

SUZUKI

wagonR⁺

**SERVICE MANUAL
SUPPLEMENTARY SERVICE MANUAL
WIRING DIAGRAM MANUAL**

RB310/RB413/RB413D

IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

This service manual is intended for authorized Suzuki dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:

For vehicles equipped with a Supplemental Restraint Air Bag System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer.

Please observe all WARNINGS and CAUTIONS in SECTION 10B and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.

- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag deployment.
- Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F)(for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and/or seatbelt with pretensioner) beforehand to avoid component damage or unintended deployment.

FOREWORD

This manual contains procedures for diagnosis, maintenance, adjustments, minor service operations, replacement of components (Service) and for disassembly and assembly of major components (Unit Repair-Overhaul).

Applicable model: RB413

The contents are classified into sections each of which is given a section number as indicated in the Table of Contents on following page. And on the first page of each individual section is an index of that section.

This manual should be kept in a handy place for ready reference of the service work.

Strict observance of the so specified items will enable one to obtain the full performance of the vehicle.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

Related Manual

Manual Name	Manual No.
RB413 WIRING DIAGRAM MANUAL	99512-83E00-669

MAGYAR SUZUKI CORPORATION

OVERSEAS SERVICE DEPARTMENT

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NOTE:

The screen toned Section 8A WIRING DIAGRAM is not contained in this manual.

The Section 8A is contained in WIRING DIAGRAM MANUAL mentioned in FOREWORD of this manual.

SECTION 0A

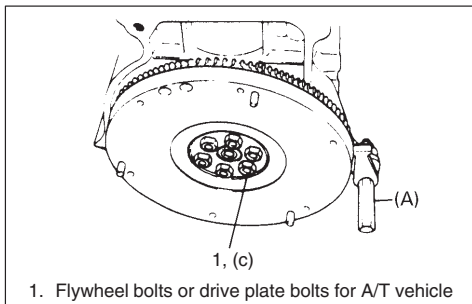
GENERAL INFORMATION

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HOW TO USE THIS MANUAL

- 1) There is a TABLE OF CONTENTS FOR THE WHOLE MANUAL on the third page of this manual, whereby you can easily find the section that offers the information you need. Also, there is a CONTENTS on the first page of EACH SECTION, where the main items in that section are listed.
- 2) Each section of this manual has its own pagination. It is indicated at the top of each page along with the Section name.
- 3) The SPECIAL TOOL usage and TORQUE SPECIFICATION are given as shown in figure below.



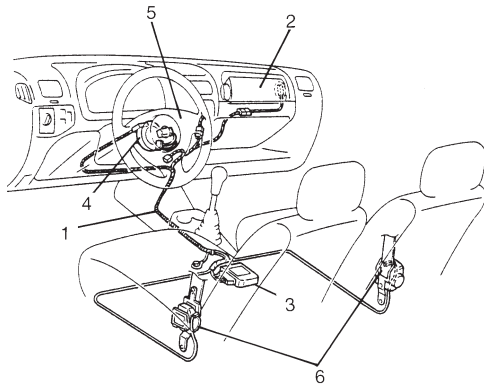
- 6) Install oil pump. Refer to "Oil pump".
- 7) Install flywheel (for M/T vehicle) or drive plate (for A/T vehicle).
Using special tool, lock flywheel or drive plate, and tighten flywheel or drive plate bolts to specified torque.

Special Tool**(A): 09924-17810****Tightening Torque****(c): 78 N·m (7.8 kg·m, 56.0 lb·ft)**

- 4) A number of abbreviations are used in the text.
For their full explanations, refer to "**ABBREVIATIONS MAY BE USED IN THIS MANUAL**" of this section.
- 5) The SI, metric and foot-pound systems are used as units in this manual.
- 6) DIAGNOSIS are included in each section as necessary.
- 7) At the end of each section, there are descriptions of SPECIAL TOOLS, REQUIRED SERVICE MATERIALS and TIGHTENING TORQUE SPECIFICATIONS that should be used for the servicing work described in that section.

PRECAUTIONS

PRECAUTION FOR VEHICLES EQUIPPED WITH A SUPPLEMENTAL RESTRAINT SYSTEM



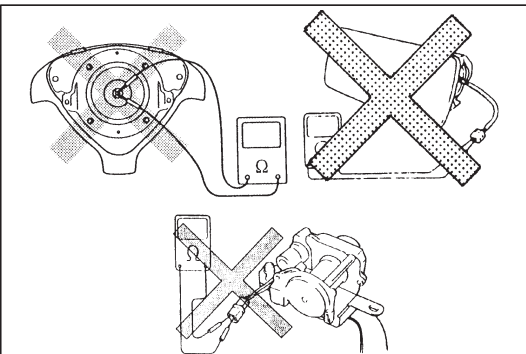
- | | |
|--|-------------------------------------|
| 1. Air bag wire harness | 4. Contact coil |
| 2. Passenger air bag (inflator) module (if equipped) | 5. Driver air bag (inflator) module |
| 3. SDM | 6. Seat belt pretensioner |

WARNING:

- The configuration of air bag system parts are as shown in the figure. When it is necessary to service (remove, reinstall and inspect) these parts, be sure to follow procedures described in SECTION 10B. Failure to follow proper procedures could result in possible air bag system activation, personal injury, damage to parts or air bag system being unable to activate when necessary.
- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, dashboard, or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended air bag system activation.

DIAGNOSIS

- When troubleshooting air bag system, be sure to follow "DIAGNOSIS" in SECTION 10B. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacement.
- Never use electrical test equipment other than that specified in this manual.

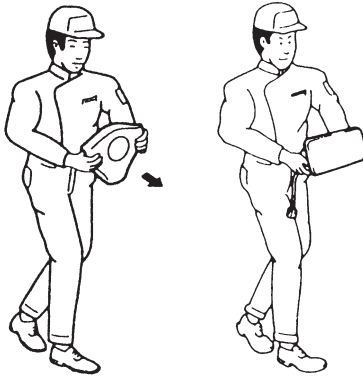


WARNING:

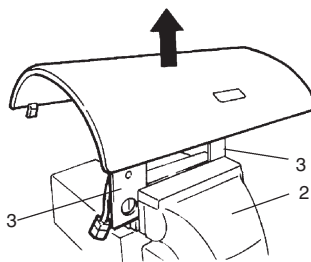
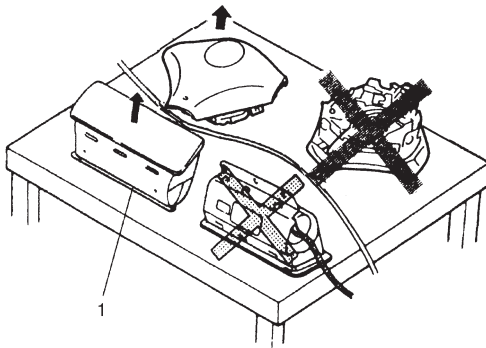
Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger) and seat belt pretensioners (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag or activate the pretensioner.

SERVICING AND HANDLING

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

WARNING:

Many of service procedures require disconnection of "AIR BAG" fuse and all air bag (inflator) module(s) from initiator circuit to avoid an accidental deployment.

Driver and Passenger Air Bag (Inflator) Modules

- For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module. When placing a live air bag (inflator) module on a bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket. This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment. Otherwise, personal injury may result.
- Never dispose of live (undeployed) air bag (inflator) modules (driver and passenger). If disposal is necessary, be sure to deploy them according to deployment procedures described in SECTION 10B before disposal.
- The air bag (inflator) module immediately after deployment is very hot. Wait for at least 10 minutes to cool it off before proceeding the work.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.

WARNING:**SDM**

- During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM). Never strike or jar the SDM.
- Never power up the air bag system when the SDM is not rigidly attached to the vehicle. All SDM fasteners must be carefully torqued and the arrow must be pointing toward the front of the vehicle to ensure proper operation of the air bag system. The SDM could be activated when powered while not rigidly attached to the vehicle which could cause deployment and result in personal injury.

WARNING:**Driver and Passenger Seat Belt Pretensioners**

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.
- When placing a live seat belt pretensioner on the workbench or other surface, it is also prohibited to put a seat belt pretensioner on top of another. Otherwise, personal injury may result.
- Never dispose of live (inactivated) seat belt pretensioners (driver and passenger). If disposal is necessary, be sure to activate them according to activation procedures described in SECTION 10B before disposal.
- The seat belt pretensioner immediately after activation is very hot. Wait for at least 10 minutes to cool it off before proceeding the work.
- With many service procedures, gloves and safety glasses should be worn to prevent any possible irritation of the skin or eyes.

CAUTION:

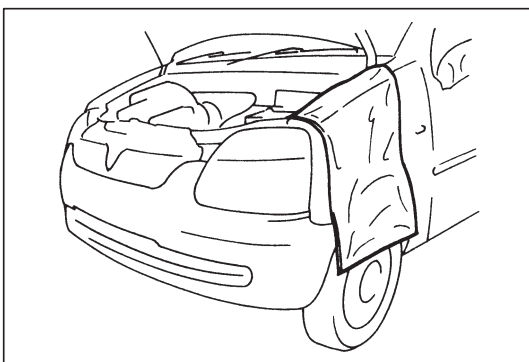
- Even when the accident was light enough not to cause air bags to activate, be sure to inspect system parts and other related parts according to instructions under “Repair and Inspection Required after an Accident” in SECTION 10B.
- When servicing parts other than air bag system, if shocks may be applied to air bag system component parts, remove those parts beforehand.
- When handling the air bag (inflator) modules (driver and passenger), seat belt pretensioners (driver and passenger) or SDM, be careful not to drop it or apply an impact to it. If an excessive impact was applied (e.g., for air bag (inflator) modules and SDM; dropped from a height of 90 cm (3 feet) or more, for seat belt pretensioners; a height of 30 cm (1 foot) or more), never attempt disassembly or repair but replace it with a new one.
- When grease, cleaning agent, oil, water, etc. has got onto air bag (inflator) modules (driver and passenger) or seat belt pretensioners (driver and passenger), wipe off immediately with a dry cloth.
- Air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
- Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.
- Never use air bag system component parts from another vehicle.
- When using electric welding, be sure to temporarily disable air bag system referring to “Disabling Air Bag System” described in “Service Precautions” in SECTION 10B.
- Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.
- WARNING/CAUTION labels are attached on each part of air bag system components. Be sure to follow the instructions.
- After vehicle is completely repaired, perform “Air Bag Diagnostic System Check” described in “Diagnosis” in SECTION 10B.

GENERAL PRECAUTIONS

The WARNING and CAUTION below describe some general precautions that you should observe when servicing a vehicle. These general precautions apply to many of the service procedures described in this manual, and they will not necessarily be repeated with each procedure to which they apply.

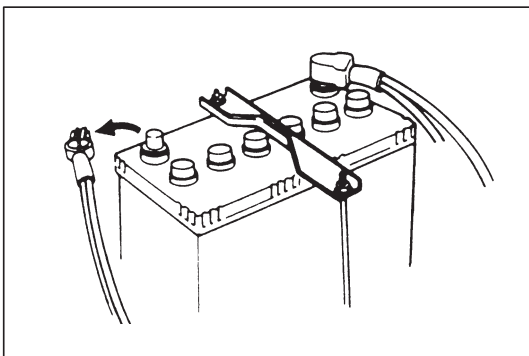
WARNING:

- Whenever raising a vehicle for service, be sure to follow the instructions under “VEHICLE LIFTING POINTS” on SECTION 0A.
- When it is necessary to do service work with the engine running, make sure that the parking brake is set fully and the transmission is in Neutral (for manual transmission vehicles) or Park (for automatic transmission vehicles). Keep hands, hair, clothing, tools, etc. away from the fan and belts when the engine is running.
- When it is necessary to run the engine indoors, make sure that the exhaust gas is forced to stream outdoors.
- Do not perform service work in areas where combustible materials can come in contact with a hot exhaust system. When working with toxic or flammable materials (such as gasoline and refrigerant), make sure that the area you work in is well-ventilated.
- To avoid getting burned, keep away from hot metal parts such as the radiator, exhaust manifold, tail-pipe, muffler, etc.
- New and used engine oil can be hazardous. Children and pets may be harmed by swallowing new or used oil. Keep new and used oil and used engine oil filters away from children and pets. Continuous contact with used engine oil has been found to cause [skin] cancer in laboratory animals. Brief contact with used oil may irritate skin. To minimize your exposure to used engine oil, wear a long-sleeve shirt and moisture-proof gloves (such as dishwashing gloves) when changing engine oil. If engine oil contacts your skin, wash thoroughly with soap and water. Launder any clothing or rags if wet with oil, recycle or properly dispose of used oil and filters.



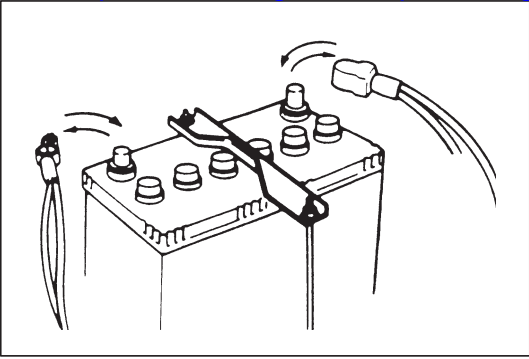
CAUTION:

- Before starting any service work, cover fenders, seats and any other parts that are likely to get scratched or stained during servicing. Also, be aware that what you wear (e.g. buttons) may cause damage to the vehicle's finish.

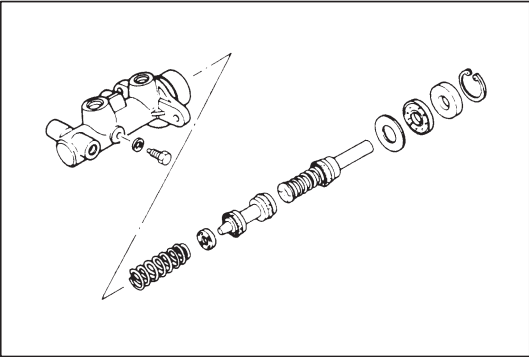


- When performing service to electrical parts that does not require use of battery power, disconnect the negative cable of the battery.

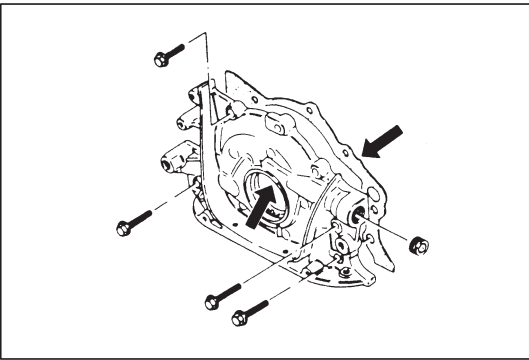
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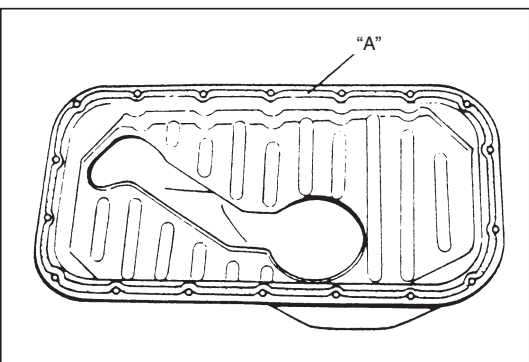
- When removing the battery, be sure to disconnect the negative cable first and then the positive cable. When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover.



- When removing parts that are to be reused, be sure to keep them arranged in an orderly manner so that they may be reinstalled in the proper order and position.

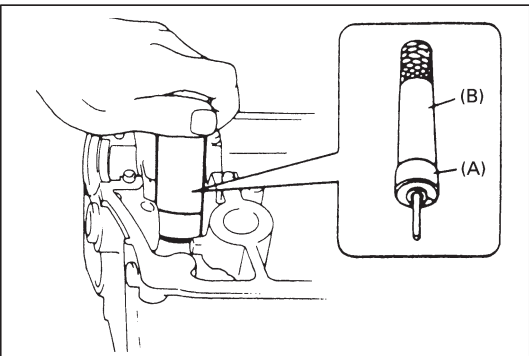


- Whenever you use oil seals, gaskets, packing, O-rings, locking washers, split pins, self-locking nuts, and certain other parts as specified, be sure to use new ones. Also, before installing new gaskets, packing, etc., be sure to remove any residual material from the mating surfaces.



- Make sure that all parts used in reassembly are perfectly clean.
- When use of a certain type of lubricant, bond or sealant is specified, be sure to use the specified type.

“A”: Sealant 99000-31150

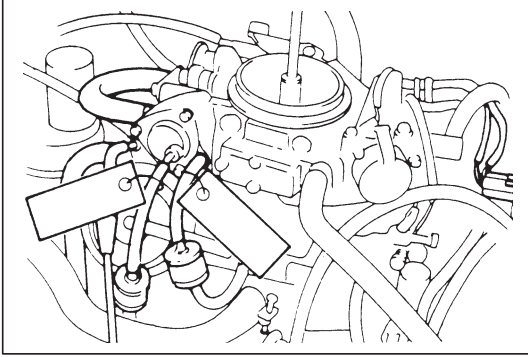


- Be sure to use special tools when instructed.

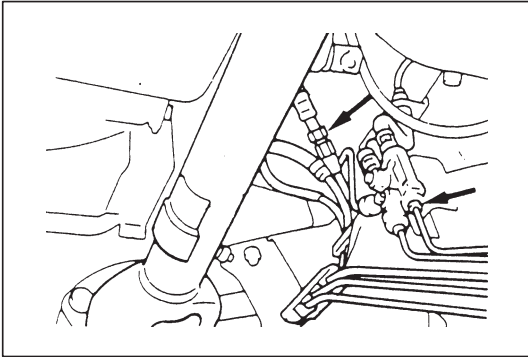
Special Tool

(A): 09917-98221

(B): 09916-58210



- When disconnecting vacuum hoses, attach a tag describing the correct installation positions so that the hoses can be re-installed correctly.



- After servicing fuel, oil, coolant, vacuum, exhaust or brake systems, check all lines related to the system for leaks.

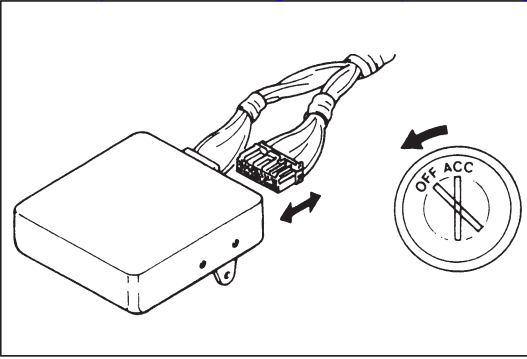
- For vehicles equipped with fuel injection systems, never disconnect the fuel line between the fuel pump and injector without first releasing the fuel pressure, or fuel can be sprayed out under pressure.

PRECAUTIONS FOR CATALYTIC CONVERTER

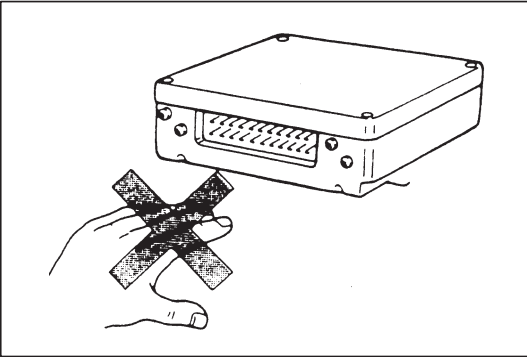
For vehicles equipped with a catalytic converter, use only unleaded gasoline and be careful not to let a large amount of unburned gasoline enter the converter or it can be damaged.

- Conduct a spark jump test only when necessary, make it as short as possible, and do not open the throttle.
- Conduct engine compression checks within the shortest possible time.
- Avoid situations which can result in engine misfire. (e.g. starting the engine when the fuel tank is nearly empty.)

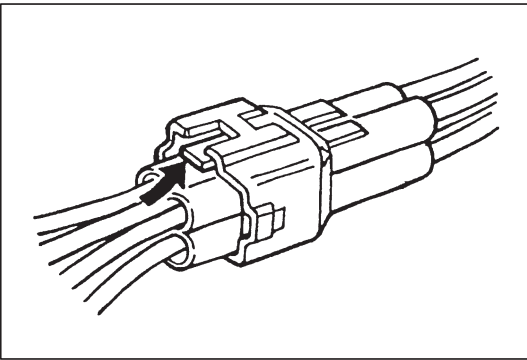
PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE



- When disconnecting and connecting coupler, make sure to turn ignition switch OFF, or electronic parts may get damaged.

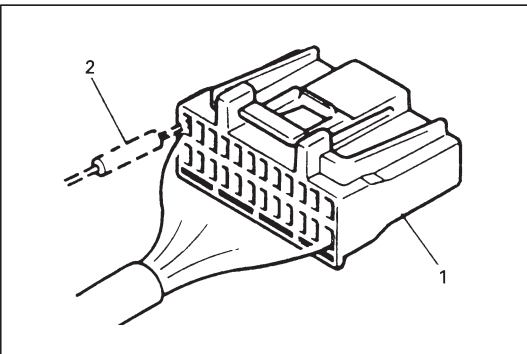


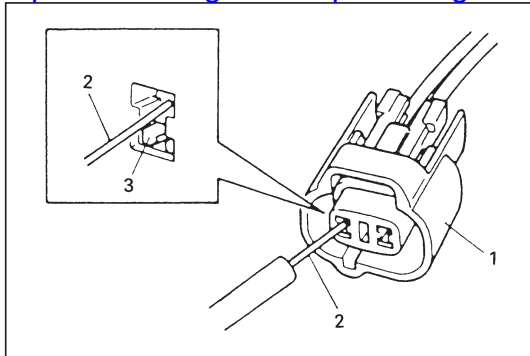
- Be careful not to touch the electrical terminals of parts which use microcomputers (e.g. electronic control unit like as ECM, PCM, P/S controller, etc.). The static electricity from your body can damage these parts.



- When disconnecting couplers, don't pull wire harness but make sure to hold coupler itself. With lock type coupler, be sure to unlock before disconnection. Attempt to disconnect coupler without unlocking may result in damage to coupler. When connecting lock type coupler, insert it till clicking sound is heard and connect it securely.

- Never connect any tester (voltmeter, ohmmeter, or whatever) to electronic control unit when its coupler is disconnected. Attempt to do it may cause damage to it.
- Never connect an ohmmeter to electronic control unit with its coupler connected to it. Attempt to do it may cause damage to electronic control unit and sensors.
- Be sure to use a specified voltmeter/ohmmeter. Otherwise, accurate measurements may not be obtained or personal injury may result. If not specified, use a voltmeter with high impedance ($M\Omega/V$ minimum) or a digital type voltmeter.
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe (2) from the wire harness side (backside) of the connector (1).



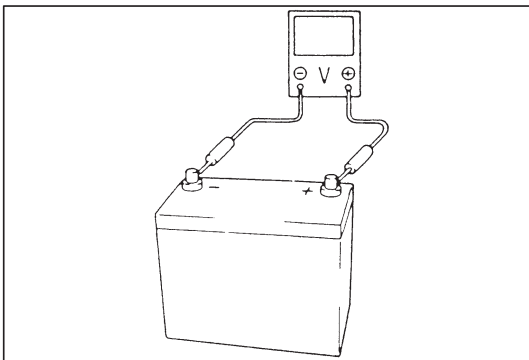


- When connecting meter probe (2) from terminal side of coupler (1) because it can't be connected from harness side, use extra care not to bend male terminal of coupler or force its female terminal open for connection.

In case of such coupler as shown connect probe as shown to avoid opening female terminal.

Never connect probe where (3) male terminal is supposed to fit.

- When checking connection of terminals, check its male half for bend and female half for excessive opening and both for locking (looseness), corrosion, dust, etc.



- Before measuring voltage at each terminal, check to make sure that battery voltage is 11V or higher. Such terminal voltage check at low battery voltage will lead to erroneous diagnosis.

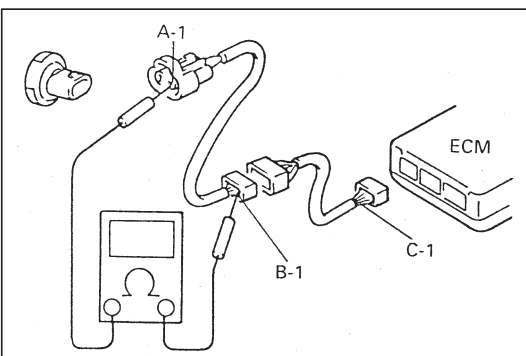
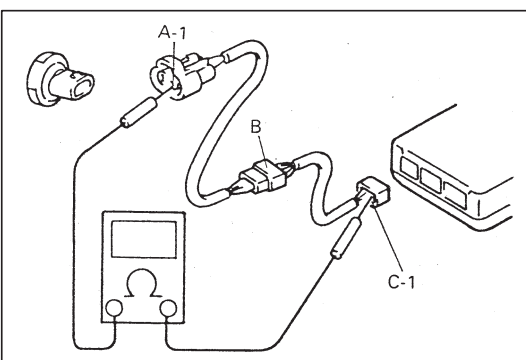
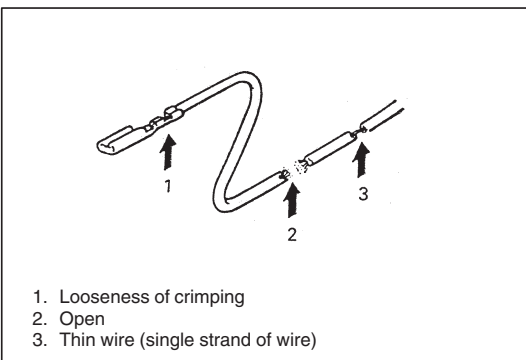
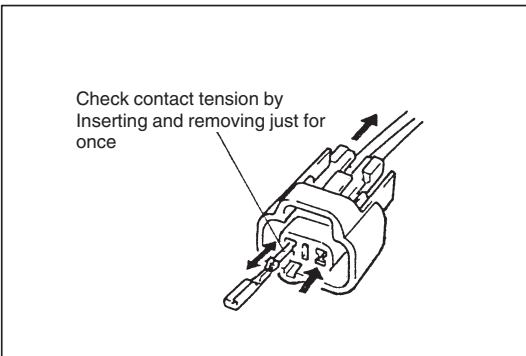
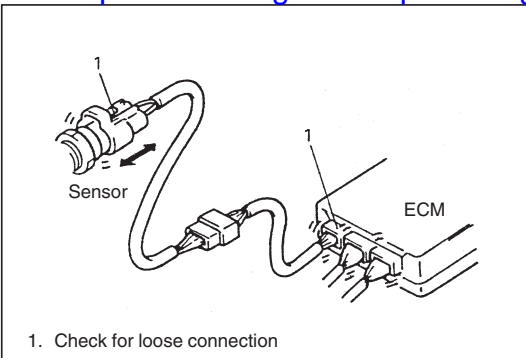
ELECTRICAL CIRCUIT INSPECTION PROCEDURE

While there are various electrical circuit inspection methods, described here is a general method to check its open and short circuit by using an ohmmeter and a voltmeter.

OPEN CIRCUIT CHECK

Possible causes for the open circuit are as follows. As the cause is in the connector or terminal in many cases, they need to be checked particularly carefully.

- Loose connection of connector
- Poor contact of terminal (due to dirt, corrosion or rust on it, poor contact tension, entry of foreign object etc.)
- Wire harness being open



When checking system circuits including an electronic control unit such as ECM, TCM, ABS control module, etc., it is important to perform careful check, starting with items which are easier to check.

- 1) Disconnect negative cable from battery.
- 2) Check each connector at both ends of the circuit being checked for loose connection. Also check lock condition of connector if equipped with connector lock.

- 3) Using a test male terminal, check both terminals of the circuit being checked for contact tension of its female terminal. Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust entry of foreign object, etc.). At the same time, check to make sure that each terminal is locked in the connector fully.

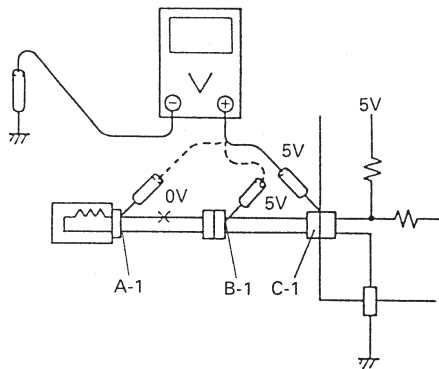
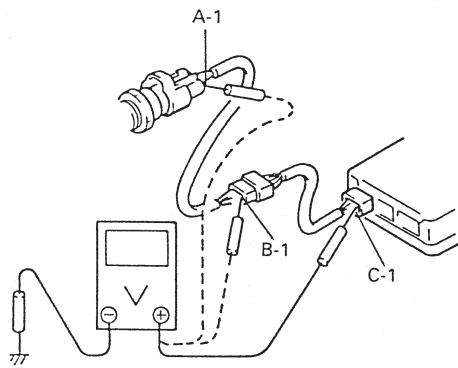
- 4) Using continuity check or voltage check procedure described in the following page, check the wire harness for open circuit and poor connection with its terminals. Locate abnormality, if any.

Continuity check

- 1) Measure resistance between connector terminals at both ends of the circuit being checked (between A-1 and C-1 in the figure). If no continuity is indicated (infinity or over limit), that means that the circuit is open between terminals A-1 and C-1.

- 2) Disconnect the connector included in the circuit (connector-B in the figure) and measure resistance between terminals A-1 and B-1.

If no continuity is indicated, that means that the circuit is open between terminals A-1 and B-1. If continuity is indicated, there is an open circuit between terminals B-1 and C-1 or an abnormality in connector-B.



Voltage check

If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

- 1) With all connectors connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.

If measurements were taken as shown in the figure at the left and results were as listed below, it means that the circuit is open between terminals B-1 and A-1.

Voltage Between:

C-1 and body ground: Approx. 5V

B-1 and body ground: Approx. 5V

A-1 and body ground: 0V

Also, if measured values were as listed below, it means that there is a resistance (abnormality) of such level that corresponds to the voltage drop in the circuit between terminals A-1 and B-1.

Voltage Between:

C-1 and body ground: Approx. 5V

B-1 and body ground: Approx. 5V

A-1 and body ground: Approx. 3V

2V voltage drop

SHORT CIRCUIT CHECK (Wire harness to ground)

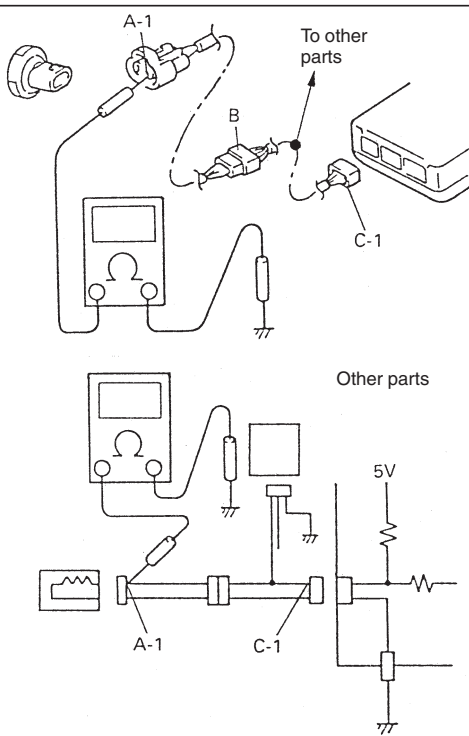
- 1) Disconnect negative cable from battery.
- 2) Disconnect connectors at both ends of the circuit to be checked.

NOTE:

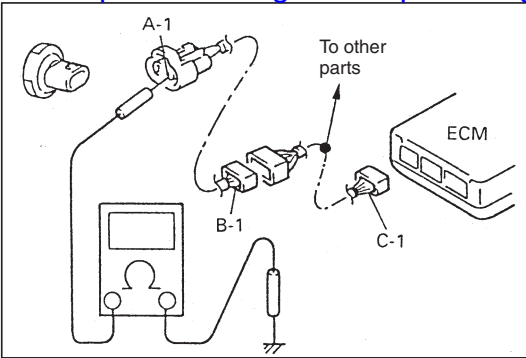
If the circuit to be checked is connected to other parts, disconnect all connectors of those parts.

Otherwise, diagnosis will be misled.

- 3) Measure resistance between terminal at one end of circuit (A-1 terminal in figure) and body ground. If continuity is indicated, it means that there is a short to ground between terminals A-1 and C-1 of the circuit.



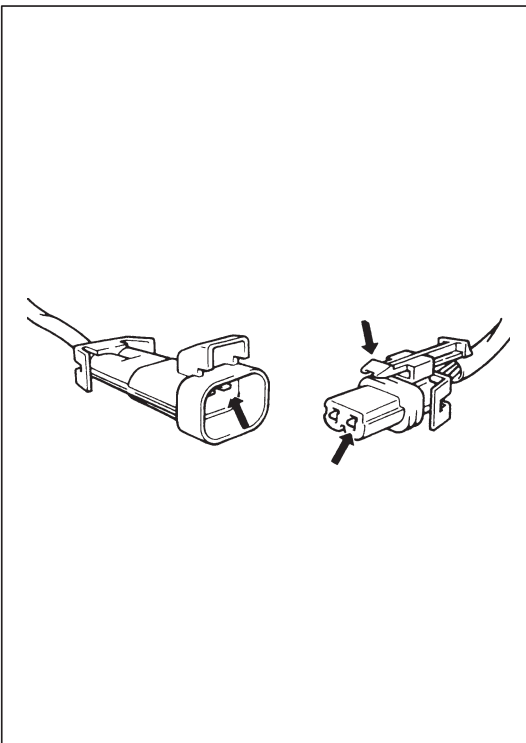
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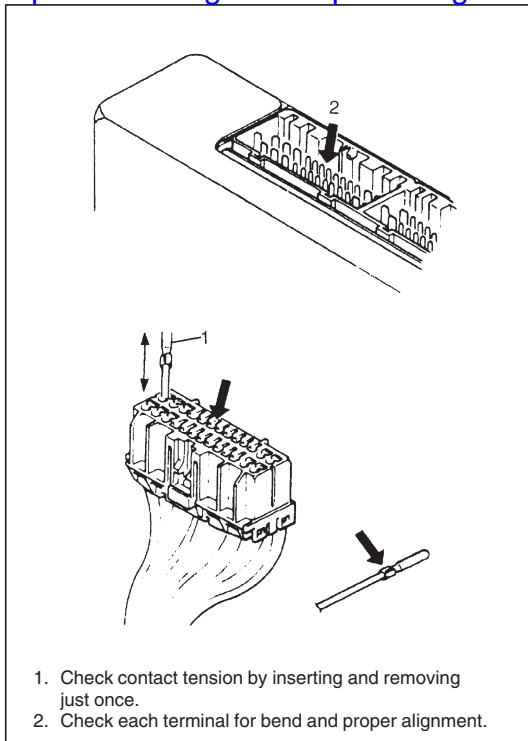
- 4) Disconnect the connector included in circuit (connector B) and measure resistance between A-1 and body ground. If continuity is indicated, it means that the circuit is shorted to the ground between terminals A-1 and B-1.

INTERMITTENTS AND POOR CONNECTION

Most intermittents are caused by faulty electrical connections or wiring, although a sticking relay or solenoid can occasionally be at fault. When checking it for proper connection, perform careful check of suspect circuits for:



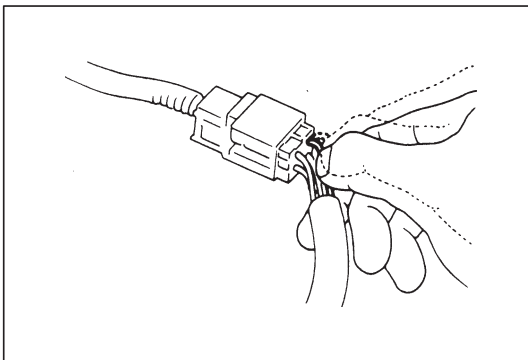
- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
However, cleaning the terminal with a sand paper or the like is prohibited.
- Damaged connector body, exposing the terminals to moisture and dirt, as well as not maintaining proper terminal orientation with the component or mating connector.



- Improperly formed or damaged terminals.

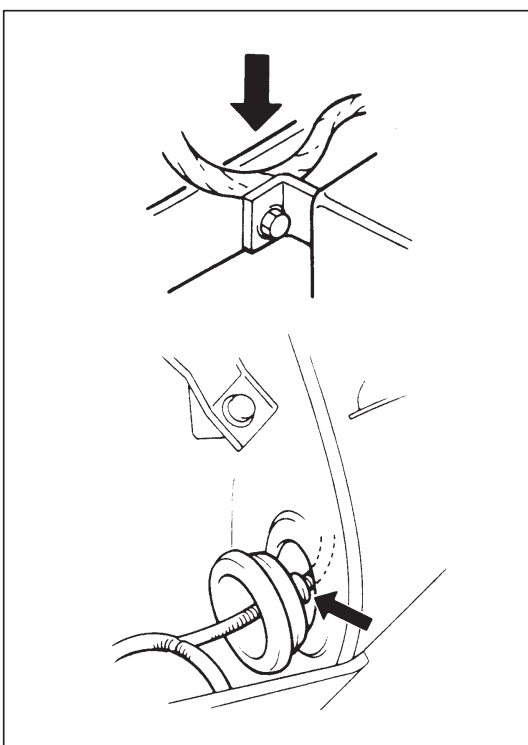
Check each connector terminal in problem circuits carefully to ensure good contact tension by using the corresponding mating terminal.

If contact tension is not enough, reform it to increase contact tension or replace.



- Poor terminal-to-wire connection.

Check each wire harness in problem circuits for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.



- Wire insulation which is rubbed through, causing an intermittent short as the bare area touches other wiring or parts of the vehicle.

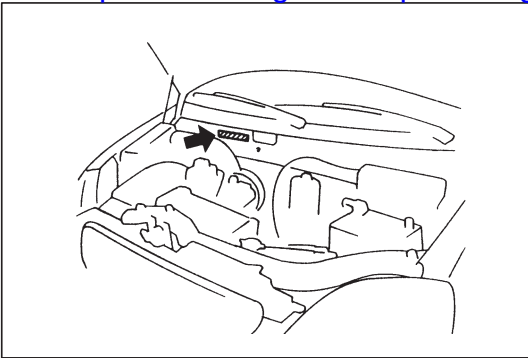
- Wiring broken inside the insulation. This condition could cause continuity check to show a good circuit, but if only 1 or 2 strands of a multi-strand-type wire are intact, resistance could be far too high.

If any abnormality is found, repair or replace.

IDENTIFICATION INFORMATION

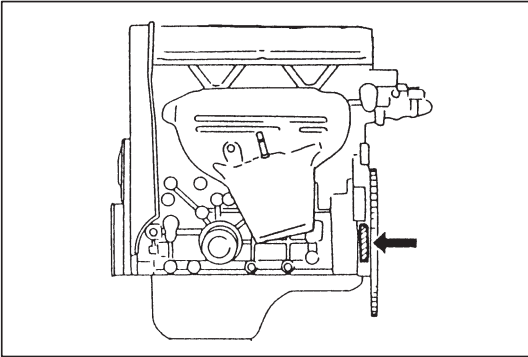
VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is located on the front dash panel in the engine room.



ENGINE IDENTIFICATION NUMBER

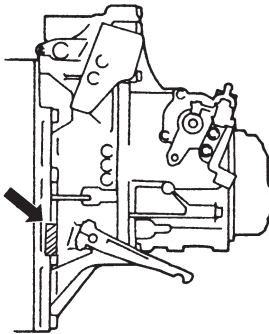
The number is punched on the cylinder block.



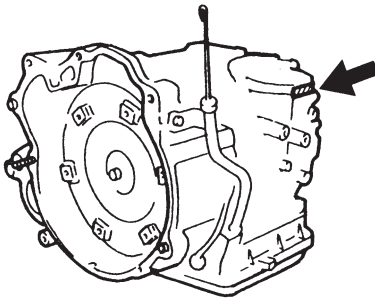
TRANSMISSION IDENTIFICATION NUMBER

The number is located on the transmission case.

For M/T

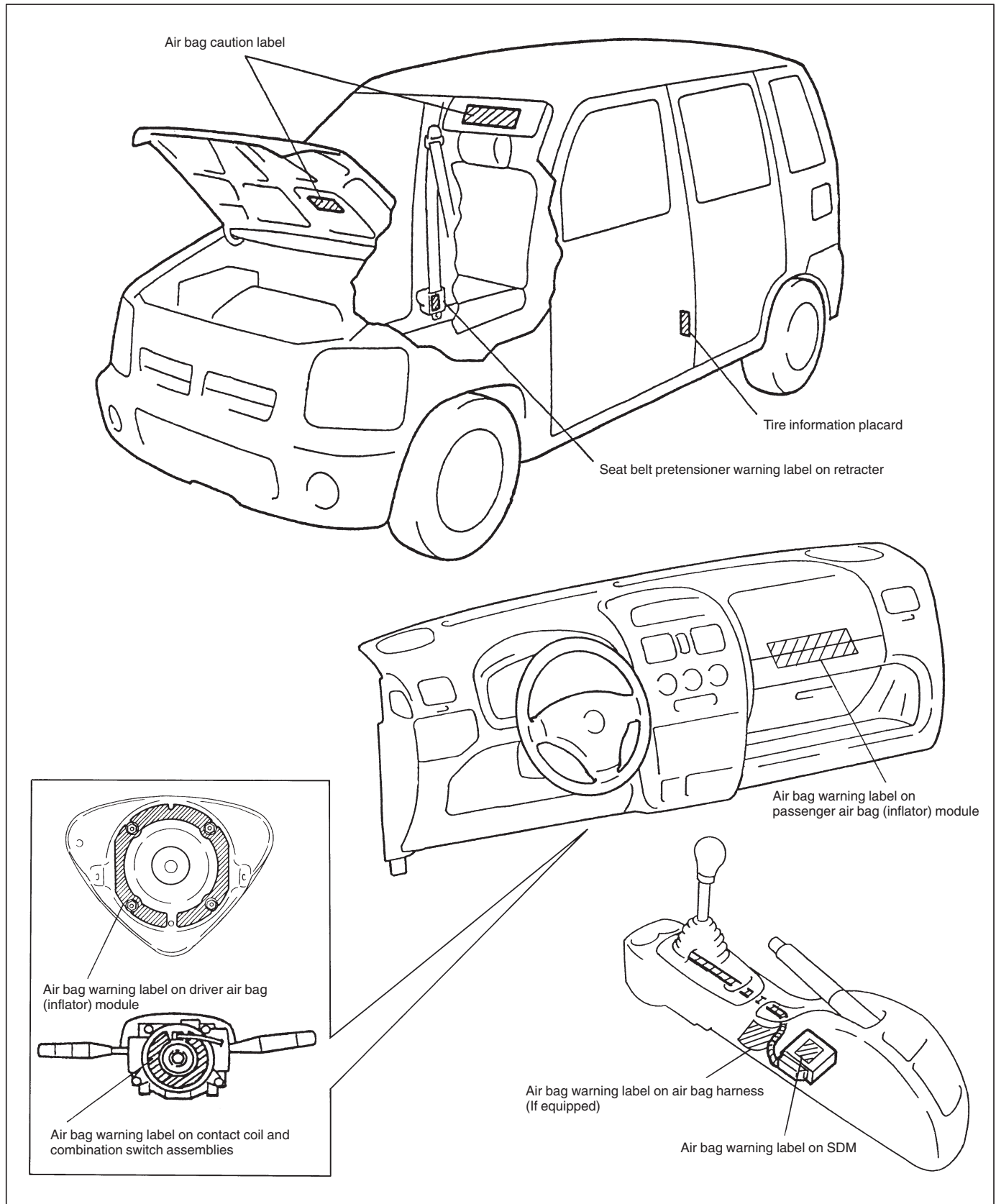


For A/T



WARNING, CAUTION AND INFORMATION LABELS

The figure below shows main labels among others that are attached to vehicle component parts. When servicing and handling parts, refer to WARNING/CAUTION instructions printed on labels. If any WARNING/CAUTION label is found stained or damaged, clean or replace it as necessary.

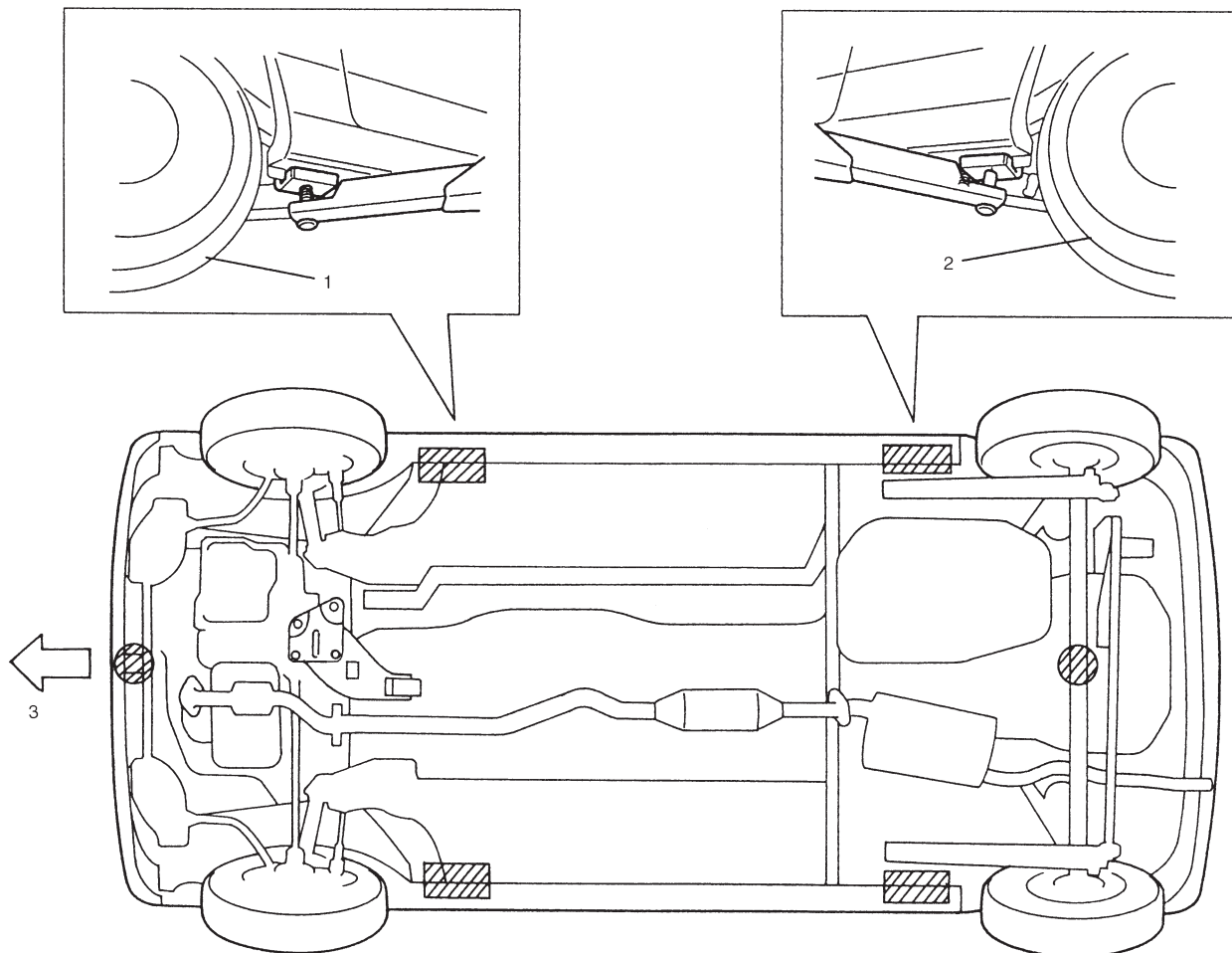


VEHICLE LIFTING POINTS



WARNING:

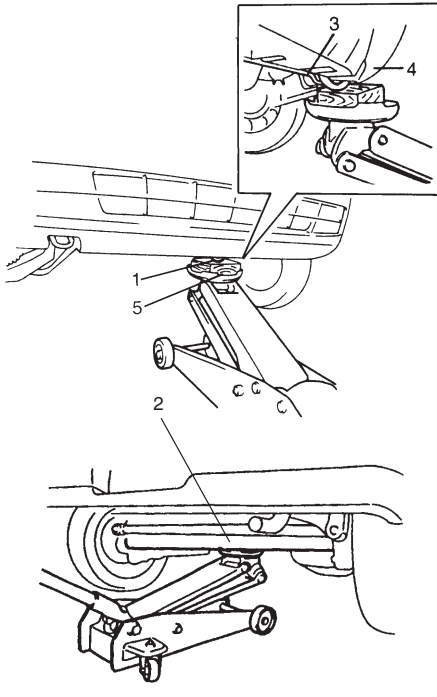
- Before applying hoist to underbody, always take vehicle balance throughout service into consideration. Vehicle balance on hoist may change depending on what part to be removed.
- Before lifting up the vehicle, check to be sure that end of hoist arm is not in contact with brake pipe, fuel pipe, bracket or any other part.
- When using frame contact hoist, apply hoist as shown (right and left at the same position). Lift up the vehicle till 4 tires are a little off the ground and make sure that the vehicle will not fall off by trying to move vehicle body in both ways. Work can be started only after this confirmation.
- Make absolutely sure to lock hoist after vehicle is hoisted up.

When using frame contact hoist:



1. Front left tire
2. Rear left tire
3. Front

-  : Support position for frame contact hoist and safety stand.
 : Floor jack position

When using floor jack:

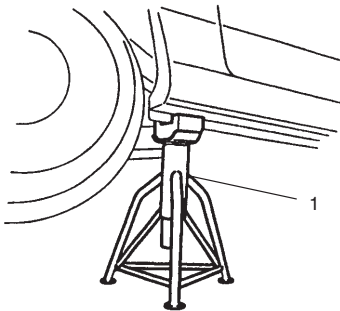
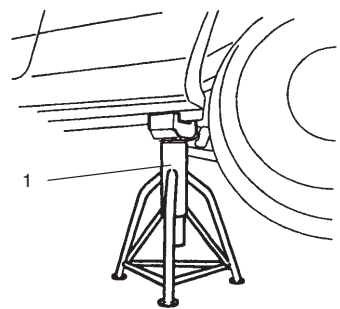
In raising front or rear vehicle end off the floor by jacking, be sure to put the wooden block (5) on the jack against front jacking bracket (1) or the center portion of rear axle (2).

CAUTION:

- Never apply jack against suspension parts (i.e., stabilizer (3), etc.), front bumper (4) or vehicle floor, otherwise it may get deformed.

WARNING:

- If the vehicle to be jacked up only at the front or rear end, be sure to block the wheels on ground in order to ensure safety.
After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone.

Front**Rear**

To perform service with either front or rear vehicle end jacked up, be sure to place safety stands (1) under body so that body is securely supported. And then check to ensure that body does not slide on safety stands and the vehicle is held stable for safety's sake.

ABBREVIATIONS AND SYMBOLS MAY BE USED IN THIS MANUAL**ABBREVIATIONS****A**

ABS	: Anti-lock Brake System
ATDC	: After Top Dead Center
API	: American Petroleum Institute
ATF	: Automatic Transmission Fluid
ALR	: Automatic Locking Retractor
AC	: Alternating Current
A/T	: Automatic Transmission
A/C	: Air Conditioning
ABDC	: After Bottom Dead Center
A/F	: Air Fuel Mixture Ratio
A-ELR	: Automatic-Emergency Locking Retractor

B

B+	: Battery Positive Voltage
BTDC	: Before Top Dead Center
BBDC	: Before Bottom Dead Center

C

CKT	: Circuit
CMP Sensor	: Camshaft Position Sensor (Crank Angle Sensor, CAS)
CO	: Carbon Monoxide
CPP Switch	: Clutch Pedal Position Switch (Clutch Switch, Clutch Start Switch)
CPU	: Central Processing Unit
CRS	: Child Restraint System

D

DC	: Direct Current
DLC	: Data Link Connector (Assembly Line Diag. Link, ALDL, Serial Data Link, SDL)
DOHC	: Double Over Head Camshaft
DOJ	: Double Offset Joint
DRL	: Daytime Running Light
DTC	: Diagnostic Trouble Code (Diagnostic Code)

E

EBCM	: Electronic Brake Control Module, ABS Control Module
ECM	: Engine Control Module
ECT Sensor	: Engine Coolant Temperature Sensor (Water Temp. Sensor, WTS)
EGR	: Exhaust Gas Recirculation
EGRT Sensor	: EGR Temperature Sensor (Recirculated Exhaust Gas Temp. Sensor, REGTS)
EFE Heater	: Early Fuel Evaporation Heater (Positive Temperature Coefficient, PTC Heater)
ELR	: Emergency Locking Retractor
EPS	: Electrical Power Steering
EVAP	: Evaporative Emission
EVAP Canister	: Evaporative Emission Canister (Charcoal Canister)

F

4WD	: 4 Wheel Drive
-----	-----------------

G

GEN	: Generator
GND	: Ground

H

HC	: Hydrocarbons
HO2S	: Heated Oxygen Sensor

I

IAC Valve	: Idle Air Control Valve (Idle Speed Control Solenoid Valve, ISC Solenoid Valve)
IAT Sensor	: Intake Air Temperature Sensor (Air temperature Sensor, ATS)
ICM	: Immobilizer Control Module
IG	: Ignition
ISC Actuator	: Idle Speed Control Actuator (Motor)
ISO	: International Standards Organization

J

JIS	: Japanese Industrial Standard
-----	--------------------------------

L

LH : Left Hand
 LSPV : Load Sensing Proportioning Valve

M

MAF Sensor : Mass Air Flow Sensor
 (Air Flow Sensor, AFS, Air Flow Meter, AFM)
 MAP Sensor : Manifold Absolute Pressure Sensor (Pressure Sensor, PS)
 Max : Maximum
 MFI : Multiport Fuel Injection (Multipoint Fuel Injection)
 Min : Minimum
 MIL : Malfunction Indicator Lamp
 M/T : Manual Transmission

N

NOx : Nitrogen Oxides

O

OBD : On-Board Diagnostic System (Self-Diagnosis Function)
 O/D : Overdrive
 OHC : Over Head Camshaft

P

PNP : Park/Neutral Position
 P/S : Power Steering
 PSP Switch : Power Steering Pressure Switch (P/S Pressure Switch)
 PCM : Powertrain Control Module
 PCV : Positive Crankcase Ventilation

R

RH : Right Hand

S

SAE : Society of Automotive Engineers
 SDM : Sensing and Diagnostic Module
 SFI : Sequential Multiport Fuel Injection
 SOHC : Single Over Head Camshaft

T

TBI : Throttle Body Fuel Injection (Single-Point Fuel Injection, SPI)
 TCC : Torque Converter Clutch
 TCM : Transmission Control Module (A/T Controller, A/T Control Module)
 TP Sensor : Throttle Position Sensor
 TVV : Thermal Vacuum Valve (Thermal Vacuum Switching Valve, TVSV, Bimetal Vacuum Switching Valve, BVSV)
 TWC : Three Way Catalytic Converter (Three Way Catalyst)
 2WD : 2 Wheel Drive















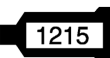



V

VIN : Vehicle Identification Number
 VSS : Vehicle Speed Sensor

W

WU-OC : Warm Up Oxidation Catalytic Converter
 WU-TWC : Warm Up Three Way Catalytic Converter

SYMBOLS

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Tightening torque		Apply SUZUKI BOND NO. 1216 99000-31160
	Apply oil (Engine, transmission, transfer, differential)		Apply SILICONE SEALANT 99000-31120
	Apply fluid (Brake, power steering or automatic transmission fluid)		Apply SEALING COMPOUND 366E 99000-31090
	Apply SUZUKI SUPER GREASE A 99000-25010		
	Apply SUZUKI SUPER GREASE C 99000-25030		Apply THREAD LOCK 1322 99000-32110
	Apply SUZUKI SUPER GREASE E 99000-25050		Apply THREAD LOCK 1333B 99000-32020
	Apply SUZUKI SUPER GREASE H 99000-25120		Apply THREAD LOCK 1342 99000-32050
	Apply SUZUKI SUPER GREASE I 99000-25210		
	Apply SUZUKI BOND NO. 1215 99000-31110		Do not reuse
	Apply SUZUKI BOND NO. 1207C 99000-31150		Note on reassembly

METRIC INFORMATION

METRIC FASTENERS

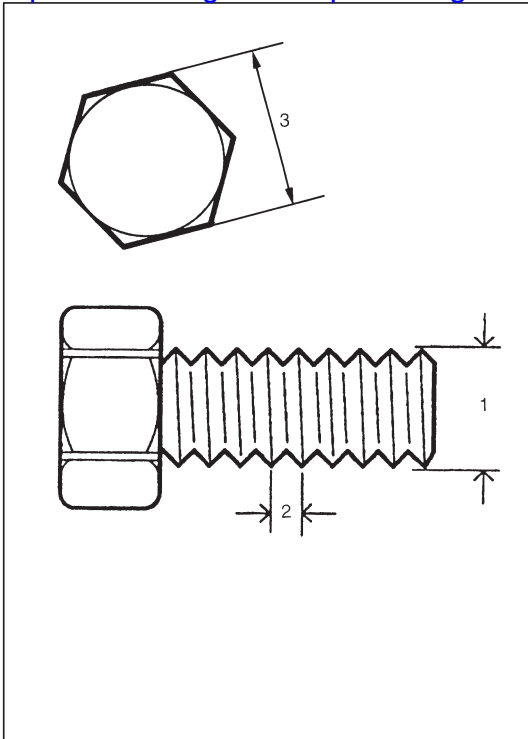
Most of the fasteners used for this vehicle are JIS-defined and ISO-defined metric fasteners. When replacing any fasteners, it is most important that replacement fasteners be the correct diameter, thread pitch and strength.

CAUTION:

Even when the nominal diameter (1) of thread is the same, the thread pitch (2) or the width across flats (3) may vary between ISO and JIS. Refer to JIS-TO-ISO Main Fasteners Comparison Table below for the difference.

Installing a mismatched bolt or nut will cause damage to the thread.

Before installing, check the thread pitch for correct matching and then tighten it by hand temporarily. If it is tight, re-check the thread pitch.



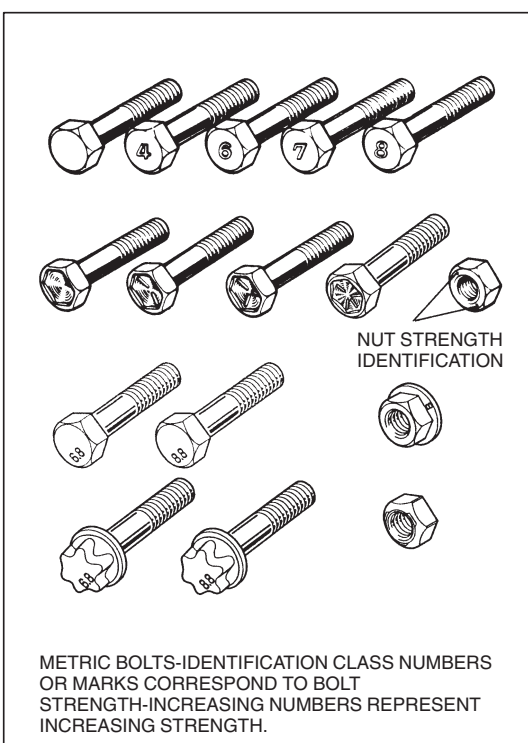
JIS-TO-ISO Main Fasteners Comparison Table

Nominal diameter		M6	M8	M10	M12	M14
Standard	Thread pitch	1.0	1.25	1.25	1.25	1.5
	Width across flats	10	12	14	17	19
ISO	Thread pitch	1.0	1.25	1.5	1.5	1.5
	Width across flats	10	13	16	18	21

FASTENER STRENGTH IDENTIFICATION

Most commonly used metric fastener strength property classes are 4T, 6.8, 7T, 8.8 and radial line with the class identification embossed on the head of each bolt. Some metric nuts will be marked with punch, 6 or 8 mark strength identification on the nut face. Figure shows the different strength markings.

When replacing metric fasteners, be careful to use bolts and nuts of the same strength or greater than the original fasteners (the same number marking or higher). It is likewise important to select replacement fasteners of the correct diameter and thread pitch. Correct replacement bolts and nuts are available through the parts division.



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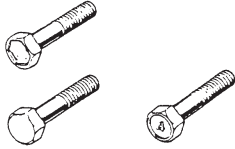

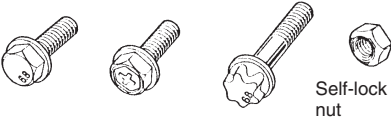

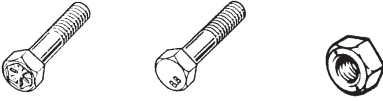

STANDARD TIGHTENING TORQUE

Each fastener should be tightened to the torque specified in each section of this manual. If no description or specification is provided, refer to the following tightening torque chart for the applicable torque for each fastener. When a fastener of greater strength than the original one is used, however, use the torque specified for the original fastener.

NOTE:

- For the flanged bolt, flanged nut and self-lock nut of 4T and 7T strength, add 10% to the tightening torque given in the chart below.
- The chart below is applicable only where the fastened parts are made of steel or light alloy.

Tightening torque chart

Thread Diameter (Nominal Diameter) (mm)		4	5	6	8	10	12	14	16	18
Strength										
A equivalent of 4T strength fastener 	N·m	1.5	3.0	5.5	13	29	45	65	105	160
	kg-m	0.15	0.30	0.55	1.3	2.9	4.5	6.5	10.5	16
	lb-ft	1.0	2.5	4.0	9.5	21.0	32.5	47.0	76.0	116.0
A equivalent of 6.8 strength fastener without flange 	N·m	2.4	4.7	8.4	20	42	80	125	193	280
	kg-m	0.24	0.47	0.84	2.0	4.2	8.0	12.5	19.3	28
	lb-ft	2.0	3.5	6.0	14.5	30.5	58.0	90.5	139.5	202.5
A equivalent of 6.8 strength fastener with flange 	N·m	2.4	4.9	8.8	21	44	84	133	203	298
	kg-m	0.24	0.49	0.88	2.1	4.4	8.4	13.3	20.3	29.8
	lb-ft	2.0	3.5	6.5	15.5	32.0	61.0	96.5	147.0	215.5
A equivalent of 7T strength fastener 	N·m	2.3	4.5	10	23	50	85	135	210	240
	kg-m	0.23	0.45	1.0	2.3	5.0	8.5	13.5	21	24
	lb-ft	2.0	3.5	7.5	17.0	36.5	61.5	98.0	152.0	174.0
A equivalent of 8.8 strength fastener without flange 	N·m	3.1	6.3	11	27	56	105	168	258	373
	kg-m	0.31	0.63	1.1	2.7	5.6	10.5	16.8	25.8	37.3
	lb-ft	2.5	4.5	8.0	19.5	40.5	76.0	121.5	187.0	270.0
A equivalent of 8.8 strength fastener with flange 	N·m	3.2	6.5	12	29	59	113	175	270	395
	kg-m	0.32	0.65	1.2	2.9	5.9	11.3	17.5	27	39.5
	lb-ft	2.5	5.0	9.0	21.0	43.0	82.0	126.5	195.5	286.0

SECTION 0B

0B

MAINTENANCE AND LUBRICATION

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CONTENTS

MAINTENANCE SCHEDULE 0B- 2

MAINTENANCE SERVICE 0B- 5

 Engine 0B- 5

 Ignition System 0B-10

 Fuel System 0B-10

 Emission Control System 0B-11

 Brake 0B-11

 Chassis and Body 0B-13

 Final Inspection 0B-18

RECOMMENDED FLUIDS AND LUBRICANTS 0B-19

MAINTENANCE SCHEDULE**NORMAL CONDITION SCHEDULE**

Interval: This interval should be judged by odometer reading or months, whichever comes first.		This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
		km (x 1,000)	15	30	45	60	75	90
		Miles (x 1,000)	9	18	27	36	45	54
		Months	12	24	36	48	60	72
1. ENGINE								
1-1. Drive belt (tension, damage)		V-rib belt	—	—	I	—	—	R
1-2. Camshaft timing belt			Replace every 100,000 km (60,000 miles)					
1-3. Valve lash (clearance)			—	I	—	I	—	I
1-4. Engine oil and Engine oil filter	When SG, SH or SJ grade oil is used.		R	R	R	R	R	R
	When SE or SF grade oil is used.		Replace every 10,000 km (6,000 miles) or 8 months					
1-5. Engine coolant			—	R	—	R	—	R
1-6. Exhaust system (leakage, damage, tightness)			—	I	—	I	—	I
2. IGNITION SYSTEM								
2-1. Spark plugs		When unleaded fuel is used	—	—	R	—	—	R
3. FUEL SYSTEM								
3-1. Air cleaner filter		Paved-road	I	I	R	I	I	R
		Dusty condition	Refer to “Severe Driving Condition” schedule					
3-2. Fuel lines (deterioration, leakage, damage)			—	I	—	I	—	I
3-3. Fuel tank			—	—	I	—	—	I
4. EMISSION CONTROL SYSTEM								
4-1. PCV (Positive Crankcase Ventilation) valve			—	—	—	—	—	I
4-2. Fuel evaporative emission control system			—	—	—	—	—	I
5. BRAKE								
5-1. Brake discs and pads (thickness, wear, damage)			I	I	I	I	I	I
Brake drums and shoes (wear, damage)			—	I	—	I	—	I
5-2. Brake hoses and pipes (leakage, damage, clamp)			—	I	—	I	—	I
5-3. Brake fluid			—	R	—	R	—	R
5-4. Brake lever and cable (damage, stroke, operation)			Inspect at first 15,000 km (9,000 miles) only					

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
	km (x 1,000)	15	30	45	60	75	90
	Miles (x 1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
6. CHASSIS AND BODY							
6-1. Clutch pedal (For manual transmission)		—	I	—	I	—	I
6-2. Tires/wheel discs (wear, damage, rotation)		I	I	I	I	I	I
6-3. Drive shaft boots (breakage, damage)		—	—	I	—	—	I
6-4. Suspension system (tightness, damage, rattle, breakage)		—	I	—	I	—	I
6-5. Steering system (tightness, damage, breakage, rattle)		—	I	—	I	—	I
6-6. Manual transmission oil (leakage, level) (“I”: 1st 15,000 km only)		I	—	R	—	—	R
6-7. Automatic transmission	Fluid level	—	I	—	I	—	I
	Fluid change	Replace every 160,000 km (100,000 miles)					
6-8. All latches, hinges and locks		—	I	—	I	—	I
6-9. Ventilator air filter (if equipped)		—	I	R	—	I	R

NOTES:

- **"R": Replace or change**
- **"I": Inspect and correct or replace if necessary**
- **For Sweden, item 2-1, 4-1 and 4-2 should be performed by odometer reading only.**

MAINTENANCE RECOMMENDED UNDER SEVERE DRIVING CONDITIONS

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, it is recommended that applicable maintenance operation be performed at the particular interval as given in the chart below.

Severe condition code

- A – Repeated short trips**
- B – Driving on rough and/or muddy roads**
- C – Driving on dusty roads**
- D – Driving in extremely cold weather and/or salted roads**
- E – Repeated short trips in extremely cold weather**
- H – Trailer towing (if admitted)**

Severe Condition Code	Maintenance	Maintenance Operation	Maintenance Interval
– B C D – – – –	Drive belt (V-rib belt)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months
A – C D E – – H	Engine oil and oil filter	R	Every 5,000 km (3,000 miles) or 4 months
A B C – E – – H	Spark plugs	R	Every 10,000 km (6,000 miles) or 8 months
– – C – – – – –	Air cleaner filter *1	I	Every 2,500 km (1,500 miles)
		R	Every 30,000 km (18,000 miles) or 24 months
– B – – E – – H	Manual transmission oil	R	Every 30,000 km (18,000 miles) or 24 months
– B – – E – – H	Automatic transmission fluid	R	Every 30,000 km (18,000 miles) or 24 months
– B C D – – – H	Wheel bearings	I	Every 15,000 km (9,000 miles) or 12 months
– – C D – – – –	Ventilator air filter *2 (if equipped)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months

NOTES:

- **“R”:** Replace or change
- **“I”:** Inspect and correct or replace if necessary
- ***1:** Inspect or replace more frequently if necessary.
- ***2:** Clean or replace more frequently if the air from the ventilator decreases.

MAINTENANCE SERVICE ENGINE

ITEM 1-1

Drive Belt Inspection and Replacement

WARNING:

Disconnect negative cable at battery before checking and adjusting belt tension.

Water pump belt inspection

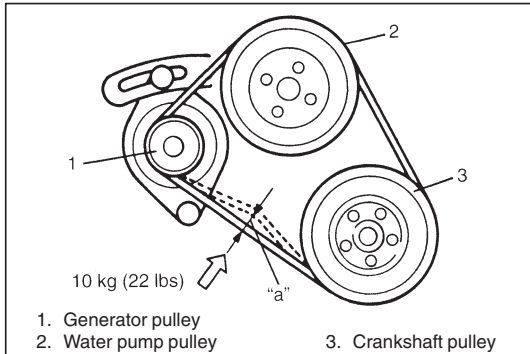
- 1) Remove engine under cover of right side from vehicle body.
- 2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. Replace, if necessary.
- 3) Check pump belt for tension and adjust it as necessary.

Water pump belt tension "a":

8 – 10 mm (0.32 – 0.39 in.) deflection under 100 N, 10 kg or 22 lb pressure

NOTE:

When replacing belt with a new one, adjust belt tension to 6 – 7 mm (0.24 – 0.27 in.).

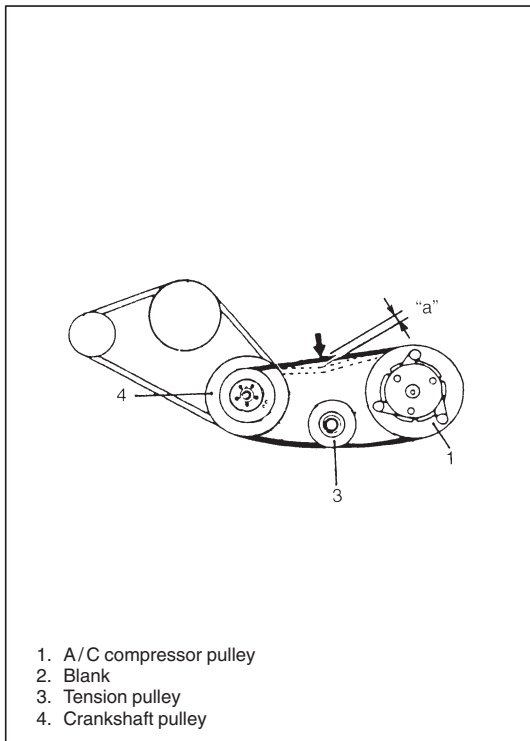


A/C compressor drive belt inspection (If equipped)

- 1) Hoist vehicle and remove engine under cover of right side from vehicle body.
- 2) Inspect belt for wear, deterioration and tension. Replace or adjust, if necessary.

A/C compressor drive belt tension "a":

7 – 9 mm (0.28 – 0.35 in.) deflection under 100 N, 10 kg or 22 lb pressure

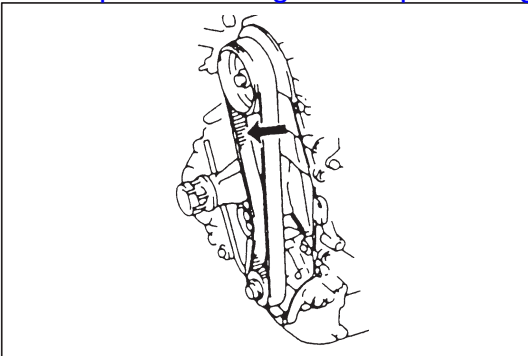


A/C compressor drive belt replacement

- 1) Disconnect negative cable from battery.
- 2) Remove engine under cover of right side.
- 3) Loosen belt tension and replace belt with new one.
- 4) Adjust belt tension to specification.
- 5) Install engine under cover and connect negative cable to battery.

Water pump belt replacement

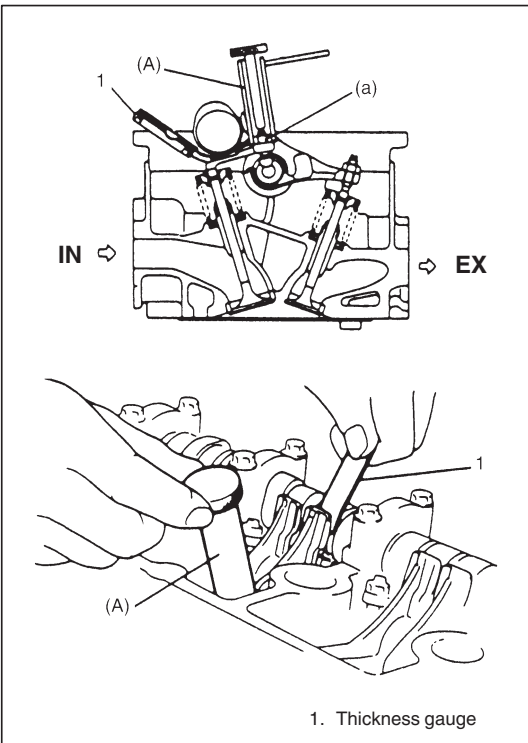
Replace belt with new one. Refer to SECTION 6B for replacement procedure of pump belt.

**ITEM 1-2****Camshaft Timing Belt Replacement**

Replace belt with new one. Refer to SECTION 6A1 for replacement procedure.

CAUTION:

- Do not bend or twist timing belt.
- Do not allow timing belt to come into contact with oil, water, etc.

**ITEM 1-3****Valve Lash Inspection**

- 1) Remove cylinder head cover.
- 2) Inspect intake and exhaust valve lash and adjust as necessary. Refer to SECTION 6A1 for valve lash inspection and adjustment procedure.

Valve lash specification		When cold (Coolant temperature is 15 – 25°C or 59 – 77°F)	When hot (Coolant temperature is 60 – 68°C or 140 – 154°F)
	Intake	0.13 – 0.17 mm (0.005 – 0.007 in)	0.17 – 0.21 mm (0.007 – 0.008 in)
	Exhaust	0.23 – 0.27 mm (0.009 – 0.011 in)	0.27 – 0.31 mm (0.011 – 0.012 in)

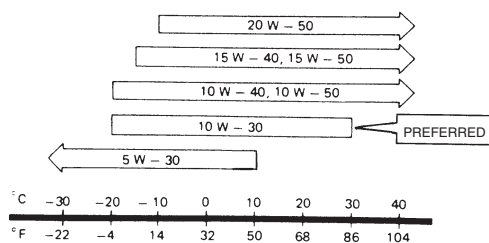
Special Tool

(A): 09917-18210

Tightening Torque

(a): 12 N·m (1.2 kg-m, 8.5 lb-ft)

- 3) Install cylinder head cover and tighten bolts to specification.

Proper Engine Oil Viscosity Chart**ITEM 1-4****Engine Oil and Filter Change****WARNING:**

New and used engine oil can be hazardous.

Be sure to read "WARNING" in General Precaution in SECTION 0A and observe what is written there.

Use engine oil of SE, SF, SG, SH or SJ grade.

Select the appropriate oil viscosity according to the left chart.

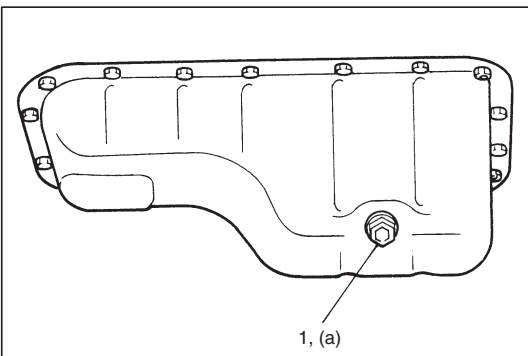
For ambient temperature between -20°C (-4°F) and 30°C (86°F), it is highly recommended to use SAE 10W-30 oil.

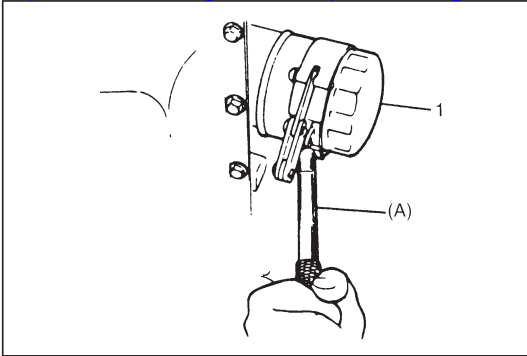
Before draining engine oil, check engine for oil leakage. If any evidence of leakage is found, make sure to correct defective part before proceeding to following work.

- 1) Drain engine oil by removing drain plug (1).
- 2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

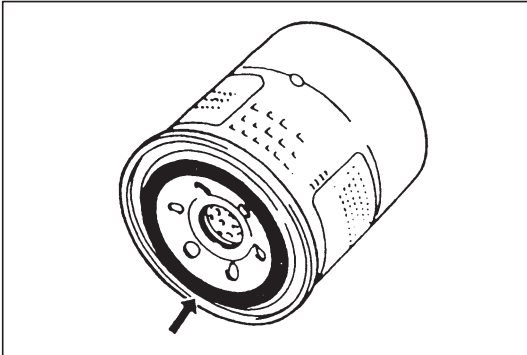




3) Loosen oil filter (1) by using oil filter wrench (Special tool).

Special Tool

(A): 09915-47330

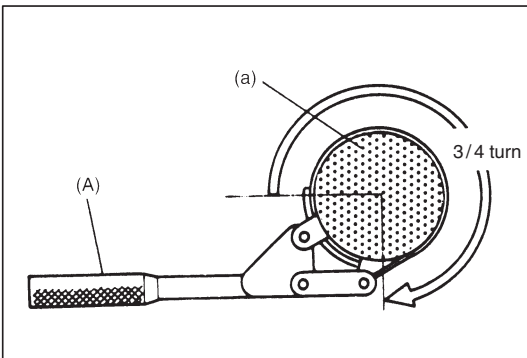


4) Apply engine oil to new oil filter "O" ring.

5) Screw new filter on oil filter stand by hand until filter "O" ring contacts mounting surface.

CAUTION:

To tighten oil filter properly, it is important to accurately identify the position at which filter "O" ring first contacts mounting surface.



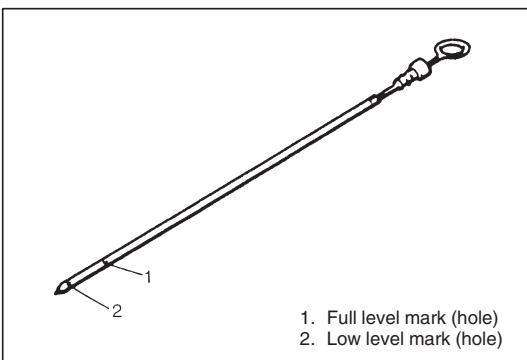
6) Tighten filter 3/4 turn from the point of contact with mounting surface using an oil filter wrench.

Special Tool

(A): 09915-47330

Tightening Torque

(a): 14 N·m (1.4 kg·m, 10.5 lb·ft)



7) Replenish oil until oil level is brought to FULL level mark (1) on dipstick (Oil pan and oil filter capacity). Filler inlet is at the top of cylinder head cover.

8) Start engine and run it for three minutes. Stop it and wait another 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

Engine oil capacity

Oil pan capacity	about 3.1 liters (6.5/5.5 US/Imp pt.)
Oil filter capacity	about 0.2 liters (0.4/0.3 US/Imp pt.)
Others	about 0.3 liters (0.6/0.5 US/Imp pt.)
Total	about 3.6 liters (7.5/6.3 US/Imp pt.)

NOTE:

Engine oil capacity is specified as left table.

However, note that amount of oil required when actually changing oil may somewhat differ from data in left table depending on various conditions (temperature, viscosity, etc.).

9) Check oil filter and drain plug for oil leakage.

ITEM 1-5**Engine Coolant Change****WARNING:**

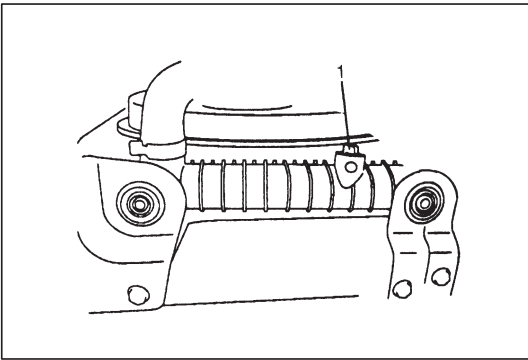
To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

CAUTION:

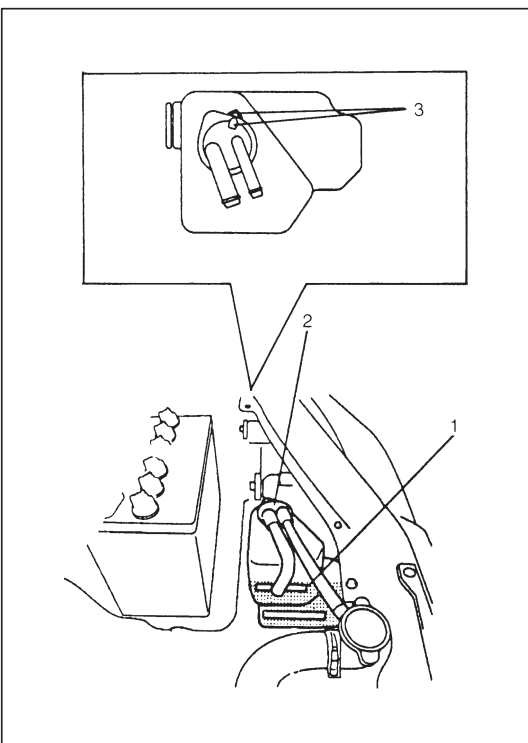
When changing engine coolant, use mixture of 50% water and 50% ethylene-glycol base coolant (Anti-Freeze/Anti-corrosion coolant) for the market where ambient temperature falls lower than -16°C (3°F) in winter and mixture of 70% water and 30% ethylene-glycol base coolant for the market where ambient temperature doesn't fall lower than -16°C (3°F).

Even in a market where no freezing temperature is anticipated, mixture of 70% water and 30% ethylene glycol base coolant should be used for the purpose of corrosion protection and lubrication.

Refer to SECTION 6B of this manual for COOLANT CAPACITY.



- 1) Remove radiator cap when engine is cool.
- 2) Loosen radiator drain plug (1) to drain coolant.
- 3) Remove reservoir and drain.
- 4) Tighten drain plug securely. Also install reservoir.
- 5) Slowly pour specified amount of coolant to the base of radiator filler neck, and run engine, with radiator cap removed, until radiator upper hose is hot. This drives out any air which may still be trapped within cooling system. Add coolant as necessary until coolant level reaches filler throat of radiator. Reinstall radiator cap.

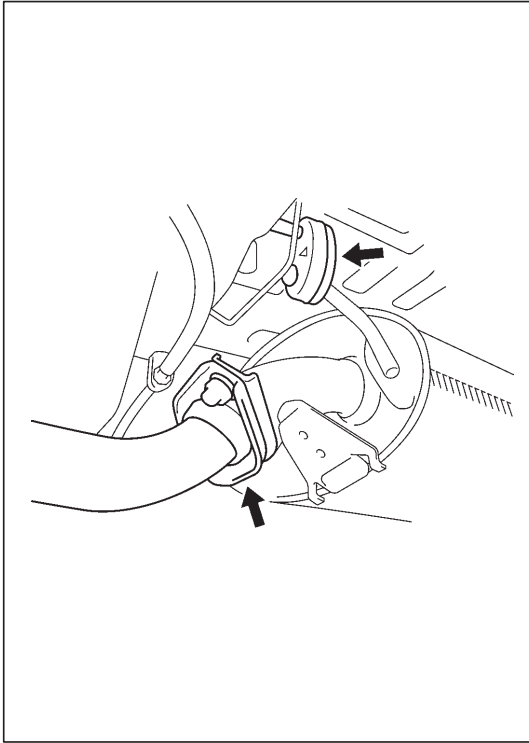


- 6) Add coolant to reservoir so that its level aligns with FULL level line (1). Then, reinstall cap (2) to reservoir aligning match marks (3) on the reservoir and cap.

ITEM 1-6**Exhaust System Inspection****WARNING:**

To avoid danger of being burned, do not touch exhaust system when it is still hot.

Any service on exhaust system should be performed when it is cool.



When carrying out periodic maintenance or vehicle is raised for other service, check exhaust system as follows:

- Check rubber mountings for damage and deterioration.
- Check exhaust system for leakage, loose connections, dents, and damages.

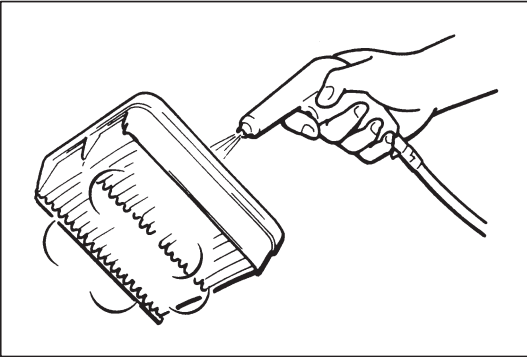
If bolts or nuts are loose, tighten them to specification.

Refer to SECTION 6K for torque specification of bolts and nuts.

- Check nearby body areas for damaged, missing or mispositioned parts, open seams, holes, loose connections or other defects which could permit exhaust fumes to seep into vehicle.
- Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to floor carpet.
- Any defects should be fixed at once.

IGNITION SYSTEM**ITEM 2-1****Spark Plugs Replacement**

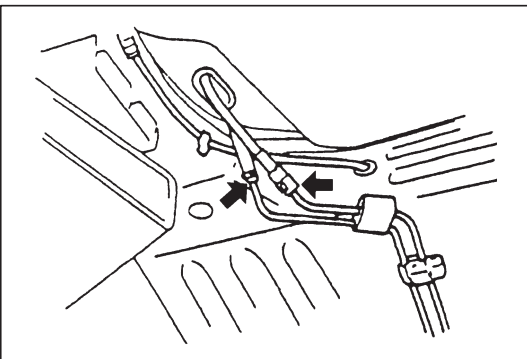
Replace spark plugs with new ones referring to Section 6F1.

**FUEL SYSTEM****ITEM 3-1****Air Cleaner Filter Inspection**

- 1) Unclamp air cleaner case clamps.
- 2) Take cleaner filter out of air cleaner case.
- 3) Visually check that air cleaner filter is not excessively dirty, damaged or oily.
- 4) Clean filter with compressed air from air outlet side of filter.
- 5) Install air cleaner filter into case referring to Section 6A1.
- 6) Clamp case securely.

Air Cleaner Filter Replacement

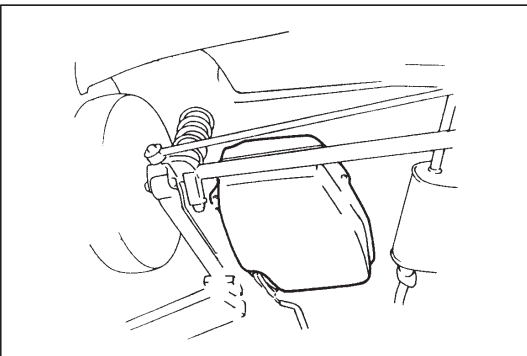
Replace air cleaner filter with new one according to procedure described in Section 6A1.

**ITEM 3-2****Fuel Lines Inspection**

Check fuel lines for loose connection, deterioration or damage which could cause leakage. Make sure all clamps are secure.

Replace any damaged or deteriorated parts.

There should be no sign of fuel leakage or moisture at any fuel connection.

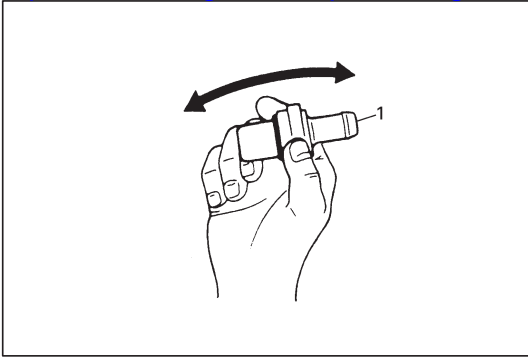
**ITEM 3-3****Fuel Tank Inspection**

Check fuel tank for damage, cracks, fuel leakage, corrosion and tank bolts looseness.

If a problem is found, repair or replace.

EMISSION CONTROL SYSTEM**ITEM 4-1****PCV (Positive Crankcase Ventilation) Valve Inspection**

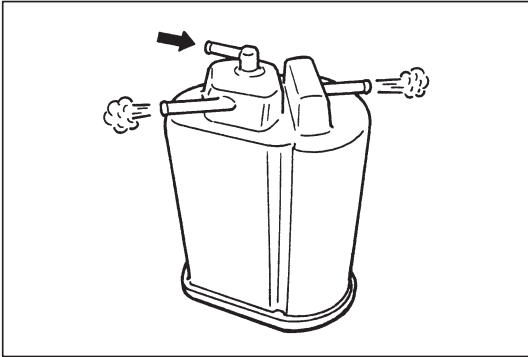
Check crankcase ventilation hoses and PCV hoses for leaks, cracks or clog, and PCV valve (1) for stick or clog. Refer to Section 6E for PCV valve checking procedure.

**ITEM 4-2****Fuel Evaporative Emission Control System Inspection****WARNING:**

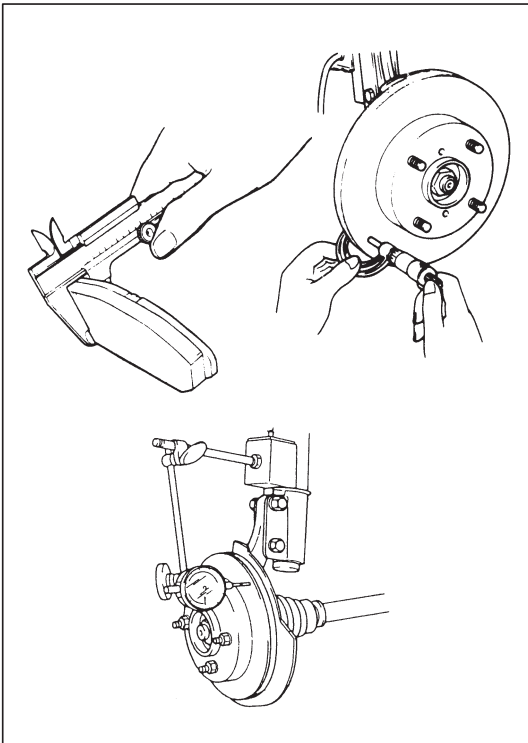
DO NOT SUCK nozzles on EVAP canister. Fuel vapor inside EVAP canister is harmful.

Check EVAP (Evaporative Emission) canister for damage, clog and operation referring to SECTION 6E1.

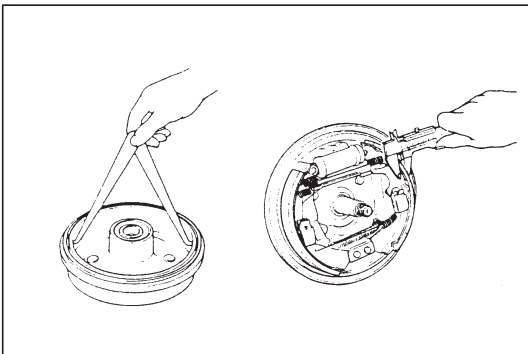
If a problem is found, replace.

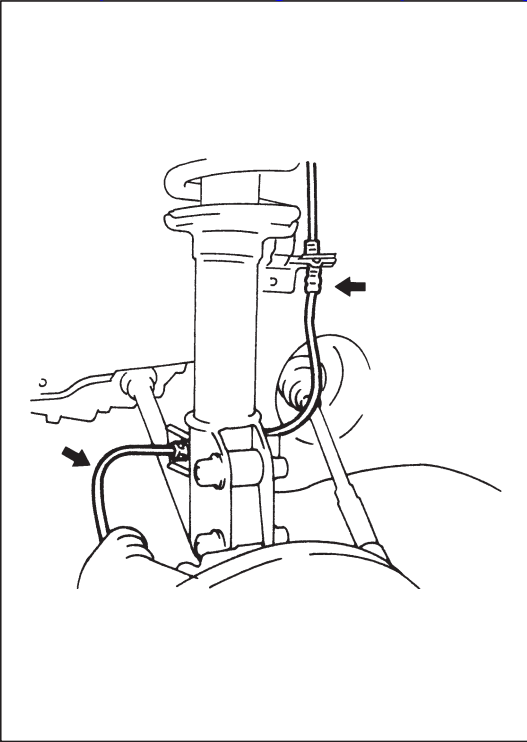
**BRAKE****ITEM 5-1****Brake Discs, Pads, Drums and Shoes Inspection****Brake discs and pads**

- 1) Remove wheel and caliper but don't disconnect brake hose from caliper.
- 2) Check front disc brake pads and discs for excessive wear, damage and deflection. Replace parts as necessary. For the details, refer to SECTION 5B.
- 3) Install caliper and wheel.

**Brake drums and shoes**

- 1) Remove wheel and brake drum.
- 2) Check rear brake drums and brake linings for excessive wear and damage, while wheels and drums are removed. At the same time, check wheel cylinders for leakage. Replace as necessary. For the details, refer to SECTION 5C.
- 3) Install brake drum and wheel.



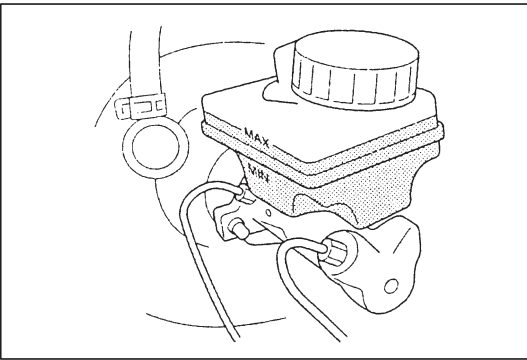
**ITEM 5-2****Brake Hoses and Pipes Inspection**

Perform this inspection where there is enough light and use a mirror as necessary.

- Check brake hoses and pipes for proper hook-up, leaks, cracks, chafing, wear, corrosion, bends, twists and other damage. Replace any of these parts as necessary.
- Check all clamps for tightness and connections for leakage.
- Check that hoses and pipes are clear of sharp edges and insecure parts.

CAUTION:

After replacing any brake pipe or hose, be sure to carry out air purge operation.

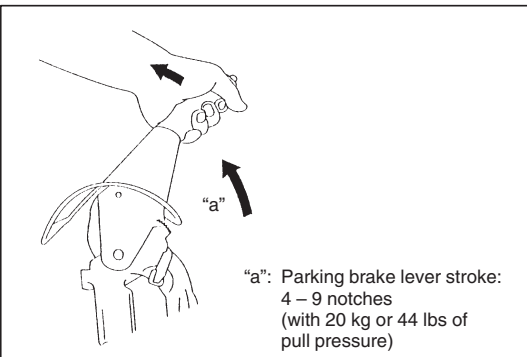
**ITEM 5-3****Brake Fluid Change****CAUTION:**

Do not use old or used brake fluid, or any fluid from any unsealed container.

Change brake fluid as follows.

Drain existing fluid from brake system completely, fill system with above recommended fluid and carry out air purge operation.

For air purging procedure, refer to SECTION 5.

**ITEM 5-4****Brake Lever and Cable Inspection****Parking brake lever**

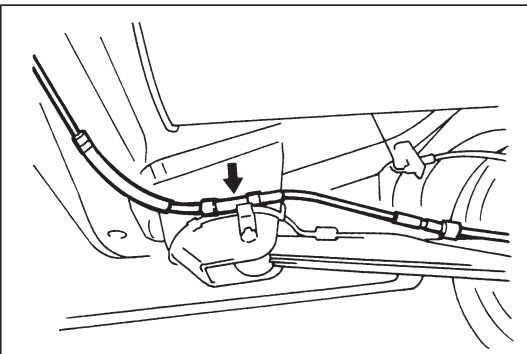
- Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking lever.
- Check parking brake lever for proper operation and stroke, and adjust it if necessary.

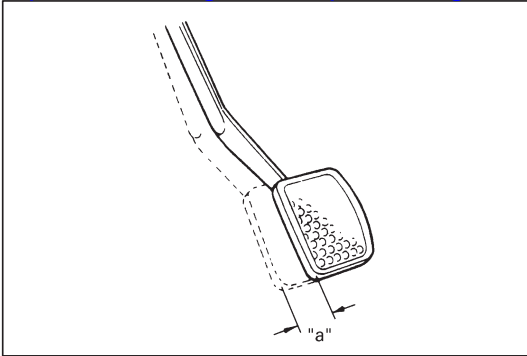
For checking and adjusting procedures, refer to PARKING BRAKE INSPECTION AND ADJUSTMENT in SECTION 5C.

Parking brake cable

Inspect brake cable for damage and smooth movement.

Replace cable if it is in deteriorated condition.



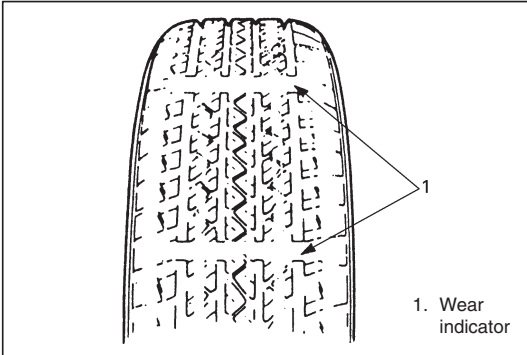


CHASSIS AND BODY

ITEM 6-1

Clutch Pedal Free Travel Inspection (Cable type only)

Check clutch pedal free travel "a". Refer to SECTION 7C for procedure to check and adjust it.



ITEM 6-2

Tire/Wheel Disc Inspection

[Tire inspection]

- 1) Check tire for uneven or excessive wear, or damage. If defective, replace.

- 2) Check inflating pressure of each tire and adjust pressure to specification as necessary.

NOTE:

- Tire inflation pressure should be checked when tires are cool.
- Specified tire inflation pressure should be found on tire placard or in owner's manual which came with vehicle.

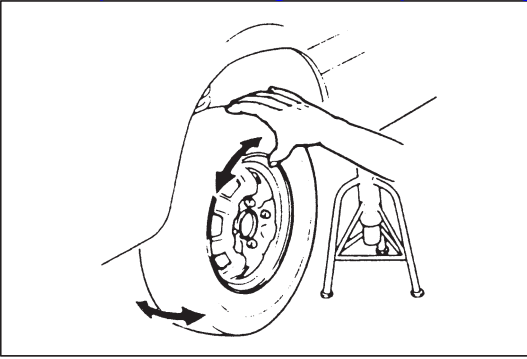
[Wheel disc inspection]

Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.

[Tire rotation]

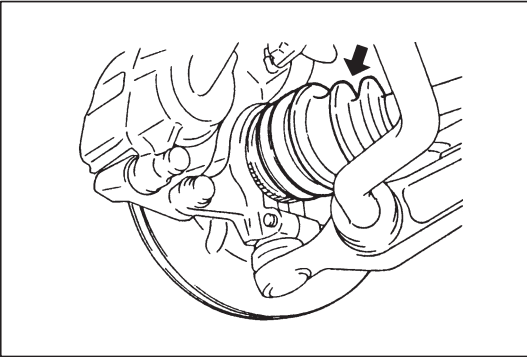
Rotate tires.

For details of the steps, refer to SECTION 3F.



Wheel Bearing Inspection

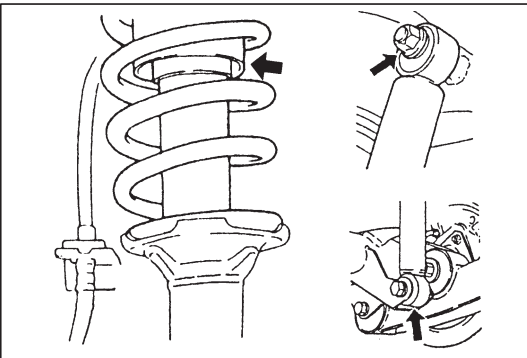
- 1) Check front wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to FRONT SUSPENSION INSPECTION of SECTION 3D.
- 2) Check rear wheel bearing for wear, damage abnormal noise or rattle. For details, refer to REAR SUSPENSION INSPECTION of SECTION 3E.



ITEM 6-3

Drive Shaft (Axle) Boot Inspection

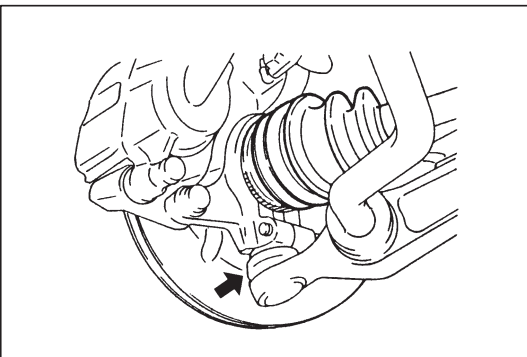
Check drive shaft boots (wheel side and differential side) for leakage, detachment, tear or any other damage.
Replace boot as necessary.



ITEM 6-4

Suspension System Inspection

- Inspect front struts & rear shock absorbers for evidence of oil leakage, dents or any other damage on sleeves; and inspect anchor ends for deterioration.
Replace defective parts, if any.
- Check front and rear suspension systems for damaged, loose or missing parts; also for parts showing signs of wear or lack of lubrication.
Repair or replace defective parts, if any.
- Check front suspension arm ball joint stud dust seals for leakage, detachment, tear or any other damage.
Replace defective boot, if any.



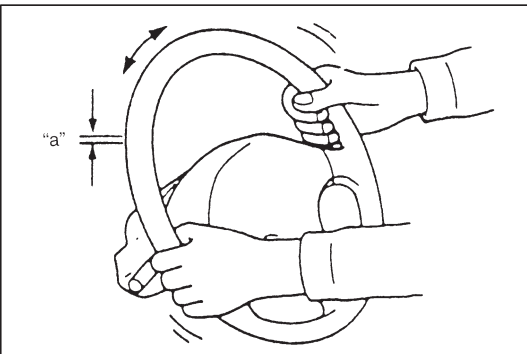
ITEM 6-5

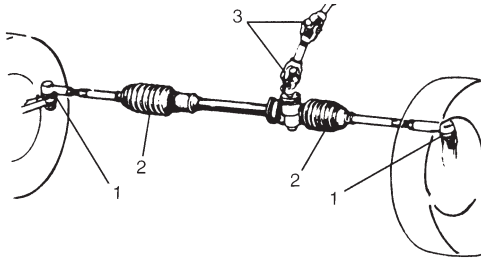
Steering System Inspection

- 1) Check steering wheel for play and rattle, holding vehicle straight on ground.

Steering wheel play "a": 0 – 30 mm (0 – 1.1 in.)

- 2) Check bolts and nuts for tightness and retighten them as necessary. Repair or replace defective parts, if any.





1. Tie-rod end boot
2. Steering gear case boot
3. Universal joint

- 3) Check steering linkage for looseness and damage. Repair or replace defective parts, if any.
- 4) Check boots of steering linkage and steering gear case for damage (leaks, detachment, tear, etc.). If damage is found, replace defective boot with new one.
If any dent is found on steering gear case boots, correct it to original shape by turning steering wheel to the right or left as far as it stops and holding it for a few seconds.
- 5) Check universal joints of steering shaft for rattle and damage. If rattle or damage is found, replace defective part with a new one.
- 6) Check that steering wheel can be turned fully to the right and left. Repair or replace defective parts, if any.
- 7) If equipped with power steering system, check also, in addition to above check items, that steering wheel can be turned fully to the right and left more lightly when engine is running at idle speed than when it is stopped. Repair, if found faulty.
- 8) Check wheel alignment referring to Section 3A.

ITEM 6-6

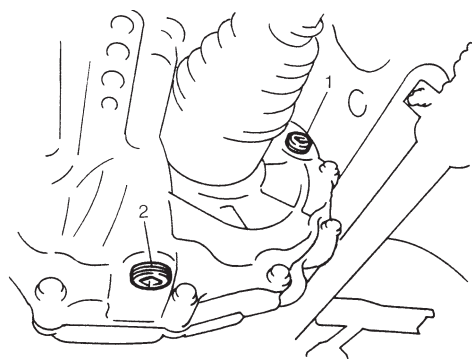
Manual Transmission Oil Inspection and Change

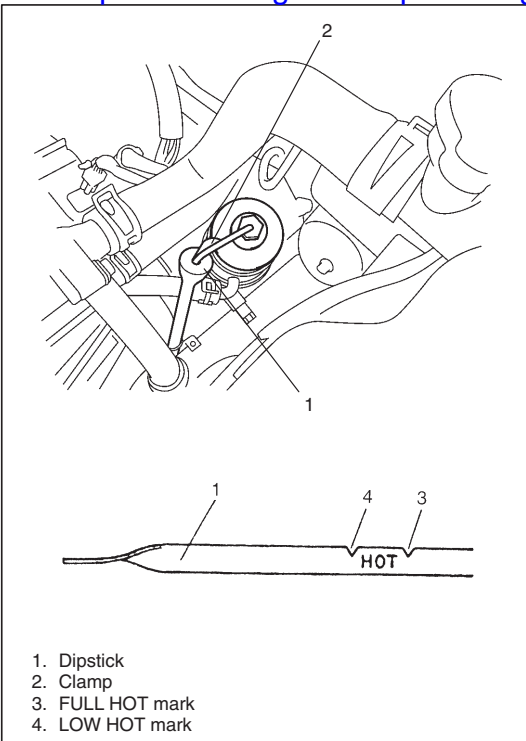
[Inspection]

- 1) Inspect transmission case for evidence of oil leakage.
Repair leaky point if any.
- 2) Make sure that vehicle is placed level for oil level check.
- 3) Remove oil filler/level plug (1) of transmission.
- 4) Check oil level.
Oil level can be checked roughly by means of filler/level plug hole. That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled.
If oil is found insufficient, pour specified oil up to level hole.
For specified oil, refer to description of oil change under On-Vehicle Service in Section 7A.
- 5) Apply sealant to filler/level plug and tighten it to specified torque.

[Change]

- 1) Place the vehicle level and drain oil by removing drain plug (2).
- 2) Apply sealant to drain plug after cleaning it and tighten drain plug to specified torque.
- 3) Pour specified oil up to level hole.
- 4) Tighten filler plug to specified torque.
For recommended oil, its amount and tightening torque data, refer to On-Vehicle Service of Section 7A.



**ITEM 6-7****Automatic Transmission Fluid Inspection and Change**

[Fluid level inspection]

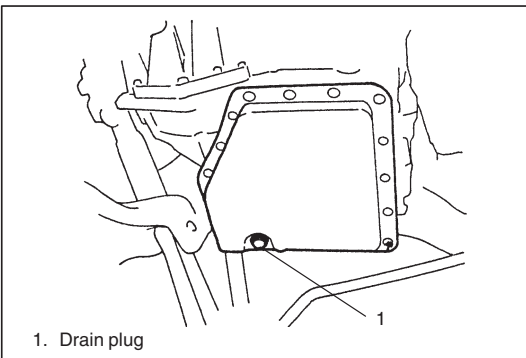
- 1) Inspect transmission case for evidence of fluid leakage.

Repair leaky point, if any.

- 2) Make sure that vehicle is placed level for fluid level check.

- 3) Unclamp dipstick and pull out it. Check fluid level.

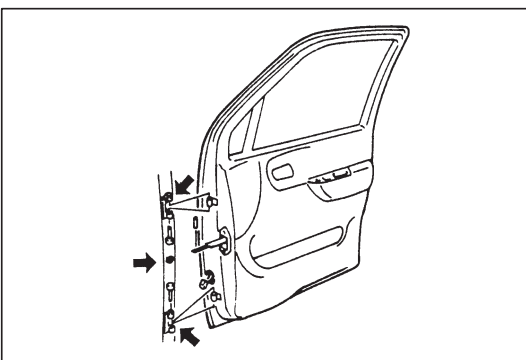
For fluid level checking procedure, refer to SECTION 7B and be sure to perform it under specified conditions. If fluid level is low, replenish specified fluid.



[Fluid change]

- 1) Perform steps 1) and 2) of above Fluid Level Inspection.

- 2) Change fluid with new specified fluid referring to SECTION 7B.

**ITEM 6-8****All Latches, Hinges and Locks Inspection****Doors**

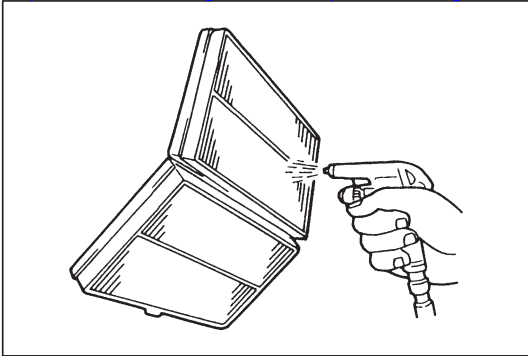
Check that each door of front, rear and back doors opens and closes smoothly and locks securely when closed.

If any malfunction is found, lubricate hinge and latch or repair door lock system.

Engine hood

Check that secondary latch operates properly (check that secondary latch keeps hood from opening all the way even when pulling hood release handle inside vehicle.) Also check that hood opens and closes smoothly and properly and hood locks securely when closed.

If any malfunction is found, lubricate hinge and latch, or repair hood lock system.

**ITEM 6-9****Ventilator Air Filter (if equipped)****Inspection**

- 1) Remove air filter from air inlet box or cooling unit referring to Section 1B.
- 2) Check filter for dirt. Replace excessively dirty filter.
- 3) Blow off dust by compressed air from air outlet side of filter.
- 4) Install filter to air inlet box or cooling unit referring to Section 1B.

Replacement

Replace ventilator air filter with new one referring to Section 1B.

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FINAL INSPECTION

WARNING:

When carrying out road tests, select a safe place where no man or no running vehicle is seen so as to prevent any accident.

Seats

Check that seat slides smoothly and locks securely at any position. Also check that reclining mechanism of front seat back allows it to be locked at any angle.

Seat Belt

Inspect belt system including webbing, buckles, latch plates, retractors and anchors for damage or wear. Check that seat belt is securely locked.

Battery Electrolyte Level Check

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case. If battery is equipped with built-in indicator, check battery condition by the indicator.

Accelerator Pedal Operation

Check that pedal operates smoothly without getting caught or interfered by other part.

Engine Start

Check engine start for readiness.

WARNING:

Before performing the following check, be sure to have enough room around the vehicle. Then, firmly apply both the parking brake and the regular brakes. Do not use the accelerator pedal. If the engine starts, be ready to turn off the ignition promptly. Take these precautions because the car could move without warning and possibly cause personal injury or property damage.

On automatic transmission vehicles, try to start the engine in each select lever position. The starting motor should crank only in "P" (Park) or "N" (Neutral). On manual transmission vehicles, place the shift lever in "Neutral", depress clutch pedal fully and try to start.

Exhaust System Check

Check for leakage, cracks or loose supports.

Clutch (For Manual transmission)

Check for the following.

- Clutch is completely released when depressing clutch pedal,
- No slipping clutch occurs when releasing the clutch pedal and accelerating,
- Clutch itself is free from any abnormal condition.

Gearshift or Select Lever (Transmission)

Check gear shift or select lever for smooth shifting to all positions and for good performance of transmission in any position.

With automatic transmission equipped vehicle, also check that shift indicator indicates properly according to which position select lever is shifted to.

Brake

[Foot brake]

Check the following;

- that brake pedal has proper travel,
- that brake works properly,
- that it is free from noise,
- that vehicle does not pull to one side when brake is applied,
- and that brake do not drag.

[Parking brake and automatic transmission "P" (Park) mechanism]

Check that parking brake lever has proper travel.

WARNING:

With vehicle parked on a fairly steep slope, make sure nothing is in the way downhill to avoid any personal injury or property damage. Be prepared to apply regular brake quickly even if vehicle should start to move.

Check to ensure that parking brake is fully effective when the vehicle is stopped on the safe slope and brake lever is pulled all the way.

Make sure that vehicle is at complete stop when select lever is shifted to "P" range position and all brakes are released.

Steering

- Check to ensure that steering wheel is free from instability, or abnormally heavy feeling.
- Check that the vehicle does not wander or pull to one side.

Engine

- Check that engine responds readily at all speeds.
- Check that engine is free from abnormal noise and abnormal vibration.

Body, Wheels and Power Transmitting System

Check that body, wheels and power transmitting system are free from abnormal noise and abnormal vibration or any other abnormal condition.

Meters and Gauge

Check that speedometer, odometer, fuel meter, temperature gauge, etc. are operating accurately.

Lights

Check that all lights operate properly.

Windshield Defroster

Periodically check that air comes out from defroster outlet when operating heater or air conditioning. Set fan switch lever to "HI" position for this check.

RECOMMENDED FLUIDS AND LUBRICANTS

Engine oil	SE, SF, SG, SH or SJ (Refer to engine oil viscosity chart in item 1-4.)
Engine coolant (Ethylene glycol base coolant)	"Anti-freeze/Anti-corrosion coolant"
Brake fluid	DOT4 or SAE J1704
Manual transmission oil	API GL-4, SAE75W-90 (Refer to Section 7A for detail)
Automatic transmission fluid	An equivalent of DEXRON [®] -III
Door hinges	Engine oil or water resistance chassis grease
Hood latch assembly	
Key lock cylinder	Spray lubricant

SECTION 1A

HEATER AND VENTILATION

1A

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

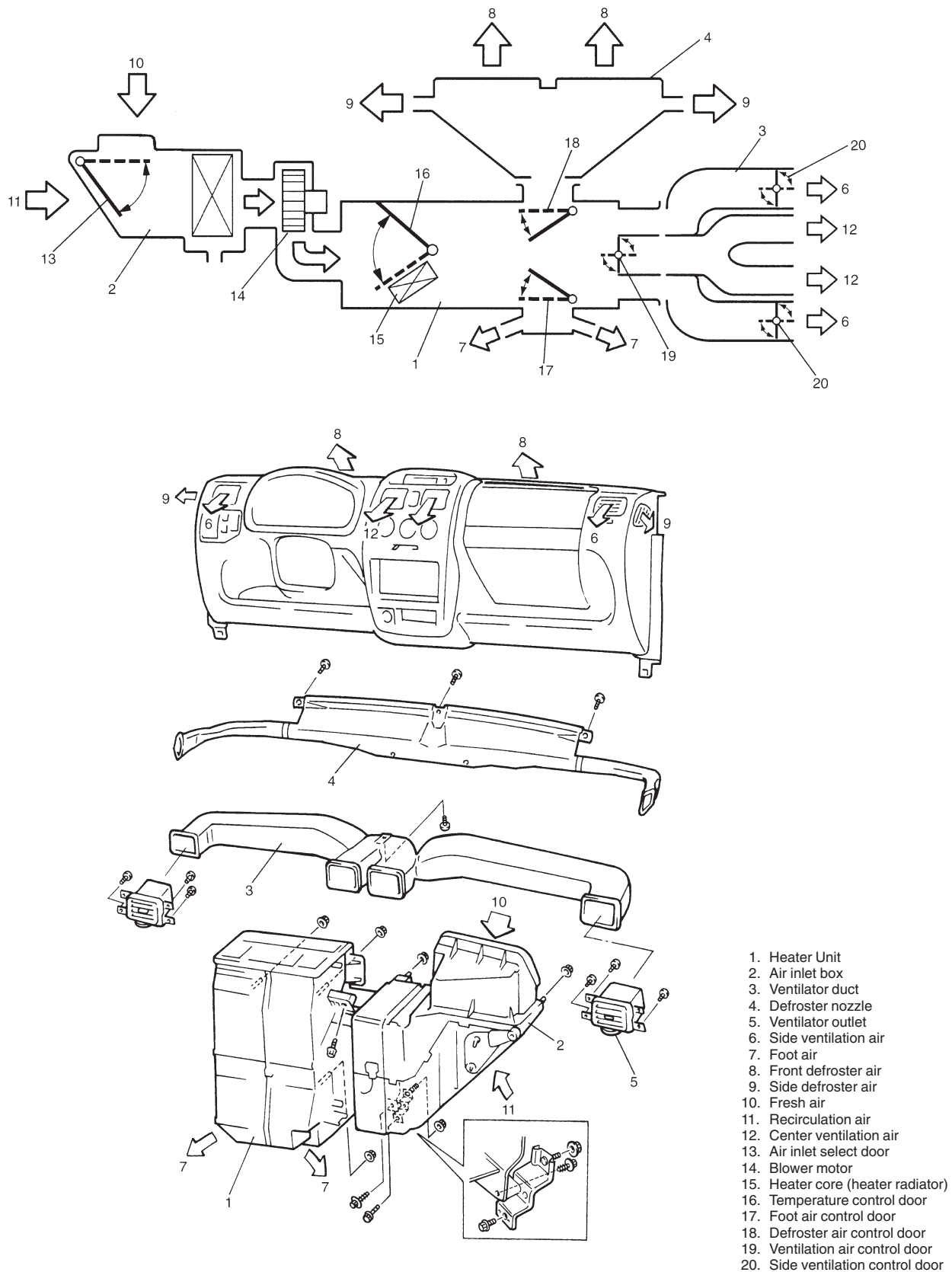
The link mechanism of the heater varies depending on the specifications.

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Ventilation Louver	1A-10

GENERAL DESCRIPTION

The heater and ventilation consist of the following parts.

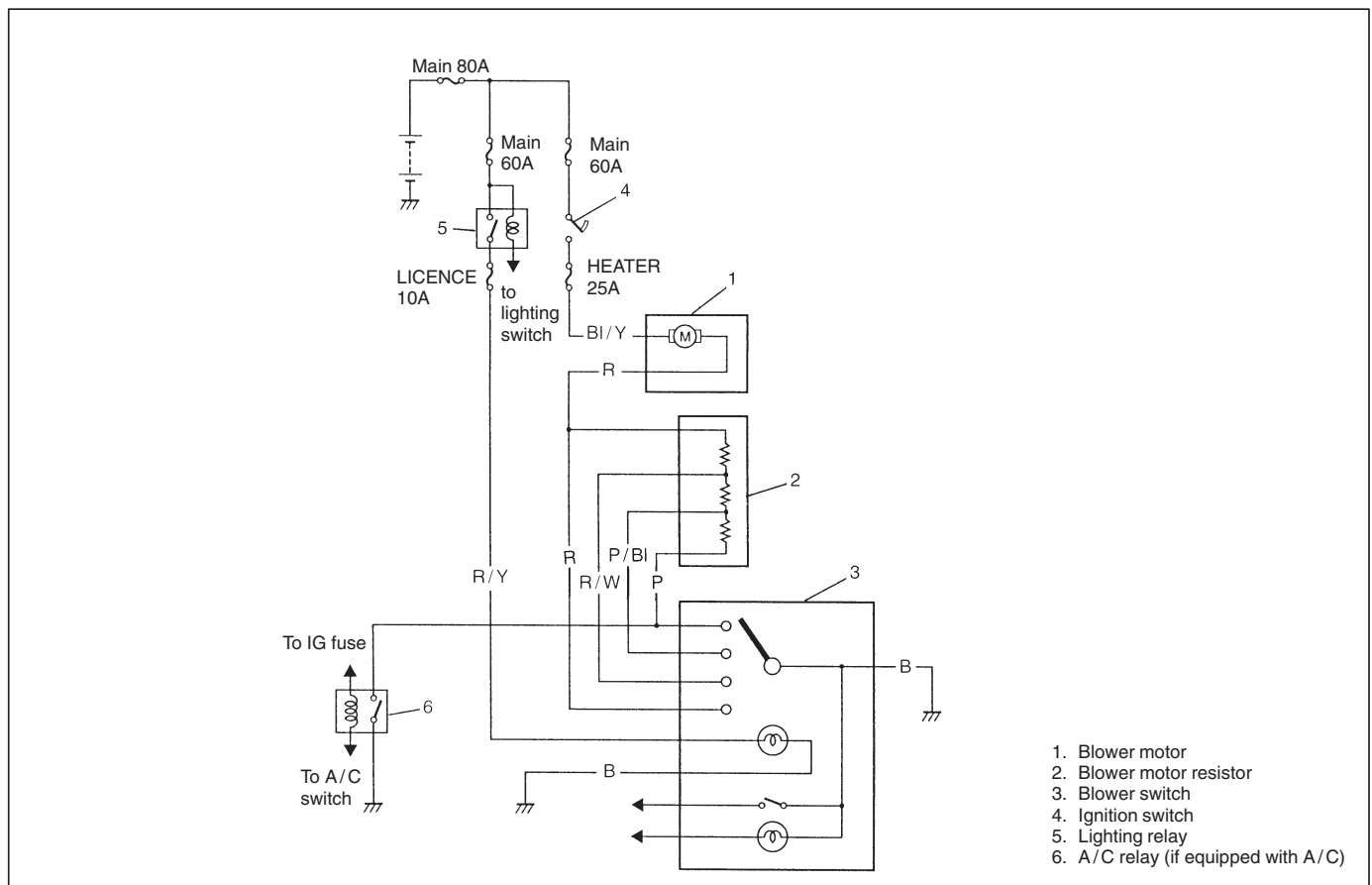


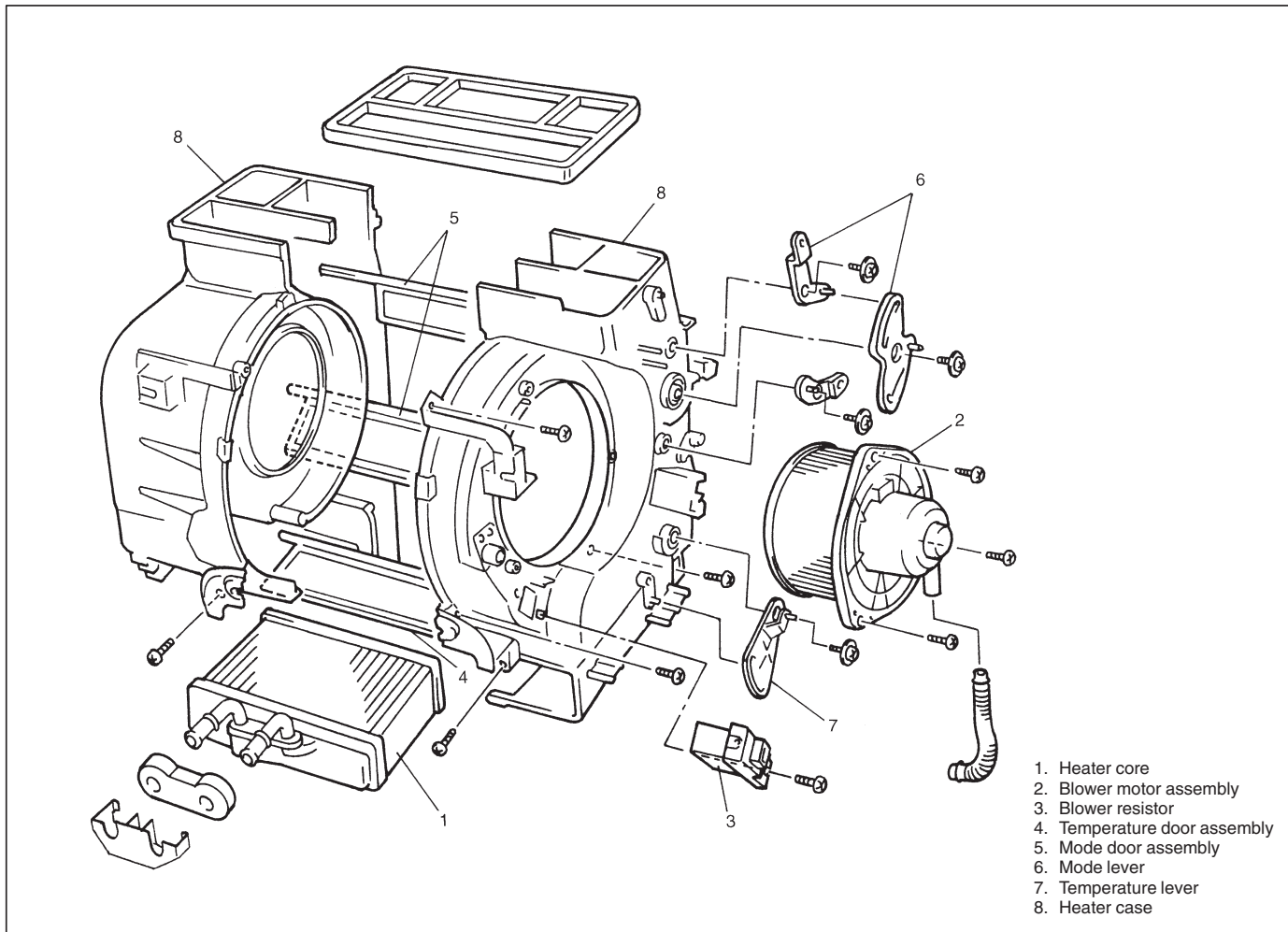
DIAGNOSIS

DIAGNOSIS TABLE

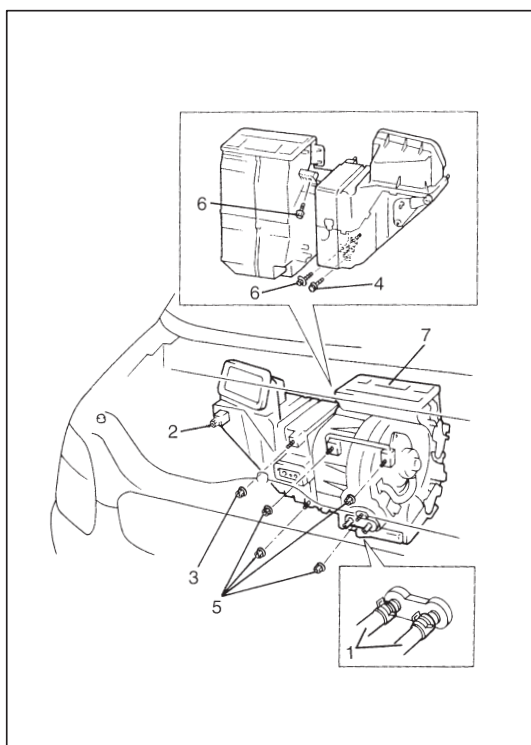
Trouble	Possible Cause	Remedy
Heater blower won't work even when its switch is ON.	<ul style="list-style-type: none"> Blower fuse blown Blower resistor faulty Blower switch faulty Blower motor faulty Wiring or grounding faulty 	Check for short to ground and replace fuse. Check resistor. Check blower switch. Replace motor. Repair as necessary.
Incorrect temperature output.	<ul style="list-style-type: none"> Control cables broken or binding Temperature control lever faulty Control cable clamp position is faulty Air damper broken Air ducts clogged Heater radiator leaking or clogged Heater hoses leaking or clogged Thermostat faulty 	Check cables. Check control lever. Check and adjustment. Repair damper. Repair air ducts. Replace radiator. Replace hoses. Check thermostat.
When mode control lever is changed, air outlet port is not changed or lever position disagree with air outlet port.	<ul style="list-style-type: none"> Control cables broken or binding Air damper broken Air ducts clogged Air damper broken Air ducts leaking or clogged 	Check cable. Check control lever. Check and adjustment. Repair damper. Repair air ducts.

WIRING CIRCUIT



ON VEHICLE SERVICE**HEATER UNIT**

1. Heater core
2. Blower motor assembly
3. Blower resistor
4. Temperature door assembly
5. Mode door assembly
6. Mode lever
7. Temperature lever
8. Heater case

**REMOVAL**

- 1) Disconnect negative (–) cable at battery.
- 2) If equipped with air bag system, disable air bag system.
Refer to **DISABLING AIR BAG SYSTEM** in Section 10B.
- 3) Drain engine coolant and disconnect heater hoses (1) from heater unit.
- 4) Remove instrument panel.
Refer to **INSTRUMENT PANEL** in Section 9.
Loosen air inlet box (cooling unit) mounting nut (2), and remove mounting nut (3).
- 5) Remove bolts (4), nuts (5) and screws (6).
- 6) Remove heater unit (7).

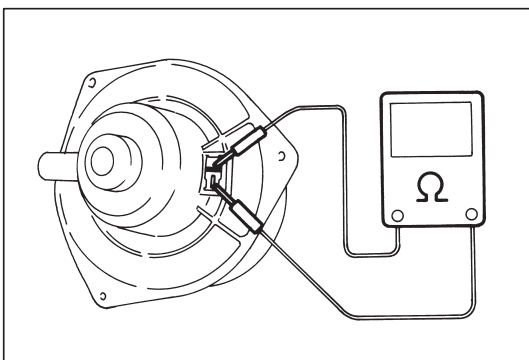
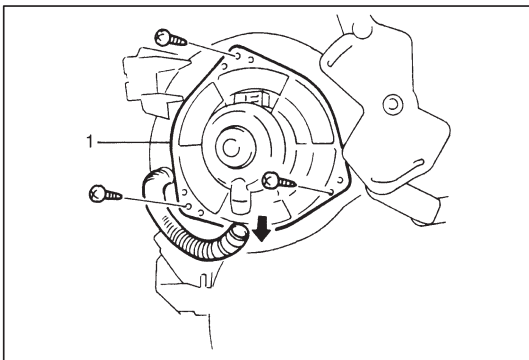
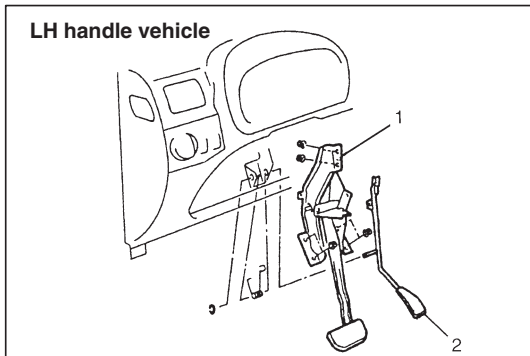
INSTALLATION

Install heater unit by reversing removal procedure, noting the following items.

- When installing each part, be careful not to catch any cable or wiring harness.
- Adjust heater control cable (refer to heater control lever assembly in this section).
- Fill engine coolant to radiator.
- If equipped with air bag system, enable air bag system. Refer to "ENABLING AIR BAG SYSTEM" in Section 10B.

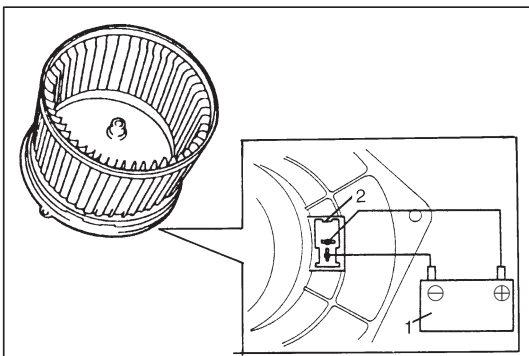
BLOWER MOTOR**REMOVAL**

- 1) Disconnect negative (–) cable at battery.
- 2) Disable air bag system, if equipped.
Refer to DISABLING AIR BAG SYSTEM in Section 10B.
- 3) Remove column hole cover.
- 4) Remove clutch pedal assembly (RH steering vehicle) or brake pedal assembly (1) and accelerator pedal (2) (LH steering vehicle). Refer to "BRAKE PEDAL" in Section 5A and "CLUTCH PEDAL" in Section 7C.
- 5) Disconnect blower motor couplers.
- 6) Remove blower motor (1).

**INSPECTION**

- 1) Check continuity between two terminals as shown in figure.
If there is no continuity, replace blower motor.
- 2) Connect battery (1) to blower motor connector (2) as shown, then check that the blower motor operates smoothly.
If blower motor operates do not smoothly, replace blower motor.

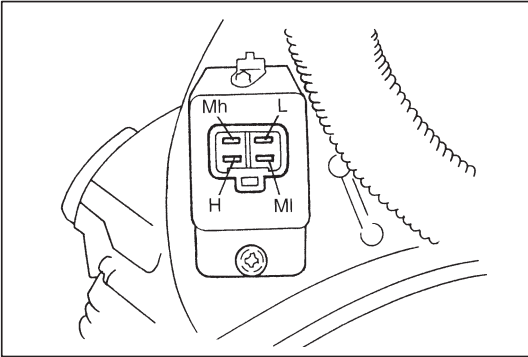
Reference current data: Approx. 13 – 20 A at 12 V



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INSTALLATION

- 1) Reverse removal procedure for installation.
- 2) Enable air bag system, if equipped.
Refer to ENABLING AIR BAG SYSTEM in Section 10B.



BLOWER MOTOR RESISTOR

INSPECTION

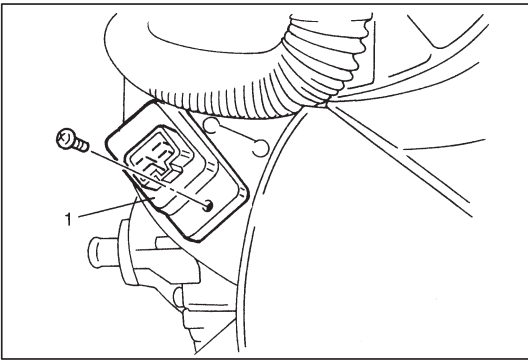
Measure each terminal-to-terminal resistance on resistor.

Resistance H – Mh : Approx. 0.6 Ω

Mh – MI: Approx. 1.0 Ω

MI – L : Approx. 1.8 Ω

If measured resistance is incorrect, replace heater blower motor resistor.

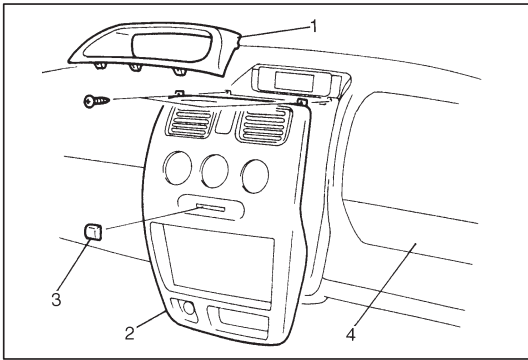
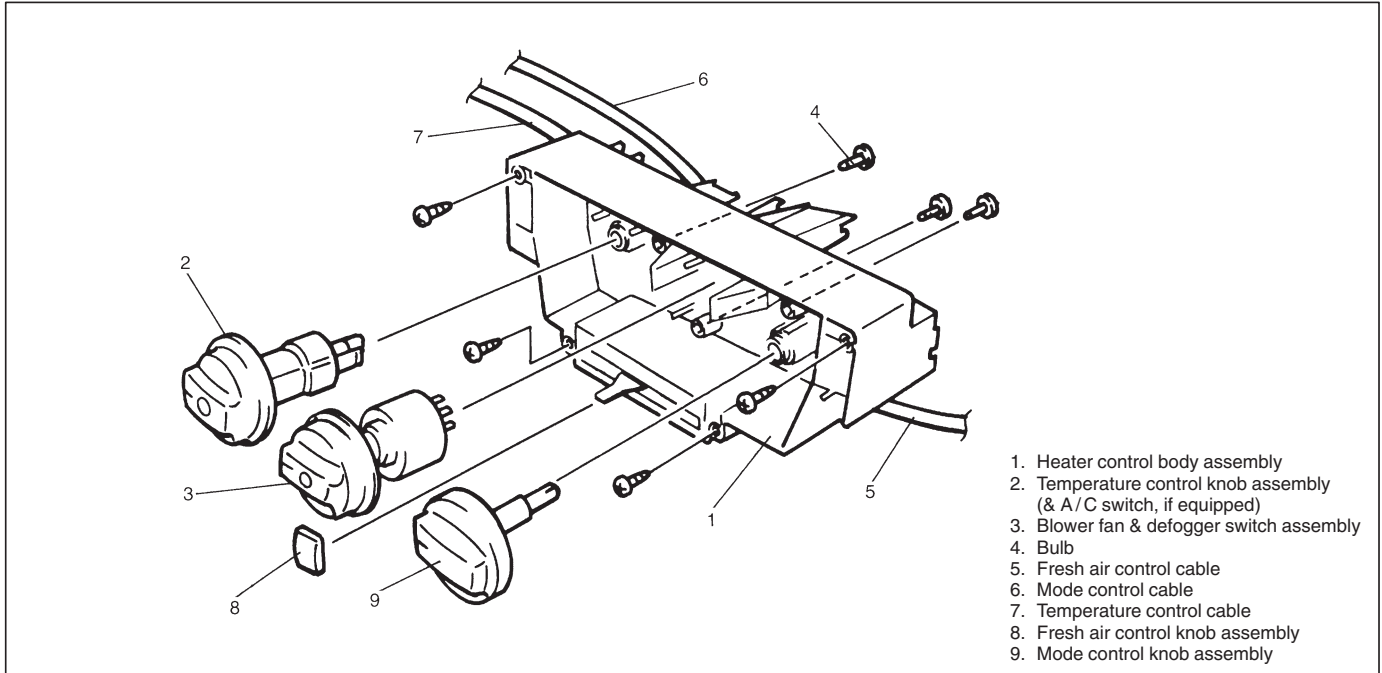


REMOVAL

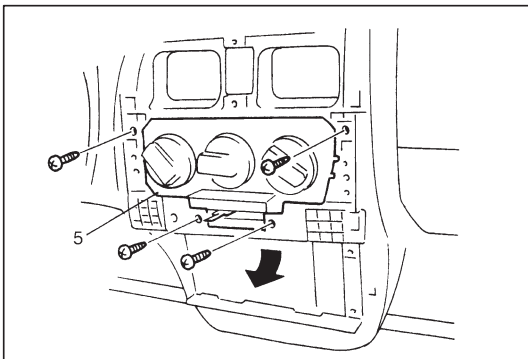
- 1) Disconnect negative (–) cable at battery.
- 2) Disable air bag system, if equipped.
Refer to DISABLING AIR BAG SYSTEM in Section 10B.
- 3) Remove clutch pedal bracket (RH steering vehicle), if necessary.
Refer to “CLUTCH PEDAL” in Section 7C.
- 4) Disconnect resistor coupler.
- 5) Remove blower motor resistor (1).

INSTALLATION

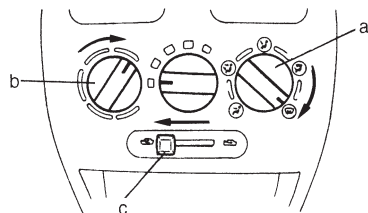
- 1) Reverse removal procedure for installation.
- 2) Enable air bag system, if equipped.
Refer to ENABLING AIR BAG SYSTEM in Section 10B.

HEATER CONTROL LEVER ASSEMBLY**REMOVAL**

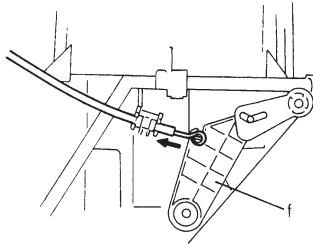
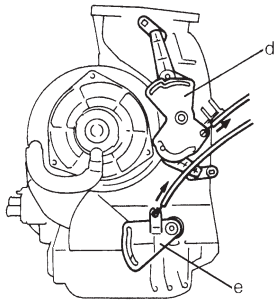
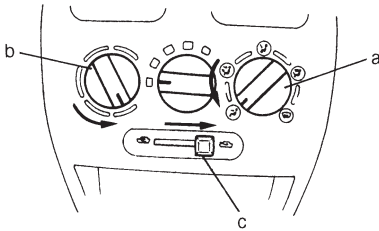
- 1) Disconnect negative (–) cable at battery.
- 2) Disable air bag system, if equipped.
Refer to **DISABLING AIR BAG SYSTEM** in Section 10B.
- 3) Remove ashtray, center upper garnish (1), center lower garnish (2), heater control knob (3), instrument lid (4) and radio or accessory case (if equipped).
- 4) Disconnect each heater control cables (mode control, temperature control and fresh air control) from heater unit and air inlet box.
- 5) Disconnect blower fan switch coupler and A/C switch coupler (if equipped).
- 6) Remove heater control lever assembly (5).
- 7) Remove blower fan switch.



LH VEHICLE



RH VEHICLE

**INSTALLATION**

- 1) Reverse removal procedure for installation.
- 2) Adjust cables as follows.
 - i) Move mode control knob (a), temperature control knob (b) and fresh air control knob (c) fully in arrow direction as shown in figure.
 - ii) Push mode lever (d), temperature lever (e) and door link (f) fully in arrow direction and fix cable with clamp in position as shown in figure.

NOTE:

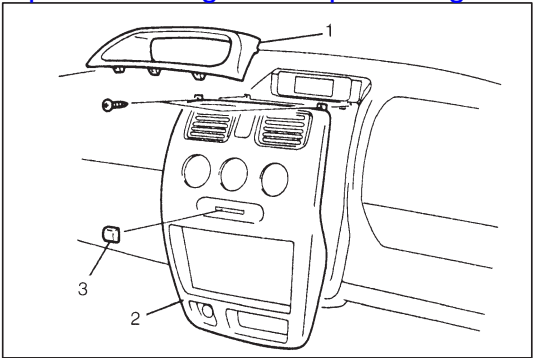
After installing control cables, be sure that control levers move smoothly and stop at proper position.

- 3) If equipped with air bag, enable air bag system. Refer to "ENABLING AIR BAG SYSTEM" in "AIR BAG SYSTEM" section.

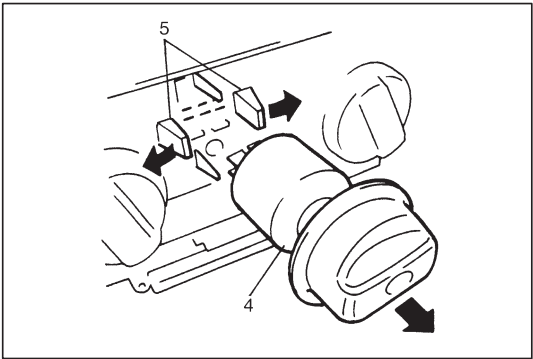
BLOWER FAN & DEFOGGER SWITCH

REMOVAL

- 1) Disconnect negative (–) cable at battery.
- 2) Remove ashtray, instrument center upper garnish (1), heater control knob (3), instrument center lower garnish (2) and radio or accessory case (if equipped).
- 3) Disconnect blower fan switch coupler.

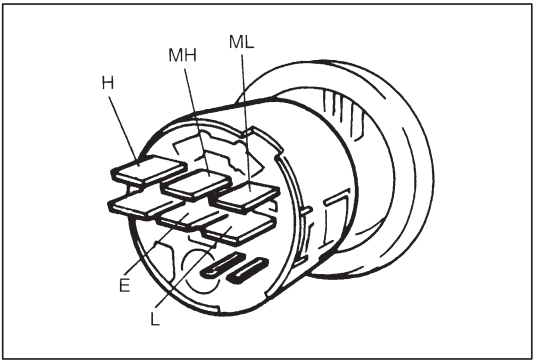


- 4) Remove blower fan switch (4) with unlocked the locking part (5) as shown in figure.



INSTALLATION

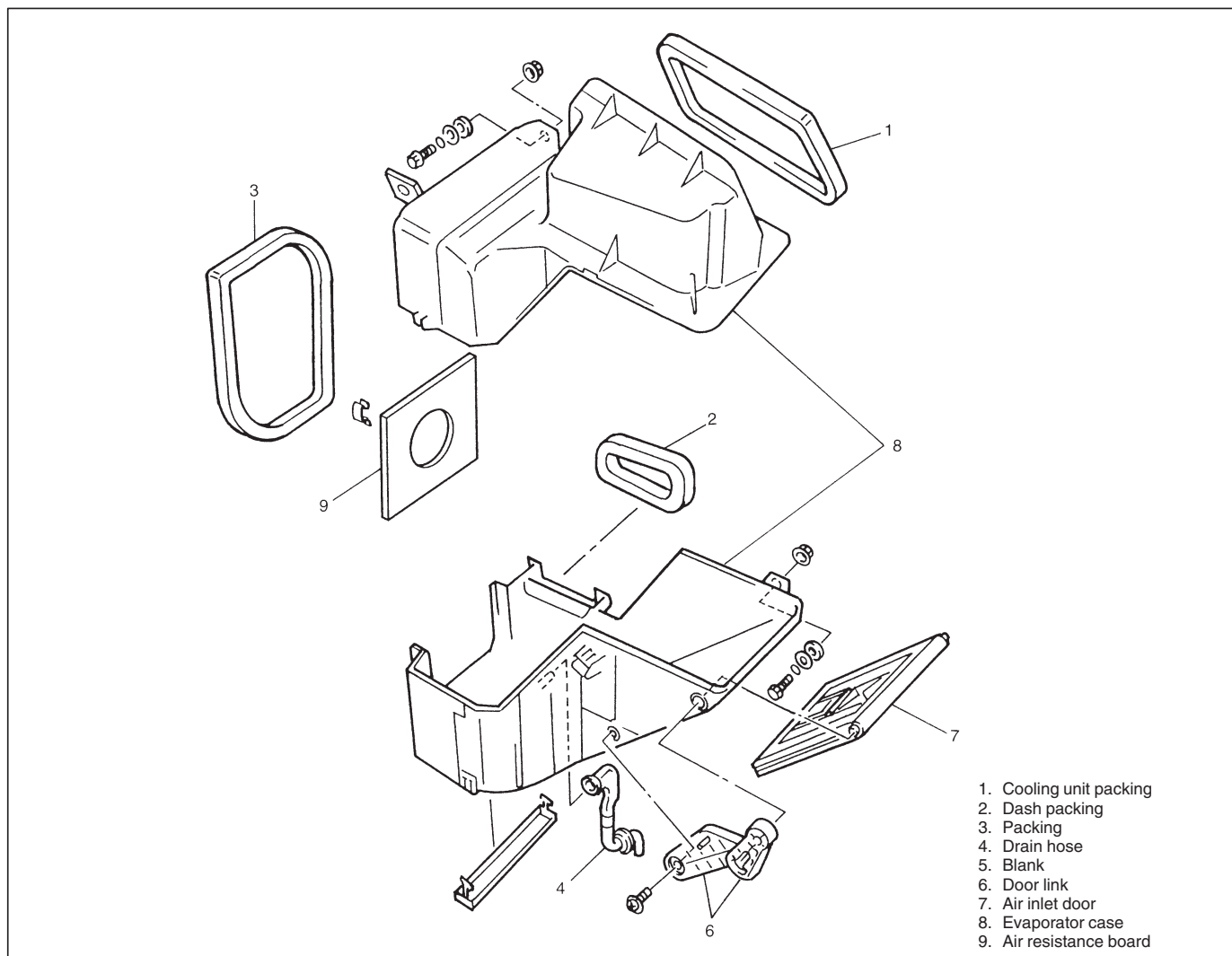
Reverse removal sequence to install blower fan switch.



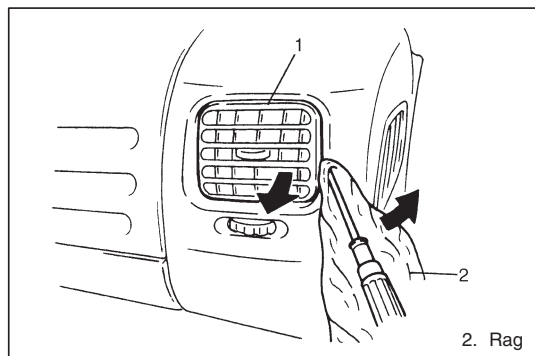
INSPECTION OF BLOWER FAN SWITCH

Check blower fan switch for each terminal-to-terminal continuity. For the detail refer to “WIRING CIRCUIT” earlier in this section.

POSITION \ TERMINAL	E	L	M _L	M _H	H
OFF	○				
1	○	○			
2	○		○		
3	○			○	
4	○				○

AIR INLET BOX**REMOVAL AND INSTALLATION**

Refer to "COOLING UNIT" in "AIR CONDITIONING" section.

**VENTILATION LOUVER****REMOVAL AND INSTALLATION**

Remove ventilation louver (1) as shown in figure, and reverse removal sequence to install ventilation louver.

SECTION 1B

AIR CONDITIONING (OPTIONAL)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

1B

CAUTION:

The air conditioning system of this vehicle uses refrigerant HFC-134a (R-134a).

None of refrigerant, compressor oil and component parts is interchangeable between two types of A/C: one using refrigerant CFC-12 (R-12) and the other using refrigerant HFC-134a (R-134a).

Be sure to check which refrigerant is used before any service work including inspection and maintenance. For identification between these two types, refer to the description in page 1B-2.

When replenishing or changing refrigerant and compressor oil and when replacing parts, make sure that the material or the part to be used is appropriate to the A/C installed in the vehicle being serviced.

Use of incorrect one will result in leakage of refrigerant, damage in parts or other faulty condition.

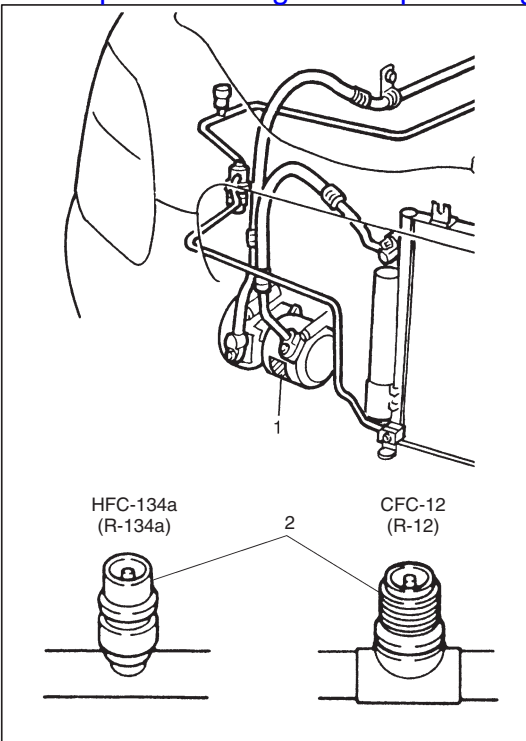
For basic servicing method of the air conditioning system that is not described in this section, refer to AIR CONDITIONING BASIC MANUAL (99520-02130).

CONTENTS

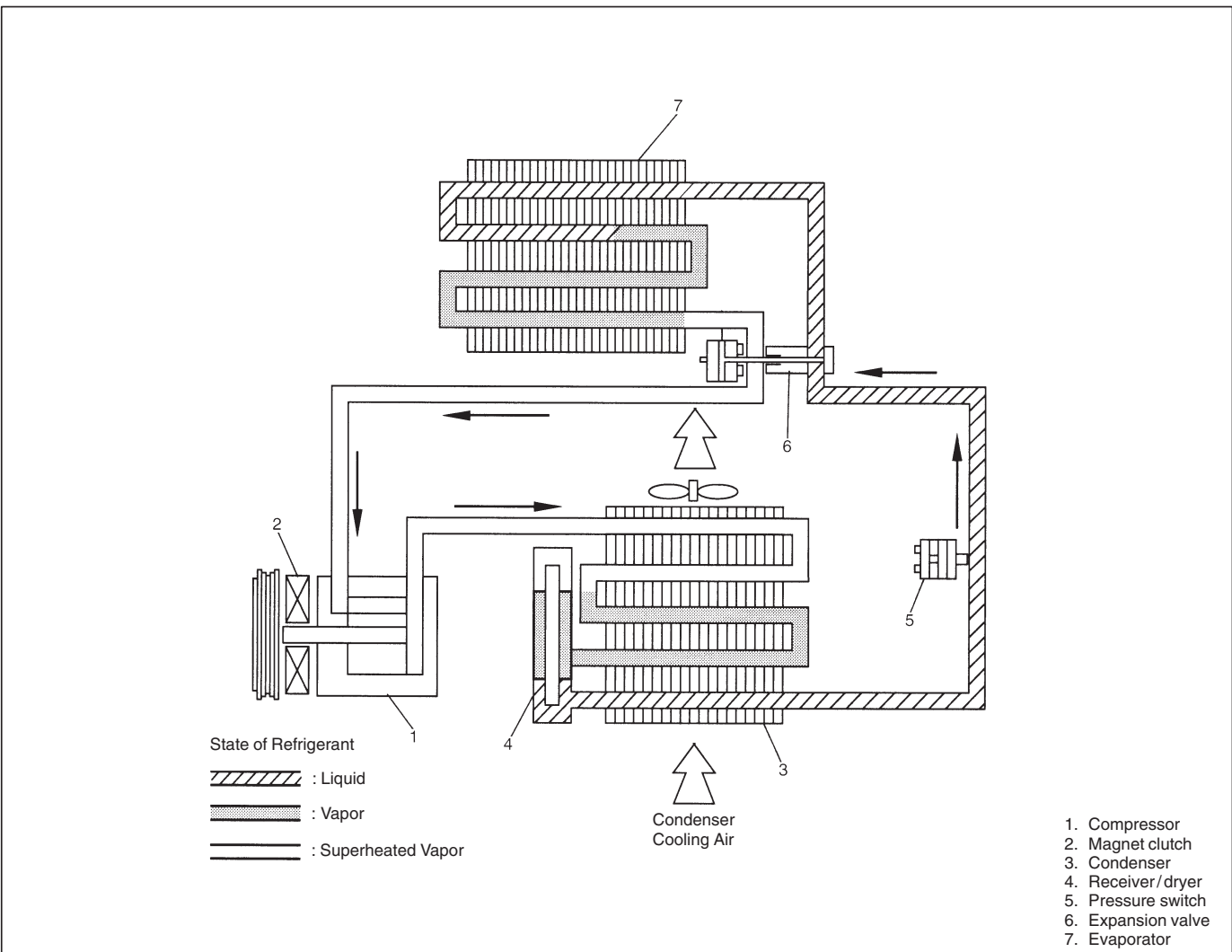
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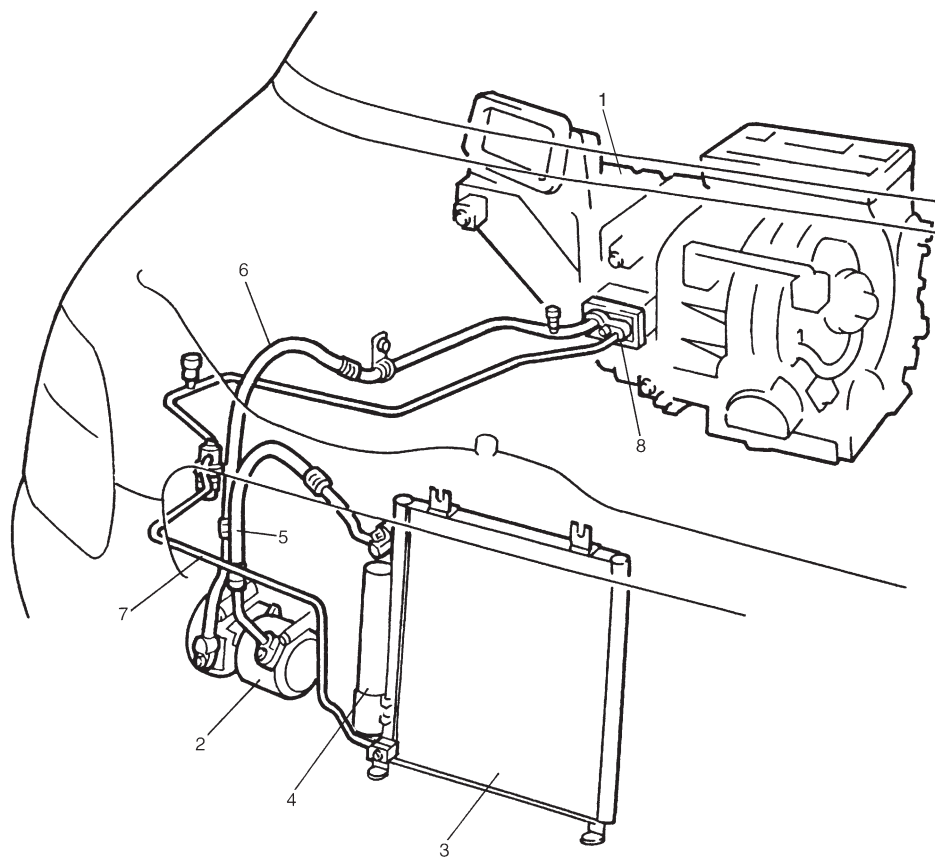
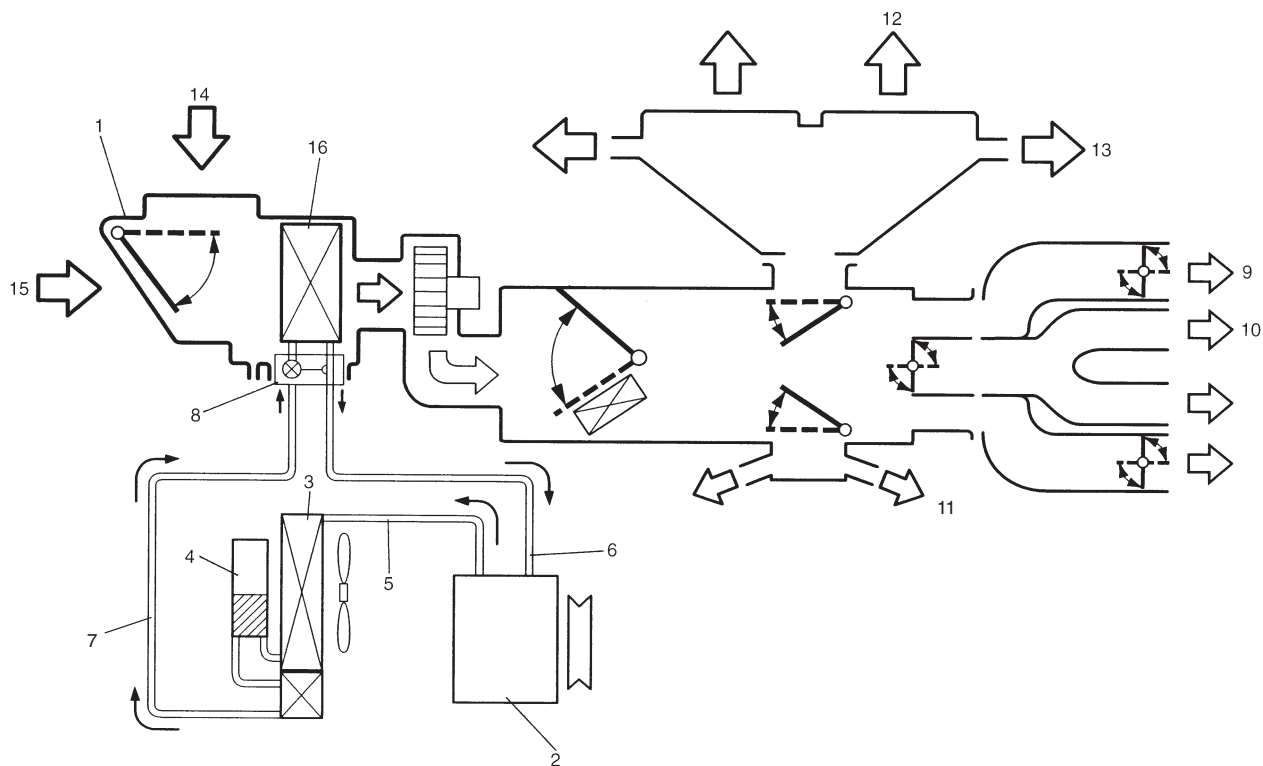
GENERAL DESCRIPTION

Whether the A/C in the vehicle being serviced uses HFC-134a (R-134a) or CFC-12 (R-12) is indicated on LABEL (1) on the compressor. Also, it can be checked by the shape of the service (charge) valve (2).



REFRIGERANT FLOW OF AIR CONDITIONING SYSTEM



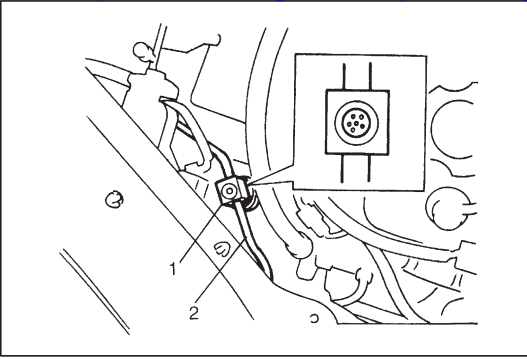
MAJOR COMPONENTS AND LOCATION

1. Cooling unit
2. Compressor
3. Condenser assembly
4. Receiver/dryer
5. Discharge hose
6. Suction hose
7. Liquid pipe
8. Expansion valve
9. Side ventilation air
10. Center ventilation air
11. Foot air
12. Front defroster air
13. Side defroster air
14. Fresh air
15. Recirculation air
16. Evaporator

DIAGNOSIS**GENERAL DIAGNOSIS TABLE**

Condition	Possible Cause	Correction
Cool air does not come out (A/C system improper operative)	A/C system inoperative <ul style="list-style-type: none"> • No refrigerant • Fuse blown • A/C switch faulty • Blower fan switch faulty • A/C thermistor faulty • Dual pressure switch faulty • Wiring or grounding faulty • ECT sensor faulty • ECM faulty 	Recover, evacuation and charging. Check "IG COIL" fuse, "HEATER" fuse and check for short circuit to ground. Check A/C switch. Check blower fan switch. Check A/C thermistor. Check dual pressure switch. Repair as necessary. Check ECT sensor. Check ECM.
	Compressor inoperative (dose not rotate) <ul style="list-style-type: none"> • Magnet clutch faulty • Drive belt loose or broken • Compressor faulty • ECM faulty 	Check magnet clutch. Adjust or replace drive belt. Check compressor. Check ECM.
	Radiator (and condenser), cooling fan motor inoperative <ul style="list-style-type: none"> • Fuse blown • Radiator cooling fan relay faulty • Wiring or grounding faulty • Radiator cooling fan motor faulty • ECM faulty 	Check RDTR fuse and check short circuit to ground. Check radiator cooling fan relay. Repair as necessary. Check radiator cooling fan motor. Check ECM.
	Blower motor inoperative <ul style="list-style-type: none"> • Fuse blown • Blower resistor faulty • Blower fan switch faulty • Wiring or grounding faulty • Blower motor faulty 	Check "HEATER" fuse and check for short circuit to ground. Check blower motor resistor. Check blower fan switch. Repair as necessary. Check blower motor.
When the blower fan switch is OFF position, blower motor does not operate at A/C switch is ON	<ul style="list-style-type: none"> • A/C blower motor relay faulty • Wiring or grounding faulty • A/C switch faulty 	Check A/C blower motor relay. Repair as necessary. Check A/C switch.
Cool air does not come out or insufficient cooling (A/C system normal operative)	<ul style="list-style-type: none"> • Insufficient or excessive charge of refrigerant • Condenser clogged • Evaporator clogged or frosted • A/C thermistor faulty • Expansion valve faulty • Receiver/dryer clogged • Drive belt slipping • Magnetic clutch faulty 	Check charge of refrigerant. Check system for leaks. Check condenser. Check evaporator and position of A/C thermistor. Check A/C thermistor. Check expansion valve. Check receiver/dryer. Check or replace drive belt. Check magnetic clutch.

Condition	Possible Cause	Correction
Cool air does not come out or insufficient cooling (A/C system normal operative)	<ul style="list-style-type: none"> ● Compressor faulty ● Air in A/C system ● Air leaking from cooling unit or air duct ● Heater and ventilation system faulty ● Blower motor faulty ● Excessive compressor oil existing in A/C system 	Check compressor. Replace receiver/dryer, and evacuation and charging. Repair as necessary. Check air inlet box assembly. Check heater control lever assembly. Check heater assembly. Check blower motor. Evacuate and charge system.
Cool air does not comes out only intermittently	<ul style="list-style-type: none"> ● Wiring connection faulty ● Expansion valve faulty ● Excessive moisture in A/C system ● Magnetic clutch faulty ● Excessive charge of refrigerant 	Repair as necessary. Check expansion valve. Replace receiver/dryer, and evacuation and charging. Check magnetic clutch. Check charge of refrigerant.
Cool air comes out only at high speeds	<ul style="list-style-type: none"> ● Condenser clogged ● Insufficient charge of refrigerant ● Air in A/C system ● Drive belt slipping ● Compressor faulty 	Check condenser. Check charge of refrigerant. Replace receiver/dryer, and evacuation and charging. Check or replace drive belt. Check compressor.
Cool air does not come out only at high speeds	<ul style="list-style-type: none"> ● Excessive charge of refrigerant ● Evaporator frosted 	Check charge refrigerant. Check evaporator.
Insufficient velocity of cooled air	<ul style="list-style-type: none"> ● Evaporator clogged or frosted ● Air leaking from cooling unit or air duct ● Blower motor faulty ● Wiring or grounding faulty ● Air filter element clogged 	Check evaporator. Repair as necessary. Check blower motor. Repair as necessary. Check air filter element.



QUICKLY CHECKING OF REFRIGERANT CHARGE

CHARGE OF REFRIGERANT

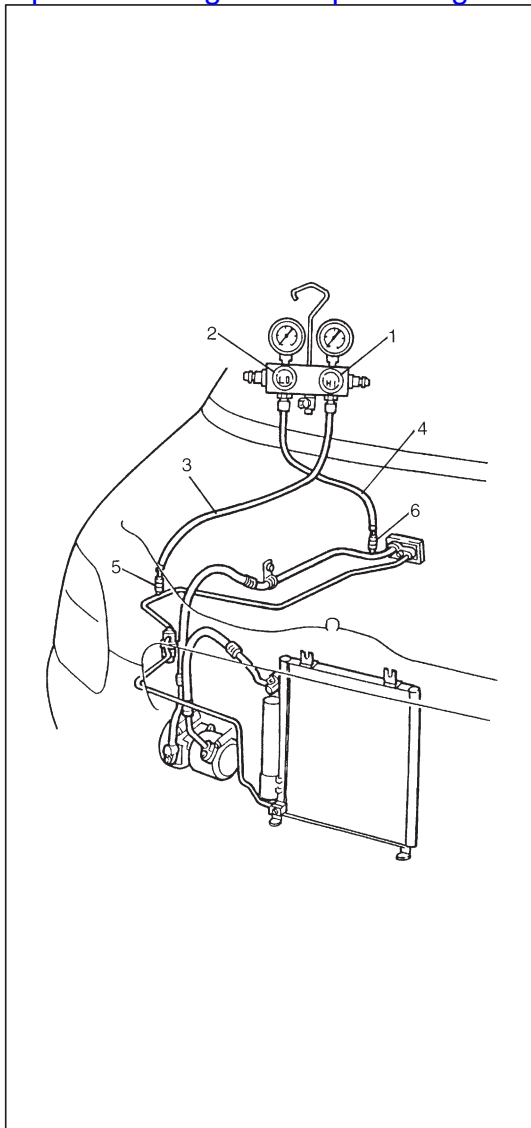
When the A/C inlet temperature is within 30 – 35°C.

The following procedure can be used for quickly checking whether the A/C system has a proper charge of refrigerant or not.

Run engine at fast idle, and operate A/C at its maximum cooling capacity for a few minutes. Then, look at the sight glass (1) on liquid pipe (2) and compare what is observed with the symptoms listed in "CHECKING REFRIGERANT CHARGE" table given below.

CHECKING REFRIGERANT CHARGE

Item No.	Symptom	Charge of refrigerant	Correction
1	Bubbles observed in sight glass	Insufficient charge of refrigerant in system	Check system for leaks with a leak tester.
2	No bubbles observed in sight glass	No or insufficient charge of refrigerant in system	Refer to the items 3 and 4.
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty system	Evacuate and charge system and then check it for leaks with a leak tester.
4	Noticeable temperature difference between compressor inlet and outlet	Proper or too much charge of refrigerant in system	Refer to the items 5 and 6.
5	When A/C is turned OFF, refrigerant in sight glass clears immediately and remains clear	Too much charge of refrigerant in system	Discharge excess charge of refrigerant to adjust it to a specified charge.
6	When A/C is turned OFF, refrigerant in sight glass once produces bubbles and then clears	Proper charge of refrigerant in system	NO CORRECTION NEEDED BECAUSE CHARGE OF REFRIGERANT IS NORMAL.

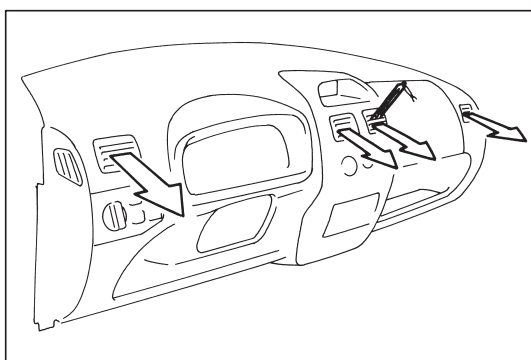
DIAGNOSIS TEST

- 1) Confirm that vehicle and environmental conditions are as follows.
 - Vehicle is not exposed to direct sun.
 - Ambient temperature is within 15°C – 35°C (59°F – 95°F).
- 2) Make sure that high pressure valve (1) and low pressure valve (2) of manifold gauge are firmly closed.
- 3) Connect high pressure charging hose (3) to high pressure service valve (5) on vehicle, and connect low pressure charging hose (4) to low pressure service valve (6) on vehicle.
- 4) Bleed the air in charging hoses (3), (4) by loosening their respective nuts on manifold gauge, utilizing the refrigerant pressure. When a hiss is heard, immediately tighten nut.

CAUTION:

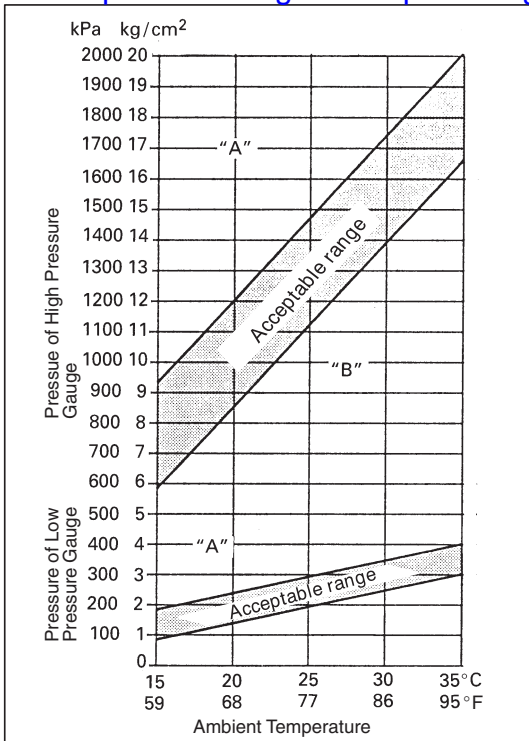
Do not interchange high and low pressure charging hoses by mistake.

- 5) Warm up engine to normal operating temperature and keep it at specified idle speed.
- 6) Turn A/C switch ON, and set blower switch at "HI", temperature control knob at "COOL", mode control knob at "FACE", fresh/circulation control lever at "CIRCULATION". (Confirm that A/C compressor and condenser fan are working.)
- 7) Keep all windows, doors and engine hood open.



A/C inlet air temperature	15 – 35°C (59 – 95°F)
Engine rpm	Keep 1500 rpm
Blower switch	Max.
Temperature control	Max. cold
Doors	All open
Air inlet damper position	Recirculation

- 8) With about 20 mm (0.8 in.) of dry bulb thermometer inserted into center duct air outlet and another one set near evaporator air inlet, read temperature indicated on each thermometer.



- 9) Check for each pressure of low side and high side if it is within shaded range of left graph.

NOTE:

Pressure registered on gauge varies with ambient temperature. Therefore, use left graphs when determining if pressures are normal or not.

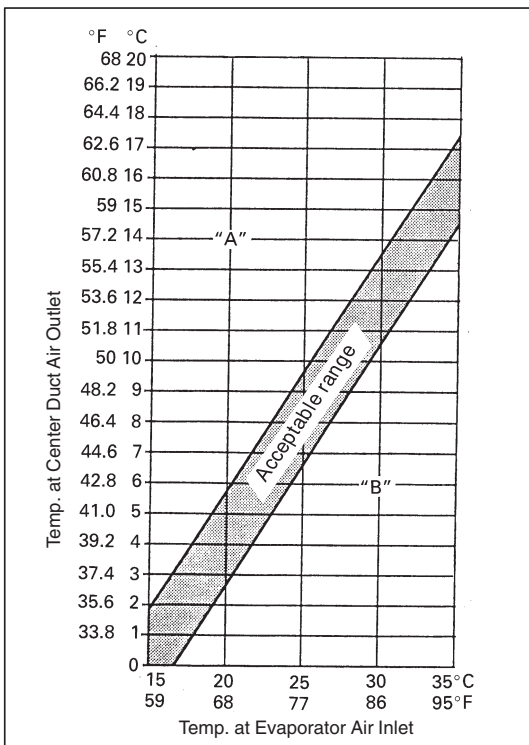
Example:

Gauges should read as follows when ambient temperature is 30°C

Pressure on high pressure gauge (HI):	1400 – 1750 kPa 14.0 – 17.5 kg/cm²
---------------------------------------	---------------------------------------

Pressure on low pressure gauge (LO):	230 – 350 kPa 2.3 – 3.5 kg/cm²
--------------------------------------	-----------------------------------

If each gauge reading is out of specified pressure, correct defective part referring to following Test Diagnosis table.



- 10) Check inlet port temperature-to-outlet port temperature relationship using graph at the left.

For example, if evaporator inlet port temperature is 25°C (77°F) and center duct air outlet temperature is 8°C (46.4°F), their crossing point is within acceptable range as shown in graph at the left.

In this case, cooling performance is satisfactory and proper.

- 11) If crossing point is out of acceptable range, diagnose trouble referring to following Test Diagnosis table.

DIAGNOSIS TEST TABLE

	TESTING RESULTS	POSSIBLE CAUSE	REMEDY
HIGH PRESSURE GAUGE	Pressure high ("A" area of high side graph)	<ul style="list-style-type: none"> ● Refrigerant overcharged ● Expansion valve frozen or clogged ● Clogged refrigerant passage of high side ● Condenser fan malfunction ● Dirty or bent condenser fins ● Compressor malfunction (Insufficient oil etc.) ● Engine overheat 	<ul style="list-style-type: none"> ● Recharge ● Check expansion valve ● Clean or replace ● Check condenser fan ● Clean or repair ● Check compressor ● Check engine cooling system
	Pressure low ("B" area of high side graph)	<ul style="list-style-type: none"> ● Insufficient refrigerant (Insufficient charge or leakage) ● Expansion valve malfunction (valve opens too wide) ● Compressor malfunction (Insufficient compression) 	<ul style="list-style-type: none"> ● Check for leakage, repair if necessary and recharge ● Check expansion valve ● Check compressor
LOW PRESSURE GAUGE	Pressure high ("A" area of high side graph)	<ul style="list-style-type: none"> ● Expansion valve malfunction (valve opens too wide) ● Compressor malfunction (Insufficient compression) 	<ul style="list-style-type: none"> ● Check expansion valve ● Check compressor
	Pressure low ("B" area of high side graph)	<ul style="list-style-type: none"> ● Insufficient refrigerant (Insufficient charge or leakage) ● Expansion valve malfunction (valve opens too narrow) ● Clogged refrigerant passage (crashed pipe) 	<ul style="list-style-type: none"> ● Check for leakage, repair if necessary and recharge ● Check expansion valve ● Repair or replace
THERMOMETER AT CENTER DUCT	Outlet air temperature at center duct is high (Crossing point is in area "A")	<ul style="list-style-type: none"> ● Insufficient or excessive charge of refrigerant ● Dirty or bent evaporator fins ● Air leakage from cooling (heater) unit or air duct ● Malfunctioning, switchover function of damper in cooling (heater) unit ● Compressor malfunction 	<ul style="list-style-type: none"> ● Check refrigerant pressure ● Clean or repair ● Repair or replace ● Repair or replace ● Check compressor
	Outlet air temperature at center duct is low (Crossing point is in area "B")	<ul style="list-style-type: none"> ● Insufficient air volume from center duct (Heater blower malfunction) ● Compressor malfunction 	<ul style="list-style-type: none"> ● Check blower motor and fan ● Check compressor

If ambient temperature is within 30 – 35°C (86 – 95°F), it is possible to do using next page table for detail diagnosis.

DETAIL DIAGNOSIS TABLE AT AMBIENT TEMPERATURE WITHIN 30 – 35°C (85 – 95°F)

MANIFOLD GAUGE ($\frac{\text{MPa}}{\text{kg/cm}^2}$ / psi)		CONDITION	CAUSE	CORRECTION
Lo	Hi			
0.23 – 0.35 (2.3 – 3.5) (33 – 50)	1.4 – 1.75 (14 – 17.5) (200 – 249)	Normal condition.	_____	_____
Negative pressure	0.5 – 0.6 (5 – 6) (71.2 – 85.3)	<ul style="list-style-type: none"> The low pressure side reads a negative pressure, and the high pressure side reads an extremely low pressure. Presence of frost around tubing to and from receiver/dryer and expansion valve. 	<ul style="list-style-type: none"> Dust particles or water droplets are either stuck or frozen inside expansion valve, preventing the refrigerant from flowing. 	<ul style="list-style-type: none"> Clean expansion valve. Replace it if it cannot be cleaned. Replace receiver/dryer. Evacuate the A/C system and recharge with fresh refrigerant.
Normal: 0.23 – 0.35 (2.3 – 3.5) (33 – 50) ↓ Abnormal: Negative pressure	Normal: 1.4 – 1.75 (14 – 17.5) (200 – 249) ↓ Abnormal: 0.69 – 0.98 (7 – 10) (100 – 142)	<ul style="list-style-type: none"> During A/C operation, the low pressure side sometimes indicates negative pressure, and sometimes normal pressure. Also high pressure side reading fluctuates between the abnormal and normal pressure. 	<ul style="list-style-type: none"> Expansion valve is frozen due to moisture in the system, and temporarily shuts off the refrigeration cycle. 	<ul style="list-style-type: none"> Replace expansion valve. Replace receiver/dryer. Evacuate A/C system and recharge with fresh refrigerant.
0.05 – 0.15 (0.5 – 1.5) (4.2 – 21.3)	0.69 – 0.98 (7 – 10) (100 – 142)	<ul style="list-style-type: none"> Both low and high pressure sides indicate low readings. Continuous air bubbles are visible through sight glass. Output air is slightly cold. 	<ul style="list-style-type: none"> Insufficient refrigerant in system. (Refrigerant leaking) 	<ul style="list-style-type: none"> Using a gas leak detector, check for leaks and repair as necessary. Recharge refrigerant to a specified amount. If the pressure reading is almost 0 when the manifold gauges are attached, check for any leaks, repair them, and evacuate the system.
0.4 – 0.6 (4 – 6) (56.9 – 85.3)		<ul style="list-style-type: none"> Pressure on low pressure side is high. Pressure on high pressure side is low. Both pressure becoming equal right after A/C is turned OFF. 	<ul style="list-style-type: none"> Internal leak in compressor. 	<ul style="list-style-type: none"> Inspect compressor and repair or replace as necessary.
0.35 – 0.45 (3.5 – 4.5) (50 – 64)	1.96 – 2.45 (20 – 25) (285 – 355)	<ul style="list-style-type: none"> High pressure reading on both low and high pressure sides. Air bubbles are not visible even when engine rpm is lowered. 	<ul style="list-style-type: none"> Overcharged A/C system. Faulty condenser cooling operation. Faulty condenser fan operation. 	<ul style="list-style-type: none"> Adjust refrigerant to specified amount. Clean condenser. Inspect and repair condenser fan.
		<ul style="list-style-type: none"> High pressure reading on both low and high pressure sides. Low pressure side tubing is not cold when touched. Air bubbles are visible through sight glass. 	<ul style="list-style-type: none"> Presence of air in A/C system. (Improperly evacuated) 	<ul style="list-style-type: none"> Replace receiver/dryer. Inspect quantity of compressor oil and presence of contaminants in oil. Evacuate system and recharge with fresh refrigerant.
0.45 – 0.55 (4.5 – 5.5) (64 – 78)		<ul style="list-style-type: none"> High pressure reading on both low and high pressure sides. Large amount of frost or dew on the low pressure side tubing. 	<ul style="list-style-type: none"> Faulty expansion valve. Refrigerant flow is not regulated properly. 	<ul style="list-style-type: none"> Replace expansion valve.

[illegible]

Fig. A

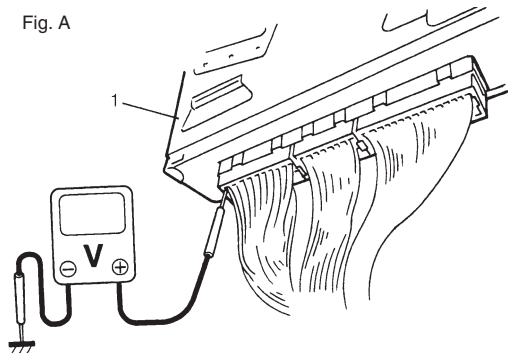
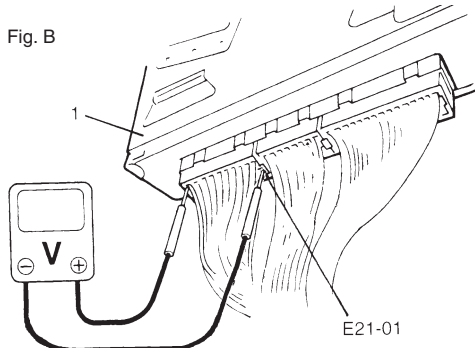


Fig. B



A/C SYSTEM INSPECTION OF ECM AND ITS CIRCUITS

ECM and its Circuits can be checked at ECM wiring couplers by measuring voltage.

CAUTION:

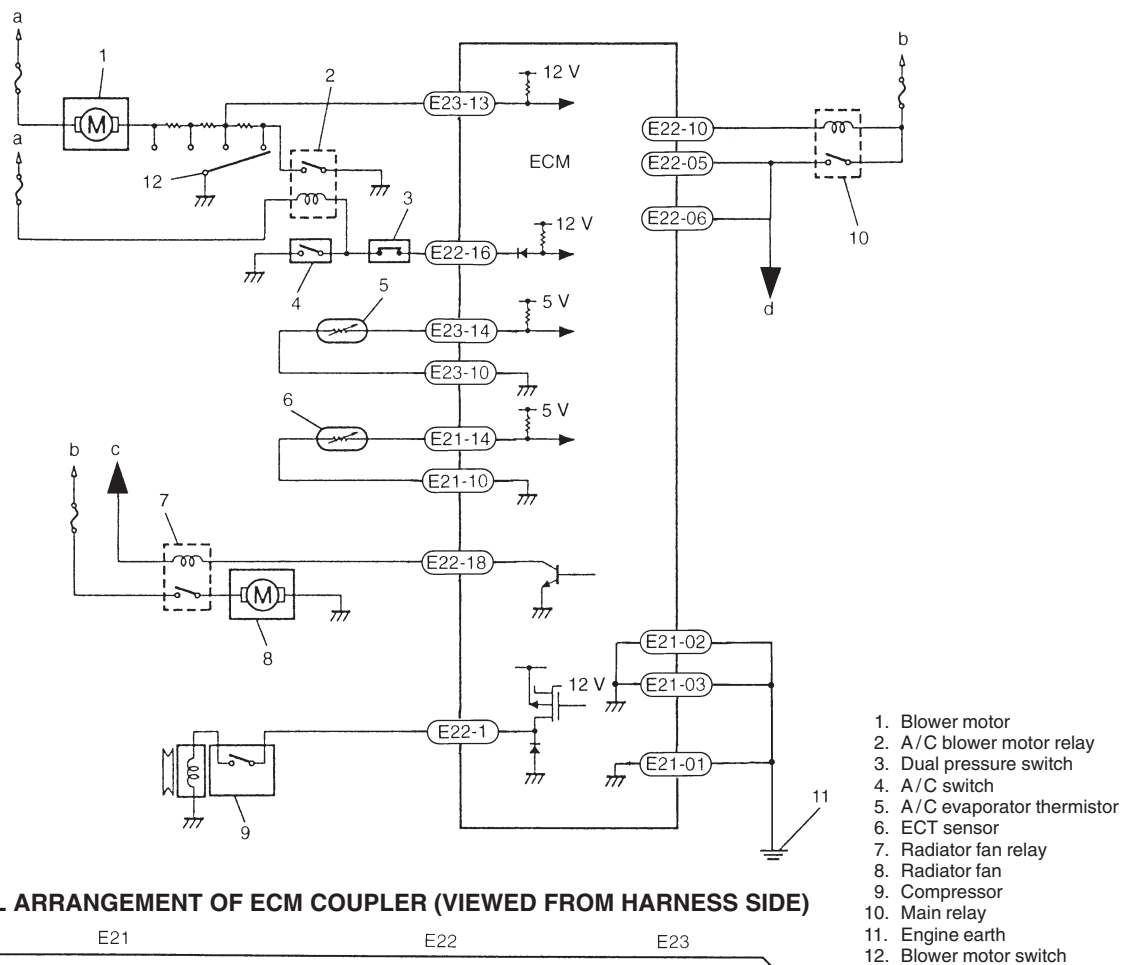
ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with couplers disconnected from it.

Voltage Check

- 1) Remove ECM (1) from vehicle.
 - 2) Connect ECM (1) couplers to ECM.
 - 3) Check voltage at each terminal of couplers connected.
- Refer to next page and "Inspection of ECM and its circuit" in ENGINE AND EMISSION CONTROL SYSTEM section.

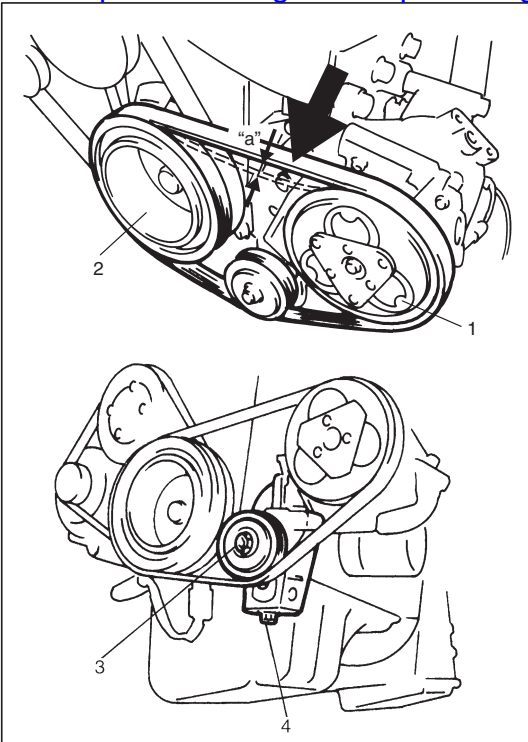
NOTE:

As each terminal voltage is affected by the battery voltage, confirm that it is 11V or more when ignition switch is ON.



ECM VOLTAGE VALUES TABLE FOR RELATION OF A/C CONTROL

Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
E21-01	B	ECM ground for sensor circuit (E21-10, E23-10)	Ground to body (Fig A)	-0.5 – 0 volt	Ignition switch ON
E21-02	B/Y	ECM ground for power circuit	Ground to body (Fig A)	-0.5 – 0 volt	Ignition switch ON
E21-03	B/Y	ECM ground for power circuit	Ground to body (Fig A)	-0.5 – 0 volt	Ignition switch ON
E21-10	Br/W	Sensor ground	Ground to body (Fig A)	-0.5 – 0 volt	Ignition switch ON
E21-14	Y/G	Engine coolant temperature sensor input	Ground to engine (Fig B)	0.71 – 0.76 volts (290 – 320 Ω)	Engine coolant temperature at Approx. 80°C (176°F) with ignition ON
				0.35 – 0.37 volts (136 – 144 Ω)	Engine coolant temperature at Approx. 110°C (230°F) with ignition ON
E22-01	B/Y	Compressor magnet clutch output	Ground to engine (Fig B)	10 – 14 volts	Blower switch and A/C switch ON with engine running
				0 – 1 volt	Except the above-mentioned with engine running
E22-05	B/R	Power supply for engine control	Ground to engine (Fig B)	10 – 14 volts	Ignition switch ON
E22-06	B/R	Power supply for engine control	Ground to engine (Fig B)	10 – 14 volts	Ignition switch ON
E22-10	Bl/B	Main relay	Ground to engine (Fig B)	0 – 1 volt	Ignition switch ON
				10 – 14 volts	Ignition switch OFF
E22-16	Lg/R	A/C switch input	Ground to engine (Fig B)	0 – 1 volt	Blower switch and A/C switch ON with ignition switch ON
				10 – 14 volts	Blower switch or A/C switch OFF with ignition switch ON
E22-18	Bl	Radiator (condenser) cooling fan relay output	Ground to engine (Fig B)	0 – 1 volt	Blower switch and A/C switch ON or engine coolant temp. sensor more than 98°C (208°F) with engine running
				10 – 14 volts	Except the above-mentioned with engine running
E23-10	Br/W	Sensor ground	Ground to body (Fig A)	-0.5 – 0 volt	Ignition switch ON
E23-13	P/Bl	Blower fan speed input	Ground to engine (Fig B)	0 – 2 volt	Blower switch 2nd or 3rd or 4th position with ignition switch ON
				3 – 5 volts	Blower switch 1st position with ignition switch ON
				10 – 14 volts	Blower switch OFF position with ignition switch ON
E23-14	G/R	Evaporator thermistor temp. input	Ground to engine (Fig B)	2.0 – 2.3 volts (1800 – 2200 Ω)	Evaporator thermistor temp. at Approx. 25°C (77°F) with ignition switch ON
				3.5 – 3.6 volts (6300 – 7000 Ω)	Evaporator thermistor temp. at Approx. 0°C (32°F) with ignition switch ON

A/C COMPRESSOR DRIVE BELT INSPECTION

- 1) Check belt for wear and cracks, and replace as required.
- 2) Check belt tension by measuring how much it deflects when pushed at intermediate point between compressor pulley (1) and crankshaft pulley (2) with about 100 N (10 kg, 22 lbs) force.

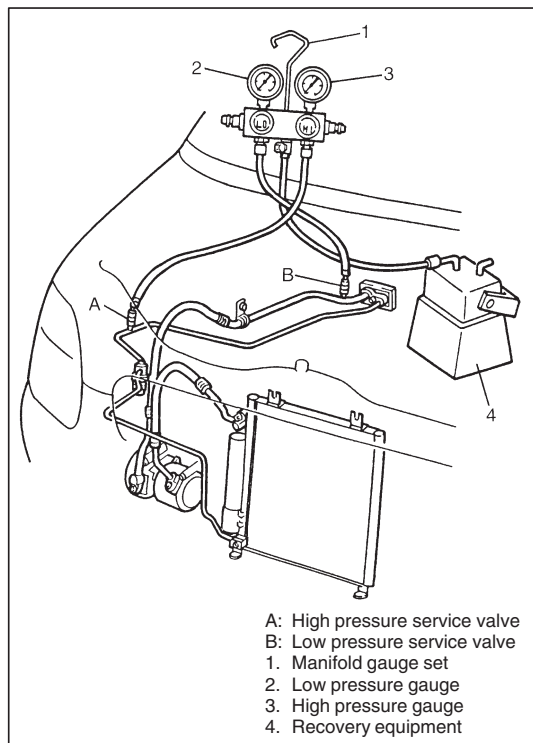
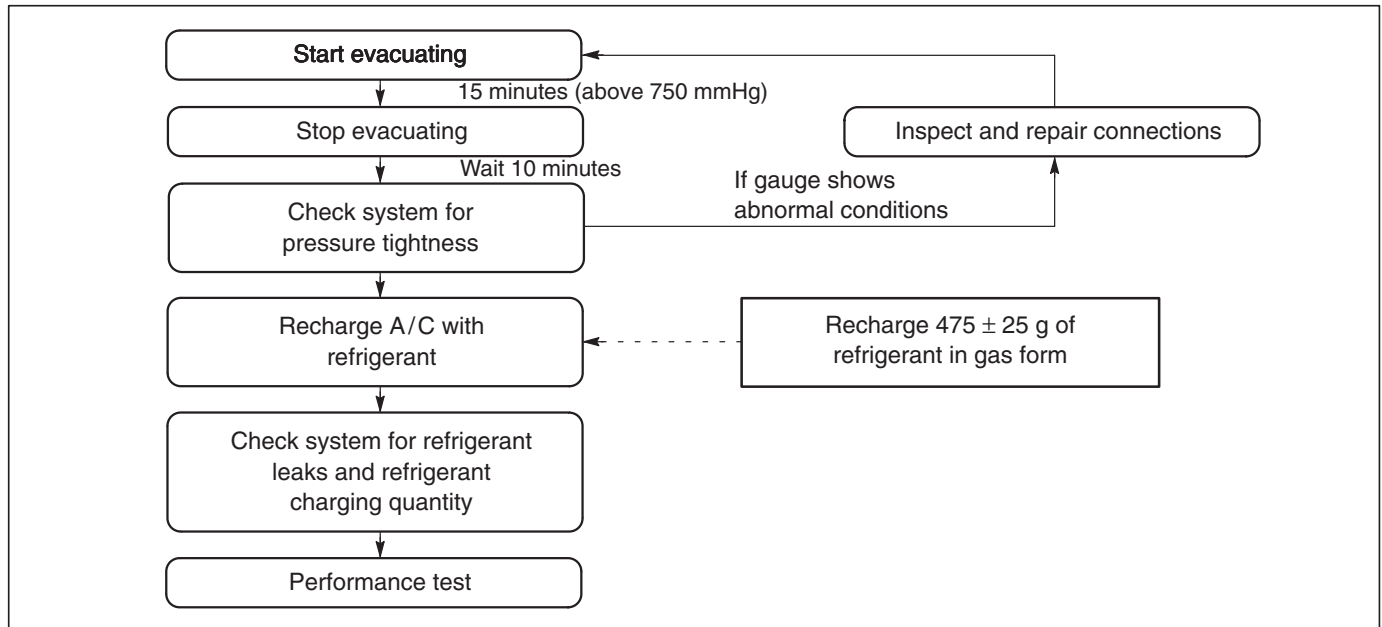
**“a” : 7 – 9 mm (0.27 – 0.35 in.) as deflection/
100N (10 kg, 22 lbs)**

If belt tension is without above specification, adjust belt tension by according to following items.

- i) Loosen tension pulley bolt (3).
- ii) Adjust belt tension by tighten or loosen tension pulley adjust bolt (4).
- iii) Tighten tension pulley bolt (3).
- iv) Turn the crank pulley one revolution, then check belt tension.

RECOVERY, EVACUATION AND CHARGING

OPERATION PROCEDURE FOR CHARGING A/C WITH REFRIGERANT



REFRIGERANT RECOVERY

When discharging refrigerant out of A/C system, always recover it by using refrigerant recovery and recycling equipment. Discharging it into atmosphere would cause adverse effect to environments.

NOTE:

When handling recovery and recycling equipment, be sure to follow the instruction manual for the equipment.

EVACUATING AND CHARGING

Refer to AIR CONDITIONING BASIC MANUAL (99520-02130).

NOTE:

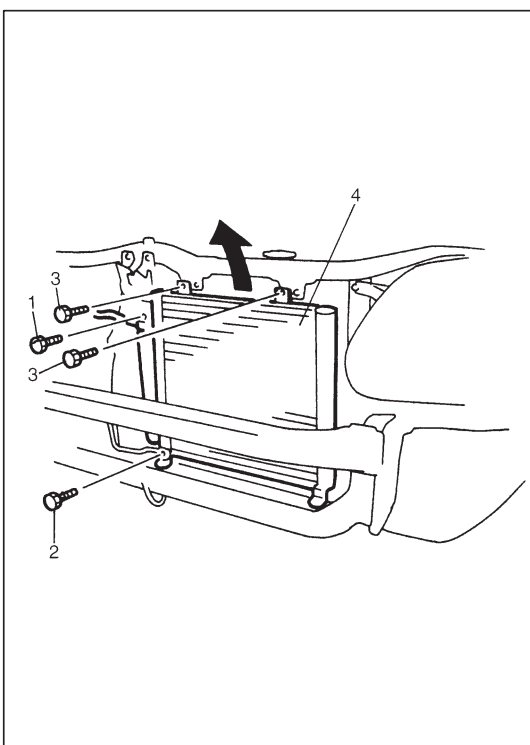
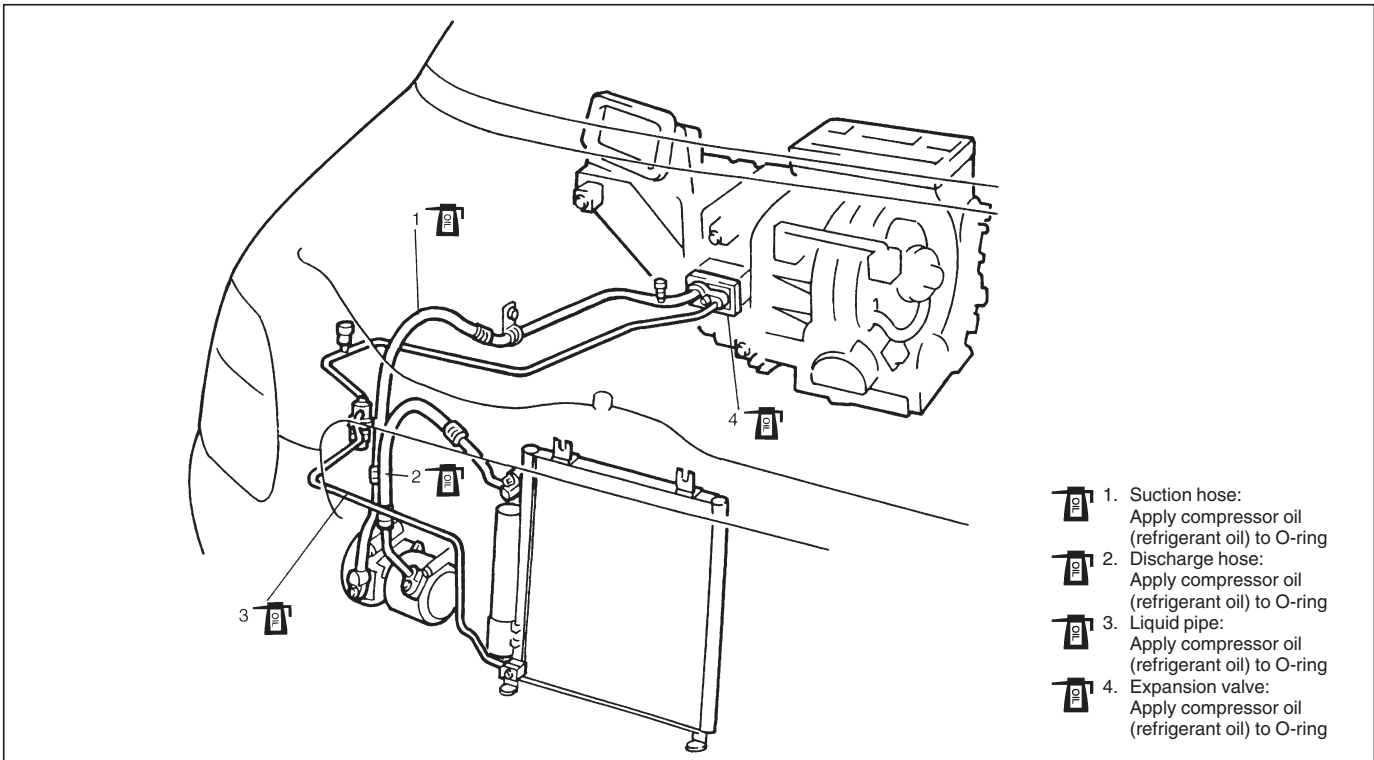
Specified amount of refrigerant: 475 ± 25 g

ON-VEHICLE SERVICE

NOTE:

When refrigerant line must be disconnected and connected to remove and reinstall any component of A/C system, be sure to observe the following instructions.

- When disconnecting any line from the system, install a blinding plug or cap to fitting of such line immediately.
- When connecting hoses and pipes to each other respectively, previously apply a few drops of compressor oil (refrigerating oil) to O-ring.



A/C CONDENSER ASSEMBLY

REMOVAL

- 1) Disconnect negative (–) cable at battery.
- 2) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 3) Remove front bumper. Refer to FRONT BUMPER in BODY SERVICE Section.
- 4) Loosen discharge hose bolt (1) and liquid pipe bolt (2).
- 5) Loosen condenser mounting bolts (3).
- 6) Remove condenser assembly (4).

INSTALLATION

Reverse removal sequence to install condenser, noting the following point.

- If replace condenser, pour 15 cc of refrigerating oil to compressor suction-side.
- Evacuate and charge system according to previously described procedure.

INSPECTION

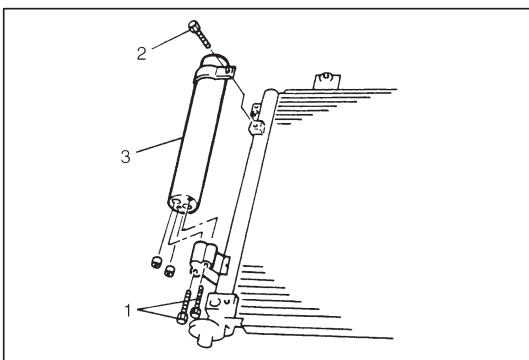
Check the following.

- Condenser fins for leakage, blockage and damage
- Condenser fittings for leakage

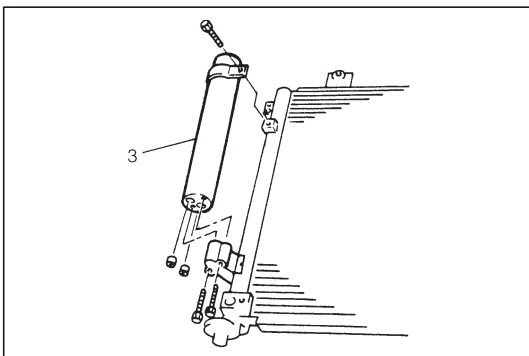
Clogged condenser fins should be washed with water, and should be dried with compressed air.

NOTE:

Be careful not to damage condenser fins. If condenser fin is bent, straighten it by using a screwdriver or pair of pliers. If any leakage is found from fitting or tube, repair or replace condenser.

**RECEIVER/DRYER****REMOVAL**

- 1) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 2) Remove A/C condenser assembly. Refer to A/C condenser assembly in this section.
- 3) Loosen receiver/dryer attachment bolts (1), (2).
- 4) Remove receiver/dryer (3).

**INSTALLATION**

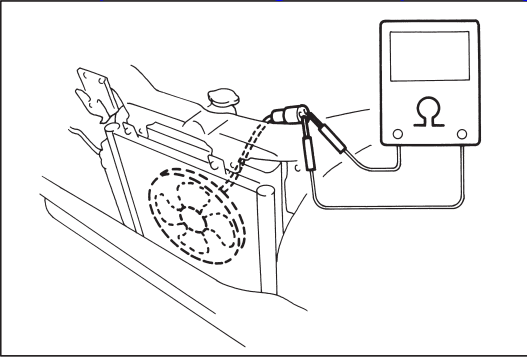
Reverse removal sequence to install receiver/dryer noting the following points.

- If receiver/dryer (3) is replaced, pour 20 cc of refrigerating oil to compressor suction-side.
- Evacuate and charge system according to previously described procedure.

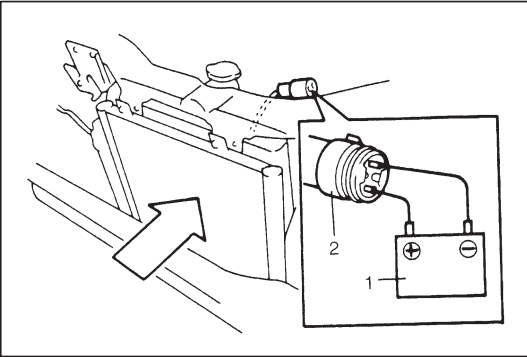
RADIATOR (AND CONDENSER) COOLING FAN MOTOR

INSPECTION

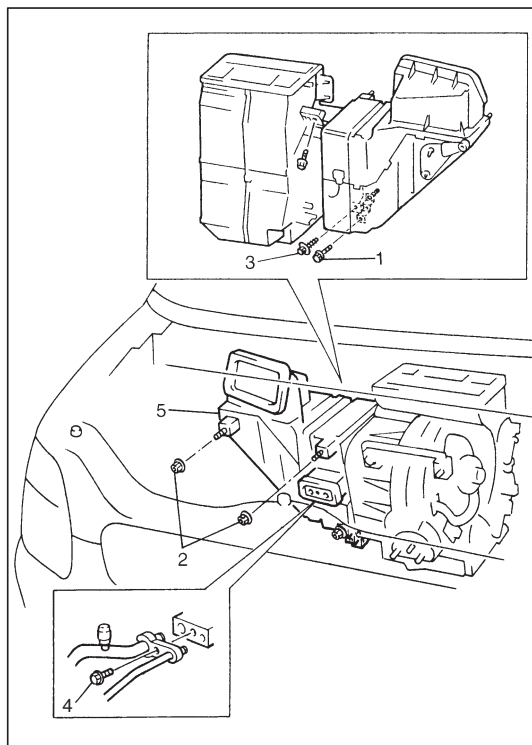
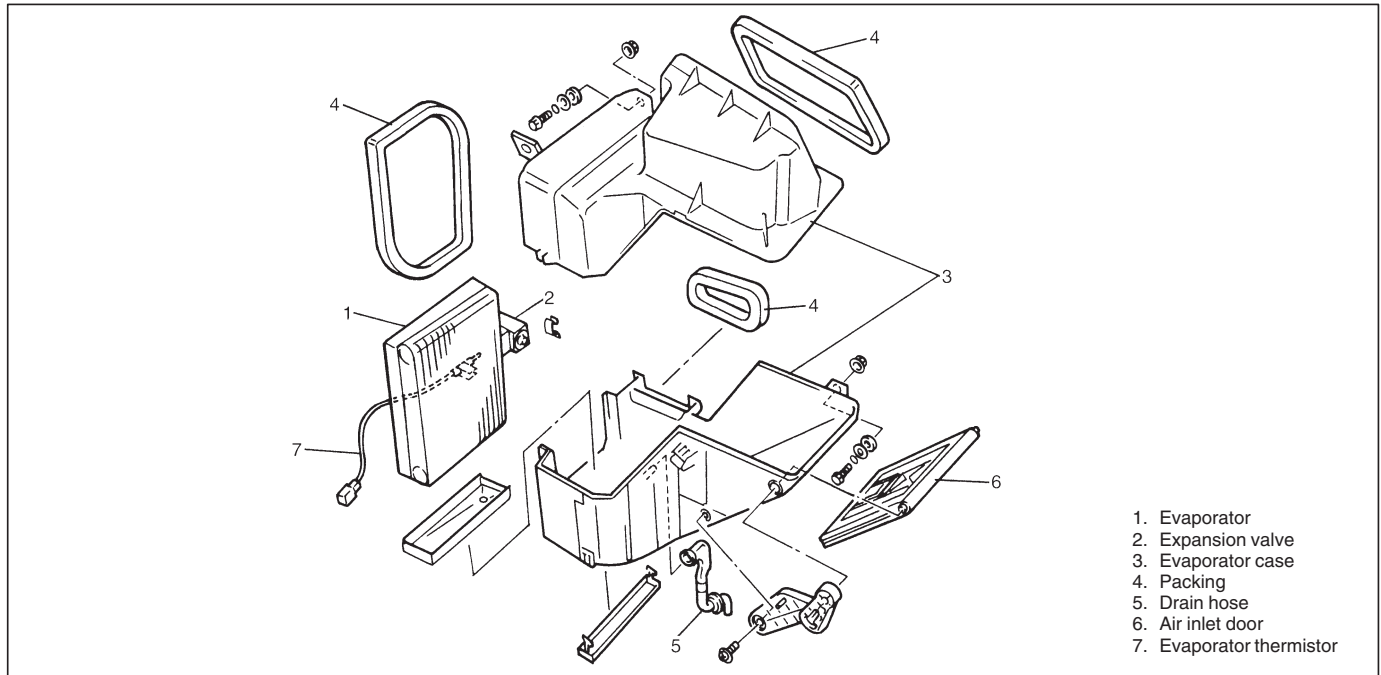
- 1) Check continuity between each two terminals.
If there is no continuity, replace radiator (and condenser) cooling fan motor.



- 2) Connect battery (1) to radiator (and condenser) cooling fan motor coupler (2) as shown in figure, then check that the radiator (and condenser) cooling fan motor operates smoothly.
If radiator (and condenser) cooling fan motor does not operate smoothly, replace motor.



Reference current data: Approx. 8.5 – 11.5 A at 12 V

COOLING UNIT (EVAPORATOR)**REMOVAL**

- 1) Disconnect negative (–) cable at battery.
- 2) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 3) Disable air bag system, if equipped.
- 4) Remove heater control cable, main harness clamp.
- 5) Loosen suction hose & liquid pipe bolt (4).
- 6) Loosen cooling unit bolt (1), nuts (2) and screw (3) as shown in figure.
- 7) Remove cooling unit (5).

INSPECTION

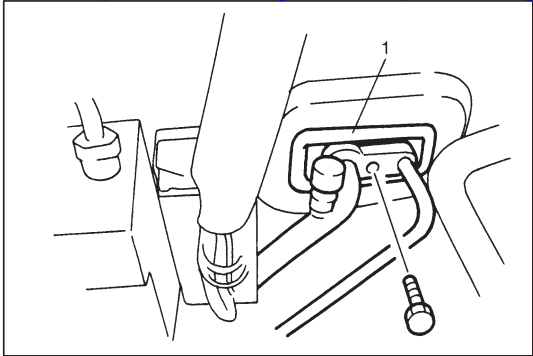
Check the following

- Evaporator fins for leakage, blockage and damage.
- Evaporator fitting for leakage.

Clogged evaporator fins should be washed with water, and should be dried with compressor air.

NOTE:

Be careful not to damage evaporator fins. If evaporator fin is bent, straighten it by using a screwdriver or pair of pliers. If any leakage is found from fitting or tube, repair or replace evaporator.

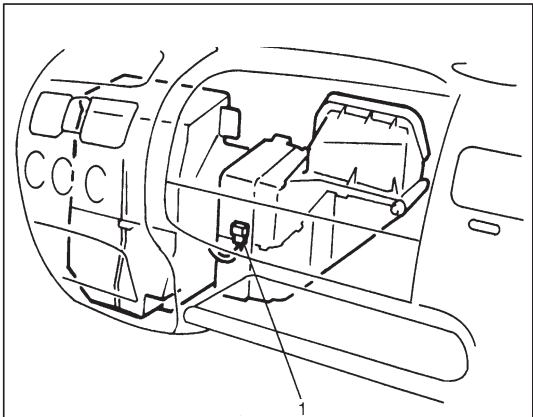


INSTALLATION

Reverse removal sequence to install cooling unit, noting the following points.

- If cooling unit or evaporator is replaced, pour 25 cc of refrigerating oil to compressor suction-side.
- Install uniformly the padding (1) to installation hole.

- Evacuate and charge system according to previously described procedure.
- Adjust heater control cable, refer to HEATER CONTROL LEVER ASSEMBLY in HEATER AND VENTILATION section.
- Enable air bag system, if equipped.



A/C EVAPORATOR THERMISTOR

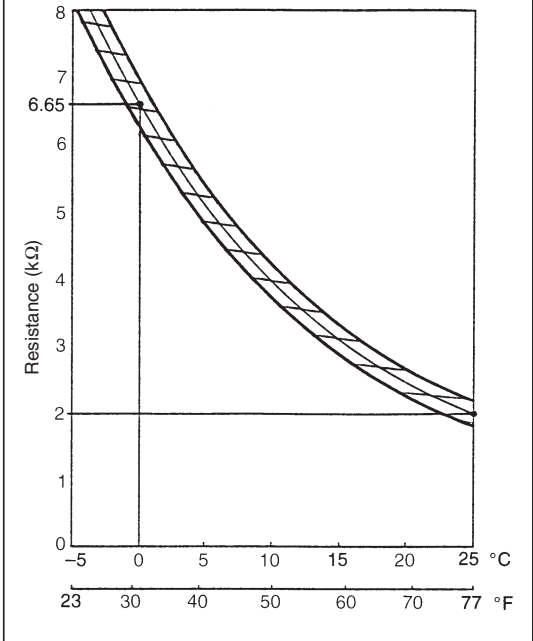
Check resistance between evaporator thermistor (1) terminals.

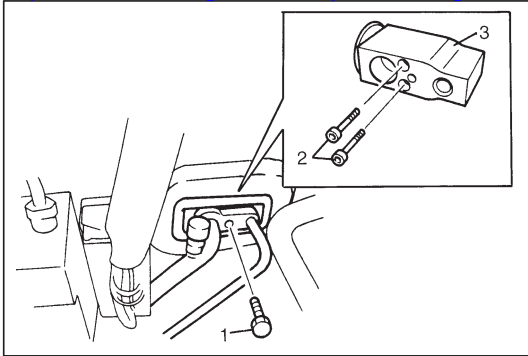
Sensor Temperature (°C (°F))	Resistance (kΩ)
0 (32)	6.3 – 7.0
25 (77)	1.8 – 2.2

If check results are as not specified, replace evaporator thermistor.

NOTE:

When the evaporator thermistor removed, its should be reinstalled in original position.





EXPANSION VALVE

INSPECTION

Refer to "Troubleshooting Procedure Using Manifold Gauge Set" earlier in this section for inspection.

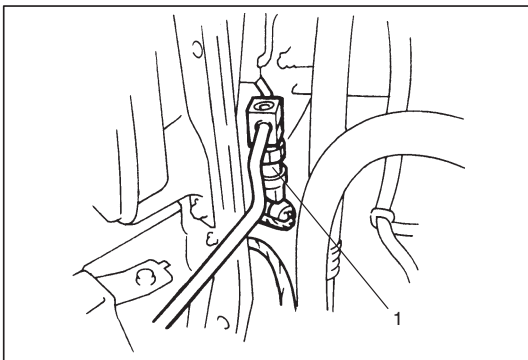
REMOVAL

- 1) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 2) Loosen liquid pipe mounting bolt (1).
- 3) Loosen expansion attaching bolts (2) and remove expansion valve (3).

INSTALLATION

Reverse removal procedure for installation, noting the following points.

- Apply compressor oil to expansion valve O-ring and connecting hose and pipe O-ring.
- Evacuate and charge system according to previously described procedure.



DUAL PRESSURE SWITCH

INSPECTION

- 1) Check dual pressure switch (1) for continuity at normal temperature (approx. 25°C (77°F)) when A/C system has a proper charge of refrigerant and when A/C system (compressor) is under operation. In each of these cases, switch should show proper continuity.

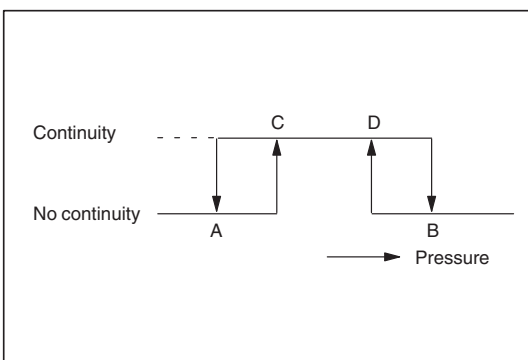
- 2) Check switch for continuity at specified pressure as shown.

A: Approx 200 KPa (2.0 kg/cm²)

B: Approx 3200 KPa (32 kg/cm²)

C: Approx 230 KPa (2.3 kg/cm²)

D: Approx 2800 KPa (28 kg/cm²)



REMOVAL

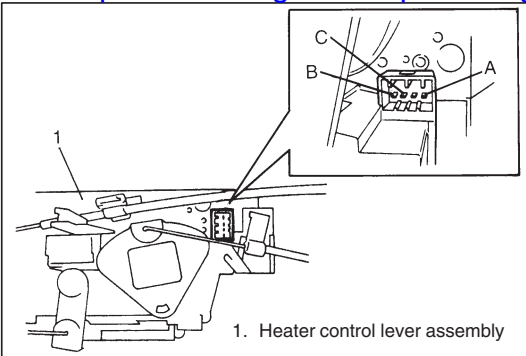
- 1) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 2) Disconnect negative (-) cable at battery.
- 3) Remove dual pressure switch.

INSTALLATION

Reverse removal procedure for installation, noting the following points.

- Apply compressor oil to dual pressure switch O-ring.
- Evacuate and charge system according to previously described procedure.

Tightening torque for pressure sensor
11 N·m (1.1 kg-m, 8.0 lb-ft)



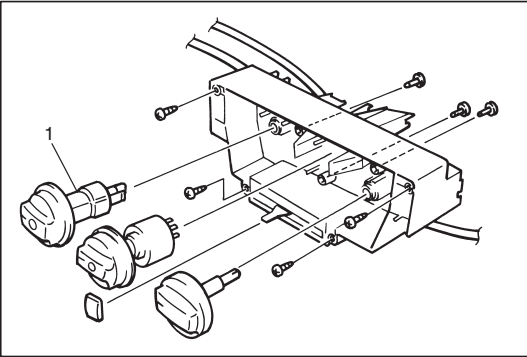
A/C SWITCH

INSPECTION

- 1) Remove heater control lever assembly, refer to "HEATER CONTROL LEVER ASSEMBLY" in Section 1A.
- 2) Check following points for A/C switch.
 - Pull A/C Switch nob and check it there is continuity between terminals "A" and "B".
 - With battery voltage (+) connected to terminal "C" and (-) to terminal "A", pull A/C Switch nob and check it indicator lamp lights.

REMOVAL AND INSTALLATION

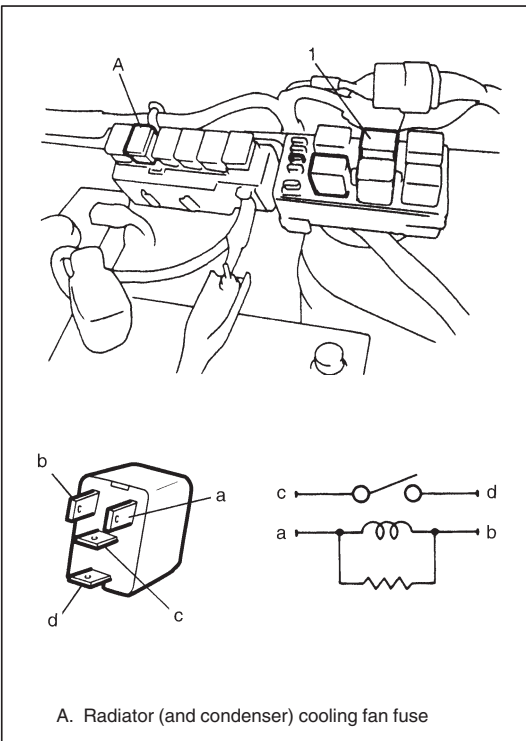
Refer to "HEATER CONTROL LEVER ASSEMBLY" in Section 1A for A/C Switch (1) removal and installation.



RADIATOR (AND CONDENSER) COOLING FAN RELAY

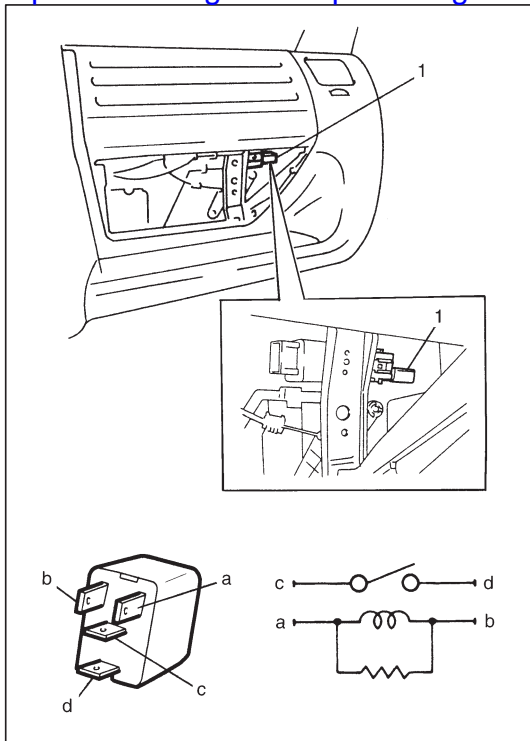
INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Remove radiator cooling fan relay (1) from vehicle.
- 3) Check that there is no continuity between terminal "c" and "d". If there is continuity, replace relay.
- 4) Connect battery positive (+) terminal to terminal "b" of relay. Connect battery negative (-) terminal "a" of relay. Check continuity between terminal "c" and "d". If there is no continuity when relay is connected to the battery, replace relay.



A/C BLOWER FAN RELAY**INSPECTION**

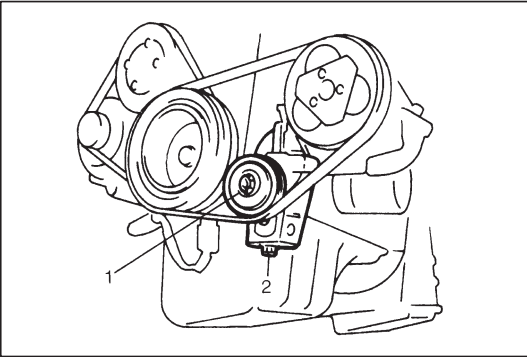
- 1) Disconnect negative cable at battery.
- 2) Remove A/C blower fan relay (1) from vehicle.
- 3) Check that there is no continuity between terminal "c" and "d".
If there is continuity, replace relay.
- 4) Connect battery positive (+) terminal to terminal "b" and connect battery negative terminal to terminal "a".
Check continuity between terminal "c" and "d".
If there is no continuity when relay is connected to the battery, replace relay.



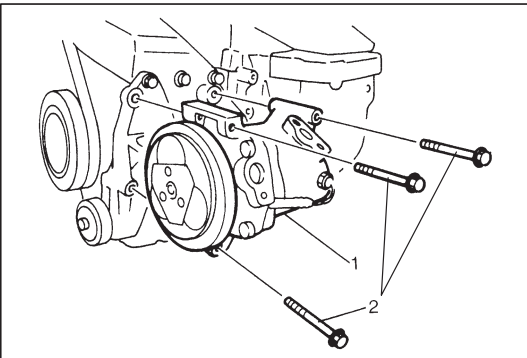
COMPRESSOR

REMOVAL

- 1) RUN engine at idle speed with air conditioning ON for 10 minutes. After that stop the engine.
- 2) Disconnect negative (–) cable at battery.
- 3) Recover refrigerant from refrigeration system by using recovery and recycling equipment.



- 4) Remove front bumper.
- 5) Remove engine front cover.
- 6) Disconnect magnet clutch lead wire and undo lead wire clamp.
- 7) Remove compressor drive belt by loosening tension pulley bolt (1) and adjust bolt (2).

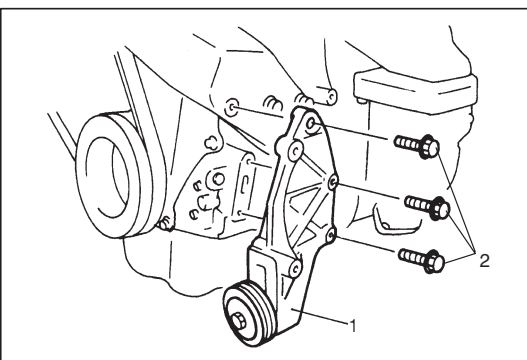


- 8) Disconnect suction and discharge hoses from compressor.

NOTE

Cap open fittings immediately to keep moisture out of system.

- 9) Remove compressor with magnet clutch assembly (1) from its mount by loosening mounting bolts (2).
- 10) If compressor is replaced.
Drain oil from compressor, and measure its amount.

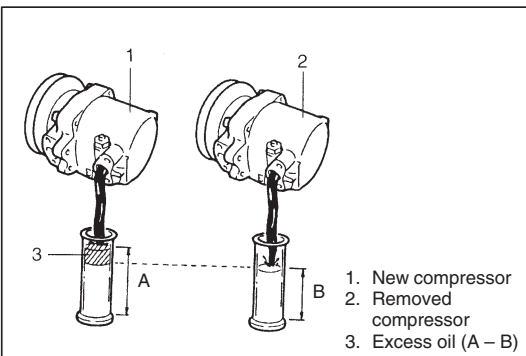


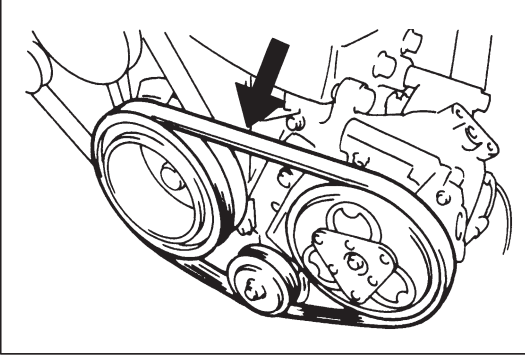
- 11) Remove compressor mount (1) by loosening mount bolts (2).

INSTALLATION

Reverse removal procedure noting the following point.

- If compressor is replaced, pour new compressor oil with the same amount as that drained from compressor in REMOVAL.
Refer to "REPLENISHING COMPRESSOR OIL" in this section.
- Evacuate and charge system according to previously described procedure.





- Adjust drive belt tension. Refer to "DRIVE BELT INSPECTION" in this section.

CAUTION:

Be sure to use HFC-134a (R-134a) compressor oil.

NOTE:

Compressor assembly supplied from factory is filled up with the following amount of oil.

Oil amount in compressor: 120 cm³ (120 cc, 7.5 in³)

REPLENISHING COMPRESSOR OIL

When replacing air conditioning parts with new ones, it is necessary to replenish oil by the amount supposedly remaining in each part.

When changing gas only

When it is unavoidable to change gas without replacing any component part for engine removal and installation or for some other reason, replenish 50 cc oil. When replenishing gas only, oil replenishment is not necessary.

When replacing compressor

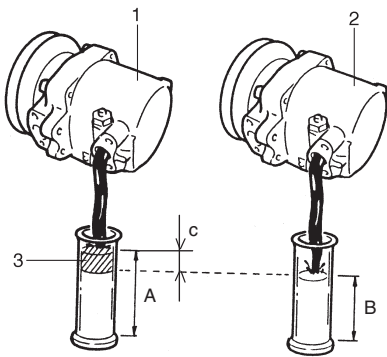
Compressor oil is sealed in each new compressor by the amount required for air conditioner cycle. Therefore, when using a new compressor for replacement, drain oil from it by the amount calculated as follows.

$$"C" = "A" - "B"$$

"C": Amount of oil to be drained

"A": Amount of oil sealed in a new compressor

"B": Amount of oil remaining in removed compressor



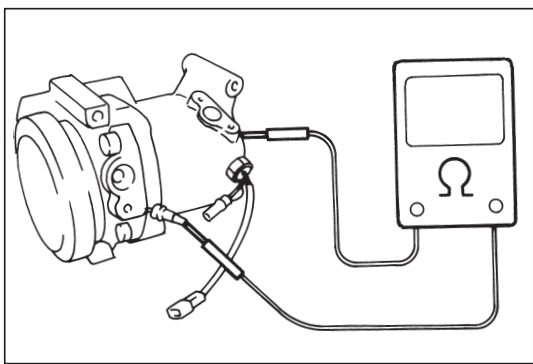
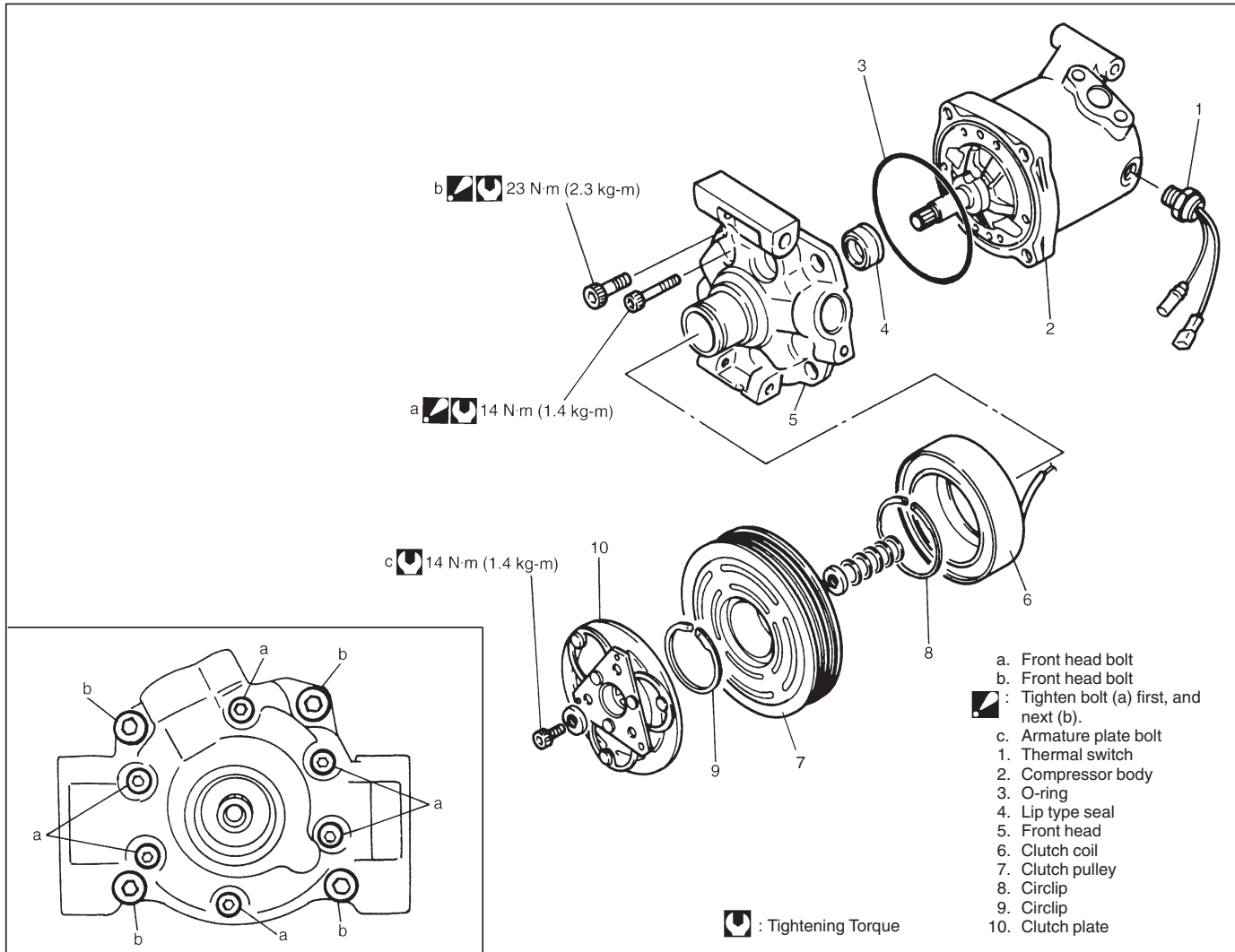
1. New compressor
2. Removed compressor
3. Excess oil (A - B)

When replacing other part

Part replaced	Amount of compressor oil to be replenished
Evaporator	25 cc
Condenser	15 cc
Receiver/dryer	20 cc
Hoses	10 cc each
Pipes	10 cc each

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MAGNET CLUTCH

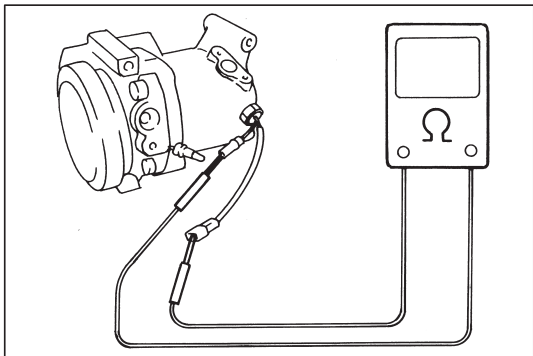


INSPECTION

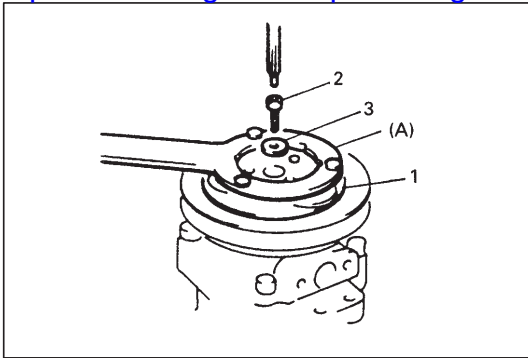
- Check clutch plate and clutch pulley for wear and oil soaked conditions respectively.
- Check clutch pulley bearing for noise, wear and grease leakage.
- Measure clutch coil for resistance at 20°C.

Standard Resistance: 3.4 – 4.1 Ω

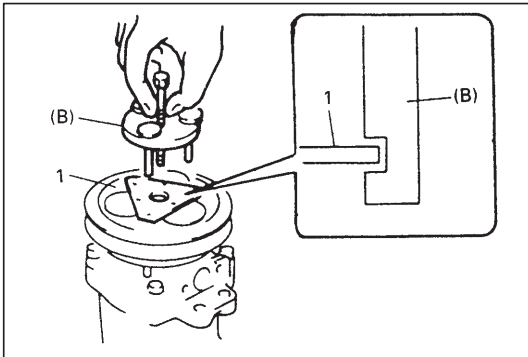
If the measured resistance does not remain within above tolerance, replace magnet clutch assembly.



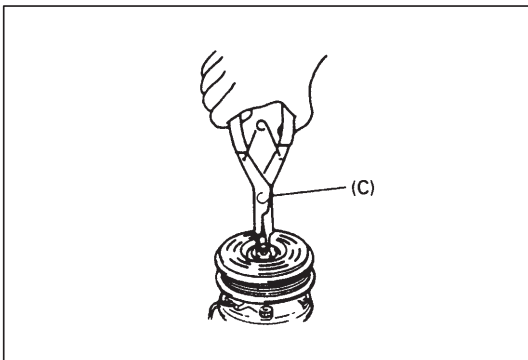
- Use an ohmmeter to check thermal switch for continuity. If it is no continuity, replace it.

**REMOVAL**

- 1) Remove compressor from vehicle. Refer to COMPRESSOR in this section.
- 2) Fix clutch plate (1) with special tool (A) and remove clutch plate bolt (2) and washer (3).

Special Tool**(A): 09991-06020**

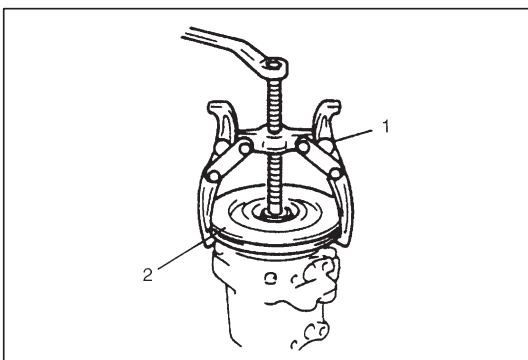
- 3) Using special tool (B) if necessary, remove clutch plate (1).

Special Tool**(B): 09991-06030**

- 4) Remove shims from shaft.
- 5) Using special tool (C), remove circlip.

Special Tool**(C): 09900-06107**

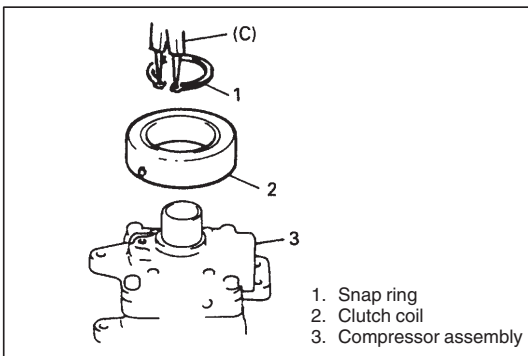
- 6) Remove clutch coil read wire clamp by loosening its screw and disconnect clutch coil read wire from thermal switch read wire.



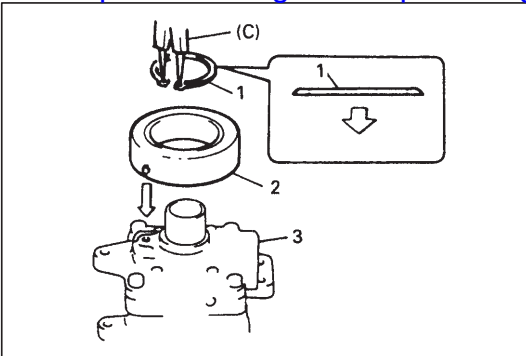
- 7) Remove clutch pulley (2) with puller (1).

NOTE:**Be careful not to damage pulley when tapping clutch pulley.**

- 8) Remove clutch coil.



- 9) Remove circlip (1) by using special tool (C).
- 10) Remove clutch coil (2) from compressor (3).

**INSTALLATION**

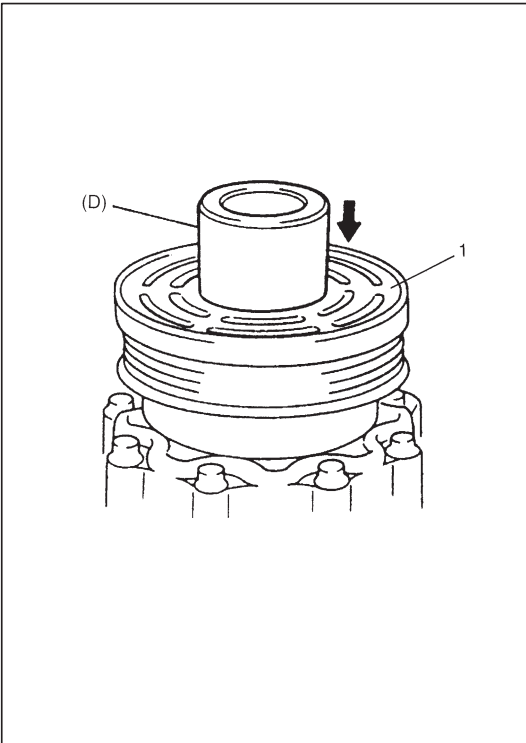
- 1) Install clutch coil (2).

Protrusion on under side of clutch coil must match hole in compressor (3) to prevent movement and correctly locate lead wire.

- 2) Using special tool (C), install circlip (1) as shown.

Special Tool

(C): 09900-06107



- 3) Install clutch pulley (1).

(I) Set clutch pulley (1) squarely over clutch pulley installation boss.

(II) Place special tool (D) onto clutch coil bearing.

Ensure that edge rests only on inner race of bearing.

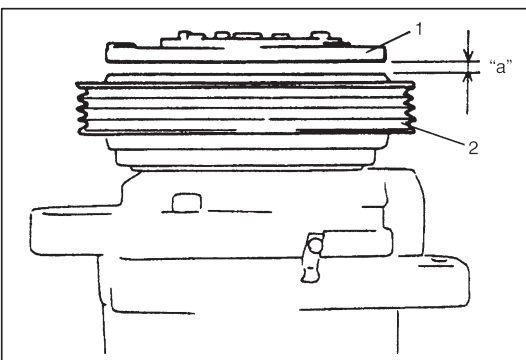
(III) Install circlip.

Special Tool

(D): 09991-06010

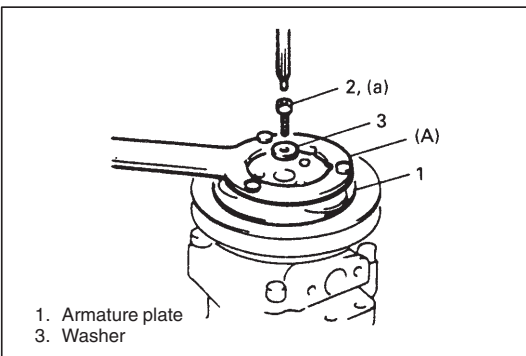
CAUTION:

Be careful not to scratch bearing seal.



- 4) Adjust clearance, between clutch plate (1) and clutch pulley (2) by putting shim on compressor shaft.

Standard clearance "a": 0.3 – 0.6 mm (0.012 – 0.024 in.)



- 5) Tighten new clutch plate bolt (2) as specified below.

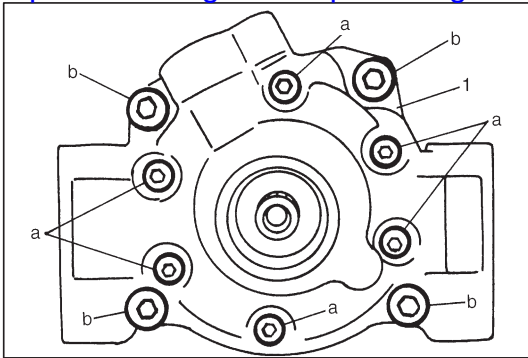
Tightening Torque

(a): 14 N·m (1.4 kg·m, 10.5 lb·ft)

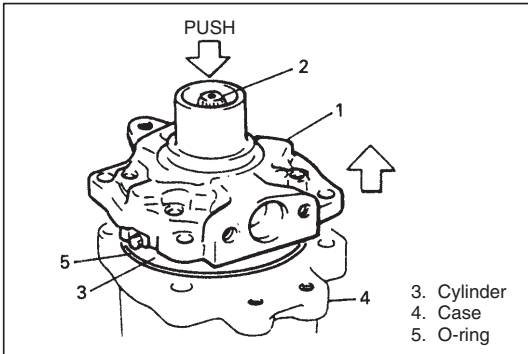
Special Tool

(A): 09991-06020

1. Armature plate
3. Washer

**LIP SEAL****REMOVAL**

- 1) Remove magnet clutch, referring to "MAGNET CLUTCH" in this section.
- 2) Remove front head (1) mounting bolts (a), (b).

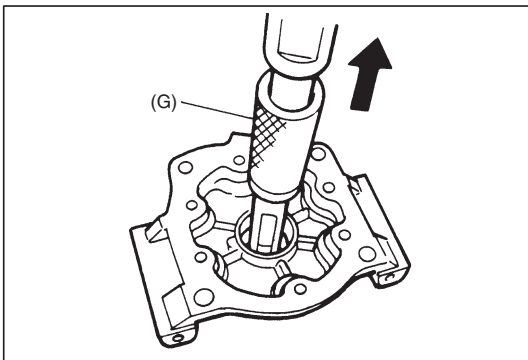


- 3) Remove front head (1) by pushing cylinder shaft (2).

NOTE:

Be careful not to remove cylinder from front head.

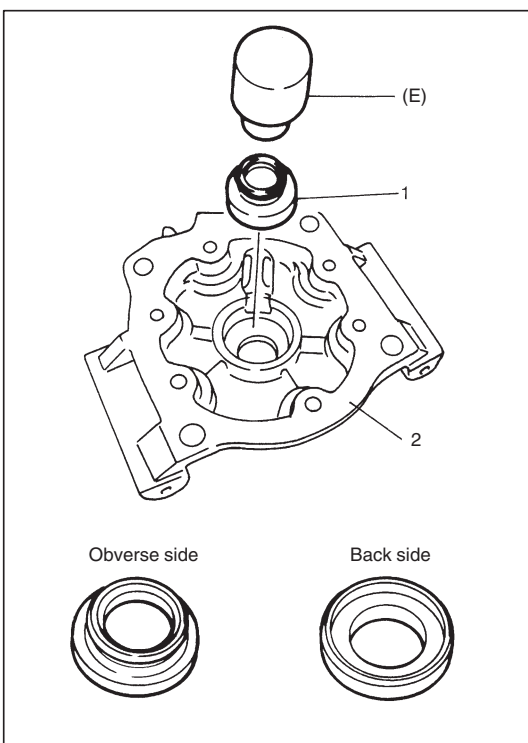
- 4) Remove O-ring.



- 5) Remove lip seal from front head using special tool (G).

Special Tool

(G): 09923-73210

**INSTALLATION**

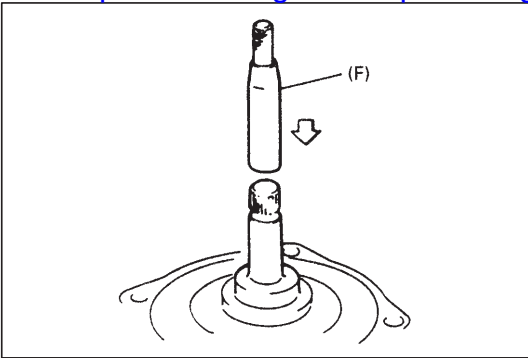
- 1) Press-fit lip seal (1) into front head (2) using special tool (E).

Special Tool

(E): 09991-06050

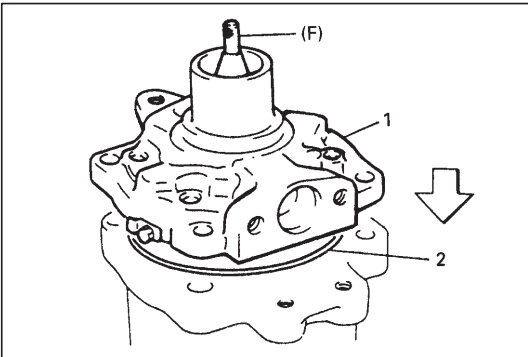
CAUTION:

Do not reuse mechanical seal once removed from compressor.



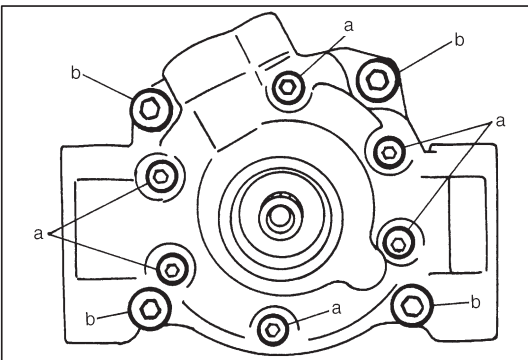
- 2) Coat special tool (F) surface with oil and place it on the shaft.

Special Tool
(F): 09991-06040



- 3) Install O-ring (2) to case.
4) Apply compressor oil to lip seal and O-ring.
5) Install front head (1).

Special Tool
(F): 09991-06040



- 6) Tighten front head mounting bolts (a), (b).

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

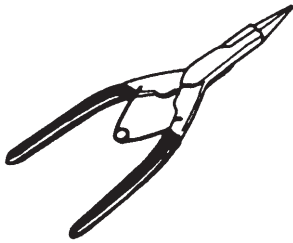
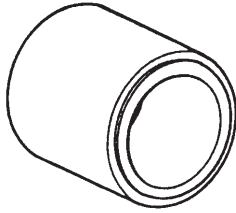
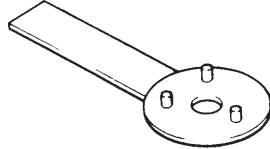
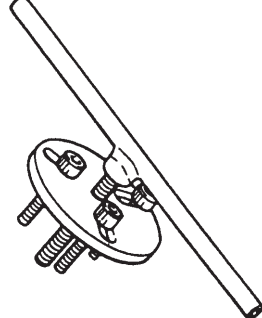
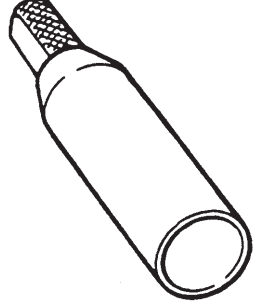
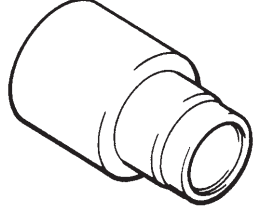
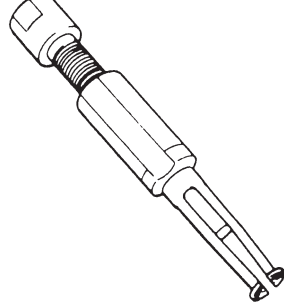
NOTE:

- Be sure to use new front head mounting bolts.
- Tighten bolt (a) first, and next (b).

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Compressor oil (Refrigerant oil)	COMPRESSOR OIL RS20 (150 cc) 99000-99088	<ul style="list-style-type: none"> ● O-ring ● Each Component
Refrigerant	REFRIGERANT DRUM (200 g) 95794-50G00	<ul style="list-style-type: none"> ● Refrigerant charge

SPECIAL TOOLS

 <p>09900-06107 Snap ring pliers (Opening type)</p>	 <p>09900-06010 Magnet clutch pulley installer</p>	 <p>09991-06020 Armature plate spanner</p>	 <p>09991-06030 Armature plate remover</p>
 <p>09991-06040 Lip type seal protector</p>	 <p>09991-06050 Lip type seal installer</p>	 <p>09923-73210 Bearing remover</p>	

SECTION 3**STEERING, SUSPENSION, WHEELS AND TIRES**

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FRONT END ALIGNMENT	SECTION 3A
MANUAL RACK AND PINION	SECTION 3B
ELECTRICAL POWER STEERING (P/S) SYSTEM (IF EQUIPPED)	SECTION 3B1
AIR BAG STEERING WHEEL AND COLUMN	SECTION 3C
FRONT SUSPENSION	SECTION 3D
REAR SUSPENSION	SECTION 3E
WHEELS AND TIRES	SECTION 3F

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TIRE DIAGNOSIS	3-6
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Radial Tire Waddle	3-6
Radial Tire Lead	3-8
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DIAGNOSIS**GENERAL DIAGNOSIS**

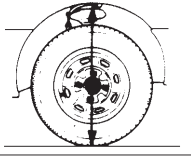
Since the problems in steering, suspension, wheels and tires involve several systems, they must all be considered when diagnosing a complaint. To avoid using the wrong symptom, always road test the vehicle first. Proceed with the following preliminary inspection and correct any defects which are found.

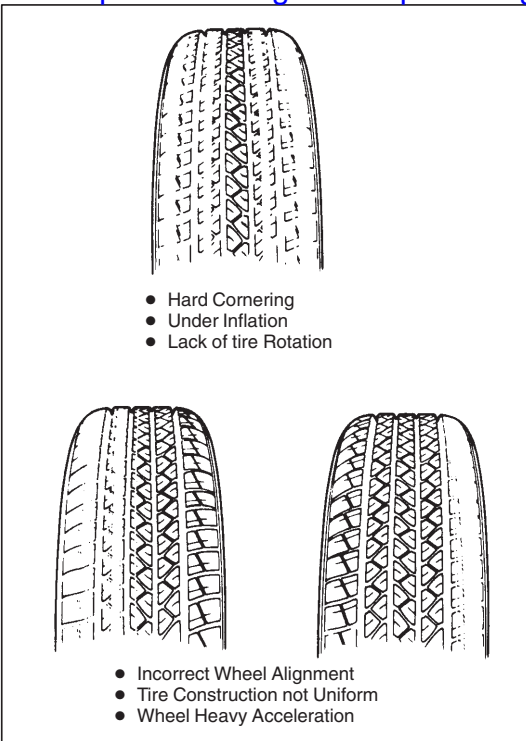
- 1) Inspect tires for proper pressure and uneven wear.
- 2) Raise vehicle on a hoist and inspect front and rear suspension and rack and pinion for loose or damaged parts.
- 3) Spin front wheels. Inspect for out-of-round tires, out-of-balance tires, bent rims, loosen and/or rough wheel bearings.

GENERAL DIAGNOSIS TABLE		
Condition	Possible Cause	Reference Item
Vehicle Pulls (Leads)	<ul style="list-style-type: none"> ● Mismatched or uneven tires ● Tires not adequately inflated ● Broken or sagging springs ● Radial tire lateral force ● Disturbed front end alignment ● Disturbed rear wheel alignment ● Brake dragging in one road wheel ● Loose, bent or broken front or rear suspension parts 	Replacement tires in Section 3F Inflation of tires in Section 3F Strut damper assembly in Section 3D or coil spring in Section 3E Replacement tires in Section 3F Section 3A Check and adjust rear wheel alignment Refer to Section 5 Tighten or replace suspension parts
Abnormal or Excessive Tire Wear	<ul style="list-style-type: none"> ● Broken or sagging spring ● Tire out of balance ● Disturbed front or rear end alignment ● Faulty strut (shock absorber) ● Hard driving ● Overloaded vehicle ● Not rotating tire ● Worn or loose road wheel bearing ● Wobbly wheel or tire ● Tires not adequately inflated 	Strut damper assembly in Section 3D or coil spring in Section 3E General balance procedure or replacement tires in Section 3F Section 3A Strut damper assembly in Section 3D Replacement tires in Section 3F Replacement tires in Section 3F Replacement tires or tire rotation in Section 3F Knuckle/bearing in Section 3D Replacement wheels or tires in Section 3F Inflation of tires in Section 3F
Wheel Tramp	<ul style="list-style-type: none"> ● Blister or bump on tire ● Improper strut (shock absorber) action 	Replacement tires in Section 3F Strut damper assembly in Section 3D

Condition	Possible Cause	Reference Item
Shimmy, Shake or Vibration	<ul style="list-style-type: none"> ● Tire or wheel out of balance ● Loosen wheel bearings ● Worn tie rod ends ● Worn lower ball joints ● Excessive wheel runout ● Blister or bump on tire ● Excessively loaded radial runout of tire/wheel assembly ● Disturbed front end alignment ● Loose or worn steering linkage ● Loose steering gear case bolts 	Balance wheels or general balance procedure in Section 3F Knuckle/Bearing in Section 3D and/or wheel bearing and wheel stud in Section 3E Tie rod end in Section 3B Suspension arm/bushing in Section 3D Replacement wheels or tires in Section 3F Replacement tires in Section 3F Replacement wheels or tires in Section 3F Section 3A Section 3B and 3C Manual rack and pinion assembly in Section 3B
Hard Steering	<ul style="list-style-type: none"> ● Tire not adequately inflated ● Malfunctioning Electrical power steering system ● Bind in tie rod end ball studs or lower ball joints ● Disturbed front end alignment ● Rack and pinion adjustment ● Bind in steering column 	Inflation of tires in Section 3F Refer to "Diagnosis" in Section 3B1 Tie rod end in Section 3B or suspension arm/bushing in Section 3D Section 3A Steering rack plunger in Section 3B Steering column in Section 3C
Too Much Play in Steering	<ul style="list-style-type: none"> ● Wheel bearings worn ● Loose steering gear case bolts ● Rack and pinion adjustments (Manual steering only) ● Worn steering shaft joints ● Worn tie rod ends or tie rod inside ball joints ● Worn lower ball joints 	Knuckle/Bearing in Section 3D Manual rack and pinion assembly in Section 3B Section 3B Steering lower shaft joint in Section 3C Tie rod end or rack boot/tie rod in Section 3B Suspension arm/bushing in Section 3D
Poor Returnability	<ul style="list-style-type: none"> ● Bind in tie rod end ball studs ● Bind in ball joints ● Bind in steering column ● Poorly lubricated rack and pinion ● Disturbed front end alignment ● Rack and pinion adjustment ● Tires not adequately inflated 	Tie rod end in Section 3B Rack boot/tie rod, tie rod end in Section 3B and suspension arm/bushing in Section 3D Steering column in Section 3C Steering pinion or steering rack in Section 3B Section 3A Steering rack plunger in Section 3B Inflation of tires in Section 3F

Condition	Possible Cause	Reference Item
Rack and Pinion Noise (Rattle or Chuckle)	<ul style="list-style-type: none"> ● Loose steering gear case bolts ● Worn rack bush ● Rack and pinion adjustment 	Manual rack and pinion assembly in Section 3B Rack bushing in Section 3B Steering rack plunger in Section 3B
Abnormal Noise, Front End	<ul style="list-style-type: none"> ● Worn, sticky or loose tie rod ends, lower ball joints, tie rod inside ball joints or drive shaft joints ● Damaged struts or mountings ● Worn suspension arm bushings ● Loose or worn stabilizer bar mountings ● Loose wheel nuts ● Loose suspension bolts or nuts ● Broken or otherwise damaged wheel bearings ● Broken suspension springs ● Poorly lubricated or worn strut bearings 	Rack boot/tie rod, tie rod end in Section 3B, suspension arm in Section 3D or drive shaft in Section 4 Strut damper assembly in Section 3D Suspension arm/bushing in Section 3D Stabilizer bar and/or bushings Section 3F Section 3D or 3E Knuckle/bearing in Section 3D or wheel bearing and wheel stud in Section 3E Strut damper assembly in Section 3D or coil spring in Section 3E Strut damper assembly in Section 3D
Wander or Poor Steering Stability	<ul style="list-style-type: none"> ● Mismatched or uneven tires ● Loosen ball joints and tie rod ends ● Faulty struts or mounting ● Loose stabilizer bar ● Broken or sagging springs ● Rack and pinion adjustment ● Front end alignment 	Replacement tires or inflation tires in Section 3F Suspension arm/bushing in Section 3D and tie rod end in Section 3B Strut damper assembly in Section 3D Stabilizer bar and/or bushing in Section 3D Strut damper assembly in Section 3D or coil spring in Section 3E Steering rack plunger in 3B Section 3A
Erratic Steering When Braking	<ul style="list-style-type: none"> ● Worn wheel bearings ● Broken or sagging springs ● Wheel tires are inflated unequally ● Disturbed front end alignment ● Brakes not working in unison ● Leaking wheel cylinder or caliper ● Warped discs ● Badly worn brake linings ● Drum is out of round in some brakes ● Defective wheel cylinders 	Knuckle/bearing in Section 3D and/or wheel bearing and wheel stud in Section 3E Strut damper assembly in Section 3D Inflation of tire in Section 3F Section 3A Refer to Section 5 Refer to Section 5B or 5C Refer to Section 5B Refer to Section 5C Refer to Section 5C Refer to Section 5C

Condition	Possible Cause	Reference Item
Low or Uneven Trim Height Right-to-left trim height (H) difference should be within 10 mm (0.4 in.) with curb weight.  *Same with rear side.	<ul style="list-style-type: none"> ● Broken or sagging springs ● Over loaded ● Incorrect springs 	Strut damper assembly in Section 3D or coil spring in Section 3E Check loading Strut damper assembly in Section 3D or coil spring in Section 3E
Ride Too Soft	<ul style="list-style-type: none"> ● Faulty struts (shock absorber) 	Strut damper assembly in Section 3D
Suspension Bottoms	<ul style="list-style-type: none"> ● Overloaded ● Faulty struts (shock absorber) ● Incorrect broken or sagging springs 	Check loading Strut damper assembly in Section 3D Strut damper assembly in Section 3D or coil spring in Section 3E
Body Leans or Sways in Corners	<ul style="list-style-type: none"> ● Loose stabilizer bar ● Faulty struts (shock absorbers) or mounting ● Broken or sagging springs ● Overloaded 	Stabilizer bar and/or bushing in Section 3D Strut damper assembly in Section 3D Strut damper assembly in Section 3D or coil spring in Section 3E Check loading
Cupped Tires	<ul style="list-style-type: none"> ● Front struts defective ● Worn wheel bearings ● Excessive tire or wheel run-out ● Worn ball joints ● Tire out of balance 	Strut damper assembly in Section 3D Knuckle/bearing in Section 3D or wheel bearing and wheel stud in Section 3E Replacement tires in Section 3D Suspension arm/bushing in Section 3D General balance procedures in Section 3F



TIRE DIAGNOSIS

IRREGULAR AND/OR PREMATURE WEAR

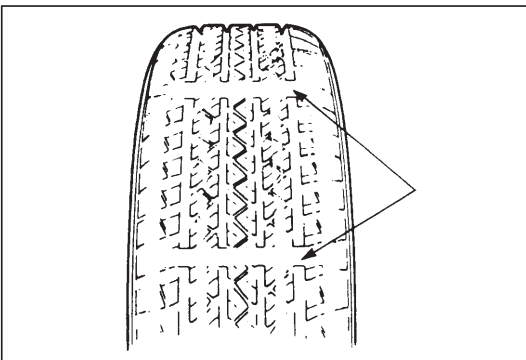
Irregular and premature wear has many causes. Some of them are: incorrect inflation pressures, lack of tire rotation, driving habits, improper alignment.

If the following conditions are noted, rotation is necessary:

- 1) Front tire wear is different from rear.
- 2) Uneven wear exists across the tread of any tire.
- 3) Front tire wear is unequal between the right and left.
- 4) Rear tire wear is unequal between the right and left.
- 5) There is cupping, flat spotting, etc.

A wheel alignment check is necessary if following conditions are noted:

- 1) Front tire wear is unequal between the right and left.
- 2) Wear is uneven across the tread of any front tire.
- 3) Front tire treads have scuffed appearance with "feather" edges on one side of tread ribs or blocks.

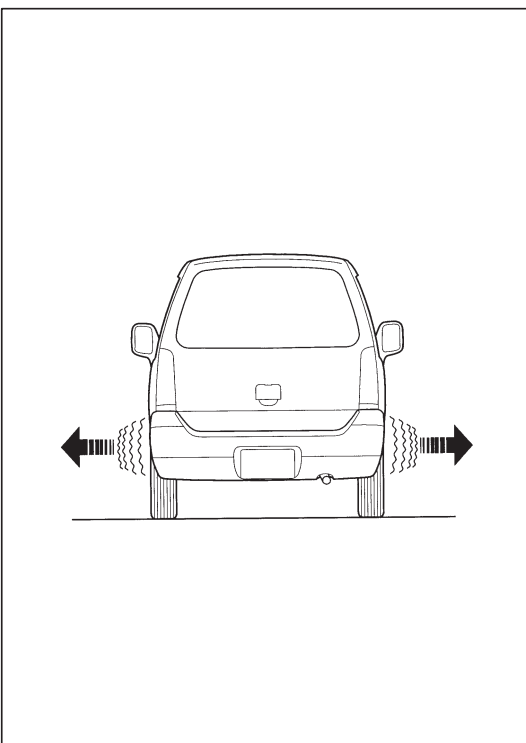


WEAR INDICATORS

Original equipment tires have built-in tread wear indicators to show when they need replacement.

These indicators will appear as 12 mm (0.47 in.) wide bands when the tire tread depth becomes 1.6 mm (0.063 in.).

When the indicators appear in 3 or more grooves at 6 locations, tire replacement is recommended.



RADIAL TIRE WADDLE

Waddle is side to side movement at the front and/or rear of the vehicle. It is caused by the steel belt not being straight within the tire. It is most noticeable at a low speed, 8 to 48 km/h (5 to 30 mph).

It is possible to locate the faulty tire by road testing the vehicle. If it is on the rear, the rear end of the vehicle shakes from side to side or "waddles". To the driver in his seat, it feels as though someone is pushing on the side of vehicle.

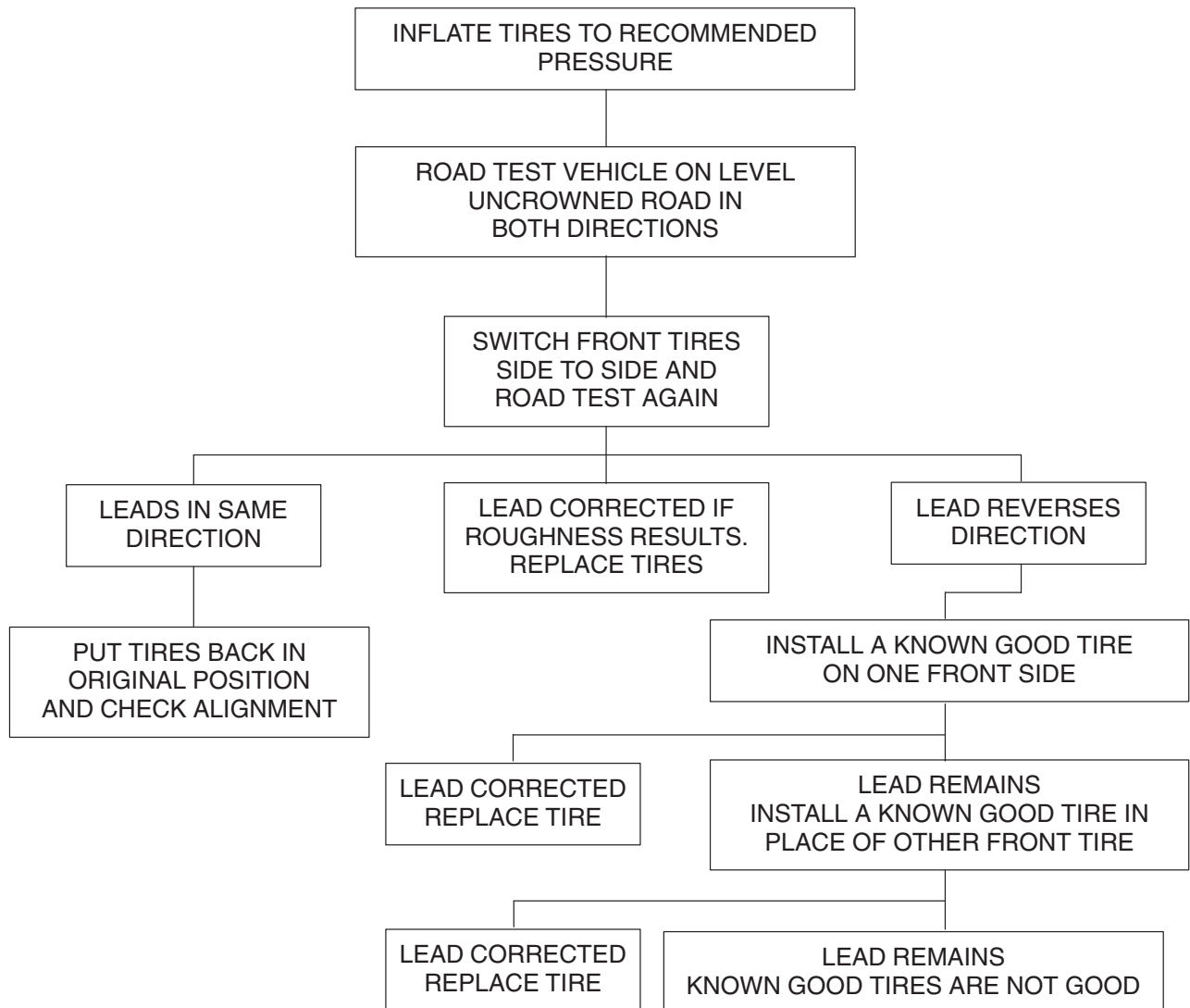
If the faulty tire is on the front, waddling is more visual. The front sheet metal appears to be moving back and forth and the driver feels as though he is at the pivot point in vehicle.

Waddle can be quickly diagnosed by using Tire Problem Detector (TPD) and following the equipment manufacture's recommendations.

If TPD is not available, an alternative method of substituting known good tire/wheel assemblies can be used as follows, although it takes a longer time.

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- 1) Ride vehicle to determine whether the front or rear waddles.
- 2) Install tires and wheels that are known to be good (on similar vehicle) in place of those on waddling end of vehicle. If waddling end cannot be identified, substitute rear ones.
- 3) Road test again. If improvement is noted, reinstall originals one at a time till waddle causal tire is found. If no improvement is noted, install known good tires in place of all four. Then reinstall originals in the same manner as above.



RADIAL TIRE LEAD

"Lead" is the deviation of the vehicle from a straight path on a level road even with no pressure on the steering wheel. Lead is usually caused by:

- 1) Incorrect alignment
- 2) Uneven brake adjustment
- 3) Tire construction

The way in which a tire is built can produce lead in a vehicle. An example of this is placement of the belt. Off center belts on radial tires can cause the tire to develop a side force while rolling straight down the road. If one side of the tire has a little larger diameter than the other, the tire will tend to roll to one side. This will develop a side force which can produce vehicle lead.

The procedure in above figure (Lead Diagnosis) should be used to make sure that front alignment is not mistaken for tire lead.

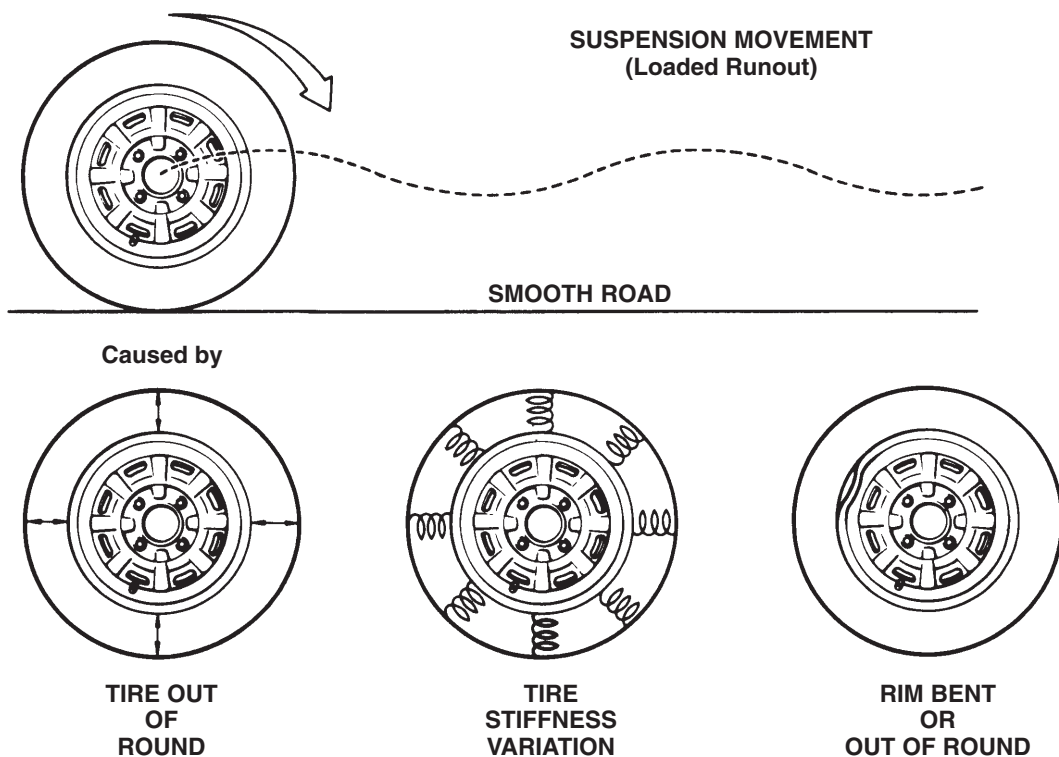
- 1) Part of the lead diagnosis procedure is different from the proper tire rotation pattern currently in the owner and service manuals. If a medium to high mileage tire is moved to the other side of the vehicle, be sure to check that ride roughness has not developed.
- 2) Rear tires will not cause lead.

VIBRATION DIAGNOSIS

Wheel unbalance causes most of the highway speed vibration problems. If a vibration remains after dynamic balancing, its possible causes are as follows.

- 1) Tire runout
- 2) Wheel runout
- 3) Tire stiffness variation

Measuring tire and/or wheel free runout will uncover only part of the problem. All three causes, known as loaded radial runout, must be checked by using a Tire Problem Detector (TPD). If TPD is not available, alternative method of substituting known good tire and wheel assemblies on the problem vehicle can be used, although it takes a longer time.



SECTION 3A

FRONT END ALIGNMENT

CONTENTS

DIAGNOSIS	SECTION 3	Preliminary Checks Prior to Adjusting	
GENERAL DESCRIPTION	3A-1	Front Alignment	3A-2
Toe Setting	3A-1	Toe Adjustment	3A-2
Camber	3A-1	Camber and Caster Adjustment	3A-2
		Steering Angle	3A-3

3A

GENERAL DESCRIPTION

WHEEL TOE-IN TOP VIEW

"B" - "A" = Toe-in

CAMBER ANGLE

POSITIVE CAMBER

Alignment service data

Toe-in	$-3.0 \pm 1 \text{ mm}$ ($-0.118 \pm 0.039 \text{ in.}$)
Camber	$-0^\circ 20' \pm 1^\circ$
Caster	$3^\circ 40' \pm 1^\circ$
Kingpin inclination	$11^\circ 50' \pm 1^\circ$

NOTE:
Toe-in value given above was measured by using a toe-in gauge.

Front alignment refers to the angular relationship between the front wheels, the front suspension attaching parts and the ground. Generally, the only adjustment required for front alignment is toe setting.

Camber and caster can't be adjusted. Therefore, should camber or caster be out of specification due to the damage caused by hazardous road conditions or collision, whether the damage is in body or in suspension should be determined. If the body is damaged, it should be repaired and if suspension is damaged, it should be replaced.

TOE SETTING

Toe is the turning in or out of the front wheels. The purpose of a toe specification is to ensure parallel rolling of the front wheels (Excessive toe-in or toe-out may increase tire wear).

Amount of toe can be obtained by subtracting "A" from "B" as shown in above figure and therefore is given in mm (in.).

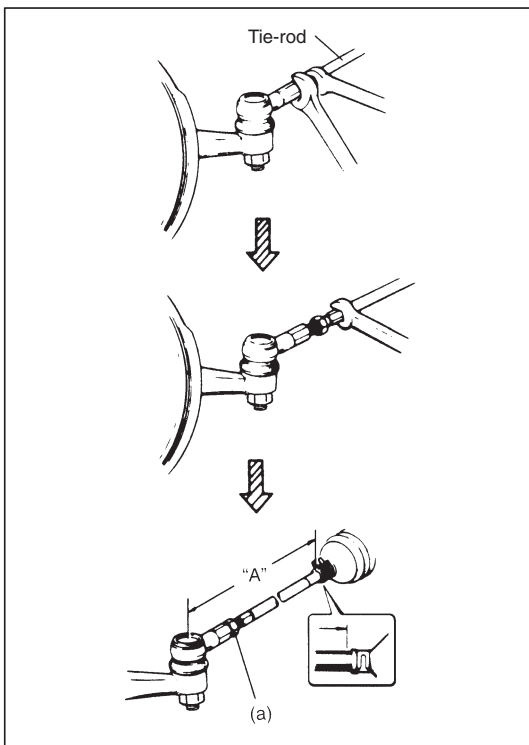
CAMBER

Camber is the tilting of the front wheels from the vertical, as viewed from the front of the vehicle. When the wheels tilt outward at the top, the camber is positive. When the wheels tilt inward at the top, the camber is negative. The amount of tilt is measured in degrees.

PRELIMINARY CHECKS PRIOR TO ADJUSTING FRONT ALIGNMENT

Steering and vibration complaints are not always the result of improper alignment. An additional item to be checked is the possibility of tire lead due to worn or improperly manufactured tires. "Lead" is the deviation of the vehicle from a straight path on a level road without hand pressure on the steering wheel. Section 3 of this manual contains a procedure for determining the presence of a tire lead problem. Before making any adjustment affecting toe setting, the following checks and inspections should be made to ensure correctness of alignment readings and alignment adjustments:

- 1) Check all tires for proper inflation pressures and approximately the same tread wear.
- 2) Check for loose of ball joints. Check tie rod ends; if excessive looseness is noted, it must be corrected before adjusting.
- 3) Check for run-out of wheels and tires.
- 4) Check vehicle trim heights; if out of limits and a correction is to be made, it must be made before adjusting toe.
- 5) Check for loose of suspension arms.
- 6) Check for loose or missing stabilizer bar attachments.
- 7) Consideration must be given to excess loads, such as tool boxes. If this excess load is normally carried in vehicle, it should remain in vehicle during alignment checks.
- 8) Consider condition of equipment being used to check alignment and follow manufacturer's instructions.
- 9) Regardless of equipment used to check alignment, vehicle must be on a level surface both fore and aft and transversely.



TOE ADJUSTMENT

Toe is adjusted by changing the tie rod length. Loosen right and left tie rod end lock nuts first and then rotate right and left tie rods by the same amount to align toe-in to specification. In this adjustment, right and left tie rods should become equal in length ("A" in left figure).

Before rotating tie rods, apply grease between tie rods and rack boots so that boots won't be twisted.

After adjustment, tighten lock nuts to specified torque and make sure that rack boots are not twisted.

Tightening Torque

(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

CAMBER AND CASTER ADJUSTMENT

Should camber or caster be found out of specifications upon inspection, locate its cause first. If it is in damaged, loose, bent, dented or worn suspension parts, they should be replaced. If it is in vehicle body, repair it so as to attain specifications.

To prevent possible incorrect reading of camber or caster, vehicle front end must be moved up and down a few times before inspection.

STEERING ANGLE

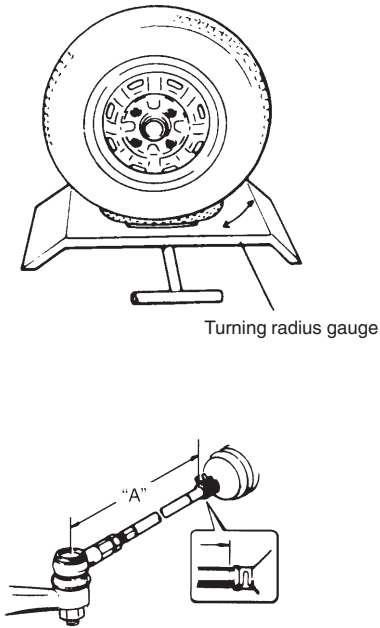
When tie rod or tie rod end was replaced, check toe and then also steering angle with turning radius gauge.

If steering angle is not correct, check if right and left tie rods are equal in length ("A" in left figure).

NOTE:

If tie rod lengths were changed to adjust steering angle, reinspect toe-in.

Steering angle inside : $35 \pm 3^\circ$
outside: $31 \pm 3^\circ$



Reference Information:

Side slip:

For inspecting front wheel side slip with side slip tester:

Side slip limit: IN 2 mm/m – OUT 4 mm/m
(IN 0.079 in/3.3 ft – OUT 0.157 in/3.3 ft)

If side slip exceeds above limit, toe-in or front wheel alignment may not be correct.

SECTION 3B**MANUAL RACK AND PINION****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

3B**NOTE:**

All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

CONTENTS

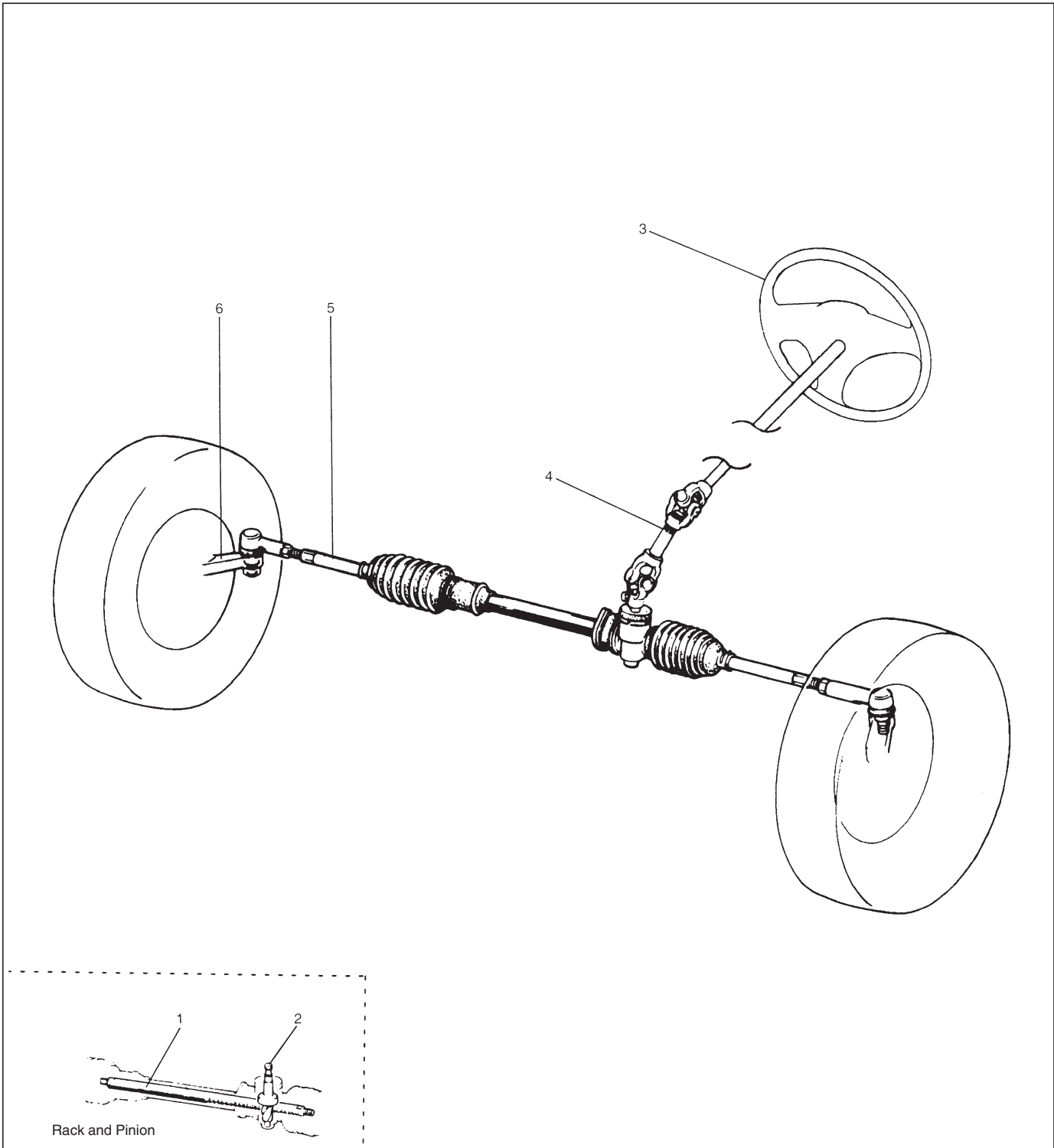
GENERAL DESCRIPTION	3B- 2
DIAGNOSIS	3B- 3
ON-VEHICLE SERVICE	3B- 5
Lubrication	3B- 5
Tie Rod End	3B- 6
Manual Rack and Pinion Assembly (Steering Gear Case)	3B- 8
Rack Boot/Tie Rod	3B-11
Steering Rack Plunger	3B-13
Steering Pinion	3B-14
Steering Rack	3B-15
Pinion Bearing	3B-17
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SPECIAL TOOLS	3B-18

GENERAL DESCRIPTION

The rack and pinion steering system consists of two components, the rack (1) and the pinion (2). When the steering wheel (3) is turned, the motion is transmitted to the steering shaft joint (4) and then to the pinion (2). Since the pinion teeth mesh with teeth on rack, the motion is further transferred to the rack and changed to linear motion. The force is then transmitted through the tie rods (5) to the steering knuckles (6) which turn wheels.

NOTE:

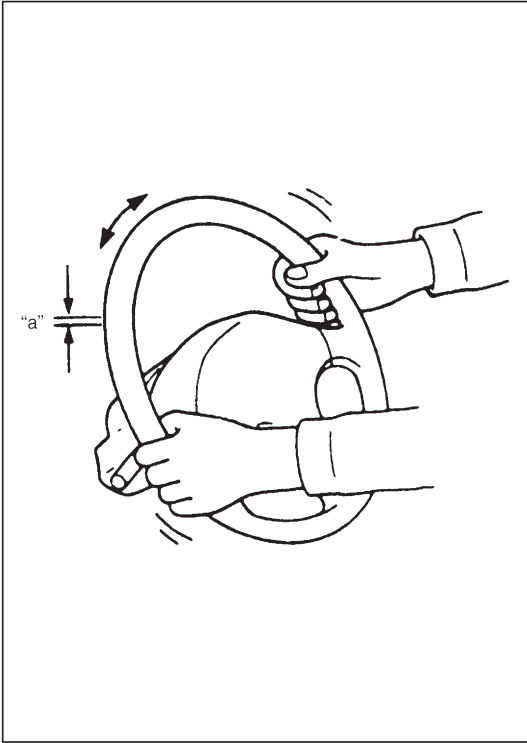
Although the figure below shows only the left-hand steering vehicle, the same work procedure and data apply to the right-hand steering vehicle.



DIAGNOSIS

DIAGNOSIS TABLE

Refer to SECTION 3.



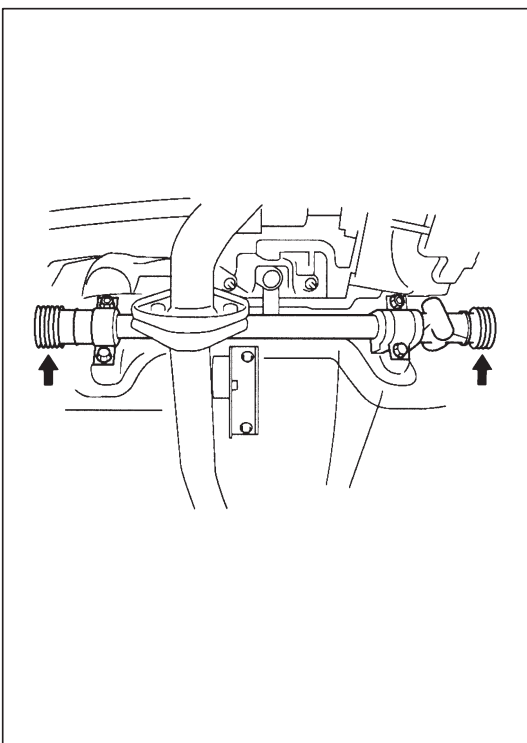
STEERING WHEEL CHECK

Check steering wheel for play and rattle, holding vehicle in straight forward condition on the ground.

Steering wheel play "a": 0 – 30 mm (0 – 1.1 in.)

If steering wheel play is not within specification, inspect as follows and replace if found defective.

- Tie-rod end ball stud for wear (ball stud should move when more than 2 kg-cm torque is applied.)
- Lower ball joint for wear
- Steering shaft joint for wear
- Steering pinion or rack gear for wear or breakage
- Each part for looseness



STEERING RACK BOOT CHECK

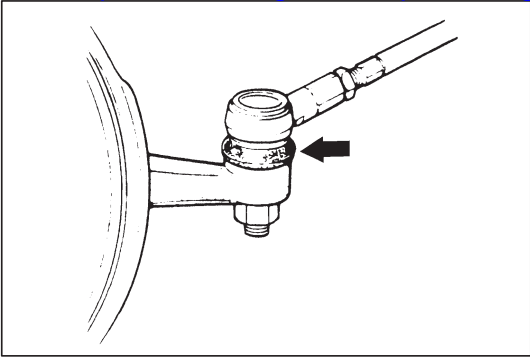
Hoist vehicle.

Inspect each boot for tear. A torn boot allows entry of dust and water which can cause wear to steering rack and pinion to produce noise as well as rust to result in malfunction of steering system.

If even a small tear is noted, replace with new one.

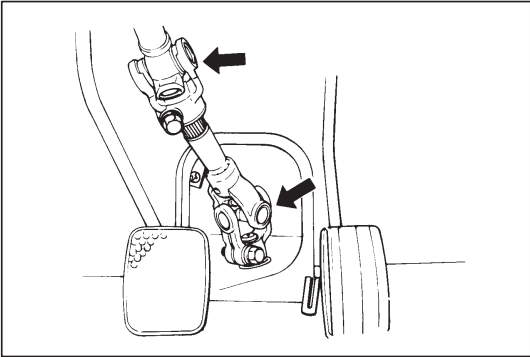
Also, check each boot for dent. If there is a dent, keep boot in most compressed state for some seconds to correct dent.

Boots should be visually inspected for any damage, dent and tear during every periodical inspection at specified intervals and whenever vehicle is hoisted for any other purpose.



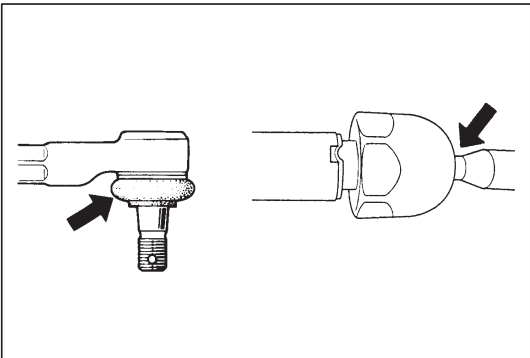
TIE ROD END BOOTS CHECK

Inspect each boot for tear. If even a small tear is noted, replace with new one.



STEERING SHAFT JOINT CHECK

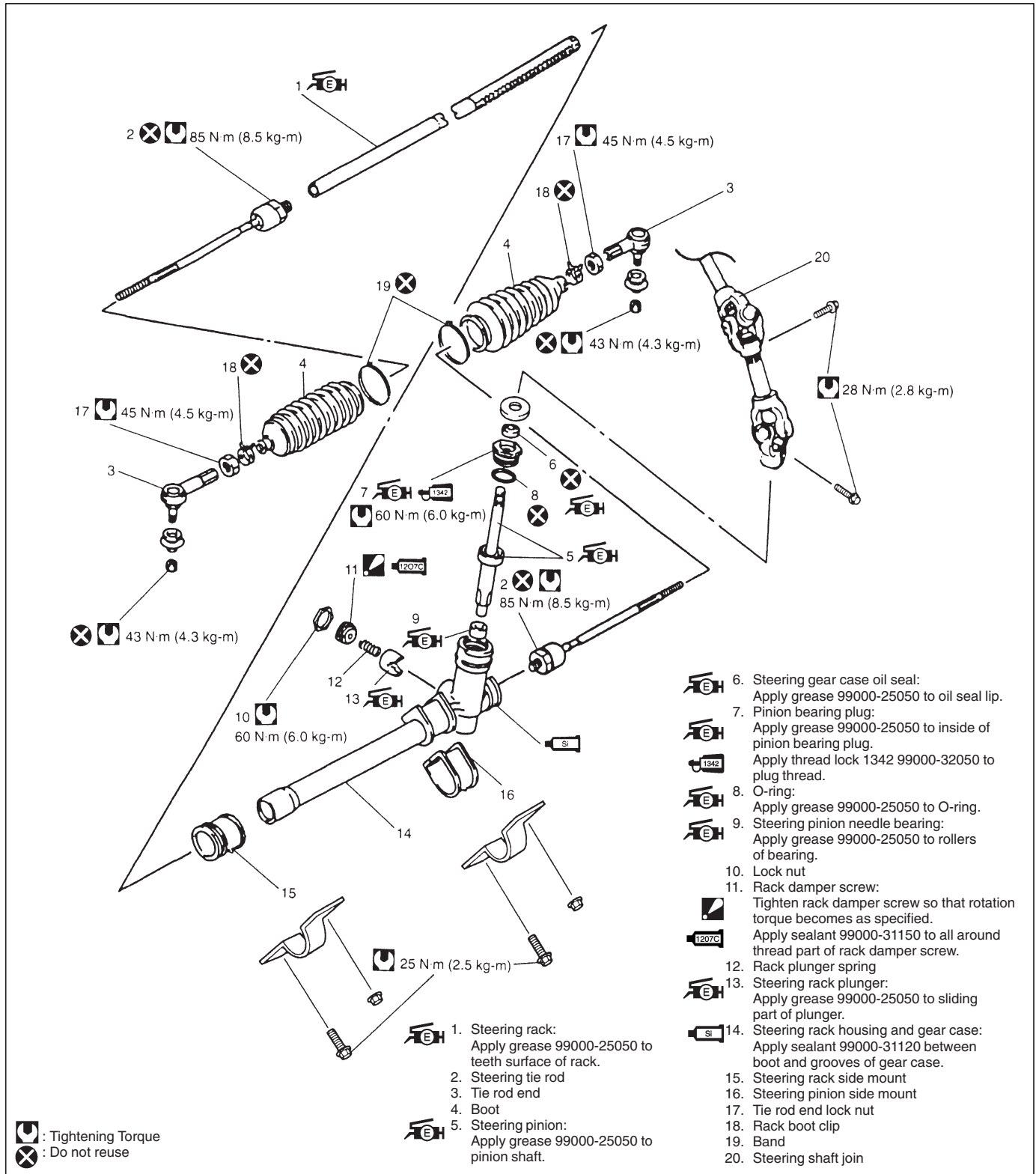
Check shaft joint for wear, breakage and other damage and replace if any defect exists.



TIE ROD END CHECK

- 1) Inspect for play in ball joint.
 - 2) Inspect for play in rack end ball joint.
- In either case, if found defective, replace.

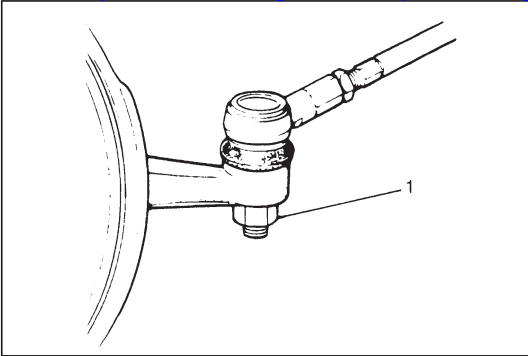
ON-VEHICLE SERVICE



LUBRICATION

When inner parts of the steering gear case were disassembled, they should be washed clean before reassembly. It is recommended to use the grease as given at the right where grease application is indicated in the text.

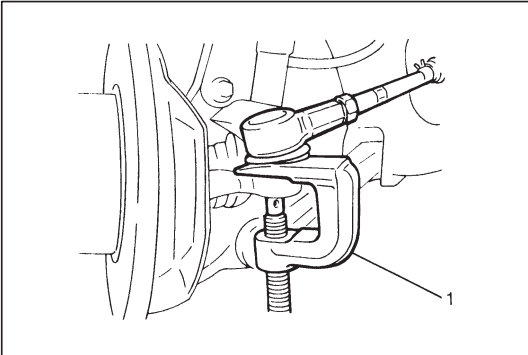
* **SUZUKI SUPER GREASE (E) 99000-25050, or Lithium grease (applicable for $-40^{\circ}\text{C} \sim 130^{\circ}\text{C}$ or $-40^{\circ}\text{F} \sim 266^{\circ}\text{F}$)**



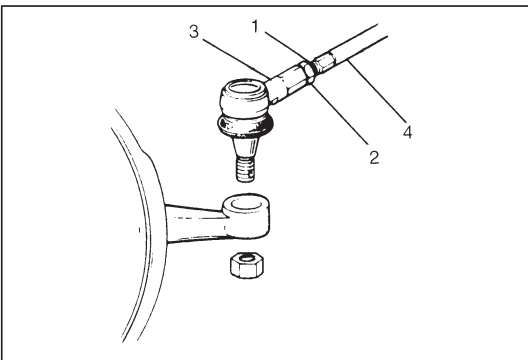
TIE ROD END

REMOVAL

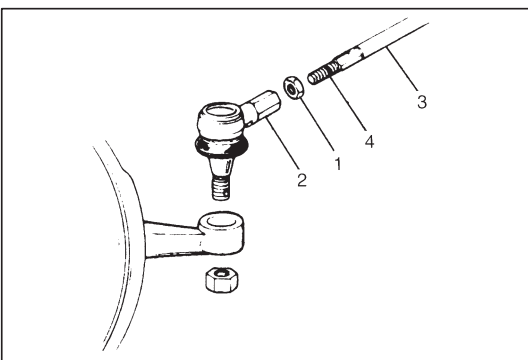
- 1) Hoist vehicle and remove wheel.
- 2) Remove tie rod end nut (1) from steering knuckle.



- 3) Disconnect tie rod end from knuckle, using puller (1).

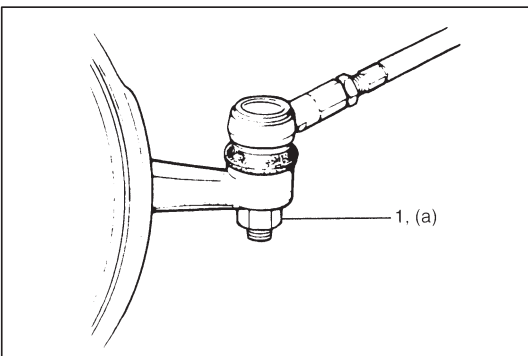


- 4) For ease of adjustment after installation, make marking (1) of tie rod end lock nut (2) position on tie rod end thread. Then loosen lock nut (2) and remove tie rod end (3) from tie rod (4).



INSTALLATION

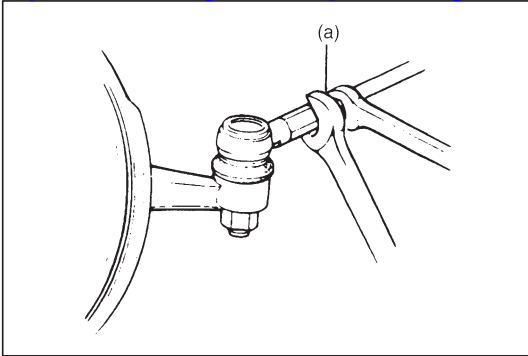
- 1) Install tie rod end lock nut (1) and tie rod end (2) to tie rod (3). Align lock nut with mark (4) on tie rod thread.



- 2) Connect tie rod end to knuckle. Tighten new tie rod end nut (1) to specified torque.

Tightening Torque

(a): 43 N·m (4.3 kg-m, 31.5 lb-ft)



- 3) Inspect for proper toe (Refer to FRONT END ALIGNMENT).
- 4) After confirming proper toe, tighten tie rod end lock nut to specified torque.

Tightening Torque

(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

- 5) Tighten wheel to specified torque and lower hoist.

Tightening Torque for wheel nuts:

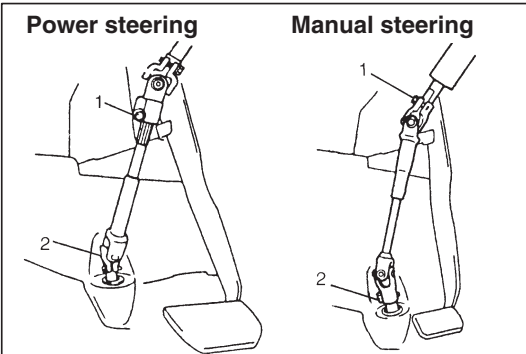
85 N·m (8.5 kg-m, 61.5 lb-ft)

MANUAL RACK AND PINION ASSEMBLY (STEERING GEAR CASE)

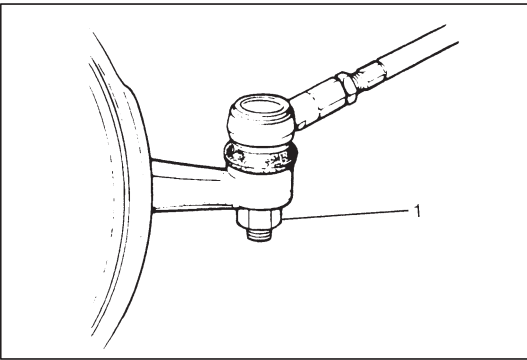
REMOVAL

CAUTION:

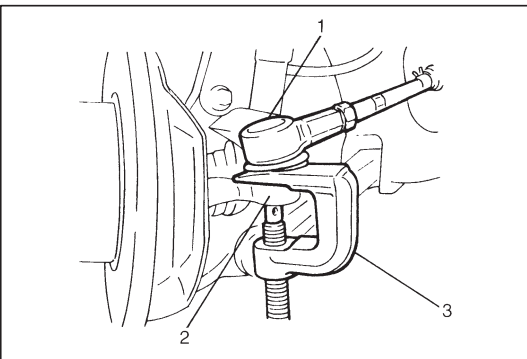
Be sure to set front wheels in straight direction and remove ignition key from key cylinder before these steps, otherwise contact coil of air bag system may get damaged.



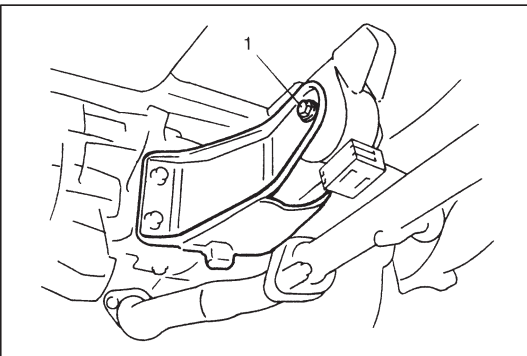
- 1) Slide driver's seat as far back as possible.
- 2) Pull off front part of floor mat on driver's side and remove steering shaft joint cover.
- 3) For ease of installation, loosen steering shaft upper joint bolt (1) but don't remove.
- 4) Remove steering shaft lower joint bolt (2) and disconnect lower joint from pinion.



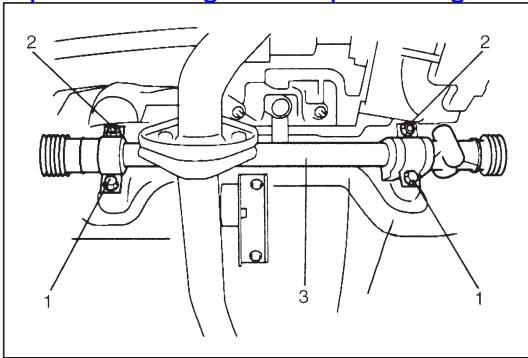
- 5) Hoist vehicle and remove both wheels.
- 6) Remove tie rod end nuts (1) from both knuckles.



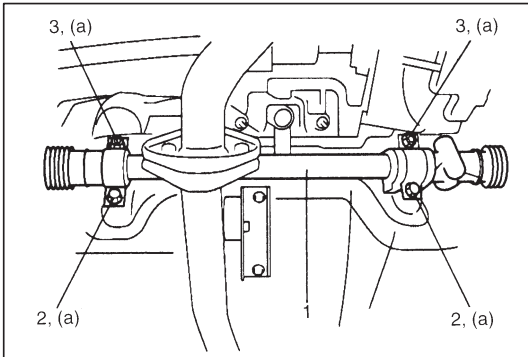
- 7) Disconnect both tie rod ends (1) from knuckles (2), using puller (3).



- 8) Support engine with transmission by transmission jack and then remove engine rear mounting bolt (1).



- 9) Remove steering gear case mount bolts (1), nuts (2) and gear case brackets, then remove gear case (3).

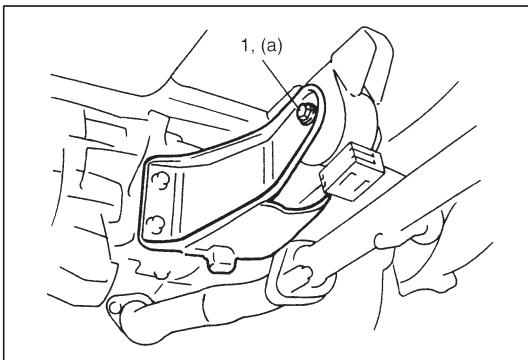


INSTALLATION

- 1) Apply grease to inside of pinion packing and install pinion packing onto pinion. Mount steering gear case (1) to body and tighten gear case mount bolts (2) and nuts (3) to specified torque.

Tightening Torque

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

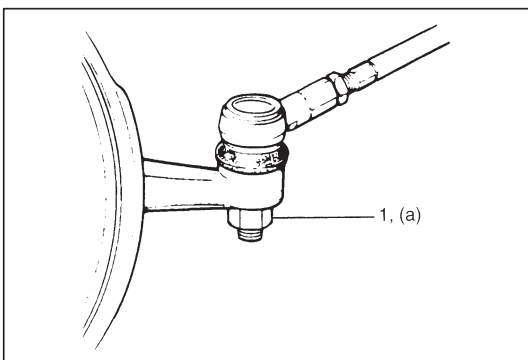


- 2) Install engine rear mounting bolt (1). Tighten bolts to specified torque.

Tightening Torque

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

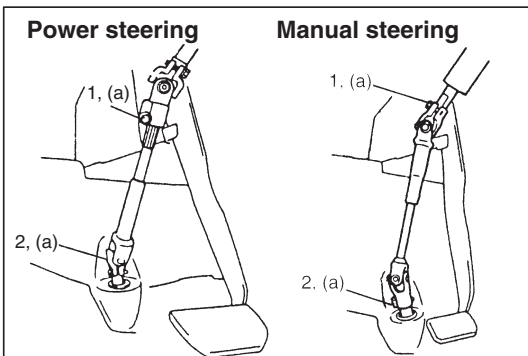
- 3) Remove transmission jack.



- 4) Install tie rod ends to knuckles (right & left). Tighten each new tie rod end nut (1) to specified torque.

Tightening Torque

(a): 43 N·m (4.3 kg-m, 31.5 lb-ft)



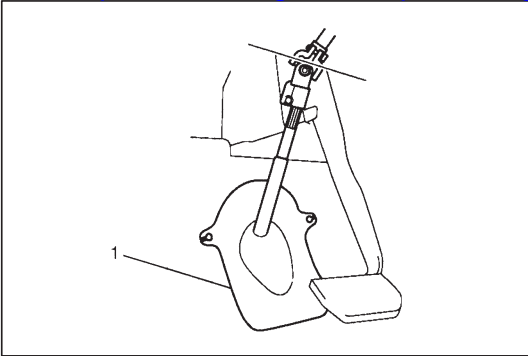
- 5) Be sure that steering wheel and brake discs (right & left) are all straight-ahead position and then insert steering lower joint into steering pinion shaft.

- 6) Tighten steering shaft joint bolts (1) and (2) to specified torque (Lower side first and then upper side).

Tightening Torque

(a): 28 N·m (2.8 kg-m, 20.5 lb-ft)

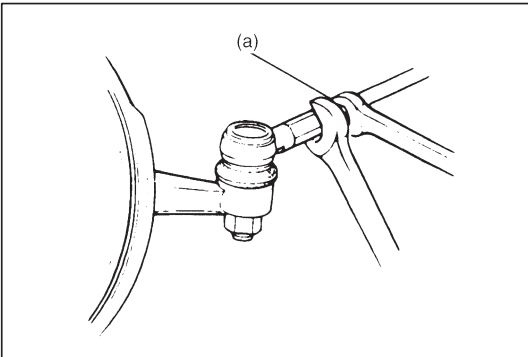
Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>



- 7) Reinstall cover (1) removed previously to steering shaft joint.
- 8) Put back floor mat as it was.
- 9) Install both wheels and tighten wheel nuts to specified torque.

Tightening Torque for wheel nuts:

85 N·m (8.5 kg-m, 61.5 lb-ft)



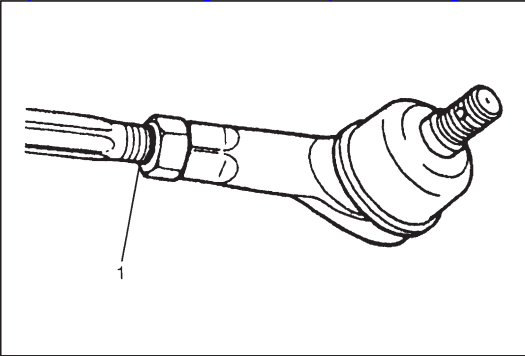
- 10) Lower hoist.
- 11) Check toe setting. Adjust as required (Refer to Section 3A FRONT END ALIGNMENT).
- 12) Tighten both tie rod end lock nuts to specified torque.

Tightening Torque

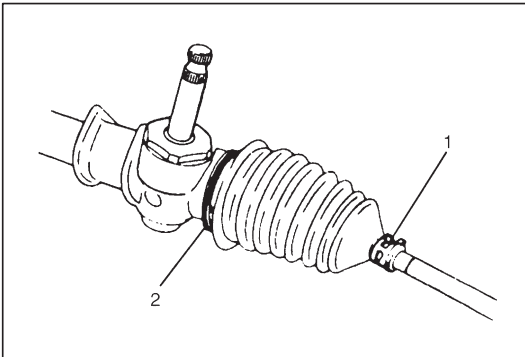
(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

RACK BOOT/TIE ROD**REMOVAL**

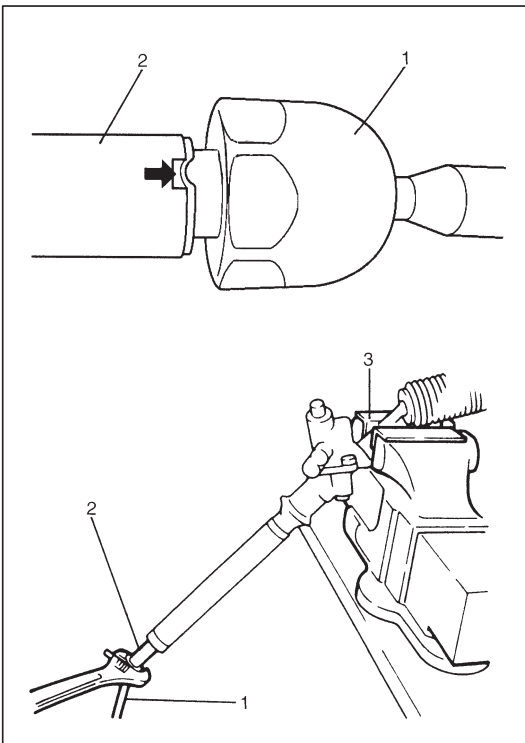
- 1) Remove steering gear case by performing Steps 1) – 9) in MANUAL RACK AND PINION REMOVAL of this section.
- 2) For ease of adjustment after installation, make marking (1) of tie rod end lock nut position of tie rod end thread.

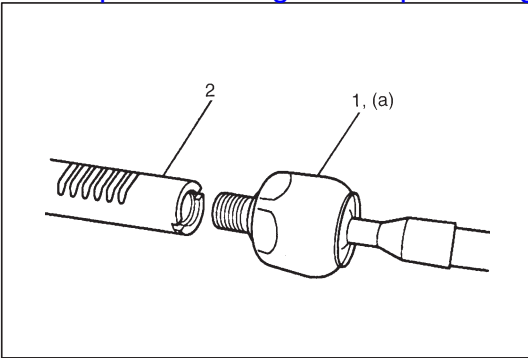


- 3) Loosen tie rod end lock nut and remove tie rod end.
- 4) Remove boot band (2) and clip (1).
- 5) Remove boot from tie rod.



- 6) Unbend bent part of tie rod (1).
- 7) Hold rack with soft jawed vise (3) and remove tie rod from rack (2).

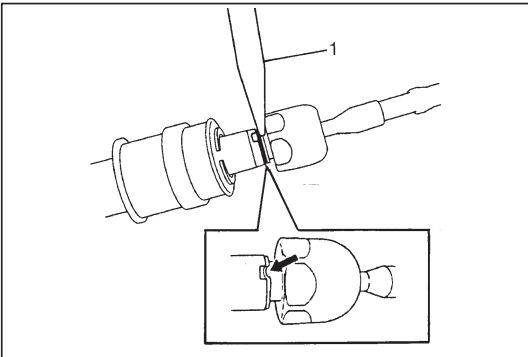


**INSTALLATION**

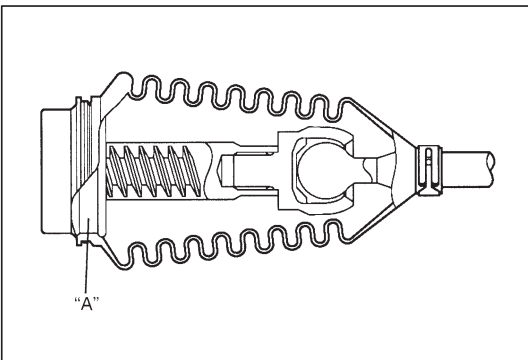
- 1) Install new tie rod (1) to rack (2).
- 2) Hold rack with soft jawed vise and tighten tie rod to specified torque.

Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



- 3) Caulk a part of tie rod indicated in figure with punch (1).

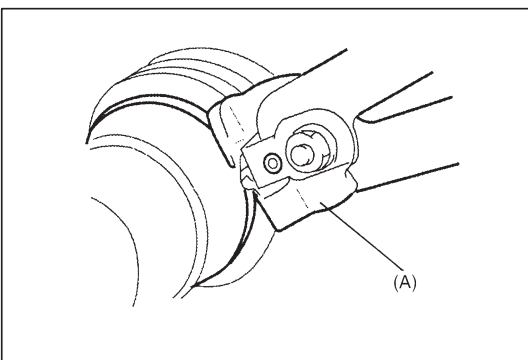


- 4) Apply sealant to gear case groove "A" indicated in figure.

"A": Sealant, 99000-31120

Position boot properly in grooves of gear case (or rack side mount) and tie rod.

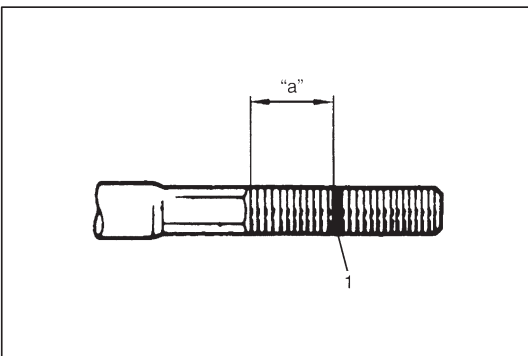
After this, check to ensure that boot is free from twist and dent.



- 5) Fasten boot with new band and clip securely.

Special Tool

(A): 09943-55010



- 6) Install tie rod end lock nut and tie rod end to tie rod.
Position lock nut to marking (1) made in removal.

NOTE:

When tie rod was replaced, measure length "a" on removed tie rod and use it on new replacement tie rod so as to position lock nut properly.

- 7) For installation procedures following the above, use Steps 1) – 12) in INSTALLATION of STEERING GEAR CASE.

STEERING RACK PLUNGER**REMOVAL**

- 1) Remove rack boots and tie rods.
- 2) Loosen lock nut (1) with holding damper screw (2) with special tool.

Special Tool**(A): 09944-28320**

- 3) Remove lock nut (1), rack damper screw (2), rack plunger spring (3) and rack plunger (4).

INSPECTION

- Inspect rack plunger (1) for wear or damage.
 - Inspect rack plunger spring (2) for deterioration.
- In either case, if found defective, replace.

INSTALLATION

- 1) Apply grease lightly to sliding part of plunger (1) against rack.
- 2) Install plunger and spring (2) as shown.
- 3) Apply sealant to all around thread part of rack damper screw (3) and tighten it to specified torque with special tool.

Special Tool**(A): 09944-28320****"A": Sealant 1207C, 99000-31150****Tightening Torque****(a): 7 – 12 N·m (0.7 – 1.2 kg-m, 5.5 – 8.5 lb-ft)**

- 4) After tightening rack damper screw to specified torque, turn it back by $30^\circ \sim 60^\circ$ so that rotation torque becomes as specified below.
Pinion rotation torque should be checked with rack position centered.

Special Tool**(A): 09944-18310****Rotation Torque of pinion****(a): 1.0 – 1.5 N·m (0.10 – 0.15 kg-m, 0.72 – 1.08 lb-ft)**

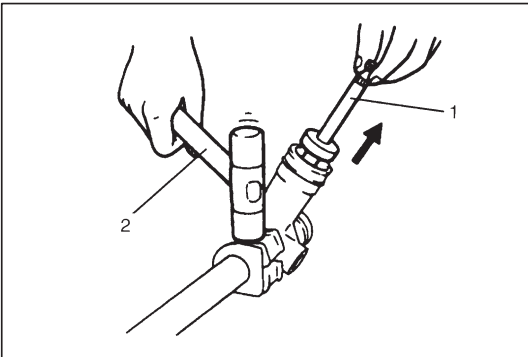
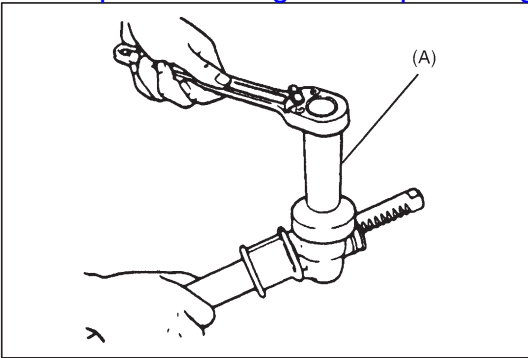
Also, check if rack as a whole moves smoothly.

- 5) After adjustment, tighten lock nut to specified torque with holding damper screw at the position.

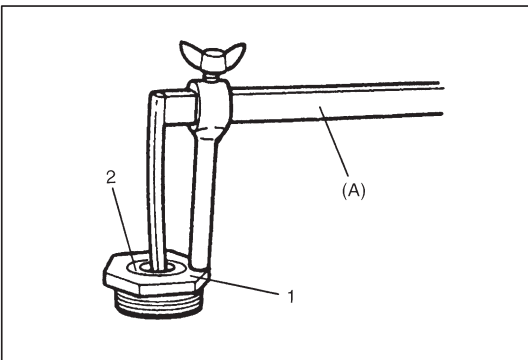
Special Tool**(A): 09944-28320****Tightening Torque****(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)**

STEERING PINION**REMOVAL**

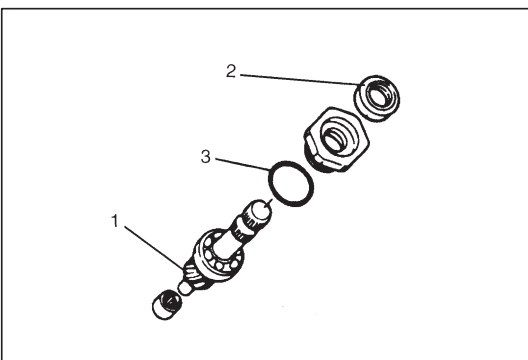
- 1) Remove rack plunger as shown in STEERING RACK PLUNGER.
- 2) Remove bearing plug with special tool.

Special Tool**(A): 09944-28310**

- 3) Tap on position as shown with plastic hammer (2) to separate pinion assembly (1) from housing, and remove pinion assembly (1).



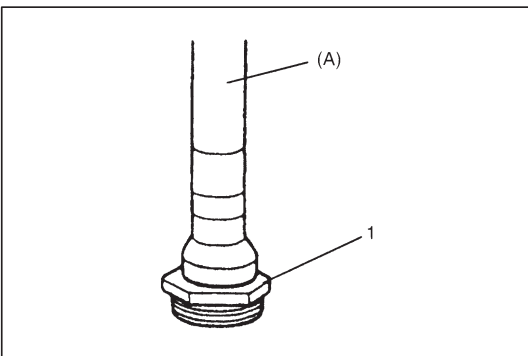
- 4) Remove oil seal (2) with special tool from pinion bearing plug (1).

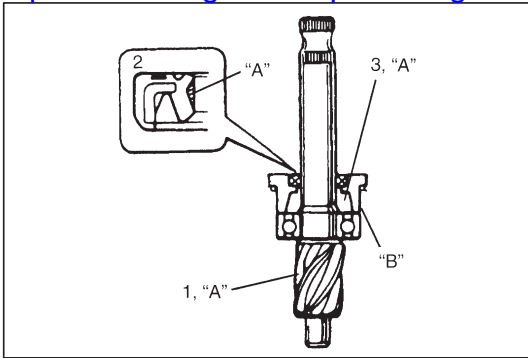
Special Tool**(A): 09913-50121****INSPECTION**

- Inspect pinion teeth surface (1) for wear or damage.
 - Inspect oil seal (2) for damage.
 - Inspect O-ring (3) for damage.
 - Check rotation condition of bearing and inspect for wear.
- If found defective, replace.

INSTALLATION

- 1) Install new oil seal with special tool to pinion bearing plug (1).

Special tool**(A): 09925-98210**

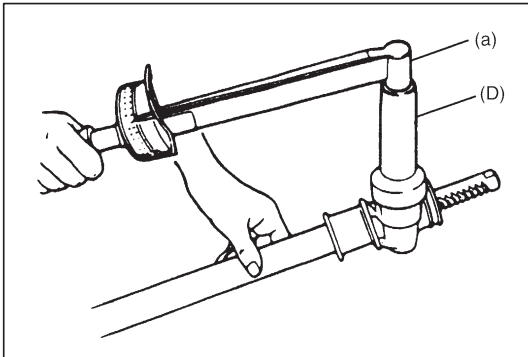


- 2) Apply grease to all around pinion teeth (1), pinion needle bearing, gear case, O-ring and gear case oil seal lip (2). Fill inside of pinion bearing plug (3) with grease.

"A": Grease E, 99000-25050

- 3) Apply thread lock cement to pinion bearing plug thread. Install pinion assembly to steering gear case.

"B": Thread Lock 1342, 99000-32050



- 4) Tighten pinion bearing plug to specified torque.

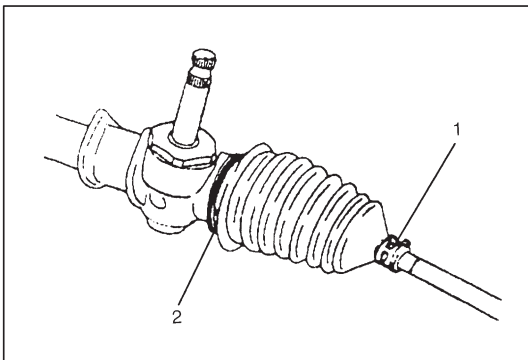
Tightening Torque

(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)

Special Tool

(D): 09944-28310

- 5) Install rack plunger as described in STEERING RACK PLUNGER of this section.

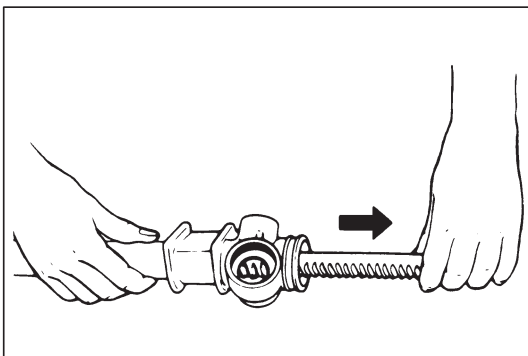


STEERING RACK

REMOVAL

- 1) Remove steering gear case.
- 2) Remove boot bands (2) and clips (1).
- 3) Move both boots toward tie rod end.

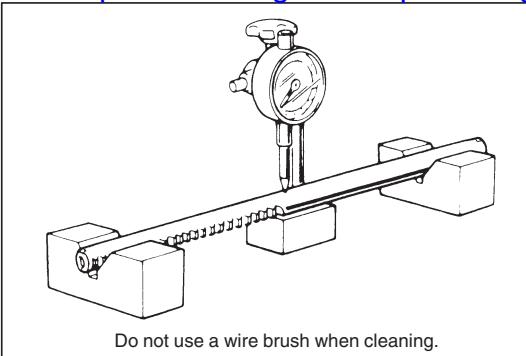
- 4) Remove tie rods (right and left) from steering rack by performing Steps 6) and 7) in RACK BOOT/TIE ROD REMOVAL of this section.
- 5) Mark left and right tie rods accordingly.
- 6) Remove rack plunger and pinion assembly from gear case by performing Steps 1) – 3) in STEERING PINION REMOVAL of this section.



- 7) Remove rack from gear case. Direction for rack removal is as shown.

CAUTION:

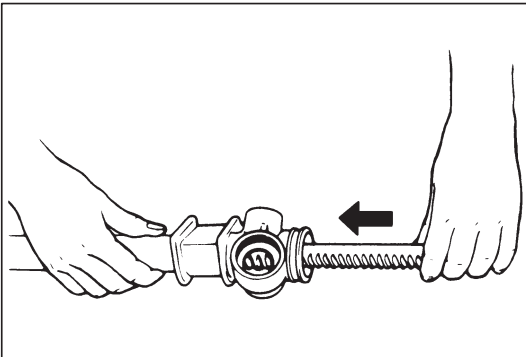
Inside of steering rack bushing is coated with special coating. As it is damageable, be very careful not to cause damage to it when removing rack from steering gear case.

**INSPECTION**

Inspect for deflection, teeth wear, or damage, back surface wear or damage.

Limit of rack deflection: 0.4 mm (0.016 in.)

If deflection exceeds limit, replace rack.

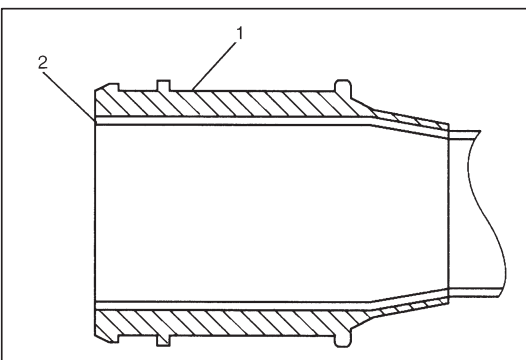
**INSTALLATION**

- 1) Apply grease to entire teeth surface of rack and its periphery.
- 2) Slide rack into steering gear case in the direction as shown.

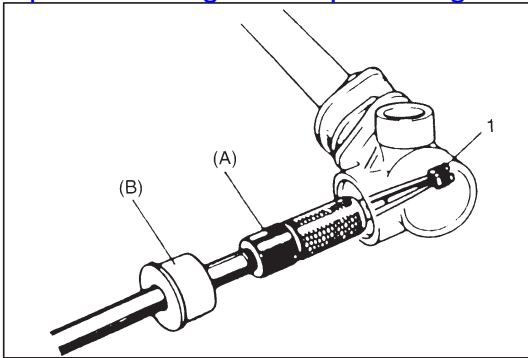
CAUTION:

Inside of steering rack bushing is coated with special coating. As it is damageable, be very careful not to cause damage to it when inserting rack into steering gear case.

- 3) Install pinion assembly to gear case by performing Steps 2) – 4) in STEERING PINION INSTALLATION of this section.
- 4) Perform Steps 1) – 5) in STEERING RACK PLUNGER INSTALLATION of this section.



- 5) Before installing boot to steering rack housing, position rack side mount (1) so that its end (2) is flush with housing end. Install tie rods to rack by performing Steps 1) – 7) in RACK BOOT/TIE ROD INSTALLATION of this section.



PINION BEARING

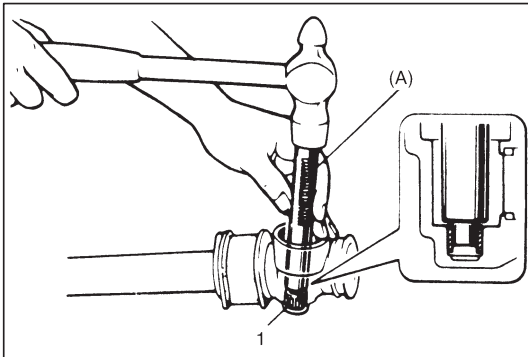
REMOVAL

- 1) Remove rack from steering gear case, referring to STEERING RACK REMOVAL of this section.
- 2) Remove pinion bearing (1) from gear case with special tools as shown.

Special Tool

(A): 09921-20200

(B): 09930-30102



INSTALLATION

- 1) Apply grease to rollers of pinion bearing.
- 2) Press-fit pinion bearing (1) into gear case with special tool as shown.

After press-fitting, make sure that bearing rollers are installed properly.

Special Tool

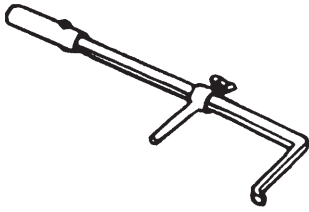
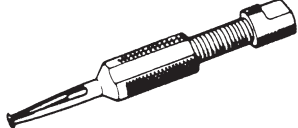
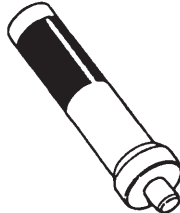
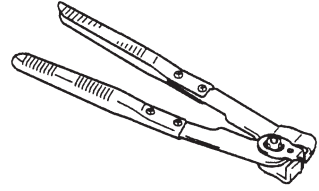
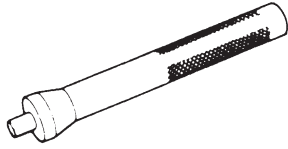

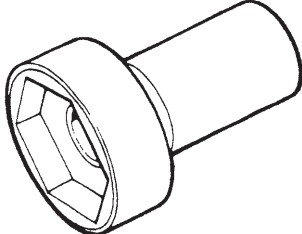
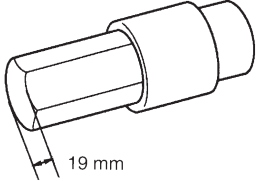
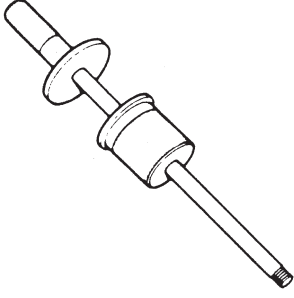
(A): 09943-88211

- 3) Follow Steps 1) – 5) in STEERING RACK INSTALLATION of this section to complete installation.

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium Grease (Should be applicable for -40°C ~ 130°C)	SUZUKI SUPER GREASE (E) (99000-25050)	<ul style="list-style-type: none"> • Sliding part of rack against steering housing (All around rack plunger and rack) • Sliding part against steering pinion (Oil seal lip, needle bearing) • Steering rack and pinion gear teeth • Rack end ball joint
Lock cement	THREAD LOCK 1342 (99000-32050)	<ul style="list-style-type: none"> • Pinion bearing plug thread
Sealant	SUZUKI BOND NO. 1207C (99000-31150)	<ul style="list-style-type: none"> • All around thread part of rack damper screw
Silicon sealant	SUZUKI SILICONE SEAL (99000-31120)	<ul style="list-style-type: none"> • Contacting parts of gear case groove and pinion side boot

SPECIAL TOOLS

			
09913-50121 Oil seal remover	09921-20200 Pinion bearing remover	09925-98210 Bearing installer	09943-55010 (J-22610) Boot clamp plier
			
09943-88211 Pinion bearing installer	09944-18310 Pinion torque checking socket	09944-28310 42 mm Socket (Pinion bearing plug socket)	09944-28320 Hexagon bit (19 mm)
			
09930-30102 Sliding shaft			

SECTION 3B1

ELECTRICAL POWER STEERING (EPS) SYSTEM (IF EQUIPPED)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

3B1

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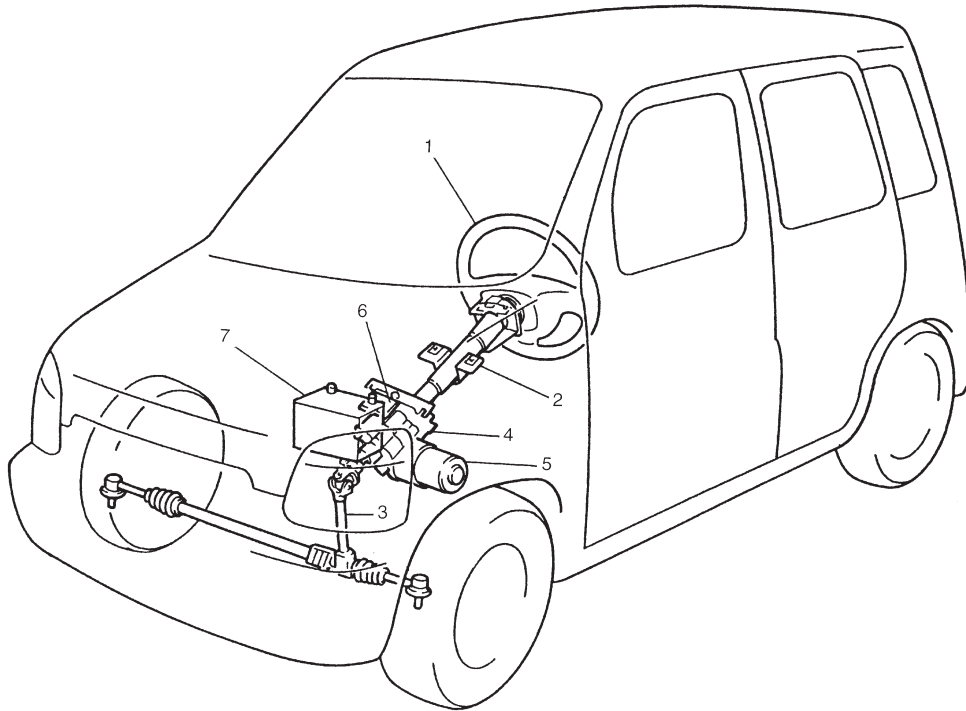
GENERAL DESCRIPTION

This electrical power steering (EPS) system consists of a P/S control module, a torque sensor and a motor assembly (with clutch incorporated) installed to the steering column.

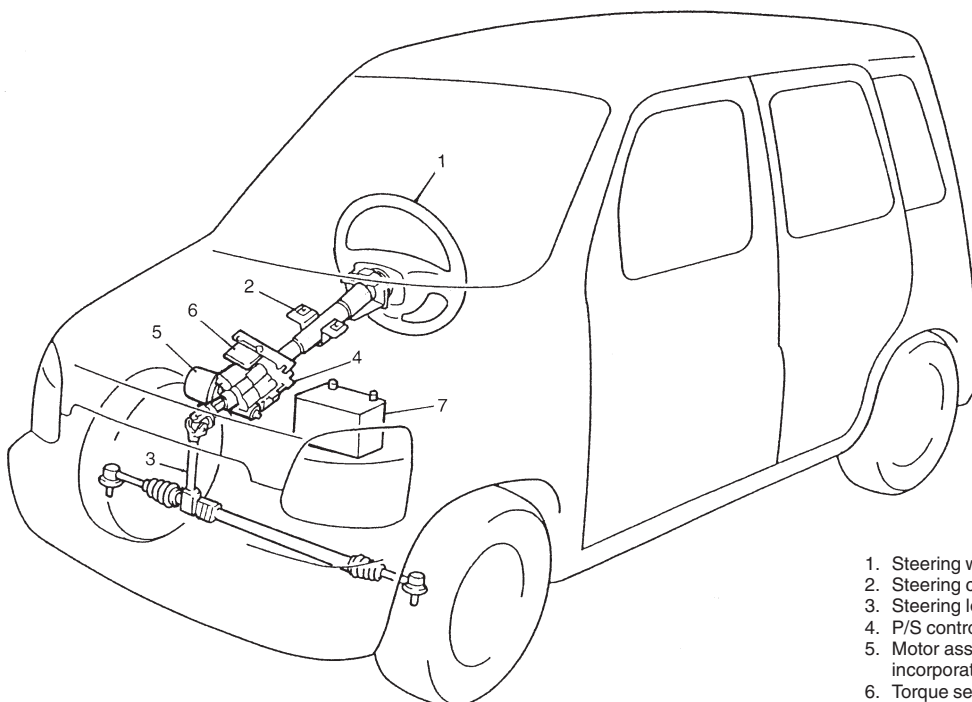
In this system, the P/S control module determines the level and direction of the assist force for the steering wheel according to the signals from the torque sensor and the vehicle speed, runs the motor so as to assist operation of the steering wheel.

COMPONENTS

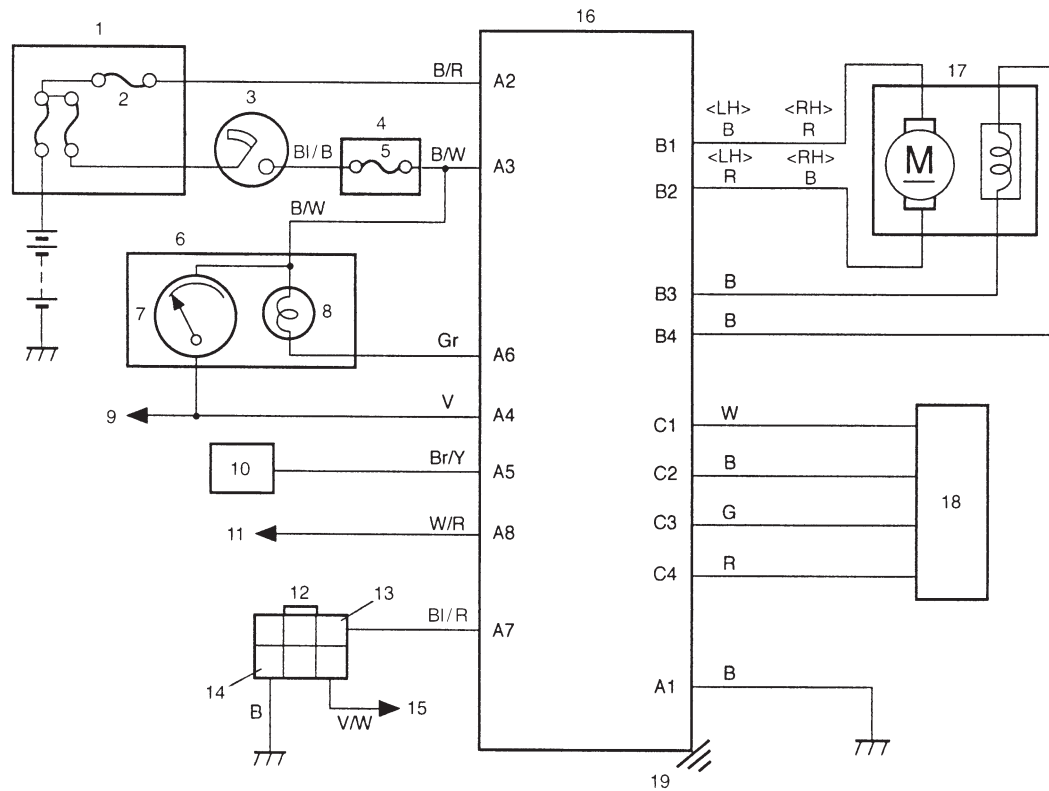
[LH]



[RH]



1. Steering wheel
2. Steering column assembly
3. Steering lower shaft
4. P/S control module
5. Motor assembly (with clutch incorporated)
6. Torque sensor
7. Battery

WIRING DIAGRAM

1. Main fuse box
2. "EPS" fuse (30 A)
3. Ignition switch
4. Circuit fuse box
5. "IG coil" fuse (15A)
6. Combination meter
7. Speedometer
8. "EPS" warning lamp

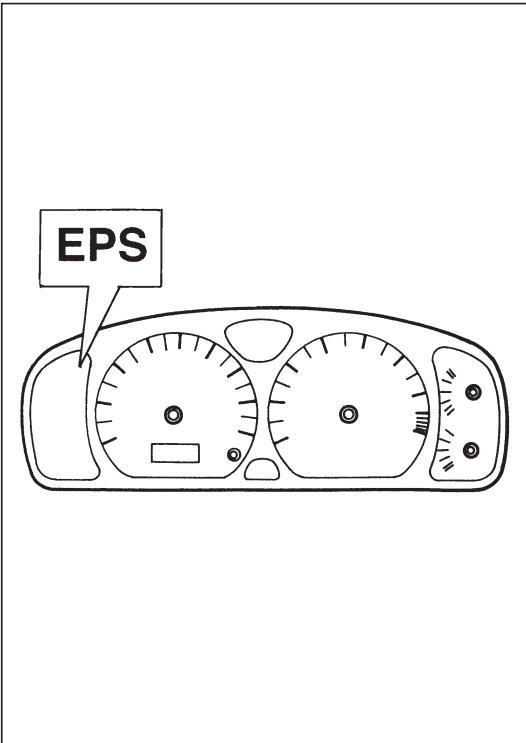
9. To vehicle speed sensor (VSS)
10. ECM/PCM
11. To data link connector (DLC)
12. Monitor coupler
13. Diagnosis switch terminal (for P/S system)
14. Ground terminal
15. To ABS hydraulic unit/control module assembly (if equipped)

16. P/S control module
17. Motor assembly (with clutch incorporated)
18. Torque sensor
19. P/S control module body ground
20. Connector "A"
21. Connector "B"
22. Connector "C"

DIAGNOSIS

The P/S system in this vehicle are controlled by P/S control module. P/S control module has an on-board diagnostic system which detects a malfunction in this system.

When diagnosing troubles, be sure to have full understanding of the outline of "ON-BOARD DIAGNOSTIC SYSTEM" and each item in "PRECAUTION IN DIAGNOSING TROUBLE" and execute diagnosis according to "SYSTEM CHECK FLOW TABLE".



ON-BOARD DIAGNOSTIC SYSTEM

P/S control module performs on-board diagnosis (self-diagnosis) on the system and operates "EPS" warning lamp as follows.

- "EPS" warning lamp lights when the ignition switch is turned to ON position (but the engine at stop) regardless of the condition of P/S system. This is only to check "EPS" warning lamp bulb and its circuit.
- If the areas monitored by P/S control module is free from any trouble after the engine start (while engine is running), "EPS" warning lamp turns OFF.
- When P/S control module detects a trouble which has occurred in the areas, it makes "EPS" warning lamp turn ON while the engine is running to warn the driver of such occurrence of trouble and at the same time it stores the exact trouble area in P/S control module memory. The trouble area is shown as Diagnostic Trouble Code (DTC) and it can be read referring to "DTC CHECK" in this section.

PRECAUTIONS IN DIAGNOSING TROUBLES

- Take a note of DTC indicated first.
- Be sure to read "PRECAUTIONS FOR ELECTRONIC CIRCUIT SERVICE" in SECTION 0A before inspection and observe what is written there.
- DTC C1122 (flashing pattern: 22) (engine speed signal fail) is indicated when ignition switch is ON position and engine is not running but if indication changes to a normal one when engine is started, it means nothing abnormal.
- As DTC is stored in memory of P/S control module, be sure to clear memory after repair by performing the procedure described in "DTC CLEARANCE".

SYSTEM CHECK FLOW TABLE

STEP	ACTION	YES	NO
1	<p>1) Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such a questionnaire form as shown below will facilitate collecting information to the point required for proper analysis and diagnosis.</p> <p>2) Check if what the customer claimed in CUSTOMER QUESTIONNAIRE is actually found in the vehicle and If that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.)</p> <p>3) Perform "EPS" WARNING LAMP CIRCUIT CHECK FLOW TABLE in this section.</p> <p>4) Check DTC referring to "DTC CHECK" in this section and record the DTC(s).</p> <p>5) Clear DTC if any malfunction DTC exists referring to "DTC CLEARANCE" in this section, then recheck DTC.</p> <p>Is any malfunction DTC detected?</p>	Go to Step 2.	Go to Step 3.
2	<p>1) Inspect and repair referring to applicable "DTC TABLE" in this section.</p> <p>2) Clear DTC referring to "DTC CLEARANCE" in this section.</p> <p>Does the trouble recur?</p>	Go to Step 5.	Go to Step 4.
3	<p>1) Test drive the vehicle and turn steering wheel fully to the right and left during test driving. See WARNING 1. Check if any trouble exists.</p> <p>2) Inspect and repair basic parts referring to "DIAGNOSIS CHART" in SECTION 3.</p> <p>3) If the trouble cannot be repaired in Step 3-2), inspect and repair referring to "TROUBLE DIAGNOSIS (FOR TROUBLE NOT INDICATED BY ON-BOARD DIAGNOSTIC SYSTEM)" in this section.</p> <p>Does the trouble recur?</p>	Go to Step 5.	Go to Step 4.
4	<p>1) Confirm that the problem symptom has gone and P/S system is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving as in Step 3-1) and confirm that no DTC is indicated.</p> <p>Is any malfunction DTC detected?</p>	Go to Step 5.	END
5	<p>Check DTC referring to "DTC CHECK" in this section.</p> <p>Is any malfunction DTC detected?</p>	Go to Step 2.	Go to Step 3.

WARNING 1:

Carry out driving test in very little traffic area to prevent an accident.

CUSTOMER QUESTIONNAIRE (EXAMPLE)

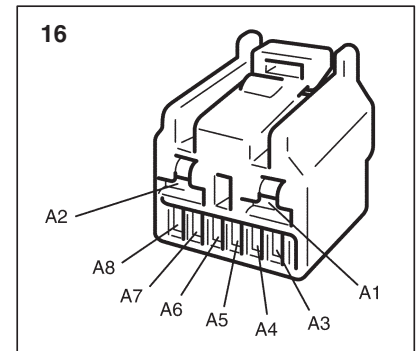
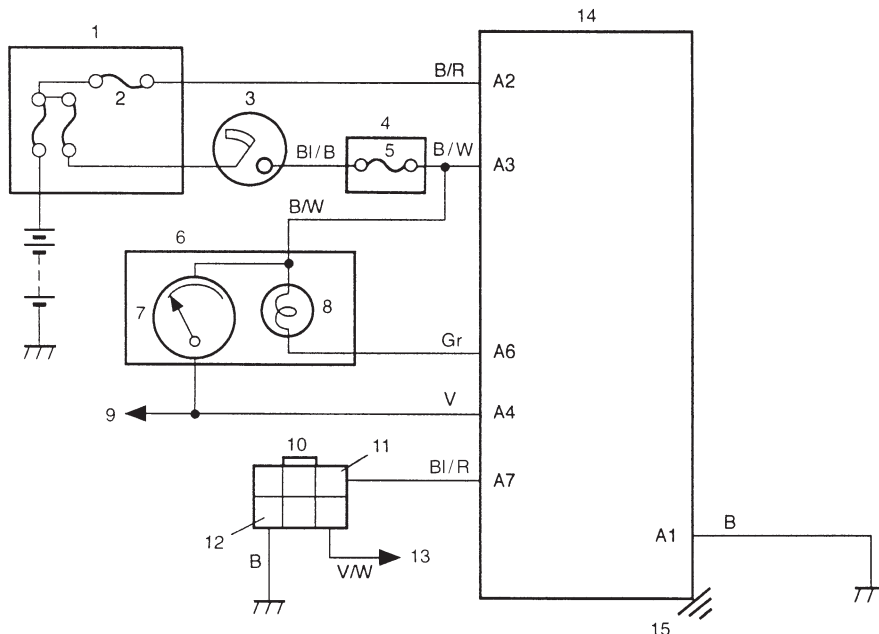
Customer's name:	Model:	VIN:	
Date of issue:	Date Reg.:	Date of problem:	Mileage:

Problem Symptoms	<ul style="list-style-type: none"> ● Steering wheel feels heavy ● Vehicle pulls to one side during straight driving ● Poor recovery from turns ● Too much play in steering ● Abnormal noise while vehicle is running: from motor, from rack and pinion, other _____ ● Other:
Frequency of occurrence	<ul style="list-style-type: none"> ● Continuous/Intermittent (_____ times a day, a month)/ other _____
Conditions for Occurrence of Problem	<ul style="list-style-type: none"> ● Vehicle at stop & ignition switch is ON position: ● When starting: at initial start only/at every start/Other _____ ● Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other _____ ● Road surface condition: Paved road/rough road/snow-covered road other _____ ● Chain equipment:
Environmental Condition	<ul style="list-style-type: none"> ● Weather: fair/cloudy/rain/snow/other _____ ● Temperature: _____ °C (_____ °F)
Diagnostic Trouble Code	<ul style="list-style-type: none"> ● First check: Normal code/malfunction code (_____) ● Second check after test drive: Normal code/malfunction code (_____)

“EPS” WARNING LAMP CIRCUIT CHECK FLOW TABLE**CAUTION:**

Be sure to perform “SYSTEM CHECK FLOW TABLE” before starting diagnosis according to flow table.

STEP	ACTION	YES	NO
1	1) Make sure that battery voltage is about 11 V or higher. 2) Note “EPS” warning lamp as ignition switch is turned to ON position. Does “EPS” warning lamp come ON when ignition switch is turned to ON position?	Go to Step 2.	Proceed to “TABLE-A “EPS” WARNING LAMP DOES NOT LIGHT”.
2	Does “EPS” warning lamp flash?	Proceed to “TABLE-B “EPS” WARNING LAMP FLASHES”.	Go to Step 3.
3	1) Using service wire short diagnosis switch terminal to ground terminal on monitor coupler. 2) Turn ignition switch to ON position. Does “EPS” warning lamp indicate DTC No.22 (flashing pattern: 22) and/or other code flashing pattern?	“EPS” warning lamp circuit is good condition.	Proceed to “TABLE-C “EPS” WARNING LAMP REMAINS ON”.



1. Main fuse box
2. “EPS” fuse (30 A)
3. Ignition switch
4. Circuit fuse box
5. “IG coil” fuse (15A)
6. Combination meter
7. Speedometer
8. “EPS” warning lamp

9. To vehicle speed sensor (VSS)
10. Monitor coupler
11. Diagnosis switch terminal (for P/S system)
12. Ground terminal
13. To ABS hydraulic unit/control module assembly (if equipped)
14. P/S control module
15. P/S control module body ground
16. Connector “A”

TABLE-A “EPS” WARNING LAMP DOES NOT LIGHT

STEP	ACTION	YES	NO
1	Was “SYSTEM CHECK FLOW TABLE” performed?	Go to Step 2.	Go to “SYSTEM CHECK FLOW TABLE” in this section.
2	Are “EPS” fuses in good condition?	Go to Step 3.	Check short to ground in “B/R” (for “EPS” fuse) wire, and then replace fuse.
3	1) Remove steering column hole cover. 2) Disconnect 8-pin (“A”) connector from P/S control module. 3) Check proper connection to P/S control module at terminal “A2”. 4) If OK, check voltage between “A2” and body ground. Is it 10 – 14 V?	Go to Step 4.	Repair high resistance or open in “B/R” wire circuit.
4	1) Check proper connection to P/S control module at terminal “A3”. 2) If OK, turn ignition switch to ON position. 3) Check voltage between “A3” and body ground. Is it 10 – 14 V?	Go to Step 5.	Repair high resistance or open in “B/W” wire circuit.
5	1) Turn ignition switch to OFF position. 2) Remove combination meter. 3) Remove and check “EPS” bulb. Is “EPS” bulb in good condition?	Go to Step 6.	Replace bulb.
6	1) Check voltage between “A6” terminal and body ground with “EPS” bulb disconnected. Is it 10 – 14 V?	Repair short to power circuit in “EPS” light (“Gr” wire) circuit.	Go to Step 7.
7	1) Install “EPS” bulb and combination meter. 2) Check proper connection to P/S control module at terminal “A6”. 3) If OK, short “A6” terminal to body ground with “A” connector disconnected. Does “EPS” light turn ON at ignition switch is ON position?	Go to Step 8.	Repair high resistance or open in “EPS” light (“Gr” wire) circuit.
8	1) Check P/S control module is installed to steering column assembly securely (check for body ground of P/S control module). 2) If OK, check resistance between “A1” terminal and body ground. Is resistance 1 Ω or less?	Substitute a known-good P/S control module and recheck.	Repair poor ground (“B” wire) circuit.

Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>

Fig. for Step 3

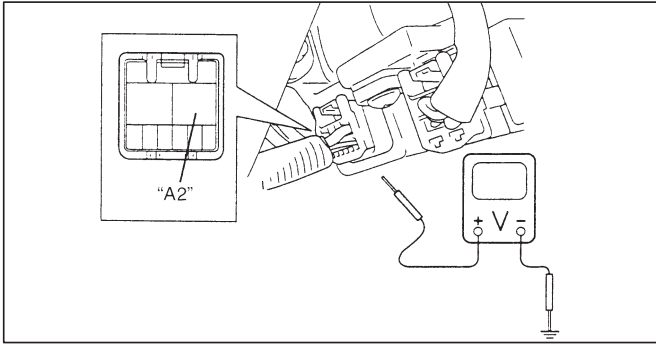


Fig. for Step 4

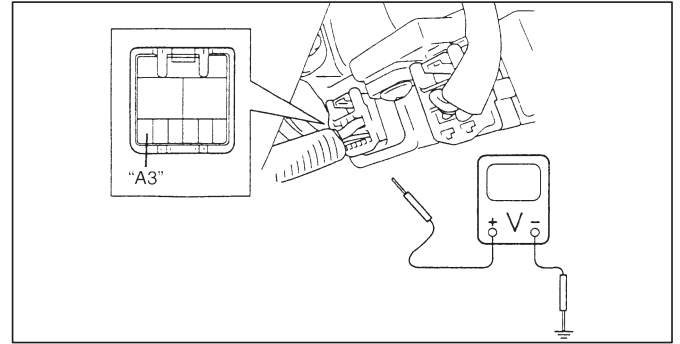


Fig. for Step 6

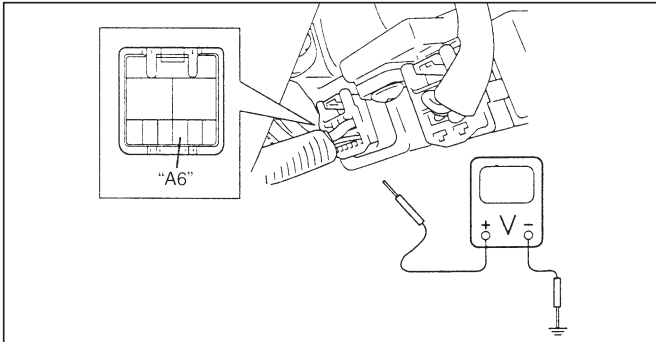


Fig. for Step 7

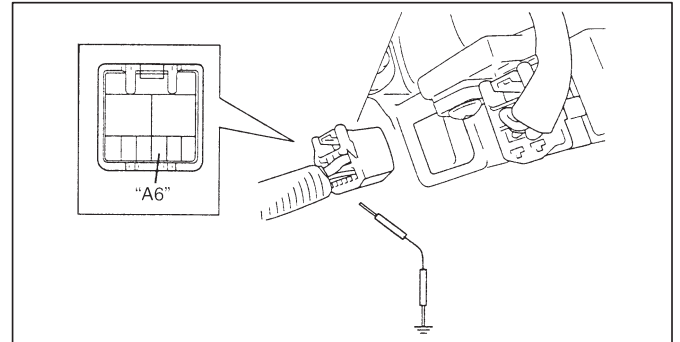


Fig. for Step 8

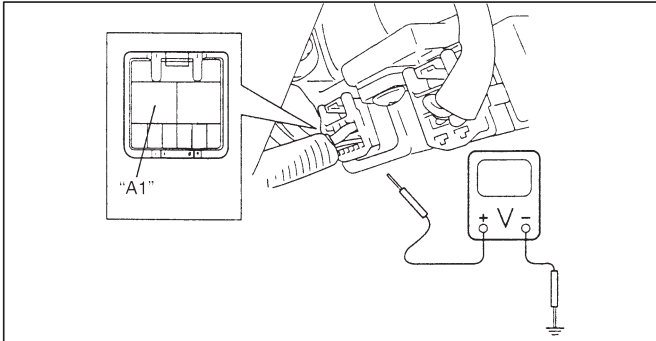


TABLE-B “EPS” WARNING LAMP FLASHES

STEP	ACTION	YES	NO
1	Was “SYSTEM CHECK FLOW TABLE” performed?	Go to Step 2.	Go to “SYSTEM CHECK FLOW TABLE” in this section.
2	1) Check monitor coupler for P/S system. Is it connected diagnosis switch terminal for P/S system and ground terminal in monitor coupler by service wire?	Remove service wire.	Go to Step 3.
3	1) With ignition switch OFF, disconnect 8-pin (“A”) connector from P/S control module. 2) Measure resistance between “A7” terminal of “A” connector and body ground. Is resistance 1 Ω or less?	Repair short from “Bl/W” wire circuit to ground.	Substitute a known-good P/S control module and recheck.

Fig. for Step 2

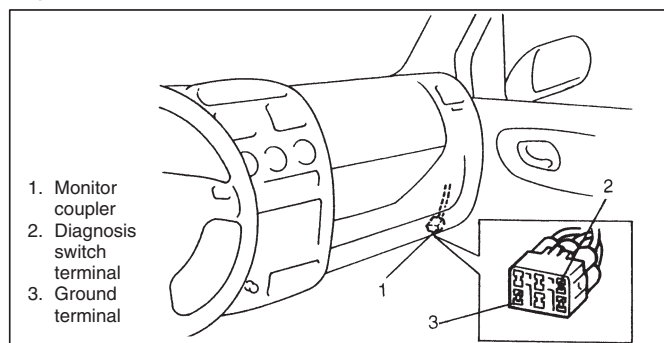


Fig. for Step 3

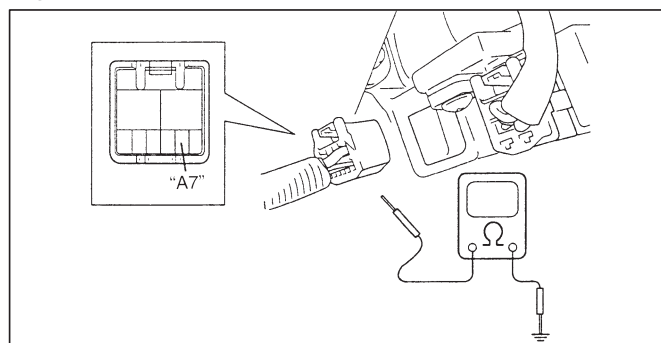


TABLE-C “EPS” WARNING LAMP REMAINS ON (EVEN THOUGH DIAGNOSIS SWITCH TERMINAL GROUNDED)

STEP	ACTION	YES	NO
1	Was “SYSTEM CHECK FLOW TABLE” performed?	Go to Step 2.	Go to “SYSTEM CHECK FLOW TABLE” in this section.
2	1) Short diagnosis switch terminal to body ground by service wire. Does “EPS” warning lamp turn ON with ignition switch ON position?	Repair high resistance or open in ground (“B” wire) circuit on monitor coupler.	Go to Step 3.
3	1) Turn ignition switch to OFF position. 2) Remove steering column lower cover. 3) Disconnect 8-pin (“A”) connector from P/S control module. 4) Check proper connection to P/S control module at terminal “A7”. 5) If OK, check resistance between “A7” terminal and “BI/W” wire terminal on monitor coupler. Is resistance 1 Ω or less?	Go to Step 4.	Repair high resistance or open in “BI/W” wire circuit.
4	1) Check proper connection to P/S control module at terminal “A6”. 2) If OK, turn ignition switch to ON position. 3) Check voltage between “A6” and body ground. Is it 10 – 14 V?	Substitute a known-good P/S control module and recheck.	Repair short to ground in “EPS” light (“Gr” wire) circuit.

Fig. for Step 2

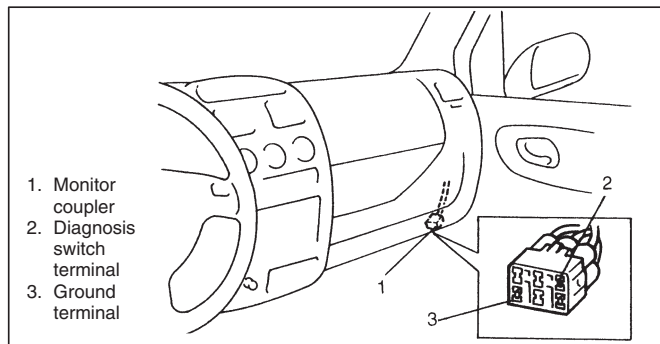


Fig. for Step 3

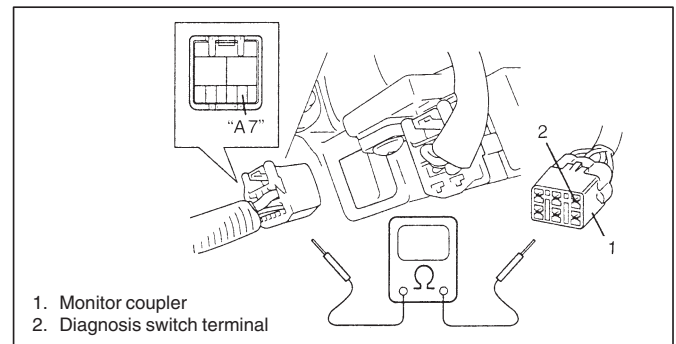
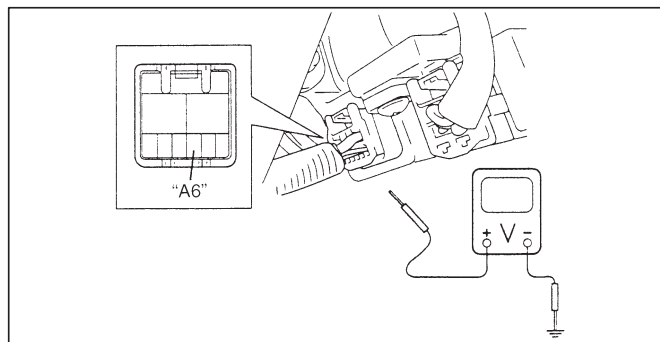
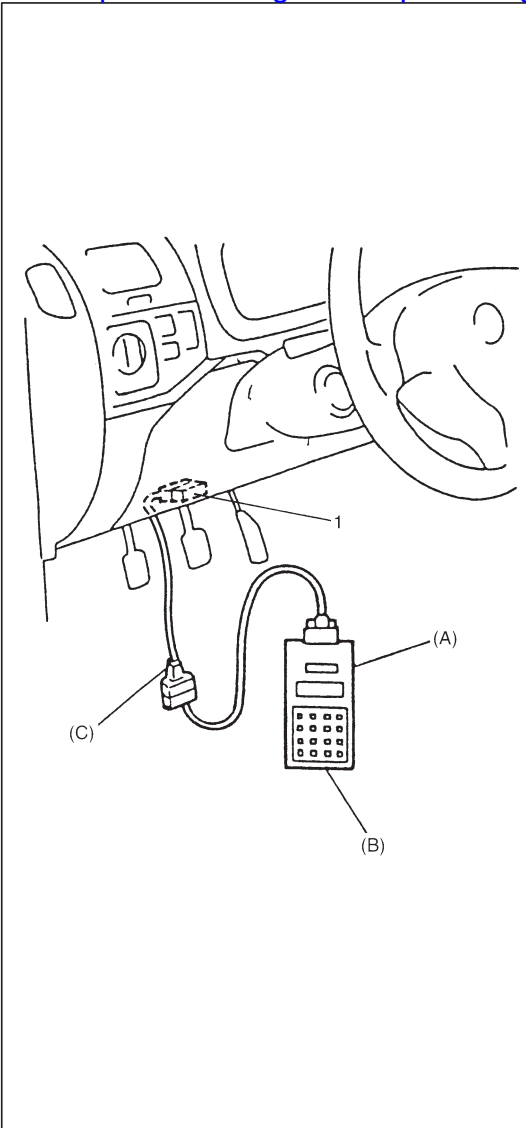


Fig. for Step 4





DTC CHECK

USING SUZUKI SCAN TOOL

- 1) Turn ignition switch to OFF position.
- 2) After setting cartridge, connect SUZUKI scan tool to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

Special Tool

(A): 09931-76011

(B): Mass storage cartridge

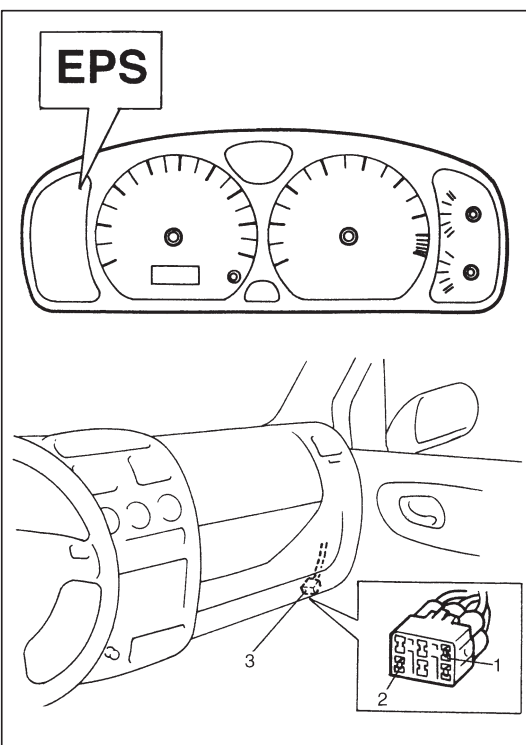
(C): 09931-76030

- 3) Turn ignition switch to ON position.
- 4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down referring to SUZUKI SCAN TOOL OPERATOR'S MANUAL for further details.

NOTE:

If Suzuki scan tool cannot display DTC, perform "SERIAL DATA LINK CIRCUIT CHECK" described in this section.

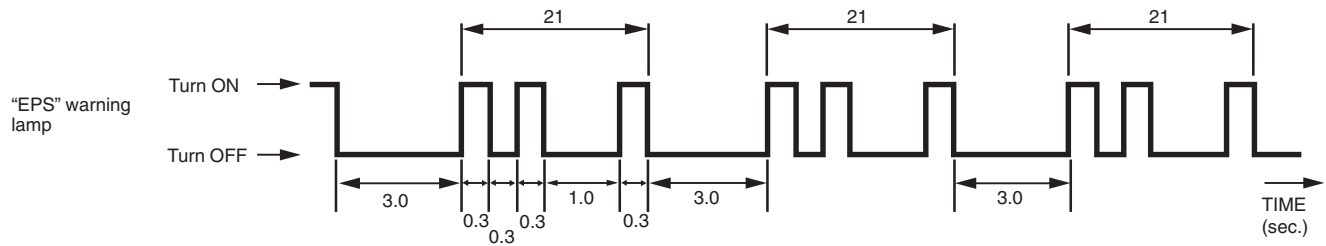
- 5) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.



NOT USING SUZUKI SCAN TOOL

- 1) Check that "EPS" warning lamp comes ON when ignition switch is turned to ON position referring to "EPS" WARNING LAMP CIRCUIT CHECK FLOW TABLE.
- 2) Apply chocks to wheels, set shift lever to neutral position and pull parking brake fully.
- 3) Start engine.
- 4) Using service wire, short diagnosis switch terminal (1) to ground terminal (2) on monitor coupler (3).
- 5) Read DTC from flashing pattern of "EPS" warning lamp referring to "DTC TABLE".
- 6) After completing the check, turn ignition switch to OFF position disconnect service wire from monitor coupler.

Example: When VSS circuit fail (DTC C1121) is set

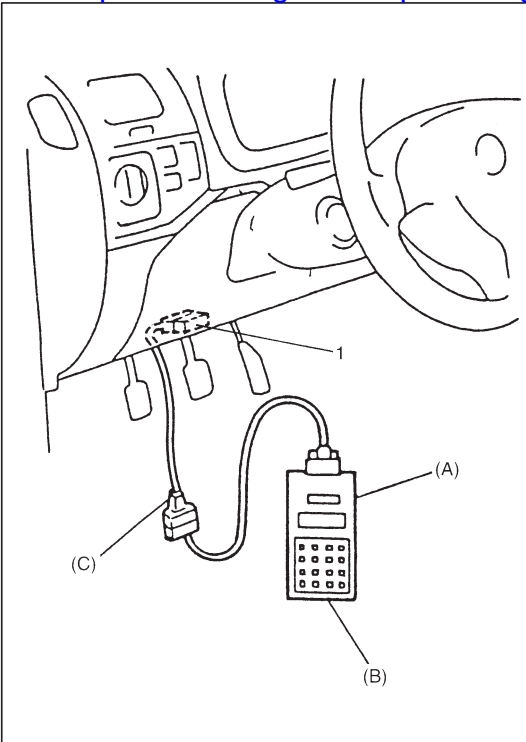


NOTE:

- When more than 2 DTCs are stored in memory, flashing for each DTC is repeated three times starting with the smallest DTC number in increasing order.
- If a code not listed on the table is displayed, then the P/S control module is faulty.
- DTC C1122 or DTC No.22 (flashing pattern: 22) is indicated when ignition switch ON and engine not running but if NO DTC or DTC No.12 (flashing pattern: 12) is indicated when engine is started, it means nothing abnormal.
- Current DTC and history DTC can be identified by lighting and flashing of “EPS” warning lamp. “EPS” warning lamp operates as follow depending on the trouble condition.

	Current DTC is set. (Abnormality exists at present.)	History DTC is set only. (Faulty condition occurred once in the past but normal condition is restored at present.)	Current DTC and history DTC exist.
“EPS” warning lamp after engine started	Remains ON.	Turns OFF.	Remains ON.
“EPS” warning lamp when shorting diagnosis switch terminal and ground terminal	Displays current DTC.	Displays history DTC.	Displays current DTC and history DTC.

For identify current DTC, clear history DTC referring to “DTC CLEARANCE” in this section.



DTC CLEARANCE

USING SUZUKI SCAN TOOL

- 1) Turn ignition switch to OFF position.
- 2) After setting cartridge to SUZUKI scan tool, connect scan tool to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

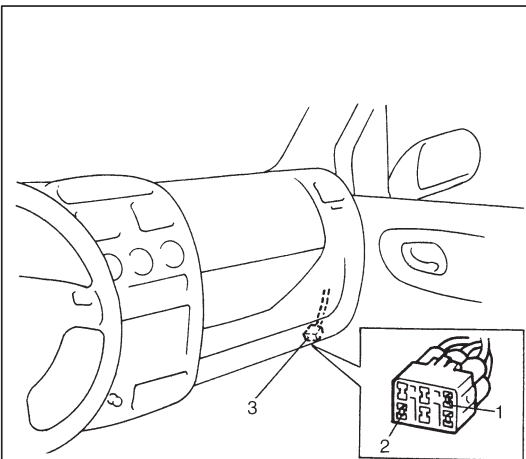
Special Tool

(A): 09931-76011

(B): Mass storage cartridge

(C): 09931-76030

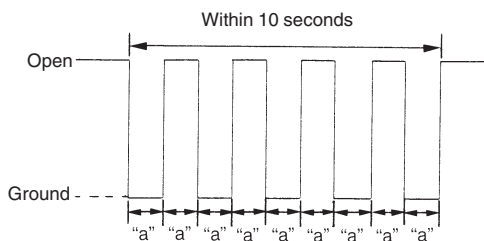
- 3) Turn ignition switch to ON position.
- 4) Erase DTC according to instructions displayed on SUZUKI scan tool referring to "SUZUKI SCAN TOOL OPERATOR'S MANUAL" for further details.
- 5) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.



NOT USING SUZUKI SCAN TOOL

- 1) Turn ignition switch to ON position.
- 2) Using service wire, repeat shorting and opening between diagnosis output terminal (1) and ground terminal (2) on monitor coupler (3) at least 5 times at about 1 second intervals within 10 seconds.

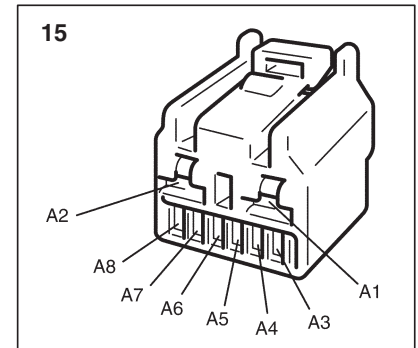
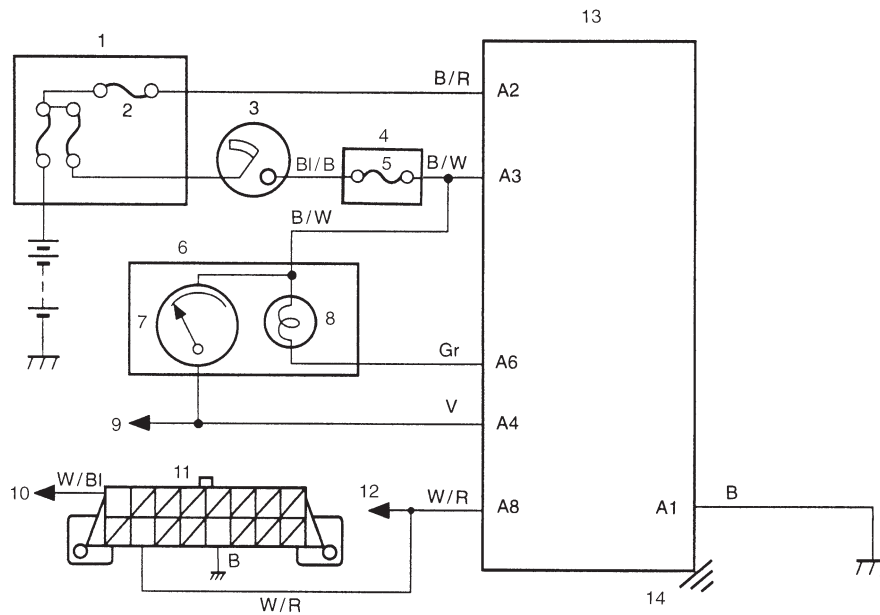
Condition between diagnosis switch terminal and ground terminal



"a": about 1 second

SERIAL DATA LINK CIRCUIT CHECK**CAUTION:**

Be sure to perform "SYSTEM CHECK FLOW TABLE" before starting diagnosis according to flow table.



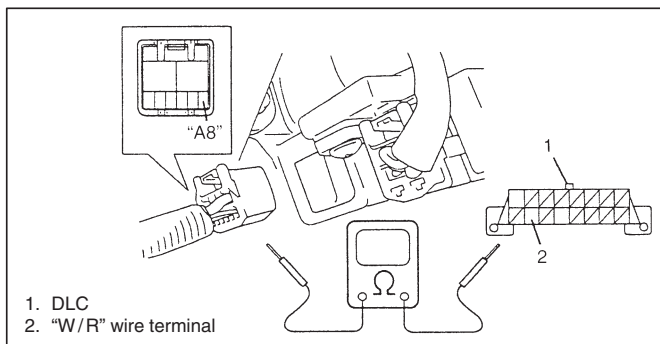
1. Main fuse box
2. "EPS" fuse (30 A)
3. Ignition switch
4. Circuit fuse box
5. "IG coil" fuse (15A)
6. Combination meter
7. Speedometer
8. "EPS" warning lamp

9. To vehicle speed sensor (VSS)
10. To main fuse box
11. Data link connector (DLC)
12. To ECM/PCM, SDM and ABS hydraulic unit/control module assembly (if equipped)
13. P/S control module
14. P/S control module body ground
15. Connector "A"

DIAGNOSTIC FLOW TABLE




















STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	1) Make sure that SUZUKI scan tool is free from malfunction and correct cartridge for P/S system is used. 2) Turn ignition switch to OFF position. 3) Check proper connection of SUZUKI scan tool to DLC. Is connection in good condition?	Go to Step 3.	Properly connect SUZUKI scan tool to DLC.
3	1) Check if communication is possible by trying communication with other controller (ECM/PCM, ABS hydraulic unit/control module assembly (if equipped) or SDM). Is it possible to communicate with other controller?	Go to Step 4.	Repair open in common section of serial data circuit ("W/R" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("W/R" wire circuit).
4	1) With ignition switch is OFF position, disconnect 8-pin ("A") connector from P/S control module. 2) Check proper connection at "A8" ("W/R" wire) terminal for serial data circuit. 3) If OK, then check resistance between "A8" ("W/R" wire) terminal and "W/R" wire terminal for serial data circuit in DLC. Is resistance 1 Ω or less?	Substitute a known-good P/S control module and recheck.	Repair high resistance or open in "W/R" wire circuit for P/S system.

Fig. for Step 4



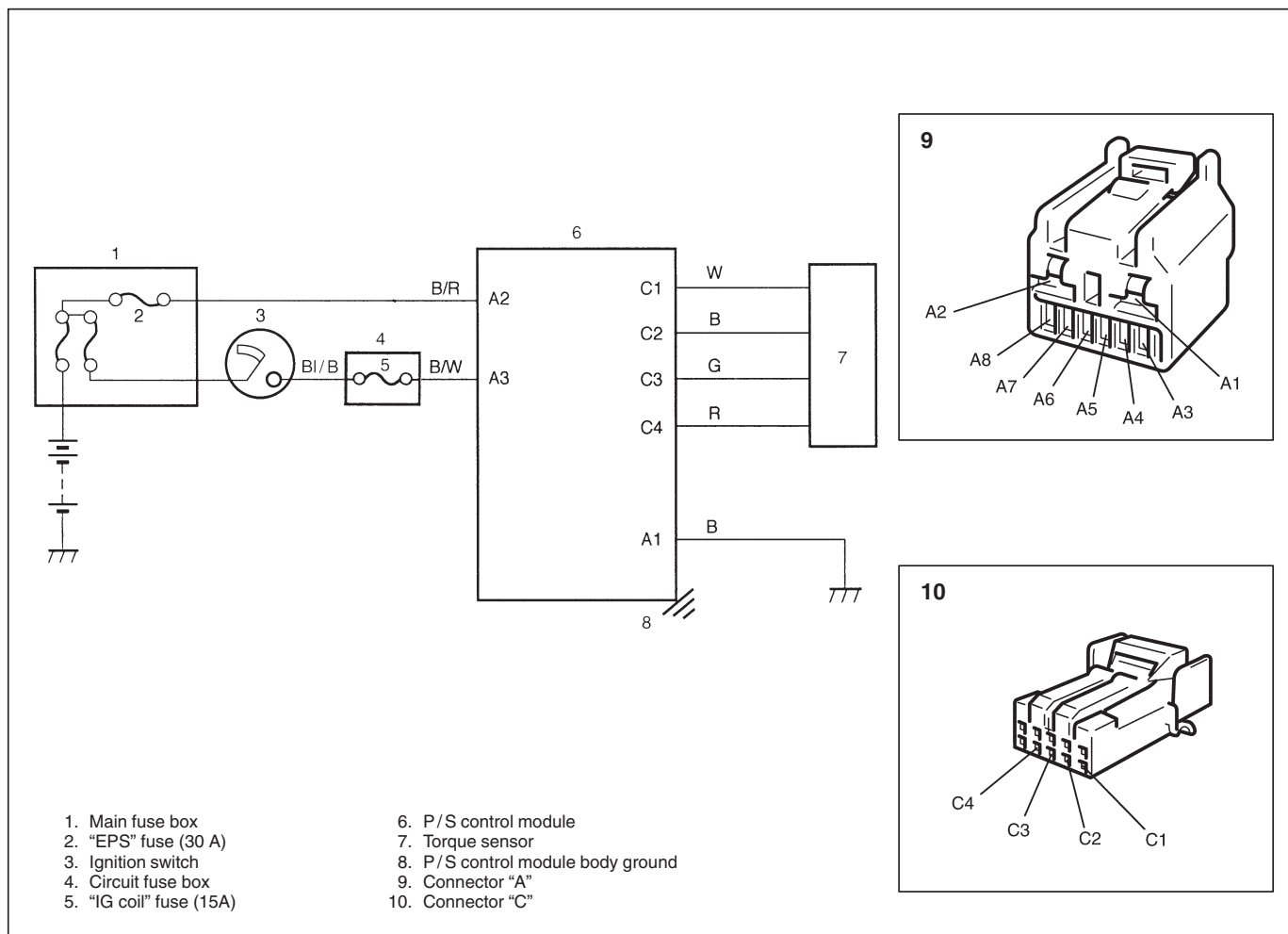
DTC TABLE**CAUTION:**

Be sure to perform "SYSTEM CHECK FLOW TABLE" before starting diagnosis according to flow table of each DTC.

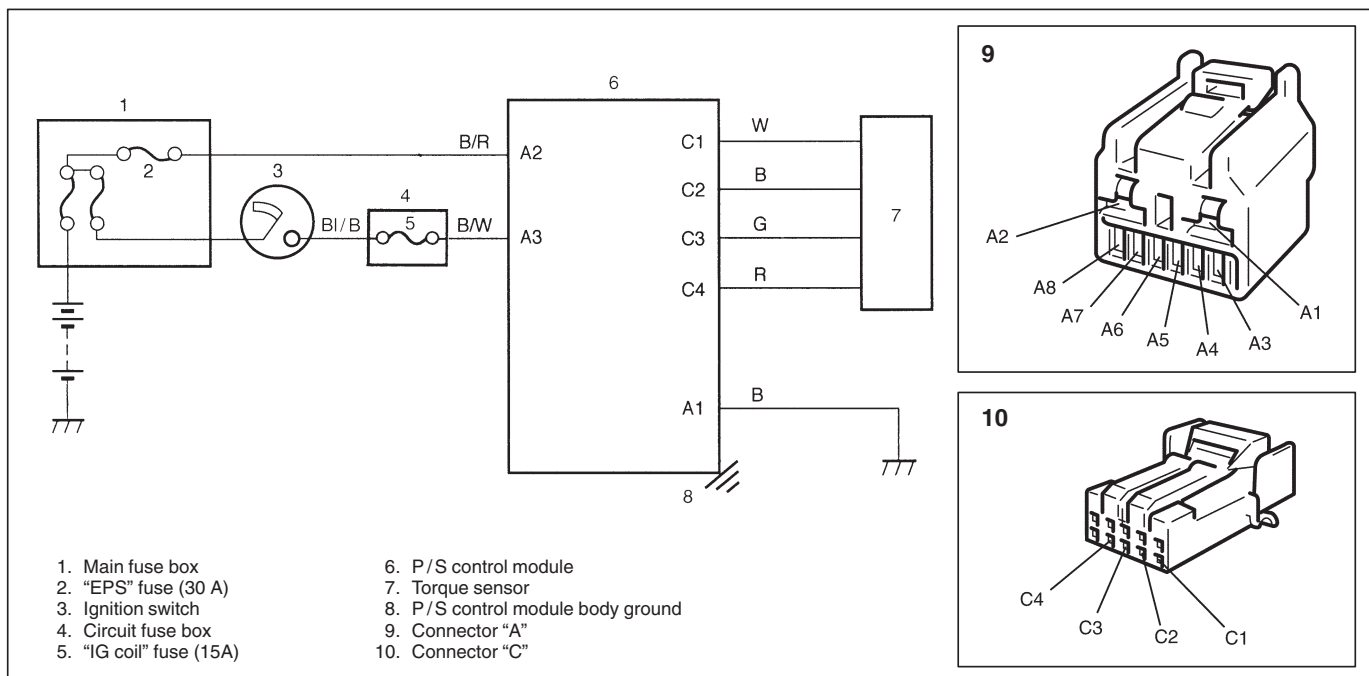
DTC	“EPS” light flashing pattern		DIAGNOSTIC ITEM	DIAGNOSIS
	No.	Model		
NO DTC	12		Normal	This code appears when none of the other codes are identified.
C1111	11		Torque sensor	Diagnose trouble according to “DIAGNOSTIC FLOW TABLE” corresponding to each code No.
C1113	13			
C1114	14			
C1115	15			
C1121	21		VSS signal	
C1123	23			
C1124	24			
C1122	22		Engine speed signal	
C1141	41		Motor	
C1142	42			
C1143	43			
C1144	44			
C1145	45			
C1151	51		Clutch	
C1152	52		P/S control module	
C1154	54			
C1155	55			
C1153	53		P/S control module power supply	

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DTC C1111 TORQUE SENSOR MAIN CIRCUIT FAIL **DTC C1113 TORQUE SENSOR MAIN AND SUB CIRCUIT FAIL** **DTC C1115 TORQUE SENSOR SUB CIRCUIT FAIL**

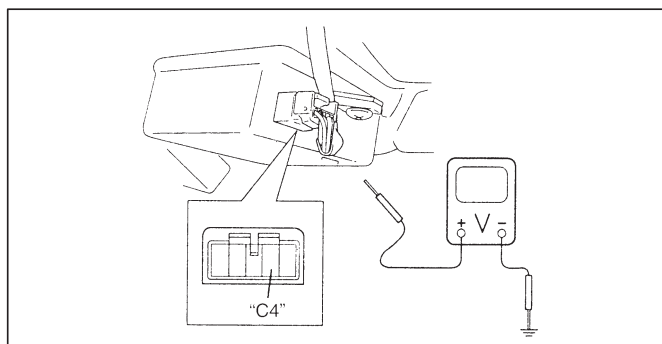


STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	Is DTC C1114 indicated?	Proceed to "DTC C1114 TORQUE SENSOR 5 V POWER SUPPLY CIRCUIT FAIL" in this section.	Go to Step 3.
3	1) Remove steering column hole cover. 2) Check proper connection for 5-pin ("C") connector to P/S control module. 3) If OK, check torque sensor and its circuit referring to "ON-VEHICLE INSPECTION" of "TORQUE SENSOR". Is torque sensor in good condition?	Substitute a known-good P/S control module and recheck.	Replace torque sensor and recheck.

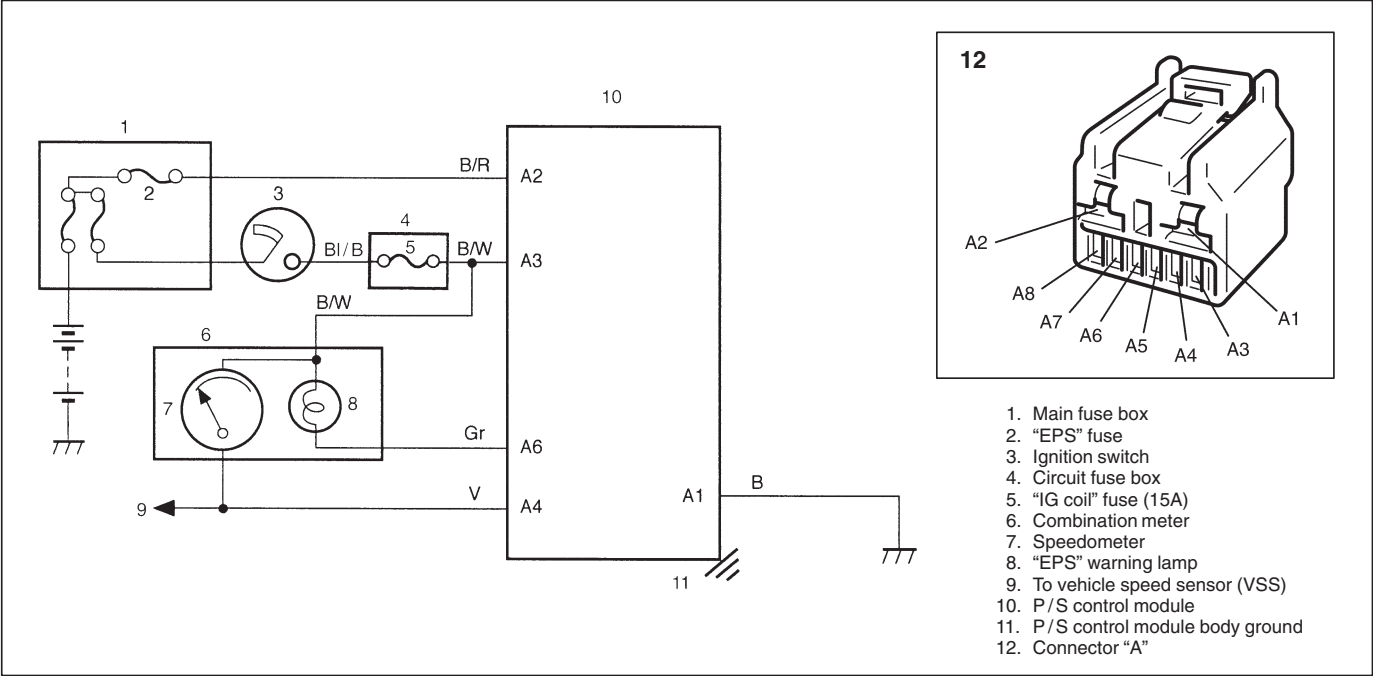
DTC C1114 TORQUE SENSOR 5V POWER SUPPLY CIRCUIT FAIL

STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	1) Remove steering column hole cover. 2) Check proper connection for 5-pin ("C") connector to P/S control module. 3) If OK, turn ignition switch to ON position. 4) Check voltage between "C4" ("R" wire) terminal of 5-pin ("C") connector and body ground with "C" connector connected to P/S control module. Is it about 5 V?	Go to Step 3.	Repair high resistance, open or short to power circuit or ground in 5 V power supply ("R" wire) circuit.
3	1) Check torque sensor and its circuit referring to "ON-VEHICLE INSPECTION" of "TORQUE SENSOR". Is torque sensor in good condition?	Substitute a known-good P/S control module and recheck.	Replace torque sensor and recheck.

Fig. for Step 2

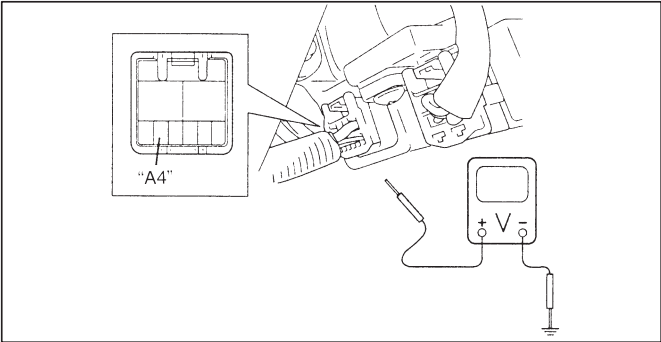


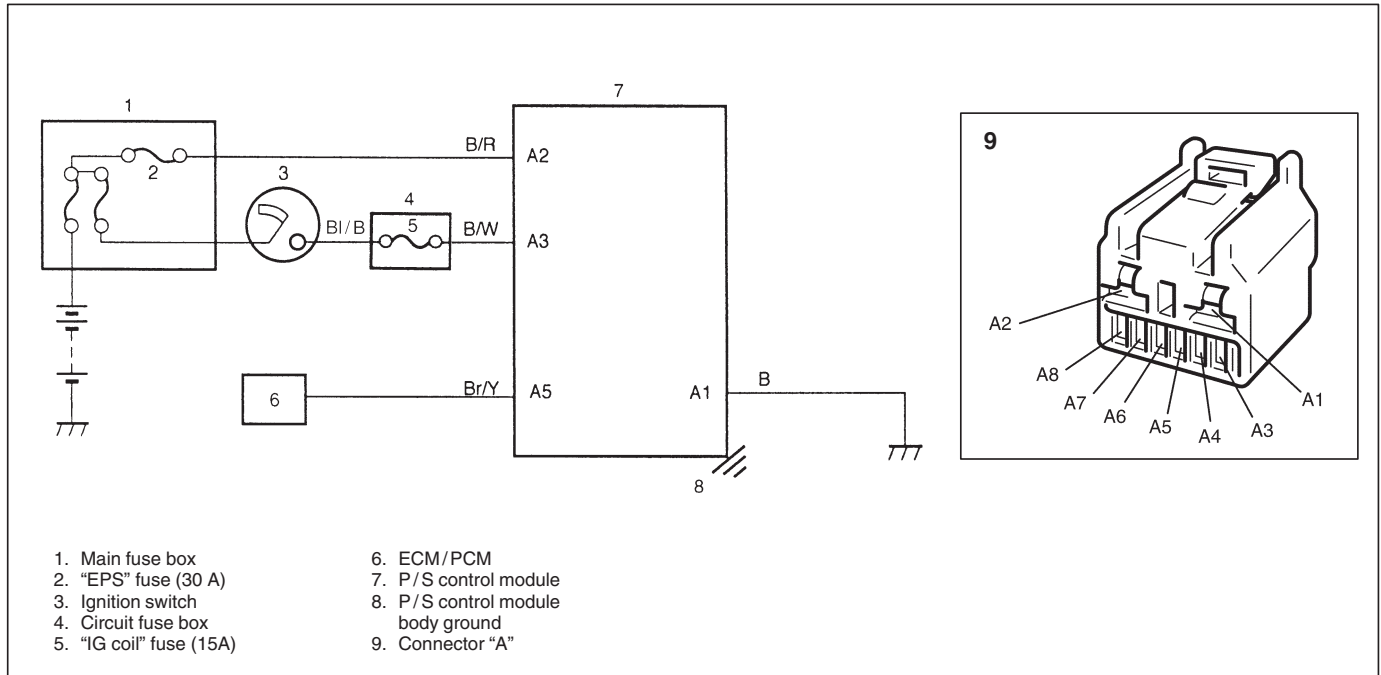
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DTC C1121/C1123/C1124 VSS CIRCUIT FAIL



STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	<p>1) Ignition switch to OFF position.</p> <p>2) Remove steering column hole cover.</p> <p>3) Disconnect 8-pin ("A") connector from P/S control module.</p> <p>4) Check proper connection to P/S control module at terminal "A4" ("V" wire).</p> <p>5) If OK, connect voltmeter between "A4" ("V" wire) terminal and body ground with "A" connector connected.</p> <p>6) Hoist front end of vehicle and lock front right tire.</p> <p>7) Turn front left tire quickly with ignition switch is ON position.</p> <p>Does voltmeter indicated deflection between 0 – 1 V and 9 – 11 V a few times while tire is turned one revolution?</p>	<p>Check intermittent trouble referring to "INTERMITTENT TROUBLE" in SECTION 0A.</p> <p>If OK, substitute a known-good P/S control module and recheck.</p>	<p>Repair VSS or its ("V" wire) circuit referring to SECTION 6E.</p>

Fig. for Step 2



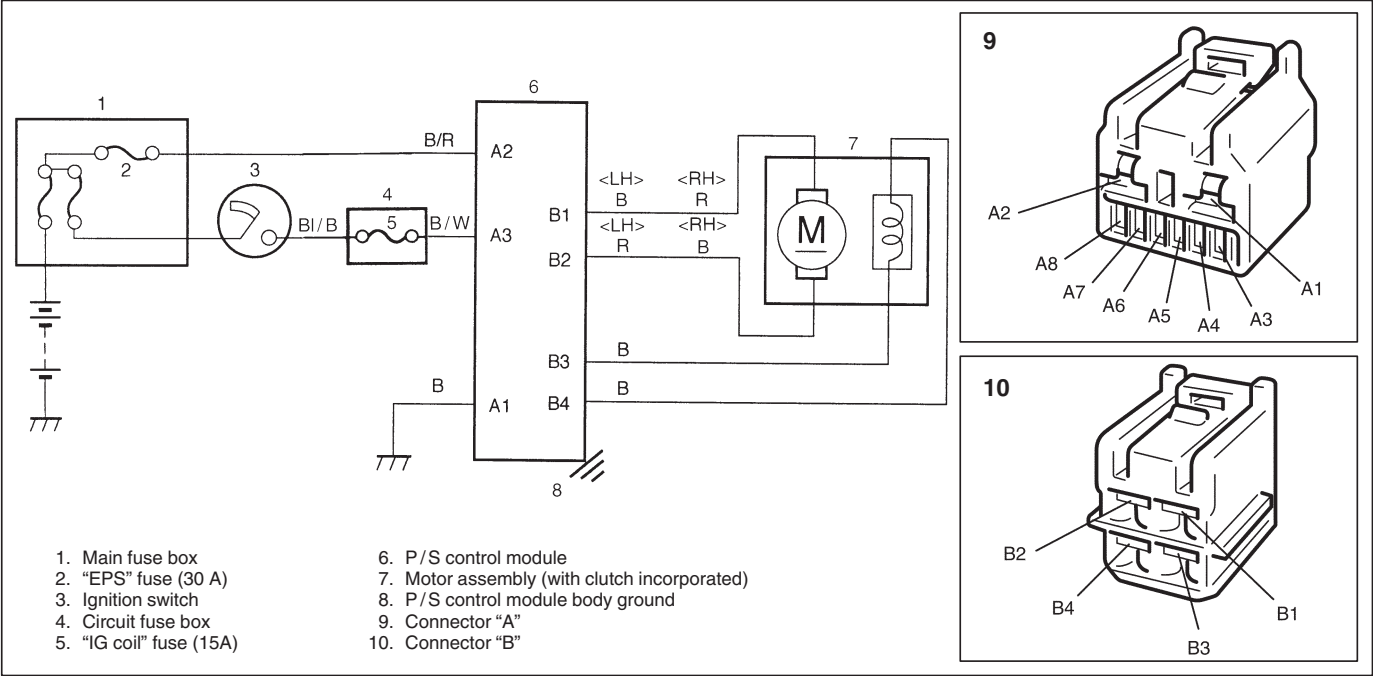
DTC C1122 ENGINE SPEED SIGNAL CIRCUIT FAIL

STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	1) Recheck DTC with engine running. Is DTC C1122 indicated?	Go to Step 3.	It is nothing abnormal for DTC C1122. System is in normal condition.
3	1) Check proper connection to P/S control module and ECM/PCM at each "Br/Y" wire terminal (P/S control module side: "A5" terminal, ECM/PCM side: Refer to "WIRING DIAGRAM" in SECTION 6E), then check intermittent trouble referring to "INTERMITTENT TROUBLE" in SECTION 0A. Is check result in good condition?	Go to Step 4.	Repair poor connection or intermittent trouble.
4	1) See NOTE 1 describe below. 2) Using SUZUKI scan tool, read data list for P/S system referring to "SUZUKI SCAN TOOL OPERATOR'S MANUAL". 3) Check engine speed. Is proper engine speed indicated?	Substitute a known-good P/S control module and recheck.	Repair high resistance, open or short to power circuit or ground in "Br/Y" wire circuit. If OK, check engine speed signal of ECM/PCM.

NOTE 1:

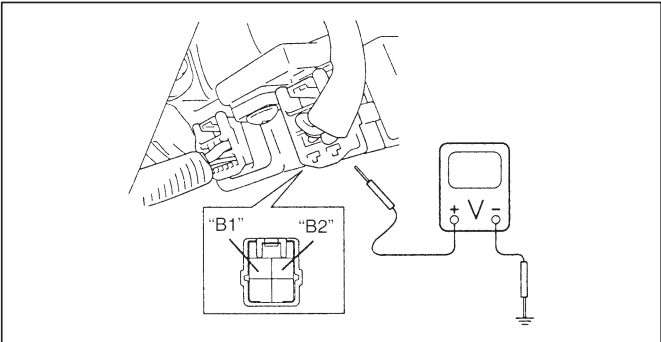
It is necessary for SUZUKI scan tool to perform STEP 4 of this table.

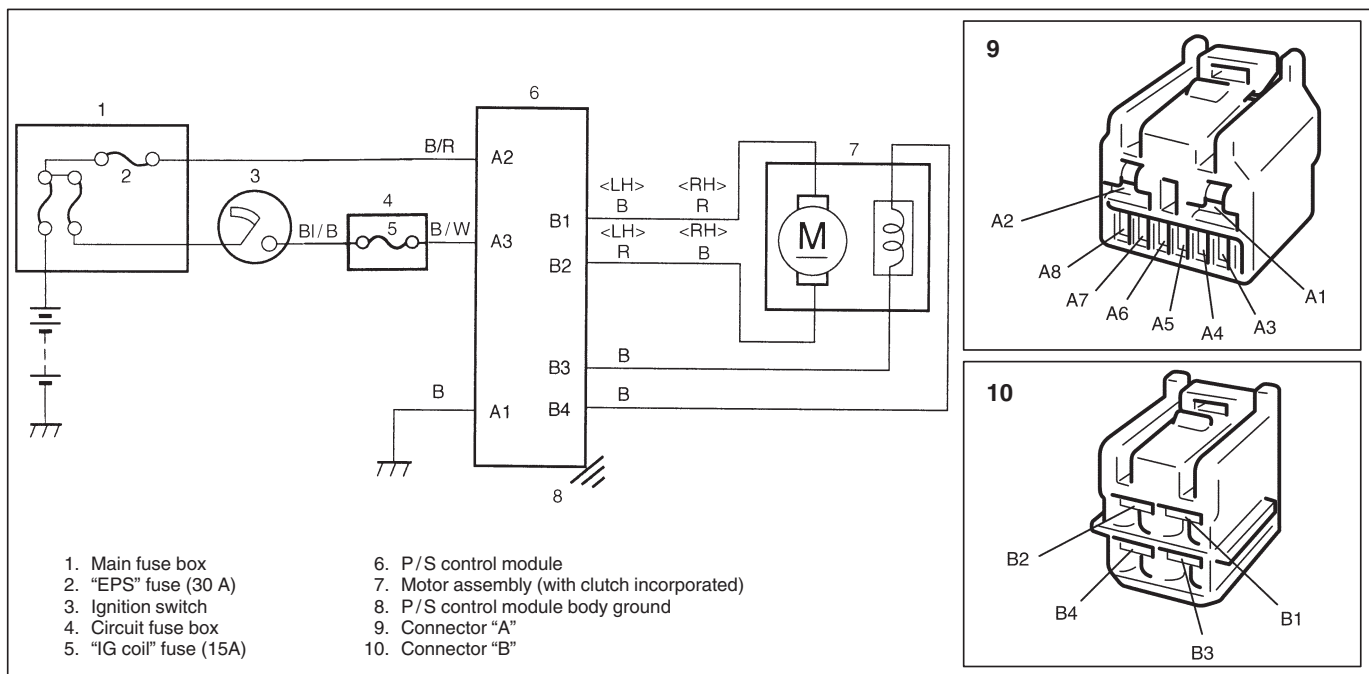
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DTC C1141/C1142/C1143/C1144/C1145 MOTOR CIRCUIT FAIL



STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	1) Remove steering column hole cover. 2) Check proper connection for 4-pin ("B") connector to P/S control module. 3) If OK, start engine. 4) Check voltage between "B1" terminal and body ground and "B2" terminal and body ground with "B" connector connected to P/S control module. Are they 5 – 7 V with steering wheel held at position for vehicle to run straight?	Go to Step 3.	Repair poor connection, high resistance, open or short to power circuit or ground in "B1" or "B2" circuit.
3	1) Check motor and its circuit referring to "ON-VEHICLE INSPECTION" of "MOTOR ASSEMBLY (WITH CLUTCH INCORPORATED)". Is motor in good condition?	Substitute a known-good P/S control module and recheck.	Replace motor assembly and recheck.

Fig. for Step 2



DTC C1151 CLUTCH CIRCUIT FAIL

STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	1) Remove steering column hole cover. 2) Check proper connection for 4-pin ("B") connector to P/S control module. 3) If OK, start engine. 4) Check voltage between "B3" terminal and body ground with "B" connector connected to P/S control module. Is it 0 V?	Go to Step 3.	Repair poor connection, high resistance, open or short to power circuit or ground in "B3" circuit.
3	1) With engine running, check voltage between "B4" terminal and body ground with "B" connector connected to P/S control module. Is it 10 – 14 V with steering wheel held at position for vehicle to run straight?	Go to Step 4.	Repair poor connection, high resistance, open or short to power circuit or ground in "B4" circuit.
4	1) Check motor and its circuit referring to "ON-VEHICLE INSPECTION" of "MOTOR ASSEMBLY (WITH CLUTCH INCORPORATED)". Is clutch in good condition?	Substitute a known-good P/S control module and recheck.	Replace motor assembly and recheck.

Fig. for Step 2

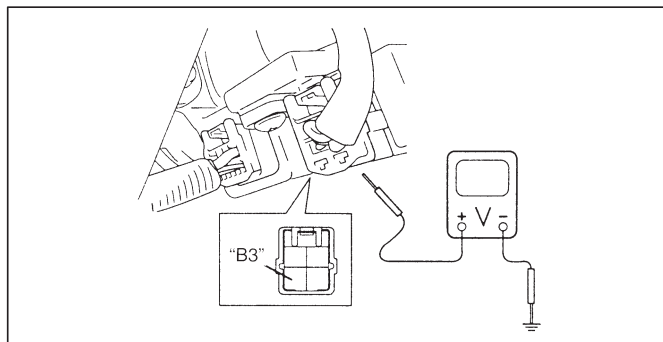
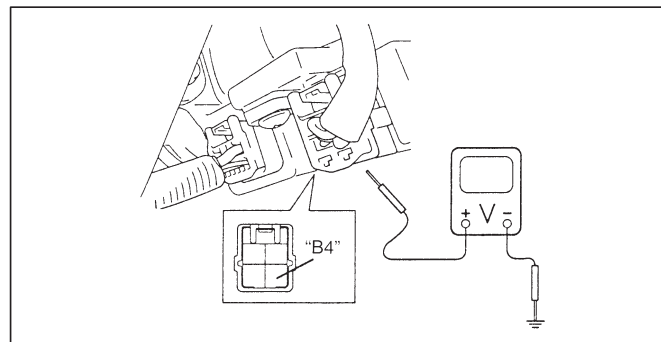
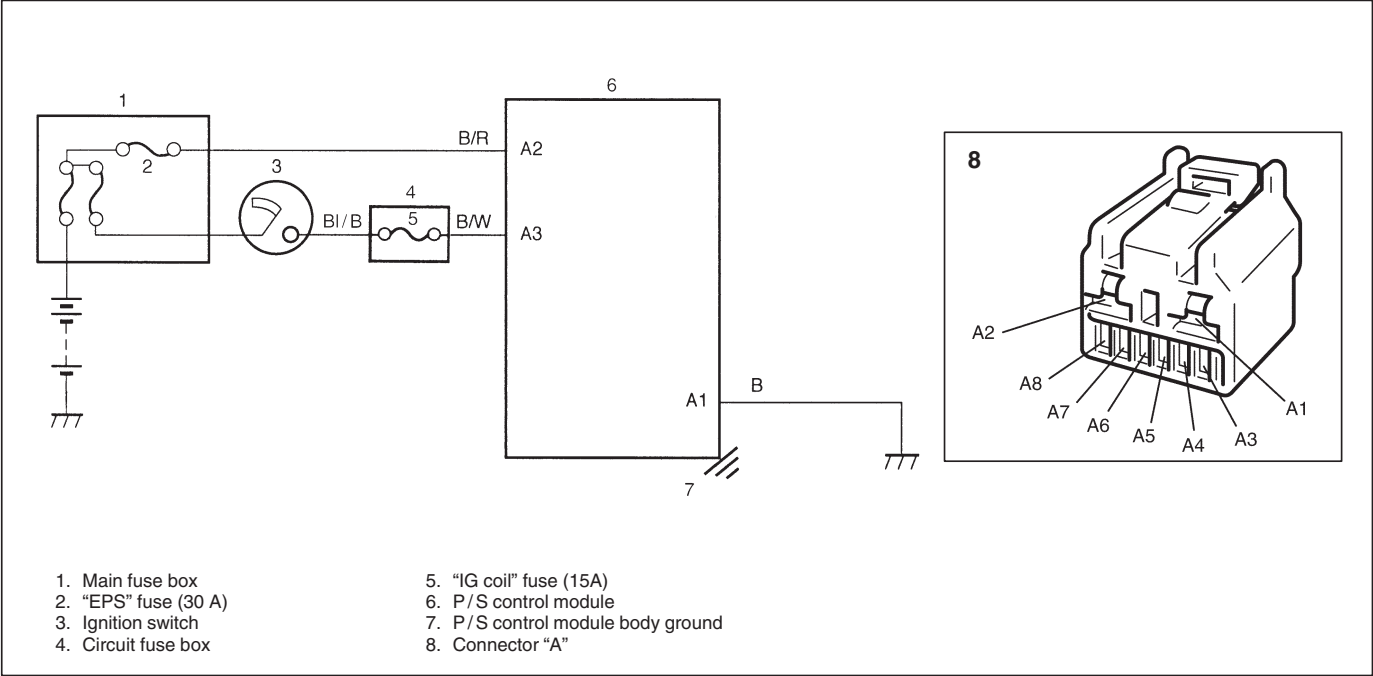


Fig. for Step 3

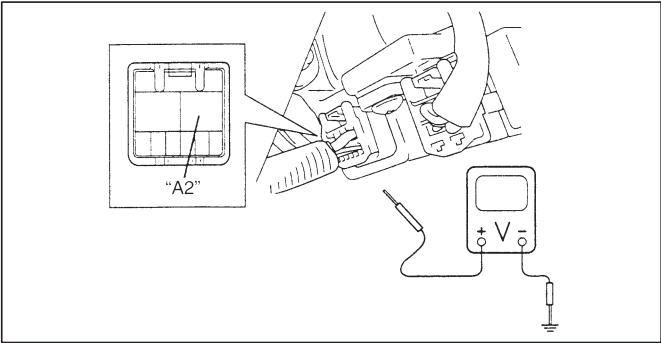


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DTC C1153 P/S CONTROL MODULE POWER SUPPLY CIRCUIT FAIL



STEP	ACTION	YES	NO
1	Was "SYSTEM CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "SYSTEM CHECK FLOW TABLE" in this section.
2	1) Remove steering column hole cover. 2) Check proper connection to P/S control module at "A2" ("B/R" wire) terminal. 3) If OK, check voltage between "A2" terminal and body ground with "A" connector connected to P/S control module. Is it 10 – 14 V?	Check intermittent trouble referring to "INTERMITTENT TROUBLE" in SECTION 0A. If OK, substitute a known-good P/S control module and recheck.	Repair poor connection or high resistance in "A2" ("B/R" wire) circuit.

Fig. for Step 2



DTC C1152/C1154/C1155 P/S CONTROL MODULE FAIL

Substitute a known-good P/S control module and recheck.

INSPECTION OF P/S CONTROL MODULE AND ITS CIRCUITS

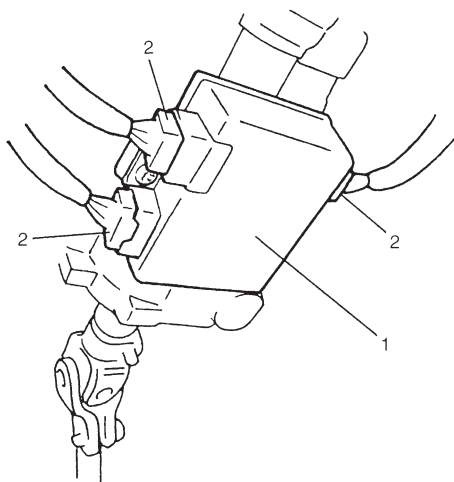
P/S control module (1) and its circuits can be checked at P/S control module wiring couplers (2) by measuring voltage and resistance.

CAUTION:

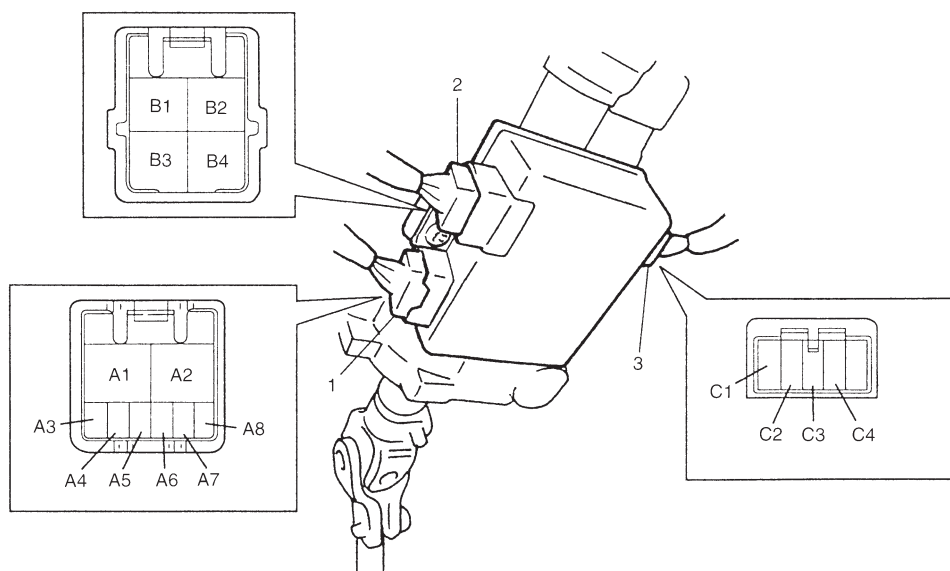
P/S control module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to P/S control module with coupler disconnected from it.

Voltage Check

- 1) Remove steering column hole cover.
- 2) Check that battery voltage is 11 V or more when ignition switch is ON position.
- 3) Check voltage at each terminal of couplers connected referring to terminal arrangement shown below and voltage table on next page.



TERMINAL ARRANGEMENT OF P/S CONTROL MODULE COUPLERS (VIEWED FROM HARNESS)



1. Connector "A"
2. Connector "B"
3. Connector "C"

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TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
A1	Ground	—	—
A2	P/S control module power supply from battery	10 – 14 V	—
A3	P/S control module power supply from ignition switch	10 – 14 V	Ignition switch is ON position
A4	VSS	Indicator deflection repeated 0 – 1 V and 9 – 11 V	Ignition switch is ON position Front left tire turned quickly with right tire locked
A5	Engine speed signal	About 1 V	Engine idling Measured by multimeter
A6	“EPS” warning lamp	0 – 2 V	Engine idling “EPS” light ON
		10 – 14 V	Engine idling “EPS” light OFF
A7	Diagnosis switch terminal	About 5 V	Ignition switch is ON position
A8	SUZUKI scan tool	—	—
B1	Motor output 2	5 – 7 V	Engine idling and steering wheel held at position for vehicle to run straight
B2	Motor output 1	5 – 7 V	Engine idling
B3	Clutch output 2	0 V	—
B4	Clutch output 1	10 – 14 V	Engine idling
C1	Torque sensor (Main)	About 2.5 V	Ignition switch is ON position Steering wheel held at position for vehicle to run straight Check voltage between “C1” and “C3” terminals.
C2	Torque sensor (Sub)	About 2.5 V	Ignition switch is ON Steering wheel held at position for vehicle to run straight Check voltage between “C2” and “C3” terminals.
C3	Torque sensor (GND)	0 V	—
C4	5 V power supply for torque sensor	About 5 V	Ignition switch is ON position Check voltage between “C4” and “C3” terminals.

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TROUBLE DIAGNOSIS (FOR TROUBLE NOT INDICATED BY ON-BOARD DIAGNOSTIC SYSTEM)

This section describes trouble diagnosis of P/S system parts whose trouble is not indicated by the on-board diagnostic system (self-diagnostic function).

When DTC No. 12 (flashing pattern: 12) is indicated by the on-board diagnostic system (self-diagnosis function) and assuredly those steering basic parts as described in "DIAGNOSIS CHART" in SECTION 3 are all in good condition, check the following power steering system parts which may be a possible cause for each symptom of the steering.

SYMPTOM	POSSIBLE CAUSE	INSPECTION
Steering wheel feels heavy (Perform "INSPECTION OF STEERING FORCE" on next page before diagnosis.)	<ul style="list-style-type: none"> ● Steering wheel installed improperly (twisted) ● Poor performance of torque sensor ● Poor performance of motor and clutch ● Faulty steering column ● Poor performance of VSS 	<p>Install steering wheel correctly.</p> <p>Check torque sensor referring to "ON-VEHICLE INSPECTION" of "TORQUE SENSOR".</p> <p>Check motor and clutch referring to "ON-VEHICLE INSPECTION" of "MOTOR ASSEMBLY".</p> <p>Replace.</p> <p>Check VSS referring to SECTION 6E.</p>
Vehicle pulls to one side during straight driving	<ul style="list-style-type: none"> ● Poor performance of torque sensor 	<p>Check torque sensor referring to "ON-VEHICLE INSPECTION" of "TORQUE SENSOR".</p>
Poor recovery from turns	<ul style="list-style-type: none"> ● Poor performance of torque sensor ● Faulty steering column 	<p>Check torque sensor referring to "ON-VEHICLE INSPECTION" or "TORQUE SENSOR".</p> <p>Replace.</p>

INSPECTION OF STEERING WHEEL PLAY

Check steering wheel for looseness or rattle by trying to move it in its shaft direction and lateral direction.

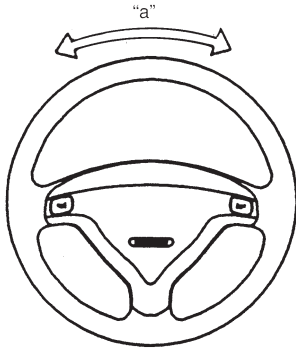
If found defective, repair or replace.

Check steering wheel for play, holding vehicle in straight forward condition on the ground and with engine stopped.

Steering wheel play "a": 0 – 30 mm (0 – 1.2 in.)

If steering wheel play is not within specification, inspect as follows and replace if found defective.

- Tie rod end ball stud for wear
- Lower ball joint for wear
- Steering shaft joint for wear
- Steering pinion or rack gear for wear or breakage
- Each part for looseness



INSPECTION OF STEERING FORCE

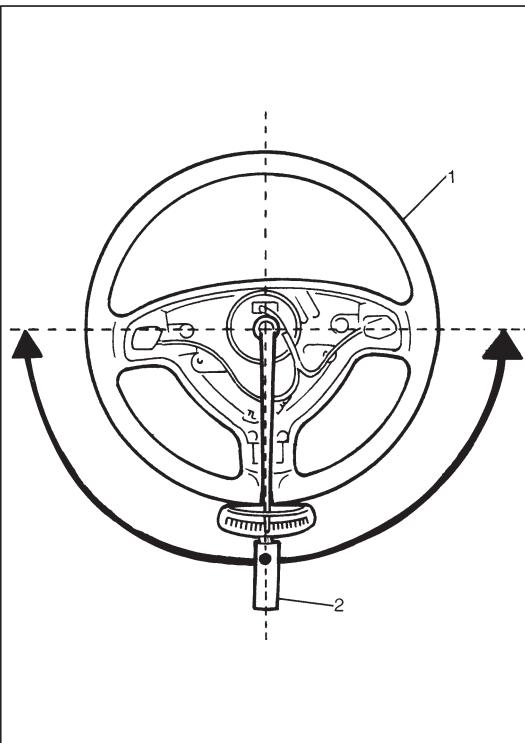
- 1) Place vehicle on level road and set steering wheel (1) at straight-ahead position.
- 2) Check that tire inflation pressure is as specified. (Refer to tire placard.)
- 3) Remove driver air bag (inflator) module referring to SECTION 3C1.
- 4) Start engine.
- 5) With engine idling, measure steering force by torque wrench (2) as shown left figure.

Steering force: Less than 5.9 N·m (0.59 kg-m, 4.5 lb-ft)

NOTE:

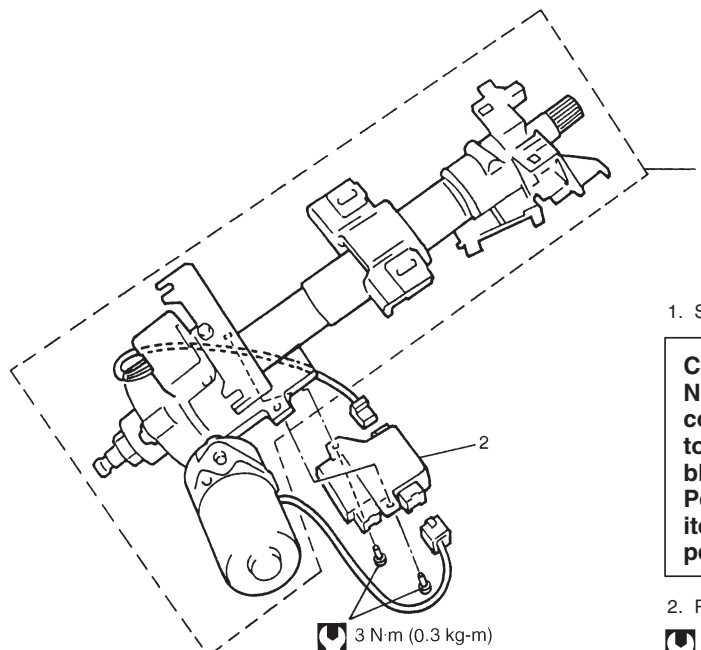
Be sure to consider the tire type, pressure and contact surface before inspection.

- 6) Install driver air bag (inflator) module referring to SECTION 3C.



ON-VEHICLE SERVICE

[LH]



1. Steering column assembly

CAUTION:
 Never disassemble steering column assembly, remove torque sensor or motor assembly (with clutch incorporated). Performing any of these prohibited services will affect original performance of EPS system.

2. P/S control module

: Tightening Torque

P/S CONTROL MODULE**REMOVAL**

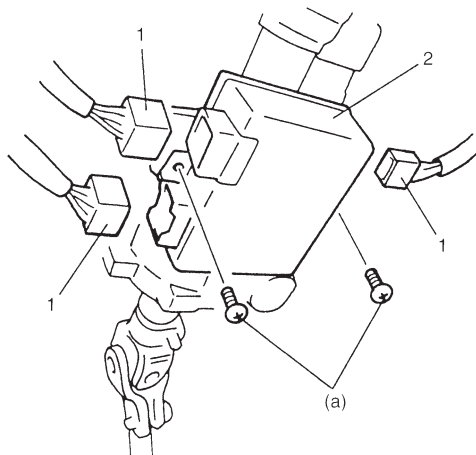
- 1) Disconnect negative cable at battery.
- 2) Remove steering column hole cover.
- 3) Disconnect couplers (1) from P/S control module (2).
- 4) Remove P/S control module from steering column assembly.

INSTALLATION

Reverse removal procedure for installation.

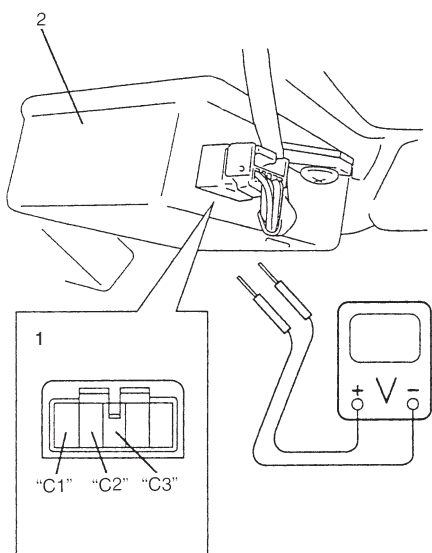
Tightening Torque

(a): 3 N·m (0.3 kg-m, 2.0 lb-ft)



TORQUE SENSOR**ON-VEHICLE INSPECTION**

- 1) Remove steering column lower cover.
- 2) Turn ignition switch to ON position.
- 3) Check voltage between terminals of torque sensor connector (1) with connecting it to P/S control module (2) and not running engine.

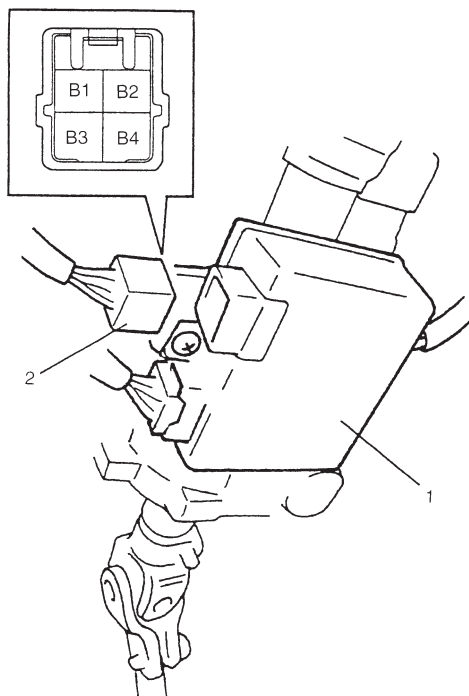


	Steering wheel turned fully right	Steering wheel held at position for run straight	Steering wheel turned fully left
Main sensor ("C1" – "C3")	About 3.9 V	About 2.5 V	About 1.1 V
Sub sensor ("C2" – "C3")	About 1.1 V	About 2.5 V	About 3.9 V

If check result is not satisfactory, replace steering column assembly.

MOTOR ASSEMBLY (WITH CLUTCH INCORPORATED)**ON-VEHICLE INSPECTION**

- 1) Remove steering column hole cover.
- 2) Disconnect motor and clutch coupler (1) from P/S control module (2) with ignition switch is OFF.
- 3) Check resistance between terminals of motor assembly coupler.



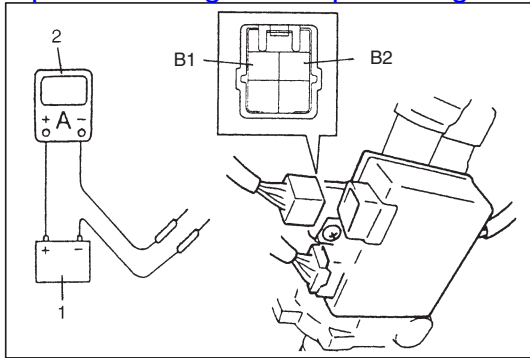
"B1" and "B2" (For motor)	About 1 Ω
"B3" and "B4" (For clutch)	About 12 Ω (at 20°C (68°F))

If check result is not satisfactory, replace steering column assembly.

- 4) Check continuity between terminal of motor assembly coupler and body ground.

"B1" and body ground	No continuity
"B3" and body ground	No continuity

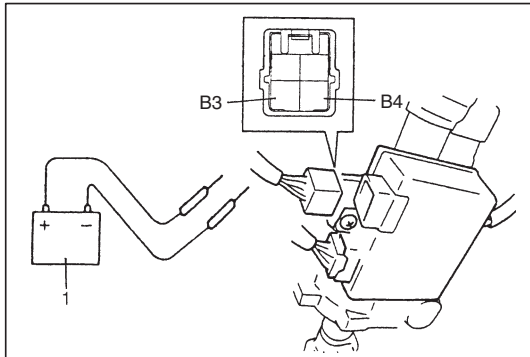
If check result is not satisfactory, replace steering column assembly.



- 5) Connect battery (1) between "B1" and "B2". Check that motor rotates smoothly, then measure current between "B1" and "B2" using ammeter (2) as shown in left figure.

Standard current (reference value) : About 0.65 A

If check result is not satisfactory, replace steering column assembly.



- 6) Connect battery (1) between "B3" and "B4", then check that clutch operation sound is heard.

If check result is not satisfactory, replace steering column assembly.

STEERING COLUMN ASSEMBLY

Refer to "STEERING WHEEL AND COLUMN" section for removal and installation of steering column assembly but disconnect all couplers from P/S control module beforehand.

SPECIAL TOOLS

<p>1. Storage case 2. Operator's manual 3. Tech 1A 4. DLC cable 5. Test lead/probe 6. Power source cable 7. DLC cable adapter 8. Self-test adapter</p> <p>09931-76011 SUZUKI scan tool (Tech 1A) kit</p>	<p>Mass storage cartridge</p>	<p>09931-76030 16/14 pin DLC cable</p>
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SECTION 3C**STEERING WHEEL AND COLUMN****WARNING:**

The procedures in this section must be followed in the order listed to temporarily disable the air bag system and prevent false diagnostic codes from setting.

Failure to follow procedures could result in possible air bag system activation, personal injury or otherwise unneeded air bag system repairs.

CAUTION:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above procedures are not followed, parts or system damage could result.

3C**CONTENTS**

GENERAL DESCRIPTION	3C- 2	Deployed driver air bag (inflator) module	3C- 5
Steering Column	3C- 2	Contact coil cable assembly	3C- 6
Steering Wheel and Driver Air Bag (Inflator) Module	3C- 2	Air bag wire harness and connector ...	3C- 6
DIAGNOSIS	3C- 2	Disposal Precaution	3C- 6
Inspection and Repair Required After Accident	3C- 2	ON-VEHICLE SERVICE	3C- 7
PRECAUTIONS	3C- 3	Driver Air Bag (Inflator) Module	3C- 8
Service Precaution	3C- 3	Steering Wheel	3C-10
Disabling air bag system	3C- 3	Contact Coil Cable Assembly	3C-12
Enabling air bag system	3C- 4	Steering Column	3C-14
Handling Precaution	3C- 4	Steering Lower Shaft	3C-17
Live (undeployed) driver air bag (inflator) module	3C- 4	CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE	3C-19
		REQUIRED SERVICE MATERIALS	3C-20

GENERAL DESCRIPTION

STEERING COLUMN

This double tube type steering column has the following three important features in addition to the steering function:

- The column is energy absorbing, designed to compress in a front-end collision.
- The ignition switch and lock are mounted conveniently on this column.
- With the column mounted lock, the ignition and steering operations can be locked to inhibit theft of the vehicle.

To insure the energy absorbing action, it is important that only the specified screws, bolts, and nuts be used as designated and that they are tightened to the specified torque.

When the column assembly is removed from the vehicle, special care must be taken in handling it. A sharp blow on the end of the steering shaft, leaning on the assembly, or dropping the assembly could shear the plastic shear pins which maintain column length and position.

STEERING WHEEL AND DRIVER AIR BAG (INFLATOR) MODULE

The driver air bag (inflator) module is one of the supplemental restraint air bag system components and is mounted to the center of the steering wheel.

During certain frontal crashes, the air bag system supplements the restraint of the driver's and/or passenger's seat belts by deploying the air bag in each air bag (inflator) module.

The air bag (inflator) module should be handled with care to prevent accidental deployment. When servicing, be sure to observe all WARNINGS and CAUTIONS in this section. Refer to "Precautions" later in this section, and to SECTION 10B.

DIAGNOSIS

For diagnosis of the steering wheel and steering column, refer to SECTION 3. For diagnosis of the air bag system, refer to SECTION 10B.

INSPECTION AND REPAIR REQUIRED AFTER ACCIDENT

After an accident, whether the air bag has been deployed or not, be sure to perform inspections and repairs described under "Checking Steering Column for Accident Damage" in this section as well as "Repairs and Inspections Required after Accident" in SECTION 10B.

PRECAUTIONS

SERVICE PRECAUTION

- WARNING/CAUTION labels are attached on each part of air bag system components (SDM, air bag (inflator) module(s) and seat belt pretensioners (if equipped)). Be sure to follow the instructions.

WARNING:

- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, dashboard, or any other air bag system component. Modifications can adversely affect air bag system performance and lead to injury.
- Failure to follow procedures could result in possible air bag activation, personal injury or unneeded air bag system repairs.

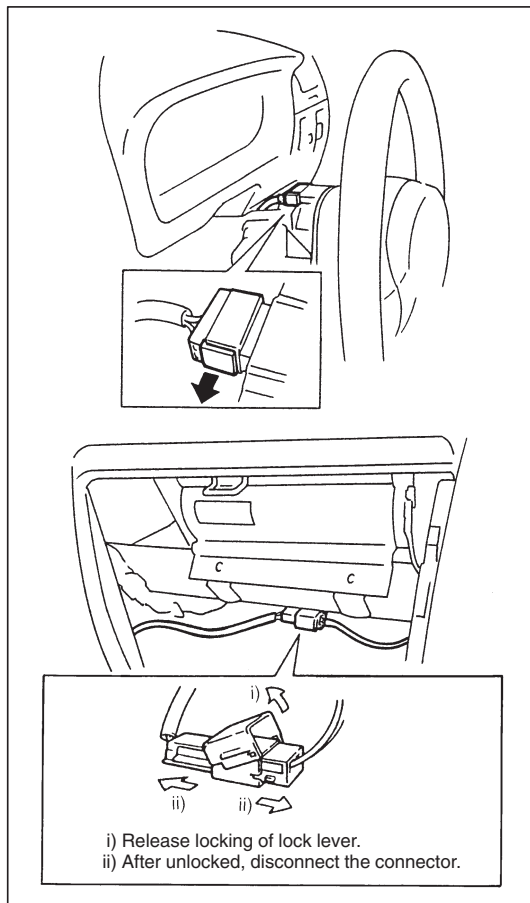
- Many of the service procedures require disconnection of the "AIR BAG" fuse and all air bag (inflator) module(s) (driver and passenger) from the initiator circuit to avoid an accidental deployment.
- Never use air bag component parts from another vehicle.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components.
- When servicing, if shocks may be applied to air bag system component parts, remove those parts beforehand.

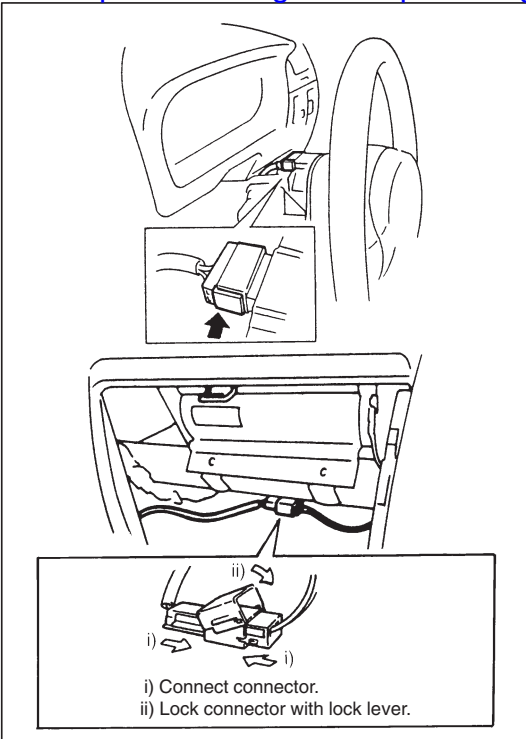
WARNING:

When performing service on or around air bag system components or air bag system wiring, follow the procedures listed below to temporarily disable the air bag system. Failure to follow procedures could result in possible air bag deployment, personal injury or unneeded air bag system repairs.

DISABLING AIR BAG SYSTEM

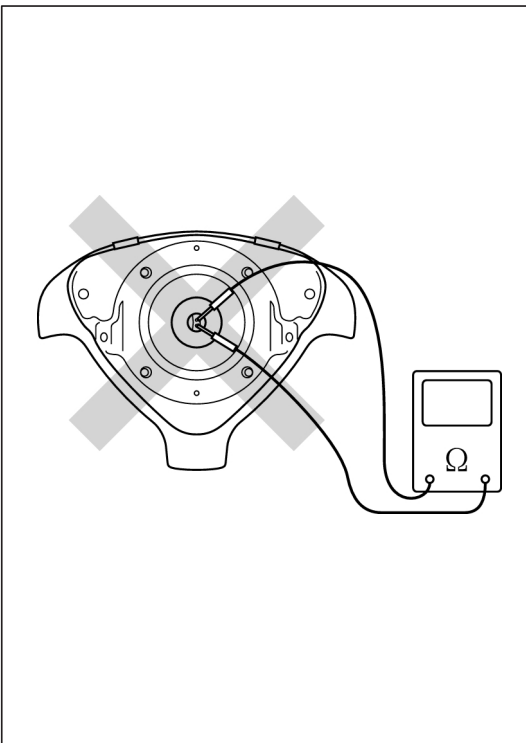
- 1) Turn steering wheel so that vehicle's wheels (front tires) are pointing straight ahead.
- 2) Turn ignition switch to "LOCK" position and remove key.
- 3) Remove "AIR BAG" fuse from circuit fuse box.
- 4) Remove steering column lower cover and upper cover.
- 5) Disconnect connector from contact coil assembly.
- 6) If equipped with passenger air bag (inflator) module, open glove box panel by unhooking and pushing it from inside of instrument panel and disconnect Yellow connector of passenger air bag (inflator) module.





ENABLING AIR BAG SYSTEM

- 1) Turn ignition switch to "LOCK" and remove key.
- 2) Connect connector to contact coil assembly, and install steering column upper cover and lower cover.
- 3) Connect Yellow connector of passenger air bag (inflator) module if equipped, and be sure to lock connector with lock lever and close glove box panel.
- 4) Install "AIR BAG" fuse to the circuit fuse box.
- 5) Turn ignition switch to "ON" and verify that "AIR BAG" warning lamp flashes 6 times and then turns OFF.
If it does not operate as described, perform "Air Bag Diagnostic System Check" in SECTION 10B.



HANDLING PRECAUTION

LIVE (UNDEPLOYED) DRIVER AIR BAG (INFLATOR) MODULE

WARNING:

Never attempt to measure the resistance of the air bag (inflator) module. It is very dangerous as the electric current from the tester may deploy the air bag.

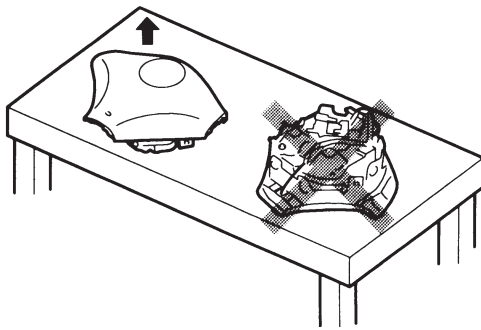
Special care is necessary when handling and storing a live (undepleted) air bag (inflator) module. The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.

- Never attempt disassembly of the air bag (inflator) module.
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When grease, cleaning agent, oil, water, etc., got on the air bag (inflator) module, wipe it off immediately with a dry cloth.

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



- If air bag (inflator) module was dropped from a height of 90 cm (3 ft) or more, it should be replaced.
- When an abnormality is noted as existing in the live (undeployed) air bag (inflator) module, be sure to deploy it before discarding it. (Refer to “Air Bag (Inflator) Module Disposal” in SECTION 10B.)

WARNING:

- For handling and storing an air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module.
- When placing a live air bag (inflator) module on a bench or other surface, always face the bag up, away from the surface.

It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) module.

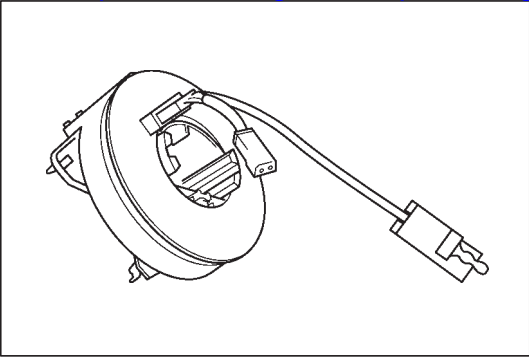
This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

DEPLOYED DRIVER AIR BAG (INFLATOR) MODULE

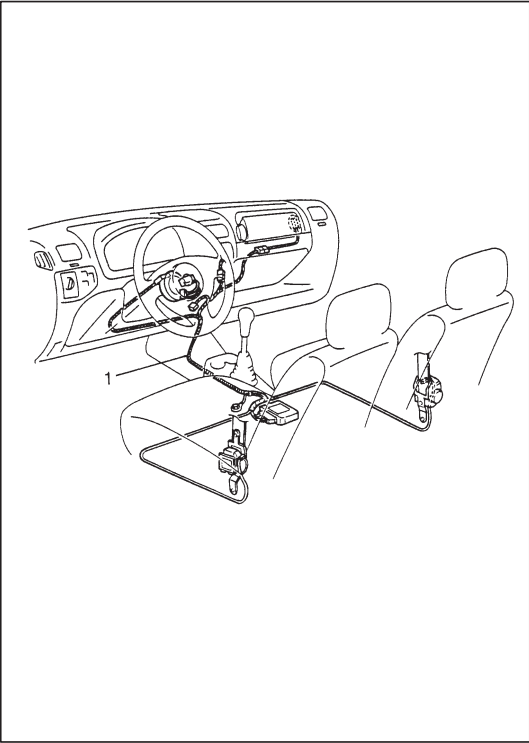
WARNING:

- Immediately after deployment, the air bag (inflator) module is very hot. Wait for at least 10 minutes to cool it off before starting servicing (handling) it.
- Do not apply water, etc. to deployed air bag (inflator) module.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.
- Wash your hands with mild soap and water after completing the work.

Refer to the procedure described under “Deployed Air Bag (Inflator) Module Disposal” in SECTION 10B for details.

**CONTACT COIL CABLE ASSEMBLY**

Do not turn contact coil more than allowable number of turns (about two and a half turns from the center position clockwise or counter-clockwise respectively), or coil will break.

**AIR BAG WIRE HARNESS AND CONNECTOR****CAUTION:**

When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.

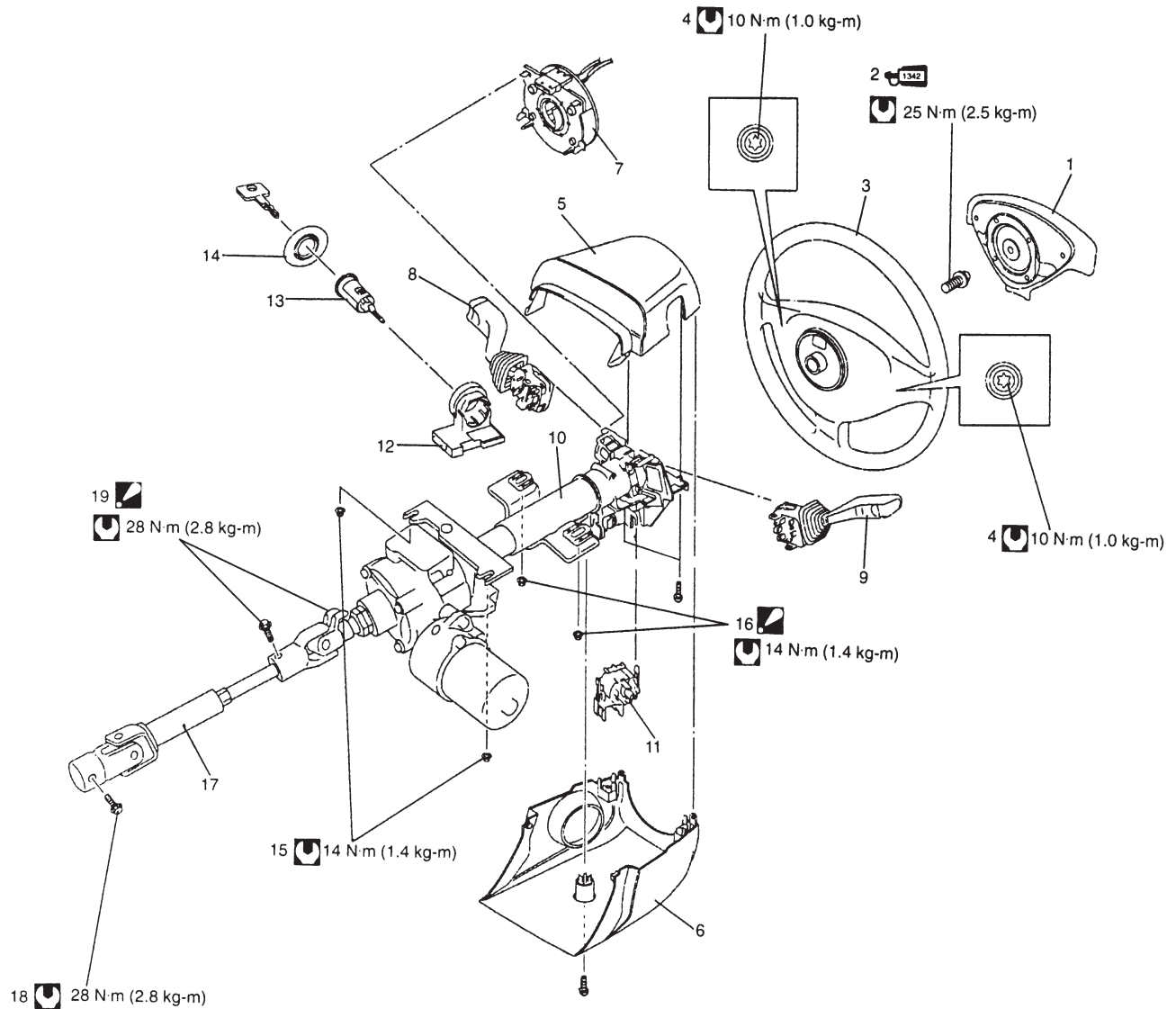
- Air bag wire harness (1) can be identified easily as it is covered with a Yellow protection tube. Be very careful when handling it.
- When installing it, be careful so that the air bag wire harness is not caught or does not interfere with other parts.
- Make sure all air bag system grounding points are clean and grounds are securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

DISPOSAL PRECAUTION

Do not dispose of live (undeployed) air bag (inflator) module. When disposal is necessary, be sure to deploy it first according to the procedure described in SECTION 10B and then dispose it.

WARNING:

Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which could cause personal injury. Undeployed air bag (inflator) module must not be disposed of through normal refuse channels. The undeployed air bag (inflator) module contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

ON-VEHICLE SERVICE

1. Driver air bag (inflator) module
2. Steering shaft bolt:
Apply thread lock 99000-32050 to all around thread part of steering shaft bolt.
3. Steering wheel
4. Driver air bag (inflator) module mounting bolt
5. Steering column upper cover
6. Steering column lower cover
7. Contact coil cable assembly
8. Wiper switch assembly
9. Turn & dimmer switch assembly

10. Steering column assembly
11. Ignition switch assembly
12. Immobilizer control module
13. Ignition switch cylinder assembly
14. Ignition switch protector
15. Steering column lower mounting nut
16. Steering column upper mounting nut:
After tightening lower nut, tighten upper nut.
17. Lower shaft
18. Lower joint bolt
19. Upper joint bolt:
After tightening lower joint bolt, tighten upper joint bolt.

: Tightening Torque

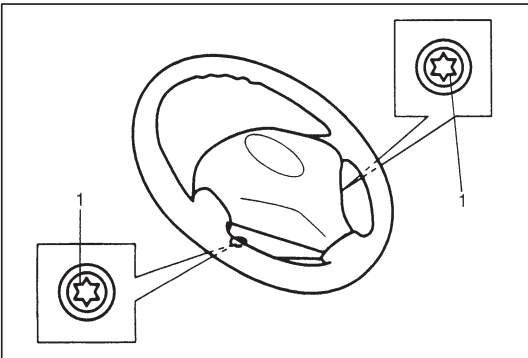
DRIVER AIR BAG (INFLATOR) MODULE

WARNING:

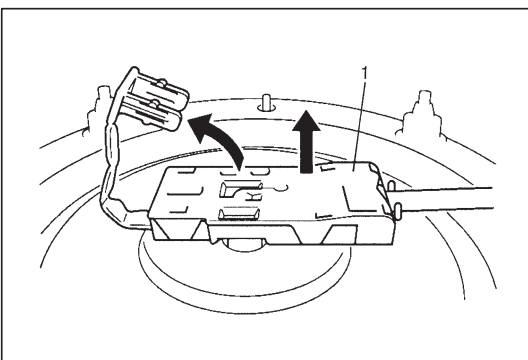
When handling an air bag (inflator) module, be sure to read "Precautions" given earlier in this section and observe each instruction. Failure to follow them could cause a damage to the air bag (inflator) module or result in personal injury.

REMOVAL

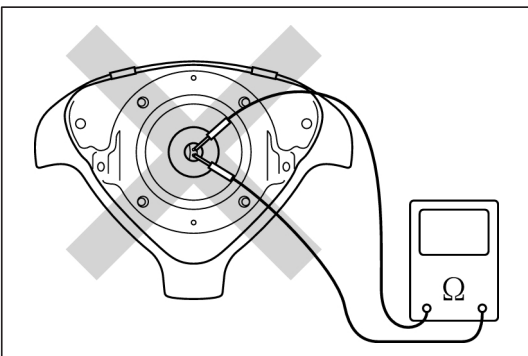
- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.



- 3) Loosen 2 bolts (1) mounting driver air bag (inflator) module till it turns freely.



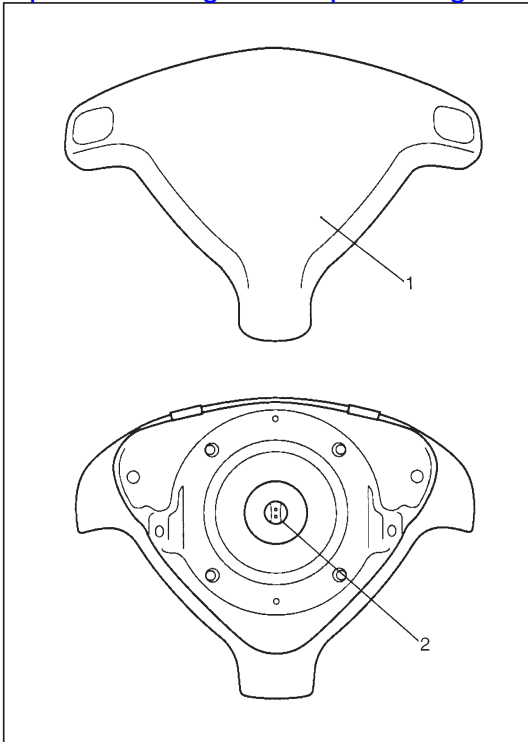
- 4) Remove air bag (inflator) module from steering wheel.
- 5) Disconnect yellow connector (1) of driver air bag (inflator) module as shown in figure.

**INSPECTION****WARNING:**

Never disassemble air bag (inflator) module or measure its resistance. Otherwise, personal injury may result.

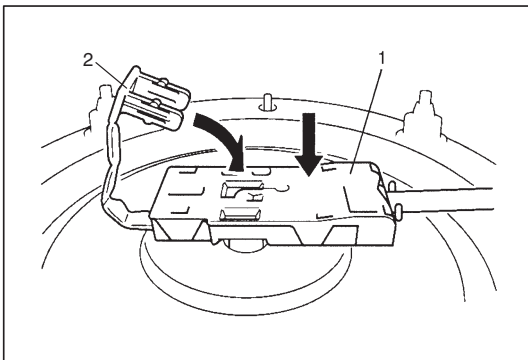
CAUTION:

If air bag (inflator) module was dropped from a height of 90 cm (3 ft) or more, it should be replaced.



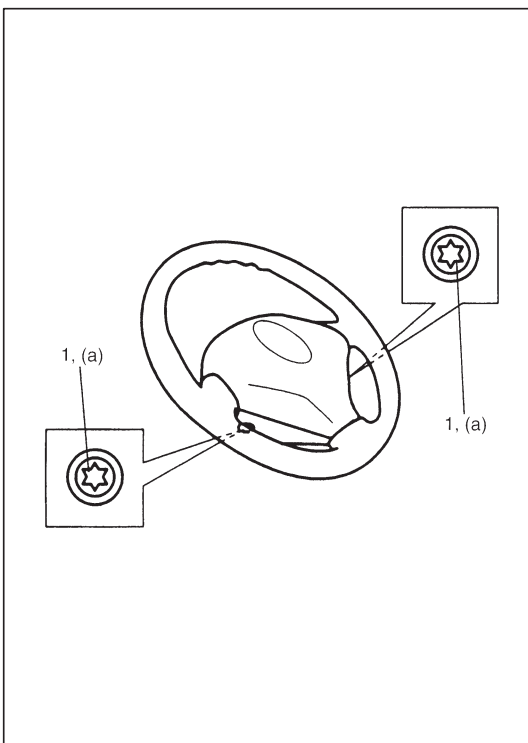
Check air bag (inflator) module visually and if any of the following is found, replace it with a new one.

- Air bag being deployed
- Trim cover (pad surface) (1) being cracked
- Terminal (2) being damaged
- Air bag (inflator) module being damaged or having been exposed to strong impact (dropped)



INSTALLATION

- 1) Connect yellow connector (1) of driver air bag (inflator) module and then lock (2) securely as shown in figure.



- 2) Install driver air bag (inflator) module to steering wheel, taking care so that no part of wire harness is caught between them.
- 3) Tighten driver air bag (inflator) module mounting bolts (1) to specified torque.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

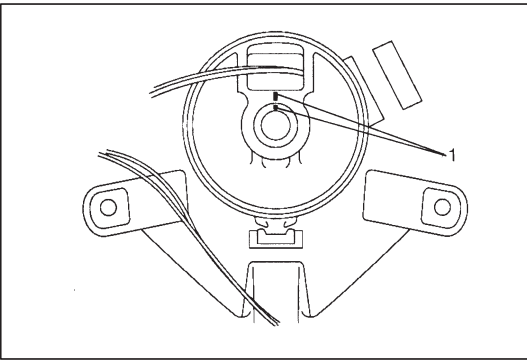
- 4) Make sure that clearance between module and steering wheel is uniform all the way.
- 5) Connect negative battery cable.
- 6) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

STEERING WHEEL**CAUTION:**

Do not turn the contact coil more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively) with steering wheel removed, or coil will break.

REMOVAL

- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.
- 3) Remove driver air bag (inflator) module from steering wheel referring to "Driver Air Bag (Inflator) Module" earlier in this section.
- 4) Disconnect horn connector.



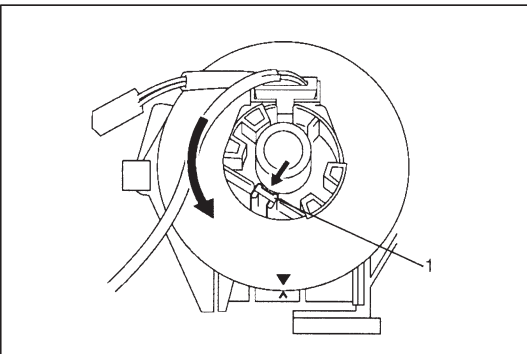
- 5) Remove steering shaft bolt.
- 6) Make alignment marks (1) on steering wheel and shaft for a guide during reinstallation.
- 7) Remove steering wheel.

CAUTION:

Do not hammer the end of the shaft. Hammering it will loosen the plastic shear pins which maintain the column length and impair the collapsible design of the column.

CENTERING CONTACT COIL CABLE ASSEMBLY

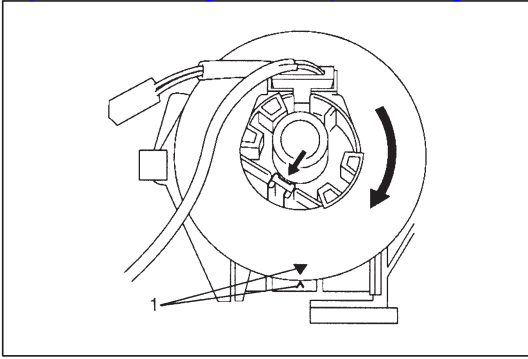
- 1) Check that vehicle's wheels (front tires) are set at straight-ahead position.
- 2) Check that ignition switch is at "LOCK" position.



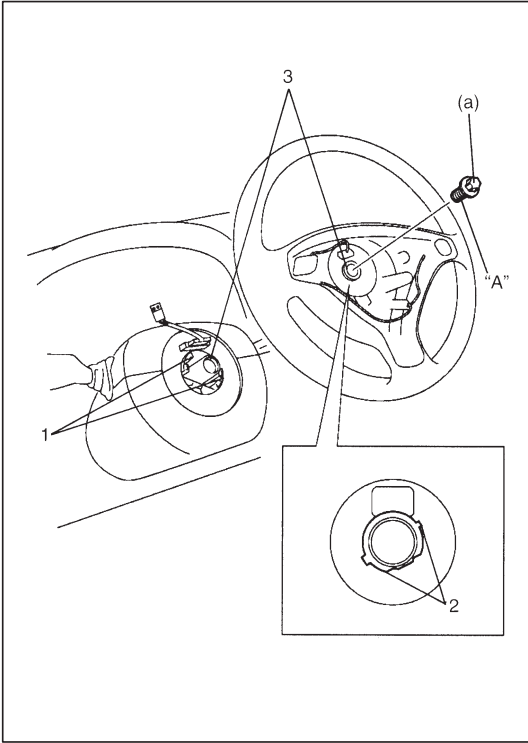
- 3) With pushing lock lever (1) and releasing contact coil lock, turn contact coil counterclockwise slowly with a light force till contact coil will not turn any further.

NOTE:

Contact coil can turn about 5 turns at maximum, that is, if it is at the center position, can turn about two and a half turns both clockwise and counterclockwise.



- 4) From the position where contact coil became unable to turn any further (it stopped), turn it back clockwise about two and a half rotations and align center mark with alignment mark (1).



INSTALLATION

- 1) Check that vehicle's front tires are at straight-ahead position and contact coil is centered. If contact coil is turned after removing steering wheel, center contact coil referring to "Centering Contact Coil Cable Assembly" earlier in this section.

CAUTION:

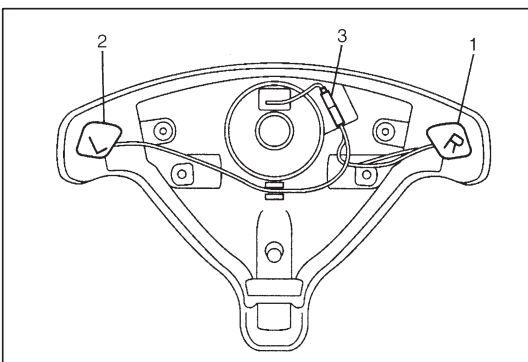
These two conditions are prerequisite for installation of steering wheel. If steering wheel has been installed without these conditions, contact coil will break when steering wheel is turned.

- 2) Install steering wheel to steering shaft with 2 grooves (1) on contact coil fitted in two lugs (2) in the back of steering wheel and also aligning marks (3) on steering wheel and steering shaft.
- 3) Apply thread lock to all around thread part of steering shaft bolt and tighten to specified torque.

"A": Thread lock 1342 99000-32050

Tightening Torque

(a): 25 N·m (2.5 kg-m, 18.5 lb-ft)



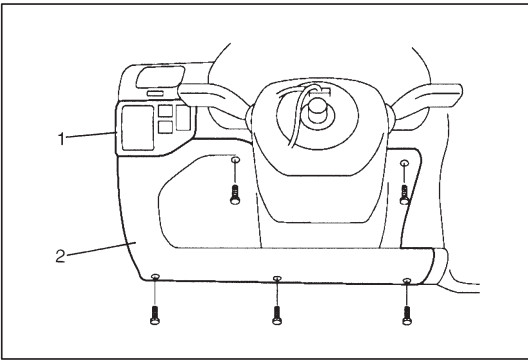
- 4) Install horn buttons, right (1) and left (2), and fix connector (3) securely.
- 5) Install driver air bag (inflator) module to steering wheel. Refer to "Driver Air Bag (Inflator) Module" earlier in this section.
- 6) Connect negative battery cable.
- 7) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

CONTACT COIL CABLE ASSEMBLY**CAUTION:**

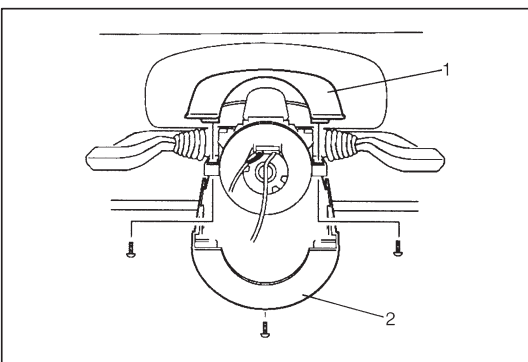
Do not turn contact coil more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively), or coil will break.

REMOVAL

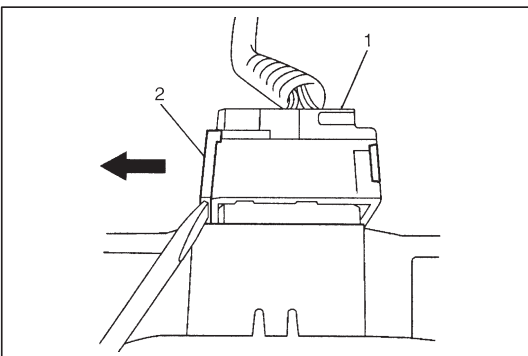
- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.
- 3) Remove steering wheel from steering column. Refer to "Steering Wheel" earlier in this section.



- 4) Remove instrument panel switch garnish (1) and steering column hole cover (2).

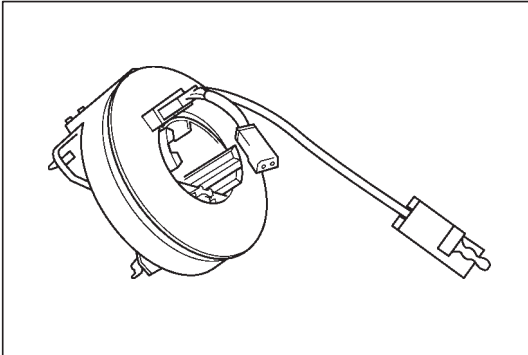
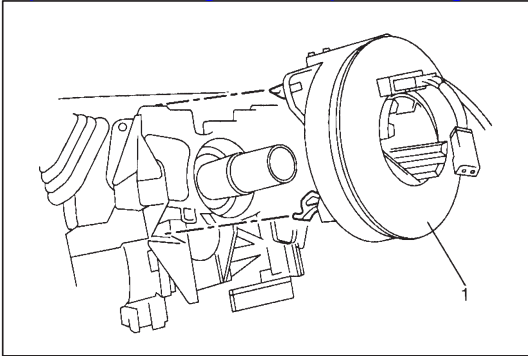


- 5) Remove steering column lower cover (2) and upper cover (1).



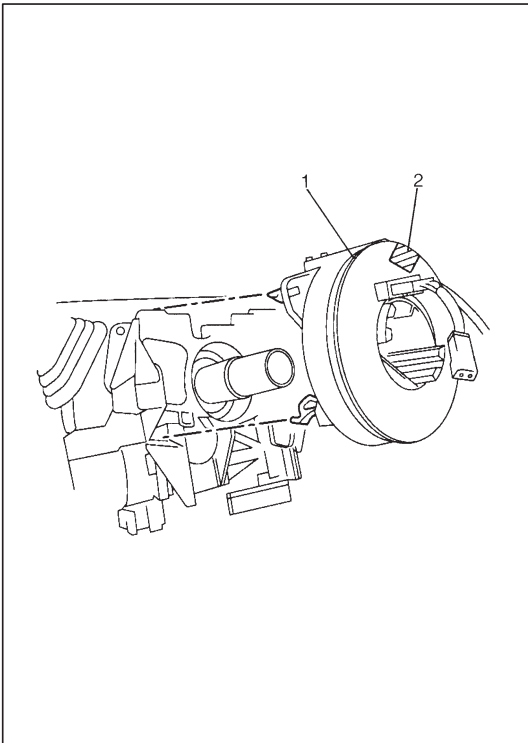
- 6) Disconnect connector (1) for contact coil cable assembly by pulling connector lock (2) out.

7) Remove contact coil cable assembly (1) from steering column.



INSPECTION

Check contact coil cable assembly wire harness for any signs of scorching, melting or other damage. If it is damaged, replace.

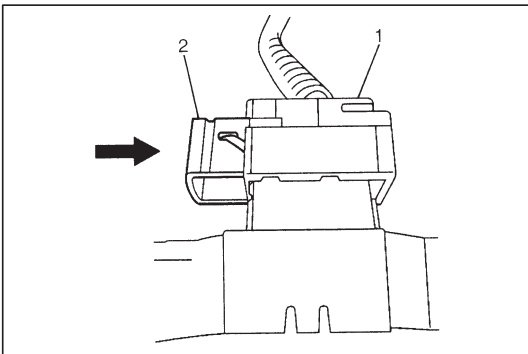


INSTALLATION

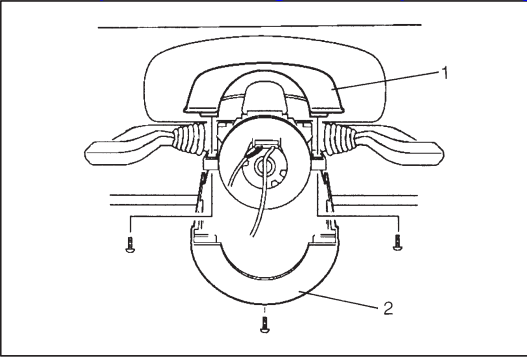
- 1) Check to make sure that vehicle's front tires are set at straight-ahead position and then ignition switch is at "LOCK" position.
- 2) Install contact coil cable assembly (1) to steering column securely.

NOTE:

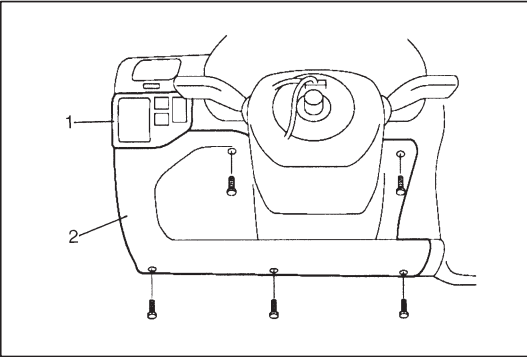
New contact coil cable assembly is supplied with contact coil set and held at its center position with a seal (2). Peel this seal after installing contact coil cable assembly to steering column.



- 3) Connect connector (1) for contact coil cable assembly by pushing connector lock (2) into connector.



4) Install steering column upper cover (1) and lower cover (2).



5) Install steering column hole cover (2) and instrument panel switch garnish (1).

6) Install steering wheel to steering column. Refer to "Steering Wheel" earlier in this section.

7) Connect battery negative cable.

8) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

STEERING COLUMN

CAUTION:

Once the steering column is removed from the vehicle, the column is extremely susceptible to damage.

- Dropping the column assembly on its end could collapse the steering shaft or loosen the plastic shear pins which maintain column length.
- Leaning on the column assembly could cause it to bend or deform.

Any of the above damage could impair the column's collapsible design.

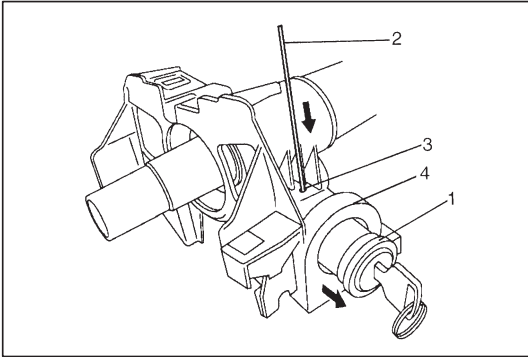
Steering column mounting nuts should not be loosened with steering shaft joint upper side bolt tightened as this could cause damage to shaft joint bearing.

NOTE:

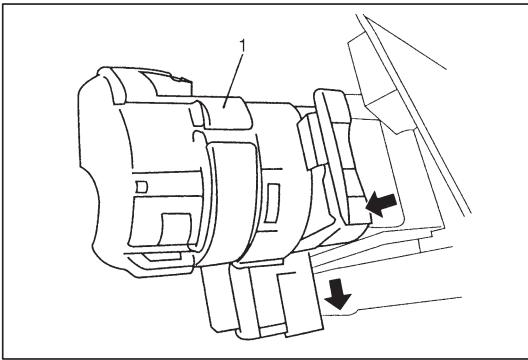
When servicing steering column or any column-mounted component, remove steering wheel. But when removing steering column simply to gain access to instrument panel components, leave steering wheel installed on steering column.

REMOVAL

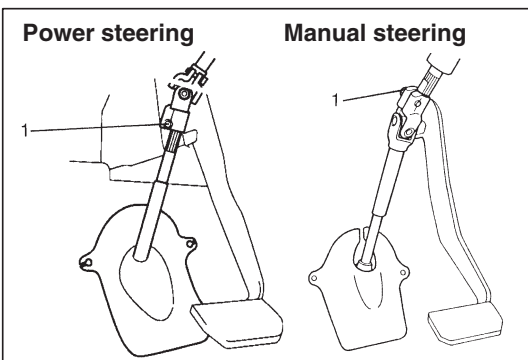
- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.
- 3) Remove steering wheel and contact coil cable assembly. Refer to "Steering Wheel" and "Contact Coil Cable Assembly" earlier in this section.



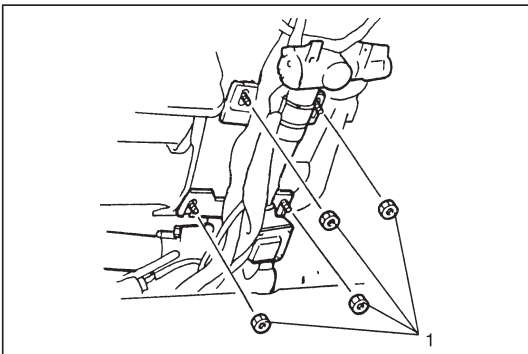
- 4) Detach turn & dimmer switch assembly and wiper switch assembly from steering column.
- 5) Remove ignition switch cylinder assembly (1) as follows.
 - a) Turn ignition switch key to "ACC" position.
 - b) Insert 2 mm (0.078 in.) rod (2) through hole (3) and push ignition switch cylinder lock.
- 5-1) Remove immobilizer control module (4) from steering column.



- 6) Detach ignition switch assembly (1) from steering column.
- 7) Disconnect connectors from electrical power steering system parts if equipped.



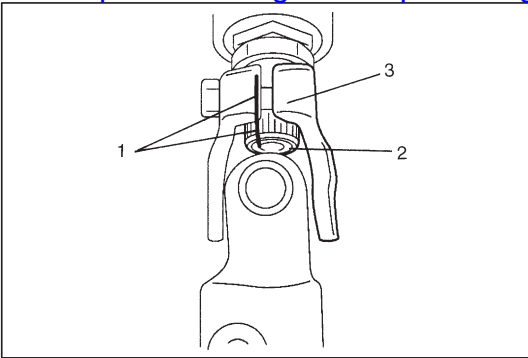
- 8) Remove steering shaft upper joint bolt (1).



- 9) Remove steering column mounting nuts (1).
- 10) Remove steering column from vehicle.

WARNING:

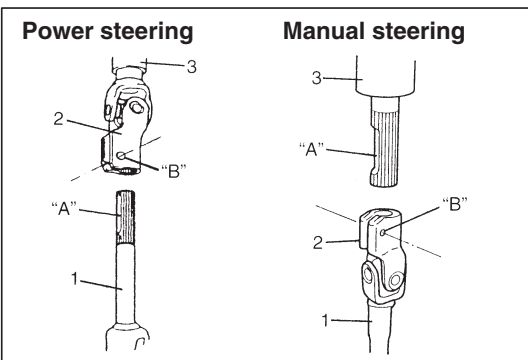
Never rest a steering column assembly on the steering wheel with the air bag (inflator) module face down and column vertical. Otherwise, personal injury may result.



- 11) When disconnecting upper joint (3) from power steering column shaft (2), make alignment marks (1) on column shaft and upper joint, and be sure to align marks (1) when reconnecting.

INSPECTION

Check steering column for damage and operation referring to CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE later in this section.

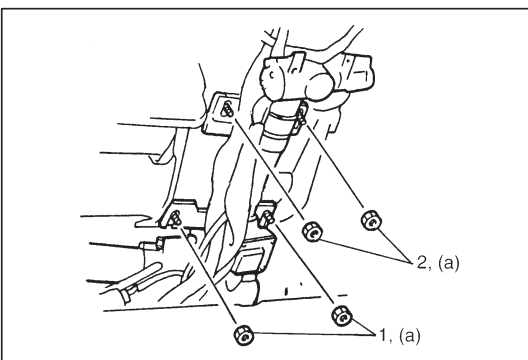


INSTALLATION

- 1) Connect steering column to lower shaft.

For power steering, align flat part "A" of lower shaft (1) with bolt hole "B" of upper joint (2) as shown. Then insert upper joint (2) onto lower shaft (1).

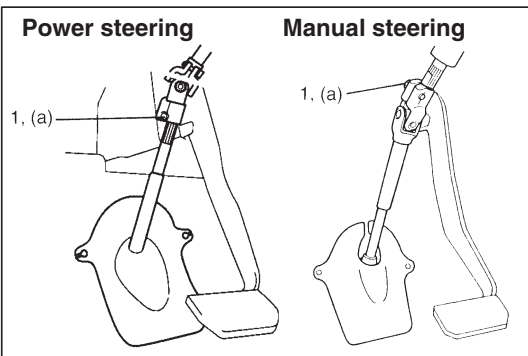
For manual steering, align flat part "A" of steering column (3) with bolt hole "B" of upper joint (2) and insert steering column shaft into upper joint (2) of lower shaft (1).



- 2) Install steering column assembly to lower and upper brackets. Torque steering column lower nuts (1) first and then upper nuts (2) to specifications as given below.

Tightening Torque

(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)



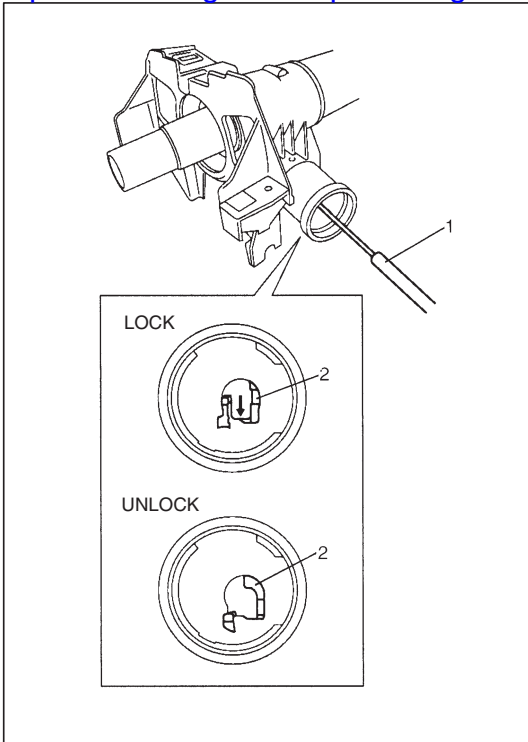
- 3) Install bolt (1) to steering shaft upper joint and tighten it to specified torque.

CAUTION:

After tightening column nuts, tighten steering shaft upper joint bolt. Otherwise shaft joint bearing is damaged.

Tightening Torque

(a): 28 N·m (2.8 kg-m, 20.5 lb-ft)



- 4) Install ignition switch assembly and immobilizer control module to steering column.
- 5) Install ignition switch cylinder assembly as follows.
 - a) Push steering lock (2) down till it clicks, using screw driver (1), so that it is at unlock position.
 - b) Turn ignition key of ignition switch cylinder assembly to "ACC" position.
 - c) In this state, push ignition switch cylinder assembly into steering column till it clicks.
- 6) Install turn & dimmer switch, wiper switch and ignition switch protector to steering column.
- 7) Connect all connectors that have been removed in "Removal".
- 8) Install contact coil cable assembly and steering wheel. Refer to CONTACT COIL CABLE ASSEMBLY and STEERING WHEEL in this section.

- 9) Connect negative battery cable.
- 10) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

STEERING LOWER SHAFT

REMOVAL

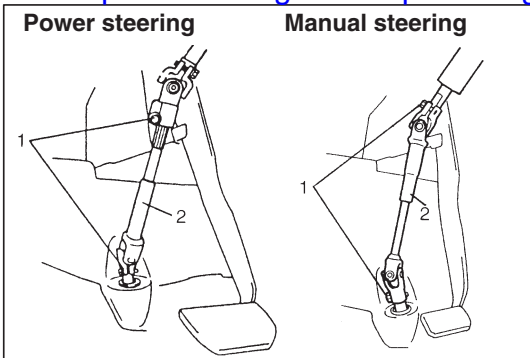
- 1) Turn steering wheel so that vehicle's front tires are at straight-ahead position.
- 2) Turn ignition switch to "LOCK" position and remove key.

CAUTION:

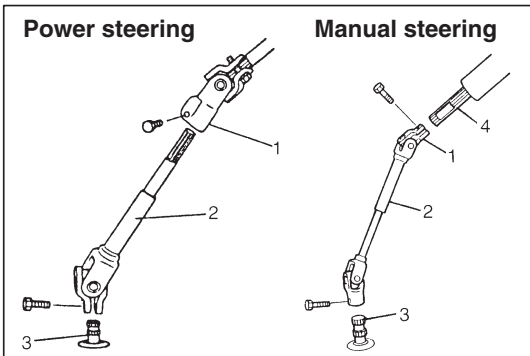
Never turn steering wheel while steering lower shaft is removed.

Should it have been turned and contact coil have got out of its centered position, it needs to be centered again. Also, turning steering wheel more than about two and a half turns will break contact coil.

- 3) Remove steering joint cover.

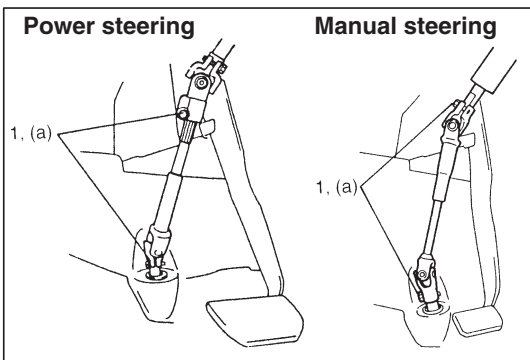


- 4) Remove steering shaft joint bolts (1) and then remove steering lower shaft (2).



INSTALLATION

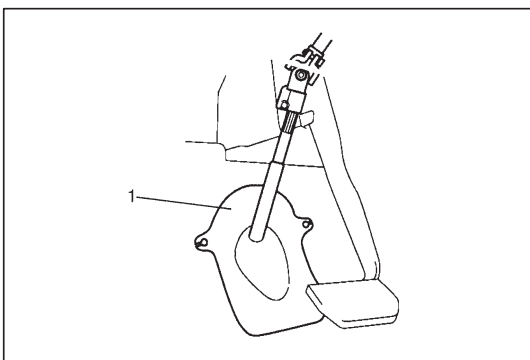
- 1) Align flat part of steering lower shaft (2) or steering column (4) with bolt hole of upper joint (1) as shown. Then insert lower shaft or steering column into upper joint.
- 2) Be sure that front wheels and steering wheel are in straight-forward state and insert lower joint into steering pinion shaft (3).



- 3) Tighten steering shaft joint bolts (1) to specification (lower side first and then upper side).

Tightening Torque

(a): 28 N·m (2.8 kg-m, 20.5 lb-ft)

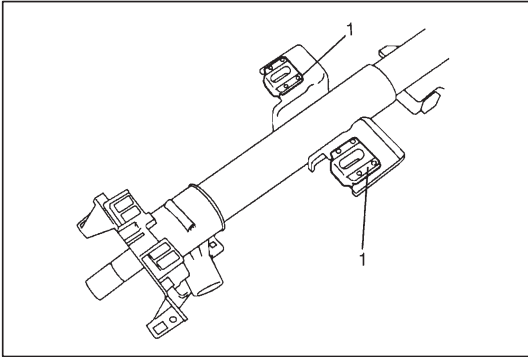


- 4) Install steering shaft joint cover (1).

CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

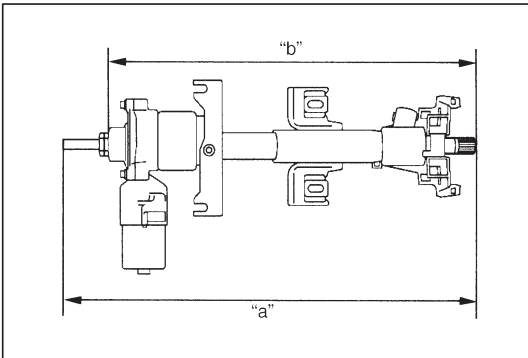
NOTE:

Vehicles involved in accidents resulting in body damage, where steering column has been impacted or air bag deployed, may have a damaged or misaligned steering column.



CHECKING PROCEDURE

- 1) Check that two capsules (1) are attached to steering column bracket securely. If found loose, replace steering column assembly.



- 2) Take measurement "a" and "b" as shown. If it is shorter than specified length, replace column assembly with new one.

Power steering column length

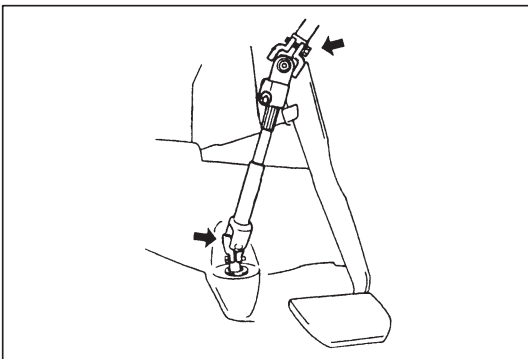
"a": $518 \pm 1.5 \text{ mm}$ ($20.4 \pm 0.06 \text{ in.}$)

"b": $479.2 \pm 1.5 \text{ mm}$ ($18.9 \pm 0.06 \text{ in.}$)

Manual steering column length

"a": $512 \pm 1.5 \text{ mm}$ ($20.2 \pm 0.06 \text{ in.}$)

"b": $440 \pm 1.5 \text{ mm}$ ($17.3 \pm 0.06 \text{ in.}$)



- 3) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play. If anything is found faulty, replace as lower joint assembly or column assembly.

- 4) Check steering shaft for smooth rotation.

If found defective, replace as column assembly.

- 5) Check steering shaft and column for bend, cracks or deformation.

If found defective, replace.

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REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Thread lock cement	THREAD LOCK 1342 (99000-32050)	Steering shaft bolt

SECTION 3D

FRONT SUSPENSION

NOTE:

- All front suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any front suspension part. Replace it with a new part or damage to the part may result.

CONTENTS

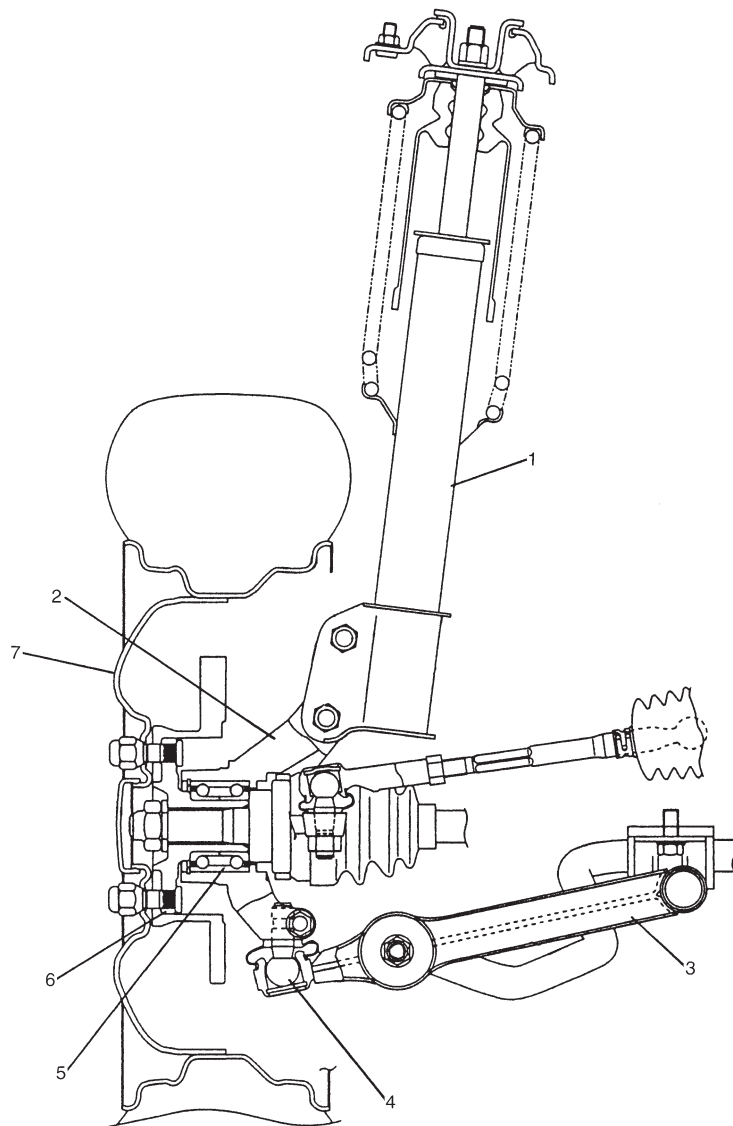
GENERAL DESCRIPTION	3D- 2	
DIAGNOSIS	3D- 3	3D
Diagnosis Table	Section 3	
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Strut Assembly Check	3D- 3	
Suspension Control Arm/Knuckle Check	3D- 4	
Suspension Control Arm Joint Check	3D- 4	
Wheel Disc, Nut & Bearing Check	3D- 4	
ON VEHICLE SERVICE	3D- 5	
Stabilizer Bar and/or Bushings	3D- 5	
Strut Assembly	3D- 7	
Steering Knuckle/Bearing	3D-11	
Suspension Control Arm/Bushing	3D-17	
REQUIRED SERVICE MATERIAL	3D-19	
SPECIAL TOOLS	3D-20	

GENERAL DESCRIPTION

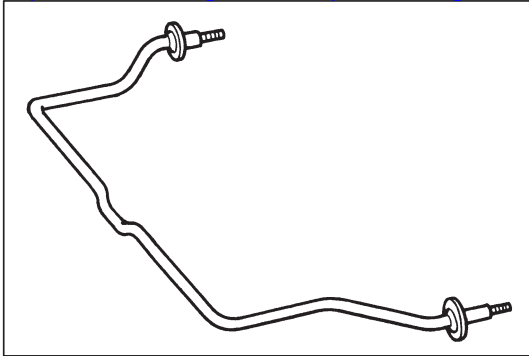
The front suspension is the strut type independent suspension. The upper end of a strut is anchored to the vehicle body by a strut support. The strut and strut support are isolated by a rubber mount. A strut bearing is also installed a little lower to the rubber mount.

The lower end of the strut is connected to the upper end of a steering knuckle and lower end of knuckle is attached to the stud of a ball joint which is incorporated in a unit with a suspension control arm. And connected to this steering knuckle is the tie-rod end.

Thus, movement of the steering wheel is transmitted to the tie-rod end and then to the knuckle, eventually causing the wheel-and-tire to move. In this operation, with the movement of the knuckle, the strut also rotates by means of the strut bearing and lower ball joint.



1. Strut assembly
2. Steering knuckle
3. Suspension control arm
4. Ball stud
5. Wheel bearing
6. Front wheel hub
7. Wheel



DIAGNOSIS

DIAGNOSIS TABLE

Refer to Section 3.

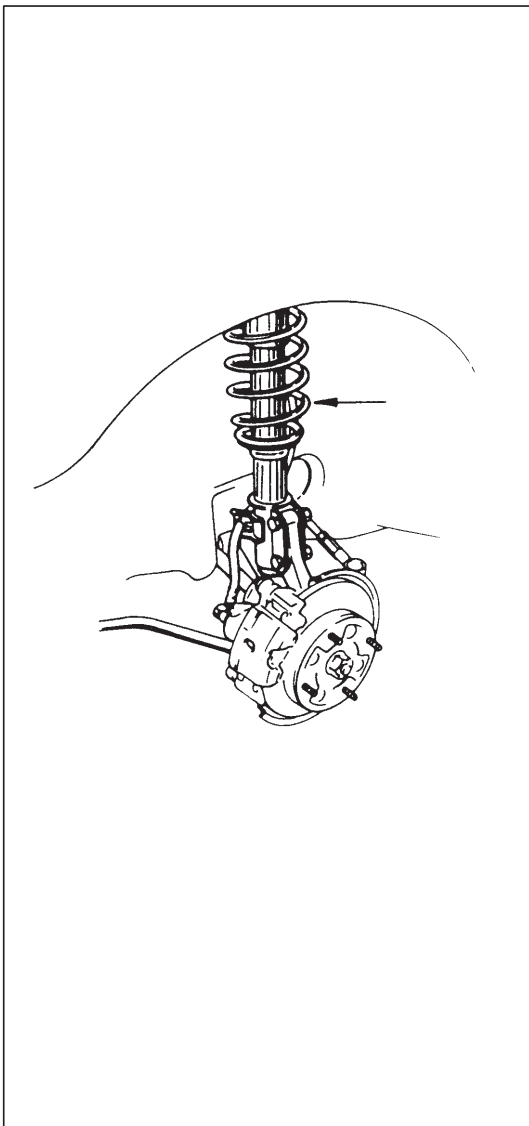
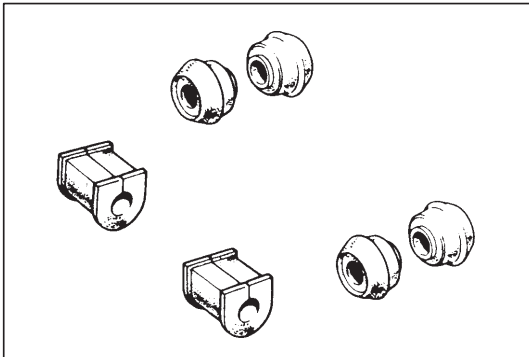
STABILIZER BAR AND/OR BUSHING CHECK

Bar

Inspect for damage or deformation. If defective, replace.

Bushing

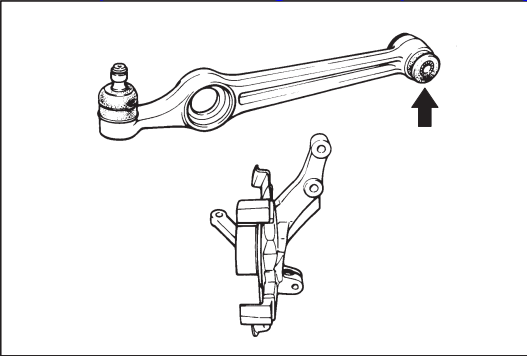
Inspect for damage, wear or deterioration. If defective, replace.



STRUT ASSEMBLY CHECK

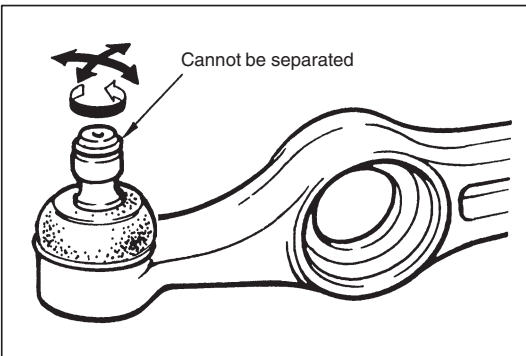
- 1) Inspect strut for oil leakage. If strut is found faulty, replace it as an assembly unit, because it can not be disassembled.
- 2) Strut function check
Check and adjust tire pressures as specified. Bounce vehicle body three or four times continuously by pushing front end on the side with strut to be checked. Apply the same amount of force at each push and note strut resistance both when pushed and rebounding.
Also, note how many times vehicle body rebounds before coming to stop after hands are off. Do the same for strut on the other side.
Compare strut resistance and number of rebound on the right with those on the left. And they must be equal in both. With proper strut, vehicle body should come to stop the moment hands are off or after only one or two small rebounds. If struts are suspected, compare them with known good vehicle or strut.
- 3) Inspect for damage or deformation.
- 4) Inspect bearing for wear, abnormal noise or gripping.
- 5) Inspect for cracks or deformation in the spring seat.
- 6) Inspect for deterioration of the bump stopper.
- 7) Inspect strut support for wear, cracks or deformation.

Replace any parts found defective in steps 2) – 7).



SUSPENSION CONTROL ARM/KNUCKLE CHECK

Inspect control arm/knuckle for cracks, deformation or damage.
Inspect control arm bushing for damage, wear or deterioration.



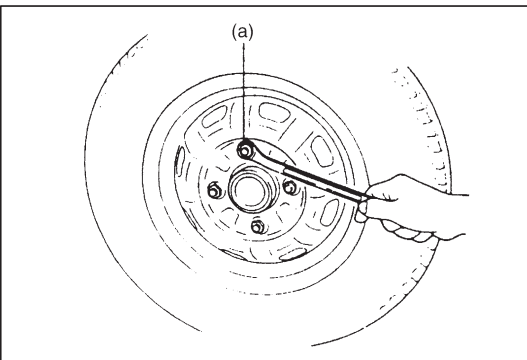
SUSPENSION CONTROL ARM JOINT CHECK

- 1) Check for smooth rotation.
- 2) Inspect ball stud for damage.
- 3) Inspect dust cover for damage.
- 4) Inspect for play in ball joint. If found defective, replace.

NOTE:

Suspension arm and arm joint cannot be separated.

If there is any damage to either, control arm assembly must be replaced as a complete unit.

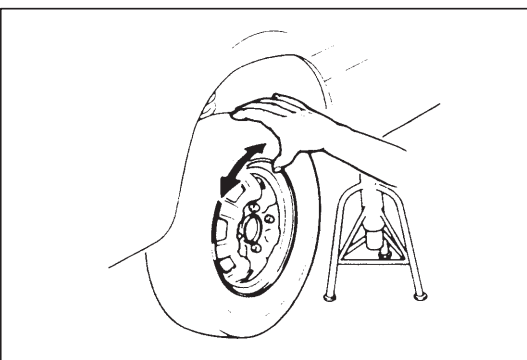


WHEEL DISC, NUT & BEARING CHECK

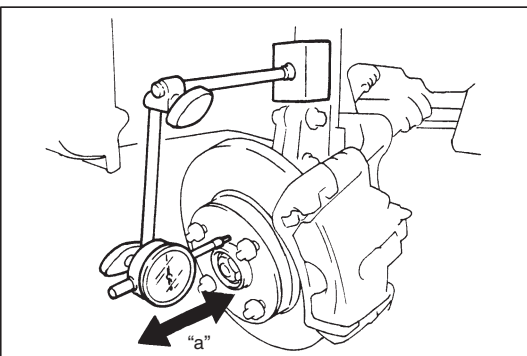
- 1) Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.
- 2) Check wheel nuts for tightness and, as necessary retighten them to specification.

Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



- 3) By rotating wheel actually, check wheel bearing for noise and smooth rotation. If defective, replace bearing.



- 4) Check wheel bearing for wear. When measuring thrust play,
 - a) Remove wheel.
 - b) Fix brake disc tightening wheel nuts.
 - c) Set a dial gauge.
 - d) Check wheel bearing for thrust play.

Thrust play limit "a": 0.1 mm (0.004 in.)

When measurement exceeds limit, replace bearing.

ON-VEHICLE SERVICE

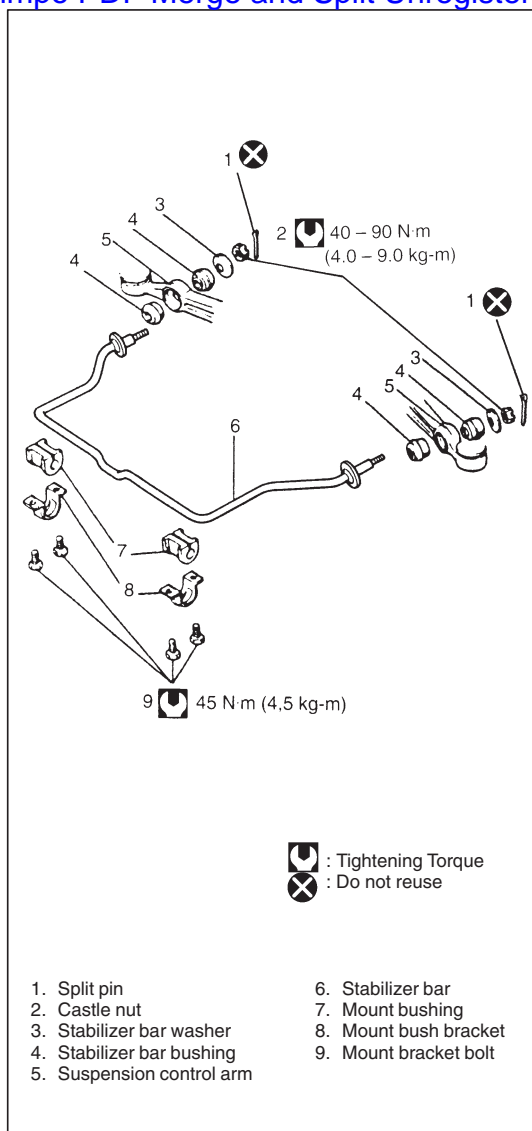
STABILIZER BAR AND/OR BUSHINGS

REMOVAL

- 1) Hoist vehicle and allow the front suspension control arms (5) to hang free.
- 2) Remove front wheels.
- 3) Remove split pins (1) and then castle nuts (2).
- 4) Remove stabilizer bar mount bushing bracket bolts (9).
- 5) Remove stabilizer bar (6) from front suspension control arms (5).

NOTE:

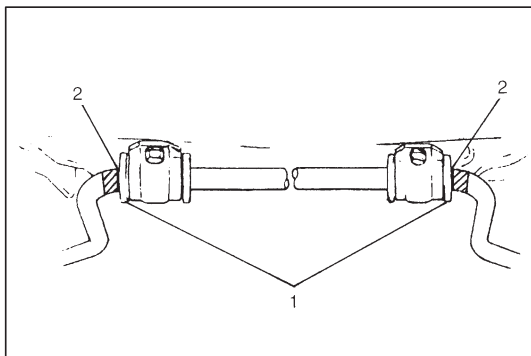
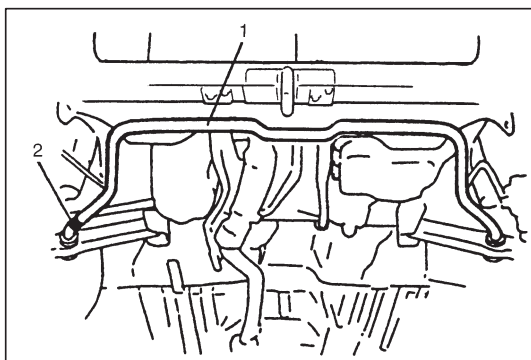
If it is hard to remove stabilizer bar (6), set tires in contact with ground (with suspension compressed).

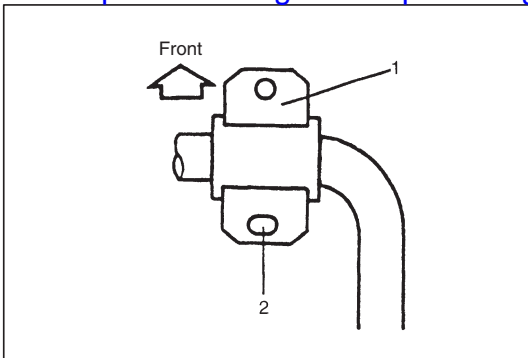


INSTALLATION

For installation, reverse removal procedure, observing the following instructions.

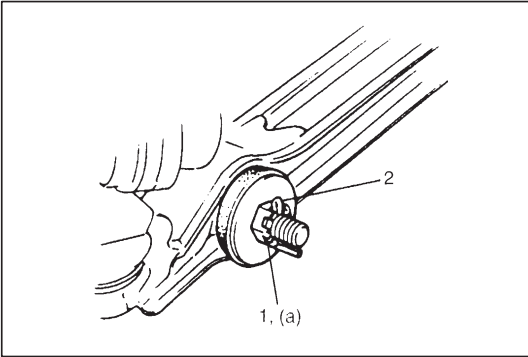
- Install stabilizer bar (1) so that paint mark (2) on it comes to the right side of vehicle.
- Align the outside edge (1) of mount bushing with the inside edge (2) of paint as shown in figure.





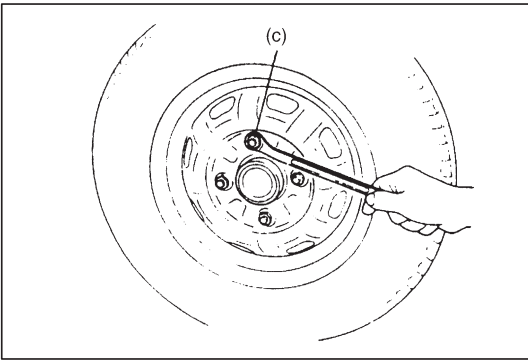
- Install mounting bracket (1) so that its oblong hole side (2) comes to the rear.
- Tighten stabilizer bar bracket bolts to specified torque.

Tightening torque for stabilizer bar bracket bolts:
45 N·m (4.5 kg-m, 32.5 lb-ft)



- After tightening castle nut (1) to specified torque, install new split pin (2) as shown.

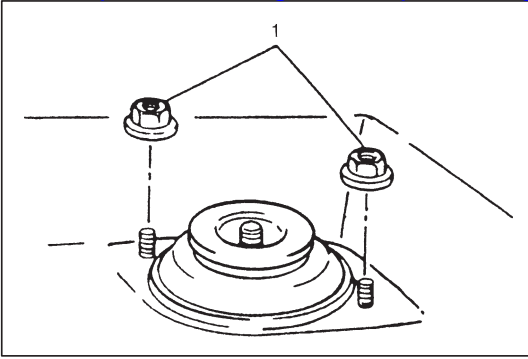
Tightening Torque
(a): 40 – 90 N·m (4.0 – 9.0 kg-m, 29.0 – 65.0 lb-ft)



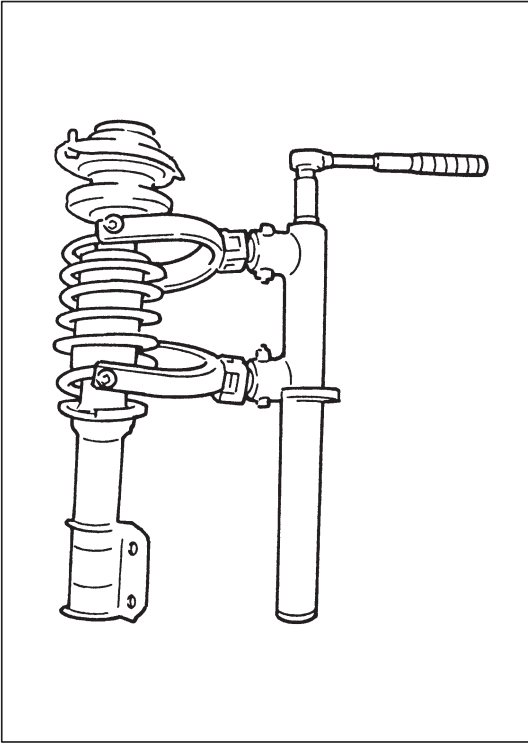
- Install wheels and tighten wheel nuts to specified torque.

Tightening Torque
(c): 85 N·m (8.5 kg-m, 61.5 lb-ft)

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- 8) Remove strut support nuts (1).
Hold strut by hand so that it will not fall off.
- 9) Remove strut assembly.

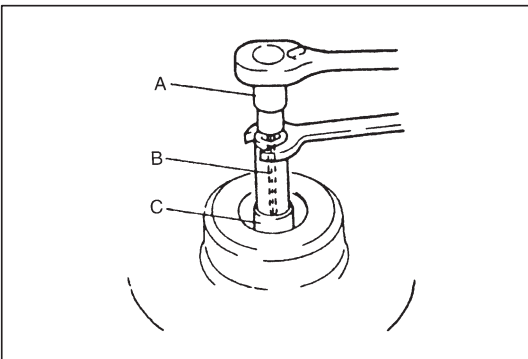


DISASSEMBLY

- 1) Using a spring compressor, compress the strut spring till its force pressing the spring seat is released.

CAUTION:

Use a commercially available spring compressor and follow the operation procedure described in the Instruction Manual supplied with that spring compressor.



- 2) While keeping spring compressed with spring compressor, remove strut nut with special tools.

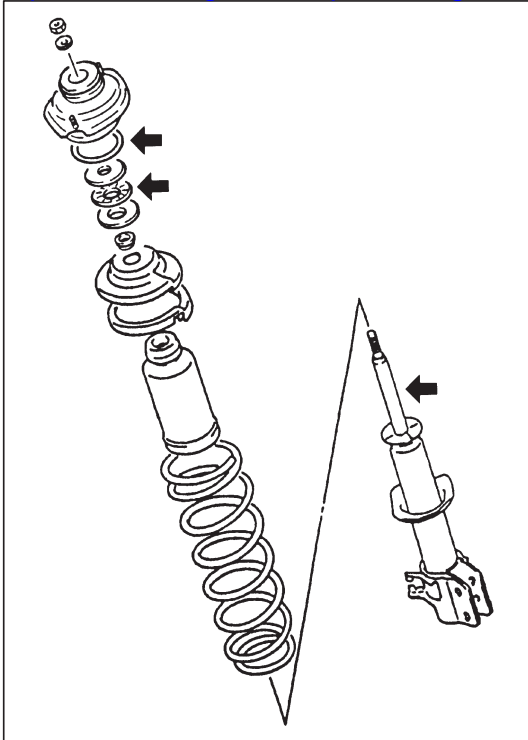
Special Tool

(A): 09900-00411

(B): 09900-00414

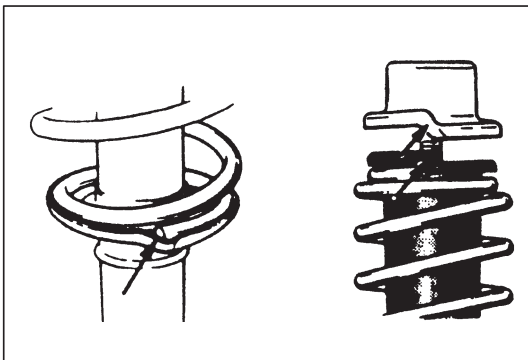
(C): 09945-26010

- 3) Disassemble strut assembly.

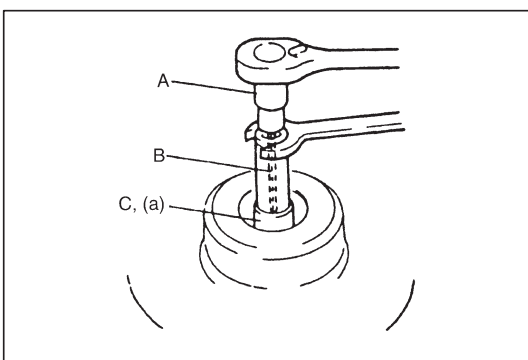
**ASSEMBLY**

For assembly, reverse disassembly procedure, observing following instructions.

- Apply grease to bearing seal, strut bearing and sliding part of strut rod.



- Mate spring end with stepped part of spring lower seat as shown.
- Install spring seat, mating stepped part of seat with spring upper end as shown.



- Using special tools, tighten strut nut to specified torque.

Special Tool

(A): 09900-00411

(B): 09900-00414

(C): 09945-26010

Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.0 lb-ft)

INSTALLATION

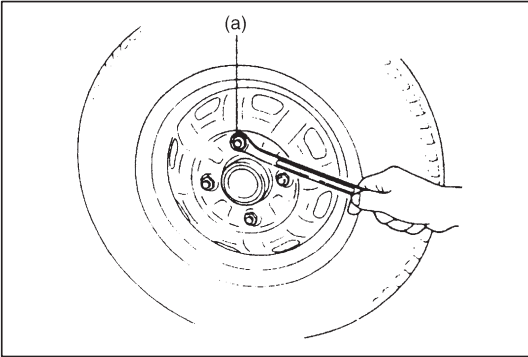
- Install strut assembly by reversing REMOVAL procedure.

CAUTION:

Don't twist brake hose when installing it.

Install E-ring as far as it fits to bracket as shown.

- Torque all fasteners to specification, referring to assembly figure on 3D-7.

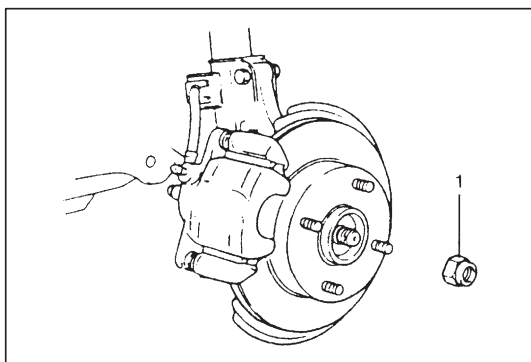
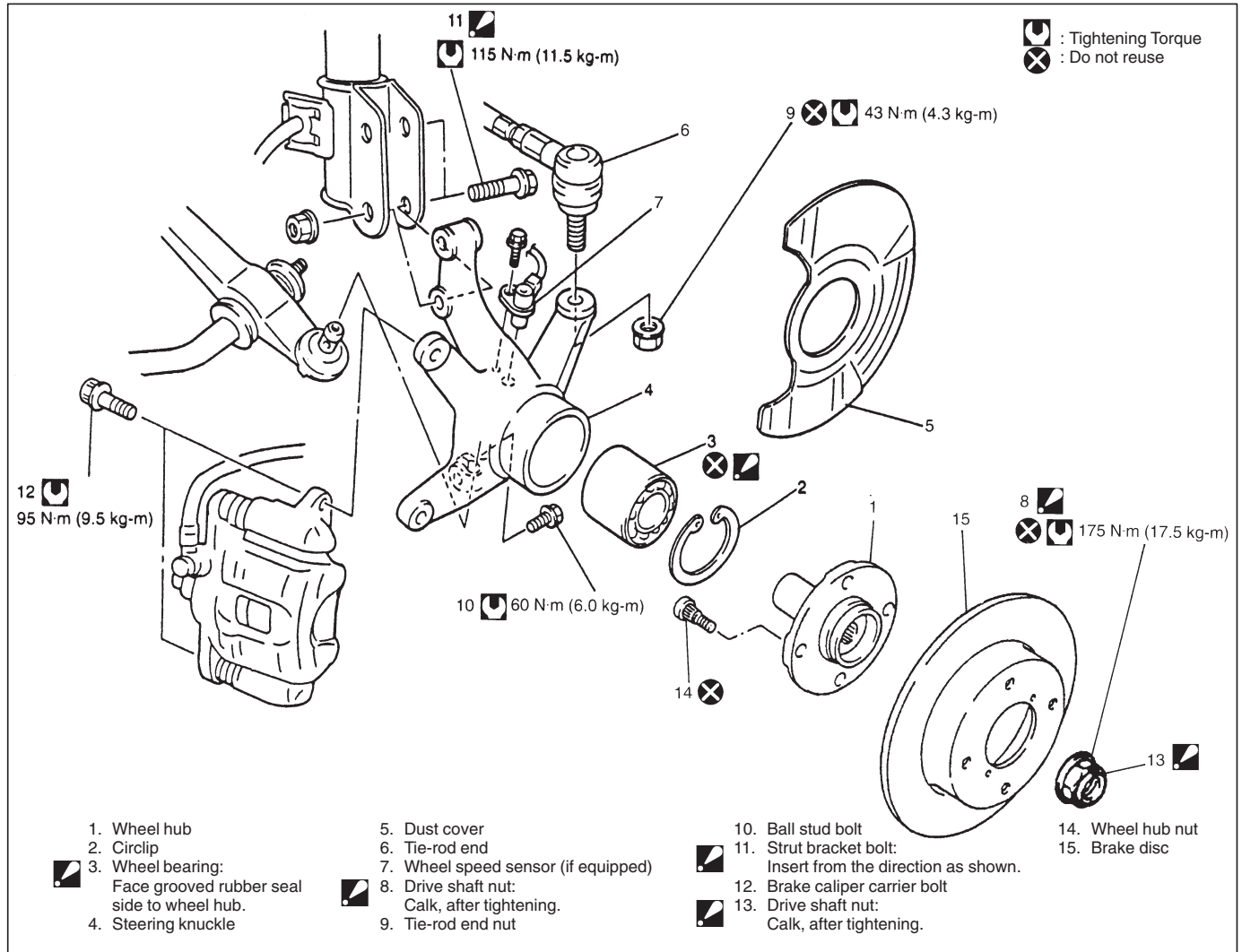


- Install wheel and tighten wheel nuts to specified torque.

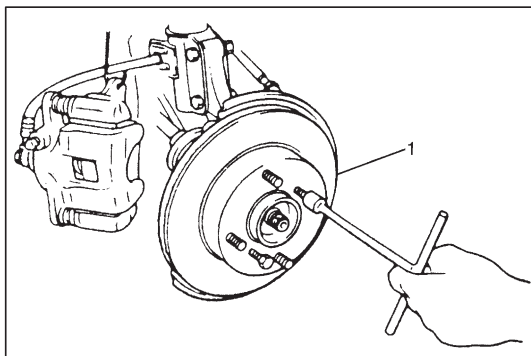
Tightening Torque

(a) 85 N·m (8.5 kg-m, 61.5 lb-ft)

- Confirm front end (wheel) alignment, referring to SECTION 3A.

STEERING KNUCKLE/BEARING**REMOVAL**

- 1) Hoist vehicle and remove wheel.
- 2) Uncalk drive shaft nut (1).
- 3) Depress foot brake pedal and hold it there. Remove drive shaft nut.



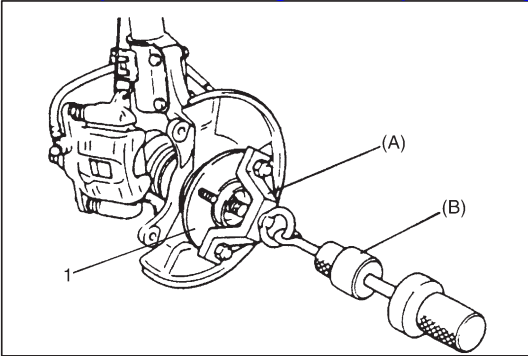
- 4) Remove caliper carrier bolts.
- 5) Remove caliper with carrier.

NOTE:

Hang removed caliper with a wire hook of the like so as to prevent brake hose from bending and twisting excessively or being pulled.

Don't operate brake pedal with pads removed.

- 6) Pull brake disc (1) off by using two 8 mm bolts.

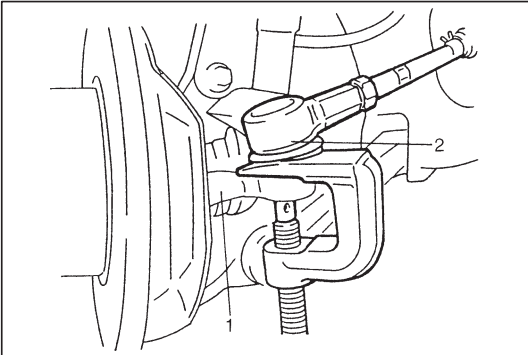


7) Pull out wheel hub (1) with special tools.

Special Tool

(A): 09943-17912

(B): 09942-15511

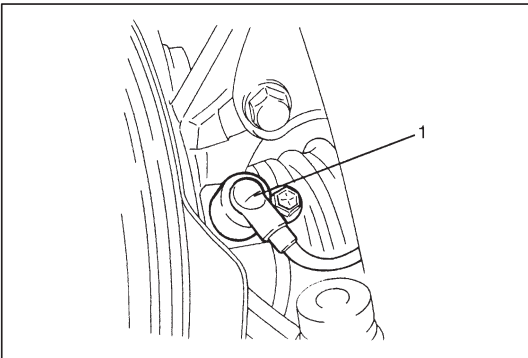


8) Remove tie-rod end nut and disconnect tie-rod end (2) from knuckle (1) with puller.

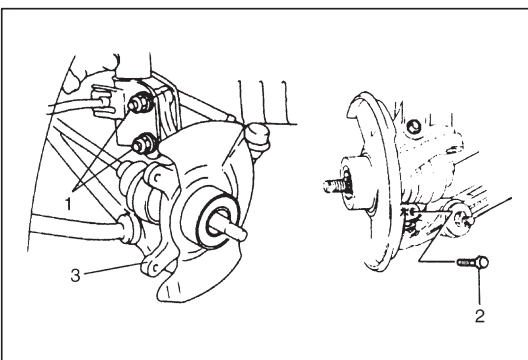
CAUTION:

Never reuse tie-rod end nut.

Reused nut will not be locked securely.

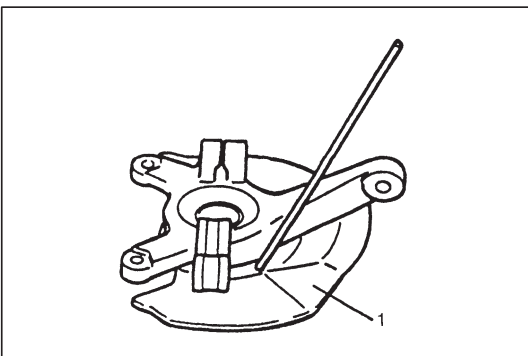


9) Remove wheel speed sensor (1) from knuckle (if equipped).



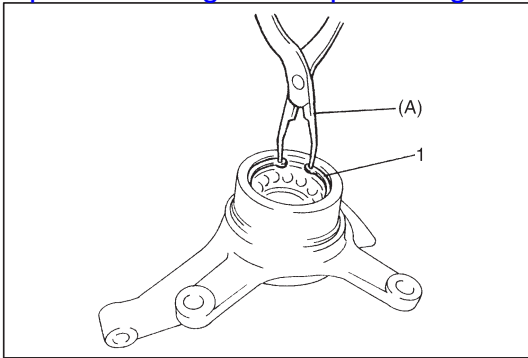
10) Remove strut bracket bolts (1) from strut bracket and then ball stud bolt (2).

11) Remove knuckle (3).



DISASSEMBLY

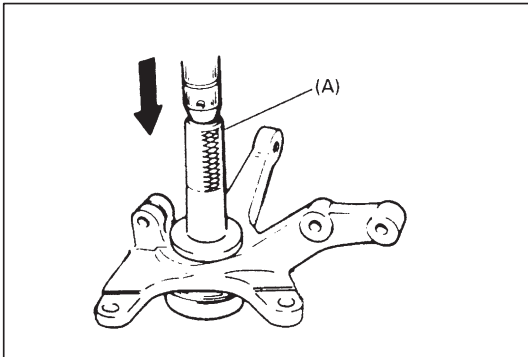
1) Uncaulk and remove dust cover (1).



2) Remove circlip (1).

Special Tool

(A): 09900-06108



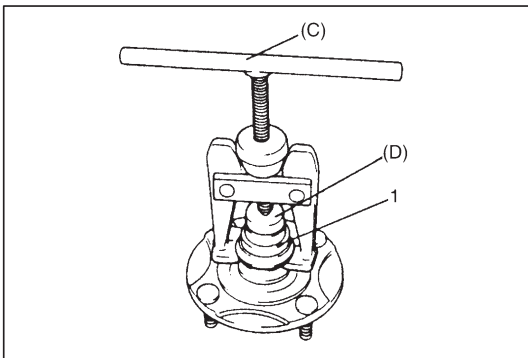
3) Remove wheel bearing using special tool and hydraulic press.

Special Tool

(A): 09913-75810

CAUTION:

- Never reuse wheel bearing. Reused bearing should have excessive play.
- When replacing bearing, inner races or outer race, be sure to replace them with new ones as a set.

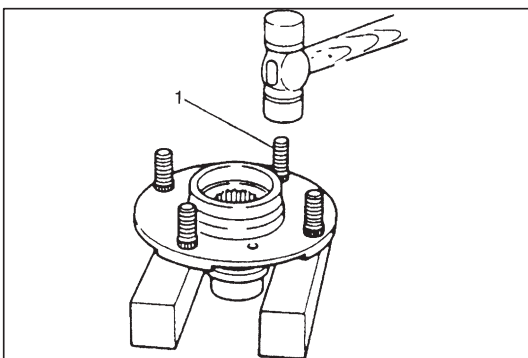


4) Remove wheel bearing inner race (1).

Special Tool

(C): 09913-61110

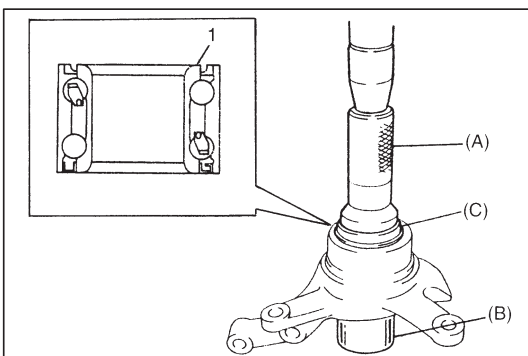
(D): 09925-88210



5) Remove hub bolts (1).

CAUTION:

Never remove bolt unless replacement is necessary.
Be sure to use a new bolt for replacement.



ASSEMBLY

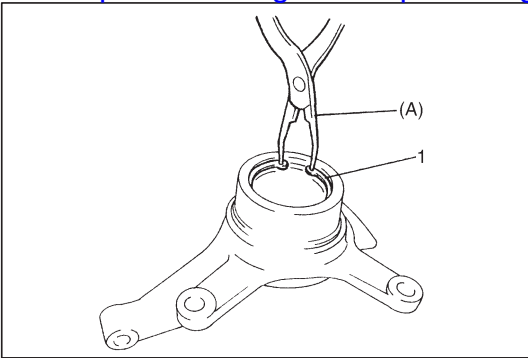
1) Face grooved rubber seal side (1) of new wheel bearing upward as shown and press-fit new wheel bearing into knuckle using special tools.

Special Tool

(A): 09913-75810

(B): 09951-18210

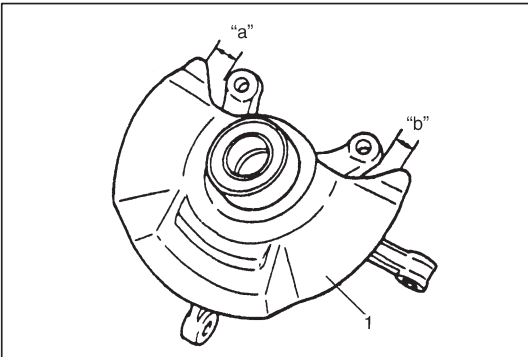
(C): 09924-84510-002



2) Install circlip (1).

Special Tool

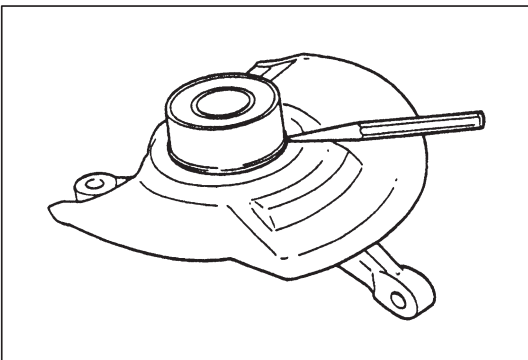
(A): 09900-06108



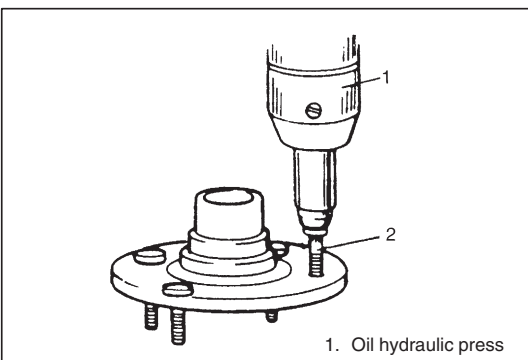
3) Drive in dust cover (1) so that dimensions "a" and "b" become equal as shown.

CAUTION:

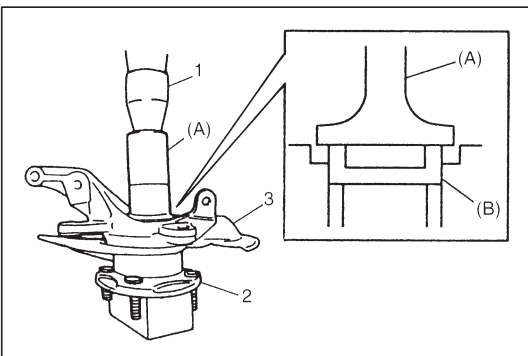
When drive in dust cover, be careful not to deform it.



4) Caulk with a punch.



5) Insert new stud (2) in hub hole. Rotate stud (2) slowly to assure serrations are aligned with those made by original bolt.



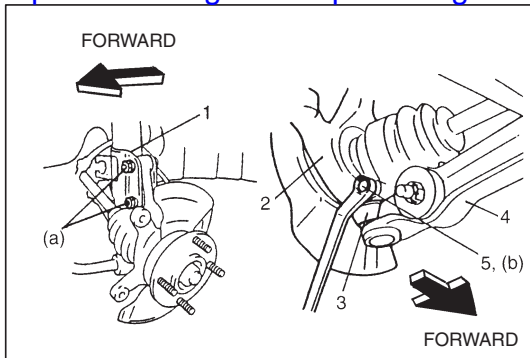
INSTALLATION

1) Using special tools and hydraulic press (1), drive wheel hub (2) into steering knuckle (3) as shown.

Special Tool

(A): 09913-75520

(B): 09944-66020

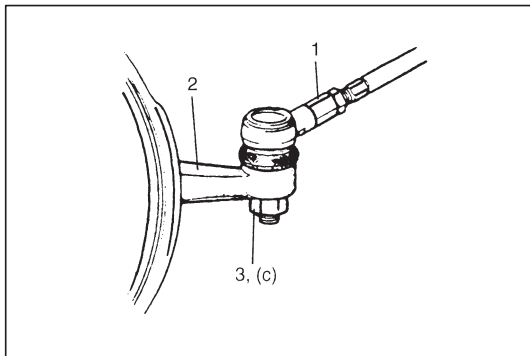


- 2) Install knuckle (2) to ball stud (3) on suspension control arm (4) and strut bracket (1). Installing direction of each bolt is as shown. Align knuckle bolt hole with ball stud groove and install ball stud bolt (5). Tighten each bolt and nuts to specified torque.

Tightening Torque

(a): 115 N·m (11.5 kg-m, 83.5 lb-ft)

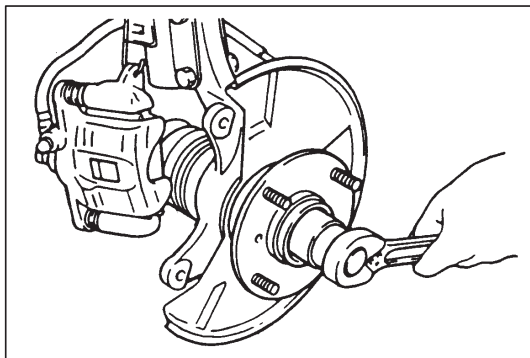
(b): 60 N·m (6.0 kg-m, 43.5 lb-ft)



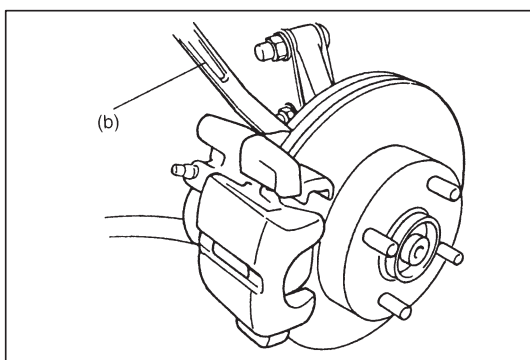
- 3) Install wheel speed sensor (if equipped).
4) Connect tie-rod end (1) to knuckle (2) and install new tie-rod end nut (3).
Tighten tie-rod end nut to specified torque.

Tightening Torque

(c): 43 N·m (4.3 kg-m, 31.5 lb-ft)



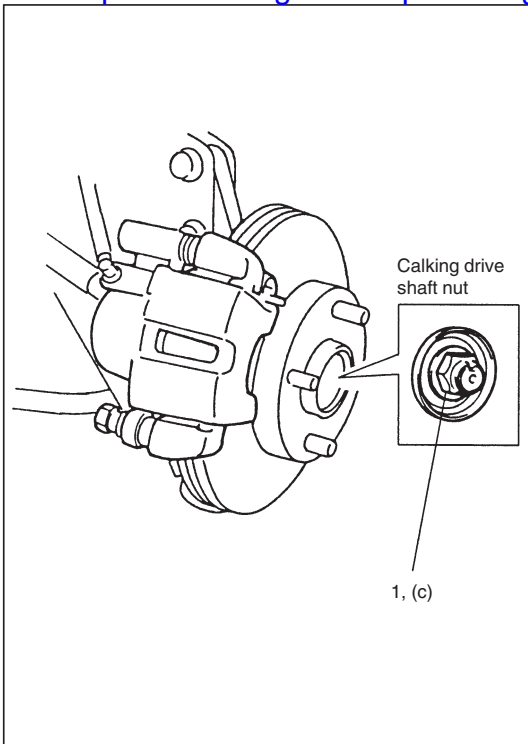
- 5) Tighten new drive shaft nut temporarily.



- 6) Install brake disc.
7) Install brake caliper/caliper carrier.
8) Tighten caliper carrier bolts to specified torque.

Tightening Torque

(b): 95 N·m (9.5 kg-m, 69.0 lb-ft)



- 9) Depress foot brake pedal and hold it there.
Tighten new drive shaft nut (1) to specified torque.

Tightening Torque**(c): 175 N·m (17.5 kg-m, 127.0 lb-ft)**

- 10) Calk drive shaft nut as shown.

CAUTION:

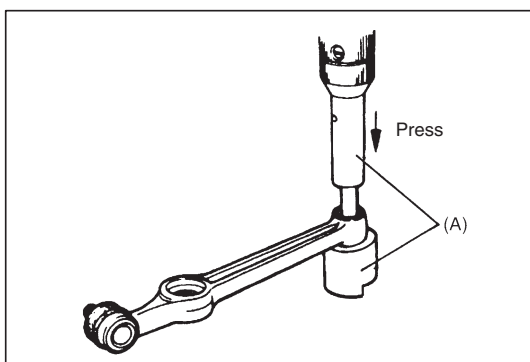
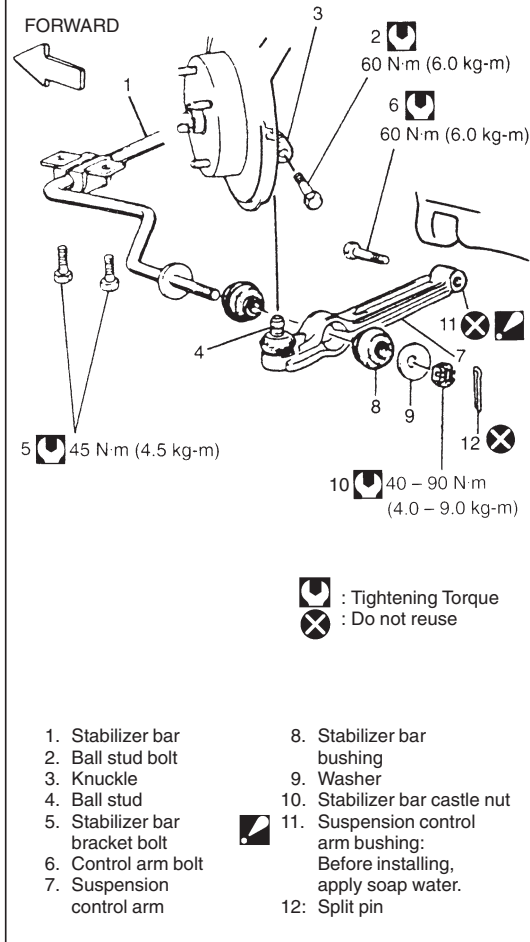
Be careful while caulking nut so that no crack will occur in caulked part of nut. Cracked nut must be replaced with new one.

- 11) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque For Wheel Nuts**85 N·m (8.5 kg-m, 61.5 lb-ft)**

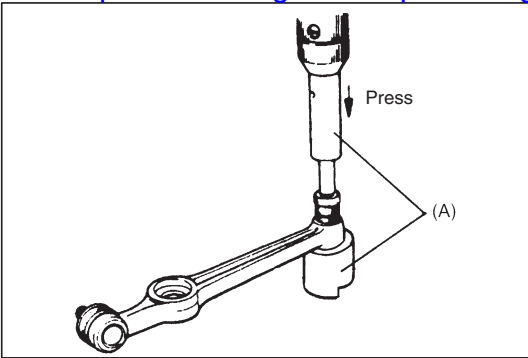
SUSPENSION CONTROL ARM/BUSHING**REMOVAL**

- 1) Hoist vehicle and remove wheel.
- 2) Remove split pin (12), stabilizer bar castle nut (10), washer (9) and bushing (8).
- 3) Remove stabilizer bar mount bracket (right & left) bolts (5).
- 4) Remove ball stud bolt (2).
- 5) Remove suspension control arm bolt (6).
- 6) Remove suspension control arm (7).



- 7) Remove bushing.
Place suspension control arm onto flat surface side of special tool and push out bushing with special tool and oil hydraulic press as shown.

Special Tool
(A): 09943-77910

**INSTALLATION**

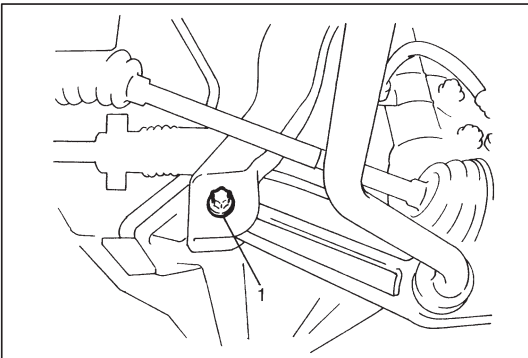
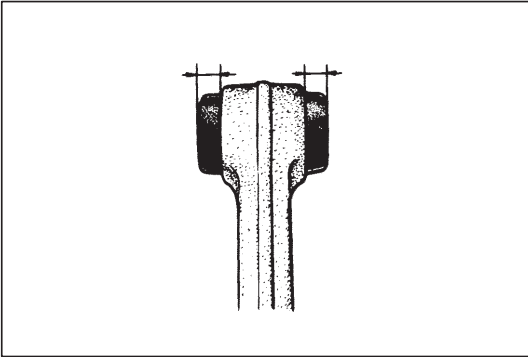
- 1) Place suspension control arm onto flat surface side of special tool and install new bushing with special tool and oil hydraulic press as shown.

Special Tool

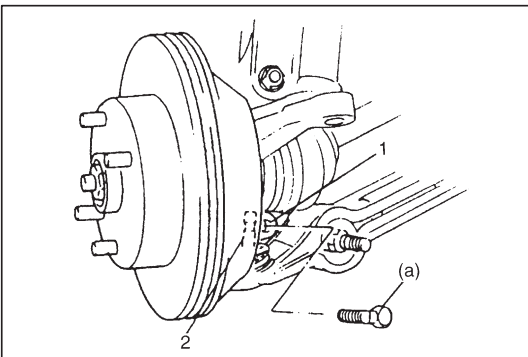
(A): 09943-77910

NOTE:

- Before installing bushing, apply soap water on its circumference to facilitate installation.
- When installed, bush should be equal on the right and left of arm as shown.



- 2) Install suspension control arm to vehicle body and tighten suspension control arm bolt (1) temporarily.

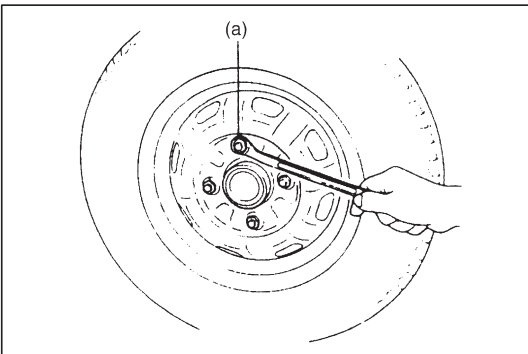


- 3) Install ball stud (2) to knuckle (1). Align ball stud groove with knuckle bolt hole as shown.

Then install ball stud bolt from the direction as shown. Tighten ball stud bolt to specified torque.

Tightening Torque

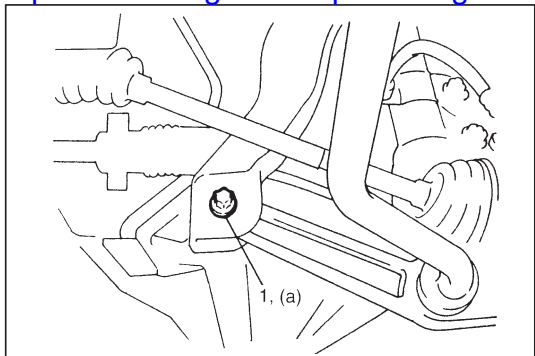
(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)



- 4) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



5) Lower hoist and vehicle in non-loaded condition, tighten control arm bolt (1) to specified torque.

Tightening Torque

(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)

- Install stabilizer bar, referring to STABILIZER BAR INSTALLATION in this section.

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithic wheel bearing grease	SUZUKI SUPER GREASE (A) (99000-25010)	<ul style="list-style-type: none"> ● Outside inner race ● Bearing seal ● Strut bearing ● Sliding part of strut rod

SPECIAL TOOLS

<p>1. 09900-00411 Hexagon wrench socket</p> <p>2. 09900-00414 Hexagon wrench bit (6 mm)</p>	<p>09900-06108 Snap ring pliers (closing type)</p>	<p>09913-61110 Bearing puller</p>	<p>09913-75810 Bearing installer</p>
<p>09924-84510-002 Bearing installer attachment</p>	<p>09925-88210 Bearing puller attachment</p>	<p>09940-53111 Bearing installer</p>	<p>09942-15511 Sliding hammer</p>
<p>09943-17912 Front wheel hub remover (Brake drum remover)</p>	<p>09943-77910 Control bush remover</p>	<p>09945-26010 17 mm Socket wrench</p>	<p>09951-18210 Bearing installer support</p>

SECTION 3E

REAR SUSPENSION

NOTE:

- All suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any suspension part. Replace it with a new part, or damage to the part may result.

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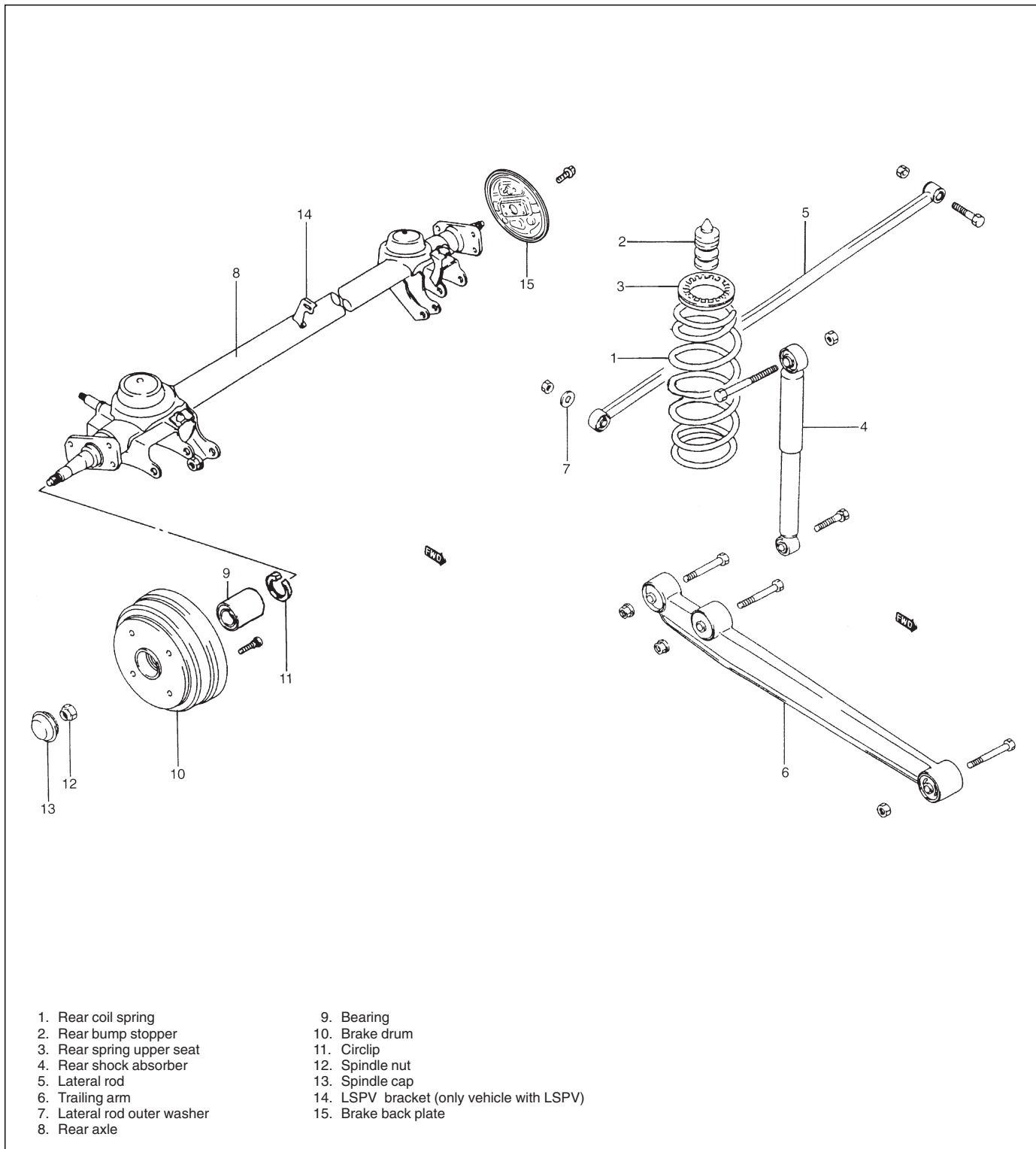
GENERAL DESCRIPTION

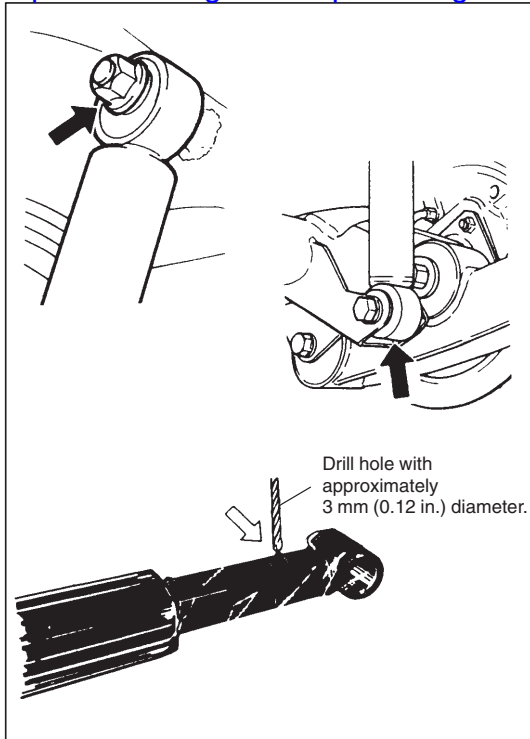
Rear suspension is Isolated Trailing Link (I.T.L.) type which consists of coil springs, rear axle, shock absorbers, lateral rod and trailing arms.

The lateral rod is installed to the body and axle by using bushes so as to prevent axle movement in the lateral direction.

The trailing arms which are connected with the axle are installed to the body by using a bush so that axle moves up and down with the bush as its supporting point.

The shock absorber is installed between the body and axle to absorb up-and-down movement of the vehicle body.





DIAGNOSIS

DIAGNOSIS TABLE

Refer to SECTION 3.

REAR SHOCK ABSORBER CHECK

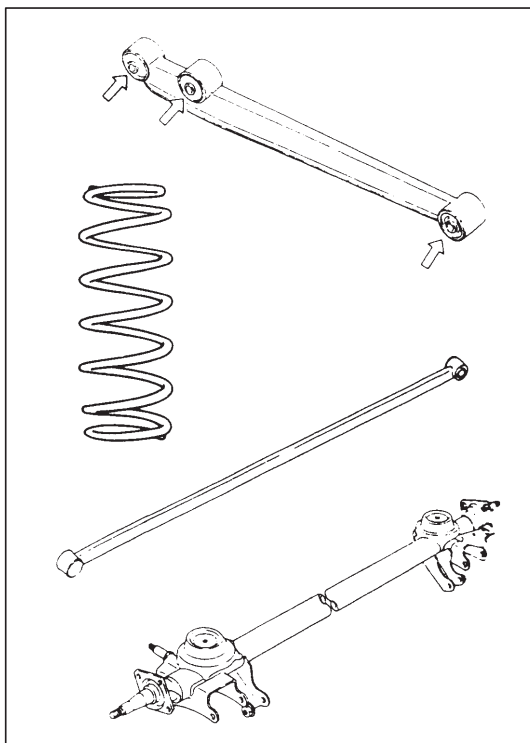
- Inspect for deformation or damage.
- Inspect bushings for wear or damage.
- Inspect for evidence of oil leakage.

Replace any defective part.

WARNING:

When handling rear shock absorber in which high-pressure gas is sealed, make sure to observe the following precautions.

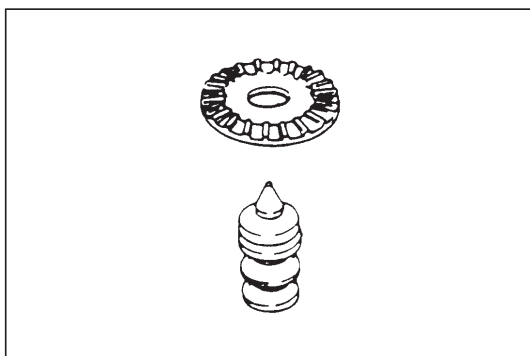
- **Don't disassemble it.**
- **Don't put it into the fire.**
- **Don't store it where it gets hot.**
- **Before disposing it, be sure to drill a hole in it where shown by an arrow in figure and let gas and oil out. Lay it down sideways for this work. The gas itself is harmless but it may issue out of the hole together with chips generated by the drill. Therefore, be sure to wear goggle.**



TRAILING ARM, LATERAL ROD, REAR AXLE AND COIL SPRING CHECK

- Inspect for cracks, deformation or damage.
- Inspect bushing for damage, wear or breakage.

Replace any defective part.



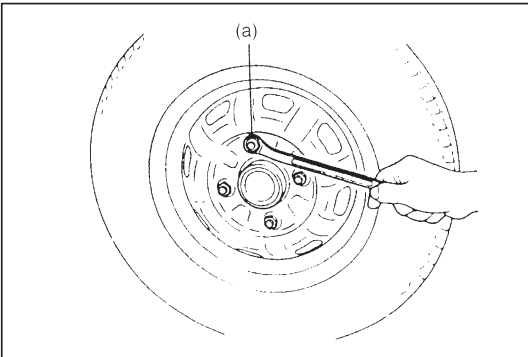
BUMP STOPPER/SPRING UPPER SEAT CHECK

- Inspect for cracks, deformation or damage.

Replace any defective part.

REAR SUSPENSION FASTENERS CHECK

Check each bolt and nut fastening suspension parts for tightness. Tighten loose one, if any, to specified torque, referring to ON-VEHICLE SERVICE in this section.

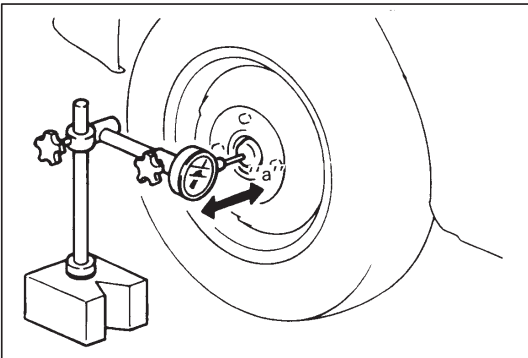


WHEEL DISC, NUT & BEARING CHECK

- Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.
- Check wheel nuts for tightness and, as necessary, retighten to specification.

Tightening Torque

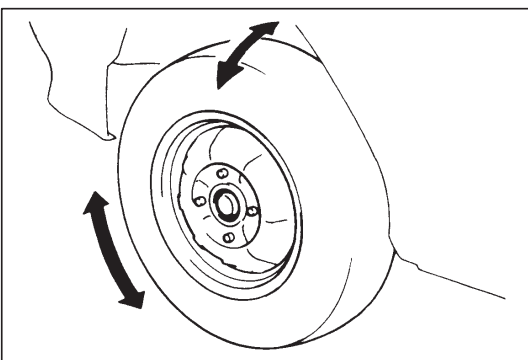
(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



- Check wheel bearings for wear. When measuring thrust play, apply a dial gauge to spindle cap center.

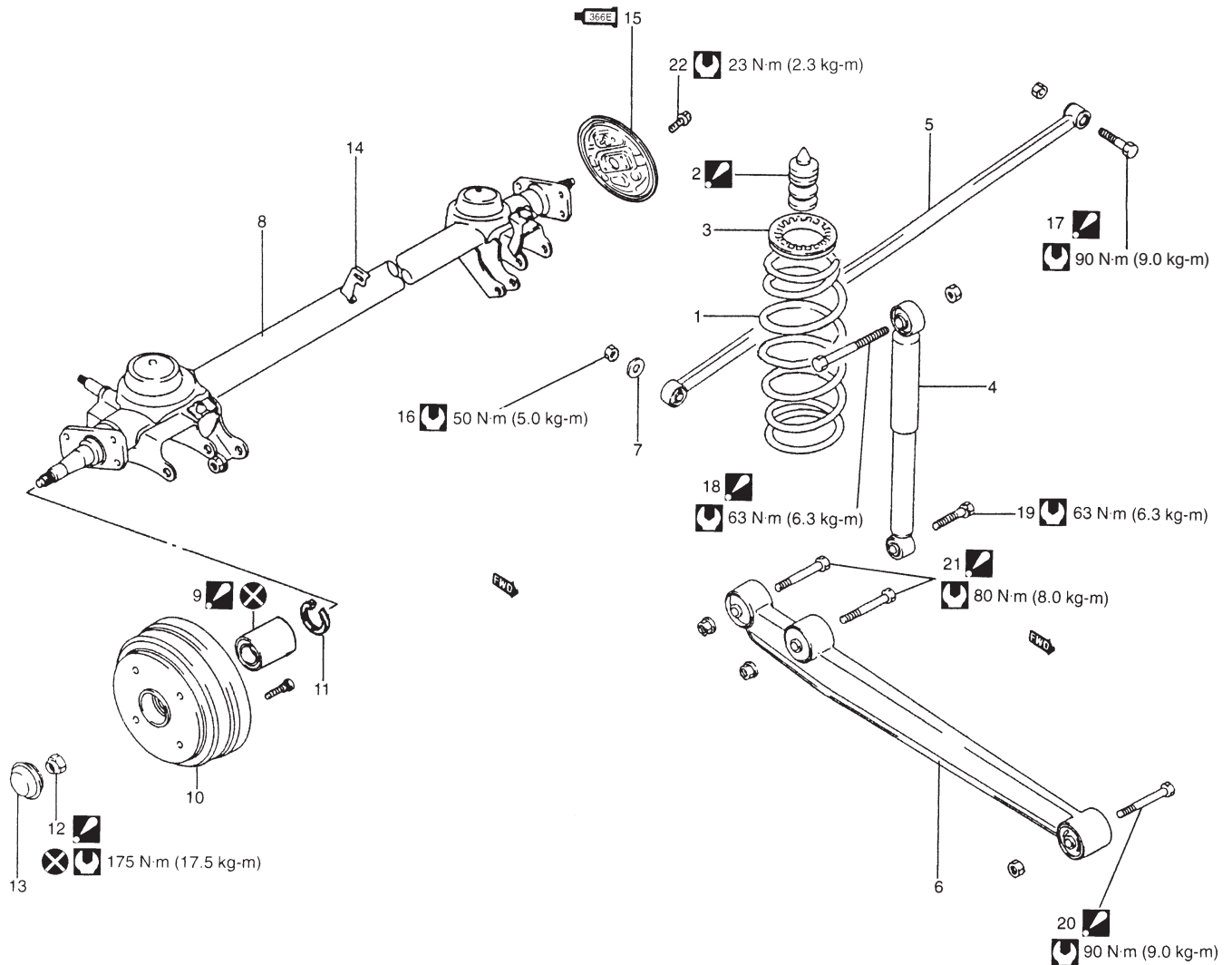
Thrust play limit “a”: 0.1 mm (0.004 in.)

When measurement exceeds limit, replace bearing.









- By rotating wheel actually, check wheel bearing for noise and smooth rotation. If it is defective, replace bearing.



ON-VEHICLE SERVICE

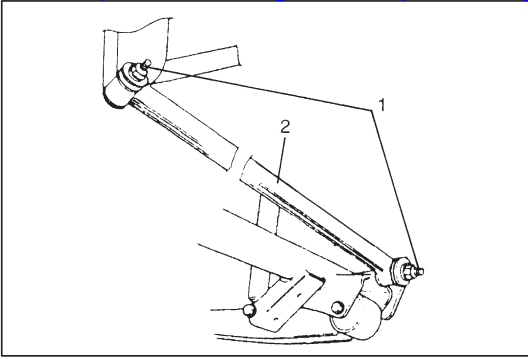


1. Rear coil spring
2. Rear bump stopper:
Apply soap water, when installing.
3. Rear spring upper seat
4. Rear shock absorber
5. Lateral rod
6. Trailing arm
7. Lateral rod outer washer
8. Rear axle
9. Bearing:
Seal side of bearing comes
inside of brake drum.

10. Brake drum
11. Circlip
-  12. Spindle nut:
Caulk, after tightening.
13. Spindle cap
14. LSPV bracket
(only vehicle with LSPV)
-  15. Brake back plate:
Apply water tight sealant 99000-31090 to joint of plate and axle.
16. Lateral rod axle side nut

-  17. Lateral rod body side bolt:
Insert from the direction as shown
-  18. Shock absorber upper bolt:
Insert from vehicle outside.
19. Shock absorber lower bolt
-  20. Trailing arm front bolt:
Insert from vehicle inside.
-  21. Trailing arm rear bolt:
Insert from vehicle inside.
22. Brake back plate bolt

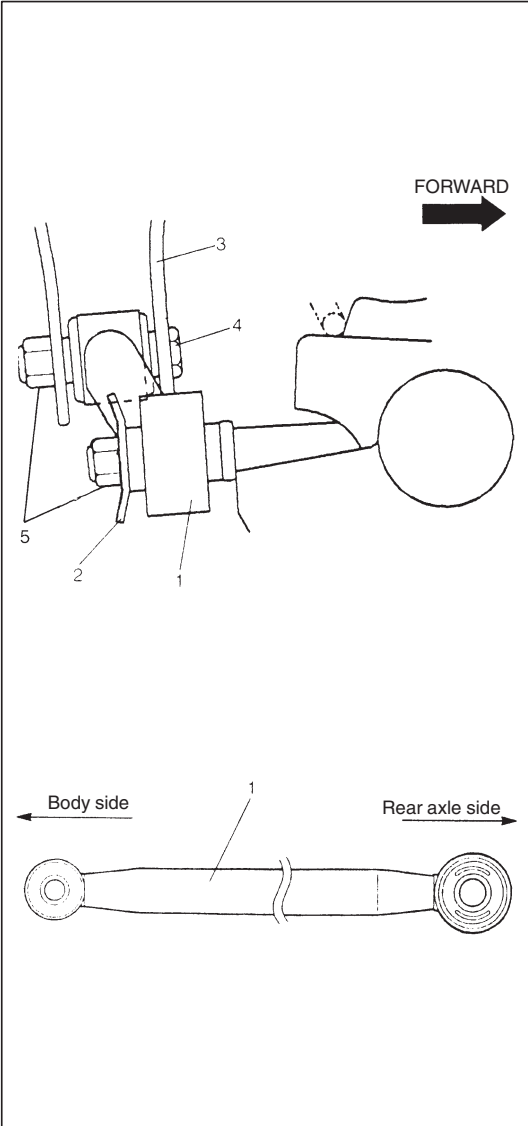
 : Tightening Torque
 : Do not reuse



LATERAL ROD

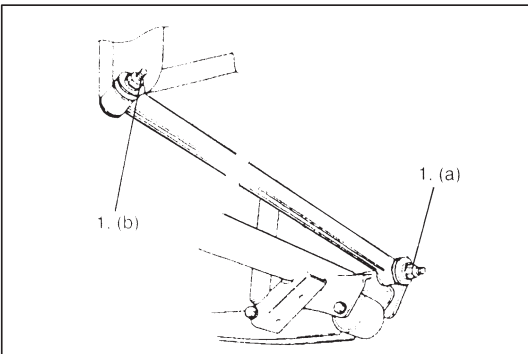
REMOVAL

- 1) Hoist vehicle.
- 2) Remove lateral rod nuts (1).
- 3) Remove lateral rod (2).



INSTALLATION

- 1) Install lateral rod (1) to rear axle and vehicle body (3) referring to figure for proper installing direction of bolt (4) and washer (2). Tighten nuts (5) temporarily by hand.



- 2) Lower hoist.
- 3) Tighten lateral rod nuts (1) to specified torque. It is the most desirable to have vehicle off hoist and in non-loaded condition when tightening them.

Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

(b): 90 N·m (9.0 kg-m, 65.0 lb-ft)

REAR SHOCK ABSORBER

REMOVAL

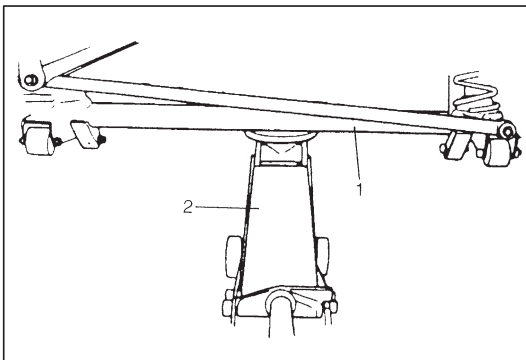
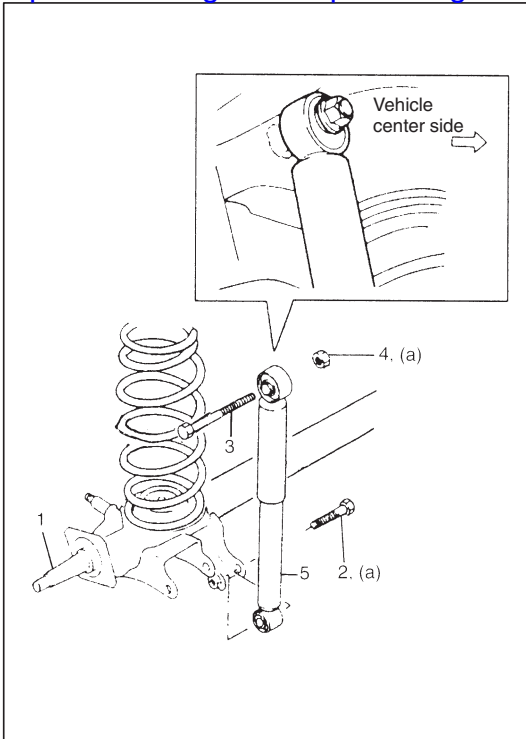
- 1) Hoist vehicle.
- 2) Support rear axle (1) by using floor jack to prevent it from lowering.
- 3) Remove lower bolt (2).
- 4) Remove upper bolt (3) and nut (4). Then remove shock absorber (5).

INSTALLATION

- 1) Install shock absorber (5), referring to left figure.
Tighten bolt and nut temporarily by hand.
- 2) Remove floor jack from rear axle (1) and lower hoist.
- 3) Tighten bolts to specified torque.

Tightening Torque

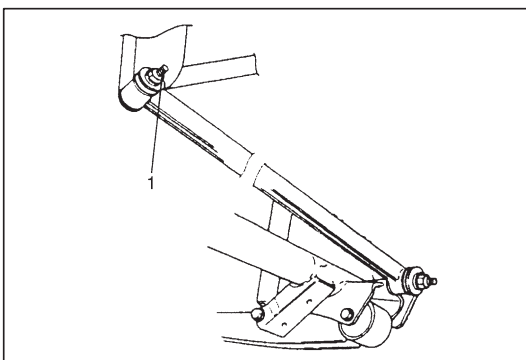
(a): 63 N·m (6.3 kg-m, 45.5 lb-ft)



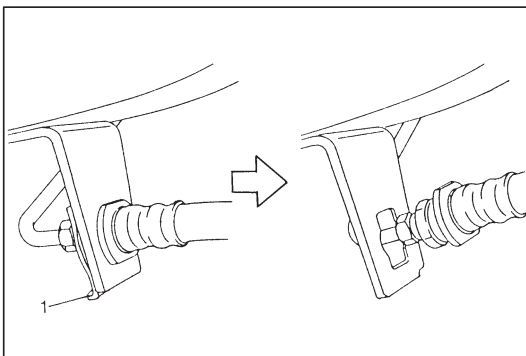
COIL SPRING

REMOVAL

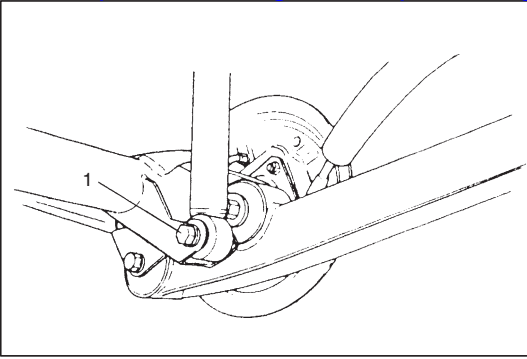
- 1) Hoist vehicle and remove rear wheel (s).
- 2) Support rear axle (1) by using floor jack (2) to prevent it from lowering.



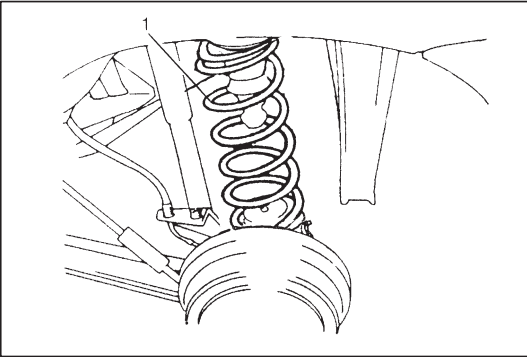
- 3) Remove lateral rod body side bolt and nut (1).



- 4) Remove brake flexible hose E-ring (1).



5) Remove shock absorber lower bolt (1).

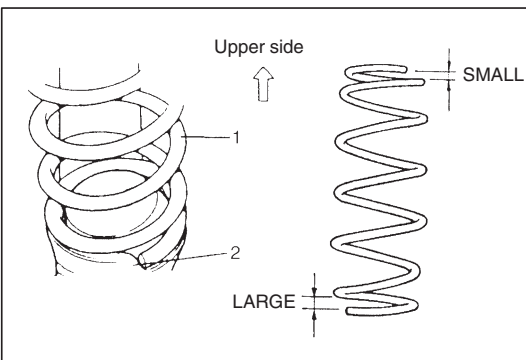


6) Lower rear axle gradually as far down as where coil spring (1) can be removed.

CAUTION:

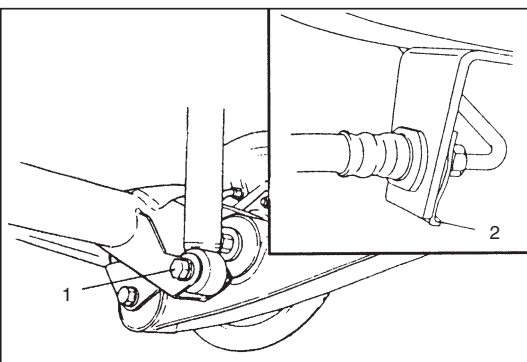
**Be careful not to let rear axle down too much.
It may cause damage to brake flexible hose and parking
brake cable.**

7) Remove coil spring.



INSTALLATION

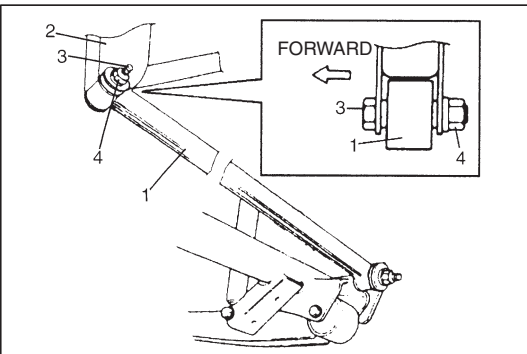
1) Install coil spring (1) with its small pitch end facing up and large pitch end down and make sure that spring end comes in contact with stepped part (2) of spring seat as shown in figure.



2) Tighten shock absorber lower bolt (1) temporarily by hand.

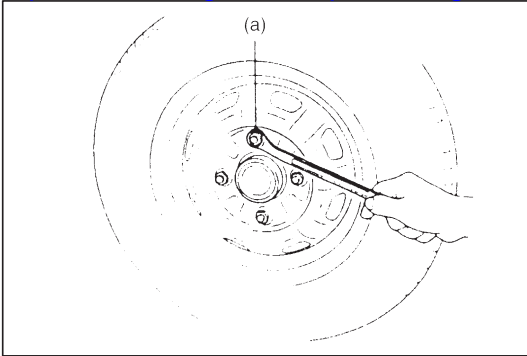
3) Remove floor jack from rear axle.

4) Install brake flexible hose E-ring (2).



5) Install lateral rod (1) to vehicle body (2), referring to figure for proper installing direction of bolt (3).

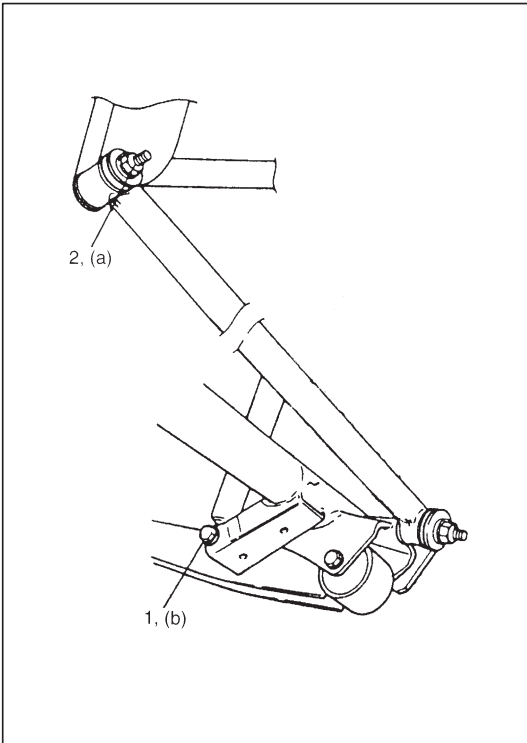
Tighten nut (4) temporarily by hand.



6) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

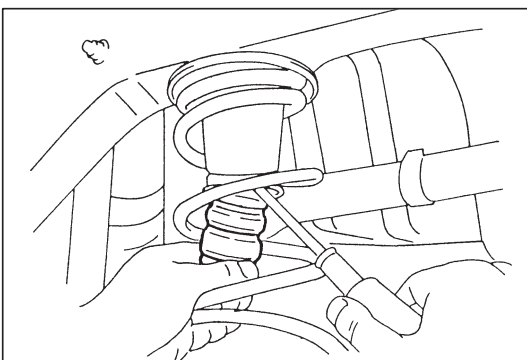


7) Lower hoist and vehicle in non-loaded condition, tighten absorber lower bolt (1) and lateral rod body side nut (2) to specified torque.

Tightening Torque

(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)

(b): 63 N·m (6.3 kg-m, 45.5 lb-ft)



BUMP STOPPER

REMOVAL

- 1) Hoist vehicle and remove rear wheel.
- 2) Remove bump stopper using flat tip screwdriver.

INSTALLATION

- 1) Install bump stopper.

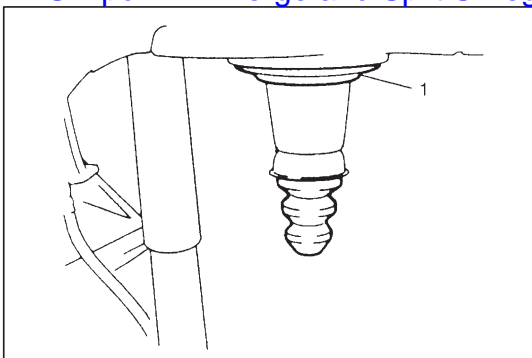
NOTE:

Before installing bump stopper apply soap water on it.

- 2) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

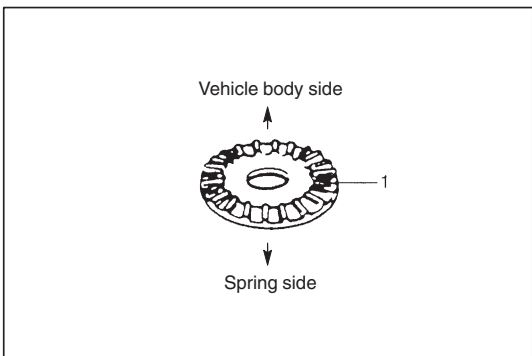
85 N·m (8.5 kg-m, 61.5 lb-ft)



SPRING UPPER SEAT

REMOVAL

- 1) Remove coil spring. For details, refer to COIL SPRING REMOVAL in this section.
- 2) Remove spring upper seat (1).



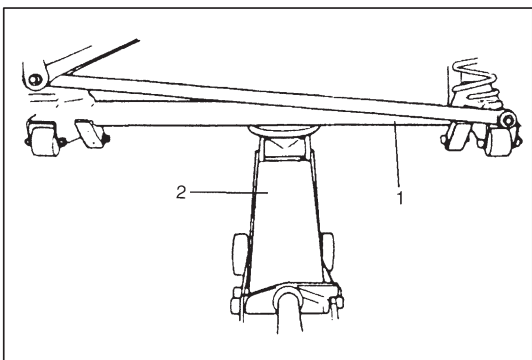
INSTALLATION

- 1) Install spring upper seat (1).

NOTE:

For proper installing direction of spring upper seat, refer to figure at left.

- 2) Install coil spring. For details, refer to COIL SPRING INSTALLATION in this section.



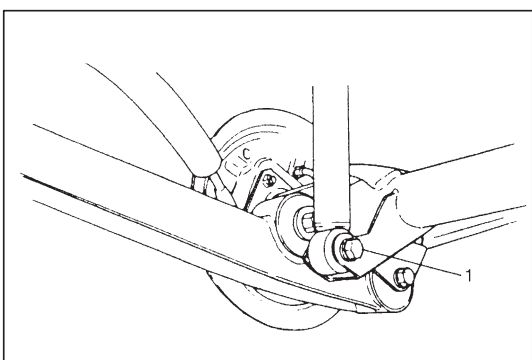
TRAILING ARM

REMOVAL

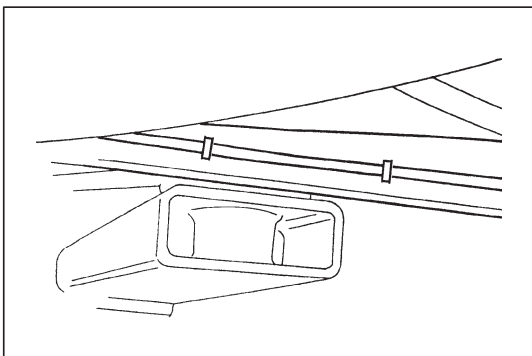
- 1) Hoist vehicle and remove rear wheel.
- 2) Support rear axle (1) by using floor jack (2).

CAUTION:

Never apply floor jack against lateral rod as it may get deformed.

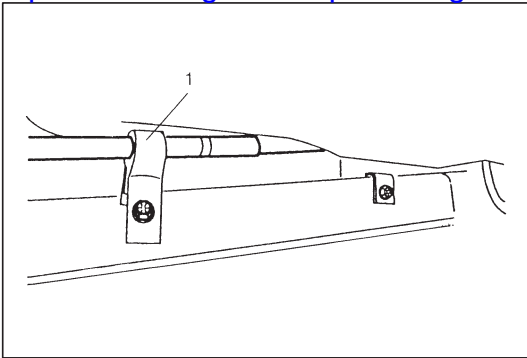


- 3) Remove shock absorber lower bolt (1).

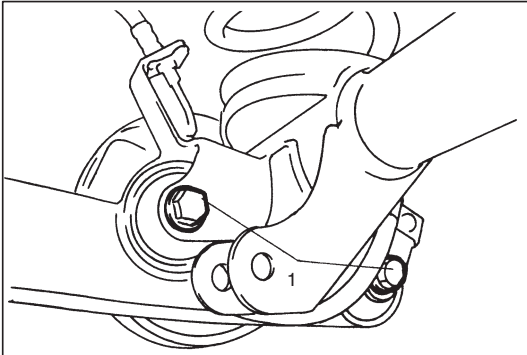


- 4) For ABS equipped vehicle, disconnect wheel speed sensor lead wire clamp from trailing arm.

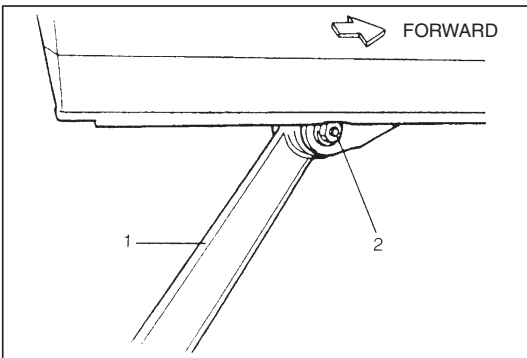
5) Remove parking brake cable clamp (1).



6) Remove trailing arm rear bolts (1).

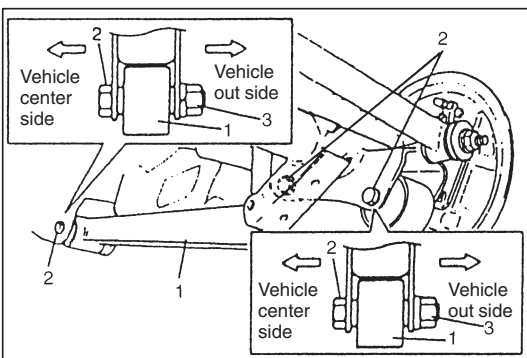


7) Remove trailing arm front bolt (2) and then remove trailing arm (1).

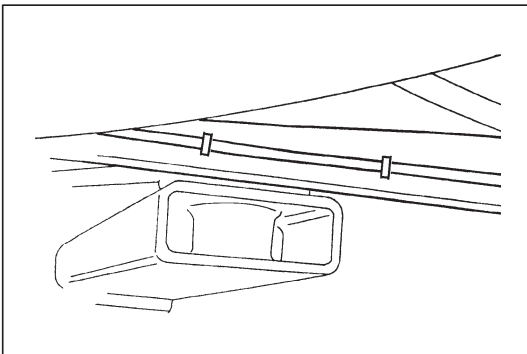


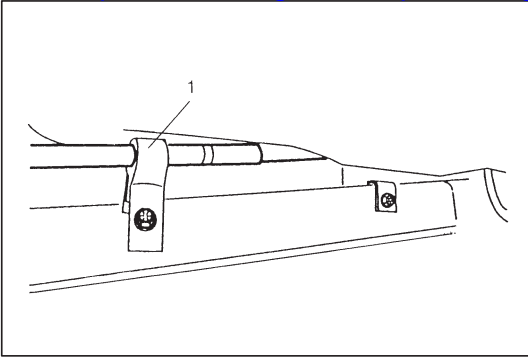
INSTALLATION

1) Install trailing arm (1) to vehicle body and rear axle, referring to figure for proper installing direction of bolts (2) and then tighten nuts (3) temporarily by hand.

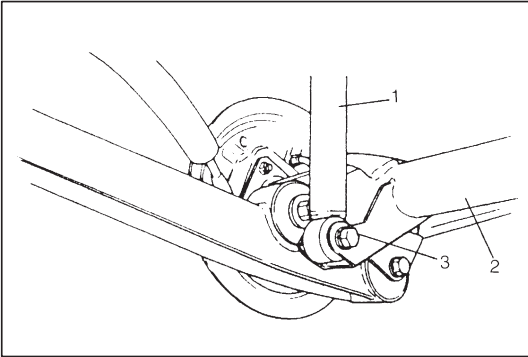


2) Install wheel speed sensor lead wire clamp, if equipped.





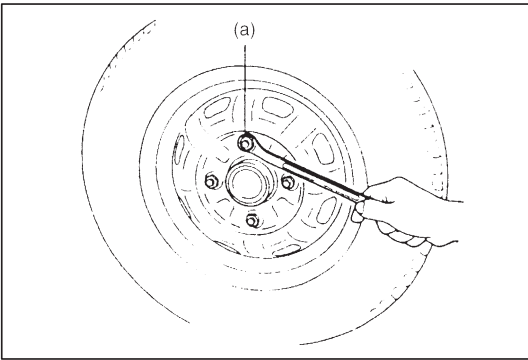
3) Install parking brake cable clamp (1).



4) Install shock absorber (1) to rear axle (2).

5) Tighten shock absorber lower bolt (3) temporarily by hand.

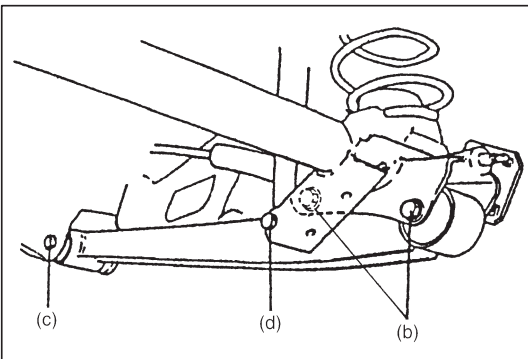
6) Remove floor jack from rear axle.



7) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque for wheel nuts

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



8) Lower hoist and vehicle in non loaded condition, tighten trailing arm front and rear nuts and shock absorber lower bolt to specified torque.

Tightening Torque

(b): 80 N·m (8.0 kg-m, 58.0 lb-ft)

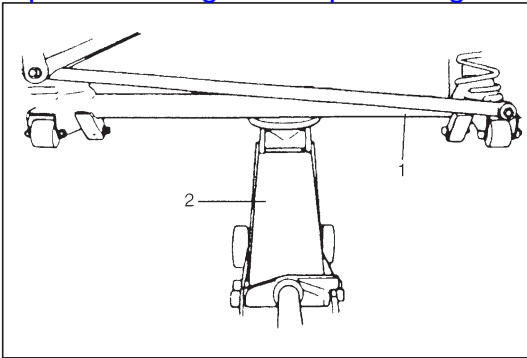
(c): 90 N·m (9.0 kg-m, 65.0 lb-ft)

(d): 63 N·m (6.3 kg-m, 45.5 lb-ft)

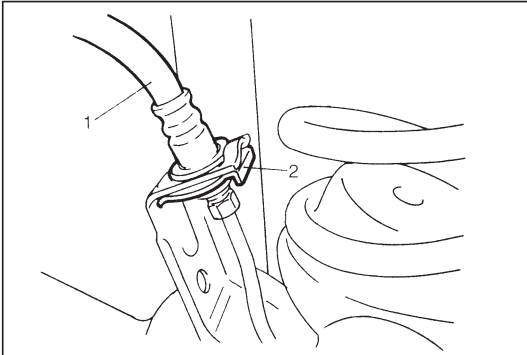
REAR AXLE

REMOVAL

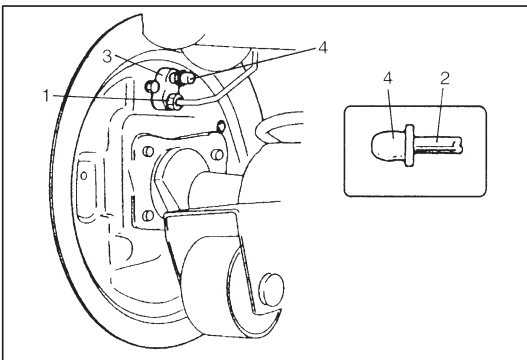
- 1) Hoist vehicle and remove rear wheels (right & left).
- 2) Support rear axle (1) by using floor jack (2).
- 3) Remove rear brake drums (right & left). For details, refer to steps 2) to 6) of BRAKE DRUM REMOVAL in SECTION 5C.



- 4) Remove E-rings (2) (right & left) securing brake hose (1).



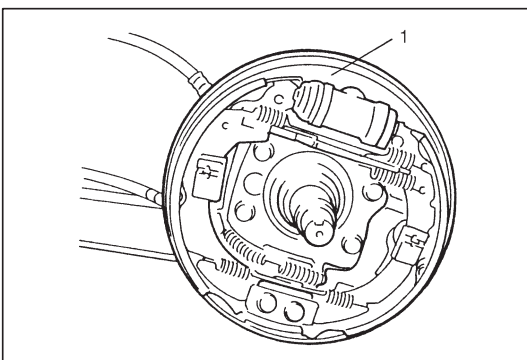
- 5) Disconnect brake pipe flare nuts (1) from wheel cylinders (3) (right & left) and put bleeder plug cap (4) onto pipe (2) to prevent fluid from spilling.



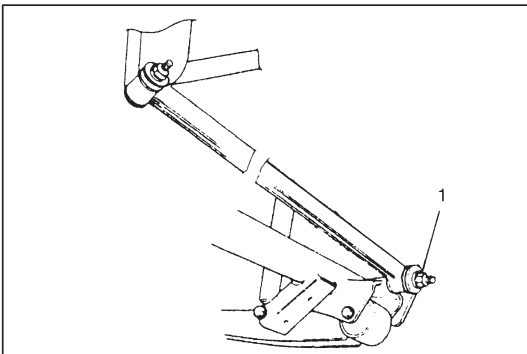
CAUTION:

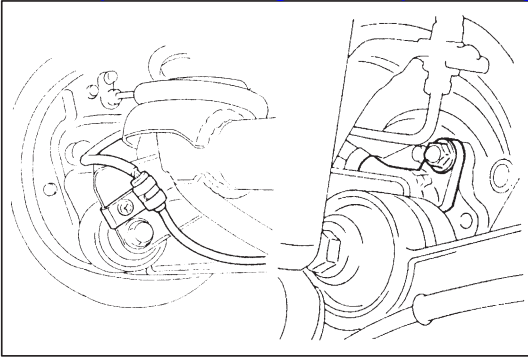
Do not allow brake fluid to get on painted surfaces.

- 6) Remove brake back plates (1) (right & left) from rear axle and hang removed brake back plate with a wire hook.

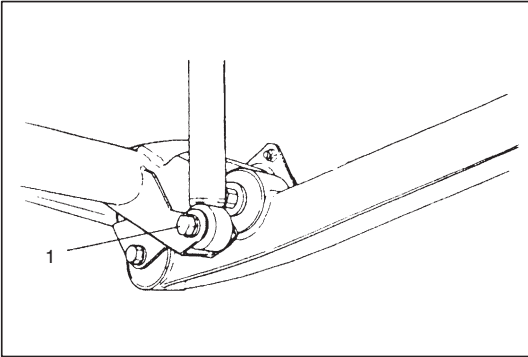


- 7) Remove lateral rod axle side nut (1).

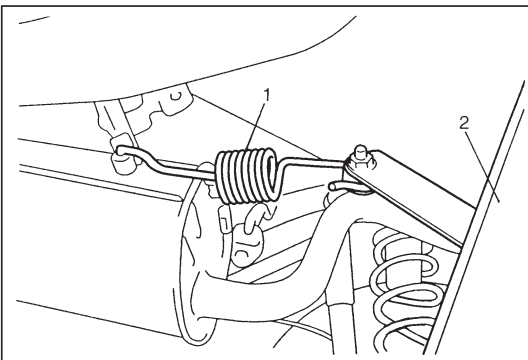




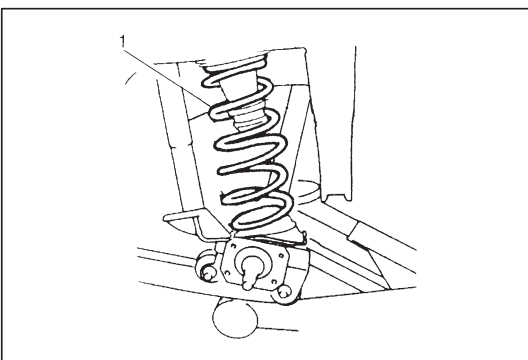
- 8) Disconnect wheel speed sensor and lead wire clamps (right & left) (if equipped).



- 9) Remove shock absorber lower bolts (1) (right & left).



- 10) Remove LSPV spring (1) from rear axle (2) (if equipped).

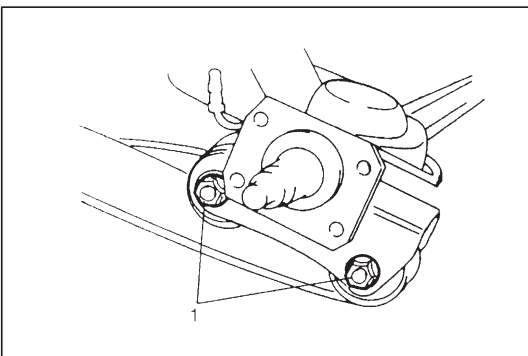


- 11) Lower rear axle gradually as far down as where coil springs (1) (right & left) can be removed.

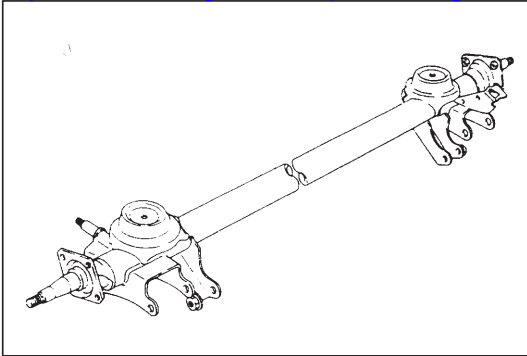
CAUTION:

**Be careful not to let rear axle down too much.
It may cause damage to brake flexible hose and parking
brake cable.**

- 12) Remove coil springs (right & left).



- 13) Loosen trailing arm rear side nuts (1) but don't remove bolts (right & left).

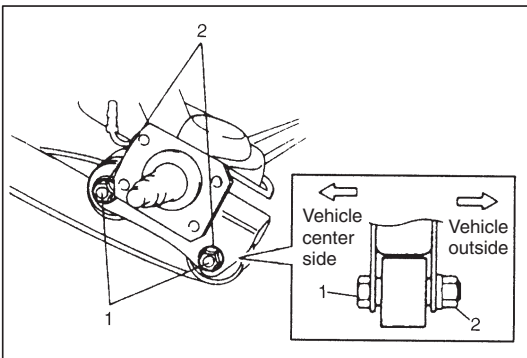


- 14) While supporting rear axle at both ends (right & left), remove trailing arm rear side bolts and then remove rear axle from chassis by lowering floor jack gradually.

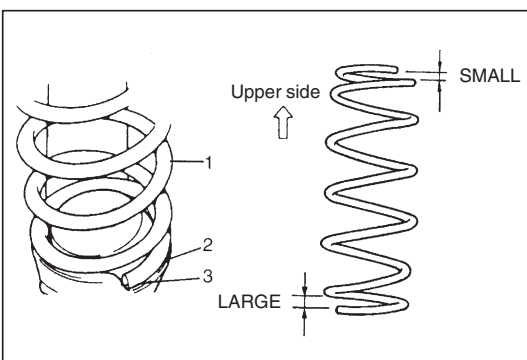
INSTALLATION

Install removed parts in reverse order of removal, noting the following points.

- 1) Place rear axle on floor jack. Then install lateral rod to rear axle and tighten nut temporarily by hand.



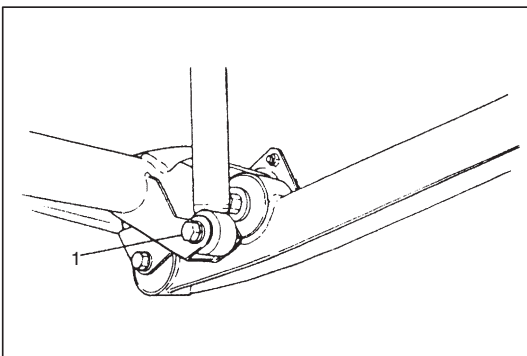
- 2) Install trailing arm rear bolts (1) (right & left) in proper direction as shown in figure. Then tighten nuts (2) temporarily by hand.



- 3) Install coil springs (1) (right & left) on spring seat (2) of rear axle as shown in figure and then raise rear axle.

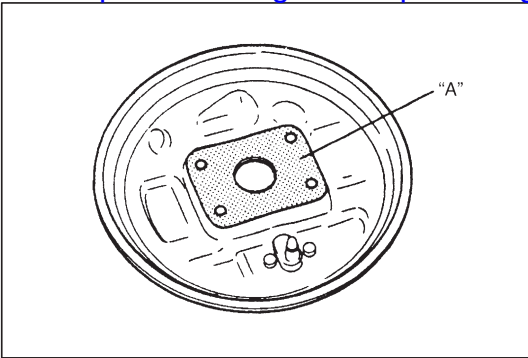
NOTE:

When seating coil spring (1), mate spring end with stepped part (3) of rear axle spring seat as shown.



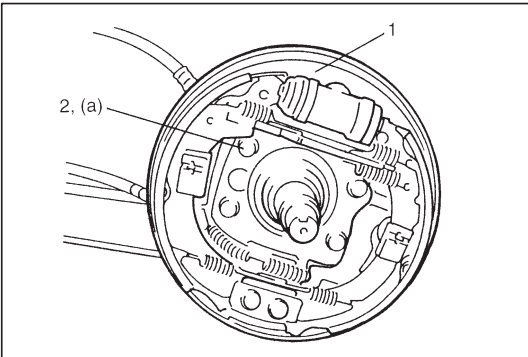
- 4) Tighten shock absorber lower bolts (1) (right & left) temporarily by hand.
5) Remove floor jack from rear axle.

Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>



- 6) Clean mating surface of rear axle (right & left) with brake back plate and apply water tight sealant as shown in figure.

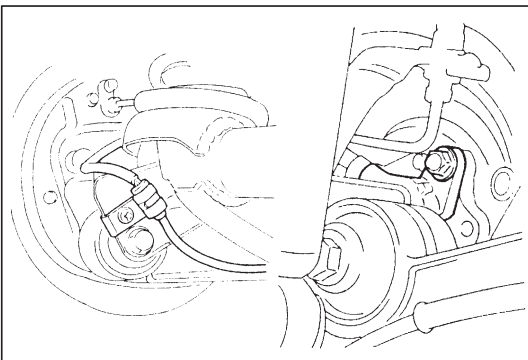
"A": Sealant 99000-31090



- 7) Install brake back plates (1) and tighten back plate bolts (2) to specified torque.

Tightening Torque

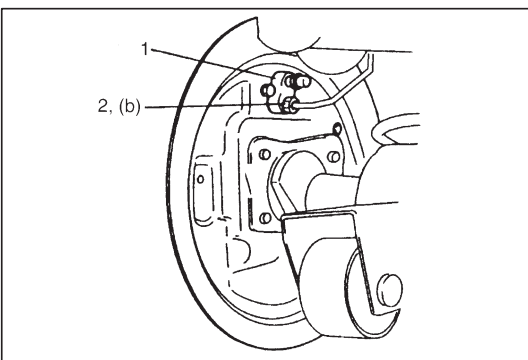
(a): 23 N·m (2.3 kg-m, 16.5 lb-ft)



- 8) Connect wheel speed sensor and lead wire clamps (right & left) (if equipped).

CAUTION:

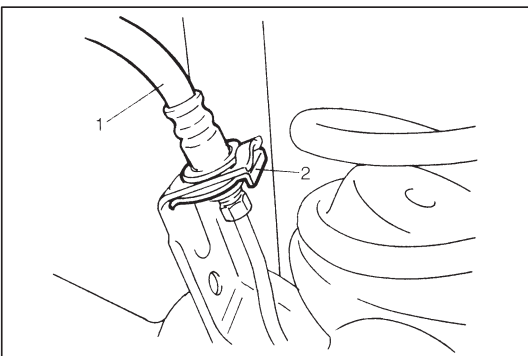
Since there are two holes on each side of rear axle, be sure to install wheel speed sensor at the position as shown in figure.



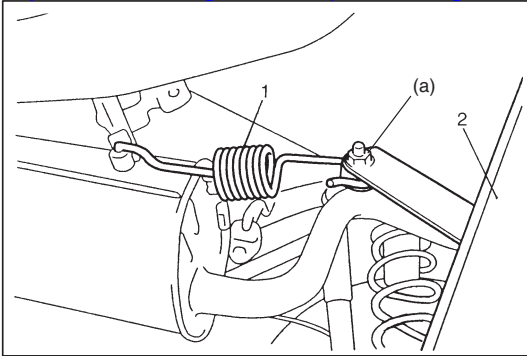
- 9) Connect brake pipes to wheel cylinders (1) (right & left) and tighten brake pipe flare nuts (2) to specified torque.

Tightening Torque

(b): 16 N·m (1.6 kg-m, 11.5 lb-ft)



- 10) Connect brake flexible hoses (1) (right & left) to bracket on rear axle and secure it with E-rings (2) (right & left).

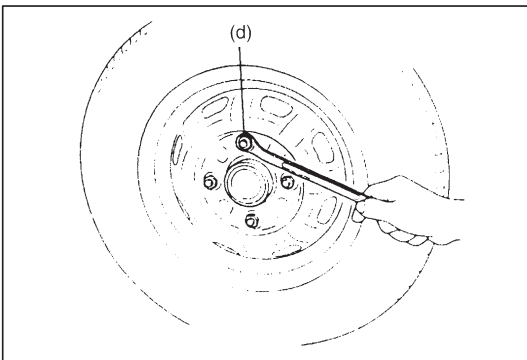


- 11) Install LSPV spring (1) to rear axle (2) (if equipped).

Tightening Torque

(a): 26 N·m (2.6 kg-m, 19.0 lb-ft)

- 12) Install brake drums (right & left). For details, refer to steps 3) to 8) of BRAKE DRUM INSTALLATION in Section 5C.
- 13) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, see SECTION 5.)

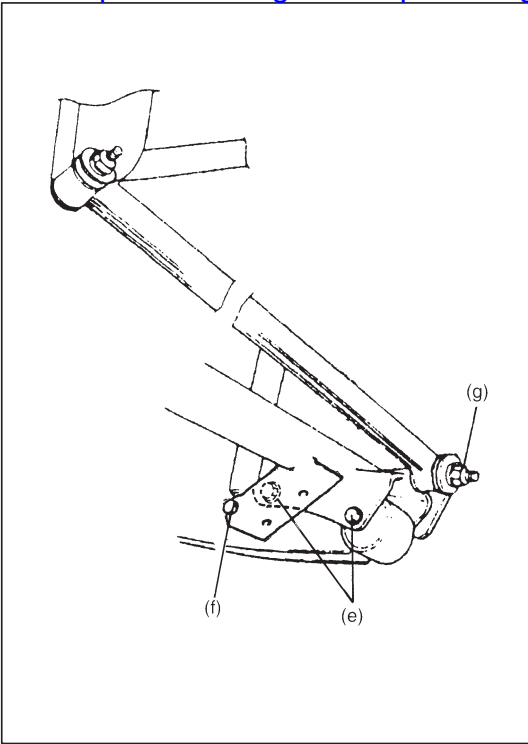


- 14) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

(d): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 15) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable. (for adjustment, see SECTION 5.)
- 16) Install console box.
- 17) Lower hoist and bounce vehicle up and down several times to stabilize suspension.



- 18) Tighten right and left trailing arm rear nuts, shock absorber lower bolts and lateral rod rear axle side nut to specified torque.

NOTE:

When tightening these nuts and bolts, be sure that vehicle is off hoist and in non loaded condition.

Tightening Torque

(e): 80 N·m (8.0 kg-m, 58.0 lb-ft)

(f): 63 N·m (6.3 kg-m, 45.5 lb-ft)

(g): 50 N·m (5.0 kg-m, 36.5 lb-ft)

- 19) Check to ensure that brake drum is free from dragging and proper braking is obtained.
- 20) Perform brake test (foot brake and parking brake).

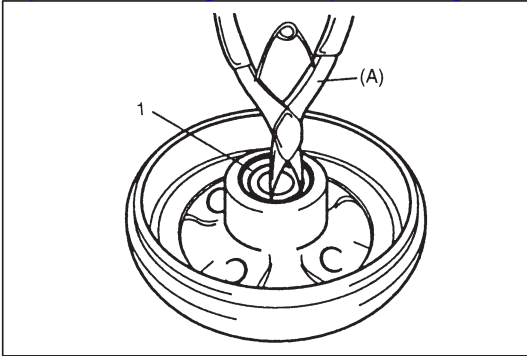
WHEEL BEARING AND WHEEL STUD

REMOVAL

- 1) Remove rear brake drum, referring to REAR BRAKE DRUM REMOVAL in SECTION 5C.
- 2) Remove circlip (1).

Special Tool

(A): 09900-06108



- 3) Remove wheel bearing by using special tool and hydraulic press.

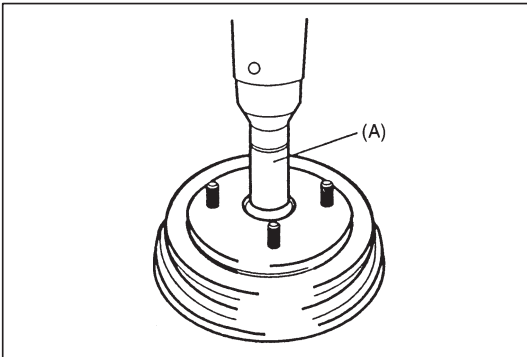
Special Tool

(A): 09913-76010

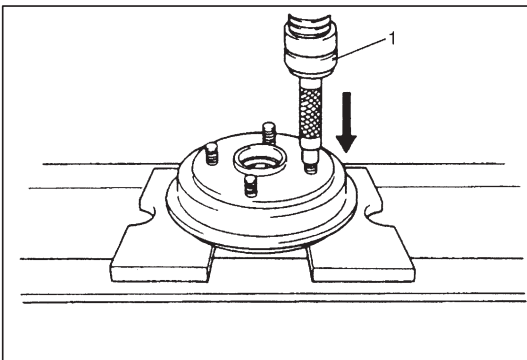
CAUTION:

Never reuse wheel bearing.

Reused bearing should have excessive play.

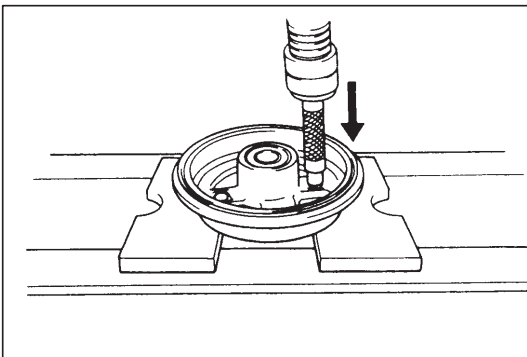


- 4) Remove wheel stud bolt by using hydraulic press (1).



INSTALLATION

- 1) Insert new stud in drum hole and rotate it slowly to assure serrations are aligned with those made by replaced bolt.



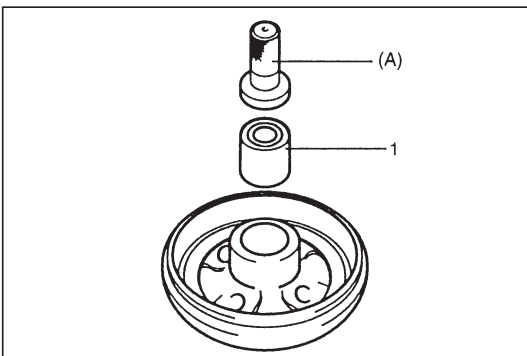
- 2) Install new wheel bearing (1) by using special tool and hydraulic press.

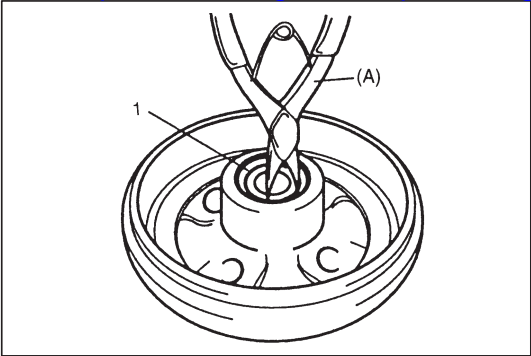
NOTE:

Seal side of bearing comes inside of brake drum.

Special Tool

(A): 09913-75810





3) Install circlip (1).

Special Tool
(A): 09900-06108

4) Install brake drum and wheel, referring to BRAKE DRUM INSTALLATION in SECTION 5C.

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	DOT4	Brake reservoir tank
Water tight sealant	SEALING COMPOUND 366E (99000-31090)	Join seam of rear axle and brake back plate

SPECIAL TOOLS

<p>09900-06108 Snap ring pliers</p>	<p>09913-75810 Bearing installer</p>	<p>09913-76010 Rear wheel bearing installer</p>	<p>09942-15511 Sliding hammer</p>
<p>09943-17912 Brake drum remover</p>			

SECTION 3F

WHEELS AND TIRES

NOTE:

All wheel fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts.

There is to be no welding as it may result in extensive damage and weakening of the metal.

CONTENTS

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Tires	3F-1	Service Operations	3F-5
Wheels	3F-1	Metric lug nuts and wheel studs	3F-5
Replacement Tires	3F-1	Wheel Removal	3F-5
Replacement Wheels	3F-2	Tire mounting and dismounting	3F-5
How to measure wheel runout	3F-2	Tire repair	3F-6
MAINTENANCE AND MINOR		Balancing Wheels	3F-6
ADJUSTMENTS	3F-3	General Balance Procedures	3F-7
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Matched tires and wheels	3F-3	TIGHTENING TORQUE	
Inflation of tires	3F-4	SPECIFICATIONS	3F-7
Tire placard	3F-4		

GENERAL DESCRIPTION

TIRES

This vehicle is equipped with the following tire.

165/60R14 or 155/65R14

The tire is of tubeless type. The tire is designed to operate satisfactorily with loads up to the full rated load capacity when inflated to the recommended inflation pressures.

Correct tire pressures and driving habits have an important influence on tire life. Heavy cornering, excessively rapid acceleration, and unnecessary sharp braking increase tire wear.

WHEELS

Standard equipment wheels are the following steel wheel.

14 × 4 1/2 J

REPLACEMENT TIRES

When replacement is necessary, the original equipment type tire should be used. Refer to the Tire Placard. Replacement tires should be of the same size, load range and construction as those originally on the vehicle. Use of any other size or type tire may affect ride, handling, speedometer/odometer calibration, vehicle ground clearance and tire or snow chain clearance to the body and chassis.

kPa	kgf/cm ²	psi
160	1.6	23
180	1.8	26
200	2.0	29
220	2.2	32
240	2.4	35
260	2.6	38
280	2.8	41
300	3.0	44

WARNING:

Do not mix different types of tires on the same vehicle such as radial, bias and bias-belted tires except in emergencies, because handling may be seriously affected and may result in loss of control.

It is recommended that new tires be installed in pairs on the same axle. If necessary to replace only one tire, it should be paired with the tire having the most tread, to equalize braking traction.

The metric term for tire inflation pressure is the kilopascal (kPa). Tire pressures is usually printed in both kPa and psi on the Tire Placard.

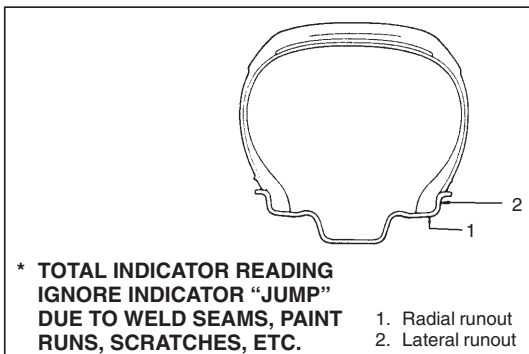
Metric tire gauges are available from tool suppliers.

The chart, shown left table, converts commonly used inflation pressures from kPa to psi.

REPLACEMENT WHEELS

Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, air leak through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than shown in figure below may cause objectionable vibrations.

Replacement wheels must be equivalent to the original equipment wheels in load capacity, diameter, rim with offset and mounting configuration. A wheel of improper size or type may affect wheel and bearing life, brake cooling, speedometer/odometer calibration, vehicle ground clearance and tire clearance to body and chassis.



HOW TO MEASURE WHEEL RUNOUT

To measure the wheel runout, it is necessary to use an accurate dial indicator. The tire may be on or off the wheel. The wheel should be installed to the wheel balancer or the like for proper measurement. Take measurements of both lateral runout and radial runout at both inside and outside of the rim flange. With the dial indicator set in place securely, turn the wheel one full revolution slowly and record every reading of the indicator.

When the measured runout exceeds the specification and correction by the balancer adjustment is impossible, replace the wheel. If the reading is affected by welding, paint or scratch, it should be ignored.

	Radial runout limit	Lateral runout limit
Steel wheel	2.0 mm (0.078 in.)	2.0 mm (0.078 in.)

MAINTENANCE AND MINOR ADJUSTMENTS

WHEEL MAINTENANCE

Wheel repairs that use welding, heating, or peening are not approved. All damaged wheels should be replaced.

WHEEL ATTACHING STUDS

If a broken stud is found, see Section 3E (rear) or Section 3D (front) for Note and Replacement procedure.

MATCHED TIRES AND WHEELS

Tires and wheels are matchmounted at the assembly plant.

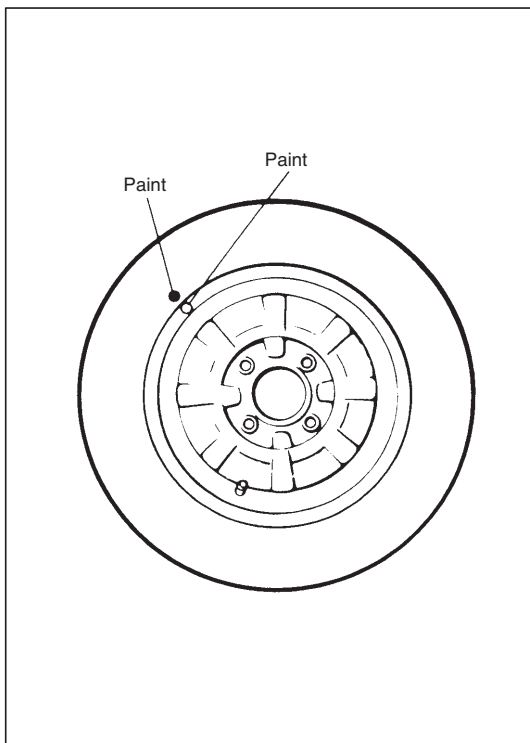
This means that the radially stiffest part of the tire, or "high spot", is matched to the smallest radius or "low spot" of the wheel.

This is done to provide the smoothest possible ride.

The "high spot" of the tire is originally marked by paint dot on the outboard sidewall. This paint dot will eventually be washed off the tire.

The "low spot" of the wheel is originally marked by paint dot on the wheel rim-flange. Properly assembled, the wheel rims' paint dot should be aligned with the tires' paint dot as shown in left figure.

Whenever a tire is dismantled from its wheel, it should be remounted so that the tire and wheel are matched. If the tire's paint dot cannot be located, a line should be scribed on the tire and wheel before dismantling to assure that it is remounted in the same position.



INFLATION OF TIRES

The pressure recommended for any model is carefully calculated to give a satisfactory ride, stability, steering, tread wear, tire life and resistance to bruises.

Tire pressure, with tires cold, (after vehicle has set for three hours or more, or driven less than one mile) should be checked monthly or before any extended trip. Set to the specifications on the tire placard located on the left door (right door for right-hand side steering vehicle) lock pillar.

It is normal for tire pressure to increase when the tires become hot during driving.

Do not bleed or reduce tire pressure after driving. Bleeding reduces the "Cold Inflation Pressure".

Higher than recommended pressure can cause:

1. Hard ride
2. Tire bruising or carcass damage
3. Rapid tread wear at center of tire

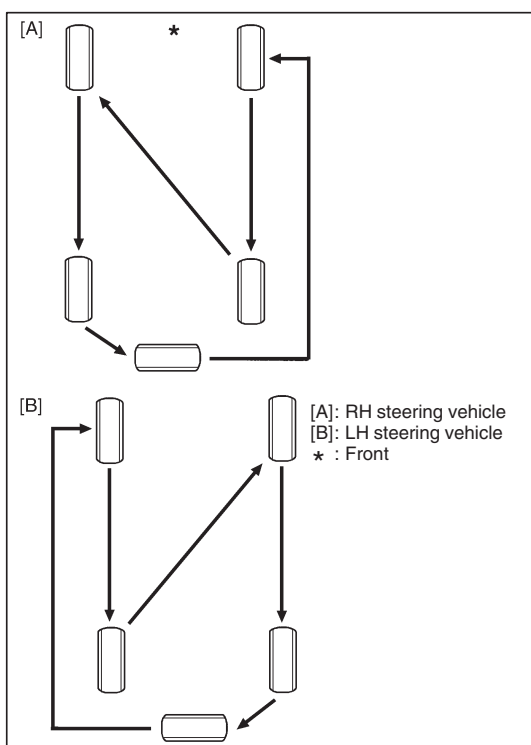
Unequal pressure on same axle can cause:

1. Uneven braking
2. Steering lead
3. Reduced handling
4. Swerve on acceleration

Lower than recommended pressure can cause:

1. Tire squeal on turns
2. Hard Steering
3. Rapid and uneven wear on the edges of the tread
4. Tire rim bruises and rupture
5. Tire cord breakage
6. High tire temperature
7. Reduced handling
8. High fuel consumption

Valve caps should be on the valves to keep dust and water out.



TIRE PLACARD

The tire placard is located on the left door (right door for right-hand side steering vehicle) lock pillar and should be referred to for tire information.

The placard lists the maximum load, tire size and cold tire pressure where applicable.

NOTE:

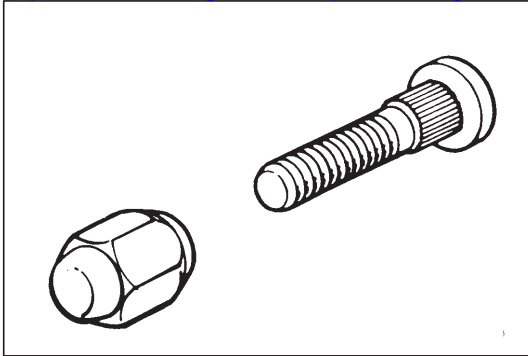
Whether rim size and/or maximum load are listed or not depends on regulations of each country.

TIRE ROTATION

To equalize wear, rotate tires according to left figure. Radial tires should be rotated periodically. Set tire pressure.

NOTE:

Due to their design, radial tires tend to wear faster in the shoulder area, particularly in front positions. This makes regular rotation especially necessary.

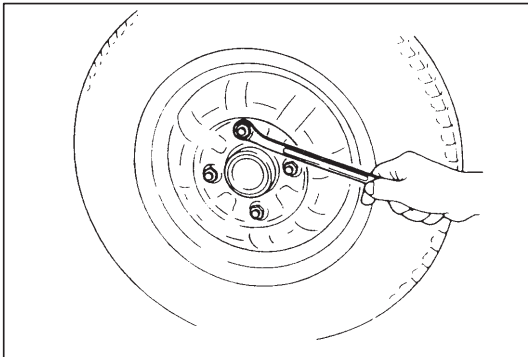


ON-VEHICLE SERVICE

SERVICE OPERATIONS

METRIC LUG NUTS AND WHEEL STUDS

All models use metric lug nuts and wheel studs (size: M12 x 1.25).

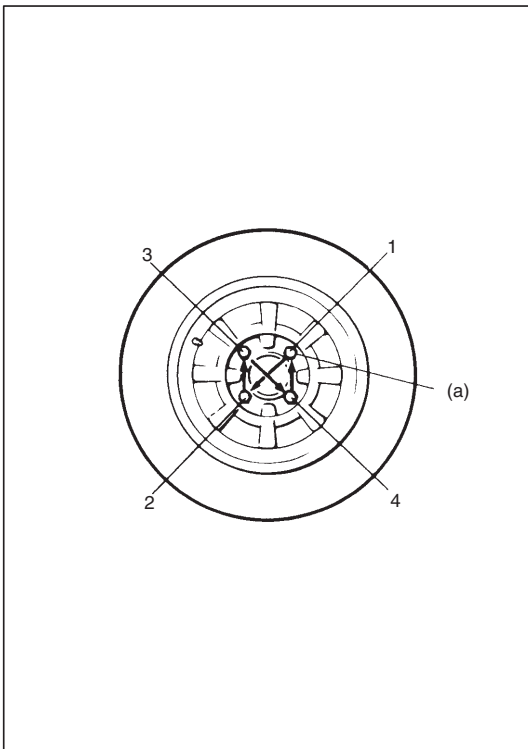


WHEEL REMOVAL

- 1) Loosen wheel nuts by approximately 180° (half a rotation).
- 2) Hoist vehicle.
- 3) Remove wheel.

CAUTION:

Never use heat to loosen tight wheel because application of heat to wheel can shorten life of wheel and damage wheel bearings.



Wheel nuts must be tightened in sequence and to proper torque to avoid bending wheel or brake disc, left figure.

NOTE:

Before installing wheels, remove any build-up of corrosion on wheel mounting surface and brake disc mounting surface by scraping and wire brushing. Installing wheels without good metal-to-metal contact at mounting surfaces can cause wheel nuts to loosen, which can later allow a wheel to come off while vehicle is moving.

Tightening Torque

(a): 85 N·m (8.5 kg·m, 61.5 lb·ft)

TIRE MOUNTING AND DISMOUNTING

Use a tire changing machine to mount or dismount tires. Follow equipment manufacturer's instructions. Do not use hand tools or tire irons alone to change tires as they may damage tire beads or wheel rim.

Rim bead seats should be cleaned with a wire brush or coarse steel wool to remove lubricants, old rubber and light rust. Before mounting or dismounting a tire, bead area should be well lubricated with approved tire lubricant.

After mounting, inflate to specified pressure shown on tire placard so that beads are completely seated.

WARNING:

Do not stand over tire when inflating. Bead may break when bead snaps over rim's safety hump and cause serious personal injury.

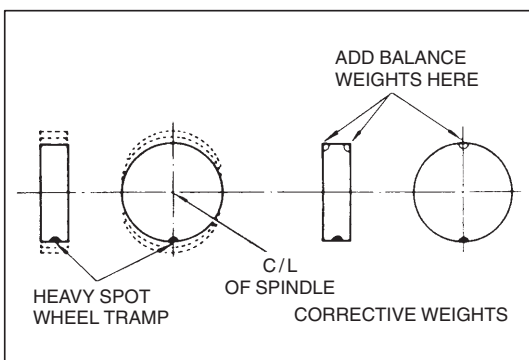
Do not exceed specified pressure when inflating. If specified pressure will not seat beads, deflate, re-lubricate and reinflate.

Over inflation may cause bead to break and cause serious personal injury.

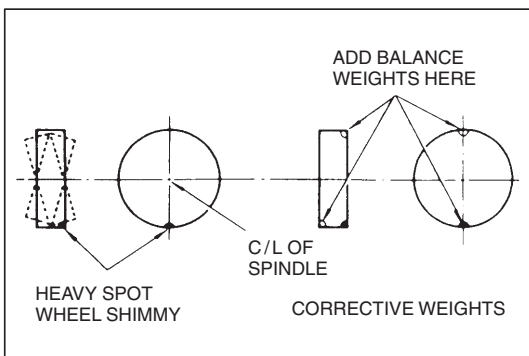
Install valve core and inflate to proper pressure.

TIRE REPAIR

There are many different materials and techniques on the market to repair tires. As not all of these work on all types of tires, tire manufacturers have published detailed instructions on how and when to repair tires. These instructions can be obtained from each tire manufacturer.

**BALANCING WHEELS**

There are two types of wheel and tire balance: static and dynamic. Static balance, as shown in left figure, is the equal distribution of weight around the wheel. Wheels that are statically unbalanced cause a bouncing action called tramp. This condition will eventually cause uneven tire wear.



Dynamic balance, as shown in left figure, is the equal distribution of weight on each side of the wheel centerline so that when the tire spins there is no tendency for the assembly to move from side to side. Wheels that are dynamically unbalanced may cause shimmy.

GENERAL BALANCE PROCEDURES

Deposits of mud, etc. must be cleaned from inside of rim.

WARNING:

Stones should be removed from the tread in order to avoid operator injury during spin balancing and to obtain good balance.

Each tire should be inspected for any damage, then balanced according to equipment manufacturer's recommendation.

OFF-VEHICLE BALANCING

Most electronic off-vehicle balancers are more accurate than the on-vehicle spin balancers. They are easy to use and give a dynamic (two plane) balance. Although they do not correct for drum or disc unbalance as does on-vehicle spin balancing, this is overcome by their accuracy, usually to within 1/8 ounce.

ON-VEHICLE BALANCING

On-vehicle balancing methods vary with equipment and tool manufacturers. Be sure to follow each manufacturer's instructions during balancing operation.

WARNING:

Wheel spin should be limited to 35 mph (55 km/h) as indicated on speedometer.

This limit is necessary because speedometer only indicates one-half of actual wheel speed when one drive wheel is spinning and the other drive wheel is stopped.

Unless care is taken in limiting drive wheel spin, spinning wheel can reach excessive speeds. This can result in possible tire disintegration or differential failure, which could cause serious personal injury or extensive vehicle damage.

TIGHTENING TORQUE SPECIFICATIONS

Fastening	Tightening torque		
	N·m	kg-m	lb-ft
Wheel nuts	85	8.5	61.5

SECTION 4**FRONT DRIVE SHAFT****CONTENTS**

GENERAL DESCRIPTION	4- 1
DIAGNOSIS	4- 1
ON-VEHICLE SERVICE	4- 2
Removal	4- 4
Inspection	4- 5
Disassembly	4- 5
Inspection	4- 8
Assembly	4- 8
Installation	4-12
REQUIRED SERVICE MATERIAL	4-13
SPECIAL TOOLS	4-13

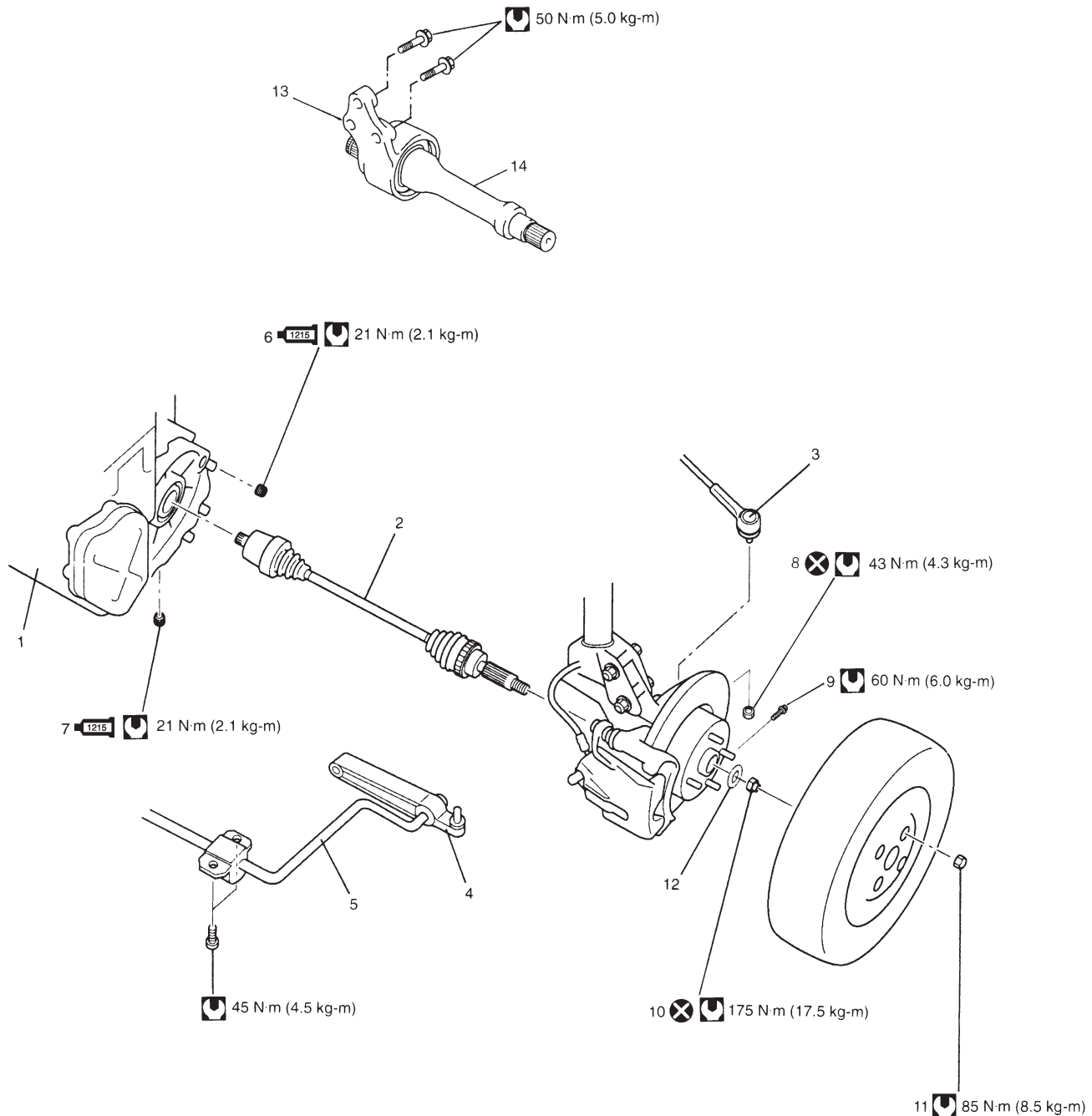
GENERAL DESCRIPTION

A constant velocity double offset joint (DOJ) is used on the differential side of the left side drive shaft assembly. A constant velocity tripod joint is used on the differential side or center shaft side of the right side drive shaft assembly.

A constant velocity ball joint is used on the wheel side of both right and left drive shaft assemblies. The drive shaft can slide through the tripod joint or DOJ in the extension/contraction direction.

DIAGNOSIS



Condition	Possible Cause	Correction
Abnormal Noise	<ul style="list-style-type: none"> • Worn or breakage drive shaft joint • Worn or breakage center bearing 	Replace. Replace.

ON-VEHICLE SERVICE**Removal & Installation**

1. Transmission
2. Drive shaft assembly
3. Tie-rod end
4. Suspension control arm
5. Stabilizer

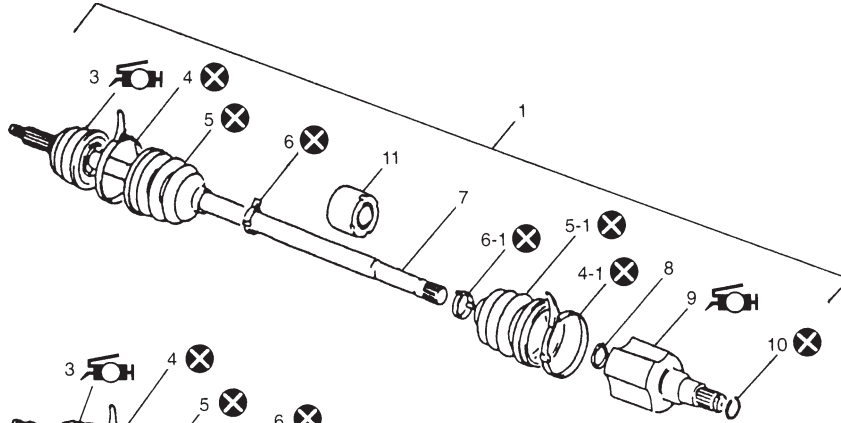
6. Oil filler/level plug:
Apply sealant 99000-31110 to plug thread.
7. Oil drain plug:
Apply sealant 99000-31110 to plug thread.

8. Tie-rod end nut
9. Ball stud bolt
10. Drive shaft nut
11. Wheel nut
12. Washer
13. Center bearing support
14. Center shaft

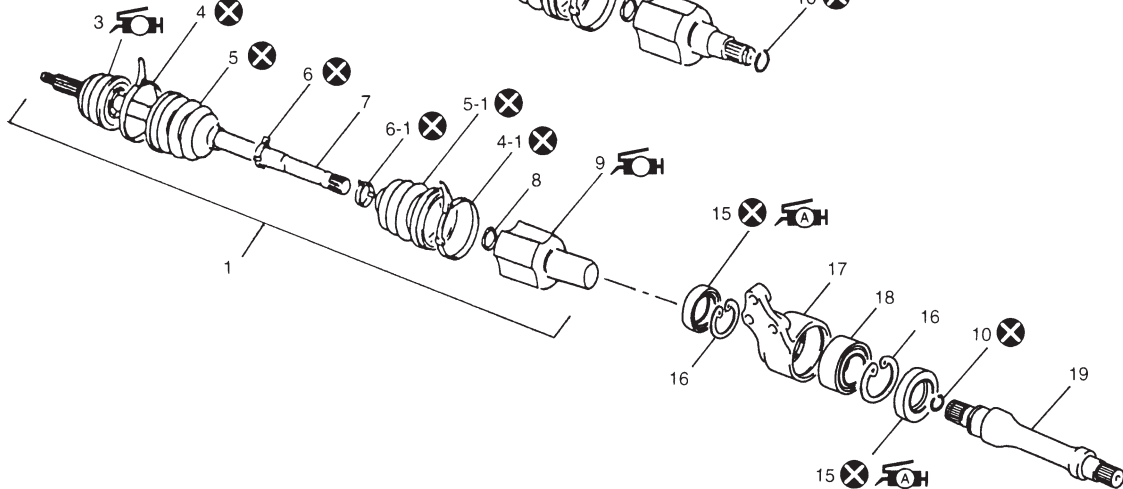
 : Tightening Torque
 : Do not reuse

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Disassembly & Reassembly

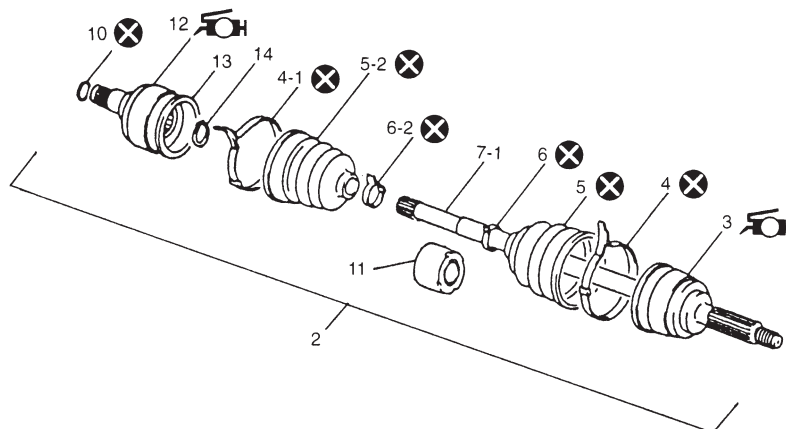
[A]



[B]



[C]



[A] : For M/T model

[B] : For A/T model

[C] : Both models



: Do not reuse

1. Right side drive shaft assembly
2. Left side drive shaft assembly
3. Wheel side joint (Constant velocity ball joint):
Apply HTBJ grease included in spare parts to ball joint.
4. Ball joint boot big band
- 4-1. Tripod joint & DOJ boot big band
5. Ball joint boot
- 5-1. Tripod joint boot
- 5-2. DOJ boot
6. Ball joint boot small band
- 6-1. Tripod joint boot small band
- 6-2. DOJ boot small band
7. Drive shaft for tripod
- 7-1. Drive shaft for DOJ
8. Snap ring



9. Differential (or center shaft) side joint
(Constant velocity tripod joint):
Apply GKN 1 LUBER C grease included in spare parts to tripod joint.

10. Snap ring



11. Damper (For M/T model only)
12. Differential side joint (Constant velocity DOJ):
Apply Thermax grease included in spare parts to DOJ

13. Snap ring

14. Retaining ring



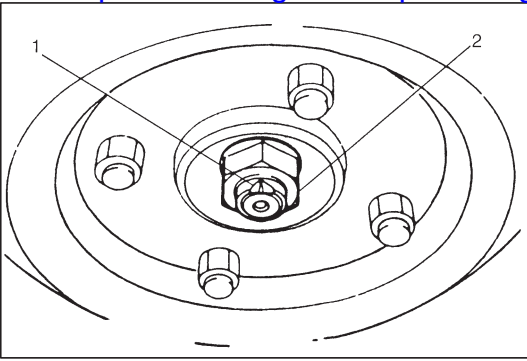
15. Oil seal:
Apply grease A 99000-25010 to oil seal lip and bearing side space.

16. Center bearing support circlip

17. Center bearing support

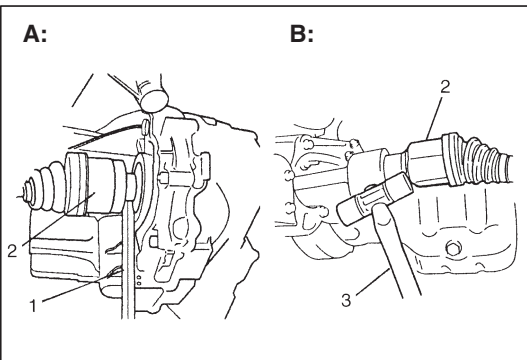
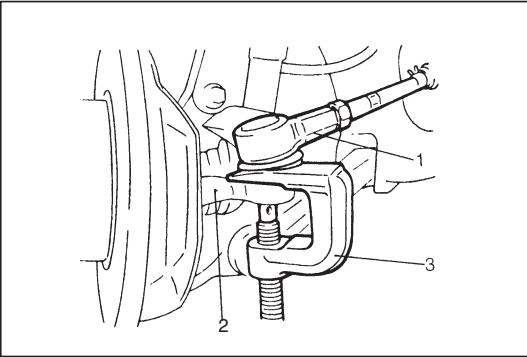
18. Center bearing

19. Center shaft

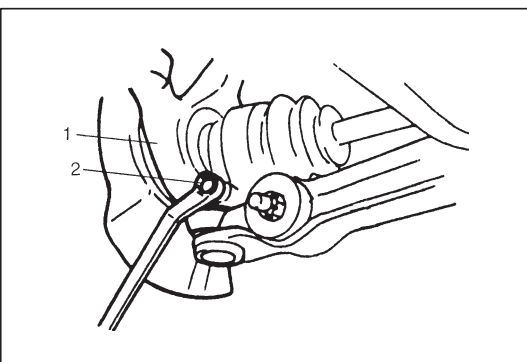
REMOVAL**CAUTION:**

To prevent breakage of boots, be careful not to bring them into contact with other parts when removing drive shaft assembly.

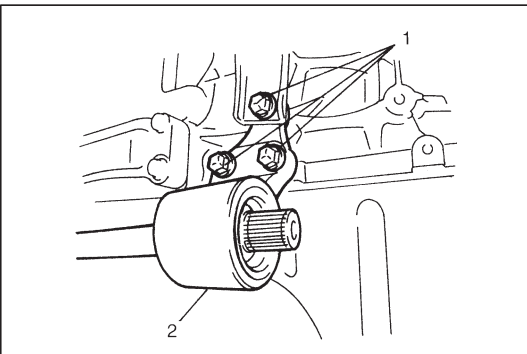
- 1) Undo caulking (1) and remove drive shaft nut (2).
- 2) Loosen wheel nuts.
- 3) Hoist vehicle.
- 4) Remove wheel.
- 5) Drain transmission oil.
- 6) Remove tie-rod end nut.
- 7) Disconnect tie-rod end (1) from steering knuckle (2) by using puller (3).



- 8) A: For vehicle without center shaft
Using tire lever (1), pull out drive shaft joint (2) so as to release snap ring fitting of joint spline at differential side.
- B: For vehicle with center shaft
Using plastic hammer (3), drive out drive shaft joint so as to release snap ring fitting of joint spline at center shaft.



- 9) Remove two stabilizer mount brackets from vehicle body.
- 10) Disconnect front suspension control arm ball joint stud from steering knuckle (1) by pushing down stabilizer bar after removing ball joint bolt (2).
- 11) Remove drive shaft assembly.



- 12) For vehicle with center shaft
Loosen intake manifold rear stiffener upper bolt.
- 13) For vehicle with center shaft
Remove center bearing support bolts (1) and remove center bearing support (2) with center shaft from differential side gear.

INSPECTION

- Check boots for breakage or deterioration.
- Check wheel side joint for rattle or smooth movement.
- Check differential side joint or center shaft side joint for smooth movement.

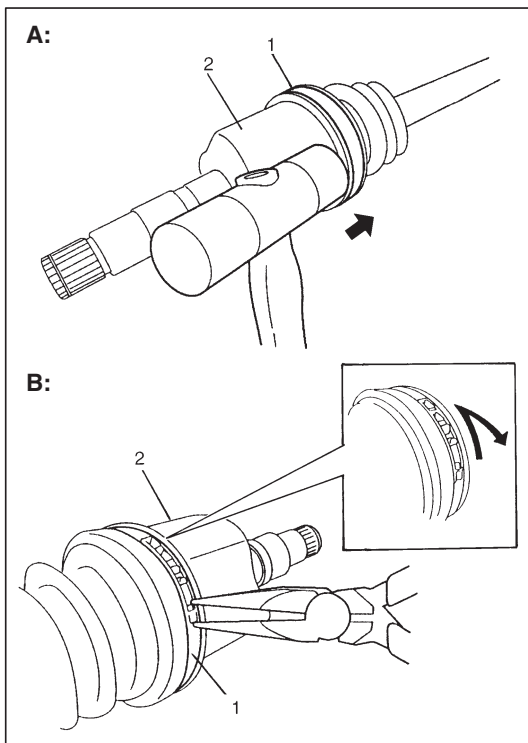
If malfunction is found, replace.

DISASSEMBLY

For Tripod joint type drive shaft (right side)

CAUTION:

- Disassembly of wheel side joint is not allowed. If noise or damage exists in it, replace it as assembly.
- Do not disassemble tripod joint spider. If any malfunction is found in it, replace it as differential side joint assembly.



- 1) Remove differential side boot big band (1) as follows.

A: For boot big band without joint

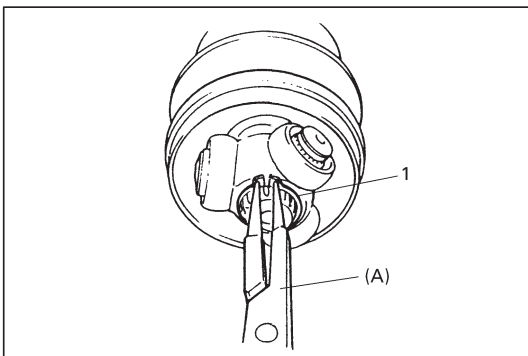
- a) Remove boot big band by tapping boot and band with plastic hammer.

If it is hard to remove boot big band, cut it using a nipper or a iron saw with care not to damage tripod joint housing.

B: For boot big band with joint

- a) Draw hooks of boot big band together and remove band.

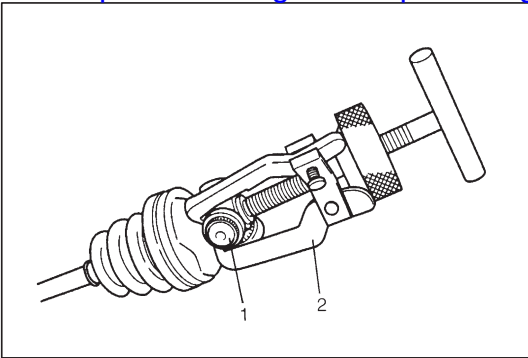
- 2) Take out tripod joint housing (2).



- 3) Remove grease from shaft and take off snap ring (1) by using special tool.

Special Tool

(A): 09900-06107



4) Remove spider (1) by using 3 arms puller (2).

CAUTION:

To prevent needle bearing of joint from being degreased, do not wash it if it is to be reused.

5) Remove boot small band, then pull out differential side boot from shaft.

6) Pull out damper through shaft. (For M/T model only)

7) Remove wheel side boot big band (1) as follows.

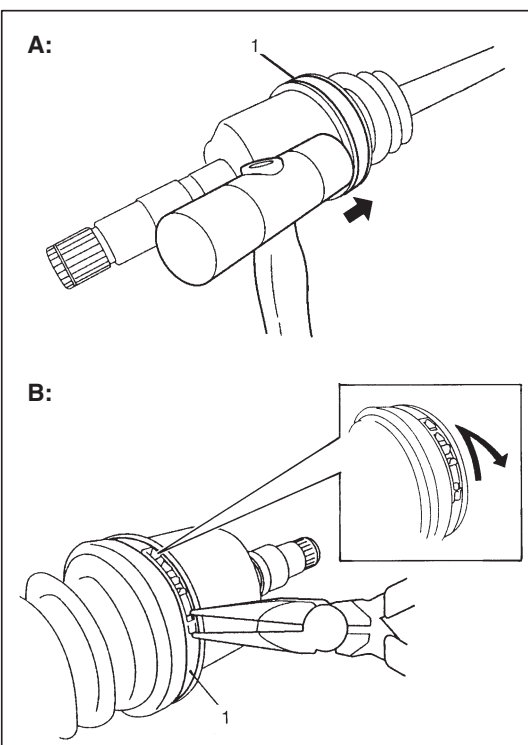
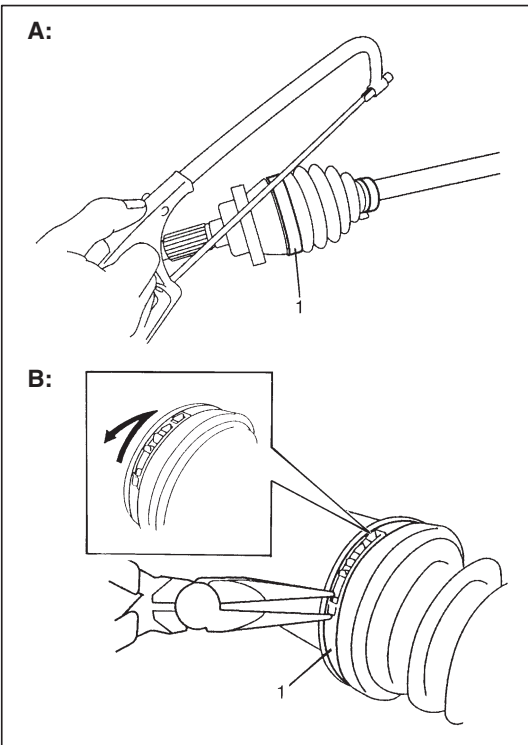
A: For boot big band without joint

a) Cut boot big band using a iron saw or a nipper with care not to damage wheel side joint housing.

B: For boot big band with joint

a) Draw hooks of boot big band together and remove band.

8) Remove wheel side small band, then pull out wheel side boot from shaft.



For DOJ type drive shaft (left side)

CAUTION:

Disassembly of wheel side joint is not allowed. If noise or damage exists in it, replace it as assembly.

1) Remove differential side boot big band (1) as follows.

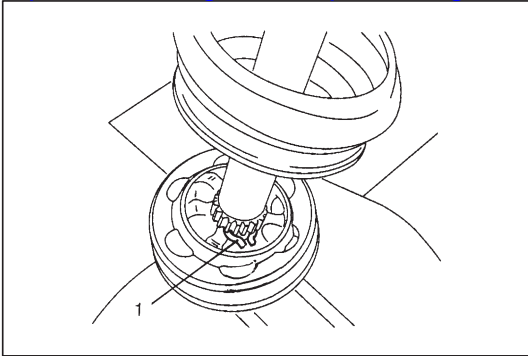
A: For boot big band without joint

a) Remove boot big band by tapping boot and band with plastic hammer.

If it is hard to remove boot big band, cut it using a nipper or a iron saw with care not to damage DOJ housing.

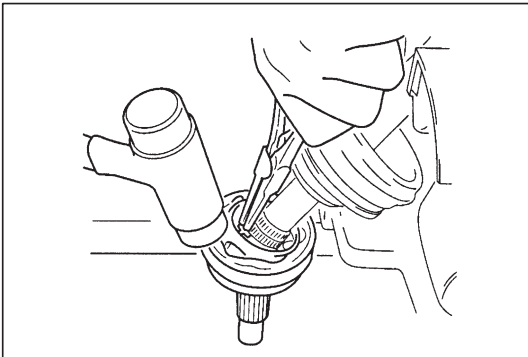
B: For boot big band with joint

a) Draw hooks of boot big band together and remove band.



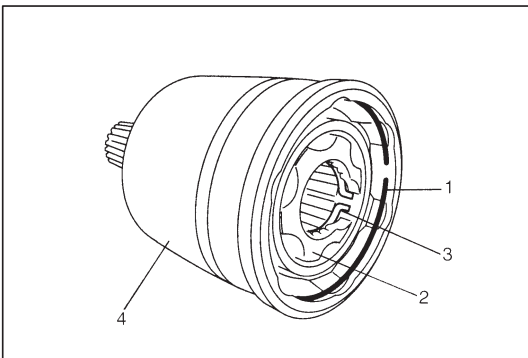
2) Remove DOJ from shaft as follows.

- a) Fold over boot and remove old grease so that retaining ring (1) is accessible.



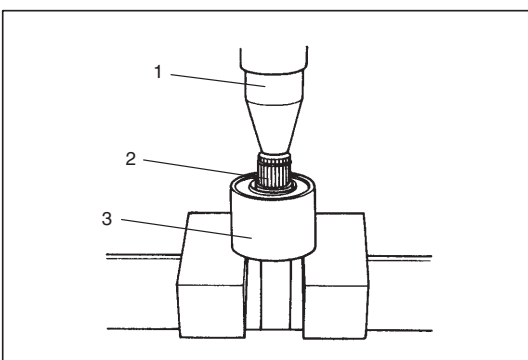
b) Clamp drive shaft in soft jawed vise.

Spread retaining ring using snap ring pliers (opening type) and tap DOJ of drive shaft using plastic hammer until retaining ring no longer engages in groove of shaft.



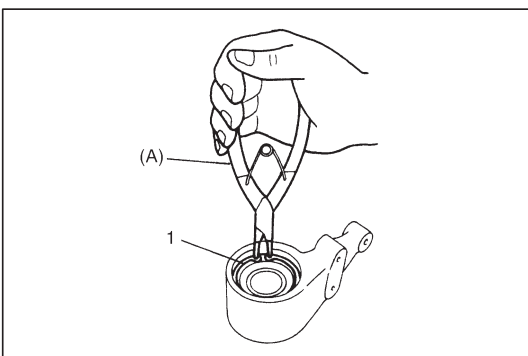
3) Remove snap ring (1) and then remove cage (2) with retaining ring (3) from housing (4) if necessary.

4) Remove differential side boot, damper and wheel side boot from shaft referring to steps 5), 6), 7) and 8) in disassembly for tripod joint type drive shaft.



For Center shaft and Center bearing support

- 1) Using hydraulic press (1), draw out center shaft (2) from center bearing.
- 2) Remove oil seals from center bearing support (3).



3) Remove bearing support circlips (1).

Special Tool

(A): 09900-06108

4) Remove center bearing from center bearing support.

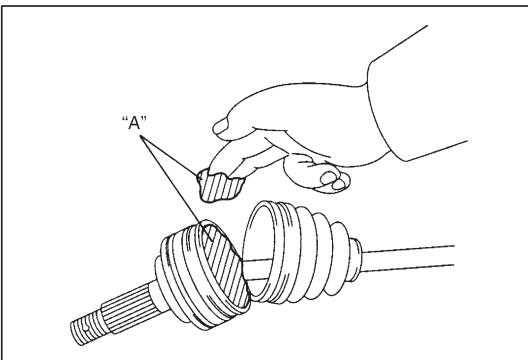
INSPECTION

- Check shaft and joint for damage, wear or bend.
Replace them as necessary.
- Check retaining ring and snap ring for breakage or deformation.
Replace as necessary.

ASSEMBLY

For Tripod joint type drive shaft (right side)

- 1) Wash disassembled parts (except boots and needle bearing of spider). After washing, dry parts completely by blowing air.
- 2) Clean boots with cloth. DO NOT wash boot in degreaser, such as gasoline or kerosene, etc. Washing in degreaser causes deterioration of boot.

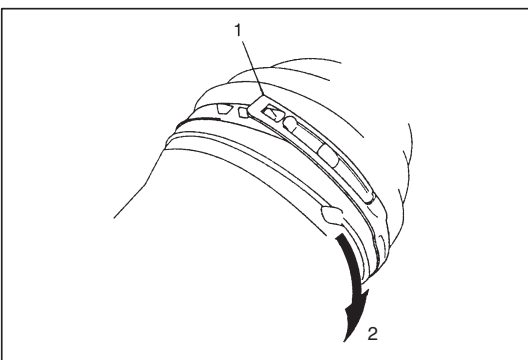


- 3) Install new wheel side boot on shaft temporarily.
- 4) Apply grease to wheel side joint. Use grease in tube included in wheel side boot set.

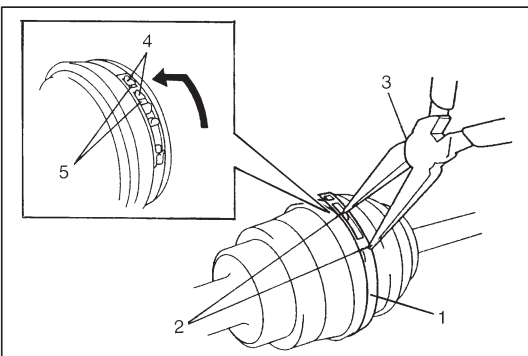
“A”: HTBJ (High Temperature Birfield Joint) grease/
Color: Black

Grease capacity: About 60 – 80 g (2.1 – 2.8 oz)

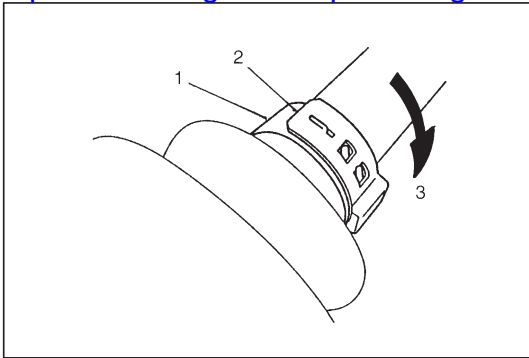
- 5) Fit wheel side boot onto grooves of housing and shaft.



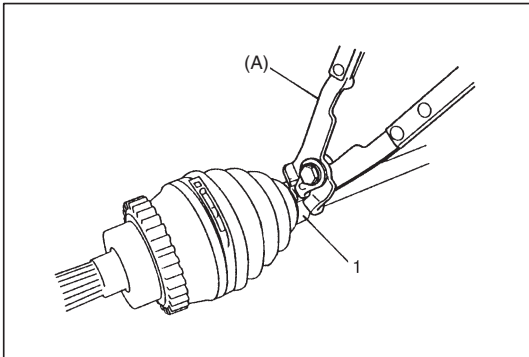
- 6) Place new wheel side big band (1) onto boot putting band outer end (1) against forward rotation (2) as shown in figure.



- 7) Fasten boot big band (1) by drawing hooks (2) with plier (3) and engage hooks (4) in slot and window (5).



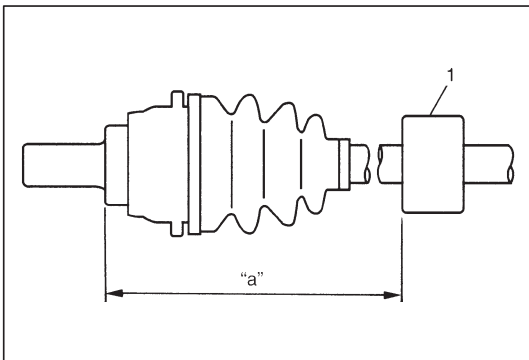
- 8) Place new wheel side boot (1) onto boot putting band outer end (2) against forward rotation (3) as shown in figure.



- 9) Confirm that wheel side boot is not stretched or contracted and fasten boot small band (1) securely at that position.

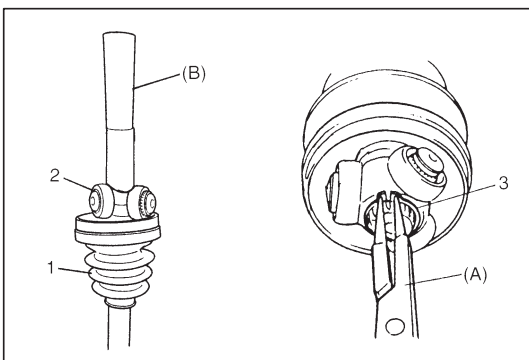
Special Tool

(A): 09943-55010



- 10) Install damper (1) on drive shaft according to dimension specified below. (For M/T model only)

Length "a": 347 – 353 mm (13.7 – 13.9 in.)



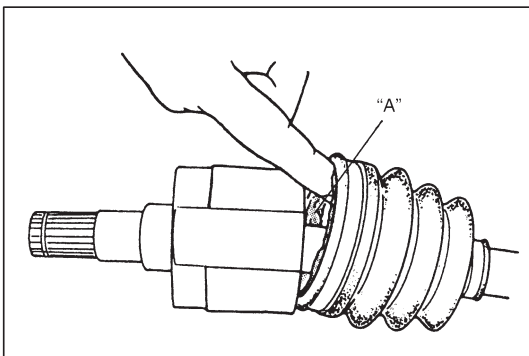
- 11) Set new differential side small band and differential side boot (1) on shaft temporarily.

- 12) Install tripod joint spider (2) on shaft by using special tool with hammer, facing its chamfered spline inward (wheel side), then fasten it with snap ring (3).

Special Tool

(A): 09900-06107

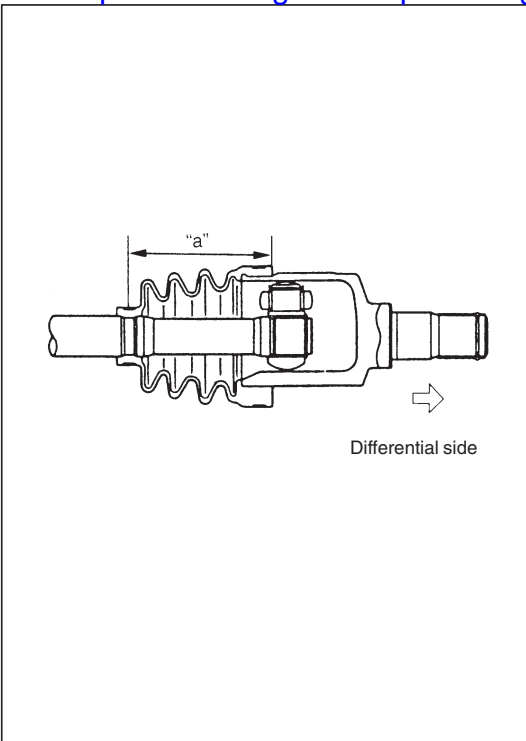
(B): 09925-98221



- 13) Apply grease to tripod joint and inside of housing then install housing. Use grease supplied with spare parts.

"A": GKN1 LUBER C grease/Color: Amber or brown & semi-opaque

Grease capacity: About 85 – 105 g (3.0 – 3.7 oz)



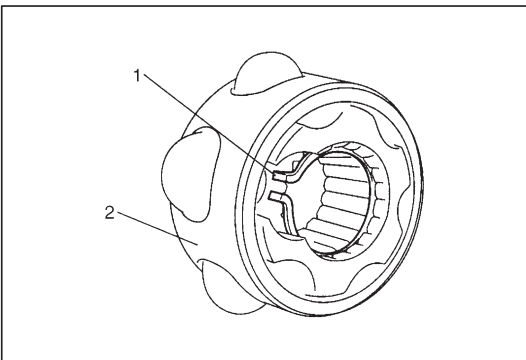
- 14) Fit boot to grooves of shaft and housing and adjust boot length to specification below. Insert screwdriver into boot and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

Length "a": 80 – 90 mm (3.15 – 3.54 in.)

CAUTION:

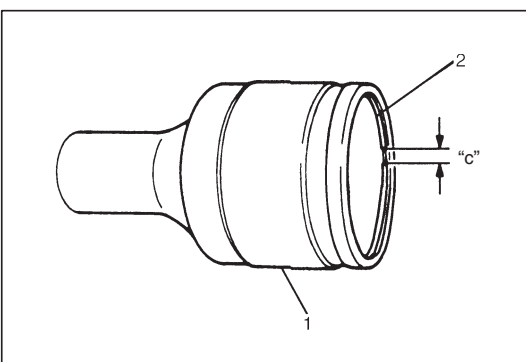
- To prevent any problem caused by washing solution, do not wash joint boots and tripod joint except its housing. Degreasing of those parts with cloth is allowed.
- Do not squeeze or distort boot when fastening it with bands. Distorted boot caused by squeezing air may reduce its durability.

- 15) Install and fasten new big and small bands at that position of step 14) in the same procedure as previous steps 6) to 9).



For DOJ type drive shaft (left side)

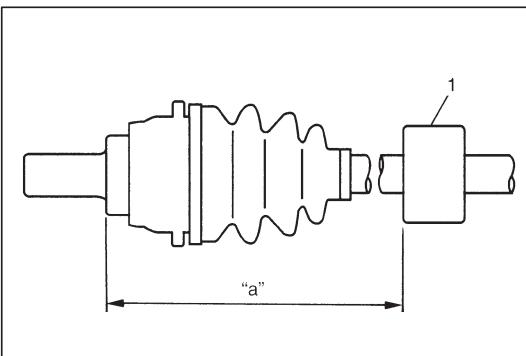
- 1) Wash disassembled parts (except boots). After washing, dry parts completely by blowing air.
- 2) Clean boots with cloth. Do not wash boots in degreaser, such as gasoline or kerosene, etc.
Washing in degreaser causes deterioration of boot.
- 3) Install retaining ring (1) to cage (2).



- 4) Insert cage into housing (1) and fit snap ring (2) into groove of housing.

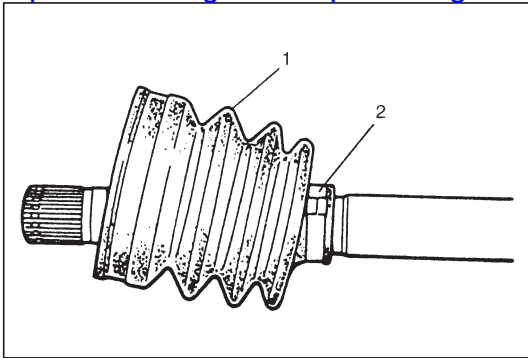
CAUTION:

Position opening of snap ring "c" so that it will not be lined up with a ball.

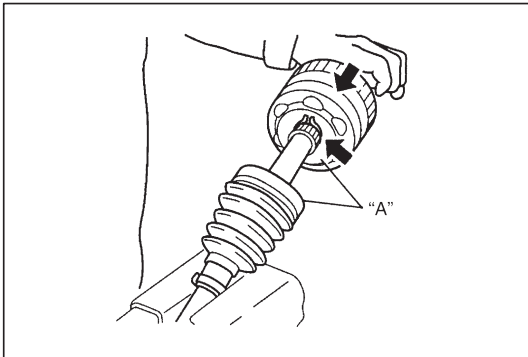


- 5) Install new wheel side boot on shaft according to steps 3) to 9) for Tripod Joint Type Drive Shaft Assembly.
- 6) Install damper (1) on drive shaft according to dimension specified below. (For M/T model only)

Length "a": 134 – 140 mm (5.3 – 5.5 in.)



- 7) Set new differential side small band (2) and differential side boot (1) on shaft temporarily.

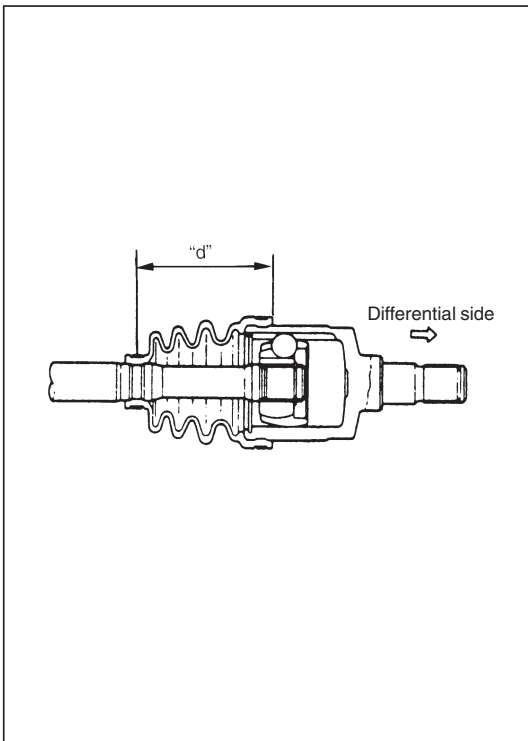


- 8) Apply grease to DOJ and inside of housing.
Use grease supplied with spare parts.

“A”: Thermax grease/Color: Black

Grease capacity: About 50 – 70 g (1.8 – 2.5 oz)

- 9) Place DOJ onto spline of drive shaft and drive onto drive shaft by using plastic hammer until retaining ring engages.



- 10) Fit boot to grooves of shaft and housing and adjust length “d” to specification below.

Insert screwdriver into boot and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

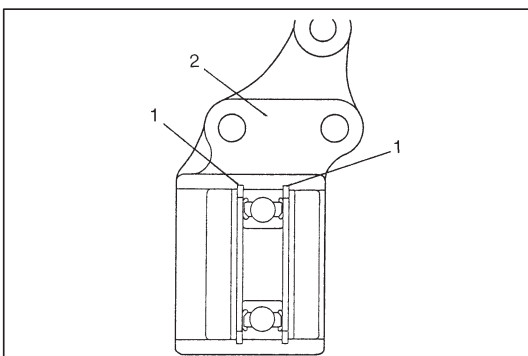
Length “d”: 80 – 90 mm (3.15 – 3.54 in.)

CAUTION:

- To prevent any problem caused by washing solution, do not wash joint boots. Degreasing of those parts with cloth is allowed.
- Do not squeeze or distort boot when fastening it with bands.

Distorted boot caused by squeezing air may reduce its durability.

- 11) Install and fasten new big and small bands at that position of step 10) in the same procedure as steps 6) to 9) of Tripod Joint Type Drive Shaft Assembly.

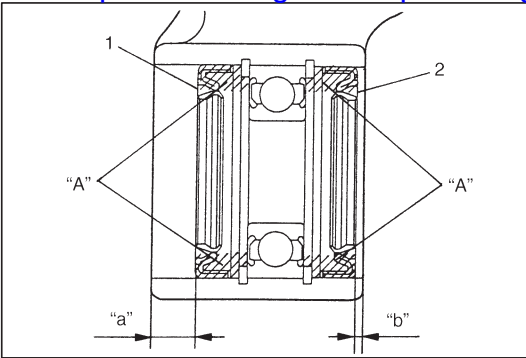


For Center shaft and Center bearing support

Install center shaft by reversing removal procedure and noting following points

- When installing bearing support circlip (1), make sure that it fits in circlip groove in center bearing support (2) securely as shown.

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- When installing left oil seal (1) and right oil seal (2), use care so that oil seals in proper direction and position as shown figure.

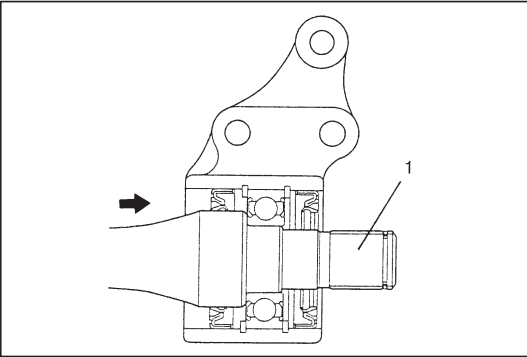
Distance “a”: 11 – 12 mm (0.43 – 0.47 in.)

“b”: 2 – 3 mm (0.08 – 0.12 in.)

- Be sure to apply grease to oil seal lip and bearing side space indicated in figure.

“A”: Grease 99000-25010

- Press-fit center shaft (1) from left oil seal side.



INSTALLATION

CAUTION:

- To avoid excessive expansion of boot and consequential disconnection of joint in boot, do not pull tripod joint housing.
- Protect oil seals and boots from any damage, preventing them from unnecessary contact while installing drive shaft.
- Do not hit joint boot with hammer. Inserting joint only by hands is allowed.
- Make sure that differential side joint is inserted fully and its snap ring is seated as it was.

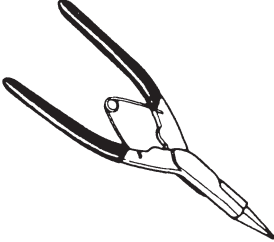
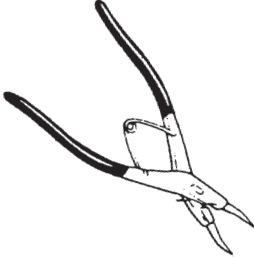
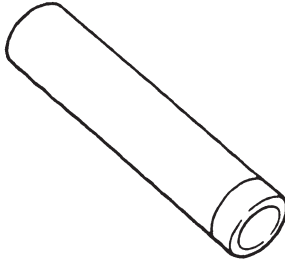
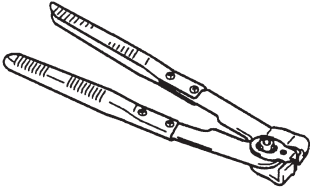
Install drive shaft assembly by reversing removal procedure and noting the following points.

- Install wheel side joint to steering knuckle first and then differential side joint to transmission or center shaft.
- Tighten each bolt and nut to the specified torque.
Refer to figure of the beginning of ON-VEHICLE SERVICE for specified tightening torque.
- Apply sealant to drain plug for manual transmission.
- Fill transmission with oil as specified. (Refer to SECTION 7A.)
- For automatic transmission, carry out full step of fluid level check procedure i.e. LEVEL CHECK, referring to Section 7B.
- Check toe seating and adjust as required.

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	Oil drain and filler/level plugs for manual transmission
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Center bearing side space of oil seal

SPECIAL TOOLS

 <p>09900-06107 Snap ring pliers (Open type)</p>	 <p>09900-06108 Snap ring pliers (Closing type)</p>	 <p>09925-98221 Bearing installer</p>	 <p>09943-55010 (J-22610) Boot clamp plier</p>
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SECTION 5

BRAKES

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

- When inspecting and servicing vehicle equipped with ABS, be sure to refer to section 5E1 first.
- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

DIAGNOSIS	5-3
BRAKE PIPE/HOSE/MASTER CYLINDER	5A-1
FRONT BRAKE	5B-1
PARKING AND REAR BRAKE	5C-1

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GENERAL DESCRIPTION

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and four in rear).

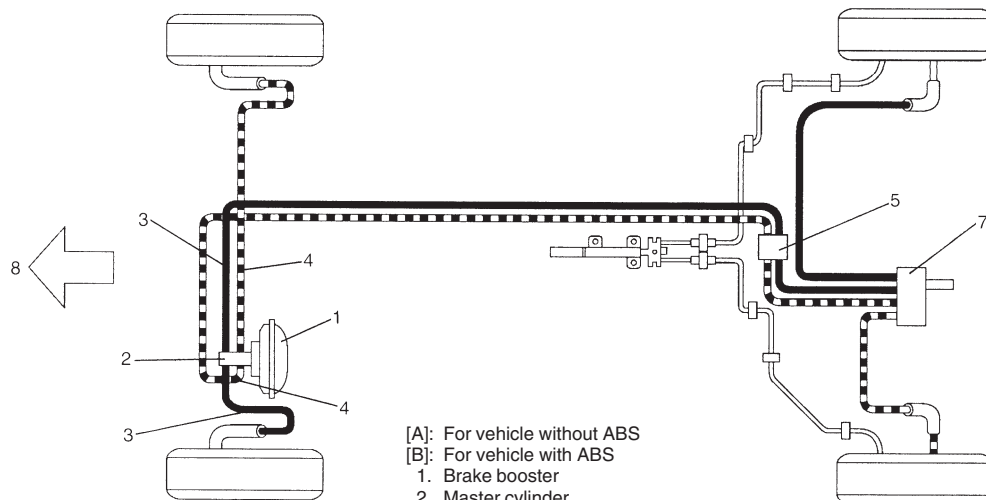
The master cylinder is a tandem master cylinder. Brake pipes are connected to the master cylinder and they make two independent circuits. One connects front right & rear left brakes and the other connects front left & rear right brakes.

The load sensing proportioning valve (LSPV) is included in these circuits between the master cylinder and the rear brake for the vehicle without ABS.

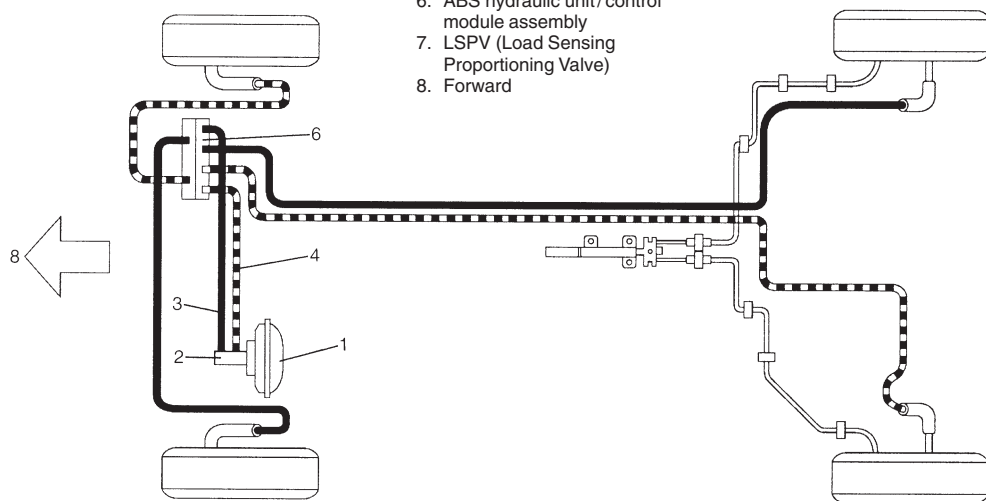
In this brake system, the disc brake type is used for the front wheel brake and a drum brake type (leading/trailing shoes) for the rear brake.

The parking brake system is mechanical. It applies brake force to only rear wheels by means of the cable and mechanical linkage system. The same brake shoes are used for both parking and foot brakes.

[A]



[B]



NOTE:

The above figures show left-hand steering vehicle.

The figure for right-hand steering vehicle should be symmetrical.

DIAGNOSIS

ROAD TESTING BRAKES

Brakes should be tested on dry, clean, smooth and reasonably level roadway which is not crowned. Road test brakes by making brake applications with both light and heavy pedal forces at various speeds to determine if the vehicle stops evenly and effectively.

Also drive vehicle to see if it leads to one side or the other without brake application. If it does, check the tire pressure, front end alignment and front suspension attachments for looseness. See diagnosis table for other causes.

BRAKE FLUID LEAKS

Check the master cylinder fluid levels. While a slight drop in reservoir level does result from normal lining wear, an abnormally low level indicates a leak in the system. In such a case, check the entire brake system for leakage. If even a slight evidence of leakage is noted, the cause should be corrected or defective parts should be replaced.

If fluid level is lower than the minimum level of reservoir, refilling is necessary. Fill reservoir with specified brake fluid.

Brake fluid: Refer to reservoir tank cap.

CAUTION:

Since brake system of this vehicle is factory-filled with brake fluid indicated on reservoir tank cap, do not use or mix different type of fluid when refilling; otherwise serious damage will occur.

Do not use old or used brake fluid, or any fluid from a unsealed container.

SUBSTANDARD OR CONTAMINATED BRAKE FLUID

Improper brake fluid, mineral oil or water in the fluid may cause the brake fluid to boil or the rubber components in the hydraulic system to deteriorate.

If deterioration of rubber is evident, disassemble all hydraulic parts and wash with alcohol. Dry these parts with compressed air before assembly to keep alcohol out of the system. Replace all rubber parts in the system, including hoses. Also, when working on the brake mechanisms, check for fluid on the linings. If excessive fluid is found, replace the linings.

The system must be flushed if there is any doubt as to the grade of fluid in the system or if fluid has been used which contained parts that have been subjected to contaminated fluid.

DIAGNOSIS TABLE

Condition	Possible Cause	Correction
Not enough braking force	<ul style="list-style-type: none"> ● Brake oil leakage from brake lines. ● Brake disc or pads stained with oil. ● Overheated brakes. ● Poor contact of shoes on brake drum. ● Brake shoes linings stained with oil or wet with water. ● Badly worn brake shoe linings. ● Defective wheel cylinders. ● Malfunctioning caliper assembly. ● Air in system. ● Maladjusted sensor spring length of LSPV if equipped. ● Broken sensor spring of LSPV if equipped. ● Defective LSPV if equipped. ● Malfunctioning ABS (Antilock brake system), if equipped. 	<p>Locate leaking point and repair. Clean or replace. Determine cause and repair. Repair for proper contact. Replace.</p> <p>Replace. Repair or replace. Repair or replace. Bleed system. Check or adjust.</p> <p>Replace. Replace. Check system and replace as necessary.</p>
Brake pull (Brakes not working in unison)	<ul style="list-style-type: none"> ● Pad or shoe linings are wet with water or stained with oil in some brakes. ● Drum-to-shoe clearance out of adjustment in some brakes. (Malfunctioning auto adjusting mechanism). ● Drum is out of round in some brakes. ● Wheel tires are inflated unequally. ● Malfunctioning wheel cylinders. ● Disturbed front end alignment. ● Unmatched tires on same axle. ● Restricted brake pipes or hoses. ● Malfunctioning caliper assembly. ● Loose suspension parts. ● Loose calipers. 	<p>Replace.</p> <p>Check for inoperative auto adjusting mechanism.</p> <p>Replace. Inflate equally. Repair or replace. Adjust as prescribed. Tires with approximately the same amount of tread should be used on the same axle. Check for soft hoses and damaged lines. Replace with new hoses and new brake pipes. Check for stuck or sluggish pistons and proper lubrication of caliper slide bush. Caliper should slide. Check all suspension mountings. Check and torque bolts to specifications.</p>
Noise (high pitched squeak without brake applied)	<ul style="list-style-type: none"> ● Front lining worn out. 	Replace linings.
Rear brake locked prematurely	<ul style="list-style-type: none"> ● Maladjusted sensor spring length of LSPV if equipped. ● Malfunction LSPV assembly if equipped. 	<p>Check or adjust.</p> <p>Replace assembly.</p>
Brake locked (For vehicles equipped with ABS)	<ul style="list-style-type: none"> ● Malfunctioning ABS, if equipped. 	Check system and replace as necessary.

Condition	Possible Cause	Correction
Excessive pedal travel (Pedal stroke too large)	<ul style="list-style-type: none"> ● Partial brake system failure. ● Insufficient fluid in master cylinder reservoirs. ● Air in system. (pedal soft/spongy) ● Rear brake system not adjusted (malfunctioning auto adjusting mechanism). ● Bent brake shoes. ● Worn rear brake shoes. 	<p>Check brake systems and repair as necessary.</p> <p>Fill reservoirs with approved brake fluid.</p> <p>Check for leaks and air in brake systems.</p> <p>Check warning light. Bleed system if required.</p> <p>Bleed system.</p> <p>Repair auto adjusting mechanism.</p> <p>Adjust rear brakes.</p> <p>Replace brake shoes.</p> <p>Replace brake shoes.</p>
Dragging brakes (A very light drag is present in all disc brakes immediately after pedal is released)	<ul style="list-style-type: none"> ● Master cylinder pistons not returning correctly. ● Restricted brake pipes or hoses. ● Incorrect parking brake adjustment on rear brakes. ● Weakened or broken return springs in the brake. ● Sluggish parking-brake cables. ● Wheel cylinder or caliper piston sticking. ● Malfunctioning ABS, if equipped with ABS. 	<p>Replace master cylinder.</p> <p>Check for soft hoses or damaged pipes and replace with new hoses and/or new brake pipes.</p> <p>Check and adjust to correct specifications.</p> <p>Replace.</p> <p>Repair or replace.</p> <p>Repair as necessary.</p> <p>Check system and replace as necessary.</p>
Pedal pulsation (Pedal pulsates when depressed for braking)	<ul style="list-style-type: none"> ● Damaged or loose wheel bearings. ● Distorted steering knuckle or rear wheel spindle. ● Excessive disc lateral runout. ● Parallelism not within specifications. ● Rear drums out of round. 	<p>Replace wheel bearings.</p> <p>Replace knuckle or rear wheel spindle.</p> <p>Check per instructions. If not within specifications, replace or machine the disc.</p> <p>Check per instructions. If not with specifications, replace or machine the disc.</p> <p>Check runout.</p> <p>Repair or replace drum as necessary.</p>
<p>NOTE:</p> <p>For vehicle equipped with ABS, pulsation of fluid pressure may be felt through brake pedal while ABS is being operated. But it does not indicate any abnormality.</p>		
Braking noise	<ul style="list-style-type: none"> ● Glazed shoe linings, or foreign matters stuck to linings. ● Worn or distorted shoe linings. ● Loose front wheel bearings. ● Distorted backing plates or loose mounting bolts. 	<p>Repair or replace shoe linings.</p> <p>Replace shoe linings (or pads).</p> <p>Replace wheel bearings.</p> <p>Replace or retighten securing bolts.</p>

Condition	Possible Cause	Correction
Brake warning light turns on after engine start	<ul style="list-style-type: none"> ● Parking brake applied. ● Insufficient amount of brake fluid. ● Brake fluid leaking from brake line. ● Brake warning light circuit faulty. ● Malfunctioning ABS, if equipped with ABS. 	Release parking brake and check that brake warning light turns off. Add brake fluid. Investigate leaky point, correct it and add brake fluid. Refer to "DIAGNOSIS" of ABS section. Check system referring to "DIAGNOSIS" of ABS section.
Brake warning light turns on when brake is applied	<ul style="list-style-type: none"> ● Brake fluid leaking from brake line. ● Insufficient amount of brake fluid. 	Investigate leaky point, correct it and add brake fluid. Add brake fluid.
Brake warning light fails to turn on even when parking brake is applied	<ul style="list-style-type: none"> ● Bulb burnt out. ● Brake warning light circuit open. 	Replace bulb. Repair circuit.
ABS warning light does not turn on for 2 sec. after ignition switch has turned ON.	<ul style="list-style-type: none"> ● Bulb burnt out. ● ABS warning light circuit open, if equipped with ABS. (including check relay) 	Replace bulb. Check system referring to "DIAGNOSIS" of ABS section.
ABS warning light remains on after ignition switch has turned on for 2 sec.	<ul style="list-style-type: none"> ● Malfunctioning ABS, if equipped with ABS. 	Check system referring to "DIAGNOSIS" of ABS section.

CHECK AND ADJUSTMENT

BLEEDING BRAKES

CAUTION:

Brake fluid is extremely damaging to paint. If fluid should accidentally touch painted surface, immediately wipe fluid from paint and clean painted surface.

NOTE:

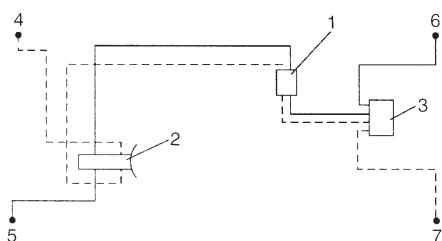
For vehicle equipped with ABS, make sure that ignition switch turns off.

Hydraulic lines of brake system are based on the diagonal split system. When a brake pipe or hose was disconnected at the wheel, bleeding operation must be performed at both ends of the line of the removed pipe or hose. When any joint part of the master cylinder or other joint part between the master cylinder and each brake (wheel) was removed, the hydraulic brake system must be bled at all 4 wheel brakes.

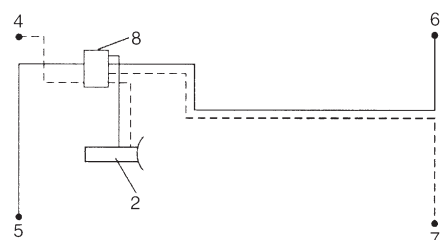
NOTE:

Perform bleeding operation starting with wheel cylinder farthest from master cylinder and then at front caliper of the same brake line. Do the same on the other brake line.

[A]



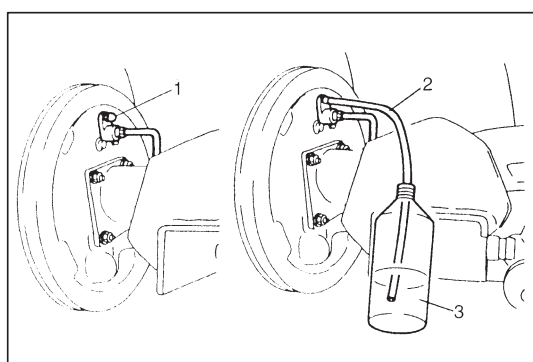
[B]



[A]: Without ABS

[B]: With ABS

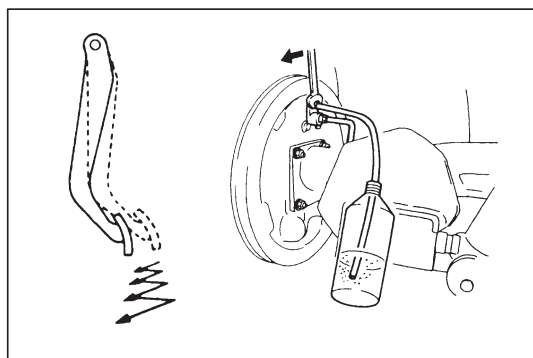
- 1. 4-way joint
- 2. Master cylinder
- 3. LSPV
- 4. Right brake caliper
- 5. Left brake caliper
- 6. Right wheel cylinder
- 7. Left wheel cylinder
- 8. ABS hydraulic unit
- : Air bleeding point



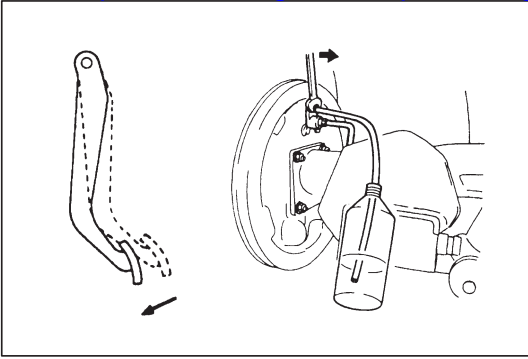
1) Fill master cylinder reservoir with brake fluid and keep at least one-half full of fluid during bleeding operation.

2) Remove bleeder plug cap (1).

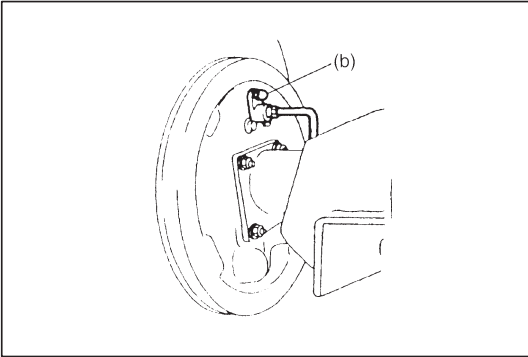
Attach a vinyl tube (2) to bleeder plug of wheel cylinder, and insert the other end into container (3).



3) Depress brake pedal several times, and then while holding it depressed, loosen bleeder plug about one-third to one half turn.



- 4) When fluid pressure in the cylinder is almost depleted, retighten bleeder plug.

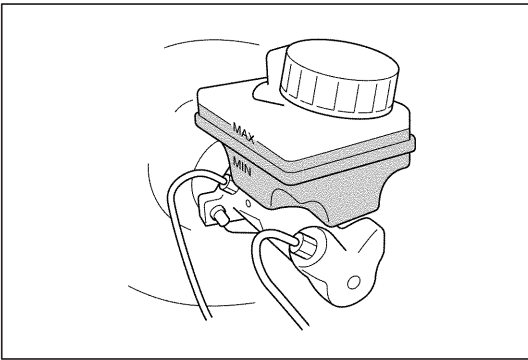


- 5) Repeat this operation until there are no more air bubbles in hydraulic line.
6) When bubbles stop, with depressing brake pedal, tighten bleeder plug.

Tightening Torque

(b): 8.5 N·m (0.85 kg-m, 6.5 lb-ft) for rear brake
6.5 N·m (0.65 kg-m, 5.0 lb-ft) for front brake

- 7) Then attach bleeder plug cap.



- 8) After completing bleeding operation, apply fluid pressure to pipe line and check for leakage.
9) Replenish fluid into reservoir up to specified level.
10) Check brake pedal for "sponginess". If found spongy, repeat entire procedure of bleeding.

BRAKE PEDAL FREE HEIGHT CHECK

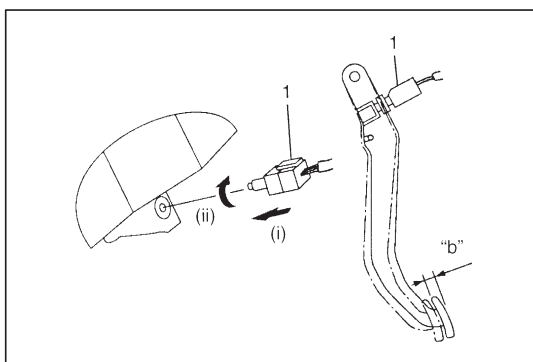
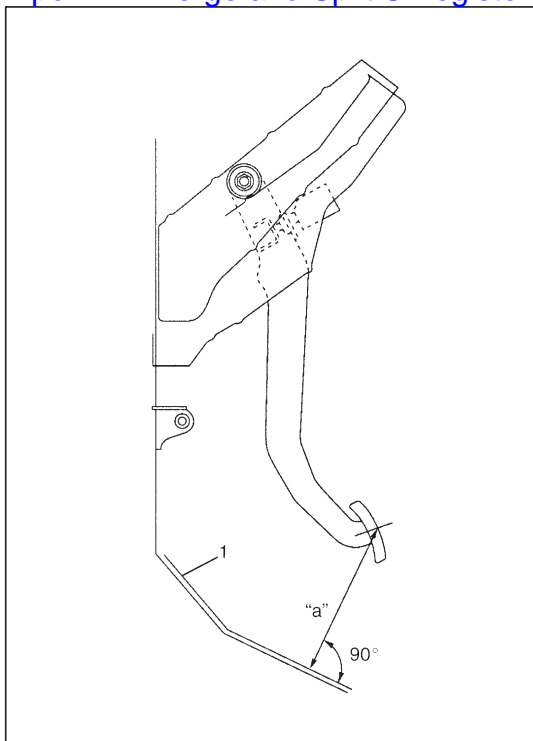
Peel off carpet and check brake pedal for free height.

Brake pedal free height "a"

from silencer (1) : 150 – 160 mm (5.9 – 6.3 in.)

If it is not within specification, check and adjust the following items 1) to 4).

- 1) Check brake pedal for dent.
- 2) Check that brake booster is installed securely.
- 3) Check stop light switch position referring to BRAKE LIGHT SWITCH CHECK below.
- 4) Check measurement between booster mounting surface and center of clevis pin hole referring to BRAKE BOOSTER INSPECTION in section 5A.

**BRAKE (STOP) LIGHT SWITCH CHECK**

- 1) Check that stop light lights when brake pedal is depressed the specified distance.

Distance "b": 10 – 20 mm (0.4 – 0.8 in.)

If check result is not as specified, adjust stop light switch (1) position so that stop light lights when brake pedal is depressed the specified distance.

- 2) Check that stop light is turned off when brake pedal released.

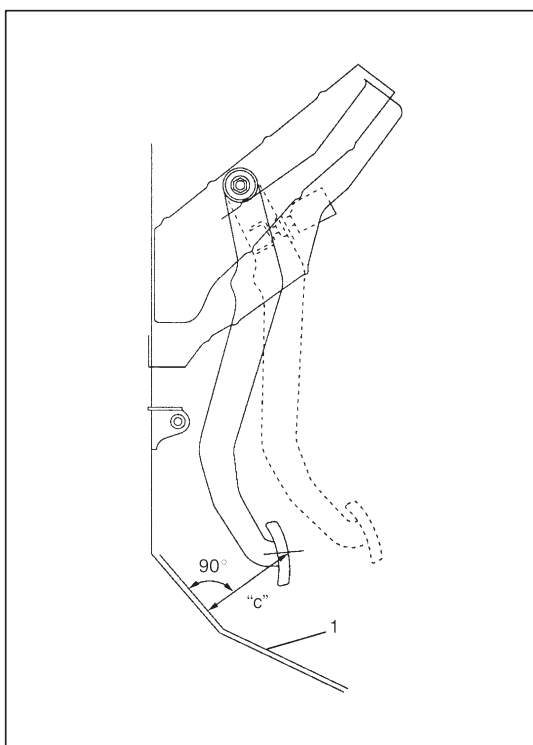
EXCESSIVE PEDAL TRAVEL CHECK

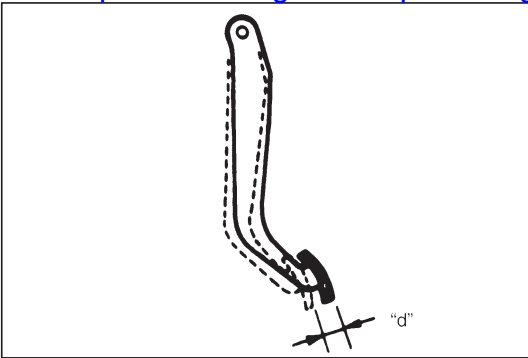
- 1) Peel off carpet and start engine.
- 2) Depress brake pedal a few times.
- 3) With brake pedal depressed with approximately 30 kg (66 lbs) load, measure pedal to silencer (1) clearance "c".

Clearance "c": over 100 mm (3.94 in.)

- 4) If clearance "c" is less than 100 mm (3.94 in.), the most possible cause is either rear brake shoes are worn out beyond limit or air is in lines.

Should clearance "c" remain less than 100 mm (3.94 in.) even after replacement of brake shoes and bleeding of system, troubleshoot brake system.



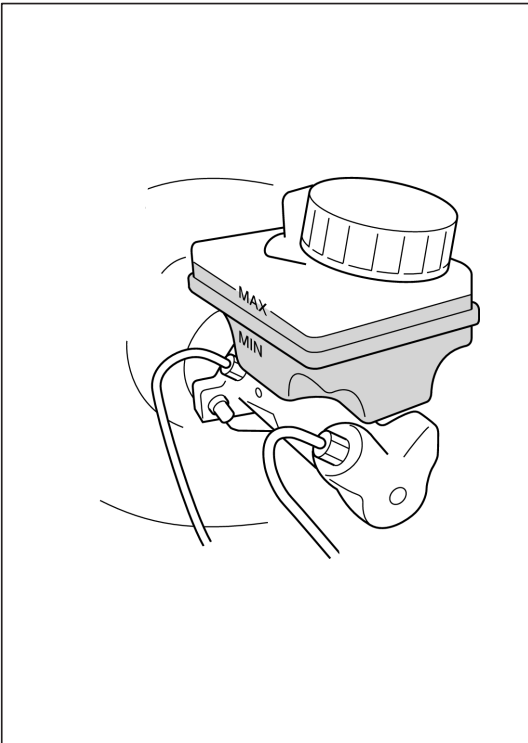


BRAKE PEDAL PLAY CHECK

Pedal play should be within specification. If out of specification, check brake light switch for proper installation position and adjust if necessary.

Also check pedal shaft bolt and master cylinder pin installation for looseness and replace if defective.

Pedal play "d": 1 – 8 mm (0.04 – 0.32 in.)



BRAKE FLUID LEVEL CHECK

Be sure to use particular brake fluid either as indicated on reservoir cap of that vehicle or recommended in owner's manual which comes along with that vehicle.

Use of any other fluid is strictly prohibited.

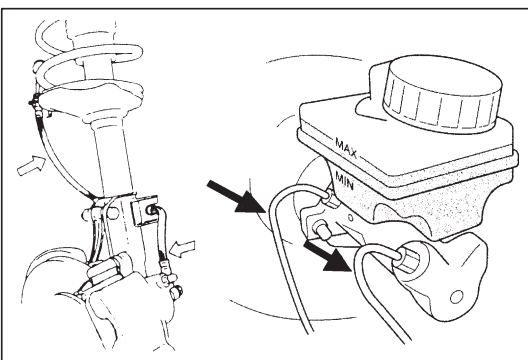
Fluid level should be between MIN and MAX lines marked on reservoir.

When warning light lights sometimes during driving, replenish fluid to MAX line.

When fluid decreases quickly, inspect brake system for leakage. Correct leaky points and then refill to specified level.

CAUTION:

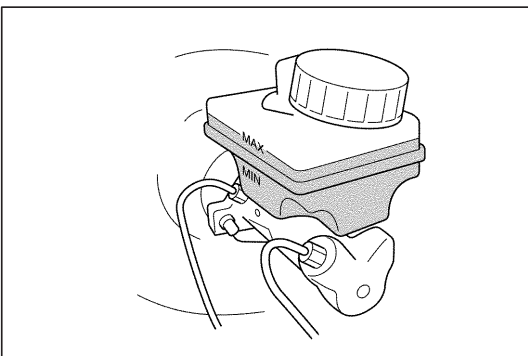
Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use a container which has been used for mineral oil or a container which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in hydraulic brake system and water mixed into brake fluid will lower fluid boiling point. Keep all fluid containers capped to prevent contamination.



BRAKE HOSE AND PIPE CHECK

The brake hose assembly should be checked for road hazard damage, for cracks and chafing of the outer cover, for leaks and blisters. A light and mirror may be needed for an adequate inspection. If any of the above conditions are observed on the brake hose, it is necessary to replace it.

Inspect the pipe for damage, cracks, dents and corrosion. If any defect is found, replace it.

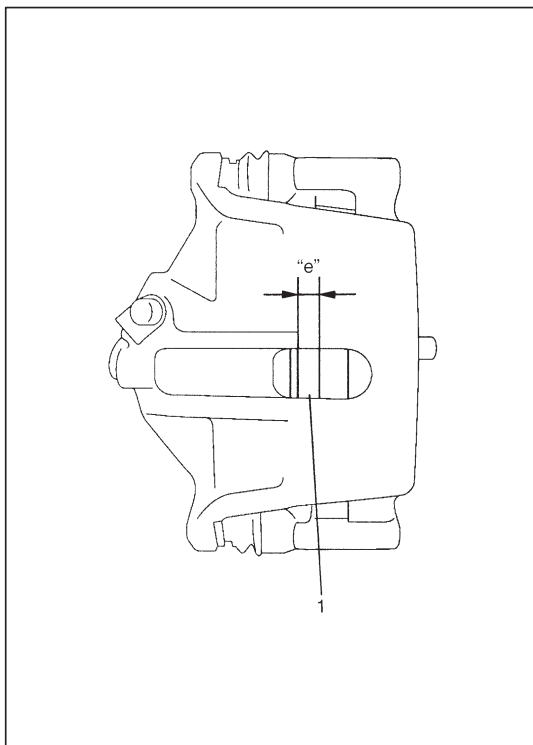


MASTER CYLINDER CHECK

Check for a cracked master cylinder casting or brake fluid around the master cylinder. Leaks are indicated only if there is at least a drop of fluid. A damp condition is not abnormal.

BRAKE DISC CHECK

Refer to item FRONT DISC BRAKE PAD INSPECTION of Section 5B for inspection point and procedure.



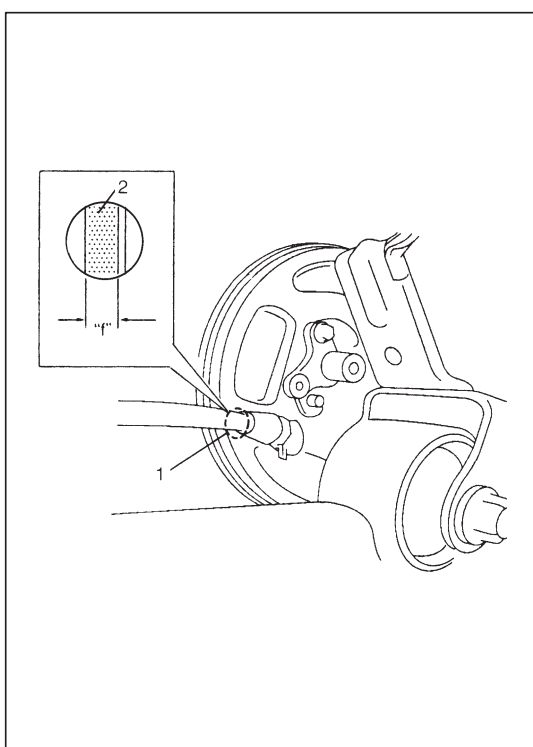
BRAKE PAD CHECK

Inspect pad linings periodically according to maintenance schedule whenever wheels are removed (for tire rotation or other reason). Take a look through hole of caliper and check lining (1) thickness of each pad.

Thickness "e"

Service Limit: 2.0 mm (0.08 in.)

If one of brake pad is worn to service limit, all linings must be replaced at the same time.



BRAKE SHOE CHECK

Inspection should be carried out on the following points after brake pedal travel "c" (pedal to silencer clearance) check as described on previous page of this section, even when it is more than specification.

Amount of brake shoe wear can be checked as follows.

- 1) Hoist vehicle.
- 2) Remove rubber cover (plug) (1) from brake back plate.
- 3) Through hole of back plate, visually check for thickness of brake shoe lining (2). If lining thickness "f" is found less than below specified wear limit, replace all brake shoes with new ones.

Thickness "f"

Service Limit: 1.0 mm (0.04 in.)

PARKING BRAKE INSPECTION AND ADJUSTMENT

Inspection

Hold center of parking brake lever grip and pull it up with 200 N (20 kg, 44 lbs) force.

With parking brake lever pulled up as shown, count ratchet notches. There should be 4 to 9 notches.

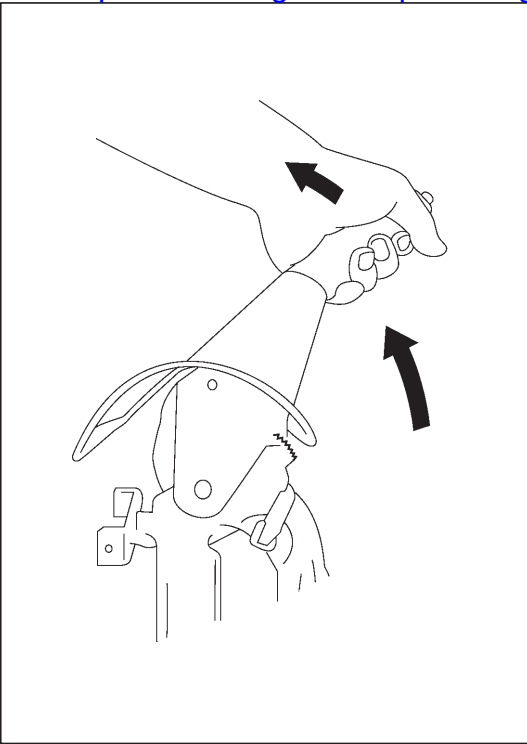
Also, check if both right and left rear wheels are locked firmly.

To count number of notches easily, listen to click sounds that ratchet makes while pulling parking brake lever without pressing its button. One click sound corresponds to one notch.

If number of notches is out of specification, adjust cable referring to adjustment procedure so as to obtain specified parking brake stroke.

NOTE:

Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking brake lever.



Adjustment

NOTE:

Make sure for the following conditions before cable adjustment.

- No air is trapped in brake system.
- Brake pedal travel is proper.
- Brake pedal is depressed repeatedly with about 300 N (30 kg, 66 lbs) load until adjuster actuator clicking sound can not be heard from drum brake.
- Parking brake lever is pulled up a few times with about 500 N (50 kg, 110 lbs) force.
- Rear brake shoes are not worn beyond limit, and self adjusting mechanism operates properly.
- If parking brake lever stroke is less than specification, loosen adjusting nut (1) as far as end of bolt. Then depress brake pedal repeatedly with about 300 N (30 kg, 66 lbs) load until adjuster actuator clicking sound can not be heard from drum brake.

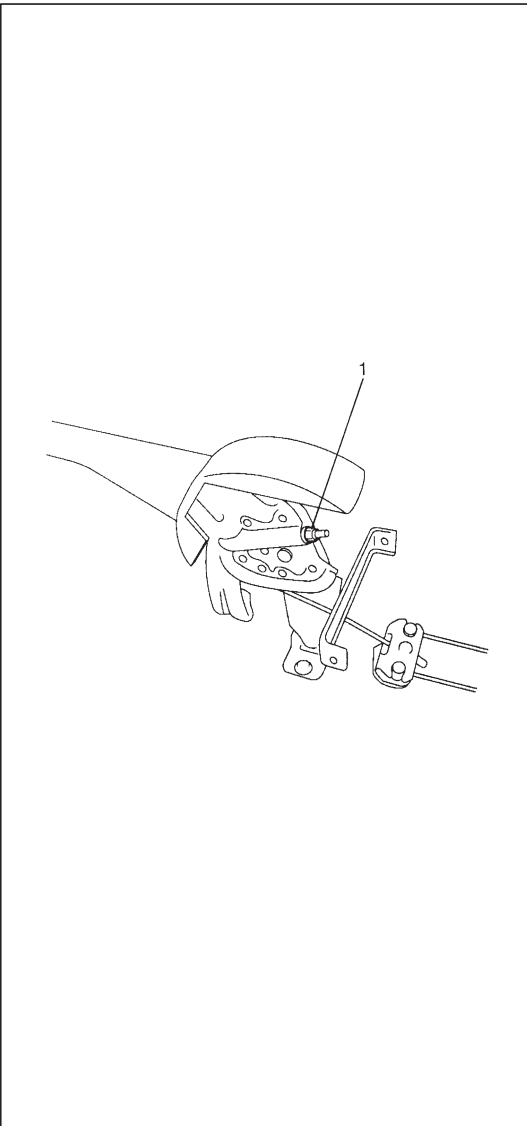
After confirming that above conditions are all satisfied, adjust parking brake lever stroke by loosening or tightening adjust nut.

NOTE:

Check brake drum for dragging after adjustment.

Parking brake stroke: 4 to 9 notches

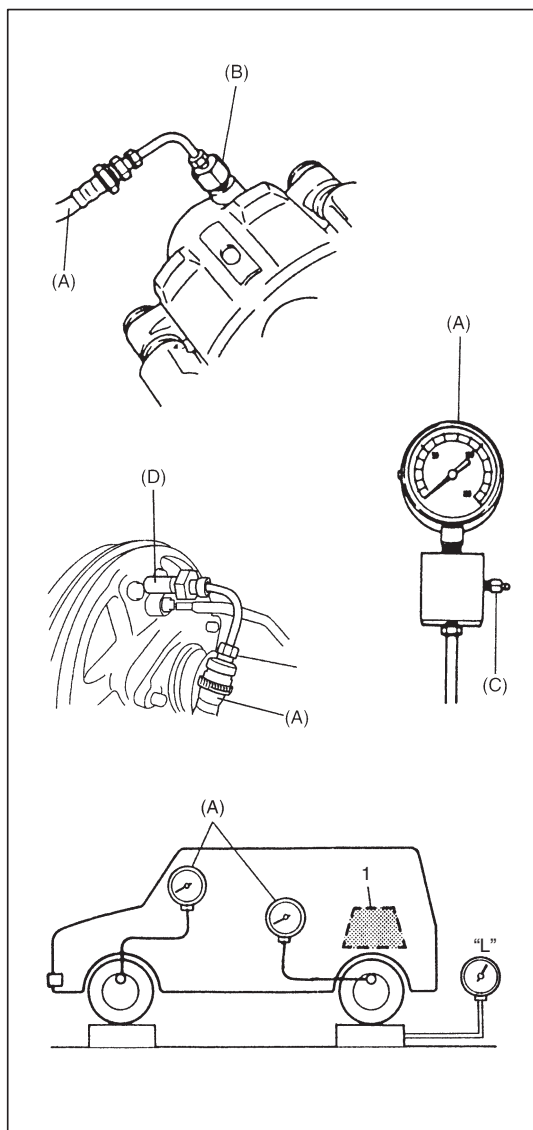
(When lever is pulled up at 200 N (20 kg, 44 lbs))



FLUSHING BRAKE HYDRAULIC SYSTEM

It is recommended that entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in hydraulic system.

Periodical change of brake fluid is also recommended.



FLUID PRESSURE TEST (if equipped with LSPV)

Test procedure for LSPV assembly is as follows.

Before testing, confirm the following.

- Fuel tank is filled with fuel fully.
 - Vehicle is equipped with spare tire, tools, jack and jack handle.
- 1) Stop vehicle on level floor and place approximately about 1,000 N (100 kg, 220 lbs) weight (1) on rear housing so that rear axle weighs 4,500 N (450 kg, 992 lbs).

Rear axle weight "L": 4,500 N (450 kg, 992 lbs)

- 2) Install special tool to front and rear brake.

NOTE:

Pressure gauge should be connected to bleeder plug hole of front (left side brake) and rear (right side brake). After testing front left side and rear right side, test front right side and rear left side in the same way.

Special Tool

Front brake

(A): 09956-02310

(B): 09952-36310

(C): 55473-82030 (Air bleeder plug as a spare part)

NOTE:

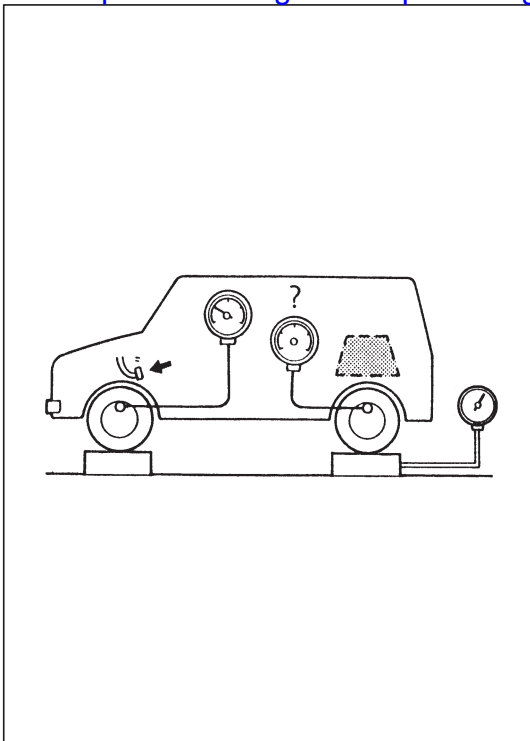
For front brake, use special tool (B) instead of thread diameter 10 mm attachment included in special tool (A).

Rear brake

(A): 09956-02310

(C): 55473-82030 (Air bleeder plug as a spare part)

(D): 09952-48320

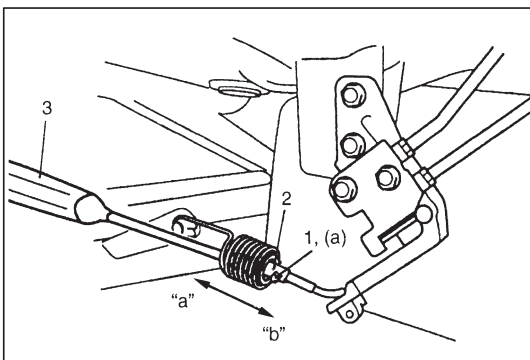


- 3) Depress brake pedal gradually till fluid pressure of front brake becomes as specified below and check corresponding pressure of rear brake then. It should be within specification given below.

Front brake	Rear brake
7,500 kPa	5,600 – 7,100 kPa
75 kg/cm ²	56 – 71 kg/cm ²
1,067 psi	796 – 1,009 psi

As done above, apply 100 kg/cm² pressure to front brake and check that rear brake pressure then is within specification as given below.

Front brake	Rear brake
10,000 kPa	6,300 – 7,900 kPa
100 kg/cm ²	63 – 79 kg/cm ²
1,422 psi	896 – 1,123 psi



- 4) If rear brake pressure is not within specification, adjust it by changing spring bracket (2) position as follows.
- If rear brake pressure is higher than specification, move spring bracket (2) to direction “a” and if it is lower, to direction “b” by pushing spring bracket with a screw driver (3).
 - Repeat steps 3) and 4) until rear brake pressure is within specification.
 - After adjustment, be sure to torque screw (1) to specification.

Tightening Torque

(a): 5 N·m (0.5 kg-m, 4.0 lb-ft)

- 5) Upon completion of fluid pressure test, bleed brake system and perform brake test.

BOOSTER OPERATION CHECK

There are two ways to perform this inspection, with and without a tester. Ordinarily, it is possible to roughly determine its condition without using a tester.

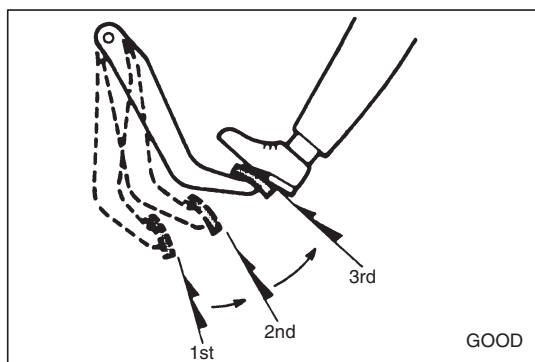
NOTE:

For this check, make sure that no air is in hydraulic line.

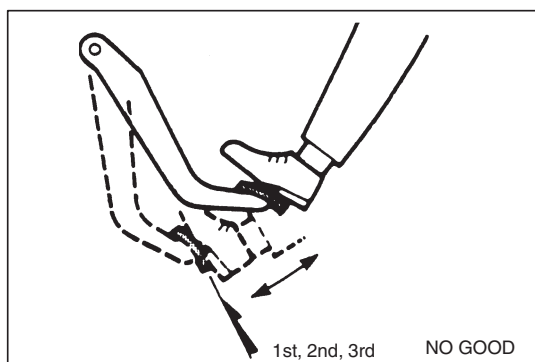
INSPECTION WITHOUT TESTER

Check Air Tightness

- 1) Start engine.
- 2) Stop engine after running for 1 to 2 minutes.



- 3) Depress brake pedal several times with the same load as in ordinary braking and observe pedal travel. If pedal goes down deep the first time but its travel decreases as it is depressed the second and more times, air tightness is obtained.

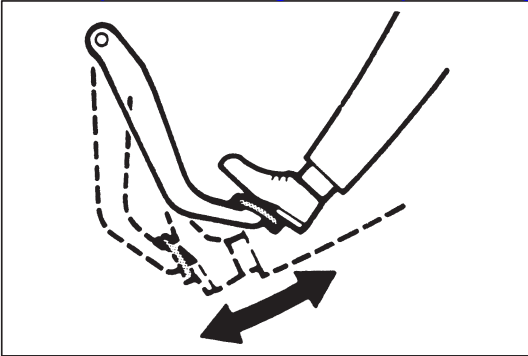


- 4) If pedal travel doesn't change, air tightness isn't obtained.

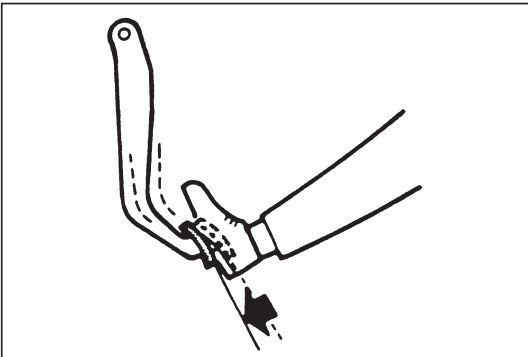
NOTE:

If defective, inspect vacuum lines and sealing parts, and replace any faulty part.

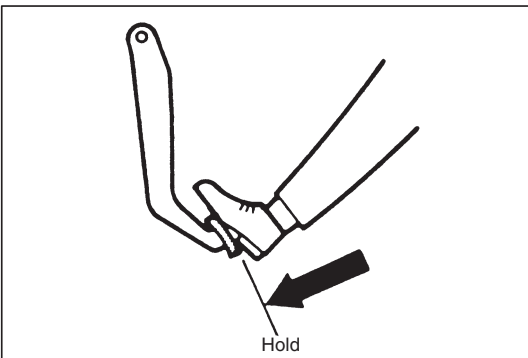
When this has been done, repeat the entire test.

**Check Operation**

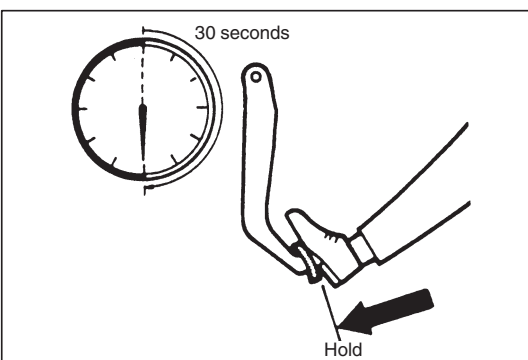
- 1) With engine stopped, depress brake pedal several times with the same load and make sure that pedal travel doesn't change.



- 2) Start engine while depressing brake pedal. If pedal travel increases a little, operation is satisfactory. But no change in pedal travel indicates malfunction.

**Check Air Tightness Under Load**

- 1) With engine running, depress brake pedal. Then stop engine while holding brake pedal depressed.



- 2) Hold brake pedal depressed for 30 seconds. If pedal height does not change, condition is good. But it isn't if pedal rises.


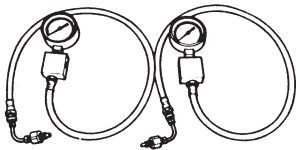
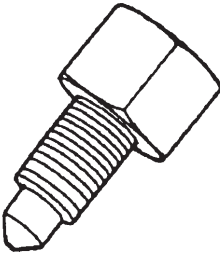
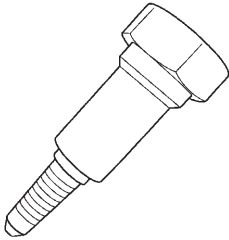
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N·m	kg·m	lb·ft
Brake pipe 4-way joint bolt		11	1.1	8.0
Brake pipe flare nut		16	1.6	11.5
Brake bleeder plug	Front caliper	6.5	0.65	5.0
	Wheel cylinder	8.5	0.85	6.5
LSPV mounting bolt		26	2.6	19.0
LSPV spring end nut		26	2.6	19.0
LSPV spring bracket screw		11	1.1	8.0
Wheel nut		85	8.5	61.5

REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED PRODUCT	USE
Brake fluid	DOT 4 or SAE J1704	<ul style="list-style-type: none"> ● To fill master cylinder reservoir. ● To clean and apply to inner parts of caliper and wheel cylinder when they are disassembled.

SPECIAL TOOLS

 <p>09950-78230 Flare nut wrench (10 × 11 mm)</p>	 <p>09956-02310 Fluid pressure gauge</p>	 <p>09952-36310 Pressure gauge attachment</p>	 <p>09952-48320 Pressure gauge attachment</p>
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SECTION 5A**BRAKE PIPE/HOSE/MASTER CYLINDER****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

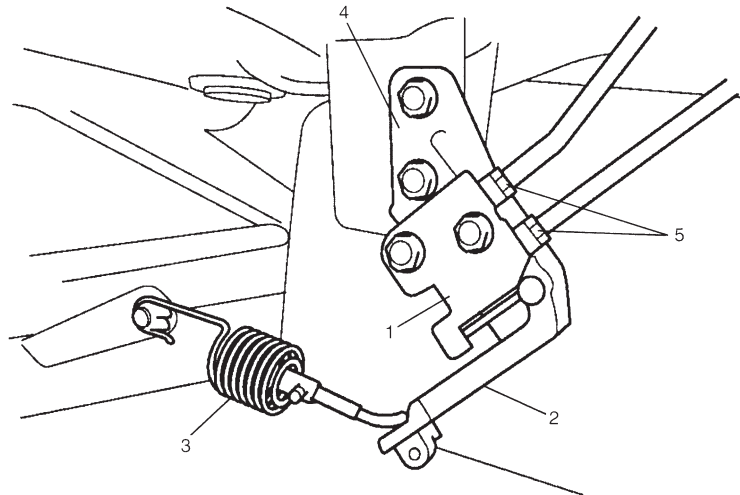
CONTENTS**5A**

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DIAGNOSIS	5A- 3
CHECK AND ADJUSTMENT	5A- 3
ON-VEHICLE SERVICE	5A- 3
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Master Cylinder Reservoir	5A- 7
Master Cylinder Assembly	5A- 9
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LSPV (Load Sensing Proportioning Valve) Assembly (if equipped)	5A-14
Brake Pedal and Brake Pedal Bracket	5A-17
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SPECIAL TOOLS	5A-18

GENERAL DESCRIPTION

LSPV (Load Sensing Proportioning Valve) ASSEMBLY (if equipped)

As shown in figure below, LSPV is included within the brake circuit which connects the master cylinder and the rear wheel brake. It controls the hydraulic pressure applied to the rear wheel brake according to the loaded state of the vehicle (or weight of the load), whereby preventing the rear wheels from getting locked prematurely.



1. LSPV
2. LSPV lever
3. Spring
4. LSPV bracket
5. Brake flare nut

DIAGNOSIS

Refer to Section 5 BRAKES.

CHECK AND ADJUSTMENT

Refer to Section 5 BRAKES.

ON-VEHICLE SERVICE

CAUTION:

- Lubricate rubber parts with clean, fresh brake fluid to ease assembly.
- Do not use lubricated shop air on brake parts as damage to rubber components may result.
- If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- The torque values specified are for dry, unlubricated fasteners.
- Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid.

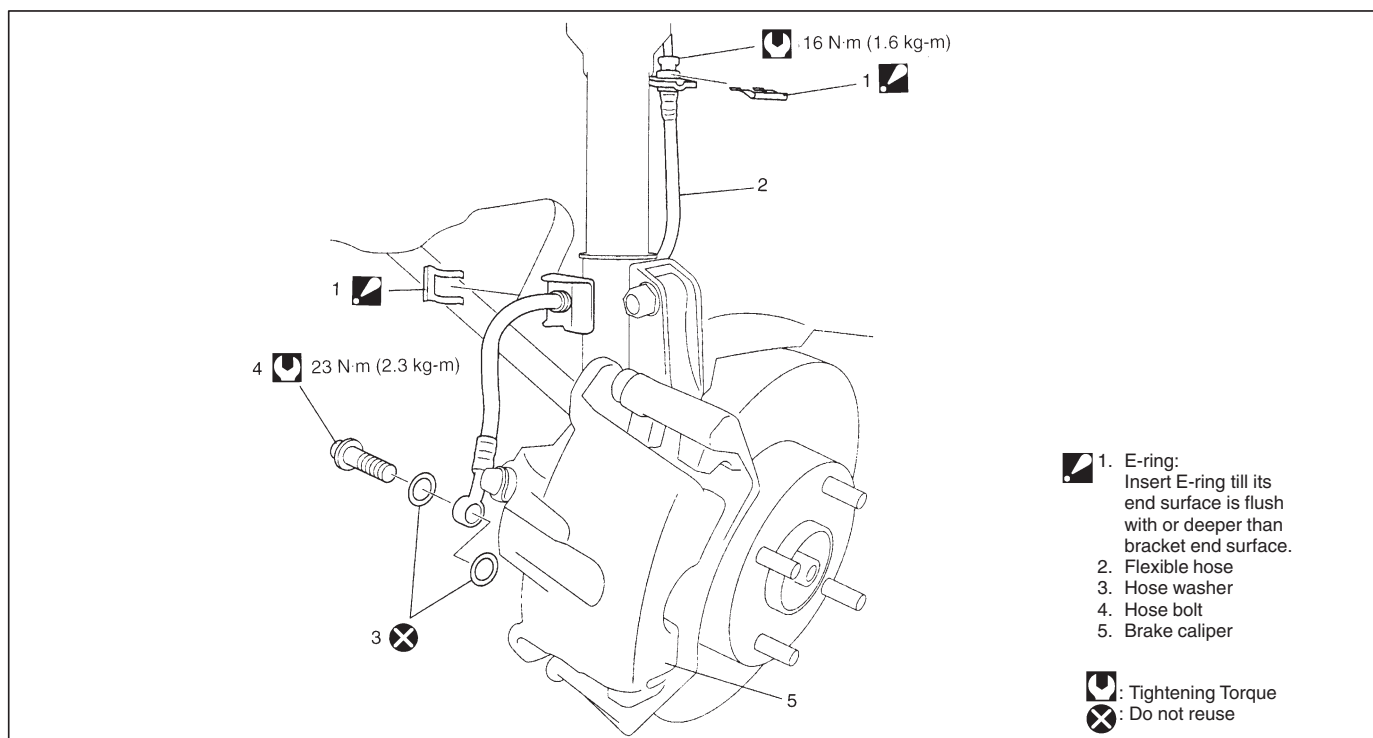
FRONT BRAKE HOSE/PIPE

REMOVAL

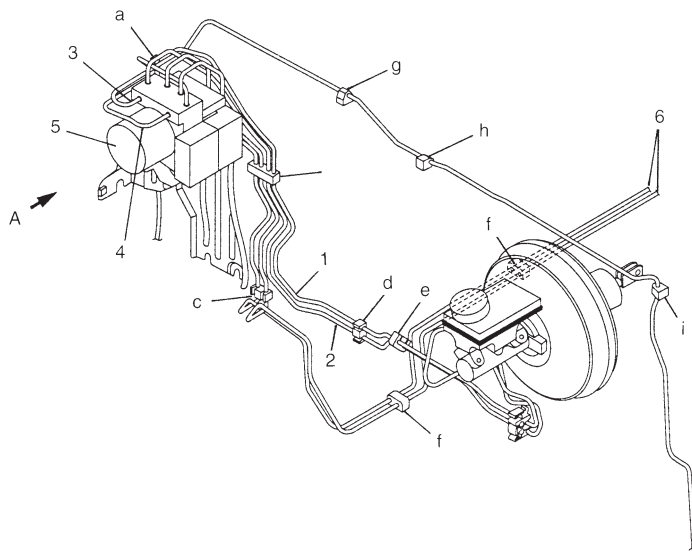
- 1) Raise and suitably support vehicle. Remove tire and wheel.
This operation is not necessary when removing pipes connecting master cylinder and flexible hose.
- 2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.

INSTALLATION

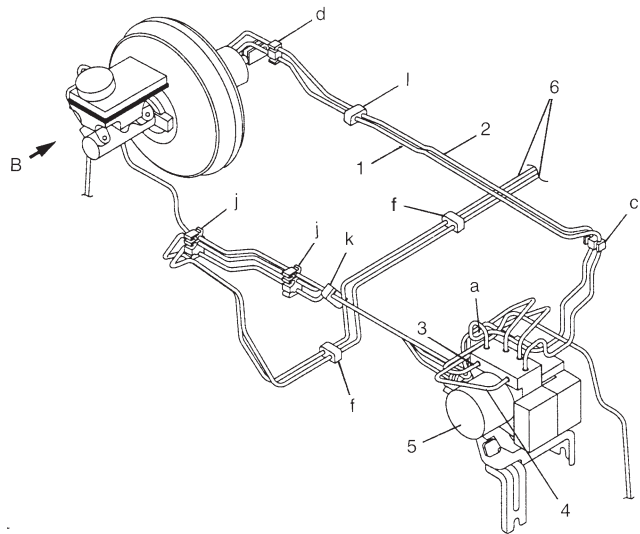
- 1) Reverse removal procedure for brake hose and pipe installation procedure.
For installation, make sure that steering wheel is in straightforward position and hose has no twist or kink. Check to make sure that hose doesn't contact any part of suspension, both in extreme right and extreme left turn conditions. If it does at any point, remove and correct. Fill and maintain brake fluid level in reservoir. Bleed brake system.
- 2) Perform brake test and check installed part for fluid leakage.



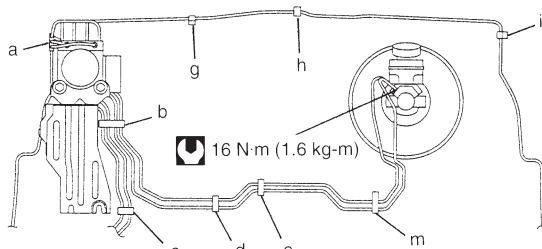
[A]



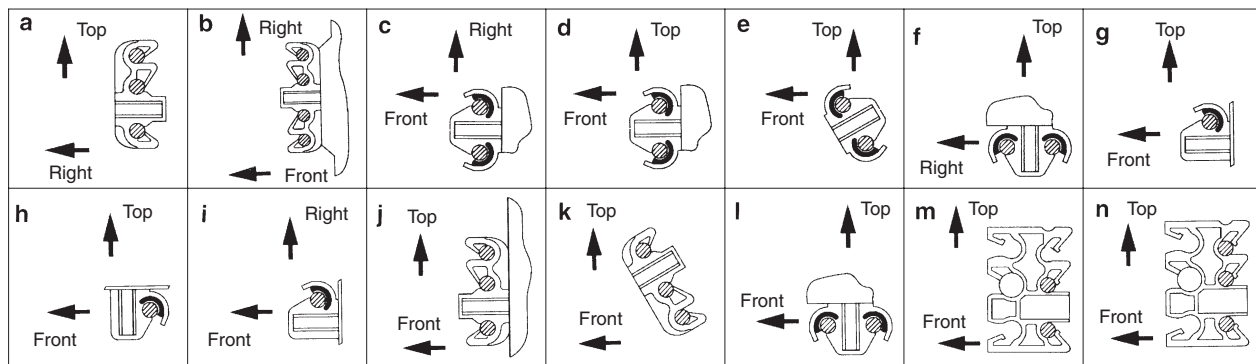
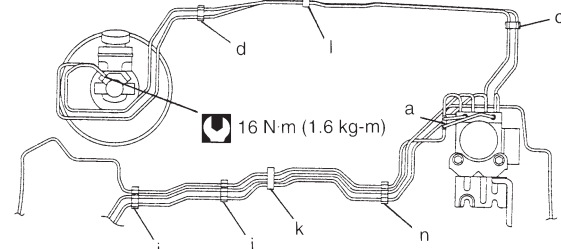
[B]



Viewed from A



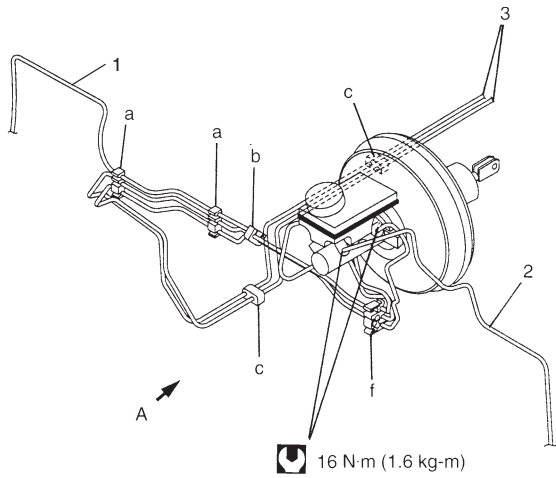
Viewed from B



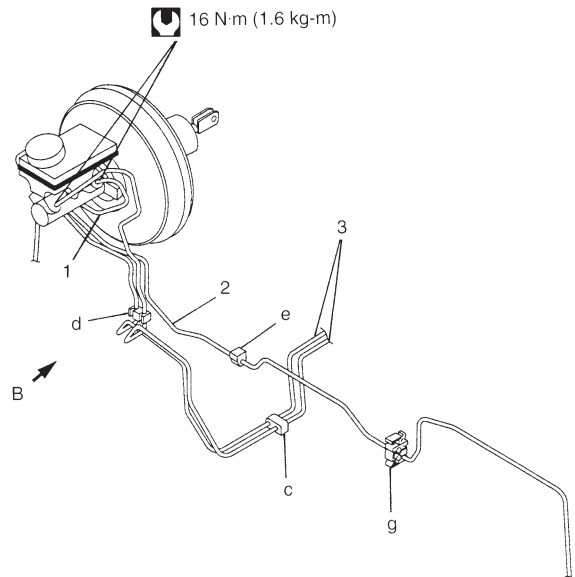
- [A]: For left-hand steering vehicle
 [B]: For right-hand steering vehicle
 a – n: Clamp
 1. From master cylinder primary to ABS hydraulic unit
 2. From master cylinder secondary to ABS hydraulic unit
 3. From ABS hydraulic unit to left front brake
 4. From ABS hydraulic unit to right front brake
 5. ABS hydraulic unit
 6. To rear brakes

: Tightening Torque

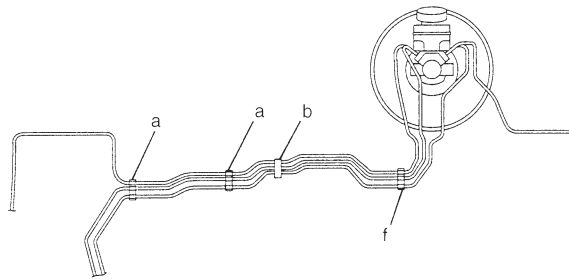
[A]



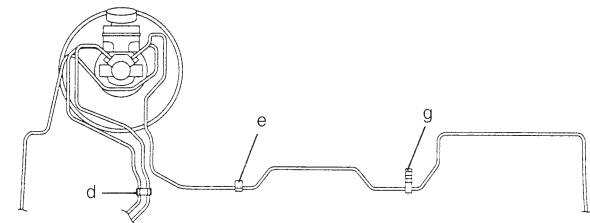
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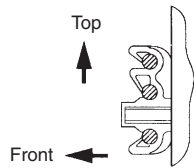
Viewed from A



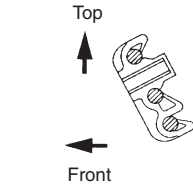
Viewed from B



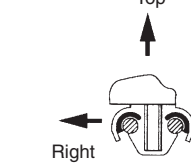
a



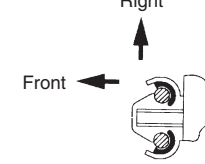
b



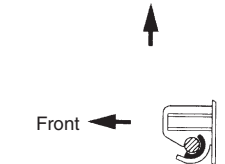
c



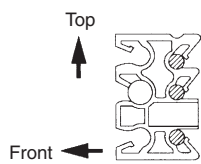
d



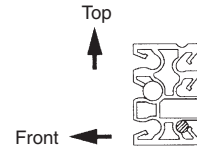
e



f



g



- [A]: For left-hand steering vehicle
[B]: For right-hand steering vehicle
a – g: Clamp
1. From master cylinder primary to right front brake
2. From master cylinder secondary to left front brake
3. To rear brakes

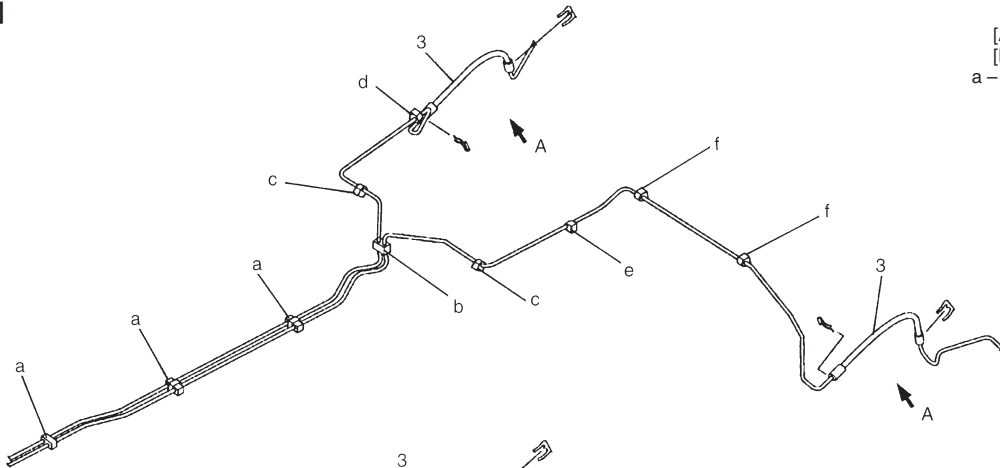
 : Tightening Torque

REAR BRAKE HOSE/PIPE**REMOVAL**

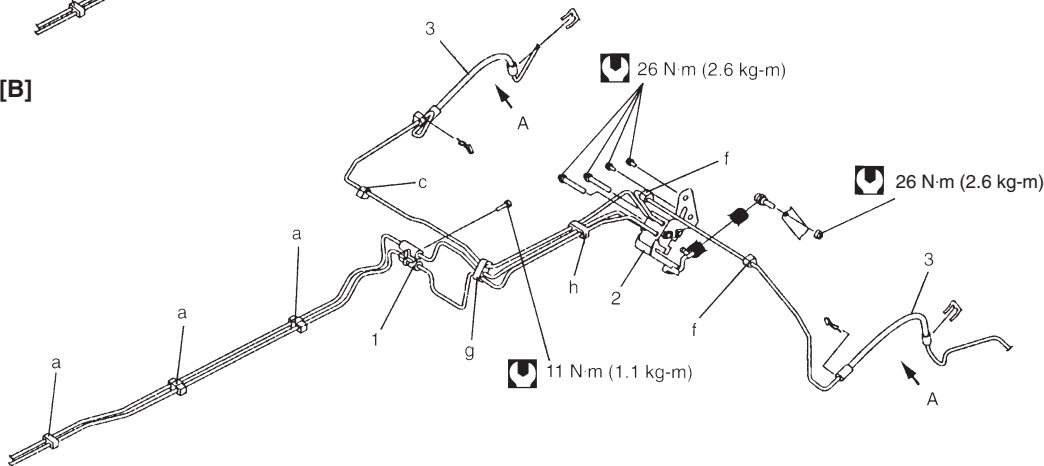
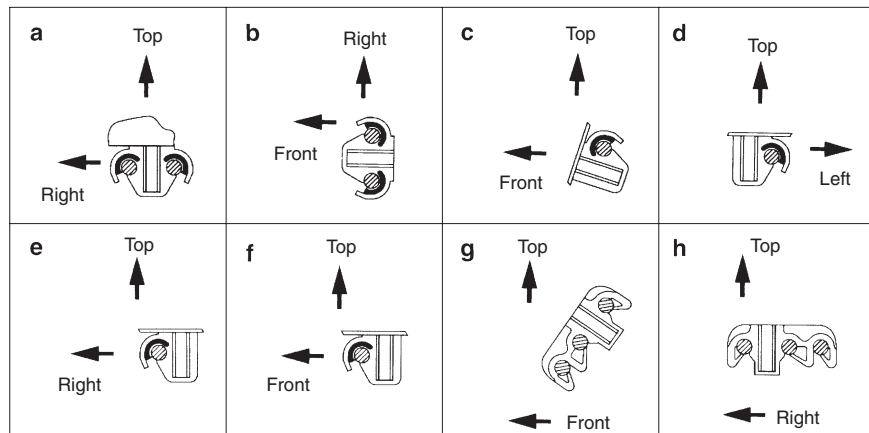
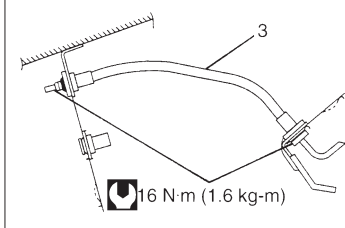
- 1) Raise and suitably support vehicle. Remove tire and wheel.
- 2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.

INSTALLATION

- 1) Reverse removal procedure for brake hose or pipe installation procedure.
 - Install clamps properly referring to figure below.
 - When installing hose, make sure that it has no twist or kink.
- 2) Fill and maintain brake fluid level in reservoir. Bleed brake system.
- 3) Perform brake test and check each installed part for fluid leakage.

[A]

[A]: with ABS
 [B]: without ABS
 a - h: Clamp
 1. 4 way joint
 2. LSPV assembly
 3. Rear brake hose

[B]**Viewed from A**

: Tightening Torque

MASTER CYLINDER RESERVOIR**CAUTION:**

Observe **CAUTION** at the beginning of **ON-VEHICLE SERVICE**.

NOTE:

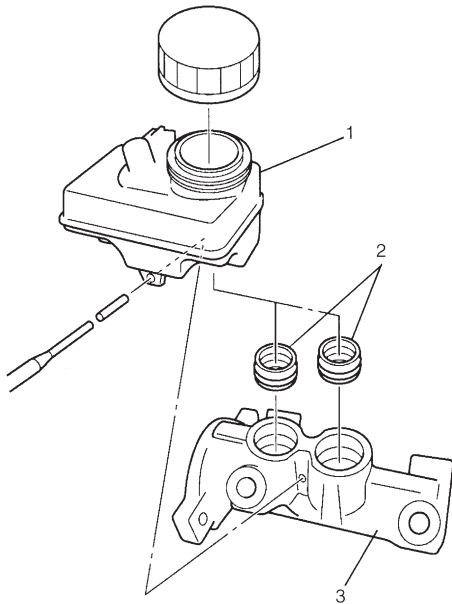
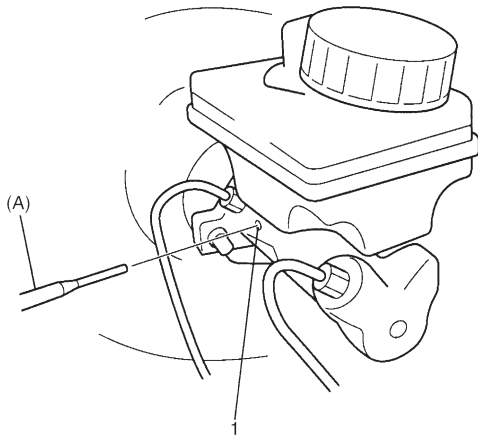
For right hand steering vehicle, remove and install master cylinder reservoir according to procedure of **MASTER CYLINDER ASSEMBLY REMOVAL** and **INSTALLATION** in this section.

REMOVAL

- 1) Clean outside of reservoir.
- 2) Disconnect reservoir lead wire at coupler.
- 3) Take out fluid with syringe or such.
- 4) Remove reservoir connector pin (1) using special tool.

Special Tool

(A): 09922-85811



- 5) Remove reservoir (1) and grommets (2) from master cylinder (3).

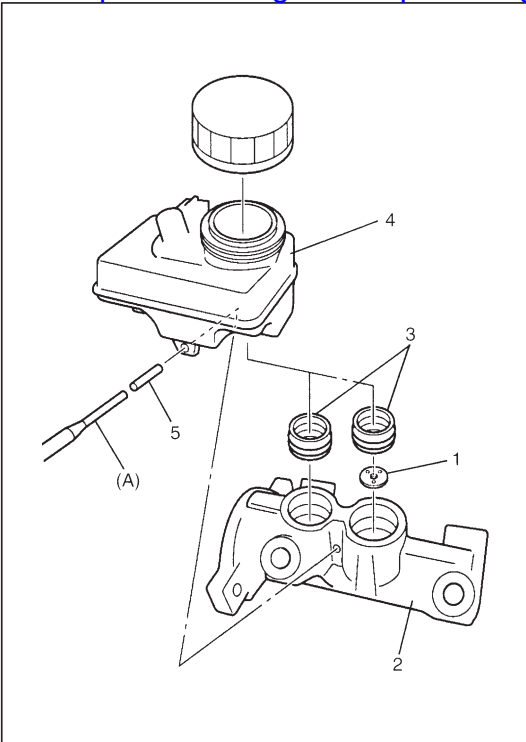
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INSTALLATION

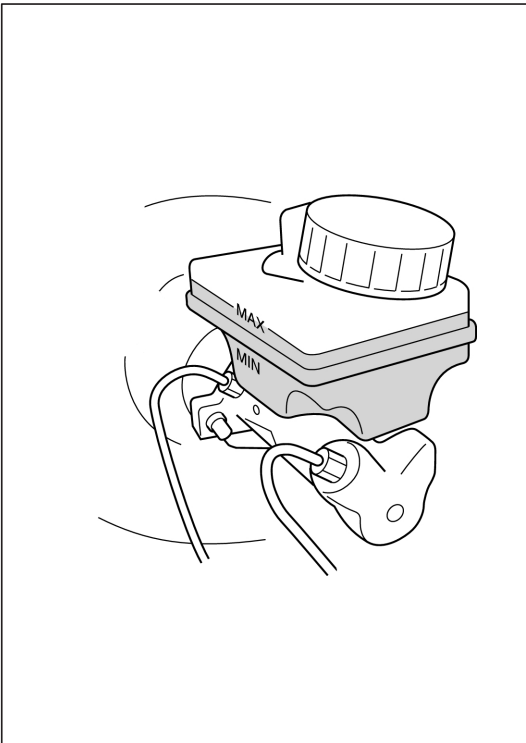
- 1) For vehicle with ABS, install pin washer retainer (1) to secondary reservoir port of master cylinder (2) if removed.
- 2) When using new grommets, lubricate them with the same fluid as the one to fill reservoir with. Then fit grommets (3) to master cylinder. Grommets must be seated in place.
- 3) Install reservoir (4) and drive in reservoir pin (5).
Drive in reservoir pin till both of its ends at the right and left of reservoir becomes the same length.

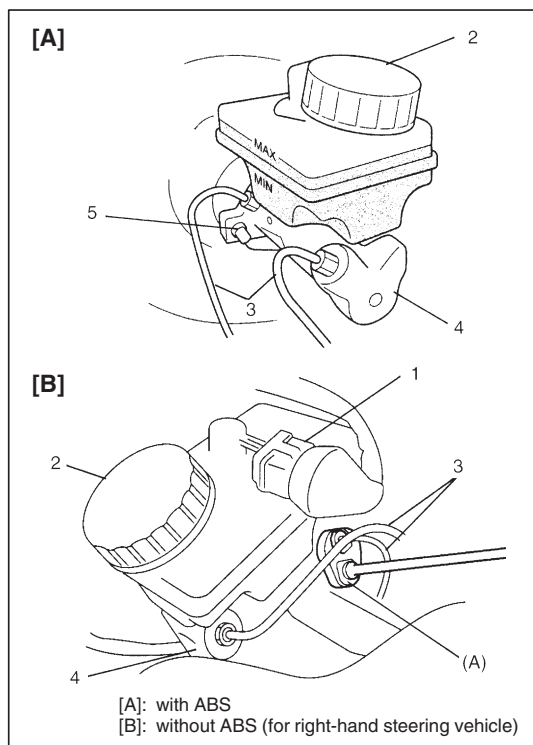
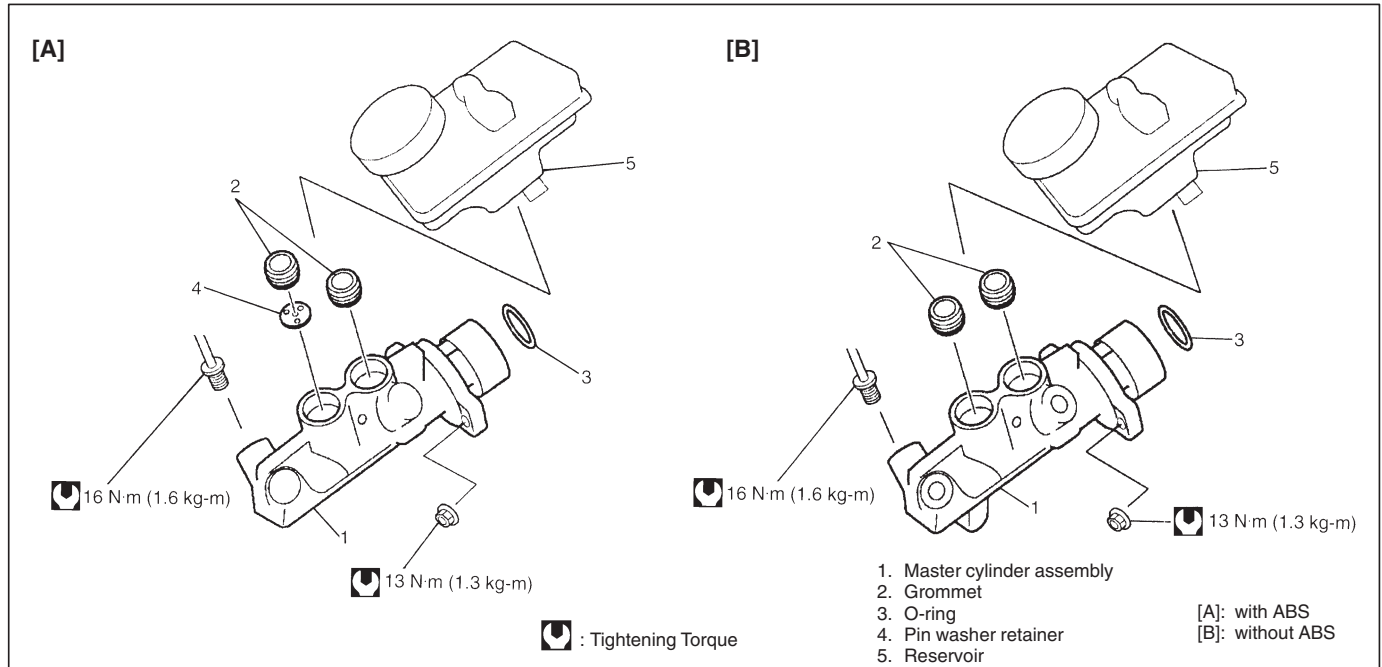
Special Tool

(A): 09922-85811



- 4) Connect reservoir lead wire.
- 5) Fill reservoir with specified fluid and bleed air from brake system.
- 6) Upon completion of installation, check for fluid leakage.



MASTER CYLINDER ASSEMBLY**CAUTION:**

- Never disassemble master cylinder. Disassembly will spoil its original performance. If faulty condition is found, replace it with new one.
- Observe CAUTION at the beginning of ON-VEHICLE SERVICE.

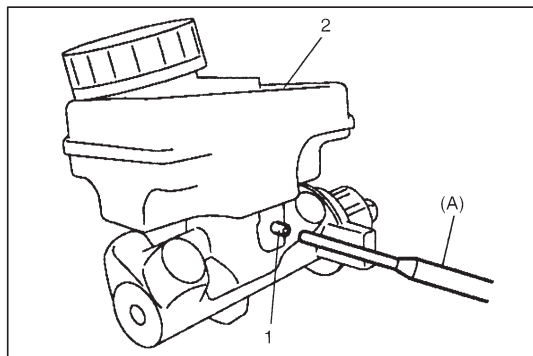
REMOVAL

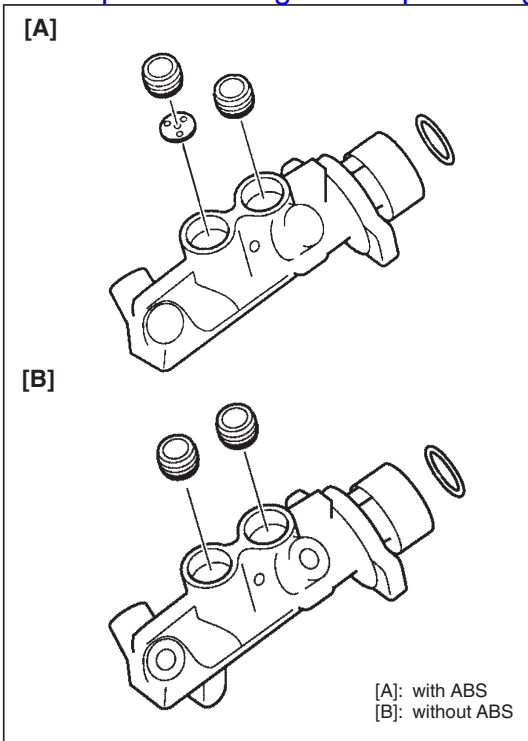
- 1) Clean around master cylinder and reservoir.
- 2) Disconnect reservoir lead wire at coupler (1).
- 3) Remove reservoir cap (2) and take out fluid with syringe or such.
- 4) Disconnect brake pipes (3) from master cylinder (4).
For RH steering vehicle not equipped with ABS, disconnect pipes from master cylinder by using special tool.

Special Tool**(A): 09950-78240**

- 5) Remove master cylinder attaching nuts (5).

- 6) Remove master cylinder from brake booster.
- 7) Remove reservoir pin (1) and reservoir (2) by using special tool.

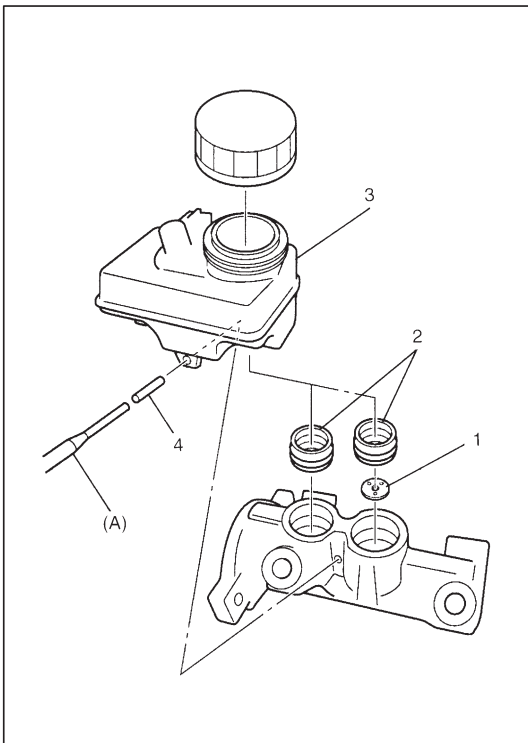
Special Tool**(A): 09922-85811**

**INSPECTION**

Inspect each parts for wear, deterioration or damage, and replace parts if necessary.

Inspect master cylinder for scoring, corrosion and smooth operation. It is best to replace corroded cylinder.

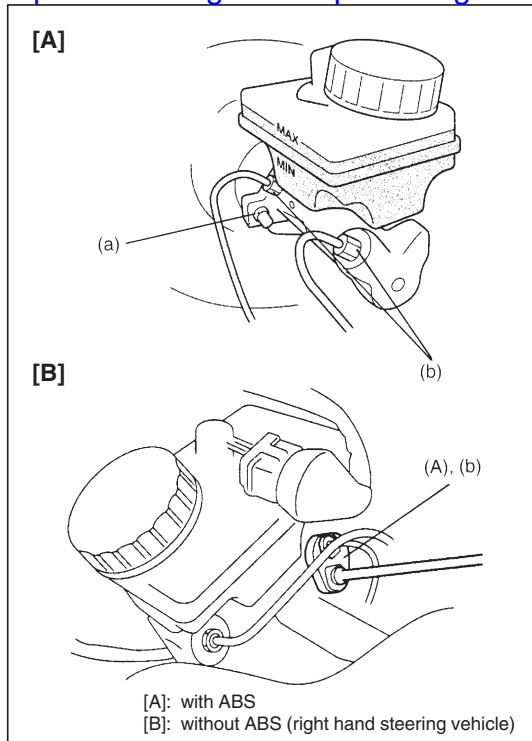
Corrosion can be identified as pits or excessive roughness.

**INSTALLATION**

- 1) For vehicle with ABS, install pin washer retainer (1) if removed and apply thin coat of brake fluid to all around new grommets (2) and install them to cylinder body, then install reservoir (3).
- 2) Set a pin (4) in reservoir hole and drive it in till both of its ends at the right and left of reservoir becomes the same length.

Special Tool

(A): 09922-85811



- 3) Install master cylinder to brake booster.
- 4) Torque master cylinder attaching nuts to specification.

Tightening Torque

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

- 5) Connect hydraulic lines and torque flare nuts to specification.

Special Tool

(A): 09950-78240

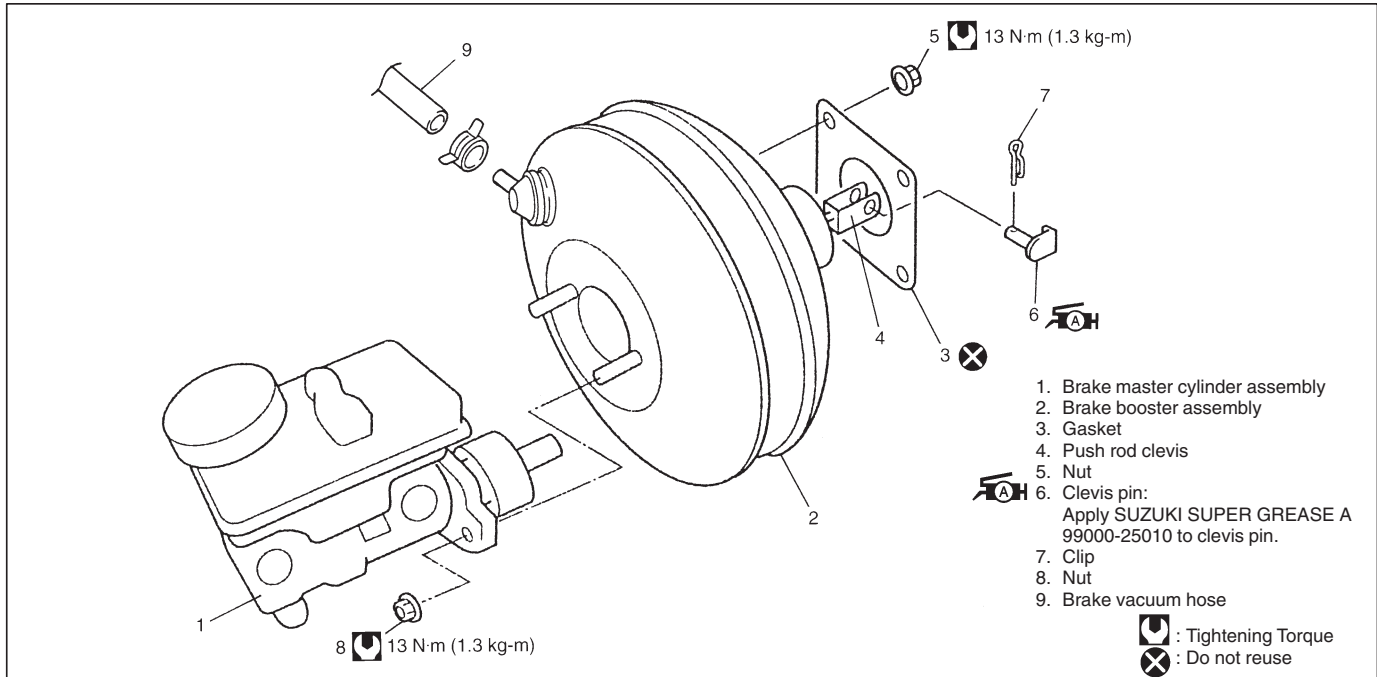
Tightening Torque

(b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

- 6) Connect reservoir lead wire.
- 7) Fill reservoir with specified brake fluid.
- 8) After installing, check brake pedal play and bleed air from system (See SECTION 5).
- 9) Perform brake test and check each installed part for fluid leakage.

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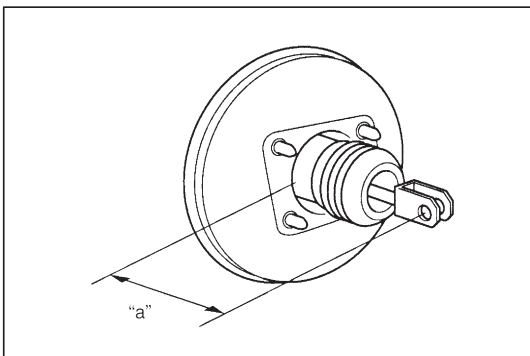
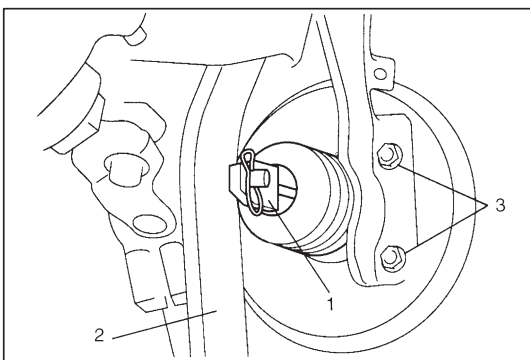
BRAKE BOOSTER

**CAUTION:**

- Never disassemble brake booster. Disassembly will spoil its original function. If it is found faulty, replace it with new one.
- Observe CAUTION at the beginning of ON-VEHICLE SERVICE.

REMOVAL

- 1) Remove master cylinder assembly, referring to steps 1) to 5) of its REMOVAL in this section.
- 2) Disconnect brake vacuum hose from brake booster.
- 3) Disconnect push rod clevis (1) from brake pedal arm (2).
- 4) Remove attaching nuts (3) and then booster.

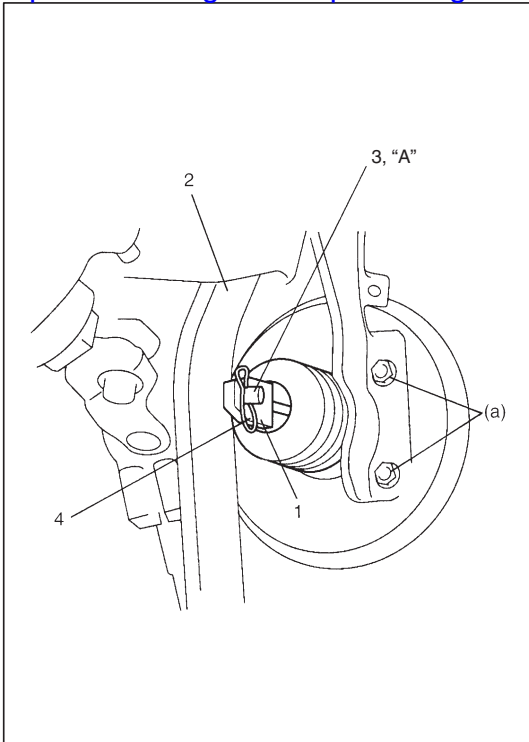
**INSPECTION**

- Check brake booster for damage and operation, boot for damage and deterioration.
- Check for push rod length.

Length

“a”: 114.5 – 115.5 mm (4.51 – 4.55 in.)

If any malfunction is found, replace brake booster.

**INSTALLATION****NOTE:**

Check for push rod length referring to above BRAKE BOOSTER INSPECTION.

- 1) Install new gasket and booster to dash panel as shown. Then connect booster push rod clevis (1) to pedal arm (2) with clevis pin (3) and clip (4).

"A": Grease A 99000-25010

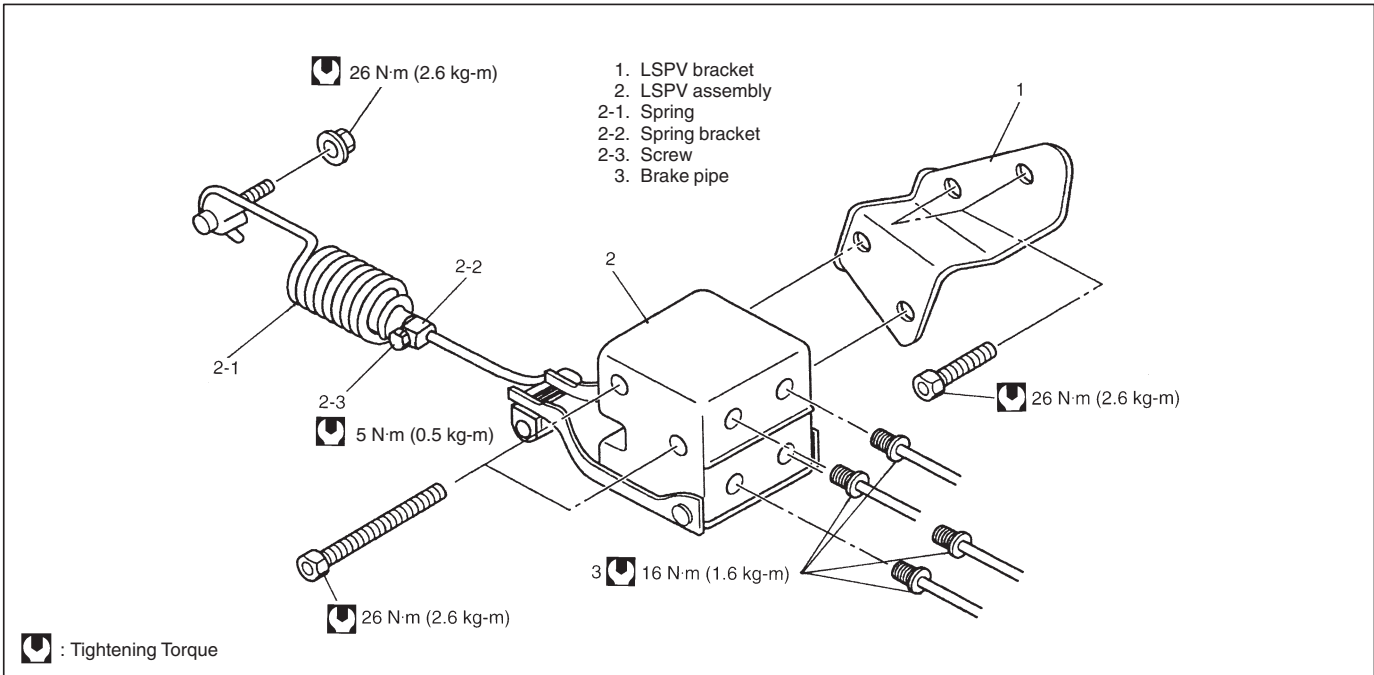
- 2) Tighten booster attaching nuts to the specified torque.

Tightening Torque

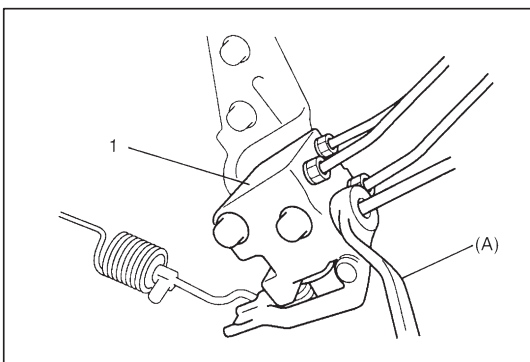
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

- 3) Connect brake vacuum hose to brake booster.
- 4) Install master cylinder, referring to steps 3) to 8) of its INSTALLATION of this section.
- 5) After installing, perform BOOSTER OPERATION CHECK referring to SECTION 5.

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LSPV (Load Sensing Proportioning Valve) ASSEMBLY (if equipped)

**CAUTION:**

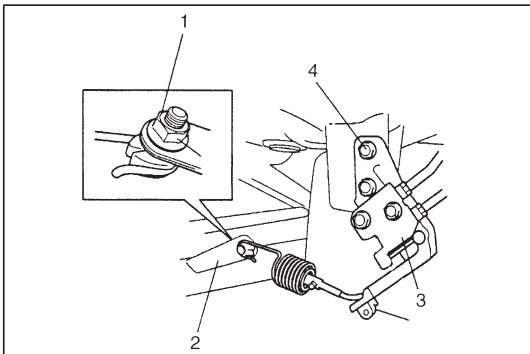
- Never disassemble LSPV assembly. Disassembly will spoil its original performance. Replace with new one if defective.
- Observe CAUTION at the beginning of ON-VEHICLE SERVICE.

**REMOVAL**

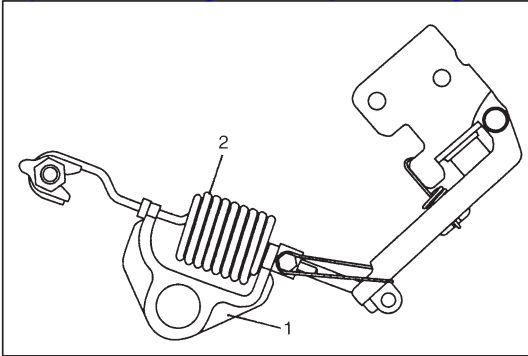
- 1) Clean around reservoir cap and take out fluid with syringe or such.
- 2) Hoist vehicle.
- 3) Disconnect brake pipes from LSPV assembly (1).

Special Tool

(A): 09950-78230 (10 x 11 mm)

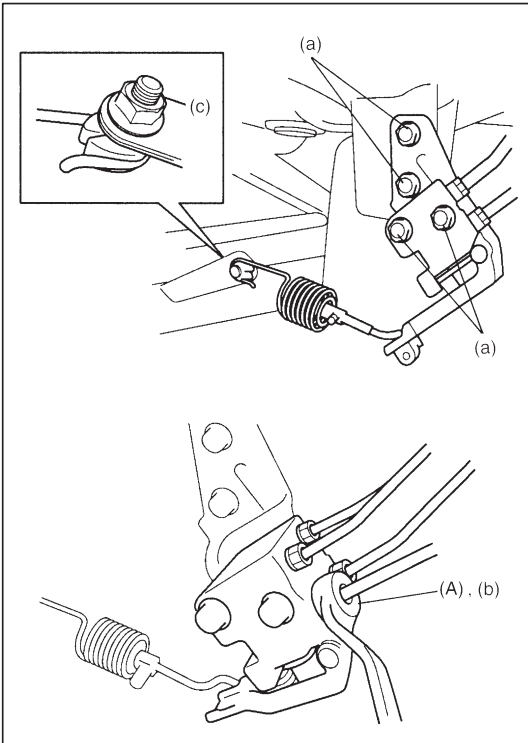


- 4) Remove nut (1) and detach spring end from rear axle (2).
- 5) Remove LSPV assembly (3) with bracket (4) from vehicle body.

**INSTALLATION****NOTE:**

New LSPV assembly is supplied with held in specified spring length with adjusting block (1).

Do not remove adjusting block until spring (2) installation position is adjusted.



- 1) Install LSPV assembly with bracket to vehicle body.
- 2) Torque each bolt and nut to specification as indicated respectively in figure.

Special Tool

(A): 09950-78230 (10 x 11 mm)

Tightening Torque

(a): 26 N·m (2.6 kg-m, 19.0 lb-ft)

(b): 16 N·m (1.6 kg-m, 11.5 lb-ft) (brake flare nut)

(c): 26 N·m (2.6 kg-m, 19.0 lb-ft)

- 3) Fill reservoir with specified fluid and bleed air from brake system.

- 4) Check or adjust spring installation position.
For used LSPV assembly, check that it is installed properly referring to the following **INSPECTION & ADJUSTMENT**.
For new LSPV assembly, adjust spring installation position as follows.

- a) Confirm the following before adjustment.

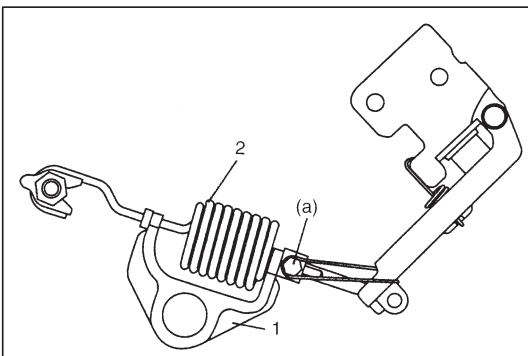
- Fuel level meter indicates around "E" (Empty). (Fuel tank holds about 5 liters.)
- Vehicle is equipped with spare tire, tools, jack and jack handle.
- Vehicle is free from any other load.
- Vehicle is placed on level floor.

- b) Tighten spring bracket bolt to specified torque.

Tightening Torque

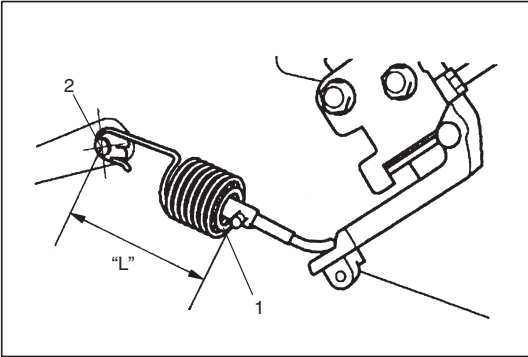
(a): 5 N·m (0.5 kg-m, 4.0 lb-ft)

- c) Remove adjusting block (1) from spring (2).
- d) Confirm fluid pressure referring to Fluid Pressure Test in **SECTION 5**.



INSPECTION & ADJUSTMENT

- 1) Confirm the following before inspection and adjustment.
 - Fuel tank is filled with fuel fully.
 - Vehicle is equipped with spare tire, tools, jack and jack handle.
 - Vehicle is free from any other load.
 - Vehicle is placed on level floor.

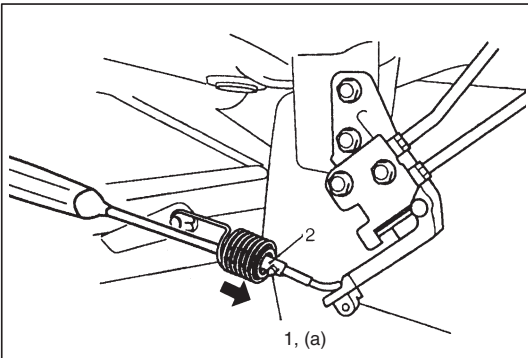


- 2) Check spring length between spring end (1) and spring bolt center (2).

Spring length

“L”: About 99.3 mm (3.9 in.)

If it is out of specification, adjust it as follows.

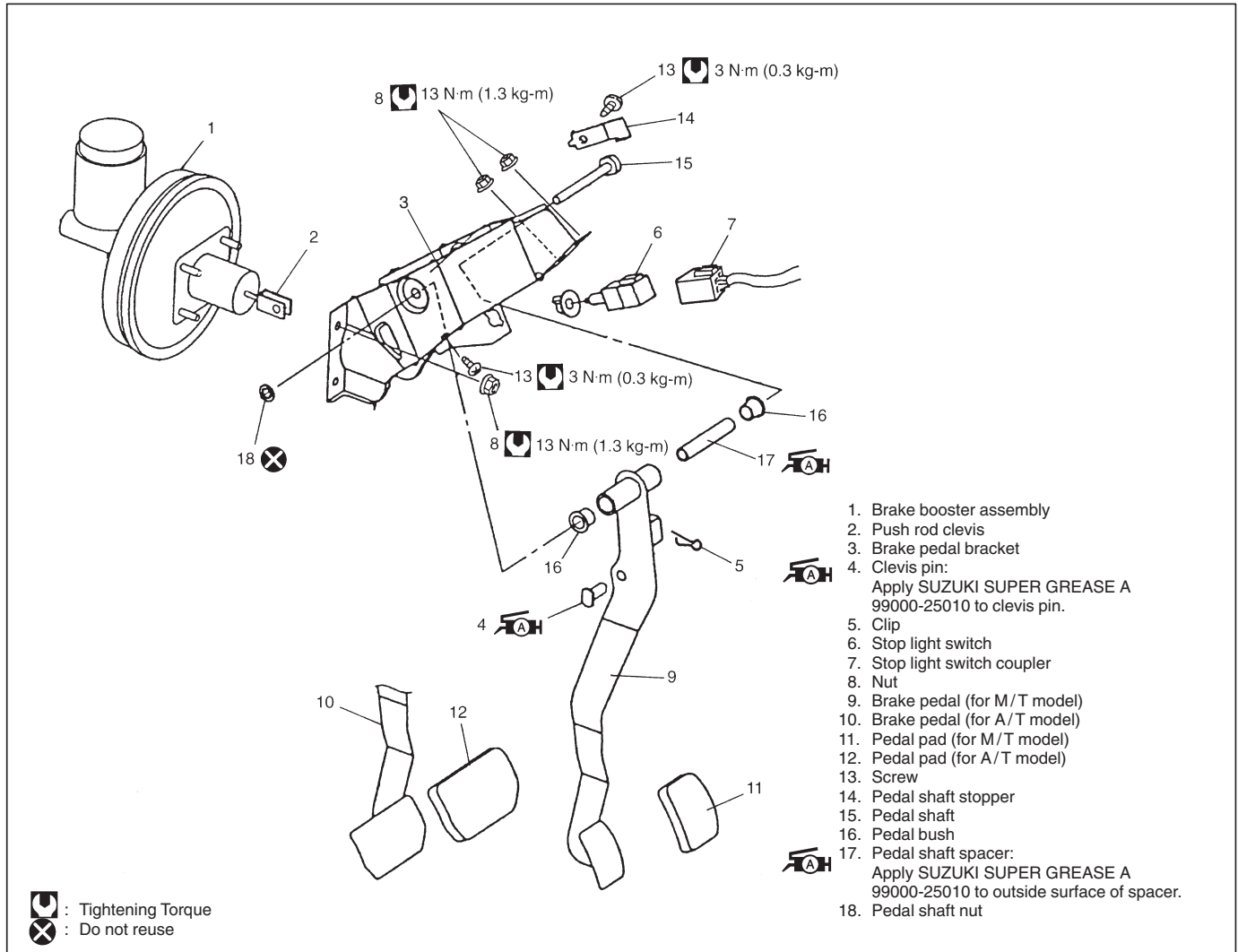


- 3) Loosen spring bracket bolt (1) and stretch spring to specified length by pushing spring bracket (2) with a driver or the like.
- 4) At that position in step 3), tighten spring bracket bolt to specified torque.

Tightening Torque

(a): 5 N·m (0.5 kg-m, 4.0 lb-ft)

- 5) Confirm fluid pressure referring to Fluid Pressure Test in SECTION 5.

BRAKE PEDAL AND BRAKE PEDAL BRACKET**REMOVAL**

- 1) Disconnect stop light switch coupler.
- 2) Disconnect push rod clevis from brake pedal.
- 3) Remove attaching nuts.
- 4) Remove brake pedal bracket with brake pedal.
- 5) Remove each parts, if necessary.

INSTALLATION

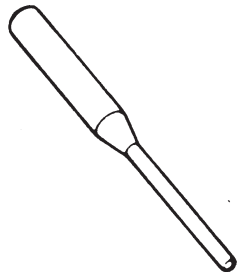
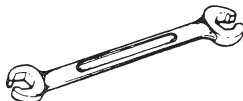
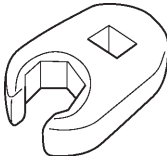
Reverse removal procedure for installation, noting the following.

- Tighten each nuts and screws to specified torque as indicated above figure.
- After installing, check brake pedal play and perform brake test.

REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED PRODUCT	USE
Brake fluid	DOT 4 or SAE J1704	<ul style="list-style-type: none">• To fill master cylinder reservoir.• To clean and apply to inner parts of caliper and wheel cylinder when they are disassembled.

SPECIAL TOOLS

		
09922-85811 Connector pin remover	09950-78230 Flare nut wrench (10 x 11 mm)	09950-78240 Flare nut socket (10 mm)

SECTION 5B**FRONT BRAKE****NOTE:**

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

CONTENTS

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Disc Brake Caliper Assembly	5B- 2
DIAGNOSIS	5B- 2
CHECK AND ADJUSTMENT	5B- 2
ON-VEHICLE SERVICE	5B- 3
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Front Disc Brake Caliper	5B- 7
Front Brake Disc	5B-10
REQUIRED SERVICE MATERIAL	5B-12
SPECIAL TOOLS	5B-12

GENERAL DESCRIPTION

DISC BRAKE CALIPER ASSEMBLY

This caliper is mounted to the brake caliper carrier with two caliper pin bolts. Hydraulic force, created by applying force to the brake pedal, is converted by the caliper to friction. The hydraulic force acts equally against the piston and the bottom of the caliper bore to move the piston outward and to move (slide) the caliper inward, resulting in a clamping action on the disc. This clamping action forces the pads (linings) against the disc, creating friction to stop the vehicle.

DIAGNOSIS

Refer to Section 5 (BRAKES).

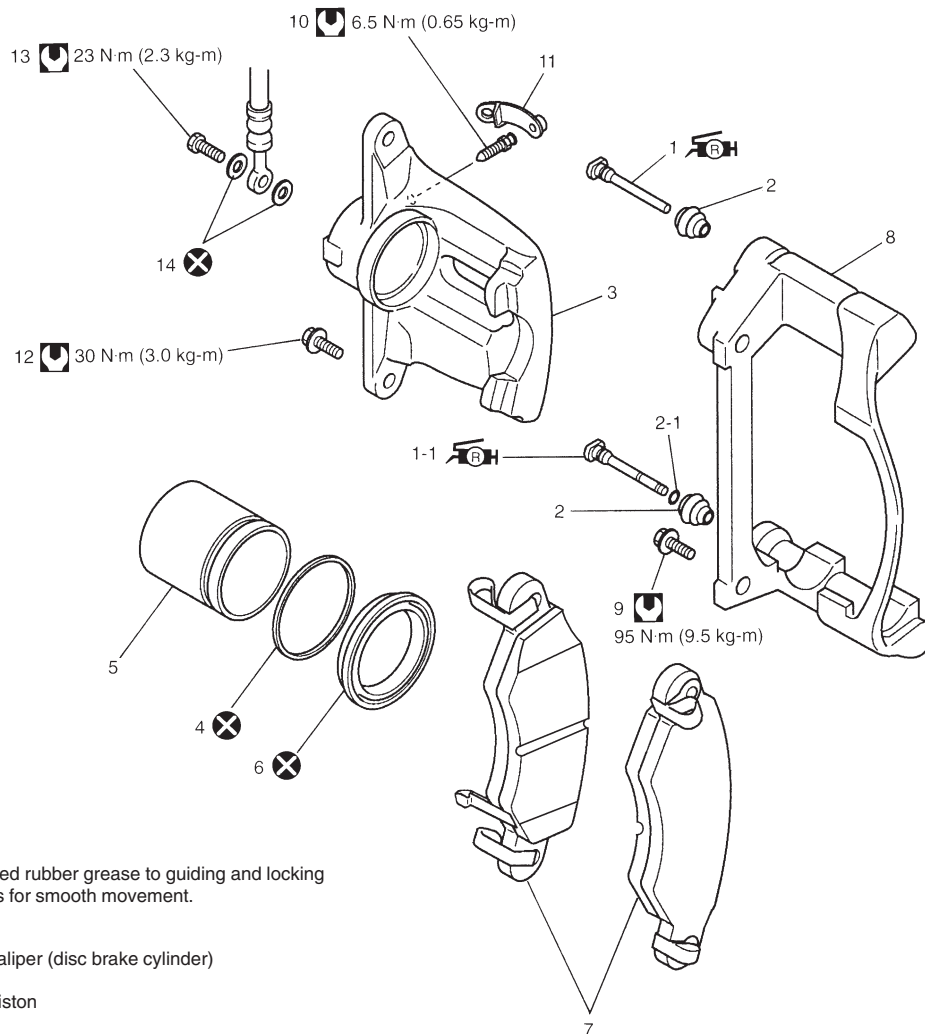
CHECK AND ADJUSTMENT

Refer to Section 5 (BRAKES).

ON-VEHICLE SERVICE**CAUTION:**

Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any component is removed or line disconnected, bleed the brake system.

Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.



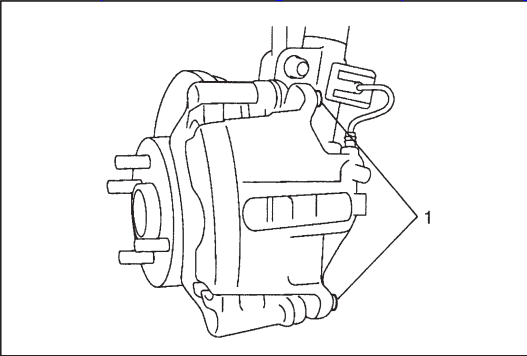
1. Guiding pin:
- 1-1. Locking pin:
Apply specified rubber grease to guiding and locking pins surfaces for smooth movement.
2. Pin boot
- 2-1. O-ring
3. Disc brake caliper (disc brake cylinder)
4. Piston seal
5. Disc brake piston
6. Piston boot
7. Disc brake pad
8. Brake caliper carrier
9. Caliper bolt
10. Bleeder plug
11. Bleeder plug cap
12. Caliper pin bolt
13. Flexible hose bolt
14. Gasket



: Tightening Torque
: Do not reuse

FRONT DISC BRAKE PAD**REMOVAL**

- 1) Hoist vehicle and remove wheel.
- 2) Remove caliper pin bolts (1).

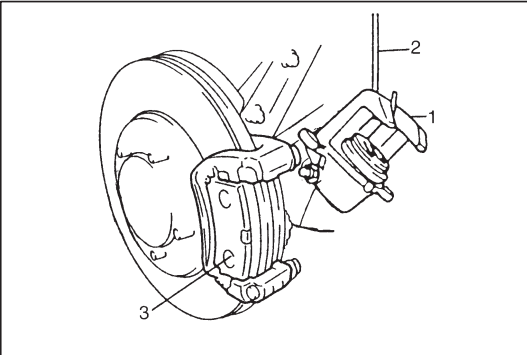


- 3) Remove E-ring from strut and then remove caliper (1) from caliper carrier.

NOTE:

Hang removed caliper with a wire hook (2) or the like so as to prevent brake hose from bending and twisting excessively or being pulled. Don't operate brake pedal with pads removed.

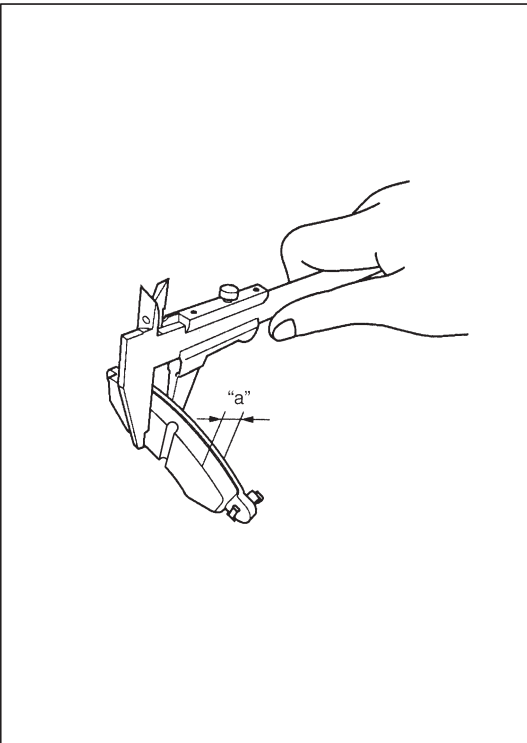
- 4) Remove pads (3).

**INSPECTION****Brake Pad**

Check pad lining for wear. When wear exceeds limit, replace with new one.

CAUTION:

Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.



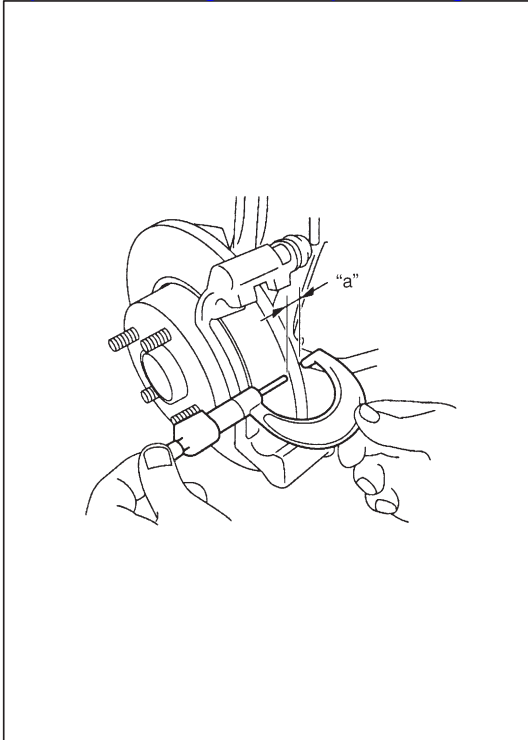
Pad thickness (lining + rim) "a"

Standard : 15.3 mm (0.60 in.)

Service limit : 8.2 mm (0.32 in.)

NOTE:

When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.

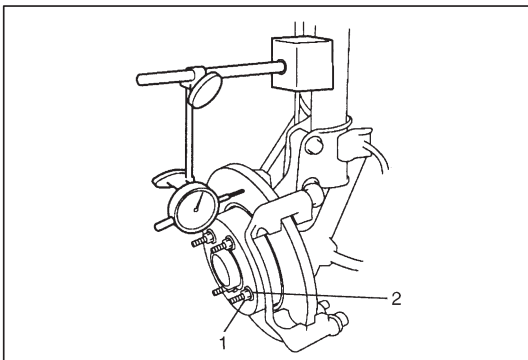
**Brake Disc**

Check disc surface for scratches in wearing parts. Scratches on disc surface noticed at the time of specified inspection or replacement are normal and disc is not defective unless they are serious. But when there are deep scratches or scratches all over disc surface, replace it. When only one side is scratched, polish and correct that side.

Disc thickness "a"

Standard : 12.0 mm (0.47 in.)

Service limit : 10.0 mm (0.39 in.)

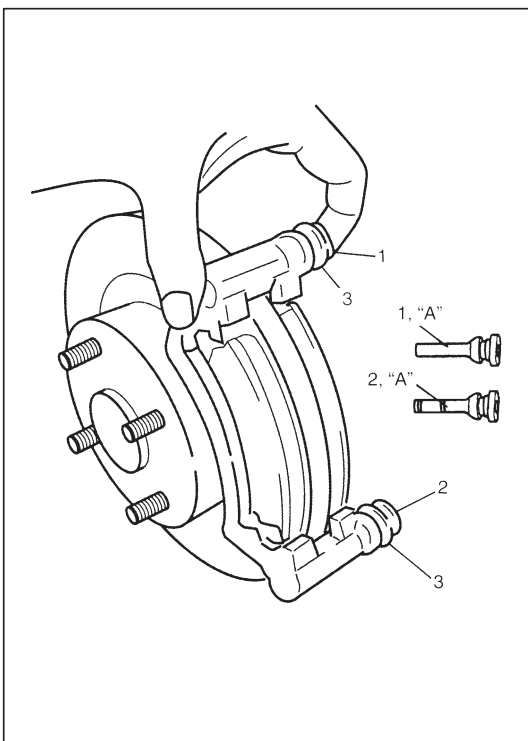


Use wheel nuts (1) and suitable plain washers (2) to hold the disc securely against the hub, then mount a dial indicator as shown and measure the runout at 20 mm (0.79 in.) from the outer edge of the disc.

Limit on disc deflection: 0.15 mm (0.006 in.)

NOTE:

Check front wheel bearing for looseness before measurement.

**Cylinder Slide Guiding and Locking Pins**

Check guiding pin (1) and locking pin (2) for smooth movement as shown.

If it is found faulty, correct or replace. Apply rubber grease to guiding and locking pins outer surface. Rubber grease should be the one whose viscosity is less affected by such low temperature as -40°C (-40°F).

"A": Rubber grease

Locking pin (2) has grooves and O-ring but guiding pin (1) has no groove. Install guiding pin into pin hole of carrier upper side.

Dust Boot

Check boot (3) for breakage, crack and damage. If defective, replace.

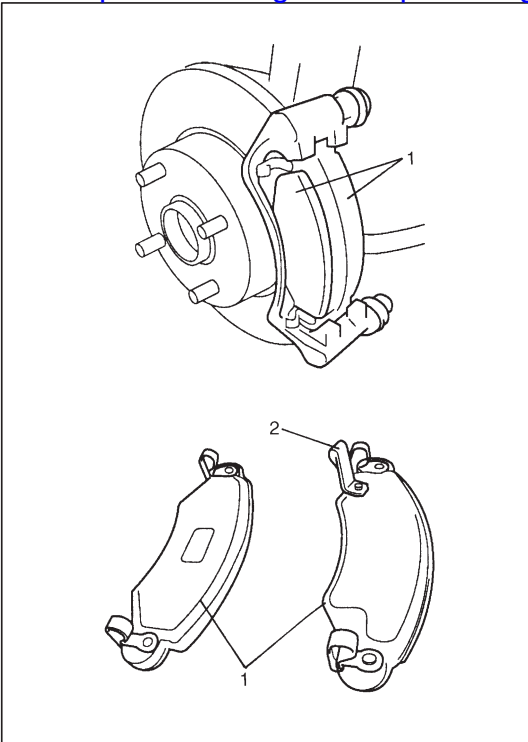
INSTALLATION**CAUTION:**

Observe **CAUTION** at the beginning of **ON-VEHICLE SERVICE**.

- 1) Install pads (1).

NOTE:

Install pad with sensor (2) to vehicle center side.



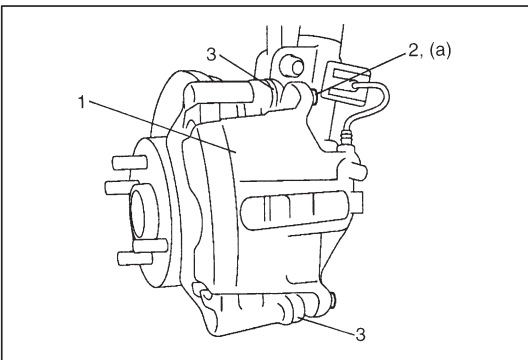
- 2) Install caliper (1) and torque caliper pin bolts (2) to specification.

Tightening Torque

(a): 30 N·m (3.0 kg-m, 22.0 lb-ft)

NOTE:

Make sure that boots (3) are fit into groove securely.

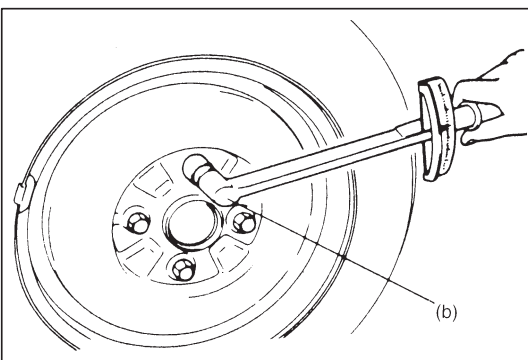


- 3) Torque front wheel nuts to specification.

Tightening Torque

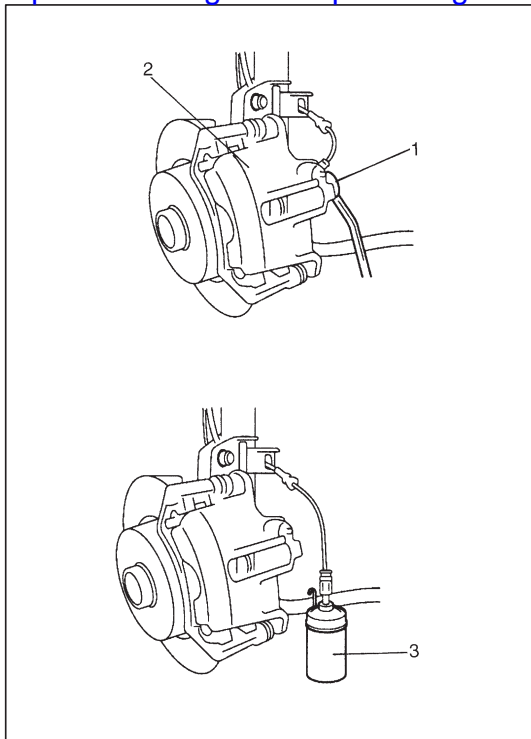
(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 4) Upon completion of installation, perform brake test.

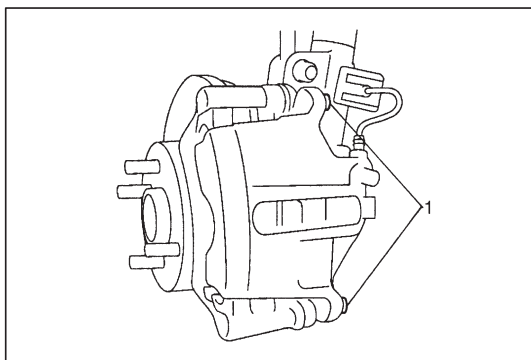


FRONT DISC BRAKE CALIPER**REMOVAL**

- 1) Hoist vehicle and remove wheel.
- 2) Remove brake flexible hose bolt (1) from caliper (2). As this will allow fluid to flow out of hose, have a container (3) ready beforehand.



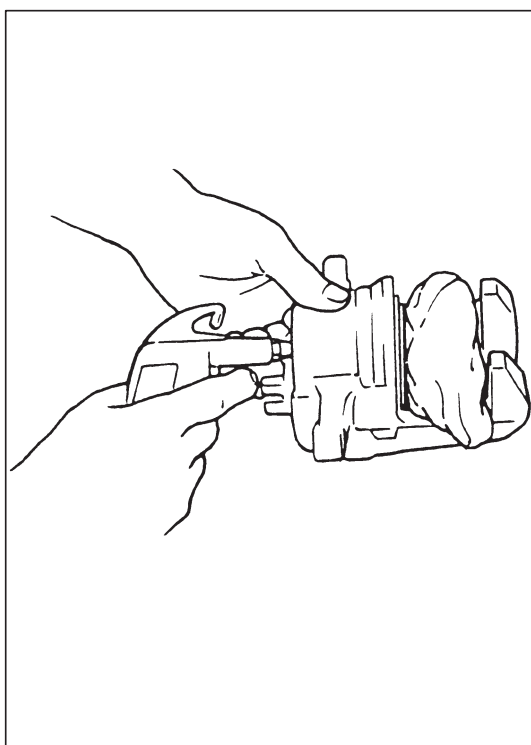
- 3) Remove caliper pin bolts (1).
- 4) Remove caliper.

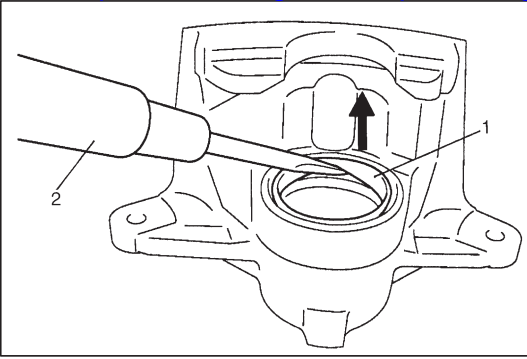
**DISASSEMBLY****WARNING:**

Do not apply too much highly compressed air which will cause piston to jump out of cylinder. It should be taken out gradually with moderately compressed air. Do not place your fingers in front of piston when using compressed air.

Before disassembly, clean all around caliper with brake fluid.

- 1) Blow compressed air into cylinder through bolt hole where flexible hose was fitted.
With this air pressure, piston can be pushed out of cylinder.

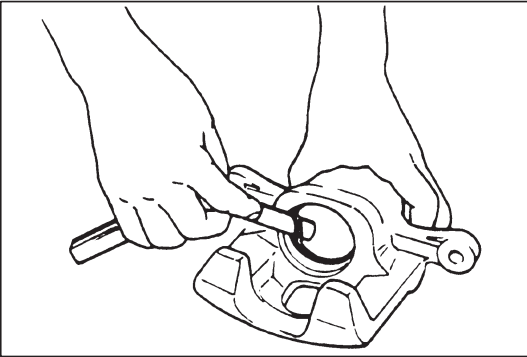




- 2) Remove piston boot (1) prying it with a metal tool (2) (no sharp edge).

CAUTION:

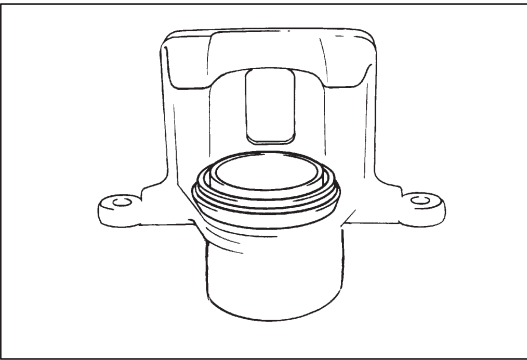
Be careful not to damage inside (bore side) of cylinder.



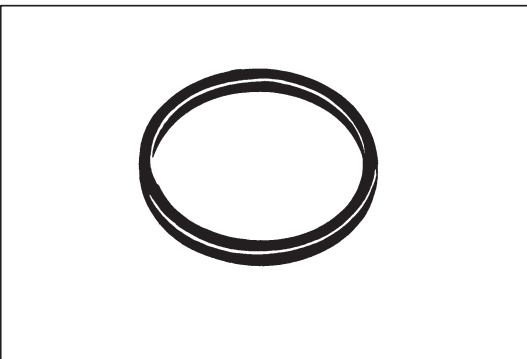
- 3) Remove piston seal using a thin blade like a thickness gauge, etc.

CAUTION:

Be careful not to damage inside (bore side) of cylinder.

**INSPECTION****Piston Boot**

Check boot for breakage, crack and damage. If defective, replace.

**Piston Seal**

Excessive or uneven wear of pad lining may indicate unsmooth return of the piston. In such a case, replace rubber seal.

ASSEMBLY

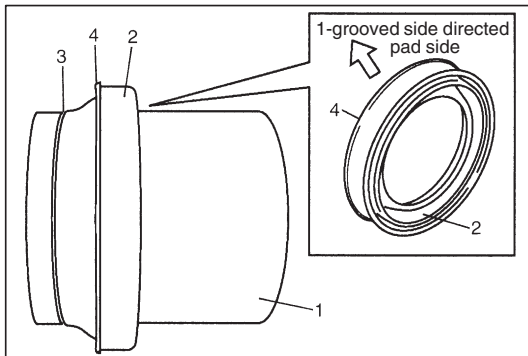
Reassemble front brake in reverse order of disassembly, noting the following points.

CAUTION:

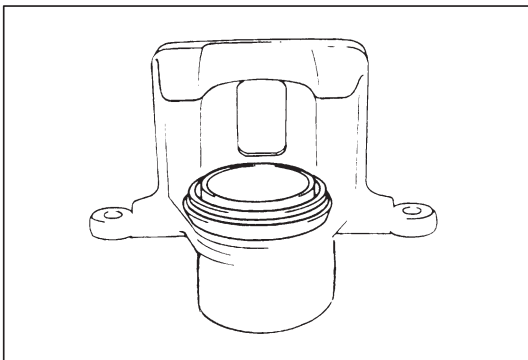
- Wash each part cleanly before installation in the same fluid as the one used in master cylinder reservoir.
- Never use other fluid or thinner.
- Before installing piston and piston seal to cylinder, apply fluid to them.
- After reassembling brake lines, bleed air from them.

Piston Seal

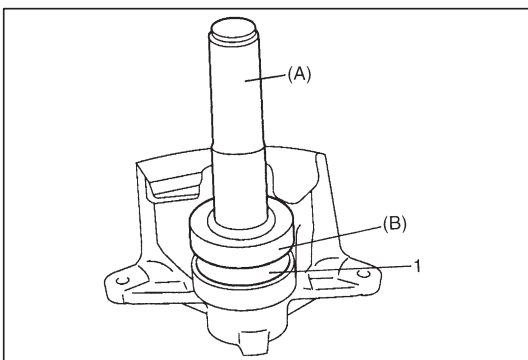
Piston seal is used to seal piston and cylinder and to adjust clearance between pad and disc. Replace with a new one at every overhaul. Fit piston seal into groove in cylinder taking care not to twist it.

**Piston and Boot**

- 1) Fit new boot (2) in groove (3) of piston (1) facing stepped end (4) of boot to groove side.



- 2) Insert piston into cylinder by hand.

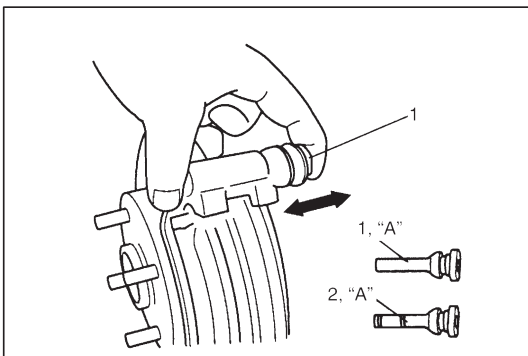


- 3) Drive in boot (1) into cylinder till its end surface becomes flush with cylinder end surface using special tools.

Special Tool

(A): 09924-74510

(B): 09944-88210

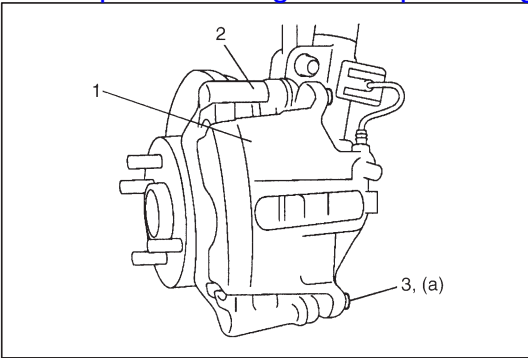
**Caliper**

Before installing caliper (cylinder body) to carrier, check to ensure that guiding pin (1) and locking pin (2) inserted in each caliper carrier hole can be moved smoothly in thrust direction.

NOTE:

Use rubber grease whose viscosity varies very little even at -40°C (-40°F) if applied.

“A”: Rubber grease

**INSTALLATION****CAUTION:**

Observe **CAUTION** at the beginning of **ON-VEHICLE SERVICE**.

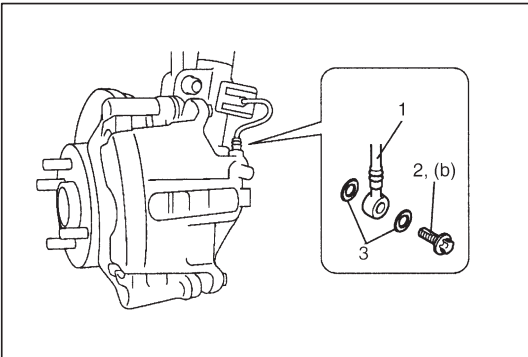
- 1) Install caliper (1) to caliper carrier (2).
- 2) Torque caliper pin bolts (3) to specifications.

Tightening Torque

(a): 30 N·m (3.0 kg-m, 22.0 lb-ft)

NOTE:

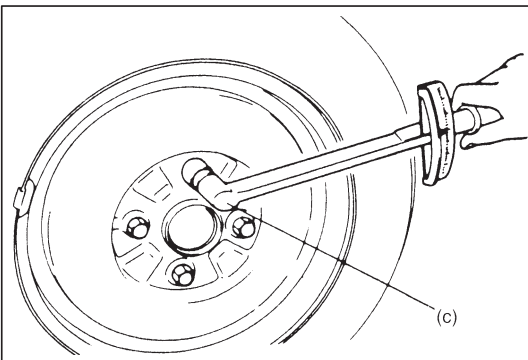
Make sure that boots are fit into groove securely.



- 3) Install brake flexible hose (1) and new gaskets (3) as shown and torque hose bolt (2) to specification.

Tightening Torque

(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

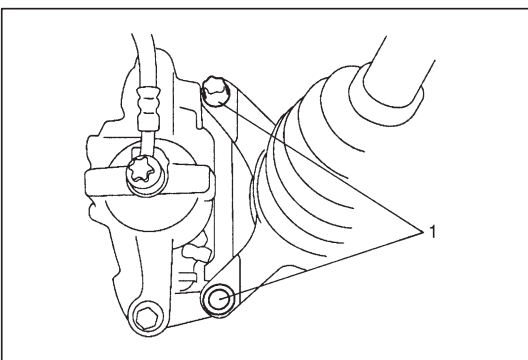


- 4) Torque wheel nuts to specification.

Tightening Torque

(c): 85 N·m (8.5 kg-m, 61.5 lb-ft)

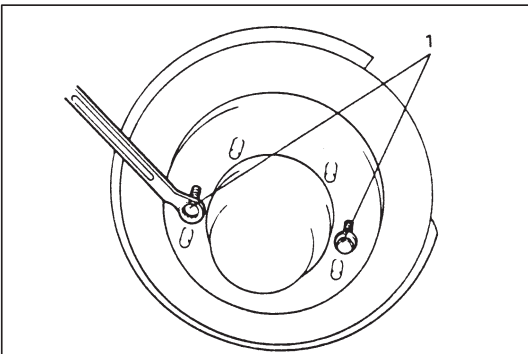
- 5) After completing installation, fill reservoir with brake fluid and bleed brake system. Perform brake test and check each installed part for oil leakage.

**FRONT BRAKE DISC****CAUTION:**

During removal, be careful not to damage brake flexible hose and not to depress brake pedal.

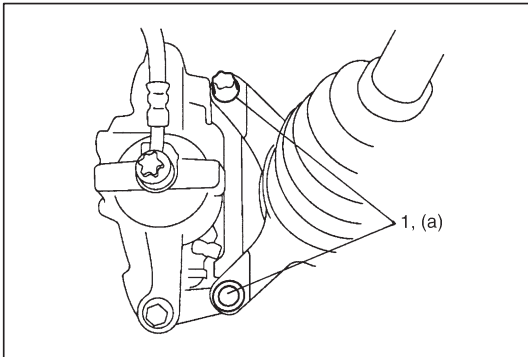
REMOVAL

- 1) Hoist vehicle and remove wheel.
- 2) Remove caliper assembly by loosening carrier bolts (1).
- 3) Remove disc by using 8 mm bolts (1) (2 pcs).



INSPECTION

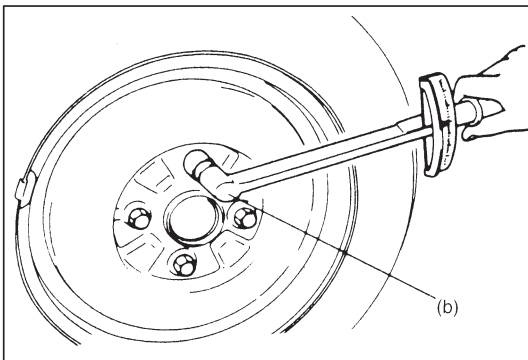
Refer to FRONT DISC BRAKE PAD INSPECTION.

**INSTALLATION**

- 1) Install disc to wheel hub.
- 2) Install caliper assembly to steering knuckle.
- 3) Torque caliper carrier bolts (1) to specification.

Tightening Torque

(a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



- 4) Torque front wheel nuts to specifications.

Tightening Torque

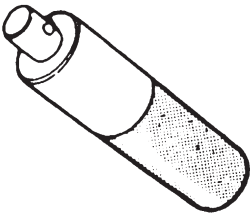

(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 5) Upon completion of installation, perform brake test.

REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED PRODUCT	USE
Brake fluid	DOT 4 or SAE J1704	<ul style="list-style-type: none">● To fill master cylinder reservoir.● To clean and apply to inner parts of caliper and wheel cylinder when they are disassembled.
Rubber grease	An equivalent of Molykote PG 54 plastislip or Molykote Q5-7544 (DOW CORNING made)	To caliper guiding and locking pins.

SPECIAL TOOLS

	
09924-74510 Bearing installer	09944-88210 Bearing installer

SECTION 5C

PARKING AND REAR BRAKE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

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Parking Brake Lever	5C- 4
Parking Brake Cable	5C- 5
Brake Drum	5C- 7
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Brake Back Plate	5C-14
REQUIRED SERVICE MATERIALS	5C-17
SPECIAL TOOLS	5C-17

GENERAL DESCRIPTION

DRUM BRAKE ASSEMBLY

The drum brake assembly is of leading and trailing type drum brake and has a self shoe clearance adjusting system so that drum-to-shoe clearance is maintained appropriate at all times. The parking brake is mechanical and applies brake force to only rear wheels by means of the cable, linkage and shoes.

DIAGNOSIS

Refer to SECTION 5 (BRAKES).

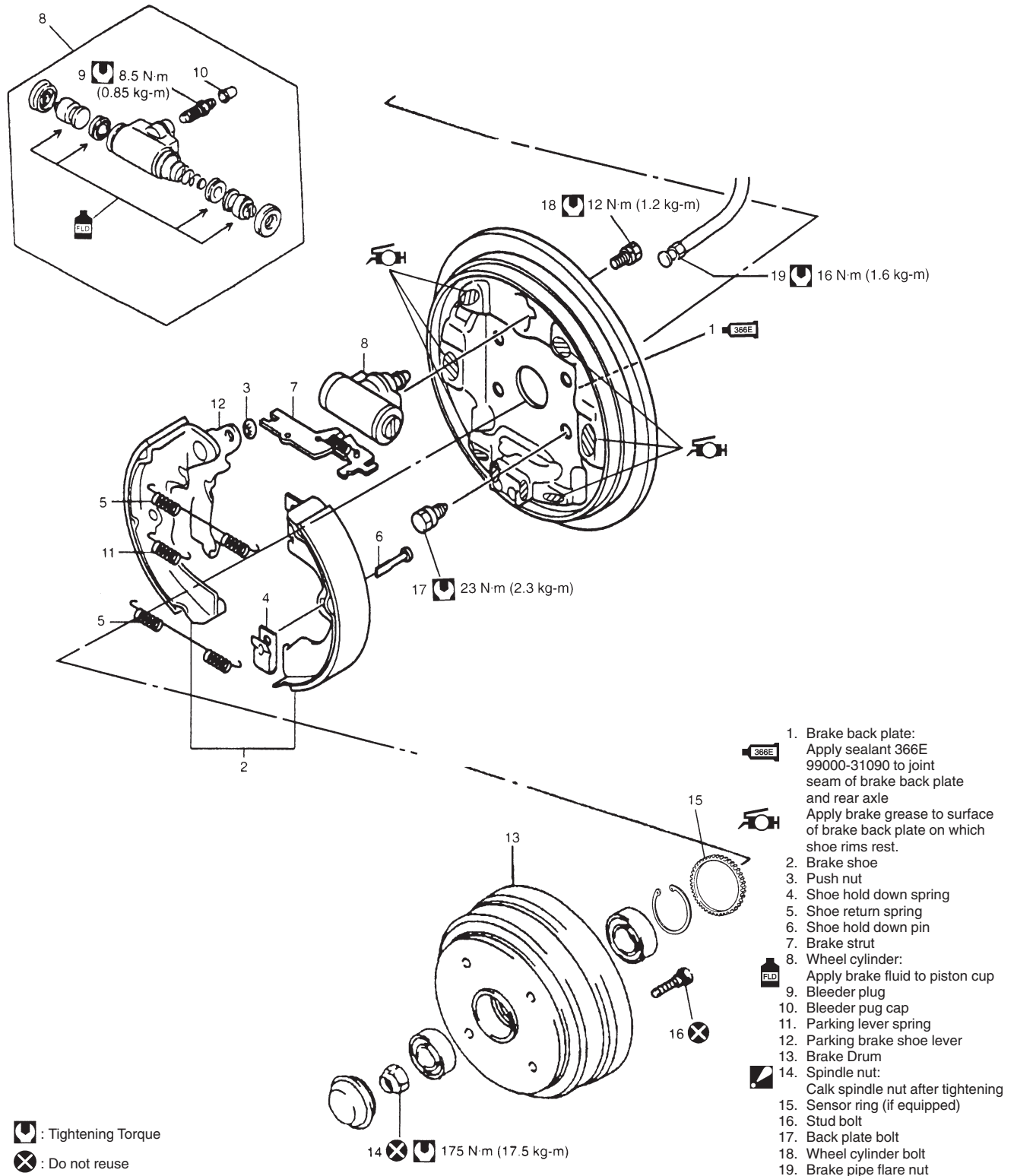
CHECK AND ADJUSTMENT

Refer to SECTION 5 (BRAKES).

ON-VEHICLE SERVICE

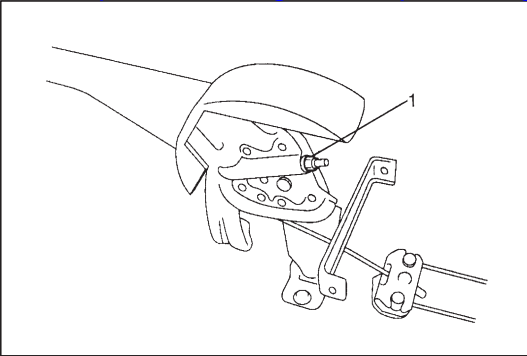
CAUTION:

- Replace all components included in repair kits to service this drum brake. Lubricate parts as specified.
- If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- The torque values specified are for dry, unlubricated fasteners.

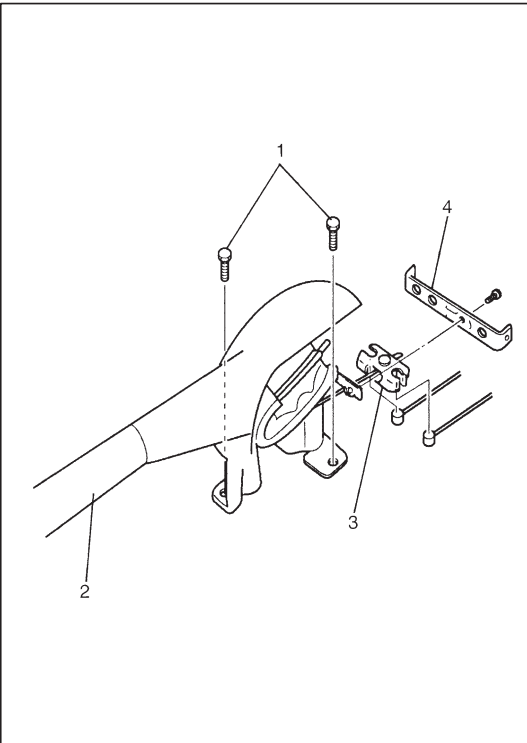


PARKING BRAKE LEVER**REMOVAL**

- 1) Disconnect negative (–) cable at battery.
- 2) Remove console box.
- 3) Block vehicle wheels and release parking brake lever.
- 4) Disconnect lead wire of parking brake switch at coupler.
- 5) Loosen parking brake cable adjusting nut (1).



- 6) Remove parking brake lever bolts (1) and then remove parking brake lever assembly (2) with equalizer (3).
- 7) Remove console box bracket (4) from parking brake lever assembly.

**NOTE:**

Don't disassemble parking brake lever switch. It must be removed and installed as a complete switch assembly.

INSTALLATION

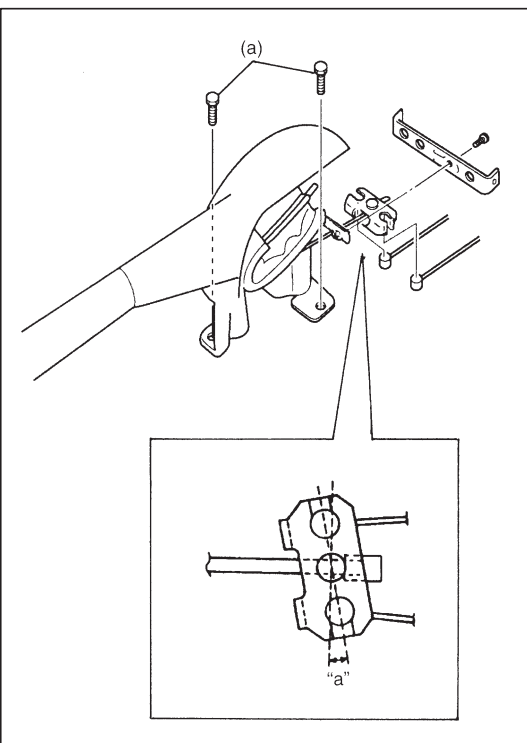
- 1) Install in reverse order of REMOVAL procedure.
Check equalizer inclined angle.

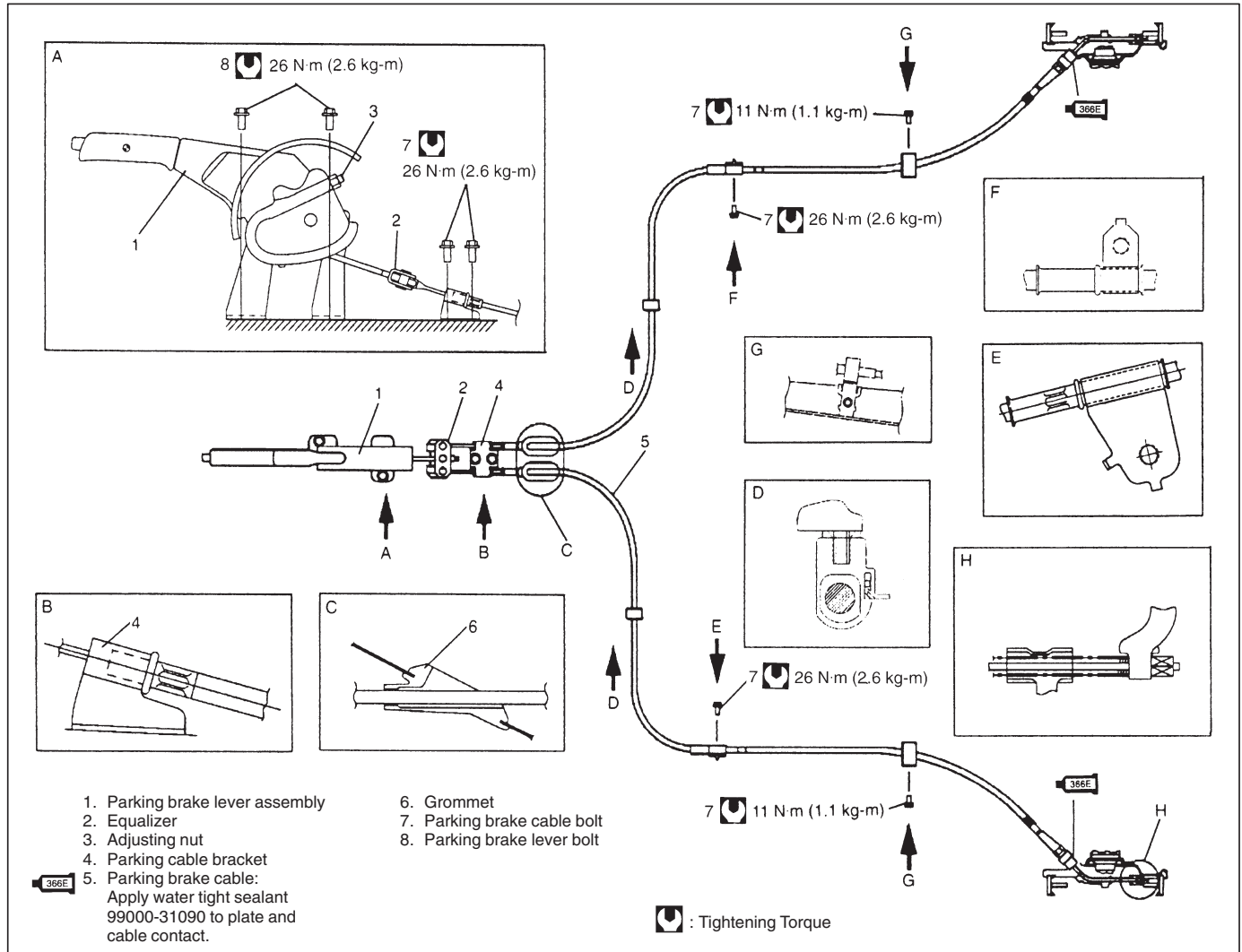
Angle "a": within 15 degrees

Tightening Torque

(a): 26 N·m (2.6 kg-m, 19.0 lb-ft)

- 2) After all parts are installed, parking brake lever needs to be adjusted. Refer to PARKING BRAKE INSPECTION AND ADJUSTMENT in SECTION 5.
- 3) Check brake drum for dragging and brake system for proper performance.



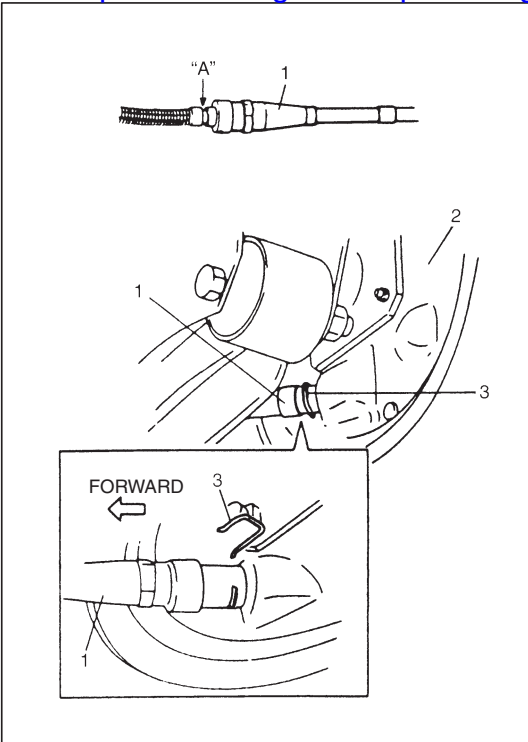
PARKING BRAKE CABLE**REMOVAL**

- 1) Remove brake drum. (Refer to steps 1) to 5) of BRAKE DRUM REMOVAL of this section.)
- 2) Disconnect parking brake cable from brake shoe lever. (Refer to steps 2) to 4) of BRAKE SHOE REMOVAL of this section.)
- 3) Disconnect brake cable from brake back plate. (Refer to step 4) of BRAKE BACK PLATE REMOVAL of this section.)

NOTE:

When it is necessary to remove both right and left parking brake cables, repeat above steps 1) and 2) on right and left wheels.

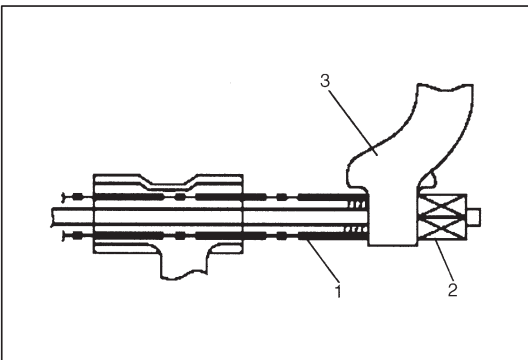
- 4) Remove cable from equalizer.

**INSTALLATION**

Install parts in reverse order of REMOVAL procedure, noting the following.

- 1) Distinguish right side parking brake cable from left side one with its clamp width.
Parking brake cable with narrow clamp should be installed to right side of vehicle.
- 2) Apply water tight sealant where plate and cable contact, and run parking brake cable (1) through brake back plate (2) and secure it with clip (3).

"A": Sealant 366E, 99000-31090

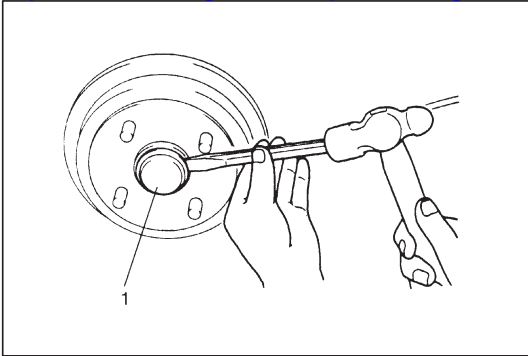


- 3) Install brake cable spring (1) and nipple end (2) to parking brake shoe lever (3) securely as shown in figure.

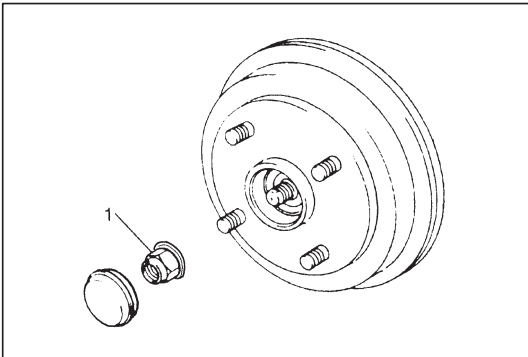
- 4) For brake shoe installation, refer to steps 1) to 3) of BRAKE SHOE INSTALLATION of this section.
- 5) For brake drum installation, refer to steps 3) to 8) of BRAKE DRUM INSTALLATION of this section.
- 6) For proper routing and secure clamping of parking brake cable.
- 7) Install cable to equalizer.
- 8) Upon completion of installation, adjust cable. (Refer to PARKING BRAKE INSPECTION AND ADJUSTMENT in SECTION 5.) Then check brake drum for dragging and brake system for proper performance. After removing vehicle from hoist, brake test should be performed.

BRAKE DRUM**REMOVAL**

- 1) Hoist vehicle and remove wheel.
- 2) Remove spindle cap (1) as shown (by hammering lightly at 3 locations around it so as not to deform or cause damage to seating part of cap).



- 3) Uncalk spindle nut, remove spindle nut (1).

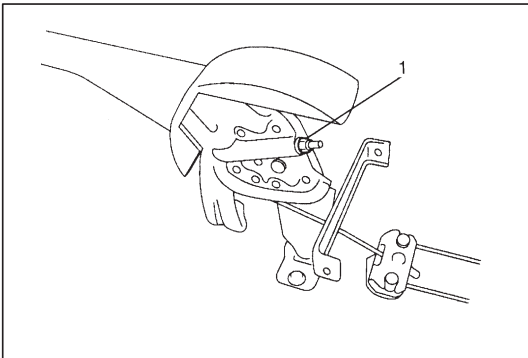


- 4) Release parking brake lever.

- 5) Remove brake drum.

If brake drum can not be removed easily, increase clearance between brake shoes and drum as follows.

- a) Remove console box and loosen parking brake cable adjusting nut (1).



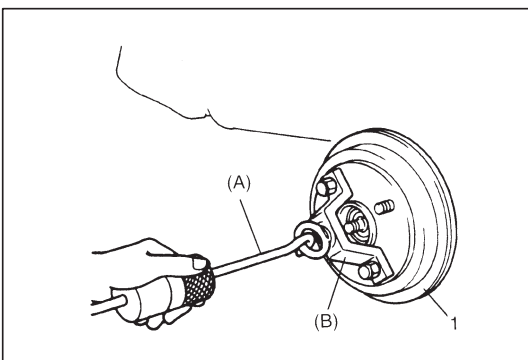
- b) Pull brake drum (1) off by hand.

If it is hard to remove, use special tools.

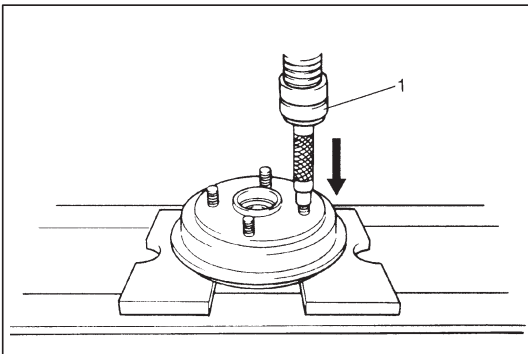
Special Tool

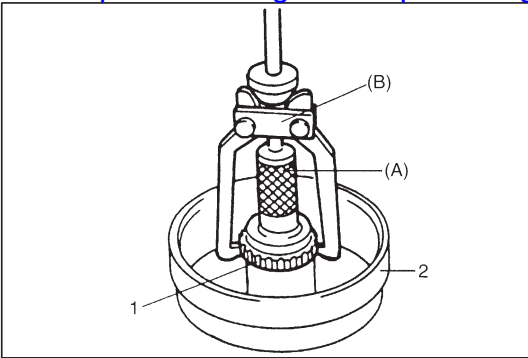
(A): 09942-15510

(B): 09943-17912



- 6) Remove wheel stud bolts by using hydraulic press (1).





- 7) Remove sensor ring (1) from brake drum (2) using special tools (if equipped with ABS).

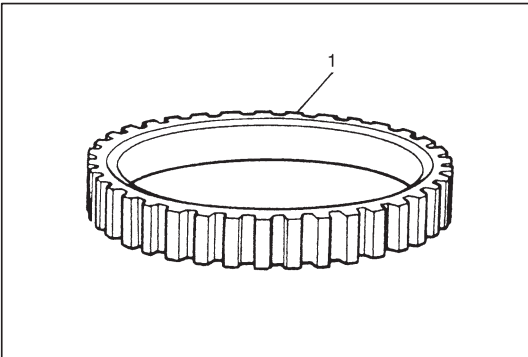
CAUTION:

Pull out sensor ring from brake drum gradually and evenly. Attempt to pull it out partially may cause it to be deformed.

Special Tool

(A): 09913-75520

(B): 09913-65135

**INSPECTION****Sensor Ring (if equipped with ABS)**

- Check ring serration (teeth) for being missing, damaged or deformed.
 - Check sensor ring for being deformed (warped).
 - Check that no foreign material is attached.
- If any malfunction is found, repair or replace.

**Brake Drum**

Inspect drum for cleanliness. Check wear of its braking surface by measuring its inside diameter.

Inside diameter

Standard : 180 mm (7.09 in.)

Service Limit : 182 mm (7.16 in.)

Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves.

Cracked, Scored, or Grooved Drum

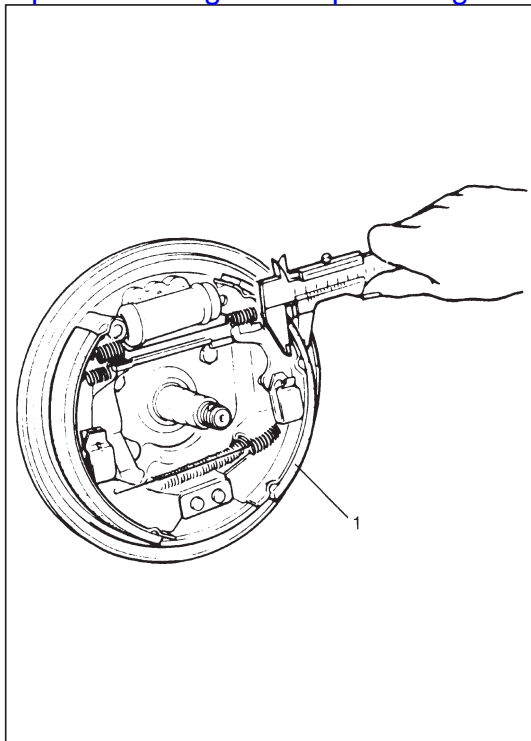
A cracked drum is unsafe for further service and must be replaced. Do not attempt to weld a cracked drum.

Smooth up any slight scores. Heavy or extensive scoring will cause excessive brake lining wear and it will probably be necessary to re-surface drum braking surface.

If brake linings are slightly worn and drum is grooved, drum should be polished with fine emery cloth but should not be turned.

NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point, if any.

**Brake shoe**

Where lining is worn out beyond service limit, replace shoe.

Thickness (lining + shoe rim)

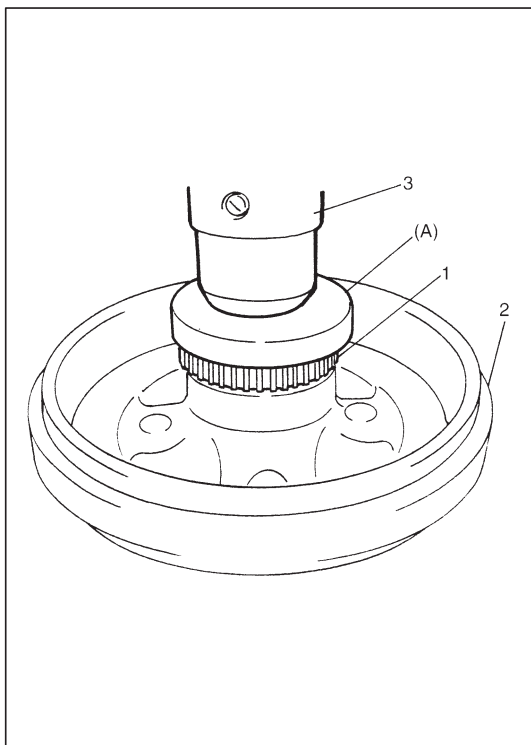
Standard : 5.5 mm (0.22 in.)

Service limit: 2.6 mm (0.10 in.)

If one of brake linings is to service limit, all linings must be replaced at the same time.

CAUTION:

Never polish lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage drum. When it is required to correct lining, replace it with a new one.

**INSTALLATION**

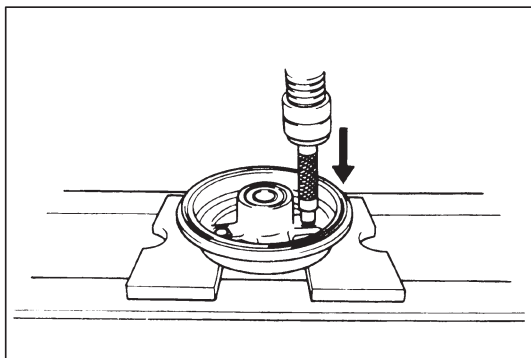
- 1) Install new sensor ring (1) to brake drum (2) by using special tool and hydraulic press (3) (if equipped with ABS).

CAUTION:

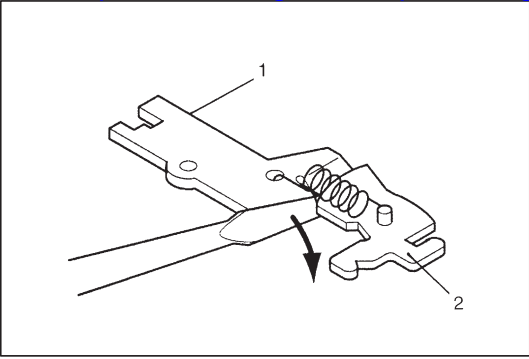
Do not reuse (reinstall) removed sensor ring.
Used sensor ring can not be press-fitted securely.

Special Tool

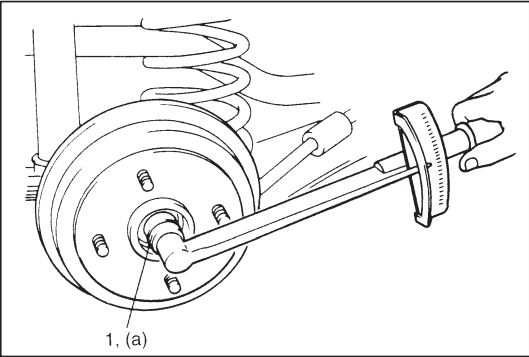
(A): 09926-68310



- 2) Insert new stud in drum hole and rotate it slowly to assure serrations are aligned with those made by replaced bolt.



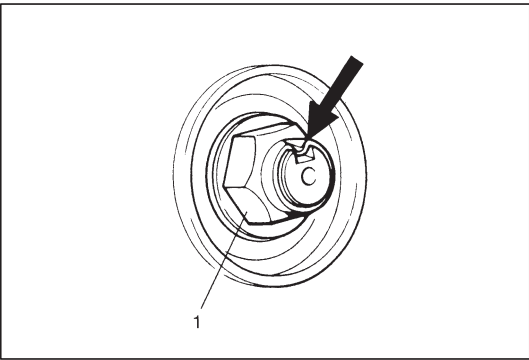
- 3) Put flat head rod or the like between rod (1) and ratchet (2) and pull ratchet as shown to maximize clearance between shoe and drum.



- 4) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.
5) Install new spindle nut (1).
6) Tighten spindle nut (1) to specified torque.

Tightening Torque

(a): 175 N·m (17.5 kg-m, 126.5 lb-ft)



- 7) Calk spindle nut (1).
8) Install spindle cap.

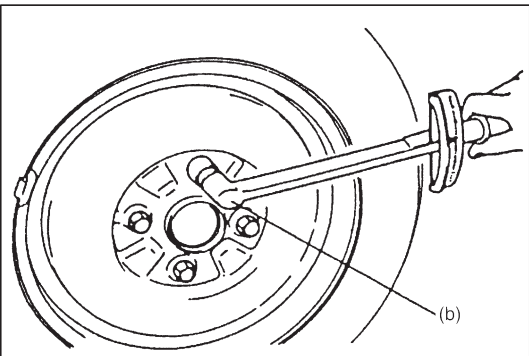
NOTE:

- When installing spindle cap, hammer lightly several locations on the collar of cap until collar comes closely into contact with brake drum.
- If fitting part of cap is deformed or damaged or if it is fitted loosely, replace with new one.

- 9) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.

Adjust parking brake cable. (For adjustment, see PARKING BRAKE INSPECTION AND ADJUSTMENT in SECTION 5.)

- 10) Install console box if removed.



- 11) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

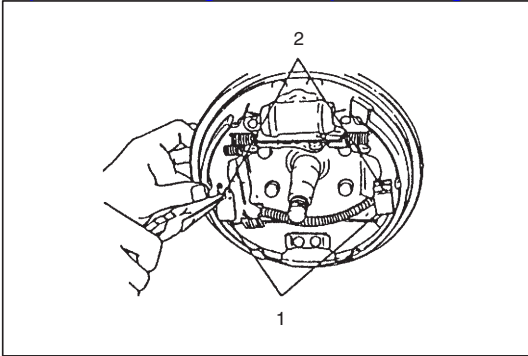
(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 12) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).

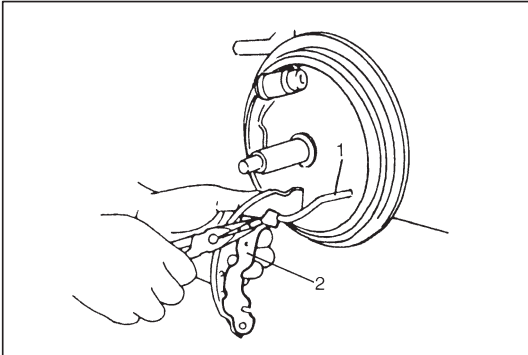
BRAKE SHOE

REMOVAL

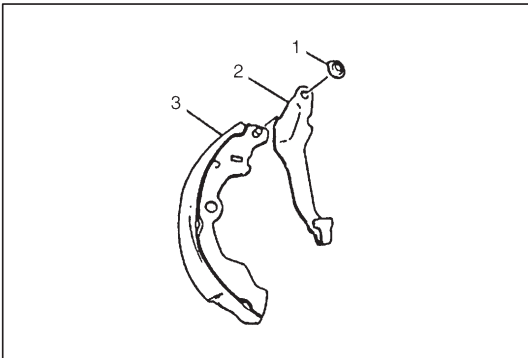
- 1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL.
- 2) Remove shoe hold down springs (1) by turning shoe hold down pins (2).
- 3) Remove return springs, brake shoes and strut.

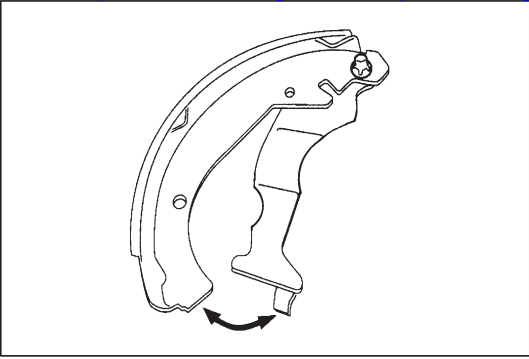


- 4) Disconnect parking brake cable (1) from parking brake shoe lever (2).

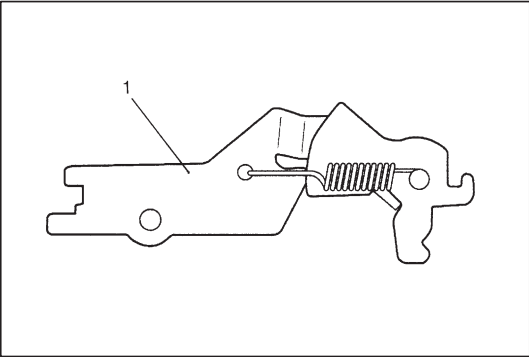


- 5) Remove push nut (1).
- 6) Remove parking brake shoe lever (2) from shoe rim (3).

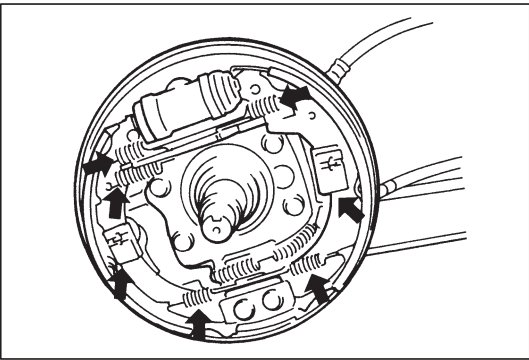


**INSPECTION****Parking Shoe Lever**

Inspect brake shoe lever for smooth movement along shoe rim. If defective, correct or replace.

**Brake Strut**

- Check ratchet of brake strut (1) assembly for wear or damage.
- Check shoe return spring, strut shoe return spring and shoe hold down spring for damage, corrosion and weakening.

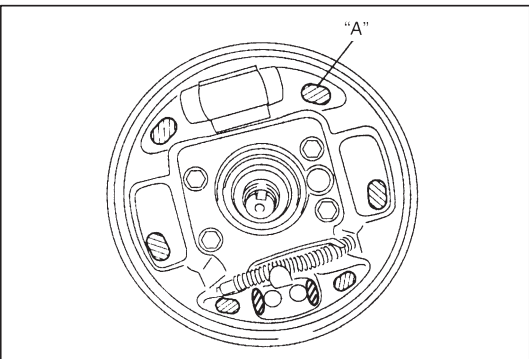
**Springs**

Inspect for damage or weakening.

Inspect each part with arrow for rust. If found defective, replace.

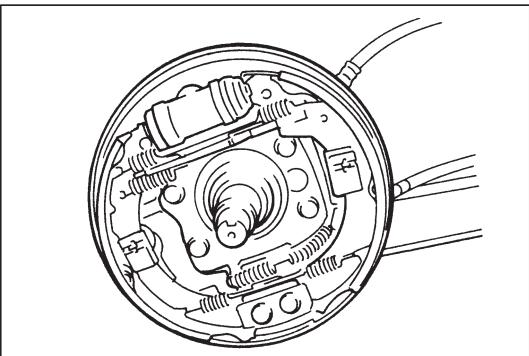
Brake Shoe

Refer to BRAKE DRUM INSPECTION in this section.

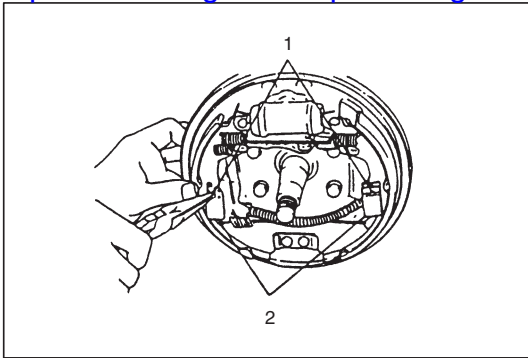
**INSTALLATION**

- 1) Clean brake back plate and apply thin coat of grease to eight surfaces on which shoe rims rest.

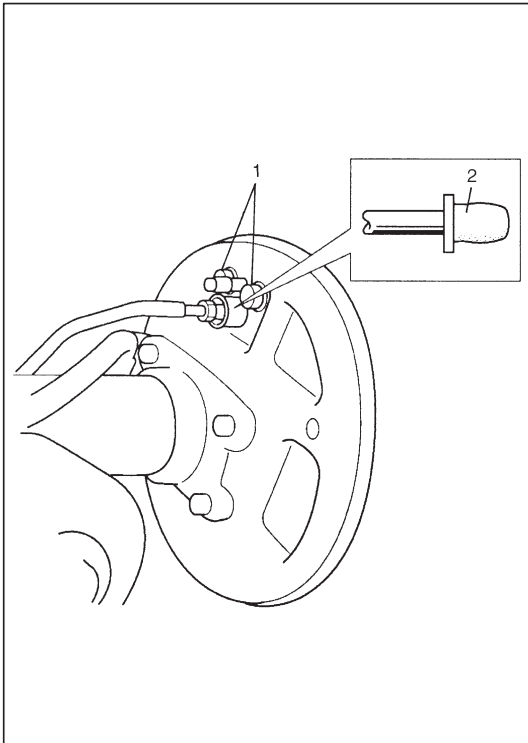
"A": Bentonite base brake grease (Anti-squeal agent)



- 2) Assemble parts as shown in reverse order of REMOVAL.



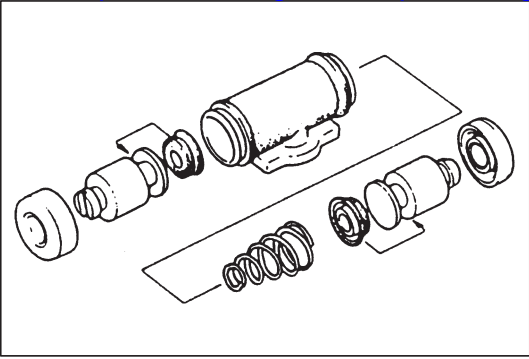
- 3) Install shoe hold down springs (2) by pushing them down in place and turning hold down pins (1).
- 4) For procedure hereafter, refer to steps 3) to 12) of BRAKE DRUM INSTALLATION in this section.



WHEEL CYLINDER

REMOVAL

- 1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL.
- 2) Perform steps 2) to 4) of BRAKE SHOE REMOVAL.
- 3) Loosen brake pipe flare nut but only within the extent that fluid does not leak.
- 4) Remove wheel cylinder mounting bolts (1). Disconnect brake pipe from wheel cylinder and put wheel cylinder bleeder plug cap (2) onto pipe to prevent fluid from spilling.

**INSPECTION**

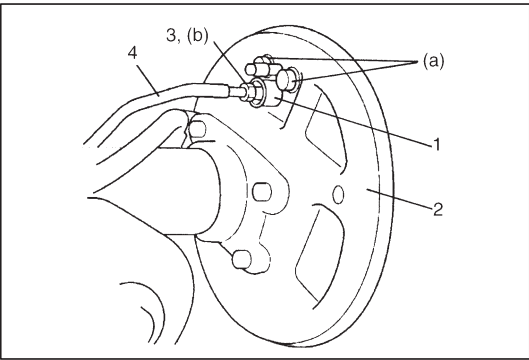
Inspect wheel cylinder disassembled parts for wear, cracks, corrosion or damage.

NOTE:

Clean wheel cylinder components with brake fluid.

INSTALLATION

- 1) Take off bleeder plug cap from brake pipe and connect pipe (for pipes) to wheel cylinder just enough to prevent fluid from leaking.



- 2) Tighten wheel cylinder (1) to brake back plate (2) to specified torque.
- 3) Torque flare nut (3) of brake pipe (4) which was connected in step 1) to specification.

Tightening Torque

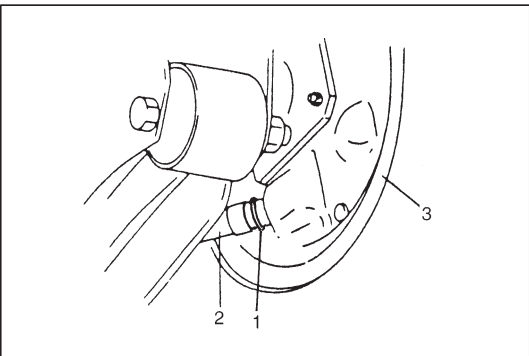
(a): 12 N·m (1.2 kg-m, 9.0 lb-ft)

(b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

- 4) Install bleeder plug cap taken off from pipe back to bleeder plug.
- 5) For procedure hereafter, refer to steps 1) to 6) of BRAKE SHOE INSTALLATION.

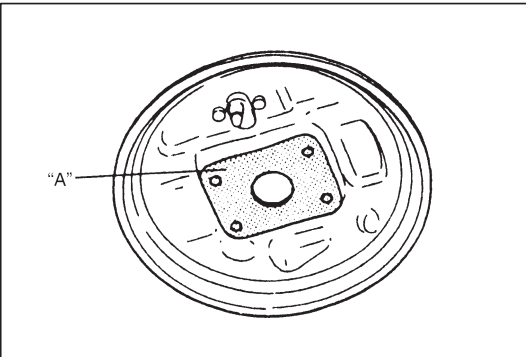
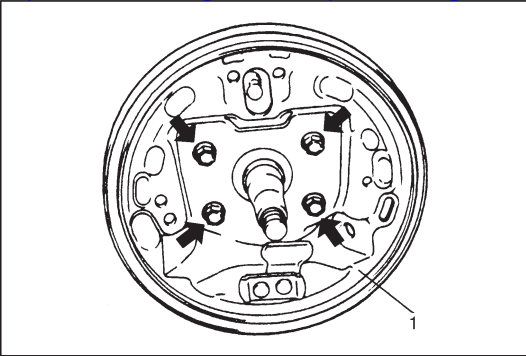
NOTE:

Be sure to bleed brake system. (for bleeding operation, see BLEEDING BRAKES in SECTION 5.)

**BRAKE BACK PLATE****REMOVAL**

- 1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL in this section.
- 2) Perform steps 2) to 4) of BRAKE SHOE REMOVAL in this section.
- 3) Perform steps 3) and 4) of WHEEL CYLINDER REMOVAL in this section.
- 4) Remove parking brake cable securing clip (1) and disconnect brake cable (2) from brake back plate (3).

- 5) Remove brake back plate (1) from rear axle.



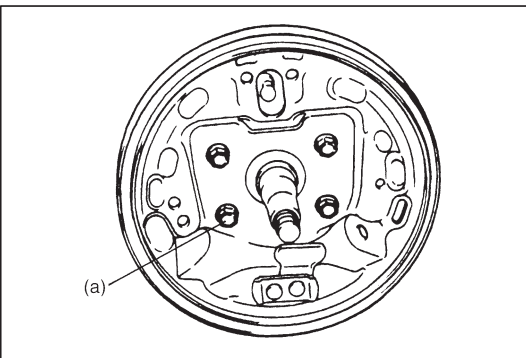
INSTALLATION

- 1) Apply water tight sealant to mating surfaces of brake back plate and rear axle.

"A": Sealant 366E, 99000-31090

NOTE:

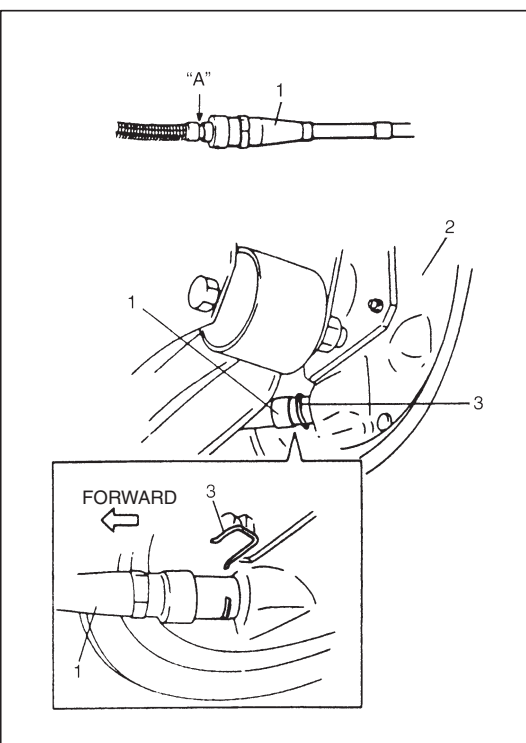
In case of vehicle equipped with ABS, do not apply sealant around hole for wheel speed sensor.



- 2) Install brake back plate and tighten back plate bolts to specified torque.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 16.5 lb-ft)

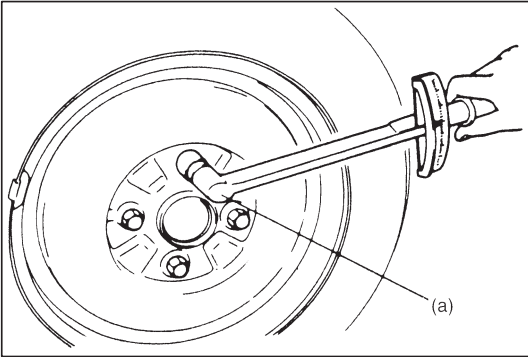


- 3) Apply water tight sealant where plate and cable contact, and run parking brake cable (1) through brake back plate (2) and secure it with clip (3).

"A": Sealant 366E, 99000-31090

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- 4) Install wheel cylinder, and tighten wheel cylinder bolts and brake pipe flare nut to specified torque. (Refer to steps 1) to 4) of WHEEL CYLINDER INSTALLATION in this section.)
- 5) Install brake shoes, referring to steps 1) to 3) of BRAKE SHOE INSTALLATION in this section.
- 6) Install brake drum. Refer to steps 3) to 8) of its INSTALLATION in this section.
- 7) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, see BLEEDING BRAKES in SECTION 5.)



- 8) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

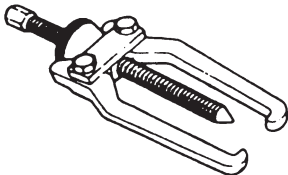
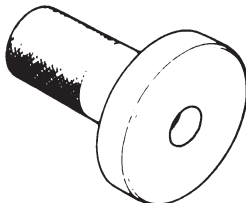
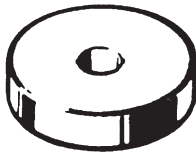
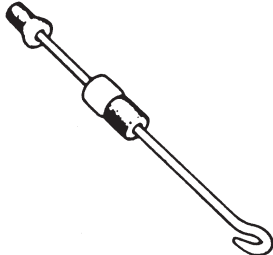
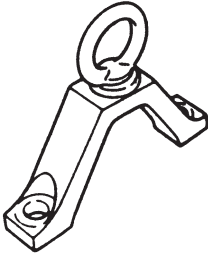

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 9) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable. (For adjustment, see PARKING BRAKE INSPECTION and ADJUSTMENT in SECTION 5.)
- 10) Install console box, if removed.
- 11) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).
- 12) Check each installed part for oil leakage.

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED PRODUCT	USE
Brake fluid	DOT 4 or SAE J1704	<ul style="list-style-type: none"> • To fill master cylinder reservoir. • To clean and apply to inner parts of caliper and wheel cylinder when they are disassembled.
Water tight sealant	SEALING COMPOUND 366E 99000-31090	<ul style="list-style-type: none"> • To apply to mating surfaces of brake back plate and rear wheel cylinder. • To apply to contact position of parking brake cable and back plate. • To apply to mating surfaces of brake back plate and rear axle.
Anti-squeal agent	Hydrocarbon base brake grease	<ul style="list-style-type: none"> • To coat thinly to surface on which shoe rims rest.

SPECIAL TOOLS

 <p>09913-65135 Bearing puller</p>	 <p>09913-75520 Bearing installer</p>	 <p>09926-68310 Bearing installer</p>	 <p>09942-15510 Sliding hammer</p>
 <p>09943-17912 Brake drum remover (Front wheel hub remover)</p>	 <p>09950-78230 Flare nut wrench (10 × 11 mm)</p>		

SECTION 5E1

ANTILOCK BRAKE SYSTEM (ABS)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

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GENERAL DESCRIPTION

COMPONENTS AND PARTS LOCATION

The ABS (Antilock Brake System) controls the fluid pressure applied to the Wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied.

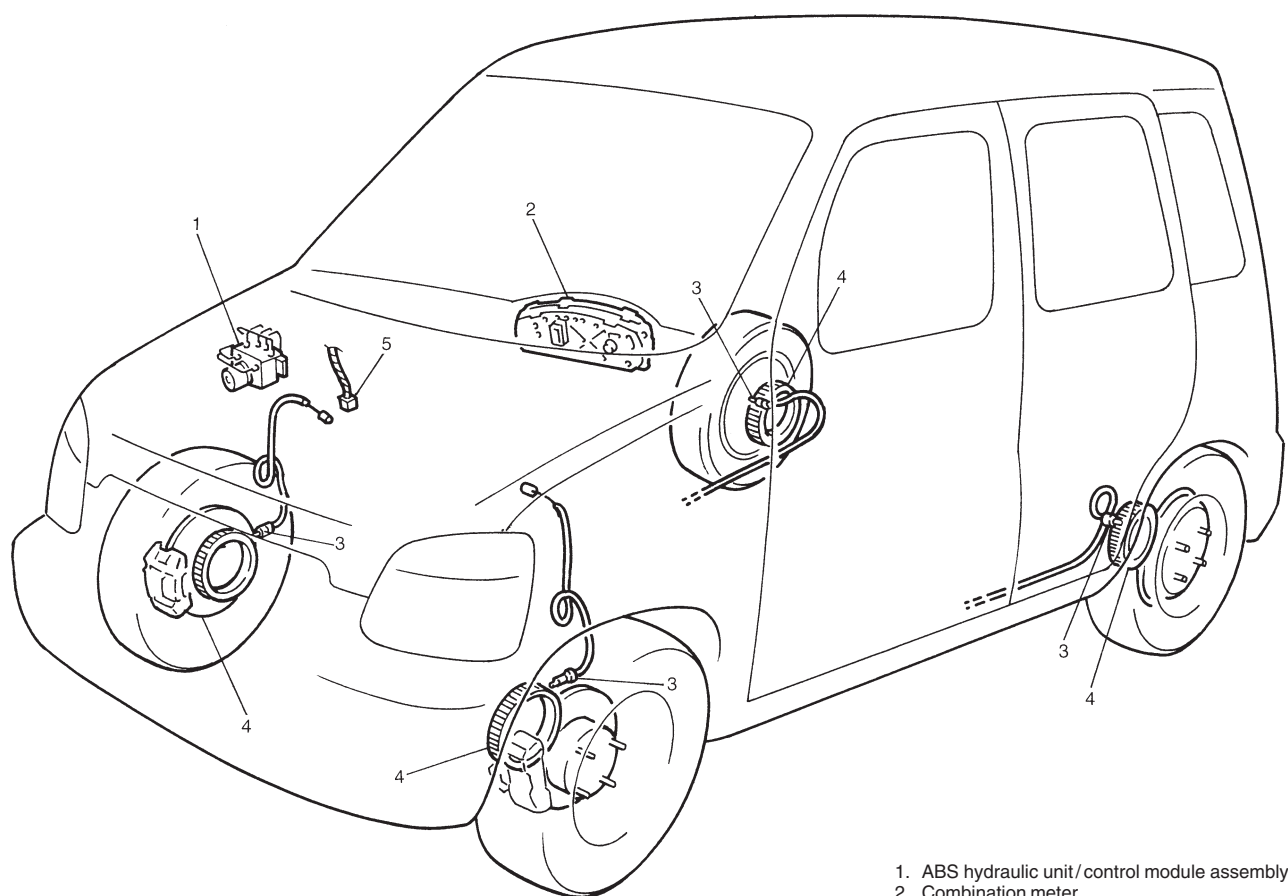
This ABS has also the following function.

While braking is applied, but before ABS control becomes effective, braking force is distributed between the front and rear so as to prevent the rear wheels from being locked too early for better stability of the vehicle.

The main component parts of this ABS include the following parts in addition to those of the conventional brake system.

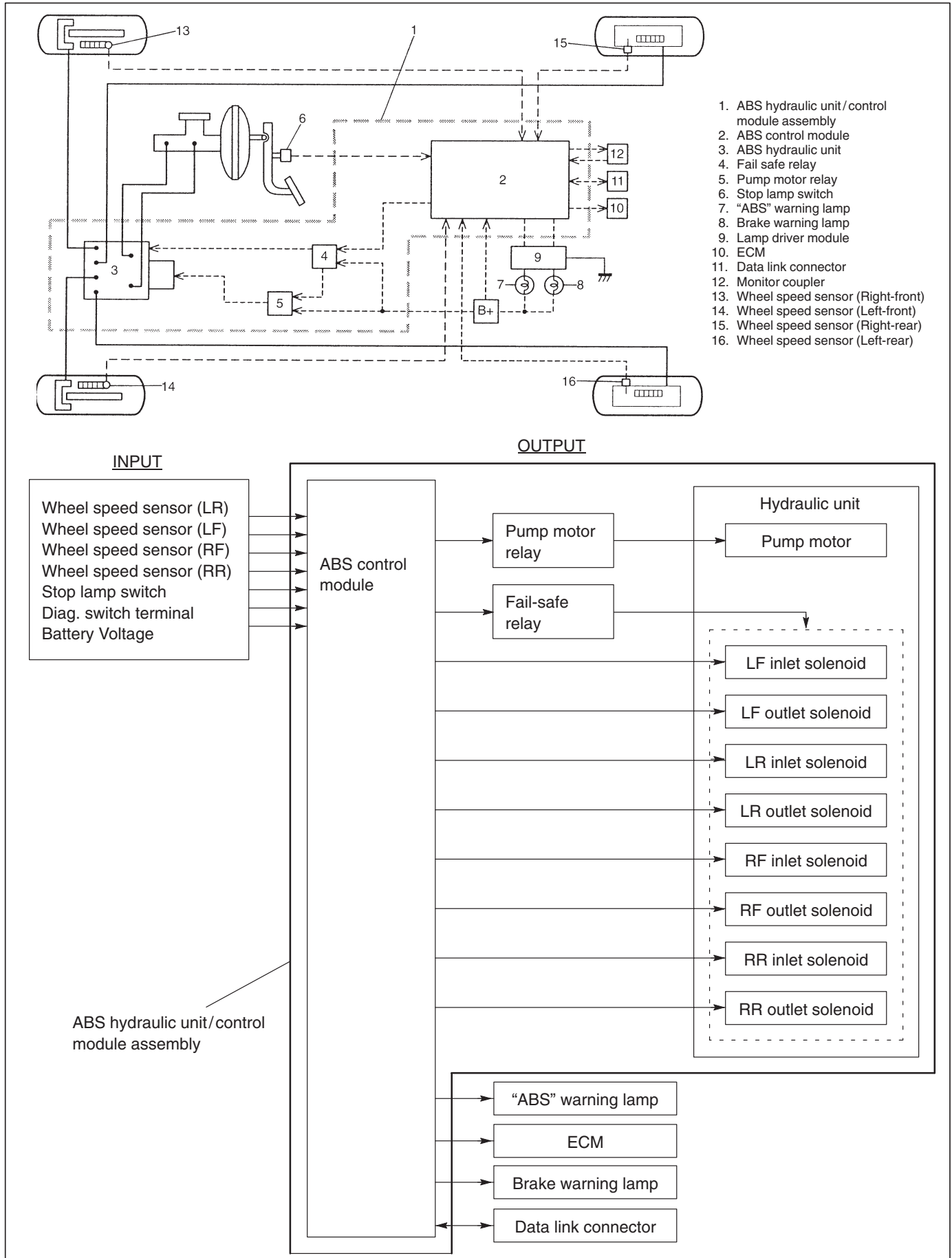
- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- “ABS” warning lamp which lights to inform abnormality when system fails to operate properly.
- ABS hydraulic unit/control module assembly is incorporated ABS control module, ABS hydraulic unit (actuator assembly), fail-safe relay and pump motor relay.
- ABS control module which sends operation signal to ABS hydraulic unit to control fluid pressure applied to each wheel cylinder based on signal from each wheel speed sensor so as to prevent wheel from locking.
- ABS hydraulic unit which operates according to signal from ABS control module to control fluid pressure applied to wheel cylinder of each 4 wheels.
- Fail-safe relay (solenoid valve) relay which supplies power to solenoid valve in ABS hydraulic unit and pump motor relay.
- Pump motor relay which supplies power to pump motor in ABS hydraulic unit.

LH steering vehicle shown



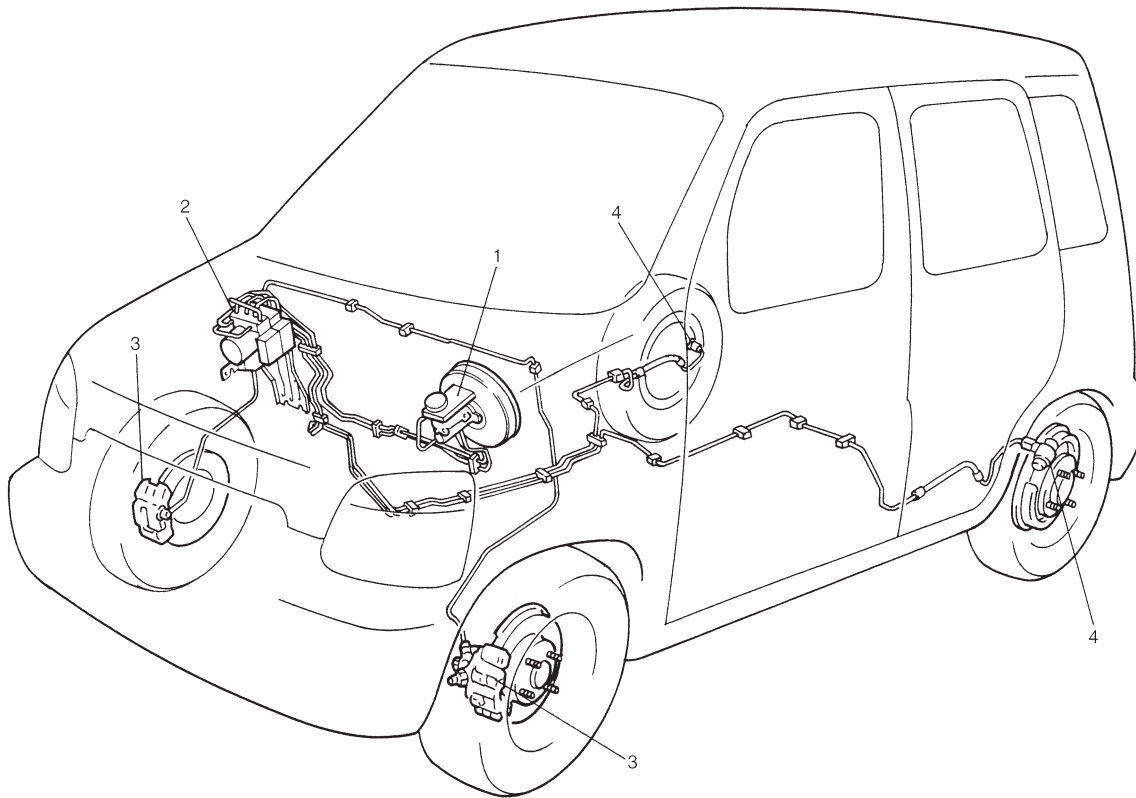
1. ABS hydraulic unit/control module assembly
2. Combination meter
3. Wheel speed sensors
4. Wheel speed sensor rings
5. Monitor coupler

SYSTEM SCHEMATIC

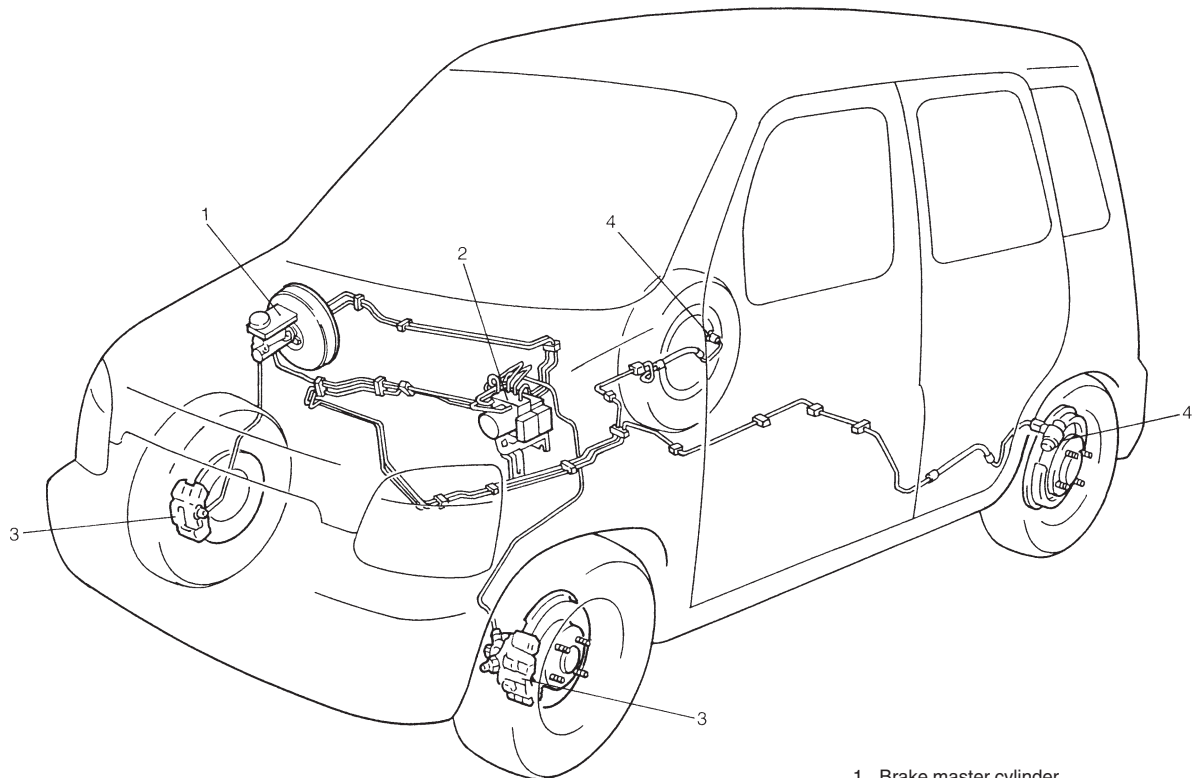


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BRAKE HOSE/PIPE ROUTING

For LH Steering Vehicle



For RH Steering Vehicle



- 1. Brake master cylinder
- 2. ABS hydraulic unit/control module assembly
- 3. Front disk brakes
- 4. Rear drum brakes

ABS HYDRAULIC UNIT/CONTROL MODULE ASSEMBLY

ABS control module is a component of ABS hydraulic unit/control module assembly and has the following functions.

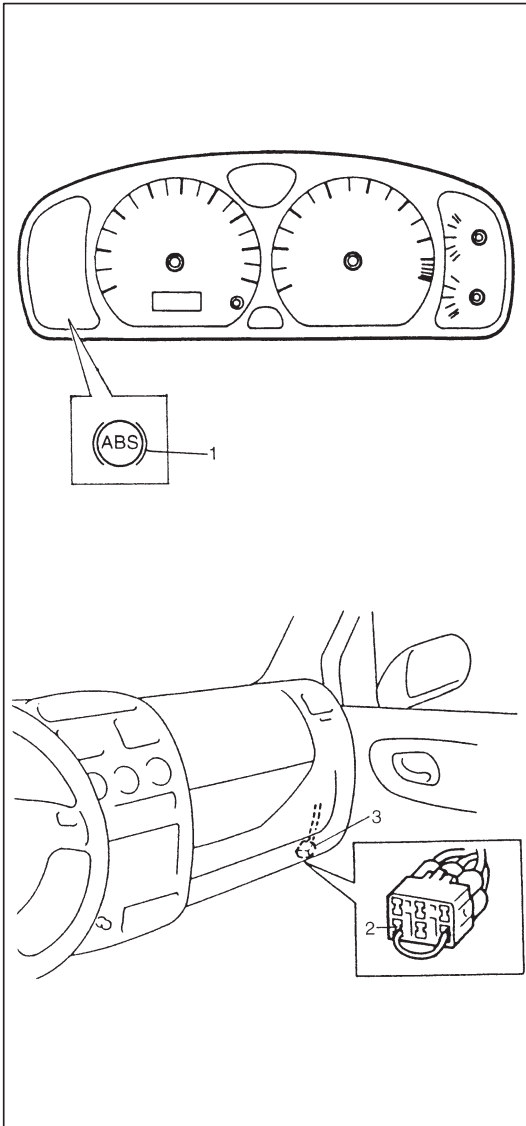
Self-Diagnosis Function

ABS control module diagnoses conditions of the system component parts (whether or not there is any abnormality) all the time and indicates the results (warning of abnormality occurrence and DTC) through the "ABS" warning lamp as described below.

NOTE:

ABS control module assembly may turn ON brake warning lamp as well as "ABS" warning lamp depending on the trouble that detected by ABS control module.

- 1) When ignition switch is turned ON, "ABS" warning lamp (1) lights for 2 seconds to check its bulb and circuit.
- 2) When no abnormality has been detected (the system is in good condition), "ABS" warning lamp turns OFF after 2 seconds.
- 3) When an abnormality in the system is detected, "ABS" warning lamp is kept light and the area where that abnormality lies is stored in the memory in ABS control module.
- 4) When diagnosis switch terminal (2) of monitor coupler (3) is grounded as shown in figure, the abnormal area is output as DTC.



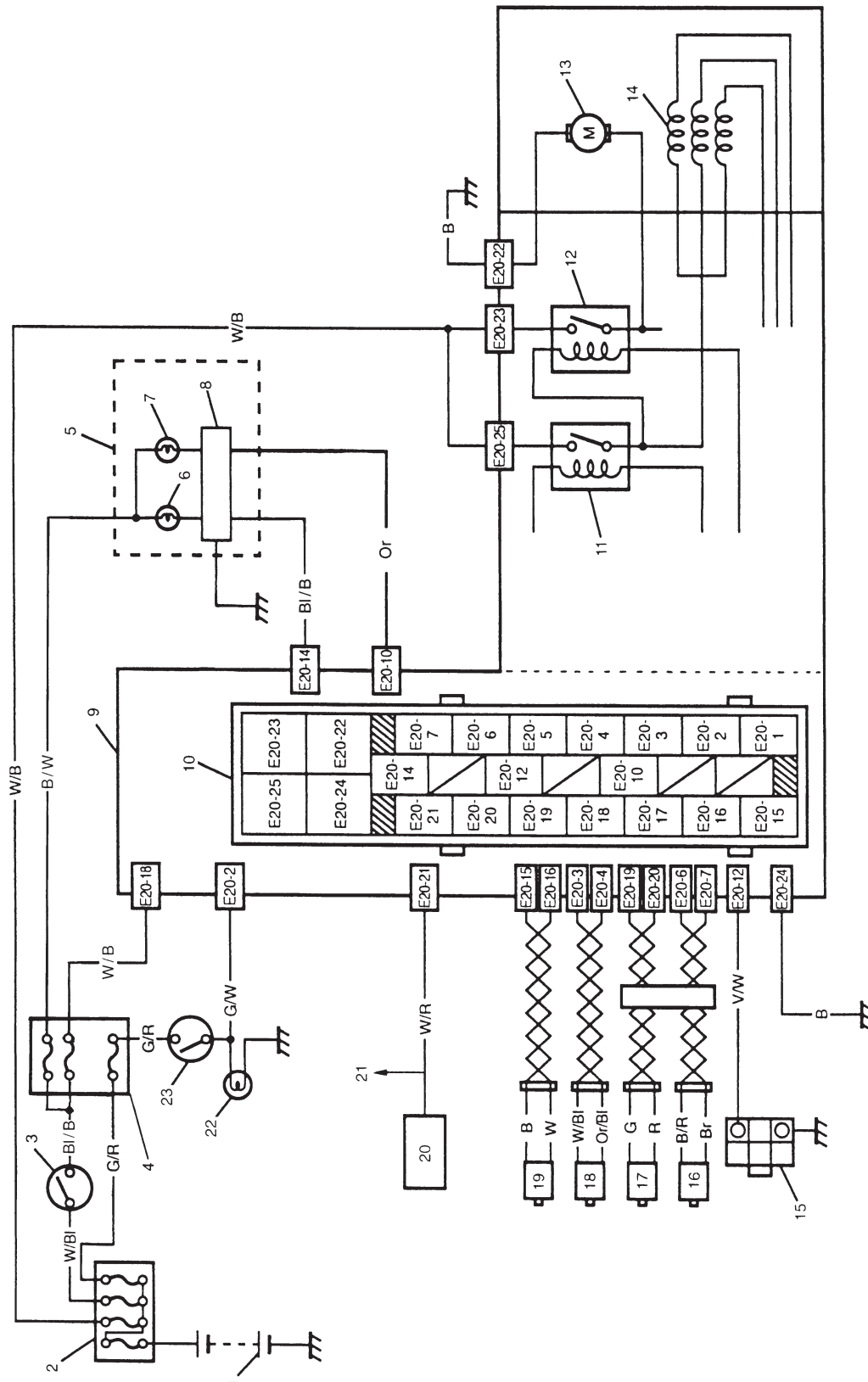
SYSTEM CONDITION		DIAGNOSIS SWITCH TERMINAL	"ABS" WARNING LAMP
In good condition at present	No trouble in the past	Open	OFF
		Grounded	DTC 12
	Trouble occurred in the past	Open	OFF
		Grounded	History DTC
Abnormality exists at present	No trouble in the past	Open	ON
		Grounded	Current DTC
	Trouble occurred in the past	Open	ON
		Grounded	Current and history DTC

NOTE:

The current code and the history code are displayed without any classification.

Fail-Safe Function

When an abnormality occurs (an abnormal DTC is detected), ABS control module turns OFF the fail-safe relay which supplies power to ABS hydraulic unit. Thus, with ABS not operating, brakes function just like the brake system of the vehicle without ABS.



1. Battery
2. Main fuses
3. Ignition switch
4. Circuit fuses
5. Combination meter
6. "ABS" warning lamp
7. Brake warning lamp
8. Warning lamp driver module (for ABS)
9. ABS hydraulic unit/control module assembly
10. Terminal arrangement of ABS hydraulic unit/control module assembly
11. ABS fail-safe relay (Solenoid valve relay)
12. ABS pump motor relay
13. Pump motor
14. Solenoid valves
15. Diagnosis monitor coupler
16. Right-rear wheel speed sensor
17. Left-rear wheel speed sensor
18. Right-front wheel speed sensor
19. Left-front wheel speed sensor
20. Data link connector
21. To ECM, SDM and EPS controller (if equipped)
22. Stop lamp
23. Stop lamp switch

Wire color

B : Black
 B/G : Black/Green
 B/R : Black/Red
 B/W : Black/White
 B/Y : Black/Yellow
 Bl : Blue
 Bl/B : Blue/Black
 Bl/Y : Blue/Yellow
 Bl/W : Blue/White
 Br : Brown
 G : Green
 G/R : Green/Red
 G/W : Green/White
 Or/Bl : Orange/Blue
 R : Red
 R/B : Red/Black
 R/Bl : Red/Blue
 R/W : Red/White
 R/Y : Red/Yellow
 V : Violet
 V/Y : Violet/Yellow
 W : White
 W/B : White/Black
 W/Bl : White/Blue
 W/G : White/Green
 W/R : White/Red
 W/Y : White/Yellow

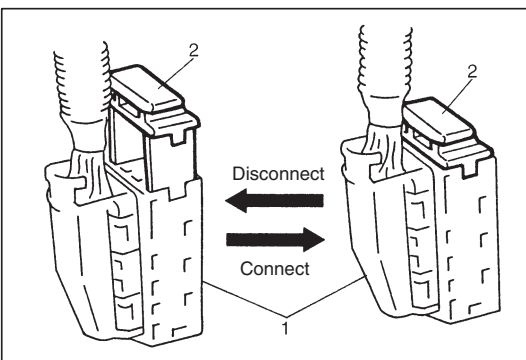
TERMINAL	CIRCUIT
E20-1	—
E20-2	Stop lamp switch
E20-3	Right-front wheel speed sensor (+)
E20-4	Right-front wheel speed sensor (—)
E20-5	—
E20-6	Right-rear wheel speed sensor (—)
E20-7	Right-rear wheel speed sensor (+)
E20-8	—
E20-9	—
E20-10	Brake warning lamp
E20-11	—
E20-12	Diagnosis switch terminal
E20-13	—
E20-14	"ABS" warning lamp
E20-15	Left-front wheel speed sensor (+)
E20-16	Left-front wheel speed sensor (—)
E20-17	—
E20-18	Ignition switch
E20-19	Left-rear wheel speed sensor (+)
E20-20	Left-rear wheel speed sensor (—)
E20-21	Data link connector
E20-22	Ground (for ABS pump motor)
E20-23	ABS pump motor relay
E20-24	Ground (for ABS control module)
E20-25	ABS fail-safe relay

DIAGNOSIS

To ensure that the trouble diagnosis is done accurately and smoothly, observe "Precautions in Diagnosing Troubles" and follow "ABS Diagnostic Flow Table".

PRECAUTIONS IN DIAGNOSING TROUBLES

- If the vehicle was operated in any of the following ways, "ABS" warning lamp may light momentarily but this does not indicate anything abnormal in ABS.
 - The vehicle was driven with parking brake pulled.
 - The vehicle was driven with brake dragging.
 - The vehicle was stuck in mud, sand, etc.
 - Wheel spin occurred while driving.
 - Wheel(s) was rotated while the vehicle was jacked up.
- Be sure to read "Precautions for Electronic Circuit Service" in Section 0A before inspection and observe what is written there.
- Be sure to use the trouble diagnosis procedure as described in the flow table. Failure to follow the flow table may result in incorrect diagnosis. (Some other diagnosis trouble code may be stored by mistake in the memory of ABS control module during inspection.)



- When disconnecting ABS hydraulic unit/control module connector (1), pull up lock (2) of connector.
When connecting, set the connector on ABS hydraulic unit/control module assembly and push the lock (2) down.

ABS DIAGNOSTIC FLOW TABLE

Refer to the following pages for the details of each step.

STEP	ACTION	YES	NO
1	1) Perform "Customer Complaint Analysis". 2) Perform "Problem Symptom Confirmation". 3) Perform "Diagnostic Trouble Code Check, Record and Clearance". Is there any malfunction DTC?	Go to Step 2.	Go to Step 5.
2	1) Perform "Driving Test". Is trouble symptom identified?	Go to Step 3.	Go to Step 6.
3	1) Check diagnostic trouble code. Is it malfunction code?	Go to Step 4.	Go to Step 5.
4	1) Inspect and repair referring to applicable diagnostic trouble code table in this section. 2) Perform "Final Confirmation Test" after cleared DTC. Does trouble recur?	Go to Step 7.	End.
5	1) Inspect and repair referring to "DIAGNOSIS" in "BRAKES" section. 2) Perform "Final Confirmation Test".	—	—
6	1) Check intermittent troubles referring to "Intermittent and Poor Connection" in "GENERAL INFORMATION" section and related circuit of trouble code recorded in step 2. 2) Perform "Final Confirmation Test" after cleared diagnostic trouble code. Does trouble recur?	Go to Step 7.	End.
7	1) Perform "Diagnostic Trouble Code Check, Record and Clearance". Is there any malfunction code?	Go to Step 2.	Go to Step 5.

1. MALFUNCTION ANALYSIS**i) Customer Complaint Analysis**

Record details of the problem (failure, complaint) and how it occurred as described by the customer.

For this purpose, use of such a questionnaire form as shown below will facilitate collecting information to the point required for proper analysis and diagnosis.

CUSTOMER QUESTIONNAIRE (EXAMPLE)

Customer's name:	Model:	VIN:	
Date of issue:	Date of Reg:	Date of problem:	Mileage:

Problem Symptoms	<ul style="list-style-type: none"> ● "ABS" warning lamp abnormal: fails to turn on/fails to go off/flashes ● Abnormal noise while vehicle is running: from motor, from valve, other _____ ● Wheel is locked at braking: ● Pump motor does not stop (running): ● Braking does not work: ● Other:
Frequency of occurrence	<ul style="list-style-type: none"> ● Continuous/Intermittent (_____ times a day, a month)/ other _____
Conditions for Occurrence of Problem	<ul style="list-style-type: none"> ● Vehicle at stop & ignition switch ON: ● When starting: at initial start only/at every start/Other _____ ● Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other _____ ● Road surface condition: Paved road/rough road/snow-covered road/ other _____ ● Chain equipment:
Environmental Condition	<ul style="list-style-type: none"> ● Weather: fair/cloudy/rain/snow/other _____ ● Temperature: °F (_____ °C)
Diagnostic Trouble Code	<ul style="list-style-type: none"> ● First check: _____ Normal code/malfunction code (_____) ● Second check after test drive: Normal code/malfunction code (_____)

ii) Problem Symptom Confirmation

Check if what the customer claimed in CUSTOMER QUESTIONNAIRE is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.) Check warning lamps related to brake system referring to “Brake Warning Lamp Check” and “ABS Warning Lamp Check” in this section.

iii) Diagnostic Trouble Code (DTC) Check, Record and Clearance

Perform “Diagnostic Trouble Code Check” procedure in this section, record it and then clear it referring to “Diagnostic Trouble Code Clearance” in this section.

If the malfunction DTC which was once displayed and then cleared cannot be detected (indicated) again when the ignition switch is turned ON, attempt to diagnose the trouble based on the DTC recorded in this step may mislead the diagnosis or make diagnosing difficult. Proceed to Step 2 to check control module for proper self-diagnosis function.

If the malfunction DTC which was once displayed and then cleared can be detected (indicated) again when ignition switch is turned ON, proceed to Step 3.

2. DRIVING TEST

Test drive the vehicle at 40 km/h for more than a minute and check if any trouble symptom (such as abnormal lighting of “ABS” warning light) exists.

If the malfunction DTC is confirmed again at ignition switch ON, driving test as described in above is not necessary. Proceed to Step 3.

3. DIAGNOSTIC TROUBLE CODE CHECK

Recheck diagnostic trouble code referring to item “DTC CHECK” as shown in the following page.

4. DIAGNOSTIC TROUBLE CODE FLOW TABLE

According to Diagnostic flow table for the diagnostic trouble code confirmation in Step 3, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator assembly or other part and repair or replace faulty parts.

5. “DIAGNOSIS” IN “BRAKE” SECTION

Check the parts or system suspected as a possible cause referring to “Diagnosis” in “BRAKE” section and based on symptoms appearing on the vehicle (symptom obtained through Steps 1-i, 1-ii and 2 and repair or replace faulty parts, if any).

6. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to INTERMITTENT TROUBLE in “GENERAL INFORMATION” section and related circuit of trouble code recorded in Step 1-iii.

7. FINAL CONFIRMATION TEST

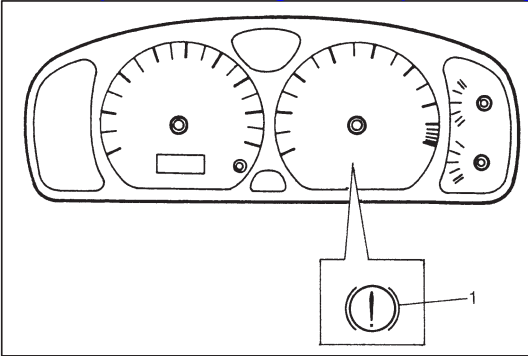
Confirm that the problem symptom has gone and the ABS is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that no DTC is indicated.

BRAKE WARNING LAMP CHECK

NOTE:

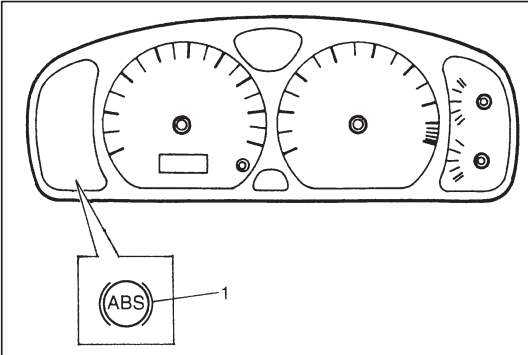
Perform this check on a level place.

- 1) Turn ignition switch ON with parking brake applied.
 - 2) Check that brake warning lamp (1) is turned ON.
 - 3) Release parking brake with ignition switch ON and check that brake warning lamp goes off.
- If it doesn't go off, go to "TABLE-E" in this section.



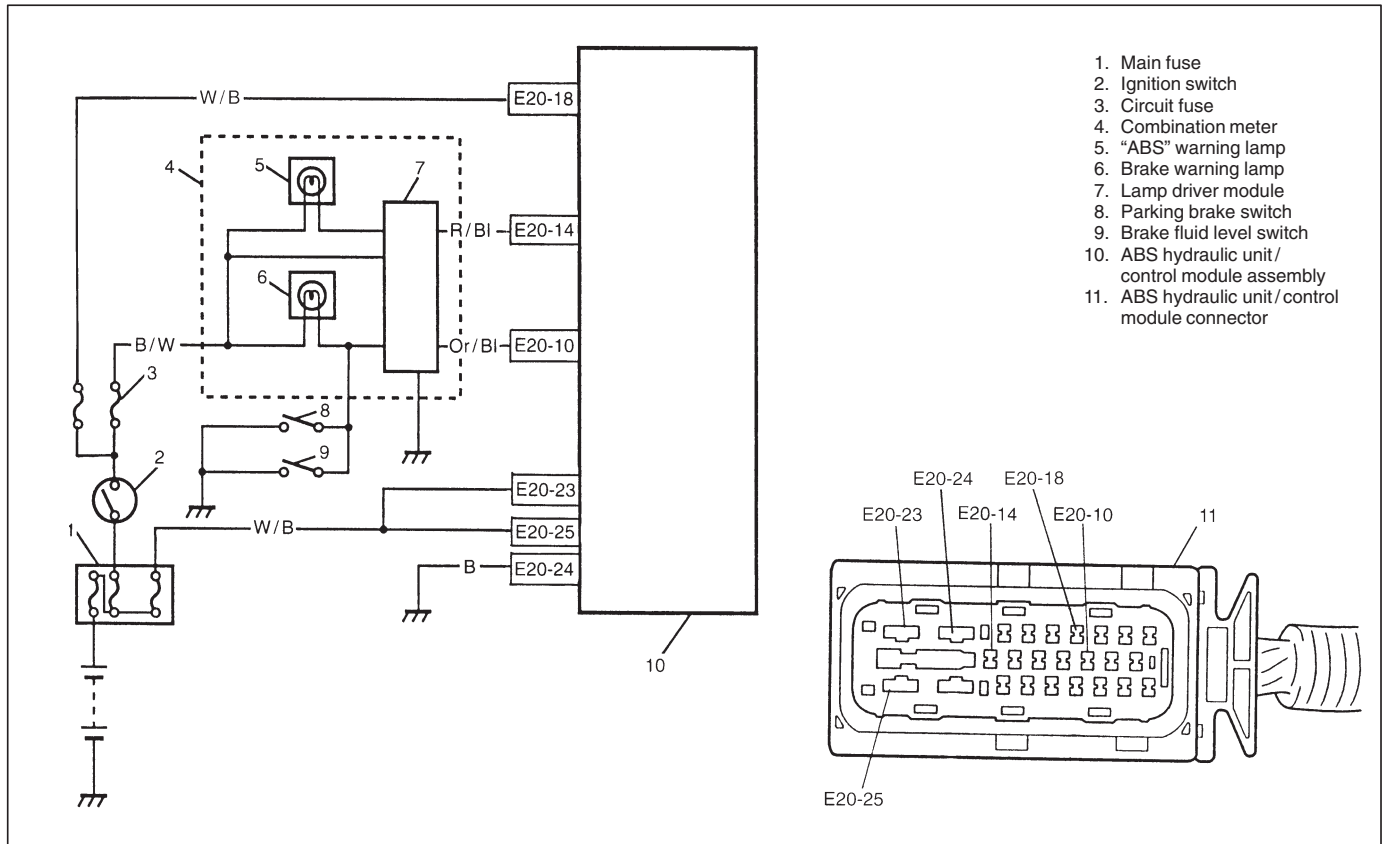
"ABS" WARNING LAMP CHECK

- 1) Turn ignition switch ON.
 - 2) Check that "ABS" warning lamp (1) comes ON for about 2 seconds and then goes off.
- If any faulty condition is found, advance to Diagnostic Flow Table-A, B, C or D.



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TABLE – A “ABS” WARNING LAMP CIRCUIT CHECK – LAMP DOES NOT COME “ON” AT IGNITION SWITCH ON



CIRCUIT DESCRIPTION

Operation (ON/OFF) of “ABS” warning lamp is controlled by ABS control module through lamp driver module in combination meter.

If the Antilock brake system is in good condition, ABS control module turns “ABS” warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, “ABS” warning lamp is turned ON continuously by ABS control module. Also, it is turned ON continuously by lamp driver module when the connector of ABS control module is disconnected.

INSPECTION

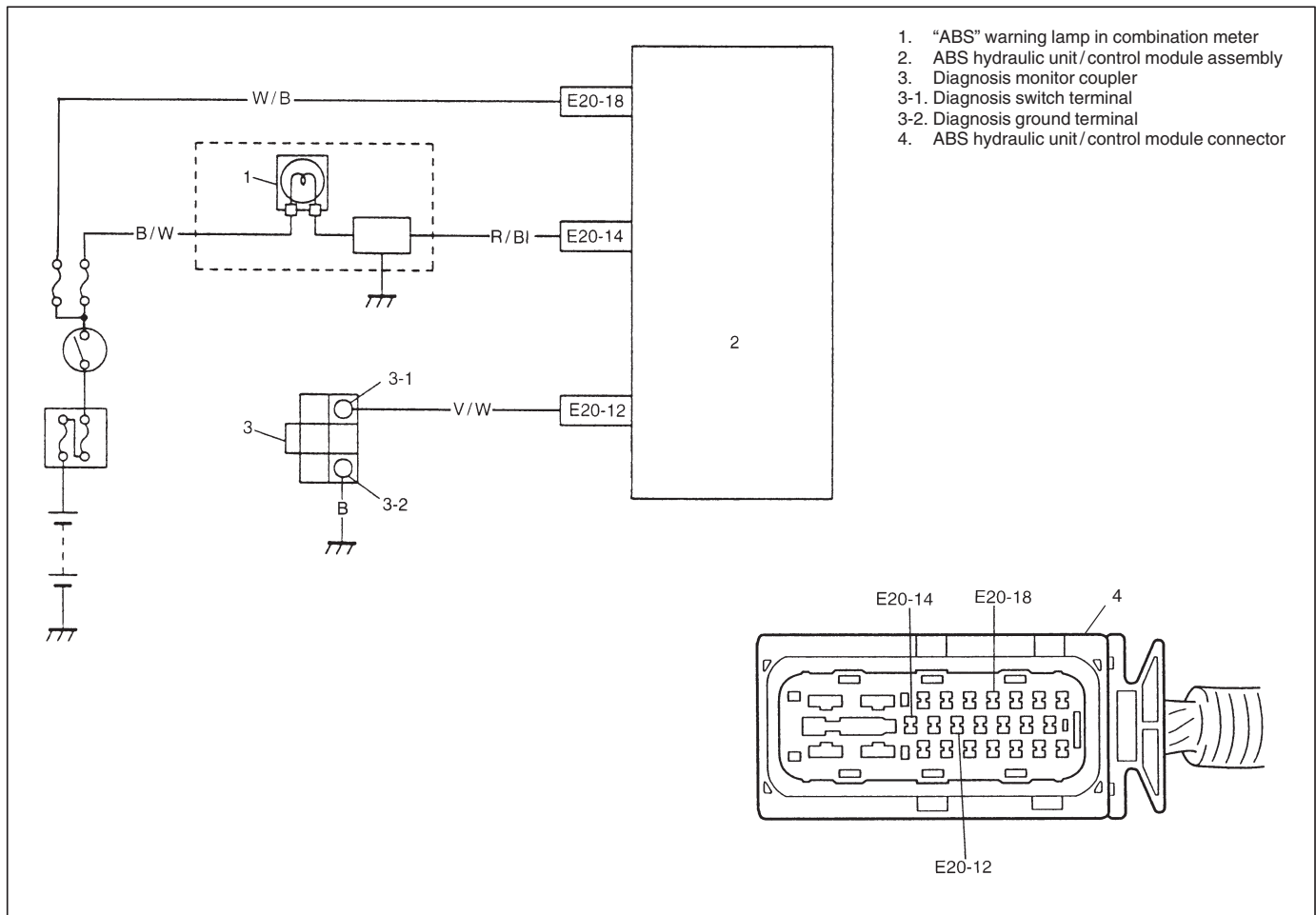
STEP	ACTION	YES	NO
1	1) Turn ignition switch ON. Do other warning lamp come ON?	Go to Step 2.	Go to Step 4.
2	1) Disconnect ABS hydraulic unit/control module connector. Does ABS warning lamp light with ignition switch ON?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 3.
3	1) Remove combination meter. Is bulb of ABS warning lamp in good condition?	“R/BI” circuit shorted to ground. If OK, replace combination meter (lamp driver module).	Replace bulb.
4	Is IG fuse in good condition?	Open in “B/W” wire to combination meter or poor connection.	Repair and replace.

TABLE – B “ABS” WARNING LAMP CIRCUIT CHECK – LAMP COMES “ON” STEADY

Refer to TABLE – A for System Circuit Diagram and Circuit Description.

INSPECTION

STEP	ACTION	YES	NO
1	Perform diagnostic trouble code check. Is there any DTC (including code No.12, NO CODES on SUZUKI scan tool) exists?	Go to Step 2.	Go to Step 3.
2	Does malfunction DTC (other than code No.12) exist at step 1?	Go to Step 7 of “ABS Diagnostic Flow Table” in this section.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals “E20-14”, “E20-18” and “E20-24”. 3) If OK then ignition switch “ON” and measure voltage at terminal E20-18 of connector. Is it 10 – 14 V?	Go to Step 4.	“B/W” circuit open.
4	1) With ABS hydraulic unit/control module connector disconnected, turn ignition switch ON and light ABS warning lamp. 2) Connect terminal “E20-14” of disconnected connector to ground using service wire. Does ABS warning lamp turn off?	Go to Step 5.	“R/BI” circuit open. If wire and connection are OK, replace combination meter (lamp driver module).
5	1) Measure resistance from connector terminal “E20-24” to body ground. Is continuity indicated?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“B” circuit open.

TABLE – C “ABS” WARNING LAMP CIRCUIT CHECK – THE LAMP FLASHES CONTINUOUSLY WHILE IGNITION SWITCH IS ON**CIRCUIT DESCRIPTION**

When diagnosis switch terminal is shorted or connected to the ground with ignition switch ON, diagnosis trouble code (DTC) is indicated by flashing of “ABS” warning lamp only in the following cases.

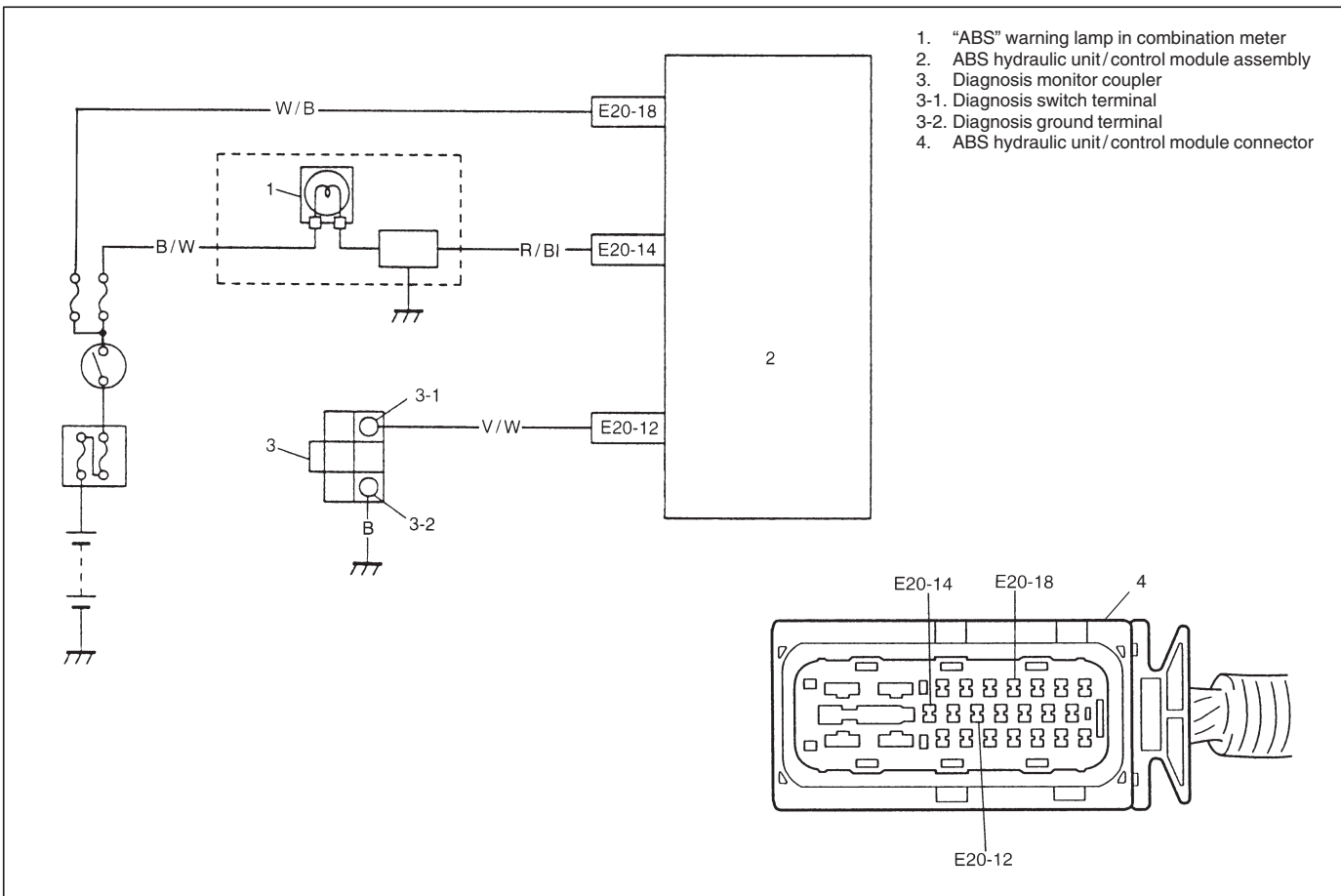
- Normal DTC (12) is indicated if no malfunction DTC is detected in the ABS.
- A history malfunction DTC is indicated by flashing of the lamp if a current malfunction DTC is not detected at that point although a history malfunction DTC is stored in memory.

INSPECTION

STEP	ACTION	YES	NO
1	Is diagnosis switch terminal connected to ground via service wire?	Go to Step 3.	Go to Step 2.
2	1) Ignition switch ON. 2) Measure voltage between diagnosis switch terminal and ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“V/W” wire circuit shorted to ground.
3	1) Ignition switch ON. 2) Does flashing of ABS warning lamp indicate DTC?	Go to Step 7 of “ABS diagnostic flow table” in this section.	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

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TABLE – D CODE (DTC) IS NOT OUTPUTTED EVEN WITH DIAGNOSIS SWITCH TERMINAL CONNECTED TO GROUND.



CIRCUIT DESCRIPTION

When diagnosis switch terminal is connected to ground with ignition switch turned ON, the ABS control module outputs diagnostic trouble code by flashing "ABS" warning lamp.

INSPECTION

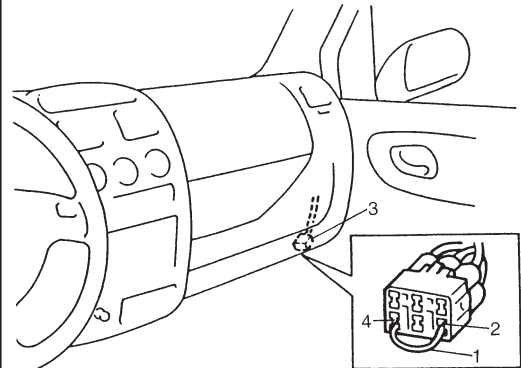
STEP	ACTION	YES	NO
1	Is it shorted diagnosis switch terminal and ground terminal by service wire properly?	Go to Step 2.	Connect service wire securely.
2	1) Disconnect service wire. 2) Disconnect ABS hydraulic unit/control module connector. 3) Measure resistance between diagnosis switch terminal and connector terminal "E20-12". Is it infinite (∞)?	"V/W" circuit open.	Go to Step 3.
3	1) Measure resistance between ground terminal of monitor coupler and body ground. Is continuity indicated?	Go to Step 4.	"B" circuit open or poor connection.
4	1) Check for proper connection to ABS hydraulic unit/control module at terminal "E20-12". 2) If OK, then check "ABS" warning lamp circuit referring to TABLE A and B. Is it in good condition?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Repair "ABS" warning lamp circuit.

TABLE – E BRAKE WARNING LAMP CHECK-LAMP COMES “ON” STEADY CIRCUIT DESCRIPTION

Brake warning lamp is controlled by parking brake switch, brake fluid level switch and ABS control module/hydraulic unit assembly through lamp driver module in combination meter. Refer to “TABLE-A” for circuit diagram.

STEP	ACTION	YES	NO
1	1) Make sure that: <ul style="list-style-type: none"> ● Parking brake is completely released. ● Brake fluid level is upper than the minimum level. Are the check results OK?	Go to Step 2.	Release parking brake completely and/or replenish brake fluid.
2	Does “ABS” warning lamp come on?	Perform “TABLE B” previously outlined.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals “E20-10”. 3) If OK, apply chocks to wheels and select gear in neutral position (P range for A/T). 4) Keep brake pedal depressed and start engine. Release parking brake. 5) Connect terminal “E20-10” of disconnected connector to ground using service wire. Does brake warning lamp turn off?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“Or/BI” circuit open. If wire and connection are OK, replace combination meter.

DIAGNOSTIC TROUBLE CODE (DTC) CHECK (USING "ABS" WARNING LAMP)

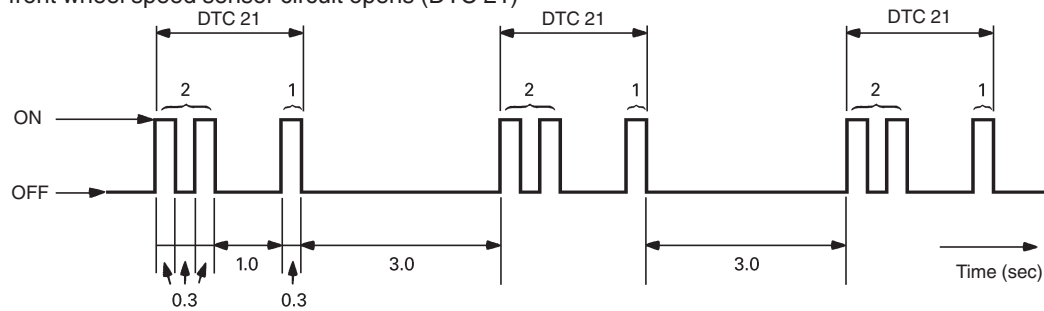


- 1) Perform "ABS" WARNING LAMP CHECK described above.
- 2) Using service wire (1), connect diagnosis switch terminal (2) of monitor coupler (3) to ground (4).
- 3) Turn ignition switch ON.
- 4) Read flashing of "ABS" warning lamp which represents DTC as shown in example below and write it down. When more than 2 DTCs are stored in memory, flashing for each DTC is repeated three times starting with the smallest DTC number in increasing order.

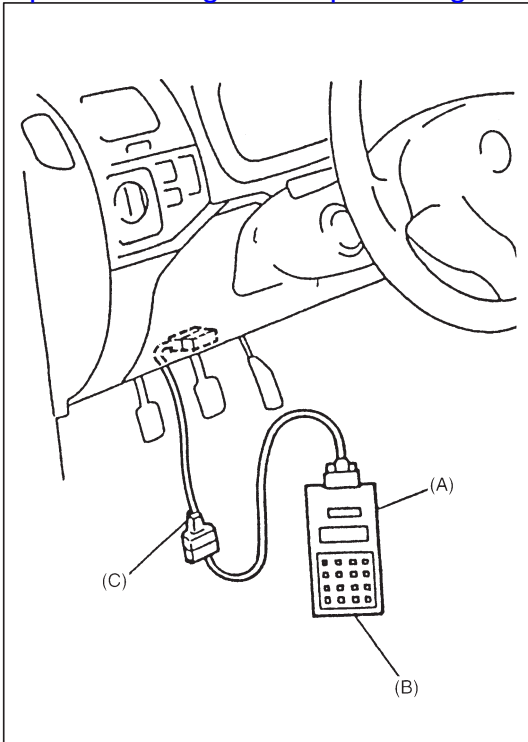
For details of DTC, refer to "DTC Table".

Example : When right-front wheel speed sensor circuit opens (DTC 21)

"ABS" warning lamp



- 5) After completing the check, turn ignition switch off, disconnect service wire from monitor coupler.



DIAGNOSTIC TROUBLE CODE (DTC) CHECK (USING SUZUKI SCAN TOOL)

- 1) After setting cartridge for ABS to SUZUKI scan tool, connect SUZUKI scan tool to data link connector.

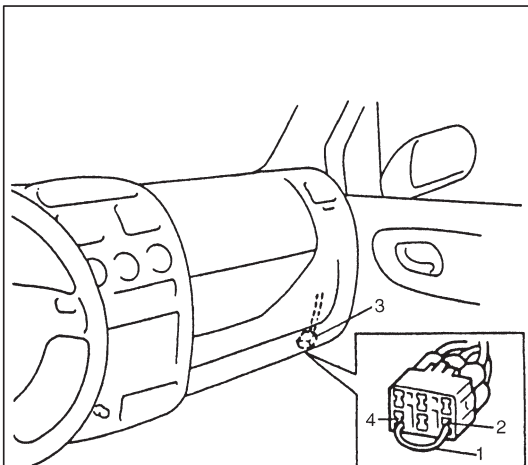
Special Tool

(A): 09931-76011 (SUZUKI scan tool)

(B): Mass storage cartridge

(C): 09931-76030 (16/14 pin DLC cable)

- 2) Turn ignition switch ON.
- 3) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
- 4) After completing the check, turn ignition switch off and disconnect SUZUKI scan tool from DLC.



DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

WARNING:

When performing a driving test, select a safe place where there is neither any traffic nor any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.

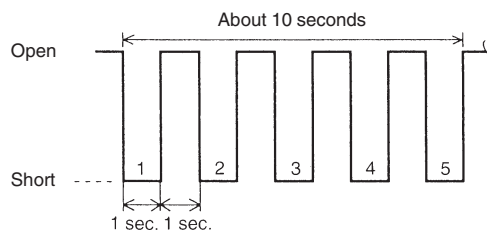
After repair or replace malfunction part(s), clear all DTCs by performing the following procedure.

- 1) Turn ignition switch OFF.
- 2) Using service wire (1), connect diagnosis switch terminal (2) of diagnosis monitor coupler (3) to ground terminal (4).
- 3) With connection described in above step 2) maintained, turn ignition switch ON.
- 4) Repeat disconnecting and reconnecting of service wire between diagnosis and ground terminals 5 times or more at about 1 sec. interval within 10 seconds.
- 5) Turn ignition switch OFF and disconnect service wire from monitor coupler.
- 6) Perform "DRIVING TEST" (step 2 of "ABS DIAGNOSTIC FLOW TABLE" in this section) and DTC CHECK and confirm that normal DTC (DTC 12) is displayed; not malfunction DTC.


















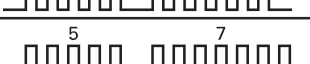



NOTE:

It is also possible to clear DTC by using SUZUKI scan tool. Refer to Cartridge Manual for procedure to clear DTC.

Condition between diagnosis switch terminal and body ground

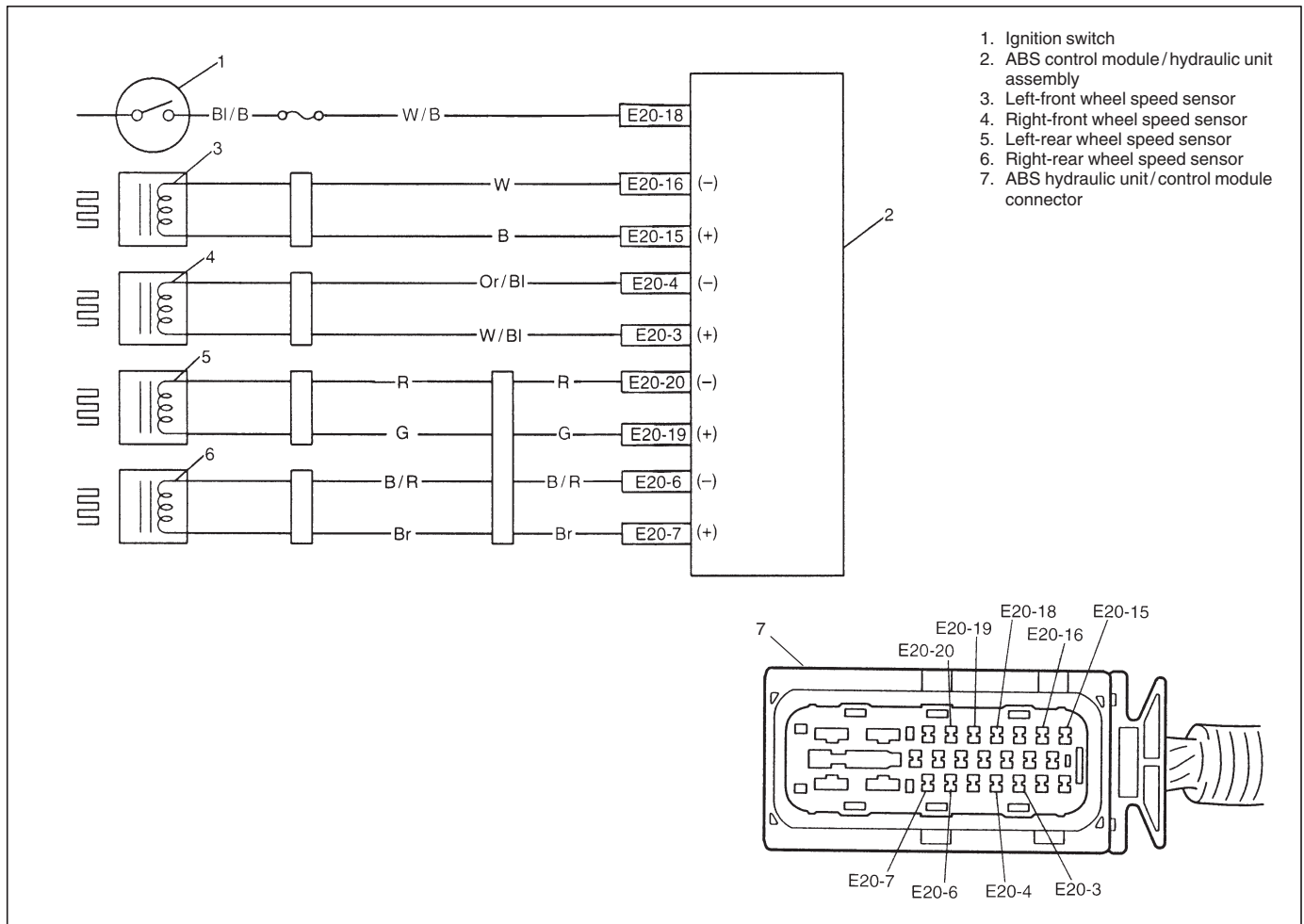


DIAGNOSTIC TROUBLE CODE (DTC) TABLE**CAUTION:****Be sure to perform “ABS DIAGNOSTIC FLOW TABLE” before starting diagnosis.**

DTC (displayed on SUZUKI scan tool)	DTC (indicated by “ABS” warning lamp)	ABS warning lamp flashing pattern	DIAGNOSTIC ITEMS	
NO DTC	12		Normal	
C1021	21		RF	Wheel speed sensor circuit
C1025	25		LF	
C1031	31		RP	
C1035	35		LR	
C1022	22		RF	Wheel speed sensor circuit or sensor ring
C1026	26		LF	
C1032	32		RR	
C1036	36		LR	
C1041	41		RF	Inlet solenoid valve circuit
C1042	42			Outlet solenoid valve circuit
C1045	45		LF	Inlet solenoid valve circuit
C1046	46			Outlet solenoid valve circuit
C1051	51		RR	Inlet solenoid valve circuit
C1052	52			Outlet solenoid valve circuit
C1055	55		LR	Inlet solenoid valve circuit
C1056	56			Outlet solenoid valve circuit
C1057	57		Power source	
C1061	61		ABS pump motor and/or motor relay circuit	
C1063	63		Fail safe-relay	
C1071	71		ABS control module	

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**DTC 21, 22 – RIGHT-FRONT WHEEL SPEED SENSOR CIRCUIT OR
SENSOR RING**
**25, 26 – LEFT-FRONT WHEEL SPEED SENSOR CIRCUIT OR
SENSOR RING**
**31, 32 – RIGHT-REAR WHEEL SPEED SENSOR CIRCUIT OR
SENSOR RING**
**35, 36 – LEFT-REAR WHEEL SPEED SENSOR CIRCUIT OR
SENSOR RING**



DESCRIPTION

The ABS control module monitors the voltage at the terminal of each sensor while the ignition switch is ON. When the voltage is not within the specified range, an applicable DTC will be set. Also, when no sensor signal is inputted at starting or while running, an applicable DTC will be set.

NOTE:

When the vehicle was operated in any of the following ways, one of these DTCs may be set even when the sensor is in good condition. If such possibility is suspected, repair the trouble (dragging of brake, etc.) of the vehicle, clear DTC once and then after performing the driving test as described in Step 2 of "ABS DIAGNOSIS FLOW TABLE", check whether or not any abnormality exists.

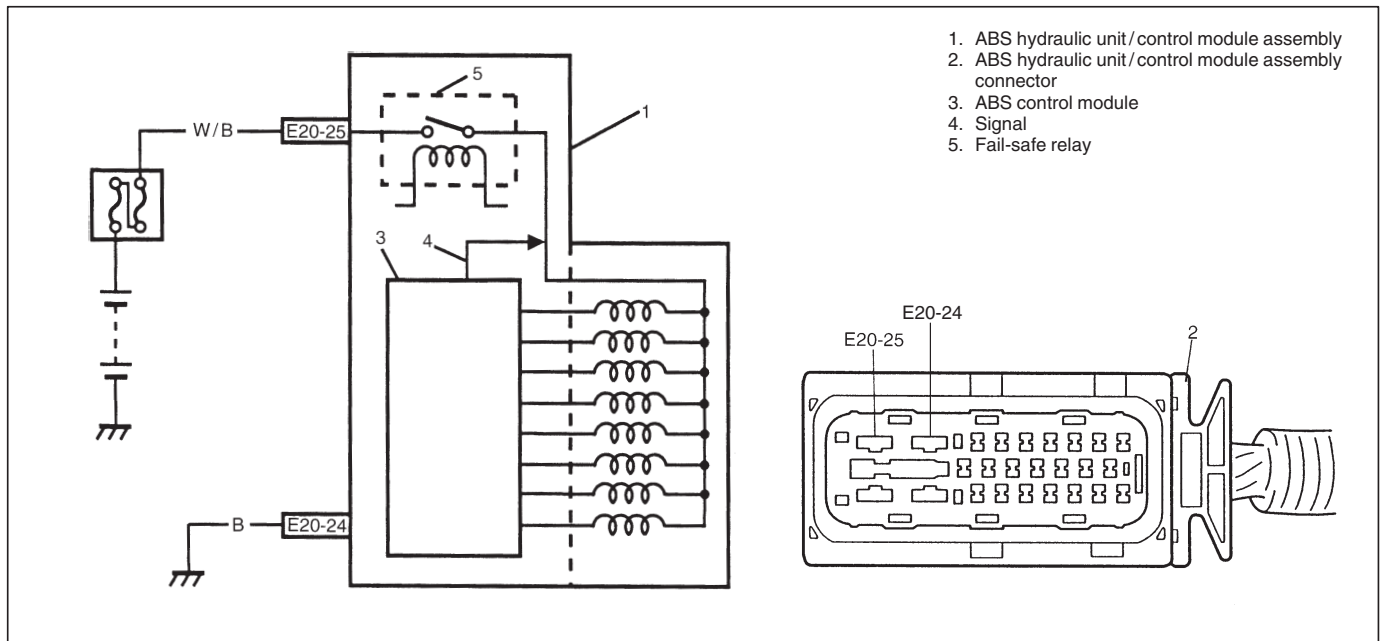
- The vehicle was driven with parking brake pulled.
- The vehicle was driven with brake dragging.
- Wheel spin occurred while driving.
- Wheel(s) was turned while the vehicle was jacked up.
- The vehicle was stuck.

DTC 21, 22, 25, 26, 31, 32, 35 or 36**INSPECTION**

STEP	ACTION	YES	NO
1	1) Disconnect applicable ABS wheel speed sensor coupler with ignition switch OFF. 2) Measure resistance between terminals of ABS wheel speed sensor. Refer to "Front Wheel Speed Sensor" and/or "Rear Wheel Speed Sensor" under "ON-VEHICLE SERVICE" in this section. Is measured resistance value as specified?	Go to Step 2.	Replace ABS wheel speed sensor assembly.
2	1) Turn ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS control module at each sensor terminal. 4) If OK, then turn ignition switch ON and measure voltage between sensor terminal of module connector and body ground. Is it 0V?	Go to Step 3.	ABS wheel speed sensor circuit shorted to power.
3	1) Turn ignition switch OFF. 2) Connect ABS wheel speed sensor coupler. 3) Measure resistance between the following points. <ul style="list-style-type: none"> Both ABS hydraulic unit/control module connector terminals of the corresponding sensor. This check result should be the same as above STEP 1. Either terminal of wheel speed sensor coupler and body ground. This check result should be no continuity. Are both check results OK?	Go to Step 4.	Circuit open or shorted to ground.
4	1) Remove applicable ABS wheel speed sensor. 2) Check sensor for damage or foreign material attached. Is it in good condition?	Go to Step 5.	Clean, repair or replace.
5	Check front and/or rear sensor ring for the following (remove rear drum as necessary): <ul style="list-style-type: none"> Rotor serration (teeth) neither missing nor damaged. No foreign material being attached. Rotor not being eccentric. Wheel bearing free from excessive play. Are they in good condition?	Go to Step 6.	Clean, repair or replace.
6	1) Install ABS wheel speed sensor to knuckle. 2) Tighten sensor bolt to specified torque and check that there is no clearance between sensor and knuckle. Is it OK?	Go to Step 7.	Replace ABS wheel speed sensor.
7	Referring to "Front Wheel Speed Sensor Reference" and/or "Rear Wheel Speed Sensor Reference" in this section, check output voltage or waveform. Is specified voltage and/or waveform obtained?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Replace sensor and recheck.

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- DTC 41 – RIGHT-FRONT INLET SOLENOID CIRCUIT**
45 – LEFT-FRONT INLET SOLENOID CIRCUIT
51 – RIGHT-REAR INLET SOLENOID CIRCUIT
55 – LEFT-REAR INLET SOLENOID CIRCUIT
42 – RIGHT-FRONT OUTLET SOLENOID CIRCUIT
46 – LEFT-FRONT OUTLET SOLENOID CIRCUIT
52 – RIGHT-REAR OUTLET SOLENOID CIRCUIT
56 – LEFT-REAR OUTLET SOLENOID CIRCUIT



DESCRIPTION

The ABS control module monitors the output from the valve.

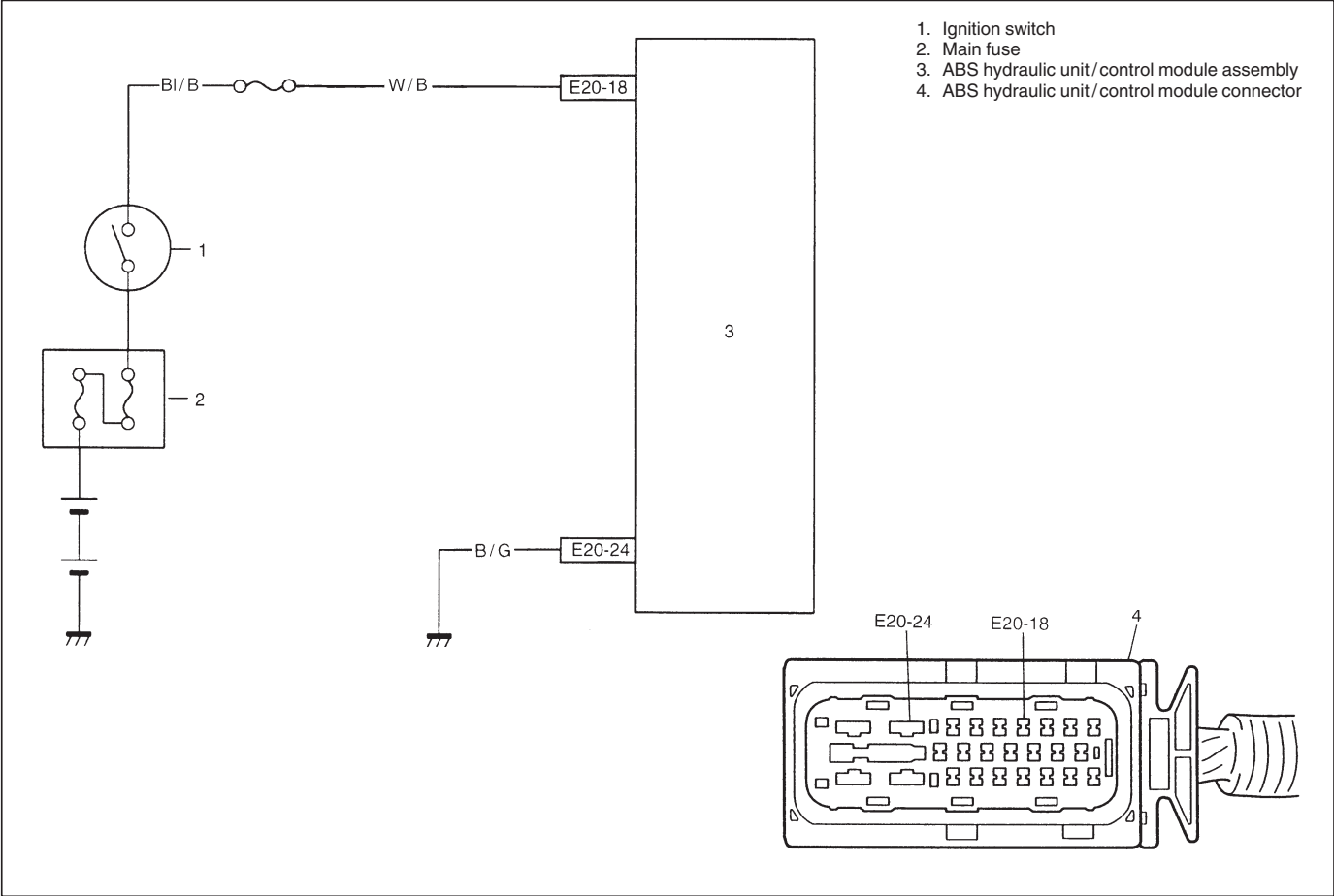
When the output of each valve exceeds the specified value compared with the signal sent from ABS control module, this DTC is set.

DTC 41, 45, 51, 55, 42, 46, 52, 56 – SOLENOID CIRCUIT

INSPECTION

STEP	ACTION	YES	NO
1	1) Check solenoid operation referring to item "ABS HYDRAULIC UNIT OPERATION CHECK" in this section. Is it in good condition?	Check terminal "E20-25" connection. If connection is OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 2.
2	1) Ignition switch "OFF". 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal "E20-25". 4) If OK, then measure voltage between terminal "E20-25" of module connector and "E20-24". Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"W/B" or "B" circuit open.

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DTC 57 – POWER SOURCE CIRCUIT

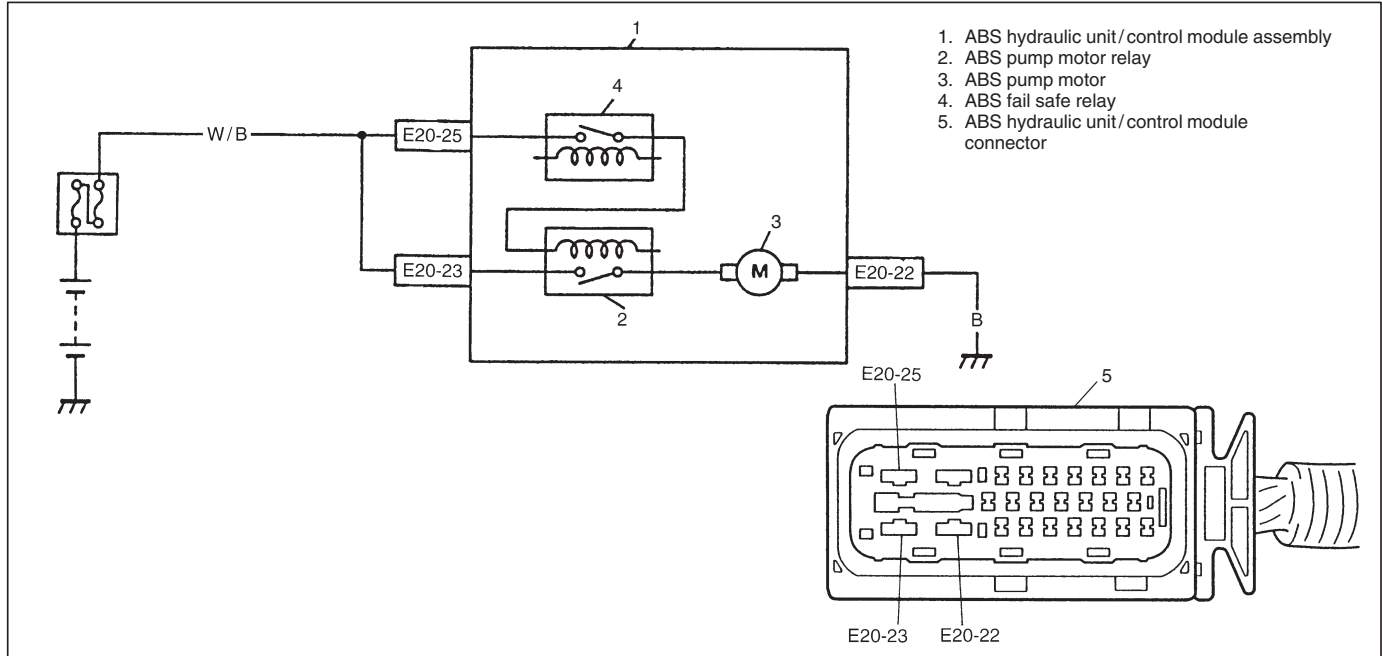


DESCRIPTION

The ABS control module monitors the power source voltage at terminal “E20-18”. When the power source voltage becomes extremely high or low, this DTC will be set. As soon as the voltage rises or lowers to the specified level, the set DTC will be cleared.

INSPECTION

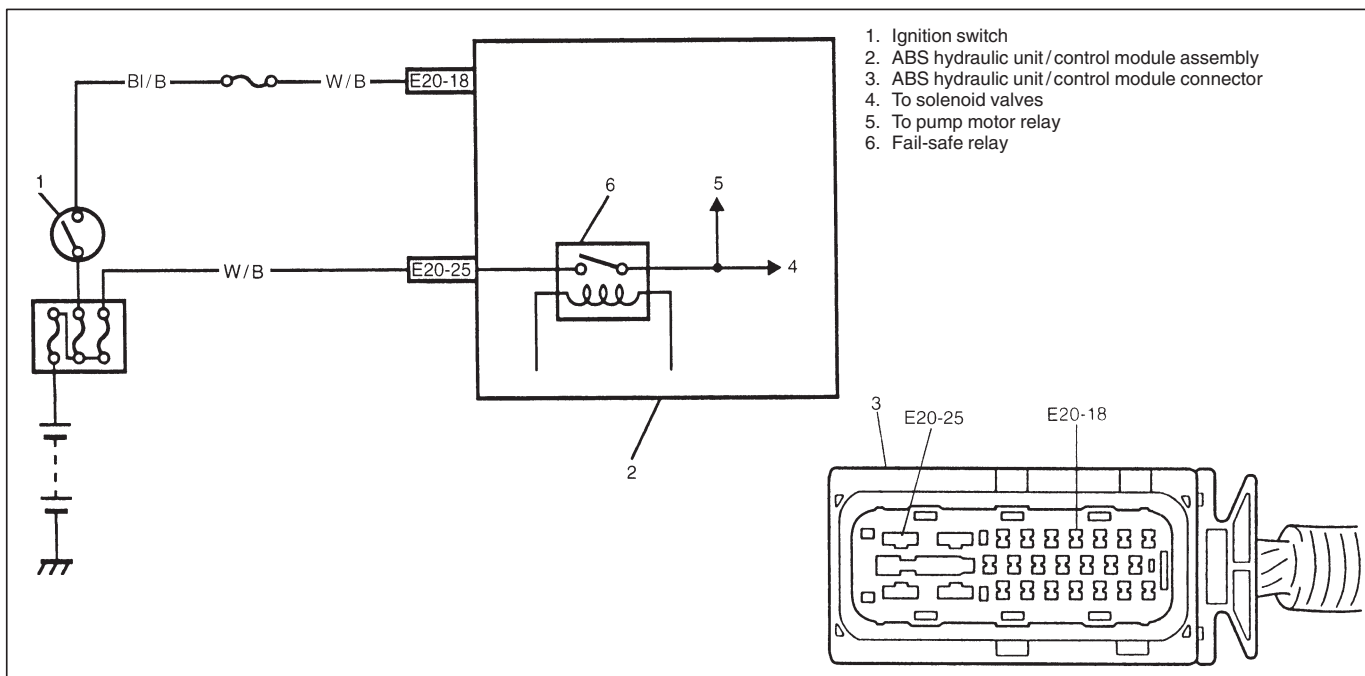
STEP	ACTION	YES	NO
1	1) Connect a voltmeter between battery positive (+) terminal and body ground. 2) Start the engine and measure the maximum voltage when racing the engine. Is it over 18V?	Check charging system referring to “CHARGING SYSTEM” section.	Go to Step 2.
2	1) Disconnect ABS hydraulic unit/control module connector. 2) Keep the engine idling, measure the voltage between terminal “E20-18” of ABS control module and body ground. Is it always under 9V?	<ul style="list-style-type: none">● Check charging system referring to “CHARGING SYSTEM” section.● Imperfect short between wire “B/W” and ground.	<ul style="list-style-type: none">● Poor connection of terminal “E20-18” or “E20-24” of the ABS control module. If the above are in good condition, substitute a known-good ABS hydraulic unit/control module and recheck.

DTC 61 – ABS PUMP MOTOR CIRCUIT**DESCRIPTION**

The ABS control module monitors the voltage at monitor terminal of pump motor circuit constantly with the ignition switch turned ON. It sets this DTC when the voltage at the monitor terminal does not become high/low according to ON/OFF commands to the motor relay of the module (does not follow these commands).

INSPECTION

STEP	ACTION	YES	NO
1	1) Check pump motor referring to item "ABS HYDRAULIC UNIT OPERATION CHECK" in this section. Is it in good condition?	Check terminals "E20-25" and "E20-23" connection. If connections OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 2.
2	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal "E20-23". 4) If OK, then measure voltage between terminal "E20-23" of module connector and body ground. Is it 10 – 14 V?	Go to Step 3.	"W/B" circuit open.
3	Measure resistance between terminal "E20-22" of ABS hydraulic unit/control module connector and body ground. Is it infinite (∞)?	"B" circuit open .	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

DTC 63 – ABS FAIL-SAFE RELAY CIRCUIT**DESCRIPTION**

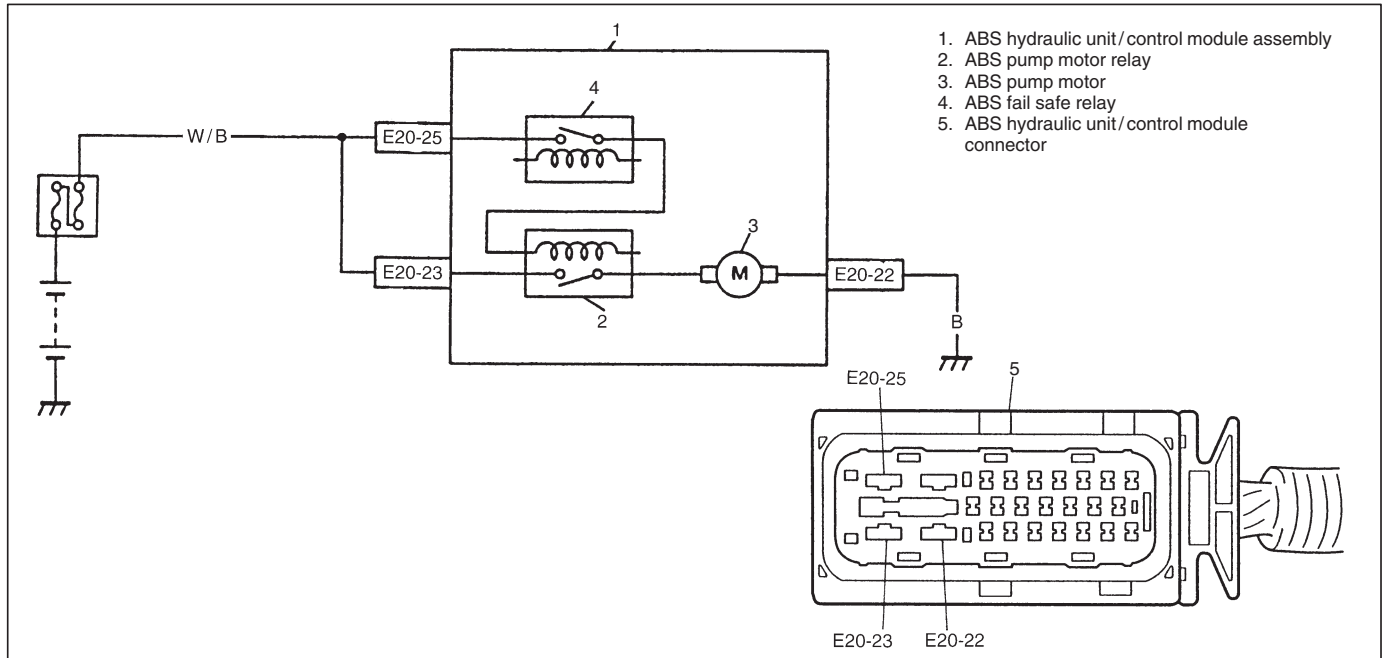
ABS control module monitors the voltage at the terminal of solenoid circuit constantly with ignition switch turned ON. Also, immediately after ignition switch is turned “ON”, perform initial check as follows.

Switch fail-safe relay in the order of OFF → ON and check if voltage changes to Low → High. If anything faulty is found in the initial check and when the voltage is low with ignition switch turned ON, this DTC will be set.

INSPECTION

STEP	ACTION	YES	NO
1	Check battery voltage. Is it about 11 V or higher?	Go to Step 2.	Check charging system referring to “CHARGING SYSTEM” section.
2	Check ABS main fuse and connection. Is it in good condition?	Go to Step 3.	Repair and/or replace fuse.
3	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check proper connection to ABS hydraulic unit/control module at terminal “E20-25”. 4) If OK, then measure voltage between connector terminal “E20-25” and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“W/B” circuit open or short to ground.

DTC 71 – ABS CONTROL MODULE



DESCRIPTION

This DTC will be set when an internal malfunction is detected in the ABS control module.

INSPECTION

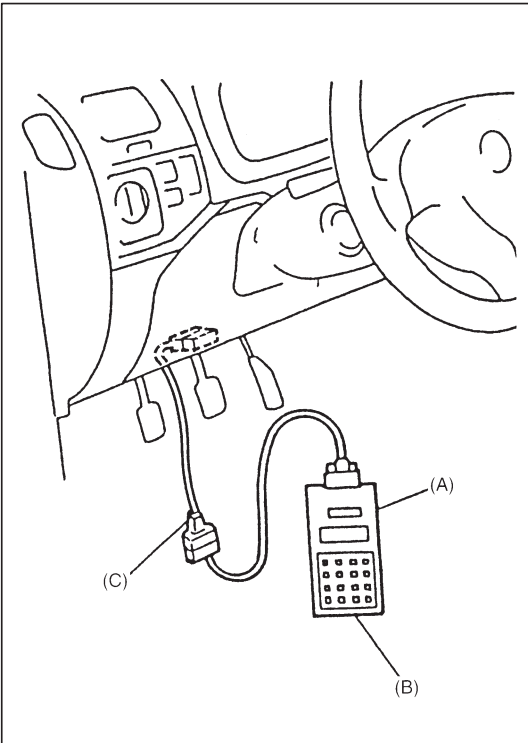
STEP	ACTION	YES	NO
1	Clear all DTCs and check DTC. Is it DTC 71?	Go to Step 2.	Could be a temporary malfunction of the ABS control module.
2	1) Check proper connection of ABS hydraulic unit / control module connector 2) If OK, disconnect ABS hydraulic unit/control module connector and check the followings. <ul style="list-style-type: none"> ● Voltage “E20-25” terminal: 10 – 14 V ● Resistance between “E20-24” and body ground: Continuity Are the check result as specified above?	Replace ABS hydraulic unit/ control module assembly.	Repair and recheck.

ON-VEHICLE SERVICE

PRECAUTION

When connector is connected to ABS hydraulic unit/control module assembly, do not disconnect connectors of sensors with ignition switch ON. Then DTC will be set in ABS control module.

ABS HYDRAULIC UNIT OPERATION CHECK (USING SUZUKI SCAN TOOL)



- 1) Remove steering column hole cover.
- 2) Connect SUZUKI scan tool (Tech-1) to data link connector (DLC) (1) with ignition switch OFF.

Special Tool

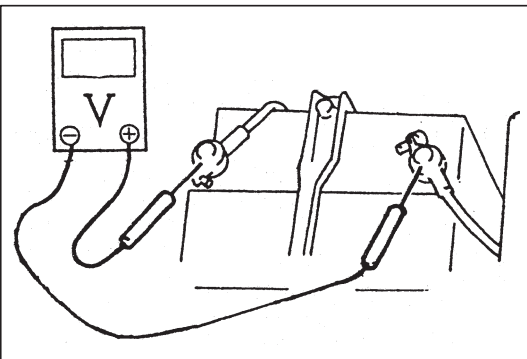
(A): 09931-76011 (SUZUKI scan tool)

(B): Mass storage cartridge

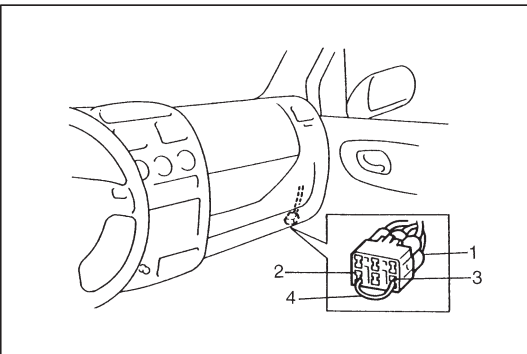
(C): 09931-76030 (16/14 pin DLC cable)

- 3) Turn ignition switch to ON position and check actuator operation using "HYDRAULIC CONTROL TEST" under "miscellaneous test" ("MISC. TEST") mode of SUZUKI scan tool.

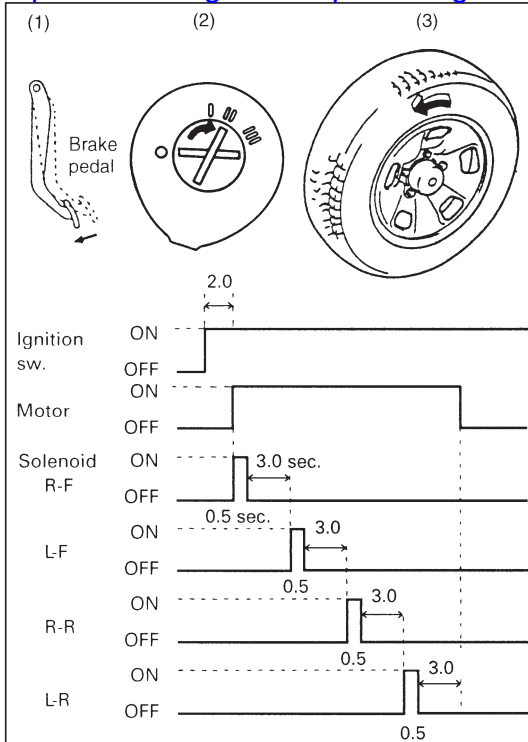
ABS HYDRAULIC UNIT OPERATION CHECK (NOT USING SUZUKI SCAN TOOL)



- 1) Check that basic brake system other than ABS is in good condition.
- 2) Check that battery voltage is 11V or higher.
- 3) With "ABS" warning lamp, check that no abnormality is detected in ABS. Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CHECK" in this section.
- 4) Lift up vehicle.

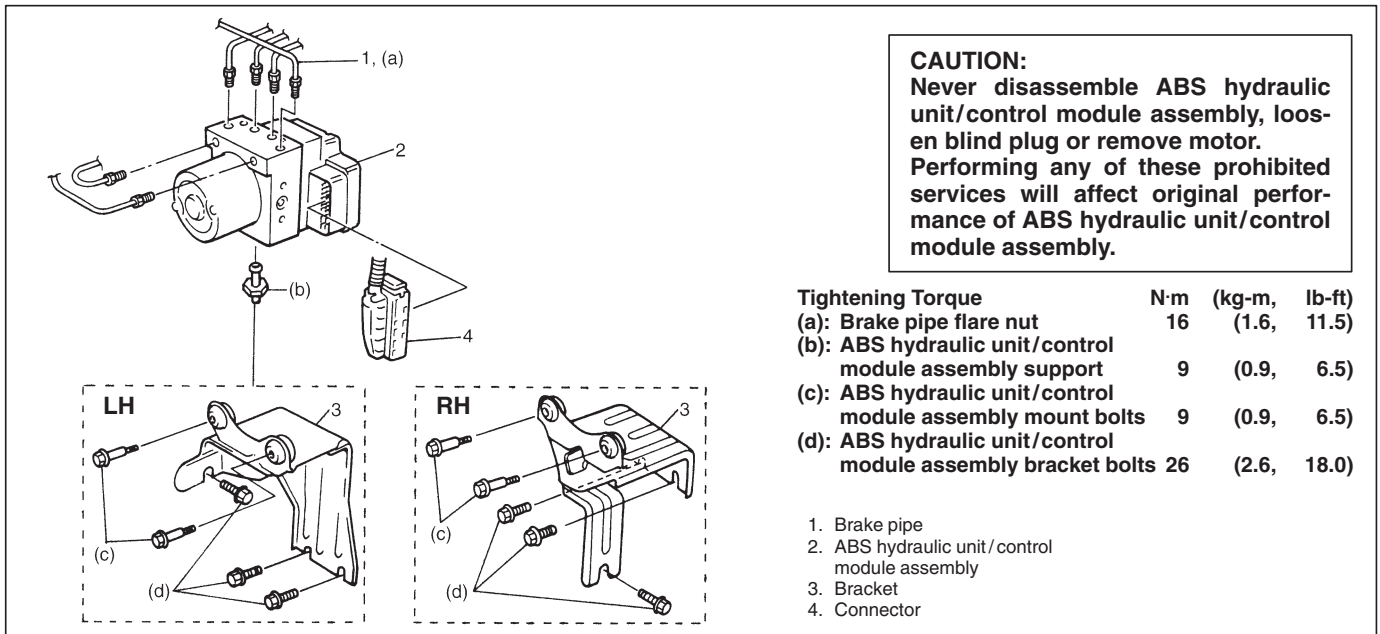


- 5) Set transmission to neutral and release parking brake.
- 6) Turn each wheel gradually by hand to check if brake dragging occurs. If it does, correct.
- 7) With diagnosis switch terminal (1) of monitor coupler (2) connected to ground terminal (3) using service wire (4), turn ignition switch ON and check if "ABS" warning lamp indicates DTC 12. If malfunction DTC is indicated, repair it first.
- 8) Turn ignition switch "OFF".



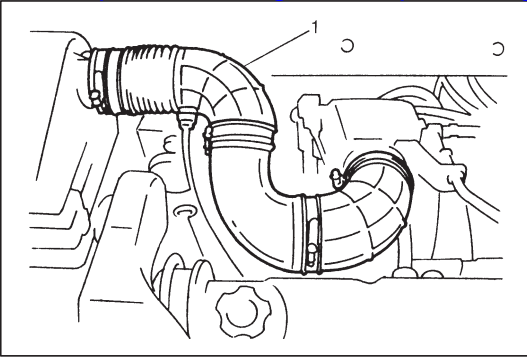
- 9) Perform the following checks with help of another person.
 Brake pedal should be depressed and then ignition switch turned ON by one person and wheel should be turned by another person's hand. At this time, check that:
- Operation sound of solenoid is heard and wheel turns only about 0.5 sec. (Brake force is depressurized).
 - Operation sound of pump motor is heard and pulsation is felt at brake pedal.
- 10) If all 4-wheels cannot be checked during one ignition cycle (OFF → ON), repeat Steps 8) and 9) till all 4 wheels are checked.
 If a faulty condition is found in Steps 9) and 10), replace hydraulic unit/control module assembly.
- 11) Turn ignition switch "OFF" and remove service wire from monitor coupler.

ABS HYDRAULIC UNIT/CONTROL MODULE ASSEMBLY

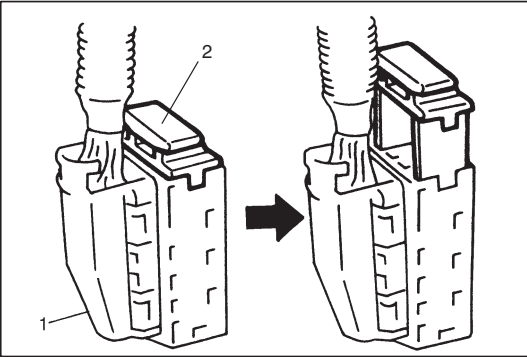


HYDRAULIC UNIT INSPECTION

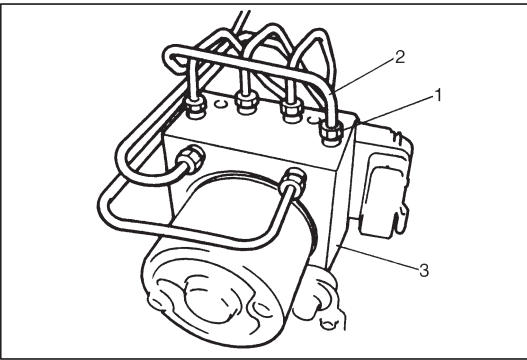
Check hydraulic unit for fluid leakage.
 If any, repair or replace.

**REMOVAL**

- 1) Disconnect negative cable from battery.
- 2) For LH vehicle, remove air cleaner outlet pipe (1) referring to "Engine Mechanical" section.



- 3) Disconnect ABS hydraulic unit/control module assembly connector (1) by pulling up lock (2).



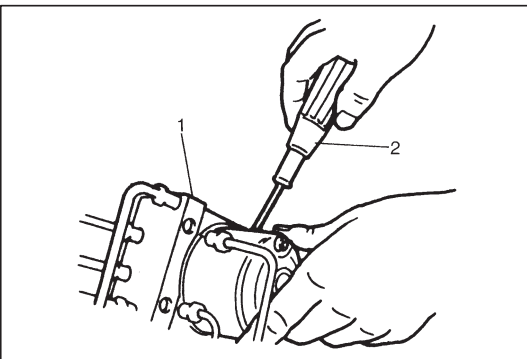
- 4) Using special tool, loosen flare nuts (1) and disconnect brake pipes (2) from ABS hydraulic unit/control module assembly (3).

Special Tool

09950-78220

NOTE:

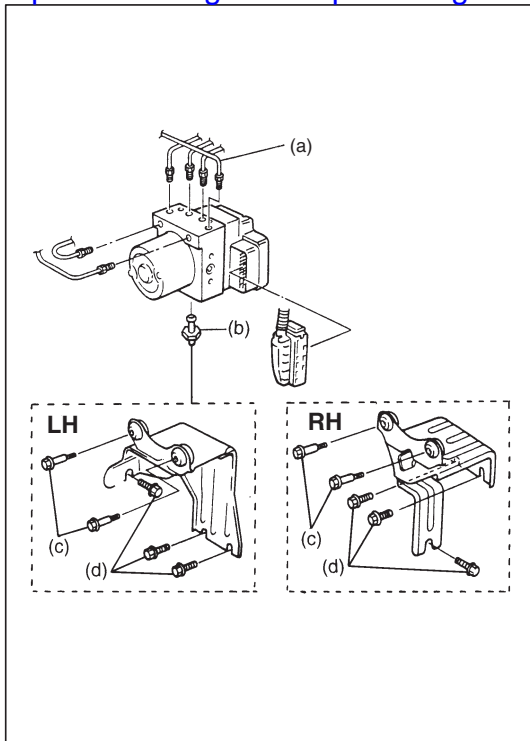
**Put bleeder plug cap onto pipe to prevent fluid from spilling.
Do not allow brake fluid to get on painted surfaces.**



- 5) Remove two nuts and disconnect take out ABS hydraulic unit/control module assembly (1) from bracket using screwdriver (2).

CAUTION:

- Do not give an impact to hydraulic unit.
- Use care not to allow dust to enter hydraulic unit.
- Do not place hydraulic unit on its side or upside down.
Handling it in inappropriate way will affect its original performance.

**INSTALLATION**

- 1) Install hydraulic unit by reversing removal procedure.

Tightening Torque

(a): 16 N·m (1.6 kg-m, 11.5 lb-ft)

(b): 9 N·m (0.9 kg-m, 6.5 lb-ft)

(c): 9 N·m (0.9 kg-m, 6.5 lb-ft)

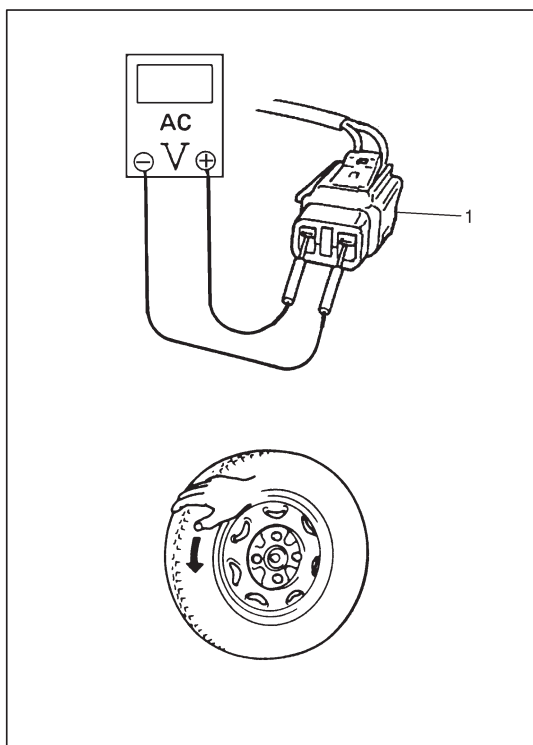
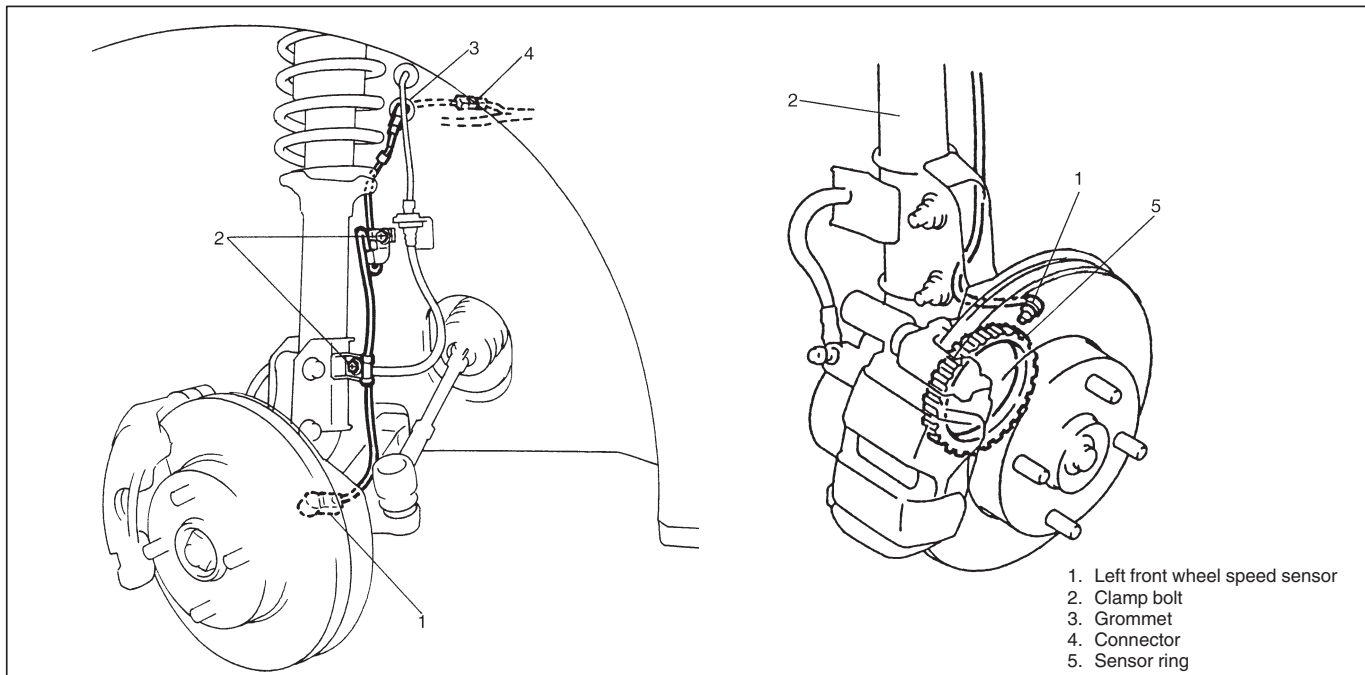
(d): 26 N·m (2.6 kg-m, 18.0 lb-ft)

- 2) Bleed air from brake system referring to "BRAKE" section.
- 3) Check each installed part for fluid leakage and perform "ABS Hydraulic Unit Operation Check" in this section.

NOTE:

For new ABS hydraulic unit/control module assembly, if "ABS Hydraulic Unit Operation Check" procedure has not been performed, "ABS" warning lamp may flash when ignition switch is turned ON position.

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FRONT WHEEL SPEED SENSOR

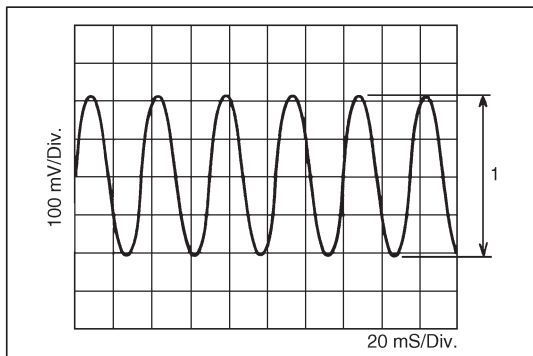


OUTPUT VOLTAGE INSPECTION

- 1) Turn ignition switch OFF.
- 2) Hoist vehicle a little.
- 3) Disconnect wheel speed sensor connector (1).
- 4) Disconnect wheel speed sensor grommet from vehicle body.
- 5) Connect voltmeter between connector (1) terminals.
- 6) While turning wheel by hand at a speed of approximately 1 full rotation to 1 1/3 rotation per second, check AC voltage of sensor.

**Output AC voltage at 1 to 1 1/3 rotation per second:
 100 mV or more**

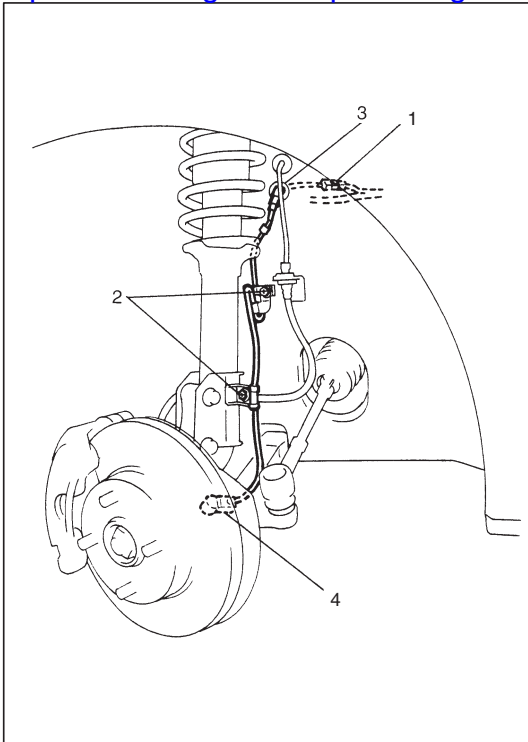
If measured voltage is not as specified, check sensor, rotor and their installation conditions.



Reference

When using oscilloscope for this check, check if peak-to-peak voltage (1) meets specification and waveform is complete.

**Peak-to-peak voltage at 1 to 1 1/3 rotation per second:
 280 mV or more at 43 – 57 Hz**

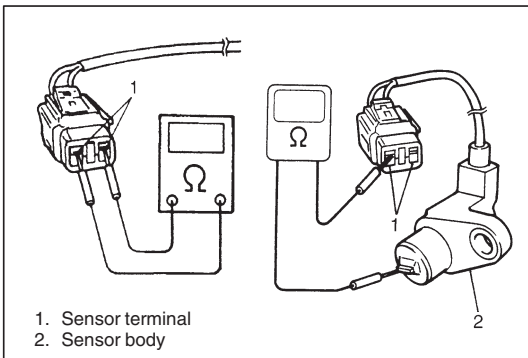


REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Disconnect front wheel speed sensor coupler (1).
- 3) Hoist vehicle and remove wheel.
- 4) Remove harness clamp bolts (2) and grommet (3).
- 5) Remove front wheel speed sensor (4) from knuckle.

CAUTION:

- Do not pull wire harness when removing front wheel speed sensor.
- Do not cause damage to surface of front wheel speed sensor and do not allow dust, etc. to enter its installation hole.



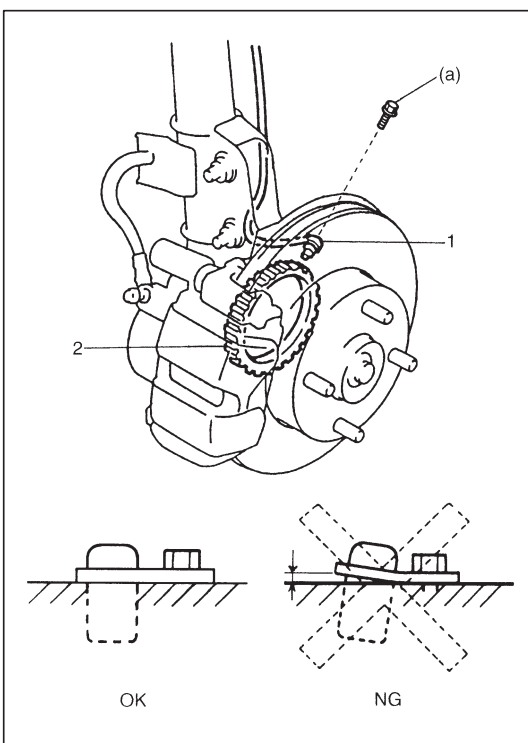
SENSOR INSPECTION

- Check sensor for damage.
- Check sensor for resistance and continuity.

Between both terminals (1) sensor: 1.2 – 1.6 k Ω at 20°C (68°F)

Between sensor terminal and sensor body (2): No continuity

If the check result is not as specified and any malcondition is found, replace.



INSTALLATION

- 1) Check that no foreign material is attached to sensor (1) and sensor ring (2).
- 2) Install it by reversing removal procedure.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

CAUTION:

- Do not pull or twist wire harness more than necessary when installing front wheel speed sensor.

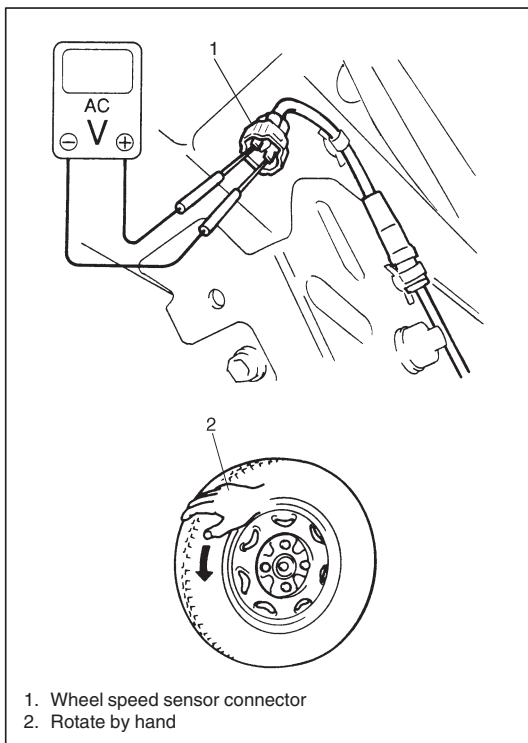
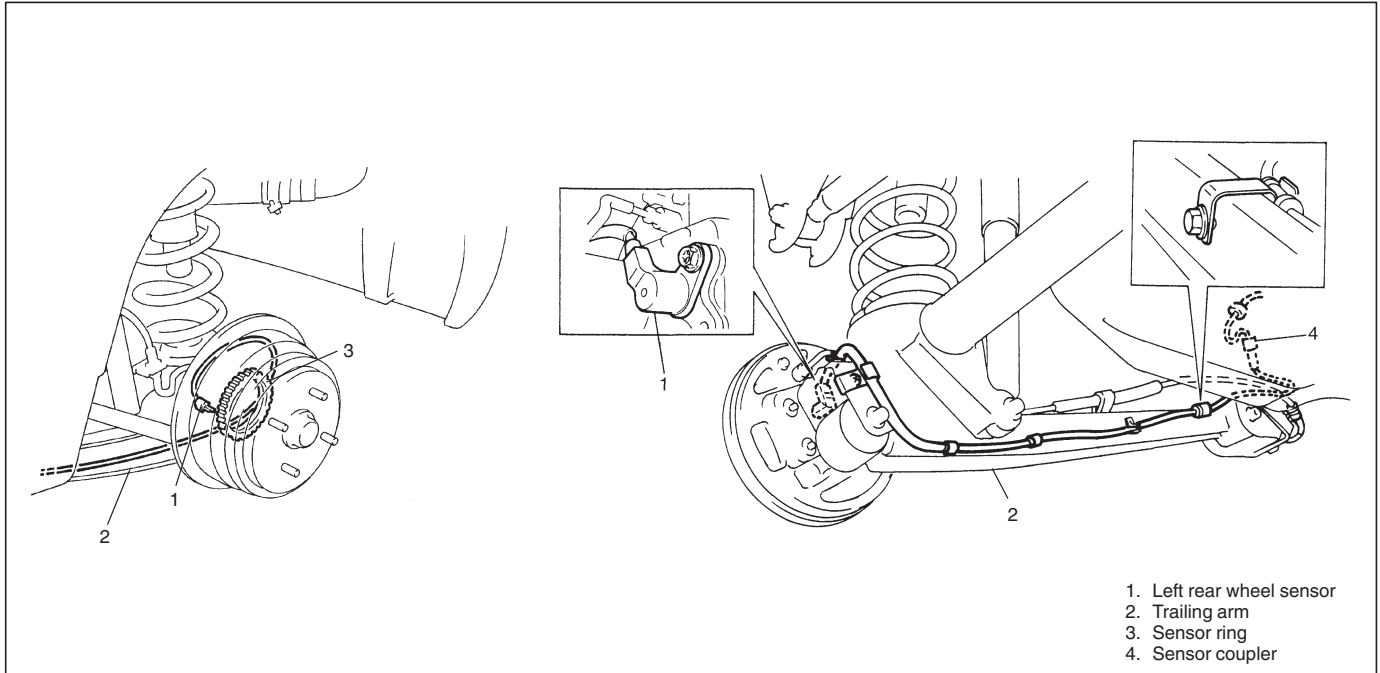
- 3) Check that there is no clearance between sensor and knuckle.

FRONT WHEEL SPEED SENSOR RING

NOTE:

The front wheel sensor ring can not be removed or replaced alone. If front wheel sensor ring needs to be replaced, replace it as a wheel side joint assembly of drive shaft.

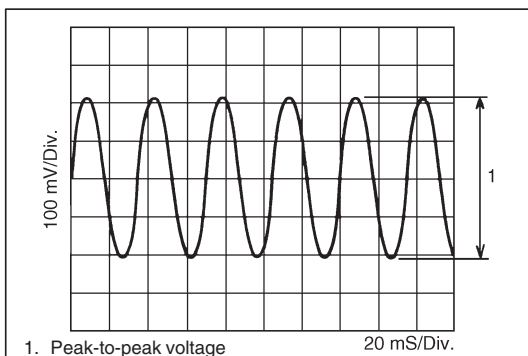
For removal and installation of wheel side joint assembly of drive shaft, refer to "FRONT DRIVE SHAFTS" section in this manual.

REAR WHEEL SPEED SENSOR**OUTPUT VOLTAGE INSPECTION**

- 1) Turn ignition switch "OFF".
- 2) Hoist vehicle.
- 3) Disconnect connector of wheel speed sensor.
- 4) Connect voltmeter between connector terminals.
- 5) While turning wheel at a speed of approximately 1 full rotation to 1 1/3 rotation per second, check AC voltage of sensor.

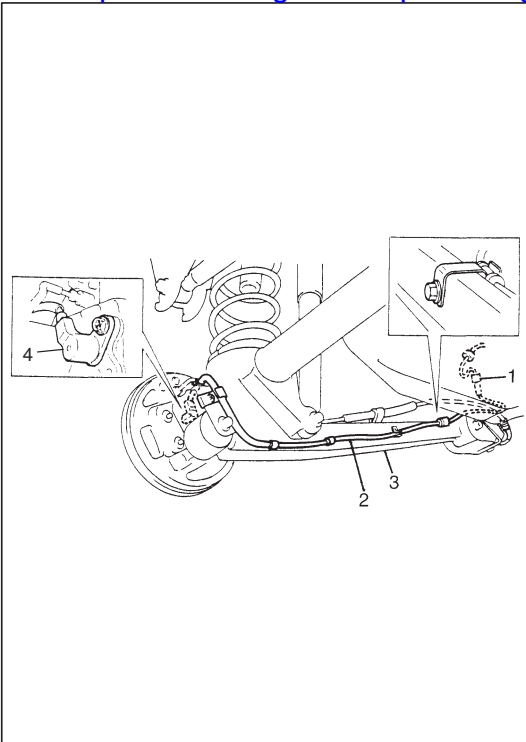
**Output AC voltage at 1 to 1 1/3 rotation per second:
100 mV or more**

If measured voltage is not as specified, check sensor, rotor and their installation conditions.

**Reference**

When using oscilloscope for this check, check if peak-to-peak voltage meets specification and waveform is complete.

**Peak-to-peak voltage at 1 to 1 1/3 rotation per second:
280 mV or more at 43 – 57 Hz**

**REMOVAL**

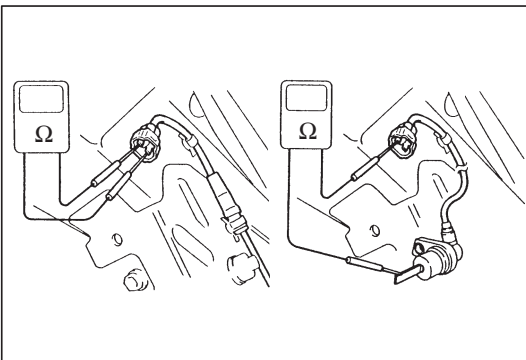
- 1) Disconnect negative cable from battery.
- 2) Hoist vehicle.
- 3) Disconnect rear wheel speed sensor coupler (1).
- 4) Detach ABS wheel sensor wire harness (2) from suspension frame (3).

Do not detach clip of rear wheel speed sensor connector from vehicle body unless replacement is necessary.

- 5) Remove rear wheel speed sensor (4) from rear axle housing.

CAUTION:

- Do not pull wire harness when removing rear wheel speed sensor.
- Do not cause damage to surface of rear wheel speed sensor and do not allow dust, etc. to enter its installation hole.

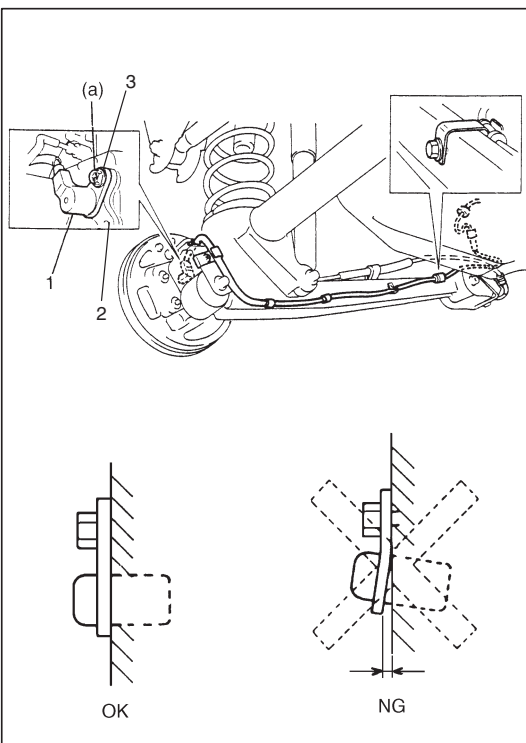
**SENSOR INSPECTION**

- Check sensor for damage.
- Check sensor for resistance and continuity.

Between both terminals of sensor: 0.9 – 1.3 kΩ at 20°C (68°F)

Between sensor terminal and sensor body: No continuity

If the check result is not as specified and any malfunction is found, replace.

**INSTALLATION**

- 1) Check that no foreign material is attached to sensor (1) and ring.
- 2) Reverse removal procedure for installation noting the following.
 - There is another bolt hole (2) that is fit for wheel speed sensor bolt by proper bolt hole (3).

Be sure to install wheel speed sensor and its bolt at the correct (upper) position as shown in figure.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.2 lb-ft)

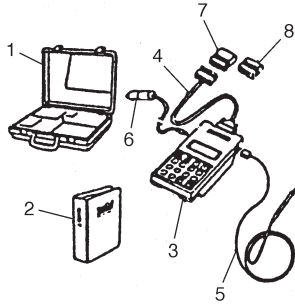
CAUTION:

Do not pull or twist wire harness more than necessary when installing rear wheel speed sensor.

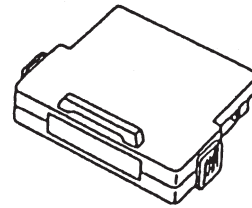
- 3) Check that there is no clearance between sensor and rear axle shaft.

REAR WHEEL SPEED SENSOR RING

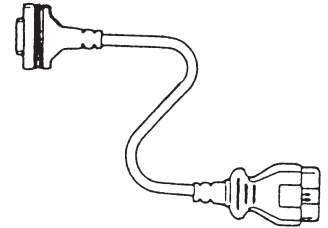
For removal, inspection and installation of rear wheel sensor ring, refer to “BRAKES” section in this manual.

SPECIAL TOOLS

09931-76011
SUZUKI scan tool (Tech 1A) kit



Mass storage cartridge



09931-76030
16/14 pin DLC cable



09950-78220
Flare nut wrench (10 mm)

SECTION 6

ENGINE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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GENERAL INFORMATION

STATEMENT ON CLEANLINESS AND CARE

An automobile engine is a combination of many machined, honed, polished and lapped surfaces with tolerances that are measured in the thousands of an millimeter (ten thousands of an inch).

Accordingly, when any internal engine parts are serviced, care and cleanliness are important.

Throughout this section, it should be understood that proper cleaning and protection of machined surfaces and friction areas is part of the repair procedure. This is considered standard shop practice even if not specifically stated.

- A liberal coating of engine oil should be applied to friction areas during assembly to protect and lubricate the surfaces on initial operation.

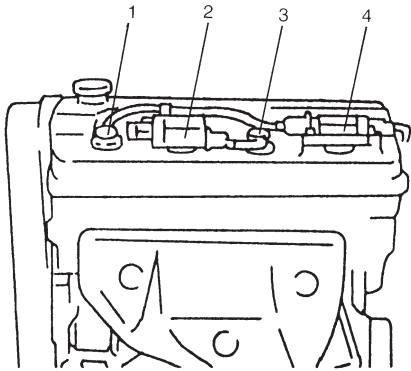
- Whenever valve train components, pistons, piston rings, connecting rods, rod bearings, and crankshaft journal bearings are removed for service, they should be retained in order.

At the time of installation, they should be installed in the same locations and with the same mating surfaces as when removed.

- Battery cables should be disconnected before any major work is performed on the engine.

Failure to disconnect cables may result in damage to wire harness or other electrical parts.

- Throughout this manual, the four cylinders of the engine are identified by numbers; No.1 (1), No.2 (2), No.3 (3) and No.4 (4) counted from crankshaft pulley side to flywheel side.



GENERAL INFORMATION ON ENGINE SERVICE

THE FOLLOWING INFORMATION ON ENGINE SERVICE SHOULD BE NOTED CAREFULLY, AS IT IS IMPORTANT IN PREVENTING DAMAGE, AND IN CONTRIBUTING TO RELIABLE ENGINE PERFORMANCE.

- When raising or supporting engine for any reason, do not use a jack under oil pan. Due to small clearance between oil pan and oil pump strainer, jacking against oil pan may cause it to be bent against strainer resulting in damaged oil pick-up unit.

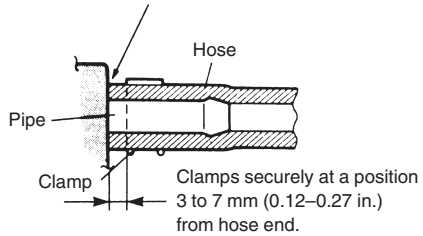
- It should be kept in mind, while working on engine, that 12-volt electrical system is capable of violent and damaging short circuits.

When performing any work where electrical terminals can be grounded, ground cable of the battery should be disconnected at battery.

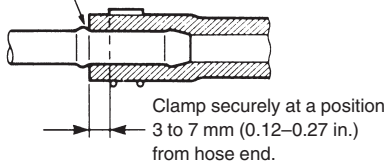
- Any time the air cleaner, throttle body or intake manifold is removed, the intake opening should be covered. This will protect against accidental entrance of foreign material which could follow intake passage into cylinder and cause extensive damage when engine is started.

HOSE CONNECTION

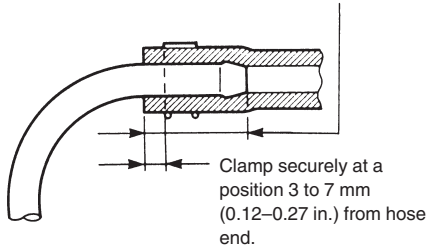
With short pipe, fit hose as far as it reaches pipe joint as shown.



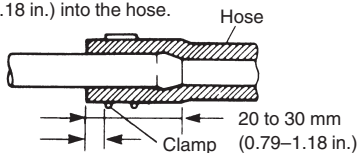
With following type pipe, fit hose as far as its peripheral projection as shown.



With bent pipe, fit hose as its bent part as shown or till pipe is about 20 to 30 mm (0.79-1.18 in.) into the hose.



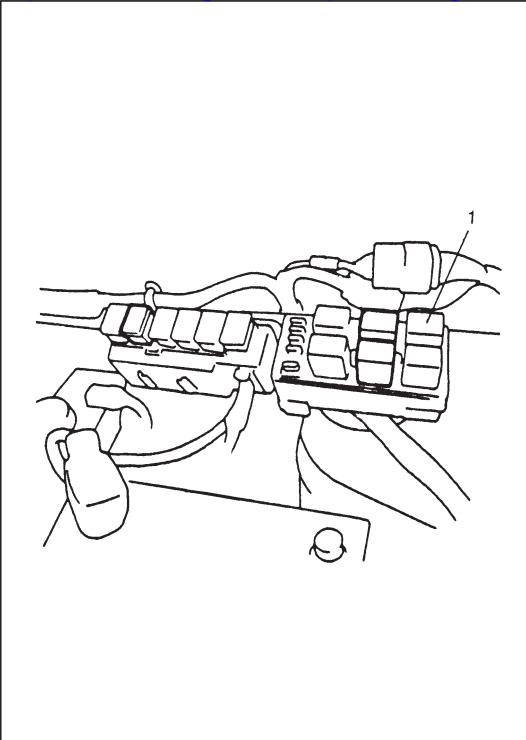
With straight pipe, fit hose till pipe is, about 20 to 30 mm (0.79-1.18 in.) into the hose.

**PRECAUTION ON FUEL SYSTEM SERVICE**

- Work must be done with no smoking, in a well-ventilated area and away from any open flames.
- As fuel feed line (between fuel pump and fuel delivery pipe) is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected. Before loosening or disconnecting fuel feed line, make sure to release fuel pressure according to "FUEL PRESSURE RELIEF PROCEDURE". A small amount of fuel may be released after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Put that cloth in an approved container when disconnection is completed.
- Never run engine with fuel pump relay disconnected when engine and exhaust system are hot.
- Fuel or fuel vapor hose connection varies with each type of pipe. When reconnecting fuel or fuel vapor hose, be sure to connect and clamp each hose correctly referring to left figure Hose Connection. After connecting, make sure that it has no twist or kink.
- When installing injector or fuel delivery pipe, lubricate its O-ring with spindle oil or gasoline.
- When connecting fuel pipe flare nut, first tighten flare nut by hand and then tighten it to specified torque.

FUEL PRESSURE RELIEF PROCEDURE**CAUTION:**

This work must not be done when engine is hot. If done so, it may cause adverse effect to catalyst.



After making sure that engine is cold, release fuel pressure as follows.

- 1) Place transmission gear shift lever in "Neutral" (Shift selector lever to "P" range for A/T model), set parking brake, and block drive wheels.
- 2) Remove relay box cover.
- 3) Disconnect fuel pump relay (1) from relay box.
- 4) Remove fuel filler cap to release fuel vapor pressure in fuel tank and then reinstall it.
- 5) Start engine and run it till it stops for lack of fuel. Repeat cranking engine 2-3 times for about 3 seconds each time to dissipate fuel pressure in lines. Fuel connections are now safe for servicing.
- 6) Upon completion of servicing, connect fuel pump relay (1) to relay box and install relay box cover.

FUEL LEAKAGE CHECK PROCEDURE

After performing any service on fuel system, check to make sure that there are no fuel leakages as follows.

- 1) Turn ON ignition switch for 3 seconds (to operate fuel pump) and then turn it OFF.
Repeat this (ON and OFF) 3 or 4 times and apply fuel pressure to fuel line. (till fuel pressure is felt by hand placed on fuel feed hose.)
- 2) In this state, check to see that there are no fuel leakages from any part of fuel system.

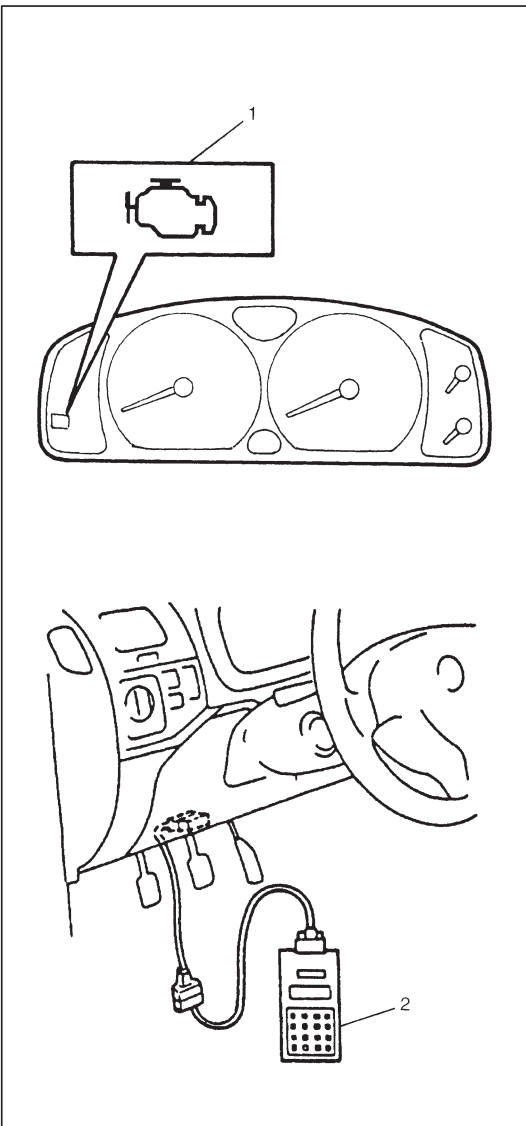
ENGINE DIAGNOSIS

GENERAL DESCRIPTION

This vehicle is equipped with an engine and emission control system which are under control of ECM.

The engine and emission control system in this vehicle are controlled by ECM. ECM has an On-Board Diagnostic system which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission. When diagnosing engine troubles, be sure to have full understanding of the outline of "On-Board Diagnostic System" and each item in "Precaution in Diagnosing Trouble" and execute diagnosis according to "ENGINE DIAGNOSTIC FLOW TABLE".

There is a close relationship between the engine mechanical, engine cooling system, ignition system, exhaust system, etc. and the engine and emission control system in their structure and operation. In case of an engine trouble, even when the malfunction indicator lamp (MIL) doesn't turn ON, it should be diagnosed according to this flow table.



ON-BOARD DIAGNOSTIC SYSTEM (VEHICLE WITH EGR VALVE)

ECM in this vehicle has following functions.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the bulb of the malfunction indicator lamp (1).
- When ECM detects a malfunction which gives an adverse effect to vehicle emission while the engine is running, it makes the malfunction indicator lamp (1) in the meter cluster of the instrument panel turn ON or flash (flashing only when detecting a misfire which can cause damage to the catalyst) and stores the malfunction area in its memory.
(If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL (1) turn OFF although DTC stored in its memory will remain.)
- As a condition for detecting a malfunction in some areas in the system being monitored by ECM and turning ON the malfunction indicator lamp (1) due to that malfunction, 2 driving cycle detection logic is adopted to prevent erroneous detection.
- When a malfunction is detected, engine and driving conditions then are stored in ECM memory as freeze frame data. (For the details, refer to description on Freeze frame data.)
- It is possible to communicate by using not only SUZUKI scan tool (Tech-1) (2) but also generic scan tool. (Diagnostic information can be accessed by using a scan tool.)

Warm-up Cycle

A warm-up cycle means sufficient vehicle operation such that the coolant temperature has risen by at least 22°C (40°F) from engine starting and reaches a minimum temperature of 70°C (160°F).

Driving Cycle

A "Driving Cycle" consists of engine startup and engine shutoff.

2 Driving Cycle Detection Logic

The malfunction detected in the first driving cycle is stored in ECM memory (in the form of pending DTC and freeze frame data) but the malfunction indicator lamp does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

Pending DTC

Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycle detection logic.

An Example of Freeze Frame Data

1. Trouble Code	P0102 (1st)
2. Engine Speed	782 RPM
3. Eng Cool Tmp.	80°C
4. Vehicle Spd.	0 km/h
5. MAP Sensor	39 kPa
6. St. Term FT1	− 0.8% Lean
7. Lg. Term FT1	− 1.6% Lean
8. Fuel 1 Stat.	Closed Loop
9. Fuel 2 Stat.	Not used
10. Load value	25.5%

1st, 2nd or 3rd in parentheses here represents which position in the order the malfunction is detected.

Freeze Frame Data

ECM stores the engine and driving conditions (in the form of data as shown at the left) at the moment of the detection of a malfunction in its memory. This data is called "Freeze frame data".

Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the vehicle was running or stopped, where air/fuel mixture was lean or rich) when a malfunction was detected by checking the freeze frame data. Also, ECM has a function to store each freeze frame data for three different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.

Priority of freeze frame data:

ECM has 4 frames where the freeze frame data can be stored. The first frame stores the freeze frame data of the malfunction which was detected first. However, the freeze frame data stored in this frame is updated according to the priority described below. (If malfunction as described in the upper square "1" below is detected while the freeze frame data in the lower square "2" has been stored, the freeze frame data "2" will be updated by the freeze frame data "1".)

PRIORITY	FREEZE FRAME DATA IN FRAME 1
1	Freeze frame data at initial detection of malfunction among misfire detected (P0300-P0304), fuel system too lean (P0171) and fuel system too rich (P0172)
2	Freeze frame data when a malfunction other than those in "1" above is detected

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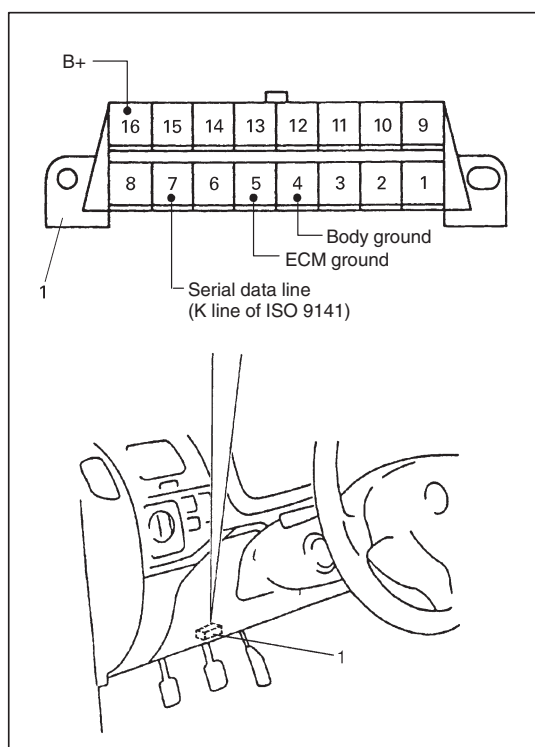
In the 2nd through the 4th frames, the freeze frame data of each malfunction is stored in the order as the malfunction is detected. These data are not updated.

Shown in the table below are examples of how freeze frame data are stored when two or more malfunctions are detected.

FRAME MALFUNCTION DETECTED ORDER		FRAME 1 FREEZE FRAME DATA to be updated	FRAME 2 1st FREEZE FRAME DATA	FRAME 3 2nd FREEZE FRAME DATA	FRAME 4 3rd FREEZE FRAME DATA
	No malfunction	No freeze frame data			
1	P0400 (EGR) detected	Data at P0400 detection	Data at P0400 detection	—	—
2	P0171 (Fuel system) detected	Data at P0171 detection	Data at P0400 detection	Data at P0171 detection	—
3	P0300 (Misfire) detected	Data at P0171 detection	Data at P0400 detection	Data at P0171 detection	Data at P0300 detection
4	P0301 (Misfire) detected	Data at P0171 detection	Data at P0400 detection	Data at P0171 detection	Data at P0300 detection

Freeze frame data clearance:

The freeze frame data is cleared at the same time as clearance of diagnostic trouble code (DTC).



Data Link Connector (DLC)

DLC (1) is in compliance with SAEJ1962 in its installation position, the shape of connector and pin assignment.

Serial data line (K line of ISO 9141) is used for SUZUKI scan tool (Tech-1) to communicate with ECM.

ON-BOARD DIAGNOSTIC SYSTEM (VEHICLE WITHOUT EGR VALVE)

ECM diagnosis troubles which may occur in the area including the following parts when the ignition switch is ON and the engine is running, and indicates the result by turning on or flashing malfunction indicator lamp (1).

- Heated oxygen sensor
- ECT sensor
- TP sensor
- IAT sensor
- MAP sensor
- CMP sensor
- CKP sensor
- VSS
- CPU (Central Processing Unit) of ECM

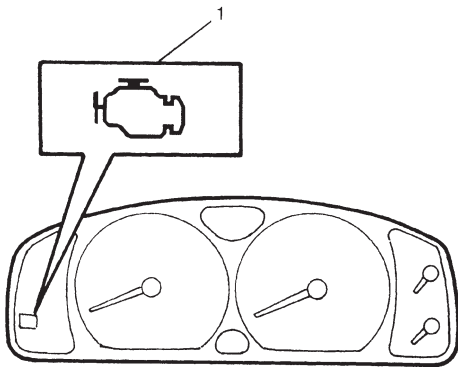
ECM and malfunction indicator lamp (1) operate as follows.

- Malfunction indicator lamp (1) lights when the ignition switch is turned ON (but the engine at stop) with the diagnosis switch terminal ungrounded regardless of the condition of Electronic Fuel Injection system. This is only to check the malfunction indicator lamp (1) bulb and its circuit.
- If the above areas of Electronic Fuel Injection system is free from any trouble after the engine start (while engine is running), malfunction indicator lamp (1) turns OFF.
- When ECM detects a trouble which has occurred in the above areas, it makes malfunction indicator lamp (1) turn ON while the engine is running to warn the driver of such occurrence of trouble and at the same time it stores the trouble area in ECM back-up memory. (The memory is kept as it is even if the trouble was only temporary and disappeared immediately. And it is not erased unless the power to ECM is shut off for specified time below.)
ECM also indicates trouble area in memory by means of flashing of malfunction indicator lamp (1) at the time of inspection. (i.e. when diagnosis switch terminal (2) is grounded and ignition switch is turned ON.)

NOTE:

- When a trouble occurs in the above areas and disappears soon while the diagnosis switch terminal is ungrounded and the engine is running, malfunction indicator lamp (1) lights and remains ON as long as the trouble exists but it turns OFF when the normal condition is restored.
- Time required to erase diagnostic trouble code memory thoroughly varies depending on ambient temperature as follows.

AMBIENT TEMPERATURE	TIME TO CUT POWER TO ECM
Over 0°C (32°F)	60 sec. or longer
Under 0°C (32°F)	Not specifiable. Select a place with higher than 0°C (32°F) temperature.



PRECAUTION IN DIAGNOSING TROUBLE

- Don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine or main fuse before confirming diagnostic information (DTC, freeze frame data, etc.) stored in ECM memory. Such disconnection will erase memorized information in ECM memory.
- Diagnostic information stored in ECM memory can be cleared as well as checked by using SUZUKI scan tool (Tech-1) or generic scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
- Priorities for diagnosing troubles (Vehicle with EGR valve).
If troubleshooting priorities for multiple diagnostic codes are given in the applicable DTC flow chart, these should be followed. If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.
 1. Diagnostic trouble codes (DTCs) other than DTC P0171/P0172 (Fuel system too lean/too rich), DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected) and DTC P0400 (EGR flow malfunction)
 2. DTC P0171/P0172 (Fuel system too lean/too rich) and DTC P0400 (EGR flow malfunction)
 3. DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected)
- Be sure to read "Precautions for Electrical Circuit Service" in Section 0A before inspection and observe what is written there.
- ECM Replacement
When substituting a known-good ECM, check for following conditions. Neglecting this check may cause damage to a known-good ECM.
 - Resistance value of all relays, actuators is as specified respectively.
 - MAP sensor and TP sensor are in good condition and none of power circuits of these sensors is shorted to ground.

ENGINE DIAGNOSTIC FLOW TABLE

Refer to the following pages for the details of each step.

STEP	ACTION	YES	NO
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the next page. Was customer complaint analysis performed?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance 1) Check for DTC (including pending DTC) referring to the next page. Is there any DTC(s)?	1) Print DTC and freeze frame data or write them down and clear them by referring to "DTC Clearance" section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the next page. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC Check" section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC Check" section. Is there any DTC(s)?		Go to Step 10.
8	Engine Basic Inspection and Symptoms-To-Diagnosis Matrix Table 1) Check and repair according to "Engine Basic Check" and "Symptom-To-Diagnosis Matrix Table" section. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Trouble shooting for DTC 1) Check and repair according to applicable DTC diag. flow table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the next page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

2. DIAGNOSTIC TROUBLE CODE (DTC)/FREEZE FRAME DATA CHECK, RECORD AND CLEARANCE

First, check DTC (including pending DTC), referring to “DTC check” section. If DTC is indicated, print it and freeze frame data or write them down and then clear them by referring to “DTC clearance” section. DTC indicates malfunction that occurred in the system but does not indicate whether it exists now or it occurred in the past and the normal condition has been restored now. To check which case applies, check the symptom in question according to Step 4 and recheck DTC according to Step 5.

Attempt to diagnose a trouble based on DTC in this step only or failure to clear the DTC in this step will lead to incorrect diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting.

NOTE:

- If only Automatic transmission DTCs (P0702-P1717) or Immobilizer DTCs (P1610-P1614) are indicated in this step, perform trouble diagnosis according to “Diagnosis” in Section 7B or Section 8G.

3. and 4. VISUAL INSPECTION

As a preliminary step, be sure to perform visual check of the items that support proper function of the engine referring to “Visual Inspection” section.

5. TROUBLE SYMPTOM CONFIRMATION

Based on information obtained in Step 1 Customer complaint analysis and Step 2 DTC/freeze frame data check, confirm trouble symptoms. Also, reconfirm DTC according to “DTC Confirmation Procedure” described in each DTC Diagnosis section.

6. and 7. RECHECKING AND RECORD OF DTC/FREEZE FRAME DATA

Refer to “DTC check” section for checking procedure.

8. ENGINE BASIC INSPECTION AND ENGINE DIAGNOSIS TABLE

Perform basic engine check according to the “Engine Basic Inspection Flow Table” first. When the end of the flow table has been reached, check the parts of the system suspected as a possible cause referring to SYMPTOMS-TO-DIAGNOSIS MATRIX TABLE and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or basic engine check) and repair or replace faulty parts, if any.

9. TROUBLESHOOTING FOR DTC (See each DTC Diag. Flow Table)

Based on the DTC indicated in Step 5 and referring to the applicable DTC diag. flow table in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ECM or other part and repair or replace faulty parts.

10. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A and related circuit of DTC recorded in Step 2.

11. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the engine is free from any abnormal conditions. If what has been repaired is related to the DTC, clear the DTC once, perform DTC confirmation procedure and confirm that no DTC is indicated.

CUSTOMER PROBLEM INSPECTION FORM (EXAMPLE)

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

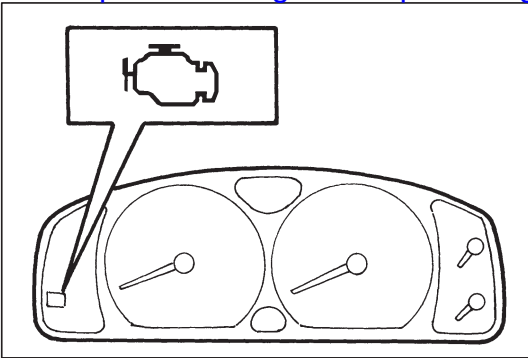
PROBLEM SYMPTOMS	
<input type="checkbox"/> Difficult Starting <input type="checkbox"/> No cranking <input type="checkbox"/> No initial combustion <input type="checkbox"/> No combustion <input type="checkbox"/> Poor starting at (<input type="checkbox"/> cold <input type="checkbox"/> warm <input type="checkbox"/> always) <input type="checkbox"/> Other_____	<input type="checkbox"/> Poor Driveability <input type="checkbox"/> Hesitation on acceleration <input type="checkbox"/> Back fire/ <input type="checkbox"/> After fire <input type="checkbox"/> Lack of power <input type="checkbox"/> Surging <input type="checkbox"/> abnormal knocking <input type="checkbox"/> Other_____
<input type="checkbox"/> Poor Idling <input type="checkbox"/> Poor fast idle <input type="checkbox"/> Abnormal idling speed (<input type="checkbox"/> High <input type="checkbox"/> Low) (r/min.) <input type="checkbox"/> Unstable <input type="checkbox"/> Hunting (r/min. to r/min.) <input type="checkbox"/> Other_____	<input type="checkbox"/> Engine Stall when <input type="checkbox"/> Immediately after start <input type="checkbox"/> Accel. pedal is depressed <input type="checkbox"/> Accel. pedal is released <input type="checkbox"/> Load is applied <input type="checkbox"/> A/C <input type="checkbox"/> Electric load <input type="checkbox"/> P/S <input type="checkbox"/> Other_____
<input type="checkbox"/> OTHERS:	

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental Condition	
Weather	<input type="checkbox"/> Fair <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Snow <input type="checkbox"/> Not related <input type="checkbox"/> Other_____
Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold (°F/ °C) <input type="checkbox"/> Not related
Frequency	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes (times/ day, month) <input type="checkbox"/> Only once <input type="checkbox"/> Under certain condition
Road	<input type="checkbox"/> Urban <input type="checkbox"/> Suburb <input type="checkbox"/> Highway <input type="checkbox"/> Mountainous (<input type="checkbox"/> Uphill <input type="checkbox"/> Downhill) <input type="checkbox"/> Tarmacadam <input type="checkbox"/> Gravel <input type="checkbox"/> Other_____
Vehicle Condition	
Engine condition	<input type="checkbox"/> Cold <input type="checkbox"/> Warming up phase <input type="checkbox"/> Warmed up <input type="checkbox"/> Not related <input type="checkbox"/> Other at starting <input type="checkbox"/> Immediately after start <input type="checkbox"/> Racing without load <input type="checkbox"/> Engine speed (r/min)
Vehicle condition	During driving: <input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Right hand corner <input type="checkbox"/> Left hand corner <input type="checkbox"/> When shifting (Lever position) <input type="checkbox"/> At stop <input type="checkbox"/> Vehicle speed when problem occurs (km/h, Mile/h) <input type="checkbox"/> Other_____

Malfunction indicator lamp condition	<input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Diagnostic trouble code	First check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code ()
	Second check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code ()

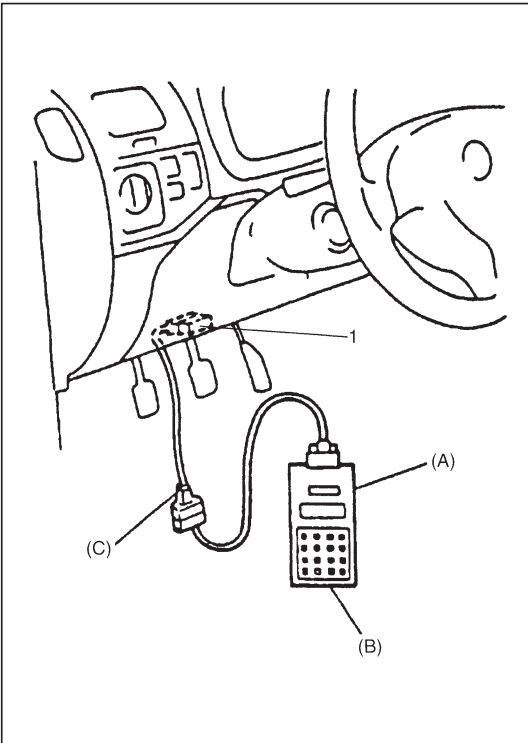
NOTE:

The above form is a standard sample. It should be modified according to conditions characteristic of each market.



MALFUNCTION INDICATOR LAMP (MIL) CHECK

- 1) Turn ON ignition switch (but the engine at stop) and check that MIL lights.
If MIL does not light up (or MIL dims), go to "Diagnostic Flow Table A-1" for troubleshooting.
- 2) Start engine and check that MIL turns OFF.
If MIL remains ON and no DTC is stored in ECM, go to "Diagnostic Flow Table A-2" for troubleshooting.



DIAGNOSTIC TROUBLE CODE (DTC) CHECK [Using SUZUKI scan tool]

- 1) Prepare SUZUKI scan tool (Tech-1).
- 2) With ignition switch OFF, connect it to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

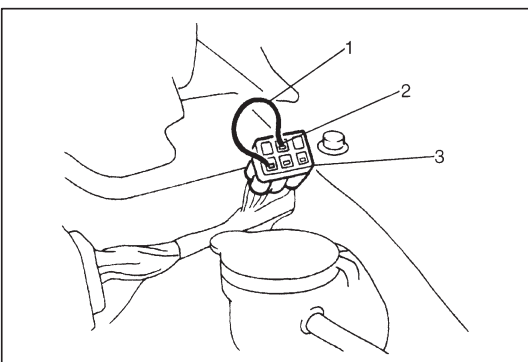
Special Tool:

(A): SUZUKI scan tool

(B): Mass storage cartridge

(C): 16/14 pin DLC cable

- 3) Turn ignition switch ON and confirm that MIL lights.
- 4) Read DTC, pending DTC and freeze frame data according to instructions displayed on scan tool and print it or write it down. Refer to scan tool operator's manual for further details.
If communication between scan tool and ECM is not possible, check if scan tool is communicable by connecting it to ECM in another vehicle. If communication is possible in this case, scan tool is in good condition. Then check data link connector and serial data line (circuit) in the vehicle with which communication was not possible.
- 5) After completing the check, turn ignition switch off and disconnect scan tool from data link connector.



[Not using SUZUKI scan tool] (Vehicle without EGR valve)

- 1) Check malfunction indicator lamp referring to "Malfunction Indicator Lamp Check" in this section.
- 2) With the ignition switch OFF position, disconnect SUZUKI scan tool if connected and using service wire (1), ground diagnosis switch terminal (2) in monitor coupler (3).
- 3) With the ignition switch ON position and leaving engine OFF, read DTC from flashing pattern of malfunction indicator lamp. Refer to "Diagnostic Trouble Code Table".
If lamp remains ON, go to "Diagnostic Flow Table A-1".

NOTE:

- If abnormality or malfunction lies in two or more areas, malfunction indicator lamp indicates applicable codes three times each.

And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.

- Take a note of diagnostic trouble code indicated first.

- 4) After completing the check, turn the ignition switch OFF position and disconnect service wire from monitor coupler.

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

[Using SUZUKI scan tool]

- 1) Connect SUZUKI scan tool (Tech-1) to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch ON.
- 3) Erase DTC and pending DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch off and disconnect scan tool from data link connector.

NOTE:

DTC and freeze frame data stored in ECM memory are also cleared in following cases. Be careful not to clear them before keeping their record.

- When power to ECM is cut off (by disconnecting battery cable, removing fuse or disconnecting ECM connectors)
- When the same malfunction (DTC) is not detected again during 40 engine warm-up cycles.

[Not using SUZUKI scan tool]

- 1) Turn the ignition switch OFF position.
- 2) Disconnect battery negative cable for specified time below to erase diagnostic trouble code stored in ECM memory and reconnect it.

Time required to erase DTC:

Ambient temperature	Time to cut power to ECM
Over 0°C (32°F)	30 sec. or longer
Under 0°C (32°F)	Not specifiable. Select a place with higher than 0°C (32°F) temperature.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL (vehicle with EGR valve)	MIL (vehicle without EGR valve)
P0105 (No.11)	Manifold absolute pressure circuit malfunction	Low pressure-high vacuum-low voltage (or MAP sensor circuit shorted to ground) High pressure-low vacuum-high voltage (or MAP sensor circuit open)	1 driving cycle	1 driving cycle
P0110 (No.18)	Intake air temp. circuit malfunction	Intake air temp. circuit low input Intake air temp. circuit high input	1 driving cycle	1 driving cycle
P0115 (No.19)	Engine coolant temp. circuit malfunction	Engine coolant temp. circuit low input Engine coolant temp. circuit high input	1 driving cycle	1 driving cycle
P0120 (No.13)	Throttle position circuit malfunction	Throttle position circuit low input Throttle position circuit high input	1 driving cycle	1 driving cycle
P0121	Throttle position circuit performance problem	Poor performance of TP sensor	2 driving cycles	Not applicable
P0130 (No.14)	HO2S circuit malfunction (Sensor-1)	Min. output voltage of HO2S-higher than specification Max. output voltage of HO2S-lower than specification	2 driving cycles	1 driving cycle
P0133	HO2S circuit slow response (Sensor-1)	Response time of HO2S-1 output voltage between rich and lean is longer than specification.	2 driving cycles	Not applicable
P0135 (No.14)	HO2S heater circuit malfunction (Sensor-1)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	1 driving cycle
P0136	HO2S circuit malfunction (Sensor-2)	Max. voltage of HO2S-2 is lower than specification or its min. voltage is higher than specification	2 driving cycles	Not applicable
P0141	HO2S heater circuit malfunction (Sensor-2)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON. (or heater circuit or short)	2 driving cycles	Not applicable
P0171	Fuel system too lean	Short term fuel trim or total fuel trim (short and long terms added) is larger than specification for specified time or longer. (fuel trim toward rich side is large.)	2 driving cycles	Not applicable
P0172	Fuel system too rich	Short term fuel trim or total fuel trim (short and long term added) is smaller than specification for specified time or longer. (fuel trim toward lean side is large.)	2 driving cycles	Not applicable
P0300 P0301 P0302 P0303 P0304	Random misfire detected Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected Cylinder 4 misfire detected	Misfire of such level as to cause damage to three way catalyst	MIL flashing during misfire detection	Not applicable
		Misfire of such level as to deteriorate emission but not to cause damage to three way catalyst	2 driving cycles	Not applicable

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL (vehicle with EGR valve)	MIL (vehicle without EGR valve)
P0325 (No.17)	Knock sensor circuit malfunction	Knock sensor circuit low input Knock sensor circuit high input	1 driving cycle	1 driving cycle
P0335 (No.23)	Crankshaft position sensor circuit malfunction	No signal for 2 sec. During engine cranking	1 driving cycle	1 driving cycle
P0340 (No.15)	Camshaft position sensor circuit malfunction	No signal during engine running	1 driving cycle	1 driving cycle
P0400	Exhaust gas recirculation flow malfunction detected	Excessive or insufficient EGR flow	2 driving cycles	Not applicable
P0420	Catalyst system efficiency below threshold	Output waveforms of HO2S-1 and HO2S-2 are similar. (Time from output voltage change of HO2S-1 to that of HO2S-2 is shorter than specification.)	2 driving cycles	Not applicable
P0443	Purge control valve circuit malfunction	Purge control valve circuit is open or shorted to ground	2 driving cycles	Not applicable
P0480	Radiator fan control circuit malfunction	Radiator cooling fan relay terminal voltage is low when cooling temp. is lower than specification	2 driving cycles	Not applicable
P0500 (No.16)	Vehicle speed sensor malfunction	No signal while running in "D" range or during fuel cut at decelerating	2 driving cycles	1 driving cycle
P0505 (No.26)	Idle control system malfunction	No closed signal to IAC valve is detected	2 driving cycles	1 driving cycle
P0601	Internal control module memory check sum error	Data write error (or check sum error) when written into ECM	2 driving cycles	Not applicable
P1450 (No.29)	Barometric pressure sensor circuit malfunction	Barometric pressure is lower or higher than specification. (or sensor malfunction)	1 driving cycle	1 driving cycle
P1451	Barometric pressure sensor performance problem	Difference between manifold absolute pressure (MAP sensor value) and barometric pressure (barometric pressure sensor value) is larger than specification during cranking.	2 driving cycles	Not applicable
P1500	Starter signal circuit malfunction	Starter signal is not inputted from engine cranking till its start and after or it is always inputted	2 driving cycles	Not applicable
P1510	ECM backup power source malfunction	No backup power after starting engine	1 driving cycle	Not applicable
P1600	Serial communication problem between ECM and TCM	No signal or check sum error while engine running	1 driving cycle	Not applicable
P1717	AT D-range signal circuit malfunction	No "D" range (park/neutral position signal) is inputted while vehicle running	2 driving cycles	Not applicable

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DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL
P0702 P1702 (No.52)	Internal Malfunction of TCM	Refer to Section 7B	
P0705 (No.34)	Transmission Range Switch Circuit Malfunction		
☆P0710 (No.36) (No.38)	Transmission Fluid Temperature Signal Circuit Malfunction		
P0715 (No.14)	Input/Turbine Speed Sensor Circuit Malfunction		
P0720 (No.31)	A/T VSS Signal Circuit Malfunction		
P0725 (No.35)	Engine Speed Input Circuit Malfunction		
P0730 (No.18)	Turbine Revolution Sensor Signal, A/T VSS Signal Circuit or Automatic Transmission Itself Malfunction		
P0741 (No.29)	Torque Converter Clutch Circuit Performance or Stuck off		
P0743 (No.25) (No.26)	Lock-up Solenoid No.2 Circuit Malfunction		
P0753 (No.21) (No.22)	Shift Solenoid No.1 Circuit		
P0758 (No.23) (No.24)	Shift Solenoid No.2 Circuit		
P0763 (No.43)	Shift Solenoid No.3 Circuit		
P0768 (No.45)	Shift Solenoid No.4 Circuit		
P0773 (No.48)	Shift Solenoid No.5 Circuit		
P1700 (No.32) (No.33)	Throttle Position Signal Input Malfunction		
P1709 (No.51)	Engine Coolant Temperature/Barometric Pressure Signal Malfunction		
P1717	AT D-range Signal Circuit Malfunction		
☆P1610 (No.89)	Secret Key and Password Not Registered	Refer to Section 8G	
☆P1611 (No.85)	Password Not Matched		
☆P1612 (No.86)	No Signal from ECM		
☆P1613 (No.87)	No Signal from Immobilizer		
☆P1614 (No.88)	Incorrect Signal		

Note:

- For () marked No. in DTC column, it is used for vehicle without EGR valve.
- For vehicle without EGR valve, DTC No.12 appears when none of the other codes is identified.
- With the generic scan tool, only star (☆) marked data in the above table can not be read.

FAIL-SAFE TABLE

When any of the following DTCs is detected, ECM enters fail-safe mode as long as malfunction continues to exist but that mode is canceled when ECM detects normal condition after that.

DTC NO.	DETECTED ITEM	FAIL-SAFE OPERATION
P0105	Manifold absolute pressure circuit malfunction	<ul style="list-style-type: none"> ● ECM uses value determined by throttle opening and engine speed. ● ECM stops EGR, EVAP purge and idle air control.
P0110	Intake air temp. circuit malfunction	ECM controls actuators assuming that intake air temperature is 20°C (68°F).
P0115	Engine coolant temp. circuit malfunction	ECM controls actuators assuming that engine coolant temperature is 80°C (176°F).
P0120	Throttle position circuit malfunction	ECM controls actuators assuming that throttle opening is 20°.
P0340	Camshaft position sensor circuit malfunction	ECM controls injection system sequential injection to synchronous injection.
P0500	Vehicle speed sensor malfunction	ECM stops idle air control.
P1450	Barometric pressure sensor low/high input	ECM controls actuators assuming that barometric pressure is 100 kPa (760 mmHg).

VISUAL INSPECTION

Visually check following parts and systems.

INSPECTION ITEM	REFERRING SECTION								
<ul style="list-style-type: none"> ● Engine oil ——— level, leakage ● Engine coolant ——— level, leakage ● Fuel ——— level, leakage ● A/T fluid ——— level, leakage ● Air cleaner element ——— dirt, clogging ● Battery ——— fluid level, corrosion of terminal ● Water pump belt ——— tension, damage ● Throttle cable ——— play, installation ● Vacuum hoses of air intake system ——— disconnection, looseness, deterioration, bend ● Connectors of electric wire harness ——— disconnection, friction ● Fuses ——— burning ● Parts ——— installation, bolt ——— looseness ● Parts ——— deformation ● Other parts that can be checked visually 	Section 0B Section 0B Section 0B Section 0B Section 0B Section 0B Section 6E1 Section 8								
Also check following items at engine start, if possible <table border="0" style="margin-left: 20px;"> <tr> <td>● Malfunction indicator lamp</td><td rowspan="5">} Operation</td></tr> <tr> <td>● Charge warning lamp</td></tr> <tr> <td>● Engine oil pressure warning lamp</td></tr> <tr> <td>● Engine coolant temp. meter</td></tr> <tr> <td>● Fuel level meter</td></tr> <tr> <td>● Tachometer, if equipped</td><td></td></tr> </table>	● Malfunction indicator lamp	} Operation	● Charge warning lamp	● Engine oil pressure warning lamp	● Engine coolant temp. meter	● Fuel level meter	● Tachometer, if equipped		Section 6 Section 6H Section 8 (section 6 for pressure check) Section 8 Section 8
● Malfunction indicator lamp	} Operation								
● Charge warning lamp									
● Engine oil pressure warning lamp									
● Engine coolant temp. meter									
● Fuel level meter									
● Tachometer, if equipped									
<ul style="list-style-type: none"> ● Abnormal air being inhaled from air intake system ● Exhaust system ——— leakage of exhaust gas, noise ● Other parts that can be checked visually 									

ENGINE BASIC INSPECTION

This check is very important for troubleshooting when ECM has detected no DTC and no abnormality has been found in visual inspection.

Follow the flow table carefully.

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check battery voltage. Is it 11 V or more?	Go to Step 3.	Charge or replace battery.
3	Is engine cranked?	Go to Step 4.	Go to "DIAGNOSIS" in Section 6G.
4	Does engine start?	Go to Step 5.	Go to Step 7.
5	Check idle speed as follows: 1) Warm up engine to normal operating temp. 2) Shift transmission to neutral position for M/T ("P" position for A/T). 3) All of electrical loads are switched off. 4) Check engine idle speed with scan tool. See Fig. 1. Is it 650 – 750 r/min (700 – 800 r/min. for A/T vehicle)?	Go to Step 6.	Go to "SYMPTOM-TO-DIAGNOSIS MATRIX TABLE".
6	Check ignition timing as follows: 1) When not using SUZUKI scan tool, disconnect scan tool from DLC and connect test switch terminal of monitor coupler to ground. See Fig. 2. When using SUZUKI scan tool, select "MISC" mode on SUZUKI scan tool and fix ignition timing to initial one. See Fig. 3. 2) Remove air cleaner bolt and clips and shift air cleaner position to observe ignition timing. 3) Using timing light (1), check initial ignition timing. See Fig. 4. Is it $5^{\circ} \pm 3^{\circ}$ BTDC at specified idle speed?	Go to "SYMPTOM-TO-DIAGNOSIS MATRIX TABLE".	Check ignition control related parts referring to Section 6F3.
7	Check fuel supply as follows: 1) Check to make sure that enough fuel is filled in fuel tank. 2) Turn ON ignition switch for 2 seconds and then OFF. See Fig. 5. Is fuel pressure from fuel feed hose (1) when ignition switch is turned ON?	Go to Step 9.	Go to Step 8.
8	Check fuel pump for operating. 1) Was fuel pump operating sound heard from fuel filler for about 2 seconds after ignition switch ON and stop?	Go to "DIAG. FLOW TABLE B-3".	Go to "DIAG. FLOW TABLE B-2".
9	Check ignition spark as follows: 1) Disconnect injector couplers. 2) Remove spark plugs and connect them to high tension cords. 3) Ground spark plugs. 4) Crank engine and check if each spark plug sparks. Is it in good condition?	Go to Step 10.	Go to "DIAGNOSIS" in Section 6F3.
10	Check fuel injector for operation as follows: 1) Install spark plugs and connect injector connectors. 2) Using sound scope (1), check operating sound of each injector (2) when cranking engine. See Fig. 6. Was injector operating sound heard from all injectors?	Go to "SYMPTOM-TO-DIAGNOSIS MATRIX TABLE".	Go to "DIAG. FLOW TABLE B-1".

Fig. 1 for Step 5

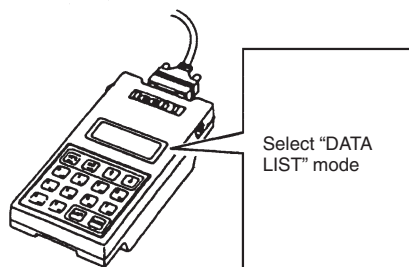


Fig. 2 for Step 6

When not using SUZUKI scan tool:

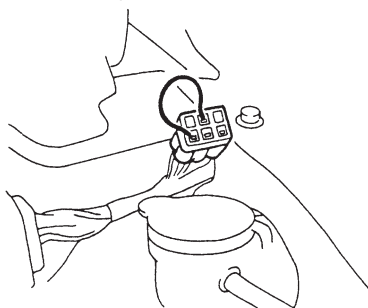


Fig. 3 for Step 6

When using SUZUKI scan tool



Fig. 4 for Step 6

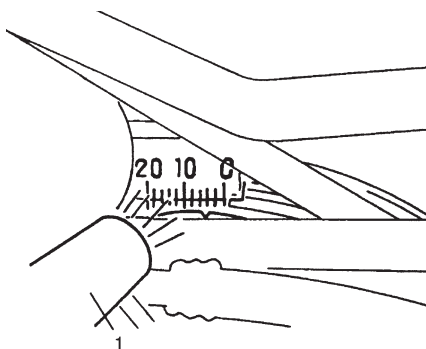


Fig. 5 for Step 7

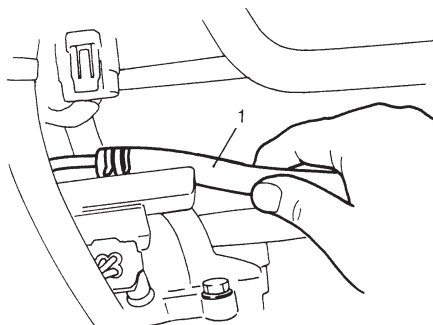
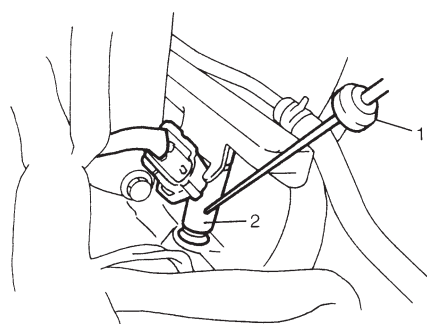


Fig. 6 for Step 10



ENGINE DIAGNOSIS TABLE

Perform troubleshooting referring to following table when ECM has detected no DTC and no abnormality has been found in visual inspection and engine basic inspection previously.

Condition	Possible Cause	Referring Item
Hard Starting (Engine cranks OK)	Ignition system out of order <ul style="list-style-type: none"> ● Faulty spark plug ● Leaky high-tension cord ● Loose connection or disconnection of high-tension cords or lead wires ● Faulty ignition coil Fuel system out of order <ul style="list-style-type: none"> ● Dirty or clogged fuel hose or pipe ● Malfunctioning fuel pump ● Air inhaling from intake manifold gasket or throttle body gasket Engine and emission control system out of order <ul style="list-style-type: none"> ● Faulty idle air control system ● Faulty ECT sensor or MAP sensor <ul style="list-style-type: none"> ● Faulty ECM Low compression <ul style="list-style-type: none"> ● Poor spark plug tightening or faulty gasket ● Compression leak from valve seat ● Sticky valve stem <ul style="list-style-type: none"> ● Weak or damaged valve springs ● Compression leak at cylinder head gasket ● Sticking or damaged piston ring ● Worn piston, ring or cylinder Others <ul style="list-style-type: none"> ● Malfunctioning PCV valve 	Spark plugs in Section 6F1 High-tension cords in Section 6F1 High-tension cords in Section 6F1 Ignition coil in Section 6F1 Diagnostic Flow Table B-3 Diagnostic Flow Table B-3 Diagnostic Flow Table B-4 ECT sensor or MAP sensor in Section 6E Compression check in Section 6A1 Spark plugs in Section 6F1 Valves inspection in Section 6A1 Valves inspection in Section 6A1 Valve springs inspection in Section 6A1 Cylinder head inspection in Section 6A1 Cylinders, pistons and piston rings inspection in Section 6A1 Cylinders, pistons and piston rings inspection in Section 6A1 PCV system in Section 6E

Condition	Possible Cause]	Referring Item
Low oil pressure	<ul style="list-style-type: none"> • Improper oil viscosity • Malfunctioning oil pressure switch • Clogged oil strainer • Functional deterioration of oil pump • Worn oil pump relief valve • Excessive clearance in various sliding parts 	Engine oil and oil filter change in Section 0B Oil pressure switch inspection in Section 8 Oil pan and oil pump strainer cleaning in Section 6A1 Oil pump in Section 6A1 Oil pump in Section 6A1
Engine noise Note: Before checking mechanical noise, make sure that: <ul style="list-style-type: none"> • Specified spark plug in used. • Specified fuel is used. 	Valve noise <ul style="list-style-type: none"> • Improper valve lash • Worn valve stem and guide • Weak or broken valve spring Piston, ring and cylinder noise <ul style="list-style-type: none"> • Worn piston, ring and cylinder bore Connecting rod noise <ul style="list-style-type: none"> • Worn rod bearing • Worn crank pin • Loose connecting rod nuts • Low oil pressure Crankshaft noise <ul style="list-style-type: none"> • Low oil pressure • Worn bearing • Worn crankshaft journal • Loose bearing cap bolts • Excessive crankshaft thrust play 	Valve lash in Section 6A1 Valves inspection in Section 6A1 Valve springs inspection in Section 6A1 Valves inspection in Section 6A1 Pistons and cylinders inspection in Section 6A1 Crank pin and connecting rod bearing inspection in Section 6A1 Crank pin and connecting rod bearing inspection in Section 6A1 Connecting rod installation in Section 6A1 Previously outlined Previously outlined Crankshaft and bearing inspection in Section 6A1 Crankshaft and bearing inspection in Section 6A1 Crankshaft inspection in Section 6A1 Crankshaft thrust play inspection in Section 6A1

Condition	Possible Cause	Referring Item
Overheating	<ul style="list-style-type: none"> ● Inoperative thermostat ● Poor water pump performance ● Clogged or leaky radiator ● Improper engine oil grade ● Clogged oil filter or oil strainer ● Poor oil pump performance ● Faulty radiator fan control system ● Dragging brakes ● Slipping clutch ● Blown cylinder head gasket 	Thermostat in Section 6B Water pump in Section 6B Radiator in Section 6B Engine oil and oil filter change in Section 0B Oil pressure check in Section 6A1 Oil pressure check in Section 6A1 Radiator fan control system in Section 6E Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C Cylinder head in Section 6A1
Poor gasoline mileage	Ignition system out of order <ul style="list-style-type: none"> ● Leaks or loose connection of high-tension cord ● Faulty spark plug (improper gap, heavy deposits and burned electrodes, etc.) Engine and emission control system out of order <ul style="list-style-type: none"> ● Malfunctioning EGR valve (if equipped) ● High idle speed ● Poor performance of TP sensor, ECT sensor or MAP sensor ● Faulty EGR valve (if equipped) ● Faulty fuel injector(s) ● Faulty ECM Low compression Others <ul style="list-style-type: none"> ● Poor valve seating ● Dragging brakes ● Slipping clutch ● Thermostat out of order ● Improper tire pressure 	High-tension cords in Section 6F1 Spark plugs in Section 6F1 EGR system in Section 6E Refer to item "Improper engine idle speed" previously outlined TP sensor, ECT sensor or MAP sensor in Section 6E EGR system in Section 6E Diagnostic Flow Table B-1 Previously outlined Valves inspection in Section 6A1 Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C Thermostat in Section 6B Refer to Section 3F
Excessive engine oil consumption	Oil leakage <ul style="list-style-type: none"> ● Blown cylinder head gasket ● Leaky camshaft oil seals Oil entering combustion chamber <ul style="list-style-type: none"> ● Sticky piston ring ● Worn piston and cylinder ● Worn piston ring groove and ring ● Improper location of piston ring gap ● Worn or damaged valve stem seal ● Worn valve stem 	Cylinder head in Section 6A1 Camshaft in Section 6A1 Piston cleaning in Section 6A1 Pistons and cylinders inspection in Section 6A1 Pistons inspection in Section 6A1 Pistons assembly in Section 6A1 Valves removal and installation in Section 6A1 Valves inspection in Section 6A1

Condition	Possible Cause	Referring Item
Engine hesitates (Momentary lack of response as accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make vehicle move, as from a stop sign.)	Ignition system out of order <ul style="list-style-type: none"> ● Spark plug faulty or plug gap out of adjustment ● Leaky high-tension cord Fuel system out of order <ul style="list-style-type: none"> ● Fuel pressure out of specification Engine and emission control system out of order <ul style="list-style-type: none"> ● Malfunctioning EGR valve (if equipped) ● Poor performance of TP sensor, ECT sensor or MAP sensor ● Faulty fuel injector ● Faulty ECM Engine overheating Low compression	Spark plugs in Section 6F1 High-tension cords in Section 6F1 Diagnostic Flow Table B-3 Trouble diagnosis in Section 6 EGR system in section 6E TP sensor, ECT sensor or MAP sensor in Section 6E Diagnostic Flow Table B-1 Refer to "Overheating" section Previously outlined
Surge (Engine power variation under steady throttle or cruise. Feels like vehicle speeds up and down with no change in accelerator pedal.)	Ignition system out of order <ul style="list-style-type: none"> ● Leaky or loosely connected high-tension cord ● Faulty spark plug (excess carbon deposits, improper gap, and burned electrodes, etc.) Fuel system out of order <ul style="list-style-type: none"> ● Variable fuel pressure ● Kinky or damaged fuel hose and lines ● Faulty fuel pump (clogged fuel filter) Engine and emission control system out of order <ul style="list-style-type: none"> ● Malfunctioning EGR valve ● Poor performance of MAP sensor ● Faulty fuel injector ● Faulty ECM 	High-tension cords in Section 6F1 Spark plugs in Section 6F1 Diagnostic Flow Table B-3 EGR system in Section 6E MAP sensor in Section 6E Diagnostic Flow Table B-1
Excessive detonation (Engine makes continuously sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.)	Engine overheating Ignition system out of order <ul style="list-style-type: none"> ● Faulty spark plug ● Loose connection of high-tension cord Fuel system out of order <ul style="list-style-type: none"> ● Clogged fuel filter (faulty fuel pump) or fuel lines ● Air inhaling from intake manifold or throttle body gasket Engine and emission control system out of order <ul style="list-style-type: none"> ● Malfunctioning EGR valve (if equipped) ● Poor performance of knock sensor, ECT sensor or MAP sensor ● Faulty fuel injector(s). ● Faulty ECM ● Excessive combustion chamber deposits 	Refer to "Overheating" section Spark plugs in Section 6F1 High-tension cords in Section 6F1 Diagnostic Flow Table B-1 or B-2 Trouble diagnosis in Section 6 EGR system in Section 6E Knock sensor in Section 6, ECT sensor or MAP sensor in Section 6E Diagnostic Flow Table B-1 Piston and cylinder head cleaning in Section 6A1

Condition	Possible Cause	Referring Item
Engine has no power	Ignition system out of order <ul style="list-style-type: none"> ● Faulty spark plug ● Faulty ignition coil with ignitor ● Leaks, loose connection or disconnection of high-tension cord ● Faulty knock sensor Engine overheating Fuel system out of order <ul style="list-style-type: none"> ● Clogged fuel hose or pipe ● Malfunctioning fuel pump ● Air inhaling from intake manifold gasket or throttle body gasket Engine and emission control system out of order <ul style="list-style-type: none"> ● Malfunctioning EGR valve (if equipped) ● Maladjusted accelerator cable play ● Poor performance of TP sensor, ECT sensor or MAP sensor ● Faulty fuel injector(s) ● Faulty ECM Low compression Others <ul style="list-style-type: none"> ● Dragging brakes ● Slipping clutch 	Spark plugs in Section 6F1 Ignition coil in Section 6F1 High-tension cords in Section 6F1 Knock sensor malfunction in this section Refer to "Overheating" section Diagnostic Flow Table B-3 in Section 6 Diagnostic Flow Table B-2 EGR system inspection in Section 6E Accelerator cable play in Section 6E TP sensor, ECT sensor or MAP sensor in Section 6E Diagnostic Flow Table B-1 Previously outlined Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C

Condition	Possible Cause	Referring Item
Improper engine idling or engine fails to idle	Ignition system out of order <ul style="list-style-type: none"> • Faulty spark plug • Leaky or disconnected high-tension cord • Faulty ignition coil with ignitor Fuel system out of order <ul style="list-style-type: none"> • Fuel pressure out of specification • Leaky manifold, throttle body, or cylinder head gasket Engine and emission control system out of order <ul style="list-style-type: none"> • Malfunctioning EGR valve (if equipped) • Faulty idle air control system • Faulty evaporative emission control system • Faulty EGR system (if equipped) • Faulty fuel injector(s) • Poor performance of ECT sensor, TP sensor or MAP sensor • Faulty ECM Engine overheating Low compression Others <ul style="list-style-type: none"> • Loose connection or disconnection of vacuum hoses • Malfunctioning PCV valve 	Spark plugs in Section 6F1 High-tension cords in Section 6F1 Ignition coil in Section 6F1 Diagnostic Flow Table B-3 in Section 6 EGR system in Section 6E Diagnostic Flow Table B-4 EVAP control system in Section 6E EGR system in Section 6E Diagnostic Flow Table B-1 ECT sensor, TP sensor or MAP sensor in Section 6E Refer to "Overheating" section Previously outlined PCV system in Section 6E

Condition	Possible Cause	Referring Item
Excessive hydrocarbon (HC) emission or carbon monoxide (CO)	<p>Ignition system out of order</p> <ul style="list-style-type: none"> ● Faulty spark plug ● Leaky or disconnected high-tension cord ● Faulty ignition coil with ignitor <p>Low compression</p> <p>Engine and emission control system out of order</p> <ul style="list-style-type: none"> ● Lead contamination of three way catalytic converter ● Faulty evaporative emission control system ● Fuel pressure out of specification ● Closed loop system (A/F feed back compensation) fails <ul style="list-style-type: none"> – Faulty TP sensor – Poor performance of ECT sensor or MAP sensor ● Faulty injector(s) ● Faulty ECM <p>Others</p> <ul style="list-style-type: none"> ● Engine not at normal operating temperature ● Clogged air cleaner ● Vacuum leaks 	<p>Spark plugs in Section 6F1 High-tension cords in Section 6F1 Ignition coil assembly in Section 6F1 Refer to “Low compression” section</p> <p>Check for absence of filler neck restrictor EVAP control system in Section 6E Diagnostic Flow Table B-3</p> <p>TP sensor in Section 6E ECT sensor or MAP sensor in Section 6E Diagnostic Flow Table B-1</p>
Excessive nitrogen oxides (NOx) emission	<p>Ignition system out of order</p> <ul style="list-style-type: none"> ● Improper ignition timing <p>Engine and emission control system out of order</p> <ul style="list-style-type: none"> ● Lead contamination of catalytic converter ● Faulty EGR system (if equipped) ● Fuel pressure out of specification ● Closed loop system (A/F feed back compensation) fails <ul style="list-style-type: none"> – Faulty TP sensor – Poor performance of ECT sensor or MAP sensor ● Faulty injector(s) ● Faulty ECM 	<p>See section 6F1</p> <p>Check for absence of filler neck restrictor. EGR system in Section 6E Diagnostic Flow Table B-3</p> <p>TP sensor in Section 6E ECT sensor or MAP sensor in Section 6E Diagnostic Flow Table B-1</p>

SCAN TOOL DATA

As the data values given below are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference values. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.

Also, conditions in the below table that can be checked by the scan tool are those detected by ECM and output from ECM as commands and there may be cases where the engine or actuator is not operating (in the condition) as indicated by the scan tool. Be sure to use the timing light to check the ignition timing.

NOTE:

- With the generic scan tool, only star (☆) marked data in the table below can be read.
- The triangle (Δ) marked data in the table below can not be read for vehicle without EGR valve.
- When checking the data with the engine running at idle or racing, be sure to shift M/T gear to the neutral gear position and A/T gear to the “Park” position and pull the parking brake fully. Also, if nothing or “no load” is indicated, turn OFF A/C, all electric loads, P/S and all the other necessary switches.

	SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
☆	FUEL SYSTEM B1 (FUEL SYSTEM STATUS)	At specified idle speed after warming up		CLOSED (closed loop)
☆	CALC LOAD (CALCULATED LOAD VALUE)	At specified idle speed with no load after warming up		3 – 9%
		At 2500 r/min with no load after warming up		12 – 17%
☆	COOLANT TEMP. (ENGINE COOLANT TEMP.)	At specified idle speed after warming up		85 – 100°C, 185 – 212°F
☆	SHORT FT BI (SHORT TERM FUEL TRIM)	At specified idle speed after warming up		–20 – +20%
☆	LONG FT BI (LONG TERM FUEL TRIM)	At specified idle speed after warming up		–15 – +15%
☆	MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE)	At specified idle speed with no load after warming up		24 – 37 kPa, 180 – 280 mmHg
☆	ENGINE SPEED	At idling with no load after warming up		Desired idle speed ± 50 r/min
☆	VEHICLE SPEED	At stop		0 km/h, 0 MPH
☆	IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYLINDER)	At specified idle speed with no load after warming up		3 – 11° BTDC
☆	INTAKE AIR TEMP.	At specified idle speed after warming up		Ambient temp. +15°C (59°F) –5°C (23°F)
☆	MAF (MASS AIR FLOW RATE)	At specified idle speed with no load after warming up		1 – 4 gm/sec
		At 2500 r/min with no load after warming up		4 – 9 gm/sec
☆	THROTTLE POS (ABSOLUTE THROTTLE POSITION)	Ignition switch ON/engine stopped	Throttle valve fully closed	7 – 18%
			Throttle valve fully open	70 – 90%
☆	O2S B1 S1 (HEATED OXYGEN SENSOR-1)	At specified idle speed after warming up		0.05 – 0.95 V
Δ ☆	O2S B1 S2 (HEATED OXYGEN SENSOR-2)	When engine is running at 2000 r/min. for 3 min or longer after warming up.		0 – 0.95 V
Δ ☆	O2S FT B1 S1	At specified idle speed after warming up		–20 – +20%
Δ ☆	DIS. WITH MIL ON	—		—

SCAN TOOL DATA		CONDITION		NORMAL CONDITION/ REFERENCE VALUES	
	DESIRED IDLE (DESIRED IDLE SPEED)	At idling with no load after warming up, M/T at neutral, A/T at "P" range		M/T	700 r/min
				A/T	750 r/min
	TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE)	Ignition switch ON/engine stopped	Throttle valve fully closed	More than 0.2 V	
			Throttle valve fully open	Less than 4.8 V	
	INJ PULSE WIDTH (FUEL INJECTION PULSE WIDTH)	At specified idle speed with no load after warming up		2.0 – 3.6 msec.	
		At 2500 r/min with no load after warming up		2.0 – 3.6 msec.	
	IAC FLOW DUTY (IDLE AIR CONTROL FLOW DUTY)	At idling with no load after warming up		5 – 25%	
	TOTAL FUEL TRIM	At specified idle speed after warming up		–35 – +35%	
	BATTERY VOLTAGE	Ignition switch ON/engine stop		10 – 14 V	
	CANIST PRG DUTY (EVAP CANISTER PURGE FLOW DUTY)	_____		0 – 100%	
	CLOSED THROT POS (CLOSED THROTTLE POSITION)	Throttle valve at idle position		ON	
		Throttle valve opens larger than idle position		OFF	
	FUEL CUT	When engine is at fuel cut condition		ON	
		Other than fuel cut condition		OFF	
	RADIATOR FAN (RADIATOR FAN CONTROL RELAY)	Ignition switch ON	Engine coolant temp.: Lower than 92.5°C (199°F)	OFF	
			Engine coolant temp.: 97.5°C (208°F) or higher	ON	
	ELECTRIC LOAD	Ignition switch ON/Headlight, small light, heater fan and rear window defogger all turned OFF		OFF	
		Ignition switch ON/Headlight, small light, heater fan or rear window defogger turned ON		ON	
	A/C SWITCH	Engine running after warming up, A/C not operating		OFF	
		Engine running after warming up, A/C operating		ON	
	PNP SIGNAL (PARK/ NEUTRAL POSITION SIGNAL) A/T only	Ignition switch ON	Selector lever in "P" or "N" position	P/N Range	
			Selector lever in "R", "D", "2" or "L" position	D Range	
Δ	EGR VALVE	At specified idle speed after warming up		0%	
Δ	FUEL TANK LEVEL	_____		0 – 100%	
	BAROMETRIC PRESS	_____		Display the barometric pressure	
	FUEL PUMP	Within 3 seconds after ignition switch ON or engine running		ON	
		Engine stop at ignition switch ON		OFF	
	BRAKE SW	Ignition switch ON	Brake pedal is depressing	ON	
			Brake pedal is releasing	OFF	
	BLOWER FAN	Ignition switch ON	Blower fan switch ON	ON	
			Blower fan switch OFF	OFF	
	A/C MAG CLUTCH	Ignition switch ON	A/C switch ON	ON	
			A/C switch OFF	OFF	

SCAN TOOL DATA DEFINITIONS**FUEL SYSTEM (FUEL SYSTEM STATUS)**

Air/fuel ratio feedback loop status displayed as either open or closed loop. Open indicates that ECM ignores feedback from the exhaust oxygen sensor. Closed indicates final injection duration is corrected for oxygen sensor feedback.

CALC LOAD (CALCULATED LOAD VALUE, %)

Engine load displayed as a percentage of maximum possible load. Value is calculated mathematically using the formula: actual (current) intake air volume ÷ maximum possible intake air volume x 100%.

COOLANT TEMP.**(ENGINE COOLANT TEMPERATURE, °C, °F)**

It is detected by engine coolant temp. sensor

SHORT FT B1 (SHORT TERM FUEL TRIM, %)

Short term fuel trim value represents short term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

LONG FT B1 (LONG TERM FUEL TRIM, %)

Long term fuel trim Value represents long term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE, kPa, inHg)

It is detected by manifold absolute pressure sensor and used (among other things) to compute engine load.

ENGINE SPEED (rpm)

It is computed by reference pulses from crankshaft position sensor.

VEHICLE SPEED (km/h, MPH)

It is computed based on pulse signals from vehicle speed sensor.

IGNITION ADVANCE**(IGNITION TIMING ADVANCE FOR NO.1 CYLINDER, °)**

Ignition timing of NO.1 cylinder is commanded by ECM. The actual ignition timing should be checked by using the timing light.

INTAKE AIR TEMP. (°C, °F)

It is detected by intake air temp. sensor and used to determine the amount of air passing into the intake manifold as air density varies with temperature.

MAF (MASS AIR FLOW RATE, gm/s, lb/min)

It represents total mass of air entering intake manifold which is computed based on signals from MAP sensor, IAT sensor, TP sensor, etc.

THROTTLE POS**(ABSOLUTE THROTTLE POSITION, %)**

When throttle position sensor is fully closed position, throttle opening is indicated as 0% and 100% full open position.

OXYGEN SENSOR B1 S1**(HEATED OXYGEN SENSOR-1, V)**

It indicates output voltage of HO2S-1 installed on exhaust manifold (pre-catalyst).

OXYGEN SENSOR B1 S2**(HEATED OXYGEN SENSOR-2, V)**

It indicates output voltage of HO2S-2 installed on exhaust pipe (post-catalyst). It is used to detect catalyst deterioration.

DESIRED IDLE (DESIRED IDLE SPEED, rpm)

The Desired Idle Speed is an ECM internal parameter which indicates the ECM requested idle. If the engine is not running, this number is not valid.

TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE, V)

The Throttle Position Sensor reading provides throttle valve opening information in the form of voltage.

INJ PULSE WIDTH**(FUEL INJECTION PULSE WIDTH, msec.)**

This parameter indicates time of the injector drive (valve opening) pulse which is output from ECM (but injector drive time of NO.1 cylinder for multiport fuel injection).

IAC FLOW DUTY (IDLE AIR (SPEED) CONTROL DUTY, %)

This parameter indicates current flow time rate within a certain set cycle of IAC valve (valve opening rate) which controls the amount of bypass air (idle speed).

TOTAL FUEL TRIM (%)

The value of Total Fuel Trim is obtained by putting values of Short Term Fuel Trim and Long Term Fuel Trim together. This value indicates how much correction is necessary to keep the air/fuel mixture stoichiometrical.

BATTERY VOLTAGE (V)

This parameter indicates battery positive voltage inputted from main relay to ECM.

CANISTER PURGE DUTY (EVAP CANISTER PURGE FLOW DUTY, %)

This parameter indicates valve ON (valve open) time rate within a certain set cycle of EVAP purge solenoid valve which controls the amount of EVAP purge.

0% means that the purge valve is completely closed while 100% is a fully open valve.

CLOSED THROTTLE POSITION (ON/OFF)

This parameter will read ON when throttle valve is fully closed, or OFF when the throttle is not fully closed.

FUEL CUT (ON/OFF)

ON : Fuel being cut (output signal to injector is stopped)

OFF : Fuel not being cut

RADIATOR FAN (RADIATOR FAN CONTROL RELAY, ON/OFF)

ON : Command for radiator fan control relay operation being output.

OFF : Command for relay operation not being output.

ELECTRIC LOAD (ON/OFF)

ON : Headlight, small light, heater fan or rear window defogger ON signal inputted.

OFF : Above electric loads all turned OFF.

A/C SWITCH (ON/OFF)

ON : Command for A/C operation being output from ECM to A/C amplifier.

OFF : Command for A/C operation not being output.

FUEL TANK LEVEL (%)

This parameter indicates approximate fuel level in the fuel tank. As the detectable range of the fuel level sensor is set as 0 to 100%, however, with some models whose fuel tank capacity is smaller, the indicated fuel level may be only 70% even when the fuel tank is full.

PNP SIGNAL (PARK/NEUTRAL POSITION SIGNAL, P/N RANGE or D RANGE)

It is detected by signal from TCM.

D range : A/T is in "R", "D", "2" or "L" range.

P/N range : A/T is in "P" or "N" range or the above signal is not inputted from TCM.

EGR VALVE (%)

This parameter indicates opening rate of EGR valve which controls the amount of EGR flow.

INSPECTION OF ECM AND ITS CIRCUITS

ECM and its circuits can be checked at ECM wiring couplers by measuring voltage and resistance.

CAUTION:

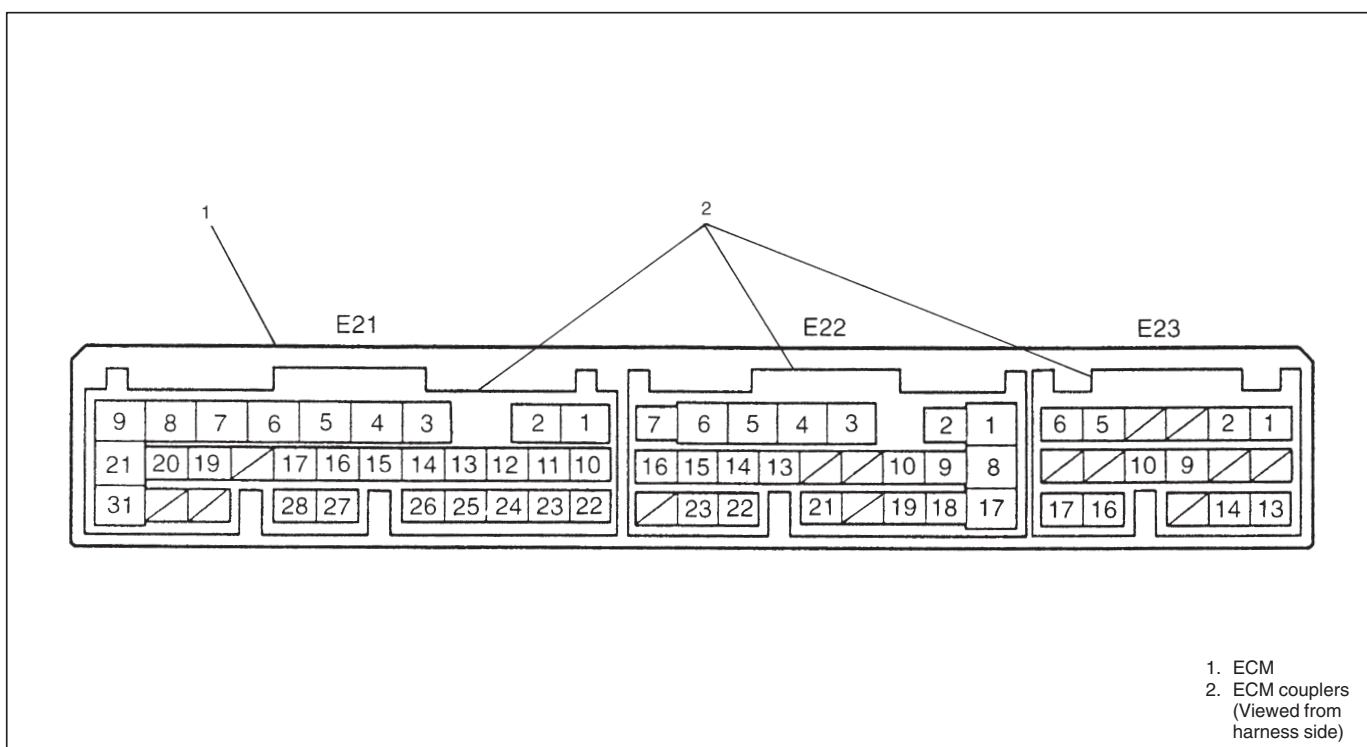
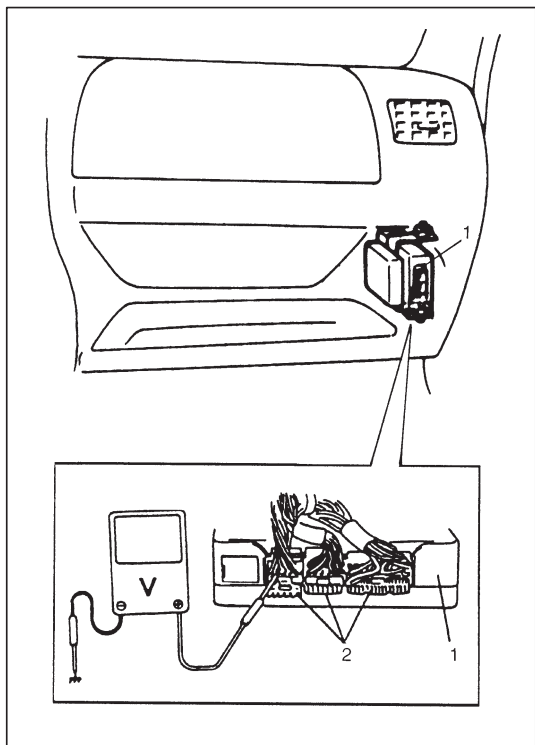
ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with coupler disconnected from it.

Voltage Check

- 1) Remove ECM (1) from body referring to Section 6E.
- 2) Check voltage at each terminal of couplers (2) connected.

NOTE:

As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.



TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
1	Ground	—	—
2	Ground	—	—
3	Ground	—	—
4	EVAP canister purge valve	10 – 14 V	Ignition switch ON
5	Engine coolant temp. and barometric pressure signal for TCM (A/T)	Indication deflection repeated 0 V and 10 – 14 V	Ignition switch ON
6	Idle air control valve	0 – 13 V	At specified idle speed after engine warmed up
7	Heater of HO2S-1	10 – 14 V	Ignition switch ON
8	Fuel injector NO.4	10 – 14 V	Ignition switch ON
9	Fuel injector NO.1	10 – 14 V	Ignition switch ON
10	Sensor ground	—	—
11	Camshaft position sensor	0 – 0.8 V and 4 – 6 V	Ignition switch ON
12	Knock sensor	2.1 – 2.9 V	Ignition switch ON
13	Heater oxygen sensor-1	Refer to DTC P0130 diag. flow table	
14	Engine coolant temp. sensor	0.55 – 0.95 V	Ignition switch ON Engine coolant temp.: 80°C (176°F)
15	Intake air temp. sensor	2.0 – 2.7 V	Ignition switch ON Intake air temp.: 20°C (68°F)
16	Test switch terminal (Vehicle without EGR VALVE)	4 – 6 V	Ignition switch ON
17	Electric load signal (+)	0 V	Ignition switch ON Small light and rear defogger OFF
		10 – 14 V	Ignition switch ON Small light and rear defogger ON
18	—	—	—
19	Ignition coil #2	—	—
20	Ignition coil #1	—	—
21	Fuel injector NO.2	10 – 14 V	Ignition switch ON
22	Power source for sensor	4.75 – 5.25 V	Ignition switch ON
23	Crankshaft position sensor (+)	—	—
24	Crankshaft position sensor (–)	—	—
25	Shield ground	—	—
26	Manifold absolute pressure sensor	3.3 – 4.0 V	Ignition switch ON Barometric pressure: 100 kPa (760 mmHg)
27	Diag. Switch terminal (Vehicle without EGR VALVE)	4 – 6 V	Ignition switch ON
28	Monitor output (Vehicle without EGR VALVE)	—	—
29	Blank	—	—
30	Blank	—	—
31	Fuel injector NO.3	10 – 14 V	Ignition switch ON

CONNECTOR "E21"

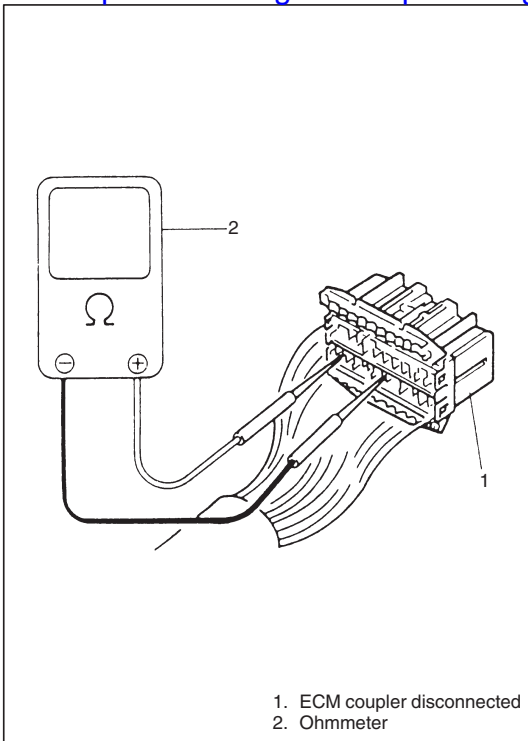
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TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
1	A/C compressor clutch	0 V	Ignition switch ON
2	EGR valve (stepper motor coil 1) (if equipped)	0 – 1 V	More than 3 seconds after ignition switch ON
		0 – 14 V	After engine start
3	Data link connector	10 – 14 V	Ignition switch ON
4	Heater of HO2S-2 (Vehicle with EGR valve)	10 – 14 V	Ignition switch ON
5	Power source	10 – 14 V	Ignition switch ON
6	Power source	10 – 14 V	Ignition switch ON
7	Power source for back-up	10 – 14 V	Ignition switch ON and OFF
8	EGR valve (stepper motor coil 3)(if equipped)	10 – 14 V	More than 3 seconds after ignition switch ON
		0 – 14 V	After engine start
9	EGR valve (stepper motor coil 2)(if equipped)	10 – 14 V	More than 3 seconds after ignition switch ON
		0 – 14 V	After engine start
10	Main relay	10 – 14 V	Ignition switch OFF
		0.4 – 1.5 V	Ignition switch ON
11	Blank	—	—
12	Blank	—	—
13	Heated oxygen sensor-2 (Vehicle with EGR valve)	Refer to DTC P0130 diag. flow table	
14	D-range ID-up signal (A/T)	10 – 14 V	Ignition switch ON
15	R-range signal (A/T)	0 V	Ignition switch ON
16	A/C (input) signal	10 – 14 V	Ignition switch ON A/C switch OFF
		0 – 2 V	Ignition switch ON A/C switch ON
17	EGR valve (stepper motor coil 4)(if equipped)	0 – 1 V	More than 3 seconds after ignition switch ON
		0 – 14 V	After engine start
18	Radiator fan control relay	10 – 14 V	Ignition switch ON Engine coolant temp.: Below 92.5°C (199°F)
		0 – 1 V	Ignition switch ON Engine coolant temp.: 97.5°C (208°F) or higher
19	Fuel pump relay	0 – 1 V	For 2 seconds after ignition switch ON
		10 – 14 V	After the above time
20	Shield ground	—	—
21	Throttle opening signal for TCM (A/T)	Indication deflection repeated 0 V and 10 – 14 V	Ignition switch ON
22	Fuel level sensor (gauge) (Vehicle with EGR valve)	0 – 2 V	Ignition switch ON Fuel tank fully filled
		4.5 – 7.5 V	Ignition switch ON Fuel tank emptied
23	Serial data for TCM	10 – 14 V and 0 – 1 V	Ignition switch ON
24	Blank	—	—

CONNECTOR "E22"

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TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
CONNECTOR "E23"	1	0 – 1 V	Ignition switch ON
		10 – 14 V	When engine running
	2	Indicator deflection repeated 0 V and 4 – 6 V	Ignition switch ON Front left tire turned slowly with front right tire locked
	3	Blank	—
	4	Blank	—
	5	0.2 – 1.0 V	Ignition switch ON Throttle valve at idle position
		2.8 – 4.8 V	Ignition switch ON Throttle valve at full open position
	6	Ignition switch	10 – 14 V Ignition switch ON
	7	Blank	—
	8	Blank	—
	9	0 V	Ignition switch ON Stop lamp switch OFF
		10 – 14 V	Ignition switch ON Stop lamp switch ON
	10	Sensor ground	—
	11	Blank	—
	12	Blank	—
	13	0 – 2 V	Ignition switch ON Blower fan turned OFF
		10 – 14 V	Ignition switch ON Blower fan turned ON
	14	A/C EVAP temp. sensor	—
	15	Blank	—
	16	Tachometer (if equipped)	0 – 1 V Ignition switch ON
	17	6 – 12 V	While engine cranking
		0 V	Other than above

**Resistance Check**

- 1) Disconnect ECM couplers from ECM with ignition switch OFF.

CAUTION:

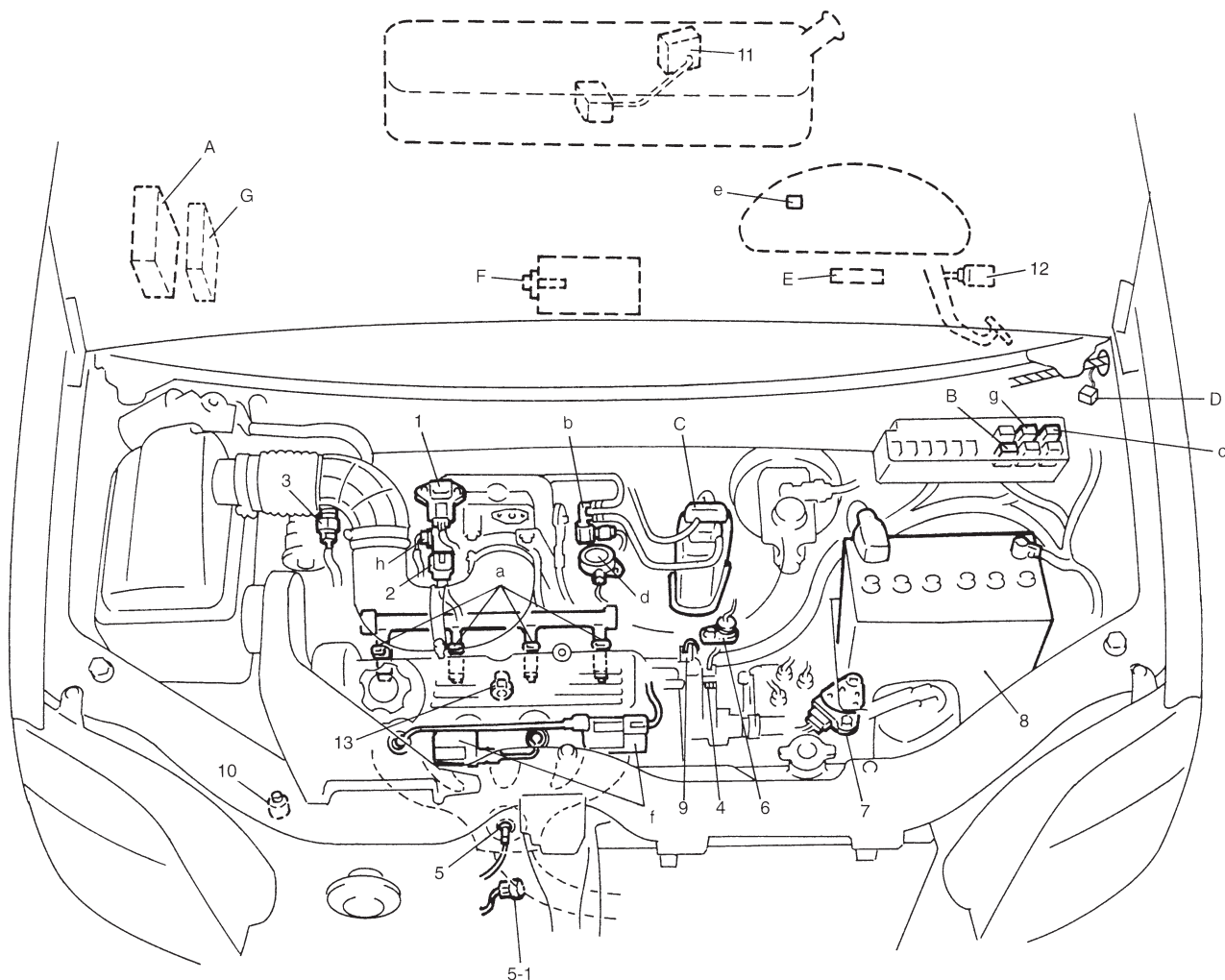
Never touch terminals of ECM itself or connect voltmeter or ohmmeter.

- 2) Check resistance between each terminal of couplers disconnected.

CAUTION:

- Be sure to connect ohmmeter probe from wire harness side of coupler.
- Be sure to turn OFF ignition switch for this check.
- Resistance in table below represents that when parts temperature is 20°C (68°F).

TERMINALS	CIRCUIT	STANDARD RESISTANCE
E21-7 to E23-6	HO2S-1 heater	11.7 – 15.6 Ω
E22-4 to E23-6	HO2S-2 heater	11.7 – 15.6 Ω
E21-9 to E22-5/6	No.1 injector	12.0 – 13.0 Ω
E21-21 to E22-5/6	No.2 injector	12.0 – 13.0 Ω
E21-31 to E22-5/6	No.3 injector	12.0 – 13.0 Ω
E21-8 to E22-5/6	No.4 injector	12.0 – 13.0 Ω
E22-2 to E22-5/6	EGR valve (stepper motor coil 4)	20 – 24 Ω
E22-9 to E22-5/6	EGR valve (stepper motor coil 3)	20 – 24 Ω
E22-8 to E22-5/6	EGR valve (stepper motor coil 2)	20 – 24 Ω
E22-17 to E22-5/6	EGR valve (stepper motor coil 1)	20 – 24 Ω
E21-4 to E22-5/6	EVAP canister purge valve	30 – 34 Ω
E22-19 to E23-6	Fuel pump relay	70 – 110 Ω
E22-1 to Body ground	A/C compressor clutch	3 – 4.5 Ω
E22-18 to E22-5/6	Radiator fan control relay	70 – 110 Ω
E22-10 to E22-7	Main relay	70 – 110 Ω
E21-1 to Body ground	Ground	Continuity
E21-2 to Body ground	Ground	Continuity
E21-3 to Body ground	Ground	Continuity

COMPONENT LOCATION**INFORMATION SENSORS**

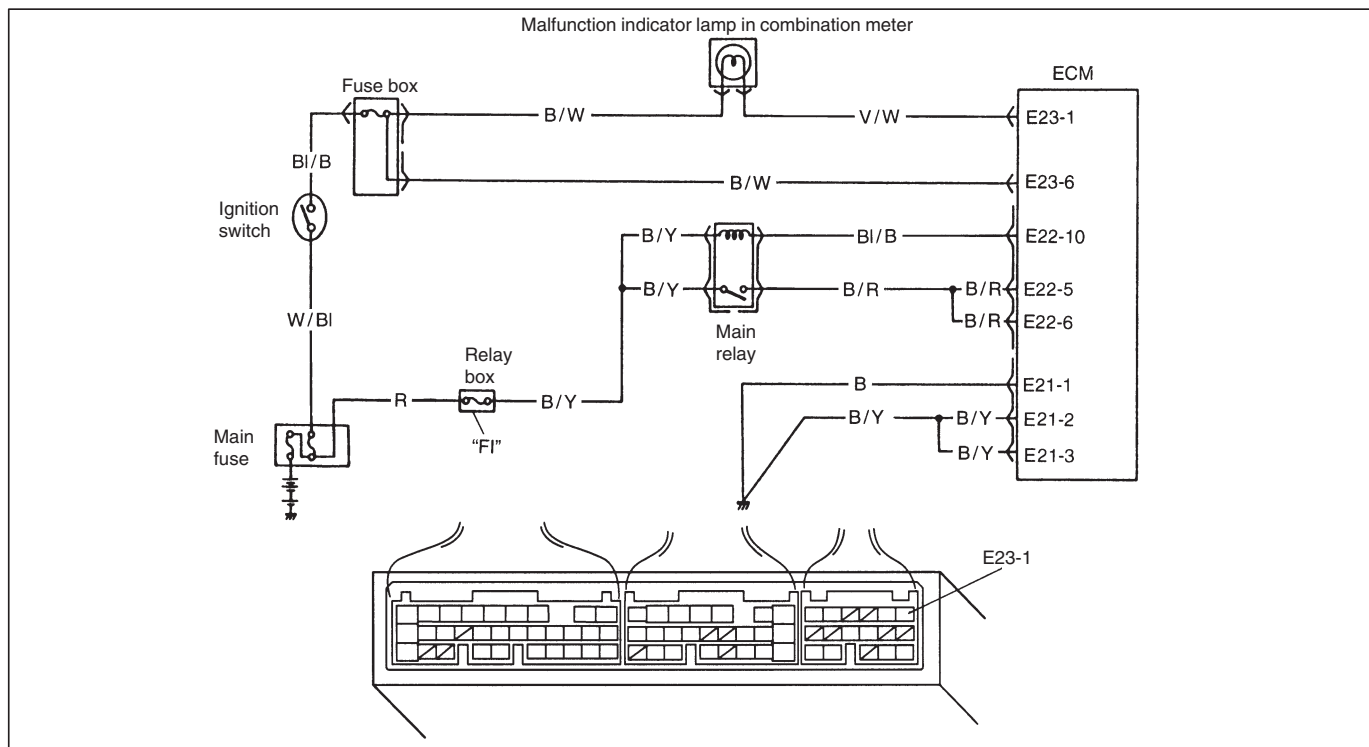
1. MAP sensor
2. TP sensor
3. IAT sensor
4. ECT sensor
5. Heated oxygen sensor-1
- 5-1. Heated oxygen sensor-2 (if equipped)
6. VSS
7. Transmission range switch (A/T)
8. Battery
9. CMP sensor
10. CKP sensor
11. Fuel level sensor (gauge) (in fuel tank)
12. Stop lamp switch
13. Knock sensor

CONTROL DEVICES

- a. Fuel injector
- b. EVAP canister purge valve
- c. Fuel pump relay
- d. EGR valve (step motor) (if equipped)
- e. Malfunction indicator lamp
- f. Ignition coil assembly
- g. Radiator fan control relay
- h. IAC valve

OTHERS

- A: ECM
- B: Main relay
- C: EVAP canister
- D: Monitor connector (If equipped)
- E: Data link connector
- F: A/C EVAP thermistor (if equipped)
- G: Transmission control module (A/T)

TABLE A-1 MALFUNCTION INDICATOR LAMP CIRCUIT CHECK – LAMP DOES NOT COME “ON” AT IGNITION SWITCH ON (BUT ENGINE AT STOP)**CIRCUIT DESCRIPTION**

When the ignition switch is turned ON, ECM causes the main relay to turn ON (close the contact point). Then, ECM being supplied with the main power, turns ON the malfunction indicator lamp (MIL). When the engine starts to run and no malfunction is detected in the system, MIL goes OFF but if a malfunction was or is detected, MIL remains ON even when the engine is running.

INSPECTION

STEP	ACTION	YES	NO
1	MIL Power Supply Check 1) Turn ignition switch ON. Do other indicator/warning lights in combination meter comes ON?	Go to Step 2.	“IG” fuse blown, main fuse blown, ignition switch malfunction, “B/W” circuit between “IG” fuse and combination meter or poor coupler connection at combination meter.
2	ECM Power and Ground Circuit Check Does engine start?	Go to Step 3.	Go to TABLE A-3 ECM POWER AND GROUND CIRCUIT CHECK. If engine is not cranked, go to DIAGNOSIS in SECTION 6G.
3	MIL Circuit Check 1) Turn ignition switch OFF and disconnect connectors from ECM. 2) Check for proper connection to ECM at terminal E23-1. 3) If OK, then using service wire, ground terminal E23-1 in connector disconnected. Does MIL turn on at ignition switch ON?	Substitute a known-good ECM and recheck.	Bulb burned out or “V/W” wire circuit open.

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TABLE A-2 MALFUNCTION INDICATOR LAMP CIRCUIT CHECK – LAMP REMAINS “ON” AFTER ENGINE STARTS

WIRING DIAGRAM/CIRCUIT DESCRIPTION – Refer to table A-1.

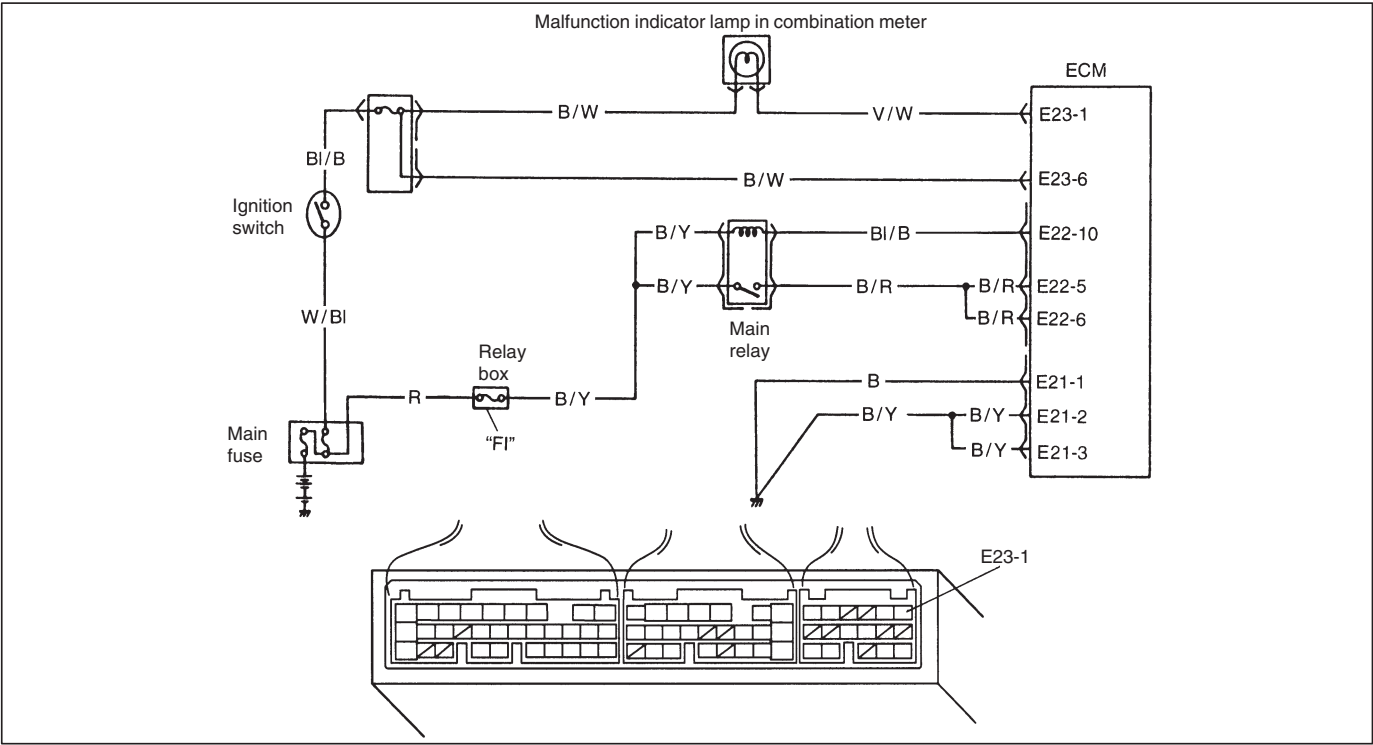
INSPECTION

STEP	ACTION	YES	NO
1	Diagnostic Trouble Code (DTC) check 1) Check DTC referring to DTC CHECK section. Is there any DTC(s)?	Go to Step 2 of ENGINE DIAG. FLOW TABLE.	Go to Step 2.
2	DTC check Start engine and recheck DTC while engine running. Is there any DTC(s)?		Go to Step 3.
3	MIL Circuit check 1) Turn OFF ignition switch. 2) Disconnect connectors from ECM. Does MIL turn ON at ignition switch ON?	“V/W” wire circuit shorted to ground.	Substitute a known-good ECM and recheck.

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TABLE A-3 ECM POWER AND GROUND CIRCUIT CHECK – MIL DOESN'T LIGHT AT IGNITION SWITCH ON AND ENGINE DOESN'T START THOUGH IT IS CRANKED UP

CIRCUIT DESCRIPTION



When the ignition switch turned ON, the main relay turns ON (the contact point closes) and the main power is supplied to ECM.

INSPECTION

STEP	ACTION	YES	NO
1	Main Relay Operating Sound Check Is operating sound of main relay heard at ignition switch ON?	Go to Step 5.	Go to Step 2.
2	Main Relay Check 1) Turn OFF ignition switch and remove main relay (1). 2) Check for proper connection to main relay (1) at terminal 3 and 4. 3) Check resistance between each two terminals. See Fig. 1 and 2. Between terminals 1 and 2: Infinity Between terminals 3 and 4: 70 – 110 Ω 4) Check that there is continuity between terminals 1 and 2 when battery is connected to terminals 3 and 4. See Fig. 3. Is main relay in good condition?	Go to Step 3.	Replace main relay.
3	Fuse Check Is main "FI" fuse in good condition? See Fig. 4.	Go to Step 4.	Check for short in circuits connected to this fuse.
4	ECM Power Circuit Check 1) Turn OFF ignition switch, disconnect connectors from ECM and install main relay. 2) Check for proper connection to ECM at terminals E23-6, E22-10, E22-5 and E22-6. 3) If OK, then measure voltage between terminal E23-6 and ground, E22-10 and ground with ignition switch ON. Is each voltage 10 – 14 V?	Go to Step 5.	"B/W", "B/Y" or "B/I/B" circuit open.

STEP	ACTION	YES	NO
5	ECM Power Circuit Check 1) Using service wire, ground terminal E22-10 and measure voltage between terminal E22-5 and ground at ignition switch ON. Is it 10 – 14 V?	Check ground circuits "BI/B" and "B/Y" for open. If OK, then substitute a known-good ECM and recheck.	Go to Step 6.
6	Is operating sound of main relay heard in Step 1?	Go to Step 7.	"B/Y" or "B/R" wire open.
7	Main Relay Check 1) Check main relay according to procedure in Step 2. Is main relay in good condition?	"B/Y" or "B/R" wire open.	Replace main relay.

Fig. 1 for Step 2

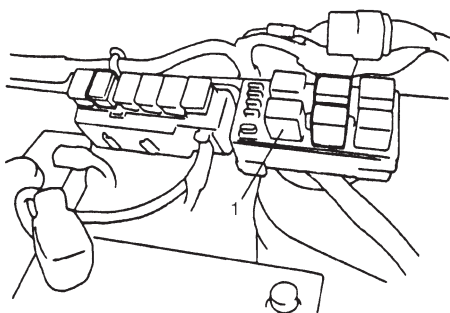


Fig. 2 for Step 2

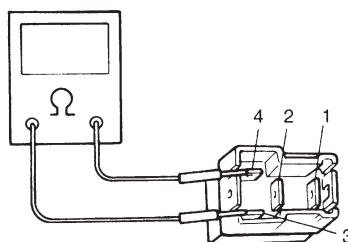


Fig. 3 for Step 2

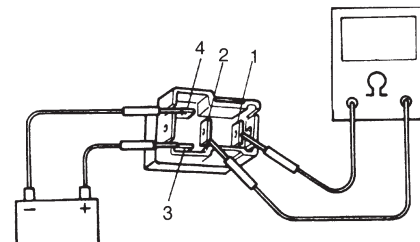
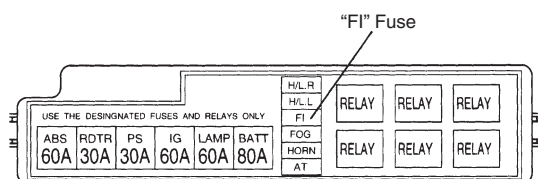
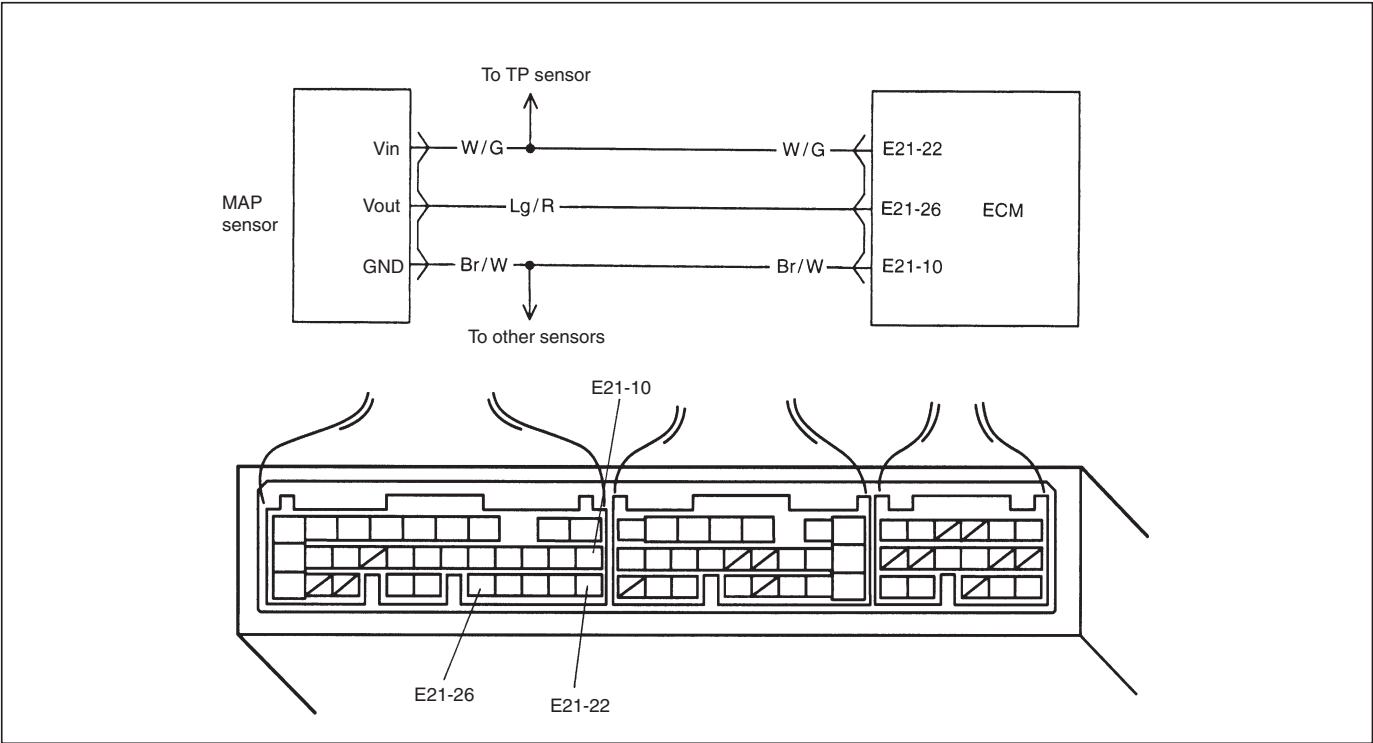


Fig. 4 for Step 3



DTC P0105 MANIFOLD ABSOLUTE PRESSURE (MAP) CIRCUIT (DTC No.11) MALFUNCTION

CIRCUIT DESCRIPTION

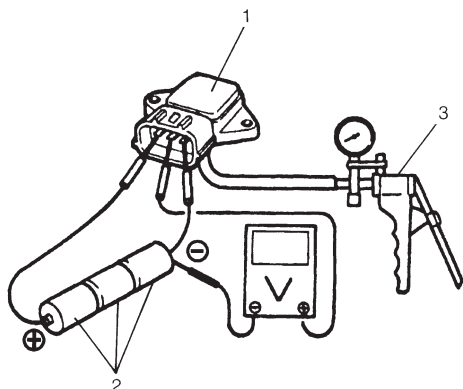


DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">● MAP: 4.9 kpa, 37 mmHg or less (Low pressure – High vacuums – Low voltage)● MAP: 114.7 kpa, 860mmHg or more (High pressure – Low vacuums – High voltage)	<ul style="list-style-type: none">● “Br/W” circuit open● “W/G” circuit open or shorted to ground● “Lg/R” circuit open or shorted to ground● MAP sensor malfunction● ECM malfunction

NOTE:
When DTC P0120 is indicated together, it is possible that “W/G” circuit is open.

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

**MAP Sensor Individual Check**

- 1) Disconnect coupler from MAP sensor (1).
- 2) Remove MAP sensor (1).
- 3) Arrange 3 new 1.5 V batteries (2) in series (check that total voltage is 4.5 – 5.0 V) and connect its positive terminal to “Vin” terminal of sensor and negative terminal to “Ground” terminal. Then check voltage between “Vout” and “Ground”. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump (3).

Output voltage (Vin voltage 4.5 – 5.5 V, ambient temp. 20 – 30°C, 68 – 86°F)

ALTITUDE (Reference)		BAROMETRIC PRESSURE		OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	(kPa)	(V)
0	0	760	100	3.3 – 4.3
2 000	610	707	94	
2 001	611	Under 707 over 634	94	3.0 – 4.1
5 000	1 524		85	
5 001	1 525	Under 634 over 567	85	2.7 – 3.7
8 000	2 438		76	
8 001	2 439	Under 567 over 526	76	2.5 – 3.3
10 000	3 048		70	

If check result is not satisfactory, replace MAP sensor (1).

- 4) Install MAP sensor (1) securely.
- 5) Connect MAP sensor (1) coupler securely.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check MAP Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake manifold pressure. See Fig. 1. Is it 114.7 kPa or more or 43 kPa or less?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.
3	Check Wire Harness. 1) Disconnect MAP sensor connector with ignition switch OFF. 2) Check for proper connection of MAP sensor at "Lg/R" and "Br/W" wire terminals. 3) If OK, then with ignition switch ON, check voltage at each of "W/G" and "Lg/R" wire terminals. See Fig. 2. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	"W/G" wire open or shorted to ground circuit or shorted to power circuit, "Lg/R" wire open or shorted to ground, poor E21-26 connection or E21-22 connection. If wire and connection are OK, confirm that MAP sensor is normal and then substitute a known-good ECM and recheck. NOTE: When battery voltage is applied to "W/G" wire, it is possible that MAP sensor is also faulty.
4	Check MAP sensor according to "MAP Sensor Individual Check". Is it in good condition?	"W/G" wire shorted to "Lg/R" wire, "Br/W" wire open, poor E21-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace MAP sensor.

Fig. 1 for Step 2

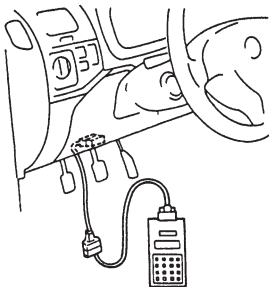
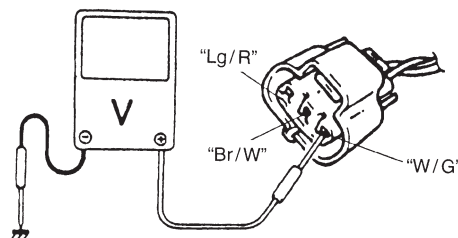
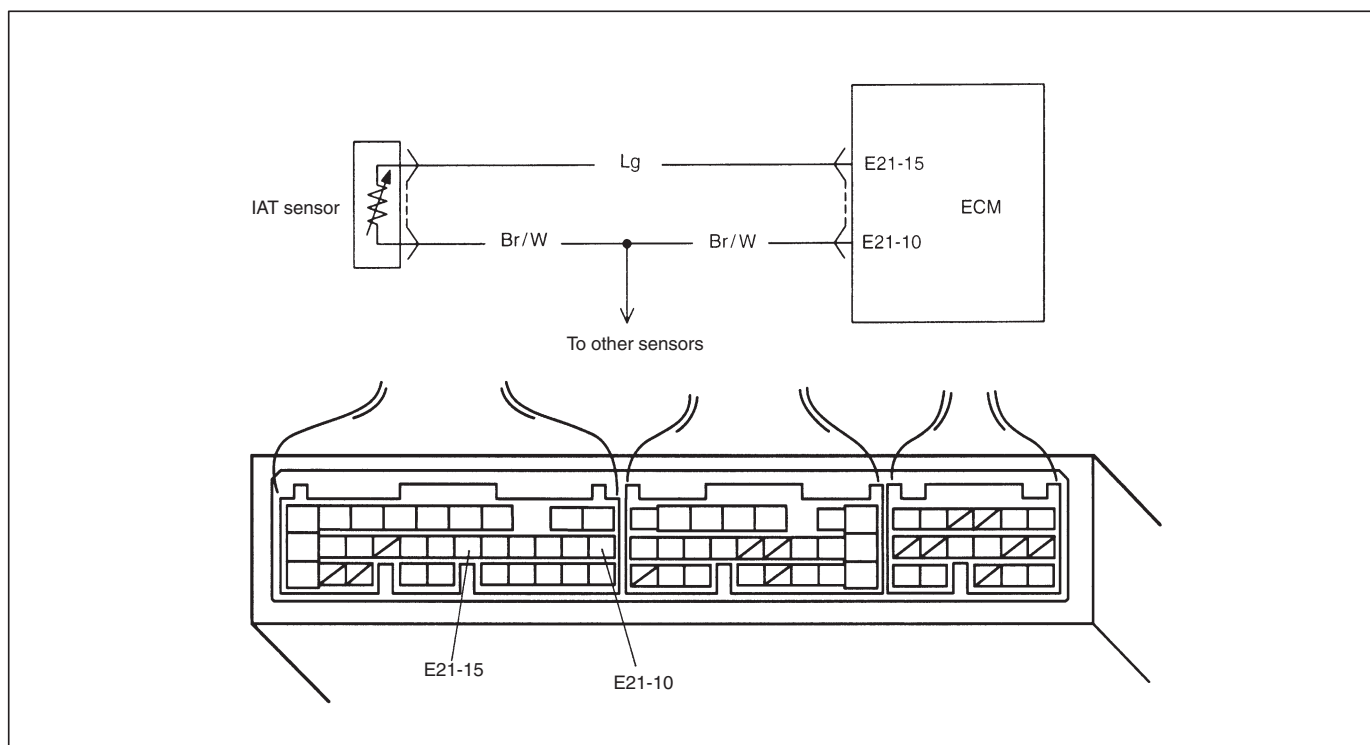


Fig. 2 for Step 3



DTC P0110 (DTC No.18) INTAKE AIR TEMP. (IAT) CIRCUIT MALFUNCTION**CIRCUIT DESCRIPTION**

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Low intake air temperature (High voltage-High resistance) • High intake air temperature (Low voltage-Low resistance) 	<ul style="list-style-type: none"> • “Lg” circuit open or shorted to power. • “Br/W” circuit open • IAT sensor malfunction • ECM malfunction

NOTE:

- When DTC P0115 and P0120 are indicated together, it is possible that “Br/W” circuit is open.
- Before inspecting, be sure to check that ambient temperature is higher than -40°C (-40°F).

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode no scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check IAT Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake air temp. displayed on scan tool. See Fig. 1. Is -40°C (-40°F) or 119°C (246°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.
3	Check Wire Harness. 1) Disconnect IAT sensor connector with ignition switch OFF. 2) Check for proper connection to IAT sensor at "Lg" and "Br/W" wire terminals. 3) If OK, then with ignition switch ON, is voltage applied to "Lg" wire terminal about 4 – 6 V? See Fig. 2.	Go to Step 4.	"Lg" wire open or shorted to power, or poor E21-15 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Does scan tool indicate -40°C (-40°F) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness 1) Check intake air temp. displayed on scan tool with ignition switch ON. Is -40°C (-40°F) indicated?	Replace IAT sensor.	"Lg" wire shorted to ground. If wire is OK, substitute a known-good ECM and recheck.
6	Check Wire Harness. 1) Using service wire, connect IAT sensor connector terminals. 2) Check intake air temp. displayed on scan tool with ignition switch ON. See Fig. 3. Is 119°C (246°F) indicated?	Replace IAT sensor.	"Lg" wire open or poor E21-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. 1 for Step 2

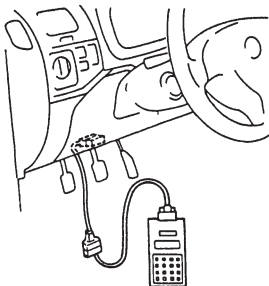


Fig. 2 for Step 3

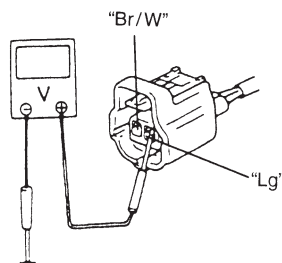
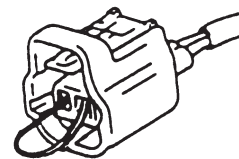


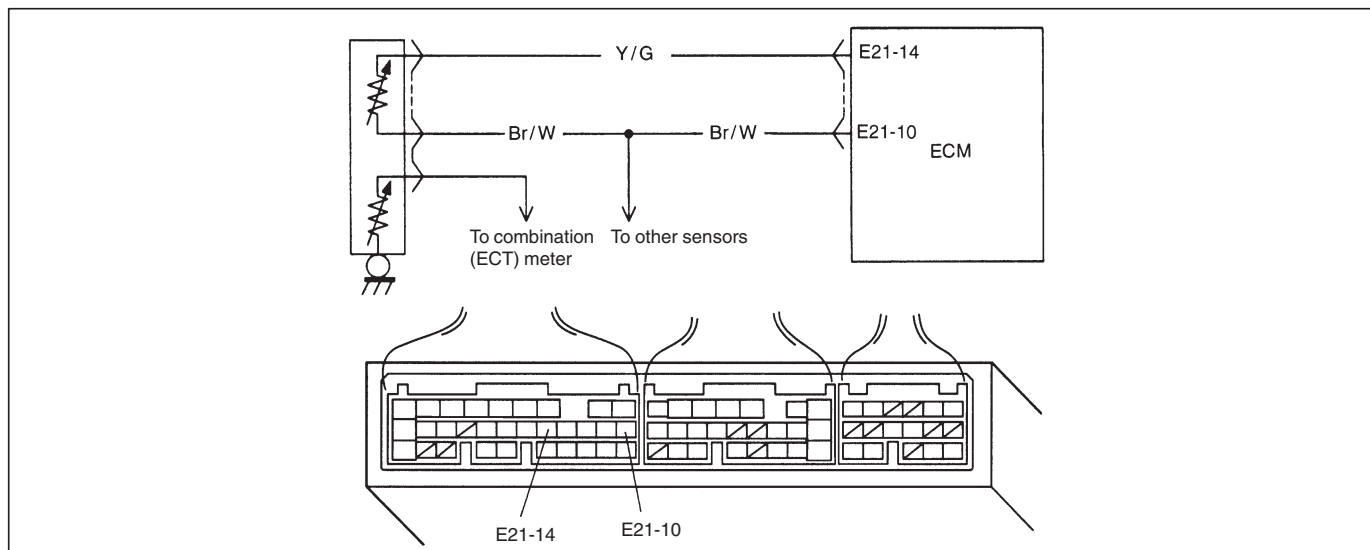
Fig. 3 for Step 6



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DTC P0115 ENGINE COOLANT TEMPERATURE (ECT) CIRCUIT (DTC No.19) MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Low engine coolant temperature (High voltage-High resistance) • High engine coolant temperature (Low voltage-Low resistance) 	<ul style="list-style-type: none"> • “Y/G” circuit open or shorted to power • “Br/W” circuit open • ECT sensor malfunction • ECM malfunction

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

NOTE:

- Before inspecting, be sure to check that coolant temp. meter in combination meter indicates normal operating temperature (Engine is not overheating).
- When this DTC and P1709 are stored together, also clear DTC stored in TCM after completion of repair.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check ECT Sensor and Its Circuit. 1) Connect scan tool with ignition switch OFF. 2) Turn ignition switch ON. 3) Check engine coolant temp. displayed on scan tool. See Fig. 1. Is -40°C (-40°F) or 119°C (246°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0 A.
3	Check Wire Harness. 1) Disconnect ECT sensor connector with ignition switch OFF. 2) Check for proper connection to ECT sensor at "Br/W" and "Y/G" wire terminals. 3) If OK, then with ignition switch ON, is voltage applied to "Y/G" wire terminal about 4 – 6 V? See Fig. 2.	Go to Step 4.	"Y/G" wire open or shorted to power, or poor E21-14 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Does scan tool indicate -40°C (-40°F) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness. 1) Check engine coolant temp. displayed on scan tool with ignition switch ON. Is -40°C (-40°F) indicated?	Replace ECT sensor.	"Y/G" wire shorted to ground. If wire is OK, substitute a known-good ECM and recheck.
6	Check Wire Harness. 1) Using service wire, connect ECT sensor connector terminals. See Fig. 3. 2) Turn ignition switch ON and check engine coolant temp. displayed on scan tool. Is 119°C (246°F) indicated?	Replace ECT sensor.	"Br/W" wire open or poor E21-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. 1 for Step 2

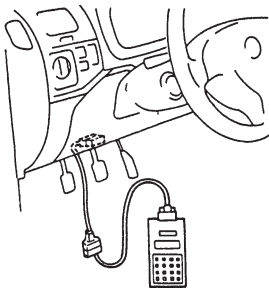


Fig. 2 for Step 3

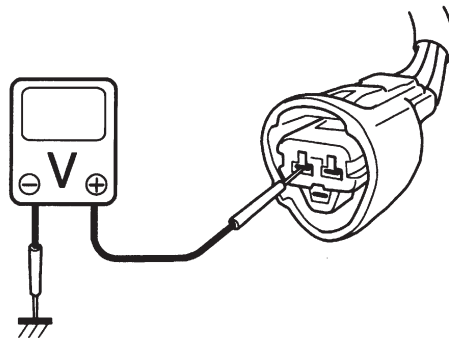
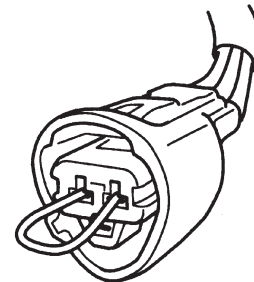
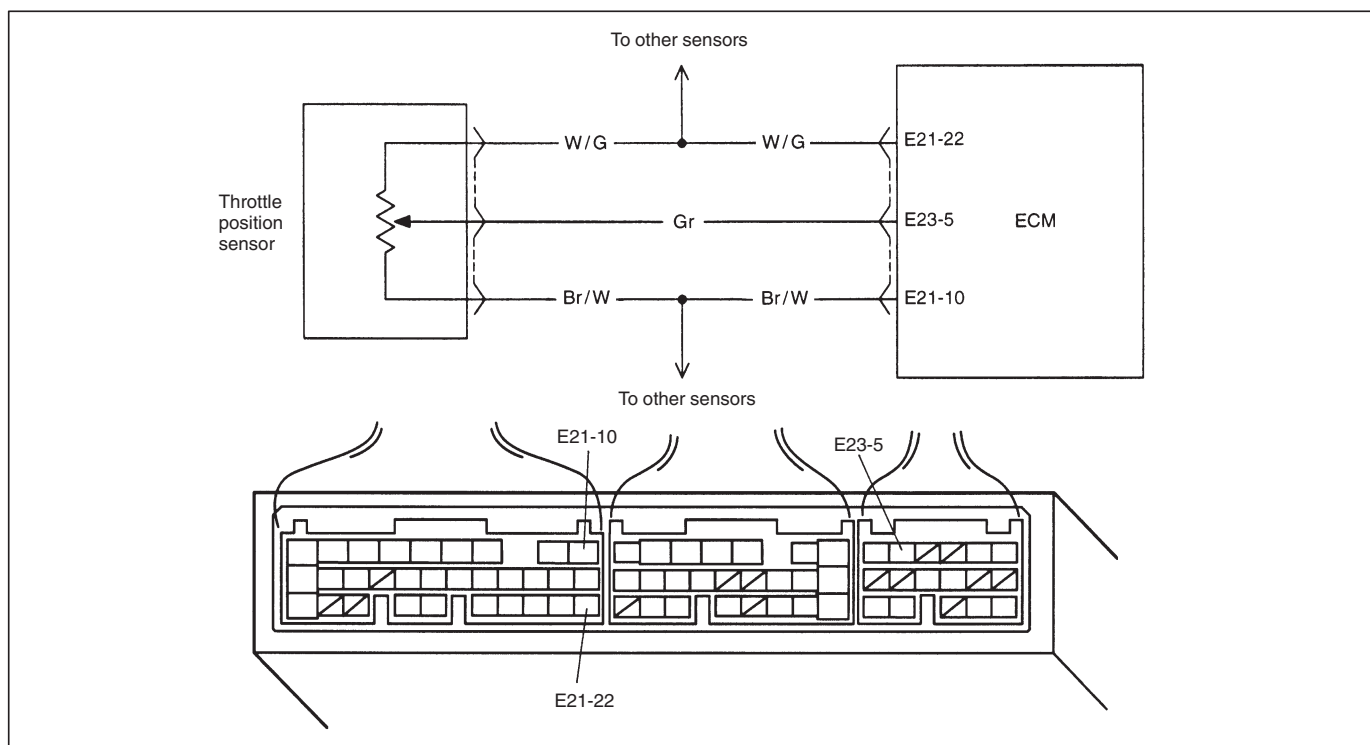


Fig. 3 for Step 6



DTC P0120 (DTC No.13) THROTTLE POSITION CIRCUIT MALFUNCTION**CIRCUIT DESCRIPTION**

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Signal voltage high • Signal voltage low 	<ul style="list-style-type: none"> • “Br/W” circuit open • “Gr” circuit open or shorted to ground • “W/G” circuit open or shorted to power or ground • TP sensor malfunction • ECM malfunction

NOTE:

When DTC P0105, P0110, P0115 and/or P0120 are indicated together, it is possible that “Br/W” or “W/G” circuit is open.

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

NOTE:

When this DTC and P1700 are stored together, also clear DTC stored in TCM after completion of repair.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check TP Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF and then turn ignition switch ON. 2) Check throttle valve opening percentage displayed on scan tool. See Fig. 1. Is it displayed 2% or less? 3) Check throttle valve opening percentage displayed on scan tool while opening throttle valve from idle position to full open position. See Fig. 1. Is it displayed 96% or higher?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0 A.
3	Check Wire Harness. 1) Disconnect connector from TP sensor with ignition switch OFF. 2) Check for proper connection to TP sensor at "W/G", "Gr" and "Br/W" wire terminal. 3) If OK, then with ignition switch ON, check voltage at each of "W/G" and "Gr" wire terminals. See Fig. 2. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	"W/G" wire open, "W/G" wire shorted to ground circuit or power circuit or "Br/W" wire, "Gr" wire open or shorted to ground circuit or poor E21-22 or E23-5 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Check TP Sensor. 1) Check resistance between terminals of TP sensor. See Fig. 3. Between 1 and 2: 2.5 – 6.0 k Ω Between 1 and 3: 100 Ω – 20 k Ω Are measured values within specifications?	"Br/W" wire open or poor E21-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace TP sensor.

Fig. 1 for Step 2

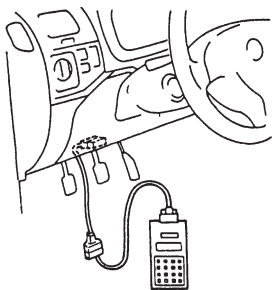


Fig. 2 for Step 3

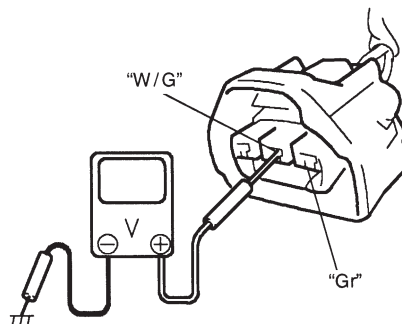
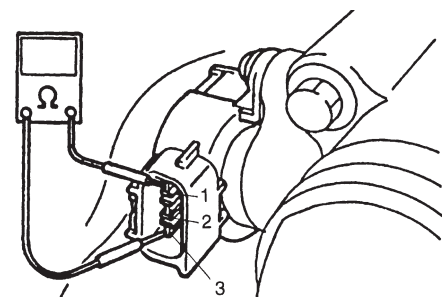


Fig. 3 for Step 4

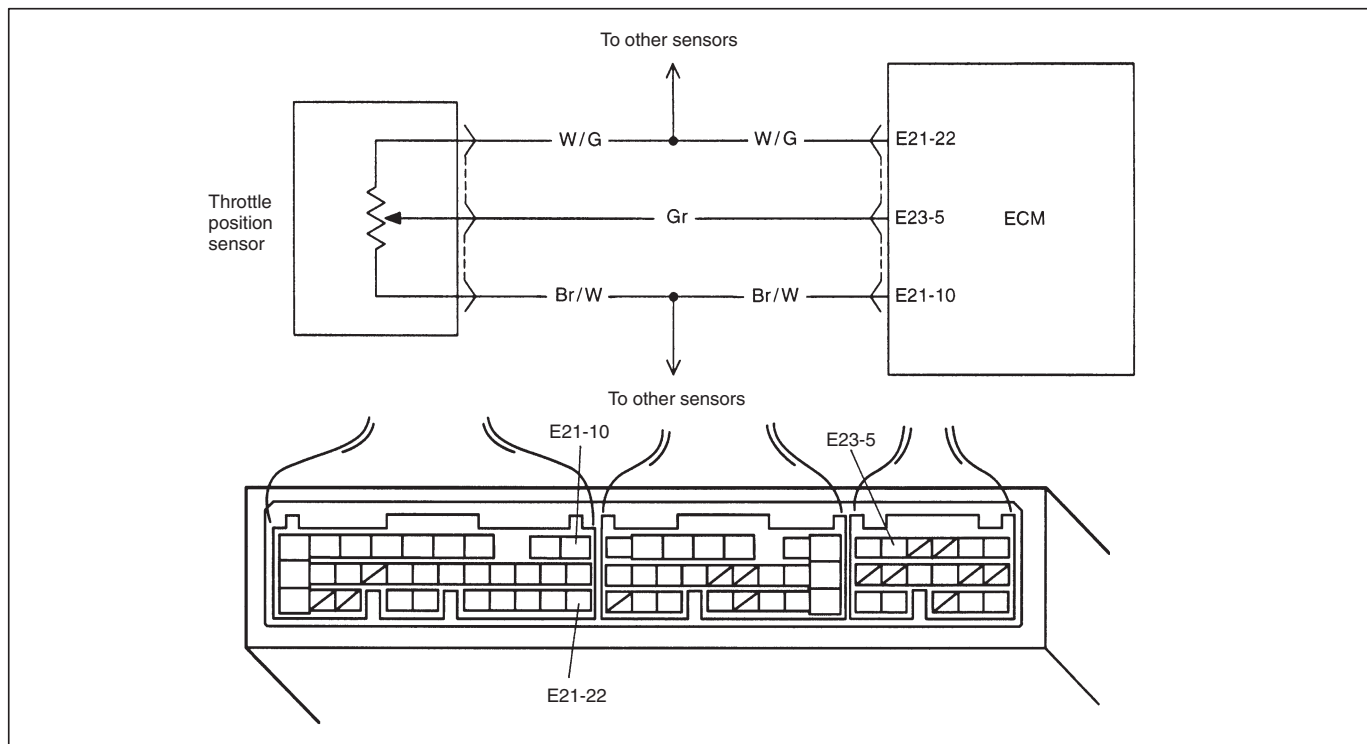


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MEMO

DTC P0121 THROTTLE POSITION CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • After engine warmed up. • While vehicle running at specified engine speed. • No change in intake manifold pressure (constant throttle opening) • Difference between actual throttle opening (detected from TP sensor) and opening calculated by ECM (Obtained on the basis of engine speed and intake manifold pressure) in larger than specified value. <p>※ 2 driving cycle detection logic, continuous monitoring</p>	<ul style="list-style-type: none"> • TP sensor malfunction • High resistance in the circuit • ECM malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Turn ignition switch OFF. Clear DTC with ignition switch ON, check vehicle and environmental condition for:
 - Indication of fuel level meter in combination meter: 1/4 or more
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: -10°C , 14°F or higher
 - Intake air temp.: 70°C , 158°F or lower
 - Engine coolant temp.: $70 - 110^{\circ}\text{C}$, $158 - 230^{\circ}\text{F}$
- 2) Warm up engine to normal operating temperature.
- 3) Increase vehicle speed to 30 – 40 mph, 50 – 60 km/h in 3rd gear or “D” range and hold throttle valve at that opening position for 1 min.
- 4) Stop vehicle.
- 5) Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	<p>Check TP Sensor and Its Circuit.</p> <p>When using SUZUKI scan tool:</p> <ol style="list-style-type: none"> 1) Turn ignition switch OFF and connect SUZUKI scan tool to DLC. 2) Turn ignition switch ON and check TP sensor output voltage when throttle valve is at idle position and fully opened. See Fig. 1 and 3. <p>When not using SUZUKI scan tool:</p> <ol style="list-style-type: none"> 1) Turn ignition switch ON. 2) Check voltage at terminal E23-5 of ECM connector connected, when throttle valve is at idle position and fully opened. See Fig. 2 and 3. <p>Dose voltage vary within specified value linearly as shown in figure?</p>	If voltmeter was used, check terminal E23-5 for poor connection. If OK, substitute a known-good ECM and recheck.	Go to Step 3.
3	<p>Check TP Sensor.</p> <ol style="list-style-type: none"> 1) Turn ignition switch OFF. 2) Disconnect TP sensor connector. 3) Check for proper connection to TP sensor at each terminal. 4) If OK, then measure resistance between terminals and check if each measured value is as specified below. See Fig. 4. <p>Between 1 and 2: 2.5 – 6.0 kΩ</p> <p>Between 1 and 3: 100 Ω – 20 kΩ, varying according to throttle valve opening.</p> <p>Are measured values as specified?</p>	High resistance in "W/G", "Gr" or "Br/W" circuit. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace TP sensor.

Fig. 1 for Step 2

When using SUZUKI scan tool:

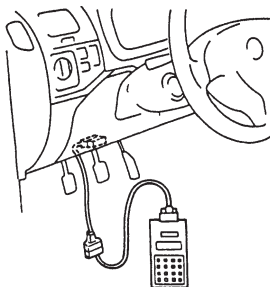


Fig. 2 for Step 2

When not using SUZUKI scan tool:

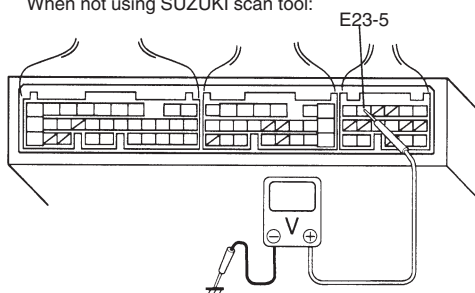


Fig. 3 for Step 2

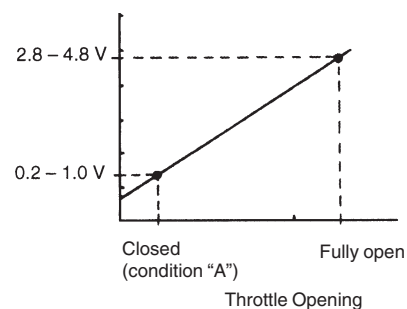
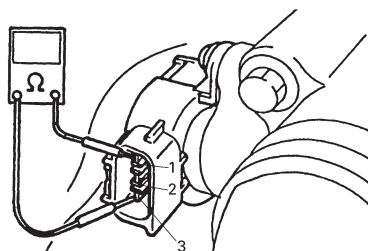
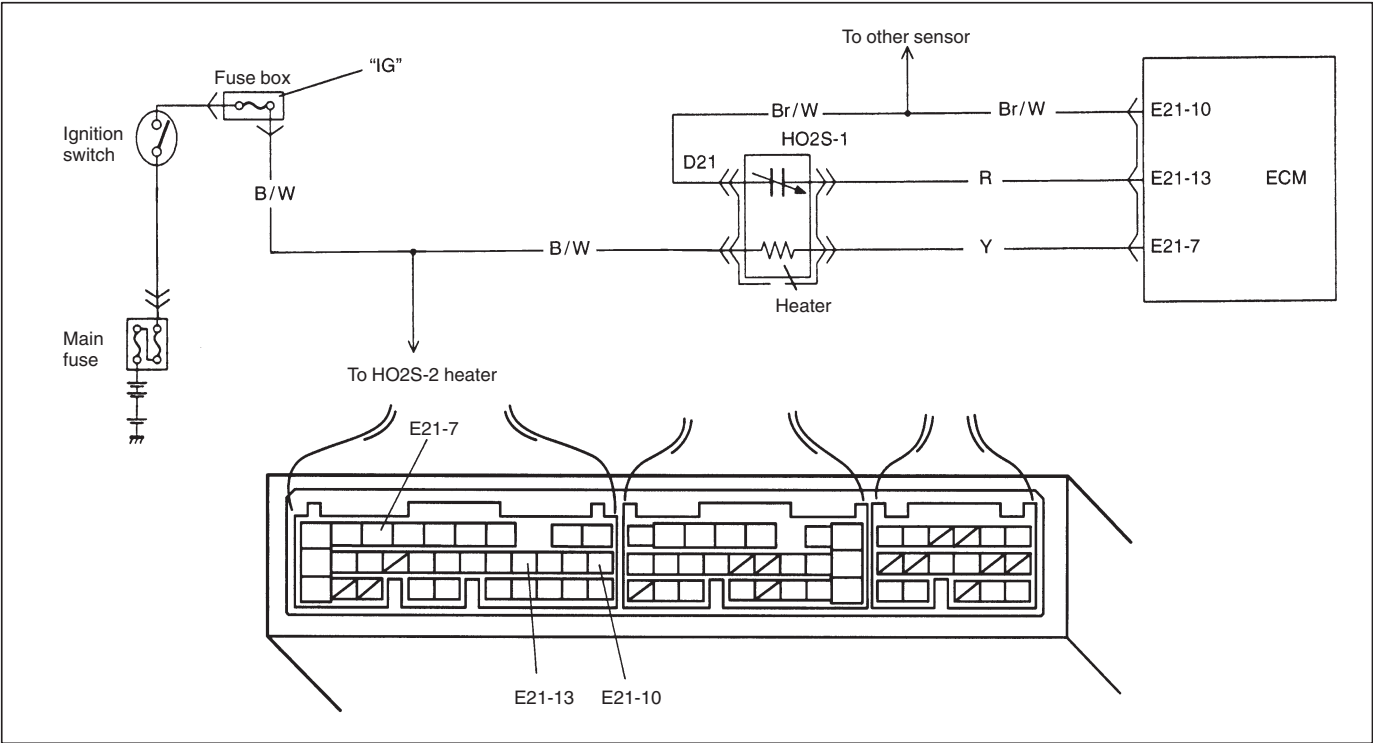


Fig. 4 for Step 3



DTC P0130 HEATED OXYGEN SENSOR (HO2S) CIRCUIT (DTC No.14) MALFUNCTION (SENSOR-1)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">When running at idle speed after engine warmed up and running at specified vehicle speed, HO2S-1 output voltage does not go below 0.3 V or over 0.6 V.* 2 driving cycle detection logic, Monitoring once/1 driving.	<ul style="list-style-type: none">Heated oxygen sensor-1 malfunction"Br/W" or "R" circuit open (poor connection) or short

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- Turn ignition switch OFF. Clear DTC with ignition switch ON, check vehicle and environmental condition for:
 - Indication of fuel level meter in combination meter: 1/4 or more
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: -10°C, 14°F or higher
 - Intake air temp.: 70°C, 158°F or lower
- Warm up engine to normal operating temperature.
- Drive vehicle at 30 – 40 mph, 50 – 60 km/h for 2 min.
- Stop vehicle and run engine at idle for 2 min.
- Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST" or "PENDING DTC" mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC(s) other than HO2S-1 (DTC P0130)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	<p>1) Connect scan tool to DLC with ignition switch OFF.</p> <p>2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec.</p> <p>3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture). See Fig. 1 and 2.</p> <p>Does HO2S-1 output voltage deflect between 0.3 V and over 0.6 V repeatedly?</p>	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Check "R" and "Br/W" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-1.

Fig. 1 for Step 3

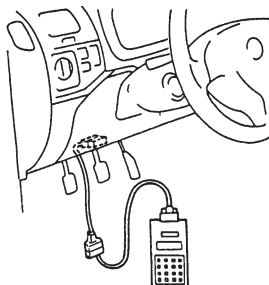
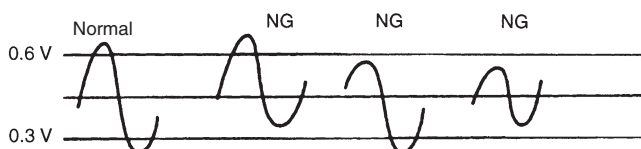


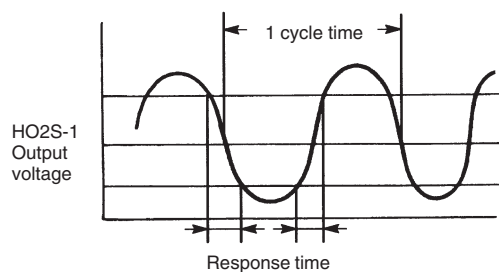
Fig. 2 for Step 3



DTC P0133 HEATED OXYGEN SENSOR (HO2S) CIRCUIT SLOW RESPONSE (SENSOR-1)**WIRING DIAGRAM/CIRCUIT DESCRIPTION** – Refer to DTC P0130 section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> When running at specified idle speed after engine warmed up and running at specified vehicle speed, response time (time to change from lean to rich or from rich to lean) of HO2S-1 output voltage is about 1 sec. at minimum or average time of 1 cycle is 5 sec. at minimum. See. Fig. 1 * 2 driving cycle detection logic, Monitoring once/1 driving. 	<ul style="list-style-type: none"> Heated oxygen sensor-1 malfunction

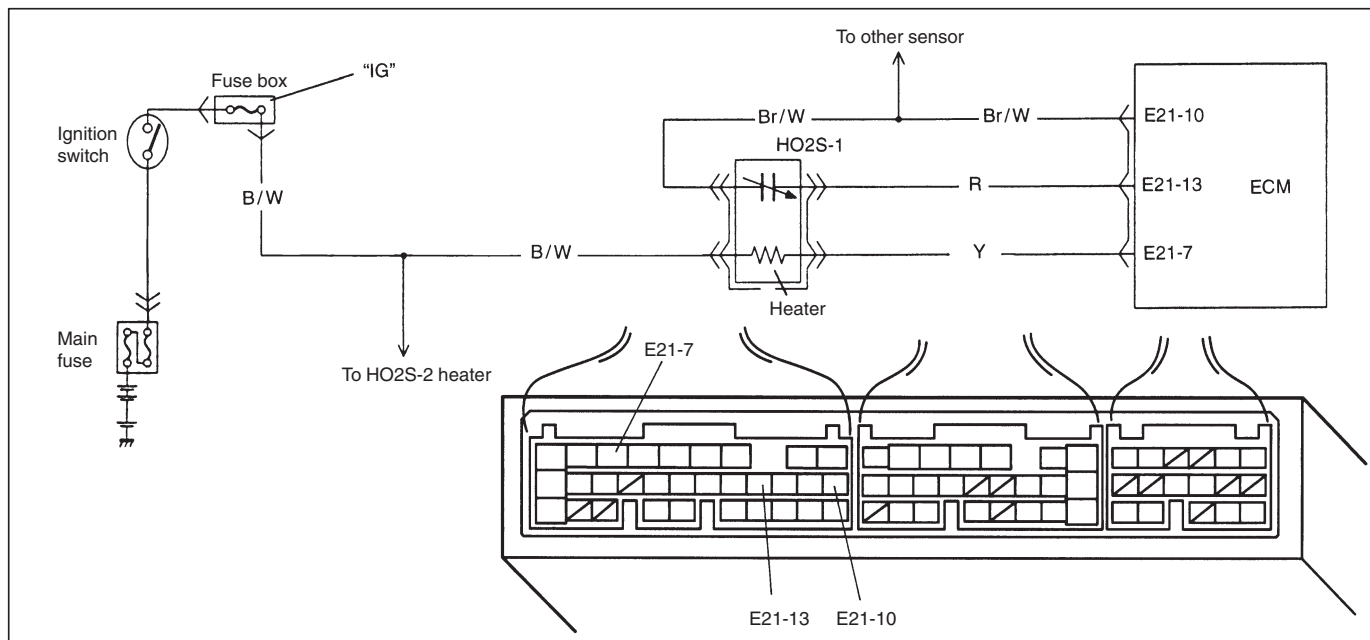
Fig. 1

**DTC CONFIRMATION PROCEDURE** – Refer to DTC P0130 section.**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC(s) other than HO2S-1 (DTC P0133)?	Go to applicable DTC Diag. Flow Table.	Replace HO2S-1.

DTC P0135 HEATED OXYGEN SENSOR (HO2S) HEATER CIRCUIT (DTC No.14) MALFUNCTION (SENSOR-1)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC will set when A or B condition is met. A: • Low voltage at terminal E21-7 when engine is running at high load. B: • High voltage at terminal E21-7 when engine is running under condition other than above. ※ 2 driving cycle detection logic, Continuous monitoring.	• HO2S-1 heater circuit open or shorted to ground • ECM malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON, start engine and keep it at idle for 1 min.
- 3) Start vehicle and depress accelerator pedal fully for 5 sec. or longer.
- 4) Stop vehicle.
- 5) Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST" or "PENDING DTC" mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Heater for Operation. 1) Check voltage at terminal E21-7. See Fig. 1. 2) Warm up engine to normal operating temperature. 3) Stop engine. 4) Turn ignition switch ON and Check voltage at terminal E21-7. See Fig. 1. Voltage should be over 10 V. 5) Start engine, run it at idle and check voltage at the same terminal. Voltage should be below 1.9 V. Are check results as specified?	Intermittent trouble Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check Heater of Sensor-1. 1) Disconnect HO2S-1 coupler with ignition switch OFF. 2) Check for proper connection to HO2S-1 at "B/W" and "Y" wire terminals. 3) If OK, then check heater resistance. See Fig. 2. Is it 11.7 – 15.6 Ω at 20°C, 68°F?	"Y" wire open or shorted to ground or poor connection at E21-7. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace HO2S-1.

Fig. 1 for Step 2

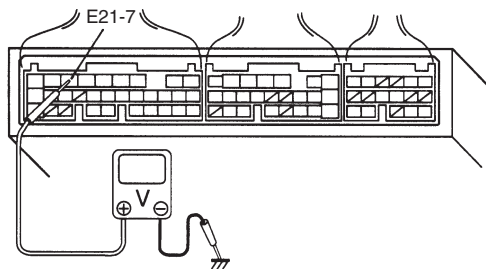
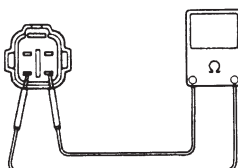
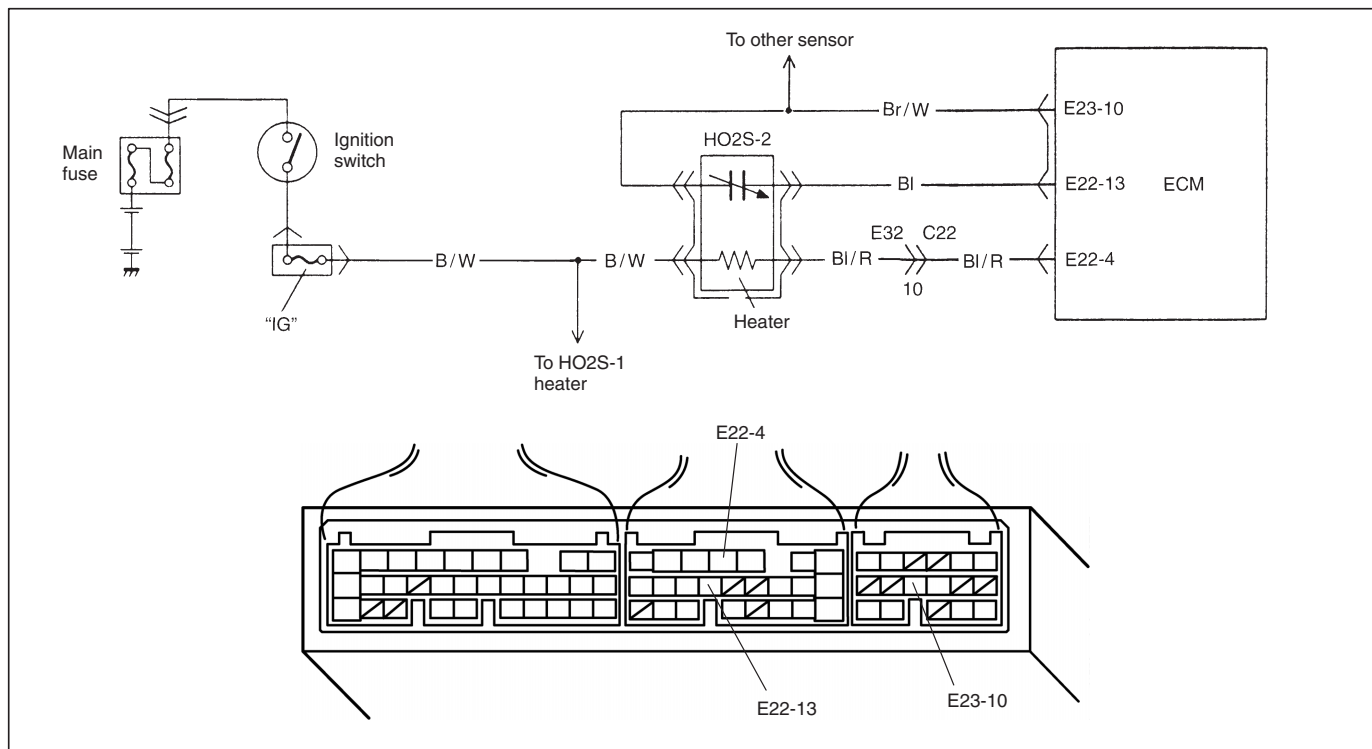


Fig. 2 for Step 3



DTC P0136 HEATED OXYGEN SENSOR (HO2S) CIRCUIT MALFUNCTION (SENSOR-2)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<p>DTC will set when A or B condition is detected.</p> <p>A. Max. output voltage of HO2S-2 is lower than specified value or Min. output voltage is higher than specified value while vehicle driving.</p> <p>B. Engine is warmed up and HO2S-2 voltage is 4.5 V or more. (circuit open)</p> <p>※ 2 driving cycle detection logic, monitoring once/1 driving.</p>	<ul style="list-style-type: none"> ● Exhaust gas leakage ● "Br/W" or "BI" circuit open or short ● Heated oxygen sensor-2 malfunction ● Fuel system malfunction

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DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

1) Turn ignition switch OFF.

Clear DTC with ignition switch ON, check vehicle and environmental condition for:

- Indication of fuel level meter in combination meter: 1/4 or more
- Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
- Ambient temp.: -10°C , 14°F or higher
- Intake air temp.: 70°C , 158°F or lower
- No exhaust gas leakage and loose connection

2) Warm up engine to normal operating temperature.

3) Drive vehicle under usual driving condition for 5 min. and check HO2S-2 output voltage and “short term fuel trim” with “Data List” mode on scan tool, and write it down.

4) Stop vehicle (don't turn ignition switch OFF).

5) Increase vehicle speed to higher than 20 mph, 32 km/h and then stop vehicle.

6) Repeat above steps 5) 4 times.

7) Increase vehicle speed to about 50 mph (80 km/h) in 3rd gear or 2 range.

8) Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) for 10sec. or more.

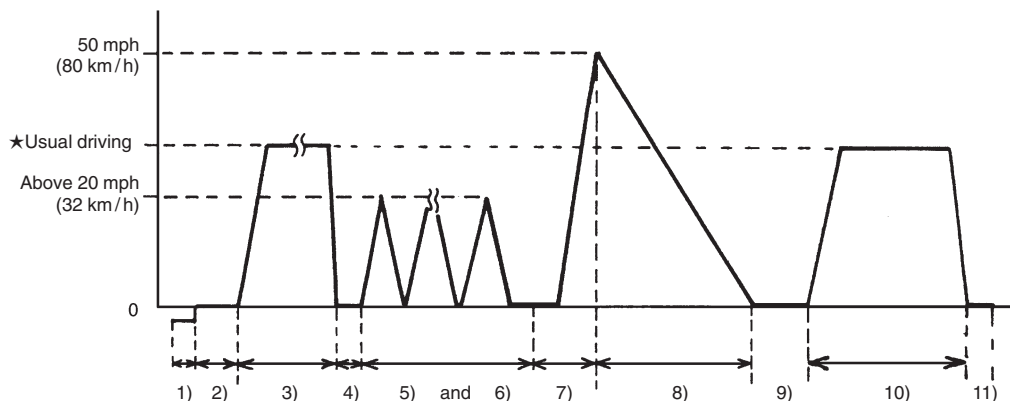
9) Stop vehicle (don't turn ignition switch OFF) and run engine at idle for 2 min.

After this step 9), if “Oxygen Sensor Monitoring TEST COMPLETED” is displayed in “READINESS TESTS” mode and DTC is not displayed in “DTC” mode, confirmation test is completed.

If “TEST NOT COMPLETED” is still being displayed, proceed to next step 10).

10) Drive vehicle under usual driving condition for 10 min. (or vehicle is at a stop and run engine at idle for 10 min. or longer)

11) Stop vehicle (don't turn ignition switch OFF). Confirm test results according to “Test Result Confirmation Flow Table” in “DTC CONFIRMATION PROCEDURE” of DTC P0420.



★Usual driving: Driving at 30 – 40 mph, 50 – 60 km/h including short stop according to traffic signal. (under driving condition other than high-load, high-engine speed, rapid accelerating and decelerating)

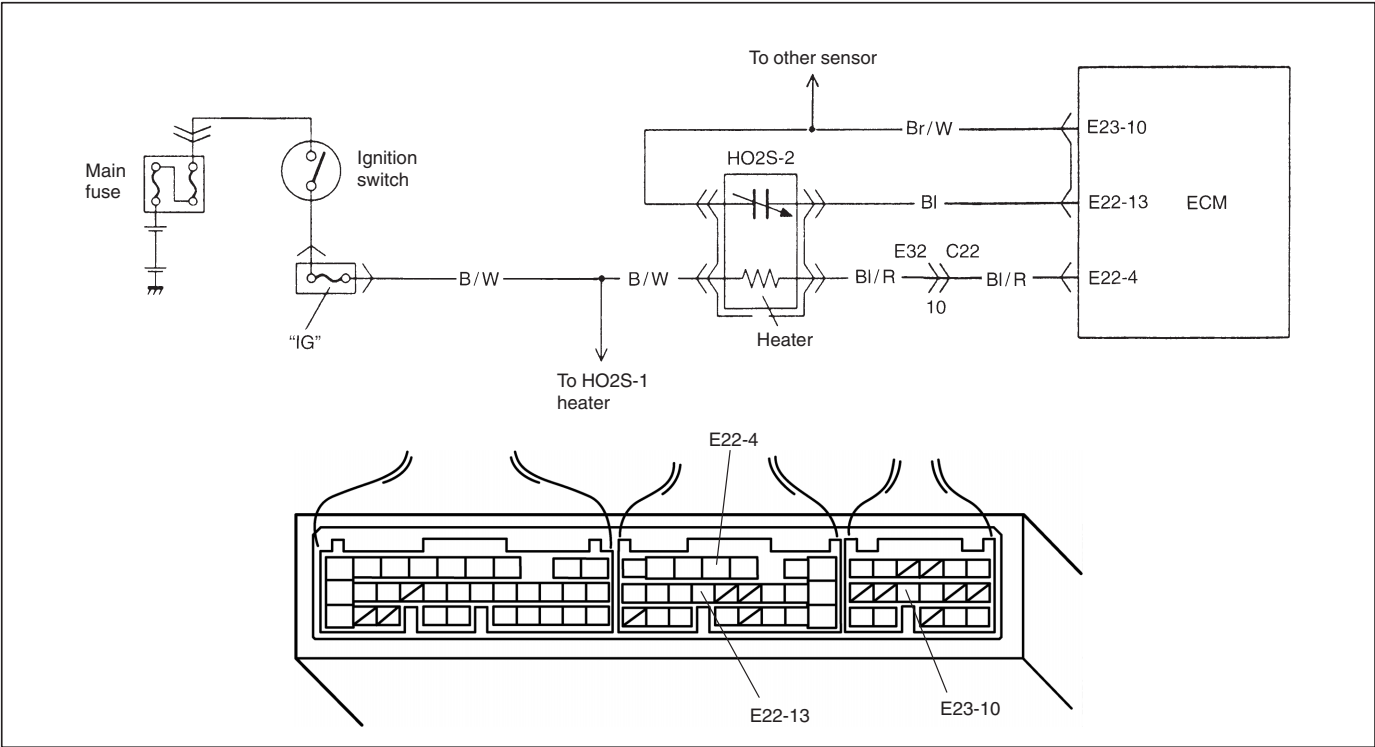
INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check exhaust system for leakage, loose connection and damage. Is it good condition?	Go to Step 3.	Repair or replace.
3	Check HO2S-2 and Its Circuit. Was HO2S-2 output voltage indicated on scan tool in step 3) of DTC confirmation test less than 1.275 V?	Go to Step 4.	"Br/W" or "BI" circuit open or HO2S-2 malfunction.
4	Check Short Term Fuel Trim. Did short term fuel trim vary within $-20 - +20\%$ range in step 3) of DTC confirmation test?	Check "BI" and "Br/W" wire for open and short, and connection for poor connection. If wire and connection are OK, replace HO2S-2.	Check fuel system. Go to DTC P0171/P0172 Diag. Flow Table.

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DTC P0141 HEATED OXYGEN SENSOR (HO2S) HEATER CIRCUIT MALFUNCTION (SENSOR-2)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC will set when A or B condition it met. A. Low voltage at terminal E22-4 for specified time after engine start or while engine running at high load. B. High voltage at terminal E22-4 while engine running under other than above condition. ※ 2 driving cycle detection logic, continuous monitoring.	● HO2S-2 heater circuit open or shorted to ground ● ECM malfunction

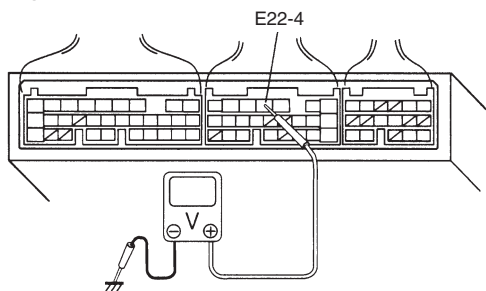
DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF once and then ON.
- 2) Clear DTC, start engine and warm up engine to normal operating temperature.
- 3) Keep it at 2000 r/min for 2 min.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	<p>Check HO2S-2 Heater and Its Circuit.</p> <p>1) Warm up engine to normal operating temperature.</p> <p>2) Stop engine.</p> <p>3) Turn ignition switch ON and check voltage at terminal E22-4 See Fig. 1. Voltage should be over 10 V.</p> <p>4) Start engine, run it at idle and check voltage at the same terminal after 1 min. from engine start. Voltage should be below 1.9 V.</p> <p>Are check result as specified?</p>	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	<p>Check Heater or Sensor-2.</p> <p>1) Disconnect HO2S-2 coupler with ignition switch OFF.</p> <p>2) Check for proper connection to HO2S-2 at "B/W" and "Bl/R" wire terminals.</p> <p>3) If OK, then check heater resistance. Is it 11.7 – 15.6 Ω at 20°C, 68°F?</p>	"Bl/R" wire open or shorted to ground or poor connection at E22-4. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace HO2S-2.

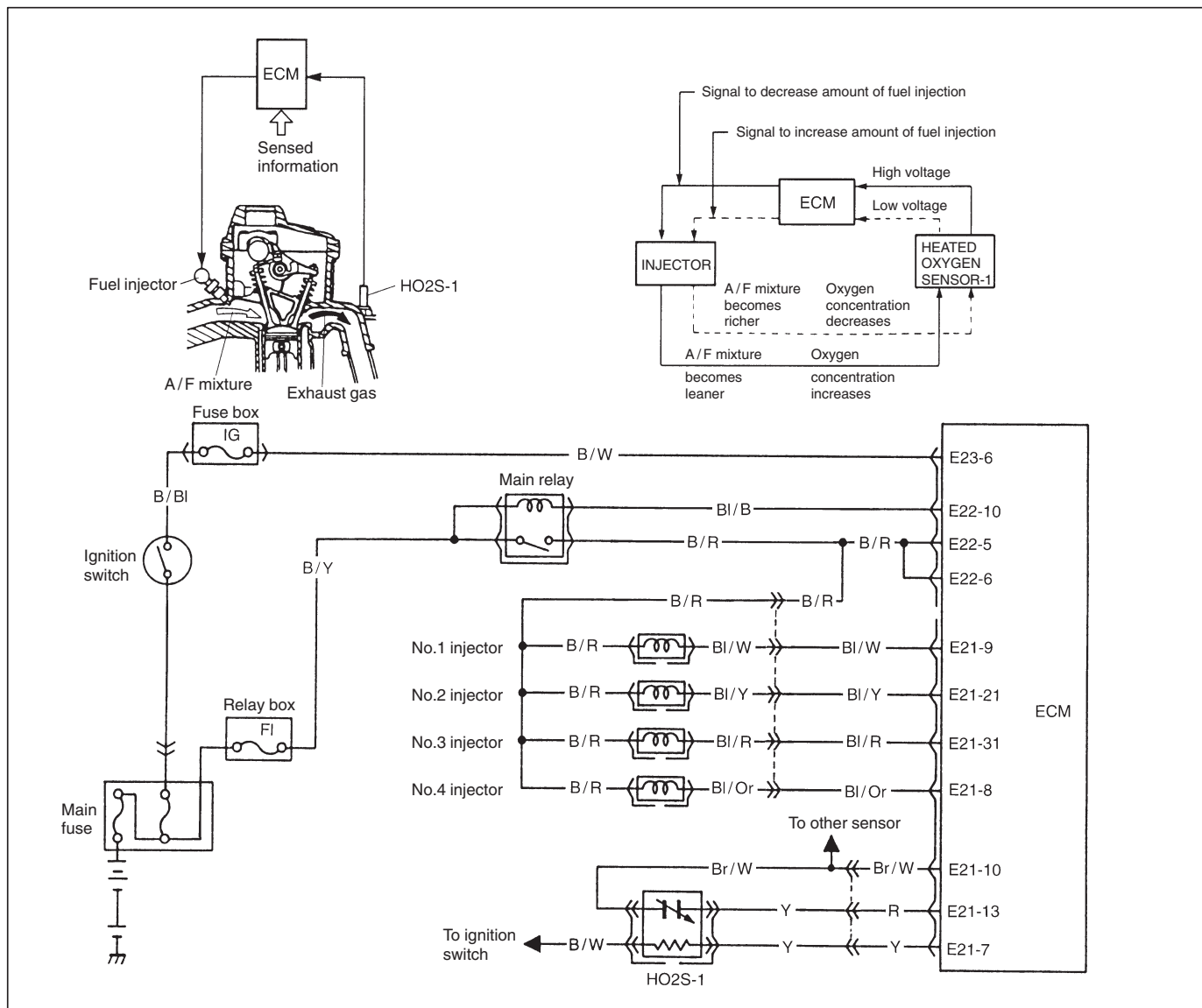
Fig. 1 for Step 2



DTC P0171 FUEL SYSTEM TOO LEAN

DTC P0172 FUEL SYSTEM TOO RICH

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> When following condition occurs while engine running under closed loop condition. <ul style="list-style-type: none"> Air/fuel ratio too lean (Total fuel trim (short and long terms added) is more than 30%) or Air/fuel ratio too rich (Total fuel trim is less than -30%) * 2 driving cycle detection logic, continuous monitoring. 	<ul style="list-style-type: none"> Vacuum leaks (air drawn in). Exhaust gas leakage. Heated oxygen sensor-1 circuit malfunction. Fuel pressure out of specification. Fuel injector malfunction (clogged or leakage). MAP sensor poor performance. ECT sensor poor performance. IAT sensor poor performance. TP sensor poor performance. EVAP control system malfunction. PCV valve malfunction.

DTC CONFIRMATION PROCEDURE**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester on a level road.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Check vehicle and environmental condition for:
 - Indication of fuel level meter in combination meter: 1/4 or more
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: –10°C, 14°F or higher
 - Intake air temp.: 70°C, 158°F or lower
- 4) Start engine and drive vehicle under usual driving condition (described in DTC confirmation procedure of DTC P0136) for 5 min. or longer and until engine is warmed up to normal operating temperature.
- 5) Keep vehicle speed at 30 – 40 mph, 50 – 60 km/h in 5th gear or “D” range for 5 min. or more.
- 6) Stop vehicle (do not turn ignition switch OFF).
- 7) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC(s) other than fuel system (DTC P0171/P0172)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	<p>Check HO2S-1 Output Voltage.</p> <p>1) Connect scan tool to DLC with ignition switch OFF. See Fig. 1.</p> <p>2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec.</p> <p>3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture).</p> <p>Does HO2S-1 output voltage deflect between below 0.3 V and over 0.6 V repeatedly?</p>	Go to Step 4.	Go to DTC P0130 Diag. Flow Table (HO2S-1 circuit check).
4	<p>Check Fuel Pressure (Refer to section 6E for details).</p> <p>1) Release fuel pressure from fuel feed line.</p> <p>2) Install fuel pressure gauge.</p> <p>3) Check fuel pressure. See Fig. 2.</p> <p>With fuel pump operating and engine at stop : 270–310 kPa, 2.7–3.1 kg/cm², 38.4–44.0 psi.</p> <p>At specified idle speed : 270–310 kPa, 2.7–3.1 kg/cm², 38.4–44.0 psi.</p> <p>Is measured value as specified?</p>	Go to Step 5.	Go to Diag. Flow Table B-3 Fuel Pressure Check.
5	<p>Check Fuel Injectors and Circuit.</p> <p>1) Using sound scope (1) or such, check operating sound of each injector (2) when engine is running. Cycle of operating sound should vary according to engine speed. See Fig. 3. If no sound or an unusual sound is heard, check injector circuit (wire or coupler) or injector.</p> <p>2) Turn ignition switch OFF and disconnect a fuel injector connector.</p> <p>3) Check for proper connection to fuel injector at each terminal.</p> <p>4) If OK, then check injector resistance. See Fig. 4. Injector Resistance: 12–13 ohm at 20°C (68°F)</p> <p>5) Carry out steps 1) and 3) on each injector.</p> <p>6) Check each injector for injected fuel volume referring to Section 6E. See Fig. 5. Injected Fuel Volume: 44–54 cc/15 sec 1.49/1.55–1.82/1.90 US/lmp.oz/15 sec)</p> <p>7) Check each injector for fuel leakage after injector closed. Fuel Leakage: Less than 1 drop/min.</p> <p>Is check result in step 1) and 3) to 7) satisfactory?</p>	Go to Step 6.	Check injector circuit or replace fuel injector(s).
6	<p>Check EVAP Canister Purge Valve.</p> <p>1) Disconnect purge hose (1) from EVAP canister.</p> <p>2) Place finger against the end of disconnected hose.</p> <p>3) Check that vacuum is not felt there when engine is cool and running at idle. See Fig. 6.</p> <p>Is vacuum felt?</p>	Check EVAP control system (See Section 6E).	Go to Step 7.
7	<p>Check intake manifold absolute pressure sensor for performance (See DTC P0105 Diag. Flow Table).</p> <p>Is it in good condition?</p>	Go to Step 8.	Repair or replace.

STEP	ACTION	YES	NO
8	Check engine coolant temp. sensor for performance (See Section 6E). Is it in good condition?	Go to Step 9.	Replace engine coolant temp. sensor.
9	Check intake air temp. sensor for performance (See Section 6E). Is it in good condition?	Go to Step 10.	Replace intake air temp. sensor.
10	Check throttle position sensor for performance (See Step 4 of DTC P0121 Diag. Flow Table). Is it in good condition?	Go to Step 11.	Replace throttle position sensor.
11	Check PCV valve for valve clogging (See Section 6E). Is it in good condition?	Substitute a known-good ECM and recheck.	Replace PCV valve.

Fig. 1 for Step 3

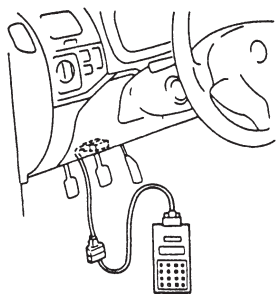


Fig. 2 for Step 4

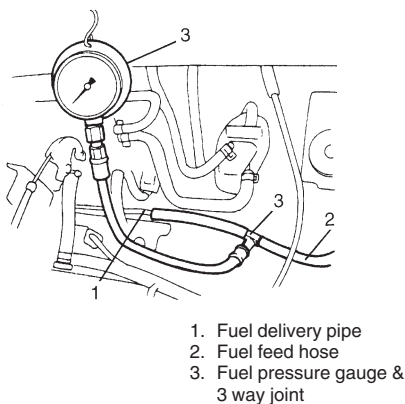


Fig. 3 for Step 5

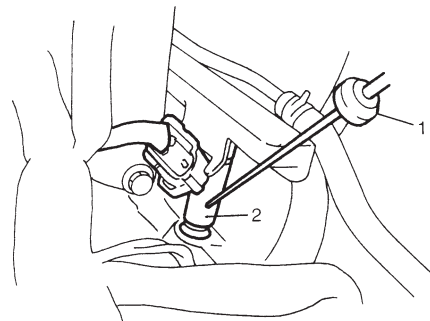


Fig. 4 for Step 5

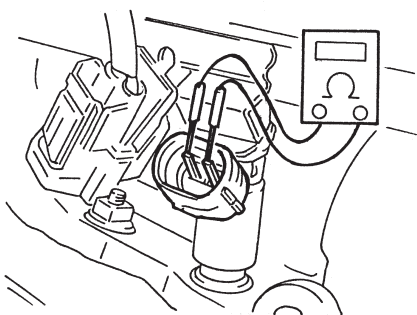


Fig. 5 for Step 5

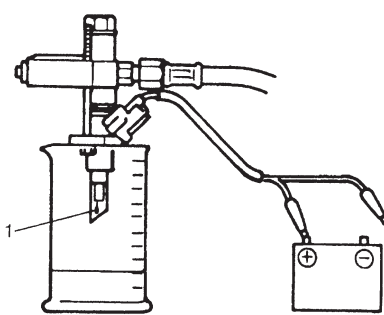
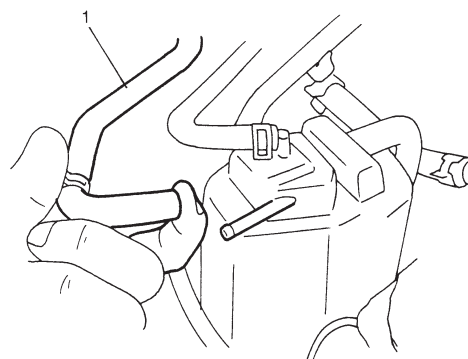


Fig. 6 for Step 6



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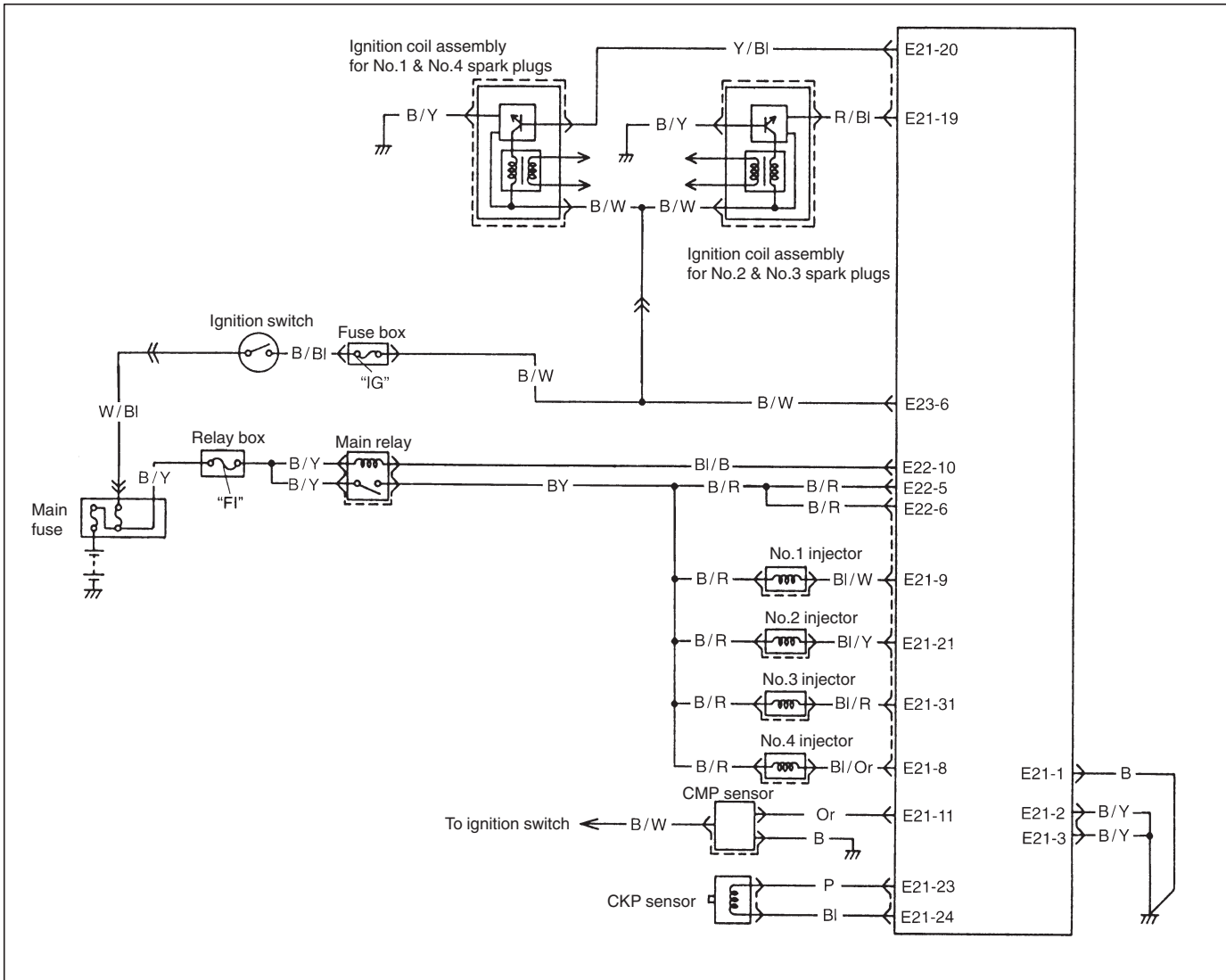
DTC P0300 RANDOM MISFIRE DETECTED (Misfire detected at 2 or more cylinders)

DTC P0301 CYLINDER 1 MISFIRE DETECTED

DTC P0302 CYLINDER 2 MISFIRE DETECTED

DTC P0303 CYLINDER 3 MISFIRE DETECTED

DTC P0304 CYLINDER 4 MISFIRE DETECTED



CIRCUIT DESCRIPTION

ECM monitors crankshaft revolution speed and engine speed via the crankshaft position sensor and cylinder No. via the camshaft position sensor. Then it calculates the change in the crankshaft revolution speed and from how many times such change occurred in every 200 or 1000 engine revolutions, it detects occurrence of misfire. When ECM detects a misfire (misfire rate per 200 revolutions) which can cause overheating and damage to the three way catalytic converter, it makes the malfunction indicator lamp (MIL) flash as long as misfire occurs at that rate. After that, however, when the misfire rate drops, MIL remains ON until it has been judged as normal 3 times under the same driving conditions.

Also, when ECM detects a misfire (misfire rate per 1000 revolutions) which will not cause damage to three way catalytic converter but can cause exhaust emission to be deteriorated, it makes MIL light according to the 2 driving cycle detection logic.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Engine under other than high revolution condition • Not on rough road • Engine speed changing rate • Manifold absolute pressure changing rate • Throttle opening changing rate • Misfire rate per 200 or 1000 engine revolutions (how much and how often crankshaft revolution speed changes) is higher than specified value 	<ul style="list-style-type: none"> • Engine overheating • Vacuum leaks (air inhaling) from air intake system • Ignition system malfunction (spark plug(s), high-tension cord(s), ignition coil assembly) • Fuel pressure out of specification • Fuel injector malfunction (clogged or leakage) • Engine compression out of specification • Valve lash (clearance) out of specification • Manifold absolute pressure sensor malfunction • Engine coolant temp. sensor malfunction • PCV valve malfunction • EVAP control system malfunction • EGR system malfunction

DTC CONFIRMATION PROCEDURE

NOTE:

Among different types of random misfire, if misfire occurs at cylinders 1 and 4 or cylinders 3 and 2 simultaneously, it may not possible to reconfirm DTC by using the following DTC confirmation procedure. When diagnosing the trouble of DTC P0300 (Random misfire detected) of the engine which is apparently misfiring, even if DTC P0300 cannot be reconfirmed by using the following DTC confirmation procedure, proceed to the following Diag. Flow Table.

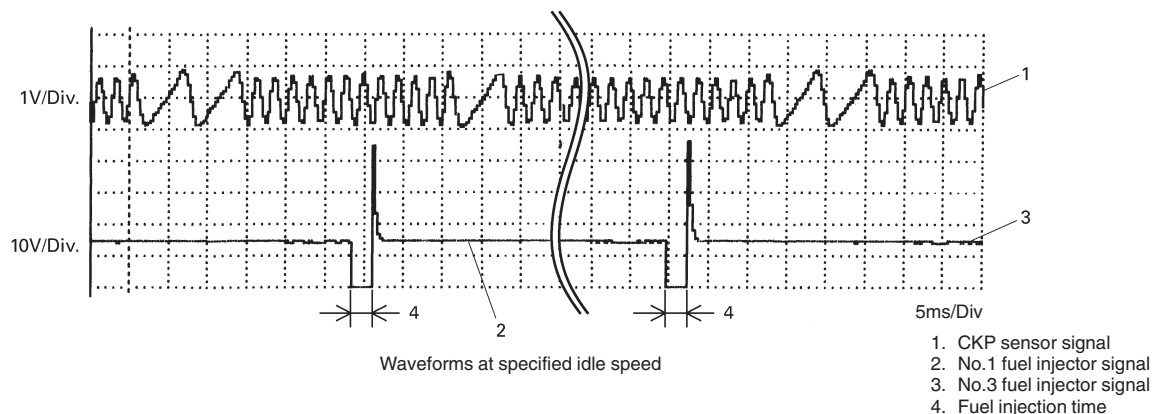
WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Check vehicle and environmental condition for:
 - Indication of fuel level meter in combination meter: 1/4 or more
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: -10°C , 14°F or higher
 - Intake air temp.: 70°C , 158°F or lower
 - Engine coolant temp.: $-10 - 110^{\circ}\text{C}$, $14 - 230^{\circ}\text{F}$
- 4) Start engine and keep it at idle for 2 min. or more.
- 5) Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST" or "PENDING DTC" mode.
- 6) If DTC is not detected at idle, consult usual driving based on information obtained in "Customer complaint analysis" and "Freeze frame data check".

Reference

Display of fuel injection signal using oscilloscope



INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC other than Fuel system (DTC P0171/P0172) and misfire (DTC P0300-P0304)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	<p>Check Ignition System.</p> <p>1) Remove spark plugs and check them for;</p> <ul style="list-style-type: none"> • Air gap: 1.0 – 1.1 mm (0.040 – 0.043 in.) See Fig. 1. • Carbon deposits • Insulator damage • Plug type <p>If abnormality is found, adjust, clean or replace.</p> <p>2) Disconnect all injector connectors. See Fig. 2.</p> <p>3) Connect spark plugs to high tension cords and then ground spark plugs.</p> <p>4) Crank engine and check that each spark plug sparks.</p> <p>Are above check results satisfactory?</p>	Go to Step 4.	Check ignition system parts (Refer to Section 6F1).
4	<p>Check Fuel Pressure (Refer to Section 6E for details).</p> <p>1) Release fuel pressure from fuel feed line.</p> <p>2) Install fuel pressure gauge. See Fig. 3.</p> <p>3) Check fuel pressure.</p> <p>With fuel pump operating and engine at stop : 270 – 310 kPa, 2.7 – 3.1 kg/cm², 38.4 – 44.0 psi.</p> <p>At specified idle speed : 270 – 310 kPa, 2.7 – 3.1 kg/cm², 38.4 – 44.0 psi.</p> <p>Is measured value as specified?</p>	Go to Step 5.	Go to Diag. Flow Table B-3 fuel pressure check.
5	<p>Check Fuel Injectors and Circuit.</p> <p>1) Using sound scope (1) or such, check operating sound of each injector (2) when engine is running. Cycle of operating sound should vary according to engine speed. See Fig 4.</p> <p>If no sound or an unusual sound is heard, check injector circuit (wire or coupler) or injector.</p> <p>2) Turn ignition switch OFF and disconnect a fuel injector connector.</p> <p>3) Check for proper connection to fuel injector at each terminal.</p> <p>4) If OK, then check injector resistance. See Fig. 5.</p> <p>Injector Resistance: 12 – 13 ohm at 20°C (68°F)</p> <p>5) Carry out steps 1) and 3) on each injector.</p> <p>6) Check each injector for injected fuel volume referring to Section 6E. See Fig. 6.</p> <p>Injected Fuel Volume: 40 – 50 cc/15 sec (1.35/1.41 – 1.69/1.76 US/Imp. oz/15 sec)</p> <p>7) Check each injector for fuel leakage after injector closed.</p> <p>Fuel Leakage: Less than 1 drop/min.</p> <p>Is check result in step 1) and 3) to 7) satisfactory?</p>	Go to Step 6.	Check injector circuit or replace fuel injector(s).

STEP	ACTION	YES	NO
6	Check PCV valve for clogging (See Section 6E). Is it in good condition?	Go to Step 7.	Replace PCV valve.
7	Check EVAP Canister Purge Valve for Closing. 1) Disconnect purge hose (1) from EVAP canister. 2) Place finger against the end of disconnected hose. 3) Check that vacuum is not felt there, when engine is cool and running at idle. See Fig. 7. Is vacuum felt?	Check EVAP control system (See Section 6E).	Go to Step 8.
8	Check intake manifold pressure sensor for performance (See DTC P0105 Diag. Flow Table). Is it in good condition?	Go to Step 9.	Repair or replace.
9	Check engine coolant temp. sensor for performance (See Section 6E). Is it in good condition?	Go to Step 10.	Replace engine coolant temp. sensor.
10	Check parts or system which can cause engine rough idle or poor performance. – Engine compression (See Section 6A1). – Valve lash (See Section 6A1). – Valve timing (Timing belt installation. See Section 6A1). Are they in good condition?	Check wire harness and connection of ECM ground, ignition system and fuel injector for intermittent open and short.	Repair or replace.

Fig. 1 for Step 3

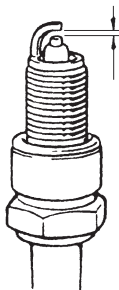


Fig. 4 for Step 5

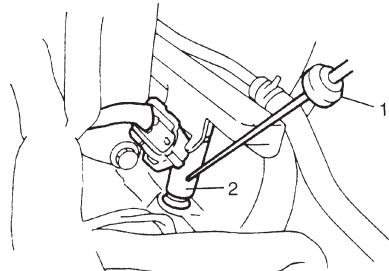


Fig. 7 for Step 7

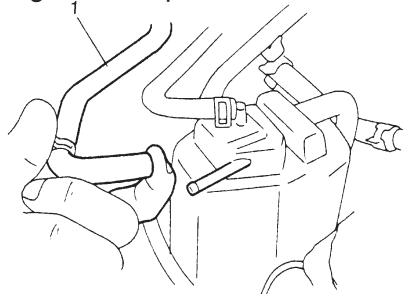


Fig. 2 for Step 3

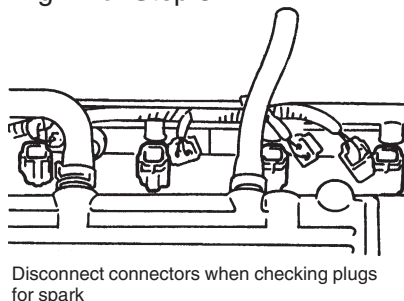


Fig. 5 for Step 4

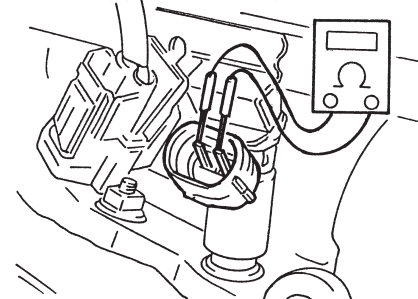


Fig. 3 for Step 4

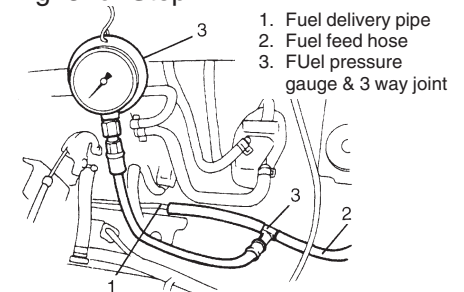
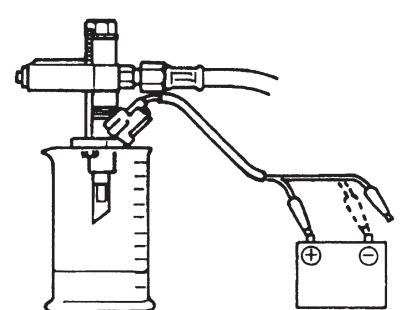
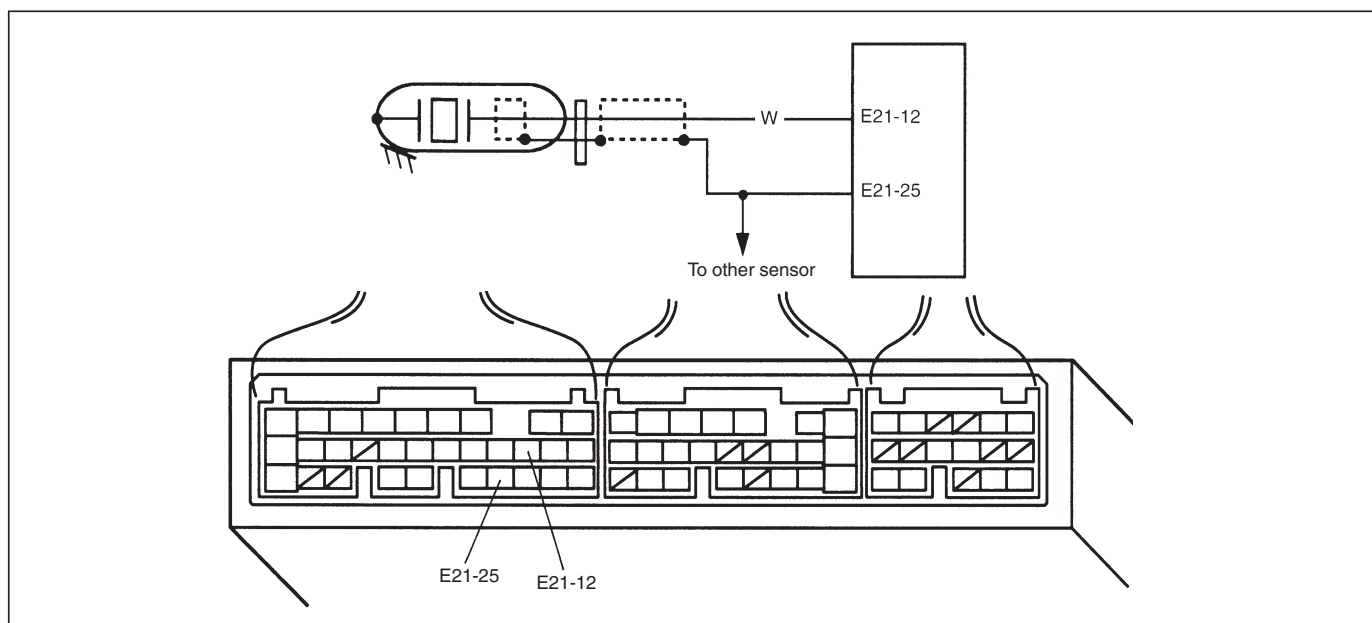


Fig. 6 for Step 5



DTC P0325 (DTC No.17) KNOCK SENSOR CIRCUIT MALFUNCTION**CIRCUIT DESCRIPTION**

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • KNOCK: 3.75 V or more • KNOCK: 1.25 V or less 	<ul style="list-style-type: none"> • "W" circuit open or shorted to ground • KNOCK sensor malfunction • ECM malfunction

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE performed?"	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	1) With engine running, check voltage from "E21-12" terminal of ECM connector to body ground. See Fig. 1. 2) Is voltage about 1.25 – 3.75 V?	Knock sensor and its circuit are in good condition. Intermittent trouble or faulty ECM. Recheck, referring to INTERMITTENT TROUBLE in Section 0A.	Go to Step 3.
3	1) Stop engine. 2) With ignition switch at OFF position, disconnect knock sensor connector. 3) With ignition switch at ON position, check voltage from "W" to body ground terminal of knock sensor connector. See Fig. 2. 4) Is it 4 – 5 V?	Faulty knock sensor. Substitute a known-good knock sensor and recheck.	"W" wire open, shorted to ground circuit or poor "E21-12" connection. If wire and connection are OK, substitute a known-good ECM and recheck.

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Fig. 1 for Step 2

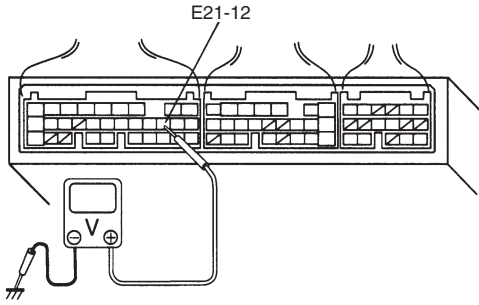
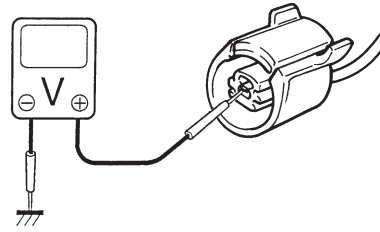
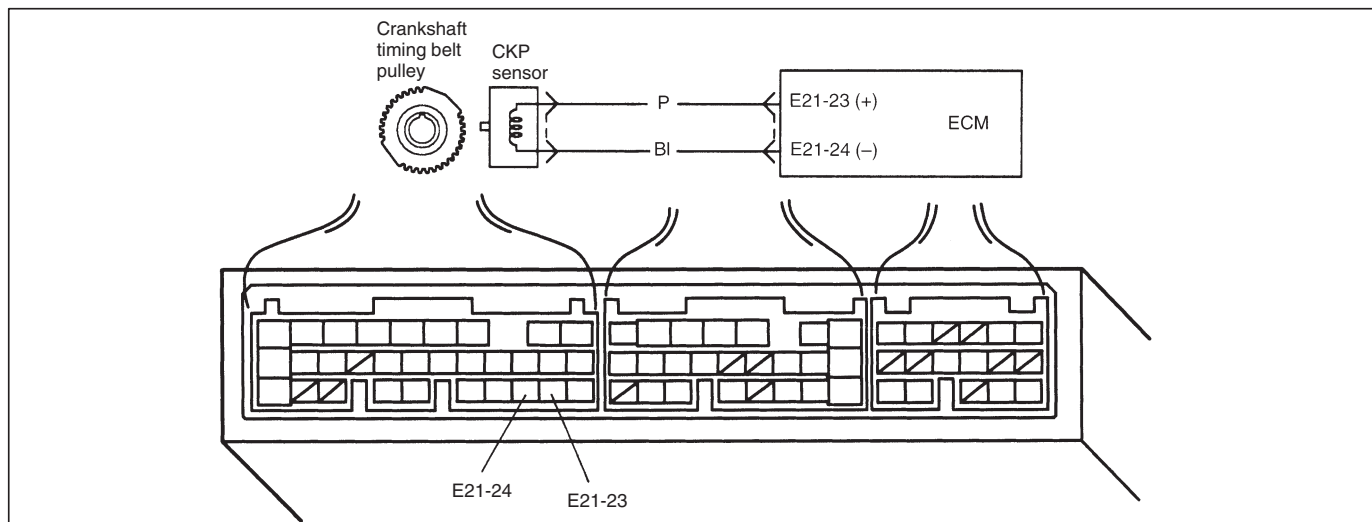


Fig. 2 for Step 2



DTC P0335 CRANKSHAFT POSITION (CKP) SENSOR CIRCUIT (DTC No.23) MALFUNCTION

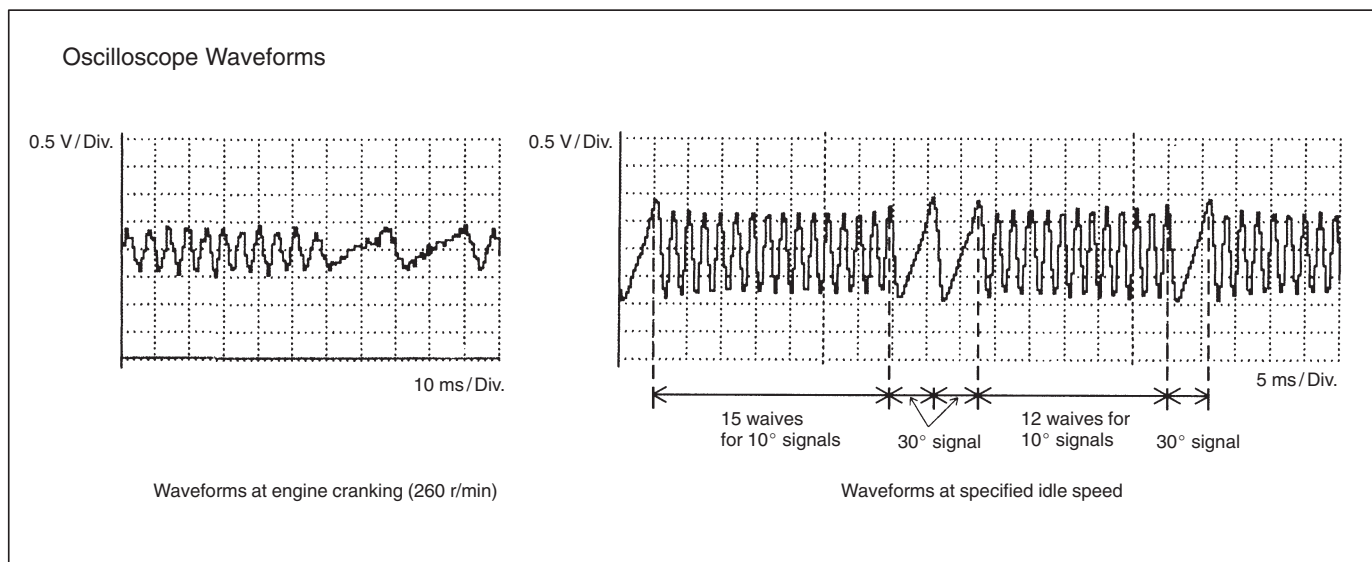
CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • NO CKP sensor signal for 2 seconds at engine cranking. 	<ul style="list-style-type: none"> • CKP sensor circuit open or short. • Crankshaft timing belt pulley teeth damaged. • CKP sensor malfunction, foreign material being attached or improper installation. • ECM malfunction.

Reference

Connect oscilloscope between terminals C20-3 (+) and C20-11 (-) of ECM connector connected to ECM and check CKP sensor signal.



DTC CONFIRMATION PROCEDURE

- 1) Clear DTC and crank engine for 2 sec.
- 2) Select "DTC" mode on scan tool and check DTC.

INSPECTION**NOTE:**

If starter circuit is open (i.e., start signal circuit is OK but starter fails to run), this DTC is stored in memory at starter switch ON, even though CKP sensor is in good condition.

When starter motor fails to run and this DTC appears, check starter circuit first.

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC P1500 (Engine starter signal circuit)?	Go to DTC P1500 Diag. Flow Table.	Go to Step 3.
3	<p>Check CKP Sensor for Resistance.</p> <p>1) Disconnect CKP sensor connector with ignition switch OFF.</p> <p>2) Then check for proper connection to CKP sensor at "P" and "BI" wire terminals.</p> <p>3) If OK, measure sensor resistance between terminals. See Fig. 1. CKP sensor resistance: 360 – 460 Ω at 20°C, 68°F</p> <p>4) Measure resistance between each terminal and ground.</p> <p>Insulation resistance: 1 MΩ or more.</p> <p>Were measured resistance valves in step 3) and 4) as specified?</p>	Go to Step 4.	Replace CKP sensor.
4	<p>Check visually CKP sensor and pulley for the following. See Fig. 2.</p> <ul style="list-style-type: none"> • Damage • No foreign material attached. • Correct installation. <p>Are they in good condition?</p>	<p>"P" or "BI" wire open or shorted to ground, or poor connection at E21-23 or E21-24.</p> <p>If wire and connection are OK, intermittent trouble or faulty ECM. Recheck for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p>	Clean, repair or replace.

Fig. 1 for Step 3

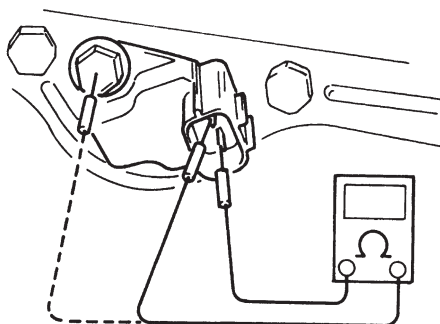
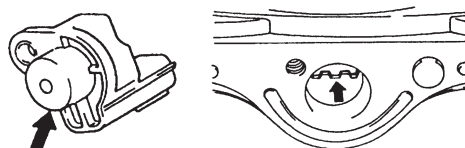
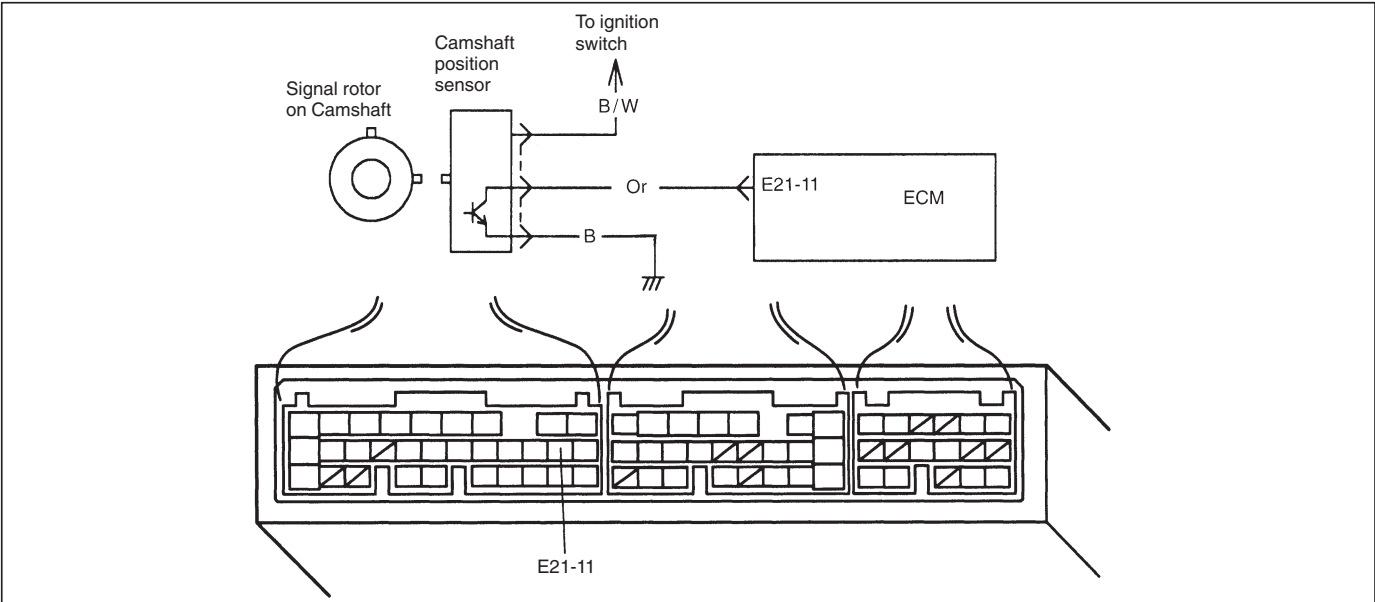


Fig. 2 for Step 4



DTC P0340 CAMSHAFT POSITION (CMP) SENSOR CIRCUIT (DTC No.15) MALFUNCTION

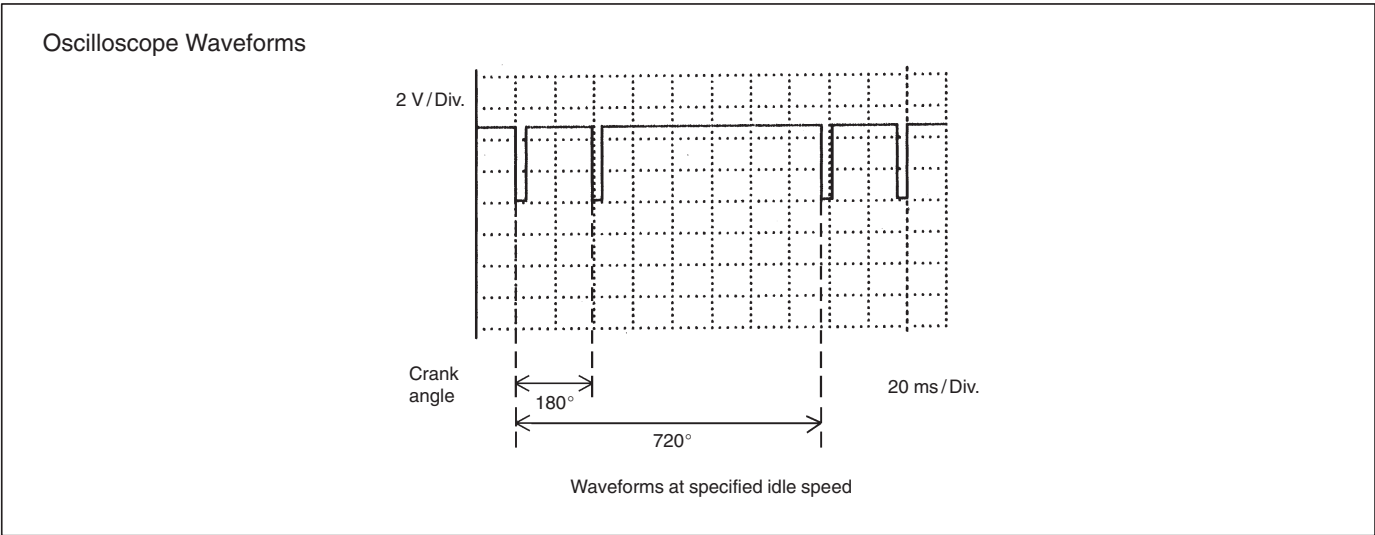
CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">• No CMP sensor signal during engine running (CKP sensor signal is inputted).	<ul style="list-style-type: none">• CMP sensor circuit open or short.• Signal rotor teeth damaged.• CMP sensor malfunction, foreign material being attached or improper installation.• ECM malfunction.

Reference

Connect oscilloscope between terminals E21-11 of ECM connector connected to ECM and body ground and check CKP sensor signal.



DTC CONFIRMATION PROCEDURE

- 1) Clear DTC.
- 2) Start engine and keep it at idle for 1 min.
- 3) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check CMP Sensor and connector for proper installation. Is CMP sensor installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check Wire Harness and Connection. 1) Disconnect connector from CMP sensor. 2) Check for proper connection to CMP sensor at each terminal. 3) If OK, turn ignition switch ON and check for voltage at each terminal of sensor connection disconnected. See Fig. 1. Terminal "B+" : 10 – 14 V Terminal "Vout" : 4 – 5 V Terminal "GND" : 0 V Is check result satisfactory?	Go to Step 5.	Go to Step 4.
4	Was terminal "Vout" voltage out of specification in Step 3 check?	"Or" wire open, short or poor connection. If wire and connection are OK, substitute a known-good ECM and recheck.	"B/W" or "B" wire open, short or poor connection.
5	Check Ground Circuit for Open. 1) Turn ignition switch OFF. 2) Check for continuity between "GND" terminal of CMP sensor connector and engine ground. Is continuity indicated?	Go to Step 6.	"B" wire open or poor ground connection.
6	Check CMP Sensor for Operation. 1) Remove CMP sensor from sensor case. 2) Remove metal particles on end face of CMP sensor, if any. 3) Connect each connector to ECM and CMP sensor. 4) Turn ignition switch ON. 5) Check for voltage at terminal E21-11 of connector connected to ECM by passing magnetic substance (iron) while keeping approximately 1 mm (0.03 in.) gap with respect to end face of CMP sensor. See Fig. 2 and 3. Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?	Go to Step 7.	Replace CMP sensor.

STEP	ACTION	YES	NO
7	Check signal rotor for the following, using mirror. See Fig. 4. <ul style="list-style-type: none"> • Damage • No foreign material attached Is it in good condition?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Clean rotor teeth or replace CMP sensor.

Fig. 1 for Step 3

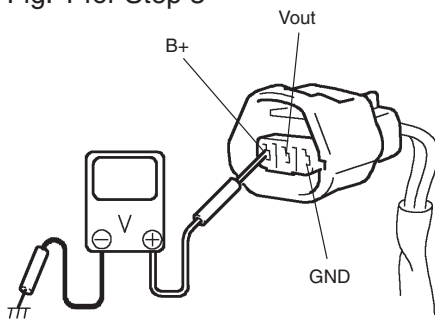


Fig. 2 for Step 6

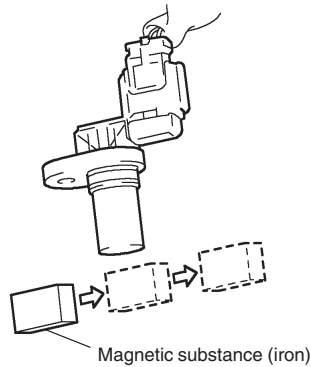


Fig. 3 for Step 6

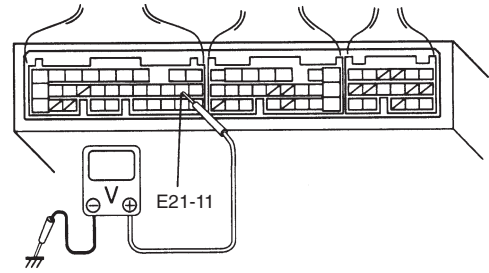
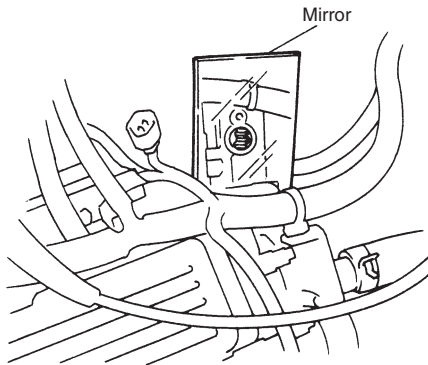
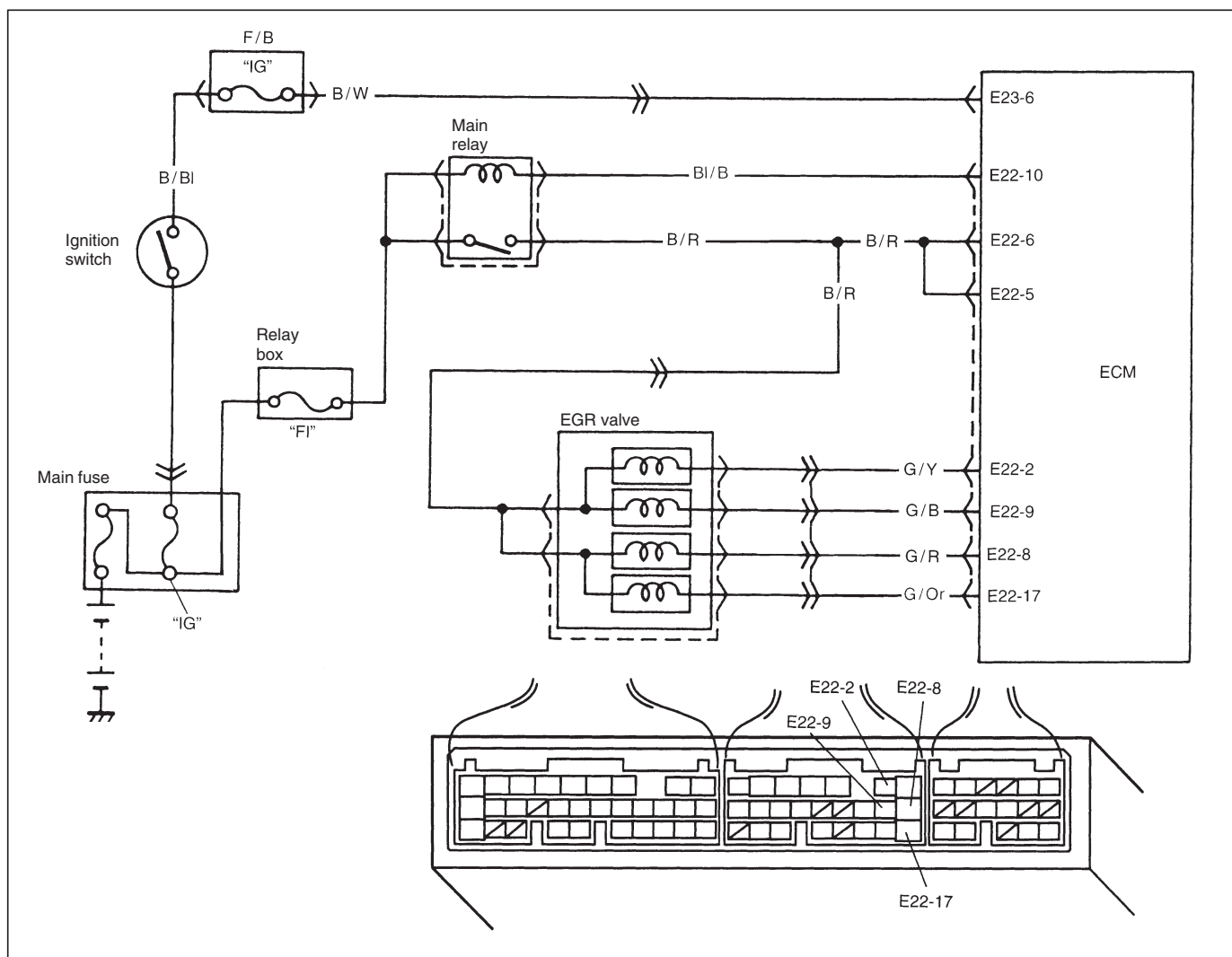


Fig. 4 for Step 7



DTC P0400 EXHAUST GAS RECIRCULATION FLOW MALFUNCTION**CIRCUIT DESCRIPTION**

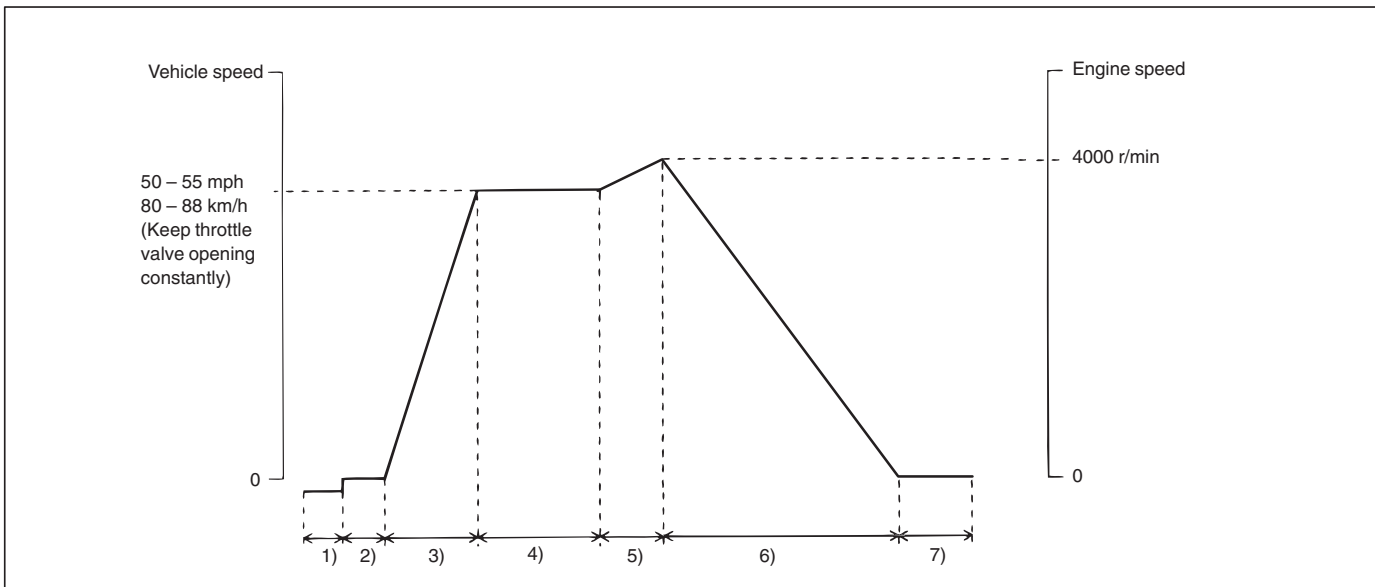
DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> While running at specified vehicle speed after engine warm-up During deceleration (engine speed high with closed throttle position ON) in which fuel cut is involved, difference in intake manifold absolute pressure between when EGR valve is opened at specified value and when it is closed is larger or smaller than specified value. <p>2 driving cycle detection logic, monitoring once/1 driving</p>	<ul style="list-style-type: none"> EGR valve or its circuit EGR passage ECM

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DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Turn ignition switch OFF.
Clear DTC with ignition switch ON, check vehicle and environmental condition for:
 - Indication of fuel level meter in combination meter: 1/4 or more
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: -10°C , 14°F or higher
 - Intake air temp.: 70°C , 122°F or lower
- 2) Start engine and warm it up to normal operating temperature ($70 - 110^{\circ}\text{C}$, $158 - 230^{\circ}\text{F}$) and run it at idle for 5 min.
- 3) Increase vehicle speed to 50 – 55 mph, 80 – 88 km/h in 5th gear or in “D” range.
- 4) Hold throttle valve at that opening position for 2 min. or longer.
- 5) Increase engine speed to 4000 r/min. in 3rd gear or in “2” range.
- 6) Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) till engine speed reaches 1500 r/min.
- 7) Stop vehicle (don't turn ignition switch OFF) and confirm test results according to following “Test Result Confirmation Flow Table.”

**Test Result Confirmation Flow Table**

STEP	ACTION	YES	NO
1	Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST”. Is DTC or pending DTC displayed?	Proceed to applicable DTC flow table.	Go to Step 2.
2	Set scan tool to “READINESS TESTS” mode and check if testing has been completed. Is test completed?	No DTC is detected. (Confirmation test is completed)	Repeat DTC confirmation procedure.

DTC P0400**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	1) Turn ignition switch ON. 2) Does EGR stepper motor operation for 0.6 second after ignition switch OFF?	Go to Step 3.	Go to Step 6.
3	With ignition switch at OFF, check voltage between E22-2, 8, 9, 17 terminals of ECM and body ground. Is voltage about 0 V? See Fig. 2. Next turn ignition switch to ON, check voltage between E22-2, 8, 9, 17 terminals of ECM and body ground. Is voltage within 10 – 14 V?	Go to Step 4.	Go to Step 7.
4	Do you have SUZUKI scan tool?	Go to Step 5.	Stuck or faulty EGR valve or clogged EGR gas passage. If all above are OK, substitute a known-good ECM and recheck.
5	Check EGR system referring to "EGR SYSTEM -system inspection" in Section 6E. Is check result satisfactory?	Substitute a known-good ECM and recheck.	Stuck or faulty EGR valve or clogged EGR gas passage.
6	1) Disconnect EGR valve coupler with ignition switch OFF. 2) Check voltage between "B/R" wire terminals of EGR valve coupler and body ground with ignition switch ON. See Fig. 1. 3) Are they about 10 – 14 V?	Go to Step 3.	"B/R" wire open or short
7	Check EGR valve referring to "EGR SYSTEM -Inspection" in Section 6E. Is it good condition?	EGR valve harness ("G/Y", "G/B", "G/R" or "G/Or" wire) open or short or poor coupler connection (D09-2, E22-2, 8, 9, 17) If wire harness and connection are OK, substitute a known-good ECM and recheck.	Faulty EGR valve

Fig. 1 for step 6

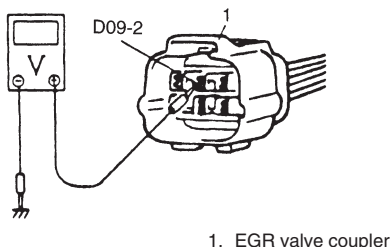
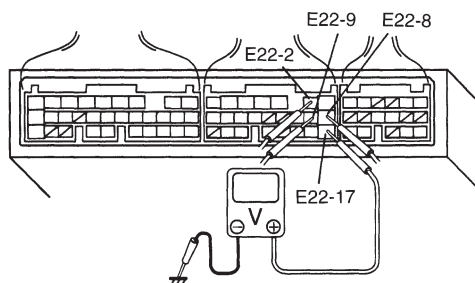


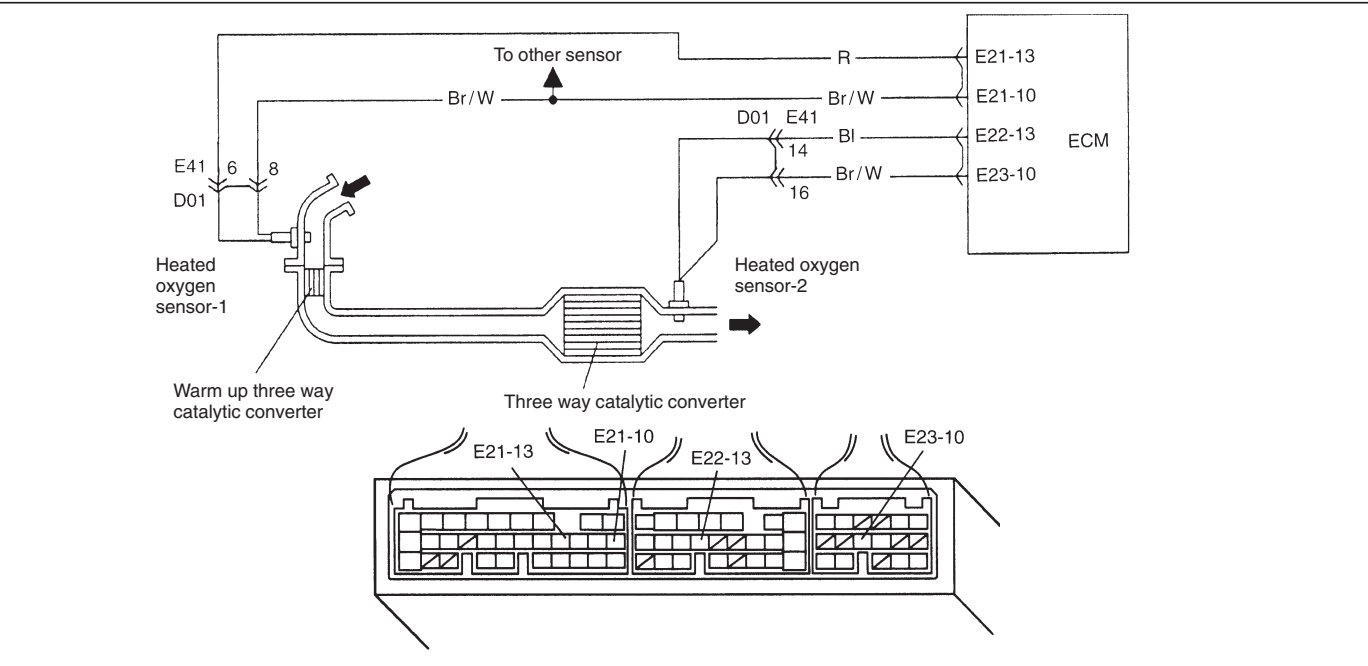
Fig. 2 for step 3



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DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD

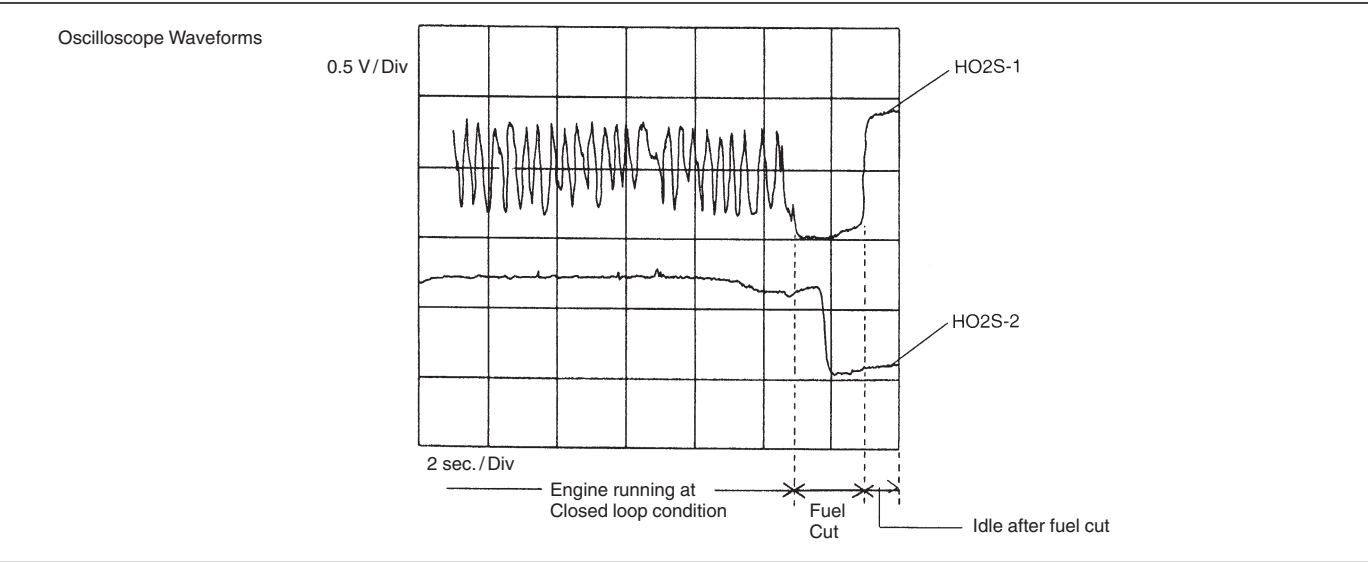
CIRCUIT DESCRIPTION



ECM monitors oxygen concentration in the exhaust gas which has passed the three way catalytic converter by HO2S-2.

When the catalyst is functioning properly, the variation cycle of HO2S-2 output voltage (oxygen concentration) is slower than that of HO2S-1 output voltage because of the amount of oxygen in the exhaust gas which has been stored in the catalyst.

Reference



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">While vehicle running at constant speed under other than high load.Time from rich or lean switching command is output till HO2S-2 output voltage crosses 0.45 V is less than specified value.2 driving cycle detection logic, monitoring once/1 driving.	<ul style="list-style-type: none">Exhaust gas leakThree way catalytic converter malfunctionFuel system malfunctionHO2S-2 malfunctionHO2S-1 malfunction

DTC CONFIRMATION PROCEDURE**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

1) Turn ignition switch OFF.

Clear DTC with ignition switch ON, check vehicle and environmental condition for:

- Indication of fuel level meter in combination meter: 1/4 or more
- Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
- Ambient temp.: -10°C , 14°F or higher
- Intake air temp.: 70°C , 158°F or lower
- Engine coolant temp.: $70 - 110^{\circ}\text{C}$, $158 - 230^{\circ}\text{F}$

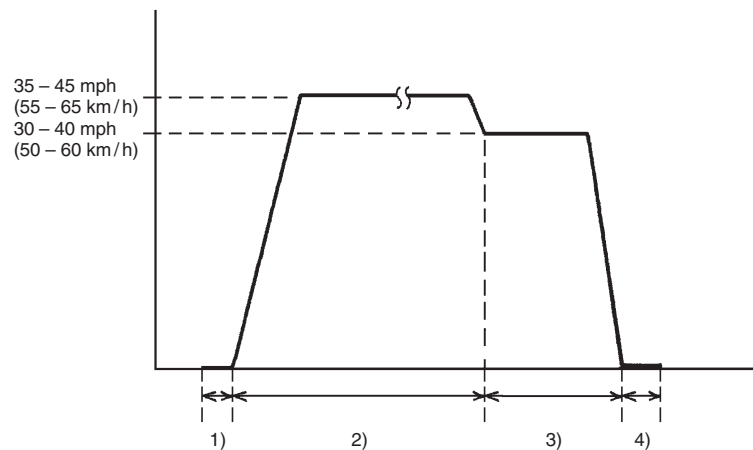
2) Start engine and drive vehicle at 35 – 45 mph, 55 – 65 km/h for 8 min. or longer.

While this driving, if “Catalyst Monitoring TEST COMPLETED” is displayed in “READINESS TESTS” mode and DTC is not displayed in “DTC” mode, confirmation test is completed.

If “TEST NOT COMPLTD” is still being displayed, continue test driving.

3) Decrease vehicle speed at 30 – 40 mph, 50 – 60 km/h, and hold throttle valve at that opening position for 2 min. and confirm that short term fuel trim vary within -20% – $+20\%$ range.

4) Stop vehicle (do not turn ignition switch OFF) and confirm test results according to following “Test Result Confirmation Flow Table”.

**Test Result Confirmation Flow Table**

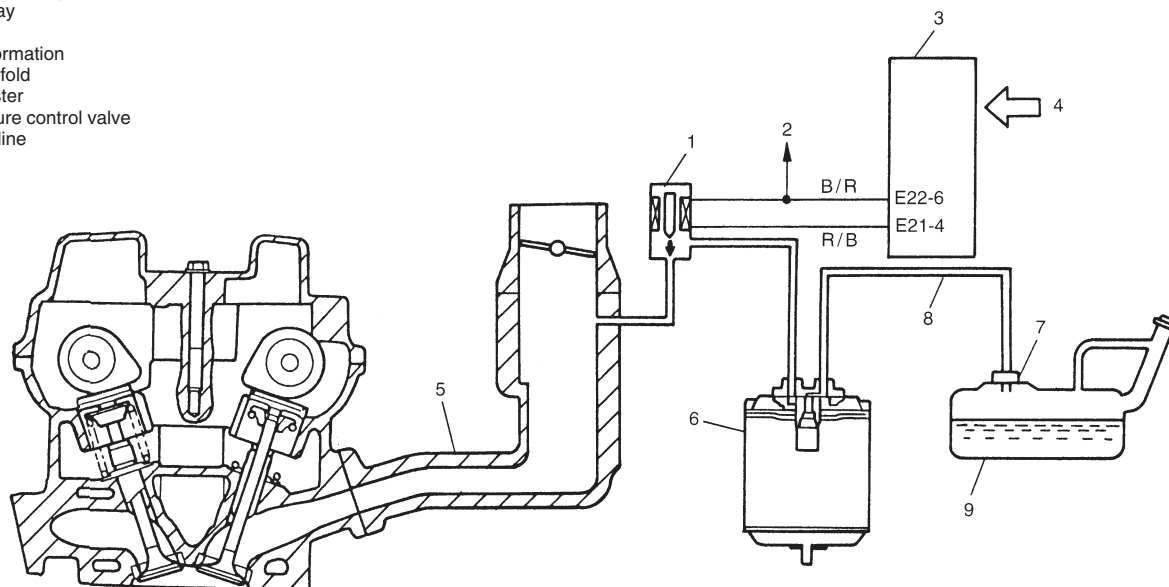
STEP	ACTION	YES	NO
1	Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode. Is DTC or pending DTC displayed?	Proceed to applicable DTC Diag. Flow Table.	Go to Step 2.
2	Set scan tool to “READINESS TESTS” mode and check if testing has been completed. Is test completed?	No DTC is detected (confirmation test is completed).	Repeat DTC confirmation procedure.

DTC P0420**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Short Term Fuel Trim. Did short term fuel trim vary within -20% $-+20\%$ range in step 3) of DTC confirmation test?	Go to Step 3.	Check fuel system. Go to DTC P0171/P0172 Diag. Flow Table.
3	Check HO2S-2 for Output Voltage. Perform steps 1) through 9) of DTC confirmation procedure for DTC P0136 (HO2S-2 malfunction) and check output voltage of HO2S-2 then. Is over 0.6 V and below 0.3 V indicated?	Replace three way catalytic converter.	Check "BI" and "Br/W" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-2.

DTC P0443 PURGE CONTROL VALVE CIRCUIT MALFUNCTION**CIRCUIT DESCRIPTION**

1. EVAP canister purge valve
2. To main relay
3. ECM
4. Sensed information
5. Intake manifold
6. EVAP canister
7. Tank pressure control valve
8. Fuel vapor line
9. Fuel tank



DTC DETECTING CONDITION	POSSIBLE CAUSE
Canister Purge control valve circuit is opened or shorted.	<ul style="list-style-type: none"> ● "R/B" circuit open or short ● "B/R" wire open ● Canister purge valve malfunction

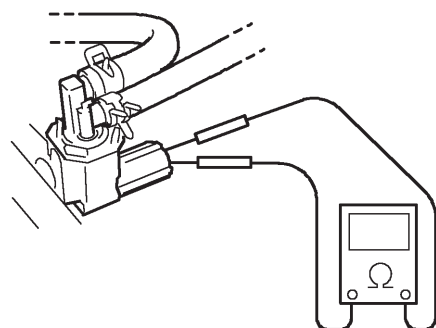
DTC CONFIRMATION PROCEDURE

- 1) Clear DTC with ignition switch ON.
- 2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Check EVAP canister purge valve operation 1) With ignition switch OFF, disconnect coupler from canister purge valve. 2) Check resistance of EVAP canister purge valve. Resistance between two terminals : 30 – 34 Ω at 20°C (68°F) Resistance between terminal and body : 1M Ω or higher Is it as specified?	"R/B" circuit open or short, "B/R" circuit open, poor EVAP canister purge valve coupler connection.	Replace EVAP canister purge valve.

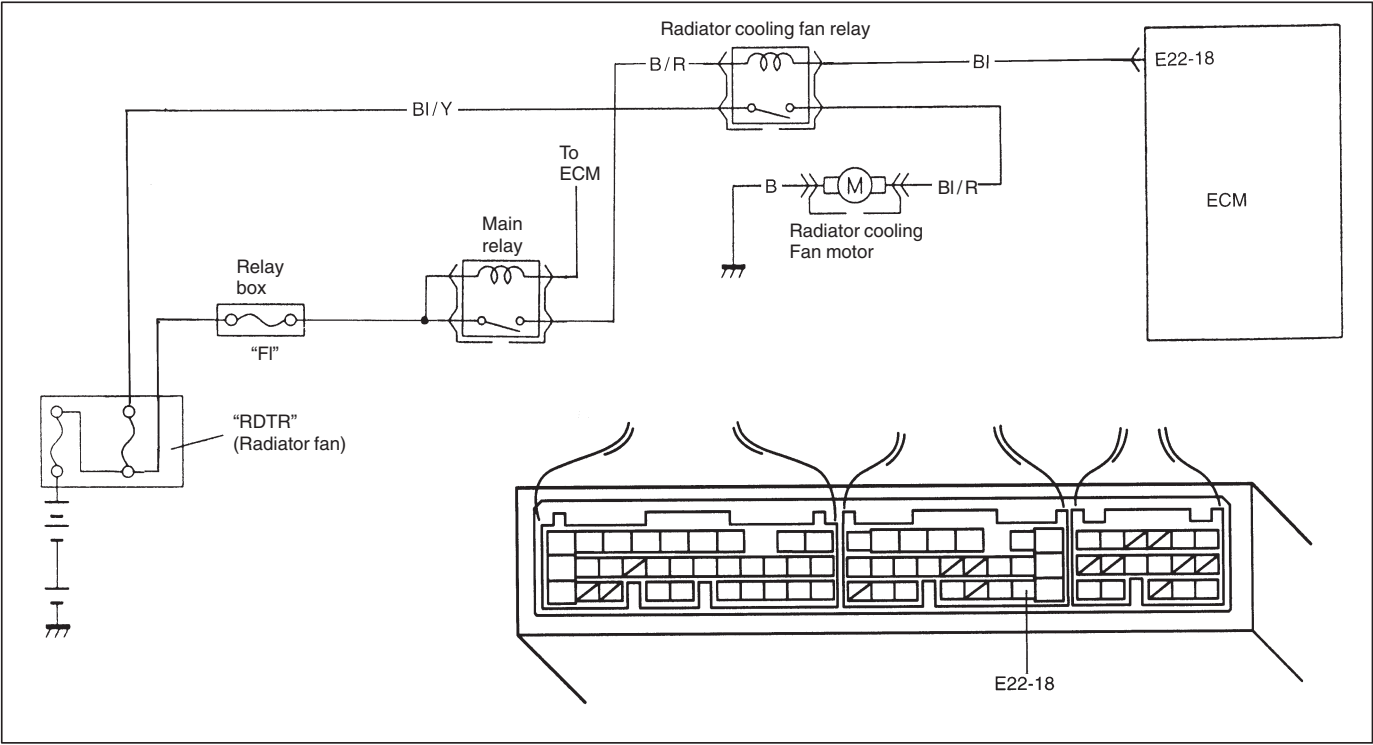
Fig. 1 for Step 1



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DTC P0480 RADIATOR COOLING FAN CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">● Low voltage at terminal E22-18 when engine coolant temp. is below 93°C, 200°F. 2 driving cycle detection logic, continuous monitoring.	<ul style="list-style-type: none">● “B/R” or “BI” circuit open or short● Radiator cooling fan relay malfunction● ECM malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Warm up engine until radiator cooling fan starts to operate.
- 4) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

DTC P0480**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Radiator Cooling Fan Relay and Its Circuit. 1) Turn ignition switch ON. 2) Check for voltage at terminal E22-18 of ECM connector connected, under following condition. See Fig. 1. When engine coolant temp. is lower than 93°C, 200°F and A/C switch turns OFF: 10 – 14 V Is voltage as specified?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check Radiator Cooling Fan Control Relay. 1) Turn ignition switch OFF and remove radiator cooling fan relay. 2) Check for proper connection to the relay at "B/R" and "BI" wire terminals. 3) If OK, then measure resistance between terminals a and b. See Fig. 2 and 3. Is it 100 – 150 Ω?	"B/R" or "BI" circuit open or short. If wires and connections are OK, substitute a known-good ECM and recheck.	Replace radiator cooling fan relay.

Fig. 1 for Step 2

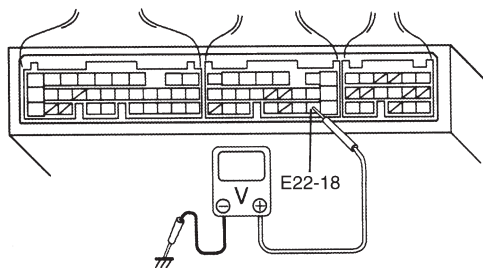


Fig. 2 for Step 3

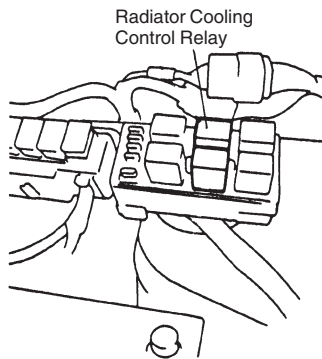
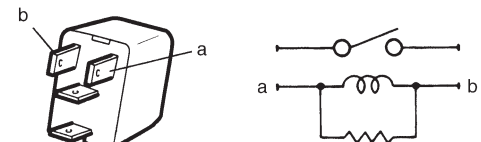
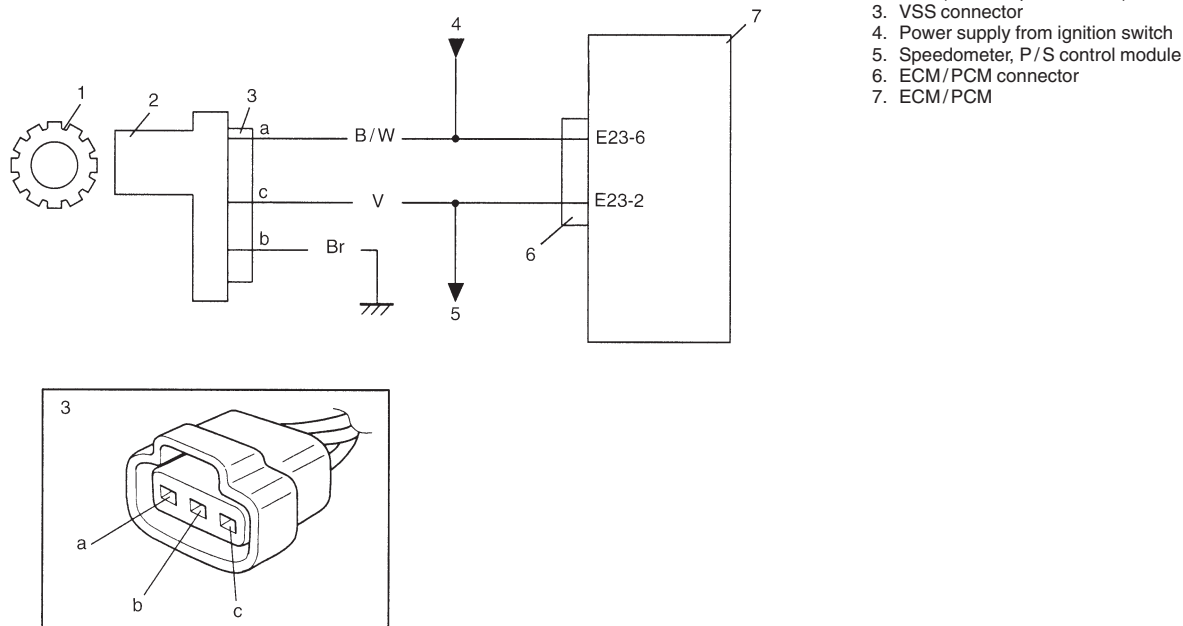


Fig. 3 for Step 3



DTC P0500 (DTC NO.16) VEHICLE SPEED SENSOR (VSS) MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> ● VSS signal not inputted while vehicle running in “D” range or during fuel cut at deceleration. 2 driving cycle detection logic, continuous monitoring 	<ul style="list-style-type: none"> ● “Br” circuit open ● “V” or “B/W” circuit open or short ● VSS (speedometer driven gear) malfunction ● ECM malfunction ● Speedometer malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

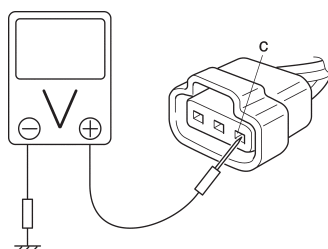
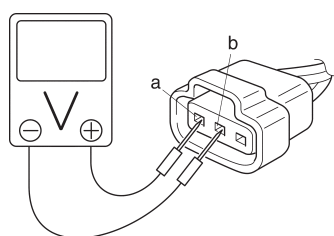
- 1) Clear DTC and warm up engine to normal operating temperature.
- 2) Increase vehicle speed to 50 mph, 80 km/h in 3rd gear or “2” range while observing vehicle speed displayed on scan tool.
- 3) Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) for 4 sec. or more.
- 4) Check pending DTC and DTC.

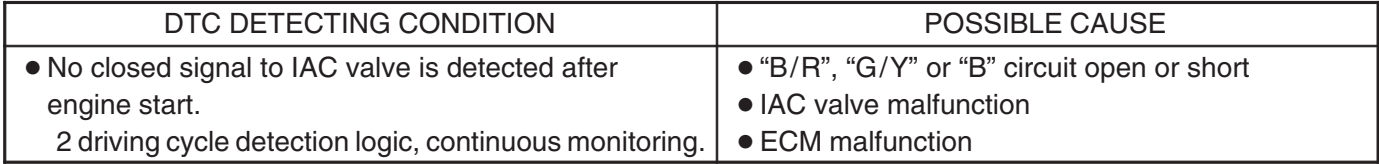
DTC P0500**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Does speedometer indicate vehicle speed?	Go to Step 3.	Go to Step 5.
3	Check Vehicle Speed Signal. Is vehicle speed displayed on scan tool in step 2) and 3) of DTC confirmation procedure?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 4.
4	1) Turn ignition switch to OFF position. 2) Disconnect combination meter connectors. Refer to Section 8C. 3) Disconnect P/S control module connector (if equipped). 4) Turn ignition switch to ON position, without running engine. 5) Measure voltage from terminal "c" of VSS connector to ground. Is voltage within 4 – 5 V?	Faulty speedometer. Faulty P/S control module.	"V" wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
5	1) With ignition switch at OFF position, disconnect VSS connector. 2) Turn ignition switch to ON position, without running engine. 3) Measure voltage from terminal "a" to "b" of VSS connector. Is voltage within 10 – 14 V?	Go to Step 6.	"B/W" or "Br" wire open or short.
6	1) Measure voltage from terminal "c" of VSS connector to ground. Is voltage more than 4 V?	Go to Step 7.	"V" wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
7	1) Remove VSS. 2) Visually inspect VSS sensor signal rotor for damage. Was any damage found?	Faulty VSS signal rotor.	Poor connection of VSS connector terminal. If OK, substitute a known-good VSS and recheck.

Fig. 1 for Step 5

Fig. 2 for Step 4 and Step 6





- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Start engine and run it at idle for 1 min.
- 4) Check DTC and pending DTC.

DTC P0505**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	<p>Check Idle Air Control System.</p> <p>When using SUZUKI scan tool:</p> <ol style="list-style-type: none"> 1) Connect SUZUKI scan tool to DLC with ignition switch OFF, set parking brake and block drive wheels. 2) Warm up engine to normal operating temperature. 3) Clear DTC and select "MISC TEST" mode on SUZUKI scan tool. See Fig. 1. <p>Is it possible to control (increase and reduce) engine idle speed by using SUZUKI scan tool?</p> <p>When not using SUZUKI scan tool:</p> <ol style="list-style-type: none"> 1) Remove IAC valve from throttle body referring to "IAC Valve Removal" in Section 6E. 2) Check IAC valve for operation referring to "IAC Valve Inspection" in Section 6E. See Fig. 2. <p>Is check result satisfactory?</p>	<p>Intermittent trouble or faulty ECM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p>	Go to Step 3.
3	<p>Check Wire Harness for Open and Short.</p> <ol style="list-style-type: none"> 1) Turn ignition switch OFF. 2) Disconnect IAC valve connector. 3) Check for proper connection to IAC valve at each terminals. 4) If OK, disconnect ECM connector. 5) Check for proper connection to ECM at E21-6 terminal. 6) If OK, check "B/R", "G/Y" and "B" circuit for open and short. <p>Are they in good condition?</p>	Replace IAC valve and recheck.	Repair or replace.

Fig. 1 for Step 2

When using SUZUKI scan tool:

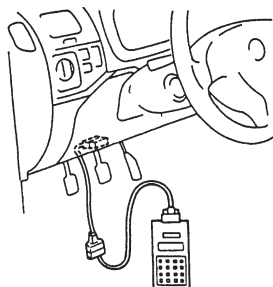
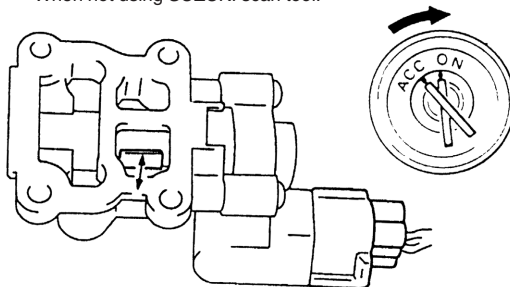


Fig. 2 for Step 2

When not using SUZUKI scan tool:



DTC P0601 INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR

DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC P0601: Data write error (or check sum error) when written into ECM 2 driving cycle detection logic, continuous monitoring.	ECM

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON and then turn ignition switch OFF.
- 3) Start engine and run it at idle if possible.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

INSPECTION

Substitute a known-good ECM and recheck.

DTC P1450 BAROMETRIC PRESSURE SENSOR LOW/HIGH (DTC No.29) INPUT

DTC P1451 BAROMETRIC PRESSURE SENSOR PERFORMANCE PROBLEM

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Barometric pressure sensor is installed in ECM.

DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC P1450: <ul style="list-style-type: none"> Barometric pressure: 136 kPa 1025 mmHg or higher, or 33 kPa 250 mmHg or lower 	<ul style="list-style-type: none"> ECM (barometric pressure sensor) malfunction
DTC P1451: <ul style="list-style-type: none"> Vehicle stopped Engine cranking Difference between barometric pressure and intake manifold absolute pressure is 26 kPa, 200 mmHg or more 2 driving cycle detection logic, monitoring once/1 driving.	<ul style="list-style-type: none"> Manifold absolute pressure sensor and its circuit malfunction ECM (barometric pressure sensor) malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Turn ignition switch ON for 2 sec., crank engine for 2 sec. and run it at idle for 1 min.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

INSPECTION

DTC P1450:

Substitute a known-good ECM and recheck.

DTC P1451:

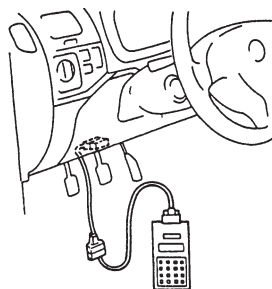
NOTE:

Note that atmospheric pressure varies depending on weather conditions as well as altitude. Take that into consideration when performing these check.

STEP	ACTION	YES	NO
1	1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and select "DATA LIST" mode on scan tool. 3) Check manifold absolute pressure. See Fig. 1. Is it barometric pressure (approx. 100 kPa, 760 mmHg) at sea level?	Substitute a known-good ECM and recheck.	Go to Step 2.

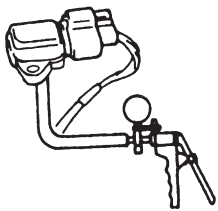
Fig. 1 for Step 1

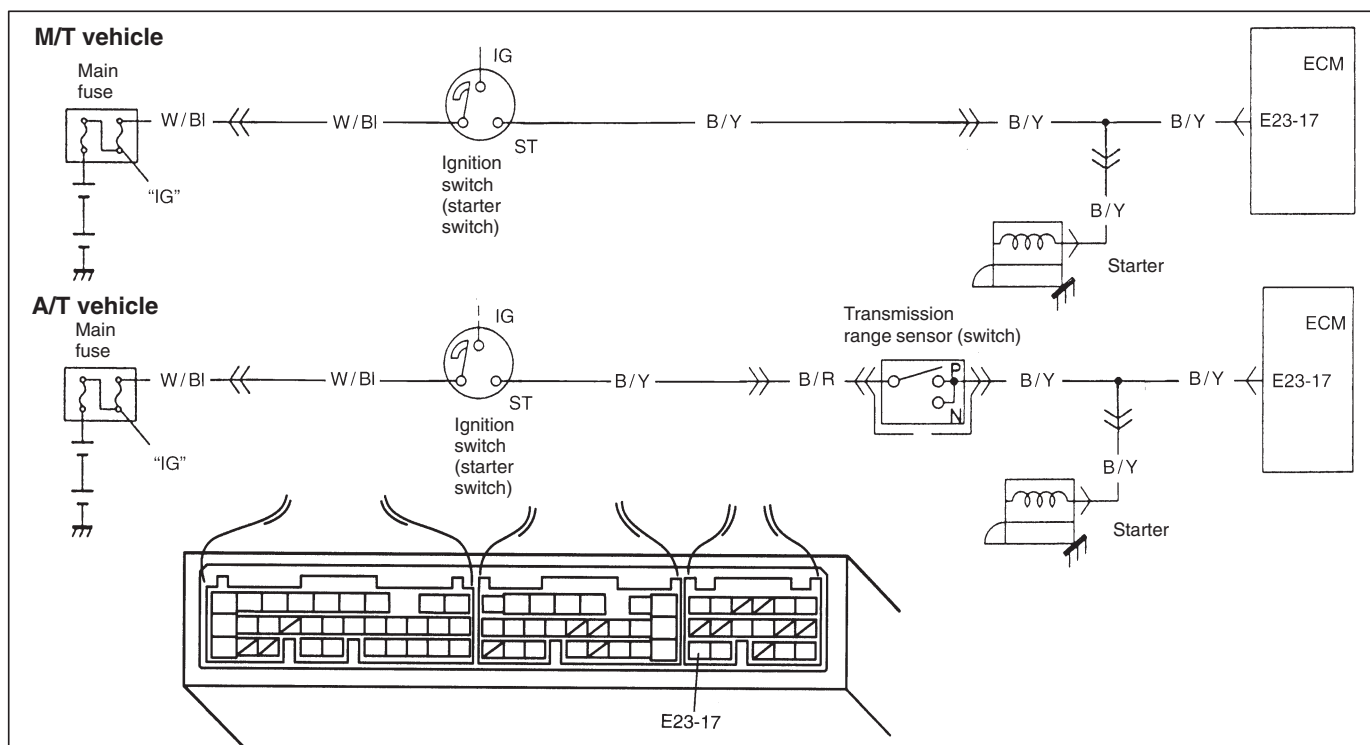
When using SUZUKI scan tool:



STEP	ACTION	YES	NO								
2	<p>Check MAP Sensor</p> <p>1) Remove MAP sensor from intake manifold and connect vacuum pump gauge to MAP sensor. See Fig. 2.</p> <p>2) Connect scan tool to DLC and turn ignition switch ON.</p> <p>3) Check intake manifold absolute pressure displayed on scan tool under following conditions.</p> <table><tr><th>Applying Vacuum</th><th>Displayed Value on Scan Tool</th></tr><tr><td>0</td><td>Barometric pressure (Approx. 100 kPa, 760 mmHg)</td></tr><tr><td>27 kPa 200 mmHg</td><td>Barometric pressure –27 kPa (Approx. 73 kPa, 560 mmHg)</td></tr><tr><td>67 kPa 500 mmHg</td><td>Barometric pressure –67 kPa (Approx. 33 kPa, 260 mmHg)</td></tr></table> <p>Is check result satisfactory?</p>	Applying Vacuum	Displayed Value on Scan Tool	0	Barometric pressure (Approx. 100 kPa, 760 mmHg)	27 kPa 200 mmHg	Barometric pressure –27 kPa (Approx. 73 kPa, 560 mmHg)	67 kPa 500 mmHg	Barometric pressure –67 kPa (Approx. 33 kPa, 260 mmHg)	<p>Check air intake system for air being drawn in and engine compression.</p> <p>If OK, then substitute a known-good ECM and recheck.</p>	<p>Replace MAP sensor.</p>
Applying Vacuum	Displayed Value on Scan Tool										
0	Barometric pressure (Approx. 100 kPa, 760 mmHg)										
27 kPa 200 mmHg	Barometric pressure –27 kPa (Approx. 73 kPa, 560 mmHg)										
67 kPa 500 mmHg	Barometric pressure –67 kPa (Approx. 33 kPa, 260 mmHg)										

Fig. 2 for Step 2



DTC P1500 ENGINE STARTER SIGNAL CIRCUIT MALFUNCTION**CIRCUIT DESCRIPTION**

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Low voltage at terminal E23-17 when cranking engine or • High voltage at terminal E23-17 after starting engine. 2 driving cycle detection logic, continuous monitoring.	<ul style="list-style-type: none"> • "B/Y" circuit open • ECM malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON, crank engine and run it at idle for 3 min.
- 3) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

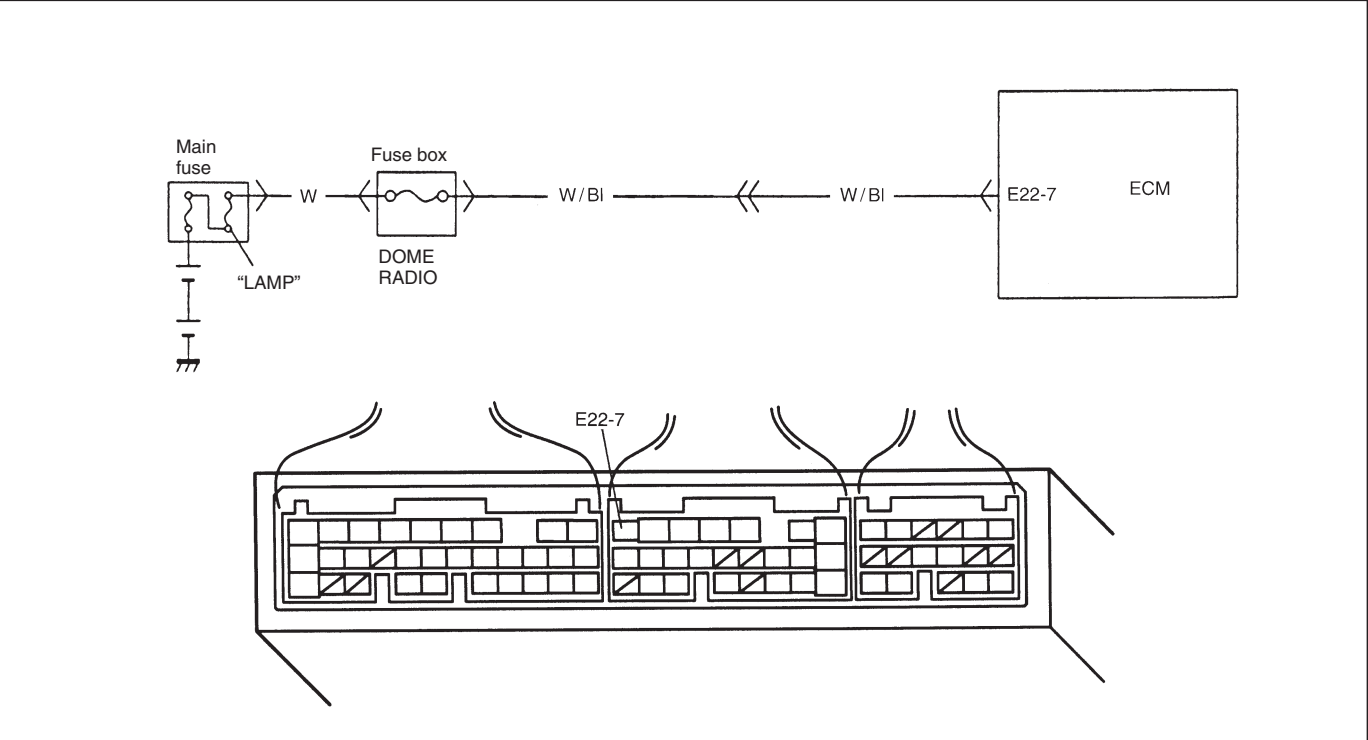
INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check for voltage at terminal E23-17 of ECM connector connected, under following condition. While engine cranking : 6 – 10 V After starting engine : 0 V Is voltage as specified?	Poor E23-17 connection or intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If wire and connections are OK, substitute a known-good ECM and recheck.	"B/Y" circuit open.

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DTC P1510 ECM BACK-UP POWER SUPPLY MALFUNCTION

CIRCUIT DESCRIPTION



Battery voltage is supplied so that diagnostic trouble code memory, values for engine control learned by ECM, etc. are kept in ECM even when the ignition switch is turned OFF.

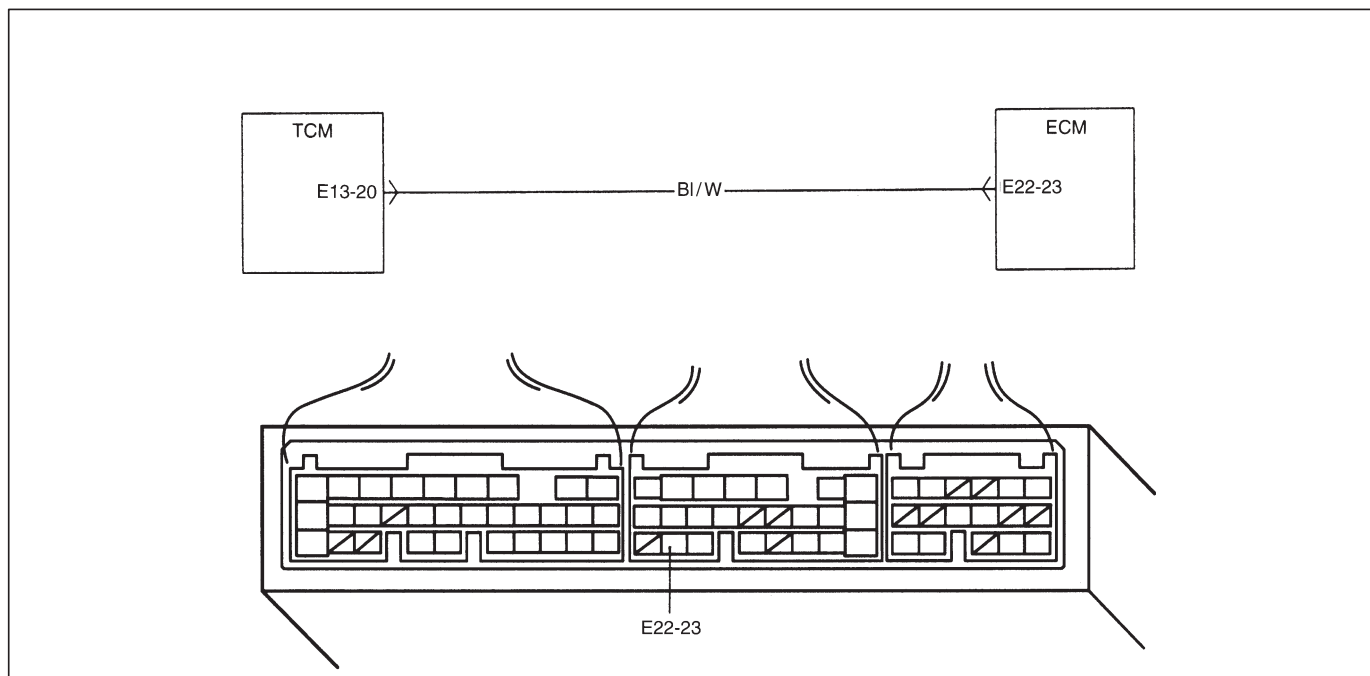
DTC DETECTING CONDITION	POSSIBLE CAUSE
● Low voltage at terminal E22-7 after starting engine.	● “W/BI” circuit open ● ECM malfunction

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and run it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Check for voltage at terminal E22-7 of ECM connector connected, under each condition, ignition switch OFF and engine running. Is it 10 – 14 V at each condition?	Poor E22-7 connection or intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A. If wire and connections are OK, substitute a known- good ECM and recheck.	“W/BI” circuit open.

DTC P1600 SERIAL COMMUNICATION PROBLEM BETWEEN ECM AND TCM**CIRCUIT DESCRIPTION**

The serial data line is pulled up to about 12 V by ECM and TCM transmits information to ECM through it by controlling its grounding.

TCM constantly sends information while ignition switch is ON as to whether judgement was made or not with respect to all detectable DTCs as well as whether or not abnormality exists after judgement.

DTC DETECTING CONDITION	POSSIBLE CAUSE
No signal inputted from TCM to ECM or check sum error while engine running	<ul style="list-style-type: none"> ● "BI/W" circuit open or short ● TCM power or ground circuit open. ● TCM malfunction ● ECM malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Start engine and run it at idle for 1 min.
- 4) Select "DTC" mode on scan tool and check DTC.

DTC P1600**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check signal voltage. Check voltage between terminal E22-23 and body ground with ignition switch ON. Does it change between 0 – 12 V? See Fig. 1.	Intermittent trouble or faulty ECM or TCM. Check for intermittent trouble referring to "Intermittent and poor connection" in Section 0A.	Go to Step 3.
3	Is it about 12 V at Step 2?	"BI/W" wire open, poor E13-20 connection or TCM power or ground circuit open. If wires and connections are OK, substitute a known-good TCM and recheck.	Go to Step 4.
4	Check signal circuit. 1) Disconnect TCM coupler with ignition switch OFF. 2) Check voltage between E13-20 terminal and body ground with ignition switch ON. See Fig. 2. Is it about 12 V?	Check TCM power and ground circuit for open. If OK, substitute a known-good TCM and recheck.	"BI/W" wire shorted to ground or poor E22-23 terminal connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. 1 for Step 1

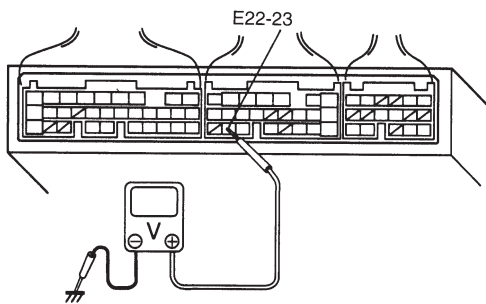
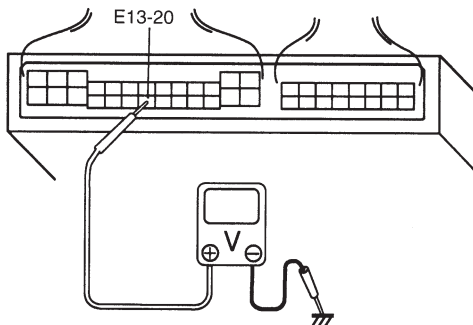
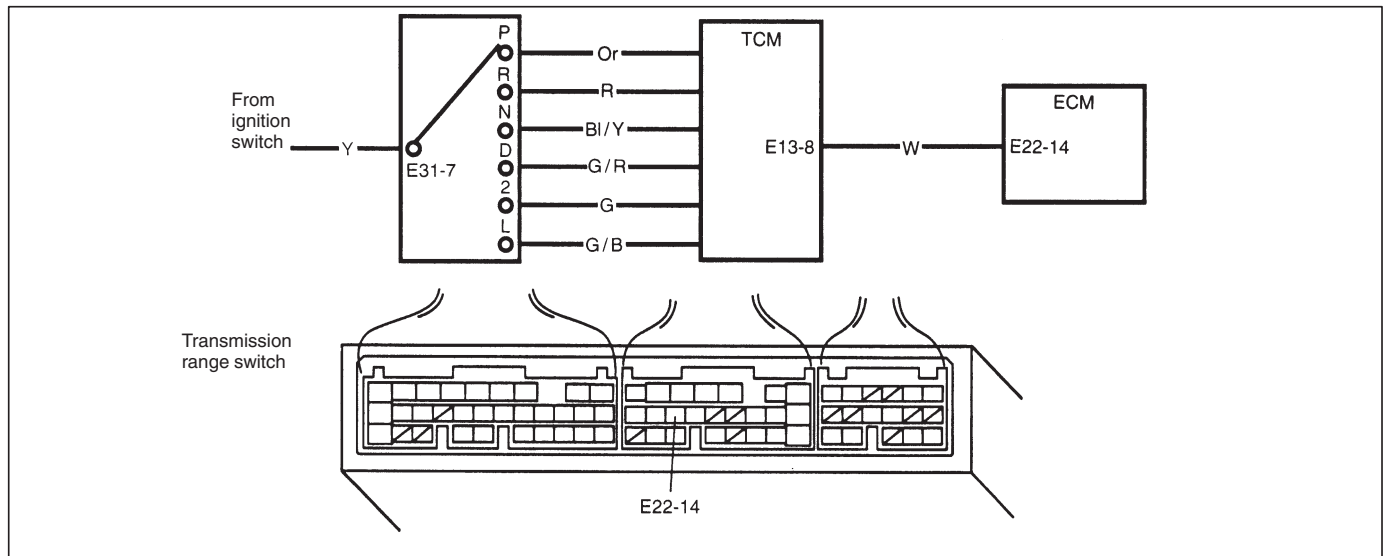


Fig. 2 for Step 4



DTC P1717 A/T DRIVE RANGE (PARK/NEUTRAL POSITION) SIGNAL CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • “D” range signal not inputted (Park/Neutral position signal inputted) to ECM while vehicle running <p>2 driving cycle detection logic, Continuous monitoring.</p>	<ul style="list-style-type: none"> • “W” circuit open • Transmission range switch malfunction • “R”, “D”, “2” or “L” range signal circuit open • TCM power or ground circuit open • TCM malfunction • ECM malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Start engine and shift selector lever to “D” range.
- 4) Increase vehicle speed to higher than 20 mph, 32 km/h and then stop vehicle.
- 5) Repeat above step 4) 9 times.
- 6) Shift selector lever to “2” range and repeat above step 4) and 5).
- 7) Shift selector lever to “L” range and repeat above step 4) and 5).
- 8) Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode.

DTC P1717**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	<p>Check PNP signal ("D" range signal). When using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. See Fig. 1. 2) Turn ignition switch ON and check PNP signal ("P/N" or "D" range) on display when shifting selector lever to each range.</p> <p>When not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminal E22-14 of ECM connector connected. See Fig. 2.</p> <p>Is "D" range on display (Is 0 – 1 V indicated) no matter which of "R", "D", "2" and "L" range positions selector lever may be at? See Fig. 3.</p>	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and poor connection" in Section 0A.	Go to Step 3.
3	Is "P/N" range on display (Is 10 – 14 V indicated) when selector lever is at one of "R", "D", "2" and "L" range positions only? See Fig. 3.	Check transmission range switch and circuits referring to section 7B.	Go to Step 4.
4	<p>Check PNP signal circuit. 1) Turn ignition switch OFF. 2) Disconnect TCM connectors. 3) Check for proper connection to TCM at terminal E13-8. 4) If OK, then check voltage at terminal E13-8 in TCM connector disconnected, with ignition switch ON. Is it 10 – 14 V? See Fig. 4</p>	"Y" circuit open, poor E31-7 connection, select cable maladjusted, transmission range sensor maladjusted or transmission range sensor malfunction. If all above are OK, substitute a known-good TCM and recheck.	"W" circuit open or poor E22-14 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. 1 for Step 2

When using SUZUKI scan tool:

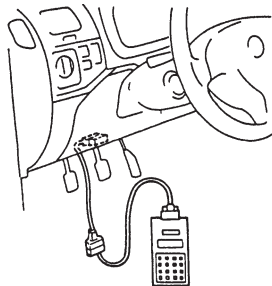


Fig. 2 for Step 2

When not using SUZUKI scan tool:

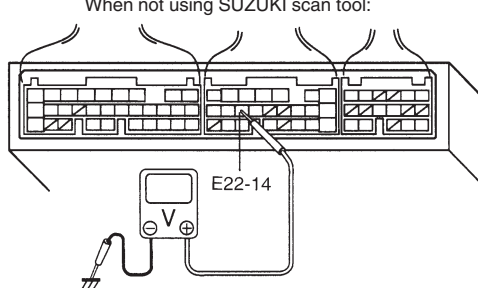


Fig. 3 for Step 2 and 3

Scan tool or voltmeter Selector lever position	SUZUKI SCAN TOOL DISPLAY	VOLTAGE AT E22-14
"P" and "N" range	P/N range	10 – 14V
"R", "D", "2" and "L" range	D range	0 – 1V

Fig. 4 for Step 4

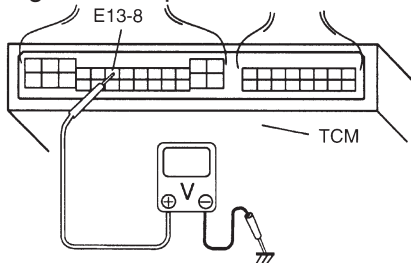
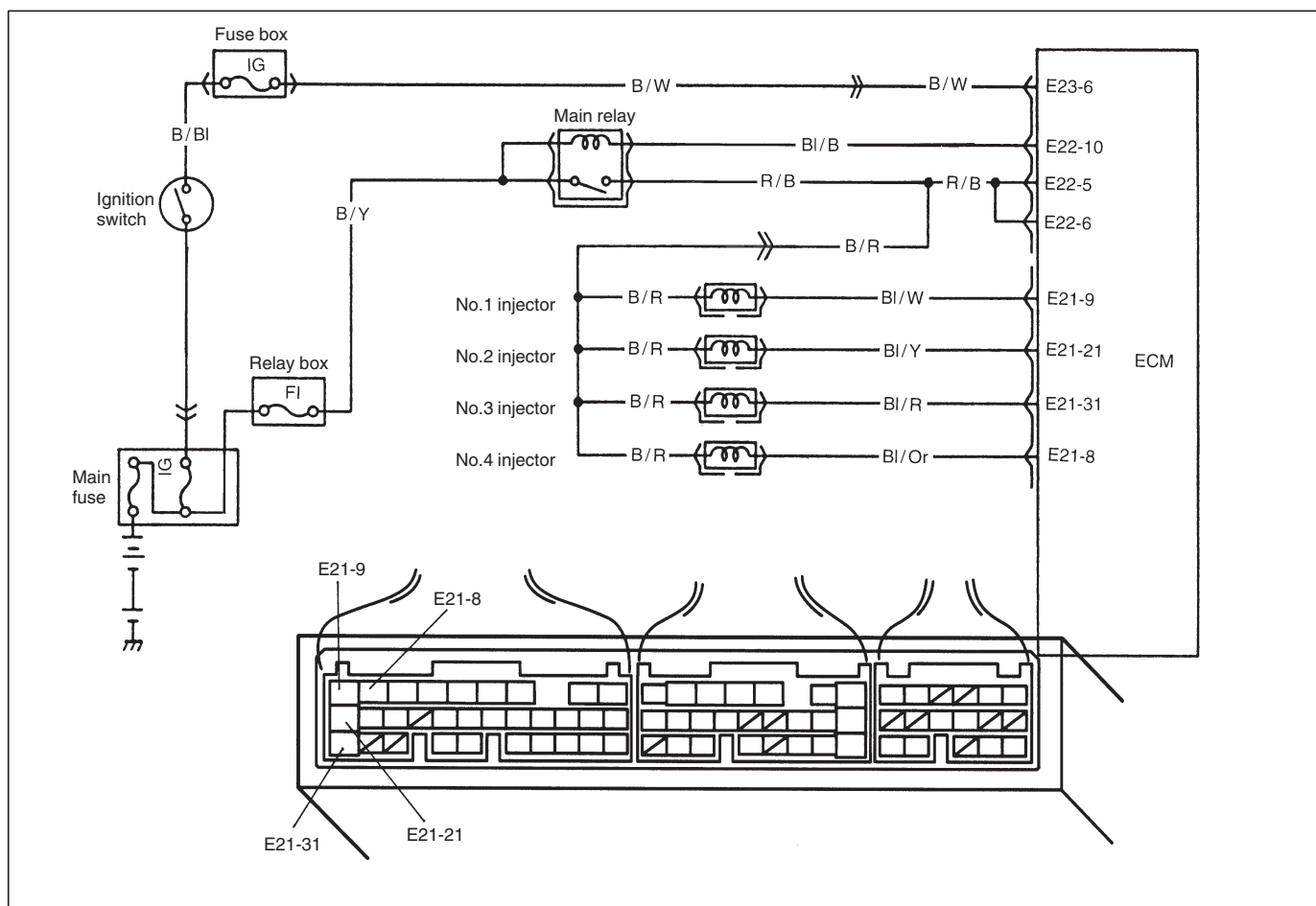
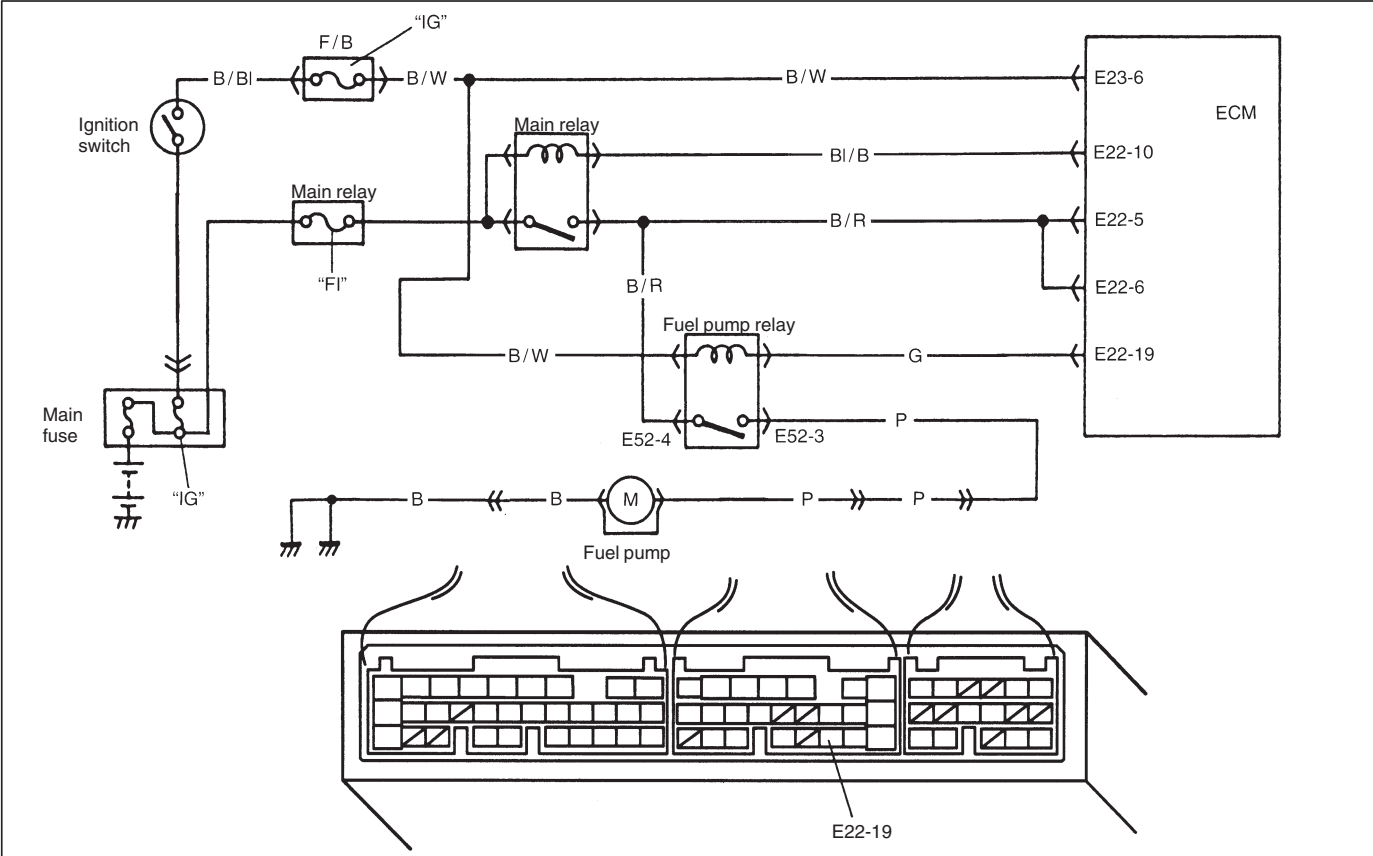


TABLE B-1 FUEL INJECTOR CIRCUIT CHECK**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Injector for Operating Sound. Using sound scope, check each injector for operating sound at engine cranking. Do all 4 injectors make operating sound?	Fuel injector circuit is in good condition.	Go to Step 3.
3	Dose none of 4 injectors make operating sound at Step 2?	Go to Step 4.	Check coupler connection and wire harness of injector not making operating sound and injector itself (Refer to Section 6E).
4	Check power circuit of injectors for open and short. Is it normal?	Check all 4 injectors for resistance respectively. If resistance is OK, substitute a known-good ECM and recheck.	Power circuit open or short.

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TABLE B-2 FUEL PUMP AND ITS CIRCUIT CHECK



INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Fuel Pump Control System for Operation. See Fig. 1. Is fuel pump heard to operate for 2 sec. after ignition switch ON?	Fuel pump circuit is in good condition.	Go to Step 3.
3	Check Fuel Pump for Operation. 1) Remove fuel pump relay from relay box with ignition switch OFF. 2) Check for proper connection to relay at each terminals. 3) If OK, using service wire, connect terminals E52-3 and E52-4 of relay connector. See Fig. 2. <div>CAUTION: Check to make sure that connection is made between correct terminals. Wrong connection can cause damage to ECM, wire harness, etc.</div> Is fuel pump heard to operate at ignition switch ON?	Go to Step 4.	"P", "B" or "B/R" circuit open or fuel pump malfunction.
4	Check Fuel Pump Relay for Operation. 1) Check resistance between each two terminals of fuel pump relay. See Fig.3. Between terminals "c" and "d": Infinity Between terminals "a" and "b": 100 – 150 Ω 2) Check that there is continuity between terminals "c" and "d" when battery is connected to terminals "a" and "b". See Fig. 3. Is fuel pump relay in good condition?	"G" circuit open or poor E22-19 connection. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace fuel pump relay.

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Fig. 1 for Step 2

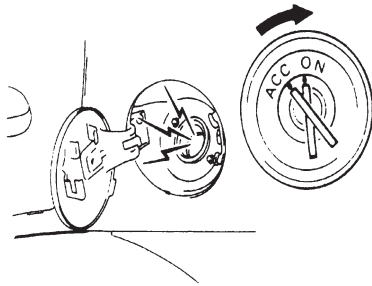


Fig. 2 for Step 3

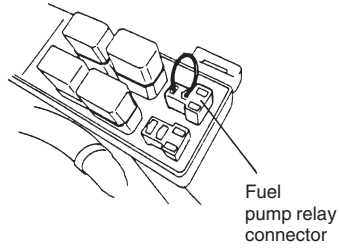
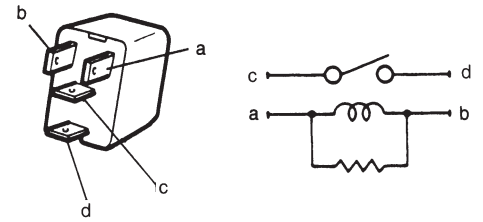
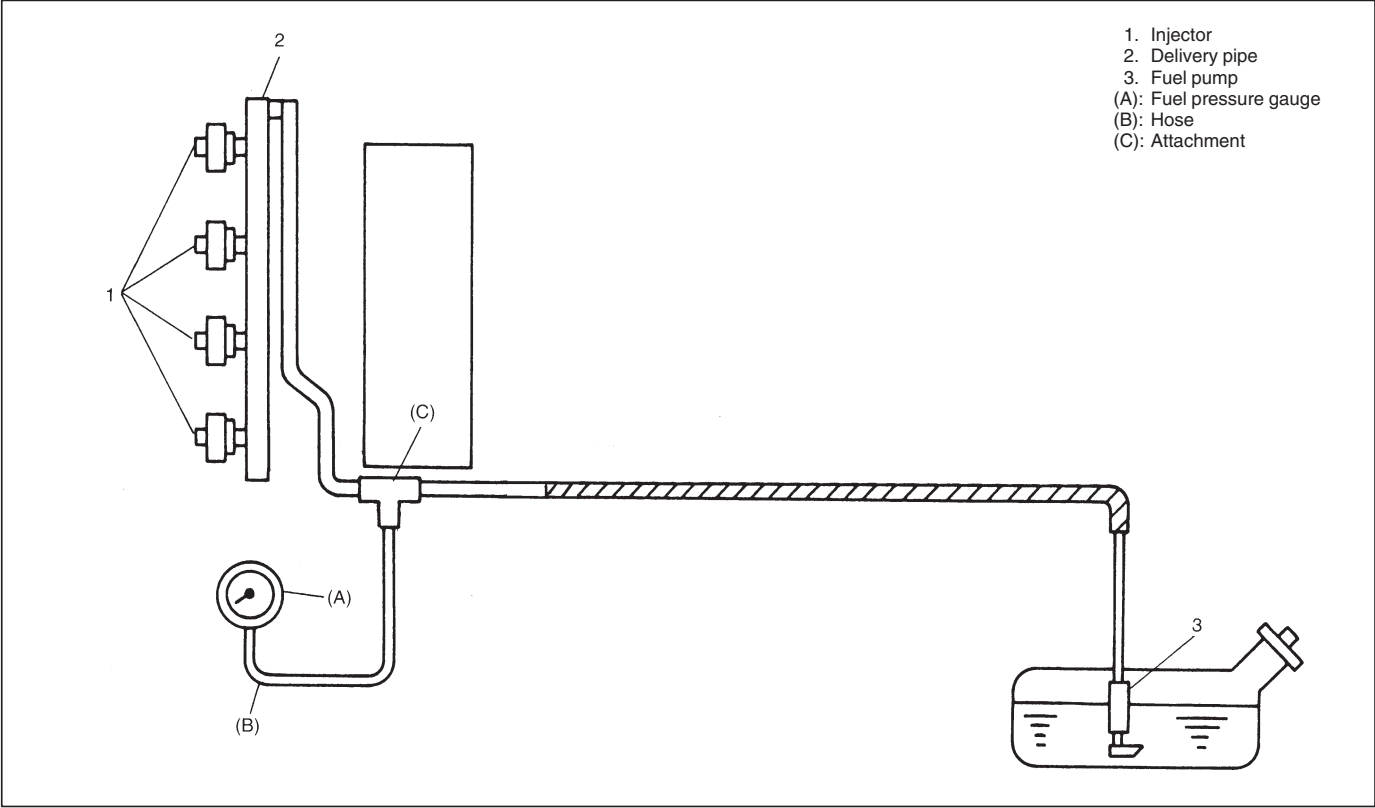


Fig. 3 for Step 4



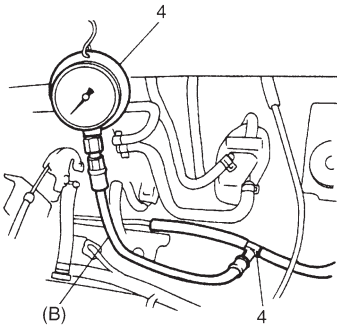


INSPECTION

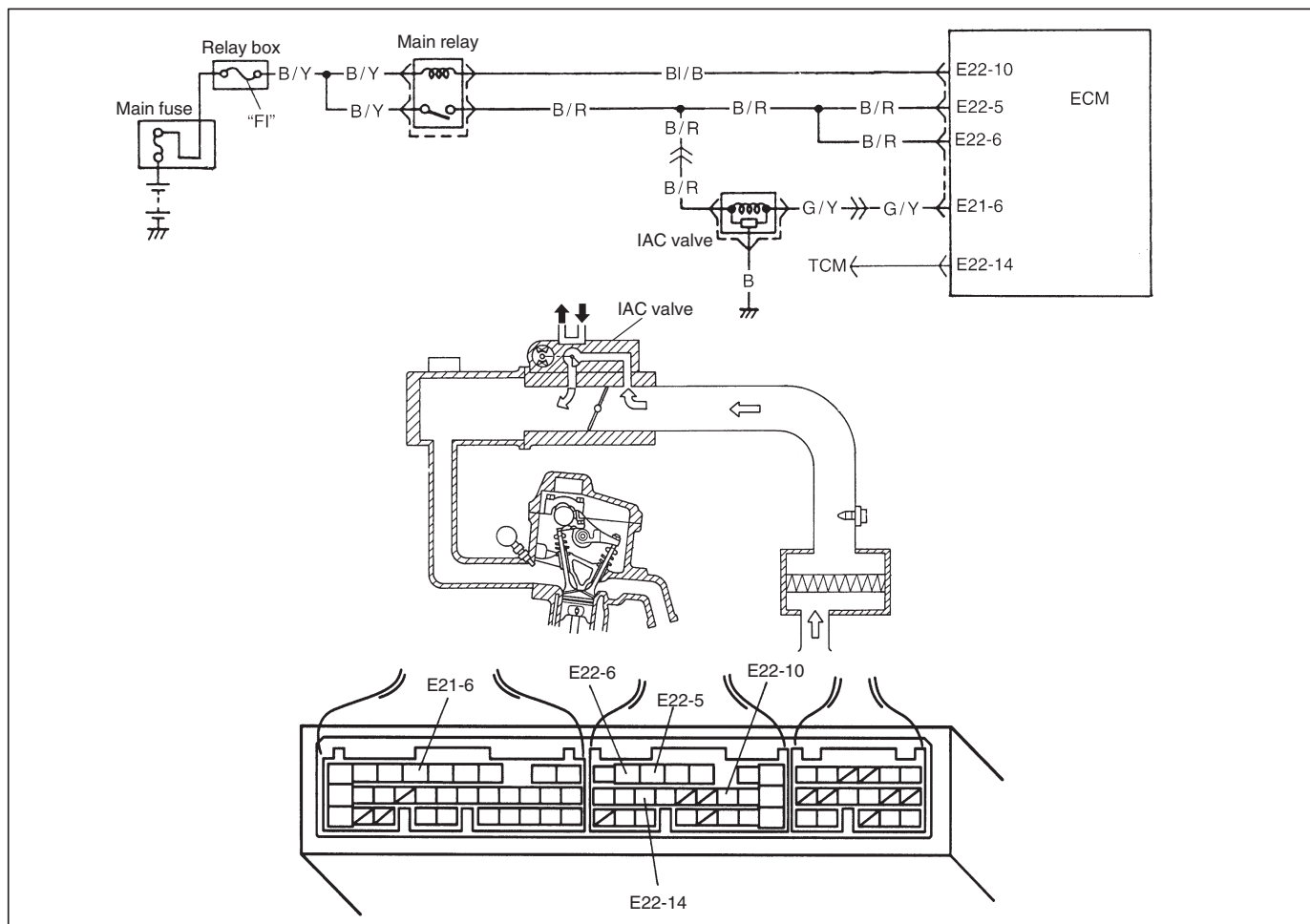
STEP	ACTION	YES	NO
1	Check Fuel Pressure (Refer to Section 6E for details). 1) Release fuel pressure from fuel feed line. 2) Install fuel pressure gauge. 3) Check fuel pressure by repeating ignition switch ON and OFF. See Fig. 1. Is fuel pressure within 270 – 310 kPa (2.7 – 3.1 kg/cm ² , 38.4 – 44.0 psi)?	Go to Step 2.	Go to Step 4.
2	Is 250 kPa (2.5 kg/cm ² , 35.6 psi) or higher fuel pressure retained for 1 minute after fuel pump is stopped at Step 1?	Normal fuel pressure.	Go to Step 3.
3	Is there fuel leakage from fuel feed line hose, pipe or their joint?	Fuel leakage from hose, pipe or joint.	Faulty fuel pressure regulator.
4	Was fuel pressure higher than spec. in Step 1?	Faulty fuel pressure regulator.	Clogged fuel filter, faulty fuel pressure regulator, Restricted fuel feed hose or pipe, Faulty fuel pump or Fuel leakage from hose connection in fuel tank.

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Fig. 1 for Step 1



4. Fuel pressure gauge & 3way joint

TABLE B-4 IDLE AIR CONTROL SYSTEM CHECK**INSPECTION**

STEP	ACTION	YES	NO
1	Check engine idle speed and IAC duty referring to "Idle Speed/IAC Duty Inspection" in Section 6E. Is idle speed within specification?	Go to Step 2.	Go to Step 4.
2	Is IAC duty within specification in Step 1?	Go to Step 3.	Check for followings: – Vacuum leak – EVAP canister purge control system – Clog of IAC air passage – Accessory engine load – Closed throttle position (TP sensor) – Stuck of PCV valve
3	Is engine idle speed kept specified speed even with headlight ON?	System is in good condition.	Check IAC system for operation referring to Step 2 of DTC P0505 Diag. Flow Table.
4	Was idle speed higher than specification in Step 1?	Go to Step 5.	Go to Step 8.
5	Check A/C (input) signal circuit referring to Step 1 of Table B-5 A/C Signal Circuit Check, if equipped. (A/C signal can be also checked by using SUZUKI scan tool.) Is it in good condition?	Go to Step 6.	Repair or replace A/C signal circuit or A/C system.

STEP	ACTION	YES	NO
6	Check IAC system referring to Step 2 of DTC P0505 Diag. Flow Table. Is check result satisfactory?	Go to Step 7.	Go to Step 3 of DTC P0505 Diag. Flow Table.
7	Was IAC duty less than about 3% (or more than about 97% for OFF duty meter) in Step 1 of this table?	Check abnormal air inhaling from air intake system, PCV valve and EVAP canister purge control system.	Check TP sensor (closed throttle position) and ECT sensor for performance. If sensors are OK, substitute a known-good ECM.
8	Check PNP signal ("D" range signal). When using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. See Fig. 1. 2) Turn ignition switch ON and check PNP signal ("P/N" and "D" range) on display when shifting selector lever to each range. When not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminal E22-14 of ECM connector connected. See Fig. 1. Is "D" range on display (Is 0 – 1 V indicated) no matter which of "R", "D", "2" and "L" range positions selector lever may be at? Is "P/N" range on display (Is 10 – 14 V indicated) when selector lever is at one of "R", "D", "2" and "L" range position only? See Fig. 2.	Go to Step 9.	Repair or replace.
9	Check IAC system referring to Step 2 of DTC P0505 Diag. Flow Table. Is check result satisfactory?	Go to Step 10.	Go to Step 3 of DTC P0505 Diag. Flow Table.
10	Was IAC duty more than about 30% or 40% (or less than 70% or 60% for OFF duty meter) in Step 1 of this table? NOTE: Duty value with () are applicable to vehicle used at high altitude (higher than 2000 m or 6560 ft).	Check parts or system which can cause engine low idle. – Accessory engine load – Clog of air passage – Etc.	Substitute a known-good ECM and recheck.

Fig. 1 for Step 8

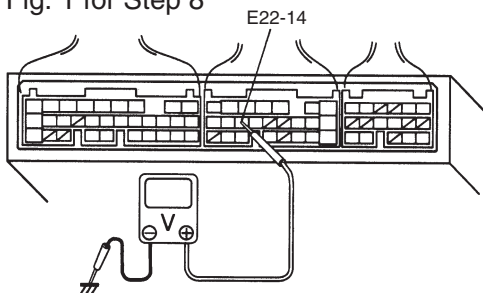
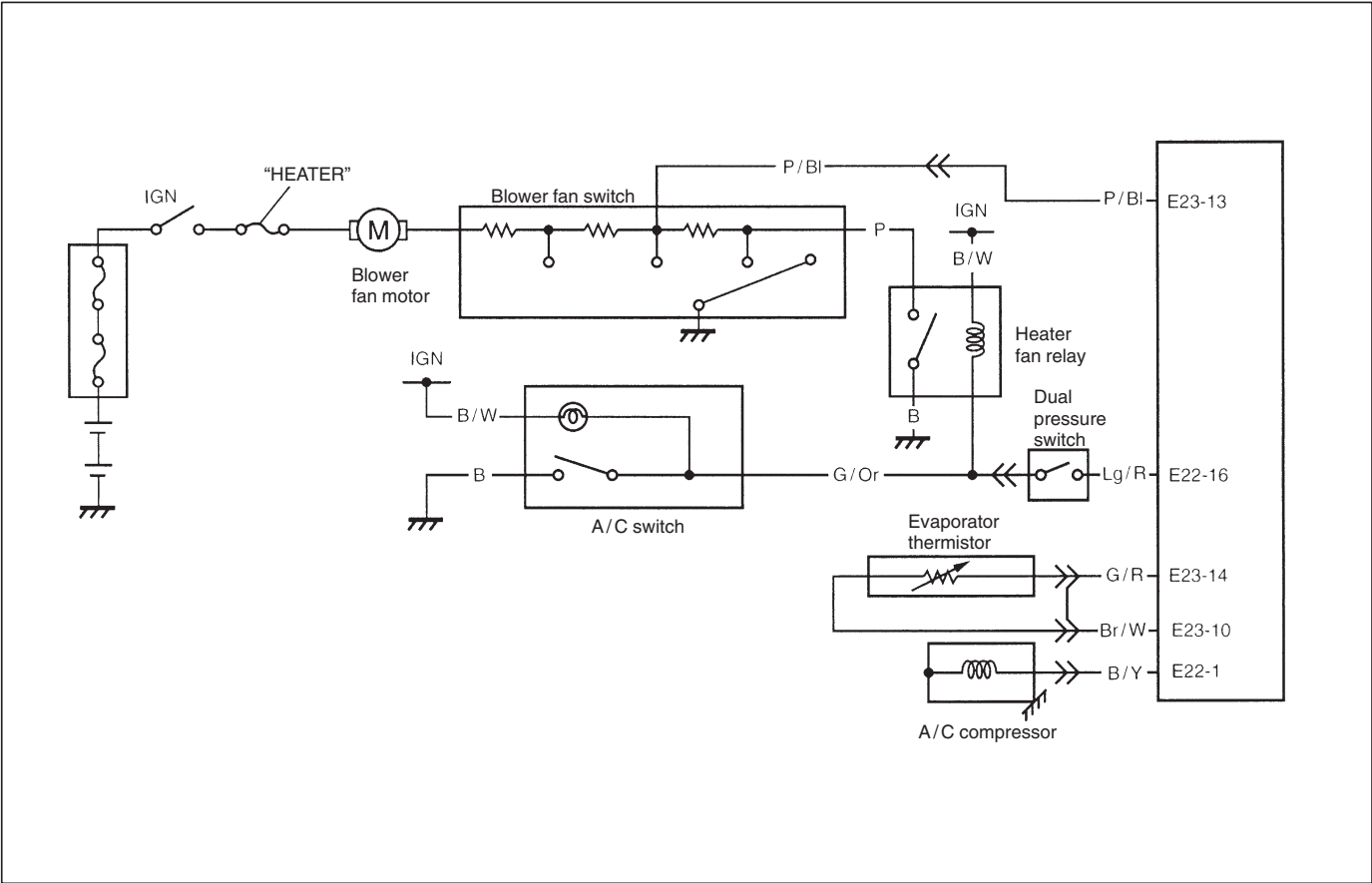


Fig. 2 for Step 8

Scan tool or voltmeter Selector lever position	SUZUKI SCAN TOOL DISPLAY	VOLTAGE AT E92-15
"P" and "N" range	P/N range	10 – 14V
"R", "D", "2" and "L" range	D range	0 – 1V

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TABLE B-5 A/C SIGNAL CIRCUITS CHECK (VEHICLE WITH A/C)

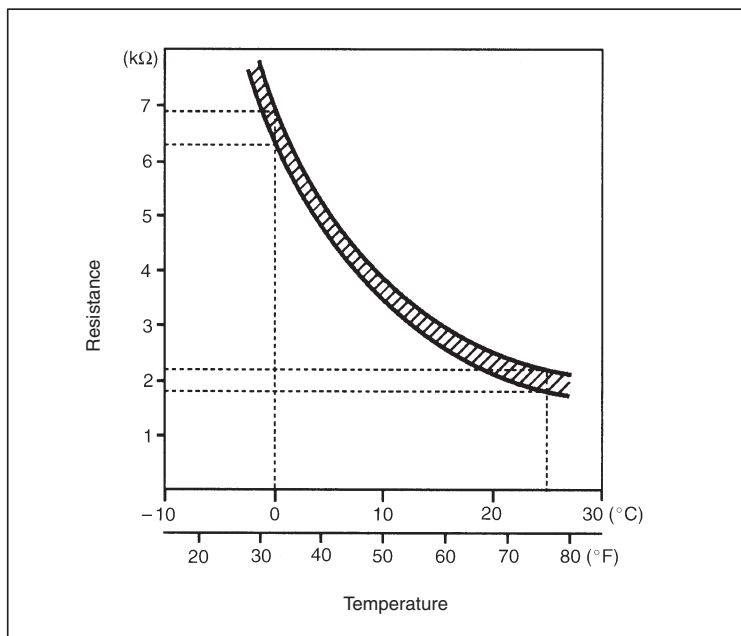


INSPECTION

STEP	ACTION	YES	NO				
1	1) Disconnect ECM connectors with ignition switch at OFF position. 2) Check resistance between E23-14 terminal and E23-10 terminal. 3) Is it within specification? Reference value. See Fig. 1. At 0°C 6.3 – 6.9 kΩ At 25°C 1.8 – 2.2 kΩ	Go to Step 2.	Faulty A/C evaporator thermistor or its circuit.				
2	1) Check voltage at E22-16 terminal under each condition given in table below. <table border="1"><tr><td>Ignition switch ON A/C switch OFF</td><td>10 – 14V</td></tr><tr><td>Ignition switch ON A/C switch ON</td><td>0 – 1V</td></tr></table> 2) Is check result satisfactory?	Ignition switch ON A/C switch OFF	10 – 14V	Ignition switch ON A/C switch ON	0 – 1V	Go to Step 3.	● “Lg/R” wire open or short ● Poor E22-16 terminal connection If wire and connection are OK, substitute a known-good ECM and recheck. Go to Step 3.
Ignition switch ON A/C switch OFF	10 – 14V						
Ignition switch ON A/C switch ON	0 – 1V						

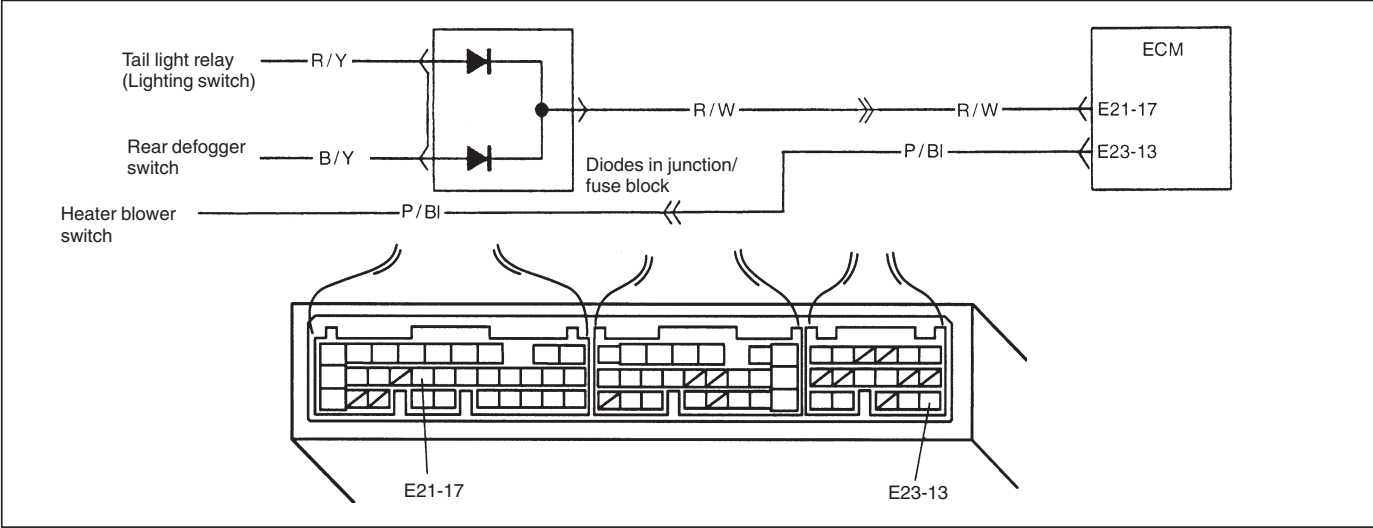
STEP	ACTION	YES	NO				
3	<div>1) Check voltage at E22-1 terminal under each condition given in table below.</div> <table><tr><td>While engine running, A/C switch OFF</td><td>0 V</td></tr><tr><td>While engine running, A/C switch ON</td><td>10 – 14V</td></tr></table> <div>NOTE: When A/C evaporator thermistor temp. is below 2.5°C (36.5°F), A/C remain OFF (E22-1 terminal voltage become 0 – 1 V). This condition is not abnormal.</div> <div>2) Is check result satisfactory?</div>	While engine running, A/C switch OFF	0 V	While engine running, A/C switch ON	10 – 14V	A/C control system circuits are in good condition.	<ul style="list-style-type: none">● “B/Y” wire open or short● Poor E22-1 terminal connection If wire and connection are OK, substitute a known-good ECM and recheck.
While engine running, A/C switch OFF	0 V						
While engine running, A/C switch ON	10 – 14V						

Fig. for Step 1



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TABLE B-6 ELECTRIC LOAD SIGNAL CIRCUIT CHECK



INSPECTION

STEP	ACTION	YES	NO
1	<p>Check Electric Load Signal Circuit.</p> <p>When using SUZUKI scan tool:</p> <p>1) Connect SUZUKI scan tool to DLC with ignition switch OFF.</p> <p>2) Start engine and select "DATA LIST" mode on scan tool.</p> <p>3) Check electric load signal under following each condition. See Fig. 1.</p> <p>Ignition switch ON, Small light, heater blower fan and rear defogger all turned OFF : OFF 0 V (E21-17) 10 – 14 V (E23-13)</p> <p>Ignition switch ON, Small light, heater blower fan or rear defogger turned ON : ON 10 – 14 V (E21-17) 0 V (E23-13)</p> <p>Is check result satisfactory?</p> <p>When not using SUZUKI scan tool:</p> <p>1) Turn ignition switch ON.</p> <p>2) Check voltage at each terminals E21-17 and E23-13 of ECM connector connected, under above each condition. See Fig. 2.</p> <p>Is each voltage as specified?</p>	Electric load signal circuit is in good condition.	"R/W" and/or "P/BI" circuit open or short, Electric load diodes malfunction or Each electric load circuit malfunction.

Fig. 1 for Step 1

When using SUZUKI scan tool:

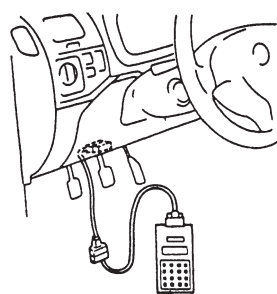


Fig. 2 for Step 1

When not using SUZUKI scan tool:

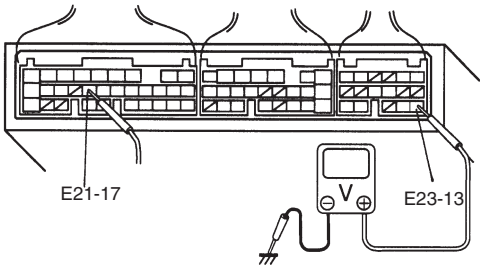
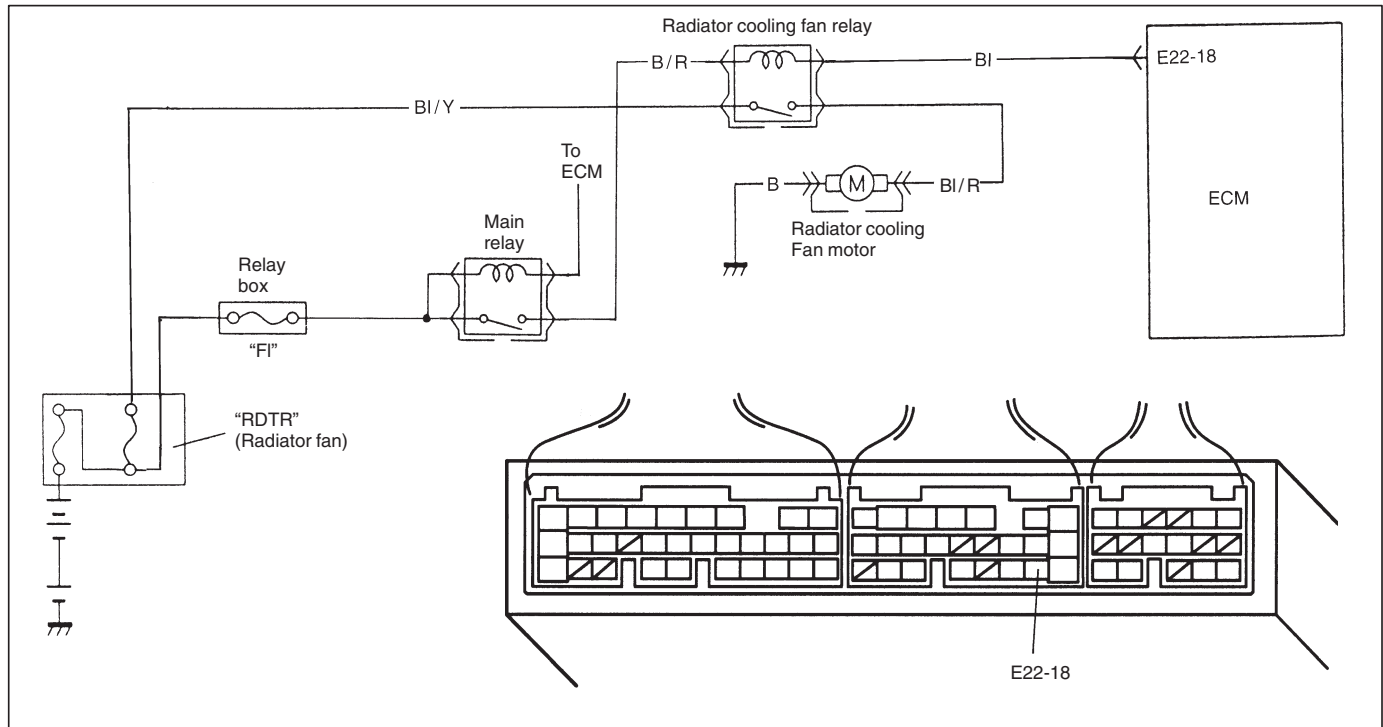


TABLE B-7 RADIATOR COOLING FAN CONTROL SYSTEM CHECK**INSPECTION**

STEP	ACTION	YES	NO
1	Check Fan Control System. 1) Connect scan tool to DLC with ignition switch OFF. 2) Start engine and select "DATA LIST" mode on scan tool. 3) Warm up engine until coolant temp. is 97.5°C, 208°F or higher and A/C switch turn OFF. (If engine coolant temp. does not rise, check engine cooling system or ECT sensor.) See Fig. 1. Is radiator cooling fan started when engine coolant temp. reached above temp.?	Radiator cooling fan control system is in good condition.	Go to Step 2.
2	Check Radiator Cooling Fan Relay and Its Circuit. 1) Check DTC and pending DTC with scan tool. Is DTC P0480 displayed?	Go to DTC P0480 Diag. Flow Table.	Go to Step 3.
3	Check Radiator Cooling Fan Relay. 1) Turn ignition switch OFF and remove radiator cooling fan relay. 2) Check for proper connection to relay at terminals "c" and "d". 3) If OK, check that there is continuity between "c" and "d" when battery is connected to terminals "a" and "b". See Fig. 2. Is check result satisfactory?	Go to Step 4.	Replace radiator fan relay.
4	Check Radiator Cooling Fan. 1) Turn ignition switch OFF. 2) Disconnect cooling fan motor connector. 3) Check for proper connection to motor at "BI/R" and "B" terminals. 4) If OK, connect battery to motor and check for operation. See Fig. 3. Is it in good condition?	"BI/Y", "BI/R" or "B" circuit open.	Replace radiator cooling fan motor.

Fig. 1 for Step 1

When using SUZUKI scan tool:

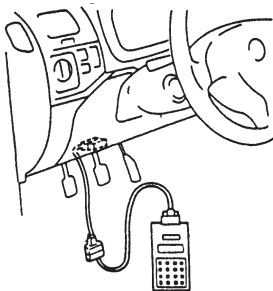
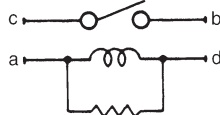
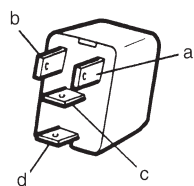


Fig. 2 for Step 3



Radiator cooling fan relay

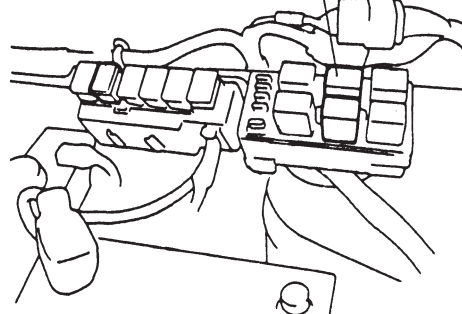
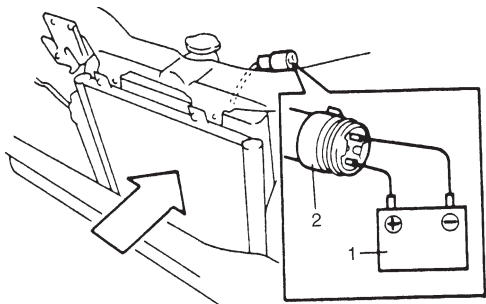
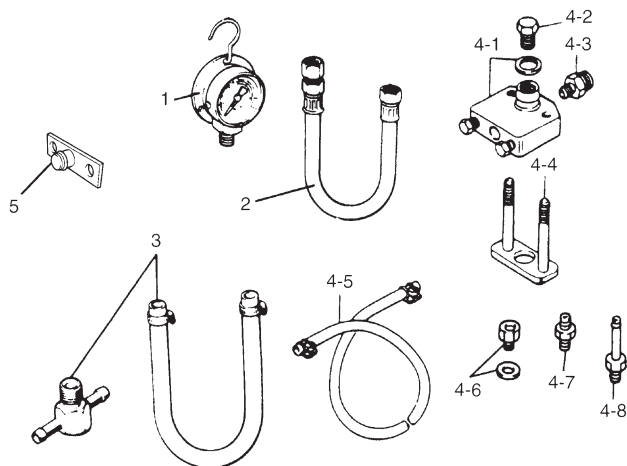
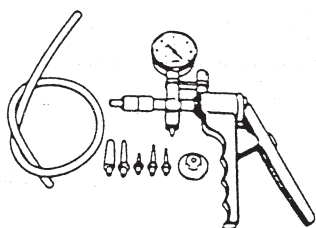


Fig. 3 for Step 4

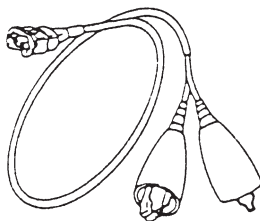


SPECIAL TOOLS

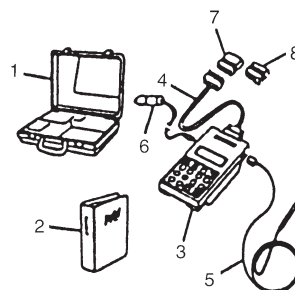
1. Pressure gauge
09912-58441
2. Pressure hose
09912-58431
3. 3-way joint & hose
09912-58490
4. Checking tool set
09912-58421
- 4-1. Tool body & washer
- 4-2. Body plug
- 4-3. Body attachment-1
- 4-4. Holder
- 4-5. Return hose & clamp
- 4-6. Body attachment-2 & washer
- 4-7. Hose attachment-1
- 4-8. Hose attachment-2
5. Checking tool plate
09912-57610



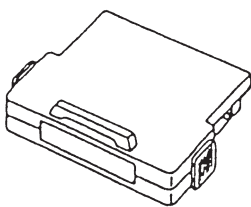
09917-47910
Vacuum pump gauge



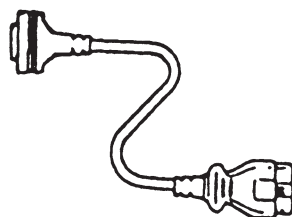
09930-88530
Injector test lead



09931-76011
SUZUKI scan tool (Tech 1 A) kit



Mass storage cartridge



09931-76030
16/14 pin DLC cable

SECTION 6A1

6A1

ENGINE MECHANICAL

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

Whether following systems (parts) are used in the particular vehicle or not depends on specifications. Be sure to bear this in mind when performing service work.

- EGR control system (EGR valve, pressure transducer, solenoid vacuum valve and etc.).
- EVAP canister and vacuum hoses.
- EVAP canister purge valve.
- Oxygen sensor or CO adjusting resistor.

CONTENTS

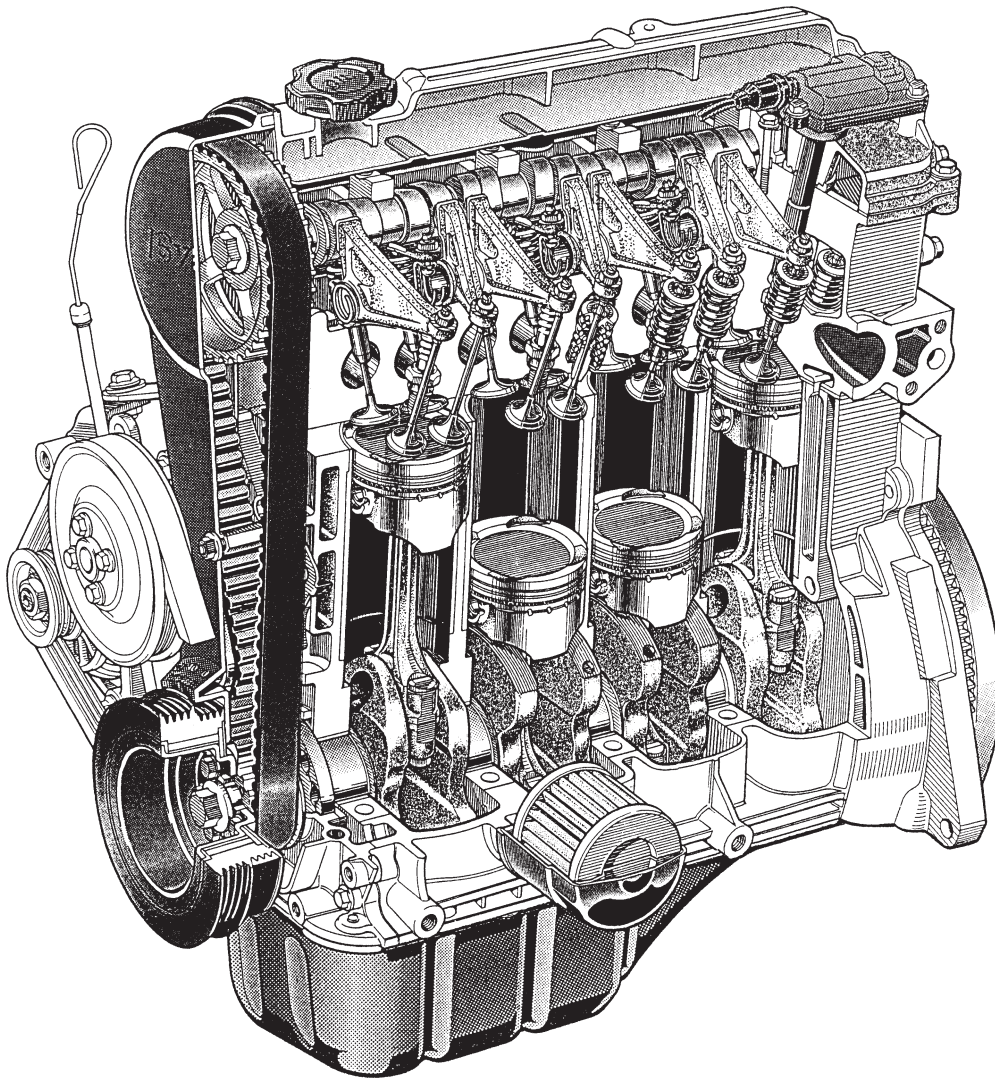
GENERAL DESCRIPTION	6A1- 2	Cylinder Head Cover	6A1-12
Engine	6A1- 2	Throttle Body and Intake Manifold	6A1-13
Engine Lubrication	6A1- 3	Exhaust Manifold	6A1-16
Cylinder Block	6A1- 4	Timing Belt and Belt Tensioner	6A1-18
Crankshaft and Main Bearings	6A1- 4	Oil Pan and Oil Pump Strainer	6A1-24
Pistons, Rings, Piston Pins and Connecting Rods	6A1- 4	Oil Pump	6A1-27
Cylinder Head and Valve Train	6A1- 4	Rocker Arms, Rocker Arm Shaft and Camshaft	6A1-32
ON-VEHICLE SERVICE	6A1- 5	Valves and Cylinder Head	6A1-40
Hose and Pipe Routing	6A1- 5	Piston, Piston Rings, Connecting Rods and Cylinders	6A1-53
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Engine Vacuum Check	6A1- 7	Engine mounting	6A1-63
Oil Pressure Check	6A1- 7	Engine Assembly	6A1-64
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Air Cleaner Element	6A1-10	SPECIAL TOOLS	6A1-80
Air Cleaner Assembly	6A1-11	REQUIRED SERVICE MATERIALS	6A1-81
Air Cleaner Outlet Hose	6A1-11		
Knock Sensor	6A1-12		

GENERAL DESCRIPTION

ENGINE

The engine is a water-cooled, in line 4 cylinders, 4 stroke cycle gasoline unit with its S.O.H.C. (Single Overhead Camshaft) valve mechanism arranged for "V"-type valve configuration and 16 valves (IN2 and EX2/one cylinder).

The single overhead camshaft is mounted over the cylinder head; it is driven from crankshaft through timing belt, and no push rods are provided in the valve train system.



ENGINE LUBRICATION

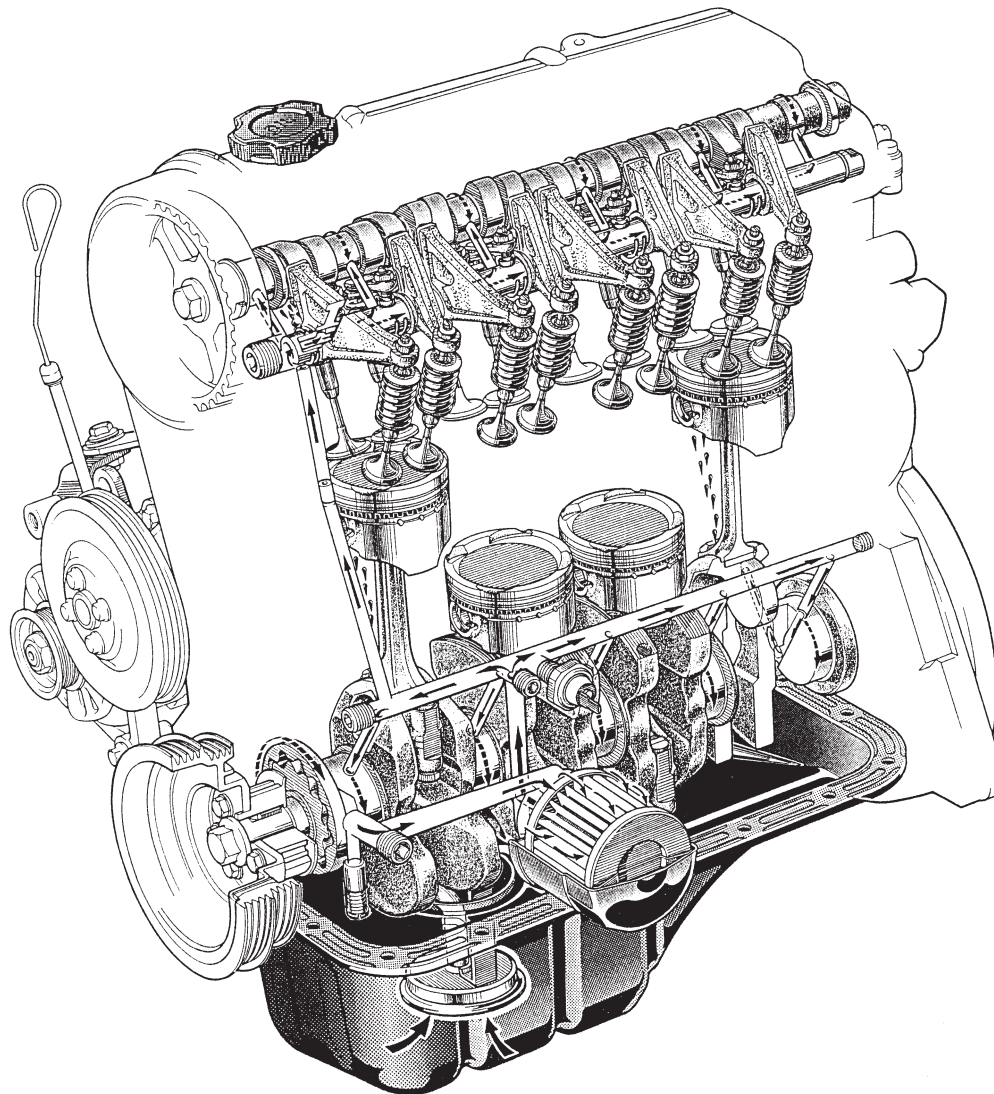
The oil pump is of a trochoid type, and mounted on crankshaft at crankshaft pulley side.

Oil is drawn up through oil pump strainer and passed through pump to oil filter.

The filtered oil flows into two paths in cylinder block. In one path, oil reaches crankshaft journal bearings. Oil from crankshaft journal bearings is supplied to connecting rod bearings by means of intersecting passages drilled in crankshaft, and then injected from a small hole provided on big end of connecting rod to lubricate piston, rings, and cylinder wall.

In another path, oil goes up to cylinder head and lubricates camshaft journals, rocker arms, camshaft, etc., after passing through the internal oilway of rocker arm shafts.

An oil relief valve is provided on oil pump. This valve starts relieving oil pressure when the pressure comes over about 400 kPa (4.0 kg/cm², 56.88 psi). Relieved oil drains back to oil pan.



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CYLINDER BLOCK

The cylinder block is made of cast aluminum alloy and has 4 cylinders arranged "In-Line".

A cylindrical cast iron sleeve is installed in each cylinder.

CRANKSHAFT AND MAIN BEARINGS

A monoblock casting crankshaft is supported by 5 main bearings which are of precision insert type. Four crank pins on the crankshaft are positioned 180° apart.

PISTONS, RINGS, PISTON PINS AND CONNECTING RODS

The piston is cast aluminum alloy, and has two compression rings and one oil ring.

Among two compression rings (top and 2nd rings), the outer surface of the top ring is treated with nitriding for improvement in abrasion resistance.

The oil ring consists of two rails and one spacer.

The piston pin is offset 0.5 mm towards the major thrust side.

This allows a gradual change in thrust pressure against the cylinder wall as the piston travels its path. Pins, made of chromium steel, have a floating fit in the pistons and in the connecting rods. The connecting rods are made of forged steel, and the rod bearings are of precision insert type.

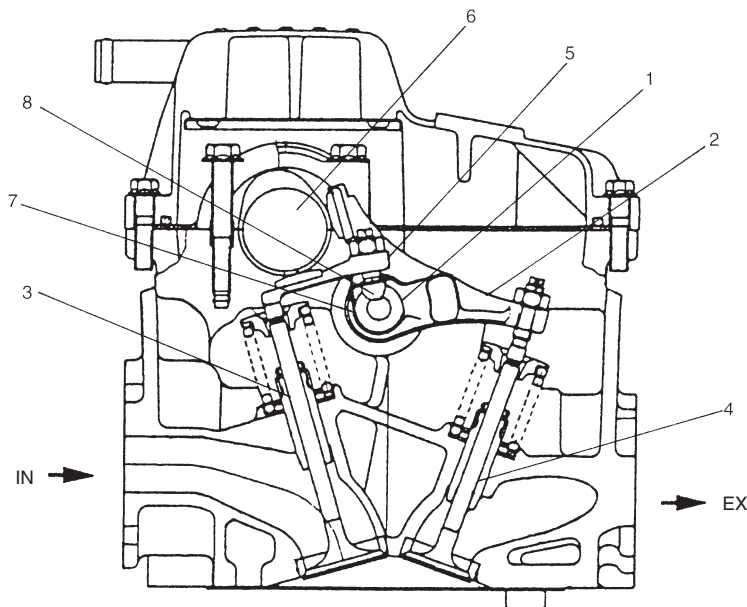
CYLINDER HEAD AND VALVE TRAIN

The cylinder head is made of aluminum casting.

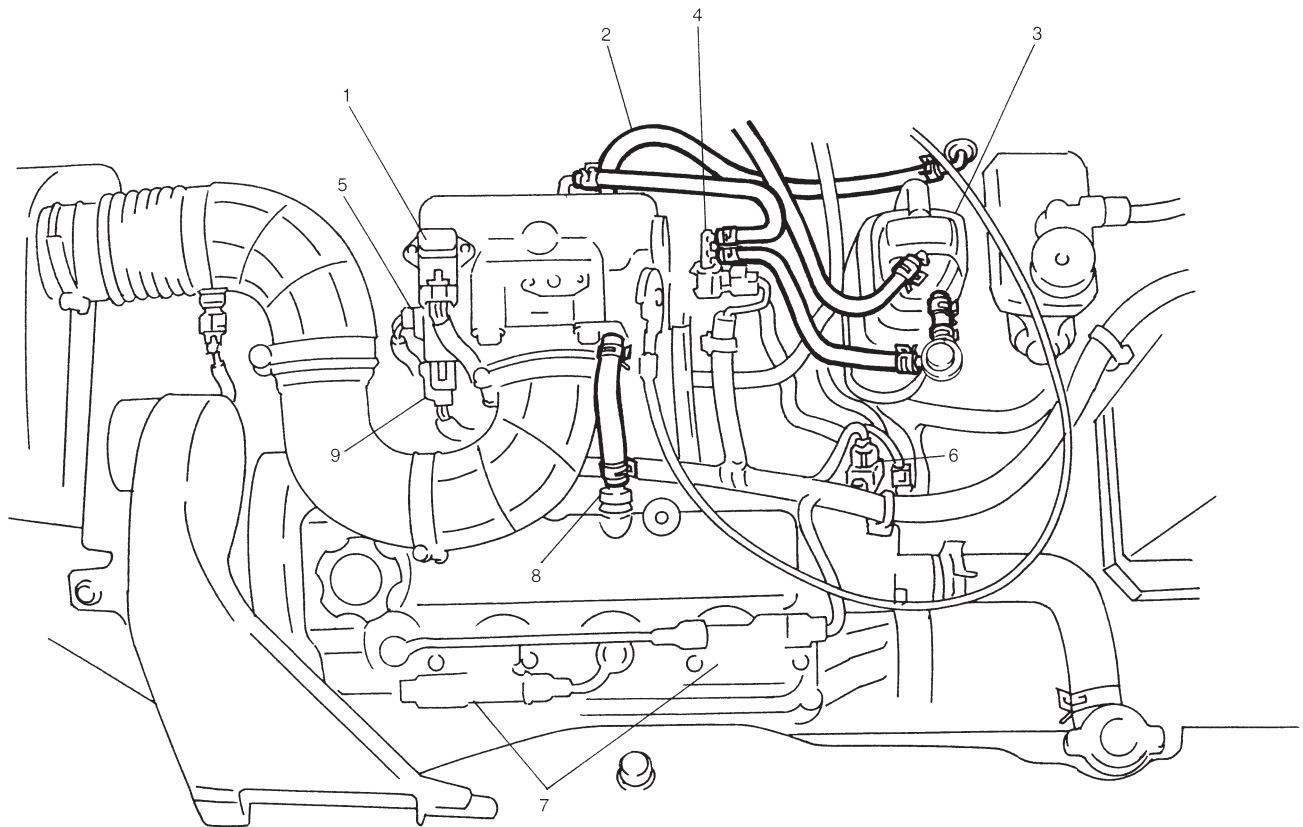
The supporting part of the camshaft is an independent cap type. The combustion chamber has 4 valves and uses the center plug type pent roof shape for higher intake and exhaust efficiency.

As the intake side rocker arm is end pivot type, it swings according to the camshaft movement to open and close the intake valve.

On the other hand, the exhaust side rocker arm is see-saw type. It swings with the rocker arm shaft as its supporting point and according to the camshaft movement to open and close the exhaust valve.



- | | |
|---------------------|--------------------|
| 1. Rocker arm shaft | 5. Rocker arm (IN) |
| 2. Rocker arm (EX) | 6. Camshaft |
| 3. Intake valve | 7. Clip |
| 4. Exhaust valve | 8. Pivot |

ON-VEHICLE SERVICE**HOSE AND PIPE ROUTING**

1. MAP sensor
2. Brake booster vacuum hose
3. EVAP canister
4. EVAP canister purge valve
5. TP sensor
6. CMP sensor
7. Ignition coil assembly
8. PCV valve
9. IAC valve

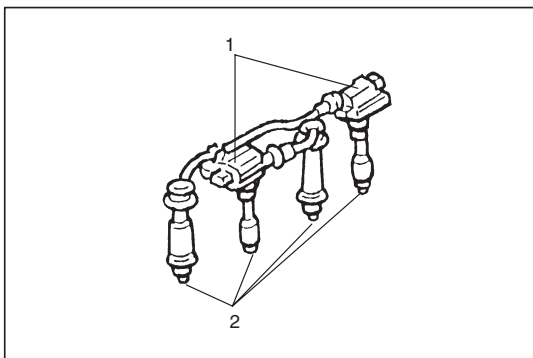
COMPRESSION CHECK

Check compression pressure on all four cylinders as follows:

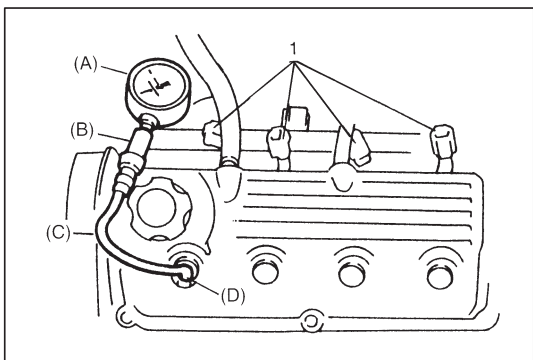
- 1) Warm up engine.
- 2) Stop engine after warming up.

NOTE:

After warming up engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.



- 3) Remove ignition coil assemblies (1) and all spark plugs (2) referring to Section 6F.



- 4) Disconnect fuel injector wire harness at couplers (1).
- 5) Install special tool (Compression gauge) into spark plug hole.

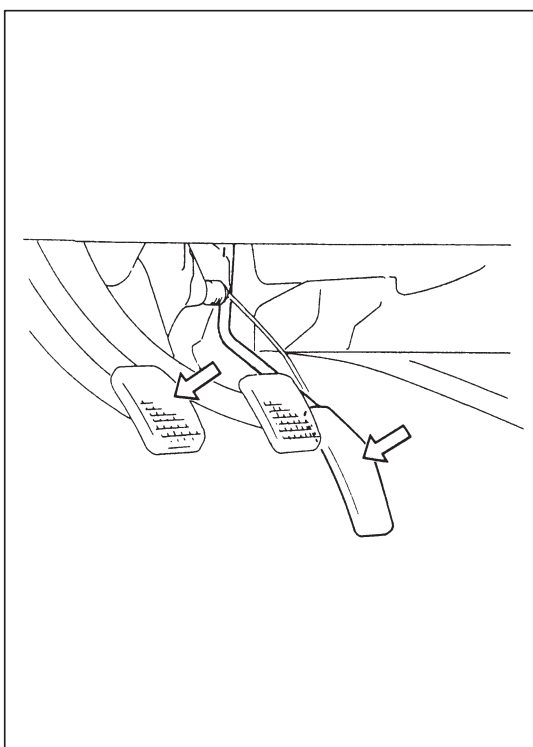
Special Tool

(A): 09915-64510-001

(B): 09915-64510-002

(C): 09915-64530

(D): 09915-67010



- 6) Disengage clutch (to lighten starting load on engine) for M/T model, and depress accelerator pedal all the way to make throttle valve full-open.
- 7) Crank engine with fully charged battery, and read the highest pressure on compression gauge.

NOTE:

For measuring compression pressure, crank engine at least 250 r/min. by using fully charged battery.

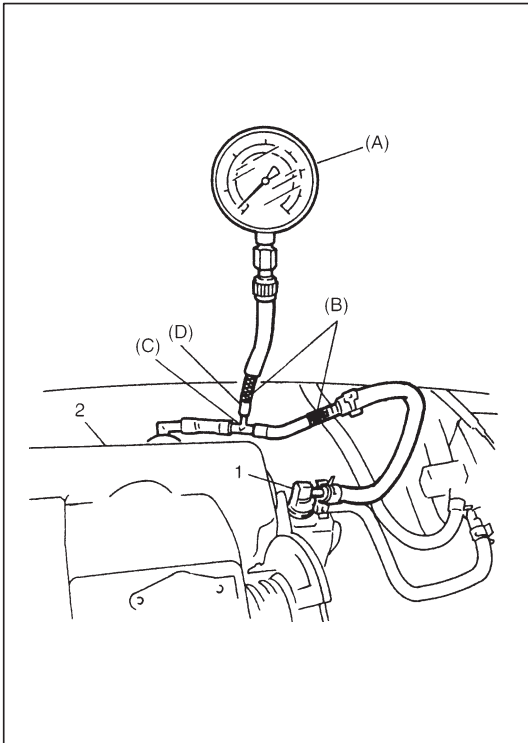
	Compression pressure
Standard	1400 kPa (14.0 kg/cm ² , 199.0 psi)
Limit	1100 kPa (11.0 kg/cm ² , 156.4 psi)
Max. difference between any two cylinders	100 kPa (1.0 kg/cm ² , 14.2 psi)

- 8) Carry out steps 5) through 7) on each cylinder to obtain four readings.
- 9) After checking, install spark plugs and ignition coil assemblies and connect injector wire harness connector securely.

ENGINE VACUUM CHECK

The engine vacuum that develops in the intake line is a good indicator of the condition of the engine. The vacuum checking procedure is as follows:

1) Warm up engine to normal operating temperature.



2) With engine stopped, disconnect EVAP canister purge valve (1) hose from intake manifold (2) and connect 3-way joint, hoses and special tool (vacuum gauge and joint) between intake manifold and EVAP canister purge valve (1) hose disconnected.

Special Tool

(A): 09915-67310

(B): 09918-08210 x 2 pcs

Spare Part

(C): 09367-04002

(D): 09355-35754-6010

3) Run engine at specified idle speed (see Section 6E1), and read vacuum gauge. Vacuum should be within following specification.

Vacuum specification: 52.6 – 65.8 kPa (40 – 50 cm·Hg, 15.7 – 19.7 in·Hg) at specified idling speed

4) After checking, connect vacuum hoses.

OIL PRESSURE CHECK

NOTE:

Prior to checking oil pressure, check the followings.

- Oil level in oil pan.

If oil level is low, add oil up to Full level hole on oil level gauge.

- Oil quality.

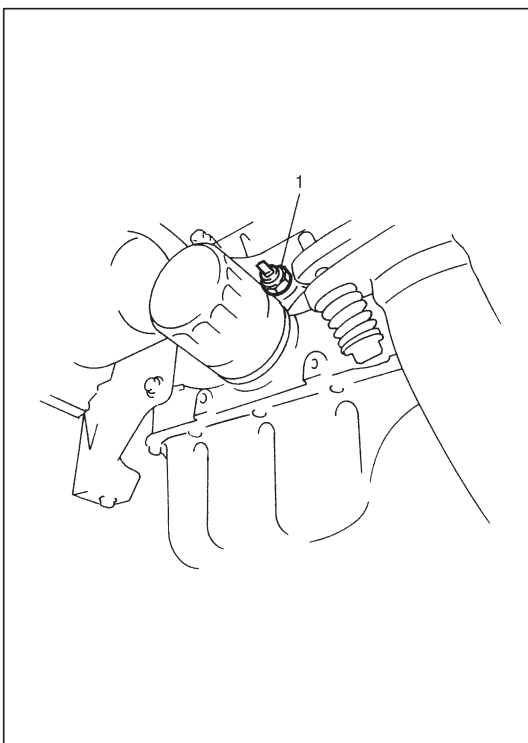
If oil is discolored, or deteriorated, change it.

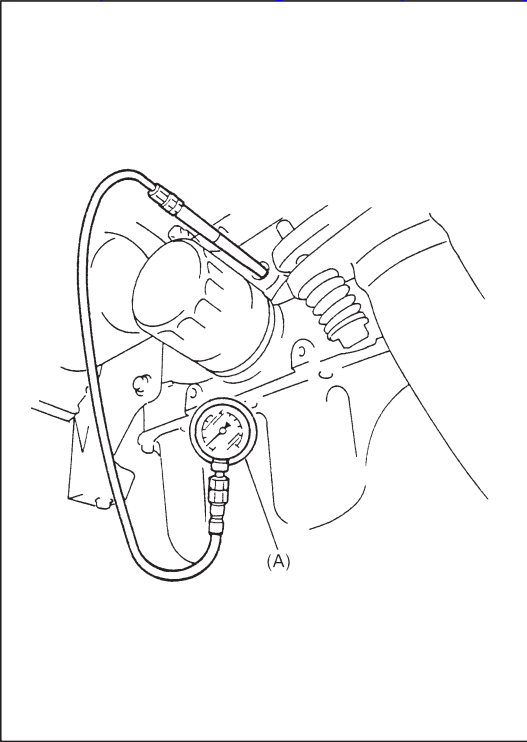
For particular oil to be used, refer to the table in Section 0B.

- Oil leaks.

If leak is found, repair it.

1) Remove oil pressure switch (1) from cylinder block.





- 2) Install special tool (Oil pressure gauge) to vacated threaded hole.

Special Tool

(A): 09915-77310

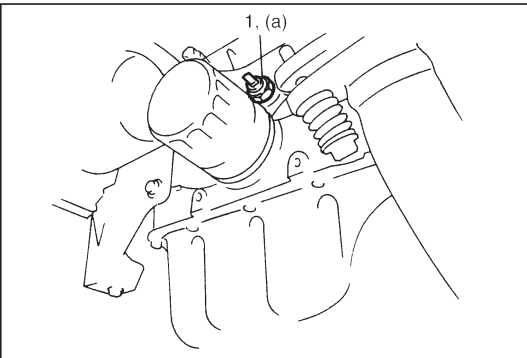
- 3) Start engine and warm it up to normal operating temperature.
- 4) After warming up, raise engine speed to 4,000 r/min and measure oil pressure.

Oil pressure specifications: 360 – 440 kPa

(3.6 – 4.4 kg/cm², 51.2 – 62.6 psi)

at 3,960 – 4,040 r/min (rpm)

- 5) After checking oil pressure, stop engine and remove oil pressure gauge.



- 6) Before reinstalling oil pressure switch (1), be sure to wrap its screw threads with a sealing tape and tighten switch to specified torque.

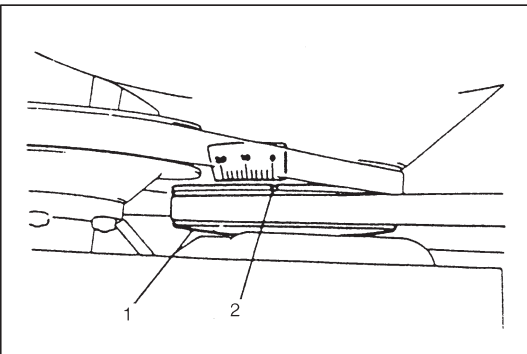
NOTE:

If sealing tape edge is bulged out from screw threads of switch, cut it off.

Tightening Torque

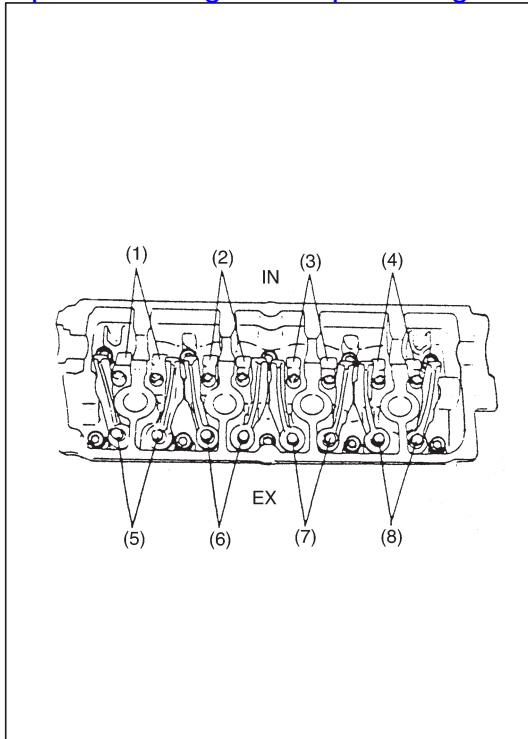
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)

- 7) After installing oil pressure switch, start engine and check oil pressure switch for oil leakage.



VALVE LASH (CLEARANCE)

- 1) Remove negative cable at battery.
- 2) Remove cylinder head cover referring to item "Cylinder Head Cover" in this section.
- 3) Remove right side of engine under cover from body.
- 4) Remove air cleaner assembly to observe "V" mark (2) on crankshaft pulley (1).
- 5) Using 17 mm socket, turn crankshaft pulley clockwise until "V" mark (in white paint) on pulley aligns with "0" (zero) calibrated on timing belt cover.



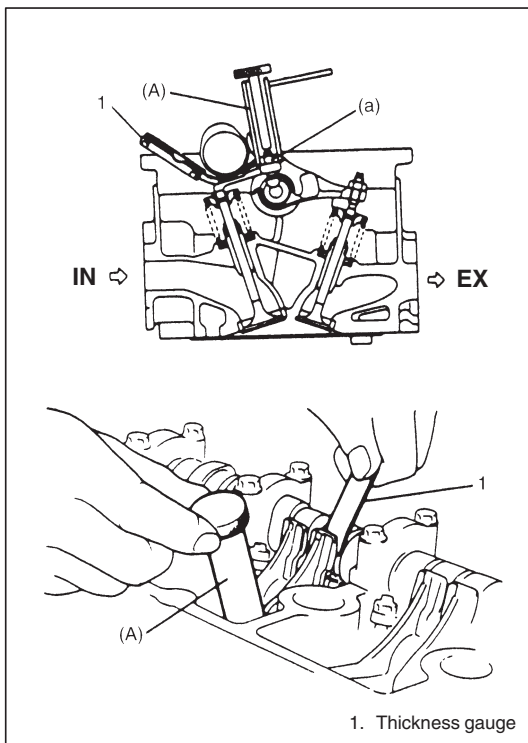
- 6) Check if the rocker arms of No.1 cylinder are off the respective cam lobes (of camshaft); if so, valves (1), (2), (5) and (7) in left figure are ready for clearance checking and adjustment.

Check valve lashes at valves (1), (2), (5) and (7).

If the rocker arms of No.4 cylinder are off the respective cam lobes, check valve lashes at valves (3), (4), (6) and (8).

NOTE:

When checking valve clearance, insert thickness gauge between camshaft and cam-riding face of rocker arm.



- 7) If valve lash is out of specification, adjust it to specification by turning adjusting screw after loosening lock nut.

After adjustment, tighten lock nut to specified torque while holding adjusting screw stationary, and then make sure again that valve lash is within specification.

Valve clearance Specification		When cold (Coolant temperature is 15 – 25°C or 59 – 77°F)	When hot (Coolant temperature is 60 – 68°C or 140 – 154°F)
	Intake	0.13 – 0.17 mm (0.005 – 0.007 in.)	0.17 – 0.21 mm (0.007 – 0.008 in.)
	Exhaust	0.23 – 0.27 mm (0.009 – 0.011 in.)	0.27 – 0.31 mm (0.011 – 0.012 in.)

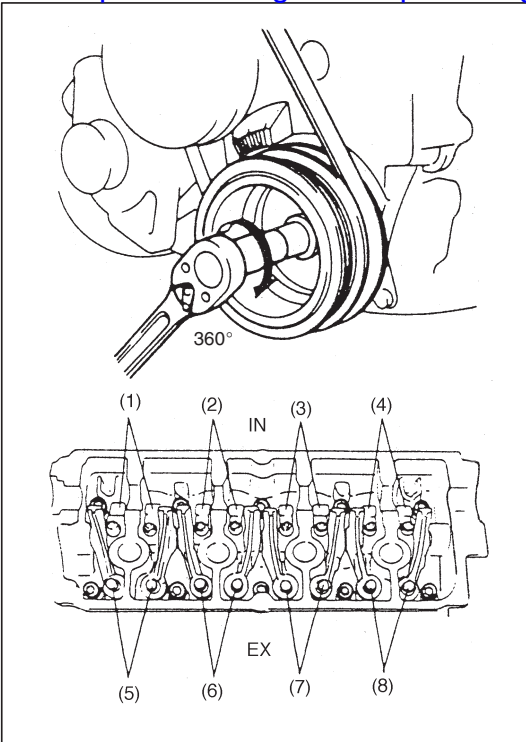
Special Tool

(A): 09917-18210

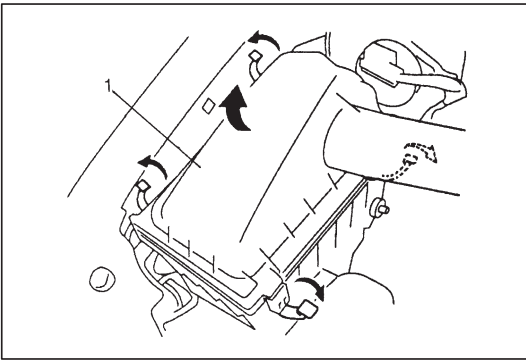
Tightening Torque

(a): 12 N·m (1.2 kg-m, 9.0 lb-ft)

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- 8) After checking and adjusting valve lashes at valves (1), (2), (5) and (7), (or (3), (4), (6) and (8)) rotate crankshaft exactly one full turn (360°) and check the same at valves (3), (4), (6) and (8) (or (1), (2), (5), and (7)). Adjust them as necessary.
- 9) After checking and adjusting all valves, reverse removal procedure for installation.



AIR CLEANER ELEMENT

This air cleaner element is of dry type. Remember that it needs cleaning according to following procedure.

REMOVAL

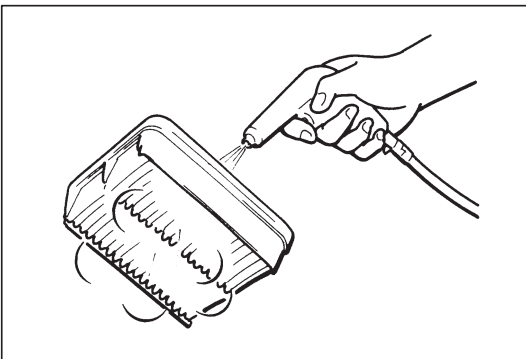
- 1) Disconnect air cleaner outlet No.1 hose from air cleaner assembly (1).
- 2) Open air cleaner case after unhooking its clamps.
- 3) Remove air cleaner element from case.

INSPECTION

Check air cleaner element for dirt. Replace excessively dirty element.

CLEANING

Blow off dust by compressed air from air outlet side of element.



INSTALLATION

Reverse removal procedure for installation.

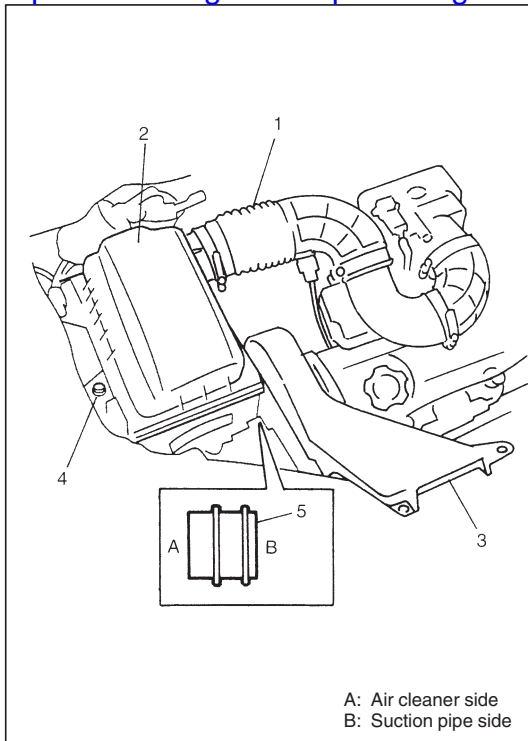
AIR CLEANER ASSEMBLY**REMOVAL**

- 1) Disconnect air cleaner outlet No.1 hose (1) from air cleaner assembly (2).
- 2) Remove suction pipe (3) from air cleaner assembly.
- 3) Remove air cleaner assembly by removing bolt (4) shown in figure.

INSTALLATION

Reverse removal procedure for installation, noting the following.

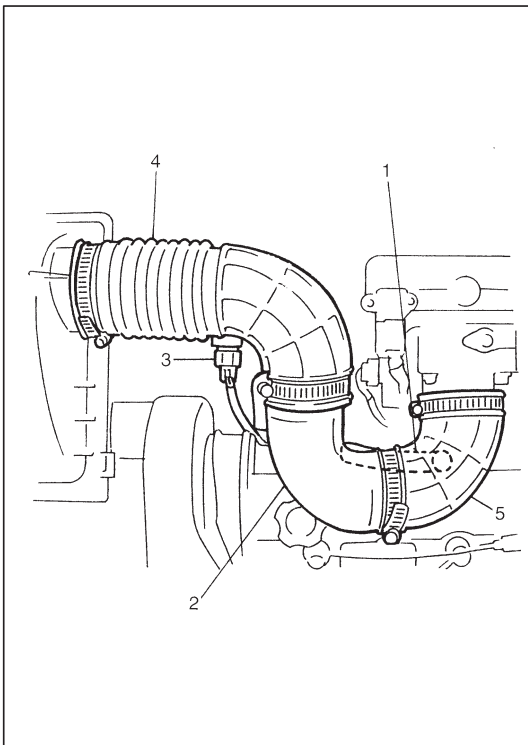
- Install suction pipe grommet (5) in the direction indicated in figure.
- Clamp each hose securely.

**AIR CLEANER OUTLET HOSE****REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Disconnect breather hose (1) from air intake joint (2).
- 3) Disconnect IAT sensor (3) wire at coupler.
- 4) Remove air cleaner outlet No.1 hose (4) and No.2 hose (5) with air intake joint.

INSTALLATION

Reverse removal procedure for installation.



KNOCK SENSOR

REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Hoist vehicle.
- 3) Remove intake manifold rear stiffener.
- 4) Disconnect knock sensor connector (1).
- 5) Remove knock sensor (2) from cylinder block.

INSPECTION

Check sensor for damage.

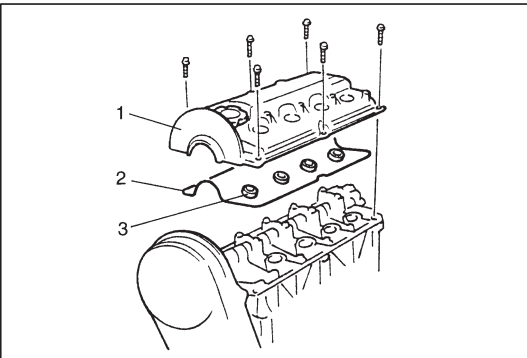
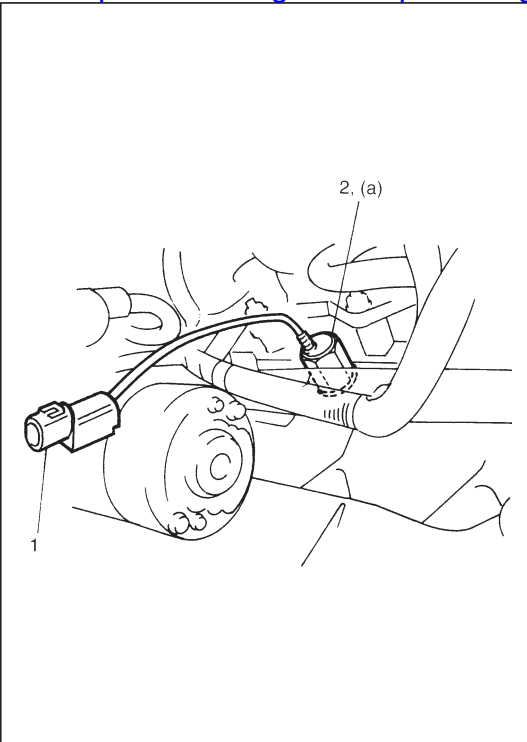
If any faulty is found, replace.

INSTALLATION

Reverse removal procedure for installation.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 16.5 lb-ft)



CYLINDER HEAD COVER

REMOVAL

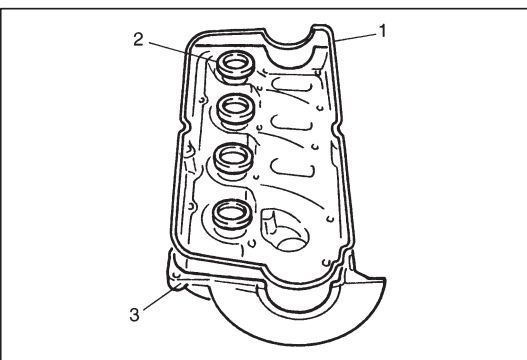
- 1) Disconnect negative cable at battery.
- 2) Disconnect breather hose and PCV valve from head cover.
- 3) Remove suction pipe from air cleaner assembly.
- 4) Remove ignition coil assemblies with high-tension cord.
- 5) Remove cylinder head cover (1) with cylinder head cover gasket (2) and O-rings (3).

INSTALLATION

- 1) Install O-rings (2) and cylinder head cover gasket (1) to cylinder head cover (3).

NOTE:

Be sure to check each of these parts for deterioration or any damage before installation and replace if found defective.



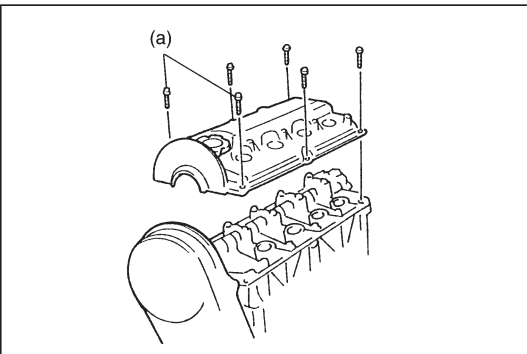
- 2) Install cylinder head cover to cylinder head and tighten cover bolts to specified torque.

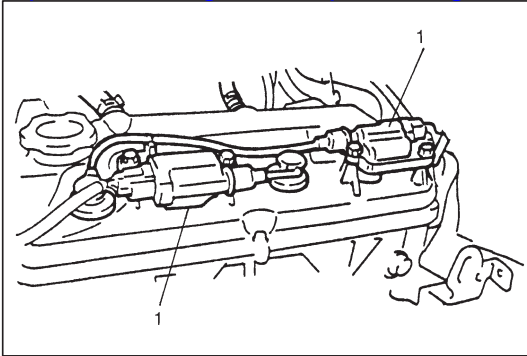
Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

NOTE:

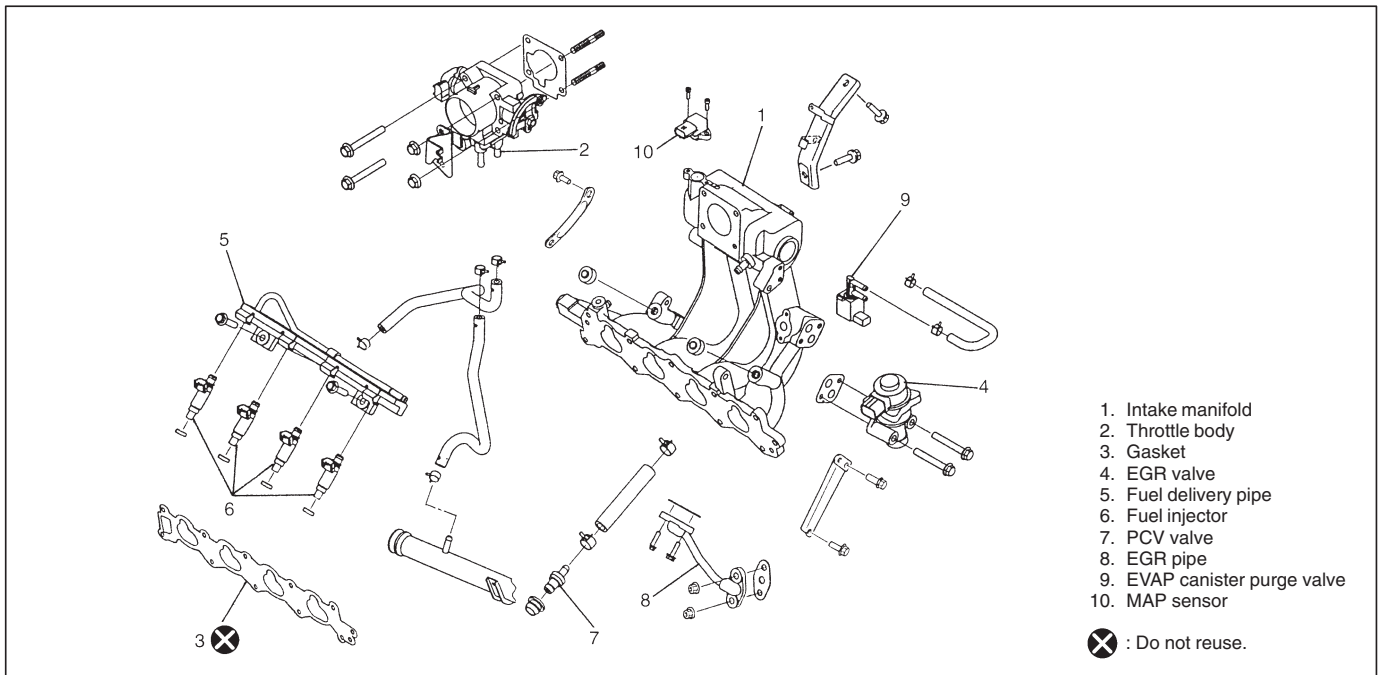
When installing cylinder head cover, use care so that cylinder head cover gasket or O-rings will not get out of place or fall off.





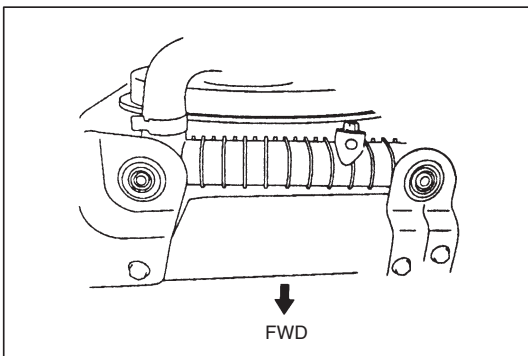
- 3) Install ignition coil assemblies (1) with high-tension cord.
- 4) Connect PCV valve and breather hose to head cover.
- 5) Install suction pipe to air cleaner assembly, referring to INSTALLATION of AIR CLEANER ASSEMBLY in this section.
- 6) Connect negative cable at battery.

THROTTLE BODY AND INTAKE MANIFOLD



REMOVAL

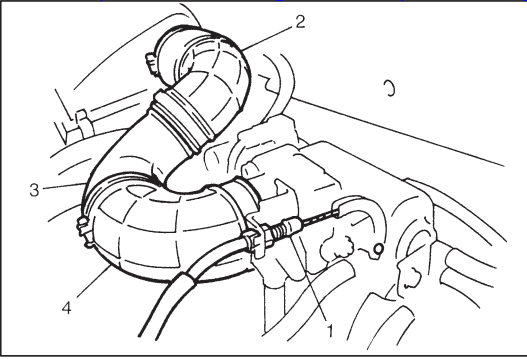
- 1) Relieve fuel pressure according to procedure described in Section 6.
- 2) Disconnect negative cable at battery.



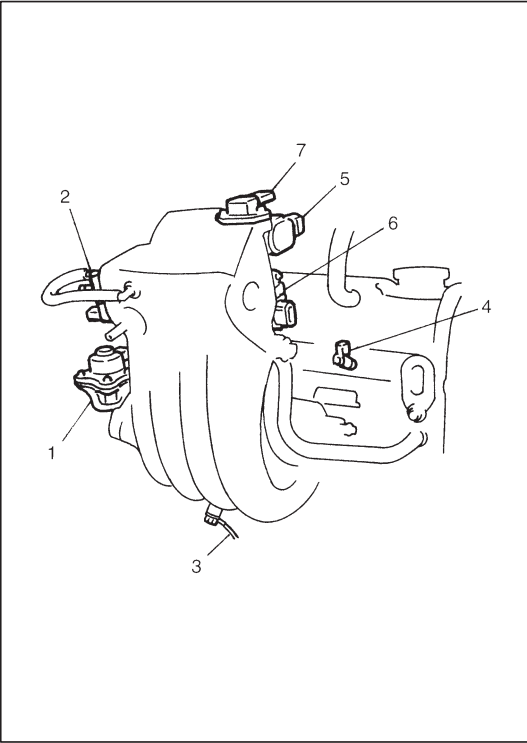
- 3) Drain cooling system.

WARNING:

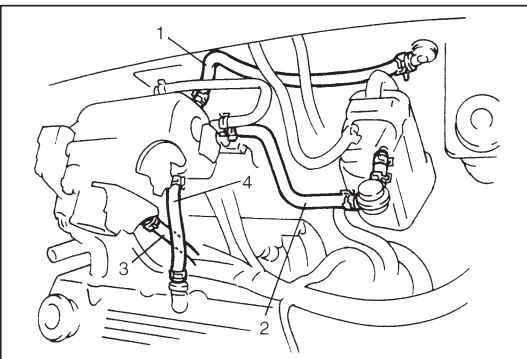
To help avoid danger of being burned, do not remove drain plug and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.



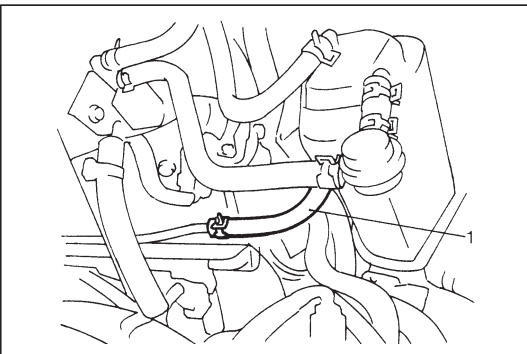
- 4) Disconnect accelerator cable (1) from throttle body.
- 5) Remove air cleaner outlet No.1 hose (2) and No.2 hose (4) with air intake joint (3).



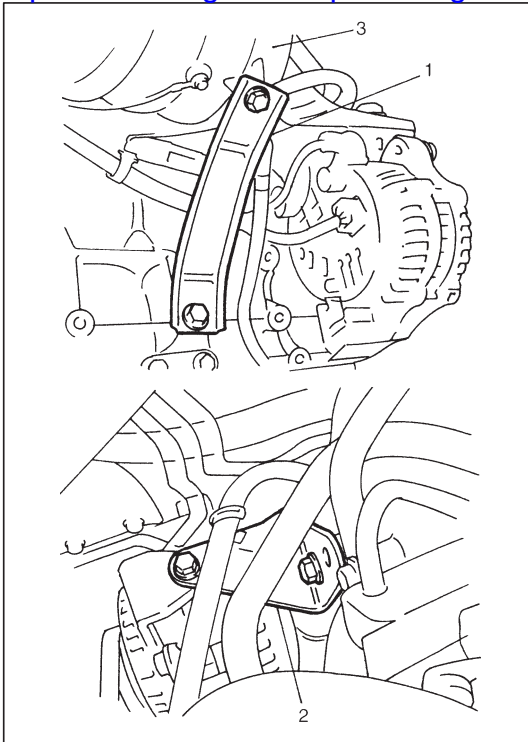
- 6) Disconnect following electric lead wires and release clamps.
 - EGR valve (1)
 - EVAP canister purge valve (2)
 - Ground wire (3) from intake manifold
 - Fuel injectors (4)
 - TP sensor (5)
 - IAC valve (6)
 - MAP sensor (7)



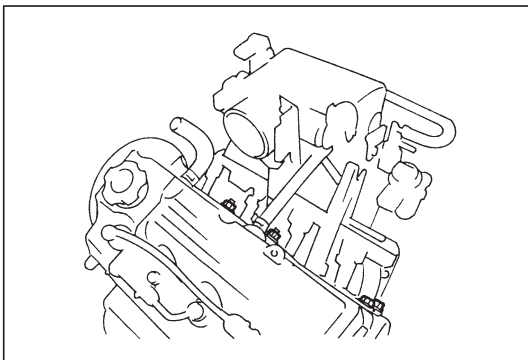
- 7) Disconnect following hoses:
 - Brake booster hose (1) from intake manifold.
 - EVAP canister purge hose (2) from EVAP canister purge valve.
 - Engine cooling water (coolant) hose (3) from IAC valve and intake manifold.
 - PCV hose (4) from intake manifold.



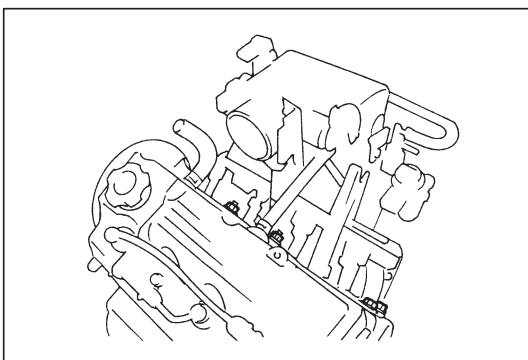
- 8) Disconnect fuel feed hose (1) from fuel delivery pipe.



- 9) Remove intake manifold rear stiffener (1) and generator adjust arm reinforcement (2) from intake manifold (3).



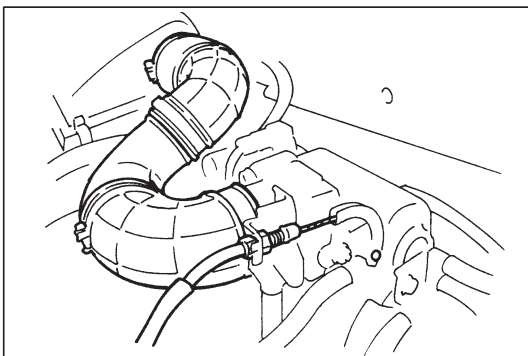
- 10) Remove intake manifold with throttle body from cylinder head, and then its gasket.



INSTALLATION

Reverse removal procedure for installation noting the followings.

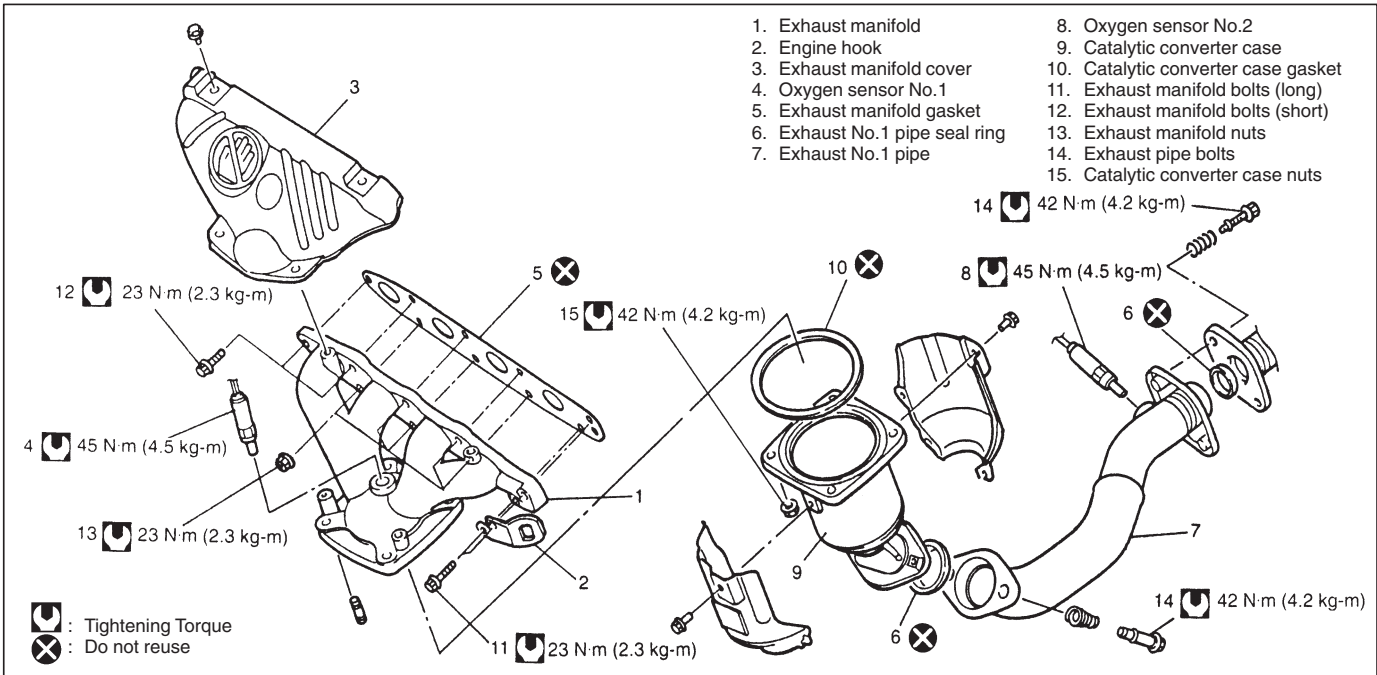
- Use new intake manifold gasket.
- When installing intake manifold, install clamps at positions as shown in figure.



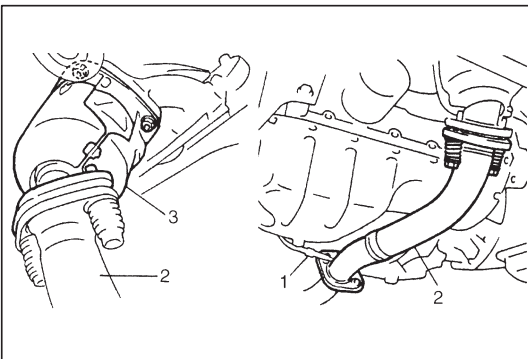
- Adjust accelerator cable play, referring to Section 6E.
- Check to ensure that all removed parts are back in place.
Reinstall any necessary parts which have not been reinstalled.
- Refill cooling system, referring to Section 6B.
- Upon completion of installation, turn ignition switch ON but engine OFF and check for fuel leaks.
- Finally, start engine and check for engine coolant leaks.

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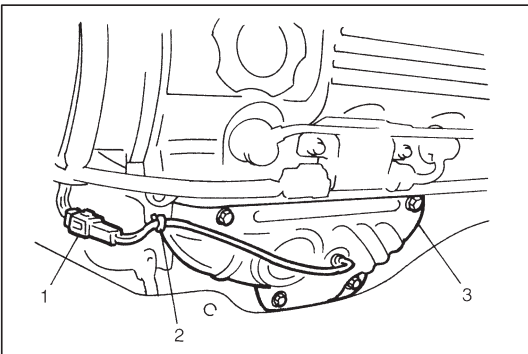
EXHAUST MANIFOLD

**WARNING:**

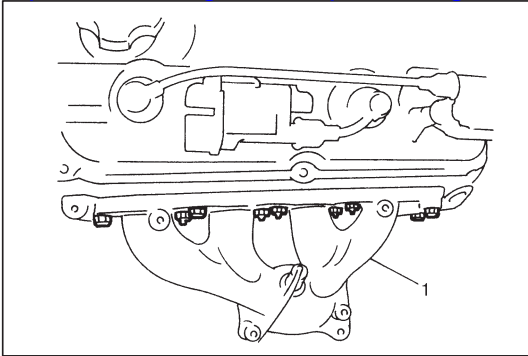
To avoid danger of being burned, do not service exhaust system while it is still hot. Service should be performed after system cools down.

**REMOVAL**

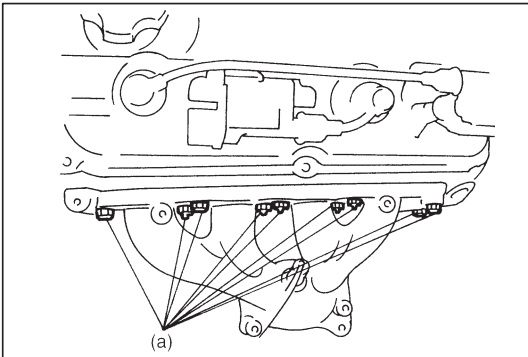
- 1) Disconnect negative cable at battery.
- 2) Disconnect oxygen sensor No.2 (1) coupler and clamp.
- 3) Remove exhaust No.1 pipe (2) with catalytic converter case (3).



- 4) Disconnect oxygen sensor No.1 coupler (1) and clamp (2).
- 5) Remove exhaust manifold cover (3).



- 6) Remove exhaust manifold (1) and its gasket from cylinder head.
- 7) Remove catalytic converter case gasket and exhaust No.1 pipe seal ring (rear side).

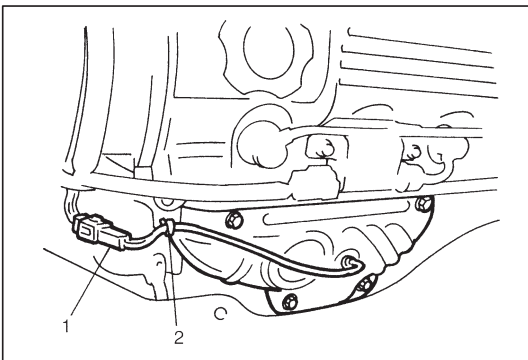


INSTALLATION

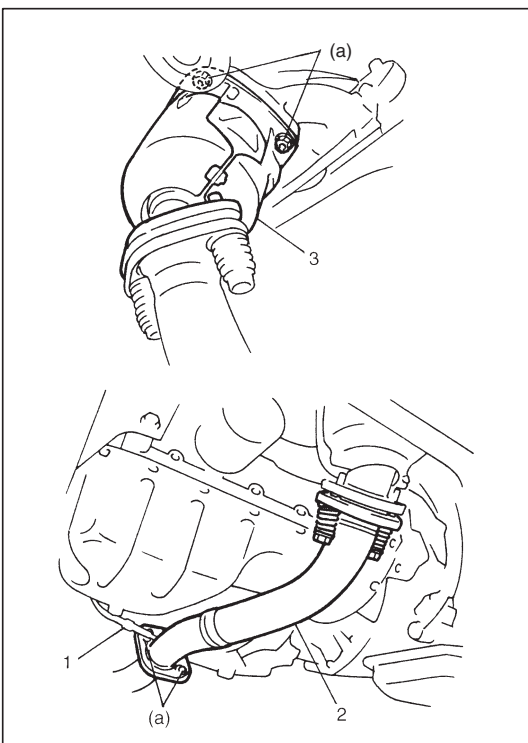
- 1) Install new gaskets to cylinder head, catalytic converter case and exhaust No.1 pipe (rear side).
- 2) Install exhaust manifold.
Tighten manifold bolts and nuts to specified torque.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 3) Install exhaust manifold cover.
- 4) Connect oxygen sensor No.1 coupler (1) and clamp (2) its wire securely.



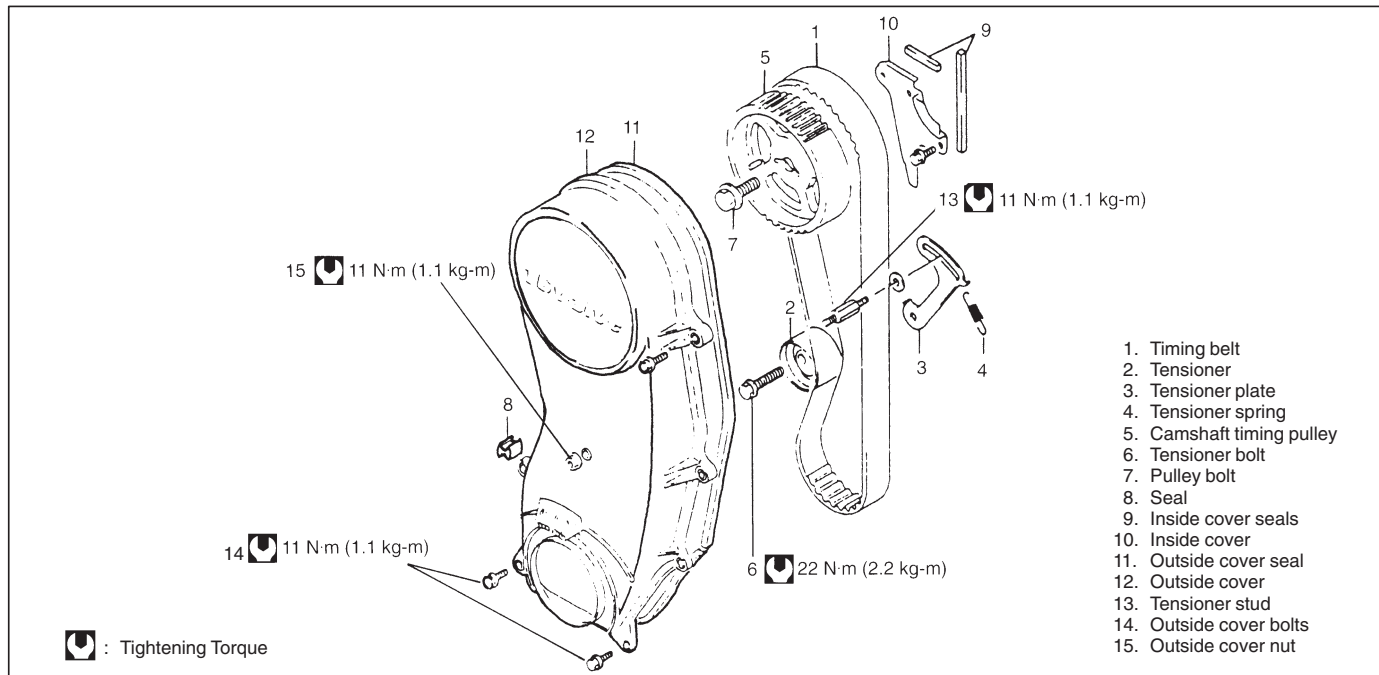
- 5) Install catalytic converter case (3) with exhaust No.1 pipe (2) to exhaust manifold.

Tightening Torque

(a): 42 N·m (4.2 kg-m, 30.5 lb-ft)

- 6) Connect oxygen sensor No.2 (1) coupler, refer to EXHAUST SYSTEM section.
- 7) Connect negative cable at battery.
- 8) Check exhaust system for exhaust gas leakage.

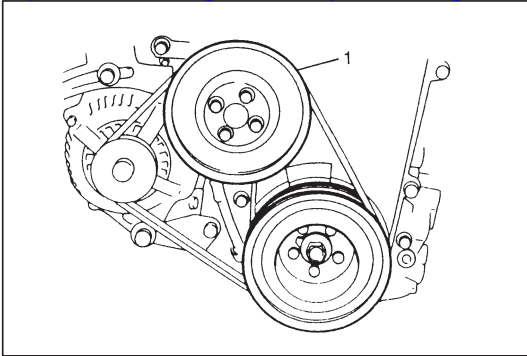
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TIMING BELT AND BELT TENSIONER

**REMOVAL**

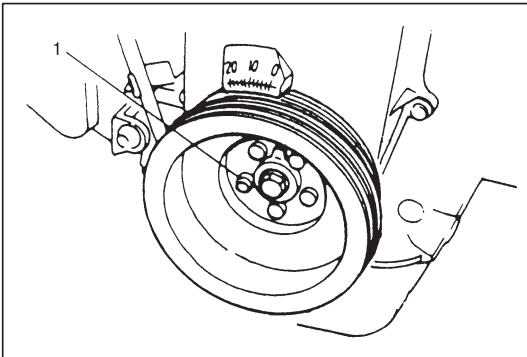
- 1) Disconnect negative cable at battery.
- 2) Remove right side of engine under cover (1).
- 3) Disconnect A/C suction and discharge hoses from A/C compressor.
- 4) Remove A/C compressor and its bracket (if equipped), refer to Section 1B.
- 5) Remove suction pipe and air cleaner assembly.

- 6) Support engine by using support device.

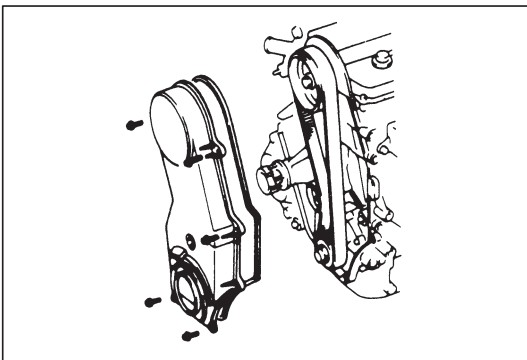
- 7) Remove engine right mounting bracket (1), stiffener (2) and engine right mounting swing bracket (3).



8) Remove water pump pulley (1) and drive belt.

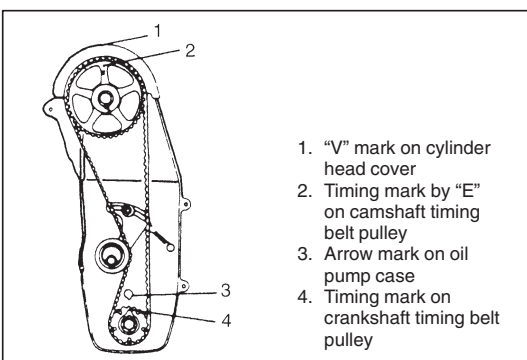


9) Remove crankshaft pulley by removing pulley bolts (1).

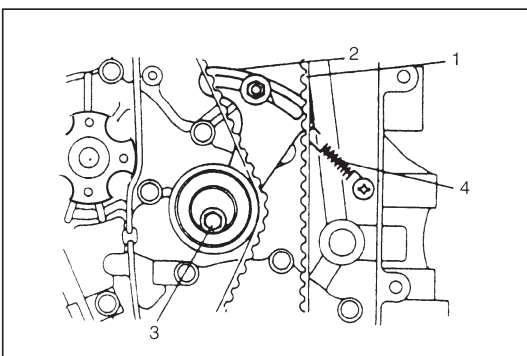


10) Release harness clamps.

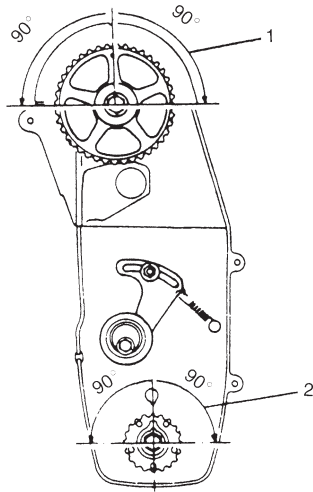
11) Remove timing belt outside cover.



12) For installation of timing belt, align 4 timing marks as shown in figure by turning crankshaft.



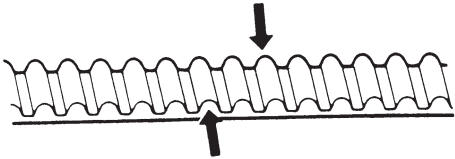
13) Remove timing belt tensioner (3), tensioner plate (2), tensioner spring (4) and timing belt (1).



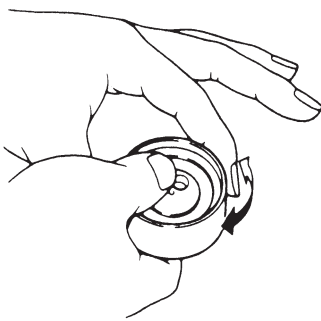
1. Camshaft allowable turning range --- By timing mark, within 90° from "V" mark on head cover on both right and left.
2. Crankshaft allowable turning range --- By timing mark, within 90° from arrow mark on oil pump case on both right and left.

CAUTION:

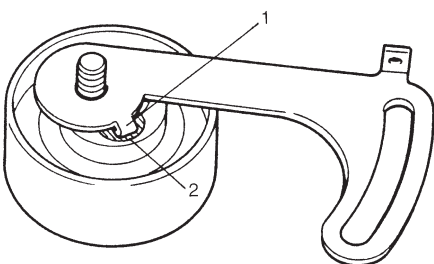
- After timing belt is removed, never turn camshaft and crankshaft independently more than such an extent as shown in figure. If turned, interference may occur among piston and valves, and parts related to piston and valves may be damaged.
- Never bend timing belt.

**INSPECTION**

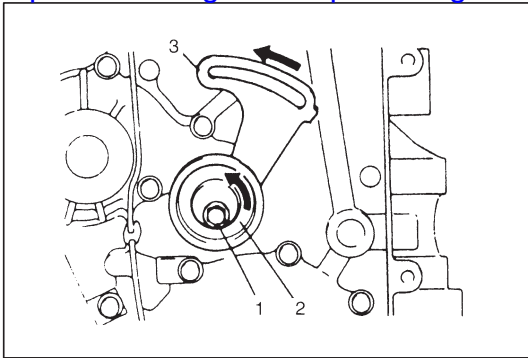
- Inspect timing belt for wear or crack.
Replace it as necessary.



- Inspect tensioner for smooth rotation.

**INSTALLATION**

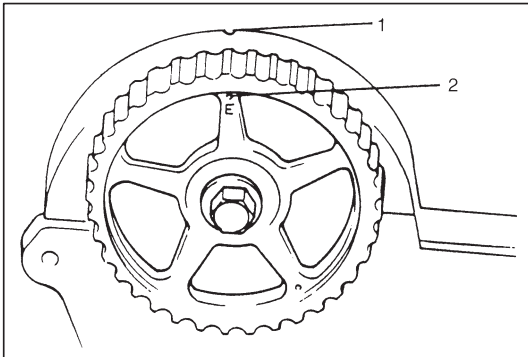
- 1) Install tensioner plate to tensioner.
Insert lug (1) of tensioner plate into hole (2) in tensioner.



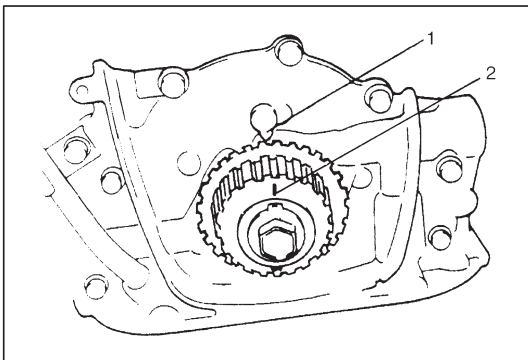
2) Install tensioner (2) and tensioner plate (3):

Do not tighten tensioner bolt (1) with wrench yet. Hand tighten only at this time.

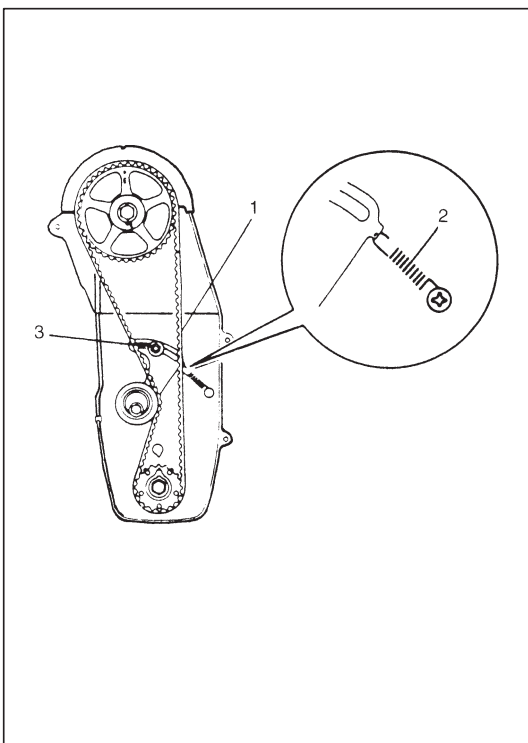
Check to ensure that plate movement in arrow direction as shown in figure causes tensioner to move in the same direction. If no associated movement between plate and tensioner occurs, remove tensioner and plate again and reinsert plate lug into tensioner hole.



3) Check that timing mark (2) on camshaft timing belt pulley is aligned with "V" mark (1) on cylinder head cover. If not, align two marks by turning camshaft but be careful not to turn it more than its allowable turning range which is described on previous page.



4) Check that timing mark (2) on crankshaft timing belt pulley is aligned with arrow mark (1) on oil pump case. If not, align two marks by turning crankshaft but be careful not to turn it more than its allowable turning range which is described on previous page.



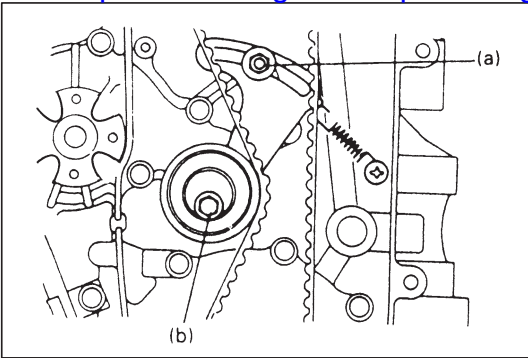
5) Install timing belt and tensioner spring (2).

With two sets of marks aligned and tensioner plate pushed up, install timing belt on two pulleys in such a way that drive side of belt (1) is free from any slack.

And then install tensioner spring as shown in figure, and hand-tighten tensioner stud (3).

NOTE:

- When installing timing belt, match arrow mark (⇒) on timing belt with rotating direction of crankshaft.
- In this state, No.4 piston is at top dead center of compression stroke.

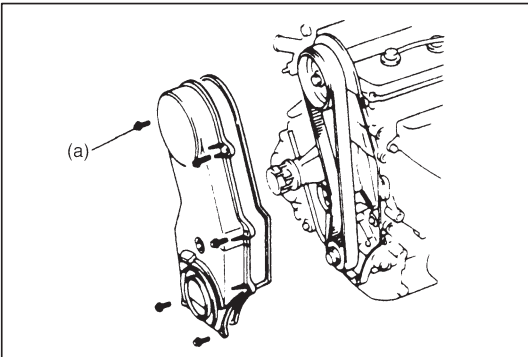


- 6) To take up slack of timing belt, turn crankshaft two rotations clockwise after installing it. After making sure that belt is free from slack, tighten tensioner stud first and then tensioner bolt to each specified torque.
Then confirm again that two sets of marks are aligned respectively.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

(b): 22 N·m (2.2 kg-m, 16.0 lb-ft)

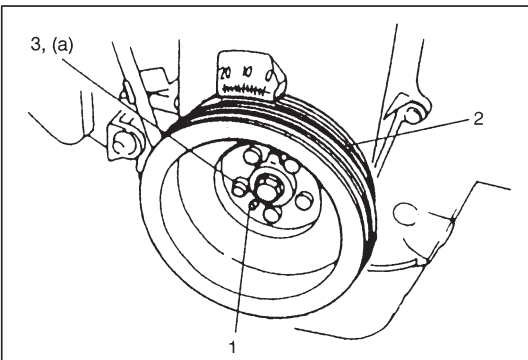


- 7) Install timing belt outside cover.

Before installing, make sure that seal is between water pump and oil pump case.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

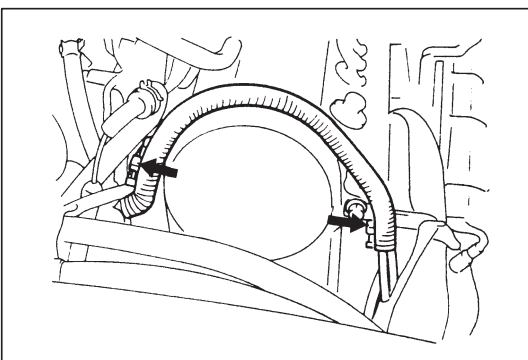


- 8) Install crankshaft pulley (2).

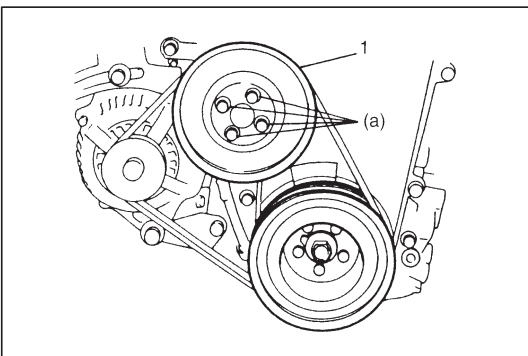
Fit hole of pulley to pin (1) on crankshaft timing belt pulley, and tighten pulley bolts (3) to specified torque.

Tightening Torque

(a): 16 N·m (1.6 kg-m, 11.5 lb-ft)



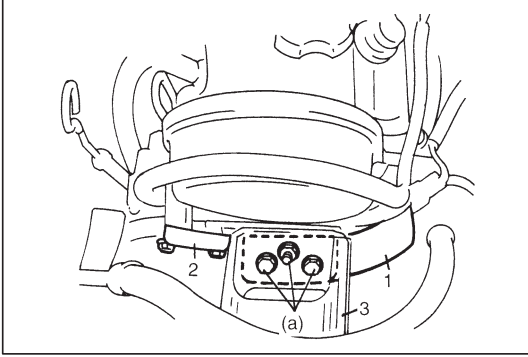
- 9) Clamp harness securely.



- 10) Install water pump pulley (1) and drive belt.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



- 11) Install engine right mounting bracket (1), stiffener (2) and engine right mounting swing bracket (3).

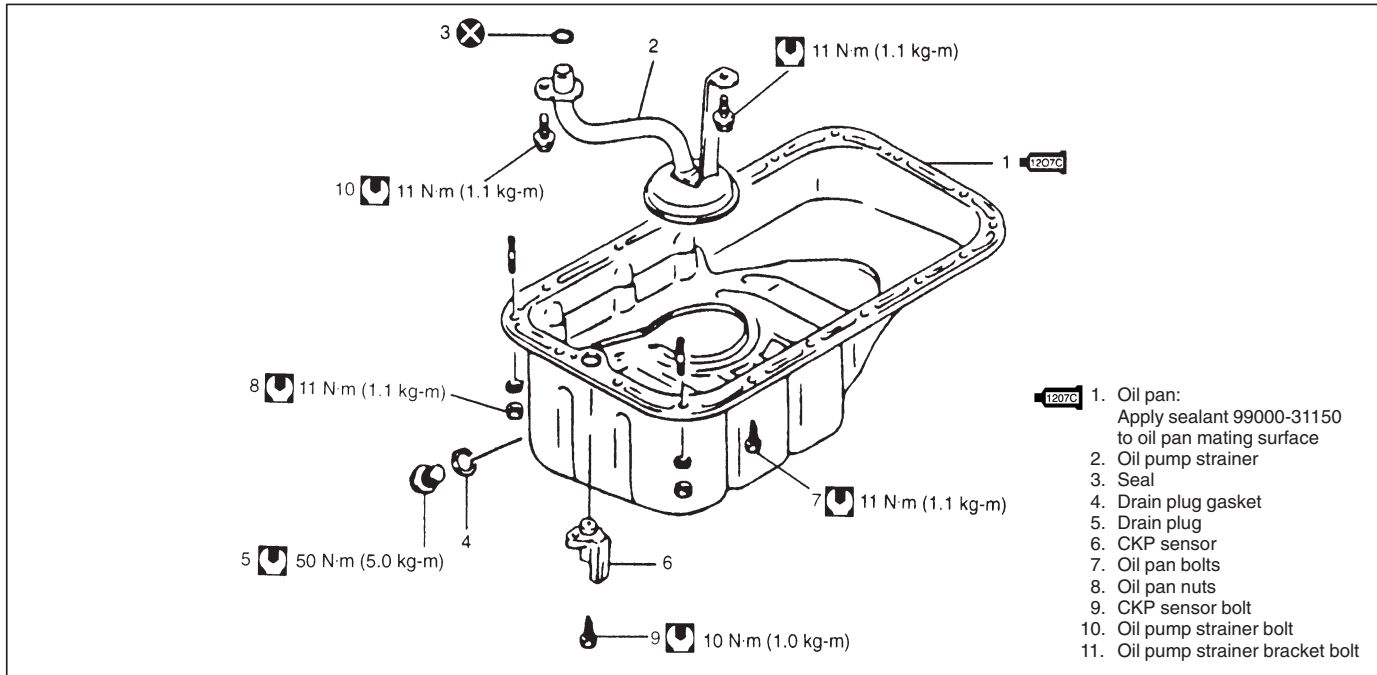
Tightening Torque

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

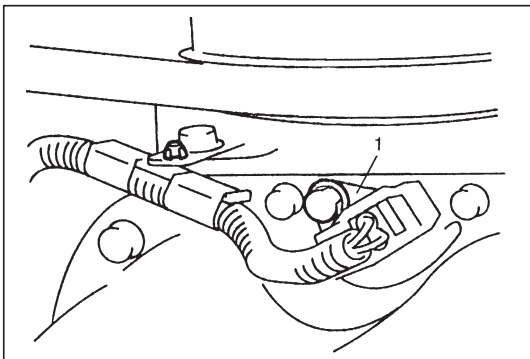
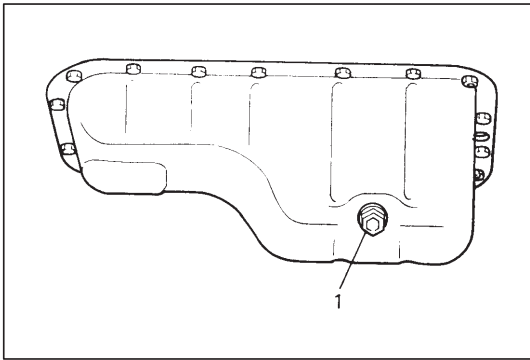
- 12) Remove support device.

- 13) Install A/C compressor bracket and A/C compressor, if equipped.
- 14) Connect A/C suction and discharge hoses, if equipped.
- 15) Adjust drive belt tension, referring to "ENGINE COOLING" section.
- 16) Adjust A/C compressor belt tension, if equipped.
Refer to Section 1B.
- 17) Evacuate and charge air conditioning system, refer to Section 1B.
- 18) Install suction pipe to air cleaner assembly, refer to INSTALLATION of AIR CLEANER ASSEMBLY in this section.
- 19) Connect negative cable at battery.

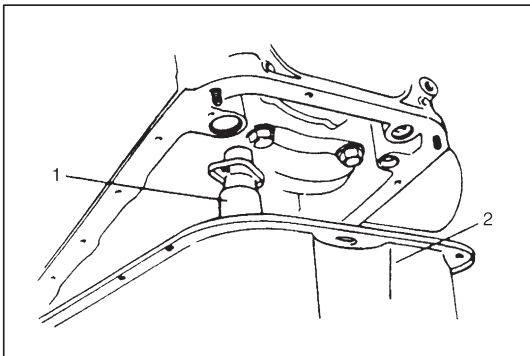
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OIL PAN AND OIL PUMP STRAINER

**REMOVAL**

- 1) Raise vehicle.
- 2) Drain engine oil by removing drain plug (1).



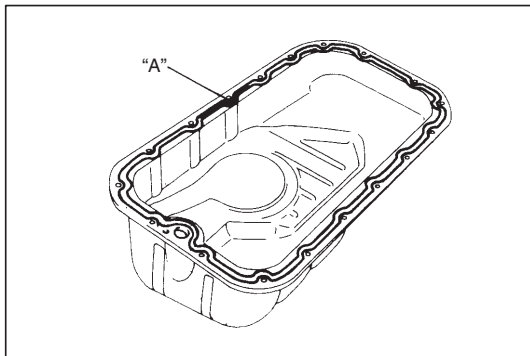
- 3) Remove right side of engine under cover.
- 4) Disconnect oxygen sensor No.2 connector and then remove exhaust No.1 pipe with oxygen sensor No.2.
- 5) Remove clutch housing (torque converter housing for A/T) lower plate.
- 6) Remove CKP sensor (1).



- 7) Remove oil pan (2) and then oil pump strainer (1).

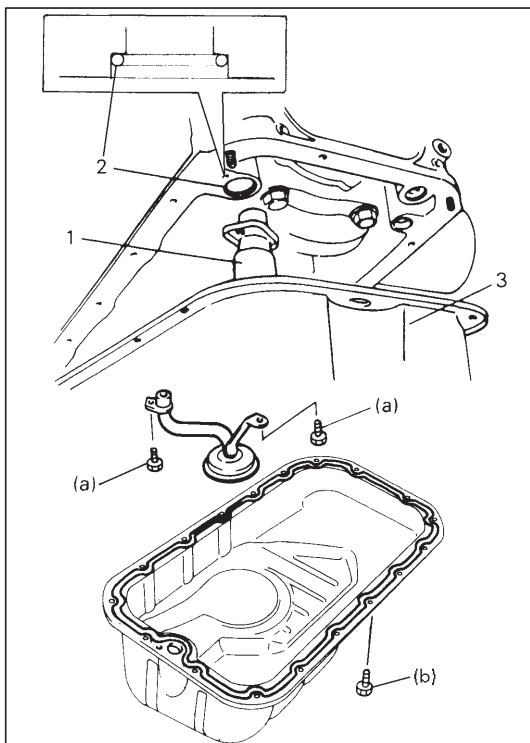
CLEANING

- Clean mating surface of oil pan and cylinder block.
Remove oil, old sealant, and dusts from mating surfaces and oil pan inside.
- Clean oil pump strainer screen.

**INSTALLATION**

- 1) Apply sealant to oil pan mating surface continuously as shown in figure.

"A" Sealant: 99000-31150



- 2) Install oil pump strainer (1) and oil pan (3) as described below. Install O-ring (2) into cylinder block securely as shown in figure. Install oil pump strainer to cylinder block. Tighten strainer bolt first and then bracket bolt to specified torque.

Tightening Torque

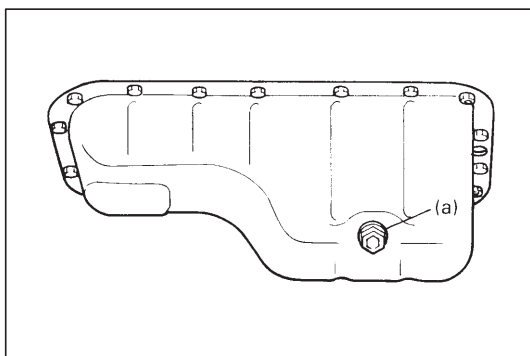
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

After fitting oil pan to cylinder block, run in securing bolts and start tightening at the center: move wrench outward, tightening one bolt at a time.

Tighten bolts to specified torque.

Tightening Torque

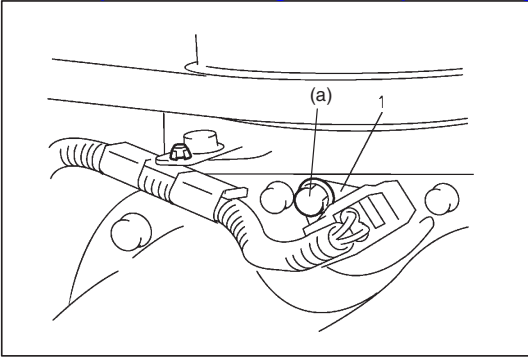
(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)



- 3) Install gasket and drain plug to oil pan. Tighten drain plug to specified torque.

Tightening Torque

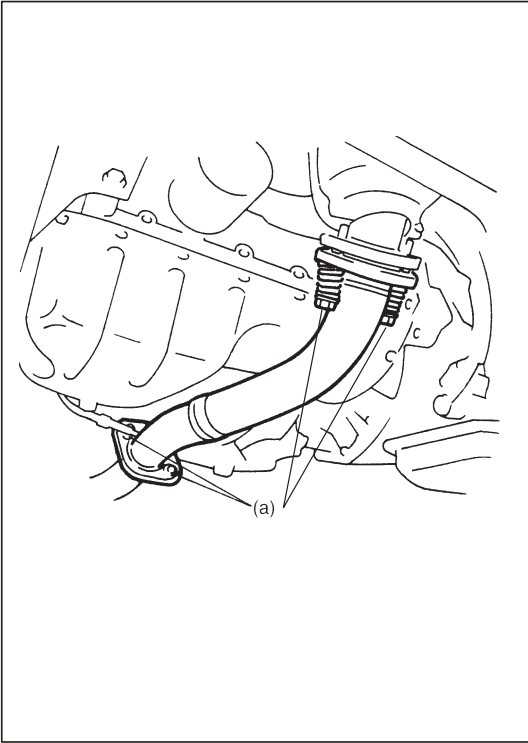
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



- 4) Install CKP sensor (1) and connect its coupler, then clamp its harness.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 5) Install exhaust No.1 pipe and connect oxygen sensor No.2 connector.

Tighten bolts to specified torque.

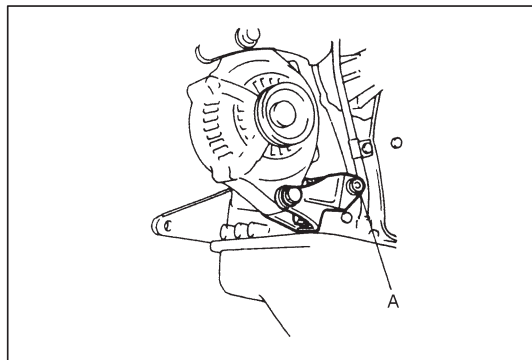
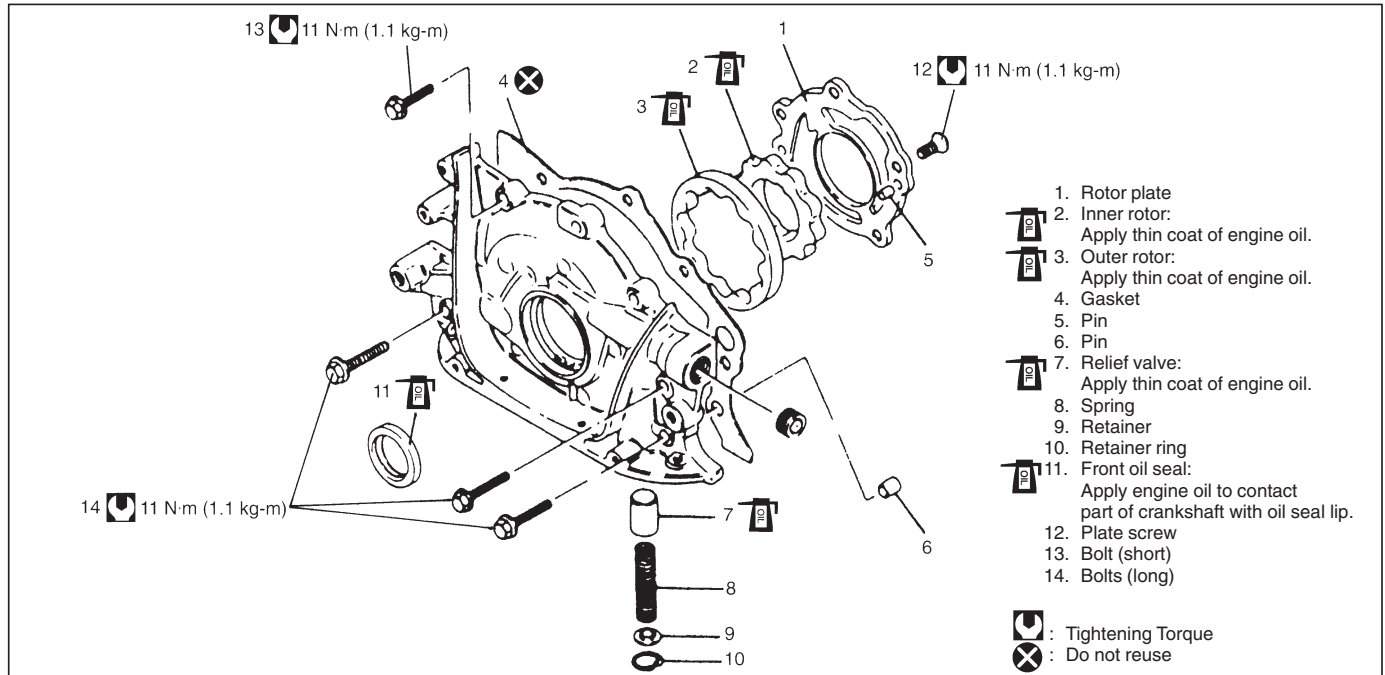
Tightening Torque

(a): 42 N·m (4.2 kg-m, 30.5 lb-ft)

NOTE:

Use new gasket for exhaust No.1 pipe.

- 6) Install right side of engine under covers.
7) Refill engine with engine oil, referring to item "ENGINE OIL CHANGE" in Section 0B.

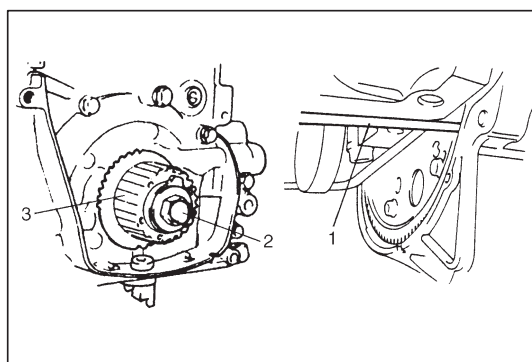
OIL PUMP**REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Remove timing belt as previously outlined.
- 3) Remove generator and its bracket.

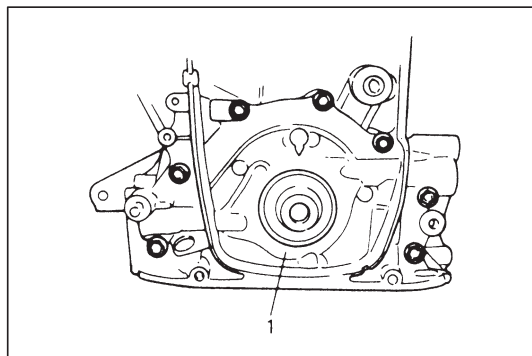
NOTE:

When installing bracket, tighten nut (A) first.

- 4) Remove oil pan and oil pump strainer as previously outlined.



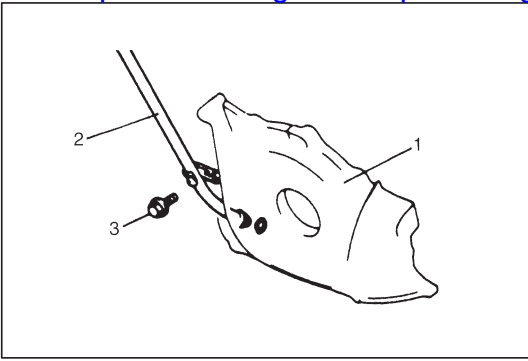
- 5) Remove crankshaft timing belt pulley (3).
 Using flat end rod or the like (1) with flywheel ring gear (drive plate ring gear for A/T) to lock crankshaft.
 With crankshaft locked, remove crankshaft timing belt pulley bolt (2).



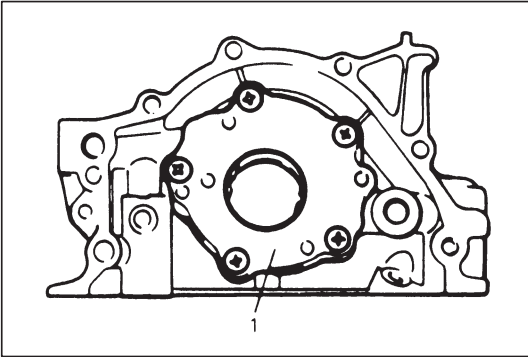
- 6) Remove oil pump (1) assembly.

DISASSEMBLY

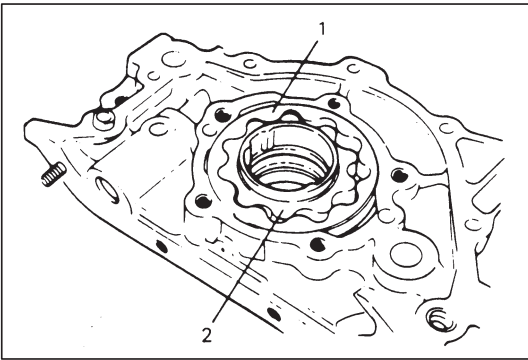
- 1) Remove oil level gauge guide bolt (3) and pull out guide (2) from oil pump (1).

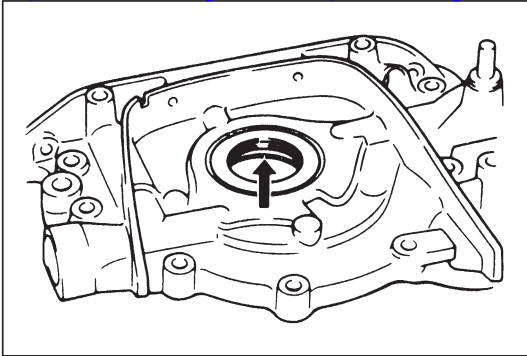


- 2) Remove rotor plate (1).

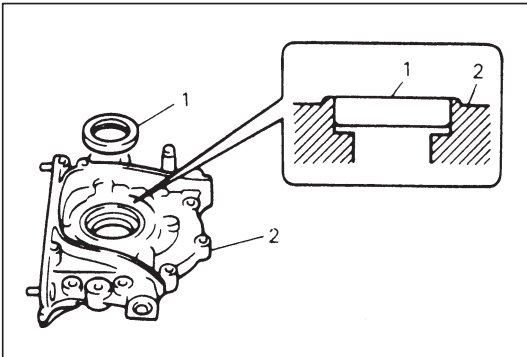


- 3) Remove outer rotor (1) and inner rotor (2).

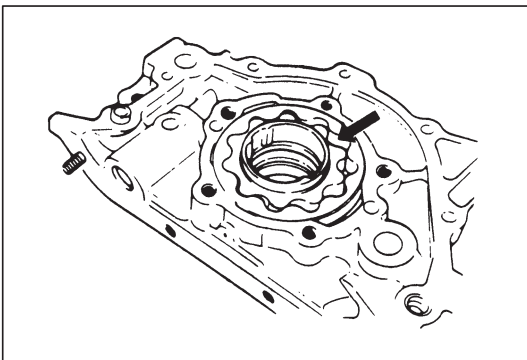


**INSPECTION**

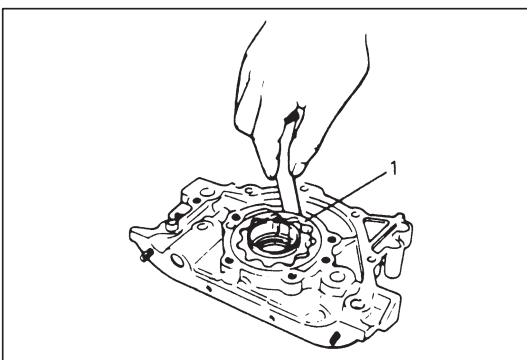
- Check oil seal lip for fault or other damage. Replace as necessary.

**NOTE:**

When installing oil seal (1), press-fit it till its end face is flush with oil pump case (2) end face.



- Check outer and inner rotors, rotor plate, and oil pump case for excessive wear or damage.

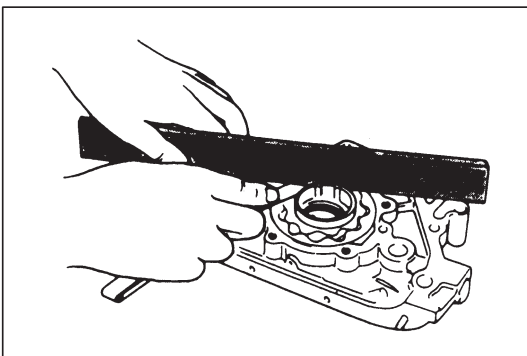
**MEASUREMENT**

- **Radial clearance**

Check radial clearance between outer rotor (1) and case, using thickness gauge.

If clearance exceeds its limit, replace outer rotor or case.

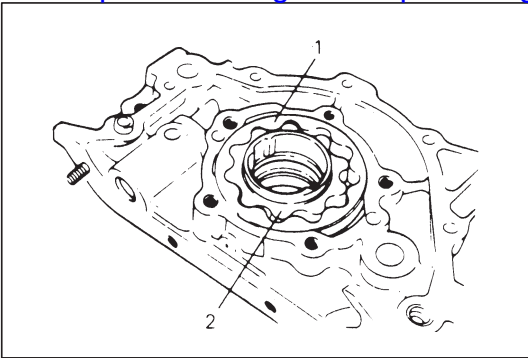
Limit on radial clearance between outer rotor and case:
0.2 mm (0.0079 in.)



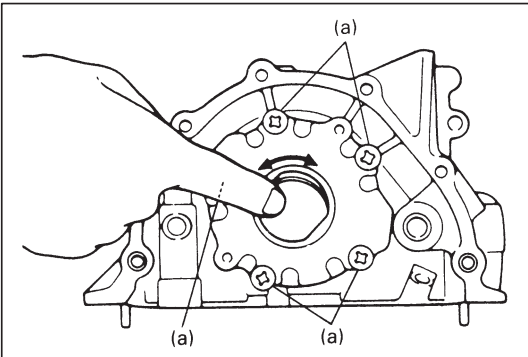
- **Side clearance**

Using straight edge and thickness gauge, measure side clearance.

Limit on side clearance: 0.1 mm (0.0039 in.)

**ASSEMBLY**

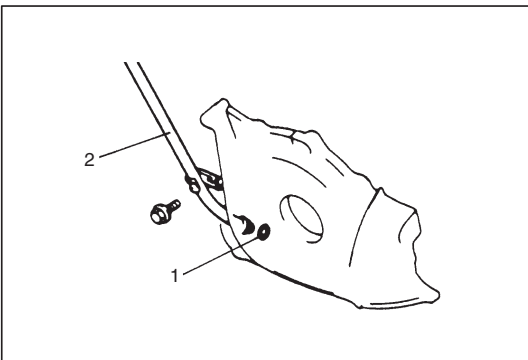
- 1) Wash, clean and then dry all disassembled parts.
- 2) Apply thin coat of engine oil to inner rotor (2) and outer rotor (1), oil seal lip portion, and inside surfaces of oil pump case and plate.
- 3) Install outer and inner rotors to pump case.



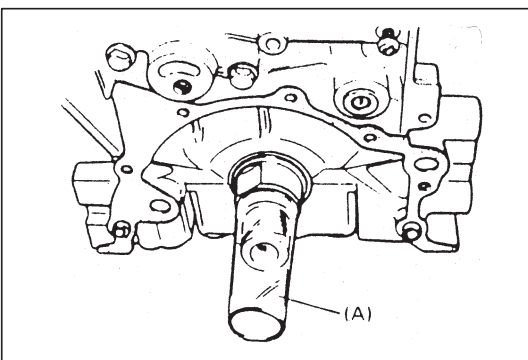
- 4) Install rotor plate. Tighten screws securely. After installing plate, check to be sure that gears turn smoothly by hand.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



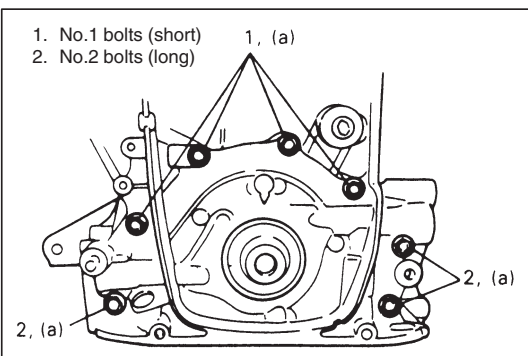
- 5) Apply engine oil to O-ring (1) and install O-ring and guide (2).

**INSTALLATION**

- 1) Install two oil pump pins and oil pump gasket to cylinder block. Use a new gasket.
- 2) To prevent oil seal lip from being damaged or upturned when installing oil pump to crankshaft, fit special tool (Oil seal guide) to crankshaft, and apply engine oil to special tool.

Special Tool

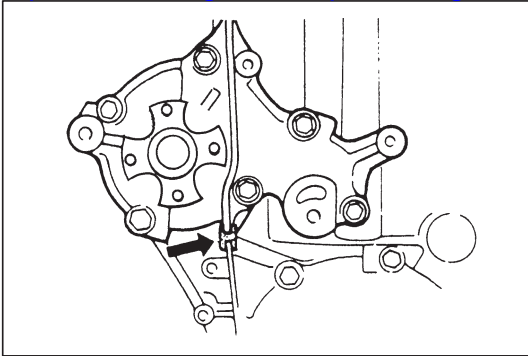
(A): 09926-18210



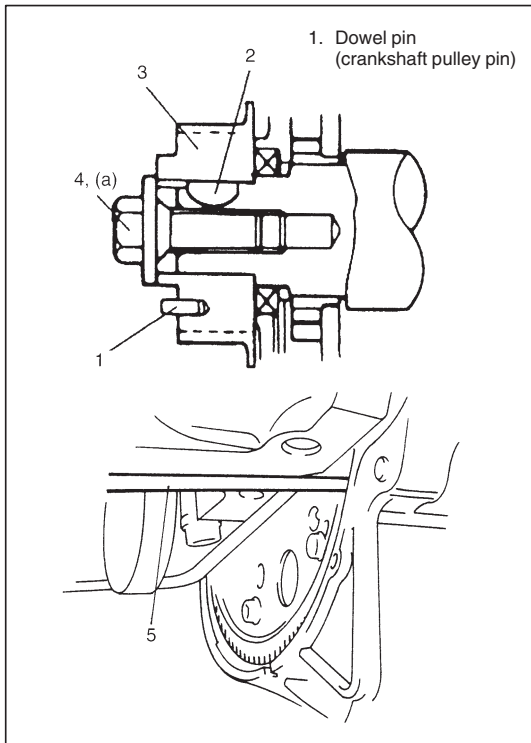
- 3) Install oil pump to cylinder block. As there are 2 types of oil pump bolts, refer to figure for their correct use and tighten them to specified torque.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



4) Install rubber seal between oil pump and water pump.



5) Install key (2) and crank timing belt pulley (3). Refer to figure for proper installation of these parts.

With crankshaft locked using flat end rod or the like (5), tighten crank timing belt pulley bolt (4) to specified torque.

Tightening Torque

(a): 130 N·m (13.0 kg-m, 94.0 lb-ft)

6) Install timing belt, tensioner, oil pump strainer, oil pan and other parts as previously outlined.

7) Check to ensure that all removed parts are back in place.

Reinstall any necessary parts which have not been reinstalled.

8) Adjust water pump drive belt tension, referring to "ENGINE COOLING" section.

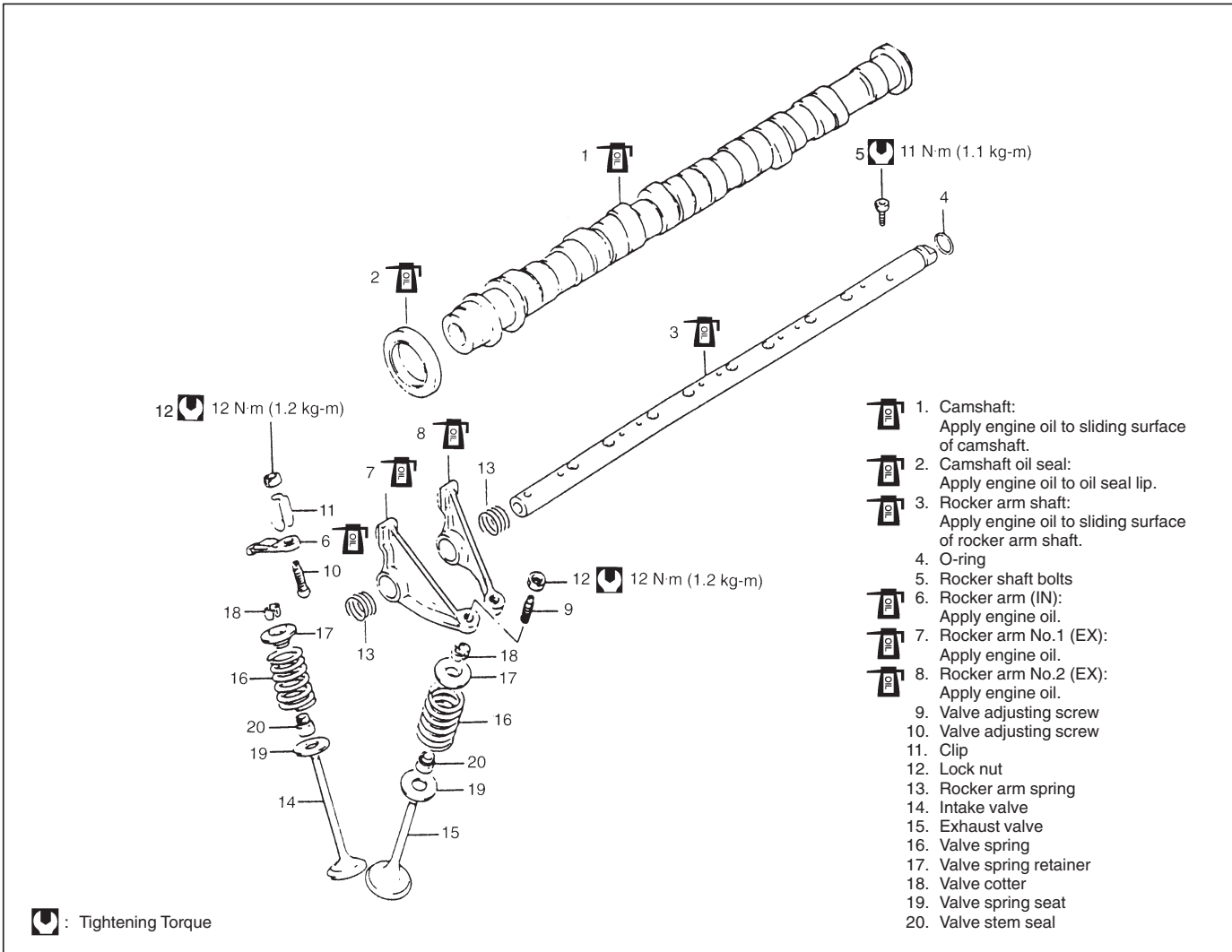
9) Adjust A/C compressor belt tension, if equipped.
Refer to SECTION 1B.

10) Refill engine with engine oil, referring to item "ENGINE OIL CHANGE" in SECTION 0B.

11) Connect negative cable at battery.

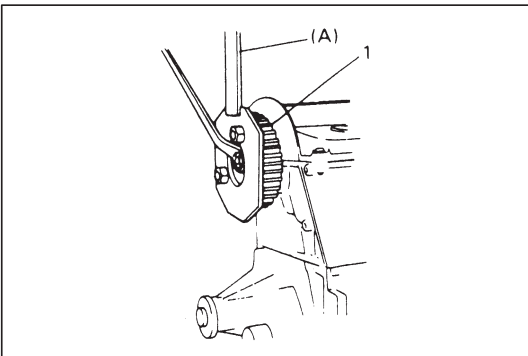
12) After completing installation, check oil pressure by running engine.

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ROCKER ARMS, ROCKER ARM SHAFT AND CAMSHAFT



REMOVAL

- 1) After disconnect negative and positive cables at battery, remove battery and battery tray.
- 2) Drain cooling system.
- 3) Disconnect radiator inlet hose from thermostat case.
- 4) Remove timing belt as previously outlined.

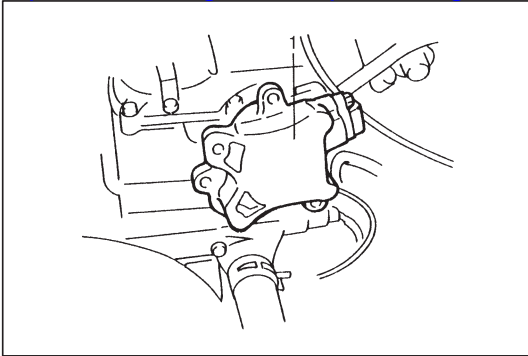


- 5) Remove camshaft timing belt pulley (1) by using special tool.

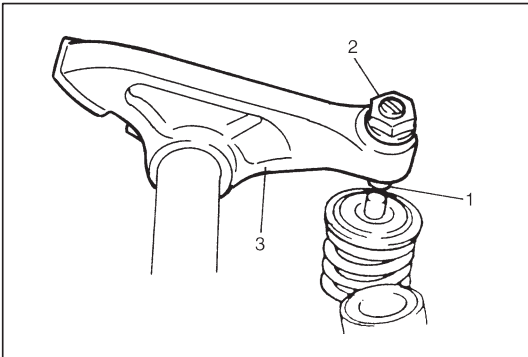
Special Tool

(A): 09917-68220

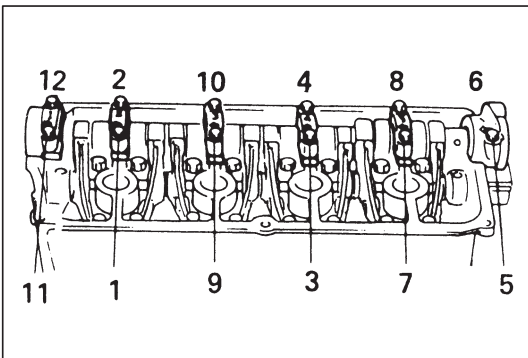
- 6) Remove cylinder head cover as previously outlined.



- 7) Remove engine harness clamp bracket from CMP sensor case (1).
- 8) Disconnect CMP sensor connector and remove CMP sensor case from cylinder head.
Place a container or rag under CMP sensor case, for a small amount of oil flows out during removal of case.



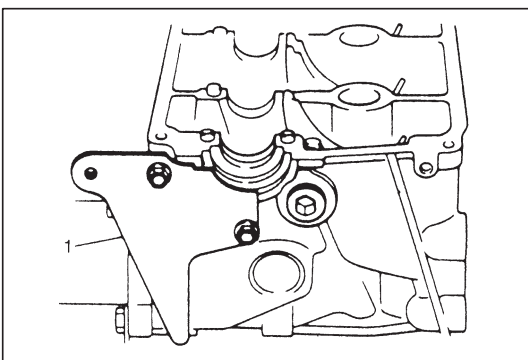
- 9) After loosening all valve adjusting screw lock nuts (2), turn adjusting screws (1) back all the way to allow all rocker arms (3) to move freely.



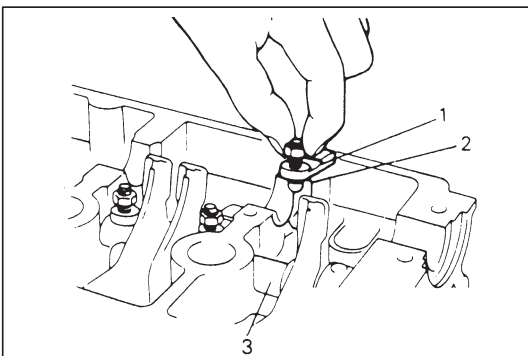
- 10) Remove camshaft housing and camshaft.

NOTE:

To remove camshaft housing bolts, loosen them in such order as indicated in figure, a little at a time.



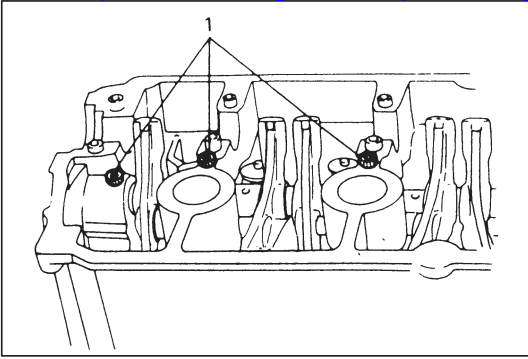
- 11) Remove timing belt inside cover (1).



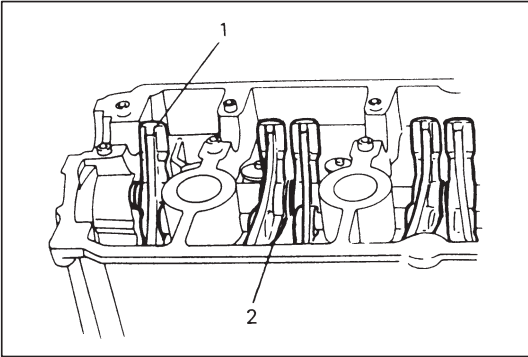
- 12) Remove intake rocker arm (1) with clip (2) from rocker arm shaft (3).

NOTE:

Do not bend clip when removing intake rocker arm.

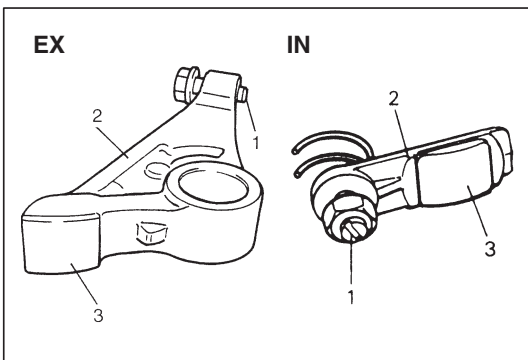


13) Remove rocker arm shaft bolts (1).



14) Remove exhaust rocker arms (1) and rocker arm spring (2) by pulling rocker arm shaft to transmission side.

15) Remove O-ring from rocker arm shaft.

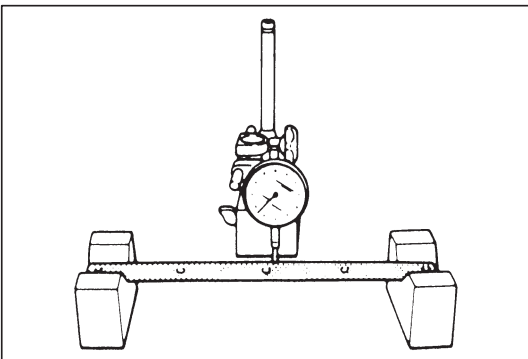


INSPECTION

Adjusting Screw and Rocker Arm

If tip of adjusting screw (1) is badly worn, replace it.

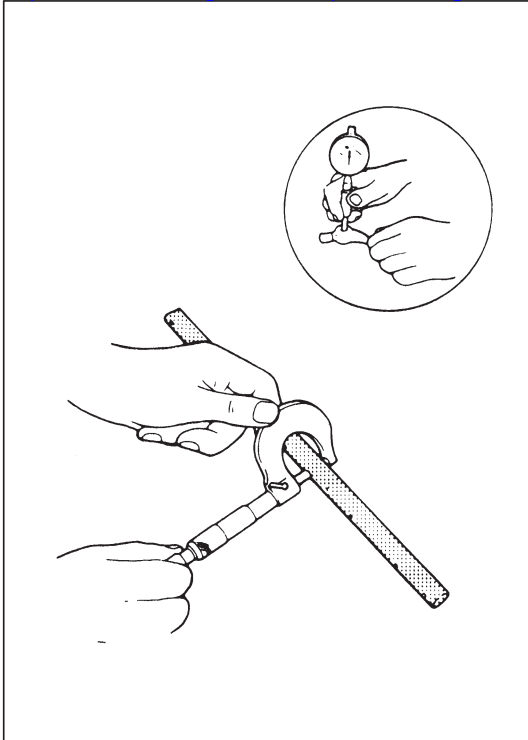
Rocker arm (2) must be replaced if its cam-riding face (3) is badly worn.



Rocker Arm Shaft Runout

Using "V" blocks and dial gauge, check runout. If runout exceeds its limit, replace rocker arm shaft.

Runout limit: 0.10 mm (0.004 in.)



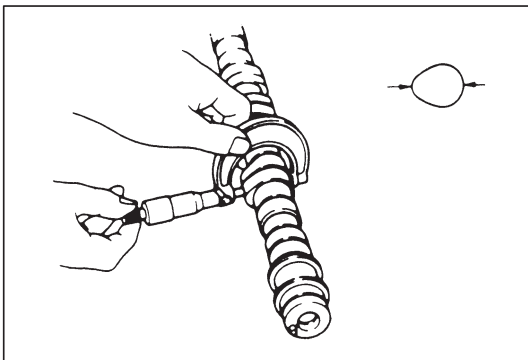
Rocker Arm-to-Rocker Arm Shaft Clearance

Using a micrometer and a bore gauge, measure rocker shaft dia. and rocker arm I.D.

Difference between two readings is arm-to-shaft clearance on which a limit is specified.

If limit is exceeded, replace shaft or arm, or both.

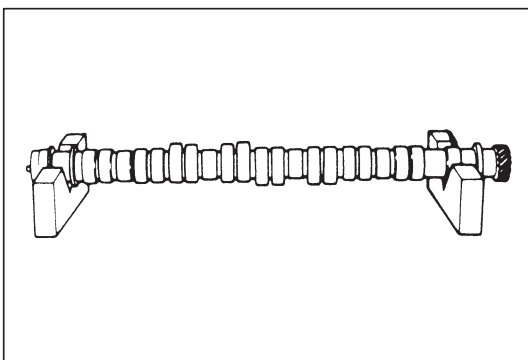
Item	Standard	Limit
Rocker arm I.D.	15.996 – 16.014 mm (0.629 – 0.630 in.)	—
Rocker arm shaft dia.	15.969 – 15.984 mm (0.6287 – 0.6293 in.)	—
Arm-to-shaft clearance	0.012 – 0.045 mm (0.0005 – 0.0018 in.)	0.09 mm (0.0035 in.)



Cam Wear

Using a micrometer, measured height of cam. If measured height is below limit, replace camshaft.

Cam height	Standard	Limit
Intake cam	36.184 – 36.344 mm (1.4246 – 1.4309 in.)	36.084 mm (1.4206 in.)
Exhaust cam	35.900 – 36.060 mm (1.4134 – 1.4197 in.)	35.800 mm (1.4094 in.)

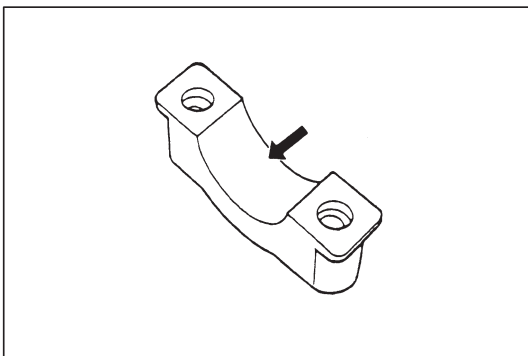


Camshaft Runout

Hold camshaft between two “V” blocks, and measure runout by using a dial gauge.

If runout exceeds the limit, replace camshaft.

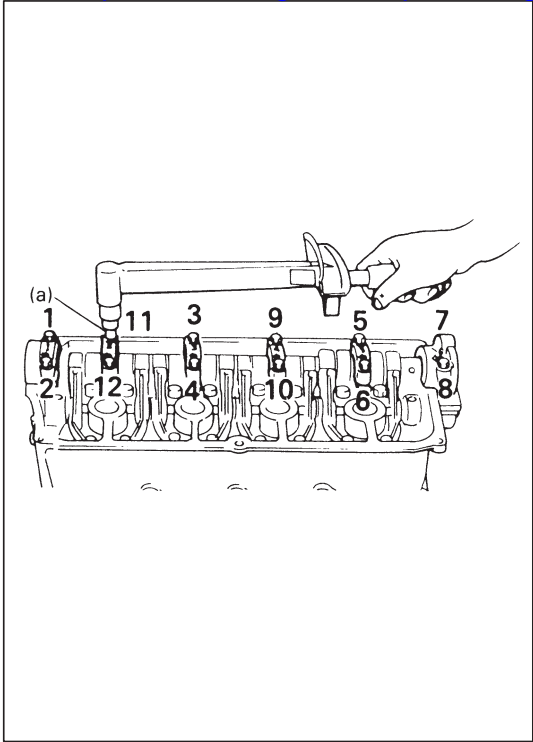
Runout limit: 0.10 mm (0.0039 in.)



Camshaft Journal Wear

Check camshaft journals and camshaft housings for pitting, scratches, wear or damage.

If any malfunction is found, replace camshaft or cylinder head with housing. Never replace cylinder head without replacing housing.



Check clearance by using plasticgauge.

The procedure is as follows.

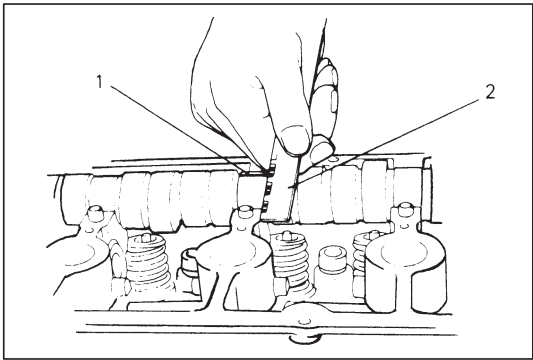
- 1) Clean housings and camshaft journals.
- 2) Install camshaft to cylinder head.
- 3) Place a piece of plasticgauge the full width of journal of camshaft (parallel to camshaft).
- 4) Install camshaft housing, referring to INSTALLATION of following page.
- 5) Tighten camshaft housing bolts in such order as indicated in figure a little at a time till they are tightened to specified torque.

Tightening Torque

(a): 11 N·m (1.1 kg·m, 8.0 lb·ft)

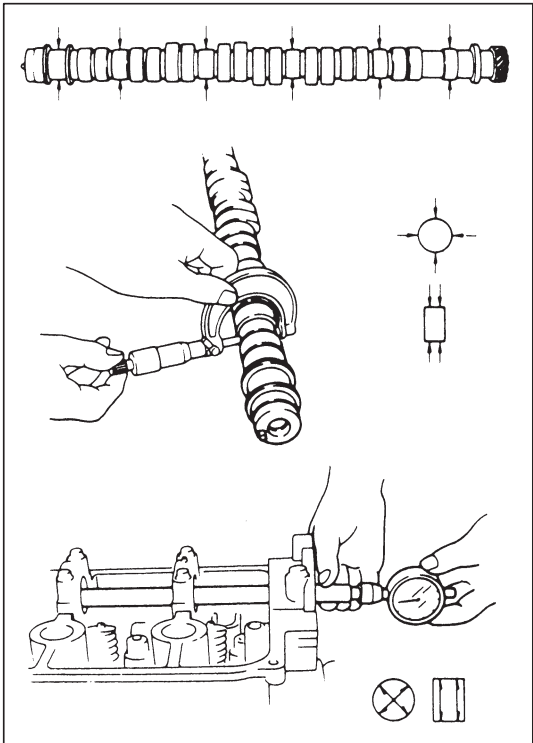
NOTE:

Do not rotate camshaft while plasticgauge is installed.



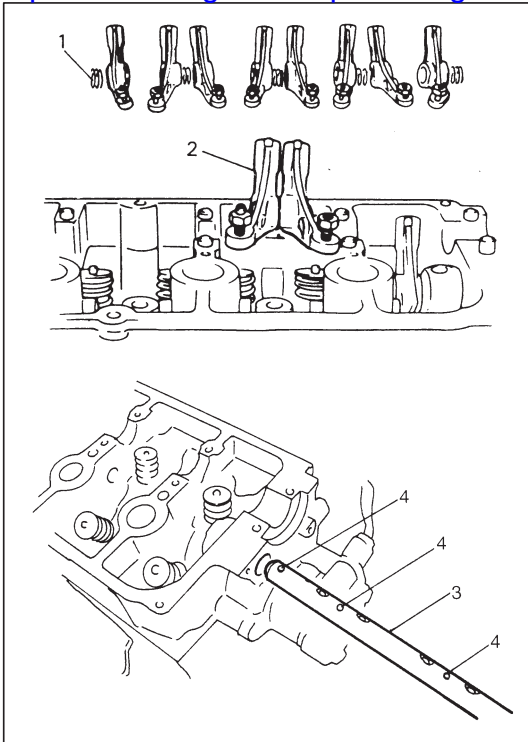
- 6) Remove housing and using scale (2) on plasticgauge envelope, measure plasticgauge (1) width at its widest point.

	Standard	Limit
Journal clearance	0.040 – 0.082 mm (0.0016 – 0.0032 in.)	0.12 mm (0.0047 in.)



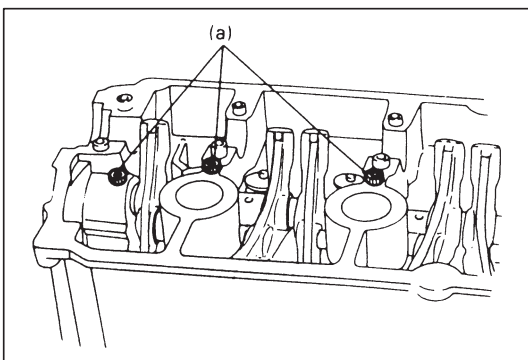
If measured camshaft journal clearance exceeds limit, measure journal (housing) bore and outside diameter of camshaft journal. Replace camshaft or cylinder head assembly whichever the difference from specification is greater.

Item	Standard
Camshaft journal bore die.	28.000 – 28.021 mm (1.1024 – 1.1031 in.)
Camshaft journal O.D.	27.939 – 27.960 mm (1.1000 – 1.1008 in.)

**INSTALLATION**

- 1) Apply engine oil to rocker arm shaft and rocker arms.
- 2) Install rocker arm shaft (3) with shaft bolt holes (4) facing up, rocker arm (exhaust side) (2) and rocker arm spring (1).

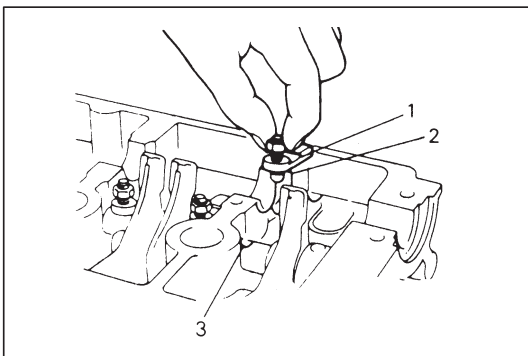
- 3) Check O-ring for damage or deterioration.
Install O-ring to rocker arm shaft.



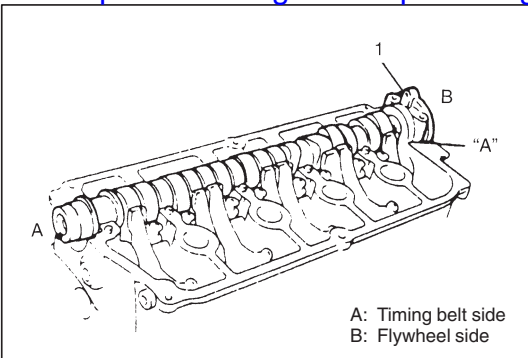
- 4) Install rocker arm shaft bolts and tighten them to specified torque.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



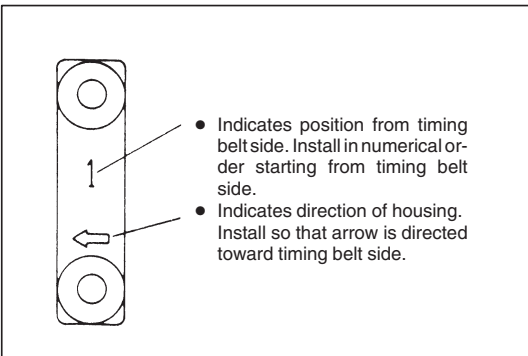
- 5) Fill small amount of engine oil into arm pivot holding part (3) of rocker arm shaft. Install rocker arm (intake side) (1) with clips (2) to rocker arm shaft.



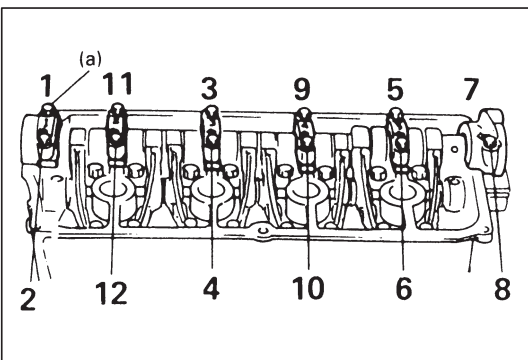
6) Apply engine oil to cams and journals on camshaft and put camshaft on cylinder head. Install camshaft housing to camshaft and cylinder head.

- Apply engine oil to sliding surface of each housing against camshaft journal.
- Apply sealant to mating surface of No.6 housing (1) which will mate with cylinder head.

“A” Sealant: 99000-31110



- Embossed marks are provided on each camshaft housing, indicating position and direction for installation. Install housings as indicated by these marks.
- As camshaft housing No.1 retains camshaft in proper position as to thrust direction, make sure to first fit No.1 housing to No.1 journal of camshaft securely.

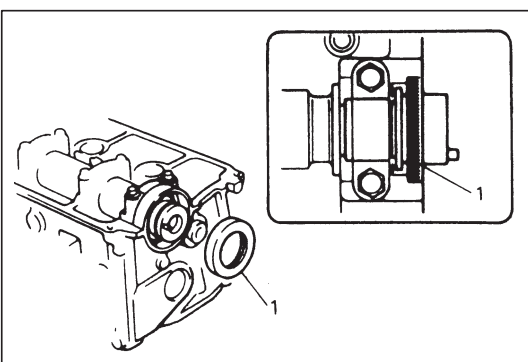


- After applying engine oil to housing bolts, tighten them temporarily first. Then tighten them by following sequence as indicated in figure.

Tighten a little at a time and evenly among bolts and repeat tightening sequence two to three times before they are tightened to specified torque.

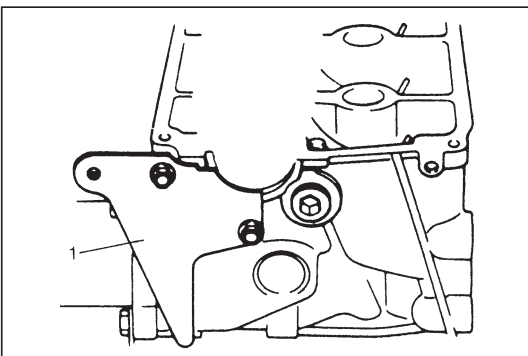
Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

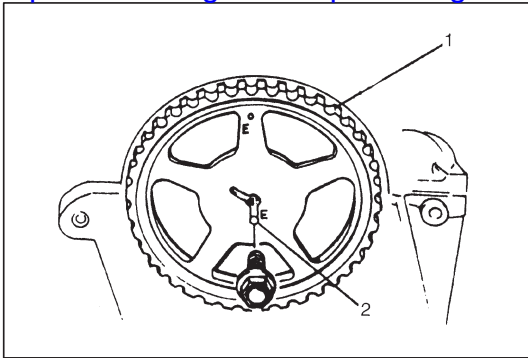


7) Install camshaft oil seal (1).

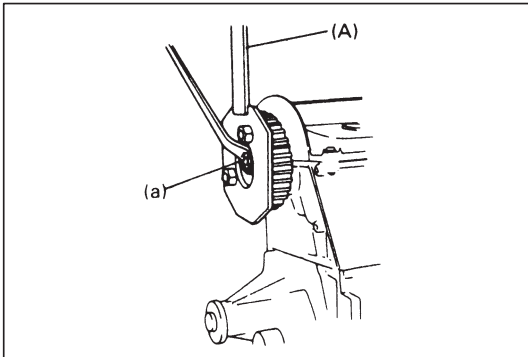
After applying engine oil to oil seal lip, press-fit camshaft oil seal till oil seal surface becomes flush with housing surface.



8) Install timing belt inside cover (1).



- 9) Install camshaft timing belt pulley (1) to camshaft while fitting pin (2) on camshaft into slot at "E" mark.



- 10) Using special tool, tighten pulley bolt to specified torque.

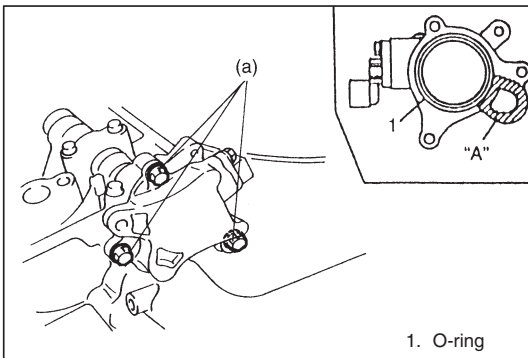
Tightening Torque

(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)

Special Tool

(A): 09917-68220

- 11) After place cylinder head cover on proper position, install belt tensioner, timing belt, outside cover, crankshaft pulley, water pump belt and engine right mounting bracket and stiffener as previously outlined.
- 12) Remove cylinder head cover.



- 13) After applying sealant to part "A" as shown in figure at the left, install CMP sensor case to cylinder head and tighten its fixing bolts to specified torque.

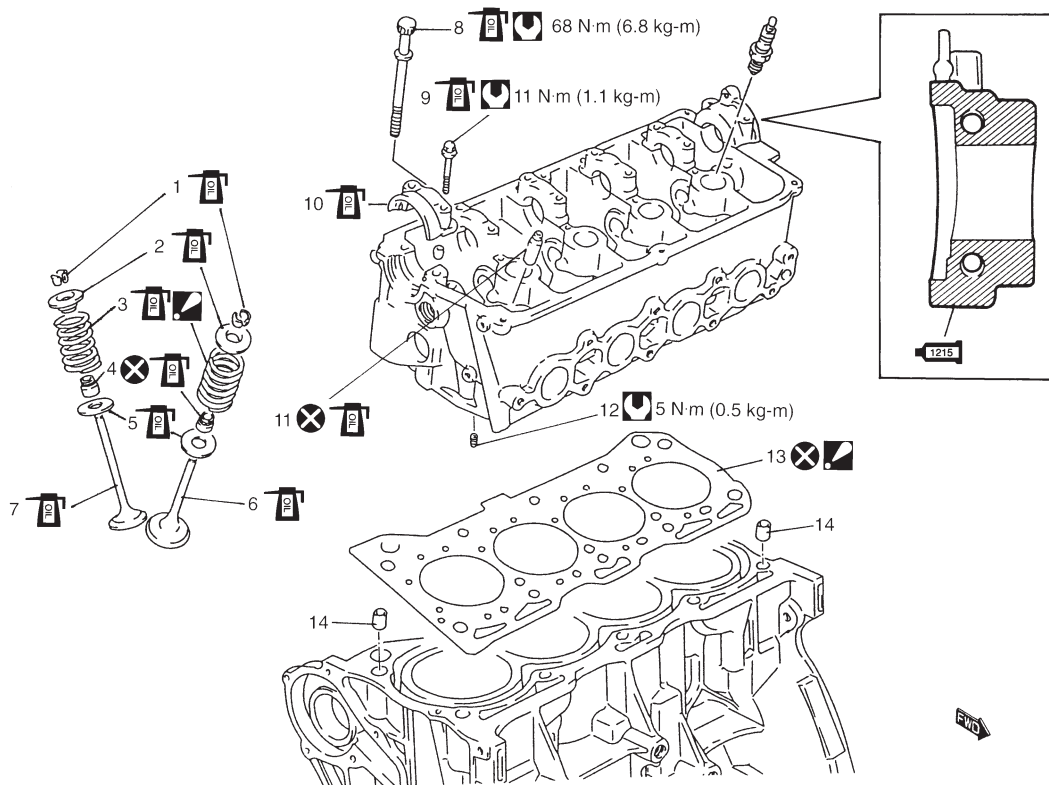
"A" Sealant: 99000-31110

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

Connect CMP sensor connector.

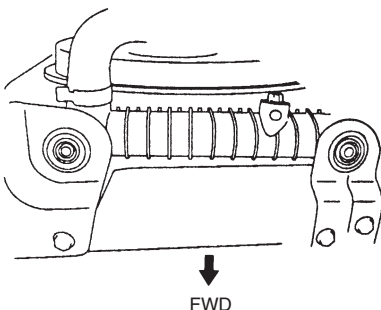
- 14) Adjust valve clearance as previously outlined.
- 15) Install cylinder head cover.
- 16) After install battery tray and battery, connect positive and negative cables at battery.
- 17) Confirm that ignition timing is within specification referring to "IGNITION SYSTEM" section.



- 1. Valve cotters:
Apply engine oil.
- 2. Valve spring retainer:
Apply engine oil.
- 3. Valve spring:
Apply engine oil.
Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).
- 4. Valve stem seal:
Apply engine oil.

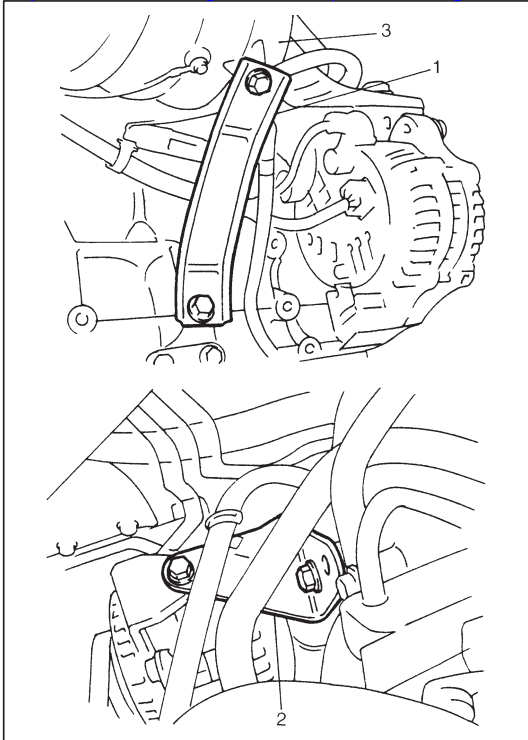
- 5. Valve spring seat:
Apply engine oil.
- 6. Exhaust valve:
Apply engine oil to valve stem.
- 7. Intake valve:
Apply engine oil to valve stem.
- 8. Cylinder head bolt:
Apply engine oil.
- 9. Camshaft housing bolt:
Apply engine oil.

- 10. Camshaft housing:
Apply engine oil to sliding surface of each housing against camshaft journal.
Apply sealant to mating surface of No.6 housing.
- 11. Valve guide:
Apply engine oil to valve guide bore.
- 12. Oil venturi plug
- 13. Cylinder head gasket:
"TOP" mark provided on gasket comes to crankshaft pulley side, facing up (toward cylinder head side).
- 14. Dowel pin

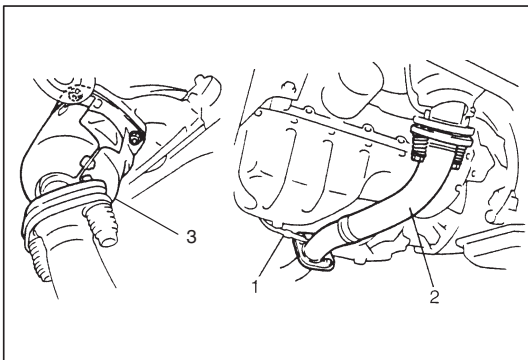


REMOVAL

- 1) Relieve fuel pressure according to procedure described in Section 6.
- 2) Disconnect negative cable at battery.
- 3) Drain cooling system.
- 4) Remove air cleaner outlet hose No.1 and No.2 with intake joint and suction pipe as previously outlined.



- 5) Remove intake manifold rear stiffener (1) and generator adjust arm reinforcement (2) from intake manifold (3).



- 6) Disconnect oxygen sensor No.2 coupler (1) and remove exhaust No.1 pipe (2) with catalytic converter case (3).

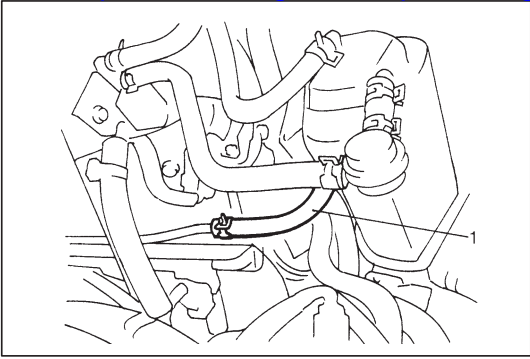
- 7) Disconnect following electric wires:

- MAP sensor
 - CMP sensor
 - Engine oil pressure switch
 - Ignition coil assembly
 - ECT sensor
 - Ground wire from intake manifold and cylinder head
 - Injectors
 - TP sensor
 - IAC valve
 - Oxygen sensor (if equipped)
 - EVAP canister purge valve (if equipped)
- and then release above wire harnesses from clamps.

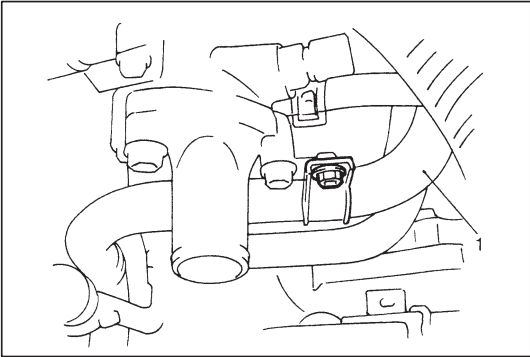
- 8) Disconnect following hoses:

- Canister purge hose from EVAP canister purge valve
- Radiator inlet hose from thermostat case
- Brake booster hose from intake manifold
- Heater inlet hose from pipe
- Throttle body outlet hose from throttle body

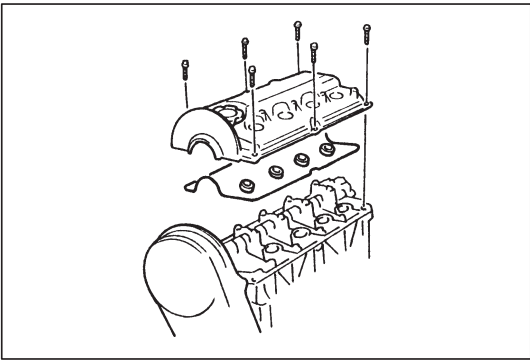
- 9) Disconnect accelerator cable from throttle body and each clamp.



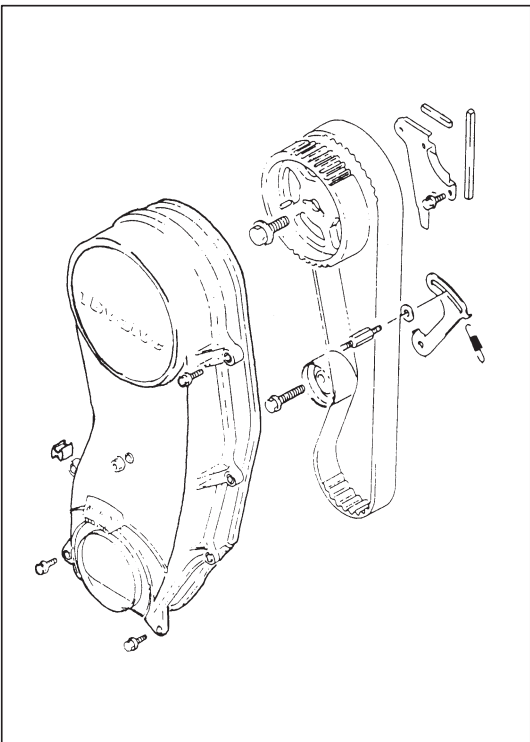
10) Disconnect fuel feed hose (1) from fuel delivery pipe.



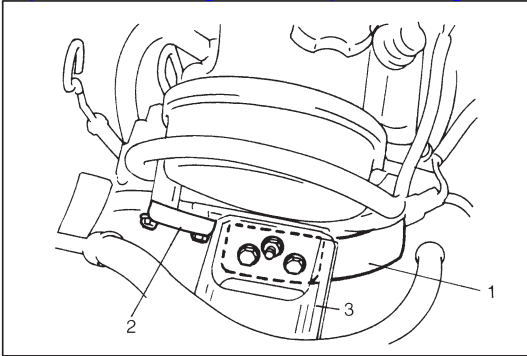
11) Disconnect water inlet pipe (1) from its bracket.



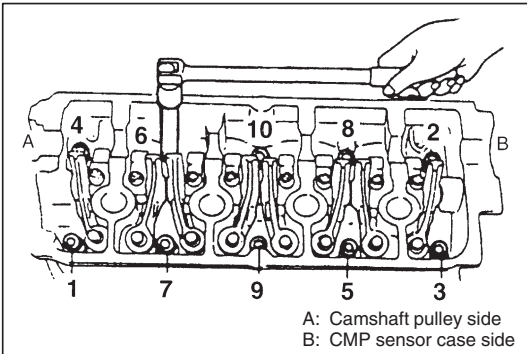
12) Remove cylinder head cover as previously outlined.
Loosen all valve lash adjusting screws fully.



13) Remove timing belt and camshaft as previously outlined.

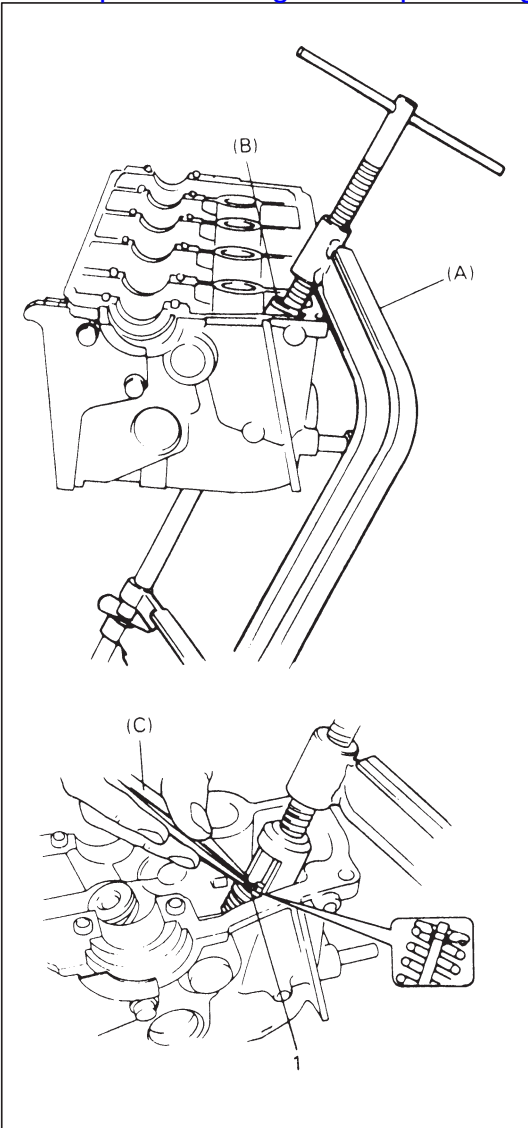


- 14) Install engine right mounting bracket (1), stiffener (2) and engine right mounting swing bracket (3).
- 15) Remove support device.



- 16) Loosen cylinder head bolts in such order as indicated in figure and remove them.
- 17) Check all around cylinder head for any other parts required to be removed or disconnected and remove or disconnect whatever necessary.

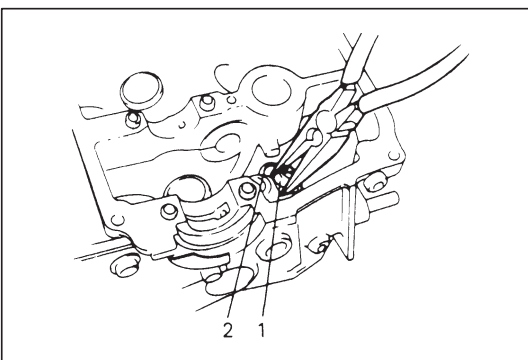
- 18) Remove cylinder head with thermostat case, intake manifold and exhaust manifold.

**DISASSEMBLY**

- 1) For ease in servicing cylinder head, remove thermostat case, intake manifold with throttle body and exhaust manifold from cylinder head.
- 2) Remove rocker arms and springs by pulling its shaft out to transmission side.
- 3) Using special tool (Valve lifter), compress valve springs and then remove valve cotters (1) by using special tool (Forceps) as shown.

Special Tool**(A): 09916-14510****(B): 09916-14910****(C): 09916-84511**

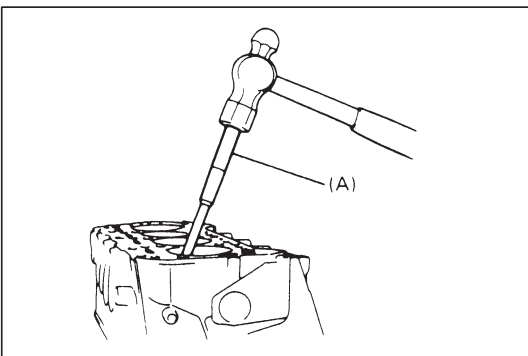
- 4) Release special tool, and remove spring retainer and valve spring.
- 5) Remove valve from combustion chamber side.



- 6) Remove valve stem oil seal (1) from valve guide and then valve spring seat (2).

NOTE:

Do not reuse oil seal once disassembled. Be sure to use new oil seal when assembling.

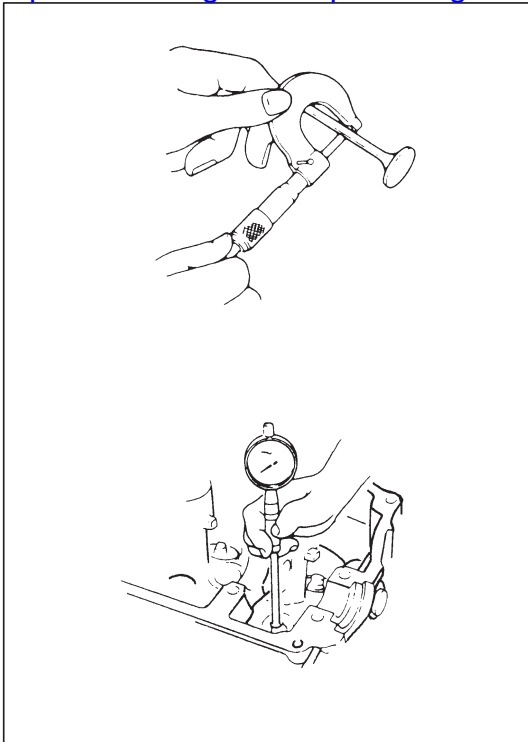


- 7) Using special tool (Valve guide remover), drive valve guide out from combustion chamber side to valve spring side.

Special Tool**(A): 09916-44910****NOTE:**

Do not reuse valve guide once disassembled. Be sure to use new valve guide (Oversize) when assembling.

- 8) Place disassembled parts except valve stem seal and valve guide in order, so that they can be installed in their original position.

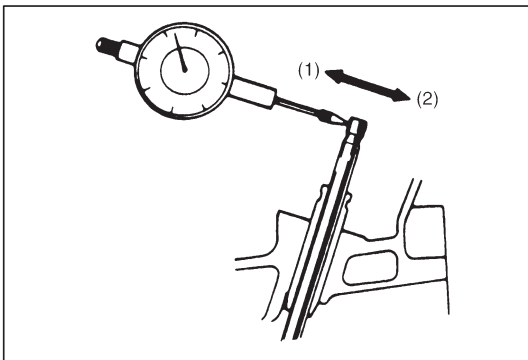
**INSPECTION****Valve Guides**

Using a micrometer and bore gauge, take diameter readings on valve stems and guides to check stem-to-guide clearance.

Be sure to take reading at more than one place along the length of each stem and guide.

If clearance exceeds limit, replace valve and valve guide.

Item		Standard	Limit
Valve stem diameter	In	5.465 – 5.480 mm (0.2152 – 0.2157 in.)	–
	Ex	5.440 – 5.455 mm (0.2142 – 0.2148 in.)	–
Valve guide I.D.	In	5.500 – 5.512 mm (0.2166 – 0.2170 in.)	–
	Ex	5.440 – 5.455 mm (0.2142 – 0.2148 in.)	–
Stem-to-guide clearance	In	0.020 – 0.047 mm (0.0008 – 0.0018 in.)	0.07 mm (0.0027 in.)
	Ex	0.045 – 0.072 mm (0.0018 – 0.0028 in.)	0.09 mm (0.0035 in.)

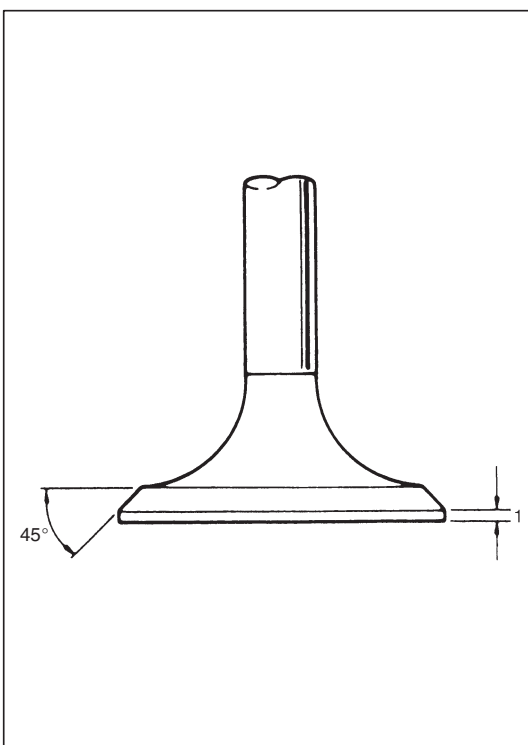


If bore gauge is not available, check end deflection of valve stem with a dial gauge instead.

Move stem end in directions (1) and (2) to measure end deflection.

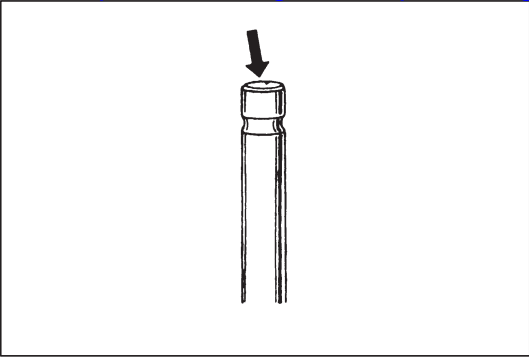
If deflection exceeds its limit, replace valve stem and valve guide.

Valve stem end deflection limit	In	0.14 mm (0.005 in.)
	Ex	0.18 mm (0.007 in.)

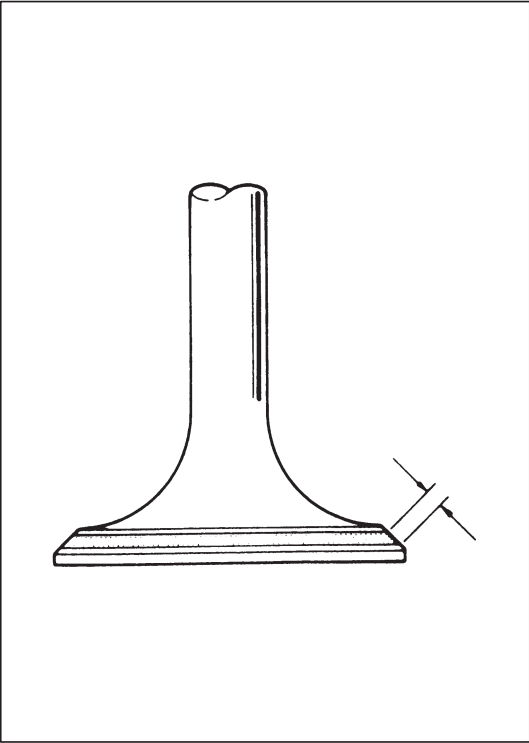
**Valves**

- Remove all carbon from valves.
- Inspect each valve for wear, burn or distortion at its face and stem and, as necessary, replace it.
- Measure thickness (1) of valve head. If measured thickness exceeds limit, replace valve.

Valve head thickness		
	Standard	Limit
IN	0.8 – 1.2 mm (0.03 – 0.047 in.)	0.6 mm (0.024 in.)
EX		0.7 mm (0.027 in.)



- Inspect valve stem end face for pitting and wear. If pitting or wear is found there, valve stem end may be resurfaced, but not so much as to grind off its chamfer. When it is worn so much that its chamfer is gone, replace valve.

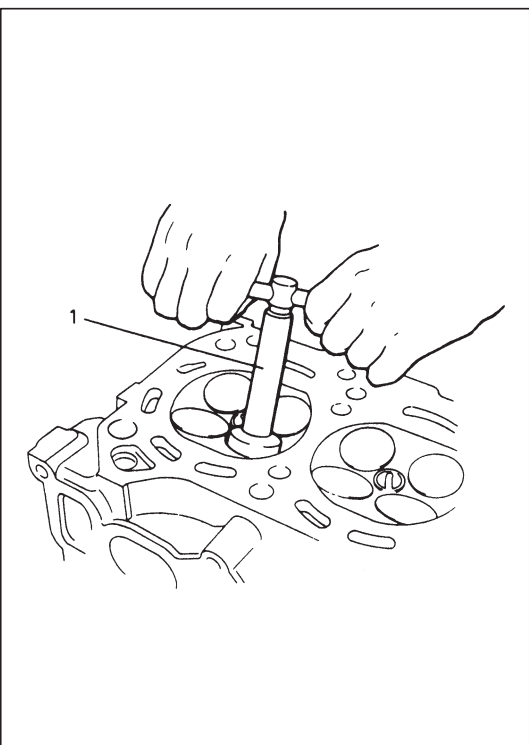


- **Seating contact width:**

Create contact pattern on each valve in the usual manner, i.e., by giving uniform coat of marking compound to valve seat and by rotatingly tapping seat with valve head. Valve lapper (tool used in valve lapping) must be used.

Pattern produced on seating face of valve must be a continuous ring without any break, and the width of pattern must be within specified range.

Standard seating width revealed by contact pattern on valve face	In	1.1 – 1.3 mm
	Ex	(0.0433 – 0.0512 in.)



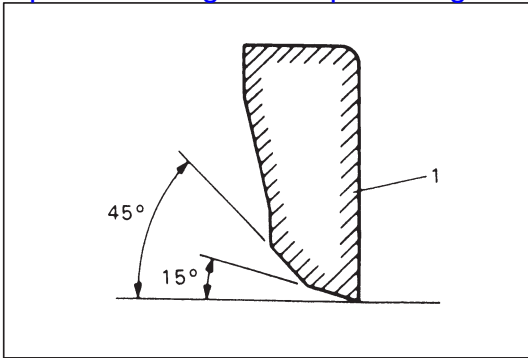
- **Valve seat repair:**

A valve seat not producing a uniform contact with its valve or showing width of seating contact that is out of specified range must be repaired by regrinding or by cutting and regrinding and finished by lapping.

1. **EXHAUST VALVE SEAT:** Use valve seat cutters (1) to make two cuts as illustrated in figure. Two cutters must be used: the first for making 15° angle, and the second for making 45° angle. The second cut must be made to produce desired seat width.

Seat width for exhaust valve seat:

1.1 – 1.3 mm (0.0433 – 0.0512 in.)

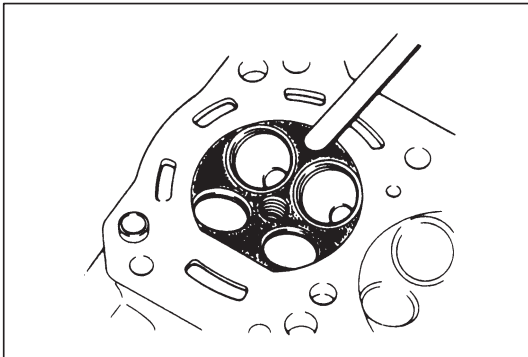


2. INTAKE VALVE SEAT: Cutting sequence is the same as for exhaust valve seats (1).

Seat width for intake valve seat:

1.1 – 1.3 mm (0.0433 – 0.0512 in.)

3. VALVE LAPPING: Lap valve on seat in two steps, first with coarse size lapping compound applied to face and the second with fine-size compound, each time using valve lapper according to usual lapping method.



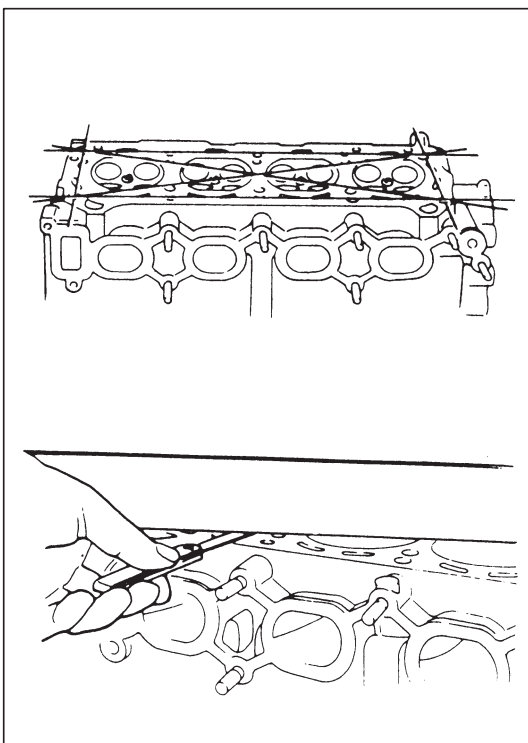
Cylinder Head

- Remove all carbon from combustion chambers.

NOTE:

Do not use any sharp-edged tool to scrape off carbon. Be careful not to scuff or nick metal surfaces when decarbonizing. The same applies to valves and valve seats, too.

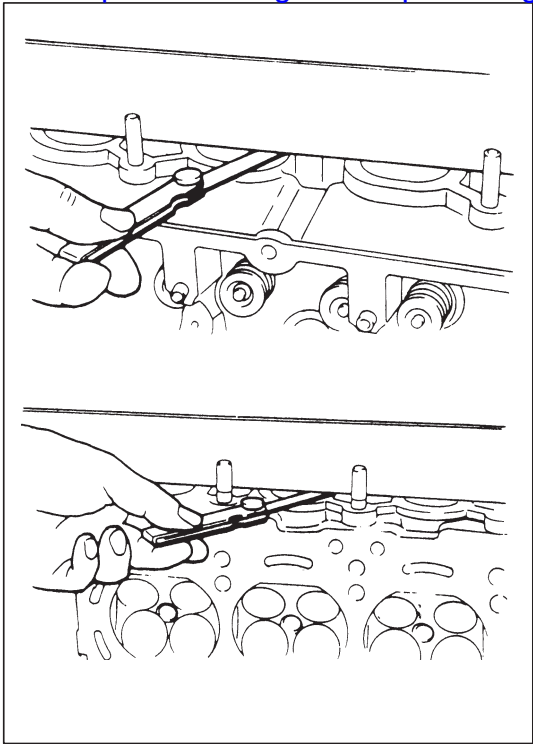
- Check cylinder head for cracks in intake and exhaust ports, combustion chambers, and head surface.



- Flatness of gasketed surface:

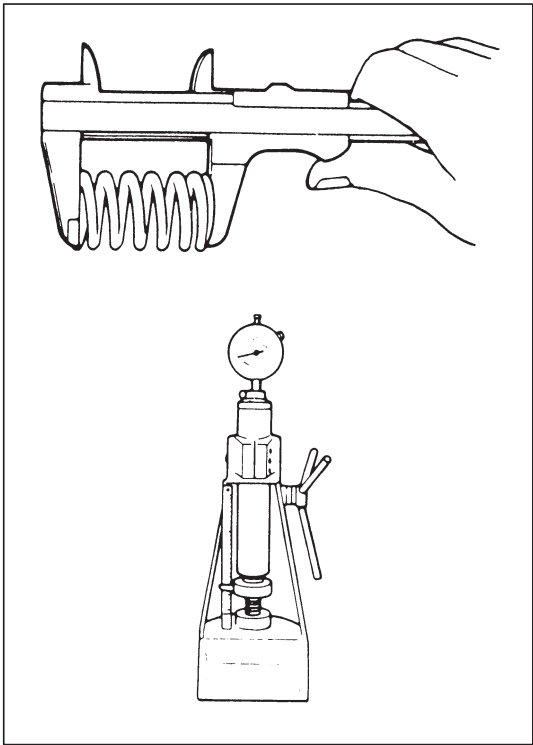
Using a straightedge and thickness gauge, check surface at a total of 6 locations. If distortion limit, given below, is exceeded, correct gasketed surface with a surface plate and abrasive paper of about #400 (Waterproof silicon carbide abrasive paper): place paper on and over surface plate, and rub gasketed surface against paper to grind off high spots. Should this fail to reduce thickness gauge readings to within limit, replace cylinder head. Leakage of combustion gases from this gasketed joint is often due to warped gasketed surface: such leakage results in reduced power output.

Limit of distortion: 0.05 mm (0.002 in.)



- Distortion of manifold seating faces:
Check seating faces of cylinder head for manifolds, using a straightedge and thickness gauge, in order to determine whether these faces should be corrected or cylinder head replaced.

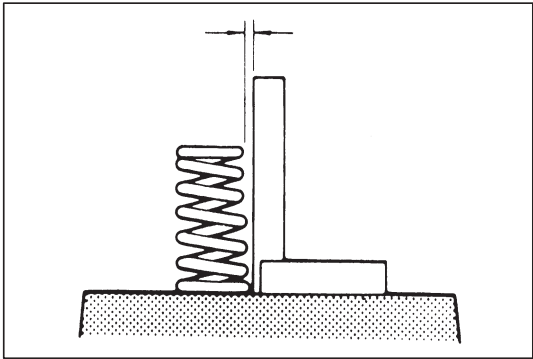
Limit of distortion: 0.10 mm (0.004 in.)



Valve Springs

- Referring to data given below, check to be sure that each spring is in sound condition, free of any evidence of breakage or weakening. Remember, weakened valve springs can cause chatter, not to mention possibility of reducing power output due to gas leakage caused by decreased seating pressure.

Item	Standard	Limit
Valve spring free length	36.83 mm (1.4500 in.)	35.67 mm (1.4043 in.)
Valve spring preload	10.7 – 12.5 kg for 31.5 mm (23.6 – 27.5 lb/ 1.24 in.)	9.3 kg for 31.5 mm (20.5 lb/1.24 in.)

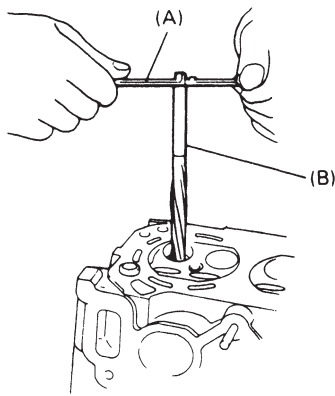


- Spring squareness:
Use a square and surface plate to check each spring for squareness in terms of clearance between end of valve spring and square. Valve springs found to exhibit a larger clearance than limit given below must be replaced.

Valve spring squareness limit: 1.6 mm (0.063 in.)

ASSEMBLY

- 1) Before installing valve guide into cylinder head, ream guide hole with special tool (11 mm reamer) so remove burrs and make it truly round.

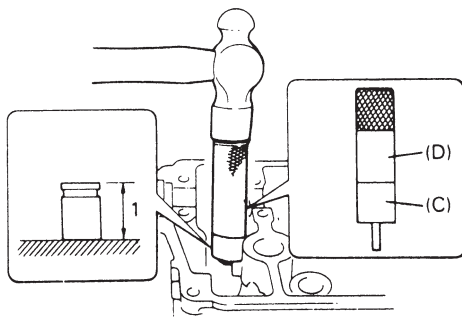
Special Tool**(A): 09916-34541****(B): 09916-38210**

- 2) Install valve guide to cylinder head.

Heat cylinder head uniformly at a temperature of 80 to 100°C (176 to 212°F) so that head will not be distorted, and drive new valve guide into hole with special tools.

Drive in new valve guide until special tool (Valve guide installer) contacts cylinder head.

After installing, make sure that valve guide protrudes by 11.5 mm (0.45 in.) from cylinder head.

Special Tool**(C): 09916-56011****(D): 09916-58210****NOTE:**

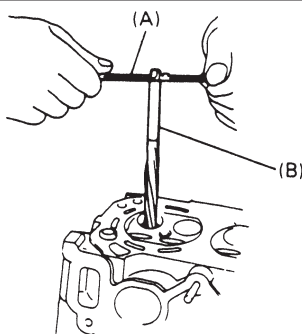
- Do not reuse valve guide once disassembled. Install new valve guide (Oversize).
- Intake and exhaust valve guides are identical.

Valve guide oversize: 0.03 mm (0.0012 in.)

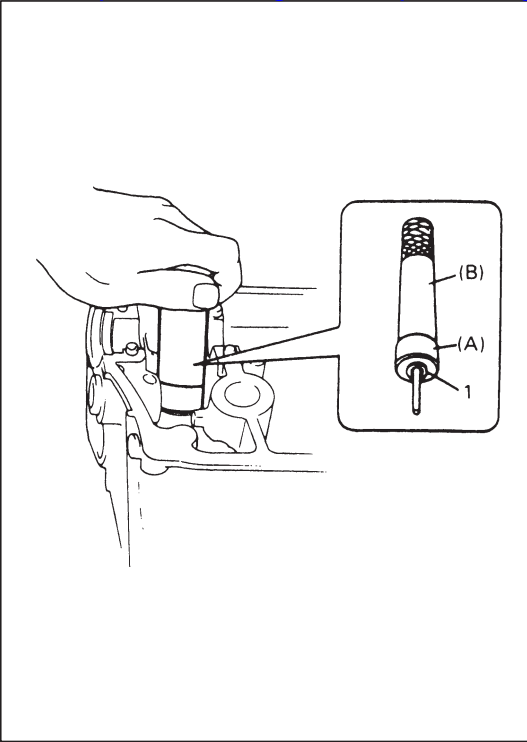
Valve guide protrusion (In and Ex): 11.5 mm (0.45 in.)

1. Valve guide protrusion (11.5 mm)

- 3) Ream valve guide bore with special tool (5.5 mm reamer). After reaming, clean bore.

Special Tool**(A): 09916-34541****(B): 09916-34550**

- 4) Install valve spring seat to cylinder head.



- 5) Install new valve stem seal (1) to valve guide.

After applying engine oil to seal and spindle of special tool (Valve guide installer handle), fit oil seal to spindle, and then install seal to valve guide by pushing special tool by hand.

After installing, check to be sure that seal is properly fixed to valve guide.

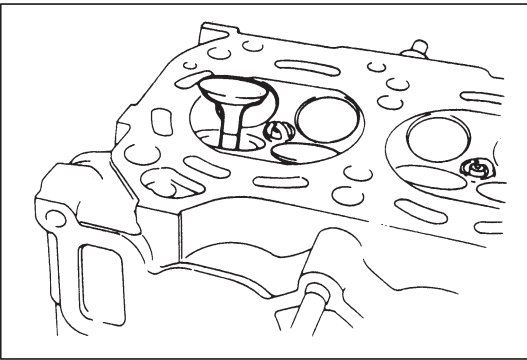
Special Tool

(A): 09917-98221

(B): 09916-58210

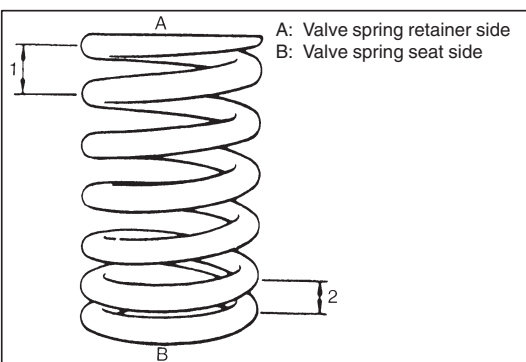
NOTE:

- Do not reuse seal once disassembled. Be sure to install new seal.
- When installing, never tap or hit special tool with a hammer or else. Install seal to guide only by pushing special tool by hand. Tapping or hitting special tool may cause damage to seal.



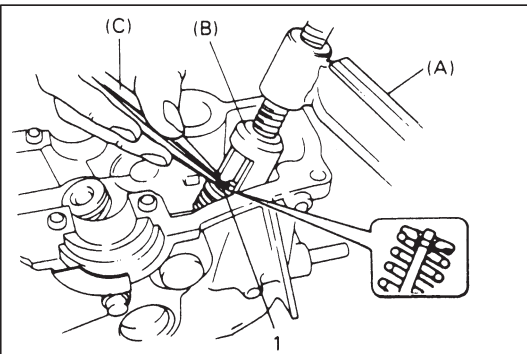
- 6) Install valve to valve guide.

Before installing valve to valve guide, apply engine oil to stem seal, valve guide bore, and valve stem.



- 7) Install valve spring and spring retainer.

Each valve spring has top end (large-pitch (1) end) and bottom end (small-pitch (2) end). Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).



- 8) Using special tool (Valve lifter), compress valve spring and fit two valve coppers (1) into groove in valve stem.

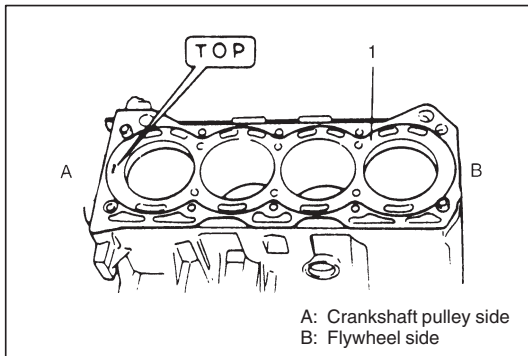
Special Tool

(A): 09916-14510

(B): 09916-14910

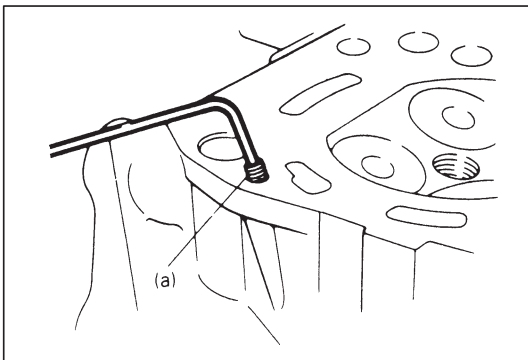
(C): 09916-84511

- 9) Install rocker arms, springs, rocker arm shaft as previously outlined.
- 10) Install thermostat case, intake manifold and exhaust manifold.



INSTALLATION

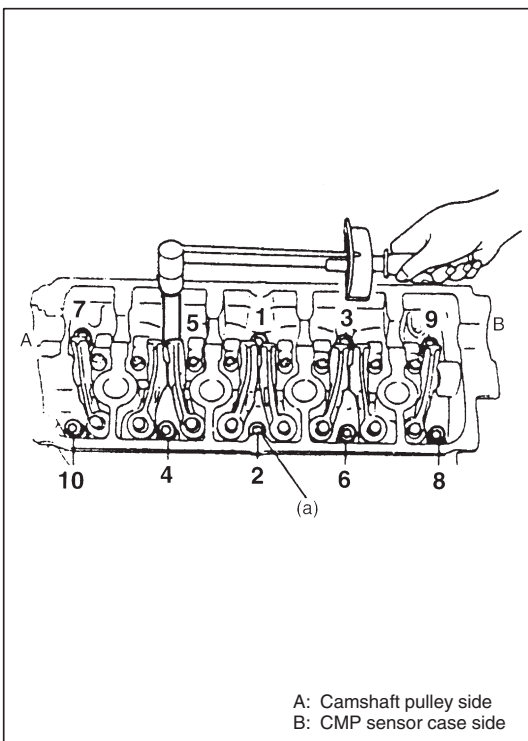
- 1) Remove old gasket and oil on mating surfaces and install new head gasket (1) as shown in figure, that is, "TOP" mark provided on gasket comes to crankshaft pulley side, facing up (toward cylinder head side).



- 2) Check to make sure that oil jet (venturi plug) is installed and if it is, that it is not clogged.
When installing it, be sure to tighten to specified torque.

Tightening Torque

(a): 3.5 N·m (0.35 kg-m, 2.5 lb-ft)



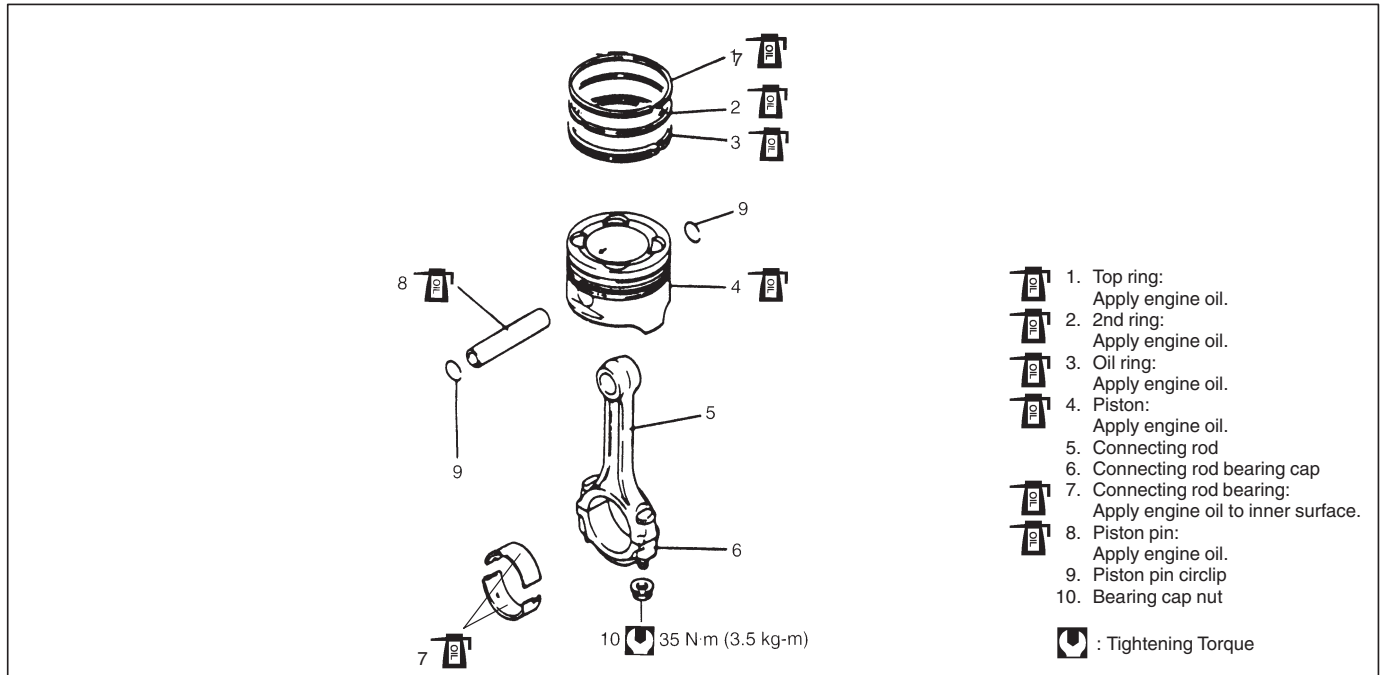
- 3) Apply engine oil to cylinder head bolts and tighten them gradually as follows.

- a) Tighten all bolts to 35 N·m (3.5 kg-m, 25.0 lb-ft) according to numerical order in figure.
- b) In the same manner as in a), tighten them to 55 N·m (5.5 kg-m, 40.0 lb-ft).
- c) Loosen all bolts until tightening torque is reduced to 0 (zero) in reverse order of tightening.
- d) In the same manner as in a), tighten them to 35 N·m (3.5 kg-m, 25.0 lb-ft).
- e) In the same manner as in a) again, tighten them to specified torque.

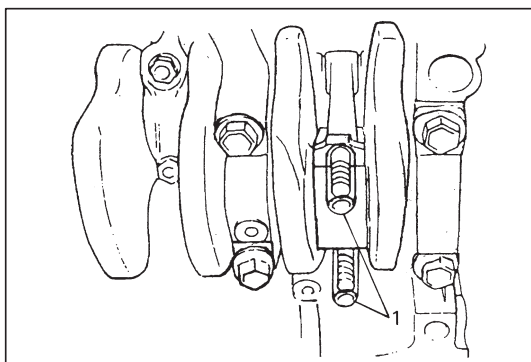
Tightening Torque

(a): 68 N·m (6.8 kg-m, 49.5 lb-ft)

- 4) Reverse removal procedure for installation, noting the following points.
- Adjust drive belt tension, referring to “ENGINE COOLING” section.
 - Adjust A/C compressor belt tension, if equipped.
Refer to Section 1B.
 - Adjust intake and exhaust valve lashes as previously outlined.
 - Adjust accelerator cable play. Refer to Section 6E.
 - Check to ensure that all removed parts are back in place.
Reinstall any necessary parts which have not been reinstalled.
 - Refill cooling system referring Section 6B.
 - Connect negative cable at battery.
 - Confirm that ignition timing is within specification referring to “IGNITION SYSTEM” section.
 - Verify that there is no fuel leakage, water leakage and exhaust gas leakage at each connection.

PISTON, PISTON RINGS, CONNECTING RODS AND CYLINDERS**REMOVAL**

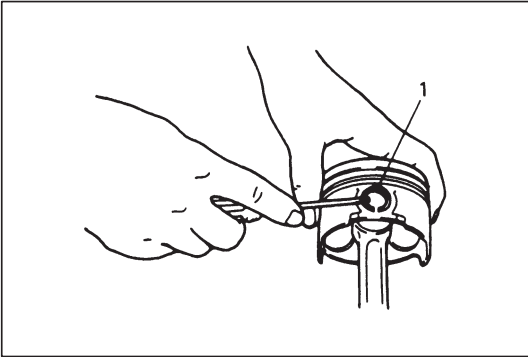
- 1) Remove cylinder head from cylinder block as previously outlined.
- 2) Install engine right mounting bracket.
- 3) Drain engine oil.
- 4) Remove oil pan and oil pump strainer as previously outlined.
- 5) Mark cylinder number on all pistons, connecting rods and rod bearing caps, using silver pencil or quick drying paint.



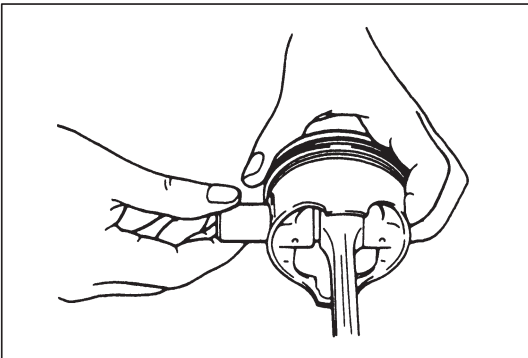
- 6) Remove rod bearing caps.
- 7) Install guide hose (1) over threads of rod bolts.
This is to prevent damage to bearing journal and rod bolt threads when removing connecting rod.
- 8) Decarbon top of cylinder bore before removing piston from cylinder.
- 9) Push piston and connecting rod assembly out through the top of cylinder bore.

DISASSEMBLY

- 1) Using piston ring expander, remove two compression rings (Top and 2nd) and oil ring from piston.



- 2) Remove piston pin from connecting rod.
 - Ease out piston pin circlips (1), as shown.



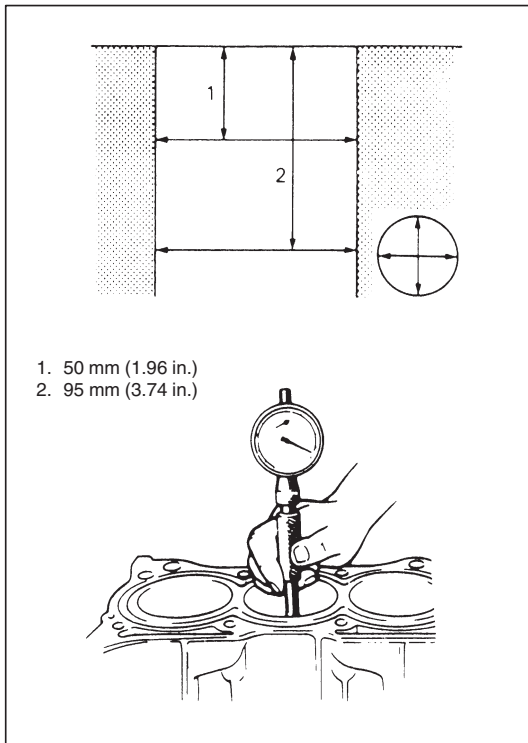
- Force piston pin out.

CLEANING

Clean carbon from piston head and ring grooves, using a suitable tool.

INSPECTION**Cylinders**

- Inspect cylinder walls for scratches, roughness, or ridges which indicate excessive wear. If cylinder bore is very rough or deeply scratched, or ridged, rebore cylinder and use oversize piston.



- Using a cylinder gauge, measure cylinder bore in thrust and axial directions at two positions as shown in figure.

If any of following conditions is noted, rebore cylinder.

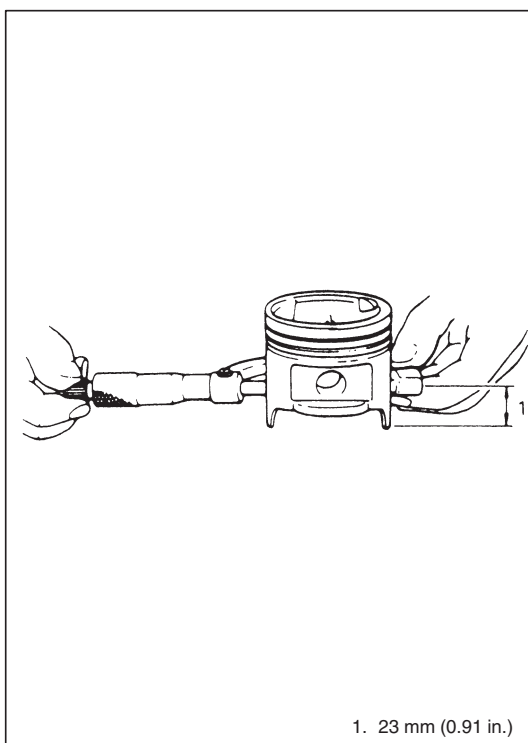
- 1) Cylinder bore dia. exceeds limit.
- 2) Difference of measurements at two positions exceeds taper limit.
- 3) Difference between thrust and axial measurements exceeds out-of-round limit.

Cylinder bore dia. limit: 74.15 mm (2.9196 in.)

Tapper and out-of-round limit: 0.10 mm (0.0039 in.)

NOTE:

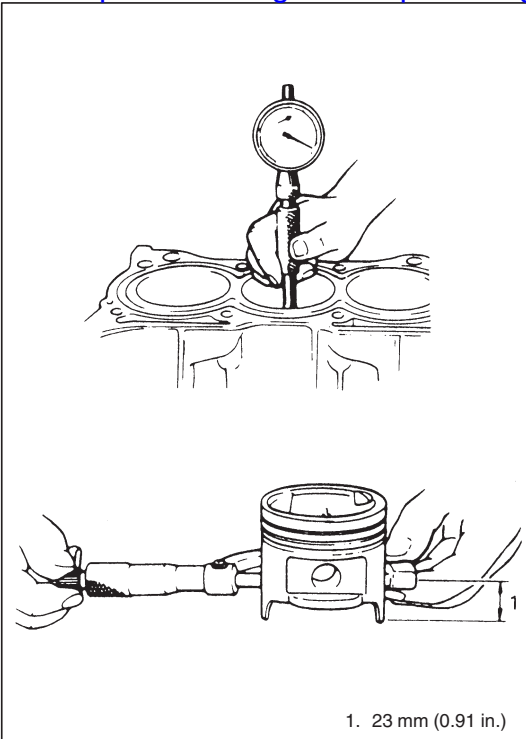
If any one of four cylinders has to be rebored, rebore all four to the same next oversize. This is necessary for the sake of uniformity and balance.

**Pistons**

- Inspect piston for faults, cracks or other damaged. Damaged or faulty piston should be replaced.
- Piston diameter:

As indicated in figure, piston diameter should be measured at a position 23 mm (0.91 in.) from piston skirt end in the direction perpendicular to piston pin.

Piston diameter	Standard	73.970 – 73.990 mm (2.9122 – 2.9130 in.)
	Oversize: 0.25 mm (0.0098 in.)	74.220 – 74.230 mm (2.9220 – 2.9224 in.)
	0.50 mm (0.0196 in.)	74.470 – 74.480 mm (2.9319 – 2.9323 in.)



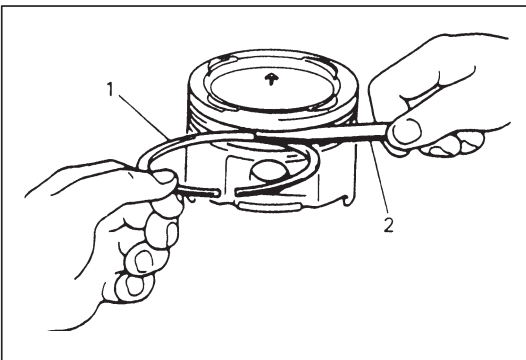
- **Piston clearance:**

Measure cylinder bore diameter and piston diameter to find their difference which is piston clearance. Piston clearance should be within specification as given below. If it is out of specification, re-bore cylinder and use oversize piston.

Piston clearance: 0.02 – 0.04 mm (0.0008 – 0.0015 in.)

NOTE:

Cylinder bore diameters used here are measured in thrust direction at two positions.



- **Ring groove clearance:**

Before checking, piston grooves must be clean, dry and free of carbon.

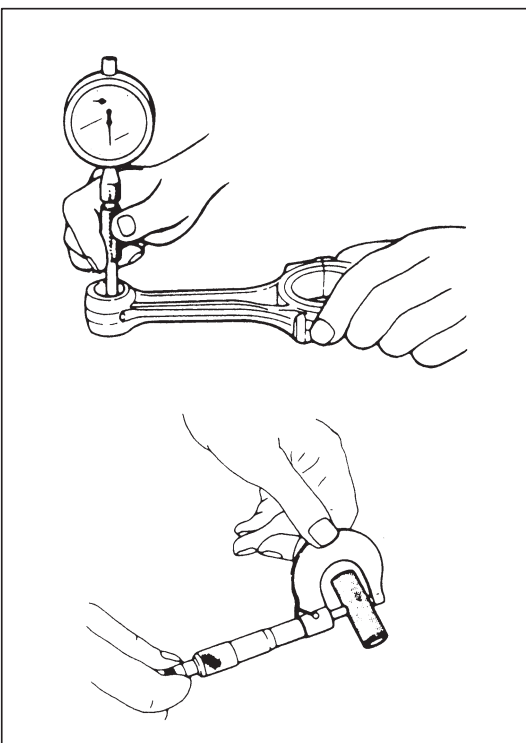
Fit new piston ring (1) into piston groove, and measure clearance between ring and ring land by using thickness gauge (2).

If clearance is out of specification, replace piston.

Ring groove clearance:

Top: 0.03 – 0.07 mm (0.0012 – 0.0027 in.)

2nd: 0.02 – 0.06 mm (0.0008 – 0.0023 in.)



Piston pin

- Check piston pin, connecting rod small end bore and piston bore for wear or damage, paying particular attention to condition of small end bore bush. If pin, connecting rod small end bore or piston bore is badly worn or damaged, replace pin, connecting rod or piston.

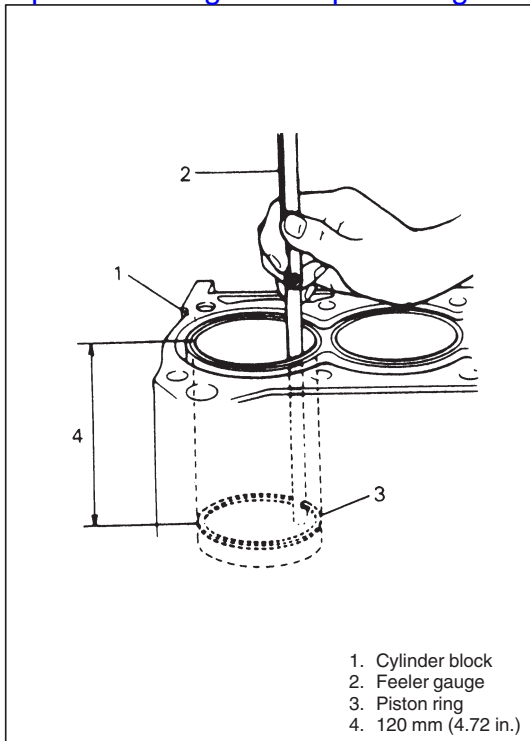
- **Piston pin clearance:**

Check piston pin clearance in small end. Replace connecting rod if its small end is badly worn or damaged or if measured clearance exceeds limit.

Item	Standard	Limit
Piston clearance in small end	0.003 – 0.016 mm (0.0001 – 0.0006 in.)	0.05 mm 0.0020 in.)

Small-end bore: 19.003 – 19.011 mm (0.7482 – 0.7486 in.)

Piston pin dia.: 18.995 – 19.000 mm (0.7479 – 0.7480 in.)



Piston Rings

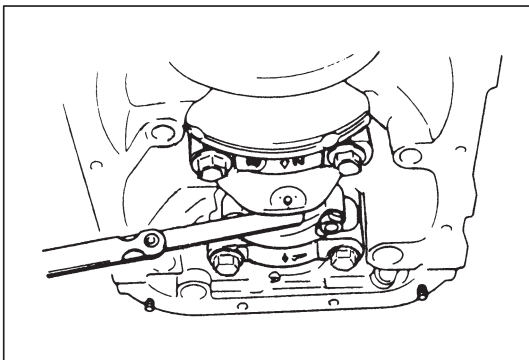
To measure end gap, insert piston ring into cylinder bore and then measure the gap by using thickness gauge.

If measured gap is out of specification, replace ring.

NOTE:

Decarbon and clean top of cylinder bore before inserting piston ring.

Item		Standard	Limit
Piston ring end gap	Top ring	0.15 – 0.30 mm (0.0059 – 0.0118 in.)	0.7 mm (0.0275 in.)
	2nd ring	0.2 – 0.35 mm (0.0079 – 0.0137 in.)	0.7 mm (0.0275 in.)
	Oil ring	0.2 – 0.7 mm (0.0079 – 0.0275 in.)	1.7 mm (0.0669 in.)



Connecting Rod

● Big-end side clearance:

Check big-end of connecting rod for side clearance, with rod fitted and connected to its crank pin in the normal manner. If measured clearance is found to exceed its limit, replace connecting rod.

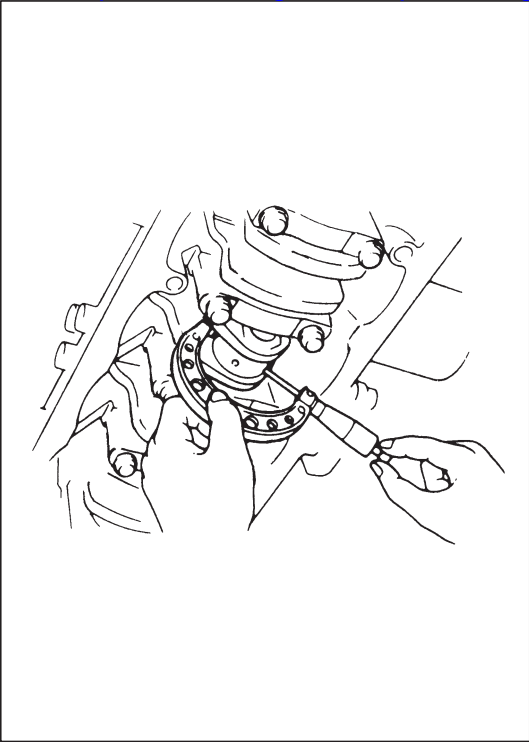
Item	Standard	Limit
Big-end side clearance	0.10 – 0.20 mm (0.0039 – 0.0078 in.)	0.35 mm (0.0137 in.)

● Connecting rod alignment:

Mount connecting rod on aligner to check it for bow and twist and, if limit is exceeded, replace it.

Limit on bow : 0.05 mm (0.0020 in.)

Limit on twist: 0.10 mm (0.0039 in.)

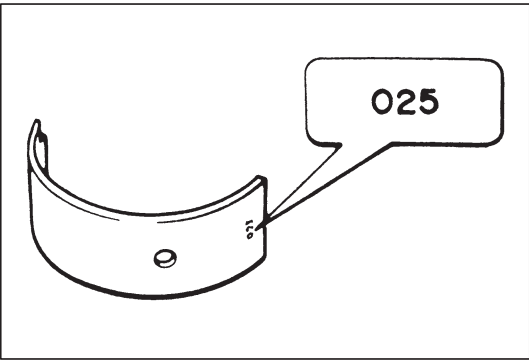


Crank Pin and Connecting Rod Bearings

- Inspect crank pin for uneven wear or damage. Measure crank pin for out-of-round or taper with a micrometer. If crank pin is damaged, or out-of-round or taper is out of limit, replace crankshaft or regrind crank pin to undersize and use undersize bearing.

Connecting rod bearing size	Crank pin diameter
Standard	41.982 – 42.000 mm (1.6528 – 1.6535 in.)
0.25 mm (0.0098 in.) undersize	41.732 – 41.750 mm (1.6430 – 1.6437 in.)

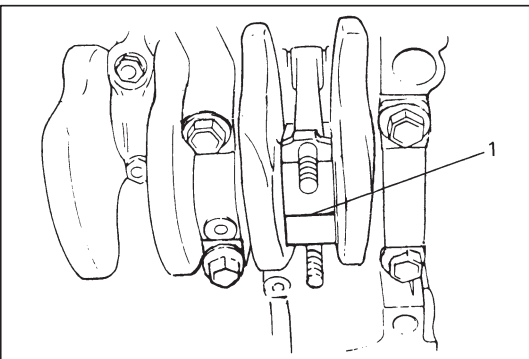
Out-of-round and taper limit: 0.01 mm (0.0004 in.)



• Rod bearing:

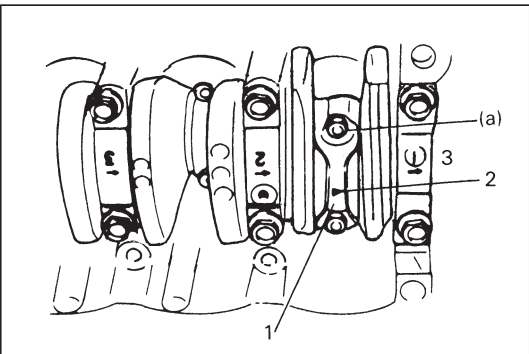
Inspect bearing shells for signs of fusion, pitting, burn or flaking and observe contact pattern. Bearing shells found in defective condition must be replaced.

Two kinds of rod bearing are available; standard size bearing and 0.25 mm undersize bearing. To distinguish them, 0.25 mm undersize bearing has the stamped number (USO25) on its backside as indicated in figure, but standard size one has no number.



• Rod bearing clearance:

- Before checking bearing clearance, clean bearing and crank pin.
- Install bearing in connecting rod and bearing cap.
- Place a piece of plastic gauge (1) to full width of crankpin as contacted by bearing (parallel to crankshaft), avoiding oil hole.

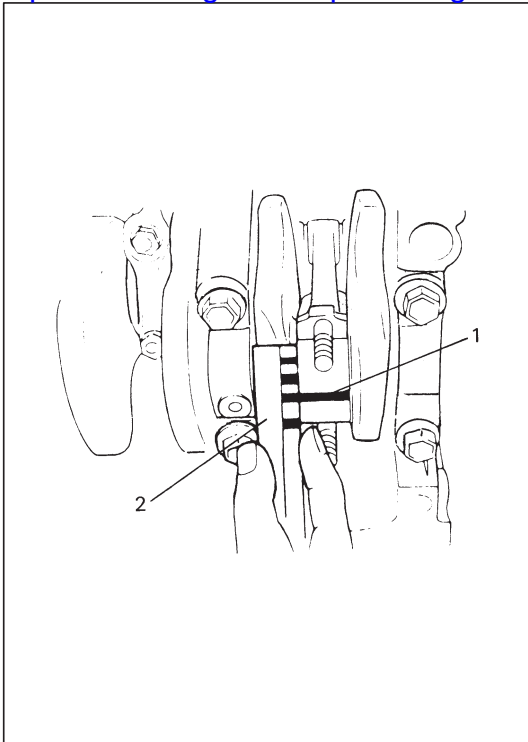


4) Install rod bearing cap (1) to connecting rod.

When installing cap, be sure to point arrow mark (2) on cap to crankshaft pulley side (3), as shown in figure. After applying engine oil to rod bolts, tighten cap nuts to specified torque. DO NOT turn crankshaft with gaging plastic installed.

Tightening Torque

(a): 35 N·m (3.5 kg·m, 25.5 lb·ft)

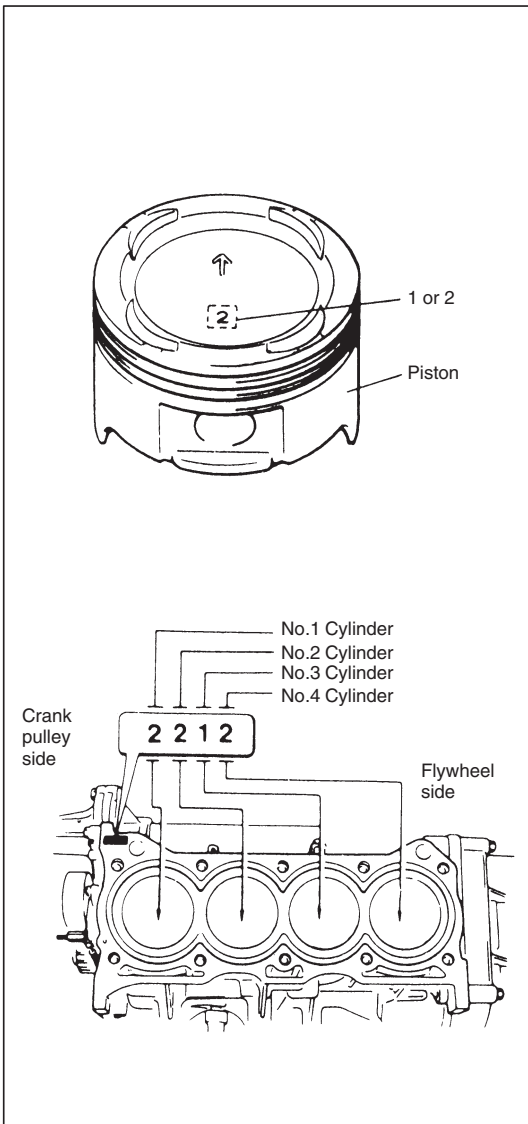


- 5) Remove cap and using a scale (2) on plastic gauge envelope, measure gaging plastic (1) width at the widest point (clearance).

If clearance exceeds its limit, use a new standard size bearing and remeasure clearance.

Item	Standard	Limit
Bearing clearance	0.020 – 0.050 mm (0.0008 – 0.0019 in.)	0.080 mm (0.0031 in.)

- 6) If clearance can not be brought to within its limit even by using a new standard size bearing, regrind crankpin to undersize and use 0.25 mm undersize bearing.

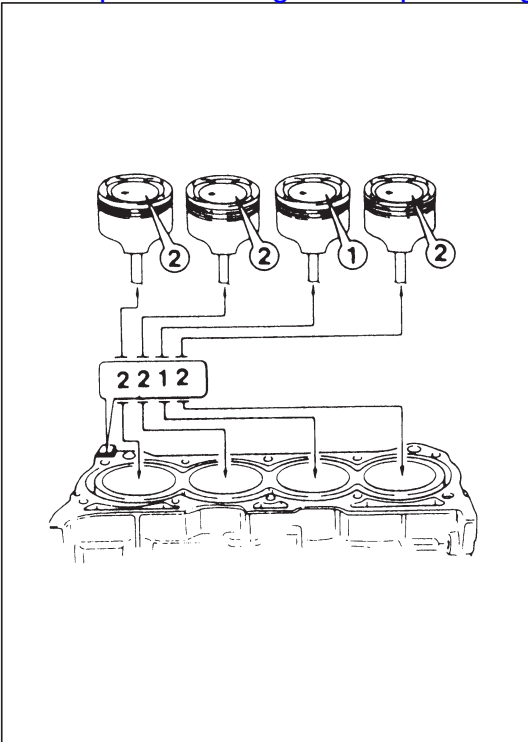


ASSEMBLY

NOTE:

Two sizes of piston are available as standard size spare part so as to ensure proper piston-to-cylinder clearance. When installing a standard size piston, make sure to match piston with cylinder as follows.

- Each piston has stamped number 1 or 2 as shown. It represents outer diameter of piston.
- There are also stamped numbers of 1 and 2 on the cylinder block as shown. The first number represents inner diameter of No.1 cylinder, the second number of No.2 cylinder, the third number of No.3 cylinder and the fourth number of No.4 cylinder.

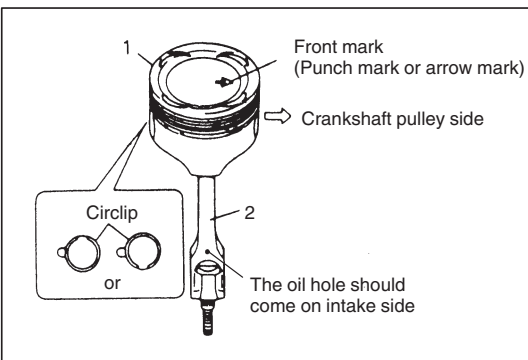


- c) Stamped number on piston and that on cylinder block should correspond. That is, install number 2 stamped piston to cylinder which is identified with number 2 and a number 1 piston to cylinder with number 1.

Unit: mm (in.)

Piston		Cylinder		Piston-to-cylinder clearance
Number at the top (mark)	Outer diameter	Number (mark)	Bore diameter	
1	73.98 – 73.99 (2.9126 – 2.9130)	1	74.01 – 74.02 (2.9138 – 2.9141)	0.02 – 0.04 (0.0008 – 0.0015)
2	73.97 – 73.98 (2.9122 – 2.9126)	2	74.00 – 74.01 (2.9134 – 2.9138)	

Also, a letter A, B or C is stamped on piston head but ordinarily it is not necessary to discriminate each piston by this letter.

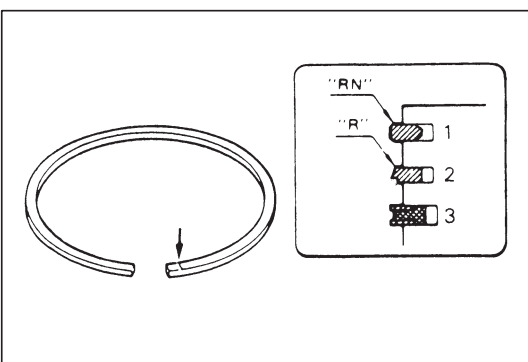


- 1) Install piston pin to piston (1) and connecting rod (2):

After applying engine oil to piston pin and piston pin holes in piston and connecting rod, fit connecting rod to piston as shown in figure and insert piston pin to piston and connecting rod, and install piston pin circlips.

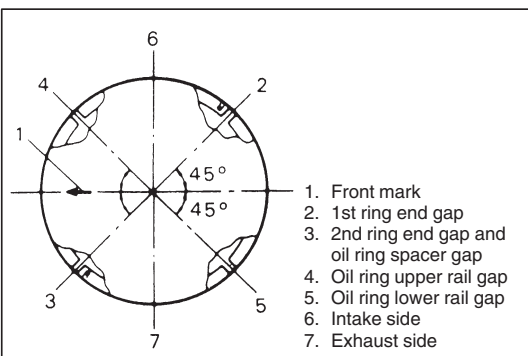
NOTE:

Circlip should be installed with its cut part facing either up or down as shown in figure.



- 2) Install piston rings to piston:

- As indicated in figure at the left, 1st (1) and 2nd rings (2) have "RN" or "R" mark respectively. When installing these piston rings to piston, direct marked side of each ring toward top of piston.
- 1st ring differs from 2nd ring in thickness, shape and color of surface contacting cylinder wall. Distinguish 1st ring from 2nd ring by referring to figure.
- When installing oil ring (3), install spacer first and then two rails.



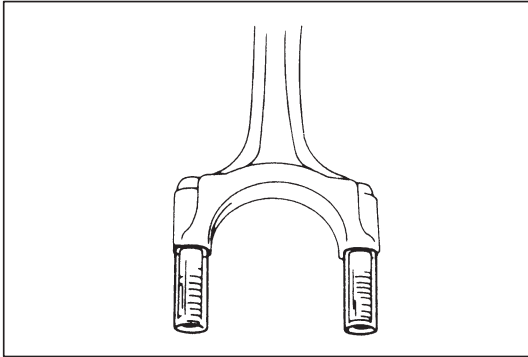
- 3) After installing three rings (1st, 2nd and oil rings), distribute their end gaps as shown in figure.

INSTALLATION OR CONNECTION

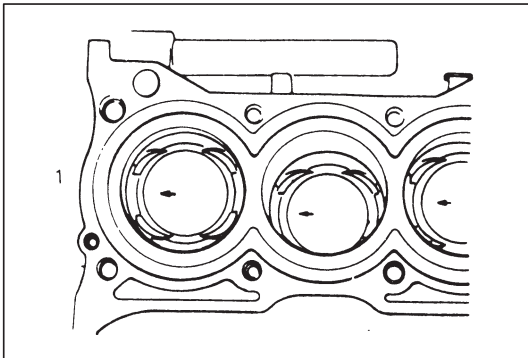
- 1) Apply engine oil to pistons, rings, cylinder walls, connecting rod bearings and crankpins.

NOTE:

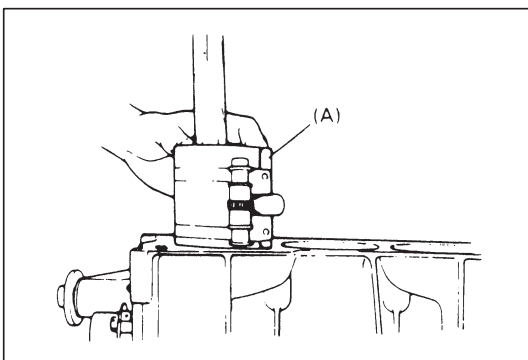
Do not apply oil between connecting rod and bearing or between bearing cap and bearing.



- 2) Install guide hoses over connecting rod bolts.
These guide hoses protect crank pin and threads of rod bolt from damage during installation of connecting rod and piston assembly.



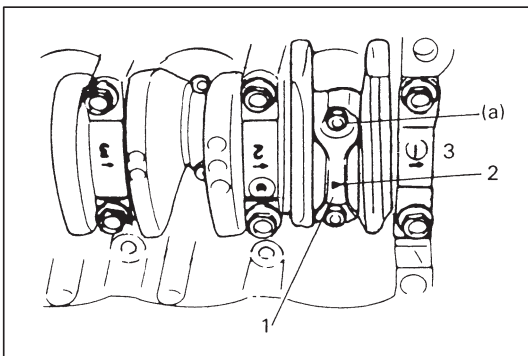
- 3) When installing piston and connecting rod assembly into cylinder bore, point front mark (punch mark or arrow mark) on piston head to crankshaft pulley side (1).



- 4) Install piston and connecting rod assembly into cylinder bore.
Use special tool (Piston ring compressor) to compress rings.
Guide connecting rod into place on crankshaft.
Using a hammer handle, tap piston head to install piston into bore. Hold ring compressor firmly against cylinder block until all piston rings have entered cylinder bore.

Special Tool

(A): 09916-77310

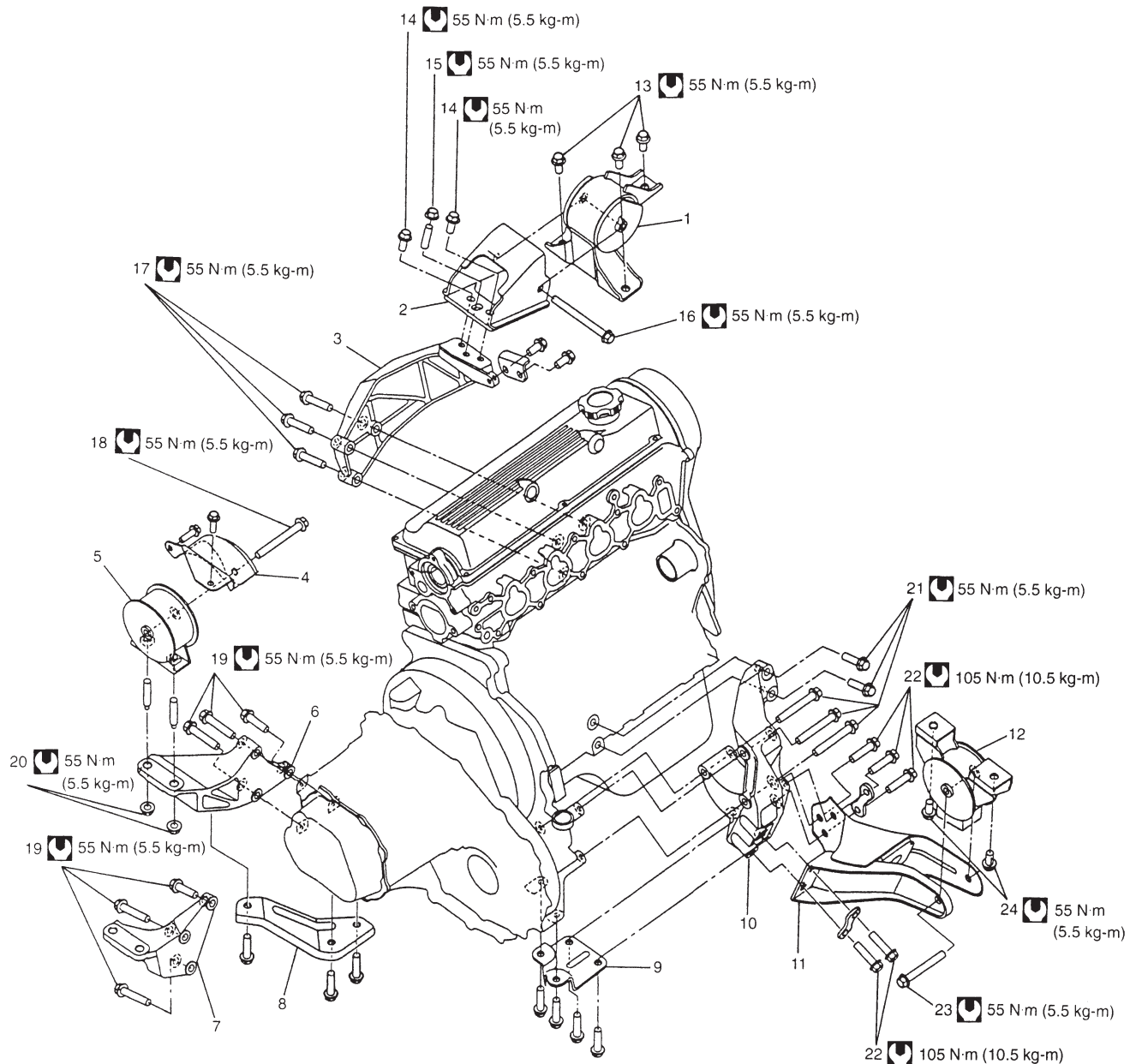


- 5) Install bearing cap (1):
Point arrow mark (2) on cap to crankshaft pulley side (3).
Tighten cap nuts to specification.

Tightening Torque

(a): 35 N·m (3.5 kg·m, 25.5 lb·ft)

- 6) Reverse removal procedure for installation, noting the following points.
- Adjust water pump drive belt tension, referring to “ENGINE COOLING” section.
 - Adjust A/C compressor belt tension, if equipped.
Refer to Section 1B.
 - Adjust accelerator cable play. Refer to Section 6E.
 - Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
 - Refill engine with engine oil, referring to item “ENGINE OIL CHANGE” in Section 0B.
 - Refill cooling system referring to Section 6B.
 - Connect negative cable at battery.
 - Verify that ignition timing is within specification referring to “IGNITION SYSTEM” section.
 - Verify that there is no fuel leakage, coolant leakage, oil leakage and exhaust gas leakage at each connection.

UNIT REPAIR OVERHAUL**ENGINE MOUNTING**

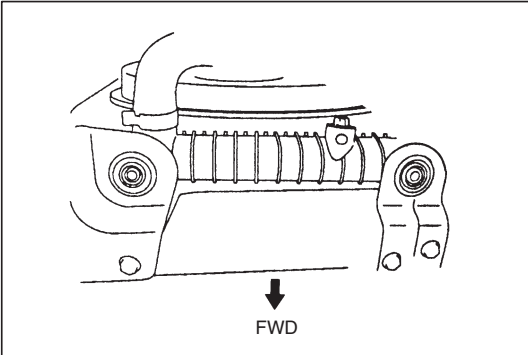
1. Right mounting
2. Right mounting swing bracket
3. Right mounting bracket
4. Left mounting body bracket
5. Left mounting
6. Left mounting bracket (M/T model)
7. Left mounting bracket (A/T model)
8. Left mounting bracket stiffener (M/T model)
9. Rear mounting bracket stiffener
10. Rear mounting No.2 bracket
11. Rear mounting No.1 bracket
12. Rear mounting

13. Right mounting body bolt
14. Right mounting bracket & swing bolt
15. Right mounting bracket & swing nut
16. Right mounting bush bolt
17. Right mounting bracket bolt
18. Left mounting bush bolt
19. Left mounting bracket & transmission bolt
20. Left mounting nut
21. Rear mounting bracket No.2 bolt
22. Rear mounting bracket No.1 to No.2 bolt
23. Rear mounting bush bolt
24. Rear mounting body bolt

 : Tightening Torque

ENGINE ASSEMBLY**REMOVAL**

- 1) Release fuel pressure in fuel feed line by referring to Section 6.
- 2) After disconnect negative and positive cables at battery, remove battery and battery tray.
- 3) Remove engine hood after disconnecting windshield washer hose.

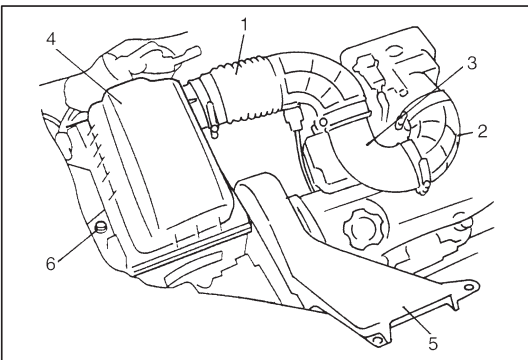


- 4) Drain cooling system.

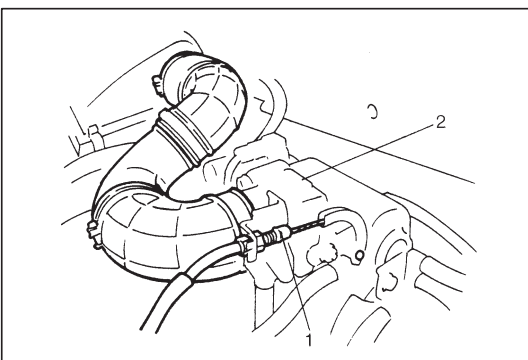
WARNING:

To help avoid danger of being burned, do not remove drain plug and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.

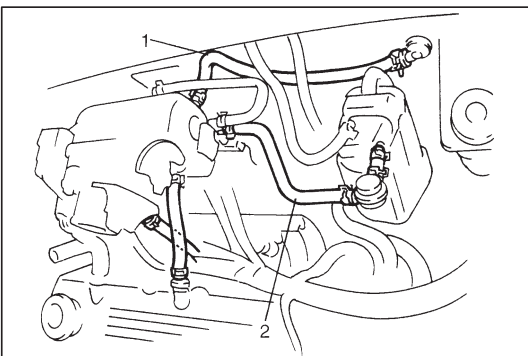
- 5) Disconnect radiator inlet hose from thermostat case and outlet hose from water inlet pipe.



- 6) Remove air cleaner outlet No.1 hose (1) and No.2 hose (2) with air intake joint (3) as previously outlined.
- 7) Remove suction pipe (5) and remove air cleaner assembly (4) by removing its fastening bolt (6).



- 8) Disconnect following cables.
 - Accelerator cable (1) from throttle body (2).
 - Clutch cable from transmission (M/T).
 - Gear select cable from transmission (A/T).

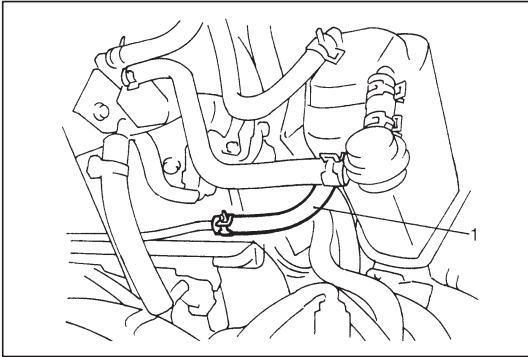


- 9) Disconnect following vacuum hose.
 - Brake booster hose (1) from intake manifold.
 - Canister purge hose (2) from EVAP canister purge valve.

10) Disconnect following electric wires:

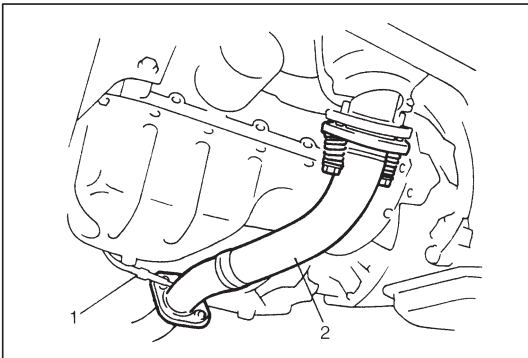
- Back-up light switch (M/T)
- Shift switch (A/T)
- Forward clutch revolution sensor (4 A/T)
- A/T vehicle speed sensor (A/T)
- Battery negative cable from transmission
- Vehicle speed sensor
- e.t.c.

and release above wire harness from clamps.



11) Disconnect fuel feed hose (1) from fuel delivery pipe.

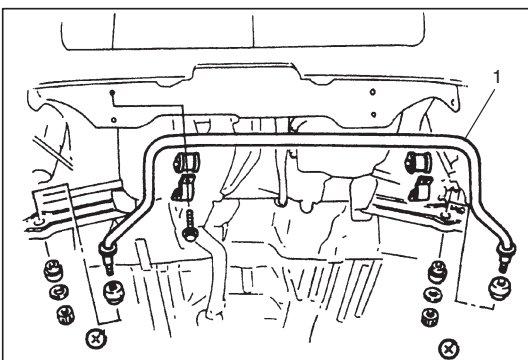
12) Disconnect heater inlet and outlet hoses.



13) Remove right and left engine under covers.

14) Disconnect oxygen sensor No.2 coupler (1) and remove exhaust No.1 pipe (2).

15) Drain engine and transmission oil.



16) Remove stabilizer bar (1) referring to Section 3D.

17) Remove drive shaft joints from differential gear of transmission.

Refer to Section 4 (DRIVE SHAFT) for procedure to disconnect drive shaft joint.

For engine and transmission removal, it is not necessary to remove drive shafts from steering knuckle.

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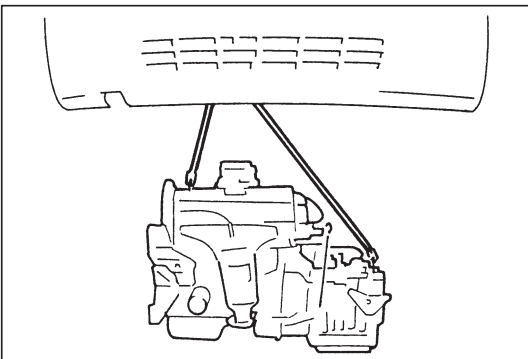
18) Disconnect A/C suction and discharge hoses and then remove A/C compressor and its bracket (if equipped), refer to Section 1B.

19) Install support device.

20) Remove engine rear mounting bush bolt (1).

21) Remove engine left mounting nuts (2).

22) Remove engine right mounting bracket bolts (3) and nut (4).



23) Before removing engine with transmission from body, recheck to make sure all hoses, electric wires and cables are disconnected from engine and transmission.

24) Lower engine with transmission from body.

**INSTALLATION**

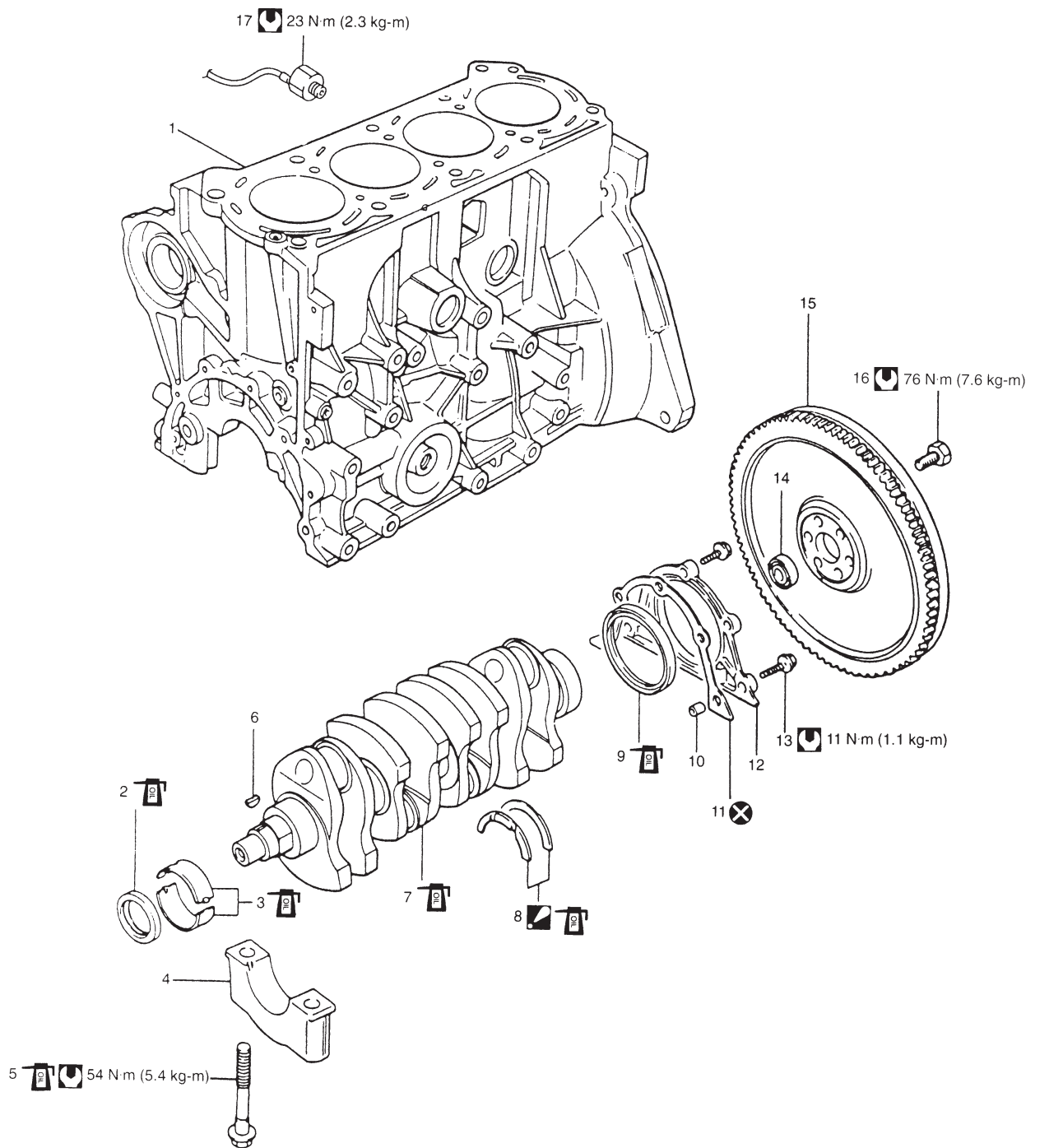
- 1) Lift engine with transmission into engine compartment, but do not remove support device.
- 2) Install engine right mounting bracket bolts and nut.
- 3) Install engine left mounting nuts.
- 4) Install engine rear mounting bush bolt.
- 5) Tighten bolts and nuts to specified torque.

Tightening Torque

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

- 6) Remove support device.
- 7) Reverse removal procedures for installation of remainder.
 - Install A/C compressor bracket and A/C compressor and connect A/C suction and discharge hoses, refer to Section 1B.
 - Push in each drive shaft joint fully so that snap ring engages with differential gear or center bearing support. Use care not to damage oil seal lip when inserting.
 - Install stabilizer bar, refer to Section 3D.
 - Install exhaust No.1 pipe.
 - Install right and left engine under covers.
 - Connect each hoses securely.
 - Clamp electric wire securely.
- 8) Adjust clutch pedal free travel, referring to Section 7C. (M/T)
Connect gear select cable referring to Section 7B. (A/T)
- 9) Refill transmission with gear oil. (A/T fluid for A/T model), referring to Section 0B.
- 10) Refill engine with engine oil, referring to Section 0B.
- 11) Refill cooling system, referring to Section 6B.
- 12) Adjust A/C compressor belt, referring to Section 1B. (if equipped)
- 13) Upon completion of installation, verify that there is no fuel leakage, coolant leakage, transmission oil leakage or exhaust gas leakage at each connection.
- 14) Adjust accelerator cable play, referring to Section 6E.



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MAIN BEARINGS, CRANKSHAFT AND CYLINDER BLOCK

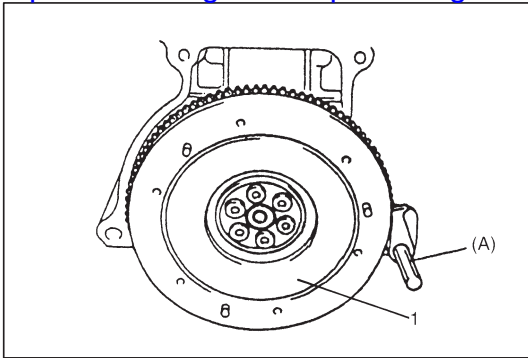


1. Cylinder block
2. Front oil seal:
Apply engine oil to contact part of crankshaft with oil seal lip.
3. Main bearing:
Apply engine oil to bearing inside surfaces.
4. Bearing cap
5. Cap bolt:
Apply engine oil to bolt and bearing surfaces.

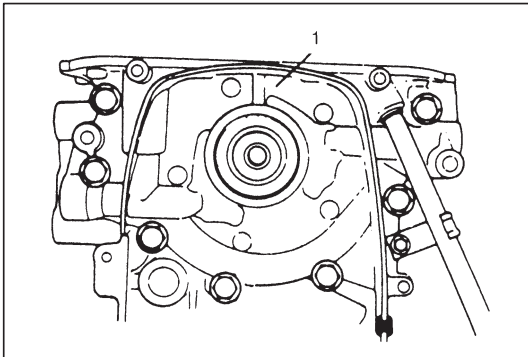
6. Timing pulley key
7. Crankshaft:
Apply engine oil to crankshaft journals.
8. Thrust bearing:
Set oil grooves of bearing to crank wefts.
Apply engine oil.
9. Rear oil seal:
Apply engine oil to contact part of crankshaft with oil seal lip.

10. Pin
11. Oil seal housing gasket
12. Oil seal housing
13. Housing bolts
14. Input shaft bearing
15. Flywheel
16. Flywheel bolts
17. Knock sensor

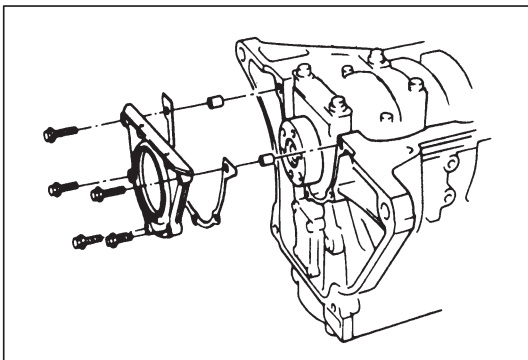
 : Tightening Torque
 : Do not reuse

**REMOVAL**

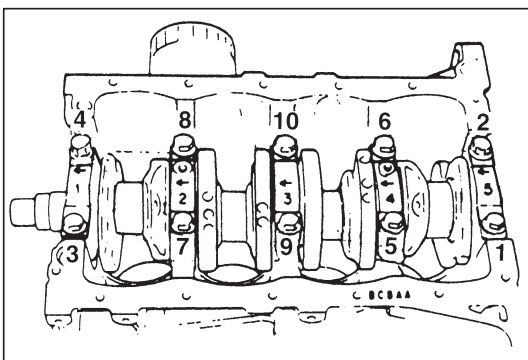
- 1) Remove engine assembly from body as previously outlined.
- 2) Remove clutch cover, clutch disc and flywheel (1) (drive plate for A/T).

Special Tool**(A): 09924-17810**

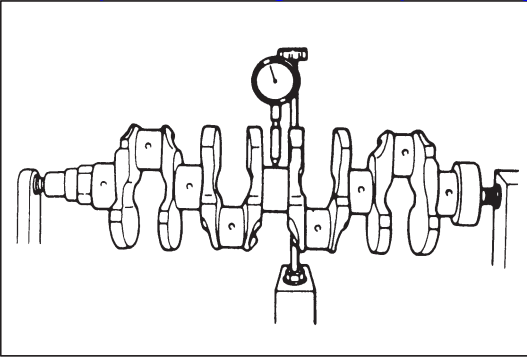
- 3) Remove crankshaft pulley, timing belt and crankshaft timing pulley.
- 4) Remove cylinder head assembly.
- 5) Remove oil pan and oil pump strainer.
- 6) Remove oil pump (1).



- 7) Remove oil seal housing.
- 8) Remove connecting rod bearing caps.

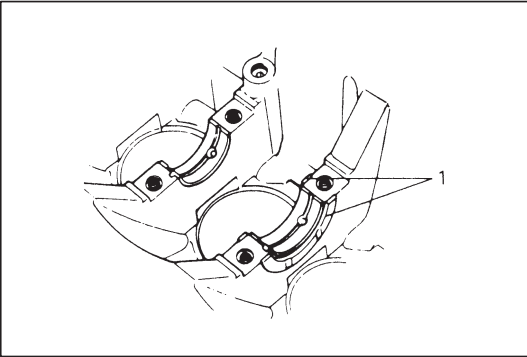


- 9) Loosen crankshaft bearing cap bolts in such order as indicated in figure a little at a time and remove bearing caps.
- 10) Remove crankshaft from cylinder block.

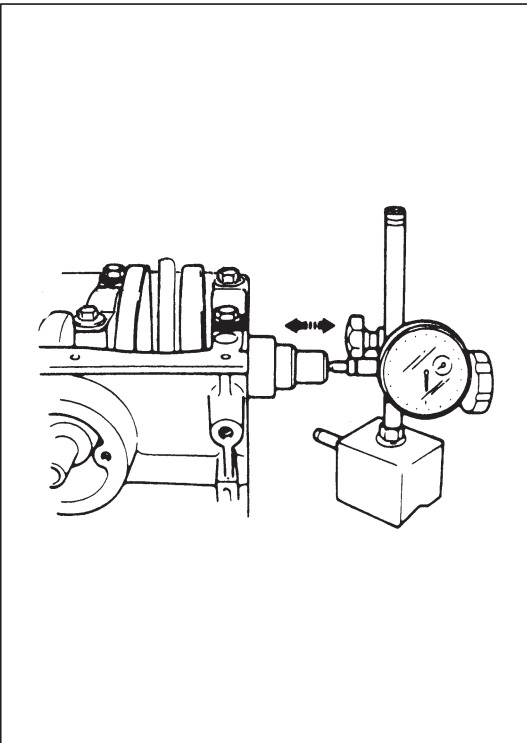
**INSPECTION****Crankshaft****Crankshaft runout**

Using a dial gauge, measure runout at center journal. Rotate crankshaft slowly. If runout exceeds its limit, replace crankshaft.

Limit on runout: 0.06 mm (0.0023 in.)

**Crankshaft thrust play**

Measure this play with crankshaft set in cylinder block in the normal manner, that is, with thrust bearing (1) and journal bearing caps installed.



Use a dial gauge to read displacement in axial (thrust) direction of crankshaft.

If its limit is exceeded, replace thrust bearing with new standard one or oversize one to obtain standard thrust play.

Crankshaft Thrust Play

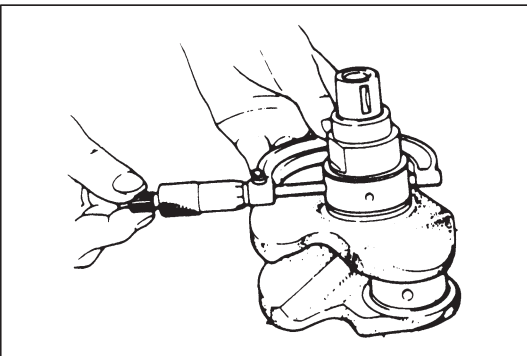
Standard: 0.11 – 0.31 mm (0.0044 – 0.0122 in.)

Limit : 0.38 mm (0.0149 in.)

Thickness of crankshaft thrust bearing

Standard: 2.500 mm (0.0984 in.)

Oversize 0.125 mm (0.0049 in.): 2.563 mm (0.1009 in.)

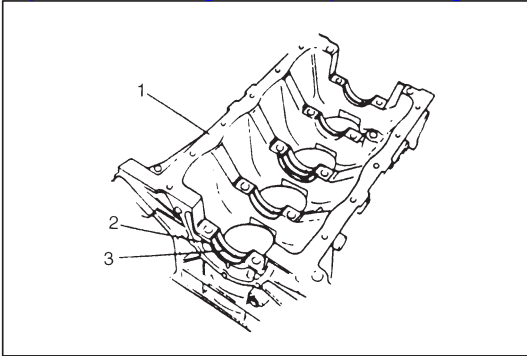
**Out-of-round and taper (uneven wear) of journals**

An unevenly worn crankshaft journal shows up as a difference in diameter at a cross section or along its length (or both).

This difference, if any, is determined by taking micrometer readings.

If any one of journals is badly damaged or if amount of uneven wear in the sense explained above exceeds its limit, regrind or replace crankshaft.

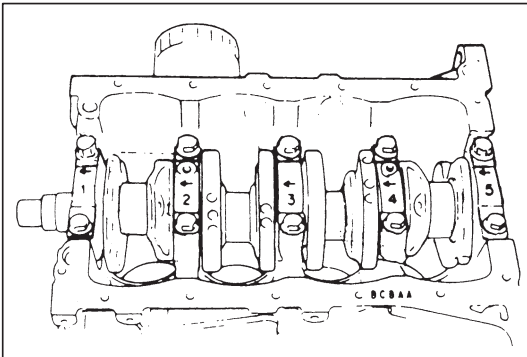
Limit on out-of-round and taper: 0.01 mm (0.0004 in.)



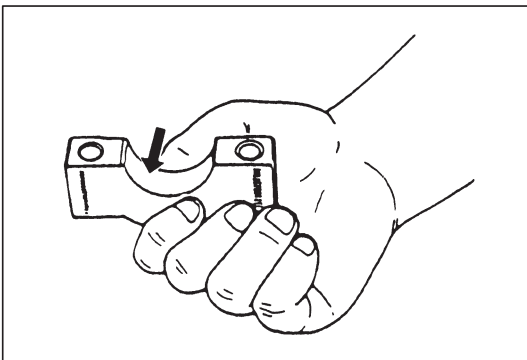
Main Bearings

General information

- Service main bearings are available in standard size and 0.25 mm (0.0098 in.) undersize, and each of them has 5 kinds of bearings differing in tolerance.
- Upper half of bearing (2) has oil groove (3) as shown in figure. Install this half with oil groove to cylinder block (1).



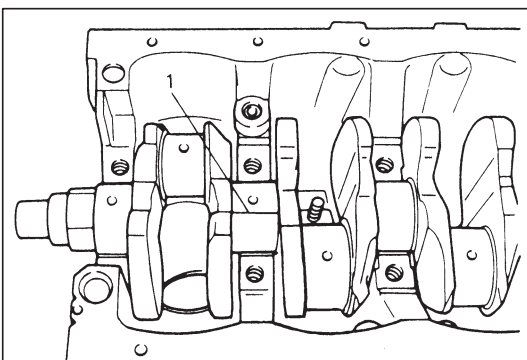
- On each main bearing cap, arrow mark and number are embossed as shown in figure. When installing each bearing cap to cylinder block, point arrow mark toward crankshaft pulley side and install each cap from that side to flywheel side in ascending order of numbers "1", "2", "3", "4" and "5". Tighten cap bolts to specified torque.



Inspection

Check bearings for pitting, scratches, wear or damage.

If any malfunction is found, replace both upper and lower halves. Never replace one half without replacing the other half.



Main bearing clearance

Check clearance by using plastic gauge (1) according to following procedure.

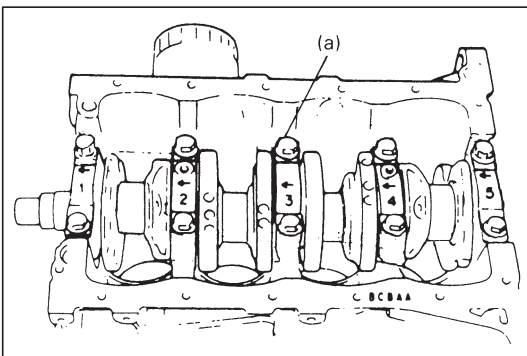
- 1) Remove bearing caps.
- 2) Clean bearings and main journals.
- 3) Place a piece of plastic gauge to full width of bearing (parallel to crankshaft) on journal, avoiding oil hole.
- 4) Install bearing cap as previously outlined and evenly torque cap bolts to specified torque. Bearing cap MUST be torqued to specification in order to assure proper reading of clearance.

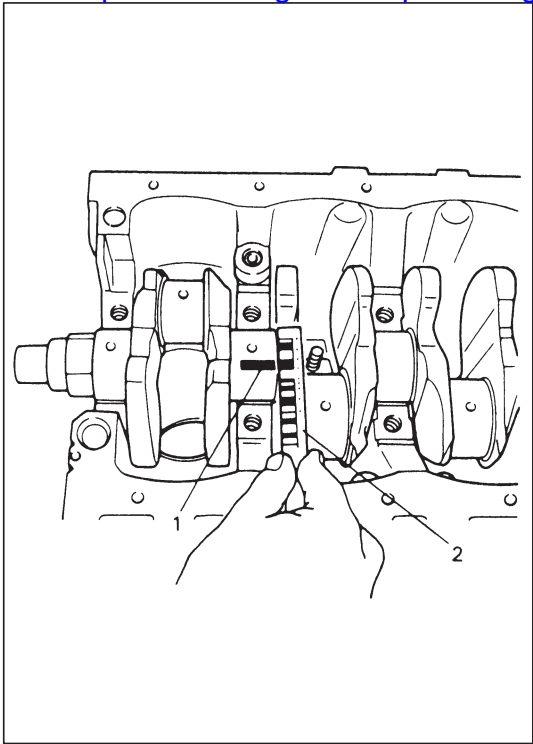
Tightening Torque

(a): 54 N·m (5.4 kg-m, 39.0 lb-ft)

NOTE:

Do not rotate crankshaft while plastic gauge is installed.





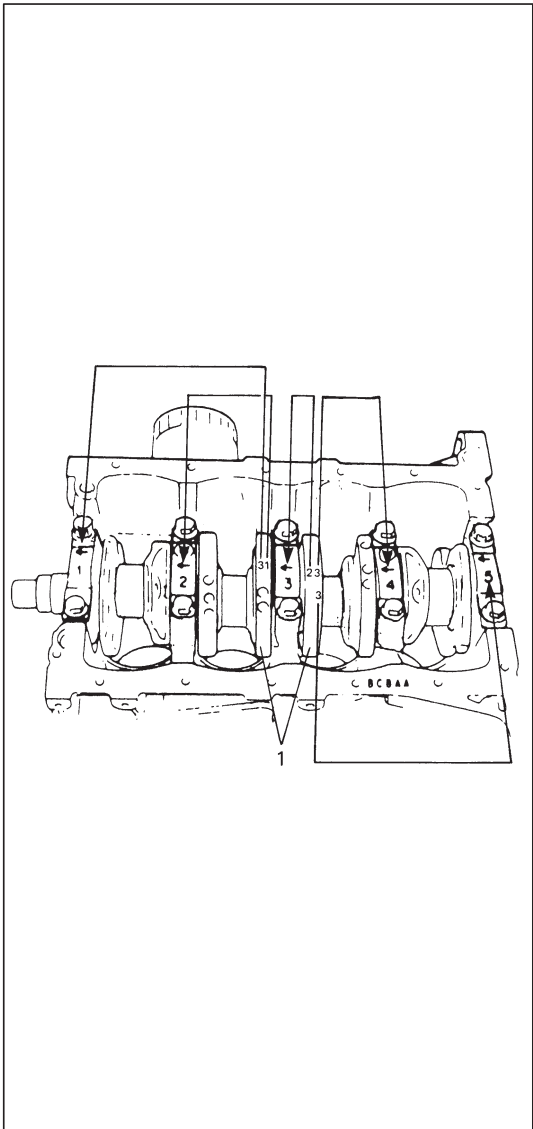
- 5) Remove cap and using scale (2) on plastic gauge (1) envelope, measure plastic gauge width at its widest point. If clearance exceeds its limit, replace bearing. Always replace both upper and lower inserts as a unit.

A new standard bearing may produce proper clearance.

If not, it will be necessary to regrind crankshaft journal for use of 0.25 mm undersize bearing.

After selecting new bearing, recheck clearance.

Bearing clearance	Standard	Limit
	0.020 – 0.040 mm (0.0008 – 0.0016 in.)	0.060 mm (0.0023 in.)



Selection of main bearings

STANDARD BEARING:

If bearing is in malcondition, or bearing clearance is out of specification, select a new standard bearing according to following procedure and install it.

- 1) First check journal diameter by using following procedure.

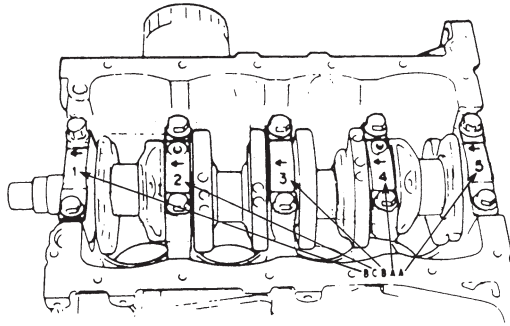
As shown in figure, crank webs of No.2 and No.3 cylinders (1) have five stamped numerals.

Three kinds of numerals (“1”, “2” and “3”) represent following journal diameters.

Numeral stamped	Journal diameter
1	44.994 – 45.000 mm (1.7714 – 1.7716 in.)
2	44.988 – 44.994 mm (1.7712 – 1.7714 in.)
3	44.982 – 44.988 mm (1.7709 – 1.7712 in.)

The first, second, third, fourth and fifth (left to right) stamped numerals represent journal diameters at bearing caps “1”, “2”, “3”, “4” and “5” respectively.

For example, in figure, the first (leftmost) numeral “3” indicates that journal dia. at bearing cap “1” is within 44.982 – 44.988 mm (1.7709 – 1.7712 in.), and second one “1” indicates that journal dia. at cap “2” is within 44.994 – 45.000 mm (1.7714 – 1.7716 in.).



- 2) Next, check bearing cap bore diameter without bearing.
- On mating surface of cylinder block, four alphabets are stamped as shown in figure.
- Three kinds of alphabets ("A", "B" and "C") represent following cap bore diameters.

Alphabet stamped	Bearing cap bore diameter (without bearing)
A	49.000 – 49.006 mm (1.9291 – 1.9294 in.)
B	49.006 – 49.012 mm (1.9294 – 1.9296 in.)
C	49.012 – 49.018 mm (1.9296 – 1.9298 in.)

The first, second, third, fourth and fifth (left to right) stamped alphabets represent cap bore diameters of bearing caps "1", "2", "3", "4" and "5", respectively.

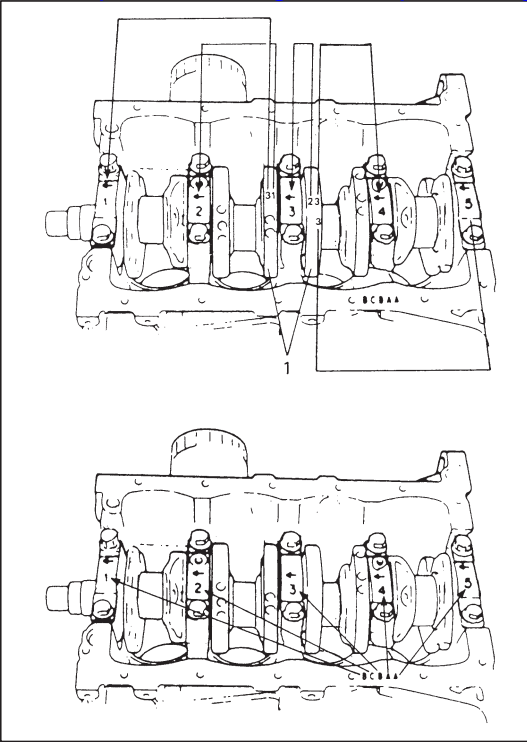
For example, in figure, the first (leftmost) alphabet "B" indicates that cap bore dia. of bearing cap "1" is within 49.006 – 49.012 mm, and the fifth (rightmost) alphabet "A" indicates that cap bore dia. of cap "5" is within 49.000 – 49.006 mm.



1. Paint

- 3) There are five kinds of standard bearings differing in thickness. To distinguish them, they are painted in following colors at the position as indicated in figure.
- Each color indicates following thickness at the center of bearing.

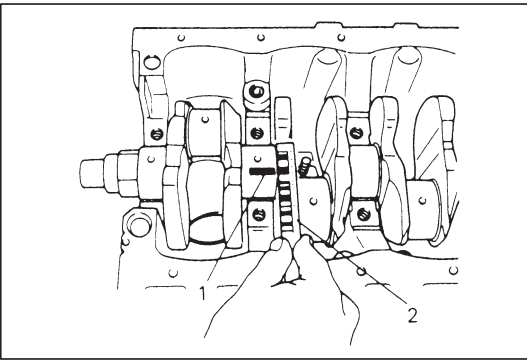
Color painted	Bearing thickness
Green	1.996 – 2.000 mm (0.0786 – 0.0787 in.)
Black	1.999 – 2.003 mm (0.0787 – 0.0788 in.)
Colorless (no paint)	2.002 – 2.006 mm (0.0788 – 0.0789 in.)
Yellow	2.005 – 2.009 mm (0.0789 – 0.0790 in.)
Blue	2.008 – 2.012 mm (0.0790 – 0.0791 in.)



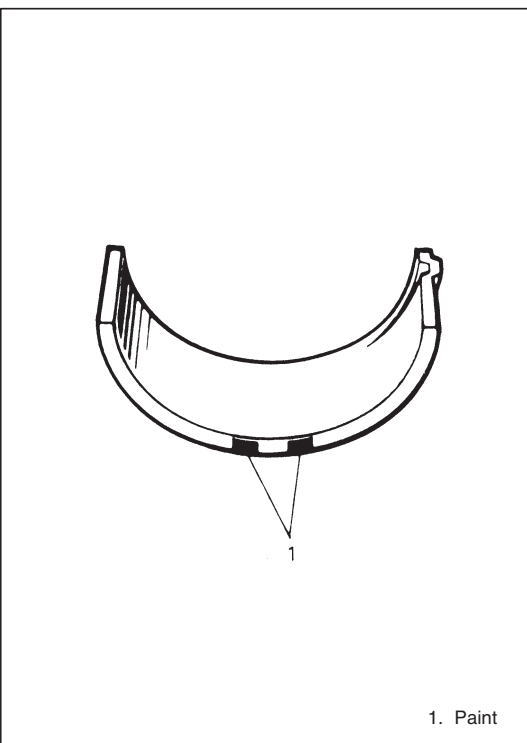
- 4) From numerals stamped on crank webs of No.2 and No.3 cylinders (1) and the alphabets stamped on mating surface of cylinder block, determine new standard bearing to be installed to journal, by referring to table given below.

For example, if numeral stamped on crank web is "1" and alphabet stamped on mating surface is "B", install a new standard bearing painted in "Black" to its journal.

		Numeral stamped on crank web (Journal diameter)		
		1	2	3
Alphabet stamped on mating surface (Bearing cap bore dia.)	A	Green	Black	Colorless
	B	Black	Colorless	Yellow
	C	Colorless	Yellow	Blue
		New standard bearing to be installed.		



- 5) Using scale (2) on gaging plastic (1), check bearing clearance with newly selected standard bearing.
If clearance still exceeds its limit, use next thicker bearing and recheck clearance.
- 6) When replacing crankshaft or cylinder block due to any reason, select new standard bearings to be installed by referring to numerals stamped on new crankshaft or alphabets stamped on mating surface of new cylinder block.



UNDERSIZE BEARING (0.25 mm):

- 0.25 mm undersize bearing is available, in five kinds varying in thickness.

To distinguish them, each bearing is painted in following colors at such position as indicated in figure.

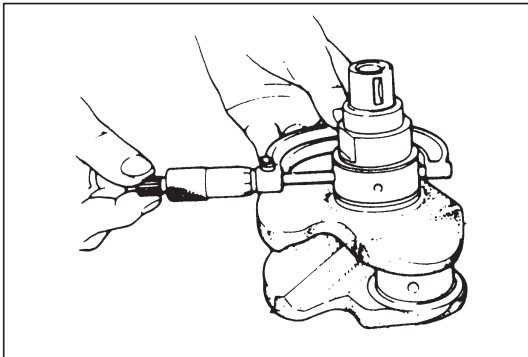
Each color represents following thicknesses at the center of bearing.

Color painted	Bearing thickness
Green & Red	2.121 – 2.125 mm (0.0835 – 0.0836 in.)
Black & Red	2.124 – 2.128 mm (0.0836 – 0.0837 in.)
Red only	2.127 – 2.131 mm (0.0837 – 0.0838 in.)
Yellow & Red	2.130 – 2.134 mm (0.0838 – 0.0839 in.)
Blue & Red	2.133 – 2.137 mm (0.0839 – 0.0840 in.)

- If necessary, regrind crankshaft journal and select undersize bearing to use with it as follows.

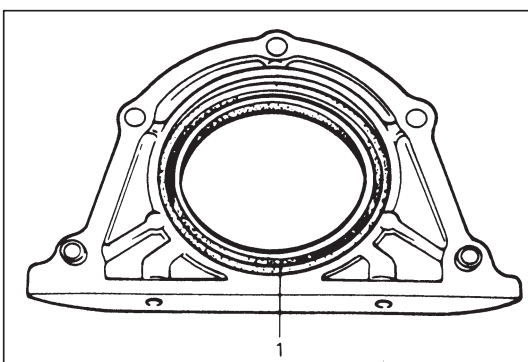
1) Regrind journal to following finished diameter.

**Finished diameter: 44.732 – 44.750 mm
(1.7611 – 1.7618 in.)**



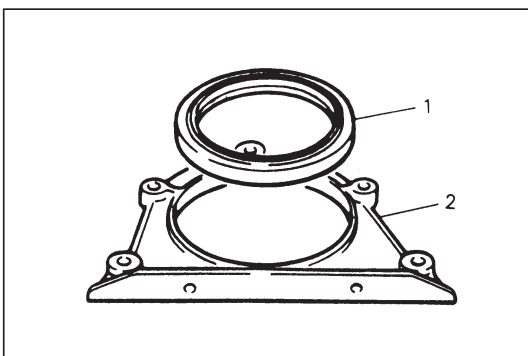
- 2) Using micrometer, measure reground journal diameter. Measurement should be taken in two directions perpendicular to each other in order to check for out-of-round.
- 3) Using journal diameter measured above and alphabets stamped on mating surface of cylinder block, select an undersize bearing by referring to table given below. Check bearing clearance with newly selected undersize bearing.

		Measured journal diameter		
		44.744 – 44.750 mm (1.7616 – 1.7618 in.)	44.738 – 44.744 mm (1.7613 – 1.7616 in.)	44.732 – 44.738 mm (1.7611 – 1.7613 in.)
Alphabets stamped on mating surface of cylinder block	A	Green & Red	Black & Red	Red only
	B	Black & Red	Red only	Yellow & Red
	C	Red only	Yellow & Red	Blue & Red
		Undersize bearing to be installed		

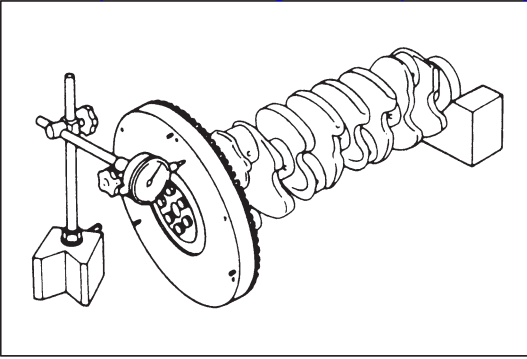


Rear Oil Seal

Carefully inspect rear oil seal (1) for wear or damage. If its lip is worn or damaged, replace it.

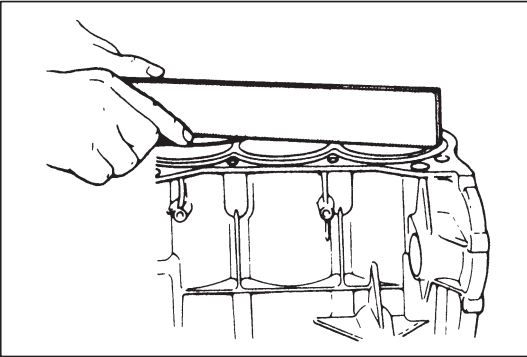


For oil seal (1) installation, press-fit rear oil seal so that oil seal housing (2) end face is flush with oil seal end face.

**Flywheel**

- If ring gear is damaged, cracked or worn, replace flywheel.
- If the surface contacting clutch disc is damaged, or excessively worn, replace flywheel.
- Check flywheel for face runout with dial gauge.
If runout exceeds its limit, replace flywheel.

Limit on runout: 0.2 mm (0.0078 in.)

**Cylinder Block****Distortion of gasketed surface**

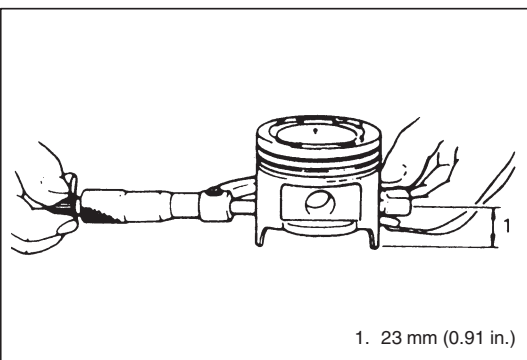
Using straightedge and thickness gauge, check gasketed surface for distortion and, if flatness exceeds its limit, correct it.

Item	Standard	Limit
Flatness	0.03 mm (0.0012 in.)	0.06 mm (0.0024 in.)

Honing or reboring cylinders

- 1) When any cylinder needs reboring, all other cylinders must also be rebored at the same time.
- 2) Select oversized piston according to amount of cylinder wear.

Size	Piston diameter
O/S 0.25	74.220 – 74.230 mm (2.9220 – 2.9224 in.)
O/S 0.50	74.470 – 74.480 mm (2.9319 – 2.9323 in.)



- 3) Using micrometer, measure piston diameter.

- 4) Calculate cylinder bore diameter to be rebored.

$$D = A + B - C$$

D: Cylinder bore diameter to be rebored.

A: Piston diameter as measured.

B: Piston clearance = 0.02 – 0.04 mm
(0.0008 – 0.0015 in.)

C: Allowance for honing = 0.02 mm (0.0008 in.)

- 5) Rebore and hone cylinder to calculated dimension.

NOTE:

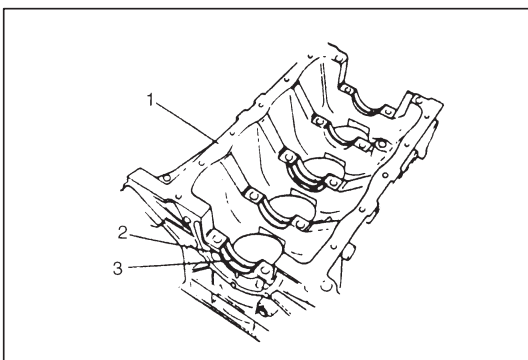
Before reboring, install all main bearing caps in place and tighten to specification to avoid distortion of bearing bores.

- 6) Measure piston clearance after honing.

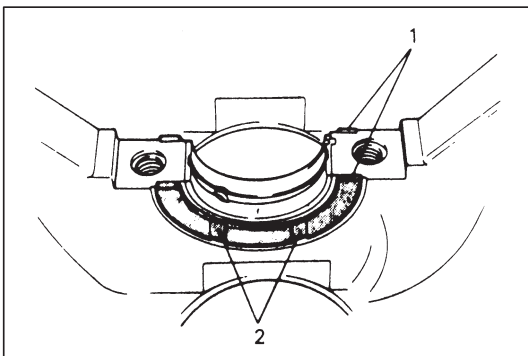
INSTALLATION

NOTE:

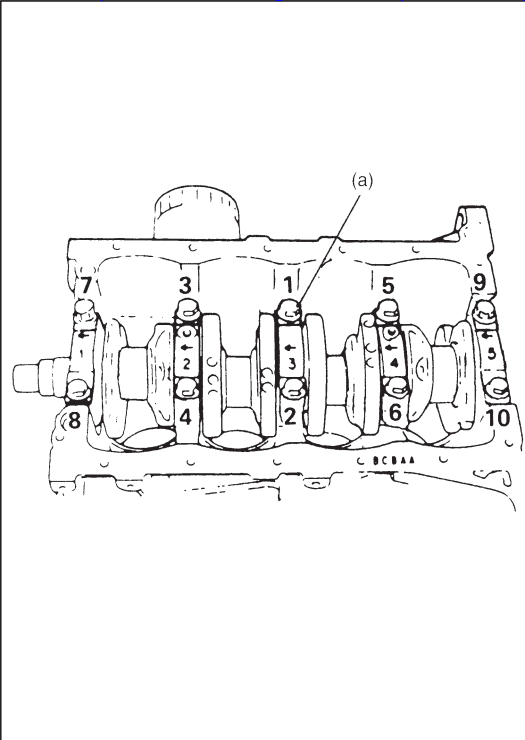
- All parts to be installed must be perfectly clean.
- Be sure to oil crankshaft journals, journal bearings, thrust bearings, crankpins, connecting rod bearings, pistons, piston rings and cylinder bores.
- Journal bearings, bearing caps, connecting rods, rod bearings, rod bearing caps, pistons and piston rings are in combination sets. Do not disturb such combination and make sure that each part goes back to where it came from, when installing.



- 1) Install main bearings to cylinder block (1).
Upper half of bearing (2) has an oil groove (3). Install it to cylinder block, and the other half without oil groove to bearing cap.
Make sure that two halves are painted in the same color.



- 2) Install thrust bearings (1) to cylinder block between No.2 and No.3 cylinders. Face oil groove (2) sides to crank webs.



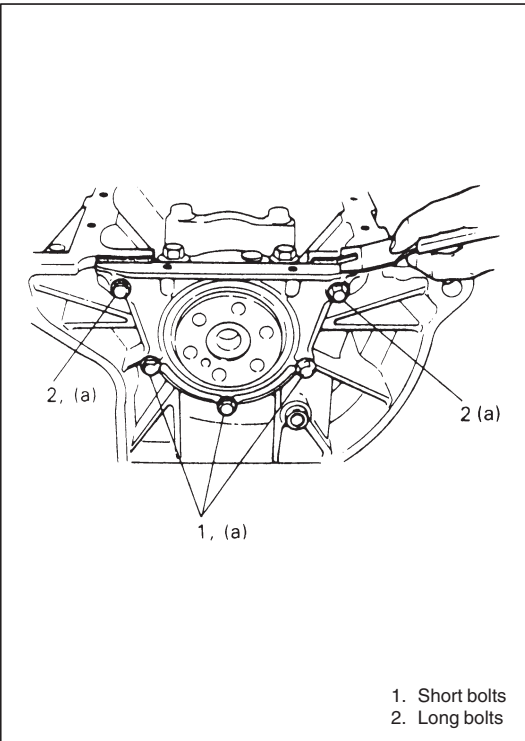
- 3) Install crankshaft to cylinder block.
- 4) Install bearing cap to cylinder block, making sure to point arrow mark (on each cap) to crankshaft pulley side. Fit them sequentially in ascending order, 1, 2, 3, 4 and 5, starting from pulley side. Tighten bearing cap bolts in such order as shown in figure a little at a time and repeat it till they are tightened to specified torque.

Tightening Torque

(a): 54 N·m (5.4 kg-m, 39.0 lb-ft)

NOTE:

After tightening cap bolts, check to be sure that crankshaft rotates smoothly when turning it by 8.0 N·m (0.8 kg, 5.8 lb-ft) torque or below.



- 5) Install new gasket and oil seal housing.

Do not reuse gasket removed in disassembly. Apply engine oil to oil seal lip before installation. Tighten housing bolts to specification.

Tightening Torque

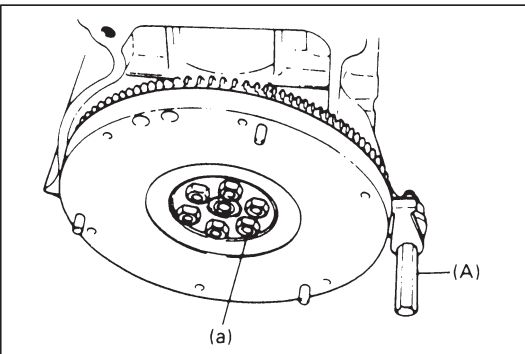
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

NOTE:

As there are 2 types of housing bolts, refer to figure for their correct use.

After installing oil seal housing, gasket edges might bulge out; it so, cut them off to make them flush with cylinder block and oil seal housing.

- 6) Install oil pump.
Refer to INSTALLATION of OIL PUMP in this section.



- 7) Install flywheel (M/T model) or drive plate (A/T model).

Using special tool, lock flywheel or drive plate, and torque its bolts to specification.

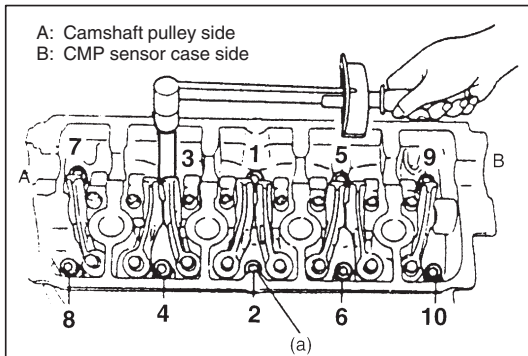
Special Tool

(A): 09924-17810

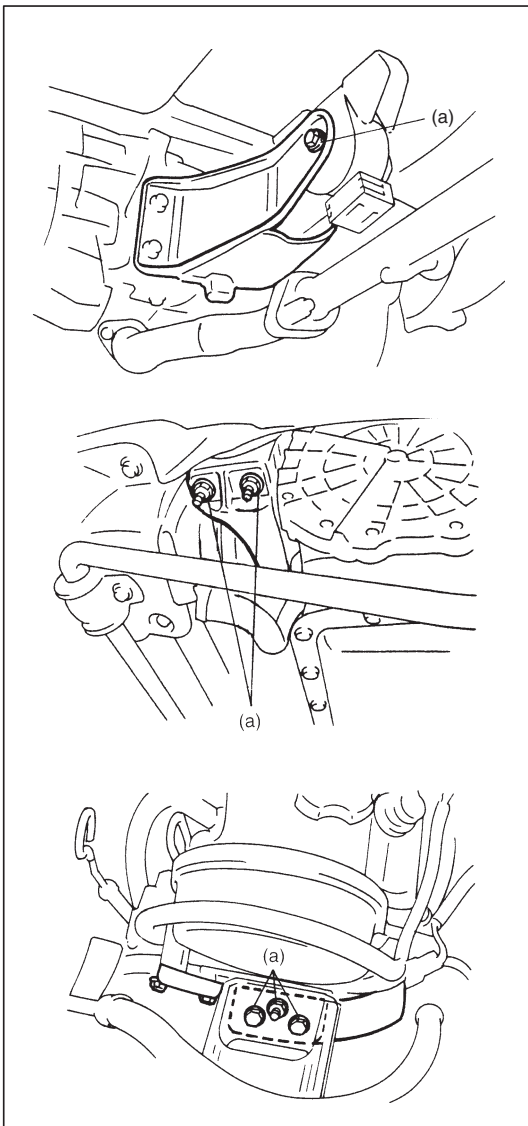
Tightening Torque

(a): 76 N·m (7.6 kg-m, 55.0 lb-ft)

- 8) Install pistons and connecting rods as previously outlined.
- 9) Install oil pump strainer and oil pan as previously outlined.



- 10) Install cylinder head assembly to cylinder block as previously outlined.

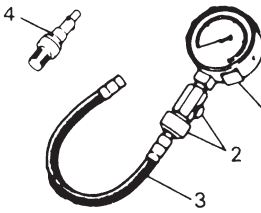
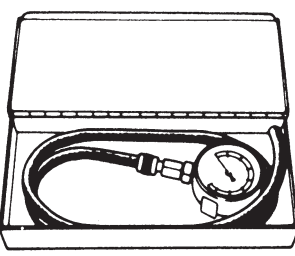
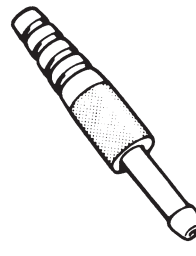
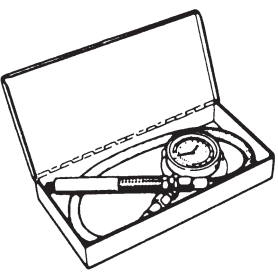
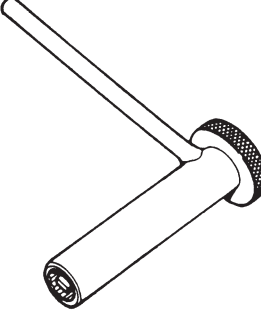
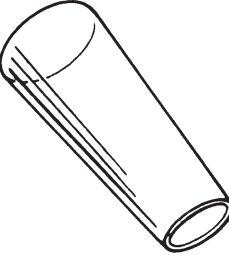
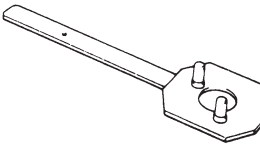
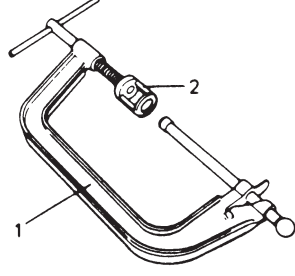
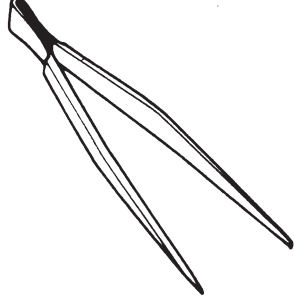
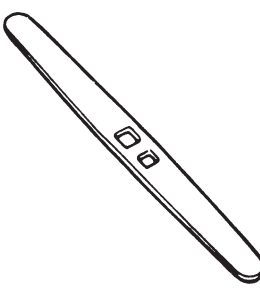
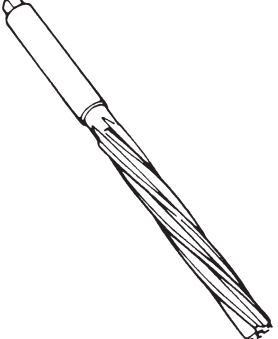
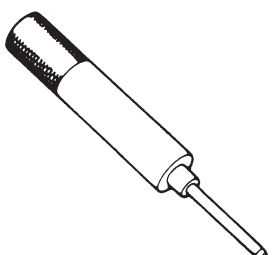

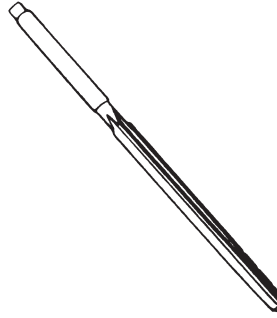



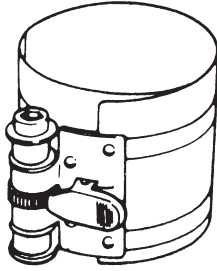
- 11) Install camshaft, crankshaft timing belt pulley, timing belt, crankshaft pulley, water pump pulley, etc., as previously outlined.
- 12) Install clutch to flywheel (for M/T vehicle). For clutch installation, refer to "CLUTCH" section.
- 13) Install engine assembly to vehicle as previously outlined.

Tightening Torque

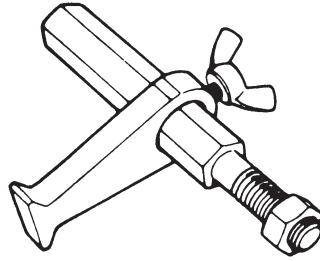
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

SPECIAL TOOLS

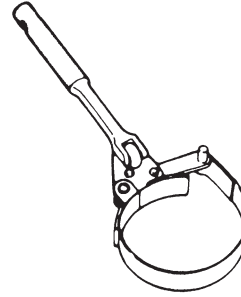
 <p>1. 09915-64510-001 Compression gauge 2. 09915-64510-002 Connector 3. 09915-64530 Hose 4. 09915-67010 Attachment</p>	 <p>09915-67310 Vacuum gauge</p>	 <p>09918-08210 Vacuum gauge hose joint</p>	 <p>09915-77310 Oil pressure gauge</p>
 <p>09917-18210 Tappet adjuster wrench</p>	 <p>09926-18210 Oil seal guide (Vinyl resin)</p>	 <p>09917-68220 Camshaft pulley holder</p>	 <p>1. 09916-14510 Valve lifter 2. 09916-14910 Valve lifter attachment</p>
 <p>09916-84511 Forceps</p>	 <p>09916-44910 Valve guide remover</p>	 <p>09916-34541 Reamer handle</p>	 <p>09916-38210 Reamer (11 mm)</p>
 <p>09916-58210 Valve guide installer handle</p>	 <p>09916-56011 Valve guide installer attachment</p>	 <p>09916-34550 Reamer (5.5 mm)</p>	 <p>09917-98221 Valve stem seal installer</p>



09916-77310
Piston ring compressor



09924-17810
Flywheel holder



09915-47330
Oil filter wrench

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Sealant	SUZUKI BOND NO.1207C (99000-31150)	<ul style="list-style-type: none"> ● Mating surfaces of cylinder block and oil pan.
Sealant	SUZUKI BOND NO.1215 (99000-31110)	<ul style="list-style-type: none"> ● Mating surfaces of camshaft housing (No.6). ● Mating surfaces of CMP sensor case and cylinder head.

SECTION 6B**ENGINE COOLING****6B****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CONTENTS

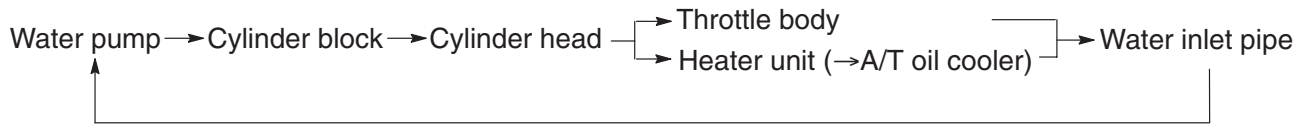
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GENERAL DESCRIPTION

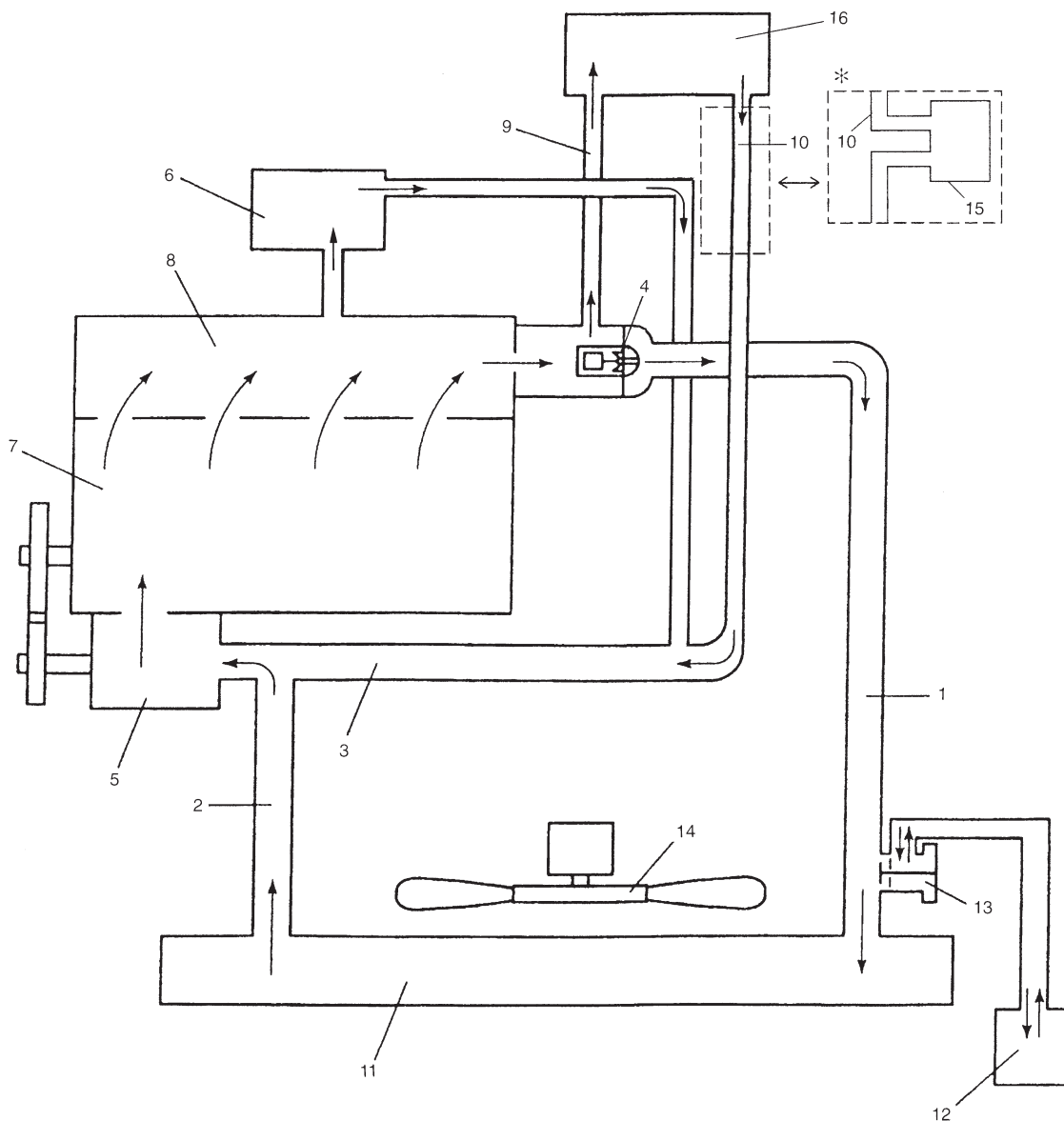
The cooling system consists of the radiator cap, radiator, coolant reservoir, hoses, water pump, cooling fan and thermostat. The radiator is of tube-and-fin type.

COOLING SYSTEM CIRCULATION

1) While the engine is warmed up (thermostat closed), coolant circulates as follows.



2) When coolant is warmed up to normal temperature and the thermostat opens, coolant passes through the radiator core to be cooled as well as the above flow circuit.



- 1. Radiator inlet hose
- 2. Radiator outlet hose
- 3. Water inlet pipe
- 4. Thermostat

- 5. Water pump
- 6. Throttle body
- 7. Cylinder block
- 8. Cylinder head

- 9. Heater inlet hose
- 10. Heater outlet hose
- 11. Radiator
- 12. Reservoir tank

- 13. Radiator cap
- 14. Cooling fan
- 15. A/T oil cooler
- 16. Heater unit

※: A/T vehicle

COOLANT

The coolant recovery system is standard. The coolant in the radiator expands with heat, and the overflow is collected in the reservoir.

When the system cools down, the coolant is drawn back into the radiator.

The cooling system has been filled at the factory with a quality coolant that is a 50/50 mixture of water and ethylene glycol antifreeze (70/30; in a market where no freezing temperature is anticipated).

This 50/50 mixture coolant solution provides freezing protection to -36°C (-33°F).

- Maintain cooling system freeze protection at -36°C (-33°F) to ensure protection against corrosion and loss of coolant from boiling. This should be done even if freezing temperatures are not expected.

- Add ethylene glycol base coolant when coolant has to be added because of coolant loss or to provide added protection against freezing at temperature lower than -36°C (-33°F).

NOTE:

- **Alcohol or methanol base coolant or plain water alone should not be used in cooling system at any time as damage to cooling system could occur.**
- **Even in a market where no freezing temperature is anticipated, mixture of 70% water and 30% ethylene glycol antifreeze (Antifreeze/Anti-corrosion coolant) should be used for the purpose of corrosion protection and lubrication.**

ANTI-FREEZE PROPORTIONING CHART

			Vehicle with M/T		Vehicle with A/T	
ANTI-FREEZE PROPORTIONING CHART	Freezing temperature	°C	−16	−36	−16	−36
		°F	3	−33	3	−33
	Anti-freeze/Anti-corrosion coolant concentration	%	30	50	30	50
	Ratio of compound to cooling water	ltr.	1.32/3.08	2.20/2.20	1.35/3.15	2.25/2.25
		US pt.	2.79/6.51	4.65/4.65	2.85/6.66	4.76/4.76
		Imp. pt.	2.32/5.42	3.87/3.87	2.38/5.54	3.96/3.96
COOLANT CAPACITY	Engine radiator and heater		3.7 liters (7.82/6.51 US/Imp. pt.)		3.8 liters (8.03/6.69 US/Imp. pt.)	
	Reservoir		0.7 liters (1.48/1.23 US/Imp. pt.)			
	Total		4.4 liters (9.30/7.74 US/Imp. pt.)		4.5 liters (9.51/7.92 US/Imp. pt.)	

DIAGNOSIS

Condition	Possible Cause	Correction
Engine overheats	<ul style="list-style-type: none">● Loose or broken water pump belt● Not enough coolant● Faulty thermostat● Faulty water pump● Dirty or bent radiator fins● Coolant leakage on cooling system● Defective cooling fan motor● Faulty fan motor control circuit● Plugged radiator● Faulty radiator cap● Dragging brakes● Slipping clutch	<p>Adjust or replace. Check coolant level and add as necessary. Replace. Replace. Clean or remedy. Repair. Check and replace as necessary. Check control circuit. Check and replace radiator as necessary. Replace. Adjust brake. Adjust or replace.</p>

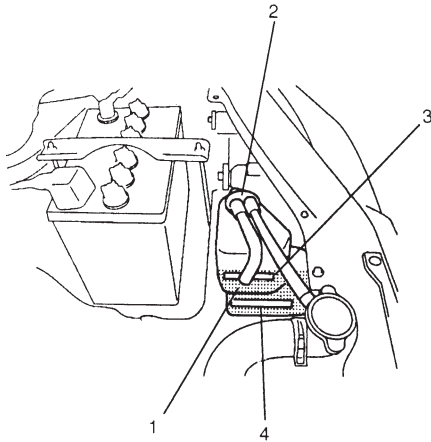
MAINTENANCE

COOLANT LEVEL CHECK

Coolant Level

To check level, lift hood and look at “see-through” coolant reservoir (1).

It is not necessary to remove radiator cap to check coolant level.



WARNING:

To help avoid danger of being burned:

- Do not remove reservoir cap while coolant is “boiling”.
- Do not remove radiator cap while engine and radiator are still hot.

Scalding fluid and steam can be blown out under pressure if either cap is taken off too soon.

When engine is cool, check coolant level in reservoir.

A normal coolant level should be between “FULL” (3) and “LOW” (4) level marks on reservoir.

If coolant level is below “LOW” level mark, remove reservoir cap (2) and add proper coolant to reservoir to bring coolant level up to “FULL” level mark. Then, reinstall cap and align match marks on tank and cap.

NOTE:

- If proper quality antifreeze is used, there is no need to add extra inhibitors or additives that claim to improve system. They may be harmful to proper operation of system, and are unnecessary expense.
- When installing reservoir cap, align arrow marks on reservoir and cap.

COOLING SYSTEM SERVICE

WARNING:

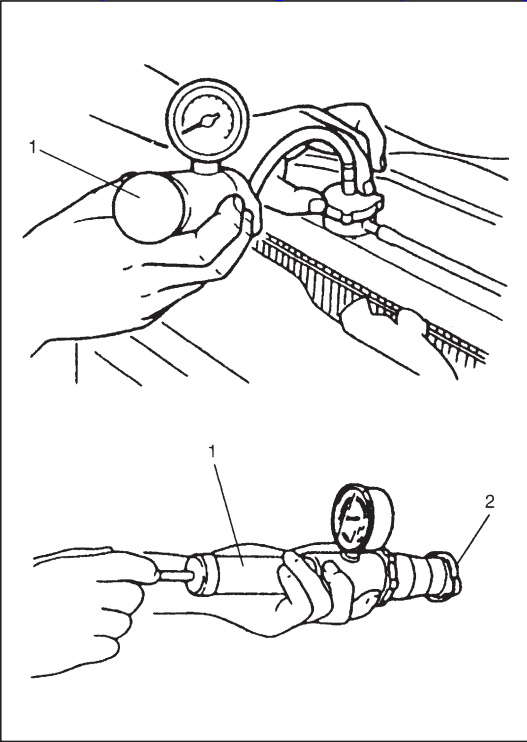
To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot.

Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

Cooling system should be serviced as follows.

- 1) Check cooling system for leakage or damage.
- 2) Wash radiator cap and filler neck with clean water by removing radiator cap when engine is cold.
- 3) Check coolant for proper level and freeze protection.

Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>



- 4) Using a pressure tester (1), check system and radiator cap (2) for proper pressure holding capacity 110 kPa (1.1 kg/cm², 15.6 psi). If replacement of cap is required, use specified cap for this vehicle.

NOTE:

After installing radiator cap to radiator, make sure that the ear of cap lines is parallel to radiator.

- 5) Tighten hose clamps and inspect all hoses. Replace hoses whenever cracked, swollen or otherwise deteriorated.
- 6) Clean frontal area of radiator core.

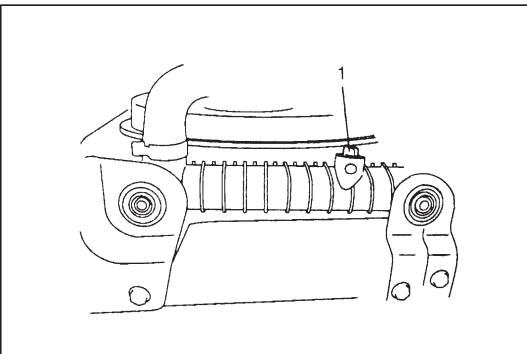
COOLING SYSTEM FLUSH AND REFILL

- 1) Remove radiator cap when engine is cool:
Turn cap counterclockwise slowly until it reaches a "stop".
(Do not press down while turning it.)
Wait until pressure is relieved (indicated by a hissing sound) then press down on cap and continue to turn it counterclockwise.

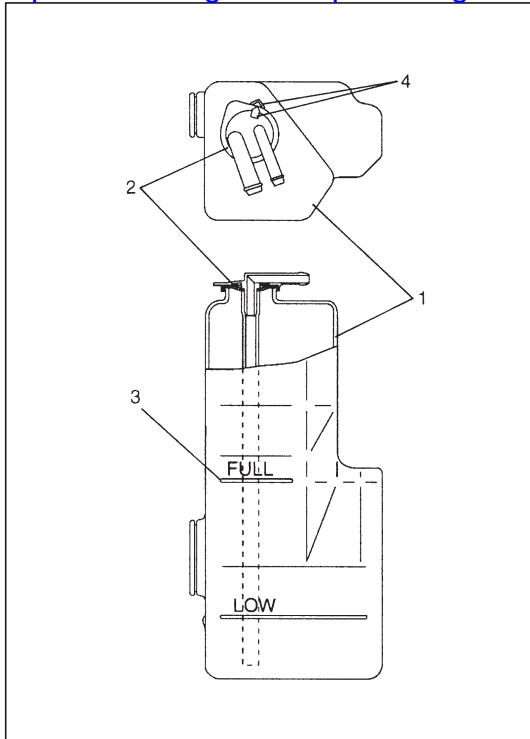
WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

- 2) With radiator cap removed, run engine until upper radiator hose is hot (this shows that thermostat is open and coolant is flowing through system).



- 3) Stop engine and drain coolant.
- 4) Close drain plug (1). Add water until system is filled and run engine until upper radiator hose is hot again.
- 5) Repeat steps 3) and 4) several times until drained liquid is nearly colorless.
- 6) Drain system and then close radiator drain plug tightly.



- 7) Remove reservoir (1) and remove cap (2) from reservoir and pour out any fluid, scrub and clean inside of tank with soap and water.
Flush it well with clean water and drain. Reinstall reservoir.
- 8) Disconnect coolant hose from throttle body for improving air purging efficiency and add 50/50 mixture of good quality ethylene glycol antifreeze and water to radiator until coolant overflow disconnected hose. And connect coolant hose to throttle body.
Fill radiator to the base of radiator filler neck and reservoir to "FULL" level mark (3). Reinstall reservoir cap and align match marks (4) on reservoir and cap.
- 9) Run engine, with radiator cap removed, until radiator upper hose is hot.
- 10) With engine idling, add coolant to radiator until level reaches the bottom of filler neck. Install radiator cap, making sure that the ear of cap lines is parallel to radiator.

WATER PUMP BELT TENSION

WARNING:

Disconnect negative cable at battery before checking and adjusting belt tension.

- 1) Inspect belt for cracks, cuts, deformation, wear and cleanliness.
If it is necessary to replace belt, refer to WATER PUMP BELT in this section.

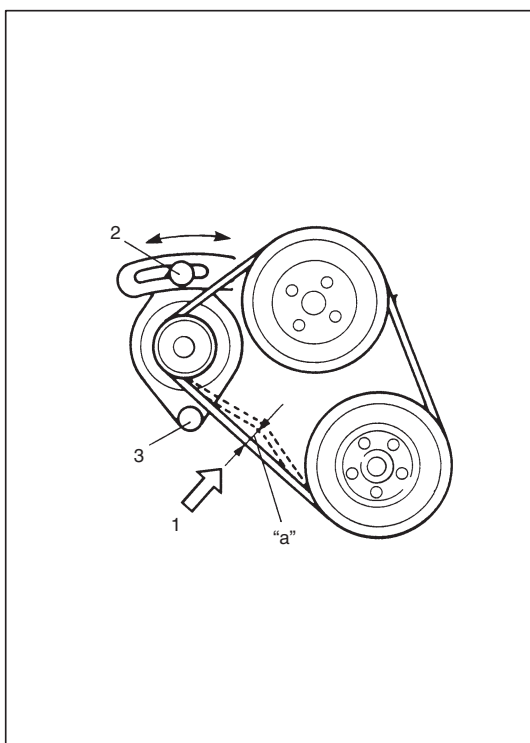
- 2) Check belt for tension. Belt is in proper tension when it deflects 8 to 10 mm (0.32 – 0.39 in.) under thumb pressure (about 10 kg or 22 lbs (1)).

Belt tension "a": 8 – 10 mm (0.32 – 0.39 in.) as deflection

NOTE:

When replacing belt with a new one, adjust belt tension to 6 – 7 mm (0.24 – 0.27 in.).

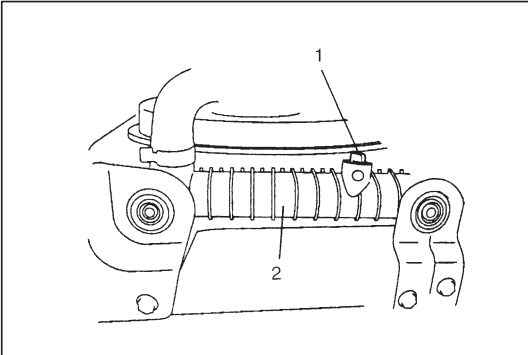
- 3) If belt is too tight or too loose, adjust it to proper tension by displacing generator position.
- 4) Tighten belt adjusting bolt (2) and generator pivot bolt (3).
- 5) Connect negative cable at battery terminal.



ON-VEHICLE SERVICE

WARNING:

- Check to make sure that engine coolant temperature is cold before removing any part of cooling system.
- Also be sure to disconnect negative cord from battery terminal before removing any part.



COOLING SYSTEM DRAINING

- 1) Remove radiator cap.
- 2) Loosen drain plug (1) on radiator (2) to drain coolant.
- 3) After draining coolant, be sure to tighten drain plug securely.
- 4) Fill cooling system. (Refer to COOLANT in GENERAL DESCRIPTION.)

COOLING WATER PIPES OR HOSES

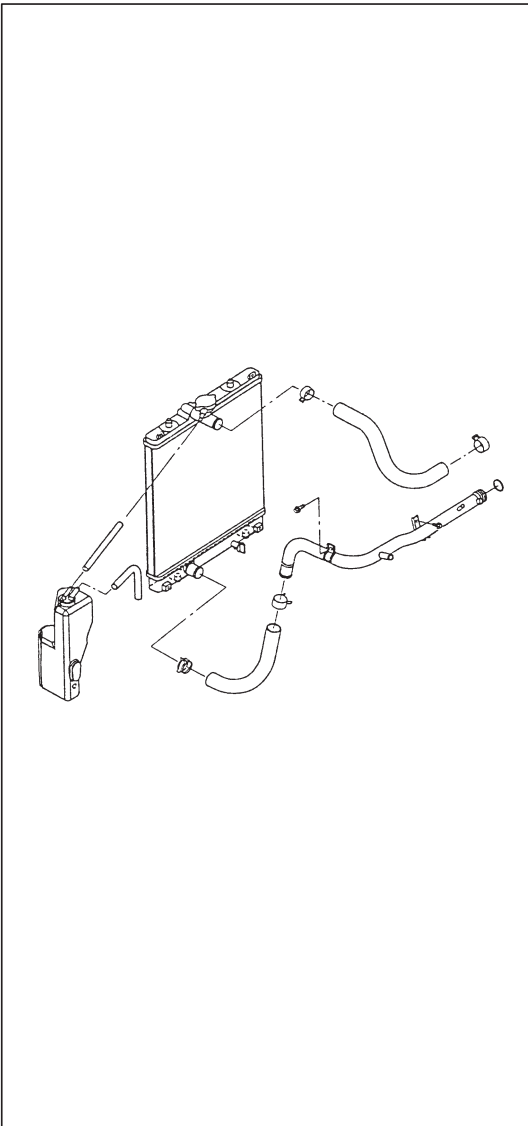
REMOVAL

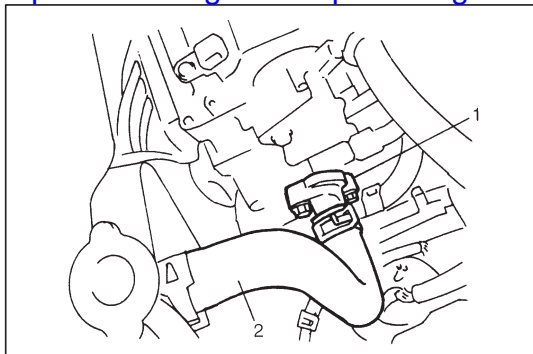
- 1) Drain cooling system.
- 2) To remove these pipes or hoses, loosen clamp on each hose and pull hose end off.

INSTALLATION

Install removed parts in reverse order of removal procedure, noting the following.

- Tighten each clamp securely.
- Refill cooling system with proper coolant, referring to COOLANT in GENERAL DESCRIPTION.

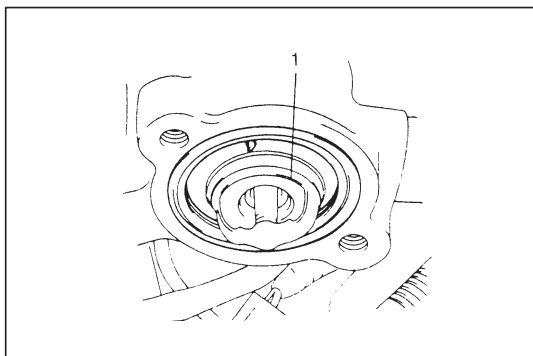




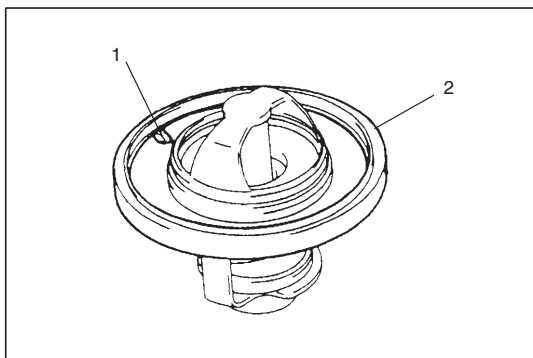
THERMOSTAT

REMOVAL

- 1) Drain coolant and tighten drain plug.
- 2) Remove radiator inlet hose (2) at thermostat cap.
- 3) Remove thermostat cap (1).

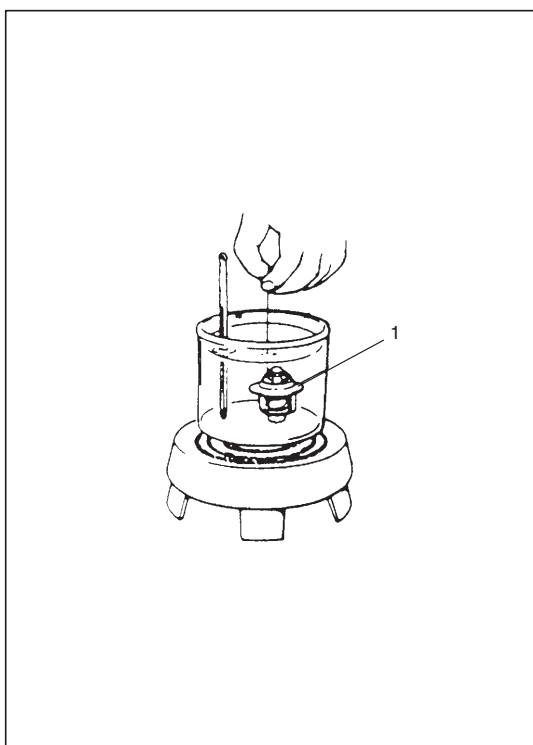


- 4) Remove thermostat (1).



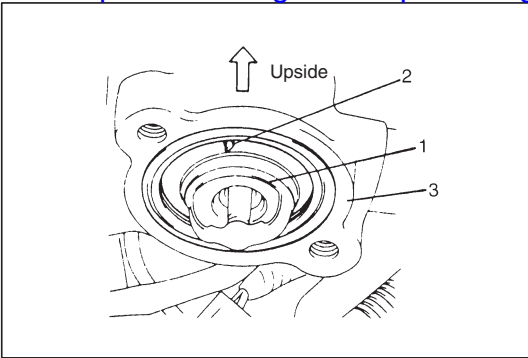
INSPECTION

- 1) Make sure that air bleed valve (1) of thermostat is clean.
Should this valve be clogged, engine would tend to overheat.
- 2) Check to make sure that valve seat is free from foreign matters which would prevent valve from seating tight.
- 3) Check thermostat seal (2) for breakage, deterioration or any other damage.



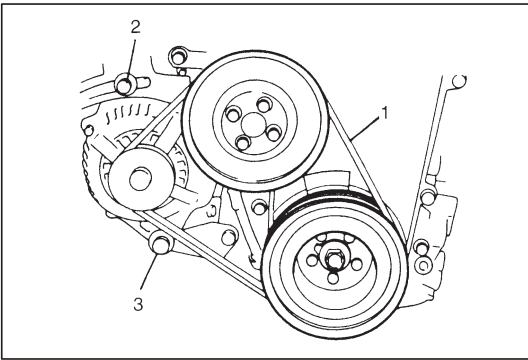
- 4) Check thermostatic movement of wax pellet as follows:
 - (1) Immerse thermostat (1) in water, and heat water gradually.
 - (2) Check that valve starts to open at specific temperature.
 - (3) If valve starts to open at a temperature substantially below or above specific temperature, thermostat unit should be replaced with a new one. Such a unit, if reused, will bring about overcooling or overheating tendency.

Thermostat functional spec. $\pm 1.5^{\circ}\text{C}$ (34°F)	
Temp. at which valve begins to open	88°C (190°F)
Temp. at which valve become fully open	100°C (212°F)
Valve lift	More than 8 mm at 100°C

**INSTALLATION**

- 1) When positioning thermostat (1) on thermostat case (3), be sure to position it so that air bleed valve (2) comes at position as shown in figure.

- 2) Install thermostat cap to thermostat case.
- 3) Connect cooling water hose.
- 4) Fill cooling system (refer to COOLING SYSTEM FLUSH AND REFILL in this section).
- 5) After installation, check each part for leakage.

**WATER PUMP BELT****REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Loosen drive belt adjusting bolt (2) and generator pivot bolt (3). When servicing car equipped with A/C, remove compressor drive belt before removing water pump belt (1).
- 3) Slacken belt by displacing generator and then remove it.

INSTALLATION

- 1) Install belt to water pump pulley, crankshaft pulley and generator pulley.
When servicing car equipped with A/C, install compressor drive belt, too.
- 2) Adjust belt tension.
For Adjustment of compressor drive belt tension, refer to Section 1B.
- 3) Tighten water pump belt adjusting bolt and pivot bolt.
- 4) Connect negative cable at battery.

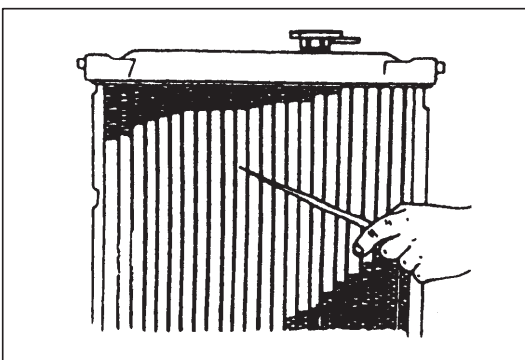
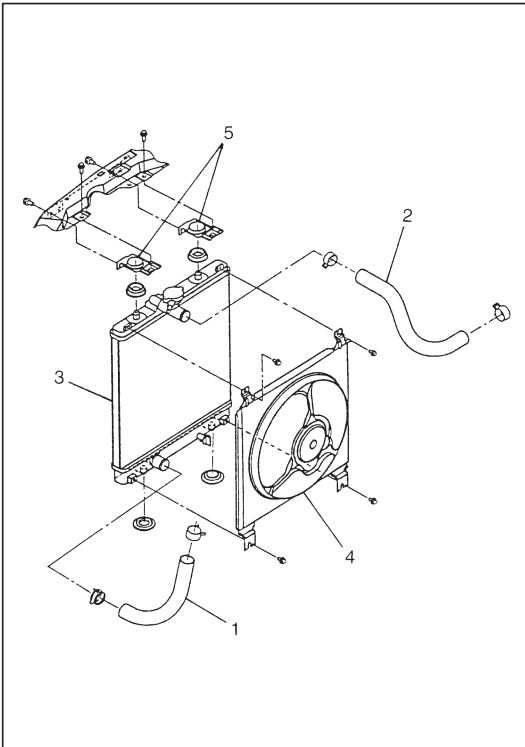
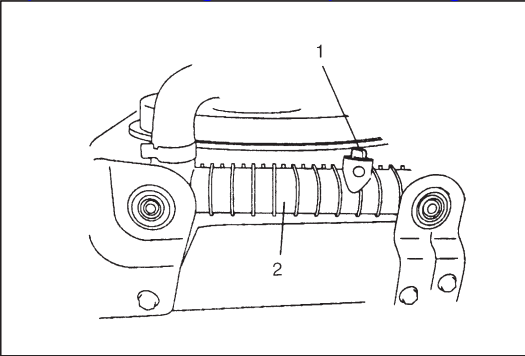
WATER PUMP BELT TENSION INSPECTION AND ADJUSTMENT

For this inspection or adjustment, refer to WATER PUMP BELT TENSION.

RADIATOR

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Drain cooling system by loosening drain plug (1) of radiator (2).
- 3) Disconnect coupler of cooling fan motor.
- 4) Remove front bumper (see Section 9).
- 5) Remove reservoir.
- 6) Disconnect radiator inlet (2) and outlet hoses (1) from radiator (3).
- 7) Remove cooling fan assembly (4) from radiator.
- 8) Remove radiator support upper brackets (5) and then remove radiator.



INSPECTION

Check radiator for leakage or damage. Straighten bent fins, if any.

CLEANING

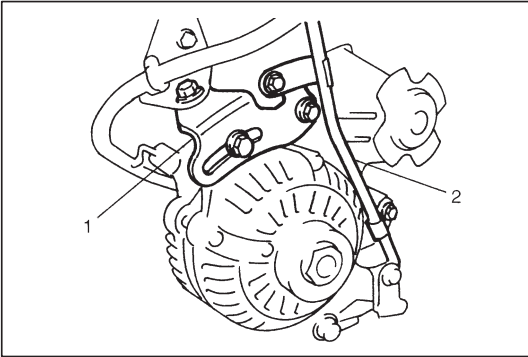
Clean frontal area of radiator cores.

INSTALLATION

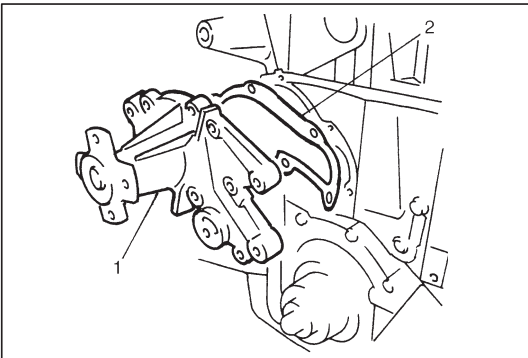
Reverse removal procedures.

NOTE:

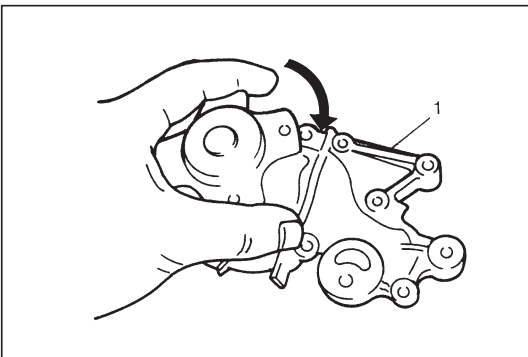
- Refill cooling system with proper coolant referring to COOLANT in GENERAL DESCRIPTION.
- After installation, check each joint for leakage.

**WATER PUMP**

- 1) Disconnect negative cable at battery.
- 2) Drain cooling system.
- 3) Remove timing belt and tensioner refer to TIMING BELT AND TENSIONER of SECTION 6A1.
- 4) Remove generator adjusting arm (1).
- 5) Remove oil level gauge guide (2) with oil level gauge.



- 6) Remove water pump (1), gasket (2) and rubber seal.

**INSPECTION****NOTE:**

Do not disassemble water pump.

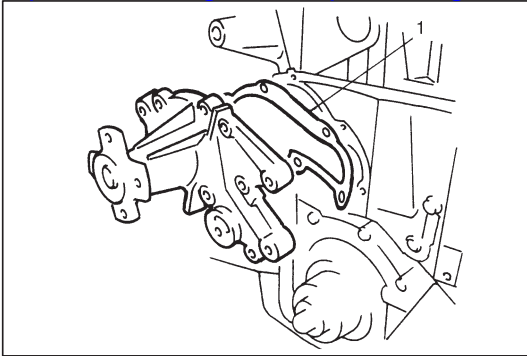
If any repair is required on pump, replace it as assembly.

Rotate water pump (1) by hand to check for smooth operation.

If pump does not rotate smoothly or makes abnormal noise, replace it.

INSTALLATION

- 1) Install new pump gasket (1) to cylinder block.

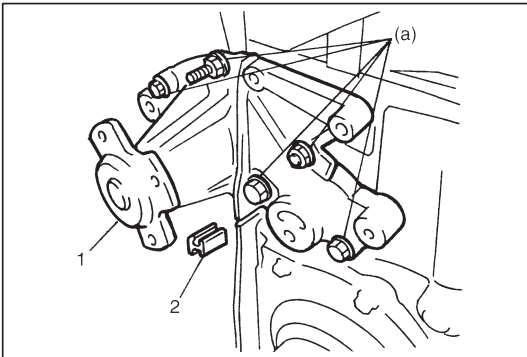


- 2) Install water pump (1) to cylinder block.

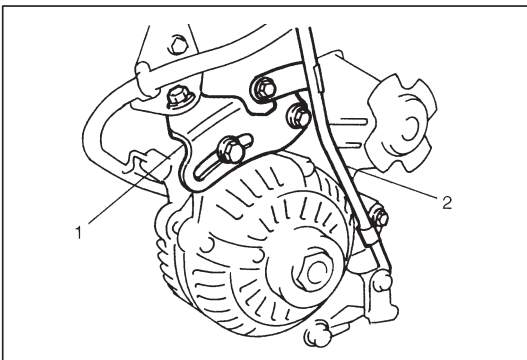
Tightening Torque

(a): 11 N·m (1.1 kg·m, 8.0 lb·ft)

- 3) After installing water pump, install rubber seal (2) between water pump and oil pump.
- 4) Install belt tensioner, timing belt and timing belt outside cover refer to TIMING BELT AND TENSIONER of SECTION 6A1.



- 5) Install generator adjusting arm (1).
- 6) With engine oil applied to O-ring, install oil level gauge guide (2).
- 7) Adjust water pump belt tension. (Refer to WATER PUMP BELT TENSION of MAINTENANCE in this section.)
- 8) Fill cooling system.
- 9) Connect negative cable at battery.
- 10) After installation, check each part for leakage.

**REQUIRED SERVICE MATERIAL**

MATERIAL	USE
Ethylene glycol base coolant (Anti-freeze/Anti-corrosion coolant)	Engine cooling system for improving cooling efficiency and for protection against rusting.

SECTION 6C**ENGINE FUEL****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

6C**CONTENTS**

GENERAL DESCRIPTION	6C- 2
Fuel System	6C- 2
ON-VEHICLE SERVICE	6C- 3
Fuel Lines	6C- 5
Fuel Pipe	6C- 5
Fuel Filler Cap	6C- 6
Fuel Tank Inlet Valve	6C- 7
Fuel Tank	6C- 9
Fuel Pump Assembly (with fuel filter, fuel level gauge, fuel pressure regulator and fuel cut valve)	6C-14
SPECIAL TOOL	6C-16

CAUTION:

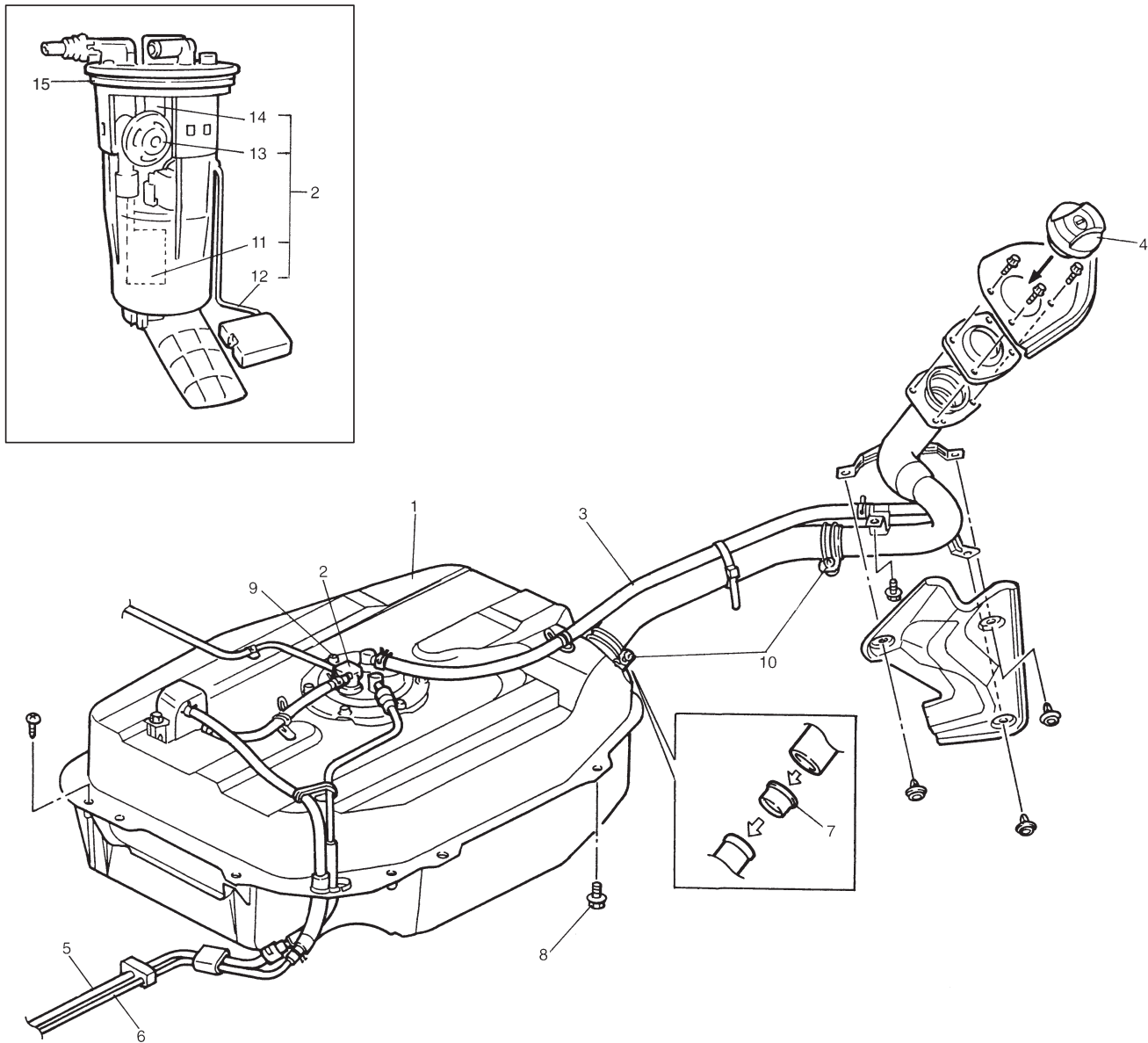
The engine of this vehicle requires the use of unleaded fuel only. Use of leaded and/or low lead fuel can result in engine damage and reduce the effectiveness of the emission control system.

GENERAL DESCRIPTION

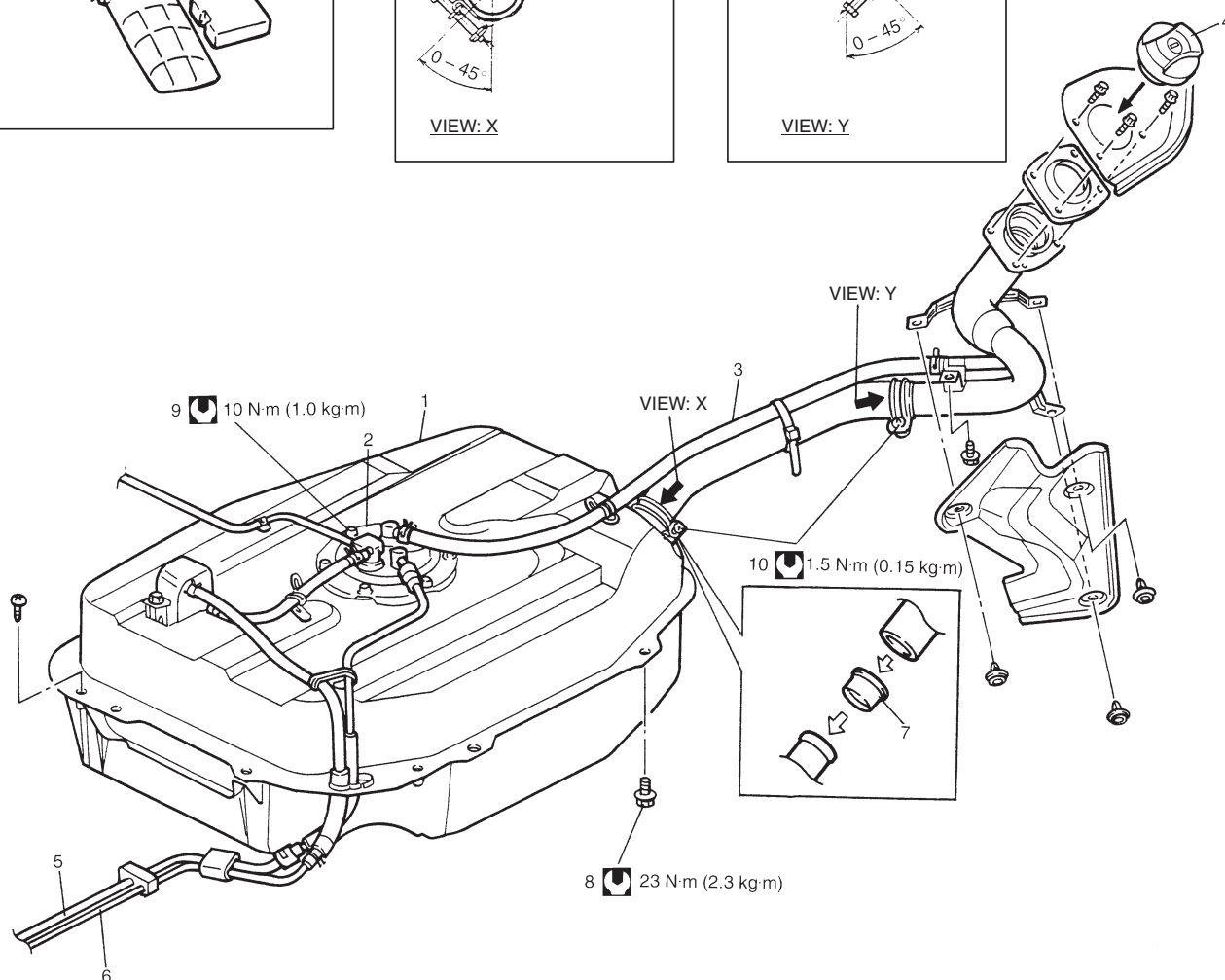
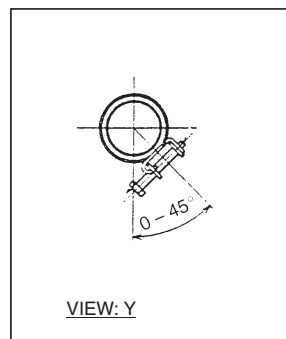
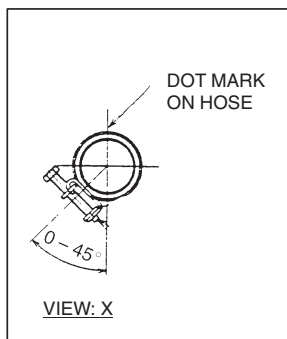
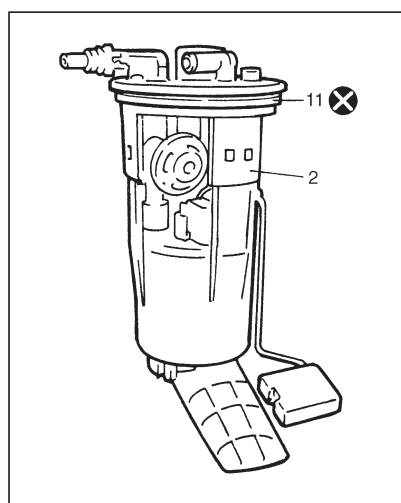
FUEL SYSTEM

The main components of the fuel system are fuel tank, fuel pump assembly (with fuel filter, fuel level gauge, fuel pressure regulator and fuel cut valve), fuel feed line and fuel vapor line.

For the details of fuel flow and fuel vapor flow, refer to "ENGINE AND EMISSION CONTROL SYSTEM" section.





- | | |
|--|-----------------------------|
| 1. Fuel tank | 9. Fuel pump bolts |
| 2. Fuel pump assembly | 10. Fuel filler hose clamp |
| 3. Breather hose | 11. Fuel filter |
| 4. Fuel filler cap | 12. Fuel level gauge |
| 5. Fuel feed line | 13. Fuel pressure regulator |
| 6. Fuel vapor line (vehicle with EVAP canister only) | 14. Fuel cut valve |
| 7. Fuel tank inlet valve | 15. Fuel pump gasket |
| 8. Fuel tank bolts | |

ON-VEHICLE SERVICE

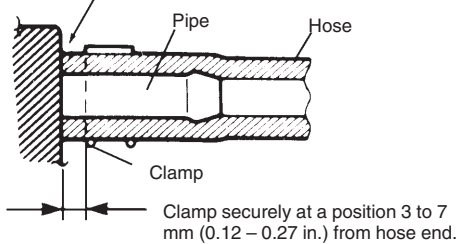
1. Fuel tank
2. Fuel pump assembly

CAUTION:
Do not disassemble fuel pump assembly. Disassembly will spoil its original performance.

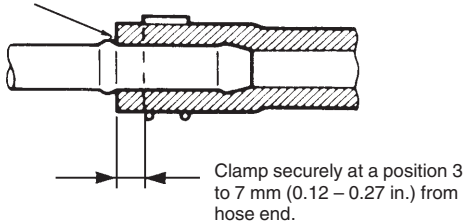
3. Breather hose
4. Fuel filler cap
5. Fuel feed line
6. Fuel vapor line (vehicle with EVAP canister only)
7. Fuel tank inlet valve
8. Fuel tank bolts
9. Fuel pump bolts
10. Fuel filler hose clamp
11. Fuel pump gasket

 : Tightening Torque
 : Do not reuse

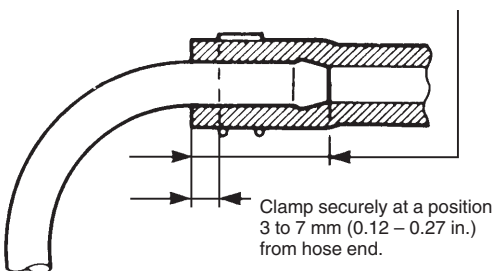
With short pipe, fit hose as far as it reaches pipe joint as shown.



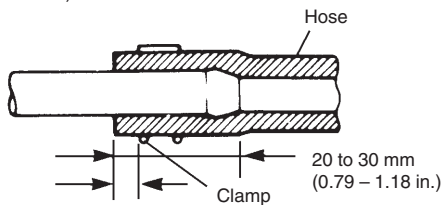
With following type pipe, fit hose as far as its peripheral projection as shown.



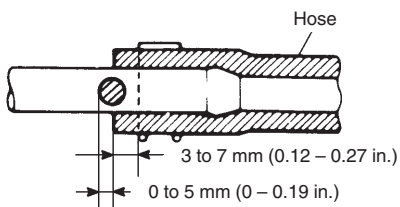
With bent pipe, fit hose as far as its bent part as shown or till pipe is about 20 to 30 mm (0.79-1.18 in.) into the hose.



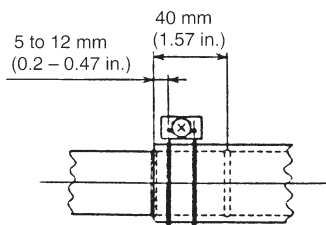
With straight pipe, fit hose till pipe is about 20 to 30 mm (0.79-1.18 in.) in the hose.



With red marked pipe, fit hose till hose end reaches red mark on pipe.



For fuel tank filler hose, insert it to spool or welding-bead.



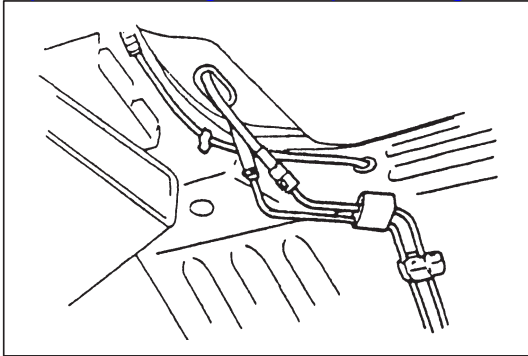
WARNING:

Before attempting service of any type on fuel system, following cautions should be always observed.

- Disconnect negative cable at battery.
- DO NOT smoke, and place “NO SMOKING” signs at work area.
- Be sure to have CO₂ fire extinguisher handy.
- Be sure to perform work in a well-ventilated area and away from any open flames (such as gas hot heater).
- Wear safety glasses.
- To relieve fuel vapor pressure in fuel tank, remove fuel filler cap from fuel filler neck and then reinstall it.
- As fuel feed line is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected.

Before loosening or disconnecting fuel feed line, make sure to relieve fuel pressure.

- A small amount of fuel may be released after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop towel. Be sure to put that towel in an approved container when disconnection is completed.
- Note that fuel hose connection varies with each type of pipe. Be sure to connect and clamp each hose correctly referring to the figure.



FUEL LINES

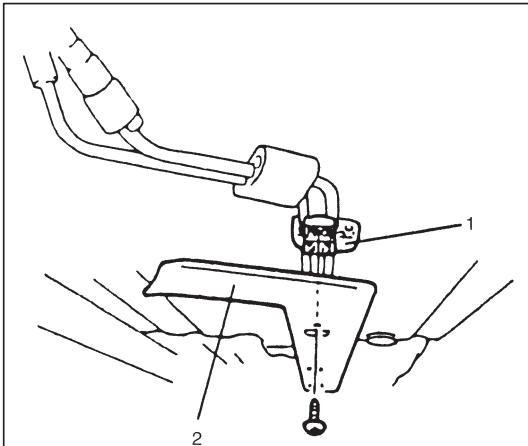
Due to the fact that fuel feed line is under high pressure, use special care when servicing it.

INSPECTION

Visually inspect fuel lines for evidence of fuel leakage, hose crack and deterioration, or damage.

Make sure that all clamps are secure.

Replace parts as needed.



FUEL PIPE

REMOVAL

- 1) Relieve fuel pressure in fuel feed line.
- 2) Disconnect negative cable at battery.
- 3) Remove steering gear box assembly. Refer to Section 3B for details.
- 4) Remove pipe cover (2) from vehicle.
- 5) Disconnect fuel pipe joint and fuel hoses from the front end and the rear end of each fuel pipe.

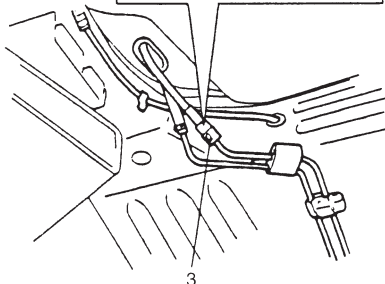
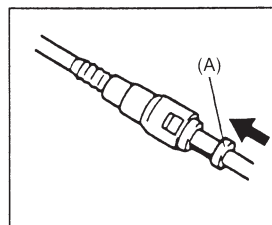
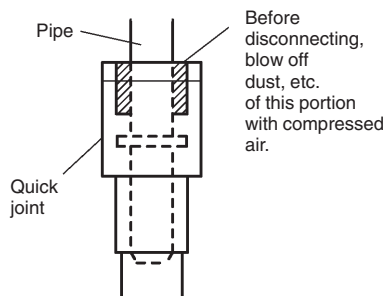
For quick joint (3), disconnect it as follows:

- a) Remove mud, dust and/or foreign material between pipe and joint by blowing compressed air.
- b) Unlock joint lock by inserting special tool between pipe and joint.

Special Tool

(A): 09919-47020

- c) Disconnect joint from pipe.

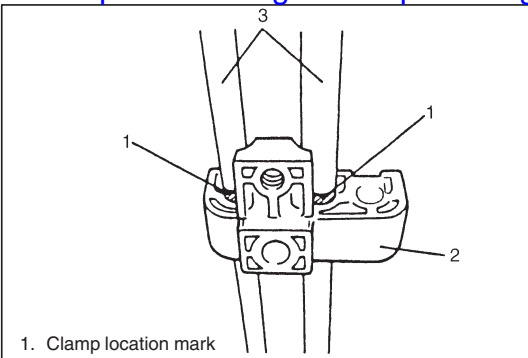


1. Clamp
2. Pipe cover
3. Quick joint

WARNING:

A small amount of fuel may be released after fuel hose is disconnected. In order to reduce the chance of personal injury, cover hose and pipe to be disconnected with a shop towel.

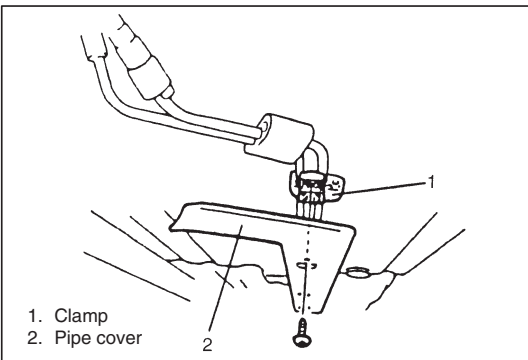
Be sure to put that towel in an approved container when disconnection is completed.



- 6) Mark the location of clamps on fuel pipes, so that the clamps can be reinstalled to where they were.
- 7) Remove pipes (3) with clamp (2) from vehicle.
- 8) Remove clamp from pipes.

INSTALLATION

- 1) Install clamps to marked location on pipes. If clamp is deformed or its claw is bent or broken, replace it with a new one.
- 2) Install pipes with pipe clamps to vehicle.

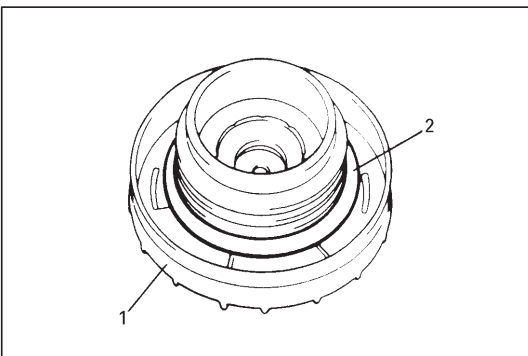


- 3) Connect fuel hoses and pipes to each pipe.

CAUTION:

When connecting joint, clean outside surfaces of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.

- 4) Install pipe cover (2) to vehicle.
- 5) Install steering gear box. Refer to Section 3B for details.
- 6) With engine "OFF" and ignition switch "ON", check for fuel leaks.



FUEL FILLER CAP

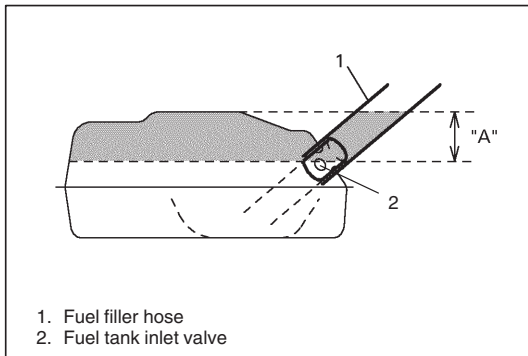
Remove cap (1), and check gasket (2) for even filler neck imprint, and deterioration or any damage. If gasket is in malcondition, replace cap.

NOTE:

If cap requires replacement, only a cap with the same features should be used. Failure to use correct cap can result in critical malfunction of system.

FUEL TANK INLET VALVE**WARNING:**

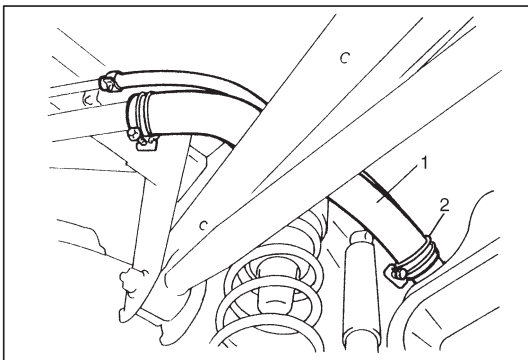
Refer to the **WARNING** at the beginning of **ON-VEHICLE SERVICE** in this section.

**REMOVAL**

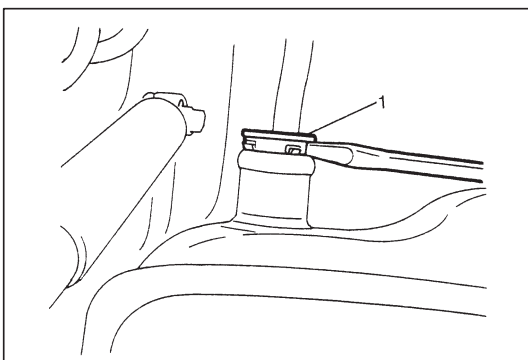
- 1) Remove fuel filler cap.
- 2) Insert hose of a hand operated pump into fuel filler hose and drain fuel in space "A" in the figure.

CAUTION:

Do not force pump hose into fuel tank, or pump hose may damage fuel tank inlet valve.



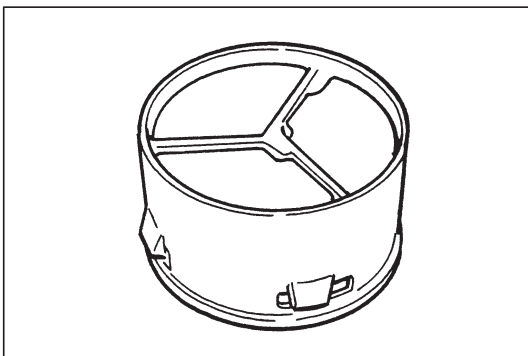
- 3) Hoist vehicle and remove clamp (2) and fuel filler hose (1) from fuel tank.



- 4) Remove fuel tank inlet valve (1) using flat-bladed screwdriver.

CAUTION:

Be careful not to damage fuel tank inlet valve (1) with flat-bladed screwdriver.

**INSPECTION**

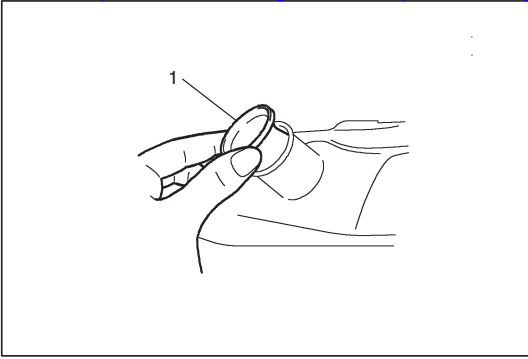
Check fuel tank inlet valve for the followings.

- Damage
- Smooth opening and closing

If any damage or malfunction is found, replace.

INSTALLATION

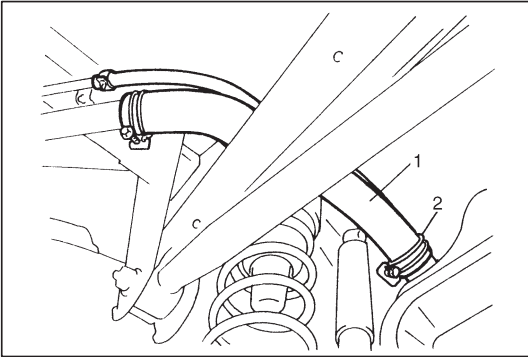
1) Install fuel tank inlet valve (1) to fuel tank.



2) Install fuel filler hose (1) to fuel tank and secure it with clamp (2).

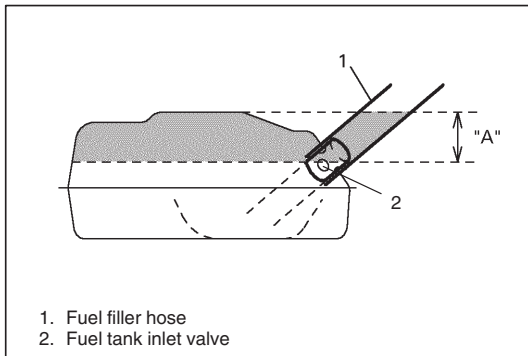
For proper installation, refer to the figure on 6C-3.

3) Lower vehicle and install fuel filler cap.



FUEL TANK**FUEL TANK DRAINING PROCEDURE****WARNING:**

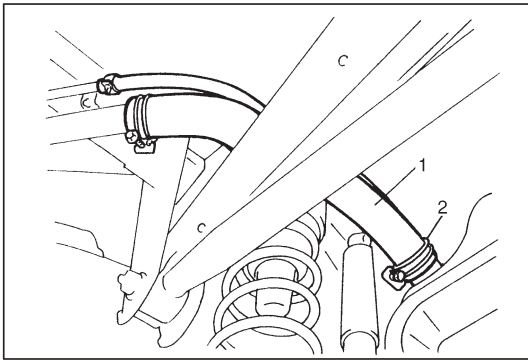
- This draining procedure will not remove all fuel. Do not attempt any service on tank using heat or flame as an explosion resulting in personal injury could occur.
- Never drain or store fuel in an open container due to the possibility of fire or explosion.



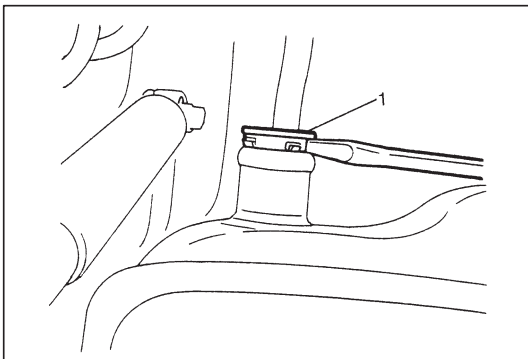
- 1) Remove fuel filler cap.
- 2) Insert hose of a hand operated pump into fuel filler hose and drain fuel in space "A" in the figure.

CAUTION:

Do not force pump hose into fuel tank, or pump hose may damage fuel tank inlet valve.



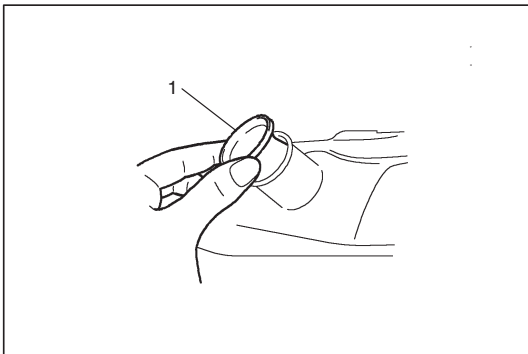
- 3) Hoist vehicle and remove clamp (2) and fuel filler hose (1) from fuel tank.



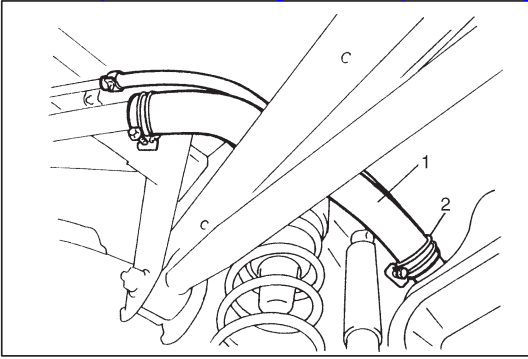
- 4) Remove fuel tank inlet valve (1) using flat-bladed screwdriver.

CAUTION:

Be careful not to damage fuel tank inlet valve (1) with flat-bladed screwdriver.



- 5) Drain remaining fuel in fuel tank with hand operated pump.
- 6) Reinstall fuel tank inlet valve (1) to fuel tank.



- 7) Reinstall fuel filler hose (1) to fuel tank and secure it with clamp (2).

For proper installation, refer to the figure on 6C-3.

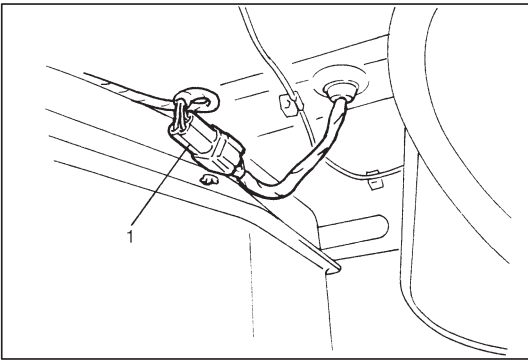
- 8) Lower vehicle and reinstall fuel filler cap.

REMOVAL

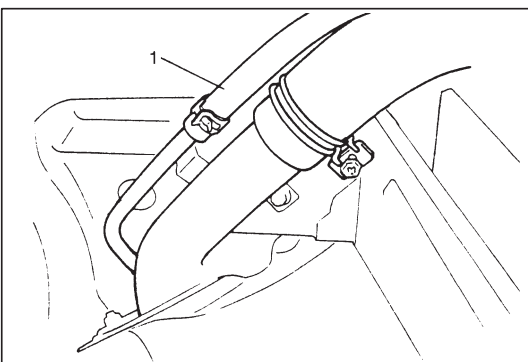
WARNING:

Refer to the WARNING at the beginning of ON-VEHICLE SERVICE in this section.

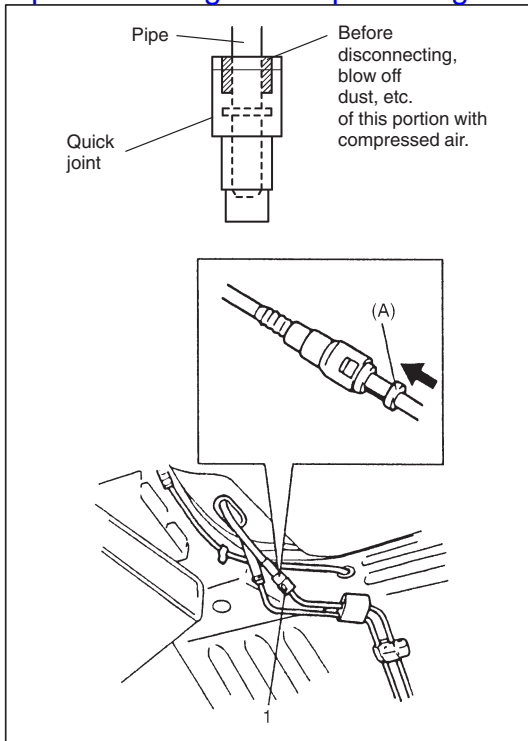
- 1) Relieve fuel pressure in fuel feed line.
- 2) Disconnect negative cable at battery.
- 3) Drain fuel tank, referring to steps 1) to 5) of FUEL TANK DRAINING PROCEDURE in this section.



- 4) Disconnect fuel pump wire at coupler (1).



- 5) Disconnect breather hose (1) from filler neck.



6) Disconnect fuel pipe joint and fuel hoses from fuel pipes.

For quick joint (1), disconnect it as follows:

- Remove mud, dust and/or foreign material between pipe and joint by blowing compressed air.
- Unlock joint lock by inserting special tool between pipe and joint.

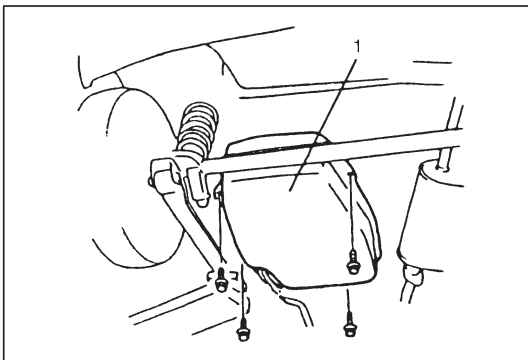
Special Tool

(A): 09919-47020

- Disconnect joint from pipe.

WARNING:

A small amount of fuel may be released after the fuel hose is disconnected. In order to reduce the chance of personal injury, cover the hose and pipe to be disconnected with a shop towel. Be sure to put that towel in an approved container when disconnection is completed.



7) Remove fuel tank (1) from vehicle.

INSPECTION

After removing fuel tank, check hoses and pipes connected to fuel tank for leaks, loose connections, deterioration or damage. Also check fuel pump assembly gaskets for leaks, visually inspect fuel tank for leaks and damage.

Replace any damaged or malfunctioned parts.

FUEL TANK PURGING PROCEDURE**WARNING:**

This purging procedure will NOT remove all fuel vapor.
Do not attempt any repair on tank using heat or flame as an explosion resulting in personal injury could occur.

Following procedure is used purging fuel tank.

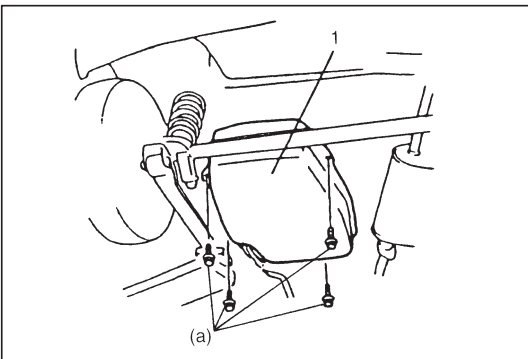
- 1) After removing fuel tank, remove all hoses, pipes, fuel pump assembly from fuel tank.
- 2) Drain all remaining fuel from tank.
- 3) Fill tank with warm water or tap water, and shake it well and then drain. Repeat this cycle until inside of tank is clean.
Replace tank if its inside is rusty.
- 4) Completely flush out remaining water after washing.

CAUTION:

Never remain water in fuel tank after washing, or fuel tank inside will get corrosion.

INSTALLATION

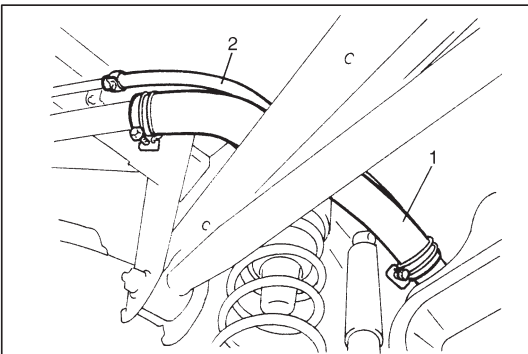
- 1) If parts have been removed from fuel tank, install them before installing fuel tank to vehicle.



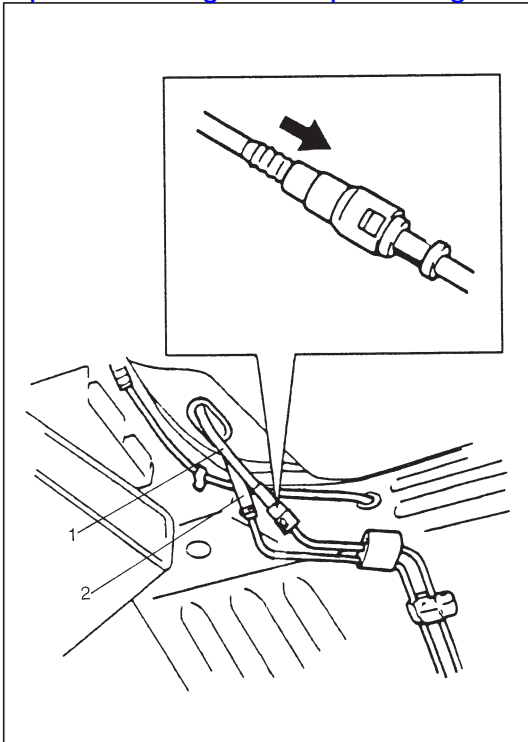
- 2) Install fuel tank (1) to vehicle.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



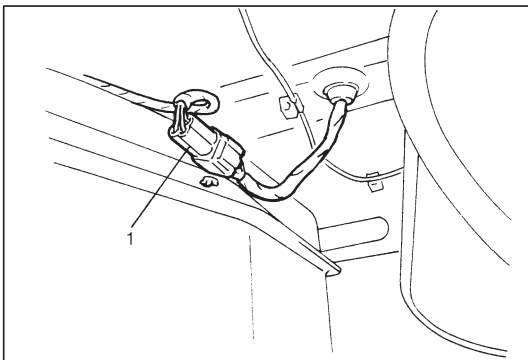
- 3) Connect fuel filler hose (1) to fuel tank and breather hose (2) to filler neck and clamp them securely.
For proper installation, refer to the figure on 6C-3.



- 4) Connect fuel hose (1) and vapor hose (2) to pipes as shown in figure and clamp them securely.

CAUTION:

When connecting joint, clean outside surfaces of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.

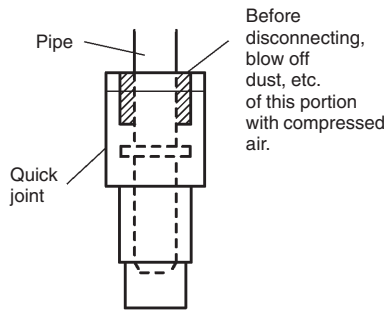


- 5) Connect fuel pump wire at coupler (1).

- 6) Connect negative cable at battery.

With engine "OFF" and ignition switch "ON", check for fuel leaks.

FUEL PUMP ASSEMBLY (WITH FUEL FILTER, FUEL LEVEL GAUGE, FUEL PRESSURE REGULATOR AND FUEL CUT VALVE)



WARNING:

Refer to the **WARNING** at the beginning of **ON-VEHICLE SERVICE** in this section.

CAUTION:

Do not disassemble fuel pump assembly. Disassembly will spoil its original performance.

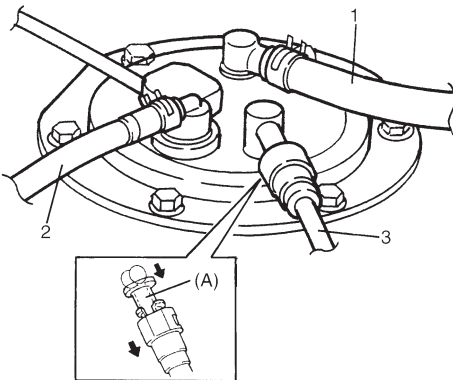
REMOVAL

- 1) Remove fuel tank from vehicle. Refer to **FUEL TANK REMOVAL** in this section.
- 2) Disconnect fuel breather hose (1), fuel vapor hose (2) and fuel feed hose (3) from fuel pump assembly.

When disconnecting joint of fuel feed line from pipe, unlock joint by inserting special tool between pipe and joint lock first.

Special Tool

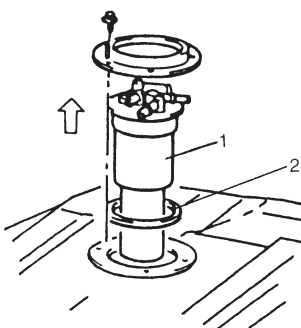
(A): 09919-47020



- 3) Remove fuel pump assembly (1) from fuel tank.

CAUTION:

Never reuse fuel pump gasket (2), or fuel leak may occur.



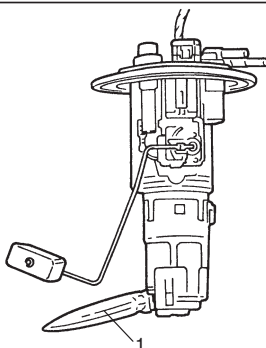
INSPECTION

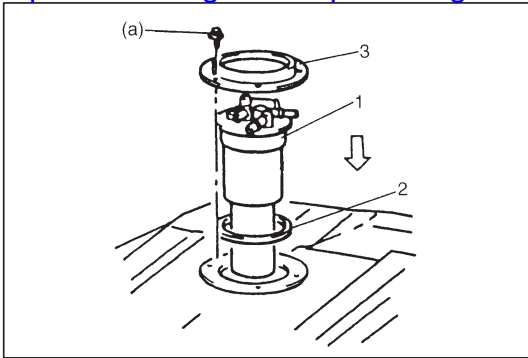
Check fuel pump assembly for damage.

Check fuel suction filter (1) for evidence of dirt and contamination. If present, replace or clean and check for presence of dirt in fuel tank.

For inspection of fuel pump itself and fuel pressure regulator, refer to Section 6E of this manual.

For inspection of fuel level gauge, refer to Section 8C of this manual.

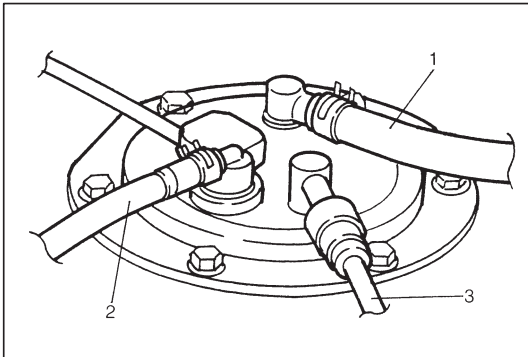


**INSTALLATION**

- 1) Clean mating surfaces of fuel pump assembly and fuel tank.
- 2) Install new gasket (2) and plate (3) to fuel pump assembly (1) then install fuel pump assembly to fuel tank.

Tightening Torque

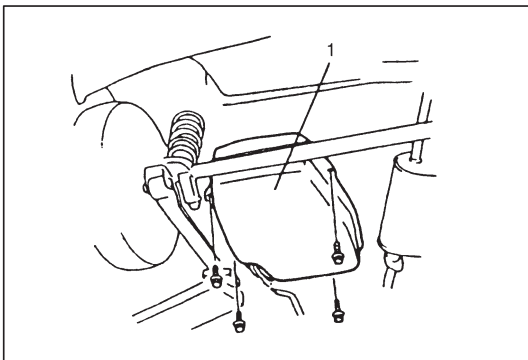
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 3) Connect fuel breather hose (1), fuel vapor hose (2) and fuel feed hose (3) to fuel pump assembly.

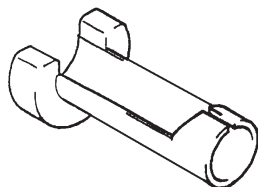
CAUTION:

When connecting joint, clean outside surface of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.



- 4) Install fuel tank (1) to vehicle. Refer to FUEL TANK INSTALLATION in this section.

SPECIAL TOOL



09919-47020
Quick joint remover

SECTION 6E

ENGINE AND EMISSION CONTROL SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

6E

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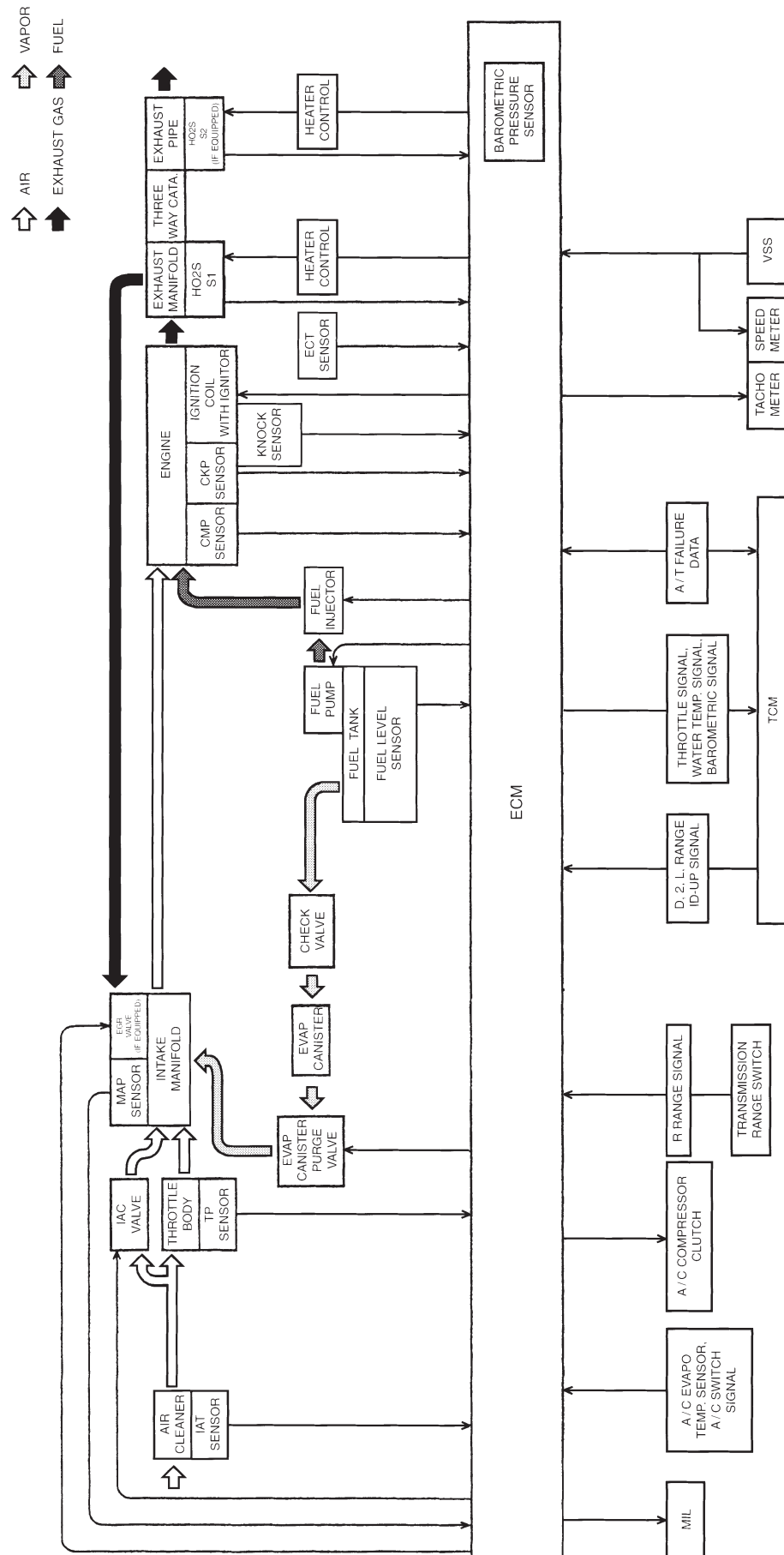
GENERAL DESCRIPTION

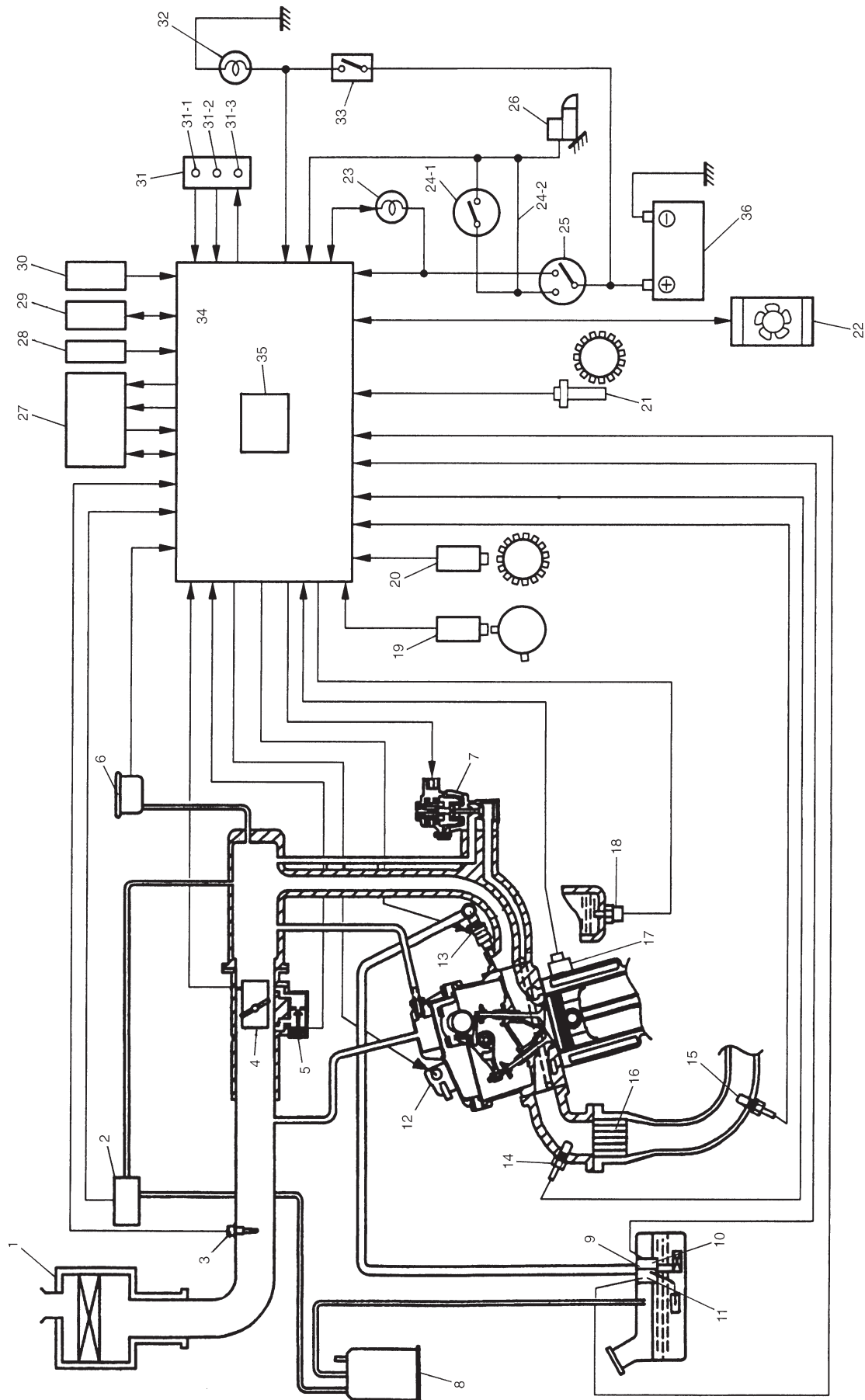
The engine and emission control system is divided into 4 major sub-systems: air intake system, fuel delivery system, electronic control system and emission control system.

Air intake system includes air cleaner, throttle body, IAC valve and intake manifold.

Fuel delivery system includes fuel pump, delivery pipe, fuel pressure regulator, etc. Electronic control system includes ECM, various sensors and controlled devices.

Emission control system includes EGR, EVAP and PCV system.





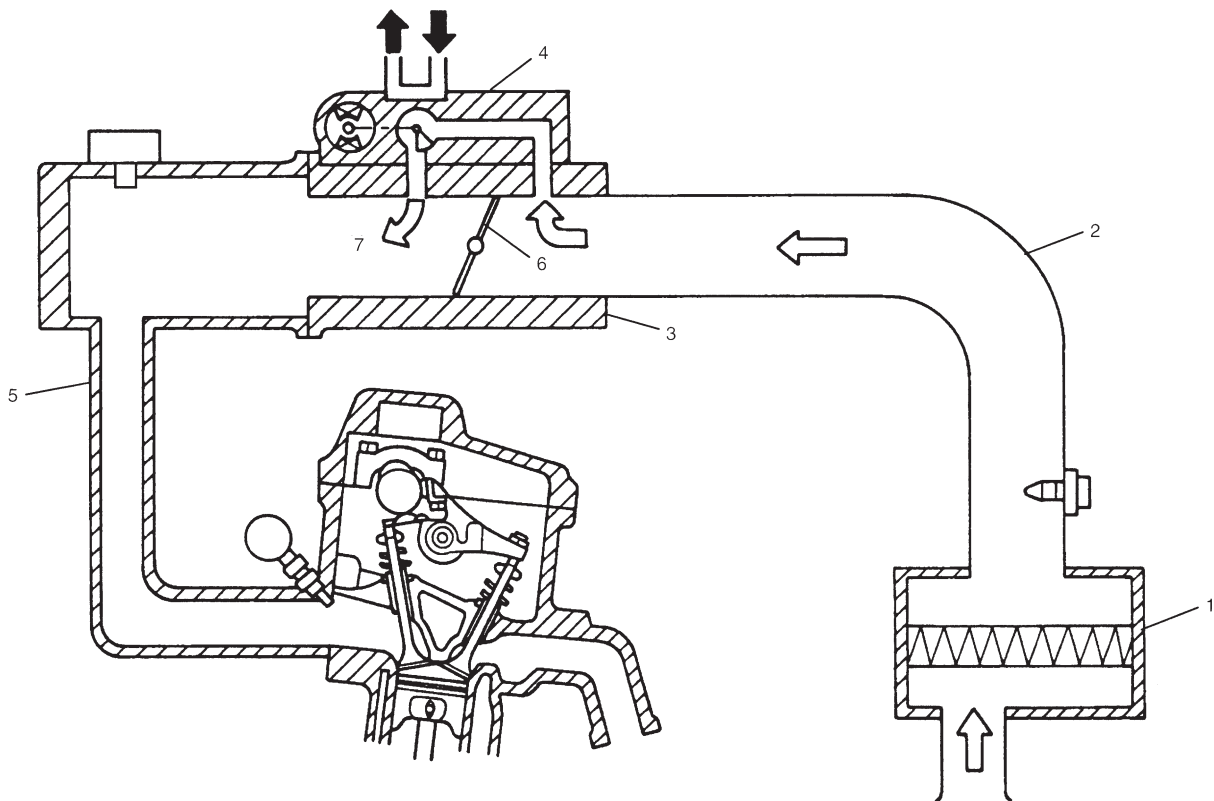
- | | | |
|--|--|--|
| 1. Air Cleaner | | |
| 2. EVAP canister purge valve | | |
| 3. IAT sensor | | |
| 4. TP sensor | | |
| 5. IAC valve | | |
| 6. MAP sensor | | |
| 7. EGR valve (if equipped) | | |
| 8. EVAP canister | | |
| 9. Tank pressure control valve
(built-in fuel pump) | | |
| 10. Fuel pump (with pressure regulator) | | |
| 11. Fuel level sensor | | |
| 12. Ignition coil assembly | | |
| 13. Fuel injector | | |
| 14. Heated Oxygen Sensor (HO2S)-1 | | |
| 15. Heated Oxygen Sensor (HO2S)-2
(if equipped) | | |
| 16. Three way catalytic converter | | |
| 17. Knock sensor | | |
| 18. ECT sensor | | |
| 19. CMP sensor | | |
| 20. CKP sensor | | |
| 21. VSS | | |
| 22. Radiator fan | | |
| 23. Malfunction indicator lamp in
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| 24-1. Transmission range switch (A/T) | | |
| 24-2. Wiring harness (M/T) | | |
| 25. Ignition switch | | |
| 26. Starter magnetic switch | | |
| 27. TCM | | |
| 28. Transmission range switch | | |
| 29. DLC | | |
| 30. Electric load | | |
| 31. Monitor connector (if equipped) | | |
| 31-1. Diagnosis switch terminal
(if equipped) | | |
| 31-2. Test switch terminal (if equipped) | | |
| 31-3. Duty output terminal (if equipped) | | |
| 32. Stop lamp | | |
| 33. Stop lamp switch | | |
| 34. ECM | | |
| 35. Barometric pressure sensor | | |
| 36. Battery | | |

AIR INTAKE SYSTEM

The main components of the air intake system are air cleaner (1), air cleaner outlet hose (2), throttle body (3), idle air control valve (4) and intake manifold (5). The air (by the amount corresponding to the throttle valve (6) opening and engine speed) is filtered by the air cleaner (1), passes through the throttle body (3),

is distributed by the intake manifold (5) and finally drawn into each combustion chamber.

When the idle air control valve (4) is opened according to the signal from ECM, the air (7) bypasses the throttle valve (6) through bypass passage and is finally drawn into the intake manifold (5).



FUEL DELIVERY SYSTEM

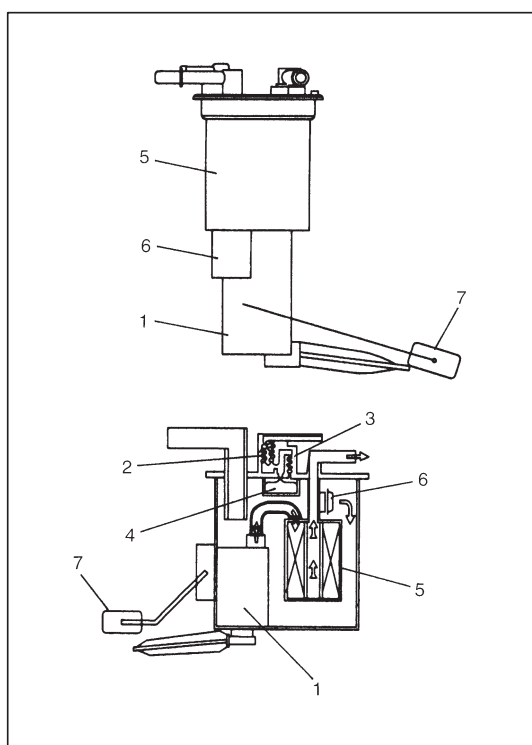
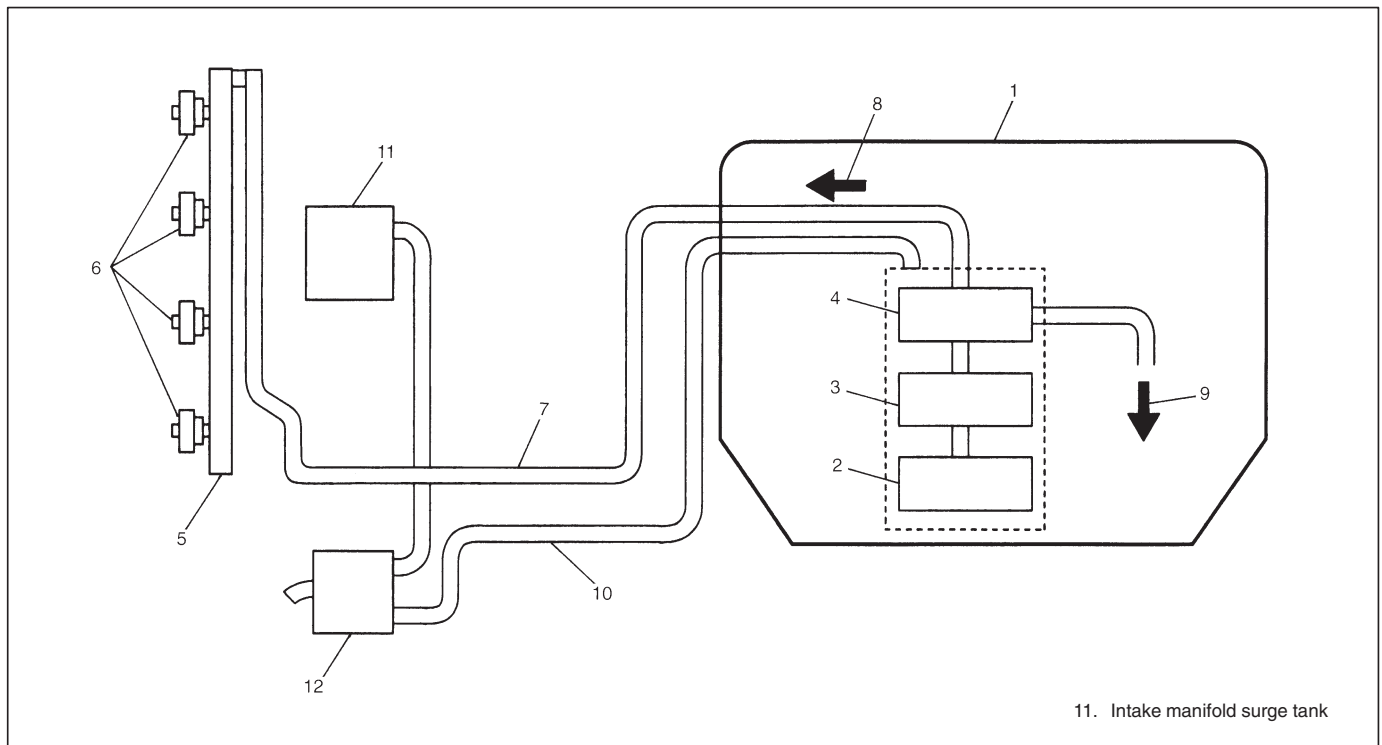
The fuel system consists of fuel tank (1), fuel pump (2) (with built-in fuel filter (3) and fuel pressure regulator (4)), delivery pipe (5), injectors (6) and fuel feed line (7).

The fuel (8) in the fuel tank (1) is pumped up by the fuel pump (2), sent into delivery pipe (5) and injected by the injectors (6).

As the fuel pump assembly is equipped with built-in fuel filter (3) and fuel pressure regulator (4), the fuel (8) is filtered and its pressure is regulated before being sent to the delivery pipe (5).

The excess fuel from fuel pressure regulation process is returned back (9) into the fuel tank.

Also, fuel vapor generated in fuel tank is led through the fuel vapor line (10) into the EVAP canister (12).



FUEL PUMP

An in-tank type electric pump has been adopted for the fuel pump (1). Incorporated in the pump assembly are;

- Tank pressure control valve (2) which keeps the pressure in the fuel tank constant, and prevents the fuel from spouting and tank itself from being deformed.
- Relief valve (3) which prevents the pressure in tank from rising excessively.
- Fuel cut valve (4) which closes as the float rises so that the fuel will not enter the canister when the fuel level in the tank rises high depending on the fuel level in the tank and the vehicle tilt angle.

Also, a fuel filter (5) and a fuel pressure regulator (6) are included and a fuel level gauge (7) is attached.

Addition of the fuel pressure regulator (6) to the fuel pump makes it possible to maintain the fuel pressure at constant level and ECM controls compensation for variation in the intake manifold pressure.

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ELECTRONIC CONTROL SYSTEM

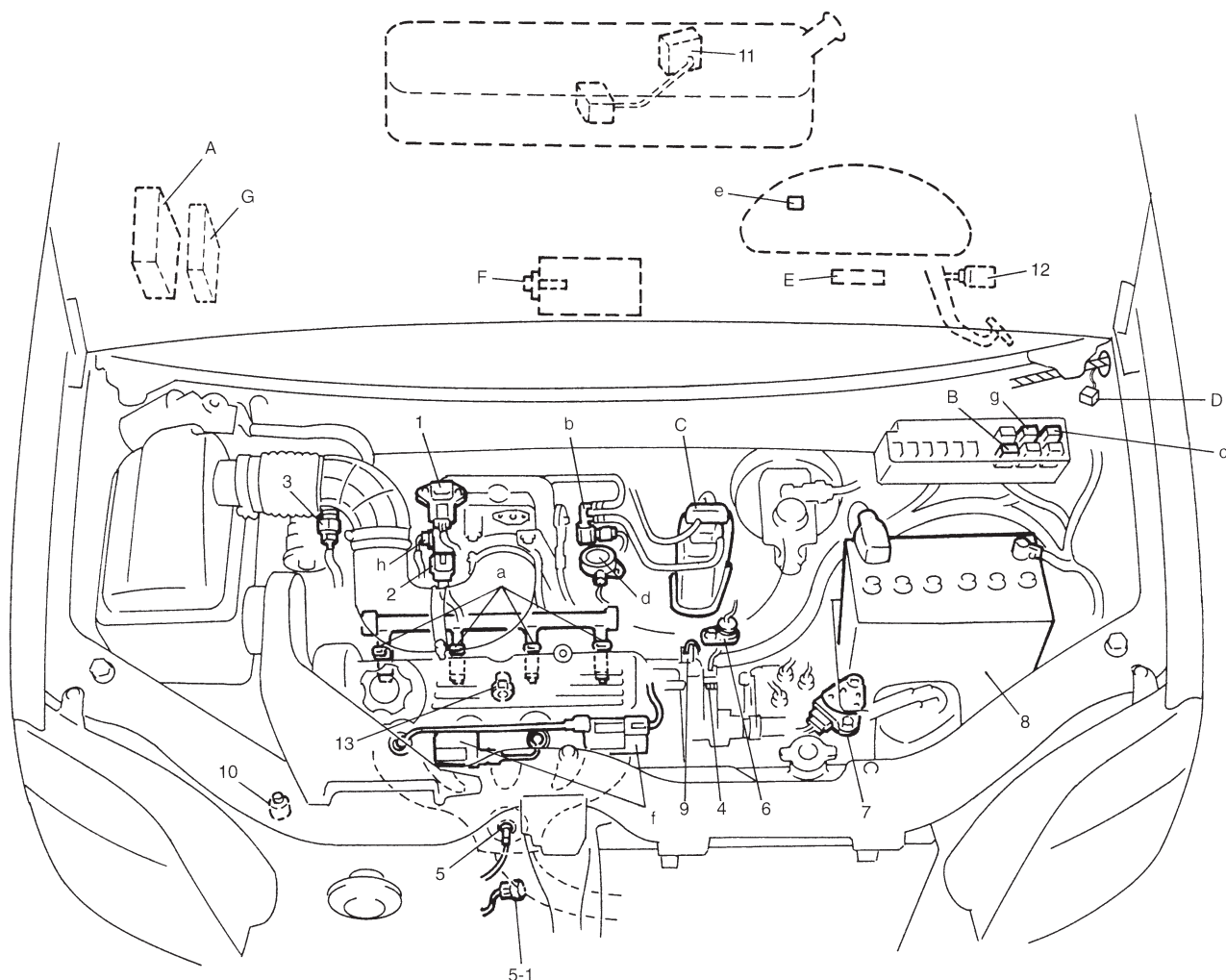
The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM which controls various devices according to the signals from the sensors and 3) various controlled devices.

Functionally, it is divided into nine sub systems:

- Fuel injection control system
- Idle speed control system
- Fuel pump control system

- A/C control system (if equipped)
- Radiator fan control system
- EGR system (if equipped)
- Evaporative emission control system
- Oxygen sensor heater control system
- Ignition control system

Also, with A/T model, ECM sends throttle valve opening signal, coolant temp. signal and barometric pressure signal to transmission control module to control A/T.



INFORMATION SENSORS

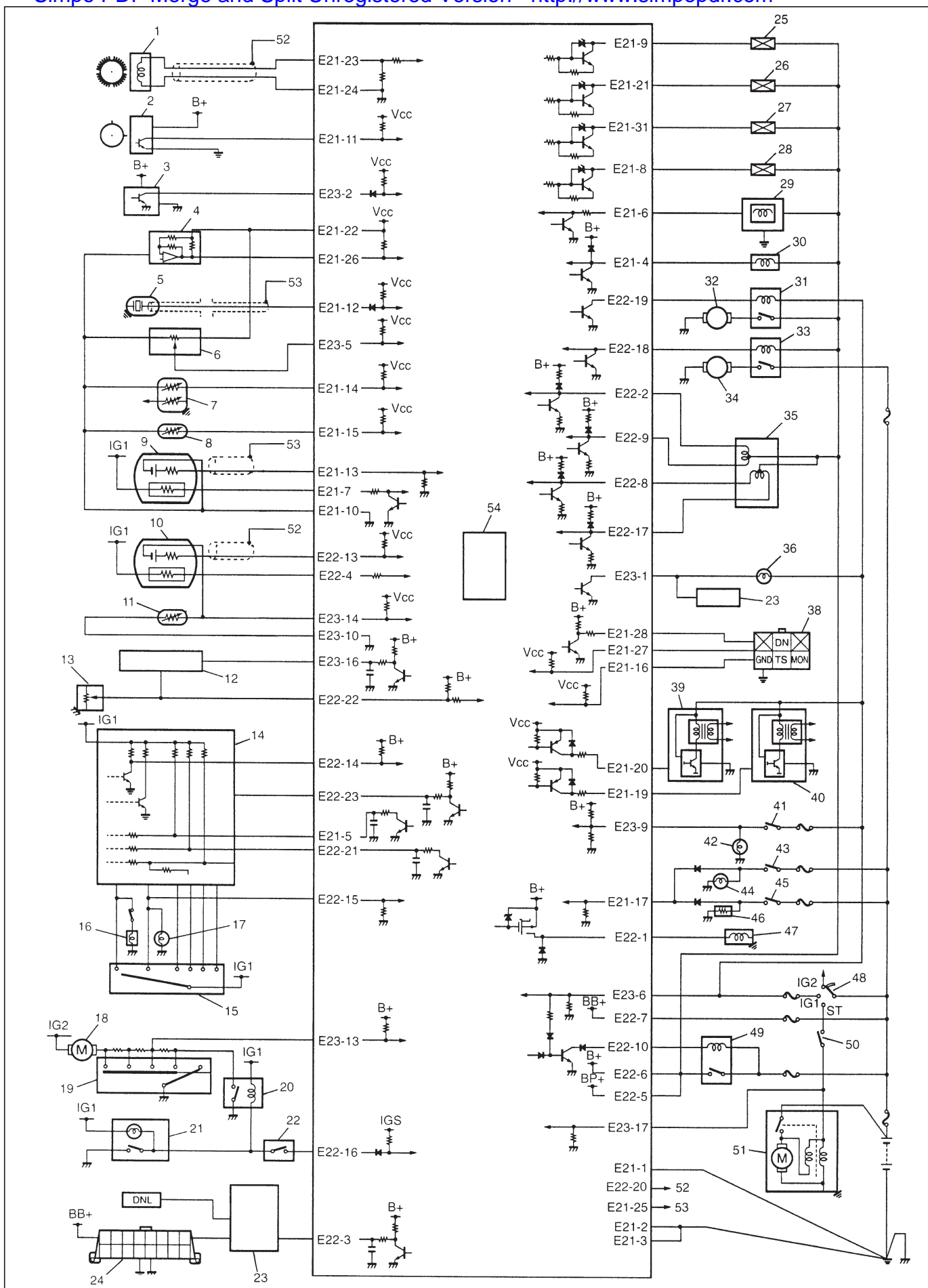
1. MAP sensor
2. TP sensor
3. IAT sensor
4. ECT sensor
5. Heated oxygen sensor-1
- 5-1. Heated oxygen sensor-2 (if equipped)
6. VSS
7. Transmission range switch (A/T)
8. Battery
9. CMP sensor
10. CKP sensor
11. Fuel level sensor (gauge) (in fuel tank)
12. Stop lamp switch
13. Knock sensor

CONTROL DEVICES

- a: Fuel injector
- b: EVAP canister purge valve
- c: Fuel pump relay
- d: EGR valve (step motor) (if equipped)
- e: Malfunction indicator lamp
- f: Ignition coil assembly
- g: Radiator fan control relay
- h: IAC valve

OTHERS

- A: ECM
- B: Main relay
- C: EVAP canister
- D: Monitor connector (If equipped)
- E: Data link connector
- F: A/C EVAP thermistor (if equipped)
- G: Transmission control module (A/T)

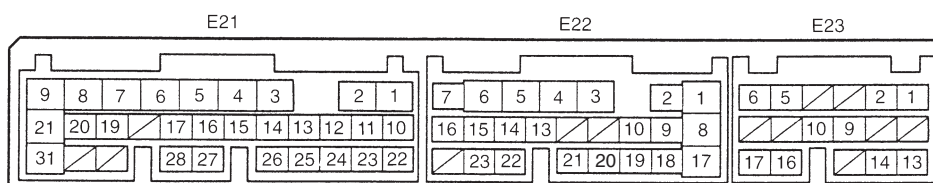


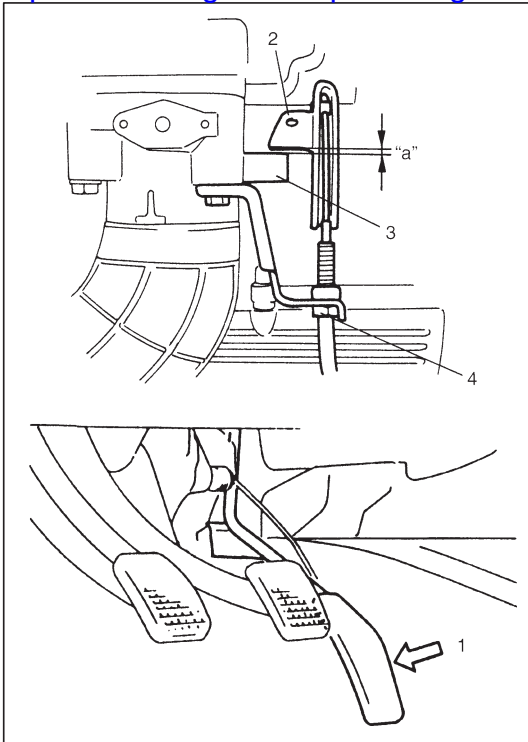
- | | | |
|-------------------------------|--------------------------------|---------------------------------|
| 1. CKP sensor | 20. Heater fan relay | 39. Ignition coil assembly |
| 2. CMP sensor | 21. A/C switch | (for No.1 and No.4 spark plugs) |
| 3. VSS | 22. A/C pressure switch | 40. Ignition coil assembly |
| 4. MAP sensor | 23. ICM | (for No.2 and No.3 spark plugs) |
| 5. Knock sensor | 24. Data link connector | 41. Stop lamp switch |
| 6. TP sensor | 25. Injector No.1 | 42. Stop lamp |
| 7. ECT sensor | 26. Injector No.2 | 43. Lighting switch |
| 8. IAT sensor | 27. Injector No.3 | 44. Position lamp |
| 9. Heated oxygen sensor-1 | 28. Injector No.4 | 45. Rear defogger switch |
| 10. Heated oxygen sensor-2 | 29. IAC valve | 46. Rear defogger |
| 11. A/C AVAP TEMP sensor | 30. EVAP canister purge valve | 47. A/C compressor clutch |
| 12. Speedometer | 31. Fuel pump relay | 48. Ignition switch |
| 13. Fuel level sensor | 32. Fuel pump | 49. Main relay |
| 14. TCM | 33. Radiator fan relay | 50. Transmission range switch |
| 15. Transmission range switch | 34. Radiator fan motor | 51. Starting motor |
| 16. Shift lock solenoid | 35. EGR valve | 52. Shield wire |
| 17. Backup lamp | 36. Malfunction indicator lamp | 53. Shield wire |
| 18. Heater fan motor | 37. Blank | 54. Barometric pressure sensor |
| 19. Heater fan switch | 38. Monitor connector | |

CON-NECTOR	TERMINAL	WIRE COLOR	CIRCUIT	CON-NECTOR	TERMINAL	WIRE COLOR	CIRCUIT
E21	1	B	Ground for ECM	E22	12	—	—
	2	B/Y	Ground for drive circuit		13	BI	Heated oxygen sensor-2
	3	B/Y	Ground for drive circuit		14	W	"D", "2", "L"-range ID-UP signal
	4	R/B	Canister purge valve		15	R	"R"-range signal
	5	Gr	Coolant temp. signal output		16	Lg/R	A/C SW signal
	6	G/Y	IAC valve		17	G/Or	EGR valve (stepper motor coil 4)
	7	Y	Heater of HO2S-1		18	BI	Radiator fan relay
	8	BI/Or	No.4 fuel injector		19	G	Fuel pump relay
	9	BI/W	No.1 fuel injector		20	—	Ground for sensor shield wire
	10	Br/W	Ground for sensor circuit		21	Y/B	Throttle opening signal output for A/T
	11	Or	CMP sensor		22	Y/R	Fuel level gauge
	12	W	Knock sensor		23	BI/W	TCM serial data line
	13	R	Heated oxygen sensor-1		24	—	—
	14	Y/G	Coolant temp. sensor	E23	1	V/W	Malfunction indicator lamp
	15	Lg	Intake air temp. sensor		2	V	Vehicle speed sensor
	16	G/Or	Test switch terminal		3	—	—
	17	R/W	Electric load (+)		4	—	—
	18	—	—		5	Gr	Throttle position (TP) sensor
	19	R/BI	IG coil assembly for No.2 and 3 spark plugs		6	B/W	Ignition switch signal
	20	Y/BI	IG coil assembly for No.1 and 4 spark plugs		7	—	—
	21	BI/Y	No.2 fuel injector		8	—	—
	22	W/G	Power supply for sensor		9	G/W	Stop lamp switch (Brake pedal switch)
	23	P	CKP sensor (+)		10	Br/W	GND for sensor
	24	BI	CKP sensor (-)		11	—	—
	25	—	Ground for sensor shield wire		12	—	—
	26	Lg/R	MAP sensor		13	P/BI	Heater blower switch signal
	27	Gr/R	Diagnosis switch terminal		14	G/R	A/C evaporator temp. sensor
	28	P/BI	Duty output terminal		15	—	—
	29	—	—		16	Br/Y	Tachometer signal
	30	—	—		17	B/Y	Engine start signal
	31	BI/R	No.3 fuel injector				

Wire color

B	: Black	Or	: Orange
B/R	: Black/Red	P	: Pink
B/W	: Black/White	P/BI	: Pink/Blue
B/Y	: Black/Yellow	P/G	: Pink/Green
BI	: Blue	V	: Violet
BI/Or	: Blue/Orange	V/W	: Violet/White
BI/B	: Blue/Black	W	: White
BI/R	: Blue/Red	W/B	: White/Black
BI/W	: Blue/White	W/BI	: White/Blue
BI/Y	: Blue/Yellow	W/G	: White/Green
Br/W	: Brown/White	W/R	: White/Red
Br/Y	: Brown/Yellow	R	: Red
G	: Green	R/B	: Red/Black
G/B	: Green/Black	R/BI	: Red/Blue
G/R	: Green/Red	R/W	: Red/White
G/W	: Green/White	Y	: Yellow
G/Y	: Green/Yellow	Y/B	: Yellow/Black
Gr	: Gray	Y/BI	: Yellow/Blue
Gr/R	: Gray/Red	Y/G	: Yellow/Green
Lg	: Lightgreen	Y/R	: Yellow/Red
Lg/R	: Lightgreen/Red		





ON-VEHICLE SERVICE

ACCELERATOR CABLE ADJUSTMENT

- 1) With accelerator pedal depressed fully (1), check clearance between throttle lever (2) and lever stopper (3) (throttle body) which should be within following specification.

Clearance "a" : 0.5 – 2.0 mm (0.02 – 0.07 in.)

(With pedal depressed fully)

If measured value is out of specification, adjust it to specification with cable adjusting nut (4).

IDLE SPEED/IDLE AIR CONTROL (IAC) DUTY INSPECTION

Before idle speed/IAC duty check, make sure of the following.

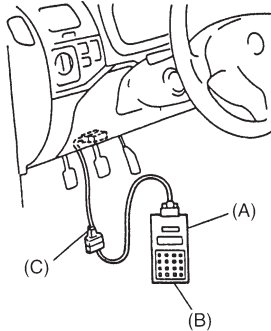
- Lead wires and hoses of Electronic Fuel Injection and engine emission control systems are connected securely.
- Accelerator cable has some play, that is, it is not tight.
- Valve lash is checked and adjusted according to maintenance schedule.
- Ignition timing is within specification.
- All accessories (wipers, heater, lights, A/C, etc.) are out of service.
- Air cleaner has been properly installed and is in good condition.
- No abnormal air inhaling from air intake system.

After above items are all confirmed, check idle speed and IAC duty as follows.

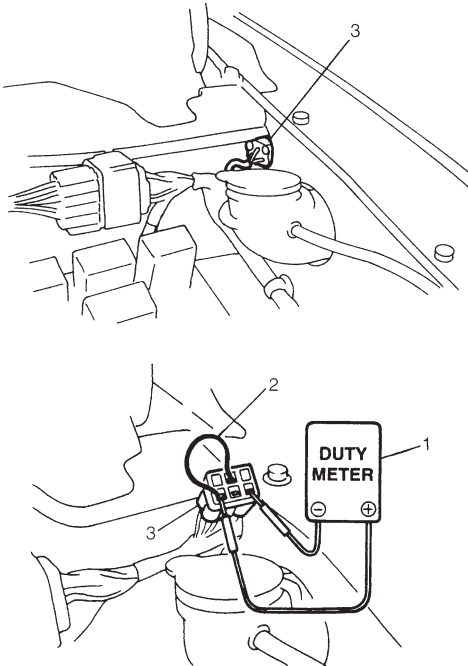
NOTE:

Before starting engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T vehicle), and set parking brake and block drive wheels.

When using SUZUKI scan tool:



When using duty meter (Vehicle without EGR valve):



- 1) Connect SUZUKI scan tool to DLC with ignition switch OFF, if it is available.
- 2) Warm up engine to normal operating temperature.
- 3) Check engine idle speed and "IAC duty" as follows:

When using SUZUKI scan tool:

(a) Select "Data List" mode on scan tool to check "IAC duty".

(A): 09931-76011 (SUZUKI scan tool)

(B): Mass storage cartridge

(C): 09931-76030 (16/14 pin DLC cable)

When using duty meter (1) (Vehicle without EGR valve):

NOTE:

IAC duty can be checked using monitor connector only for vehicle not equipped with EGR valve.

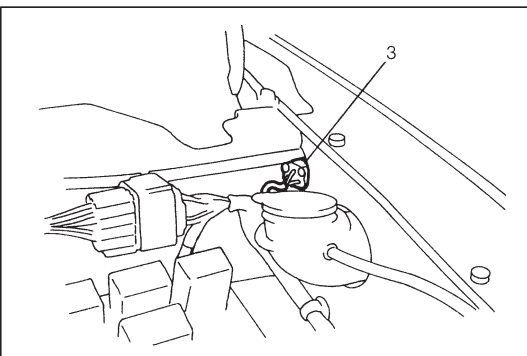
- (a) Disconnect scan tool from DLC if connected.
- (b) Set tachometer.
- (c) Pull monitor connector (3) out of fender apron panel hole.
- (d) Using service wire (2), ground "Diag. switch terminal" in monitor connector (3) and connect duty meter between "Duty output terminal" and "Ground terminal" of monitor connector (3).

If duty and/or idle speed is out of specifications, inspect idle air control system referring to Diagnostic Flow Chart B-4 IDLE AIR CONTROL SYSTEM CHECK in Section 6.

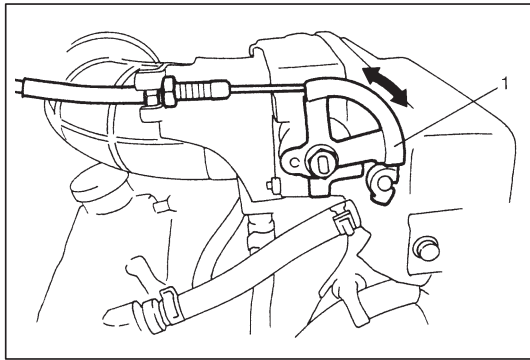
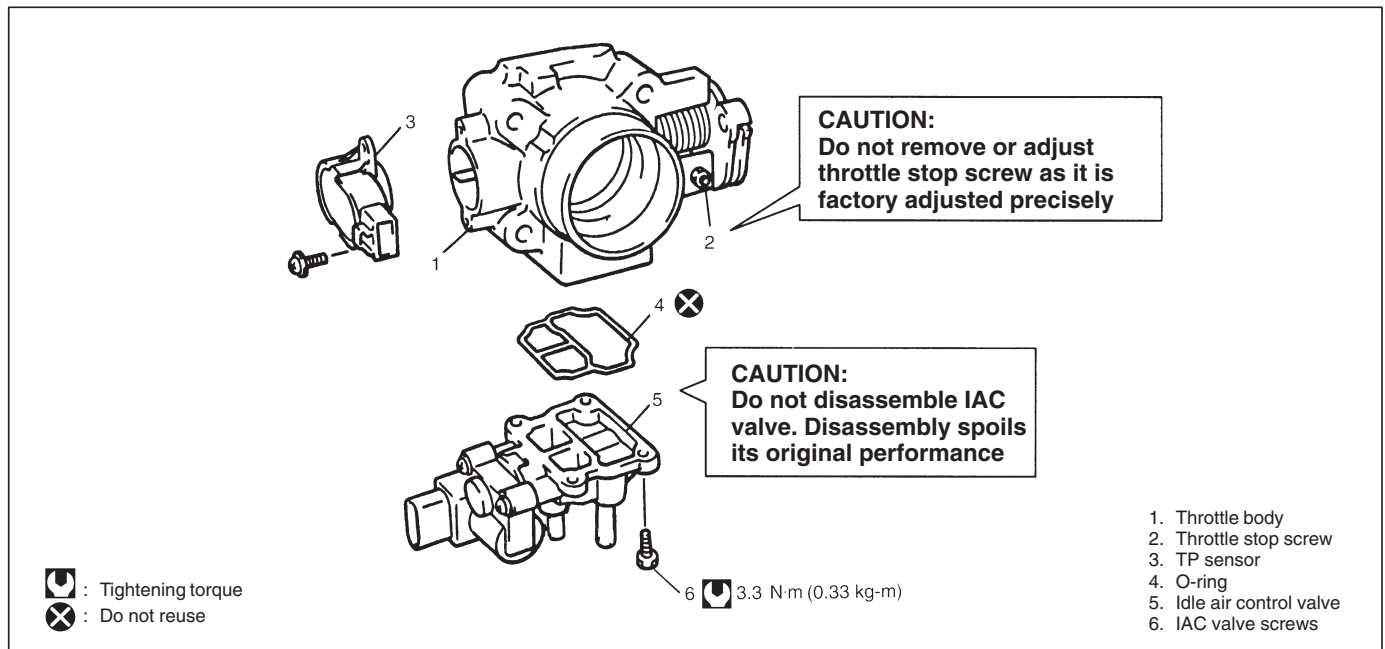
ENGINE IDLE SPEED AND IAC DUTY		
	A/C OFF	A/C ON
M/T vehicle	700 \pm 50 r/min (rpm) 3 – 30 or *3 – 40%	850 \pm 50 r/min (rpm)
A/T vehicle at P/N range	750 \pm 50 r/min (rpm) 3 – 30 or *3 – 40%	850 \pm 50 r/min (rpm)

NOTE:

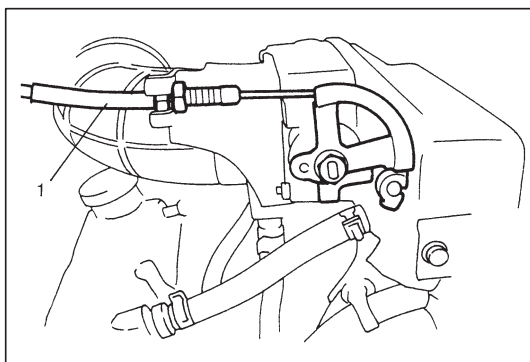
- Above duty values are ON duty (low voltage rate) meter indications.
- Duty values with (*) are applicable to vehicle used at high altitude (higher than 2,000 m or 6,560 ft).



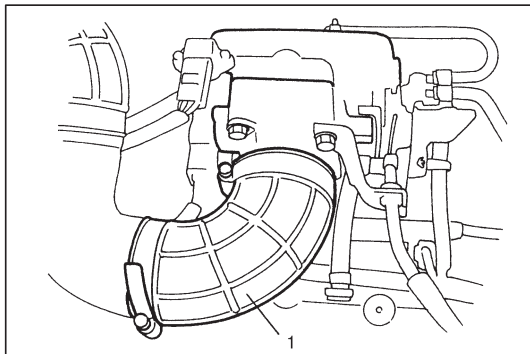
- 4) Remove service wire from monitor connector (3).
- 5) Insert monitor connector (3) in fender apron panel hole.
- 6) Check that 850 \pm 50 r/min. idle speed is obtained with lighting switch ON and heater blower switch in 2 – 4 position.
If not, check "Electric load (+)" circuit and "Heater blower switch signal" circuit. Refer to "ELECTRONIC CONTROL SYSTEM" in this section.
- 7) Check that specified engine idle speed is obtained with A/C ON if vehicle is equipped with A/C.
If not, check A/C ON signal circuit and idle air control system.

AIR INTAKE SYSTEM**THROTTLE BODY****On-Vehicle Inspection**

- Check that throttle valve lever (1) moves smoothly.

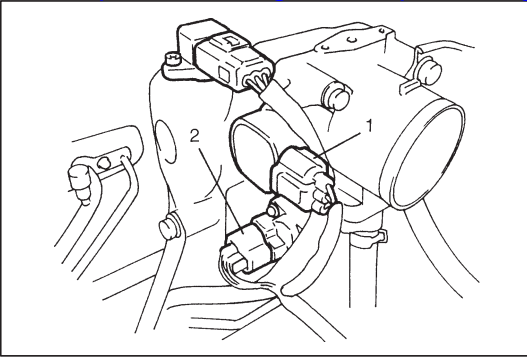
**Removal**

- 1) Disconnect negative cable at battery.
- 2) Drain cooling system.
- 3) Disconnect accelerator cable (1) from throttle body.



- 4) Disconnect air cleaner outlet hose (1) from throttle body.

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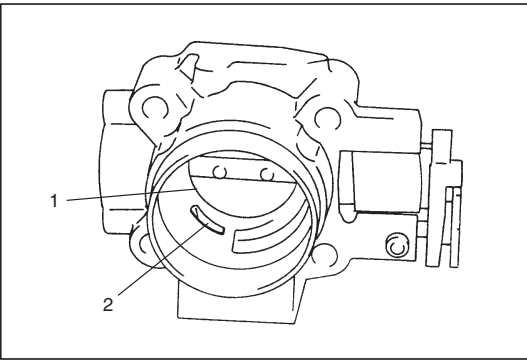
- 5) Disconnect electric coupler from TP sensor (1) and IAC valve (2).
- 6) Remove throttle body from intake manifold.
- 7) Disconnect engine coolant hoses from throttle body.

Disassembly

NOTE:

While disassembling and assembling throttle body, use special care not to deform levers on throttle valve shaft or cause damage to any other parts.

- 1) Remove TP sensor and IAC valve from throttle body.



Cleaning

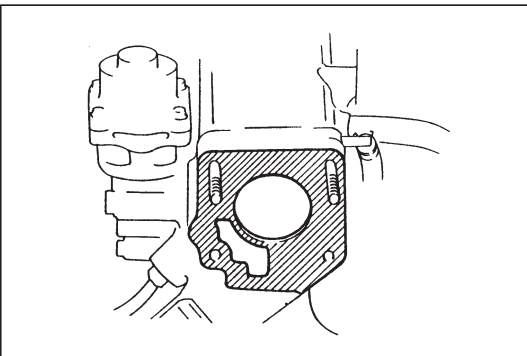
Clean throttle body bore (1) and idle air passage (2) by blowing compressed air.

NOTE:

- TP sensor, idle air control valve or other components containing rubber must not be placed in a solvent or cleaner bath. A chemical reaction will cause these parts to swell, harden or get distorted.

Reassembly

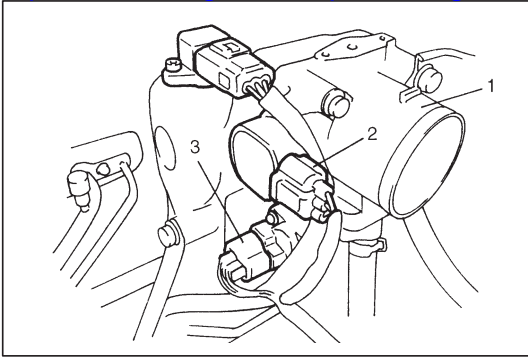
- 1) Install IAC valve to throttle body referring to "IAC valve Installation" section.
- 2) Install TP sensor to throttle body referring to "TP sensor Installation" section.



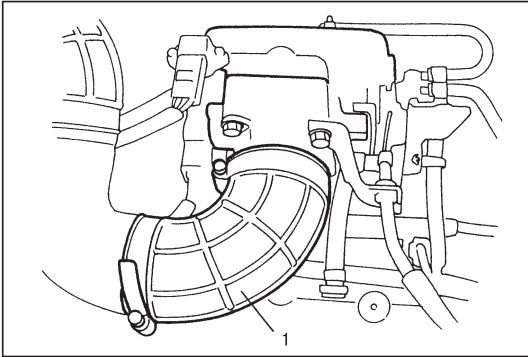
Installation

- 1) Clean mating surfaces and install throttle body gasket to intake manifold.
Use new gasket.

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- 2) Connect engine coolant hoses.
- 3) Install throttle body (1) to intake manifold.
- 4) Connect coupler to TP sensor (2) and IAC valve (3) securely.

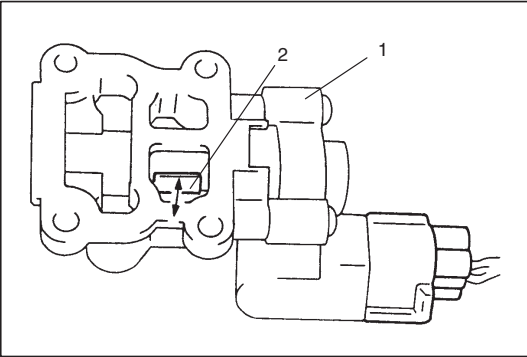


- 5) Install air cleaner outlet hose (1) and pipe.
- 6) Connect accelerator cable and adjust cable play to specification.
- 7) Refill cooling system.
- 8) Connect negative cable at battery.

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IDLE AIR CONTROL VALVE (IAC VALVE)

Removal

- 1) Remove throttle body from intake manifold referring to "Throttle Body Removal" section.
- 2) Remove IAC valve from throttle body.

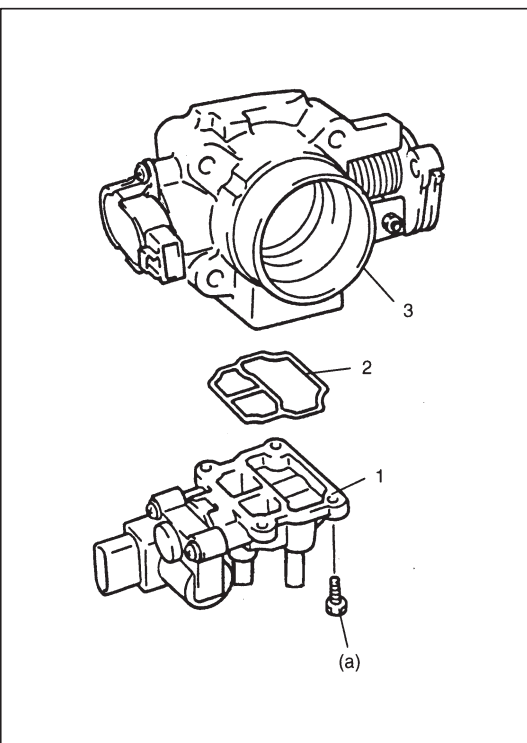
**Inspection**

- 1) Connect each connector to IAC valve (1), TP sensor and IAT sensor.
- 2) Check that rotary valve (2) of IAC valve opens and closes once and then stops in about 60 ms as soon as ignition switch is turned ON.

NOTE:

- This check should be performed by two people, one person turns on ignition switch while the other checks valve operation.
- As valve operation is momentary, it may be overlooked. To prevent this, perform this operation check 3 times or more continuously.

If rotary valve of IAC valve does not operate at all, check wire harness for open and short. If wire harness is in good condition, replace IAC valve and recheck.

**Installation**

- 1) Install new O-ring (2) to IAC valve (1).
- 2) Install IAC valve (1) to throttle body (3).
Tighten IAC valve screws to specified torque.

Tightening Torque

(a): 3.3 N·m (0.33 kg-m, 2.5 lb-ft)

- 3) Install throttle body to intake manifold referring to "Throttle Body Installation" section.

FUEL DELIVERY SYSTEM**FUEL PRESSURE INSPECTION****WARNING:**

Be sure to perform work in a well-ventilated area and away from any open flames, or there is a risk of a fire breaking out.

- 1) Relieve fuel pressure in fuel feed line referring to "Fuel Pressure Relief Procedure" in Section 6.

- 2) Disconnect fuel feed hose from fuel delivery pipe.

CAUTION:

A small amount of fuel may be released when fuel hose is disconnected. Place container under the joint with a shop cloth so that released fuel is caught in container or absorbed in cloth. Place that cloth in an approved container.

- 3) Connect special tools and hose between fuel delivery pipe and fuel feed hose as shown in figure, and clamp hoses securely to ensure no leaks occur during checking.

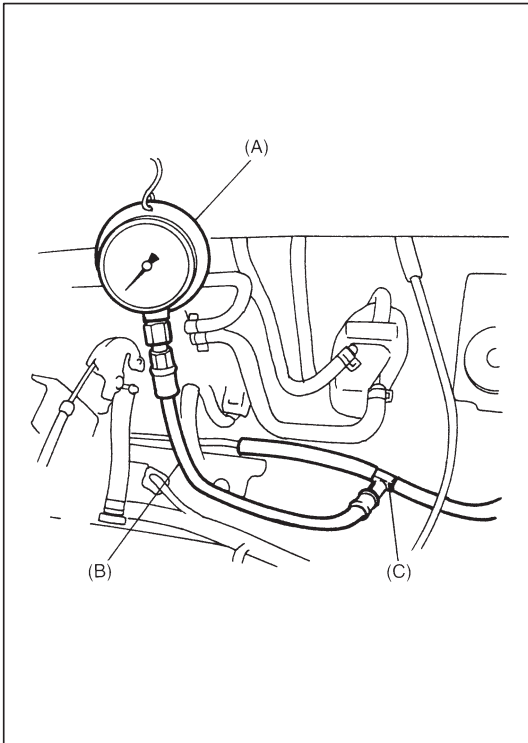
Special Tool

(A): 09912-58441

(B): 09912-58431

(C): 09912-58490

- 4) Check that battery voltage is above 11 V.

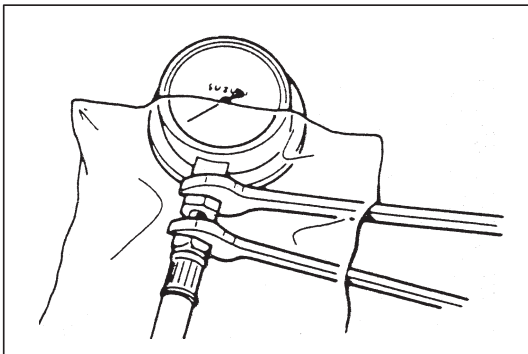


CONDITION	FUEL PRESSURE
With fuel pump operating and engine stopped	270 – 310 kPa 2.7 – 3.1 kg/cm ² 38.4 – 44.0 psi
At specified idle speed	
With 1 min. after engine (fuel pump) stop (Pressure reduces as time passes)	over 250 kPa 2.5 kg/cm ² 35.6 psi

- 5) Turn ignition switch ON to operate fuel pump and after 2 seconds turn it OFF. Repeat this 3 or 4 times and then check fuel pressure.
- 6) Start engine and warm it up to normal operating temperature.
- 7) Measure fuel pressure at idling.

If measured pressure doesn't satisfy specification, refer to "Diagnostic Flow Table B-3" in "Engine Diagnosis" section and check each possibly defective part. Replace if found defective.

- 8) After checking fuel pressure, remove fuel pressure gauge.

**CAUTION:**

As fuel feed line is still under high fuel pressure, make sure to release fuel pressure according to following procedures.

- Place fuel container under joint.
- Cover joint with rag and loosen joint nut slowly to release fuel pressure gradually.

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- 9) Remove special tools from fuel delivery pipe.
- 10) Connect fuel feed hose to fuel delivery pipe and clamp it securely.
- 11) With engine "OFF" and ignition switch "ON", check for fuel leaks.

FUEL PUMP WITH PRESSURE REGULATOR

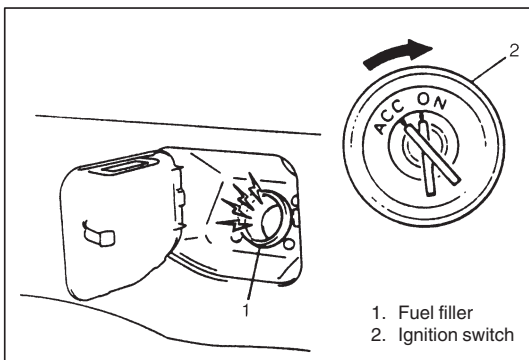
On-Vehicle Inspection

CAUTION:

When fuel filler cap is removed in any procedure, work must be done in a well-ventilated area, keep away from any open flames and without smoking.

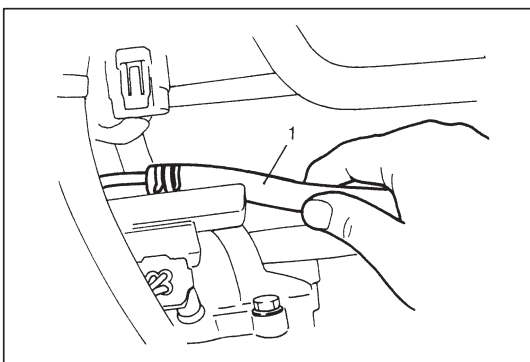
NOTE:

The fuel pressure regulator is the one body with the fuel pump assembly so individual inspection of it is impossible.



- 1) Remove filler cap and turn ON ignition switch. Then fuel pump operating sound should be heard from fuel filler for about 2 seconds and stop. Be sure to reinstall fuel filler cap after checking.

If above check result is not satisfactory, advance to "Diagnostic Flow Chart B-2".



- 2) Turn OFF ignition switch and leave over 10 minutes as it is.
- 3) Fuel pressure should be felt at fuel feed hose (1) for 2 seconds after ignition switch ON.

If fuel pressure is not felt, advance to "Diagnostic Flow Chart B-3".

Removal

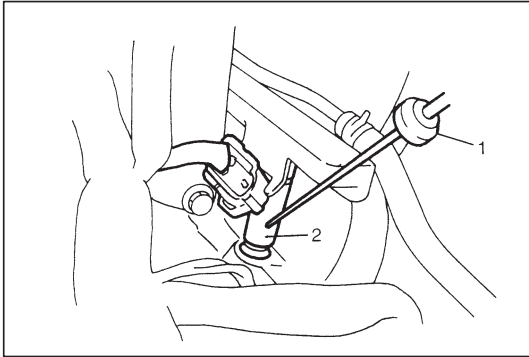
- 1) Remove fuel tank from body according to procedure described in Section 6C and remove fuel pump from fuel tank.

Inspection

Check fuel pump filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in fuel tank.

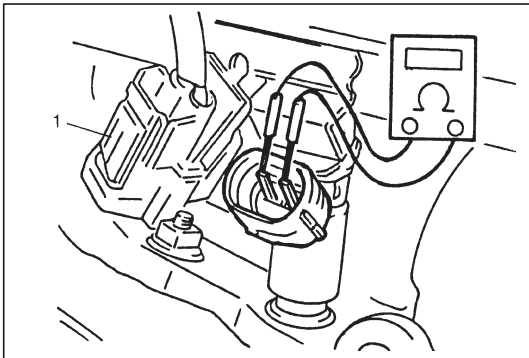
Installation

- 1) Install fuel pump to its bracket.
- 2) Install fuel pump to fuel tank and then install fuel tank to body according to procedure described in Section 6C.

**FUEL INJECTOR****On-Vehicle Inspection**

- 1) Using sound scope (1) or such, check operating sound of injector (2) when engine is running or cranking. Cycle of operating sound should vary according to engine speed.

If no sound or an unusual sound is heard, check injector circuit (wire or coupler) or injector (2).

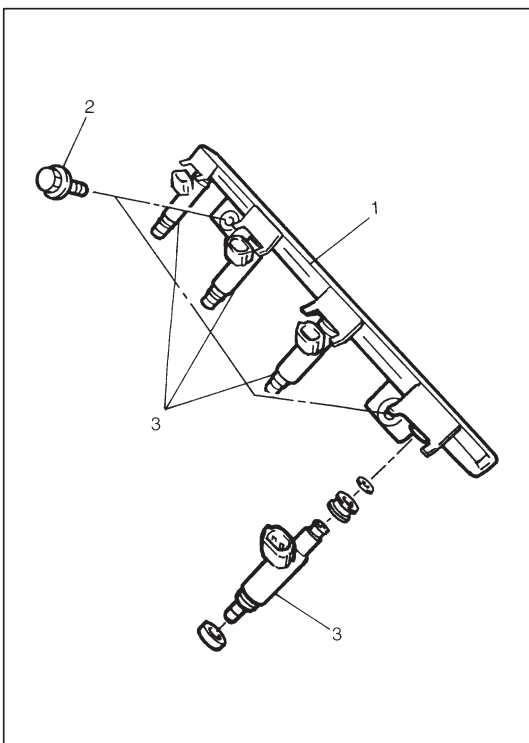


- 2) Disconnect coupler (1) from injector, connect ohmmeter between terminals of injector and check resistance.

Resistance of injector: 12.0 – 13.0 Ω at 20°C, 68°F

If resistance is out of specification, replace.

- 3) Connect coupler (1) to injector securely.

**Removal**

- 1) Relieve fuel pressure according to procedure described in Section 6.
- 2) Disconnect battery negative cable at battery.
- 3) Disconnect fuel injector couplers.
- 4) Disconnect fuel feed hose from fuel delivery pipe (1).
- 5) Remove fuel delivery pipe bolts (2).
- 6) Remove fuel injector(s) (3).

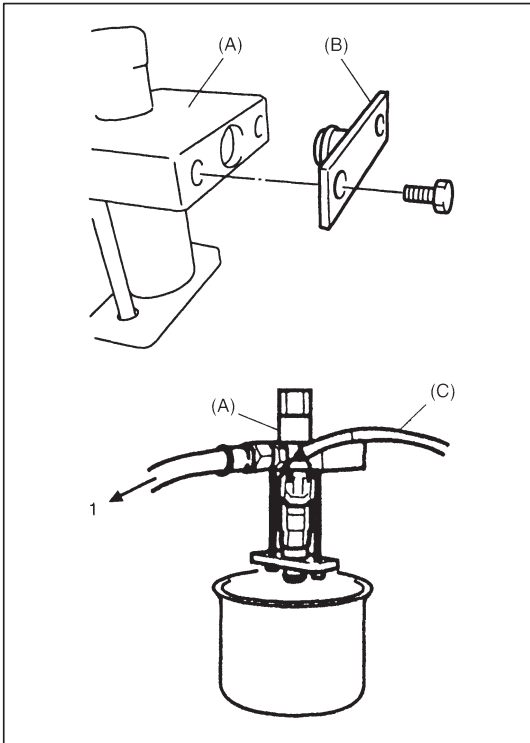
CAUTION:

A small amount of fuel may come out after removal of fuel injectors, cover them with shop cloth.

Inspection**WARNING:**

As fuel is injected in this inspection, perform in a well ventilated area and away from open flames.

Use special care to prevent sparking when connecting and disconnecting test lead to and from battery.



- 1) Install injector to special tool (injector checking tool).

Special Tool

(A): 09912-58421

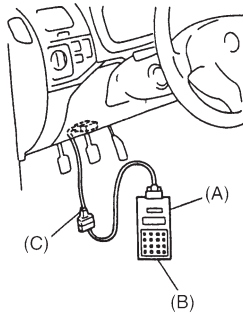
(B): 09912-57610

- 2) Connect special tools (hose and attachment) to fuel feed pipe (1) of vehicle.
- 3) Connect special tool (test lead) to injector.

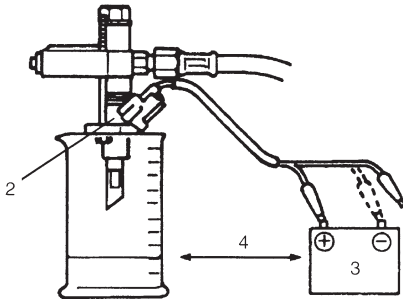
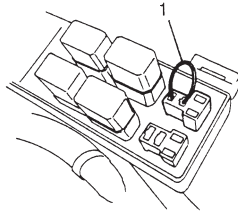
Special Tool

(C): 09930-88530

**When using
SUZUKI scan tool :**



**When not using
SUZUKI scan tool :**



4. Keep as far apart
as possible

- 4) Install suitable vinyl tube onto injector nozzle to prevent fuel from splashing out when injecting.
- 5) Put graduated cylinder under injector as shown.
- 6) Operate fuel pump and apply fuel pressure to injector as follows:
When using SUZUKI scan tool :
(1) Connect SUZUKI scan tool to DLC with ignition switch OFF.
(2) Turn ignition switch ON, clear DTC and select "MISC TEST" mode on SUZUKI scan tool.
(3) Turn fuel pump ON by using SUZUKI scan tool.

(A): 09931-76011 (SUZUKI scan tool)

(B): Mass storage cartridge

(C): 09931-76030 (16/14 pin DLC cable)

When not using SUZUKI scan tool :

- (1) Remove fuel pump relay from connector.
- (2) Connect two terminals of relay connector using service wire (1) as shown in figure.

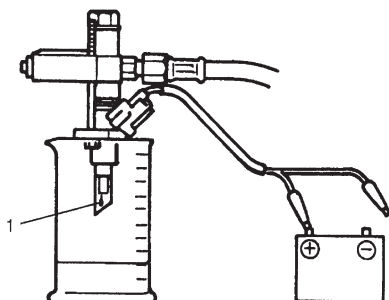
CAUTION:

Check to make sure that connection is made between correct terminals. Wrong connection can cause damage to ECM, wire harness, etc.

- (3) Turn ignition switch ON.
- 7) Apply battery voltage (3) to injector (2) for 15 seconds and measure injected fuel volume with graduated cylinder.
Test each injector two or three times.
If not within specification, replace injector.

Injected fuel volume:

40 – 50 cc/15 sec. (1.35/1.41 – 1.69/1.76 US/lmp. oz/15 sec.)



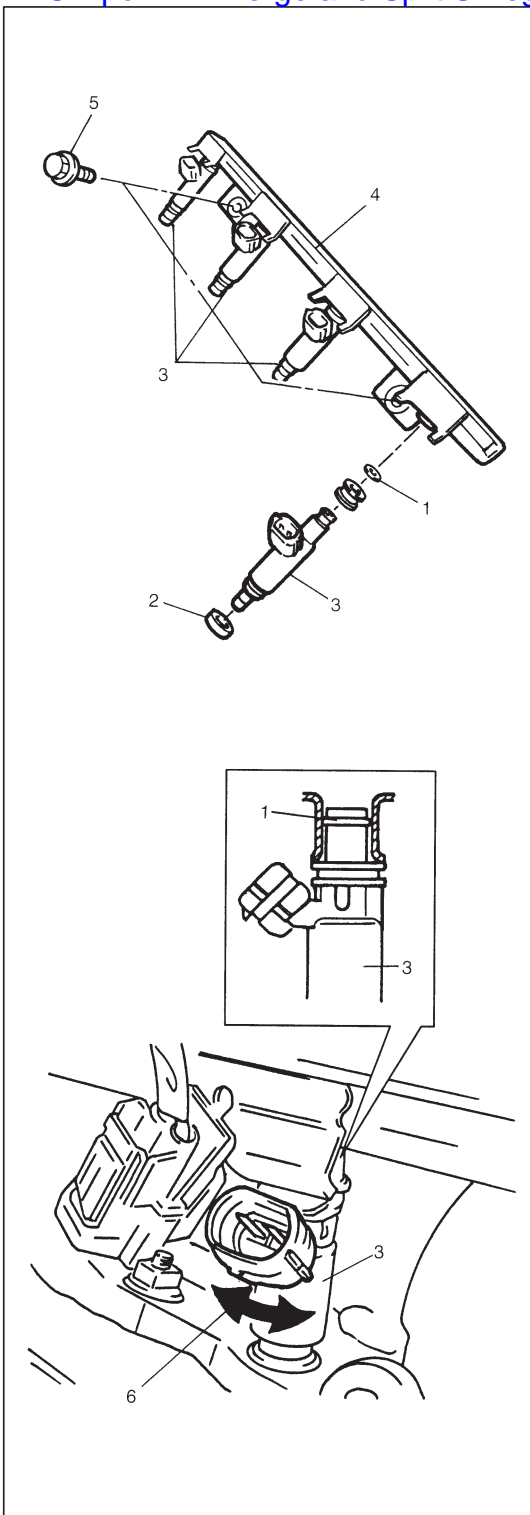
- 8) Check fuel leakage from injector nozzle. Do not operate injector for this check (but fuel pump should be at work).
If fuel leaks (1) more than following specifications, replace.

Fuel leakage (1): Less than 1 drop/min.

Installation

For installation, reverse removal procedure and note following precautions.

- Replace injector O-ring (1) with new one using care not to damage it.
- Check if cushion (2) is scored or damaged. If it is, replace with new one.
- Apply thin coat of fuel to O-rings (1) and then install injectors (3) into delivery pipe (4) and intake manifold. Make sure that injectors (3) rotate smoothly (6). If not, probable cause is incorrect installation of O-ring (1). Replace O-ring (1) with new one.
- Tighten delivery pipe bolts (5) and make sure that injectors (3) rotate smoothly (6).
- After installation, with engine "OFF" and ignition switch "ON", check for fuel leaks around fuel line connection.

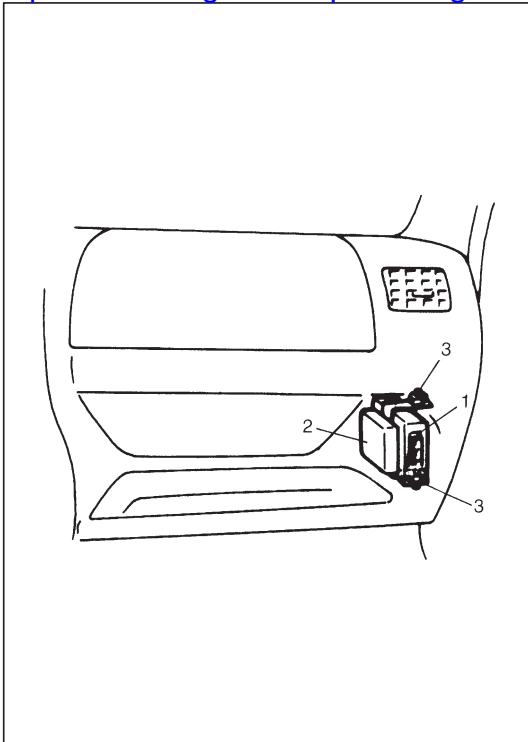


ELECTRONIC CONTROL SYSTEM

ENGINE CONTROL MODULE (ECM)

CAUTION:

As ECM consists of precision parts, be careful not to expose it to excessive shock.

**Removal**

- 1) Disconnect battery negative cable at battery.
- 2) Disable air bag system, refer to "DISABLING THE AIR BAG SYSTEM" in Section 9J if equipped.
- 3) Remove glove box.
- 4) Disconnect ECM (1) and TCM (2) (if equipped) couplers.
- 5) Loosen 2 nuts (3) and remove ECM and TCM (if equipped).

Installation

- 1) Reverse removal procedure noting the following:
 - Connect couplers to ECM and TCM (if equipped) securely.

MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP SENSOR)

Inspection

Check MAP sensor referring to "MAP Sensor Individual Check" in DTC P0105 Flow Chart. If malfunction is found, replace.

THROTTLE POSITION SENSOR (TP SENSOR)**Inspection**

- 1) Disconnect negative cable at battery and coupler from TP sensor.
- 2) Using ohmmeter, check resistance between terminals under each condition given in table below.

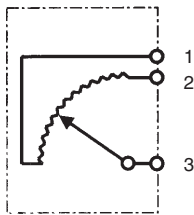
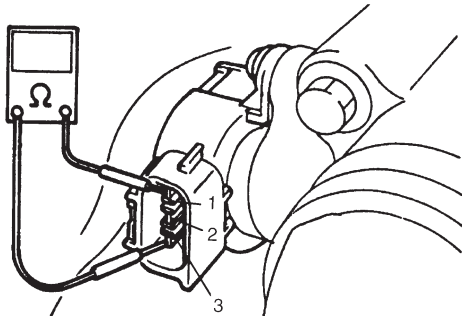
TERMINALS	RESISTANCE
Between 1 and 2 terminals	2.5 – 6.0 k Ω
Between 1 and 3 terminals	100 Ω – 20 k Ω , varying according to throttle valve opening.

NOTE:

There should be more than 2 k Ω resistance difference between when throttle valve is at idle position and when it is fully open.

If check result is not satisfactory, replace TP sensor.

- 3) Connect TP sensor coupler securely.
- 4) Connect negative cable to battery.



1. Ground terminal
2. Reference voltage terminal
3. Output voltage terminal

Removal

- 1) Disconnect battery negative cable at battery.
- 2) Disconnect coupler from TP sensor.
- 3) Remove TP sensor from throttle body.

Installation

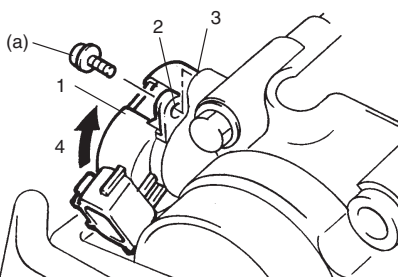
- 1) Install TP sensor (1) to throttle body.

Fit TP sensor to throttle body in such way that its holes (3) are a little away from TP sensor screw holes (2) as shown in left figure and turn TP sensor clockwise so that those holes align (4).

Tightening Torque

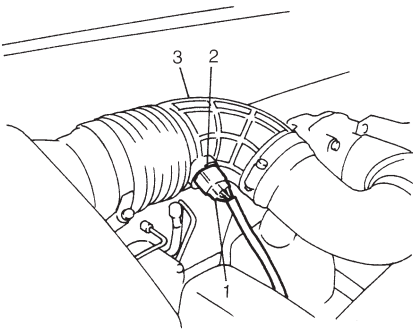
(a): 2.0 N·m (0.20 kg-m, 1.5 lb-ft)

- 2) Connect coupler to TP sensor securely.
- 3) Connect battery negative cable to battery.



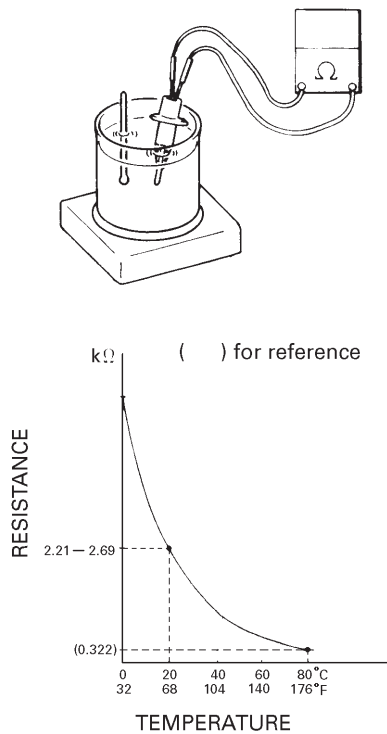
INTAKE AIR TEMPERATURE SENSOR (IAT SENSOR)**Removal**

- 1) Disconnect battery negative cable at battery.
- 2) Disconnect coupler (1) from IAT sensor (2).
- 3) Remove IAT sensor (2) from air cleaner outlet hose (3).

**Inspection**

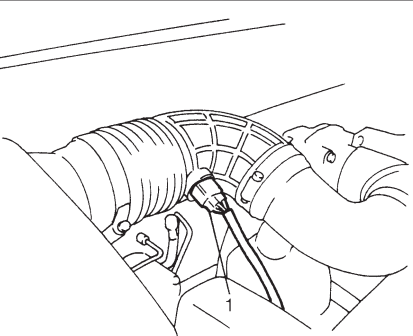
Immerse temperature sensing part of IAT sensor in water (or ice) and measure resistance between sensor terminals while heating water gradually.

If measured resistance doesn't show such characteristic as shown in left figure, replace IAT sensor.

**Installation**

Reverse removal procedure noting the following.

- Clean mating surfaces of IAT sensor and air cleaner outlet hose.
- Connect IAT sensor coupler (1) securely.



ENGINE COOLANT TEMPERATURE SENSOR (ECT SENSOR)

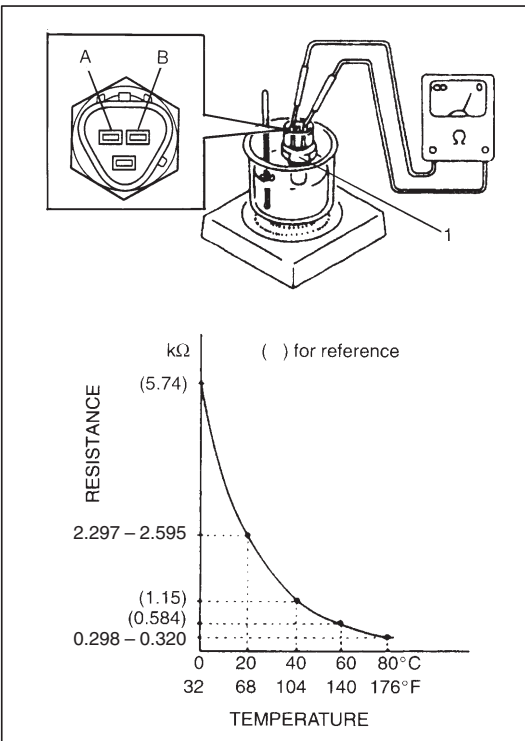
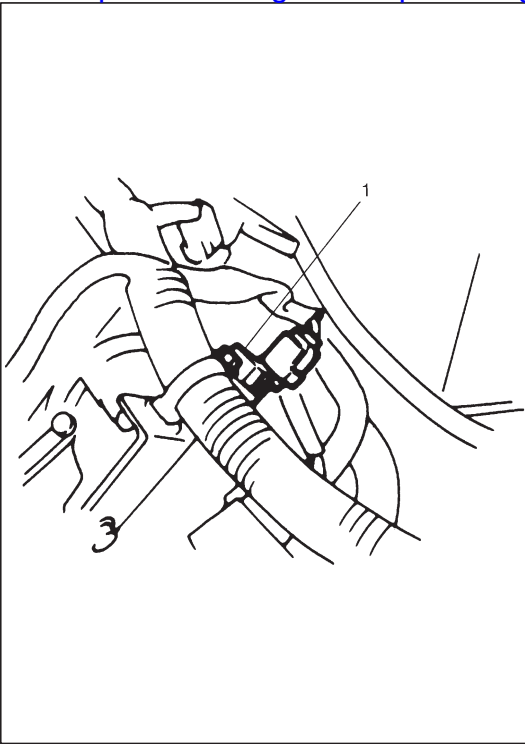
Removal

- 1) Disconnect battery negative cable at battery.
- 2) Drain coolant referring to Section 6B.

WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

- 3) Disconnect coupler from ECT sensor.
- 4) Remove ECT sensor (1) from thermostat case.



Inspection

Immerse temperature sensing part of ECT sensor (1) in water (or ice) and measure resistance between terminal "A" and "B" while heating water gradually.

If measured resistance doesn't show such characteristic as shown in left figure, replace ECT sensor (1).

Installation

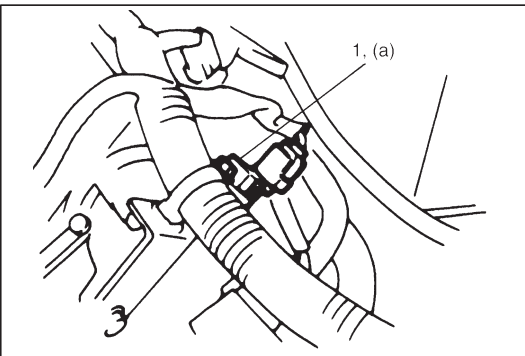
Reverse removal procedure noting the following:

- Clean mating surfaces of ECT sensor (1) and thermostat case.
- Check O-ring for damage and replace if necessary.
- Tighten ECT sensor (1) to specified torque.

Tightening Torque

(a): 15 N·m (1.5 kg-m, 11.5 lb-ft)

- Connect coupler to ECT sensor (1) securely.
- Refill coolant referring to Section 6B.



HEATED OXYGEN SENSOR (Sensor-1 and Sensor-2)**Oxygen Sensor Heater Inspection**

- 1) Disconnect sensor coupler.
- 2) Using ohmmeter, measure resistance between terminals "V_B" and "GND" of sensor coupler.

NOTE :

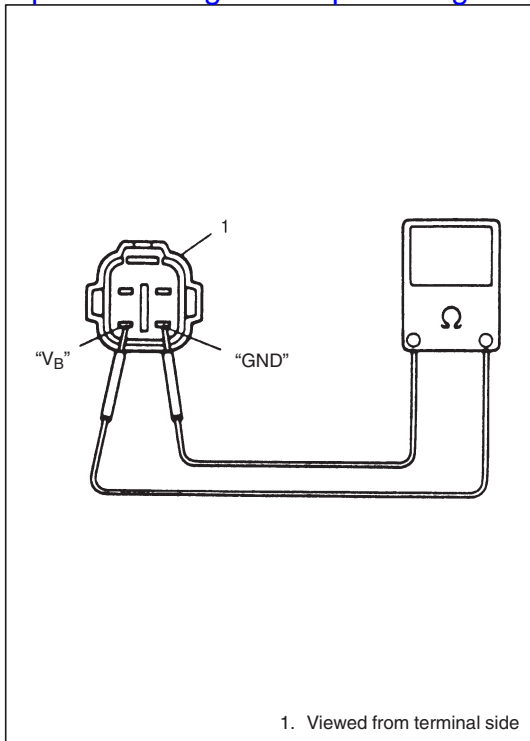
Temperature of sensor affects resistance value largely.
Make sure that sensor heater is at correct temperature.

Resistance of oxygen sensor heater :

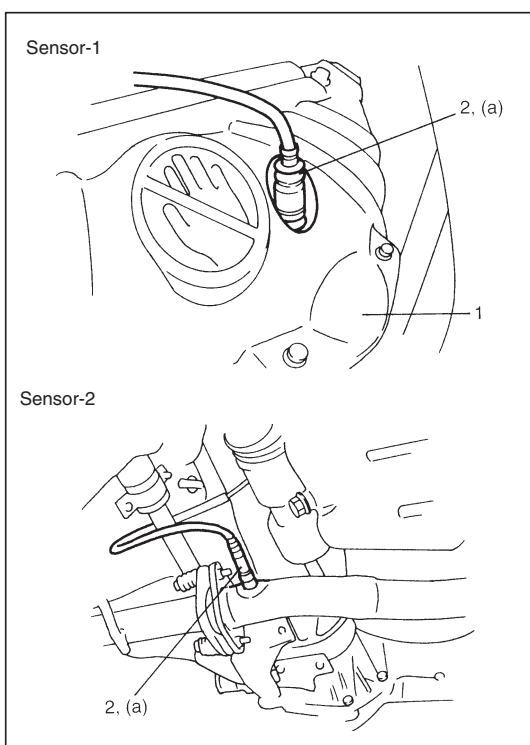
11.7 – 15.6 Ω at 20°C, 68°F

If found faulty, replace oxygen sensor.

- 3) Connect sensor coupler securely.

**Removal****WARNING:**

To avoid danger of being burned, do not touch exhaust system when system is hot. Oxygen sensor removal should be performed when system is cool.



- 1) Disconnect negative cable at battery.
- 2) For sensor-1, remove exhaust manifold cover (1) and disconnect coupler of heated oxygen sensor and release its wire harness from clamps.
- 3) For sensor-2, hoist vehicle and disconnect coupler of heated oxygen sensor and release its wire harness from clamp.
- 4) Remove heated oxygen sensor (2) from exhaust manifold or exhaust pipe.

Installation

Reverse removal procedure noting the following.

- Tighten heated oxygen sensor (2) to specified torque.

Tightening Torque for heated oxygen sensor

(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

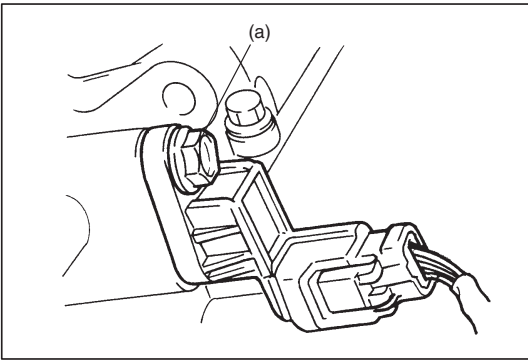
- Connect coupler of heated oxygen sensor (2) and clamp wire harness securely.
- After installing heated oxygen sensor (2), start engine and check that no exhaust gas leakage exists.

CAMSHAFT POSITION SENSOR**Inspection**

Check camshaft position sensor referring to DTC P0340 (DTC No. 15) Diag. Flow Table in Section 6. If malfunction is found, replace.

Removal

- 1) Disconnect negative cable at battery.
- 2) Disconnect connector from camshaft position sensor.
- 3) Remove camshaft position sensor from sensor case (distributorless ignition case).

**Installation**

- 1) Check that O-ring is free from damage.
- 2) Check that camshaft position sensor and signal rotor tooth are free from any metal particles and damage.
- 3) Install camshaft position sensor to sensor case.

Tightening Torque

(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

- 4) Connect connector to it securely.
- 5) Connect negative cable to battery.

CRANKSHAFT POSITION SENSOR**Inspection**

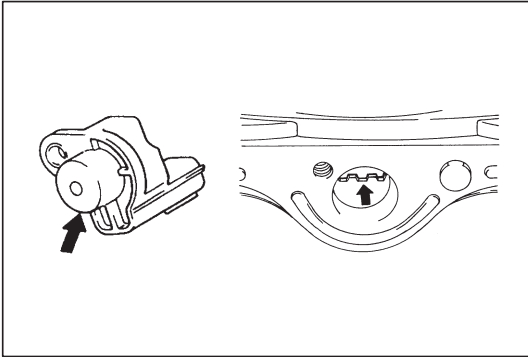
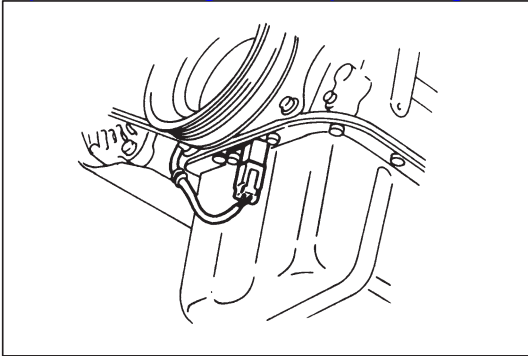
Check crankshaft position sensor referring to step 1 and 2 of DTC P0335 Flow Chart. If malfunction is found, replace.

Removal

- 1) Hoist vehicle.
- 2) Remove engine under cover on right side.
- 3) Disconnect connector from crankshaft position sensor.
- 4) Remove crankshaft position sensor from oil pan.

Installation

- 1) Check to make sure that crankshaft position sensor and pulley tooth is free from any metal particles and damage.
- 2) Install crankshaft position sensor to oil pan.
- 3) Connect connector to it securely.
- 4) Install engine under cover.

**VEHICLE SPEED SENSOR (VSS)****Inspection**

Check vehicle speed sensor referring to step 3 of DTC P0500 (DTC No. 16) Flow Chart. If malfunction is found, replace.

Removal/Installation

Refer to Section 7A.

FUEL LEVEL SENSOR (GAUGE)**Inspection**

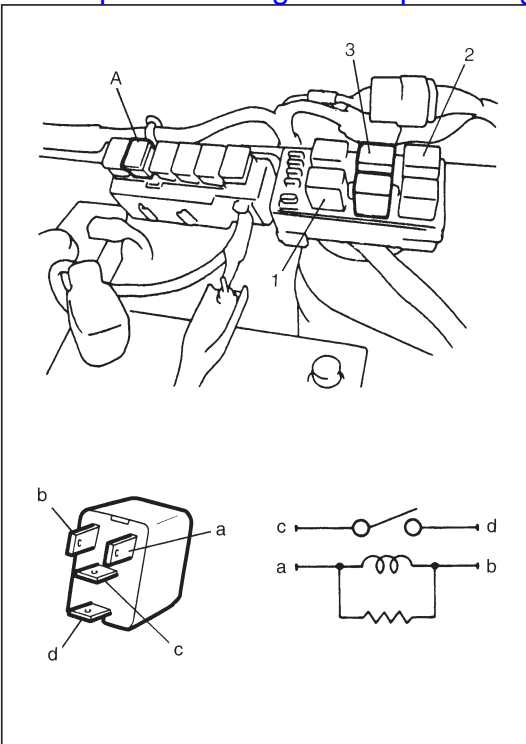
Refer to Section 8.

Removal/Installation

Refer to Section 6C.

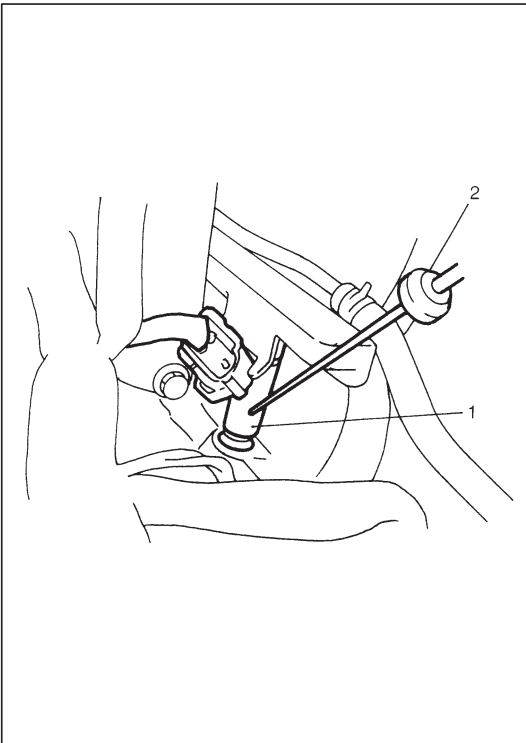
MAIN RELAY, FUEL PUMP RELAY AND RADIATOR FAN CONTROL RELAY**Inspection**

- 1) Disconnect negative cable at battery.
- 2) Remove main relay (1), fuel pump relay (2) and radiator fan control relay (3) from vehicle.
- 3) Check that there is no continuity between terminal "c" and "d". If there is continuity, replace relay.
- 4) Connect battery positive (+) terminal to terminal "b" of relay. Connect battery negative (-) terminal "a" of relay. Check continuity between terminal "c" and "d". If there is no continuity when relay is connected to the battery, replace relay.

**FUEL CUT OPERATION****Inspection****NOTE:**

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range), A/C is OFF and that parking brake lever is pulled all the way up.

- 1) Warm up engine to normal operating temperature.
- 2) While listening to sound of injector (1) by using sound scope (2) or such, increase engine speed to higher than 3,000 r/min.
- 3) Check to make sure that sound to indicate operation of injector stops when throttle valve is closed instantly and it is heard again when engine speed is reduced to less than about 2,000 r/min.

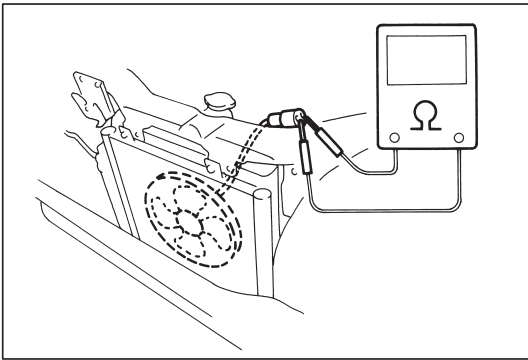


RADIATOR FAN CONTROL SYSTEM**System Inspection****WARNING:**

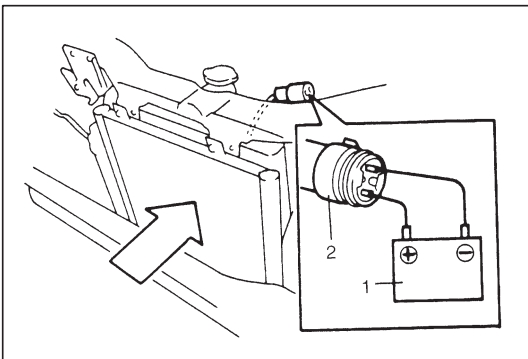
Keep hands, tools, and clothing away from engine cooling fan to help prevent personal injury. This fan is electric and can come on whether or not the engine is running. The fan can start automatically in response to the ECT sensor with the ignition switch in the "ON" position.

Check system for operation referring to Flow Chart B-8 in Section 6.

If radiator fan fails to operate properly, check relay, radiator fan and electrical circuit.

**Radiator Fan****Inspection**

- 1) Check continuity between each two terminals.
If there is no continuity, replace radiator fan motor.



- 2) Connect battery (1) to radiator fan motor coupler (2) as shown in figure, then check that the radiator fan motor operates smoothly.
If radiator fan motor does not operate smoothly, replace motor.

Reference current data: Approx. 8.5 – 11.5 A at 12 V

OUTPUT SIGNALS OF THROTTLE VALVE OPENING AND ENGINE COOLANT TEMP. (Vehicle with A/T only)**Throttle Valve Opening Signal Inspection**

Check throttle valve opening (throttle position) signal referring to step 1 of DTC P1700/DTC No.32 or 33 Flow Chart in Section 7B. If check result is not satisfactory, check each wire harness, circuit connections and TP sensor.

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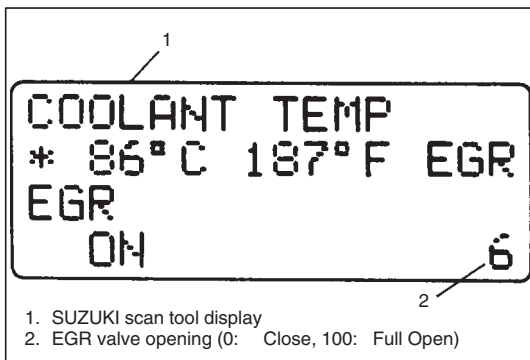
Engine Coolant Temp. Signal Inspection

Check engine coolant temp. signal referring to step 1 of DTC P1705/DTC NO.51 Flow Chart in Section 7B.

If check result is not satisfactory, check each wire harness, circuit connection and ECT sensor.

EMISSION CONTROL SYSTEM**EGR SYSTEM****System Inspection (using SUZUKI scan tool)**

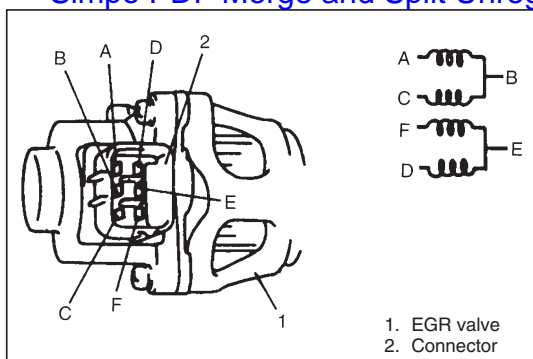
- 1) Connect SUZUKI scan tool to DLC with ignition switch OFF.
- 2) Turn ignition switch ON and then select "DATA LIST" mode on scan tool.
- 3) Make sure that vehicle condition is as following.
 - Vehicle speed = 0 KPH
 - Engine coolant temp. $\geq 80^{\circ}\text{C}$
 - Engine speed ≤ 3000 rpm
- 4) Clear DTC by using "CLEAR INFO" mode.



- 5) With engine idling (without depressing accelerator pedal), open EGR valve by using "STEP EGR" mode in "MISC TEST" menu. In this state, according as EGR valve opening increases engine idle speed drops. If not, possible cause is clogged EGR gas passage, stuck or faulty EGR valve, poor performance of ECT sensor or TP sensor or DTC and/or pending DTC is (are) stored in ECM memory.

Removal

- 1) Disconnect negative cable at battery.
- 2) Disconnect EGR valve coupler.
- 3) Remove EGR valve and gasket from intake manifold.

**Inspection**

- 1) Check resistance between following terminals of EGR valve in each pair.

Terminal	Standard resistance
A – B	20 – 24 Ω
C – B	
F – E	
D – E	

If found faulty, replace EGR valve assy.

- 2) Remove carbon from EGR valve gas passage.

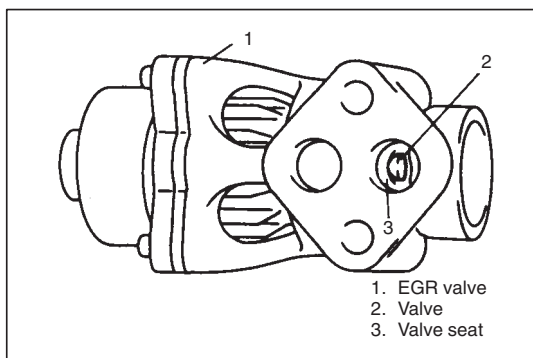
NOTE:

Do not use any sharp-edged tool to remove carbon.

Be careful not to damage or bend EGR valve, valve seat and rod.

- 3) Inspect valve, valve seat and rod for fault, cracks, bend or other damage.

If found faulty, replace EGR valve assembly.

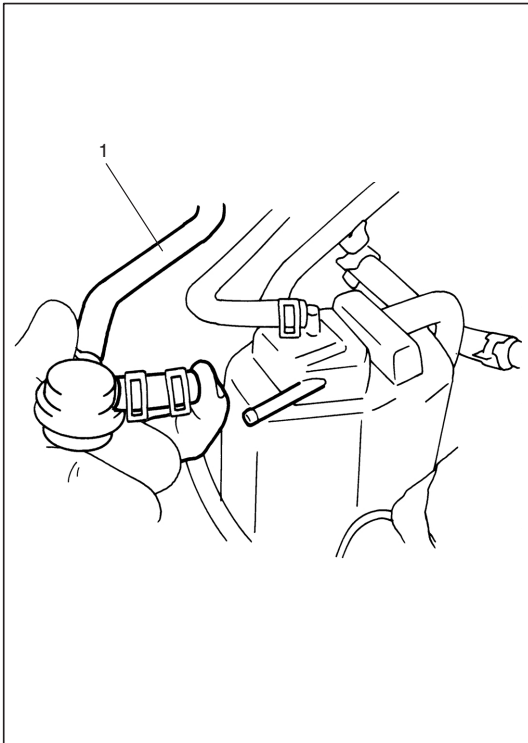
**Installation**

Reverse removal procedure noting following.

- Clean mating surface of valve and intake manifold.
- Use new gasket.

EVAPORATIVE EMISSION CONTROL SYSTEM**EVAP Canister Purge Inspection****NOTE:**

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range) and that parking brake lever is pulled all the way up.

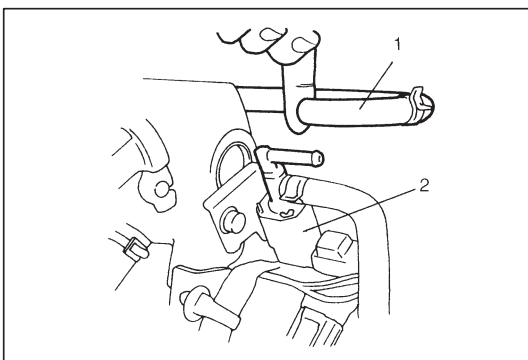


- 1) Disconnect purge hose (1) from EVAP canister.
- 2) Place finger against the end of disconnected hose and check that vacuum is not felt there when engine is cool and running at idle speed.
- 3) Connect purge hose to EVAP canister and warm up engine to normal operating temperature.
- 4) Disconnect purge hose from EVAP canister.
- 5) Also check that vacuum is felt when engine is running at idle speed.

NOTE:

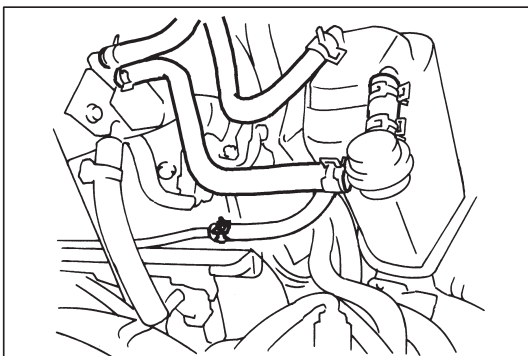
The EVAP canister purge system does not perform purging (vacuum is not detected at the purge hose) unless the engine is sufficiently warmed up and the heated oxygen sensor is activated fully. Also, when the purge hose is disconnected in Step 4), the air is drawn into the purge line. As a result, ECM detects a change in the purge gas concentration and sometimes stops purging but this indicates nothing abnormal.

If check result is not satisfactory, check vacuum passage, hoses, EVAP canister purge valve, wire harness and ECM.

**Vacuum Passage Inspection**

Start engine and run it at idle speed. Disconnect vacuum hose (1) from EVAP canister purge valve (2). With finger placed against hose disconnected, check that vacuum is applied.

If it is not applied, clean vacuum passage by blowing compressed air.

**Vacuum Hose Inspection**

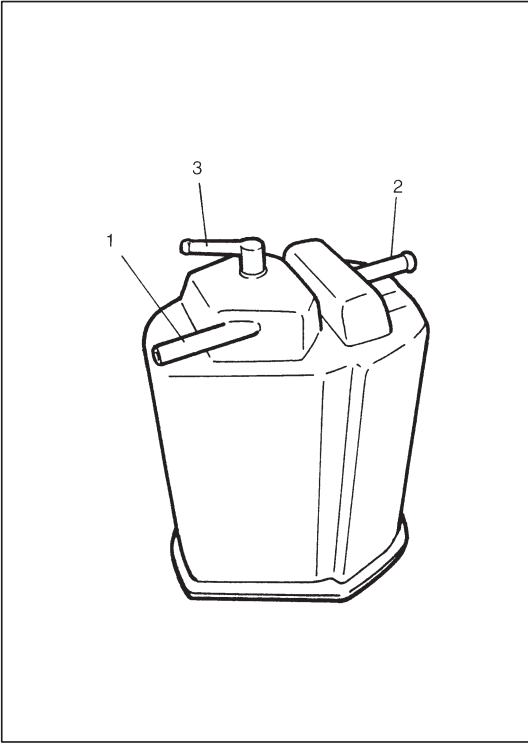
Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>

EVAP Canister Purge Valve Inspection

Check EVAP canister purge valve referring to step 1 of DTC P0443 Flow Chart.

If found malfunction, replace.



EVAP Canister Inspection

WARNING:

DO NOT SUCK nozzles on EVAP canister. Fuel vapor inside EVAP canister is harmful.

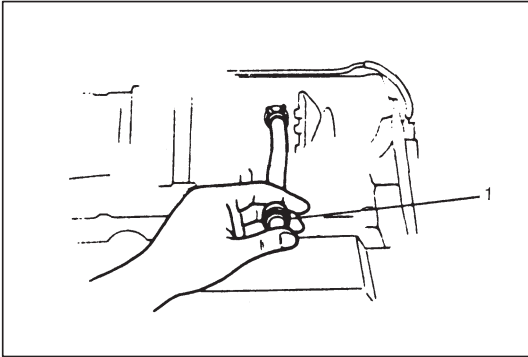
- 1) Check outside of EVAP canister visually.
- 2) Disconnect vacuum hoses from EVAP canister.
- 3) Check that there should be no restriction of flow through purge pipe (1) and air pipe (2) when air is blown into tank pipe (3).
If any faulty condition is found in above inspection replace.

PCV SYSTEM**NOTE:**

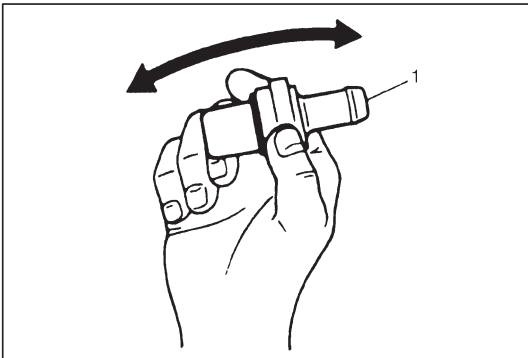
Be sure to check that there is no obstruction in PCV valve or its hoses before checking IAC duty, for obstructed PCV valve or hose hampers its accurate adjustment.

PCV Hose Inspection

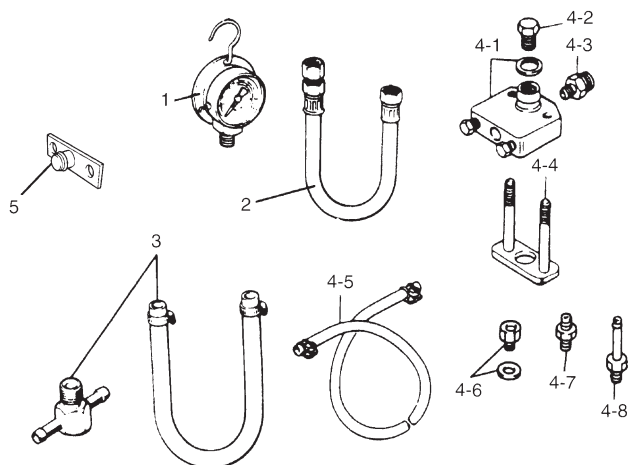
Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

**PCV Valve Inspection**

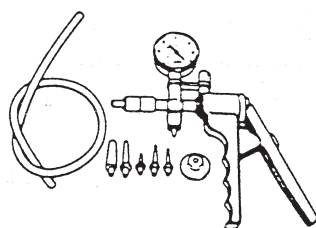
- 1) Disconnect PCV valve (1) from cylinder head cover and install plug to head cover hole.
- 2) Run engine at idle.
- 3) Place your finger over end of PCV valve (1) to check for vacuum. If there is no vacuum, check for clogged valve. Replace as necessary.



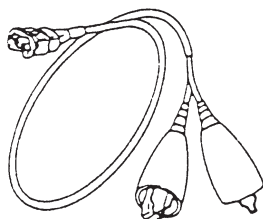
- 4) After checking vacuum, stop engine and remove PCV valve (1). Shake valve and listen for the rattle of check needle inside the valve. If valve does not rattle, replace valve.
- 5) After checking, remove plug and install PCV valve (1).

SPECIAL TOOLS

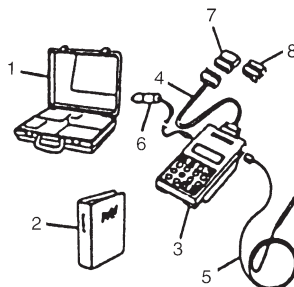
1. Pressure gauge
09912-58441
2. Pressure hose
09912-58431
3. 3-way joint & hose
09912-58490
4. Checking tool set
09912-58421
- 4-1. Tool body & washer
- 4-2. Body plug
- 4-3. Body attachment-1
- 4-4. Holder
- 4-5. Return hose & clamp
- 4-6. Body attachment-2 & washer
- 4-7. Hose attachment-1
- 4-8. Hose attachment-2
5. Checking tool plate
09912-57610



09917-47910
Vacuum pump gauge

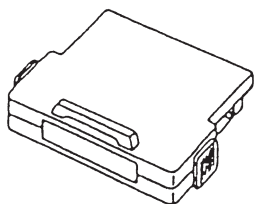


09930-88530
Injector test lead

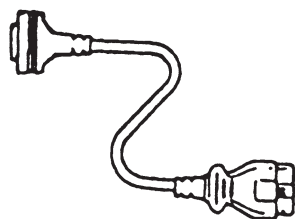


09931-76011
SUZUKI scan tool (Tech 1A) kit

1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable (14/26 pin,
09931-76040)
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adaptor



Mass storage cartridge



09931-76030
16/14 pin DLC cable

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
TP sensor mounting screw	2	0.2	1.5
IAC valve	3.3	0.33	2.5
ECT sensor	12	1.2	9.0
Heated oxygen sensor-1 and -2	45	4.5	32.5
Camshaft position sensor	9	0.9	6.5

SECTION 6F1

IGNITION SYSTEM (ELECTRONIC IGNITION SYSTEM)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

6F1

CONTENTS

GENERAL DESCRIPTION	6F1-2	Spark Plugs	6F1-6
DIAGNOSIS	6F1-3	Ignition Coil Assembly	6F1-6
ON-VEHICLE SERVICE	6F1-5	Crankshaft Position Sensor	6F1-7
Ignition Spark Test	6F1-5	Ignition Timing	6F1-7
High-Tension Cords	6F1-5	SPECIAL TOOLS	6F1-9

GENERAL DESCRIPTION

The ignition system is an electronic (distributorless) ignition system. It consists of the parts as described below and has an electronic ignition control system.

- ECM

It detects the engine and vehicle conditions through the signals from the sensors, determines the most suitable ignition timing and time for electricity to flow to the primary coil and sends a signal to the ignitor (power unit) in the ignition coil assembly.

- Ignition coil assembly (including an ignitor)

The ignition coil assembly has a built-in ignitor which turns ON and OFF the current flow to the primary coil according to the signal from ECM. When the current flow to the primary coil is turned OFF, a high voltage is induced in the secondary coil.

- High tension cords and spark plugs.

- CMP sensor (Camshaft position sensor) and CKP sensor (Crankshaft position sensor)

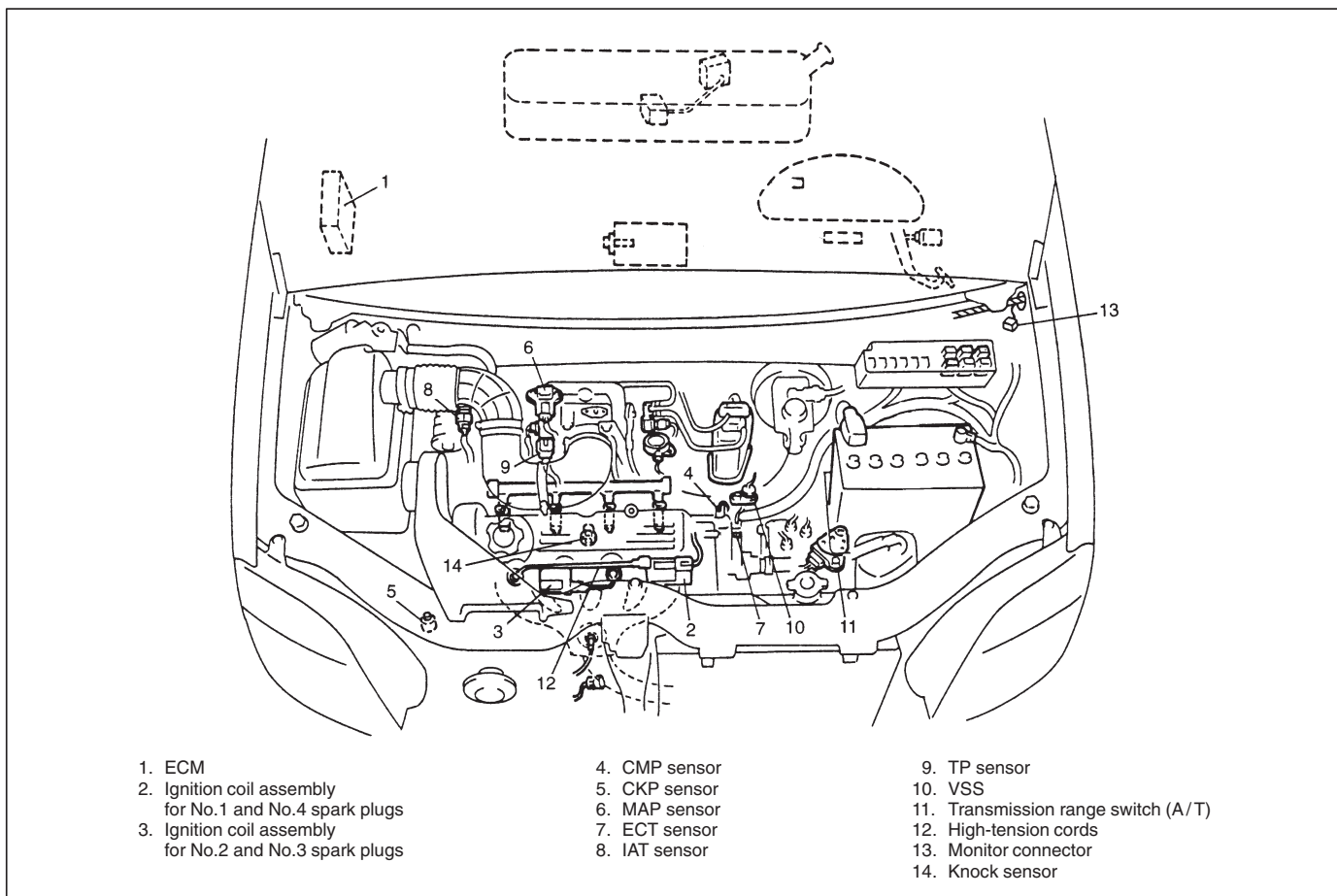
Using signals from these sensors, ECM identifies the specific cylinder whose piston is in the compression stroke and detects the crank angle.

- TP sensor, ECT sensor, MAP sensor and other sensors/switches

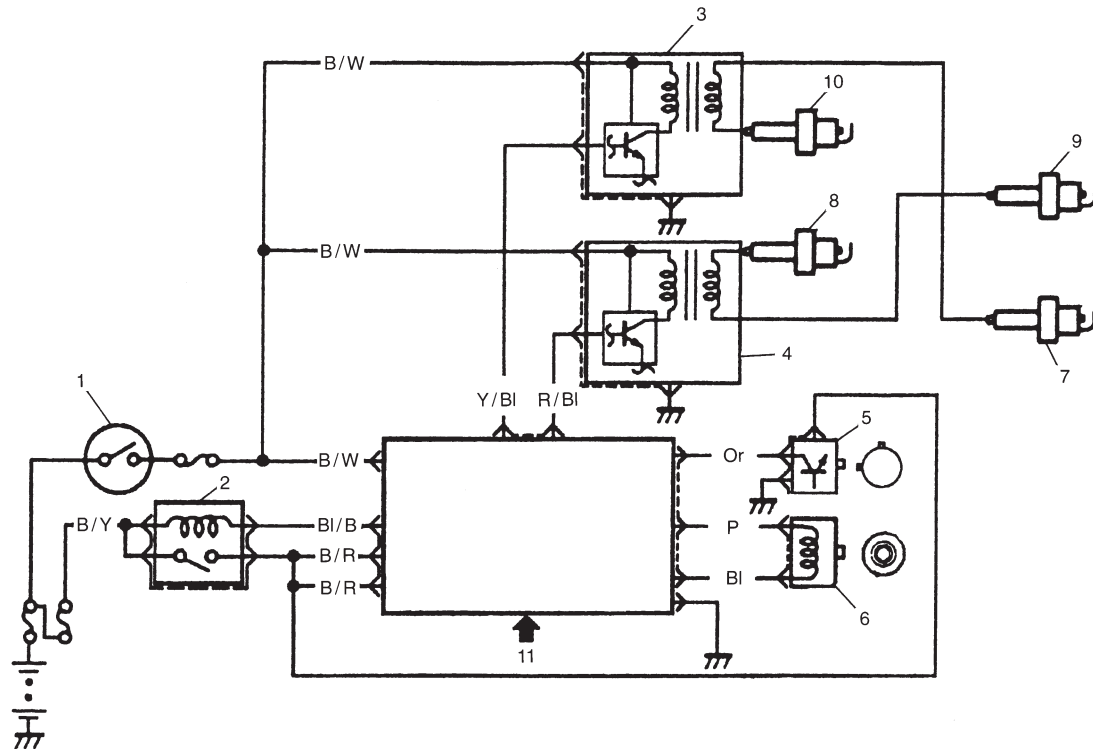
Refer to section 6E for details.

Although this ignition system does not have a distributor, it has two ignition coil assemblies (one is for No.1 and No.4 spark plugs and the other is for No.2 and No.3 spark plugs). When an ignition signal is sent from ECM to the ignitor in the ignition coil assembly for No.1 and No.4 spark plugs, a high voltage is induced in the secondary coil and that passes through the high-tension cords and causes No.1 and No.4 spark plugs to spark simultaneously. Likewise, when an ignition signal is sent to the ignitor in the other ignition coil assembly, No.2 and No.3 spark plugs spark simultaneously.

SYSTEM COMPONENTS



SYSTEM WIRING DIAGRAM



1. Ignition switch
2. Main relay
3. Ignition coil assembly for No.1 and No.4 spark plugs
4. Ignition coil assembly for No.2 and No.3 spark plugs

5. CMP sensor
6. CKP sensor
7. No.1 spark plug
8. No.2 spark plug
9. No.3 spark plug
10. No.4 spark plug

11. Sensed information
 - MAP sensor
 - ECT sensor
 - IAT sensor
 - TP sensor
 - Knock sensor
 - VSS

- Park/Neutral position signal
- Electric load signal
- Engine start signal
- Test switch terminal (Vehicle without EGR valve)

DIAGNOSIS

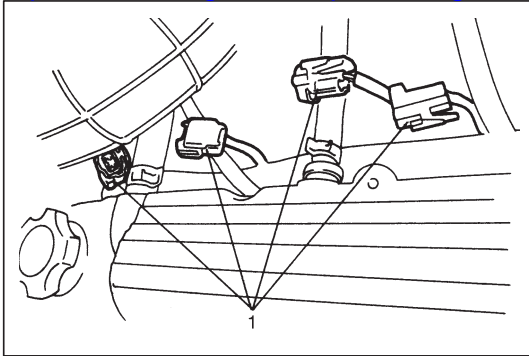
Condition	Possible Cause	Correction
Engine cranks, but will not start or hard to start	No spark <ul style="list-style-type: none"> • Blown fuse for ignition coil • Loose connection or disconnection of lead wire or high-tension cord(s) • Faulty high-tension cord(s) • Faulty spark plug(s) • Faulty ignition coil • Faulty CKP sensor or crankshaft timing belt pulley • Faulty ECM 	Replace. Connect securely. Replace. Adjust, clean or replace. Replace ignition coil assembly. Clean, tighten or replace. Replace.
Poor fuel economy or engine performance	<ul style="list-style-type: none"> • Incorrect ignition timing • Faulty spark plug(s) or high-tension cord(s) • Faulty ignition coil assembly • Faulty CKP sensor or crankshaft timing belt pulley • Faulty ECM 	Check related sensors and crankshaft timing belt pulley. Adjust, clean or replace. Replace. Clean, tighten or replace. Replace.

IGNITION SYSTEM DIAGNOSTIC FLOW TABLE

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in section 6.
2	Ignition Spark Test 1) Check all spark plugs for condition and type referring to "Spark Plugs" section. 2) If OK, perform ignition spark test, referring to "Ignition Spark Test" section. Is spark emitted from all spark plugs?	Go to Step 11.	Go to Step 3.
3	Diagnostic Trouble Code (DTC) Check Is DTC stored in ECM?	Go to applicable DTC Diag. Flow Table in section 6.	Go to Step 4.
4	Electrical Connection Check 1) Check ignition coil assemblies and high-tension cords for electrical connection. Are they connected securely?	Go to Step 5.	Connect securely.
5	High-Tension Cords Check 1) Check high-tension cord for resistance referring to "High-Tension Cords" section. Is check result satisfactory?	Go to Step 6.	Replace high-tension cord(s).
6	Ignition Coil Assembly Power Supply and Ground Circuit Check 1) Check ignition coil assembly power supply and ground circuits for open and short. Are circuits in good condition?	Go to Step 7.	Repair or replace.
7	Ignition Coil Assembly Check 1) Check ignition coil for resistance referring to "Ignition Coil Assembly" section. Is check result satisfactory?	Go to Step 8.	Replace ignition coil assembly.
8	Crankshaft Position (CKP) Sensor Check 1) Check crankshaft position sensor referring to Step 3 and 4 of DTC P0335 Diag. Flow Table in section 6. Is check result satisfactory?	Go to Step 9.	Tighten CKP sensor bolt, replace CKP sensor or crankshaft timing belt pulley.
9	Ignition Trigger Signal Circuit Check 1) Check ignition trigger signal wire for open, short and poor connection. Is circuit in good condition?	Go to Step 10.	Repair or replace.
10	A Known-good Ignition Coil Assembly Substitution 1) Substitute a known-good ignition coil assembly and then repeat Step 2. Is check result of Step 2 satisfactory?	Go to Step 11.	Substitute a known-good ECM and then repeat Step 2.
11	Ignition Timing Check 1) Check initial ignition timing and ignition timing advance referring to "Ignition Timing" section. Is check result satisfactory?	System is in good condition.	Check CKP sensor, crankshaft timing belt pulley (signal rotor) and input signals related to this system.

ON-VEHICLE SERVICE

IGNITION SPARK TEST



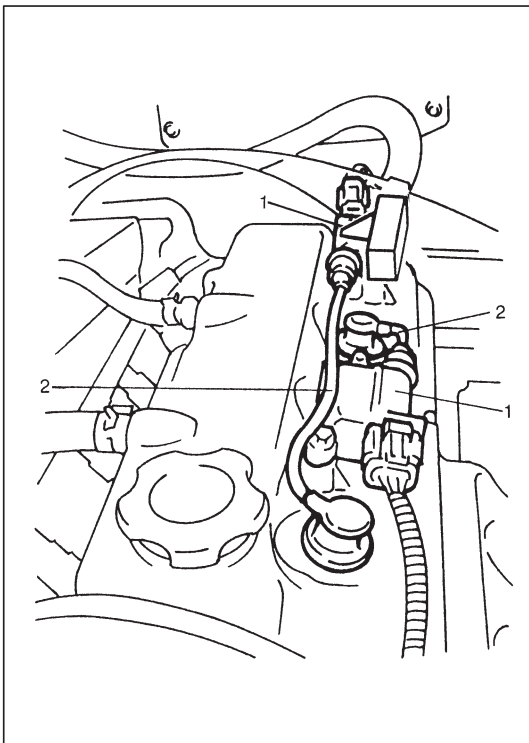
- 1) Disconnect all injector couplers (1) from injectors.

WARNING:

Without disconnection of injector couplers, combustible gas may come out from spark plug holes during this test and may get ignited in engine room.

- 2) Remove spark plug and check it for condition and type referring to "Spark Plugs" in this section.
- 3) If OK, connect ignition coil coupler to ignition coil assembly and connect spark plug to ignition coil assembly or high-tension cord. Ground spark plug.
- 4) Crank engine and check if each spark plug sparks.
- 5) If no spark is emitted, inspect the related parts as described under "Diagnosis" earlier in this section.

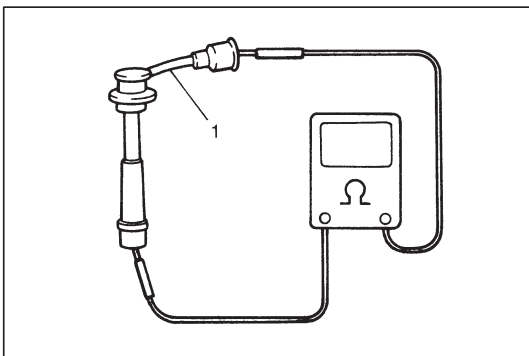
HIGH-TENSION CORDS



- 1) Disconnect high-tension cords (2) from ignition coil assemblies (1) while gripping each cap.
- 2) Pull out high-tension cords from spark plugs while gripping each cap.

CAUTION:

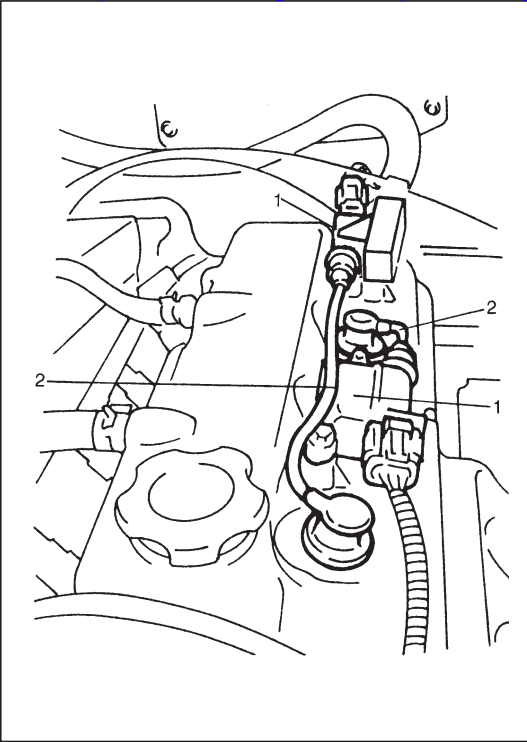
- Removal of high-tension cords together with clamps will be recommended so as not to damage their inside wire (resistive conductor).
- For the same reason, pull out each connection by gripping cap portion.



- 3) Measure resistance of high-tension cord (1) by using ohmmeter.

High-tension cord resistance: 10 – 22 k Ω /m (3.0 – 6.7 k Ω /ft)

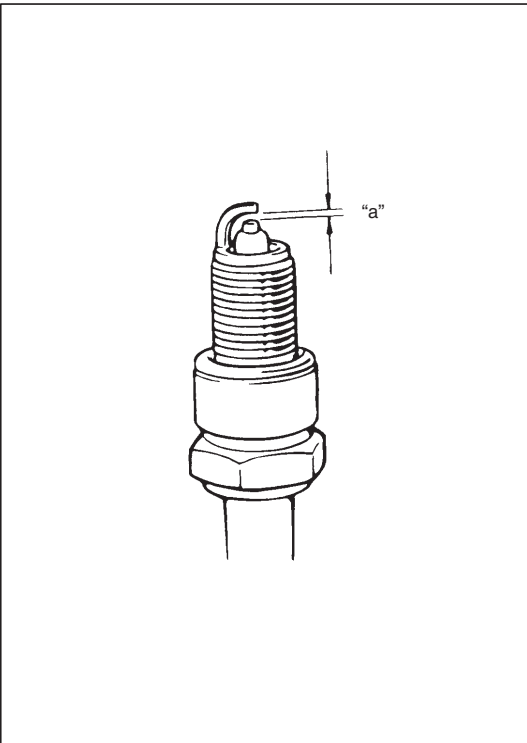
- 4) If resistance exceeds specification, replace high-tension cord(s).



- 5) Install high-tension cords (2) to spark plugs and ignition coil assemblies (1) while gripping each cap.

CAUTION:

- Never attempt to use metal conductor high-tension cords as replacing parts.
- Insert each cap portion fully when installing high-tension cords.

**SPARK PLUGS**

- 1) Pull out high-tension cords by gripping their caps and then remove ignition coil assemblies referring to IGNITION COIL ASSEMBLY in this section.
- 2) Remove spark plugs.
- 3) Inspect them for:
 - Electrode wear
 - Carbon deposits
 - Insulator damage
- 4) If any abnormality is found, adjust air gap, clean with spark plug cleaner or replace them with specified new plugs.

Spark plug air gap "a" : 1.0 – 1.1 mm (0.040 – 0.043 in.)

Spark plug type : NGK BKR6E-11
: DENSO K20PR-U11

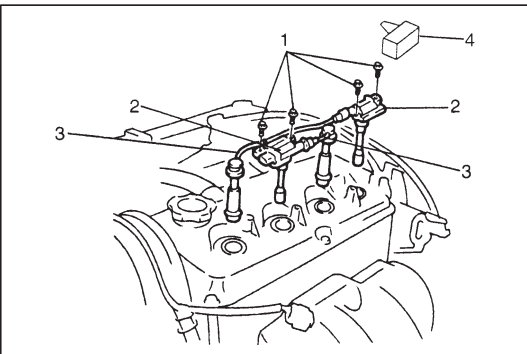
- 5) Install spark plugs and torque them to specification.

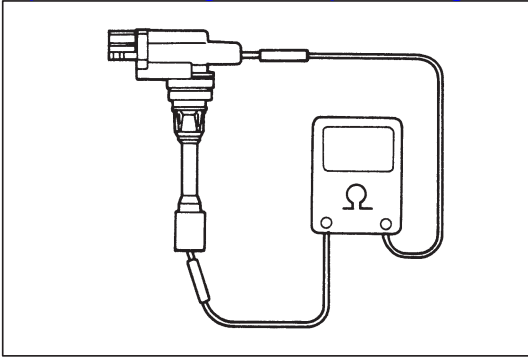
Tightening Torque for spark plug
28 N·m (2.8 kg-m, 20.0 lb-ft)

- 6) Install ignition coil assemblies referring to IGNITION COIL ASSEMBLY in this section.
- 7) Install high-tension cords securely by gripping their caps.

IGNITION COIL ASSEMBLY (INCLUDING IGNITOR)**Inspection**

- 1) Disconnect negative cable at battery.
- 2) Remove ignition coil cover (4).
- 3) Disconnect ignition coil coupler.
- 4) Disconnect high-tension cord (3) from ignition coil assembly (2).
- 5) Remove ignition coil bolts (1) and then pull out ignition coil assembly.





6) Measure secondary coil for resistance.

Secondary coil resistance : 7.6 – 10.2 kΩ at 20°C, 68°F

If resistance is out of specification, replace ignition coil assembly.

7) Install ignition coil assembly.

8) Tighten ignition coil bolts, and then connect ignition coil coupler.

9) Install high-tension cord to ignition coil assembly while gripping its cap.

10) Install ignition coil cover certainly.

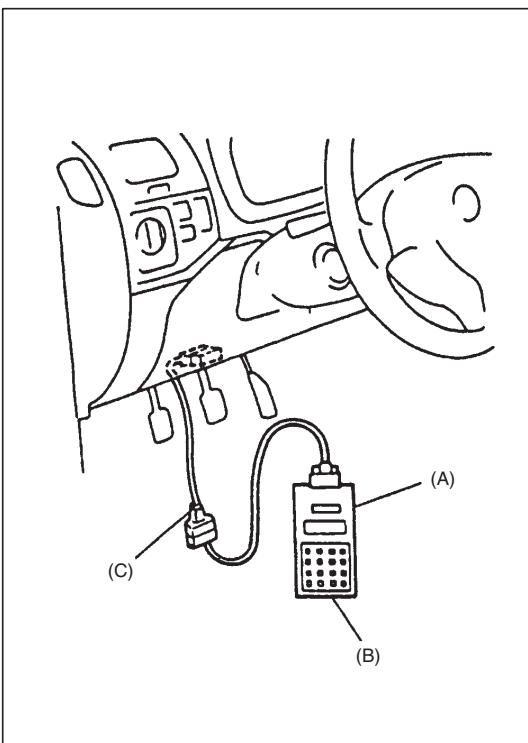
CRANKSHAFT POSITION SENSOR (CKP SENSOR)

Refer to section 6E for removal, inspection and installation.

IGNITION TIMING

NOTE:

- Ignition timing is not adjustable. If ignition timing is out of specification, check system related parts.
- Before starting engine, place transmission gear shift lever in “Neutral” (shift selector lever to “P” range for A/T model), and set parking brake.



INSPECTION

1) When using SUZUKI scan tool, connect SUZUKI scan tool to DLC with ignition switch OFF.

Special Tool

(A): 09931-76011 (SUZUKI scan tool)

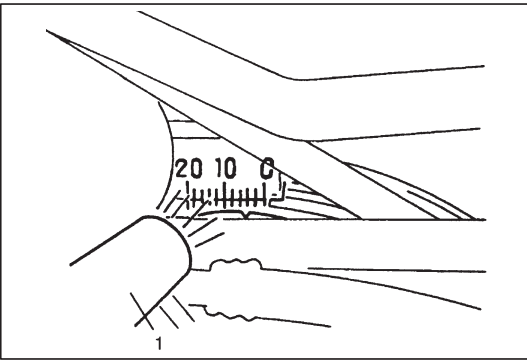
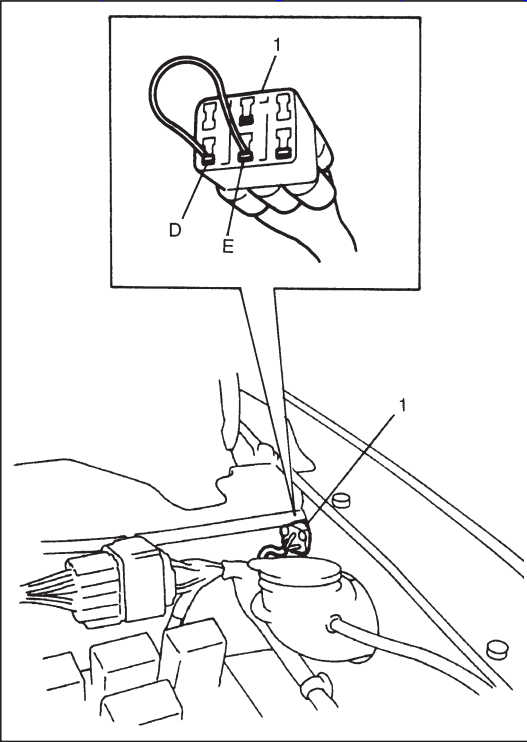
(B): Mass storage cartridge

(C): 09931-76030 (16/14 pin DLC cable)

2) Start engine and warm it up to normal operating temperature.

3) Make sure that all of electrical loads except ignition are switched off.

4) Check to be sure that idle speed is within specification.
(Refer to SECTION 6E)



- 5) Fix ignition timing to initial one as follows.

When using SUZUKI scan tool:

Select "MISC" mode on SUZUKI scan tool and fix ignition timing to initial one.

When not using SUZUKI scan tool:

Disconnect scan tool from DLC, and connect D and E terminals of diagnosis connector (1) or E to body ground by using service wire so that ignition timing is fixed on initial one.

- 6) Open air cleaner upper case and shift upper case and hose position to observe ignition timing.

- 7) Using timing light (1), check that ignition timing is within specification.

Initial ignition timing (Test switch terminal grounded or fixed with SUZUKI scan tool)

Ignition order

: $5 \pm 3^\circ$ BTDC at idle speed

: 1-3-4-2

- 8) If ignition timing is out of specification, check the followings:

- CKP sensor
- Crankshaft timing belt pulley (signal rotor)
- TP sensor
- Test switch signal circuit
- VSS
- Timing belt cover installation

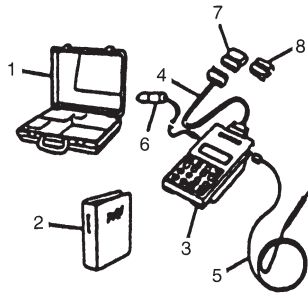
- 9) After checking Initial Ignition Timing, release ignition timing fixation by using SUZUKI scan tool or disconnect service wire from diagnosis connector.

- 10) With engine idling (test switch terminal ungrounded, throttle opening at closed position and car stopped), check that ignition timing is about 9° – 15° BTDC. (Constant variation within a few degrees from 9° – 15° indicates no abnormality but proves operation of electronic timing control system.) Also, check that increasing engine speed advances ignition timing.

If above check results are not satisfactory, check CKP sensor, test switch terminal circuit and ECM.

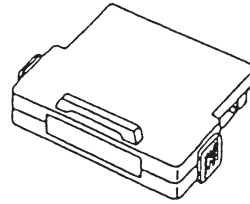
- 11) Install air cleaner upper case.

SPECIAL TOOLS

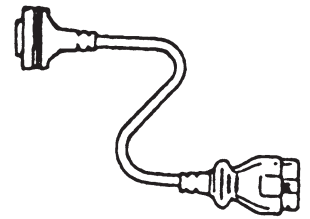


1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable (14/26 pin, 09931-76040)
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adaptor

09931-76011
SUZUKI scan tool (Tech 1A) kit



Mass storage cartridge



09931-76030
16/14 pin DLC cable

SECTION 6G

CRANKING SYSTEM

(1.2 kW Reduction Type)

NOTE:

Starting motor vary depending on specifications, etc.

Therefore, be sure to check model and specification of the vehicle being serviced before replacing parts.

CONTENTS**6G**

GENERAL DESCRIPTION	6G- 2
Cranking Circuit	6G- 2
Starting Motor Circuit	6G- 2
Starting Motor	6G- 2
DIAGNOSIS	6G- 3
UNIT REPAIR OVERHAUL	6G- 5
Dismounting and Remounting	6G- 5
Disassembly	6G- 6
Inspection	6G- 9
Reassembly	6G-13
Performance Test	6G-15
Pull-in test	6G-15
Hold-in test	6G-15
Plunger and pinion return test	6G-15
No-load performance test	6G-16
SPECIFICATIONS	6G-17
REQUIRED SERVICE MATERIAL	6G-17
SPECIAL TOOLS	6G-17

GENERAL DESCRIPTION

CRANKING CIRCUIT

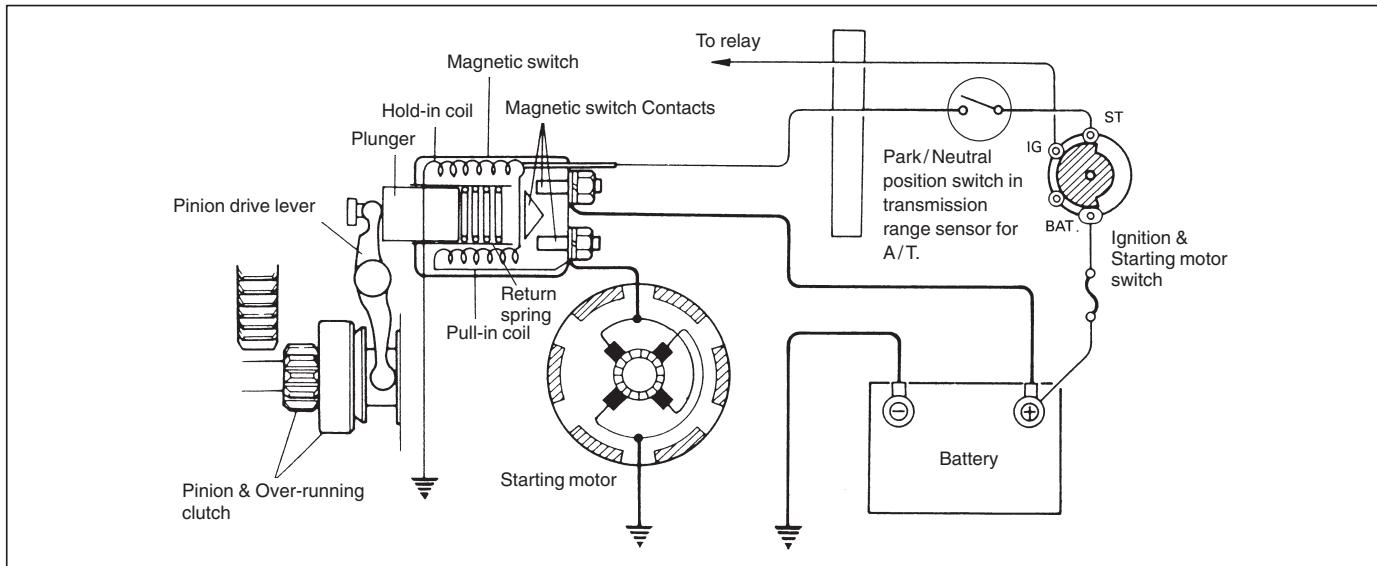
The cranking circuit consists of the battery, starting motor, ignition switch, and related electrical wiring. These components are connected electrically.

Only the starting motor will be covered in this section.

STARTING MOTOR CIRCUIT

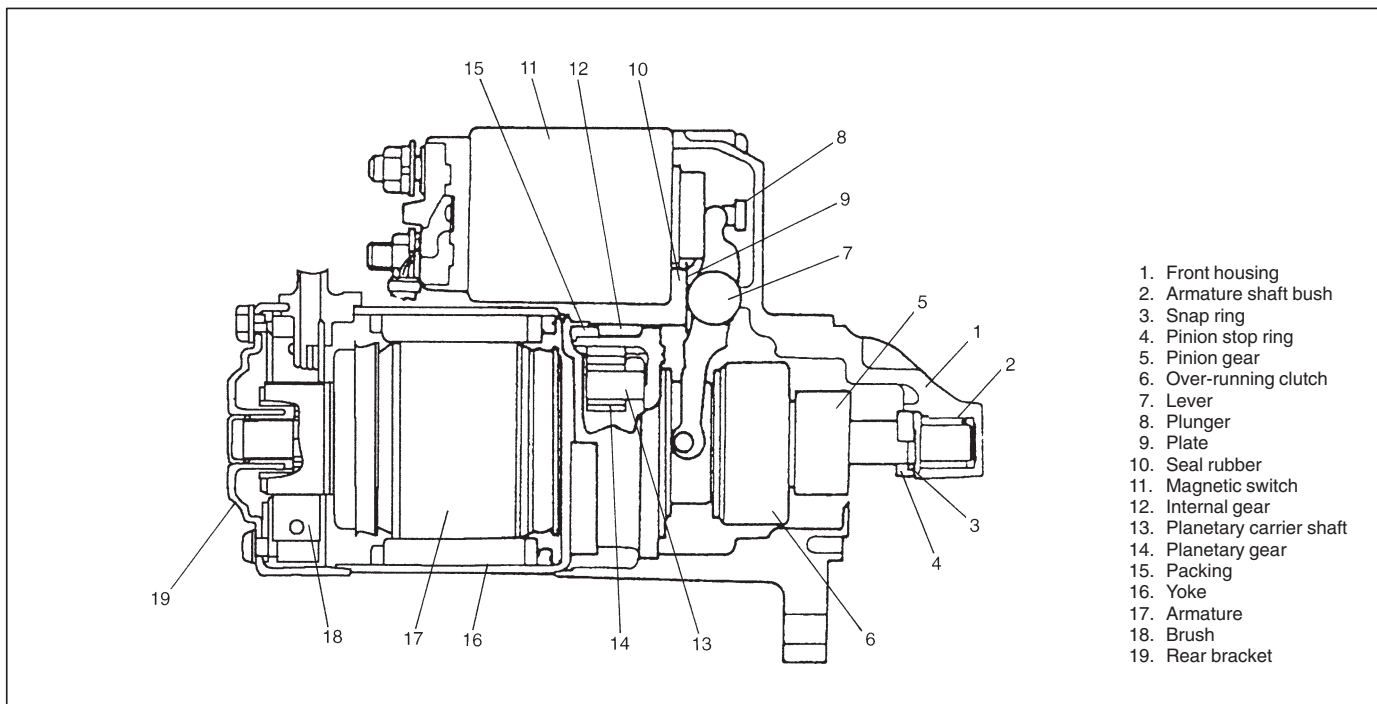
In the circuit shown in the following, the magnetic switch coils are magnetized when the ignition switch is closed. The resulting plunger and pinion drive lever movement causes the pinion to engage the engine flywheel gear and the magnetic switch main contacts to close, and cranking takes place.

When the engine starts, the pinion over-running clutch protects the armature from excessive speed until the switch is opened, at which time the return spring causes the pinion to disengage.



STARTING MOTOR

The starting motor consist of the following parts.



DIAGNOSIS

Possible symptoms due to starting system trouble would be as follows:

- Starting motor does not run (or runs slowly)
- Starting motor runs but fails to crank engine
- Abnormal noise is heard
- Starting motor does not stop running

Proper diagnosis must be made to determine exactly where the cause of each trouble lies.....in battery, wiring harness, (including ignition and starting motor switch), starting motor or engine.

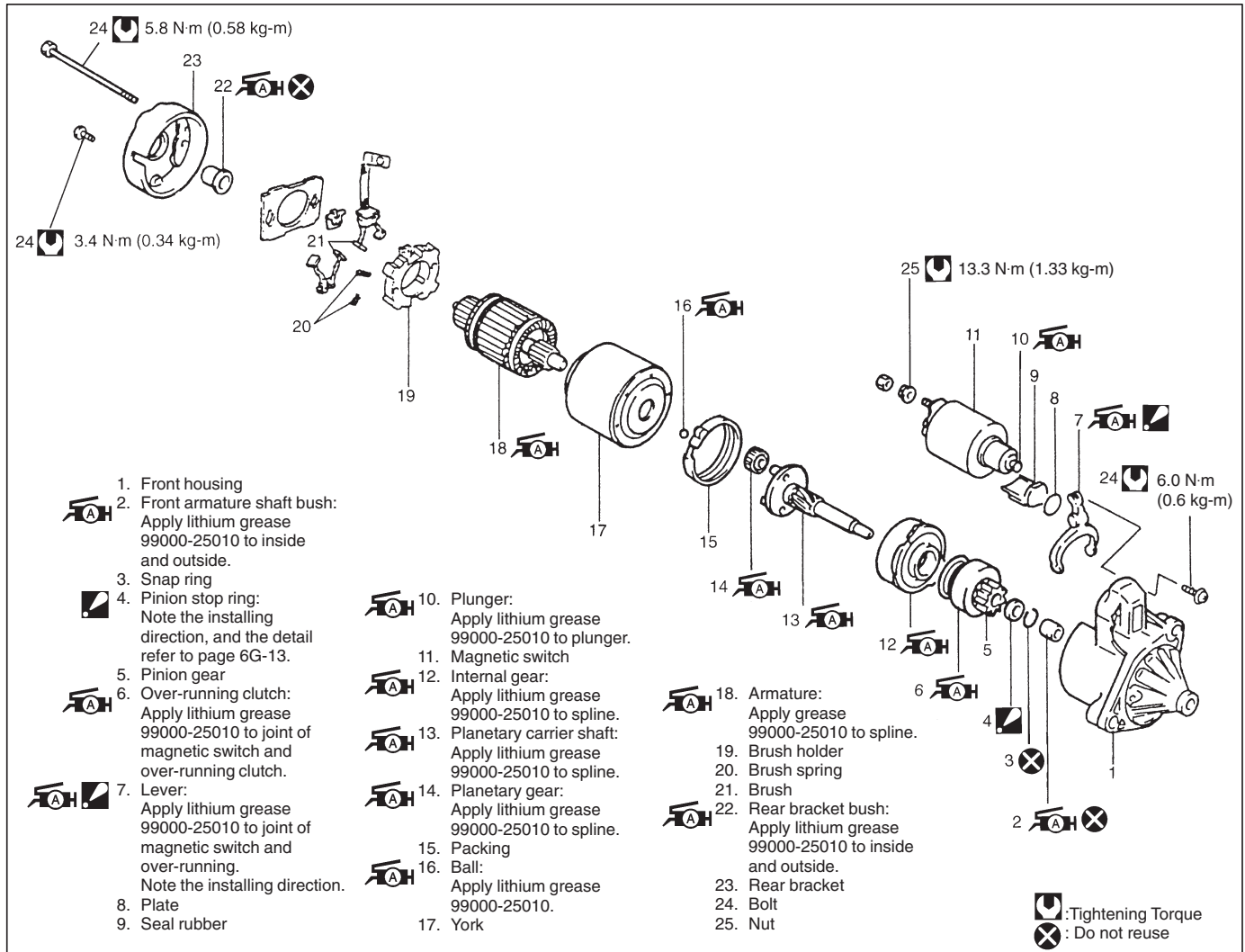
Do not remove motor just because starting motor does not run. Check the following items and narrow down scope of possible causes.

- Condition of trouble
- Tightness of battery terminals (including ground cable connection on engine side) and starting motor terminals
- Discharge of battery
- Mounting of starting motor

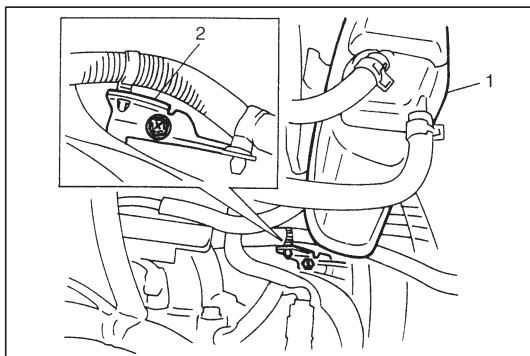
Condition	Possible Cause	Correction
Motor not running	No operating sound of magnetic switch <ul style="list-style-type: none"> • Shift lever switch is not in P or N, or not adjusted (A/T) • Battery run down • Battery voltage too low due to battery deterioration • Poor contact in battery terminal connection • Loose grounding cable connection • Fuse set loose or blown off • Poor contacting action of ignition switch and magnetic switch • Lead wire coupler loose in place • Open-circuit between ignition switch and magnetic switch • Open-circuit in pull-in coil • Brushes are seating poorly or worn down • Poor sliding or plunger and/or pinion 	Shift in P or N, or adjust switch. Recharge battery. Replace battery. Retighten or replace. Retighten. Tighten or replace. Replace. Retighten. Repair. Replace magnetic switch. Repair or replace. Repair.
	Operating sound of magnetic switch heard <ul style="list-style-type: none"> • Battery run down • Battery voltage too low due to battery deterioration • Loose battery cable connections • Burnt main contact point, or poor contacting action of magnetic switch • Brushes are seating poorly or worn down • Weakened brush spring 	Recharge battery. Replace battery. Retighten. Replace magnetic switch. Repair or replace. Replace.

Condition	Possible Cause	Correction
Motor not running	<ul style="list-style-type: none"> ● Burnt commutator ● Grounding of field coil ● Layer short-circuit of armature ● Crankshaft rotation obstructed 	Replace armature. Repair. Replace. Repair.
Starting motor running but too slow (small torque)	If battery and wiring are satisfactory, inspect starting motor <ul style="list-style-type: none"> ● Insufficient contact of magnetic switch main contacts ● Layer short-circuit of armature ● Disconnected, burnt or worn commutator ● Worn brushes ● Weakened brush springs ● Burnt or abnormally worn end bush 	Replace magnetic switch. Replace. Replace armature. Replace brush. Replace spring. Replace bush.
Starting motor running, but not cranking engine	<ul style="list-style-type: none"> ● Worn pinion tip ● Poor sliding of over-running clutch ● Over-running clutch slipping ● Worn teeth of ring gear 	Replace over-running clutch. Repair. Replace over-running clutch. Replace flywheel (M/T) or drive plate (A/T).
Noise	<ul style="list-style-type: none"> ● Abnormally worn bush ● Worn pinion or worn teeth of ring gear ● Poor sliding of pinion (failure in return movement) ● Worn internal or planetary gear teeth ● Lack of oil in each part 	Replace bush. Replace over-running clutch, flywheel (M/T) or drive plate (A/T). Repair or replace. Replace. Lubricate.
Starting motor does not stop running	<ul style="list-style-type: none"> ● Fused contact points of magnetic switch ● Short-circuit between turns of magnetic switch coil (layer short-circuit) ● Failure of returning action in ignition switch 	Replace magnetic switch. Replace magnetic switch. Replace.

UNIT REPAIR OVERHAUL

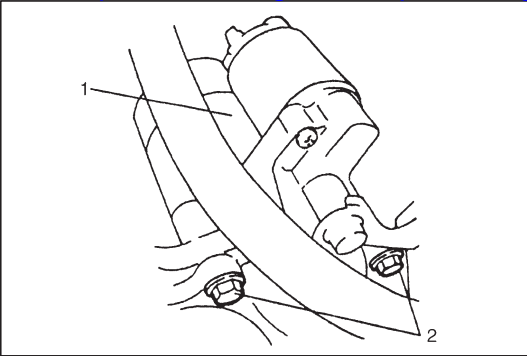


For overhauling of starting motor, it is recommended that component parts should be cleaned thoroughly. However, yoke, armature coil, over-running clutch, magnetic switch assembly, rubber or plastic parts are NOT ALLOWED to be washed in degreasing tank or with grease dissolving solvent. Those parts should be cleaned by blowing air and wiping with cloth.

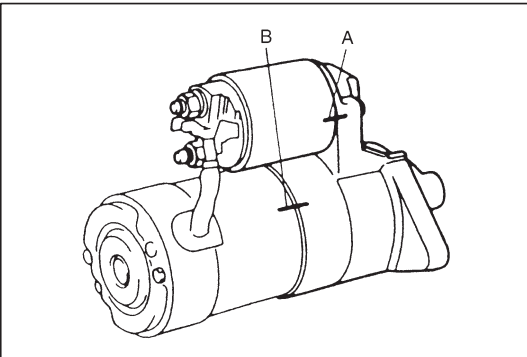


DISMOUNTING AND REMOUNTING

- 1) Disconnect positive (+) and negative (-) battery lead cables at battery.
- 2) Remove battery and battery tray.
- 3) Disconnect EVAP canister (1) and remove cable clamp (2).



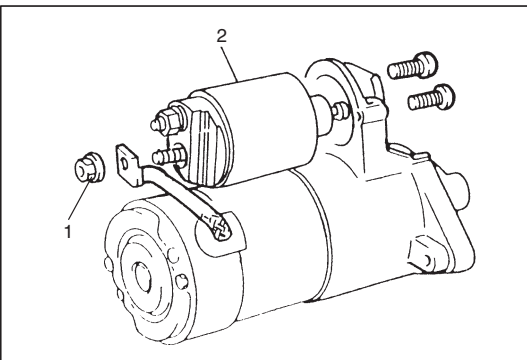
- 4) Disconnect magnetic switch lead wire and battery cable from starting motor (1).
- 5) Remove two starting motor mount bolts (2).
- 6) Remove starting motor.
- 7) To install, reverse the above procedure.



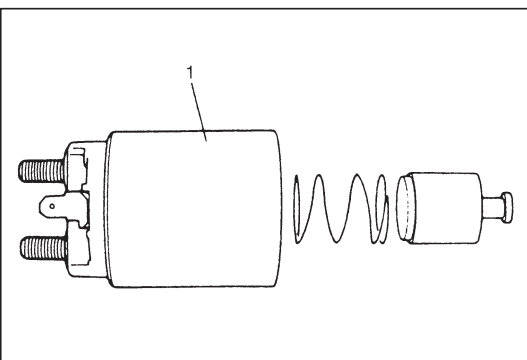
DISASSEMBLY

NOTE:

- Before disassembling starting motor, be sure to put match marks at two locations (A & B) as shown so that any possible mistake can be avoided.
- Do not clamp yoke in a vise or strike it with a hammer during repair operations.

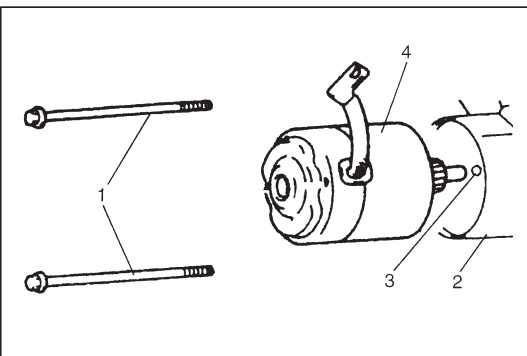


- 1) Remove nut (1) securing the end of field coil lead to terminal on the head of magnetic switch.
- 2) Remove magnetic switch (2).

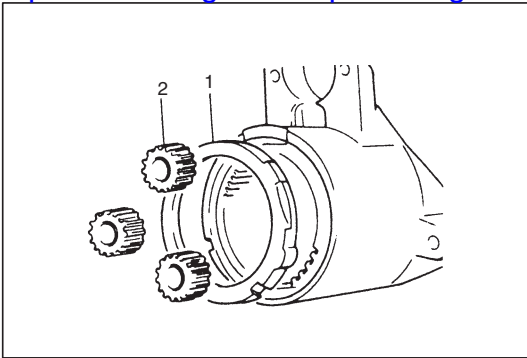


NOTE:

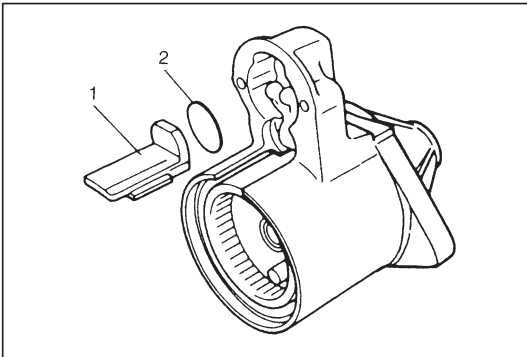
Don't disassemble magnetic switch (1). If defective, replace as a complete assembly.



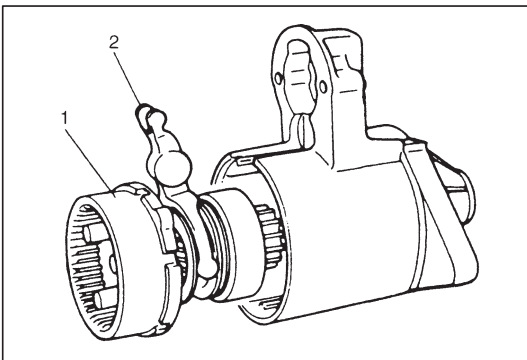
- 3) Remove bolts (1), then separate reduction gear assembly (2) and ball (3) from starting motor assembly (4).



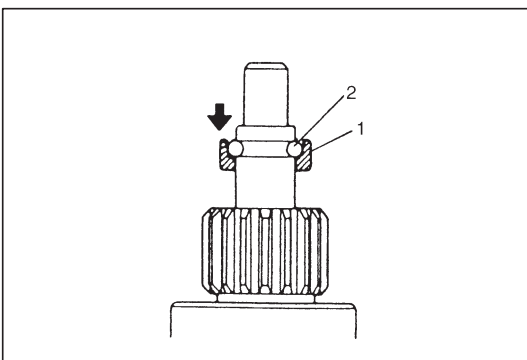
4) Remove packing (1) and planetary gears (2).



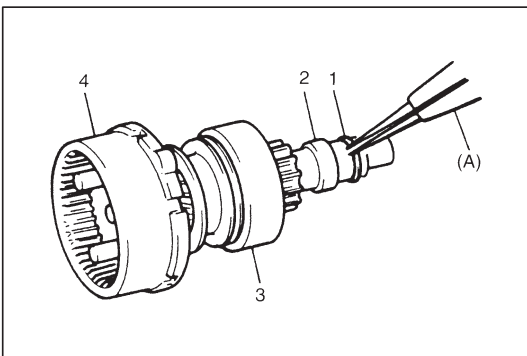
5) Remove seal rubber (1) and plate (2).



6) Remove shaft assembly (1) with lever (2).



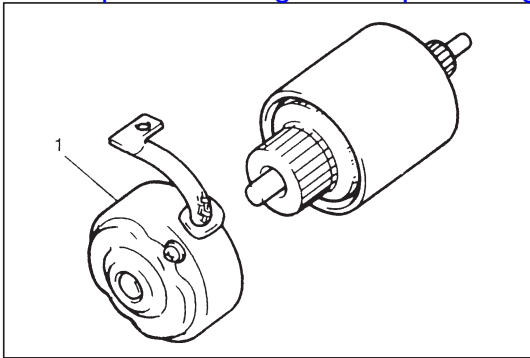
7) Loosen pinion stop ring (1) fixed by snap ring (2).



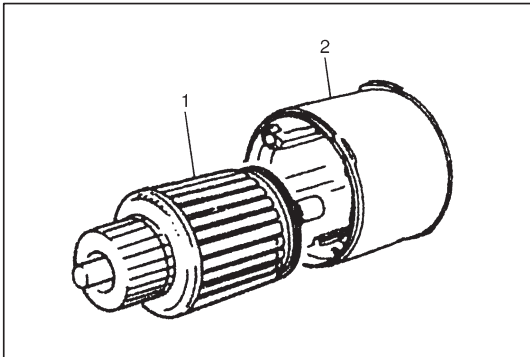
8) Remove snap ring (1), and then pull out pinion stop ring (2), over-running clutch (3) and internal gear (4).

Special Tool

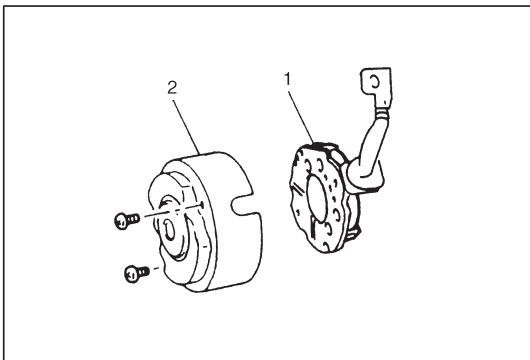
(A): 09900-06107



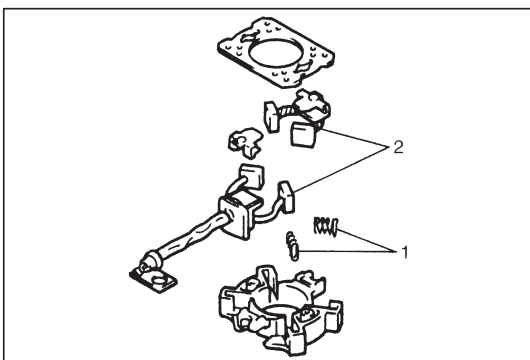
9) Remove rear bracket (1) with brush holder.



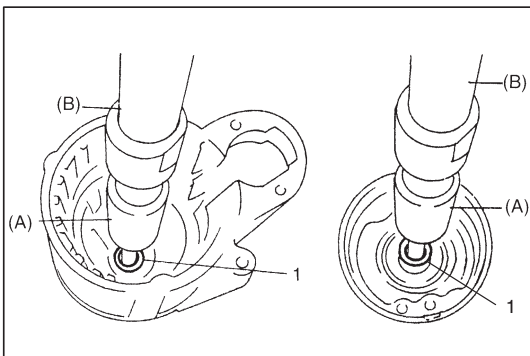
10) Remove armature (1) from yoke (2).



11) Remove brush holder (1) from rear bracket (2).

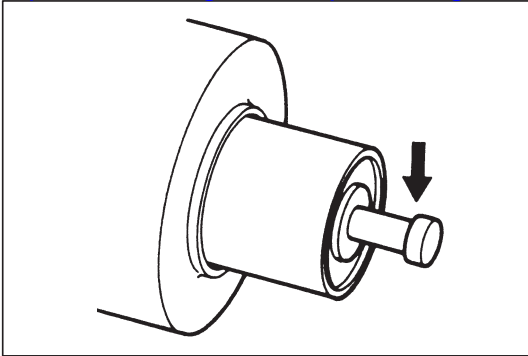


12) Remove brush springs (1) and brushes (2).



13) Remove armature shaft bushes (1) using special tools.

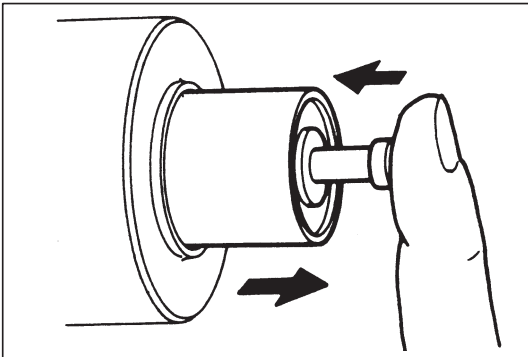
Special Tool
(A): 09921-20200
(B): 09930-30102



INSPECTION

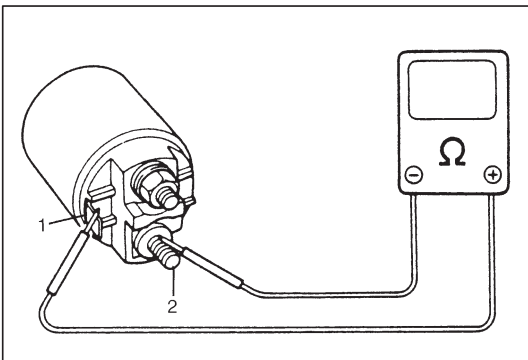
PLUNGER

Inspect plunger for wear. Replace if necessary.



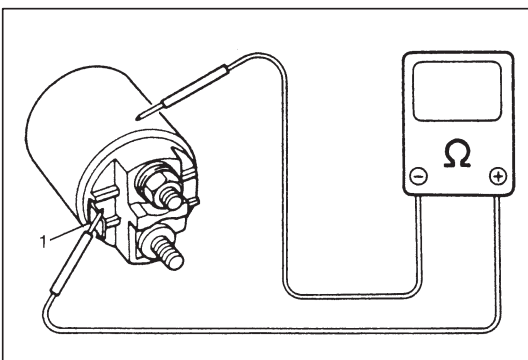
MAGNETIC SWITCH

Push in plunger and release it. The plunger should return quickly to its original position. Replace if necessary.



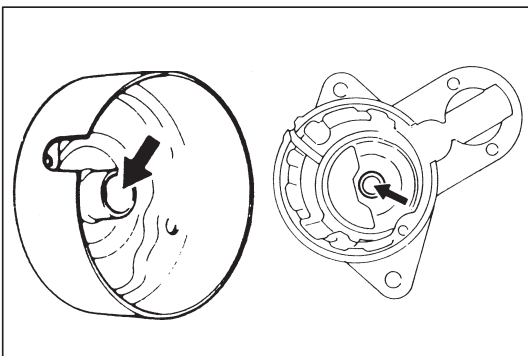
● Pull-In Coil Open Circuit Test

Check for continuity across magnetic switch 'S' terminal (1) and 'M' terminal (2). If no continuity exists, coil is open and should be replaced.



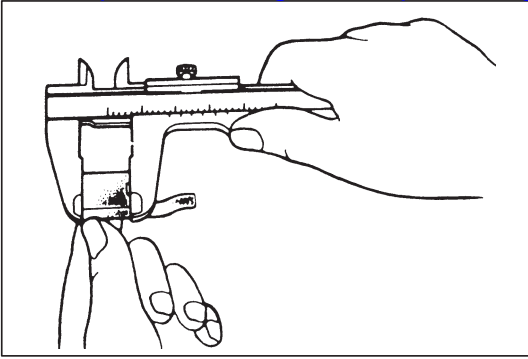
● Hold-In Coil Open Circuit Test

Check for continuity across magnetic switch 'S' terminal (1) and coil case. If no continuity exists, coil is open and should be replaced.



ARMATURE SHAFT BUSH

Inspect bushes for wear or damage. Replace if necessary.

**BRUSH**

- Check brushes for wear.
Measure length of brushes and if below limit, replace brush.

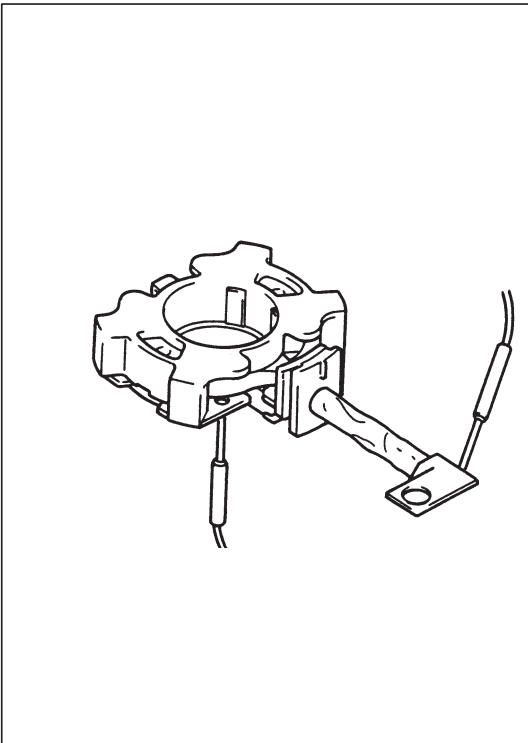
Brush length

Standard	12.3 mm (0.44 in.)
Limit	7 mm (0.28 in.)

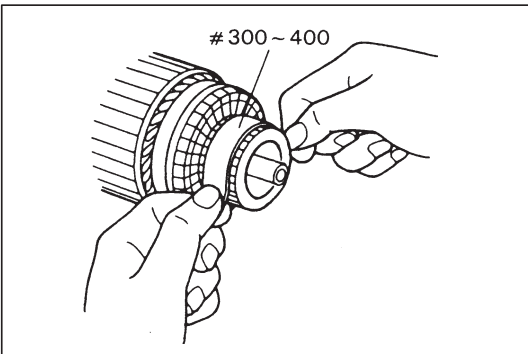
- Install brushes to each brush holder and check for smooth movement.

SPRING

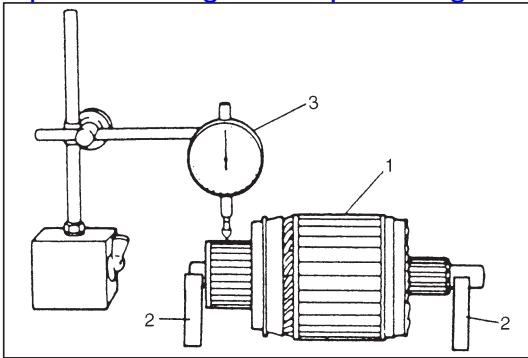
- Inspect brush springs for wear, damage or other abnormal conditions. Replace if necessary.

**BRUSH HOLDER**

- Check movement of brush in brush holder. If brush movement within brush holder is sluggish, check brush holder for distortion and sliding faces for contamination. Clean or correct as necessary.
- Check for continuity across brush positive terminal and grounded brush holder. If continuity exists, brush holder is grounded due to defective insulation and should be replaced.

**ARMATURE**

- Inspect commutator for dirt or burn. Correct with sandpaper or lathe, if necessary.



- Check commutator for uneven wear with armature (1) supported on V-blocks (2). If deflection of dial gauge (3) pointer exceeds limit, repair or replace.

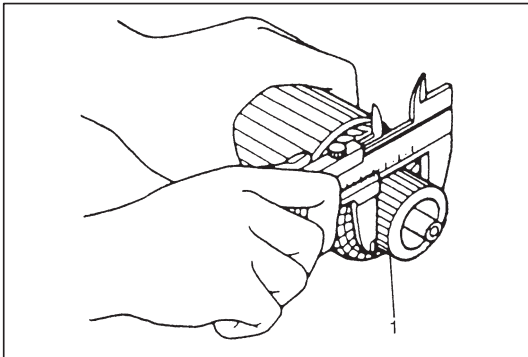
NOTE:

Below specification presupposes that armature is free from bend. Bent armature must be replaced.

Commutator out of round

Standard : 0.05 mm (0.002 in.) or less

Limit : 0.4 mm (0.015 in.)

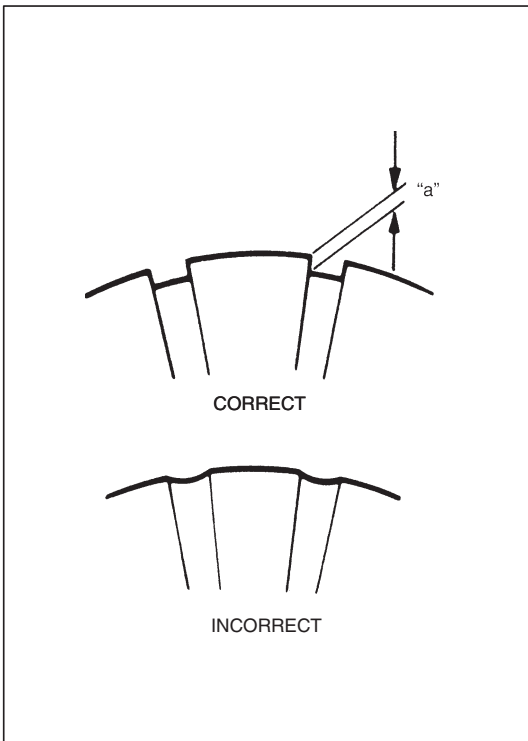


- Inspect commutator (1) for wear. If diameter is below limit, replace armature.

Commutator outside diameter

Standard : 29.4 mm (1.16 in.)

Limit : 28.8 mm (1.13 in.)

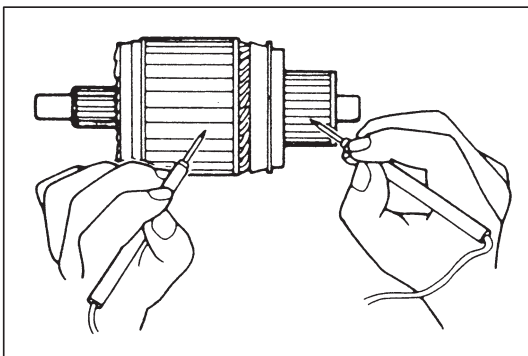


- Inspect commutator for wear or abnormal condition. Replace if necessary.

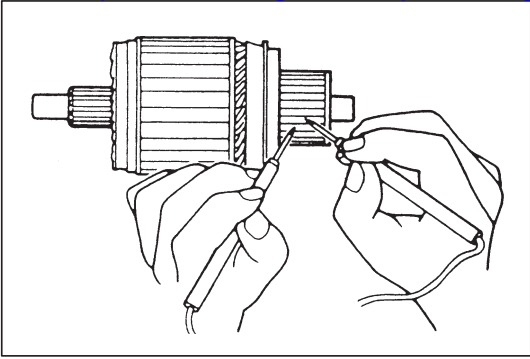
Commutator insulator reference depth "a"

Standard : 0.4 – 0.6 mm (0.015 – 0.023 in.)

Limit : 0.2 mm (0.008 in.)

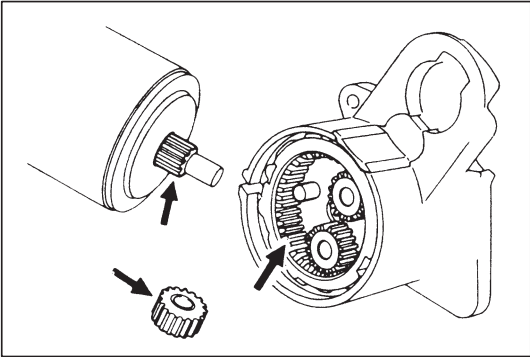
**● Ground Test**

Check commutator and armature core. If there is continuity, armature is grounded and must be replaced.



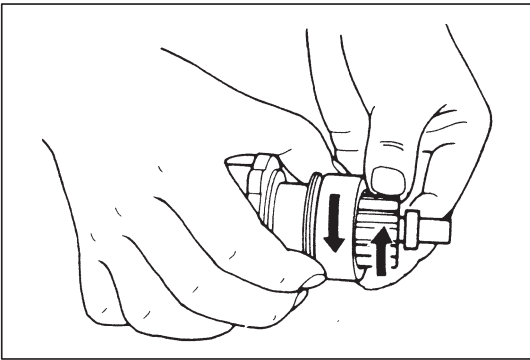
● Open Circuit Test

Check for continuity between segments. If there is no continuity at any test point, there is an open circuit and armature must be replaced.



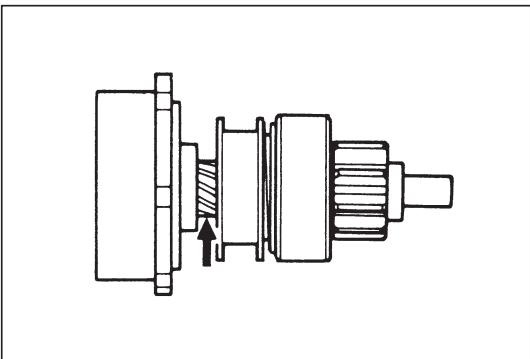
GEARS

Inspect internal gear and planetary gears for wear, damage or other abnormal conditions. Replace if necessary.



PINION AND OVER-RUNNING CLUTCH

● Inspect pinion for wear, damage or other abnormal conditions. Check that clutch locks up when turned in direction of drive and rotates smoothly in reverse direction. Replace if necessary.

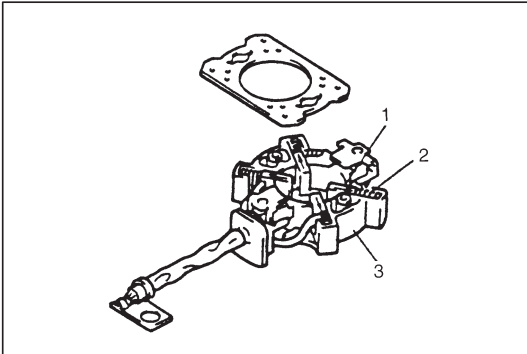


● Inspect spline teeth for wear or damage. Replace if necessary. Inspect pinion for smooth movement.

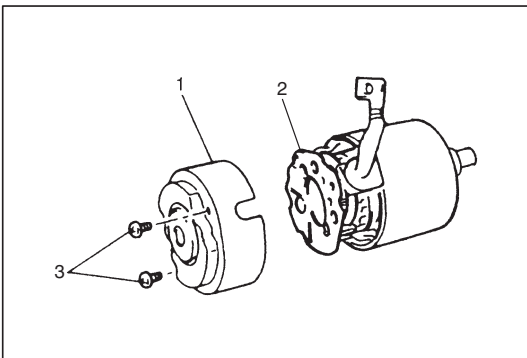
REASSEMBLY**CAUTION:**

New oilless bearing have been lubricated when they are supplied as spare parts. **DO NOT** wash with grease dissolving solvent nor lubricate them with other lubricant.

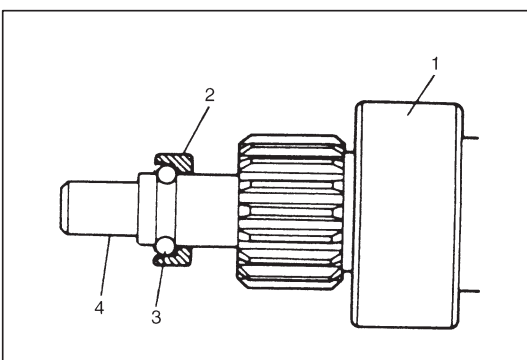
- 1) Apply grease (Refer to page 6G-5).
- 2) Install armature to yoke.



- 3) Install brushes (1) and brush springs (2) to brush holder (3).
- 4) Install brush holder to armature while pushing 4 brushes outward.



- 5) Install new rear armature shaft bush.
- 6) Install rear bracket (1) to brush holder (2).
- 7) Tighten brush holder screws (3).

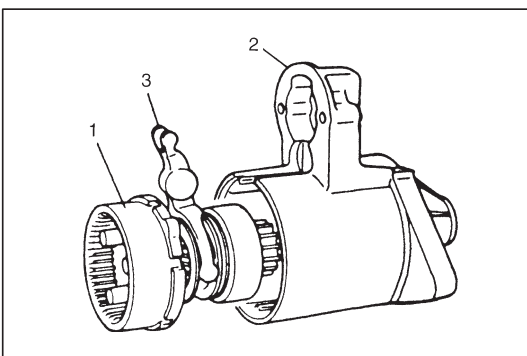


- 8) Install over-running clutch (1), pinion stop ring (2) and snap ring (3) to gear shaft (4).

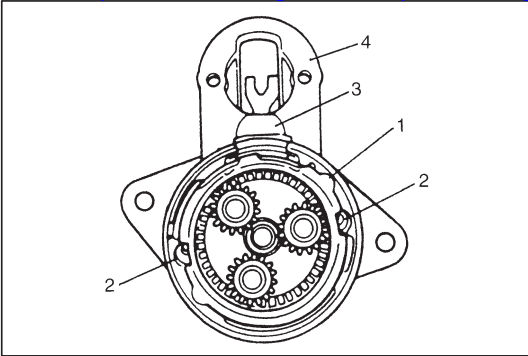
NOTE:

Care for installing direction of pinion stop ring.

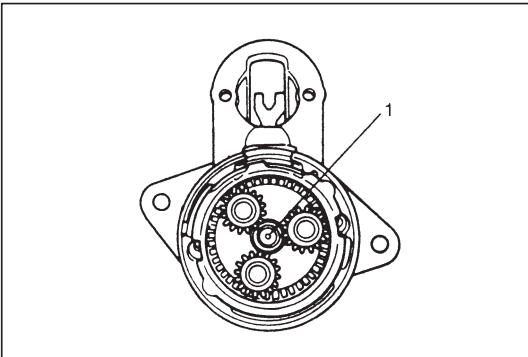
- 9) Set pinion stop ring at the position as shown.
- 10) Install new front armature shaft bush to front housing.



- 11) Insert shaft assembly (1) into front housing (2) with lever (3) positioned as shown.

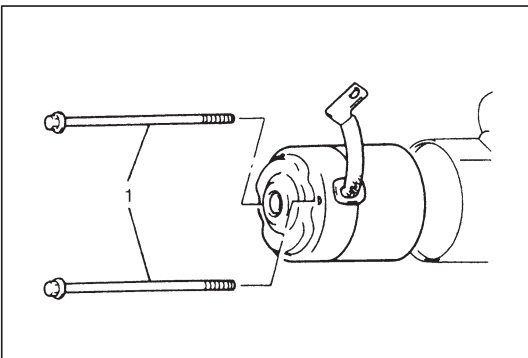


- 12) Install packing (1) so that cuts in packing align with bolt holes (2) for through bolts in front housing.
- 13) Install plate and seal rubber (3) to front housing (4).

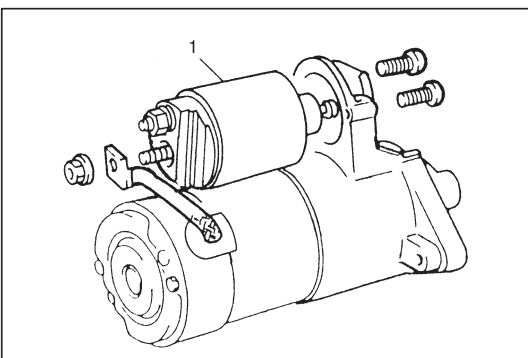


- 14) Apply grease to ball (1) and install ball into shaft hole.

Grease: 99000-25010



- 15) Install yoke, armature, brush holder and rear bracket to front housing by aligning match marks provided before removal.
- 16) Tighten through bolts (1).



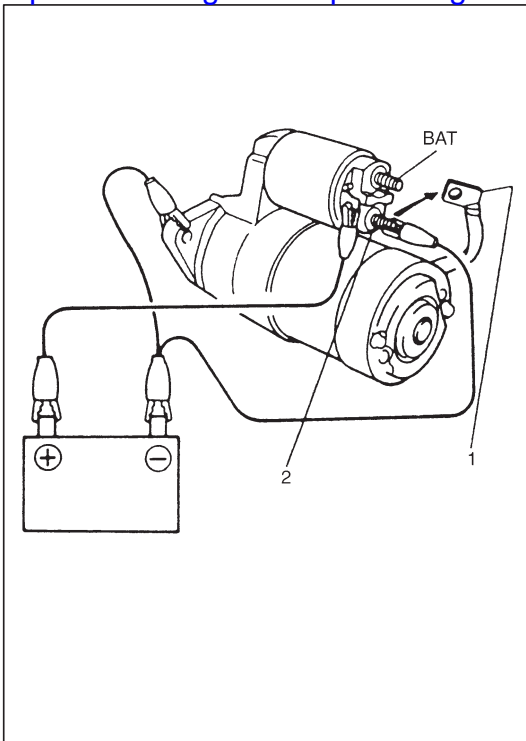
- 17) Install magnetic switch assembly (1) and connect wire (switch to motor) to switch terminal.
- 18) Upon completion of assembly, carry out PERFORMANCE TEST. (Refer to page 6G-15.)

PERFORMANCE TEST**WARNING:**

When performing the following test, be sure to connect the battery and the starting motor with a lead wire of the same size as the cable that was originally used there.

CAUTION:

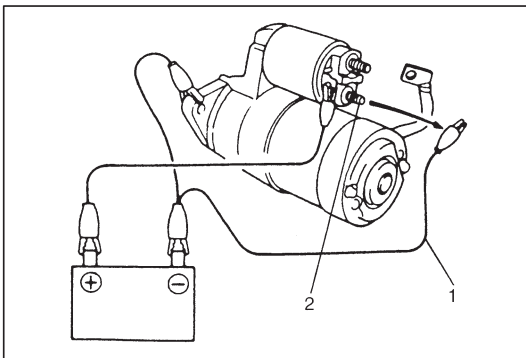
Each test must be performed within 3 – 5 seconds to avoid coil from burning.

**1) Pull-In Test**

Disconnect lead wire (1) from terminal 'M' (2), and connect battery to magnetic switch as shown.

Check the plunger and pinion (over-running clutch) move outward.

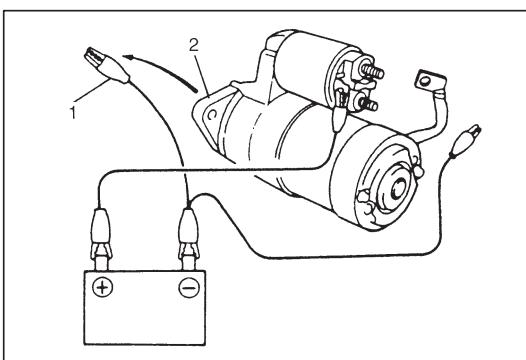
If plunger and pinion (over-running clutch) don't move, replace magnetic switch.

**2) Hold-In Test**

While connected as above with plunger out, disconnect negative lead (1) from terminal 'M' (2).

Check that plunger and pinion remain out.

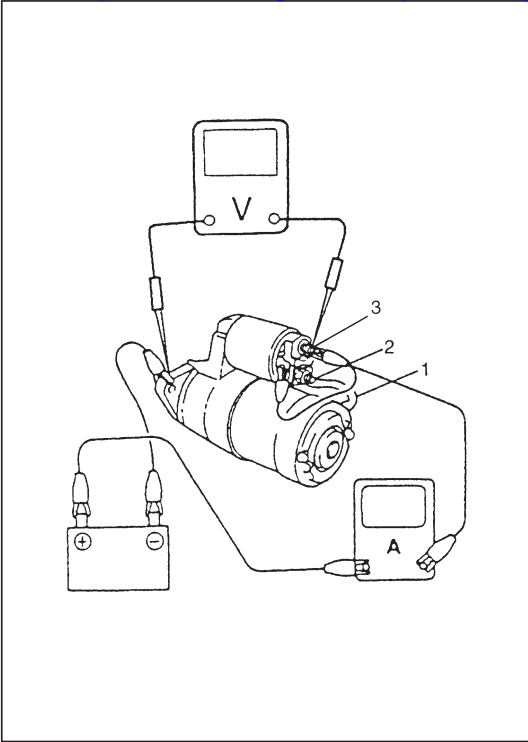
If plunger and pinion return inward, replace magnetic switch.

**3) Plunger and Pinion Return Test**

Disconnect negative lead (1) from starting motor body (2).

Check that plunger and pinion return inward.

If plunger and pinion don't return, disassemble and inspect starting motor.

**4) No-Load Performance Test**

- a) Connect motor lead wire (switch to motor) (1) to terminal 'M' (2).
- b) Connect battery and ammeter to starter as shown.
- c) Check that starter rotates smoothly and steadily with pinion moving out. Check that ammeter indicates specified current.

Specified current: 90 A MAX. at 11 V (between terminal 'B' (3) and starter body)

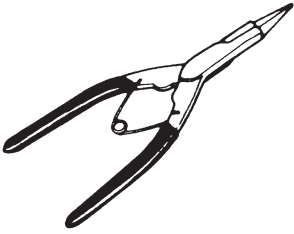
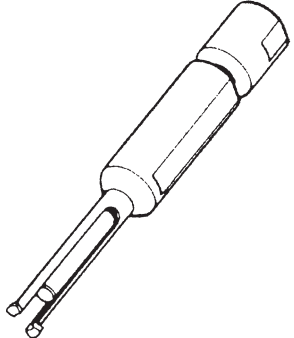
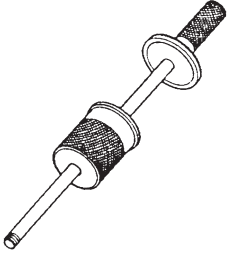
SPECIFICATIONS

Voltage		12 volts	
Output		1.2 kW	
Rating		30 seconds	
Direction of rotation		Clockwise as viewed from pinion side	
Brush length		12.3 mm (0.44 in.)	
Number of pinion teeth		8	
Performance		Condition	Guarantee
Around at 20 °C (68 °F)	No load characteristic	11.0 V	90 A maximum 2,500 rpm minimum
	Load characteristic	7.5 V 300 A	10.5 N·m (1.05 kg-m, 7.59 lb-ft) minimum 880 rpm minimum
	Locked characteristic	4.0 V	760 A maximum 19.5 N·m (1.95 kg-m, 14.1 lb-ft) minimum
	Magnetic switch operating voltage		8 volts maximum

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> ● Front and rear bush ● Plunger ● Pinion drive lever ● Internal gear ● Planetary carrier shaft ● Planetary gear ● Ball ● Armature

SPECIAL TOOLS

 <p>09900-06107 Snap ring pliers (Opening type)</p>	 <p>09921-20200 Bearing remover</p>	 <p>09930-30102 Sliding shaft</p>
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SECTION 6G1

CRANKING SYSTEM

(0.9 kW No-Reduction Type)

NOTE:

Starting motor vary depending on specifications, etc. Therefore, be sure to check model and specification of the vehicle being serviced before replacing parts.

CONTENTS

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SPECIAL TOOLS	6G1-13	

GENERAL DESCRIPTION

CRANKING CIRCUIT

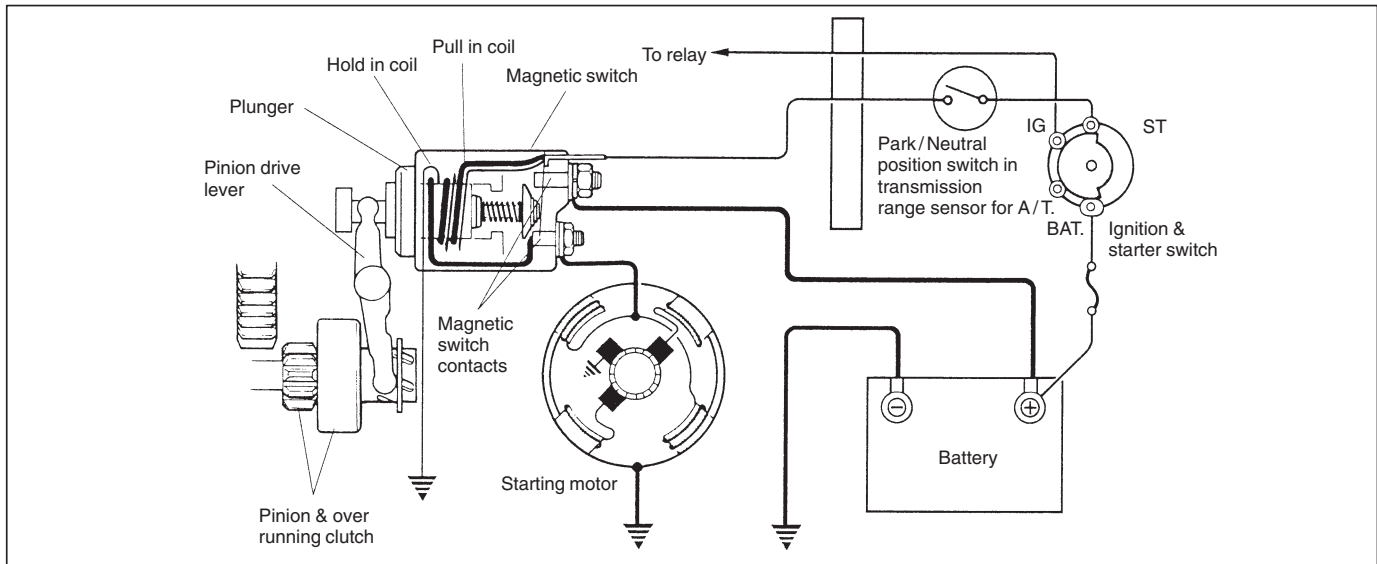
The cranking circuit consists of the battery, starting motor, ignition switch, and related electrical wiring. These components are connected electrically as shown below.

Only the starting motor will be covered in this section.

STARTING MOTOR CIRCUIT

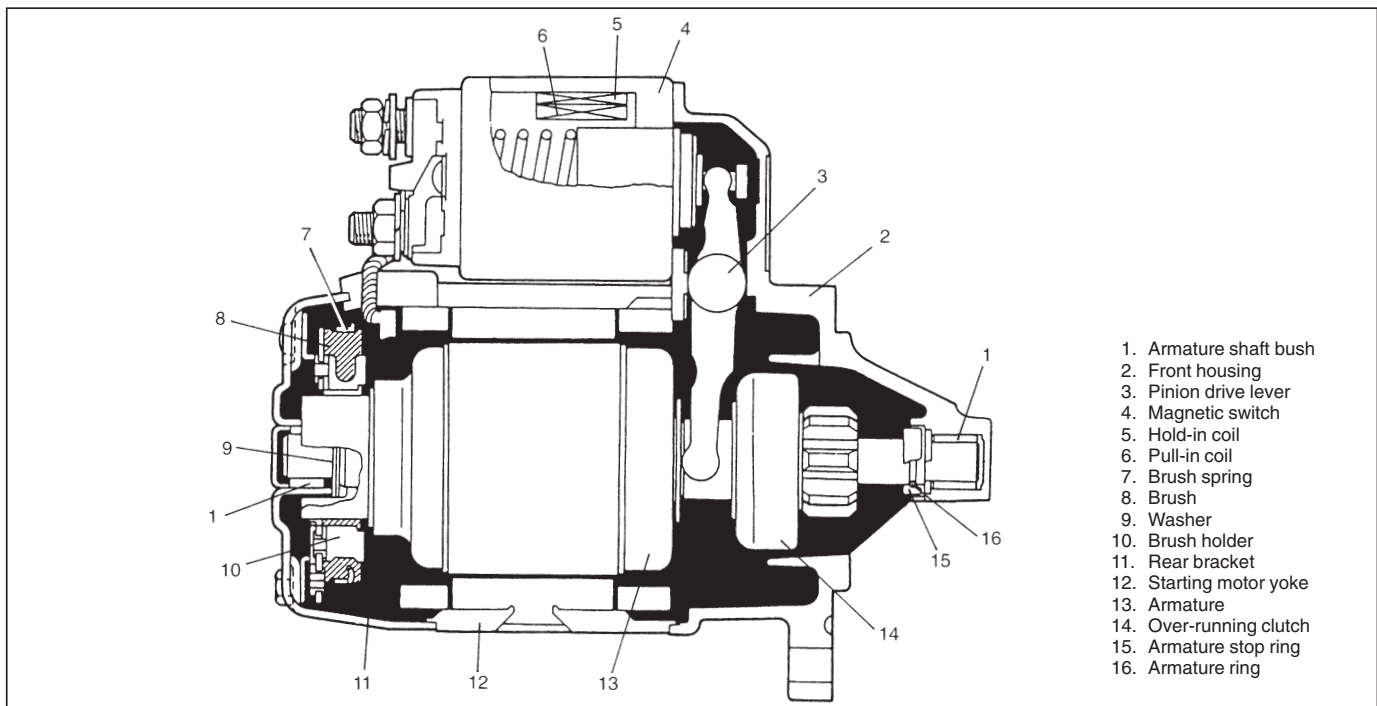
In the circuit shown in the following, the magnetic switch coils are magnetized when the ignition switch is closed. The resulting plunger and pinion drive lever movement causes the pinion to engage the engine flywheel gear and the magnetic switch main contacts to close, and cranking takes place.

When the engine starts, the pinion over-running clutch protects the armature from excessive speed until the switch is opened, at which time the return spring causes the pinion to disengage.



STARTING MOTOR

The starting motor consist of the following parts.



DIAGNOSIS

Possible symptoms due to starting system trouble would be as follows:

- Starting motor does not run (or runs slowly)
- Starting motor runs but fails to crank engine
- Abnormal noise is heard
- Starting motor does not stop running

Proper diagnosis must be made to determine exactly where the cause of each trouble lies in battery, wiring harness, (including ignition and starter switch), starting motor or engine.

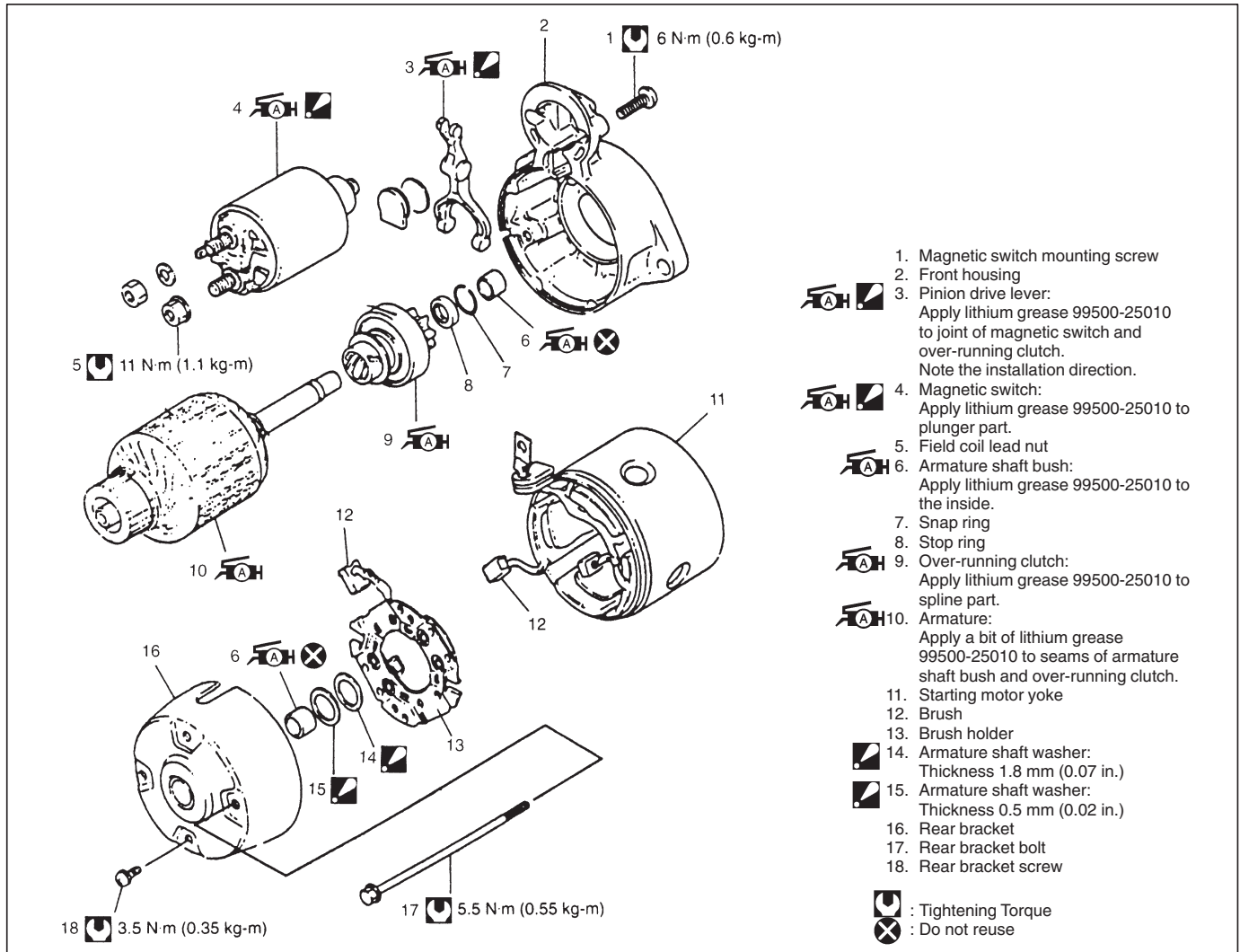
Do not remove motor just because starting motor does not run. Check the following items and narrow down scope of possible causes.

- Condition of trouble
- Tightness of battery terminals (including ground cable connection on engine side) and starting motor terminals
- Discharge of battery
- Mounting of starting motor

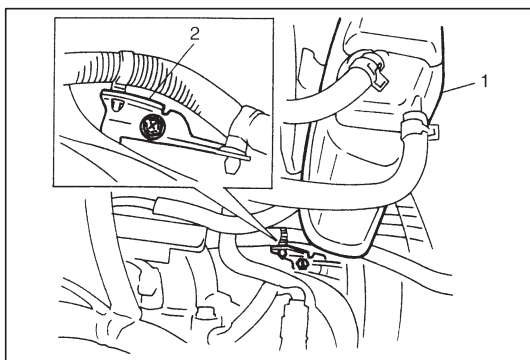
Condition	Possible Cause	Correction
Motor not running	No operating sound of magnetic switch <ul style="list-style-type: none"> • Battery run down • Battery voltage too low due to battery deterioration • Poor contact in battery terminal connection • Loose grounding cable connection • Fuse set loose or blown off • Poor contacting action of ignition switch and magnetic switch • Lead wire coupler loose in place • Open-circuit between ignition switch and magnetic switch • Open-circuit in pull-in coil • Poor sliding of plunger and/or pinion • Shift lever switch is not in P or N, or not adjusted (A/T) • Brushes are seating poorly or worn down 	Recharge battery. Replace battery. Retighten or replace. Retighten. Tighten or replace. Replace. Retighten. Repair. Replace magnetic switch. Repair. Shift in P or N, or adjust switch. Repair or replace.
	Operating sound of magnetic switch heard <ul style="list-style-type: none"> • Battery run down • Battery voltage too low due to battery deterioration • Loose battery cable connections • Burnt main contact point, or poor contacting action of magnetic switch • Brushes are seating poorly or worn down • Weakened brush spring • Burnt commutator • Grounding of field coil • Layer short-circuit of armature • Crankshaft rotation obstructed 	Recharge battery. Replace battery. Retighten. Replace magnetic switch. Repair or replace. Replace. Replace armature. Repair. Replace. Repair.

Condition	Possible Cause	Correction
Starting motor running but too slow (small torque)	If battery and wiring are satisfactory, inspect starting motor <ul style="list-style-type: none"> ● Insufficient contact of magnetic switch main contacts ● Layer short-circuit of armature ● Disconnected, burnt or worn commutator ● Grounding of field coil ● Worn brushes ● Weakened brush springs ● Burnt or abnormally worn end bush 	Replace magnetic switch. Replace. Replace. Repair. Replace brush. Replace spring. Replace bush.
Starting motor running, but not cranking engine	<ul style="list-style-type: none"> ● Worn pinion tip ● Poor sliding of over-running clutch ● Over-running clutch slipping ● Worn teeth of ring gear 	Replace over-running clutch. Repair. Replace over-running clutch. Replace flywheel (M/T) or drive plate (A/T).
Noise	<ul style="list-style-type: none"> ● Abnormally worn bush ● Worn pinion or worn teeth of ring gear ● Poor sliding of pinion (failure in return movement) ● Lack of grease in each part 	Replace bush. Replace over-running clutch or flywheel (M/T), drive plate (A/T). Repair or replace. Lubricate.
Starting motor does not stop running	<ul style="list-style-type: none"> ● Fused contact points of magnetic switch ● Short-circuit between turns of magnetic switch coil (layer short-circuit) ● Failure of returning action in ignition switch 	Replace magnetic switch. Replace magnetic switch. Replace.

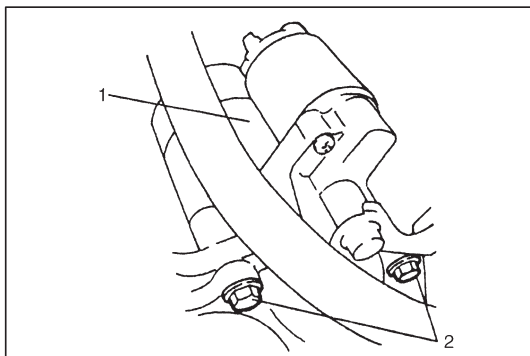
UNIT REPAIR OVERHAUL



DISMOUNTING AND REMOUNTING



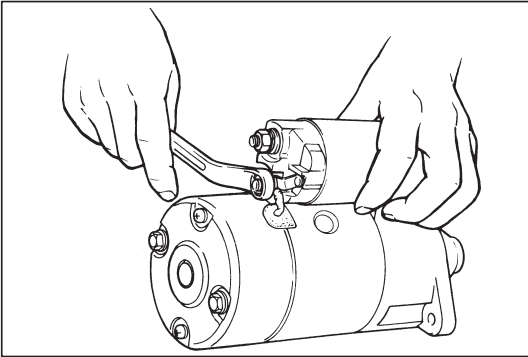
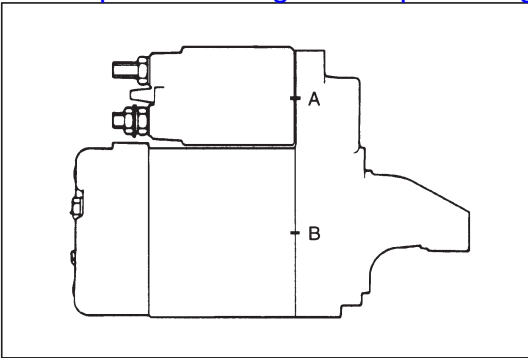
- 1) Disconnect positive (+) and negative (-) battery lead cables at battery.
- 2) Remove battery and battery tray.
- 3) Disconnect EVAP canister (1) and remove cable clamp (2).



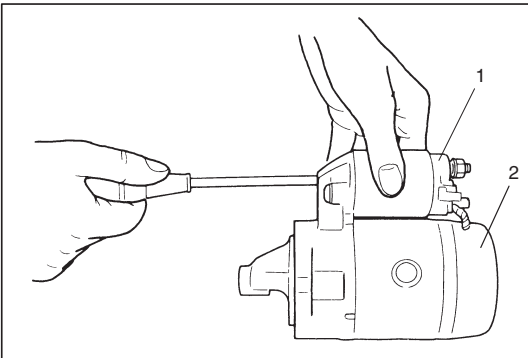
- 4) Disconnect magnetic switch lead wire and battery cable from starting motor (1).
- 5) Remove two starting motor mount bolts (2).
- 6) Remove starting motor.
- 7) To install, reverse the above procedure.

DISASSEMBLY**NOTE:**

- Before disassembling starting motor, be sure to put match marks at two locations (A and B) as shown in left figure so that any possible mistakes can be avoided.
- Do not clamp yoke in a vise or strike it with a hammer during disassembling and reassembling.



- 1) Remove nut securing the end of field coil lead to terminal on the head of magnetic switch.

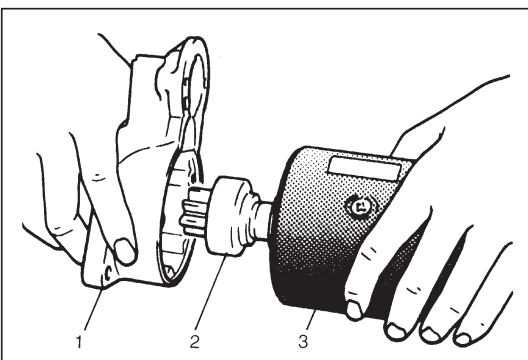


- 2) Take off magnetic switch (1) by removing 2 mounting screws.

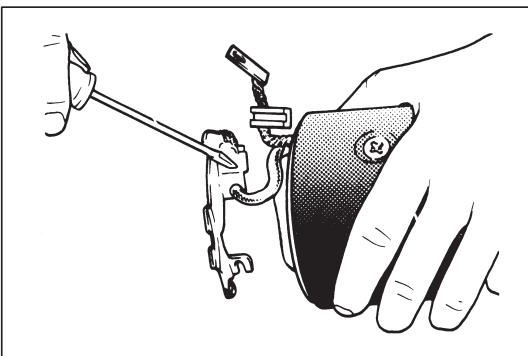
NOTE:

Don't disassemble this switch. If defective, replace as a complete assembly.

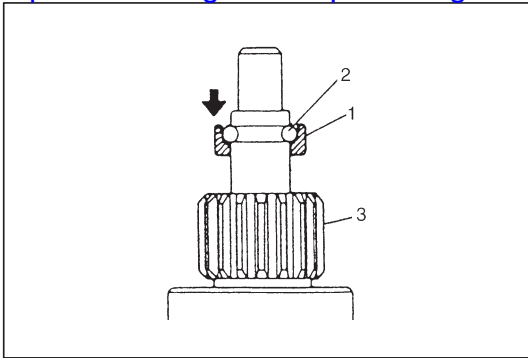
- 3) Loosen 2 bolts and 2 screws to remove rear bracket (2).



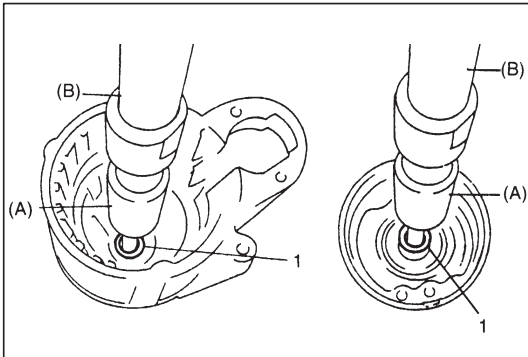
- 4) Separate front housing (1) and armature (2) from yoke (3).



- 5) Draw brushes out of brush holder.



- 6) Loosen pinion stop ring (1) fixed by snap ring (2).
- 7) Remove snap ring, and then pull out pinion stop ring and over-running clutch (3).

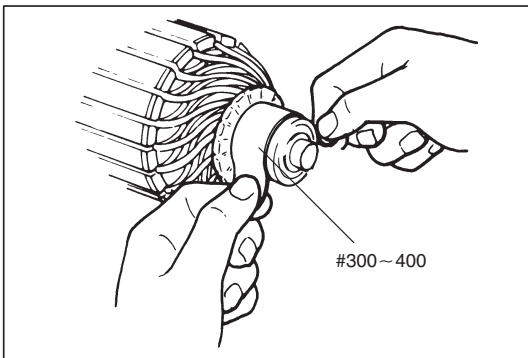


- 8) Remove armature shaft bushes (1) using special tools.

Special Tool

(A): 09921-20200

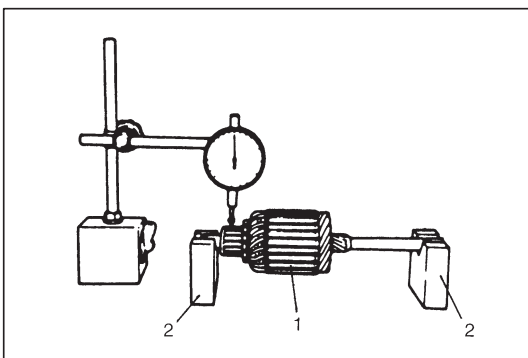
(B): 09930-30102



INSPECTION

ARMATURE

- Inspect commutator for dirt or burn. Correct with sandpaper or lathe, if necessary.



- Check commutator for uneven wear with armature (1) supported on V blocks (2). If deflection of dial gauge pointer exceeds limit, repair or replace.

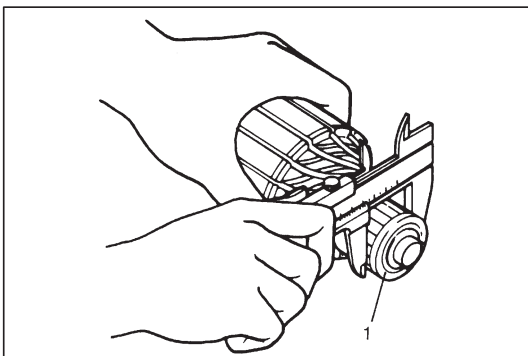
NOTE:

Below specification presupposes that armature is free from bend. Bent shaft must be replaced.

Commutator out of round

Standard: 0.05 mm (0.0019 in.) or less

Limit: 0.4 mm (0.015 in.)

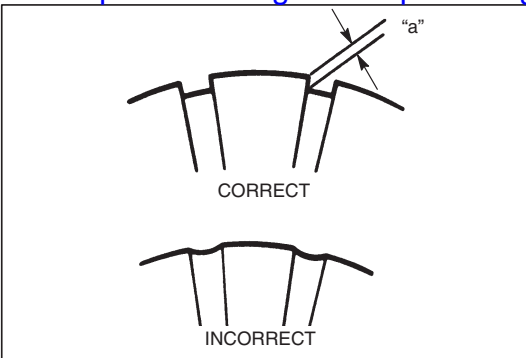


- Inspect commutator (1) for wear. If diameter is below limit, replace armature.

Commutator outside reference diameter

Standard: 32.0 mm (1.26 in.)

Limit: 31.4 mm (1.24 in.)

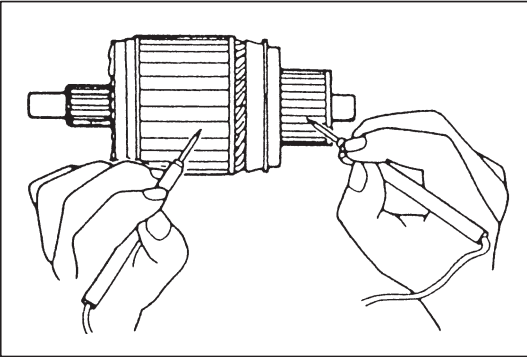


- Inspect commutator for wear or abnormal limit. Replace if necessary.

Commutator insulator reference depth "a"

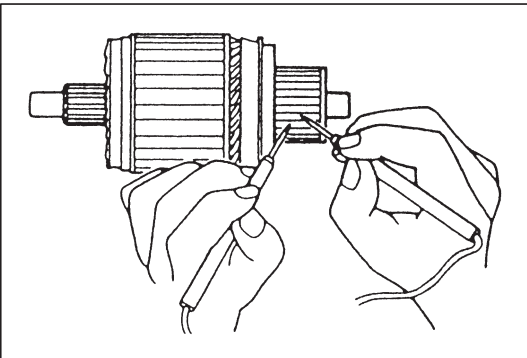
Standard: 0.4 – 0.6 mm (0.015 – 0.023 in.)

Limit: 0.2 mm (0.0078 in.)



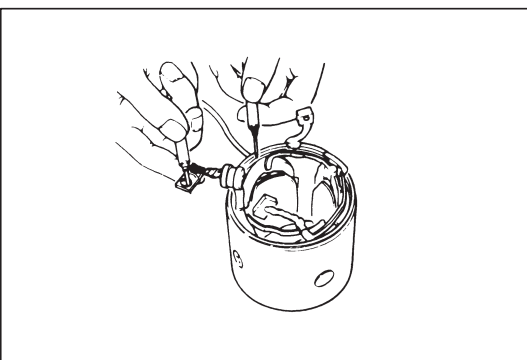
● Ground test

Check commutator and armature core. If there is continuity, armature is grounded and must be replaced.



● Open circuit test

Check for continuity between segments. If there is no continuity at any point, there is an open circuit and armature must be replaced.



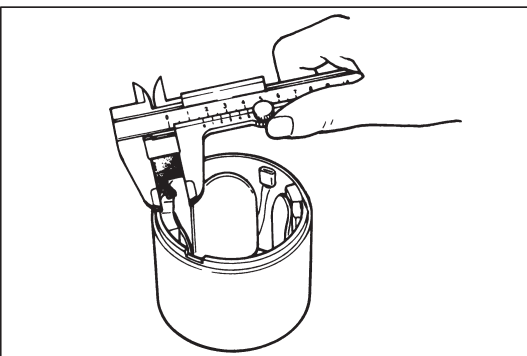
FIELD COIL

Ground test

Check continuity between brush and bare surface.

If there is continuity, field windings are grounded.

The yoke assembly must be replaced.



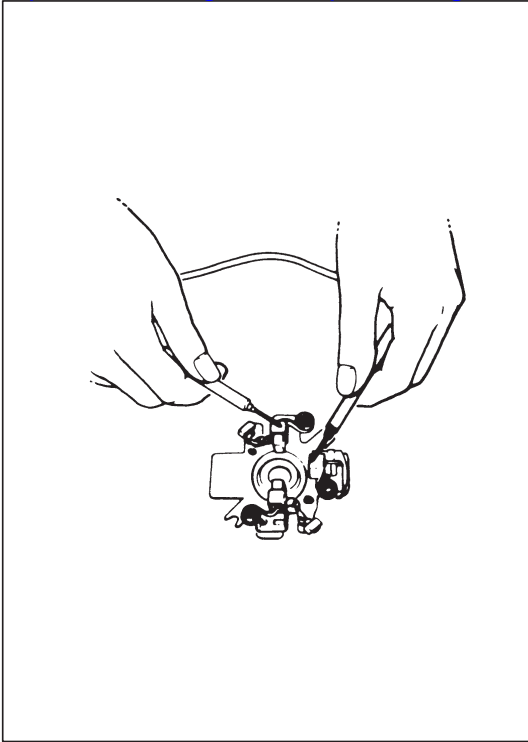
BRUSH

Check brushes for wear. If below limit, replace brush.

Brush length

Standard: 17.0 mm (0.67 in.)

Limit: 11.5 mm (0.45 in.)



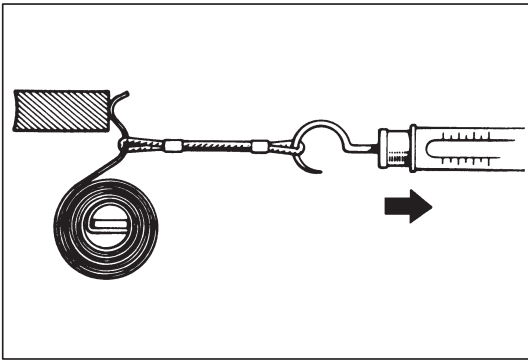
BRUSH HOLDER

Check movement of brush in brush holder. If brush movement within brush holder is sluggish, check brush holder for distortion and sliding faces for correct contamination.

Clean or correct as necessary.

Clean for continuity across insulated brush holder (positive side) and grounded brush holder (negative side).

If continuity exists, brush holder is grounded due to defective insulation and should be replaced.



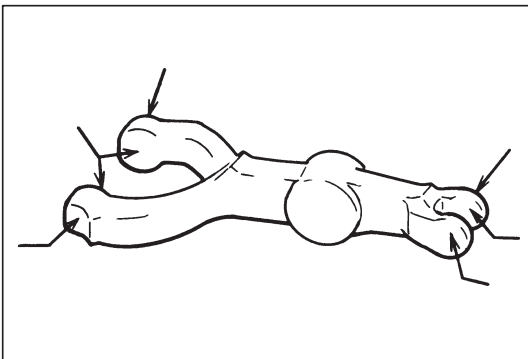
SPRING

Inspect brush spring for wear, damage or other abnormal conditions. Replace if necessary.

Brush spring tension

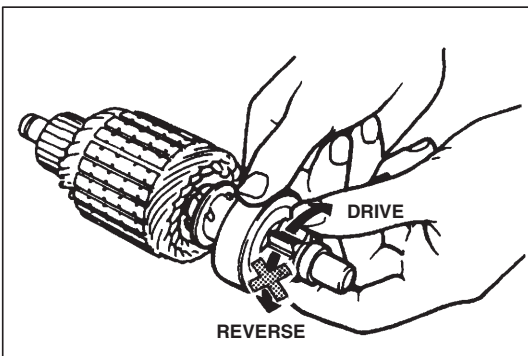
Standard: 1.95 kg (4.3 lb)

Limit: 0.9 kg (1.98 lb)



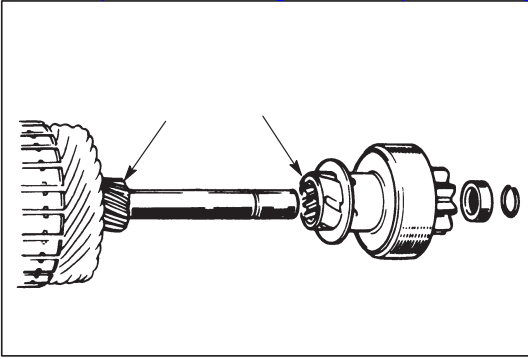
DRIVE LEVER

Inspect drive lever for wear. Replace if necessary.

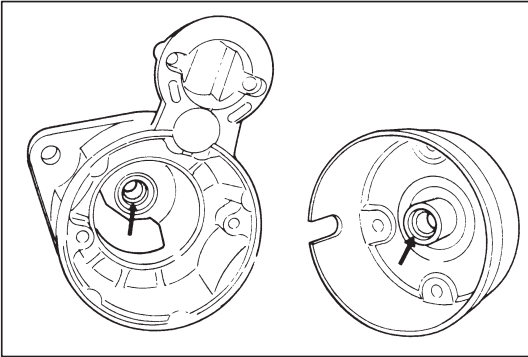


PINION AND OVER-RUNNING CLUTCH

- Inspect pinion for wear, damage or other abnormal conditions. Check that clutch locks up when turned in direction of drive and rotates smoothly in reverse direction. Replace if necessary.

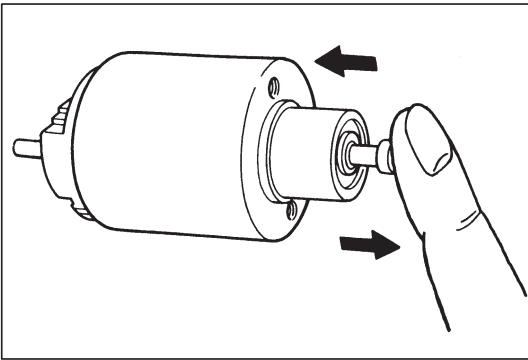


- Inspect spline teeth for wear or damage. Replace if necessary. Inspect pinion for smooth movement.



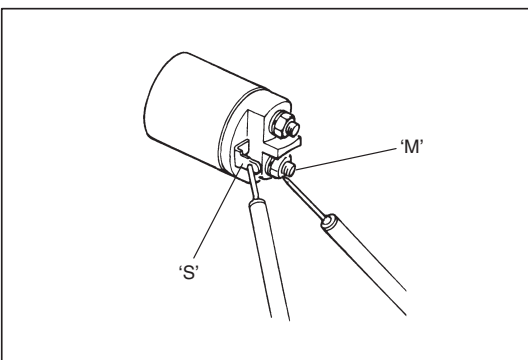
ARMATURE SHAFT BUSH

Inspect bushes for wear or damage. Replace if necessary.



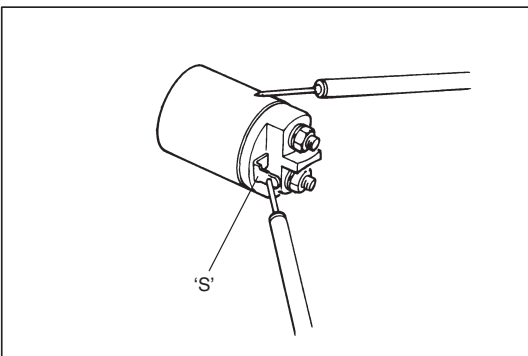
MAGNETIC SWITCH

Push in plunger and release it. Plunger should return quickly to its original position. Replace if necessary.



● Pull-in coil open circuit test

Check for continuity across magnetic switch 'S' terminal and 'M' terminal. If no continuity exists, coil is open and should be replaced.



● Hold-in coil open circuit test

Check for continuity across magnetic switch 'S' terminal and coil case. If no continuity exists, coil is open and should be replaced.

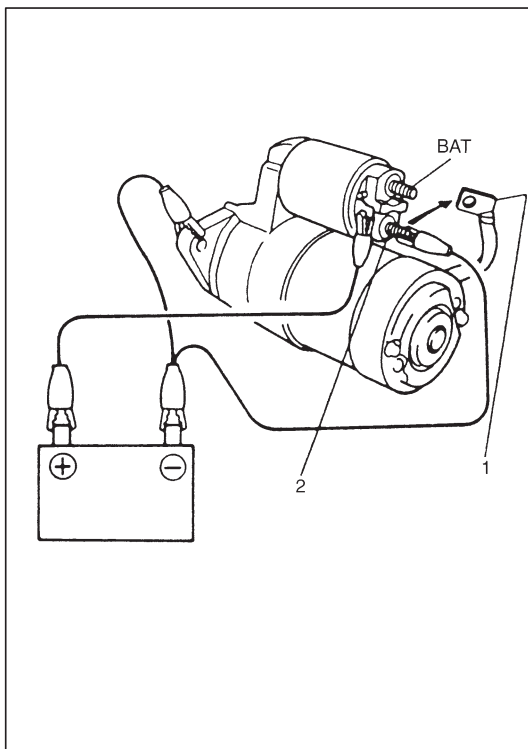
REASSEMBLY

Reverse disassembly procedure for reassembly noting the following.

- Apply grease to current part referring to figure in page 6G1-5.
- Install pinion drive lever into drive housing referring to page 6G1-5 especially for its direction.
- Do not reuse armature shaft bushes. If replacement, install new ones.
- Tighten bolts and nuts to specified torque referring to page 6G1-5.
- Pay attention to an installation location of armature shaft washers referring to page 6G1-5.
- Upon completion of assembly, carry out "PERFORMANCE TEST" in this section.
- Tighten battery cable nut to specified torque.

Tightening Torque

11 N·m (1.1 kg·m, 8.0 lb·ft)



PERFORMANCE TEST

WARNING:

When performing the following test, be sure to connect the battery and the starting motor with a lead wire of the same size as the cable that was originally used there.

CAUTION:

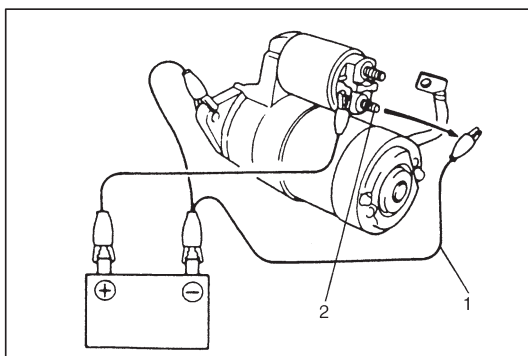
Each test must be performed within 3 – 5 seconds to avoid coil from burning.

1) Pull-In Test

Disconnect lead wire (1) from terminal 'M' (2), and connect battery to magnetic switch as shown.

Check the plunger and pinion (over-running clutch) move outward.

If plunger and pinion (over-running clutch) don't move, replace magnetic switch.

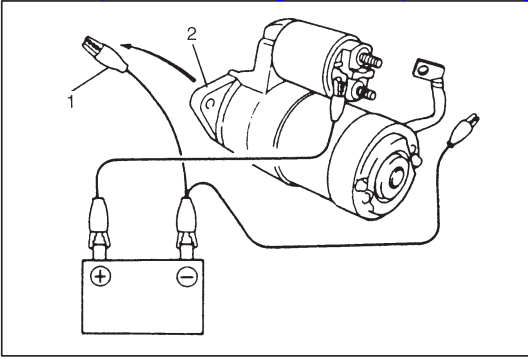


2) Hold-In Test

While connected as above with plunger out, disconnect negative lead (1) from terminal 'M' (2).

Check that plunger and pinion remain out.

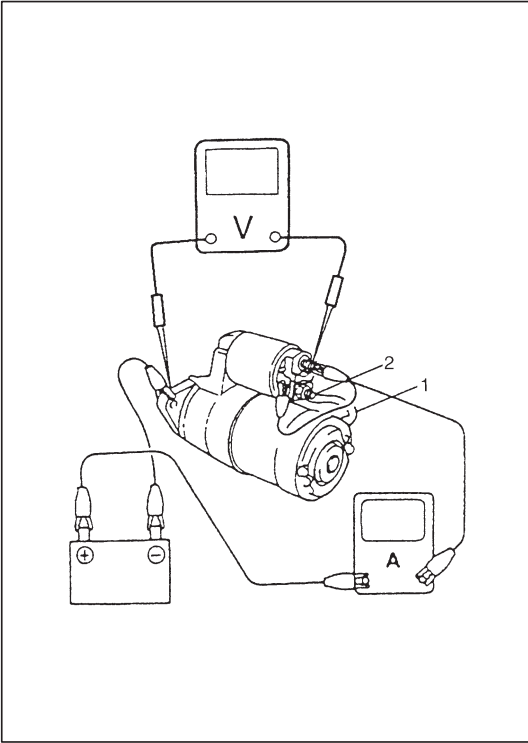
If plunger and pinion return inward, replace magnetic switch.

**3) Plunger and Pinion Return Test**

Disconnect negative lead (1) from switch body (2).

Check that plunger and pinion return inward.

If plunger and pinion don't return, disassemble and inspect starting motor.

**4) No-Load Performance Test**

a) Connect motor lead wire (switch to motor) (1) to terminal 'M' (2).

b) Connect battery and ammeter to starter as shown.

c) Check that starter rotates smoothly and steadily with pinion moving out. Check that ammeter indicates specified current.

Specified current: Less than 53 A MAX at 11.5 V

(between terminal 'B' and starter body)

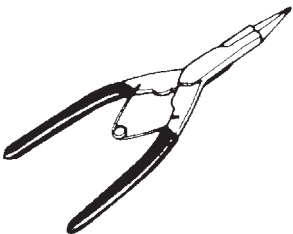
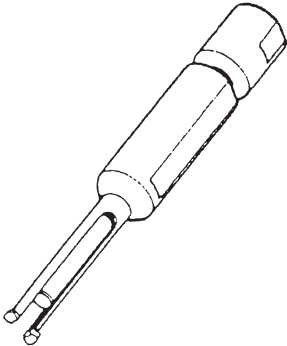
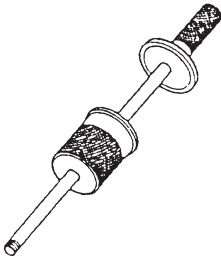
SPECIFICATIONS

Voltage		12 volts	
Output		0.8 kW	
Rating		30 seconds	
Direction of rotation		Clockwise as viewed from pinion side	
Brush length		17.0 mm (0.67 in.)	
Number of pinion teeth		8	
Performance		Condition	Guarantee
Around at 20°C (68°F)	No load characteristic	11.5V	53 A maximum 6000 rpm minimum
	Load characteristic	9 V 150 A	2.8 N·m (0.28 kg-m, 2.0 lb-ft) minimum 2000 rpm minimum
	Locked characteristic	5 V	360 A maximum 6.86 N·m (0.7 kg-m, 5.1 lb-ft) minimum
	Magnetic switch operating voltage		8 volts maximum

REQUIRED SERVICE MATERIAL

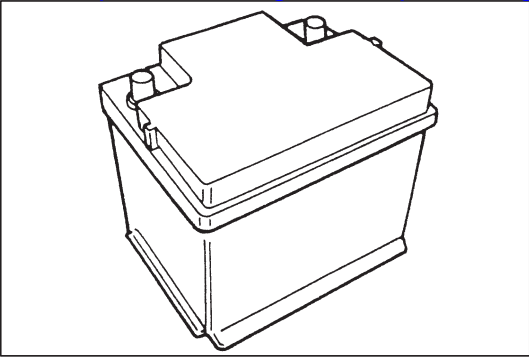
MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> • Armature shaft. • Over-running clutch. • Armature shaft bushes. • Drive lever.

SPECIAL TOOLS

 <p>09900-06107 Snap ring pliers (Opening type)</p>	 <p>09921-20200 Bearing remover</p>	 <p>09930-30102 Sliding shaft</p>
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SECTION 6H**CHARGING SYSTEM****CONTENTS**

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BATTERY

GENERAL DESCRIPTION

The battery has three major functions in the electrical system.

- It is a source of electrical energy for cranking the engine.
- It acts as a voltage stabilizer for the electrical system.
- It can, for a limited time, provide energy when the electrical load exceeds the output of the generator.

CARRIER AND HOLD-DOWN

The battery carrier should be in good condition so that it will support the battery securely and keep it level.

Before installing the battery, the battery carrier and hold-down clamp should be clean and free from corrosion and make certain there are no parts in carrier.

To prevent the battery from shaking in its carrier, the hold-down bolts should be tight enough but not over-tightened.

ELECTROLYTE FREEZING

The freezing point of electrolyte depends on its specific gravity. Since freezing may ruin a battery, it should be protected against freezing by keeping it in a fully charged condition. If a battery is frozen accidentally, it should not be charged until it is warmed.

SULFATION

If the battery is allowed to stand for a long period in discharged condition, the lead sulfate becomes converted into a hard, crystalline substance, which will not easily turn back to the active material again during the subsequent recharging. "Sulfation" means the result as well as the process of that reaction.

Such a battery can be revived by very slow charging and may be restored to usable condition but its capacity is lower than before.

CARE OF BATTERY

WARNING:

- **Never expose battery to open flame or electric spark because of battery generate gas which is flammable and explosive.**
- **Do not allow battery fluid to contact eyes, skin, fabrics, or painted surfaces as fluid is a corrosive acid. Flush any contacted area with water immediately and thoroughly.**
- **Batteries should always be kept out of reach of children.**

1) The battery is a very reliable component, but needs periodical attentions.

- Keep the battery carrier clean
- Prevent rust formation on the terminal posts
- Keep the electrolyte up to the upper level uniformly in all cells.

When keeping battery on vehicle over a long period of time, follow instructions given below.

- Weekly, start the engine and run it until it reaches normal operating temperature with engine speed of 2000 to 3000 rpm. Make sure all electric switches are off before storing the vehicle.
- Recharge the battery twice a month to prevent it from discharging excessively. This is especially important when ambient temperature is low.

The battery discharges even when it is not used, while vehicles are being stored. Battery electrolyte can freeze and battery case can crack at cold ambient condition if battery is not properly charged.

2) Keep the battery cable connections clean.

The cable connections, particularly at the positive (+) terminal post, tend to become corroded. The product of corrosion, or rust, on the mating faces of conductors resists the flow of current.

Clean the terminals and fittings periodically to ensure good metal-to-metal contact, and grease the connections after each cleaning to protect them against rusting.

3) Be always in the know as to the state of charge of the battery.

The simplest way to tell the state of charge is to carry out a hydrometer test. The hydrometer is an instrument for measuring the specific gravity of the battery electrolyte. The specific gravity of the electrolyte is indicative of the state of charge. Refer to "DIAGNOSIS" of BATTERY in this section.

DIAGNOSIS

COMMON CAUSES OF FAILURE

A battery is not designed to last indefinitely; however, with proper care, it will provide many years of service. If the battery performs satisfactorily during test but fails to operate properly for no apparent reason, the following are some factors that may point to the cause of trouble:

- Accessories left on overnight or for an extended period without the generator operating.
- Slow average driving speeds for short periods.
- Electrical load exceeding generator output particularly with addition of aftermarket equipment.
- Defects in charging system such as high resistance, slipping drive belt, loose generator output terminal, faulty generator or voltage regulator. Refer to "GENERATOR" in this "DIAGNOSIS" section.
- Battery abuse, including failure to keep battery cable terminals clean and tight or loose battery hold down.
- Mechanical problems in electrical system such as shorted or pinched wires.

VISUAL INSPECTION

Check for obvious damage, such as cracked or broken case or cover, that could permit loss of electrolyte. If obvious damage is noted, replace battery. Determine cause of damage and correct as needed.

HYDROMETER TEST

The direct method of checking the battery for state of charge is to carry out a high rate discharge test, which involves a special precise voltmeter and an expensive instrument used in the service shops, but not recommendable to the user of the vehicle.

At 20°C of battery temperature (electrolyte temperature):

- The battery is in FULLY CHARGED STATE if the electrolyte specific gravity is 1.280.
- The battery is in HALF CHARGED STATE if the specific gravity is 1.220.
- The battery is in NEARLY DISCHARGED STATE if the specific gravity is 1.150 and is in danger of freezing.

As the specific gravity varies with the temperature, if battery temperature is not at 20°C (68°F), you have to correct your specific gravity reading (taken with your hydrometer) to the value at 20°C (68°F) and apply the corrected specific gravity value to the three-point guide stated value.

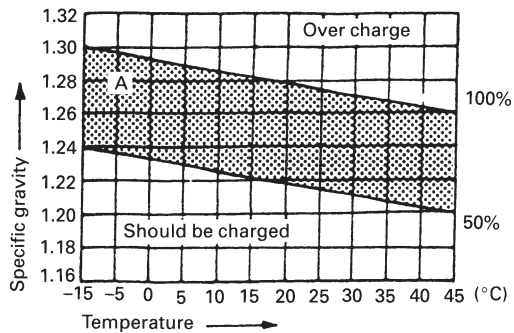
For the manner of correction, refer to the graph showing the relation between specific gravity value and temperature at the left.

HOW TO USE THE TEMPERATURE-CORRECTED STATE-OF-CHARGE GRAPH

Suppose your specific gravity reading is 1.28 and the battery temperature is -5°C (23°F). Locate the intersection of the -5°C line and the 1.28 specific gravity line.

The intersection is within the "A" zone (shaded area in the graph) and that means CHARGED STATE.

To know how much the battery is charged, draw a line parallel to the zone demarcation line and extend it to the right till it meets with the percentage scale. In the present example, the line meets at about 85% point on the percentage scale. Therefore, the battery is charged up to the 85% level.



UNIT REPAIR OVERHAUL

JUMP STARTING IN CASE OF EMERGENCY WITH AUXILIARY (BOOSTER) BATTERY

CAUTION:

If vehicle is manual transmission model and has a catalytic converter, do not push or tow it to start. Damage to its emission system and/or to other parts may result.

Both booster and discharged battery should be treated carefully when using jumper cables. Follow procedure outlined below, being careful not to cause sparks.

WARNING:

- Departure from these conditions or procedure described below could result in:
 - i) Serious personal injury (particularly to eyes) or property damage from such causes as battery explosion, battery acid, or electrical burns.
 - ii) Damage to electronic components of either vehicle.
- Remove rings, watches, and other jewelry. Wear approved eye protection.
- Be careful so that metal tools or jumper cables do not contact positive battery terminal (or metal in contact with it) and any other metal on vehicle, because a short circuit could occur.

- 1) Set parking brake and place automatic transmission in PARK (NEUTRAL on manual transmission). Turn off ignition, turn off lights and all other electrical loads.
- 2) Check electrolyte level. If it is below low level line, add distilled water.
- 3) Attach end of one jumper cable to positive terminal of booster battery and the other end of the same cable to positive terminal of discharged battery (Use 12-volt battery only to jump start engine).
- 4) Attach one end of the remaining negative cable to negative terminal of booster battery, and the other end to a solid engine ground (such as exhaust manifold) at least 45 cm (18 in.) away from battery of vehicle being started.

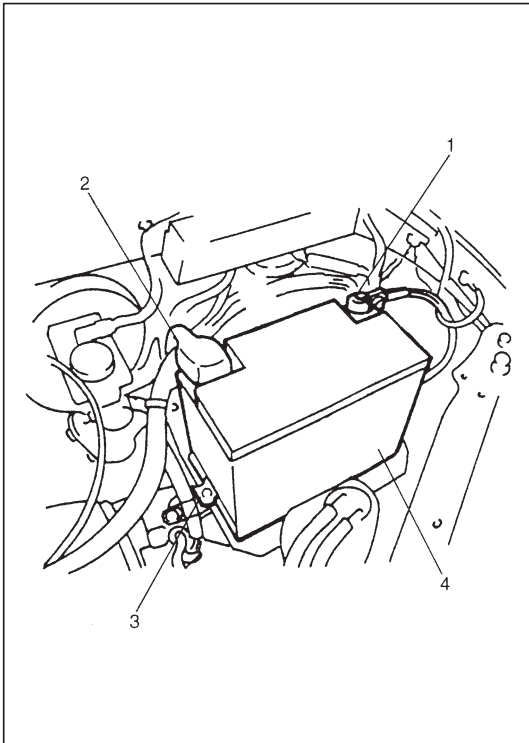
WARNING:

Do not connect negative cable directly to negative terminal of dead battery.

- 5) Start engine of vehicle with booster battery and turn off electrical accessories. Then Start engine of the vehicle with discharged battery.
- 6) Disconnect jumper cables in the exact reverse order.

CAUTION:

When jump starting engine with charging equipment, be sure equipment used is 12-volt and negative ground. Do not use 24-volt charging equipment. Using such equipment can cause serious damage to electrical system or electronic parts.

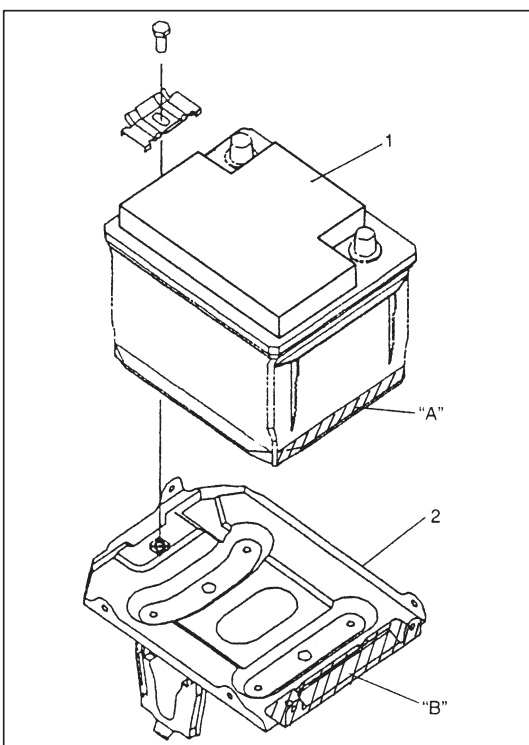
**REMOVAL**

- 1) Disconnect negative cable (1).
- 2) Disconnect positive cable (2).
- 3) Remove battery band (3).
- 4) Remove battery (4).

HANDLING

When handling battery, the following safety precautions should be followed:

- Hydrogen gas is produced by battery. A flame or spark near battery may cause the gas to ignite.
- Battery fluid is highly acidic. Avoid spilling on clothing or other fabric. Any spilled electrolyte should be flushed with large quantity of water and cleaned immediately.

**INSTALLATION**

Reverse removal procedure for installation, and then note the following instruction.

- Install battery (1) to battery tray (2), and then fit "A" to "B" exactly.
- Torque battery positive (+) and negative (–) cable terminal nuts to specification.

Tightening Torque

8.0 N·m (0.8 kg-m, 6.0 lb-ft)

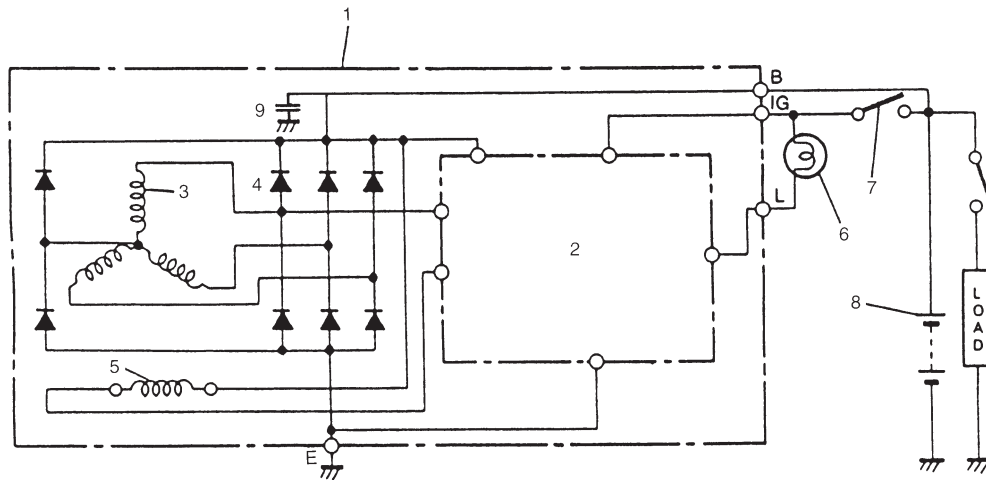
NOTE:

Check to be sure that ground cable has enough clearance to hood panel by terminal.

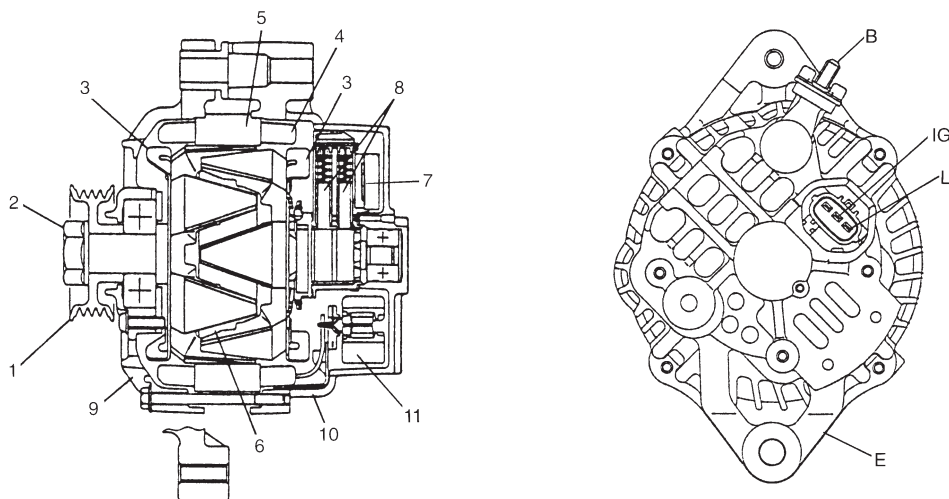
GENERATOR

GENERAL DESCRIPTION

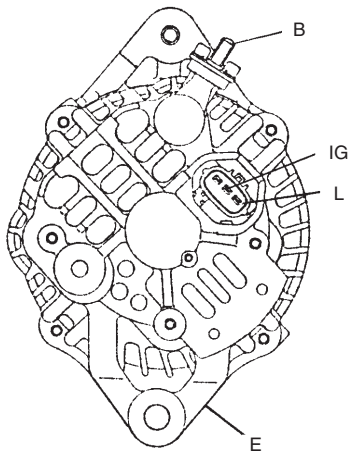
The generator is a small and high performance type with an IC regulator incorporated. The internal components are connected electrically as shown.



- | | |
|--------------------------------------|---------------------------|
| 1. Generator with regulator assembly | 6. Charge indicator light |
| 2. I.C. regulator | 7. Ignition switch |
| 3. Stator coil | 8. Battery |
| 4. Diode | 9. Condenser |
| 5. Field coil (rotor coil) | |



- | | | |
|----------------|------------------|---|
| 1. Pulley | 7. Regulator | B : Generator output (Battery terminal) |
| 2. Pulley nut | 8. Brush | E : Ground |
| 3. Rotor fan | 9. Front housing | IG : Ignition terminal |
| 4. Stator coil | 10. Rear housing | L : Lamp terminal |
| 5. Stator core | 11. Rectifier | |
| 6. Field coil | | |

DIAGNOSIS

B : Generator output (Battery terminal)
 E : Ground
 IG : Ignition terminal
 L : Lamp terminal

CAUTION:

- Do not mistake polarities of IG terminal and L terminal.
- Do not create a short circuit between IG and L terminals.
Always connect these terminals through a lamp.
- Do not connect any load between L and E.
- When connecting a charger or a booster battery to vehicle battery, refer to this section describing battery charging.

Trouble in charging system will show up as one or more of the following conditions:

- 1) Faulty indicator lamp operation.
- 2) An undercharged battery as evidenced by slow cranking or indicator dark.
- 3) An overcharged battery as evidenced by excessive spewing of electrolyte from vents.

Noise from generator may be caused by a loose drive pulley, loose mounting bolts, worn or dirty bearings, defective diode, or defective stator.

FAULTY INDICATOR LAMP OPERATION

PROBLEM	POSSIBLE CAUSE	CORRECTION
Charge light does not light with ignition ON and engine off	<ul style="list-style-type: none"> ● Fuse blown ● Light burned out ● Wiring connection loose ● IC regulator 	Check fuse. Replace light. Tighten loose connection. Check generator.
Charge light does not go out with engine running (battery requires frequent recharging)	<ul style="list-style-type: none"> ● Drive belt loose or worn ● IC regulator or generator faulty ● Wiring faulty 	Adjust or replace drive belt. Check charging system. Repair wiring.
Noise from radio	Condenser faulty	Replace IC regulator assembly.

UNDERCHARGED BATTERY

This condition, as evidenced by slow cranking or indicator clear with red dot can be caused by one or more of the following conditions even though indicator lamp may be operating normal. The following procedure also applies to cars with voltmeter and ammeter.

- 1) Make sure that undercharged condition has not been caused by accessories left on for extended period of time.
- 2) Check drive belt for proper tension.
- 3) If battery defect is suspected referring to BATTERY section.
- 4) Inspect wiring for defects. Check all connections for tightness and cleanliness, battery cable connections at battery, starting motor and ignition ground cable.
- 5) Connect voltmeter and ammeter as shown.

Voltmeter

Set between generator B terminal and ground.

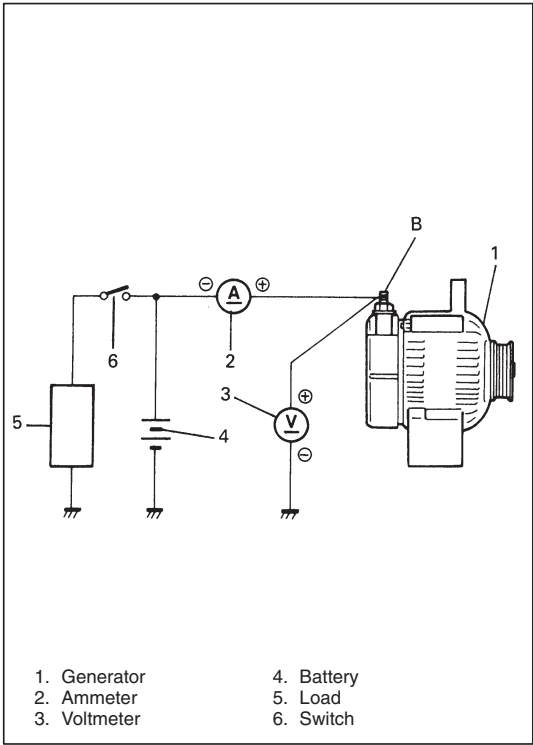
Ammeter

Set between generator B terminal and battery (+) terminal.

NOTE:

Use fully charged battery.

- 6) Measure current and voltage.



NO-LOAD CHECK

Run engine from idling up to 2,000 rpm and read meters.

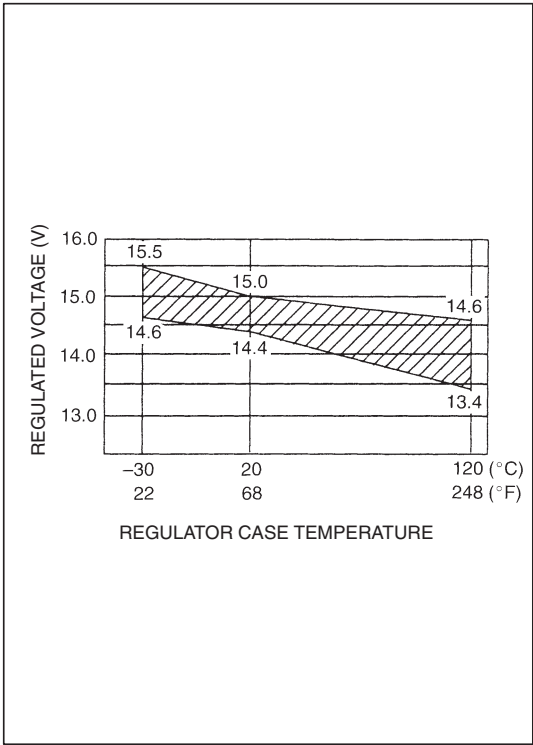
NOTE:

Turn off switches of all accessories (wiper, heater etc.).

Standard current	10 A maximum
Standard voltage	14.4 – 15.0 V at 20°C (68°F)

NOTE:

Consideration should be taken that voltage will differ somewhat with regulator case temperature as shown in left figure.



Higher Voltage

If voltage is higher than standard value, check ground of brushes. If brushes are not grounded, replace IC regulator.

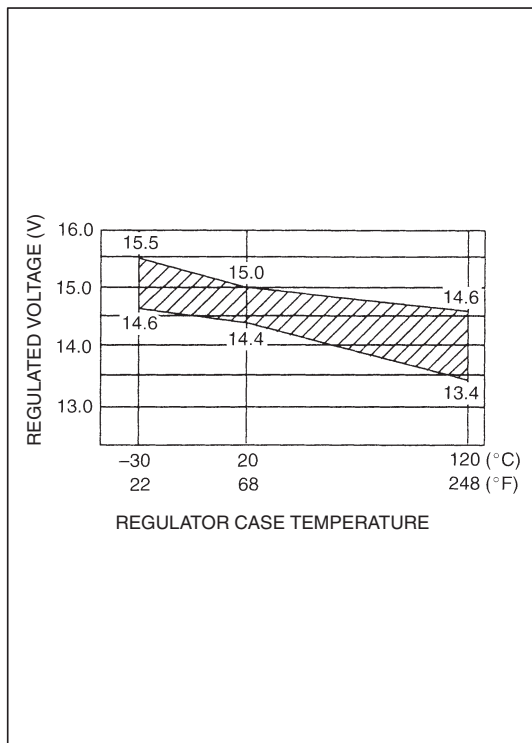
Lower Voltage

If voltage is below or in standard value, increase engine speed up to 2000 – 2500 rpm soon after starting engine, and read maximum value on ammeter immediately.

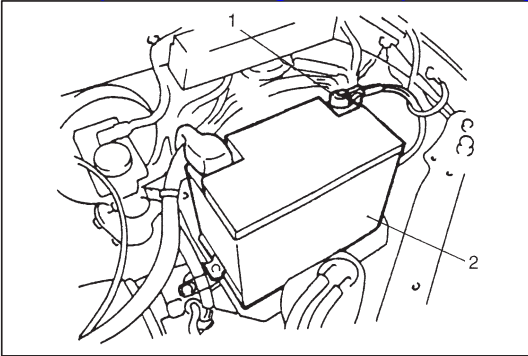
If current is less than 49 A, repair or replace generator.

LOAD CHECK

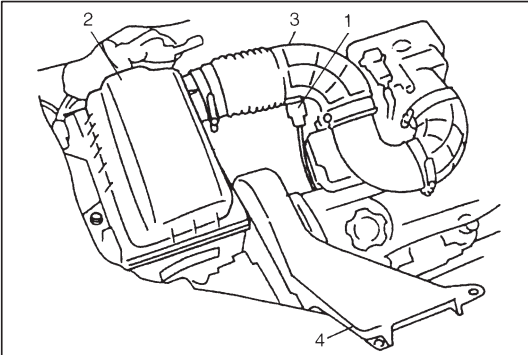
- 1) Run engine at 2,000 rpm and turn on head light and heater motor.
- 2) Measure current and if it is less than 20 A repair or replace generator.

**OVERCHARGED BATTERY**

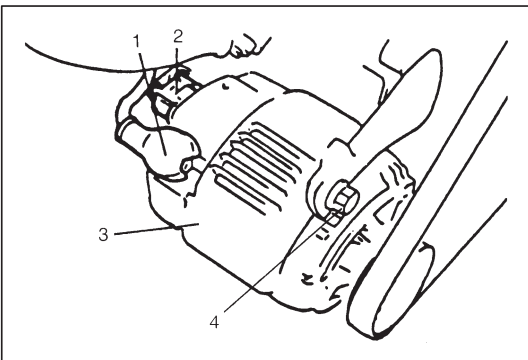
- 1) To determine battery condition, refer to BATTERY section.
- 2) If obvious overcharge condition exists as evidenced by excessive spewing of electrolyte, measure generator B terminal voltage at engine 2,000 rpm.
- 3) If measured voltage is higher than upper limit value, proceed to disassembly section of generator service.
- 4) Check ground of brushes. If brushes are not grounded, replace IC regulator. Then check field coil for grounds and shorts, referring to "INSPECTION" section.

UNIT REPAIR OVERHAUL**REMOVAL**

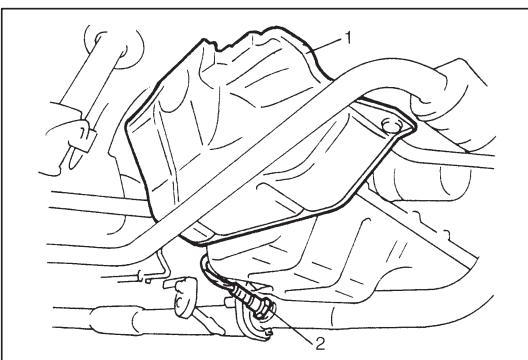
- 1) Disconnect negative (-) cable (1) at battery (2).



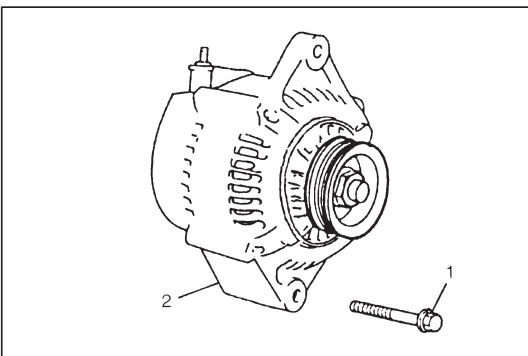
- 2) Disconnect IAT sensor coupler (1).
- 3) Remove air cleaner assembly (2) with air cleaner outlet No.1 hose (3) and suction pipe (4).
- 4) Remove generator cover.



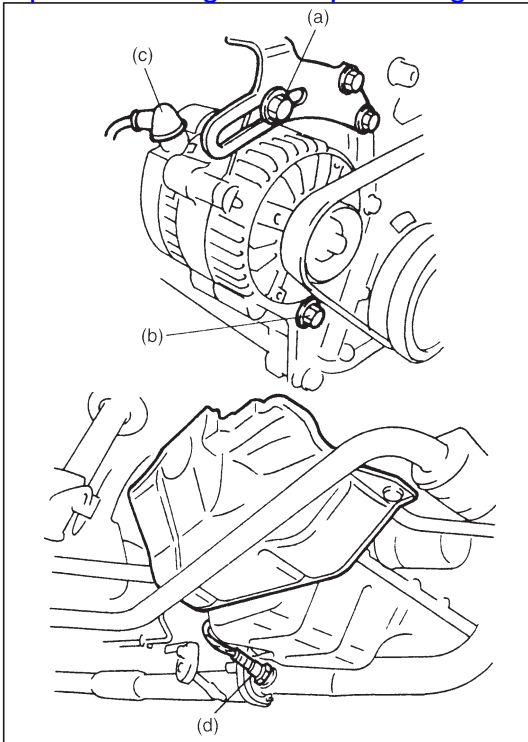
- 5) Disconnect "B" terminal wire (1) and coupler (2) from generator (3).
- 6) Remove upper generator bolt (4).
- 7) Hoist vehicle.



- 8) Remove left side of engine under cover (1) and oxygen sensor No.2 (2).



- 9) Remove generator belt referring to SECTION 6B.
- 10) Remove lower generator bolt (1), and then remove generator (2).

**INSTALLATION**

Reverse removal procedure and giving specified tension to water pump and generator drive belt referring to SECTION 6B.

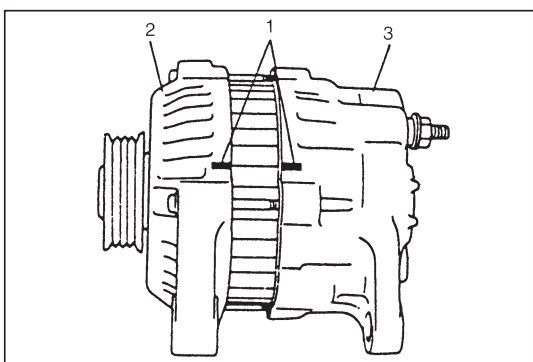
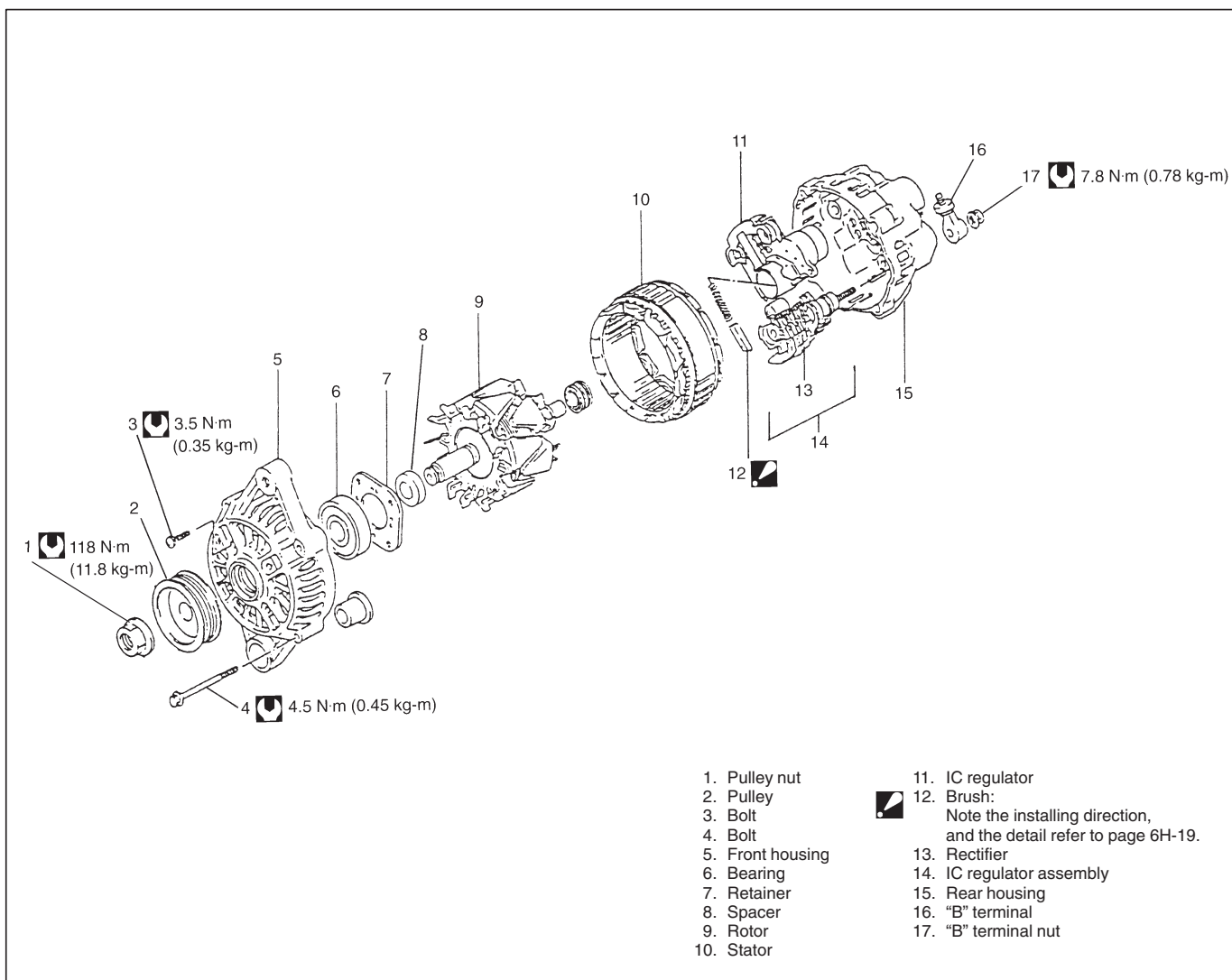
Tightening Torque

(a): 22 N·m (2.2 kg-m, 16.0 lb-ft)

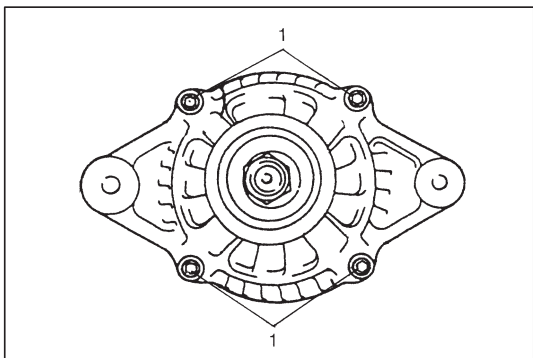
(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)

(c): 7.8 N·m (0.78 kg-m, 5.5 lb-ft)

(d): 45 N·m (4.5 kg-m, 32.5 lb-ft)

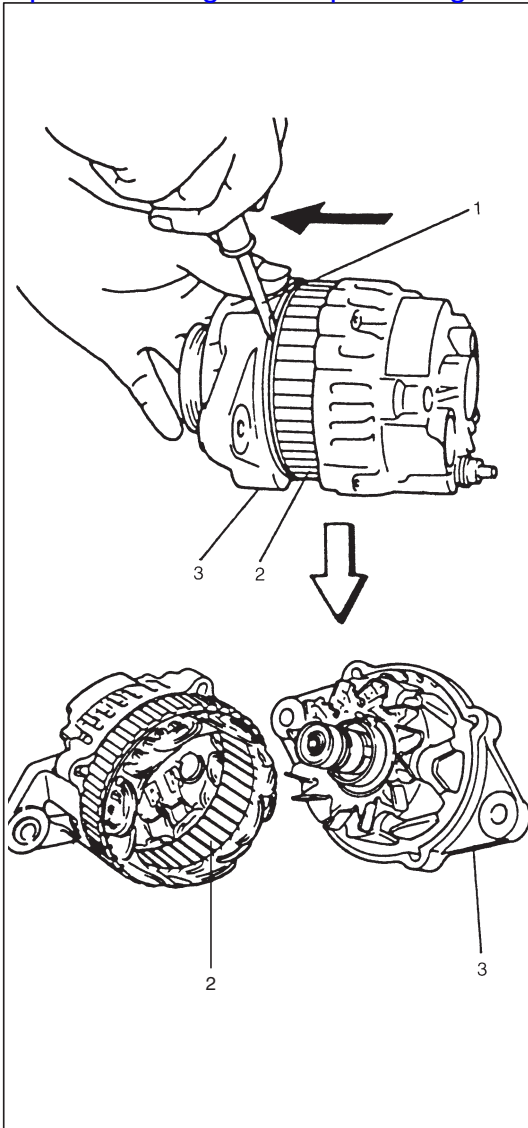


1) For easier reinstallation, provide match marks (1) on front housing (2) and rear housing (3) as shown before separating them.



2) Remove housing bolts (1) from generator.

- 3) Insert flat tip screwdriver (1) between stator core (2) and front housing (3), and then separate generator into front and rear sides.

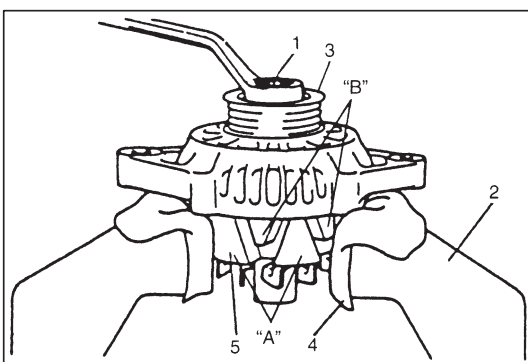


- 4) Loosen pulley nut (1) using vise (2) and take off pulley (3).

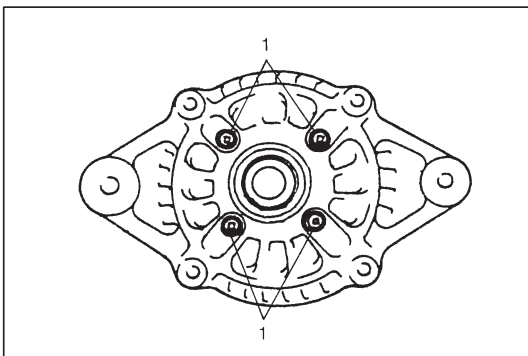
NOTE:

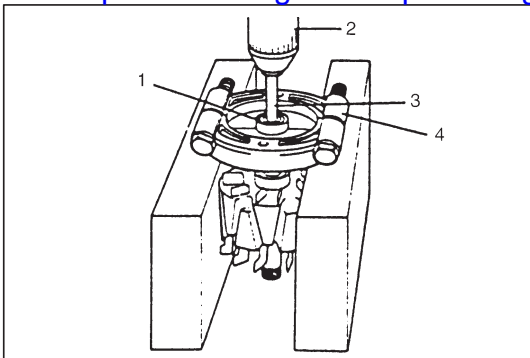
- When using vise, put clean cloth (4) between rotor (5) and vise so as not to cause damage to rotor.
- Be sure to hold the location "A". Do not hold the location "B" as it does not have enough structural strength.

- 5) Remove rotor from front housing.

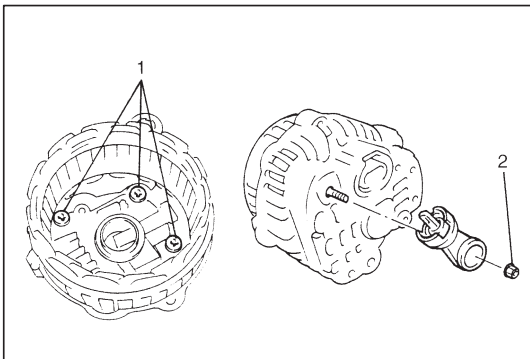


- 6) When removing front bearing, remove bearing retainer screws (1) and retainer.

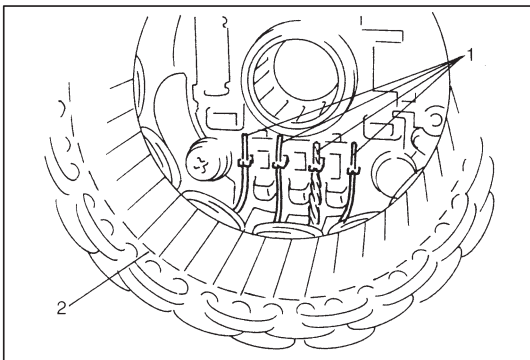




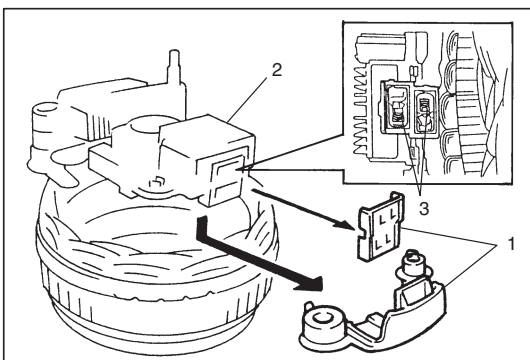
- 7) When removing rear bearing (1), use oil hydraulic press (2) general rod (3) and general tool (4).



- 8) Remove three screws (1) and generator "B" terminal nut (2).
9) Remove stator with IC regulator assembly from rear housing.



- 10) Unsolder stator leads (1) and remove stator (2) from IC regulator assembly.



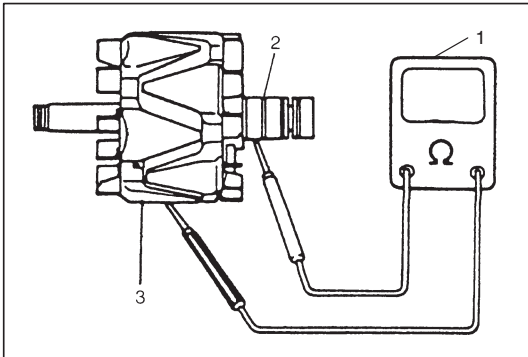
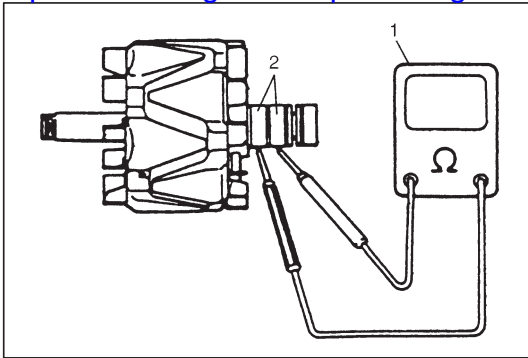
- 11) To remove brush, remove holder (1) from brush holder (2) and then disconnect brush wire (3) from regulator terminal using soldering iron.

INSPECTION**Rotor**

- 1) Using ohmmeter (1), check for continuity between slip rings of rotor (2).

If there is no continuity, replace rotor.

Standard resistance: 2.5 – 2.9 Ω

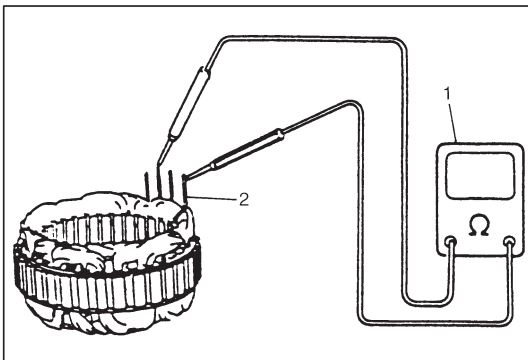


- 2) Using ohmmeter (1), check that there is no continuity between slip ring (2) and rotor core (3).

If there is continuity, replace rotor.

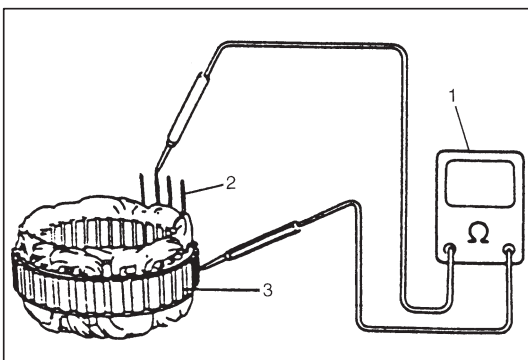
- 3) Check slip rings for roughness or scoring.

If rough or scored, replace rotor.

**Stator**

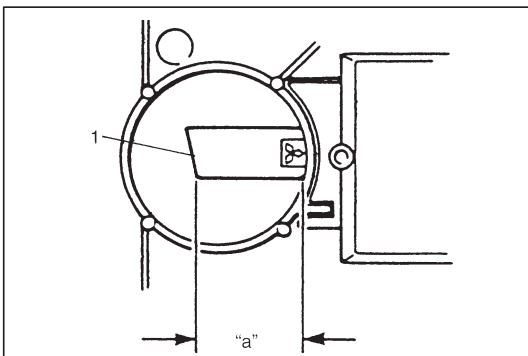
- 1) Using ohmmeter (1), check all stator coil leads (2) for continuity.

If there is no continuity, replace stator.



- 2) Using ohmmeter (1), check that there is no continuity between stator coil leads (2) and stator core (3).

If there is continuity, replace stator.

**Brush and brush holder**

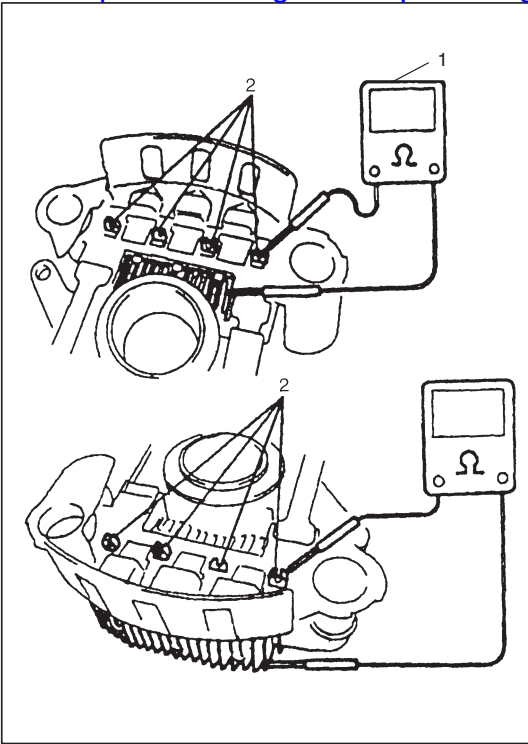
Check each brush (1) for wear by measuring its length.

If brush is found worn down to service limit, replace brush.

Brush length "a"

Standard: 16 mm (0.63 in.)

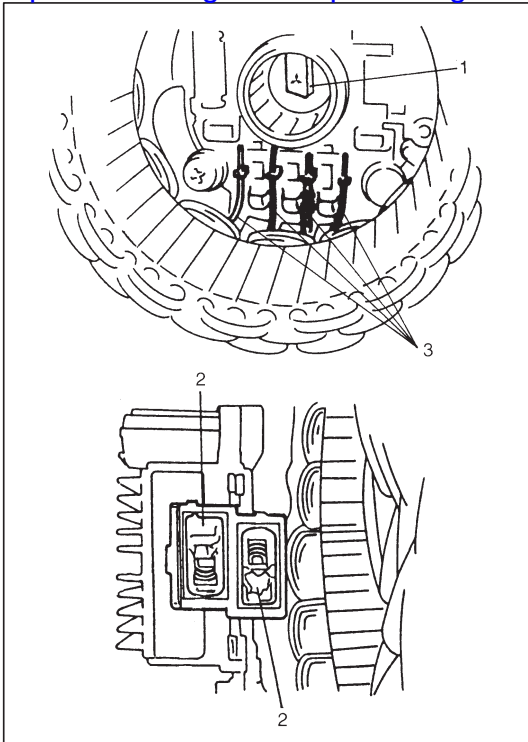
Service limit: 2 mm (0.08 in.)

**Rectifier**

Using ohmmeter (1), check continuity between each of upper and lower rectifier bodies and each diode lead (2).

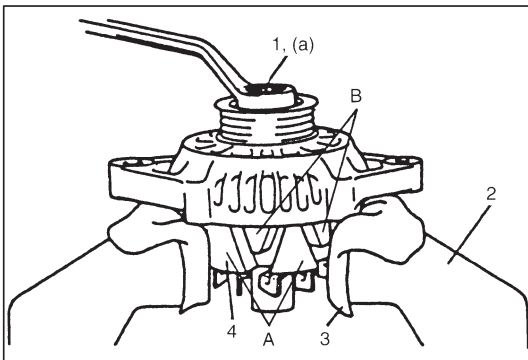
Check both directions by reversing probes of ohmmeter and there should be only one-way continuity in each case.

If check result is not satisfactory, replace rectifier.

**ASSEMBLY**

Reverse disassembly procedure for installation, noting the following instruction.

- Be sure to install brushes (1) in the proper direction as shown and solder brush wires (2) and stator leads (3).



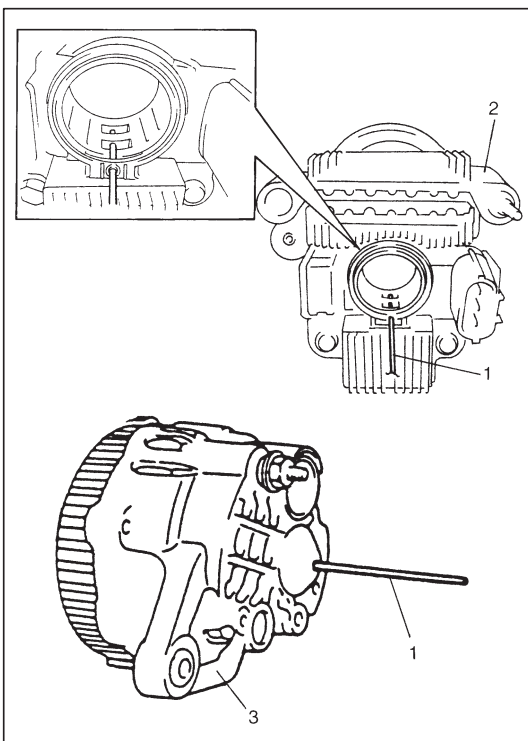
- Tighten generator pulley nut (1) to specified torque.

Tightening Torque

(a): 118 N·m (11.8 kg-m, 85.5 lb-ft)

NOTE:

- When using vise (2), put clean cloth (3) between rotor (4) and vise so as not to cause damage to rotor.
- Be sure to hold the location A. Do not hold the location B as it does not have enough structural strength.

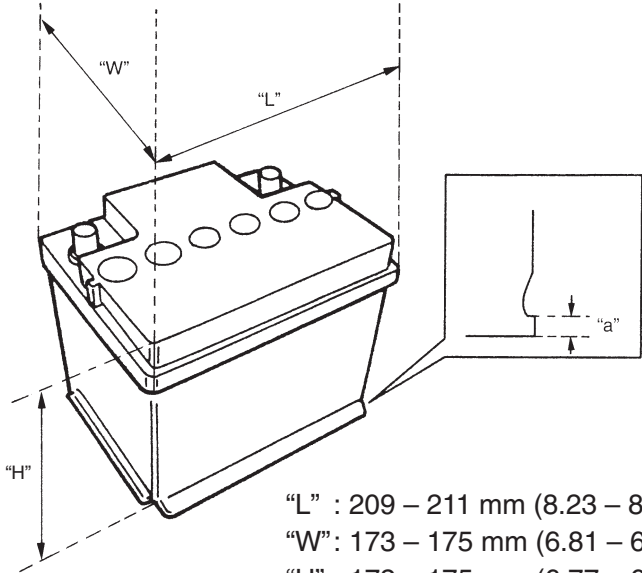


- Push brushes into brush holder, then support brushes by inserting appropriate wire (1) before install IC regulator assembly (2) to rear housing (3).

NOTE:

- After installing rotor, remove wire.
- Check to make sure that match marks on front and rear housing are aligned.
- Do not apply grease to rear (rotor) bearing. Remove oil completely if found in bearing box of rear housing.
- After assembling generator, make sure that rotor turns smoothly.

SPECIFICATIONS**BATTERY**

Battery type	PERION 6A3625	PERION 6A4425
Nominal output	12 V	
Rated capacity	36 Ah/20 h	44 Ah/20 h
	28 Ah/5 h	36 Ah/5 h
Cold cranking amperes	332 A	390 A
Electrolyte	3.8 L (8.03/6.69 US/Imp pt)	
Electrolyte specified gravity	1.28 when fully charged at 25°C (77°F)	
Battery dimension	 <p> "L" : 209 – 211 mm (8.23 – 8.31 in.) "W": 173 – 175 mm (6.81 – 6.89 in.) "H" : 172 – 175 mm (6.77 – 6.89 in.) "a" : 10.5 mm (0.41 in.) </p>	

GENERATOR

Rated voltage	12 V
Nominal output	70 A
Permissible max. speed	18000 r/min.
No-load speed	1300 r/min (rpm)
Setting voltage	14.4 to 15.0 V (at 20°C (68°F))
Permissible ambient temperature	–30 to 90°C (–22 to 194°F)
Polarity	Negative ground
Rotation	Clockwise viewed from pulley side

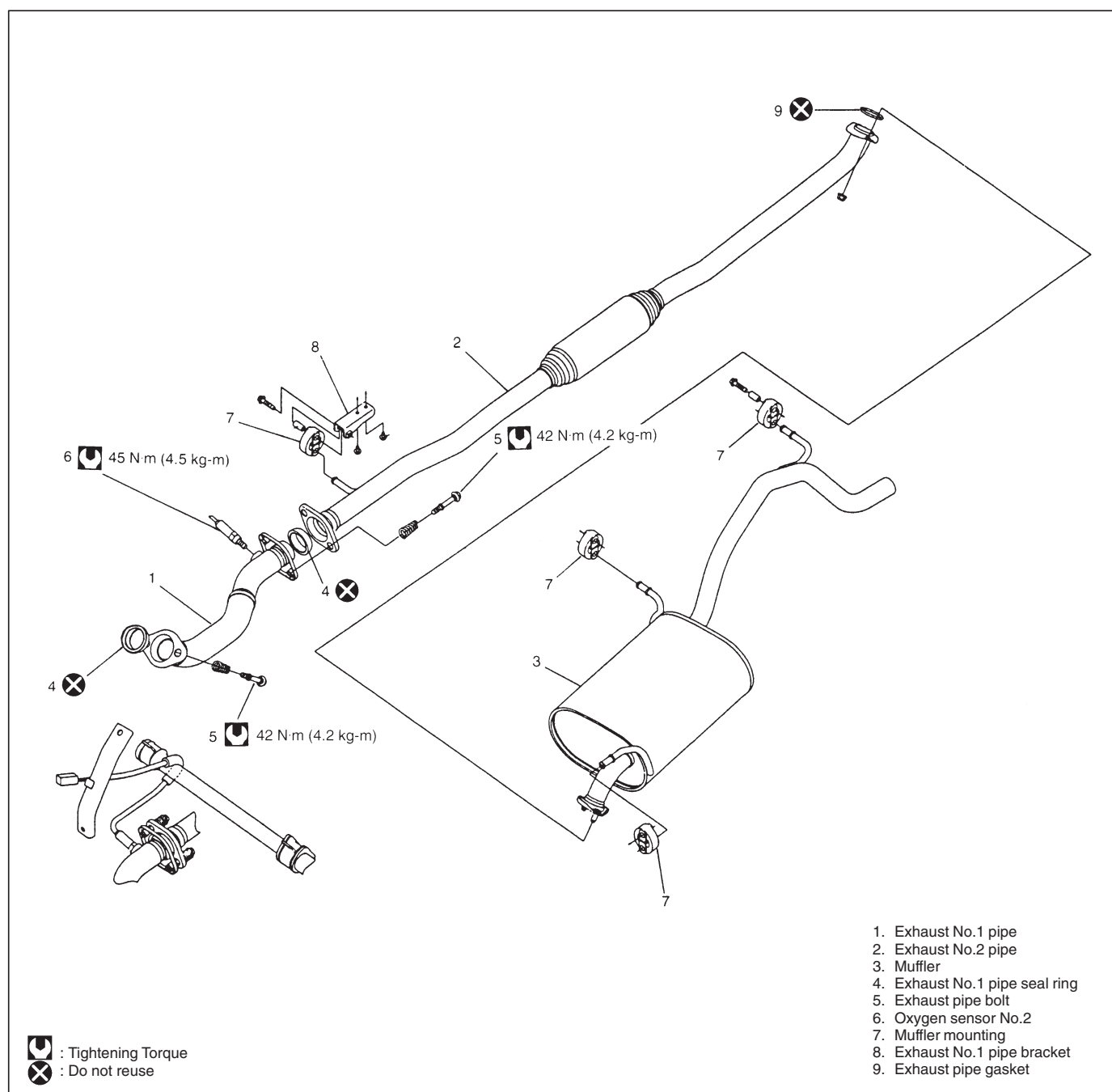
SECTION 6K

EXHAUST SYSTEM

CONTENTS

ON-VEHICLE SERVICE	6K-1
MAINTENANCE	6K-2

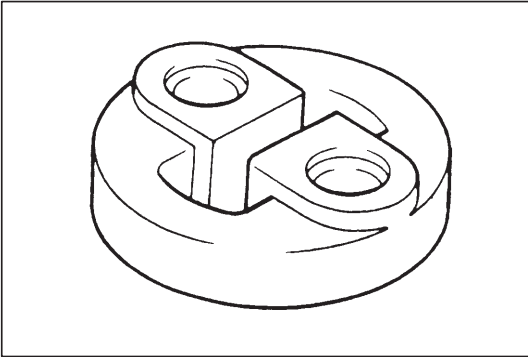
ON-VEHICLE SERVICE



MAINTENANCE

WARNING:

To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.



At every interval of periodic maintenance service, and when vehicle is raised for other service, check exhaust system as follows:

- Check rubber mountings for damage, deterioration, and out of position.

- Check exhaust system for leakage, loose connection, dent and damage.

If bolts or nuts are loosened, tighten them to specified torque.

- Check nearby body areas for damaged, missing, or mispositioned part, open seam, hole, loose connection or any other defect which could permit exhaust fumes to seep into vehicle.
- Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to passenger compartment carpet.
- Any defect should be fixed at once.

SECTION 7A

MANUAL TRANSMISSION

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CONTENTS

7A

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GENERAL DESCRIPTION

CONSTRUCTION AND SERVICING

The transmission provides five forward speeds and one reverse speed by means of three synchronizers and three shafts-input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

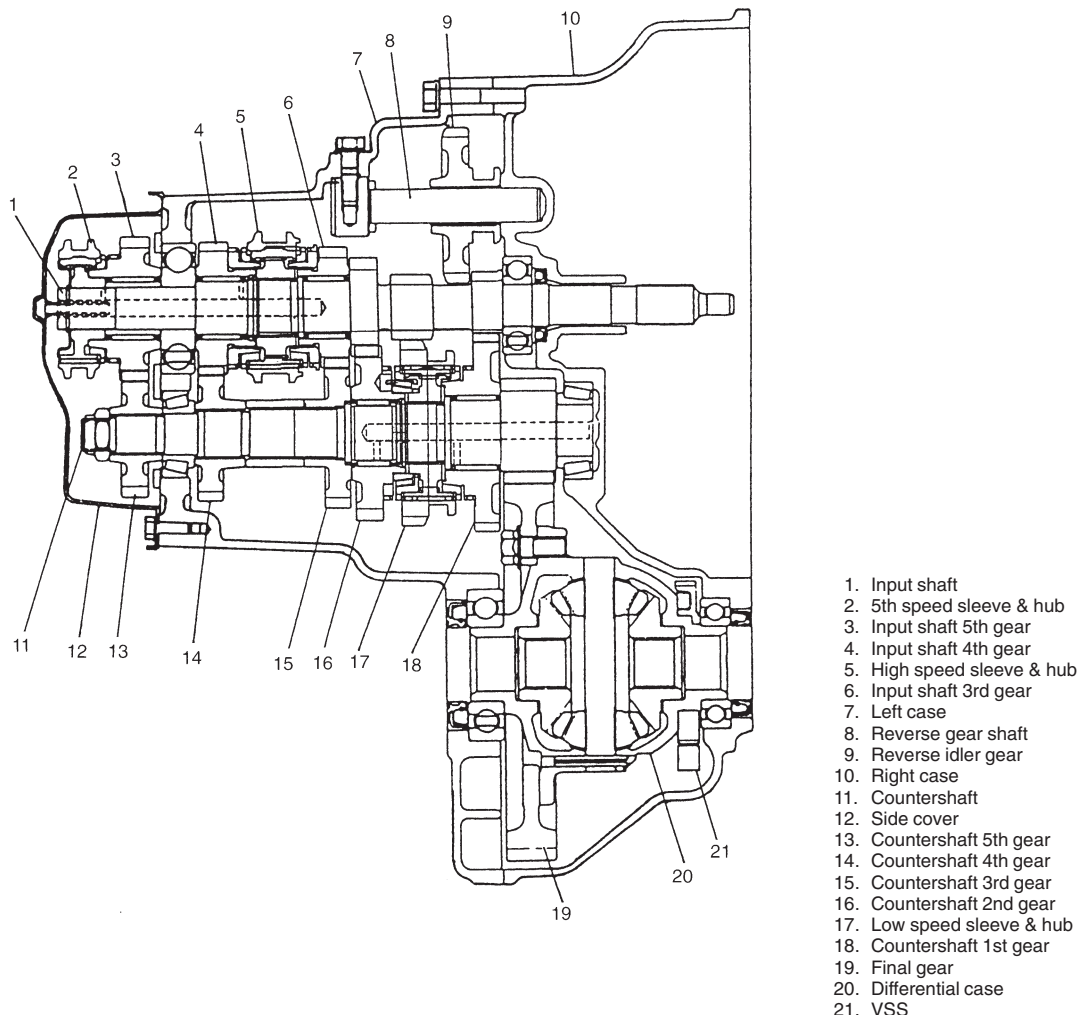
The low speed synchronizer is mounted on counter shaft and engaged with counter shaft first gear or second gear, while the high speed synchronizer is done on input shaft and engaged with input shaft third gear or fourth gear.

The fifth speed synchronizer on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

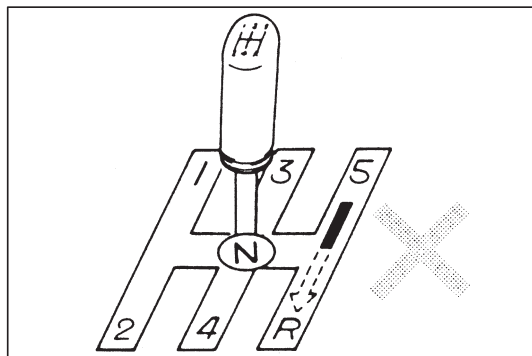
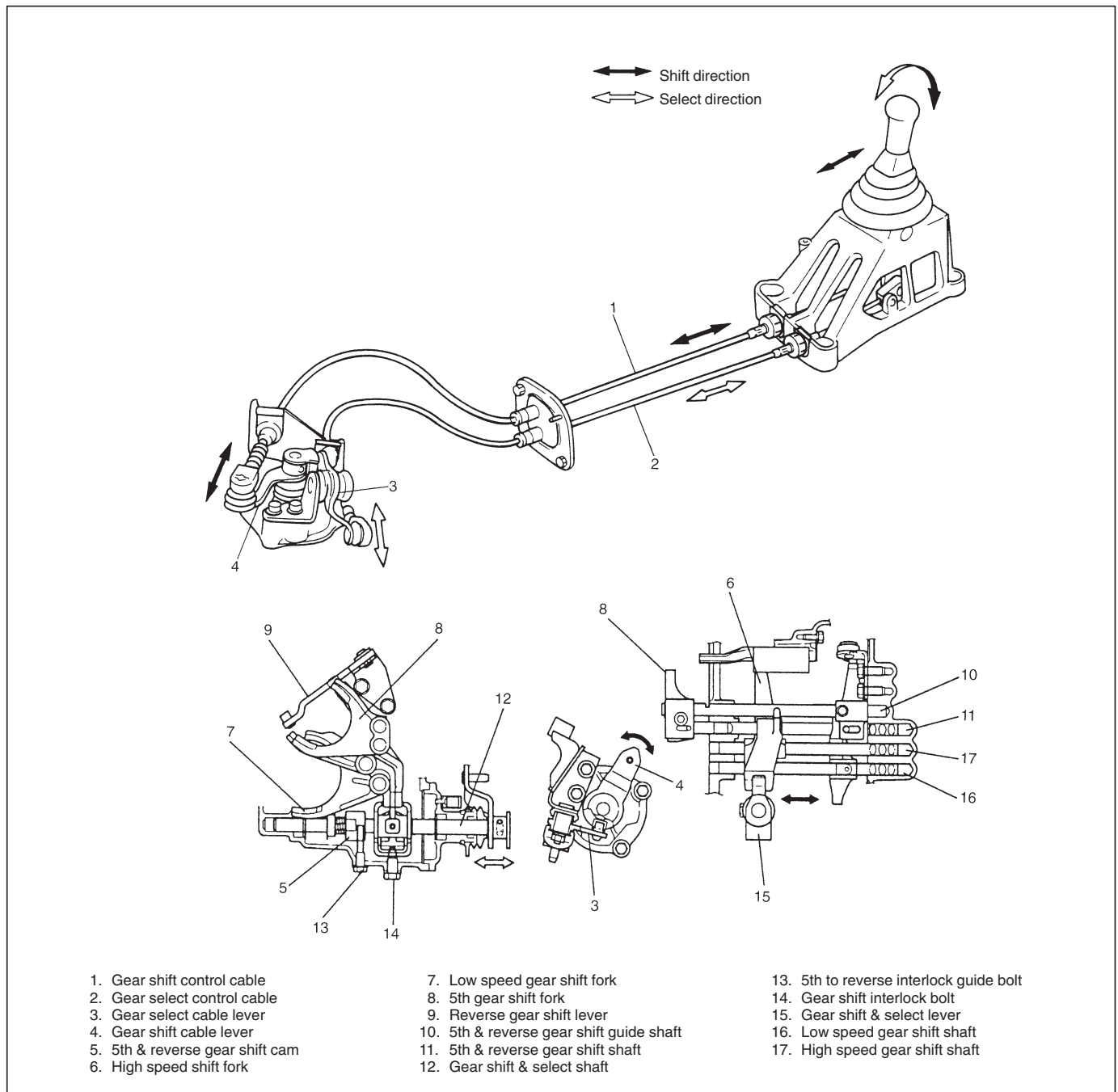
For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transmission case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

Further, care must be taken to adjust preload of counter shaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.



GEAR SHIFT MECHANISM

The gear shifting control system consists of the following main parts. Movement of gear shift control lever is transmitted to gear shift & select shaft through gear shift and gear select cables.



5TH & REVERSE GEAR SHIFT CAM

5th & reverse gear shift cam, cam guide return spring and 5th to reverse interlock guide bolt are provided to prevent the gear from being directly shifted from 5th to reverse.

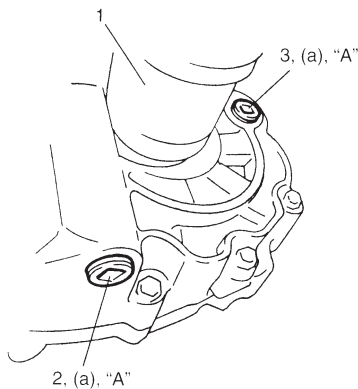
DIAGNOSIS

Condition	Possible Cause	Correction
Gears slipping out of mesh	<ul style="list-style-type: none"> ● Maladjusted gear shift/select control cables ● Worn shift fork shaft ● Worn shift fork or synchronizer sleeve ● Weak or damaged locating springs ● Worn bearings on input shaft or counter shaft ● Worn chamfered tooth on sleeve and gear 	Adjust. Replace. Replace. Replace. Replace. Replace sleeve and gear.
Hard shifting	<ul style="list-style-type: none"> ● Maladjusted gear shift/select control cables ● Inadequate lubricant ● Improper clutch pedal free travel ● Distorted or broken clutch disc ● Damaged clutch pressure plate ● Worn synchronizer ring ● Worn chamfered tooth on sleeve or gear ● Worn gear shift/select control cables joint ● Distorted shift shaft 	Adjust. Replenish. Adjust. Replace. Replace clutch cover. Replace. Replace sleeve or gear. Replace. Replace.
Noise	<ul style="list-style-type: none"> ● Inadequate or insufficient lubricant ● Damaged or worn bearing(s) ● Damaged or worn gear(s) ● Damaged or worn synchronizer parts 	Replenish. Replace. Replace. Replace.

ON-VEHICLE SERVICE

CAUTION:

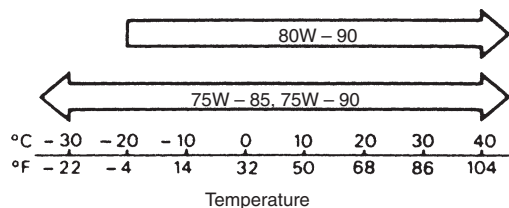
Do not reuse circlip, spring pin, E-ring, oil seal, gasket, self locking nut and specified parts. Reuse of it can result in trouble.



1. Drive shaft (LH)

Viscosity chart

SAE



OIL CHANGE

- 1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
- 2) With vehicle lifted up, check oil level and leakage.
If leakage exists, correct it.
- 3) Drain old oil and fill new specified oil by specified amount (up to level hole).
- 4) Apply sealant to thread of drain plug (2) and level/filler plug (3) and torque them as specified below.

"A": Sealant, Bond No. 1215, 99000-31110

Tightening Torque

(a): 21 N·m (2.1 kg-m, 15.5 lb-ft)

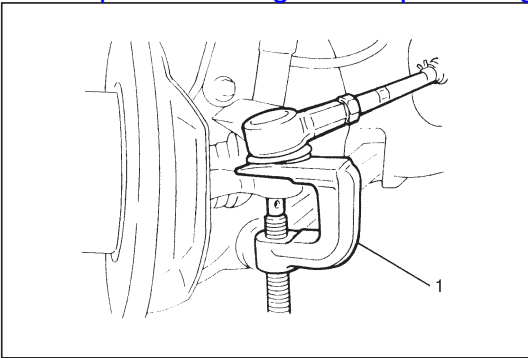
NOTE:

- It is recommended to use API GL-4 75W-90 gear oil.
- Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

Oil specification: API GL-4

For SAE classification, refer to viscosity chart at the left.

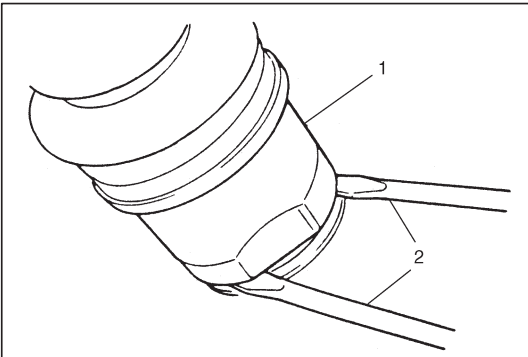
Oil capacity : 2.2 liters (4.6/3.9 US/Imp. pt)



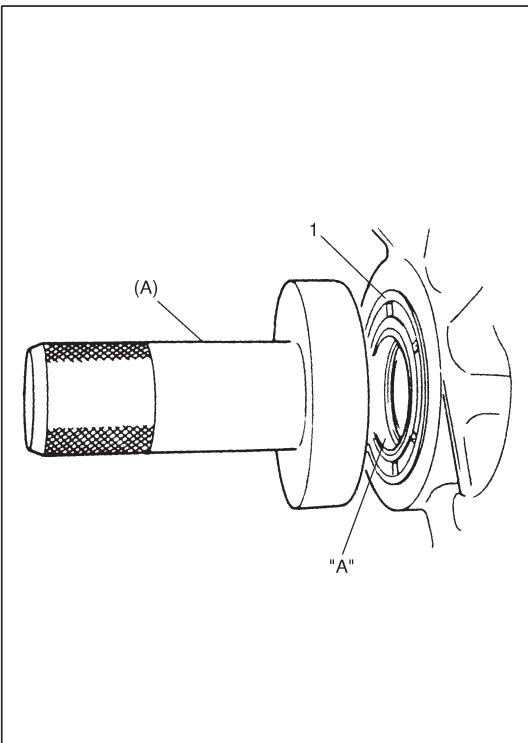
DIFFERENTIAL SIDE OIL SEAL

REPLACEMENT

- 1) Lift up vehicle and drain transmission oil.
- 2) Remove wheel, and then remove tie-rod end nut.
- 3) Disconnect tie-rod end from knuckle by using puller (1).
- 4) Remove two stabilizer mount brackets from vehicle body.
- 5) Remove ball stud bolt and then separate suspension arm from knuckle.



- 6) By using large size screwdrivers (2), pull out drive shaft joint (1) so as to release snap ring fitting of joint spline at differential side. Pushing knuckle portion outward, detach drive shaft at differential side.



- 7) Remove oil seal (1) and install a new one until it becomes flush with case surface by using special tool and hammer.

NOTE:

When installing oil seal, face its spring side inward.

Special Tool

(A): 09913-75510

- 8) Apply grease to oil seal lip and at the same time check drive shaft where oil seal contacts and make sure of its smoothness.

"A": Grease A 99000-25010

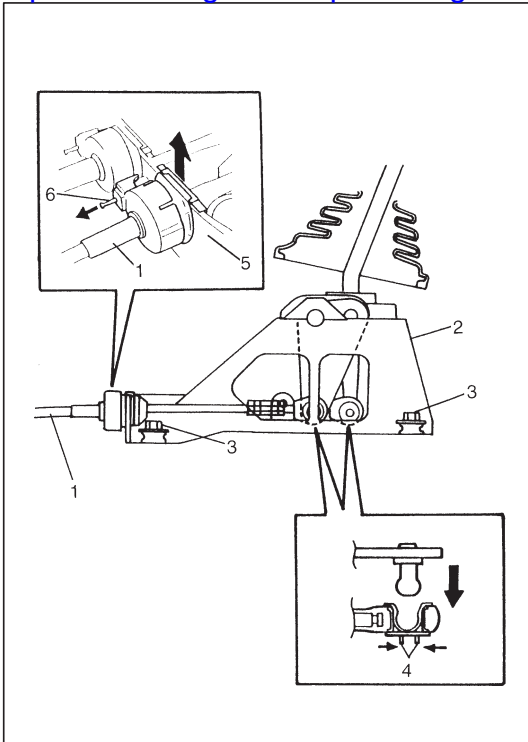
- 9) Insert drive shaft joint to differential gear.

CAUTION:

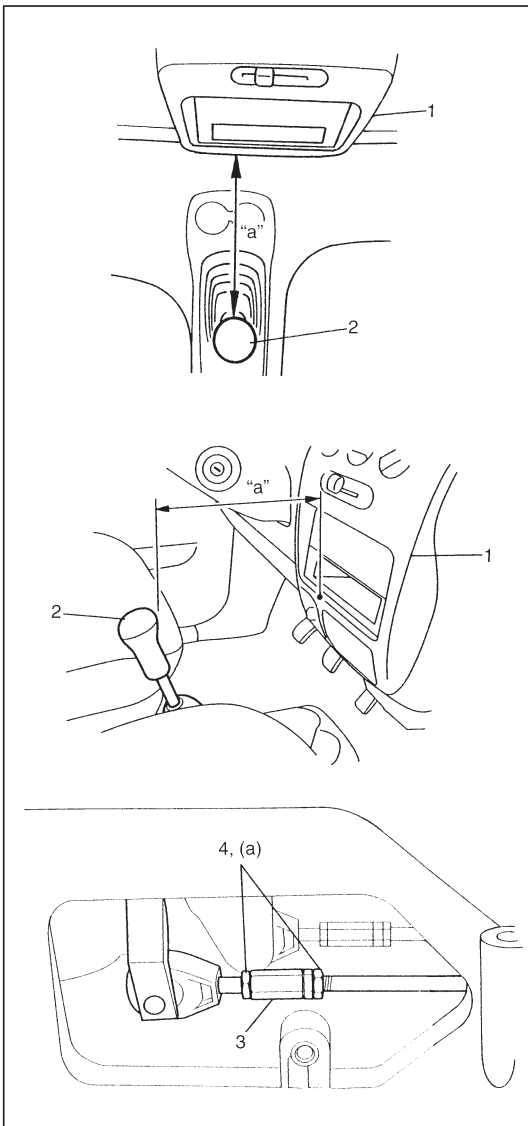
- Be careful not to scratch oil seal lip with drive shaft joint while inserting.
- Make sure to insert drive shaft joint fully and seat its snap ring as it was.
- Do not hit joint boot with hammer or the like. Nothing but hands is allowed to use when inserting joint.

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- 10) Connect ball stud with knuckle and fasten with bolt to specification referring to Section 4.
- 11) Connect tie-rod end with knuckle and fasten new nut to specified torque referring to Section 4.
- 12) Install stabilizer mount brackets, fasten bolts to specified torque referring to Section 4.
- 13) Fill transmission oil as specified and make sure that oil has been sealed with oil seal.

**REMOVAL**

- 1) Remove console box.
- 2) Disconnect gear shift and select control cables (1) from gear shift control lever assembly (2).
 - a) Disconnect cable end from pivot while pushing cable end bush (4).
 - b) Detach cable from bracket (5) while pulling pin (6).
- 3) Remove gear shift lever assembly mounting control cable guide nuts (3) and gear shift lever assembly from body.
- 4) Disconnect shift and select cables from transmission in the same manner as step 2).
- 5) Remove cable grommet and cable clamp, and then remove shift and select cables from body.

**INSTALLATION**

Reverse removal procedure for installation and note as follows.

- Tighten gear shift control lever assembly mounting nuts to specified torque.

Tightening Torque

13 N·m (1.3 kg-m, 9.5 lb-ft)

- Adjustment of shift cable.

With shift control lever in NEUTRAL position, adjust shift cable adjusting nut (3) so that distance "a" between edge of instrument panel (1) and center of shift knob (2) measured as shown.

NOTE:

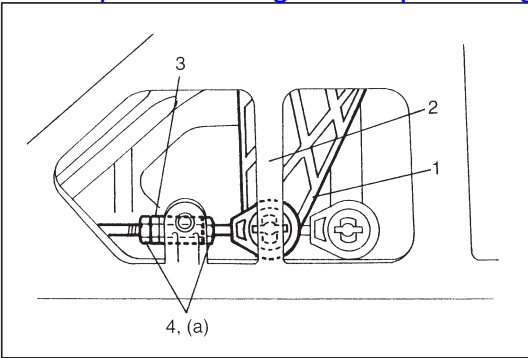
- After shift cable adjustment, tighten lock nut (4) to specified torque.

Tightening Torque

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

- Make sure that boots are installed correctly.

Distance "a": 215 mm (8.46 in.)



● Adjustment of select cable.

With shift control lever in NEUTRAL position, adjust select cable adjusting nut (3) so that the tip of select arm (cable joint point) (1) and the center rib of gear shift control lever assembly (2) are aligned as shown.

NOTE:

After select cable adjustment, tighten lock nut (4) to specified torque.

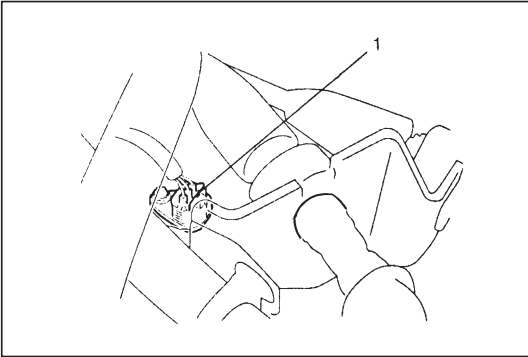
Tightening Torque

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

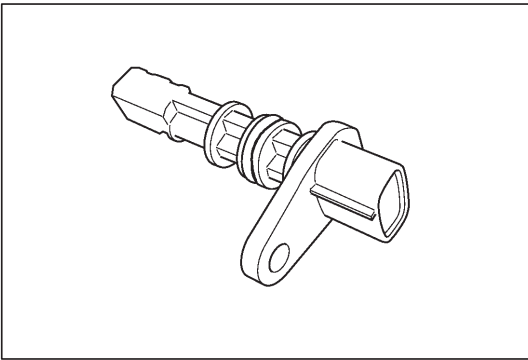
VEHICLE SPEED SENSOR (VSS)

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disconnect VSS coupler (1).

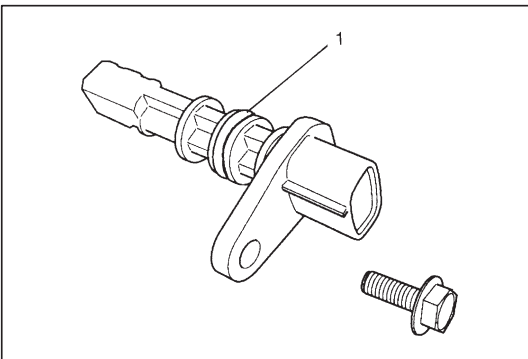


- 3) Remove VSS.

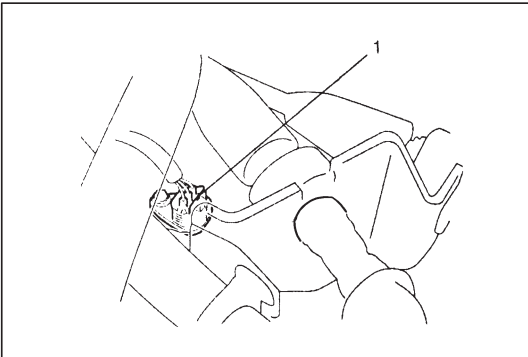


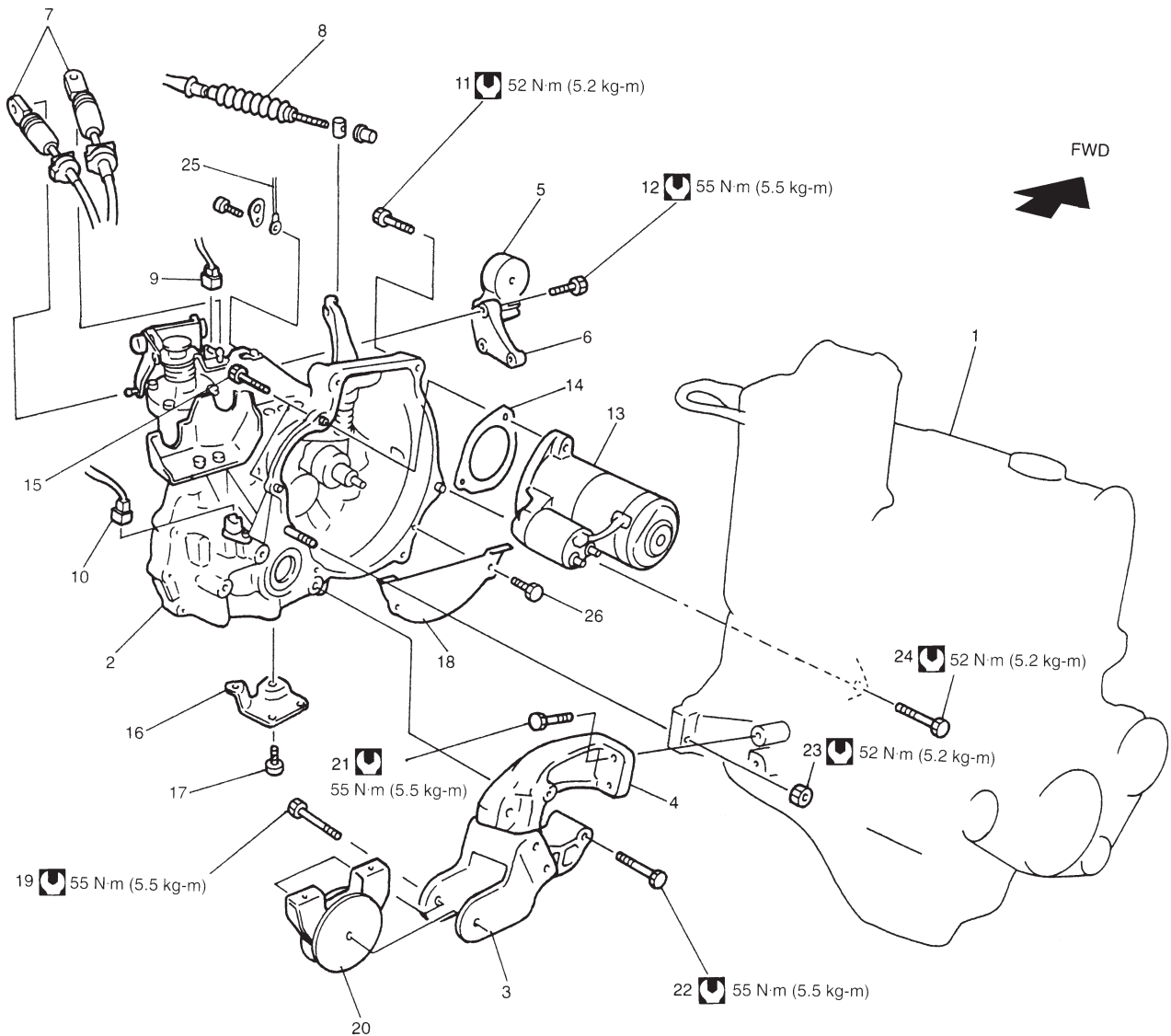
INSTALLATION

- 1) Check O-ring (1) and VSS surface for their flawlessness, apply oil to O-ring and then install VSS to transmission.



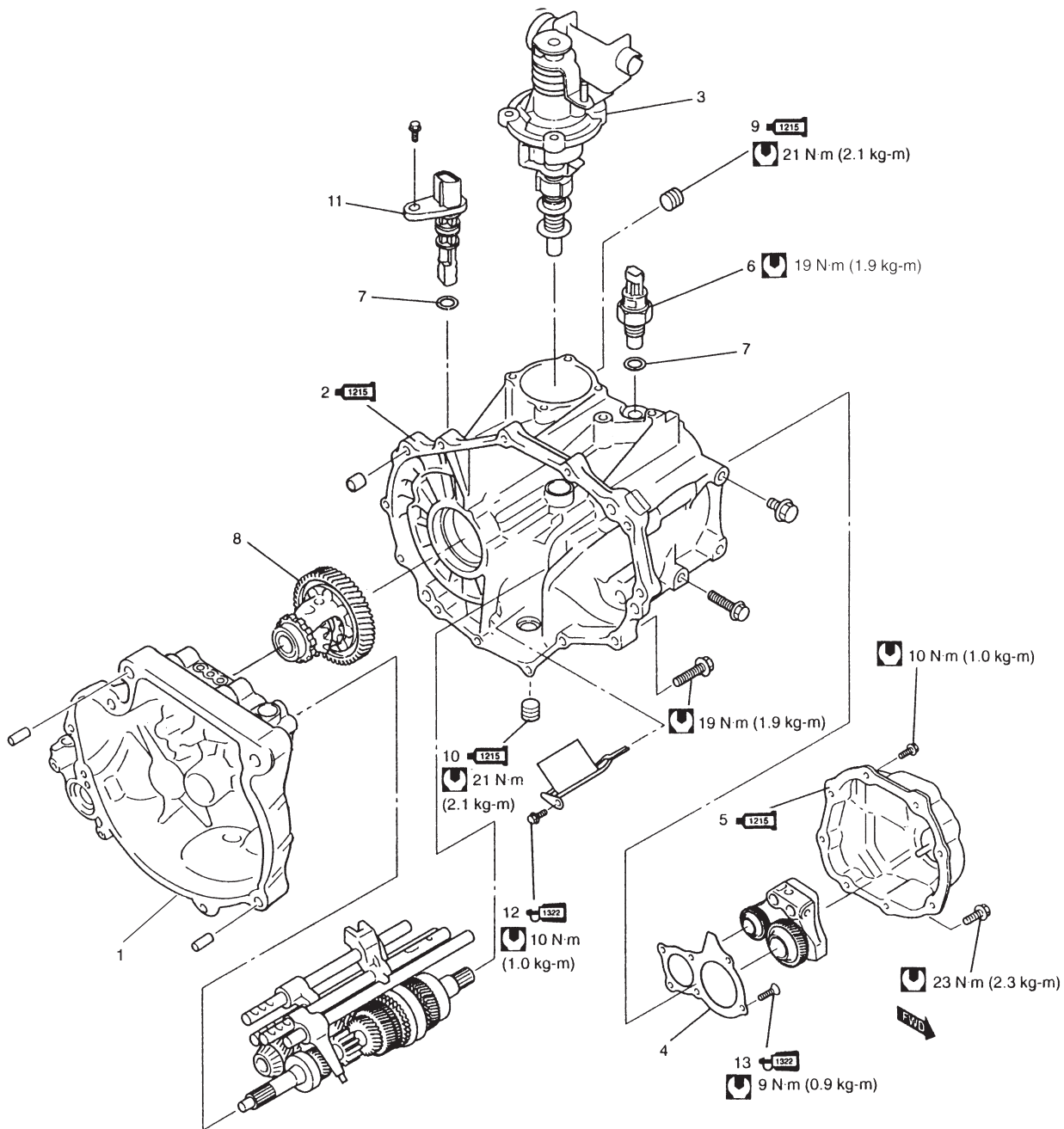
- 2) Connect VSS coupler (1).
- 3) Connect negative cable at battery.



UNIT REPAIR OVERHAUL**TRANSMISSION UNIT**

- | | | |
|--------------------------------------|--|--|
| 1. Engine | 10. VSS connector | 19. Engine rear mounting bolt |
| 2. Transmission | 11. Transmission to engine bolts | 20. Engine rear mounting |
| 3. Engine rear mounting No.1 bracket | 12. Engine left mounting bracket bolts | 21. Engine rear mounting No.2 bracket bolts |
| 4. Engine rear mounting No.2 bracket | 13. Starting motor | 22. Transmission to engine rear mounting No.2 bracket bolt |
| 5. Engine left mounting | 14. Starting motor plate | 23. Transmission to engine nut |
| 6. Engine left mounting bracket | 15. Starting motor bolts | 24. Transmission to engine bolts |
| 7. Shift & select control cables | 16. Engine rear mounting bracket stiffener | 25. Ground cable |
| 8. Clutch cable | 17. Stiffener bolts | 26. Clutch housing lower plate bolts |
| 9. Back up light switch connector | 18. Clutch housing lower plate | |

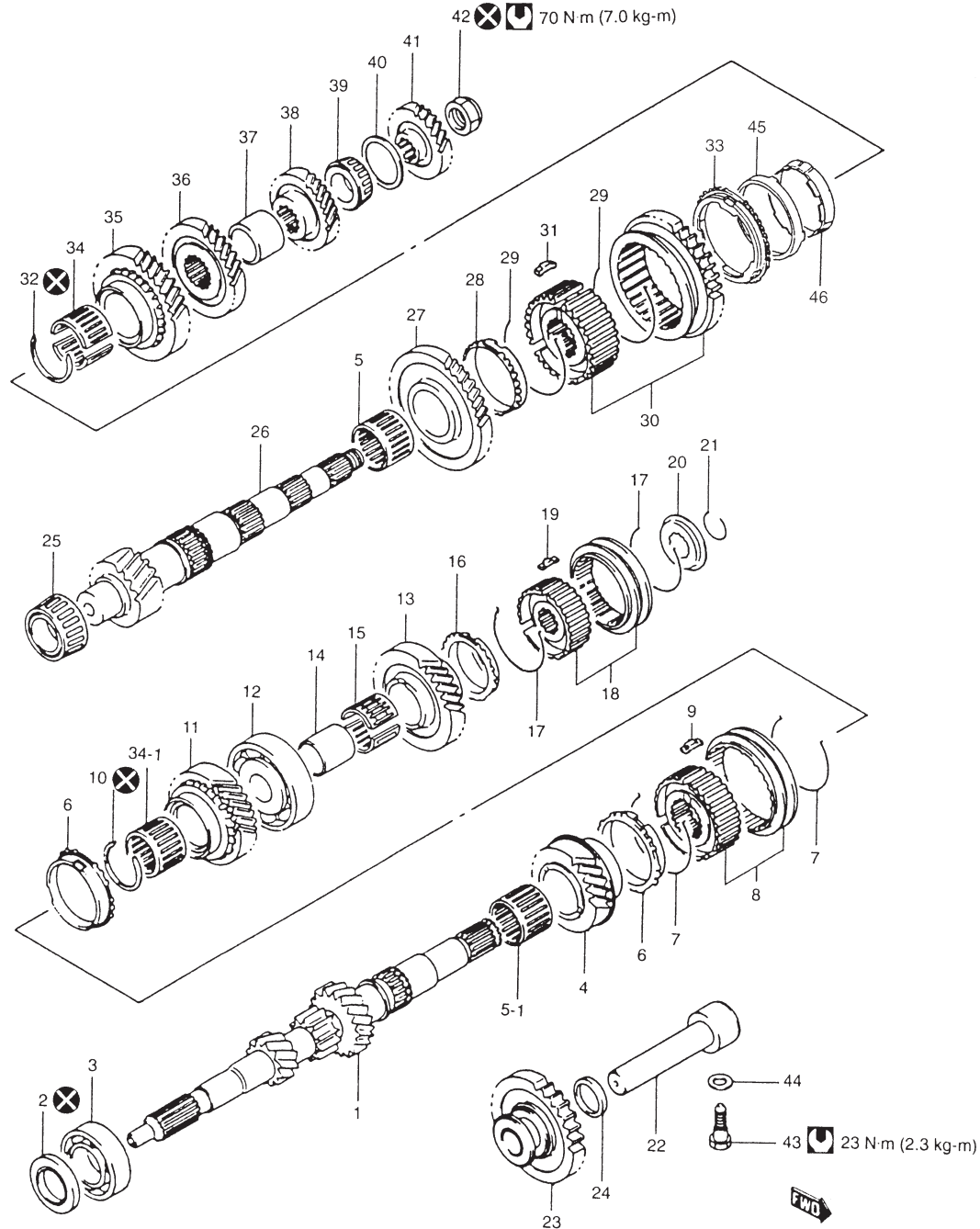
TRANSMISSION CASE



- 1. Transmission right case
- 2. Transmission left case:
Apply sealant 99000-31110
to mating surface of left case and
right case.
- 3. Gear shifter assembly
- 4. Transmission left case plate
- 5. Transmission side cover:
Apply sealant 99000-31110
to mating surface of side cover and
left case.
- 6. Back up light switch
- 7. O-ring

- 8. Differential assembly
- 9. Oil level / filler plug:
Apply sealant 99000-31110
to all around thread part of plug.
- 10. Oil drain plug:
Apply sealant 99000-31110
to all around thread part of plug.
- 11. VSS
- 12. Oil gutter bolt:
Apply thread lock 99000-32110
to all around thread part of bolt.
- 13. Left case plate screw

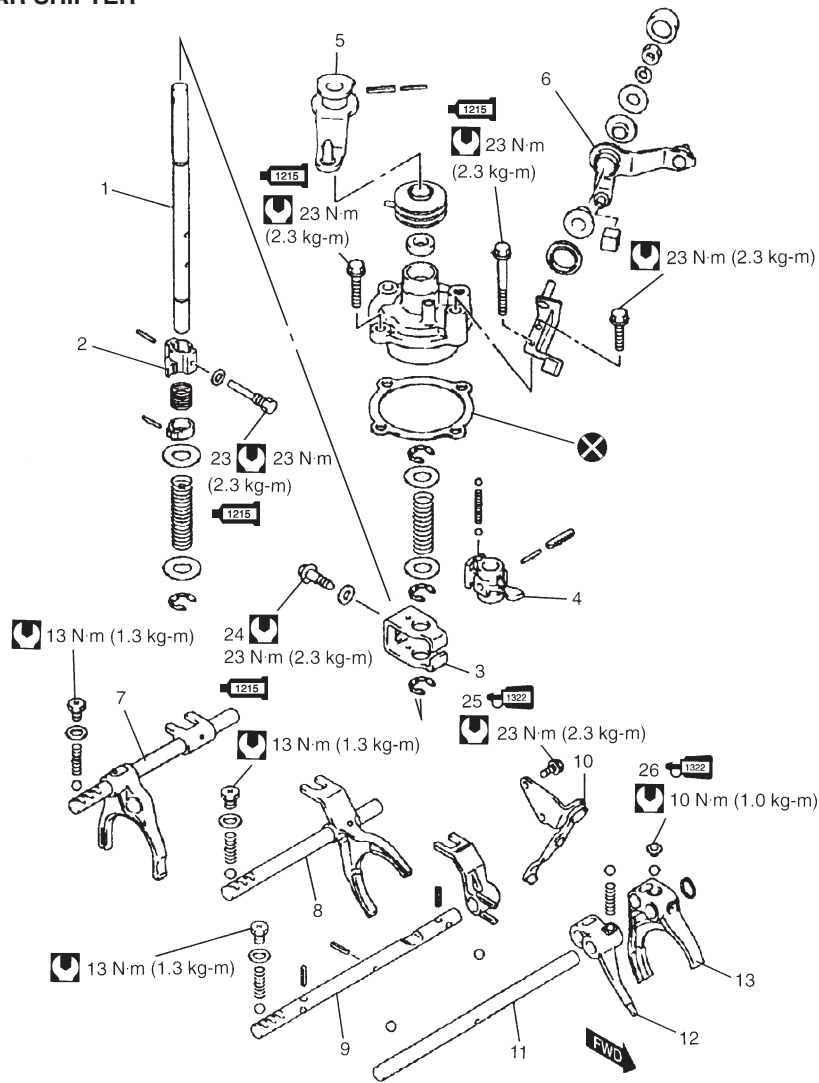
: Tightening Torque
 : Do not reuse



- | | | |
|---|-----------------------------------|--|
| 1. Input shaft | 16. 5th speed synchronizer ring | 32. Circlip |
| 2. Oil seal | 17. 5th synchronizer spring | 33. 2nd gear synchronizer outer ring |
| 3. Input shaft right bearing | 18. 5th speed sleeve & hub | 34. Needle bearing (separated steel cage type) |
| 4. Input shaft 3rd gear | 19. 5th synchronizer key | 34-1. Needle bearing (steel cage type) |
| 5. Needle bearing (resin cage type) | 20. 5th synchronizer hub plate | 35. Countershaft 2nd gear |
| 5-1. Needle bearing (resin cage type) | 21. Circlip | 36. Countershaft 3rd gear |
| 6. High speed synchronizer ring | 22. Reverse gear shaft | 37. 3rd & 4th gear spacer |
| 7. High speed synchronizer spring | 23. Reverse idler gear | 38. Countershaft 4th gear |
| 8. High speed sleeve & hub | 24. Reverse shaft washer | 39. Countershaft left bearing |
| 9. High speed synchronizer key | 25. Countershaft right bearing | 40. Bearing set shim |
| 10. Circlip | 26. Countershaft | 41. Countershaft 5th gear |
| 11. Input shaft 4th gear | 27. Countershaft 1st gear | 42. Countershaft nut |
| 12. Input shaft left bearing | 28. 1st gear synchronizer ring | 43. Reverse shaft bolt |
| 13. Input shaft 5th gear | 29. Low speed synchronizer spring | 44. Washer |
| 14. 5th gear spacer | 30. Low speed sleeve & hub | 45. Center cone |
| 15. 5th gear needle bearing (separated steel cage type) | 31. Low speed synchronizer key | 46. 2nd gear synchronizer inner ring |

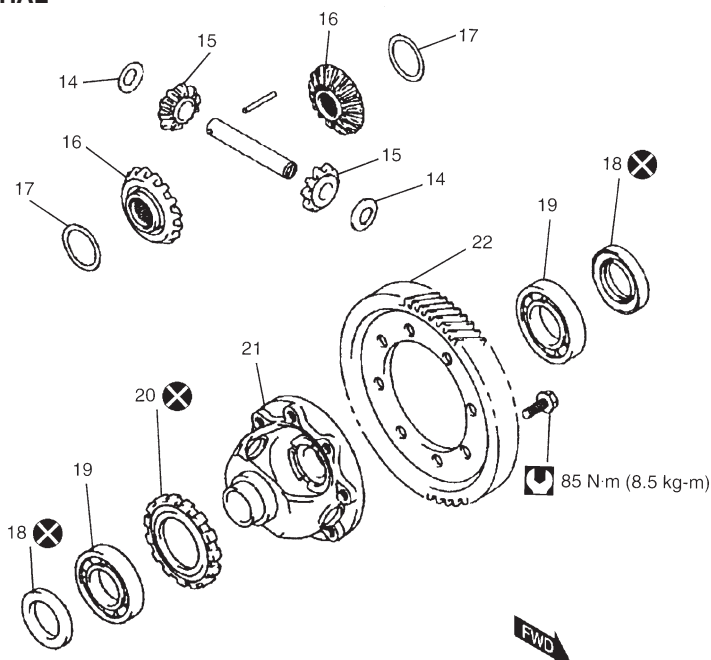
: Tightening Torque
 : Do not reuse



GEAR SHIFTER



1. Gear shift & select shaft
2. 5th & reverse gear shift cam
3. Gear shift interlock plate
4. Gear shift & select lever
5. Shift cable lever
6. Select cable lever
7. Low speed gear shift shaft
8. High speed gear shift shaft
9. 5th & reverse gear shift shaft
10. Reverse gear shift lever
11. 5th & reverse gear shift guide shaft
12. Reverse gear shift arm
13. 5th gear shift fork
14. Side gear washer
15. Differential side pinion gear
16. Differential side gear
17. Side gear washer
18. Differential side oil seal
19. Differential side bearing
20. Speed sensor ring
21. Differential case
22. Final gear
23. 5th to reverse interlock guide bolt:
Apply sealant, SUZUKI Bond No. 1215, 99000-31110 to bolt thread.
24. Gear shift interlock bolt:
Apply sealant, SUZUKI Bond No. 1215, 99000-31110 to bolt thread.
25. Reverse gear shift lever bolt:
Apply thread lock 99000-32110 to all around thread part of bolt.
26. 5th gear shift fork plug:
Apply thread lock 99000-32110 to all around thread part of plug.

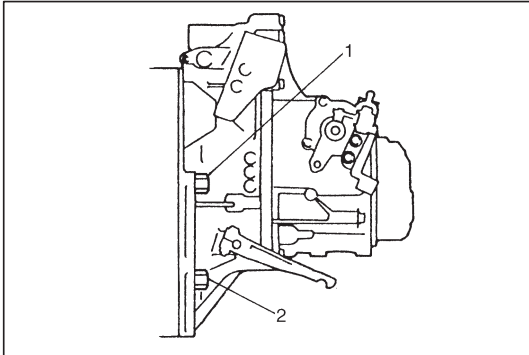
DIFFERENTIAL



 : Tightening Torque
 : Do not reuse

DISMOUNTING OF TRANSMISSION**UNDER HOOD**

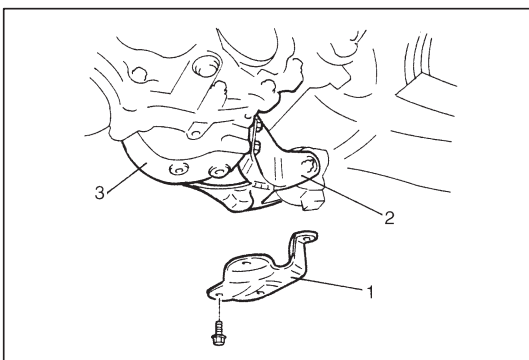
- 1) Disconnect negative cable at battery.
- 2) Undo wiring harness clamps, disconnect back up light switch coupler, VSS coupler and ground cable.
- 3) Disconnect clutch cable from clutch release lever and bracket.
- 4) Disconnect gear shift and select control cables.



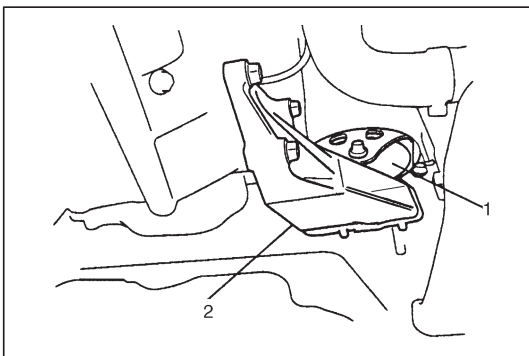
- 5) Remove bolt (2), and loosen bolt (1) which is unable to be removed due to interference of water pipe.
- 6) Remove starting motor taking out its bolts. Starting motor plate should also come down.
- 7) Support engine by using lifting device.

ON LIFT

- 8) Drain transmission oil referring to OIL CHANGE of ON-VEHICLE SERVICE in this section.
- 9) Remove left and right drive shaft referring to Section 4.
- 10) Remove left side of engine under cover.



- 11) Remove engine rear mounting bracket stiffener (1).
- 12) Remove clutch housing lower plate.
- 13) Remove engine rear mounting No.1 bracket (2) with No.2 bracket (3).
- 14) Remove transmission to engine bolt and nut.
- 15) Lower vehicle and support transmission with transmission jack.



- 16) Remove engine left mounting (1) with bracket (2).
- 17) Remove other attached parts from transmission, if any.
- 18) Pull transmission out so as to disconnect input shaft from clutch disc and then lower it.

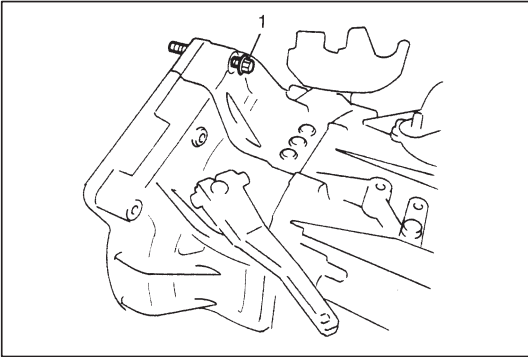
REMountING

CAUTION:

Care should be taken not to scratch oil seal lip with drive shaft while raising transmission.

Do not hit drive shaft joint with hammer when installing it into differential gear.

Remount transmission in reverse order of dismounting procedure noting the following.



- Set bolt (1) to the original position of transmission before mounting transmission assembly to engine assembly.

- Refer to the first figure of UNIT REPAIR OVERHAUL for fastener specified torque.
- Push in drive shaft joints (right & left) fully so as to snap ring of shaft engages with differential gear.
- Set each clamp for wiring securely.
- After connecting clutch cable, be sure to adjust its play properly. Refer to SECTION 7C.
- Fill transmission with oil as specified.
- Connect battery and check function of engine, clutch and transmission.

DISASSEMBLING UNIT**FIFTH GEARS**

- 1) Remove side cover bolts and take off transmission side cover.

CAUTION:

Care should be taken not to distort side cover when it is removed from left case.

- 2) Using special tool, remove circlip (1) and then hub plate (2).

Special Tool

(A): 09900-06107

- 3) Remove shift fork plug (1) and guide ball (2).

NOTE:

Use of magnet would facilitate removal of guide ball.

- 4) Drive out spring pin (3) by using special tool and hammer.

Special Tool

(B): 09922-85811

- 5) Remove circlip (4) by using circlip plier.

- 6) Remove gear shift fork (2), sleeve & hub assembly (3), synchronizer ring spring, synchronizer ring and 5th gear all together. Use gear puller (1) for removal if spline fitting of hub is tight.

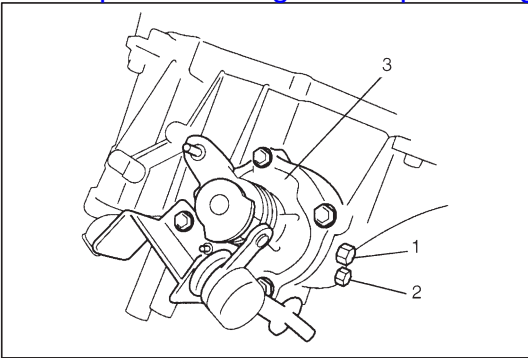
- 7) Unfasten caulking of countershaft nut, install input shaft 5th gear (1) and special tool to stop rotation of shafts, and then remove countershaft nut (2).

Special Tool

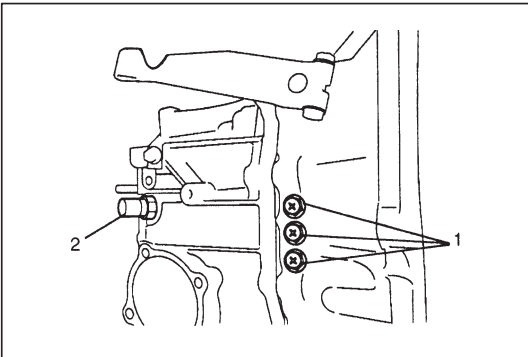
(C): 09927-76010

- 8) Remove special tool, input shaft 5th gear, needle bearing of separated steel cage type and then counter shaft 5th gear. Gear puller (4) would be necessary if spline fitting of counter shaft 5th gear (3) is tight.

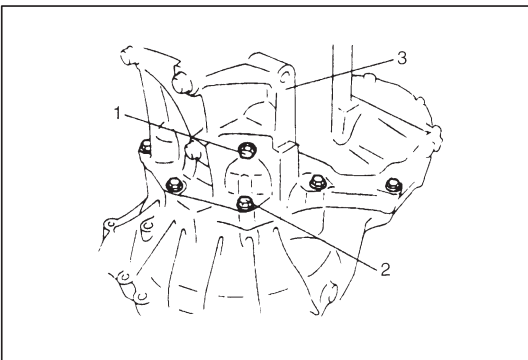
- 9) Remove plate screws (1) and take off left case plate (2), and then bearing set shim.

GEAR SHIFTER, INPUT SHAFT AND COUNTER SHAFT

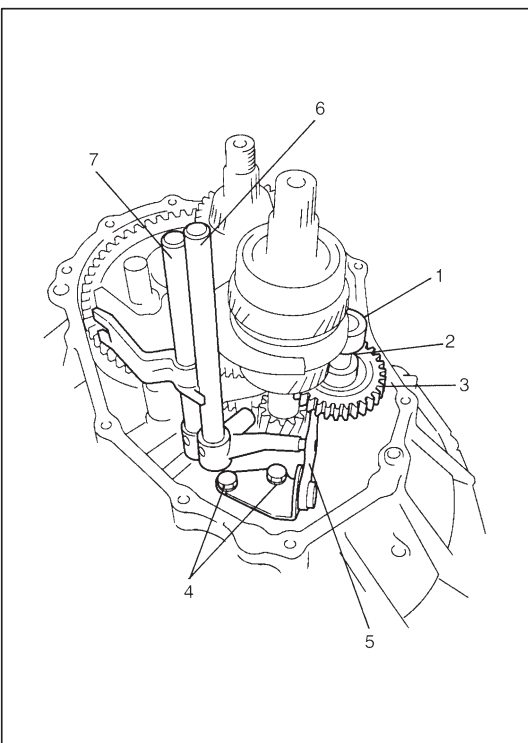
- 1) Remove gear shift interlock bolt (1) and 5th to reverse interlock guide bolt (2) from transmission case.
- 2) Remove gear shifter assembly (3).



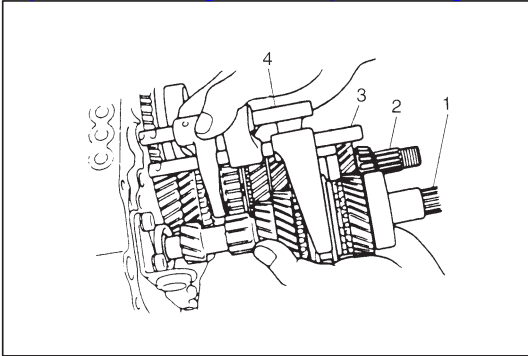
- 3) Remove gear shift locating bolts (1) with washers, then take out locating springs and steel balls.
- 4) Remove back up light switch (2).



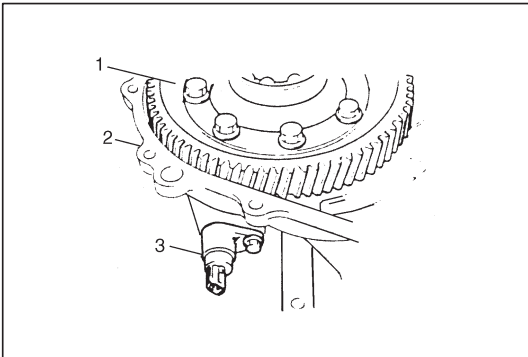
- 5) Remove reverse shaft bolt (1) with washer.
- 6) Remove case bolts (2) from outside and another bolts from clutch housing side.
- 7) Tapping left case (3) flanges with plastic hammer, remove left case.



- 8) Pull out reverse gear shaft (1) with washer (2), then take off reverse idler gear (3).
- 9) Remove reverse gear shift lever bolts (4), and reverse gear shift lever (5).
- 10) Pull out 5th & reverse gear shift guide shaft (6) together with 5th & reverse gear shift shaft (7).

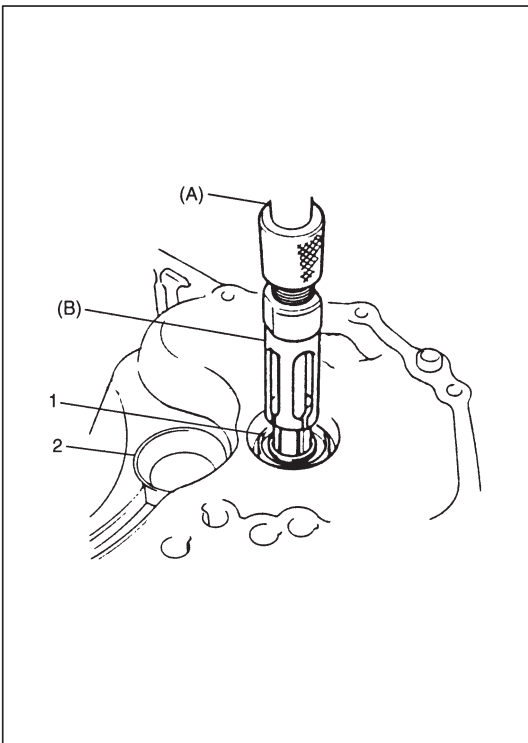


- 11) Tapping input shaft end with plastic hammer, push it out as assembly from case a little, then take out input shaft assembly (1), counter shaft assembly (2), high speed gear shift shaft (3) and low speed gear shift shaft (4) all at once.
- 12) Remove counter shaft left bearing cup from left case.
- 13) Remove differential side left oil seal also from left case.



RIGHT CASE

- 1) Remove differential gear assembly (1) from right case (2).
- 2) Remove bolt and then pull out VSS (3).



- 3) If input shaft right bearing has been left in right case, pull it out by using special tools.

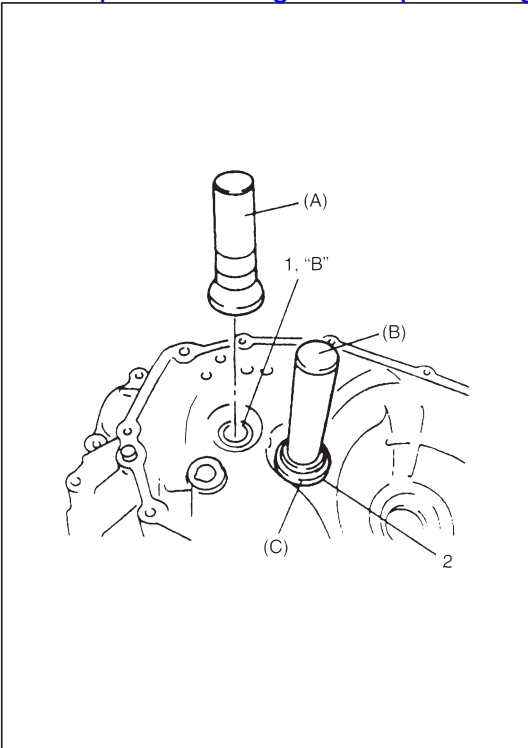
Remove input shaft oil seal (1) by using special tools.

Special Tool

(A): 09930-30102

(B): 09923-74510

- 4) Also pull out countershaft right bearing cup (2) by using special tools (bearing remover 09941-64511 with sliding shaft 09930-30102).

SUB ASSEMBLY SERVICE**NOTE:**

Before installation, wash each part and apply specified gear oil to sliding faces of bearing and gear.

RIGHT CASE

- 1) Install input shaft oil seal (1) facing its spring side upward. Use special tool and hammer for installation and apply grease to oil seal lip.

"B": SUZUKI SUPER GREASE A, 99000-25010

Special Tool

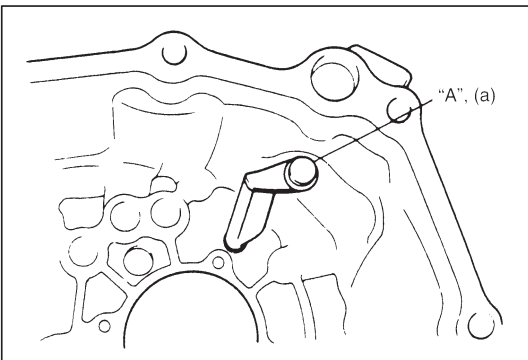
(A): 09951-76010

- 2) Install countershaft right bearing cup (2) by using special tools and hammer.

Special Tool

(B): 09924-74510

(C): 09925-68210

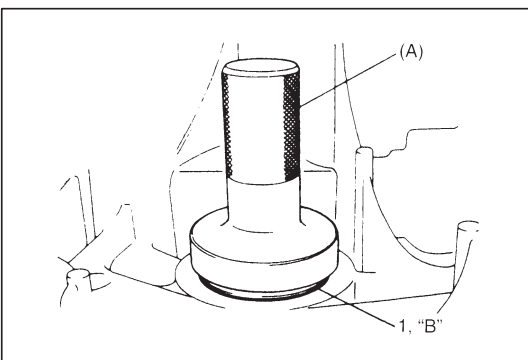
**LEFT CASE**

- 1) If input oil gutter has been removed, install it with bolt applied with thread lock cement.

"A": Thread lock 1322, 99000-32110

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 2) Install differential side left oil seal (1) facing its spring side inward until it becomes flush with case surface by using special tool with hammer, and then apply grease to its lip.

"B": SUZUKI SUPER GREASE A, 99000-25010

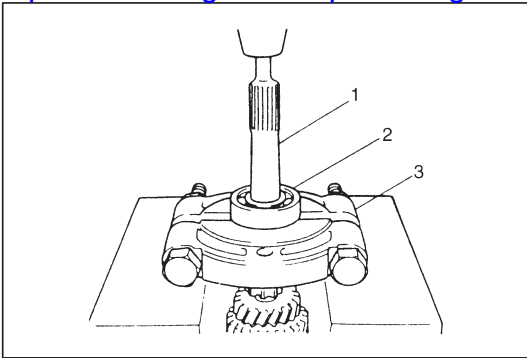
Special Tool

(A): 09913-75510

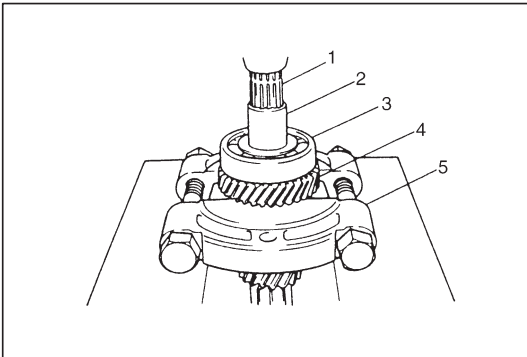
- 3) Install counter shaft left bearing cup into case bore by tapping it with plastic hammer lightly.

INPUT SHAFT ASSEMBLY**DISASSEMBLY**

- 1) Remove input shaft right bearing (2) from input shaft (1) by using bearing puller (3) and press.

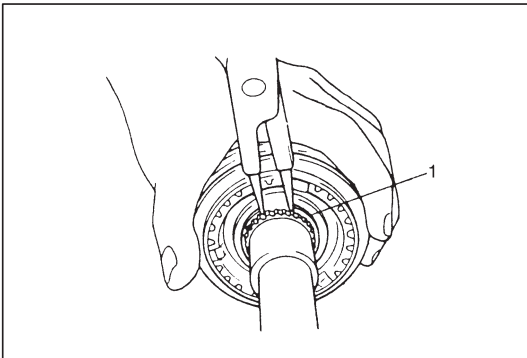


- 2) Drive out 5th gear spacer (2), left bearing (3) and 4th gear (4) all at once from input shaft (1) by using puller (5) and press.

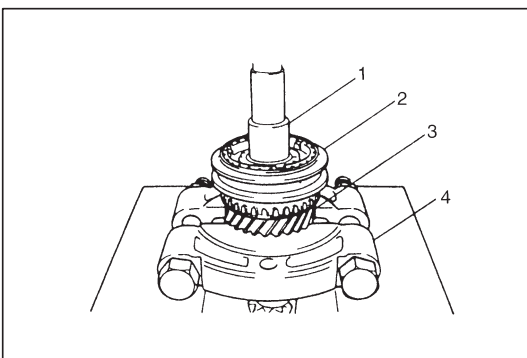
**CAUTION:**

To avoid gear tooth from being damaged, support it at flat side of bearing puller.

- 3) Take out 4th gear needle bearing and high speed synchronizer ring.
- 4) Using circlip pliers, remove circlip (1).

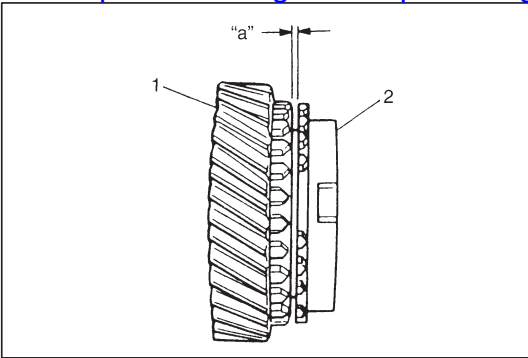


- 5) Drive out high speed synchronizer sleeve & hub assembly (2) together with 3rd gear (3) from input shaft (1) by using puller (4) and press.

**CAUTION:**

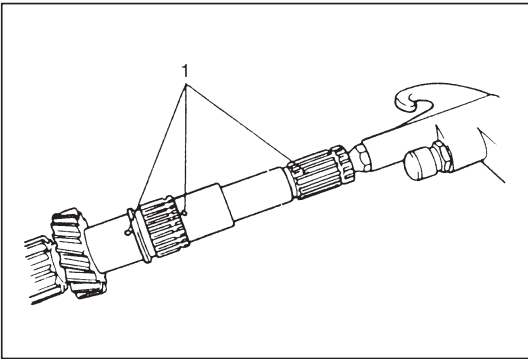
Make sure to use flat side of puller to avoid causing damage to 3rd gear tooth.

- 6) Take out 3rd gear needle bearing from shaft.
- 7) Disassemble synchronizer sleeve & hub assembly.

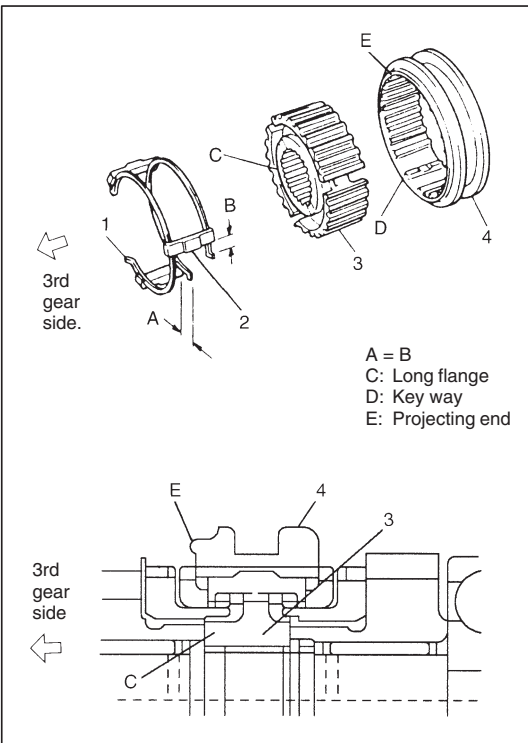
**INSPECTION AND REASSEMBLY**

- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) If synchronizer parts need to be repaired, check clearance "a" between ring (2) and gear (1), each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

Clearance "a": Standard 1.0 – 1.4 mm (0.039 – 0.055 in.)
Service limit 0.5 mm (0.019 in.)



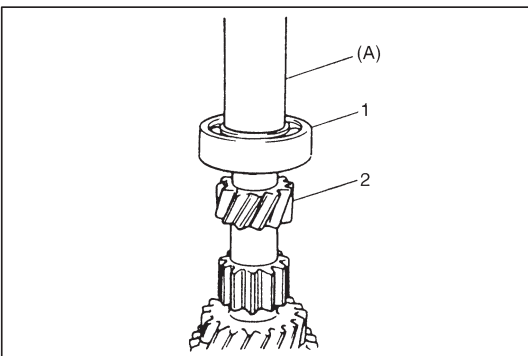
- 3) To ensure lubrication, air blow oil holes (1) and make sure that they are free from any obstruction.



- 4) Fit high speed synchronizer sleeve (4) to hub (3), insert 3 keys (2) in it and then set springs (1) as shown in figure.

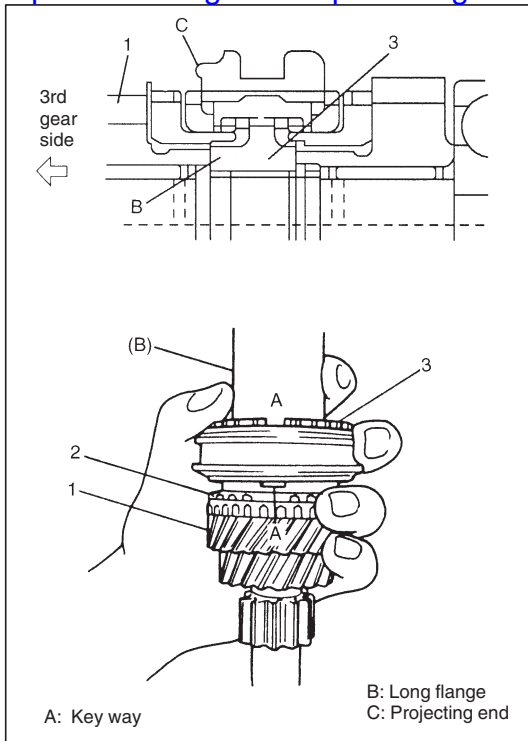
NOTE:

- No specific direction is assigned to each key but it is assigned as sleeve & hub assembly.
- Size of high speed synchronizer sleeve, hub, keys and springs is between those of low speed and 5th speed ones.



- 5) Drive in right bearing (1) to input shaft (2) by using special tool and hammer.

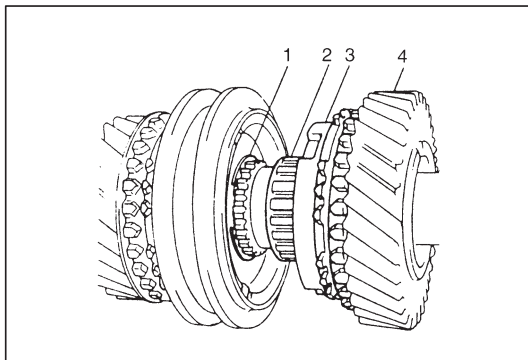
Special Tool
(A): 09913-80112



- 6) Install 3rd gear needle bearing of resin cage type, apply oil to it, then install 3rd gear (1) and synchronizer ring (2).
- 7) Drive in high speed sleeve & hub assembly (3) by using special tool and hammer, facing long flange side of hub to 3rd gear.

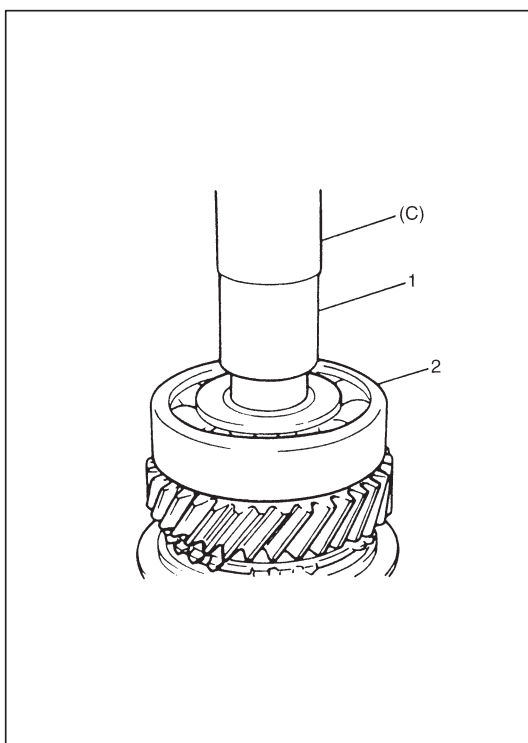
NOTE:

- While press-fitting sleeve & hub, make sure that synchronizer ring key slots are aligned with keys in sleeve & hub assembly.
- Check free rotation of 3rd gear after press-fitting sleeve & hub assembly.
- Synchronizer rings for 3rd and 4th are identical.

Special Tool**(B): 09913-84510**

- 8) Install circlip (1) and confirm that circlip is installed in groove securely.

Install needle bearing (2) of steel cage type, apply oil to bearing and then install synchronizer ring (3) and 4th gear (4).



- 9) Press-fit left bearing (2) by using special tool and hammer.

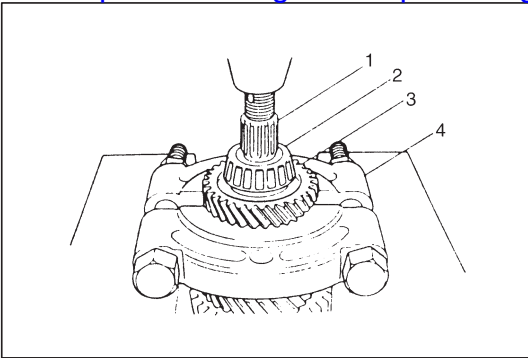
Special Tool**(C): 09925-98221**

- 10) Using the same special tool, drive in 5th gear spacer (1).

CAUTION:

To prevent 5th gear spacer from being distorted because of excessive compression, do not press-fit it with left bearing at once.

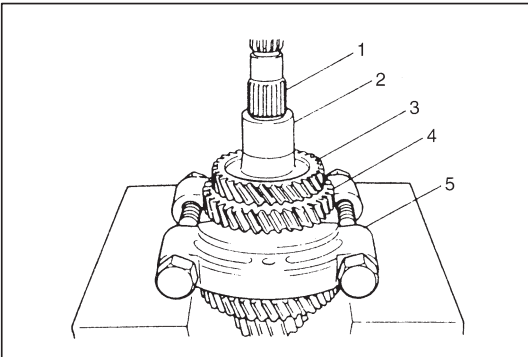
COUNTER SHAFT ASSEMBLY DISASSEMBLY



- 1) Drive out left bearing cone (2) with 4th gear (3) from counter shaft (1) by using puller (4) and press.

CAUTION:

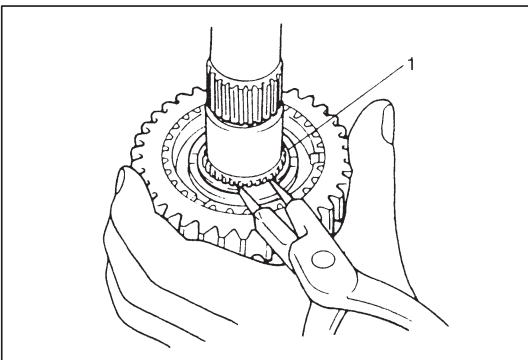
- Use puller and press that will bear at least 5 ton (11,000 lb) safely.
- To avoid tooth damage, support 4th gear at flat side of puller.



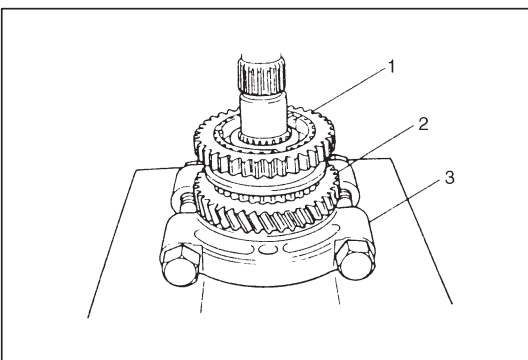
- 2) Apply puller (5) to 2nd gear (4) and drive out 3rd & 4th gear spacer (2) and 3rd gear (3) together with 2nd gear from counter shaft (1) by using press. Take out needle bearing of separated steel cage type from counter shaft.

CAUTION:

- If compression exceeds 5 ton (11,000 lb), release compression once, reset puller support and then continue press work again.
- To avoid gear tooth from being damaged, support it at flat side of bearing puller.



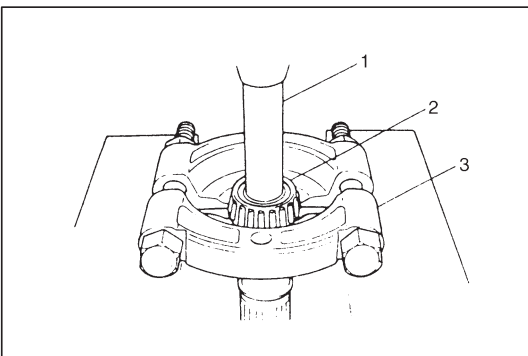
- 3) Take out 2nd synchronizer outer ring, center cone and inner ring.
- 4) Using circlip pliers, remove circlip (1).



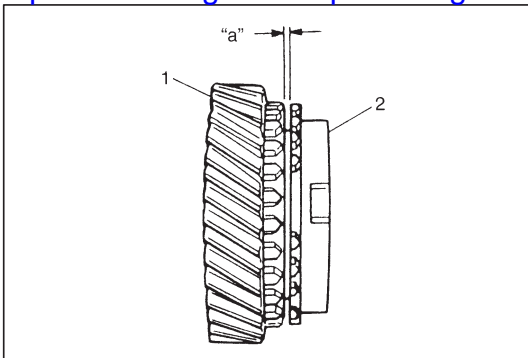
- 5) Apply puller (3) to 1st gear (2) and drive out low speed synchronizer sleeve & hub assembly (1) with gear by using press.

CAUTION:

- To avoid gear tooth from being damaged, support it at flat side of bearing puller.

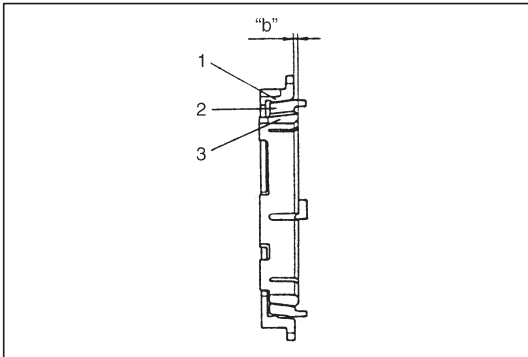


- 6) Disassemble synchronizer sleeve & hub assembly.
- 7) Take out needle bearing from shaft.
- 8) Remove right bearing cone (2) by using puller (3), metal stick (1) and press.

**INSPECTION AND REASSEMBLY**

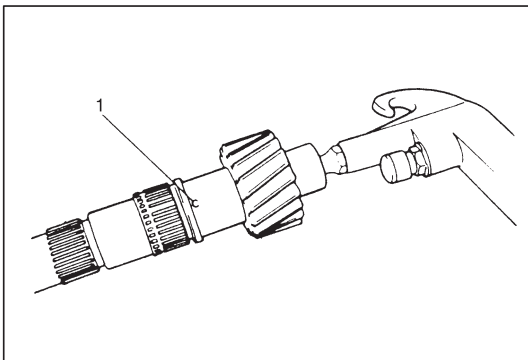
- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) If synchronizer parts need to be repaired, check clearance "a" between ring (2) and gear (1), each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

Clearance "a": Standard 1.0 – 1.4 mm (0.039 – 0.055 in.)
Service limit 0.5 mm (0.019 in.)

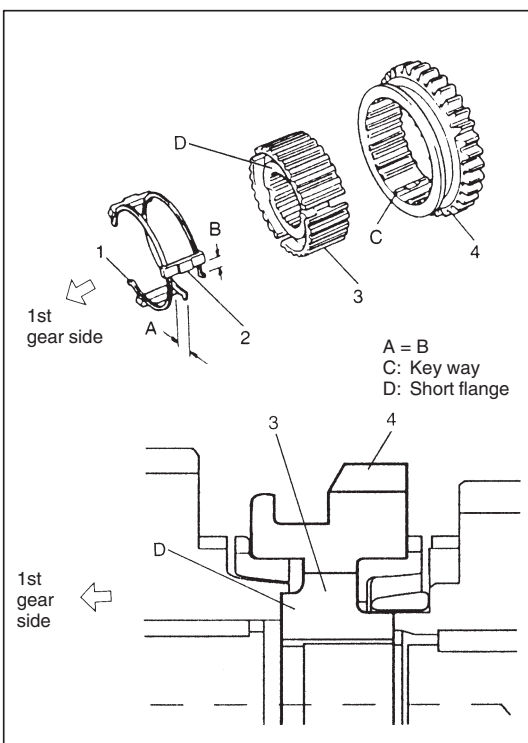


- 3) Put the synchronizer outer ring (1), inner ring (3) and the cone (2) together and then measure the step difference between the outer ring and the inner ring. And also check each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

Difference "b": Standard 1.0 – 1.4 mm (0.039 – 0.055 in.)
Service limit 0.5 mm (0.019 in.)



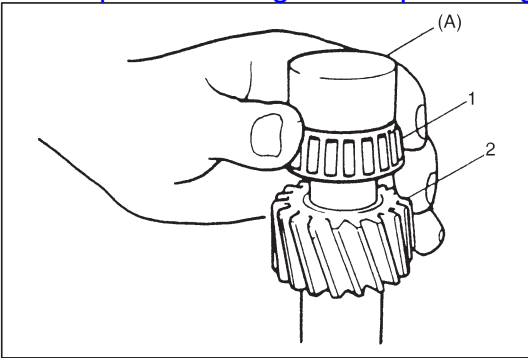
- 4) To ensure lubrication, air blow oil holes (1) and make sure that they are free from any obstruction.



- 5) Fit low speed synchronizer sleeve (4) to hub (3), insert 3 keys (2) in it and then set springs (1) as shown in figure.

NOTE:

- No specific direction is assigned to each key but it is assigned as sleeve & hub assembly.
- Size of low speed synchronizer keys and springs are the largest compared with those of high speed and 5th speed ones.

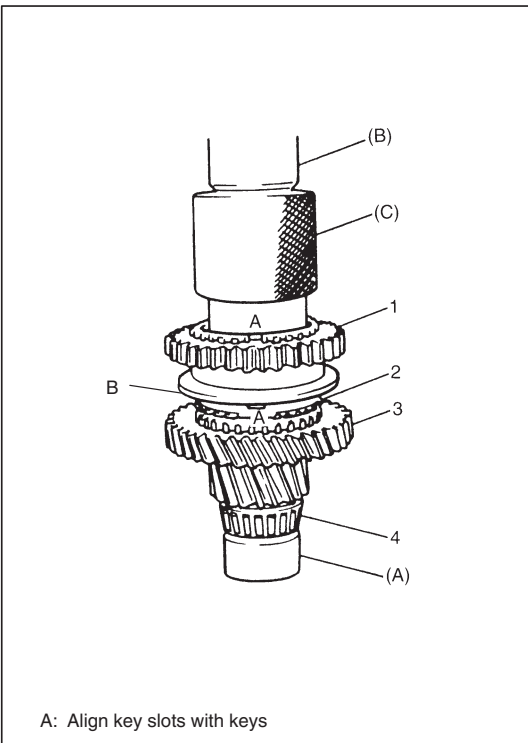


- 6) Install right bearing cone (1) to counter shaft (2) by using special tool and hammer.

Special Tool

(A): 09923-78210

- 7) Install needle bearing of resin cage type, apply oil to it, then install 1st gear and 1st gear synchronizer ring.



- 8) Drive in low speed sleeve & hub assembly (1) by using special tools and hammer, facing "B" side of sleeve to 1st gear.

NOTE:

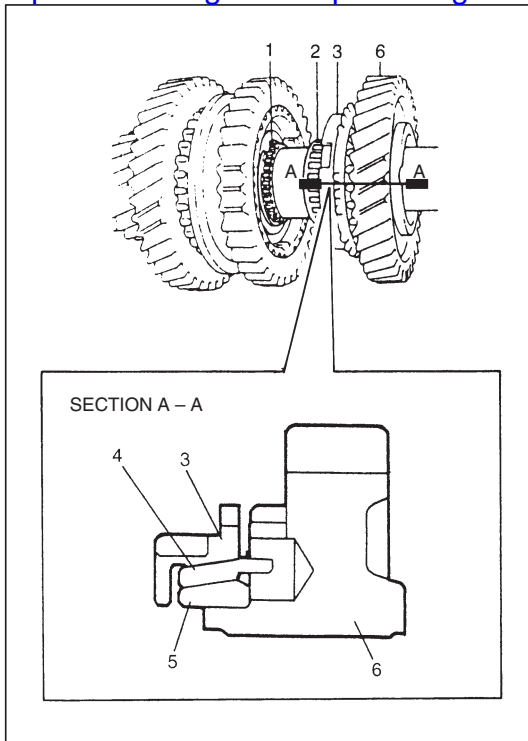
- Support shaft with special tool as shown in figure so that retainer of bearing cone (4) will be free from compression.
- Make sure that synchronizer ring (2) key slots are aligned with keys while press-fitting sleeve & hub assembly.
- Check free rotation of 1st gear (3) after press-fitting sleeve & hub assembly.

Special Tool

(A): 09923-78210

(B): 09925-18010

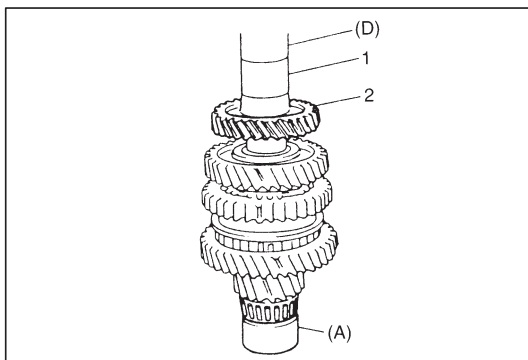
(C): 09940-53111



- 9) Install circlip (1) and confirm that circlip is installed in groove securely.

Install needle bearing (2) of separated steel cage type, apply oil to bearing.

With synchronizer outer ring (3), center cone (4) & inner ring (5) put together and installed to 2nd gear (6) as shown in figure.



- 10) Press-fit 3rd gear (2) and spacer (1) by using special tools and press.

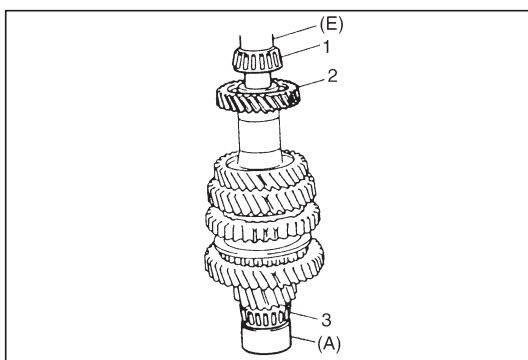
CAUTION:

Press-fit 3rd gear and spacer first, and then 4th gear later separately so that counter shaft will not be compressed excessively.

Special Tool

(A): 09923-78210

(D): 09913-80112



- 11) Press-fit 4th gear (2) by using the same procedure as the above.

- 12) Install left bearing cone (1) by using special tools and hammer.

NOTE:

For protection of right bearing cone (3), always support shaft with special tool as illustrated.

Special Tool

(A): 09923-78210

(E): 09925-98221

GEAR SHIFTER**GEAR SHIFT AND SELECT SHAFT ASSEMBLY**

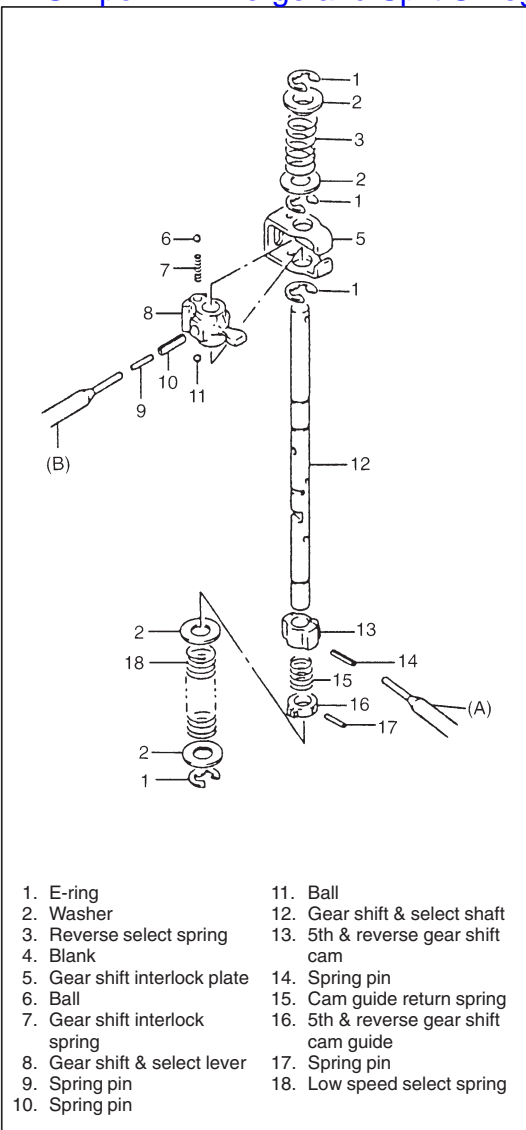
- 1) To disassemble component parts, use special tools and 2.8–3.0 mm (0.11 in.) pin remover in addition.

Special Tool**(A): 09922-85811(4.5 mm)****(B): 09925-78210 (6.0 mm)**

- 2) Clean all parts thoroughly, inspect them and replace with new ones as required.
- 3) Assemble component parts by reversing removal procedure.

NOTE:

- When driving in spring pins, prevent shaft from being bent by supporting it with wood block.
- Assemble 5th & reverse gear shift cam by winding cam guide return spring, and then drive in spring pin.
- Distinguish low speed spring (No paint) (18) from reverse select spring (Pink) (3).

**HIGH SPEED AND LOW SPEED GEAR SHIFT SHAFTS INSPECTION**

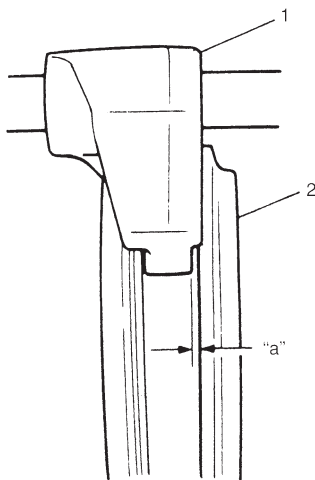
- 1) Using feeler gauge, check clearance between fork (1) and sleeve (2) and replace those parts if it exceeds limit below.

NOTE:

For correct judgement of parts replacement, carefully inspect contact portion of fork and sleeve.

Clearance "a": Service limit 1.0 mm (0.039 in.)

- 2) Insert each gear shift shaft into case and check that it moves smoothly. If it doesn't, correct by using oilstone, reamer or the like.



5TH & REVERSE GEAR SHIFTER

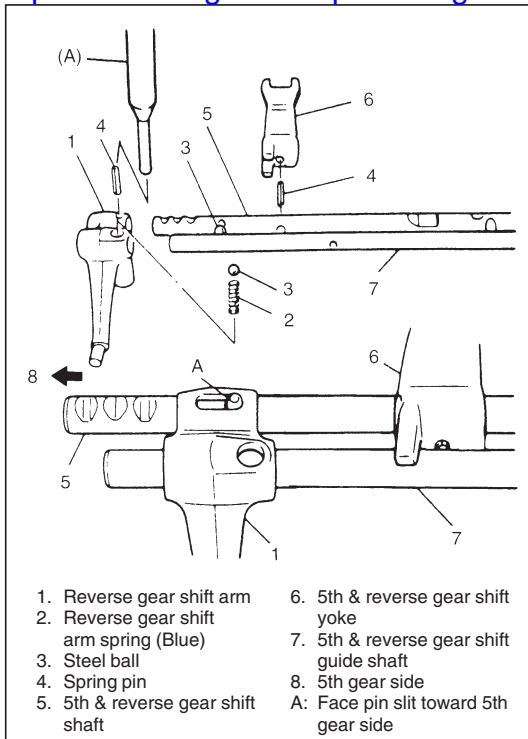
- 1) Disassemble component parts by using special tool and hammer.

Special Tool**(A): 09922-85811 (4.5 mm)**

- 2) Replace or correct parts as required and assemble shafts making sure that component parts are in proper order as shown in figure.

NOTE:

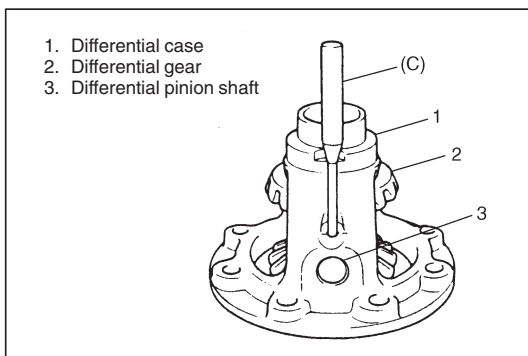
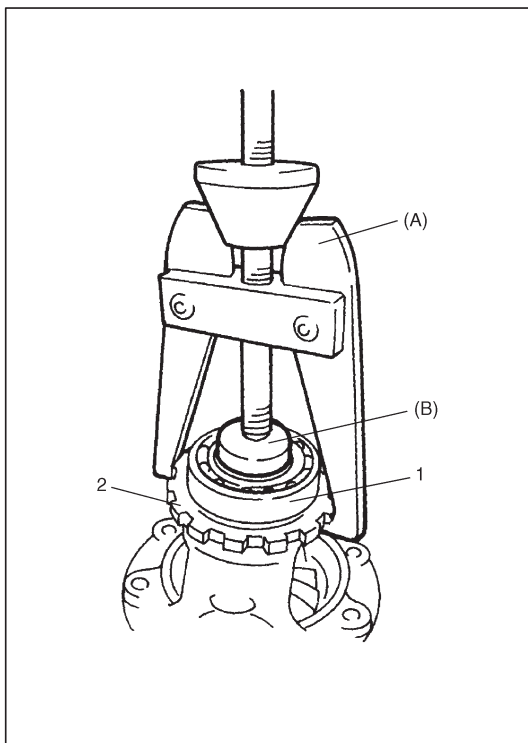
- Distinguish reverse gear shift arm spring (Blue) (2) from low speed locating spring (Yellow).
- Install 2 steel balls (3) in reverse gear shift arm (1) without fail.
- Drive in spring pin for reverse shift arm facing slit A toward front.

**DIFFERENTIAL ASSEMBLY****DISASSEMBLY**

- 1) Using special tools, remove right bearing (1) and sensor rotor (2).

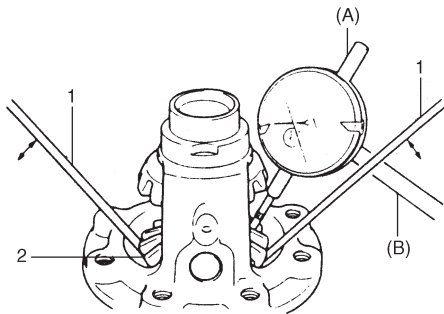
Special Tool**(A): 09913-60910****(B): 09925-88210**

- 2) Remove left bearing in the same manner.
- 3) Support differential case with soft jawed vise and remove final gear bolts then take out final gear.



- 4) Using special tool and hammer, drive out differential side pinion shaft pin and then disassemble component parts.

Special Tool**(C): 09922-85811 (4.5 mm)**

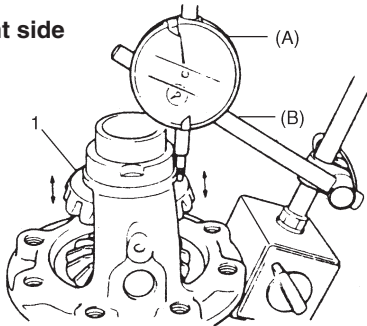
Left side**ADJUSTMENT AND REASSEMBLY**

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

- 1) Assemble differential gear and measure thrust play of differential gear as follows.

Special Tool**(A): 09900-20606****(B): 09900-20701****Differential gear thrust play:****0.03 – 0.31 mm (0.001 – 0.012 in.)****Left side**

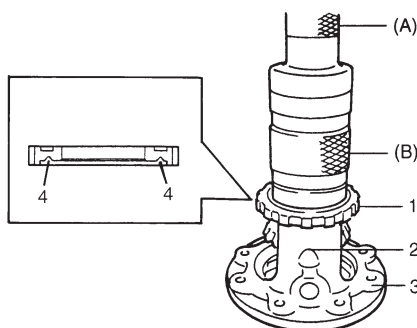
- Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear.
- Using 2 screwdrivers (1), move gear (2) up and down and read movement of dial gauge pointer.

Right side**Right side**

- Using similar procedure to the above, set dial gauge tip to gear (1) shoulder.
- Move gear up and down by hand and read dial gauge.

- 2) If thrust play is out of specification, select suitable thrust washer from among the following available size, install it and check again that specified gear play is obtained.

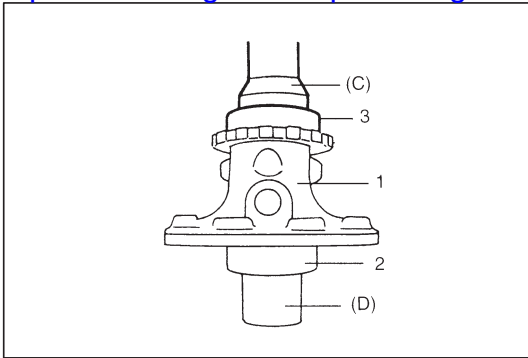
Available thrust washer thickness	0.9, 0.95, 1.0, 1.05, 1.1, 1.15 and 1.2 mm (0.035, 0.037, 0.039, 0.041, 0.043, 0.045, and 0.047 in.)
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- 3) Drive in differential side pinion shaft pin (2) till the depth from differential case (3) surface is about 1 mm (0.04 in.).

- 4) Press-fit new sensor rotor (1) with groove (4) side downward as shown by using special tools and copper hammer.

Special Tool**(A): 09913-75510****(B): 09940-54910**

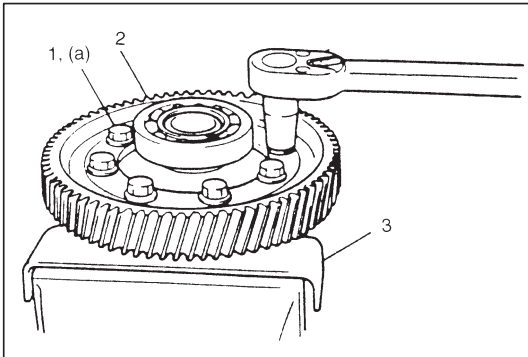


- 5) Press-fit left bearing by using special tools and copper hammer.
- 6) Support differential assembly (1) as illustrated so as to left bearing (2) is floating, and then press-fit right bearing (3) like left bearing in Step 5).

Special Tool

(C): 09951-76010

(D): 09951-16060



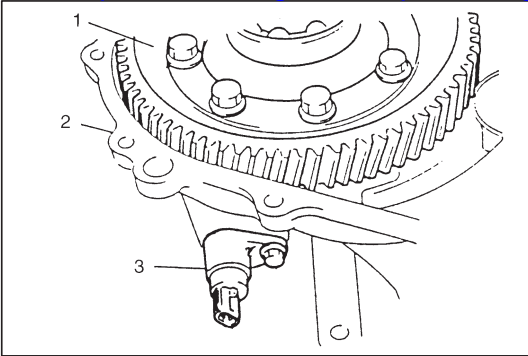
- 7) Hold differential assembly with soft jawed vise (3), install final gear (2) and then tighten bolts (1) to specified torque.

CAUTION:

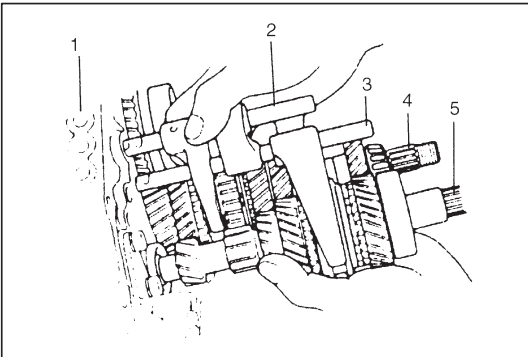
Use of any other bolts than specified ones is prohibited.

Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

**ASSEMBLING UNIT****DIFFERENTIAL TO LEFT CASE**

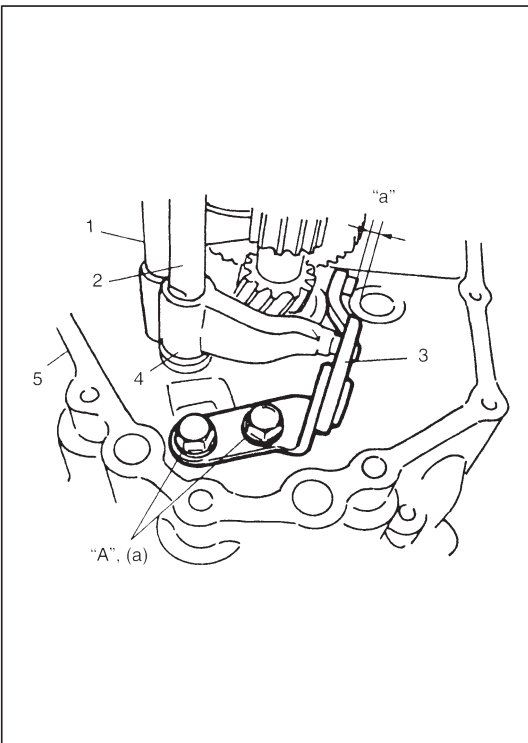
- 1) Install differential assembly (1) into right case (2).
- 2) Insert VSS (3) applied with oil to its O-ring, then tighten it with bolt.



- 3) Join input shaft (5), countershaft (4), low speed gear shift shaft (2) and high speed gear shift shaft (3) assemblies all together, then install them into right case (1).

NOTE:

- Input shaft right bearing on shaft can be installed into right case by tapping shaft with plastic hammer.
- Check to make sure that counter shaft is engaged with final gear while installing.



- 4) Install 5th & reverse gear shift shaft (1) with 5th & reverse gear shift guide shaft (2) into right case (5). Reverse gear shift arm (4) has to be joined with reverse gear shift lever (3) at the same time.
- 5) Place reverse gear shift lever, fasten it with bolts after applying thread lock cement.

“A”: Thread lock cement, 99000-32110

Tightening Torque

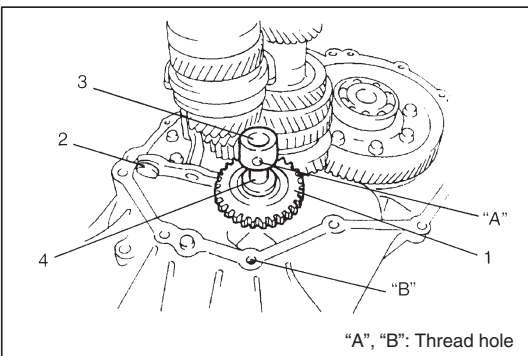
(a): 23 N·m (2.3 kg·m, 17.0 lb·ft)

NOTE:

- When installing reverse gear shift lever, set distance “a” between lever end and shaft bore to be 5 mm (0.2 in.).

Distance “a”: 5 mm (0.2 in.)

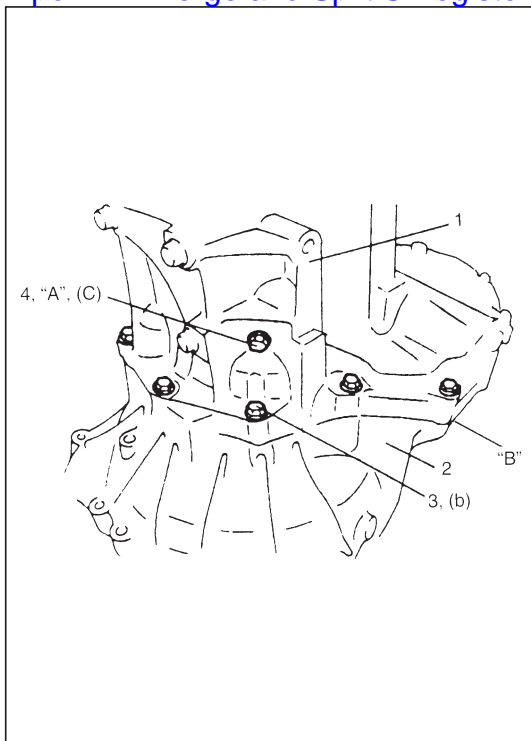
- Distance “a” can be measured by installing reverse gear shaft provisionally.
- When “a” is 5 mm (0.2 in.), clearance between reverse idler gear groove and shift lever end will be 1 mm (0.04 in.).



- 6) Make reverse idler gear (1) with reverse gear shift lever (2), insert reverse gear shaft (3) into case through idler gear and then align “A” in shaft with “B” in case.

NOTE:

- Make sure that washer (4) has been installed in shaft at above the gear.
- Check to confirm that reverse gear shift lever end has clearance 1 mm (0.04 in.) to idler gear groove.



- 7) Clean mating surfaces of both right and left cases, coat mating surface of left case (1) with sealant evenly then mate it with right case (2).

"B": Sealant, Bond No.1215, 99000-31110

- 8) Tighten case bolts (3) from left case side to specified torque.

Tightening Torque

(b): 19 N·m (1.9 kg-m, 14.0 lb-ft)

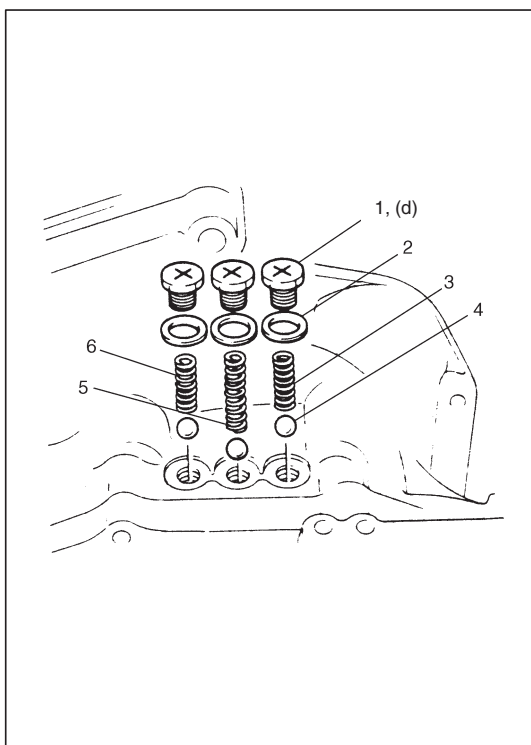
- 9) Install reverse shaft bolt (4) applied with thread lock cement with aluminum washer and tighten it.

"A": Thread lock 1322, 99000-32110

Tightening Torque

(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 10) Install another case bolts from clutch housing side and tighten them to specification.



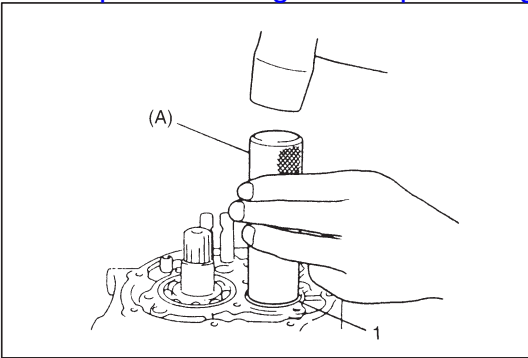
- 11) Check locating spring for deterioration and replace with new one as necessary.

Locating spring free length	Standard	Service Limit
Low speed (3) and 5th & reverse (6)	26.1 mm (1.028 in.)	25.0 mm (0.984 in.)
High speed (5)	40.1 mm (1.579 in.)	39.0 mm (1.535 in.)

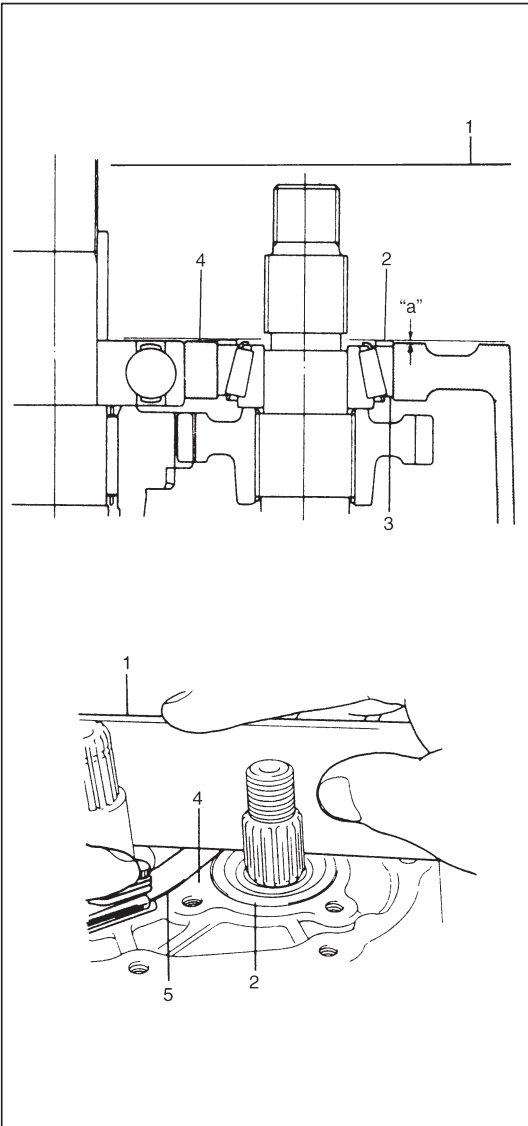
- 12) Install steel ball (4) and locating spring for respective gear shift shaft and tighten with bolt (1) and washer (2).

Tightening Torque

(d): 13 N·m (1.3 kg-m, 9.5 lb-ft)

**FIFTH GEARS**

- 1) To seat countershaft left bearing cup (1) to bearing cone, tap cup by using special tool and plastic hammer.

Special Tool**(A): 09913-84510**

- 2) Put a shim (2) on bearing cup (3) provisionally, place straight edge (1) over it and compress it by hand through straight edge, and then measure "a" (Clearance between case surface (4) and straight edge) by using feeler gauge (5).

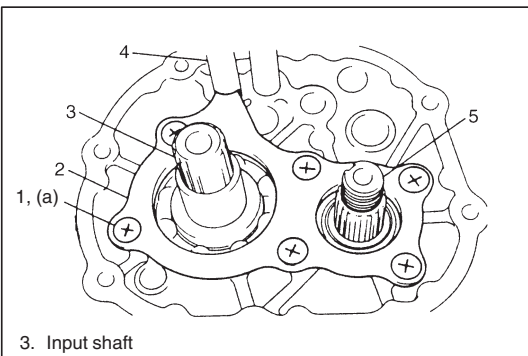
Clearance "a": 0.08 – 0.12 mm (0.0032 – 0.0047 in.)
(Shim protrusion)

- 3) By repeating above step, select a suitable shim which adjusts clearance "a" to specification and put it on bearing cup.

NOTE:

Insert 0.1 mm (0.004 in.) feeler to know whether or not a shim fulfills specification quickly.

Available shim thickness	0.40, 0.45, 0.50, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0, 1.05, 1.1 and 1.15 mm (0.015, 0.017, 0.019, 0.021, 0.023, 0.025, 0.027, 0.029, 0.031, 0.033, 0.035, 0.037, 0.039, 0.041, 0.043 and 0.045 in.)
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- 4) Place left case plate (2) inserting its end in groove of shift guide shaft (4) and then tighten it with new screws (1).

CAUTION:

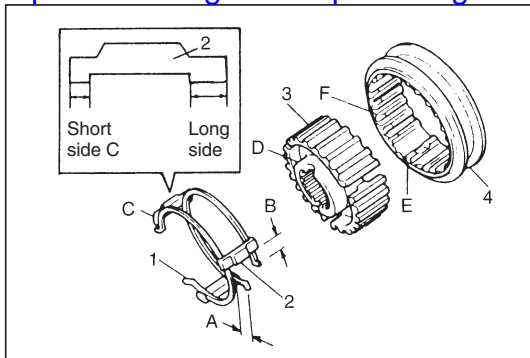
Be sure to use new screws with pre-coating adhesive. Otherwise, screws may loosen.

NOTE:

After tightening screws, make sure that counter shaft (5) can be rotated by hand feeling some load.

Tightening Torque

(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)



- 5) Assemble 5th speed synchronizer sleeve (4) and hub (3) with keys (2) and springs (1).

NOTE:

Short side C in keys, long flange D in hub and chamfered spline F in sleeve should face inward (5th gear side).

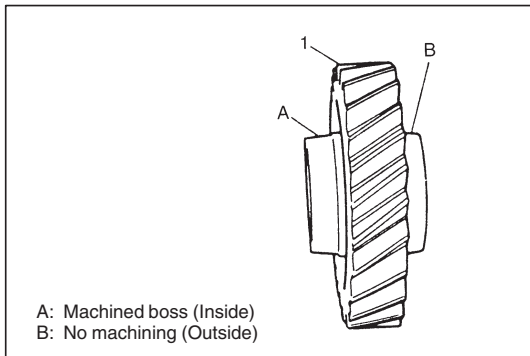
A = B

C: Short side (Inward)

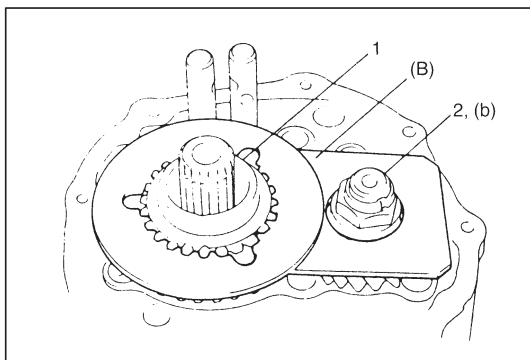
D: Long flange (Inward)

E: Key way

F: Chamfered spline (Inward)



- 6) Install 5th gear (1) to counter shaft facing machined boss A inward.



- 7) Install needle bearing of separated steel cage type to input shaft, apply oil then install 5th gear (1) and special tool to stop shaft rotation.

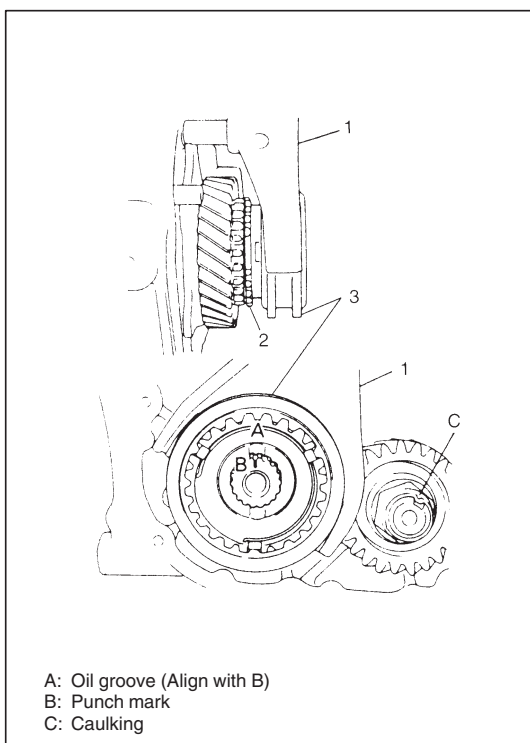
Special Tool

(B): 09927-76010

- 8) Install new countershaft nut (2) and tighten it to specification.

Tightening Torque

(b): 70 N·m (7.0 kg-m, 51.0 lb-ft)



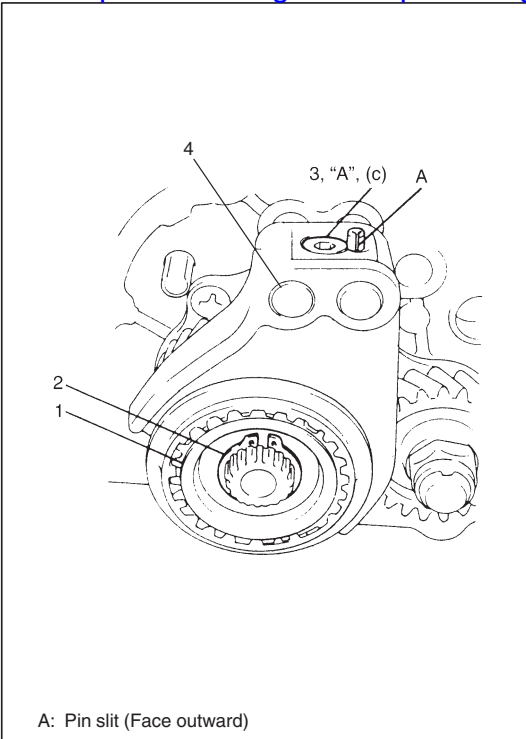
- 9) Remove special tool, then caulk nut at C with caulking tool and hammer.

- 10) Install synchronizer ring (2).

- 11) Fit 5th gear shift fork (1) to sleeve & hub assembly (3) and install them into input shaft, shift shaft and shift guide shaft at once aligning hub oil groove A with shaft mark B.

NOTE:

Long flange of hub faces inward (gear side).



- 12) Drive in spring pin facing its slit A outward.
- 13) Install steel ball, tighten shift fork plug (3) applied with thread lock cement.

“A”: Thread lock 1322, 99000-32110

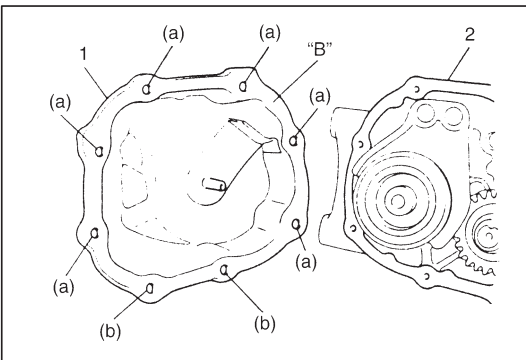
Tightening Torque

(c): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 14) Fit hub plate (1) and fix it with circlip (2).
- 15) Install circlip (4) to the end of 5th & reverse gear shift guide shaft.

CAUTION:

- Coat shift fork plug with thread lock cement reasonably. If it is done to much, excess may interfere in ball movement and cause hard shift to 5th speed.
- Make sure circlip is installed in shaft groove securely.



- 16) Clean mating surface of both left case (2) and side cover (1), coat mating surface with sealant evenly, mate it with left case and then tighten bolts.

“B”: Sealant Bond No. 1215, 99000-31110

Tightening Torque:

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

GEAR SHIFT AND SELECT SHAFT ASSEMBLY

- 1) Clean mating surface of guide case.
- 2) Apply grease to select lever shaft bush and select lever washer, and install gear shift and select shaft assembly with new gasket into transmission.

“A”: Grease A, 99000-25010

- 3) Apply sealant to gear shift guide case No. 2 bolt (5). Tighten gear shift guide case No. 1 bolts (1) and No. 2 bolt (5) to specified torque at the position that clearance “a” is within 1 – 1.5 mm (0.04 – 0.06 in.).

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 4) Install washer and gear shift interlock bolt (2) applied with sealant and then tighten it to specified torque.

“B”: Sealant, Bond No.1215, 99000-31110

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 5) Install washer and 5th to reverse interlock guide bolt (3) applied with sealant and then tighten it to specified torque.

“B”: Sealant, Bond No. 1215, 99000-31110

Tightening Torque

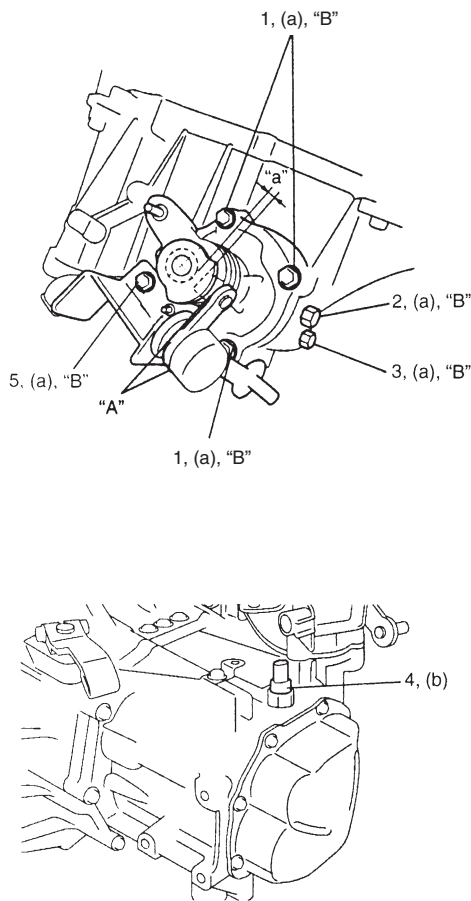
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 6) Tighten back up light switch (4) to specified torque.

Tightening Torque

(b): 19 N·m (1.9 kg-m, 14.0 lb-ft)

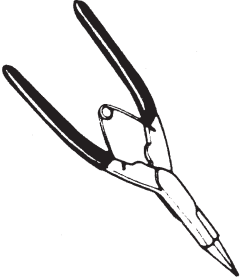
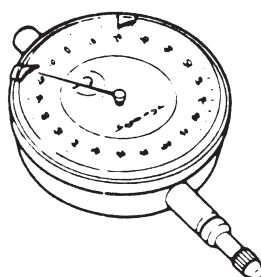
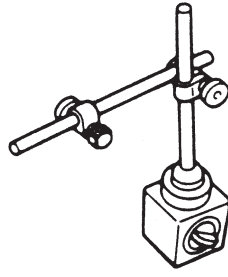
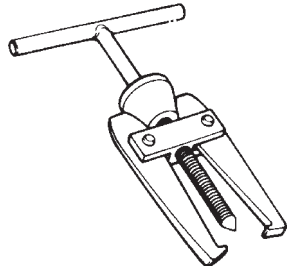
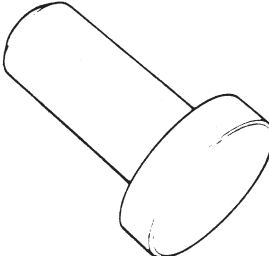

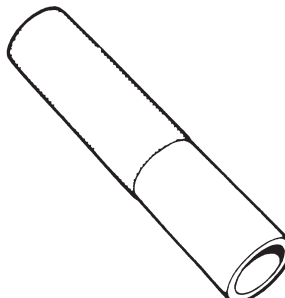
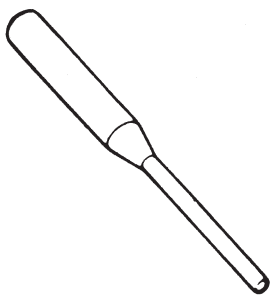
- 7) Check input shaft for rotation in each gear position.
- 8) Also confirm function of back up light switch in reverse position by using ohmmeter.

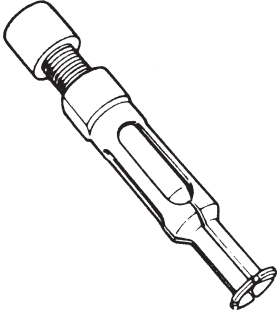
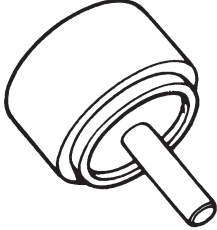
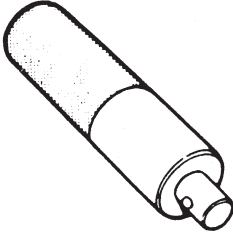
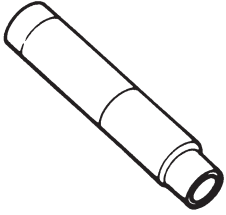
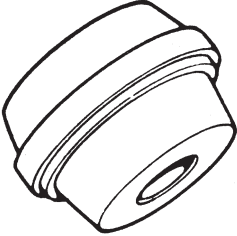
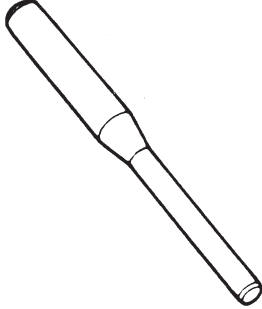
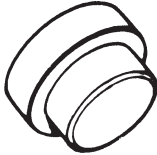
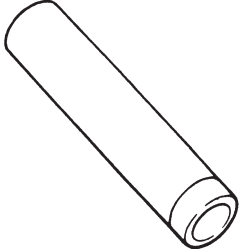
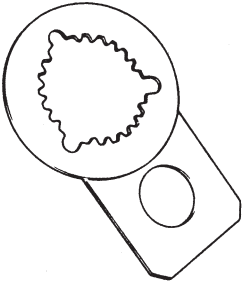
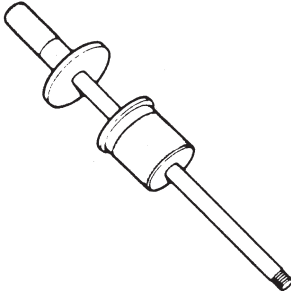
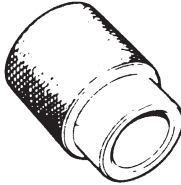

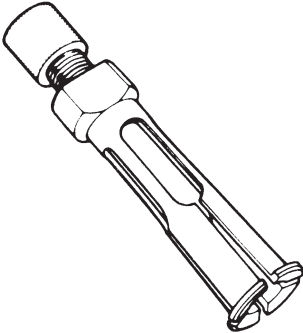
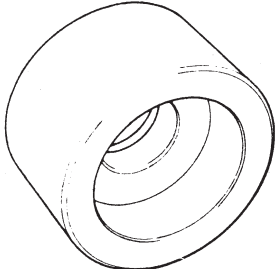
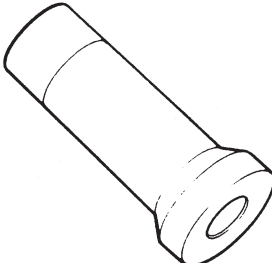


REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCTS	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> ● Oil seal lips
Sealant	SUZUKI BOND NO.1215 (99000-31110)	<ul style="list-style-type: none"> ● Oil drain plug and filler/level plug ● Gear shift shaft bolt ● Mating surface of transmission case ● Mating surface of side cover ● Gear shift interlock bolt ● 5th to reverse interlock guide bolt
Thread lock cement	THREAD LOCK 1322 (99000-32110)	<ul style="list-style-type: none"> ● Reverse gear shift lever bolts ● Oil gutter bolt ● Left case plate screws ● Shift fork plug ● Reverse shaft bolt

SPECIAL TOOLS

 <p>09900-06107 Snap ring pliers (Opening type)</p>	 <p>09900-20606 Dial gauge</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09913-60910 Bearing puller</p>
 <p>09913-75510 Bearing installer</p>	 <p>09913-80112 Bearing installer</p>	 <p>09913-84510 Bearing installer</p>	 <p>09922-85811 Spring pin remover 4.5 mm</p>

 <p>09923-74510 Bearing remover</p>	 <p>09923-78210 Bearing installer</p>	 <p>09924-74510 Installer attachment</p>	 <p>09925-18010 Bearing installer</p>
 <p>09925-68210 Bearing outer race installer</p>	 <p>09925-78210 Spring pin remover 6 mm</p>	 <p>09925-88210 Bearing puller attachment</p>	 <p>09925-98221 Bearing installer</p>
 <p>09927-76010 Gear holder</p>	 <p>09930-30102 Sliding shaft</p>	 <p>09940-53111 Bearing installer</p>	 <p>09940-54910 Sensor rotor installer</p>
 <p>09941-64511 Bearing remover</p>	 <p>09951-16060 Bush remover</p>	 <p>09951-76010 Bearing installer</p>	

SECTION 7B

AUTOMATIC TRANSMISSION (4 A/T)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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[Simpopdf Merge and Split Unregistered Version - http://www.simpopdf.com](http://www.simpopdf.com)

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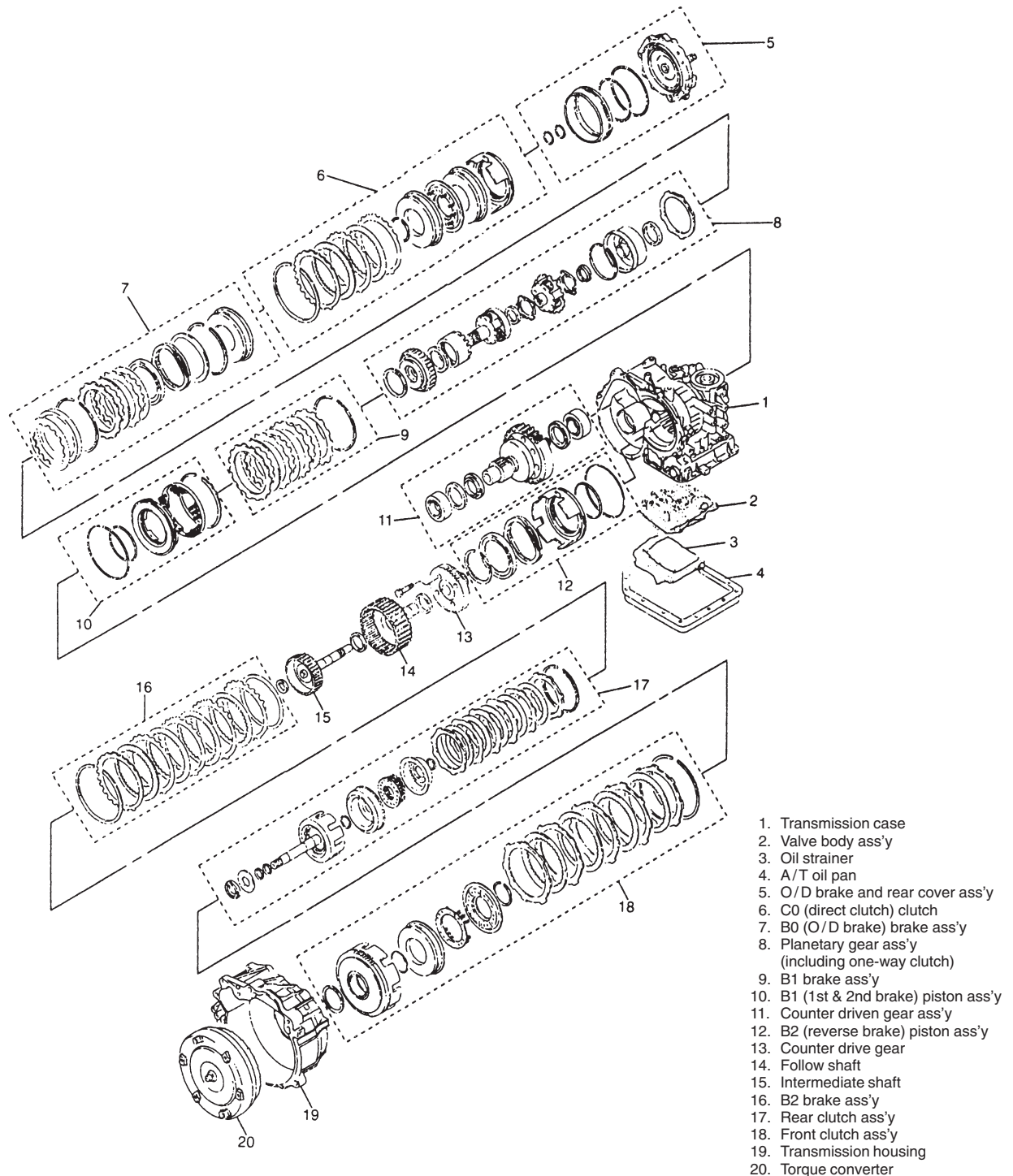
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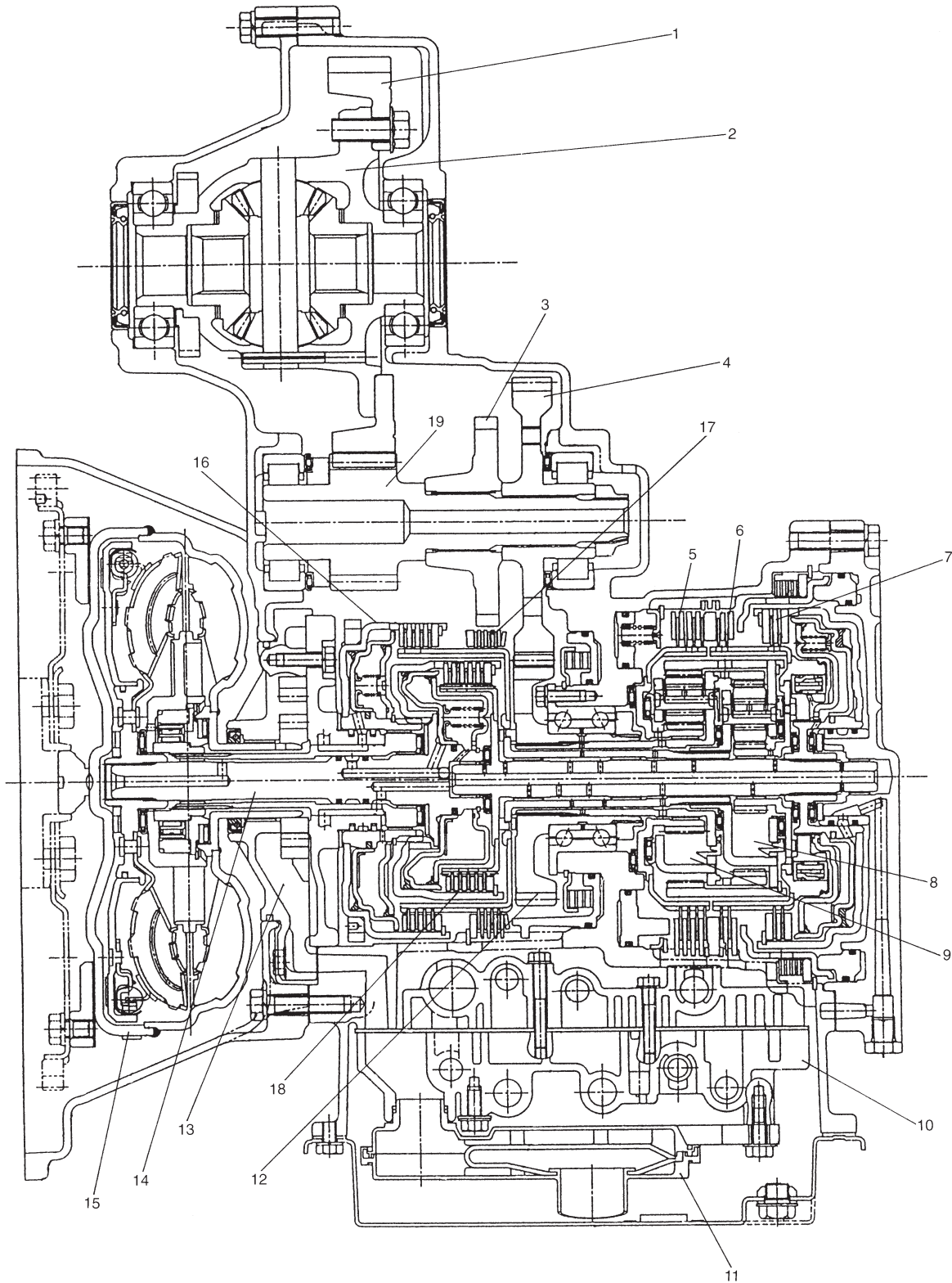
This automatic transmission is a full automatic type with 3-speed plus overdrive (O/D).

The torque converter is a 3-element, 1-step and 2-phase type equipped with lock-up mechanism. The gear shift device consists of 2 sets of planetary gear units, 3 sets of disc type clutches, 3 sets of disc type brakes and one-way clutch. The gear shift is done by selecting one of 6 positions ("P", "R", "N", "D", "2" and "L") by means of the select lever installed on the floor. On the shift knob, there is an overdrive (O/D) cut switch which allows shift-up to the overdrive mode and shift-down from the overdrive mode.

NOTE:

Oil pump and differential gear are not shown in this figure.





- | | | |
|----------------------------|-------------------------|-------------------------------------|
| 1. Final gear | 7. Direct clutch (C0) | 13. Oil pump |
| 2. Differential gear ass'y | 8. Rear planetary gear | 14. Input shaft |
| 3. Parking gear | 9. Front planetary gear | 15. Torque converter |
| 4. Counter driven gear | 10. Valve body ass'y | 16. Front clutch (C2) |
| 5. 1st and 2nd brake (B1) | 11. Oil strainer | 17. Reverse brake (B2) |
| 6. Overdrive brake (B0) | 12. Counter drive gear | 18. Rear clutch (C1) |
| | | 19. Differential drive pinion shaft |

Item		Specifications			
Torque converter	Type Stall torque ratio	3-element, 1-step, 2-phase type 1.75			
Oil pump	Type Drive system	Internal gear type oil pump Engine driven			
Gear change device	Type	Forward 4-step, reverse 1-step planetary gear type			
	Shift position	“P” range	Gear in neutral, output shaft fixed, engine start		
		“R” range	Reverse		
		“N” range	Gear in neutral, engine start		
		“D” range (O/D ON)	Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change		
		“D” range (O/D OFF)	Forward 1st ↔ 2nd ↔ 3rd ← 4th automatic gear change		
		“2” range	Forward 1st ↔ 2nd ← 3rd automatic gear change		
Gear change device		“L” range	Forward 1st ← 2nd reduction, and fixed at 1st gear		
	Gear ratio	1st	2.962	Number of teeth	Front sun gear : 34
		2nd	1.515		Rear sun gear : 21
		3rd	1.000		Front pinion gear : 16
		4th (overdrive gear)	0.737		Rear pinion gear : 19
		Reverse (reverse gear)	2.809		Front internal gear : 66
					Rear internal gear : 59
	Control elements	Wet type multi-disc clutch 3 sets One-way clutch 1 set Wet type multi-disc brake 3 sets			
	Final gear reduction ratio (Differential)	3.578			
Lubrication	Lubrication system	Force feed system by oil pump			
Cooling	Cooling system	Water-cooled			
Fluid used		Equivalent of DEXRON®-III			

FUNCTIONS**NOTE:**

For operation of each part, refer to **TABLE OF COMPONENT OPERATION**.

PART NAME	FUNCTION
Rear clutch	Meshes input shaft and rear sun gear through one-way clutch.
Front clutch	Meshes input shaft and front internal gear and rear carrier.
Overdrive brake	Fixes rear sun gear.
1st & 2nd brake	Fixes front sun gear.
Reverse brake	Fixes front internal gear and rear carrier.
Direct clutch	Meshes input shaft and rear sun gear.

TABLE OF COMPONENT OPERATION

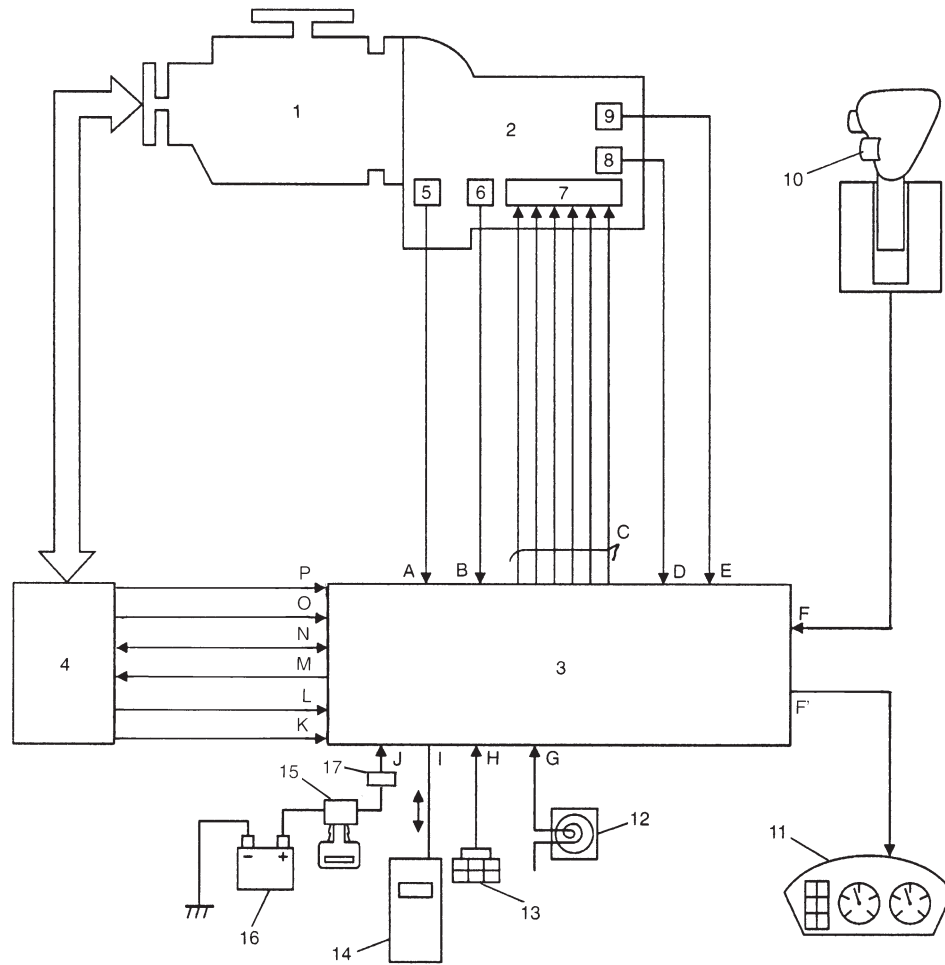
Part		Rear clutch	Front clutch	Overdrive brake	1st & 2nd brake	Reverse brake	Direct clutch	One-way clutch
Selector position	Gear position							
	P	○	X	X	X	X	○	X
	R	○	X	X	X	○	○	○
	N	○	X	X	X	X	○	X
D	1st	○	X	X	○	X	X	○
	2nd	○	○	X	○	X	X	X
	3rd	○	○	X	X	X	○	X
	4th (O/D)	X	○	○	X	X	○	X
2	1st	○	X	X	○	X	○	X
	2nd	○	○	X	○	X	○	X
L	1st	○	X	X	○	X	○	○

○ : Operating X : Not operating

TABLE OF SHIFT SOLENOID VALVE OPERATION

Range & Gear	Shift Solenoid Valve				
	No.1	No.2	No.3	No.4	No.5
P , N	X	○	X	X	X
1st gear of O/D, D , 2	X	○	○	X	○
1st gear of L	X	○	○	X	X
2nd gear of O/D, D , 2 , L	X	X	○	X	○
3rd gear of O/D, D (2 , L)	X	X	X	X	X
4th gear of O/D	○	X	X	○	X
R	X	X	X	X	X

○ : Operating X : Not operating

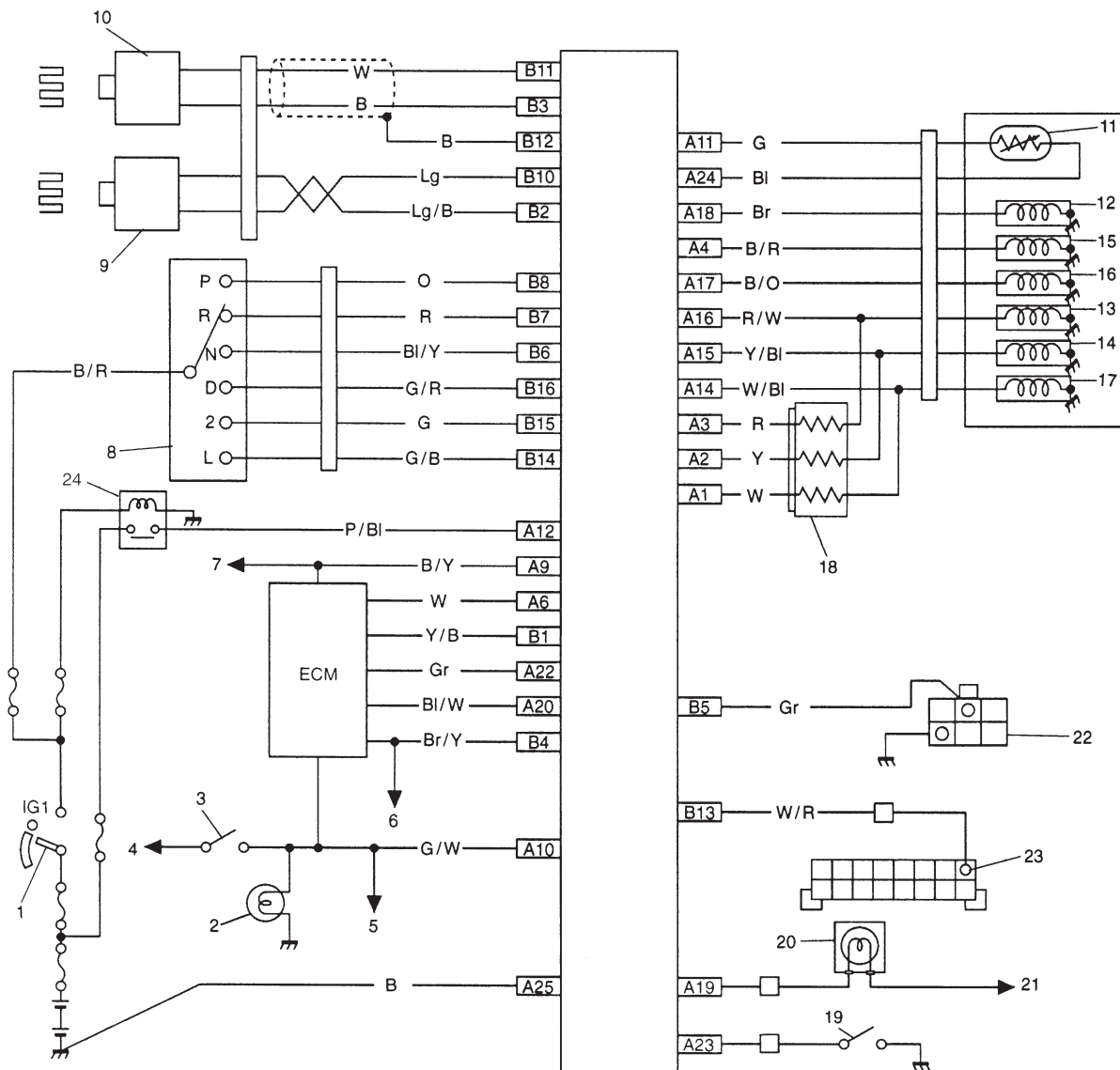
ELECTRONIC SHIFT CONTROL SYSTEM

1. Engine
2. Transmission
3. TCM
4. ECM
5. Input revolution sensor
6. A/T fluid temperature sensor
7. Solenoid valves
(Shift solenoid valve No.1 – No.5
and Lock-up solenoid valve)
8. A/T vehicle speed sensor
9. Shift switch
10. O/D off switch
11. Combination meter
(O/D off lamp)
12. Stop lamp
13. Monitor coupler
14. Suzuki scan tool
15. Ignition switch
16. Battery
17. A/T Relay

- A. Input revolution signal
- B. A/T fluid temp. signal
- C. Shift/lock-up control signal
- D. A/T VSS signal
- E. Shift position signal
- F. O/D off switch signal
- F'. O/D off lamp signal
- G. Brake switch signal
- H. Diagnosis switch signal
- I. Serial communication with
Suzuki scan tool
- J. Power supply
- K. Throttle opening signal
- L. Engine coolant temp. /MAP sensor signal
- M. Idle up signal
- N. A/T failure signal
- O. Engine rev.
- P. A/C signal.

TRANSMISSION CONTROL MODULE (TCM)

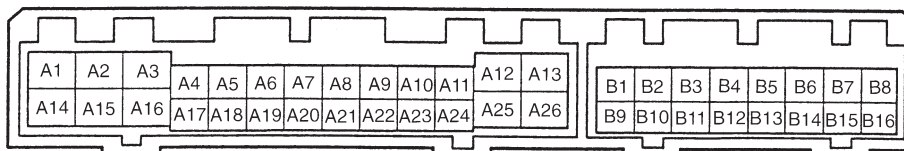
The TCM is an electronic circuit component that controls gear shift and idle-up according to the signal from each sensor. It is a microcomputer consisting of an IC, transistor, diode, etc. It is installed behind glove box.

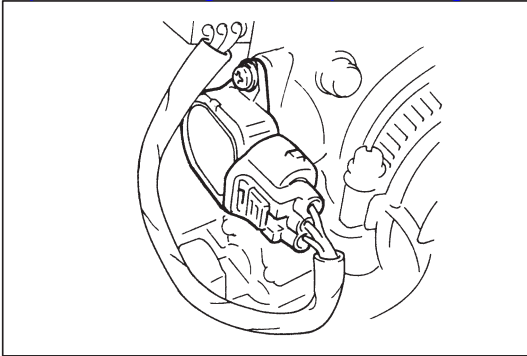


1. Ignition switch
2. Stop lamp
3. Stop lamp switch
4. To battery
5. To speedometer, EPS controller (if equipped) and ABS control module (if equipped)
6. To speedometer, EPS controller (if equipped) and ABS control module (if equipped)
7. To A/C compressor

8. Shift switch
9. Input revolution sensor
10. A/T VSS
11. A/T fluid temperature sensor
12. Lock-up solenoid
13. Shift solenoid No. 1
14. Shift solenoid No. 2
15. Shift solenoid No. 3

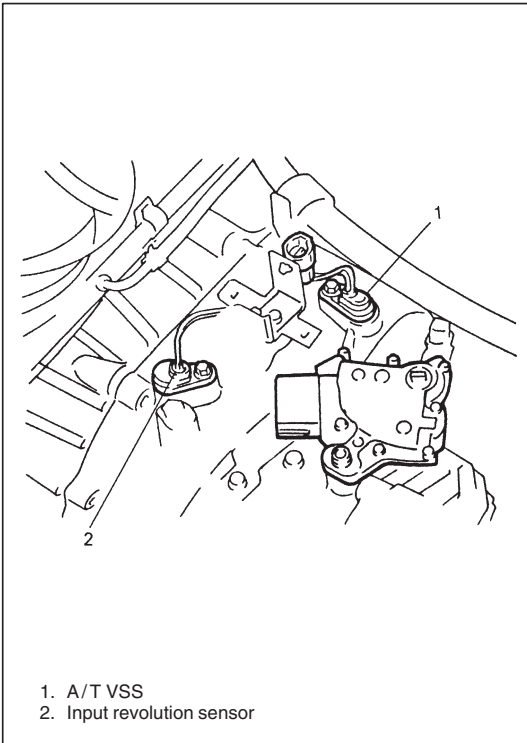
16. Shift solenoid No. 4
17. Shift solenoid No. 5
18. Dropping resistor
19. O/D (Over Drive) off switch
20. "O/D OFF" lamp
21. To IG 1
22. Monitor coupler
23. Data link connector
24. A/T relay





THROTTLE POSITION SENSOR

This sensor is installed to the throttle valve shaft. Throttle valve opening signal is transmitted from TP sensor to ECM as voltage signal. The signal is converted to duty signal in ECM and it is sent to TCM.



VEHICLE SPEED SENSOR

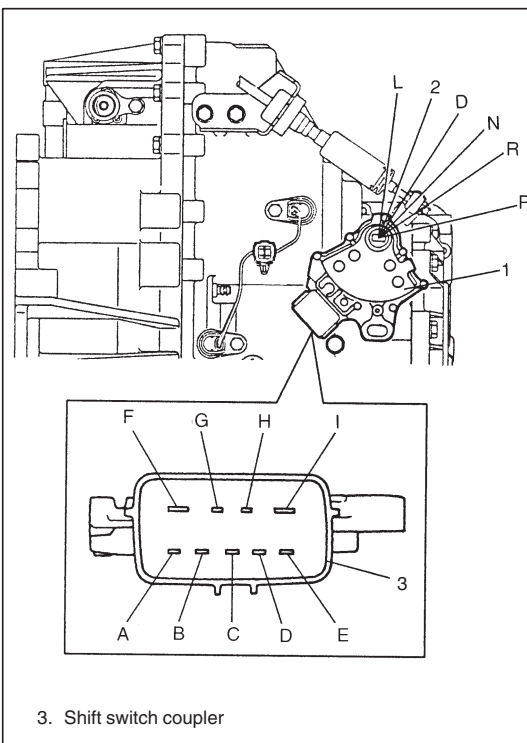
This sensor is a pulse generator type that detects revolution of the counter driven gear (vehicle speed) in the transmission case. The pulse generator is a noncontact sensor consisting of a permanent magnet, coil and gears.

As the gear of the counter driven gear rotor turns, the magne-flux from the permanent magnet varies and a voltage of the frequency corresponding to the rotor revolution occurs in the coil. This voltage is inputted to the TCM where TCM judges the counter driven gear revolution or the vehicle speed.

INPUT REVOLUTION SENSOR

This sensor is a pulse generator type that detects revolution of torque converter's turbine shaft in the transmission case.

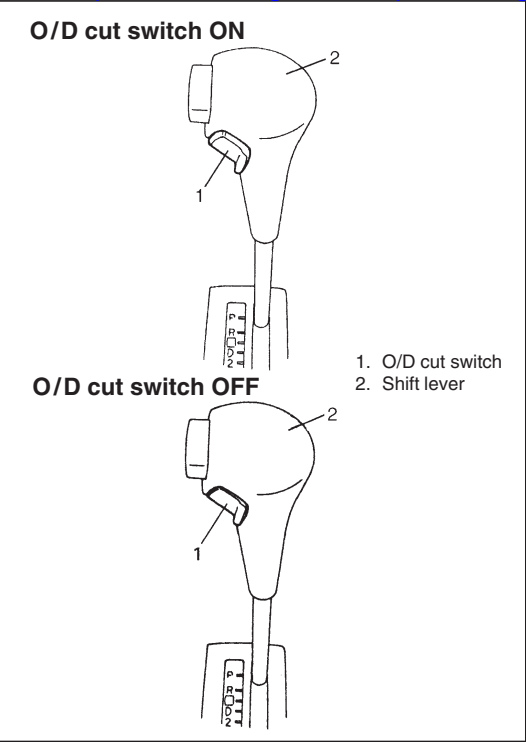
The principle of operation is the same as the vehicle speed sensor.



SHIFT SWITCH

A shift switch (1) is provided so that the engine can be started only when the shift lever is in the "P" or "N" position.

Switch Position \ Terminal No.	B	A	H	C	E	D	G	I	F
P	○						○	○	○
R		○					○		
N			○				○	○	○
D				○			○		
2					○		○		
L						○	○		



O/D CUT SWITCH

The gear shift up or shift down to and from the O/D gear can be selected with this switch.

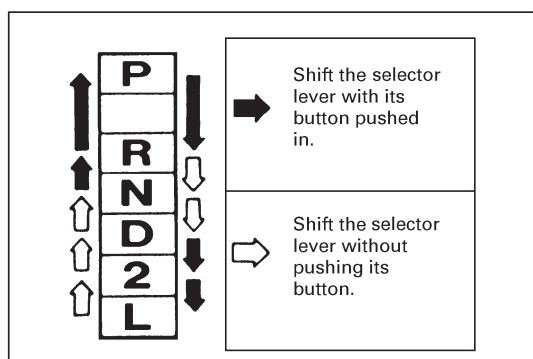
O/D cut switch	O/D OFF indicator light
ON	ON
OFF	OFF

FAIL SAFE FUNCTION

This function is provided by the safe mechanism that assures safe driveability even when the solenoid valve, sensor or its circuit fails.

The table below shows the fail safe function for each fail condition of sensor, solenoid or its circuit.

AREA	Fail safe condition	Fail safe function
Throttle opening signal circuit	<ol style="list-style-type: none"> 1. Circuit open/shorted 2. Abnormal signal 3. Abnormal ECM output 	<ol style="list-style-type: none"> 1. Choosing gear as throttle at "full closed". 2. Choosing gear as throttle at "full open". 3. Vehicle coasted down when brake is applied and engine rev. is less than 1,500 rpm.
Input rev. signal/output rev. signal circuit faulty	No signal or abnormal signal inputted	<ul style="list-style-type: none"> • When vehicle running, the gear is fixed to the gear right before the trouble is occurred and O/D is cut. • When vehicle running and in shift change, the gear is fixed to the gear which is going to be selected. Lock-up function is turned OFF. • When trouble found vehicle at stop, the gear is selected as follows; P:P, R:R, N:N, D:3rd, 2:2nd, L:1st.
Shift switch and its circuit	<ol style="list-style-type: none"> 1. No shift switch signal input 2. Two or more shift switch signals input 	<ol style="list-style-type: none"> 1. The gear is fixed to "R" range. 2. When trouble found vehicle at stop, if 2 or more signal inputted at the same time, the gear is selected as follows: P:R→R, R:N→R, N:D→D, D:2→D, 2:L→2 • When vehicle running, the gear is fixed to the gear right before the trouble is occurred. • When 3 or more signals inputted, the gear is fixed to "R" range.
A/T fluid temp. sensor	Low fluid temp. signal inputted for a long time	No lock-up.
Shift solenoid or its circuit	Abnormal voltage is detected.	A/T power relay is turned OFF and the gear is selected as follows: P:P, R:R, N:N, D/2/L:3rd
Lock-up solenoid or its circuit	Abnormal voltage is detected.	No lock-up.
Internal relay for solenoids	<ol style="list-style-type: none"> 1. Relay shorted (Deposited) 2. Relay circuit open 	<ol style="list-style-type: none"> 1. The gear is selected as follows: P:P, R:R, N:N, D:3rd, 2:2nd, L:1st. 2. All operating signals for solenoids are cut.

**CHANGE MECHANISM**

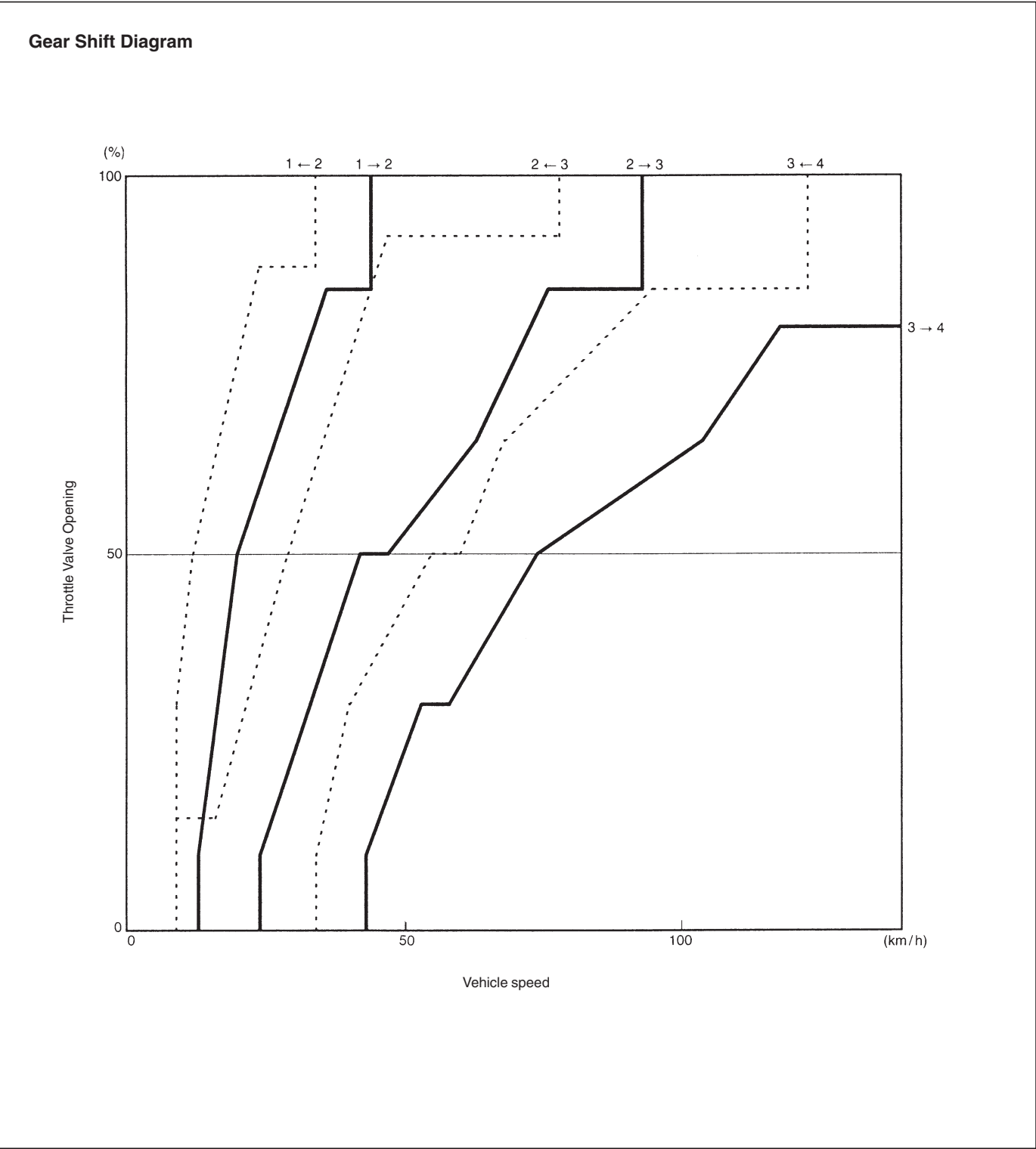
The same select pattern shift lever is used as the floor type and frequently used "N" and "D" ranges are made selectable freely.

AUTOMATIC GEAR SHIFT DIAGRAM

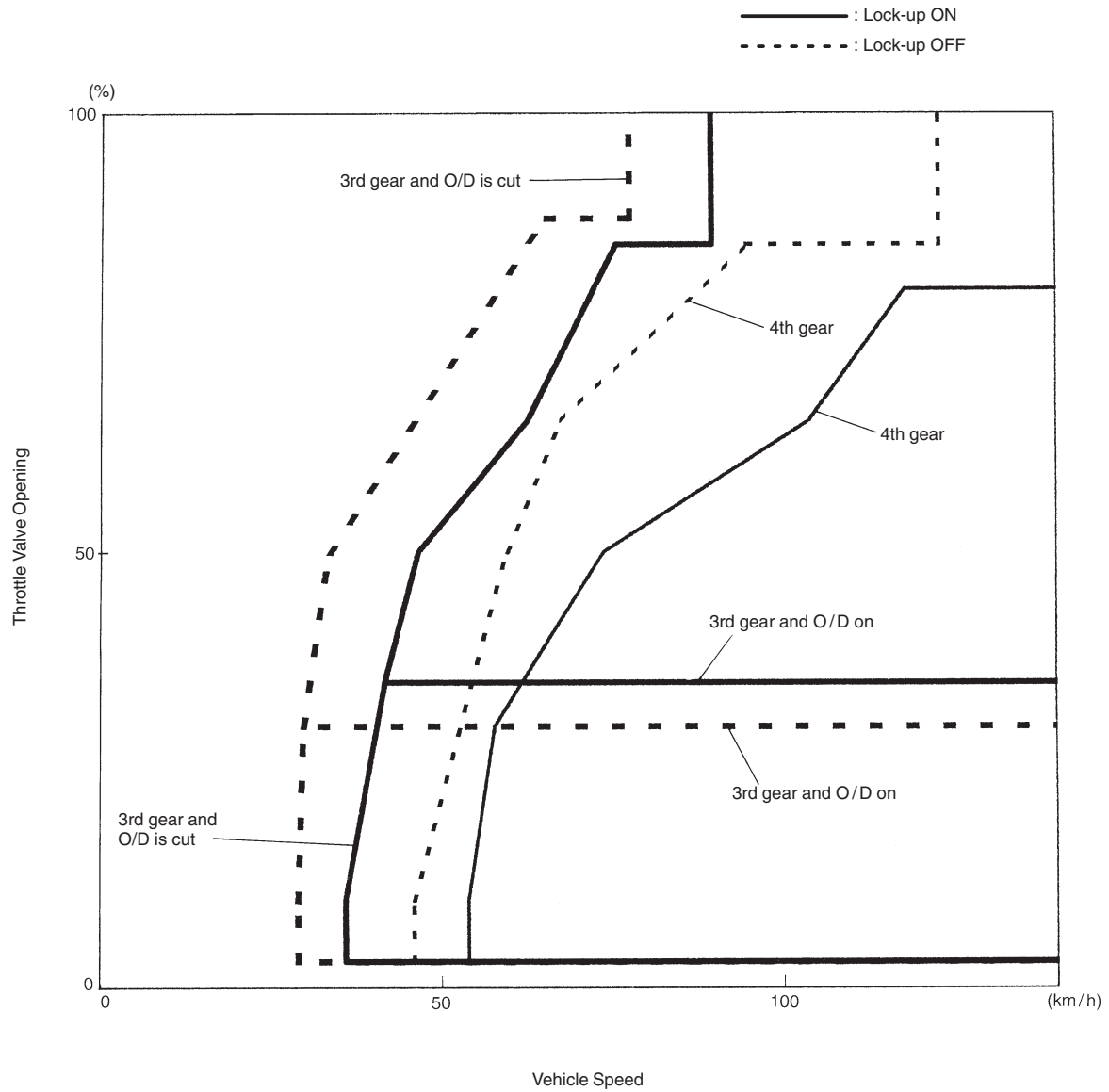
Automatic shift schedule as a result of shift control is shown below.

Unit: km/h

Shift	1 → 2	2 → 3	3 → 4	4 → 3	3 → 2	2 → 1
Throttle opening						
Full throttle	44	93	—	123	78	34
Closed throttle	13	24	43	34	9	9



TCC Lock-up Diagram



DIAGNOSIS

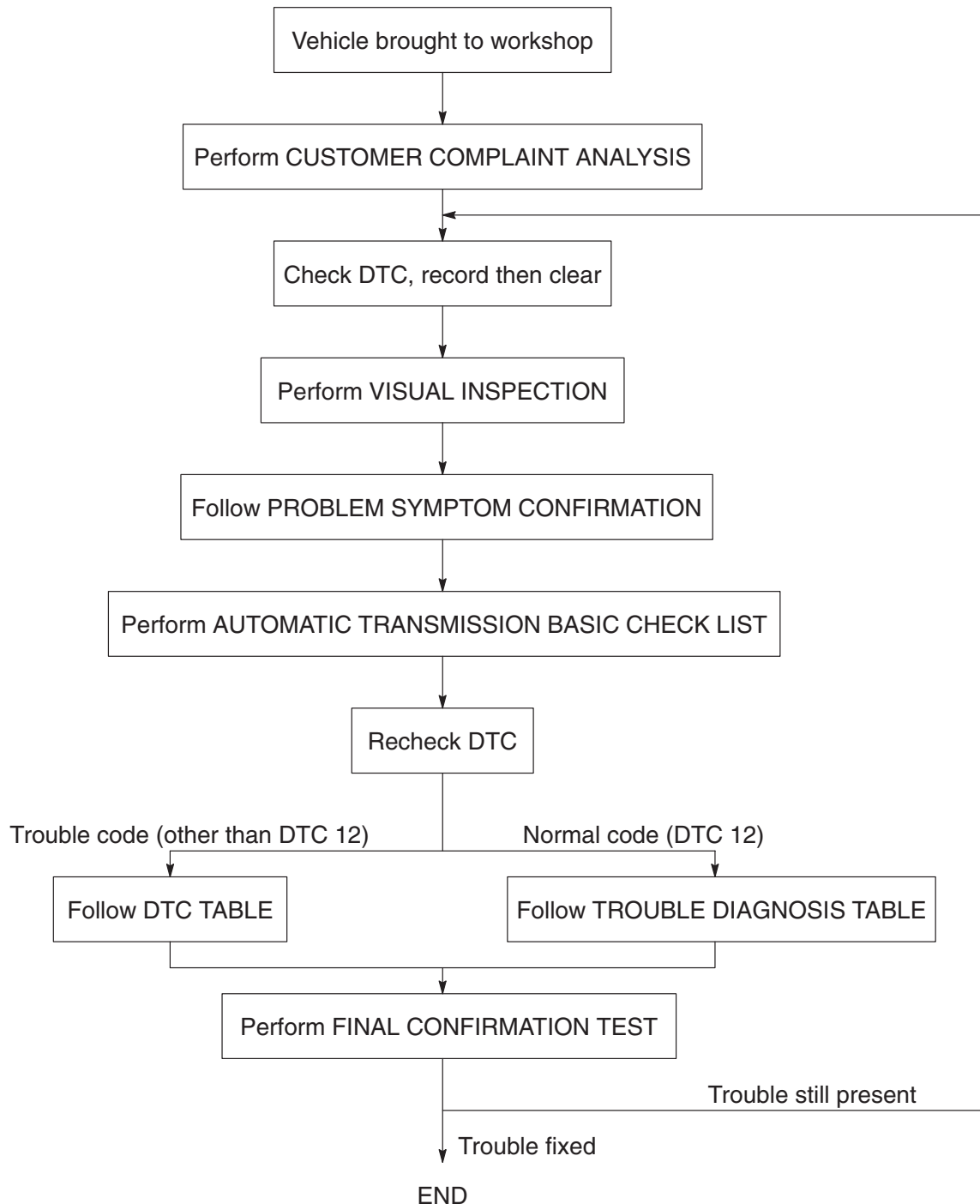
This vehicle is equipped with an electronic transmission control system, which controls the automatic shift up and shift down timing, etc. suitably to vehicle driving conditions.

When diagnosing a trouble in the transmission including this system, follow “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” given below to obtain correct result smoothly.

AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW CHART

NOTE:

For the details of each step, refer to the following pages.



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1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such a questionnaire form as shown below will facilitate collecting information to the point required for proper analysis and diagnosis.

CUSTOMER QUESTIONNAIRE (EXAMPLE)

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:
DESCRIPTION OF PROBLEM			
Engine does not start		Engine stops	
Vehicle does not move (forward, rearward)		Transmission does not shift (1st, 2nd, 3rd, 4th, Rev) gear	
No lock-up (Lock-up clutch operation)		Automatic shift does not occur	
Shift point too high or too low		Transmission slipping in (1st, 2nd, 3rd, 4th, Rev) gear	
Excessive gear change shock		Other	
VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS			
Environmental Condition			
Weather	fair/cloudy/rain/snow/not related/other()		
Temperature	hot/warm/cool/cold/() °C/not related		
Frequency	always/sometimes () times/ day, month)/only once		
Road	urban/suburb/highway/mountainous (uphill/downhill)/tarmacadam/gravel/other()		
Vehicle Condition			
Transmission range	(P, R, N, D, 2, L) range/(→) range		
Transmission temp.	cold/warming up phase/warmed up		
Vehicle	at stop/during driving (constant speed/accelerating/decelerating/right hand corner/left hand corner)/other ()/speed (km/h)		
Engine	Speed (r/min)/throttle opening (idle/about %/full)		
Brake	Apply/Not apply		
"O/D OFF" switch	ON/OFF		
MALFUNCTION INDICATOR LAMP ("O/D OFF" LIGHT) FUNCTION			
always ON/sometimes ON/not on			
Diagnostic trouble code indicated/not indicated			
Diagnostic trouble code recorded			

NOTE:

The above form is a standard sample. It should be modified according to conditions characteristic of each market.

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2. DIAGNOSTIC TROUBLE CODE (DTC) CHECK, RECORD AND CLEAR

To check DTC, refer to Diagnostic Trouble Code(s) Check in this section. When a DTC is indicated by this lamp, it means existence of a malfunction in the system represented by that code but whether it still exists (current) or it occurred in the past and has gone (history) is unknown. To know it, clear this DTC once (Refer to DIAGNOSTIC TROUBLE CODE CLEARANCE in this section.), perform TEST DRIVE and/or PROBLEM SYMPTOM CONFIRMATION in this section and then check DTC again as described in DIAGNOSTIC TROUBLE CODE CHECK. Attempt to diagnose the trouble based on the DTC recorded in this step or failure to clear the DTC in this step may mislead the diagnosis or make diagnosing difficult. Even after checking the DTC with the SUZUKI scan tool, diagnosis should be performed according to this flow chart to check TCM for proper self-diagnosis function.

3. VISUAL INSPECTION

As a preliminary step, perform visual check of the following items that support proper function of the automatic transmission.

INSPECTION ITEM	REFERRING SECTION
<ul style="list-style-type: none"> ● Engine oil ----- level, leakage ● Engine coolant ----- level, leakage ● A/T fluid ----- level, leakage, color ● Battery ----- fluid level, corrosion of terminal ● A/T fluid hoses ----- disconnection, looseness, deterioration ● Connectors of electric wire harness ----- disconnection, friction ● Fuses ----- burning ● Parts ----- installation, bolt ----- looseness ● Parts ----- deformation ● Other parts that can be checked visually <p>Also add following items at engine start.</p> <ul style="list-style-type: none"> ● Indicator, warning lights in combination meter ----- ON (indicating abnormality in system) or OFF ● Other parts that can be checked visually 	<p>Section 0B</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 8</p> <p>Section 8</p> <p>Section 8C</p>

4. PROBLEM SYMPTOM CONFIRMATION

Check if what the customer claimed in CUSTOMER COMPLAINT ANALYSIS is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.)

When the symptom is not actually found, possibility is:

- The symptom occurs under certain conditions.
 - Retry with the vehicle under different conditions.
- The trouble occurred only temporarily and normal operation has been restored.
 - Perform DIAGNOSTIC TROUBLE CODE CHECK and if the diagnostic trouble code is indicated, inspect according to the flow table for that DTC.

5. AUTOMATIC TRANSMISSION BASIC CHECK

Perform basic automatic transmission check according to the list below first.

AUTOMATIC TRANSMISSION BASIC CHECK LIST

1. Power Supply Voltage Check
Check that the battery voltage is within 10 – 14 V at engine stop.
2. A/T Fluid Check
Check A/T fluid level and quality.
3. STALL TEST
Perform STALL TEST. Refer to STALL TEST in this section for details.
4. LINE PRESSURE TEST
Perform LINE PRESSURE TEST. Refer to LINE PRESSURE TEST in this section.
5. ROAD TEST
Perform ROAD TEST to understand correctly the trouble area.
6. Electrical Harness and Coupler Check
Check the connection of the harness coupler. Check for the loose connection of the harness, loose connection of the terminals.

5-1. DIAGNOSTIC TROUBLE CODE CHECK

Check diagnostic trouble code, referring diagnostic trouble code(s) check in this section.

5-2. DIAGNOSTIC TROUBLE CODE FLOW CHART

Based on the DTC indicated in DIAGNOSTIC TROUBLE CODE CHECK, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, TCM or other part and repair or replace faulty parts.

6. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the automatic transmission is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that a normal code is indicated.

TROUBLE DIAGNOSIS TABLE**NOTE:**

For the inspection of throttle position sensor, refer to TP SENSOR in Section 6E of Service Manual mentioned in the FOREWORD of this manual.

TABLE 1 (ELECTRICAL)

Condition		Possible Cause	Correction
No up-shift	1st → 2nd 2nd → 3rd	<ul style="list-style-type: none"> ● A/T VSS or its circuit faulty ● Shift solenoid No.2 (1st → 2nd), No.3 (2nd → 3rd) , No.5 (2nd → 3rd) and/or its circuit faulty ● Throttle position sensor or its circuit faulty ● TCM faulty 	Inspect A/T VSS. Repair or replace. Inspect TP sensor. Replace TCM.
	3rd → 4th	<ul style="list-style-type: none"> ● A/T VSS or its circuit faulty ● Shift solenoid No.1, No.4 or its circuit faulty ● O/D CUT switch circuit faulty ● Throttle position sensor or its circuit faulty ● TCM faulty 	Inspect A/T VSS. Repair or replace. Refer to "O/D CUT SWITCH" in this section and/or inspect its circuit. Inspect TP sensor. Replace TCM.
No down-shift	4th → 3rd 3rd → 2nd 2nd → 1st	<ul style="list-style-type: none"> ● Shift solenoid No.1 (4th → 3rd), No.2 (2nd → 1st), No.3 (3rd → 2nd), No.4 (4th → 3rd), No.5 (3rd → 2nd) or its circuit faulty ● Throttle position sensor or its circuit faulty ● TCM faulty 	Repair or replace. Inspect TP sensor. Replace TCM.
Shift point too high or too low		● Throttle position sensor, A/T VSS or its circuit faulty	Inspect TP sensor and/or A/T VSS.
Vehicle does not move		● Shift solenoid No.1, No.2, No.3 or its circuit faulty	Repair or replace.
Excessive slip		● Shift solenoid No.1 to No.5 or its circuit faulty	Repair or replace.
Excessive shock at N → D or N → R		<ul style="list-style-type: none"> ● Shift solenoid No.2, No.3, No. 5 or its circuit faulty ● ISC circuit 	Repair or replace. Inspect ISC circuit.
No lock-up or No lock-up OFF		<ul style="list-style-type: none"> ● Lock-up solenoid valve or its circuit faulty ● Throttle position sensor or its circuit faulty ● Input rev. sensor and/or AT VSS or its circuit faulty. ● Abnormal engine rev. signal or its circuit. ● ECM faulty 	Repair or replace. Refer to throttle position sensor in Section 6E. Refer to ECT sensor in Section 6E. Repair or replace. Inspect ECM.

TABLE 2 (MECHANICAL)

Condition		Possible Cause	Correction
Vehicle does not move at any range		<ul style="list-style-type: none"> Manual valve faulty Primary regulator valve faulty 	Clean or replace. Clean or replace.
No gear change	1st ⇄ 2nd	<ul style="list-style-type: none"> Shift solenoid No.2 and/or No.5 stuck 	Clean or replace.
	2nd ⇄ 3rd	<ul style="list-style-type: none"> Shift solenoid No.1, No.3 and/or fail valve No.1 stuck 	Clean or replace.
	3rd ⇄ 4th	<ul style="list-style-type: none"> Shift solenoid No.1, No.4 and/or fail valve No.2 stuck 	Clean or replace.
Harsh engagement	P, N → R	<ul style="list-style-type: none"> Front clutch accumulator faulty 	Clean or replace.
	N → D	<ul style="list-style-type: none"> 1st & 2nd brake accumulator faulty 	Clean or replace.
	1st → 2nd at D range or 2 range	<ul style="list-style-type: none"> Front clutch accumulator faulty Shift solenoid No.2 	Clean or replace.
	2nd → 3rd at D range	<ul style="list-style-type: none"> Direct clutch accumulator faulty Shift solenoid No.5 	Clean or replace.
	3rd → 4th at D range	<ul style="list-style-type: none"> Overdrive brake accumulator faulty Shift solenoid No.4 	Clean or replace.
	All gear change	<ul style="list-style-type: none"> Primary regulator valve faulty 	Clean or replace.
Excessive slip (low line pressure)		<ul style="list-style-type: none"> Primary regulator valve faulty 	Clean or replace.
Vehicle does not move at	1st, 2nd, 3rd and reverse gear	<ul style="list-style-type: none"> Rear clutch faulty 	Repair or replace.
	Reverse gear	<ul style="list-style-type: none"> Reverse brake faulty 	Repair or replace.
	2nd, 3rd and 4th gear	<ul style="list-style-type: none"> Front clutch faulty 	Repair or replace.
	3rd and 4th gear	<ul style="list-style-type: none"> Direct clutch faulty 	Repair or replace.
	1st and 2nd gear	<ul style="list-style-type: none"> 1st & 2nd brake faulty 	Repair or replace.
	4th gear	<ul style="list-style-type: none"> Overdrive brake faulty 	Repair or replace.
	Any forward and reverse gear	<ul style="list-style-type: none"> Parking lock pawl faulty 	Repair or replace.
Shock or engine stalls when starting off and stopping		<ul style="list-style-type: none"> Lock-up clutch faulty Lock-up solenoid faulty Lock-up control valve faulty Lock-up signal valve faulty 	Inspect and replace as necessary. Clean or replace. Clean or replace. Clean or replace.
No up-shift	1st → 2nd	<ul style="list-style-type: none"> Front clutch faulty 	Repair or replace.
	2nd → 3rd	<ul style="list-style-type: none"> Direct clutch faulty 	Repair or replace.
	3rd → 4th	<ul style="list-style-type: none"> Overdrive brake faulty 	Repair or replace.
No engine braking	2nd or 3rd gear	<ul style="list-style-type: none"> Front, rear or direct clutch or 1st & 2nd brake faulty 	Repair or replace.
	L range 1st gear	<ul style="list-style-type: none"> Direct clutch or 1st & 2nd brake faulty 	Repair or replace.
No lock-up		<ul style="list-style-type: none"> Torque converter clutch faulty Lock-up control valve faulty Lock-up solenoid faulty Secondary regulator valve faulty Signal valve faulty 	Inspect and replace as necessary. Clean or replace. Clean or replace. Clean or replace. Clean or replace.



STALL TEST

This test is to check overall performance of automatic transmission and engine by measuring stall speed at "D" and "R" ranges. Be sure to perform this test only when transmission fluid is at normal operating temperature and its level is between FULL and LOW marks.

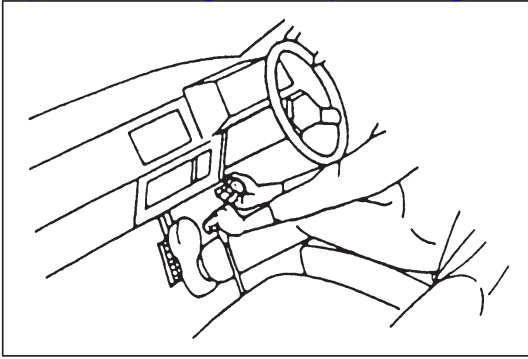
CAUTION:

- Do not run engine at stall more than 5 seconds continuously, for fluid temperature may rise excessively high.
- After performing stall test, be sure to leave engine running at idle for longer than 30 seconds before another stall test.

- 1) Apply parking brake and block wheels.
- 2) Install tachometer.
- 3) Start engine with select lever shifted to "P".
- 4) Depress brake pedal fully.
- 5) Shift select lever to "D" and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant (stall speed).
- 6) Release accelerator pedal immediately after stall speed is checked.
- 7) In the same way, check stall speed in "R" range.
- 8) Stall speed should be within following specification.

Stall speed: 2,700 – 3,100 r/min

Test result	Possible cause
Lower than standard level	<ul style="list-style-type: none"> ● Lack of engine output ● Defective torque converter
Higher than standard level in "D" range	<ul style="list-style-type: none"> ● Low line pressure ● Malfunctioning 1st & 2nd brake ● Malfunctioning rear clutch ● Malfunctioning stator one-way clutch
Higher than standard level in "R" range	<ul style="list-style-type: none"> ● Low line pressure ● Malfunctioning rear clutch ● Malfunctioning reverse brake ● Malfunctioning stator one-way clutch ● Malfunctioning direct clutch



TIME LAG TEST

This test is to check conditions of clutch, reverse brake and fluid pressure. "Time lag" means time elapsed since select lever is shifted with engine idling till shock is felt.

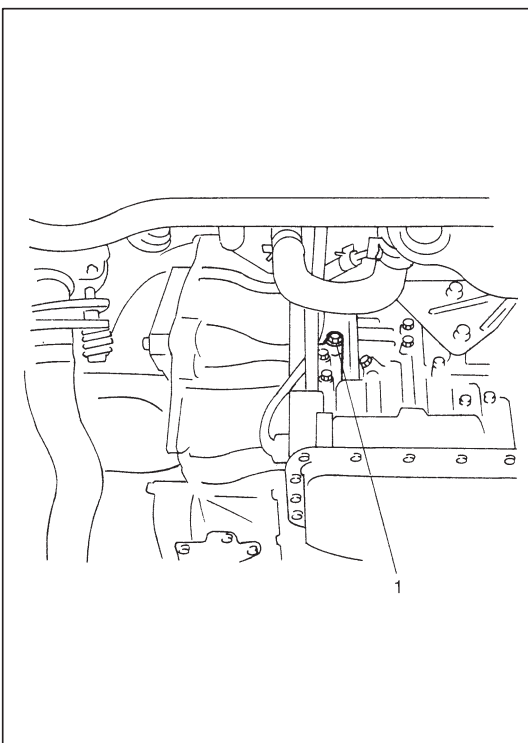
- 1) With chocks placed in front and behind front and rear wheels respectively, depress brake pedal.
- 2) Start engine.
- 3) With stop watch ready, shift select lever from "N" to "D" range and measure time from that moment till shock is felt.
- 4) Similarly measure time lag by shifting select lever from "N" to "R" range.

Specification for time lag	"N"→"D"	Less than 1.0 sec.
	"N"→"R"	Less than 1.2 sec.

NOTE:

- Make sure that selector cable is properly adjusted.
- When repeating this test, be sure to wait at least minute after select lever is shifted back to "N" range.
- Engine should be warmed up fully for this test.

Test result	Possible cause
When "N"→"D" time lag exceeds specification.	<ul style="list-style-type: none"> ● Low line pressure ● Worn rear clutch ● Worn 1st & 2nd brake
When "N"→"R" time lag exceeds specification.	<ul style="list-style-type: none"> ● Low line pressure ● Worn rear clutch ● Worn direct clutch ● Worn reverse brake



LINE PRESSURE TEST

Purpose of this test is to check operating conditions of each part by measuring fluid pressure in fluid pressure line.

Line pressure test requires following conditions.

- Automatic fluid is at normal operating temperature (70 – 80°C / 158 – 176°F).
 - Fluid is filled to proper level (between FULL and LOW on dipstick).
- 1) Apply parking brake securely and place chocks against wheels.
 - 2) Remove fluid pressure check hole plug bolt (1).
 - 3) Attach oil pressure gauge to fluid pressure check hole in transmission case.

Special Tool

(A) : 09925-37810

CAUTION:

After attaching oil pressure gauge, check that no fluid leakage exists.

- 4) Depress foot brake fully, run engine at idle and stall then check fluid pressure in “D” or “R” range.

CAUTION:

Do not continue running engine at stall speed longer than 5 seconds.

Engine running mode	Line pressure	
	“D” range	“R” range
At idle speed	7.6 – 9.2 kg/cm ² 108.1 – 130.8 psi	14.1 – 17.3 kg/cm ² 200.6 – 246.0 psi
At stall speed	7.9 – 9.5 kg/cm ² 112.4 – 135.0 psi	14.4 – 17.6 kg/cm ² 204.8 – 250.2 psi

Test result	Possible cause
Line pressure higher than standard level in each range	<ul style="list-style-type: none"> ● Malfunctioning regulator valve
Line pressure lower than standard level in each range	<ul style="list-style-type: none"> ● Malfunctioning regulator valve ● Defective oil pump
Line pressure lower than standard level only in “D” range	<ul style="list-style-type: none"> ● Fluid leakage from “D” range pressure circuit ● Fluid leakage from 1st & 2nd brake ● Fluid leakage from rear clutch
Line pressure lower than standard level only in “R” range	<ul style="list-style-type: none"> ● Fluid leakage from “R” range pressure circuit ● Fluid leakage from rear clutch ● Fluid leakage from direct clutch ● Fluid leakage from reverse brake

ENGINE BRAKE TEST**WARNING:**

Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.

- 1) While driving vehicle in 3rd gear of “D” range, shift select lever down to “2” range and check if engine brake operates.
- 2) In the same way as in Step 1), check engine brake for operation when select lever is shifted down to “L” range.
- 3) Engine brake should operate in above test.

Test result	Possible cause
Fails to operate when shifted down to “2” range	<ul style="list-style-type: none"> ● Defective shift switch ● 1st & 2nd brake defective ● Direct clutch defective
Fails to operate when shifted down to “L” range	

“P” RANGE TEST

- 1) Stop vehicle on a slope, shift select lever to “P” range and at the same time apply parking brake.
- 2) After stopping engine, depress brake pedal and release parking brake.
- 3) Then, release brake pedal gradually and check that vehicle remains stationary.
- 4) Depress brake pedal and shift select lever to “N” range.
- 5) Then, release brake pedal gradually and check that vehicle moves.

WARNING:

Before test, check to make sure no one is around vehicle or down on a slope and keep watchful for safety during test.

Test result	Possible cause
Vehicle moves at “P” range or remains stationary at “N” range	Defective parking lock pawl or spring

ELECTRONIC CONTROL SYSTEM DIAGNOSIS

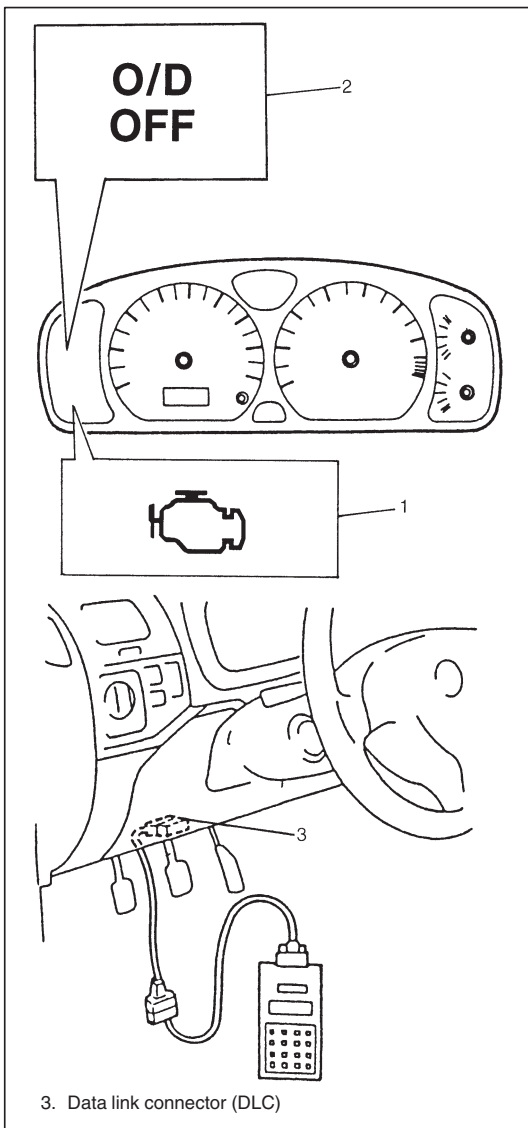
TCM has on-board diagnostic system (a system self-diagnosis function).

Investigate where the trouble is by referring to "DIAGNOSTIC FLOW TABLE" and "DIAGNOSTIC TROUBLE CODE TABLE" on later pages.

PRECAUTIONS IN DIAGNOSING TROUBLES

[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

- For the vehicle with EGR valve, MIL (1) comes on when TCM detects the malfunction of transmission system. But MIL does not come on in case of DTC P0710 (DTC 36 and 38).
- The DTC stored in the TCM memory is output by flashing of "O/D OFF" light (2) with the diagnosis switch terminal grounded.
- If no DTC is stored in the TCM memory, Code 12 is output repeatedly.
- If DTCs are stored in the TCM memory, they are output starting from the smallest code number in the increasing order. After all DTCs are output, all DTCs output again.

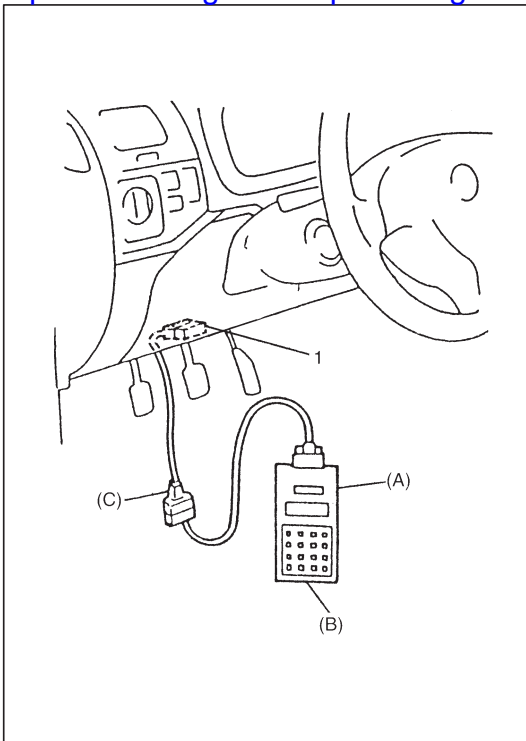


[INTERMITTENT TROUBLES] and [NOTES ON SYSTEM CIRCUIT INSPECTION]

Refer to SECTION 0A.

DIAGNOSTIC TROUBLE CODE(S) CHECK**[Check DTC with SUZUKI scan tool]**

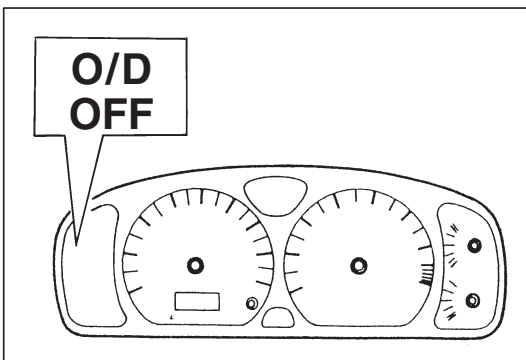
- 1) Turn ignition switch OFF.
- 2) After setting cartridge to SUZUKI scan tool, connect it to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

Special Tool**(A): 09931-76011 (SUZUKI scan tool)****(B): Mass storage cartridge****(C): 09931-96030 (16/14 pin DLC cable)**

- 3) Turn ignition switch ON.
- 4) Read DTC according to instructions displayed on scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the check, turn ignition switch OFF and disconnect scan tool from data link connector (DLC).

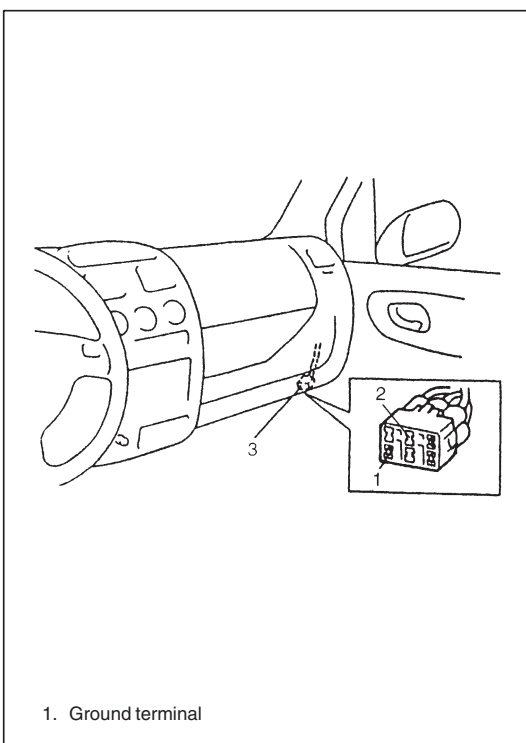
[Check DTC without SUZUKI scan tool]

- 1) Turn ignition switch ON and make sure that O/D OFF light is OFF in combination meter (O/D cut switch OFF).



- 2) Turn ignition switch OFF.

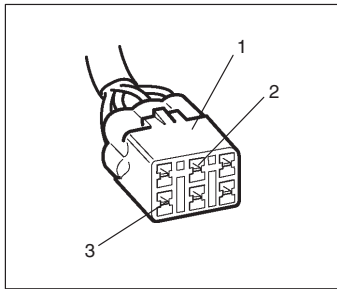
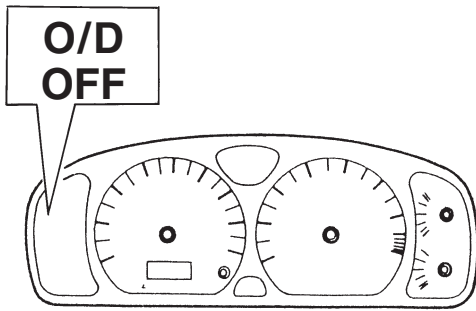
- 3) Using service wire, ground diagnosis switch terminal (2) of monitor coupler (3).



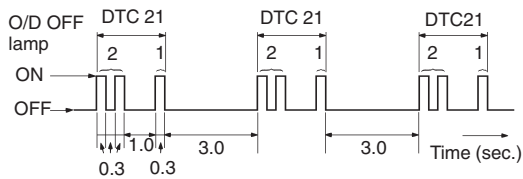
1. Ground terminal

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- 4) Read DTC from flashing pattern of O/D OFF light.
- 5) After completing the DTC check, turn ignition switch OFF and disconnect service wire from monitor coupler (1).



2. Diag. switch terminal
3. Ground terminal



DIAGNOSTIC TROUBLE CODE(S) (DTC) CLEARANCE

[Clear DTC with SUZUKI scan tool]

- 1) Turn ignition switch OFF.
- 2) After setting cartridge to scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

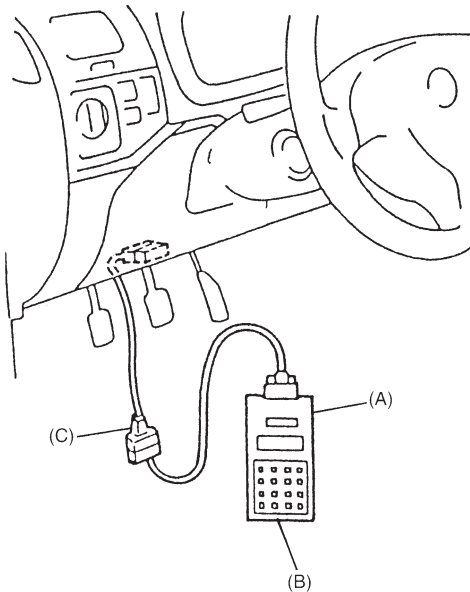
Special Tool

(A): 09931-76011 (SUZUKI scan tool)

(B): Mass storage cartridge

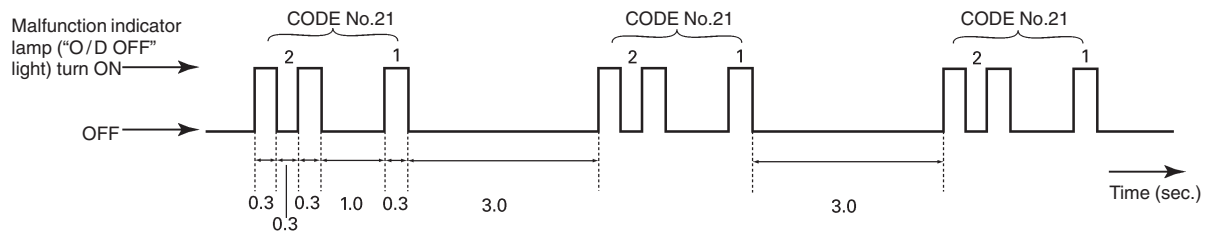
(C): 09931-76030 (16/14 pin DLC cable)

- 3) Turn ignition switch ON.
- 4) Erase DTC according to instructions displayed on scan tool. Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the check, turn ignition switch OFF and disconnect scan tool from data link connector (DLC).



[Clear DTC without SUZUKI scan tool]

- 1) Turn ignition switch ON.
- 2) Using service wire, ground diagnosis switch terminal of monitor coupler five times within 10 seconds.
- 3) Perform "DTC check" and confirm that only DTC12 (normal DTC) is displayed. If not, repeat step 1) and 2) and check again.

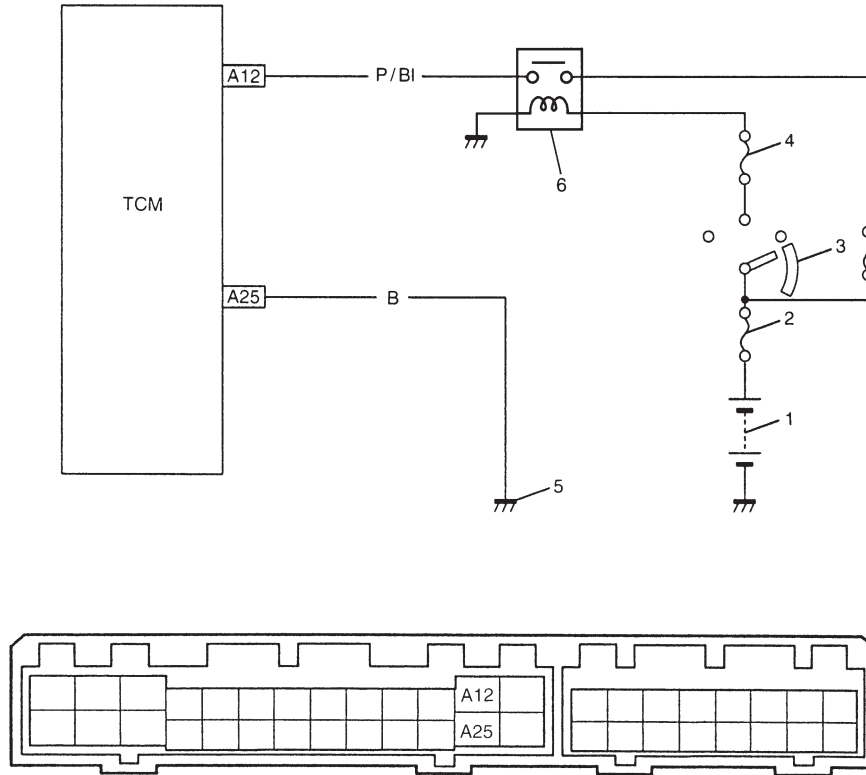
DIAGNOSTIC TROUBLE CODE (DTC) TABLE**EXAMPLE: SHIFT SOLENOID No.1 FAILURE (CODE No. 21)**

DTC			DIAGNOSTIC ITEM
Displayed on SUZUKI scan tool	“O/D OFF” lamp flashing pattern		
NO DTC	12		Normal
P0715	14		Input revolution sensor
P0730	18		Input revolution sensor signal circuit, A/T VSS signal circuit or automatic transmission itself
P0753	21		Shift solenoid No.1 circuit
	22		
P0758	23		Shift solenoid No.2 circuit
	24		
P0743	25		Lock-up solenoid No.2 circuit
	26		
P0741	29		Torque converter clutch
P0720	31		A/T VSS signal circuit
P1700	32		Throttle opening signal circuit
	33		
P0705	34		Shift range switch
P0725	35		Engine revolution signal circuit
P0710	36		A/T fluid temperature signal circuit
	38		
P0763	43		Shift solenoid No.3 circuit
P0768	45		Shift solenoid No.4 circuit
P0773	48		Shift solenoid No.5 circuit
P1709	51		Engine coolant temperature signal circuit
P0702 P1702	52		Internal malfunction of TCM

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TCM POWER AND GROUND CIRCUIT CHECK

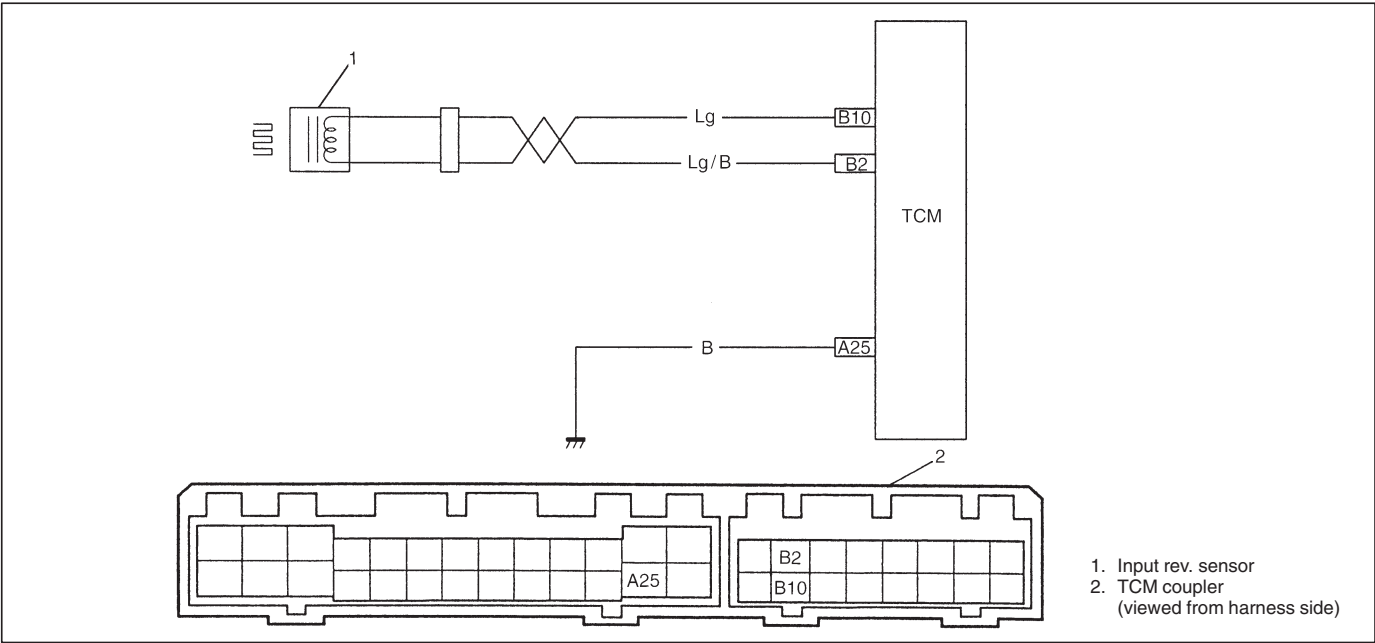
(AUTOMATIC TRANSMISSION DOESN'T SHIFT TO 1ST GEAR AT VEHICLE START IN "D" RANGE)



1. Battery
2. Main fuse
3. Ignition switch
4. Circuit fuse (IG)
5. Ground
6. A/T relay

STEP	ACTION	YES	NO
1	Check voltage between terminal "A12" of TCM coupler and body ground with ignition switch ON. Is it 10 – 14 V?	Go to Step 2.	"P/B" wire open or faulty A/T relay.
2	Check voltage between terminal "A25" of TCM coupler and body ground with ignition switch ON. Is it about 0 V?	Poor "A12" or "A25" connection. If all above are OK, replace known-good TCM and recheck.	"B" wire open.

DTC 14 – INPUT REV. SENSOR SIGNAL
(INPUT SIGNAL TOO HIGH OR TOO LOW)



STEP	ACTION	YES	NO
1	1) Turn ignition switch OFF and disconnect A/T VSS – input rev. sensor coupler. 2) Measure resistance between terminals of the disconnected sensor side coupler. (See figure below.) Is it 160 – 200 Ω?	Go to Step 2.	Replace input rev. sensor.
2	1) Connect A/T VSS – input rev. sensor coupler then disconnect TCM couplers. 2) Measure resistance between terminal “B10” and “B2” of disconnected harness side coupler. Is it 160 – 200 Ω?	Go to Step 3.	Open “Lg” or “Lg/B” wire or shorted to each other.
3	1) Turn ignition switch OFF and connect input rev. sensor coupler then disconnect TCM couplers. 2) Measure resistance between terminal “B10” (of disconnected harness side coupler) and body ground then terminal “B2” (of disconnected harness side coupler) and body ground. (See figure below.) Are they about 0 Ω?	Short in between “Lg” wire to ground or “Lg/B” wire to ground.	Poor connection of terminal “B10” or “B2” of TCM. If all the above are in good condition, the cause can be a “temporary malfunction” of the TCM.

Figure for step 1

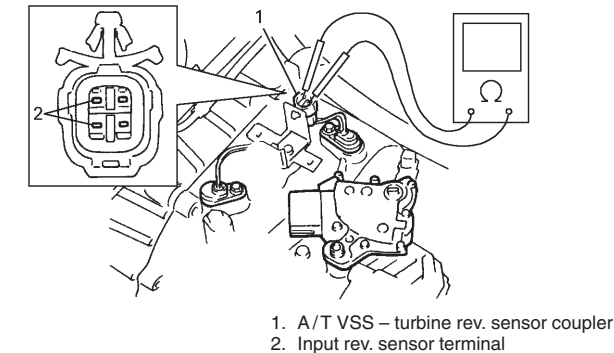
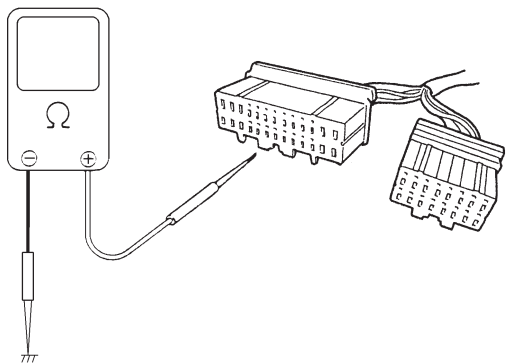


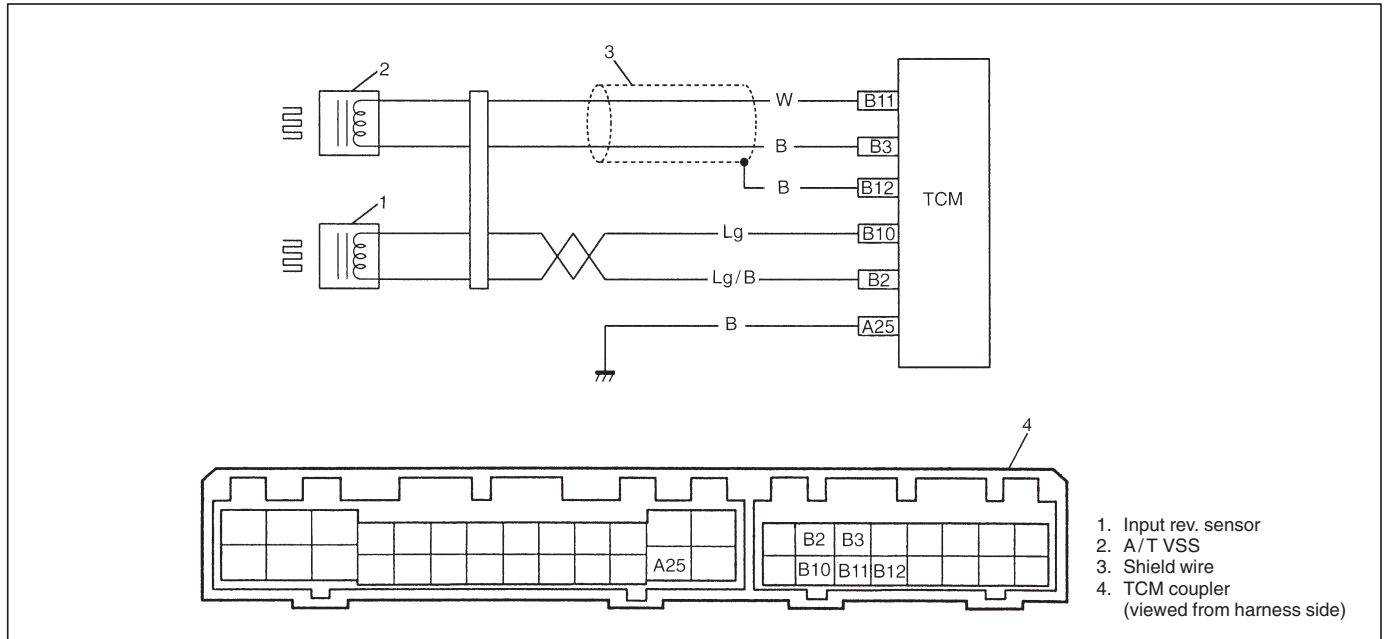
Figure for step 3



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DTC 18 – INPUT REV. SENSOR, A/T VSS OR A/T ITSELF

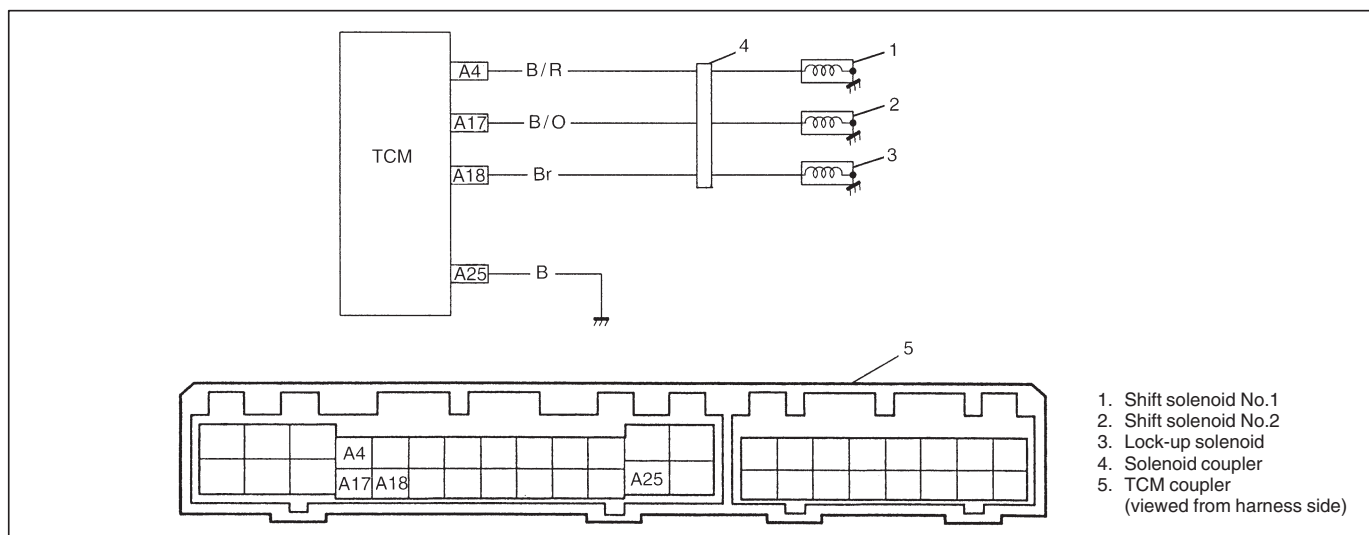
(INPUT VEHICLE SPEED TOO HIGH OR TOO LOW COMPARING TO INPUT REV. SENSOR SIGNAL)



STEP	ACTION	YES	NO
1	Check if DTC 14 or 31 is displayed. Is DTC 14 or 31 displayed?	Inspect according to DTC 14 or 31 flow table first.	Diagnose the faulty condition according to "DIAGNOSIS" in this section.

DTC 21 – SHIFT SOLENOID NO.1**23 – SHIFT SOLENOID NO.2****25 – LOCK-UP SOLENOID**

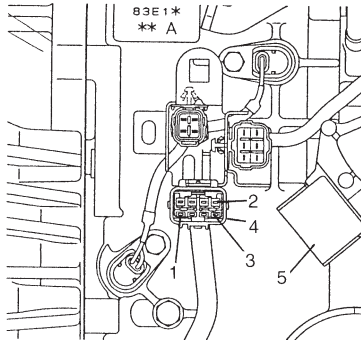
(SHIFT SOLENOID OUTPUT VOLTAGE TOO HIGH EVEN THOUGH TCM ORDERS SHIFT SOLENOID TO TURN OFF)



STEP	ACTION	YES	NO
1	1) Turn ignition switch OFF and disconnect shift solenoid coupler. 2) Measure the resistance between each solenoid terminal of the solenoid coupler and transmission ground. (See chart and figure below.) Is it about 12 Ω ?	Go to Step 2.	<ul style="list-style-type: none"> ● Broken solenoid lead wire. ● Malfunction of solenoid valve.
2	1) Connect shift solenoid coupler then disconnect TCM couplers. 2) Measure the resistance between each solenoid terminal of the disconnected harness side TCM coupler and body ground. (See chart and figure below.) Is it about 12 Ω ?	Go to Step 3.	Broken "Br", "B/R" or "B/O" wire or poor connection of solenoid coupler.
3	Turn ignition switch ON then measure voltage between terminal "A4", "A17" or "A18" of disconnected harness side TCM coupler and body ground. Is it about 0 V?	Poor connection at terminal "A4", "A17" or "A18" of TCM. If all the above are in good condition, the cause can be a "temporary malfunction" of the TCM.	"Br", "B/R" or "B/O" wire or solenoid lead wire shorted to power source circuit.

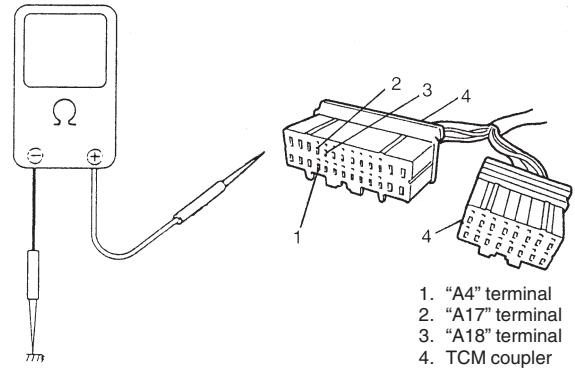
Solenoid	Terminal Number	Lead Wire Color (between TCM and solenoid coupler)
Shift solenoid No.1	A4	B/R
Shift solenoid No.2	A17	B/O
Lock-up solenoid	A18	Br

Figure for step 1



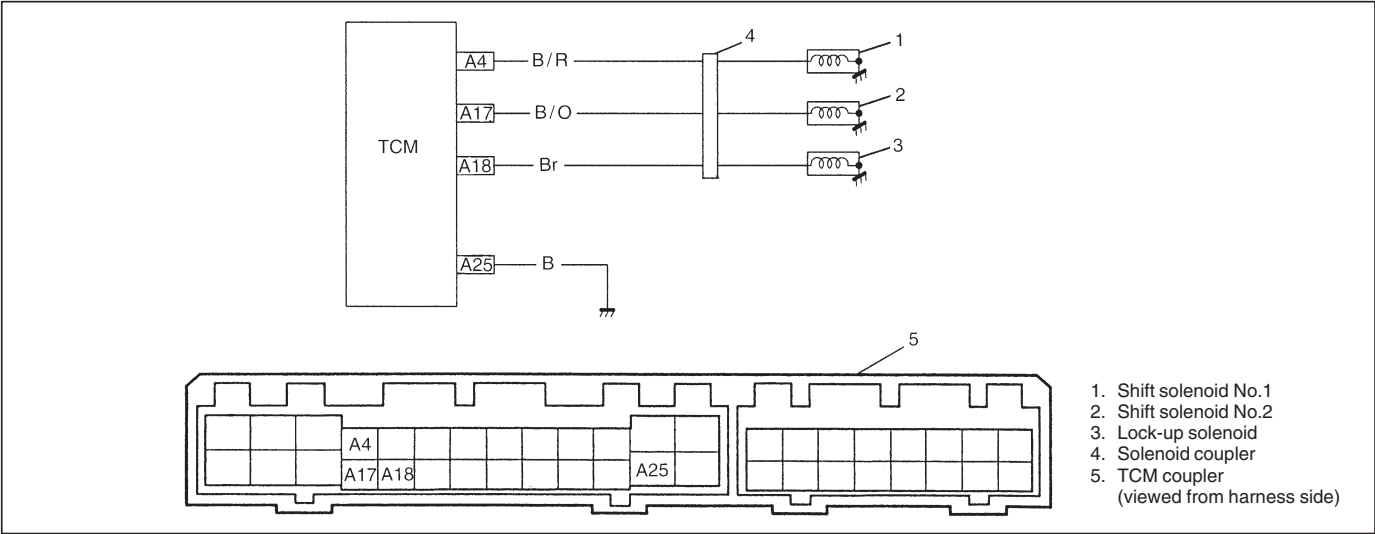
1. Shift solenoid No.1 terminal
2. Shift solenoid No.2 terminal
3. Lock-up solenoid terminal
4. Solenoid coupler
5. Shift switch

Figure for steps 2 and 3



1. "A4" terminal
2. "A17" terminal
3. "A18" terminal
4. TCM coupler

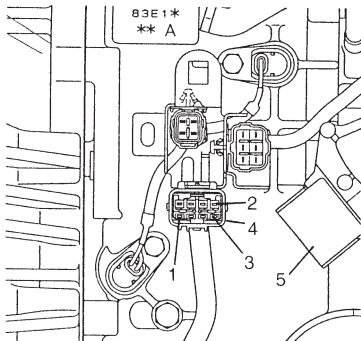
DTC 22 – SHIFT SOLENOID NO.1
24 – SHIFT SOLENOID NO.2
26 – LOCK-UP SOLENOID



STEP	ACTION	YES	NO
1	1) Turn ignition switch OFF and disconnect solenoid coupler. 2) Measure the resistance between each solenoid terminal of solenoid coupler and transmission ground. (See chart and figure below.) Is it about 12 Ω?	Go to Step 2.	<ul style="list-style-type: none"> Short in between solenoid lead wire and ground. Malfunction of shift solenoid valve.
2	1) Disconnect TCM couplers. 2) Measure the resistance between terminal “A4”, “A17” or “A18” of the disconnected harness side TCM coupler and body ground. (See figure below.) Is it about 0 Ω?	Short in between “B/R”, “B/O” or “Br” wire and ground.	The cause can be a “temporary malfunction” of the TCM.

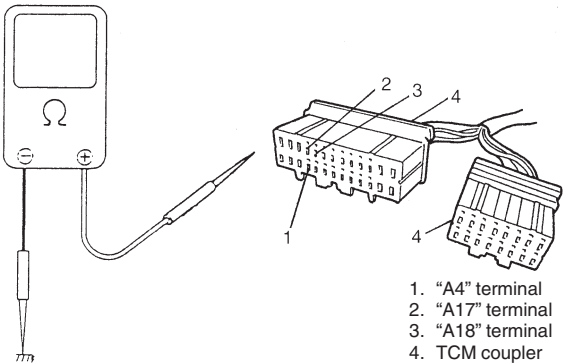
Solenoid	TCM Terminal Number	Lead Wire Color (between TCM and solenoid coupler)
Shift solenoid No.1	A4	B/R
Shift solenoid No.2	A17	B/O
Lock-up solenoid	A18	Br

Figure for step 1



- Shift solenoid No.1 terminal
- Shift solenoid No.2 terminal
- Lock-up solenoid terminal
- Solenoid coupler
- Shift switch

Figure for step 2



- “A4” terminal
- “A17” terminal
- “A18” terminal
- TCM coupler

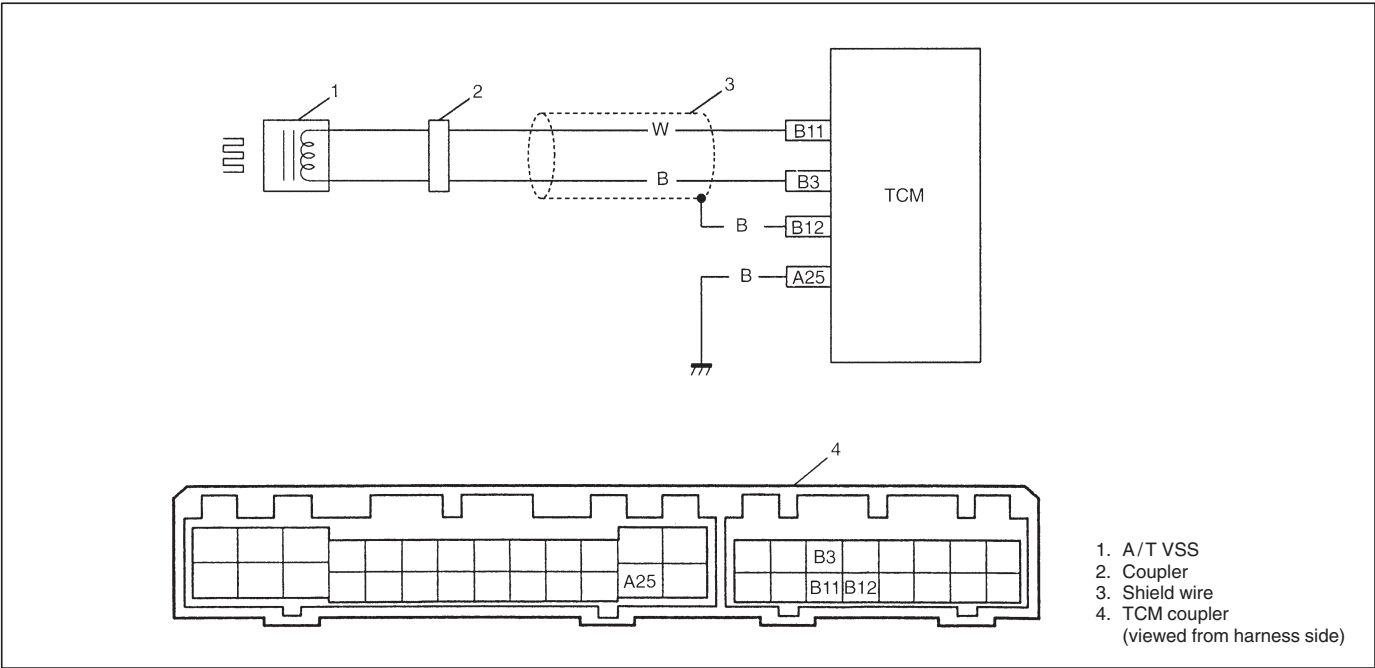
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DTC 29 – LOCK-UP CLUTCH

- Substitute known-good torque converter and recheck.
- Check if fluid has an odor and is discolored, and replace as necessary.

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DTC 31 – A/T VEHICLE SPEED SENSOR (A/T VSS)
(INPUT VOLTAGE TOO HIGH OR TOO LOW)



STEP	ACTION	YES	NO
1	1) Turn ignition switch OFF and disconnect A/T VSS – input rev. sensor coupler. 2) Measure resistance between terminals of disconnected sensor side coupler. (See figure below.) Is it 160 – 200 Ω?	Go to Step 2.	Replace A/T VSS.
2	1) Connect A/T VSS coupler then disconnect TCM couplers. 2) Measure resistance between terminal “B11” and “B3” of disconnected harness side coupler. (See figure below.) Is it 160 – 200 Ω?	Go to Step 3.	Broken “W” or “B” wire or shorted to each other.
3	1) Turn ignition switch OFF and disconnect A/T VSS – input rev. sensor coupler. 2) Measure resistance between terminal “3” (of disconnected sensor side coupler) – body ground then terminal “4” (of disconnected sensor side coupler) – body ground. (See figure below.) Is it about 0 Ω?	Replace A/T VSS.	Go to Step 4.

STEP	ACTION	YES	NO
4	1) Turn ignition switch OFF and connect A/T VSS coupler. 2) Measure resistance between terminal "B11" (of disconnected harness side coupler) – body ground then terminal "B3" (of disconnected harness side coupler) – body ground. Is it about 0 Ω ?	Short in between "W" wire and ground or "B" wire and ground.	Go to Step 5.
5	Measure resistance between terminal "B11" – "B12" (of disconnected harness side coupler) then terminal "B3" – "B12" (of disconnected harness side coupler). Is it about 0 Ω ?	"W" wire or "B" wire shorted to shield portion.	Poor connection of terminal "B11" or "B3" of the TCM. If all the above are in good condition, the cause can be a temporary malfunction of the TCM or the TCM itself.

Figure for step 1, 2

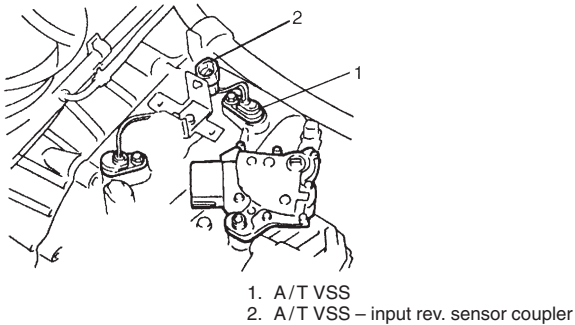


Figure for step 2, 5

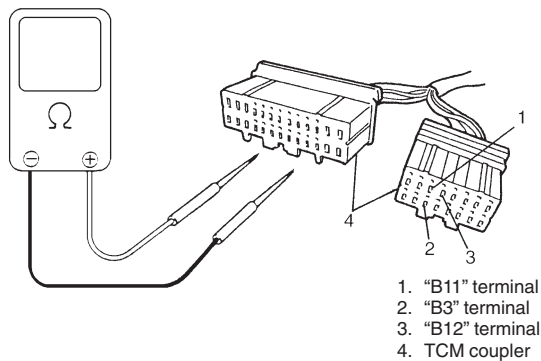


Figure for step 3

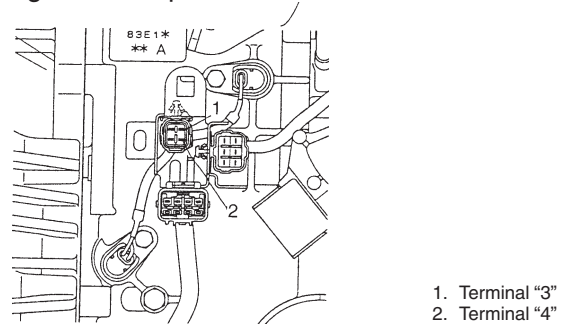
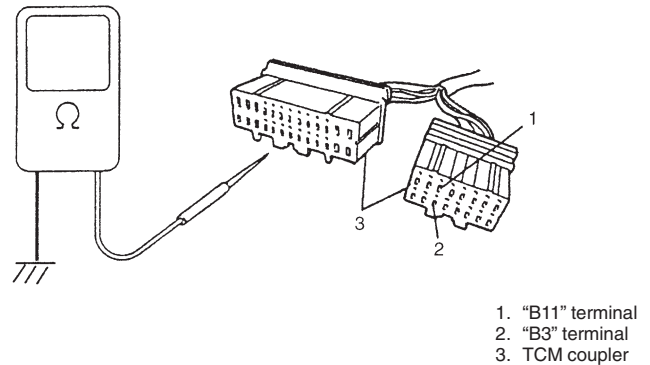
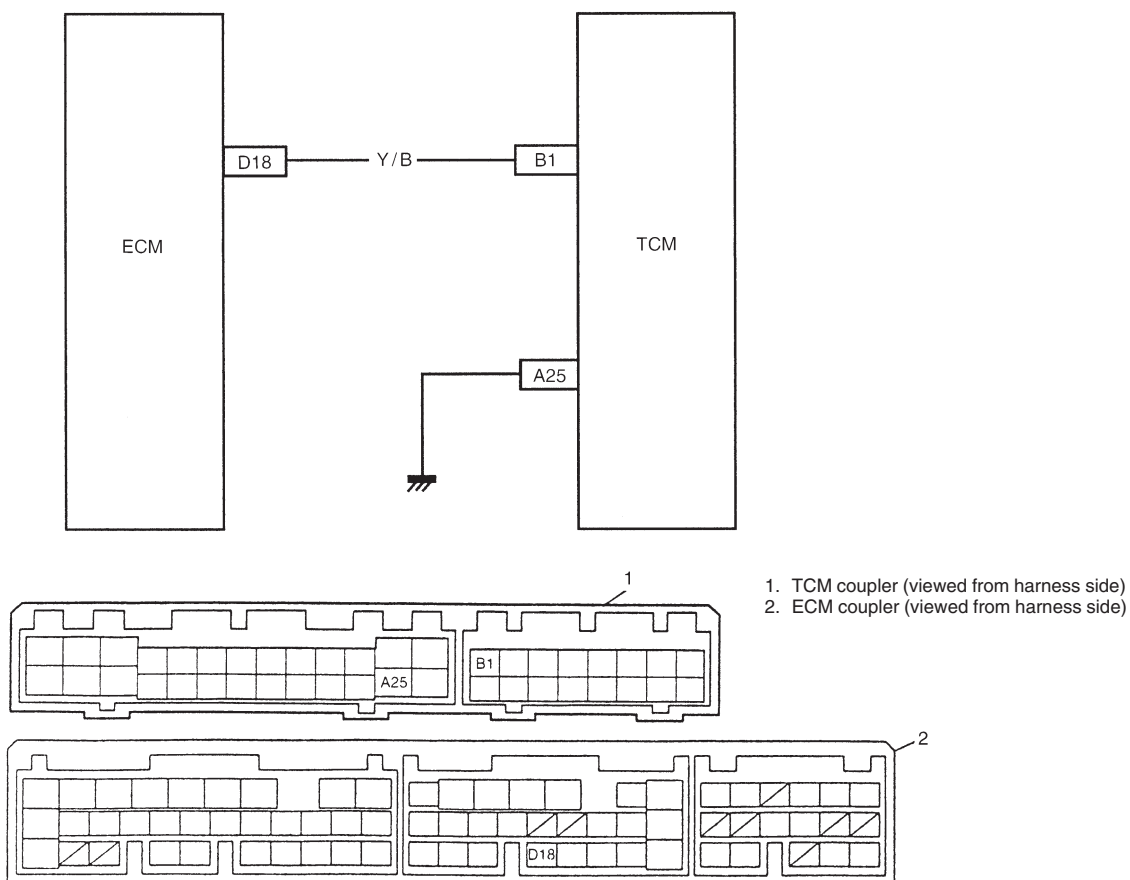


Figure for step 4



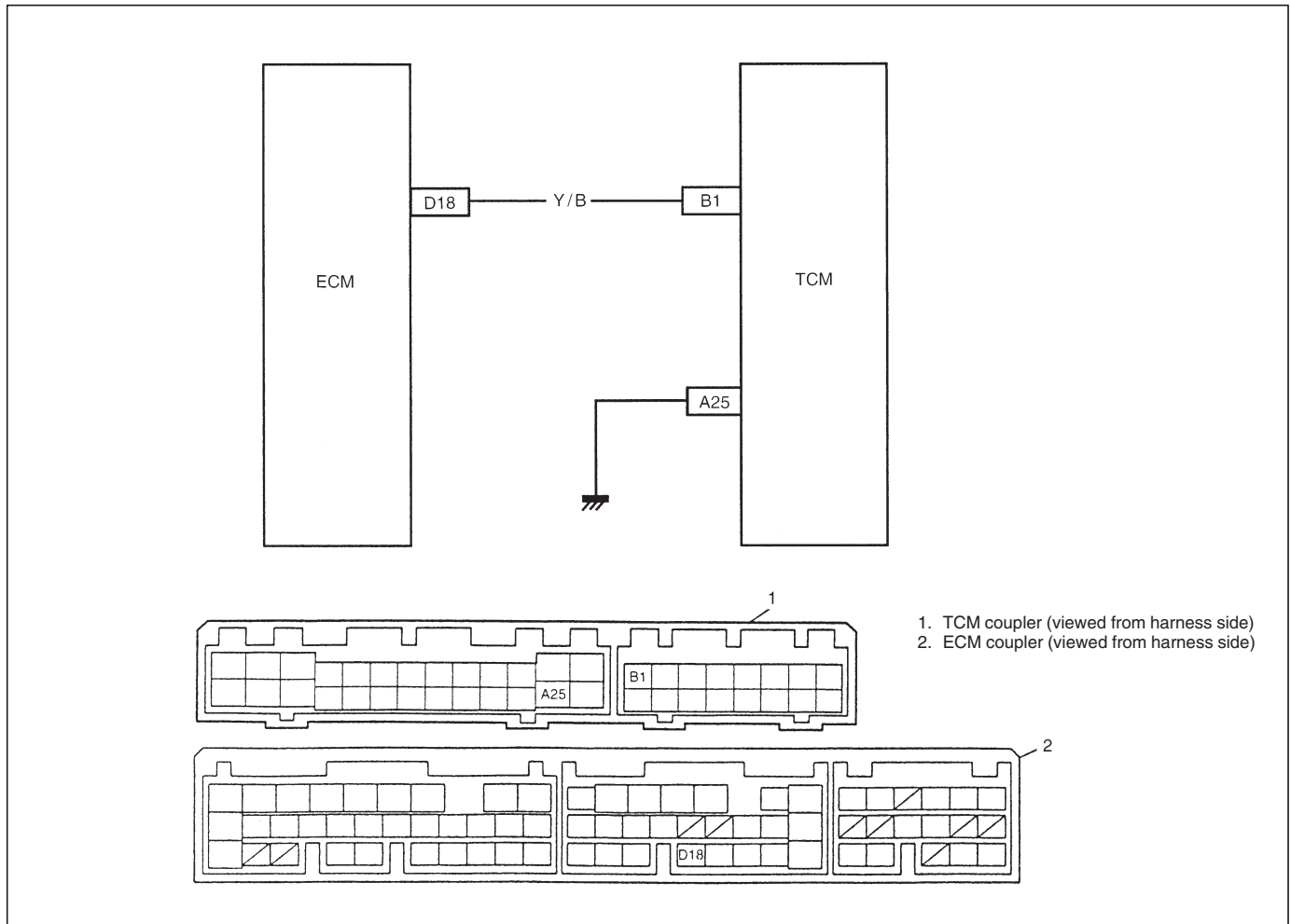
DTC 32 – THROTTLE POSITION SIGNAL (THROTTLE OPENING SIGNAL OF OVER 100% INPUTTED)



STEP	ACTION	YES	NO
1	Check throttle opening signal referring to Section 6E. Is it OK?	Intermittent trouble or faulty TCM. Recheck referring to "Intermittent trouble" in Section 0B.	Go to Step 2.
2	Check DTC of electronic fuel injection system referring to Section 6E. Does the DTC show normal code?	Go to Step 3.	Inspect and repair referring to DTC flow table of electronic fuel injection system in Section 6E.
3	1) Turn ignition switch OFF and disconnect TCM and ECM couplers. 2) Check resistance between terminal "B1" of disconnected harness side TCM coupler and body ground. Is it infinity?	Go to Step 4.	"Y/B" wire shorted to ground.
4	1) Connect TCM couplers. 2) Turn ignition switch ON and check voltage between terminal "D18" of disconnected harness side ECM coupler and body ground. Is it 10 – 14 V?	Intermittent trouble or faulty ECM. Substitute a known-good ECM and recheck.	Substitute a known-good TCM and recheck.

DTC 33– THROTTLE POSITION SIGNAL

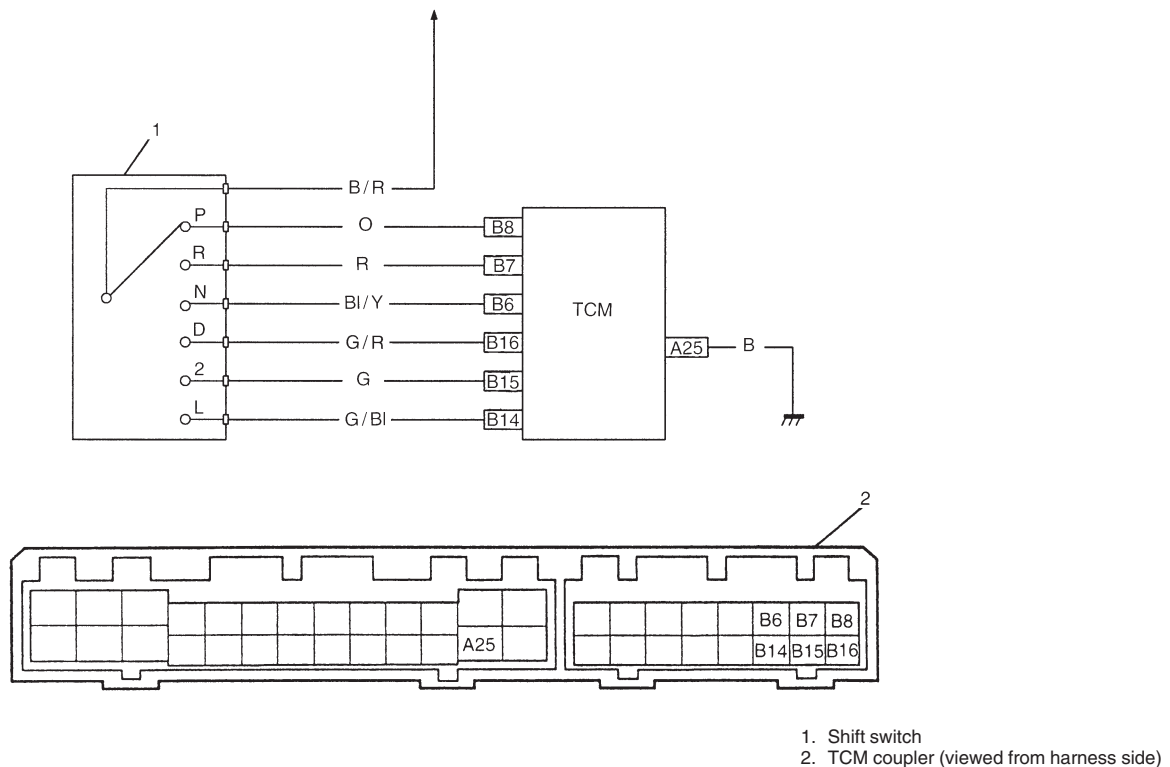
(THROTTLE OPENING SIGNAL OF UNDER 0% INPUTTED OR INPUT SIGNAL FIXED TO HIGH (12V) OR LOW (0V))



STEP	ACTION	YES	NO
1	Check throttle opening signal referring to Section 6E. Is it OK?	Intermittent trouble or faulty TCM. Recheck referring to "Intermittent trouble" in Section 0B.	Go to Step 2.
2	Check DTC of electronic fuel injection system referring to Section 6E. Does the DTC show normal code?	Go to Step 3.	Inspect and repair referring to DTC table of electronic fuel injection system in Section 6E.
3	1) Turn ignition switch OFF and disconnect ECM couplers. 2) Turn ignition switch ON and check voltage between terminal "D18" of disconnected harness side ECM coupler and body ground. Is it 10 – 14 V?	Poor connection of terminal "D18" of ECM coupler. If connection is OK, substitute a known-good ECM and recheck.	"Y/B" wire open or poor "B1" connection of TCM coupler. If wire and connection are OK, substitute a known-good TCM and recheck.

DTC 34 – SHIFT SWITCH

(NO SHIFT SWITCH SIGNAL INPUTTED OR TWO OR MORE SHIFT SWITCH SIGNALS INPUTTED AT THE SAME TIME)



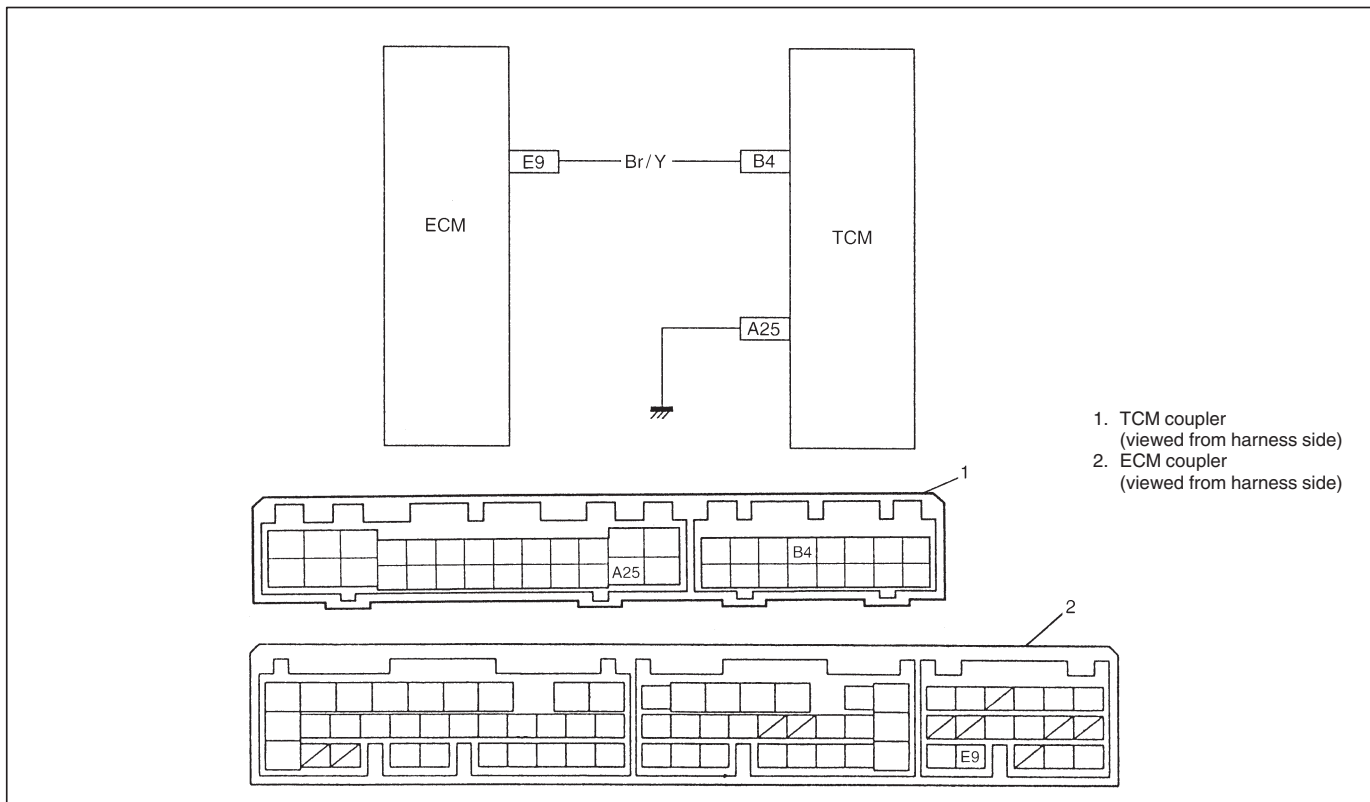
STEP	ACTION	YES	NO
1	1) Turn ignition switch OFF, disconnect TCM coupler. 2) Turn ignition switch ON, check voltage between terminal "B8" and "A25" of disconnected harness side TCM coupler. Is it 10 – 14 V at "P" range and 0 V at other range?	Go to Step 2.	Go to Step 7.
2	While ignition switch ON, check voltage between terminal "B7" and "A25" of disconnected harness side TCM coupler. Is it 10 – 14 V at "R" range and 0 V at other range?	Go to Step 3.	Go to Step 7.
3	While ignition switch ON, check voltage between terminal "B6" and "A25" of disconnected harness side TCM coupler. Is it 10 – 14 V at "N" range and 0 V at other range?	Go to Step 4.	Go to Step 7.
4	While ignition switch ON, check voltage between terminal "B16" and "A25" of disconnected harness side TCM coupler. Is it 10 – 14 V at "D" range and 0 V at other range?	Go to Step 5.	Go to Step 7.
5	While ignition switch ON, check voltage between terminal "B15" and "A25" of disconnected harness side TCM coupler. Is it 10 – 14 V at "2" range and 0 V at other range?	Go to Step 6.	Go to Step 7.

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STEP	ACTION	YES	NO
6	While ignition switch ON, check voltage between terminal "B14" and "A25" of disconnected harness side TCM coupler. Is it 10 – 14 V at "L" range and 0 V at other range?	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent troubles" in Section 0B.	Go to Step 7.
7	Check shift switch referring in this section. Is it OK?	Shift switch wire shorted. If wire harnesses are OK, substitute a known-good TCM and recheck.	Replace shift switch.

DTC 35 – ENGINE REV. SIGNAL

(NO ENGINE REV. SIGNAL INPUTTED EVEN THOUGH STANDARD
VALUE OF VEHICLE SPEED SIGNAL AND THROTTLE OPENING
SIGNAL INPUTTED)

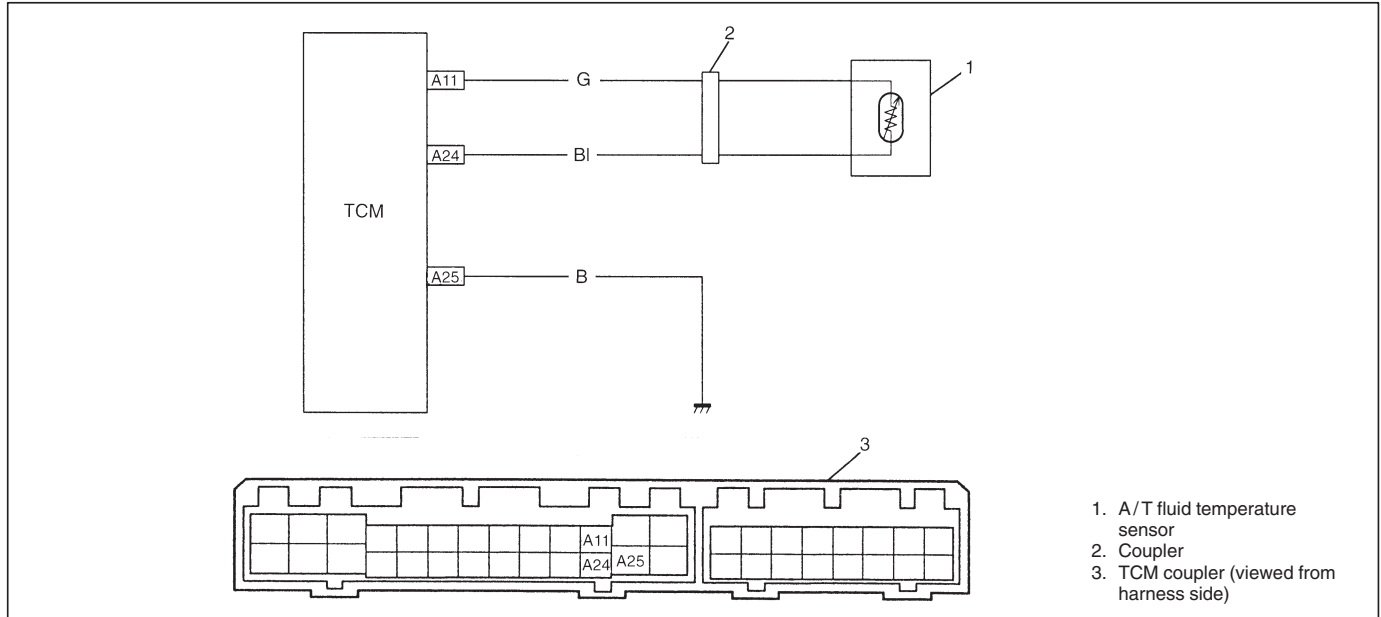


STEP	ACTION	YES	NO
1	Check DTC of electronic fuel injection system referring to Section 6E. Does the DTC show normal code?	Go to Step 2.	Inspect and repair referring to DTC flow table of electronic fuel injection system in Section 6E.
2	1) Turn ignition switch OFF and disconnect ECM and TCM couplers. 2) Check continuity between “E9” and “B4”. Is there continuity?	Go to Step 3.	“Br/Y” wire open.
3	1) Turn ignition switch OFF and disconnect TCM and ECM couplers. 2) Check resistance between terminal “B4” of disconnected harness side TCM coupler and body ground. Is it infinity?	Go to Step 4.	“B4” wire shorted to ground.
4	1) Turn ignition switch OFF and connect TCM couplers. 2) Turn ignition switch ON and check voltage between terminal “E9” of disconnected harness side ECM coupler and body ground. Is it 10 – 14 V?	Intermittent trouble or faulty ECM. Substitute a known-good ECM and recheck.	Substitute a known-good TCM and recheck.

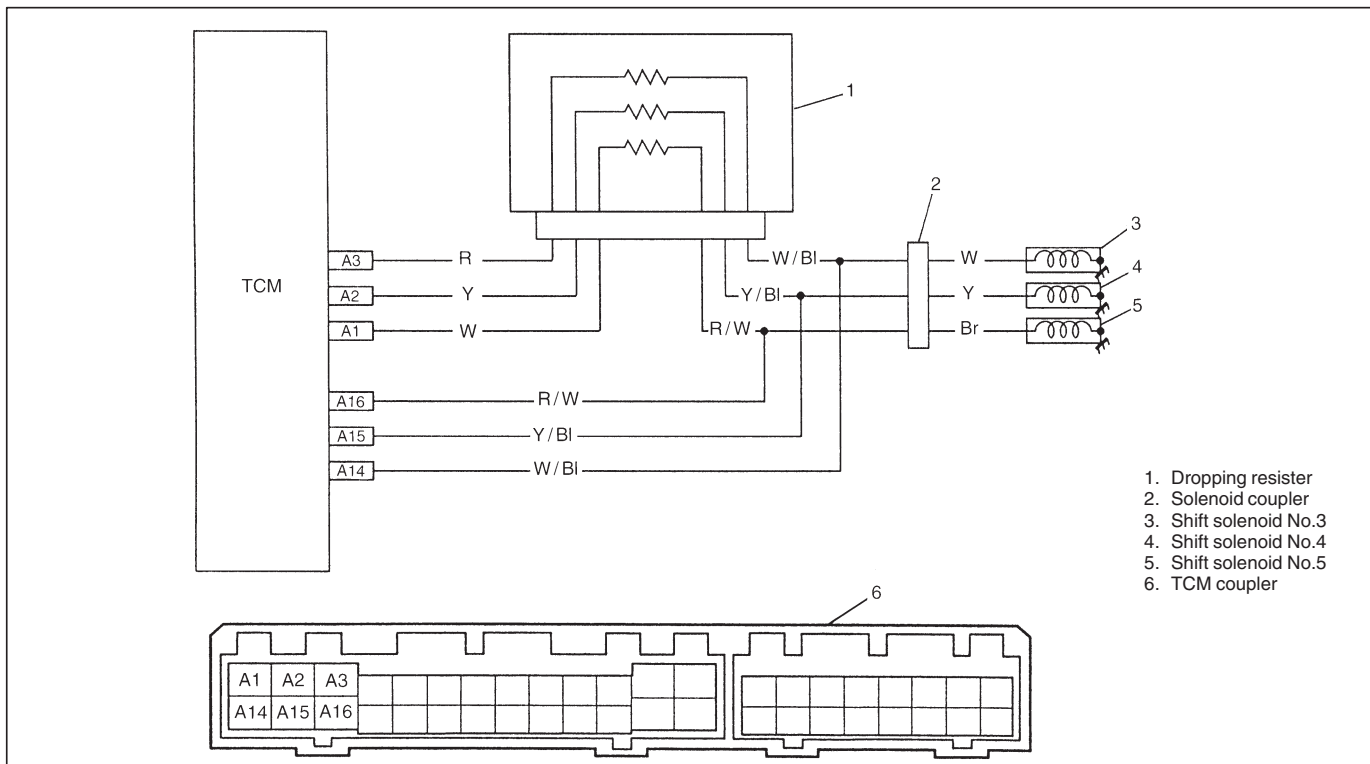
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DTC 36 – A/T FLUID TEMPERATURE SIGNAL (NO A/T FLUID TEMPERATURE SIGNAL INPUTTED)

DTC 38 – A/T FLUID TEMPERATURE SIGNAL (A/T FLUID TEMPERATURE SIGNAL INPUT VOLTAGE DOES NOT GO DOWN EVEN THOUGH STANDARD VALUE OF ENGINE REV. SIGNAL INPUTTED)



STEP	ACTION	YES	NO
1	1) Turn ignition switch OFF and disconnect solenoid wire harness coupler. 2) Turn ignition switch ON then measure voltage between “G” wire terminal of disconnected harness side coupler and engine ground. Is it about 5V?	Go to Step 2.	<ul style="list-style-type: none"> ● Broken “G” lead wire or shorted to 12 V power source. ● Poor connection of “A11” terminal at TCM. If all the above are in good condition, substitute a known-good TCM and restart the troubleshooting.
2	1) Turn ignition switch OFF and connect solenoid wire harness coupler. 2) Turn ignition switch ON then measure voltage between “BI” lead wire terminal of solenoid wire harness coupler and engine ground (with coupler connected). Is it about 5V?	Broken “BI” lead wire or poor connection of “A24” terminal at TCM. If all the above are in good condition, substitute a known-good TCM and restart the troubleshooting.	Go to Step 3.
3	Check A/T fluid temperature sensor referring to A/T FLUID TEMPERATURE SENSOR INSPECTION in this section. Is it OK?	Short in between “G” lead wire and 5V power source or short in between A/T fluid temp. sensor lead wire and 5V power source. If all the above are in good condition, the cause can be a temporary malfunction of the TCM.	Replace A/T fluid temperature sensor.

DTC 43 – SHIFT SOLENOID NO.3**DTC 45 – SHIFT SOLENOID NO.4****DTC 48 – SHIFT SOLENOID NO.5**

STEP	ACTION	YES	NO
1	1) Turn ignition switch OFF and disconnect solenoid coupler. 2) Measure resistance between terminal of solenoid coupler and transmission ground. (See figure below.) Is it about 3 Ω?	Go to Step 2.	<ul style="list-style-type: none"> Short in between solenoid lead wire and ground. Malfuction of solenoid valve.
2	1) Disconnect TCM couplers. 2) Measure resistance between solenoid coupler terminal of body side and TCM coupler terminal connected to dropping resistor (A1, A2 or A3). (See chart below.) Is it about 8 Ω?	Go to Step 3.	Inspect dropping resistor referring to "ON-VEHICLE SERVICE" in this section. If OK, circuit between TCM and dropping resistor or dropping resistor and solenoid coupler is open.
3	Check continuity between terminal of TCM coupler and terminal of solenoid coupler. (See chart below.) Is there continuity?	Go to Step 4.	Circuit between TCM and solenoid coupler is open.
4	Check continuity between solenoid coupler terminal and transmission ground with TCM, dropping resistor and solenoid couplers disconnected. Is there continuity?	Circuit between TCM and transmission is shorted to ground.	Go to Step 5.
5	Check continuity between dropping resistor terminal and transmission ground. (See chart below.) Is there continuity?	Circuit between TCM and dropping resistor is shorted to ground.	Substitute a known-good TCM and recheck.

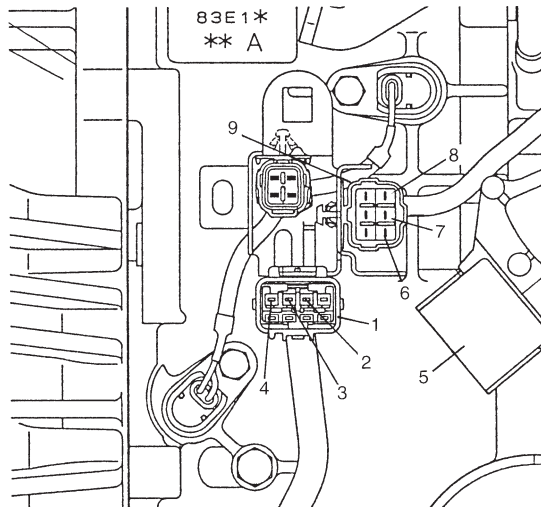
Chart for step 2

Solenoid	TCM terminal No.	Solenoid coupler lead wire color (body side)
No.3	A3	W/BI
No.4	A2	Y/BI
No.5	A1	R/W

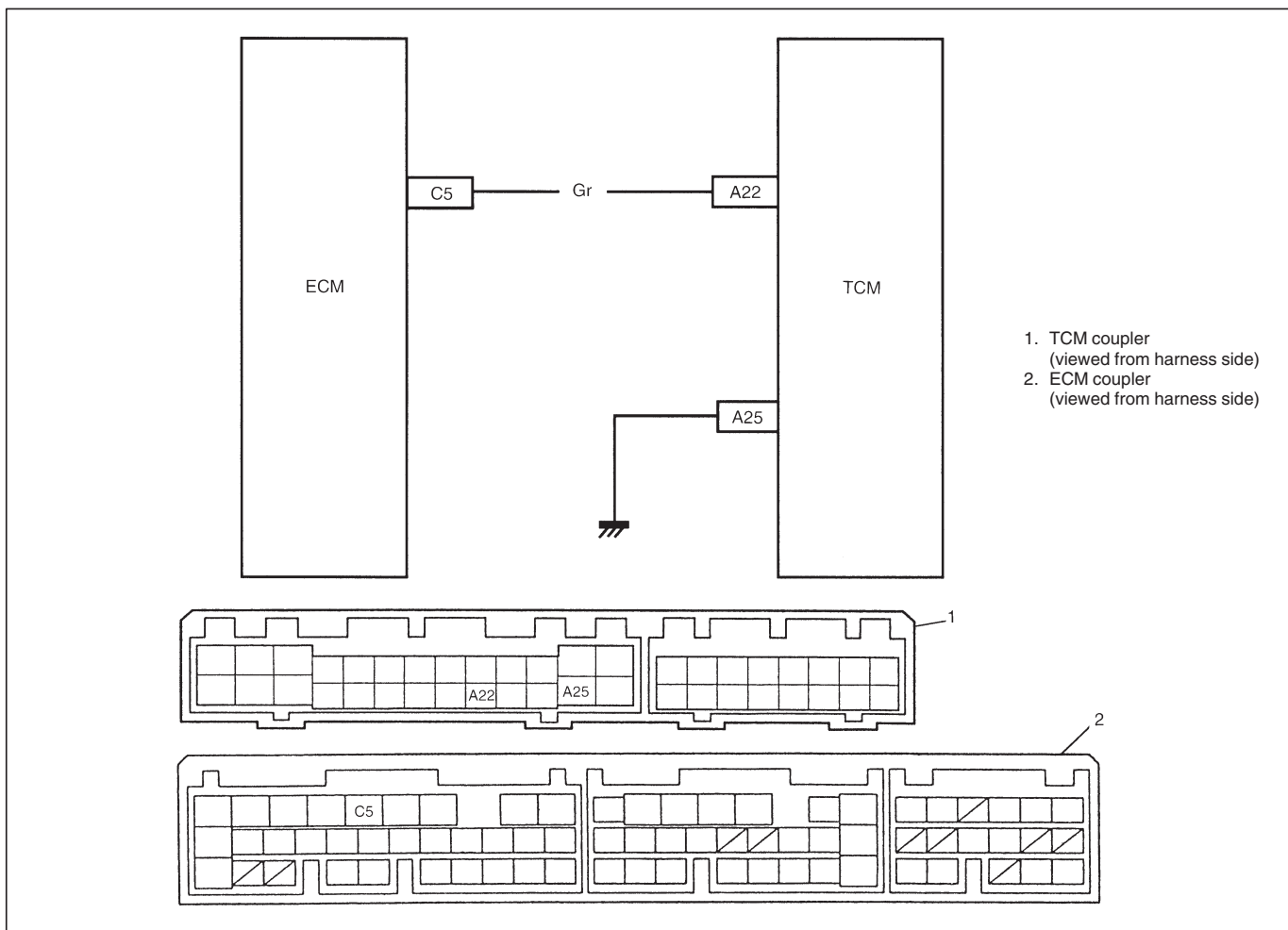
Chart for step 3

Solenoid	TCM terminal No.	Solenoid coupler lead wire color (body side)
No.3	A14	W/BI
No.4	A15	Y/BI
No.5	A16	R/W

Figure for step 1 and 5



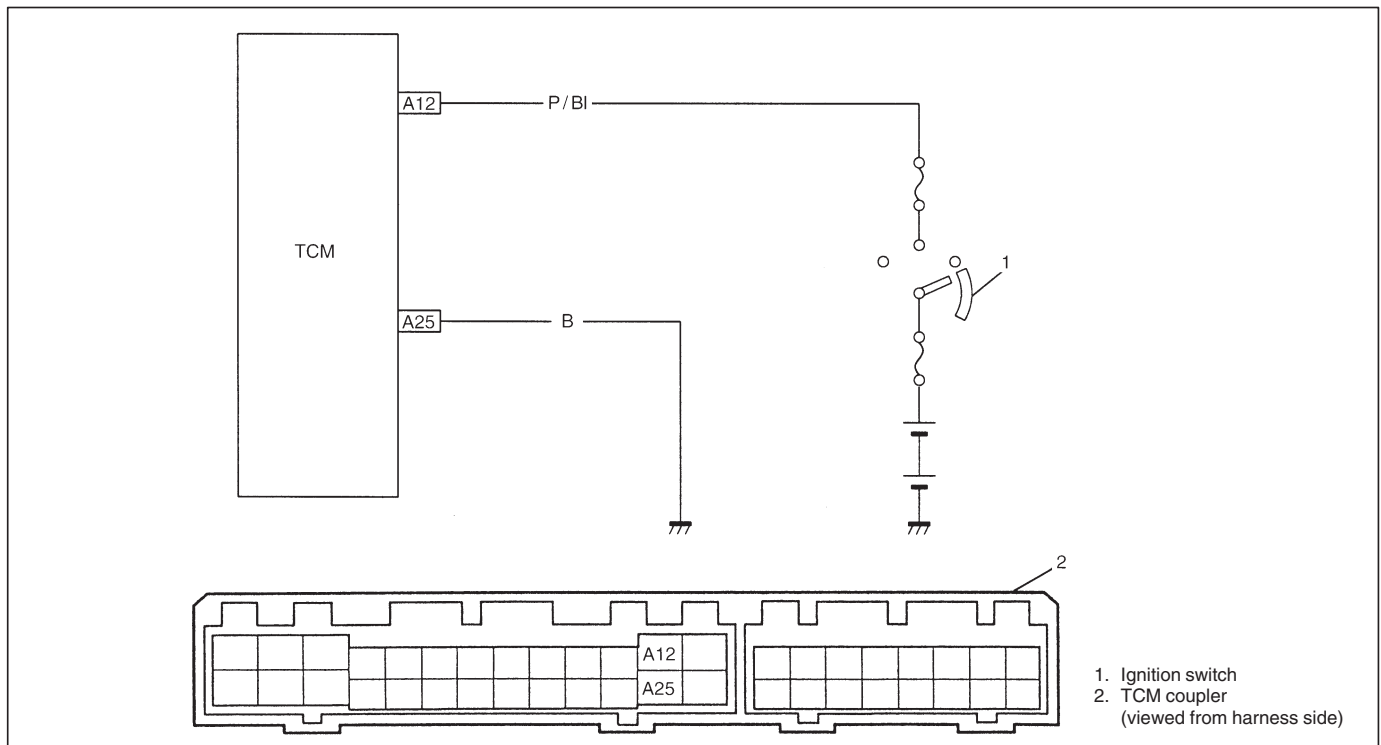
1. Solenoid coupler
2. Terminal for solenoid No.3
3. Terminal for solenoid No.4
4. Terminal for solenoid No.5
5. Shift switch
6. Dropping resistor terminal for shift solenoid No.3
7. Dropping resistor terminal for shift solenoid No.4
8. Dropping resistor terminal for shift solenoid No.5
9. Dropping resistor coupler

DTC 51 – ENGINE COOLANT TEMPERATURE SENSOR

STEP	ACTION	YES	NO
1	1) Check DTC of "Engine and Emission Control System" referring to SECTION 6E. Are both ECT and MAP sensor circuits OK?	Go to Step 2.	Inspect and repair referring to the DTC flow table in SECTION 6E.
2	1) Turn ignition switch OFF and disconnect ECM and TCM couplers. 2) Check continuity between terminals "A22" and "C5" of harness. Is the continuity?	Go to Step 3.	"Gr" wire open.
3	Check resistance between terminal "A22" of disconnected harness side TCM coupler and body ground. Is it infinity?	Go to Step 4.	"Gr" wire shorted to ground.
4	1) Turn ignition switch OFF and connect TCM couplers. 2) Turn ignition switch ON and check voltage between terminal "C5" of disconnected harness side ECM coupler and body ground. Is it 0 V?	Substitute a known-good TCM and recheck.	Substitute a known-good ECM and recheck.

DTC 52 – POWER SOURCE RELAY IN TCM

(RELAY OUTPUT VOLTAGE TOO HIGH EVEN THOUGH TCM ORDERS THE RELAY TO TURN OFF OR RELAY OUTPUT VOLTAGE TOO LOW EVEN THOUGH TCM ORDERS THE RELAY TO TURN ON)



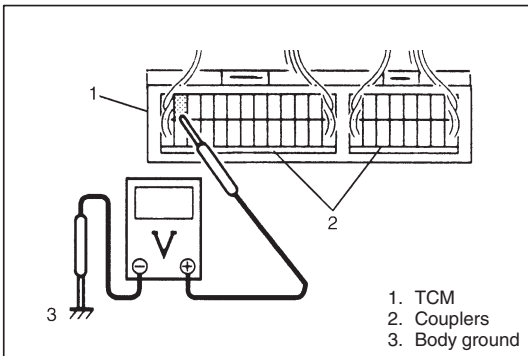
STEP	ACTION	YES	NO
1	1) Turn ignition switch ON. 2) Erase all DTCs referring to HOW TO CLEAR DTC in this section. 3) Turn ignition switch OFF. 4) Turn ignition switch ON once again and check for any DTC. Is it DTC P0702 ("O/D OFF" lamp flashing pattern 52)?	Replace TCM.	Could be a temporary malfunction of the TCM.

INSPECTION OF TCM AND ITS CIRCUITS

TCM and its circuits can be checked at TCM wiring couplers by measuring voltage and resistance.

CAUTION:

TCM cannot be checked by itself, it is strictly prohibited to connect voltmeter or ohmmeter to TCM with coupler disconnected from it.

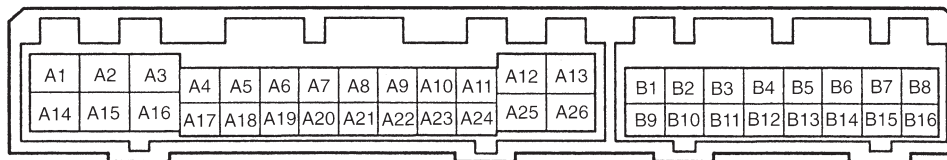
**Voltage Check**

- 1) Remove TCM from vehicle referring to TRANSMISSION CONTROL MODULE REMOVAL.
- 2) Connect TCM couplers to TCM.
- 3) Check voltage at each terminal of couplers connected.

NOTE:

As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.

Terminal arrangement of TCM coupler (Viewed from harness side)



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TERMI-NAL	CIRCUIT	STANDARD VOLTAGE	CONDITION
A1	Shift solenoid No.5 (Dropping resistor)	approx. 0 V	IG switch ON, select lever at "P" range
A2	Shift solenoid No.4 (Dropping resistor)	10 – 14 V	IG switch ON, select lever at "P" range
A3	Shift solenoid No.3 (Dropping resistor)	approx. 0 V	IG switch ON, select lever at "P" range
A4	Shift solenoid No.1	approx. 0 V	IG switch ON, select lever at "P" range
A5	Not used	–	–
A6	D-range idle up signal	10 – 14 V	Select lever at "P" or "N" range
		0 – 1 V	Select lever at other than "P" or "N" range
A7	Not used	–	–
A8	Not used	–	–
A9	A/C compressor magnet switch	approx. 0 V	A/C OFF
		10 – 14 V	A/C ON
A10	Stop lamp switch	10 – 14 V	Stop lamp ON (Brake pedal depressed)
		approx. 0 V	Stop lamp OFF (Brake pedal not depressed)
A11	A/T fluid temperature sensor	0 – 4.5 V	IG ON
A12	IG power source	10 – 14 V	IG switch ON
A13	Not used	–	–
A14	Shift solenoid No.5	approx. 0 V	IG switch ON, select lever at "P" range
A15	Shift solenoid No.4	2.4 – 5.0 V	IG switch ON, select lever at "P" range
A16	Shift solenoid No.3	approx. 0 V	IG switch ON, select lever at "P" range
A17	Shift solenoid No.2	approx. 0 V	IG switch ON, select lever at "P" range
A18	Lock-up solenoid	approx. 0 V	IG switch ON, select lever at "P" range
A19	O/D OFF lamp	10 – 14 V	IG switch ON, O/D cut switch OFF ("O/D OFF" not-illuminated)
		approx. 0 V	IG switch ON, O/D cut switch ON ("O/D OFF" illuminated)
A20	A/T failure signal	–	–
A21	Not used	–	–
A22	ECT and MAP sensor signal	–	IG ON
A23	O/D cut switch	10 – 14 V	IG switch ON, O/D cut switch OFF ("O/D OFF" not-illuminated)
		approx. 0 V	IG switch ON, O/D cut switch ON ("O/D OFF" illuminated)
A24	Sensor ground	–	–
A25	Ground	–	–
A26	Not used	–	–
B1	Throttle opening signal	–	IG switch ON. The voltage should decrease as the throttle pedal depressed.
B2	Input revolution sensor (+)	–	–
B3	Vehicle speed sensor (+)	–	–
B4	Engine revolution signal	–	–
B5	Diagnosis switch	–	–
B6	Transmission range "N" switch	10 – 14 V	IG switch ON, select lever at "N" range
		approx. 0 V	IG switch ON, select lever at other than "N" range
B7	Transmission range "R" switch	10 – 14 V	IG switch ON, select lever at "R" range
		approx. 0 V	IG switch ON, select lever at other than "R" range
B8	Transmission range "P" switch	10 – 14 V	IG switch ON, select lever at "P" range
		approx. 0 V	IG switch ON, select lever at other than "P" range
B9	Not used	–	–
B10	Input revolution sensor (–)	–	–
B11	Vehicle speed sensor (–)	–	–
B12	Vehicle speed sensor shield	–	–
B13	Serial communication (SUZUKI scan tool)	10 – 14 V	When SUZUKI scan tool not used.
B14	Transmission range "L" switch	10 – 14 V	IG switch ON, select lever at "L" range
		approx. 0 V	IG switch ON, select lever at other than "L" range
B15	Transmission range "2" switch	10 – 14 V	IG switch ON, select lever at "2" range
		approx. 0 V	IG switch ON, select lever at other than "2" range
B16	Transmission range "D" switch	10 – 14 V	IG switch ON, select lever at "D" range
		approx. 0 V	IG switch ON, select lever at other than "D" range

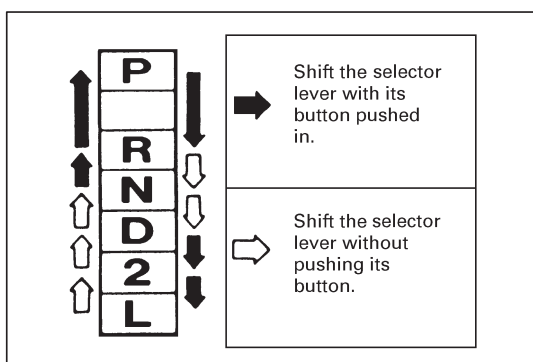
ON-VEHICLE SERVICE

MAINTENANCE SERVICE

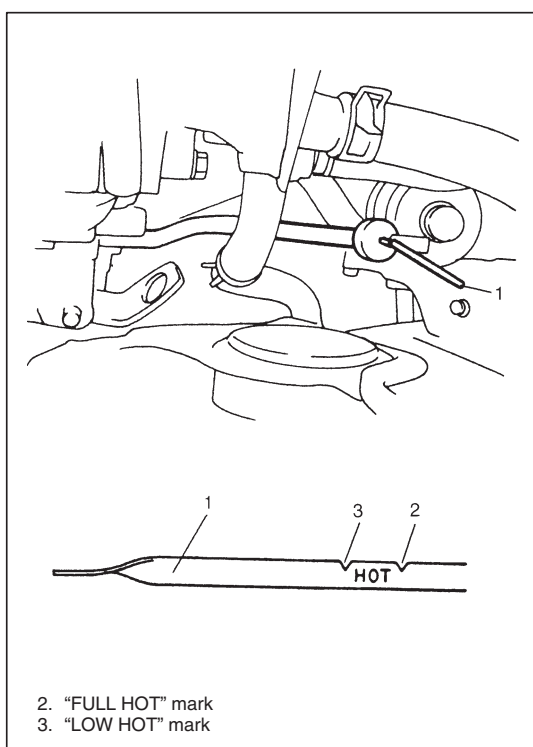
FLUID LEVEL

LEVEL CHECK AT NORMAL OPERATING TEMPERATURE

- 1) Stop vehicle and place it level.
- 2) Apply parking brake and place chocks against wheels.
- 3) With selector at P position, start engine.
- 4) Warm up engine till fluid temperature reaches normal operating temperature (70 – 80°C/158 – 176°F). As a guide to check fluid temperature, warm up engine to normal operating temperature.



- 5) Keep engine idling and shift selector slowly to L and back to P position.
- 6) With engine idling, pull out dipstick, wipe it off with a clean cloth and put it back into place.



- 7) Pull out dipstick (1) again and check fluid level indicated on it. Fluid level should be between FULL HOT and LOW HOT. If it is below LOW HOT, add an equivalent of DEXRON[®]-III up to FULL HOT.

Fluid specification
An equivalent of DEXRON [®] -III

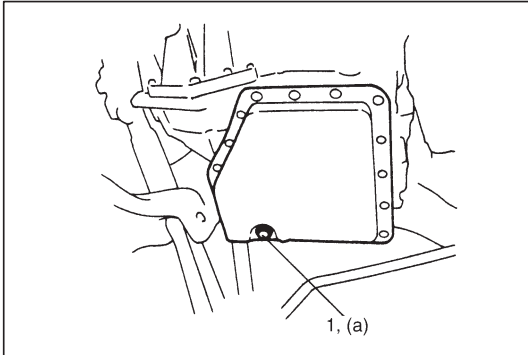
NOTE:

- **DO NOT RACE ENGINE** while checking fluid level, even after the engine start.
- **DO NOT OVERFILL.** Overfilling can cause foaming and loss of fluid through breather. Then slippage and transmission failure can result.
- Bringing the level from LOW HOT to FULL HOT requires 0.35 liters (0.74/0.62 US/Imp. pt).
- If vehicle was driven under high load such as pulling a trailer, fluid level should be checked about half an hour after it is stopped.

FLUID CHANGE INTERVALS

If the vehicle is usually driven under one or more of the following severe conditions, change the transmission fluid every 160,000 km (100,000 miles).

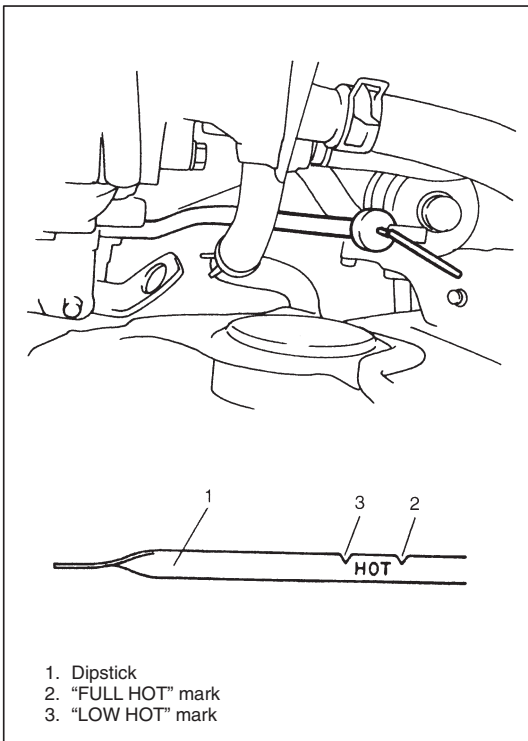
- In heavy city traffic. Where the outside temperature regularly reaches 32°C (90°F).
- In very hilly or mountainous areas.
- Commercial use, such as taxi, police vehicle or delivery service.

**CHANGING FLUID**

- 1) Lift up vehicle.
- 2) When engine has cooled down, remove drain plug (1) from oil pan and drain A/T fluid.
- 3) Install drain plug.

Tightening Torque

(a): 23 N·m (2.3 kg·m, 16.5 lb·ft)



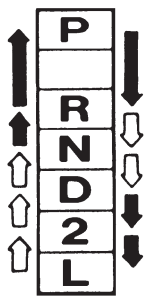
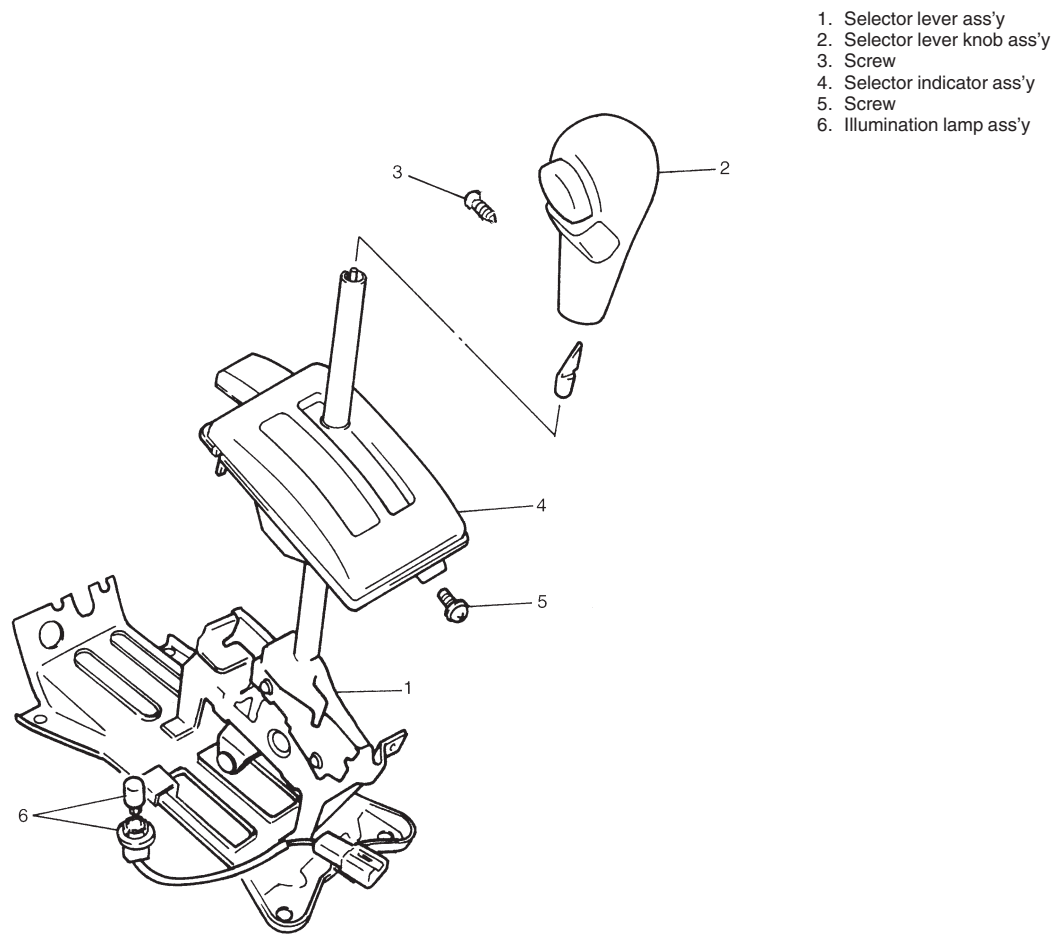
- 4) Lower vehicle and fill proper amount of an equivalent of DEXRON®-III.
- 5) Check fluid level according to procedure described under LEVEL CHECK AT NORMAL OPERATING TEMPERATURE.

Fluid specification	
An equivalent of DEXRON®-III	

Fluid capacity	
When draining from drain plug hole	4.3 liters (9.09/7.57 US/Imp. pt.)
When overhauling	5.1 liters (10.78/8.98 US/Imp. pt.)

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SELECTOR LEVER



Shift the selector lever with its button pushed in.
Shift the selector lever without pushing its button.

INSPECTION

Check selector lever for smooth and clear cut movement and position indicator for correct indication.

For operation of selector lever, refer to the figure.

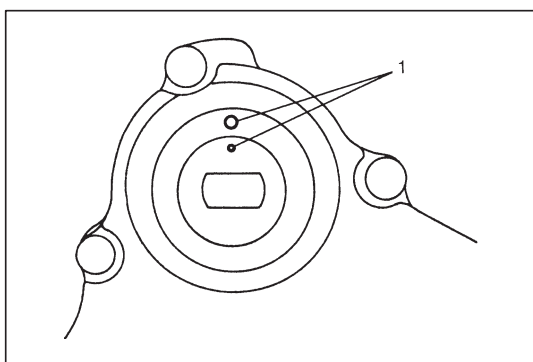
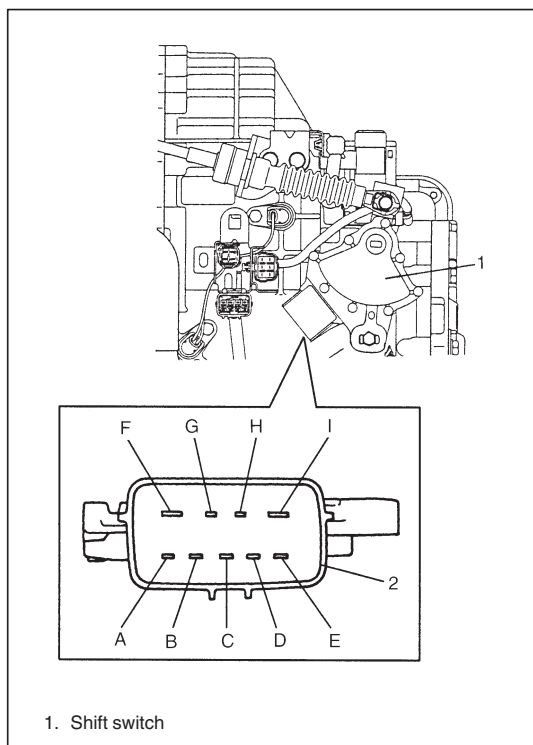
SHIFT SWITCH**REMOVAL**

- 1) Block wheels and turn selector lever to "N" range.
- 2) Disconnect shift switch coupler and selector cable.
- 3) Remove shift switch from transmission case.

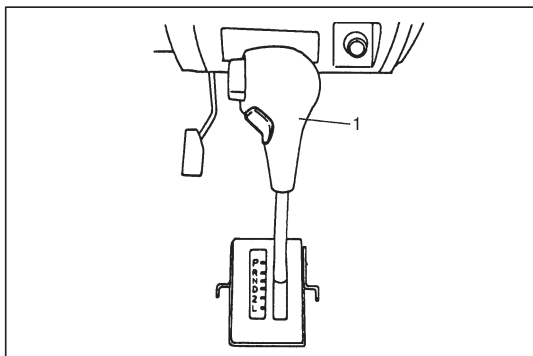
CAUTION:**Do not overhaul shift switch.****INSPECTION**

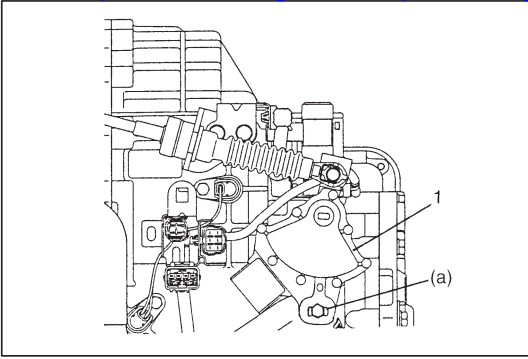
- 1) Disconnect shift switch coupler (2).
- 2) Check that continuity exists at terminals shown below by moving selector lever.

Terminal Switch Position	B	A	H	C	E	D	G	I	F
P	○						○	○	○
R		○					○		
N			○				○	○	○
D				○			○		
2					○		○		
L						○	○		

**INSTALLATION**

- 1) Using flat tip screwdriver, turn shift switch to have the match marks (1) line up (shift switch "N" range).
- 2) Turn selector lever (1) to "N" range (to have the automatic transmission to "N" range).





- 3) Install shift switch (1) to transmission case.

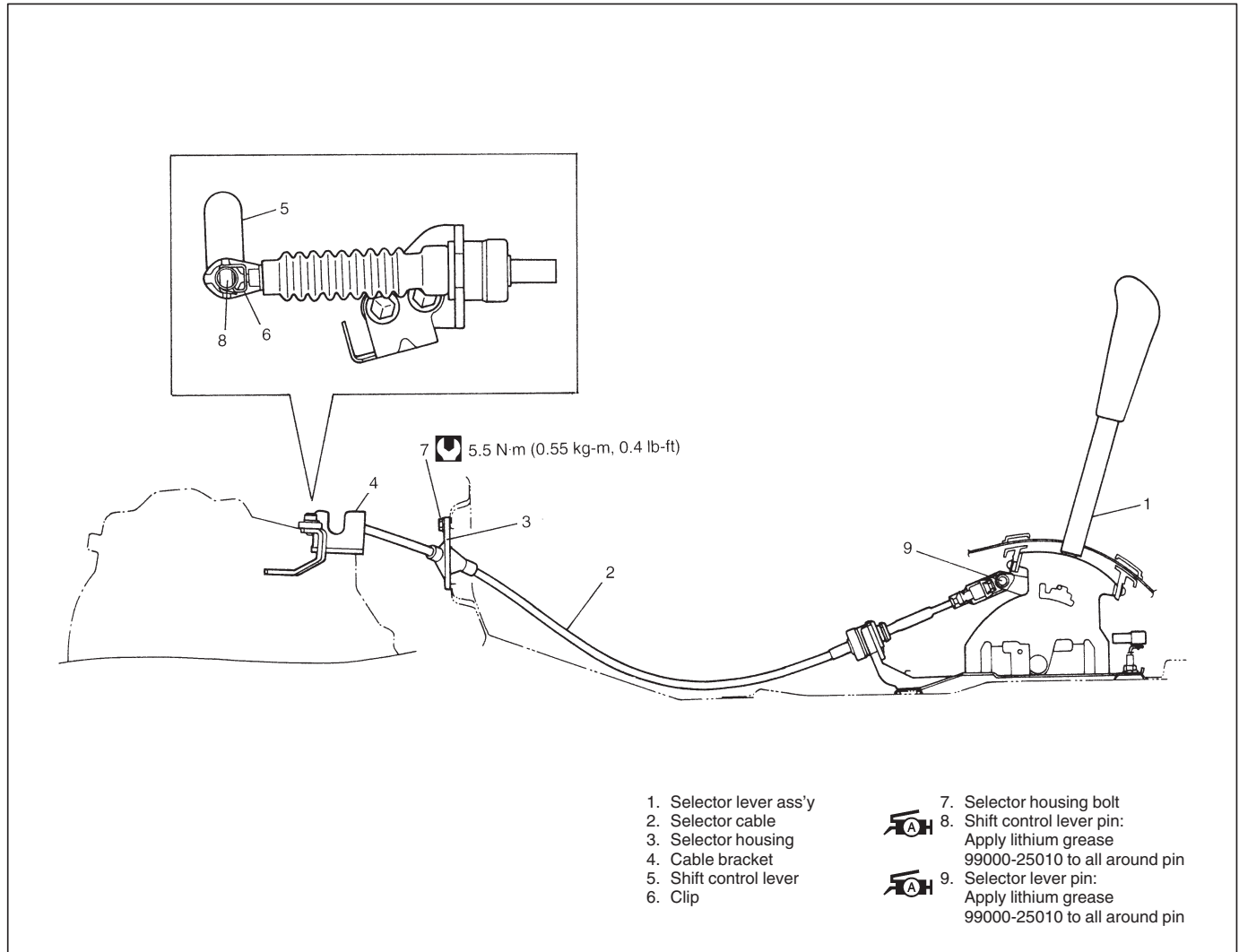
Tightening Torque

(a): 18 N·m (1.8 kg-m, 13.0 lb-ft)

- 4) Move selector lever in cabin to each range and check the continuity of each terminal of shift switch referring to INSPECTION.

- 5) Connect shift switch coupler.

- 6) Check that the engine can only be started in "N" and "P" range, but can not in "D", "2", "L" or "R" range. Also, check that backup lights come ON at "R" range.

SELECTOR CABLE**REMOVAL**

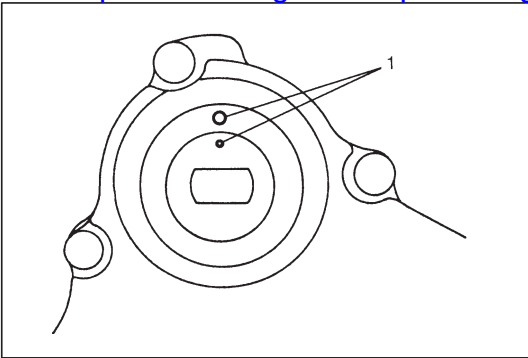
- 1) Remove parking brake lever cover.
- 2) Remove console box.
- 3) Disconnect selector cable from selector lever and then detach from bracket.
- 4) Remove clip and disconnect selector cable from transmission.
- 5) Remove selector housing from dash panel.

INSTALLATION

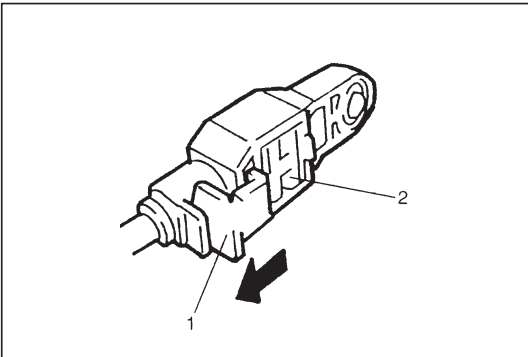
Install selector cable by reversing removal procedure.

The important steps in installation are as follows.

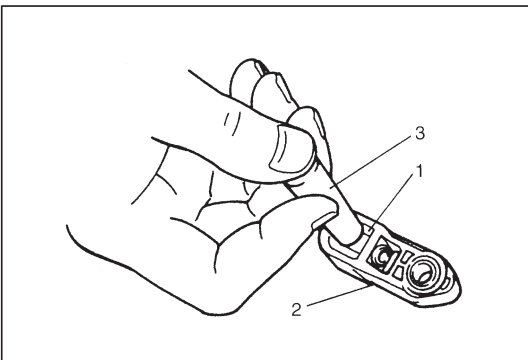
- Apply grease to pin and cable joint.
- Tighten bolts and nut in upper figure to specified torque.
- Adjusting procedure is as follows.

**ADJUSTMENT**

- 1) Turn shift switch to have the match marks (1) line up (shift switch "N" range).
- 2) Remove adjuster (cable end) from selector pin.

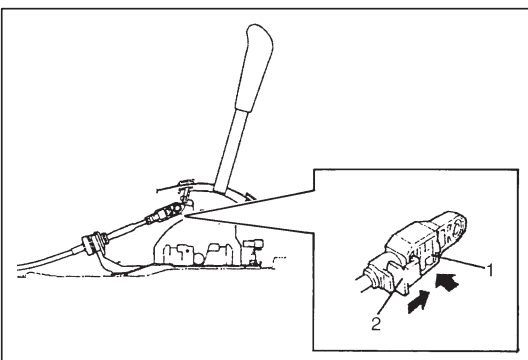


- 3) Release lock plate (1) which restrict moving of cable end holder (2).



- 4) Push cable end holder (1) out from eye-end (2) using an appropriate tool (3) to disengage cable.
- 5) Shift selector lever to "N" position.
- 6) Apply grease to selector pin and install adjuster (cable end) to it.

Grease: 99000-25010

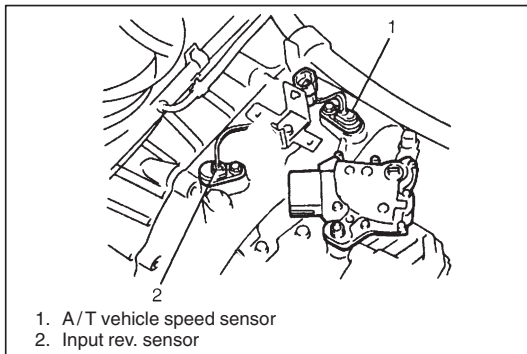
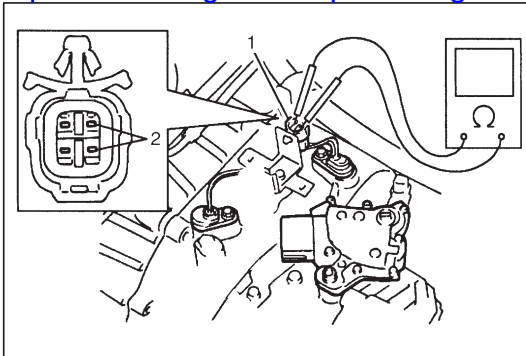


- 7) With both selector lever and shift switch kept each "N" position, drive cable end holder (1) in until it locks cable.
- 8) Slide lock plate (2) to secure cable end holder in position.
- 9) After selector rod was installed, check for the following.
 - Push vehicle with selector lever shifted to P range. Vehicle should not move.
 - Vehicle can not be driven in N range.
 - Vehicle can be driven in D, 2 and L ranges.
 - Vehicle can be backed in R range.

A/T VEHICLE SPEED SENSOR (A/T VSS)**INSPECTION**

- 1) Disconnect negative cable at battery.
- 2) Disconnect A/T VSS – input rev. sensor coupler (1).
- 3) Check resistance between A/T VSS terminals(2).

A/T VSS standard resistance: 160 – 200 Ω at 20°C (68°F)

**REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Disconnect A/T VSS – input rev. sensor coupler.
- 3) Remove A/T VSS – input rev. sensor by removing its bolt.

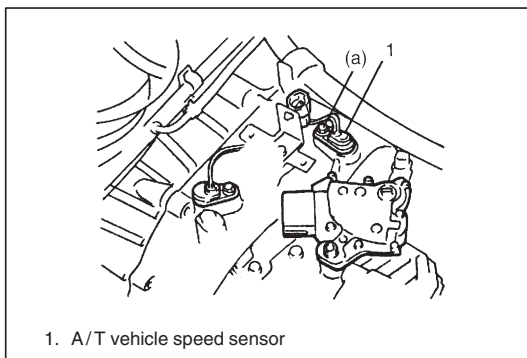
INSTALLATION

- 1) Apply A/T fluid to A/T VSS O-ring.
- 2) Install A/T VSS to A/T case and tighten bolt to specified torque.

Tightening Torque

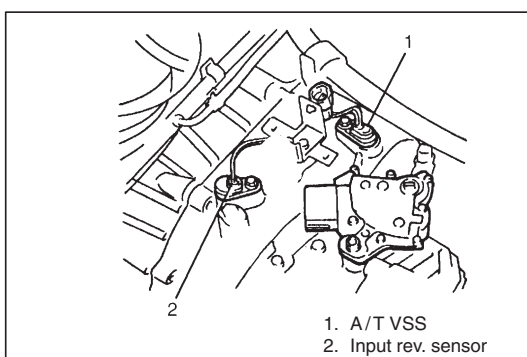
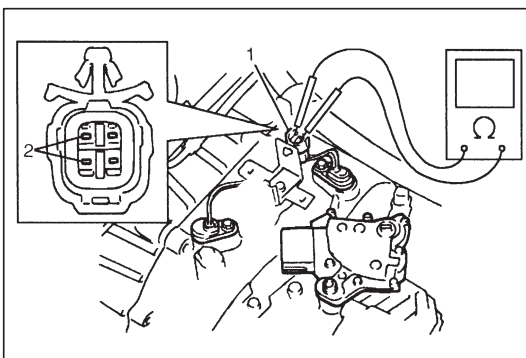
(a): 8 N·m (0.8 kg-m, 6.0 lb-ft)

- 3) Connect A/T VSS – input rev. sensor coupler.
- 4) Connect negative cable to battery.

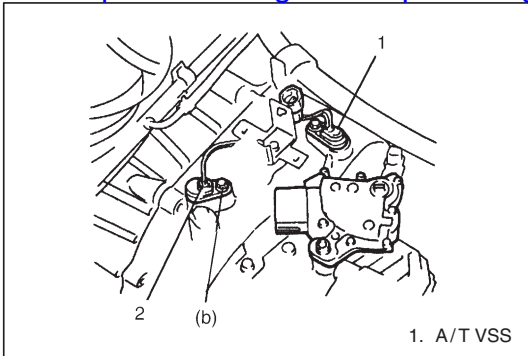
**INPUT REV. SENSOR****INSPECTION**

- 1) Disconnect negative cable at battery.
- 2) Disconnect A/T VSS – input rev. sensor coupler (1).
- 3) Check resistance between input revolution sensor terminals (2).

**Input revolution sensor standard resistance:
160 – 200 Ω at 20°C (68°F)**

**REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Disconnect A/T VSS – input rev. sensor coupler.
- 3) Remove input rev. sensor by removing its bolt.

**INSTALLATION**

- 1) Apply A/T fluid to input revolution sensor O-ring.
- 2) Install input revolution sensor (2) to A/T case and tighten bolt to specified torque.

Tightening Torque

(b): 8 N·m (0.8 kg-m, 6.0 lb-ft)

- 3) Connect A/T VSS – input rev. sensor coupler.
- 4) Connect negative cable to battery.

VEHICLE SPEED SENSOR (VSS, SPEEDOMETER DRIVEN GEAR)

Refer to SECTION 6E for removal, installation and inspection.

THROTTLE POSITION SENSOR

INSPECTION

Check throttle position sensor referring to SECTION 6E.

ENGINE COOLANT TEMP. (ECT) SENSOR

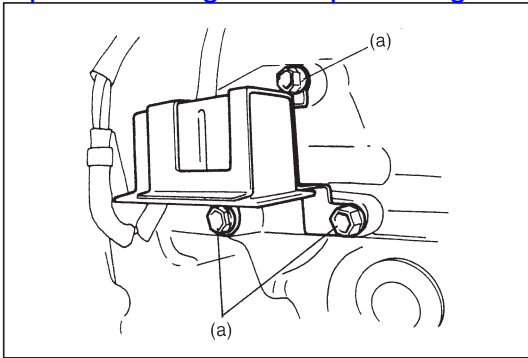
INSPECTION

Check engine coolant temp. sensor referring to SECTION 6E.

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

INSPECTION

Check MAP sensor referring to SECTION 6E.



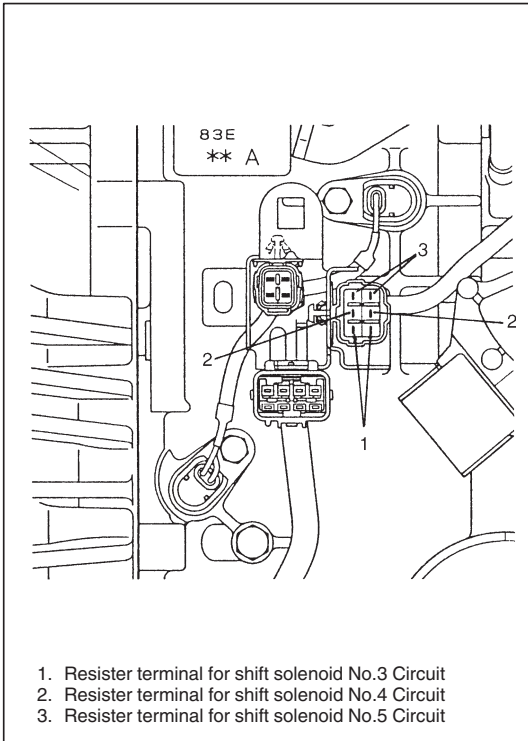
DROPPING RESISTER

REMOVAL/INSTALLATION

Refer to left figure for removal/installation.

Tightening Torque

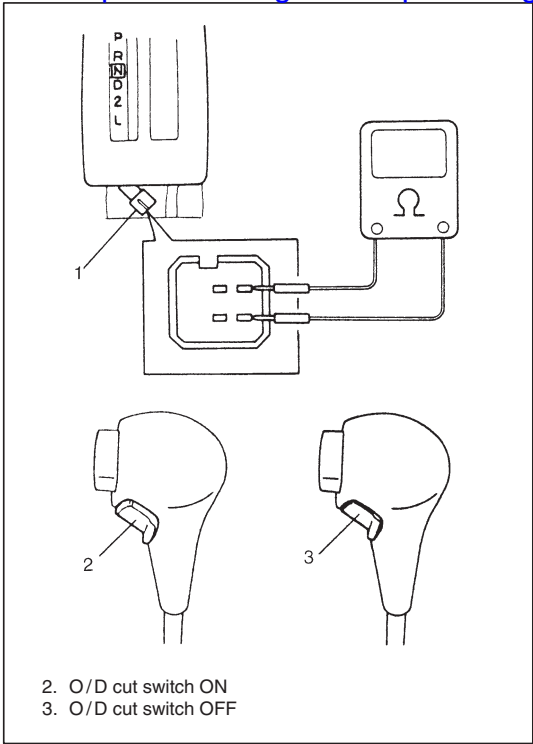
(a): 20 N·m (2.0 kg-m, 14.5 lb-ft)



INSPECTION

Measure resistance between each resister terminals.

CIRCUIT	RESISTANCE
Shift solenoid No.3	7.5 Ω
Shift solenoid No.4	7.5 Ω
Shift solenoid No.5	7.5 Ω

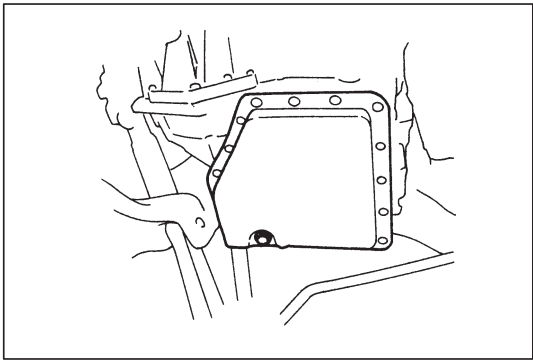


O/D CUT SWITCH

INSPECTION

- 1) Remove console box.
- 2) Disconnect O/D cut switch coupler (1).
- 3) Check continuity between O/D cut switch terminals.

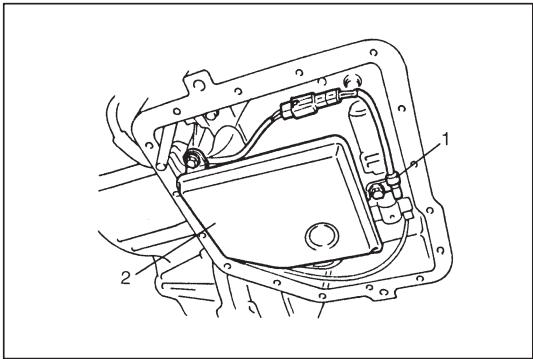
O/D cut switch	ON	OFF
Continuity	Continuity	No continuity



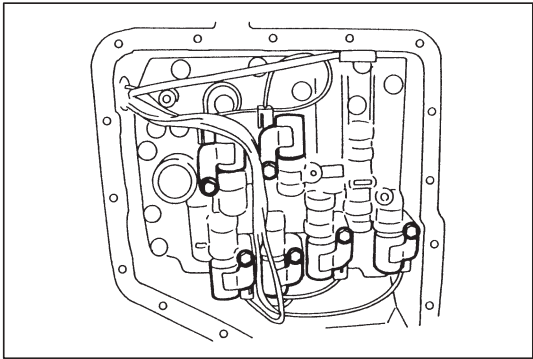
SHIFT SOLENOID VALVES AND A/T FLUID TEMP. SENSOR

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Drain A/T fluid.
- 3) Remove A/T oil pan.
- 4) Disconnect A/T fluid temp. sensor coupler.



- 5) Remove A/T oil strainer (2) and A/T fluid temperature sensor (1).



- 6) Disconnect shift solenoid couplers.
- 7) Remove shift solenoid valves.

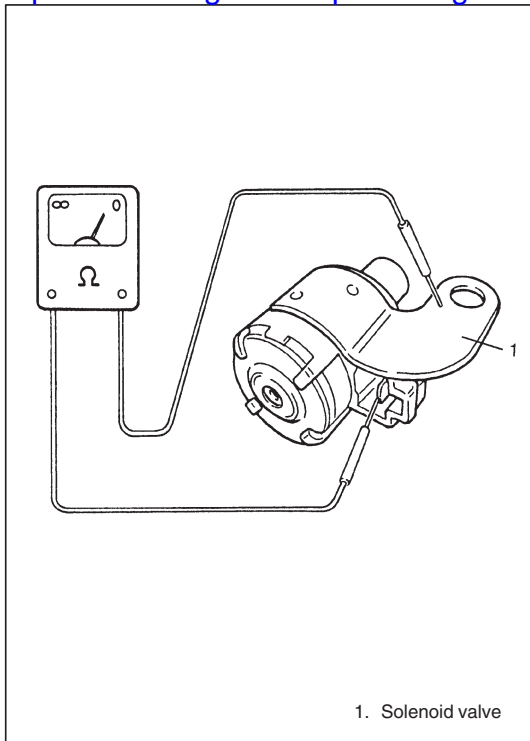
SHIFT SOLENOID VALVES**INSPECTION****Resistance Check**

- Shift solenoid No.1, No.2 and lock-up solenoid
Check resistance between terminal and solenoid body.

Standard resistance: 11.5 – 12.5 Ω

- Shift solenoid No.3, No.4 or No.5

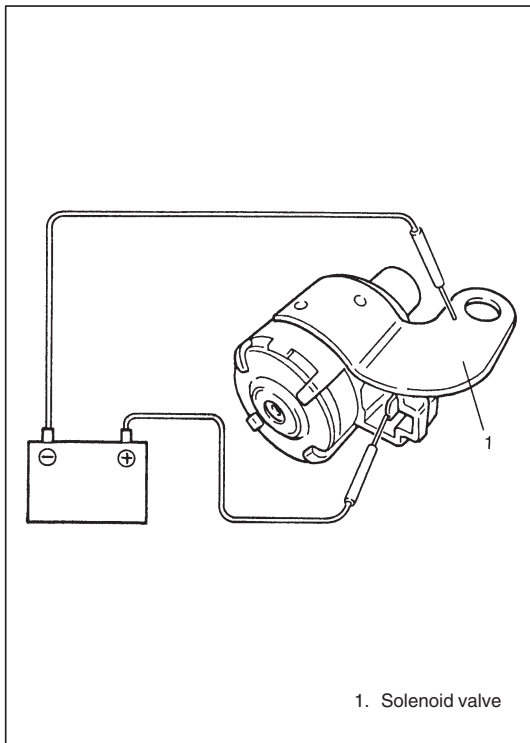
Standard resistance: 2.5 – 3.5 Ω



1. Solenoid valve

Operation check

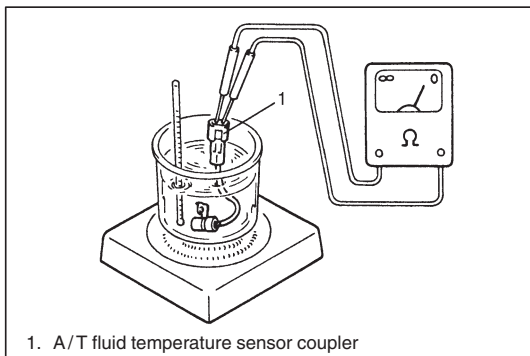
When solenoids are connected to the battery as shown in figure, check that the solenoid actuates with a click sound.



1. Solenoid valve

A/T FLUID TEMP. SENSOR**INSPECTION**

Warm up A/T fluid temp. sensor. Thus make sure its resistance decreases with the increase of temperature.



1. A/T fluid temperature sensor coupler

Temperature	Resistance
20°C (68°F)	2.5 k Ω
40°C (104°F)	1.2 k Ω
60°C (140°F)	0.6 k Ω

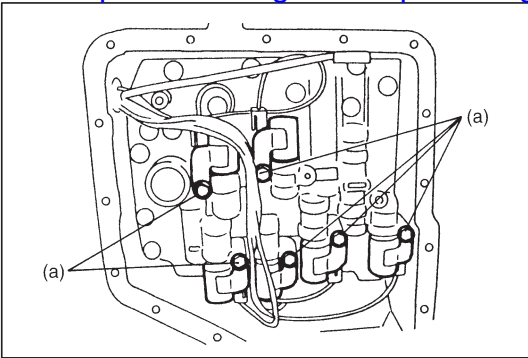
INSTALLATION

- 1) Install shift solenoid No.1, No.2, No.3 and No.4.

Tightening Torque

(a): 8 N·m (0.8 kg-m, 6.0 lb-ft)

- 2) Connect shift solenoid couplers.



- 3) Install oil strainer (2) and A/T fluid temperature sensor (1).

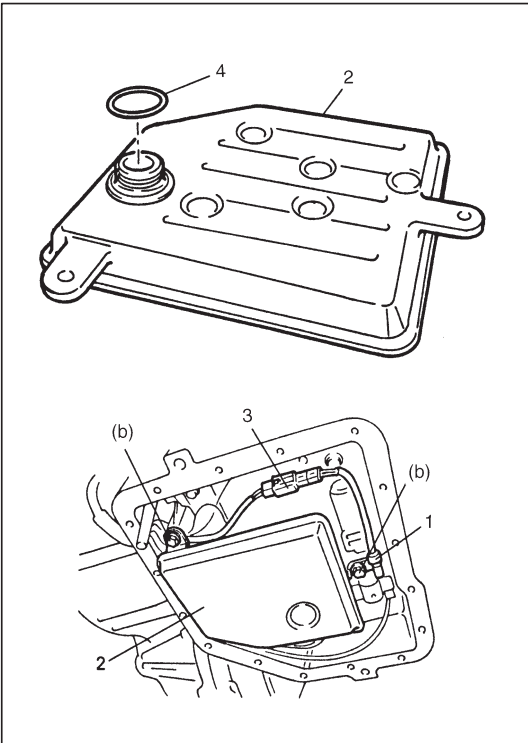
Tightening Torque

(b): 10 N·m (1.0 kg-m, 7.5 lb-ft)

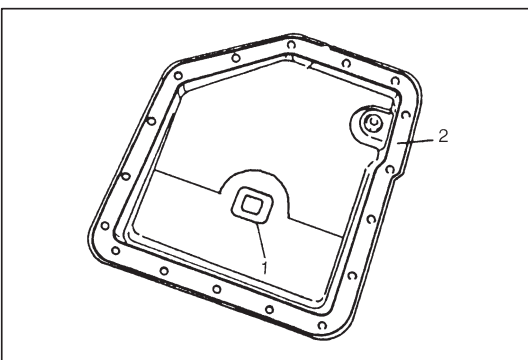
NOTE:

Do not forget to install O-ring (4) to oil strainer first.

- 4) Connect A/T fluid temperature sensor coupler (3).



- 5) Clean mating surface of A/T oil pan (1) and A/T case.
- 6) Install new gasket (2) to A/T oil pan.



- 7) Install A/T oil pan.

Tightening Torque

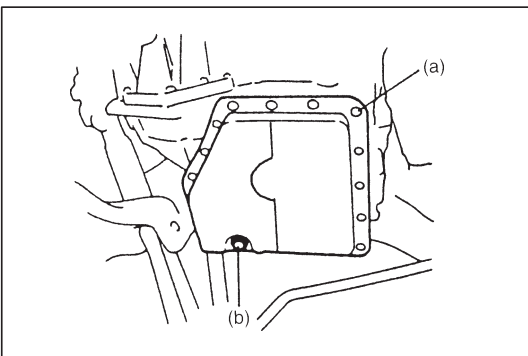
(a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

- 8) Install A/T oil pan drain bolt.

Tightening Torque

(b): 22.5 N·m (2.3 kg-m, 16.5 lb-ft)

- 9) Refill A/T fluid referring to p.7B-48.
- 10) Verify that there is no A/T fluid leakage.



DIFFERENTIAL SIDE OIL SEAL**REPLACEMENT**

- 1) Lift up vehicle and drain transmission oil.
- 2) Remove drive shaft joints from differential gear of transmission.
Refer to SECTION 4 (DRIVE SHAFT) for procedure to disconnect drive shaft joints.

For differential side oil seal removal, it is not necessary to remove drive shafts from steering knuckle.

- 3) Remove differential side oil seal (1) by using flat end rod or like.
- 4) Install new differential side oil seal by using special tool.

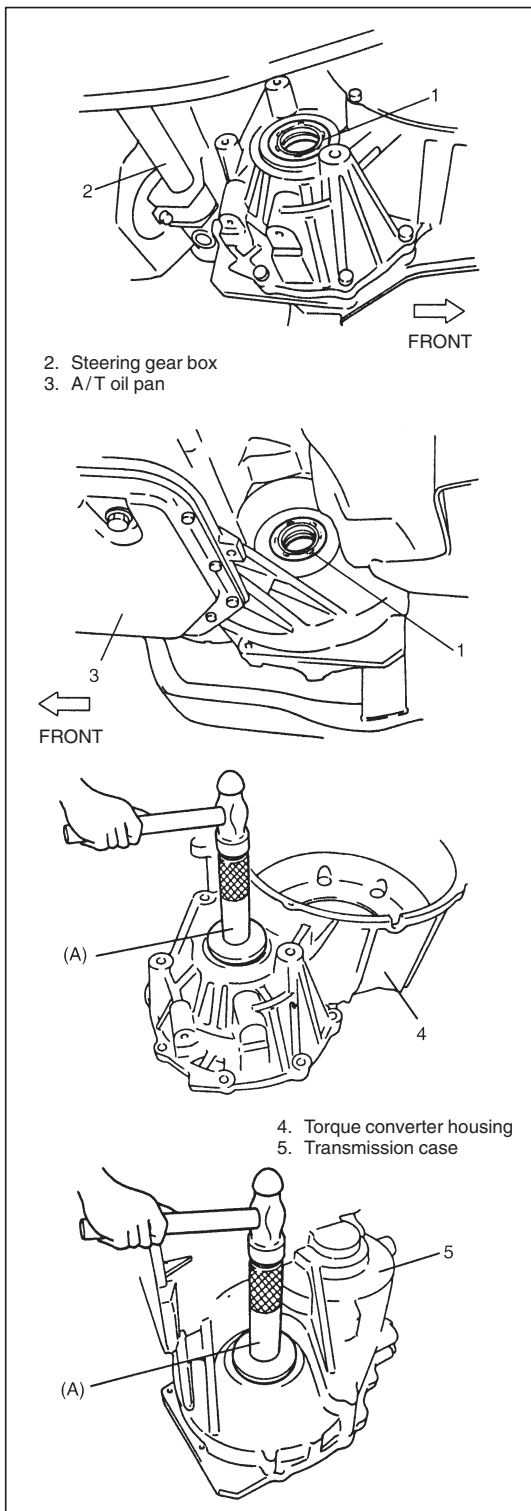
NOTE:

For oil seal installation, press-fit oil seal so that transmission case end face is flush with oil seal end face.

Special Tool

(A): 09913-75510

- 5) Install drive shaft referring to SECTION 4.
- 6) Refill A/T fluid referring to CHANGING FLUID of MAINTENANCE SERVICE.

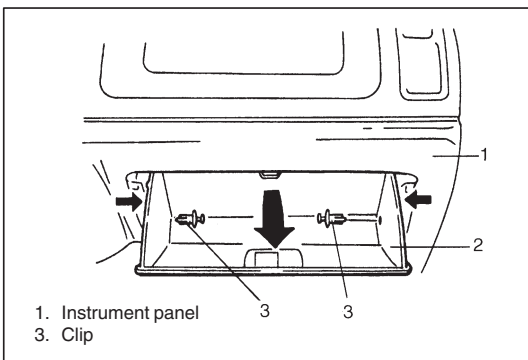


TRANSMISSION CONTROL MODULE (TCM)**CAUTION:**

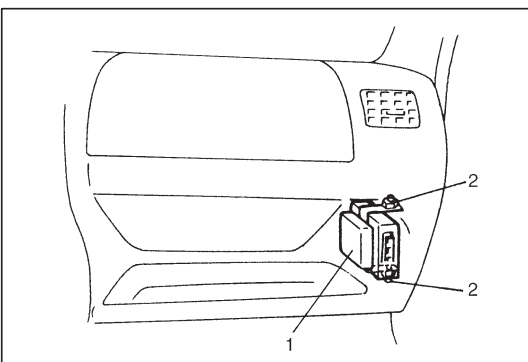
TCM and ECM consist of highly precise parts, so when handling it (or them), be careful not to expose to excessive shock.

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) If the vehicle is equipped with air bag system, disable air bag system. Refer to "Disabling Air Bag System" in SECTION 10B.



- 3) Remove glove box (2).



- 4) Disconnect couplers from TCM (1).
- 5) Loosen 2 nuts (2) and remove TCM (1) together with ECM from vehicle.

INSTALLATION

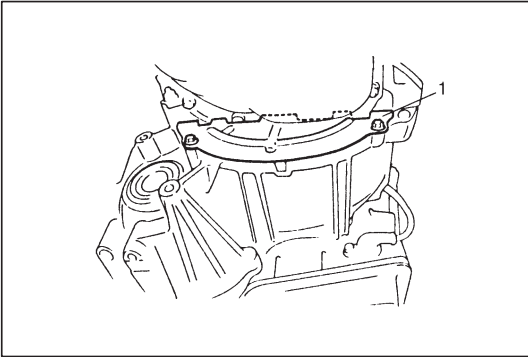
Reverse removal procedure noting the following.

- Connect ECM and TCM couplers securely.
- If the vehicle is equipped with air bag system, be sure to enable air bag system after TCM and ECM are back in place. Refer to "Enabling Air Bag System" in SECTION 10B.

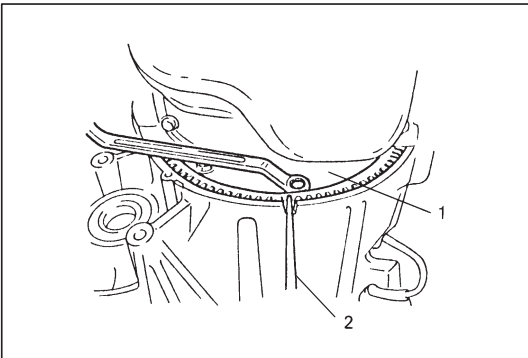
TRANSMISSION UNIT REPAIR OVERHAUL

DISMOUNTING

- 1) Take down transmission with engine. For its procedure, refer to Section 6A1.

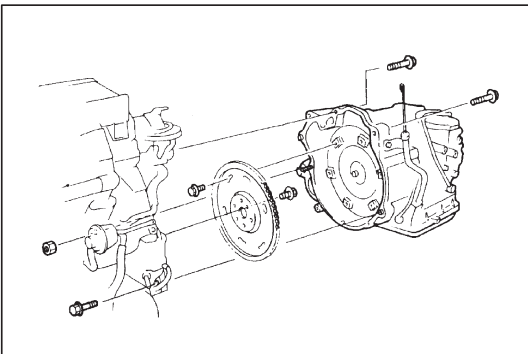


- 2) Remove torque converter housing lower plate (1).



- 3) Remove drive plate bolts.
To lock drive plate (1), engage a flat head rod or the like (2) with drive plate gear.

- 4) Remove starting motor.



- 5) Remove bolts and nut fastening engine and transmission, then detach transmission from engine.

NOTE:

When detaching transmission from engine, move it in parallel with crankshaft and use care so as not to apply excessive force to drive plate and torque converter.

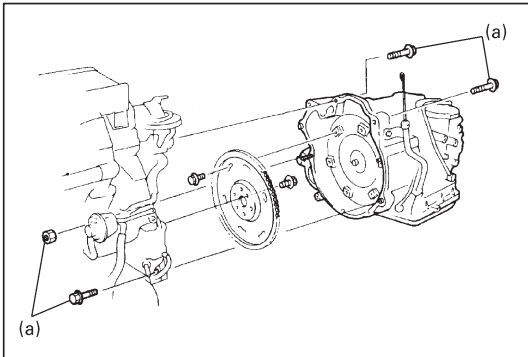
WARNING:

Be sure to keep transmission with torque converter horizontal or facing up throughout the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury.

REMOUNTING

- 1) Make sure that torque converter is installed correctly to transmission.

Refer to UNIT ASSEMBLY in this section.



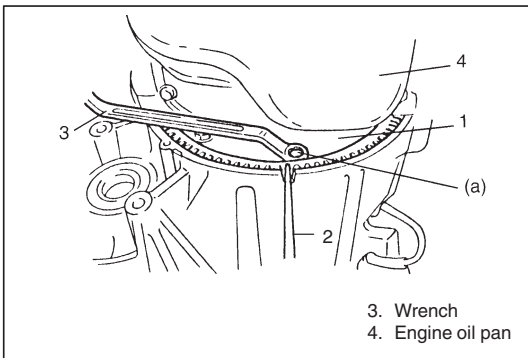
- 2) Attach transmission to engine.

Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.0 lb-ft)

WARNING:

Be sure to keep transmission with torque converter horizontal or facing up throughout the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury.



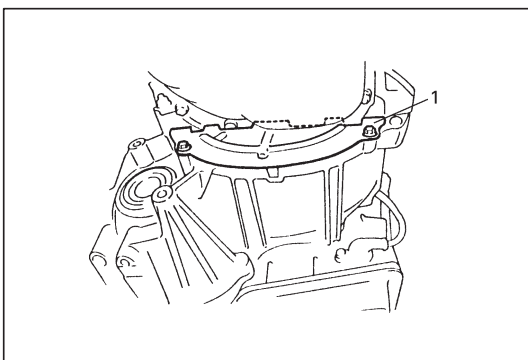
- 3) Tighten drive plate-torque converter bolts.

Align drive plate bolt hole and torque converter through starter motor mounting opening then tighten bolts through torque converter housing lower plate opening.

Lock drive plate (1) by engaging a flat head rod or the like (2) with drive plate gear.

Tightening Torque

(a): 20 N·m (2.0 kg-m, 14.5 lb-ft)



- 4) Install torque converter housing lower plate (1).

- 5) Install starting motor.

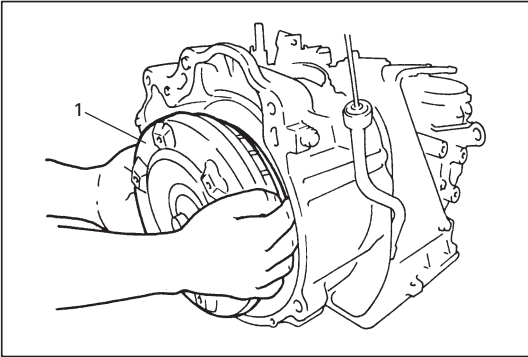
Tightening Torque for Starter Bolts:

23 N·m (2.3 kg-m, 16.5 lb-ft)

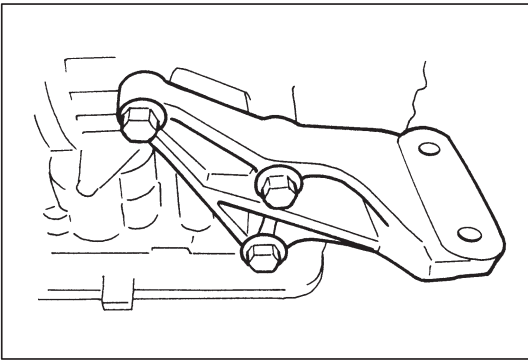
- 6) Remount engine with transmission assembly to vehicle. Refer to Section 6A1 for its procedure.

DISASSEMBLY**CAUTION:**

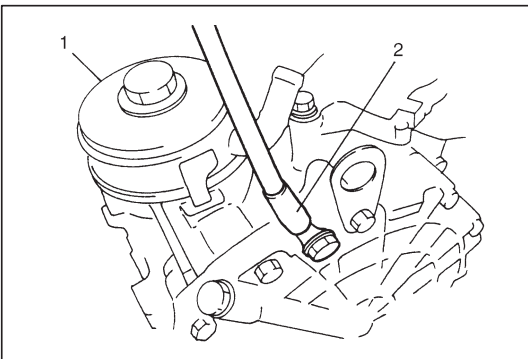
- Thoroughly clean transmission exterior before overhauling it.
- Keep working table, tools and hands clean while overhauling.
- Use special care to handle aluminum parts so as not to damage them.
- Do not expose removed parts to dust. Keep them always clean.



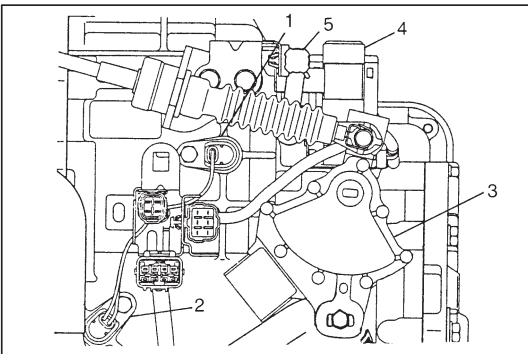
1) Remove torque converter (1).



2) Remove engine mounting LH bracket.



3) Remove oil cooler (1) and battery ground cable (2) (if still attached).

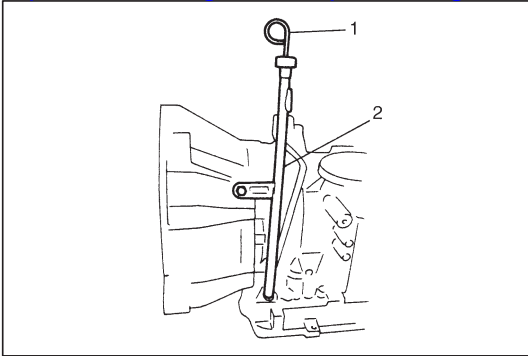


4) Remove A/T VSS (1) and input revolution sensor (2).

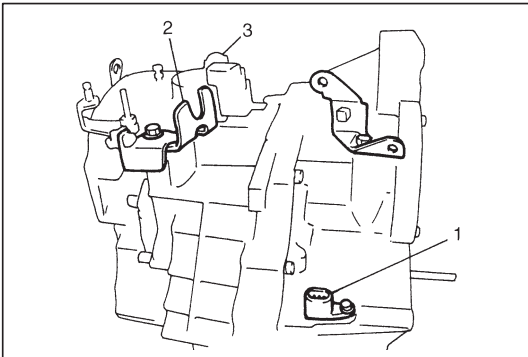
5) Remove shift switch (3).

6) Remove dropping resistor (4).

7) Remove breather hose (5).



8) Remove A/T fluid level gauge (1) and filler tube (2).

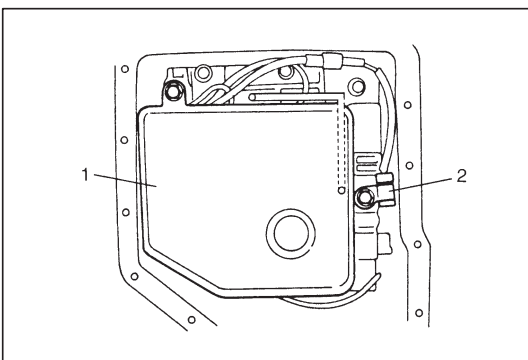


9) Remove vehicle speed sensor (1) (for speedometer), shift cable bracket (2) and connector clamp bracket (3).

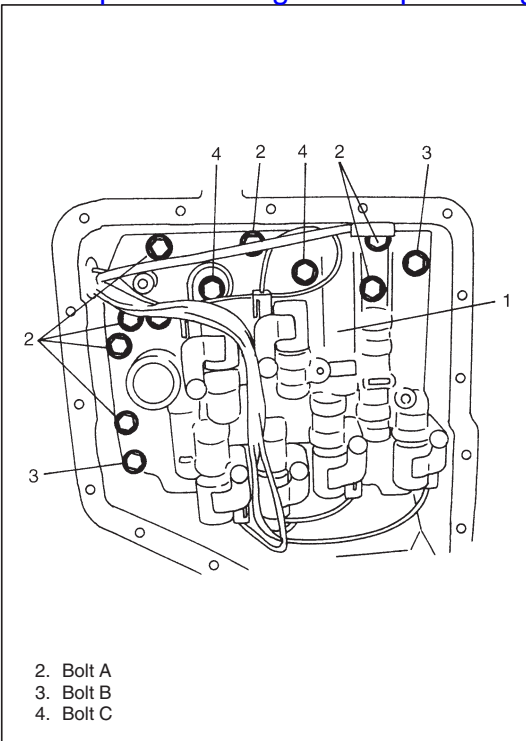
10) Remove oil pan and oil pan gasket.

NOTE:

- For removal of oil pan, do not turn transmission over as this will contaminate valve body with foreign materials in the bottom of oil pan.
- When removing oil pan, tap around it lightly with a plastic hammer. Do not force it off by using a screwdriver or the like.



11) Remove oil strainer assembly (1), and detach A/T fluid temperature sensor (2).



- 12) Disconnect couplers from solenoid valves, and A/T fluid temperature sensor.
Remove A/T fluid temperature sensor.
- 13) Remove valve body assembly (1).

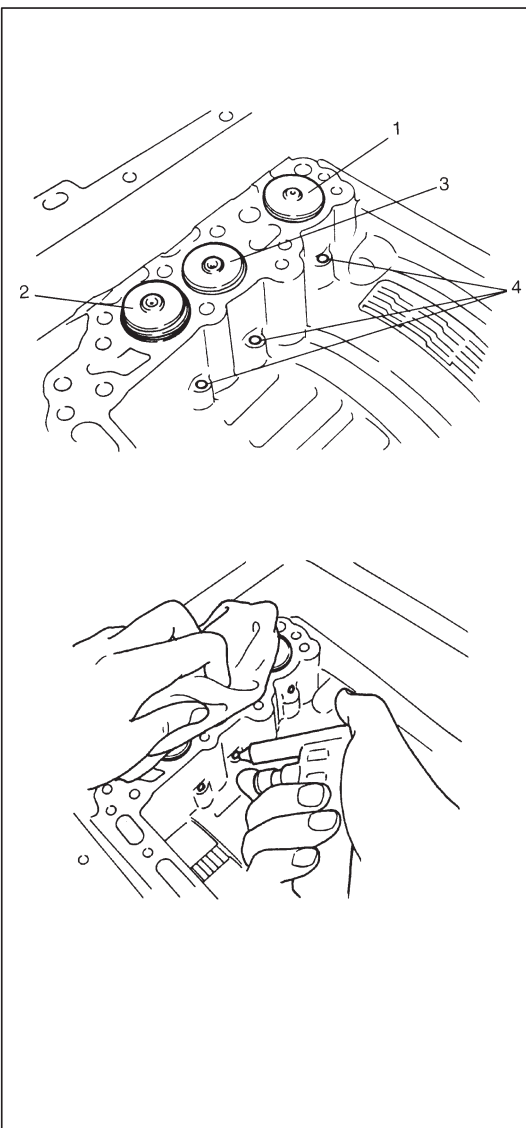
CAUTION:

Be careful not to let manual valve fall off when removing valve body assembly.

NOTE:

There are three kinds of bolts (bolts A, B and C) fixing valve body ass'y.

- 14) Remove solenoid harness assembly.



- 15) Remove accumulator pistons and springs.

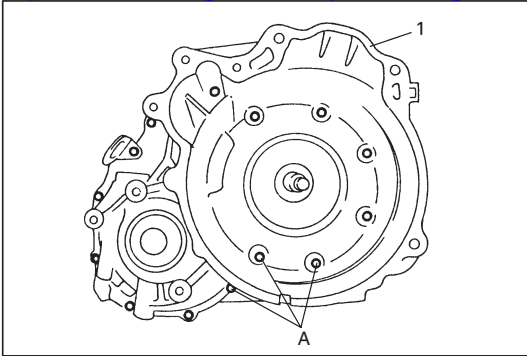
To remove C0 (1), C2 (2) and B1 (3) accumulator pistons and springs, position a rag on pistons to catch each piston.

To remove pistons, force low-pressure compressed air (1 kg/cm², 15 psi, 100 kPa, max) into hole (4) as shown in figure, and pop each piston into the rag.

To remove B0 and C1 accumulator pistons and springs, remove each snap ring and accumulator spacer, then remove spring and piston.

NOTE:

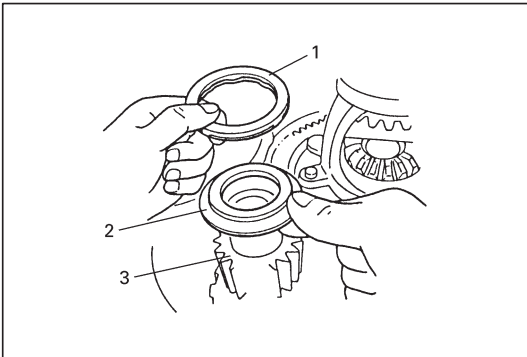
Do not push accumulator pistons with fingers or anything before removing them. Pushing them may cause compressed fluid in accumulator to spew out of hole and get to your face and clothes.



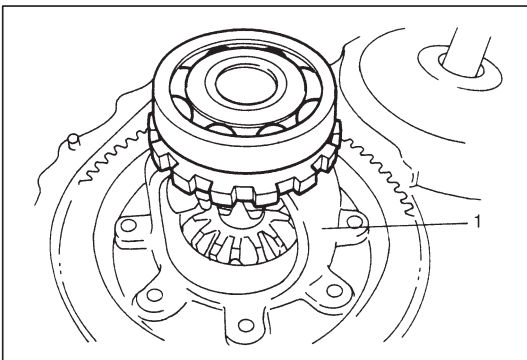
- 16) Remove torque converter housing (1).
- Remove housing internal bolts and external bolts.
 - Remove housing while tapping around it lightly with a plastic hammer.

NOTE:

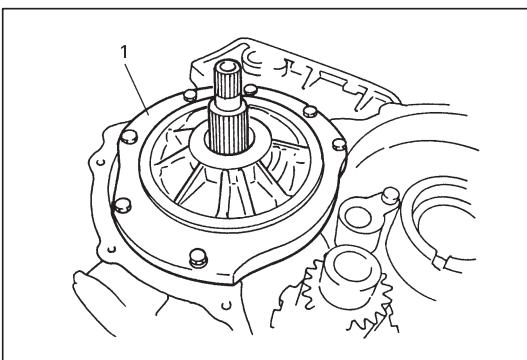
Never reuse bolts A shown in figure.



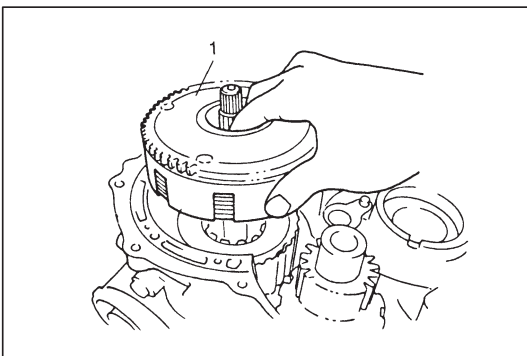
- 17) Remove thrust needle roller bearing (1) and thrust bearing race (2) from the top of counter driven gear ass'y (3).



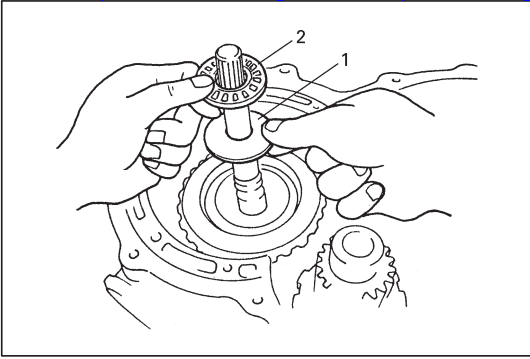
- 18) Remove differential gear assembly (1).



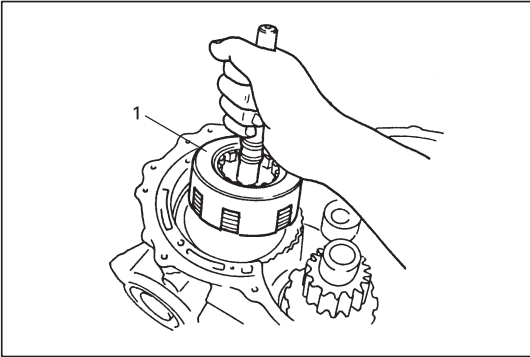
- 19) Remove oil pump (1).



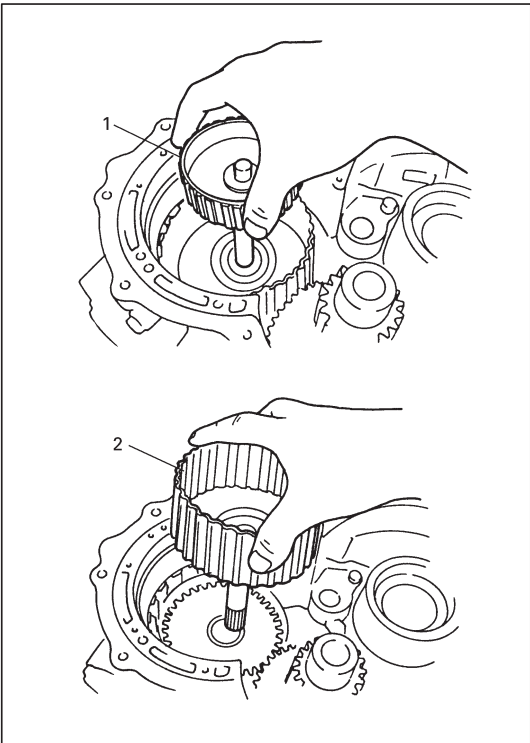
- 20) Remove front disc clutch assembly (1).



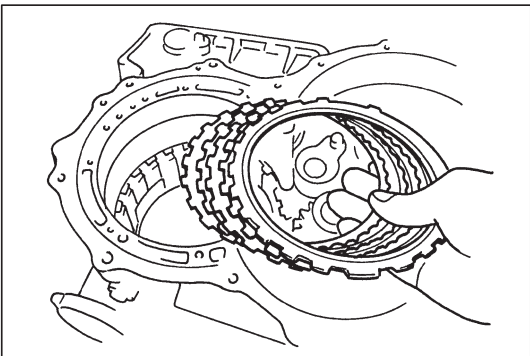
21) Remove thrust bearing race (1) and thrust needle roller bearing (2).



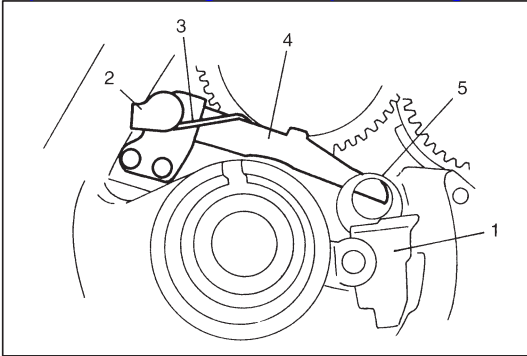
22) Remove rear disc clutch assembly (1).



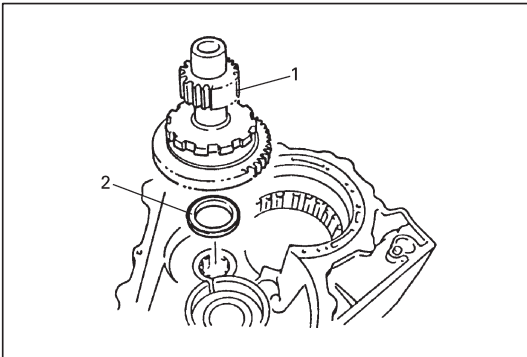
23) Remove intermediate shaft assembly (1) and follow shaft assembly (2).



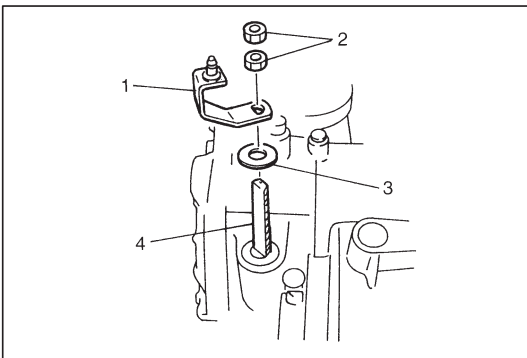
24) Remove B2 brake snap ring, brake flange, brake discs, brake plates and cushion plate.



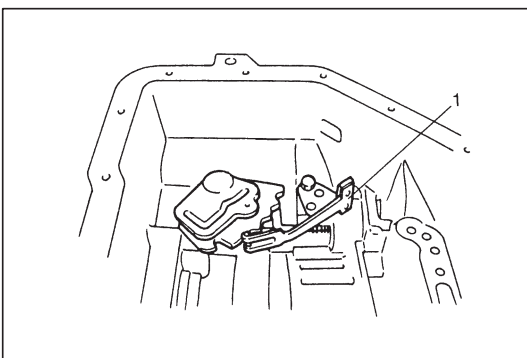
- 25) Remove oil guide plate (1) parking lock pawl cover (2), shaft, torsional spring (3) and parking lock pawl (4).
 26) Remove parking lock pawl sleeve (5).



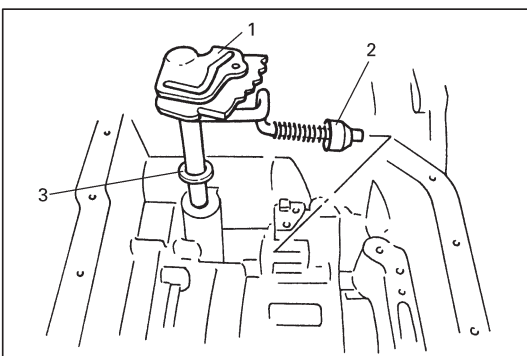
- 27) Remove counter driven gear assembly (1) and thrust needle roller bearing (2).



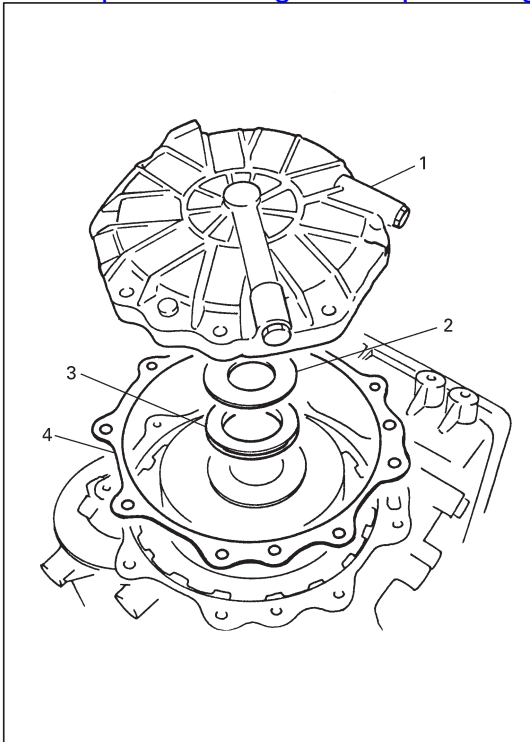
- 28) Remove control shift lever (1), nuts (2), washer (3) from manual shift shaft (4).



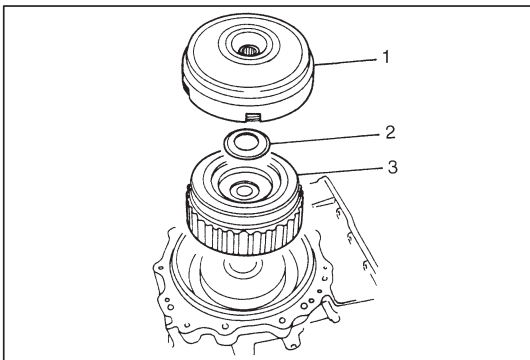
- 29) Remove detent spring (1).



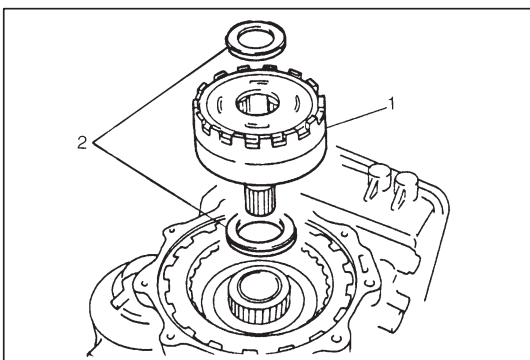
- 30) Remove manual shift shaft (1) with parking lock rod (2), and washer (3) from transmission case.



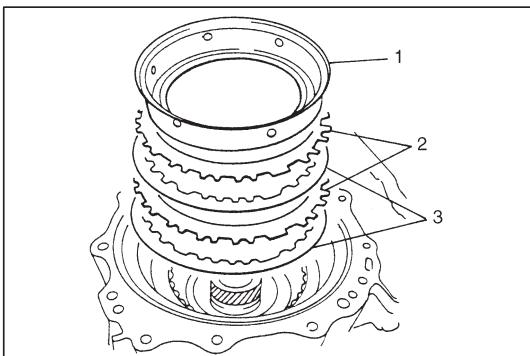
- 31) Remove rear cover assembly (1), thrust washer (2) and thrust needle roller bearing (3).
Remove gasket (4).



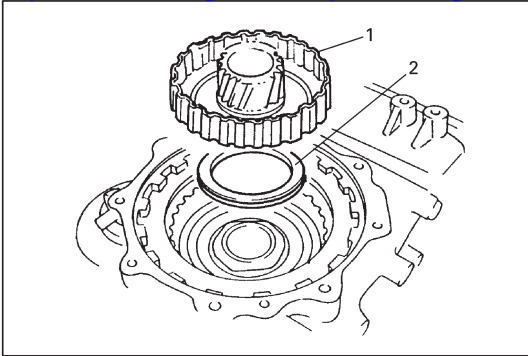
- 32) Remove C0 (direct clutch) assembly (1), thrust roller bearing (2) and rear planetary sun gear No.1 assembly (3).



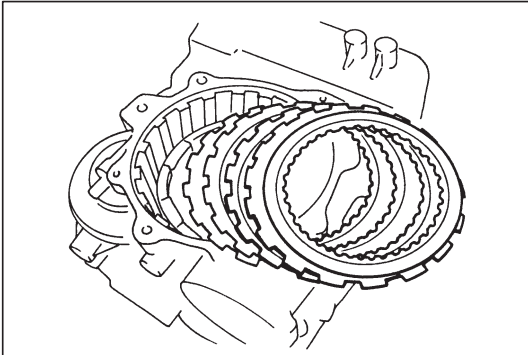
- 33) Remove planetary set (1) with bearing, thrust needle roller bearing (2).



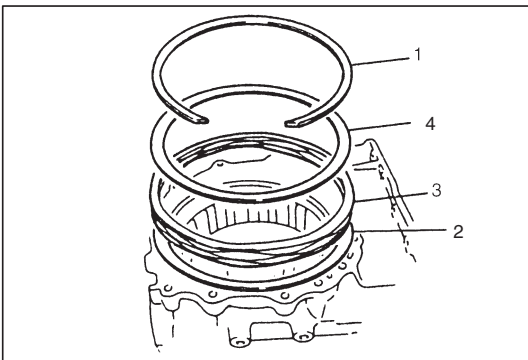
- 34) Remove O/D brake (B0 brake) piston adapter (1), B0 plates (2) and discs (3).



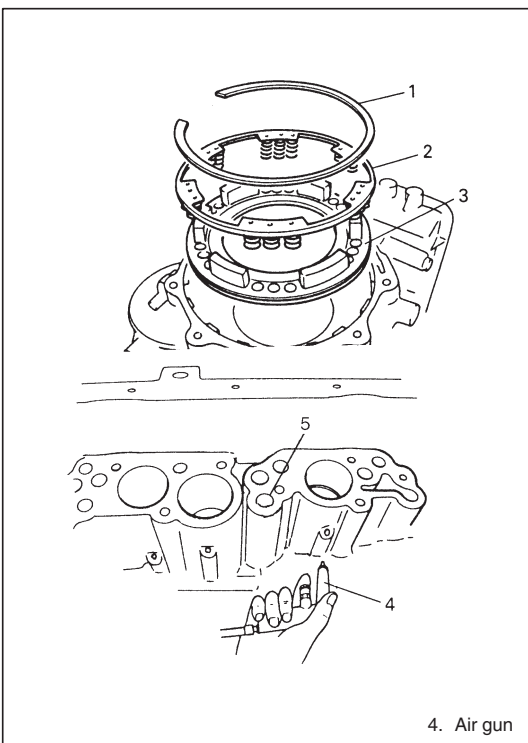
- 35) Remove planetary sun gear No.2 (1) and thrust needle roller bearing (2).



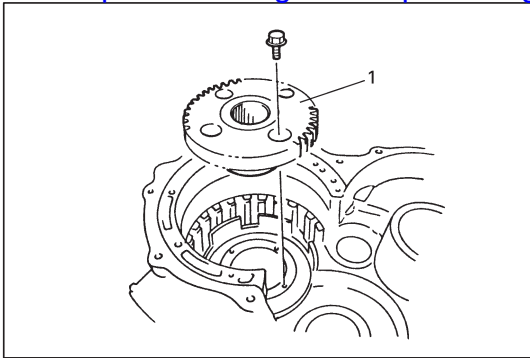
- 36) Remove snap ring, then remove brake flange and disc.
37) Remove snap ring, then remove brake discs and plates (B1 brake).



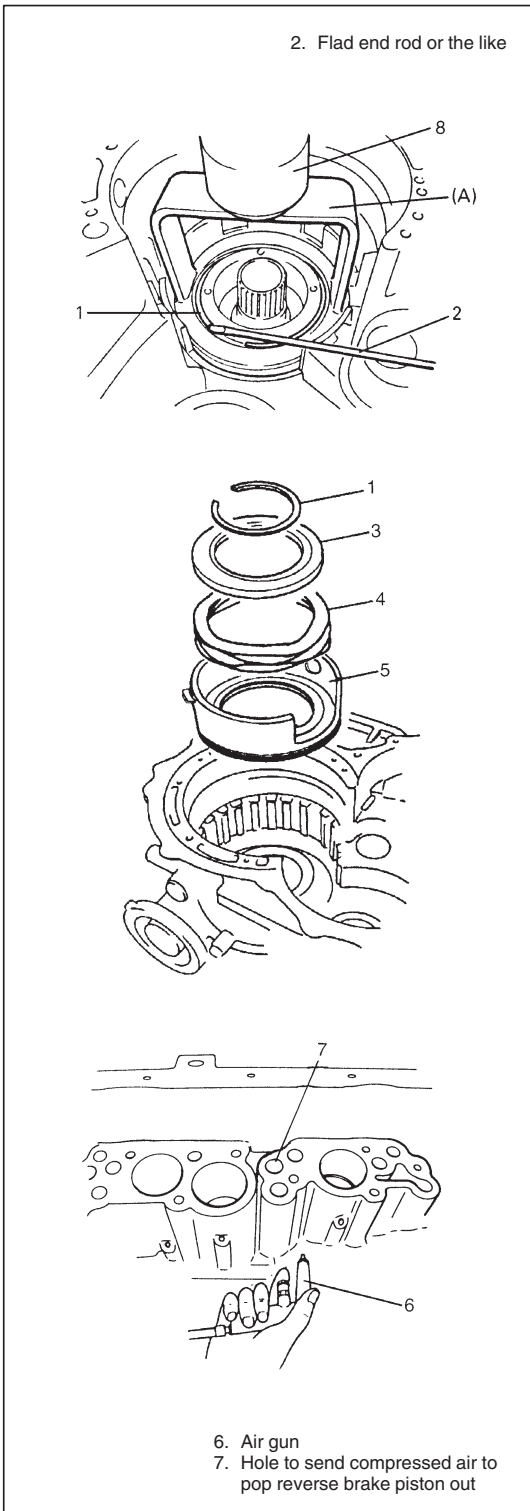
- 38) Remove snap ring (1), then O/D brake return spring seat (2), return spring (3) and spring retainer (4).



- 39) Remove snap ring (1) then remove 1st & 2nd brake piston return spring subassembly (2) and 1st & 2nd brake piston (3). To remove 1st & 2nd brake piston, force low-pressure compressed air ($1\text{kg}/\text{cm}^2$, 15psi, 100kPa max) into hole (5) shown in figure and pop out 1st & 2nd brake piston into a rag.



40) Remove counter drive gear (1).



41) Use hydraulic press (8) and special tool to compress wave spring (4), then remove snap ring (1).

Special Tool:

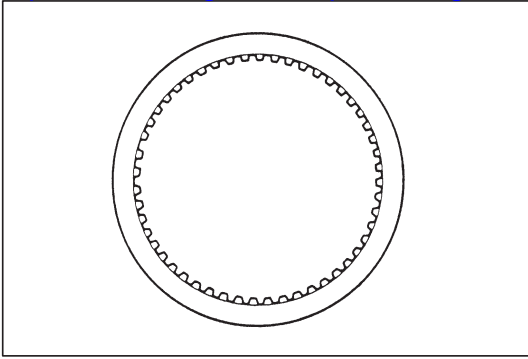
(A): 09926-96040

NOTE:

- Do not compress wave spring more than necessary.
- Do not reuse snap ring (1).

42) Remove reverse brake piston seat (3), wave spring (4) and reverse brake piston (5).

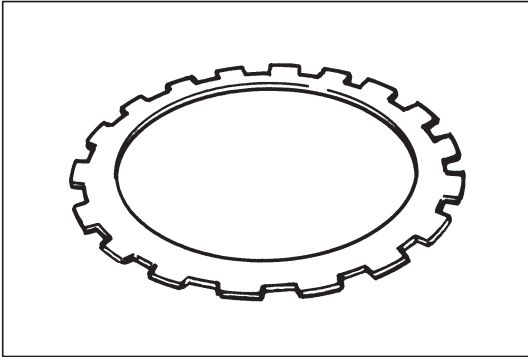
To remove reverse brake piston, force low-pressure compress air (1 kg/cm^2 , 15psi, 100kPa max) into hole (7) shown in figure, and pop out piston into a rag.

**INSPECTION****Clutch and Brake Discs**

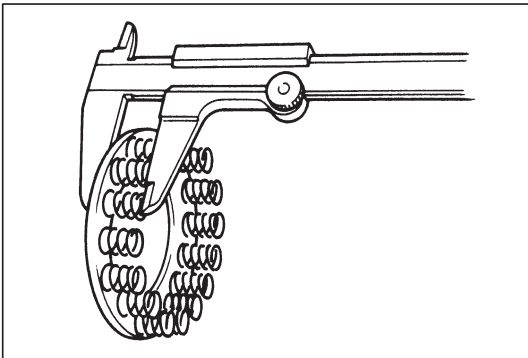
Dry and inspect them for pitting, burn flaking, wear, glazing, cracking, charring and chips or metal particles imbedded in lining. If discs show any of the above conditions, replacement is required.

NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.

**Clutch and Brake Plates and Flanges**

Dry plates and check for discoloration. If plate surface is smooth and even color smear is indicated, the plate should be reused. If severe heat spot discoloration or surface scuffing is indicated, the plate must be replaced.

**1st & 2nd Brake Piston Return Spring Subassembly**

Measure height of 1st & 2nd brake piston return spring.

Specified value: 20.81 mm

NOTE:

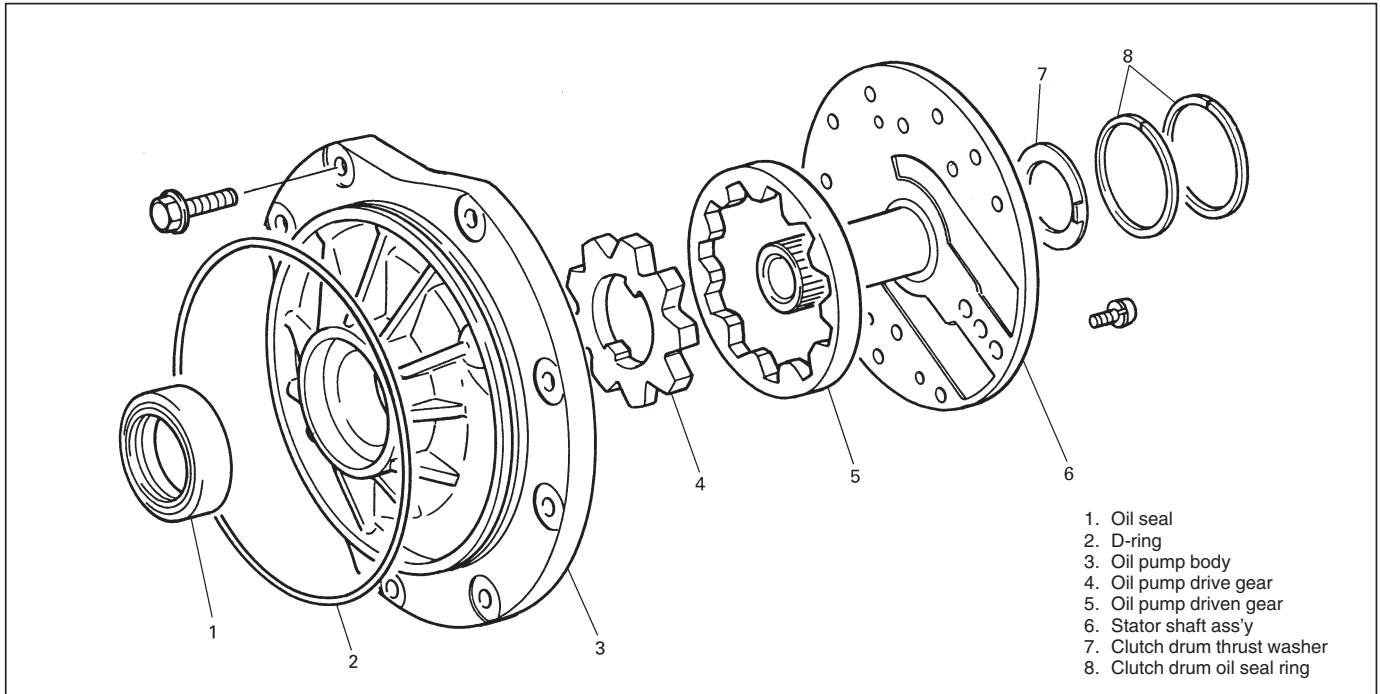
- Do not apply excessive force when measuring spring height.
- Perform measurement at several points.

Evidence of extreme heat or burning in the area of clutch may have caused springs to take a heat set and would require their replacement.

DISASSEMBLY OF SUBASSEMBLY

CAUTION:

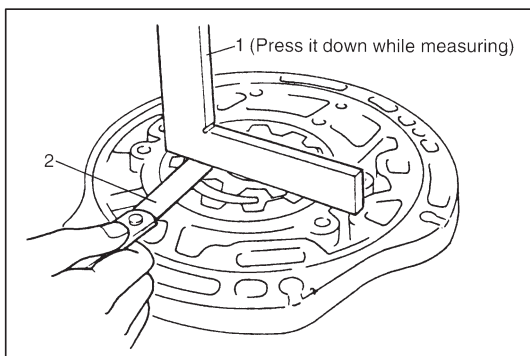
- Keep component parts in group for each subassembly and avoid mixing them up.
- Clean all parts with cleaning solvent thoroughly and air dry them.
- Use kerosene or automatic transmission fluid as cleaning solvent.
- Do not use wiping cloths or rags to clean or dry parts.
- All oil passages should be blown out and checked to make sure that they are not obstructed.
- Keep face and eyes away from solvent spray while air blowing parts.
- Check mating surface for irregularities and remove them, if any, and clean it again.
- Soak new clutch discs and brake discs in transmission fluid for at least 2 hours before assembly.
- Replace all gaskets and O-rings with new ones.
- Apply automatic transmission fluid to all O-rings.
- When installing seal ring, be careful so that it is not expanded excessively, extruded or caught.
- Replace oil seals that are removed and apply grease to their lips.
- Before installing, be sure to apply automatic transmission fluid to sliding, rolling and thrusting surface of all component part. Also after installation, make sure to check each part for proper operation.
- Always use torque wrench when tightening bolts.

OIL PUMP**DISASSEMBLY**

- 1) Remove D-ring from pump body.
- 2) Remove 2 oil seal rings and clutch drum thrust washer.
- 3) Remove 11 bolts.
- 4) Separate pump body from stator shaft ass'y.
- 5) Remove oil seal from pump body.

INSPECTION

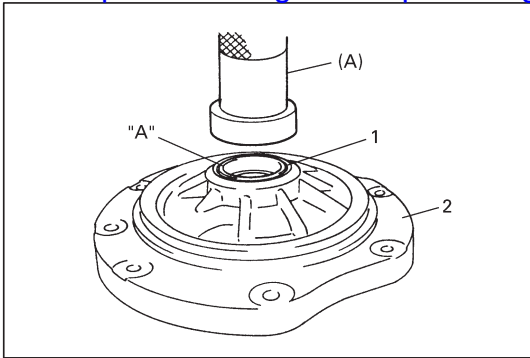
- 1) Inspect pump body oil seal.
 Check for wear, damage or cracks.
 Replace oil seal if necessary and apply grease to its lip portion slightly when it is installed.



- 2) Check side clearance of both gears.
 Using a straightedge (1) and a feeler gauge (2), measure side clearance between gear and pump body.
 If clearance exceeds its standard value, replace oil pump ass'y.

Side Clearance

Standard: 0.02 – 0.04 mm (0.0008 – 0.0015 in.)



ASSEMBLY

- 1) Install pump body oil seal (1).

Use special tool and hammer to install it, and then apply grease to its lip portion.

Special Tool

(A): 09913-85210

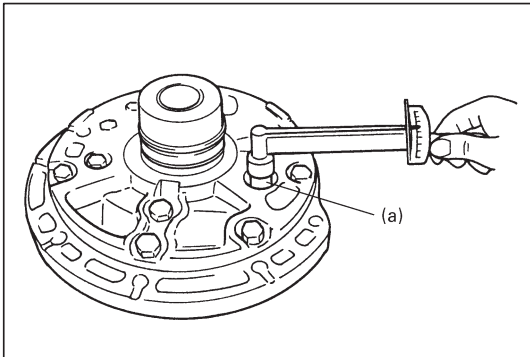
“A”: Grease 99000-25030

- 2) Install driven gear and drive gear to pump body (2) after applying A/T fluid to gears.

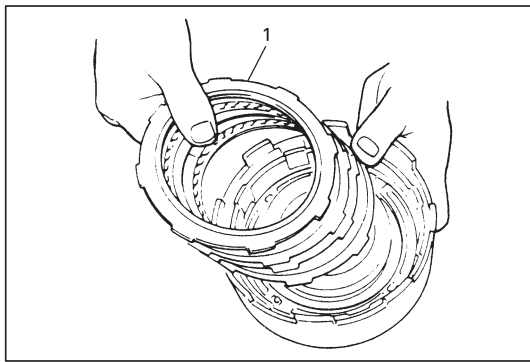
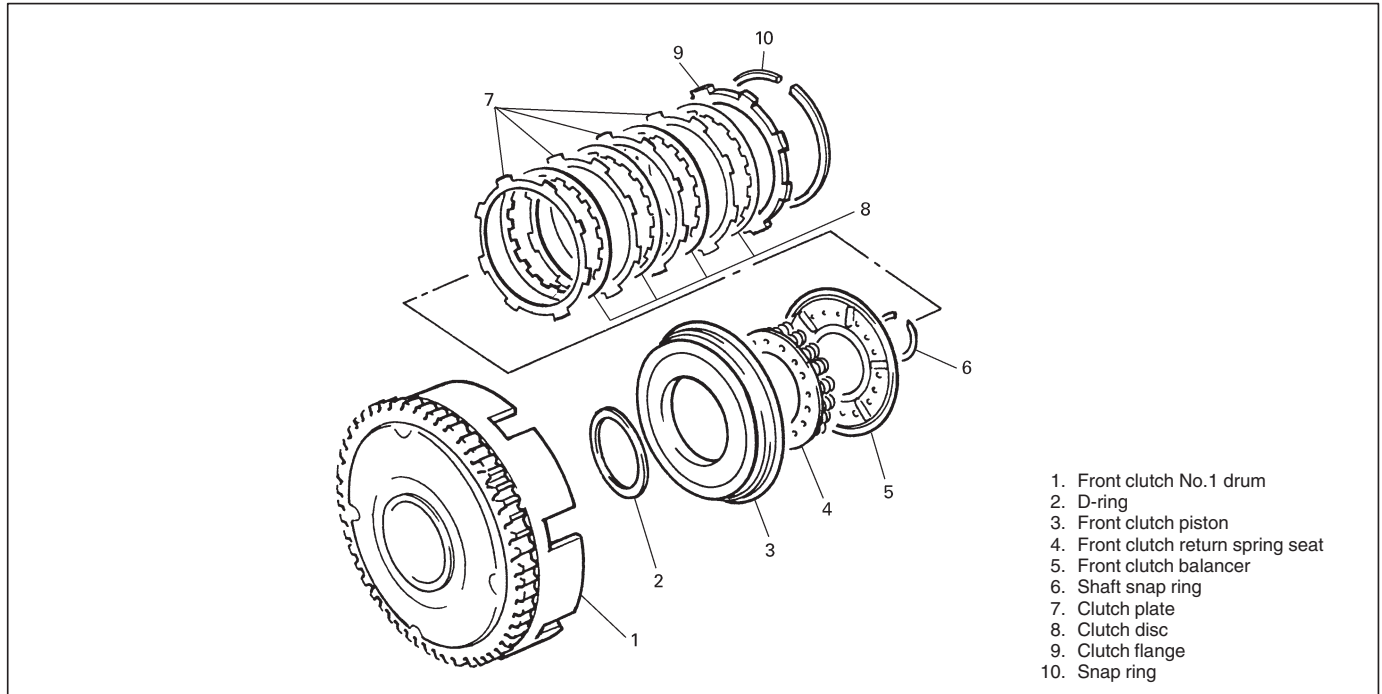
- 3) Install stator shaft ass'y to pump body and tighten 11 pump cover bolts to specification.

Tightening Torque

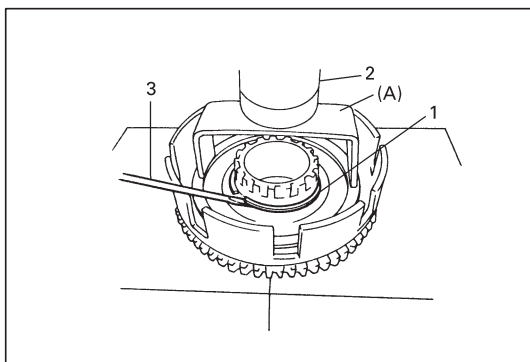
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 4) Install 2 new oil seal rings to stator shaft.
- 5) Apply grease to 2 oil seal rings.
- 6) Install D-ring applied with grease and make sure that it is not twisted or extruded.
- 7) Check drive gear for smooth rotation.

FRONT CLUTCH (C2 CLUTCH)**DISASSEMBLY**

- 1) Remove snap ring.
- 2) Remove flange (1), discs and plates.



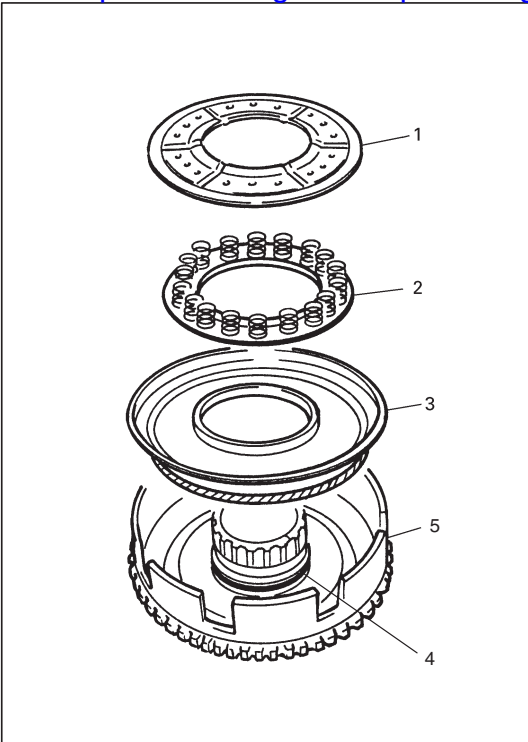
- 3) Remove shaft snap ring (1).
 Compress piston return springs and remove shaft snap ring. Place special tool (clutch spring compressor) on spring seat and compress spring with a press (2), and then remove shaft snap ring, using a flat end rod or the like (3).

CAUTION:

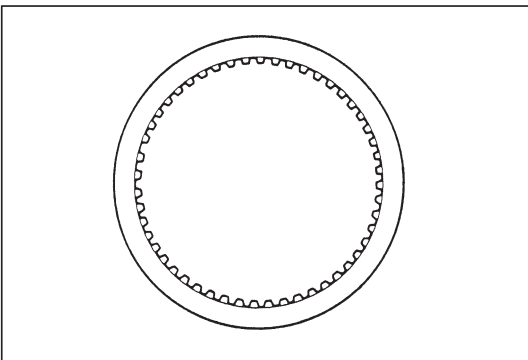
Do not push down return spring more than necessary.

Special Tool

(A): 09926-96010



- 4) Remove front clutch balancer (1) and front clutch return spring seat (2).
- 5) Remove front clutch piston (3).
Blow compressed air through input shaft oil hole to remove piston. If piston does not pop out, take it out with long nose pliers.
- 6) Remove D-ring (4) from front clutch No.1 drum (5).



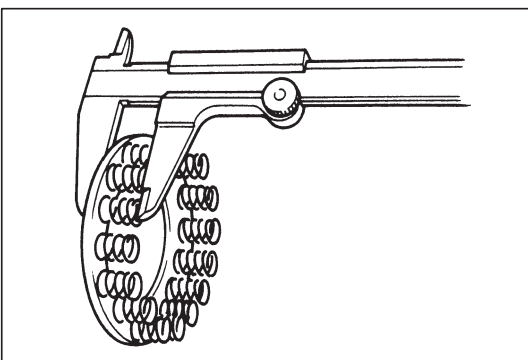
INSPECTION

Clutch Discs, Plates and Flange

Check that sliding surfaces of discs, plates and flanges are not worn or burnt. If necessary, replace.

NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.



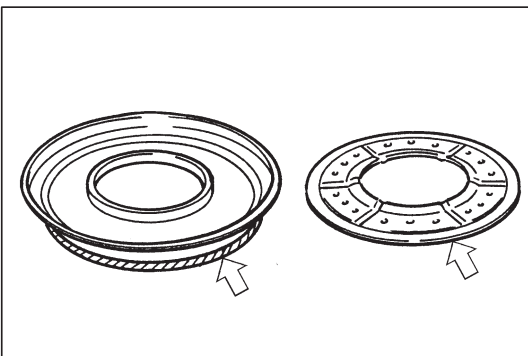
Front Clutch Return Spring Seat

Measure height of front clutch return spring.

Specified value: 13.85 mm (0.545 in.)

NOTE:

- Do not apply excessive force when measuring spring height.
- Perform measurement at several points.



Front Clutch Piston Lip and Front Clutch Balancer Lip

Check each lip for wear, deformation, cut, and/or hardening. If necessary, replace.

ASSEMBLY

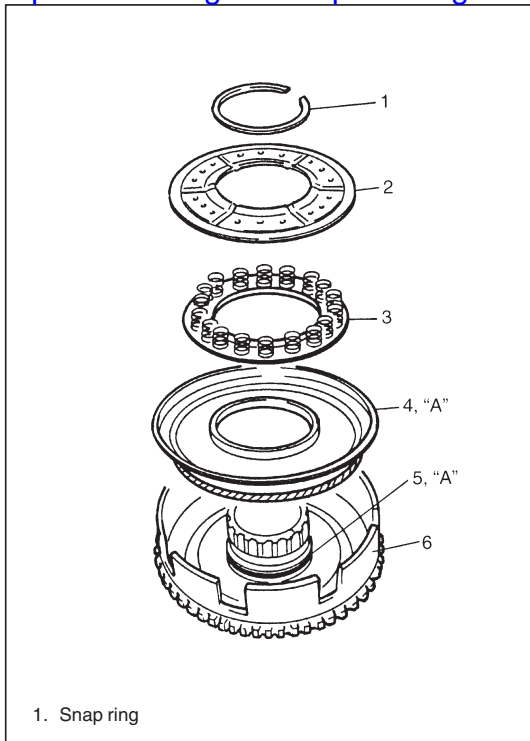
- 1) Install new D-ring (5) to front clutch No.1 drum.
Apply grease to D-ring and fit it to drum.

"A": Grease 99000-25030

- 2) Install piston (4) into front clutch No.1 drum (6).
Use care that the piston lip does not get twisted or caught.
Apply grease to the lip of the piston.

"A": Grease 99000-25030

- 3) Install front clutch return spring (3) seat and front clutch balancer (2).



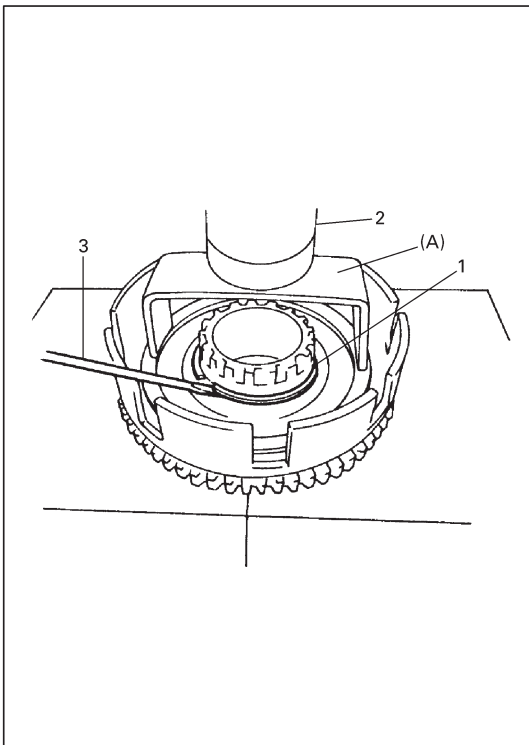
- 4) Install shaft snap ring (1).
Compress return springs and install shaft snap ring in groove by using a flat end rod or the like (3).
Place special tool (clutch spring compressor) on spring seat and compress springs with a press (2).

CAUTION:

Do not compress return spring more than necessary.

Special Tool

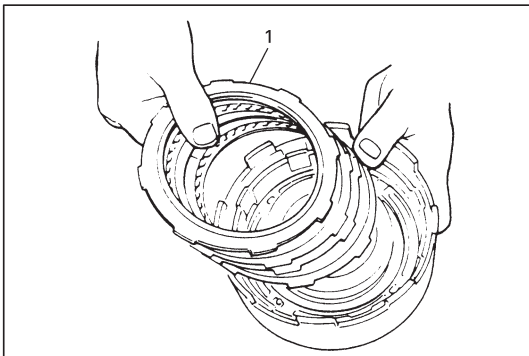
(A): 09926-96010



- 5) Install discs, plates and flange (1) in following order.
(1) Plate → (2) Disc → (3) Plate → (4) Disc → (5) Plate → (6) Disc → (7) Plate → (8) Disc → (9) Flange

NOTE:

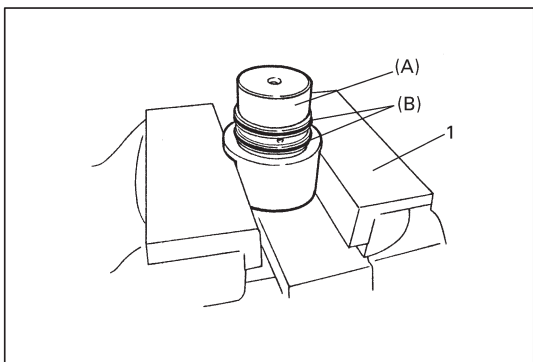
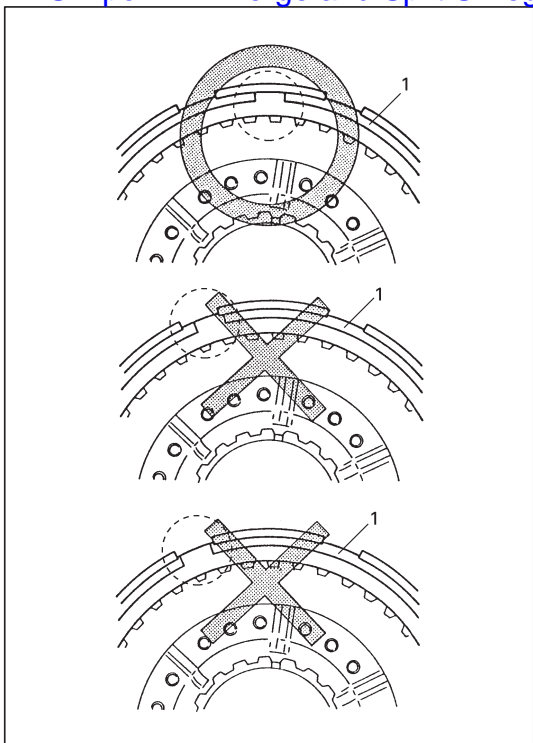
Before assembly, new discs should be soaked in automatic transmission fluid for at least 2 hours.



6) Install snap ring (1).

NOTE:

Make sure that the ends of the snap ring do not come to the opening of the front clutch No.1 drum.



7) Place special tool (A) on soft jawed vise (1) and install 2 oil seal rings on special tool.

Special Tool

(A): 09926-26030

SUZUKI GENUINE PARTS

(B): Clutch drum seal ring 22831-83E10

NOTE:

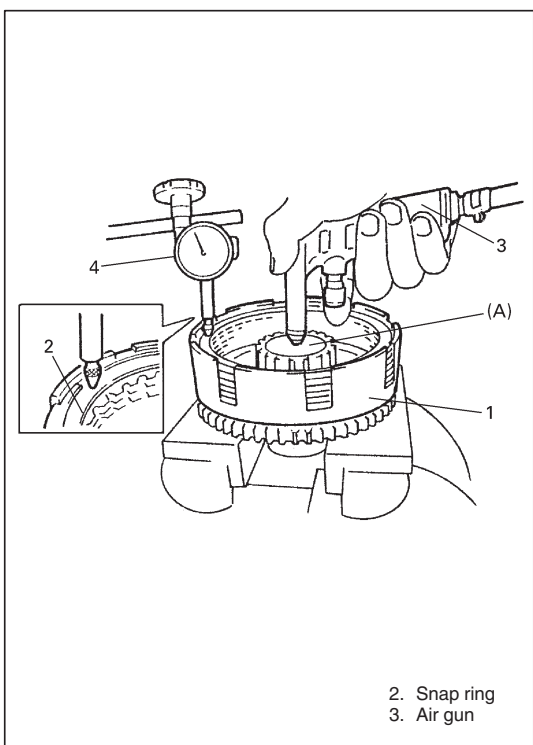
- Clutch drum seal set has two seal rings in a set.
- Do not use the seal rings removed from oil pump ass'y. It is not necessary to remove seal rings from special tool once installed.

8) Place front clutch assembly (1) on special tool (A).

9) Set dial gauge (4) on the top of clutch flange and measure clearance by blowing compressed air (4 kg/cm², 57 psi) as shown in figure.

Clearance: 0.47 – 1.14 mm (0.0185 – 0.0448 in.)

If the clearance is out of specification, replace clutch discs, plates and flange.



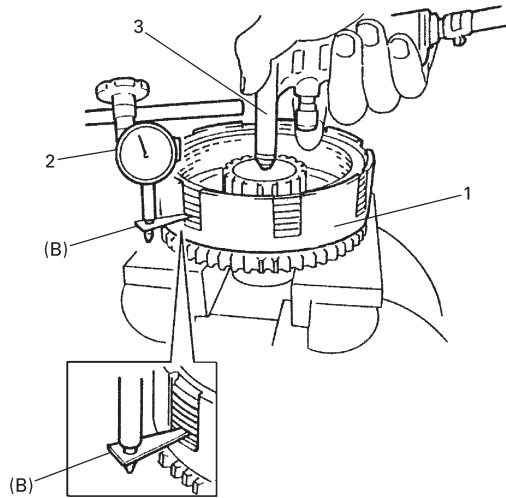
- 10) Attach special tool (B) to dial gauge (2) and set them on the lowest clutch plate.

Special Tool**(B): 09952-06010**

Measure piston stroke by blowing compressed air (4 kg/cm², 57 psi) as shown in figure.

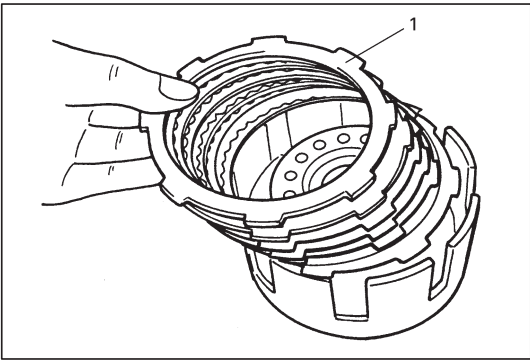
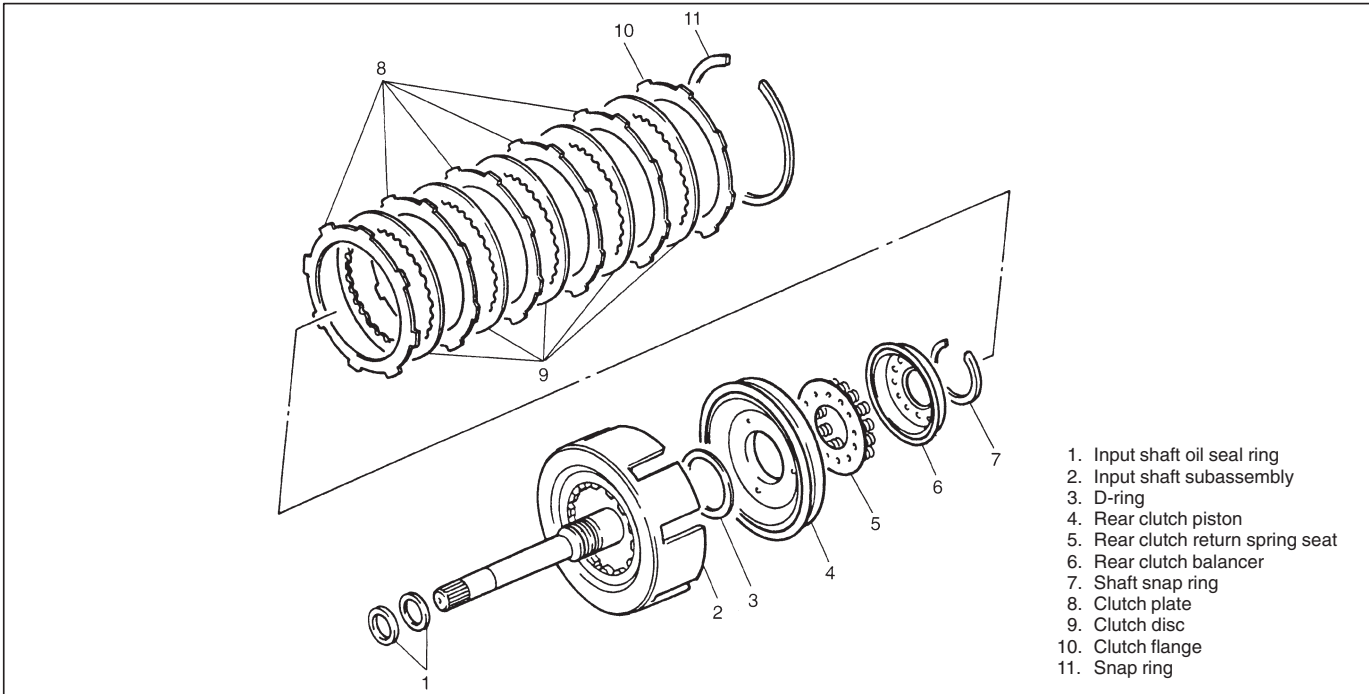
Piston Stroke: 1.46 – 1.64 mm (0.0575 – 0.0646 in.)

If the piston stroke is out of specification, replace clutch discs, plates and flange.

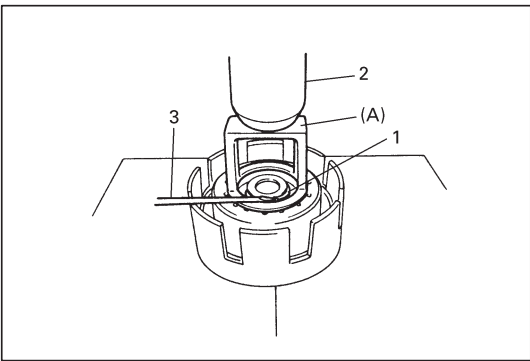


1. Front clutch assembly
3. Air gun

Simpo PDF Merge and Split Unregistered Version - <http://www.simpopdf.com>
REAR CLUTCH (C1 CLUTCH)

**DISASSEMBLY**

- 1) Remove snap ring.
- 2) Remove flange (1), discs and plates.



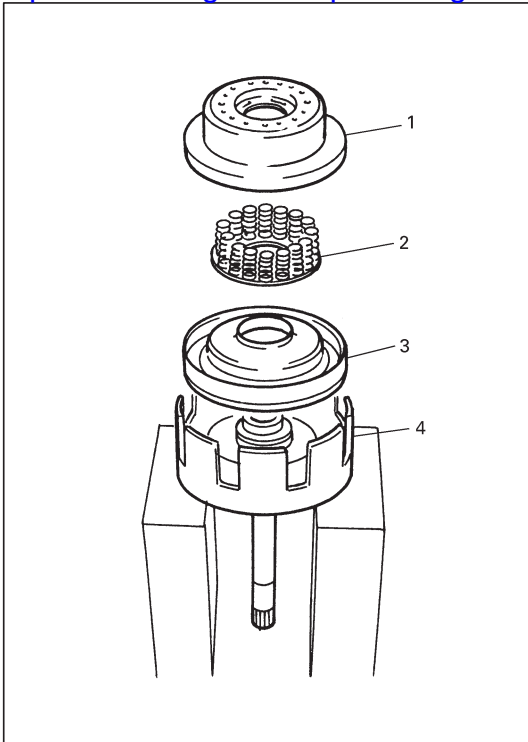
- 3) Remove shaft snap ring (1).
 Compress piston return springs and remove shaft snap ring. Place special tool (clutch spring compressor) on spring seat and compress spring with a press (2), and then remove shaft snap ring, using a flat end rod or the like (3).

CAUTION:

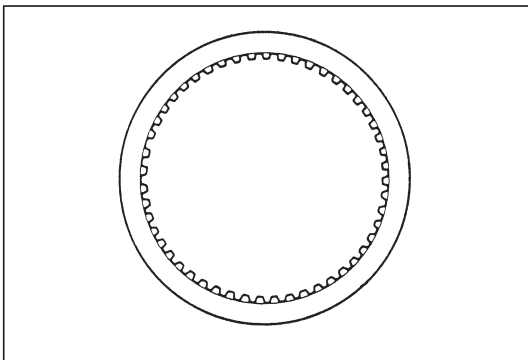
Do not push down return spring more than necessary.

Special Tool

(A): 09926-96020



- 4) Remove rear clutch balancer (1) and rear clutch return spring seat (2).
- 5) Remove rear clutch piston (3).
If piston does not pop out, blow compressed air through input shaft oil hole to remove piston.
- 6) Remove D-ring, and oil seals from input shaft subass'y (4).



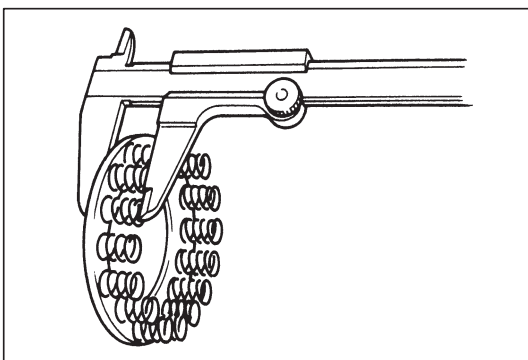
INSPECTION

Clutch Discs, Plates and Flange

Check that sliding surfaces of discs, plates and flanges are not worn or burnt. If necessary, replace.

NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.



Rear Clutch Return Spring Seat

Measure height of overdrive clutch return spring.

Specified value: 22.01 mm (0.867 in.)

NOTE:

- Do not apply excessive force when measuring spring height.
- Perform measurement at several points.

ASSEMBLY

- 1) Install new D-ring (7) and oil seals (2) to input shaft subass'y.
Apply grease to D-ring and fit it to input shaft subass'y (1).

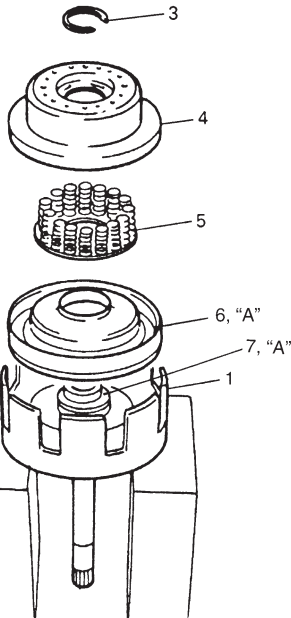
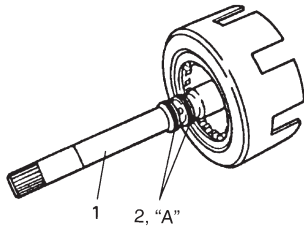
"A": Grease 99000-25030

- 2) Install piston (6) into input shaft subass'y.
Apply grease to the lip of the piston.

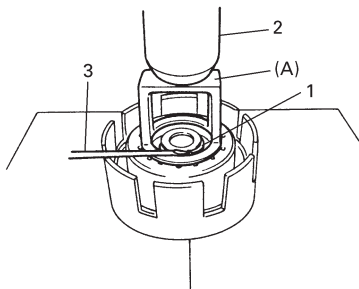
"A": Grease 99000-25030

Use care that the lip does not get twisted or caught.

- 3) Install rear clutch return spring seat (5) and rear clutch balancer (4).



3. Snap ring



- 4) Install shaft snap ring (1).
Compress return springs and install shaft snap rings in groove by using a flat end rod or the like (3).
Place special tool (clutch spring compressor) on spring seat and compress springs with a press (2).

CAUTION:

Do not compress return spring more than necessary.

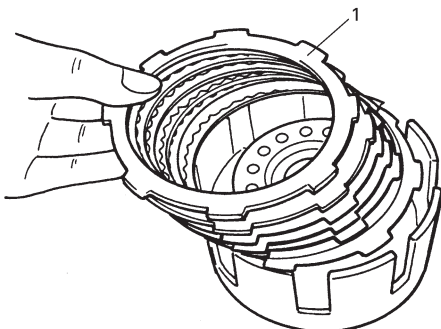
Special Tool

(A): 09926-96020

- 5) Install discs, plates and flange (1) in following order.
(1) Plate → (2) Disc → (3) Plate → (4) Disc → (5) Plate → (6) Disc → (7) Plate → (8) Disc → (9) Plate → (10) Disc → (11) Flange

NOTE:

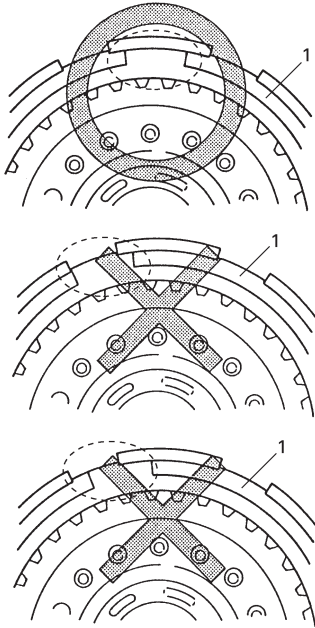
Before assembly, new discs should be soaked in automatic transmission fluid for at least 2 hours.



6) Install snap ring (1).

NOTE:

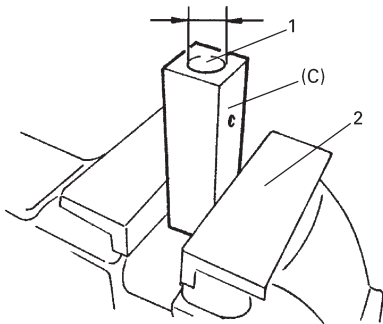
Make sure that the ends of the snap ring do not come to the opening of the input shaft subass'y.



7) Place special tool (C) on soft jawed vise (2) with wider opening (1) facing up.

Special Tool

(C): 09926-26040

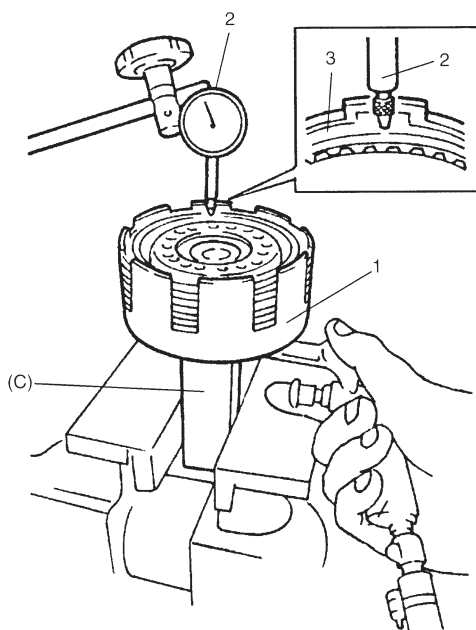


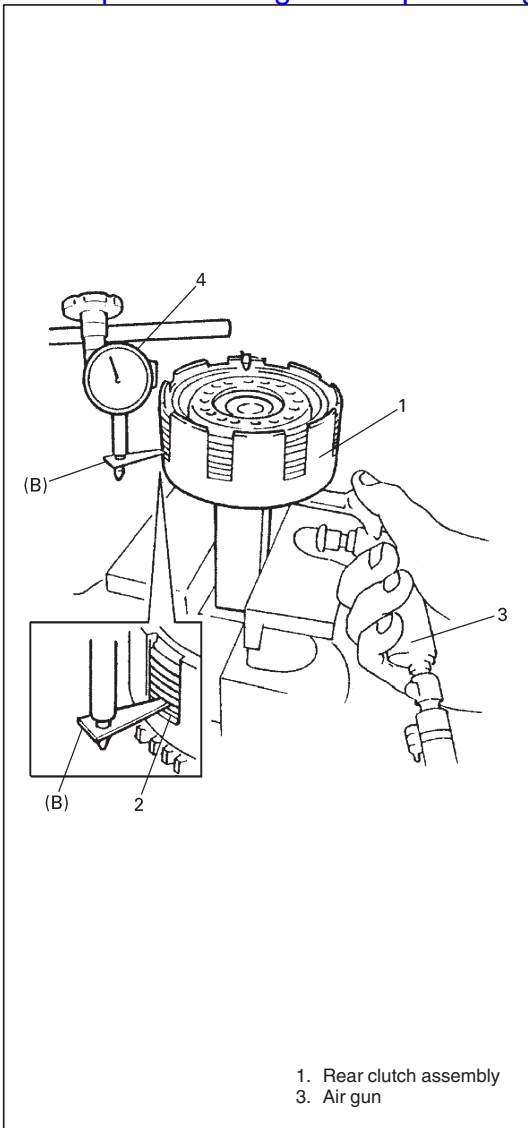
8) Place rear clutch assembly (1) on special tool (C).

9) Set dial gauge (2) on the top of clutch flange (3) and measure clearance by blowing compressed air (4 kg/cm², 57 psi) as shown in figure.

Clearance: 0.80 – 1.40 mm (0.031 – 0.055 in.)

If the clearance is out of specification, replace clutch discs, plates and flange.





10) Attach special tool (B) to dial gauge (4) and set them on the lowest clutch plate (2).

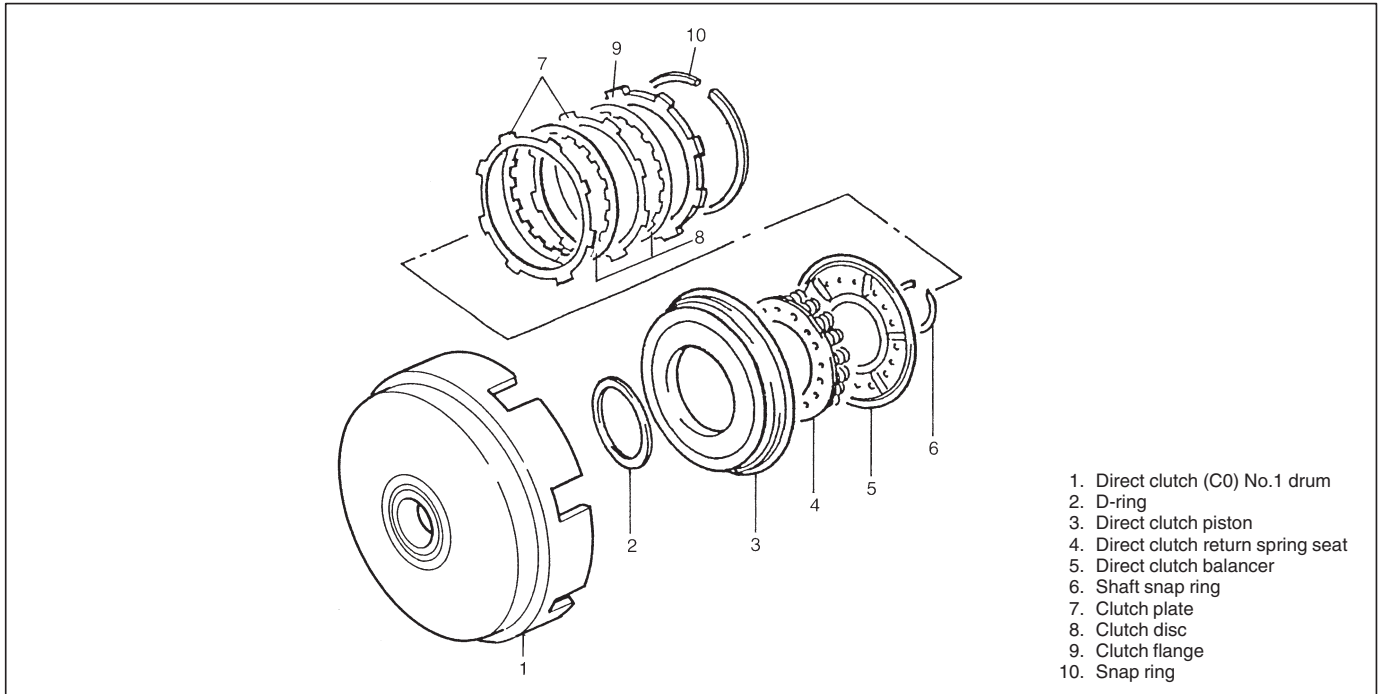
Special Tool

(B): 09952-06010

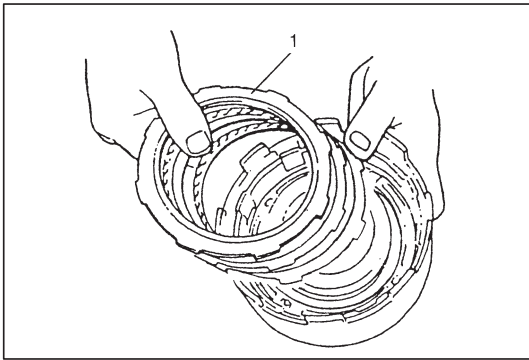
Measure piston stroke by blowing compressed air (4kg/cm², 57 psi) as shown in figure.

Piston Stroke: 1.93 – 2.13 mm (0.076 – 0.084 in.)

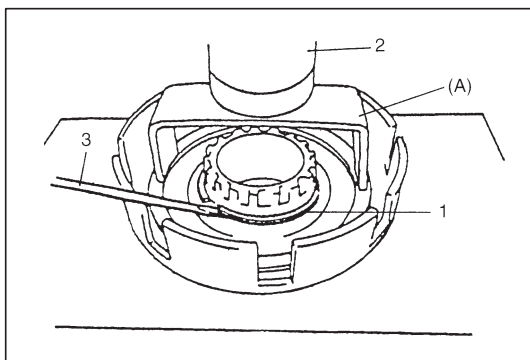
If the piston stroke is out of specification, replace clutch discs, plates and flange.

DIRECT CLUTCH (C0 CLUTCH)**DISASSEMBLY**

- 1) Remove snap ring.
- 2) Remove flange (1), discs and plates.



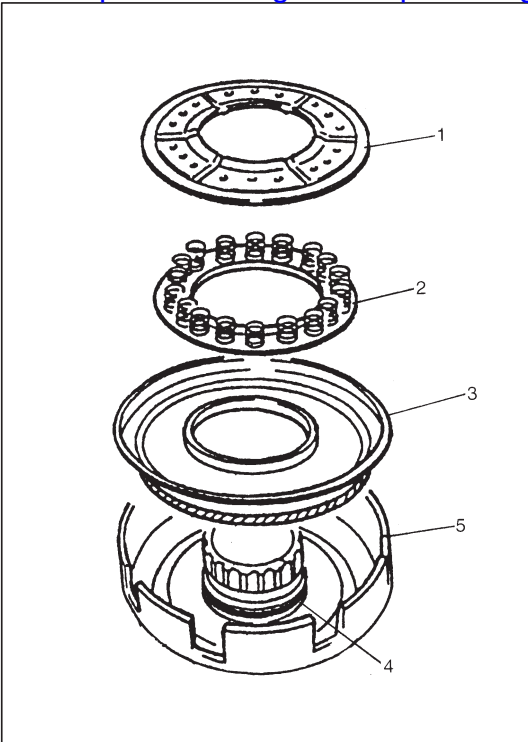
- 3) Remove shaft snap ring (1).
 Compress piston return springs and remove shaft snap ring. Place special tool (clutch spring compressor) on spring seat and compress spring with a press (2), and then remove shaft snap ring, using a flat end rod or the like (3).

**CAUTION:**

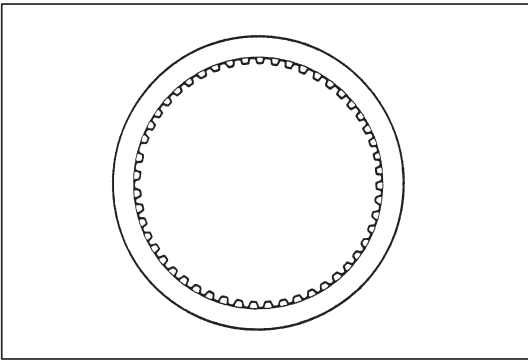
Do not push down return spring more than necessary.

Special Tool

(A): 09926-96010



- 4) Remove direct clutch balancer (1) and direct clutch return spring seat (2).
- 5) Remove direct clutch piston (3).
Blow compressed air through input shaft oil hole to remove piston. If piston does not pop out, take it out with long nose pliers.
- 6) Remove D-ring (4) from direct clutch No.1 drum (5).



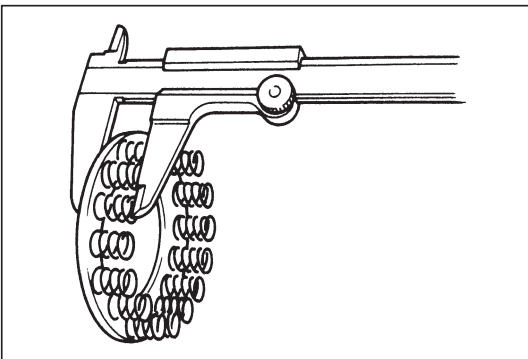
INSPECTION

Clutch Discs, Plates and Flange

Check that sliding surfaces of discs, plates and flanges are not worn or burnt. If necessary, replace.

NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.



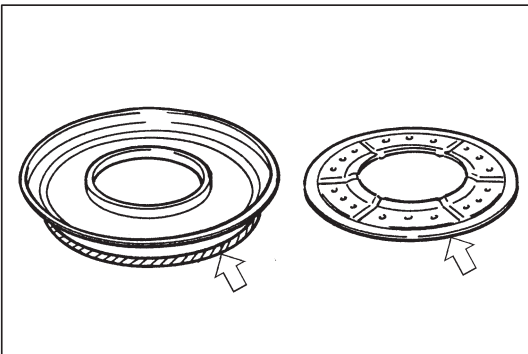
Direct Clutch Return Spring Seat

Measure height of direct clutch return spring.

Specified value: 16.3 mm (0.642 in.)

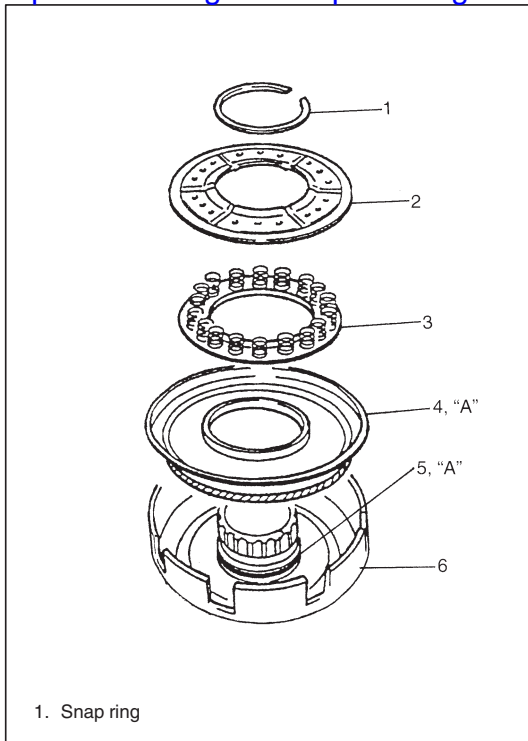
NOTE:

- Do not apply excessive force when measuring spring height.
- Perform measurement at several points.



Direct Clutch Piston Lip and Direct Clutch Balancer Lip

Check each lip for wear, deformation, cut, and/or hardening. If necessary, replace.

**ASSEMBLY**

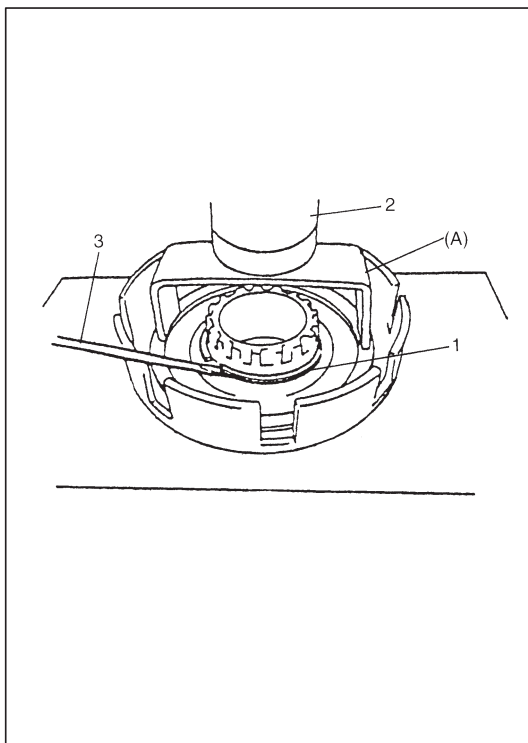
- 1) Install new D-ring (5) to direct clutch No.1 drum (6).
Apply grease to D-ring and fit it to drum.

“A”: Grease 99000-25030

- 2) Install piston (4) into direct clutch No.1 drum.
Use care that the piston lip does not get twisted or caught.
Apply grease to the lip of the piston.

“A”: Grease 99000-25030

- 3) Install direct clutch return spring seat (3) and direct clutch balancer (2).



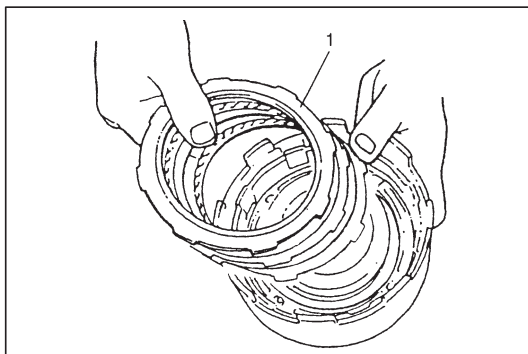
- 4) Install new shaft snap ring (1).
Compress return springs and install shaft snap ring in groove by using a flat end rod or the like (3).
Place special tool (clutch spring compressor) on spring seat and compress springs with a press (2).

CAUTION:

Do not compress return spring more than necessary.

Special Tool

(A): 09926-96010



- 5) Install discs, plates and flange (1) in following order.
(1) Flange No.1 → (2) Disc → (3) Plate → (4) Disc → (5) Flange No.2

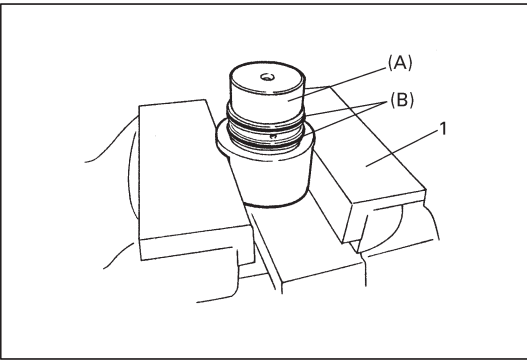
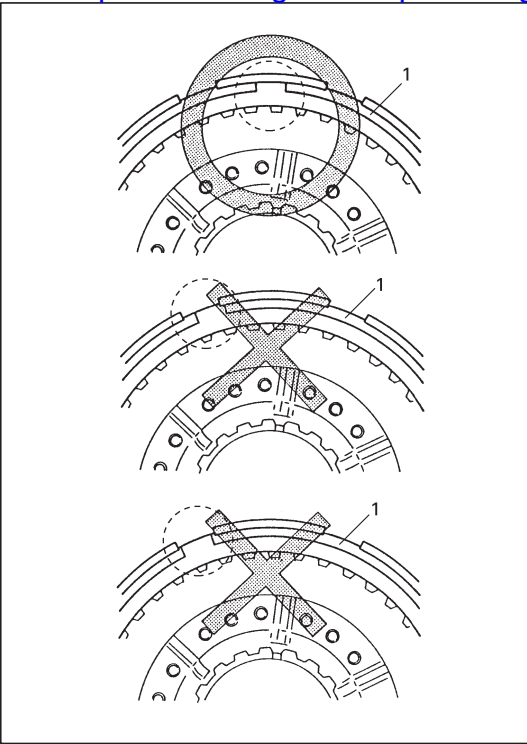
NOTE:

Before assembly, new discs should be soaked in automatic transmission fluid for at least 2 hours.

6) Install snap ring (1).

NOTE:

Make sure that the ends of the snap ring do not come to the opening of the front clutch No.1 drum.



7) Place special tool (A) on soft jawed vise (1) and install 2 oil seal rings on special tool.

Special Tool

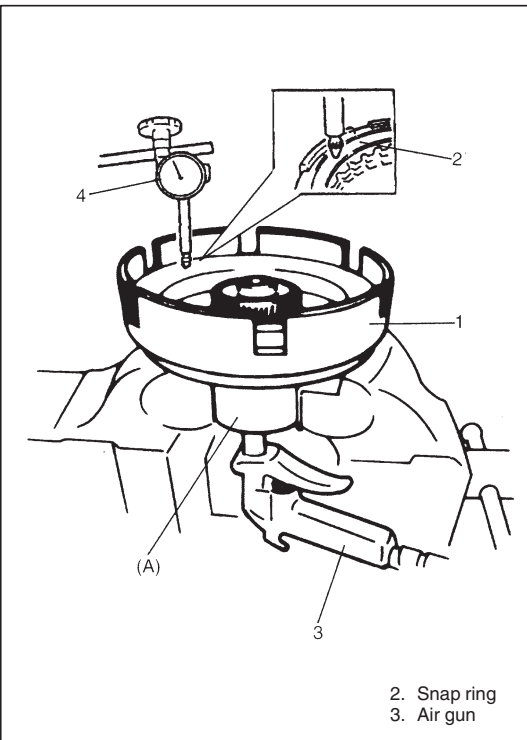
(A): 09926-26050

SUZUKI GENUINE PARTS

(B): Rear cover seal ring 24742-78F10

NOTE:

- Rear cover seal set has two seal rings in a set.
- Do not use the seal rings removed from rear cover. It is not necessary to remove seal rings from special tool once installed.



8) Place direct clutch assembly (1) on special tool (A).

9) Set dial gauge (4) on the top of clutch flange and measure clearance by blowing compressed air ($4\text{kg}/\text{cm}^2$, 57 psi) as shown in figure.

Clearance: 0.50 – 1.04 mm (0.0197 – 0.0409 in.)

If the clearance is out of specification, replace clutch discs, plates and flange.

2. Snap ring
3. Air gun

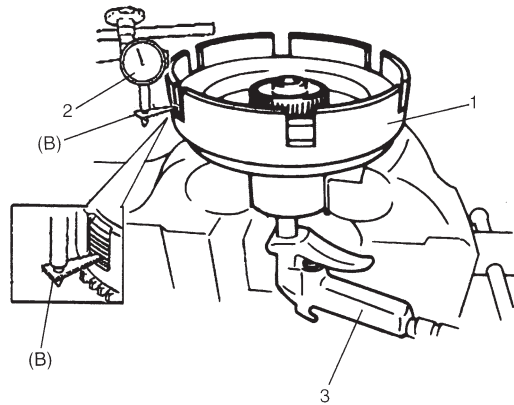
- 10) Attach special tool (B) to dial gauge (2) and set them on the lowest clutch plate.

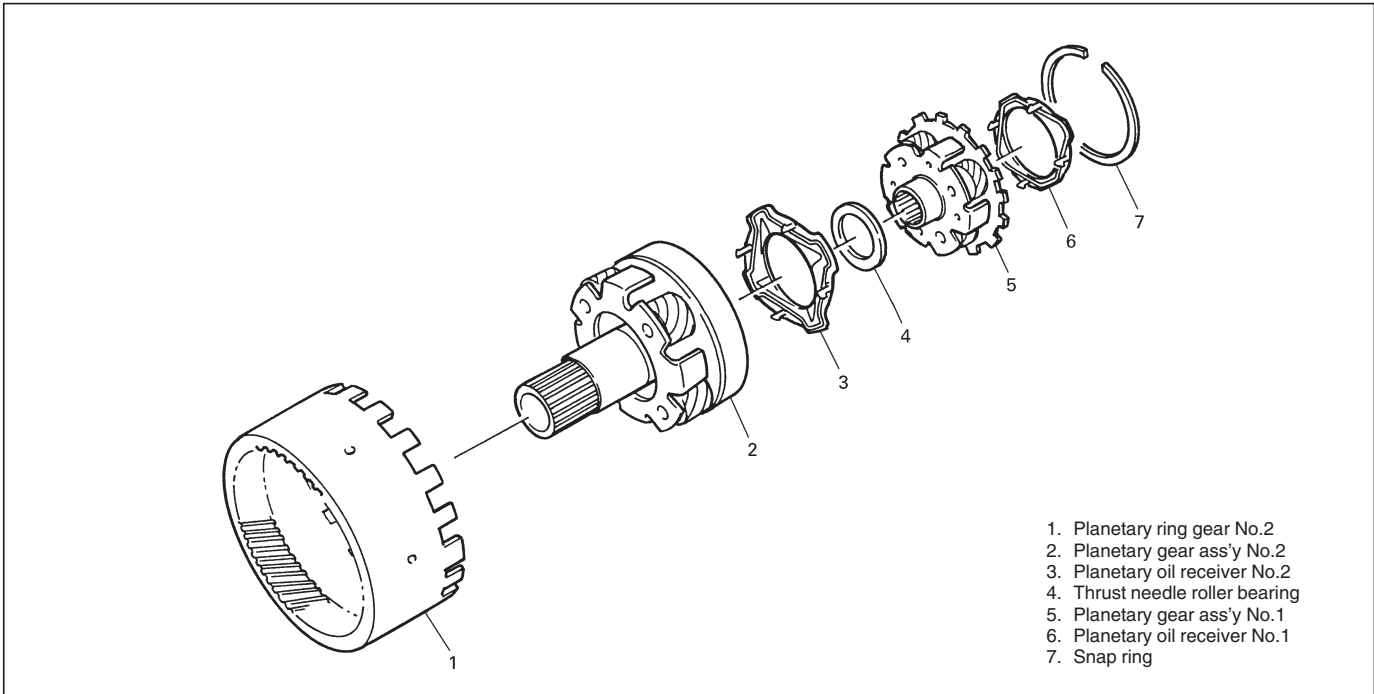
Special Tool**(B): 09952-06010**

Measure piston stroke by blowing compressed air ($4\text{kg}/\text{cm}^2$, 57 psi) as shown in figure.

Piston Stroke: 0.96 – 1.14 mm (0.0378 – 0.0449 in.)

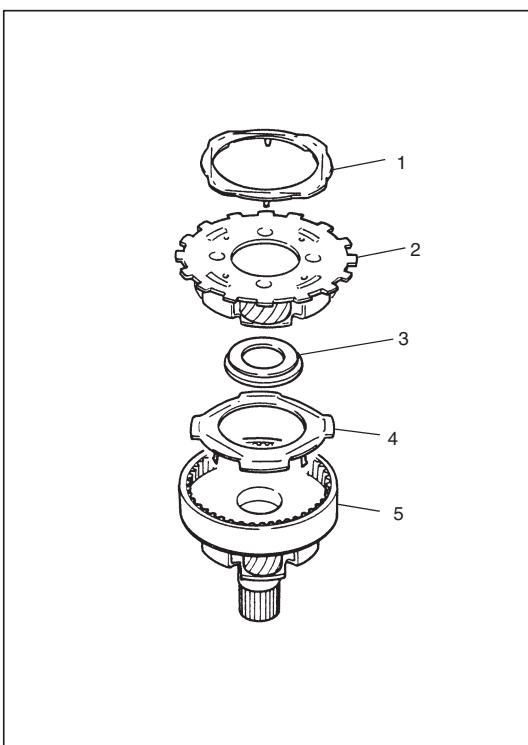
If the piston stroke is out of specification, replace clutch discs, plates and flange.





DISASSEMBLY

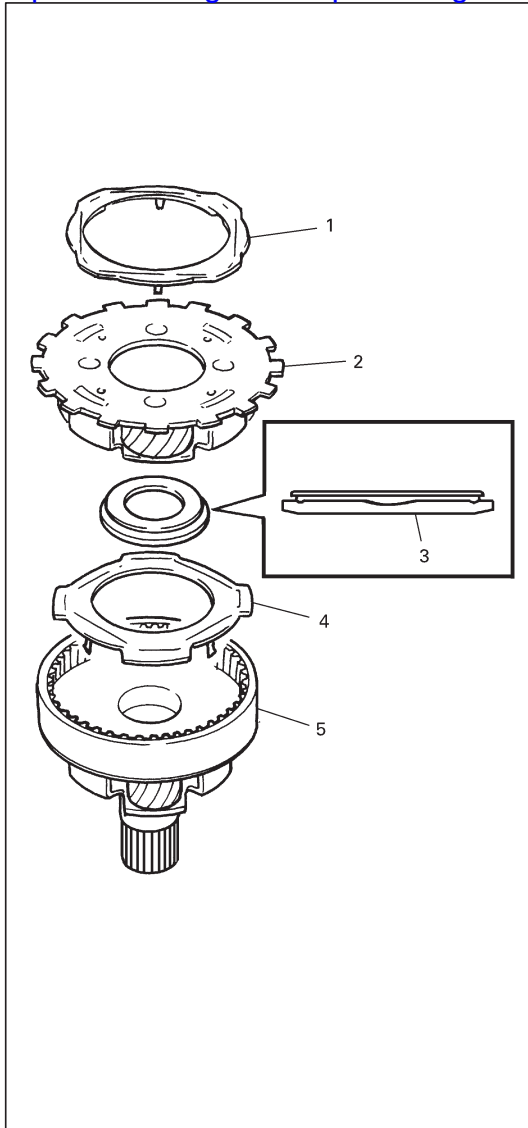
- 1) Remove snap ring.
 Remove planetary ring gear No.2.



- 2) Remove planetary oil receiver No.1 (1) and planetary gear ass'y No.1 (2) from planetary gear ass'y No.2 (5).
- 3) Remove needle roller bearing (3) and planetary oil receiver No.2 (4) from planetary gear ass'y No.2.

NOTE:

Do not reuse oil receivers (1 and 4).

**ASSEMBLY**

- 1) Install new planetary oil receiver No.2 (4) and needle roller bearing (3) to planetary gear ass'y No.2 (5).

NOTE:

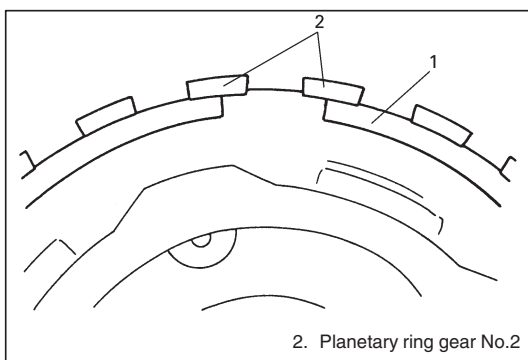
- Note the direction of needle roller bearing.
- Take care not to break the claw of oil receiver.

- 2) Install planetary gear ass'y No.1 (2) to planetary gear ass'y No.2 (5).
- 3) Install new planetary oil receiver No.1 (1).

NOTE:

Take care not to break the claw of oil receiver.

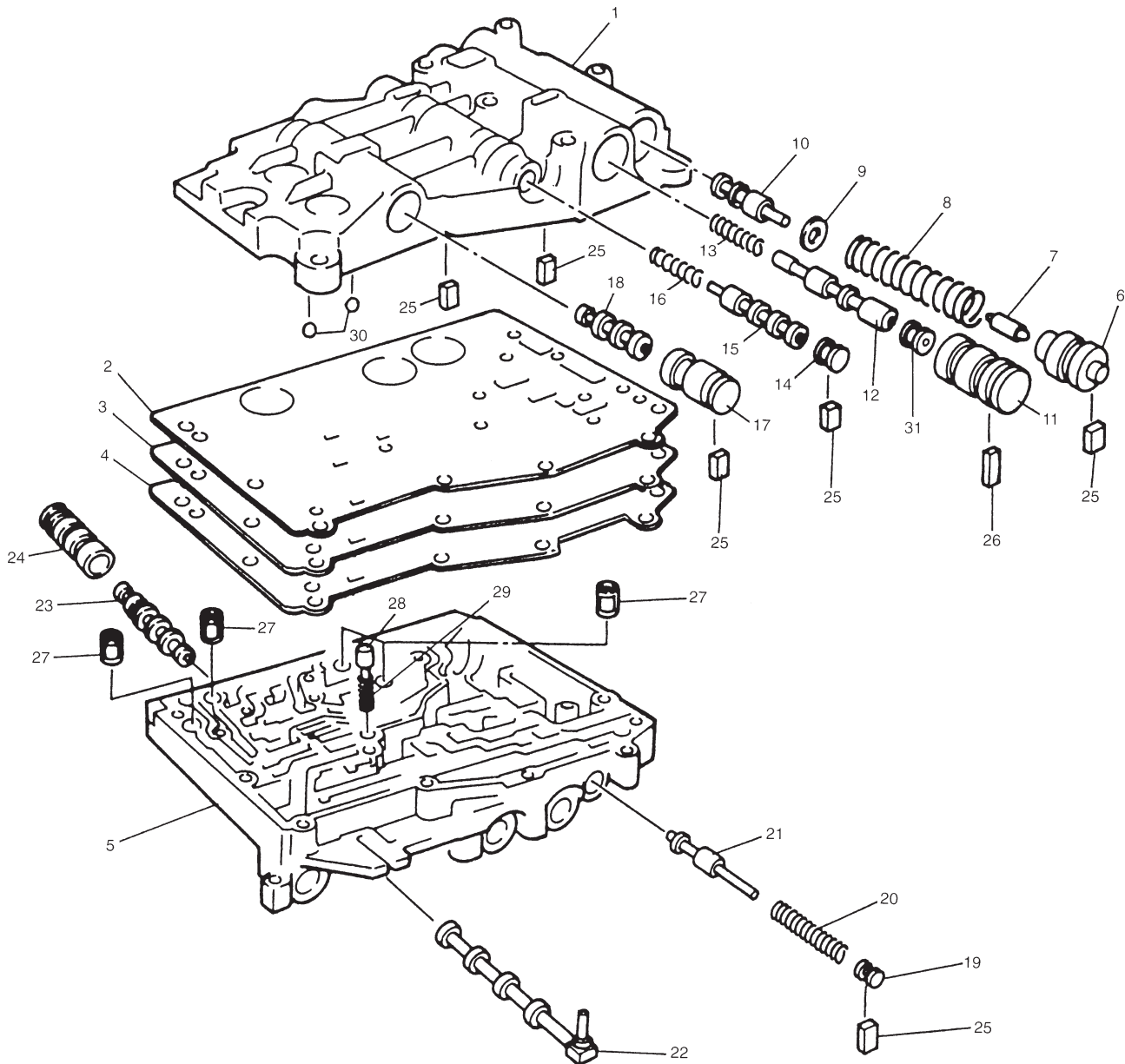
- 4) Assemble planetary ring gear No.2 and planetary gear ass'y No.2.



- 5) Install snap ring (1).

NOTE:

Note the location of the ends of the snap ring.



1. Upper valve body
2. Upper valve body gasket
3. Valve body plate
4. Lower valve body gasket
5. Lower valve body
6. Primary regulator valve sleeve
7. Primary regulator valve plunger
8. Primary regulator valve spring
9. Washer
10. Primary regulator valve

11. Lock-up control valve sleeve
12. Lock-up control valve
13. Lock-up control valve spring
14. Lock-up signal valve plug
15. Lock-up signal valve
16. Lock-up signal valve spring
17. Fail valve No.2 sleeve
18. Fail valve No.2
19. Secondary regulator valve plug
20. Secondary regulator valve spring

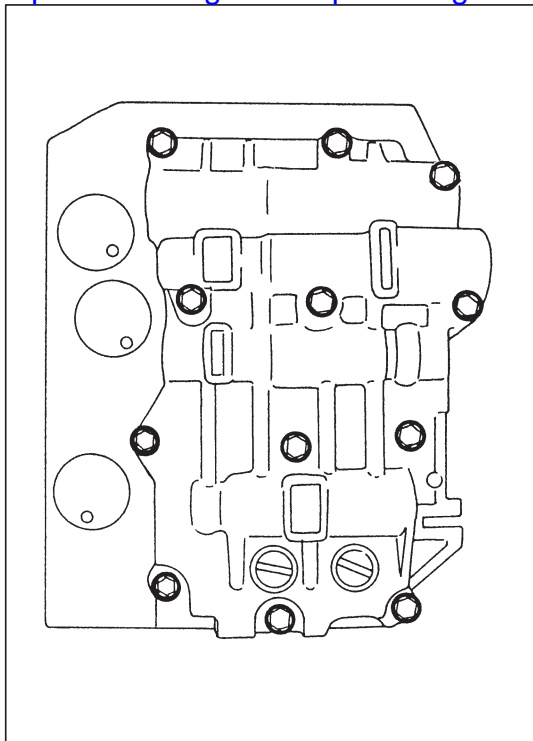
21. Secondary regulator valve
22. Manual valve
23. Fail valve No.1
24. Fail valve No.1 sleeve
25. Key (short)
26. Key (long)
27. Oil strainer
28. Cooler by-pass valve
29. Cooler by-pass valve spring
30. Steel ball
31. Lock-up control valve

VALVE BODY ASS'Y**Disassembly**

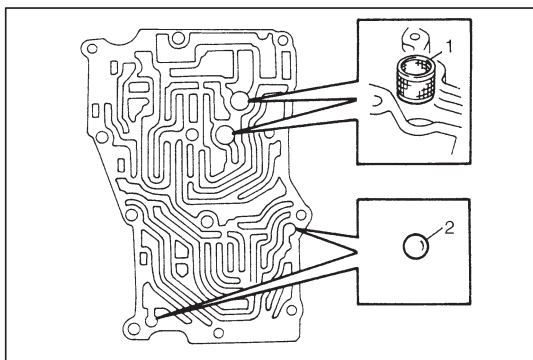
- 1) Remove manual valve.
- 2) Remove 12 bolts from lower valve body.

NOTE:

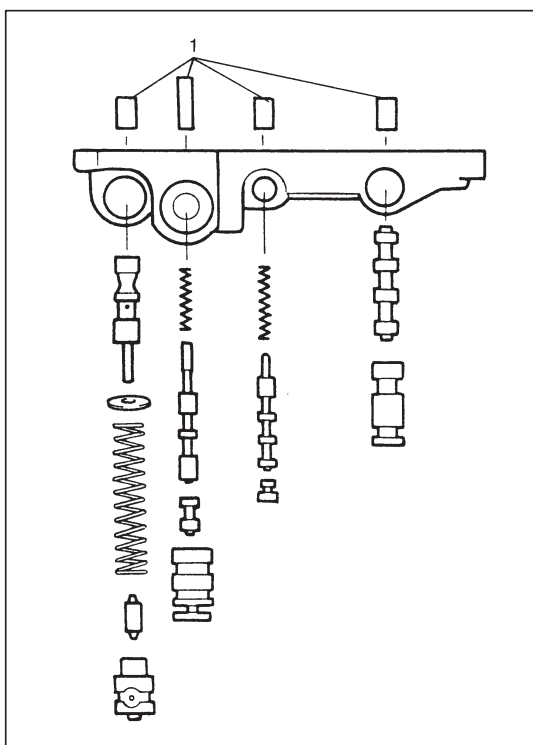
- There are 4 different kinds of bolt fixing upper and lower valve body. Do not mix them up and remember where they belong to.
- When separating lower and upper valve body, be careful not to let the steel ball to fall off.

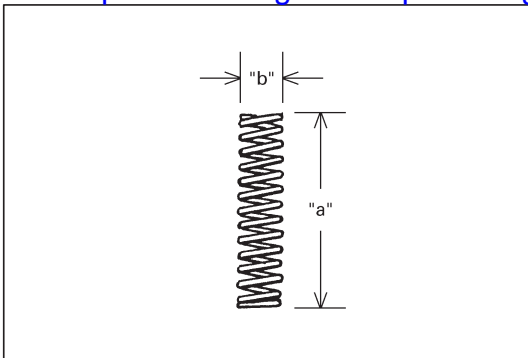
**UPPER VALVE BODY****Disassembly**

- 1) Remove oil strainers (1) and steel balls (2).



- 2) Remove keys (1).
- 3) Pull out all sleeves, valves, plungers, springs and washer.



**Reference**

Primary regulator valve spring (compression spring)

Spring	Free length "a" (mm)	Outside diameter "b" (mm)
Primary regulator valve spring	79.2	18.0
Lock-up control valve spring	31.1	8.5
Lock-up signal valve spring	36.1	8.5

Assembly

- 1) Apply A/T fluid to each valve, plate washer, spring, plunger, sleeve and key.

Insert primary regulator valve (2) about half way then place plate washer and spring. Push in primary regulator valve ass'y all the way in. Insert plunger with sleeve and hold them with the key.

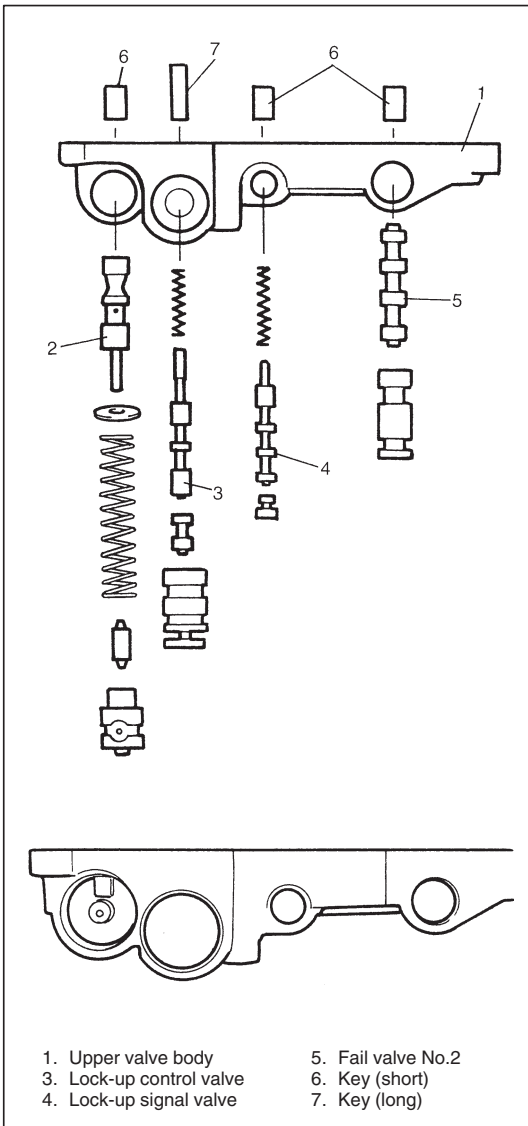
NOTE:

- Note the location of the key shown in picture.
- Compression spring has a identification color paint of yellow.
- Note the direction of the primary regulator valve.

- 2) Apply A/T fluid to each valve, sleeve spring, plug and key and insert them, then fix them with the key.

NOTE:

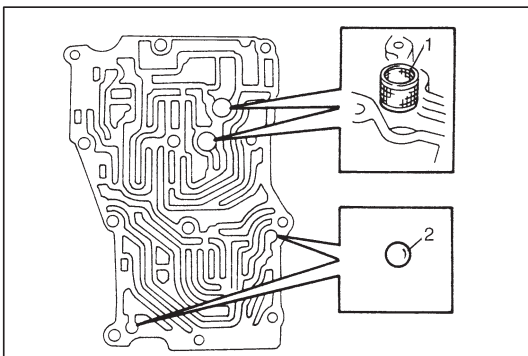
Note the direction of the fail valve.



- 3) Install oil strainers (1) and put steel balls (2).

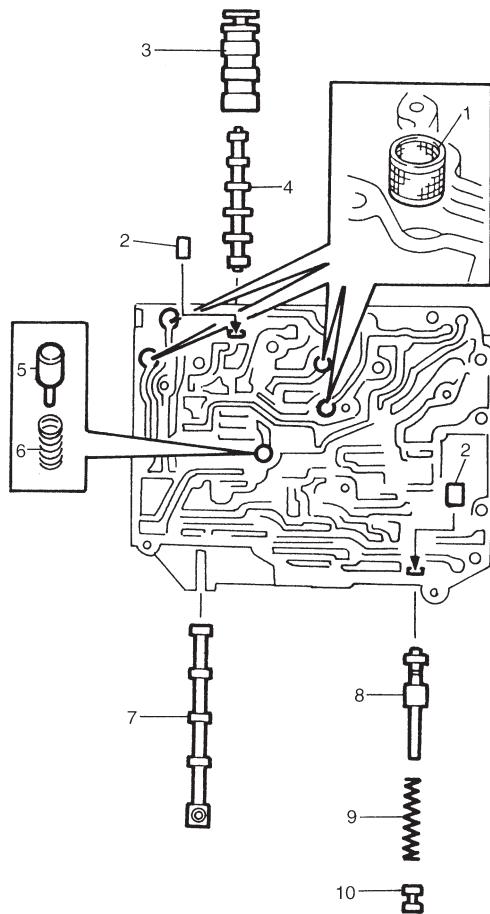
NOTE:

Clean oil strainer before installing.



LOWER VALVE BODY**Disassembly**

- 1) Remove oil strainers (1).
- 2) Remove solenoid valves, if still attached.
- 3) Remove keys (2) and pull out all sleeve, plug, spring and valves.



3. Fail valve No.1 sleeve
4. Fail valve No.1
5. Cooler by-pass valve
6. Cooler by-pass valve spring
7. Manual valve
8. Secondary regulator valve
9. Secondary regulator valve spring
10. Secondary regulator valve plug

Reference

Secondary Regulator Valve Spring (compression spring)

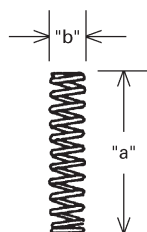
Free length "a": 38.7 mm (1.52 in.)

Outside diameter "b": 8.8 mm (0.35 in.)

Cooler By-pass valve spring

Free length "a": 22.8 mm (0.90 in.)

Outside diameter "b": 8.0 mm (0.31 in.)



Assembly

- 1) Apply A/T fluid to each valve, spring, sleeve and key.
Insert them, then fix with key.

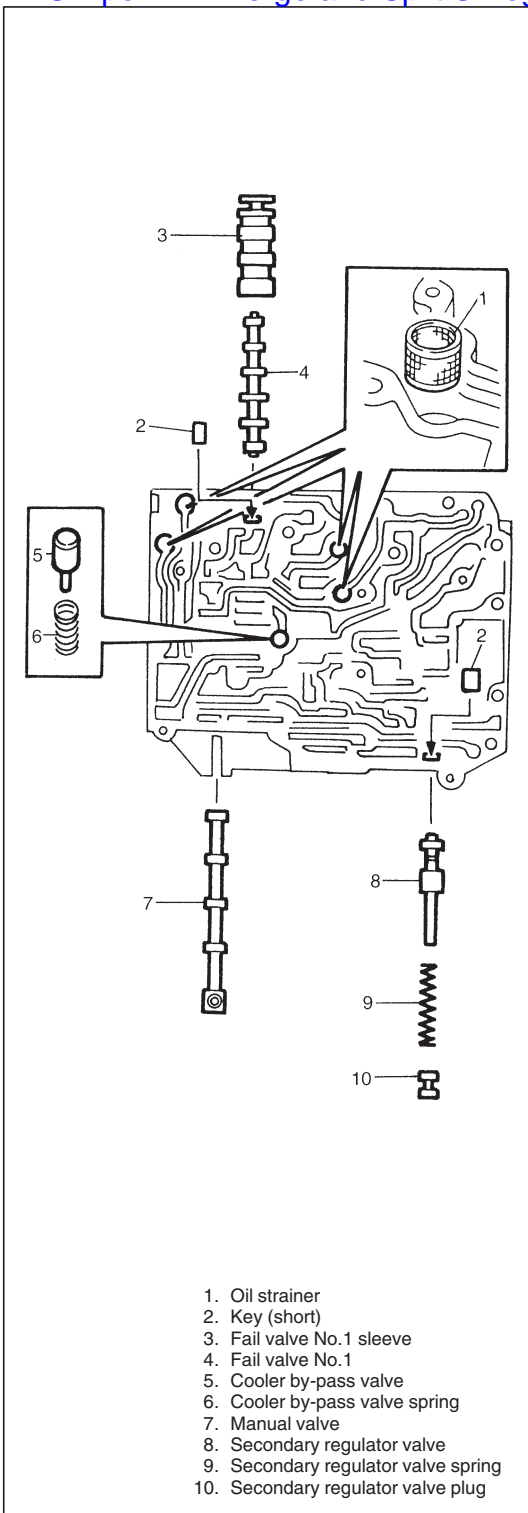
NOTE:

Make sure that the fail valve No.2 and secondary regulator valve is inserted in the right direction.

- 2) Insert oil strainers to lower valve body.

NOTE:

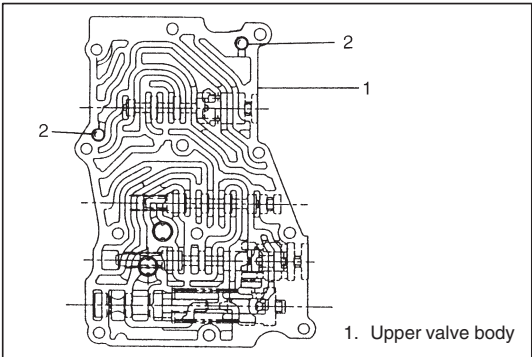
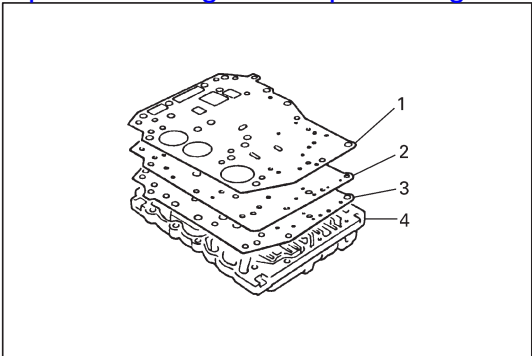
Clean oil strainer before installing.



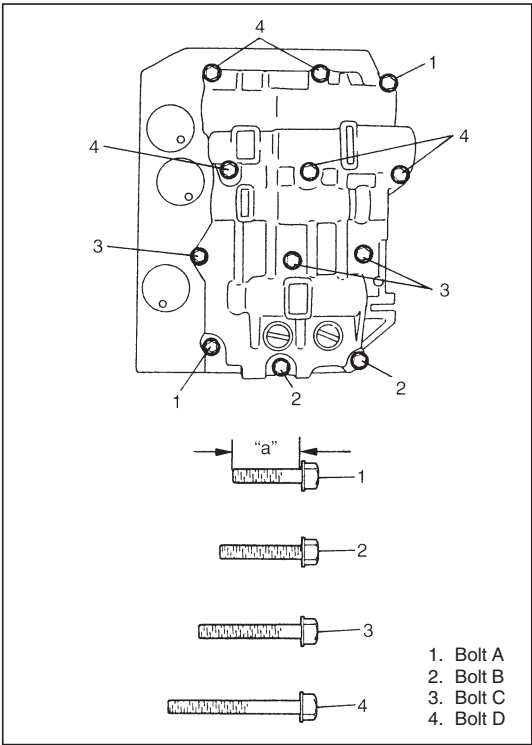
VALVE BODY ASSEMBLY

Assembly

1) Install gasket for lower valve body (3), valve body plate (2) and gasket for upper valve body (1) to lower valve body (4).



2) Make sure that steel balls (2) are at the location shown in figure.



3) Assemble lower valve body with gaskets and plate over upper valve body.

First tighten bolts A then the other bolts.

Tightening Torque

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

NOTE:

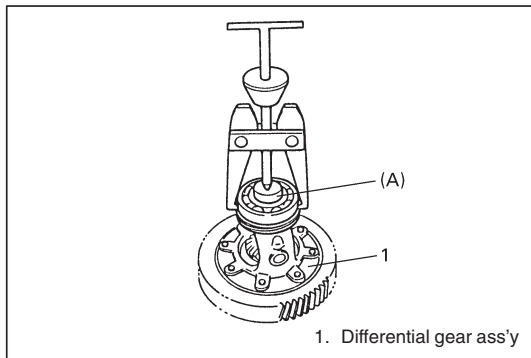
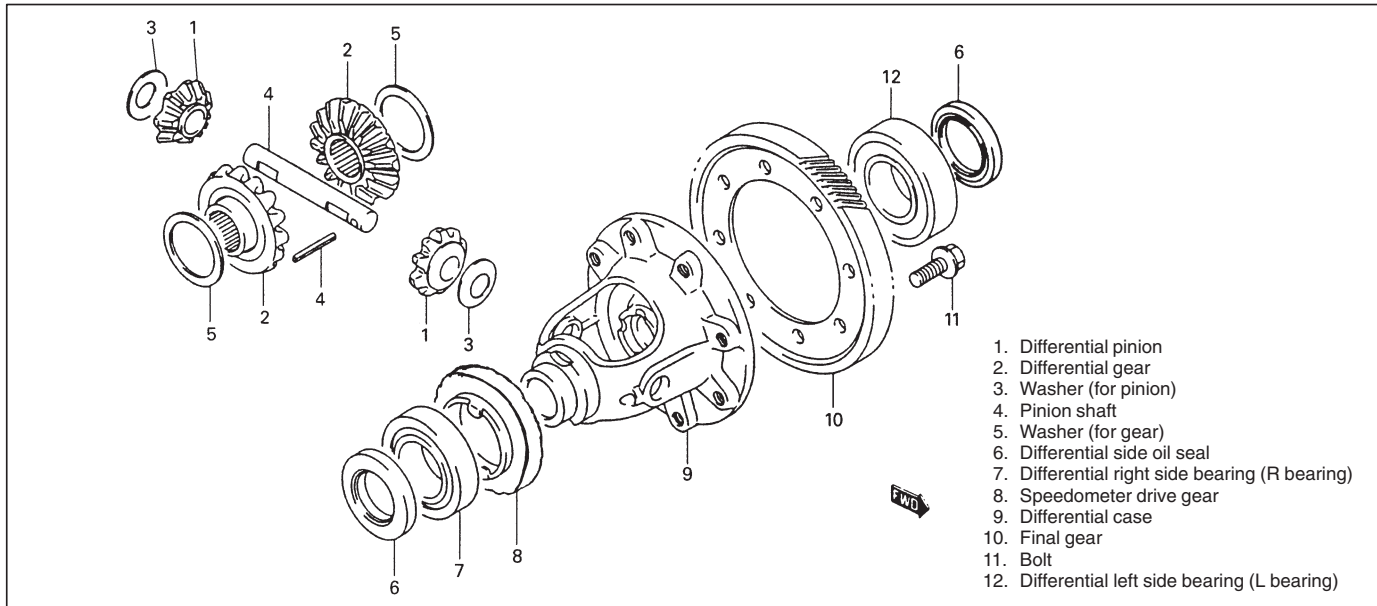
- Be careful not to fall steel balls off.
- There are four kinds of bolts fixing upper and lower valve body. Refer to the table below for the bolt specifications.

Bolt	Length "a"	Pieces
A	20 mm (0.79 in.)	2
B	23 mm (0.91 in.)	2
C	29.5 mm (1.16 in.)	3
D	42 mm (1.65 in.)	5

4) Install manual valve to valve body ass'y.

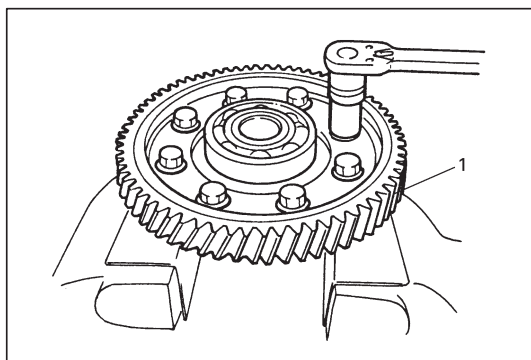
DIFFERENTIAL ASSEMBLY

Servicing procedure for differential assembly is similar to that for manual transmission. Refer to Section 7A of this manual for adjustment procedure.

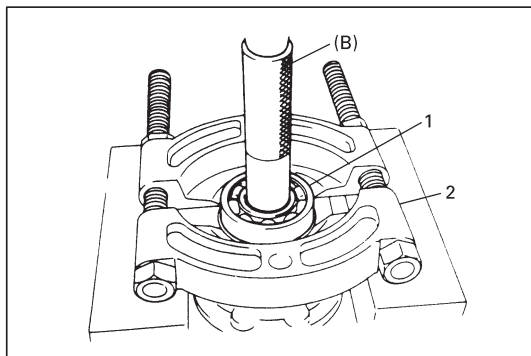
**DISASSEMBLY**

- 1) Remove R bearing and then speed sensor rotor using special tool and puller.

Special tool:
(A): 09925-88210



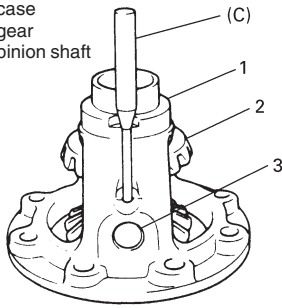
- 2) Hold differential ass'y with soft jawed vise, remove final gear (1).



- 3) Remove differential side L bearing (1).
 Drive it out by using special tool, bearing puller (2) and press.

Special Tool
(B): 09913-80112

1. Differential case
2. Differential gear
3. Differential pinion shaft



- 4) Remove side pinion shaft pin.
Use special tool and hammer for its removal.

Special Tool**(C): 09922-85811**

- 5) Remove side pinion shaft, differential pinions with each washer, differential gears with each washer.

ADJUSTMENT AND REASSEMBLY

Prepare replacing parts as required and proceed to reassembly. Make sure that all parts are clean.

- 1) Install differential gears.

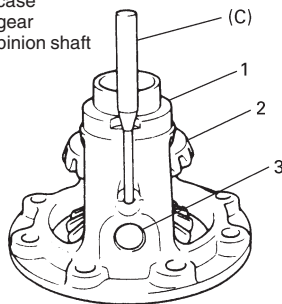
Measure and adjust thrust play referring to Section 7A.

If thrust play is out of specification, select suitable thrust washer from among following available size, install it and check again that specified gear play is obtained.

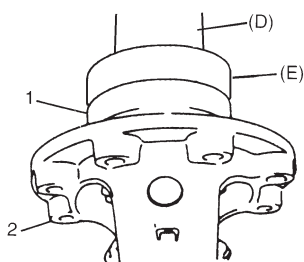
Available thrust washer thickness	0.9, 0.95, 1.0, 1.05, 1.1, 1.15 and 1.2 mm (0.035, 0.037, 0.039, 0.041, 0.043, 0.045, and 0.047 in.)
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Then assemble them with suitable thrust washers.

1. Differential case
2. Differential gear
3. Differential pinion shaft



- 2) Drive in side pinion shaft pin from right side till it is flush with diff. case surface.

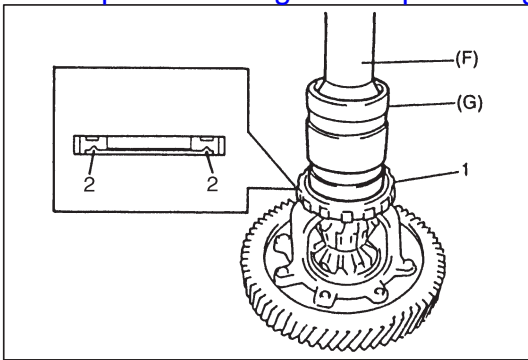
Special Tool**(C): 09922-85811**

2. Differential case

- 3) Install differential side L bearing (1). Press-fit it by using special tool and copper hammer.

Special Tool**(D): 09924-74510****(E): 09926-68310**

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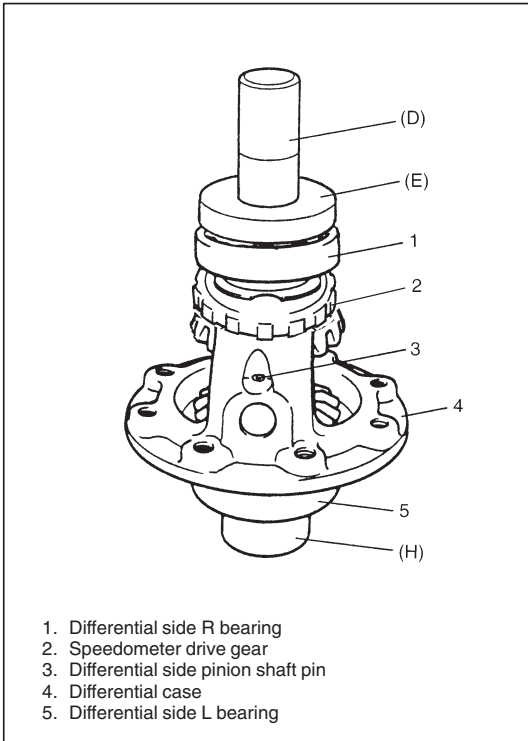


- 4) Press-fit new sensor rotor (1) with groove (2) side downward as shown by using special tools and copper hammer.

Special Tool

(F): 09951-76010

(G): 09940-54910



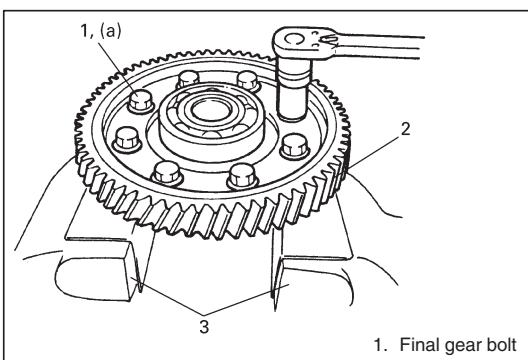
- 5) Support differential assembly as illustrated so as to float L bearing, and then press-fit R bearing by using special tool and copper hammer.

Special Tool

(D): 09924-74510

(E): 09926-68310

(H): 09951-16060



- 6) Hold differential assembly with soft jawed vise (3), install final gear (2) and then tighten it with 8 bolts to specified torque.

CAUTION:

Use of bolts other than specified ones is prohibited.

Tightening Torque

(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)

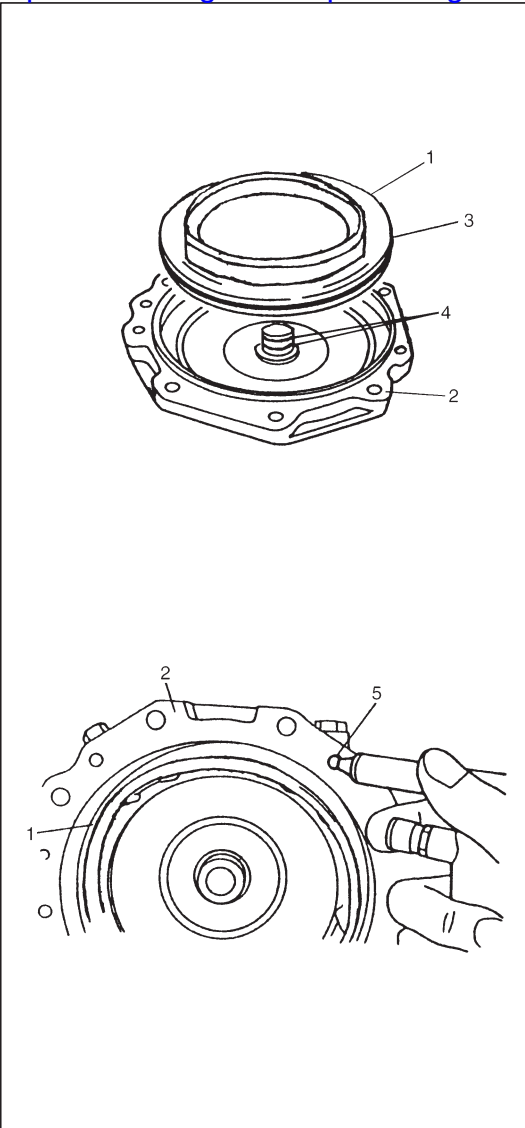
REAR COVER (B0 Piston Assembly)**DISASSEMBLY**

- 1) Remove O/D brake piston (1) from rear cover (2).

NOTE:

If O/D brake piston is hard to take it out, force low-pressure compressed air (1 kg/cm², 15 psi, 100 kPa max) into hole (5) shown in figure and pop out piston into a rag.

- 2) Remove O-ring (3) and seal ring (4).
Replace them, if damaged.

**ASSEMBLY**

- 1) Install seal rings to rear cover and O-rings to O/D brake piston.
- 2) Apply grease to O-rings and install O/D brake piston to rear cover.

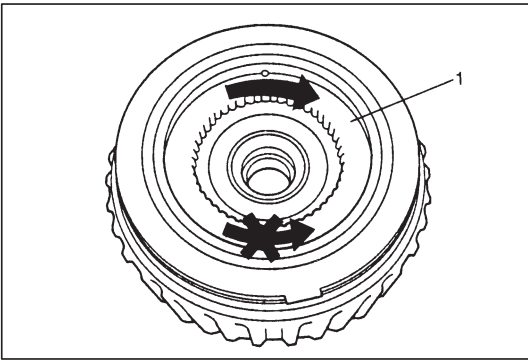
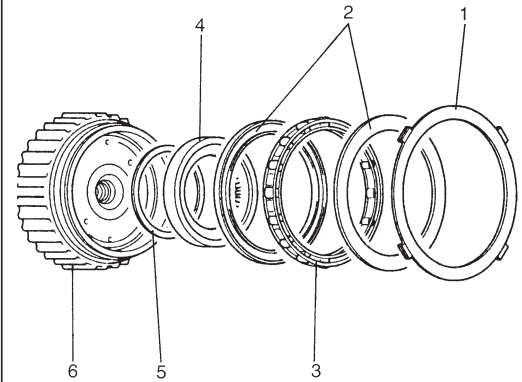
PLANETARY SUN GEAR NO.1 ASSEMBLY**DISASSEMBLY**

- 1) Remove one-way clutch retainer (1) from planetary sun gear No.1 assembly.

NOTE:

Do not reuse retainer.

- 2) Remove one-way clutch bearings (2), one-way clutch (3), inner race (4) and washer (5) from planetary sun gear No.1 (6).

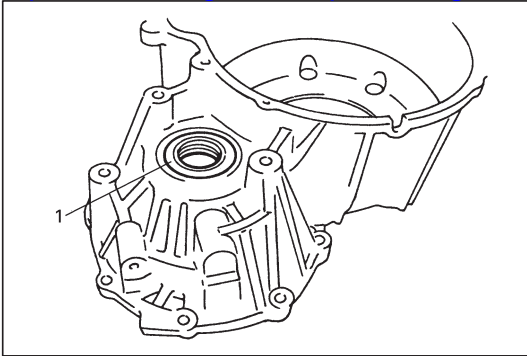
**ASSEMBLY**

Reverse removal procedure noting followings.

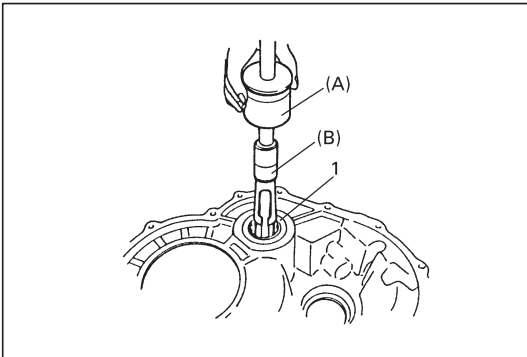
- When installing retainer, fit 2 hooks of retainer on planetary sun gear No.1 and tap the other 2 hooks with plastic hammer.
- After assembling, make sure that:
- There is no clearance between retainer and bearing.
 - Inner race (1) can rotate only one direction shown in figure.
 - Fit 2 protrusions of washer to holes of planetary sun gear No.1.

TORQUE CONVERTER HOUSING**DISASSEMBLY**

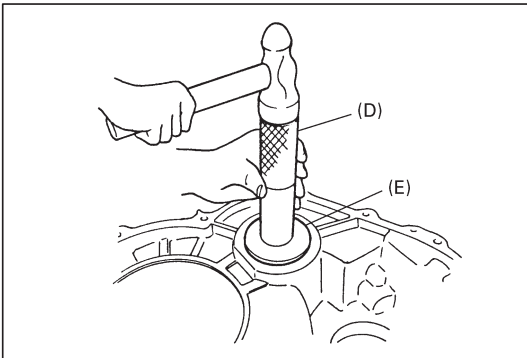
- 1) Remove oil seal (1).



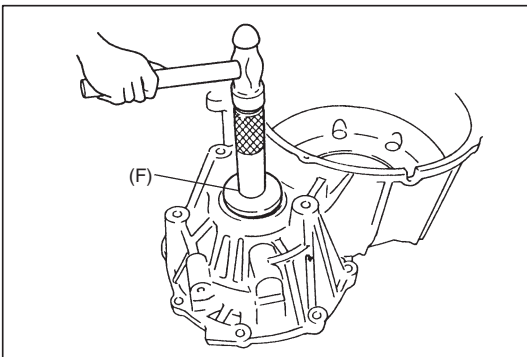
- 2) Remove counter bearing (1) using special tools.

Special Tool:**(A): 09930-30102****(B): 09923-74510****ASSEMBLY**

- 1) Install counter bearing to torque converter housing.
Use special tools and a hammer to press fit the bearing to torque converter housing.

Special Tool:**(D): 09924-74510****(E): 09944-68510**

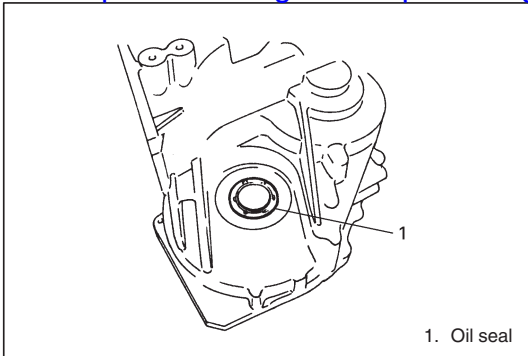
- 2) Install new oil seal to torque converter housing.
Use special tool to press-fit oil seal until the oil seal end face is flush with torque converter housing end face.

Special Tool:**(F): 09913-75510**

TRANSMISSION CASE

DISASSEMBLY

- 1) Remove oil seal (1).

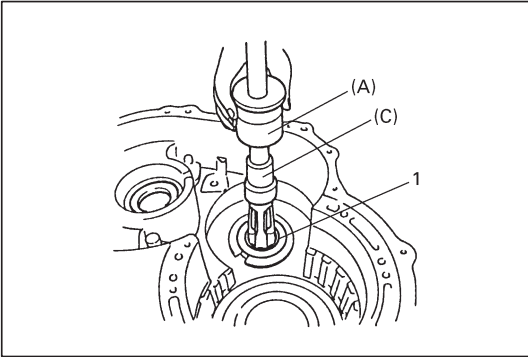


- 2) Remove counter bearing (1) using special tools.

Special Tool:

(A): 09930-30102

(C): 09941-64511



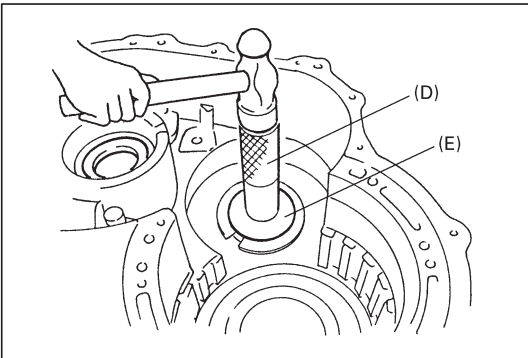
ASSEMBLY

- 1) Install counter bearing using special tools.

Special Tool:

(D): 09924-74510

(E): 09944-68510

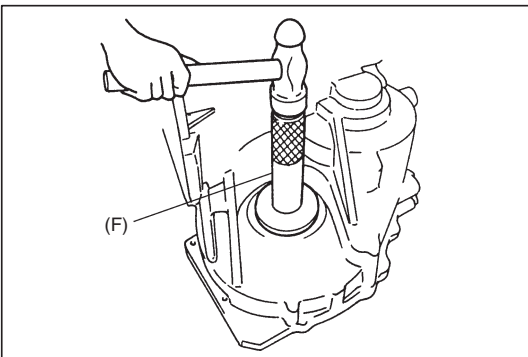


- 2) Install new oil seal to transmission case.

Use special tool to press-fit oil seal until oil seal end face is flush with transmission case end face.

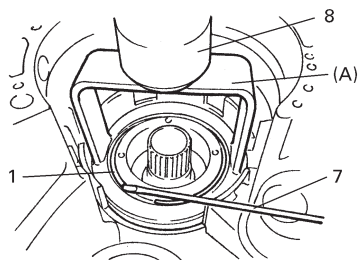
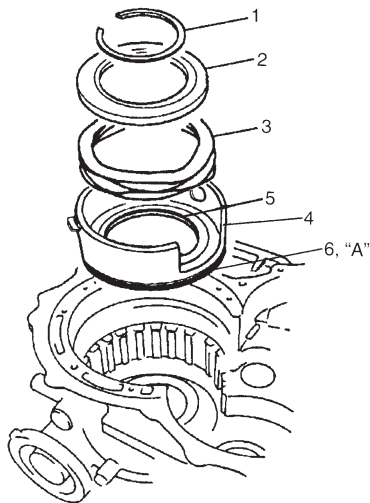
Special Tool:

(F): 09913-75510



UNIT ASSEMBLY**CAUTION:**

- Automatic transmission consists of highly precise parts. As even a flaw in a small part may cause oil leakage or decrease in function, check each part carefully before installation.
- Clean all parts with compressed air. Never use wiping cloths or rags.
- Before assembling new clutch discs and brake band, soak them in automatic transmission fluid for at least 2 hours.
- Be sure to use new gaskets and O-rings.
- Lubricate O-rings with automatic transmission fluid.
- Apply automatic transmission fluid on sliding or rotating surfaces of the parts before assembly.
- Use yellow petrolatum grease or Suzuki Super Grease C to retain parts in place.
- Be sure to install thrust bearings and races in correct direction and position.
- Make sure that snap ring ends are not aligned with one of cutouts and are installed in groove correctly.
- Do not use adhesive cements on gaskets and similar parts.
- Be sure to torque each bolt and nut to specification.



1. Snap ring
7. Flat end rod or the like

- 1) Install new O-rings (inside (5) and outside (6)) to reverse brake piston (4), and apply grease to them.

“A” Grease: 99000-25030

- 2) Install reverse brake piston (4), wave spring (3) and reverse brake piston seat (2) to transmission case.
3) Install new snap ring (1) by compressing wave spring thru reverse brake piston seat with hydraulic press (8) and special tool.

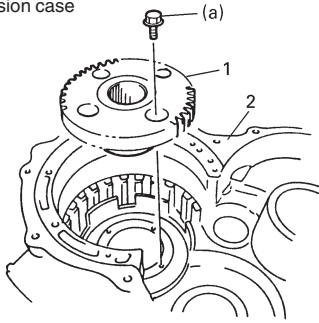
NOTE:

Don't compress wave spring more than necessary or it may get damaged.

Special Tool

(A): 09926-96040

2. Transmission case



- 4) Install counter drive gear (1).

Tightening Torque

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

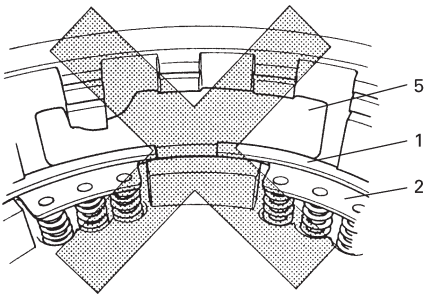
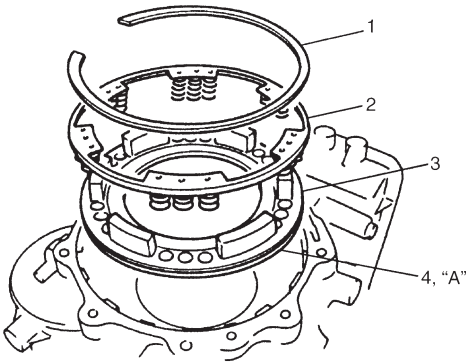
- 5) Install new inner and outer O-rings (4) to 1st & 2nd brake piston (3) and apply grease to them.

“A”: Grease 99000-25030

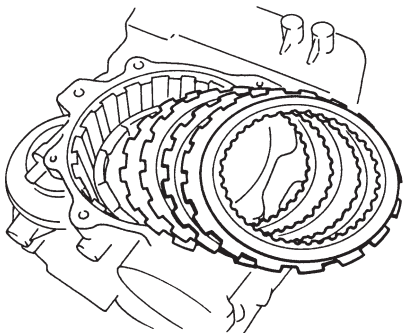
- 6) Install 1st & 2nd brake piston (3) to transmission case, in such way that the side with spring holes comes to the top. Make sure that the O-rings are not twisted or caught.
 7) Place 1st & 2nd brake piston return spring subass'y (2) on piston (3). Make sure that each spring fits the holes on the piston.
 8) Push down return spring subass'y and install snap ring (1).

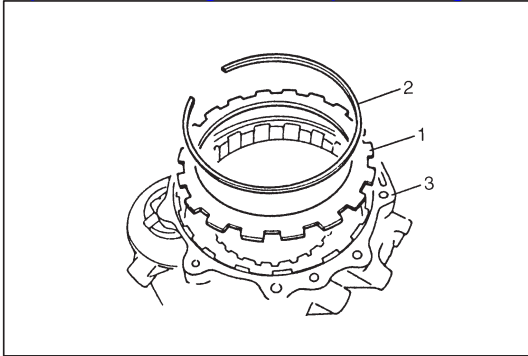
CAUTION:

Check that the opening of snap ring does not face the cored-hole (5) of the transmission case.



- 9) Install B1 brake discs and plates in following order.
 (1) Plate → (2) Disc → (3) Plate → (4) Disc → (5) Plate →
 (6) Disc → (7) Plate → (8) Disc
 10) Hold above parts with snap ring.

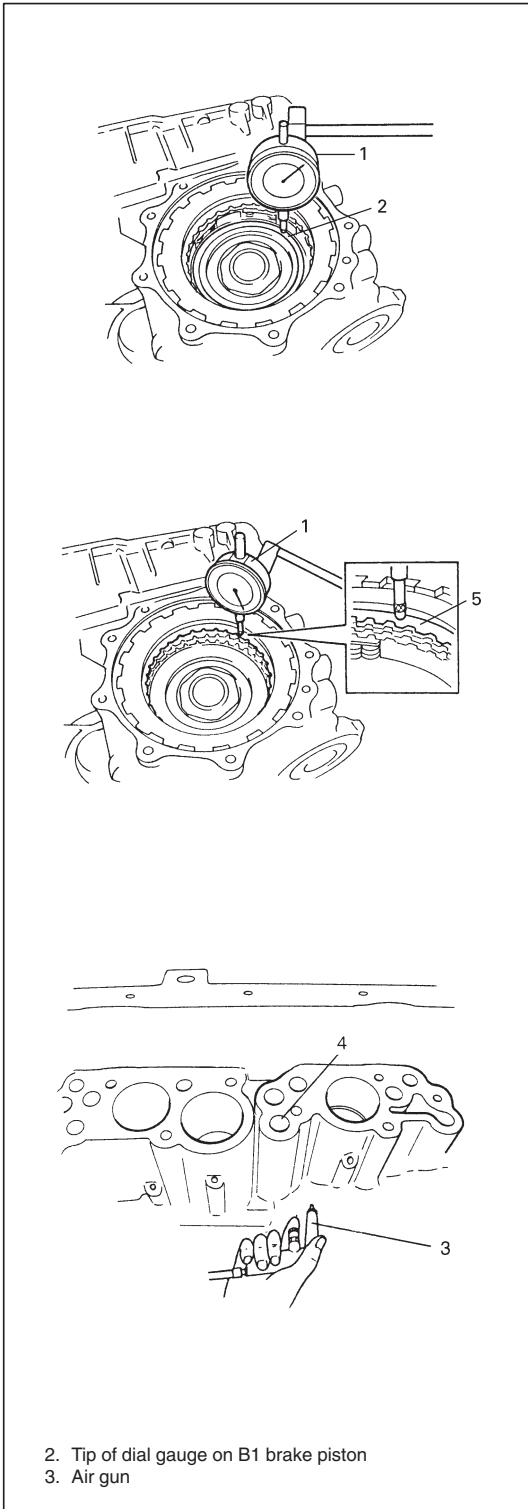




- 11) Install brake flange (1) and snap ring (2) to transmission case (3).

NOTE:

The flat surface of the flange comes to the top (must face B0 piston).



- 12) Measure B1 brake stroke and clearance in following manner.

B1 Brake Stroke:

Set the dial gauge (1) to 1st & 2nd brake (B1 brake) piston as shown. Blow compressed air into hole (4) shown in figure. Then measure the difference as the compressed air is blown in.

**Standard Value for B1 Brake Stroke = 1.79 – 2.01 mm
(0.0705 – 0.0791 in.)**

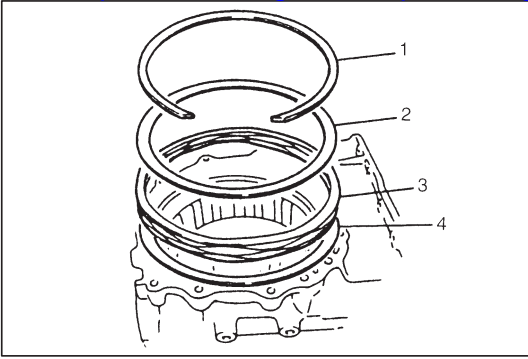
B1 Brake Clearance:

Set the dial gauge (1) on the top-most brake disc (5). Blow compressed air into the hole (4) shown in figure. Measure the difference. Call this value (A).

**Standard Value for B1 Brake Clearance:
1.31 – 1.96 mm (0.0516 – 0.0772 in.)**

If the measured value (s) is (are) out of specification, replace brake discs, plates and flange.

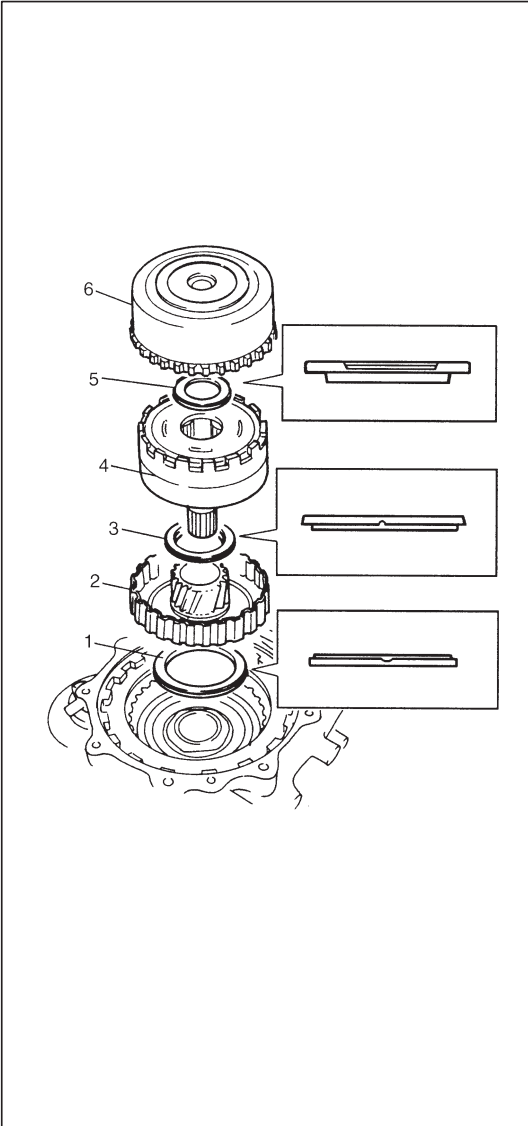
2. Tip of dial gauge on B1 brake piston
3. Air gun



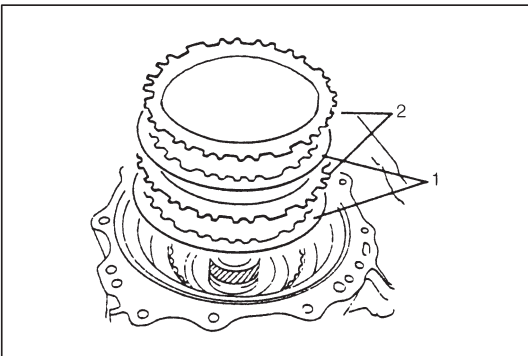
- 13) Install O/D (B0) brake return spring seat (4), return spring (3) and then retainer (2).
- 14) While compressing retainer (2), install snap ring (1).

CAUTION:

Position return spring (3) to be centered so that rear cover not be caught.

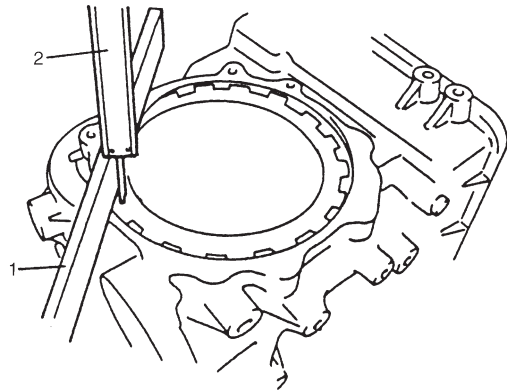


- 15) Install thrust needle roller bearing (1) and planetary sun gear No.2 (2). Turn planetary sun gear No.2 (2) right and left to match the brake discs and the spline of planetary sun gear No.2.
- 16) Install thrust needle roller bearing (3) and planetary set (4). Turn planetary set (4) right and left to match the gears of the planetary sun gear No.2 (2) and the gears of the planetary set (4).
- 17) Install thrust needle roller bearing (5) and planetary sun gear No.1 assembly (6). Turn planetary sun gear No.1 assembly (6) right and left to match the gears of planetary set (4) and the gears of planetary sun gear No.1 assembly (6).



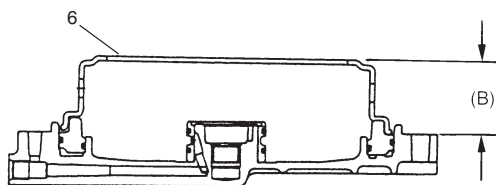
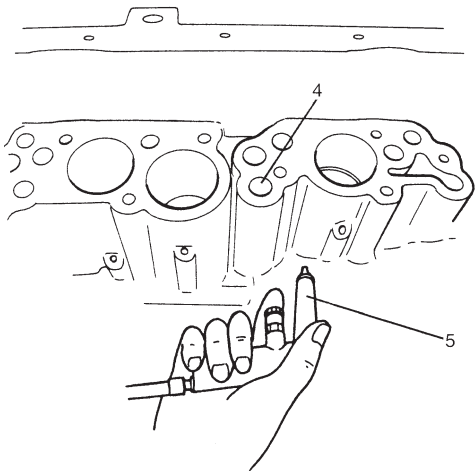
- 18) Install O/D brake (B0 brake) discs and plates.

19) Measure the clearance of B0 brake in the following manner.



- 1. Straight edge
- 2. Vernier caliper

The value on vernier caliper – width of straight edge = (A)



- 3. Rear cover assembly (with B0 piston)
- 5. Air gun
- 6. O/D brake piston adapter

Blow compressed air into hole shown in figure to activate B1 brake piston (4), then measure the distance between the top of B0 brake plate and the transmission case – rear cover mating surface.

Call this value (A).

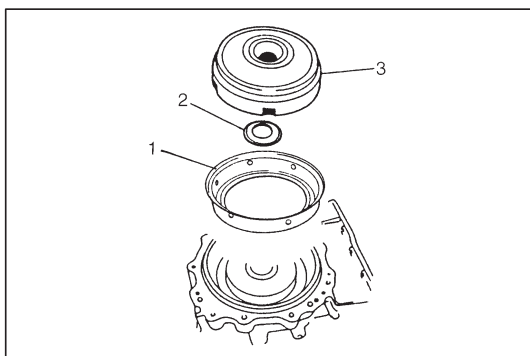
Measure the distance from top of B0 piston adapter (on rear cover) to rear cover – transmission case mating surface. Call this value (B).

$$\text{Clearance} = (A) - (B) + 0.4$$

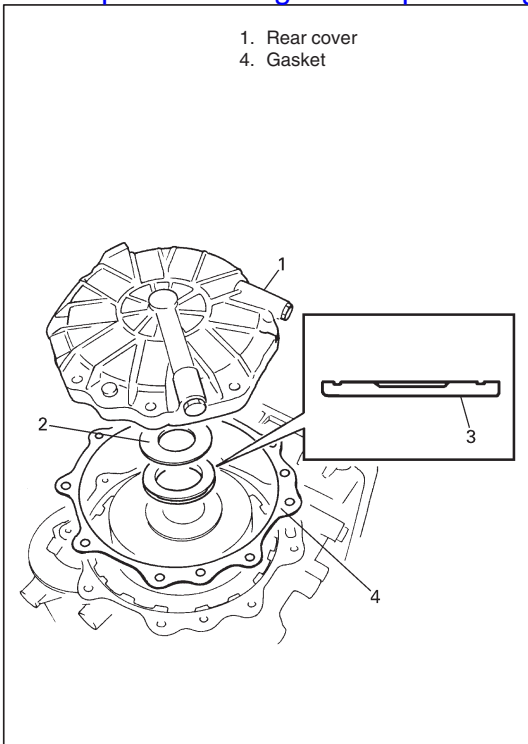
Standard Value for B0 Brake Clearance:

0.80 – 1.40 mm (0.0315 – 0.0551 in.)

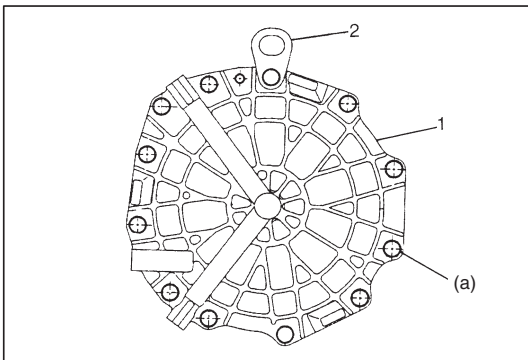
If the obtained value is out of standard value, replace brake disc and plate.



20) Install O/D brake piston adapter (1) thrust needle roller bearing (2) and direct (C0) clutch assembly (3).



- 21) Install thrust needle roller bearing (3).
22) Install thrust washer (2).



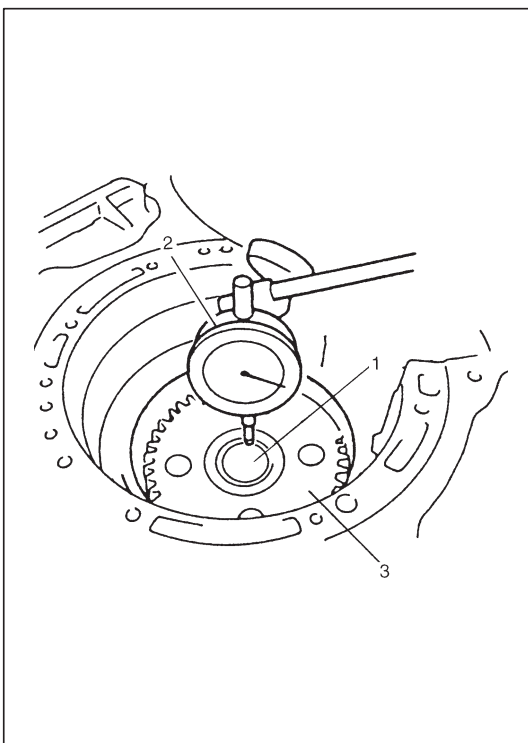
- 23) Install new gasket to transmission case and install rear cover (1).

Tightening Torque:

(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

NOTE:

Install the hook (2) to the location shown in figure.



- 24) Measure clearance of thrust washer and rear cover in the following manner.
Measure the shaft and play of planetary set (1) with dial gauge (2).

NOTE:

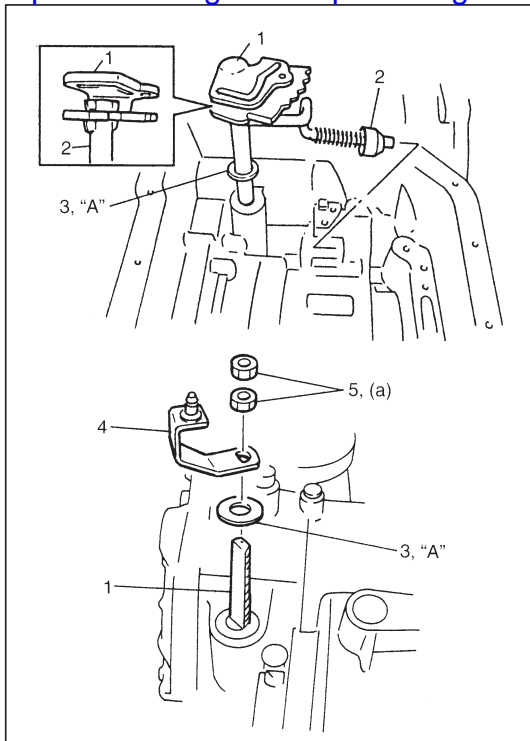
Make sure that tip of dial gauge is not in contact with counter drive gear (3).

Standard Value for Clearance: 0.3 – 0.7 mm

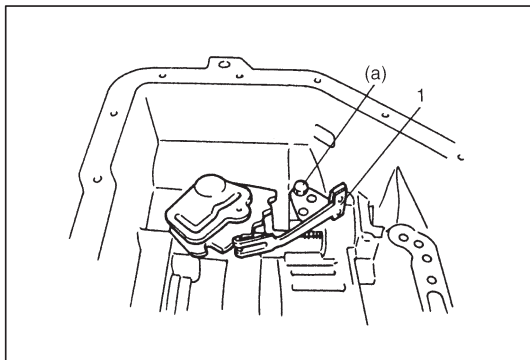
(0.012 – 0.028 in.)

If the obtained clearance is out of specification, select the thrust washer from table below and repeat above steps 22) – 24) to obtain the clearance within specification.

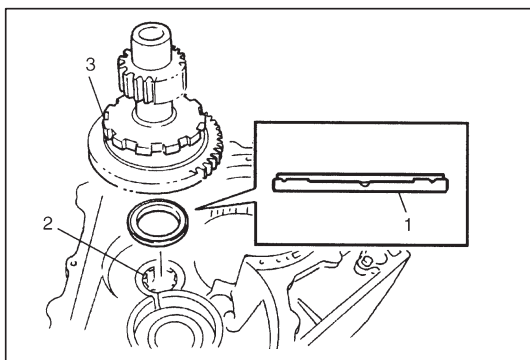
Available thrust washer (thickness)	1.9 mm (0.075 in.) 2.2 mm (0.087 in.) 2.5 mm (0.098 in.) 2.8 mm (0.110 in.)
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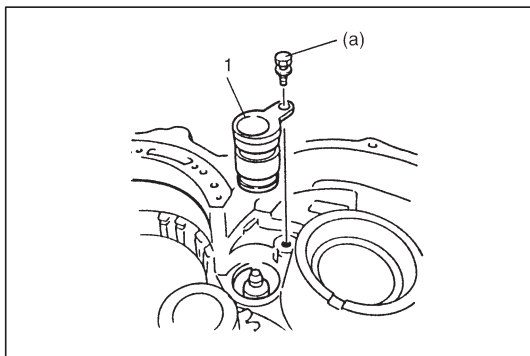
- 25) Attach parking lock rod (2) to manual shift shaft (1).
 26) Install manual shift shaft and washer (3) to transmission case. Fix manual shift shaft with washer, control shift lever (4) and two nuts (5).
 Apply grease to the washers.

Tightening Torque:**(a): 30 N·m (3.0 kg-m, 22.0 lb-ft)****“A”: Grease 99000-25030**

- 27) Install detent spring (1) to transmission case.

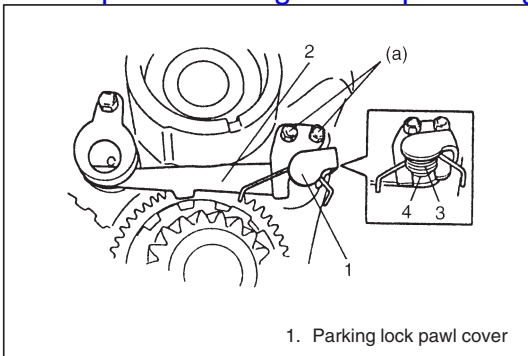
Tightening Torque:**(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)**

- 28) Install thrust needle roller bearing (2) on counter bearing (3).
 29) Install counter driven gear (1).



- 30) Install parking lock pawl sleeve (1) and oil plate (not shown in figure).

Tightening Torque:**(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)**

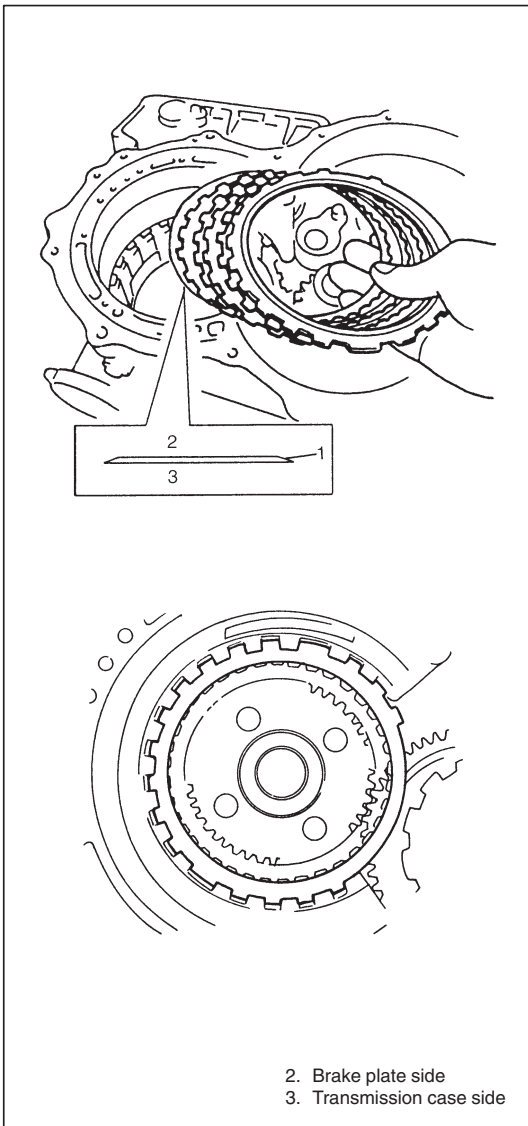


31) Install parking lock pawl (2).

32) Install parking lock pawl shaft (4), torsional spring (3), and cover, then hold them with 2 bolts.

Tightening Torque:

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



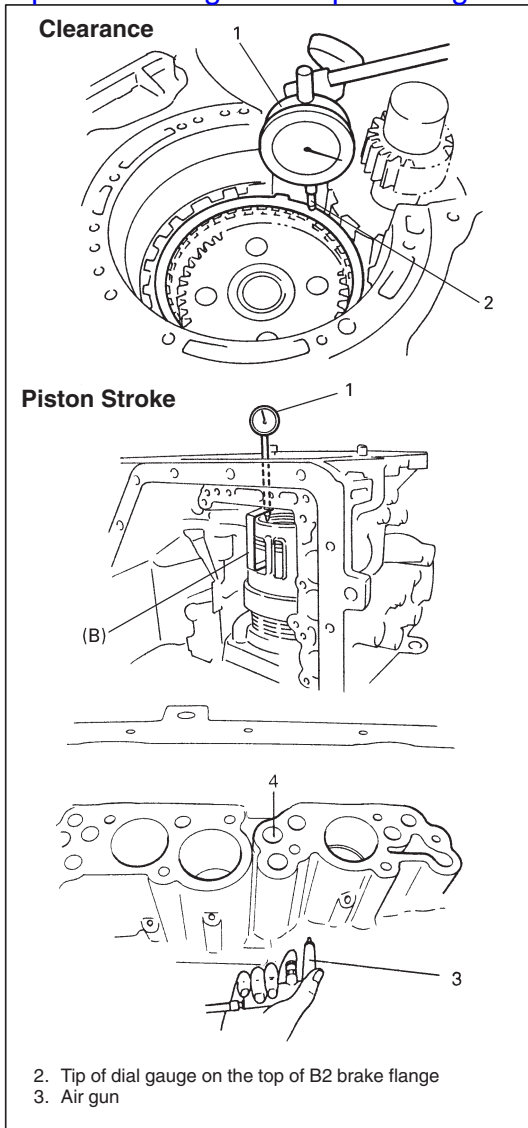
33) Install B2 brake plates, discs, flange and cushion plate in following order:

(1) Cushion plate → (2) Plate → (3) Disc → (4) Plate → (5) Disc → (6) Plate → (7) Disc → (8) Plate → (9) Disc → (10) Flange

NOTE:

- Note the direction of cushion plate (1).
- Make sure that the plates are fitted into groove of transmission case as shown in figure.

34) Hold above parts with snap ring.



- 35) Inspect B2 brake piston stroke and clearance by blowing compressed air into hole (4) shown in figure. Make sure that the obtained piston stroke and clearance satisfy the standard value.

To Measure Clearance:

Set dial gauge (1) to the top of B2 brake flange and blow compressed air into the hole shown in figure.

To Measure Piston Stroke:

Set special tool (B) on the tip of dial gauge and place the other end of special tool on the claw of B2 brake piston. Blow compressed air into the hole (4) shown in figure and measure the value for piston stroke.

Special Tool

(B) : 09952-06020

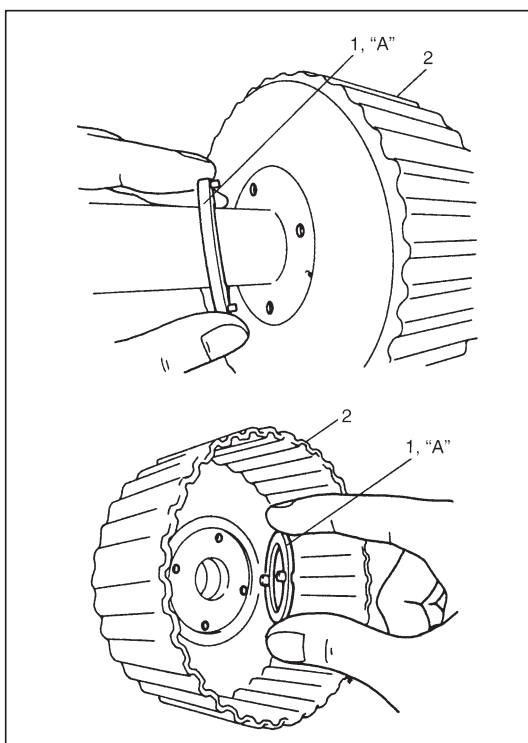
Standard Values for

Clearance : 0.79 – 1.69 mm (0.031 – 0.067 in.)

Piston stroke : 1.77 – 2.59 mm (0.070 – 0.102 in.)

NOTE:

If clearance and/or piston stroke is out of specification, disassemble B2 brake discs and plates, reinstall them to satisfy the measured values to standard value.

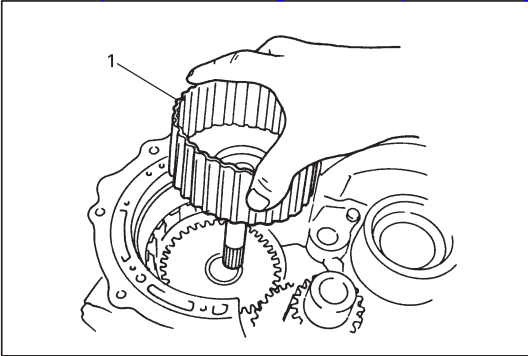


- 36) Apply grease to thrust washers (1) and install them to follow shaft (2).

NOTE:

When installing thrust washers, make sure that the protrusions of thrust washer do not interfere with the ones of the other side.

"A": Grease 99000-25030

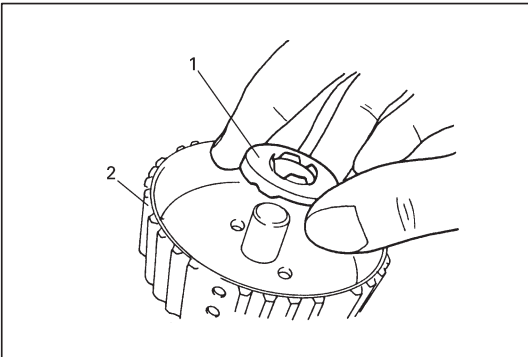


37) Install follow shaft (1) to transmission case.

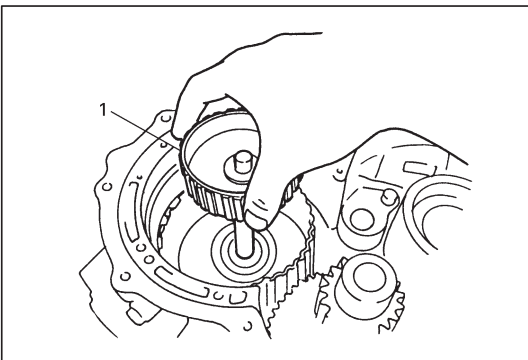
Turn it right and left to match the B2 brake discs and the spline of follow shaft.

NOTE:

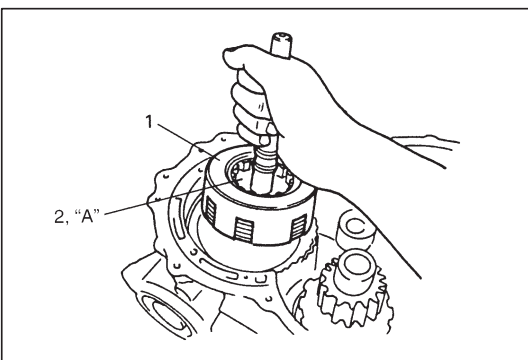
When installing follow shaft, do not let the thrust washer fall off from follow shaft.



38) Install thrust needle roller bearing (1) to intermediate shaft (2).



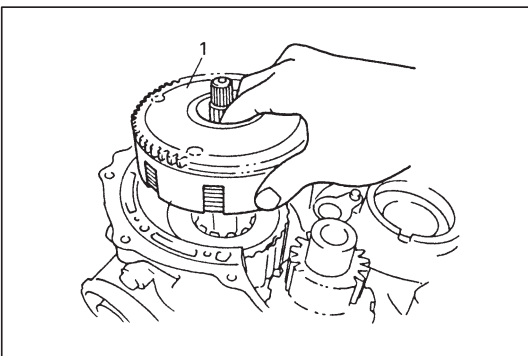
39) Install intermediate shaft (1) to transmission case.



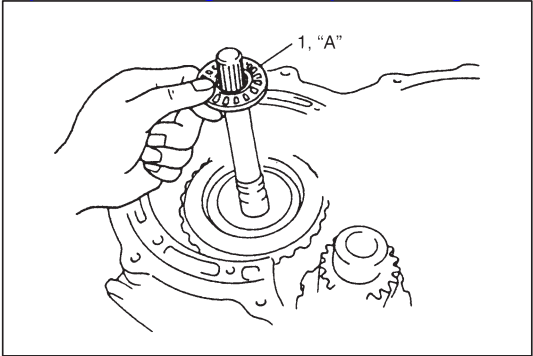
40) Install rear disc clutch assembly (1) by turning it right and left to match the clutch disc of rear disc clutch ass'y and the spline of intermediate shaft.

41) Install thrust bearing race (2).

“A”: Grease 99000-25030

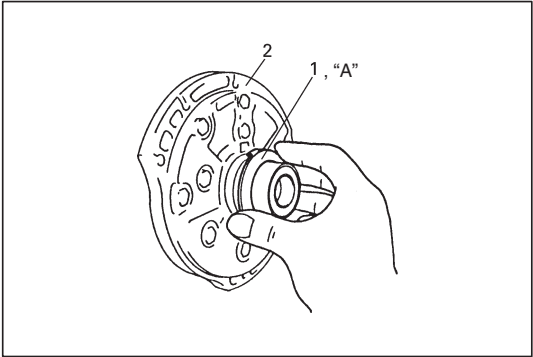


42) Install front disc clutch assembly (1) by turning it right and left to match the clutch disc of front disc clutch ass'y and the spline of follow shaft.



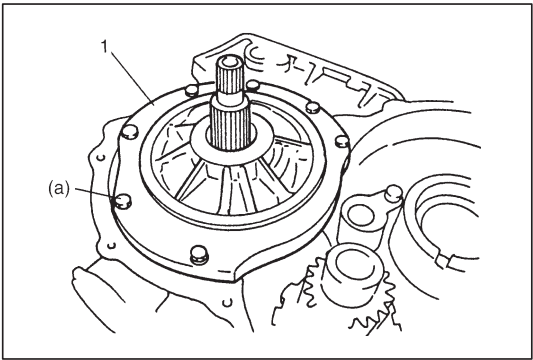
43) Apply grease to thrust needle roller bearing (1) and install it.

"A": Grease 99000-25030



44) Apply grease to clutch drum thrust washer (1) and install it to oil pump ass'y (2).

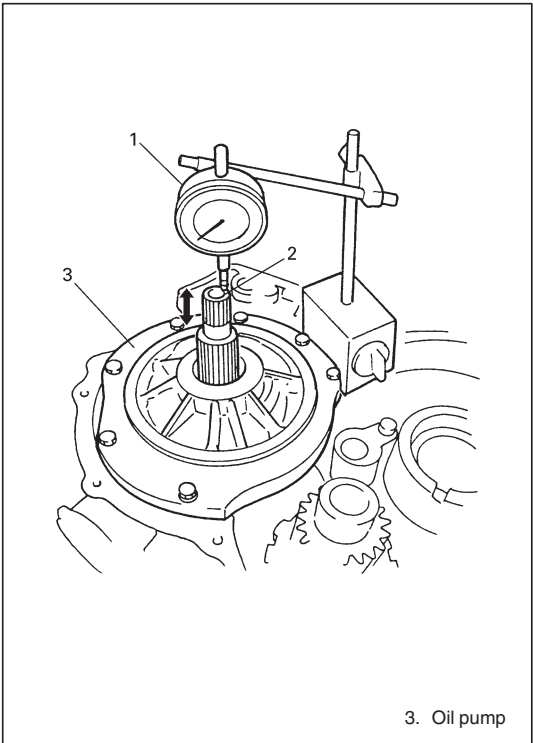
"A": Grease 99000-25030



45) Install gasket to transmission case and install oil pump assembly (1) to transmission case.

Tightening Torque:

(a): 12 N·m (1.2 kg-m, 9.0 lb-ft)



46) Measure input shaft end (2) play.

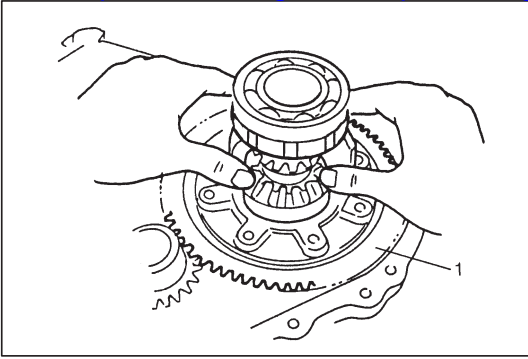
Set dial gauge (1) as shown in figure and measure the play of the input shaft.

Standard Value of Input Shaft End Play:

0.3 – 0.9 mm (0.012 – 0.036 in.)

If the obtained value is out of standard value, select thrust bearing race (installed in step 41)) of different thickness shown in table below and adjust the play.

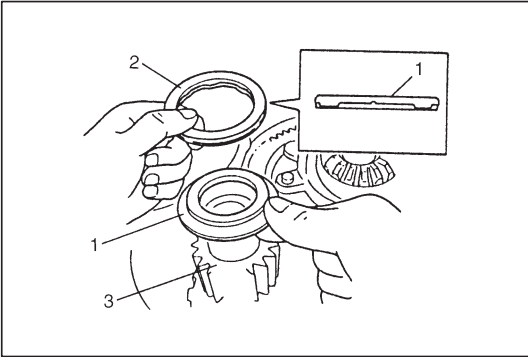
Available Thrust Bearing Race Size (thickness)	1.3 mm (0.051 in.)
	1.7 mm (0.067 in.)
	2.1 mm (0.083 in.)



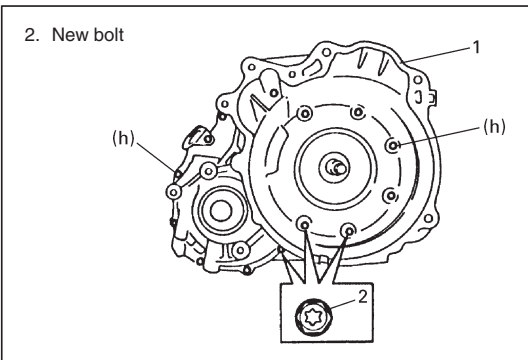
47) Install differential gear assembly (1).

NOTE:

Grease can be applied around the R and L bearing of differential gear assembly to ease fitting to the transmission case and torque converter housing.



48) Install thrust bearing race (1) and thrust needle roller bearing (2) to the top of counter driven gear (3).



49) Apply grease to oil pump D-ring.

Install new gasket to transmission case and install torque converter housing (1).

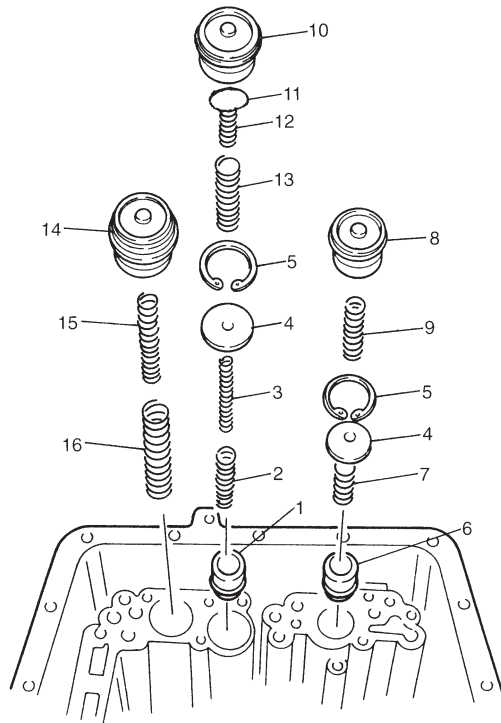
Tightening Torque:

(h): 19 N·m (1.9 kg-m, 14.0 lb-ft)

Grease: 99000-25030

NOTE:

Apply thread lock to the three bolts shown in figure.



1. C1 accumulator piston
2. C1 accumulator outer spring (with Yellow paint)
3. C1 accumulator inner spring (with Yellow paint)
4. Spacer
5. Snap ring
6. B0 accumulator piston
7. B0 accumulator spring (with Purple paint)
8. C0 accumulator piston
9. C0 accumulator spring (with Pink point)
10. B1 accumulator piston
11. B1 accumulator spacer
12. B1 accumulator inner spring (with Orange paint)
13. B1 accumulator outer spring (with Orange paint)
14. C2 accumulator piston
15. C2 accumulator inner spring (with Light Blue paint)
16. C2 accumulator outer spring (with Light Blue paint)

50) Install O-rings to each accumulator piston and apply grease or ATF to them.

Grease 99000-25030

NOTE:

C1 and B0 accumulator pistons are the same.

51) Install C1 and B0 accumulator pistons (1 and 6), springs (2, 3 and 7) and spacers (4).
Hold them with snap rings (5).

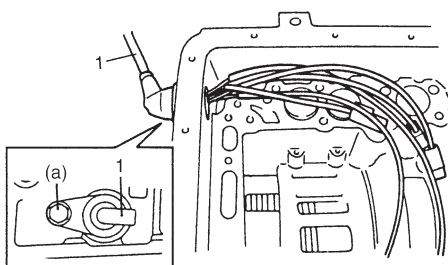
NOTE:

- Make sure that snap rings are fitted to the groove of each cylinder.
- Make sure that O-rings are not twisted or caught when installing.

52) Install C0, B1, C2 accumulator springs (9, 12, 13, 15 and 16), spacer (11) and pistons (8, 10 and 14) as shown in figure.

NOTE:

Make sure that O-rings are not twisted or caught when installing.



53) Install wire-to-solenoid assembly (1).

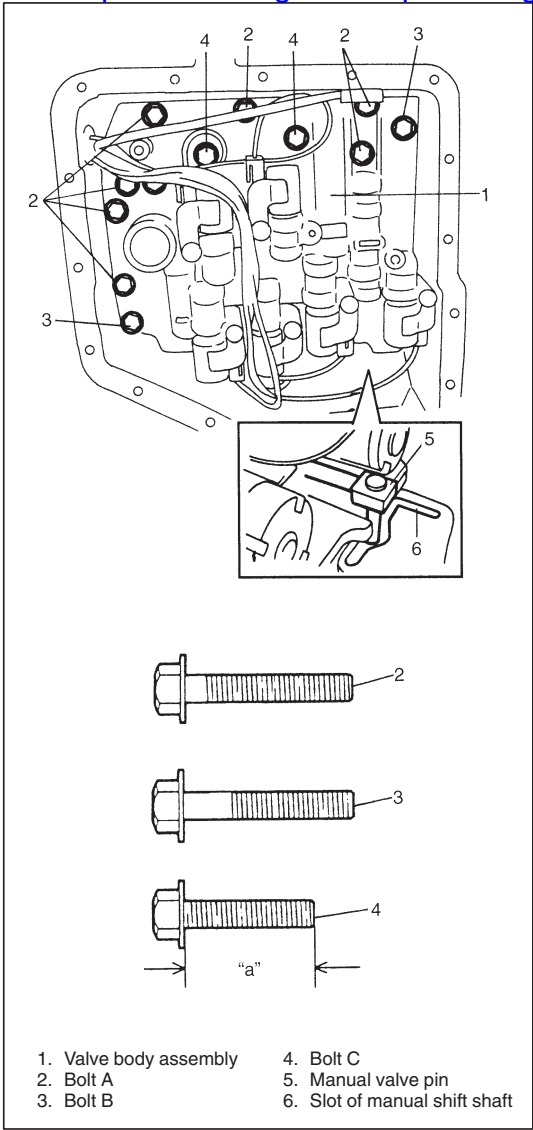
NOTE:

Apply grease to O-ring of wire-to-solenoid ass'y.

Tightening Torque:

(a): 8 N·m (0.8 kg-m, 6.0 lb-ft)

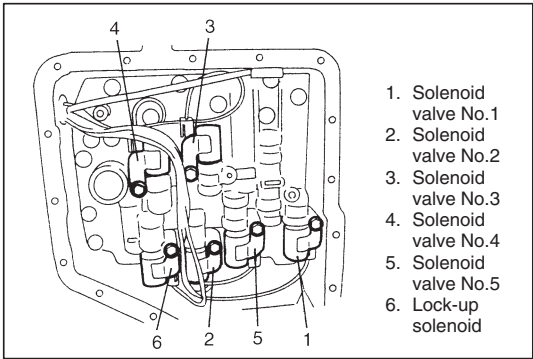
Grease 99000-25030



- 54) Install valve body to transmission case.
 First match the pin of the manual valve to the slot of the manual shift shaft.
 To fix valve body to transmission case, first tighten bolt B (3), then tighten other bolts.

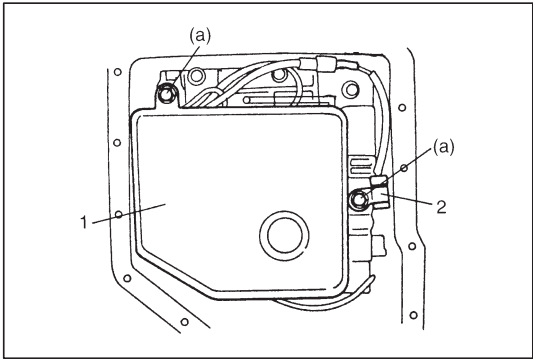
Tightening Torque for Valve Body Bolt
10 N·m (1.0 kg-m, 7.5 lb-ft)

Bolt	Length “a”	Pieces
A	30 mm (1.20 in.)	7
B	31 mm (1.22 in.)	2
C	25 mm (0.98 in.)	2



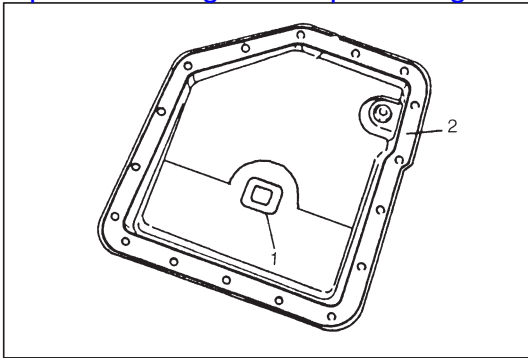
- 55) Connect couplers of wire-to-solenoid to solenoid valves.

Solenoid Valve	Wire Color
1	White
2	Black
3	Red
4	Yellow
5	Brown
Lock-up	Orange



- 56) Install O-ring to oil strainer ass’y (1). Make sure that O-ring is not twisted.
 57) Install oil strainer ass’y to the top of valve body ass’y.
 Connect A/T fluid temperature sensor (2) coupler.
 Fix A/T fluid temperature sensor and oil strainer ass’y with bolts.

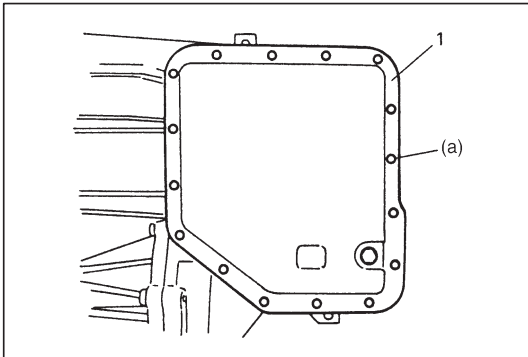
Tightening Torque:
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



58) Install magnet (1) in oil pan (2).

NOTE:

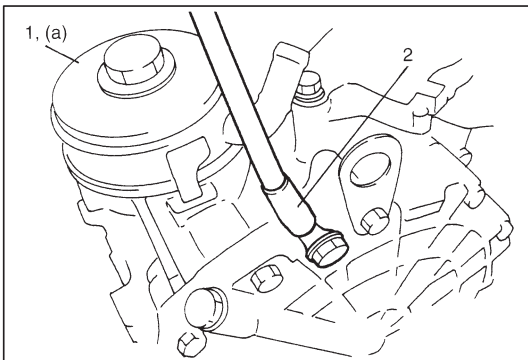
If metal particles are attached to the magnet, clean them before installing.



59) Install gasket to transmission case and install oil pan (1).

Tightening Torque:

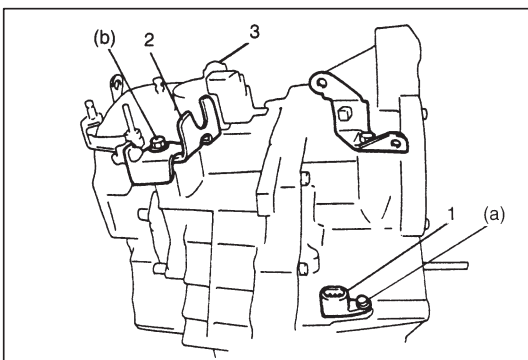
(a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)



60) Install oil cooler (1) and ground cable (2).

Tightening Torque:

(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)



61) Install vehicle speed sensor (for speedometer) (1), shift cable bracket (2) and connector clamp bracket (3).

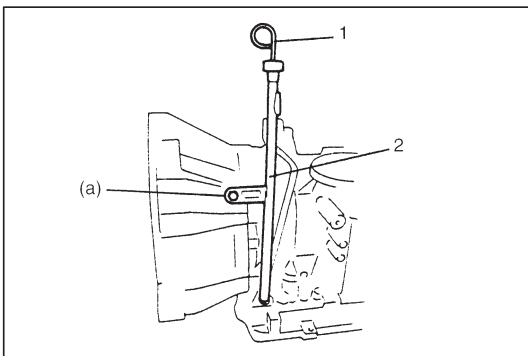
Tightening Torque:

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)

Tightening Torque for Connector Clamp Bracket

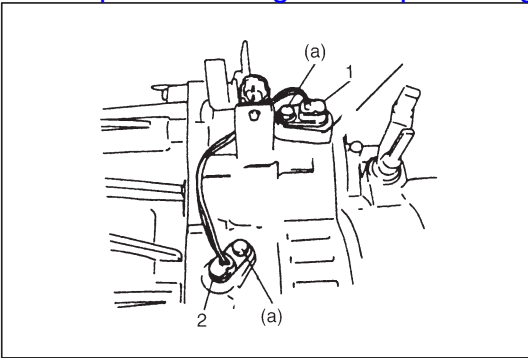
8 N·m (0.8 kg-m, 6.0 lb-ft)



62) Install A/T fluid filler tube (2) and level gauge (1).

Tightening Torque:

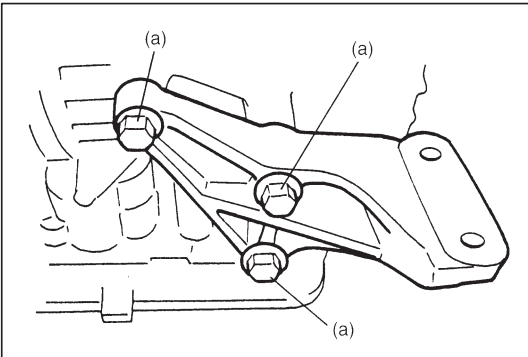
(a): 19.5 N·m (1.95 kg-m, 14.5 lb-ft)



- 63) Install A/T VSS (1) and input revolution sensor (2).
Apply grease to O-ring of each sensor.

Tightening Torque:

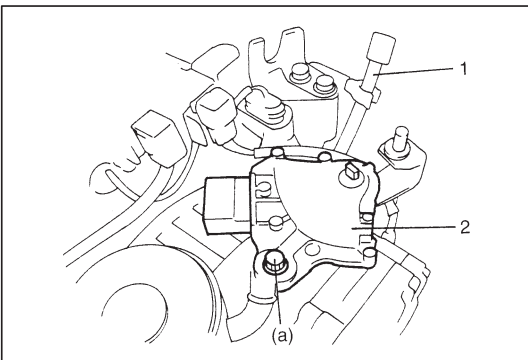
(a): 8 N·m (0.8 kg-m, 6.0 lb-ft)



- 64) Install engine mounting LH bracket.

Tightening Torque:

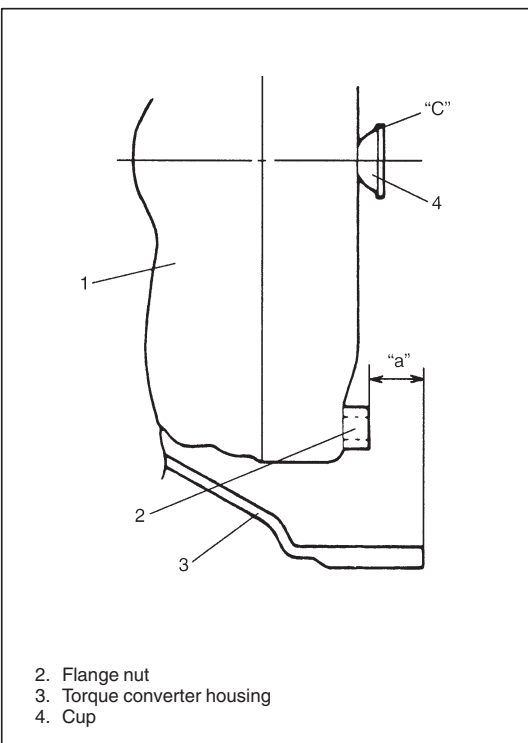
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)



- 65) Install breather hose (1).
66) Install shift switch (2).
Install it temporarily so that the adjustment can be done after installing A/T ass'y back to the vehicle.

Tightening Torque:

(a): 18 N·m (1.8 kg-m, 13.0 lb-ft)



- 67) Install torque converter (1) to input shaft.

- Install torque converter, using care not to damage oil seal of oil pump.
- After installing torque converter, check to make sure that distance "a" is within specification.

Distance "a": More than 20.9 mm (0.823 in.)

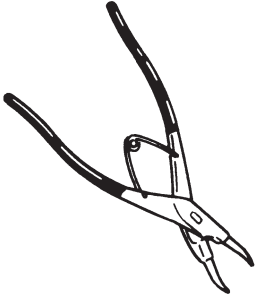
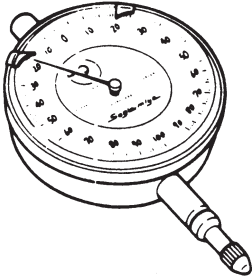
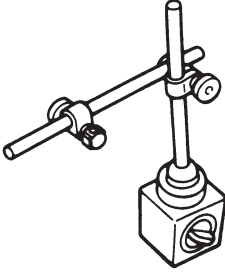
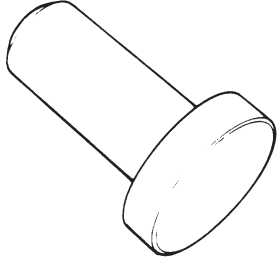
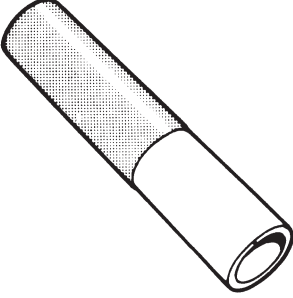
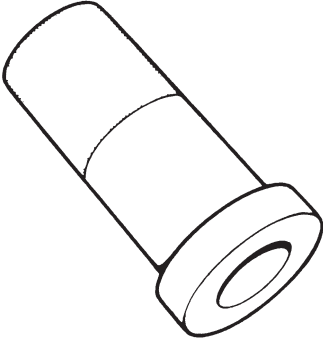
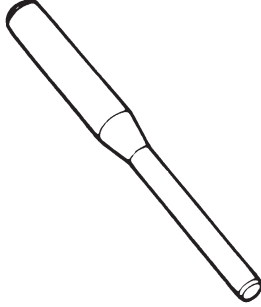
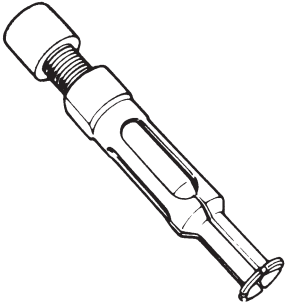
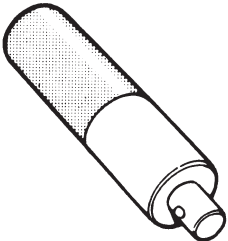
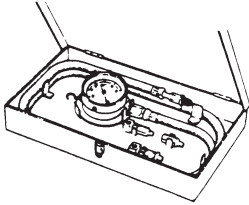
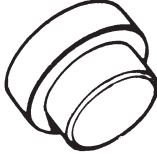
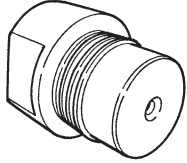
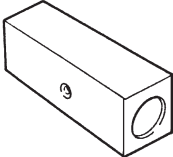

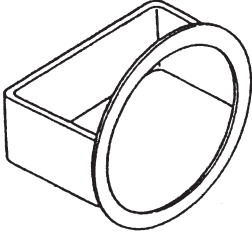
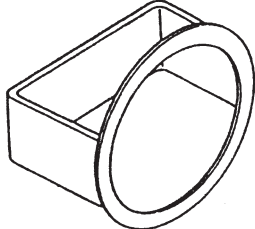
- Check torque converter for smooth rotation.
- Apply grease around cup at the center of torque converter.

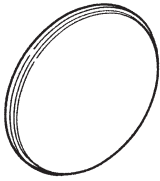
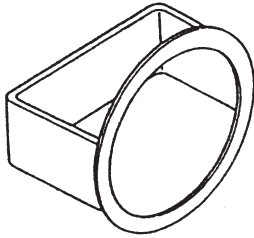
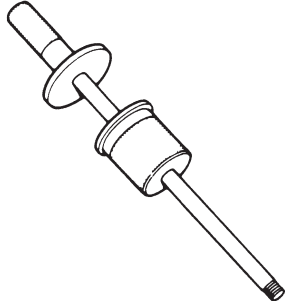
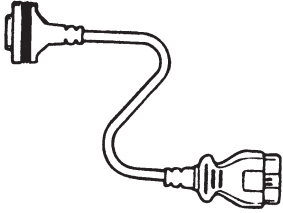
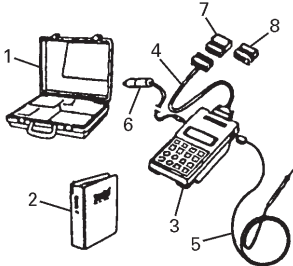
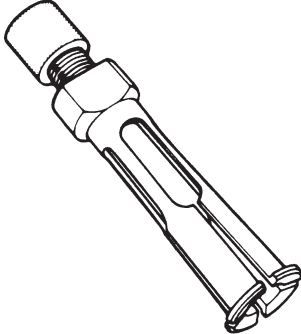

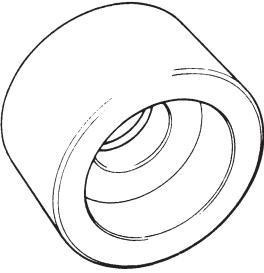
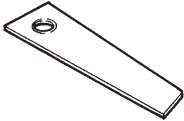
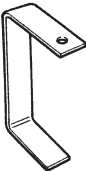
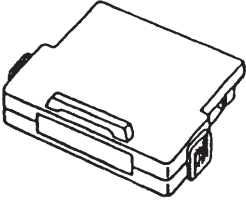
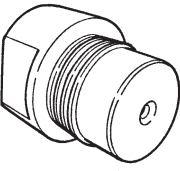
"C": Grease 99000-25010

CAUTION:

- Before installing converter, make sure that its pump hub portion is free from nicks, burrs or damage which may cause oil seal to leak.
- Be very careful not to drop converter on oil pump gear. Damage in gear, should it occur, may cause a critical trouble.

SPECIAL TOOLS

 <p>09900-06108 Snap ring plier (Closing type)</p>	 <p>09900-20606 Dial gauge</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09913-75510 Bearing installer</p>
 <p>09913-80112 Bearing installer</p>	 <p>09913-85210 Bearing installer</p>	 <p>09922-85811 Spring pin remover (6 mm)</p>	 <p>09923-74510 Bearing remover</p>
 <p>09924-74510 Installer handle</p>	 <p>09925-37810 Oil pressure gauge</p>	 <p>09925-88210 Bearing puller attachment</p>	 <p>09926-26030 Air installer No.1</p>
 <p>09926-26040 Air installer No.2</p>	 <p>09926-68310 Bearing installer</p>	 <p>09926-96010 Clutch spring compressor</p>	 <p>09926-96020 Clutch spring compressor</p>

 <p>09926-96030 Clutch spring compressor No.7</p>	 <p>09926-96040 Clutch spring compressor No.8</p>	 <p>09930-30102 Sliding shaft</p>	 <p>09931-76030 16/14 pin DLC adapter</p>
 <ol style="list-style-type: none"> 1. Storage case 2. Operator's manual 3. Tech-1A 4. DLC cable 5. Test lead/probe 6. Power source cable 7. DLC cable adaptor 8. Self-test adaptor <p>09931-76011 SUZUKI scan tool (Tech 1A) kit</p>		 <p>09941-64511 Bearing remover</p>	 <p>09944-68510 Bearing installer</p>
 <p>09951-16060 Bush remover</p>	 <p>09952-06010 Dial gauge plate No.1</p>	 <p>09952-06020 Dial gauge plate No.2</p>	 <p>Mass storage cartridge</p>
 <p>09926-26050 Air installer No.3</p>			

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Automatic transmission fluid	An equivalent of DEXRON [®] -III or DEXRON [®] -IIE	<ul style="list-style-type: none"> ● Automatic transmission ● Parts lubrication when installing
Sealant	SUZUKI BOND NO.1215 (99000-31110)	<ul style="list-style-type: none"> ● Case housing star-shaped recess bolts (3 pcs only)
Lithium grease	SUZUKI SUPER GREASE C (99000-25030)	<ul style="list-style-type: none"> ● Retaining parts in place when assembling ● Oil seal lips ● Oil pump D-ring
	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> ● Cable ends ● Converter center cup

SECTION 7C

CLUTCH

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CONTENTS

GENERAL DESCRIPTION	7C- 2	UNIT REPAIR OVERHAUL	7C- 8
DIAGNOSIS	7C- 3	Clutch Cover, Clutch Disc and Flywheel .	7C- 8
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Clutch Cable	7C- 5	REQUIRED SERVICE MATERIALS	7C-14
Clutch Pedal and Clutch Pedal Bracket ..	7C- 7	SPECIAL TOOLS	7C-14

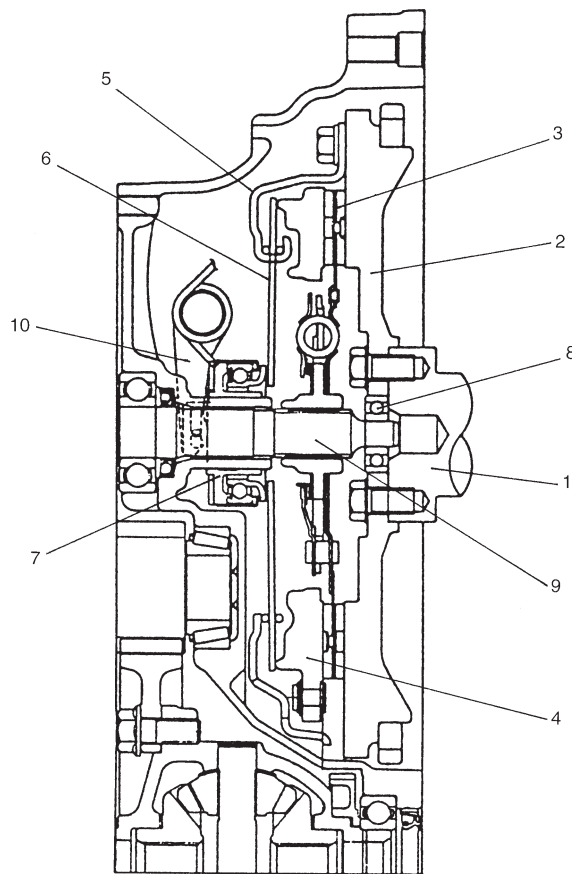
GENERAL DESCRIPTION

The clutch is a diaphragm-spring clutch of a dry single disc type. The diaphragm spring is of a tapering-finger type, which is a solid ring in the outer diameter part, with a series of tapered fingers pointing inward.

The disc, carrying four torsional coil springs, is positioned on the transmission input shaft with an involute spline fit.

The clutch cover is secured to the flywheel, and carries the diaphragm spring in such a way that the peripheral edge part of the spring pushes on the pressure plate against the flywheel (with the disc in between), when the clutch release bearing is held back. This is the engaged condition of the clutch.

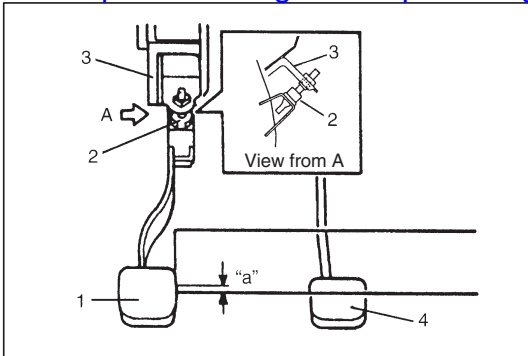
Depressing the clutch pedal causes the release bearing to advance and pushes on the tips of the tapered fingers of the diaphragm spring. When this happens, the diaphragm spring pulls the pressure plate away from the flywheel, thereby interrupting the flow of drive from flywheel through clutch disc to transmission input shaft.



1. Crankshaft
2. Flywheel
3. Clutch disc
4. Pressure plate
5. Clutch cover
6. Diaphragm spring
7. Release bearing
8. Input shaft bearing
9. Input shaft
10. Release shaft

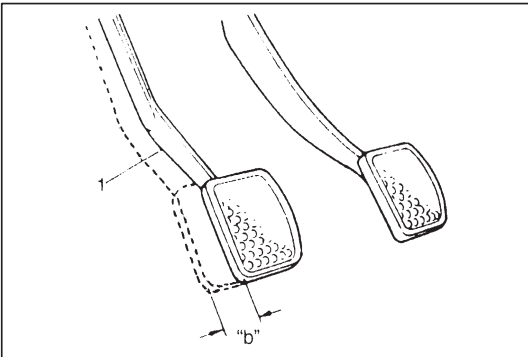
DIAGNOSIS

Condition	Possible Cause	Correction
Slipping	<ul style="list-style-type: none"> ● Improper clutch pedal free travel. ● Worn or oily clutch disc facing. ● Warped disc, pressure plate or flywheel surface. ● Weakened diaphragm spring. ● Rusted clutch cable. 	Adjust free travel. Replace disc. Replace disc, clutch cover or flywheel. Replace clutch cover. Replace cable.
Dragging clutch	<ul style="list-style-type: none"> ● Improper clutch pedal free travel. ● Weakened diaphragm spring, or worn spring tip. ● Rusted input shaft splines. ● Damaged or worn splines of transmission input shaft. ● Excessively wobbly clutch disc. ● Clutch facings broken or dirty with oil. 	Adjust free travel. Replace clutch cover. Lubricate. Replace input shaft. Replace disc. Replace disc.
Clutch vibration	<ul style="list-style-type: none"> ● Glazed (glass-like) clutch facings. ● Clutch facings dirty with oil. ● Release bearing slides unsmoothly on input shaft bearing retainer. ● Wobbly clutch disc, or poor facing contact. ● Weakened torsion springs in clutch disc. ● Clutch disc rivets loose. ● Distorted pressure plate or flywheel surface. ● Weakened engine mounting or loosened engine mounting bolt or nut. 	Repair or replace disc. Replace disc. Lubricate or replace input shaft bearing retainer. Replace disc. Replace disc. Replace disc. Replace clutch cover or flywheel. Retighten or replace mounting.
Noisy clutch	<ul style="list-style-type: none"> ● Worn or broken release bearing. ● Input shaft front bearing worn down. ● Excessive rattle of clutch disc hub. ● Cracked clutch disc. ● Pressure plate and diaphragm spring rattling. 	Replace release bearing. Replace input shaft bearing. Replace disc. Replace disc. Replace clutch cover.
Grabbing clutch	<ul style="list-style-type: none"> ● Clutch disc facings soaked with oil. ● Clutch disc facings excessively worn. ● Rivet heads showing out of facing. ● Weakened torsion springs. 	Replace disc. Replace disc. Replace disc. Replace disc.

**CLUTCH PEDAL HEIGHT CHECK**

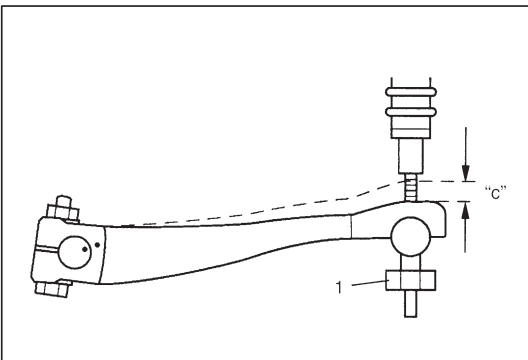
Adjust clutch pedal (1) height with adjusting bolt (2) located on pedal bracket (3) so that clutch pedal height is same as brake pedal (4) height.

Height difference “a”: 0 mm (0 in.)

**CLUTCH PEDAL FREE TRAVEL CHECK**

- 1) Confirm that clutch pedal height is specification.
- 2) Depress clutch pedal (1), stop the moment clutch resistance is felt, and measure distance (clutch pedal free travel). Free travel should be within the following specification.

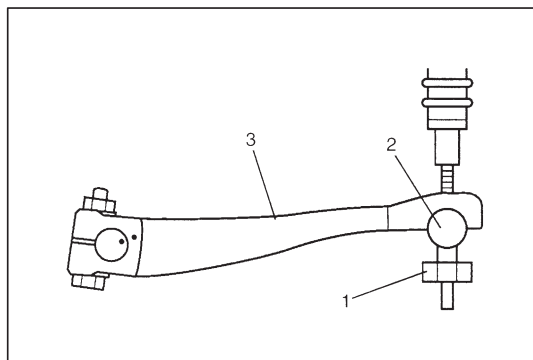
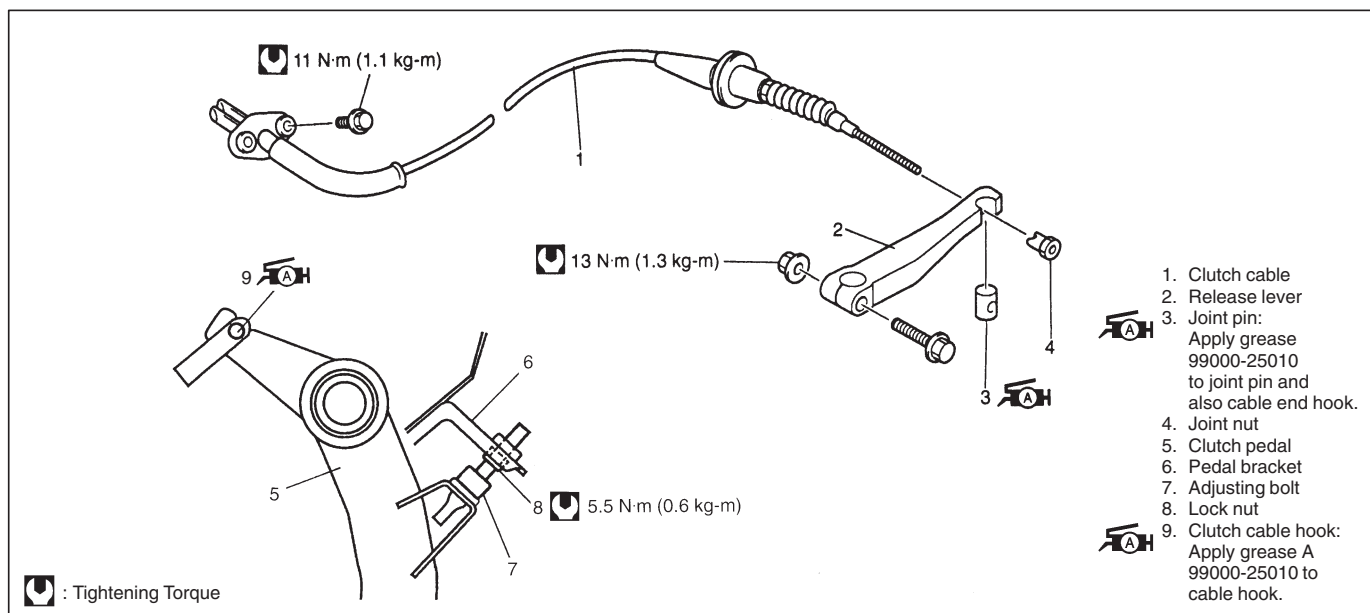
Pedal free travel “b”: 15 – 20 mm (0.6 – 0.8 in.)



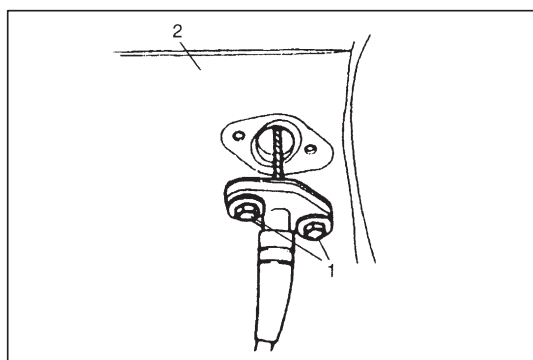
- 3) If free travel is out of specification, adjust it with cable joint nut (1).

Release lever free travel “c”: 0 – 2 mm (0 – 0.08 in.)

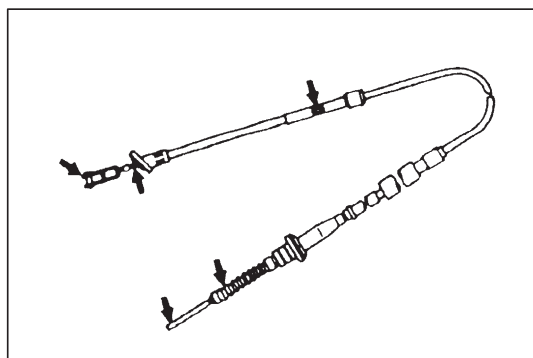
- 4) After checking clutch pedal free travel, also check clutch for proper function with engine running.

ON-VEHICLE SERVICE**CLUTCH CABLE****REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Remove clutch cable joint nut (1).
- 3) Remove joint pin (2) from clutch release lever (3).

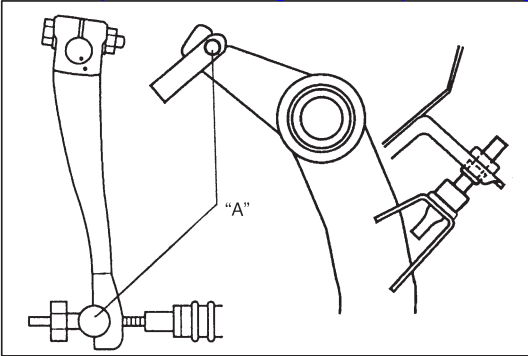


- 4) Remove clutch cable outer bolts (1) at dash panel (2) in engine room.
- 5) Disconnect cable hook from clutch pedal, then take off cable.

**INSPECTION**

Inspect clutch cable and replace it for any of the following conditions.

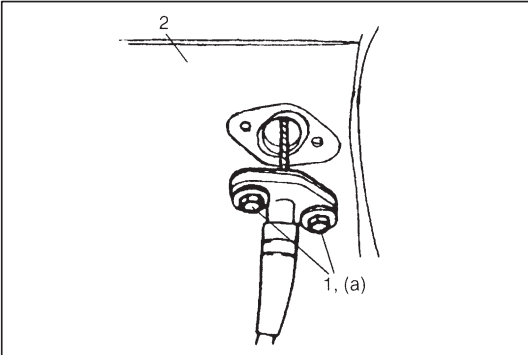
- Excessive cable friction
- Frayed cable
- Bent or kinked cable
- Broken boots
- Worn end

**INSTALLATION**

- 1) Apply grease to cable end hook and also joint pin before installing cable.

"A": Grease A, 99000-25010

- 2) Hook cable end with pedal by using screwdriver or long nose pliers from cabin inside, then join inner cable wire joint pin in release lever.

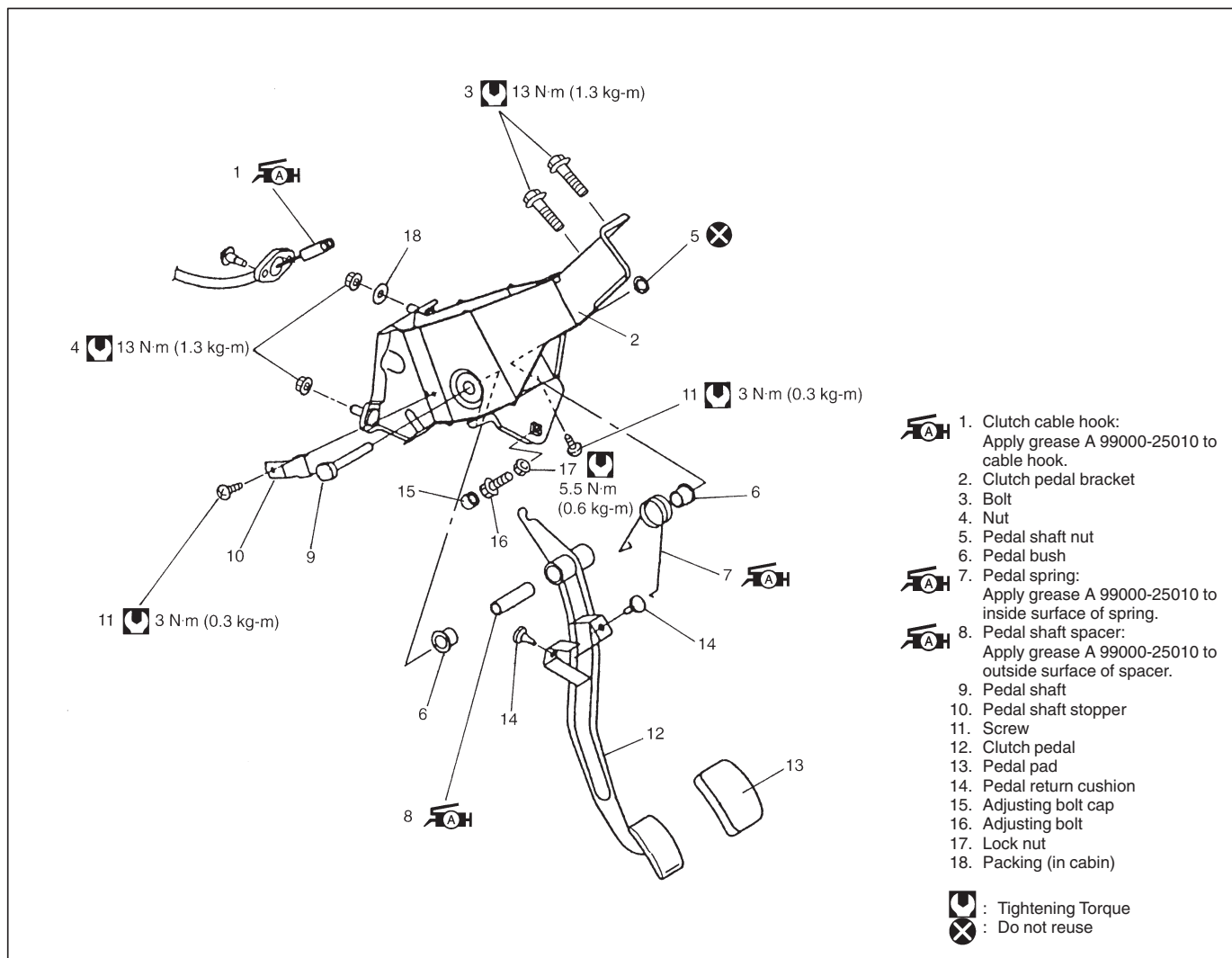


- 3) Fasten cable with 2 bolts (1) to dash panel (2).

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

- 4) Screw in joint nut and adjust free travel of pedal to specification by turning nut.
- 5) Check clutch for proper function with engine running.

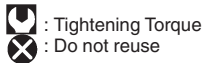
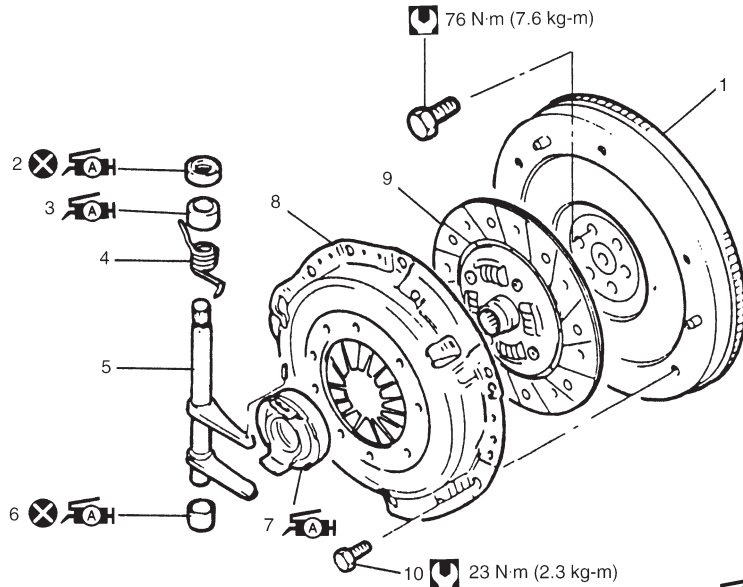
CLUTCH PEDAL AND CLUTCH PEDAL BRACKET**REMOVAL**

- 1) Disconnect clutch cable hook from clutch pedal.
- 2) Remove attaching nuts and bolts.
- 3) Remove clutch pedal bracket with clutch pedal.
- 4) Remove each parts, if necessary.

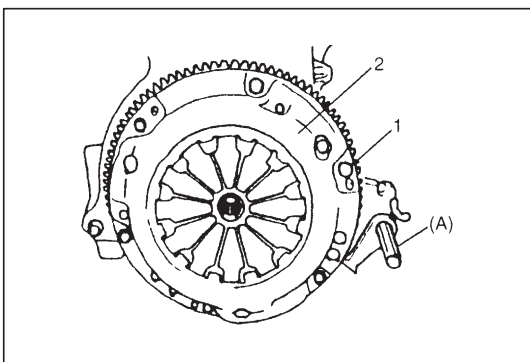
INSTALLATION

Reverse removal procedure for installation, noting the following.

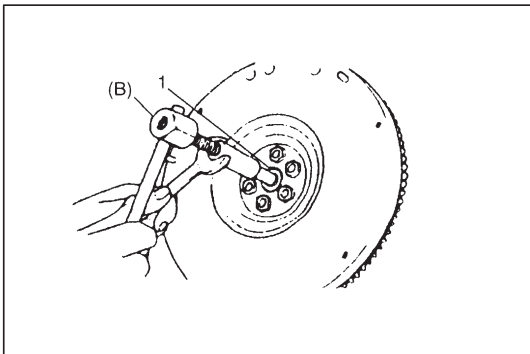
- Tighten each nuts and bolts to specified torque as indicated above figure.
- After installing, adjust clutch pedal free travel.
- Check clutch for proper function with engine running.

UNIT REPAIR OVERHAUL**CLUTCH COVER, CLUTCH DISC AND FLYWHEEL**

1. Flywheel
2. Clutch release shaft seal:
Apply grease A 99000-25010 to seal lip.
3. Clutch release shaft No.2 bush:
Apply grease A 99000-25010 to bush inside.
4. Return spring
5. Clutch release shaft
6. Clutch release shaft No.1 bush:
Apply grease A 99000-25010 to bush inside.
7. Release bearing:
Apply grease A 99000-25010 to joint of bearing and release shaft and also bearing inside.
8. Clutch cover
9. Clutch disc
10. Clutch cover bolt

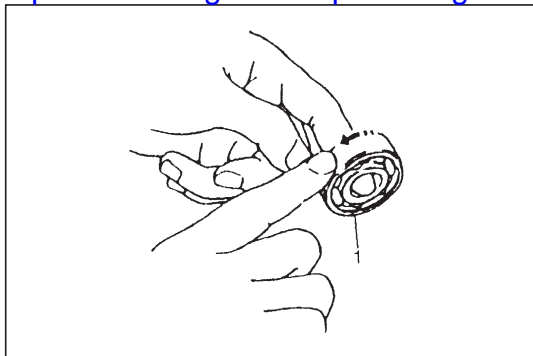
**REMOVAL**

- 1) Dismount transmission assembly referring to Section 7A.
- 2) Hold flywheel stationary with special tool (A) and remove clutch cover bolts (1), clutch cover (2) and clutch disc.

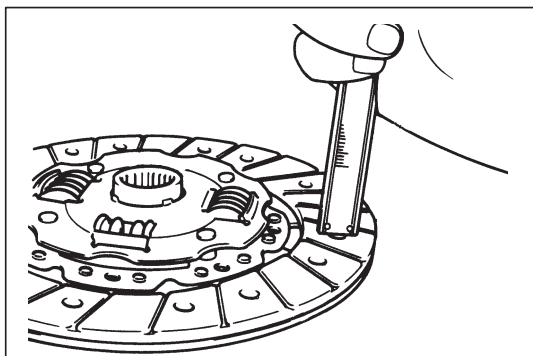
Special Tool**(A): 09924-17810**

- 3) Pull out input shaft bearing (1) by using special tool (B) and wrench.

Special Tool**(B): 09917-58010**

**INSPECTION****Input Shaft Bearing**

Check bearing (1) for smooth rotation and replace it if abnormality is found.

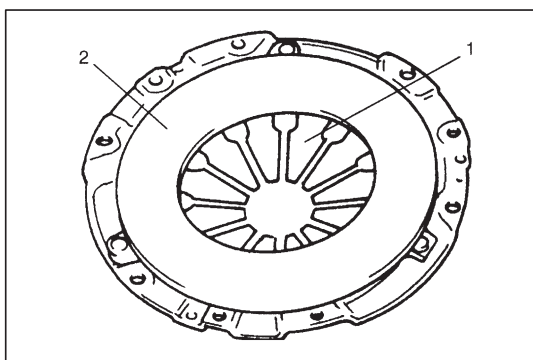
**Clutch Disc**

Measure depth of rivet head depression, i.e. distance between rivet head and facing surface. If depression is found to have reached service limit at any of holes, replace disc assembly.

Rivet head depth

Standard : 1.65 – 2.25 mm (0.06 – 0.09in.)

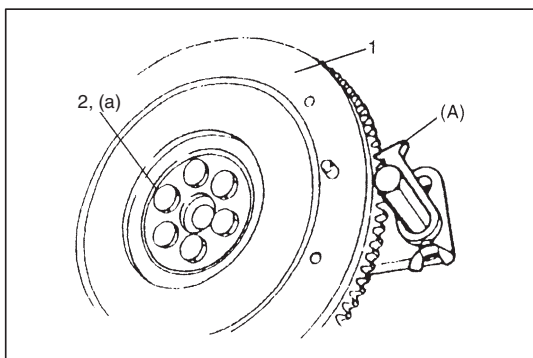
Service limit : 0.5 mm (0.02 in.)

**Clutch Cover**

- 1) Check diaphragm spring (1) for abnormal wear or damage.
- 2) Inspect pressure plate (2) for wear or heat spots.
- 3) If abnormality is found, replace it as assembly. Do not disassemble it into diaphragm and pressure plate.

Flywheel

Check surface contacting clutch disc for abnormal wear or heat spots. Replace or repair as required.

**INSTALLATION****NOTE:**

Before assembling, make sure that flywheel surface and pressure plate surface have been cleaned and dried thoroughly.

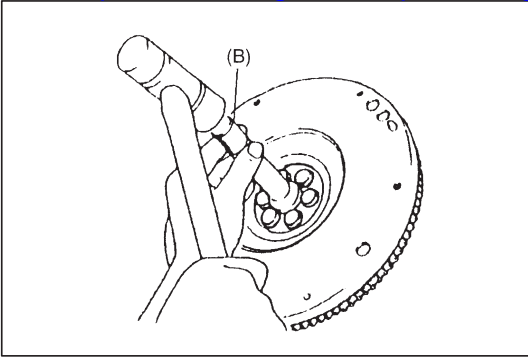
- 1) Install flywheel (1) to crankshaft and tighten bolts (2) to specification.

Special Tool

(A): 09924-17810

Tightening Torque

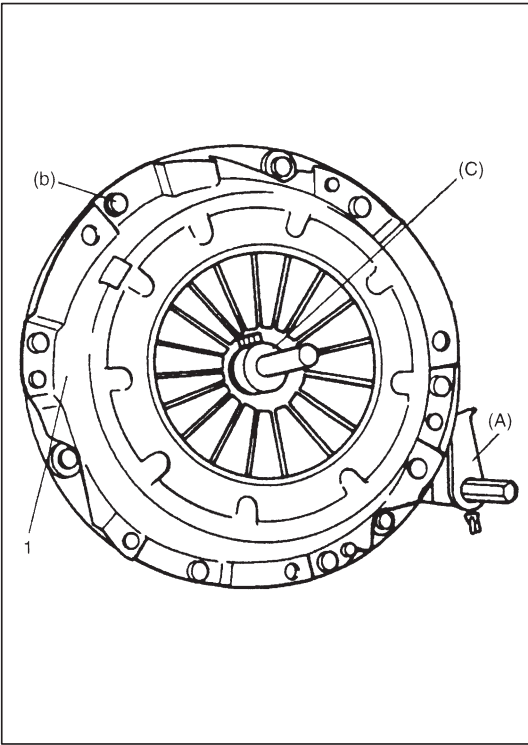
(a): 76 N·m (7.6 kg-m, 55.0 lb-ft)



- 2) Using special tool, install input shaft bearing to flywheel.

Special Tool

(B): 09925-98210



- 3) Aligning clutch disc to flywheel center by using special tool, install clutch cover (1) and bolts. Then tighten bolts to specification.

NOTE:

- While tightening clutch cover bolts, compress clutch disc with special tool (C) by hand so that disc centered.
- Tighten cover bolts little by little evenly in diagonal order.

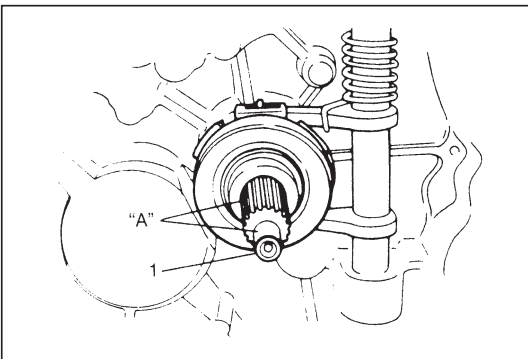
Special Tool

(A): 09924-17810

(C): 09923-36330

Tightening Torque

(b): 23 N·m (2.3 kg-m, 16.5 lb-ft)



- 4) Slightly apply grease to input shaft (1), then join transmission assembly with engine. Refer to SECTION 7A for remounting procedure.

“A”: Grease I, 99000-25210

NOTE:

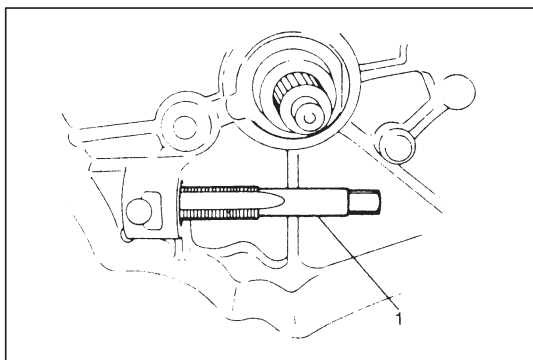
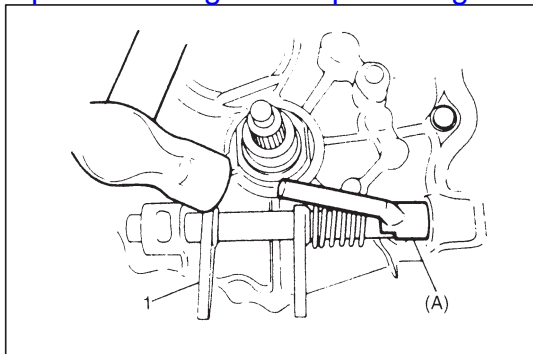
When inserting transmission input shaft to clutch disc, turn crankshaft little by little to match splines.

CLUTCH RELEASE SYSTEM**REMOVAL**

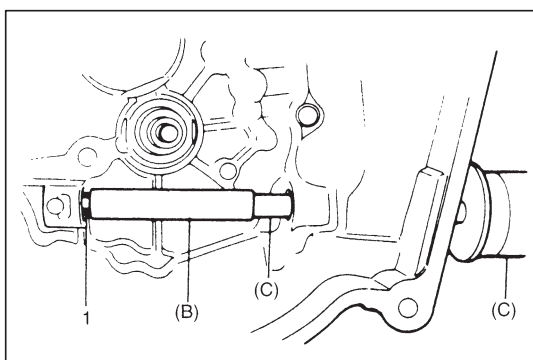
- 1) Remove release lever by loosening its bolt.
- 2) Take out release bearing by turning release shaft (1).
- 3) Unhook return spring by using pliers.
- 4) Drive out No.2 bush by using special tool and hammer.
Release shaft seal will also be pushed out.

Special Tool**(A): 09922-46010**

- 5) Remove release shaft and return spring.

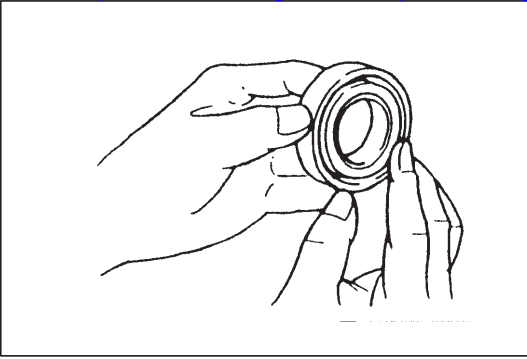


- 6) Install tap (M16 X 1.5) (1) to clutch release shaft No.1 bush.



- 7) Pull out No.1 bush by using tap (1) and special tools.

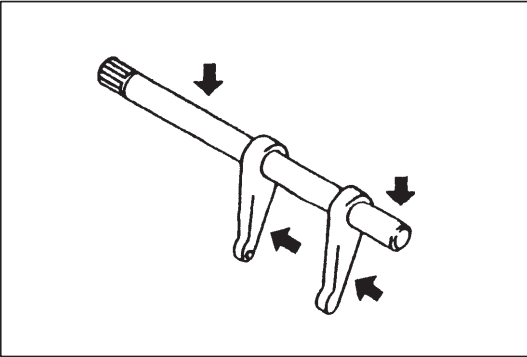
Special Tool**(B): 09923-46020****(C): 09930-30102**

**INSPECTION****Clutch release bearing**

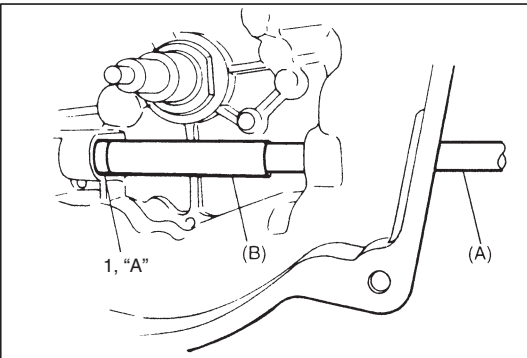
Check clutch release bearing for smooth rotation.
If abnormality is found, replace it.

CAUTION:

Do not wash release bearing. Washing may cause grease leakage and consequential bearing damage.

**Clutch release shaft**

Check clutch release shaft and its pin for deflection or damage.
If abnormality is found, replace it.

**INSTALLATION**

- 1) Drive in a new No.1 bush (1) by using special tools and then apply grease to bush inside.

Special Tool

(A): 09930-30102

(B): 09923-46030

"A": Grease A, 99000-25010

- 2) Install release shaft with return spring applied to it.

- 3) Apply grease to No.2 bush (1) inside and press-fit it by using the same special tool as in removal.

"A": Grease A, 99000-25010

Special Tool

(C): 09922-46010

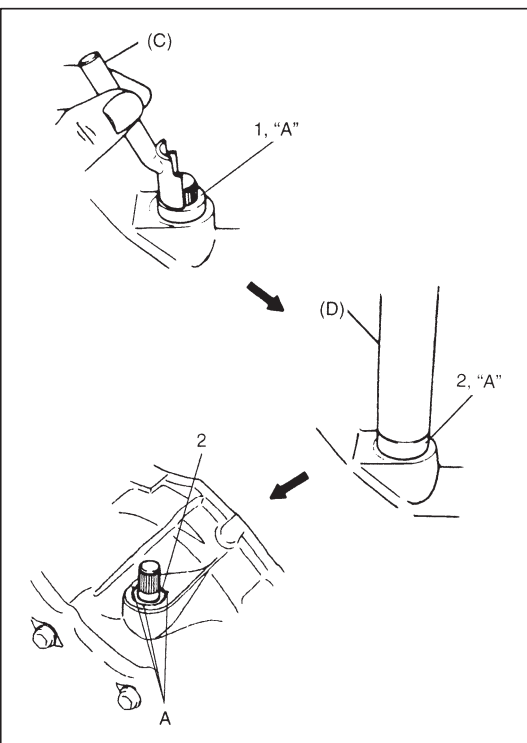
- 4) Coat grease to shaft seal (2) lip and then install it till it is flush with case surface. Use special tool for this installation and face seal lip downward (inside).

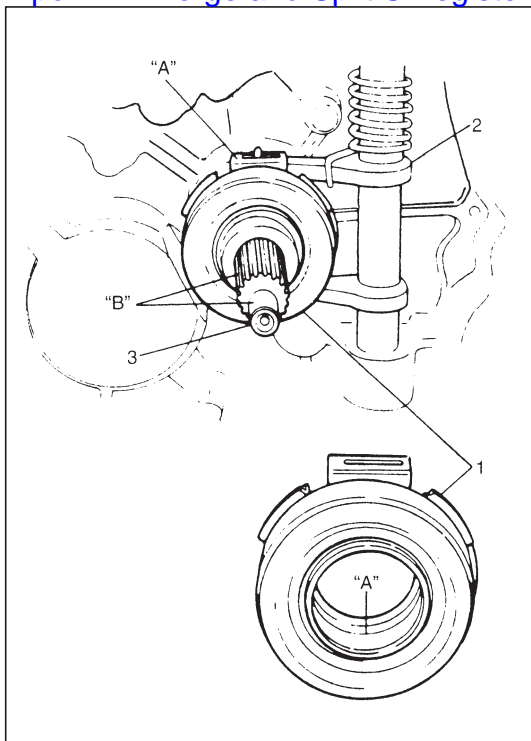
"A": Grease A, 99000-25010

Special Tool

(D): 09925-98221

- 5) Caulk seal at A by using caulking tool and hammer.





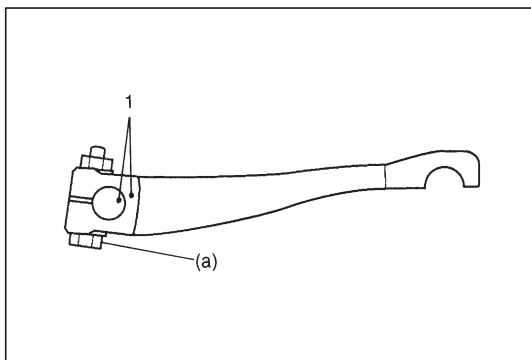
6) Hook return spring.

7) Apply grease to release bearing (1) inside and release shaft arm (2), then set bearing.

"A": Grease A, 99000-25010

8) Apply small amount of grease to input shaft (3) spline and front end as well.

"B": Grease I, 99000-25210



9) Set release lever to release shaft aligning their punch marks (1), then tighten bolt.

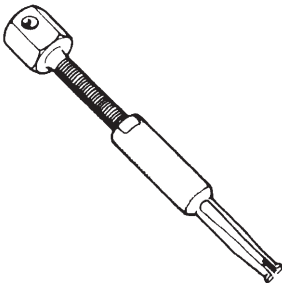
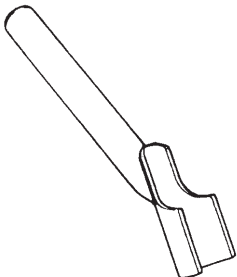
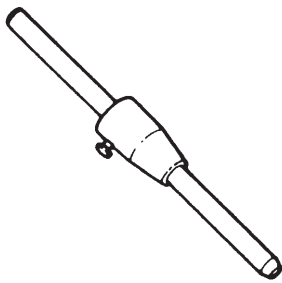
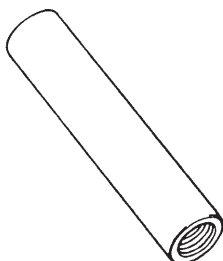
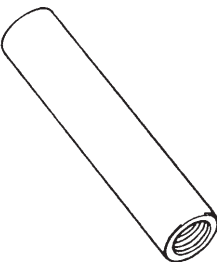
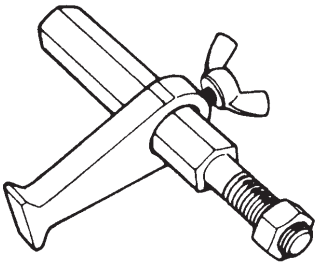
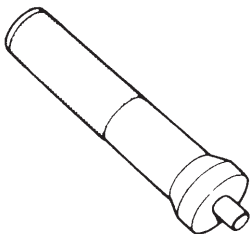
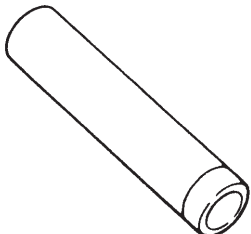
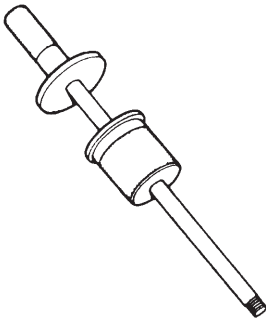
Tightening Torque

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> • Cable end hook and joint pin. • Release shaft bushes and seal. • Release shaft arm. • Release bearing inside.
	SUZUKI SUPER GREASE I (99000-25210)	Input shaft spline and front end.

SPECIAL TOOLS

 <p>09917-58010 Bearing remover</p>	 <p>09922-46010 Bush remover</p>	 <p>09923-36330 Clutch center guide</p>	 <p>09923-46020 Joint pipe</p>
 <p>09923-46030 Joint pipe</p>	 <p>09924-17810 Flywheel holder</p>	 <p>09925-98210 Input shaft bearing installer</p>	 <p>09925-98221 Bearing installer</p>
 <p>09930-30102 Sliding shaft</p>			

SECTION 8

BODY ELECTRICAL SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

WIRING DIAGRAM
(Refer to Wiring Diagram Manual mentioned in foreword of this manual)

LIGHTING SYSTEM

INSTRUMENTATION AND DRIVER INFORMATION

WINDOWS, MIRRORS, SECURITY AND LOCKS

IMMOBILIZER CONTROL SYSTEM

Section 8A

Section 8B

Section 8C

Section 8D

Section 8G

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Cautions in Servicing

Symbols and Marks

Abbreviations

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Joint Connector (J/C)

Fuse Box and Relay

Power Supply Diagram

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8-5

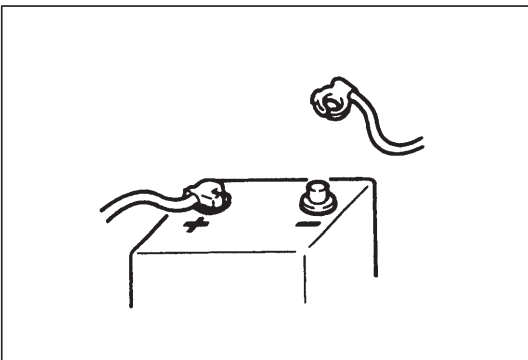
8-6

GENERAL DESCRIPTION

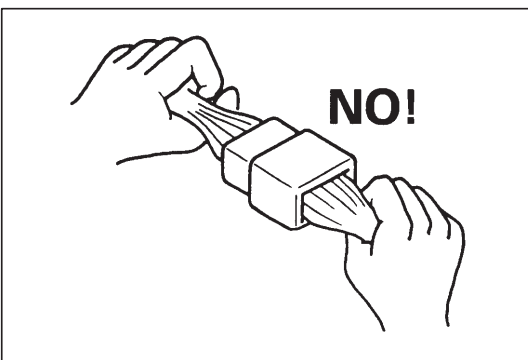
The body electrical components of this vehicle are designed to operate on 12 Volts power supplied by the battery. The electrical system utilizes negative ground polarity.

CAUTIONS IN SERVICING

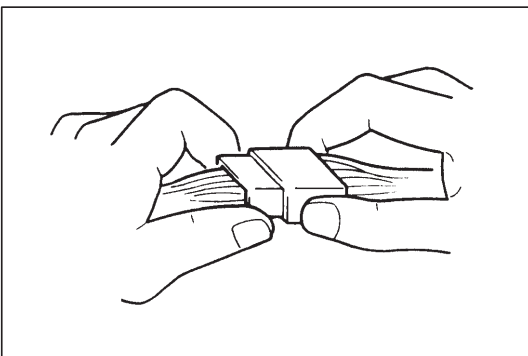
When performing works related to electric systems, observe following cautions for the purpose of protection of electrical parts and prevention of a fire from occurrence.



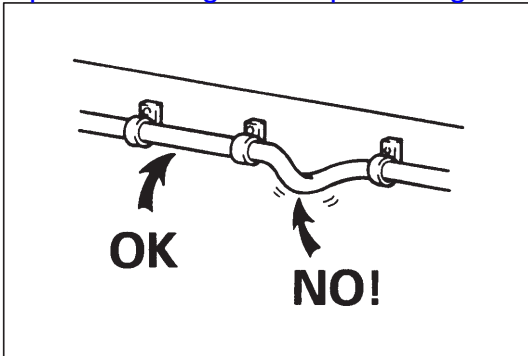
- When removing the battery from the vehicle or disconnecting the cable from the battery terminals for inspection or service works on the electric systems, always confirm first that the ignition switch and all the other switches have been turned OFF. Otherwise, the semi-conductor part may be damaged.
- When disconnecting cables from the battery, be sure to disconnect the one from the negative (–) terminal first and then the other from the positive (+) terminal.
- Reverse the above order when connecting the cables to the battery terminals.



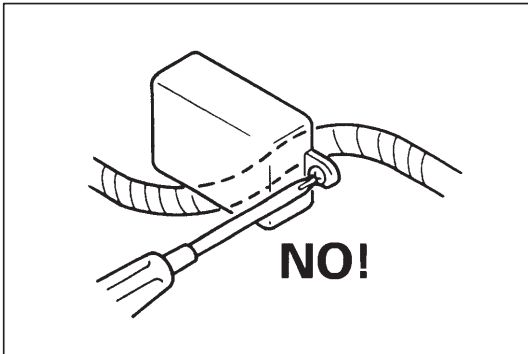
- When disconnecting connectors, never pull the wiring harnesses. Unlock the connector lock first and then pull them apart by holding connectors themselves.



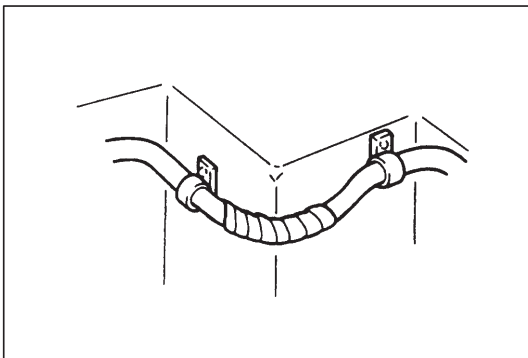
- When connecting connectors, also hold connectors and put them together until they lock securely (a click is heard).



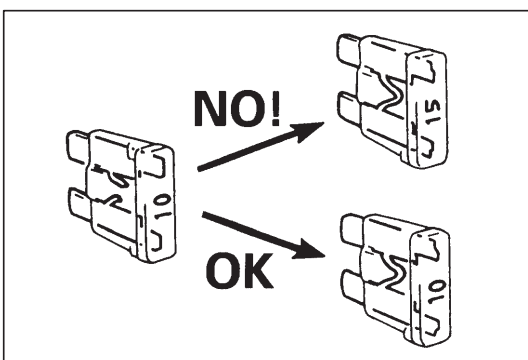
- When installing the wiring harness, fix it with clamps so that no slack is left.



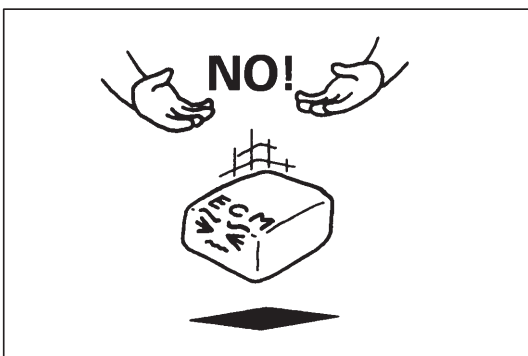
- When installing vehicle parts, be careful so that the wiring harness is not interfered with or caught by any other part.



- To avoid damage to the harness, protect its part which may contact against a part forming a sharp angle by winding tape or the like around it.

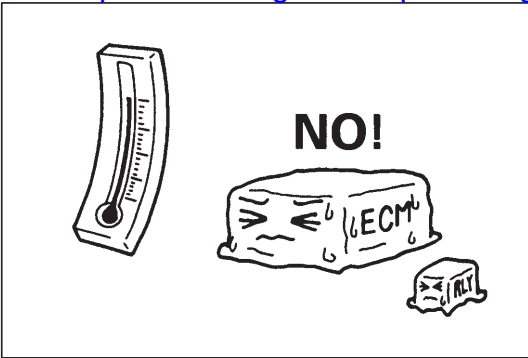


- When replacing a fuse, make sure to use a fuse of the specified capacity. Use of a fuse with a larger capacity will cause a damage to the electrical parts and a fire.

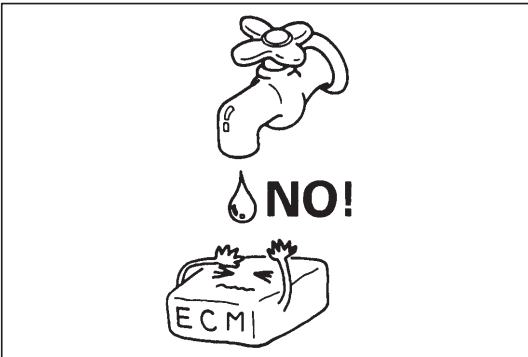


- Always be careful not to handle electrical parts (computer, relay, etc.) in a rough manner or drop them.

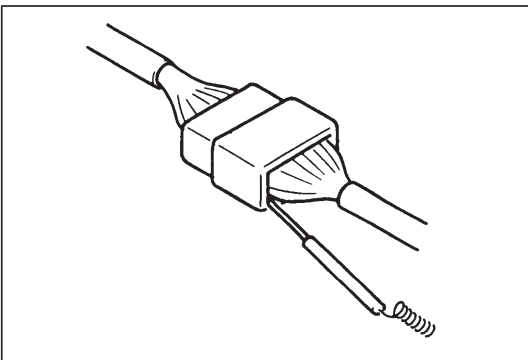
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- When performing a work that produces a heat exceeding 80°C in the vicinity of the electrical parts, remove the heat sensitive electrical part(s) beforehand.



- Use care not to expose connectors and electrical parts to water which will be a cause of a trouble.



- When using a tester for checking continuity or measuring voltage, be sure to insert the tester probe from the wire harness side.

SYMBOLS AND MARKS

Refer to Wiring Diagram Manual.

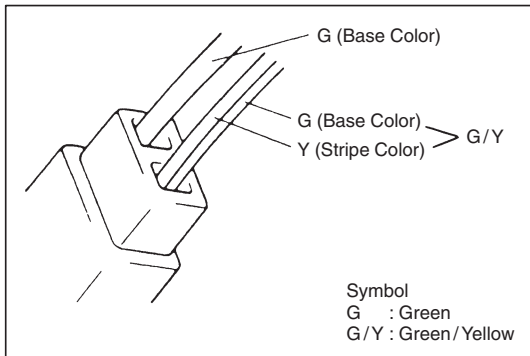
ABBREVIATIONS

Refer to Wiring Diagram Manual.

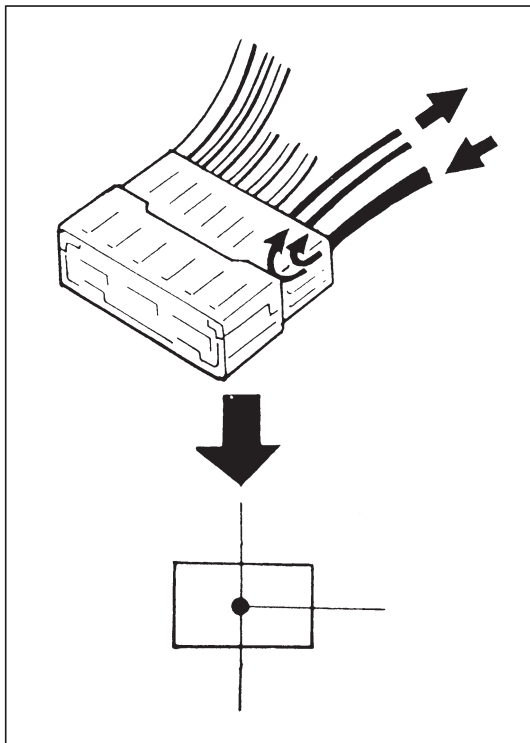
Symbol	Wire Color	Symbol	Wire Color
B	Black	O	Orange
Bl	Blue	R	Red
Br	Brown	W	White
G	Green	Y	Yellow
Gr	Gray	P	Pink
Lbl	Light blue	V	Violet
Lg	Light green		

WIRING COLOR SYMBOLS

The wire color is abbreviated to the first (or first two) alphabet(s) of each color.



There are two kinds of colored wire used in this vehicle. One is single-colored wire and the other is dual-colored (striped) wire. The single-colored wire uses only one color symbol (i.e. "G"). The dual-colored wire uses two color symbols (i.e. "G/Y"). The first symbol represents the base color of the wire ("G" in the figure) and the second symbol represents the color of the stripe ("Y" in the figure).



JOINT CONNECTOR (J/C)

- Wiring of this vehicle employs joint connector (J/C) which divide one wire into several different wires or combine several different wires into one wire.
- The joint connector is as shown in the figure.

FUSE BOX AND RELAY

Refer to Wiring Diagram Manual for locations and circuits.

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POWER SUPPLY DIAGRAM

Refer to Wiring Diagram Manual.

SECTION 8B**LIGHTING SYSTEM****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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		Interior Light	8B-19

GENERAL DESCRIPTION

CAUTIONS IN SERVICING

Refer to Section 8.

SYMBOLS AND MARKS

Refer to Section 8.

WIRING COLOR SYMBOLS

Refer to Section 8.

ABBREVIATIONS

Refer to Section 8.

JOINT CONNECTOR

Refer to Section 8.

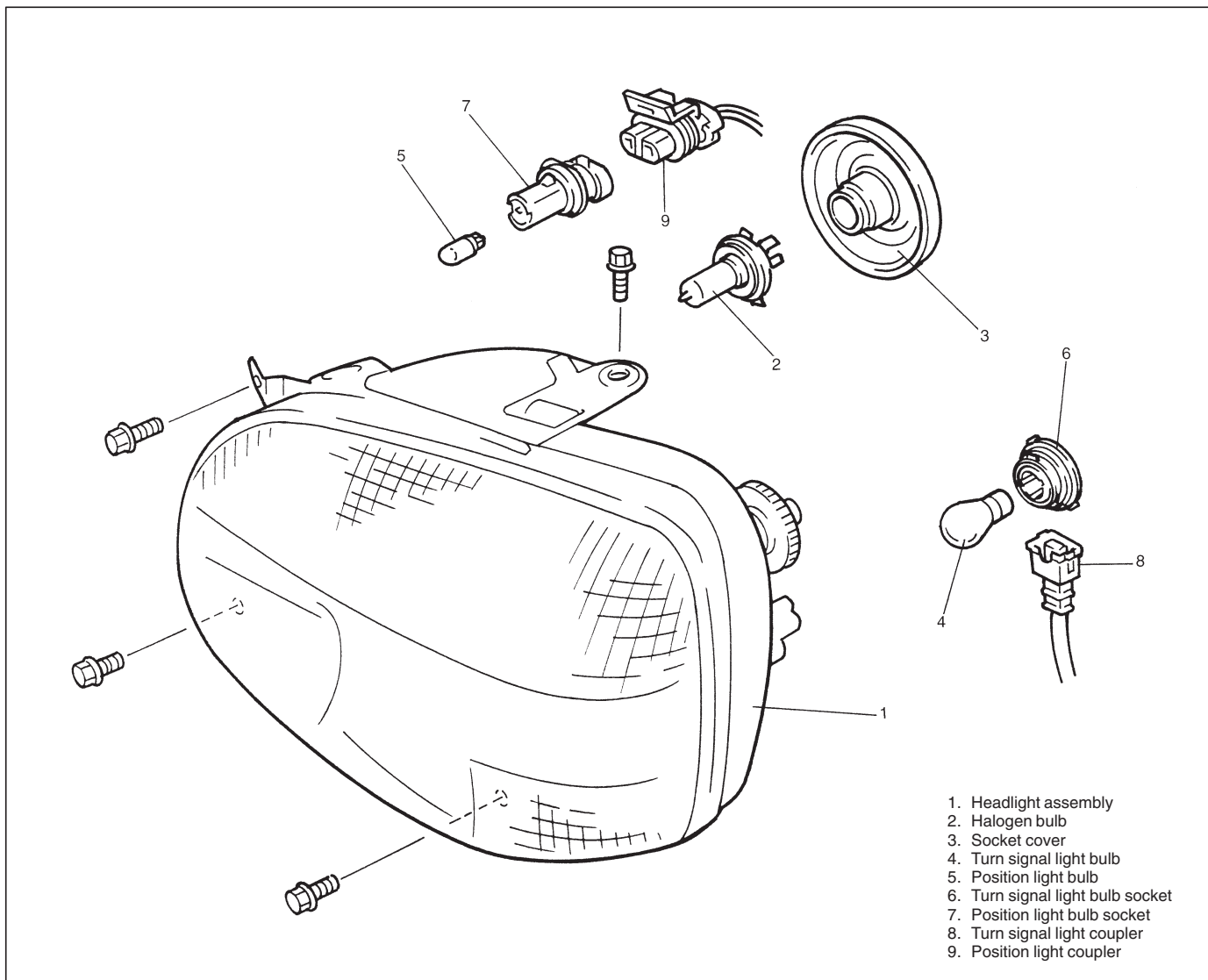
FUSE BOX AND RELAY

Refer to Section 8.

POWER SUPPLY DIAGRAM

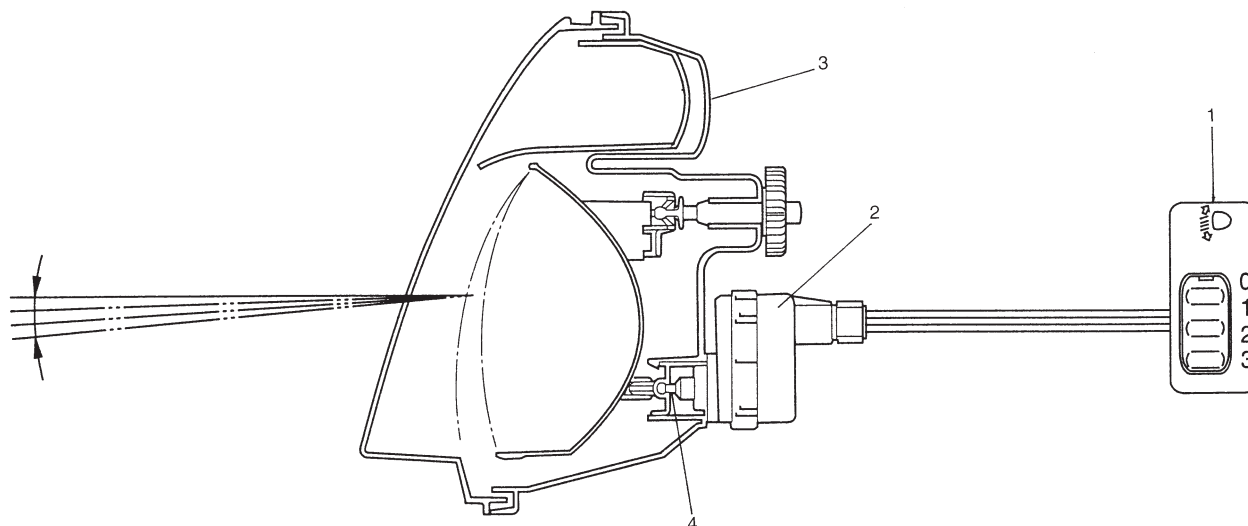
Refer to Section 8.

HEADLIGHTS

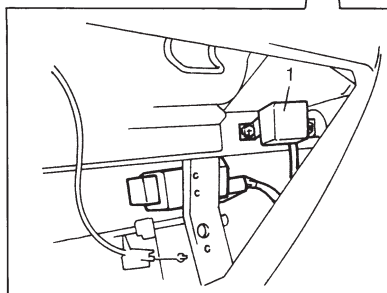
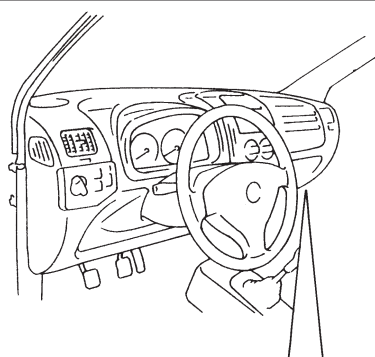


HEADLIGHT WITH LEVELING SYSTEM

1. Headlight leveling switch
2. Headlight leveling unit (actuator)
3. Headlight
4. Headlight leveling unit shaft



Switch Position	Headlight beam down angle
0	—
1	0.75°
2	1.5°
3	2.25°



The illustration shows LH steering vehicle.
And RH steering vehicle is symmetrical.

1. D.R.L. controller

DAYTIME RUNNING LIGHT (D.R.L.) SYSTEM (IF EQUIPPED)

The D.R.L. system lights headlights when the following two conditions are met.

Conditions for D.R.L. system operation

- The engine is running.
- The lighting switch is at "OFF" position.

DIAGNOSIS**HEADLIGHTS**

Trouble	Possible cause	Correction
Only one light does not light	<ul style="list-style-type: none"> ● Bulb burnt out ● Fuse blown ● Socket, wiring or grounding faulty 	Replace bulb Replace fuse Repair as necessary
Headlights do not light when lighting switch is in headlight position and engine is stopped	<ul style="list-style-type: none"> ● Main fuse and/or fuses blown ● Lighting and dimmer switch faulty ● Wiring or grounding faulty ● D.R.L. controller faulty 	Replace main fuse and/or fuses to check for short Check switches Repair as necessary Replace controller
Headlights do not light when lighting switch is in OFF position and engine is running	<ul style="list-style-type: none"> ● D.R.L. system faulty 	Refer to "DAYTIME RUNNING LIGHT (D.R.L.) SYSTEM (IF EQUIPPED)"
Only one beam ("Hi" or "Lo") does not light	<ul style="list-style-type: none"> ● Bulb burnt out ● Dimmer switch faulty 	Replace bulb Check switch

HEADLIGHTS WITH LEVELING SYSTEM

Trouble	Possible cause	Correction
Both headlights do not move	<ul style="list-style-type: none"> ● Fuse blown ● Leveling switch faulty ● Supply voltage too low 	Check circuit and replace fuse Check switch or replace it as necessary Recharge or replace battery
One of headlights (either Right or Left) does not move	<ul style="list-style-type: none"> ● Socket, wiring or grounding faulty ● Actuator faulty ● Vehicle body around headlight deformed ● Headlight ass'y itself deformed 	Repair as necessary Replace actuator Repair body Replace headlight ass'y

DAYTIME RUNNING LIGHT (D.R.L.) SYSTEM (IF EQUIPPED)

Trouble	Possible cause	Correction
Headlights do not light when lighting switch is in OFF position and engine is running	<ul style="list-style-type: none"> ● D.R.L. controller faulty ● Wiring or grounding faulty 	Replace controller Repair as necessary
Headlights still light even if lighting switch is in OFF position and engine is stopped	<ul style="list-style-type: none"> ● D.R.L. controller faulty ● "Y/B" circuit faulty 	Replace controller Repair
Headlights still light even if lighting switch is in tail position when engine is running	<ul style="list-style-type: none"> ● D.R.L. controller faulty ● Lighting switch faulty ● Position light relay faulty ● Wiring or grounding faulty 	Replace controller Repair or replace switch Replace relay Repair as necessary

TURN SIGNAL AND HAZARD WARNING LIGHTS

Trouble	Possible cause	Correction
Flash rate high or one side only flashes	<ul style="list-style-type: none"> ● Faulty ground ● Incorrect bulb ● One of light bulbs burnt out ● Turn signal/hazard warning relay faulty ● Open circuit or high resistance existing between turn signal/hazard warning switch and lights on one side 	Repair Replace Replace Replace Repair
No flashing	<ul style="list-style-type: none"> ● Blown fuse on turn signal/hazard warning circuit ● Open circuit or high resistance existing between battery and switch ● Relay faulty ● Switch faulty 	Replace Repair Replace Replace
Flash rate low	<ul style="list-style-type: none"> ● Supply voltage too low ● Relay faulty 	Recharge battery Repair

CLEARANCE, TAIL AND LICENCE PLATE LIGHTS

Trouble	Possible cause	Correction
One of lights does not light	<ul style="list-style-type: none"> ● Bulb burnt out ● Wiring or grounding faulty 	Replace Repair as necessary
Only right side or left side lights, or only licence plate light do not light	<ul style="list-style-type: none"> ● Fuse blown ● Wiring faulty 	Replace fuse Repair
All lights do not light when lighting switch is in ON position and engine is stopped	<ul style="list-style-type: none"> ● Main fuse and/or fuses blown ● Lighting switch faulty ● Position light relay faulty ● Wiring or grounding faulty ● D.R.L. controller faulty 	Replace fuses to check for short Check switch Replace relay Repair as necessary Replace controller
All lights do not light when lighting switch is in OFF position and engine is running	<ul style="list-style-type: none"> ● D.R.L. system faulty 	Refer to "DAYTIME RUNNING LIGHT (D.R.L.) SYSTEM (IF EQUIPPED)"

BACK-UP LIGHTS

Trouble	Possible cause	Correction
Back-up lights do not light	<ul style="list-style-type: none"> ● Fuse blown ● Bulb burnt out ● Back-up light switch or shift switch faulty ● Wiring or grounding faulty 	Replace fuse to check for short Replace Check switch Repair as necessary
Back-up lights remains ON	<ul style="list-style-type: none"> ● Back-up light switch or shift switch faulty ● Wiring or grounding faulty 	Check switch Repair as necessary

BRAKE LIGHTS

Trouble	Possible cause	Correction
Stop lights do not light	<ul style="list-style-type: none"> ● Fuse blown ● Bulb burnt out ● Stop light switch faulty ● Wiring or grounding faulty 	Replace fuse to check for short Replace Adjust or replace switch Repair as necessary
Stop lights stay on	<ul style="list-style-type: none"> ● Stop light switch faulty 	Adjust or replace switch
Only one light does not light	<ul style="list-style-type: none"> ● Bulb burnt out ● Wiring or grounding faulty 	Replace Repair as necessary

FRONT FOG LIGHTS (IF EQUIPPED)

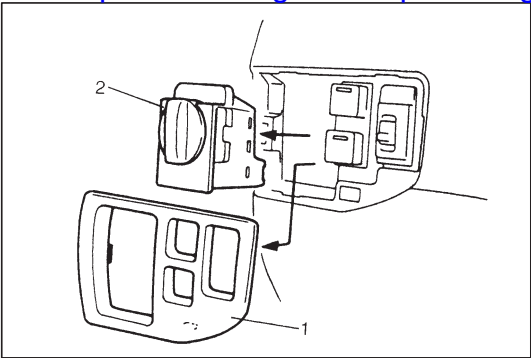
Trouble	Possible cause	Correction
Only one light does not light	<ul style="list-style-type: none"> ● Bulb burnt out ● Fuse blown ● Socket, wiring or grounding faulty 	Replace bulb Replace fuse Repair as necessary
Front fog lights do not light	<ul style="list-style-type: none"> ● Clearance, tail and licence plate lights all do not light ● Fuse blown ● Front fog light switch faulty ● Front fog light relay faulty ● Wiring or grounding faulty 	Refer to "CLEARANCE, TAIL AND LICENCE PLATE LIGHTS" Replace fuse to check for short Check switch Replace relay Repair as necessary
Front fog lights light when lighting switch is in OFF position	<ul style="list-style-type: none"> ● Front fog light relay faulty ● Wiring of front fog relay faulty 	Replace relay Repair as necessary

REAR FOG LIGHT

Trouble	Possible cause	Correction
Rear fog light does not come on when headlights and front fog lights (if equipped) come on	<ul style="list-style-type: none"> ● Main fuse and/or fuses blown ● Rear fog light switch faulty ● Wiring or grounding faulty ● Bulb burnt out ● Rear fog light controller faulty 	Replace main fuse and/or fuses to check for short Check switch Repair as necessary Replace Replace controller
[If front fog lights are equipped] Rear fog light does not come on when only headlights come on although it comes on when front fog lights come on	<ul style="list-style-type: none"> ● Rear fog light controller harness "R/BI" faulty 	Repair
[If front fog lights are equipped] Rear fog light does not come on when only front fog lights come on although it comes on when headlights come on	<ul style="list-style-type: none"> ● Rear fog light controller harness "V" faulty 	Repair

INTERIOR LIGHT

Trouble	Possible cause	Correction
Interior light does not light up	<ul style="list-style-type: none">● Bulb burnt out● Fuse blown● Wiring or grounding faulty● Door open switch faulty● Interior light faulty● Lighting switch faulty	<p>Replace</p> <p>Replace</p> <p>Repair as necessary</p> <p>Check switch</p> <p>Check light</p> <p>Check switch</p>



ON-VEHICLE SERVICE

**HEADLIGHTS
LIGHTING SWITCH**

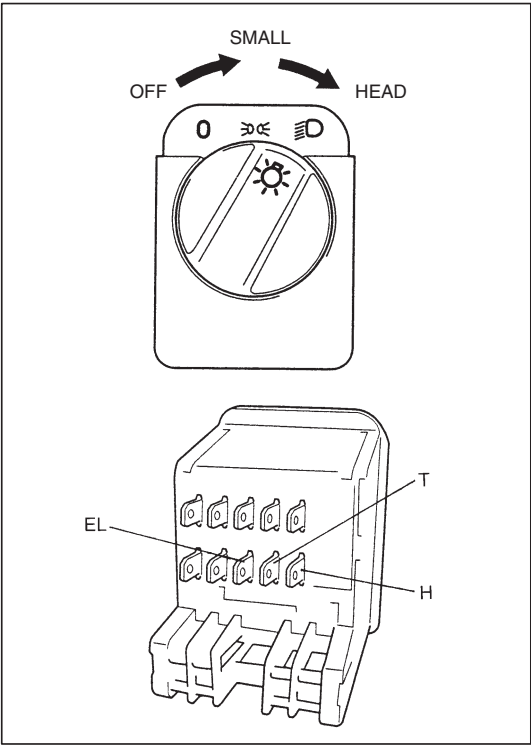
REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove garnish (1) of instrument panel switches.
- 3) Remove lighting switch (2) from instrument panel.

INSPECTION

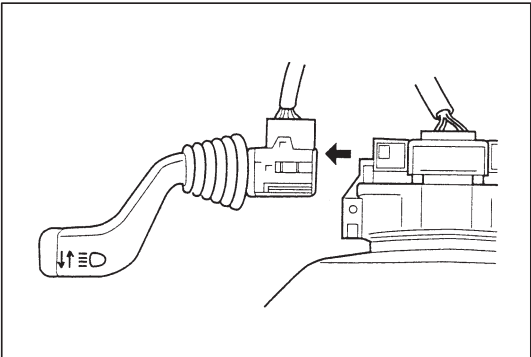
Check the continuity at each switch position. If any continuity is not obtained, replace switch.

Terminal Switch Position	EL	T	H
OFF			
SMALL	○	○	
HEAD	○	○	○



INSTALLATION

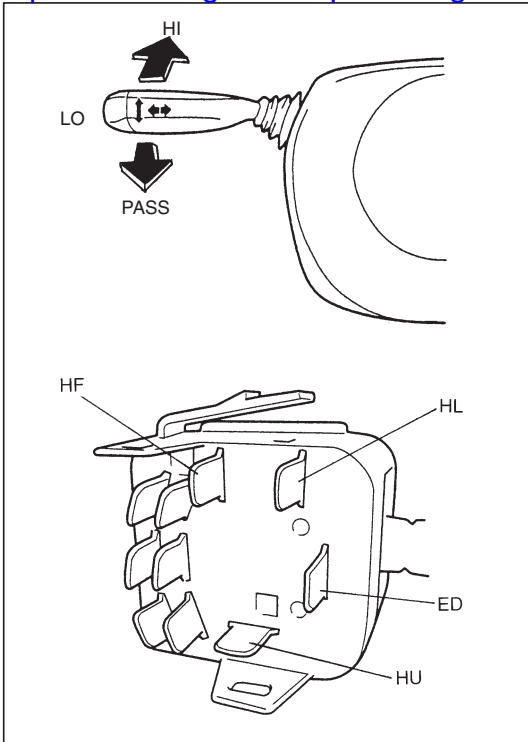
Reverse removal procedure for installation.



**DIMMER AND PASSING SWITCH (IN TURN AND
DIMMER SWITCH)**

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove steering column cover. Refer to step 5) of CONTACT COIL CABLE ASSEMBLY REMOVAL in Section 3C.
- 3) Pull out turn & dimmer switch.
- 4) Disconnect turn & dimmer switch lead wire couplers.



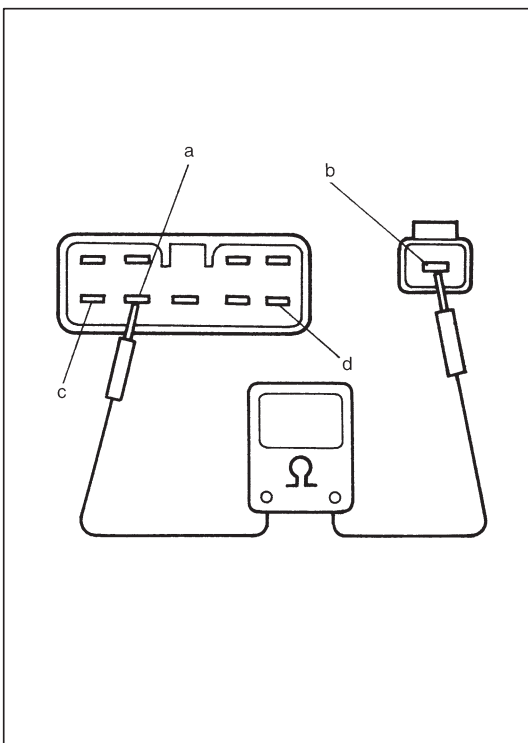
INSPECTION

Check the continuity at each switch position. If any continuity is not obtained, replace switch.

Terminal Switch Position	ED	HL	HU	HF
Passing (PASS)				
Low Beam				
High Beam (HI)				

INSTALLATION

- 1) Connect couplers to turn & dimmer switch.
- 2) Push turn & dimmer switch into steering column till it clicks.
- 3) Install steering column cover. Reverse removal procedure.



D.R.L. CONTROLLER (if equipped)

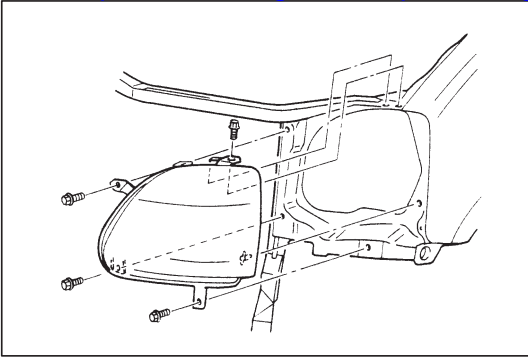
INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Disconnect D.R.L. controller lead wire coupler.
- 3) Check the continuity between controller terminals as follow:

Position light circuit : between terminal (a) and (b)

Headlight circuit : between terminal (c) and (d)

If any continuity is not obtain, replace controller.



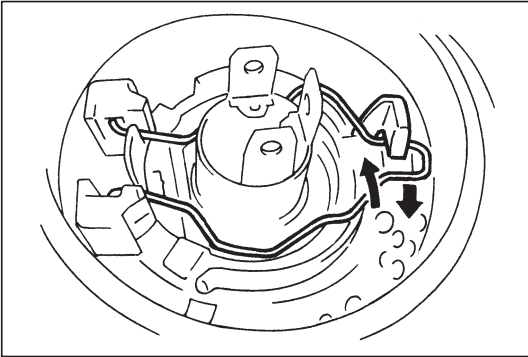
REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove front bumper.
- 3) Disconnect harness and couplers from headlight assembly.
- 4) Remove four bolts and pull headlight assembly off vehicle.

INSTALLATION

Reverse removal procedure for installation.

Make sure to follow HEADLIGHT AIMING WITH SCREEN and aim headlight after installation.



BULB REPLACEMENT

WARNING:

Don't touch when the bulb is hot.

- 1) Disconnect negative cable at battery.
- 2) Disconnect harness from bulb.
- 3) Remove socket cover and bulb.
- 4) Replace bulb and install in reverse removal procedure.

HEADLIGHT AIMING WITH SCREEN**NOTE:**

- Unless otherwise obligated by local regulations, adjust headlight aiming according to following procedure.
- After replacing headlight, be sure to perform its aiming.
- When inspecting and adjusting headlight with leveling system, make sure to set the leveling switch to "0" position with IG switch ON.

Before adjustment, make sure the following.

- Place vehicle on a flat surface in front of blank wall as below ahead of headlight surface.

Clearance "a": 10 m (32.8 ft)

- Adjust air pressure of all tires to a specified value respectively.
- Bounce vehicle body up and down by hand to stabilize suspension.
- Carry out one driver aboard.

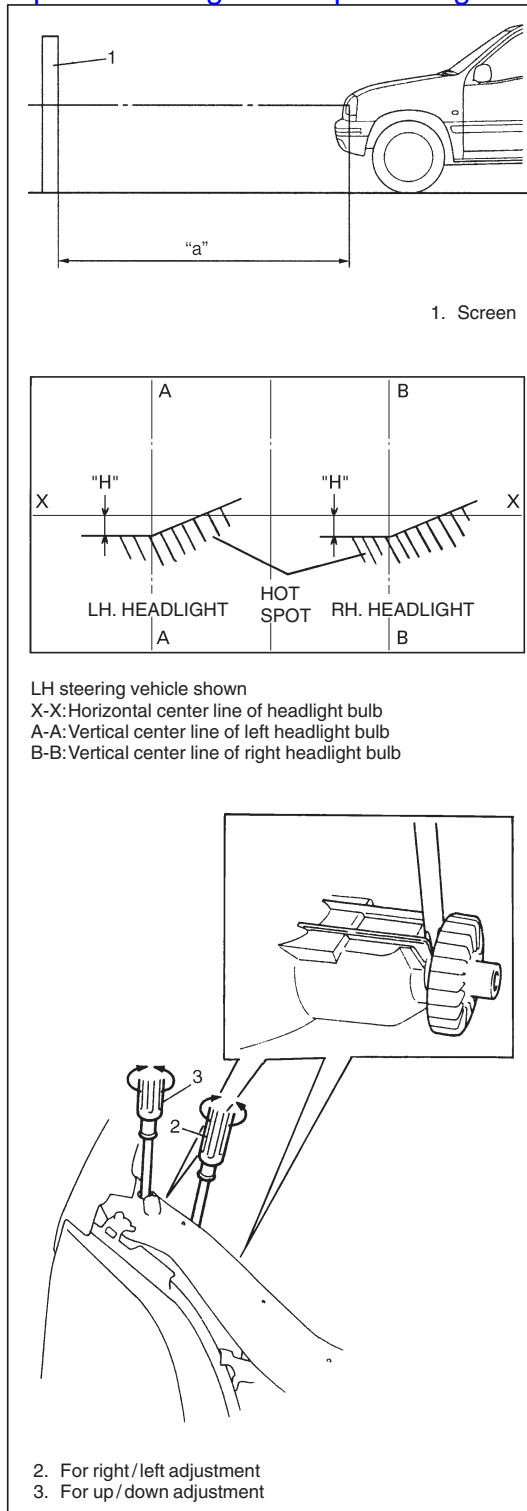
Driver's weight: 75 kg (165 lb)

Adjustment

- Check to see if hot spot (high intensity zone) of each main (low) beam axis falls as illustrated.

Clearance "H": Approx. 130 mm (5.15 in.)

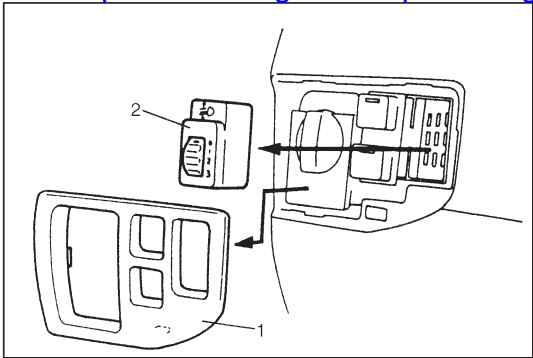
- If headlight aiming is not set properly, align it to specification by adjusting aiming screw and aiming gear.



HEADLIGHTS WITH LEVELING SYSTEM
LEVELING SWITCH

REMOVAL

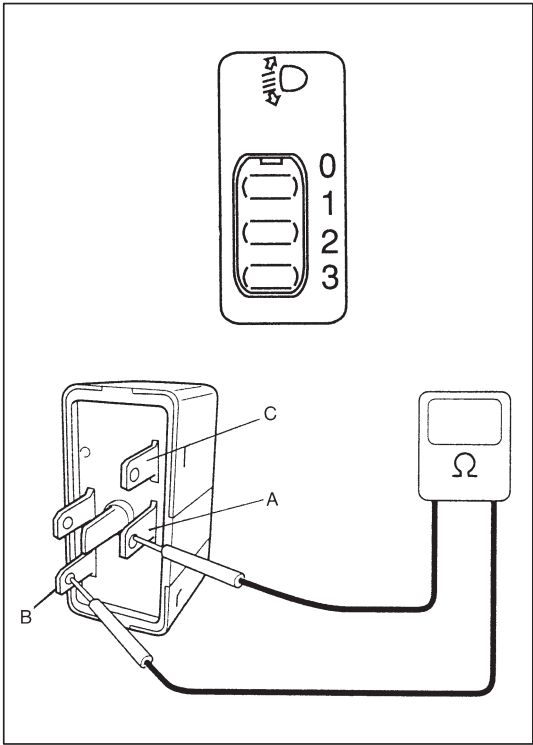
- 1) Disconnect negative cable at battery.
- 2) Remove garnish (1) of instrument panel switches.
- 3) Remove leveling switch (2) from instrument panel.



INSPECTION

Check the resistance between terminal “A” and “B” and terminal “B” and “C” at each leveling switch position. If the obtained resistance value is out of specification, replace switch.

Position	Resistance (Ω)	
	Between terminal “A” and “B”	Between terminal “B” and “C”
1	136 – 150	—
2	278 – 308	
3	421 – 465	522 – 576



INSTALLATION

Reverse removal procedure for installation.

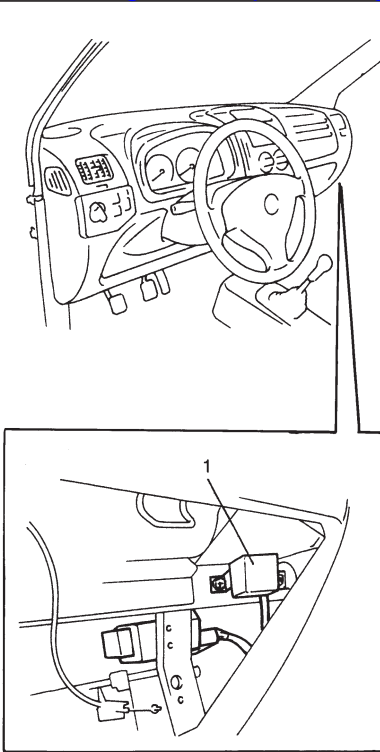
LEVELING ACTUATOR

INSPECTION

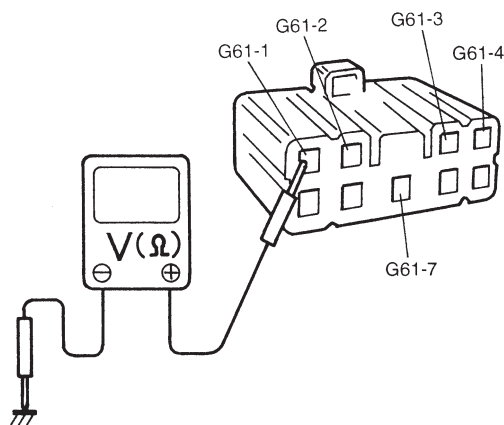
All headlight system couples connected including leveling actuator and switch, and at ignition switch ON, listen to the leveling actuator sound on both actuators according to the movement of the leveling switch. If no sound is heard with the movement of the leveling switch, replace headlight assembly.

**DAYTIME RUNNING LIGHT (D.R.L.) SYSTEM
(IF EQUIPPED)****DAYTIME RUNNING LIGHT CIRCUIT****INSPECTION**

- 1) Apply parking brake and stop engine.
With turned on lighting switch and operated dimmer switch, check headlights come on.
- 2) Start engine. Turn lighting switch at "OFF".
Check headlights come on. Turn lighting switch at "Clearance light" position. Check headlights go off.
If check result is OK, D.R.L. controller (1) is OK.
- 3) Disconnect negative cable at battery.
- 4) Disconnect D.R.L. controller coupler and connect negative cable at battery.
- 5) Check that the voltage and resistance between following terminals are specifications.

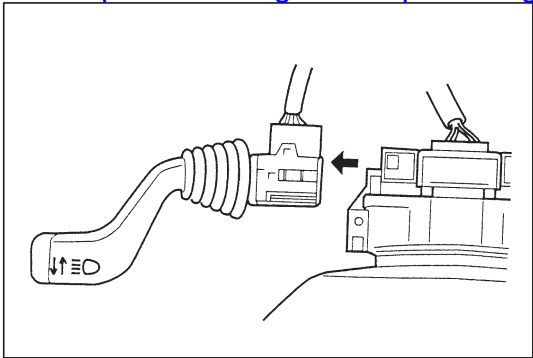


The illustration shows LH steering vehicle.
And RH steering vehicle is symmetrical.



Terminals	Condition	Specification
G61-4 and ground	When ignition switch is in OFF	0 V
	When ignition switch is in ON	10 – 15 V
G61-7 and ground	———	Continuity
G61-2 and ground	Engine stop	Continuity
	Engine run	No continuity
G61-3 and ground	———	10 – 15 V
G61-1 and ground	———	Continuity

If check result is not satisfactory, repair.



TURN SIGNAL AND HAZARD WARNING LIGHTS

TURN SIGNAL SWITCH (IN TURN AND DIMMER SWITCH)

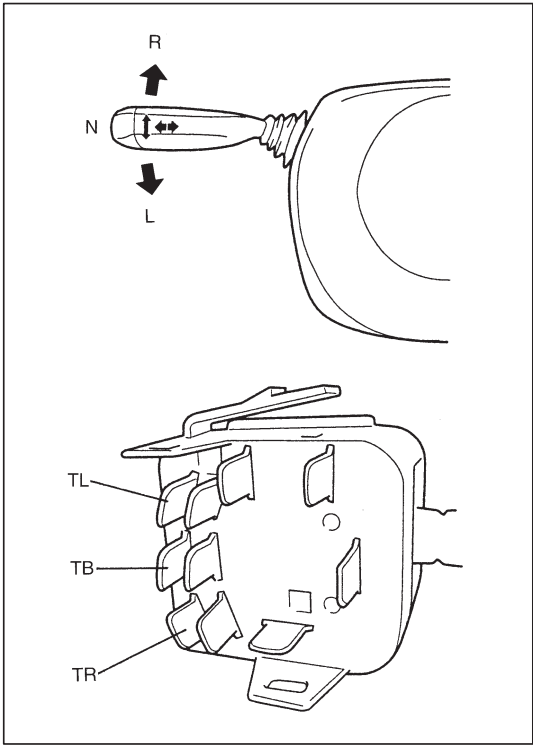
REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove steering column cover. Refer to step 5) of CONTACT COIL CABLE ASSEMBLY REMOVAL in Section 3C.
- 3) Pull out turn & dimmer switch.
- 4) Disconnect turn & dimmer switch lead wire couplers.

INSPECTION

Check the continuity at each switch position. If any continuity is not obtained, replace switch.

Terminal	TL	TB	TR
Switch Position			
L			
N			
R			

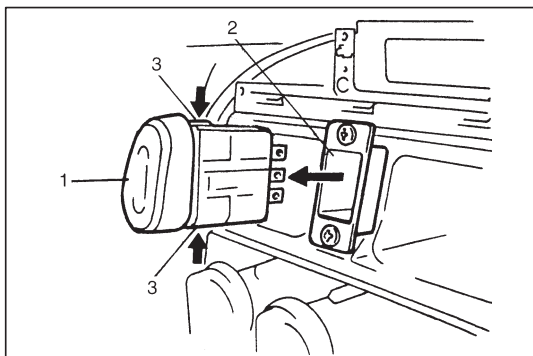


INSTALLATION

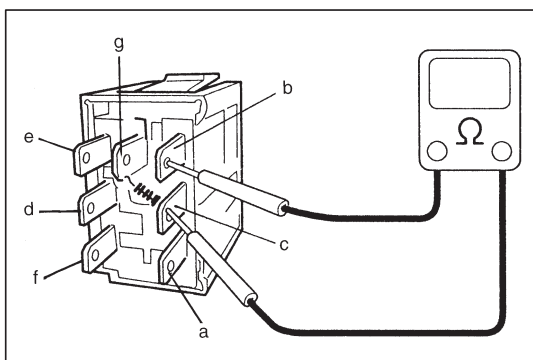
- 1) Connect couplers to turn & dimmer switch.
- 2) Push turn & dimmer switch into steering column till it clicks.
- 3) Install steering column cover. Reverse removal procedure.

HAZARD SWITCH**REMOVAL**

- 1) Remove center lower garnish. Refer to step 3) of HEATER CONTROL LEVER ASSEMBLY REMOVAL in Section 1A.



- 2) Remove hazard switch (1) from hazard switch case (2) installed in instrument panel with unlocked the locking part (3) as shown in figure.

**INSPECTION**

Check the continuity of each switch position.

If any continuity is not obtained, replace switch.

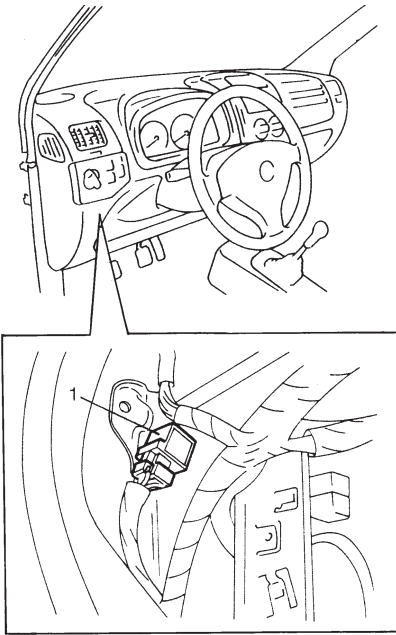
	a	b	c	d	e	f	g
OFF	○	○			⚡	⊗	○
ON		○	○	○	○	○	○

INSTALLATION

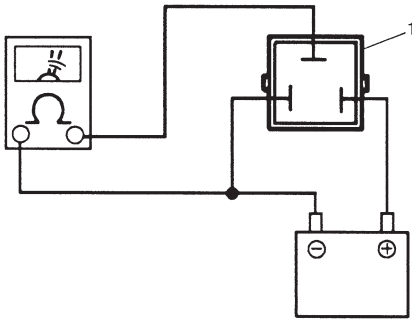
Reverse removal procedure for installation.

HAZARD RELAY**INSPECTION**

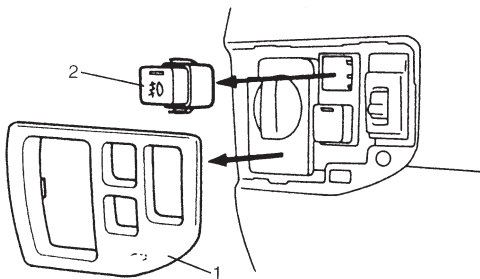
- 1) Disconnect negative cable at battery.
- 2) Disconnect hazard relay lead wire coupler.
- 3) Connect battery and tester as the left illustration.
- 4) Unless a continued click sound is heard, replace relay (1).



The illustration shows LH steering vehicle.
And RH steering vehicle is symmetrical.

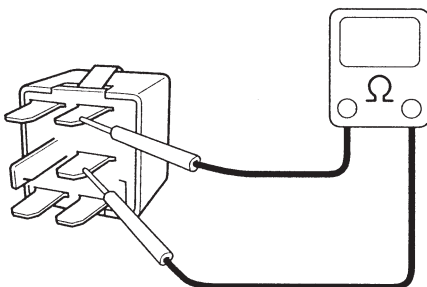
**FRONT FOG LIGHTS (IF EQUIPPED)****FRONT FOG LIGHT SWITCH****REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Remove garnish (1) of instrument panel switches.
- 3) Remove fog light switch (2) from instrument panel.

**INSPECTION**

Check front fog light switch for continuity.

ON : Continuity
OFF : No continuity



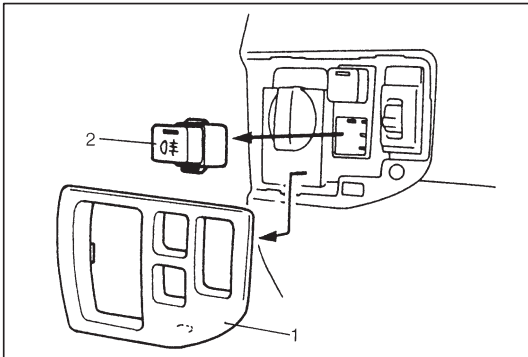
INSTALLATION

Reverse removal procedure for installation.

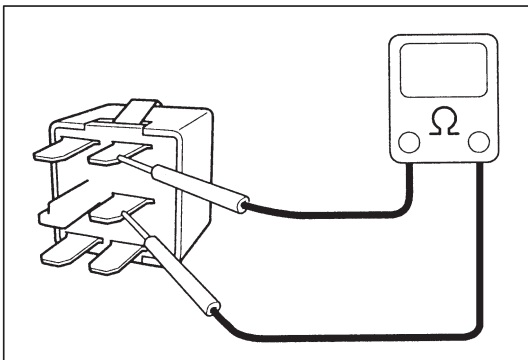
NOTE:

Front fog lights light up only when headlights (low or high beams) or position lights are ON.

Front fog lights turn OFF automatically when position lights are turned OFF. If front fog light switch holds ON position, front fog lights turn ON automatically when headlights or position lights are ON again.

**REAR FOG LIGHT****REAR FOG LIGHT SWITCH****REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Remove garnish (1) of instrument panel switches.
- 3) Remove rear fog light switch (2) from instrument panel.

**INSPECTION**

Check rear fog light switch for continuity.

PUSH: Continuity

FREE : No continuity

INSTALLATION

Reverse removal procedure for installation.

NOTE:

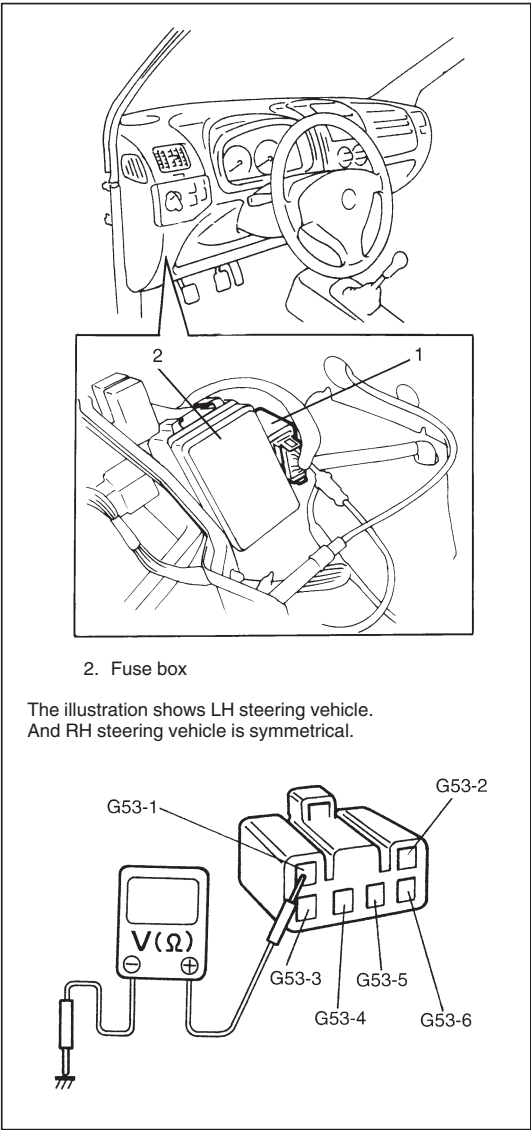
Rear fog light lights up only when headlights (low or high beams) or front fog lights (if equipped) are ON.

Rear fog light turns OFF automatically when headlights and front fog lights (if equipped) are turned OFF.

REAR FOG LIGHT

INSPECTION

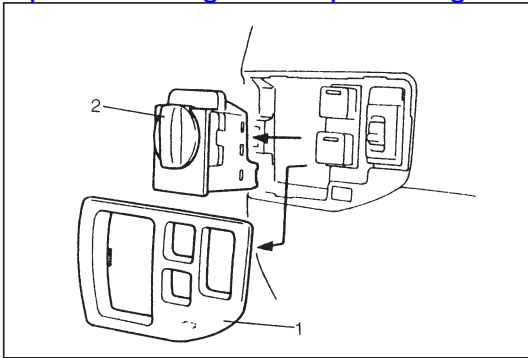
1) Check headlights and front fog lights (if equipped) come on.



- 2) Disconnect negative cable at battery.
- 3) Disconnect rear fog controller (1) coupler and connect negative cable at battery.
- 4) Check that the voltage and resistance between following terminals are specifications.

Terminals	Condition	Specification
G53-1 and ground	————	10 – 15 V
G53-2 and ground	When headlight switch is in OFF	10 – 15 V
	When headlight switch is in ON	0 V
G53-3 and ground	————	Continuity
	When rear fog light bulb is removed	No continuity
G53-4 and ground	————	Continuity
G53-5 and ground	When rear fog light switch is pushed	10 – 15 V
	When rear fog light switch is free	0 V
G53-6 and ground [If front fog lights are equipped]	When front fog lights come on	10 – 15 V
	When front fog lights do not come on	0 V

If check result is not satisfactory, repair.

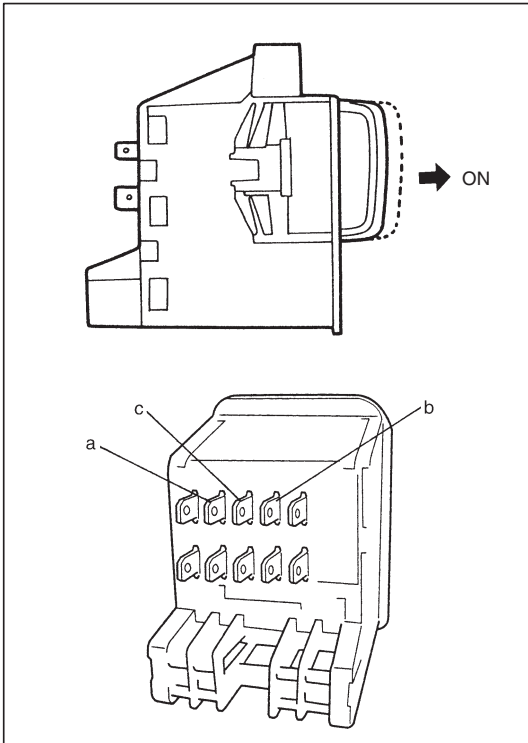


INTERIOR LIGHT

INTERIOR LIGHT SWITCH (IN LIGHTING SWITCH)

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove garnish (1) of instrument panel switches.
- 3) Remove lighting switch (2) from instrument panel.



INSPECTION

Check the continuity at each switch position. If any continuity is not obtained, replace switch.

Terminal	a	b	c
Switch Position			
OFF		○	○
ON	○	○	○

INSTALLATION

Reverse removal procedure for installation.

SECTION 8C

INSTRUMENTATION/DRIVER INFORMATION

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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Fuel Meter and Fuel Gauge Unit	8C- 3	Door Switch	8C-10
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Oil Pressure Light	8C- 3		
Brake Warning Light	8C- 3		

CAUTIONS IN SERVICING

Refer to Section 8.

SYMBOLS AND MARKS

Refer to Section 8.

WIRING COLOR SYMBOLS

Refer to Section 8.

ABBREVIATIONS

Refer to Section 8.

JOINT CONNECTOR

Refer to Section 8.

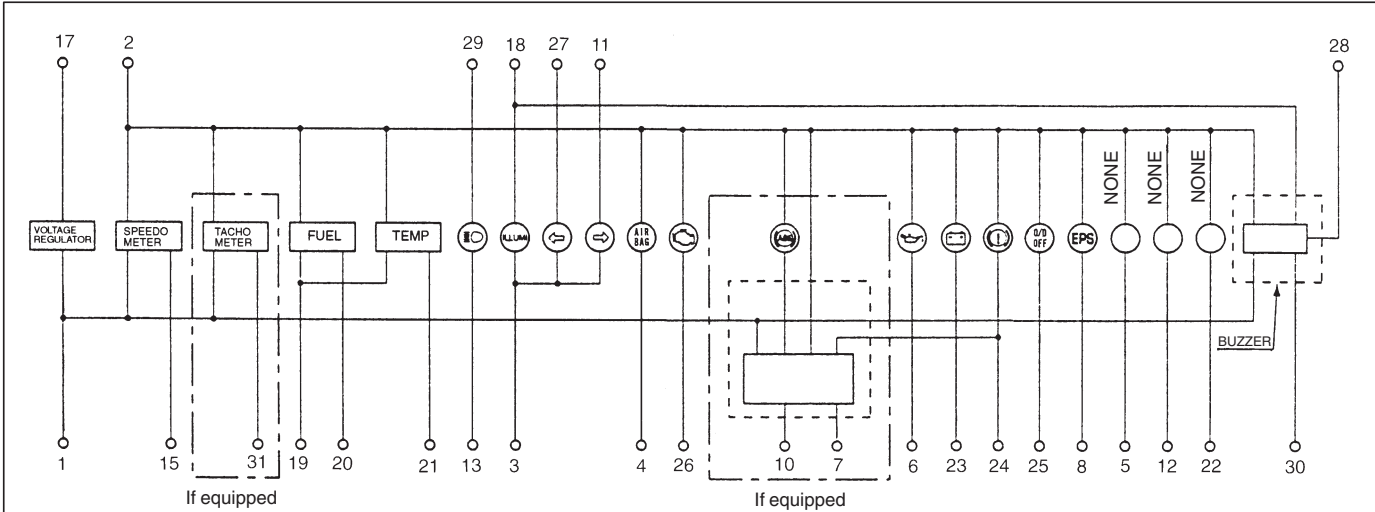
FUSE BOX AND RELAY

Refer to Section 8.

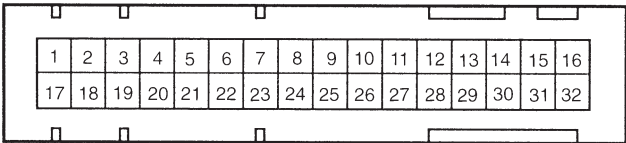
POWER SUPPLY DIAGRAM

Refer to Section 8.

COMBINATION METER



NOTE:
Terminal arrangement of coupler viewed from harness side.



➔ The upper side of combination meter

Coupler			
1. To ground	B	13. To dimmer switch	R
2. To ignition switch	B/W	14. Blank	—
3. To ground	B	15. To speed sensor	V
4. To SDM	Bl	16. Blank	—
5. Blank	—	17. To positive terminal at battery	W/Bl
6. To oil pressure switch	Y/B	18. To lighting switch	R/Y
7. To ABS control module	O	19. To ground	Br
8. To EPS control module	Gr	20. To fuel level gauge	Y/R
9. Blank	—	21. To ECT sensor	W/G
10. To ABS control module	Bl/B	22. Blank	—
11. To turn and hazard switch	G/Y	23. To generator	W/R
12. Blank	—	24. To brake fluid level switch and parking brake switch	Y/G
		25. To A/T control module	Bl/Y
		26. To ECM	V/W
		27. To turn and hazard switch	G/R
		28. To ignition switch (ACC)	Y/B
		29. To positive terminal at battery	W/Bl
		30. To door switch (driver side)	B/O
		31. To ECM	Br/Y
		32. Blank	—

DIAGNOSIS**SPEEDOMETER AND VSS**

Trouble	Possible Cause	Correction
Speedometer shows no operation	IG METER fuse blown VSS faulty Speedometer faulty Wiring or grounding faulty	Check fuse Check VSS Check speedometer Repair

FUEL METER AND FUEL GAUGE UNIT

Trouble	Possible Cause	Correction
Fuel meter shows no operation	IG METER fuse blown Fuel gauge unit faulty Fuel meter faulty Wiring or grounding faulty	Check fuse Check fuel gauge unit Check fuel meter Repair

ENGINE COOLANT TEMP. (ECT) METER AND SENSOR

Trouble	Possible Cause	Correction
Engine coolant temp. meter shows no operation	IG METER fuse blown ECT meter faulty ECT sensor faulty Wiring or grounding faulty ECM faulty	Check fuse Check ECT meter Check ECT sensor Repair Check input signal from ECM

OIL PRESSURE LIGHT

Trouble	Possible Cause	Correction
Oil pressure warning light does not light up	Bulb blown IG METER fuse blown Combination meter wiring circuit faulty Oil pressure switch faulty Wiring or grounding faulty	Check bulb Check fuse Check wiring circuit Check oil pressure switch Repair

BRAKE WARNING LIGHT

Trouble	Possible Cause	Correction
Brake warning light does not light up	Bulb blown IG METER fuse blown Combination meter wiring circuit faulty Parking brake switch faulty Brake fluid level switch faulty Wiring or grounding faulty	Check bulb Check fuse Check combination meter wiring circuit Check parking brake switch Check brake fluid level switch Repair

LIGHT REMAINDER WARNING BUZZER

Trouble	Possible Cause	Correction
Light remainder warning buzzer does not sound	LICENCE fuse blown Buzzer faulty Wiring or grounding faulty Driver or passenger door switch faulty Lighting switch faulty Position light relay faulty D.R.L. controller faulty	Check fuse Replace buzzer Repair Check door switch Check switch Replace relay Check controller. Refer to "D.R.L. CONTROLLER" of HEADLIGHTS in Section 8B

IGNITION KEY REMAINDER WARNING BUZZER

Trouble	Possible Cause	Correction
Ignition key remainder warning buzzer does not sound	DOME fuse blown Buzzer faulty Wiring or grounding faulty Driver or passenger door switch faulty	Check fuse Replace buzzer Repair Check door switch

CIGARETTE LIGHTER AND ACCESSORY SOCKET

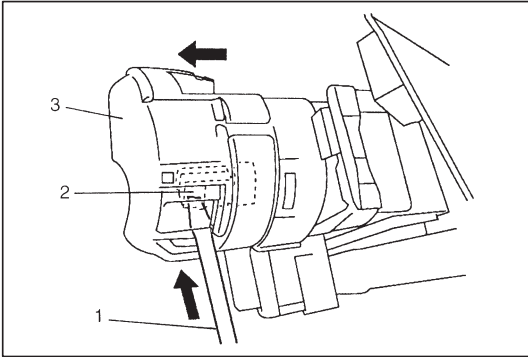
Trouble	Possible Cause	Correction
Cigarette lighter/ accessory socket shows no operation	CIGAR/ACC fuse blown Ignition switch faulty Cigarette lighter/accessory socket faulty Wiring or grounding faulty	Check fuse Check ignition switch Check cigarette lighter/accessory socket Repair

ON-VEHICLE SERVICE

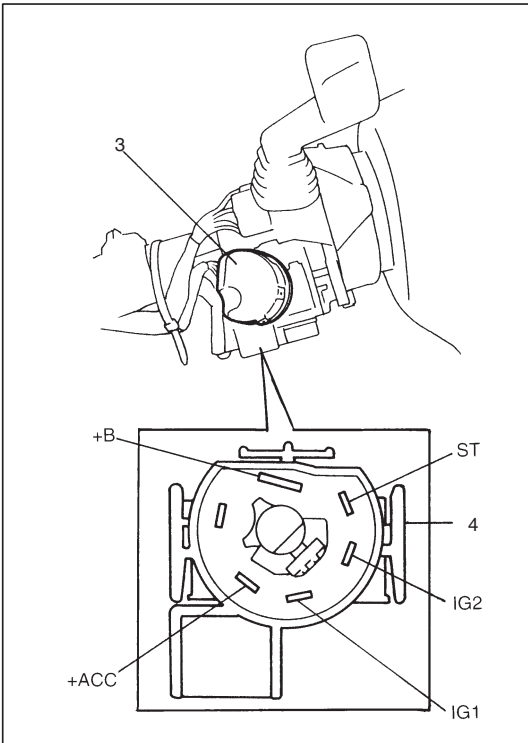
IGNITION (MAIN) SWITCH

INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Disable air bag system. Refer to DISABLING AIR BAG SYSTEM in Section 10B.
- 3) Remove steering column cover. Refer to step 5) of CONTACT COIL CABLE ASSEMBLY REMOVAL in Section 3C.



- 4) Disconnect ignition (main) switch coupler as follows.
 - a) Turn ignition switch key to "ACC" position.
 - b) Insert screw driver (1) through coupler hole.
 - c) Unlock coupler lock (2) by pushing it in arrow direction with screw driver (1).
 - d) With unlocked, disconnect ignition (main) switch coupler (3).

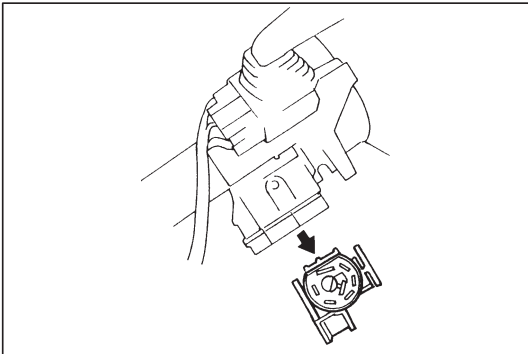


- 5) Check continuity between terminals at each switch position. If continuity is not obtained according to the table below, replace ignition (main) switch (4).

Terminal		+B	+ACC	IG1	IG2	ST
Key	Position					
OUT	LOCK	○				
	ACC	○—○				
	ON	○—○—○—○				
	ST	○—○—○—○—○				

REMOVAL

- 1) Remove ignition switch cylinder assembly. Refer to step 5) of STEERING COLUMN REMOVAL in Section 3C.
- 2) Remove ignition (main) switch from steering column.

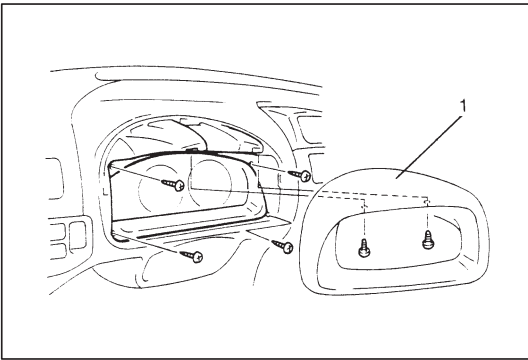


INSTALLATION

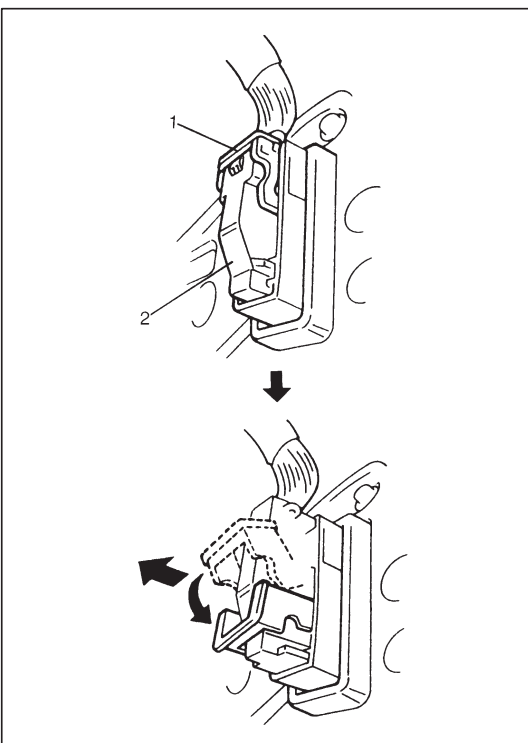
- 1) Install ignition (main) switch to steering column.
- 2) Install ignition switch cylinder assembly. Refer to step 5) of STEERING COLUMN INSTALLATION in Section 3C.
- 3) Connect ignition (main) switch coupler.
- 4) Connect negative cable at battery.
- 5) Enable air bag system. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

COMBINATION METER**REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Disable air bag system. Refer to DISABLING AIR BAG SYSTEM in Section 10B.



- 3) Remove instrument cluster panel (1).
- 4) Remove screws fastening combination meter.
- 5) Pull combination meter from instrument panel.



- 6) Turn lever (1) locking combination meter coupler (2) and disconnect coupler (2).

INSTALLATION

Reverse removal procedure for installation, noting the following.

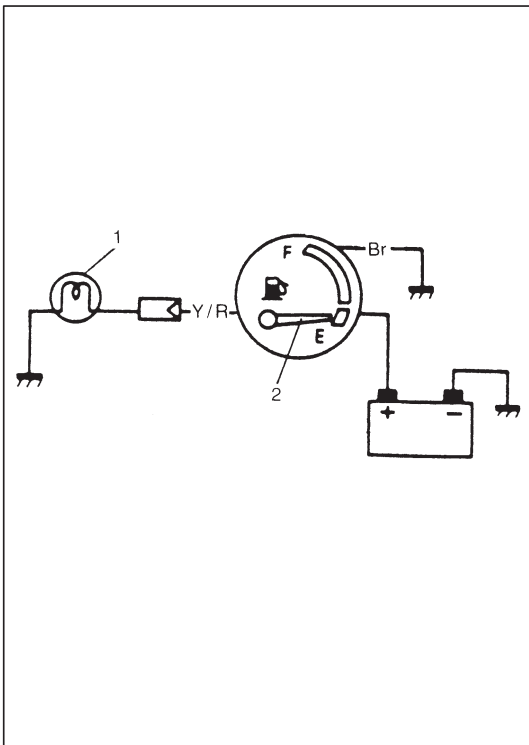
- Be sure to enable air bag system after installation. Refer to ENABLING AIR BAG SYSTEM in Section 10B for details.

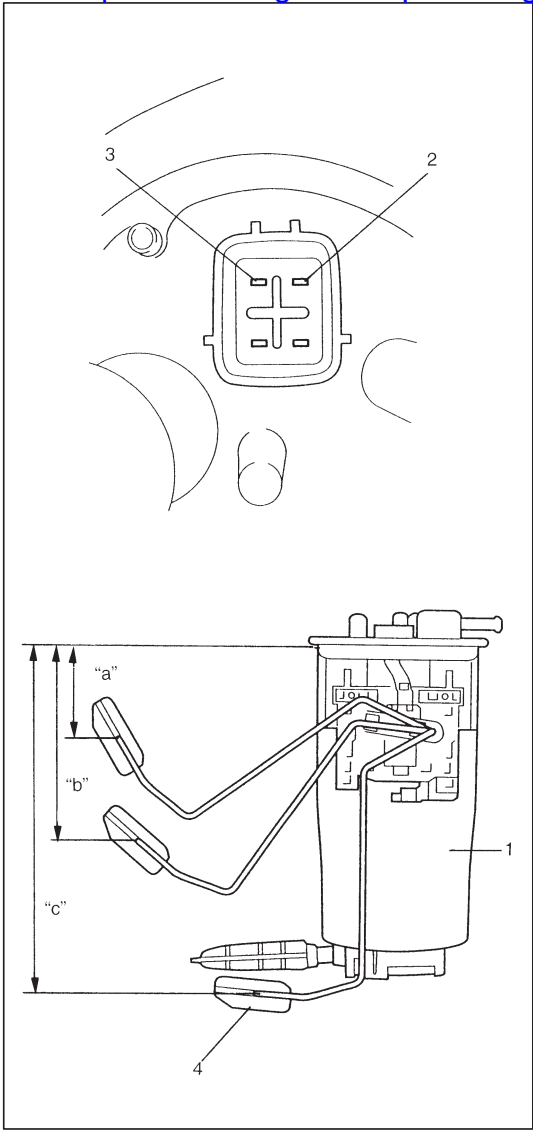
SPEEDOMETER AND SENSOR**VEHICLE SPEED SENSOR (VSS)**

Refer to VEHICLE SPEED SENSOR (VSS) in Section 7A.

FUEL METER/FUEL GAUGE UNIT**FUEL METER****INSPECTION**

- 1) Disconnect Y/R lead wire going to gauge unit.
- 2) Turn ignition switch ON, and check that fuel meter indicates E.
- 3) Turn ignition switch OFF.
- 4) Ground Y/R lead through a 3.4 W test bulb (1) as illustrated.
- 5) Turn ignition switch ON and check that bulb light up and pointer (2) moves to F side.
- 6) If fuel meter shows no operation, replace.





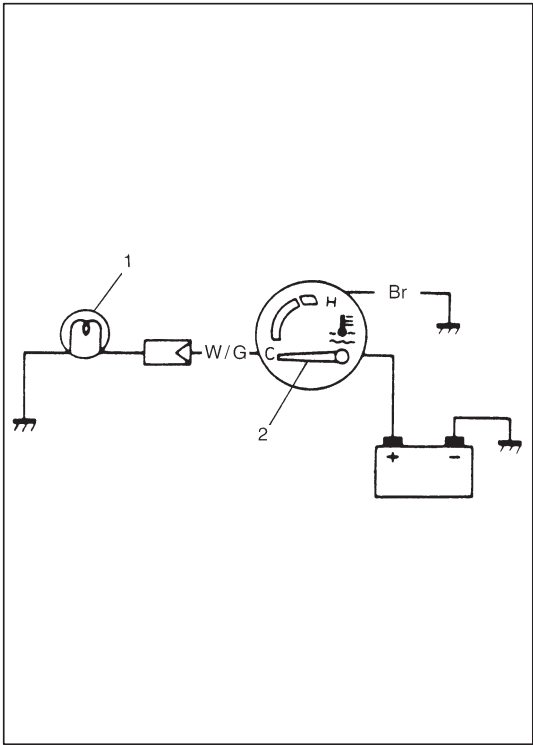
FUEL SENDER GAUGE

INSPECTION

- 1) Remove fuel tank. Refer to FUEL TANK REMOVAL in Section 6C.
- 2) Remove fuel pump assembly (1). Refer to FUEL PUMP ASSEMBLY REMOVAL in Section 6C.
- 3) Check the resistance between terminals (2) and (3) of fuel sender gauge under the following each float (4) position.

Float Position		Resistance (Ω)
Full Upper “a”	56 mm (2.20 in.)	38 – 42
Middle (1/2) “b”	119.2 mm (4.69 in.)	157 – 163
Full Lower “c”	200.5 mm (7.89 in.)	276 – 284

If measured resistance is out of specification, replace.



ENGINE COOLANT TEMP. (ECT) METER AND SENSOR

ENGINE COOLANT TEMP. (ECT) METER

INSPECTION

- 1) Disconnect W/G lead wire going to ECT sensor.
- 2) Turn ignition switch ON, and check that ECT meter indicates COOL.
- 3) Turn ignition switch OFF.
- 4) Ground W/G lead wire through a 3.4 W test bulb (1) as illustrated.
- 5) Turn ignition switch ON, and check that bulb light up and pointer (2) moves to hot side.

ENGINE COOLANT TEMP. (ECT) SENSOR FOR METER**WARNING:**

- Make sure that engine coolant temperature is cold before removing any part of cooling system.
- Also be sure to disconnect negative (-) cable at battery before removing any part.

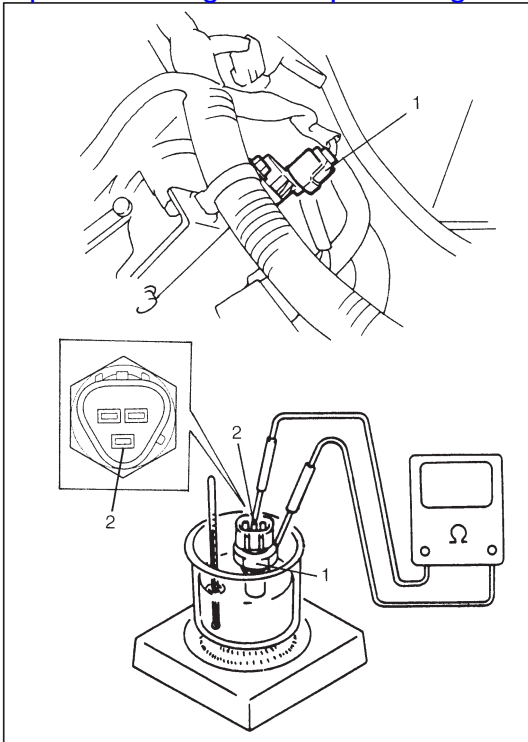
REMOVAL AND INSTALLATION

Refer to ENGINE COOLANT TEMPERATURE SENSOR in Section 6E.

INSPECTION

Warm up ECT sensor (1). Thus make sure ECT sensor for meter (2) resistance is decreased with increase of its temperature.

Temperature	Resistance
50°C (122°F)	136 – 216 Ω
120°C (248°F)	16.4 – 19.4 Ω

**OIL PRESSURE WARNING LIGHT****OIL PRESSURE SWITCH****INSPECTION**

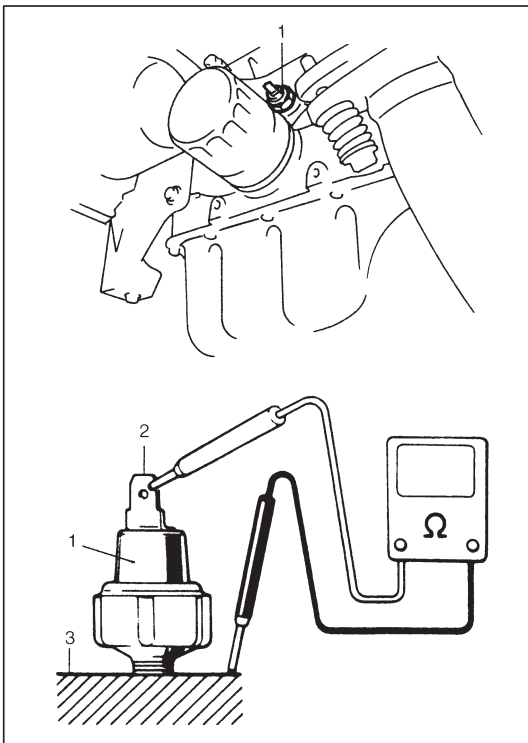
- 1) Disconnect oil pressure switch (1) lead wire.
- 2) Check continuity between oil pressure switch terminal (2) and cylinder block (3) as shown.

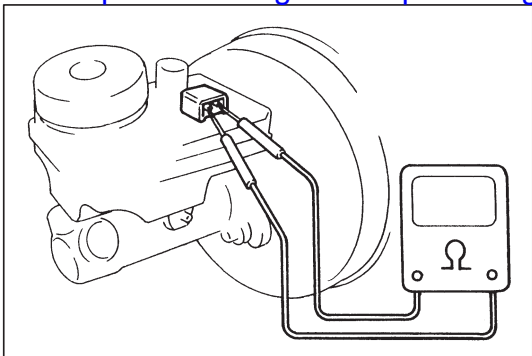
During Engine Running	No continuity
At Engine Stop	Continuity

If not, replace oil pressure switch (1).

REMOVAL AND INSTALLATION

Refer to OIL PRESSURE CHECK in Section 6A1.





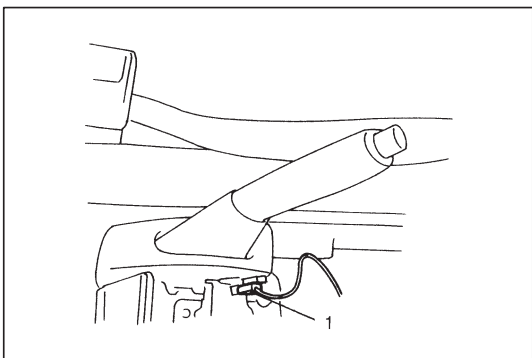
BRAKE WARNING LIGHT BRAKE FLUID LEVEL SWITCH

INSPECTION

Check switch for continuity.

If found defective, replace switch (reservoir).

OFF position (float up)	No continuity
ON position (float down)	Continuity



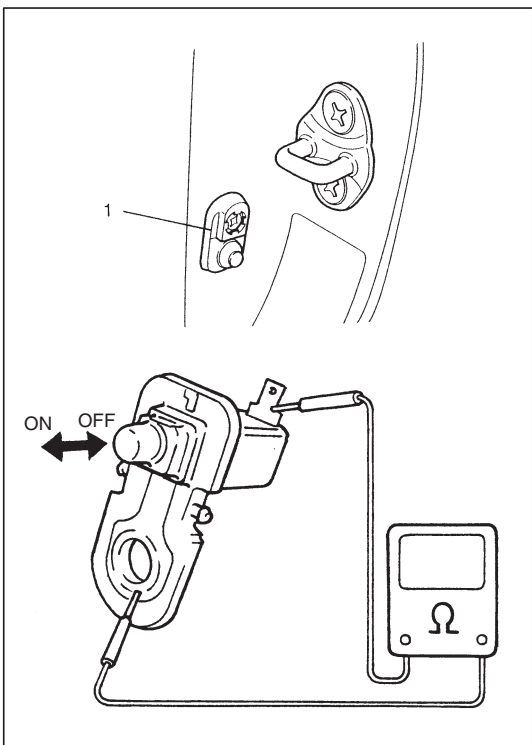
PARKING BRAKE SWITCH

INSPECTION

Check switch (1) for continuity.

If found defective, replace switch (1).

OFF position (parking brake lever released)	No continuity
ON position (parking brake lever pulled up)	Continuity



DOOR SWITCH

INSPECTION

1) Remove door switch (1).

2) Check switch (1) for continuity.

If found defective, replace switch (1).

OFF position (Door closed)	No continuity
ON position (Door open)	Continuity

IGNITION KEY REMAINDER/LIGHT REMAINDER WARNING BUZZER

REMOVAL AND INSTALLATION

Refer to COMBINATION METER in this section.

SECTION 8D

WINDOWS, MIRRORS, SECURITY AND LOCKS

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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GENERAL DESCRIPTION

CAUTIONS IN SERVICING

Refer to Section 8.

SYMBOLS AND MARKS

Refer to Section 8.

WIRING COLOR SYMBOLS

Refer to Section 8.

ABBREVIATIONS

Refer to Section 8.

JOINT CONNECTOR

Refer to Section 8.

FUSE BOX AND RELAY

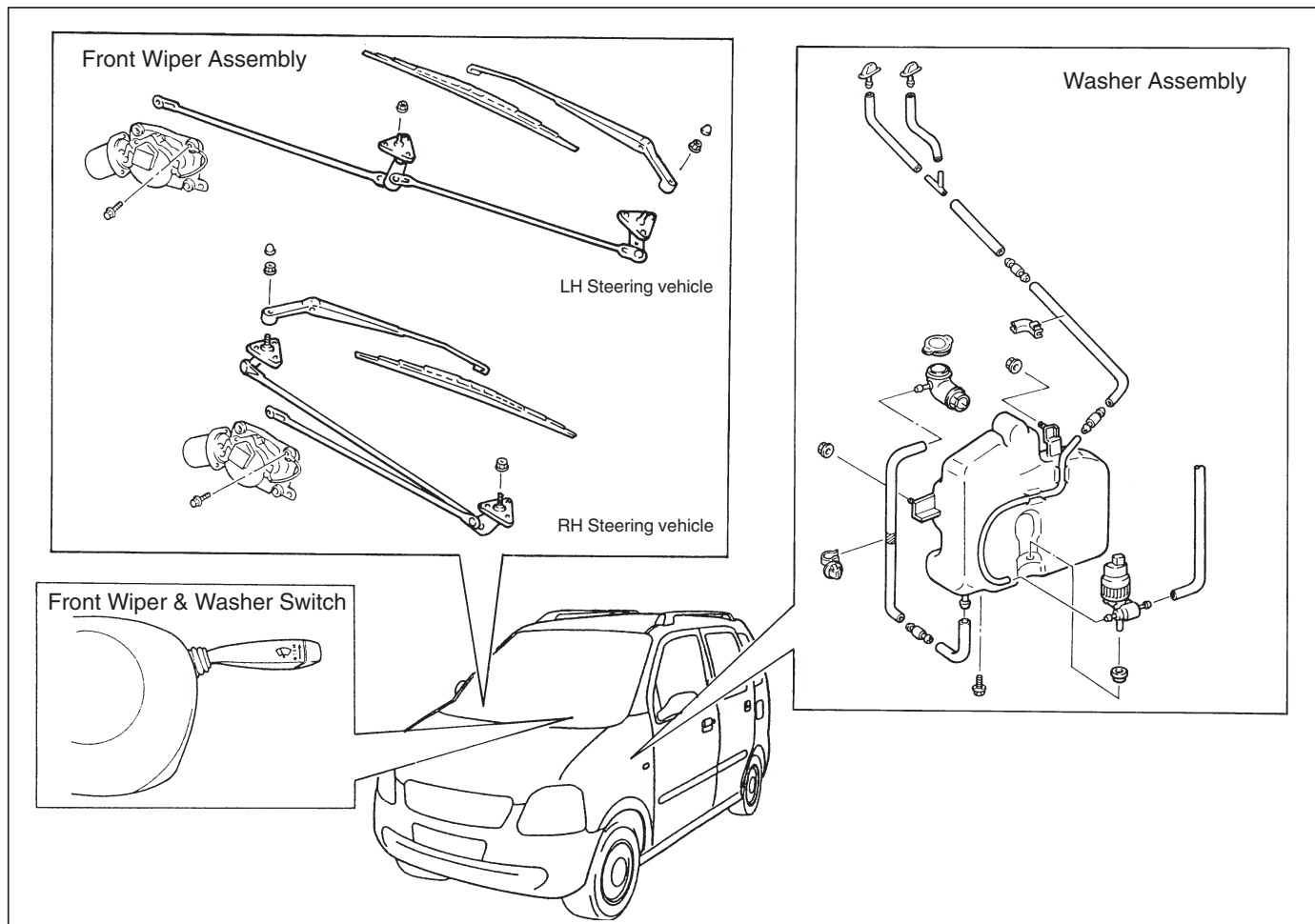
Refer to Section 8.

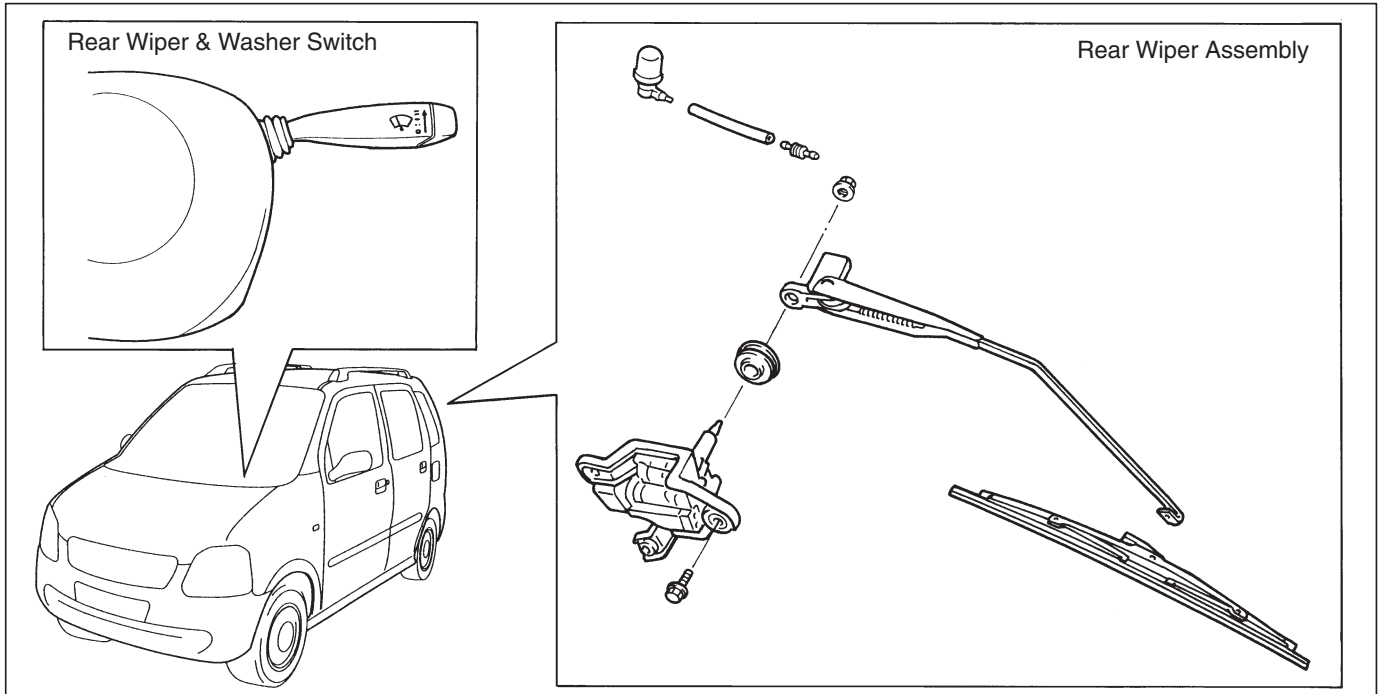
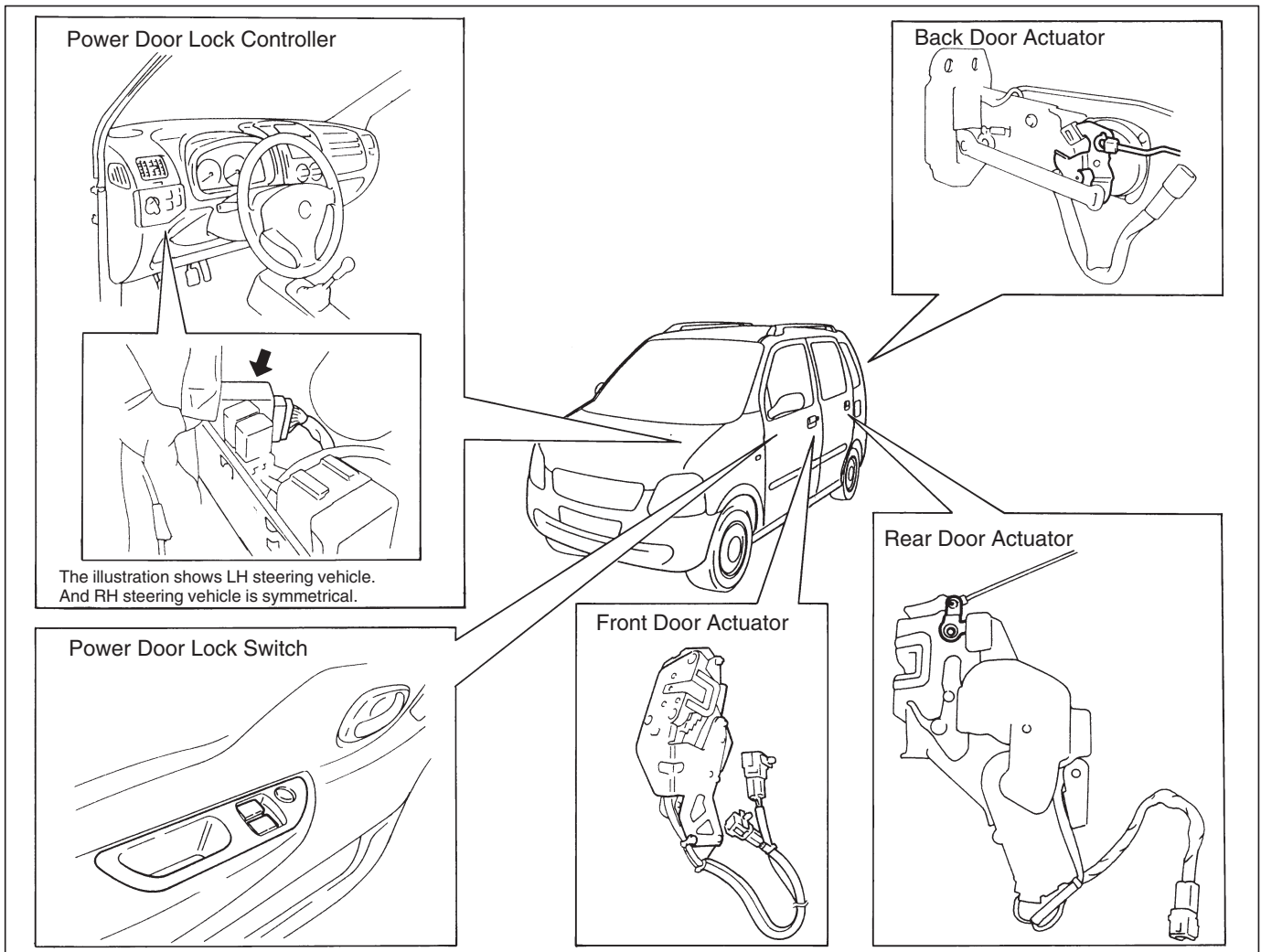
POWER SUPPLY DIAGRAM

Refer to Section 8.

WINDSHIELD WIPER AND WASHER

FRONT WIPER AND WASHER



REAR WIPER AND WASHER**POWER DOOR LOCK SYSTEM (IF EQUIPPED)**

DIAGNOSIS**WINDSHIELD WIPER AND WASHER****FRONT WIPER AND WASHER**

Trouble	Possible cause	Correction
Wiper does not operate or move at a specified speed	<ul style="list-style-type: none"> ● WIPER WASHER fuse blown ● Wiper motor faulty ● Wiper switch faulty ● Wiring or grounding faulty 	Replace blown fuse to check for short Check motor Check switch Repair
Wiper does not return to original position	<ul style="list-style-type: none"> ● Wiper motor faulty ● Wiper switch faulty ● Intermittent timer faulty ● Wiring or grounding faulty 	Check motor Check switch Check timer Repair
Only intermittent wiper does not operate	<ul style="list-style-type: none"> ● Wiper switch faulty ● Intermittent timer faulty ● Wiring or grounding faulty 	Check switch Check timer Repair
Washer and wiper does not operate when washer switch is in ON	<ul style="list-style-type: none"> ● Washer hose or nozzle clogged ● Washer motor faulty ● Washer switch faulty ● Intermittent timer faulty ● Wiring or grounding faulty 	Repair Check motor Check switch Check timer Repair

REAR WIPER AND WASHER

Trouble	Possible cause	Correction
Wiper does not operate or does not return to original position	<ul style="list-style-type: none"> ● WIPER WASHER fuse blown ● Wiper motor faulty ● Wiper switch faulty ● Wiring or grounding faulty 	Replace blown fuse to check for short Check motor Check switch Repair
Washer malfunctions	<ul style="list-style-type: none"> ● Washer hose or nozzle clogged ● Washer motor faulty ● Washer switch faulty ● Wiring faulty 	Repair Check motor Check switch Repair

REAR WINDOW DEFOGGER

Trouble	Possible cause	Correction
Defogger does not work	<ul style="list-style-type: none"> ● REAR DEFG fuse blown ● HEATER fuse blown ● Defogger switch faulty ● Defogger heat wire faulty ● Defogger relay faulty ● Wiring or grounding faulty 	Replace fuse to check for short Replace fuse to check for short Check switch Check heat wire Replace relay Repair as necessary

POWER WINDOW CONTROL SYSTEM (IF EQUIPPED)

Trouble	Possible cause	Correction
None of power windows functions	<ul style="list-style-type: none"> ● POWER WINDOW fuse blown ● Ignition switch faulty ● Wiring or grounding faulty 	Replace fuse to check for short Check switch Repair as necessary
Only one power window does not function	<ul style="list-style-type: none"> ● Power window main switch faulty ● Power window sub switch faulty ● Power window motor (actuator) faulty ● Wiring or grounding faulty 	Check switch Check switch Check motor Repair as necessary

POWER DOOR LOCK SYSTEM (IF EQUIPPED)

Condition	Possible cause	Correction
All power door locks do not operate as interlocked with door lock key	<ul style="list-style-type: none"> ● DOOR LOCK fuse blown ● Power door lock controller faulty ● Wiring or grounding faulty 	Replace fuse to check for short Replace controller Repair as necessary
Power door locks do not operate by power door lock switch	<ul style="list-style-type: none"> ● Power door lock switch faulty ● Power door lock controller faulty ● Wiring or grounding faulty 	Check switch Replace controller Repair as necessary
Only one power door lock does not operate	<ul style="list-style-type: none"> ● Actuator (door lock motor) faulty ● Wiring or grounding faulty 	Check actuator Repair as necessary
Only front power door locks or only rear power door locks do not operate	<ul style="list-style-type: none"> ● Wiring faulty 	Repair as necessary

POWER DOOR MIRROR CONTROL SYSTEM (IF EQUIPPED)

Condition	Possible cause	Correction
All power mirrors do not operate	<ul style="list-style-type: none"> ● ACC fuse blown ● Power door mirror switch faulty ● Wiring or grounding faulty 	Replace fuse to check for short Check switch Repair as necessary
One power mirror does not operate	<ul style="list-style-type: none"> ● Power door mirror switch faulty ● Actuator (power door mirror motor) faulty ● Wiring or grounding faulty 	Check switch Check actuator Repair as necessary

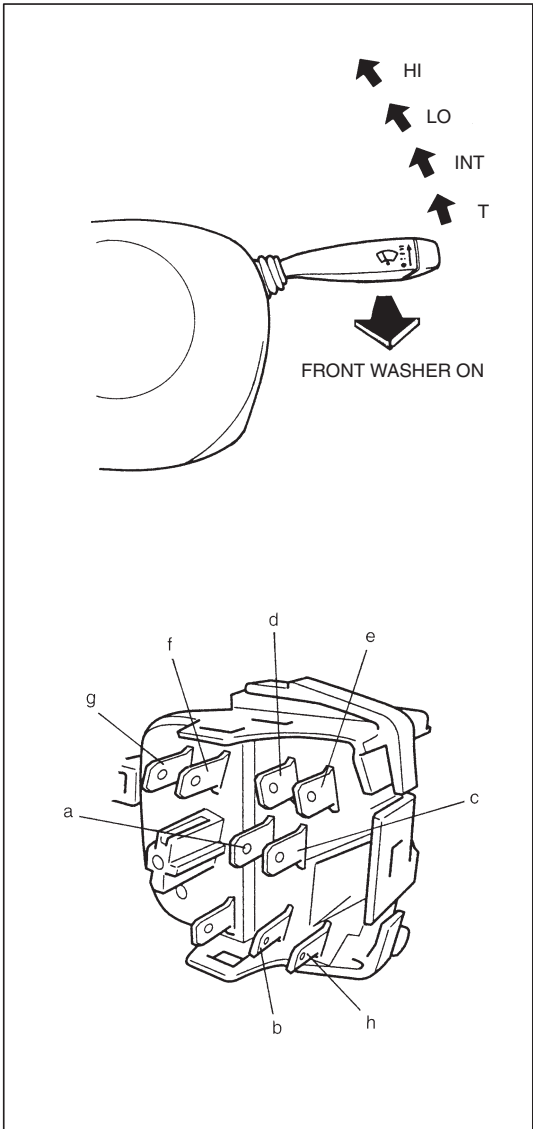
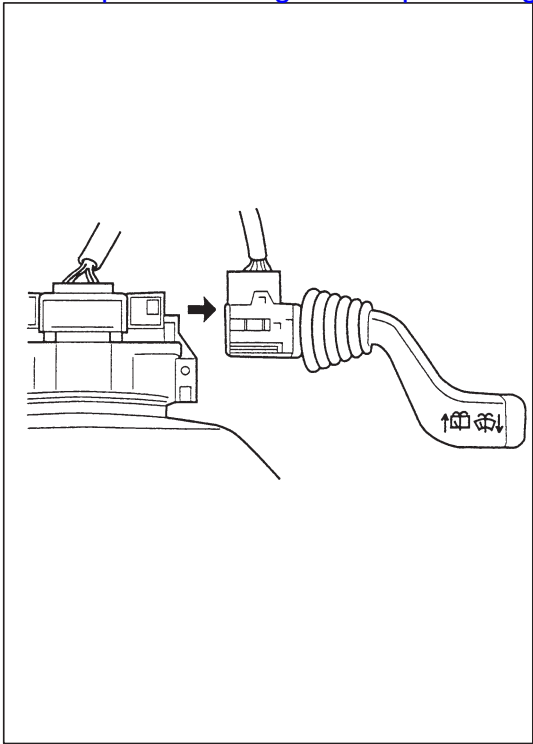
ON-VEHICLE SERVICE

WINDSHIELD WIPER AND WASHER

FRONT WIPER AND WASHER SWITCH

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove steering column cover. Refer to step 5) of CONTACT COIL CABLE ASSEMBLY REMOVAL in Section 3C.
- 3) Pull out wiper and washer switch assembly.
- 4) Disconnect wiper and washer switch lead wire coupler.



INSPECTION

Check the continuity at each switch position. If any continuity is not obtained, replace switch.

Front wiper switch

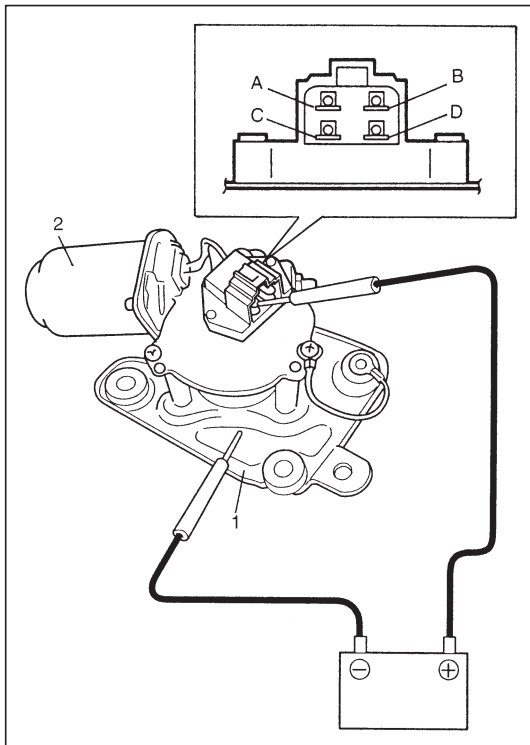
Terminal Position	a	b	c	d	e
OFF					
T					
INT					
LO					
HI					

Front washer switch

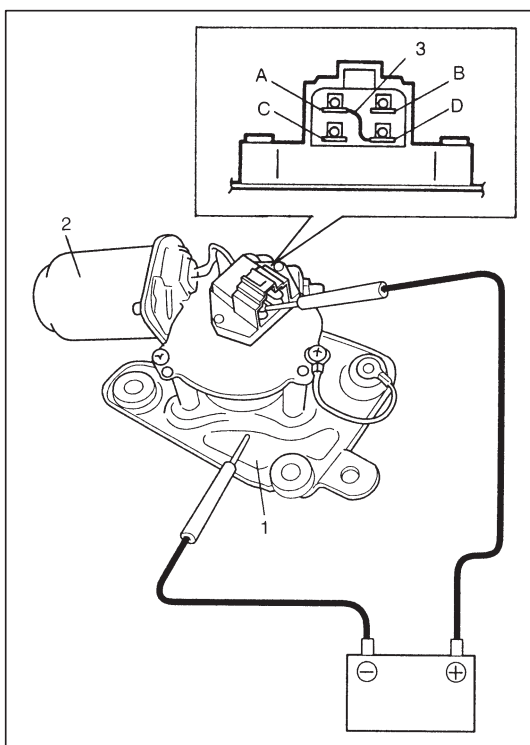
Terminal Position	a	f	g	h
OFF				
ON				

INSTALLATION

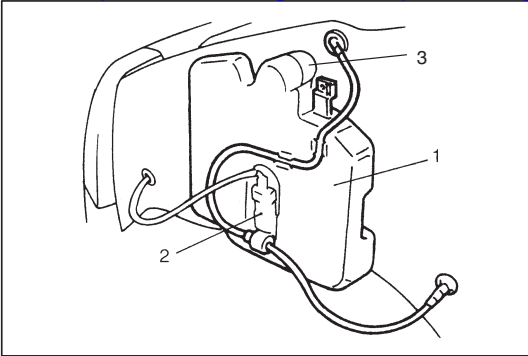
- 1) Connect wiper and washer switch lead wire coupler.
- 2) Push wiper and washer switch assembly into steering column till it clicks.
- 3) Install steering column cover. Reverse removal procedure.

**FRONT WIPER MOTOR****INSPECTION**

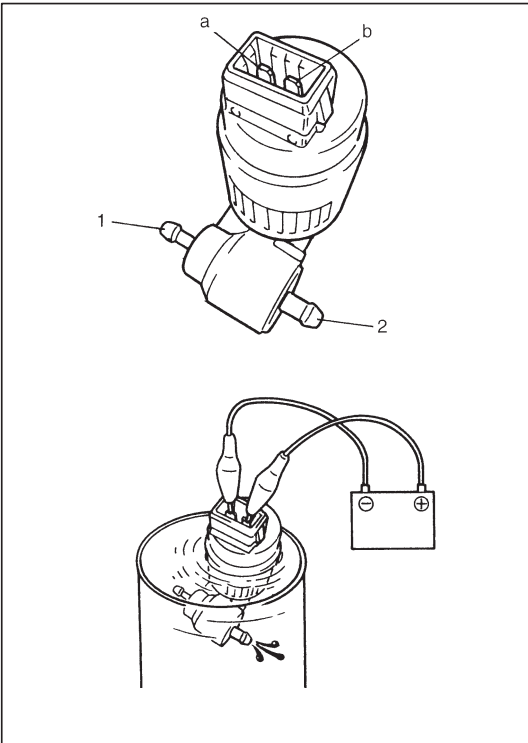
- 1) As illustrated, use a 12 V battery to connect its (+) terminal to terminal "A" and its (–) terminal to bracket (1) (wiper ground). If motor (2) rotates at a low revolution speed of 45 to 55 rpm, it is proper. For high speed check, connect battery (+) terminal to terminal "B", and its (–) terminal to bracket (1) (wiper ground). If motor (2) rotates at a high revolution speed of 67 to 83 rpm, it is proper.



- 2) Testing automatic stop action.
 - a) Connect 12 V battery (+) terminal to terminal "A" and its (–) terminal to bracket (1) (wiper ground), and let the motor (2) turn.
 - b) Disconnect terminal "A" from battery, and let the motor (2) stop.
 - c) Connect terminal "A" and "D" with a jumper wire (3), and connect terminal "C" to battery (+) terminal. Observe the motor (2) turns once again then stops at a given position.
 - d) Repeat a) thru c) several times and inspect if the motor (2) stops at the given position every time.

FRONT AND REAR WASHER PUMP**REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Remove front fender lining (LH).
- 3) Remove inlet pipe (3) from washer tank (1).
- 4) Remove washer tank (1) fitting nuts.
- 5) Disconnect pump (2) lead wires and hoses.
- 6) Remove washer tank (1).
- 7) Remove pump (2) from tank (1).

**INSPECTION**

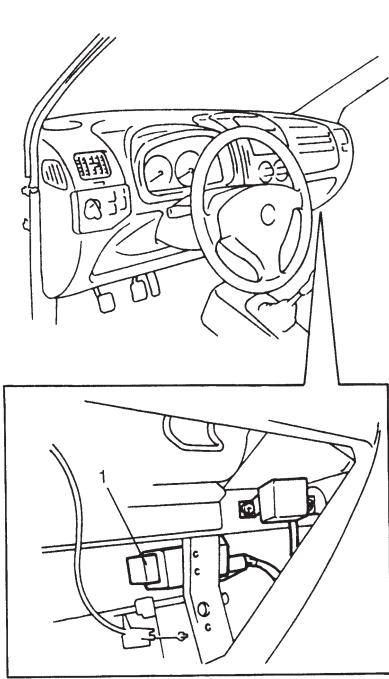
- 1) Connect battery (+) terminal to pump (a) terminal, and battery (-) terminal to pump (b) terminal.
Check that water jets from front washer side (1).
- 2) Connect battery (+) terminal to pump (b) terminal, and battery (-) terminal to pump (a) terminal.
Check that water jets from rear washer side (2).

INSTALLATION

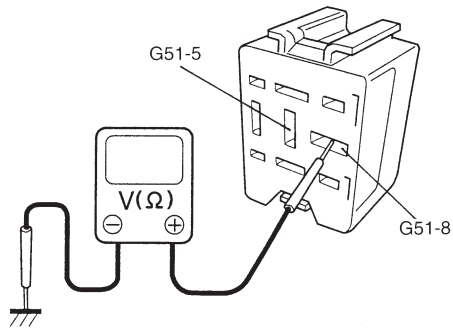
Reverse removal procedure for installation.

AUTO STOP CIRCUIT**INSPECTION**

- 1) Check that wiper motor operates with the wiper switch at low position.
- 2) Disconnect negative cable at battery.
- 3) Disable air bag system. Refer to **DISABLING AIR BAG SYSTEM** in Section 10B.
- 4) Pull out intermittent timer (1) and disconnect coupler, and connect negative cable at battery.
- 5) Check that the voltage and resistance between following terminals are specification.

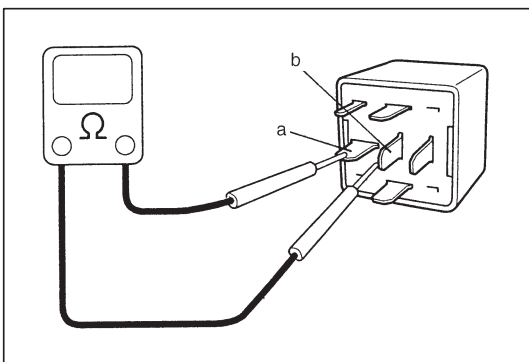


The illustration shows LH steering vehicle.
And RH steering vehicle is symmetrical.



Terminals	Condition	Specification
G51-8 and ground	—	Continuity
G51-5 and ground	When wiper blades are stopped at windshield base.	Continuity
	Turn ignition switch to ON. Turn wiper switch to ON then to OFF so that wiper blades stop at the position except starting/returning point.	10 – 15 V

If check result is not satisfactory, repair and recheck.

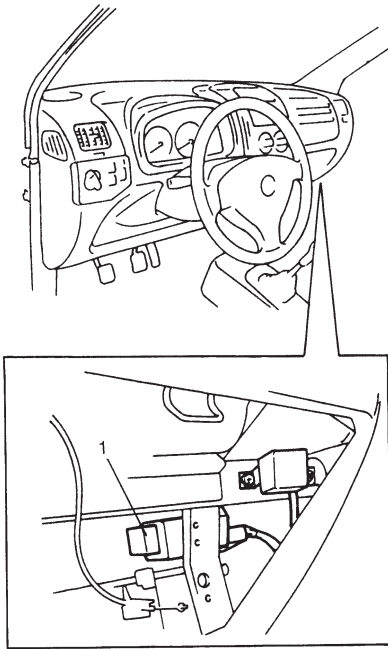


- 6) Check the continuity between terminals “a” and “b” of intermittent timer. If continuity is not obtain, replace intermittent timer and recheck.

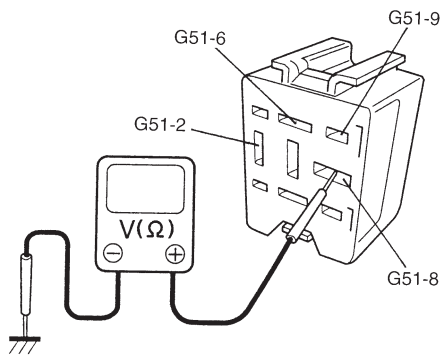
- 7) After intermittent lead wire coupler is connected and intermittent timer is installed, enable air bag system. Refer to **ENABLING AIR BAG SYSTEM** in Section 10B.

INTERMITTENT CIRCUIT**INSPECTION**

- 1) Check that wiper motor operates with the wiper switch at low position, and return to original position with the wiper switch turned OFF.
- 2) Disconnect negative cable at battery.
- 3) Disable air bag system. Refer to DISABLING AIR BAG SYSTEM in Section 10B.
- 4) Pull out intermittent timer (1) and disconnect coupler, and connect negative cable at battery.
- 5) Check that the voltage and resistance between following terminals are specifications.



The illustration shows LH steering vehicle.
And RH steering vehicle is symmetrical.



Terminals	Condition	Specification
G51-2 and ground	When ignition switch is in OFF.	0 V
	When ignition switch is in ON.	10 – 15 V
G51-6 and ground	—	Continuity
G51-8 and ground	—	Continuity
G51-9 and ground	When ignition switch is in ON and wiper switch is in OFF.	0 V
	When ignition switch is in ON and wiper switch is in intermittent position.	10 – 15 V

If check result is not satisfactory, repair.

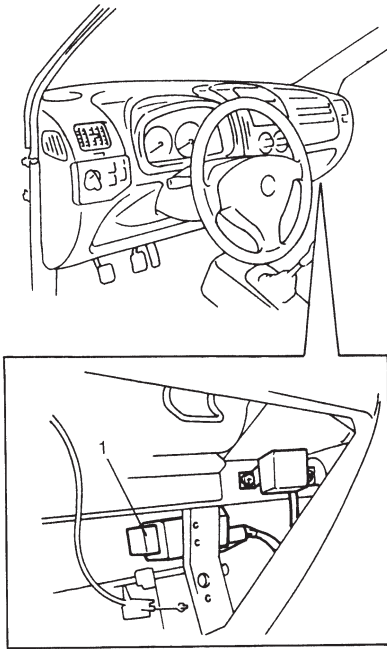
REFERENCE:

The wiper motor operates the wiper arms at an interval of approximately 6 seconds per one operation at low speed.

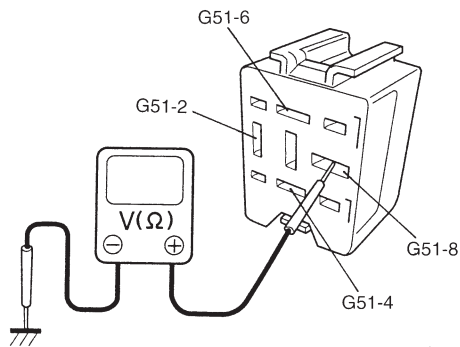
- 6) After intermittent lead wire coupler is connected and intermittent timer is installed, enable air bag system. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

WASHER LINKED CIRCUIT**INSPECTION**

- 1) Check that wiper motor operates with the wiper switch at low position, and return to original position with the wiper switch turned OFF.
- 2) Disconnect negative cable at battery.
- 3) Disable air bag system. Refer to **DISABLING AIR BAG SYSTEM** in Section 10B.
- 4) Pull out intermittent timer (1) and disconnect coupler, and connect negative cable at battery.
- 5) Check that the voltage and resistance between following terminals are specification.



The illustration shows LH steering vehicle.
And RH steering vehicle is symmetrical.



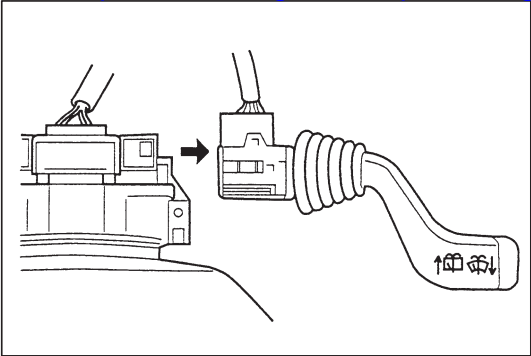
Terminals	Condition	Specification
G51-2 and ground	When ignition switch is in OFF.	0 V
	When ignition switch is in ON.	10 – 15 V
G51-6 and ground	—	Continuity
G51-8 and ground	—	Continuity
G51-4 and ground	When ignition switch is in ON and washer switch is in OFF.	0 V
	When ignition switch is in ON and washer switch is in ON.	10 – 15 V

If check result is not satisfactory, repair.

REFERENCE:

When front washer switch is in ON position for one second or more and then turned OFF, the wiper motor operates at low speed for approximately 5 seconds after front washer switch is turned OFF.

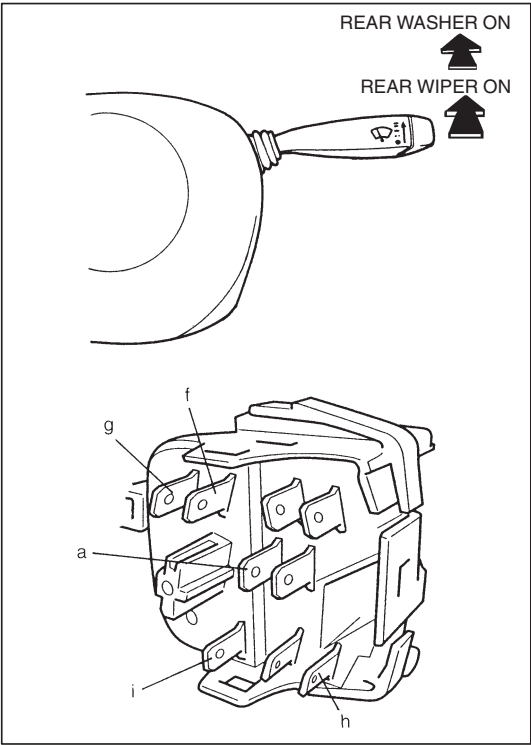
- 6) After intermittent lead wire coupler is connected and intermittent timer is installed, enable air bag system. Refer to **ENABLING AIR BAG SYSTEM** in Section 10B.



REAR WIPER AND WASHER SWITCH

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove steering column cover. Refer to step 5) of CONTACT COIL CABLE ASSEMBLY REMOVAL in Section 3C.
- 3) Pull out wiper and washer switch assembly.
- 4) Disconnect wiper and washer switch lead wire coupler.



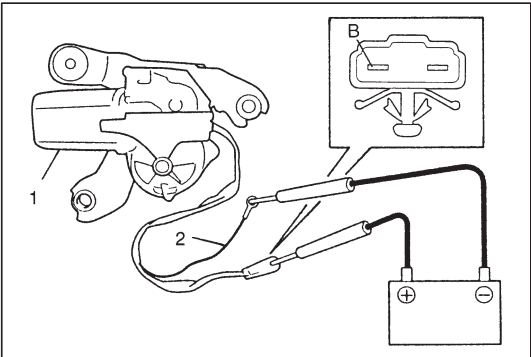
INSPECTION

Check the continuity at each switch position. If any continuity is not obtained, replace switch.

Terminal Position	a	i	f	g	h
OFF					
ON					
RR WASHER					

INSTALLATION

- 1) Connect wiper and washer switch lead wire coupler.
- 2) Push wiper and washer switch assembly into steering column till it clicks.
- 3) Install steering column cover. Reverse removal procedure.

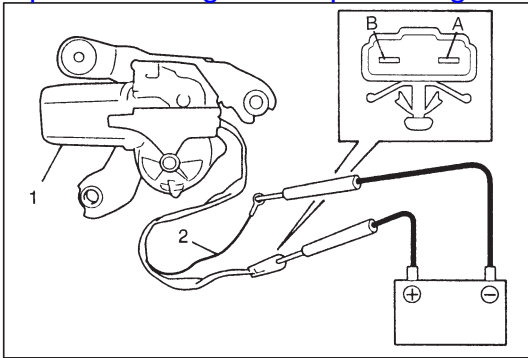


REAR WIPER MOTOR

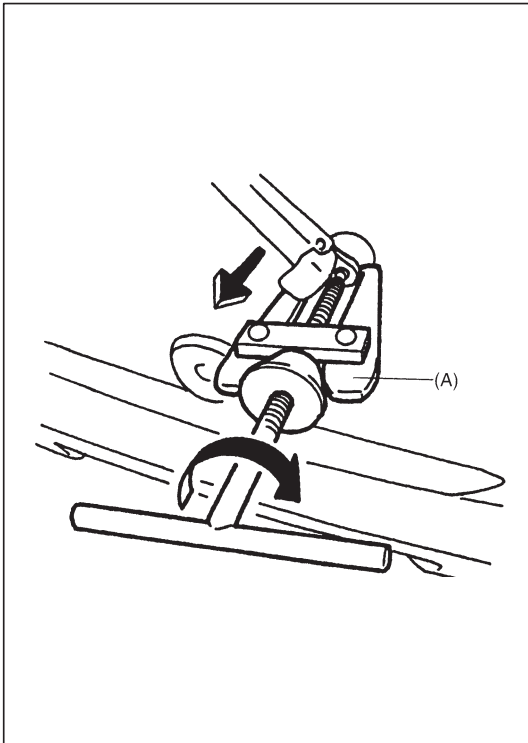
INSPECTION

1) TESTING WIPER MOTOR

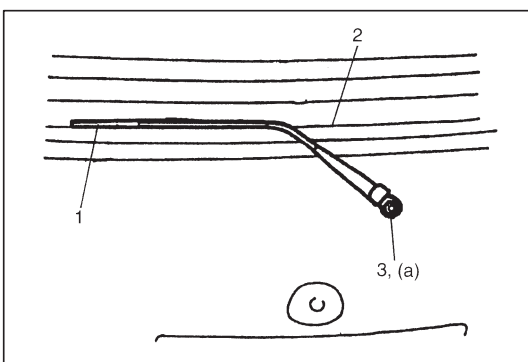
As shown left, use a 12 V battery to connect its (+) terminal to terminal “B”, and its (–) terminal to black lead wire (2). Then motor (1) should rotate at 35 to 45 rpm.

**2) TESTING AUTOMATIC STOP ACTION**

- First, connect battery (+) terminal to terminal "B" and its (-) terminal to black lead wire (2), and let the motor (1) turn.
- Then disconnect terminal "B" from battery and let the motor (1) stop.
- Next connect terminal "A" to battery (+) terminal. Observe the wiper motor (1) turns once again, then stops at a given position.
- Repeat these steps several times, and inspect if the motor (1) stops at the given position every time.

**REAR WIPER ARM****REMOVAL**

- Remove rear wiper arm mounting nut.
- Remove wiper arm and blade assembly by using special tool as shown.

Special Tool**(A): 09913-60910****INSTALLATION**

- Install rear wiper arm and blade assembly.
- The wiper blade (1) set down aligning blade with the bottom heat wire (2).
- Install wiper arm mounting nut (3).

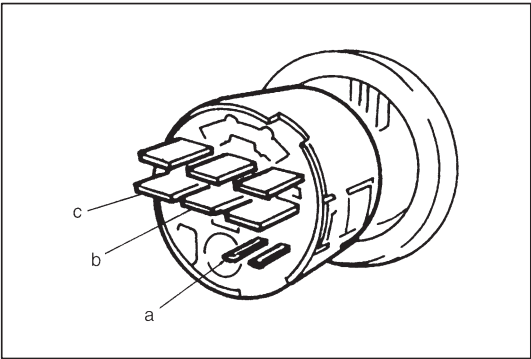
Tightening Torque**(a): 8 N·m (0.8 kg-m, 5.9 lb-ft)**

REAR WINDOW DEFOGGER

DEFOGGER SWITCH (IN BLOWER FAN AND DEFOGGER SWITCH)

REMOVAL

Remove blower fan and defogger switch. Refer to BLOWER FAN & DEFOGGER SWITCH REMOVAL in Section 1A.



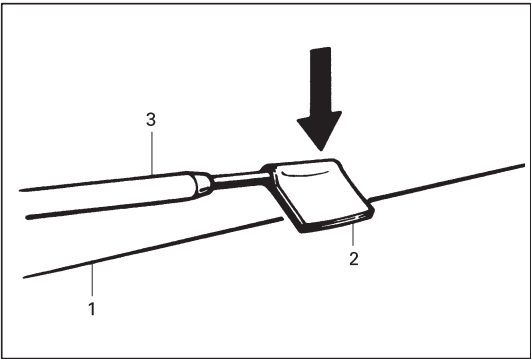
INSPECTION

Check defogger switch for continuity.
If switch has no continuity between terminals, replace.

Terminal Position	a	b	c
PUSH			
PULL			

INSTALLATION

Reverse removal procedure for installation.



DEFOGGER WIRE

CAUTION:

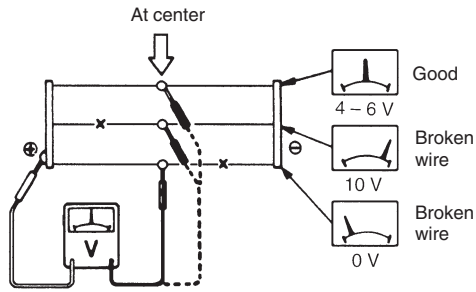
When cleaning rear window glass, use a dry cloth to wipe it along wire direction.
And also do not use detergent or abrassive-containing glass cleaner. Otherwise, wire may be damaged.

NOTE:

When measuring wire voltage, use a tester with negative probe (3) wrapped with a tin foil (2) which should be held down on wire (1) by finger pressure.

INSPECTION

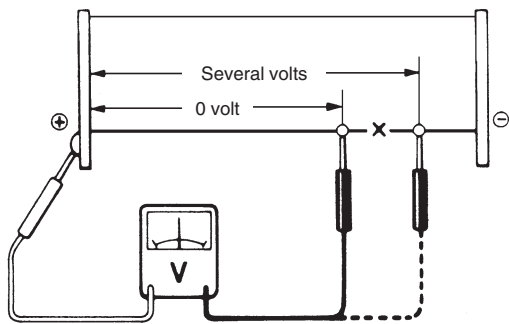
- 1) Checking wire damage
 - a. Turn main switch ON.
 - b. Turn defogger switch ON.
 - c. Check voltage at the center of each heat wire, as shown.



Voltage	Criteria
Approx. 5 V	Good (No break in wire)
Approx. 10 V or 0V	Broken wire

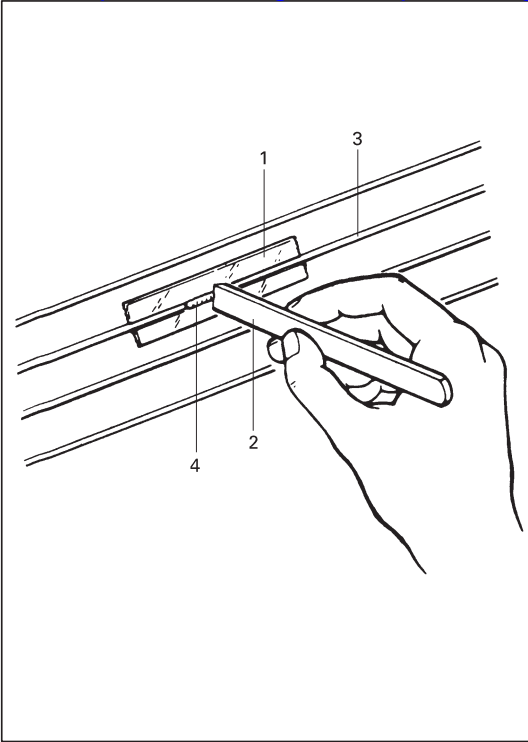
If measured voltage is 10 V, wire must be damaged between its center and positive end. If voltage is zero, wire must be damaged between its center and ground.

- 2) Locating damage in wire
 - a. Touch voltmeter positive (+) lead to heat wire positive terminal end.
 - b. Touch voltmeter negative (–) lead with a foil strip to heat wire positive terminal end, then move it along wire to the negative terminal end.
 - c. The place where voltmeter fluctuates from zero to several volts is where there is damage.

**NOTE:**

If heat wire is free from damage, voltmeter should indicate 12 V at heat wire positive terminal end and its indication should decrease gradually toward zero at the other terminal (ground).

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DEFOGGER CIRCUIT REPAIR

- 1) Use white gasoline for cleaning.
- 2) Apply masking tape (1) at both upper and lower sides of heat wire (3) to be repaired.
- 3) Apply commercially-available repair agent (4) with a fine-tip brush (2).
- 4) Two to three minutes later, remove masking tapes (1) previously applied.
- 5) Leave repaired heat wire (3) as it is for at least 24 hours before operating defogger again.

POWER WINDOW CONTROL SYSTEM (IF EQUIPPED)**POWER WINDOW MAIN SWITCH****INSPECTION**

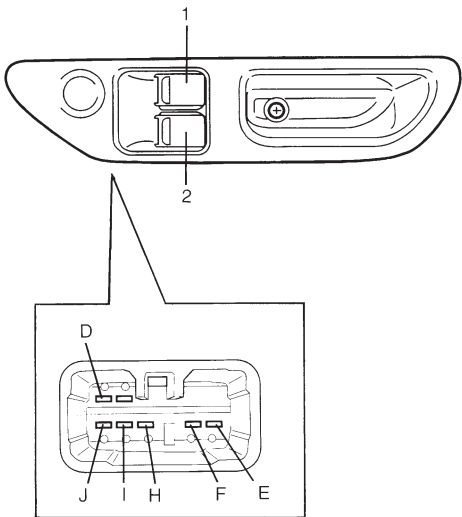
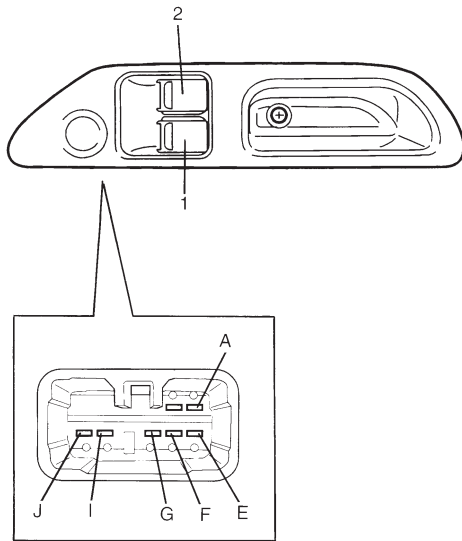
Inspect switch for continuity between terminals.

LH steering vehicle

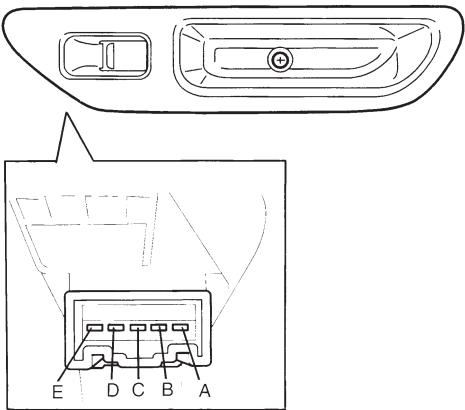
	Driver Side Window Switch (1)				Passenger Side Window Switch (2)			
Terminal Switch	G	E	F	A	G	J	I	A
UP								
OFF								
DOWN								

RH steering vehicle

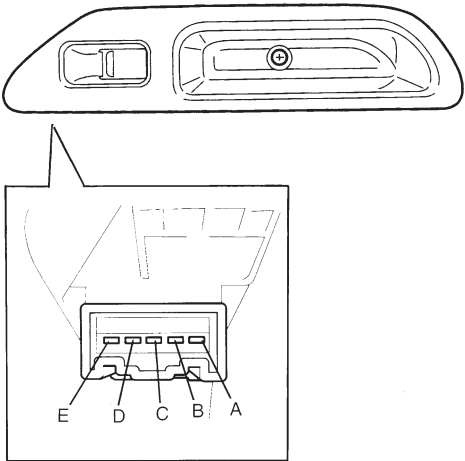
	Driver Side Window Switch (1)				Passenger Side Window Switch (2)			
Terminal Switch	H	J	I	D	H	E	F	D
UP								
OFF								
DOWN								



LH steering vehicle



RH steering vehicle

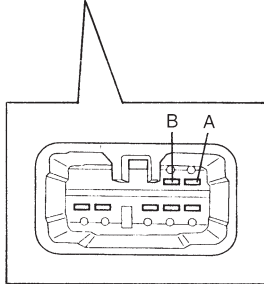
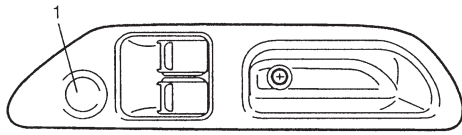
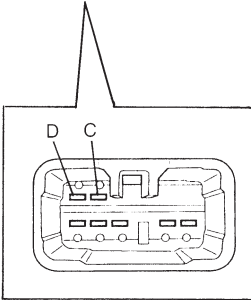
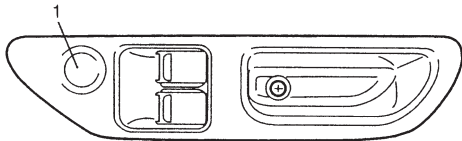


POWER WINDOW SUB SWITCH

INSPECTION

Inspect switch for continuity between terminals.

Terminal Switch Position	C	A	D	B	E
UP					
OFF					
DOWN					

LH steering vehicle**RH steering vehicle****POWER DOOR LOCK SYSTEM (IF EQUIPPED)****POWER DOOR LOCK SWITCH****INSPECTION**

Inspect continuity between terminals according to door lock switch (1) action.

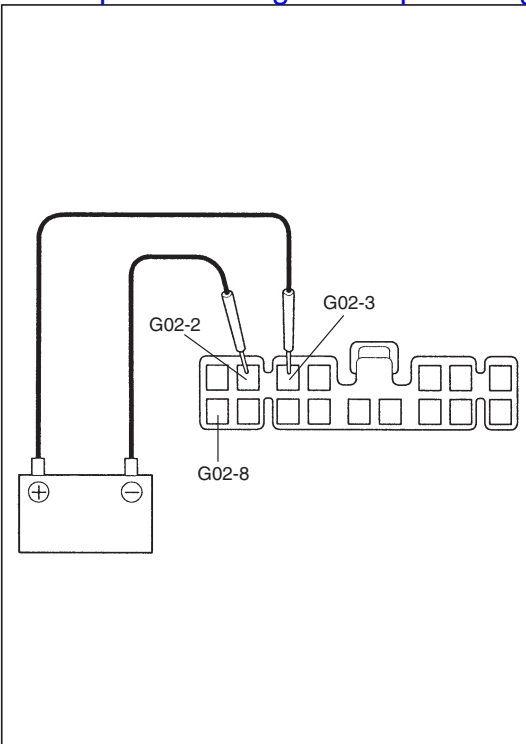
For LH steering		A	B
Vehicle terminal			
For RH steering		D	C
Vehicle terminal			
Switch	PUSH		
	FREE		

POWER DOOR LOCK CIRCUIT**INSPECTION**

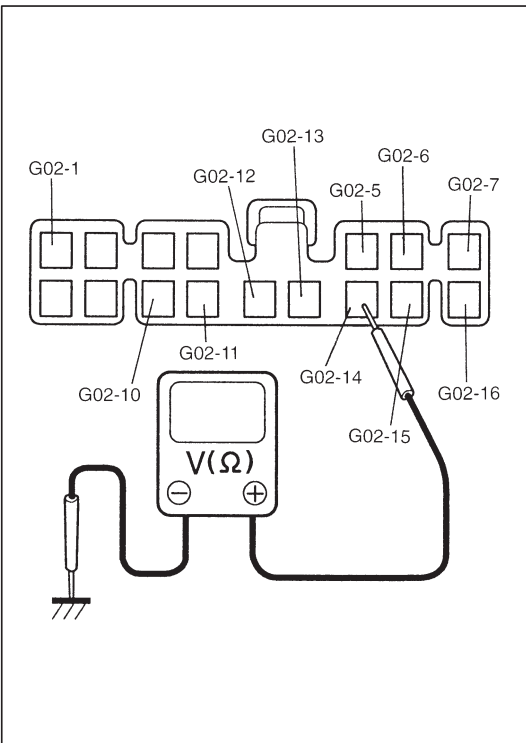
- 1) Disconnect negative cable at battery.
- 2) Disconnect door lock controller coupler.
- 3) Use a 12 V battery to connect its (+) terminal to terminal G02-3, and its (–) terminal to terminal G02-2. Check all power door locks are in lock position.

Connect battery (+) terminal to G02-8, and its (–) terminal to G02-2. Check all power door locks (except back door lock) are in dead lock position.

Connect battery (+) terminal to G02-2, and its (–) terminal to G02-3 and G02-8. Check all power door locks are in unlock position. If check result is not satisfactory, repair wiring harness and recheck.

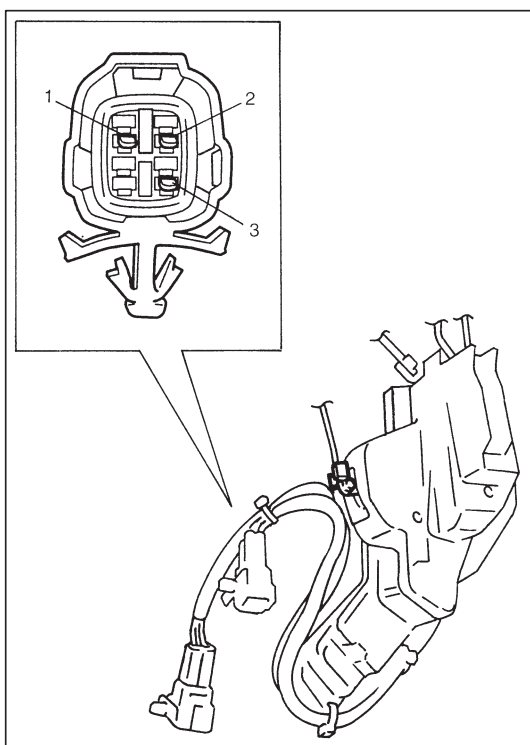


- 4) Connect battery negative cable at battery.
- 5) Check that the voltage and resistance between following terminals are specifications.



Terminals	Condition	Specification
G02-16 and ground	————	10 – 15 V
G02-11 and ground	When ignition switch is in OFF position	0 V
	When ignition switch is in ON position	10 – 15 V
G02-10 and ground	When ignition switch is in OFF position	0 V
	When ignition switch is in ACC position	10 – 15 V
G02-1 and ground	————	Continuity
G02-7 and ground	————	Continuity
G02-5 and ground	When door lock switch is pushed	Continuity
	When door lock switch is free	No continuity
G02-14 and ground	When all door switch is in OFF position	No continuity
G02-12 and ground	When driver side key switch is in unlock position	Continuity
	When driver side key switch is in OFF position	No continuity
G02-13 and ground	When driver side key switch is in lock position	Continuity
	When driver side key switch is in OFF position	No continuity
G02-15 and ground	When passenger side key switch is in unlock position	Continuity
	When passenger side key switch is in OFF position	No continuity
G02-6 and ground	When passenger side key switch is in lock position	Continuity
	When passenger side key switch is in OFF position	No continuity

If check result is not satisfactory, repair.



KEY CYLINDER SWITCH INSPECTION

Inspect continuity between terminals under the following key position.

LH steering vehicle

For driver side terminal		3	2	1
For passenger side terminal		1	2	3
Key	LOCK	○	○	
	OFF			
	UNLOCK		○	○

RH steering vehicle

For driver side terminal		1	2	3
For passenger side terminal		3	2	1
Key	LOCK	○	○	
	OFF			
	UNLOCK		○	○

POWER DOOR LOCK ACTUATOR

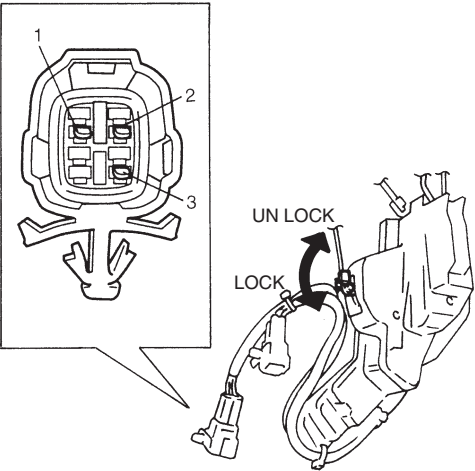
INSPECTION

- 1) Disconnect power door lock actuator coupler.
 - 2) Connect 12 V battery positive and negative terminals to the door lock actuator terminals shown below.
- If it does not operate as specified in table below, replace door lock actuator.

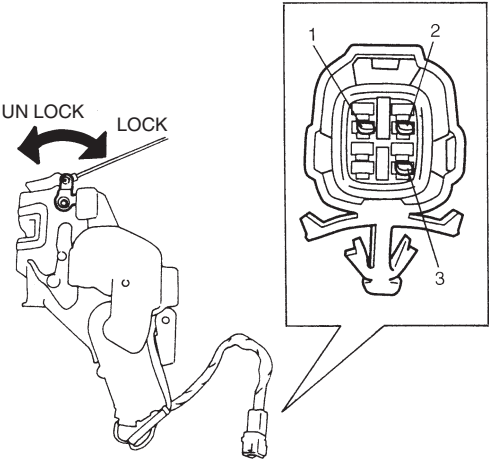
Front & Rear door

Operation Terminal	UNLOCK → LOCK	LOCK → DEAD LOCK	LOCK DEAD LOCK → UNLOCK
1		⊕	⊖
2	⊖	⊖	⊕
3	⊕		⊖

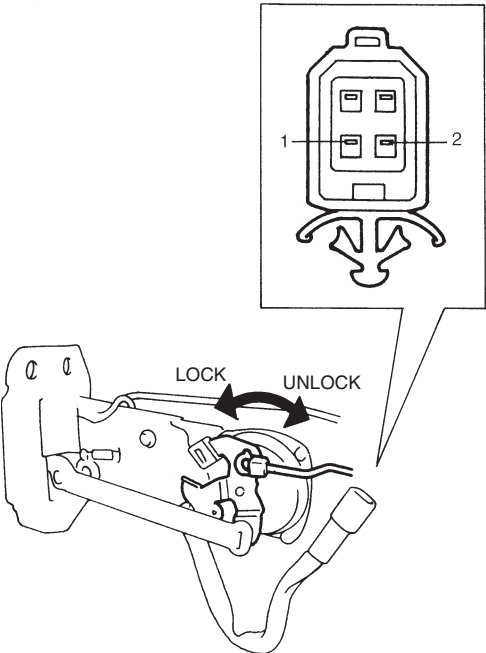
Front Door (Right & Left)



Rear door (Right & Left)



Back Door



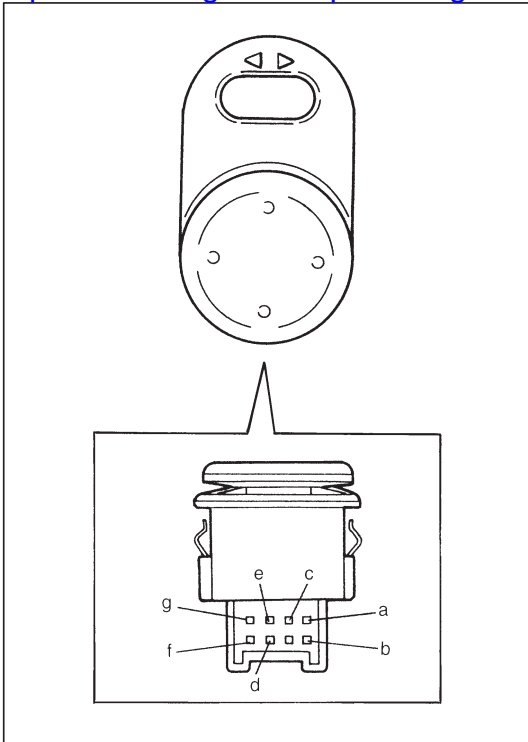
Back door

Operation Terminal	LOCK	UNLOCK
1	⊕	⊖
2	⊖	⊕

**POWER DOOR MIRROR CONTROL SYSTEM
(IF EQUIPPED)****MIRROR SWITCH****INSPECTION**

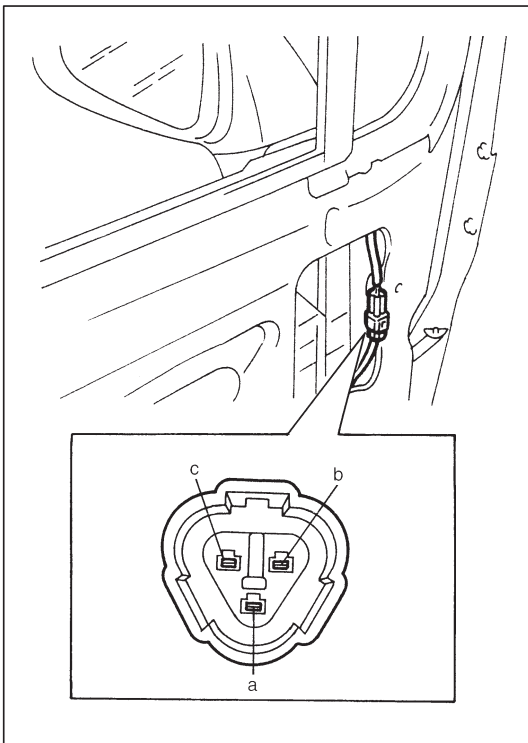
- 1) Disconnect negative cable at battery.
- 2) Pull out mirror switch from door trim.
- 3) Disconnect mirror switch lead wire coupler.
- 4) Check continuity between terminals at each switch position.
If any continuity is not obtained, replace mirror switch.

L	a	b	c	d	g
R				e	f
UP					
DOWN					
LEFT					
RIGHT					

**DOOR MIRROR ACTUATOR****INSPECTION**

- 1) Disconnect negative cable at battery.
- 2) Remove door trim. Refer to steps 1) to 5) of FRONT DOOR GLASS REMOVAL in Section 9.
- 3) Disconnect door mirror coupler.
- 4) Check that door mirror operates properly when battery voltage is applied to connector terminals.
Connect battery positive and negative terminal to the door mirror terminal shown below.
If it does not operate as specified in table below, replace door mirror assembly.

Terminal	a	b	c
Operation			
Up			
Down			
Left			
Right			



- 5) Install door trim. Reverse removal procedure.

REMOVAL AND INSTALLATION

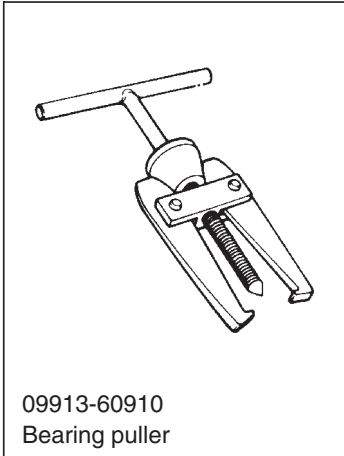
Refer to DOOR MIRROR REMOVAL AND INSTALLATION in Section 9.

NOTE:

When installing door mirror to door, be careful not to pinch harness between door and door mirror.

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SPECIAL TOOL



SECTION 8G

IMMOBILIZER CONTROL SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to AIR BAG SYSTEM COMPONENTS AND WIRING LOCATION VIEW under GENERAL DESCRIPTION in air bag section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNING and SERVICE PRECAUTIONS under ON-VEHICLE SERVICE in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative.

Either of these two conditions may result in severe injury.

- Technical service word must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery.

Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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DTC B3057 No password registered	8G-17		

GENERAL DESCRIPTION

COMPONENTS

The immobilizer control system designed to prevent vehicle burglar and it consists of following components.

- Engine control module (ECM)
- Immobilizer control module (including coil antenna)
- Ignition key with built-in transponder

Operation of this system is as follows.

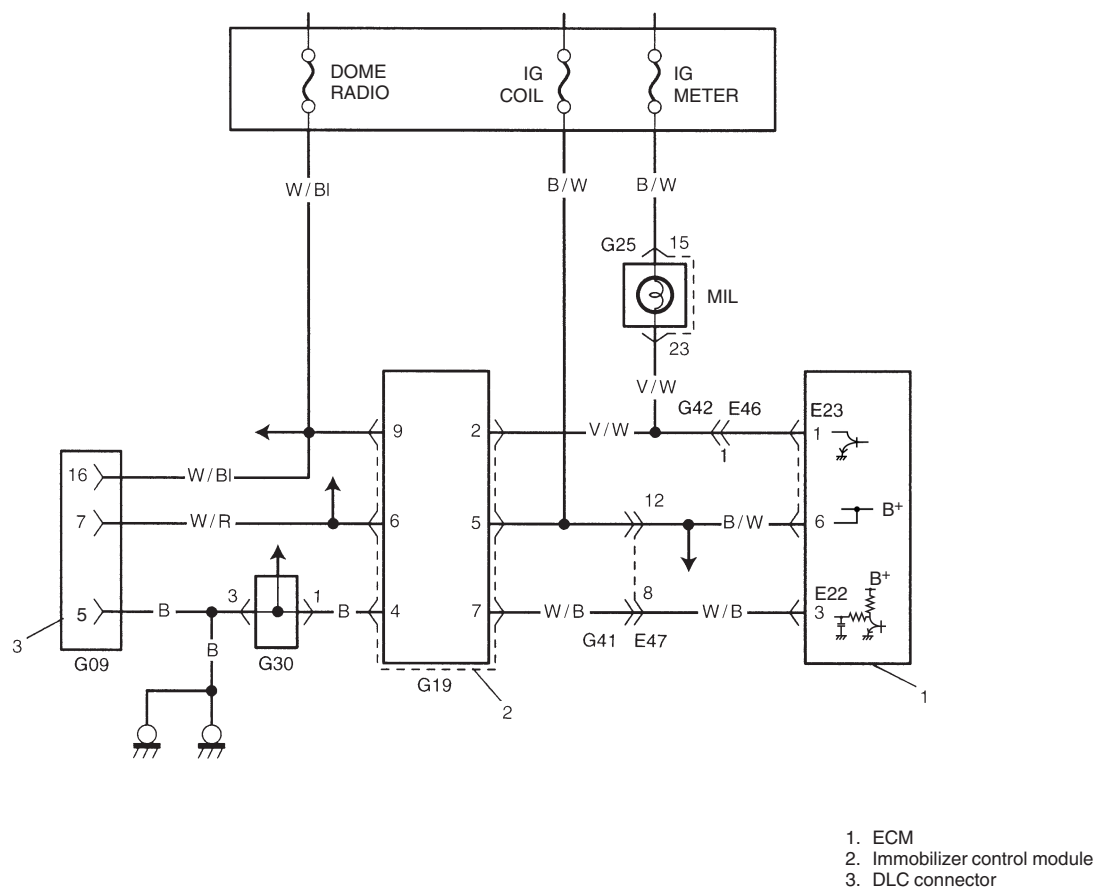
1. Each ignition key has its FIX CODE (FC) stored in memory. When the ignition switch is turned to ON (II) position, immobilizer control module tries to read the FC through the coil antenna built in immobilizer control module at ignition key switch.
2. Immobilizer control module compares FC read in step 1 and that registered in immobilizer control module and checks if they match.
3. ECM sends variable (generated randomly) to transponder via immobilizer control module and calculates it with SECRET KEY (SKC) stored in memory according to specified algorithm.

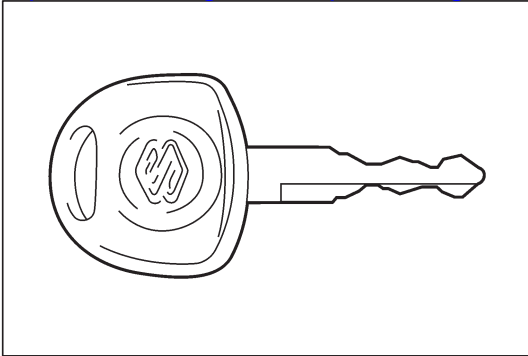
On the other hand, transponder also calculates received variable with SKC stored in memory by means of same algorithm and sends back to ECM.

4. Only when it is confirmed that ECM/transponder calculated values match, ECM keeps running engine.

If 2 calculated values did not match, ECM stops operation of injectors and ignitor to stop engine in about 1.8 seconds at the first time, after the second time ECM do not let engine start. And so it does when FIX CODES in step 2 do not match.

WIRING CIRCUIT



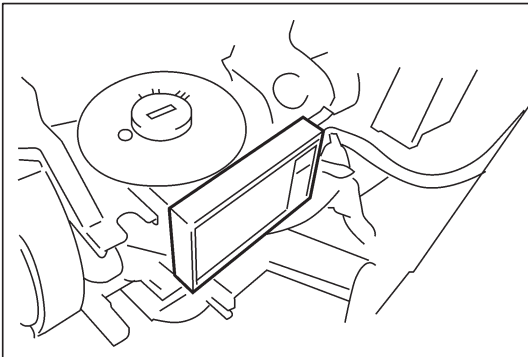


IGNITION KEY (WITH BUILT-IN TRANSPONDER)

Transponder is built in an ignition key housing. Each transponder in the key has a FIX CODE (FC) for transmission and SECRET KEY (SKC) for calculation. The FC will be transmitted from the transponder via the coil antenna to immobilizer control module when the ignition switch is turned to ON (II) position.

SKC is used for calculation with variable send from ECM.

SKC is preset (programmed) at factory shipment.



IMMOBILIZER CONTROL MODULE

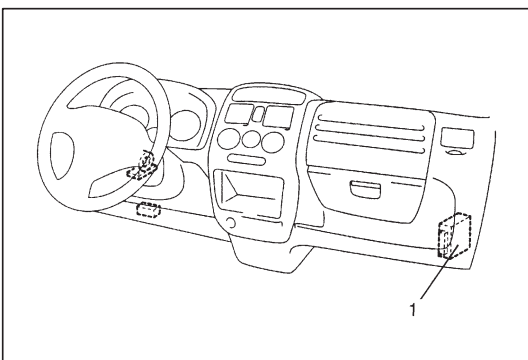
Immobilizer control module is installed to steering column beside ignition key switch. The coil antenna is installed to immobilizer control module. It energizes transponder and transmits the FIX CODE and data between transponder and immobilizer control module.

As main functions, immobilizer control module checks matching between FIX CODE transmitted from transponder and that registered in immobilizer control module (up to 5 different FIX CODE can be registered).

Immobilizer control module controls serial communication between scan tool and ECM.

Immobilizer control module has 3 different values as follows.

- Password (PWD); for accessing to program by means of scan tool.
- SECRET KEY (SKC); for ECM and transponder to calculate with.
- FIX CODE (FC); for checking if transponder is the registered one.



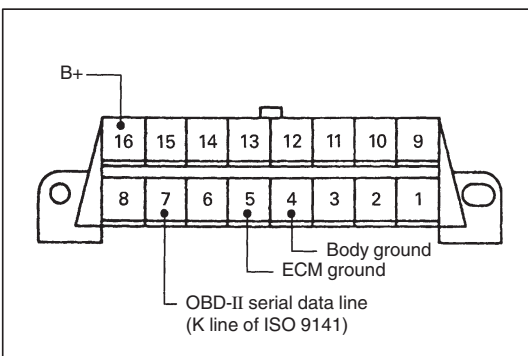
ECM

As main functions other than engine control, ECM (1) sends randomized data to transponder and checks matching between a response from transponder and the value calculated in ECM.

According to matching result of the FIX CODE and calculated value, ECM decides to keep engine running or not.

ECM has 2 different values as follows.

- Password (PWD); for accessing to program immobilizer system.
- SECRET KEY (SKC); Calculate with this value for permission of engine start.



DATA LINK CONNECTOR (DLC)

DLC is in compliance with SAE J1962 in its installation position, the shape of connector and pin assignment.

OBD-II serial data line (K line of ISO 9141) is used for SUZUKI scan tool to communicate with immobilizer control module, Airbag SDM, ABS control module, etc.

ON-BOARD DIAGNOSTIC SYSTEM

ECM and immobilizer control module diagnose troubles which may occur in the area including the following parts when the ignition switch is turned to ON position.

Immobilizer control module

- Immobilizer control module
- W-line (ECM/immobilizer control module communication line)
- Password
- MIL circuit
- Transponder (ignition key)
- Fix code

ECM

- ECM
- Secret key
- Password

When a trouble exists in the immobilizer control system (when immobilizer control module or ECM detects a diagnostic trouble code (DTC)), ECM stops operation of the injector and igniter.

For EC spec vehicle (not equipped with diagnosis connector #3)

It is impossible to know whether immobilizer system have troubles or not by referring MIL.

It is possible to communicate by using only SUZUKI scan tool.

For non-EC spec vehicle (equipped with diagnosis connector #3)

With the diagnosis switch terminal of diagnosis connector #3 (diagnosis monitor connector) (1) for ECM not grounded, the ignition switch turned at ON position (but engine at stop) and regardless of the condition of the electronic fuel injection system, ECM indicates whether a trouble has occurred in the immobilizer control system or not by causing the malfunction indicator lamp to flash or turn on.

MIL lights on:

No trouble exists in immobilizer control system.

MIL flashes:

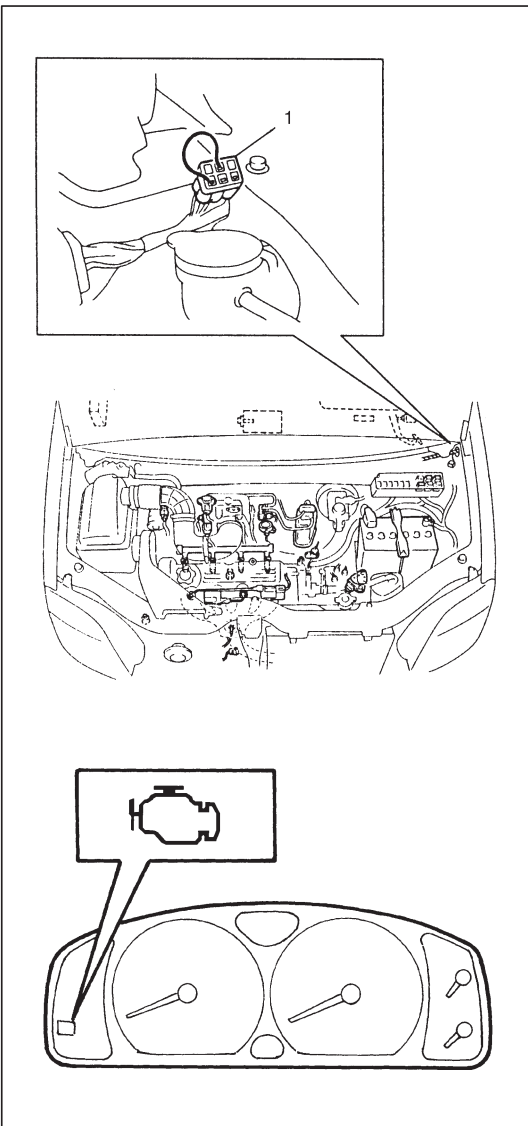
ECM detected some trouble in the immobilizer control system.

With ignition switch turned to ON position and diagnostic switch terminal grounded, ECM outputs DTC (diagnostic trouble code) by flashing MIL (malfunction indicator lamp).

NOTE:

As soon as the ignition switch is turned to ON position, ECM and immobilizer control module diagnose if a trouble has occurred in the immobilizer control system in about 5 seconds at maximum.

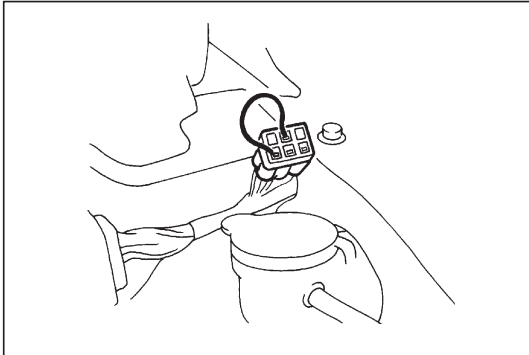
While the diagnosis is being made, the MIL (malfunction indicator lamp) stays on and diagnosis result is abnormal, it immediately changes to flashing but if the result is normal, it remains on.



DIAGNOSIS

ECM and immobilizer control module have on-board diagnostic system. Investigate where the trouble is by referring to DIAGNOSTIC FLOW TABLE and DIAGNOSTIC TROUBLE CODE TABLE.

PRECAUTIONS IN DIAGNOSING TROUBLES



- Before confirming diagnostic trouble code, do not disconnect connector from ECM, battery cable from battery, ground wire harness or main fuse.

Such disconnection will erase memorized information in ECM.

- For non-EC spec vehicle (equipped with diagnosis connector #3)
If abnormality or malfunction lies in two or more areas, MIL (malfunction indicator lamp) indicates applicable codes three times each.

And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.

When ECM detects a trouble in both electronic fuel injection system and immobilizer control system, MIL indicates trouble codes of both systems alternately while ignition switch is turned to ON position and diagnosis terminal is grounded.

- Diagnostic trouble code stored in immobilizer control module memory can be cleared as well as checked by using SUZUKI scan tool. Before using scan tool, read its Operator's (Instruction) Manual. Carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE in section 0A before inspection and observe what is written there.
- There are cases where MIL indicates a DTC that occurred only temporarily and has gone. In such case, it may occur that good parts are replaced unnecessarily. To prevent such case, be sure to follow instructions given below when checking by using DIAGNOSTIC FLOW TABLE.
 - When trouble can be identified, it is not an intermittent one: check ignition key, wires and each connector and if they are all in good condition, substitute a known-good ECM and recheck.
 - When trouble can not be identified but MIL indicates a trouble code: diagnosis troubles by using that codes No. and if ignition key, wires and each connection are all in good condition, turn OFF ignition switch and then ON.
Then check what MIL indicates.
Only when they indicate trouble code again, substitute a known-good ECM or immobilizer control module and check again.
If they indicate not DTC but normal code, it means that an intermittent trouble did occur and has gone. In this case, check wires and connection carefully.

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PRECAUTIONS AFTER REPLACING ECM OR IMMOBILIZER CONTROL MODULE

- When ECM is replaced, including when replaced because rechecking by using a known-good ECM is necessary during trouble diagnosis, secret key and password must be registered in ECM by performing procedure described in PROCEDURE AFTER ECM REPLACEMENT.
- When immobilizer control module is replaced, including when replaced because rechecking by using a known-good immobilizer control module is necessary during trouble diagnosis, transponder fix code, secret key and/or password must be registered in immobilizer control module by performing procedure described in PROCEDURE AFTER IMMOBILIZER CONTROL MODULE REPLACEMENT.

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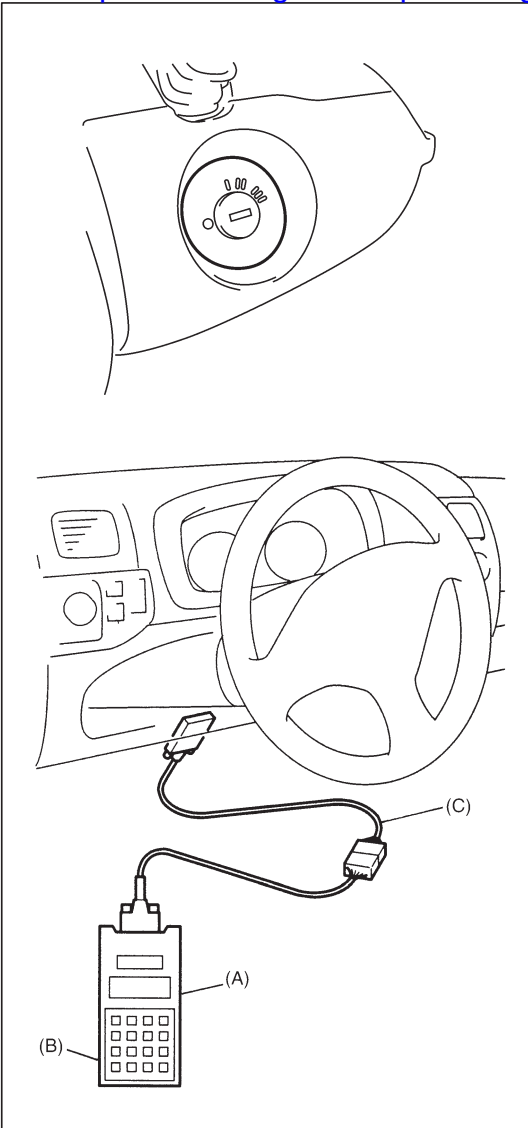
DIAGNOSTIC FLOW TABLE

DIAGNOSTIC PROCEDURE FOR EC spec vehicle (not equipped with diagnosis connector #3)

STEP	ACTION	YES	NO
1	Turn ignition switch to start engine. Does engine run?	Go to step 5.	Go to step 2.
2	W-line circuit check Measure terminal voltage of immobilizer control module connector G19-7. Is it 10 – 14 V with ignition switch at ON position, 0 – 1 V with ignition switch at OFF position?	W-line circuit is in good condition. Go to step3.	W-line circuit open or short. Check and repair. Then go to step 3.
3	Check for DTC referring to DTC CHECK in SECTION 6. Is there any malfunction DTC(s)?	Go to step 4.	Go to step 5.
4	Check, repair and/or perform necessary registration procedure according to flow table corresponding to that code number. Is there other malfunction DTC(s)?	Repeat step 4 until no diagnostic code is indicated.	Go to step 5.
5	Check for DTC referring to DTC CHECK. Refer to DTC CHECK in this section. Is there any malfunction DTC(s)?	Go to step 6.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed ENGINE DIAGNOSTIC FLOW TABLE in SECTION 6.
6	Check and repair according to flow table corresponding to that code number. Is there other malfunction DTC(s)?	Repeat step 6 until no diagnostic code is indicated.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed ENGINE DIAGNOSTIC FLOW TABLE in SECTION 6.

DIAGNOSTIC PROCEDURE FOR NON-EC spec vehicle (equipped with diagnosis connector #3)

STEP	ACTION	YES	NO
1	Check MIL (malfunction indicator lamp) for flashing with ignition switch turned to ON position and diagnosis terminal of monitor connector (diagnosis connector #3) not grounded. Is it flashing?	Go to step 2.	Go to step 5.
2	W-line circuit check Measure terminal voltage of immobilizer control module connector G19-7. Is it 10 – 14 V with ignition switch at ON position, 0 – 1 V with ignition switch at OFF position?	W-line circuit is in good condition. Go to step3.	W-line circuit open or short. Check and repair. Then go to step 3.
3	Check for DTC referring to DTC CHECK in SECTION 6. Is there any malfunction DTC(s)?	Go to step 4.	Go to step 5.
4	Check, repair and/or perform necessary registration procedure according to flow table corresponding to that code number. Is there other malfunction DTC(s)?	Repeat step 4 until no diagnostic code is indicated.	Go to step 5.
5	Check for DTC referring to DTC CHECK. Refer to DTC CHECK in this section. Is there any malfunction DTC(s)?	Go to step 6.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed ENGINE DIAGNOSTIC FLOW TABLE in SECTION 6.
6	Check and repair according to flow table corresponding to that code number. Is there other malfunction DTC(s)?	Repeat step 6 until no diagnostic code is indicated.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed ENGINE DIAGNOSTIC FLOW TABLE in SECTION 6.



DIAGNOSTIC TROUBLE CODE (DTC) CHECK

IMMOBILIZER CONTROL MODULE

- 1) Prepare SUZUKI scan tool.
- 2) With ignition switch OFF to position (), connect it to data link connector (DLC) located under instrument panel at driver's seat side.

Special Tool:

(A): SUZUKI scan tool

(B): Mass storage cartridge

(C): 16/14 pin OBD-II adapter cable

(D): 14/26 pin DLC cable (Use this cable if 14/26 pin DLC cable is not available)

- 3) Turn ignition switch to ON position (II).
Read DTC according to instructions displayed on scan tool and print it or write it down.
Refer to scan tool operator's manual for further details.
If communication between scan tool and immobilizer control module is not possible, check if scan tool is communicable by connecting it to immobilizer control system in another vehicle. If communication is possible in this case, scan tool is in good condition. Then check data link connector and serial data line (circuit) in the vehicle with which communication was not possible.

NOTE:

DTC No. B3040, B3042 and B3043 can not be confirmed by scan tool unless W-line circuit is repaired.

- 4) After completing the check, turn ignition switch to OFF position and disconnect scan tool from data link connector.

ECM

Refer to DTC CHECK in SECTION 6.

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

IMMOBILIZER CONTROL MODULE

- 1) Connect SUZUKI scan tool to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch to ON position.
- 3) Erase DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch to OFF position and disconnect scan tool from data link connector.

ECM

Refer to DTC CLEARANCE in SECTION 6.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE**IMMOBILIZER CONTROL MODULE**

DTC NO.	DETECTED ITEM	DETECTING CONDITION
B1000	Immobilizer control module internal failure	Immobilizer control module failure
B3040	W-line communication failure	Communication not finished correctly
B3042	W-line circuit shorted to ground	W-line circuit voltage low
B3043	W-line circuit shorted to battery	W-line circuit voltage high
B3055	No transponder	Ignition key without transponder is used
B3056	No transponder FIX CODE registered	Transponder fix code is not registered in immobilizer control module
B3057	No password registered	Password is not registered in immobilizer control module
B3059	No request from ECM	ECM/Immobilizer control module line (MIL) is open or shorted
B3060	Incorrect transponder detected	Unregistered transponder (FIX CODE) is detected
B3061	Transponder communication fail	Incorrect signal or no response from transponder
B3077	Read-only transponder detected	Transponder not for this system is detected

ECM

DTC NO.		DETECTED ITEM	DETECTING CONDITION
Display on scan tool	MIL flashing pattern		
P1610	89	Secret key and password not registered	Secret key and password are not registered in ECM
P1611	85	Password not matched	Stored password is incorrect
P1612	86	No signal from immobilizer	Invalid signal from immobilizer control module
P1613	87	No signal from immobilizer	Invalid signal from immobilizer control module
P1614	88	Incorrect signal from immobilizer	Received response from transponder is incorrect

NOTE:

- Two-figure DTC NO. s (MIL flashing patterns) are indicated when diagnosis terminal of diagnosis connector #3 (monitor connector) is grounded for non-EC spec vehicle (equipped with diagnosis connector #3).
- If abnormality or malfunction lies in two or more areas, MIL (malfunction indicator lamp) indicates applicable codes three times each.
And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.
- DTC B3040, B3042 and B3043 not be confirmed by scan tool unless W-line circuit is repaired.
- DTC B3059 is detected when turn ignition switch to ON (II) position within 5 seconds after ignition switch turned to (I) or () position from (II) position.

SCAN TOOL DATA

As the data value given below are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference values. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with there data alone.

Also, conditions in the table below that can be checked by the scan tool are those detected by immobilizer control module and output from immobilizer control module as commands.

SCAN TOOL DATA	VEHICLE CONDITION	NORMAL CONDITION/ REFERENCE VALUES
IGNITION SW	Ignition switch turned to ON position	ON
TRANSPONDER	Ignition switch turned to ON position	DETECTED
TRANS SKC	Ignition switch turned to ON position	REGISTERED
FIX CODE	Ignition switch turned to ON position	REGISTERED
NUMBER OF FC	(Vehicle is in normal condition)	1-5 pcs
PASSWORD	(Vehicle is in normal condition)	PROGRAMMED
WAIT LOOP	(Vehicle is in normal condition)	INACTIVE
WAIT TIME	(Vehicle is in normal condition)	0 SEC

SCAN TOOL DATA DEFINITIONS

IGNITION SW

Ignition key switch position

ON: Ignition switch at ON position

OFF: Ignition switch at OFF position

TRANSPONDER

DETECTED: Transponder in ignition key is detected by immobilizer control module.

NOT DETECTED: Transponder in ignition key is not detected.

TRANS SKC

REGISTERED: Secret key is registered in ignition key with built-in transponder.

NOT REGISTERED: Secret key is not registered in ignition key with built-in transponder yet.

FIX CODE

REGISTERED: The FIX CODE of ignition key which is inserted in key cylinder is registered in immobilizer control module.

NOT REGISTERED: The FIX CODE of ignition key which is inserted in key cylinder is not registered in immobilizer control module.

NUMBER OF FC (PCS)

The number of registered ignition key (FIX CODE).

PASSWORD

REGISTERED: Password is registered in immobilizer control module.

NOT REGISTERED: Password is not registered. It is necessary to register password to set immobilizer control module in normal operation status.

WAIT-LOOP

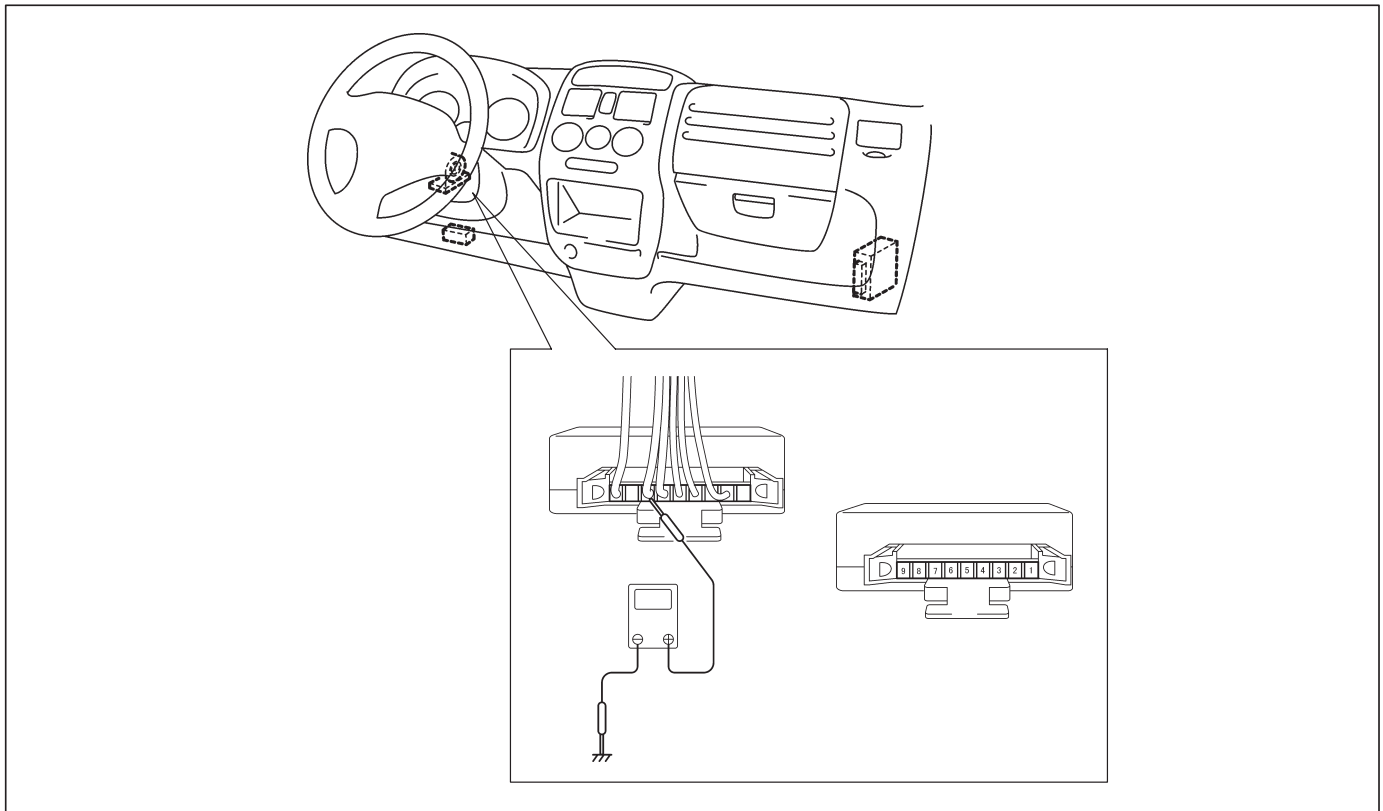
INACTIVE: Security system is inactive. It is ready for password input on scan tool.

ACTIVE: Incorrect password was inputted and system is in wait-loop status. Inputting password is inhibited for the waiting time described below.

WAIT TIME (SEC, MIN)

The time it must be waited for reinput password for programming SUZUKI scan tool indicates "0 SEC." when a correct password is input after wait time.

If failed to input correct password, it increase according to the times of misinput.

INSPECTION OF IMMOBILIZER CONTROL MODULE AND ITS CIRCUITS**VOLTAGE INSPECTION**

Immobilizer control module can be checked at wiring connectors by measuring voltage.

CAUTION:

Immobilizer control module can not be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to immobilizer control module with coupler disconnected from it.

NOTE:

As the battery voltage affects each terminal voltage, confirm that it is 11 V or more when ignition switch is turned to ON position.

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
CONNECTOR G19	1	—	Not used	—	—
	2	V/W	MIL	0 – 1 V	MIL lights on
	3	—	Not used	—	—
	4	B	Ground	0 – 1 V	Anytime
	5	B/W	Ignition switch signal	10 – 14 V 0 – 1 V	Ignition switch at ON position Ignition switch at OFF position
	6	W/R	Data link connector (Serial data line)	10 – 14 V 0 – 1 V	Scan tool connected Scan tool disconnected
	7	W/B	W-line	10 – 14 V 0 – 1 V	Scan tool connected or ignition switch at ON position. Scan tool disconnected and ignition switch at OFF position.
	8	—	Not used	—	—
	9	W/BI	Power supply	10 – 14 V	Anytime

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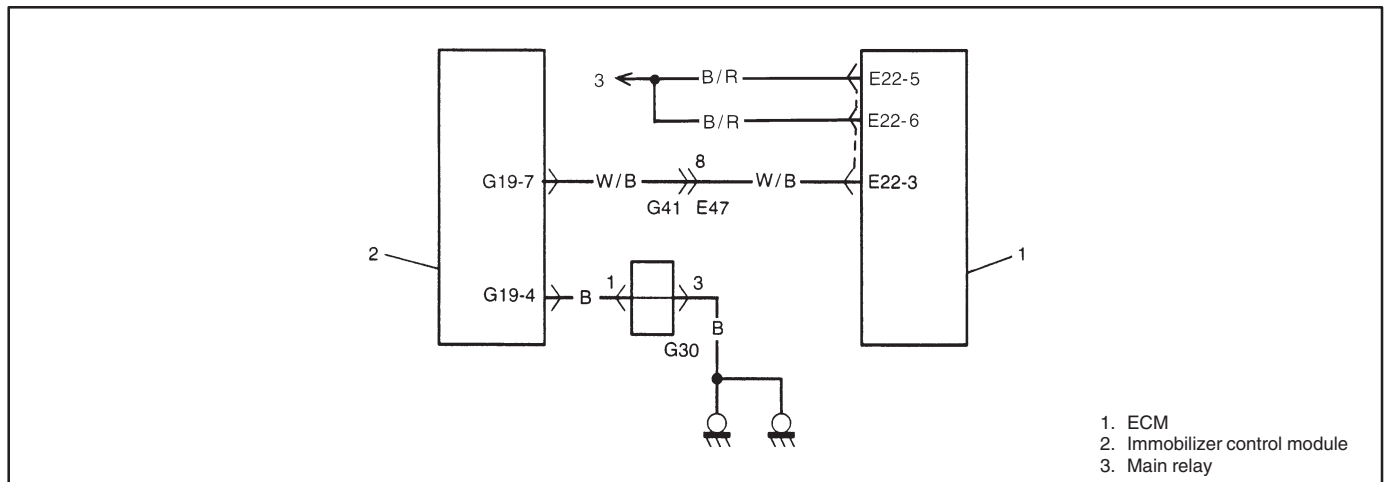
DTC B1000 IMMOBI CONT MODULE INTERNAL FAIL

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Immobilizer control module internal fail.	Immobilizer control module

TROUBLE SHOOTING (DTC B1000)

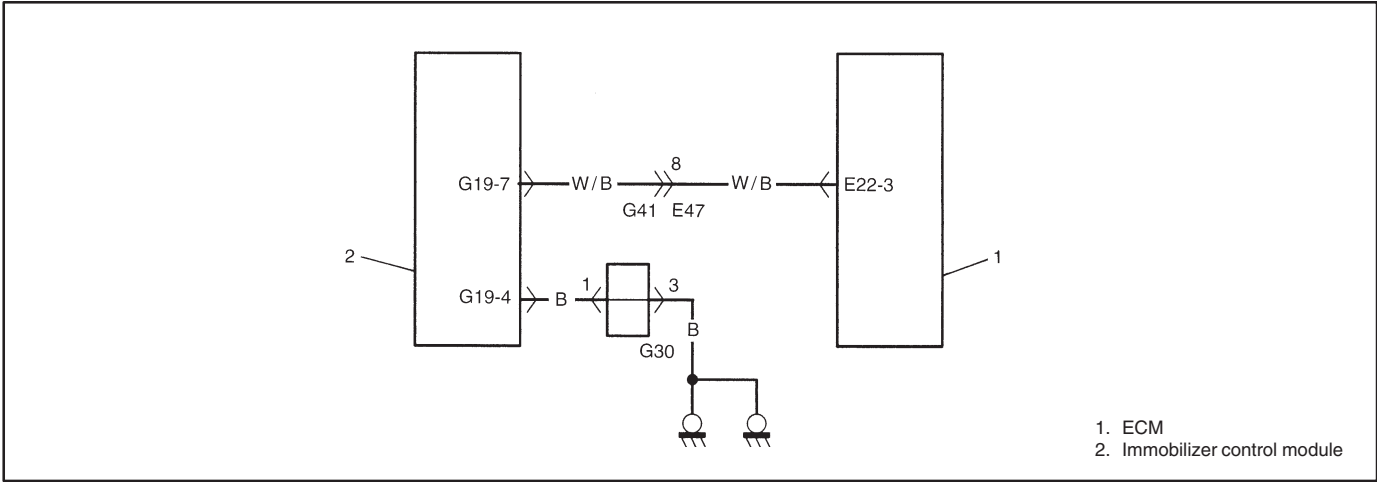
STEP	ACTION	YES	NO
1	1) Ignition switch at OFF position. 2) Disconnect connector from immobilizer control module. 3) Check for proper connection to immobilizer control module at all terminals. Are they in good condition?	Substitute a known-good immobilizer control module according to PROCEDURE FOR IMMOBILIZER CONTROL MODULE REPLACEMENT and recheck.	Repair or replace.

DTC B3040 W-LINE COMMUNICATION FAIL**WIRING CIRCUIT****DTC DETECTING CONDITION AND TROUBLE AREA**

DTC DETECTING CONDITION	TROUBLE AREA
No response from ECM while immobilizer control module requests signal.	W-line circuit ECM power circuit

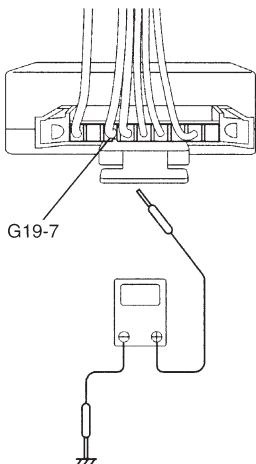
TROUBLE SHOOTING (DTC B3040)

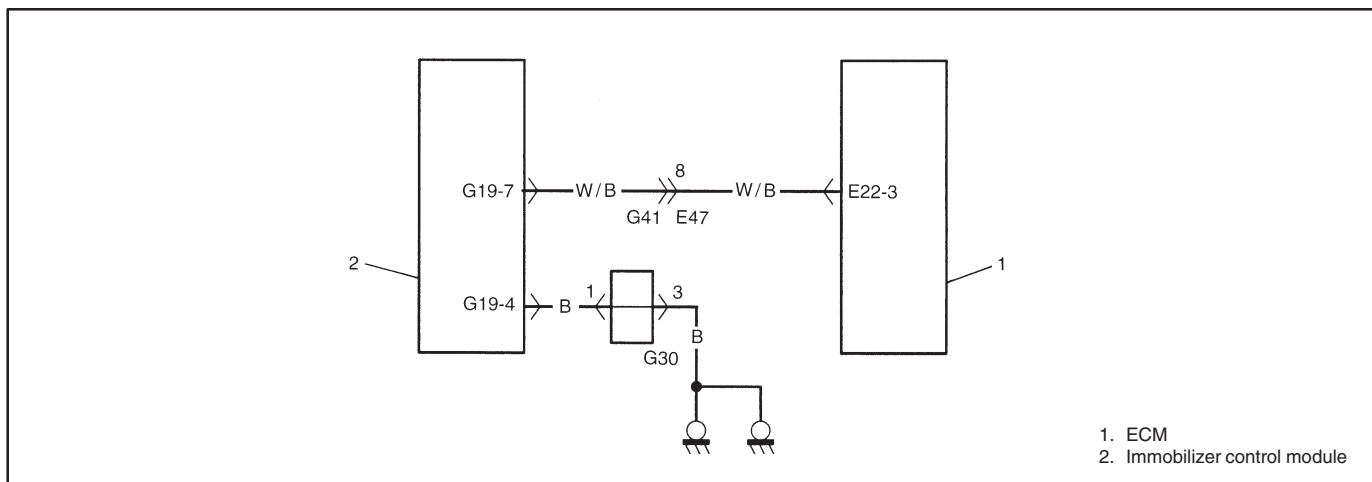
STEP	ACTION	YES	NO
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at E22-3 terminal. Is it in good condition?	Go to step 2.	Repair or replace.
2	1) Ignition switch at OFF position. 2) Disconnect connector from immobilizer control module. 3) Check for proper connection to immobilizer control module at G19-7 terminal. Is it in good condition?	Go to step 3.	Repair or replace.
3	With connectors connected, measure voltage between terminal G19-7 and ground with ignition switch at ON position. Is it 10 – 14 V?	Go to step 4.	W-line (W/B) circuit open.
4	With ignition switch at ON position, measure voltage between E22-5 or E22-6 and ground. Are they 10 – 14 V?	Substitute a known-good ECM according PROCEDURE FOR ECM REPLACEMENT and recheck.	ECM power supply (B/R) circuit open.



DTC DETECTING CONDITION	TROUBLE AREA
W-line circuit voltage is low.	W-line circuit is shorted to ground

STEP	ACTION	YES	NO
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at E22-3 terminal. Is it in good condition?	Go to step 2.	Repair or replace.
2	1) Connect connector to ECM. 2) Measure voltage between G19-7 terminal of immobilizer control module and body ground with ignition switch at ON position. Is it 10 – 14 V?	Substitute a known-good ECM according to PROCEDURE FOR ECM REPLACEMENT and recheck.	W-line is shorted to ground. Repair and recheck.

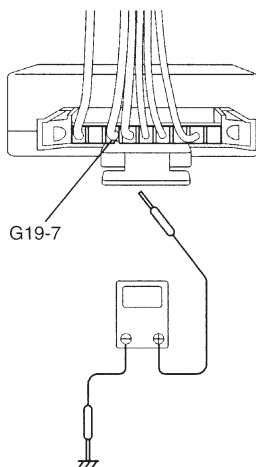


Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>**DTC B3043 W-LINE CKT MALF (SHORT TO BATTERY)****WIRING CIRCUIT****DTC DETECTING CONDITION AND TROUBLE AREA**

DTC DETECTING CONDITION	TRouble AREA
W-line circuit voltage is high.	W-line circuit is shorted to power supply circuit.

TROUBLE SHOOTING (DTC B3043)

STEP	ACTION	YES	NO
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at E22-3 terminal. Is it in good condition?	Go to step 2.	Repair or replace.
2	1) Connect connector to ECM. 2) Measure voltage between G19-7 terminal of immobilizer control module and body ground with ignition switch at OFF position and scan tool disconnected. Is it 0 – 1 V?	Substitute a known-good ECM according to PROCEDURE FOR ECM REPLACEMENT and recheck.	W-line is shorted to power supply circuit. Repair and recheck.

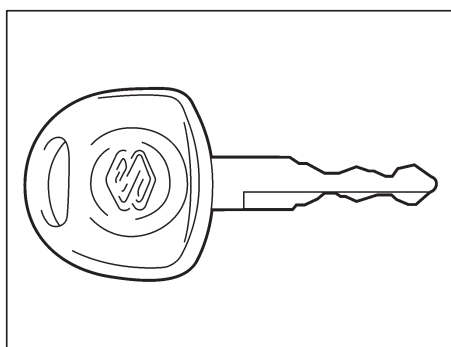
Fig. for step 2

DTC B3055 NO TRANSPONDER**DTC DETECTING CONDITION AND TROUBLE AREA**

DTC DETECTING CONDITION	TROUBLE AREA
No FIX CODE is transmitted from transponder or no code is transmitted.	Ignition key (not transponder) FIX CODE transmission error

TROUBLE SHOOTING (DTC B3055)

STEP	ACTION	YES	NO
1	1) Ignition switch at OFF position and leave it for 5 seconds or more. 2) Pull out ignition key and reinsert it. 3) Turn ignition switch to run engine. Does engine start?	Temporary error in code reading. Immobilizer control system is in good condition.	Go to step 2.
2	1) Check ignition key for shape by referring to figure. Is it the original one?	Check ignition key referring to PRECAUTIONS IN HANDLING IMMOBILIZER CONTROL SYSTEM and repair or replace.	Ignition key with built-in transponder unusable. Replace, register it if necessary and recheck.

Fig. for step 2**DTC B3056 NO FIX CODE REGISTERED****DTC DETECTING CONDITION AND TROUBLE AREA**

DTC DETECTING CONDITION	TROUBLE AREA
No transponder FIX CODE (FC) is registered in immobilizer control module.	Immobilizer control module

TROUBLE SHOOTING (DTC B3056)

STEP	ACTION	YES	NO
1	Check DATA LIST "NUMBER OF FC". Is it 0?	Go to step 2.	Substitute a known-good immobilizer control module according to PROCEDURE FOR IMMOBILIZER CONTROL MODULE REPLACEMENT and recheck.
2	Is DTC B3057 also output?	Proceed DTC FLOW TABLE of DTC B3057. Then go to step 3.	Go to step 3.
3	Register ignition key(s) with built-in transponder according to HOW TO REGISTER IGNITION KEY under ON-VEHICLE SERVICE. Check SUZUKI scan tool DATA LIST "NUMBER OF FC". Is it 1 or more?	Transponder FIX CODE(s) is registered.	Transponder registration procedure is not completed correctly. Register ignition key again.

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DTC B3057 NO PASSWORD REGISTERED

DTC DETECTING CONDITION AND TROUBLE AREA

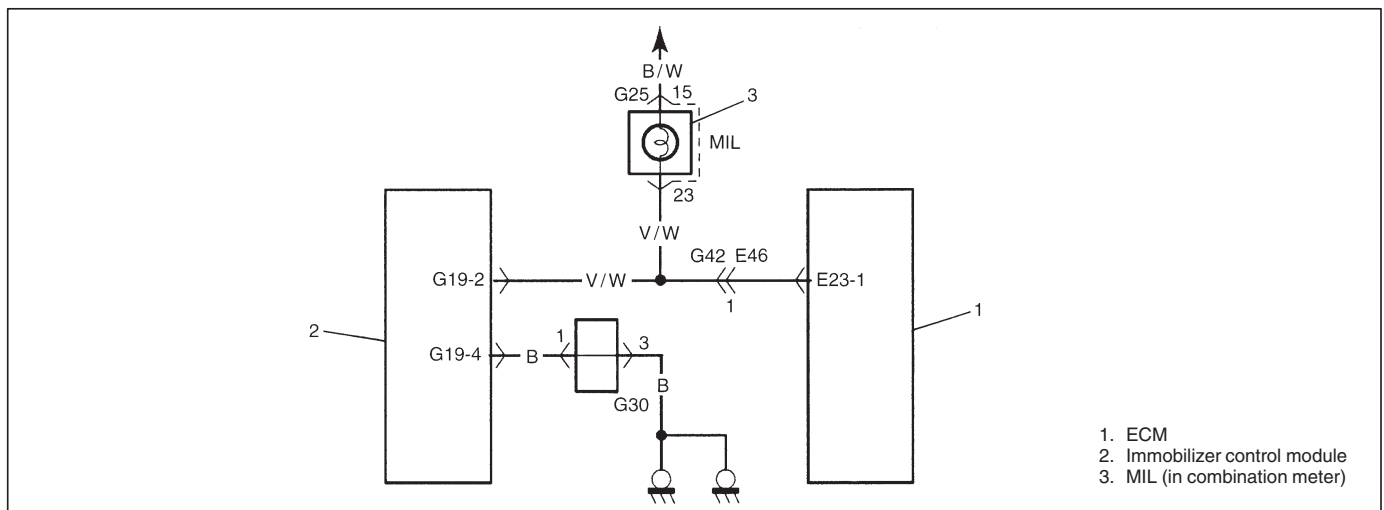
DTC DETECTING CONDITION	TROUBLE AREA
Password is not registered in immobilizer control module.	Immobilizer control module

TROUBLE SHOOTING (DTC B3057)

STEP	ACTION	YES	NO
1	1) Register password by using SUZUKI scan tool. Refer to HOW TO REGISTER PASSWORD. 2) Confirm that password is registered correctly, referring to SUZUKI scan tool DATA LIST. Is PASSWORD REGISTERED message output?	Password registration is completed.	Register password again and recheck.

DTC B3059 NO REQUEST FROM ECM

WIRING CIRCUIT



DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
No request from ECM via MIL circuit Ignition switch is not reset correctly.	MIL circuit faulty Communication between ECM and immobilizer control module

TROUBLE SHOOTING (DTC B3059)

STEP	ACTION	YES	NO
1	Turn ignition switch to (I) position or () position for more than 5 seconds, then turn ignition switch to ON (II) position. Recheck DTC. Is DTC B3059 current?	Go to step 2.	Communication between ECM and immobilizer control module was not finished correctly.
2	1) Check for proper connection to ECM at E23-1 terminal. Is it in good condition?	Go to step 3.	Repair or replace.
3	1) Check for proper connection to immobilizer control module at G19-2 terminal. Is it in good condition?	Go to step 4.	Repair or replace.
4	1) Check V/W line for open or short. Is it in good condition?	Substitute a known-good ECM according to PROCEDURE FOR ECM REPLACEMENT and recheck.	Repair or replace.

DTC B3060 INCORRECT TRANSPONDER DETECTED**DTC DETECTING CONDITION AND TROUBLE AREA**

DTC DETECTING CONDITION	TROUBLE AREA
FIX CODE does not match with registered one. FIX CODE is not registered in immobilizer control module.	Unregistered ignition key with built-in transponder Ignition key with built-in transponder faulty Immobilizer control module

TROUBLE SHOOTING (DTC B3060)

STEP	ACTION	YES	NO
1	Is DTC B3056 also output?	Proceed DTC FLOW TABLE of DTC B3056. Then go to step 2.	Go to step 2.
2	Check DATA LIST "TRANSPONDER FC". Is it registered?	Replace ignition key with built-in transponder. Then go to step 3.	Go to step 3.
3	Register transponder according to HOW TO REGISTER IGNITION KEY under ON-VEHICLE SERVICE. Check SUZUKI scan tool DATA LIST for "FIX CODE". Is it registered?	Transponder FIX CODE is registered.	Transponder registration procedure is not completed correctly. Register ignition key again.

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DTC B3061 TRANSPONDER COMMUNICATION FAIL

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
No response from transponder. Secret key is not matched between ignition key (transponder) FIX CODE does not match with registered one. FIX CODE is not registered in immobilizer control module.	Ignition key with built-in transponder internally faulty Secret key is not registered in transponder Secret key is not registered in ECM Secret keys are different between ECM and transponder Unregistered ignition key with built-in transponder FIX CODE is detected No FIX CODE in immobilizer control module

TROUBLE SHOOTING (DTC B3061)

STEP	ACTION	YES	NO
1	Is DTC B3060 also output?	Proceed DTC FLOW TABLE of DTC B3060. Then go to step 2.	Go to step 2.
2	Is DTC B3055 also output?	Proceed DTC FLOW TABLE of DTC B3055. Then go to step 3.	Go to step 3.
3	Check scan tool DATA LIST "TRANS SKC". Is it REGISTERED?	Go to step 5.	Go to step 4.
4	1) Register SKC by performing REGI SKC/FC. 2) Check DTC. Is DTC B3061 still output?	Go to step 5.	Register SKC and recheck.
5	1) Register SKC and PWD to ECM by referring PROCEDURE AFTER ECM REPLACEMENT. 2) Check DTC. Is DTC B3061 still output?	Go to step 6.	If there is other DTC, proceed the DTC FLOW TABLE.
6	1) Replace ignition key with new one and register it by referring HOW TO REGISTER IGNITION KEY. 2) Check DTC. Is DTC B3061 still output?	Substitute a known-good immobilizer control module according to PROCEDURE FOR IMMOBILIZER CONTROL MODULE REPLACEMENT and recheck.	If there is other DTC, proceed to DTC FLOW TABLE.

DTC B3077 READ-ONLY TRANSPONDER DETECTED

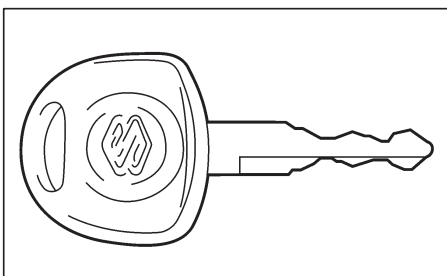
DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Transponder for other system is detected.	Ignition key with transponder

TROUBLE SHOOTING (DTC B3077)

STEP	ACTION	YES	NO
1	1) Ignition switch at OFF position and leave it for 5 seconds or more. 2) Pull out ignition key and reinsert it. 3) Turn ignition switch to run engine. Does engine start?	Temporary error in reading. Immobilizer control system is in good condition.	Replace ignition key with built-in transponder. Register transponder according to TRANSPONDER REGISTRATION.
2	Check ignition key for shape by referring to figure. Is it the original one?	Check ignition key referring to PRECAUTIONS IN HANDLING IMMOBILIZER CONTROL SYSTEM and repair or replace.	Ignition key with built-in transponder unusable. Replace, register it if necessary and recheck.

Fig. for step 2



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DTC P1610 SECRET KEY AND PASSWORD NOT REGISTERED

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
SKC and PWD are not registered in ECM.	ECM

TROUBLE SHOOTING (DTC P1610)

STEP	ACTION	YES	NO
1	1) Register password and secret key by using SUZUKI scan tool. Refer to PROCEDURE AFTER ECM REPLACEMENT. 2) Check DTC. Is DTC P1610 still output?	Perform registration procedure again and recheck.	ECM is registered correctly.

DTC P1611 PASSWORD NOT MATCHED

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Password registered in ECM is not correct.	ECM

TROUBLE SHOOTING (DTC P1610)

STEP	ACTION	YES	NO
1	Register password and secret key by using scan tool. Turn ignition switch to OFF position and leave it for 5 seconds or more. Then turn ignition switch to ON position. Is DTC P1611 still output?	Substitute a known-good ECM according to PROCEDURE FOR ECM REPLACEMENT and recheck.	ECM is in good condition.

DTC P1612/P1613 NO SIGNAL FROM IMMOBILIZER

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Signal from immobilizer control module is not received correctly.	W-line circuit Immobilizer control module failure

TROUBLE SHOOTING (DTC P1612/1613)

STEP	ACTION	YES	NO
1	Is DTC B3040, B3042 or B3043 output at immobilizer control module?	W-line fail. Proceed to each DTC FLOW TABLE according to that DTC number. Check B3042 or B3043 first and then B3040 if two codes are output at the same time.	Go to step 2.
2	1) Ignition switch at OFF position and leave it for 5 seconds or more. 2) Pull out ignition key and reinsert it. 3) Turn ignition switch to run engine. Does engine start?	Temporary error in reading. Immobilizer control system is in good condition.	Substitute a known-good ECM according to PROCEDURE FOR ECM REPLACEMENT and recheck.

DTC P1614 INCORRECT SIGNAL FROM IMMOBILIZER**DTC DETECTING CONDITION AND TROUBLE AREA**

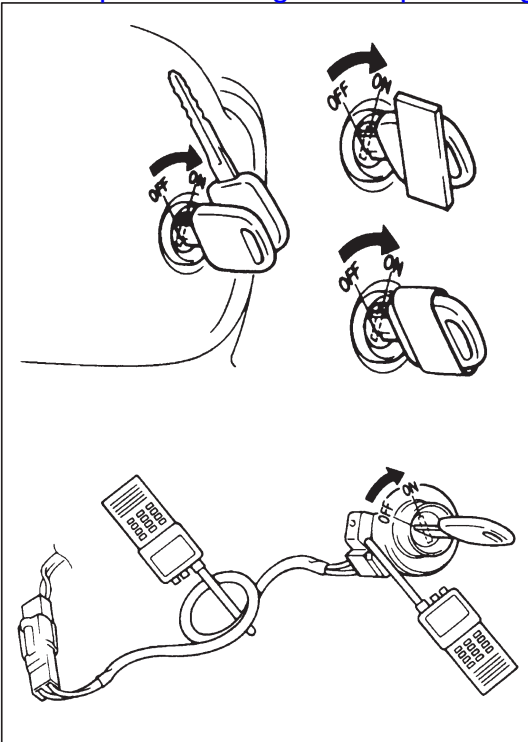
DTC DETECTING CONDITION	TROUBLE AREA
Signal from immobilizer control module is not matched.	Ignition key with built-in transponder internally faulty SKC is not registered in transponder SKC key is not registered in ECM SKCs are different between ECM and transponder Unregistered ignition key with built-in transponder FIX CODE is detected No FIX CODE in immobilizer control module

TROUBLE SHOOTING (DTC P1614)

STEP	ACTION	YES	NO
1	Proceed DTC FLOW TABLE of DTC B3061. Recheck DTC. Is DTC P1614 still output?	Substitute a known-good ECM according to PROCEDURE FOR ECM REPLACEMENT and recheck.	ECM and immobilizer control module are programmed correctly.

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

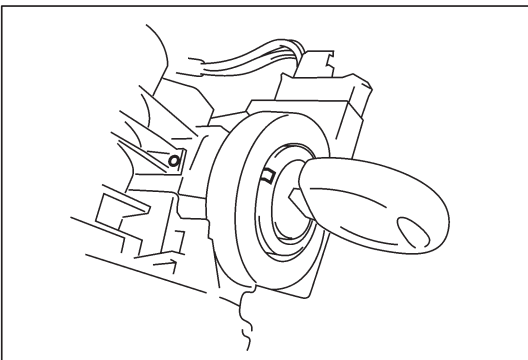
- 1) Turn ignition switch to (I) or () position.
- 2) Leave it for 5 seconds or more.
- 3) Check DTC. Refer to DTC CHECK in this section.



ON-VEHICLE SERVICE

PRECAUTIONS IN HANDLING IMMOBILIZER CONTROL SYSTEM

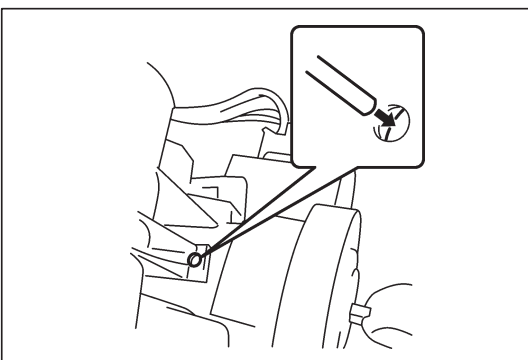
- Do not turn ignition switch to ON position (II) with ignition key with built-in transponder put together with another one or placed quite close to another one. Or the system may detect abnormal condition and prevent engine from running.
 - Do not turn ignition switch to ON position (II) by using ignition key with built-in transponder with any type of metal wound around its grip (housing) or in contact with it. Or the system may detect abnormal condition and prevent engine from starting.
 - Do not leave ignition key with built-in transponder where high temperature is anticipated. High temperature will cause transponder in ignition key to be abnormal or damaged.
 - Do not turn ignition switch to ON position (II) with a radio antenna placed near coil antenna or its harness to immobilizer control module.
- Or the system may detect abnormal condition and prevent engine from starting.



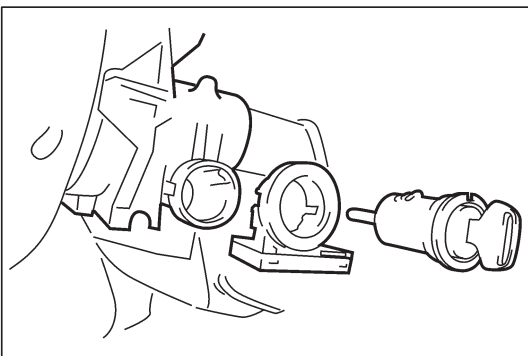
IMMOBILIZER CONTROL MODULE

REMOVAL

- 1) Remove steering column cover.
- 2) Remove key cylinder cap from key cylinder switch.
- 3) Turn ignition switch to (I) position.



- 4) Push the protrusion in the hole.



- 5) Pull off key cylinder from column ass'y.
- 6) Disconnect wire harness connector from immobilizer control module.
- 7) Remove immobilizer control module.

INSTALLATION

Reverse removal procedure. Before inserting key cylinder to steering column, push protrusion on key cylinder.

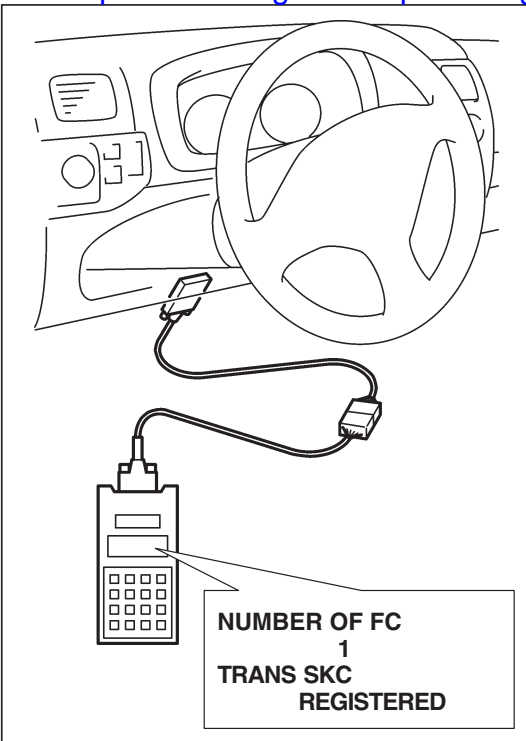
REGISTRATION PROCEDURE OF IMMOBILIZER SYSTEM COMPONENTS**IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE**

When replacing any component of immobilizer system, perform registration procedure according to following flow table.

NOTE:

When replacing immobilizer control module and ECM at the same time, the ignition key with built-in transponder that has been registered to the system (SKC registered transponder) can not be used. Prepare new ignition key with built-in transponder (SKC unregistered transponder), and perform steps 1 to 4 as follows.

STEP	ACTION	YES	NO
1	DTC CHECK. Check for DTC referring to DTC CHECK. Are there DTC B1000, B3040, B3042, and/or B3043?	Proceed to each diagnostic flow table corresponding to that DTC number.	Go to step 2.
2	Confirmation of password registration. Is there DTC B3057?	Register password by referring HOW TO REGISTER PASSWORD. After completing, go to step 3.	Go to step 3.
3	ECM replacement. Is ECM replaced?	Proceed to PROCEDURE AFTER ECM REPLACEMENT. After completing, go to step 4.	Go to step 4.
4	Immobilizer control module replacement. Is immobilizer control module replaced?	Proceed to PROCEDURE AFTER IMMOBILIZER CONTROL MODULE REPLACEMENT.	Go to step 5.
5	Ignition key with built-in transponder registration. Is ignition key registered?	Proceed to HOW TO REGISTER IGNITION KEY.	End.



HOW TO REGISTER IGNITION KEY

Register ignition key with built-in transponder by performing the following procedure.

NOTE:

Registering secret key to ignition key with built-in transponder is able only once.

1) Perform IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE.

2) Prepare ignition key with built-in transponder to be registered for the vehicle.

NOTE:

As up to 5 ignition keys may be used for immobilizer control system, make sure that total number of ignition keys that are used for the vehicle is 5 or less.

3) Prepare SUZUKI scan tool and immobilizer cartridge. Connect SUZUKI scan tool to DLC with ignition switch at OFF position.

NOTE:

For operation procedure of SUZUKI scan tool, refer to its operator's manual.

4) Insert ignition key with built-in transponder to be registered to key cylinder and turn ignition switch to ON (II) position.

5) Check scan tool DATA LIST for "NUMBER OF FC", "TRANS SKC" and "FIX CODE".

Turn ignition switch at OFF position and input password. If 5 ignition keys are already registered, clear all FIX CODEs registered in immobilizer control module by executing "CLEAR FC" command in IMMOBI CONT menu with scan tool.

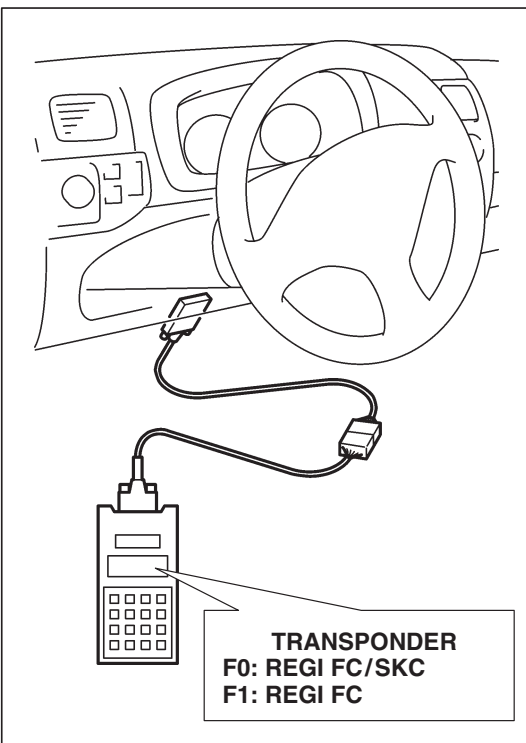
6) If FIX CODE is already registered in immobilizer control module and secret key in transponder is not registered, execute "CLEAR FC" command with scan tool.

7) By using scan tool, register FIX CODE (FC) to immobilizer control module and register secret key (SKC) to transponder by executing REGI FC/SKC command in TRANSPONDER under SELECT MODE menu with ignition switch at OFF position.

If secret key is already registered in ignition key with built-in transponder, register FIX CODE by executing "REGI FC" at TRANSPONDER menu under SELECT MODE with ignition switch at OFF position.

8) After completing registration, turn ignition switch to ON position and check that registration is executed correctly by monitoring "FIX CODE REGISTERED" and "TRANS SKC REGISTERED" displayed on scan tool DATA LIST.

9) If there is other keys to registered, perform steps 4) to 8).



SEL PASSWORD MOD

F0: INPUT

F1: REGISTER

HOW TO REGISTER PASSWORD

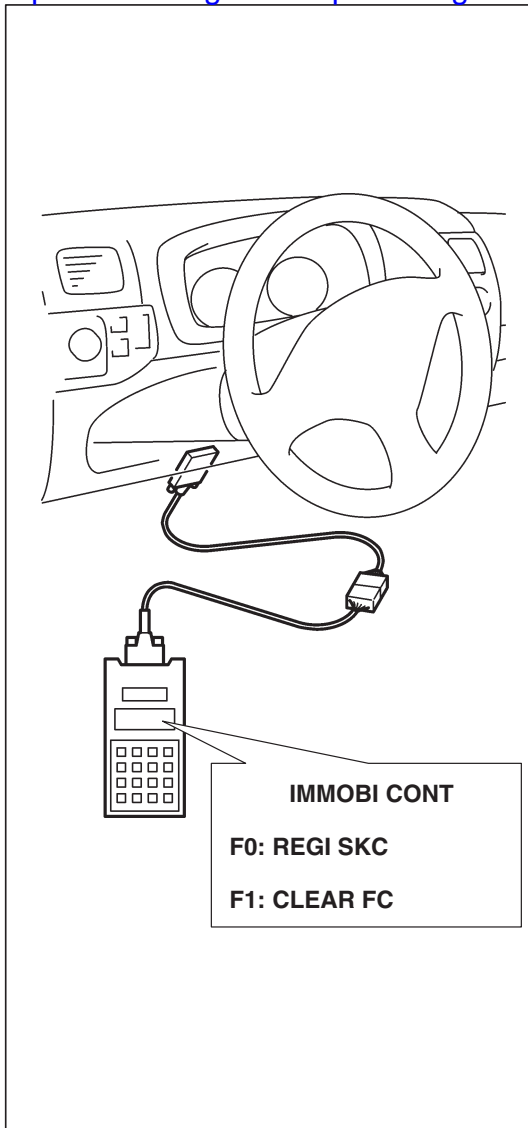
1) Perform IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE.

2) Prepare SUZUKI scan tool and immobilizer cartridge. Connect Suzuki scan tool to DLC with ignition switch at OFF position.

NOTE:

For operation procedure of SUZUKI scan tool, refer to its operator's manual.

3) Register password by performing REGISTER in SEL PASSWORD MOD menu.



PROCEDURE AFTER IMMOBILIZER CONTROL MODULE REPLACEMENT

When immobilizer control module must be replaced including when replaced because rechecking by using a known-good immobilizer control module is necessary during trouble diagnosis, register FIX CODE (FC) and secret key (SKC) to immobilizer control module by performing the following procedure.

- 1) Perform IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE.
- 2) Prepare SUZUKI scan tool and IMMOBILIZER cartridge. Connect scan tool to DLC with ignition switch at OFF position.

NOTE:

For operation procedure of scan tool, refer to operator's manual.

- 3) Register secret key (SKC) by executing REGI SKC in IMMOBI CONT menu under SELECT MODE.

CAUTION:

Never execute REGI SKC/PWD in ECM menu under SELECT MODE during immobilizer control module registration procedure. Or the ignition key will be unusable.

- 4) Check for number of registered FIX CODEs by referring DATA LIST of scan tool. If any FIX CODEs are registered, clear FIX CODEs by executing CLEAR FC in IMMOBI CONT menu.
- 5) Register ignition key to immobilizer control module by referring HOW TO REGISTER IGNITION KEY.

ECM

F0: REGI SKC/PWD

PROCEDURE AFTER ECM REPLACEMENT

When ECM is replaced, including when replaced because rechecking by using a known-good ECM is necessary during trouble diagnosis, register password and secret key (SKC) to ECM by performing following procedure.

- 1) Perform IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE.
- 2) Prepare SUZUKI scan tool and IMMOBILIZER cartridge. Connect scan tool to DLC with ignition switch at OFF position.

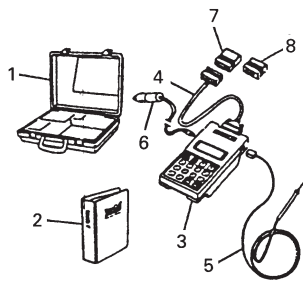
NOTE:

For operation procedure of scan tool, refer to operator's manual.

- 3) Register password (PWD) and secret key (SKC) to ECM by executing REGI SKC/PWD command in ECM under SELECT MODE with scan tool.

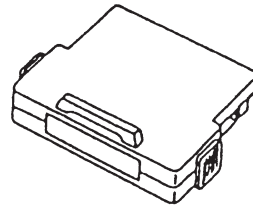
CAUTION:

Never execute REGI SKC in IMMOBI CONT menu under SELECT MODE during ECM registration procedure. Or the ignition key will be unusable.

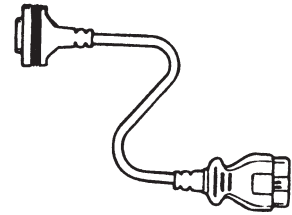
SPECIAL TOOLS

1. Storage case
2. Operator's manual
3. Tech-1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

09931-76011
SUZUKI scan tool (Tech-1A) kit



Mass storage cartridge/
Immobilizer cartridge



09931-76030
16/14 pin DLC cable

SECTION 9

BODY SERVICE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- When body servicing, if shock may be applied to air bag system component parts, remove those parts beforehand. (Refer to Section 10B.)

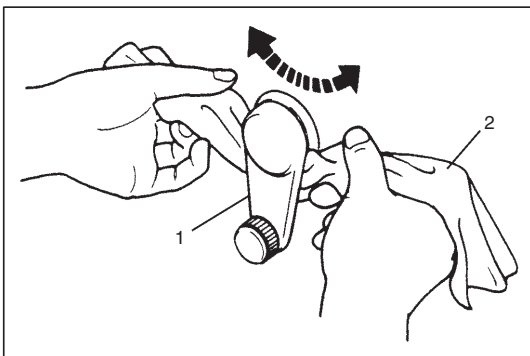
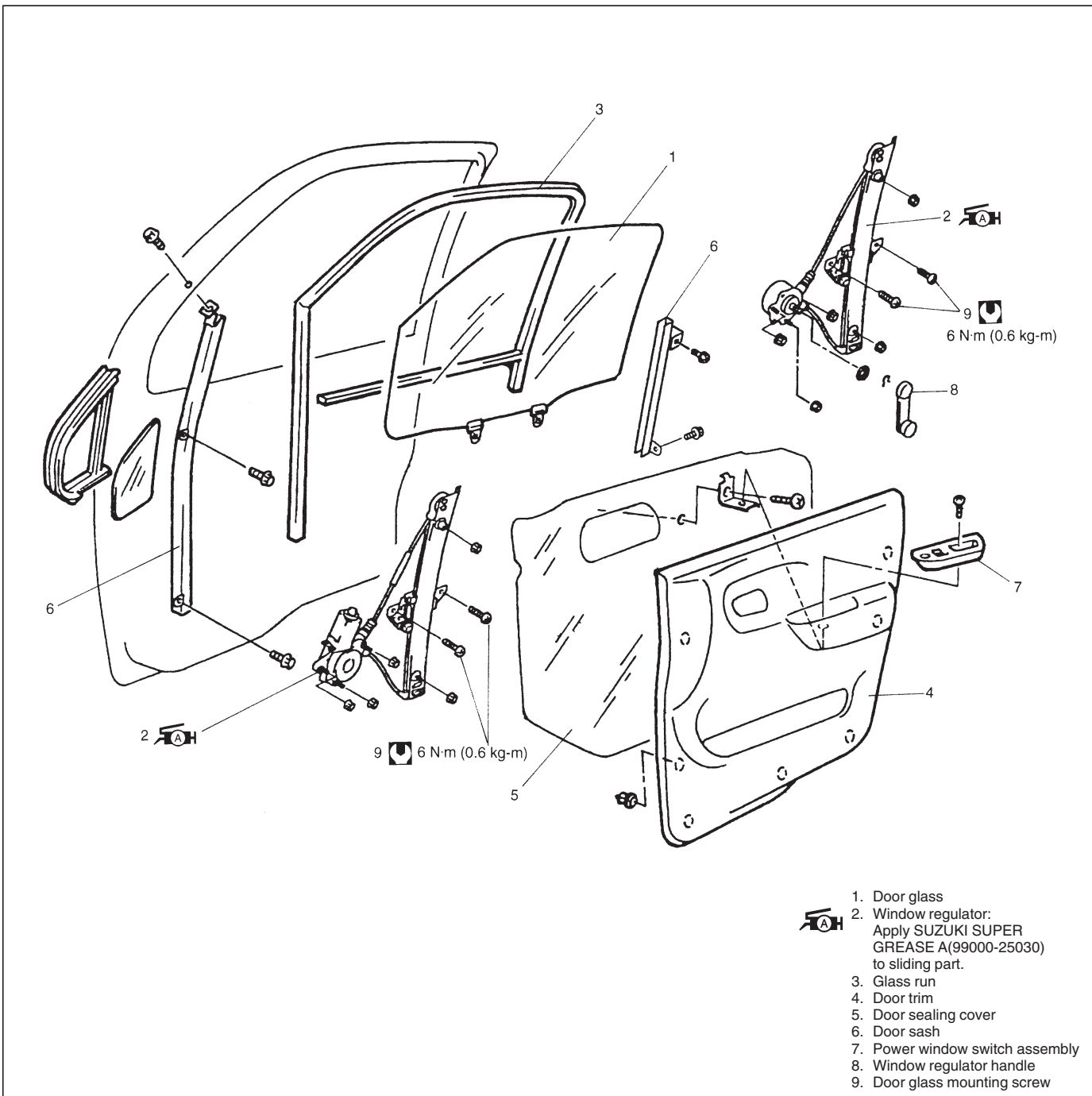
NOTE:

Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number of with an equivalent part if replacement becomes necessary.

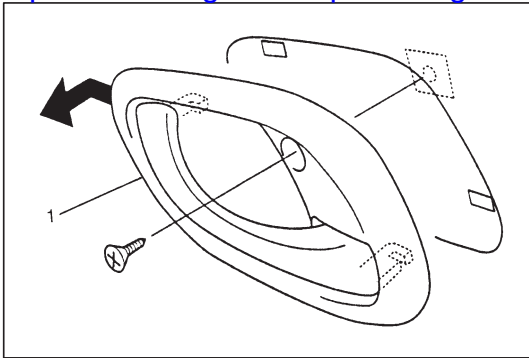
Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

CONTENTS

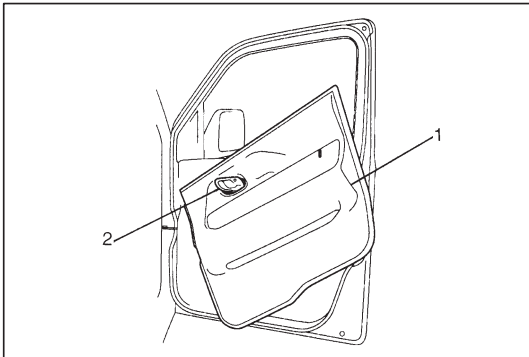
GLASS, WINDOWS AND MIRRORS	9- 2	SEATS	9-29
Front Door Glass	9- 2	Front Seat and Rear Seat	9-29
Front Door Window Regulator	9- 5	SECURITY AND LOCKS	9-30
Door Mirror	9- 6	Front Door Lock Assembly	9-30
Rear Door Glass	9- 7	Rear Door Lock Assembly	9-32
Rear Door Window Regulator	9- 9	Back Door Lock Assembly	9-33
Window Shield	9-11	Key Coding	9-34
Quarter Window	9-16	SUNROOF	9-35
Back Door Glass	9-17	Sliding Roof (If Equipped)	9-35
BODY STRUCTURE	9-18	EXTERIOR AND INTERIOR TRIM	9-42
Front and Rear Door Assembly	9-18	Floor Carpet	9-42
Front Door Assembly	9-18	Head Lining	9-43
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Front Fender	9-24	PANEL CLEARANCE	9-47
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Instrument Panel	9-26		

GLASS, WINDOWS AND MIRRORS**FRONT DOOR GLASS****REMOVAL**

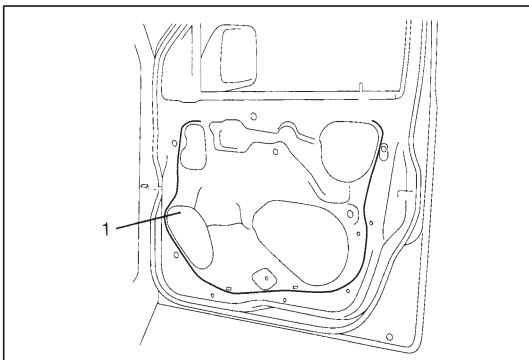
- 1) Remove window regulator handle (1) (if equipped).
For its removal, pull off snap by using a cloth (2) as shown in figure.



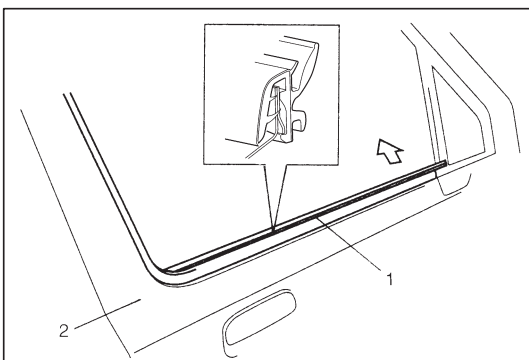
- 2) Remove inside handle bezel (1).
- 3) Remove inside lock knob and door trim fitting screw.



- 4) Remove door trim (1).
With inside handle bezel (2) tilted as shown in figure, turn door trim (1) 90° counterclockwise to remove it.
And disconnect power window switch lead wire at coupler (if equipped).



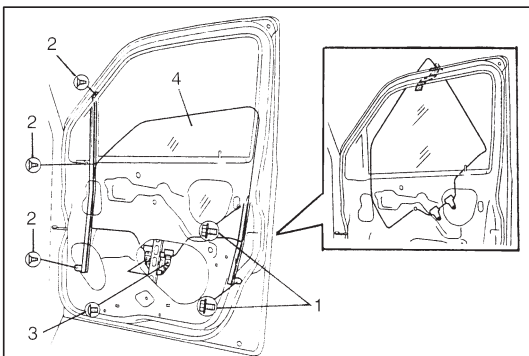
- 5) Remove door sealing cover (1).
- 6) Remove door mirror.
Refer to "DOOR MIRROR" in this section.



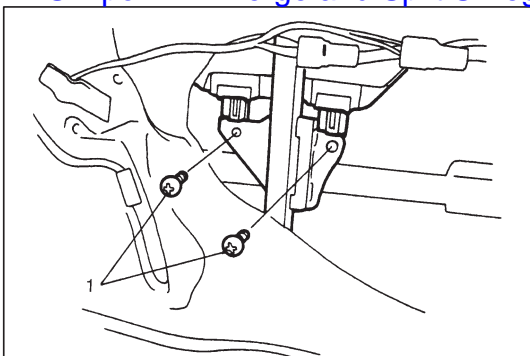
- 7) Remove glass run (1).
Lower window all the way down. Then, use a tape-wrapped putty knife to pry off glass run.

NOTE:

When removed glass run (1) from door panel (2), be careful not to deformation for glass run (1).



- 8) Remove door sash mounting bolts (1) and screws (2).
- 9) Remove glass attaching screws (3).
- 10) Take out door glass (4).

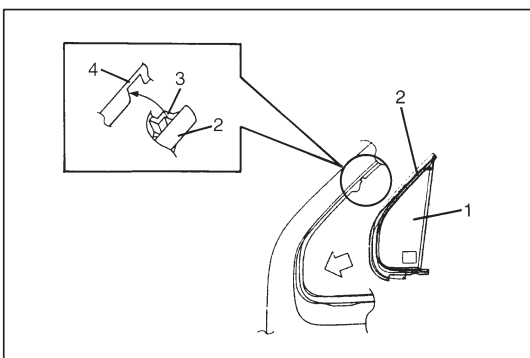
**INSTALLATION****NOTE:**

If there is deformity for glass run, replace new one.

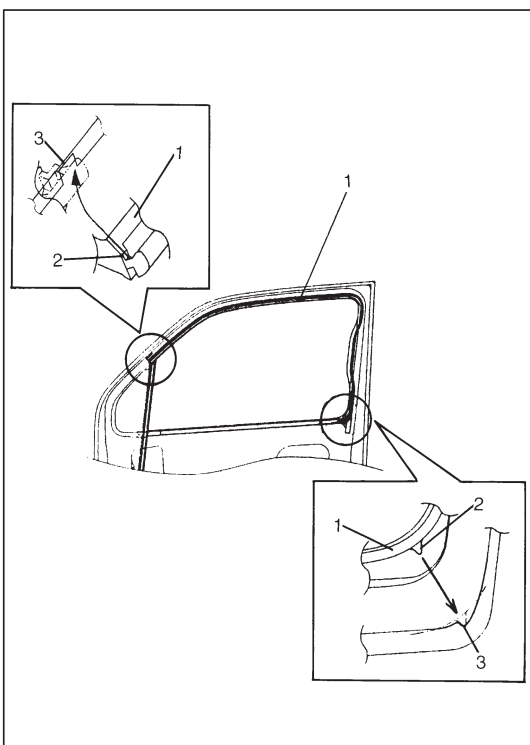
Reverse removal procedure to install door glass noting the following points:

- Tighten glass attaching screws (1) to specified torque. Tighten rear screw first, then front screw.

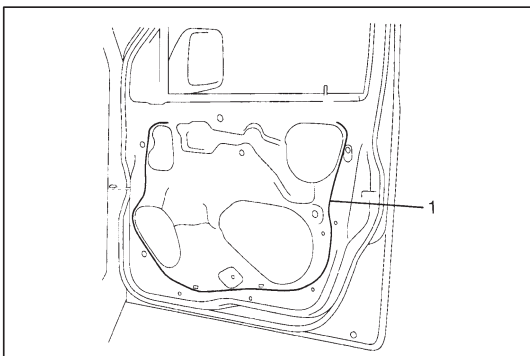
Tightening Torque: 6 N·m (0.6 kg-m, 4.3 lb-ft)



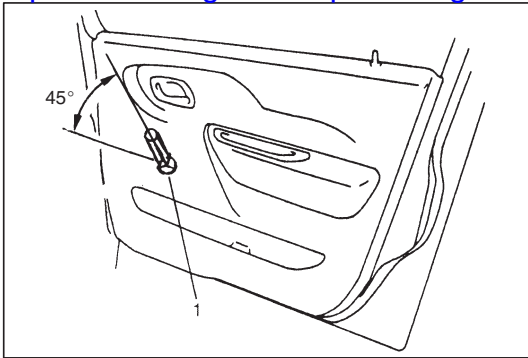
- When door window front glass (1) is installed, fit weatherstrip (2) convex part (3) to door panel cut part (4).



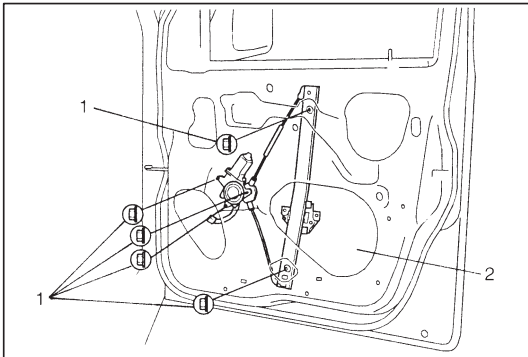
- When glass run (1) is installed, fit glass run convex part (2) to door panel cut part (3).



- Secure door sealing cover with adhesive (1).

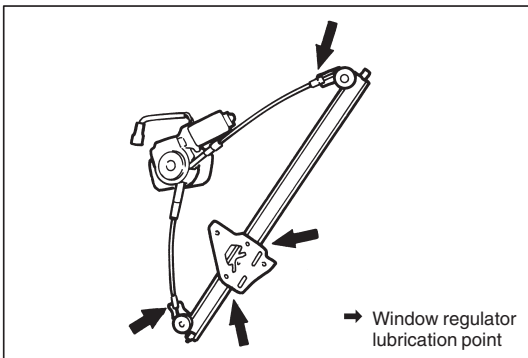


- Install door window regulator handle (1) so that it has a 45° angle when glass is fully closed, as shown in figure.



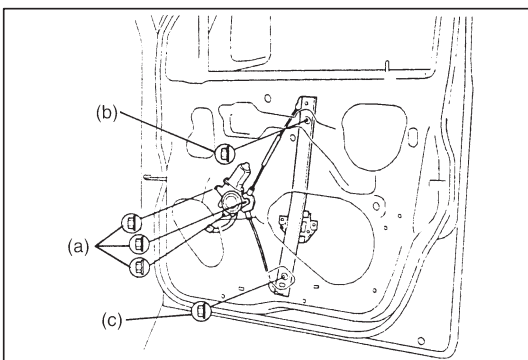
FRONT DOOR WINDOW REGULATOR REMOVAL

- 1) Remove door glass, referring to steps 1) to 9) of FRONT DOOR GLASS REMOVAL in this section.
- 2) Disconnect power window motor lead wire at coupler and loosen clamp, if equipped.
- 3) Loosen regulator mounting nuts (1) and take out regulator through hole (2) as shown in figure.



INSPECTION

- 1) Check regulator sliding and rotating parts for greasing.
- 2) Check rollers for wear and damage.
- 3) Check wire for damage.



INSTALLATION

Reverse removal procedure to install window regulator noting the following.

- Tighten window regulator attaching nuts to proper tightening order.

Tightening Order: (a) → (b) → (c)

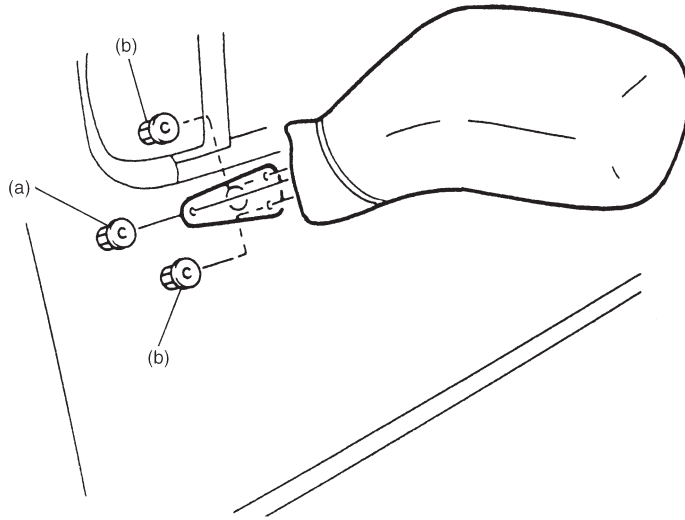
- Tighten door glass attaching screws to specified torque. Refer to "FRONT DOOR GLASS" in this section.

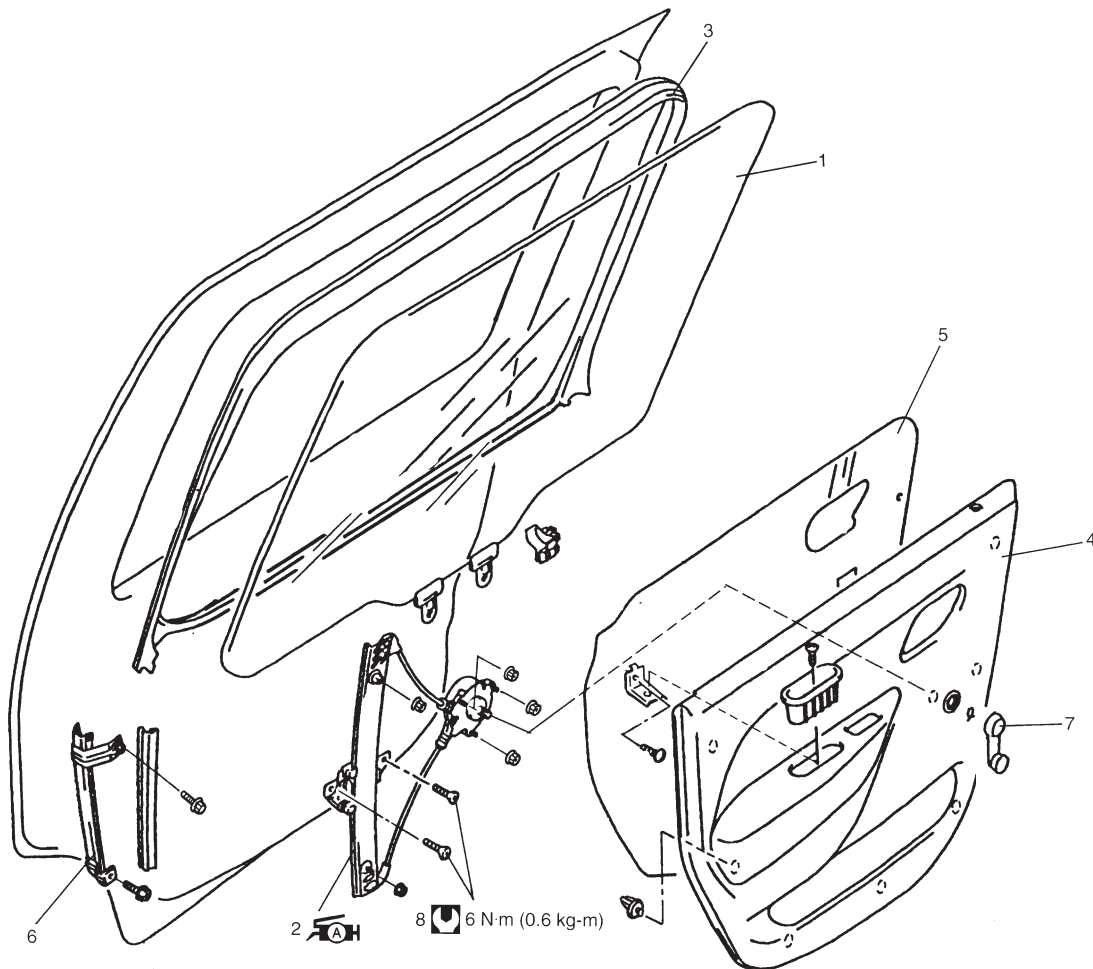
DOOR MIRROR

REMOVAL AND INSTALLATION

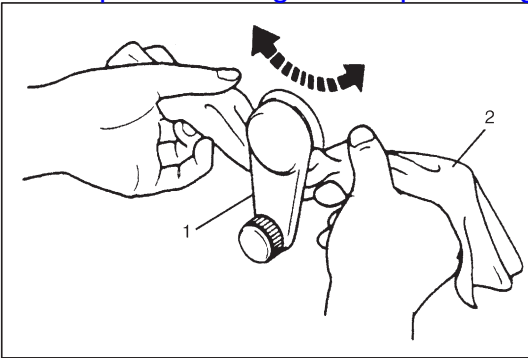
When removing or installing door mirror, refer to figure shown below.

- Tightening Order: (a) → (b)



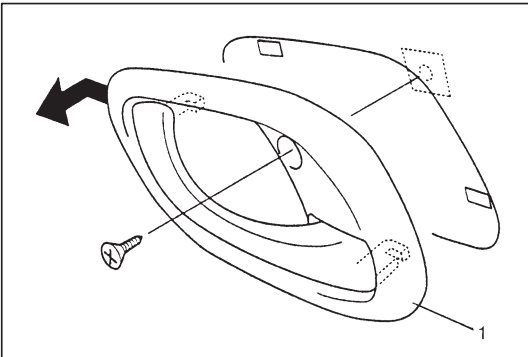
REAR DOOR GLASS

1. Door glass
2. Window regulator:
Apply SUZUKI SUPER
GREASE A (99000-25010)
to moving section.
3. Glass run
4. Door trim
5. Door sealing cover
6. Door sash
7. Window regulator handle
8. Door glass mounting screw

**REMOVAL**

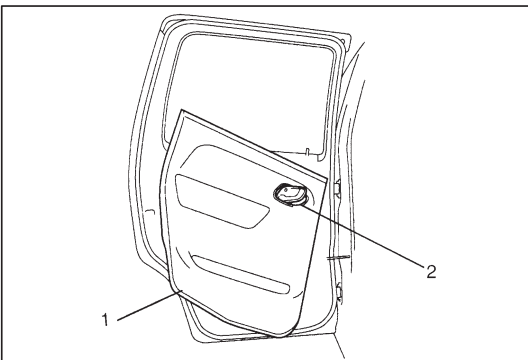
- 1) Remove window regulator handle (1).

For its removal, pull off snap by using a cloth (2) as shown in figure.



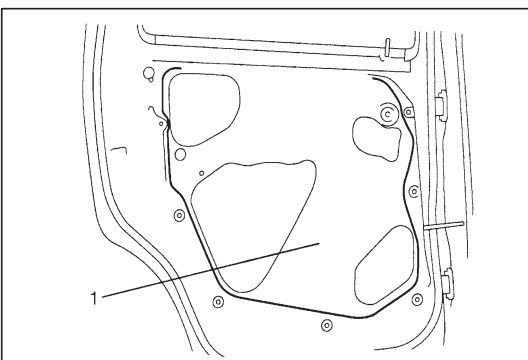
- 2) Remove inside handle bezel (1).

- 3) Remove inside lock knob and door trim fitting screw.

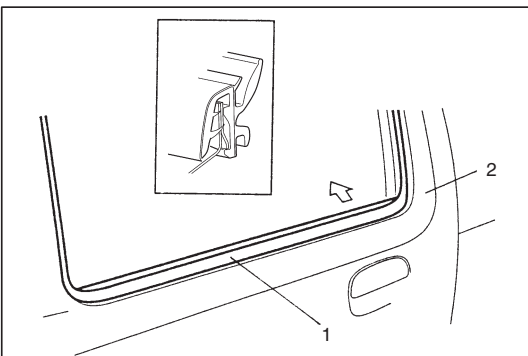


- 4) Remove door trim (1).

With inside handle bezel (2) tilted as shown in figure, turn door trim 90° counterclockwise to remove it.



- 5) Remove door sealing cover (1).

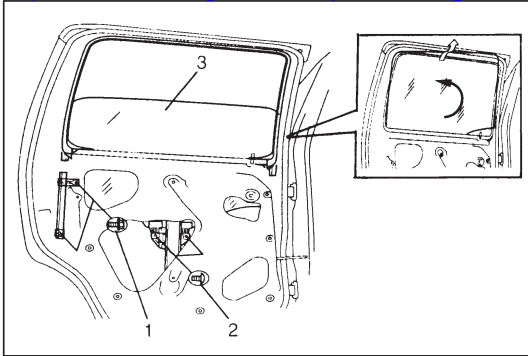


- 6) Remove glass run (1).

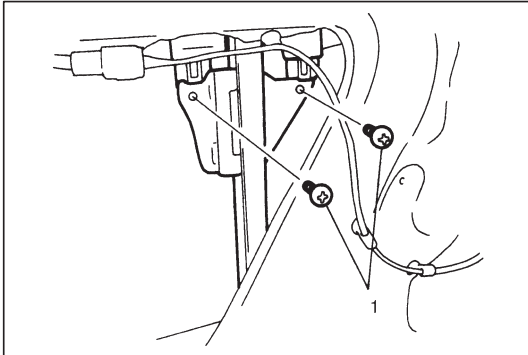
Lower window all the way down. Then, use a tape-wrapped putty knife (or screwdriver) to pry off glass run.

NOTE:

When removed glass run (1) from door panel (2), be careful not to deformation for glass run (1).



- 7) Remove door sash mounting bolts (1).
- 8) Remove glass attaching screws (2).
- 9) Turn door glass (3) 90°.
- 10) Take out door glass (3).



INSTALLATION

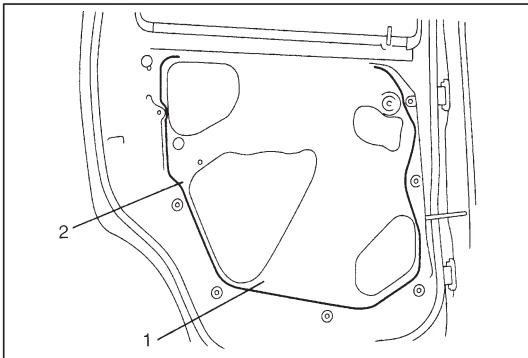
NOTE:

If there is deformity for glass run, replace new one.

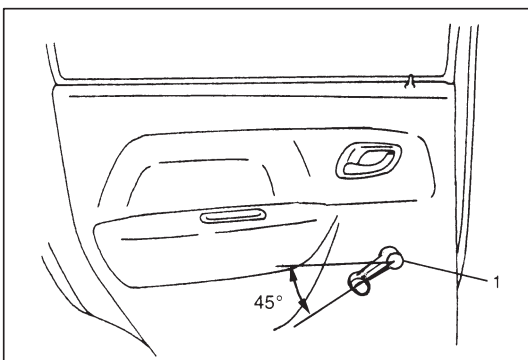
Reverse removal procedure to install door glass noting following points:

- Tighten glass attaching screws (1) to specified torque. Tighten rear screw first, then front screw.

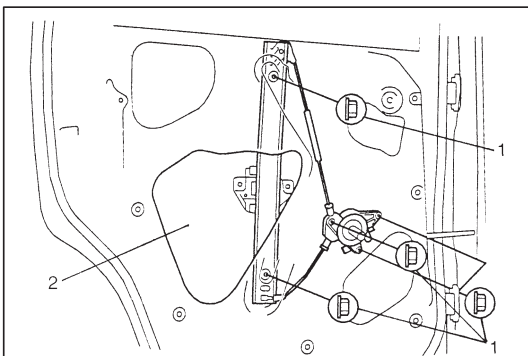
Tightening Torque: 6 N·m (0.6 kg-m, 4.3 lb-ft)



- Secure door sealing cover (1) with adhesive (2).

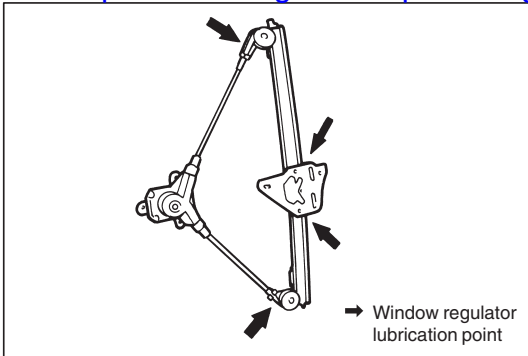


- Install door window regulator handle (1) so that it has a 45° angle when glass is fully closed, as shown in left figure.



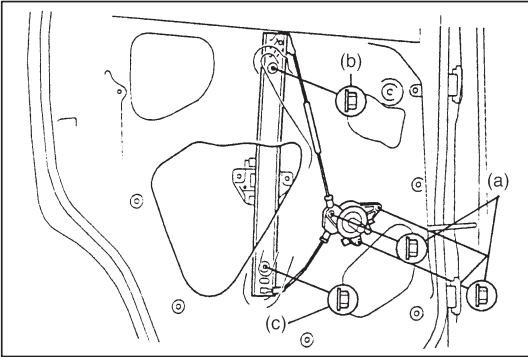
REAR DOOR WINDOW REGULATOR REMOVAL

- 1) Remove door glass, referring to steps 1) to 9) of REAR DOOR GLASS REMOVAL in this section.
- 2) Loosen regulator mounting nuts (1) and take out regulator through hole (2) as shown in left figure.



INSPECTION

- 1) Check regulator sliding and rotating parts for greasing.
- 2) Check rollers for wear and damage.
- 3) Check wire for damage.



INSTALLATION

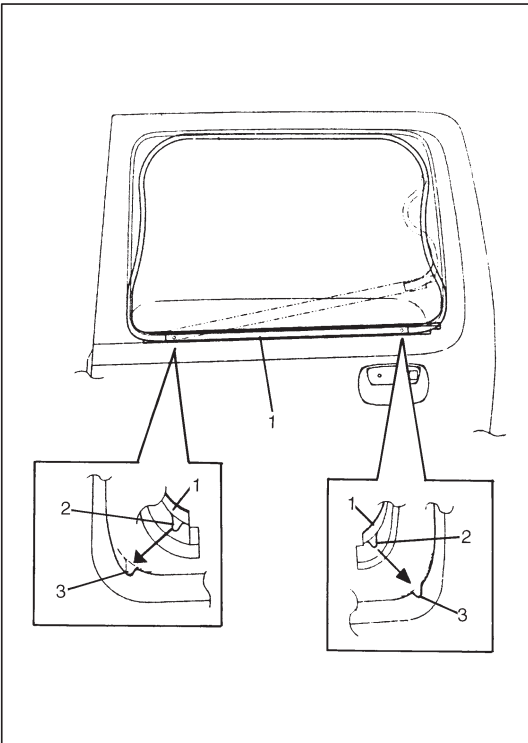
Reverse removal procedure to install window regulator noting following.

- Tighten window regulator attaching nuts to proper tightening order.

Tightening Order: (a) → (b) → (c)

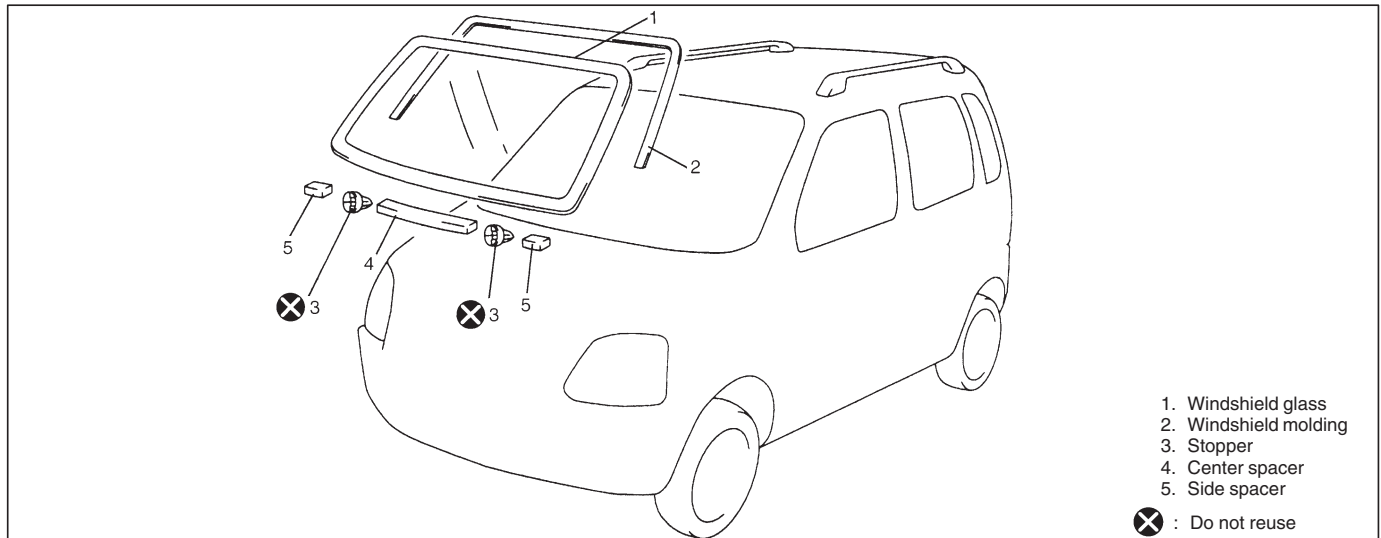
- Tighten door glass attaching screw to specified torque. Refer to "REAR DOOR GLASS" in this section.

- When glass run (1) is installed, fit glass run convex part (2) to door panel cut part (3).



WINDOW SHIELD

The front windshield is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For the Windshield replacement, it is important to use an adhesive which provides sufficient adhesion strength and follow the proper procedure.



CAUTION:

- Described in this section is the glass replacement by using 3 types of primers and 1 type of adhesive made by YOKOHAMA (one component urethane adhesive to be used with primer in combination). When using primer and adhesive made by other manufacturers, be sure to refer to handling instructions supplied with them. Negligence in following such procedure or misuse of the adhesive in any way hinders its inherent adhesive property. Therefore, before the work, make sure to read carefully the instruction and description given by the maker of the adhesive to be used and be sure to follow the procedure and observe each precaution throughout the work.
- Should coated surface be scratched or otherwise damaged, be sure to repair damaged part, or corrosion may start from there.

Use an adhesive of above mentioned type which has the following property.

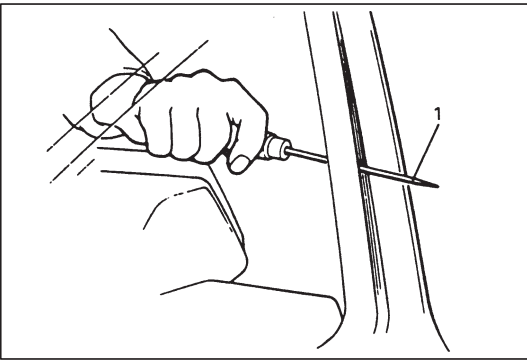
Shearing strength: 40 kg/cm² (569 lb/in²) or more

Adhesive materials and tools required for removal and installation.

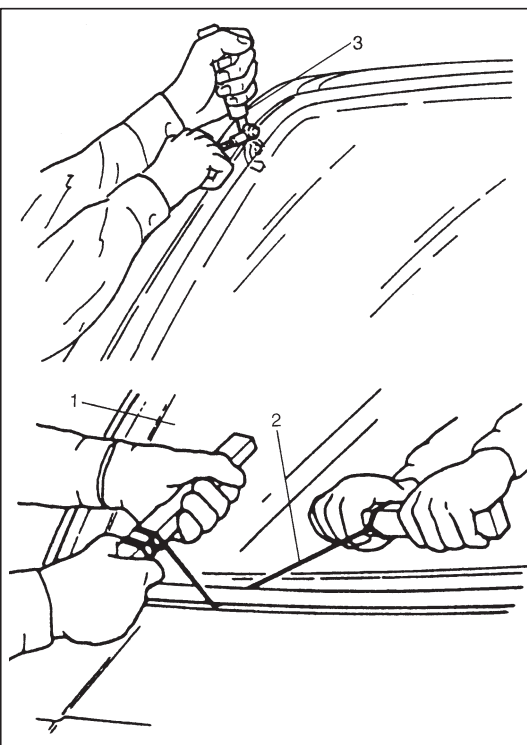
- One component urethane adhesive and primers used in combination (For one sheet of windshield).
Adhesive (470 g (15.7 oz.))
Primer for glass (30 g (1.0 oz.))
Primer for body (30 g (1.0 oz.))
Primer for molding (30 g (1.0 oz.))
- Eyeleteer
- Piano string
- Windshield knife
- Brush for primer application (2 pcs)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)

REMOVAL

- 1) Clean both inside and outside of glass and around it.
- 2) Remove wiper arms and garnish.
- 3) Using tape, cover body surface around glass to prevent any damage.
- 4) Remove rear view mirror, sunvisor, and front pillar trims (right & left).
- 5) If necessary, remove instrument panel. Refer to "INSTRUMENT PANEL" in this section.
- 6) If necessary, remove head lining. Refer to "HEAD LINING" in this section.
- 7) Remove (or cut) windshield molding.



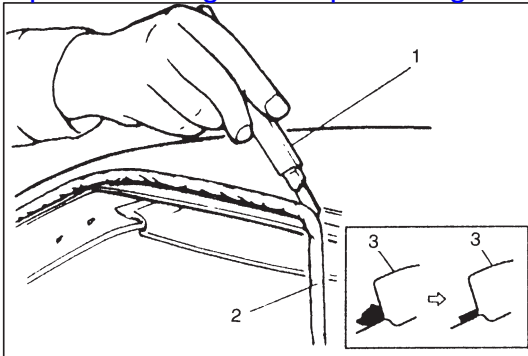
- 8) Drill hole with eyeletter (1) through adhesive and let piano string through it.



- 9) Cut adhesive all around windshield (1) with piano string (2). When using tool, windshield knife (3), to cut adhesive, be careful not to cause damage to windshield. Use wire to cut adhesive along lower part of windshield.

NOTE:

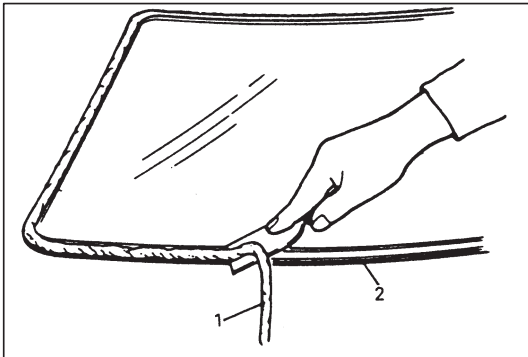
Use piano string as close to glass as possible so as to prevent damage to body and instrument panel.



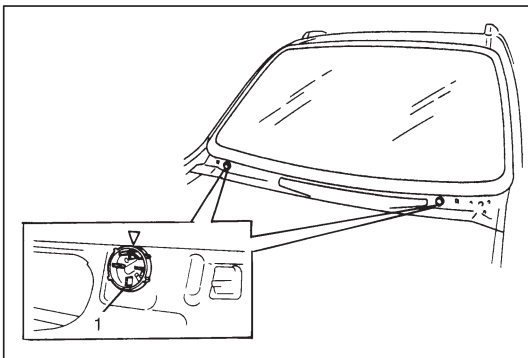
- 10) Using knife (1), smoothen adhesive (2) remaining on body side (3) so that it is 1 to 2 mm thick all around.

NOTE:

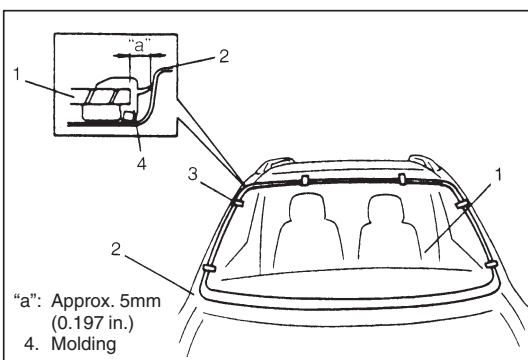
Before using knife, clean it with alcohol or the like to remove oil from it.



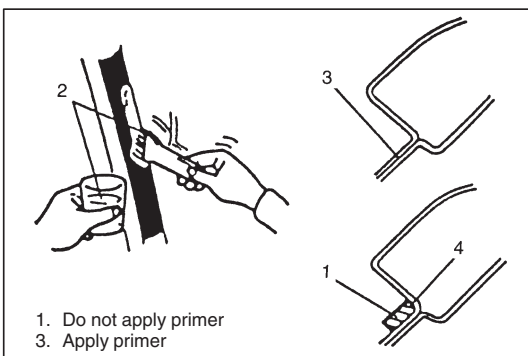
- 11) When reusing windshield, remove the adhesive (1) from it, using care not to damage primer coated surface (2).

**INSTALLATION**

- 1) Using cleaning solvent, clean windshield edge where windshield glass is to be adhered. (Let it dry for more than 10 minutes.)
2) Install new glass stoppers (1) (2pcs) to lower side of windshield.



- 3) To determine installing position of glass (1) to body (2), position glass against body so that clearance between upper end of glass (1) and body (2) is about 5 mm (0.197 in.) and clearances between each side end (right & left) of glass (1) and body (2) are even. Then mark mating marks (3) on glass (1) and body (2) as shown. Upper clearance can be adjusted by moving stoppers position.

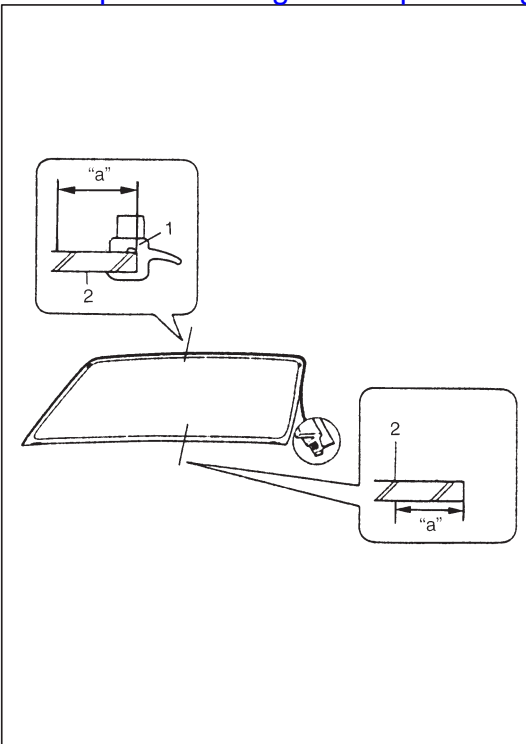


- 4) Clean contact surfaces of old adhesive (4), paint or bare metal thoroughly.

If surfaces of paint or bare metal come out, apply primer (2) for body with caution not to apply primer (2) to surface of adhesive remaining on body.

NOTE:

- Be sure to refer to primer maker's instruction for proper handling and drying time.
- Do not touch body and old adhesive surfaces where glass is to be adhered.

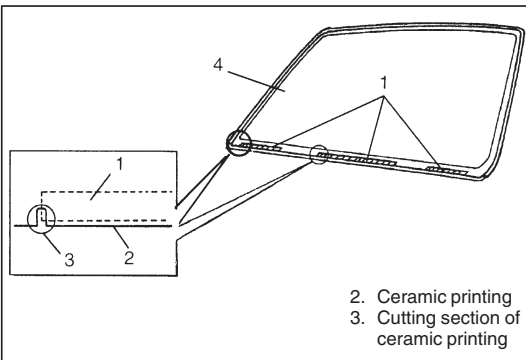


- 5) Install new molding (1) to glass (2).
- 6) Clean glass surface to be adhered to body with clean cloth. If cleaning solvent is used, let it dry for more than 10 minutes.

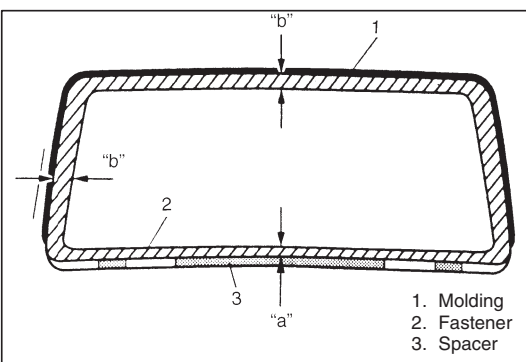
Cleaning Area

Distance from the edge of glass

"a": 30 – 50 mm (1.18 – 1.97 in.)



- 7) Install new spacer (1) to glass (4).



- 8) Using new brush, apply sufficient amount of primer for glass along glass surface to be adhered to body.

NOTE:

- Be sure to refer to maker's instruction for proper handling and drying time.
- Do not apply primer on outside of ceramic coated surface.
- Do not touch primer coated surface.

Width "a": 22 mm (0.87 in.)

"b": 15 mm (0.59 in.)

- 9) Apply primer for molding along molding surface all around as shown in figure.

10) Apply adhesive referring to figure.

NOTE:

- Start from bottom side of glass (3).
- Be careful not to damage primer.
- Height of adhesive (2) applied to lower side should be higher than that of other three sides.

Upper, right and left sides

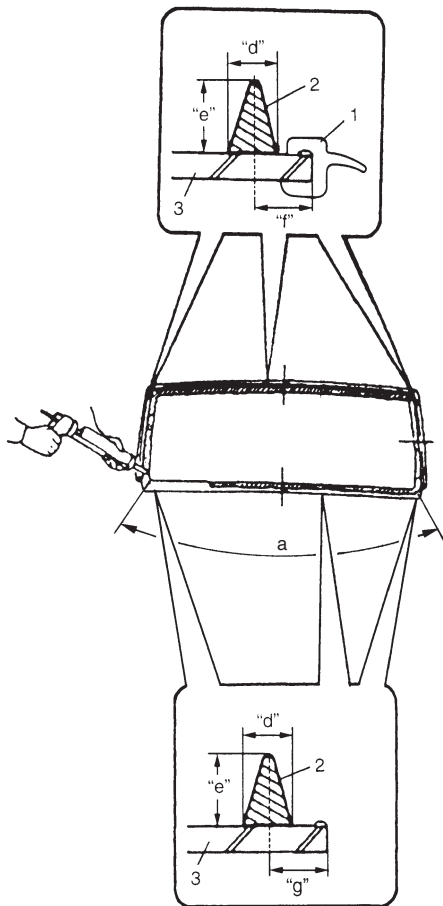
Width "d": Approx. 7 mm (0.27 in.)

Height "e": Approx. 15 mm (0.59 in.)

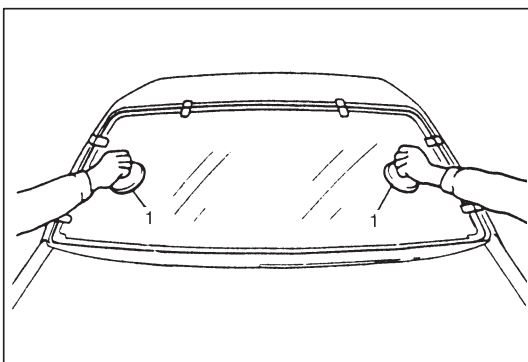
Position "f": Approx. 10 mm (0.39 in.)

"g": Approx. 17 mm (0.67 in.) section "a"

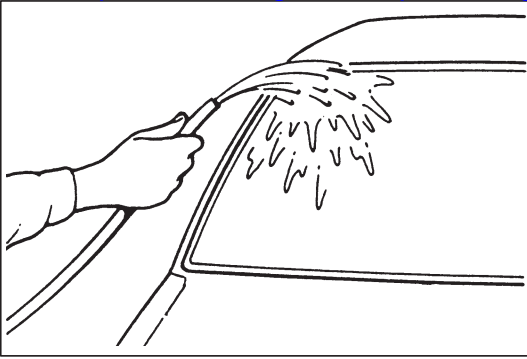
- Press glass (3) against fittings surface of body panel quickly after adhesive (2) is applied.
- Use of rubber sucker grip is helpful to hold and carry glass after adhesive (3) is applied.
- Perform steps 8) to 9) within 10 min. to ensure sufficient adhesion.
- Be sure to refer to adhesive maker's instruction for proper handling and drying time.



1. Molding



11) Holding rubber sucker grips (1), place glass onto body by aligning mating marks marked in step 3) and press it.



- 12) Check for water leakage by pouring water over windshield through hose. If leakage is found, dry windshield and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

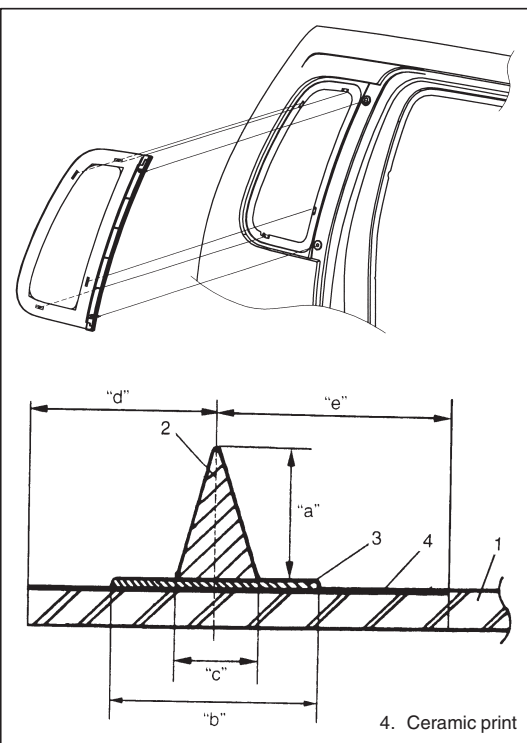
NOTE:

- Do not use high pressure water.
- Do not blow compressed air directly at adhesive applied part when drying.
- Do not use infrared lamp or like for drying.

CAUTION:

Upon completion of installation, note the following.

- Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.
- If molding is not securely in place, hold it down with a tape until adhesive is completely set.
- Each adhesive has its own setting time. Be sure to refer to its maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.
- Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.



4. Ceramic print

QUARTER WINDOW REMOVAL AND INSTALLATION

Refer to "WINDSHIELD" section as removal and installation procedures are basically the same. However, note the following.

NOTE:

Observe the following precautions when applying adhesive (2) along glass (1) edge.

- Adhesive (2) should be applied evenly especially in height.
- Be careful not to damage primer (3).
- Press glass against body quickly after adhesive (2) is applied.

Height "a" : 10 mm (0.39 in.)

Width "b" : 14 mm (0.55 in.)

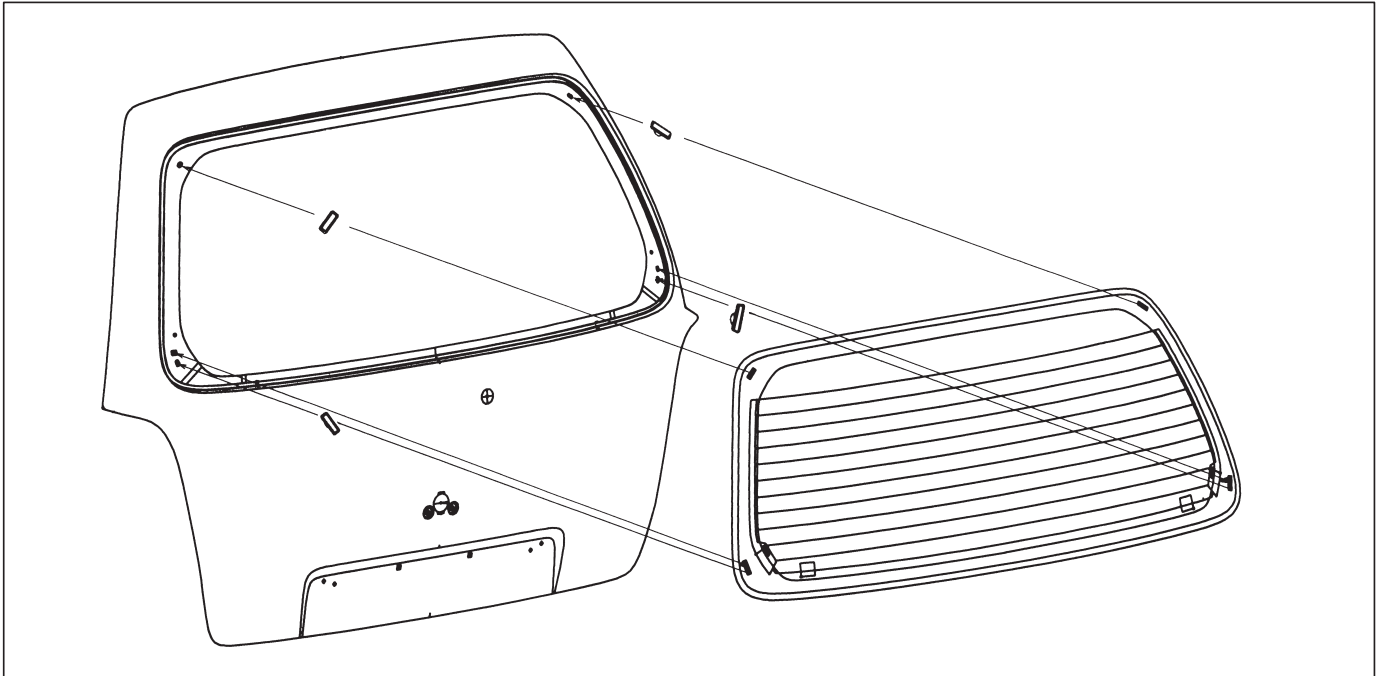
"c" : 6 mm (0.24 in.)

Position "d" : 9.5 mm (0.37 in.) for glass lower section.

: 11 mm (0.43 in.) for glass rear section.

: 8.5 mm (0.33 in.) for glass upper section.

"e" : 27.5 mm (1.1 in.) for glass front section.

BACK DOOR GLASS**REMOVAL AND INSTALLATION**

Refer to "WINDSHIELD" section as removal and installation procedures are basically the same. However, note the following.

NOTE:

Observe the following precautions when applying adhesive (4) along glass (2) edge.

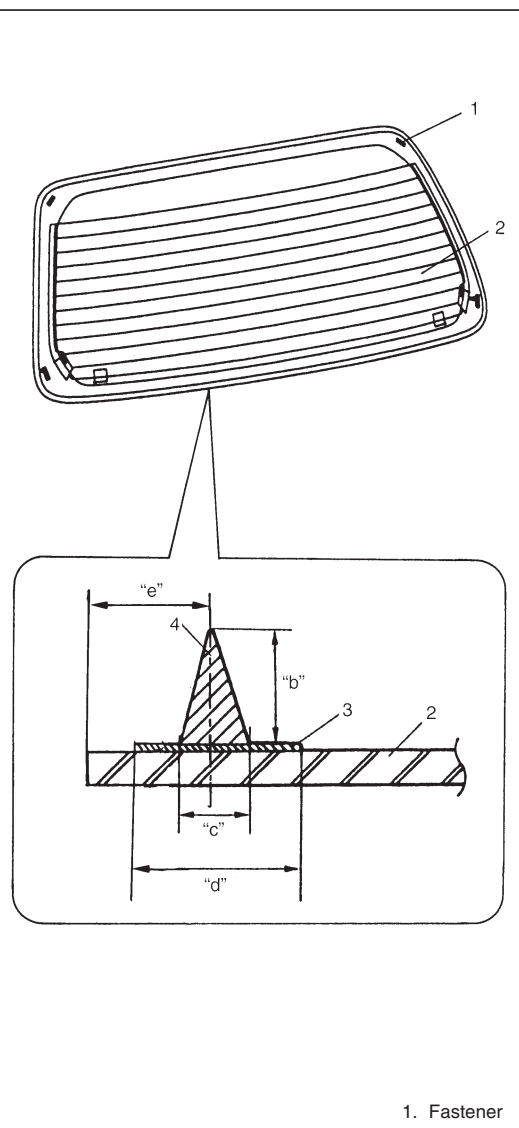
- Adhesive (4) should be applied evenly especially in height.
- Be careful not to damage primer (3).
- Press glass against body quickly after adhesive (4) is applied.

Height "b": 15 mm (0.59 in.)

Width "c": 7 mm (0.28 in.)

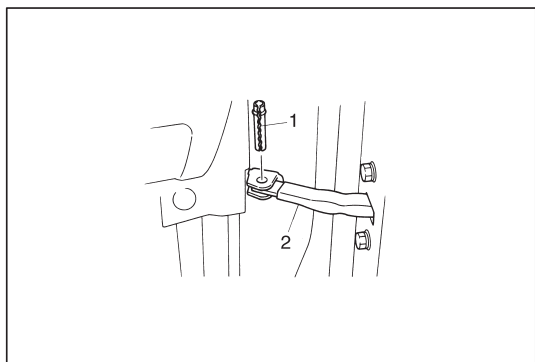
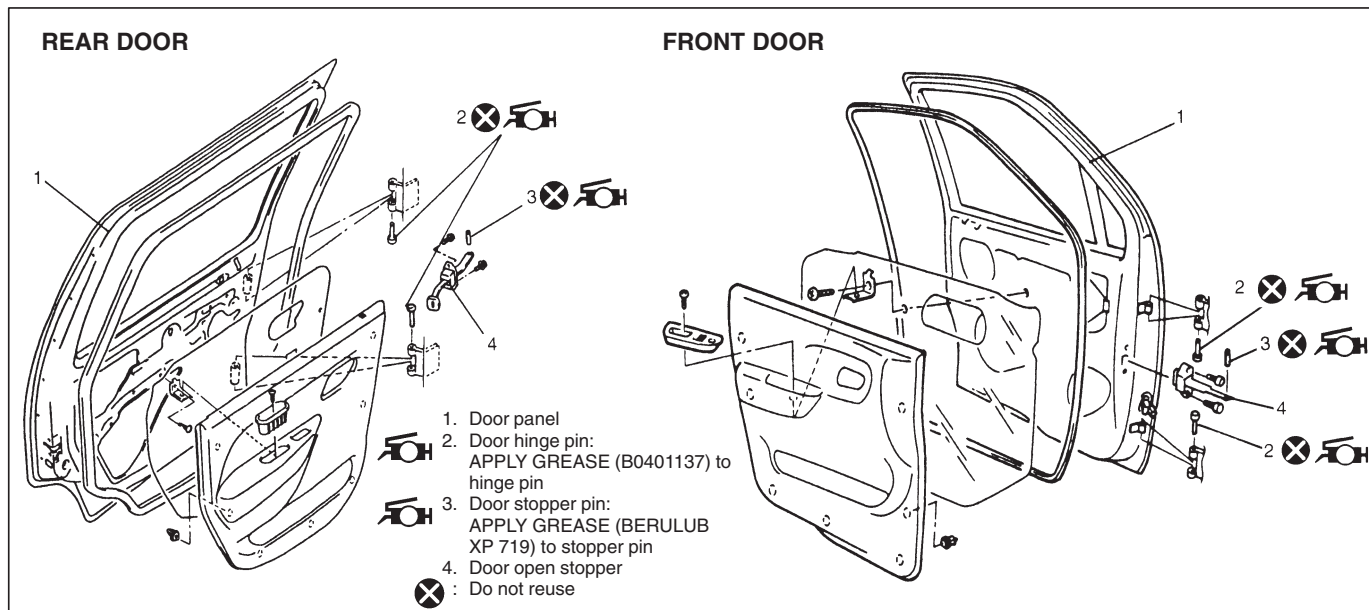
Width "d": 16 mm (0.63 in.)

Clearance "e": 13 mm (0.51 in.)



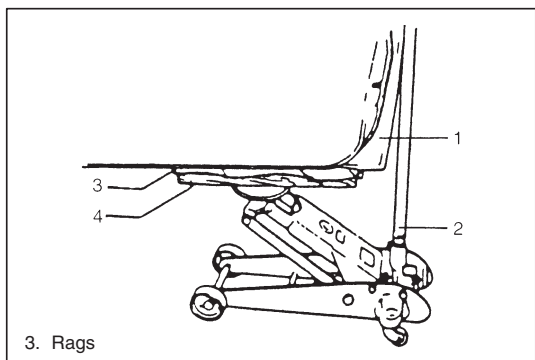
BODY STRUCTURE

FRONT AND REAR DOOR ASSEMBLY

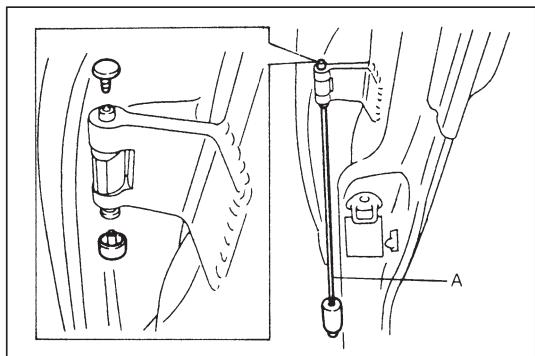


FRONT DOOR ASSEMBLY REMOVAL

- 1) Remove front fender.
- 2) Disconnect door harness lead wires at each coupler.
- 3) Remove stopper pin (1) from door open stopper (2).



- 4) Support door panel (1) using a jack (2) with a piece of wood placed (4) between jack (2) and panel (1), as shown.



- 5) Remove door hinge pin by using special tool (A).

Special Tool A: 09960-48330

- 6) Remove door assembly.

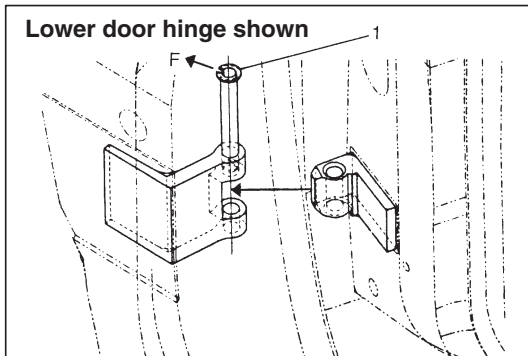
INSTALLATION

Reverse removal procedure to install door assembly, noting the following points.

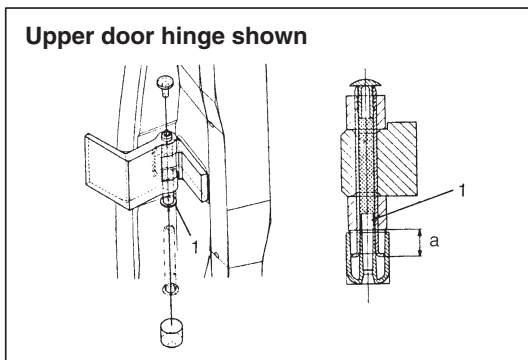
NOTE:

When replacing door, coat replacement door inside with wax for proper anticorrosion treatment.

Refer to "UNDERCOATING/ANTI-CORROSION COMPOUND APPLICATION AREA" in "BODY REPAIR MANUAL".

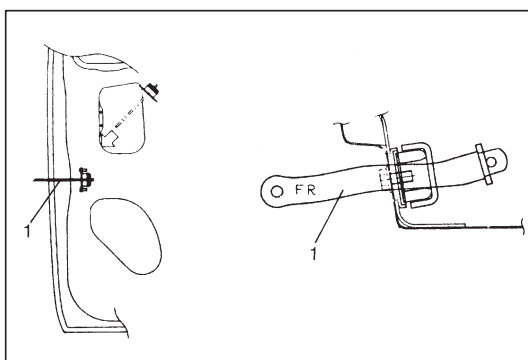


- When door hinge pin (1) is installed to install door to body, turn hinge pin cut section to vehicle forward.



- Drive in door hinge pin (1) as become follow dimensions "a".

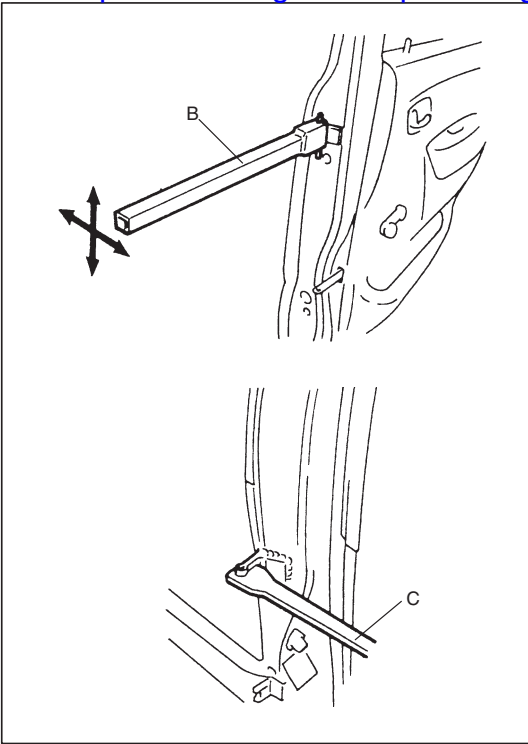
Dimension "a": 10 mm (0.4 in.)



- When door open stopper (1) is installed, be care full to face side or reverse side or door open stopper.

Front right side door : FR caved seal is face.

Front left side door : FL caved seal is face.



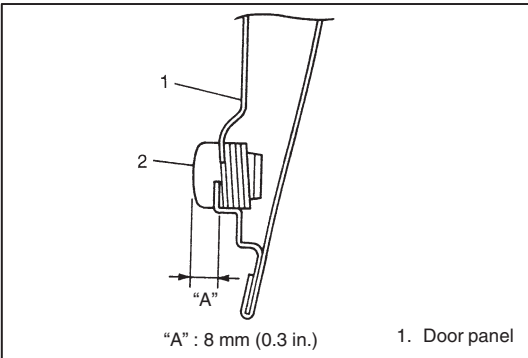
- Adjust door clearance as following procedure.

Using special tool (B), (C) and adjust clearance between rear door and body at the beginning, refer to "PANEL CLEARANCE" in this section.

Next, adjust clearance between front door and body, front door and rear door, refer to "PANEL CLEARANCE" in this section.

Special Tool B: 09960-48320

C: 09960-48310

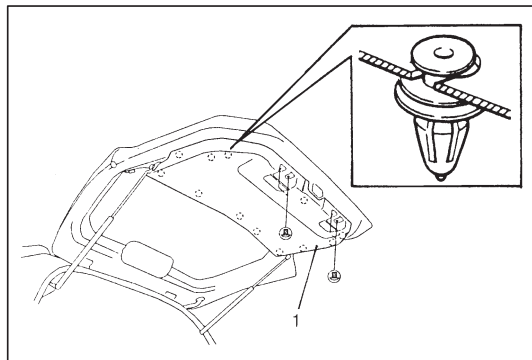
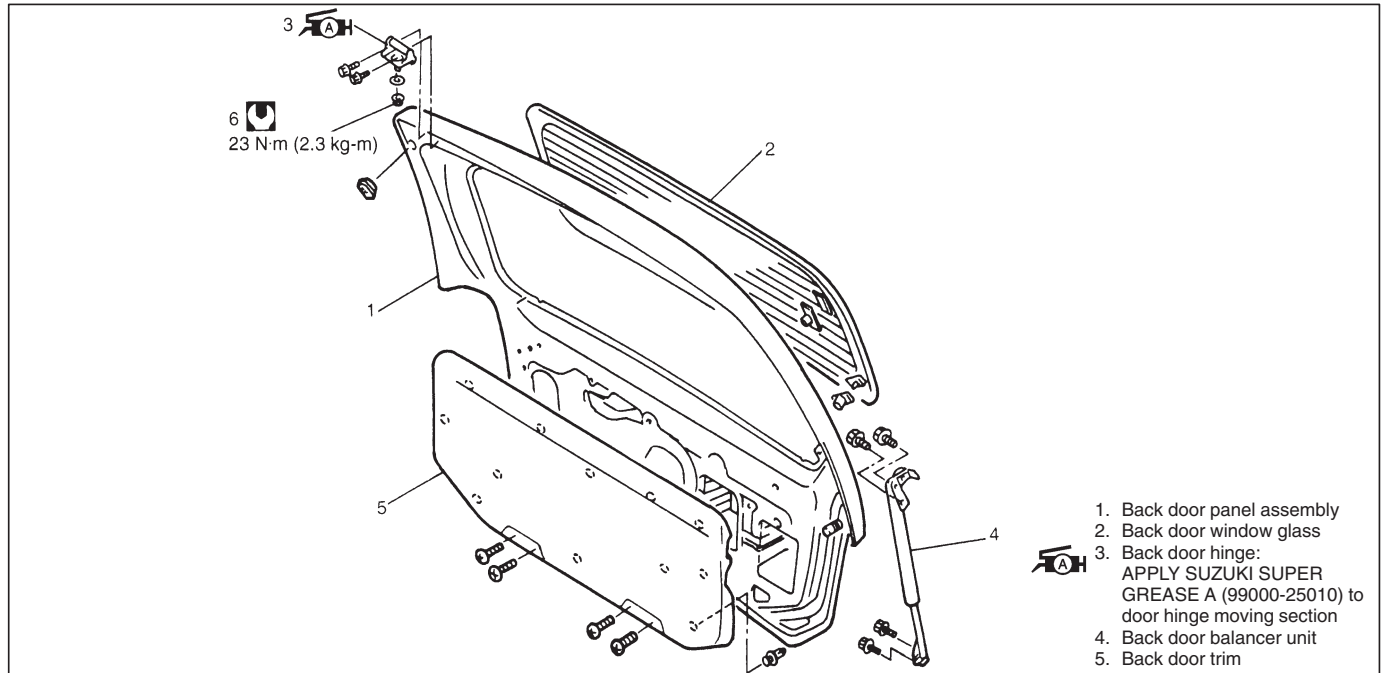


- Adjust door latch striker position by referring to "FRONT DOOR LOCK INSTALLATION" Section so that door is positioned correctly.
- Adjust front door cushion (2) into dimension (A) so that bring cushion into contact with body panel when the door is closed.
- After installation, open and close the door to check looseness. Replace door open stopper pin when there is looseness.
- When weatherstrip is hardened, water leak may develop. In such case, replace it with new one.
- Apply grease to rotating part of door hinge.

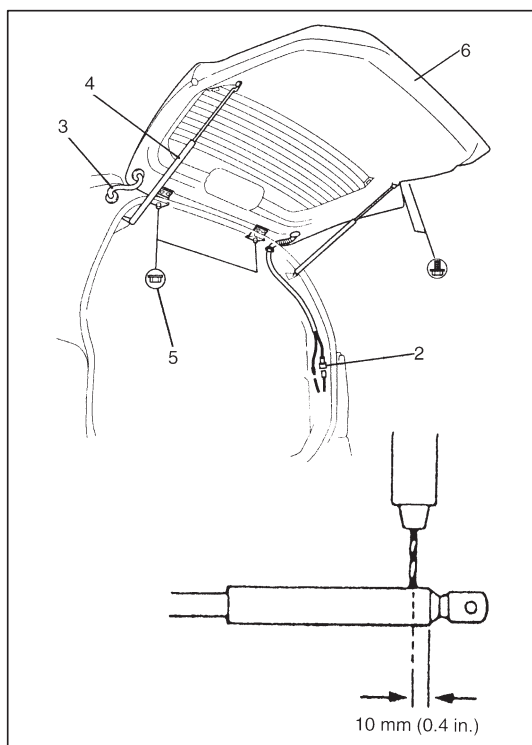
REAR DOOR ASSEMBLY

REMOVAL/INSTALLATION

Follow procedures for Front Door removal/installation in this section.

BACK DOOR ASSEMBLY**REMOVAL**

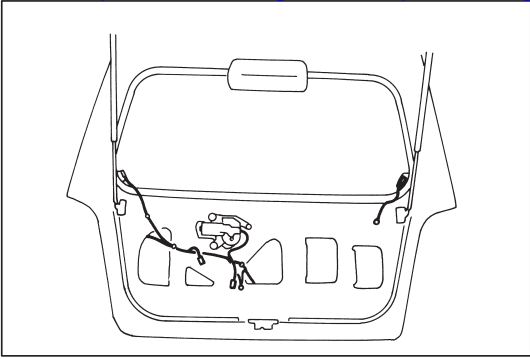
- 1) Remove back door trim (1).
- 2) Remove rear section of head lining and quarter trim.



- 3) Disconnect back door harness connector (2) and washer hose (3).
- 4) Remove back door balancer (4) (first at its door side and next at its body side).
- 5) Remove door hinge nuts (5) and remove back door assembly (6).

WARNING:**Handling of Back Door Balancer (Damper)**

- Do not disassemble balancer because its cylinder is filled with gas.
- Handle balancer carefully. Do not scar or scratch exposed surface of its piston rod, and never allow any paint or oil to stick to its surface.
- Do not turn piston rod with balancer fully extended.
- When discarding removed back door balancer (damper), use a 2 to 3 mm (0.08 to 0.12 in.) drill to make a hole as shown.
- The gas itself is harmless but it may issue out of the hole together with chips generated by the drill. Therefore, be sure to wear goggle.

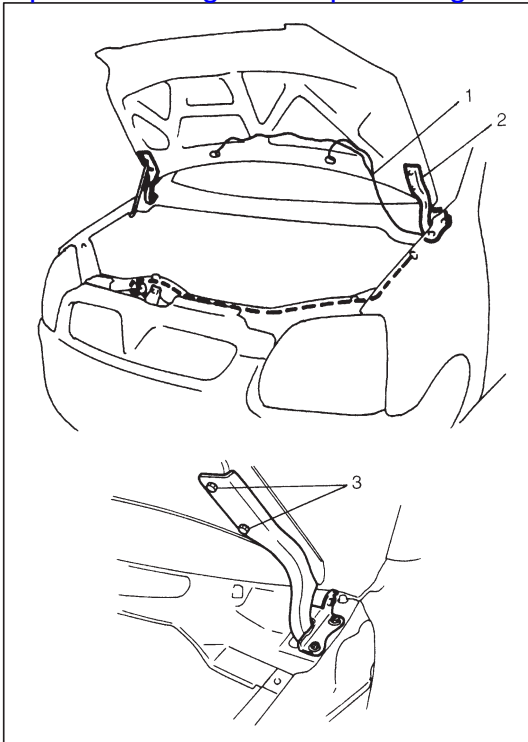
**INSTALLATION**

Reverse removal procedure to install back door noting the following points.

- Secure wiring harness.

- Adjust door latch striker position by referring "BACK DOOR LOCK ASSEMBLY INSTALLATION" so that door is positioned correctly.
- Adjust door cushion so that door contacts body when closed.
- Adjust door clearance by loosening door hinge mounting bolts and nuts referring to "PANEL CLEARANCE" in this section.
- Apply grease to hinge rotating part.
- Tighten door hinge mounting nut to specified torque.

Tightening Torque: 23 N·m (2.3 kg-m, 17.0 lb-ft)



HOOD

REMOVAL

- 1) Remove window washer hose (1) from hood (2).
- 2) Remove four mounting bolts (3) to detach hood (2).

INSTALLATION

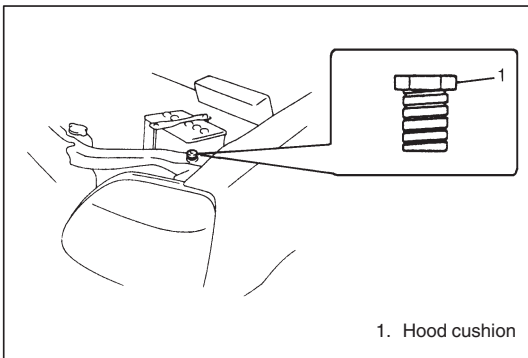
Reverse removal procedure to install hood.

ADJUSTMENT

Hood position adjustment.

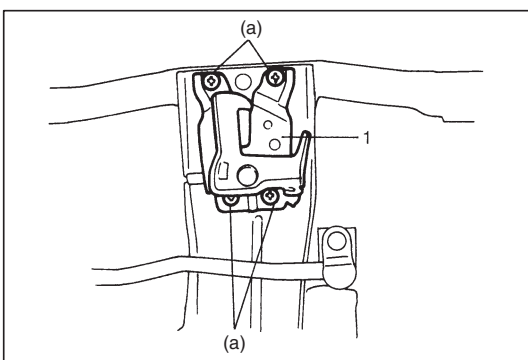
Fore-and-aft and right-and-left adjustment.

Adjust hood clearance by loosening hood mounting bolts, refer to "PANEL CLEARANCE" in this section.



- 3) Vertical adjustment

If only one side (right or left) of hood is not level with front fender, make it level by tightening or loosening hood cushion.



- 4) Hood lock position adjustment

When installing hood lock (1), bring bolt at highest position and move it in vertical direction for adjustment free from loose to hood striker.

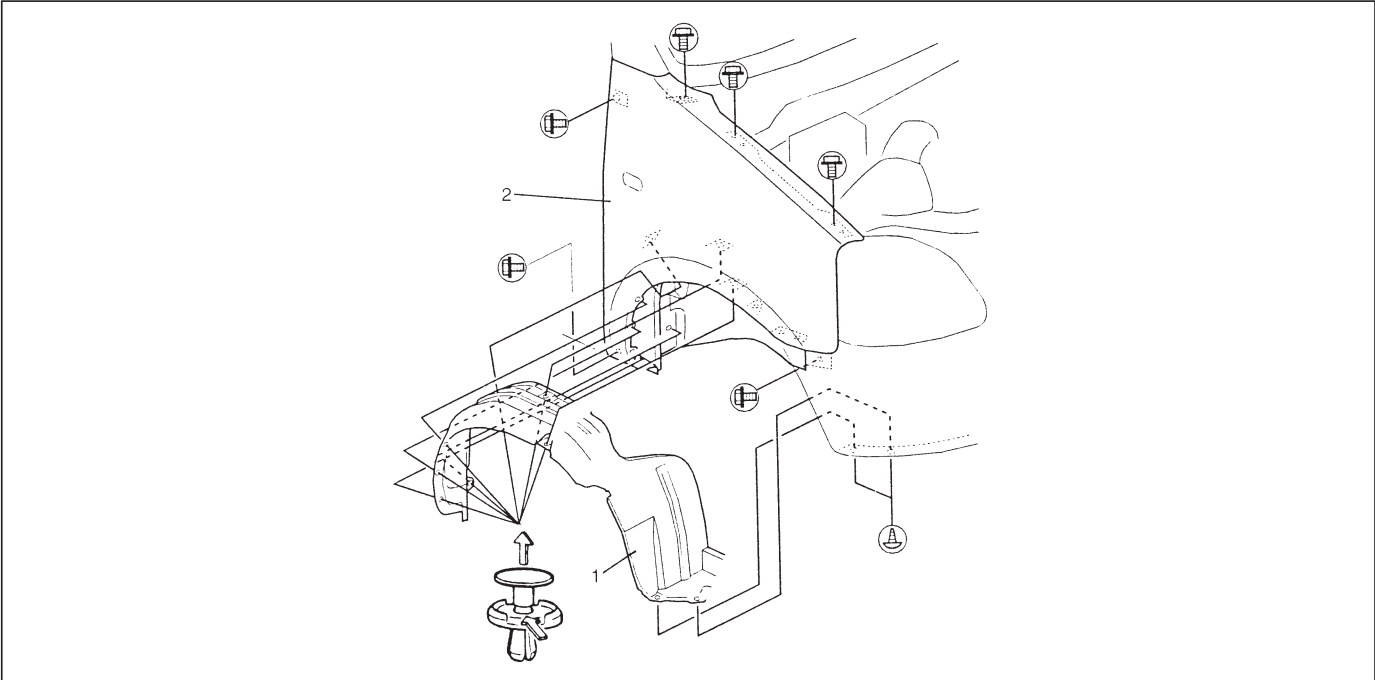
Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.0 lb-ft)

INSPECTION

Check that hood opens and closes smoothly and properly. Lubricate if necessary. Also check that secondary latch operates properly (check that secondary latch keeps hood from opening all the way) and hood locks securely when closed.

Adjust hood locks position if necessary.



REMOVAL

- 1) Remove front bumper.
- 2) Disconnect connector of side turn signal (or side marker) lamp.
- 3) Remove front fender lining (1).
- 4) Remove front fender (2).

INSTALLATION

Reverse removal procedure for installation.

NOTE:

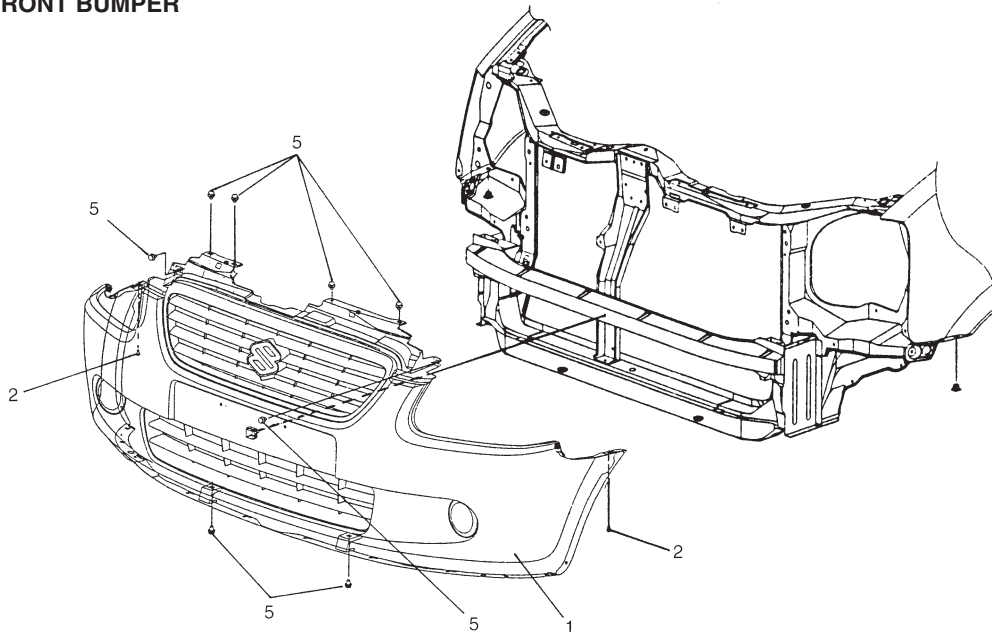
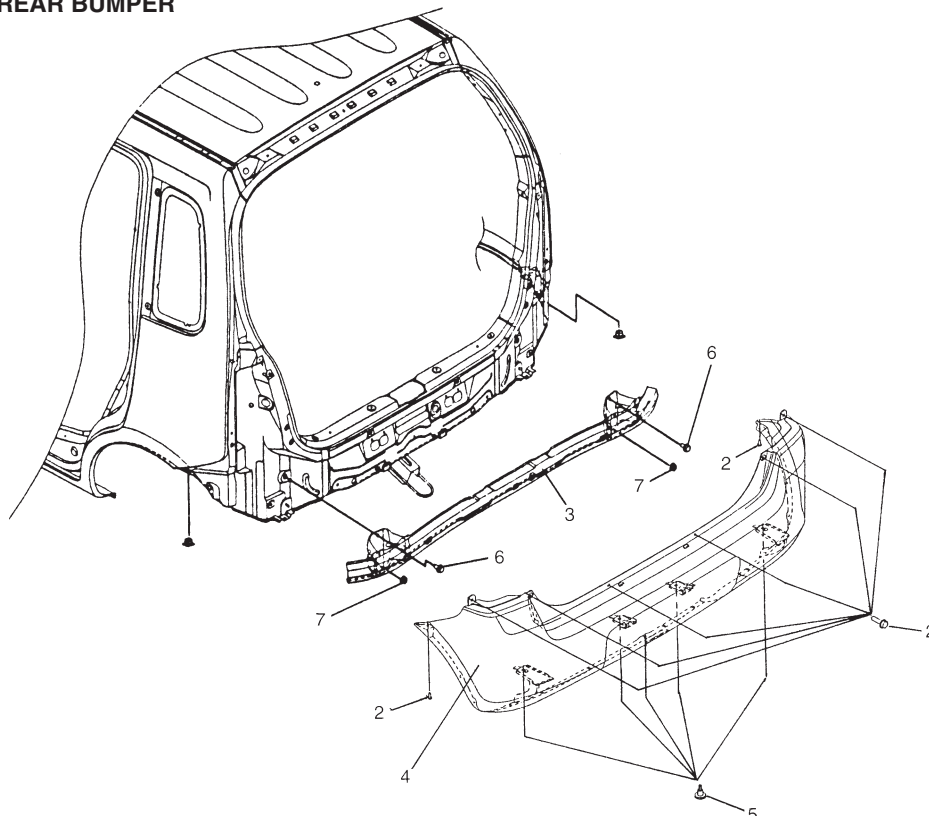
If paint on fender bolt is peeled off, be sure to apply paint again.

Adjust panel clearance referring to "PANEL CLEARANCE" in this section.

FRONT BUMPER AND REAR BUMPER**NOTE:**

Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.

Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

FRONT BUMPER**REAR BUMPER**

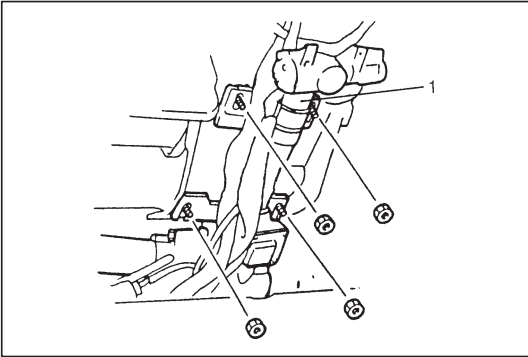
1. Front bumper
2. Screws
3. Rear bumper member
4. Rear bumper
5. Clips
6. Bolts
7. Nuts

INSTRUMENTATION AND DRIVER INFORMATION

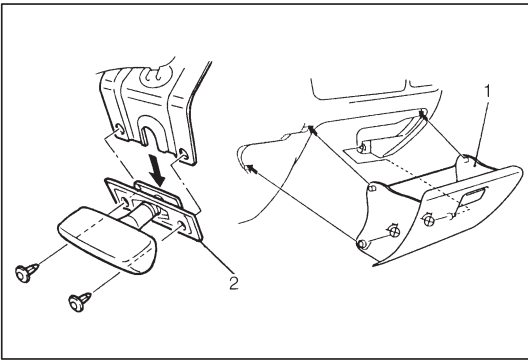
INSTRUMENT PANEL

WARNING:

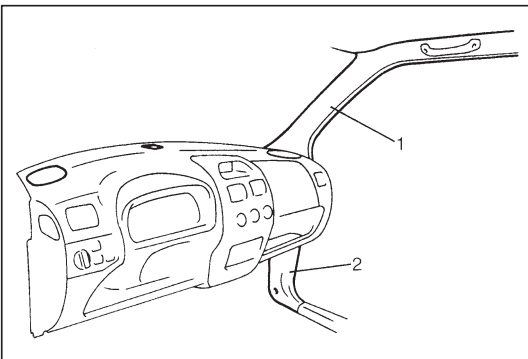
See **WARNING** at the beginning of this section.

**REMOVAL**

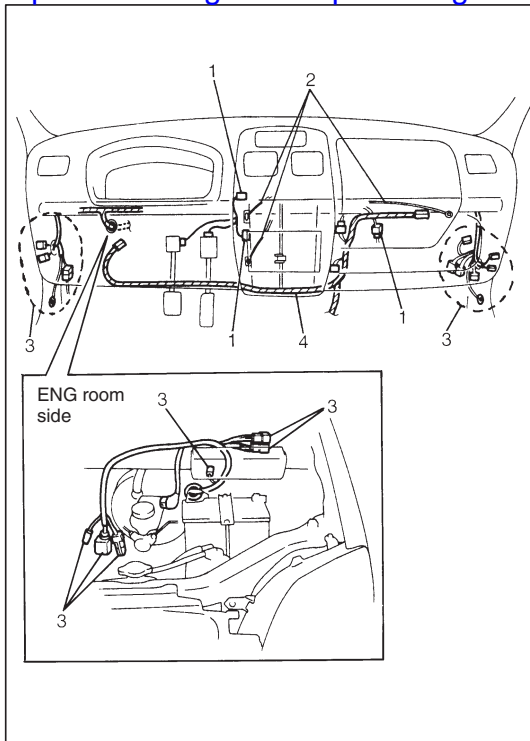
- 1) Disconnect negative (–) cable at battery.
- 2) Disable air bag system, if equipped.
Refer to “Disabling Air Bag System” in Section 10B.
- 3) Remove steering column assembly (1).
Refer to Section 3C.



- 4) Remove glove box (1) and hood latch release lever (2).



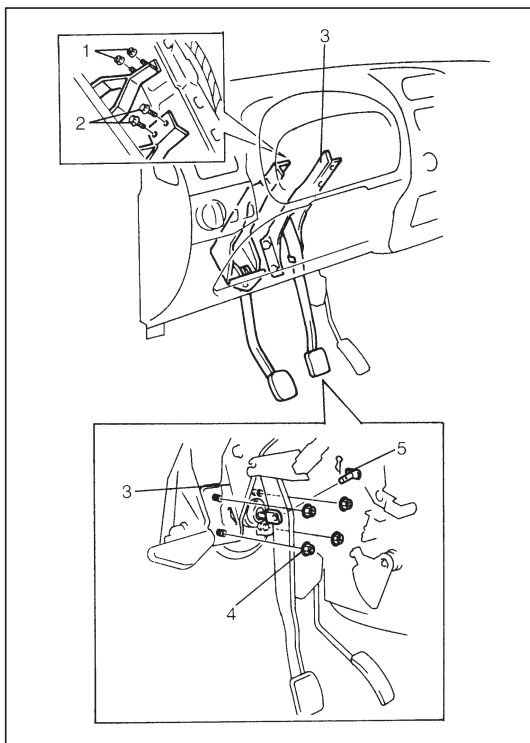
- 5) Remove both sides front pillar inner trim (1) and dash side trim (2).



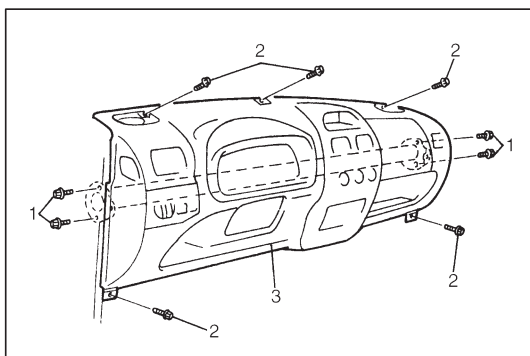
- 6) Disconnect harness (1) and cables (2) from heater unit and air inlet box assembly.
- 7) Disconnect each connector (3) and cables which need to be disconnected for removal for instrument panel.
- 8) Remove air bag harness (4) in instrument panel.

CAUTION:

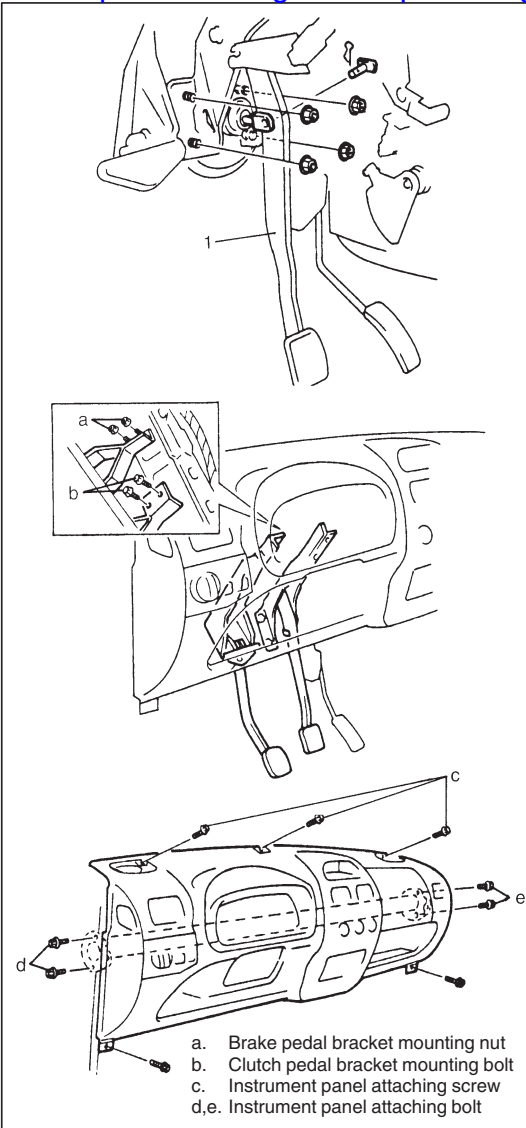
For vehicle with Air Bag, instrument panel could not be removed with Air Bag harness coupler connected. Use care not to damage Air Bag harness.



- 9) Loosen brake pedal bracket mounting nuts (1) and clutch pedal bracket mounting bolts (2).
- 10) Remove brake pedal pin (5).
- 11) Loosen brake pedal bracket and brake master booster mounting nuts (4).
Refer to "BRAKE BOOSTER" in Section 5A.
- 12) Remove brake pedal bracket (3).



- 13) Remove instrument panel mounting bolts (1) and screws (2).
- 14) Remove instrument panel (3).

**INSTALLATION**

1) Install instrument panel by reversing removal procedure, noting the following items.

- When installing each part, be careful not to catch any cable or wiring harness.
- When installing brake pedal assembly (1), refer to Section 5A "BRAKE BOOSTER INSTALLATION".
- Tighten each parts to specified torque and proper tightening order for instrument panel attaching.

Tightening Order: (c) → (d) → (e)

Tightening Torque

(a) (b) : 13 N·m (1.3 kg-m, 9.5 lb-ft)

(d) (e) : 23 N·m (2.3 kg-m, 16.5 lb-ft)

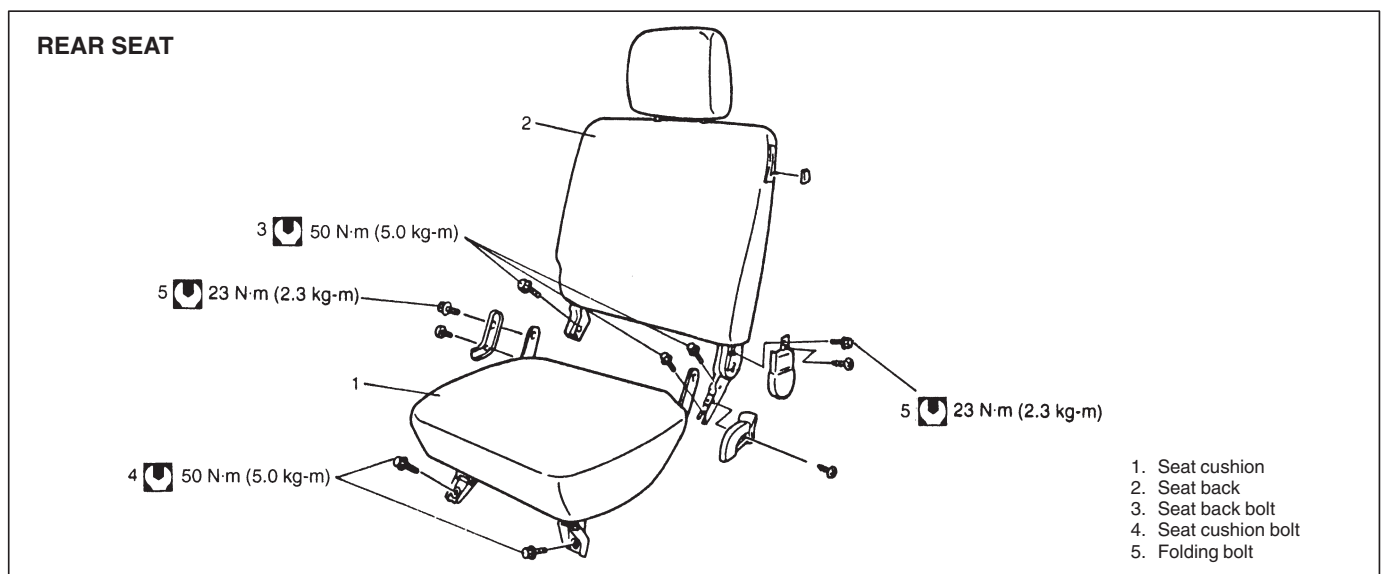
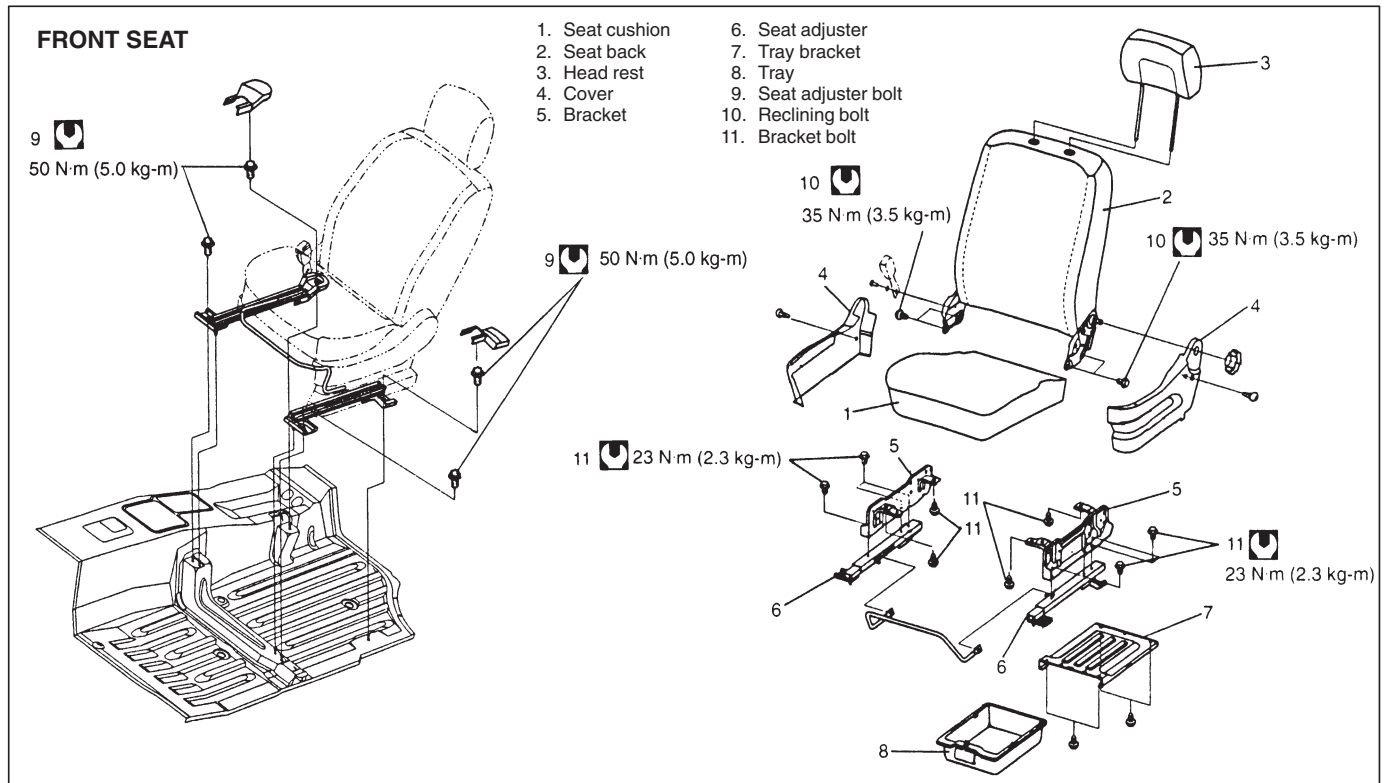
- When installing steering column assembly, refer to Section 3C "STEERING COLUMN INSTALLATION".

2) Adjust control cables. (Refer to Section 1A "HEATER CONTROL CABLES".)

3) Enable air bag system if equipped. Refer to "Enabling Air Bag System" in Section 10B.

SEATS

FRONT SEAT AND REAR SEAT

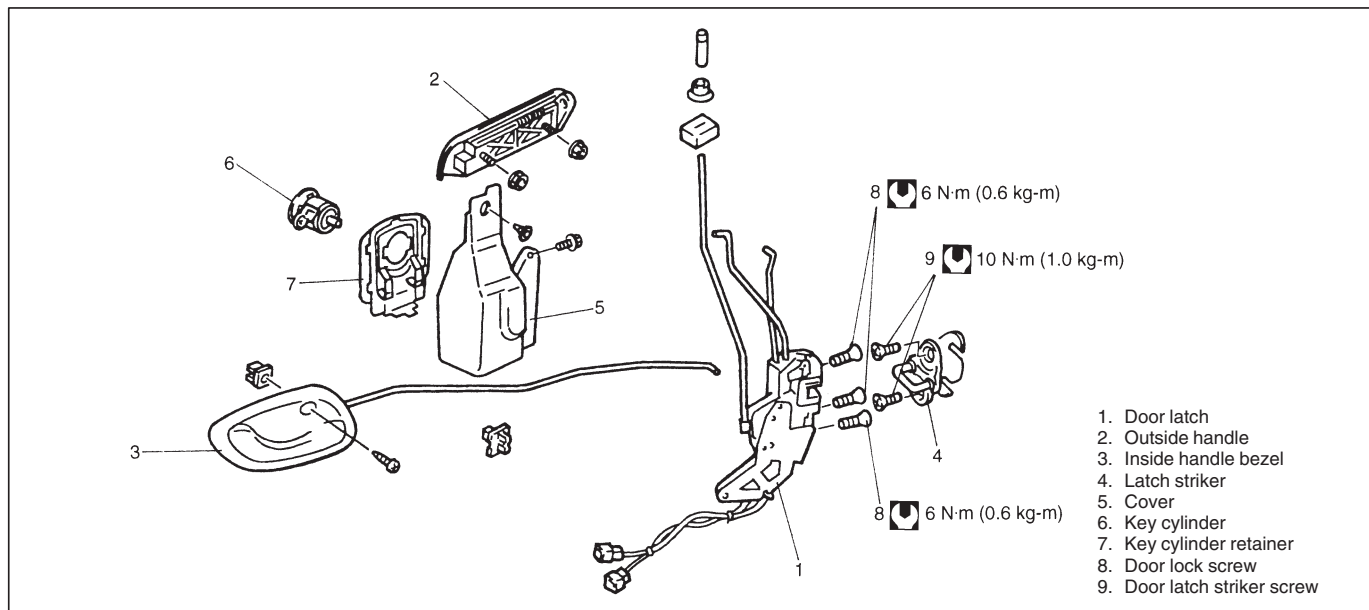


REMOVAL

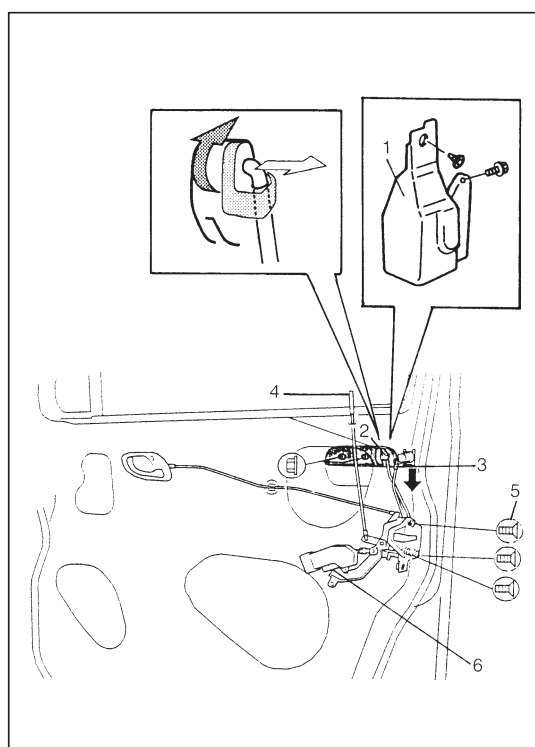
- 1) Remove four mounting bolts to remove seat cushion.
- 2) Remove four mounting bolts (front seat) or five mounting bolts (rear seat) to remove seat back.
- 3) Disassemble and repair seat as necessary.

INSTALLATION

Reverse removal procedure to install front seat.
Torque to specifications, as shown.

SECURITY AND LOCKS**FRONT DOOR LOCK ASSEMBLY****REMOVAL**

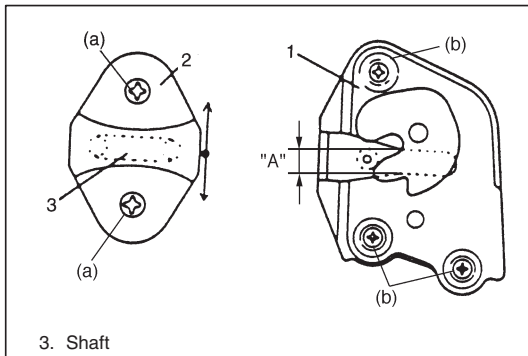
- 1) Remove door trim and door sealing cover, refer to steps 1) to 9) of FRONT DOOR GLASS REMOVAL in this section.
- 2) Raise window all the way up.
- 3) Remove door sash.



- 4) Remove door lock cover (1).
- 5) Disconnect door opening control rod (2) from outside handle.
- 6) Disconnect door lock control rod (3).
- 7) Disconnect door lock motor lead wire (if equipped).
- 8) Remove door lock nob (4).
- 9) Loosen door lock mounting screw (5) and remove door lock assembly (6).

INSTALLATION

To install front door lock, reverse removal procedure, noting the following.



- Door latch striker.

Move door latch striker (2) up or down so its center aligns with the center of groove "A" on the door lock assembly (1), as shown.

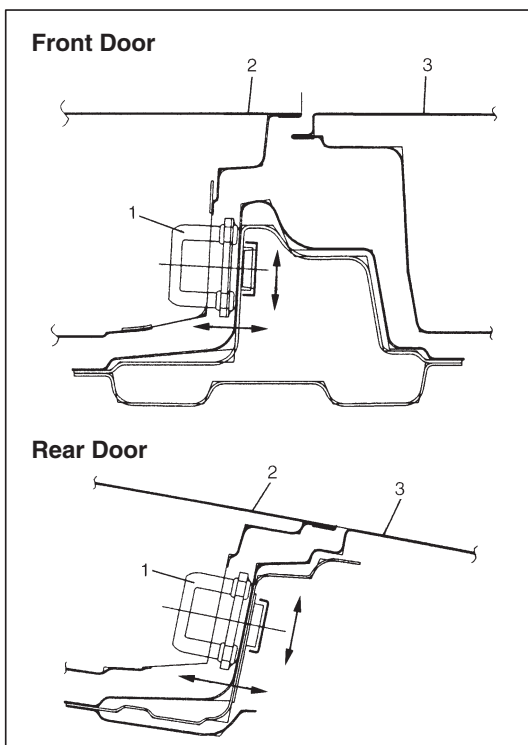
NOTE:

Striker should be moved vertically and placed level. Do not adjust door lock.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.2 lb-ft)

(b): 6 N·m (0.6 kg-m, 4.3 lb-ft)



- Move door latch striker (1) sideways to adjust door outer panel surface (2) flush with rear door outer panel or body outer panel surface (3), as shown.

In order to correctly obtain door lock operates, increase or decrease number of shims inserted between body and striker (1) to adjust it.

NOTE:

Apply grease to striker contacts parts periodically.

INSPECTION

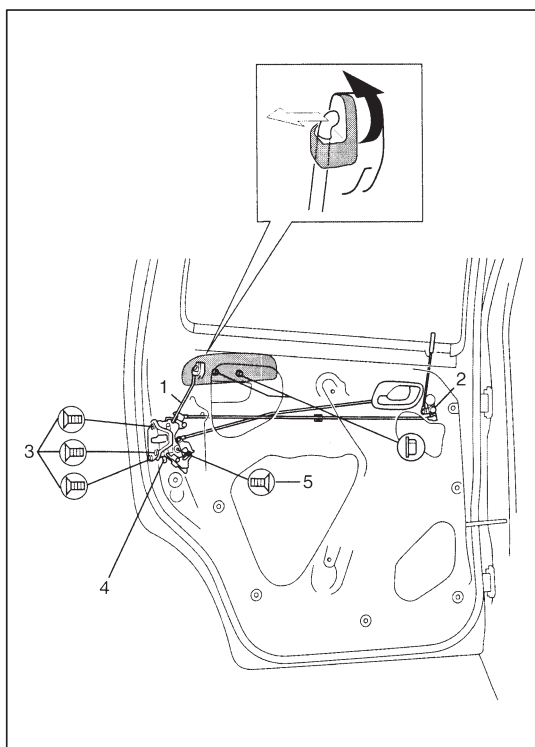
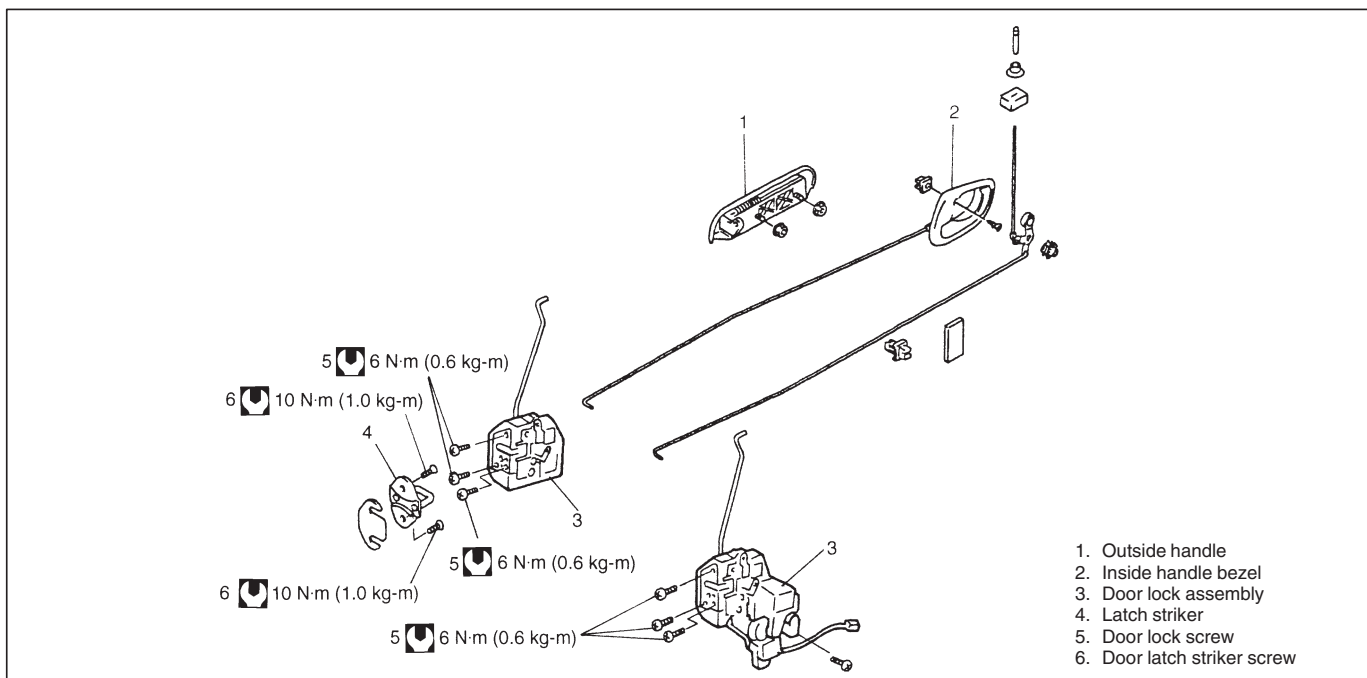
Check that door open and closes smoothly and properly.

Also check that door latch half lock operates properly (check that door latch half lock keeps door from opening all the way) and door latch full locks securely when closed.

Adjust door latch striker position if necessary.

Simpo PDF Merge and Split Unregistered Version - <http://www.simpopdf.com>

REAR DOOR LOCK ASSEMBLY

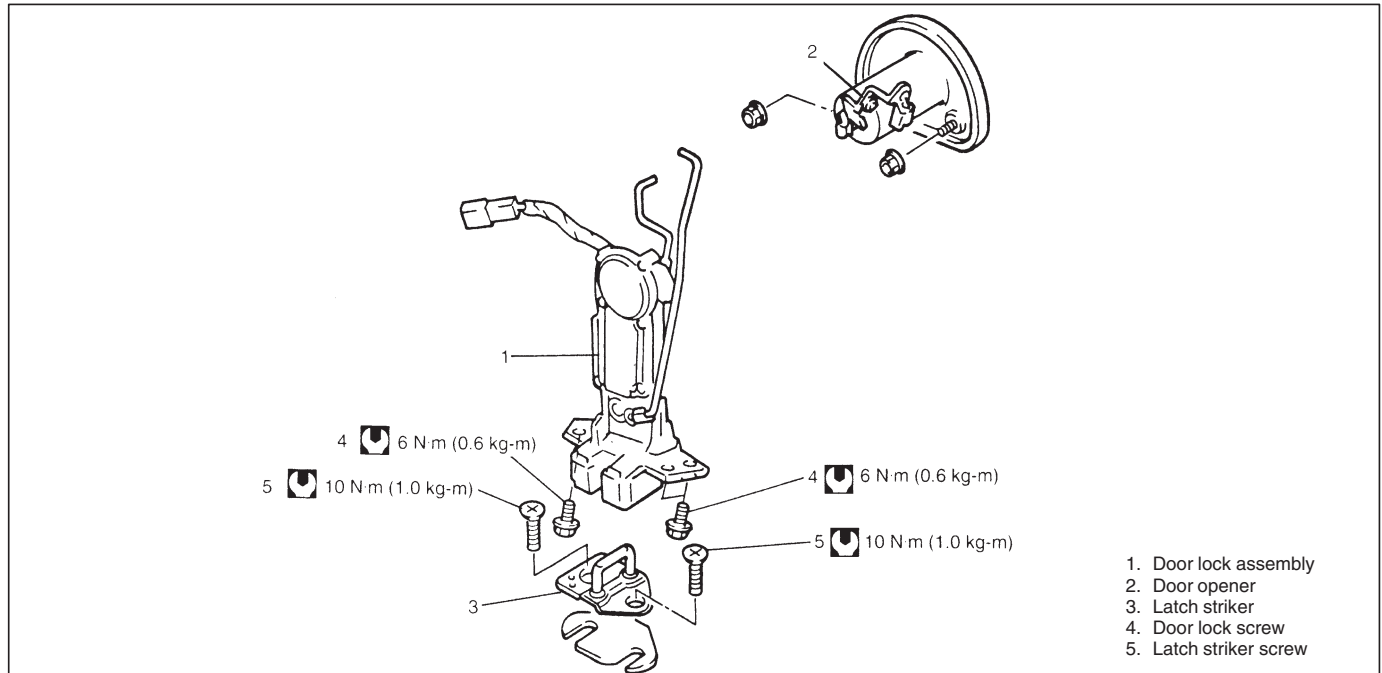


REMOVAL

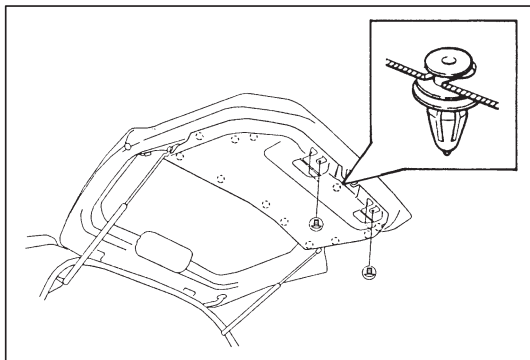
- 1) Remove door trim and door sealing cover, refer to steps 1) to 4) of REAR DOOR GLASS REMOVAL in this section.
- 2) Disconnect door opening control rod (1) and door lock control rod (2).
- 3) Loosen door lock mounting screw (3), door lock actuator screw (5) (if equipped power door lock) and remove door lock assembly (4).

INSTALLATION

Reverse removal sequence to install rear door lock, noting points mentioned in "FRONT DOOR LOCK ASSEMBLY".

BACK DOOR LOCK ASSEMBLY**REMOVAL**

1) Remove door trim.

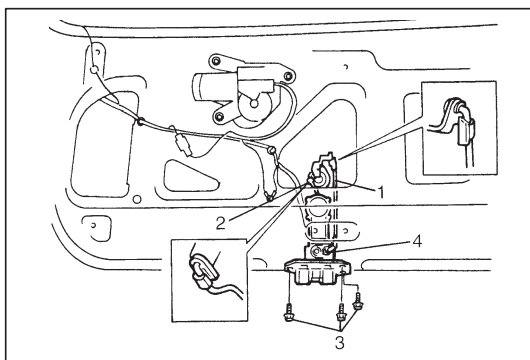


2) Disconnect door lock control rod (1).

Disconnect control rod (2).

3) Disconnect door lock motor lead wire if equipped.

4) Loosen door lock mounting screw (3) and remove door lock assembly (4).

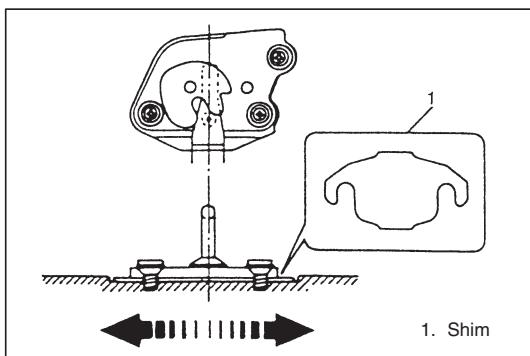
**INSTALLATION**

Reverse removal procedure to install back door lock assembly noting the following points.

- Door latch striker.

Adjust door latch striker so that its center aligns with the center of groove in door latch base.

To adjust securely door lock operates, insert proper number of shims below the bottom of striker, as shown.



INSPECTION

Check that door open and closes smoothly and properly.

Also check that door latch half lock operates properly (Check that door latch half lock keeps door from opening all the way) and door latch full locks securely closed.

Adjust door latch striker position if necessary.

KEY CODING**KEY USAGE AND IDENTIFICATION**

Key is used for ignition and door lock cylinder. Keys are cut on both edges to make them reversible.

Key identification is obtained from five character key code stamped on key code tag. Using this key code, key code cutting combination can be determined from a code list (available to owners of key cutting equipment from suppliers).

If original key is available, key code cutting combination can be determined by laying key.

IGNITION SWITCH LOCK CYLINDER**Removal/Installation**

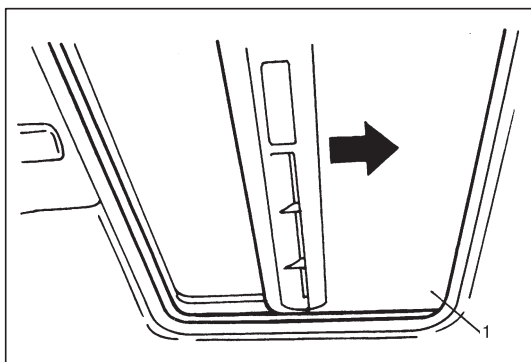
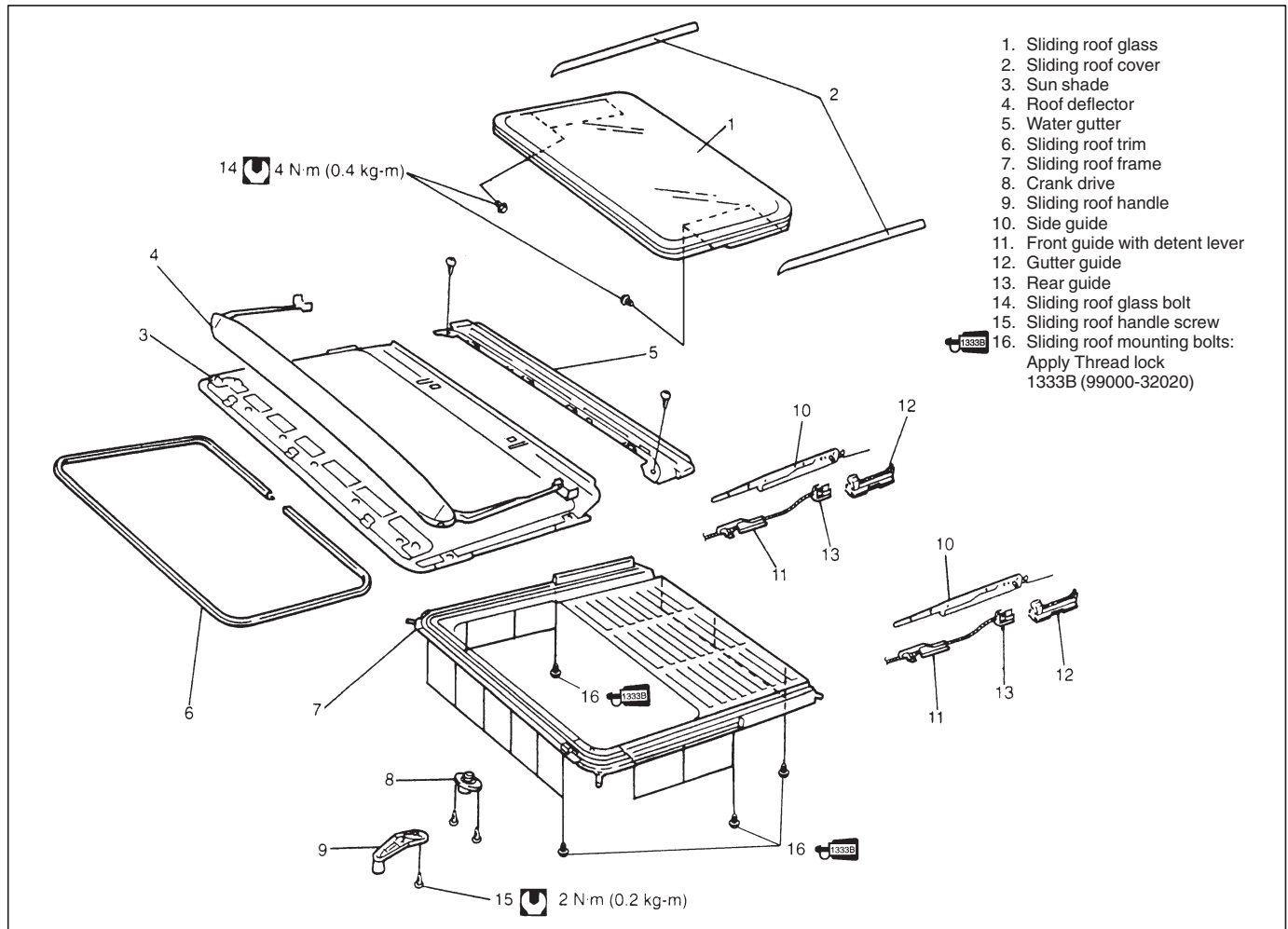
See Section 3C, "STEERING WHEEL AND COLUMN".

ELECTRICAL DIAGNOSIS

For ignition switch electrical troubleshooting, see Section 8C, "INSTRUMENTATION/DRIVER INFORMATION" in "BODY ELECTRICAL SYSTEM".

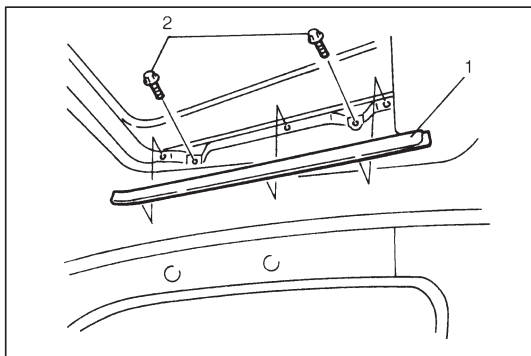
SUNROOF

SLIDING ROOF (IF EQUIPPED)

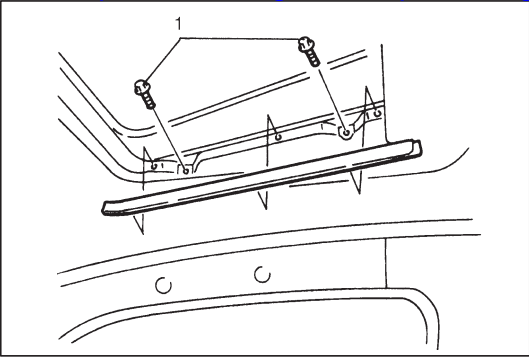


SLIDING ROOF GLASS REMOVAL

1) Open sunshade (1) fully and tilt up sliding roof glass.



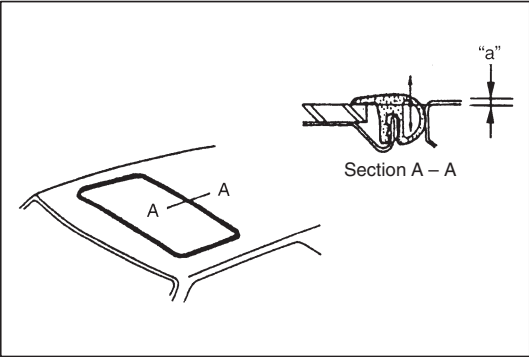
- 2) Remove sliding roof cover (1).
- 3) Loosen sliding roof bolt (2) and remove sliding roof glass.

**INSTALLATION**

Reverse removal procedure for installation, noting the following point.

- 1) Tighten glass fixing bolts (1) temporarily.
- 2) Position sliding roof glass by closing sliding roof glass completely.
- 3) Tighten glass fixing bolts (1).

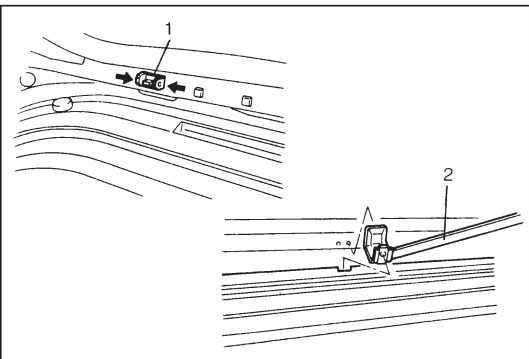
Tightening Torque: Sliding roof bolt 4 N·m (0.4 kg-m, 3 lb-ft)

**ADJUSTMENT**

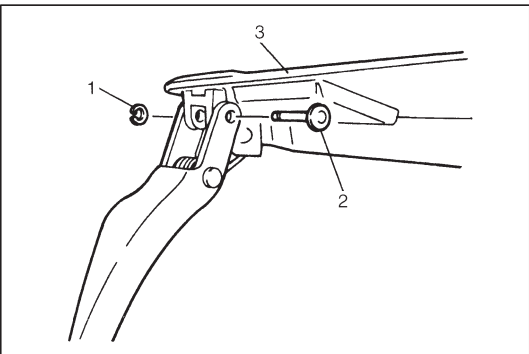
- 1) Loosen sunroof glass fixing screws (at 4 locations) and move sunroof glass up and down 2 to 3 times. In this way, sunroof glass can be positioned in both vertical and horizontal directions by elasticity of sliding roof weather strip.
- 2) Position sunroof glass by such dimensions with respect to roof panel surface as specified below.

Dimension: "a": 0 mm (0.0 in.)

- 3) After installing all parts and adjusting properly, check sunroof for proper operation (open, close and up).

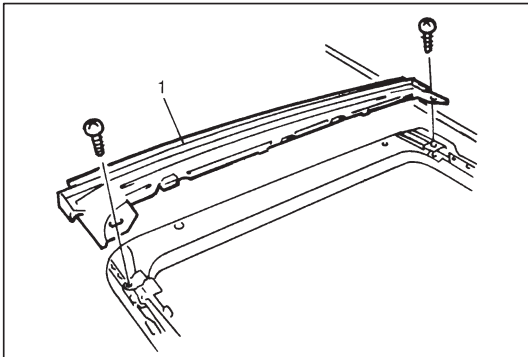
**SLIDING ROOF DEFLECTOR****REMOVAL**

- 1) Open sliding roof.
- 2) Release lags (1) at both bearing points with pliers.
- 3) Detach deflector rod (2) and then remove sliding roof deflector with rod.
- 4) Remove circlip (1) and pull off connecting pin (2).
- 5) Remove sliding roof deflector (3).

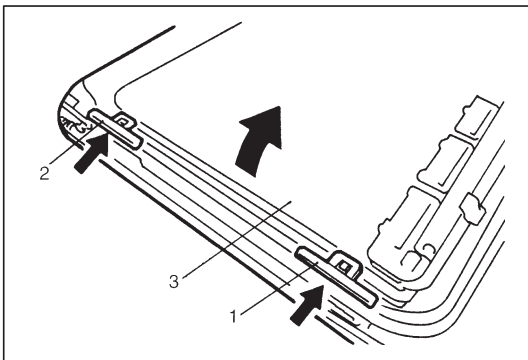


INSTALLATION

Reverse removal procedure to install deflector.

**SUNSHADE****REMOVAL**

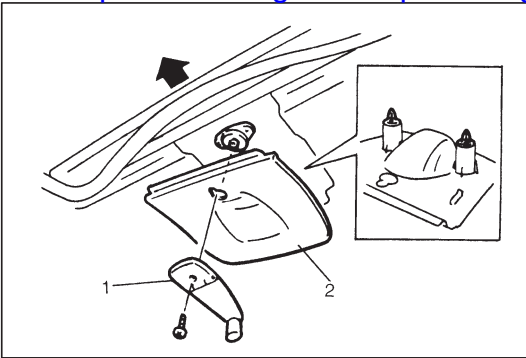
- 1) Remove sliding roof glass. Refer to "SLIDING ROOF GLASS" in this section.
- 2) Remove water gutter (1) as shown.



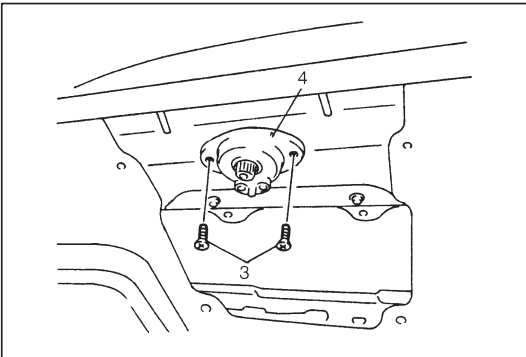
- 3) Close sun shade (3).
- 4) Detach front slider (1) and rear slider (2) by pushing arrow direction as shown.
- 5) Pull out sunshade (3) from sliding roof frame.

INSTALLATION

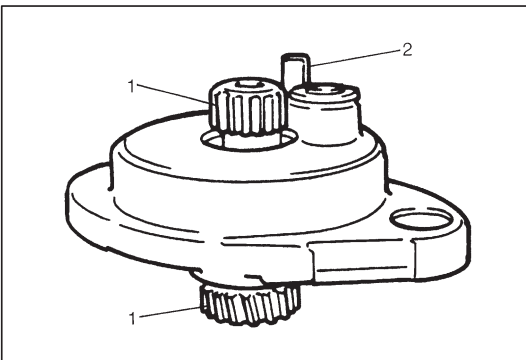
Reverse removal procedure to install sunshade.

**CRANK DRIVE****REMOVAL**

- 1) Close sliding roof glass.
- 2) Remove sliding roof handle (1) and remove sliding roof handle garnish (2).

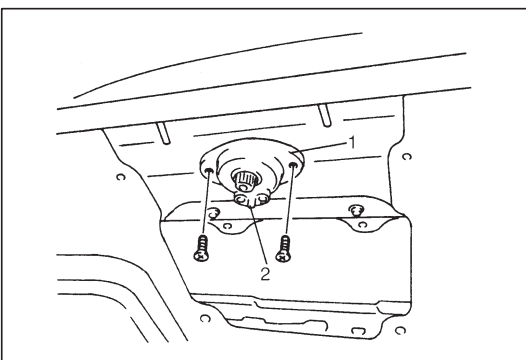


- 3) Loosen crank drive screws (3) and then remove crank drive (4).

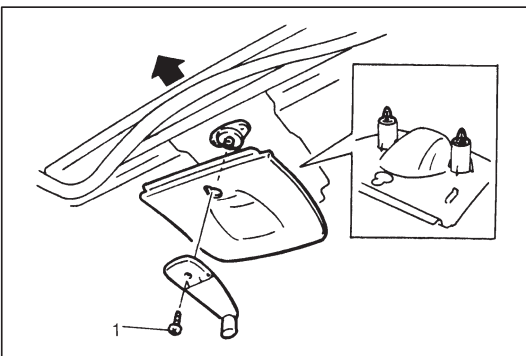
**INSPECTION**

- Check that the crank drive operates smoothly.
- Check crack and deformation for pinion gear (1) and drive lock pin (2).

If replace as necessary.

**INSTALLATION**

- 1) Adjust sliding roof assembly and crank drive for assembling position. Refer to SLIDING ROOF ASSEMBLY in this section.
- 2) Reverse removal procedure for installation.
 - Install crank drive (1) with turned it lock pin (2) to forward direction as shown in figure.

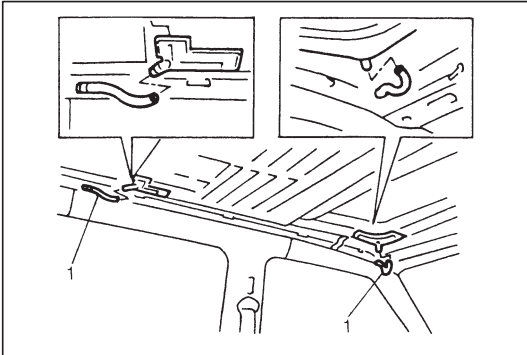
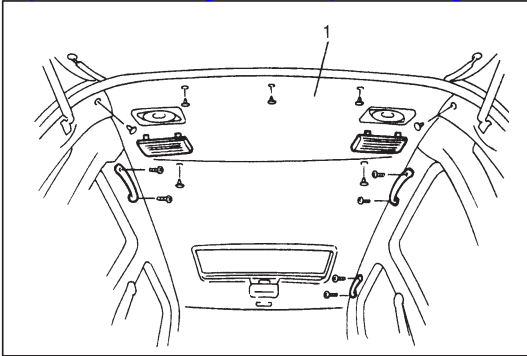


- Tighten crank drive handle screw (1) to specified torque.

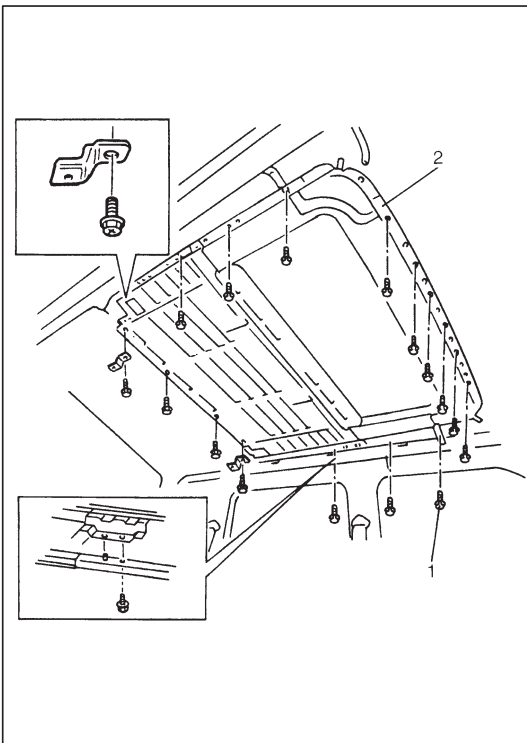
Tightening Torque: 2 N·m (0.2 kg-m, 1.4 lb-ft)

SLIDING ROOF ASSEMBLY**REMOVAL**

- 1) Remove sliding roof glass. Refer to "SLIDING ROOF GLASS" in this section.
- 2) Remove head lining (1). Refer to "HEAD LINING" in this section.



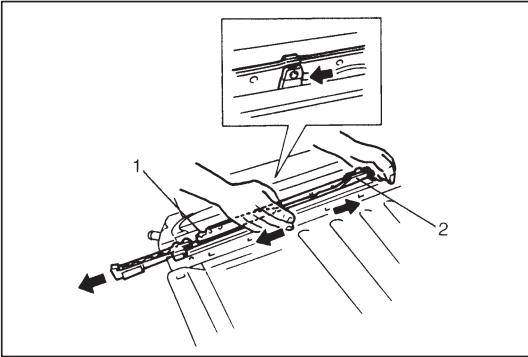
- 3) Disconnect drain hose (1) connected to sliding roof assembly at 4 locations.



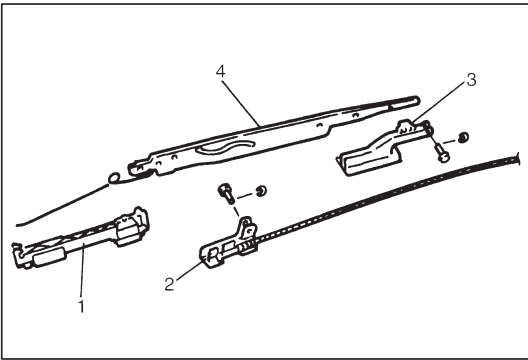
- 4) Loosen sliding roof mounting bolts (1) (16 pieces) and then remove sliding roof assembly (2).

DISASSEMBLY

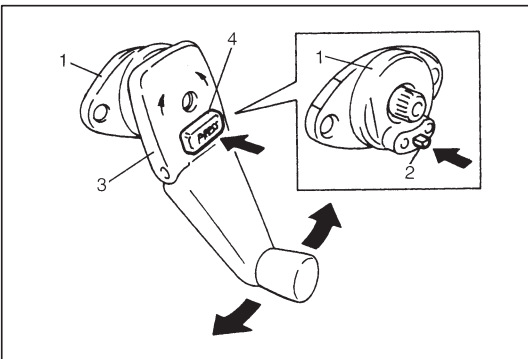
- 1) Remove sunshade. Refer to "SUNSHADE" in this section.
- 2) Remove sliding roof deflector. Refer to "SLIDING ROOF DEFLECTOR" in this section.
- 3) Remove crank drive. Refer to "CRANK DRIVE" in this section.



- 4) Pull-out side guide (1) and rear guide (2) with action cable from guide rail.



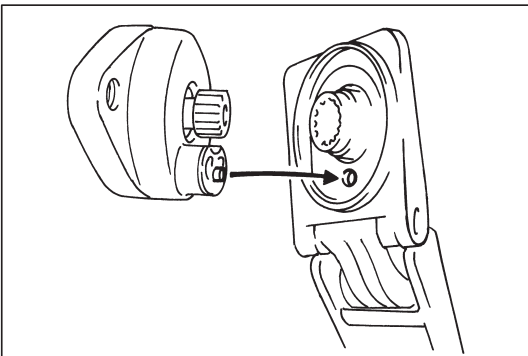
- 5) Detach gutter guide (1), rear guide with actuation cable (2) and front guide with detent lever (3) from side guide (4).

**ASSEMBLY**

Reverse disassembly procedure for assembly, observing the following instructions.

- Adjust crank drive position as follows.

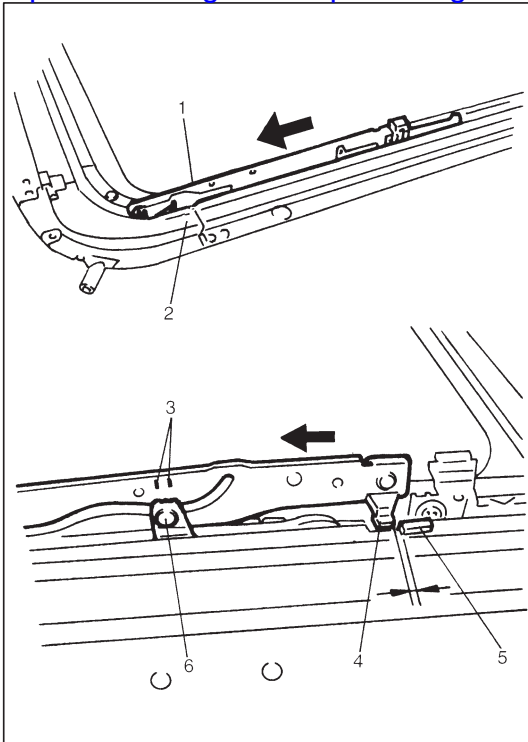
- 1) Install crank handle (3) to crank drive (1) temporary.
- 2) Push crank (1) onto drive (2) by pushing press bottom (4).
- 3) Turn crank (1) clockwise to stop position.
- 4) Turn crank back three whole turns until lock position is reached.



- 5) Crank must now fit into recess provided.
If did not properly position, readjust crank drive position.

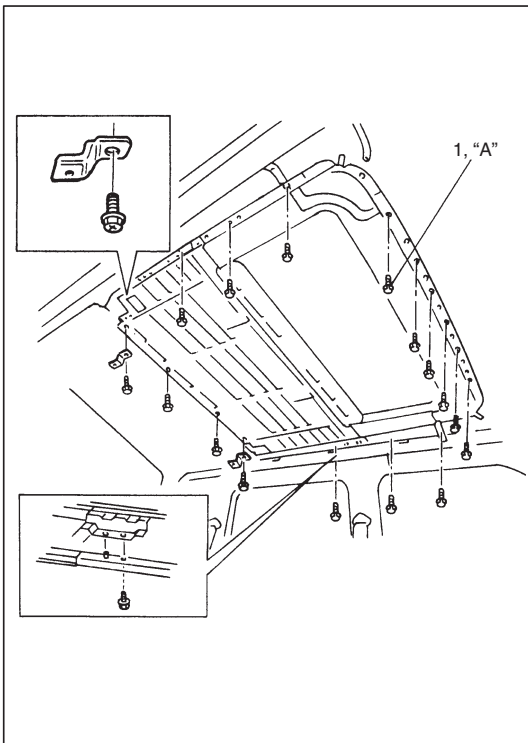
NOTE:

If crank drive is properly operates, crank drive is stopped at "Open" position after 8 turns from adjusted position and crank drive attains its end position when the button is pressed and the crank drive turned another 2 turns.



- Adjust both actuation cables as follows.

- 1) Push block guide assembly (1) forward until stopping (catch lever engages in front most recess (2) of guide rail).
- 2) Press front guide backward.
- 3) Push rear guide (6) connecting pins meet with adjusting notches (3) of side guide.
- 4) At this time, side guide bracket (4) has to be lifted from rear edge (5) of guide rail recess with slight offset of 0.2 to 0.5 mm (0.008 to 0.02 in.).

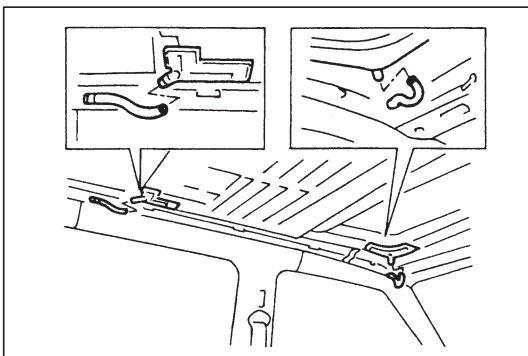


INSTALLATION

For installation, reverse removal procedure, noting the following points.

- Align both right and left positioning pins on sliding roof assembly with holes in body side for installation.
- Clean sliding roof mounting bolts (1) (16 pieces). Then, apply thread lock cement "A" to them.

"A": Thread lock 99000-32020



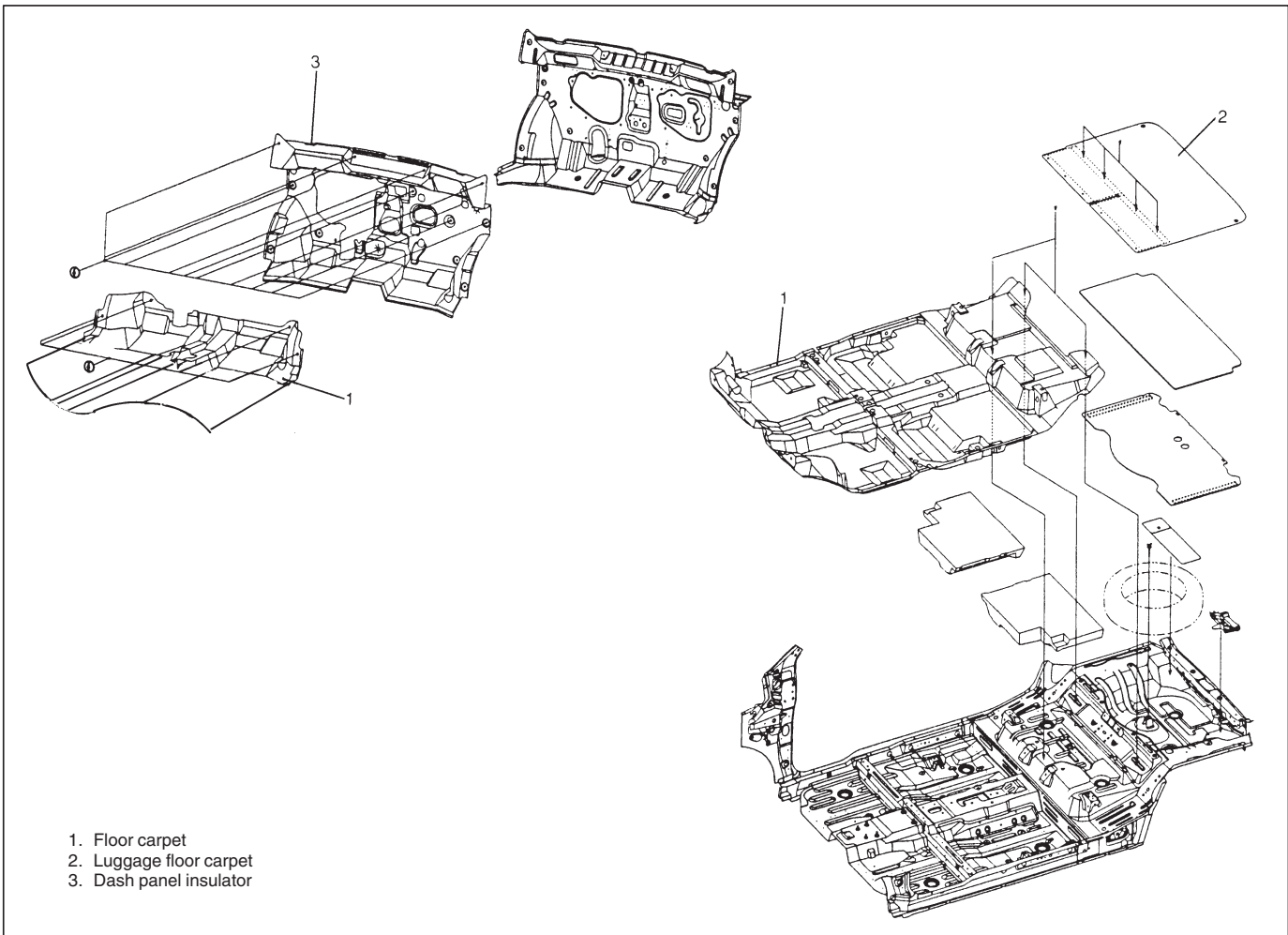
- Connect drain hoses to sliding roof assembly at 4 locations. Pass front drain hose between roof panel and inner panel and through front pillar down to outlet hole on dash side panel. Then connect drain hose to drain hose connector on dash side panel. Pass rear drain hose into rear quarter inner panel and connect drain hose to drain hose connector on its panel.

NOTE:

After reinstalling sliding roof assembly, be sure to make glass position adjustment. (Refer to SLIDING ROOF GLASS ADJUSTMENT described previously.)

EXTERIOR AND INTERIOR TRIM

FLOOR CARPET



REMOVAL

- 1) Remove front seats and rear seat cushions.
- 2) Remove seat belt lower anchor bolt.
- 3) Remove dash side trims, front side sill scuffs, center pillar inner lower trims and rear side sill scuffs.
- 4) Remove parking brake lever cover, console box.
- 5) Remove front floor carpet.

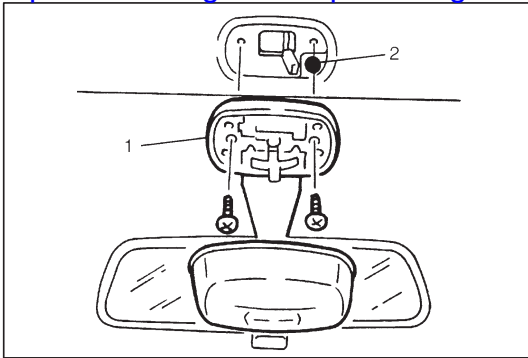
INSTALLATION

Reverse removal sequence to install front floor carpet, noting the following point.

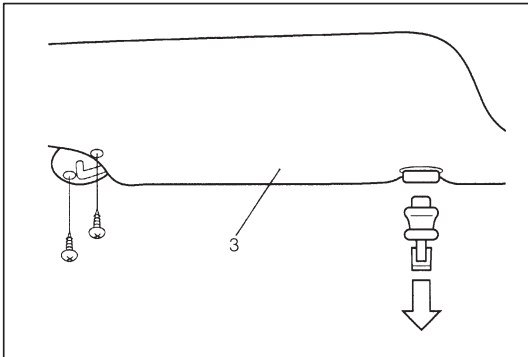
- When tightening seat belt anchor bolt, refer to Section 10A "FRONT SEAT BELT" for tightening torque.

HEAD LINING**REMOVAL**

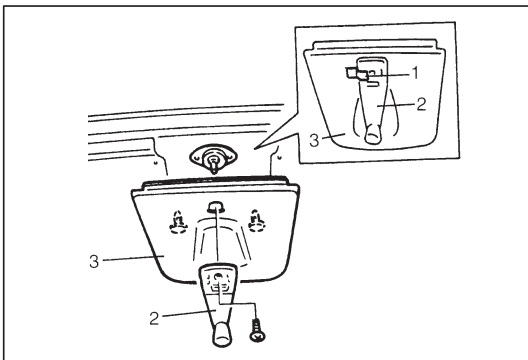
- 1) Remove interior light (1).
- 2) Remove head lining clip (2).



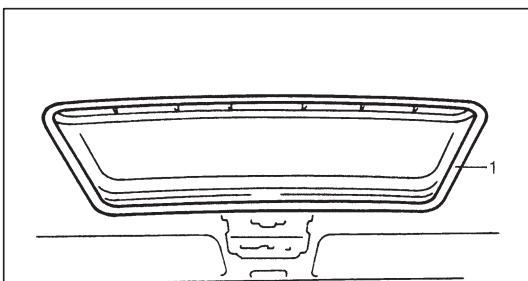
- 3) Remove sun visor (3).



- 4) Mark mating marks (1) on roof handle (2) and roof garnish (3), if equipped sliding roof.
- 5) Remove roof handle (2) and roof garnish (3), if equipped sliding roof.

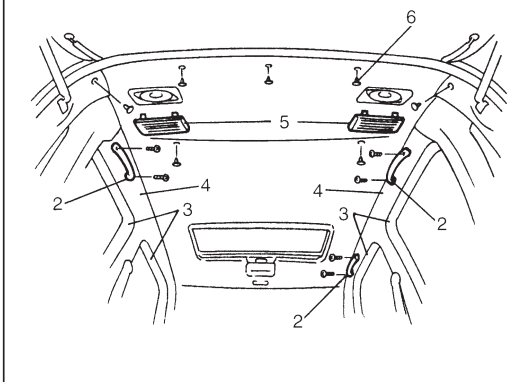


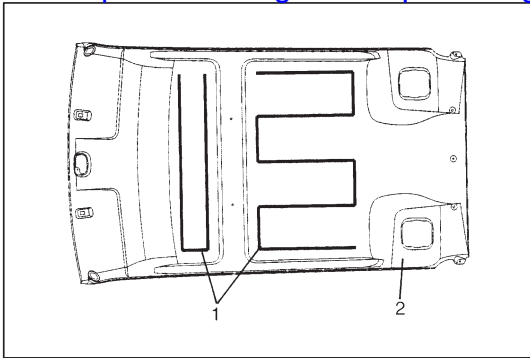
- 6) Remove roof trim (1), if equipped sliding roof.
- 7) Remove assistant grips (2).
- 8) Remove door opening trims (3) and remove inner trims covering headlinings (4).
- 9) Remove rear speaker covers (5).
- 10) Remove head lining clips (6) (5 pieces) and remove head lining.

**NOTE:**

Adhesive is used to attach head lining for vehicle without sliding roof.

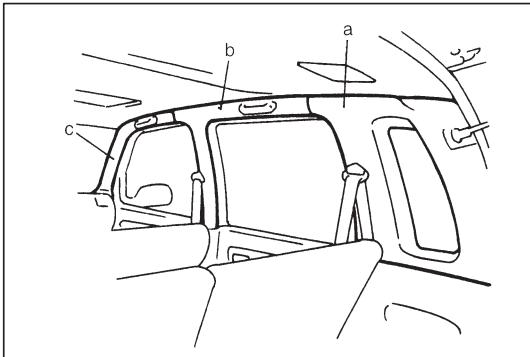
Clear adhesive from headlining and roof after removing head lining if applied.



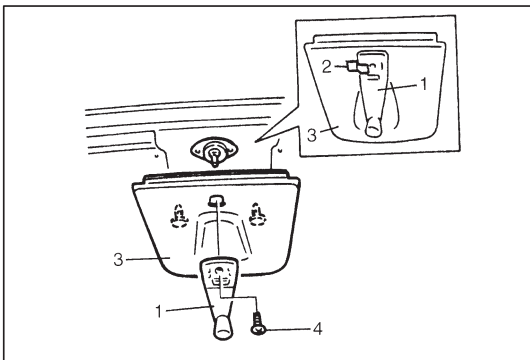
**INSTALLATION**

Reverse removal procedure for installation, noting the following items.

- Attach adhesive tapes (1) to head lining (2) as shown figure.

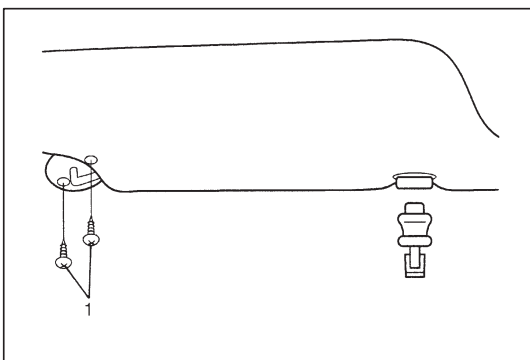


- Install interior trims in order of (a), (b), (c).



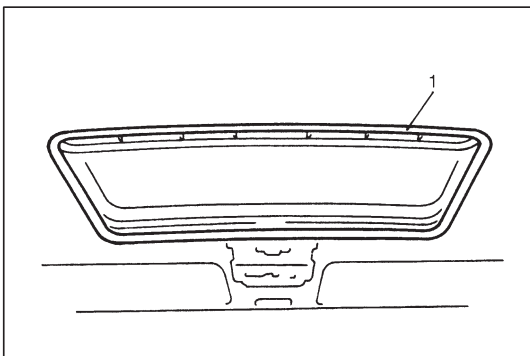
- When install roof handle (1), match marks (2) on roof handle (1) and roof garnish (3).
- Tighten roof handle screw (4) to specified torque.

Tightening Torque: 2 N·m (0.2 kg-m, 1.4 lb-ft)

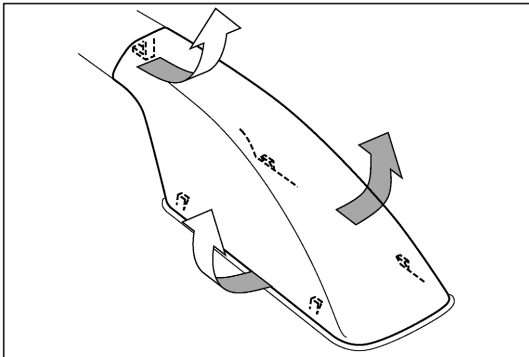
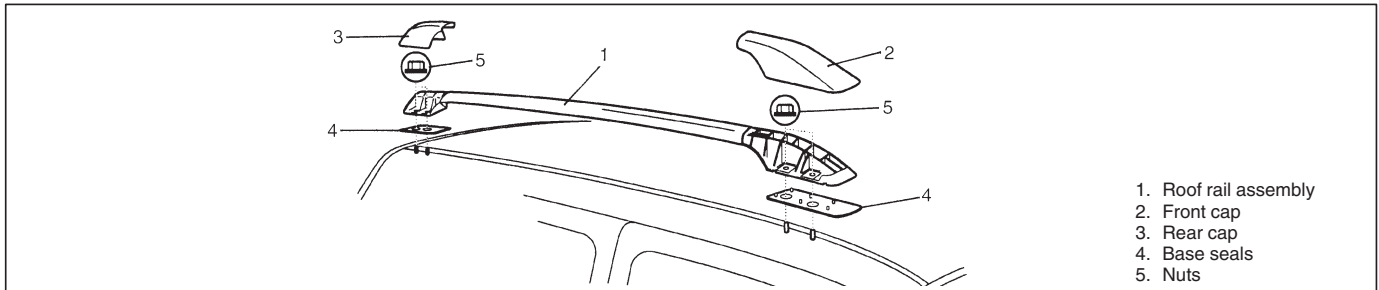


- Tighten sun visor screws (1) to specified torque.

Tightening Torque: 4 N·m (0.4 kg-m, 2.8 lb-ft)



- Install sliding roof trim (1) as shown in figure.

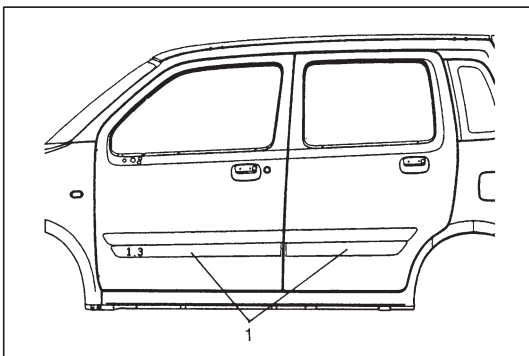
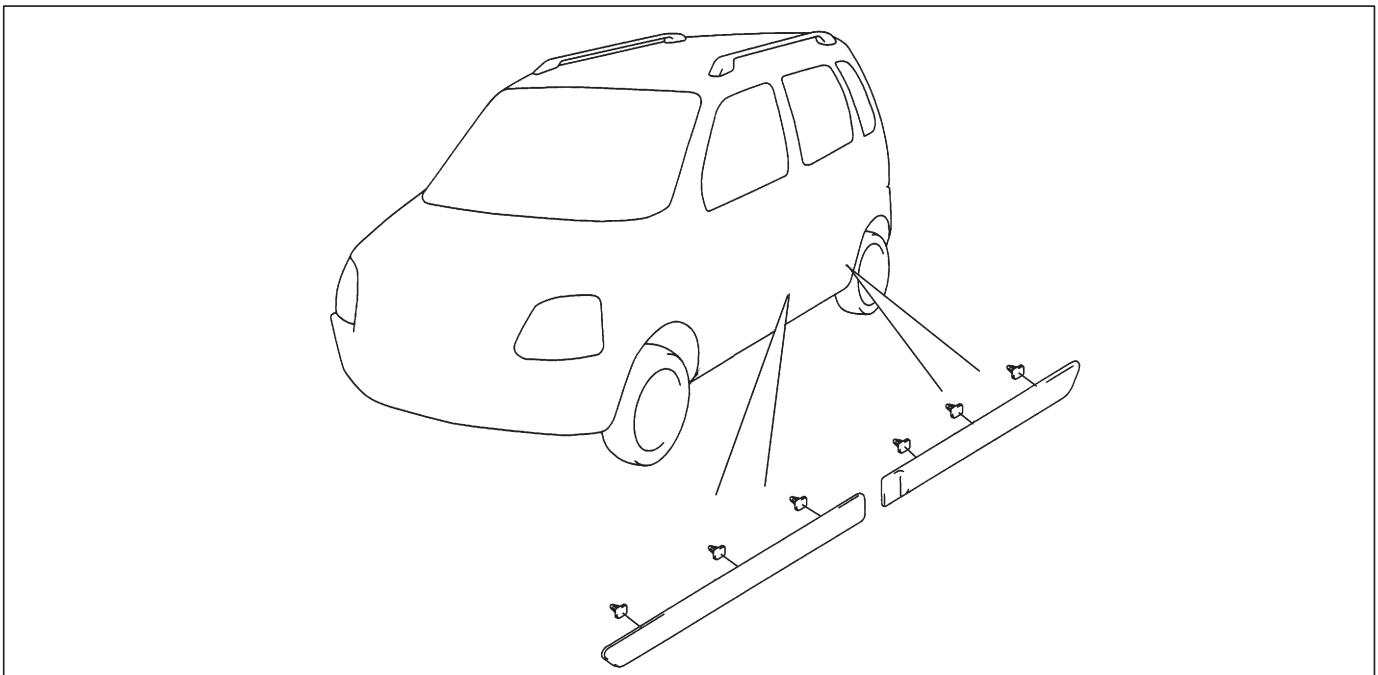
ROOF RAIL (IF EQUIPPED)**Removal**

- 1) Remove roof rail front and rear caps as shown in figure.
- 2) Remove nuts.
- 3) Remove roof rail assembly.

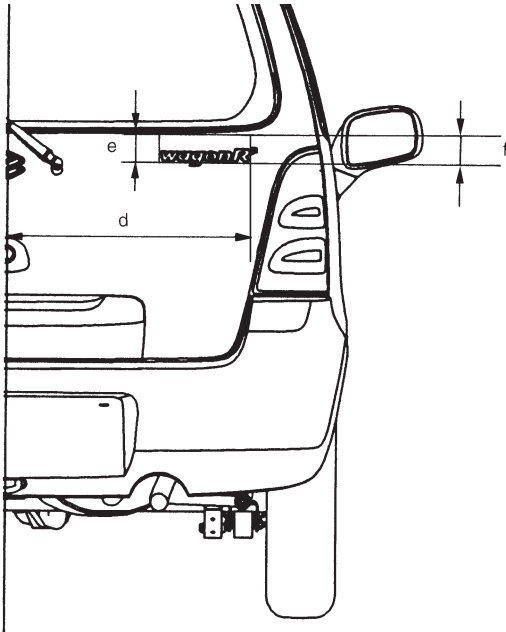
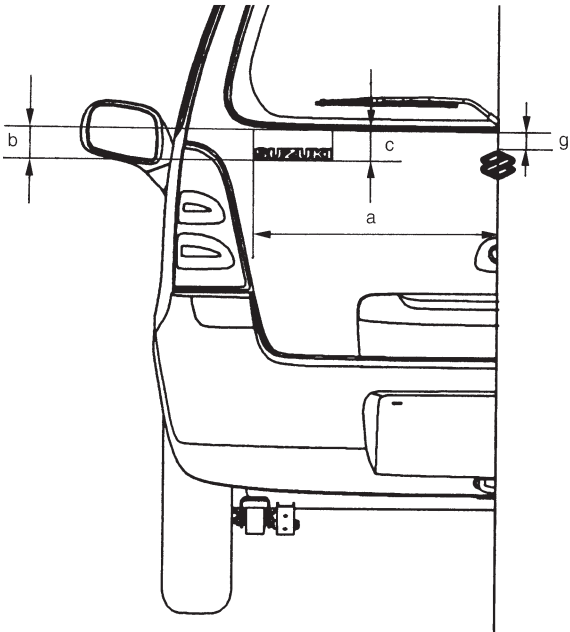
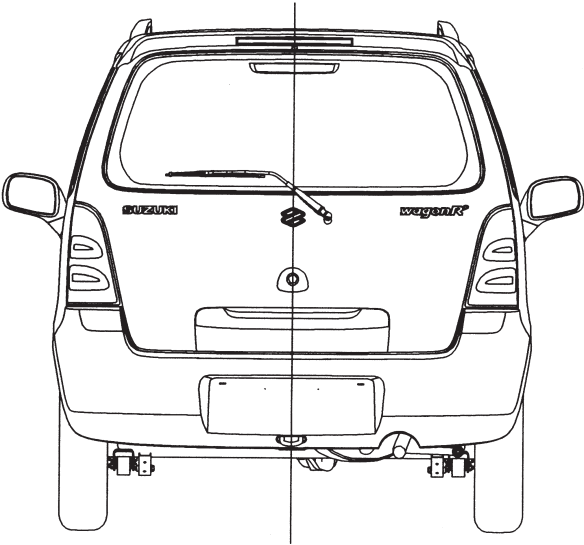
Installation

Reverse removal procedure for installation.

Confirm that each roof rail fixing nut is tightened securely.

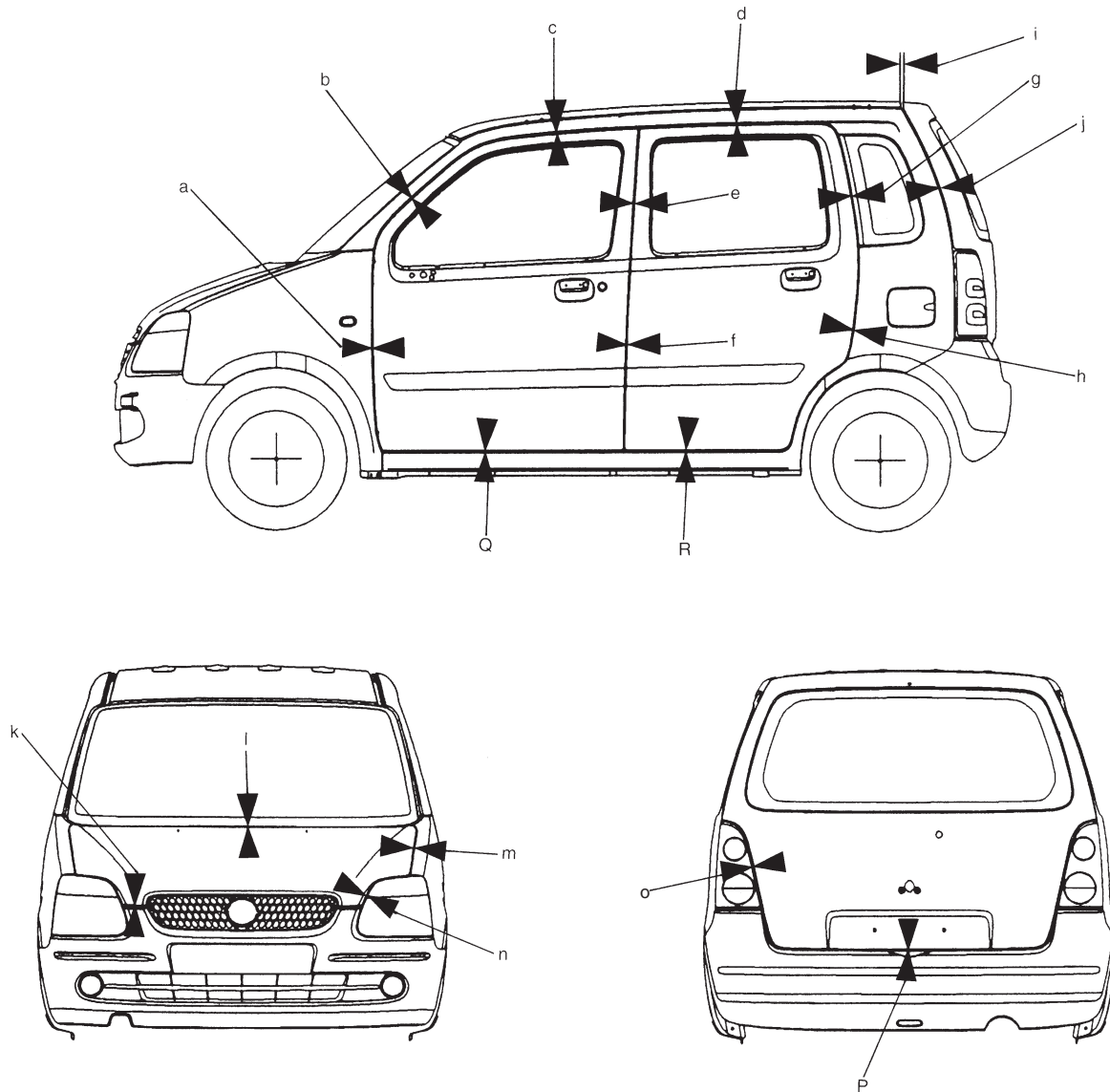
DOOR MOLDING

When door molding (1) is installed, be careful not to install for wrong side door panel.



DIMENSION

Position	Dimension	
	mm	in
a	568	22.36
b	76	2.99
c	69	2.72
d	574	22.6
e	74.5	2.93
f	74	2.91
g	43	1.69

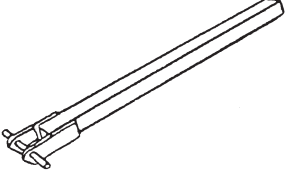

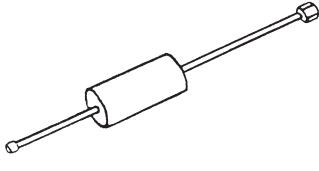
PANEL CLEARANCE

Position	Dimension		Position	Dimension	
	mm	in		mm	in
a	4 – 6	0.16 – 0.24	j	5 – 7	0.2 – 0.28
b	5 – 7	0.2 – 0.28	k	6 – 8	0.24 – 0.31
c	5 – 7	0.2 – 0.28	l	5 – 8	0.2 – 0.31
d	5 – 7	0.2 – 0.28	m	2.5 – 4.5	0.1 – 0.18
e	3.5 – 5.5	0.14 – 0.22	n	4.5 – 6.5	0.18 – 0.26
f	4 – 6	0.16 – 0.24	o	5 – 7	0.2 – 0.28
g	3.5 – 5.5	0.14 – 0.22	P	5 – 7	0.2 – 0.28
h	3.5 – 5.5	0.14 – 0.22	Q	4.5 – 6.5	0.18 – 0.26
i	8.5 – 10.5	0.33 – 0.41	R	4.5 – 6.5	0.18 – 0.26

REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED SUZUKI PRODUCTS	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	● Window regulator
Grease	Carl Bechem GmbH B0401137	● Door hinge
Grease	Carl Bechem GmbH BERULUB XP 719	● Door open stopper
Thread lock cement	Thread Lock Cement Super "1333B" (99000-32020)	● Sliding roof mounting bolts

SPECIAL TOOLS

 <p>09960-48320/KM-149-A Door hinge aligning lever</p>	 <p>09960-48310/KM-295-1 Door hinge aligning bars</p>	 <p>09960-48330/KM-298 Door hinge pin remover</p>
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SECTION 10

RESTRAINT SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- The procedures in this section must be followed in the order listed to temporarily disable the air bag system and prevent false diagnostic codes from setting. Failure to follow procedures could result in possible air bag system activation, personal injury or otherwise unneeded air bag system repairs.

SEAT BELT	SECTION 10A
AIR BAG SYSTEM	SECTION 10B

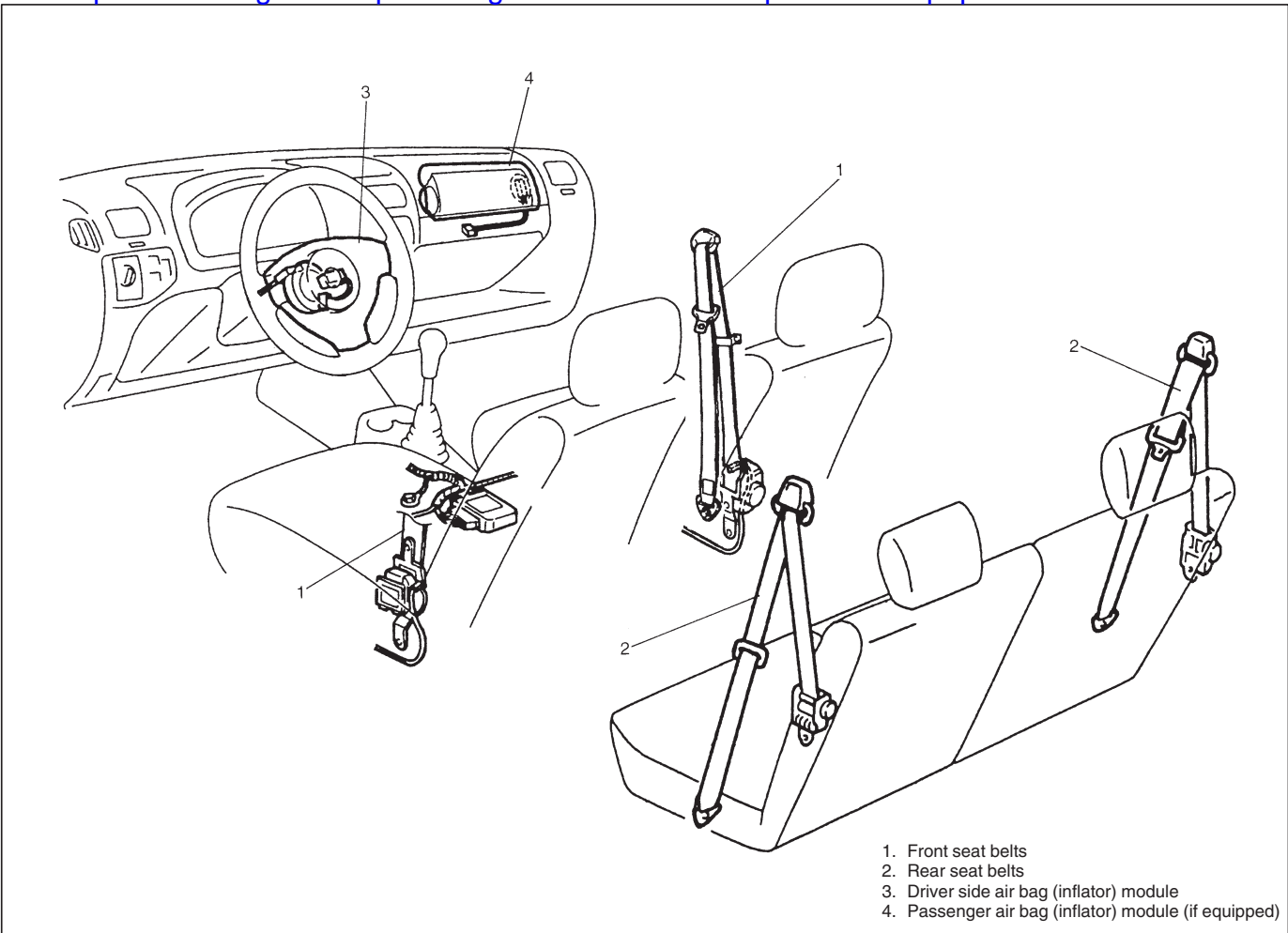
CONTENTS

GENERAL DESCRIPTION	10-1
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GENERAL DESCRIPTION

Either restraint system type 1 or 2 is used depending on vehicle specification.

	Front seat belt	Rear seat belt	Supplemental restraint system	
TYPE1	Seat belt with ELR	Seat belt with A-ELR	Driver air bag	Driver and front passenger seat belt pretensioner
TYPE2	Seat belt with ELR	Seat belt with A-ELR	Driver and front passenger air bag	Driver and front passenger seat belt pretensioner



● Seat belt with ELR

The seat belt with emergency locking retractor (ELR) is designed so that it locks immediately (to prevent the webbing from being pulled out of the retractor any further) when any of the following items is detected as exceeding each set value;

- speed at which the webbing is pulled out of the retractor,
- acceleration or deceleration of the vehicle speed, and
- inclination.

● Seat belt with A-ELR

The automatic and emergency locking retractor (A-ELR) works as an Emergency Locking Retractor (ELR) till its webbing is pulled all the way out and then on as an Automatic Locking Retractor (ALR) till it is retracted fully.

ALR: Automatically locks when the webbing is pulled out from the retractor and allowed to retract even a little.

Then the webbing can not be pulled out any further, unless it is wound all the way back into the retractor, which releases the lock and allows the webbing to be pulled out.

● Seat belt with ELR and pretensioner

The seat belt with ELR and a pretensioner has a pretensioner mechanism which operates in linkage with the air bag in addition to the above described ELR. The pretensioner takes up the sag of the seat belt in occurrence of a front collision with an impact larger than a certain set value, thereby enhancing restraint performance.

● Driver and front passenger side air bags and seat belt pretensioners

With the air bag system which includes air bags for both the driver's and passenger's sides as well as the seat belt pretensioners, the pretensioner takes up the sag of the seat belt, the driver air bag (inflator) module is deployed from the center of the steering column and the passenger air bag (inflator) module (if equipped) from the top of the instrument panel in front of the front passenger seat in occurrence of a front collision with an impact larger than a certain set value to supplement protection offered by the driver and front passenger seat belts. For more information, refer to SECTION 10B "Air Bag System".

SECTION 10A

SEAT BELT

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- The procedures in this section must be followed in the order listed to temporarily disable the air bag system and prevent false diagnostic codes from setting. Failure to follow procedures could result in possible air bag system activation, personal injury or otherwise unneeded air bag system repairs.

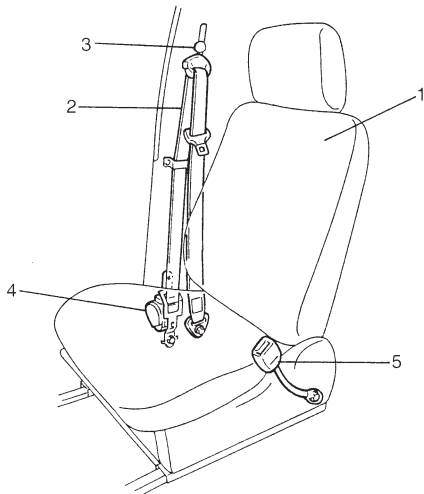
CAUTION:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above procedures are not followed, parts or system damage could result.

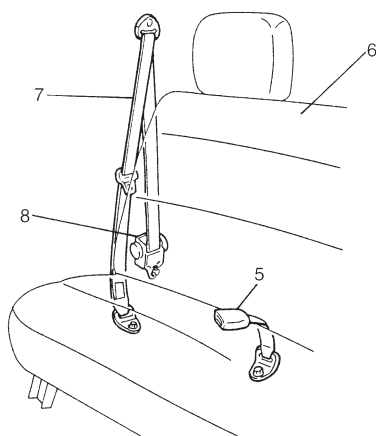
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Front seat belt



Rear seat belt



- | | |
|---|-----------------------|
| 1. Front seat | 5. Buckle |
| 2. Front seat belt | 6. Rear seat |
| 3. Shoulder adjuster | 7. Rear seat belt |
| 4. Retractor assembly (with pretensioner) | 8. Retractor assembly |

GENERAL DESCRIPTION

SEAT BELT

Refer to SECTION 10.

SEAT BELT PRETENSIONER

Seat belts of the driver and front passenger seats are provided with a pretensioner as an optional function unit. The pretensioner is incorporated in retractor assembly and controlled by SDM as one of air bag system components. It will be activated at the same time as the air bag when an impact at the front of vehicle exceeds the specified value.

When servicing seat belt (retractor assembly) with pretensioner, be sure to observe all WARNINGS and CAUTIONS in this section and "Service Precautions" under "On-Vehicle Service" in SECTION 10B.

CAUTION:

Do not reuse the seat belt pretensioner (retractor assembly) that has operated but replace it with a new one as an assembly. To confirm whether pretensioner is operated or not, refer to "Service Precautions" under "On-Vehicle Service" in SECTION 10B.

DIAGNOSIS

For diagnosis of the seat belt pretensioner, refer to SECTION 10B.

INSPECTION AND REPAIR REQUIRED AFTER ACCIDENT

After an accident, whether the seat belt pretensioner has been activated or not, be sure to perform checks, inspections and repairs described on "Repairs and Inspections Required after Accident" under "Diagnosis" in SECTION 10B.

ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

SERVICE AND DIAGNOSIS

WARNING:

If replacing seat belt is necessary, replace buckle and ELR (or webbing) together as a set. This is for the reason of ensuring locking of tongue plate with buckle.

If these parts are replaced individually, such a locking condition may become unreliable. For this reason, SUZUKI will supply only the spare buckle and ELR (or webbing) in a set part.

Before servicing or replacing seat belts, read the following precautionary items and observe them.

- Seat belts should be normal relative to strap retractor and buckle portions.
- Keep sharp edges and damaging objects away from belts.
- Avoid bending or damaging any portion of belt buckle or latch plate.
- Do not bleach or dye belt webbing. (Use only mild soap and lukewarm water to clean it.)
- When installing a seat belt anchor bolt hand-tighten first to prevent cross-threading.
- Do not attempt any repairs on retractor mechanisms or retractor covers. Replace defective assemblies with new replacement parts.
- Keep belts dry and clean at all times.
- If there exist any parts in question, replace such parts.
- Replace belts whose webbing is cut or otherwise damaged.
- Do not put anything into trim panel opening which seat belt webbing passes through.

For seat belt with pretensioner

Refer to "Service and Diagnosis" of "Service Precautions" under "On-Vehicle Service" in SECTION 10B in addition to above precaution.

WARNING:

When performing service on or around air bag system components or air bag system wiring, disable the air bag system. Refer to "Disabling Air Bag System" later in this section.

Failure to follow procedures could result in possible air bag activation, personal injury or unneeded air bag system repairs.

DISABLING AIR BAG SYSTEM

Refer to "Disabling Air Bag System" of "Service Precautions" under "On-Vehicle Service" in SECTION 10B.

ENABLING AIR BAG SYSTEM

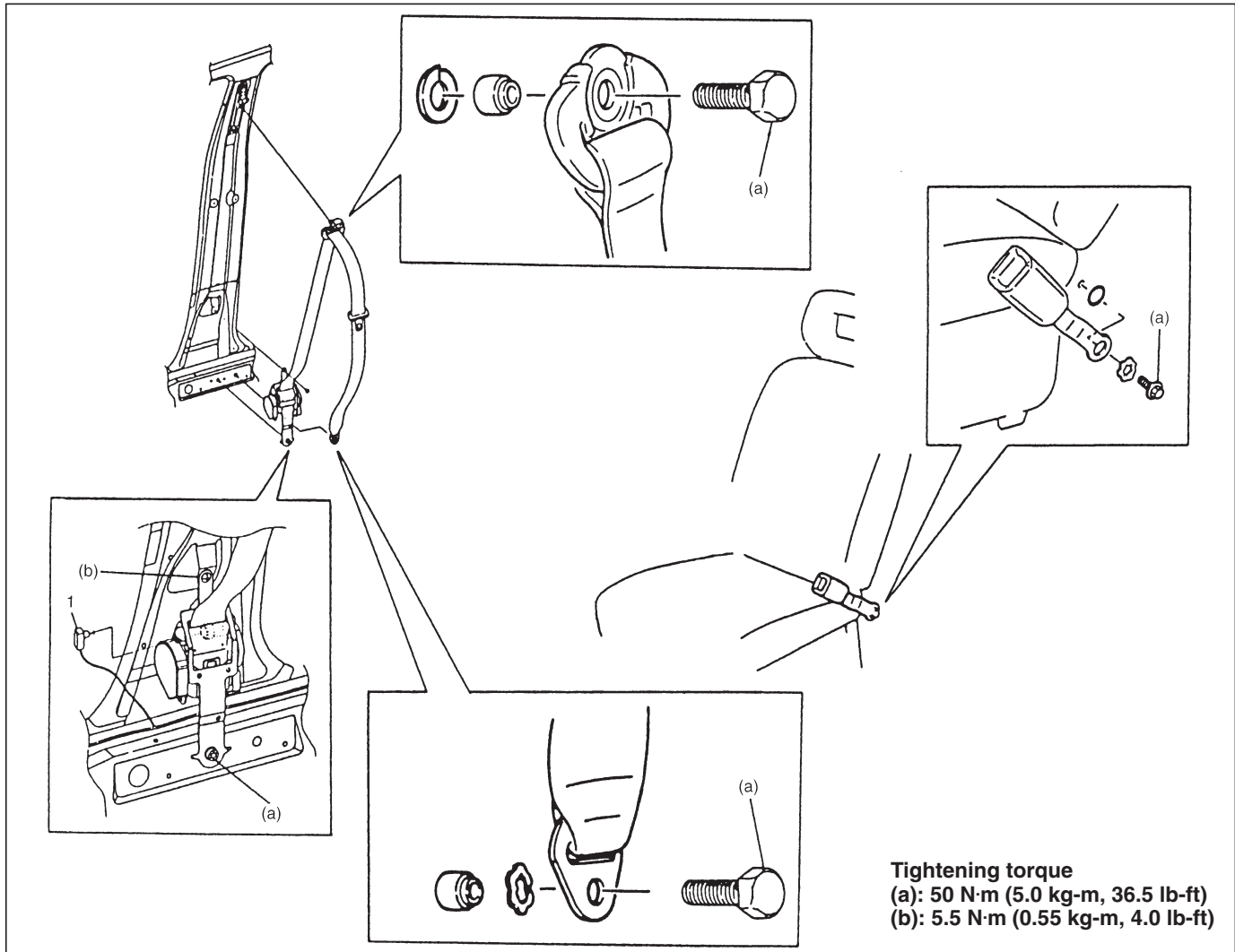
Refer to "Enabling Air Bag System" of "Service Precautions" under "On-Vehicle Service" in SECTION 10B.

HANDLING AND STORAGE

Refer to "Handling and Storage" of "Service Precautions" under "On-Vehicle Service" in SECTION 10B.

DISPOSAL

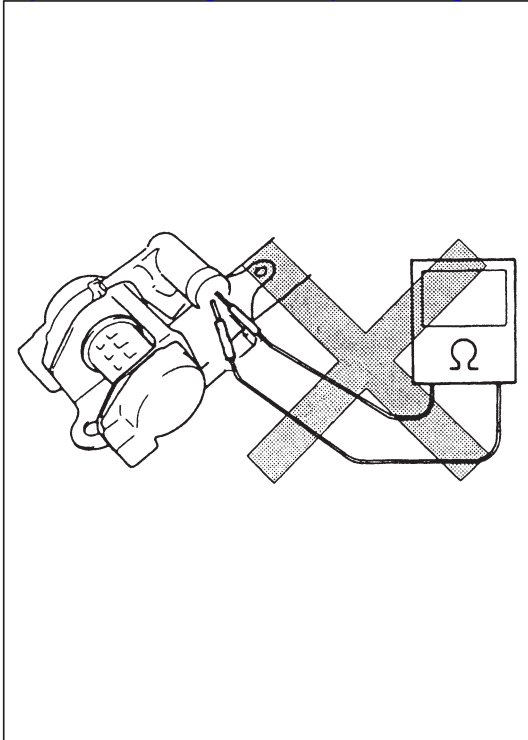
Refer to "Disposal" of "Service Precautions" under "On-Vehicle Service" in SECTION 10B.

FRONT SEAT BELT WITH PRETENSIONER**WARNING:**

- Never attempt to disassemble or repair the seat belt pretensioner (retractor assembly). If any abnormality is found, be sure to replace it with new one as an assembly.
- Be sure to read "Service Precautions" earlier in this section, before starting to work and observe every precaution during work. Neglecting them may result in personal injury or unactivation of the seat belt pretensioner when necessary.

REMOVAL

- 1) Disconnect negative battery cable from battery.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" of "Service Precautions" under "On-Vehicle Service" in SECTION 10B.
- 3) Disconnect Yellow connector (1) from seat belt pretensioner.
- 4) Remove front seat belts from vehicle referring to above figure.



INSPECTION

WARNING:

Never measure resistance of pretensioner or disassemble it. Otherwise, personal injury may result.

CAUTION:

If seat belt pretensioner (retractor assembly) was dropped from a height of 30 cm (1 ft) or more, it should be replaced.

Seat belts and attaching parts can affect the vital components and systems of a vehicle. Therefore, they should be inspected carefully and replaced with genuine parts only.

- **Seat belt**
Its webbing or strap should be free from damage.
- **Retractor assembly**
It should lock webbing when pulled quickly.
The front seat belt retractor assembly should pass the above inspection and should lock webbing even when tilted (approx. 15°) toward the fore and aft or right and left directions.
- **Anchor bolt**
Anchor bolts should be torqued to specification.
- **Belt latch**
It should be secure when latched.

Check retractor assembly with seat belt pretensioner appearance visually for the following symptoms and if any one of them is applicable, replace it with a new one as an assembly.

- Pretensioner has activated.
- There is a crack in seat belt pretensioner (retractor assembly).
- Wire harness or connector is damaged.
- Seat belt pretensioner (retractor assembly) is damaged or a strong impact (e.g., dropping) was applied to it.

INSTALLATION

Install seat belts in reverse order of removal, noting the following.

- Tighten bolts to specified torque.
- Connect Yellow connector for seat belt pretensioner securely.
- Connect negative battery cable to battery.
- Enable air bag system. Refer to "Enabling Air Bag System" under "Service Precautions" in SECTION 10B.

REAR SEAT BELT

WARNING:

Be sure to read “Service Precautions” earlier in this section before starting to work and observe every precaution during work.

REMOVAL

- 1) Remove rear seat (1) referring to “BODY SERVICE” section.
- 2) Refer to the left figure to remove rear seat belt (2).

INSPECTION

Check rear seat belt for the same items as front seat belt inspection other than related to pretensioner.

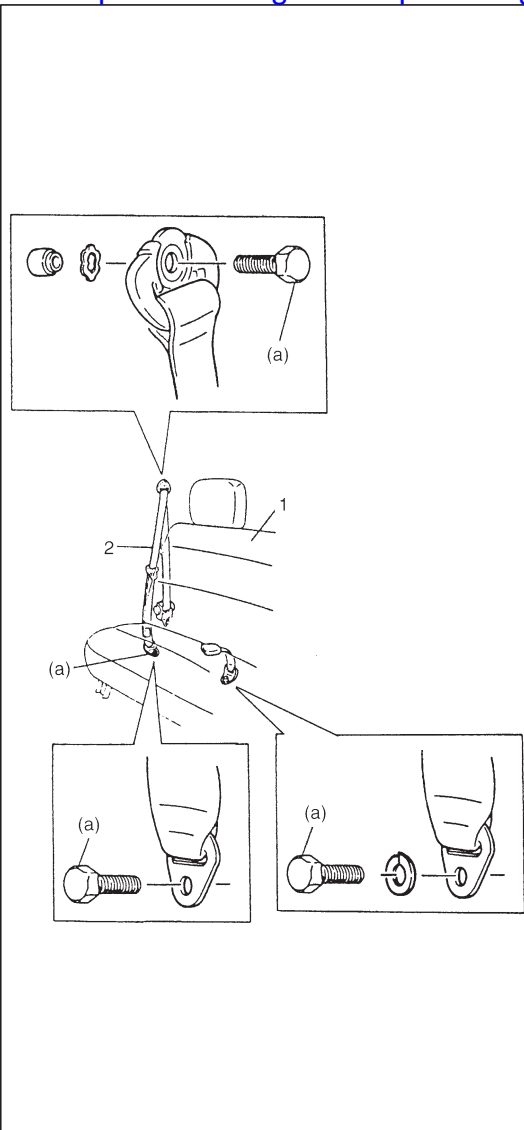
INSTALLATION

Install the rear seat belt observing the following precautions.

- Seat belt anchor bolts should have a unified fine thread (7/16 – 20 UNF). Under no circumstances should any different sized or metric screw threads be used.
- Be sure to tighten seat belt anchor bolts to specified torque.

Tightening Torque

(a): 50 N·m (5.0 kg·m, 36.5 lb·ft)



SECTION 10B

AIR BAG SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- The procedures in this section must be followed in the order listed to temporarily disable the air bag system and prevent false diagnostic codes from setting. Failure to follow procedures could result in possible air bag system activation, personal injury or otherwise unneeded air bag system repairs.

CAUTION:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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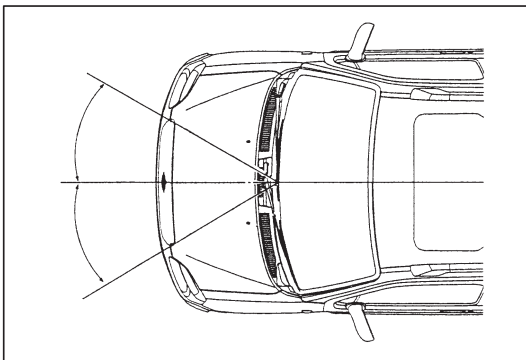
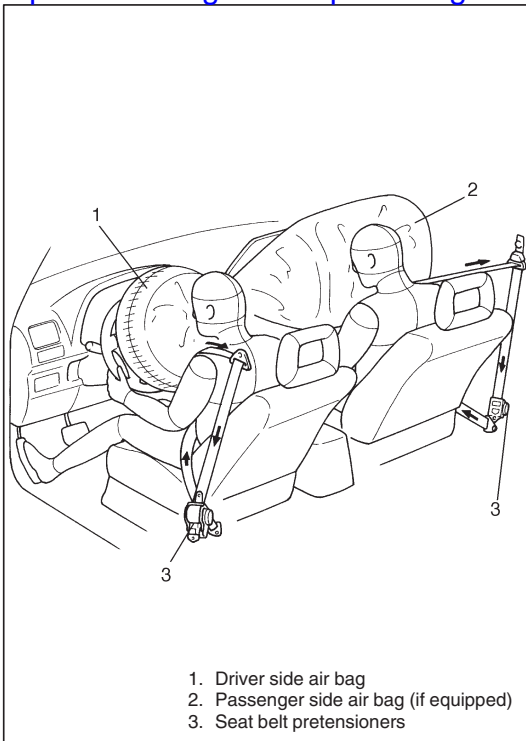
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GENERAL DESCRIPTION

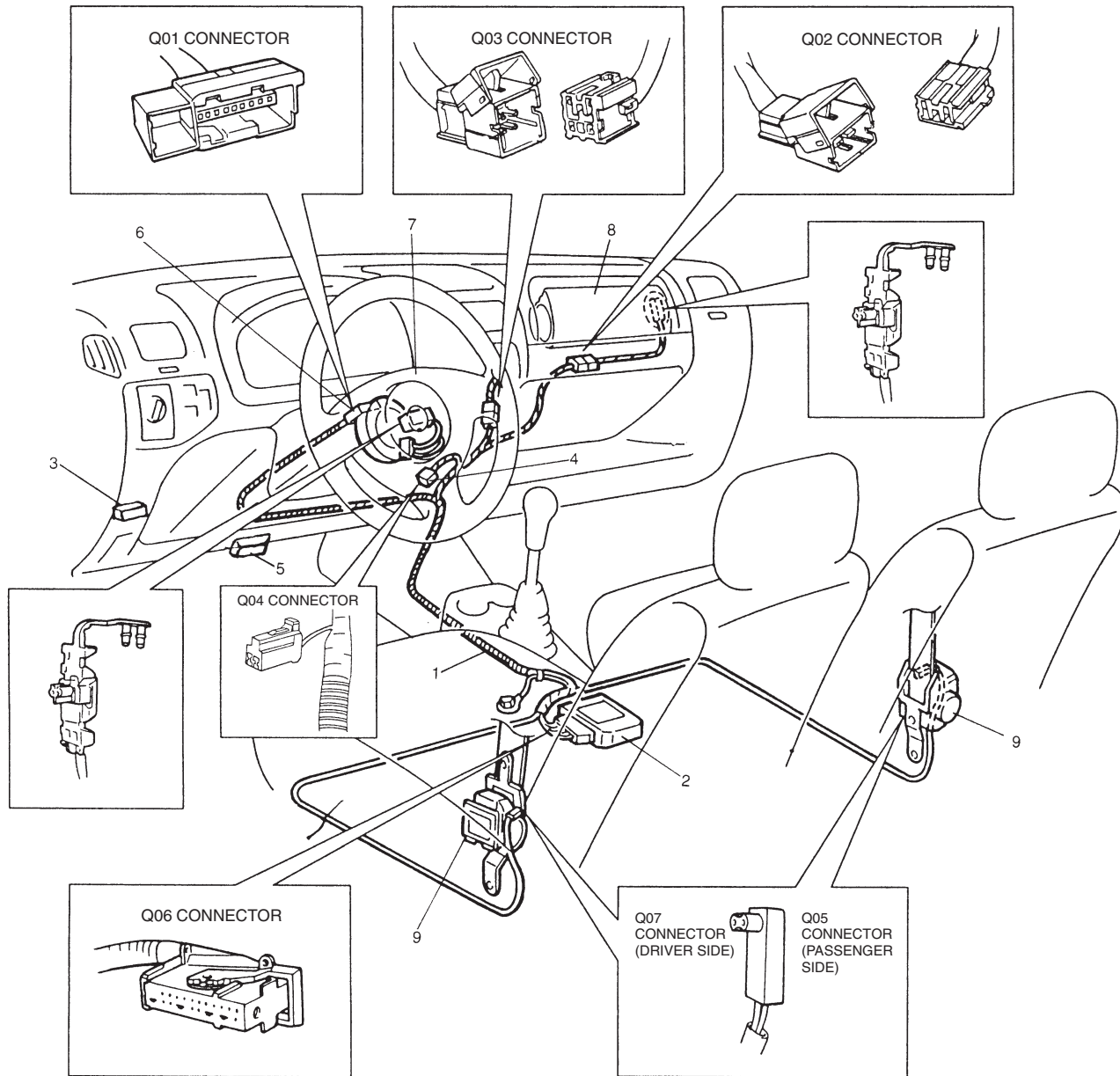
With the air bag system which includes air bags for both the driver's and passenger's (if equipped) sides as well as the seat belt pretensioners, the sag of the seat belt is taken up, the driver air bag (inflator) module is deployed from the center of the steering column and the passenger air bag (inflator) module from the top of the instrument panel in front of the front passenger seat in occurrence of a front collision with an impact larger than a certain set value to supplement protection offered by the driver and front passenger seat belts.



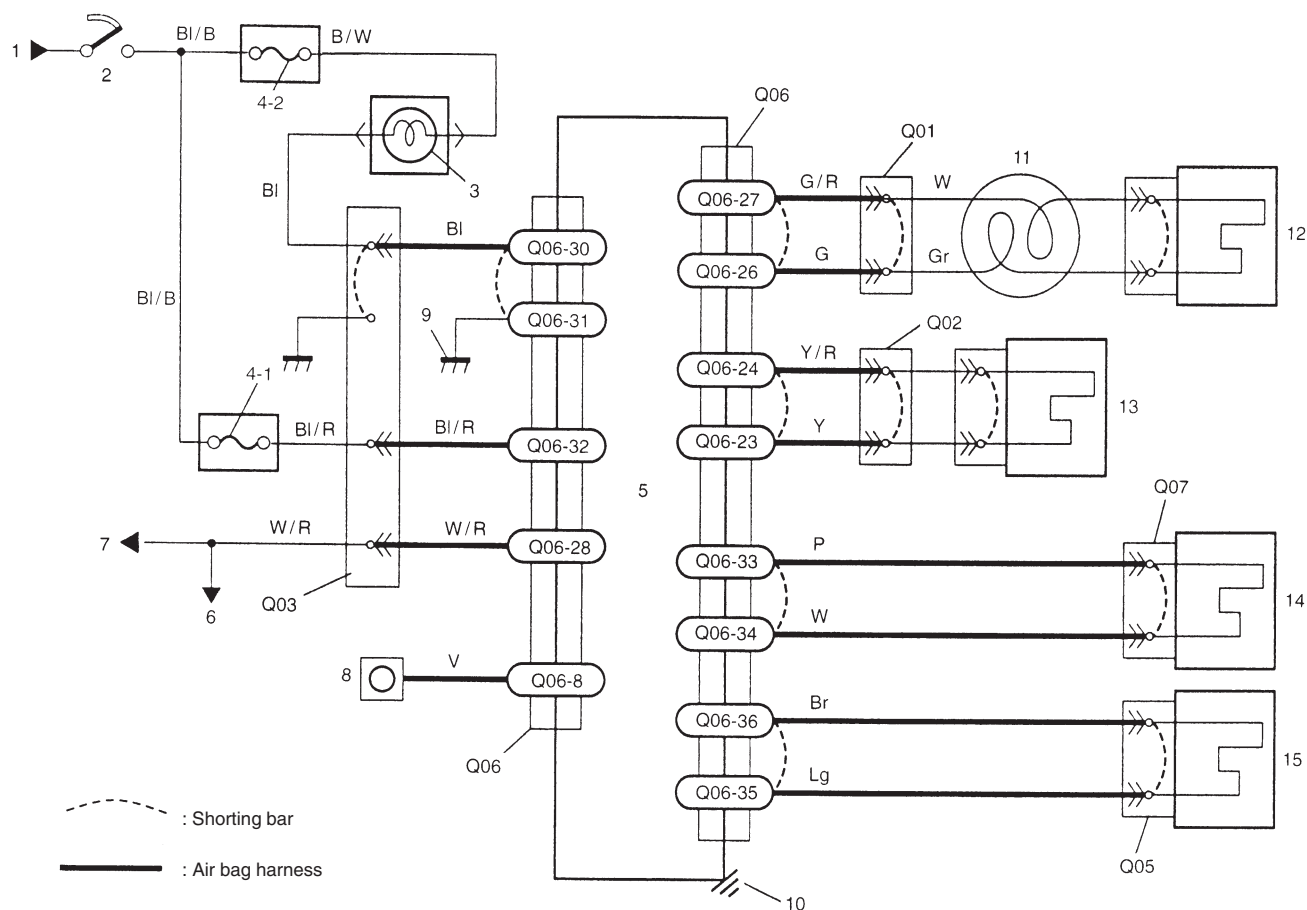
The air bag system is designed to activate only in severe frontal collisions. It is not designed to activate in rear impacts, side impacts, rollovers, or minor frontal collisions, since it would offer no protection in those types of accidents.

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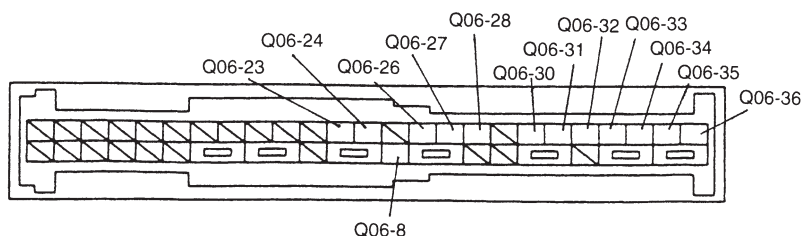
SYSTEM COMPONENTS AND WIRING LOCATION VIEW AND CONNECTORS



- | | |
|---|--|
| 1. Air bag harness | 6. Contact coil assembly |
| 2. SDM | 7. Driver air bag (inflator) module |
| 3. Circuit fuse box ("AIR BAG" fuse included) | 8. Passenger air bag (inflator) module |
| 4. Air bag monitor coupler | 9. Seat belt pretensioners |
| 5. DLC (Data Link Connector) | |

SYSTEM WIRING DIAGRAM

TERMINAL ARRANGEMENT OF SDM (VIEWED FROM HARNESS SIDE)



CONNECTOR "Q06" (SDM connector)

TERMINAL	CIRCUIT
Q06-23	Passenger air bag (inflator) module
Q06-24	
Q06-28	Data link connector (DLC)
Q06-30	"AIR BAG" warning lamp
Q06-26	Driver air bag (inflator) module
Q06-27	
Q06-8	Diagnosis switch
Q06-31	Ground
Q06-35	Passenger pretensioner (if equipped)
Q06-36	
Q06-34	Driver pretensioner (if equipped)
Q06-33	
Q06-32	Ignition switch (power source)

DIAGNOSIS

WARNING:

To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester.

Instructions in this manual must be followed carefully, otherwise personal injury may result.

DIAGNOSTIC TROUBLE CODES

The "Air Bag Diagnostic System Check" must always be the starting point of any air bag system diagnosis. The "Air Bag Diagnostic System Check" checks for proper air bag warning lamp operation and checks for air bag diagnostic trouble codes using on-board diagnosis function.

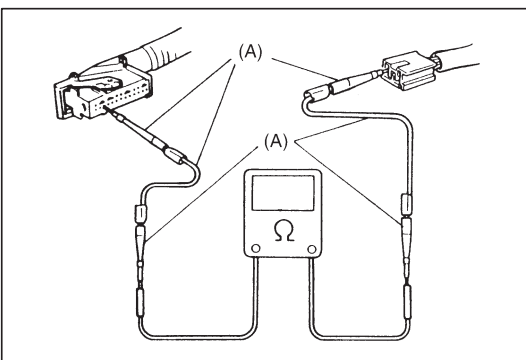
USE OF SPECIAL TOOLS

WARNING:

To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester.

Instructions in this manual must be followed carefully, otherwise personal injury may result.

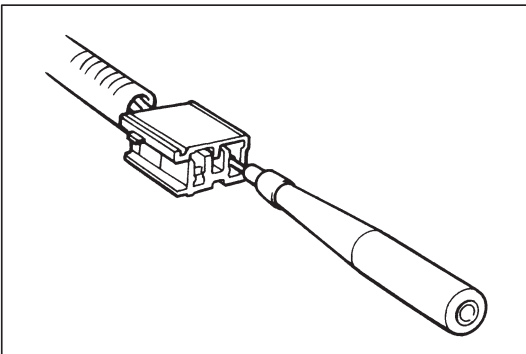
You should be familiar with the tools listed in this section under the heading "Special Tools". You should be able to measure voltage and resistance. You should be familiar with proper use of SUZUKI scan tool, Air Bag Driver/Passenger Load Tool, Connector Test Adapter Kit and the Digital Multimeter.

**Special Tool (Connector Test Adapter Kit)**

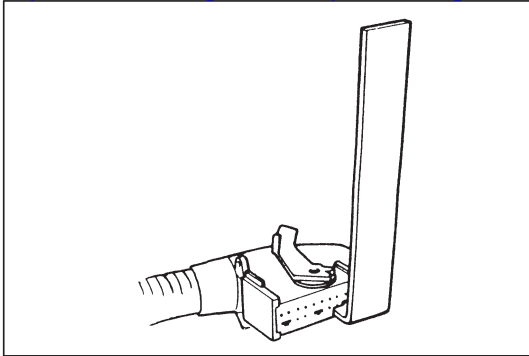
(A): 09932-76010

This must be used whenever a diagnostic procedure requests checking or probing a terminal.

Using the appropriate adapter in the special tool will ensure that no damage to the terminal will occur from the multimeter probe, such as spreading or bending.

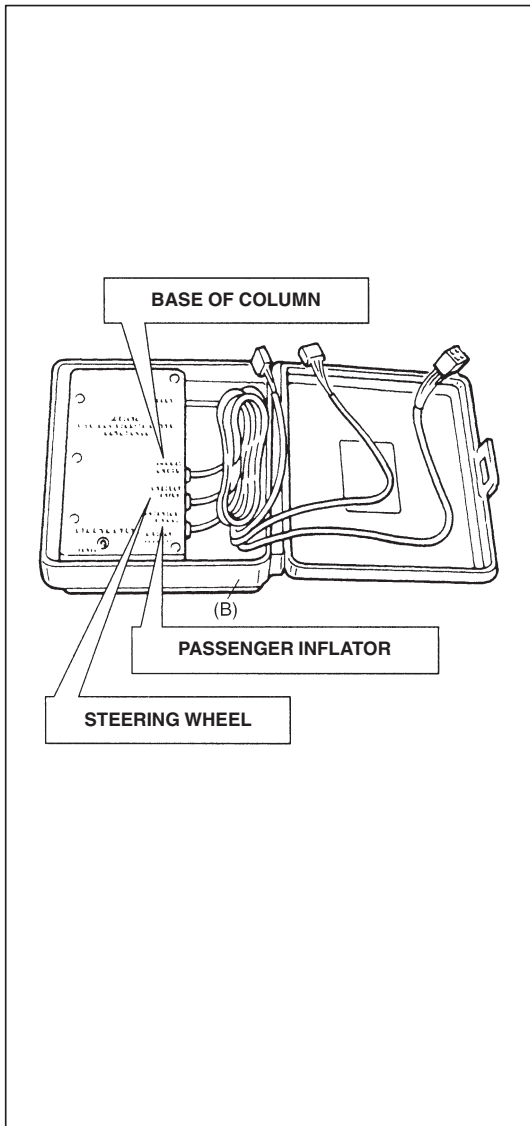


The adapter will also give an idea of whether contact tension is sufficient, helping to find an open or intermittent open due to poor terminal contact.



An SDM short bar release tool is included in the connector test adapter kit.

Inserting it into the SDM connector will release the shorting bar.



Special Tool (Air Bag Driver/Passenger Load Tool)

(B): 09932-75010

This tool is used only when called for in this section. It is used as a diagnostic aid and safety device to prevent inadvertent air bag (inflator) module deployment and seat belt pretensioner activation. The load tool has three connectors attached to its case which are electrically functional and serve as resistive load substitutions.

One of connectors ("STEERING WHEEL") is used to substitute the load of the followings.

- driver air bag (inflator) module when it is connected at the top of the column to the contact coil assembly.
- passenger air bag (inflator) module when it is connected to the air bag harness connector for passenger air bag (inflator) module.
- driver and passenger seat belt pretensioner when it is connected to air bag harness connector for driver and passenger seat belt pretensioner.

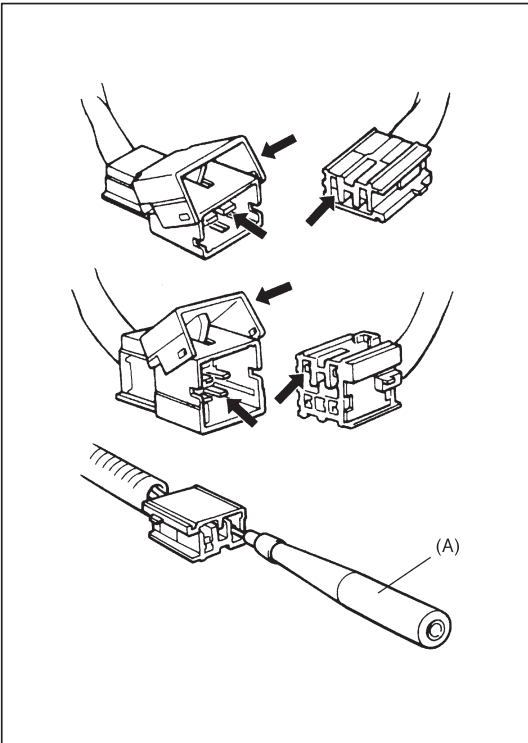
The other connectors ("BASE OF COLUMN" and "PASSENGER INFLATOR") are not used for this vehicle.

By substituting the resistance of the load tool when called for, a determination can be made as to whether an inflator circuit component is causing system malfunction and which component is causing the malfunction.

The load tool should be used only when specifically called for in the diagnostic procedures.

INTERMITTENTS AND POOR CONNECTIONS

Most intermittents are caused by faulty electrical connections or wiring. When a check for proper connection is requested in a diagnostic flow table, perform careful check of suspect circuits for:



- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact.

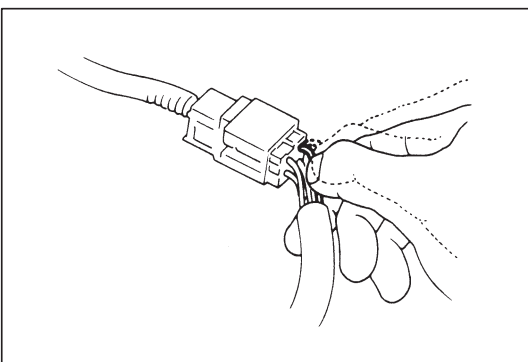
However, cleaning the terminal with a sand paper or the like is prohibited.

- Damaged connector body, exposing the terminals to moisture and dirt, as well as not maintaining proper terminal orientation with the component or mating connector.
- Improperly formed or damaged terminals.

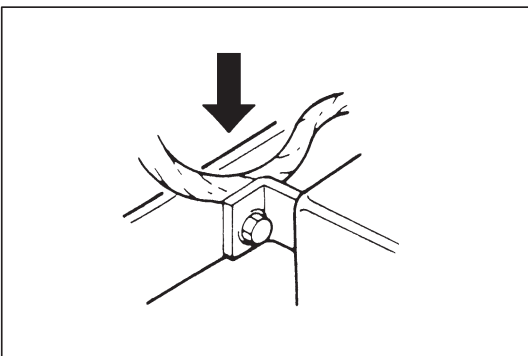
Check each connector terminal in problem circuits carefully to ensure good contact tension by using the corresponding mating terminal included in the connector test adapter kit (special tool). If contact tension is not enough, reform it to increase contact tension or replace.

Special Tool (Connector Test Adapter Kit)

(A): 09932-76010



- Poor terminal-to-wire connection.
Check each wire harness in problem circuits for poor connection by shaking it by hand lightly. If any abnormal condition is found, change the wire harness assembly or component parts with new ones.



- Wire insulation which is rubbed through, causing an intermittent short as the bare area touches other wiring or parts of the vehicle.
- Wire broken inside the insulation. This condition could cause a continuity check to show a good circuit, but if only 1 or 2 strands of a multi-strand-type wire are intact, resistance could be far too high.

If any abnormality is found, repair or replace as a wire harness assembly.

AIR BAG DIAGNOSTIC SYSTEM CHECK**WARNING:**

To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

CAUTION:

The order in which diagnostic trouble codes are diagnosed is very important. Failure to diagnose the diagnostic trouble codes in the order specified may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

The diagnostic procedures used in this section are designed to find and repair air bag system malfunctions. To get the best results, it is important to use the diagnostic flow tables and follow the sequence listed below.

A. PERFORM THE "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE"

The "Air Bag Diagnostic System Check Flow Table" must be the starting point of any air bag system diagnosis. The "Air Bag Diagnostic System Check Flow Table" checks for proper air bag warning lamp operation through air bag warning lamp and whether air bag diagnostic trouble codes exist.

B. REFER TO THE PROPER DIAGNOSTIC TABLE AS DIRECTED BY THE "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE".

The "Air Bag Diagnostic System Check Flow Table" will lead you to the correct table to diagnose any air bag system malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

C. REPEAT THE "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" AFTER ANY REPAIR OR DIAGNOSTIC PROCEDURES HAVE BEEN PERFORMED.

Performing the "Air Bag Diagnostic System Check Flow Table" after all repair or diagnostic procedures will ensure that the repair has been made correctly and that no other malfunctions exist.

AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE

STEP	ACTION	YES	NO
1	1) Make sure that battery voltage is about 11 V or higher. 2) Note air bag warning lamp as ignition switch is turned ON. 3) Does air bag warning lamp come ON or flash when ignition switch is turned ON?	Go to step 2.	Air bag warning lamp does not come ON. Proceed to Table B.
2	Does air bag warning lamp come ON steady?	Air bag warning lamp come ON steady. Proceed to Table A.	Go to step 3.
3	Does air bag warning lamp keep flashing (indicating DTC) even after initial 6-time flashing when ignition switch is ON?	Air bag warning lamp flashes. Proceed to Table C.	Go to step 4.
4	Does air bag warning lamp turn OFF, after flashing 6 times?	Go to step 5.	Go to step 6.
5	1) Check DTC. Refer to DTC CHECK. 2) Not using SUZUKI scan tool: Is DTC 12 indicated? Using SUZUKI scan tool: Is "NO DTC" displayed?	Air bag system is in good condition.	An intermittent trouble has occurred at some place. Check the connector harness, etc. related to the sensed DTC. Refer to INTERMITTENT AND POOR CONNECTIONS in this section. Then clear DTC (Refer to DTC CLEARANCE) and repeat this table.
6	1) Check DTC. Refer to DTC CHECK. 2) Not using SUZUKI scan tool: Is DTC 12 indicated? Using SUZUKI scan tool: Is "NO DTC" displayed?	Substitute a known-good SDM and recheck.	Check and repair according to Flow Table corresponding to that DTC.

DIAGNOSTIC TROUBLE CODE (DTC) CHECK**[Using SUZUKI scan tool]**

- 1) Turn ignition switch OFF.
- 2) After setting cartridge to SUZUKI scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

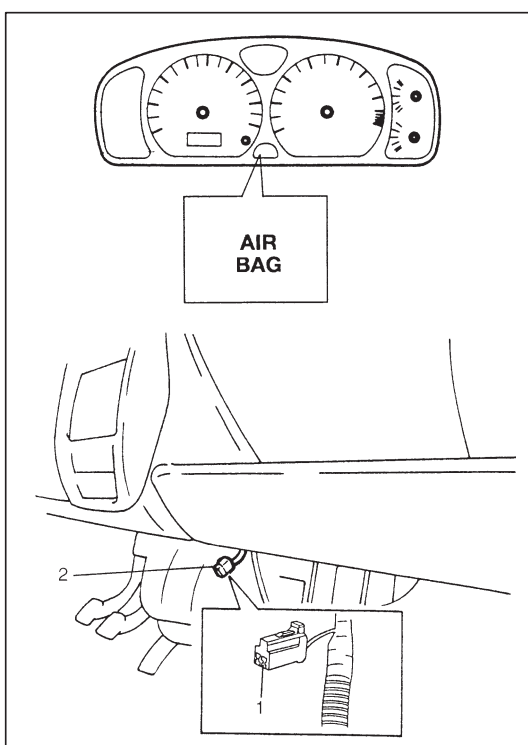
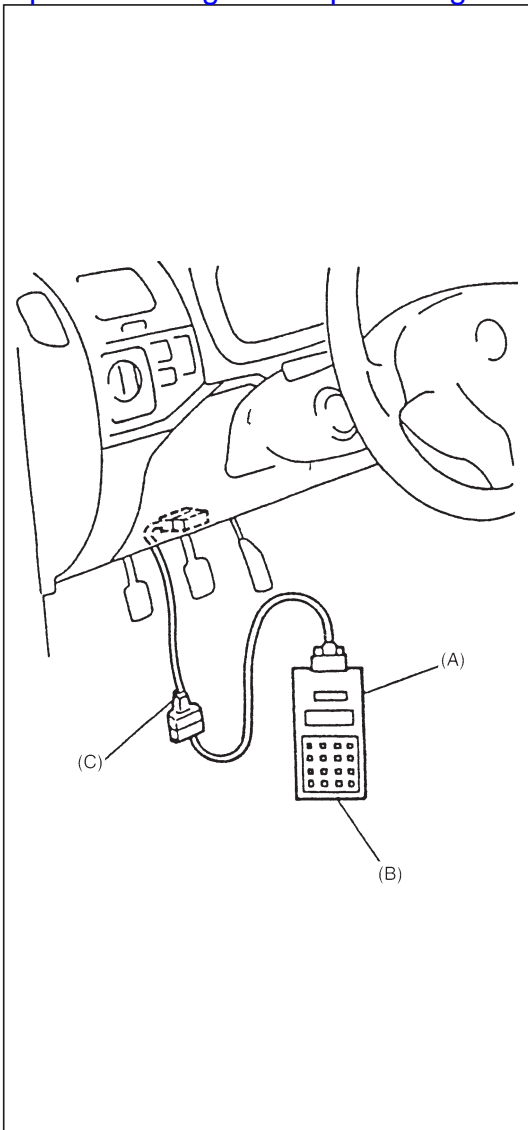
Special Tool**(A): 09931-76011 (SUZUKI scan tool)****(B): Mass storage cartridge****(C): 09931-76030 (16/14 pin DLC cable)**

- 4) Turn ignition switch ON.
- 5) Read DTC according to instructions displayed on scan tool and print it or write it down. Refer to scan tool operator's manual for further details.

NOTE:

If scan tool cannot communicate with SDM, proceed to TABLE E.

- 6) After completing the check, turn ignition switch OFF and disconnect scan tool cable from data link connector (DLC).

**[Not using SUZUKI scan tool]**

- 1) Perform Step 1 to 4 in AIR BAG DIAGNOSTIC FLOW TABLE on previous page to check air bag warning lamp for operation.
- 2) Using service wire, ground diagnosis switch terminal (1) in monitor coupler (2) (to steering column, etc.).
- 3) Turn ignition switch ON.
- 4) Read DTC from flashing pattern of air bag warning lamp. (Refer to "Diagnostic Trouble Code Table" in this section.)

NOTE:

When air bag warning lamp doesn't indicate flashing pattern of DTC while diagnosis switch terminal on air bag monitor coupler is grounded, proceed to TABLE D.

- 5) After completing the check, turn ignition switch OFF and disconnect service wire from air bag monitor coupler.

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

NOTE:

As execution of the DTC clearance will clear all DTCs, be sure to record all DTCs before servicing.

[Using SUZUKI scan tool]

- 1) Turn ignition switch OFF.
- 2) Connect SUZUKI scan tool to data link connector (DLC) in the same manner as when making this connection for DTC check.

Special Tool

(A): 09931-76011 (SUZUKI scan tool)

(B): Mass storage cartridge

(C): 09931-76030 (16/14 pin DLC cable)

- 3) Turn ignition switch ON.

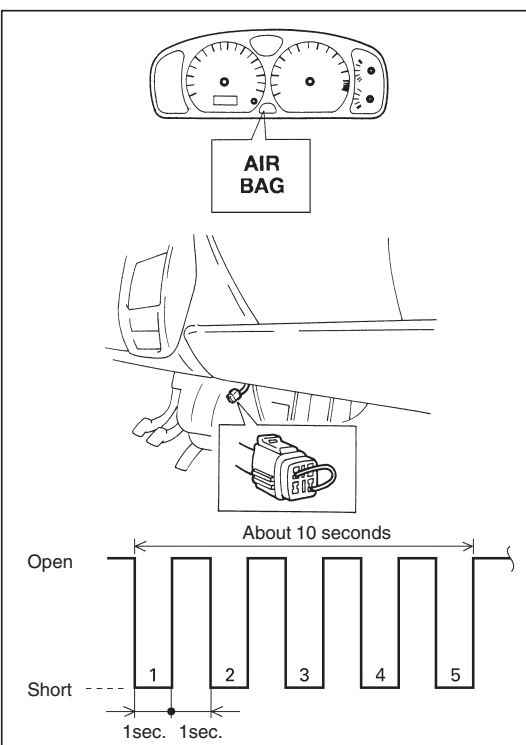
NOTE:

If scan tool cannot communicate with SDM, proceed to TABLE E.

- 4) Erase DTC according to instructions displayed on SUZUKI scan tool.
Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).
- 6) Perform "Diagnostic Trouble Code (DTC) Check" and confirm that "NO DTC" is displayed and not malfunction DTC.

NOTE:

If DTC 51 or DTC 71 is stored in SDM, it is not possible to clear DTC.

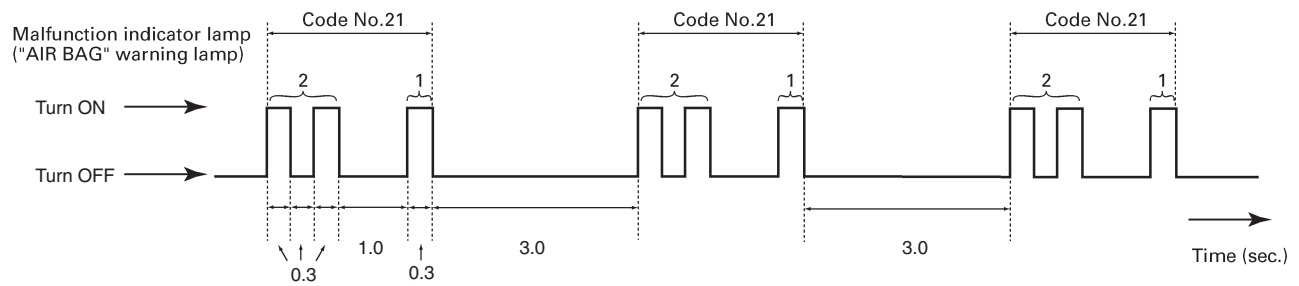


[Not using SUZUKI scan tool]

- 1) Turn ignition switch ON and wait about 6 seconds or more.
- 2) Using service wire, repeat shorting and opening between diagnosis switch terminal and ground terminal on air bag monitor coupler 5 times at about 1 second intervals.
- 3) Perform "Diagnosis Trouble Code (DTC) Check" and confirm that normal DTC (DTC 12) is displayed and not malfunction DTC.












NOTE:

If DTC 51 or DTC 71 is stored in SDM, it is not possible to clear DTC.

DIAGNOSTIC TROUBLE CODE TABLE (Page 1 of 2)**EXAMPLE: WHEN DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (CODE NO.21) IS SET**

DTC (displayed on SUZUKI scan tool)	DTC (indicated by air bag warning lamp)	Air bag warning lamp flashing pattern	DIAGNOSIS	
NO DTC	12		Normal	
B1015	15		Passenger air bag circuit	Resistance high
B1016	16			Resistance low
B1018	18			Short to ground
B1019	19			Short to power circuit
B1021	21		Driver air bag circuit	Resistance high
B1022	22			Resistance low
B1024	24			Short to ground
B1025	25			Short to power circuit
B1031	31		Power source voltage	Too high
B1032	32			Too low

DIAGNOSTIC TROUBLE CODE TABLE (Page 2 of 2)

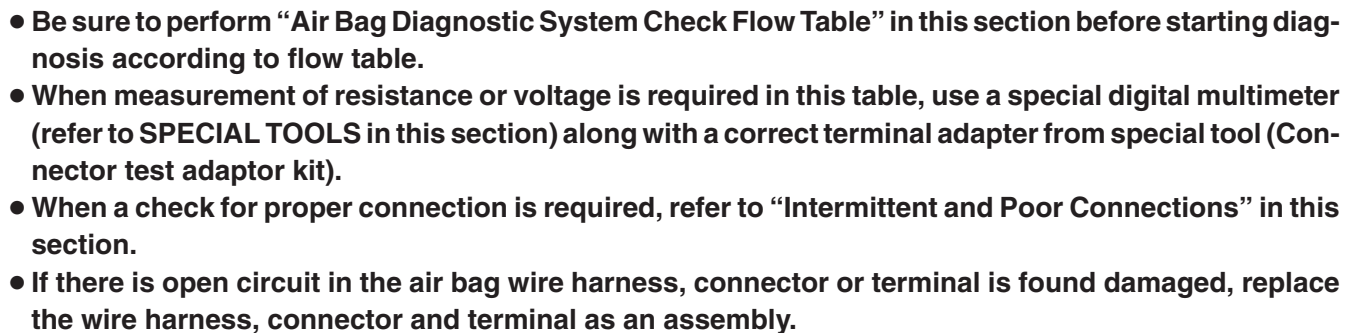
DTC (displayed on SUZUKI scan tool)	DTC (indicated by air bag warning lamp)	Air bag warning lamp flashing pattern	DIAGNOSIS	
B1041	41		Driver pretensioner circuit	Resistance high
B1042	42			Resistance low
B1043	43			Short to ground
B1044	44			Short to power circuit
B1045	45		Passenger pretensioner circuit	Resistance high
B1046	46			Resistance low
B1047	47			Short to ground
B1048	48			Short to power circuit
B1051	51		SDM	Frontal crash detected
B1061	61		Warning lamp circuit	Warning lamp failure
B1071	71		SDM	Internal fault

NOTE:

- When 2 or more codes are indicated, the lowest numbered code will appear first.
- If a code not listed on the table is displayed, then the SDM is faulty.
- After ignition switch is turned ON, air bag warning lamp flashes 6 times and then operates as shown below depending on the trouble condition and whether diagnosis switch terminal is grounded or not. For grounding diagnosis switch terminal to check DTC, refer to “DIAGNOSIS TROUBLE CODE (DTC) CHECK – [Not using SUZUKI scan tool]” in this section.

SYSTEM CONDITION		AIR BAG WARNING LAMP	
		Diagnosis switch terminal is not grounded	Diagnosis switch terminal is grounded
In good condition at present	No trouble in the past	OFF	DTC 12
	Trouble occurred in the past	ON and turns OFF after 6 sec.	History DTC
Abnormality exists at present	No trouble in the past	ON	Current DTC
	Trouble occurred in the past	ON	Current and history DTCs

TABLE E – SCAN TOOL CANNOT COMMUNICATE SDM



DIAGNOSTIC FLOW TABLE**Table A: AIR BAG WARNING LAMP COMES ON STEADY WITHOUT FLASHING**

STEP	ACTION	YES	NO
1	1) Check connections at Q03 and Q06 connectors with ignition switch OFF. Are they properly connected and secured by lock levers of couplers?	Go to step 2.	Reconnect and secure them with lock levers.
2	1) Ignition switch OFF. 2) Remove and inspect "AIR BAG" fuse. Is fuse good?	Go to step 2.	"BI/R" wire short to ground. After repair, replace "AIR BAG" fuse.
3	1) Disconnect SDM connector. 2) Check proper connection to SDM at terminal Q06-32. 3) If OK then check voltage between Q06-32 terminal of SDM connector and body ground with ignition switch ON. (See figure below.) Is it 8 V more?	Go to step 3.	"BI/R" wire (between "AIR BAG" fuse and SDM connector) open, "BI/B" wire (between ignition switch and air bag fuse) open or shorted to ground.
4	1) Disconnect connector from combination meter, referring to SECTION 8C. 2) Check continuity between Q06-30 terminal of SDM connector and body ground. (See figure below.) Is there continuity?	"BI" wire (between combination meter and SDM connector) short to ground.	Substitute a known-good SDM and recheck.

Fig. for STEP 3

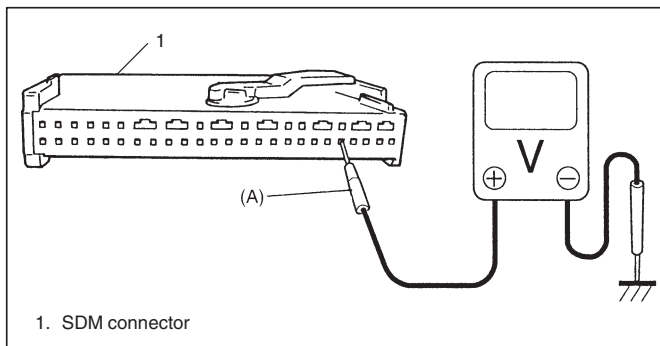
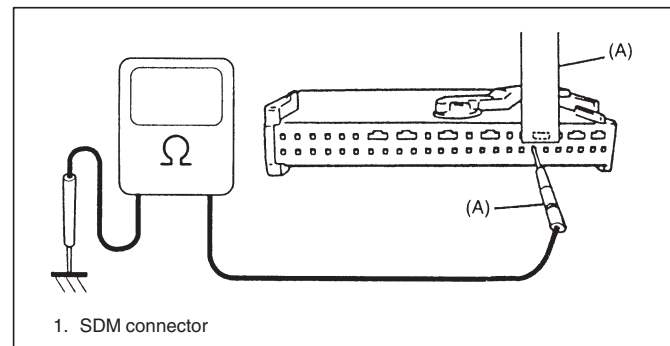


Fig. for STEP 4

**Special Tool****(A): 09932-76010****NOTE:**

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

Table B: AIR BAG WARNING LAMP DOES NOT COME ON WITH IGNITION SWITCH ON

STEP	ACTION	YES	NO
1	1) Set parking brake. 2) Note combination meter when ignition switch is turned ON. Does the "BRAKE" indicator (warning lamp) come ON?	Go to step 2.	"B/W" wire (between ignition switch and combination cluster) open or short to ground.
2	1) Disconnect SDM. 2) Check proper connection to SDM at terminal Q06-30. 3) If OK then check voltage from Q06-30 terminal of SDM connector to body ground with ignition switch ON. (See figure below.) Is it 8 V or more?	Substitute a known-good SDM and recheck.	Go to step 3.
3	1) Remove combination meter, referring to SECTION 8C. 2) Check proper connection to combination meter at terminal for air bag warning lamp and to SDM at terminal Q06-30. 3) If OK then check resistance between "BI" wire terminal of combination meter connector and Q06-30 terminal of SDM connector. (See figure below.) Is there continuity?	Go to step 4.	Repair high resistance or open in "BI" wire circuit (between combination meter and SDM).
4	1) Measure voltage from Q06-30 terminal of SDM connector to body ground with ignition switch ON. Is it 8 V or more?	Repair short from "BI" wire circuit (between combination meter and SDM) to power circuit.	Go to step 5.
5	1) Remove and inspect "AIR BAG" bulb. Is bulb good?	Substitute a known-good combination meter and recheck.	Replace bulb.

Fig. for STEP 2

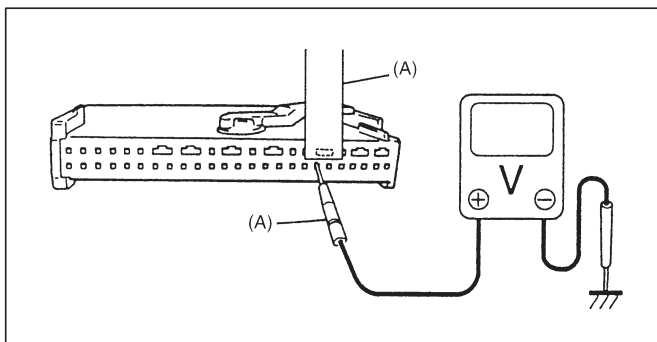
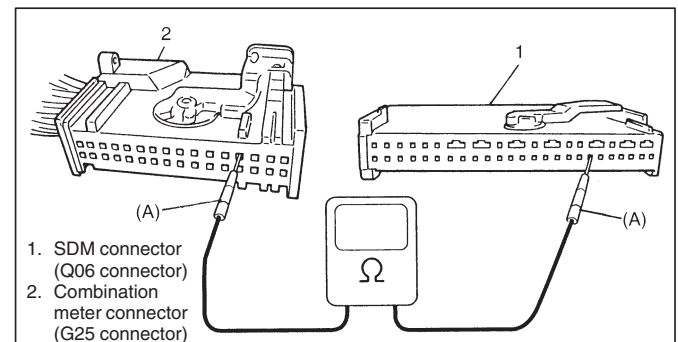


Fig. STEP 3

**Special Tool**

(A): 09932-76010

NOTE:

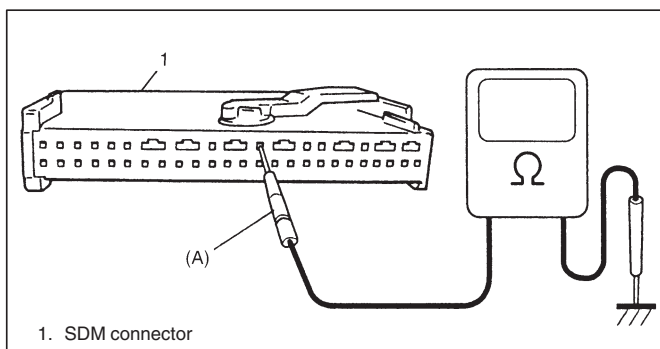
Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

Table C: AIR BAG WARNING LAMP FLASHES EVEN AFTER INITIAL 6-TIME FLASHING

STEP	ACTION	YES	NO
1	1) Check air bag monitor coupler. Is diagnosis switch terminal in air bag monitor coupler grounded by service wire?	Go to step 2.	Remove service wire.
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check continuity between Q06-8 terminal of SDM connector and body ground. (See figure below.) Is there continuity?	Repair short from "V" wire circuit to ground.	Substitute a known-good SDM and recheck.

Fig. for STEP 2



Special Tool
(A): 09932-76010

NOTE:

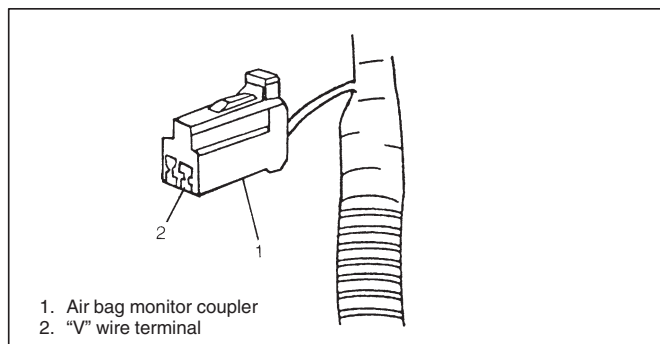
Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

Table D: AIR BAG WARNING LAMP CANNOT INDICATE FLASHING PATTERN OF DTC EVEN WITH DIAGNOSIS SWITCH TERMINAL GROUNDED

STEP	ACTION	YES	NO
1	1) Inspect service wire between diagnostic switch terminal on air bag monitor coupler and body ground. Is it securely connected between them by service wire?	Go to step 2.	Properly connect and ground diagnostic switch terminal on air bag monitor coupler to body ground by service wire.
2	1) Disconnect SDM connector from SDM. 2) Check for proper connection at "V" wire terminal (Q06-8 terminal of SDM connector). 3) If OK then check continuity between terminals Q04-1 and Q06-8. Is there continuity?	Substitute a known-good SDM and recheck.	Check "V" wire terminals. If OK then "V" wire circuit high resistance or open.

Fig. for STEP 2

**NOTE:**

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

TABLE E: SCAN TOOL CANNOT COMMUNICATE WITH SDM

STEP	ACTION	YES	NO
1	1) Make sure that SUZUKI scan tool is free from malfunction and correct cartridge for air bag system is used. 2) Ignition switch OFF. 3) Check proper connection of SUZUKI scan tool to DLC. Is connection in good condition?	Go to step 2.	Properly connect SUZUKI scan tool to DLC.
2	1) Check if communication is possible by trying communication with other control module (ECM, ICM (if equipped), P/S control module (if equipped) or ABS control module (if equipped)). Is it possible to communicate with other control module?	Go to step 3.	Repair open in common section of serial data circuit ("W/R" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("W/R" wire circuit).
3	1) With ignition switch OFF, disconnect Q03 connector from SDM. 2) Check proper connection at "W/R" wire terminal for DLC in Q03 connector. 3) If OK, then check continuity between "W/R" wire terminal in Q03 connector and Q06-28 terminal of SDM connector. (See figure below.) Is there continuity?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "W/R" wire circuit (in air bag harness).

Fig. for STEP 1

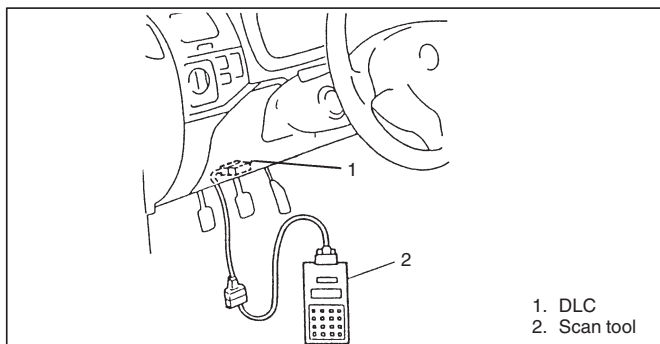
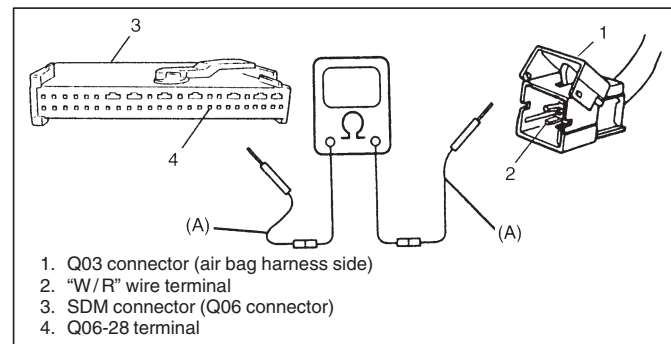


Fig. STEP 3

**Special Tool****(A): 09932-76010****NOTE:**

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK" to confirm that the trouble has been corrected.

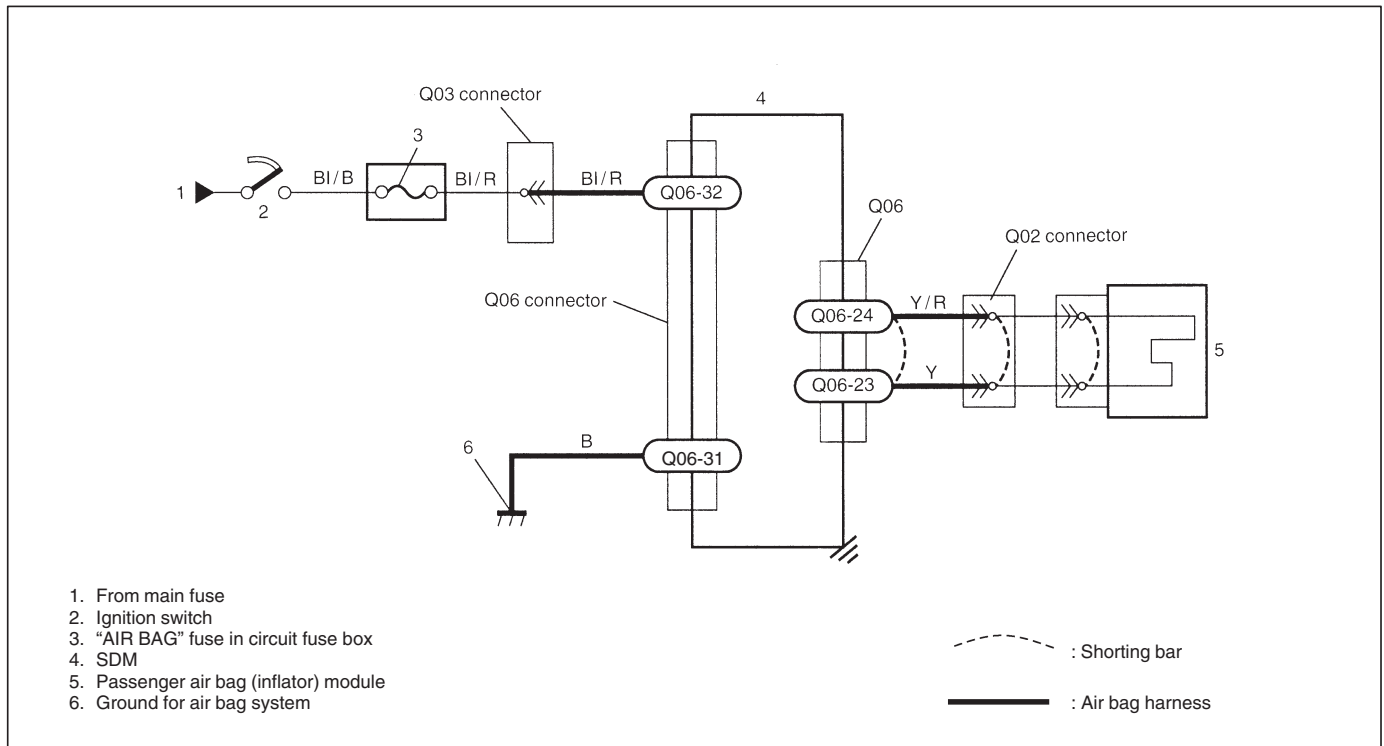
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DTC 15 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH

DTC 16 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW

DTC 18 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND

DTC 19 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT



CAUTION:

- When measurement of resistance or voltage is required in this table, use a special digital multimeter (refer to SPECIAL TOOLS in this section) along with a correct terminal adaptor from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to "Intermittent and Poor Connections" in this section.
- If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN:

DTC 15: The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is above a specified value for specified time.

DTC 16: The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is below a specified value for specified time.

DTC 18: The voltage measured at passenger air bag initiator circuit is below a specified value for specified time.

DTC 19: The voltage measured at passenger air bag initiator circuit is above a specified value for specified time.

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DIAGNOSTIC FLOW TABLE

DTC 15: PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect passenger air bag (inflator) module Q02 connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in Q02 connector. 3) If OK then connect Special Tool (B) to Q02 connector in stead of passenger air bag (inflator) module. (See figure below.) With ignition switch ON, is DTC 15 current?	Go to step 3.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
3	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals Q06-23 and Q06-24. 3) Release shorting bar in SDM connector inserting Special Tool (A), referring to figure below. 4) Measure resistance between terminals Q06-23 and Q06-24 with connected Special Tool (B). (See figure below.) Is resistance 3.8 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "Y" or "Y/R" wire circuit.

Fig. for STEP 2 and 3

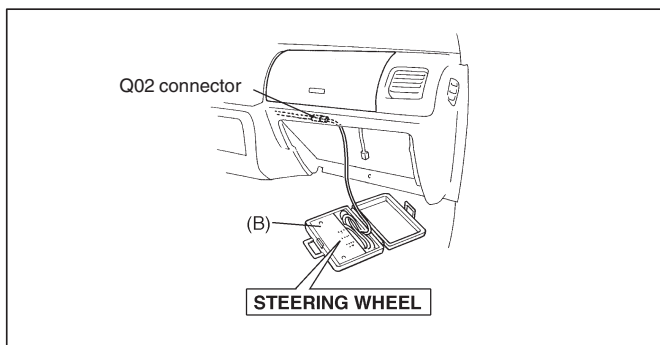
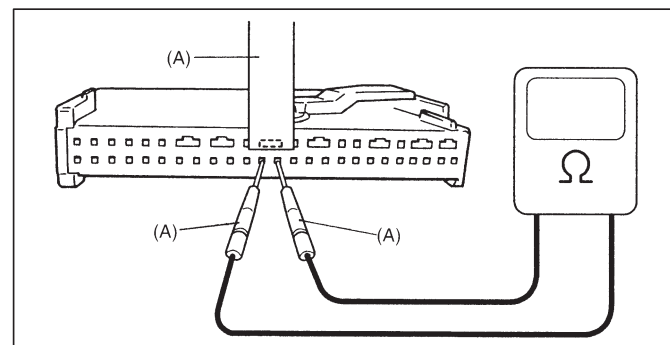


Fig. for STEP 3



Special Tool

(A): 09932-76010

(B): 09932-75010

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 16: PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in Q02 connector. 3) If OK then connect Special Tool (B) to Q02 connector in stead of passenger air bag (inflator) module. (See figure below.) With ignition switch ON, is DTC 16 current?	Go to step 3.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
3	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals Q06-23 and Q06-24. 3) Release shorting bar in SDM connector by inserting special tool (A), referring to the figure below. 4) Measure resistance between terminals Q06-23 and Q06-24 with connected Special Tool (B). (See figure below.) Is resistance 1.2 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from "Y" wire circuit to "Y/R" wire circuit or from "Y" or "Y/R" wire circuit to other wire circuit.

Fig. for STEP 2 and 3

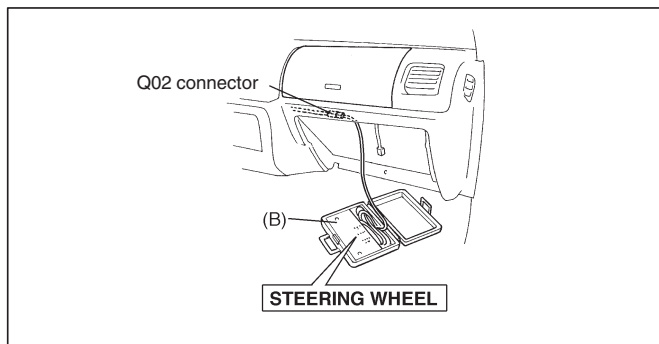
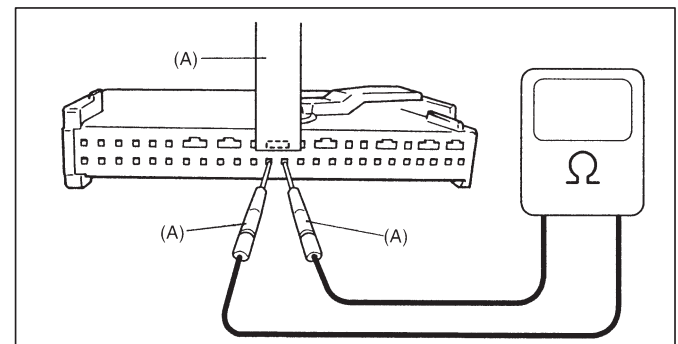


Fig. for STEP 3

**Special Tool****(A): 09932-76010****(B): 09932-75010****NOTE:**

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 18: PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in Q02 connector. 3) If OK then connect Special Tool (B) to Q02 connector instead of passenger air bag (inflator) module. (See figure below.) With ignition switch ON, is DTC 18 current?	Go to step 3.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
3	1) With ignition switch OFF, disconnect Special Tool (B) and SDM connector. 2) Check continuity between Q06-23 and Q06-31 terminals. (See figure below.) Is there continuity?	Repair short from "Y" or "Y/R" wire circuit to ground.	Substitute a known-good SDM and recheck.

Fig. for STEP 2

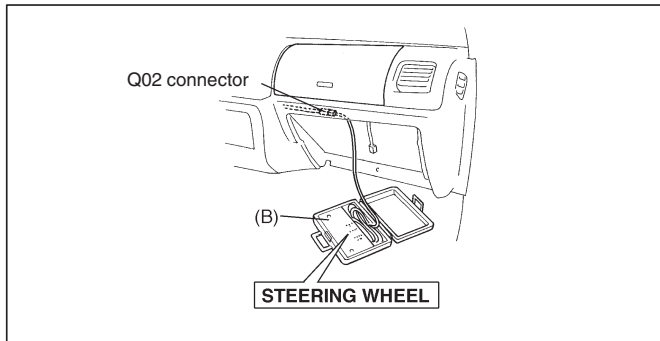
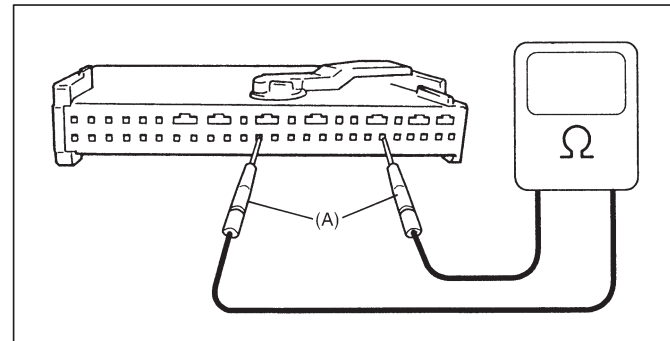


Fig. for STEP 3

**Special Tool**

(A): 09932-76010

(B): 09932-75010

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 19: PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in Q06-23 connector. 3) If OK then connect Special Tool (B) to Q06-23 connector in stead of passenger air bag (inflator) module. (See figure below.) With ignition switch ON, is DTC 19 current?	Go to step 3.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
3	1) With ignition switch OFF, disconnect Special Tool (B) and SDM connector. 2) Measure voltage from Q06-24 terminal to body ground. (See figure below.) 3) With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	Repair short from "Y" or "Y/R" wire circuit to power circuit.

Fig. for STEP 2

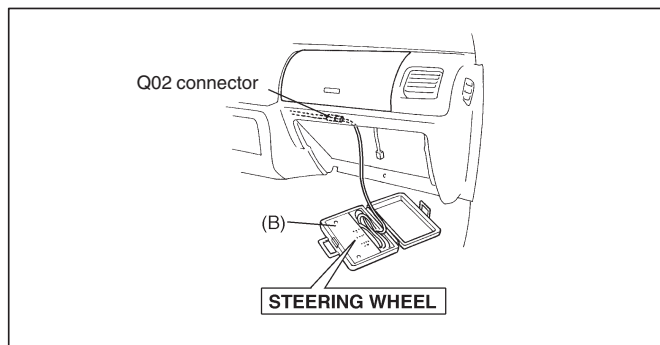
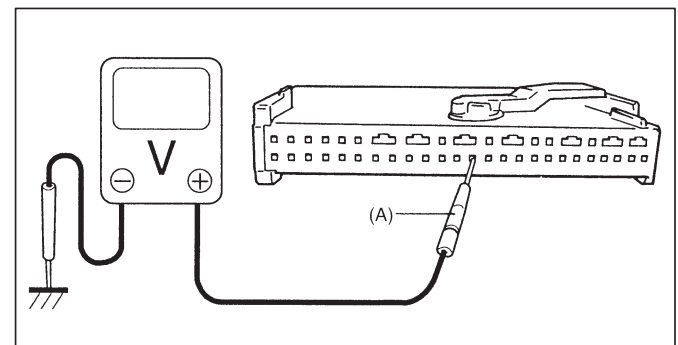


Fig. for STEP 3

**Special Tool****(A): 09932-76010****(B): 09932-75010****NOTE:**

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

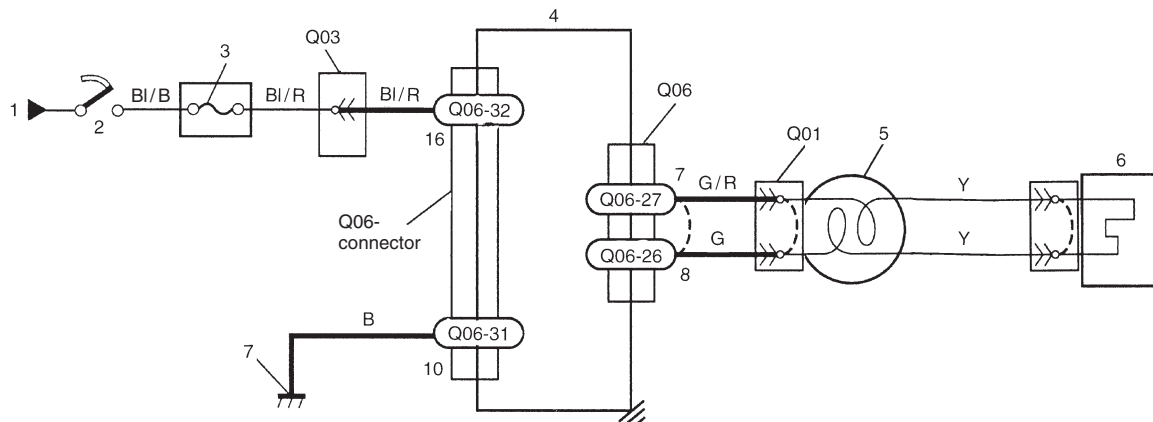
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DTC 21 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH

DTC 22 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW

DTC 24 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND

DTC 25 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT



1. From main fuse
2. Ignition switch
3. "AIR BAG" fuse in circuit fuse box
4. SDM
5. Contact coil assembly
6. Driver air bag (inflator) module
7. Ground for air bag system

----- : Shorting bar
 ————— : Air bag harness

CAUTION:

- When measurement of resistance or voltage is required in this table, use a special digital multimeter (refer to SPECIAL TOOLS in this section) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to "Intermittent and Poor Connections" in this section.
- If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN:

DTC 21: The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is above a specified value for specified time.

DTC 22: The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is below a specified value for specified time.

DTC 24: The voltage measured at driver air bag initiator circuit is below a specified value for specified time.

DTC 25: The voltage measured at driver air bag initiator circuit is above a specified value for specified time.

DIAGNOSTIC FLOW TABLE**DTC 21: DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH**

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in Q01 connector. 3) If OK then connect Special Tools to "G" terminal and "G/R" terminal of Q01 connector. (See figure below.) With ignition switch ON, is DTC 21 current?	Go to step 3.	Go to step 4.
3	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals Q06-26 and Q06-27. 3) Release shorting bar in SDM connector by inserting Special Tool (A). (See figure below.) 4) If OK then measure resistance between Q06-26 and Q06-27 terminals with connected Special Tools. Is resistance 5.1 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "G" or "G/R" wire circuit.
4	1) With ignition switch OFF, disconnect Special Tools then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C). 3) Check proper connection to driver air bag (inflator) module at terminals. 4) If OK then connect Special Tools to driver air bag (inflator) module connector. With ignition switch ON, is DTC 21 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to SECTION 3C).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to SECTION 3C).

Fig. for STEP 2 and 3

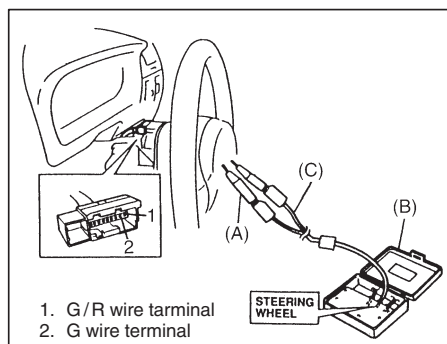


Fig. for STEP 3

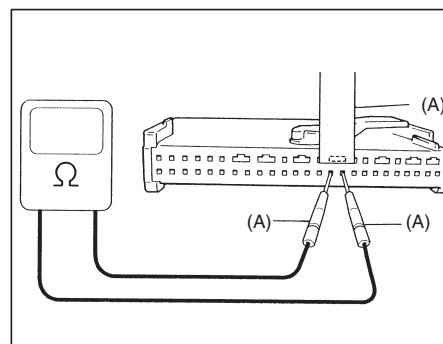
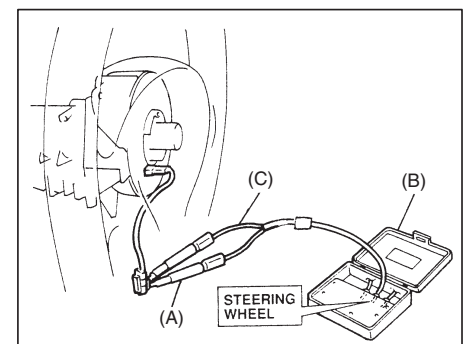


Fig. for STEP 4

**Special Tool****(A): 09932-76010****(B): 09932-75010****(C): 09932-78310****NOTE:**

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 22: DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in Q01 connector. 3) If OK then connect Special Tools to "G" terminal and "G/R" terminal of Q01 connector. (See figure below.) With ignition switch ON, is DTC 22 current?	Go to step 3.	Go to step 4.
3	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals Q06-26 and Q06-27. 3) Release shorting bar in SDM connector by inserting Special Tool (A). Refer to the figure below. 4) If OK then measure resistance between terminals Q06-26 and Q06-27 with connected Special Tools. Is resistance 1.8 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from "G" wire circuit to "G/R" wire circuit or from "G" other "G/R" wire circuit to other wire circuit.
4	1) With ignition switch OFF, disconnect Special Tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C). 3) Check proper connection to driver air bag (inflator) module at terminals. 4) If OK then connect Special Tools to driver air bag (inflator) module. (See figure below.) With ignition switch ON, is DTC 22 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to SECTION 3C).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to SECTION 3C).

Fig. for STEP 2 and 3

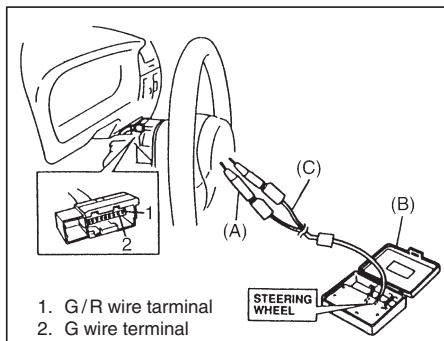


Fig. for STEP 3

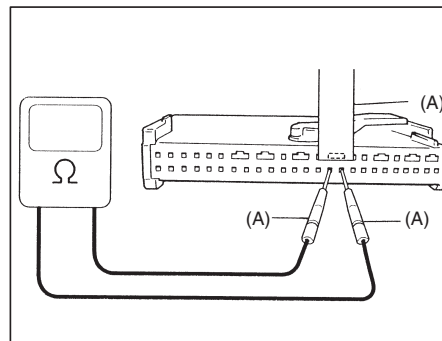
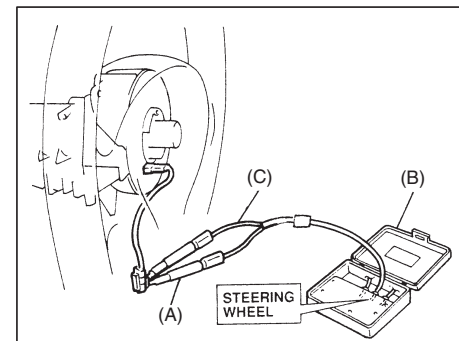


Fig. for STEP 4

**Special Tool****(A): 09932-76010****(B): 09932-75010****(C): 09932-78310****NOTE:**

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 24: DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in Q01 connector. 3) If OK then connect Special Tools to "G" terminal and "G/R" terminal of Q01 connector. (See figure below.) With ignition switch ON, is DTC 24 current?	Go to step 3.	Go to step 4.
3	1) With ignition switch OFF, disconnect Special Tools and SDM connector. 2) Check continuity between terminals Q06-26 and Q06-31. (See figure below.) Is there continuity?	Repair short from "G" or "G/R" wire circuit to ground.	Substitute a known-good SDM and recheck.
4	1) With ignition switch OFF, disconnect Special Tools then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C). 3) Check proper connection to driver air bag (inflator) module at terminals. 4) If OK then connect Special Tools to driver air bag (inflator) module connector. (See figure below.) With ignition switch ON, is DTC 24 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to SECTION 3C).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to SECTION 3C).

Fig. for STEP 2

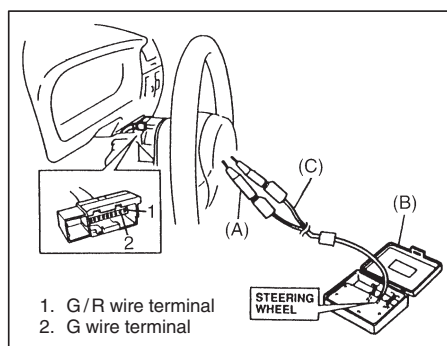


Fig. for STEP 3

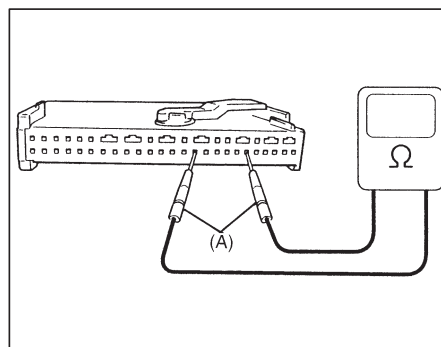
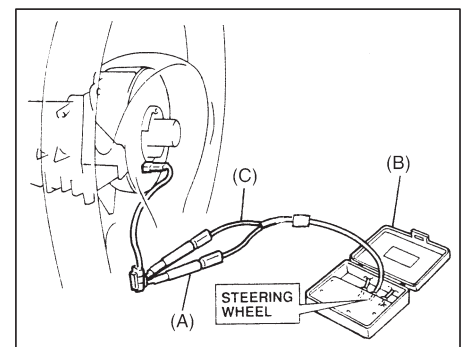


Fig. for STEP 4

**Special Tool**

(A): 09932-76010

(B): 09932-75010

(C): 09932-78310

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 25: DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in Q01 connector. 3) If OK then connect Special Tools to "G" terminal and "G/R" terminal of Q01 connector. (See figure below.) With ignition switch ON, is DTC 25 current?	Go to step 3.	Go to step 4.
3	1) With ignition switch OFF, disconnect Special Tools and SDM connector. 2) Measure voltage from Q06-27 terminal to body ground. (See figure below.) With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	Repair short from "G" or "G/R" wire circuit to power circuit.
4	1) With ignition switch OFF, disconnect Special Tools then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C). 3) Check proper connection to driver air bag (inflator) module at terminals. 4) If OK then connect Special Tools to driver air bag (inflator) module connector. (See figure below.) With ignition switch ON, is DTC 25 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to SECTION 3C).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to SECTION 3C).

Fig. for STEP 2

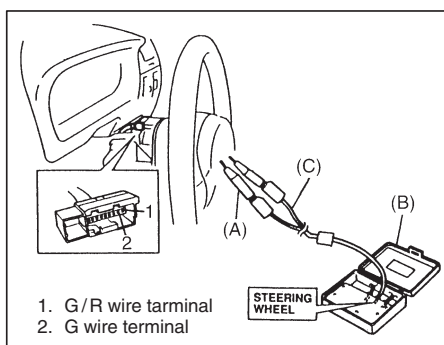


Fig. for STEP 3

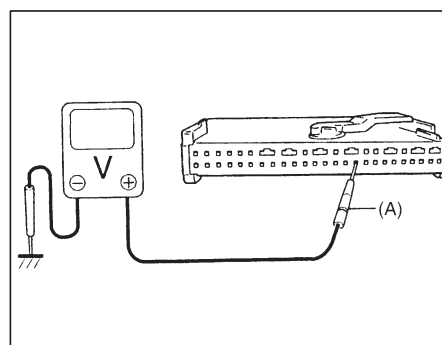
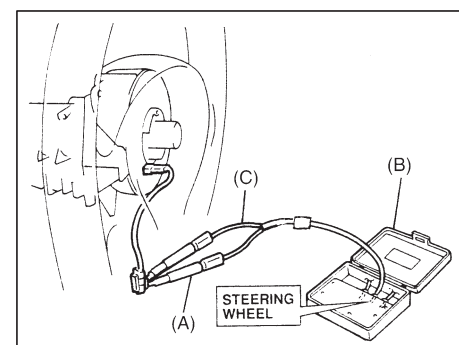


Fig. for STEP 4

**Special Tool****(A): 09932-76010****(B): 09932-75010****(C): 09932-78310****NOTE:**

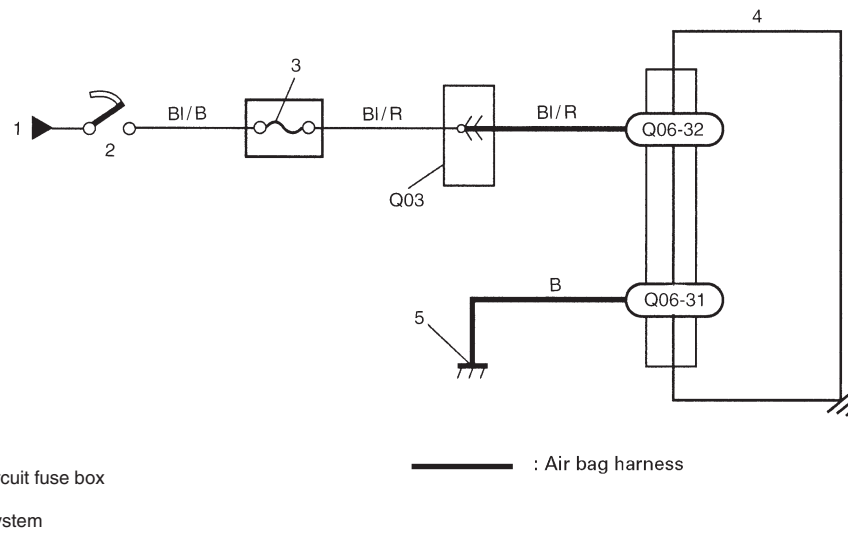
Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

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DTC 31 – POWER SOURCE VOLTAGE HIGH

DTC 32 – POWER SOURCE VOLTAGE LOW



CAUTION:

- When measurement of resistance or voltage is required in this table, use a special digital multimeter (refer to SPECIAL TOOLS in this section) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to "Intermittent and Poor Connections" in this section.
- If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN:

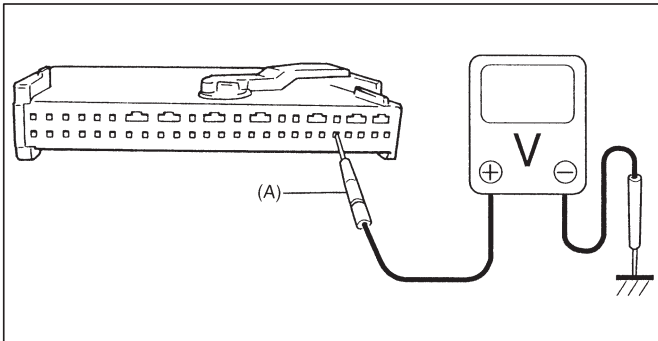
DTC 31: The power source voltage to SDM is above specified value for specified time.

DTC 32: The power source voltage is below an approx. 8 V for specified time.

DIAGNOSTIC FLOW TABLE**DTC 31: POWER SOURCE VOLTAGE HIGH**

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at Q06-32 terminal. 3) If OK then ignition switch ON, and then check voltage from Q06-32 terminal on SDM harness connector to body ground. (See figure below.) Is voltage 10 V or less?	Go to step 3.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Charging System")
3	1) With ignition switch OFF, reconnect SDM connector. With ignition switch ON, is DTC 31 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Charging System")

Fig. for STEP 2



Special Tool
(A): 09932-76010

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 32: POWER SOURCE CIRCUIT LOW

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) Measure voltage on battery. 2) Is voltage 11 V or more?	Go to step 3.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Charging System")
3	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at Q06-32 terminal. 3) If OK then ignition switch ON, and then check voltage from Q06-32 terminal on SDM connector to body ground. (See figure below.) Is voltage 8 V or more?	Go to step 5.	Go to step 4.
4	1) With ignition switch OFF, disconnect Q03 connector. 2) Check proper connection at "BI/R" wire terminal in Q03 connector. 3) If OK then ignition switch ON, and then check voltage from "BI/R" wire terminal in Q03 connector on instrument panel harness to body ground. Is voltage 8 V or more?	Repair poor connection, high resistance in "BI/R" or "BI/B" circuit of air bag harness or "AIR BAG" fuse.	Possibly faulty points are as follows. Check each of them and repair as necessary. <ul style="list-style-type: none"> • Circuit from battery to Q03 connector • Charging System (Refer to SECTION 6H "Charging System")
5	1) With ignition switch OFF, reconnect SDM connector. 2) With ignition switch ON, is DTC 32 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Charging System")

Fig. for STEP 3

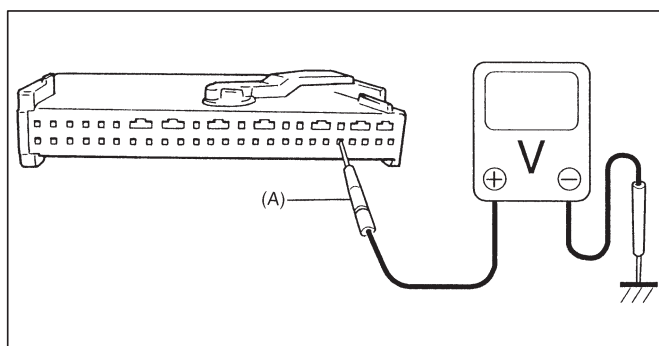
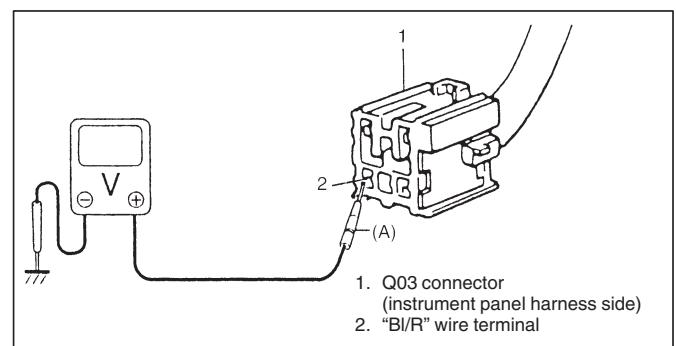


Fig. for STEP 4

**Special Tool**

(A): 09932-76010

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

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DTC 41 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH

DTC 42 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW

DTC 43 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND

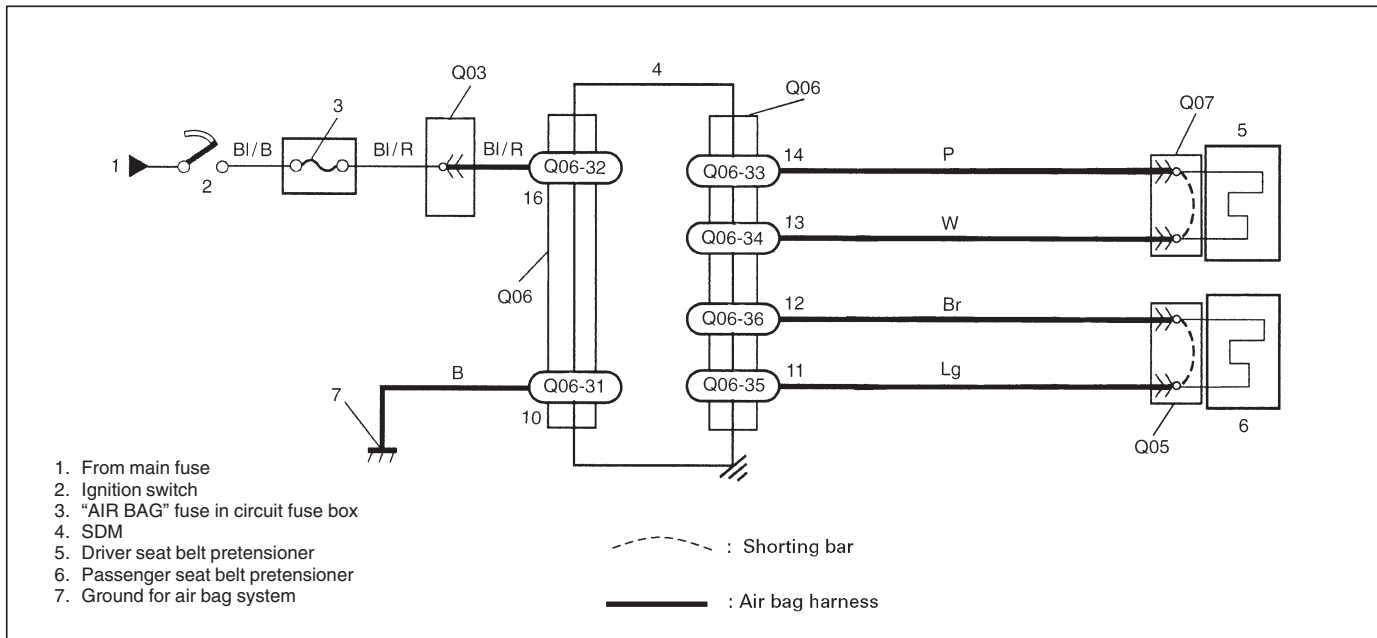
DTC 44 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT

DTC 45 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH

DTC 46 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW

DTC 47 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND

DTC 48 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT



CAUTION:

- When measurement of resistance or voltage is required in this table, use a special digital multimeter (refer to SPECIAL TOOLS in this section) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to "Intermittent and Poor Connections" in this section.
- If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN:

- DTC 41 and 45:** The resistance of driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.
- DTC 42 and 46:** The resistance of driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.
- DTC 43 and 47:** The voltage measured at driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.
- DTC 44 and 48:** The voltage measured at driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

DIAGNOSTIC FLOW TABLE**DTC 41: DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH****DTC 45: PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH**

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in Q07 or Q05 connector. 3) If OK then connect Special Tools to seat belt pretensioner connector disconnected at 1). (See figure below.) With ignition switch ON, is DTC 41 or 45 still current?	Go to step 3.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
3	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals Q06-33 and Q06-34 or Q06-35 and Q06-36. 3) If OK then measure resistance between Q06-33 and Q06-34 terminals or Q06-35 and Q06-36 terminals with Special Tools connected. (See figure below.) Is resistance 4.1 Ω or less?	Substitute a known-good SDM and recheck.	DTC41: Repair high resistance or open in "P" or "W" wire circuit. DTC45: Repair high resistance or open in "Lg" or "Br" wire circuit.

Fig. for STEP 2 and 3

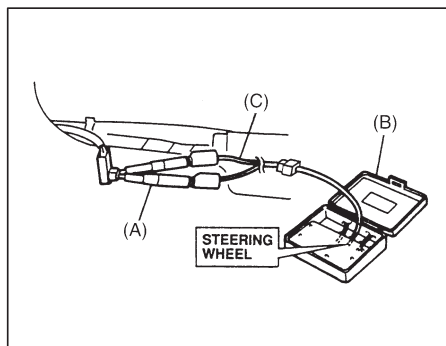
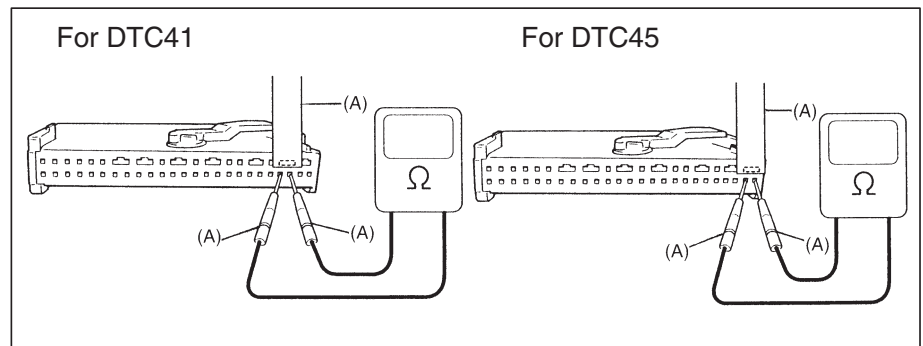


Fig. for STEP 3

**Special Tool**

(A): 09932-76010

(B): 09932-75010

(C): 09932-78310

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 42: DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW**DTC 46: PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW**

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in Q07 or Q05 connector. 3) If OK then connect Special Tools to seat belt pretensioner connector disconnected at 1). (See figure below.) 4) With ignition switch ON, is DTC 42 or 46 still current?	Go to step 3.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
3	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals Q06-33 and Q06-34 or Q06-35 and Q06-36. 3) If OK then measure resistance between Q06-33 and Q06-34 terminals or Q06-35 and Q06-36 terminals with connected Special Tools. 4) Is resistance 1.3 Ω or more?	Substitute a known-good SDM and recheck.	DTC42: Repair short from "P" wire circuit to "W" wire circuit or from "P" or "W" wire circuit to other wire circuit. DTC46: Repair short from "Lg" wire circuit to "Br" wire circuit or from "Lg" or "Br" wire circuit to other wire circuit.

Fig. for STEP 2 and 3

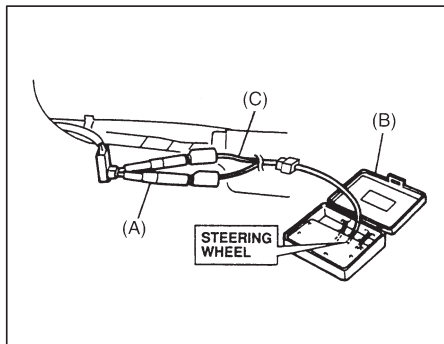
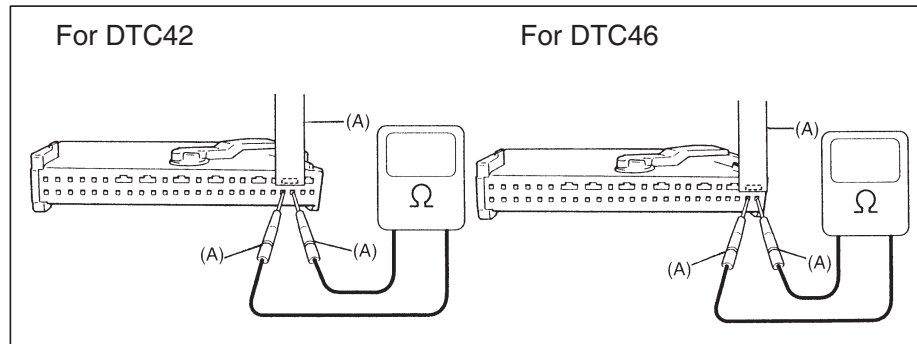


Fig. for STEP 3

**Special Tool**

(A): 09932-76010

(B): 09932-75010

(C): 09932-78310

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

DTC 43: DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND**DTC 47: PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND**

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in Q07 or Q05 connector. 3) If OK then connect Special Tools to seat belt pretensioner connector disconnected at 1). (See figure below.) With ignition switch ON, is DTC 43 or 47 still current?	Go to step 3.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
3	1) With ignition switch OFF, disconnect Special Tools and SDM connector. 2) Check continuity between Q06-33 or Q06-35 and Q06-31 terminals. Is there continuity?	DTC43: Repair short "P" or "W" wire circuit to ground. DTC47: Repair short from "Lg" or "Br" wire circuit to ground.	Substitute a known-good SDM and recheck.

Fig. for STEP 2 and 3

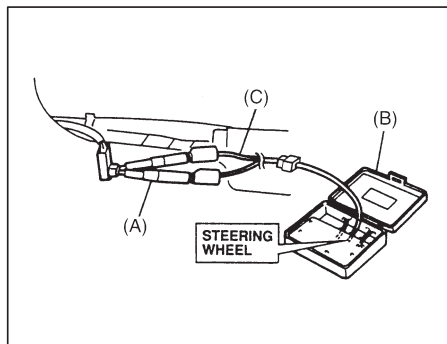
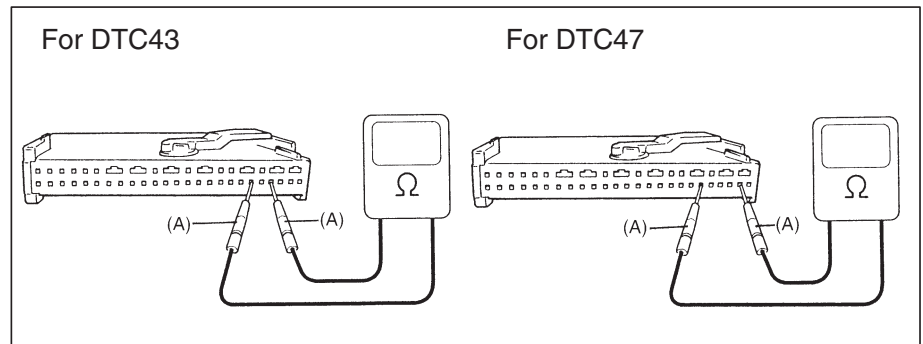


Fig. for STEP 3

**Special Tool**

(A): 09932-76010

(B): 09932-75010

(C): 09932-78310

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

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DTC 44: DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT

DTC 48: PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT

STEP	ACTION	YES	NO
1	Was item "AIR BAG SYSTEM CHECK FLOW TABLE" described in this section performed?	Go to step 2.	Perform "AIR BAG SYSTEM CHECK FLOW TABLE" in this section.
2	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in Q07 or Q05 connector. 3) If OK then connect Special Tools to seat belt pretensioner connector disconnected at 1). (See figure below.) With ignition switch ON, is DTC 44 or 48 still current?	Go to step 3.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
3	1) With ignition switch OFF, disconnect Special Tools and SDM. 2) Measure voltage from Q06-34 or Q06-36 terminal to body ground. With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	DTC44: Repair short "P" or "W" wire circuit to power circuit. DTC48: Repair short from "Lg" or "Br" wire circuit to power circuit.

Fig. for STEP 2 and 3

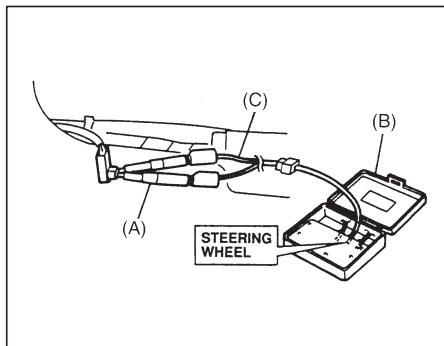
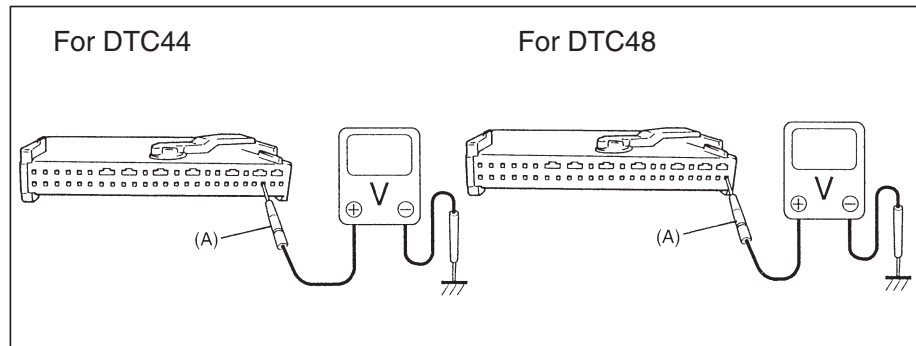


Fig. for STEP 3



Special Tool

(A): 09932-76010

(B): 09932-75010

(C): 09932-78310

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Clear diagnostic trouble codes (Refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
- 3) Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

CODE 51 – FRONTAL CRASH DETECTED (SYSTEM ACTIVATION COMMAND OUTPUTTED)**DTC WILL SET WHEN:**

The SDM detects a frontal crash of sufficient force to warrant activation of the air bag system. (SDM outputs a deployment/activation command.)

DIAGNOSTIC FLOW TABLE**NOTE:**

Before executing items in this table, be sure to perform “Air Bag Diagnostic System Check”.

STEP	ACTION	YES	NO
1	1) Ignition switch OFF. Has air bag system deployed?	Replace components and perform inspections as directed in “Repairs and Inspections Required After an Accident” in this section.	Go to step 2.
2	1) Inspect front of vehicle and undercarriage for signs of impact. Are there signs of impact?	Replace components and perform inspections as directed in “Repairs and Inspections Required After an Accident” in this section.	Replace SDM.

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat “Air Bag Diagnostic System Check” in this section to confirm that the trouble has been corrected.

DTC61 – AIR BAG WARNING LAMP CIRCUIT FAILURE**CAUTION:**

- When measurement of resistance or voltage is required in this table, use a special digital multimeter (refer to SPECIAL TOOLS in this section) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to “Intermittent and Poor Connections” in this section.
- If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN

The voltage at the air bag warning lamp circuit terminal (Q06-30) does not watch the commanded state of the warning lamp driver for specified time.

STEP	ACTION	YES	NO
1	1) This DTC is set when there is a trouble in air bag warning lamp circuit. Failure to properly perform “Air Bag Diagnostic System Check Flow Table” may also result in misdiagnosis. Therefore, check air bag warning lamp circuit again according to “Air Bag Diagnostic System Check Flow Table”. 2) Is “Air Bag” warning lamp circuit in good condition?	Go to step 2.	Repair “AIR BAG” warning lamp circuit.
2	1) Clear diagnostic trouble codes. 2) Is DTC 61 set?	Substitute a known-good SDM and recheck.	Recheck air bag system, referring to “Air Bag Diagnostic System Check Flow Table”.

NOTE:

Upon completion of inspection and repair work, perform following items.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat “Air Bag Diagnostic System Check Flow Table”, referring to p. 10B-11 to confirm that the trouble has been corrected.

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CODE 71 – INTERNAL SDM FAULT

DTC WILL SET WHEN:

An internal SDM fault is detected by SDM.

NOTE:

Before executing items below, be sure to perform “Air Bag Diagnostic System Check”.

NOTE:

CODE 71 can never be cleared once it has been set.

- 1) Ignition switch OFF.
- 2) Replace SDM.
- 3) Repeat “Air Bag Diagnostic System Check” in this section.

REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT

CAUTION:

- All air bag system components, including the electrical harness (component mounting points), must be inspected after an accident. If any components are damaged or bent, they must be replaced even if air bag system activation did not occur.
- Never use air bag system parts from another vehicle.
- Do not attempt to service the parts below. Service of these parts is by replacement only.
 - Driver/Passenger air bag (inflator) module, Driver/Passenger seat belt pretensioner (if equipped)
 - SDM
 - Contact coil
 - Air bag wire harness
- Proper operation of the sensors and air bag system requires that any repairs to the vehicle structure return it to its original production configuration.

CAUTION:

After detecting one time of such collision as to meet deployment conditions, the SDM must not be used. Refer to “Air Bag Diagnostic System Check” when checking the SDM.

ACCIDENT WITH DEPLOYMENT/ACTIVATION – COMPONENT REPLACEMENT

The following components must be replaced.

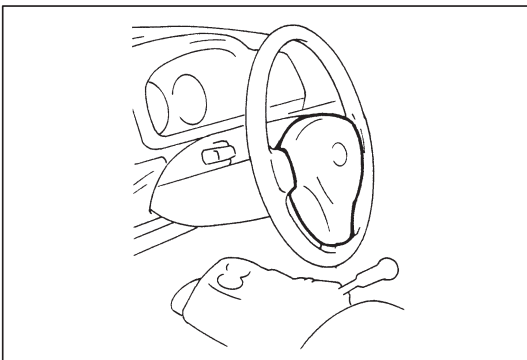
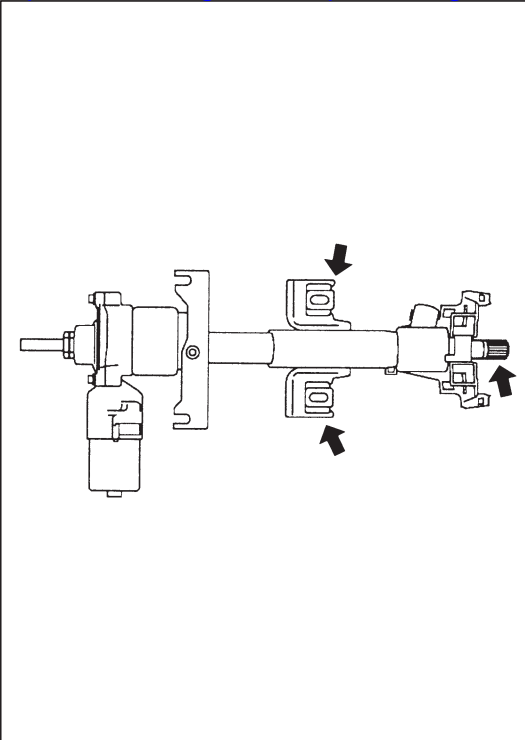
- Driver and passenger (if equipped) air bag (inflator) modules
- Driver and passenger seat belt pretensioners
- SDM

ACCIDENT WITH OR WITHOUT DEPLOYMENT/ ACTIVATION – COMPONENT INSPECTIONS

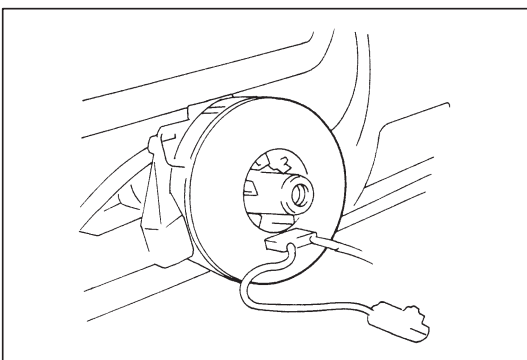
Certain air bag and restraint system components must be inspected after any crash, whether the air bag deployed or not.

Those components are:

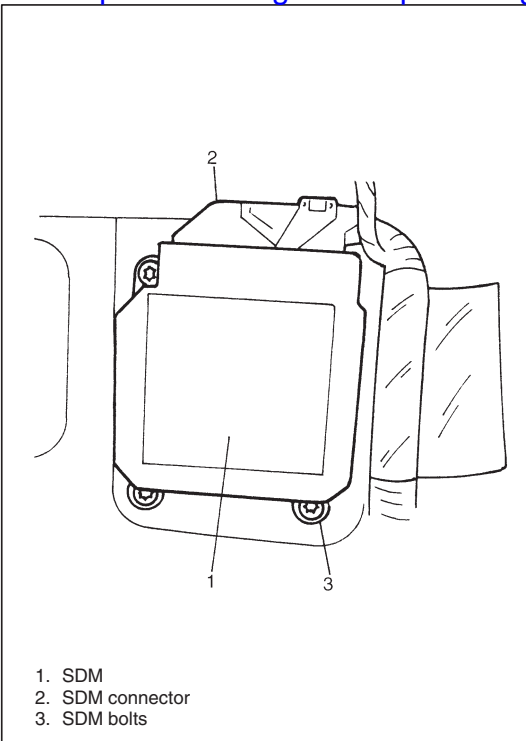
- Steering column and shaft joints
 - Check for length, damage and bend according to “Checking Steering Column for Accident Damage” in SECTION 3C1.
 - If any faulty condition is found in above checks, replace faulty part.
- Steering column bracket and capsules
 - Check for damage and bent.
 - If any faulty condition is found in above checks, replace faulty part.



- Steering wheel and driver air bag (inflator) module
 - Check for damage or air bag (inflator) module fitness.
 - Check trim cover (pad surface) for cracks.
 - Check wire harness and connector for damage or tightness.
 - If any faulty condition is found in above checks, replace faulty part.



- Contact coil and combination switch assembly
 - Check wire harness and connectors for damage or tightness.
 - Check contact coil case for damage.
 - If any faulty condition is found in above checks, replace.



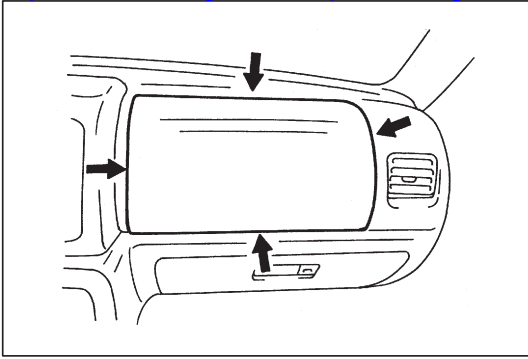
- SDM

- Check for external damage such as deformation, scratch, crack, peeled paint, etc.
- Check that SDM cannot be installed properly due to a cause in itself.
- Check that connector or lead wire of SDM has a scorching, melting or damage.
- Check that connector is connected securely or locked.
- Check SDM connector and terminals for tightness.
- Check SDM sets a diagnostic trouble code (Refer to “DTC Check” in this section) and the diagnostic table leads to a malfunctioning SDM.

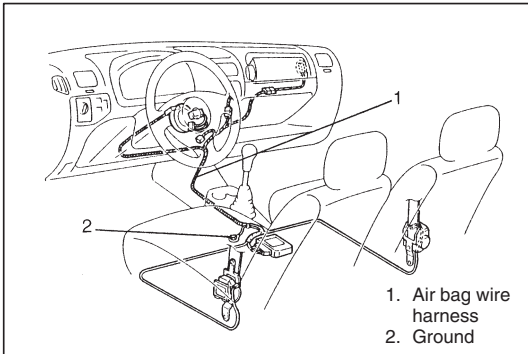
If any faulty condition is found in above checks, replace.

- Instrument panel member and reinforcement

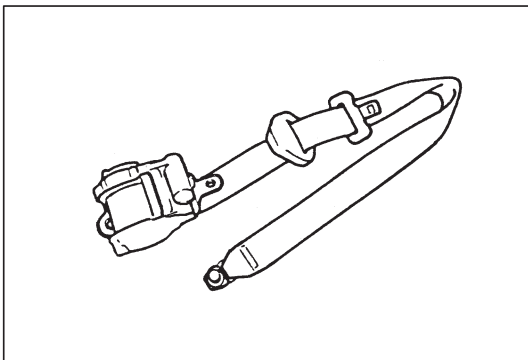
- Check for any distortion, bending, cracking or other damage.
- If any faulty condition is found in above checks, replace.



- Passenger air bag (inflator) module (if equipped)
 - Check for dents, cracks, damage or fitness.
 - Check trim cover for cracks or deformities.
 - Check harness and connector for damage or tightness.
- If any faulty condition is found in above checks, replace.



- Air bag wire harness and connections
 - Check for damages, deformities or poor connections.
(Refer to “Intermittents and Poor Connections” in this section.)
 - Check wire harness clamps for tightness.
- If any faulty condition is found, correct or replace.



- Seat belt pretensioner
 - Check for dents, cracks, damage or fitness
 - Check harness and connector for damage or tightness.
- If any faulty condition is found in above checks, replace.

- Seat belts and mounting points
 - Refer to “Seat Belt” in SECTION 10A.
- Air bag warning lamp (air bag system)
 - After vehicle is completely repaired, perform “Air Bag Diagnostic System Check” under “Diagnosis” in this section.

ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

SERVICE AND DIAGNOSIS

WARNING/CAUTION labels are attached on each part of air bag system components (SDM, air bag (inflator) modules and seat belt pretensioners). Be sure to follow the instructions.

WARNING:

- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, dashboard or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.
- Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system repairs.

- Many of service procedures require disconnection of "AIR BAG" fuse and air bag (inflator) modules (driver and passenger) from initiator circuit to avoid an accidental deployment.
- Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.
- The "Air Bag Diagnostic System Check" must be the starting point of any air bag diagnostics. The "Air Bag Diagnostic System Check" will verify proper "AIR BAG" warning lamp operation and will lead you to the correct chart to diagnose any air bag malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacements.
- Never use air bag component parts from another vehicle.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended system activation.
- When servicing, if shocks may be applied (e.g., SDM and air bag (inflator) module (driver & passenger) is dropped from a height of 90 cm (3 ft) or more, seat belt pretensioner is (driver & passenger) from height of 30 cm (1 ft) or more.) to air bag system component parts, remove those parts beforehand.
- When using electric welding, be sure to disconnect air bag (inflator) module and seat belt pretensioner connectors (driver and passenger) respectively.
- When applying paint around the air bag system related parts, use care so that the harness or connector will not be exposed to the paint mist.
- Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.

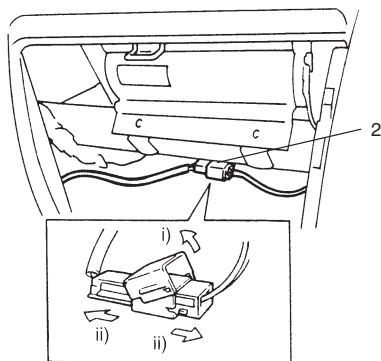
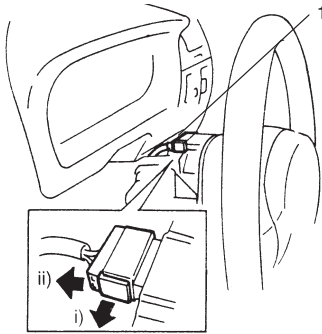
WARNING:

When performing service on or around air bag system components or air bag wiring, follow the procedures listed in the following pages to temporarily disable the air bag system.

Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system repairs.

DISABLING AIR BAG SYSTEM

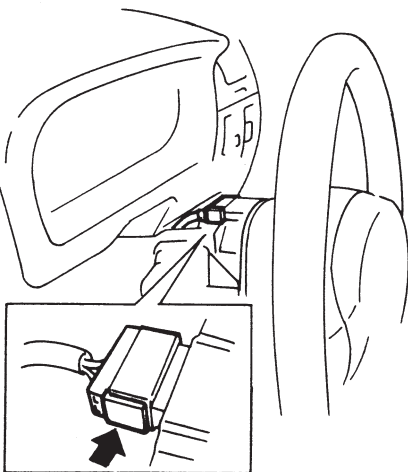
- 1) Turn steering wheel so that vehicle's wheels (front tires) and pointing straight ahead.
- 2) Turn ignition switch to "LOCK" position and remove key.
- 3) Remove "AIR BAG" fuse from circuit fuse box. Refer to "System Components and Wiring Location View and Connectors" in this section for location of circuit fuse box.
- 4) Remove steering column upper and lower covers.
- 5) Disconnect connector (1) from contact coil assembly.
- 6) If equipped with passenger air bag (inflator) module, remove glove box and disconnect Yellow connector (2) of passenger air bag (inflator) module.



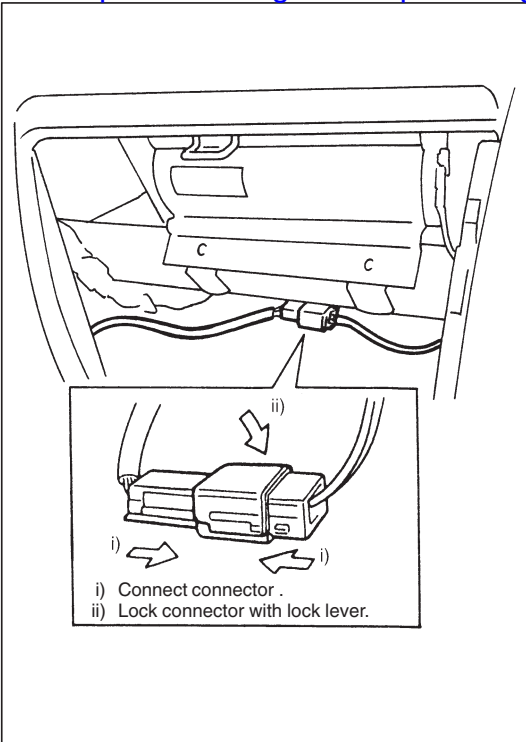
- i) Release locking of lock lever.
ii) After unlocked, disconnect to connector.

ENABLING AIR BAG SYSTEM

- 1) Turn ignition switch to steering locking position and remove key.
- 2) Connect Yellow harness connector to contact coil assembly and install steering column upper cover.



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- 3) Connect Yellow connector of passenger air bag (inflator) module (if equipped), and be sure to lock connector with lock lever and close glove box panel.
- 4) Install "AIR BAG" fuse to circuit fuse box.
- 5) Turn ignition switch to "ON" and verify that air bag warning lamp flashes 6 times and then turns off.
If it does not operate as described, perform "Air Bag Diagnostic System Check" in this section.

HANDLING AND STORAGE

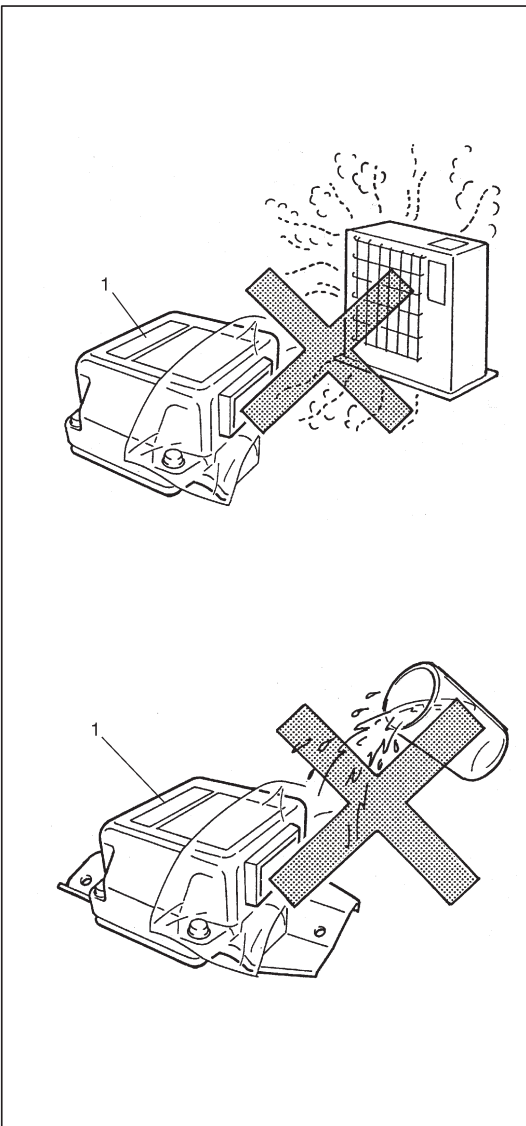
SDM

WARNING:

Never power up air bag system when SDM is not rigidly attached to the vehicle. Otherwise, personal injury may result.

CAUTION:

After detecting one time of such collision as to meet deployment conditions, the SDM must not be used.
Refer to "Diagnosis" when checking the SDM.

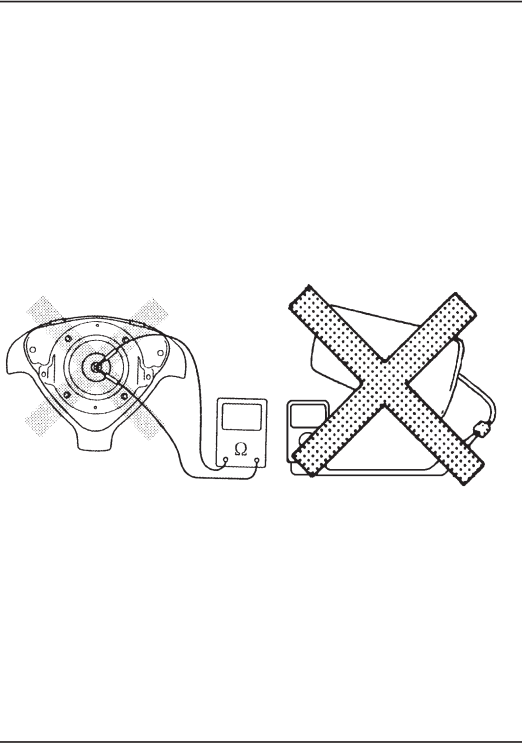


- Never attempt disassembly of SDM.
- When storing SDM (1), select a place where neither high temperature nor high humidity is anticipated and oil, water and dust are kept off.
- If SDM was dropped from a height of 90 cm (3 ft) or more or if it is found to be damaged or deformed, replace it with a new one.
- If installation part of SDM was damaged, repair that part completely before reinstallation.
- All SDM fasteners must be carefully torqued to ensure proper operation of the air bag system.

LIVE (UNDEPLOYED) AIR BAG (INFLATOR) MODULES

Special care is necessary when handling and storing a live (undeployed) air bag (inflator) modules.

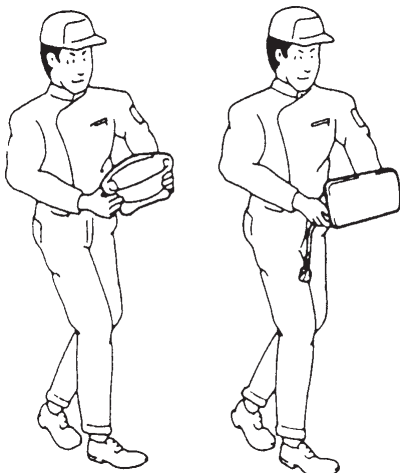
The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.

**WARNING:**

Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag.

- Never attempt disassembly of the air bag (inflator) modules.
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (undeployed) air bag (inflator) module, be sure to deploy it before discarding it.
- When grease, cleaning agent, oil, water, etc., got on the air bag (inflator) modules (driver and passenger), wipe it off immediately with a dry cloth.
- If air bag (inflator) module was dropped from a height of 90 cm (3 ft) or more, it should be replaced with a new one as an assembly.

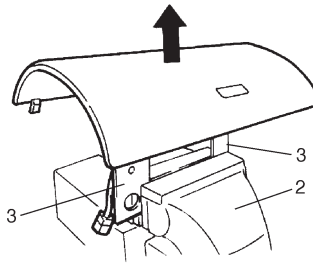
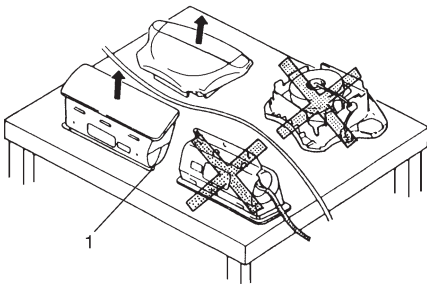
ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.

**WARNING:**

- **For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.**
- **When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module.**

Otherwise, personal injury may result.

ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

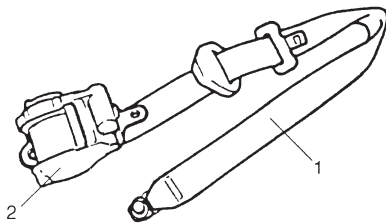
WARNING:

When placing a live air bag (inflator) module on bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket.

It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) modules.

This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

Otherwise, personal injury may result.



1. Webbing
2. Retractor assembly

LIVE (INACTIVATED) SEAT BELT PRETENSIONERS

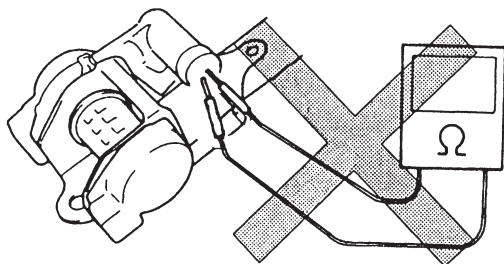
Special care is necessary when handling and storing a live (inactivated) seat belt pretensioners.

Also, when the seat belt pretensioners activate, gas is generated and the seat belt is retracted into the retractor quickly.

Note, therefore, that if they activate accidentally, the seat belt pretensioners and other object(s) around them may be thrown through the air.

WARNING:

Never attempt to measure the resistance of the seat belt pretensioners. It is very dangerous as the electric current from the tester may activate pretensioner.



- Never attempt to disassemble the seat belt pretensioners (retractor assembly).
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (inactivated) seat belt pretensioner, be sure to activate it before discarding it.
- When grease, cleaning agent oil, water, etc., got on the seat belt pretensioners (retractor assembly), wipe it off immediately with a dry cloth.
- If seat belt pretensioner was dropped from a height of 30 cm (1 ft) or more, it should be replaced with a new one as an assembly.

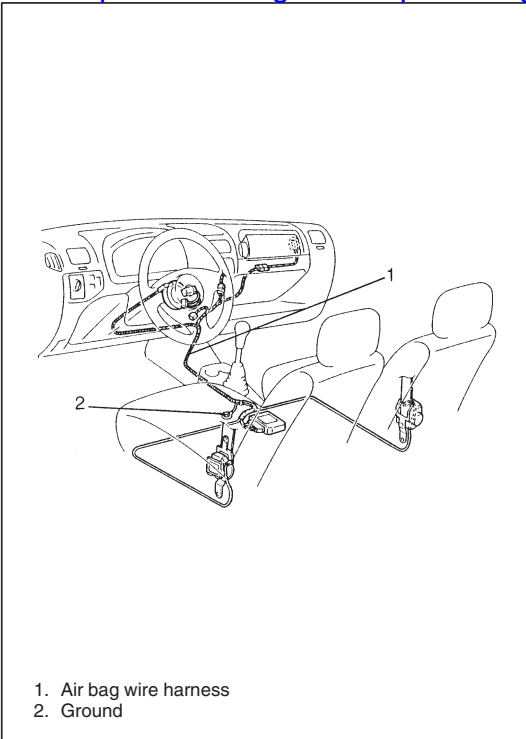
WARNING:

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner. Otherwise, personal injury may result.

DEPLOYED AIR BAG (INFLATOR) MODULES AND ACTIVATED SEAT BELT PRETENSIONERS**WARNING:**

- The air bag (inflator) module and seat belt pretensioner immediately after deployment/activation is very hot. Wait for at least 10 minutes to cool it off before proceeding the work.
- Do not apply water, oil, etc. to deployed air bag (inflator) module and to activate seat belt pretensioner.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.
- Wash your hands with mild soap and water after completing the work.

Refer to the procedure described under “Deployed Air Bag (Inflator) Module and Activated Seat Belt Pretensioner Disposal” in this section.



AIR BAG WIRE HARNESS AND CONNECTORS

Air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
- When installing it, be careful so that the air bag wire harness is not caught or does not interfere with other parts.
- Make sure all air bag system grounding points are clean and grounds are securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

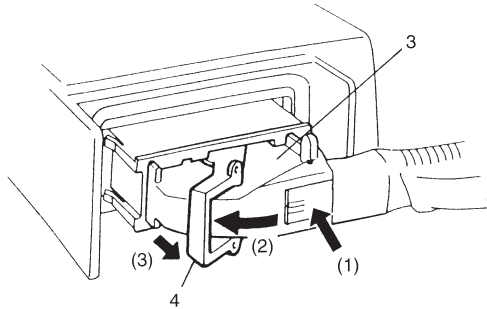
DISPOSAL

Do not dispose of the live (undeployed) air bag (inflator) modules and the live (inactivated) seat belt pretensioners. When disposal is necessary, be sure to deploy/activate the air bag and seat belt pretensioner according to deployment/activation procedure described under "Air Bag (Inflator) Module and Seat Belt Pretensioner Disposal".

WARNING:

Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which could cause personal injury. Undeployed air bag (inflator) module and inactivated seat belt pretensioner must not be disposed of through normal refuse channels.

The undeployed air bag (inflator) module and inactivated seat belt pretensioner contain substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

SDM

- (1), (2): Release locking of lock lever
(3): After unlocked disconnect connector

WARNING:

During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).

Be sure to read "Service Precautions" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or inactivation of the air bag system when necessary.

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" earlier in this section.
- 3) Remove rear console box by removing screws.
- 4) Disconnect SDM connector from SDM.

CAUTION:

As this connector has a connector lock lever, refer to the left figure for its removal procedure.

- 5) Remove SDM from vehicle.

INSPECTION**CAUTION:**

- Do not connect a tester whatever type it may be.
- Never repair or disassemble SDM.
- If SDM was dropped from a height of 90 cm (3 ft) or more, it should be replaced.

- Check SDM for dents, cracks or deformation.
 - Check SDM connector for damage, cracks or lock mechanism.
 - Check SDM terminal for bent, corrosion or rust.
- If any faulty condition is found in above checks, replace.

INSTALLATION

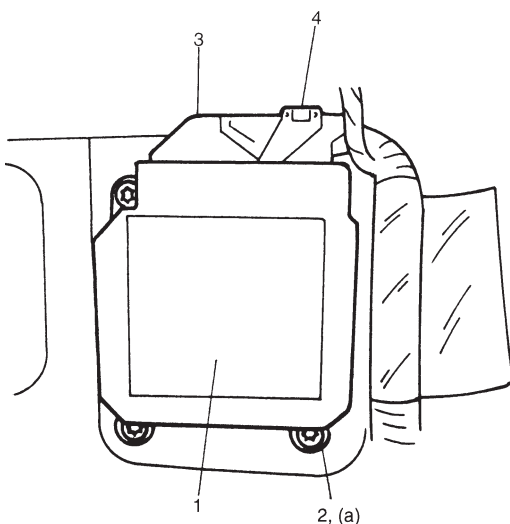
For installation, reverse removal procedure, noting the following points.

- Ensure that arrow on the SDM is pointing toward the front of the vehicle.
- Tighten SDM bolts to specified torque.

Tightening Torque

(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)

- Connect SDM connector to SDM securely.
- Enable air bag system. Refer to "Enabling Air Bag System" earlier in this section.

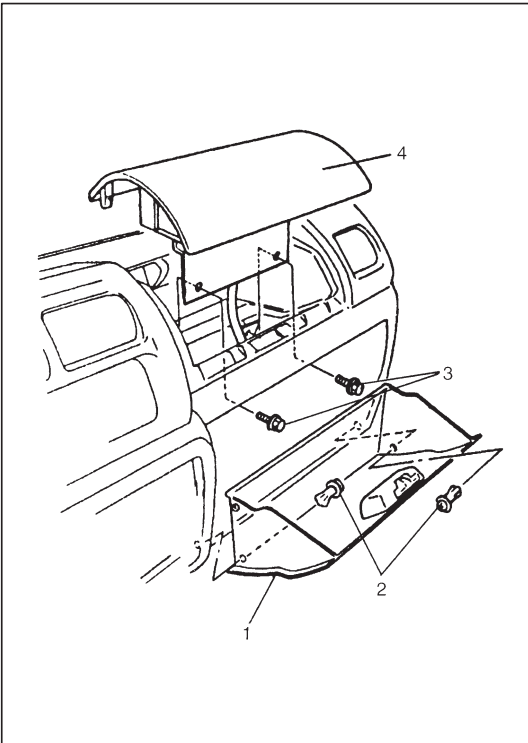


1. SDM
2. SDM bolts
3. SDM connector
4. Lock lever

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PASSENGER AIR BAG (INFLATOR) MODULE (IF EQUIPPED)

WARNING:

- Never attempt to disassemble or repair the passenger air bag (inflator) module. If any abnormality is found, be sure to replace it with new one as an assembly.
- Be sure to read “Precautions” in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.

**REMOVAL**

- 1) Disconnect negative battery cable from battery.
- 2) Open glove box (1) and remove clips (2).
- 3) Remove glove box (1).

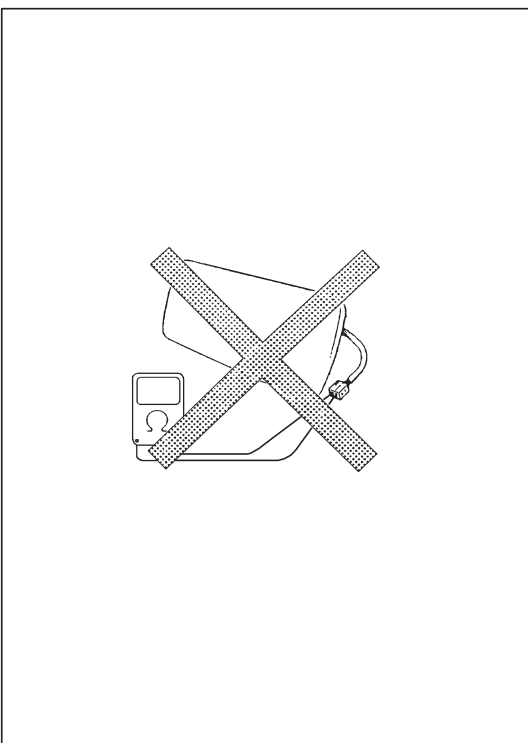
NOTE:

When it is difficult to pull out glove box, pull out it while pressing its stopper.

- 4) Disable air bag system. Refer to “Disabling Air Bag System” earlier in this section.
- 5) Remove passenger air bag (inflator) module attaching bolts (3) and passenger air bag (inflator) module (4) from vehicle.

WARNING:

Observe “Service Precautions” earlier in this section for handling and storing it.

**INSPECTION****WARNING:**

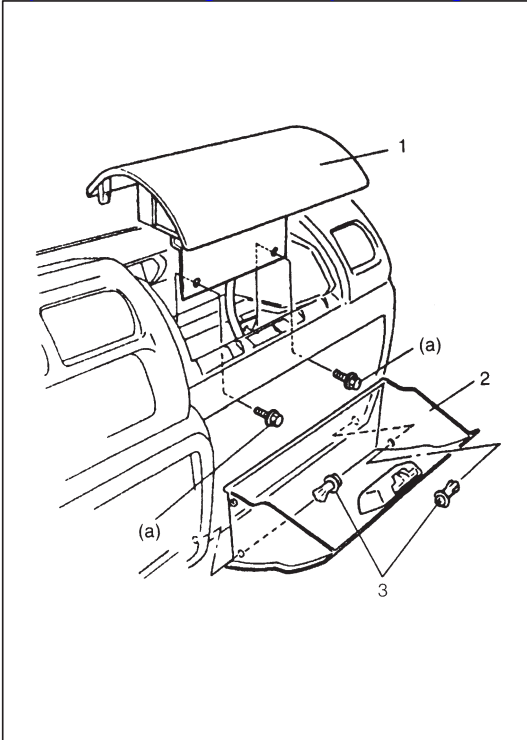
Never measure resistance of passenger air bag (inflator) module or disassemble it. Otherwise personal injury may result.

CAUTION:

If air bag (Inflator) module was dropped from a height or 90 cm (3 ft) or more, it should be replaced.

Check air bag (inflator) module appearance visually for following symptoms and if any one of them is applicable, replace with a new one.

- Air bag has deployed.
- There is a crack in trim cover (pad surface).
- Wire harness or connector is damaged.
- Air bag (inflator) module is damaged or a strong impact (e.g., dropping) was applied to it.

**INSTALLATION**

- 1) Install passenger air bag (inflator) module (1) to vehicle.
- 2) Tighten passenger air bag (inflator) module attaching bolts to specified torque.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 16.5 lb-ft)

- 3) Set glove box (2) to original position of instrument panel and open it, install glove box clips (3).
- 4) Connect negative battery cable to battery.
- 5) Enable air bag system. Refer to "Enabling Air Bag System" earlier in this section.

DRIVER AIR BAG (INFLATOR) MODULE

Refer to SECTION 3C for removal, inspection and installation.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

Refer to SECTION 3C for removal, inspection and installation.

SEAT BELT PRETENSIONER

Refer to SECTION 10A for removal, inspection and installation.

AIR BAG WARNING LAMP

Refer to SECTION 8C for removal and installation.

AIR BAG (INFLATOR) MODULE AND SEAT BELT PRETENSIONER DISPOSAL

WARNING:

Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which may cause personal injury.

Undeployed air bag (inflator) module/Inactivated seat belt pretensioner must not be disposed of through normal refuse channels.

The undeployed air bag (inflator) module and inactivated seat belt pretensioner contain substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

Do not dispose of the live (undeployed) air bag (inflator) modules and seat belt pretensioners.

The method employed depends upon the final disposition of the particular vehicle, as noted in "Deployment/Activation Outside Vehicle" and "Deployment/Activation Inside Vehicle" in this section.

Deployment/Activation Outside Vehicle Follow this procedure when disposing of the air bag (inflator) module(s) and seat belt pretensioner(s) only (i.e., the vehicle itself will be used again).

Deployment/Activation Inside Vehicle Follow this procedure when scrapping the entire vehicle including the air bag (inflator) modules and seat belt pretensioners.

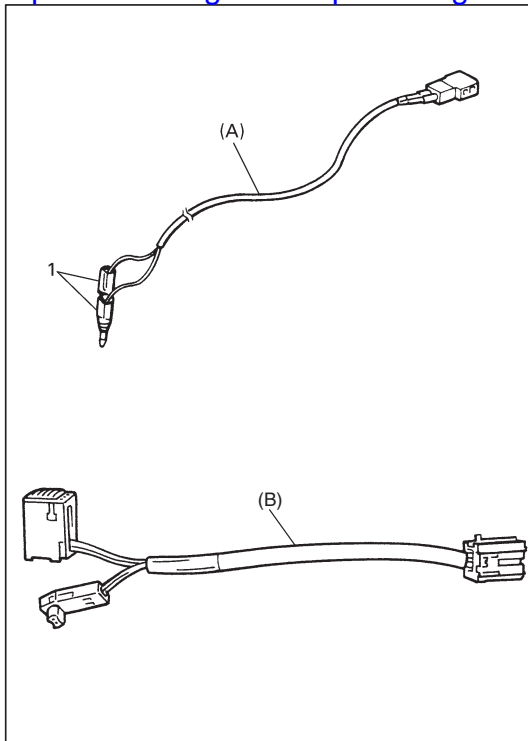
WARNING:

Following precautions must be observed for this work. Failure to observe any of them may result in personal injury.

- To avoid an accidental deployment, this work should be performed by no more than one person.
- The procedure should be followed strictly as described here.
- Be sure to read "Service Precautions" in this section beforehand.
- Never connect deployment harness to any power source before connecting deployment harness to the air bag (inflator) module and seat belt pretensioner. Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed and the pretensioner is to be activated.
- Since the smoke is produced when air bag is deployed and pretensioner is activated, select a well-ventilated area.
- The air bag (inflator) module and seat belt pretensioner will immediately deploy/activate when a power source is connected to it. Wear safety glasses throughout this entire deployment/activation and disposal procedure.
- Wear suitable ear protection when deploying air bag/activating pretensioner. Also, advise those who are in the area close to deployment/activation site to wear suitable ear protection.
- Do not deploy/activate two or more air bag system components (air bag (inflator) modules and seat belt pretensioners) at the same time.

DEPLOYMENT/ACTIVATION OUTSIDE VEHICLE

Use this procedure when the vehicle itself is used again (only the air bag (inflator) module(s) and seat belt pretensioner(s) are disposed of).



- 1) Turn ignition switch to "LOCK", remove key and put on safety glasses.
- 2) Check that there is no open, short or damage in special tools (deployment harness and adaptor cable). If any faulty is found, do not use it and be sure to use new deployment harness and/or adaptor cable.

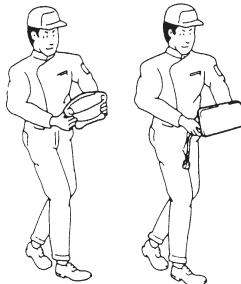
Special Tool**(A): 09932-75030****(B): 09932-78320**

- 3) Short the two deployment harness leads (1) together by fully seating one banana plug into the other.

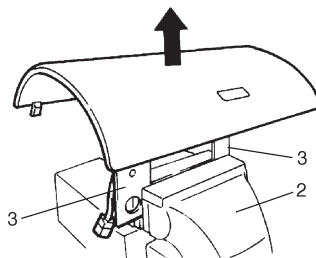
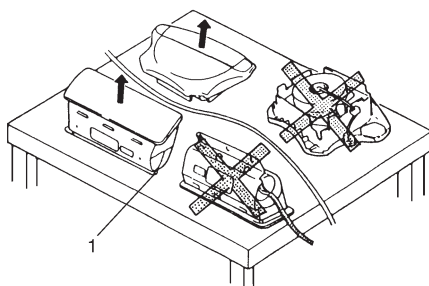
WARNING:

Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed and seat belt pretensioner is to be activated.

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

- 4) Remove air bag (inflator) module(s) and seat belt pretensioner(s) from vehicle, referring to SECTION 3C, 10A or this section.

WARNING:

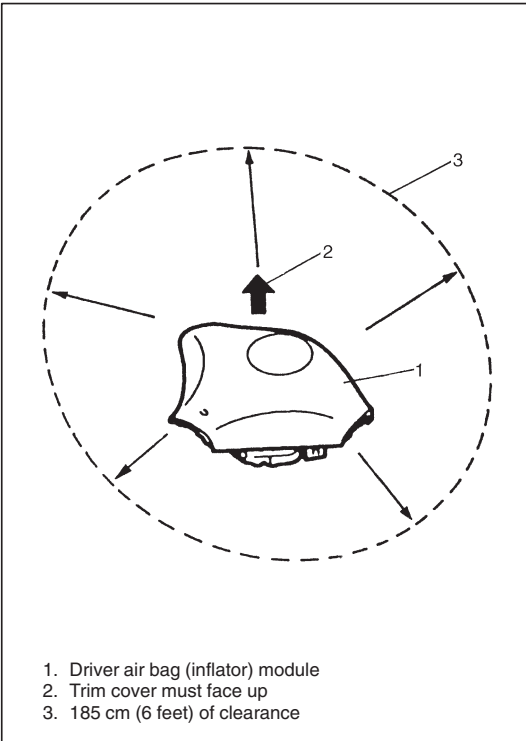
- Always carry live air bag (inflator) module with trim cover away from you.
- When storing a live air bag (inflator) module or when leaving a live air bag (inflator) module unattended on a bench or other surface, always face the bag and trim cover up and away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket.

This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

Failure to follow procedures may result in personal injury.

WARNING:

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
 - When placing a live seat belt pretensioner on the workbench or other surface, be sure not to put a seat belt pretensioner on top of another.
- Otherwise, personal injury may result.

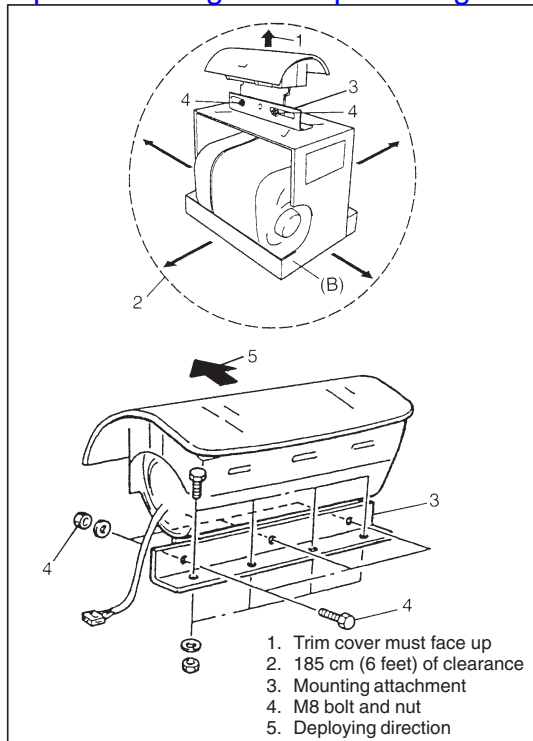


5) [In case of Driver Air Bag (Inflator) Module]

- Clear a space on the ground about 185 cm (6 feet) in diameter where the driver air bag (inflator) module is to be deployed. A paved, outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended. Ensure no loose or flammable objects are within the deployment area.
- Place the driver air bag (inflator) module, with its vinyl trim cover facing up, on the ground in the space just cleared.

[In case of Passenger Air Bag (Inflator) Module]

- Clear a space on the ground about 185 cm (6 feet) in diameter where the fixture (special tool) with attached air bag (inflator) module is to be placed for deployment. A paved outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended. Ensure that no loose or flammable objects are within the deployment area.



- ii) Place special tool (passenger air bag (inflator) module deployment fixture) on the ground in the space cleared in step i), if it has not already been placed there.

Special Tool

(B): 09932-75041 or 09932-75040 and 09932-75050

- iii) Fill plastic reservoir in fixture (special tool) with water or sand. This is necessary to provide sufficient stabilization of the fixture during deployment.
- iv) Attach the passenger air bag (inflator) module in the fixture (special tool) using mounting attachment, hold-down bolts and nuts and M8 bolts and nuts.

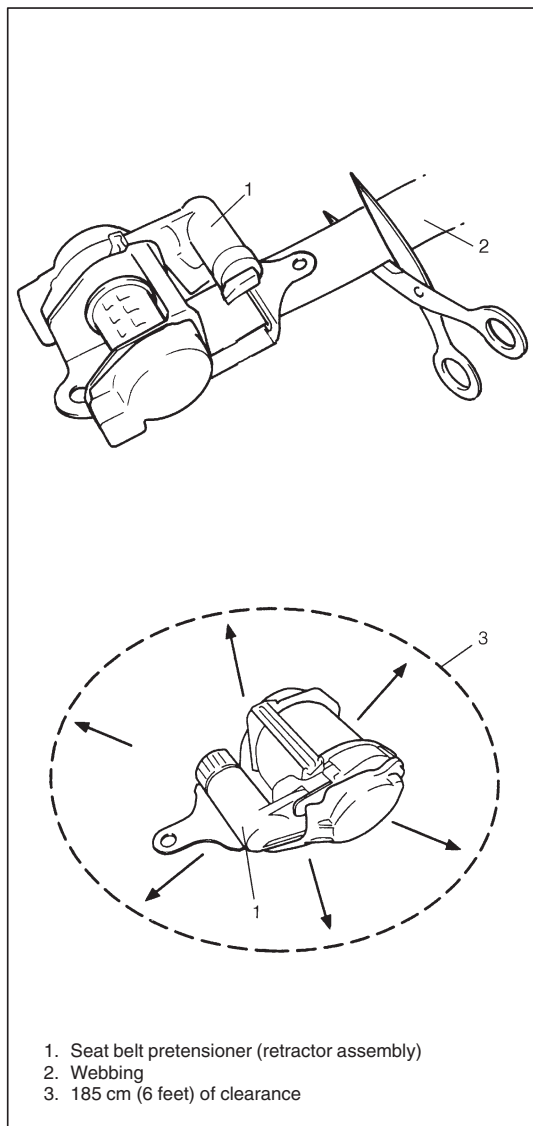
NOTE:

Make sure that deploying direction faces as shown in figure against mounting attachment.

CAUTION:

Be sure to use the following bolt and nut for fixing passenger air bag (inflator) module to mounting attachment. Size: M8, Strength: 7T

Securely hand-tighten all fastener prior to deployment.



[In case of seat belt pretensioner]

- i) Pull out the webbing fully as shown in the figure and cut it at the root of the pretensioner (retractor assembly) as shown in the figure.

WARNING:

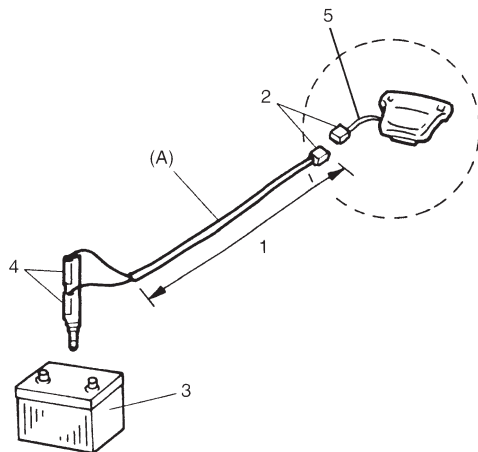
As the drum of the retractor assembly turns very quickly as soon as the webbing is cut, fix the retractor assembly with a vise on the workbench and keep your hands and fingers away from it when cutting the webbing.

- ii) Clear a space on the ground about 185 cm (6 feet) in diameter where the seat belt pretensioner is to be activated. A paved, outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended.

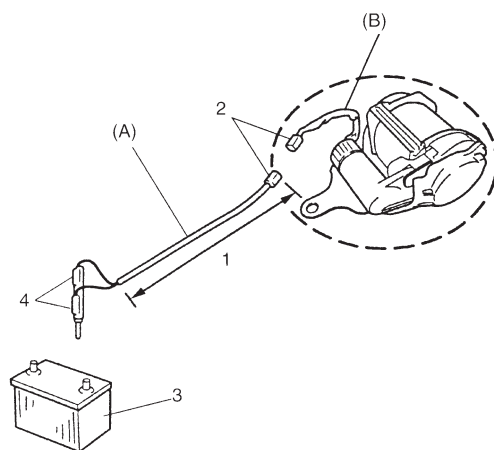
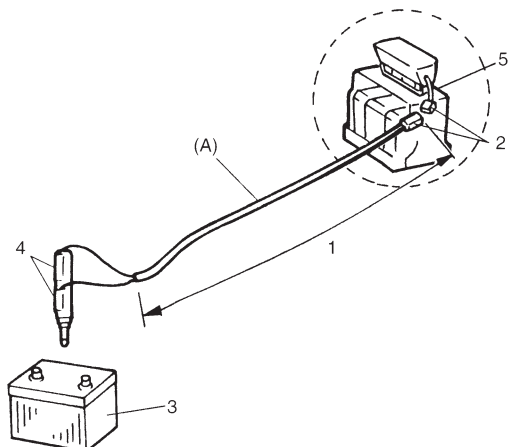
Ensure no loose or flammable objects are within the activation area.

- iii) Place the seat belt pretensioner as shown in the figure on the ground in the space just cleared.

For Driver Air Bag (Inflator) Module



For Passenger Air Bag (Inflator) Module



1. Stretch deployment harness to full length 10 m (33 ft).
2. Connect connectors.
3. Power source (12V vehicle battery).
4. Short the two deployment harness leads.
5. Air bag wire harness attached to passenger air bag module.

- 6) Stretch the deployment harness from the driver or passenger air bag (inflator) module to its full length 10 m (33 ft).

Special Tool**(A): 09932-75030****(B): 09932-78320**

- 7) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
- 8) Verify that the area around the driver or passenger air bag (inflator) module is clear of all people and loose or flammable objects.
- 9) [In case of Driver Air Bag (Inflator) Module]
Verify that the driver air bag (inflator) module is resting with its vinyl trim cover facing up.
Use wire harness as adaptor cable which is attached to passenger air bag module.
[In case of Passenger Air Bag (Inflator) Module]
Verify that the passenger air bag (inflator) module is firmly and properly secured in passenger air bag (inflator) module deployment fixture (special tool).
[In case of Seat Belt Pretensioner]
Verify that the seat belt pretensioner, with its warning label attached side facing up as shown in the figure on the ground in the space just cleared.
Connect adaptor cable to pretensioner and air bag wire harness as necessary.

Special Tool**(B): 09932-78320**

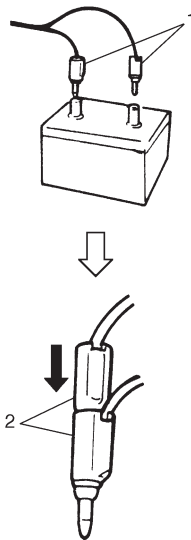
- 10) Connect the air bag (inflator) module or seat belt pretensioner to the deployment harness connector and lock connector with lock lever.
- 11) Notify all people in the immediate area that you intend to deploy/activate the air bag (inflator) module or seat belt Pretensioner.

NOTE:

- When the air bag deploys and the pretensioner activates, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to deploy the air bag (inflator) module or to activate the seat belt pretensioner and suitable ear protection should be worn.
- When the air bag deploys and the pretensioner activates, air bag (inflator) module and pretensioner (retractor assembly) may jump about 30 cm (1 ft) vertically. This is a normal reaction of them to the force of the rapid gas expansion inside the air bag and pretensioner.
- After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction.

WARNING:

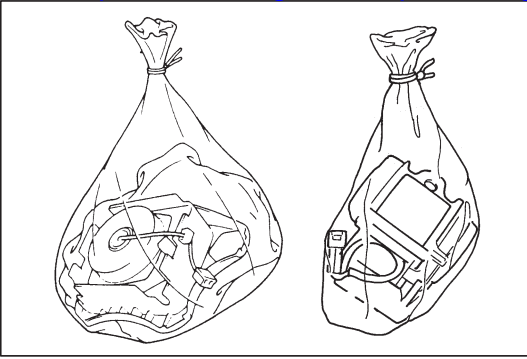
- After deployment/activation, the metal surfaces of the air bag (inflator) module and the seat belt pretensioner will be very hot. Do not touch the metal areas of them for about 10 minutes after deployment/activation.
 - Do not place the deployed air bag (inflator) module and the activated seat belt pretensioner near any flammable objects.
 - Do not apply water, oil, etc. to deployed air bag (inflator) module and activated seat belt pretensioner.
 - If the deployed air bag (inflator) module and the activated seat belt pretensioner must be moved before it is cool, wear gloves and handle it by using nonmetal material such as the air bag, webbing and vinyl trim.
- Failure to follow procedures may result in fire or personal injury.



1. Connect one banana plug to positive terminal of power source (12V vehicle battery) and then the other to negative terminal to immediately deploy.
2. Short to two deployment harness leads.

- 12) Separate the two banana plugs on the deployment harness.
- 13) Connect the deployment harness to the power source (12 V vehicle battery) to immediately deploy/activate the air bag or seat belt pretensioner.
- 14) Disconnect the deployment harness from power source (12 V vehicle battery) and short the two deployment harness leads together by fully seating one banana plug into the other.
- 15) In the unlikely event that the air bag (inflator) module or seat belt pretensioner did not deploy/activate after following these procedures, proceed immediately with Steps 20) through 23). If the air bag (inflator) module or the seat belt pretensioner did deploy/activate, proceed with Steps 16) through 19).
- 16) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the deployed air bag (inflator) module and the activated seat belt pretensioner.
- 17) Disconnect the deployment harness from the air bag (inflator) module and the seat belt pretensioner as soon after deployment/activation as possible.

This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module and seat belt pretensioner. The deployment harness are designed to be reused. They should, however, be inspected for damage after each deployment/activation and replaced if necessary.



- 18) Dispose of the deployed air bag (inflator) module and the activated seat belt pretensioner through normal refuse channels after it has cooled for at least 10 minutes and tightly seal the air bag (inflator) module and the seat belt pretensioner in a strong vinyl bag. (Refer to “Deployed Air Bag (Inflator) Module and Activated Seat Belt Pretensioner Disposal” in detail.)
- 19) Wash your hands with mild soap and water afterward.

NOTE:

The remaining steps are to be followed in the unlikely event that the air bag (inflator) module did not deploy or the seat belt pretensioner did not activate after following these procedures.

- 20) Ensure that the deployment harness has been disconnected from the power source and that its two banana plugs have been shorted together by fully seating one banana plug into the other.
- 21) Disconnect the deployment harness and cables from the air bag (inflator) module and the seat belt pretensioner.
- 22) [For air bag (inflator) module]
Temporarily store the air bag (inflator) module with its vinyl trim cover facing up, away from the surface upon which it rests. Refer to “Service Precautions” in this section for details.
[For seat belt pretensioner]
When temporarily storing the seat belt pretensioner. Refer to “Service Precautions” in this section for details.
- 23) Contact your local distributor for further assistance.

DEPLOYMENT/ACTIVATION INSIDE VEHICLE

Use this procedure when scrapping the entire vehicle including the air bag (inflator) modules and seat belt pretensioners.

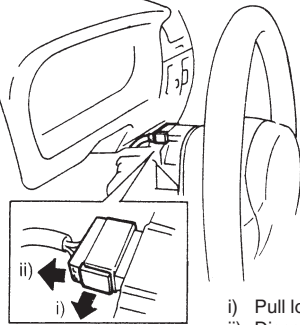
CAUTION:

When vehicle itself will be used again, deploy/activate the air bag and pretensioner outside vehicle according to "Deployment/Activation Outside Vehicle", for deploying/activating it inside will cause the instrument panel, glove box and their vicinity to be deformed.

Failure to observe this CAUTION may require unneeded vehicle inspection and repair.

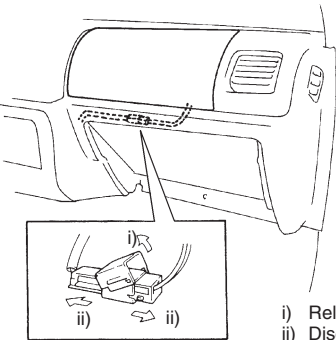
- 1) Turn ignition switch to "LOCK", remove key and put on safety glasses.
- 2) Remove all loose objects from front seats and instrument panel.
- 3) [For driver air bag (inflator) module]
Disconnect contact coil connector (Yellow connector) located near the base of the steering column.
[For passenger air bag (inflator) module]
Remove glove box from instrument panel and disconnect passenger air bag (inflator) module connector (Yellow connector).
[For seat belt pretensioner]
Remove both side (driver and passenger side) center pillar lower trim and disconnect seat belt pretensioner (Yellow) connectors from pretensioner.
- 4) Confirm that each air bag (inflator) module is securely mounted.

For Driver Air Bag (Inflator) Module



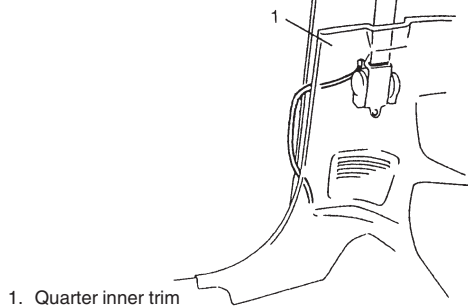
- i) Pull lock lever
- ii) Disconnect counter

For Passenger Air Bag (Inflator) Module

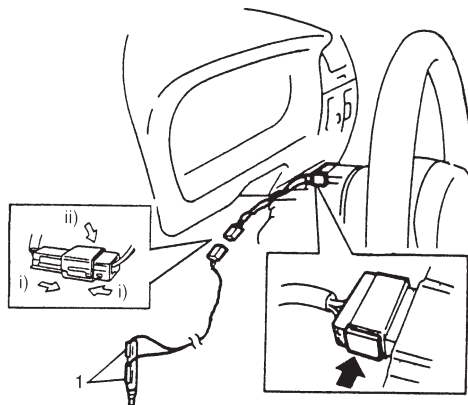


- i) Release lock lever
- ii) Disconnect connector

For Seat Belt Pretensioner



For Driver Air Bag (inflator) Module



1. Short deployment harness leads.

- 5) Check that there is no open, short or damage in special tool (deployment harness). If any faulty condition is found, do not use it and be sure to use new deployment harness.

Special Tool

(A): 09932-75030

- 6) Short the two deployment harness leads together by fully seating one banana plug into the other.

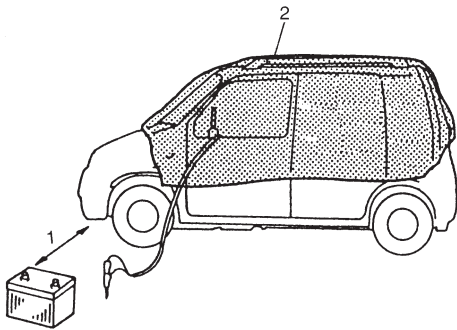
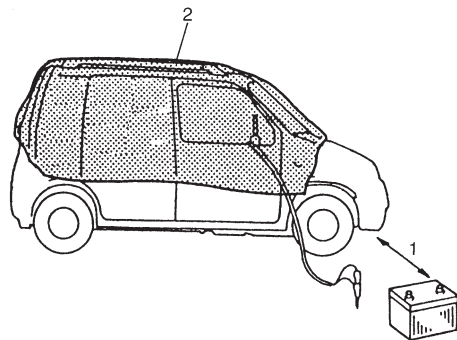
WARNING:

Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed and seat belt pretensioner is to be activated.

- 7) Connect adaptor cable (for driver air bag module and pretensioners) and deployment harness to air bag (inflator) module (driver or passenger) or seat belt pretensioner (driver or passenger) and lock connector with lock lever.

Special Tool

(B): 09932-78320

Driver side for left hand steering vehicle**Driver side for right hand steering vehicle**

1. Stretch deployment harness to its full length 10 m (33 ft).
2. Drop cloth, blanket or similar item.

- 8) Route deployment harness out the vehicle.
- 9) Verify that the inside of the vehicle and the area surrounding the vehicle are clear of all people and loose or flammable objects.
- 10) Stretch the deployment harness to its full length 10 m (33 ft).

Special Tool**(A): 09932-75030**

- 11) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
- 12) Completely cover windshield area and front door window openings with a drop cloth, blanket to similar item. This reduces the possibility of injury due to possible fragmentation of the vehicle's glass or interior.
- 13) Notify all people in the immediate area that you intend to deploy the air bag (inflator) module or activate the seat belt pretensioner.

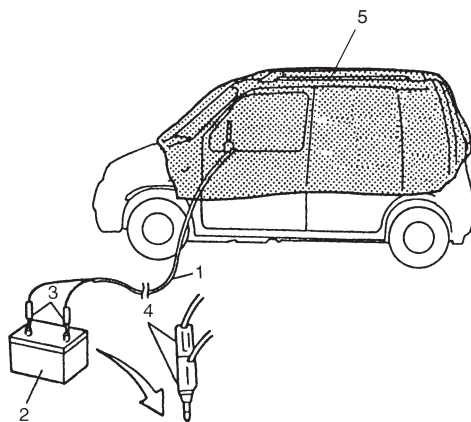
NOTE:

- When the air bag deploys and the pretensioner activates, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to deploy the air bag (inflator) module or to activate the seat belt pretensioner and suitable ear protection should be worn.
- After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction.

WARNING:

- After deployment/activation, the metal surfaces of the air bag (inflator) module and the seat belt pretensioner will be very hot. Do not touch the metal areas of them for about 10 minutes after deployment/activation.
- Do not place the deployed air bag (inflator) module and the activated seat belt pretensioner near any flammable objects.
- Do not apply water, oil, etc. to deployed air bag (inflator) module and activated seat belt pretensioner.
- If the deployed air bag (inflator) module and the activated seat belt pretensioner must be moved before it is cool, wear gloves and handle it by using non-metal material such as the air bag, webbing and vinyl trim.

Failure to follow procedures may result in fire or personal injury.



1. Stretch it to full length 10m (33 ft)
2. Power source (12V vehicle battery)
3. Connect one banana plug to positive terminal of power source (12V vehicle battery) and then the other to negative terminal to immediately deploy.
4. Short harness leads after deployment.
5. Drop cloth, blanket or similar them.

- 14) Separate the two banana plugs on the deployment harness.
- 15) Connect the deployment harness to the power source (12 V vehicle battery) to immediately deploy/activate the air bag or the pretensioner.
- 16) Disconnect the deployment harness from the power source (12 V vehicle battery) and short the two deployment harness leads together by fully seating one banana plug into the other.
- 17) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the deployed air bag (inflator) module and the activated seat belt pretensioner.
- 18) Disconnect the deployment harness from the air bag (inflator) module and the seat belt pretensioner as soon after deployment/activation as possible.

This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module and seat belt pretensioner. The deployment harness are designed to be reused. They should, however, be inspected for damage after each deployment/activation and replaced if necessary.

- 19) Carefully remove drop cloth from vehicle and clean off any fragments or discard drop cloth entirely.
- 20) Repeat Steps 2) through 19) to deploy/activate air bag (inflator) modules and seat belt pretensioners which has not been deployed/activated, if any.
- 21) In the unlikely event that the air bag (inflator) module and the seat belt pretensioner proceed immediately with Steps 23) through 25). If the air bag (inflator) module and the seat belt pretensioner did deploy/activate, proceed with Steps 22).
- 22) With air bags deployed and pretensioners activated the vehicle may be scrapped in the same manner as a non-air bag system equipped vehicle.
- 23) Remove the undeployed air bag (inflator) module(s) and the inactivated seat belt pretensioner(s) from the vehicle. For driver air bag (inflator) module refer to SECTION 3C, for passenger air bag (inflator) module refer to "On-Vehicle Service" in this section, for seat belt pretensioner refer to SECTION 10A.

24) [For air bag (inflator) module]

Temporarily store the air bag (inflator) module with its vinyl trim cover facing up, away from the surface upon which it rests. Refer to "Service Precautions" in this section for details.

[For seat belt pretensioner]

When temporarily strong the seat belt pretensioner, be sure NOT to face its exhaust hole provided side down. It must face up. Refer to "Service Precautions" in this section for details.

- 25) Contact your local distributor for further assistance.

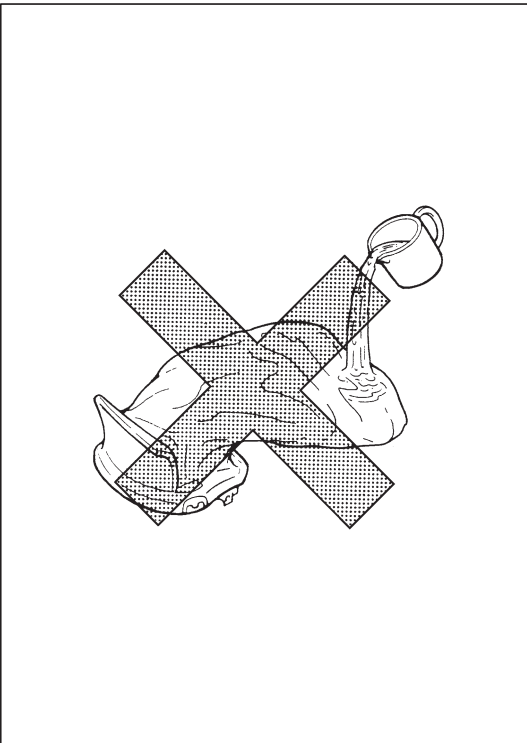
DEPLOYED AIR BAG (INFLATOR) MODULE AND ACTIVATED SEAT BELT PRETENSIONER DISPOSAL

WARNING:

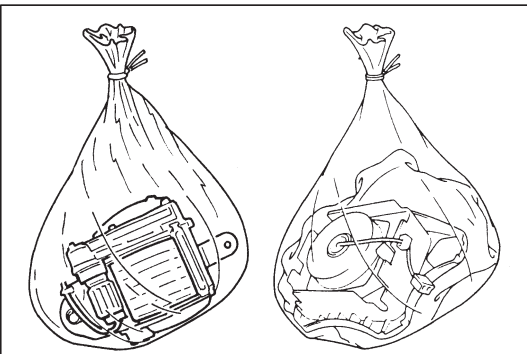
Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which may cause personal injury. The undeployed air bag (inflator) module and the inactivated seat belt pretensioner must not be disposed of through normal refuse channels.

The undeployed air bag (inflator) module and the inactivated seat belt pretensioner contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

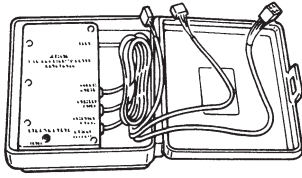
Deployed air bag (inflator) module and the activated seat belt pretensioner can be disposed of through normal refuse channels just like any other parts. For their disposal, however, following points should be noted.



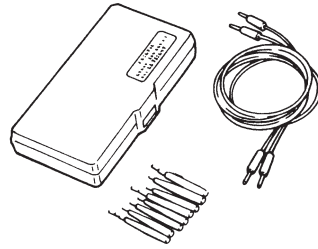
- The air bag (inflator) module and the seat belt pretensioner immediately after deployment/activation is very hot. Wait for 10 minutes to cool it off before handling them.
- Never apply water, oil, etc. to deployed air bag (inflator) module and the activated seat belt pretensioner to cool it off and be careful so that water, oil etc. does not get on the deployed air bag (inflator) module and the activated seat belt pretensioner.
- After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction. As with many service procedures, you should wear gloves and safety glasses.



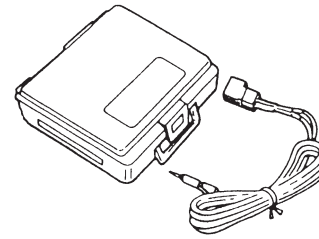
- When disposing of the deployed air bag (inflator) module and the activated seat belt pretensioner, be sure to seal it in a vinyl bag.
- When air bag (inflator) module and seat belt pretensioner have been deployed/activated inside the vehicle which is going to be scrapped, leave them as installed to the vehicle.
- Be sure to wash your hands with mild soap and water after handling it.

SPECIAL TOOLS

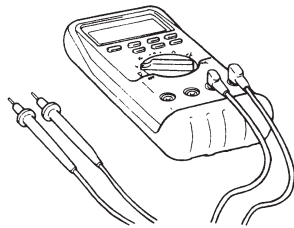
09932-75010
Air bag driver/passenger
load tool



09932-76010
Connector test adapter kit

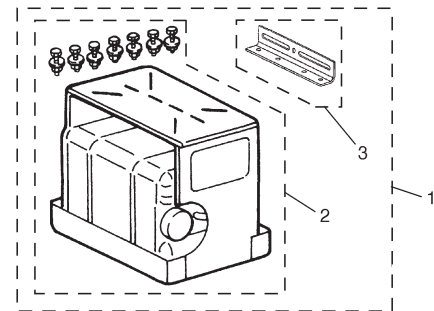


09932-75030
Air bag deployment harness

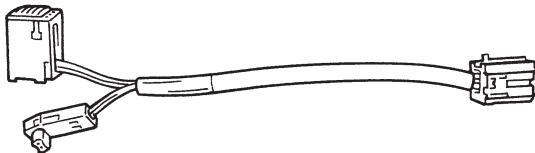


Digital multimeter for which the maximum test current is 10 mA or less at the minimum range of resistance measurement.

WARNING:
Be sure to use the specified digital multimeter. Otherwise, air bag deployment or personal injury may result.



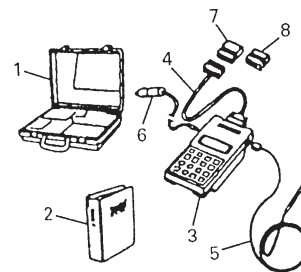
1. 09932-75041 (PAB deployment fixture) or
 2. 09932-75040 (PAB deployment fixture) and
 3. 09932-75050 (PAB deployment fixture bracket)
- PAB : Passenger air bag (inflator) module



09932-78320
Deployment adapter cable

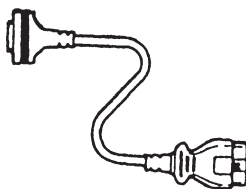


09932-78310
Adapter cable

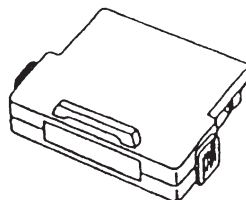


09931-76011
SUZUKI scan tool (Tech 1A) kit

1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adaptor



09931-76030
16/14 pin DLC cable



Mass storage cartridge

Prepared by
MAGYAR SUZUKI CORPORATION

Overseas Service Department

1st Ed. December, 1999

Printing: January, 2000

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IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

This service manual is intended for authorized Suzuki dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:

For vehicles equipped with a Supplemental Restraint Air Bag System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer.

Please observe all WARNINGS and CAUTIONS in SECTION 10B and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.

- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag deployment.
- Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F)(for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and/or seatbelt with pretensioner) beforehand to avoid component damage or unintended deployment.

FOREWORD

This manual contains only different service information of the following applicable model as compared with RB413 SERVICE MANUAL.

Applicable model: RB310

Therefore, whenever servicing the above applicable model, consult this manual first. And for any section, item or description not found in this manual, refer to the related manual below.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others.

Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

RELATED MANUAL:

Manual Name	Manual No.
RB413 Service Manual	99500-83E00-01E
RB310/RB413 Wiring Diagram Manual	99512U83E10-669

MAGYAR SUZUKI CORPORATION

SERVICE DEPARTMENT

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NOTE:

For the screen toned Sections in the above table, refer to the same section of the Related Manuals mentioned in FOREWORD of this manual.

SECTION 0B**0B****MAINTENANCE AND LUBRICATION****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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MAINTENANCE SCHEDULE**NORMAL CONDITION SCHEDULE**

Interval: This interval should be judged by odometer reading or months, whichever comes first.		This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
		Km (× 1,000)	15	30	45	60	75	90
		Miles (× 1,000)	9	18	27	36	45	54
		Months	12	24	36	48	60	72
1. ENGINE								
1-1. Drive belt (tension, damage)		V-rib belt (Flat type)	–	–	I	–	–	R
1-2. Camshaft timing belt			Replace every 100,000 km (60,000 miles).					
1-3. Blank								
1-4. Engine oil and oil filter	When SG, SH or SJ grade oil is used.		R	R	R	R	R	R
	When SE or SF grade oil is used.		Replace every 10,000 km (6,000 miles) or 8 months					
1-5. Engine coolant			–	R	–	R	–	R
1-6. Exhaust system (leakage, damage, tightness)			–	I	–	I	–	I
2. IGNITION SYSTEM								
2-1. Spark plugs		When unleaded fuel is used	–	–	R	–	–	R
		When leaded fuel is used	Refer to “Severe Driving Condition” schedule.					
2-2. Distributor cap and rotor			–	–	I	–	–	I
3. FUEL SYSTEM								
3-1. Air cleaner filter		Paved-road	I	I	R	I	I	R
		Dusty condition	Refer to “Severe Driving Condition” schedule.					
3-2. Fuel lines (deterioration, leakage, damage)			–	I	–	I	–	I
3-3. Fuel tank			–	–	I	–	–	I

NOTES:

- For Item 2-1 “spark plugs”, replace every 50,000 km if the local law requires.
- For Sweden, Item 2-1, 4-1 and 4-2 should be performed by odometer reading only.
- For Item 1-2 Camshaft timing belt: This belt may be replaced every 90,000 km (54,000 miles) according to customer’s maintenance convenience.

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
	Km (× 1,000)	15	30	45	60	75	90
	Miles (× 1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
4. EMISSION CONTROL SYSTEM							
4-1. PCV (Positive Crankcase Ventilation) Valve		—	—	—	—	—	I
4-2. Fuel evaporative emission control system		—	—	—	—	—	I
5. BRAKE							
5-1.	Brake discs and pads (thickness wear, damage)	I	I	I	I	I	I
	Brake drums and shoes (wear, damage)	—	I	—	I	—	I
5-2. Brake hoses and pipes (leakage, damage, clamp)		—	I	—	I	—	I
5-3. Brake fluid		—	R	—	R	—	R
5-4. Brake lever and cable (damage, stroke, operation)		Inspect at first 15,000 km (9,000 miles) only.					
6. CHASSIS AND BODY							
6-1. Clutch pedal (for manual transmission)		—	I	—	I	—	I
6-2. Tires/wheel discs (wear, damage, rotation)		I	I	I	I	I	I
6-3. Drive shafts (breakage, damage)		—	—	I	—	—	I
6-4. Suspension system (tightness, damage, rattle, breakage)		—	I	—	I	—	I
6-5. Steering system (tightness, damage, breakage, rattle)		—	I	—	I	—	I
6-6. Manual transmission oil		I	—	R	—	—	R
6-7. Automatic transmission	Fluid level	—	I	—	I	—	I
	Fluid change	Replace every 165,000 km (99,000 miles).					
	Fluid hose	—	—	—	R	—	—
6-8. All latches, hinges and locks		—	I	—	I	—	I
6-9. Ventilator air filter (if equipped)		—	I	R	—	I	R

NOTES:

- “R”: Replace or change
- “I”: Inspect and correct or replace if necessary

MAINTENANCE RECOMMENDED UNDER SEVERE DRIVING CONDITIONS

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, it is recommended that applicable maintenance operation be performed at the particular interval as given in the chart below.

Severe condition code**A – Repeated short trips****B – Driving on rough and/or muddy roads****C – Driving on dusty roads****D – Driving in extremely cold weather and/or salted roads****E – Repeated short trips in extremely cold weather****F – Leaded fuel use****G – (For Diesel engine) Town use/Towing a trailer/
Sustained high speed driving/
Hot climates above 30°C (86°F)/
Low quality lubricants or fuel****H – Trailer towing (if admitted)**

Severe Condition Code	Maintenance	Maintenance Operation	Maintenance Interval
– B C D – – – –	ITEM 1-1 Drive belt (V-rib belt)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months
A – C D E F – H	ITEM 1-4 Engine oil and filter	R	Every 5,000 km (3,000 miles) or 4 months
A B C – E F – H	ITEM 2-1 Spark plugs	R	Every 10,000 km (6,000 miles) or 8 months
– – C – – – – –	ITEM 3-1 Air cleaner filter *1	I	Every 2,500 km (1,500 miles)
		R	Every 30,000 km (18,000 miles) or 24 months
– B C D – – – – H	ITEM 6-2 Wheel bearings	I	Every 15,000 km (9,000 miles) or 12 months
– B – D E – – – H	ITEM 6-3 Drive shafts	I	Every 15,000 km (9,000 miles) or 12 months
– B – – E – – – H	ITEM 6-6 Manual transmission oil	R	Every 30,000 km (18,000 miles) or 24 months
– B – – E – – – H	ITEM 6-7 Automatic transmission fluid	R	Every 30,000 km (18,000 miles) or 24 months
– – C D – – – –	ITEM 6-9 Ventilator air filter*2 (if equipped)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months

NOTES:

- “R”: Replace or change
- “I”: Inspect and correct or replace if necessary
- *1: Inspect or replace more frequently if necessary
- *2: Clean or replace more frequently if air from ventilator decreases.

MAINTENANCE SERVICE ENGINE

ITEM 1-1

Drive Belt Inspection and Replacement

WARNING:

Disconnect negative cable at battery before checking and adjusting belt tension.

Water pump belt inspection

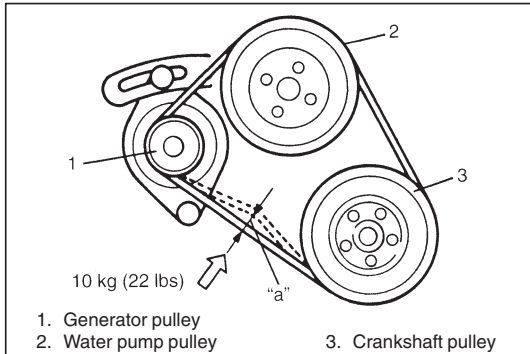
- 1) Remove engine under cover of right side from vehicle body.
- 2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. Replace, if necessary.
- 3) Check pump belt for tension and adjust it as necessary.

Water pump belt tension "a":

8 – 10 mm (0.32 – 0.39 in.) deflection under 100 N, 10 kg or 22 lb pressure

NOTE:

When replacing belt with a new one, adjust belt tension to 6 – 7 mm (0.24 – 0.27 in.).

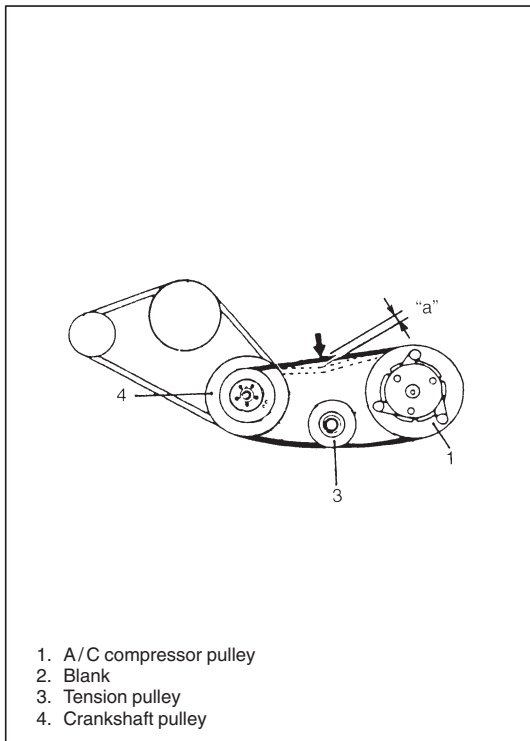


A/C compressor drive belt inspection (If equipped)

- 1) Hoist vehicle and remove engine under cover of right side from vehicle body.
- 2) Inspect belt for wear, deterioration and tension. Replace or adjust, if necessary.

A/C compressor drive belt tension "a":

7 – 9 mm (0.28 – 0.35 in.) deflection under 100 N, 10 kg or 22 lb pressure

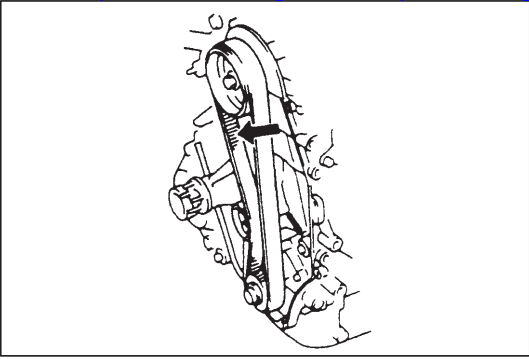


A/C compressor drive belt replacement

- 1) Disconnect negative cable from battery.
- 2) Remove engine under cover of right side.
- 3) Loosen belt tension and replace belt with new one.
- 4) Adjust belt tension to specification.
- 5) Install engine under cover and connect negative cable to battery.

Water pump belt replacement

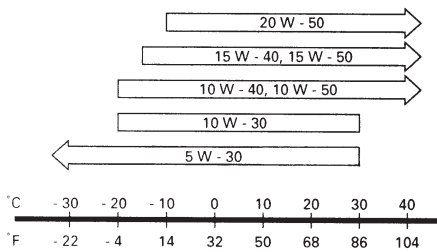
Replace belt with new one. Refer to SECTION 6B for replacement procedure of pump belt.

**ITEM 1-2****Camshaft Timing Belt Replacement**

Replace belt with new one. Refer to SECTION 6A for replacement procedure.

CAUTION:

- Do not bend or twist timing belt.
- Do not allow timing belt to come into contact with oil, water, etc.

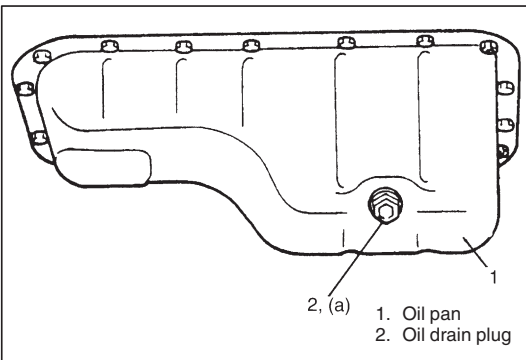
Proper Engine Oil Viscosity Chart**ITEM 1-4****Engine Oil and Filter Change****WARNING:**

New and used engine oil can be hazardous.

Be sure to read "WARNING" in General Precaution in SECTION 0A and observe what is written there.

Use engine oil of SE, SF, SG, SH or SJ grade.

Select the appropriate oil viscosity according to the left chart.



Before draining engine oil, check engine for oil leakage. If any evidence of leakage is found, make sure to correct defective part before proceeding to following work.

- 1) Drain engine oil by removing drain plug.
- 2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

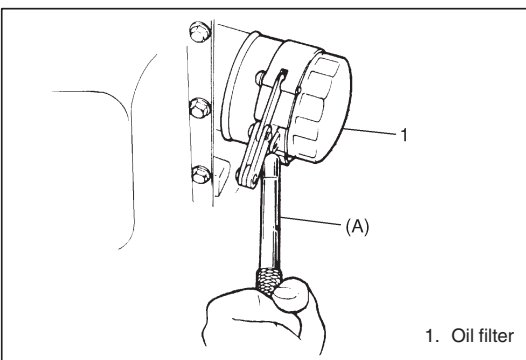
Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

- 3) Loosen oil filter by using oil filter wrench (Special tool).

Special Tool

(A): 09915-47330

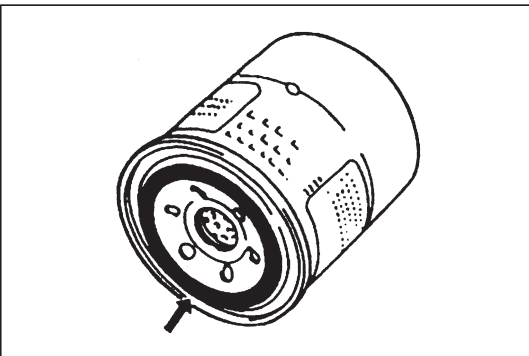


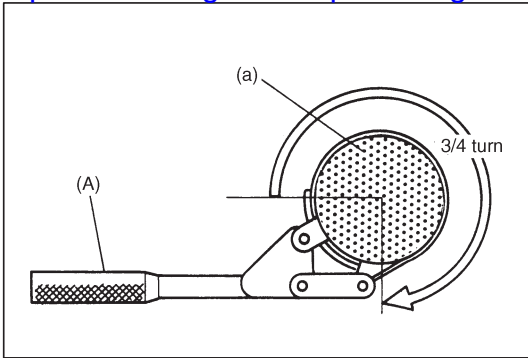
1. Oil filter

- 4) Apply engine oil to new oil filter O-ring.
- 5) Screw new filter on oil filter stand by hand until filter O-ring contacts mounting surface.

CAUTION:

To tighten oil filter properly, it is important to accurately identify the position at which filter O-ring first contacts mounting surface.





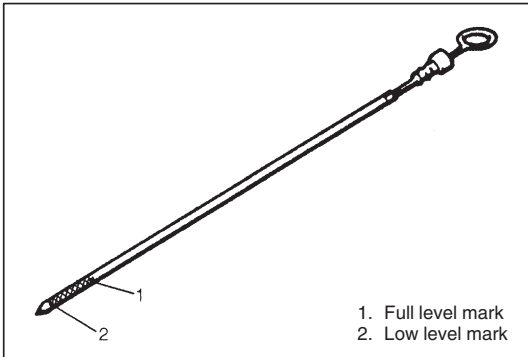
- 6) Tighten filter 3/4 turn from the point of contact with mounting surface using an oil filter wrench.

Special Tool

(A): 09915-47330

Tightening Torque (Reference)

(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)



- 7) Replenish oil until oil level is brought to FULL level mark on dipstick (oil pan and oil filter capacity). Filler inlet is at the top of cylinder head cover.
- 8) Start engine and run it for three minutes. Stop it and wait another 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

Engine Oil Capacity

Oil pan capacity	About 3.1 liters (6.5/5.5 US/Imp pt.)
Oil filter capacity	About 0.2 liter (0.4/0.3 US/Imp pt.)
Others	About 0.3 liter (0.6/0.5 US/Imp pt.)
Total	About 3.6 liters (7.5/6.3 US/Imp pt.)

NOTE:

Engine oil capacity is specified as left table.

However, note that amount of oil required when actually changing oil may somewhat differ from data in left table depending on various conditions (temperature, viscosity, etc.).

- 9) Check oil filter and drain plug for oil leakage.

ITEM 1-5

Engine Coolant Change

WARNING:

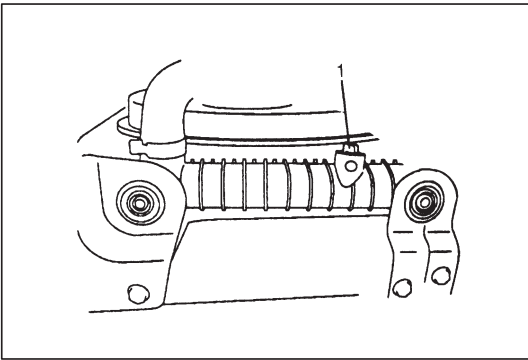
To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

CAUTION:

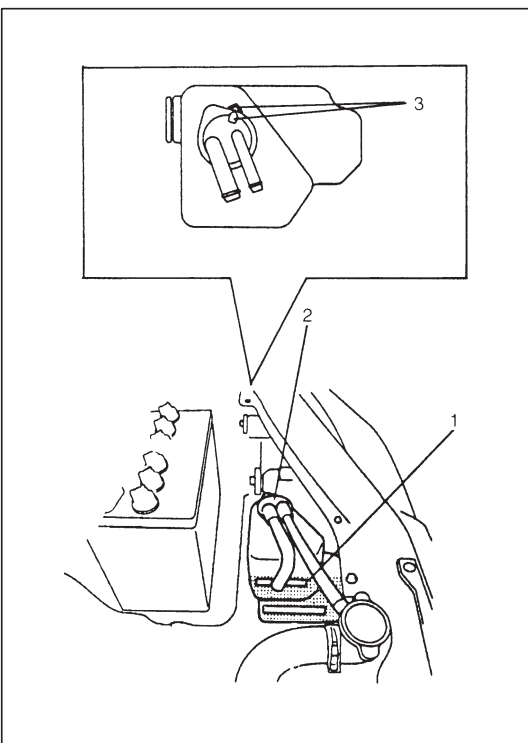
When changing engine coolant, use mixture of 50% water and 50% ethylene-glycol base coolant (Anti-Freeze/Anti-corrosion coolant) for the market where ambient temperature falls lower than -16°C (3°F) in winter and mixture of 70% water and 30% ethylene-glycol base coolant for the market where ambient temperature doesn't fall lower than -16°C (3°F).

Even in a market where no freezing temperature is anticipated, mixture of 70% water and 30% ethylene-glycol base coolant should be used for the purpose of corrosion protection and lubrication.

Refer to SECTION 6B for COOLANT CAPACITY.



- 1) Remove radiator cap when engine is cool.
- 2) Loosen radiator drain plug (1) to drain coolant.
- 3) Remove reservoir and drain.
- 4) Tighten drain plug securely. Also install reservoir.
- 5) Slowly pour specified amount of coolant to the base of radiator filler neck, and run engine, with radiator cap removed, until radiator upper hose is hot. This drives out any air which may still be trapped within cooling system. Add coolant as necessary until coolant level reaches filler throat of radiator. Reinstall radiator cap.

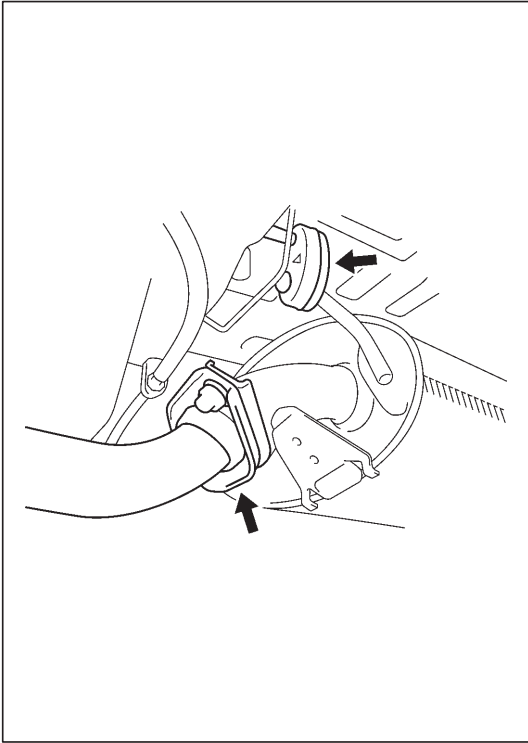


- 6) Add coolant to reservoir so that its level aligns with Full mark (1). Then, reinstall cap (2) to reservoir aligning match marks (3) on reservoir and cap.

ITEM 1-6**Exhaust System Inspection****WARNING:**

To avoid danger of being burned, do not touch exhaust system when it is still hot.

Any service on exhaust system should be performed when it is cool.



When carrying out periodic maintenance or vehicle is raised for other service, check exhaust system as follows:

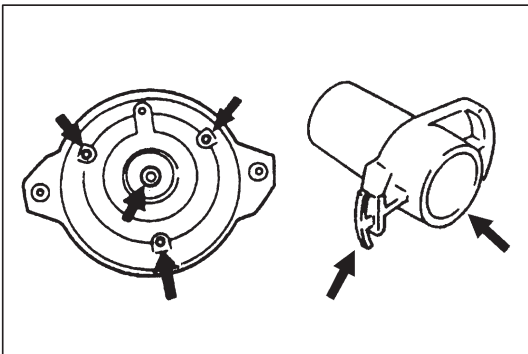
- Check rubber mountings for damage and deterioration.
- Check exhaust system for leakage, loose connections, dents, and damages.

If bolts or nuts are loose, tighten them to specification. Refer to SECTION 6K for torque specification of bolts and nuts.

- Check nearby body areas for damaged, missing or mispositioned parts, open seams, holes, loose connections or other defects which could permit exhaust fumes to seep into vehicle.
- Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to floor carpet.
- Any defects should be fixed at once.

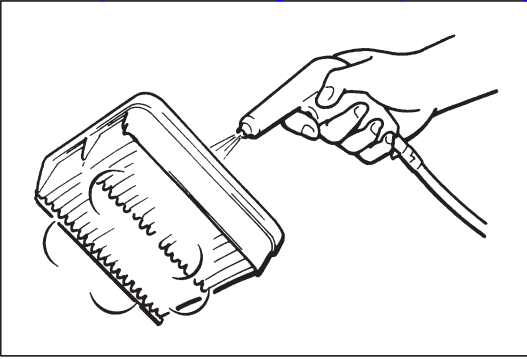
IGNITION SYSTEM**ITEM 2-1****Spark Plugs Replacement**

Replace spark plugs with new ones referring to SECTION 6F.

**ITEM 2-2****Distributor Cap and Rotor Inspection (if equipped)**

- Check distributor cap and rubber caps for cracks.
- Clean dusty and stained parts using a dry, soft cloth.
- Check center electrode and terminals for wear.
- Check rotor for cracks and its electrode for wear.

Repair or replace any component which is found to be in malcondition.



FUEL SYSTEM

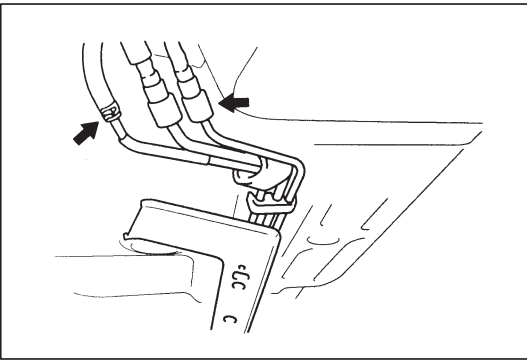
ITEM 3-1

Air Cleaner Filter Inspection

- 1) Unclamp air cleaner case clamps.
- 2) Take cleaner filter out of air cleaner case.
- 3) Visually check that air cleaner filter is not excessively dirty, damaged or oily.
- 4) Clean filter with compressed air from air outlet side of filter.
- 5) Install air cleaner filter into case referring to Section 6A.
- 6) Clamp case securely.

Air Cleaner Filter Replacement

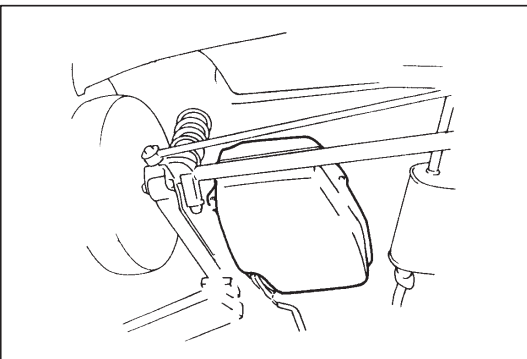
Replace air cleaner filter with new one according to steps 1), 2), 5) and 6) of Air Cleaner Filter Inspection.



ITEM 3-2

Fuel Lines Inspection

- Check fuel lines for loose connection, deterioration or damage which could cause leakage.
Make sure all clamps are secure.
- Replace any damaged or deteriorate parts.
There should be no sign of fuel leakage or moisture at any fuel connection.

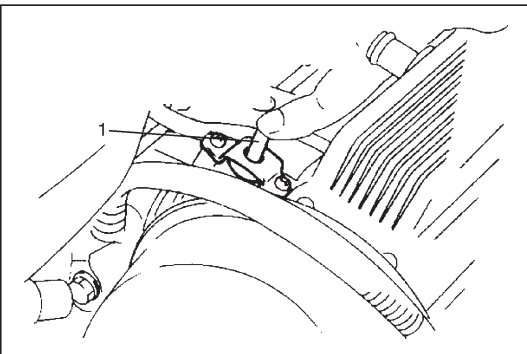


ITEM 3-3

Fuel Tank Inspection

Check fuel tank for damage, cracks, fuel leakage, corrosion and tank bolts looseness.

If a problem is found, repair or replace.



EMISSION CONTROL SYSTEM

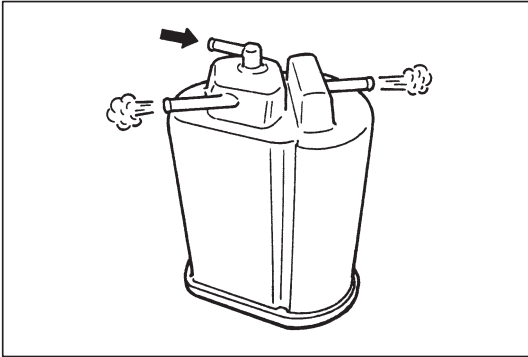
ITEM 4-1

PCV (Positive Crankcase Ventilation) Valve Inspection

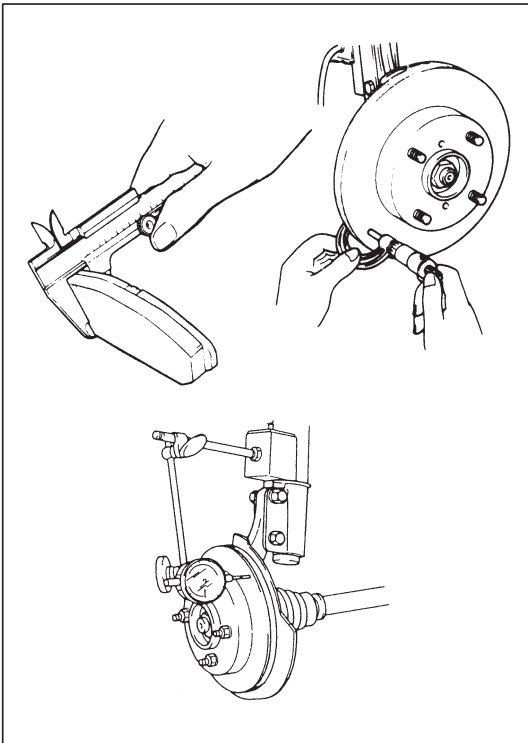
Check crankcase ventilation and PCV hose for leaks, cracks or clog, and PCV valve (1) for stick or clog. Refer to ON-VEHICLE SERVICE of SECTION 6E1 for PCV valve checking procedure.

ITEM 4-2**Fuel Evaporative Emission Control System Inspection****WARNING:**

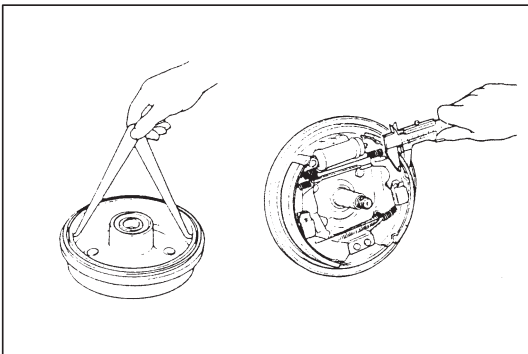
DO NOT SUCK nozzles on EVAP canister. Fuel vapor inside EVAP canister is harmful.



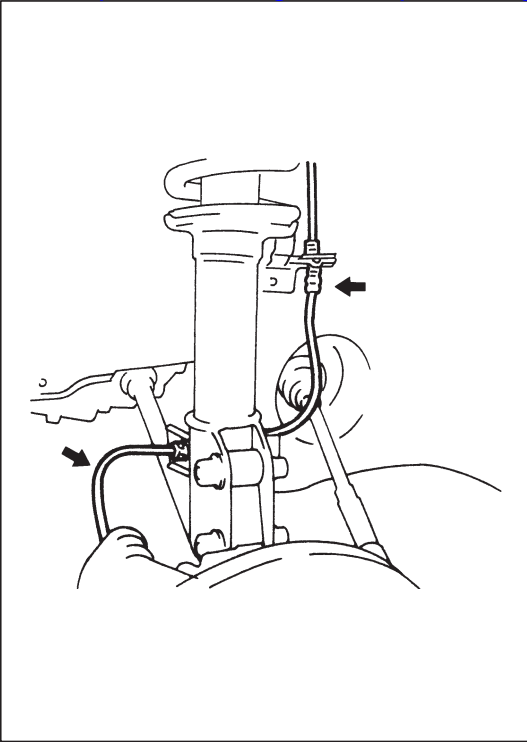
- 1) Visually inspect hoses for cracks, damage or excessive bends. Inspect all clamps for damage and proper position.
 - 2) Check EVAP canister for operation and clog, referring to SECTION 6E1.
- If a malfunction is found, repair or replace.

**BRAKE****ITEM 5-1****Brake Discs, Pads, Drums and Shoes Inspection****Brake discs and pads**

- 1) Remove wheel and caliper but don't disconnect brake hose from caliper.
- 2) Check front disc brake pads and discs for excessive wear, damage and deflection. Replace parts as necessary. For the details, refer to SECTION 5B.
- 3) Install caliper and wheel.

**Brake drums and shoes**

- 1) Remove wheel and brake drum.
- 2) Check rear brake drums and brake linings for excessive wear and damage, while wheels and drums are removed.
At the same time, check wheel cylinders for leakage.
Replace as necessary.
For the details, refer to SECTION 5C.
- 3) Install brake drum and wheel.

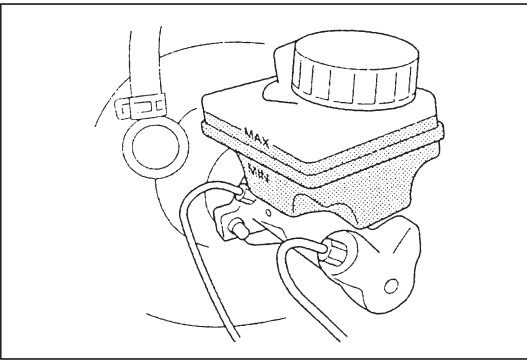
**ITEM 5-2****Brake Hoses and Pipes Inspection**

Perform this inspection where there is enough light and use a mirror as necessary.

- Check brake hoses and pipes for proper hook-up, leaks, cracks, chafing, wear, corrosion, bends, twists and other damage. Replace any of these parts as necessary.
- Check all clamps for tightness and connections for leakage.
- Check that hoses and pipes are clear of sharp edges and insecure parts.

CAUTION:

After replacing any brake pipe or hose, be sure to carry out air purge operation.

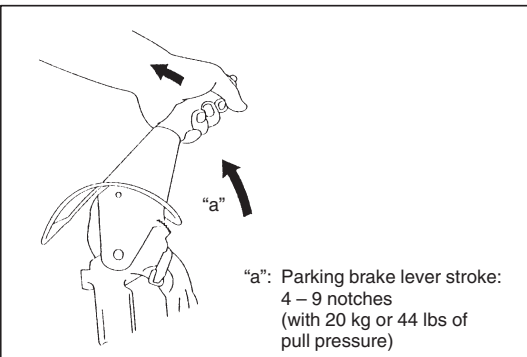
**ITEM 5-3****Brake Fluid Change****CAUTION:**

Do not use old or used brake fluid, or any fluid from any unsealed container.

Change brake fluid as follows.

Drain existing fluid from brake system completely, fill system with above recommended fluid and carry out air purge operation.

For air purging procedure, refer to SECTION 5.

**ITEM 5-4****Brake Lever and Cable Inspection****Parking brake lever**

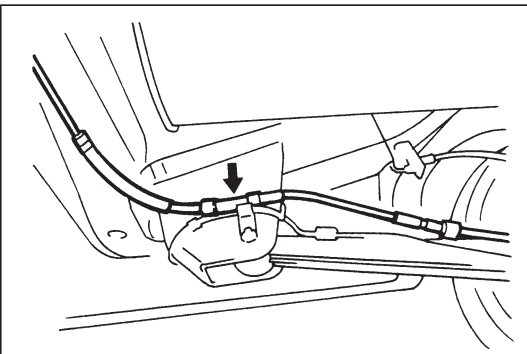
- Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking lever.
- Check parking brake lever for proper operation and stroke, and adjust it if necessary.

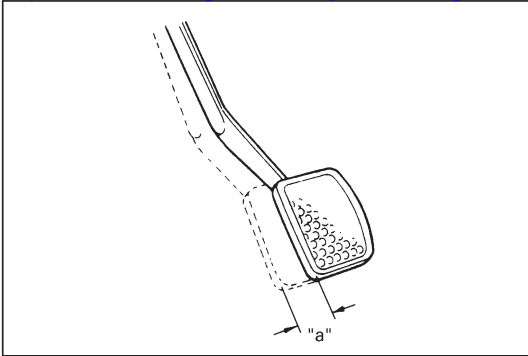
For checking and adjusting procedures, refer to PARKING BRAKE INSPECTION AND ADJUSTMENT in SECTION 5C.

Parking brake cable

Inspect brake cable for damage and smooth movement.

Replace cable if it is in deteriorated condition.



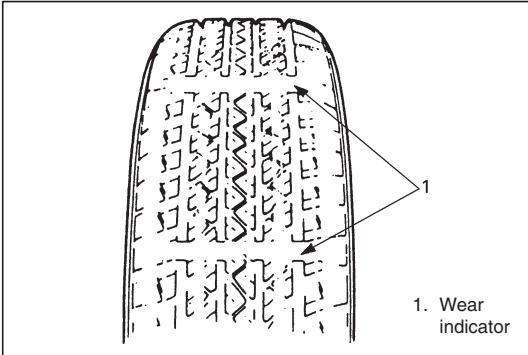


CHASSIS AND BODY

ITEM 6-1

Clutch Pedal Free Travel Inspection (Cable type only)

Check clutch pedal free travel "a". Refer to SECTION 7C for procedure to check and adjust it.



ITEM 6-2

Tire/Wheel Disc Inspection

[Tire inspection]

- 1) Check tire for uneven or excessive wear, cuts or damage. If defective, replace.

- 2) Check inflating pressure of each tire and adjust pressure to specification as necessary.

NOTE:

- Tire inflation pressure should be checked when tires are cool.
- Specified tire inflation pressure should be found on tire placard or in owner's manual which came with vehicle.

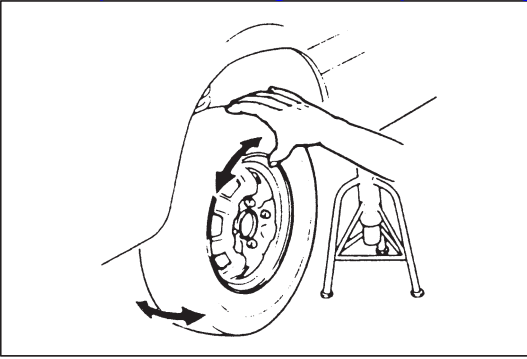
[Wheel disc inspection]

Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.

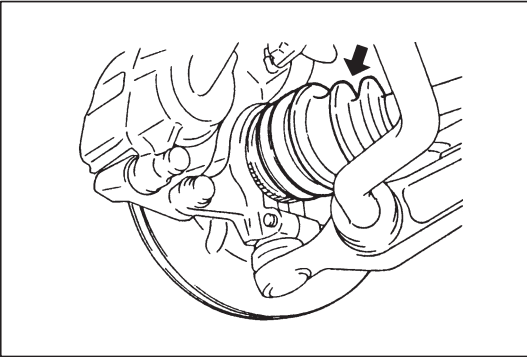
[Tire rotation]

Rotate tires.

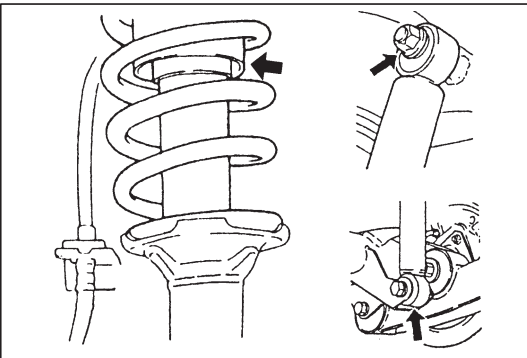
For details of the steps, refer to SECTION 3F.

**Wheel Bearing Inspection**

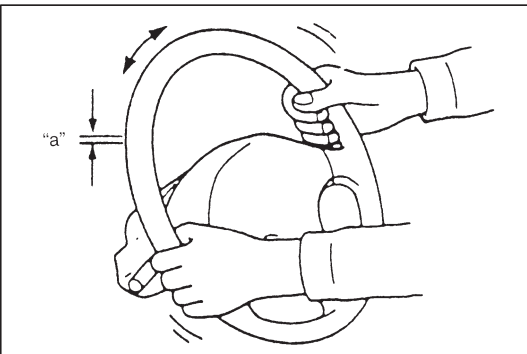
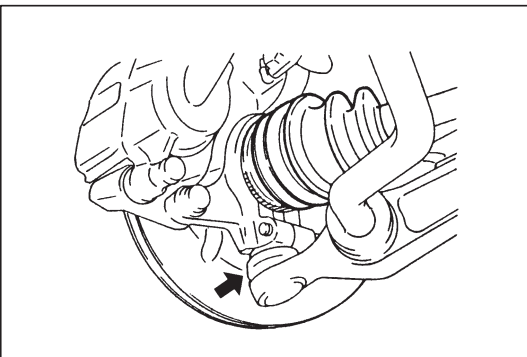
- 1) Check front wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to FRONT SUSPENSION INSPECTION of SECTION 3D.
- 2) Check rear wheel bearing for wear, damage abnormal noise or rattle. For details, refer to REAR SUSPENSION INSPECTION of SECTION 3E.

**ITEM 6-3****Drive Shaft (Axle) Boot Inspection**

Check drive shaft boots (wheel side and differential side) for leakage, detachment, tear or any other damage.
Replace boot as necessary.

**ITEM 6-4****Suspension System Inspection**

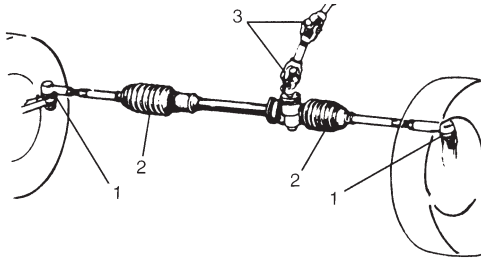
- Inspect front struts & rear shock absorbers for evidence of oil leakage, dents or any other damage on sleeves; and inspect anchor ends for deterioration.
Replace defective parts, if any.
- Check front and rear suspension systems for damaged, loose or missing parts; also for parts showing signs of wear or lack of lubrication.
Repair or replace defective parts, if any.
- Check front suspension arm ball joint stud dust seals for leakage, detachment, tear or any other damage.
Replace defective boot, if any.

**ITEM 6-5****Steering System Inspection**

- 1) Check steering wheel for play and rattle, holding vehicle straight on ground.

Steering wheel play "a": 0 – 30 mm (0 – 1.1 in.)

- 2) Check bolts and nuts for tightness and retighten them as necessary. Repair or replace defective parts, if any.



1. Tie-rod end boot
2. Steering gear case boot
3. Universal joint

- 3) Check steering linkage for looseness and damage. Repair or replace defective parts, if any.
- 4) Check boots of steering linkage and steering gear case for damage (leaks, detachment, tear, etc.). If damage is found, replace defective boot with new one.
If any dent is found on steering gear case boots, correct it to original shape by turning steering wheel to the right or left as far as it stops and holding it for a few seconds.
- 5) Check universal joints of steering shaft for rattle and damage. If rattle or damage is found, replace defective part with a new one.
- 6) Check that steering wheel can be turned fully to the right and left. Repair or replace defective parts, if any.
- 7) If equipped with power steering system, check also, in addition to above check items, that steering wheel can be turned fully to the right and left more lightly when engine is running at idle speed than when it is stopped. Repair, if found faulty.
- 8) Check wheel alignment referring to Section 3A.

ITEM 6-6

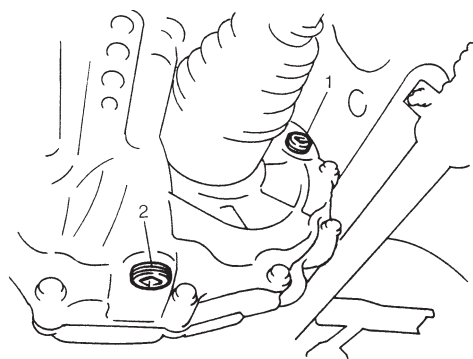
Manual Transmission Oil Inspection and Change

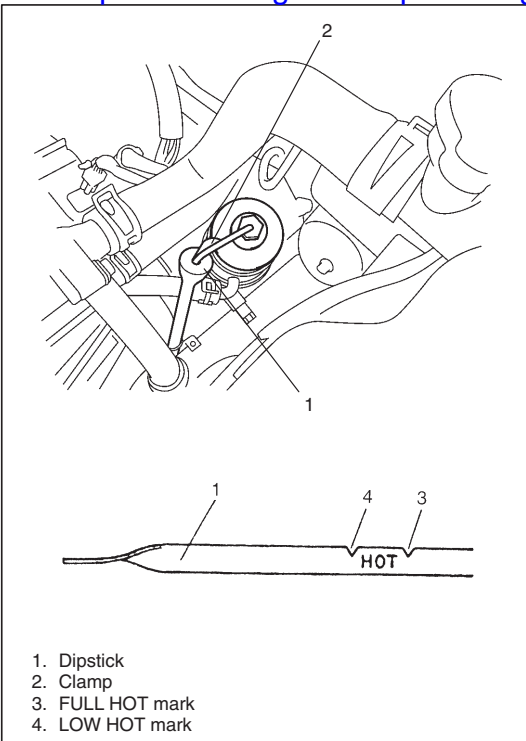
[Inspection]

- 1) Inspect transmission case for evidence of oil leakage.
Repair leaky point if any.
- 2) Make sure that vehicle is placed level for oil level check.
- 3) Remove oil filler/level plug (1) of transmission.
- 4) Check oil level.
Oil level can be checked roughly by means of filler/level plug hole. That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled.
If oil is found insufficient, pour specified oil up to level hole.
For specified oil, refer to description of oil change under On-Vehicle Service in Section 7A.
- 5) Apply sealant to filler/level plug and tighten it to specified torque.

[Change]

- 1) Place the vehicle level and drain oil by removing drain plug (2).
- 2) Apply sealant to drain plug after cleaning it and tighten drain plug to specified torque.
- 3) Pour specified oil up to level hole.
- 4) Tighten filler plug to specified torque.
For recommended oil, its amount and tightening torque data, refer to On-Vehicle Service of Section 7A.



**ITEM 6-7****Automatic Transmission Fluid Inspection and Change**

[Fluid level inspection]

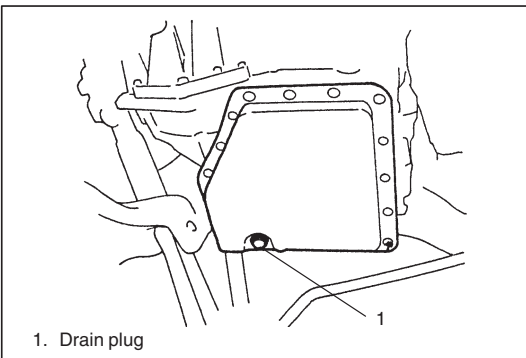
- 1) Inspect transmission case for evidence of fluid leakage.

Repair leaky point, if any.

- 2) Make sure that vehicle is placed level for fluid level check.

- 3) Unclamp dipstick and pull out it. Check fluid level.

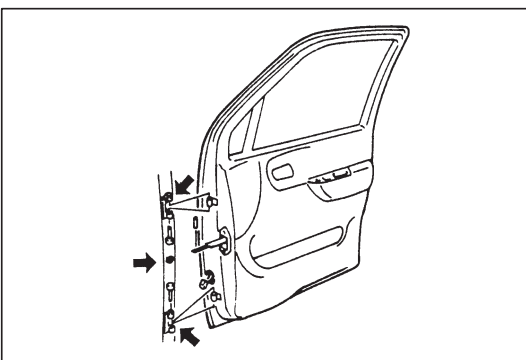
For fluid level checking procedure, refer to SECTION 7B and be sure to perform it under specified conditions. If fluid level is low, replenish specified fluid.



[Fluid change]

- 1) Perform steps 1) and 2) of above Fluid Level Inspection.

- 2) Change fluid with new specified fluid referring to SECTION 7B.

**ITEM 6-8****All Latches, Hinges and Locks Inspection****Doors**

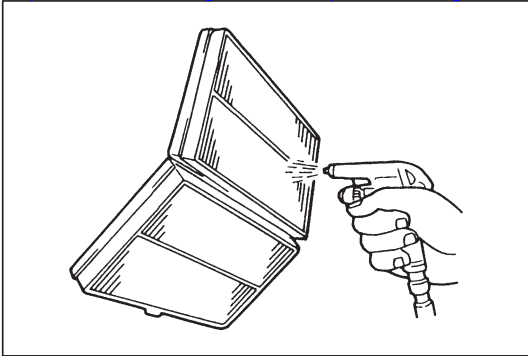
Check that each door of front, rear and back doors opens and closes smoothly and locks securely when closed.

If any malfunction is found, lubricate hinge and latch or repair door lock system.

Engine hood

Check that secondary latch operates properly (check that secondary latch keeps hood from opening all the way even when pulling hood release handle inside vehicle.) Also check that hood opens and closes smoothly and properly and hood locks securely when closed.

If any malfunction is found, lubricate hinge and latch, or repair hood lock system.

**ITEM 6-9****Ventilator Air Filter (if equipped)****Inspection**

- 1) Remove air filter from air inlet box or cooling unit by removing filter cover located on bottom of case.
- 2) Check filter for dirt. Replace excessively dirty filter.
- 3) Blow off dust by compressed air from air outlet side of filter.
- 4) Install filter to air inlet box or cooling unit referring to Section 1B.

Replacement

Replace ventilator air filter with new one referring to Section 1B.

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FINAL INSPECTION

WARNING:

When carrying out road tests, select a safe place where no man or no running vehicle is seen so as to prevent any accident.

Seats

Check that seat slides smoothly and locks securely at any position. Also check that reclining mechanism of front seat back allows it to be locked at any angle.

Seat Belt

Inspect belt system including webbing, buckles, latch plates, retractors and anchors for damage or wear. Check that seat belt is securely locked.

Battery Electrolyte Level Check

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case. If battery is equipped with built-in indicator, check battery condition by the indicator.

Accelerator Pedal Operation

Check that pedal operates smoothly without getting caught or interfered by other part.

Engine Start

Check engine start for readiness.

WARNING:

Before performing the following check, be sure to have enough room around the vehicle. Then, firmly apply both the parking brake and the regular brakes. Do not use the accelerator pedal. If the engine starts, be ready to turn off the ignition promptly. Take these precautions because the car could move without warning and possibly cause personal injury or property damage.

On automatic transmission vehicles, try to start the engine in each select lever position. The starting motor should crank only in "P" (Park) or "N" (Neutral). On manual transmission vehicles, place the shift lever in "Neutral", depress clutch pedal fully and try to start.

Exhaust System Check

Check for leakage, cracks or loose supports.

Clutch (For Manual transmission)

Check for the following.

- Clutch is completely released when depressing clutch pedal,
- No slipping clutch occurs when releasing the clutch pedal and accelerating,
- Clutch itself is free from any abnormal condition.

Gearshift or Select Lever (Transmission)

Check gear shift or select lever for smooth shifting to all positions and for good performance of transmission in any position.

With automatic transmission equipped vehicle, also check that shift indicator indicates properly according to which position select lever is shifted to.

Brake

[Foot brake]

Check the following;

- that brake pedal has proper travel,
- that brake works properly,
- that it is free from noise,
- that vehicle does not pull to one side when brake is applied,
- and that brake do not drag.

[Parking brake and automatic transmission "P" (Park) mechanism]

Check that parking brake lever has proper travel.

WARNING:

With vehicle parked on a fairly steep slope, make sure nothing is in the way downhill to avoid any personal injury or property damage. Be prepared to apply regular brake quickly even if vehicle should start to move.

Check to ensure that parking brake is fully effective when the vehicle is stopped on the safe slope and brake lever is pulled all the way.

Make sure that vehicle is at complete stop when select lever is shifted to "P" range position and all brakes are released.

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Steering

- Check to ensure that steering wheel is free from instability, or abnormally heavy feeling.
- Check that the vehicle does not wander or pull to one side.

Engine

- Check that engine responds readily at all speeds.
- Check that engine is free from abnormal noise and abnormal vibration.

Body, Wheels and Power Transmitting System

Check that body, wheels and power transmitting system are free from abnormal noise and abnormal vibration or any other abnormal condition.

Meters and Gauge

Check that speedometer, odometer, fuel meter, temperature gauge, etc. are operating accurately.

Lights

Check that all lights operate properly.

Windshield Defroster

Periodically check that air comes out from defroster outlet when operating heater or air conditioning. Set fan switch lever to "HI" position for this check.

RECOMMENDED FLUIDS AND LUBRICANTS

Engine oil	SE, SF, SG, SH or SJ (Refer to engine oil viscosity chart in item 1-4.)
Engine coolant (Ethylene glycol base coolant)	"Anti-freeze/Anti-corrosion coolant"
Brake fluid	DOT4 or SAE J1704
Manual transmission oil	API GL-4, SAE75W-90 (Refer to Section 7A for detail)
Automatic transmission fluid	An equivalent of DEXRON®-III
Door hinges	Engine oil or water resistance chassis grease
Hood latch assembly	
Key lock cylinder	Spray lubricant

SECTION 1B

AIR CONDITIONING (OPTIONAL)

1B

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CAUTION:

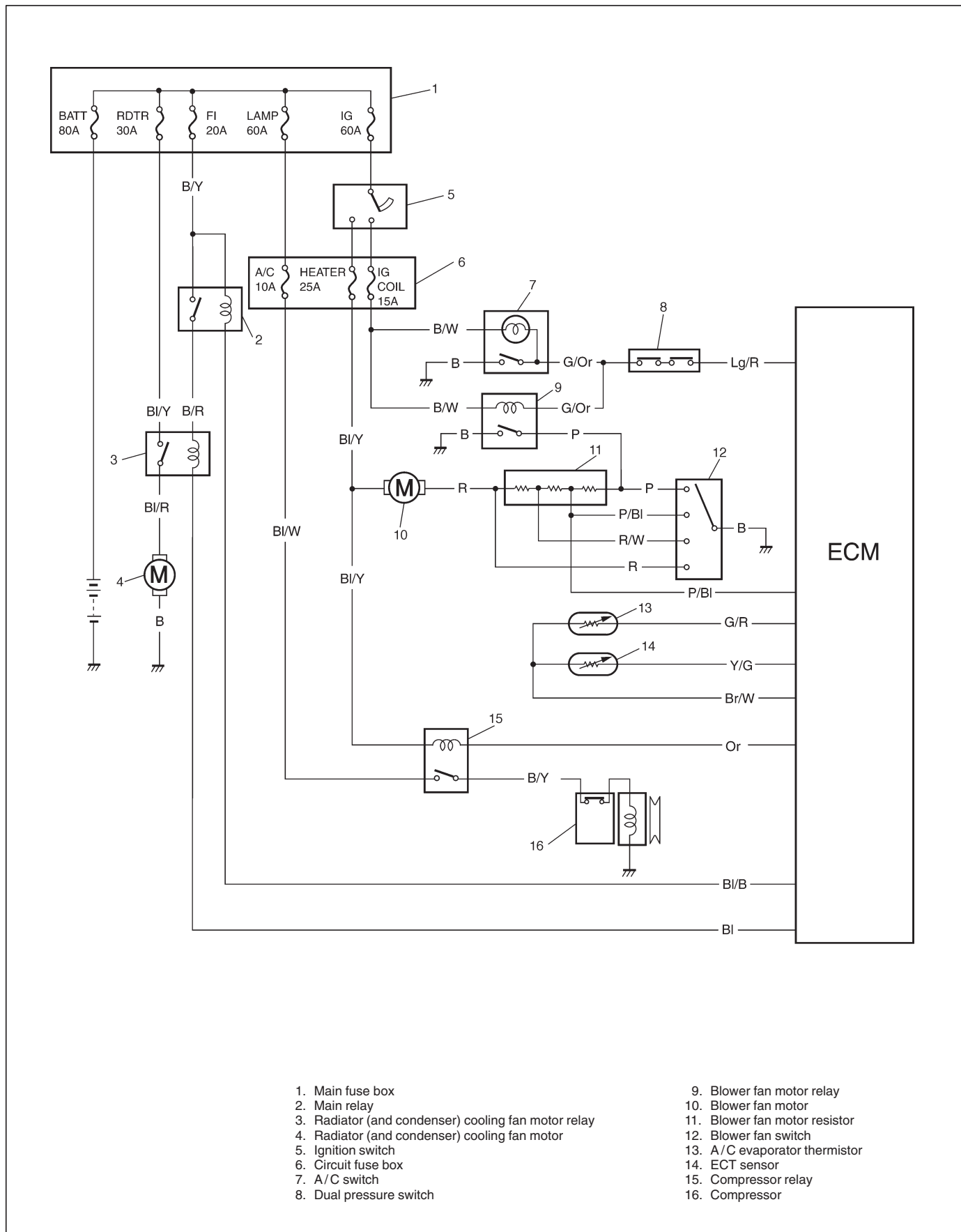
The air conditioning system of this vehicle uses refrigerant HFC-134a (R-134a).
None of refrigerant, compressor oil and component parts is interchangeable between two types of A/C: one using refrigerant CFC-12 (R-12) and the other using refrigerant HFC-134a (R-134a).
Be sure to check which refrigerant is used before any service work including inspection and maintenance. For identification between these two types, refer to “GENERAL DESCRIPTION” in the same section of the Service Manual mentioned in FOREWORD of this manual.
When replenishing or changing refrigerant and compressor oil and when replacing parts, make sure that the material or the part to be used is appropriate to the A/C installed in the vehicle being serviced. Use of incorrect one will result in leakage of refrigerant, damage in parts or other faulty condition.

NOTE:

- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.
- For basic servicing method of the air conditioning system that is not described in this section, refer to AIR CONDITIONING BASIC MANUAL (99520-02130).

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DIAGNOSIS**WIRING CIRCUIT**

A/C SYSTEM INSPECTION OF ECM AND ITS CIRCUITS

ECM and its Circuits can be checked at ECM wiring couplers by measuring voltage.

CAUTION:

ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with couplers disconnected from it.

Voltage Check

- 1) Remove ECM (1) from vehicle.
- 2) Connect ECM (1) couplers to ECM.
- 3) Check voltage at each terminal of couplers connected.

Refer to next page and "INSPECTION OF ECM AND ITS CIRCUIT" in Section 6E1.

NOTE:

As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.

Fig. A

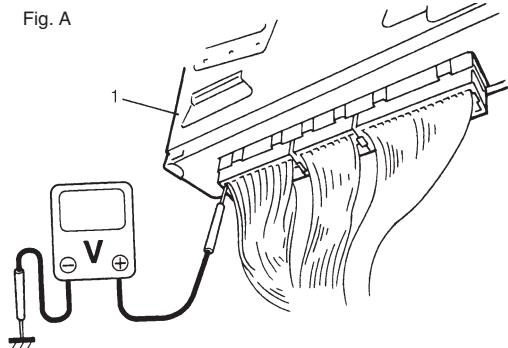
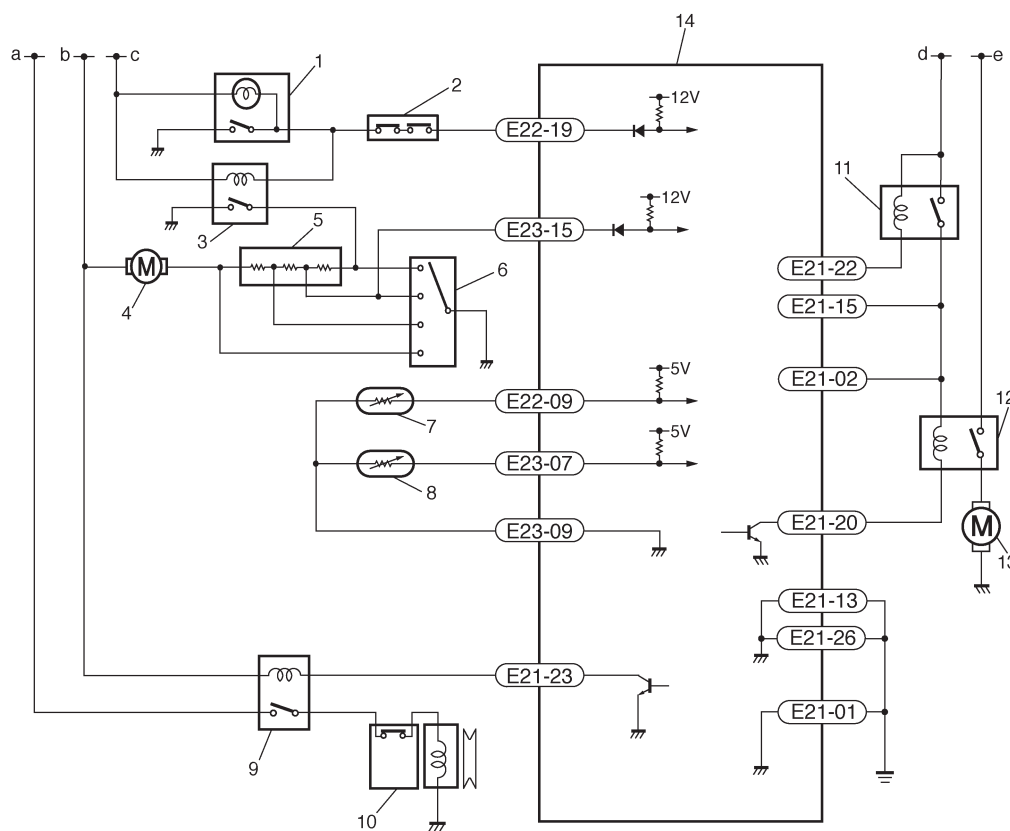
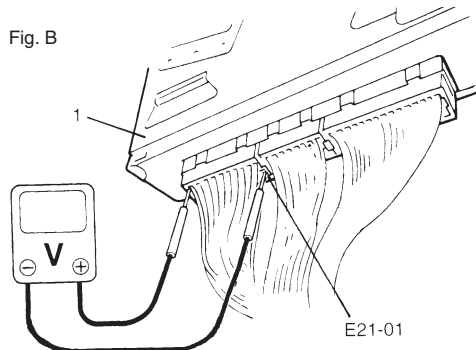
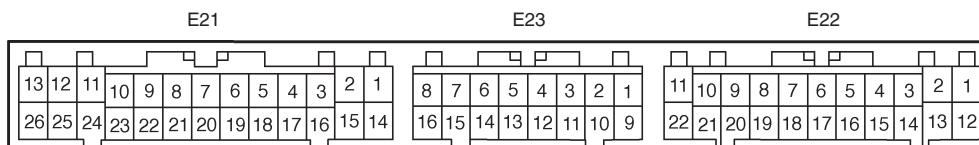


Fig. B



TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



- To "A/C 10 A" fuse in circuit fuse box
- To "HEATER 25 A" fuse in circuit fuse box
- To "IG COIL 15 A" fuse in circuit fuse box
- To "FI 20 A" fuse in main fuse box
- To "RDTR 30 A" fuse in main fuse box

- A/C switch
- Dual pressure switch
- Blower fan motor relay
- Blower fan motor
- Blower fan motor resistor
- Blower fan switch
- A/C evaporator thermistor
- ECT sensor
- Compressor relay
- Compressor
- Main relay
- Radiator (and condenser) cooling fan motor relay
- Radiator (and condenser) cooling fan motor
- ECM

ECM VOLTAGE VALUES TABLE FOR RELATION OF A/C CONTROL

Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
E21-01	B	Main ground for ECM	Ground to body (Fig. A)	-0.3 – 0.3 V	Ignition switch ON
E21-02	B/R	Power supply for engine control	Ground to engine (Fig. B)	10 – 14 V	Ignition switch ON
E21-13	B/Y	ECM ground for power circuit	Ground to body (Fig. A)	-0.3 – 0.3 V	Ignition switch ON
E21-15	B/R	Power supply for engine control	Ground to engine (Fig. B)	10 – 14 V	Ignition switch ON
E21-20	BI	Radiator (condenser) cooling fan relay output	Ground to engine (Fig. B)	0 – 1 V	A/C switch ON or engine coolant temp. sensor more than 96°C (205°F) with engine running
				10 – 14 V	Except the above-mentioned with engine running
E21-22	BI/B	Main relay	Ground to engine (Fig. B)	0 – 1 V	Ignition switch ON
				10 – 14 V	Ignition switch OFF
E21-23	Or	Compressor magnet clutch relay output	Ground to engine (Fig. B)	0 – 1 V	Blower switch and A/C switch ON with engine running
				10 – 14 V	Except the above-mentioned with engine running
E21-26	B/Y	ECM ground for power circuit	Ground to body (Fig. A)	-0.3 – 0.3 V	Ignition switch ON
E22-09	G/R	Evaporator thermistor temp. input	Ground to engine (Fig. B)	2.0 – 2.3 V (1800 – 2200 Ω)	Evaporator thermistor temp. at Approx. 25°C (77°F) with ignition switch ON
				3.5 – 3.6 V (6300 – 7000 Ω)	Evaporator thermistor temp. at Approx. 0°C (32°F) with ignition switch ON
E22-19	Lg/R	A/C switch input	Ground to engine (Fig. B)	0 – 1 V	A/C switch ON with ignition switch ON
				10 – 14 V	A/C switch OFF with ignition switch ON
E23-07	Y/G	Engine coolant temperature sensor input	Ground to engine (Fig. B)	0.71 – 0.76 V (290 – 320 Ω)	Engine coolant temperature at Approx. 80°C (176°F) with ignition ON
				0.35 – 0.37 V (136 – 144 Ω)	Engine coolant temperature at Approx. 110°C (230°F) with ignition ON
E23-09	Br/W	Sensor ground	Ground to body (Fig. A)	-0.3 – 0.3 V	Ignition switch ON
E23-15	P/BI	Blower fan speed input	Ground to engine (Fig. B)	0 – 2 V	Blower switch 2nd, 3rd or 4th position with ignition switch ON
				3 – 5 V	Blower switch 1st position with ignition switch ON
				10 – 14 V	Blower switch OFF position with ignition switch ON

SECTION 6-1

GENERAL INFORMATION
AND ENGINE DIAGNOSIS**WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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GENERAL INFORMATION

STATEMENT ON CLEANLINESS AND CARE

An automobile engine is a combination of many machined, honed, polished and lapped surfaces with tolerances that are measured in the thousands of an millimeter (ten thousands of an inch).

Accordingly, when any internal engine parts are serviced, care and cleanliness are important.

Throughout this section, it should be understood that proper cleaning and protection of machined surfaces and friction areas is part of the repair procedure. This is considered standard shop practice even if not specifically stated.

- A liberal coating of engine oil should be applied to friction areas during assembly to protect and lubricate the surfaces on initial operation.

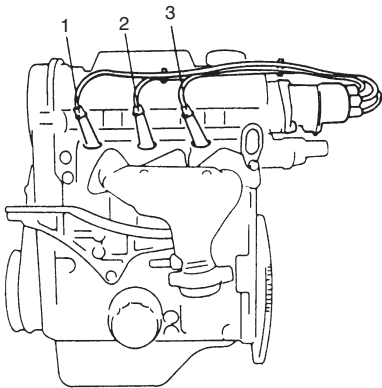
- Whenever valve train components, pistons, piston rings, connecting rods, rod bearings, and crankshaft journal bearings are removed for service, they should be retained in order.

At the time of installation, they should be installed in the same locations and with the same mating surfaces as when removed.

- Battery cables should be disconnected before any major work is performed on the engine.

Failure to disconnect cables may result in damage to wire harness or other electrical parts.

- Throughout this manual, the three cylinders of the engine are identified by numbers; No.1 (1), No.2 (2) and No.3 (3) counted from crankshaft pulley side to flywheel side.



1. No.1 cylinder
2. No.2 cylinder
3. No.3 cylinder

GENERAL INFORMATION ON ENGINE SERVICE

THE FOLLOWING INFORMATION ON ENGINE SERVICE SHOULD BE NOTED CAREFULLY, AS IT IS IMPORTANT IN PREVENTING DAMAGE, AND IN CONTRIBUTING TO RELIABLE ENGINE PERFORMANCE.

- When raising or supporting engine for any reason, do not use a jack under oil pan. Due to small clearance between oil pan and oil pump strainer, jacking against oil pan may cause it to be bent against strainer resulting in damaged oil pick-up unit.

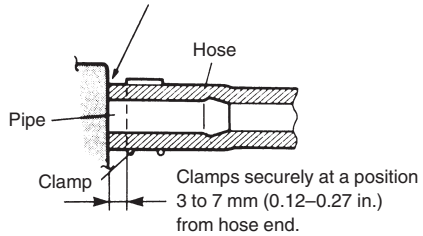
- It should be kept in mind, while working on engine, that 12-volt electrical system is capable of violent and damaging short circuits.

When performing any work where electrical terminals can be grounded, ground cable of the battery should be disconnected at battery.

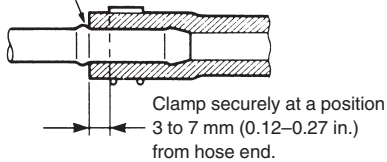
- Any time the air cleaner, throttle body or intake manifold is removed, the intake opening should be covered. This will protect against accidental entrance of foreign material which could follow intake passage into cylinder and cause extensive damage when engine is started.

HOSE CONNECTION

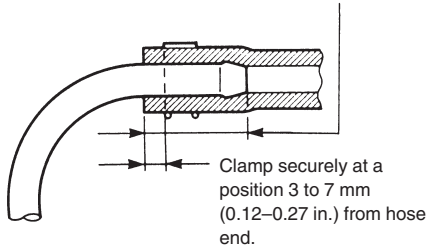
With short pipe, fit hose as far as it reaches pipe joint as shown.



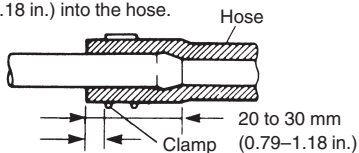
With following type pipe, fit hose as far as its peripheral projection as shown.



With bent pipe, fit hose as its bent part as shown or till pipe is about 20 to 30 mm (0.79-1.18 in.) into the hose.



With straight pipe, fit hose till pipe is, about 20 to 30 mm (0.79-1.18 in.) into the hose.



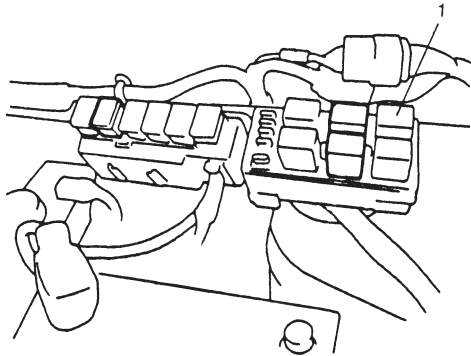
Clamp securely at a position 3 to 7 mm (0.12-0.27 in.) from hose end.

PRECAUTION ON FUEL SYSTEM SERVICE

- Work must be done with no smoking, in a well-ventilated area and away from any open flames.
- As fuel feed line (between fuel pump and fuel delivery pipe) is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected. Before loosening or disconnecting fuel feed line, make sure to release fuel pressure according to "FUEL PRESSURE RELIEF PROCEDURE". A small amount of fuel may be released after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Put that cloth in an approved container when disconnection is completed.
- Never run engine with fuel pump relay disconnected when engine and exhaust system are hot.
- Fuel or fuel vapor hose connection varies with each type of pipe. When reconnecting fuel or fuel vapor hose, be sure to connect and clamp each hose correctly referring to left figure Hose Connection. After connecting, make sure that it has no twist or kink.
- When installing injector or fuel delivery pipe, lubricate its O-ring with spindle oil or gasoline.
- When connecting fuel pipe flare nut, first tighten flare nut by hand and then tighten it to specified torque.

FUEL PRESSURE RELIEF PROCEDURE**CAUTION:**

This work must not be done when engine is hot. If done so, it may cause adverse effect to catalyst.



After making sure that engine is cold, release fuel pressure as follows.

- 1) Place transmission gear shift lever in "Neutral" (Shift selector lever to "P" range for A/T model), set parking brake, and block drive wheels.
- 2) Remove relay box cover.
- 3) Disconnect fuel pump relay (1) from relay box.
- 4) Remove fuel filler cap to release fuel vapor pressure in fuel tank and then reinstall it.
- 5) Start engine and run it till it stops for lack of fuel. Repeat cranking engine 2-3 times for about 3 seconds each time to dissipate fuel pressure in lines. Fuel connections are now safe for servicing.
- 6) Upon completion of servicing, connect fuel pump relay to relay box and install relay box cover.

FUEL LEAKAGE CHECK PROCEDURE

After performing any service on fuel system, check to make sure that there are no fuel leakages as follows.

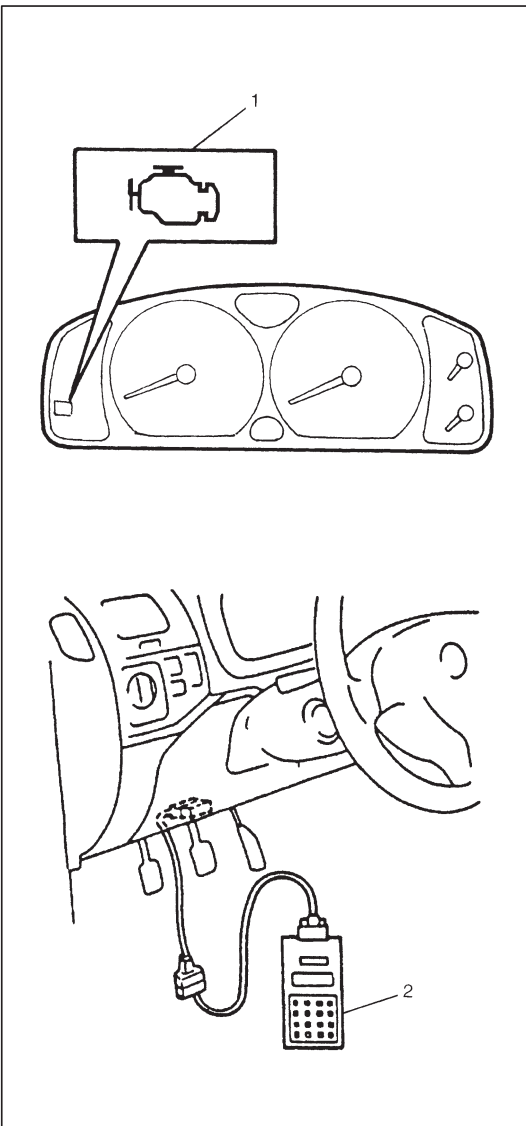
- 1) Turn ON ignition switch for 2 seconds (to operate fuel pump) and then turn it OFF.
Repeat this (ON and OFF) 3 or 4 times and apply fuel pressure to fuel line. (till fuel pressure is felt by hand placed on fuel feed hose.)
- 2) In this state, check to see that there are no fuel leakages from any part of fuel system.

ENGINE DIAGNOSIS

GENERAL DESCRIPTION

This vehicle is equipped with an engine and emission control system which are under control of ECM (PCM). The engine and emission control system in this vehicle are controlled by ECM (PCM). ECM (PCM) has an On-Board Diagnostic system which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission. When diagnosing engine troubles, be sure to have full understanding of the outline of "On-Board Diagnostic System" and each item in "Precaution in Diagnosing Trouble" and execute diagnosis according to "ENGINE DIAGNOSTIC FLOW TABLE".

There is a close relationship between the engine mechanical, engine cooling system, ignition system, exhaust system, etc. and the engine and emission control system in their structure and operation. In case of an engine trouble, even when the malfunction indicator lamp (MIL) doesn't turn ON, it should be diagnosed according to this flow table.



ON-BOARD DIAGNOSTIC SYSTEM

ECM (PCM) in this vehicle has following functions.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the bulb of the malfunction indicator lamp (1).
- When ECM (PCM) detects a malfunction which gives an adverse effect to vehicle emission while the engine is running, it makes the malfunction indicator lamp (1) in the meter cluster of the instrument panel turn ON or flash (flashing only when detecting a misfire which can cause damage to the catalyst) and stores the malfunction area in its memory.
(If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL (1) turn OFF although DTC stored in its memory will remain.)
- As a condition for detecting a malfunction in some areas in the system being monitored by ECM (PCM) and turning ON the malfunction indicator lamp (1) due to that malfunction, 2 driving cycle detection logic is adopted to prevent erroneous detection.
- When a malfunction is detected, engine and driving conditions then are stored in ECM (PCM) memory as freeze frame data. (For the details, refer to description on Freeze frame data.)
- It is possible to communicate by using not only SUZUKI scan tool (Tech-1) (2) but also generic scan tool. (Diagnostic information can be accessed by using a scan tool.)

Warm-up Cycle

A warm-up cycle means sufficient vehicle operation such that the coolant temperature has risen by at least 22°C (40°F) from engine starting and reaches a minimum temperature of 70°C (160°F).

Driving Cycle

A "Driving Cycle" consists of engine startup, driving mode where a malfunction would be detected if present and engine shutoff.

2 Driving Cycles Detection Logic

The malfunction detected in the first driving cycle is stored in ECM (PCM) memory (in the form of pending DTC and freeze frame data) but the malfunction indicator lamp does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

Pending DTC

Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycles detection logic.

An Example of Freeze Frame Data

1. Trouble Code	P0102 (1st)
2. Engine Speed	782 RPM
3. Eng Cool Tmp.	80°C
4. Vehicle Spd.	0 km/h
5. MAP Sensor	39 kPa
6. St. Term FT1	− 0.8% Lean
7. Lg. Term FT1	− 1.6% Lean
8. Fuel 1 Stat.	Closed Loop
9. Fuel 2 Stat.	Not used
10. Load value	25.5%

1st, 2nd or 3rd in parentheses here represents which position in the order the malfunction is detected.

Freeze Frame Data

ECM (PCM) stores the engine and driving conditions (in the form of data as shown at the left) at the moment of the detection of a malfunction in its memory. This data is called "Freeze frame data". Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the vehicle was running or stopped, where air/fuel mixture was lean or rich) when a malfunction was detected by checking the freeze frame data. Also, ECM (PCM) has a function to store each freeze frame data for three different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.

Priority of freeze frame data:

ECM (PCM) has 4 frames where the freeze frame data can be stored. The first frame stores the freeze frame data of the malfunction which was detected first. However, the freeze frame data stored in this frame is updated according to the priority described below. (If malfunction as described in the upper square "1" below is detected while the freeze frame data in the lower square "2" has been stored, the freeze frame data "2" will be updated by the freeze frame data "1".)

PRIORITY	FREEZE FRAME DATA IN FRAME 1
1	Freeze frame data at initial detection of malfunction among misfire detected (P0300-P0303), fuel system too lean (P0171) and fuel system too rich (P0172)
2	Freeze frame data when a malfunction other than those in "1" above is detected

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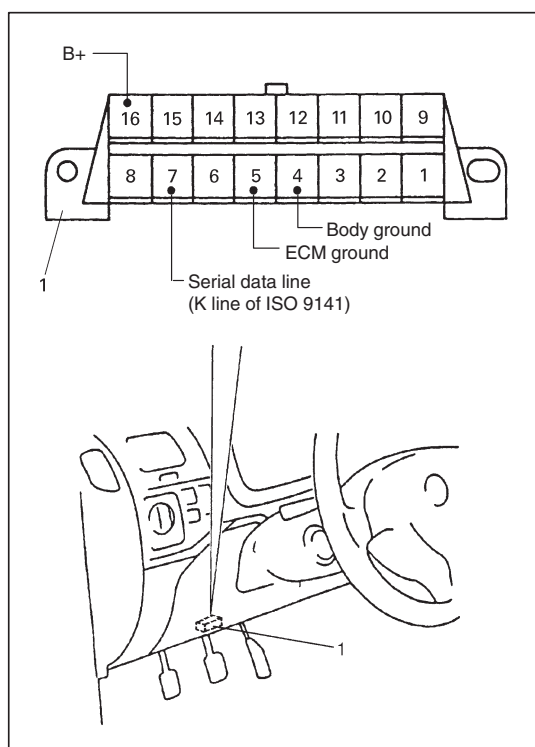
In the 2nd through the 4th frames, the freeze frame data of each malfunction is stored in the order as the malfunction is detected. These data are not updated.

Shown in the table below are examples of how freeze frame data are stored when two or more malfunctions are detected.

FRAME MALFUNCTION DETECTED ORDER		FRAME 1	FRAME 2	FRAME 3	FRAME 4
		FREEZE FRAME DATA to be updated	1st FREEZE FRAME DATA	2nd FREEZE FRAME DATA	3rd FREEZE FRAME DATA
	No malfunction	No freeze frame data			
1	P0400 (EGR) detected	Data at P0400 detection	Data at P0400 detection	—	—
2	P0171 (Fuel system) detected	Data at P0171 detection	Data at P0400 detection	Data at P0171 detection	—
3	P0300 (Misfire) detected	Data at P0171 detection	Data at P0400 detection	Data at P0171 detection	Data at P0300 detection
4	P0301 (Misfire) detected	Data at P0171 detection	Data at P0400 detection	Data at P0171 detection	Data at P0300 detection

Freeze frame data clearance:

The freeze frame data is cleared at the same time as clearance of diagnostic trouble code (DTC).

**Data Link Connector (DLC)**

DLC (1) is in compliance with SAEJ1962 in its installation position, the shape of connector and pin assignment.

Serial data line (K line of ISO 9141) is used for SUZUKI scan tool (Tech-1) or generic scan tool to communicate with ECM (PCM).

PRECAUTION IN DIAGNOSING TROUBLE

- Don't disconnect couplers from ECM (PCM), battery cable from battery, ECM (PCM) ground wire harness from engine or main fuse before confirming diagnostic information (DTC, freeze frame data, etc.) stored in ECM (PCM) memory. Such disconnection will erase memorized information in ECM (PCM) memory.
- Diagnostic information stored in ECM (PCM) memory can be cleared as well as checked by using SUZUKI scan tool (Tech-1) or generic scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
- Priorities for diagnosing troubles.
 If two or more DTCs are stored, proceed to the flow table of the DTC which has detected earliest in the order and follow the instruction in that table.
 If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.
 1. Diagnostic trouble codes (DTCs) other than DTC P0171/P0172 (Fuel system too lean/too rich) and DTC P0300/P0301/P0302/P0303 (Misfire detected)
 2. DTC P0171/P0172 (Fuel system too lean/too rich)
 3. DTC P0300/P0301/P0302/P0303 (Misfire detected)
- Be sure to read "Precautions for Electrical Circuit Service" in Section 0A before inspection and observe what is written there.
- ECM (PCM) Replacement
 When substituting a known-good ECM (PCM), check for following conditions. Neglecting this check may cause damage to a known-good ECM (PCM).
 - Resistance value of all relays, actuators is as specified respectively.
 - MAP sensor and TP sensor are in good condition and none of power circuits of these sensors is shorted to ground.

ENGINE DIAGNOSTIC FLOW TABLE

Refer to the following pages for the details of each step.

STEP	ACTION	YES	NO
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the next page. Was customer complaint analysis performed?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance 1) Check for DTC (including pending DTC) referring to the next page. Is there any DTC(s)?	1) Print DTC and freeze frame data or write them down and clear them by referring to "DTC Clearance" section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the next page. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC Check" section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC Check" section. Is there any DTC(s)?		Go to Step 10.
8	Engine Basic Inspection and Engine Diag. Table 1) Check and repair according to "Engine Basic Check" and "Engine Diag. Table" section. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Trouble shooting for DTC 1) Check and repair according to applicable DTC diag. flow table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the next page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

2. DIAGNOSTIC TROUBLE CODE (DTC)/FREEZE FRAME DATA CHECK, RECORD AND CLEARANCE

First, check DTC (including pending DTC), referring to “DTC check” section. If DTC is indicated, print it and freeze frame data or write them down and then clear them by referring to “DTC clearance” section. DTC indicates malfunction that occurred in the system but does not indicate whether it exists now or it occurred in the past and the normal condition has been restored now. To check which case applies, check the symptom in question according to Step 4 and recheck DTC according to Step 5.

Attempt to diagnose a trouble based on DTC in this step only or failure to clear the DTC in this step will lead to incorrect diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting.

NOTE:

If only Immobilizer DTCs (P1620 – P1623) are indicated in this step, perform trouble diagnosis according to “Diagnosis” in Section 8G.

3. and 4. VISUAL INSPECTION

As a preliminary step, be sure to perform visual check of the items that support proper function of the engine referring to “Visual Inspection” section.

5. TROUBLE SYMPTOM CONFIRMATION

Based on information obtained in Step 1 Customer complaint analysis and Step 2 DTC/freeze frame data check, confirm trouble symptoms. Also, reconfirm DTC according to “DTC Confirmation Procedure” described in each DTC Diagnosis section.

6. and 7. RECHECKING AND RECORD OF DTC/FREEZE FRAME DATA

Refer to “DTC check” section for checking procedure.

8. ENGINE BASIC INSPECTION AND ENGINE DIAGNOSIS TABLE

Perform basic engine check according to the “Engine Basic Inspection Flow Table” first. When the end of the flow table has been reached, check the parts of the system suspected as a possible cause referring to ENGINE DIAGNOSIS FLOW TABLE and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or basic engine check) and repair or replace faulty parts, if any.

9. TROUBLESHOOTING FOR DTC (See each DTC Diag. Flow Table)

Based on the DTC indicated in Step 5 and referring to the applicable DTC diag. flow table in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ECM (PCM) or other part and repair or replace faulty parts.

10. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A and related circuit of DTC recorded in Step 2.

11. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the engine is free from any abnormal conditions. If what has been repaired is related to the DTC, clear the DTC once, perform DTC confirmation procedure and confirm that no DTC is indicated.

CUSTOMER PROBLEM INSPECTION FORM (EXAMPLE)

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

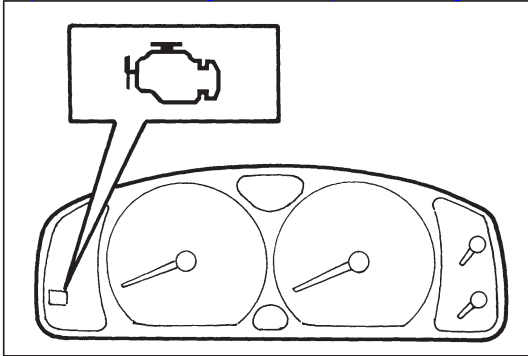
PROBLEM SYMPTOMS	
<input type="checkbox"/> Difficult Starting <input type="checkbox"/> No cranking <input type="checkbox"/> No initial combustion <input type="checkbox"/> No combustion <input type="checkbox"/> Poor starting at (<input type="checkbox"/> cold <input type="checkbox"/> warm <input type="checkbox"/> always) <input type="checkbox"/> Other_____	<input type="checkbox"/> Poor Driveability <input type="checkbox"/> Hesitation on acceleration <input type="checkbox"/> Back fire/ <input type="checkbox"/> After fire <input type="checkbox"/> Lack of power <input type="checkbox"/> Surging <input type="checkbox"/> abnormal knocking <input type="checkbox"/> Other_____
<input type="checkbox"/> Poor Idling <input type="checkbox"/> Poor fast idle <input type="checkbox"/> Abnormal idling speed (<input type="checkbox"/> High <input type="checkbox"/> Low) (r/min.) <input type="checkbox"/> Unstable <input type="checkbox"/> Hunting (r/min. to r/min.) <input type="checkbox"/> Other_____	<input type="checkbox"/> Engine Stall when <input type="checkbox"/> Immediately after start <input type="checkbox"/> Accel. pedal is depressed <input type="checkbox"/> Accel. pedal is released <input type="checkbox"/> Load is applied <input type="checkbox"/> A/C <input type="checkbox"/> Electric load <input type="checkbox"/> P/S <input type="checkbox"/> Other_____
<input type="checkbox"/> OTHERS:	

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental Condition	
Weather	<input type="checkbox"/> Fair <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Snow <input type="checkbox"/> Always <input type="checkbox"/> Other_____
Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold (°F/ °C) <input type="checkbox"/> Always
Frequency	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes (times/ day, month) <input type="checkbox"/> Only once <input type="checkbox"/> Under certain condition
Road	<input type="checkbox"/> Urban <input type="checkbox"/> Suburb <input type="checkbox"/> Highway <input type="checkbox"/> Mountainous (<input type="checkbox"/> Uphill <input type="checkbox"/> Downhill) <input type="checkbox"/> Tarmacadam <input type="checkbox"/> Gravel <input type="checkbox"/> Other_____
Vehicle Condition	
Engine condition	<input type="checkbox"/> Cold <input type="checkbox"/> Warming up phase <input type="checkbox"/> Warmed up <input type="checkbox"/> Always <input type="checkbox"/> Other at starting <input type="checkbox"/> Immediately after start <input type="checkbox"/> Racing without load <input type="checkbox"/> Engine speed (r/min.)
Vehicle condition	During driving: <input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Right hand corner <input type="checkbox"/> Left hand corner <input type="checkbox"/> When shifting (Lever position) <input type="checkbox"/> At stop <input type="checkbox"/> Vehicle speed when problem occurs (km/h, Mile/h) <input type="checkbox"/> Other_____

Malfunction indicator lamp condition	<input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Diagnostic trouble code	First check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code ()
	Second check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code ()

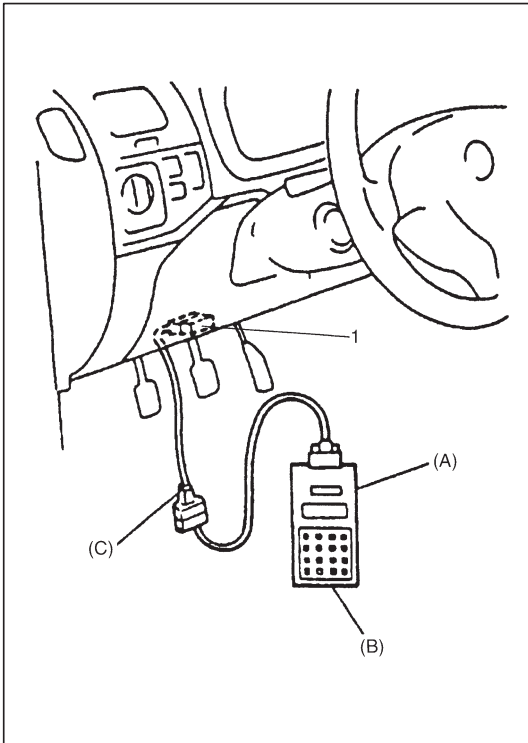
NOTE:

The above form is a standard sample. It should be modified according to conditions characteristic of each market.



MALFUNCTION INDICATOR LAMP (MIL) CHECK

- 1) Turn ON ignition switch (but the engine at stop) and check that MIL lights.
If MIL does not light up (or MIL dims), go to "Diagnostic Flow Table A-1" for troubleshooting.
- 2) Start engine and check that MIL turns OFF.
If MIL remains ON and no DTC is stored in ECM (PCM), go to "Diagnostic Flow Table A-2" for troubleshooting.



DIAGNOSTIC TROUBLE CODE (DTC) CHECK

- 1) Prepare SUZUKI scan tool (Tech-1) or generic scan tool.
- 2) With ignition switch OFF, connect it to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

Special Tool:

- (A): SUZUKI scan tool
- (B): Mass storage cartridge
- (C): 16/14 pin DLC cable

- 3) Turn ignition switch ON and confirm that MIL lights.
- 4) Read DTC, pending DTC and freeze frame data according to instructions displayed on scan tool and print it or write it down. Refer to scan tool operator's manual for further details.
If communication between scan tool and ECM (PCM) is not possible, check if scan tool is communicable by connecting it to ECM (PCM) in another vehicle. If communication is possible in this case, scan tool is in good condition. Then check data link connector and serial data line (circuit) in the vehicle with which communication was not possible.
- 5) After completing the check, turn ignition switch off and disconnect scan tool from data link connector.

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

- 1) Connect SUZUKI scan tool (Tech-1) or generic scan tool to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch ON.
- 3) Erase DTC and pending DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch off and disconnect scan tool from data link connector.

NOTE:

DTC and freeze frame data stored in ECM (PCM) memory are also cleared in following cases. Be careful not to clear them before keeping their record.

- **When power to ECM (PCM) is cut off (by disconnecting battery cable, removing fuse or disconnecting ECM (PCM) connectors for 30 sec. or longer)**
- **When the same malfunction (DTC) is not detected again during 40 engine warm-up cycles.**

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL
P0105	Manifold absolute pressure circuit malfunction	Low pressure-high vacuum-low voltage (or MAP sensor circuit shorted to ground) High pressure-low vacuum-high voltage (or MAP sensor circuit open)	1 driving cycle
P0110	Intake air temp. circuit malfunction	Intake air temp. circuit low input Intake air temp. circuit high input	1 driving cycle
P0115	Engine coolant temp. circuit malfunction	Engine coolant temp. circuit low input Engine coolant temp. circuit high input	1 driving cycle
P0120	Throttle position circuit malfunction	Throttle position circuit low input Throttle position circuit high input	1 driving cycle
P0121	Throttle position circuit performance problem	Poor performance of TP sensor	2 driving cycles
P0130	HO2S circuit malfunction (Sensor-1)	Min. output voltage of HO2S-higher than specification Max. output voltage of HO2S-lower than specification	2 driving cycles
P0133	HO2S circuit slow response (Sensor-1)	Response time of HO2S-1 output voltage between rich and lean is longer than specification.	2 driving cycles
P0134	HO2S circuit no activity detected (Sensor-1)	HO2S-1 output voltage is high or low continuously.	2 driving cycles
P0135	HO2S heater circuit malfunction (Sensor-1)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles
P0136	HO2S circuit malfunction (Sensor-2)	Max. voltage of HO2S-2 is lower than specification or its min. voltage is higher than specification	2 driving cycles
P0141	HO2S heater circuit malfunction (Sensor-2)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON. (or heater circuit or short)	2 driving cycles
P0171	Fuel system too lean	Short term fuel trim or total fuel trim (short and long terms added) is larger than specification for specified time or longer. (fuel trim toward rich side is large.)	2 driving cycles
P0172	Fuel system too rich	Short term fuel trim or total fuel trim (short and long term added) is smaller than specification for specified time or longer. (fuel trim toward lean side is large.)	2 driving cycles
P0300 P0301 P0302 P0303	Random misfire detected Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected	Misfire of such level as to cause damage to three way catalyst	MIL flashing during misfire detection
		Misfire of such level as to deteriorate emission but not to cause damage to three way catalyst	2 driving cycles

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DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL
P0335	Crankshaft position sensor circuit malfunction	No signal during engine running	1 driving cycle
P0340	Camshaft position sensor circuit malfunction	No signal for 2 sec. during engine cranking	1 driving cycle
P0420	Catalyst system efficiency below threshold	Output waveforms of HO2S-1 and HO2S-2 are similar. (Time from output voltage change of HO2S-1 to that of HO2S-2 is shorter than specification.)	2 driving cycles
P0443	EVAP Purge control valve circuit malfunction	Purge control valve circuit is open or shorted to ground	2 driving cycles
P0480	Radiator fan control circuit malfunction	Radiator cooling fan relay terminal voltage is low when cooling temp. is lower than specification	2 driving cycles
P0500	Vehicle speed sensor malfunction	No signal while running in "D" range or during fuel cut at decelerating	2 driving cycles
P0505	Idle control system malfunction	Throttle opening change is small as compared with electrically live time. Throttle valve opening is not within its target range with CTP switch ON or drive voltage exists though ECM (PCM) is not outputting ISC drive command.	1 driving cycle
P0510	Closed throttle position switch malfunction	Switch does not change from ON to OFF (or from OFF to ON) even when vehicle speed reaches over (or below) specification.	2 driving cycle
P1250	Early Fuel Evaporation Heater Circuit Malfunction	Heater monitor terminal voltage is higher than specified value when EFE OFF or it is lower than specified value when EFE ON.	2 driving cycles
P1450	Barometric pressure sensor circuit malfunction	Barometric pressure is lower or higher than specification. (or sensor malfunction)	1 driving cycle
P1451	Barometric pressure sensor performance problem	Difference between manifold absolute pressure (MAP sensor value) and barometric pressure (barometric pressure sensor value) is larger than specification during cranking.	2 driving cycles
P1500	Starter signal circuit malfunction	Starter signal is not inputted from engine cranking till its start and after or it is always inputted	2 driving cycles
P1510	ECM (PCM) backup power source malfunction	No backup power after starting engine	1 driving cycle
P1620	ECU code not registered	Refer to Section 8G.	
P1621	No ECU code transmitted from Immobilizer Control Module		
P1622	Fault in ECM (PCM)		
P1623	ECU code not matched		

FAIL-SAFE TABLE

When any of the following DTCs is detected, ECM (PCM) enters fail-safe mode as long as malfunction continues to exist but that mode is canceled when ECM (PCM) detects normal condition after that.

DTC NO.	DETECTED ITEM	FAIL-SAFE OPERATION
P0105	Manifold absolute pressure circuit malfunction	<ul style="list-style-type: none"> ● ECM (PCM) uses value determined by throttle opening and engine speed. ● ECM (PCM) stops EVAP purge control.
P0110	Intake air temp. circuit malfunction	ECM (PCM) controls actuators assuming that intake air temperature is 20°C (68°F).
P0115	Engine coolant temp. circuit malfunction	<ul style="list-style-type: none"> ● ECM (PCM) controls actuators assuming that engine coolant temperature is 80°C (176°F). ● ECM (PCM) operates radiator fan. ● ECM (PCM) stops A/C and idle speed control.
P0120	Throttle position circuit malfunction	<ul style="list-style-type: none"> ● ECM (PCM) controls actuators assuming that throttle opening is 20°. ● ECM (PCM) stops idle speed control.
P0500	Vehicle speed sensor malfunction	ECM (PCM) stops idle air control.
P1450	Barometric pressure sensor low/high input	ECM (PCM) controls actuators assuming that barometric pressure is 100 kPa (760 mmHg).

VISUAL INSPECTION

Visually check following parts and systems.

INSPECTION ITEM	REFERRING SECTION
<ul style="list-style-type: none"> ● Engine oil ——— level, leakage ● Engine coolant ——— level, leakage ● Fuel ——— level, leakage ● A/T fluid ——— level, leakage ● Air cleaner element ——— dirt, clogging ● Battery ——— fluid level, corrosion of terminal ● Water pump belt ——— tension, damage ● Throttle cable ——— play, installation ● Vacuum hoses of air intake system ——— disconnection, looseness, deterioration, bend ● Connectors of electric wire harness ——— disconnection, friction ● Fuses ——— burning ● Parts ——— installation, bolt ——— looseness ● Parts ——— deformation ● Other parts that can be checked visually <p>Also check following items at engine start, if possible</p> <ul style="list-style-type: none"> ● Malfunction indicator lamp ● Charge warning lamp ● Engine oil pressure warning lamp ● Engine coolant temp. meter ● Fuel level meter ● Tachometer, if equipped ● Abnormal air being inhaled from air intake system ● Exhaust system ——— leakage of exhaust gas, noise ● Other parts that can be checked visually 	<p>Section 0B</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 6E1</p> <p>Section 8</p> <p>Section 6</p> <p>Section 6H</p> <p>Section 8 (section 6A for pressure check)</p> <p>Section 8</p> <p>Section 8</p>

ENGINE BASIC INSPECTION

This check is very important for troubleshooting when ECM (PCM) has detected no DTC and no abnormality has been found in visual inspection.

Follow the flow table carefully.

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check battery voltage. Is it 11 V or more?	Go to Step 3.	Charge or replace battery.
3	Is engine cranked?	Go to Step 4.	Go to "DIAGNOSIS" in Section 6G.
4	Does engine start?	Go to Step 5.	Go to Step 7.
5	Check idle speed as follows. 1) Warm up engine to normal operating temp. 2) Shift transmission to neutral position for M/T ("P" position for A/T). 3) All of electrical loads are switched off. 4) Check engine idle speed with scan tool. See Fig. 1. Is it 750 – 850 r/min.?	Go to Step 6.	Go to "ENGINE DIAGNOSIS TABLE".
6	Check ignition timing as follows. 1) Select "MISC" mode on SUZUKI scan tool and fix ignition timing to initial one. See Fig. 2. 2) Using timing light (1), check initial ignition timing. See Fig. 3. Is it $5^{\circ} \pm 3^{\circ}$ BTDC at specified idle speed?	Go to "ENGINE DIAGNOSIS TABLE".	Check ignition control related parts referring to Section 6F.
7	Check immobilizer system malfunction as follows. 1) Check immobilizer indicator lamp for flashing. Is it flashing when ignition switch is turned to ON position?	Go to "DIAGNOSIS" in Section 8G.	Go to Step 8.
8	Check fuel supply as follows. 1) Check to make sure that enough fuel is filled in fuel tank. 2) Turn ON ignition switch for 2 seconds and then OFF. See Fig. 4. Is fuel return pressure (returning sounds) felt from fuel feed hose (1) when ignition switch is turned ON?	Go to Step 10.	Go to Step 9.
9	Check fuel pump for operating. 1) Was fuel pump operating sound heard from fuel filler for about 2 seconds after ignition switch ON and stop?	Go to "DIAG. FLOW TABLE B-3".	Go to "DIAG. FLOW TABLE B-2".
10	Check ignition spark as follows. 1) Disconnect injector coupler. 2) Remove spark plugs and connect them to high tension cords. 3) Ground spark plugs. 4) Crank engine and check if each spark plug sparks. Is it in good condition?	Go to Step 11.	Go to "DIAGNOSIS" in Section 6F.
11	Check fuel injector for operation as follows. 1) Install spark plugs and connect injector connectors. 2) Check that fuel is injected out in conical shape from fuel injector when cranking. Is it in good condition?	Go to "ENGINE DIAGNOSIS TABLE".	Go to "DIAG. FLOW TABLE B-1".

Fig. 1 for Step 5

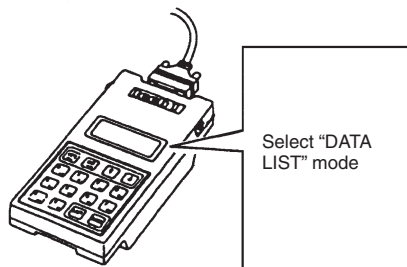


Fig. 2 for Step 6



Fig. 3 for Step 6

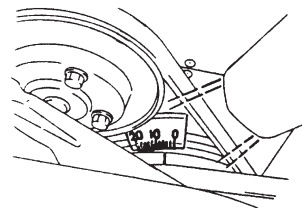


Fig. 4 for Step 8

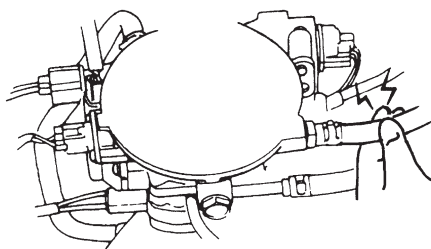
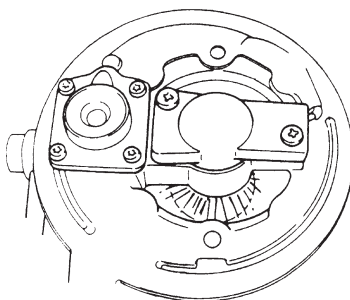


Fig. 5 for Step 11



ENGINE DIAGNOSIS TABLE

Perform troubleshooting referring to following table when ECM (PCM) has detected no DTC and no abnormality has been found in visual inspection and engine basic inspection previously.

Condition	Possible Cause	Referring Item
Hard Starting (Engine cranks OK)	Ignition system out of order <ul style="list-style-type: none"> ● Faulty spark plug ● Leaky high-tension cord ● Loose connection or disconnection of high-tension cords or lead wires ● Faulty ignition coil Fuel system out of order <ul style="list-style-type: none"> ● Dirty or clogged fuel hose or pipe ● Malfunctioning fuel pump ● Air inhaling from intake manifold gasket or throttle body gasket ● Fuel injector resistor malfunction Engine and emission control system out of order <ul style="list-style-type: none"> ● Faulty idle control system ● Faulty ECT sensor or MAP sensor ● Faulty ECM (PCM) Low compression <ul style="list-style-type: none"> ● Poor spark plug tightening or faulty gasket ● Compression leak from valve seat ● Sticky valve stem ● Weak or damaged valve springs ● Compression leak at cylinder head gasket ● Sticking or damaged piston ring ● Worn piston, ring or cylinder Others <ul style="list-style-type: none"> ● Malfunctioning PCV valve 	Spark plugs in Section 6F High-tension cords in Section 6F High-tension cords in Section 6F Ignition coil in Section 6F Diagnostic Flow Table B-3 Diagnostic Flow Table B-3 Fuel injector resistor in Section 6E1 Diagnostic Flow Table P0505 ECT sensor or MAP sensor in Section 6E1 Compression check in Section 6A Spark plugs in Section 6F Valves inspection in Section 6A Valves inspection in Section 6A Valve springs inspection in Section 6A Cylinder head inspection in Section 6A Cylinders, pistons and piston rings inspection in Section 6A Cylinders, pistons and piston rings inspection in Section 6A PCV system in Section 6E1

Condition	Possible Cause	Referring Item
Low oil pressure	<ul style="list-style-type: none"> • Improper oil viscosity • Malfunctioning oil pressure switch • Clogged oil strainer • Functional deterioration of oil pump • Worn oil pump relief valve • Excessive clearance in various sliding parts 	Engine oil and oil filter change in Section 0B Oil pressure switch inspection in Section 8 Oil pan and oil pump strainer cleaning in Section 6A Oil pump in Section 6A Oil pump in Section 6A
Engine noise Note: Before checking mechanical noise, make sure that: <ul style="list-style-type: none"> • Specified spark plug is used. • Specified fuel is used. 	Valve noise <ul style="list-style-type: none"> • Improper valve lash • Worn valve stem and guide • Weak or broken valve spring Piston, ring and cylinder noise <ul style="list-style-type: none"> • Worn piston, ring and cylinder bore Connecting rod noise <ul style="list-style-type: none"> • Worn rod bearing • Worn crank pin • Loose connecting rod nuts • Low oil pressure Crankshaft noise <ul style="list-style-type: none"> • Low oil pressure • Worn bearing • Worn crankshaft journal • Loose bearing cap bolts • Excessive crankshaft thrust play 	Valve lash in Section 6A Valves inspection in Section 6A Valve springs inspection in Section 6A Valves inspection in Section 6A Pistons and cylinders inspection in Section 6A Crank pin and connecting rod bearing inspection in Section 6A Crank pin and connecting rod bearing inspection in Section 6A Connecting rod installation in Section 6A Previously outlined Previously outlined Crankshaft and bearing inspection in Section 6A Crankshaft and bearing inspection in Section 6A Crankshaft inspection in Section 6A Crankshaft thrust play inspection in Section 6A

Condition	Possible Cause	Referring Item
Overheating	<ul style="list-style-type: none"> ● Inoperative thermostat ● Poor water pump performance ● Clogged or leaky radiator ● Improper engine oil grade ● Clogged oil filter or oil strainer ● Poor oil pump performance ● Faulty radiator fan control system ● Dragging brakes ● Slipping clutch ● Blown cylinder head gasket 	Thermostat in Section 6B Water pump in Section 6B Radiator in Section 6B Engine oil and oil filter change in Section 0B Oil pressure check in Section 6A Oil pressure check in Section 6A Radiator fan control system in Section 6E1 Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C Cylinder head in Section 6A
Poor gasoline mileage	Ignition system out of order <ul style="list-style-type: none"> ● Leaks or loose connection of high-tension cord ● Faulty spark plug (improper gap, heavy deposits and burned electrodes, etc.) Engine and emission control system out of order <ul style="list-style-type: none"> ● High idle speed ● Poor performance of TP sensor, ECT sensor or MAP sensor ● Faulty fuel injector ● Faulty fuel injector resistor ● Faulty ECM (PCM) Low compression Others <ul style="list-style-type: none"> ● Poor valve seating ● Dragging brakes ● Slipping clutch ● Thermostat out of order ● Improper tire pressure 	High-tension cords in Section 6F Spark plugs in Section 6F Refer to item "Improper engine idle speed" previously outlined TP sensor, ECT sensor or MAP sensor in Section 6E1 Diagnostic Flow Table B-1 Fuel injector resistor in Section 6E1 Previously outlined Valves inspection in Section 6A Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C Thermostat in Section 6B Refer to Section 3F
Excessive engine oil consumption	Oil leakage <ul style="list-style-type: none"> ● Blown cylinder head gasket ● Leaky camshaft oil seals Oil entering combustion chamber <ul style="list-style-type: none"> ● Sticky piston ring ● Worn piston and cylinder ● Worn piston ring groove and ring ● Improper location of piston ring gap ● Worn or damaged valve stem seal ● Worn valve stem 	Cylinder head in Section 6A Camshaft in Section 6A Piston cleaning in Section 6A Pistons and cylinders inspection in Section 6A Pistons inspection in Section 6A Pistons assembly in Section 6A Valves removal and installation in Section 6A Valves inspection in Section 6A

Condition	Possible Cause	Referring Item
Engine hesitates (Momentary lack of response as accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make vehicle move, as from a stop sign.)	Ignition system out of order <ul style="list-style-type: none"> ● Spark plug faulty or plug gap out of adjustment ● Leaky high-tension cord Fuel system out of order <ul style="list-style-type: none"> ● Fuel pressure out of specification Engine and emission control system out of order <ul style="list-style-type: none"> ● Poor performance of TP sensor, ECT sensor or MAP sensor ● Faulty fuel injector ● Faulty ECM (PCM) Engine overheating Low compression	Spark plugs in Section 6F High-tension cords in Section 6F Diagnostic Flow Table B-3 Trouble diagnosis in Section 6-1 TP sensor, ECT sensor or MAP sensor in Section 6E1 Diagnostic Flow Table B-1 Refer to "Overheating" section Previously outlined
Surge (Engine power variation under steady throttle or cruise. Feels like vehicle speeds up and down with no change in accelerator pedal.)	Ignition system out of order <ul style="list-style-type: none"> ● Leaky or loosely connected high-tension cord ● Faulty spark plug (excess carbon deposits, improper gap, and burned electrodes, etc.) Fuel system out of order <ul style="list-style-type: none"> ● Variable fuel pressure ● Kinky or damaged fuel hose and lines ● Faulty fuel pump (clogged fuel filter) Engine and emission control system out of order <ul style="list-style-type: none"> ● Poor performance of MAP sensor ● Faulty fuel injector ● Faulty ECM (PCM) 	High-tension cords in Section 6F Spark plugs in Section 6F Diagnostic Flow Table B-3 MAP sensor in Section 6E1 Diagnostic Flow Table B-1
Excessive detonation (Engine makes continuously sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.)	Engine overheating Ignition system out of order <ul style="list-style-type: none"> ● Faulty spark plug ● Loose connection of high-tension cord Fuel system out of order <ul style="list-style-type: none"> ● Clogged fuel filter (faulty fuel pump) or fuel lines ● Air inhaling from intake manifold or throttle body gasket Engine and emission control system out of order <ul style="list-style-type: none"> ● Poor performance of ECT sensor or MAP sensor ● Faulty fuel injector ● Faulty ECM (PCM) ● Excessive combustion chamber deposits 	Refer to "Overheating" section Spark plugs in Section 6F High-tension cords in Section 6F Diagnostic Flow Table B-1 or B-2 Trouble diagnosis in Section 6-1 ECT sensor or MAP sensor in Section 6E1 Diagnostic Flow Table B-1 Piston and cylinder head cleaning in Section 6A

Condition	Possible Cause	Referring Item
Engine has no power	Ignition system out of order <ul style="list-style-type: none"> ● Faulty spark plug ● Faulty ignition coil with ignitor ● Leaks, loose connection or disconnection of high-tension cord Engine overheating Fuel system out of order <ul style="list-style-type: none"> ● Clogged fuel hose or pipe ● Malfunctioning fuel pump ● Air inhaling from intake manifold gasket or throttle body gasket Engine and emission control system out of order <ul style="list-style-type: none"> ● Maladjusted accelerator cable play ● Poor performance of TP sensor, ECT sensor or MAP sensor ● Faulty fuel injector ● Faulty ECM (PCM) Low compression Others <ul style="list-style-type: none"> ● Dragging brakes ● Slipping clutch 	Spark plugs in Section 6F Ignition coil in Section 6F High-tension cords in Section 6F Refer to "Overheating" section Diagnostic Flow Table B-3 in Section 6-1 Diagnostic Flow Table B-2 Accelerator cable play in Section 6E1 TP sensor, ECT sensor or MAP sensor in Section 6E1 Diagnostic Flow Table B-1 Previously outlined Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C

Condition	Possible Cause	Referring Item
Improper engine idling or engine fails to idle	Ignition system out of order <ul style="list-style-type: none"> ● Faulty spark plug ● Leaky or disconnected high-tension cord ● Faulty ignition coil with ignitor Fuel system out of order <ul style="list-style-type: none"> ● Fuel pressure out of specification ● Leaky manifold, throttle body, or cylinder head gasket Engine and emission control system out of order <ul style="list-style-type: none"> ● Faulty idle control system ● Faulty evaporative emission control system ● Faulty fuel injector ● Faulty fuel injector resistor ● Poor performance of ECT sensor, TP sensor or MAP sensor ● Faulty ECM (PCM) Engine overheating Low compression Others <ul style="list-style-type: none"> ● Loose connection or disconnection of vacuum hoses ● Malfunctioning PCV valve ● Faulty A/C signal circuit 	Spark plugs in Section 6F High-tension cords in Section 6F Ignition coil in Section 6F Diagnostic Flow Table B-3 in Section 6-1 Diagnostic Flow Table P0505 EVAP control system in Section 6E1 Diagnostic Flow Table B-1 Fuel injector resistor in Section 6E1 ECT sensor, TP sensor or MAP sensor in Section 6E1 Refer to "Overheating" section Previously outlined PCV system in Section 6E1 Diagnostic Flow Table B-4

Condition	Possible Cause	Referring Item
Excessive hydrocarbon (HC) emission or carbon monoxide (CO)	<p>Ignition system out of order</p> <ul style="list-style-type: none"> ● Faulty spark plug ● Leaky or disconnected high-tension cord ● Faulty ignition coil with ignitor <p>Low compression</p> <p>Engine and emission control system out of order</p> <ul style="list-style-type: none"> ● Lead contamination of three way catalytic converter ● Faulty evaporative emission control system ● Fuel pressure out of specification ● Closed loop system (A/F feed back compensation) fails <ul style="list-style-type: none"> – Faulty TP sensor – Poor performance of ECT sensor or MAP sensor ● Faulty injector ● Faulty fuel injector resistor ● Faulty ECM (PCM) <p>Others</p> <ul style="list-style-type: none"> ● Engine not at normal operating temperature ● Clogged air cleaner ● Vacuum leaks 	<p>Spark plugs in Section 6F High-tension cords in Section 6F Ignition coil assembly in Section 6F Refer to “Low compression” section</p> <p>Check for absence of filler neck restrictor EVAP control system in Section 6E1 Diagnostic Flow Table B-3</p> <p>TP sensor in Section 6E1 ECT sensor or MAP sensor in Section 6E1 Diagnostic Flow Table B-1 Fuel injector resistor in Section 6E1</p>
Excessive nitrogen oxides (NOx) emission	<p>Ignition system out of order</p> <ul style="list-style-type: none"> ● Improper ignition timing <p>Engine and emission control system out of order</p> <ul style="list-style-type: none"> ● Lead contamination of catalytic converter ● Fuel pressure out of specification ● Closed loop system (A/F feed back compensation) fails <ul style="list-style-type: none"> – Faulty TP sensor – Poor performance of ECT sensor or MAP sensor ● Faulty injector ● Faulty fuel injector resistor ● Faulty ECM (PCM) 	<p>See section 6F1</p> <p>Check for absence of filler neck restrictor. Diagnostic Flow Table B-3</p> <p>TP sensor in Section 6E1 ECT sensor or MAP sensor in Section 6E1 Diagnostic Flow Table B-1 Fuel injector resistor in Section 6E1</p>

SCAN TOOL DATA

As the data values given below are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference values. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.

Also, conditions in the below table that can be checked by the scan tool are those detected by ECM (PCM) and output from ECM (PCM) as commands and there may be cases where the engine or actuator is not operating (in the condition) as indicated by the scan tool. Be sure to use the timing light to check the ignition timing.

NOTE:

- With the generic scan tool, only star (☆) marked data in the table below can be read.
- When checking the data with the engine running at idle or racing, be sure to shift M/T gear to the neutral gear position and A/T gear to the “Park” position and pull the parking brake fully. Also, if nothing or “no load” is indicated, turn OFF A/C, all electric loads, P/S and all the other necessary switches.

	SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
☆	FUEL SYSTEM B1 (FUEL SYSTEM STATUS)	At specified idle speed after warming up		CLOSED (closed loop)
☆	CALC LOAD (CALCULATED LOAD VALUE)	At specified idle speed with no load after warming up		3 – 5%
		At 2500 r/min with no load after warming up		10 – 18%
☆	COOLANT TEMP. (ENGINE COOLANT TEMP.)	At specified idle speed after warming up		85 – 95°C, 185 – 203°F
☆	SHORT FT BI (SHORT TERM FUEL TRIM)	At specified idle speed after warming up		–20 – +20%
☆	LONG FT BI (LONG TERM FUEL TRIM)	At specified idle speed after warming up		–15 – +15%
☆	MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE)	At specified idle speed with no load after warming up		29 – 48 kPa, 220 – 360 mmHg
☆	ENGINE SPEED	At idling with no load after warming up		Desired idle speed ± 50 r/min
☆	VEHICLE SPEED	At stop		0 km/h, 0 MPH
☆	IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYLINDER)	At specified idle speed with no load after warming up		–1 – 18° BTDC
☆	INTAKE AIR TEMP.	At specified idle speed after warming up		Ambient temp. ^{+35°C (+63°F)} –5°C (–9°F)
☆	MAF (MASS AIR FLOW RATE)	At specified idle speed with no load after warming up		1.0 – 3.0 gm/sec
		At 2500 r/min with no load after warming up		3.0 – 6.0 gm/sec
☆	THROTTLE POS (ABSOLUTE THROTTLE POSITION)	Ignition switch ON/ engine stopped	Throttle valve fully closed	7 – 18%
			Throttle valve fully open	70 – 90%
☆	O2S B1 S1 (HEATED OXYGEN SENSOR-1)	At specified idle speed after warming up		0.05 – 0.95 V
☆	O2S B1 S2 (HEATED OXYGEN SENSOR-2)	When engine is running at 2000 r/min. for 3 min. or longer after warming up.		0 – 0.95 V
☆	O2S FT B1 S1	At specified idle speed after warming up		–20 – +20%
☆	DIS. WITH MIL ON	—		—

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SCAN TOOL DATA	CONDITION		NORMAL CONDITION/ REFERENCE VALUES
DESIRED IDLE (DESIRED IDLE SPEED)	At idling with no load after warming up, M/T at neutral, A/T at "P" range		800 r/min
TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE)	Ignition switch ON/engine stopped	Throttle valve fully closed	More than 0.2 V
		Throttle valve fully open	Less than 4.8 V
INJ PULSE WIDTH (FUEL INJECTION PULSE WIDTH)	At specified idle speed with no load after warming up		0.8 – 2.3 msec.
	At 2500 r/min with no load after warming up		0.8 – 2.3 msec.
IAC FLOW DUTY (IDLE AIR CONTROL FLOW DUTY)	At idling with no load after warming up		20 – 40%
TOTAL FUEL TRIM	At specified idle speed after warming up		–35 – +35%
BATTERY VOLTAGE	Ignition switch ON/engine stop		10 – 14 V
CANIST PRG DUTY (EVAP CANISTER PURGE FLOW DUTY)	At specified idle speed after warming up		0 – 100%
CLOSED THROT POS (CLOSED THROTTLE POSITION)	Throttle valve at idle position		ON
	Throttle valve opens larger than idle position		OFF
FUEL CUT	When engine is at fuel cut condition		ON
	Other than fuel cut condition		OFF
RAD FAN (RADIATOR FAN CONTROL RELAY)	Ignition switch ON	Engine coolant temp.: Lower than 91.5°C (197°F)	OFF
		Engine coolant temp.: 96°C (205°F) or higher	ON
ELECTRIC LOAD	Ignition switch ON/Headlight, small light, heater fan and rear window defogger all turned OFF		OFF
	Ignition switch ON/Headlight, small light, heater fan or rear window defogger turned ON		ON
A/C SWITCH	Engine running after warming up, A/C not operating		OFF
	Engine running after warming up, A/C operating		ON
FUEL TANK LEVEL	_____		0 – 100%
BAROMETRIC PRESS	_____		Display the barometric pressure
FUEL PUMP	Within 3 seconds after ignition switch ON or engine running		ON
	Engine stop at ignition switch ON.		OFF

SCAN TOOL DATA DEFINITIONS**FUEL SYSTEM (FUEL SYSTEM STATUS)**

Air/fuel ratio feedback loop status displayed as either open or closed loop. Open indicates that ECM (PCM) ignores feedback from the exhaust oxygen sensor. Closed indicates final injection duration is corrected for oxygen sensor feedback.

CALC LOAD (CALCULATED LOAD VALUE, %)

Engine load displayed as a percentage of maximum possible load. Value is calculated mathematically using the formula: actual (current) intake air volume ÷ maximum possible intake air volume x 100%.

COOLANT TEMP.**(ENGINE COOLANT TEMPERATURE, °C, °F)**

It is detected by engine coolant temp. sensor

SHORT FT B1 (SHORT TERM FUEL TRIM, %)

Short term fuel trim value represents short term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

LONG FT B1 (LONG TERM FUEL TRIM, %)

Long term fuel trim Value represents long term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE, kPa, inHg)

It is detected by manifold absolute pressure sensor and used (among other things) to compute engine load.

ENGINE SPEED (rpm)

It is computed by reference pulses from crankshaft position sensor.

VEHICLE SPEED (km/h, MPH)

It is computed based on pulse signals from vehicle speed sensor.

IGNITION ADVANCE**(IGNITION TIMING ADVANCE FOR NO.1 CYLINDER, °)**

Ignition timing of NO.1 cylinder is commanded by ECM (PCM). The actual ignition timing should be checked by using the timing light.

INTAKE AIR TEMP. (°C, °F)

It is detected by intake air temp. sensor and used to determine the amount of air passing into the intake manifold as air density varies with temperature.

MAF (MASS AIR FLOW RATE, gm/s, lb/min)

It represents total mass of air entering intake manifold which is computed based on signals from MAP sensor, IAT sensor, TP sensor, etc.

THROTTLE POS**(ABSOLUTE THROTTLE POSITION, %)**

When throttle position sensor is fully closed position, throttle opening is indicated as 0% and 100% full open position.

OXYGEN SENSOR B1 S1**(HEATED OXYGEN SENSOR-1, V)**

It indicates output voltage of HO2S-1 installed on exhaust manifold (pre-catalyst).

OXYGEN SENSOR B1 S2**(HEATED OXYGEN SENSOR-2, V)**

It indicates output voltage of HO2S-2 installed on exhaust pipe (post-catalyst). It is used to detect catalyst deterioration.

DESIRED IDLE (DESIRED IDLE SPEED, rpm)

The Desired Idle Speed is an ECM (PCM) internal parameter which indicates the ECM (PCM) requested idle. If the engine is not running, this number is not valid.

TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE, V)

The Throttle Position Sensor reading provides throttle valve opening information in the form of voltage.

INJ PULSE WIDTH**(FUEL INJECTION PULSE WIDTH, msec.)**

This parameter indicates time of the injector drive (valve opening) pulse which is output from ECM (PCM) (but injector drive time of NO.1 cylinder for multiport fuel injection).

IAC FLOW DUTY (IDLE AIR (SPEED) CONTROL DUTY, %)

This parameter indicates opening of the throttle valve in terms of percentage to opening controllable by the ISC actuator.

TOTAL FUEL TRIM (%)

The value of Total Fuel Trim is obtained by putting values of short Term Fuel Trim and Long Term Fuel Trim together. This value indicates how much correction is necessary to keep the stoichiometric air/fuel mixture.

BATTERY VOLTAGE (V)

This parameter indicates battery positive voltage inputted from main relay to ECM (PCM).

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CANISTER PURGE DUTY (EVAP CANISTER PURGE FLOW DUTY, %)

This parameter indicates valve ON (valve open) time rate within a certain set cycle of EVAP purge solenoid valve which controls the amount of EVAP purge.

0% means that the purge valve is completely closed while 100% is a fully open valve.

CLOSED THROTTLE POSITION (ON/OFF)

This parameter will read ON when throttle valve is fully closed, or OFF when the throttle is not fully closed.

FUEL CUT (ON/OFF)

ON : Fuel being cut (output signal to injector is stopped)

OFF : Fuel not being cut

RAD FAN

(RADIATOR FAN CONTROL RELAY, ON/OFF)

ON : Command for radiator fan control relay operation being output.

OFF : Command for relay operation not being output.

ELECTRIC LOAD (ON/OFF)

ON : Headlight, small light, heater fan or rear window defogger ON signal inputted.

OFF : Above electric loads all turned OFF.

A/C SWITCH (ON/OFF)

ON : Command for A/C operation being output from ECM (PCM) to A/C amplifier.

OFF : Command for A/C operation not being output.

FUEL TANK LEVEL (%)

This parameter indicates approximate fuel level in the fuel tank. As the detectable range of the fuel level sensor is set as 0 to 100%, however, with some models whose fuel tank capacity is smaller, the indicated fuel level may be only 70% even when the fuel tank is full.

PSP SWITCH (ON/OFF)

ON : PSP switch detects P/S operation (high PS pressure).

OFF : PSP switch not detects P/S operation.

BAROMETRIC PRESS (kPa, inHg)

This parameter represents a measurement of barometric air pressure and is used for altitude correction of the fuel injection quantity and ISC actuator control.

FUEL PUMP (ON/OFF)

ON is displayed when the ECM (or PCM) activates the fuel pump via the fuel pump relay switch.

VSS (A/T) (km/h, MPH)

If is computed by using pulse signals from vehicle (output) speed sensor on automatic transmission.

TRANS RANGE (TRANSMISSION RANGE SENSOR, P, R, N, D, 2 OR L)

It is indicated transmission range detected by transmission range sensor.

SHIFT SOL 1-CON (SHIFT SOLENOID-1, ON/OFF)

ON : ON command being output to shift solenoid-1

OFF : ON command not being output.

SHIFT SOL 2-CON (SHIFT SOLENOID-2, ON/OFF)

ON : ON command being output to shift solenoid-2

OFF : ON command not being output.

SHIFT SOL 1-MON (SHIFT SOLENOID-1, ON/OFF)

The monitor result of the shift solenoid-1 circuit is displayed.

ON : Electricity being passed to shift solenoid-1 or circuit open.

OFF : Electricity not being passed or circuit short.

SHIFT SOL 2-MON (SHIFT SOLENOID-2, ON/OFF)

The monitor result of the shift solenoid-2 circuit is displayed.

ON : Electricity being passed to shift solenoid-2 or circuit open.

OFF : Electricity not being passed or circuit short.

THROT POS LEVEL (THROTTLE POSITION LEVEL FOR A/T, "0", "1", "2", "3", "4", "5", "6" or "7")

This parameter indicates which level (zone) the throttle valve opening is in. The throttle opening is divided into 8 levels (zones) from "0" (about idle position) to "7" (about full open) and signals are assigned to each opening level (zone). ECM (PCM) control the automatic gear change of the automatic transmission by using these signals according to the signal from the TP sensor.

GEAR POSITION

This parameter indicates the A/T gear position which is computed on signals from the Transmission Range Switch, VSS, TP Sensor, and so forth.

INSPECTION OF ECM (PCM) AND ITS CIRCUITS

ECM (PCM) and its circuits can be checked at ECM (PCM) wiring couplers by measuring voltage and resistance.

CAUTION:

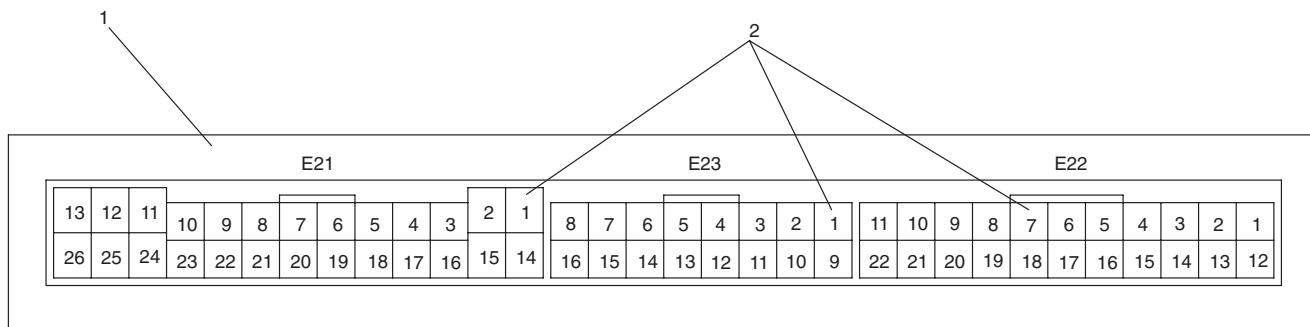
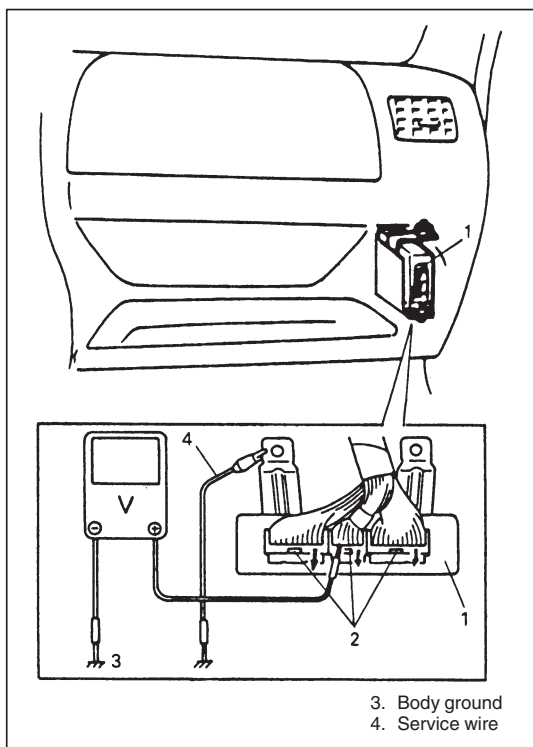
ECM (PCM) cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM (PCM) with coupler disconnected from it.

Voltage Check

- 1) Remove ECM (PCM) (1) from body referring to Section 6E1.
- 2) Check voltage at each terminal of couplers (2) connected.

NOTE:

As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.



1. ECM (PCM)
2. ECM (PCM) couplers
(Viewed from harness side)

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	TER-MINAL	WIRE COLOR	CIRCUIT	STANDARD VOLTAGE	CONDITION
CONNECTOR "E21"	1	BLK	ECM (PCM) ground	—	—
	2	BLK/RED	Power source	10 – 14 V	Ignition switch ON
	3	—	Blank	—	—
	4	—	Blank	—	—
	5	—	Blank	—	—
	6	—	Blank	—	—
	7	RED/BLK	EVAP canister purge valve	10 – 14 V	Ignition switch ON
	8	—	Blank	—	—
	9	—	Blank	—	—
	10	YEL/BLU	Igniter (IGT)	—	—
	11	GRN/WHT	ISC actuator	—	—
	12	BLU/WHT	Fuel injector	10 – 14 V	Ignition switch ON
	13	BLK/YEL	Ground	—	—
	14	WHT/BLU	Power source for back-up	10 – 14 V	Ignition switch ON and OFF
	15	BLK/RED	Power source	10 – 14 V	Ignition switch ON
	16	BLU/RED	ISC actuator relay	0 – 1.0 V	Ignition switch ON
	17	PPL/WHT	Malfunction indicator lamp	0 – 2.0 V	Ignition switch ON
				10 – 14 V	When engine running
	18	—	Blank	—	—
	19	BLU/RED	Heater of H02S-2	10 – 14 V	Ignition switch ON
	20	BLU	Radiator fan control relay	10 – 14 V	Ignition switch ON, Engine coolant temp: Below 91.5°C (197°F)
				0.3 – 1.0 V	Ignition switch ON, Engine coolant temp: 96.0°C (205°F) or higher
	21	GRN	Fuel pump relay	0 – 1.3 V	For 2 seconds after ignition switch ON
				10 – 14 V	After the above time
	22	BLU/BLK	Main relay	0.4 – 1.5 V	Ignition switch ON
	23	ORN	A/C compressor magnet clutch relay	10 – 14 V	Ignition switch ON
	24	GRN/RED	ISC actuator	—	—
	25	WHT/BLK	EFE heater relay	10 – 14 V	Ignition switch ON
	26	BLK/YEL	Ground	—	—

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	TER-MINAL	WIRE COLOR	CIRCUIT	STANDARD VOLTAGE	CONDITION
CONNECTOR "E23"	1	WHT/GRN	Power source for sensor	4.75 – 5.25 V	Ignition switch ON
	2	WHT	Camshaft position sensor (+)	—	—
	3	PNK	Crankshaft position sensor (+)	—	—
	4	YEL/RED	Closed throttle position switch (In ISC actuator)	0 – 1 V	Ignition switch ON, ISC actuator plunger is in contact with throttle lever screw
				4 – 6 V	Ignition switch ON Plunger is apart from throttle lever screw
	5	LT GRN/RED	Manifold absolute pressure sensor	3.3 – 4.0 V	Ignition switch ON Barometric pressure: 100 kPa, 760 mmHg
	6	GRY	Throttle position sensor	0.2 – 1.0 V	Ignition switch ON Throttle valve at idle position
				2.8 – 4.8 V	Ignition switch ON Throttle valve at full open position
	7	YEL/GRN	Engine coolant temp. sensor	0.55 – 0.95 V	Ignition switch ON Engine coolant temp.: 80°C (176°F)
	8	YEL	Heater of H02S-1	10 – 14 V	Ignition switch ON
	9	BRN/WHT	Ground for sensors	—	—
	10	BLK	Camshaft position sensor (–)	—	—
	11	BLU	Crankshaft position sensor (–)	—	—
	12	RED/WHT	EFE heater monitor	0 – 1 V	Heater relay OFF
				10 – 14 V	Heater relay ON
	13	RED	Heated oxygen sensor-1	Refer to DTC flow chart	
	14	LT GRN	Intake air temp. sensor	2.0 – 2.7 V	Ignition switch ON Sensor ambient temp. (Intake air temp): 20°C (68°F)
	15	PNK/BLU	Electric load signal (–) (Blower fan switch signal)	0 – 2 V	Ignition switch ON Blower fan switch ON
				10 – 14 V	Ignition switch ON Blower fan switch OFF
	16	BLK/YEL	Engine start switch (Engine start signal)	6 – 12 V	While engine cranking
				0 – 1 V	Other than above

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	TER-MINAL	WIRE COLOR	CIRCUIT	STANDARD VOLTAGE	CONDITION
CONNECTOR "E22"	1	BRN/YEL	Tachometer signal	0 – 1 V	Ignition switch ON
	2	PPL	Vehicle speed sensor	Indicator deflection repeated 0 V and 4 – 6 V	Ignition switch ON Front left tire turned slowly with front right tire locked
	3	—	Blank	—	—
	4	—	Blank	—	—
	5	—	Blank	—	—
	6	GRN/WHT	Stop lamp switch	0 V	Ignition switch ON, Stop lamp switch OFF
				10 – 14 V	Ignition switch ON, Stop lamp switch ON
	7	—	Blank	—	—
	8	BLU	Heated oxygen sensor-2	Refer to DTC flow chart	
	9	GRN/RED	A/C evaporator temp. sensor	—	—
	10	YEL/RED	Fuel level sensor (gauge)	0 – 2 V	Ignition switch ON, fuel tank fully filled
				4.5 – 7.5 V	Ignition switch ON, fuel tank emptied
	11	—	Blank	—	—
	12	WHT/BLK	Data link connector	10 – 14 V	Ignition switch ON
	13	—	Blank	—	—
	14	—	Blank	—	—
	15	—	Blank	—	—
	16	—	Blank	—	—
	17	—	Blank	—	—
	18	RED/WHT	Electric load signal (+)	0 – 1 V	Ignition switch ON Headlight, small light and rear window defogger turned OFF
				10 – 14 V	Ignition switch ON Headlight, small light or rear window defogger turned ON
	19	LT GRN/RED	A/C (input) signal	10 – 14 V	Ignition switch ON A/C switch OFF
				0 – 2 V	Ignition switch ON A/C switch ON
	20	BLK/WHT	Ignition switch	10 – 14 V	Ignition switch ON
	21	—	Blank	—	—
	22	BRN/WHT	Ground for sensor	—	—

RESISTANCE CHECK

- 1) Disconnect ECM (PCM) couplers from ECM (PCM) with ignition switch OFF.

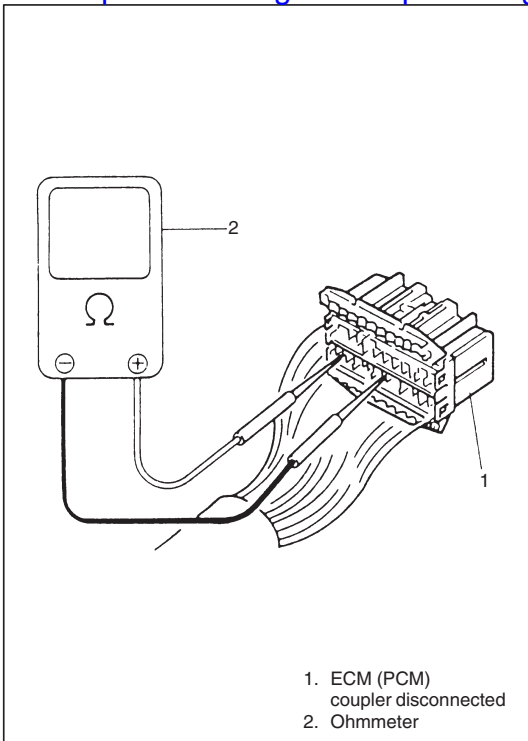
CAUTION:

Never touch terminals of ECM (PCM) itself or connect voltmeter or ohmmeter.

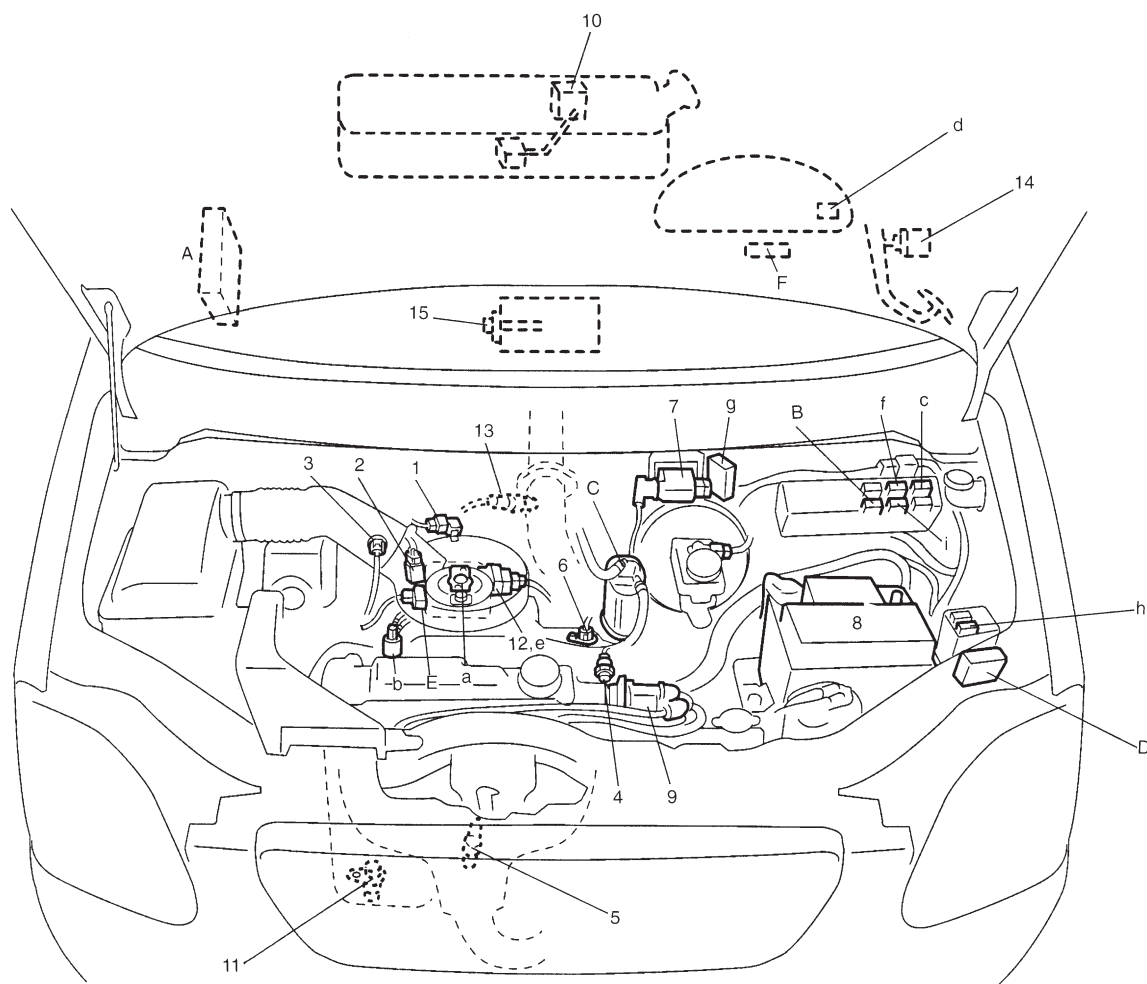
- 2) Check resistance between each terminal of couplers disconnected.

CAUTION:

- Be sure to connect ohmmeter probe from wire harness side of coupler.
- Be sure to turn OFF ignition switch for this check.
- Resistance in table below represents that when parts temperature is 20°C (68°F).



TERMINALS	CIRCUIT	STANDARD RESISTANCE
E23-8 to E22-20	H02S-1 heater	11.7 – 14.3 Ω
E21-19 to E22-20	H02S-2 heater	11.7 – 14.3 Ω
E21-12 to E21-2/15	Fuel injector	2.4 – 3.6 Ω
E21-7 to E21-2/15	EVAP canister purge valve	30 – 34 Ω
E21-21 to E22-20	Fuel pump relay	100 – 120 Ω
E21-16 to E21-2/15	ISC actuator relay	100 – 120 Ω
E21-25 to E21-2/15	EFE heater relay	100 – 120 Ω
E21-20 to E21-2/15	Radiator fan control relay	100 – 120 Ω
E21-22 to E21-14	Main relay	100 – 120 Ω
E21-1 to Body ground	Ground	Continuity
E21-13 to Body ground	Ground	Continuity
E21-26 to Body ground	Ground	Continuity

COMPONENT LOCATION**INFORMATION SENSORS**

1. MAP sensor
2. TP sensor
3. IAT sensor
4. ECT sensor
5. Heated oxygen sensor-1
6. VSS
7. Ignition coil
8. Battery
9. CMP sensor (in Distributor)
10. Fuel level sensor (gauge) (in fuel tank)
11. CKP sensor
12. CTP switch (in ISC actuator)
13. Heated oxygen sensor-2
14. Stop lamp switch
15. A/C EVAP temp. sensor (if equipped)

CONTROL DEVICES

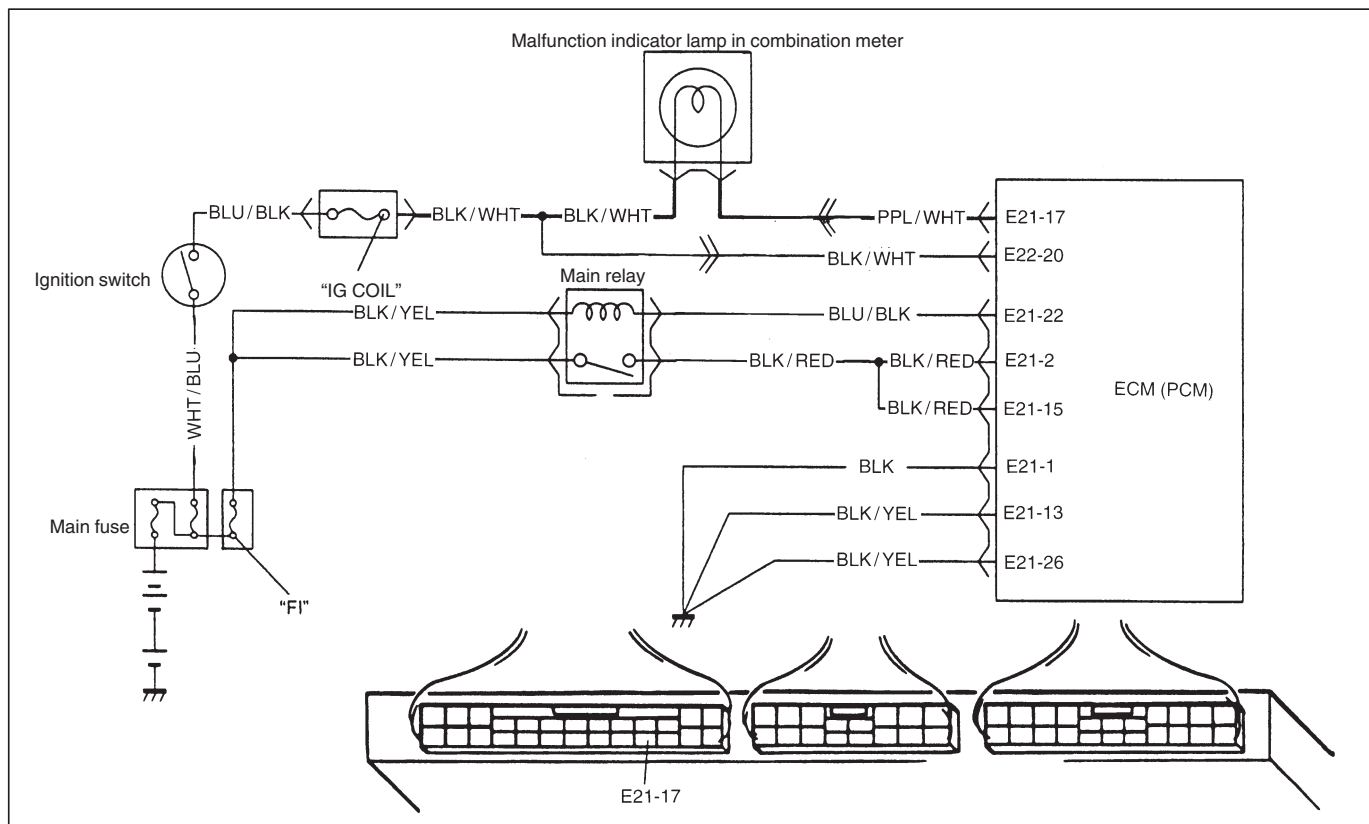
- a: Fuel injector
- b: EVAP canister purge valve
- c: Fuel pump relay
- d: Malfunction indicator lamp
- e: ISC actuator
- f: Radiator fan control relay
- g: Igniter
- h: EFE heater relay
- i: ISC actuator relay

OTHERS

- A: ECM (PCM)
- B: Main relay
- C: EVAP canister
- D: Injector resistor
- E: EFE heater
- F: Data link connector

TABLE A-1 MALFUNCTION INDICATOR LAMP CIRCUIT CHECK – LAMP DOES NOT COME “ON” AT IGNITION SWITCH ON (BUT ENGINE AT STOP)

CIRCUIT DESCRIPTION



When the ignition switch is turned ON, ECM (PCM) causes the main relay to turn ON (close the contact point). Then, ECM (PCM) being supplied with the main power, turns ON the malfunction indicator lamp (MIL). When the engine starts to run and no malfunction is detected in the system, MIL goes OFF but if a malfunction was or is detected, MIL remains ON even when the engine is running.

INSPECTION

STEP	ACTION	YES	NO
1	MIL Power Supply Check 1) Turn ignition switch ON. Do other indicator/warning lights in combination meter comes ON?	Go to Step 2.	"IG COIL" fuse blown, main fuse blown, ignition switch malfunction, "BLK/WHT" circuit between "IG COIL" fuse and combination meter or poor coupler connection at combination meter.
2	ECM (PCM) Power and Ground Circuit Check Does engine start?	Go to Step 3.	Go to TABLE A-3 ECM (PCM) POWER AND GROUND CIRCUIT CHECK. If engine is not cranked, go to DIAGNOSIS in SECTION 6G.
3	MIL Circuit Check 1) Turn ignition switch OFF and disconnect connectors from ECM (PCM). 2) Check for proper connection to ECM (PCM) at terminal E21-17. 3) If OK, then using service wire, ground terminal E21-17 in connector disconnected. Does MIL turn on at ignition switch ON?	Substitute a known-good ECM (PCM) and recheck.	Bulb burned out or "PPL/WHT" wire circuit open.

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TABLE A-2 MALFUNCTION INDICATOR LAMP CIRCUIT CHECK – LAMP REMAINS “ON” AFTER ENGINE STARTS

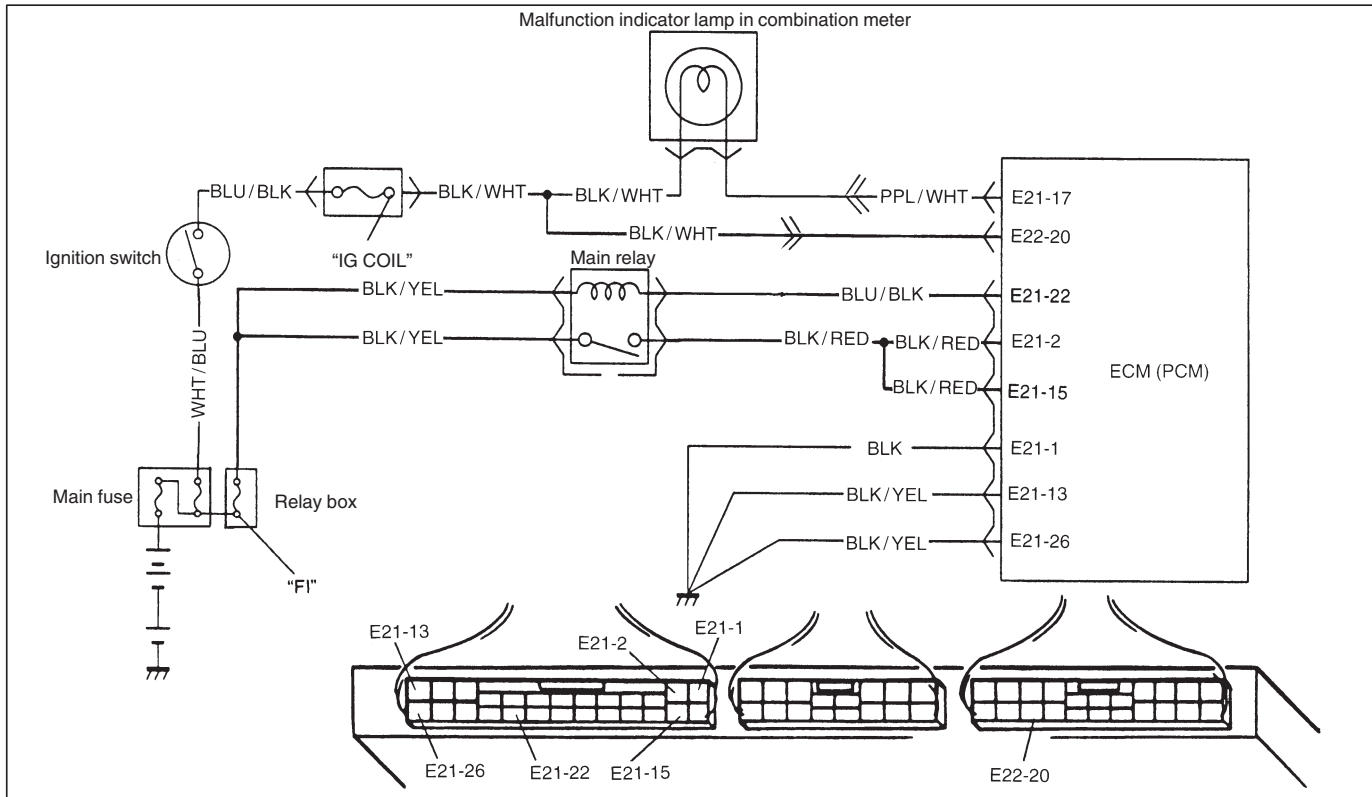
WIRING DIAGRAM/CIRCUIT DESCRIPTION – Refer to table A-1.

INSPECTION

STEP	ACTION	YES	NO
1	Diagnostic Trouble Code (DTC) check 1) Check DTC referring to DTC CHECK section. Is there any DTC(s)?	Go to Step 2 of ENGINE DIAG. FLOW TABLE.	Go to Step 2.
2	DTC check Start engine and recheck DTC while engine running. Is there any DTC(s)?		Go to Step 3.
3	MIL Circuit check 1) Turn OFF ignition switch. 2) Disconnect connectors from ECM (PCM). Does MIL turn ON at ignition switch ON?	“PPL/WHT” wire circuit shorted to ground.	Substitute a known-good ECM (PCM) and recheck.

TABLE A-3 ECM (PCM) POWER AND GROUND CIRCUIT CHECK – MIL DOESN'T LIGHT AT IGNITION SWITCH ON AND ENGINE DOESN'T START THOUGH IT IS CRANKED UP

CIRCUIT DESCRIPTION



When the ignition switch turned ON, the main relay turns ON (the contact point closes) and the main power is supplied to ECM (PCM).

INSPECTION

STEP	ACTION	YES	NO
1	Main Relay Operating Sound Check Is operating sound of main relay heard at ignition switch ON?	Go to Step 5.	Go to Step 2.
2	Main Relay Check 1) Turn OFF ignition switch and remove main relay (1). 2) Check for proper connection to main relay (1) at terminal C and D. 3) Check resistance between each two terminals. See Fig. 1 and 2. Between terminals A and B: Infinity Between terminals C and D: 100 – 120 Ω 4) Check that there is continuity between terminals A and B when battery is connected to terminals C and D. See Fig. 3. Is main relay in good condition?	Go to Step 3.	Replace main relay.
3	Fuse Check Is "FI" fuse (2) in good condition? See Fig. 4.	Go to Step 4.	Check for short in circuits connected to this fuse.
4	ECM (PCM) Power Circuit Check 1) Turn OFF ignition switch, disconnect connectors from ECM (PCM) and install main relay. 2) Check for proper connection to ECM (PCM) at terminals E22-20, E21-2, E21-15 and E21-22. 3) If OK, then measure voltage between terminal E22-20 and ground, E21-22 and ground with ignition switch ON. Is each voltage 10 – 14 V?	Go to Step 5.	"BLK/WHT", "BLK/YEL" or "BLU/BLK" circuit open.

STEP	ACTION	YES	NO
5	ECM (PCM) Power Circuit Check 1) Using service wire, ground terminal E21-22 and measure voltage between terminal E21-2 and ground at ignition switch ON. Is it 10 – 14 V?	Check ground circuits “BLK” and “BLK/YEL” for open. If OK, then substitute a known-good ECM (PCM) and recheck.	Go to Step 6.
6	Is operating sound of main relay heard in Step 1?	Go to Step 7.	“BLK/YEL” or “BLK/RED” wire open.
7	Main Relay Check 1) Check main relay according to procedure in Step 2. Is main relay in good condition?	“BLK/YEL” or “BLK/RED” wire open.	Replace main relay.

Fig. 1 for Step 2

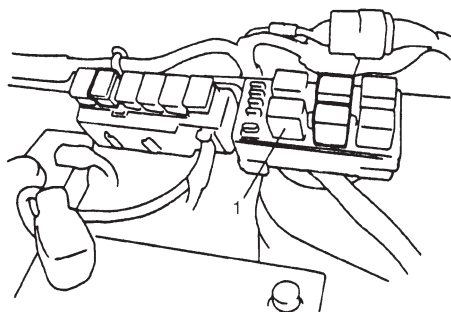


Fig. 2 for Step 2

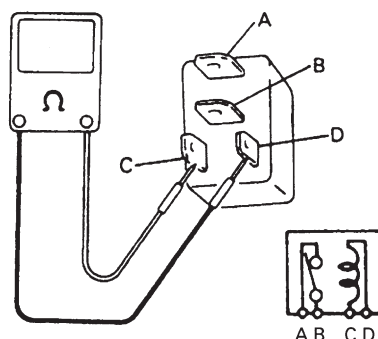


Fig. 3 for Step 2

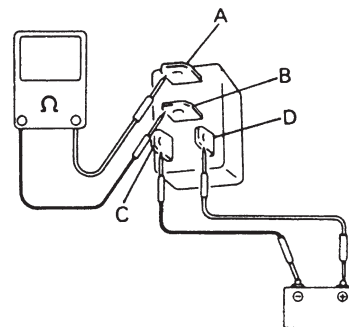
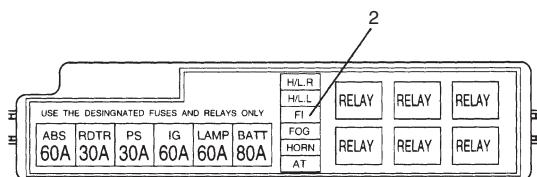
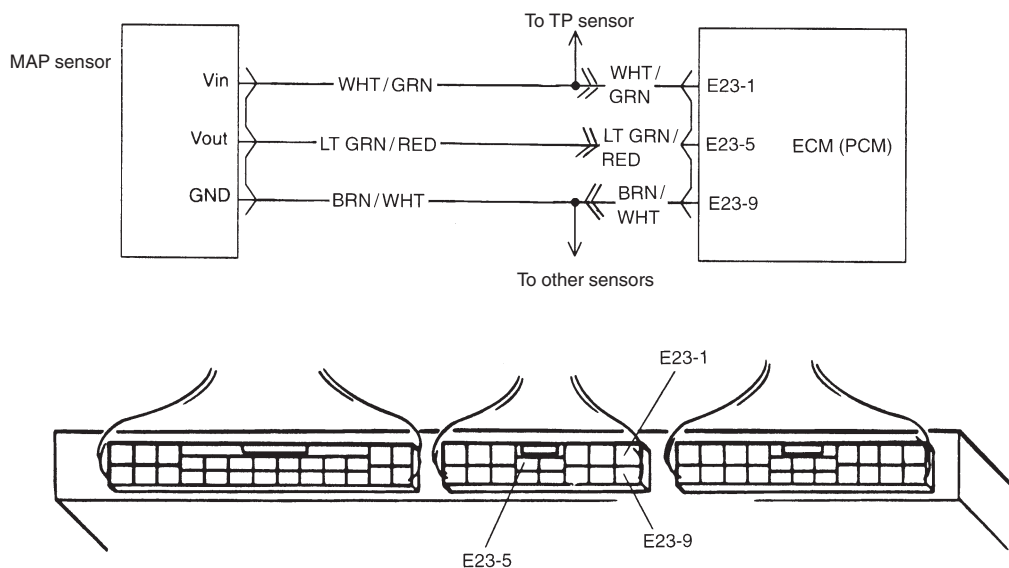


Fig. 4 for Step 3



DTC P0105 MANIFOLD ABSOLUTE PRESSURE (MAP) CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> MAP: 5 kPa, 37.5 mmHg or less (Low pressure – High vacuums – Low voltage) or MAP: 130 kPa, 975 mmHg or more (High pressure – Low vacuums – High voltage) 	<ul style="list-style-type: none"> “BRN/WHT” circuit open “WHT/GRN” circuit open or shorted to ground “LT GRN/RED” circuit open or shorted to ground MAP sensor malfunction ECM (PCM) malfunction

NOTE:

- When DTC P0105, and/or P0120, P0510 are indicated together, it is possible that “WHT/GRN” circuit is open.
- When DTC P0105, P0110, P0115 and/or P0120 are indicated together, it is possible that “BRN/WHT” circuit is open.

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check MAP Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake manifold pressure. See Fig. 1. Is it 130 kPa or more or 5 kPa or less?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.
3	Check Wire Harness. 1) Disconnect MAP sensor connector with ignition switch OFF. 2) Check for proper connection of MAP sensor at "LT GRN/RED" and "BRN/WHT" wire terminals. 3) If OK, then with ignition switch ON, check voltage at each of "WHT/GRN" and "LT GRN/RED" wire terminals. See Fig. 2. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	"WHT/GRN" wire open or shorted to ground circuit or shorted to power circuit, "LT GRN/RED" wire open or shorted to ground, poor E23-5 connection or E23-1 connection. If wire and connection are OK, confirm that MAP sensor is normal and then substitute a known-good ECM (PCM) and recheck. NOTE: When battery voltage is applied to "WHT/GRN" wire, it is possible that MAP sensor is also faulty.
4	Check MAP sensor according to "MAP Sensor Individual Check" in Section 6E1. Is it in good condition?	"WHT/GRN" wire shorted to "LT GRN/RED" wire, "BRN/WHT" wire open, poor E23-9 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace MAP sensor.

Fig. 1 for Step 2

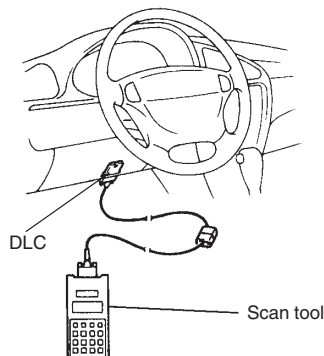
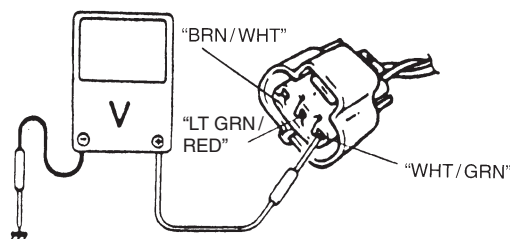
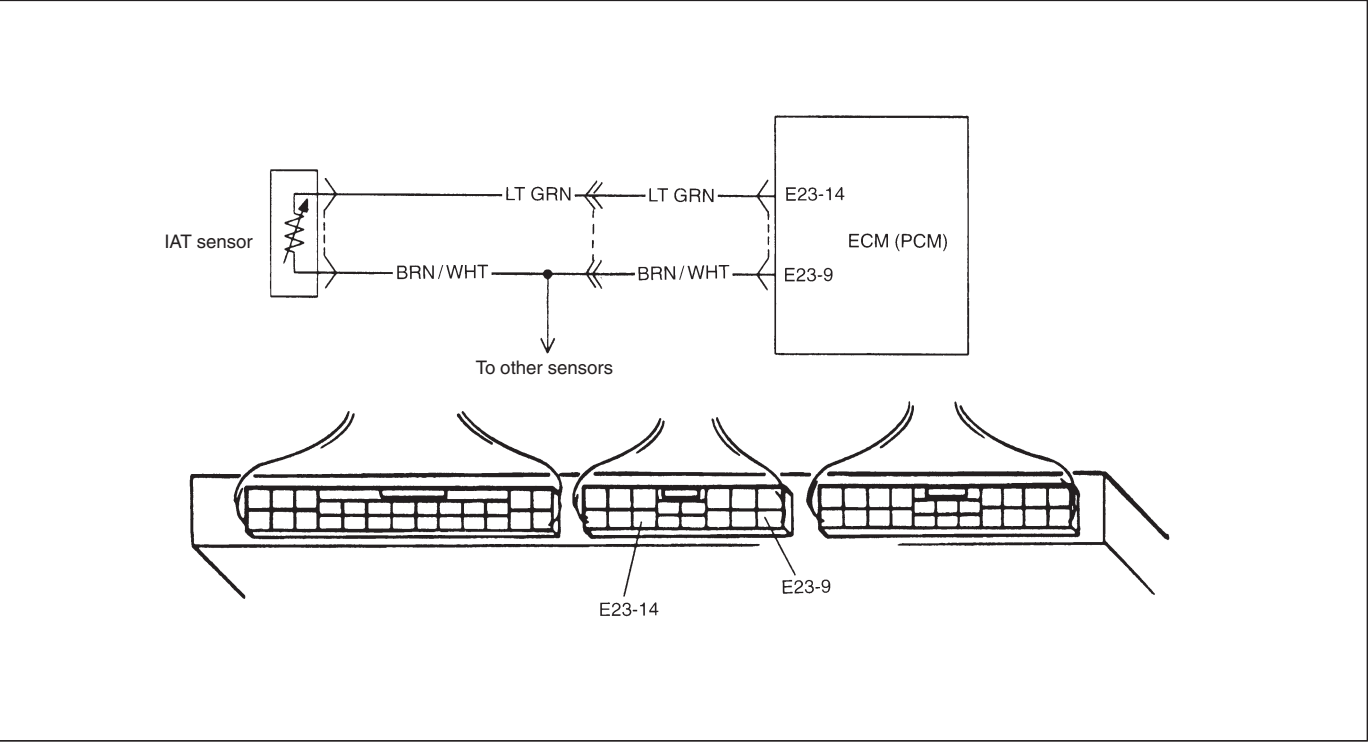


Fig. 2 for Step 3



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DTC P0110 INTAKE AIR TEMP. (IAT) CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">● Low intake air temperature (High voltage-High resistance) or● High intake air temperature (Low voltage-Low resistance)	<ul style="list-style-type: none">● “LT GRN” circuit open or shorted to power● “BRN/WHT” circuit open● IAT sensor malfunction● ECM (PCM) malfunction

- NOTE:**
- When DTC P0105, P0110, P0115 and P0120 are indicated together, it is possible that “BRN/WHT” circuit is open.
 - Before inspecting, be sure to check that ambient temperature is higher than -40°C (-40°F).

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode no scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check IAT Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake air temp. displayed on scan tool. See Fig. 1. Is -40°C (-40°F) or 119°C (246°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.
3	Check Wire Harness. 1) Disconnect IAT sensor connector with ignition switch OFF. 2) Check for proper connection to IAT sensor at "BRN/WHT" and "LT GRN" wire terminals. 3) If OK, then with ignition switch ON, is voltage applied to "LT GRN" wire terminal about 4 – 6 V? See Fig. 2.	Go to Step 4.	"LT GRN" wire open or shorted to power, or poor E23-14 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.
4	Does scan tool indicate -40°C (-40°F) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness. 1) Check intake air temp. displayed on scan tool with ignition switch ON. Is -40°C (-40°F) indicated?	Replace IAT sensor.	"LT GRN" wire shorted to ground. If wire is OK, substitute a known-good ECM (PCM) and recheck.
6	Check Wire Harness. 1) Using service wire, connect IAT sensor connector terminals. 2) Check intake air temp. displayed on scan tool with ignition switch ON. See Fig. 3. Is 119°C (246°F) indicated?	Replace IAT sensor.	"BRN/WHT" wire open or poor E23-9 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.

Fig. 1 for Step 2

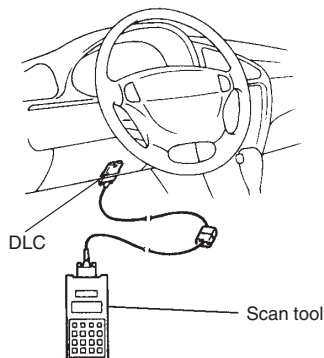


Fig. 2 for Step 3

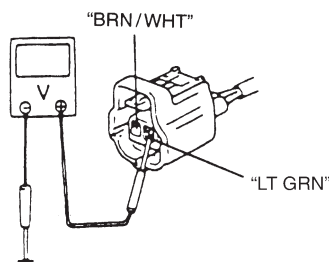
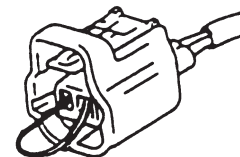
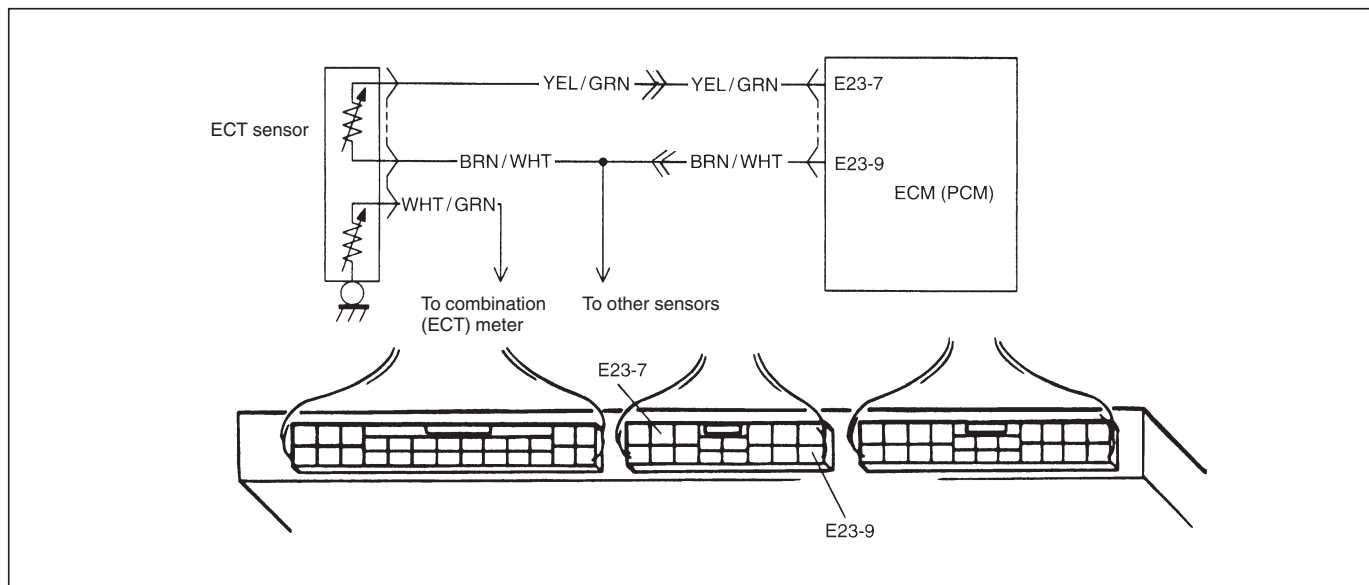


Fig. 3 for Step 6



DTC P0115 ENGINE COOLANT TEMPERATURE (ECT) CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Low engine coolant temperature (High voltage-High resistance) or • High engine coolant temperature (Low voltage-Low resistance) 	<ul style="list-style-type: none"> • “YEL/GRN” circuit open or shorted to power • “BRN/WHT” circuit open • ECT sensor malfunction • ECM (PCM) malfunction

NOTE:

Before inspecting, be sure to check that coolant temp. meter in combination meter indicates normal operating temperature (Engine is not overheating).

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check ECT Sensor and Its Circuit. 1) Connect scan tool with ignition switch OFF. 2) Turn ignition switch ON. 3) Check engine coolant temp. displayed on scan tool. See Fig. 1. Is -40°C (-40°F) or 119°C (246°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0 A.
3	Check Wire Harness. 1) Disconnect ECT sensor connector with ignition switch OFF. 2) Check for proper connection to ECT sensor at "YEL/GRN" and "BRN/WHT" wire terminals. 3) If OK, then with ignition switch ON, is voltage applied to "YEL/GRN" wire terminal about 4 – 6 V? See Fig. 2.	Go to Step 4.	"YEL/GRN" wire open or shorted to power, or poor E23-7 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Does scan tool indicate -40°C (-40°F) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness. 1) Check engine coolant temp. displayed on scan tool with ignition switch ON. Is -40°C (-40°F) indicated?	Replace ECT sensor.	"YEL/GRN" wire shorted to ground. If wire is OK, substitute a known-good ECM and recheck.
6	Check Wire Harness. 1) Using service wire, connect ECT sensor connector terminals. See Fig. 3. 2) Turn ignition switch ON and check engine coolant temp. displayed on scan tool. Is 119°C (246°F) indicated?	Replace ECT sensor.	"BRN/WHT" wire open or poor E23-9 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.

Fig. 1 for Step 2

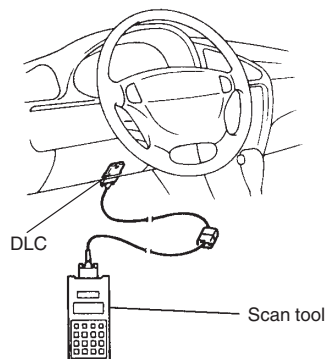


Fig. 2 for Step 3

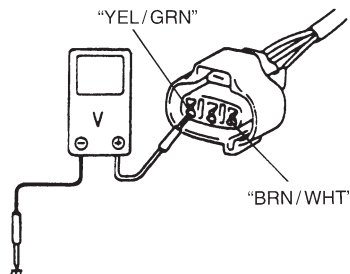
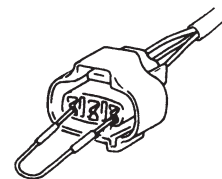
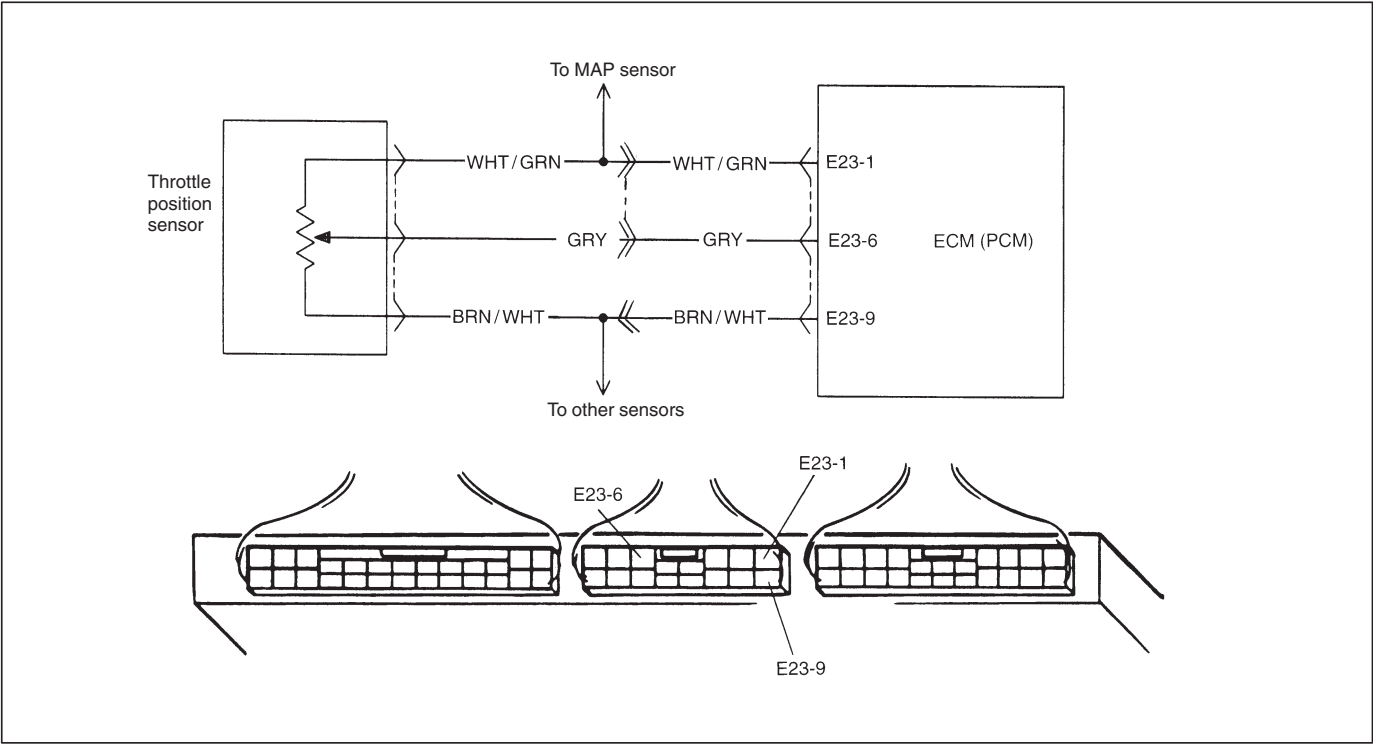


Fig. 3 for Step 6



DTC P0120 THROTTLE POSITION CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">● Signal voltage high or● Signal voltage low	<ul style="list-style-type: none">● “BRN/WHT” circuit open● “GRY” circuit open or shorted to ground● “WHT/GRN” circuit open or shorted to power or ground● TP sensor malfunction● ECM (PCM) malfunction

NOTE:

- When DTC P0105, P0110, P0115 and/or P0120 are indicated together, it is possible that “BRN/WHT” circuit is open.
- When DTC P0105, P0120 and/or P0510 are indicated together it is possible that “WHT/GRN” circuit is open.

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check TP Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF and then turn ignition switch ON. 2) Check throttle valve opening percentage displayed on scan tool. See Fig. 1. Is it displayed 2% or less? 3) Check throttle valve opening percentage displayed on scan tool while opening throttle valve from idle position to full open position. See Fig. 1. Is it displayed 96% or higher?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0 A.
3	Check Wire Harness. 1) Disconnect connector from TP sensor with ignition switch OFF. 2) Check for proper connection to TP sensor at "WHT/GRN", "GRY" and "BRN/WHT" wire terminals. 3) If OK, then with ignition switch ON, check voltage at each of "WHT/GRN" and "GRY" wire terminals. See Fig. 2. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	"WHT/GRN" wire open, "WHT/GRN" wire shorted to ground circuit or power circuit or "BRN/WHT" wire, "GRY" wire open or shorted to ground circuit or poor E23-1 or E23-6 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.
4	Check TP Sensor. 1) Check resistance between terminals of TP sensor. See Fig. 3. Between 1 and 4: 2.87 – 5.33 k Ω Between 1 and 3: 100 Ω – 20 k Ω , varying according to throttle valve opening. Are measured values within specifications?	"BRN/WHT" wire open or poor E23-9 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace TP sensor.

Fig. 1 for Step 2

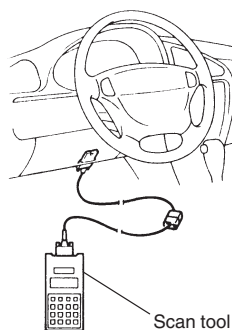


Fig. 2 for Step 3

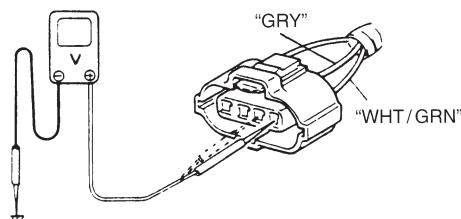
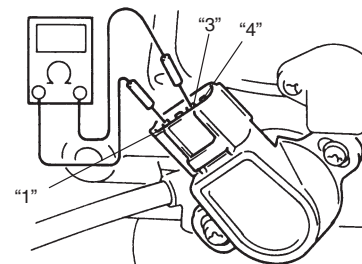


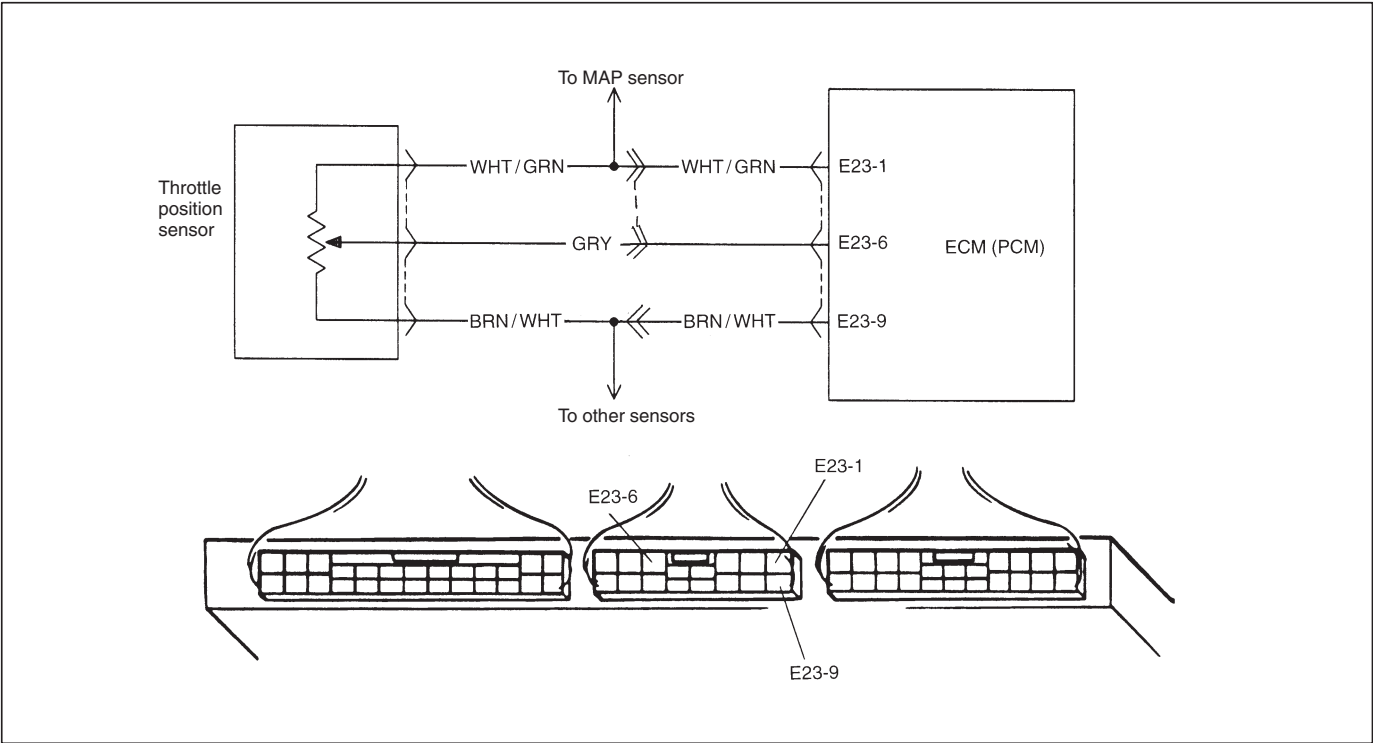
Fig. 3 for Step 4



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DTC P0121 THROTTLE POSITION CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">• After engine warmed up.• While vehicle running at specified engine speed.• No change in intake manifold pressure (constant throttle opening)• Difference between actual throttle opening (detected from TP sensor) and opening calculated by ECM (PCM) (Obtained on the basis of engine speed and intake manifold pressure) in larger than specified value. <p>✧ 2 driving cycle detection logic, continuous monitoring</p>	<ul style="list-style-type: none">• TP sensor malfunction• High resistance in the circuit• ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Turn ignition switch OFF. Clear DTC with ignition switch ON, check vehicle and environmental condition for:
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: -10°C, 14°F or higher
 - Intake air temp.: 70°C, 158°F or lower
 - Engine coolant temp.: 70 – 110°C, 158 – 230°F
- 2) Warm up engine to normal operating temperature.
- 3) Increase vehicle speed to 30 – 40 mph, 50 – 60 km/h in 3rd gear or “D” range and hold throttle valve at that opening position for 1 min.
- 4) Stop vehicle.
- 5) Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check TP Sensor and Its Circuit. 1) Turn ignition switch OFF and connect SUZUKI scan tool to DLC. 2) Turn ignition switch ON and check TP sensor output voltage when throttle valve is at idle position and fully opened. See Fig. 1 and 2. Dose voltage vary within specified value linearly as shown in figure?	If voltmeter was used, check terminal E23-6 for poor connection. If OK, substitute a known-good ECM (PCM) and recheck.	Go to Step 3.
3	Check TP Sensor. 1) Turn ignition switch OFF. 2) Disconnect TP sensor connector. 3) Check for proper connection to TP sensor at each terminal. 4) If OK, then measure resistance between terminals and check if each measured value is as specified below. See Fig. 3. Between 1 and 4: 2.87 – 5.33 k Ω Between 1 and 3: 100 Ω – 20 k Ω , varying according to throttle valve opening. Are measured values as specified?	High resistance in "WHT/GRN", "GRY" or "BRN/WHT" circuit. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace TP sensor.

Fig. 1 for Step 2

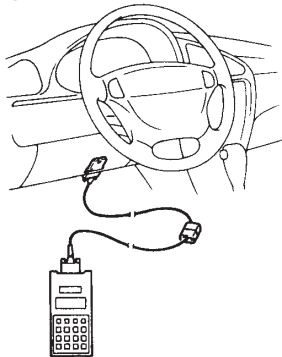


Fig. 2 for Step 2

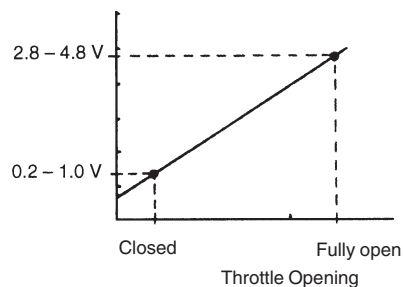
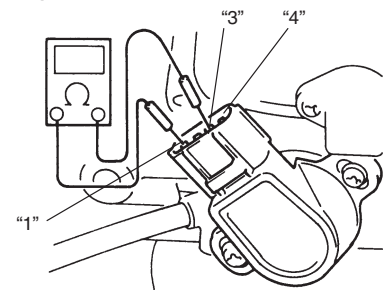
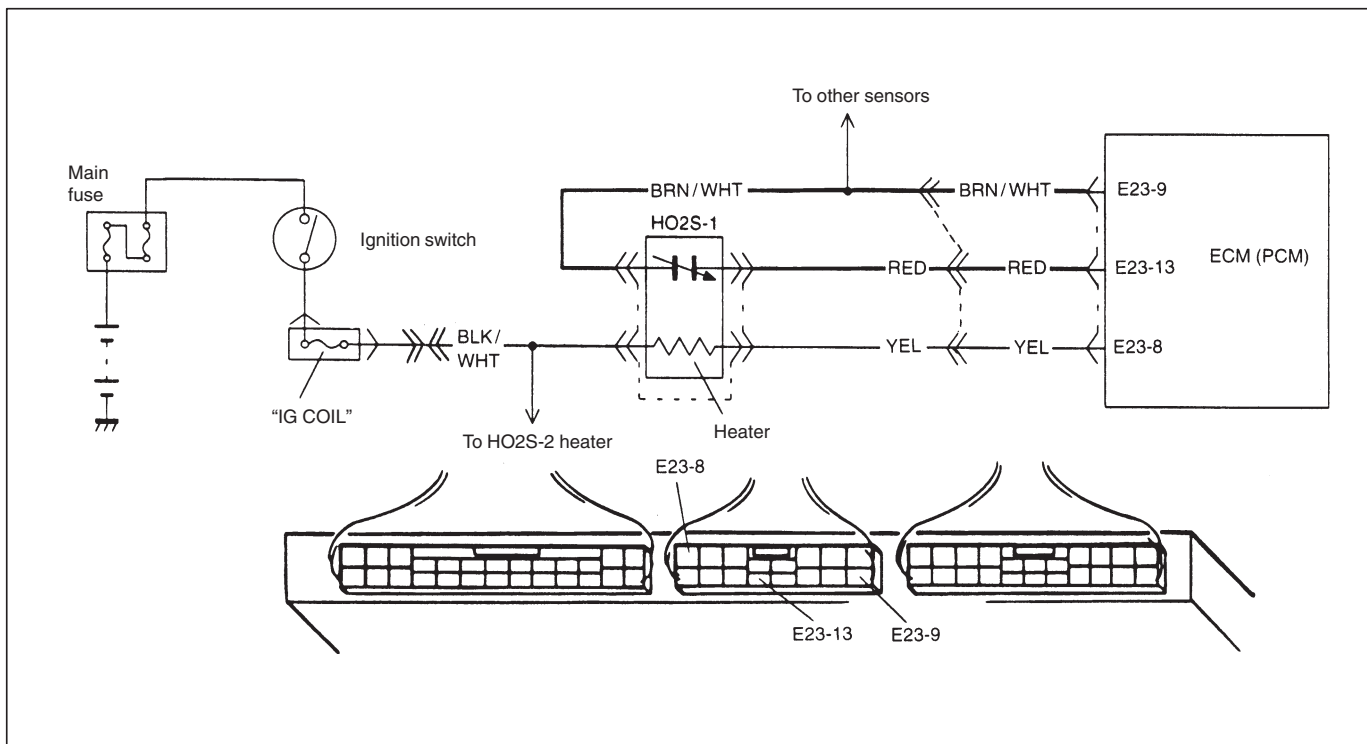


Fig. 3 for Step 3



DTC P0130 HEATED OXYGEN SENSOR (HO2S) CIRCUIT MALFUNCTION (SENSOR-1)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> When running at idle speed after engine warmed up and running at specified vehicle speed, HO2S-1 output voltage does not go below 0.3 V or over 0.6 V. * 2 driving cycle detection logic, Monitoring once/1 driving. 	<ul style="list-style-type: none"> Heated oxygen sensor-1 malfunction "RED" or "BRN/WHT" circuit open (poor connection) or short

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- Turn ignition switch OFF. Clear DTC with ignition switch ON, check vehicle and environmental condition for:
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: -10°C , 14°F or higher
 - Intake air temp.: 70°C , 158°F or lower
- Warm up engine to normal operating temperature.
- Drive vehicle at 30 – 40 mph, 50 – 60 km/h for 2 min.
- Stop vehicle and run engine at idle for 2 min.
- Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST" or "PENDING DTC" mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC(s) other than HO2S-1 (DTC P0130)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	1) Connect scan tool to DLC with ignition switch OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture). See Fig. 1 and 2. Does HO2S-1 output voltage deflect between 0.3 V and over 0.6 V repeatedly?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Check "RED" and "BRN/WHT" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-1.

Fig. 1 for Step 3

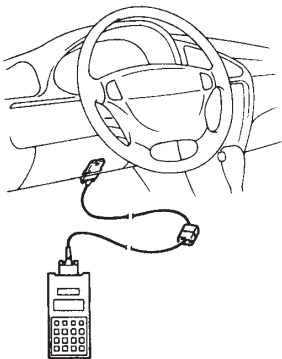
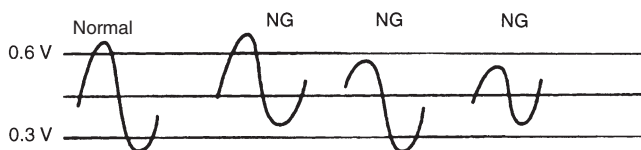
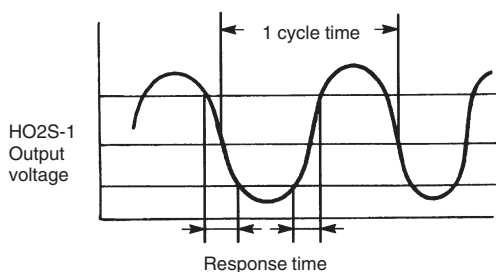


Fig. 2 for Step 3

**DTC P0133 HEATED OXYGEN SENSOR (HO2S) CIRCUIT SLOW RESPONSE (SENSOR-1)****WIRING DIAGRAM/CIRCUIT DESCRIPTION** – Refer to DTC P0130 section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> When running at specified idle speed after engine warmed up and running at specified vehicle speed, response time (time to change from lean to rich or from rich to lean) of HO2S-1 output voltage is about 1 sec. at minimum or average time of 1 cycle is 5 sec. at minimum. See. Fig. 1 * 2 driving cycle detection logic, Monitoring once/1 driving. 	<ul style="list-style-type: none"> Heated oxygen sensor-1 malfunction

Fig. 1



DTC CONFIRMATION PROCEDURE – Refer to DTC P0130 section.**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC(s) other than HO2S-1 (DTC P0133)?	Go to applicable DTC Diag. Flow Table.	Replace HO2S-1.

DTC P0134 HEATED OXYGEN SENSOR (HO2S) CIRCUIT NO ACTIVITY DETECTED (SENSOR-1)**WIRING DIAGRAM/CIRCUIT DESCRIPTION** – Refer to DTC P0130 section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Engine warmed up. • While running under other than high load and high engine speed conditions or at specified idle speed (engine is in closed loop condition), HO2S-1 output voltage is high or low continuously. ✱ 2 driving cycle detection logic, Continuous monitoring.	<ul style="list-style-type: none"> • "RED" or "BRN/WHT" circuit open or short • Heated oxygen sensor malfunction • Fuel system malfunction • Exhaust gas leakage

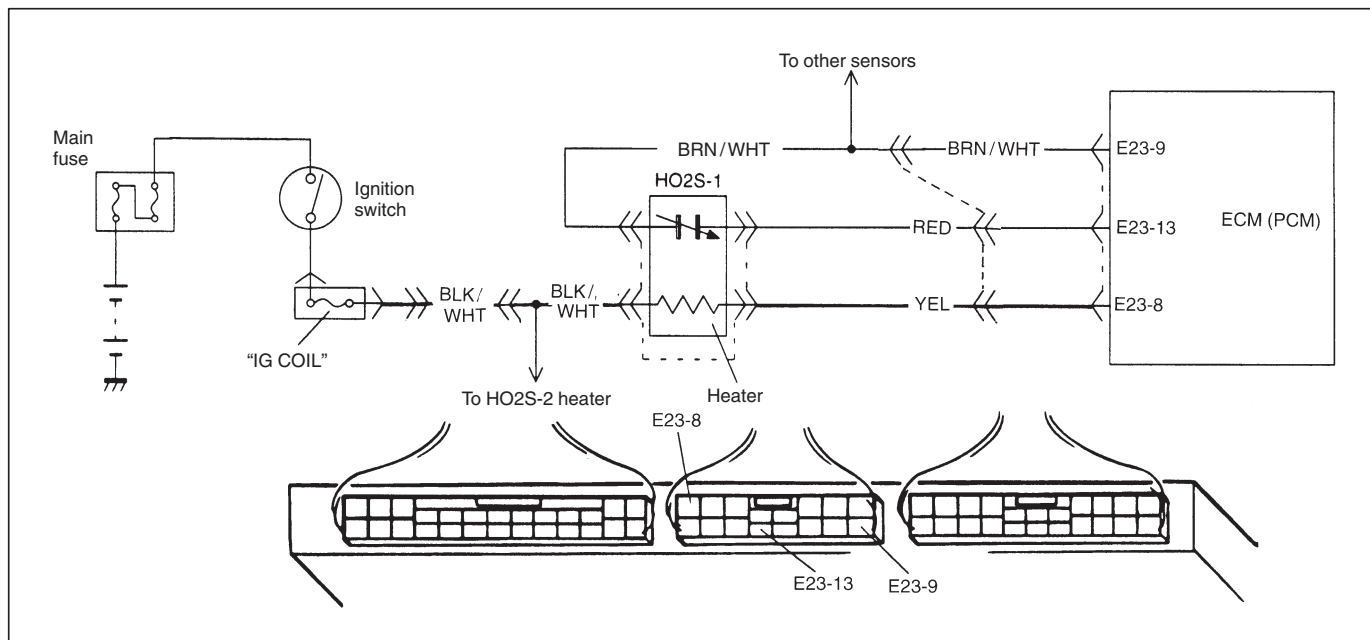
DTC CONFIRMATION PROCEDURE – Refer to DTC P0130 section.**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC(s) other than Fuel system (DTC P0171/P0172) and HO2S-1 (DTC P0134)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	Check HO2S-1 and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture). Does HO2S-1 output voltage deflect between 0.3 V and over 0.6 V repeatedly?	Go to DTC P0171 and P0172 Diag. Flow Table (Fuel System Check).	Check "RED" and "BRN/WHT" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-1.

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DTC P0135 HEATED OXYGEN SENSOR (HO2S) HEATER CIRCUIT MALFUNCTION (SENSOR-1)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<p>DTC will set when A or B condition is met.</p> <p>A:</p> <ul style="list-style-type: none"> ● Low voltage at terminal E23-8 when engine is running at high load. <p>B:</p> <ul style="list-style-type: none"> ● High voltage at terminal E23-8 when engine is running under condition other than above. <p>※ 2 driving cycle detection logic, Continuous monitoring.</p>	<ul style="list-style-type: none"> ● HO2S-1 heater circuit open or shorted to ground ● ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON, start engine and keep it at idle for 1 min.
- 3) Start vehicle and depress accelerator pedal fully for 5 sec. or longer.
- 4) Stop vehicle.
- 5) Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST" or "PENDING DTC" mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Heater for Operation. 1) Check voltage at terminal E23-8. See Fig. 1. 2) Warm up engine to normal operating temperature. 3) Stop engine. 4) Turn ignition switch ON and Check voltage at terminal E23-8. See Fig. 1. Voltage should be over 10 V. 5) Start engine, run it at idle and check voltage at the same terminal. Voltage should be below 1.9 V. Are check results as specified?	Intermittent trouble Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check Heater of Sensor-1. 1) Disconnect HO2S-1 coupler with ignition switch OFF. 2) Check for proper connection to HO2S-1 at "BRN/WHT" and "YEL" wire terminals. 3) If OK, then check heater resistance. See Fig. 2. Is it 11.7 – 14.3 Ω at 20°C, 68°F?	"YEL" wire open or shorted to ground or poor connection at E23-8. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace HO2S-1.

Fig. 1 for Step 2

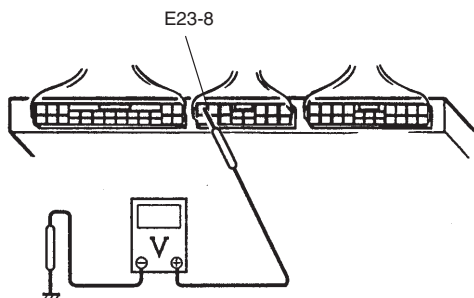
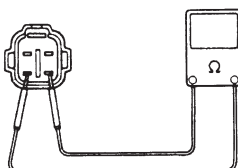
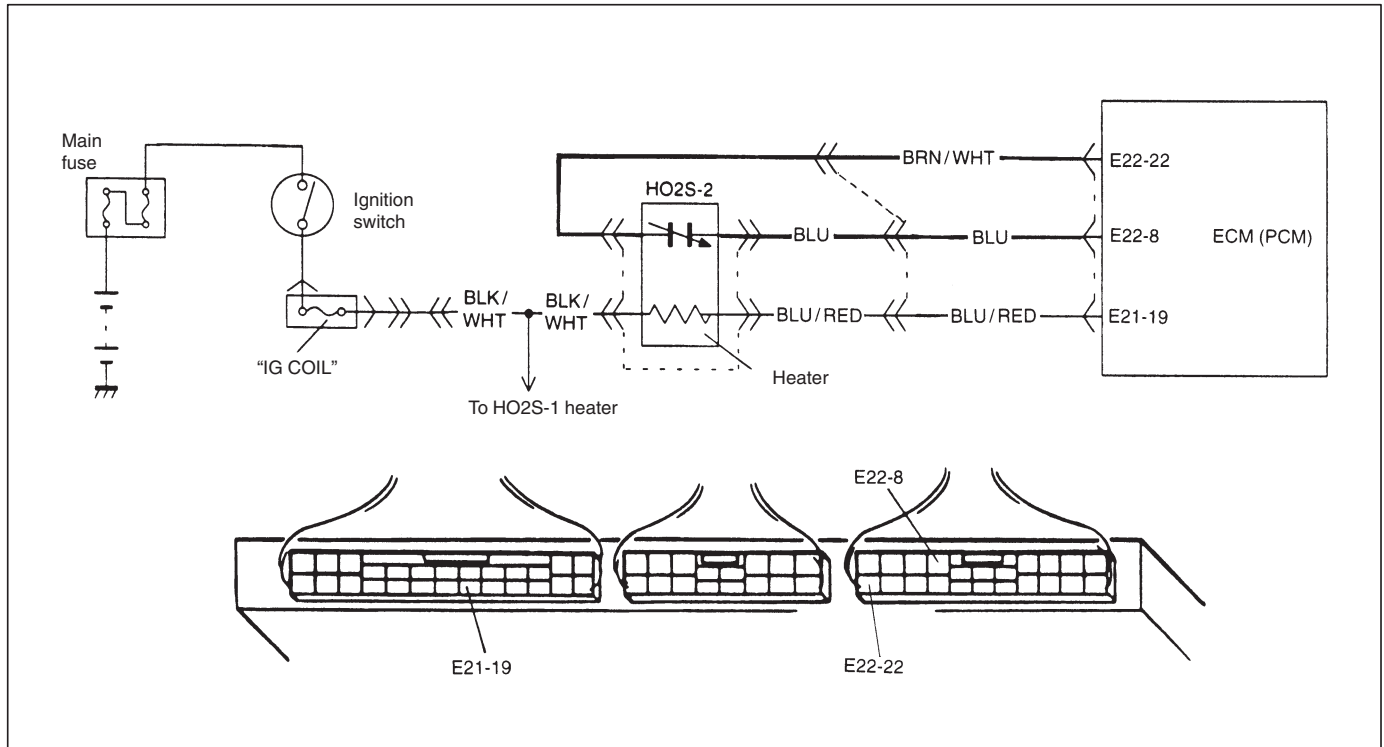


Fig. 2 for Step 3



DTC P0136 HEATED OXYGEN SENSOR (HO2S) CIRCUIT MALFUNCTION (SENSOR-2)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<p>DTC will set when A or B condition is detected.</p> <p>A. Max. output voltage of HO2S-2 is lower than specified value or Min. output voltage is higher than specified value while vehicle driving.</p> <p>B. Engine is warmed up and HO2S-2 voltage is 4.5 V or more. (circuit open)</p> <p>※ 2 driving cycle detection logic, monitoring once/1 driving.</p>	<ul style="list-style-type: none"> ● Exhaust gas leakage ● "BLU" or "BRN/WHT" circuit open or short ● Heated oxygen sensor-2 malfunction ● Fuel system malfunction

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DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

1) Turn ignition switch OFF.

Clear DTC with ignition switch ON, check vehicle and environmental condition for:

- Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
- Ambient temp.: -10°C , 14°F or higher
- Intake air temp.: 70°C , 158°F or lower
- No exhaust gas leakage and loose connection

2) Warm up engine to normal operating temperature.

3) Drive vehicle under usual driving condition for 5 min. and check HO2S-2 output voltage and “short term fuel trim” with “Data List” mode on scan tool, and write it down.

4) Stop vehicle (don't turn ignition switch OFF).

5) Increase vehicle speed to higher than 20 mph, 32 km/h and then stop vehicle.

6) Repeat above steps 5) 4 times.

7) Increase vehicle speed to about 50 mph (80 km/h) in 3rd gear or 2 range.

8) Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) for 10sec. or more.

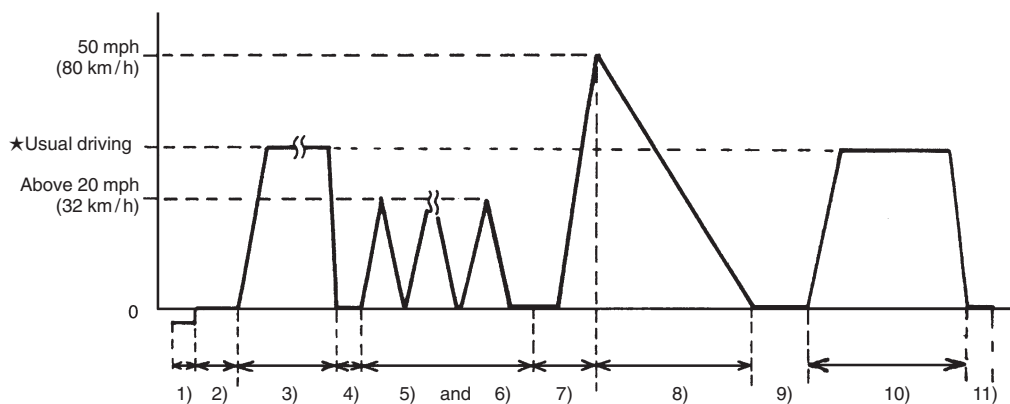
9) Stop vehicle (don't turn ignition switch OFF) and run engine at idle for 2 min.

After this step 9), if “Oxygen Sensor Monitoring TEST COMPLETED” is displayed in “READINESS TESTS” mode and DTC is not displayed in “DTC” mode, confirmation test is completed.

If “TEST NOT COMPLTD” is still being displayed, proceed to next step 10).

10) Drive vehicle under usual driving condition for 10 min. (or vehicle is at a stop and run engine at idle for 10 min. or longer)

11) Stop vehicle (don't turn ignition switch OFF). Confirm test results according to “Test Result Confirmation Flow Table” in “DTC CONFIRMATION PROCEDURE” of DTC P0420.



★Usual driving: Driving at 30 – 40 mph, 50 – 60 km/h including short stop according to traffic signal. (under driving condition other than high-load, high-engine speed, rapid accelerating and decelerating)

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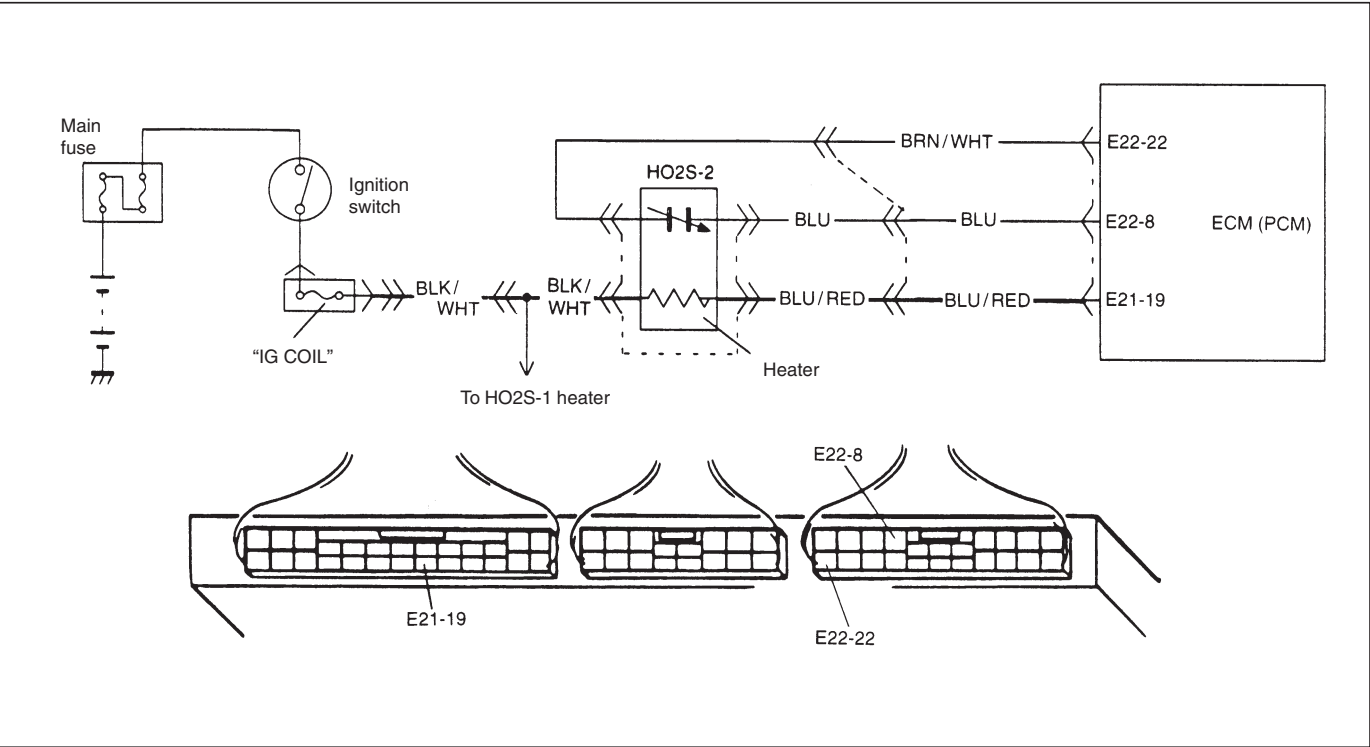
INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check exhaust system for leakage, loose connection and damage. Is it good condition?	Go to Step 3.	Repair or replace.
3	Check HO2S-2 and Its Circuit. Was HO2S-2 output voltage indicated on scan tool in step 3) of DTC confirmation test less than 1.275 V?	Go to Step 4.	"BLU" or "BRN/WHT" circuit open or HO2S-2 malfunction.
4	Check Short Term Fuel Trim. Did short term fuel trim vary within $-20 - +20\%$ range in step 3) of DTC confirmation test?	Check "BLU" and "BRN/WHT" wire for open and short, and connection for poor connection. If wire and connection are OK, replace HO2S-2.	Check fuel system. Go to DTC P0171/P0172 Diag. Flow Table.

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DTC P0141 HEATED OXYGEN SENSOR (HO2S) HEATER CIRCUIT MALFUNCTION (SENSOR-2)

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC will set when A or B condition it met. A. Low voltage at terminal E21-19 for specified time after engine start or while engine running at high load. B. High voltage at terminal E21-19 while engine running under other than above condition. ※ 2 driving cycle detection logic, continuous monitoring.	● HO2S-2 heater circuit open or shorted to ground ● ECM (PCM) malfunction

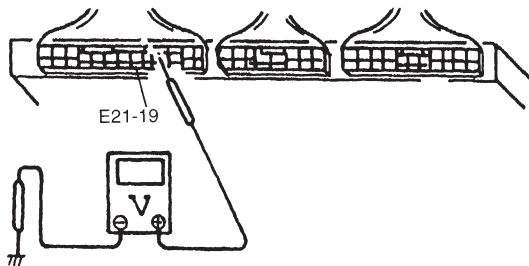
DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF once and then ON.
- 2) Clear DTC, start engine and warm up engine to normal operating temperature.
- 3) Keep it at 2000 r/min for 2 min.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	<p>Check HO2S-2 Heater and Its Circuit.</p> <p>1) Warm up engine to normal operating temperature.</p> <p>2) Stop engine.</p> <p>3) Turn ignition switch ON and check voltage at terminal E21-19 See Fig. 1. Voltage should be over 10 V.</p> <p>4) Start engine, run it at idle and check voltage at the same terminal after 1 min. from engine start. Voltage should be below 1.9 V.</p> <p>Are check result as specified?</p>	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	<p>Check Heater or Sensor-2.</p> <p>1) Disconnect HO2S-2 coupler with ignition switch OFF.</p> <p>2) Check for proper connection to HO2S-2 at "BLK/WHT" and "BLU/RED" wire terminals.</p> <p>3) If OK, then check heater resistance. Is it 11.7 – 14.3 Ω at 20°C, 68°F?</p>	"BLU/RED" wire open or shorted to ground or poor connection at E21-19. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace HO2S-2.

Fig. 1 for Step 2

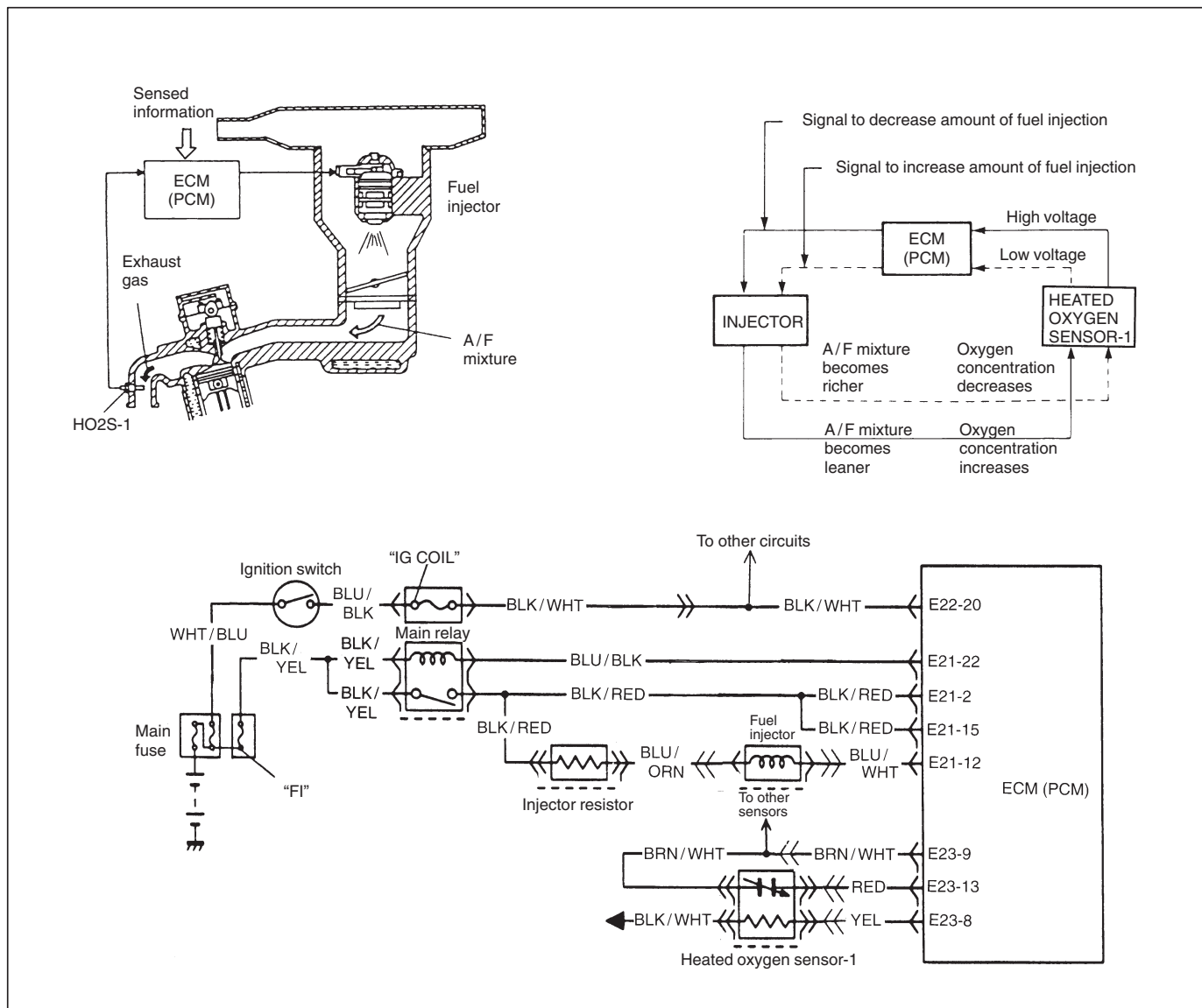


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DTC P0171 FUEL SYSTEM TOO LEAN

DTC P0172 FUEL SYSTEM TOO RICH

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> When following condition occurs while engine running under closed loop condition. <ul style="list-style-type: none"> Air/fuel ratio too lean (Total fuel trim (short and long terms added) is more than 30%) or Air/fuel ratio too rich (Total fuel trim is less than -30%) * 2 driving cycle detection logic, continuous monitoring. 	<ul style="list-style-type: none"> Vacuum leaks (air drawn in). Exhaust gas leakage. Heated oxygen sensor-1 circuit malfunction. Fuel pressure out of specification. Fuel injector malfunction (clogged or leakage). MAP sensor poor performance. ECT sensor poor performance. IAT sensor poor performance. TP sensor poor performance. EVAP control system malfunction. PCV valve malfunction.

DTC CONFIRMATION PROCEDURE**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester on a level road.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Check vehicle and environmental condition for:
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: –10°C, 14°F or higher
 - Intake air temp.: 70°C, 158°F or lower
- 4) Start engine and drive vehicle under usual driving condition (described in DTC confirmation procedure of DTC P0136) for 5 min. or longer and until engine is warmed up to normal operating temperature.
- 5) Keep vehicle speed at 30 – 40 mph, 50 – 60 km/h in 5th gear or “D” range for 5 min. or more.
- 6) Stop vehicle (do not turn ignition switch OFF).
- 7) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC(s) other than fuel system (DTC P0171/P0172)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	Check HO2S-1 Output Voltage. 1) Connect scan tool to DLC with ignition switch OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture). See Fig. 1. Does HO2S-1 output voltage deflect between below 0.3 V and over 0.6 V repeatedly?	Go to Step 4.	Go to DTC P0130 Diag. Flow Table (HO2S-1 circuit check).
4	Check Fuel Pressure (Refer to section 6E1 for details). 1) Release fuel pressure from fuel feed line. 2) Install fuel pressure gauge. 3) Check fuel pressure. See Fig. 2. With fuel pump operating and engine at stop : 160 – 210 kPa, 1.6 – 2.1 kg/cm ² , 22.7 – 29.9 psi. At specified idle speed : 90 – 140 kPa, 0.9 – 1.4 kg/cm ² , 12.8 – 20.0 psi. Is measured value as specified?	Go to Step 5.	Go to Diag. Flow Table B-3 Fuel Pressure Check.
5	Check Fuel Injector and Circuit. 1) Turn ignition switch OFF and disconnect fuel injector connector. 2) Check for proper connection to fuel injector at each terminals. 3) If OK, then check injector resistance. See Fig. 3. Injector resistance: 0.5 – 1.5 Ω at 20°C (68°F) 4) Connect injector connector. 5) Check that fuel is injected out in conical shape from fuel injector when running engine. 6) Check injector for fuel leakage after engine stop. Fuel leakage: Less than 1 drop/min. Is check result satisfactory?	Go to Step 6.	Check injector circuit or replace fuel injector.
6	Check EVAP Canister Purge Valve. 1) Disconnect purge hose (1) from EVAP canister. 2) Place finger against the end of disconnected hose. 3) Check that vacuum is not felt there when engine is cool and running at idle. See Fig. 4. Is vacuum felt?	Check EVAP control system (See Section 6E1).	Go to Step 7.
7	Check intake manifold absolute pressure sensor for performance (See DTC P0105 Diag. Flow Table). Is it in good condition?	Go to Step 8.	Repair or replace.

STEP	ACTION	YES	NO
8	Check engine coolant temp. sensor for performance (See Section 6E1). Is it in good condition?	Go to Step 9.	Replace engine coolant temp. sensor.
9	Check intake air temp. sensor for performance (See Section 6E1). Is it in good condition?	Go to Step 10.	Replace intake air temp. sensor.
10	Check throttle position sensor for performance (See Step 4 of DTC P0121 Diag. Flow Table). Is it in good condition?	Go to Step 11.	Replace throttle position sensor.
11	Check PCV valve for valve clogging (See Section 6E1). Is it good condition?	Substitute a known-good ECM (PCM) and recheck.	Replace PCV valve.

Fig. 1 for Step 3

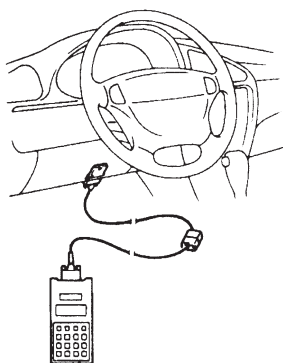


Fig. 2 for Step 4

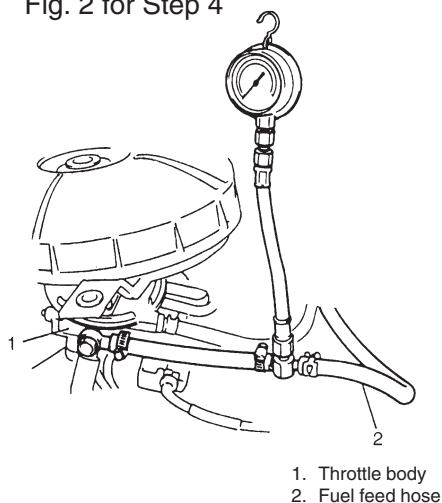


Fig. 3 for Step 5

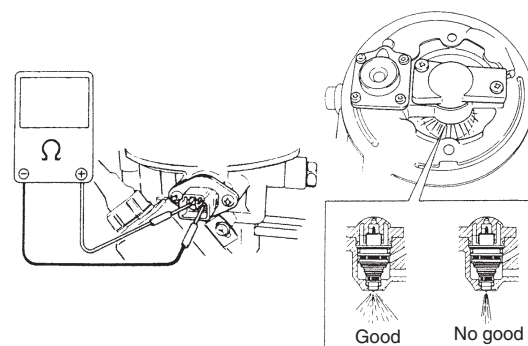
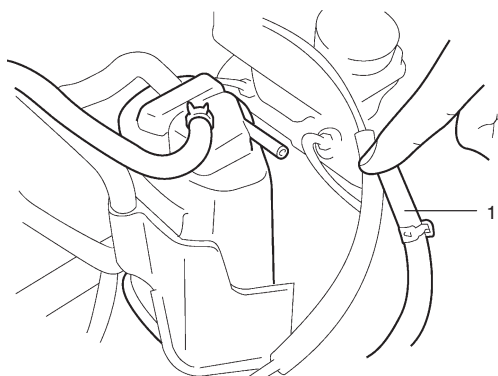


Fig. 4 for Step 6



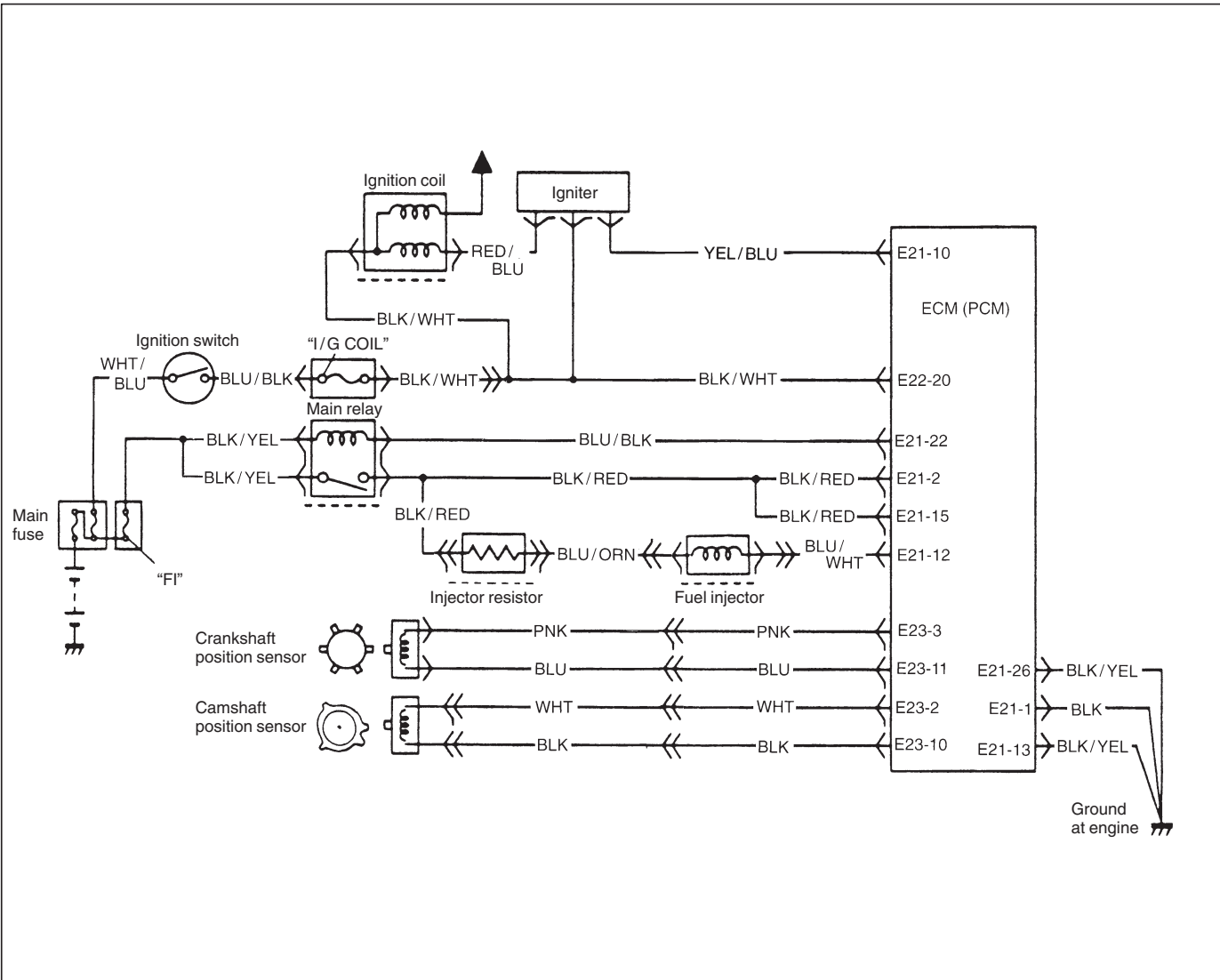
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DTC P0300 RANDOM MISFIRE DETECTED (Misfire detected at 2 or more cylinders)

DTC P0301 CYLINDER 1 MISFIRE DETECTED

DTC P0302 CYLINDER 2 MISFIRE DETECTED

DTC P0303 CYLINDER 3 MISFIRE DETECTED



CIRCUIT DESCRIPTION

ECM (PCM) monitors crankshaft revolution speed and engine speed via the crankshaft position sensor and cylinder No. via the camshaft position sensor. Then it calculates the change in the crankshaft revolution speed and from how many times such change occurred in every 200 or 1000 engine revolutions, it detects occurrence of misfire. When ECM (PCM) detects a misfire (misfire rate per 200 revolutions) which can cause overheat and damage to the three way catalytic converter, it makes the malfunction indicator lamp (MIL) flash as long as misfire occurs at that rate.

After that, however, when the misfire rate drops, MIL remains ON until it has been judged as normal 3 times under the same driving conditions.

Also, when ECM (PCM) detects a misfire (misfire rate per 1000 revolutions) which will not cause damage to three way catalytic converter but can cause exhaust emission to be deteriorated, it makes MIL light according to the 2 driving cycle detection logic.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> ● Engine under other than high revolution condition ● Not on rough road ● Engine speed changing rate ● Manifold absolute pressure changing rate ● Throttle opening changing rate ● Misfire rate per 200 or 1000 engine revolutions (how much and how often crankshaft revolution speed changes) is higher than specified value 	<ul style="list-style-type: none"> ● Engine overheating ● Vacuum leaks (air inhaling) from air intake system ● Ignition system malfunction (spark plug(s), high-tension cord(s), ignition coil assembly) ● Fuel pressure out of specification ● Fuel injector malfunction (clogged or leakage) ● Engine compression out of specification ● Valve lash (clearance) out of specification ● Manifold absolute pressure sensor malfunction ● Engine coolant temp. sensor malfunction ● PCV valve malfunction ● EVAP control system malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Check vehicle and environmental condition for:
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp.: -10°C , 14°F or higher
 - Intake air temp.: 70°C , 158°F or lower
 - Engine coolant temp.: $-10 - 110^{\circ}\text{C}$, $14 - 230^{\circ}\text{F}$
- 4) Start engine and keep it at idle for 2 min. or more.
- 5) Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode.
- 6) If DTC is not detected at idle, consult usual driving based on information obtained in “Customer complaint analysis” and “Freeze frame data check”.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is there DTC other than Fuel system (DTC P0171/P0172) and misfire (DTC P0300-P0303)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	<p>Check Ignition System.</p> <p>1) Remove spark plugs and check them for;</p> <ul style="list-style-type: none"> ● Air gap: 1.0 – 1.1 mm (0.040 – 0.043 in.) See Fig. 1. ● Carbon deposits ● Insulator damage ● Plug type <p>If abnormality is found, adjust, clean or replace.</p> <p>2) Disconnect injector connector. See Fig. 2.</p> <p>3) Connect spark plugs to high tension cords and then ground spark plugs.</p> <p>4) Crank engine and check that each spark plug sparks.</p> <p>Are above check results satisfactory?</p>	Go to Step 4.	Check ignition system parts (Refer to Section 6F).
4	<p>Check Fuel Pressure (Refer to Section 6E1 for details).</p> <p>1) Release fuel pressure from fuel feed line.</p> <p>2) Install fuel pressure gauge. See Fig. 3.</p> <p>3) Check fuel pressure.</p> <p>With fuel pump operating and engine at stop : 160 – 210 kPa, 1.6 – 2.1 kg/cm², 22.7 – 29.9 psi.</p> <p>At specified idle speed : 90 – 140 kPa, 0.9 – 1.4 kg/cm², 12.8 – 20.0 psi.</p> <p>Is measured value as specified?</p>	Go to Step 5.	Go to Diag. Flow Table B-3 fuel pressure check.
5	<p>Check Fuel Injector and Circuit.</p> <p>1) Turn ignition switch OFF and disconnect fuel injector connector.</p> <p>2) Check for proper connection to fuel injector at each terminal.</p> <p>3) If OK, then check injector resistance. See Fig. 4.</p> <p>Injector resistance: 0.5 – 1.5 Ω at 20°C (68°F).</p> <p>4) Connect injector connector.</p> <p>5) Check that fuel is injected out in conical shape from fuel injector when running engine.</p> <p>6) Check injector for fuel leakage after engine stop.</p> <p>Fuel leakage: Less than 1 drop/min.</p> <p>Is check result satisfactory?</p>	Go to Step 6.	Check injector circuit or replace fuel injector.

STEP	ACTION	YES	NO
6	Check PCV valve for clogging (See Section 6E1). Is it in good condition?	Go to Step 7.	Replace PCV valve.
7	Check EVAP Canister Purge Valve for Closing. 1) Disconnect purge hose (1) from EVAP canister. 2) Place finger against the end of disconnected hose. 3) Check that vacuum is not felt there, when engine is cool and running at idle. See Fig. 5. Is vacuum felt?	Check EVAP control system (See Section 6E1).	Go to Step 8.
8	Check intake manifold pressure sensor for performance (See Section 6E1). Is it in good condition?	Go to Step 9.	Repair or replace.
9	Check engine coolant temp. sensor for performance (See Section 6E1). Is it in good condition?	Go to Step 10.	Replace engine coolant temp. sensor.
10	Check parts or system which can cause engine rough idle or poor performance. – Engine compression (See Section 6A). – Valve lash (See Section 6A). – Valve timing (Timing belt installation. See Section 6A). Are they in good condition?	Check wire harness and connection of ECM (PCM) ground, ignition system and fuel injector for intermittent open and short.	Repair or replace.

Fig. 1 for Step 3

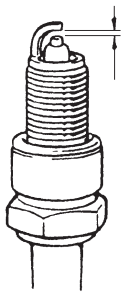


Fig. 2 for Step 3

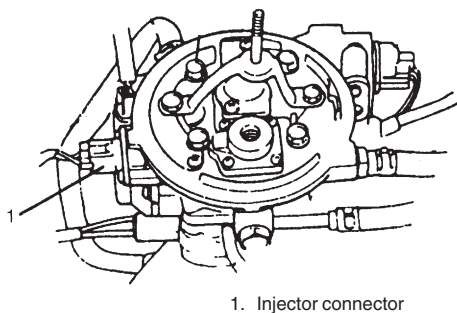
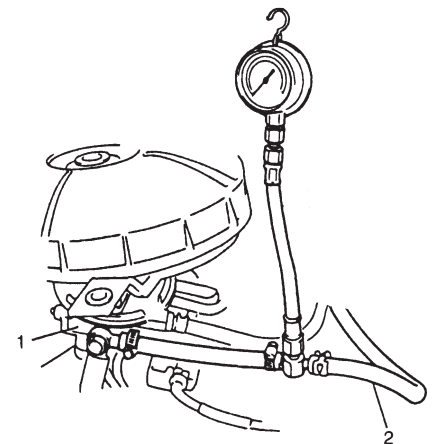


Fig. 3 for Step 4



1. Throttle body
2. Fuel feed hose

Fig. 4 for Step 5

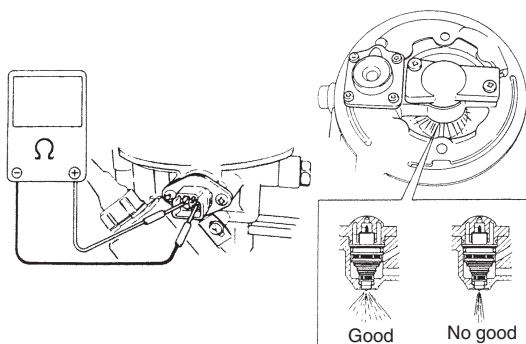
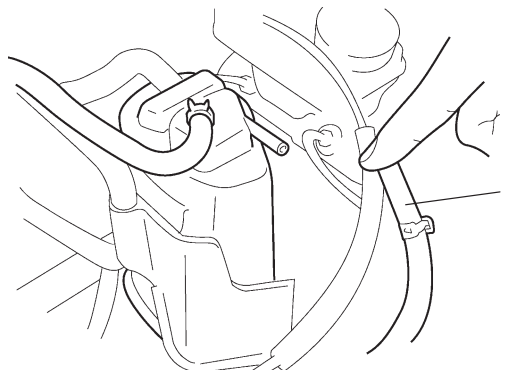
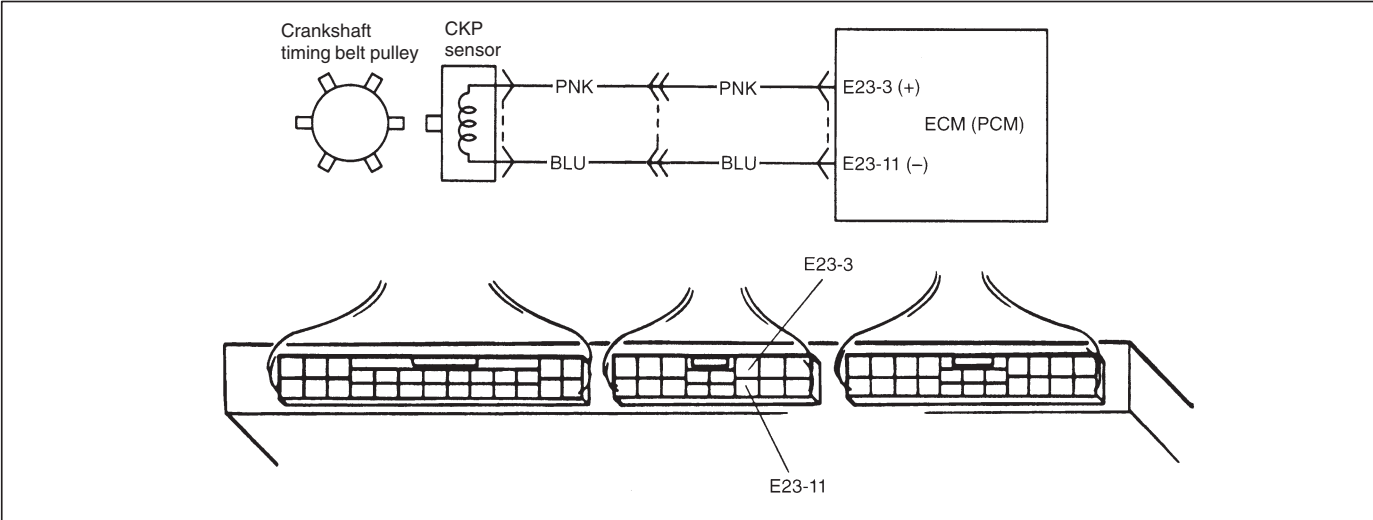


Fig. 5 for Step 7



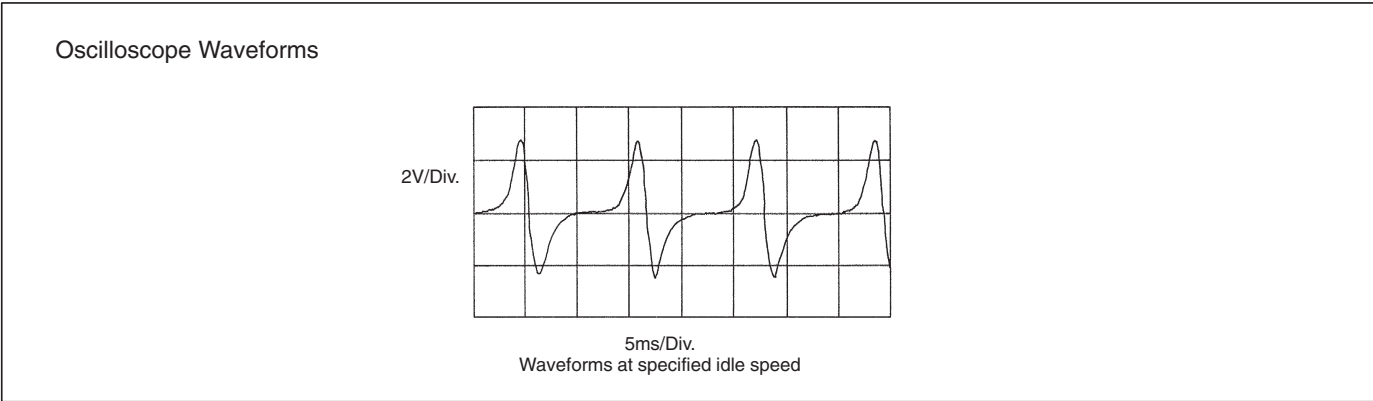
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DTC P0335 CRANKSHAFT POSITION (CKP) SENSOR CIRCUIT MALFUNCTION
CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">• No CKP sensor signal during 1 revolution of camshaft.	<ul style="list-style-type: none">• CKP sensor circuit open or short.• Crankshaft timing belt pulley teeth damaged.• CKP sensor malfunction, foreign material being attached or improper installation.• ECM (PCM) malfunction.

Reference

Connect oscilloscope between terminals E23-3 (+) and E23-11 (-) of ECM (PCM) connector connected to ECM (PCM) and check CKP sensor signal.



DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	<p>Check CKP Sensor for Resistance.</p> <p>1) Disconnect CKP sensor connector with ignition switch OFF.</p> <p>2) Then check for proper connection to CKP sensor at "PNK" and "BLU" wire terminals.</p> <p>3) If OK, measure sensor resistance between terminals. See Fig. 1.</p> <p>CKP sensor resistance: 360 – 460 Ω at 20°C, (68°F)</p> <p>4) Measure resistance between each terminal and ground.</p> <p>Insulation resistance: 1 MΩ or more.</p> <p>Were measured resistance valves in step 3) and 4) as specified?</p>	Go to Step 3.	Replace CKP sensor.
3	<p>Check visually CKP sensor and pulley for the following. See Fig. 2.</p> <ul style="list-style-type: none"> • Damage • No foreign material attached. • Correct installation. <p>Are they in good condition?</p>	<p>"PNK" or "BLU" wire open or shorted to ground, or poor connection at E23-3 or E23-11.</p> <p>If wire and connection are OK, intermittent trouble or faulty ECM (PCM).</p> <p>Recheck for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p>	Clean, repair or replace.

Fig. 1 for Step 2

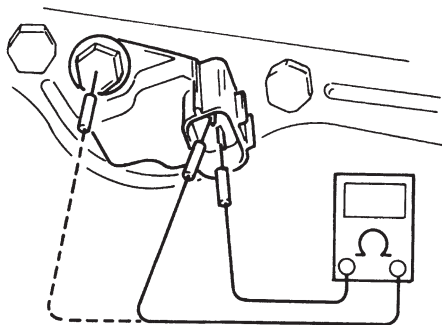
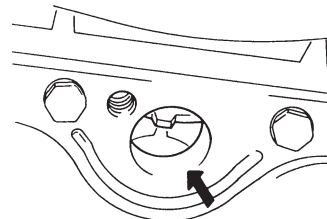
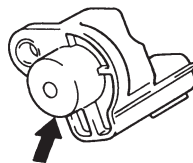
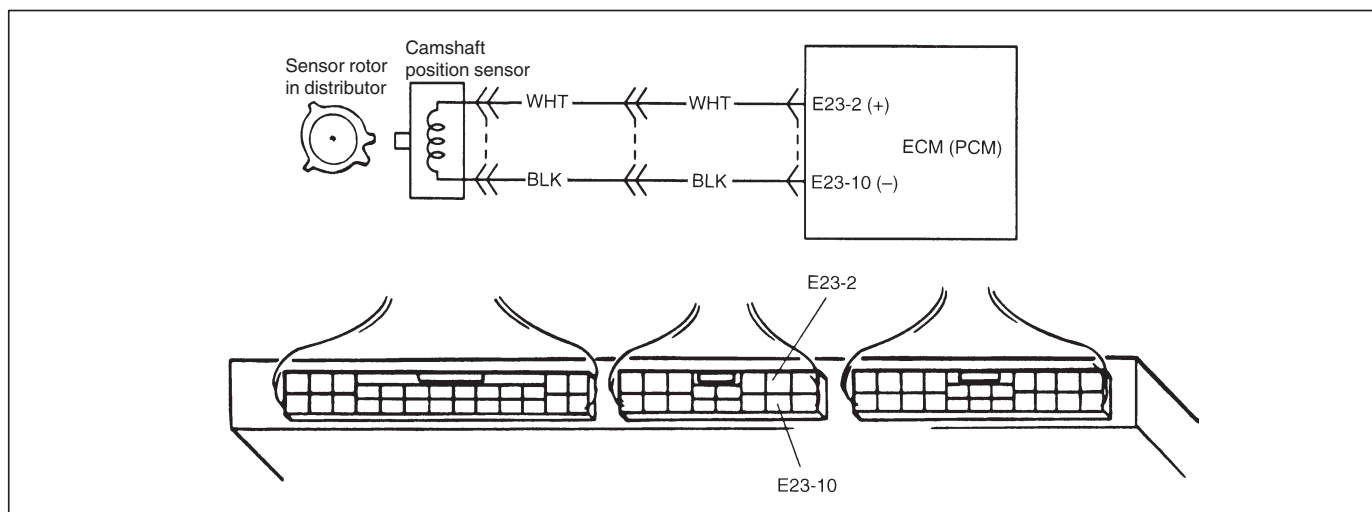


Fig. 2 for Step 3



DTC P0340 CAMSHAFT POSITION (CMP) SENSOR CIRCUIT MALFUNCTION

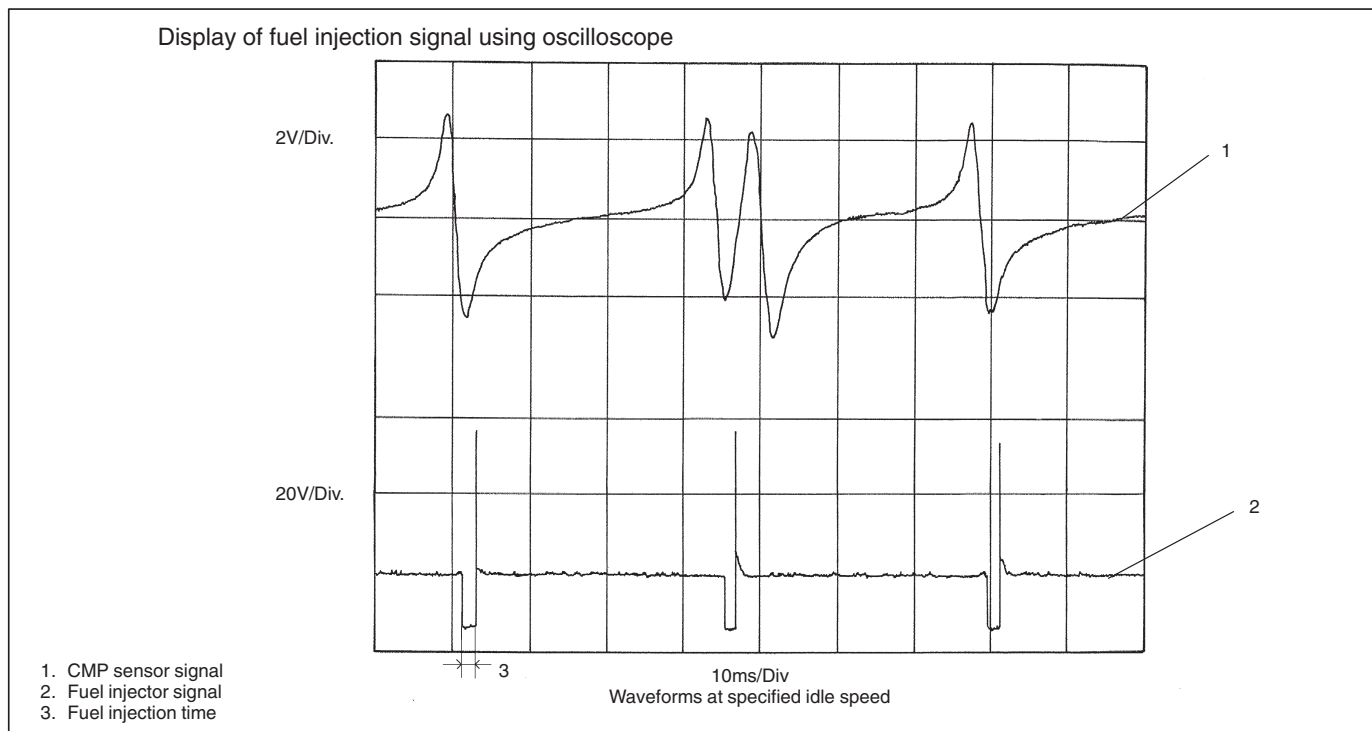
CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> No CMP sensor signal for 2 seconds at engine cranking (CKP sensor signal is inputted). 	<ul style="list-style-type: none"> CMP sensor circuit open or short. Signal rotor teeth damaged. CMP sensor malfunction, foreign material being attached or improper installation. ECM (PCM) malfunction.

Reference

Connect oscilloscope between terminals E23-2 and E23-10 of ECM (PCM) connector connected to ECM (PCM) and check CMP sensor signal.



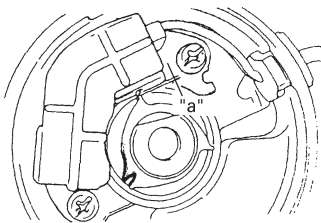
DTC CONFIRMATION PROCEDURE

- 1) Clear DTC.
- 2) Start engine and keep it at idle for 1 min.
- 3) Select "DTC" mode on scan tool and check DTC.

INSPECTION

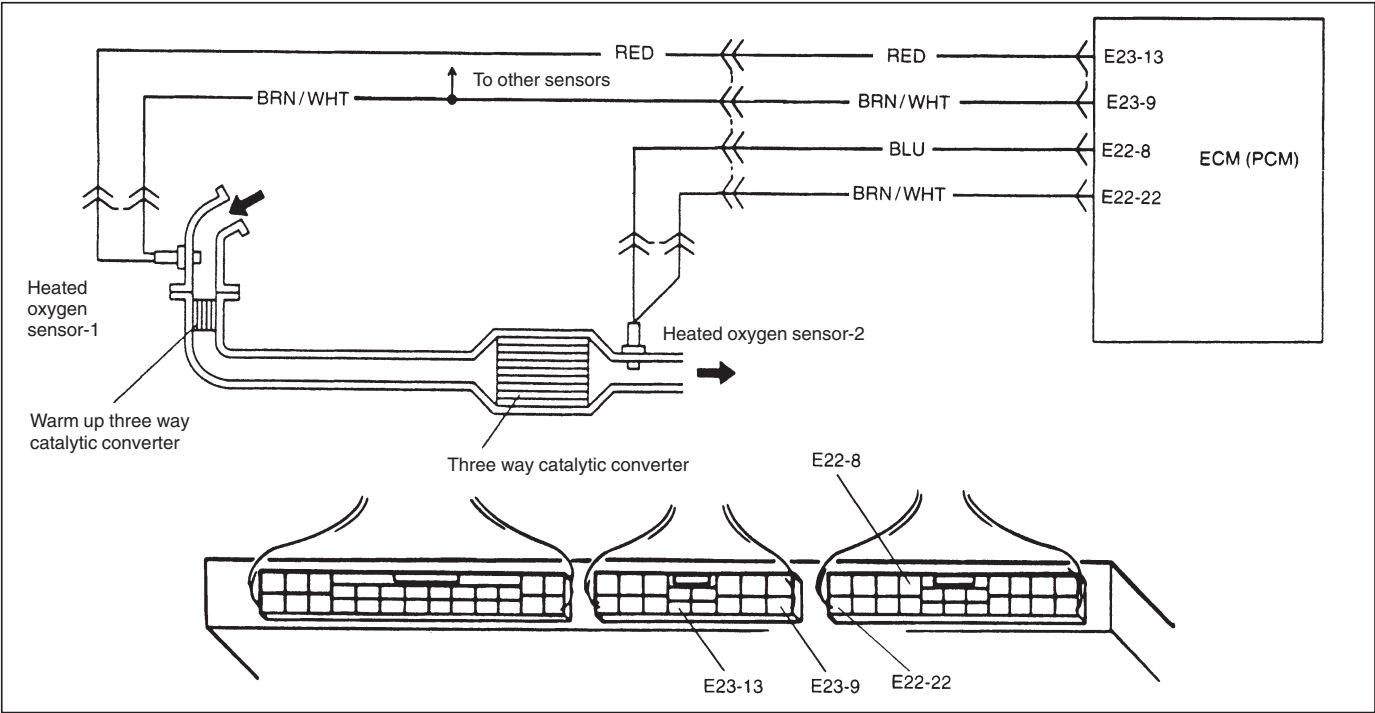
STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Is DTC P1500 (Engine starter signal circuit malfunction) detected?	Go to DTC P1500 Diag. Flow Table.	Go to Step 3.
3	Check CMP Sensor for Resistance. 1) Measure resistance of CMP sensor by referring to "CMP SENSOR (PICK UP COIL) RESISTANCE" in SECTION 6F. Is resistance within specified value?	Go to Step 4.	Faulty CMP sensor.
4	Check Wire Harness. 1) With ignition switch at OFF position, disconnect ECM (PCM) electrical connectors. 2) Measure resistance from terminal "E23-2" to "E23-10" of ECM (PCM) connector. Is resistance within 185 – 275 Ω at 20°C (68°F)?	Go to Step 5.	"WHT" or "BLK" wire open or short. Poor connection of CMP sensor connector terminal.
5	Check Air Gap Between Rotor Tooth and Sensor. See Fig. 1. 1) Remove Distributor cap. 2) Visually inspect CMP sensor signal rotor for damage. 3) Measure air gap by referring "SIGNAL ROTOR AIR GAP" in Section 6F. Was any damage found?	Faulty CMP sensor signal rotor.	Poor connection of ECM (PCM) connector terminal. If OK, substitute a known-good ECM (PCM) and recheck CMP.

Fig. 1 for Step 5



"a": Air gap

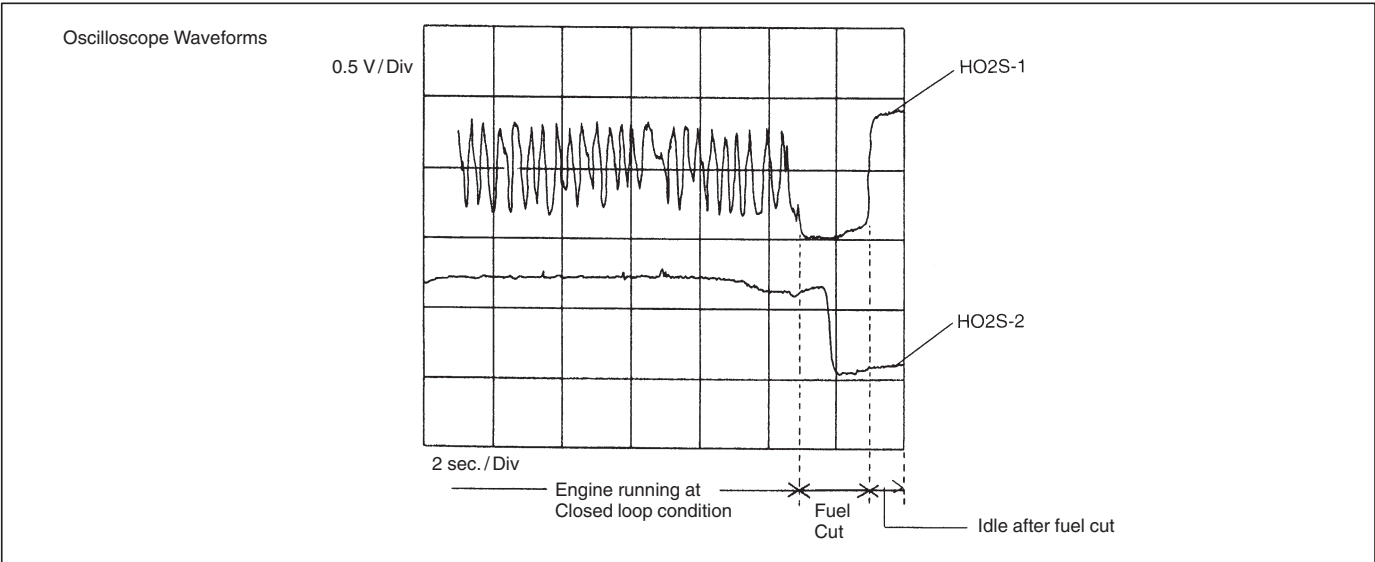
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DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD
CIRCUIT DESCRIPTION



ECM (PCM) monitors oxygen concentration in the exhaust gas which has passed the three way catalytic converter by HO2S-2.

When the catalyst is functioning properly, the variation cycle of HO2S-2 output voltage (oxygen concentration) is slower than that of HO2S-1 output voltage because of the amount of oxygen in the exhaust gas which has been stored in the catalyst.

Reference



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">• While vehicle running at constant speed under other than high load.• Time from rich or lean switching command is output till HO2S-2 output voltage crosses 0.45 V is less than specified value.2 driving cycle detection logic, monitoring once/1 driving.	<ul style="list-style-type: none">• Exhaust gas leak• Three way catalytic converter malfunction• Fuel system malfunction• HO2S-2 malfunction• HO2S-1 malfunction

DTC CONFIRMATION PROCEDURE**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

1) Turn ignition switch OFF.

Clear DTC with ignition switch ON, check vehicle and environmental condition for:

- Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
- Ambient temp.: -10°C , 14°F or higher
- Intake air temp.: 70°C , 158°F or lower
- Engine coolant temp.: $70 - 110^{\circ}\text{C}$, $158 - 230^{\circ}\text{F}$

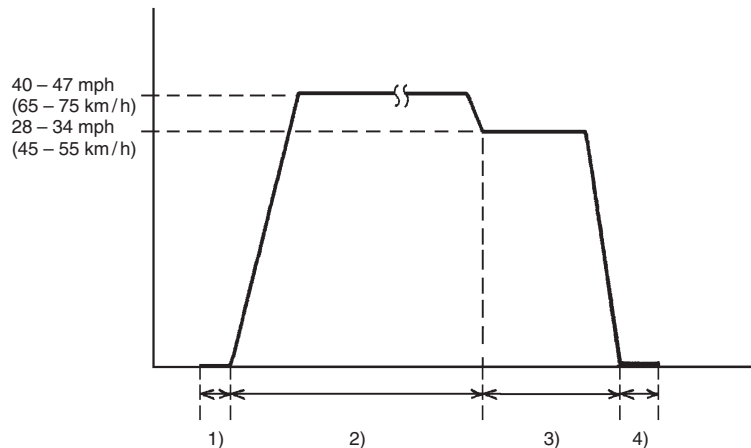
2) Start engine and drive vehicle at 40 – 47 mph, 65 – 75 km/h for 15 min. or longer.

While this driving, if “Catalyst Monitoring TEST COMPLETED” is displayed in “READINESS TESTS” mode and DTC is not displayed in “DTC” mode, confirmation test is completed.

If “TEST NOT COMPLTD” is still being displayed, continue test driving.

3) Decrease vehicle speed at 28 – 34 mph, 45 – 55 km/h, and hold throttle valve at that opening position for 2 min. and confirm that short term fuel trim vary within -20% – $+20\%$ range.

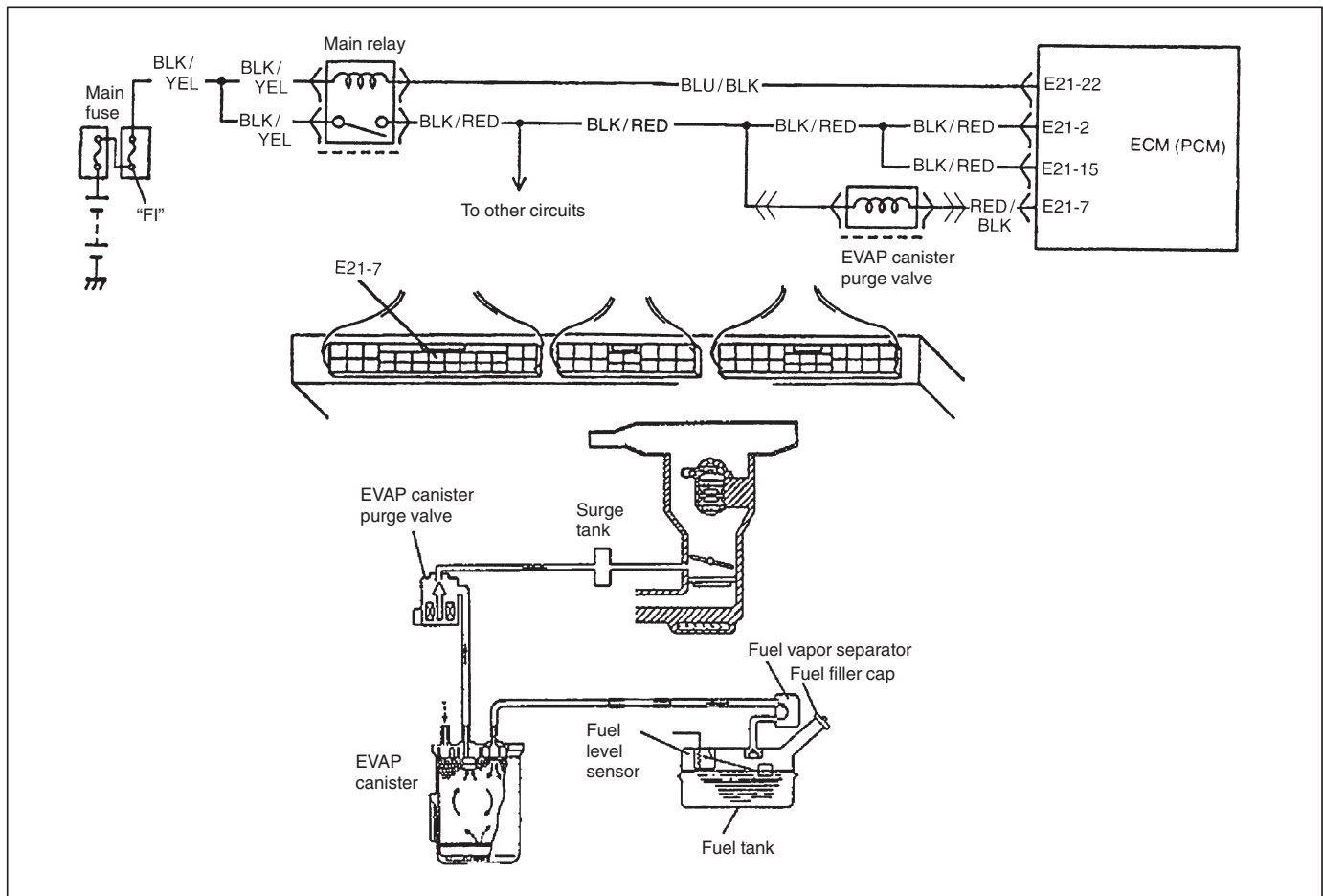
4) Stop vehicle (do not turn ignition switch OFF) and confirm test results according to following “Test Result Confirmation Flow Table”.

**Test Result Confirmation Flow Table**

STEP	ACTION	YES	NO
1	Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode. Is DTC or pending DTC displayed?	Proceed to applicable DTC Diag. Flow Table.	Go to Step 2.
2	Set scan tool to “READINESS TESTS” mode and check if testing has been completed. Is test completed?	No DTC is detected (confirmation test is completed).	Repeat DTC confirmation procedure.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Short Term Fuel Trim. Did short term fuel trim vary within -20% $-+20\%$ range in step 3) of DTC confirmation test?	Go to Step 3.	Check fuel system. Go to DTC P0171/P0172 Diag. Flow Table.
3	Check HO2S-2 for Output Voltage. Perform steps 1) through 9) of DTC confirmation procedure for DTC P0136 (HO2S-2 malfunction) and check output voltage of HO2S-2 then. Is over 0.6 V and below 0.3 V indicated?	Replace three way catalytic converter.	Check "BLU" and "BRN/WHT" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-2.

DTC P0443 PURGE CONTROL VALVE CIRCUIT MALFUNCTION**CIRCUIT DESCRIPTION**

DTC DETECTING CONDITION	POSSIBLE CAUSE
Canister Purge control valve circuit is opened or shorted.	<ul style="list-style-type: none"> • "RED/BLK" circuit open or short • "BLK/RED" circuit open • Canister purge valve malfunction

DTC CONFIRMATION PROCEDURE

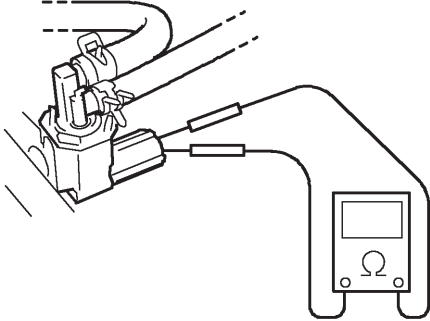
- 1) Clear DTC with ignition switch ON.
- 2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Check EVAP canister purge valve operation 1) With ignition switch OFF, disconnect coupler from canister purge valve. 2) Check resistance of EVAP canister purge valve. See Fig. 1. Resistance between two terminals : 30 – 34 Ω at 20°C (68°F) Resistance between terminal and body : 1M Ω or higher Is it as specified?	"RED/BLK" circuit open or short.	Replace EVAP canister purge valve.

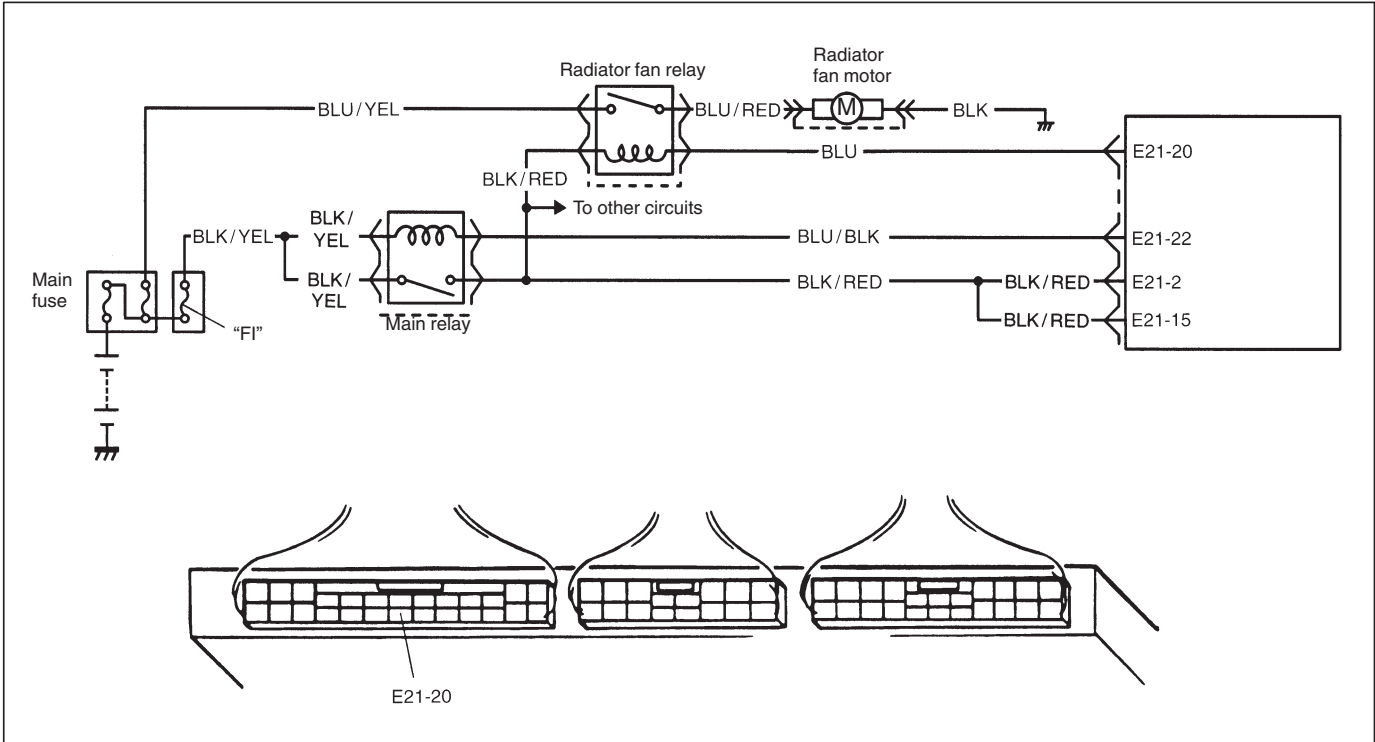
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Fig. 1 for Step 1



DTC P0480 RADIATOR FAN CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">● Low voltage at terminal E21-20 when engine coolant temp. is below 91°C, 195°F. 2 driving cycle detection logic, continuous monitoring.	<ul style="list-style-type: none">● “BLK/RED” or “BLU” circuit open or short● Radiator fan relay malfunction● ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Warm up engine until radiator cooling fan starts to operate.
- 4) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Radiator Cooling Fan Relay and Its Circuit. 1) Turn ignition switch ON. 2) Check for voltage at terminal E21-20 of ECM (PCM) connector connected, under following condition. See Fig. 1. When engine coolant temp. is lower than 91°C, 196°F and A/C switch turns OFF: 10 – 14 V Is voltage as specified?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check Radiator Fan Control Relay. 1) Turn ignition switch OFF and remove radiator fan relay. 2) Check for proper connection to the relay at "BLK/RED" and "BLU" wire terminals. 3) If OK, then measure resistance between terminals a and b. See Fig. 2. Is it 100 – 120 Ω?	"BLK/RED" or "BLU" circuit open or short. If wires and connections are OK, substitute a known-good ECM (PCM) and recheck.	Replace radiator fan relay.

Fig. 1 for Step 2

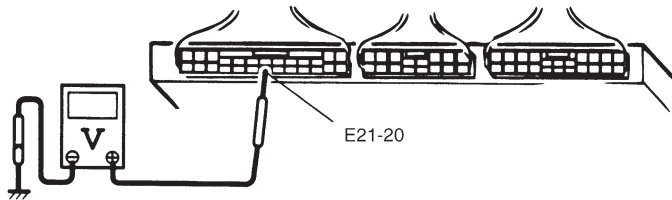
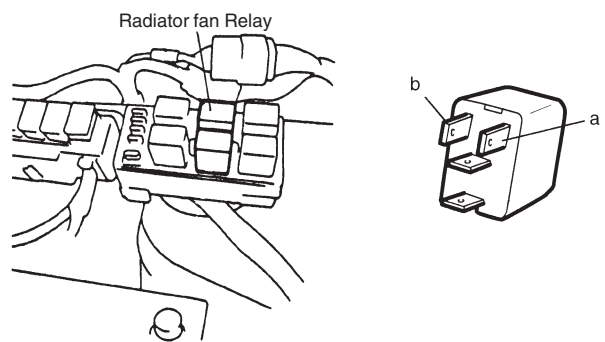
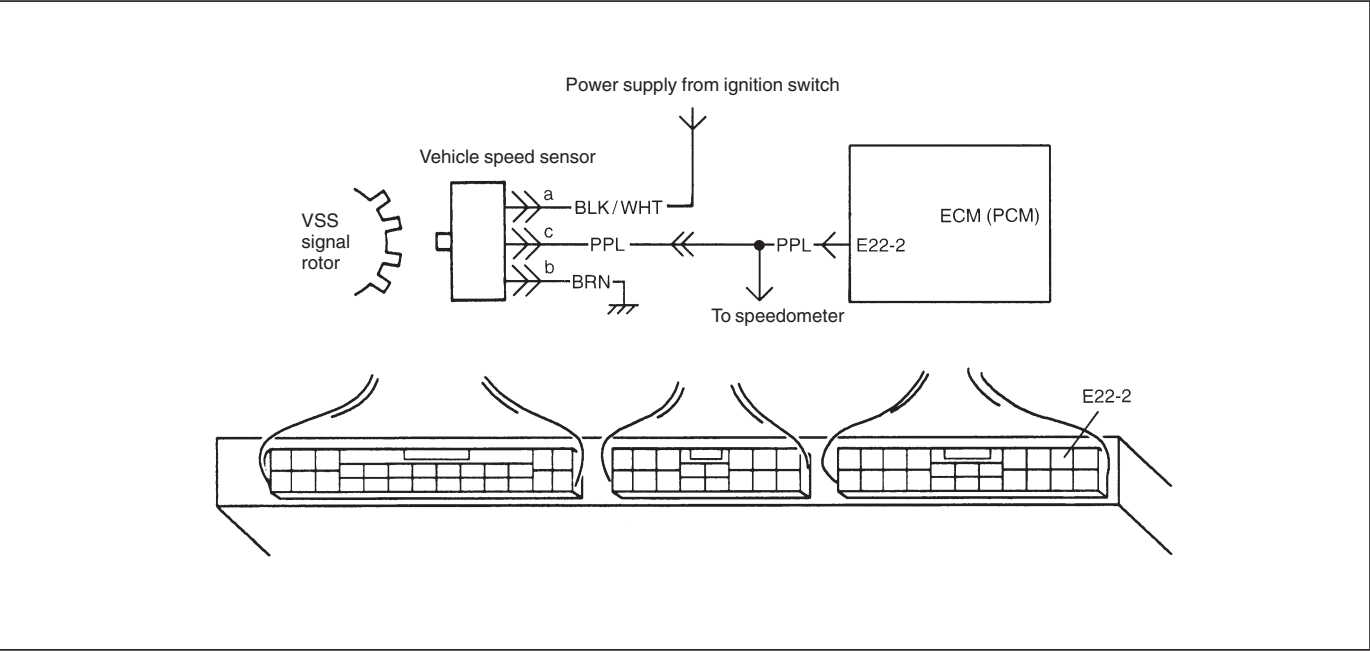


Fig. 2 for Step 3



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DTC P0500 VEHICLE SPEED SENSOR (VSS) MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none">• While fuel is kept cut at lower than 4000 r/min for longer than 4 sec.• VSS signal not inputted. 2 driving cycle detection logic, continuous monitoring.	<ul style="list-style-type: none">• “BRN” circuit open• “PPL” or “BLK/WHT” circuit open or short• VSS (speedometer driven gear) malfunction• ECM malfunction• Speedometer malfunction

DTC CONFIRMATION PROCEDURE

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- 1) Clear DTC and warm up engine to normal operating temperature.
- 2) Increase vehicle speed to 50 mph, 80 km/h in 3rd gear or “2” range while observing vehicle speed displayed on scan tool.
- 3) Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) for 4 sec. or more.
- 4) Check pending DTC and DTC.

DTC P0500**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Does speedometer indicate vehicle speed?	Go to Step 3.	Go to Step 5.
3	Check Vehicle Speed Signal. Is vehicle speed displayed on scan tool in step 2) and 3) of DTC confirmation procedure?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 4.
4	1) Turn ignition switch to OFF position. 2) Disconnect combination meter connectors. Refer to Section 8C. 3) Turn ignition switch to ON position, without running engine. 4) Measure voltage from terminal "c" of VSS connector to ground. See Fig. 2. Is voltage within 4 – 5 V?	Faulty speedometer.	"PPL" wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
5	1) With ignition switch at OFF position, disconnect VSS connector. 2) Turn ignition switch to ON position, without running engine. 3) Measure voltage from terminal "a" to "b" of VSS connector. See Fig. 1. Is voltage within 10 – 14 V?	Go to Step 6.	"BLK/WHT" or "BRN" wire open or short.
6	1) Measure voltage from terminal "c" of VSS connector to ground. See Fig. 2. Is voltage more than 4 V?	Go to Step 7.	"PPL" wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
7	1) Remove VSS. 2) Visually inspect VSS sensor signal rotor for damage. Was any damage found?	Faulty VSS signal rotor.	Poor connection of VSS connector terminal. If OK, substitute a known-good VSS and recheck.

Fig. 1 for Step 5

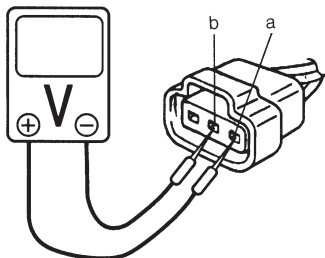
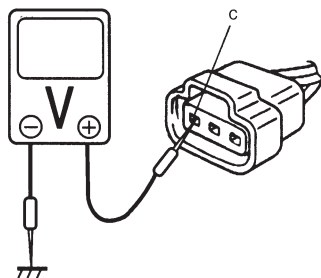
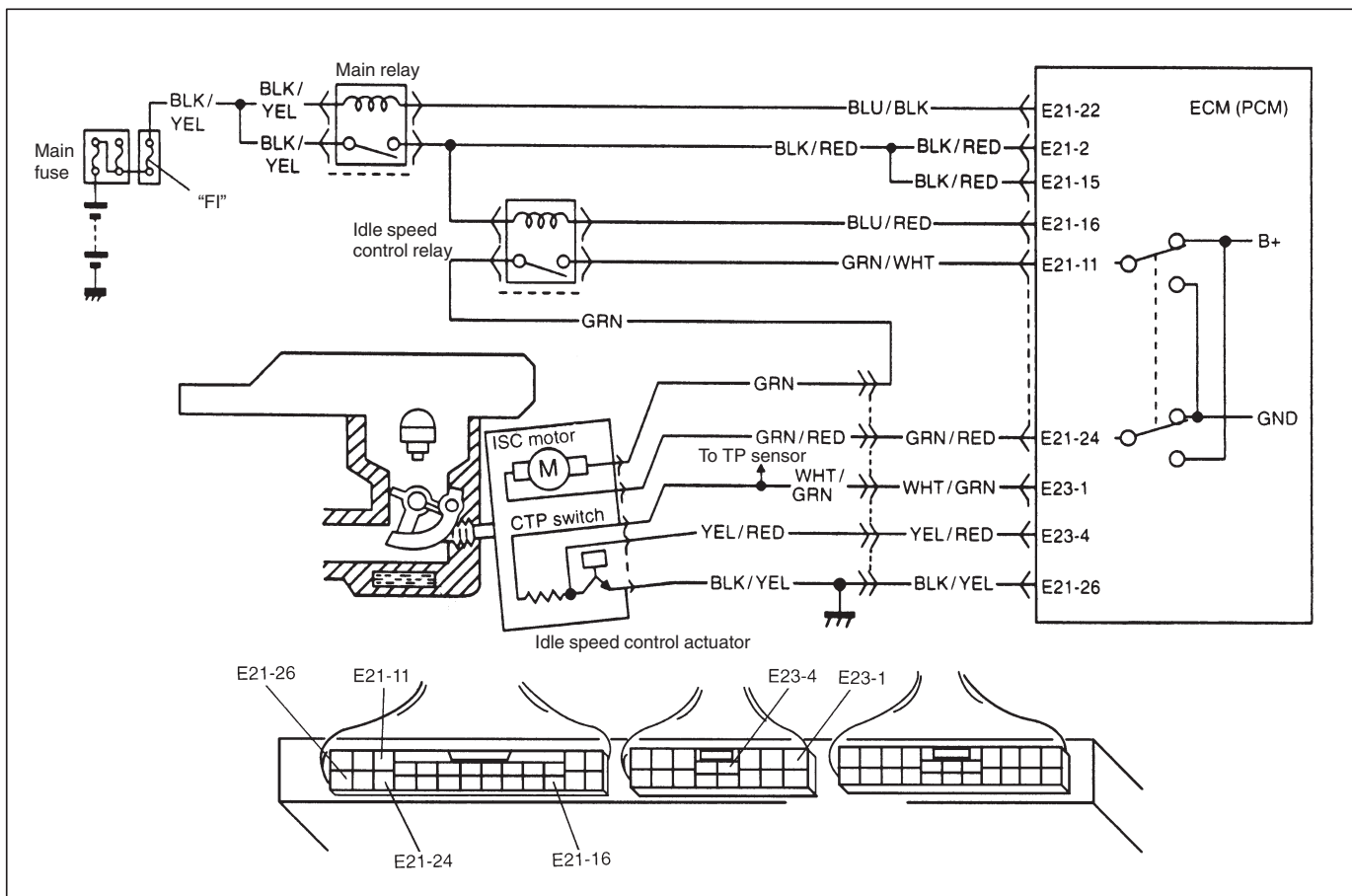


Fig. 2 for Step 4 and Step 6



DTC P0505 IDLE CONTROL SYSTEM MALFUNCTION**CIRCUIT DESCRIPTION**

DTC DETECTING CONDITION	POSSIBLE CAUSE
<p>DTC will set when A, B or C condition is met.</p> <p>A: Throttle opening change is small as compared with electrically live time.</p> <p>B: Throttle valve opening is not within its target range with CTP switch ON.</p> <p>C: Drive voltage exists though ECM (PCM) is not outputting ISC drive command.</p>	<ul style="list-style-type: none"> ● Maladjusted accelerator cable ● Poor movement of throttle valve ● Closed throttle position switch malfunction ● Idle speed control actuator malfunction ● Idle speed control relay malfunction ● "BLU/RED", "GRN/WHT", "GRN", "GRN/RED", "WHT/GRN", "YEL/RED" or "BLK/YEL" circuit open or short ● Throttle position sensor malfunction ● ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Start cold engine.
- 4) Run it idle for 5 min.
- 5) Select "DTC" mode on scan tool and check DTC.

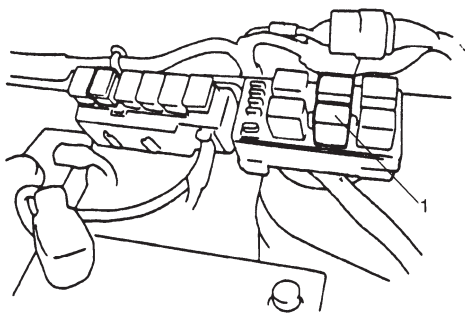
NOTE:

If engine speed changes up and down when engine speed is increased by opening throttle valve more than half but not changing its opening, it is possible that closed throttle position switch is malfunctioning.

DTC P0505**INSPECTION**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Idle Control System. 1) Connect SUZUKI scan tool to DLC with ignition switch OFF, set parking brake and block drive wheels. 2) Warm up engine to normal operating temperature. 3) Clear DTC and select "MISC TEST" mode on SUZUKI scan tool. Is it possible to control (increase and reduce) engine idle speed by using SUZUKI scan tool?	Check TP sensor (Go to DTC P0121 Flow Table) If TP sensor is OK, intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check ISC Relay. 1) Ignition switch OFF and remove ISC relay ("ISCA"). 2) Check for proper connection to ISC relay at terminals 3 and 4. 3) Check resistance between each two terminals. Between terminals 1 and 2: Infinity Between terminals 3 and 4: 100 – 120 Ω 4) Check that there is continuity between terminals 1 and 2 when battery is connected to terminals 3 and 4. Is ISC relay in good condition?	Go to Step 4.	Replace ISC relay.
4	Check Idle Speed Control Actuator. 1) Check ISC actuator operation by referring to ISC ACTUATOR INSPECTION in Section 6E1. Is it good condition?	Check "GRN/RED", "GRN", "GRN/WHT" and "BLU/RED" circuit for open and short. If wires and connections are OK, substitute a known-good ECM (PCM) and recheck.	Replace throttle body with ISC actuator.

Fig. 1 for Step 3



1. ISC relay

Fig. 2 for Step 3

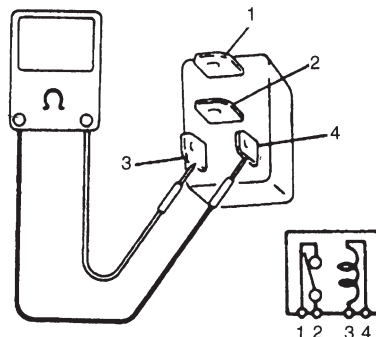
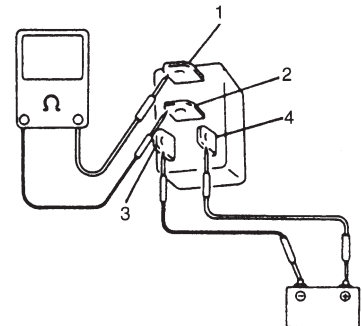


Fig. 3 for Step 3



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> ● Even when vehicle is started from stop and accelerated to specified vehicle speed, CTP switch does not turn from ON to OFF (or from OFF to ON). 2 driving cycle detection logic, continuous monitoring 	<ul style="list-style-type: none"> ● “WHT/GRN”, “YEL/RED” or “BLK/YEL” circuit open or short ● CTP switch malfunction ● ECM (PCM) malfunction

When DTC P0105, P0120 and/or P0510 are indicated together, it is possible that “WHT/GRN” circuit is open.

- 1) Turn ignition switch OFF, clear DTC with ignition switch ON and start engine.
- 2) Increase vehicle speed to 20 mph, 32 km/h and then stop vehicle.
- 3) Repeat above step 2) 15 times.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	<p>Check CTP Switch Operation.</p> <p>1) Connect SUZUKI scan tool to DLC with ignition switch OFF.</p> <p>2) Turn ignition switch ON.</p> <p>Does CTP switch operate properly under following conditions respectively? See Fig. 1.</p> <p>Condition "A": ON displayed on scan tool</p> <p>Condition "B": OFF displayed on scan tool</p> <p>Is test result satisfactory?</p>	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection in Section 0A.	Go to Step 3.
3	<p>Check CTP switch.</p> <p>1) Arrange 3 new 1.5 V batteries in series (4.5 V in total).</p> <p>2) Connect these batteries to CTP switch terminals "4" and "5".</p> <p>3) Under following each condition, check voltage between CTP switch terminals "6" and "5". See Fig. 2.</p> <p>Condition "A": 0 – 1 V</p> <p>Condition "B": 3.5 – 5.5 V</p> <p>Is measured voltage as specified?</p>	<p>Check "WHT/GRN", "YEL/RED" and "BLK/YEL" wires and connections for open or short.</p> <p>If wires and connections are OK, substitute a known-good ECM (PCM) and recheck.</p>	Replace ISC motor set (throttle body with ISC actuator).

Condition "A":
throttle lever is in contact
with ISC actuator plunger

Condition "B":
Throttle lever is apart
from plunger

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DTC P0601 INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR

DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC P0601: Data write error (or check sum error) when written into ECM (PCM) 2 driving cycle detection logic, continuous monitoring.	ECM (PCM)

DTC CONFIRMATION PROCEDURE

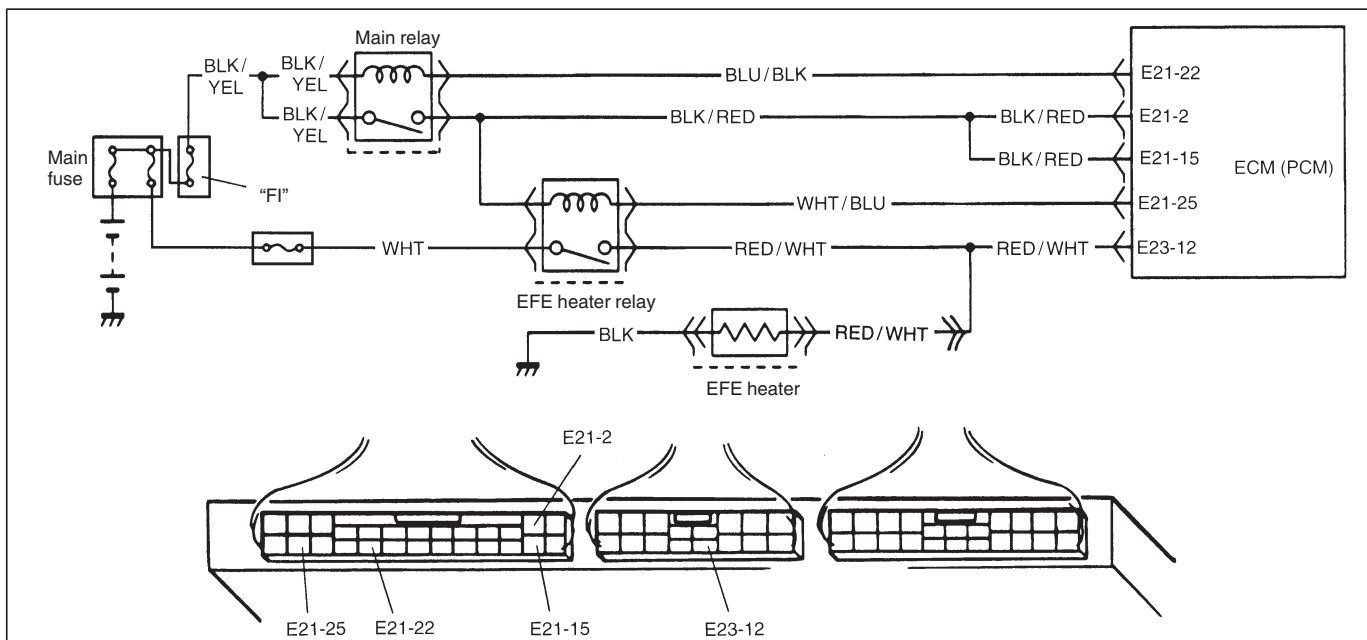
- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON and then turn ignition switch OFF.
- 3) Start engine and run it at idle if possible.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

INSPECTION

Substitute a known-good ECM (PCM) and recheck.

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**DTC P1250 EARLY FUEL EVAPORATION (EFE) HEATER CIRCUIT
 MALFUNCTION**

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • Voltage low at terminal E23-12 during engine warming up or • Voltage high at terminal E23-12 after engine warming up 2 driving cycle detection logic, continuous monitoring 	<ul style="list-style-type: none"> • "WHT/BLU", "RED/WHT" or "WHT" circuit open or short • EFE heater relay malfunction • EFE heater malfunction • ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Check vehicle and environmental condition for:
 - Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
 - Ambient temp: -10°C , 14°F or higher
 - Intake air temp: 70°C , 158°F or lower
- 4) Start cool engine and warm it up to normal operating temperature.
- 5) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check EFE Heater and Its Circuit. Check for voltage at terminal E23-12 of ECM (PCM) connector connected, under following each condition. During engine warming up (Coolant temp.: Below 80°C, 176°F, Engine speed: Over 750 r/min): Over 1.0 V After warming up: Below 1.0 V Is each voltage as specified?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check EFE Heater Relay. 1) Turn OFF ignition switch and remove EFE heater relay ("PTC"). See Fig. 2. 2) Check for proper connection to relay at terminal 3 and 4. See Fig. 3. 3) Check resistance between each two terminals. Between terminals 1 and 2: Infinity Between terminals 3 and 4: 100 – 120 Ω 4) Check that there is continuity between terminals 1 and 2 when battery is connected to terminals 3 and 4. See Fig. 4. Is EFE heater relay in good condition?	Go to Step 4.	Replace EFE heater relay.
4	Check EFE Heater and Its Circuit. 1) Turn ignition switch OFF and disconnect ECM (PCM) connectors. 2) Check for proper connection to ECM (PCM) at terminals E21-25 and E23-12. 3) If OK, then measure resistance between terminal E23-12 and ground. Is it 0.5 – 30 Ω at 20°C (68°F)?	"WHT/BLU", "RED/WHT" or "WHT" circuit open or short. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	"RED/WHT" circuit open or short. If wire and connections are OK, replace EFE heater.

Fig 1. for Step 4

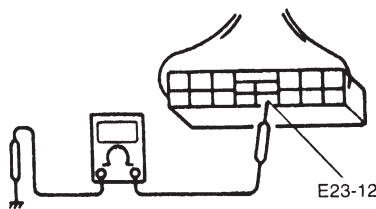


Fig. 2 for Step 3

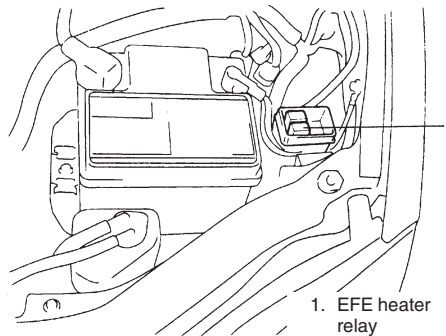


Fig. 3 for Step 3

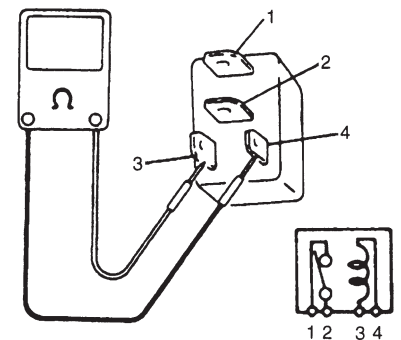
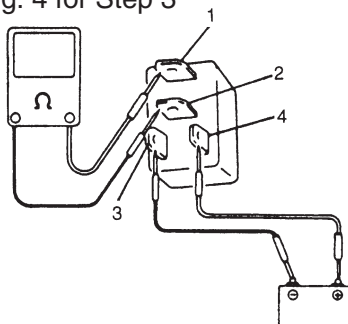


Fig. 4 for Step 3



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DTC P1450 BAROMETRIC PRESSURE SENSOR LOW/HIGH INPUT DTC P1451 BAROMETRIC PRESSURE SENSOR PERFORMANCE PROBLEM

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Barometric pressure sensor is installed in ECM (PCM).

DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC P1450: <ul style="list-style-type: none"> Barometric pressure: 136 kPa 1025 mmHg or higher, or 33 kPa 250 mmHg or lower 	<ul style="list-style-type: none"> ECM (PCM) (barometric pressure sensor) malfunction
DTC P1451: <ul style="list-style-type: none"> Vehicle stopped. Engine cranking. Difference between barometric pressure and intake manifold absolute pressure is 26 kPa, 200 mmHg or more. 2 driving cycle detection logic, monitoring once/1 driving. 	<ul style="list-style-type: none"> Manifold absolute pressure sensor and its circuit malfunction ECM (PCM) (barometric pressure sensor) malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Turn ignition switch ON for 2 sec., crank engine for 2 sec. and run it at idle for 1 min.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

INSPECTION

DTC P1450:

Substitute a known-good ECM (PCM) and recheck.

DTC P1451:

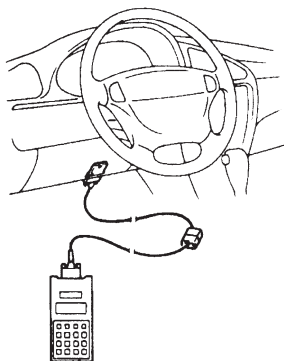
NOTE:

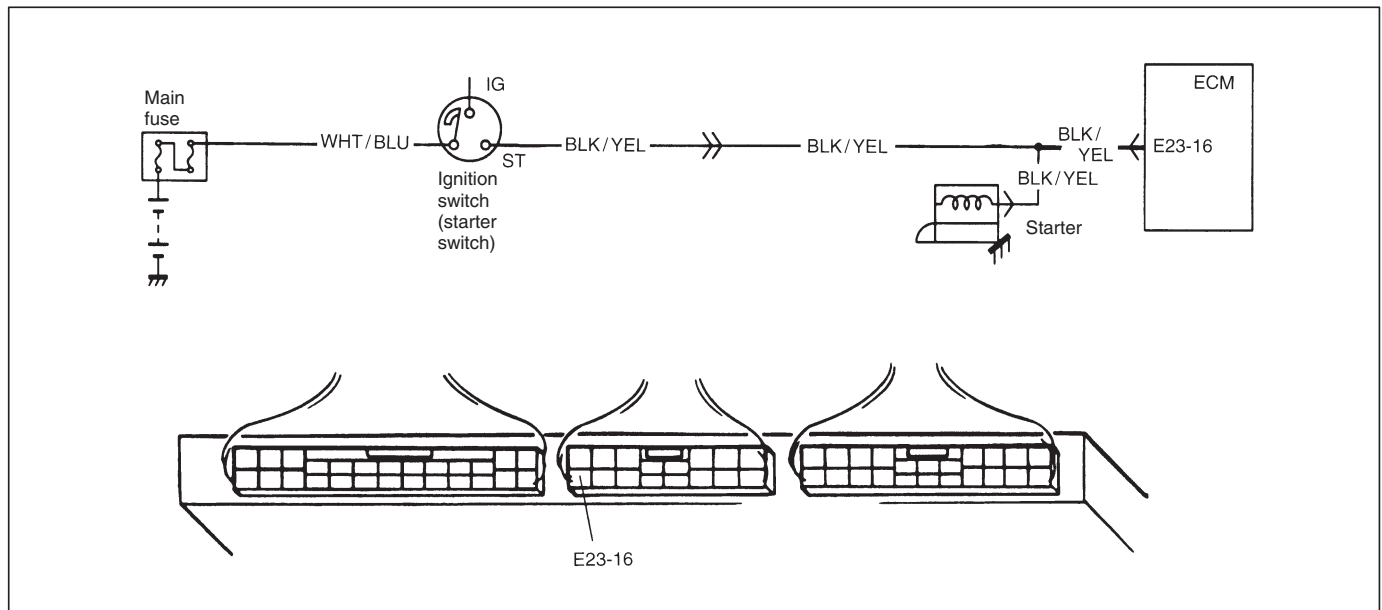
Note that atmospheric pressure varies depending on weather conditions as well as altitude.

Take that into consideration when performing these check.

STEP	ACTION	YES	NO
1	1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and select "DATA LIST" mode on scan tool. 3) Check manifold absolute pressure. See Fig. 1. Is it barometric pressure (approx. 100 kPa, 760 mmHg) at sea level?	Substitute a known-good ECM (PCM) and recheck.	Check intake manifold pressure sensor and its circuit. Go to P0105 DIAG. FLOW TABLE.

Fig. 1 for Step 1



DTC P1500 ENGINE STARTER SIGNAL CIRCUIT MALFUNCTION**CIRCUIT DESCRIPTION**

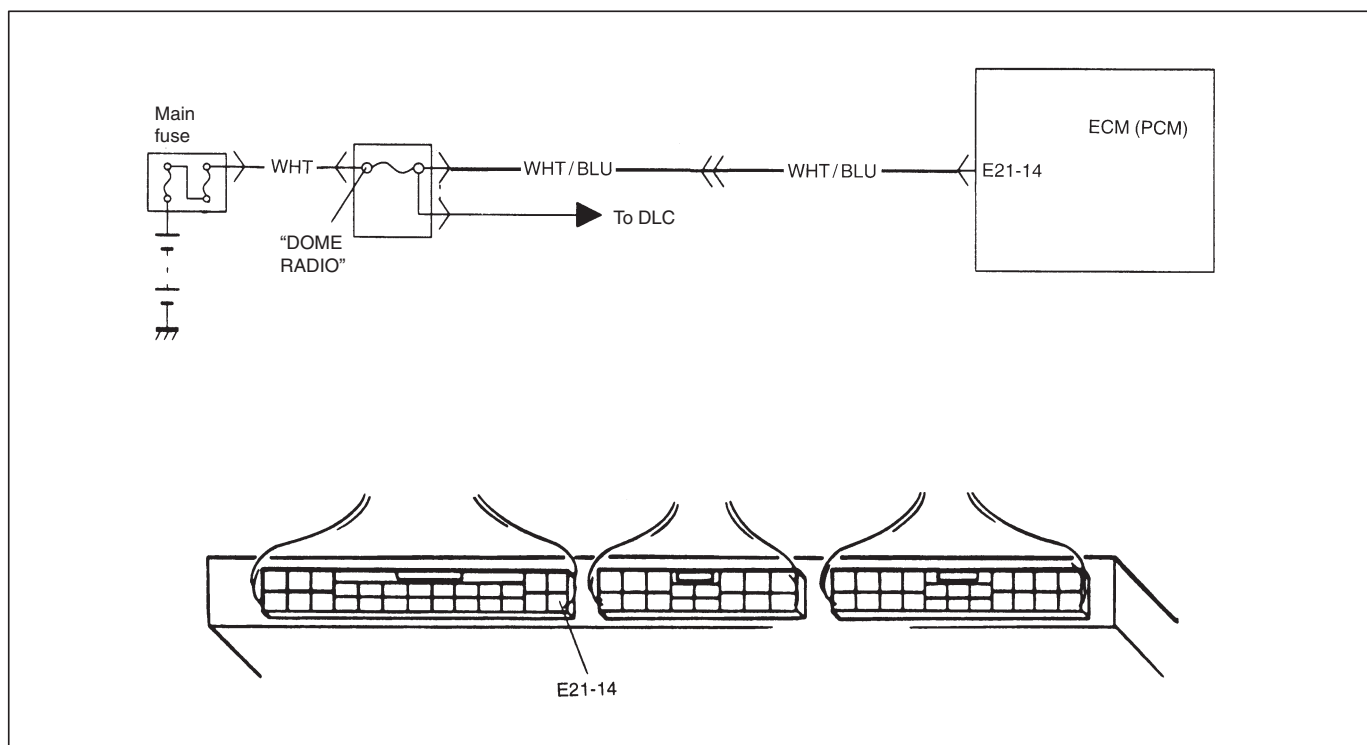
DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> • High voltage at terminal E23-16 for 3 min. after engine start. • Low voltage at terminal E23-16 during starting engine. 2 driving cycle detection logic, continuous monitoring. 	<ul style="list-style-type: none"> • “BLK/YEL” circuit open • ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON, crank engine and run it at idle for 3 min.
- 3) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Check for voltage at terminal E23-16 of ECM (PCM) connector connected, under following condition. While engine cranking : 6 – 10 V After starting engine : 0 V Is voltage as specified?	Poor E23-16 connection or intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	“BLK/YEL” circuit open.

DTC P1510 ECM (PCM) BACK-UP POWER SUPPLY MALFUNCTION**CIRCUIT DESCRIPTION**

Battery voltage is supplied so that diagnostic trouble code memory, values for engine control learned by ECM (PCM), etc. are kept in ECM (PCM) even when the ignition switch is turned OFF.

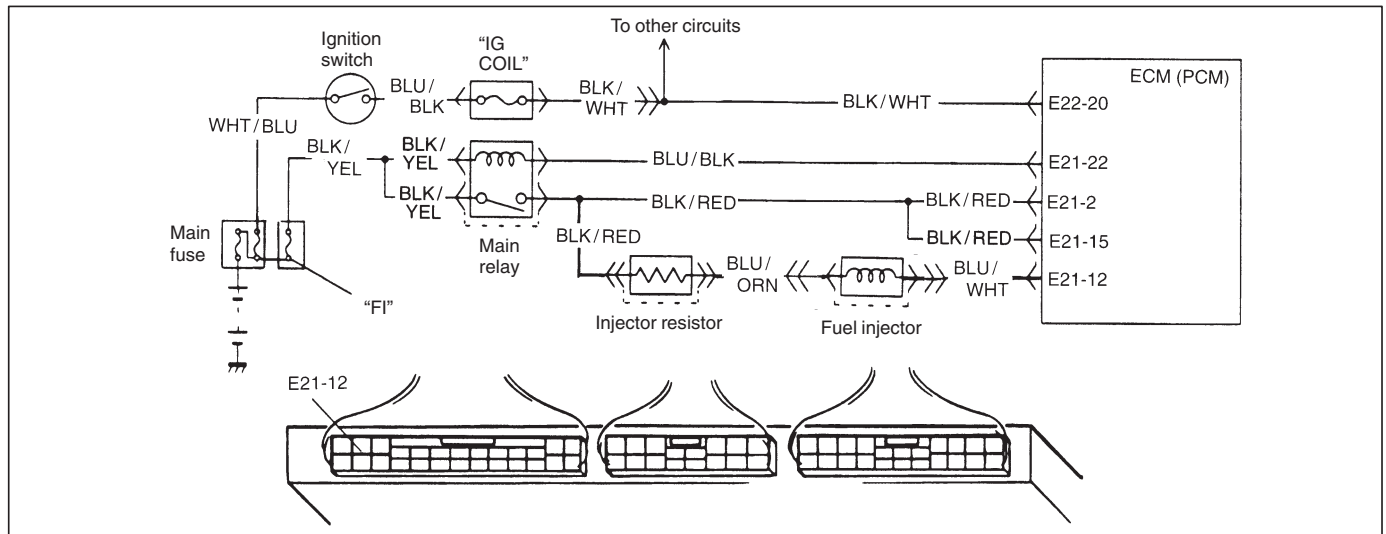
DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> Low voltage at terminal E21-14 after starting engine. 	<ul style="list-style-type: none"> "WHT/BLU" circuit open ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and run it at idle for 1 min.
- 2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Check for voltage at terminal E21-14 of ECM (PCM) connector connected, under each condition, ignition switch OFF and engine running. Is it 10 – 14 V at each condition?	Poor E21-14 connection or intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If wire and connections are OK, substitute a known- good ECM (PCM) and recheck.	"WHT/BLU" circuit open.



STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Injector Circuit Check 1) Check injector circuit for short. Is fuel injected from injector at ignition switch ON?	“BLU/WHT” wire shorted to ground or faulty injector. If wire and injector is as specified respectively and then substitute known-good ECM (PCM) and recheck.	Go to Step 3.
3	Injector Check 1) Check injector for fuel Injection referring to FUEL INJECTOR ON-VEHICLE INSPECTION in Section 6E1. Is fuel injected from injector at engine cranking?	Go to Step 4.	Go to Step 5.
4	Injector Leakage Check 1) Check injector for leaks referring to FUEL INJECTOR ON-VEHICLE INSPECTION in Section 6E1. Is it in good condition?	Injector and its circuit are in good condition.	Faulty fuel injector.
5	Check Injector for Operating Sound. 1) Using sound scope, check injector for operating sound at engine cranking. Is it detected?	Proceed to DIAG. FLOW TABLE B-2 and B-3.	Go to Step 6.

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STEP	ACTION	YES	NO
6	<p>Check Injector Resistor for Resistance.</p> <p>1) Disconnect resistor connector with ignition switch OFF.</p> <p>2) Check for proper connection to resistor at each terminals.</p> <p>3) If connection is OK, check resistance.</p> <p>Is resistance 1.9 – 2.1 Ω (at 20°C, 68°F)?</p>	<p>“BLK/RED”, “BLU/ORN” or “BLU/WHT” wire open or poor E21-12 connection. If wires and connections are OK, substitute a known- good ECM (PCM) and recheck.</p>	Replace resistor.

The diagram illustrates the electrical system for the 1994 Oldsmobile Cutlass Supreme 3.0 V6. It shows the power flow from the battery through various relays and switches to the ECM (PCM) and other components.

Key Components and Connections:

- Battery:** Connected to the Main fuse and the Ignition switch.
- Main fuse:** Protects the main power line.
- Ignition switch:** Controls the ignition system.
- 'IG COIL':** Ignition coil, connected to the Ignition switch and the ECM (PCM) terminal E22-20.
- Main relay:** Controls the fuel pump relay.
- Fuel pump relay:** Controls the fuel pump.
- Fuel pump:** Delivers fuel to the engine.
- ECM (PCM):** Engine Control Module/Powertrain Control Module, which manages the engine's operation.

Wiring Details:

- The battery is connected to the Main fuse, which then splits to the Ignition switch and the Main relay.
- The Ignition switch is connected to the 'IG COIL' and the ECM (PCM) terminal E22-20.
- The Main relay is connected to the Main fuse and the Fuel pump relay.
- The Fuel pump relay is connected to the Main relay and the Fuel pump.
- The ECM (PCM) is connected to the 'IG COIL' and the Fuel pump relay.

ECM (PCM) Terminals:

- E22-20: Ignition coil (IG COIL)
- E21-22: Main relay
- E21-2: Fuel pump relay
- E21-15: Fuel pump
- E21-21: Fuel pump

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check Fuel Pump Control System for Operation. See Fig. 1. Is fuel pump heard to operate for 2 sec. after ignition switch ON?	Fuel pump circuit is in good condition.	Go to Step 3.
3	Check Fuel Pump for Operation. 1) Remove fuel pump relay from relay box with ignition switch OFF. 2) Check for proper connection to relay at each terminals. 3) If OK, using service wire, connect terminals of relay connector. See Fig. 2. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> CAUTION: Check to make sure that connection is made between correct terminals. Wrong connection can cause damage to ECM (PCM), wire harness, etc. </div> Is fuel pump heard to operate at ignition switch ON?	Go to Step 4.	"PNK", "BLK" or "BLK/RED" circuit open or fuel pump malfunction.
4	Check Fuel Pump Relay for Operation. 1) Check resistance between each two terminals of fuel pump relay. See Fig.3. Between terminals "1" and "2": Infinity Between terminals "3" and "4": 100 – 120 Ω 2) Check that there is continuity between terminals "1" and "2" when battery is connected to terminals "3" and "4". Is fuel pump relay in good condition?	"GRN" circuit open or poor E21-21 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace fuel pump relay.

Fig. 1 for Step 2

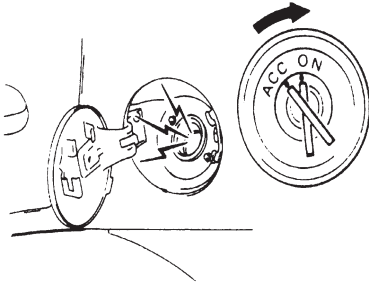


Fig. 2 for Step 3

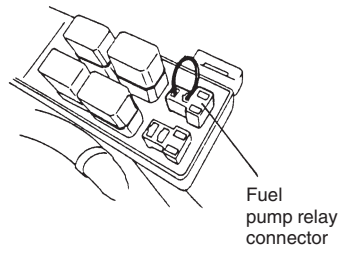


Fig. 3 for Step 4

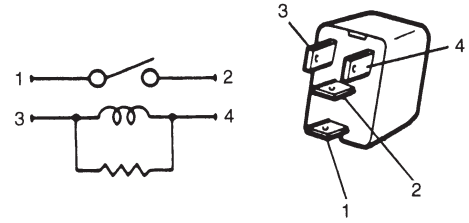
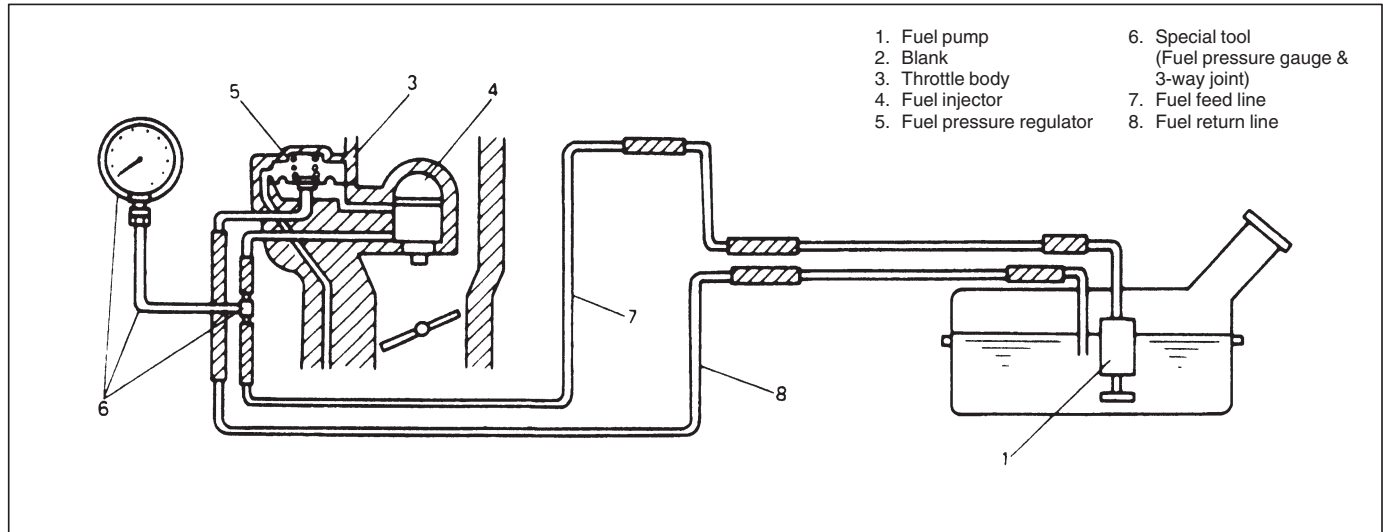
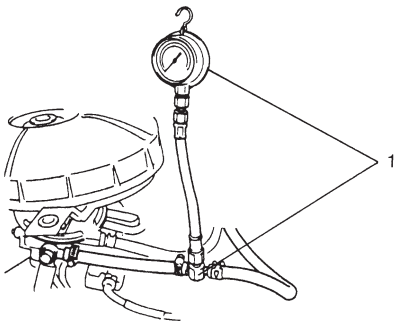


TABLE B-3 FUEL PRESSURE CHECK**INSPECTION**

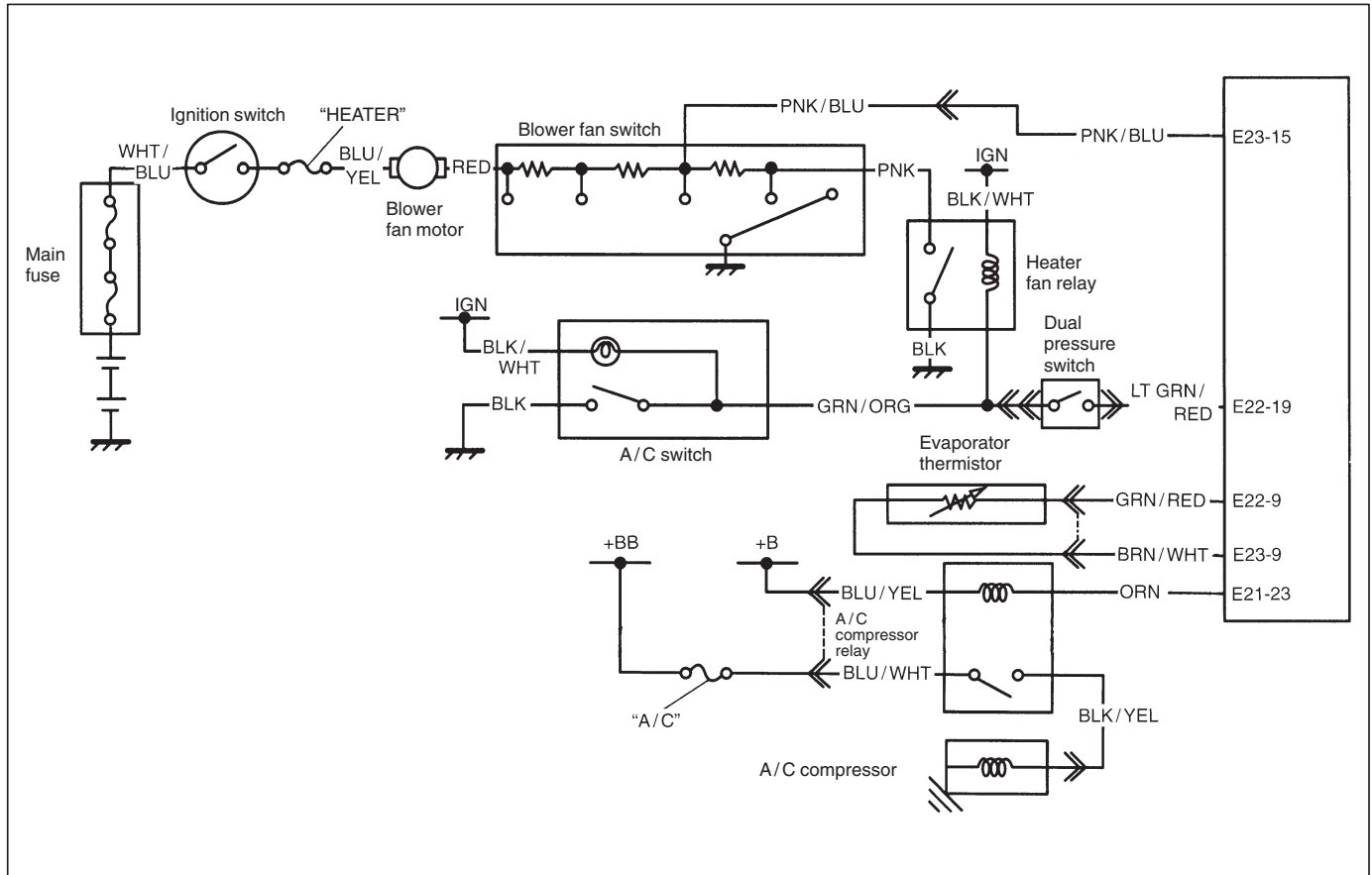
STEP	ACTION	YES	NO
1	Check Fuel Pressure (Refer to Section 6E1 for details). 1) Release fuel pressure from fuel feed line. 2) Install fuel pressure gauge. 3) Check fuel pressure by repeating ignition switch ON and OFF. See Fig. 1. Is fuel pressure then 160 – 210 kPa (1.6 – 2.1 kg/cm ² , 22.7 – 29.9 psi)?	Go to Step 2.	Go to Step 4.
2	Is 90 kPa (0.9 kg/cm ² , 12.8 psi) or higher fuel pressure retained for 1 minute after fuel pump is stopped at Step 1?	Normal fuel pressure.	Go to Step 3.
3	1) Start engine and warm it up to normal operating temperature. 2) Keep it running at specified idle speed. Is fuel pressure then within 90 – 140 kPa (0.9 – 1.4 kg/cm ² , 12.8 – 20.0 psi)?	Normal fuel pressure.	<ul style="list-style-type: none"> ● Clogged vacuum passage for fuel pressure regulator or ● Faulty fuel pressure regulator.
4	Is there fuel leakage from fuel feed line hose, pipe or their joint?	Fuel leakage from hose, pipe or joint.	Go to Step 10.
5	Was fuel pressure higher than specification in Step 1?	Go to Step 6.	Go to Step 7.
6	1) Disconnect fuel return hose from throttle body and connect new return hose to it. 2) Insert the other end of new return hose into approved gasoline container. 3) Operate fuel pump. Is specified fuel pressure obtained then?	Restricted fuel return hose or pipe.	Faulty fuel pressure regulator.
7	Was no fuel pressure supplied in Step 1?	Go to Step 8.	Go to Step 9.

STEP	ACTION	YES	NO
8	With fuel pump operated and fuel return hose blocked by pinching it, is fuel pressure applied?	Faulty fuel pressure regulator.	Shortage of fuel or fuel pump or its circuit defective (refer to B-2 FUEL PUMP AND ITS CIRCUIT CHECK).
9	1) Operate fuel pump. 2) With fuel return hose blocked by pinching it, check fuel pressure. Is it 450 kPa (4.5 kg/cm ² , 63.9 psi) or more?	Faulty fuel pressure regulator.	<ul style="list-style-type: none"> ● Clogged fuel filter, ● Restricted fuel feed hose or pipe, ● Faulty fuel pump or ● Fuel leakage from hose connection in fuel tank.
10	1) Disconnect fuel return hose from throttle body and connect new return hose to it. 2) Insert the other end of new return hose into approved gasoline container. 3) Check again if specified pressure is retained. While doing so, does fuel come out of return hose?	Faulty fuel pressure regulator.	<ul style="list-style-type: none"> ● Fuel leakage from injector, ● Fuel leakage from between injector and throttle body, ● Faulty fuel pump (faulty check valve in fuel pump) or ● Fuel leakage from fuel pressure regulator diaphragm.

Fig. 1 for Step 1



1. Fuel pressure gauge & 3way joint

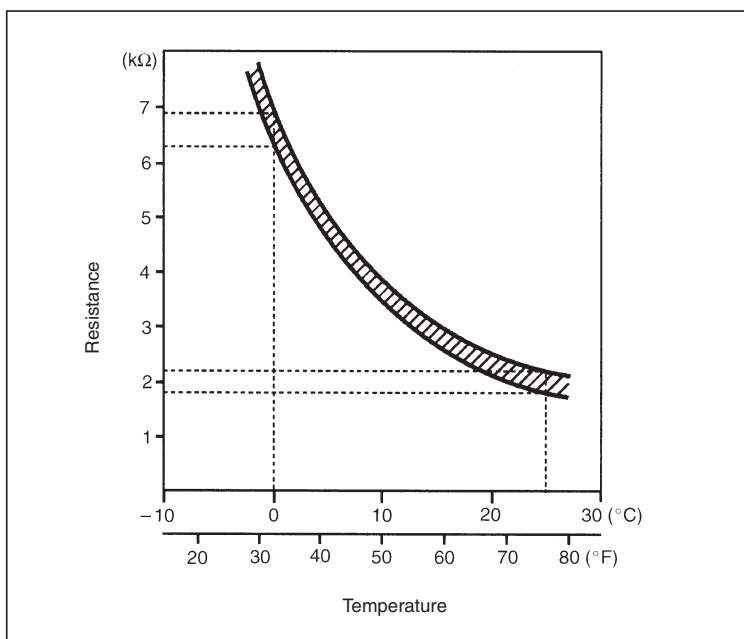
TABLE B-4 A/C SIGNAL CIRCUITS CHECK (VEHICLE WITH A/C)**INSPECTION**

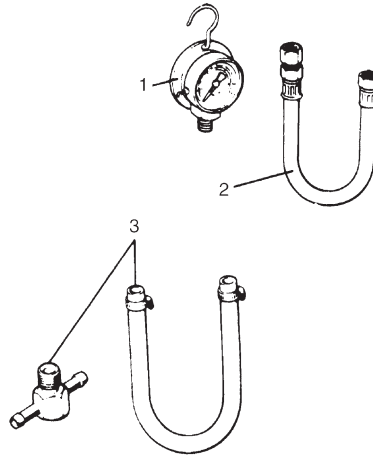
STEP	ACTION	YES	NO				
1	1) Disconnect ECM connectors with ignition switch at OFF position. 2) Check resistance between E22-9 terminal and E23-9 terminal. 3) Is it within specification? Reference value. See Fig. 1. At 0°C 6.3 – 6.9 kΩ At 25°C 1.8 – 2.2 kΩ	Go to Step 2.	Faulty A/C evaporator thermistor or its circuit.				
2	1) Check voltage at E22-19 terminal under each condition given in table below. <table><tr><td>Ignition switch ON A/C switch OFF</td><td>10 – 14 V</td></tr><tr><td>Ignition switch ON A/C switch ON</td><td>0 – 2 V</td></tr></table> 2) Is check result satisfactory?	Ignition switch ON A/C switch OFF	10 – 14 V	Ignition switch ON A/C switch ON	0 – 2 V	Go to Step 3.	● “LT GRN/RED” wire open or short ● Poor E22-19 terminal connection If wire and connection are OK, substitute a known-good ECM and recheck.
Ignition switch ON A/C switch OFF	10 – 14 V						
Ignition switch ON A/C switch ON	0 – 2 V						

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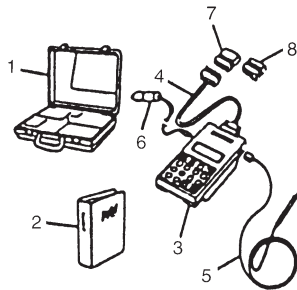
STEP	ACTION	YES	NO				
3	<div>1) Check voltage at E21-23 terminal under each condition given in table below.</div> <table><tr><td>While engine running, A/C switch OFF</td><td>0 V</td></tr><tr><td>While engine running, A/C switch ON</td><td>10 – 14V</td></tr></table> <div>NOTE: When A/C evaporator thermistor temp. is below 2.5°C (36.5°F), A/C remain OFF (E21-23 terminal voltage become 0 – 1 V). This condition is not abnormal.</div> <div>2) Is check result satisfactory?</div>	While engine running, A/C switch OFF	0 V	While engine running, A/C switch ON	10 – 14V	A/C control system circuits are in good condition.	<ul style="list-style-type: none">● “ORN” or “BLU/YEL” wire open or short● Poor E21-23 terminal connection If wire and connection are OK, substitute a known-good ECM and recheck.
While engine running, A/C switch OFF	0 V						
While engine running, A/C switch ON	10 – 14V						

Fig. 1 for Step 1



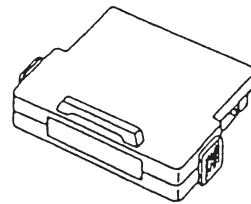
SPECIAL TOOL

- 1. Pressure gauge
09912-58441
- 2. Pressure hose
09912-58431
- 3. 3-way joint & hose
09912-58490

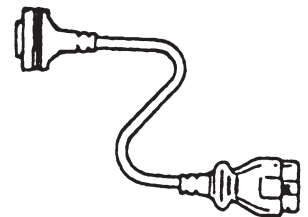


- 1. Storage case
- 2. Operator's manual
- 3. Tech 1 A
- 4. DLC cable (14/26 pin,
09931-76040)
- 5. Test lead/probe
- 6. Power source cable
- 7. DLC cable adaptor
- 8. Self-test adaptor

09931-76011
SUZUKI scan tool (Tech 1 A) kit



Mass storage cartridge



09931-76030
16/14 pin DLC cable

SECTION 6A

6A

ENGINE MECHANICAL

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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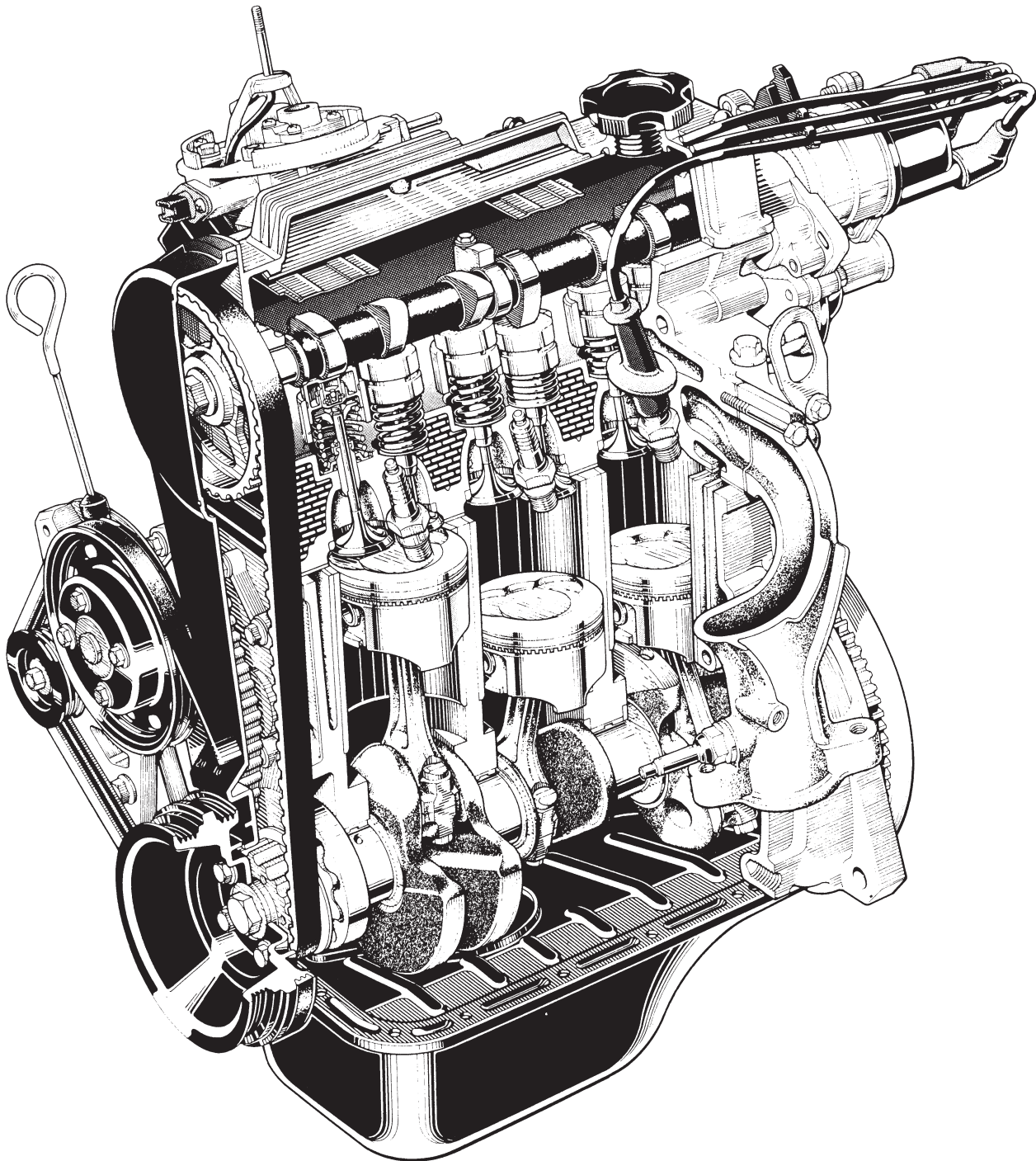
GENERAL DESCRIPTION	6A- 2	Throttle Body and Intake Manifold	6A-12
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GENERAL DESCRIPTION

ENGINE

The engine is a water-cooled, in line 3 cylinders, 4 stroke cycle gasoline unit equipped with a direct acting type S.O.H.C (Single Overhead Camshaft) valve mechanism.

The single overhead camshaft is mounted over the cylinder head; it is driven from crankshaft through timing belt and opens and closes valves (IN & EX) via the hydraulic valve lash adjusters.



ENGINE LUBRICATION

The oil pump is of a trochoid type, and mounted on crankshaft at crankshaft pulley side.

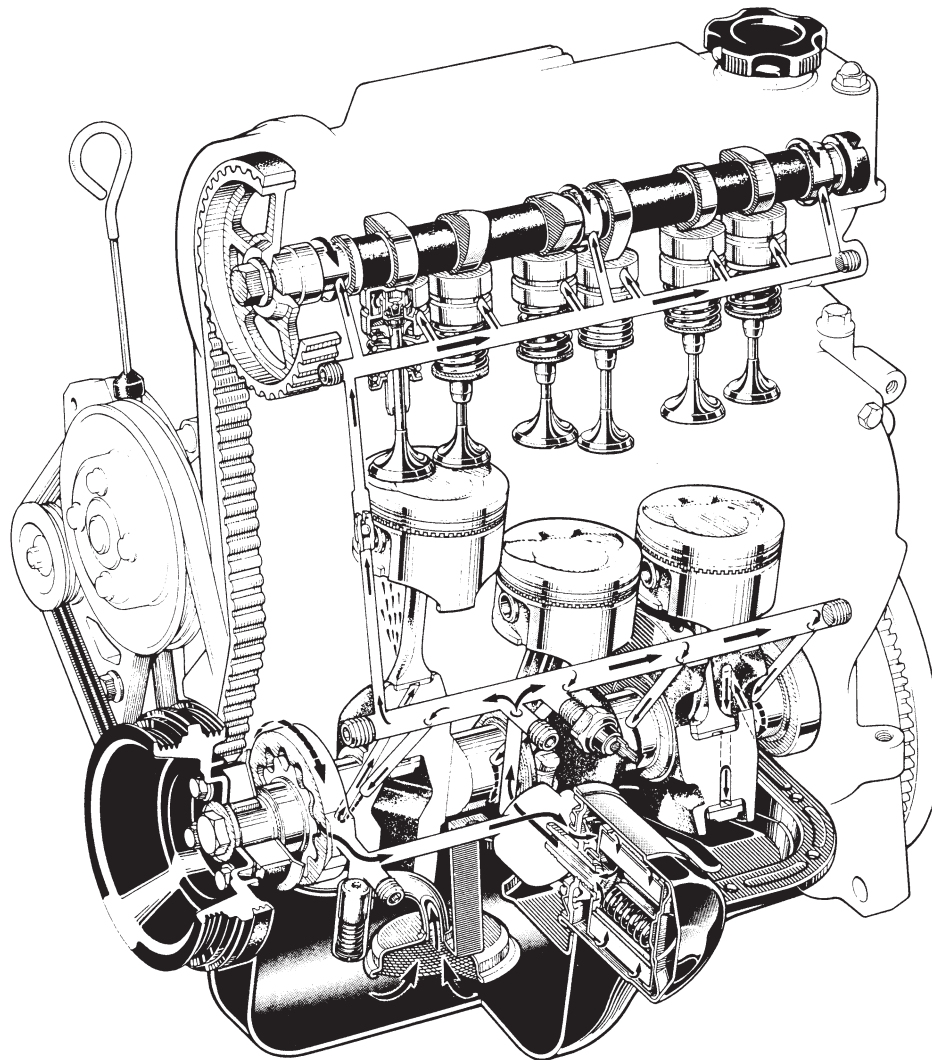
Oil is drawn up through oil pump strainer and passed through pump to oil filter.

The filtered oil flows into two paths in cylinder block. In one path, oil reaches crankshaft journal bearings. Oil from crankshaft journal bearings is supplied to connecting rod bearings by means of intersecting passages drilled in crankshaft, and then injected from a small hole provided on big end of connecting rod to lubricate piston, rings, and cylinder wall.

In another path, oil goes up to cylinder head and lubricates camshaft journals, and hydraulic valve lash adjusters, etc., passing through oil gallery in cylinder head wall.

There is a check valve in the path from cylinder block to cylinder head. It serves to keep oil gallery in cylinder head filled with oil even when engine is at a stop.

An oil relief valve is provided on oil pump. This valve starts relieving oil pressure when the pressure comes over about 3.0 kg/cm^2 (42.7 psi, 300 kPa). Relieved oil drains back to oil pan.



CYLINDER HEAD, VALVE TRAIN AND HYDRAULIC VALVE LASH ADJUSTER

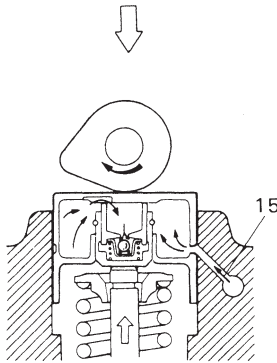
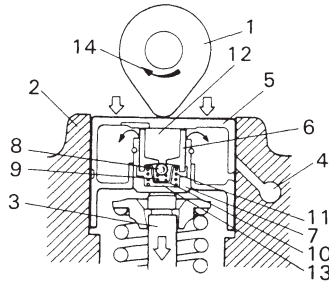
The cylinder head is made of cast aluminum alloy and has three combustion chambers arranged in-line.

The single overhead camshaft driven by the crankshaft through the timing belt is mounted on the cylinder head. It has six cams and operates the intake and exhaust valves via the hydraulic valve lash adjuster.

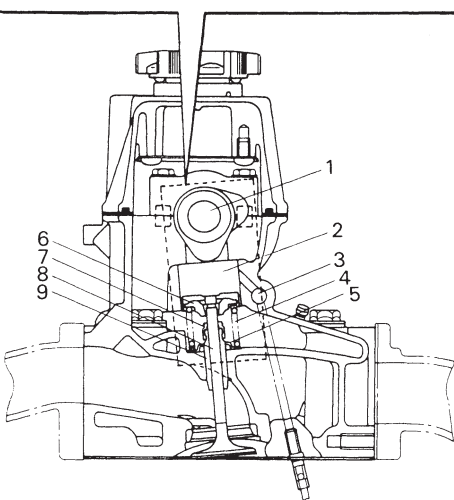
OPERATION OF HYDRAULIC VALVE LASH ADJUSTER

The hydraulic valve lash adjuster located between the camshaft and valve stem is direct acting type. With the engine oil delivered into it from the oil pump, the adjuster operates as follows so as to adjust the valve lash (clearance) to "0" automatically at all time.

- 1) When the camshaft doesn't push the bucket body, the bucket body is pushed against the cam and the body against the stem by the plunger spring force. In this state, the valve lash is kept to "0". (At "0" valve lash, the oil pressure becomes equal in the chambers "A" and "B", and the check ball closes the passage between these two chambers.)
- 2) When the cam crest of the camshaft start pushing the bucket body, the bucket body and plunger are pushed downward and at the same time the body is pushed upward by the counter force from the valve stem. As a result, the chamber "B" is compressed and the pressure rises high. Then the oil in the chamber "B" leaks through the slight clearance between the body and plunger. However, as the compression time is very short, the volume hardly changes and thus the bucket body, plunger and body, substantially as one unit, push down the valve stem to open the valve.
- 3) When pushing of the cam crest of the camshaft against the bucket body is over, the operation as described in above 1) starts again. As the oil pressure in the chamber "B" is lower than that in "A" (for the oil in the chamber "B" under high pressure has leaked gradually in above 2)), the oil pressure in the chamber "A" pushes the check ball open to allow the oil to flow from the chamber "A" to chamber "B" till the oil pressure becomes equal between the two chambers.



- | | |
|------------------|------------------------------------|
| 1. Camshaft | 9. Check ball spring |
| 2. Cylinder head | 10. Check ball cage |
| 3. Valve stem | 11. Plunger spring |
| 4. Oil gallery | 12. Chamber "A" |
| 5. Bucket body | 13. Chamber "B" |
| 6. Plunger | 14. Direction of camshaft rotation |
| 7. Body | 15. Oil flow |
| 8. Check ball | |



- | | |
|------------------------|--------------------------|
| 1. Camshaft | 6. Valve spring retainer |
| 2. Valve lash adjuster | 7. Valve stem seal |
| 3. Oil gallery | 8. Valve stem |
| 4. Valve spring | 9. Valve guide |
| 5. Valve spring seat | |

CYLINDER BLOCK

The cylinder block is made of cast aluminum alloy and has 3 cylinders arranged “In-Line”.

A cylindrical cast iron sleeve is installed in each cylinder.

CRANKSHAFT AND MAIN BEARINGS

A monoblock crankshaft made of forged steel is supported by 4 main bearings which are of precision insert type.

Three crank pins on the crankshaft are positioned 120° apart.

PISTONS, RINGS, PISTON PINS AND CONNECTING RODS

The piston is cast aluminum alloy, and has two compression rings and one oil ring.

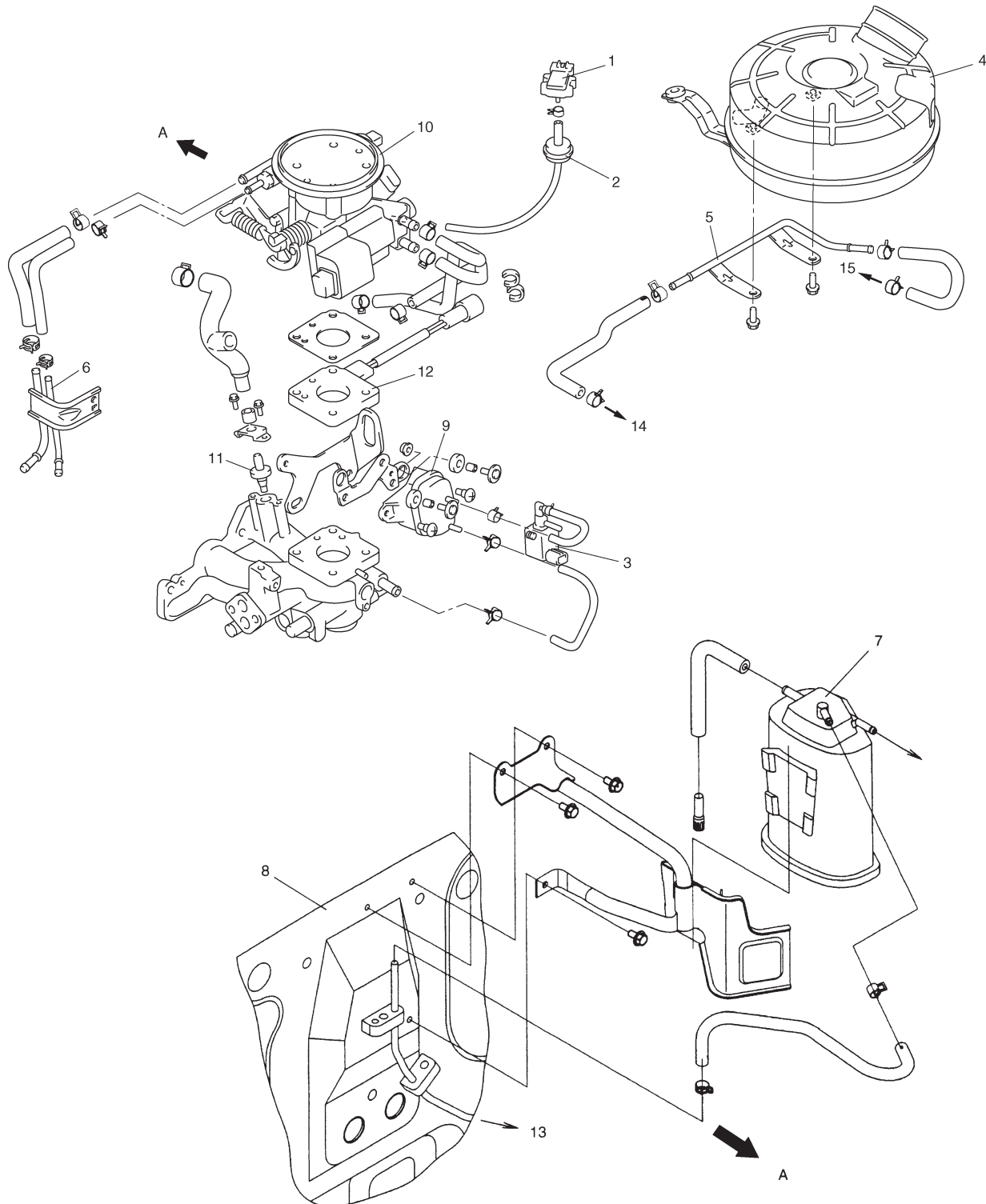
Among two compression rings (top and 2nd rings), the top ring is plated with hard chromium for improvement in abrasion resistance.

The oil ring consists of two rails and one spacer.

The piston pin is offset 0.5 mm towards the major thrust side.

This allows a gradual change in thrust pressure against the cylinder wall as the piston travels its path.

Pins, made of chromium steel, have a floating fit in the pistons and in the connecting rods. The connecting rods are made of forged steel, and the rod bearings are of precision insert type.

ON-VEHICLE SERVICE**HOSE AND PIPE ROUTING**

- A: Forward
- | | |
|------------------------------|----------------------------------|
| 1. MAP sensor | 9. EVAP canister surge tank |
| 2. Filter | 10. Throttle body |
| 3. EVAP canister purge valve | 11. PCV valve |
| 4. Air chamber case | 12. EFE heater |
| 5. Vacuum pipe | 13. To fuel tank |
| 6. Fuel pipe | 14. To EVAP canister |
| 7. EVAP canister | 15. To EVAP canister purge valve |
| 8. Dash panel | |

COMPRESSION CHECK

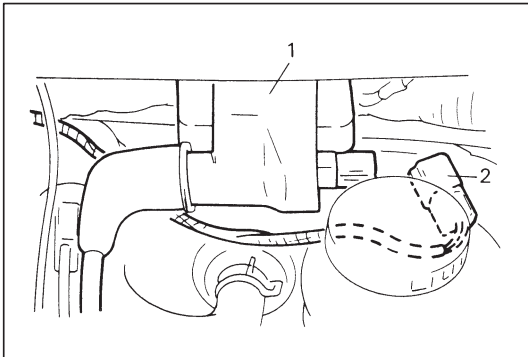
Check compression pressure on all three cylinders as follows:

- 1) Warm up engine.
- 2) Stop engine after warming up.

NOTE:

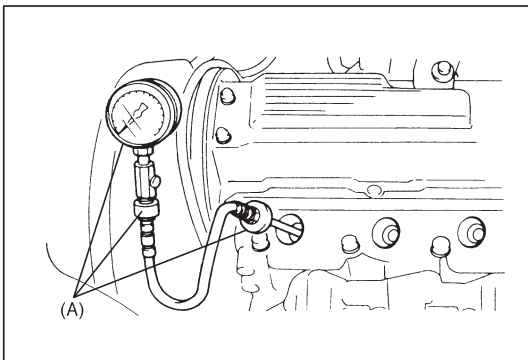
After warming up engine, place transmission gear shift lever in "Neutral" and set parking brake and block drive wheels.

- 3) Remove all spark plugs and disconnect fuel injector wire harness at coupler.
- 4) Disconnect ignition coil (1) wire harness at coupler (2).



WARNING:

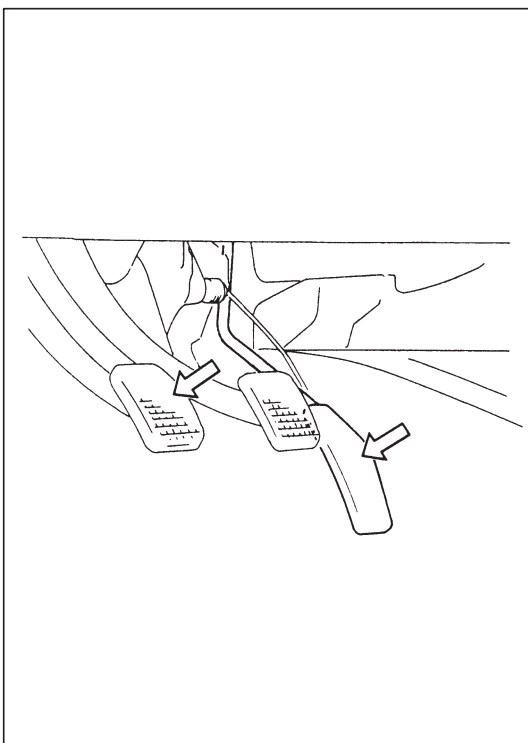
Failure in disconnecting ignition coil coupler can cause spark to occur in engine room possibly resulting in a dangerous explosion.



- 5) Install special tool (Compression gauge) into spark plug hole.

Special Tool

(A): 09915-64510



- 6) Disengage clutch (to lighten starting load on engine) and depress accelerator pedal all the way to make throttle valve full-open.
- 7) Crank engine with fully charged battery, and read the highest pressure on compression gauge.

NOTE:

For measuring compression pressure, crank engine at least 250 r/min. by using fully charged battery.

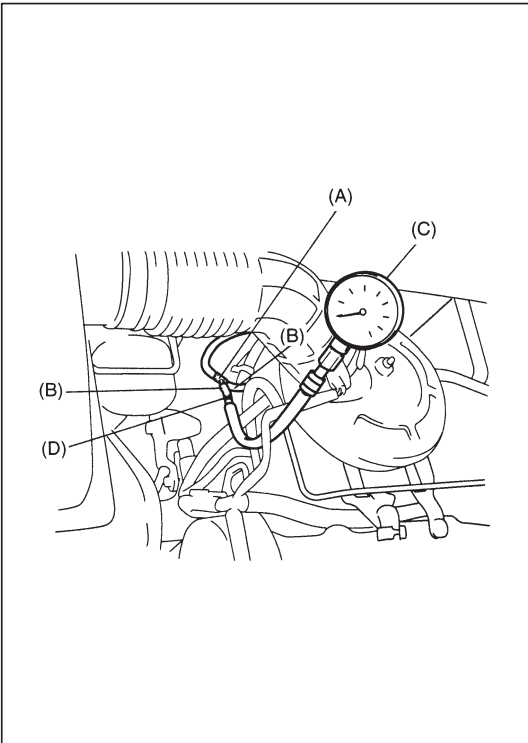
	Compression pressure
Standard	1400 kPa (14.0 kg/cm ² , 199.0 psi)
Limit	1100 kPa (11.0 kg/cm ² , 156.4 psi)
Max. difference between any two cylinders	100 kPa (1.0 kg/cm ² , 14.2 psi)

- 8) Carry out steps 5) through 7) on each cylinder to obtain four readings.
- 9) After checking, connect coupler of distributor, fuel injector and install spark plugs.

ENGINE VACUUM CHECK

The engine vacuum that develops in the intake line is a good indicator of the condition of the engine. The vacuum checking procedure is as follows:

1) Warm up engine to normal operating temperature.



2) With engine stopped, disconnect MAP sensor hose from throttle body and connect 3-way joint, hoses and special tool (vacuum gauge and joint) between throttle body and MAP sensor hose disconnected.

Special Tool

(A): 09367-04002

(B): 09343-03087

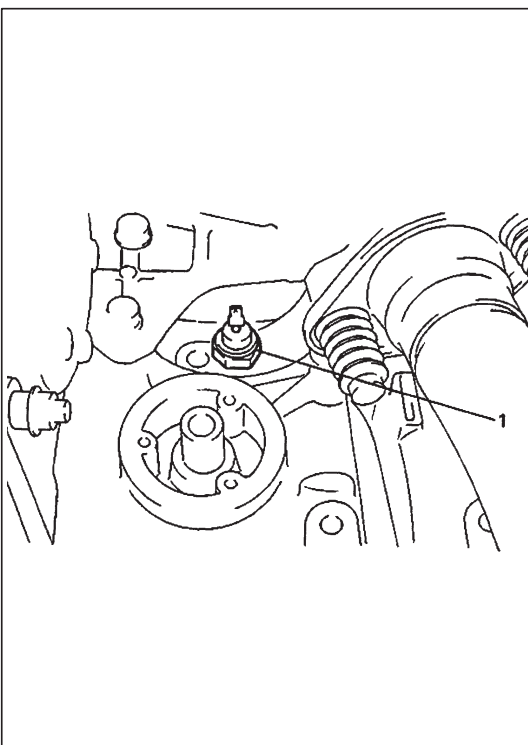
(C): 09915-67310

(D): 09918-08210

3) Run engine at specified idle speed (see Section 6E1), and read vacuum gauge. Vacuum should be within following specification.

Vacuum specification: 52.6 – 65.8 kPa (40 – 50 cm-Hg, 15.7 – 19.7 in-Hg) at specified idling speed

4) After checking, connect MAP sensor hose to throttle body.



OIL PRESSURE CHECK

NOTE:

Prior to checking oil pressure, check the followings.

- Oil level in oil pan.

If oil level is low, add oil up to Full level hole on oil level gauge.

- Oil quality.

If oil is discolored, or deteriorated, change it.

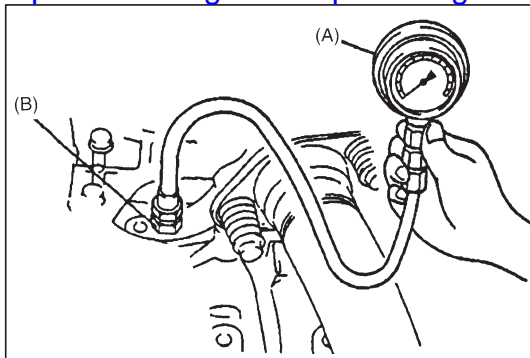
For particular oil to be used, refer to the table in Section 0B.

- Oil leaks.

If leak is found, repair it.

1) Using special tool (Oil filter wrench), remove oil filter.

2) After removing oil filter, remove oil pressure switch (1) from cylinder block.



- 3) Install special tool (Oil pressure gauge) to vacated threaded hole.

Special Tool

(A): 09915-77310

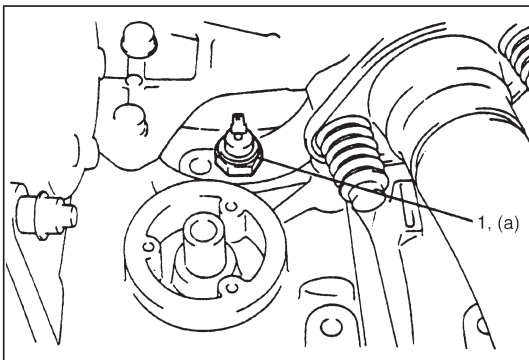
(B): 09915-78211

- 4) Reinstall oil filter.
5) Start engine and warm it up to normal operating temperature.
6) After warming up, raise engine speed to 4,000 r/min and measure oil pressure.

Oil pressure specifications: 360 – 440 kPa

(3.6 – 4.4 kg/cm², 51.2 – 62.6 psi)
at 3,960 – 4,040 r/min (rpm)

- 7) After checking oil pressure, stop engine and remove oil filter and oil pressure gauge.



- 8) Before reinstalling oil pressure switch (1), be sure to wrap its screw threads with a sealing tape and tighten switch to specified torque.

NOTE:

If sealing tape edge is bulged out from screw threads of switch, cut it off.

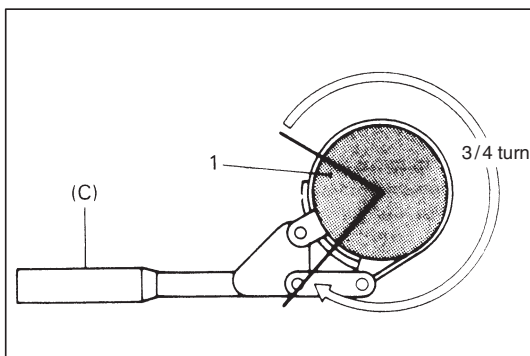
Tightening Torque

(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)

- 9) After oiling oil filter “O” ring (rubber gasket), screw oil filter on oil filter stand by hand until filter “O” ring contacts mounting surface.

CAUTION:

To tighten oil filter properly, it is important to accurately identify the position where filter “O” ring first contacts mounting surface.



- 10) Tighten filter (1) 3/4 (270°) turn from the point of contact with mounting surface using an oil filter wrench.

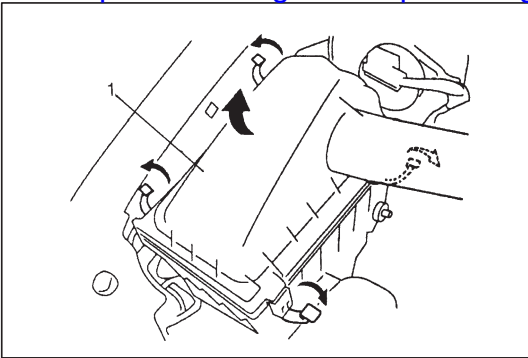
Special Tool

(C): 09915-47310

CAUTION:

To prevent oil leakage, make sure that oil filter is tight, but do not overtighten it.

- 11) After installing oil filter, start engine and check oil filter for oil leakage.

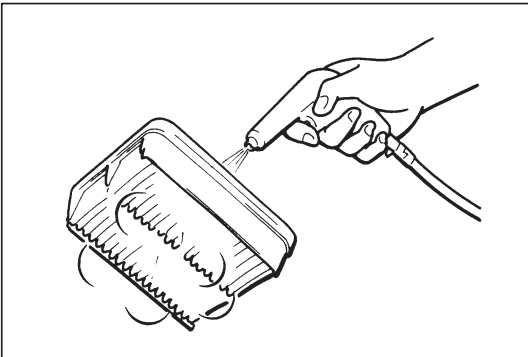


AIR CLEANER ELEMENT

This air cleaner element is of dry type. Remember that it needs cleaning according to following procedure.

REMOVAL

- 1) Disconnect air cleaner outlet No.1 hose from air cleaner assembly (1).
- 2) Open air cleaner case after unhooking its clamps.
- 3) Remove air cleaner element from case.



INSPECTION

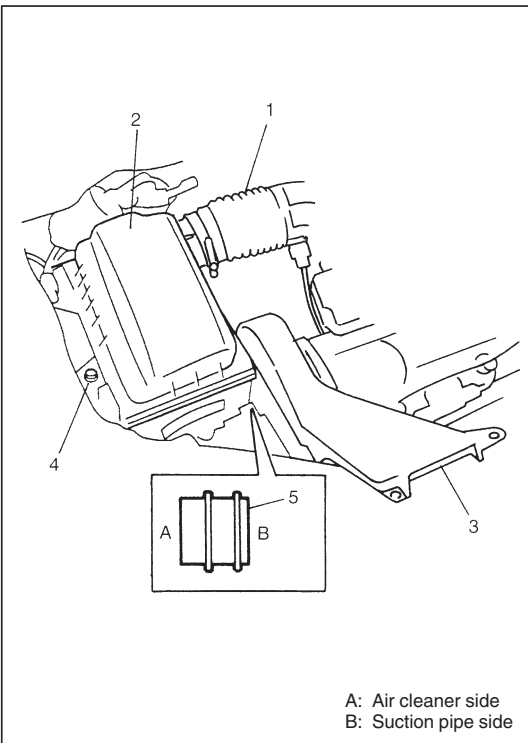
Check air cleaner element for dirt. Replace excessively dirty element.

CLEANING

Blow off dust by compressed air from air outlet side of element.

INSTALLATION

Reverse removal procedure for installation.



AIR CLEANER ASSEMBLY

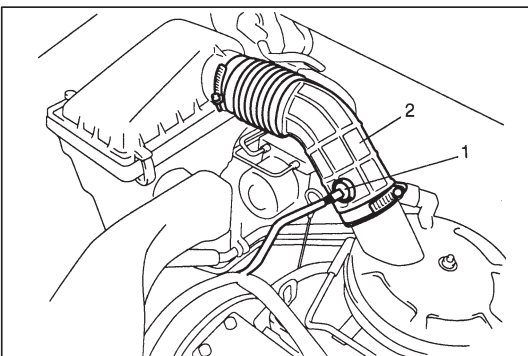
REMOVAL

- 1) Disconnect air cleaner outlet hose (1) from air cleaner assembly (2).
- 2) Remove suction pipe (3) from air cleaner assembly.
- 3) Remove air cleaner assembly by removing bolt (4) shown in figure.

INSTALLATION

Reverse removal procedure for installation, noting the following.

- Install suction pipe grommet (5) in the direction indicated in figure.
- Clamp each hose securely.



AIR CLEANER OUTLET HOSE

REMOVAL

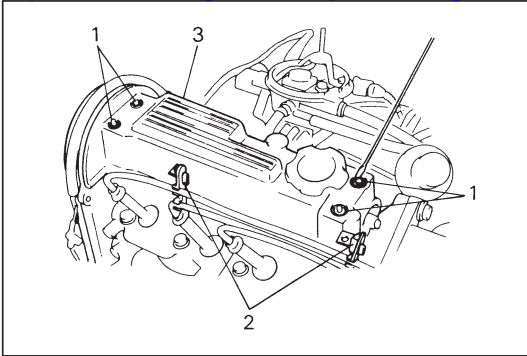
- 1) Disconnect negative cable at battery.
- 2) Disconnect IAT sensor (1) wire at coupler.
- 3) Remove air cleaner outlet hose (2).

INSTALLATION

Reverse removal procedure for installation.

CYLINDER HEAD COVER**REMOVAL**

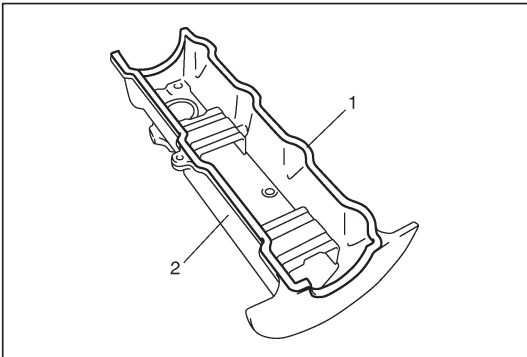
- 1) Disconnect negative cable at battery.
- 2) Remove air chamber case.
- 3) Remove high-tension cord clamps (2) from cylinder head cover.
- 4) Disconnect breather hose from cylinder head cover.
- 5) Remove cylinder head cover nuts and then seal washers (1).
- 6) Remove cylinder head cover (3) from cylinder head.

**INSTALLATION**

- 1) Install cylinder head cover gasket (1) to cylinder head cover (2).

NOTE:

Be sure to check each of these parts for deterioration or any damage before installation and replace if found defective.

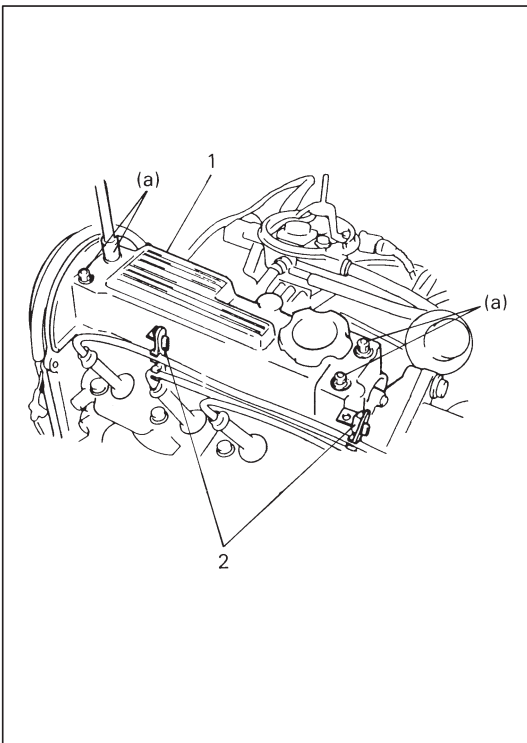


- 2) Install cylinder head cover (1).
Before installing seal washers, check each one for deterioration or damage, and replace as necessary.
Tighten cover nuts to specified torque.

Tightening Torque

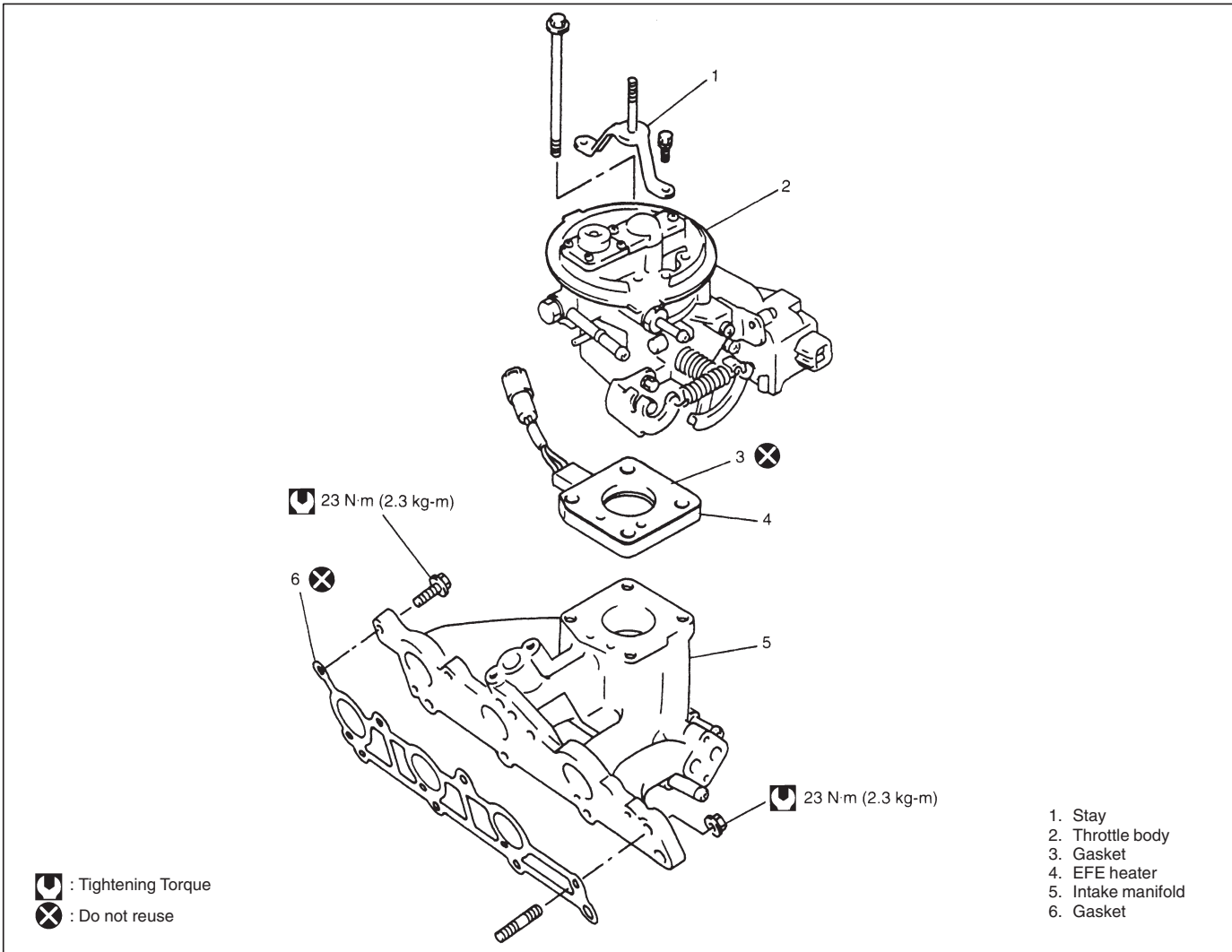
(a): 4.5 N·m (0.45 kg-m, 3.5 lb-ft)

- 3) Install high-tension cord clamps (2) to cylinder head cover.
- 4) Connect breather hose to cylinder head cover.
- 5) Install air chamber case.
- 6) Connect negative cable at battery.



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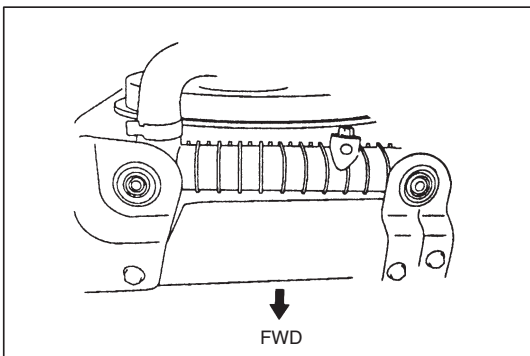
THROTTLE BODY AND INTAKE MANIFOLD



REMOVAL

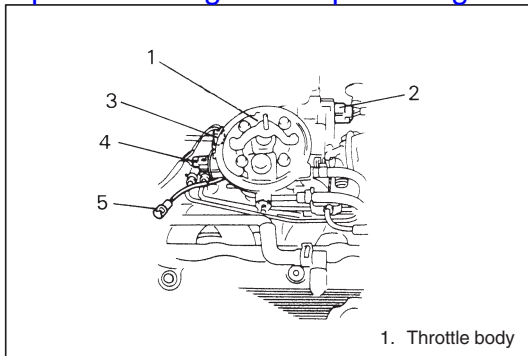
- 1) Relieve fuel pressure according to procedure described in Section 6-1.
- 2) Disconnect negative cable at battery.

- 3) Drain cooling system.

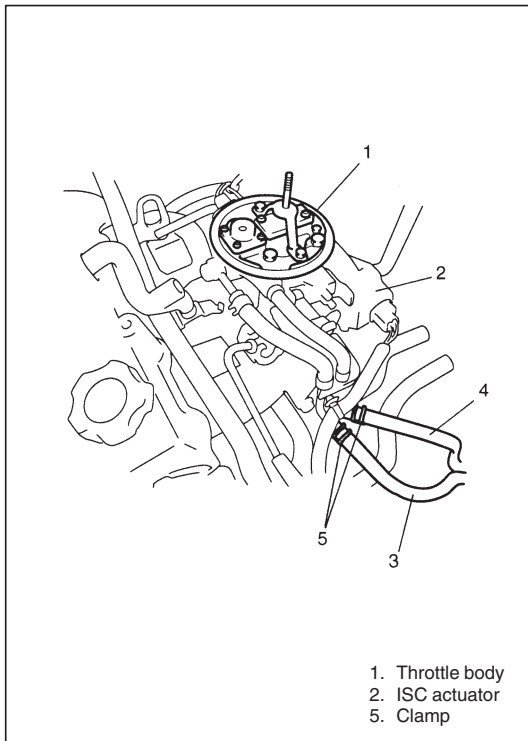


WARNING:

To help avoid danger of being burned, do not remove drain plug and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.



- 4) Remove air chamber case with air cleaner outlet hose.
- 5) Disconnect the following electric lead wires:
 - ISC actuator (2)
 - Ground wires from intake manifold
 - Fuel injector (4)
 - TP sensor (3)
 - EFE heater (5)



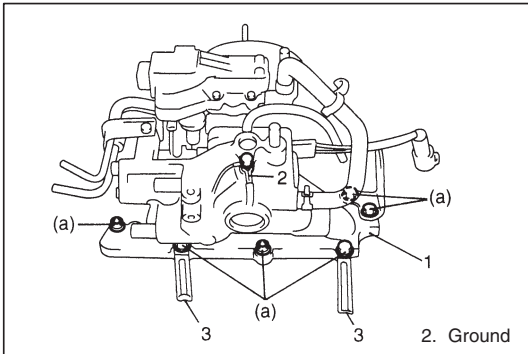
- 6) Disconnect fuel return (4) and feed hoses (3) from fuel pipes.
- 7) Disconnect coolant hoses from intake manifold and throttle body.
- 8) Remove EVAP surge tank with EVAP canister purge valve.

- 9) Disconnect the following vacuum hoses.
 - Pressure sensor hose from intake manifold.
 - Brake booster hose from intake manifold.

- 10) Disconnect breather hose from PCV valve.
- 11) Disconnect accelerator cable from throttle body.
- 12) Disconnect other connected to throttle body and intake manifold, if any.
- 13) Remove intake manifold with throttle body from cylinder head.
- 14) Remove throttle body from intake manifold.

INSTALLATION

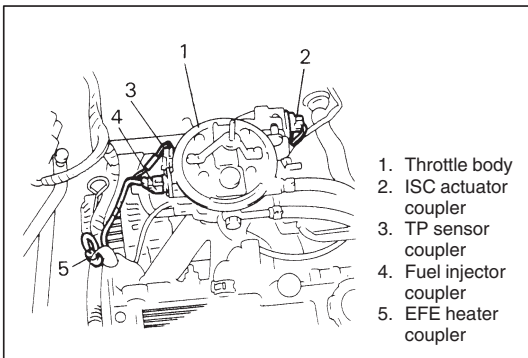
- 1) Install throttle body to intake manifold. (Refer to Section 6E1.)
- 2) Install intake manifold gasket to cylinder head. Use a new gasket.



- 3) Install intake manifold (1) with throttle body to cylinder head.
 - Install clamps (3) as shown in figure, and tighten bolts and nuts to specification.

Tightening Torque

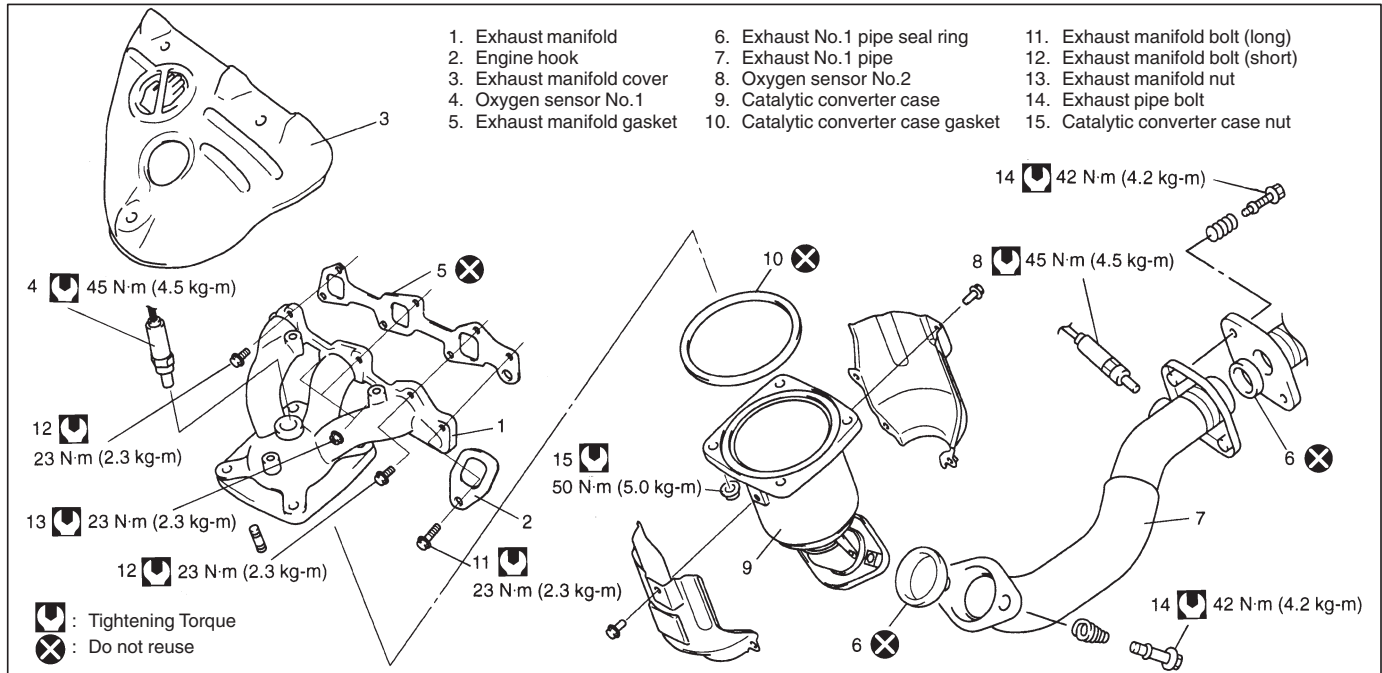
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



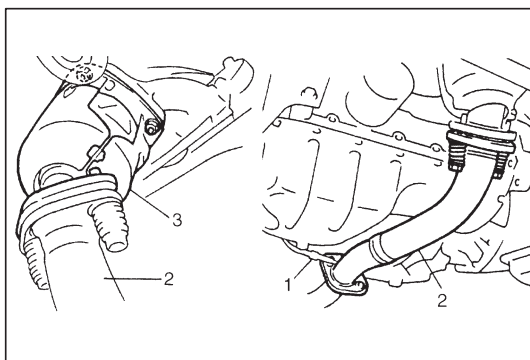
- 4) Connect breather hose to PCV valve.
- 5) Connect vacuum hoses.
- 6) Connect coolant hoses.
- 7) Connect fuel return and feed hoses to throttle body.
- 8) Connect electric lead wire.

- 9) Install EVAP surge tank with EVAP canister purge valve.
- 10) Connect accelerator cable to throttle body.
- 11) Install air cleaner assembly to throttle body.
- 12) Check to ensure that all removed parts are back in place.
Reinstall any necessary parts which have not been reinstalled.
- 13) Refill cooling system.

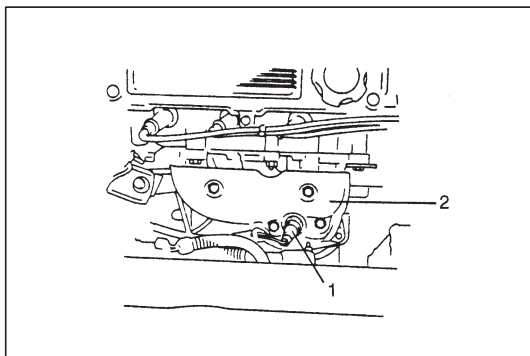
- 14) Connect negative cable at battery.
- 15) Upon completion of installation, start engine and check for fuel leaks and engine coolant leaks.
After warming up engine, adjust accelerator cable play to specification according to description in Section 6E1.

EXHAUST MANIFOLD**WARNING:**

To avoid danger of being burned, do not service exhaust system while it is still hot. Service should be performed after system cools down.

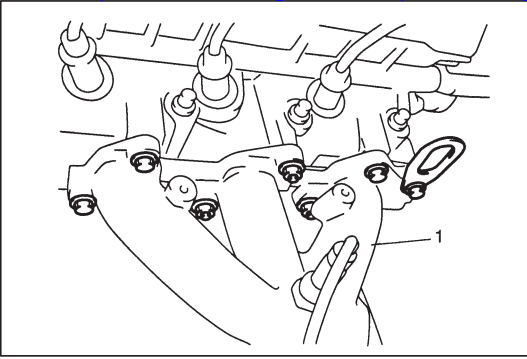
**REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Disconnect oxygen sensor No.2 (1) coupler and clamp.
- 3) Remove exhaust No.1 pipe (2) with catalytic converter case (3).

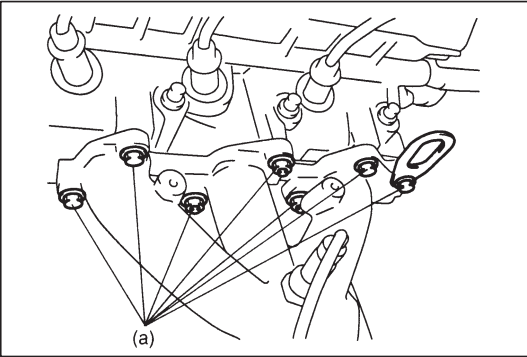


- 4) Disconnect oxygen sensor No.1 (1) coupler and clamp.
- 5) Remove exhaust manifold cover (2).

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- 6) Remove exhaust manifold (1) and its gasket from cylinder head.
- 7) Remove catalytic converter case gasket and exhaust No.1 pipe seal ring (rear side).

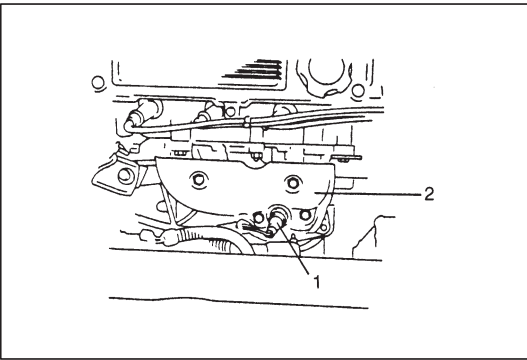


INSTALLATION

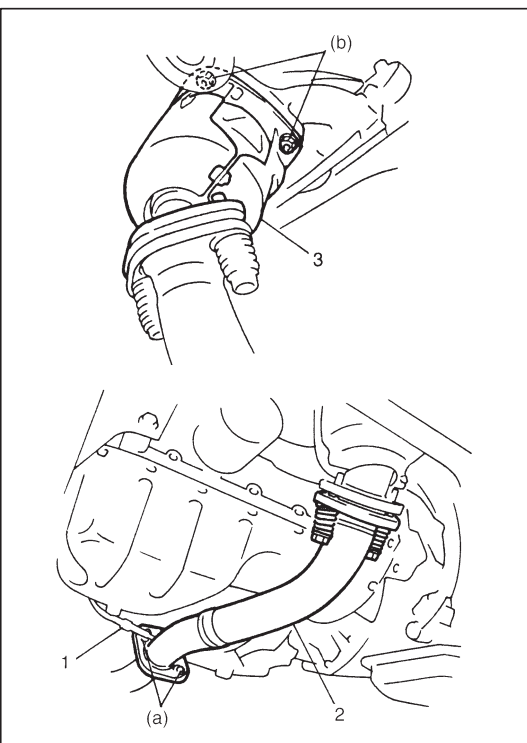
- 1) Install new gaskets to cylinder head, catalytic converter case and exhaust No.1 pipe (rear side).
- 2) Install exhaust manifold.
Tighten manifold bolts and nuts to specified torque.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 3) Install exhaust manifold cover (2).
- 4) Connect oxygen sensor No.1 (1) coupler and clamp its wire securely.



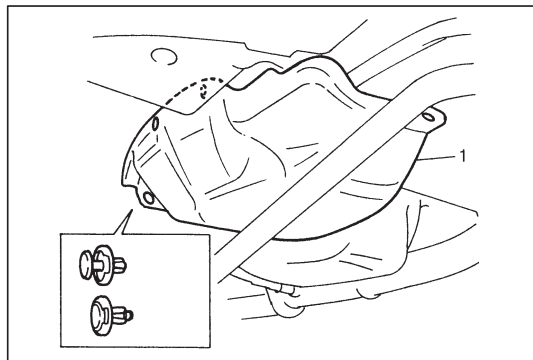
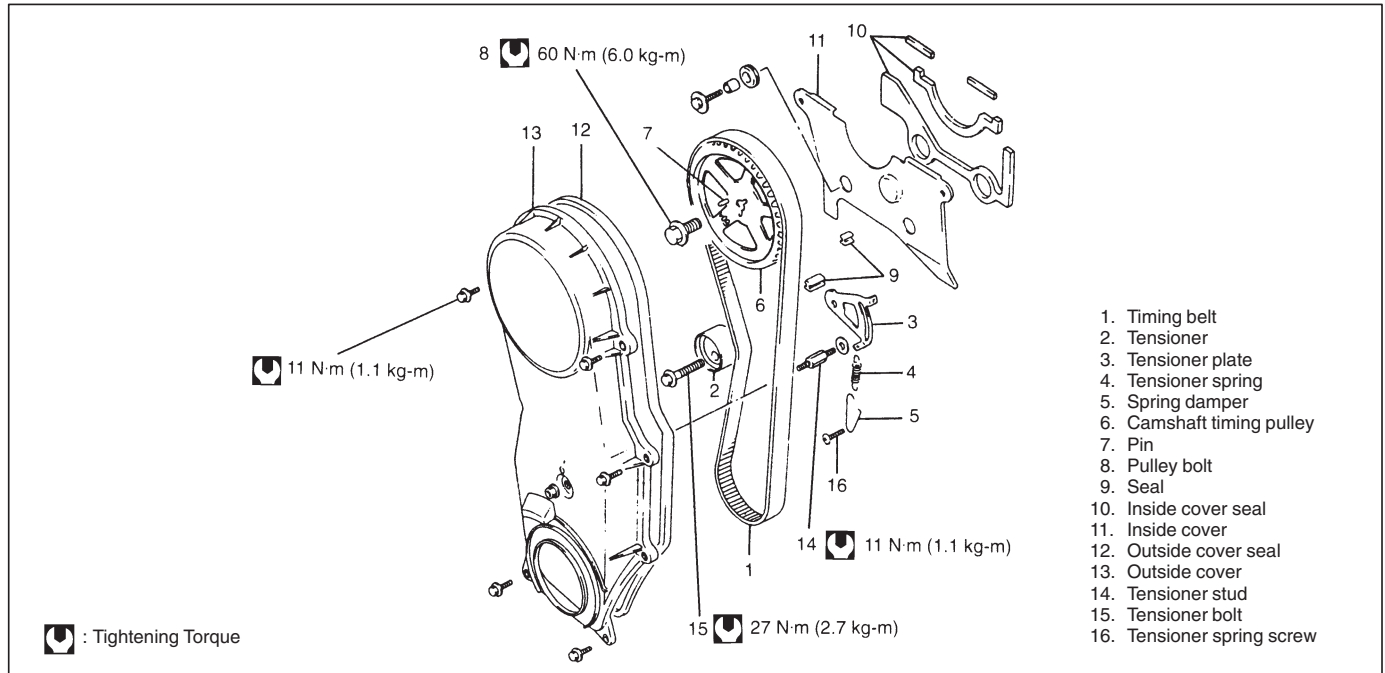
- 5) Install catalytic converter case (3) with exhaust No.1 pipe (2) to exhaust manifold.

Tightening Torque

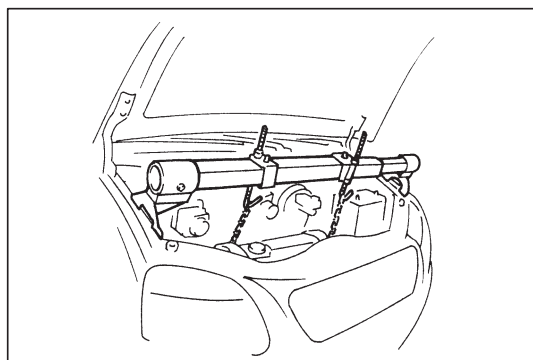
(a): 42 N·m (4.2 kg-m, 30.5 lb-ft)

(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)

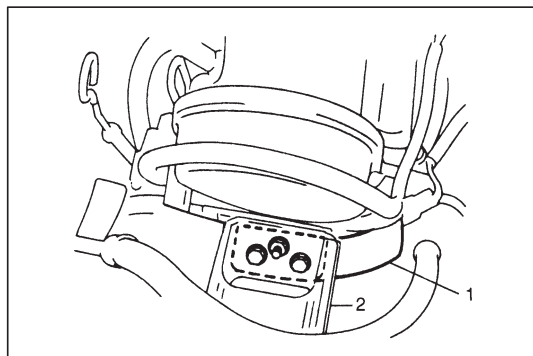
- 6) Connect oxygen sensor No.2 (1) coupler, refer to Section 6K of the Service Manual mentioned in FOREWORD of this manual.
- 7) Connect negative cable at battery.
- 8) Check exhaust system for exhaust gas leakage.

TIMING BELT AND BELT TENSIONER**REMOVAL**

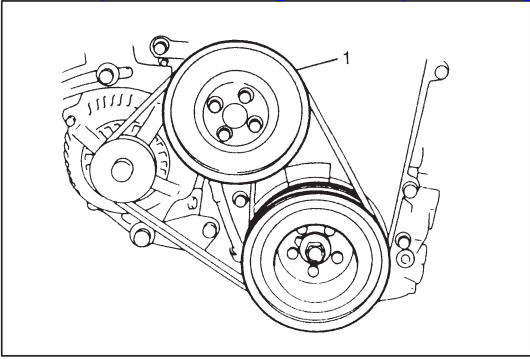
- 1) Disconnect negative cable at battery.
- 2) Remove right side of engine under cover (1).
- 3) Disconnect A/C suction and discharge hoses from A/C compressor.
- 4) Remove A/C compressor and its bracket (if equipped), refer to Section 1B.
- 5) Remove suction pipe and air cleaner assembly.



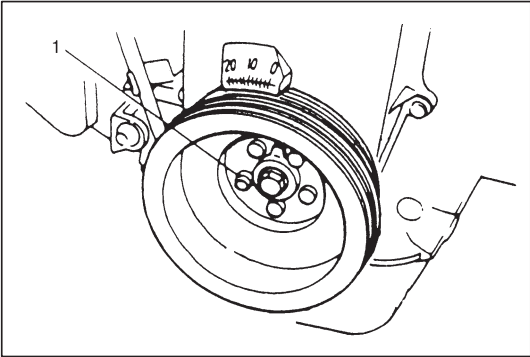
- 6) Support engine by using support device.



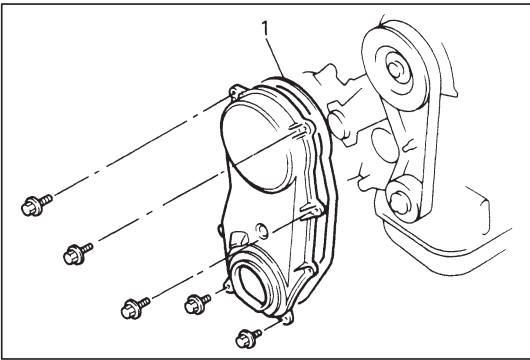
- 7) Remove engine right mounting bracket (1) and engine right mounting swing bracket (2).



8) Remove water pump pulley (1) and drive belt.

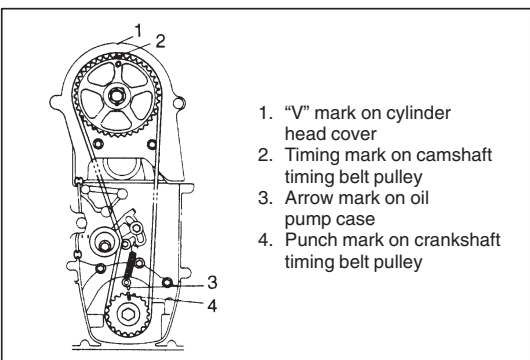


9) Remove crankshaft pulley by removing pulley bolts (1).

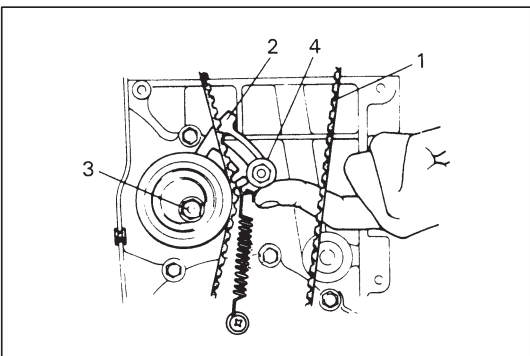


10) Release harness clamps.

11) Remove timing belt outside cover (1).

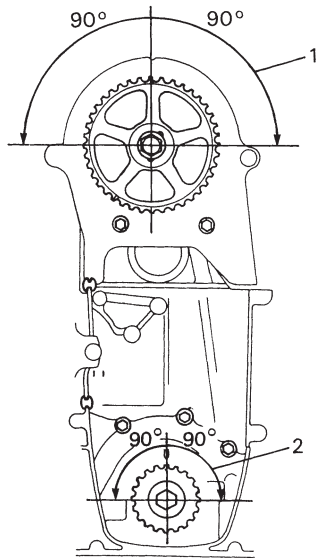


12) For installation of timing belt, align 4 timing marks as shown in figure by turning crankshaft.



13) Loosen tensioner bolt (3) and stud (4), and remove belt (1) from crankshaft timing belt pulley and camshaft timing belt pulley after pushing up the tensioner plate (2) fully by finger as shown figure.

CAUTION:
Never bend timing belt.

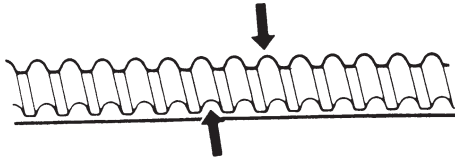


1. Camshaft allowable turning range --- By timing mark, within 90° from "V" mark on head cover on both right and left.
2. Crankshaft allowable turning range --- By timing mark, within 90° from arrow mark on oil pump case on both right and left.

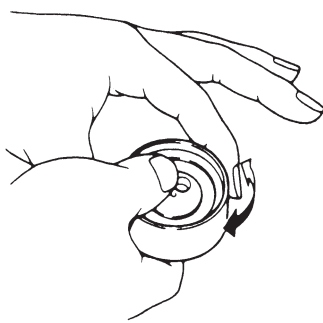
CAUTION:

- After timing belt is removed, never turn camshaft and crankshaft independently more than such an extent as shown in figure. If turned, interference may occur among piston and valves, and parts related to piston and valves may be damaged.
- Never bend timing belt.

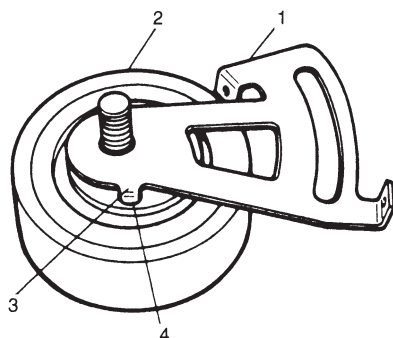
- 14) Remove tensioner, tensioner plate, tensioner spring and spring damper.

**INSPECTION**

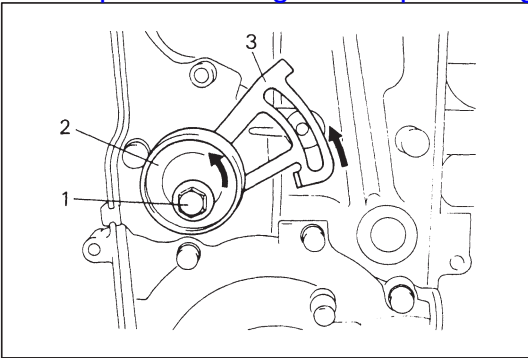
- Inspect timing belt for wear or crack.
Replace it as necessary.



- Inspect tensioner for smooth rotation.

**INSTALLATION**

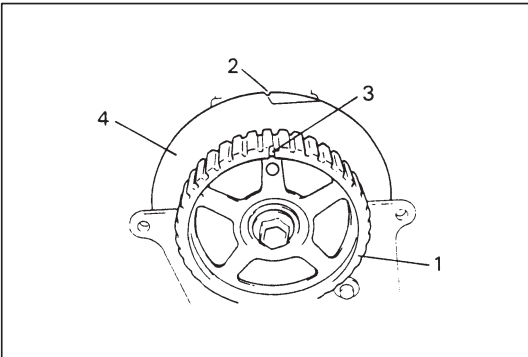
- 1) Install tensioner plate (1) to tensioner (2).
Insert lug (3) of tensioner plate into hole (4) in tensioner.



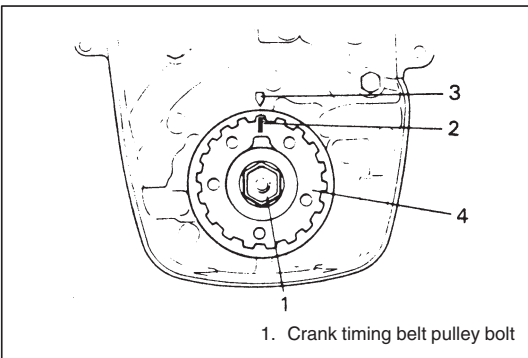
- 2) Install tensioner (2) and tensioner plate (3):

Do not tighten tensioner bolt (1) and stud with wrench yet. Hand tighten only at this time.

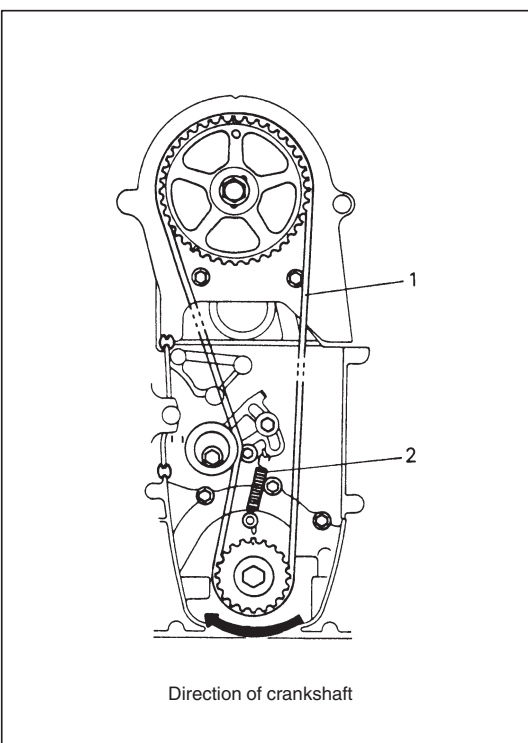
Check to ensure that plate movement in arrow direction as shown in figure causes tensioner to move in the same direction. If no associated movement between plate and tensioner occurs, remove tensioner and plate again and reinsert plate lug into tensioner hole.



- 3) Check that timing mark (3) on camshaft timing belt pulley (1) is aligned with "V" mark (2) on cylinder head cover (4). If not, align two marks by turning camshaft but be careful not to turn it more than its allowable turning range which is described on previous page.



- 4) Check that timing mark (2) on crankshaft timing belt pulley (4) is aligned with arrow mark (3) on oil pump case. If not, align two marks by turning crankshaft but be careful not to turn it more than its allowable turning range which is described on previous page.

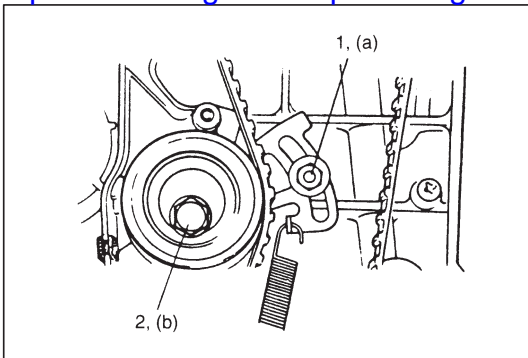


- 5) With two sets of marks aligned, install timing belt (1) on two pulleys in such a way that the drive side of belt is free of any slack, and with tensioner plate pushed up by finger.

And then install tensioner spring and spring damper (2) as shown in figure, and handtighten tensioner stud.

NOTE:

- When installing timing belt, match arrow mark (⇒) on timing belt with rotating direction of crankshaft.
- In this state, No.1 piston is at top dead center of compression stroke.

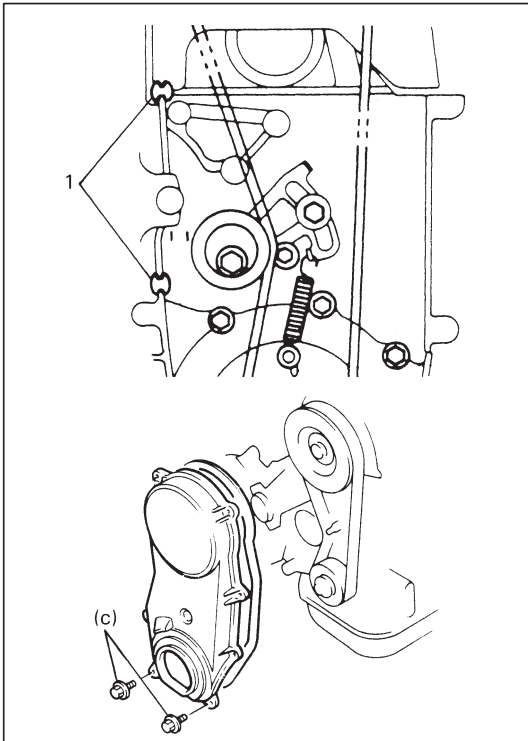


- 6) To take up slack of timing belt, turn crankshaft two rotations clockwise after installing it. After making sure that belt is free from slack, tighten tensioner stud (1) first and then tensioner bolt (2) to each specified torque.
Then confirm again that two sets of marks are aligned respectively.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

(b): 27 N·m (2.7 kg-m, 19.5 lb-ft)

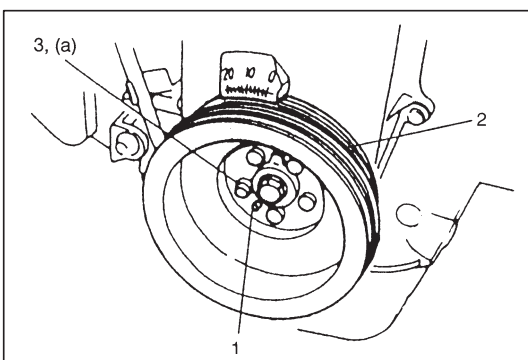


- 7) Install timing belt outside cover.

Before installing, make sure that rubber seal (1) is between water pump and oil pump case and another between water pump and cylinder head.

Tightening Torque

(c): 11 N·m (1.1 kg-m, 8.0 lb-ft)

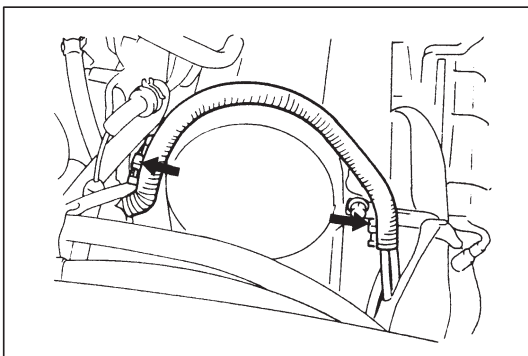


- 8) Install crankshaft pulley (2).

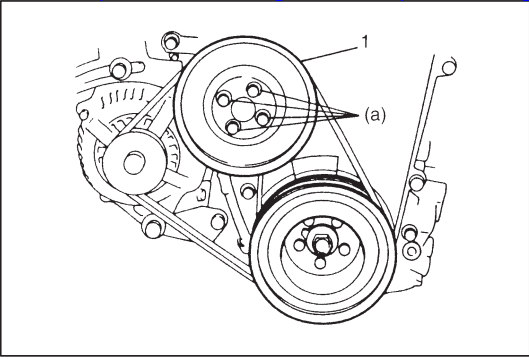
Fit hole of pulley to pin (1) on crankshaft timing belt pulley, and tighten pulley bolts (3) to specified torque.

Tightening Torque

(a): 16 N·m (1.6 kg-m, 11.5 lb-ft)



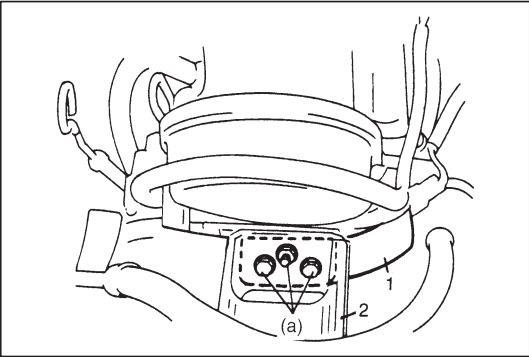
- 9) Clamp harness securely.



10) Install water pump pulley (1) and drive belt.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



11) Install engine right mounting bracket (1) and engine right mounting swing bracket (2).

Tightening Torque

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

12) Remove support device.

13) Install A/C compressor bracket and A/C compressor, if equipped.

14) Connect A/C suction and discharge hoses, if equipped.

15) Adjust drive belt tension, referring to "ENGINE COOLING" section.

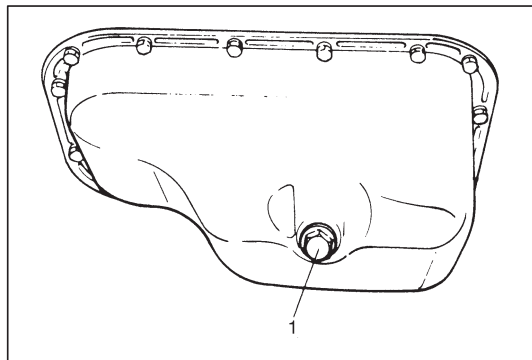
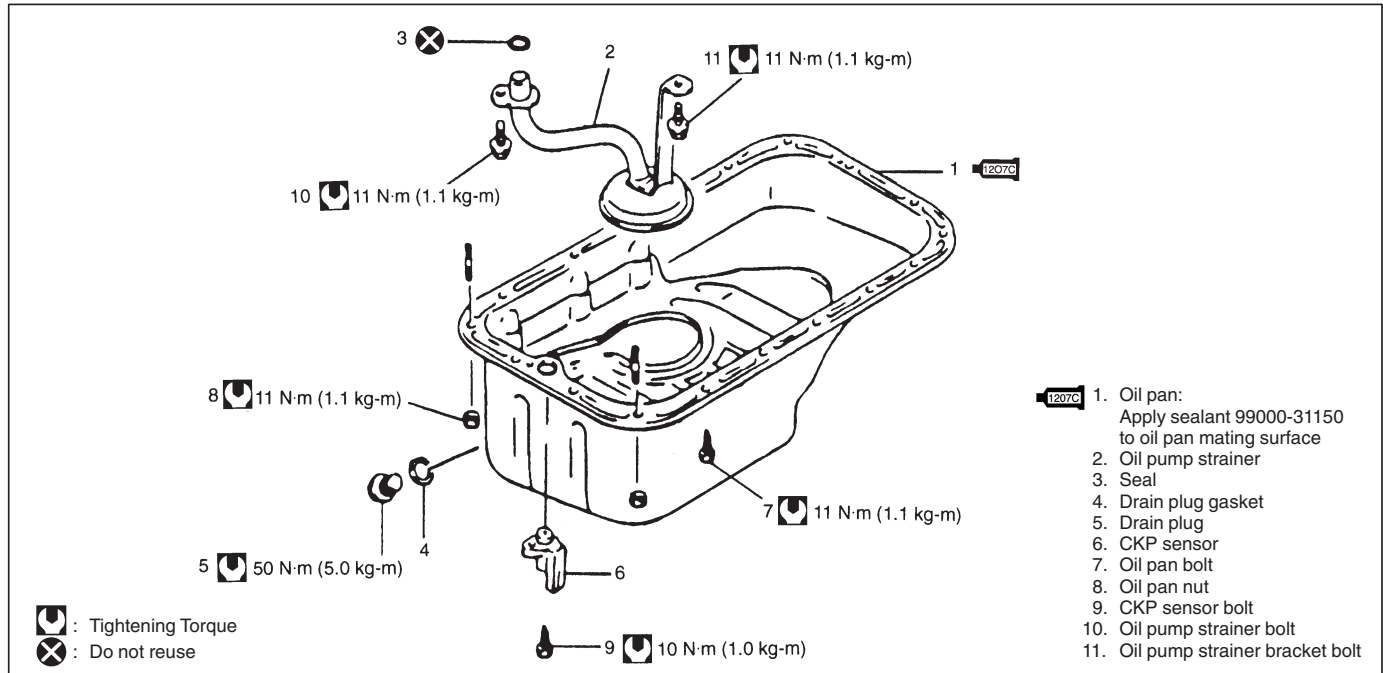
16) Adjust A/C compressor belt tension, if equipped.
Refer to Section 1B.

17) Evacuate and charge air conditioning system, refer to Section 1B.

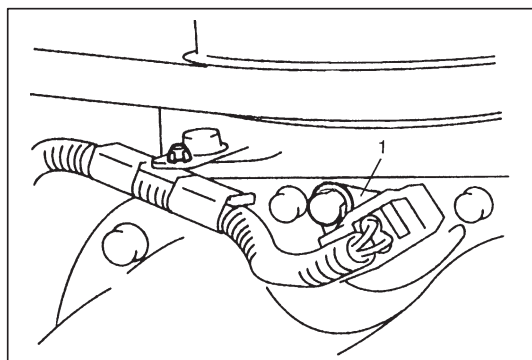
18) Install right side of engine under cover.

19) Install suction pipe and air cleaner assembly, refer to INSTALLATION of AIR CLEANER ASSEMBLY in this section.

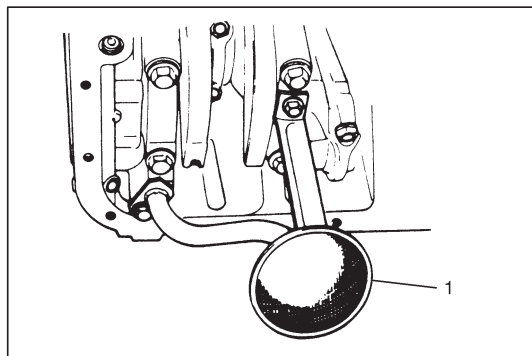
20) Connect negative cable at battery.

OIL PAN AND OIL PUMP STRAINER**REMOVAL**

- 1) Raise vehicle.
- 2) Drain engine oil by removing drain plug (1).



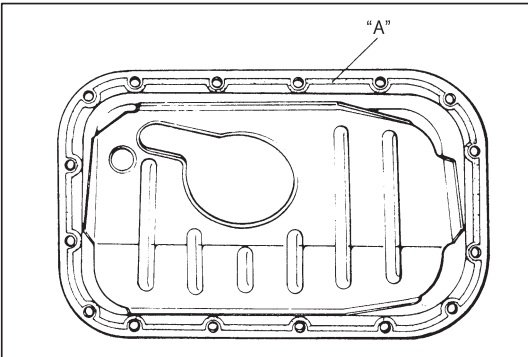
- 3) Remove right side of engine under cover.
- 4) Disconnect oxygen sensor No.2 connector and then remove exhaust No.1 pipe with oxygen sensor No.2.
- 5) Remove clutch housing lower plate.
- 6) Remove CKP sensor (1).



- 7) Remove oil pan and then oil pump strainer (1).

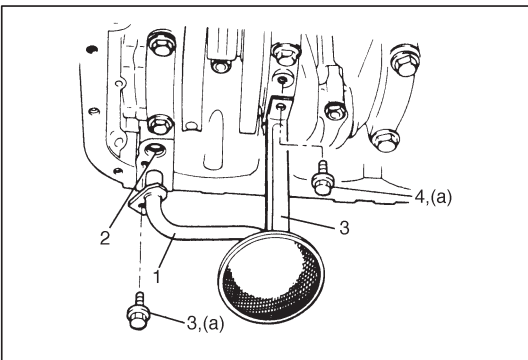
CLEANING

- Clean mating surface of oil pan and cylinder block.
Remove oil, old sealant, and dusts from mating surfaces and oil pan inside.
- Clean oil pump strainer screen.

**INSTALLATION**

- 1) Apply sealant to oil pan mating surface continuously as shown in figure.

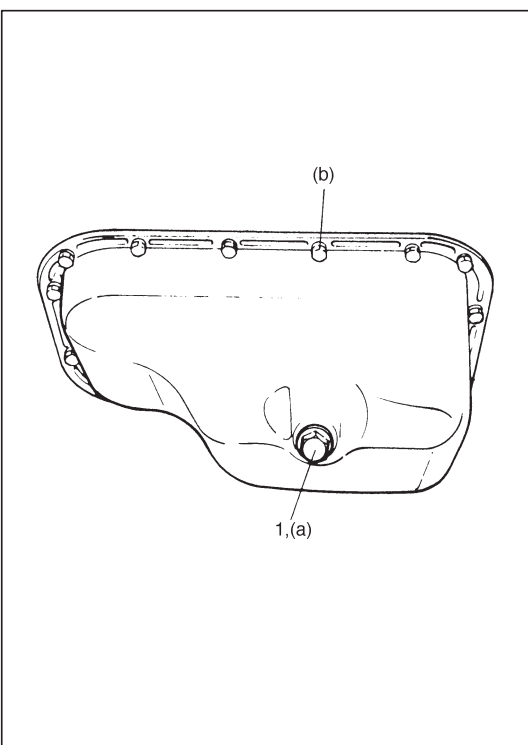
“A” Sealant: 99000-31150



- 2) Install oil pump strainer (1).
Install O-ring (2) into cylinder block securely as shown in figure.
Install oil pump strainer to cylinder block.
Tighten strainer bolt (3) first and then bracket bolt (4) to specified torque.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



- 3) Install oil pan to cylinder block.
After fitting oil pan to cylinder block, run in securing bolts and start tightening at the center: move wrench outward, tightening one bolt at a time.
Tighten bolts to specified torque.

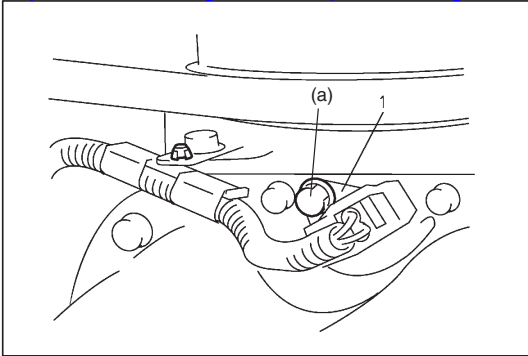
Tightening Torque

(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)

- 4) Install gasket and drain plug (1) to oil pan.
Tighten drain plug to specified torque.

Tightening Torque

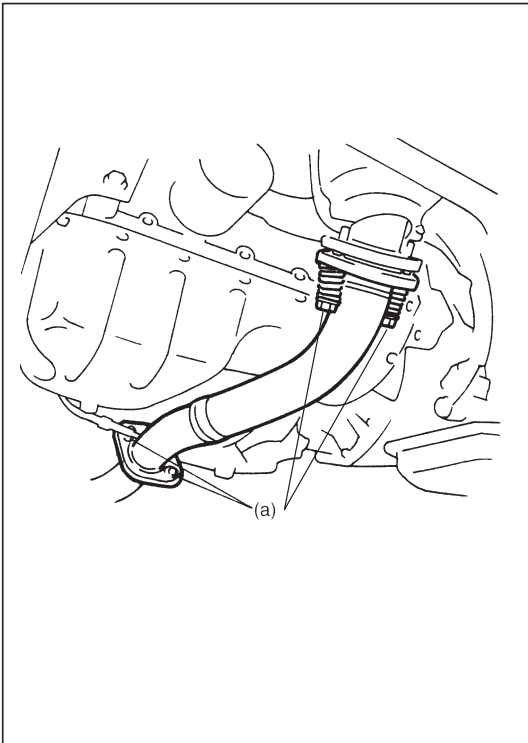
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



- 4) Install CKP sensor (1) and connect its coupler, then clamp its harness.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 5) Install exhaust No.1 pipe and connect oxygen sensor No.2 connector.

Tighten bolts to specified torque.

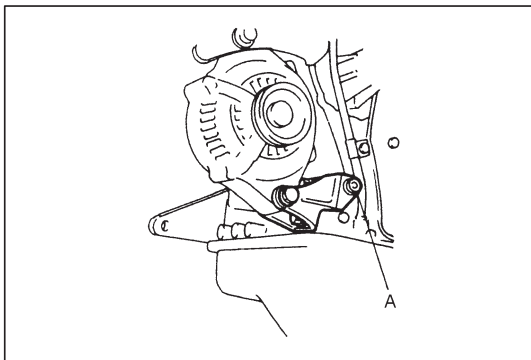
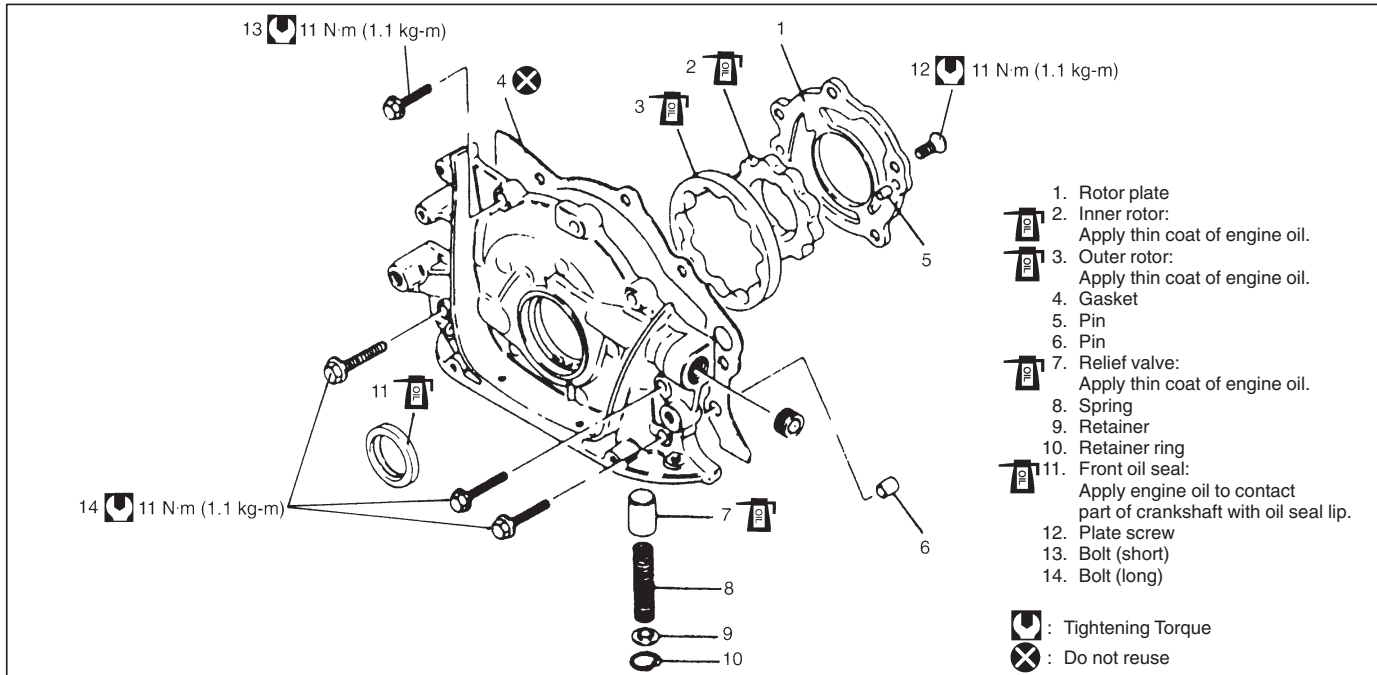
Tightening Torque

(a): 42 N·m (4.2 kg-m, 30.5 lb-ft)

NOTE:

Use new gasket for exhaust No.1 pipe.

- 6) Install right side of engine under covers.
7) Refill engine with engine oil, referring to item "ENGINE OIL CHANGE" in Section 0B.



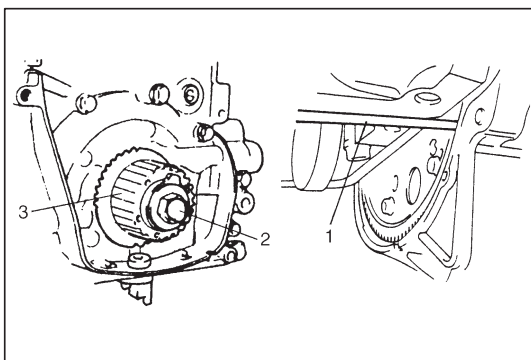
REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove timing belt as previously outlined.
- 3) Remove generator and its bracket.

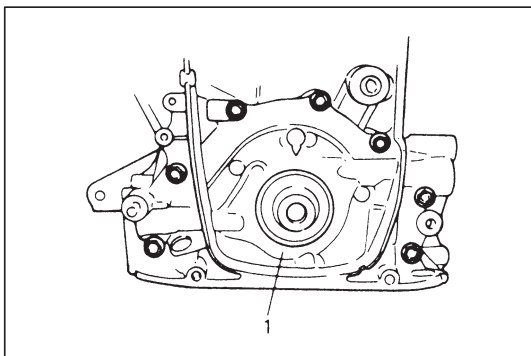
NOTE:

When installing bracket, tighten nut (A) first.

- 4) Remove oil pan and oil pump strainer as previously outlined.



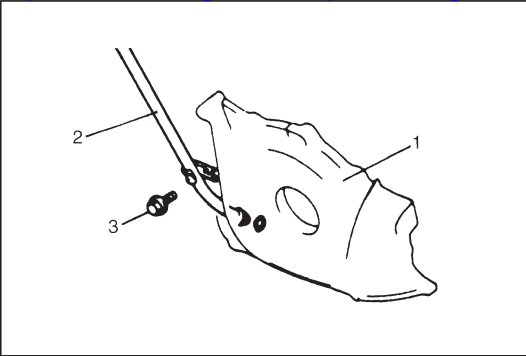
- 5) Remove crankshaft timing belt pulley (3).
Using flat end rod or the like (1) with flywheel ring gear to lock crankshaft.
With crankshaft locked, remove crankshaft timing belt pulley bolt (2).



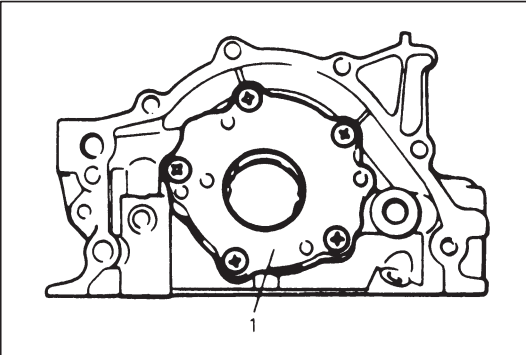
- 6) Remove oil pump (1) assembly.

DISASSEMBLY

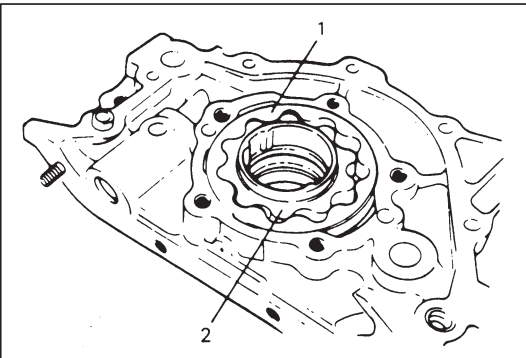
- 1) Remove oil level gauge guide bolt (3) and pull out guide (2) from oil pump (1).

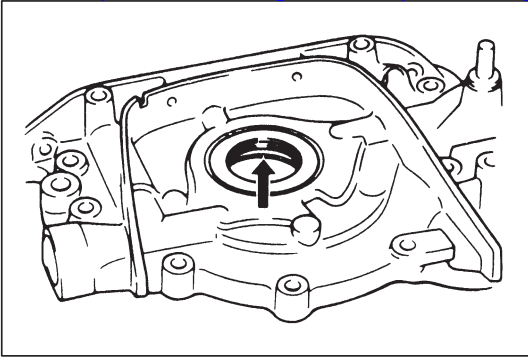


- 2) Remove rotor plate (1).

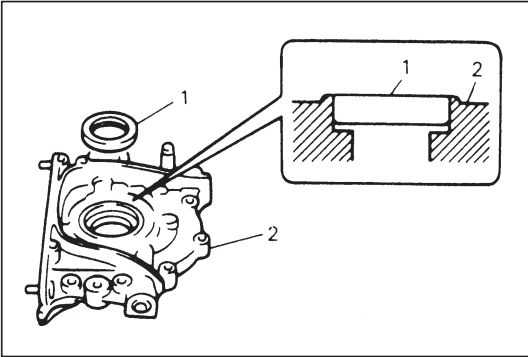


- 3) Remove outer rotor (1) and inner rotor (2).

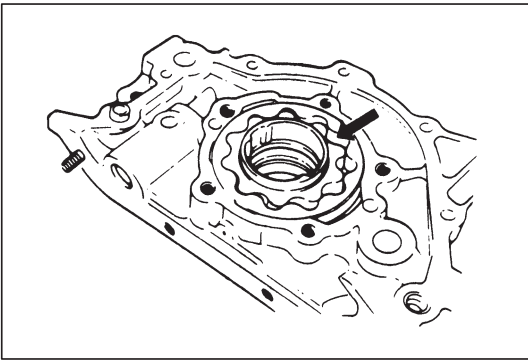


**INSPECTION**

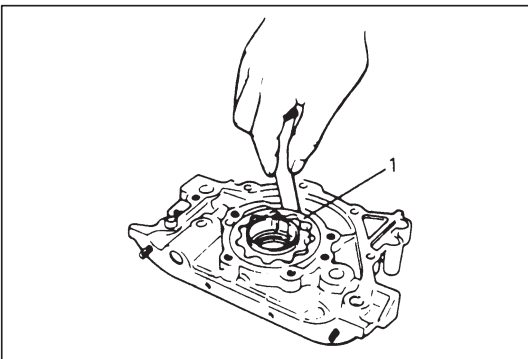
- Check oil seal lip for fault or other damage. Replace as necessary.

**NOTE:**

When installing oil seal (1), press-fit it till its end face is flush with oil pump case (2) end face.



- Check outer and inner rotors, rotor plate, and oil pump case for excessive wear or damage.

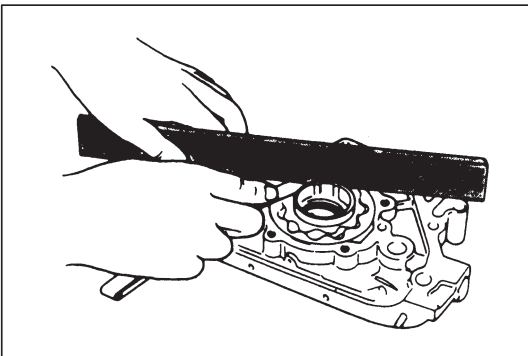
**MEASUREMENT**

- **Radial clearance**

Check radial clearance between outer rotor (1) and case, using thickness gauge.

If clearance exceeds its limit, replace outer rotor or case.

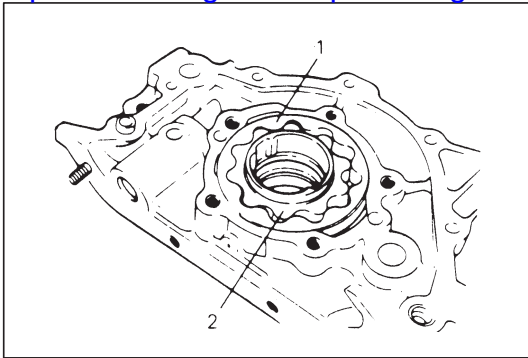
Limit on radial clearance between outer rotor and case:
0.2 mm (0.0079 in.)



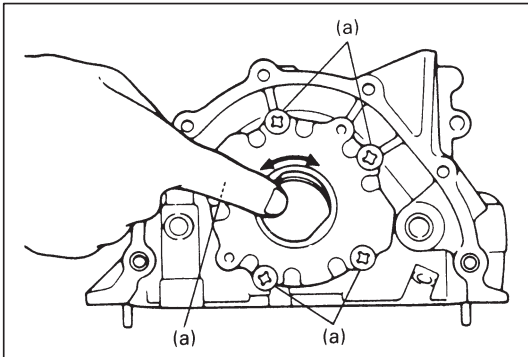
- **Side clearance**

Using straight edge and thickness gauge, measure side clearance.

Limit on side clearance: 0.1 mm (0.0039 in.)

**ASSEMBLY**

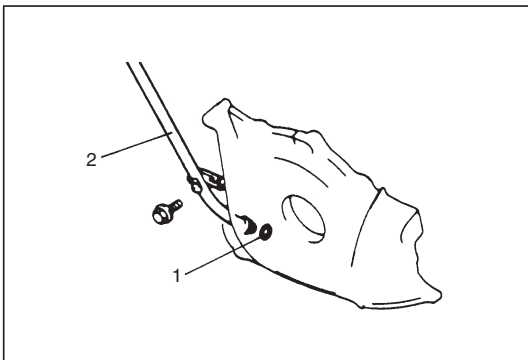
- 1) Wash, clean and then dry all disassembled parts.
- 2) Apply thin coat of engine oil to inner rotor (2) and outer rotor (1), oil seal lip portion, and inside surfaces of oil pump case and plate.
- 3) Install outer and inner rotors to pump case.



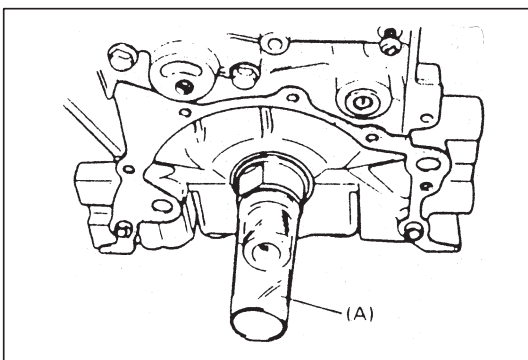
- 4) Install rotor plate. Tighten screws securely.
After installing plate, check to be sure that gears turn smoothly by hand.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



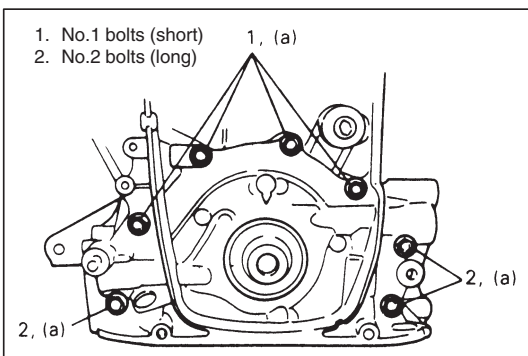
- 5) Apply engine oil to O-ring (1) and install O-ring and guide (2).

**INSTALLATION**

- 1) Install two oil pump pins and oil pump gasket to cylinder block. Use a new gasket.
- 2) To prevent oil seal lip from being damaged or upturned when installing oil pump to crankshaft, fit special tool (Oil seal guide) to crankshaft, and apply engine oil to special tool.

Special Tool

(A): 09926-18210

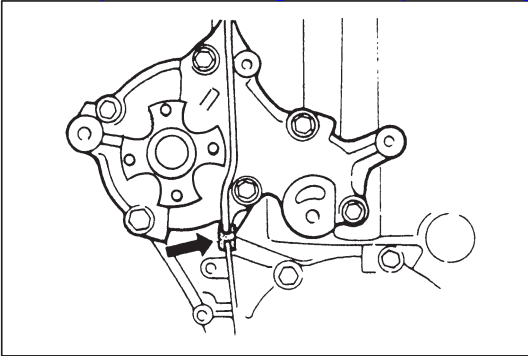


1. No.1 bolts (short)
2. No.2 bolts (long)

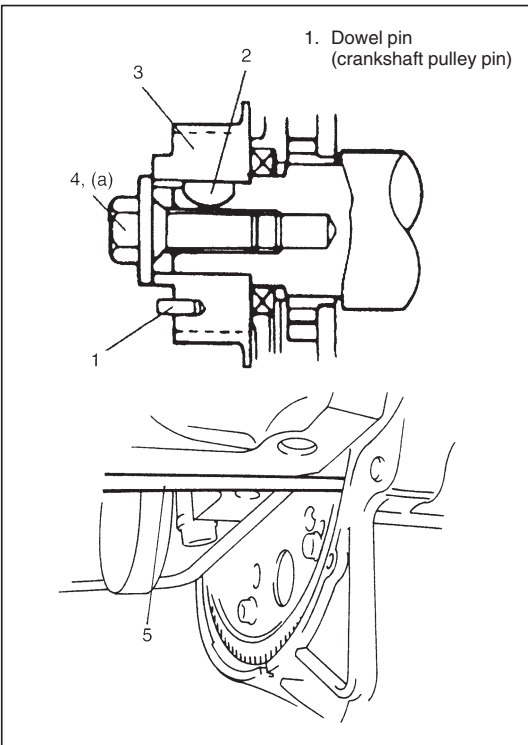
- 3) Install oil pump to cylinder block.
As there are 2 types of oil pump bolts, refer to figure for their correct use and tighten them to specified torque.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



4) Install rubber seal between oil pump and water pump.



5) Install key (2) and crank timing belt pulley (3). Refer to figure for proper installation of these parts.

With crankshaft locked using flat end rod or the like (5), tighten crank timing belt pulley bolt (4) to specified torque.

Tightening Torque

(a): 130 N·m (13.0 kg-m, 94.0 lb-ft)

6) Install timing belt, tensioner, oil pump strainer, oil pan and other parts as previously outlined.

7) Check to ensure that all removed parts are back in place.

Reinstall any necessary parts which have not been reinstalled.

8) Adjust water pump drive belt tension, referring to "ENGINE COOLING" section.

9) Adjust A/C compressor belt tension, if equipped.
Refer to SECTION 1B.

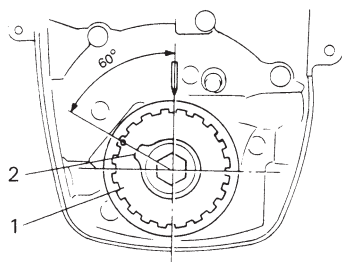
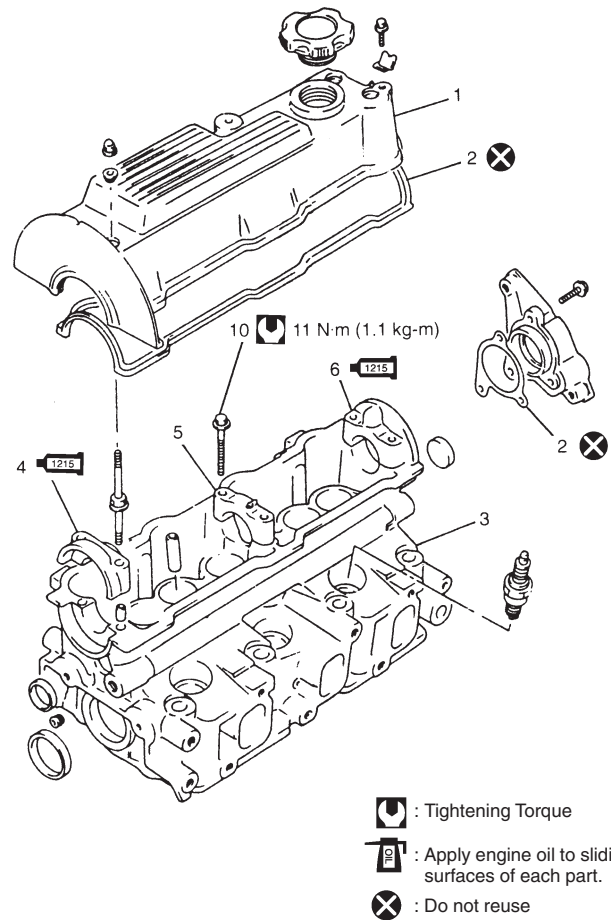
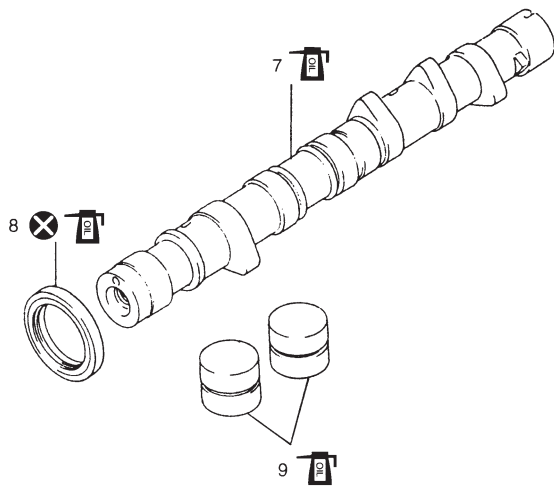
10) Refill engine with engine oil, referring to item "ENGINE OIL CHANGE" in SECTION 0B.

11) Connect negative cable at battery.

12) After completing installation, check oil pressure by running engine.

CAMSHAFT AND HYDRAULIC VALVE LASH ADJUSTER

1. Cylinder head cover
2. Gasket
3. Cylinder head
4. Camshaft housing No.1:
Apply sealant 99000-31110 to mating surface.
5. Camshaft housing No.2
6. Camshaft housing No.3:
Apply sealant 99000-31110 to mating surface.
7. Camshaft
8. Oil seal
9. Valve lash adjuster
10. Camshaft housing bolt



1. Crankshaft timing belt pulley

REMOVAL

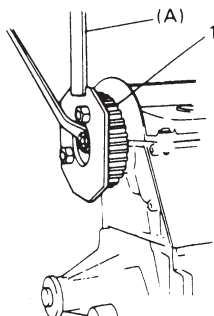
- 1) Disconnect negative cable at battery.
- 2) Remove cylinder head cover as previously outlined.
- 3) Remove distributor and then its case from cylinder head.
- 4) Remove crankshaft pulley, timing belt outside cover and timing belt as previously outlined.

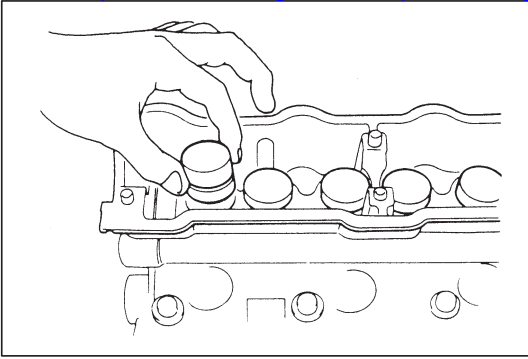
After removing timing belt, set key (2) on crankshaft in position as shown in figure by turning crankshaft. This is to prevent interference between valves and piston when reinstalling camshaft.

- 5) Remove camshaft timing belt pulley (1) by using special tool.

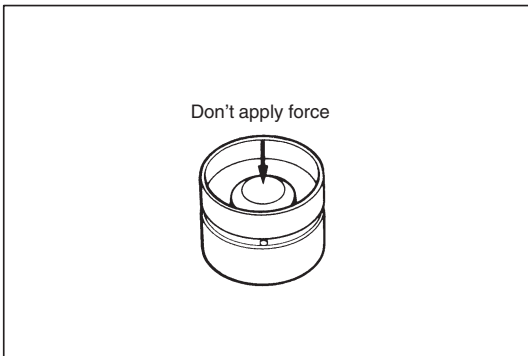
Special Tool

(A): 09917-68220

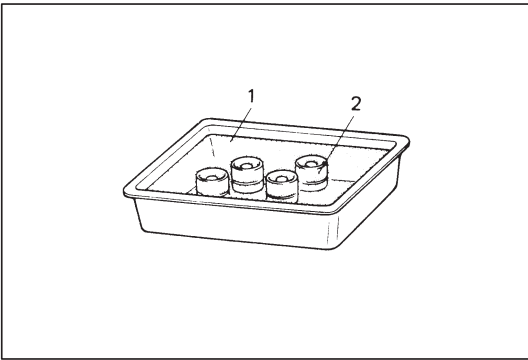




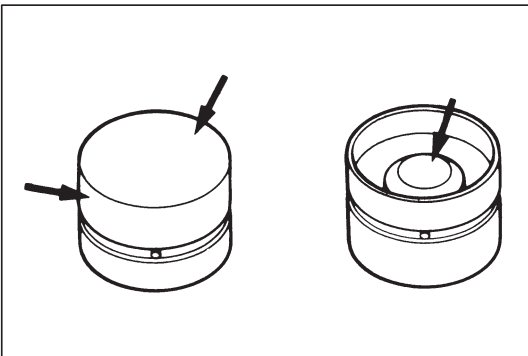
- 6) Remove camshaft housings from cylinder head.
- 7) Remove camshaft from cylinder head.
- 8) Remove valve lash adjuster from cylinder head.

**NOTE:**

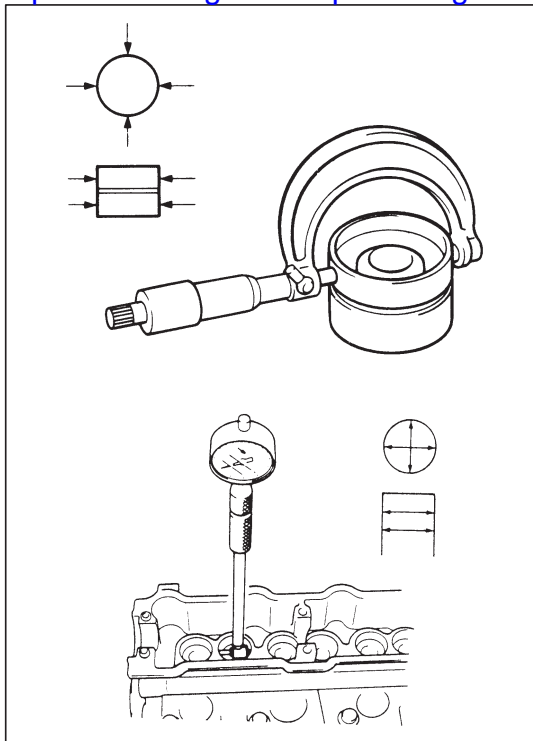
- Never disassemble hydraulic valve lash adjuster.
- Don't apply force to body of adjuster, for oil in high pressure chamber in adjuster will leak.



- Immerse removed adjuster (2) in clean engine oil (1) and keep it there till reinstalling it so as to prevent oil leakage. If it is left in air, place it with its bucket body facing down. Don't place on its side or with bucket body facing up.

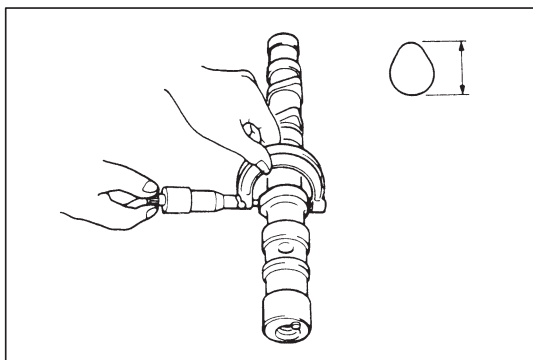
**INSPECTION****Wear of Hydraulic Valve Lash Adjuster**

Check adjuster for pitting, scratches, or damage. If any malfunction is found, replace.



Measure cylinder head bore and adjuster outside diameter to determine cylinder head-to-adjuster clearance. If clearance exceeds limit, replace adjuster or cylinder head.

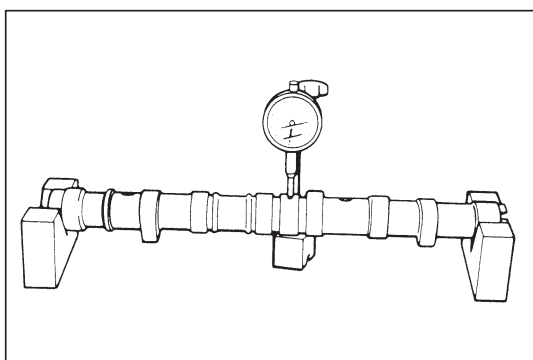
Item	Standard	Limit
Hydraulic valve lash adjuster O.D.	30.959 – 30.975 mm (1.2188 – 1.2194 in.)	—
Cylinder head bore	31.000 – 31.025 mm (1.2205 – 1.2214 in.)	—
Cylinder head to adjuster clearance	0.025 – 0.066 mm (0.0010 – 0.0025 in.)	0.15 mm (0.0059 in.)



Cam Wear

Using a micrometer, measured height of cam. If measured height is below limit, replace camshaft.

Intake & exhaust cam height	Standard	Limit
	40.415 – 40.575 mm (1.5911 – 1.5974 in.)	40.315 mm (1.5872 in.)

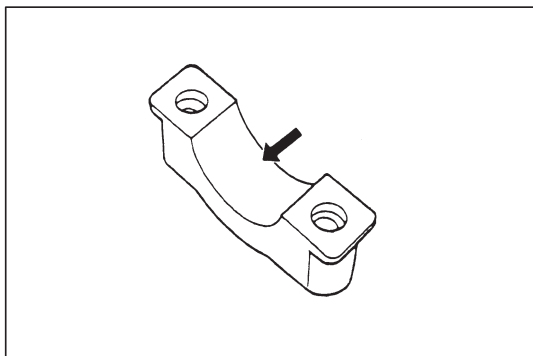


Camshaft Runout

Hold camshaft between two “V” blocks, and measure runout by using a dial gauge.

If runout exceeds the limit, replace camshaft.

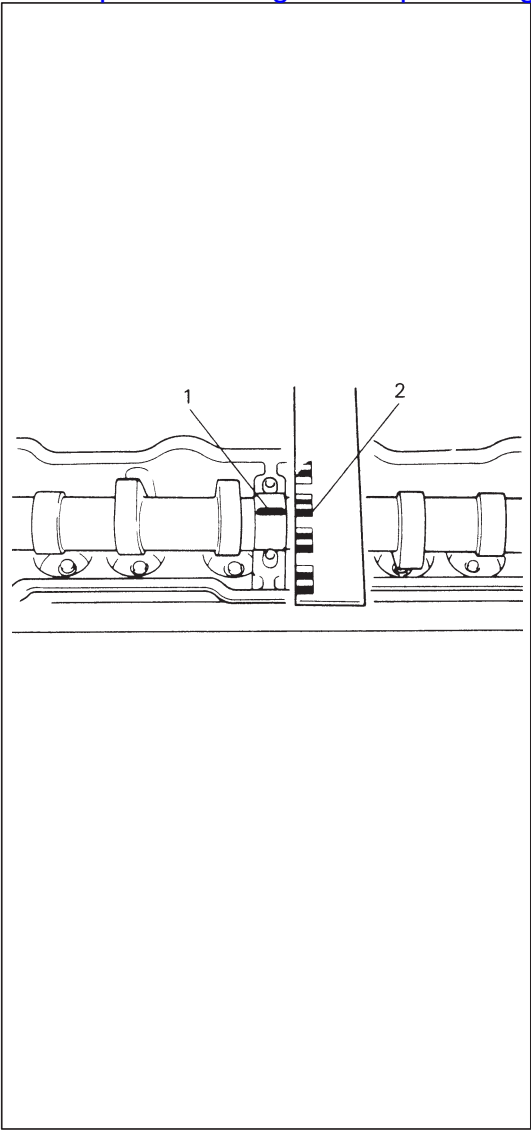
Runout limit: 0.10 mm (0.0039 in.)



Camshaft Journal Wear

Check camshaft journals and camshaft housings for pitting, scratches, wear or damage.

If any malfunction is found, replace camshaft or cylinder head with housing. Never replace cylinder head without replacing housing.



INSPECTION

Camshaft journal wear:

- Check camshaft journals and camshaft housings for pitting, scratches, wear or damage.

If any malfunction is found, replace camshaft or cylinder head with housing. Never replace cylinder head without replacing housings.

Check clearance by using gaging plastic (1). The procedure is as follows.

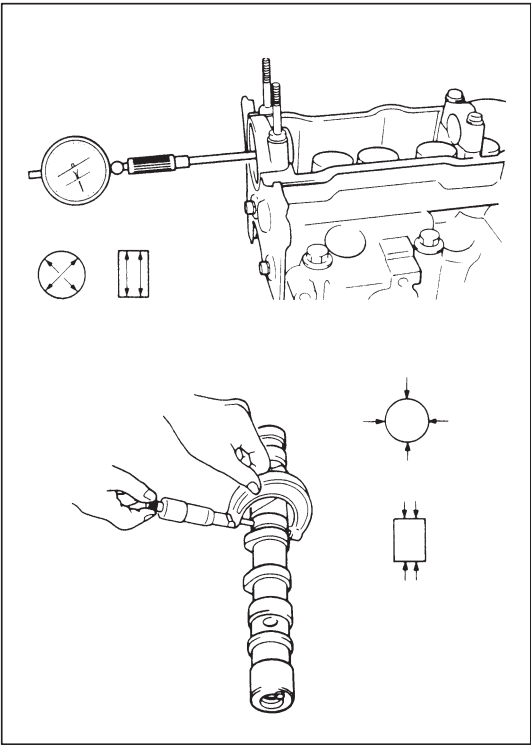
- 1) Clean housings and camshaft journals.
- 2) Make sure that all valve lash adjusters are removed and install camshaft to cylinder head.
- 3) Place a piece of gaging plastic the full width of journal of camshaft (parallel to camshaft).
- 4) Install housings as outlined on the following page and evenly torque housing bolts to specified torque. Housings **MUST** be torqued to specification in order to assure proper reading of camshaft journal clearance.

NOTE:

Do not rotate camshaft while gaging plastic is installed.

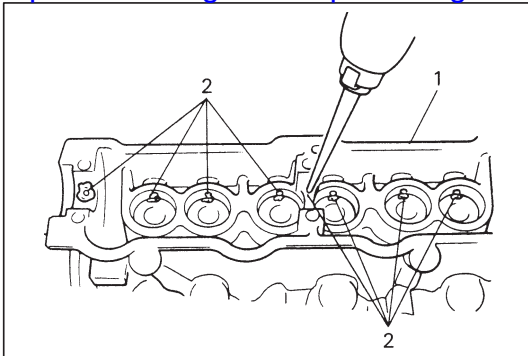
- 5) Remove housing, and using scale (2) on gaging plastic envelop, measure gaging plastic width at its widest point.

Journal clearance	Standard	Limit
	0.040 – 0.082 mm (0.0016 – 0.0032 in.)	0.12 mm (0.0047 in.)



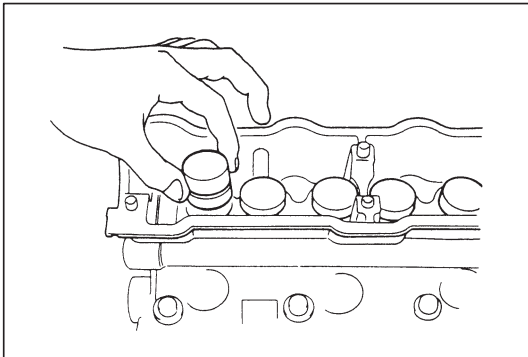
If measured camshaft journal clearance exceeds limit, measure journal (housing) bore and outside diameter of camshaft journal. Replace camshaft or cylinder head assembly whichever the difference from specification is greater.

Item		Standard
Camshaft journal bore dia.	No.1	26.000 – 26.021 mm (1.0236 – 1.0244 in.)
	No.2 & No.3	30.000 – 30.021 mm (1.1811 – 1.1819 in.)
Camshaft journal O.D.	No.1	25.939 – 25.951 mm (1.0212 – 1.0217 in.)
	No.2 & No.3	29.939 – 29.960 mm (1.1787 – 1.1795 in.)

**INSTALLATION**

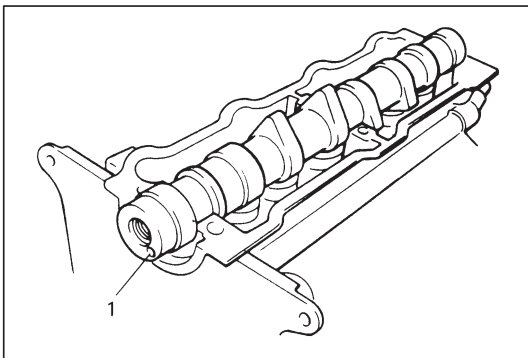
- 1) Before installing valve lash adjuster to cylinder head, fill oil passage of cylinder head (1) with engine oil according to the following procedure.

Pour engine oil through camshaft journal oil holes (2) and check that oil comes out from oil holes in sliding part of valve lash adjuster.



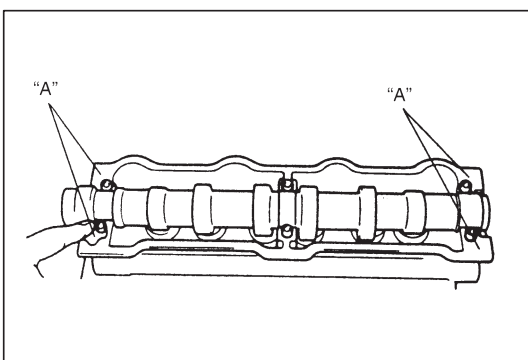
- 2) Install lash adjuster to cylinder head.

Apply engine oil around valve lash adjuster and then install it to cylinder head.



- 3) Install camshaft to cylinder head.

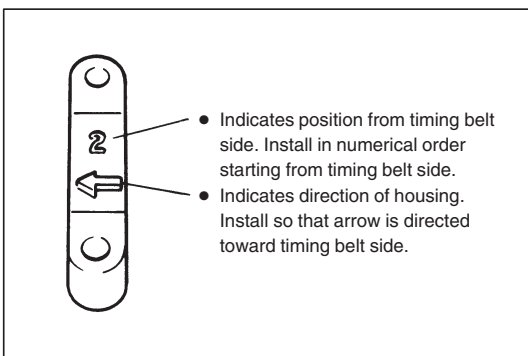
After applying engine oil to camshaft journal and all around cam, set camshaft to cylinder head so that camshaft timing belt pulley pin hole (1) in camshaft is at lower position.



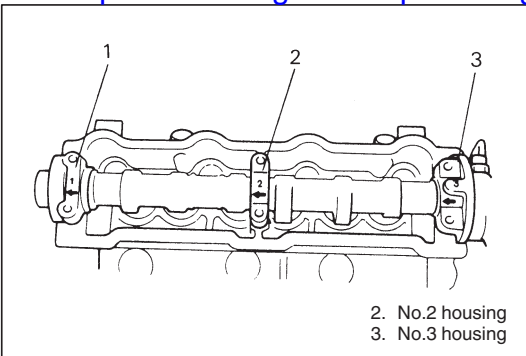
- 4) Install camshaft housing to camshaft and cylinder head.

- Apply engine oil to sliding surface of each housing against camshaft journal.
- Apply sealant to mating surface of No.1 and No.3 housings which will mate with cylinder head.

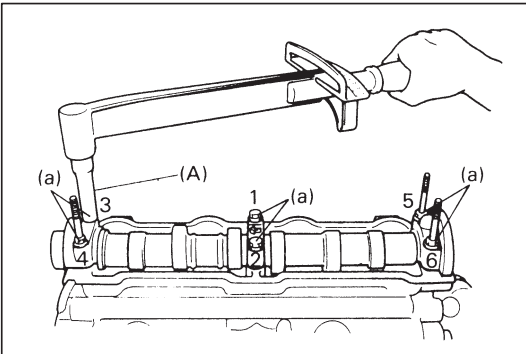
"A": Sealant 99000-31110



- Embossed marks are provided on each camshaft housing, indicating position and direction for installation. Install housing as indicated by these marks.



- As camshaft housing No.1 (1) retains camshaft in proper position as to thrust direction, make sure to first fit No.1 housing to No.1 journal of camshaft securely.



- After applying engine oil to housing bolts, tighten them temporarily first. Then tighten them by following sequence as shown in figure.

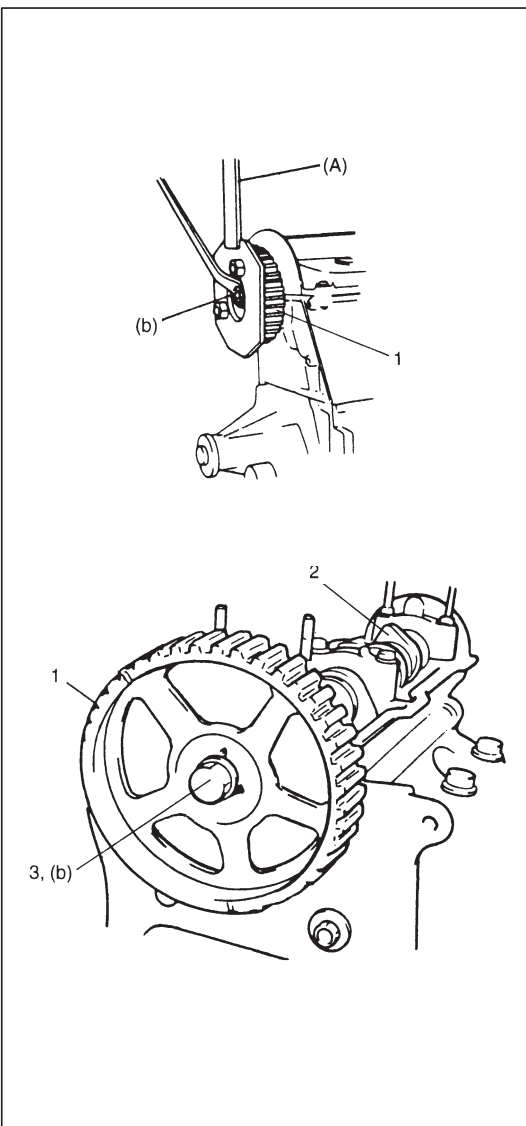
Tighten a little at a time and evenly among bolts and repeat tightening sequence three to four times before they are tightened to specified torque.

Special Tool

(A): 09919-16010

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



- 5) Install camshaft oil seal.

After applying engine oil to oil seal lip, press-fit camshaft oil seal till oil seal surface becomes flush with housing surface.

- 6) Install camshaft timing belt pulley (1) to camshaft (2) after installing dwell pin to camshaft.

With locking camshaft by using special tool, tighten pulley bolt (3) to specified torque.

Tightening Torque

(b): 60 N·m (6.0 kg-m, 43.5 lb-ft)

Special tool

(A): 09917-68220

- 7) Install cylinder head cover to cylinder head as previously outlined.

- 8) Install timing belt, timing belt outside cover, crankshaft pulley, water pump pulley and water pump belt as previously outlined.

- 9) Install distributor case and distributor.
Refer to Section 6F for installation.

- 10) Connect negative cable at battery.

- 11) Adjust ignition timing.
Refer to Section 6F for adjustment.

CAUTION:

- Don't turn camshaft or start engine (i.e., valves should not be operated) for about half an hour after reinstalling hydraulic valve lash adjusters and camshaft. As it takes time for valves to settle in place, operating engine within half an hour after their installation may cause interference to occur between valves and piston.
- If air is trapped in valve lash adjuster, valve may make tapping sound when engine is operated after valve lash adjuster is installed. In such a case, run engine for about half an hour at about 2,000 – 3,000 r/min., and then air will be purged and tapping sound will cease. Should tapping should not cease, it is possible that valve lash adjuster is defective. Replace it if defective.
If defective adjuster can't be located by hearing among 6 of them, check as follows.
 - 1) Stop engine and remove cylinder head cover.
 - 2) Push adjuster downward by hand (with less than 15 kg or 33 lbs force) when cam crest is not on adjuster to be checked and check if clearance exists between cam and adjuster. If it does, adjuster is defective and needs replacement.

VALVE LASH ADJUSTER NOISE DIAGNOSIS

In case of the followings, valve lash adjuster noise may be caused by air trapped into valve lash adjusters.

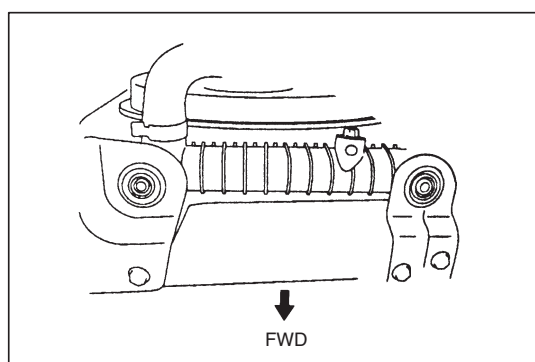
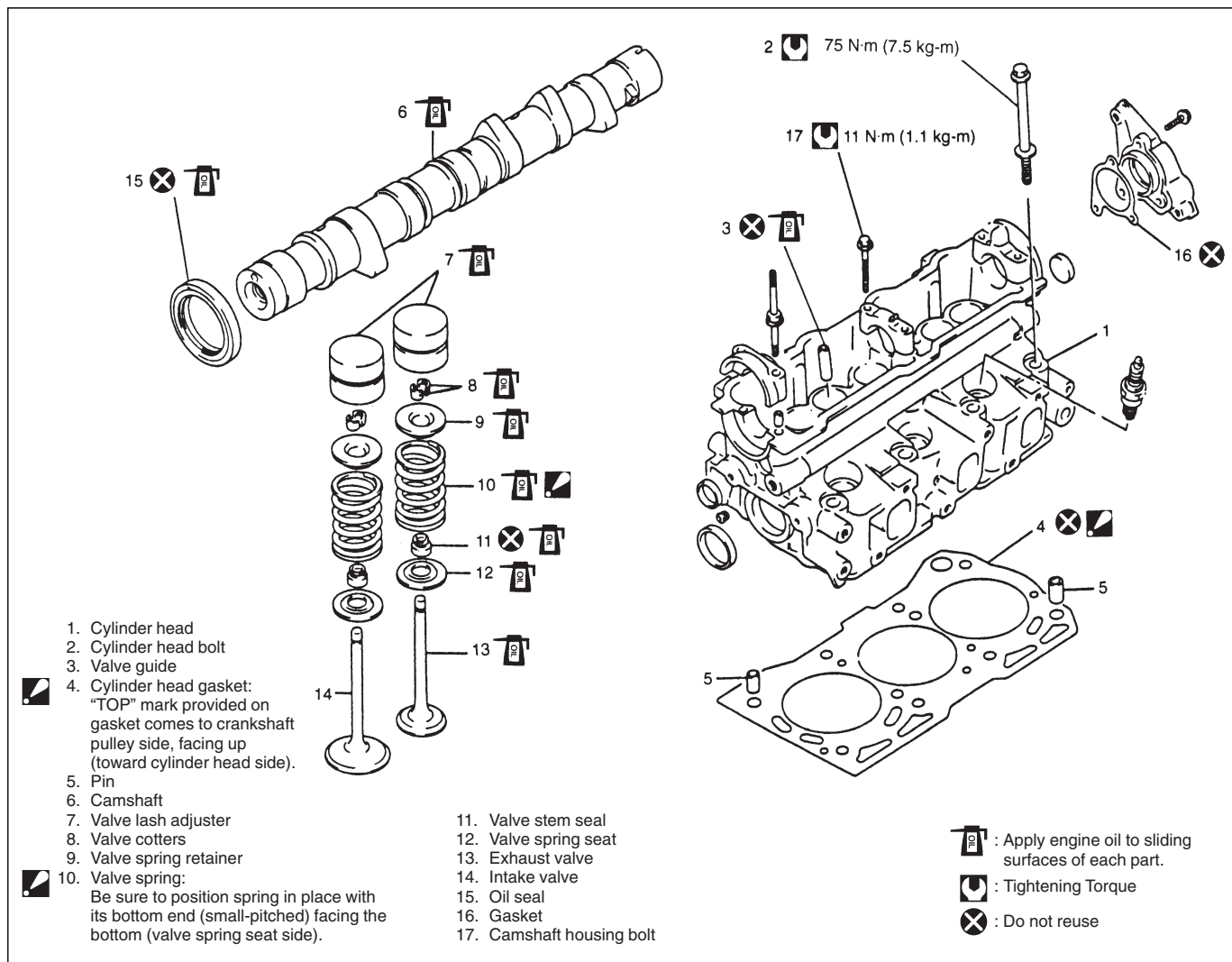
- Vehicle is left for 24 hours or more.
- Engine oil is changed.
- Hydraulic lash adjuster is replaced or reinstalled.
- Engine is overhauled.

If noise from valve lash adjusters is suspected, perform the following checks.

- 1) Check engine oil for the followings.
 - Oil level in oil pan
If oil level is low, add oil up to Full level hole on oil level gauge.
 - Oil quality
If oil is discolored, or deteriorated, change it.
For particular oil to be used, refer to Section 0B.
 - Oil leaks
If leak is found, repair it.
 - Oil pressure (refer to Oil Pressure Check in this section)
If defective pressure is found, repair it.
- 2) Run engine for about half an hour at about 2,000 to 3,000 r/min., and then air will be purge and tapping sound will cease.
- 3) Should tapping sound not cease, it is possible that hydraulic valve lash adjuster is defective.
Replace it if defective.
If defective adjuster can't be located by hearing among 6 of them, check as follows.
 - a) Stop engine and remove cylinder head cover.
 - b) Push adjuster downward by hand (with less than 20 kg or 44 lbs. Force) when cam crest is not on adjuster to be check if clearance exists between cam and adjuster.
If it does, adjuster is defective and needs replacement.

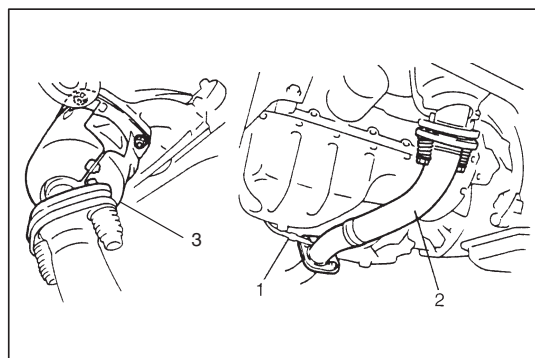
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VALVES AND CYLINDER HEAD



REMOVAL

- 1) Relieve fuel pressure according to procedure described in Section 6-1.
- 2) Disconnect negative cable at battery.
- 3) Drain cooling system.
- 4) Remove air cleaner outlet hose with air chamber case, suction pipe and air cleaner assembly as previously outlined.



- 5) Disconnect oxygen sensor No.2 coupler (1) and remove exhaust No.1 pipe (2) with catalytic converter case (3).

6) Disconnect following electric wires:

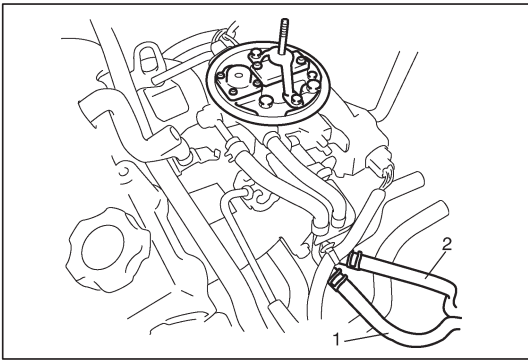
- MAP sensor
- CMP sensor
- Engine oil pressure switch
- ECT sensor
- Ground wire from intake manifold
- Injector
- TP sensor
- ISC actuator
- Oxygen sensor No. 1
- EVAP canister purge valve
- Center high-tension cord from distributor
- EFE heater

and then release above wire harnesses from clamps.

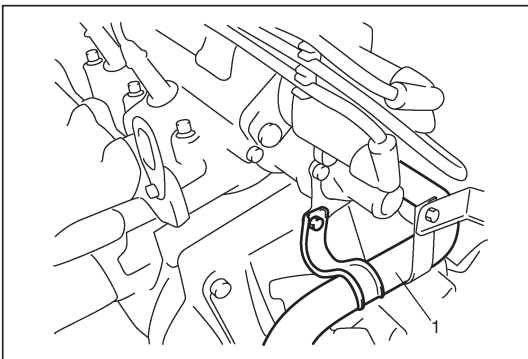
7) Disconnect following hoses:

- Canister purge hose from EVAP canister purge valve
- Radiator inlet hose from thermostat case
- Brake booster hose from intake manifold
- Heater inlet hose from intake manifold
- Throttle body outlet hose from throttle body

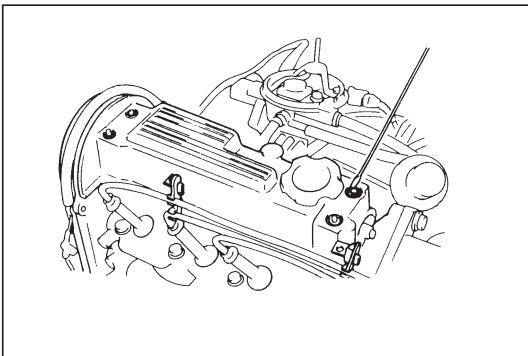
8) Disconnect accelerator cable from throttle body.



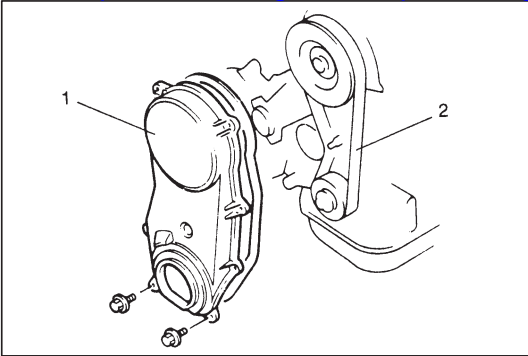
9) Disconnect fuel feed hose (1) and fuel return hose (2) from fuel pipes.



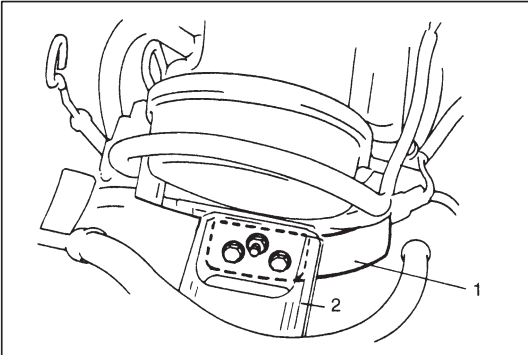
10) Disconnect water inlet pipe (1) from its bracket.



11) Remove cylinder head cover as previously outlined.

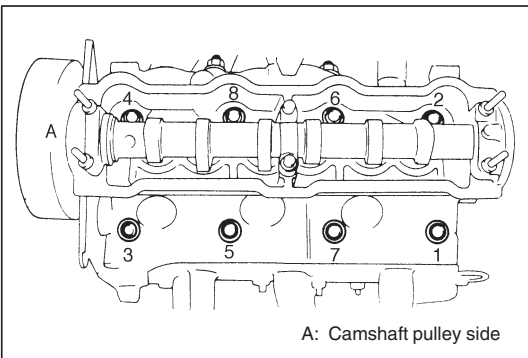


12) Remove timing belt outside cover (1) and timing belt (2) as previously outlined.



13) Install engine right mounting bracket (1) and engine right mounting swing bracket (2).

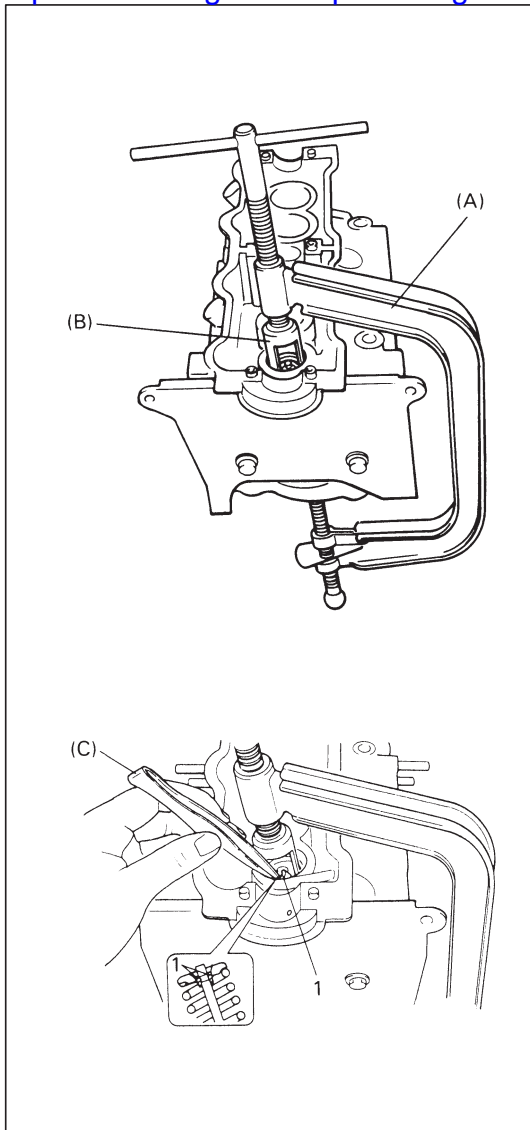
14) Remove support device.



15) Loosen cylinder head bolts in such order as indicated in figure and remove them.

16) Check all around cylinder head for any other parts required to be removed or disconnected and remove or disconnect whatever necessary.

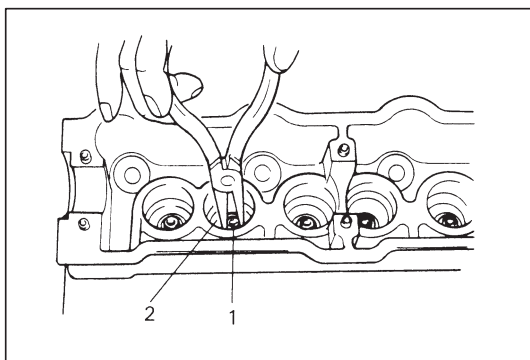
17) Remove cylinder head with distributor, thermostat case, intake manifold and exhaust manifold.

**DISASSEMBLY**

- 1) For ease in servicing cylinder head, remove distributor, thermostat case, intake manifold with throttle body and exhaust manifold from cylinder head.
- 2) Remove camshaft and valve lash adjusters from cylinder head.
- 3) Using special tool (Valve lifter), compress valve springs and then remove valve cotters (1) by using special tool (Forceps) as shown.

Special Tool**(A): 09916-14510****(B): 09916-14910****(C): 09916-84511**

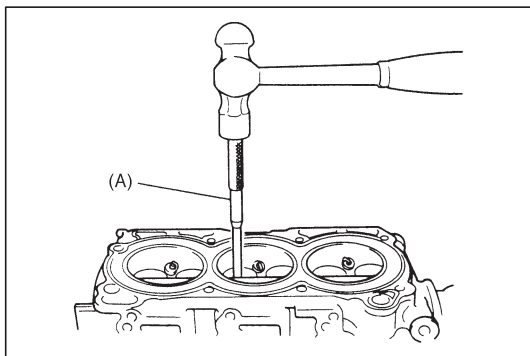
- 4) Release special tool, and remove spring retainer and valve spring.
- 5) Remove valve from combustion chamber side.



- 6) Remove valve stem oil seal (1) from valve guide and then valve spring seat (2).

NOTE:

Do not reuse oil seal once disassembled. Be sure to use new oil seal when assembling.

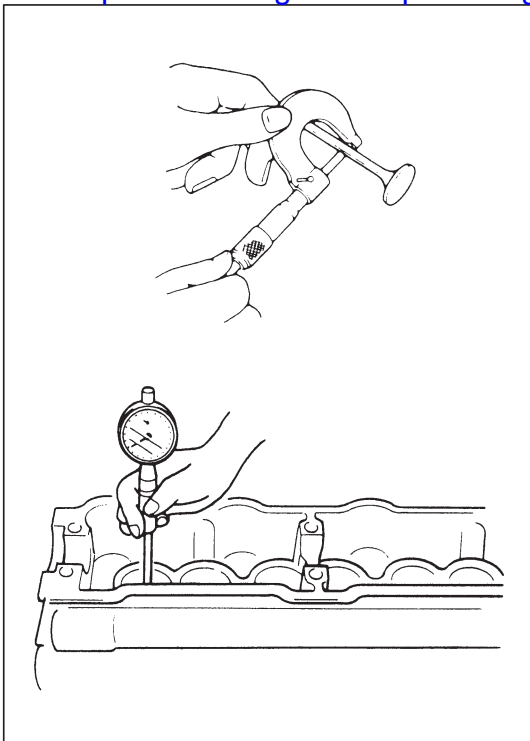


- 7) Using special tool (Valve guide remover), drive valve guide out from combustion chamber side to valve spring side.

Special Tool**(A): 09916-44910****NOTE:**

Do not reuse valve guide once disassembled. Be sure to use new valve guide (Oversize) when assembling.

- 8) Place disassembled parts except valve stem seal and valve guide in order, so that they can be installed in their original position.



INSPECTION

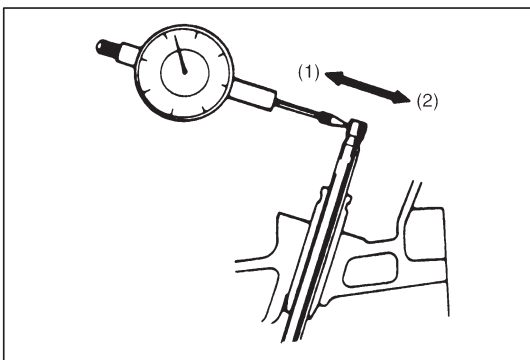
Valve Guides

Using a micrometer and bore gauge, take diameter readings on valve stems and guides to check stem-to-guide clearance.

Be sure to take reading at more than one place along the length of each stem and guide.

If clearance exceeds limit, replace valve and valve guide.

Item		Standard	Limit
Valve stem diameter	In	5.465 – 5.480 mm (0.2152 – 0.2157 in.)	–
	Ex	5.440 – 5.455 mm (0.2142 – 0.2148 in.)	–
Valve guide I.D.	In	5.500 – 5.512 mm (0.2166 – 0.2170 in.)	–
	Ex	5.440 – 5.455 mm (0.2142 – 0.2148 in.)	–
Stem-to-guide clearance	In	0.020 – 0.047 mm (0.0008 – 0.0018 in.)	0.07 mm (0.0027 in.)
	Ex	0.045 – 0.072 mm (0.0018 – 0.0028 in.)	0.09 mm (0.0035 in.)

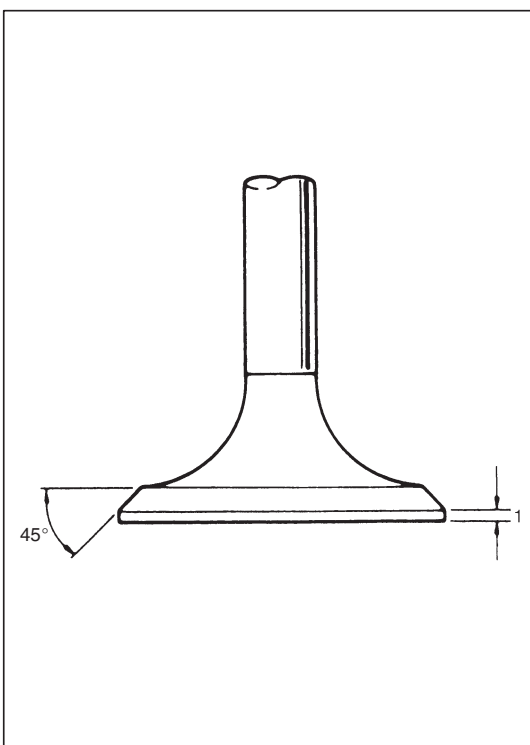


If bore gauge is not available, check end deflection of valve stem with a dial gauge instead.

Move stem end in directions (1) and (2) to measure end deflection.

If deflection exceeds its limit, replace valve stem and valve guide.

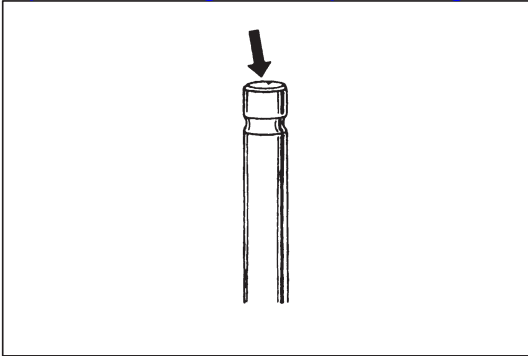
Valve stem end deflection limit	In	0.14 mm (0.005 in.)
	Ex	0.18 mm (0.007 in.)



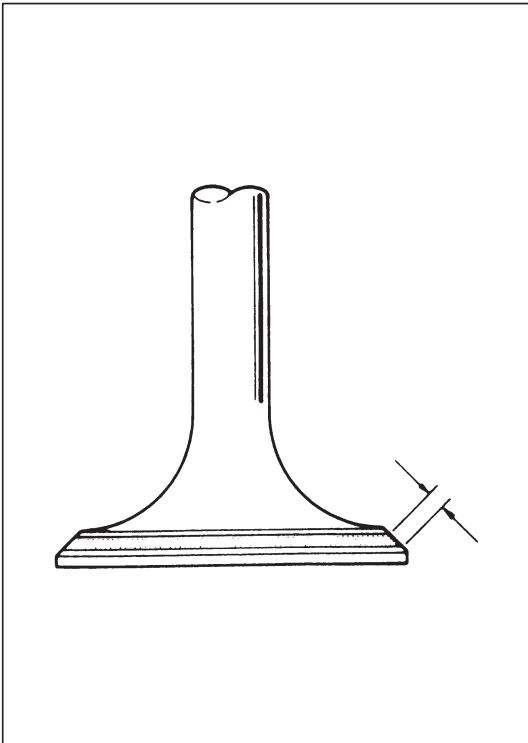
Valves

- Remove all carbon from valves.
- Inspect each valve for wear, burn or distortion at its face and stem and, as necessary, replace it.
- Measure thickness (1) of valve head. If measured thickness exceeds limit, replace valve.

Valve head thickness		
	Standard	Limit
IN	1.0 mm (0.039 in.)	0.6 mm (0.024 in.)
EX	1.2 mm (0.047 in.)	0.7 mm (0.027 in.)



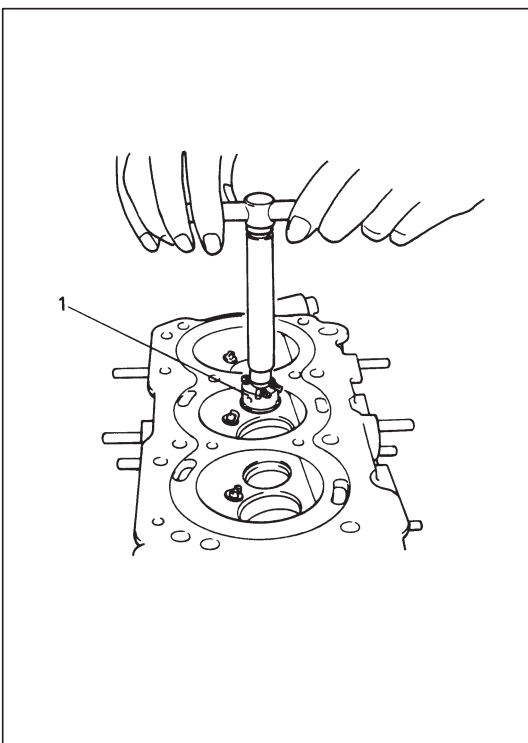
- Inspect valve stem end face for pitting and wear. If pitting or wear is found there, valve stem end may be resurfaced, but not so much as to grind off its chamfer. When it is worn so much that its chamfer is gone, replace valve.



- Seating contact width:
Create contact pattern on each valve in the usual manner, i.e., by giving uniform coat of marking compound to valve seat and by rotating tapping seat with valve head. Valve lapper (tool used in valve lapping) must be used.

Pattern produced on seating face of valve must be a continuous ring without any break, and the width of pattern must be within specified range.

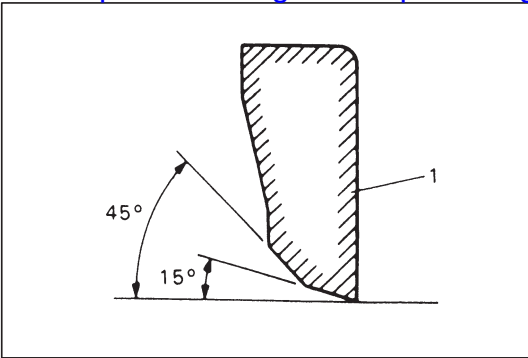
Standard seating width revealed by contact pattern on valve face	In	1.3 – 1.5 mm
	Ex	(0.0512 – 0.0590 in.)



- Valve seat repair:
A valve seat not producing a uniform contact with its valve or showing width of seating contact that is out of specified range must be repaired by regrinding or by cutting and regrinding and finished by lapping.

1. EXHAUST VALVE SEAT: Use valve seat cutters (1) to make two cuts as illustrated in figure. Two cutters must be used: the first for making 15° angle, and the second for making 45° angle. The second cut must be made to produce desired seat width.

Seat width for exhaust valve seat:
1.3 – 1.5 mm (0.0512 – 0.0590 in.)



2. INTAKE VALVE SEAT: Cutting sequence is the same as for exhaust valve seats (1).

Seat width for intake valve seat:

1.3 – 1.5 mm (0.0512 – 0.0590 in.)

3. VALVE LAPPING: Lap valve on seat in two steps, first with coarse size lapping compound applied to face and the second with fine-size compound, each time using valve lapper according to usual lapping method.

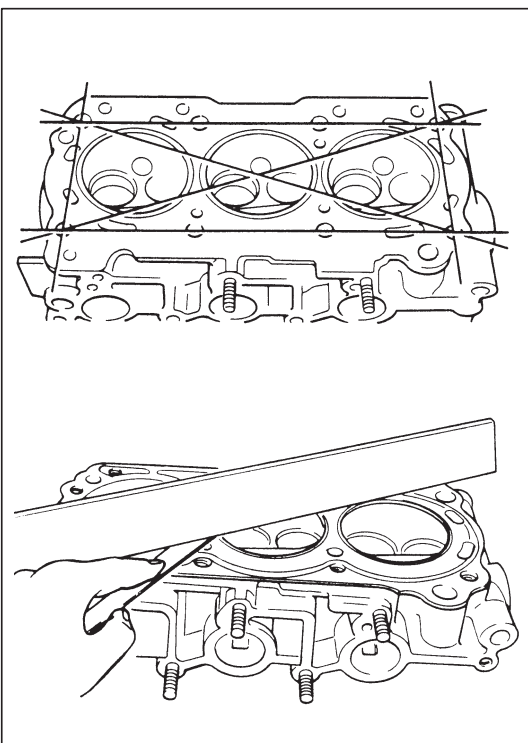
Cylinder Head

- Remove all carbon from combustion chambers.

NOTE:

Do not use any sharp-edged tool to scrape off carbon. Be careful not to scuff or nick metal surfaces when decarbonizing. The same applies to valves and valve seats, too.

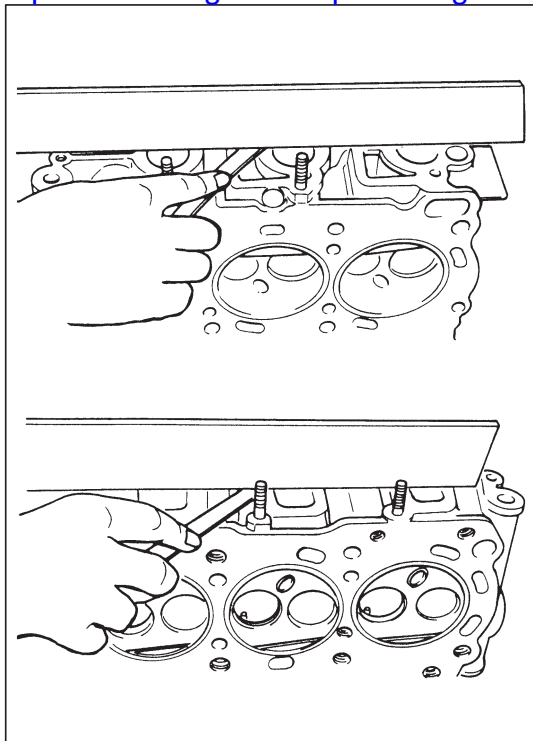
- Check cylinder head for cracks in intake and exhaust ports, combustion chambers, and head surface.



- Flatness of gasketed surface:

Using a straightedge and thickness gauge, check surface at a total of 6 locations. If distortion limit, given below, is exceeded, correct gasketed surface with a surface plate and abrasive paper of about #400 (Waterproof silicon carbide abrasive paper): place paper on and over surface plate, and rub gasketed surface against paper to grind off high spots. Should this fail to reduce thickness gauge readings to within limit, replace cylinder head. Leakage of combustion gases from this gasketed joint is often due to warped gasketed surface: such leakage results in reduced power output.

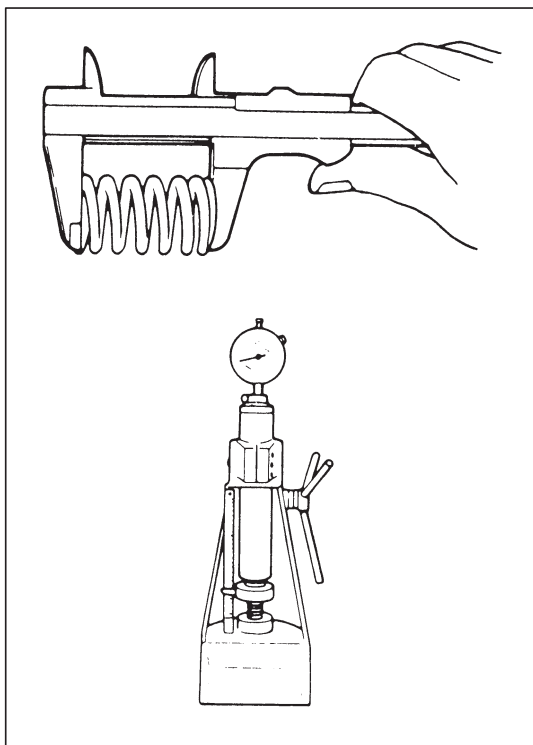
Limit of distortion: 0.05 mm (0.002 in.)



- Distortion of manifold seating faces:

Check seating faces of cylinder head for manifolds, using a straightedge and thickness gauge, in order to determine whether these faces should be corrected or cylinder head replaced.

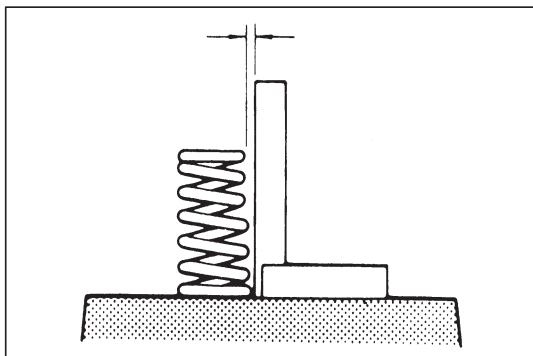
Limit of distortion: 0.10 mm (0.004 in.)



Valve Springs

- Referring to data given below, check to be sure that each spring is in sound condition, free of any evidence of breakage or weakening. Remember, weakened valve springs can cause chatter, not to mention possibility of reducing power output due to gas leakage caused by decreased seating pressure.

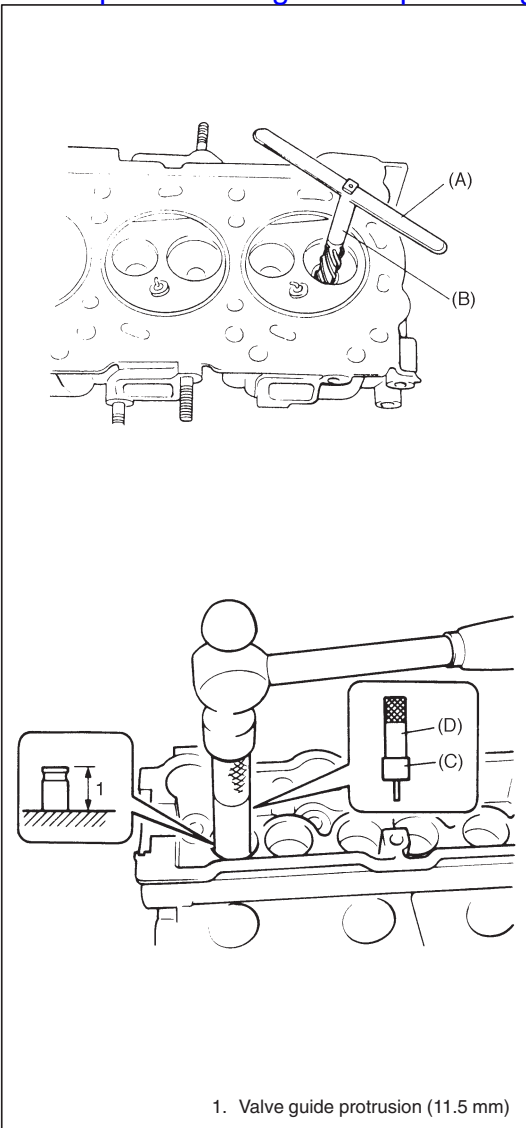
Item	Standard	Limit
Valve spring free length	42.29 mm (1.6649 in.)	41.0 mm (1.6142 in.)
Valve spring preload	209 – 235 N (20.9 – 23.5 kg) at 32.6 mm (46.1 – 51.8 lb at 1.28 in.)	187 N (18.7 kg) at 32.6 mm (41.2 lb at 1.28 in.)



- Spring squareness:

Use a square and surface plate to check each spring for squareness in terms of clearance between end of valve spring and square. Valve springs found to exhibit a larger clearance than limit given below must be replaced.

Valve spring squareness limit: 2.0 mm (0.079 in.)

**ASSEMBLY**

- 1) Before installing valve guide into cylinder head, ream guide hole with special tool (11 mm reamer) so remove burrs and make it truly round.

Special Tool**(A): 09916-34541****(B): 09916-38210**

- 2) Install valve guide to cylinder head.

Heat cylinder head uniformly at a temperature of 80 to 100°C (176 to 212°F) so that head will not be distorted, and drive new valve guide into hole with special tools.

Drive in new valve guide until special tool (Valve guide installer) contacts cylinder head.

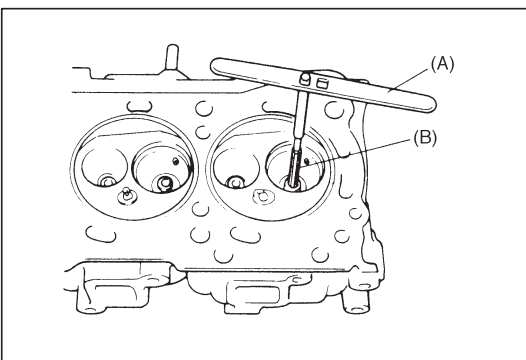
After installing, make sure that valve guide protrudes by 11.5 mm (0.45 in.) from cylinder head.

Special Tool**(C): 09916-56011****(D): 09916-58210****NOTE:**

- Do not reuse valve guide once disassembled.
Install new valve guide (Oversize).
- Intake and exhaust valve guides are identical.

Valve guide oversize: 0.03 mm (0.0012 in.)

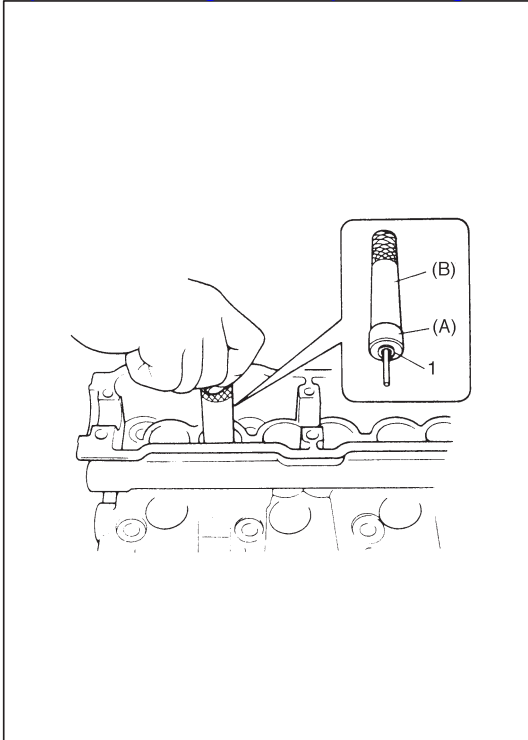
Valve guide protrusion (In and Ex): 11.5 mm (0.45 in.)



- 3) Ream valve guide bore with special tool (5.5 mm reamer).
After reaming, clean bore.

Special Tool**(A): 09916-34541****(B): 09916-34550**

- 4) Install valve spring seat to cylinder head.



- 5) Install new valve stem seal (1) to valve guide.

After applying engine oil to seal and spindle of special tool (Valve guide installer handle), fit oil seal to spindle, and then install seal to valve guide by pushing special tool by hand. After installing, check to be sure that seal is properly fixed to valve guide.

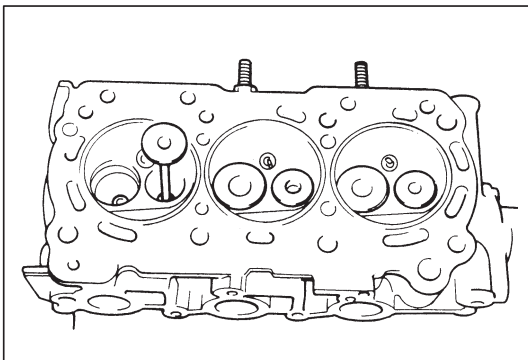
Special Tool

(A): 09917-98221

(B): 09916-58210

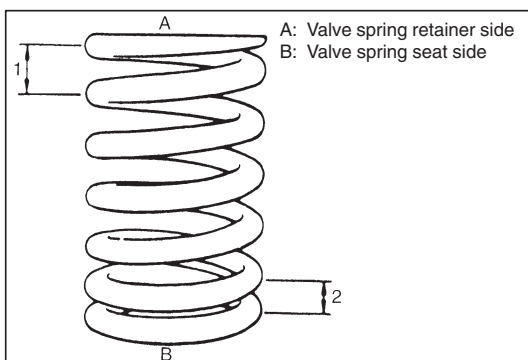
NOTE:

- Do not reuse seal once disassembled. Be sure to install new seal.
- When installing, never tap or hit special tool with a hammer or else. Install seal to guide only by pushing special tool by hand. Tapping or hitting special tool may cause damage to seal.



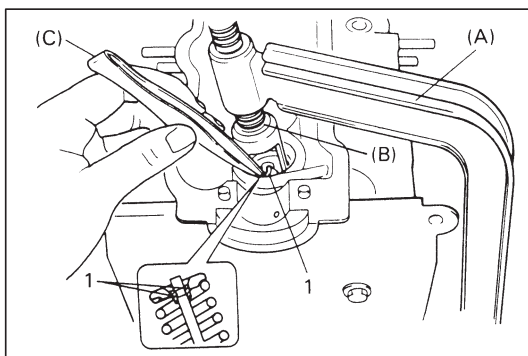
- 6) Install valve to valve guide.

Before installing valve to valve guide, apply engine oil to stem seal, valve guide bore, and valve stem.



- 7) Install valve spring and spring retainer.

Each valve spring has top end (large-pitch (1) end) and bottom end (small-pitch (2) end). Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).



- 8) Using special tool (Valve lifter), compress valve spring and fit two valve cotter pins (1) into groove in valve stem.

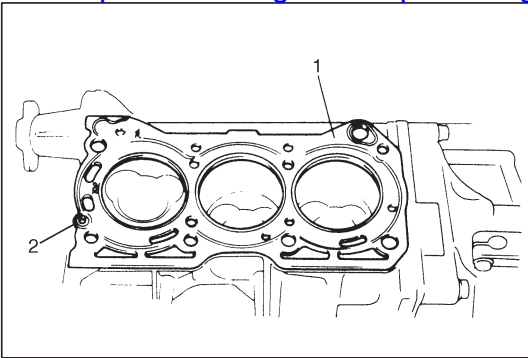
Special Tool

(A): 09916-14510

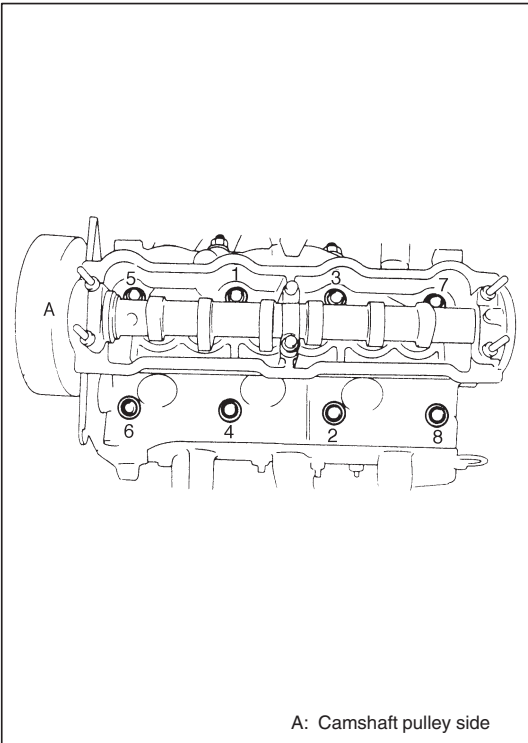
(B): 09916-14910

(C): 09916-84511

- 9) Install valve lash adjuster and camshaft as previously outlined.
10) Install thermostat case, distributor, intake manifold and exhaust manifold to cylinder head.

**INSTALLATION**

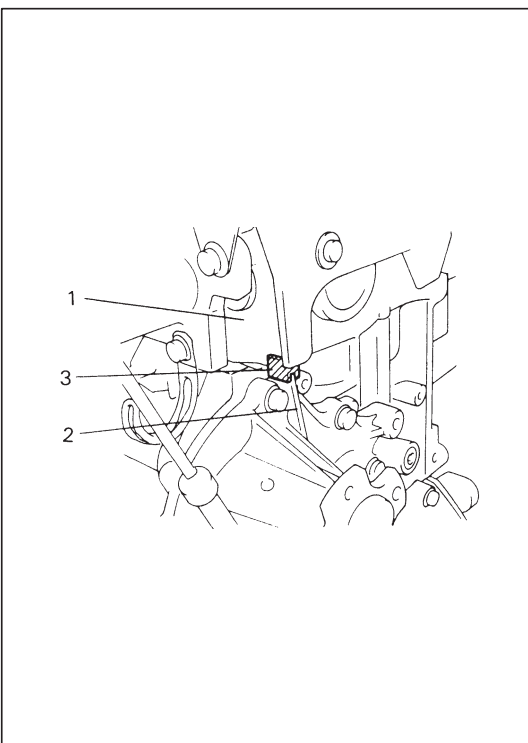
- 1) Remove old gasket and oil on mating surfaces and install new head gasket (1) as shown in figure so that check valve of cylinder block and the hole (2) for check valve of cylinder head gasket align.



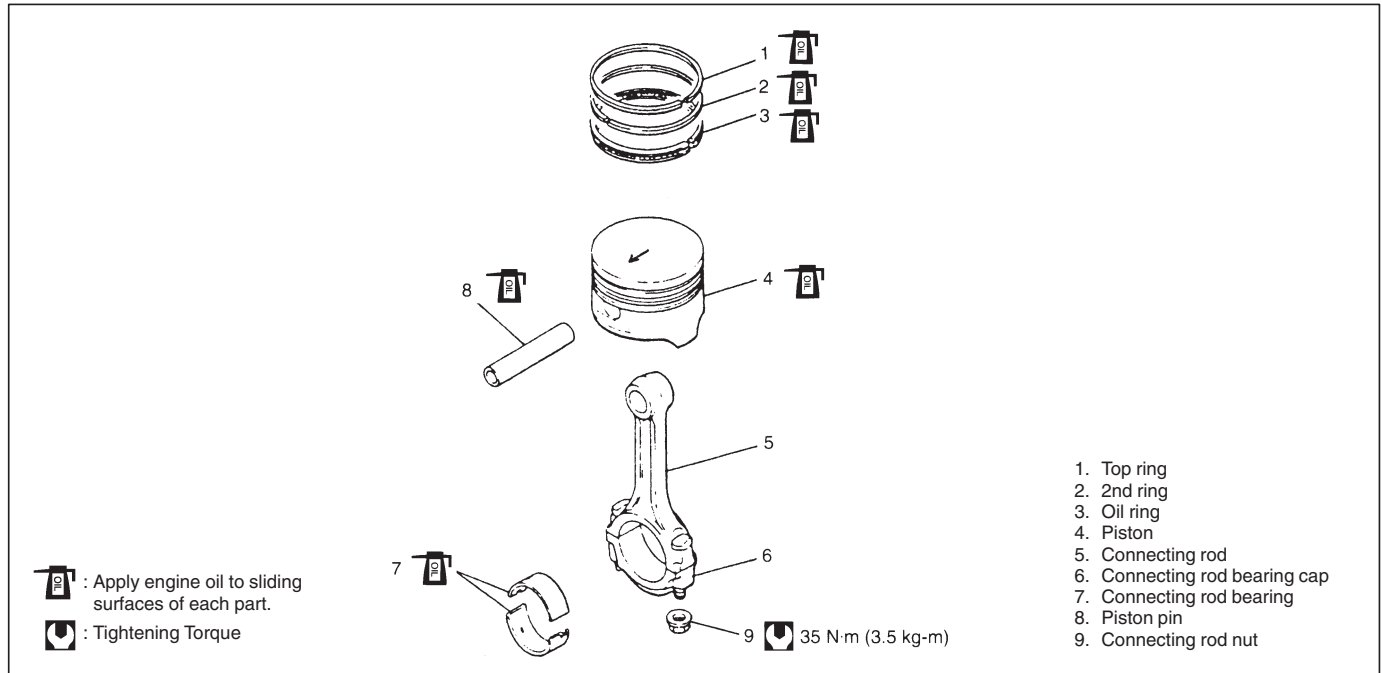
- 2) Apply engine oil to cylinder head bolts and tighten them gradually as follows.
 - a) Tighten all bolts to 37 N·m (3.7 kg-m, 27.0 lb-ft) according to numerical order in figure.
 - b) In the same manner as in a), tighten them to 58 N·m (5.8 kg-m, 42.0 lb-ft).
 - c) Loosen all bolts until tightening torque is reduced to 0 (zero) in reverse order of tightening.
 - d) In the same manner as in a), tighten them to 37 N·m (3.7 kg-m, 27.0 lb-ft).
 - e) In the same manner as in a) again, tighten them to specified torque.

Tightening Torque

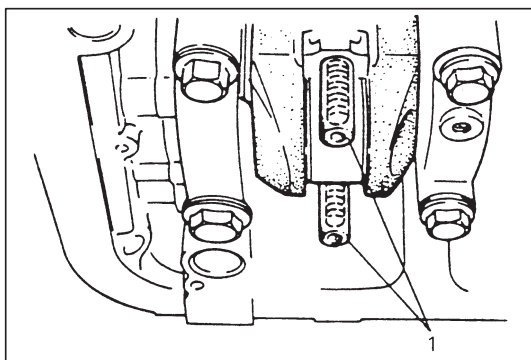
(a): 75 N·m (7.5 kg-m, 54 lb-ft)



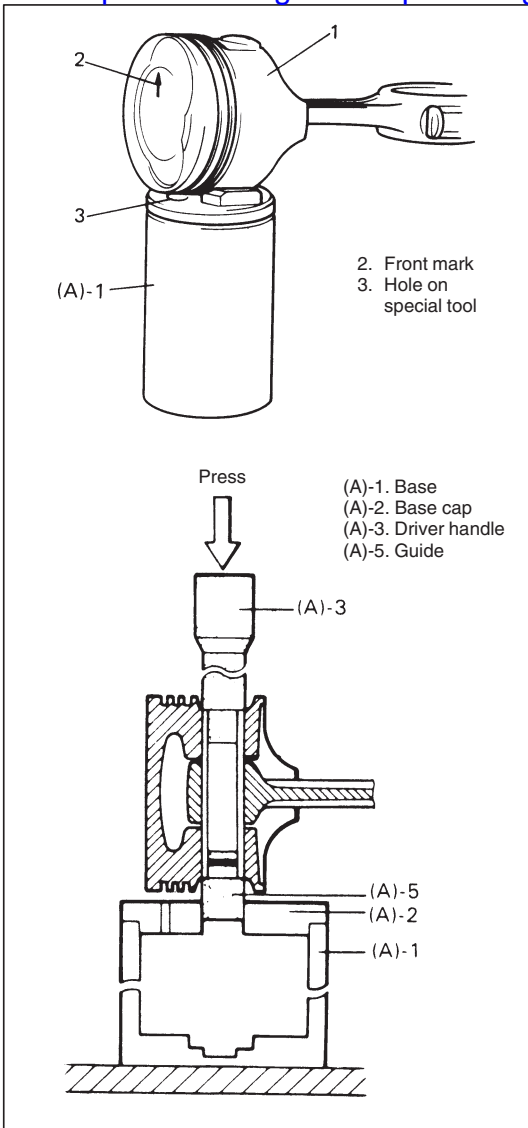
- 3) Install rubber seal (3) between water pump (2) and cylinder head (1).
- 4) Install cylinder head cover.
- 5) Install timing belt as previously outlined.
- 6) Reverse removal procedure for installation, noting the following points.
 - Adjust drive belt tension, referring to "ENGINE COOLING" section.
 - Adjust A/C compressor belt tension, if equipped. Refer to Section 1B.
 - Adjust accelerator cable play. Refer to Section 6E1.
 - Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
 - Refill cooling system referring Section 6B.
 - Connect negative cable at battery.
 - Confirm that ignition timing is within specification referring to "IGNITION SYSTEM" section.
 - Verify that there is no fuel leakage, water leakage and exhaust gas leakage at each connection.

PISTON, PISTON RINGS, CONNECTING RODS AND CYLINDERS**REMOVAL**

- 1) Remove cylinder head from cylinder block as previously outlined.
- 2) Drain engine oil.
- 3) Remove oil pan and oil pump strainer as previously outlined.
- 4) Mark cylinder number on all pistons, connecting rods and rod bearing caps, using silver pencil or quick drying paint.



- 5) Remove rod bearing caps.
- 6) Install guide hose (1) over threads of rod bolts.
This is to prevent damage to bearing journal and rod bolt threads when removing connecting rod.
- 7) Decarbon top of cylinder bore before removing piston from cylinder.
- 8) Push piston and connecting rod assembly out through the top of cylinder bore.

**DISASSEMBLY**

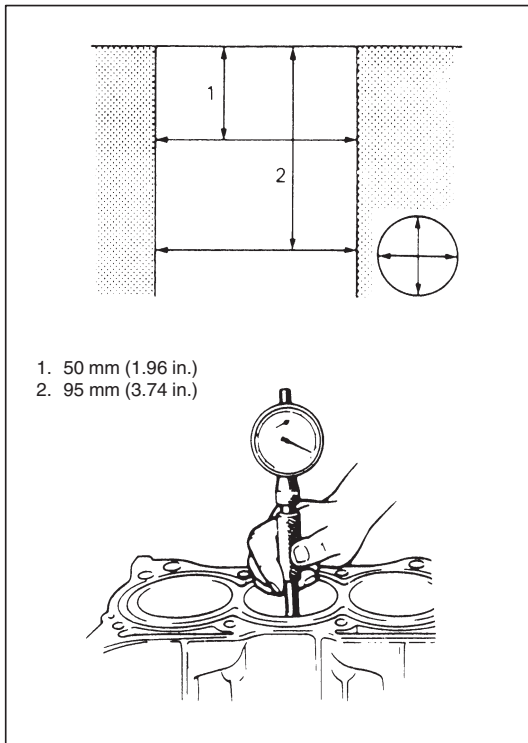
- 1) Using piston ring expander, remove two compression rings (Top and 2nd) and oil ring from piston.
- 2) Fit piston (1) and connecting rod assembly to special tool and then press piston pin out of connecting rod by using hydraulic press.

Special Tool**(A): 09910-38211****CLEANING**

Clean carbon from piston head and ring grooves, using a suitable tool.

INSPECTION**Cylinders**

- Inspect cylinder walls for scratches, roughness, or ridges which indicate excessive wear. If cylinder bore is very rough or deeply scratched, or ridged, rebore cylinder and use oversize piston.



- Using a cylinder gauge, measure cylinder bore in thrust and axial directions at two positions as shown in figure.

If any of following conditions is noted, rebore cylinder.

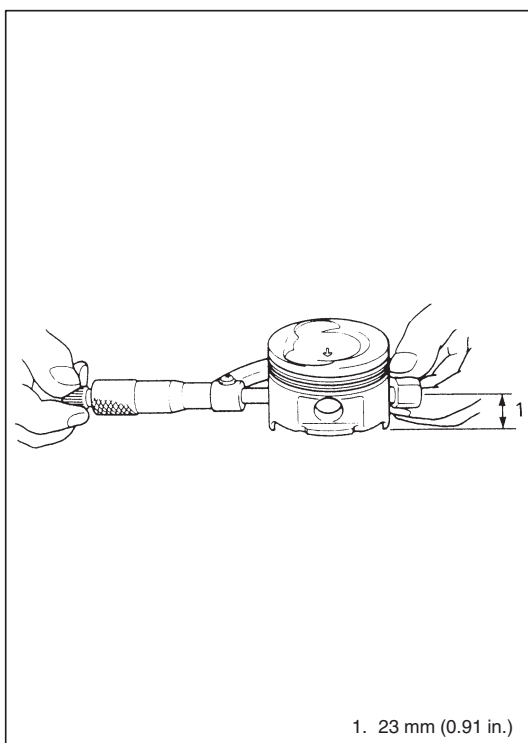
- 1) Cylinder bore dia. exceeds limit.
- 2) Difference of measurements at two positions exceeds taper limit.
- 3) Difference between thrust and axial measurements exceeds out-of-round limit.

Cylinder bore dia. limit: 74.15 mm (2.9193 in.)

Taper and out-of-round limit: 0.10 mm (0.0039 in.)

NOTE:

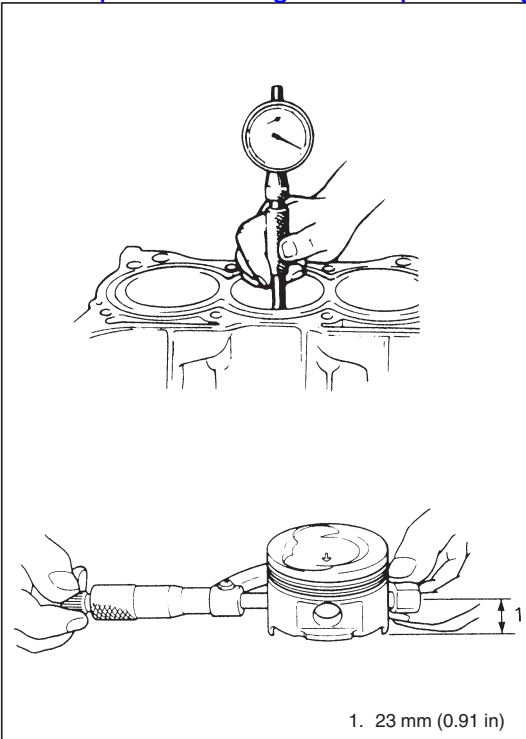
If any one of three cylinders has to be rebored, rebore all three to the same next oversize. This is necessary for the sake of uniformity and balance.

**Pistons**

- Inspect piston for faults, cracks or other damaged. Damaged or faulty piston should be replaced.
- Piston diameter:

As indicated in figure, piston diameter should be measured at a position 23 mm (0.91 in.) from piston skirt end in the direction perpendicular to piston pin.

Piston diameter	Standard	73.970 – 73.990 mm (2.9122 – 2.9130 in.)
	Oversize: 0.25 mm (0.0098 in.)	74.220 – 74.230 mm (2.9220 – 2.9224 in.)
	0.50 mm (0.0196 in.)	74.470 – 74.480 mm (2.9319 – 2.9323 in.)



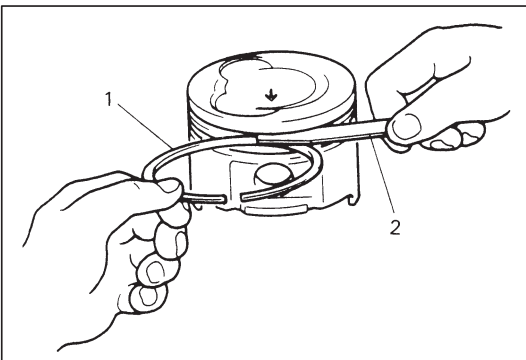
- **Piston clearance:**

Measure cylinder bore diameter and piston diameter to find their difference which is piston clearance. Piston clearance should be within specification as given below. If it is out of specification, re-bore cylinder and use oversize piston.

Piston clearance: 0.02 – 0.04 mm (0.0008 – 0.0015 in.)

NOTE:

Cylinder bore diameters used here are measured in thrust direction at two positions.



- **Ring groove clearance:**

Before checking, piston grooves must be clean, dry and free of carbon.

Fit new piston ring (1) into piston groove, and measure clearance between ring and ring land by using thickness gauge (2).

If clearance is out of specification, replace piston.

Ring groove clearance:

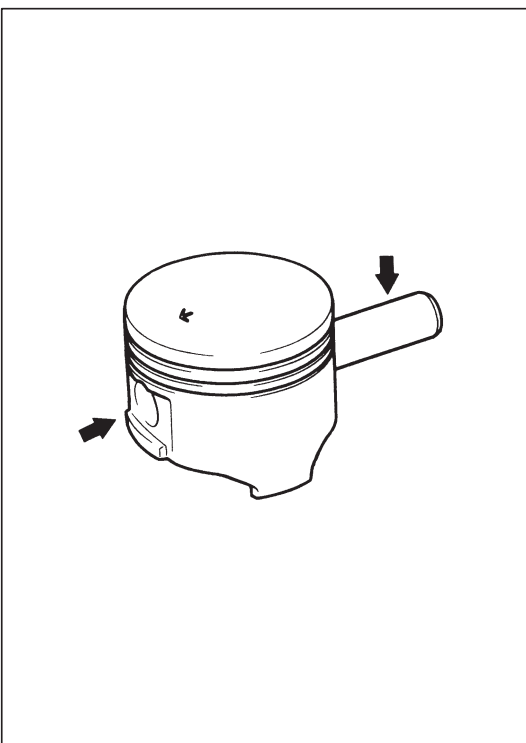
Top: 0.03 – 0.07 mm (0.0012 – 0.0027 in.)

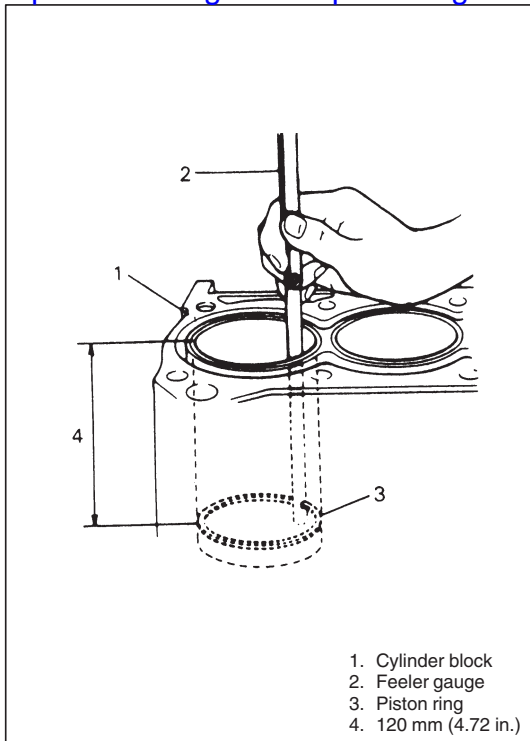
2nd: 0.02 – 0.06 mm (0.0008 – 0.0023 in.)

Piston pin

- Piston pin must be fitted into piston bore with an easy finger push at normal room temperature.

- Check piston pin and piston bore for wear or damage. If pin or piston bore is badly worn or damaged, replace pin or piston, or both.





Piston Rings

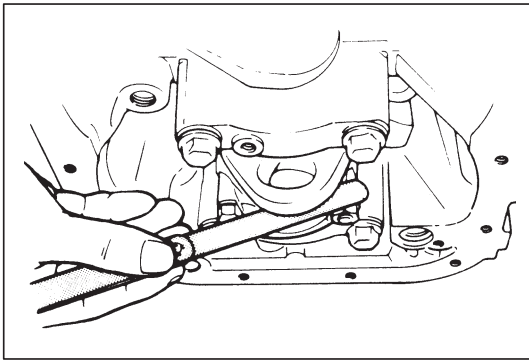
To measure end gap, insert piston ring into cylinder bore and then measure the gap by using thickness gauge.

If measured gap is out of specification, replace ring.

NOTE:

Decarbon and clean top of cylinder bore before inserting piston ring.

Item		Standard	Limit
Piston ring end gap	Top ring	0.15 – 0.30 mm (0.0059 – 0.0118 in.)	0.7 mm (0.0275 in.)
	2nd ring	0.2 – 0.35 mm (0.0079 – 0.0138 in.)	0.7 mm (0.0275 in.)
	Oil ring	0.2 – 0.6 mm (0.0079 – 0.0236 in.)	1.8 mm (0.0709 in.)



Connecting Rod

● Big-end side clearance:

Check big-end of connecting rod for side clearance, with rod fitted and connected to its crank pin in the normal manner. If measured clearance is found to exceed its limit, replace connecting rod.

Item	Standard	Limit
Big-end side clearance	0.10 – 0.20 mm (0.0039 – 0.0078 in.)	0.35 mm (0.0137 in.)

● Connecting rod alignment:

Mount connecting rod on aligner to check it for bow and twist and, if limit is exceeded, replace it.

Limit on bow : 0.05 mm (0.0020 in.)

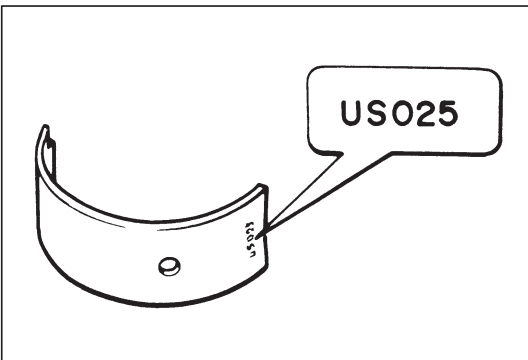
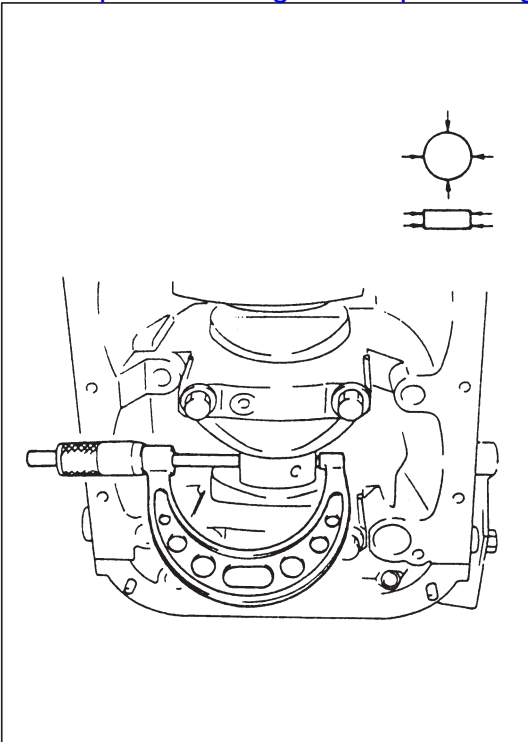
Limit on twist: 0.10 mm (0.0039 in.)

Crank Pin and Connecting Rod Bearings

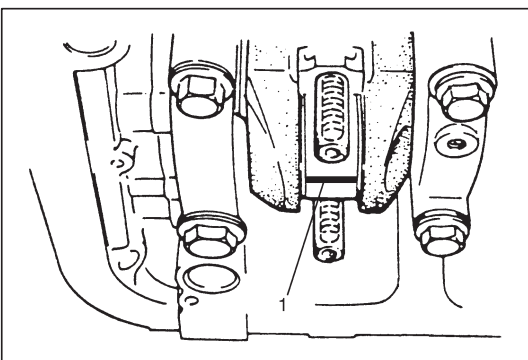
- Inspect crank pin for uneven wear or damage. Measure crank pin for out-of-round or taper with a micrometer. If crank pin is damaged, or out-of-round or taper is out of limit, replace crankshaft or regrind crank pin to undersize and use undersize bearing.

Connecting rod bearing size	Crank pin diameter
Standard	41.982 – 42.000 mm (1.6528 – 1.6535 in.)
0.25 mm (0.0098 in.) undersize	41.732 – 41.750 mm (1.6430 – 1.6437 in.)

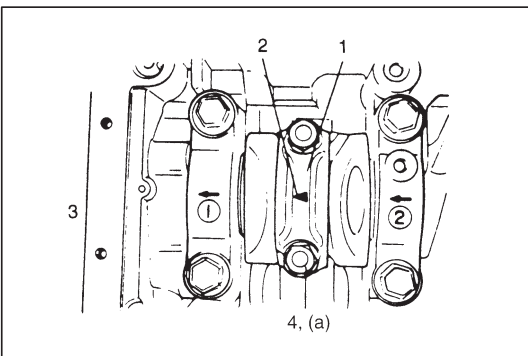
Out-of-round and taper limit: 0.01 mm (0.0004 in.)



- Rod bearing:
Inspect bearing shells for signs of fusion, pitting, burn or flaking and observe contact pattern. Bearing shells found in defective condition must be replaced.
Two kinds of rod bearing are available; standard size bearing and 0.25 mm undersize bearing. To distinguish them, 0.25 mm undersize bearing has the stamped number (US025) on its backside as indicated in figure, but standard size one has no number.



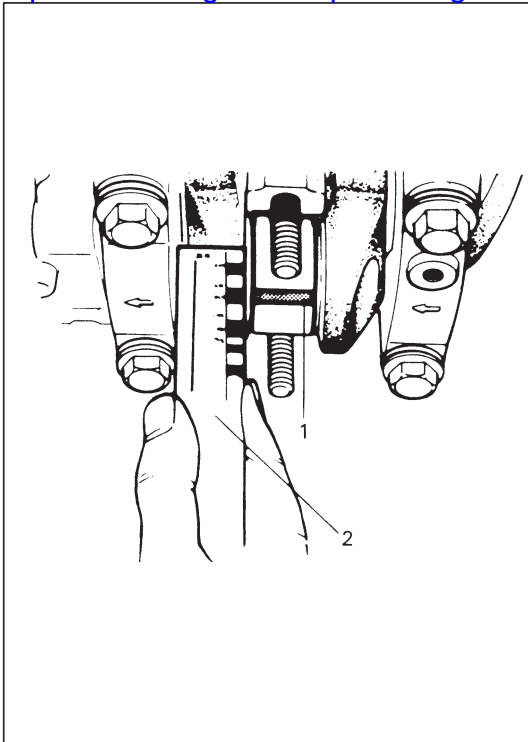
- Rod bearing clearance:
 - 1) Before checking bearing clearance, clean bearing and crank pin.
 - 2) Install bearing in connecting rod and bearing cap.
 - 3) Place a piece of gaging plastic (1) to full width of crankpin as contacted by bearing (parallel to crankshaft), avoiding oil hole.



- 4) Install rod bearing cap (1) to connecting rod.
When installing cap, be sure to point arrow mark (2) on cap to crankshaft pulley side (3), as shown in figure. After applying engine oil to rod bolts, tighten cap nuts (4) to specified torque. DO NOT turn crankshaft with gaging plastic installed.

Tightening Torque

(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)

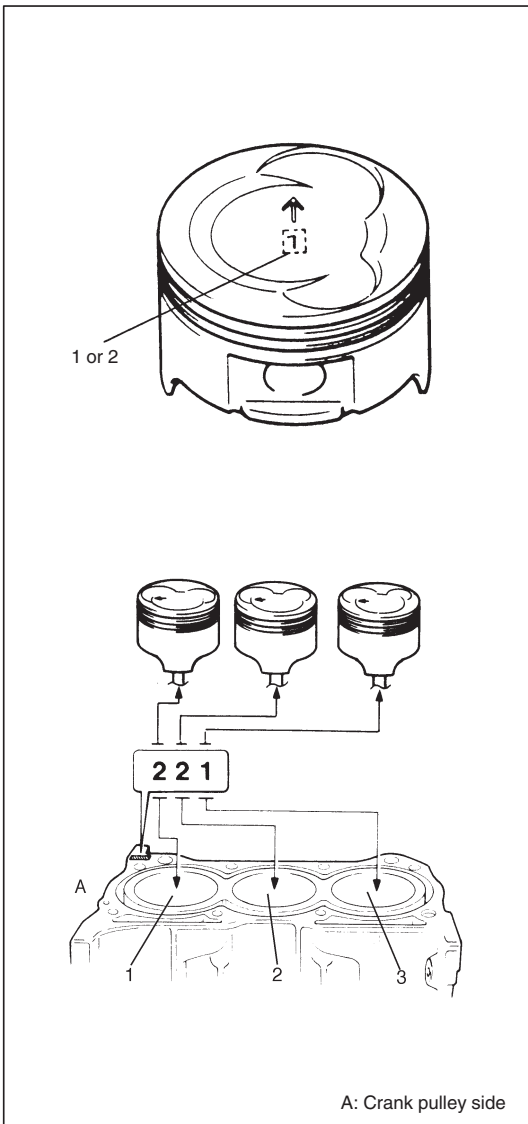


- 5) Remove cap and using a scale (2) on gaging plastic envelope, measure gaging plastic (1) width at the widest point (clearance).

If clearance exceeds its limit, use a new standard size bearing and remeasure clearance.

Item	Standard	Limit
Bearing clearance	0.020 – 0.050 mm (0.0008 – 0.0019 in.)	0.080 mm (0.0031 in.)

- 6) If clearance can not be brought to within its limit even by using a new standard size bearing, regrind crankpin to undersize and use 0.25 mm undersize bearing.



ASSEMBLY

NOTE:

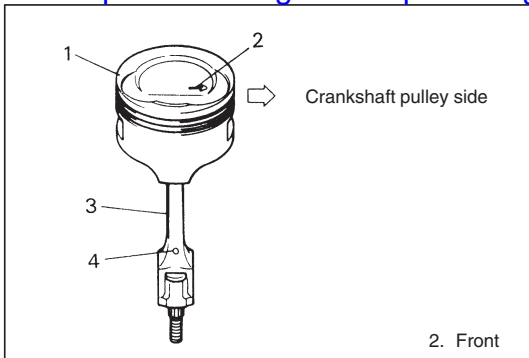
Two sizes of piston are available as standard size spare part so as to ensure proper piston-to-cylinder clearance. When installing a standard size piston, make sure to match piston with cylinder as follows.

- Each piston has stamped number 1 or 2 as shown. It represents outer diameter of piston.
- There are also stamped numbers of 1 and 2 on the cylinder block as shown. The first number represents inner diameter of No.1 cylinder (1), the second number of No.2 cylinder (2) and the third number of No.3 cylinder (3).
- Stamped number on piston and that on cylinder block should correspond. That is, install number 2 stamped piston to cylinder which is identified with number 2 and a number 1 piston to cylinder with number 1.

Unit: mm (in.)

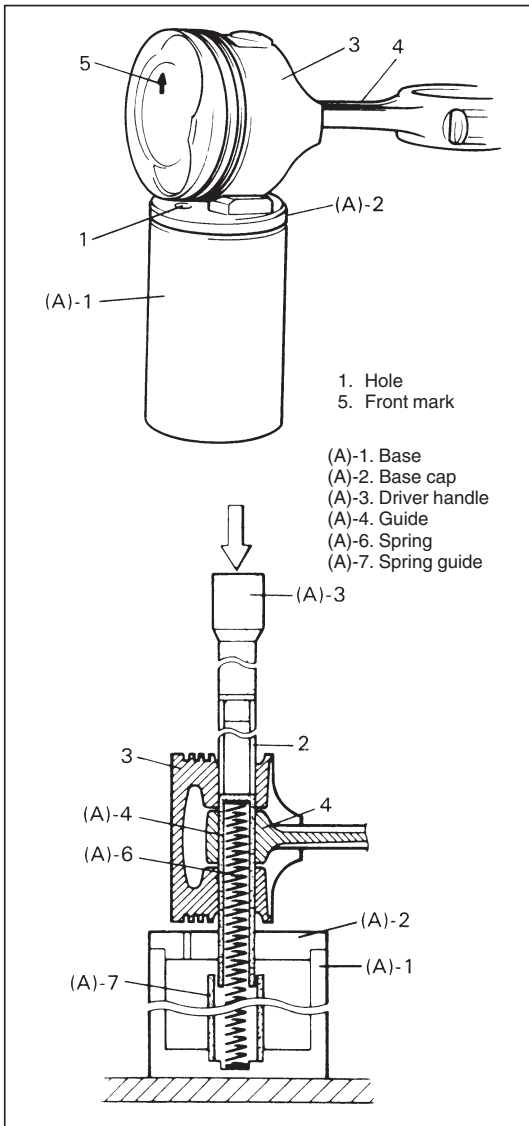
Number at the top (mark)	Piston	Cylinder		Piston-to-cylinder clearance
	Outer diameter	Number (mark)	Bore diameter	
1	73.98 – 73.99 (2.9126 – 2.9130)	1	74.01 – 74.02 (2.9138 – 2.9141)	0.02 – 0.04 (0.0008 – 0.0015)
2	73.97 – 73.98 (2.9122 – 2.9126)	2	74.00 – 74.01 (2.9134 – 2.9138)	

A: Crank pulley side



- 1) Set connecting rod (3) to piston (1).

After applying engine oil to piston pin holes in piston and connecting rod, fit connecting rod to piston as shown in figure. Oil hole (4) should be come on intake side.

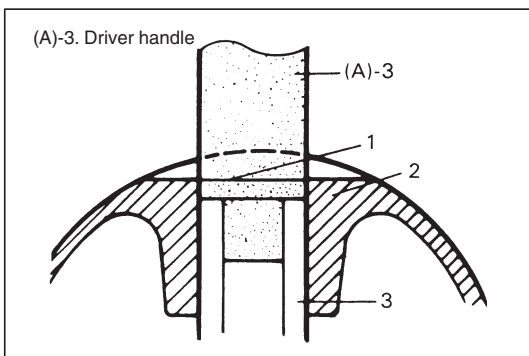


- 2) Fit piston pin (2) to piston (3) and connecting rod (4).

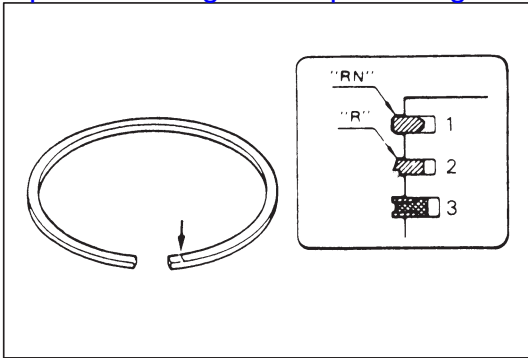
a) Place piston onto special tool (Piston in remover and installer) as shown in figure.

Special Tool

(A): 09910-38211

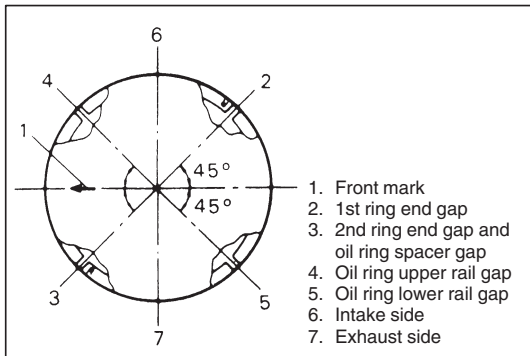


b) Press piston pin (3) into connecting rod until line (1) marked on driver handle is flush with flat surface of piston (2).



3) Install piston rings to piston:

- As indicated in figure, 1st (1) and 2nd rings (2) have “RN” or “R” mark respectively. When installing these piston rings to piston, direct marked side of each ring toward top of piston.
 - 1st ring differs from 2nd ring in thickness, shape and color of surface contacting cylinder wall.
- Distinguish 1st ring from 2nd ring by referring to figure.
- When installing oil ring (3), install spacer first and then two rails.



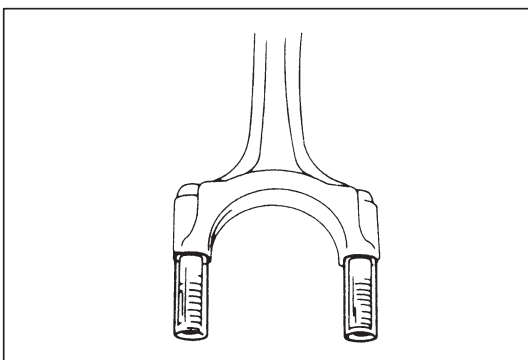
4) After installing three rings (1st, 2nd and oil rings), distribute their end gaps as shown in figure.

INSTALLATION OR CONNECTION

1) Apply engine oil to pistons, rings, cylinder walls, connecting rod bearings and crankpins.

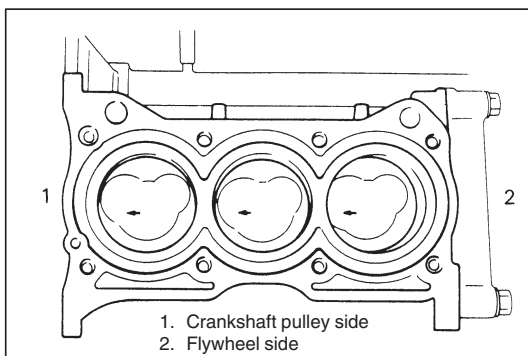
NOTE:

Do not apply oil between connecting rod and bearing or between bearing cap and bearing.

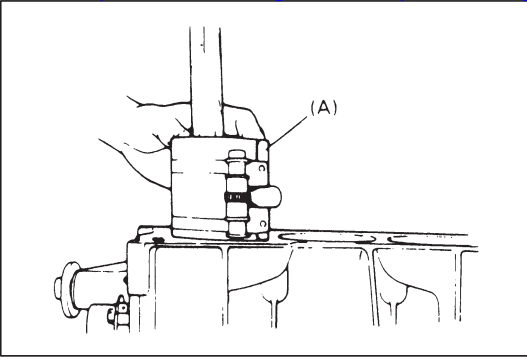


2) Install guide hoses over connecting rod bolts.

These guide hoses protect crank pin and threads of rod bolt from damage during installation of connecting rod and piston assembly.



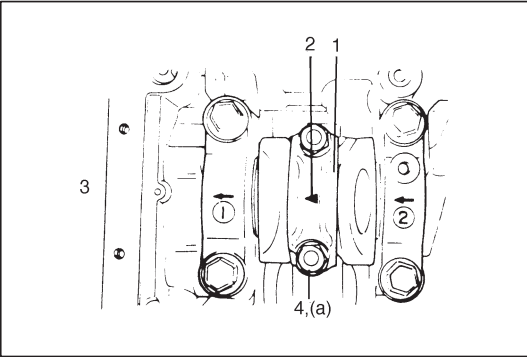
3) When installing piston and connecting rod assembly into cylinder bore, point front mark (punch mark or arrow mark) on piston head to crankshaft pulley side (1).



- 4) Install piston and connecting rod assembly into cylinder bore. Use special tool (Piston ring compressor) to compress rings. Guide connecting rod into place on crankshaft. Using a hammer handle, tap piston head to install piston into bore. Hold ring compressor firmly against cylinder block until all piston rings have entered cylinder bore.

Special Tool

(A): 09916-77310

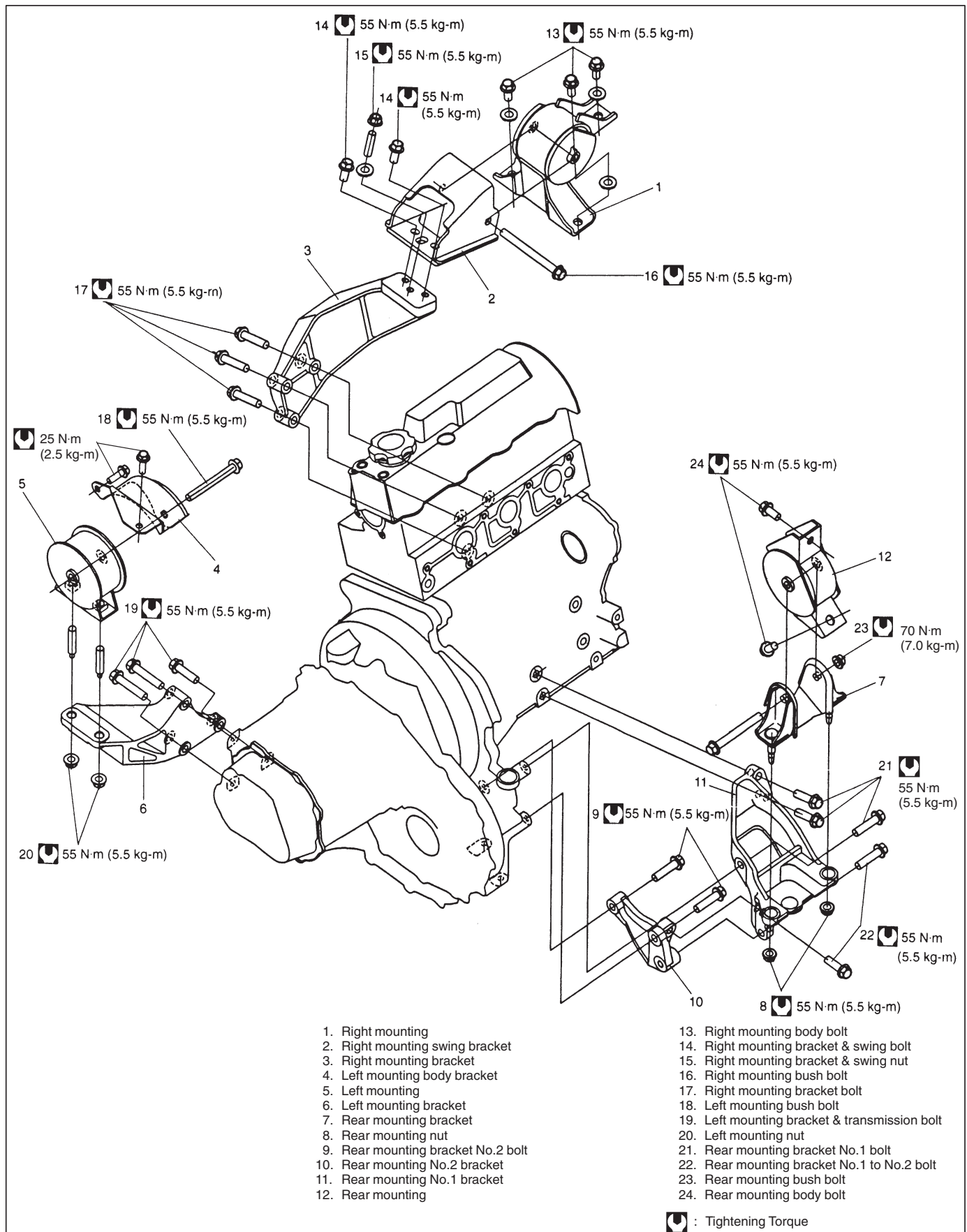


- 5) Install bearing cap (1):
Point arrow mark (2) on cap to crankshaft pulley side (3).
Tighten cap nuts (4) to specification.

Tightening Torque

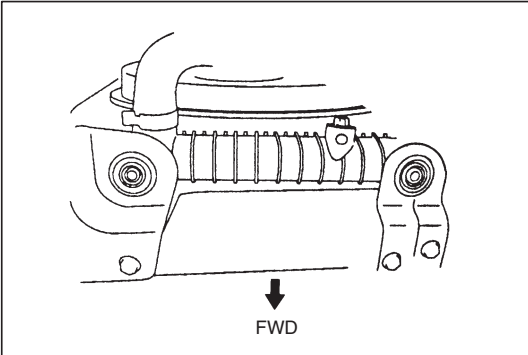
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)

- 6) Reverse removal procedure for installation, noting the following points.
- Adjust water pump drive belt tension, referring to "ENGINE COOLING" section.
 - Adjust A/C compressor belt tension, if equipped. Refer to Section 1B.
 - Adjust accelerator cable play. Refer to Section 6E1.
 - Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
 - Refill engine with engine oil, referring to item "ENGINE OIL CHANGE" in Section 0B.
 - Refill cooling system referring to Section 6B.
 - Connect negative cable at battery.
 - Verify that ignition timing is within specification referring to "IGNITION SYSTEM" section.
 - Verify that there is no fuel leakage, coolant leakage, oil leakage and exhaust gas leakage at each connection.

UNIT REPAIR OVERHAUL**ENGINE MOUNTING**

ENGINE ASSEMBLY**REMOVAL**

- 1) Release fuel pressure in fuel feed line by referring to Section 6-1.
- 2) Disconnect negative cable at battery.
- 3) Remove engine hood after disconnecting windshield washer hose.

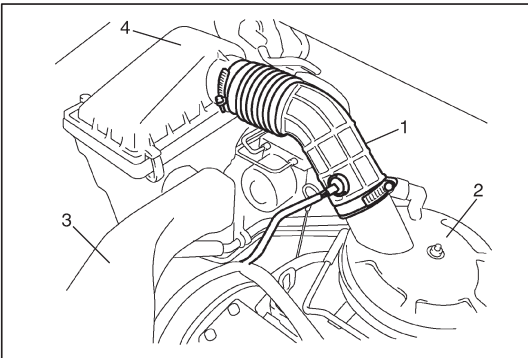


- 4) Drain cooling system.

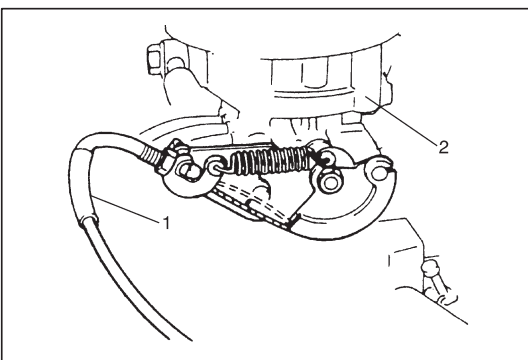
WARNING:

To help avoid danger of being burned, do not remove drain plug and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.

- 5) Disconnect radiator inlet hose from thermostat case and outlet hose from water inlet pipe.



- 6) Remove air cleaner outlet hose (1) and air chamber case (2) as previously outlined.
- 7) Remove suction pipe (3) and remove air cleaner assembly (4) by removing its fastening bolt.



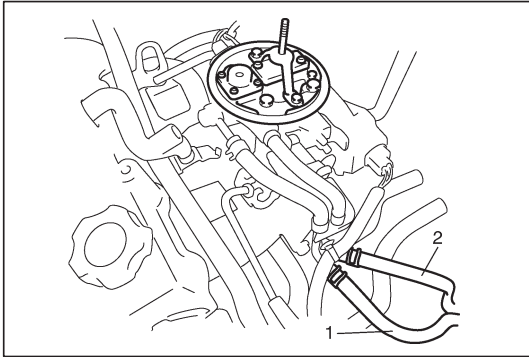
- 8) Disconnect following cables.
 - Accelerator cable (1) from throttle body (2).
 - Clutch cable from transmission.
 - Gear shift and select cable from transmission.

- 9) Disconnect brake booster hose from intake manifold.

10) Disconnect following electric wires:

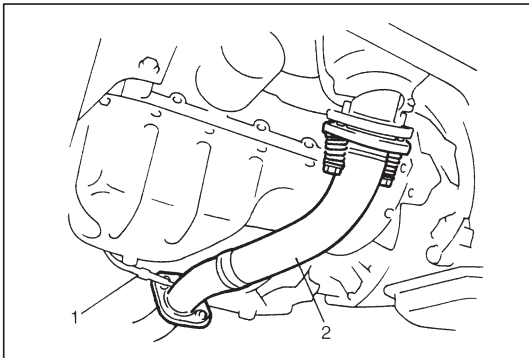
- Back-up light switch
- Generator
- Starting motor
- CKP sensor
- Battery negative cable from transmission
- Vehicle speed sensor
- e.t.c.

and release above wire harness from clamps.



11) Disconnect fuel feed hose (1) and fuel return hose (2) from fuel pipes.

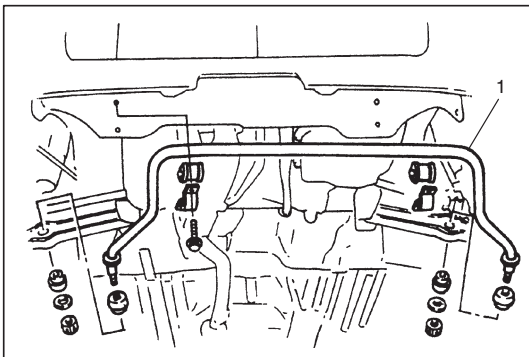
12) Disconnect heater inlet and outlet hoses.



13) Remove right and left engine under covers.

14) Disconnect oxygen sensor No.2 coupler (1) and remove exhaust No.1 pipe (2).

15) Drain engine and transmission oil.



16) Remove stabilizer bar (1) referring to Section 3D of the Service Manual mentioned in FOREWORD of this manual.

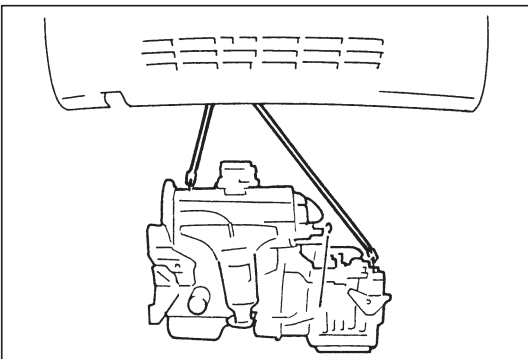
17) Remove drive shaft joints from differential gear of transmission.

Refer to Section 4 (DRIVE SHAFT) of the Service Manual mentioned in FOREWORD of this manual for procedure to disconnect drive shaft joint.

For engine and transmission removal, it is not necessary to remove drive shafts from steering knuckle.



- 18) Disconnect A/C suction and discharge hoses and then remove A/C compressor and its bracket (if equipped), refer to Section 1B.
- 19) Install support device.
- 20) Remove engine rear mounting nuts (1).
- 21) Remove engine left mounting nuts (2).
- 22) Remove engine right mounting bracket bolts (3) and nut (4).



- 23) Before removing engine with transmission from body, recheck to make sure all hoses, electric wires and cables are disconnected from engine and transmission.
- 24) Lower engine with transmission from body.

**INSTALLATION**

- 1) Lift engine with transmission into engine compartment, but do not remove support device.
- 2) Install engine right mounting bracket bolts and nut.
- 3) Install engine left mounting nuts.
- 4) Install engine rear mounting nuts.
- 5) Tighten bolts and nuts to specified torque.

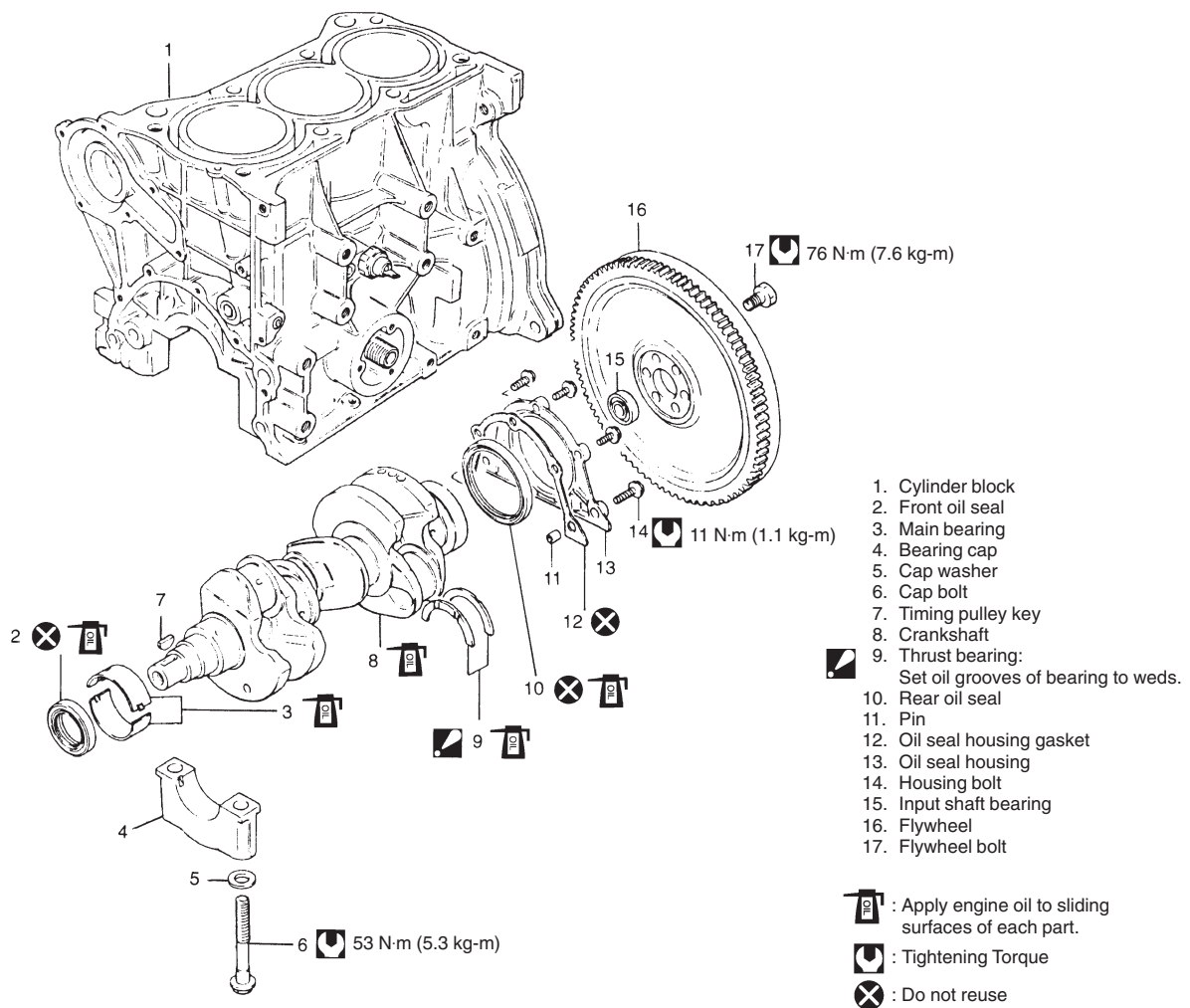
Tightening Torque

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

- 6) Remove support device.
- 7) Reverse removal procedures for installation of remainder.
 - Install A/C compressor bracket and A/C compressor and connect A/C suction and discharge hoses, refer to Section 1B.
 - Push in each drive shaft joint fully so that snap ring engages with differential gear.
Use care not to damage oil seal lip when inserting.
 - Install stabilizer bar, refer to Section 3D of the Service Manual mentioned in FOREWORD of this manual.
 - Install exhaust No.1 pipe.
 - Install right and left engine under covers.
 - Connect each hoses securely.
 - Clamp electric wire securely.

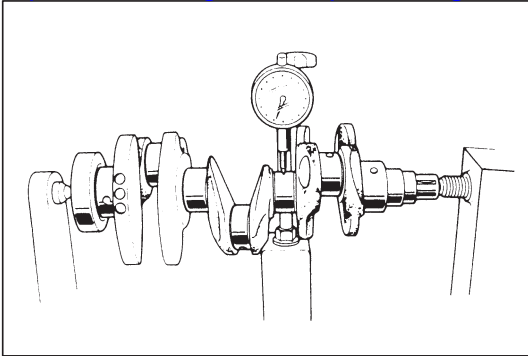
- 8) Adjust clutch pedal free travel, referring to Section 7C.
- 9) Refill transmission with gear oil, referring to Section 0B.
- 10) Refill engine with engine oil, referring to Section 0B.
- 11) Refill cooling system, referring to Section 6B.
- 12) Adjust A/C compressor belt, referring to Section 1B. (if equipped)
- 13) Upon completion of installation, verify that there is no fuel leakage, coolant leakage, transmission oil leakage or exhaust gas leakage at each connection.
- 14) Adjust accelerator cable play, referring to Section 6E1.

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MAIN BEARINGS, CRANKSHAFT AND CYLINDER BLOCK



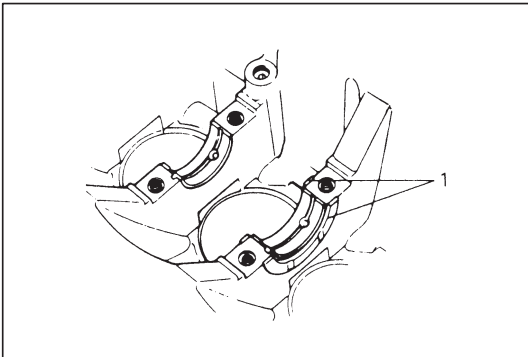
REMOVAL

- 1) Remove engine with transmission from body as previously outlined.
- 2) Remove transmission from engine, and then remove clutch and flywheel.
- 3) Remove water pump belt, generator bracket, crankshaft pulley, timing belt, and crankshaft timing belt pulley etc.
- 4) Remove cylinder head assembly.
- 5) Remove oil pan and oil pump strainer.
- 6) Remove pistons and connecting rods.
- 7) Remove oil pump and oil seal housing.
- 8) Remove main bearing caps and crankshaft.

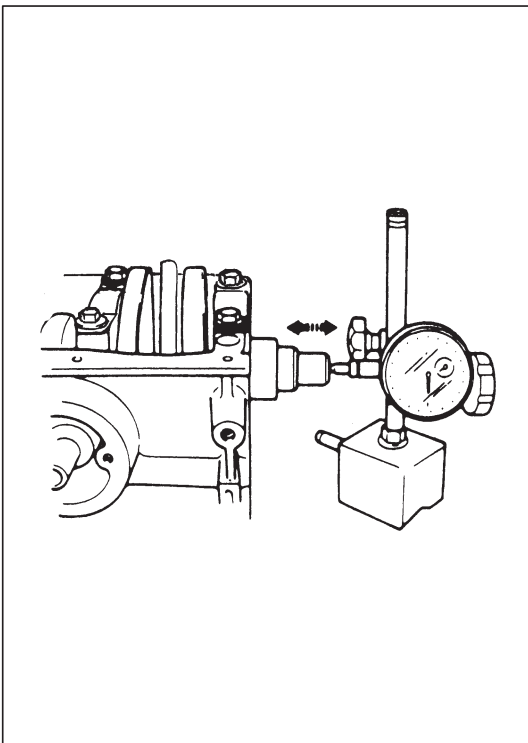
**INSPECTION****Crankshaft****Crankshaft runout**

Using a dial gauge, measure runout at center journal. Rotate crankshaft slowly. If runout exceeds its limit, replace crankshaft.

Limit on runout: 0.06 mm (0.0023 in.)

**Crankshaft thrust play**

Measure this play with crankshaft set in cylinder block in the normal manner, that is, with thrust bearing (1) and journal bearing caps installed.



Use a dial gauge to read displacement in axial (thrust) direction of crankshaft.

If its limit is exceeded, replace thrust bearing with new standard one or oversize one to obtain standard thrust play.

Crankshaft Thrust Play

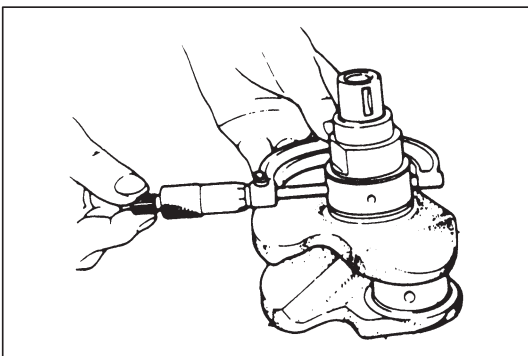
Standard: 0.11 – 0.31 mm (0.0044 – 0.0122 in.)

Limit : 0.38 mm (0.0149 in.)

Thickness of crankshaft thrust bearing

Standard: 2.500 mm (0.0984 in.)

Oversize 0.125 mm (0.0049 in.): 2.563 mm (0.1009 in.)

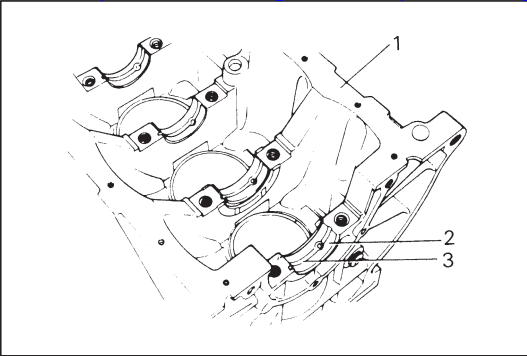
**Out-of-round and taper (uneven wear) of journals**

An unevenly worn crankshaft journal shows up as a difference in diameter at a cross section or along its length (or both).

This difference, if any, is determined by taking micrometer readings.

If any one of journals is badly damaged or if amount of uneven wear in the sense explained above exceeds its limit, regrind or replace crankshaft.

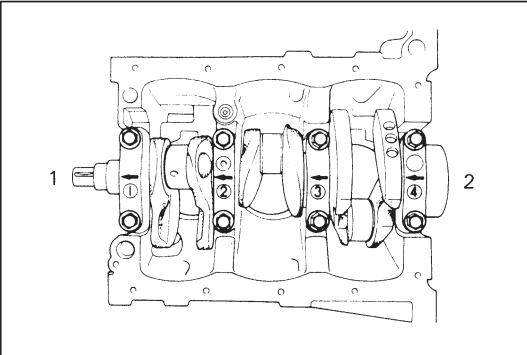
Limit on out-of-round and taper: 0.01 mm (0.0004 in.)



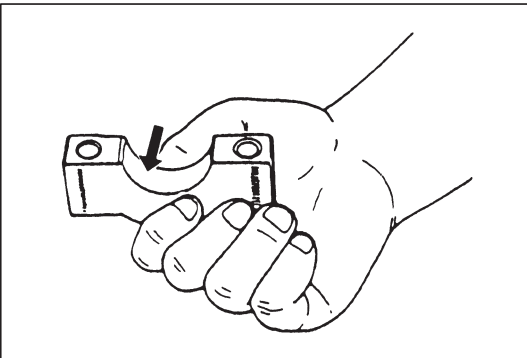
Main Bearings

General information

- Service main bearings are available in standard size and 0.25 mm (0.0098 in.) undersize, and each of them has 5 kinds of bearings differing in tolerance.
- Upper half of bearing (2) has oil groove (3) as shown in figure. Install this half with oil groove to cylinder block (1).

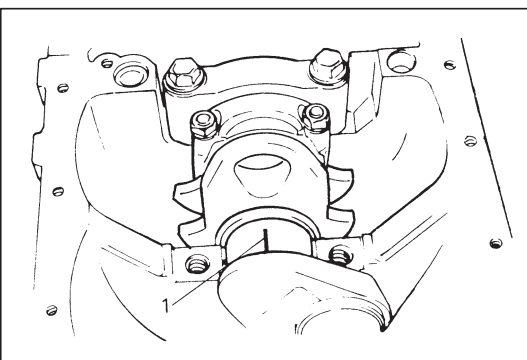


- On each main bearing cap, arrow mark and number are embossed as shown in figure. When installing each bearing cap to cylinder block, point arrow mark toward crankshaft pulley side (1) and install each cap from that side to flywheel side (2) in ascending order of numbers "1", "2", "3" and "4". Tighten cap bolts to specified torque.



Inspection

Check bearings for pitting, scratches, wear or damage. If any malfunction is found, replace both upper and lower halves. Never replace one half without replacing the other half.



Main bearing clearance

Check clearance by using gaging plastic (1) according to following procedure.

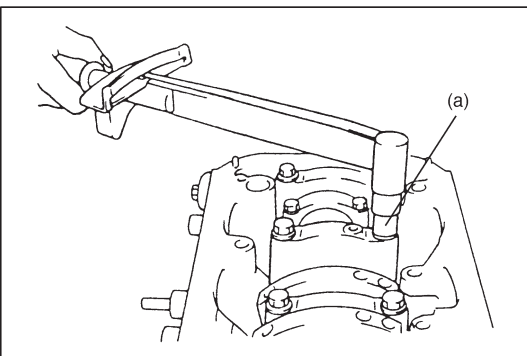
- 1) Remove bearing caps.
- 2) Clean bearings and main journals.
- 3) Place a piece of gaging plastic to full width of bearing (parallel to crankshaft) on journal, avoiding oil hole.
- 4) Install bearing cap as previously outlined and evenly torque cap bolts to specified torque. Bearing cap **MUST** be torqued to specification in order to assure proper reading of clearance.

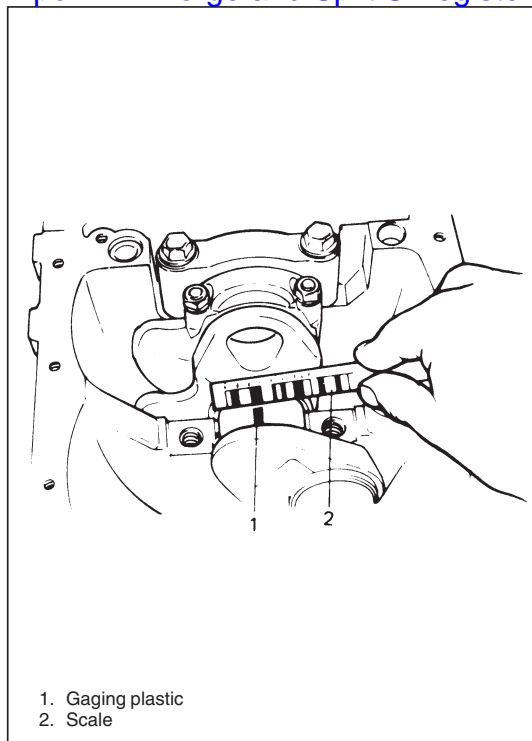
Tightening Torque

(a): 53 N·m (5.3 kg-m, 38.5 lb-ft)

NOTE:

Do not rotate crankshaft while gaging plastic is installed.





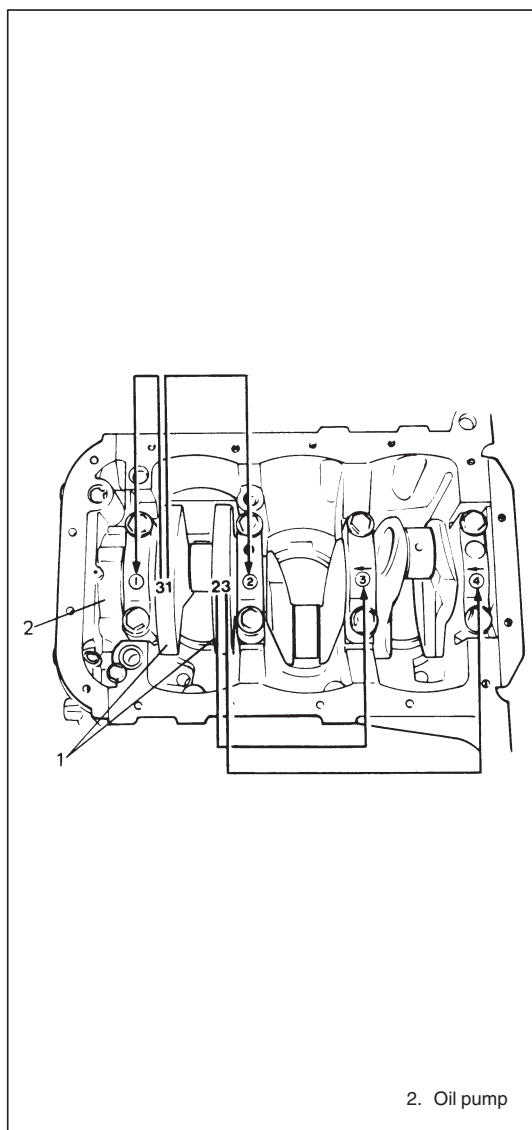
- 5) Remove cap and using scale (2) on gaging plastic (1) envelope, measure gaging plastic width at its widest point. If clearance exceeds its limit, replace bearing. Always replace both upper and lower inserts as a unit.

A new standard bearing may produce proper clearance.

If not, it will be necessary to regrind crankshaft journal for use of 0.25 mm undersize bearing.

After selecting new bearing, recheck clearance.

	Standard	Limit
Bearing clearance	0.020 – 0.040 mm (0.0008 – 0.0016 in.)	0.060 mm (0.0023 in.)



Selection of main bearings

STANDARD BEARING:

If bearing is in malcondition, or bearing clearance is out of specification, select a new standard bearing according to following procedure and install it.

- 1) First check journal diameter by using following procedure.

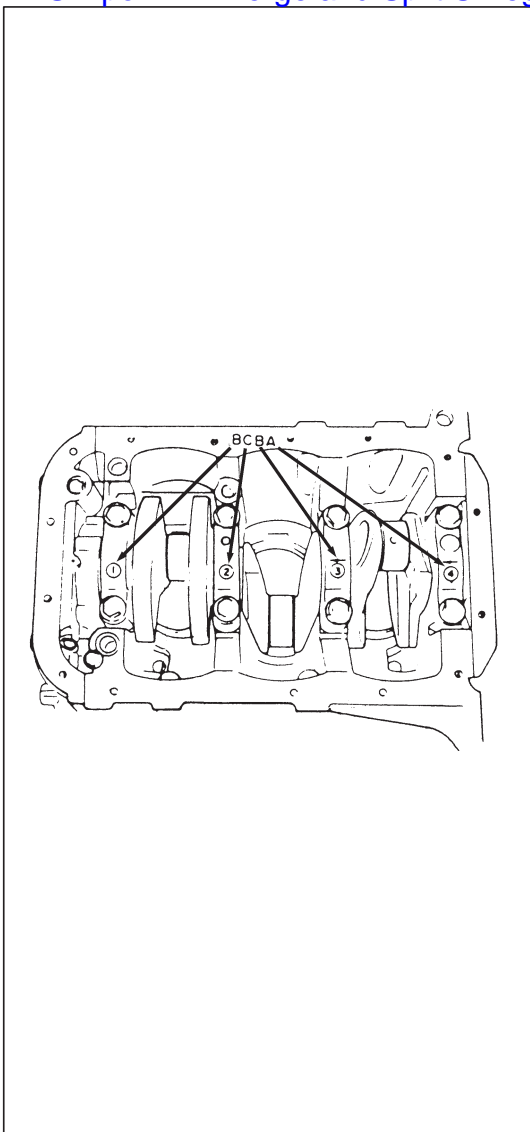
As shown in figure, crank webs of No.1 cylinder (1) has five stamped numerals.

Three kinds of numerals ("1", "2" and "3") represent following journal diameters.

Numeral stamped	Journal diameter
1	44.994 – 45.000 mm (1.7714 – 1.7716 in.)
2	44.988 – 44.994 mm (1.7712 – 1.7714 in.)
3	44.982 – 44.988 mm (1.7709 – 1.7712 in.)

The first, second, third and fourth (left to right) stamped numerals represent journal diameters at bearing caps "1", "2", "3" and "4" respectively.

For example, in figure, the first (leftmost) numeral "3" indicates that journal dia. at bearing cap "1" is within 44.982 – 44.988 mm (1.7709 – 1.7712 in.), and second one "1" indicates that journal dia. at cap "2" is within 44.994 – 45.000 mm (1.7714 – 1.7716 in.).



2) Next, check bearing cap bore diameter without bearing.

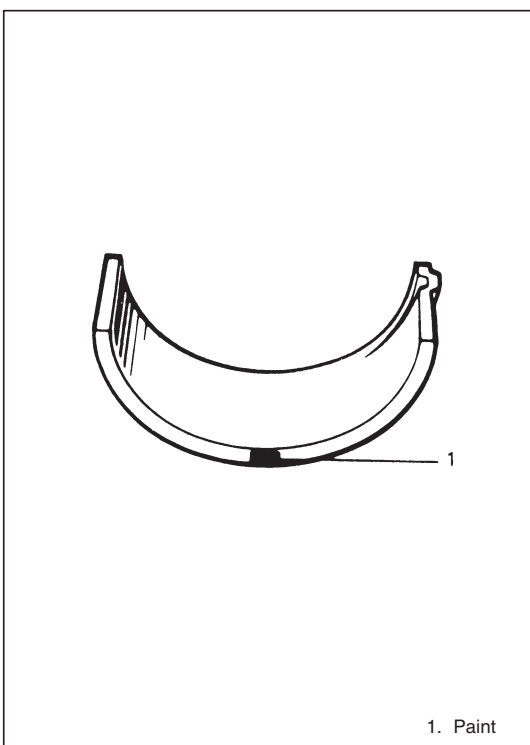
On mating surface of cylinder block, four alphabets are stamped as shown in figure.

Three kinds of alphabets ("A", "B" and "C") represent following cap bore diameters.

Alphabet stamped	Bearing cap bore diameter (without bearing)
A	49.000 – 49.006 mm (1.9291 – 1.9294 in.)
B	49.006 – 49.012 mm (1.9294 – 1.9296 in.)
C	49.012 – 49.018 mm (1.9296 – 1.9298 in.)

The first, second, third and fourth (left to right) stamped alphabets represent cap bore diameters of bearing caps "1", "2", "3" and "4", respectively.

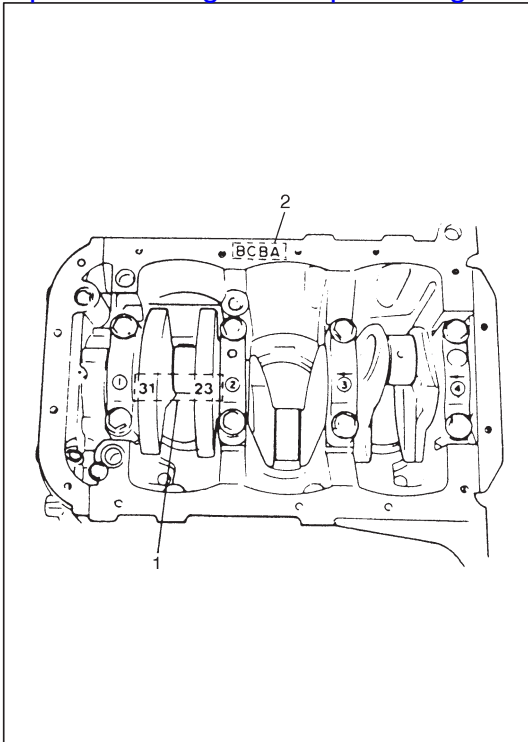
For example, in figure, the first (leftmost) alphabet "B" indicates that cap bore dia. of bearing cap "1" is within 49.006 – 49.012 mm, and the fifth (rightmost) alphabet "A" indicates that cap bore dia. of cap "4" is within 49.000 – 49.006 mm.



3) There are five kinds of standard bearings differing in thickness. To distinguish them, they are painted in following colors at the position as indicated in figure.

Each color indicates following thickness at the center of bearing.

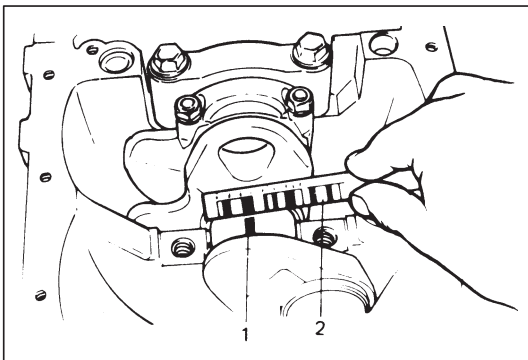
Color painted	Bearing thickness
Green	1.996 – 2.000 mm (0.0786 – 0.0787 in.)
Black	1.999 – 2.003 mm (0.0787 – 0.0788 in.)
Colorless (no paint)	2.002 – 2.006 mm (0.0788 – 0.0789 in.)
Yellow	2.005 – 2.009 mm (0.0789 – 0.0790 in.)
Blue	2.008 – 2.012 mm (0.0790 – 0.0791 in.)



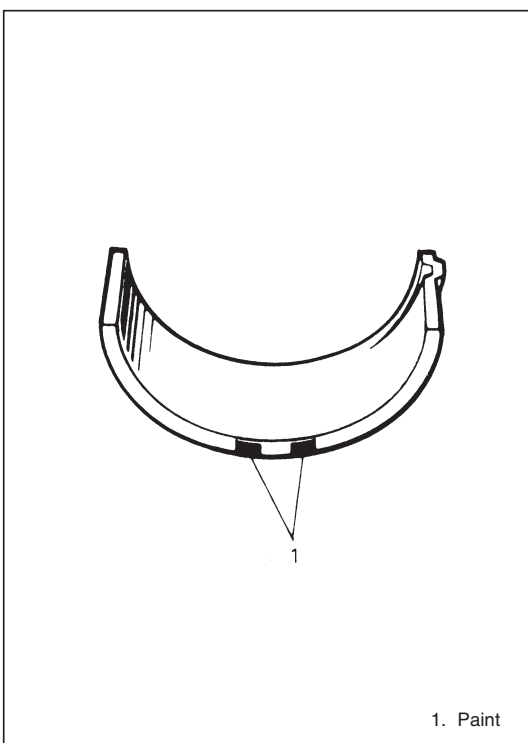
- 4) From numerals stamped on crank webs of No.1 cylinder (1) and the alphabets stamped on mating surface of cylinder block, determine new standard bearing to be installed to journal, by referring to table given below.

For example, if numeral stamped on crank web is "1" and alphabet stamped on mating surface is "B", install a new standard bearing painted in "Black" to its journal.

		Numeral stamped on crank web (Journal diameter)		
		1	2	3
Alphabet stamped on mating surface (Bearing cap bore dia.)	A	Green	Black	Colorless
	B	Black	Colorless	Yellow
	C	Colorless	Yellow	Blue
		New standard bearing to be installed.		



- 5) Using scale (2) on gaging plastic (1), check bearing clearance with newly selected standard bearing.
If clearance still exceeds its limit, use next thicker bearing and recheck clearance.
- 6) When replacing crankshaft or cylinder block due to any reason, select new standard bearings to be installed by referring to numerals stamped on new crankshaft or alphabets stamped on mating surface of new cylinder block.



UNDERSIZE BEARING (0.25 mm):

- 0.25 mm undersize bearing is available, in five kinds varying in thickness.

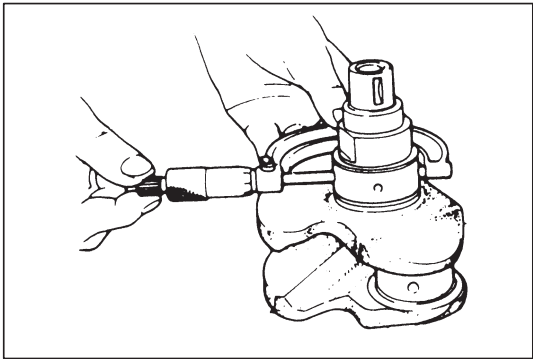
To distinguish them, each bearing is painted in following colors at such position as indicated in figure.

Each color represents following thicknesses at the center of bearing.

Color painted	Bearing thickness
Green & Red	2.121 – 2.125 mm (0.0835 – 0.0836 in.)
Black & Red	2.124 – 2.128 mm (0.0836 – 0.0837 in.)
Red only	2.127 – 2.131 mm (0.0837 – 0.0838 in.)
Yellow & Red	2.130 – 2.134 mm (0.0838 – 0.0839 in.)
Blue & Red	2.133 – 2.137 mm (0.0839 – 0.0840 in.)

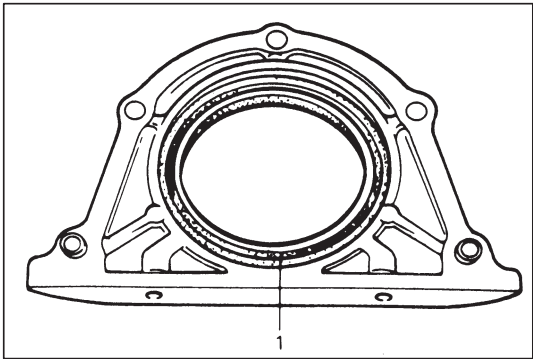
- If necessary, regrind crankshaft journal and select undersize bearing to use with it as follows.
- 1) Regrind journal to following finished diameter.

**Finished diameter: 44.732 – 44.750 mm
(1.7611 – 1.7618 in.)**



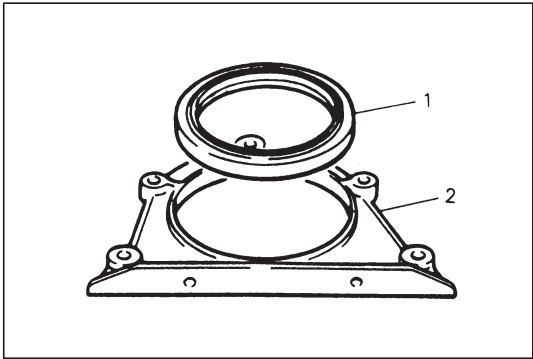
- 2) Using micrometer, measure reground journal diameter.
Measurement should be taken in two directions perpendicular to each other in order to check for out-of-round.
- 3) Using journal diameter measured above and alphabets stamped on mating surface of cylinder block, select an undersize bearing by referring to table given below.
Check bearing clearance with newly selected undersize bearing.

		Measured journal diameter		
		44.744 – 44.750 mm (1.7616 – 1.7618 in.)	44.738 – 44.744 mm (1.7613 – 1.7616 in.)	44.732 – 44.738 mm (1.7611 – 1.7613 in.)
Alphabets stamped on mating surface of cylinder block	A	Green & Red	Black & Red	Red only
	B	Black & Red	Red only	Yellow & Red
	C	Red only	Yellow & Red	Blue & Red
		Undersize bearing to be installed		

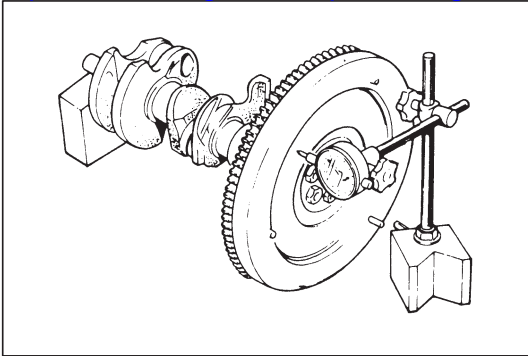


Rear Oil Seal

Carefully inspect rear oil seal (1) for wear or damage. If its lip is worn or damaged, replace it.



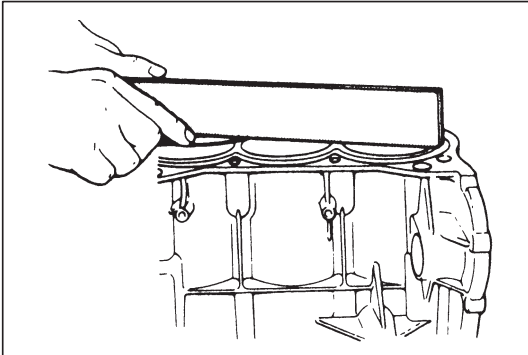
For oil seal (1) installation, press-fit rear oil seal so that oil seal housing (2) end face is flush with oil seal end face.



Flywheel

- If ring gear is damaged, cracked or worn, replace flywheel.
- If the surface contacting clutch disc is damaged, or excessively worn, replace flywheel.
- Check flywheel for face runout with dial gauge.
If runout exceeds its limit, replace flywheel.

Limit on runout: 0.2 mm (0.0078 in.)



Cylinder Block

Distortion of gasketed surface

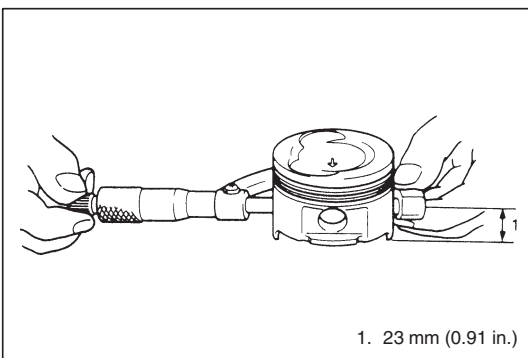
Using straightedge and thickness gauge, check gasketed surface for distortion and, if flatness exceeds its limit, correct it.

Item	Standard	Limit
Flatness	0.03 mm (0.0012 in.)	0.06 mm (0.0024 in.)

Honing or reboring cylinders

- 1) When any cylinder needs reboring, all other cylinders must also be rebored at the same time.
- 2) Select oversized piston according to amount of cylinder wear.

Size	Piston diameter
O/S 0.25	74.220 – 74.230 mm (2.9220 – 2.9224 in.)
O/S 0.50	74.470 – 74.480 mm (2.9319 – 2.9323 in.)



- 3) Using micrometer, measure piston diameter.

- 4) Calculate cylinder bore diameter to be rebored.

$$D = A + B - C$$

D: Cylinder bore diameter to be rebored.
 A: Piston diameter as measured.
 B: Piston clearance = 0.02 – 0.04 mm
 (0.0008 – 0.0015 in.)
 C: Allowance for honing = 0.02 mm (0.0008 in.)
- 5) Rebore and hone cylinder to calculated dimension.

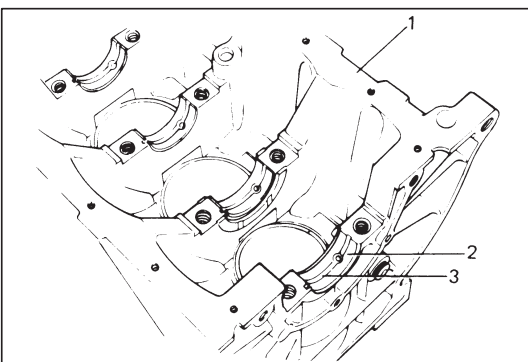
NOTE:

Before reboring, install all main bearing caps in place and tighten to specification to avoid distortion of bearing bores.

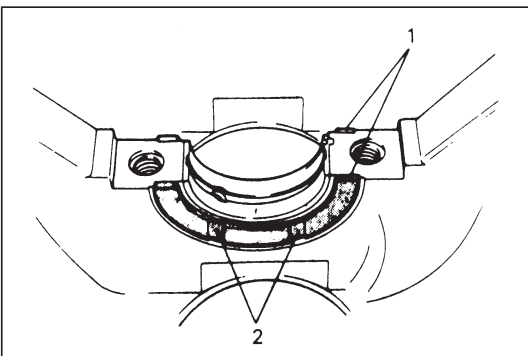
- 6) Measure piston clearance after honing.

INSTALLATION**NOTE:**

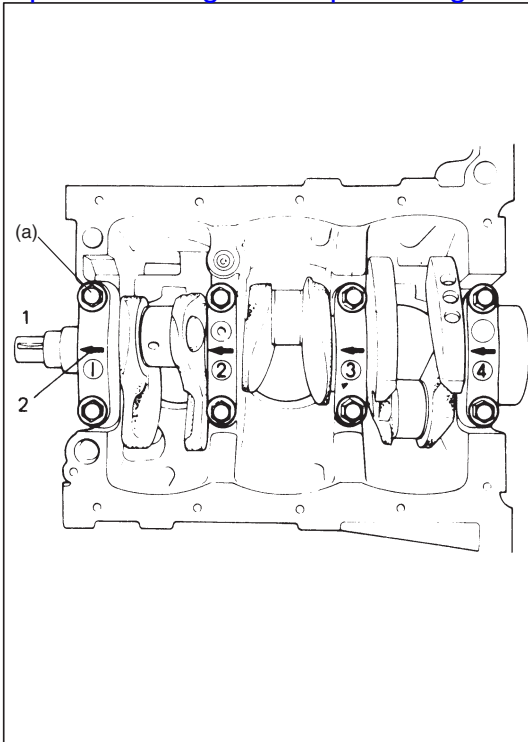
- All parts to be installed must be perfectly clean.
- Be sure to oil crankshaft journals, journal bearings, thrust bearings, crankpins, connecting rod bearings, pistons, piston rings and cylinder bores.
- Journal bearings, bearing caps, connecting rods, rod bearings, rod bearing caps, pistons and piston rings are in combination sets. Do not disturb such combination and make sure that each part goes back to where it came from, when installing.



- 1) Install main bearings to cylinder block (1).
 Upper half of bearing (2) has an oil groove (3). Install it to cylinder block, and the other half without oil groove to bearing cap.
 Make sure that two halves are painted in the same color.



- 2) Install thrust bearings (1) to cylinder block between No.2 and No.3 cylinders. Face oil groove (2) sides to crank webs.



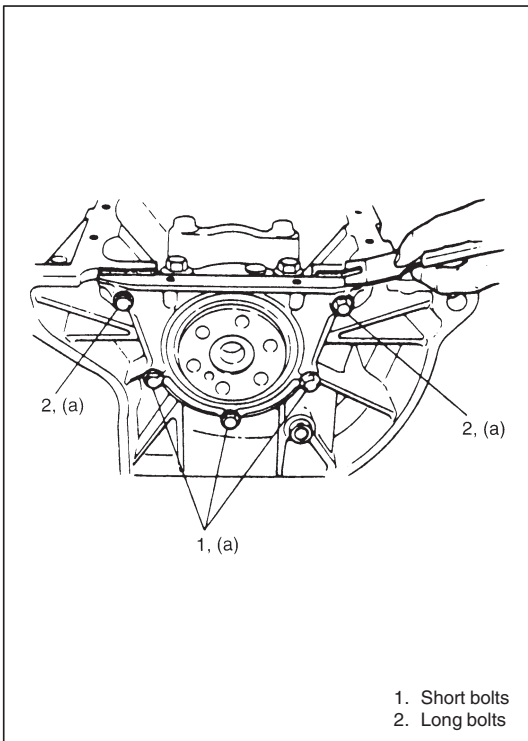
- 3) Install crankshaft to cylinder block.
- 4) Install bearing cap to cylinder block, making sure to point arrow mark (on each cap) to crankshaft pulley side. Fit them sequentially in ascending order, 1, 2, 3 and 4, starting from pulley side. Gradual and uniform tightening is important for bearing cap bolts. Make sure that four caps become tight equally and progressively till specified torque is attained.

Tightening Torque

(a): 53 N·m (5.3 kg-m, 38.5 lb-ft)

NOTE:

After tightening cap bolts, check to be sure that crankshaft rotates smoothly when turning it by 7.0 N·m (0.7 kg, 5.1 lb-ft) torque or below.



- 5) Install new gasket and oil seal housing.

Do not reuse gasket removed in disassembly. Apply engine oil to oil seal lip before installation. Tighten housing bolts to specification.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

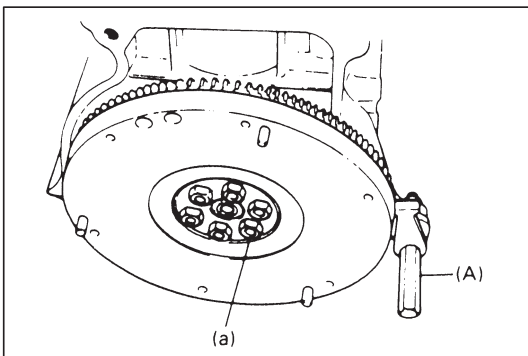
NOTE:

As there are 2 types of housing bolts, refer to figure for their correct use.

After installing oil seal housing, gasket edges might bulge out; if so, cut them off to make them flush with cylinder block and oil seal housing.

- 6) Install oil pump.

Refer to INSTALLATION of OIL PUMP in this section.



- 7) Install flywheel.

Using special tool, lock flywheel or drive plate, and torque its bolts to specification.

Special Tool

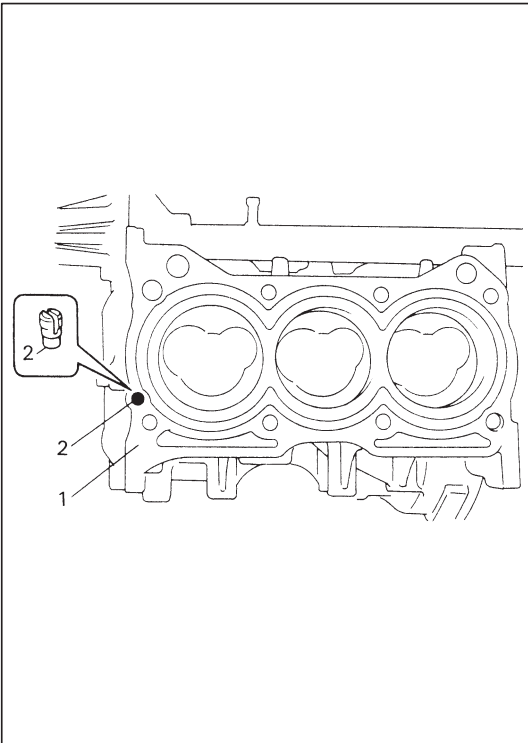
(A): 09924-17810

Tightening Torque

(a): 76 N·m (7.6 kg-m, 55.0 lb-ft)

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- 8) Install pistons and connecting rods as previously outlined.
- 9) Install oil pump strainer and oil pan as previously outlined.



- 10) Install cylinder head assembly to cylinder block (1).
Before installing cylinder head assembly to cylinder block, install check valve (2) into oil gallery in cylinder block, directing slit of valve toward top of cylinder block.

NOTE:

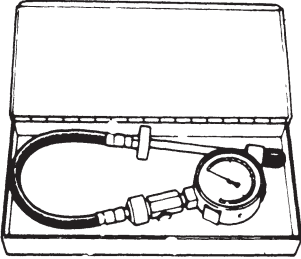
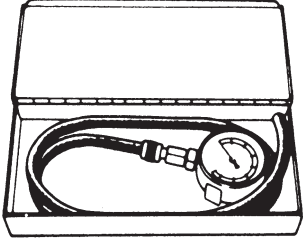
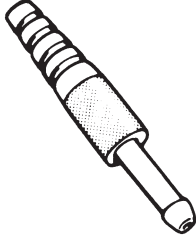
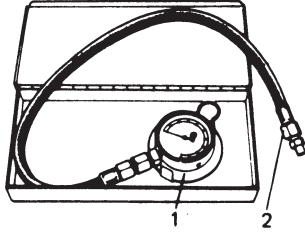
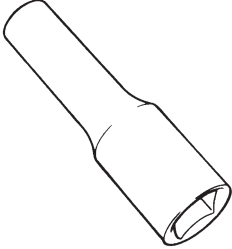
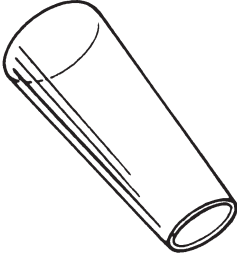
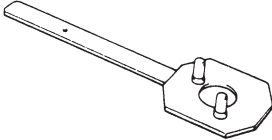
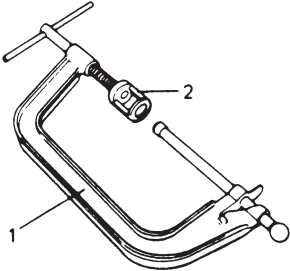
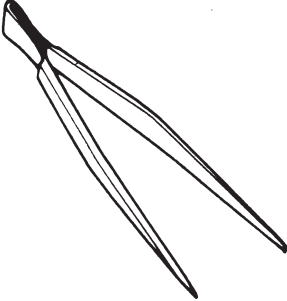
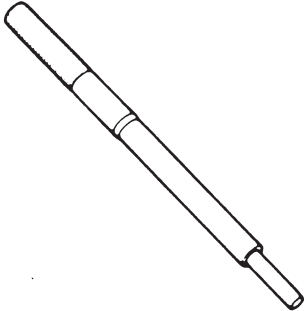
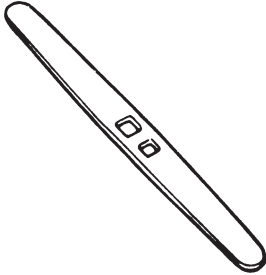
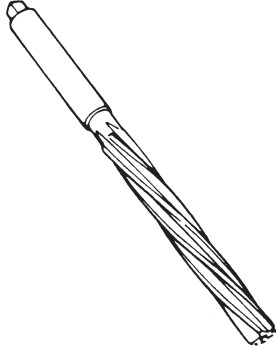
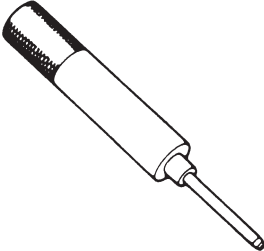

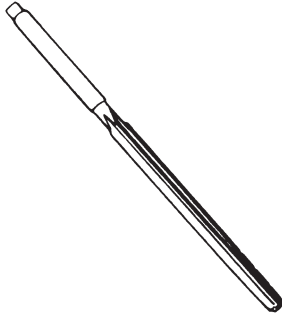

Tighten cylinder head bolts to specified torque as previously outlined.

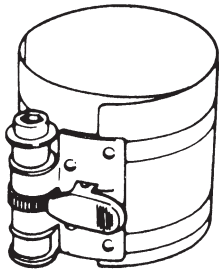
Whenever installing cylinder head to new cylinder block, use following procedure to tighten cylinder head bolts.

- **Tighten cylinder head bolts to specified torque as previously outlined and loosen them once till tightening torque becomes “zero”. And then torque them to specification again.**

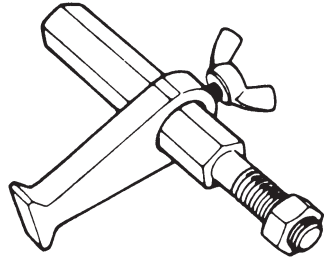
- 11) Install crankshaft timing belt pulley, timing belt, crankshaft pulley, water pump pulley, etc., as previously outlined.
- 12) Install clutch to flywheel.
For clutch installation, refer to Section 7C.
- 13) Install engine with transmission to body as previously outlined.

SPECIAL TOOLS

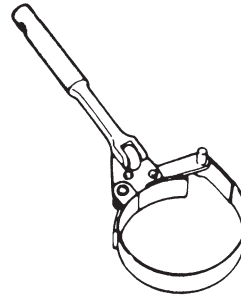
 <p>09915-64512 Compression gauge</p>	 <p>09915-67310 Vacuum gauge</p>	 <p>09918-08210 Vacuum gauge hose joint</p>	 <p>1. 09915-77310 Oil pressure gauge 2. 09915-78211 Oil pressure gauge attachment</p>
 <p>09919-16010 Deep socket</p>	 <p>09926-18210 Oil seal guide (Vinyl resin)</p>	 <p>09917-68220 Camshaft pulley holder</p>	 <p>1. 09916-14510 Valve lifter 2. 09916-14910 Valve lifter attachment</p>
 <p>09916-84511 Forceps</p>	 <p>09916-44910 Valve guide remover</p>	 <p>09916-34541 Reamer handle</p>	 <p>09916-38210 Reamer (11 mm)</p>
 <p>09916-58210 Valve guide installer handle</p>	 <p>09916-56011 Valve guide installer attachment</p>	 <p>09916-34550 Reamer (5.5 mm)</p>	 <p>09917-98221 Valve stem seal installer</p>



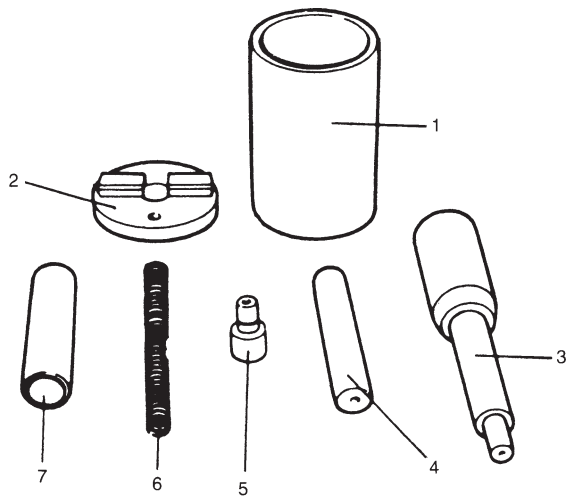
09916-77310
Piston ring compressor



09924-17810
Flywheel holder



09915-47310
Oil filter wrench



09910-38211
Piston pin remover and installer

1. Base
2. Base cap
3. Driver handle
4. Piston pin guide for installation
5. Piston pin guide for removal
6. Spring
7. Spring guide

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Sealant	SUZUKI BOND NO.1207C (99000-31150)	● Mating surfaces of cylinder block and oil pan.
Sealant	SUZUKI BOND NO.1215 (99000-31110)	● Mating surfaces of camshaft housing (No.1 and No.3).

SECTION 6B**ENGINE COOLING****6B****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

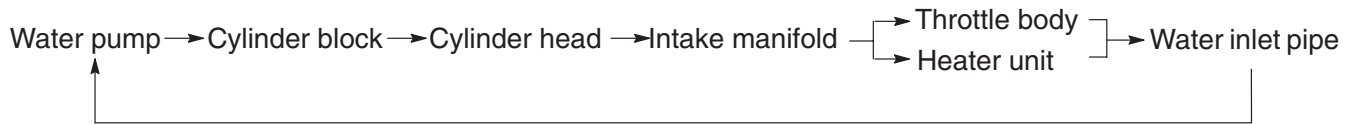
GENERAL DESCRIPTION	6B- 2
Cooling System Circulation	6B- 2
Coolant	6B- 3
Coolant (Water) Temp. Gauge	6B- 3
DIAGNOSIS	6B- 4
MAINTENANCE	6B- 4
Water Pump Belt Tension	6B- 4
ON-VEHICLE SERVICE	6B- 5
Thermostat	6B- 5
Water Pump	6B- 6
REQUIRED SERVICE MATERIAL	6B- 6

GENERAL DESCRIPTION

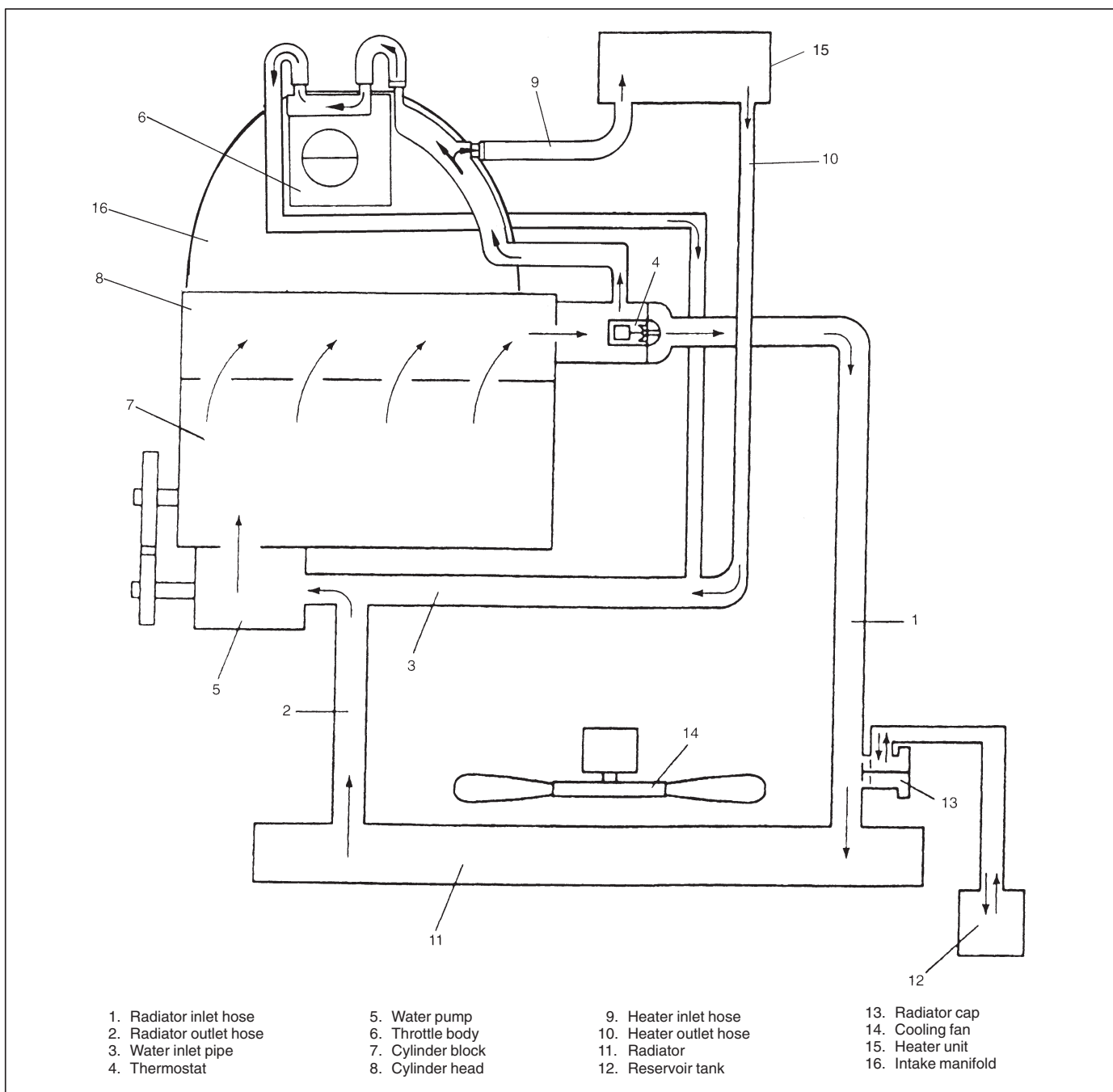
The cooling system consists of the radiator cap, radiator, coolant reservoir, hoses, water pump, cooling fan and thermostat. The radiator is of tube-and-fin type.

COOLING SYSTEM CIRCULATION

1) While the engine is warmed up (thermostat closed), coolant circulates as follows.



2) When coolant is warmed up to normal temperature and the thermostat opens, coolant passes through the radiator core to be cooled as well as the above flow circuit.



COOLANT

The coolant recovery system is standard. The coolant in the radiator expands with heat, and the overflow is collected in the reservoir.

When the system cools down, the coolant is drawn back into the radiator.

The cooling system has been filled at the factory with a quality coolant that is a 50/50 mixture of water and ethylene glycol antifreeze (70/30; in a market where no freezing temperature is anticipated).

This 50/50 mixture coolant solution provides freezing protection to -36°C (-33°F).

- Maintain cooling system freeze protection at -36°C (-33°F) to ensure protection against corrosion and loss of coolant from boiling. This should be done even if freezing temperatures are not expected.

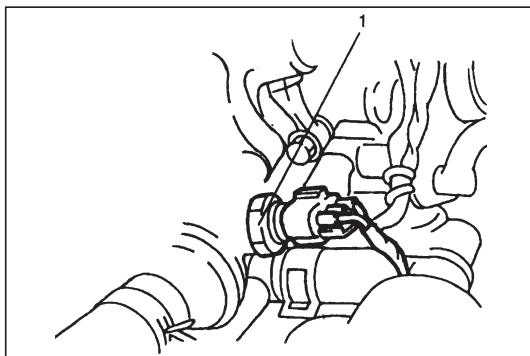
- Add ethylene glycol base coolant when coolant has to be added because of coolant loss or to provide added protection against freezing at temperature lower than -36°C (-33°F).

NOTE:

- **Alcohol or methanol base coolant or plain water alone should not be used in cooling system at any time as damage to cooling system could occur.**
- **Even in a market where no freezing temperature is anticipated, mixture of 70% water and 30% ethylene glycol antifreeze (Antifreeze/Anti-corrosion coolant) should be used for the purpose of corrosion protection and lubrication.**

ANTI-FREEZE PROPORTIONING CHART

ANTI-FREEZE PROPORTIONING CHART	Freezing temperature	$^{\circ}\text{C}$	-16	-36
		$^{\circ}\text{F}$	3	-33
	Anti-freeze/Anti-corrosion coolant concentration	%	30	50
	Ratio of compound to cooling water	ltr.	1.17/2.73	1.95/1.95
		US pt.	2.47/5.77	4.12/4.12
		Imp. pt.	2.06/4.80	3.43/3.43
COOLANT CAPACITY	Engine radiator and heater		3.3 liters (7.0/5.8 US/Imp. pt.)	
	Reservoir		0.6 liters (1.3/1.1 US/Imp. pt.)	
	Total		3.9 liters (8.2/6.9 US/Imp. pt.)	



COOLANT (WATER) TEMP. GAUGE

The coolant temp. gauge is included in engine coolant temp. (ECT) sensor (1). This gauge activates a temp. meter in the instrument cluster.

DIAGNOSIS

Condition	Possible Cause	Correction
Engine overheats	<ul style="list-style-type: none"> ● Loose or broken water pump belt ● Not enough coolant ● Faulty thermostat ● Faulty water pump ● Dirty or bent radiator fins ● Coolant leakage on cooling system ● Defective cooling fan motor ● Faulty fan motor control circuit ● Plugged radiator ● Faulty radiator cap ● Dragging brakes ● Slipping clutch ● Maladjusted ignition timing 	Adjust or replace. Check coolant level and add as necessary. Replace. Replace. Clean or remedy. Repair. Check and replace as necessary. Check control circuit. Check and replace radiator as necessary. Replace. Adjust brake. Adjust or replace. Adjust

MAINTENANCE**WATER PUMP BELT TENSION****WARNING:**

Disconnect negative cable at battery before checking and adjusting belt tension.

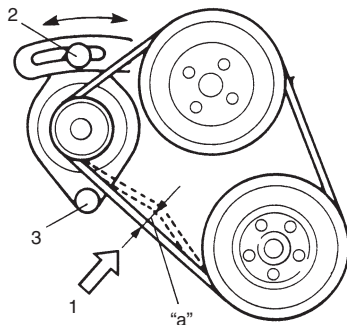
- 1) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If it is necessary to replace belt, refer to "WATER PUMP BELT" in Section 6B of the Service Manual mentioned in FOREWORD of this manual.
- 2) Check belt for tension. Belt is in proper tension when it deflects 8 to 10 mm (0.32 – 0.39 in.) under thumb pressure (about 10 kg or 22 lbs (1)).

Belt tension "a": 8 – 10 mm (0.32 – 0.39 in.) as deflection

NOTE:

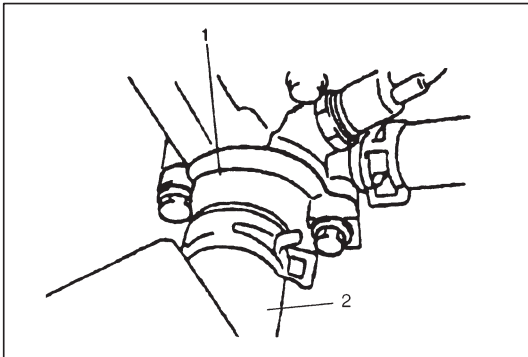
When replacing belt with a new one, adjust belt tension to 6 – 7 mm (0.24 – 0.27 in.).

- 3) If belt is too tight or too loose, adjust it to proper tension by displacing generator position.
- 4) Tighten belt adjusting bolt (2) and generator pivot bolt (3).
- 5) Connect negative cable at battery terminal.

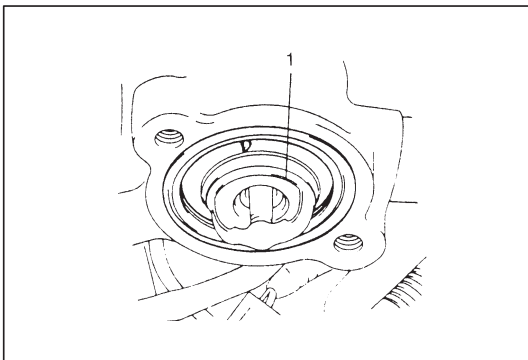


ON-VEHICLE SERVICE**WARNING:**

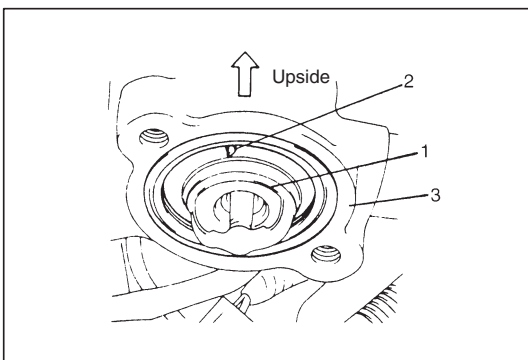
- Check to make sure that engine coolant temperature is cold before removing any part of cooling system.
- Also be sure to disconnect negative cord from battery terminal before removing any part.

**THERMOSTAT****REMOVAL**

- 1) Drain coolant and tighten drain plug.
- 2) Remove radiator inlet hose (2) at thermostat cap.
- 3) Remove water inlet pipe bolt.
- 4) Remove thermostat cap (1).



- 5) Remove thermostat (1).

**INSTALLATION**

- 1) When positioning thermostat (1) on thermostat case (3), be sure to position it so that air bleed valve (2) comes at position as shown in figure.

- 2) Install thermostat cap to thermostat case.
- 3) Install water inlet pipe bolt.
- 4) Connect cooling water hose.
- 5) Fill cooling system (refer to COOLING SYSTEM FLUSH AND REFILL in this section).
- 6) After installation, check each part for leakage.

WATER PUMP**REMOVAL, INSPECTION AND INSTALLATION**

For their procedures, refer to the same item of SECTION 6B in service manual mentioned in FOREWORD of this manual; only for REMOVAL and INSTALLATION of timing belt, belt tensioner and timing belt outside cover, refer to TIMING BELT AND TENSIONER of Section 6A in this manual.

REQUIRED SERVICE MATERIAL

MATERIAL	USE
Ethylene glycol base coolant (Anti-freeze/Anti-corrosion coolant)	Engine cooling system for improving cooling efficiency and for protection against rusting.

SECTION 6C**ENGINE FUEL****6C****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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GENERAL DESCRIPTION	6C-2
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Fuel Tank	6C-7
SPECIAL TOOL	6C-9

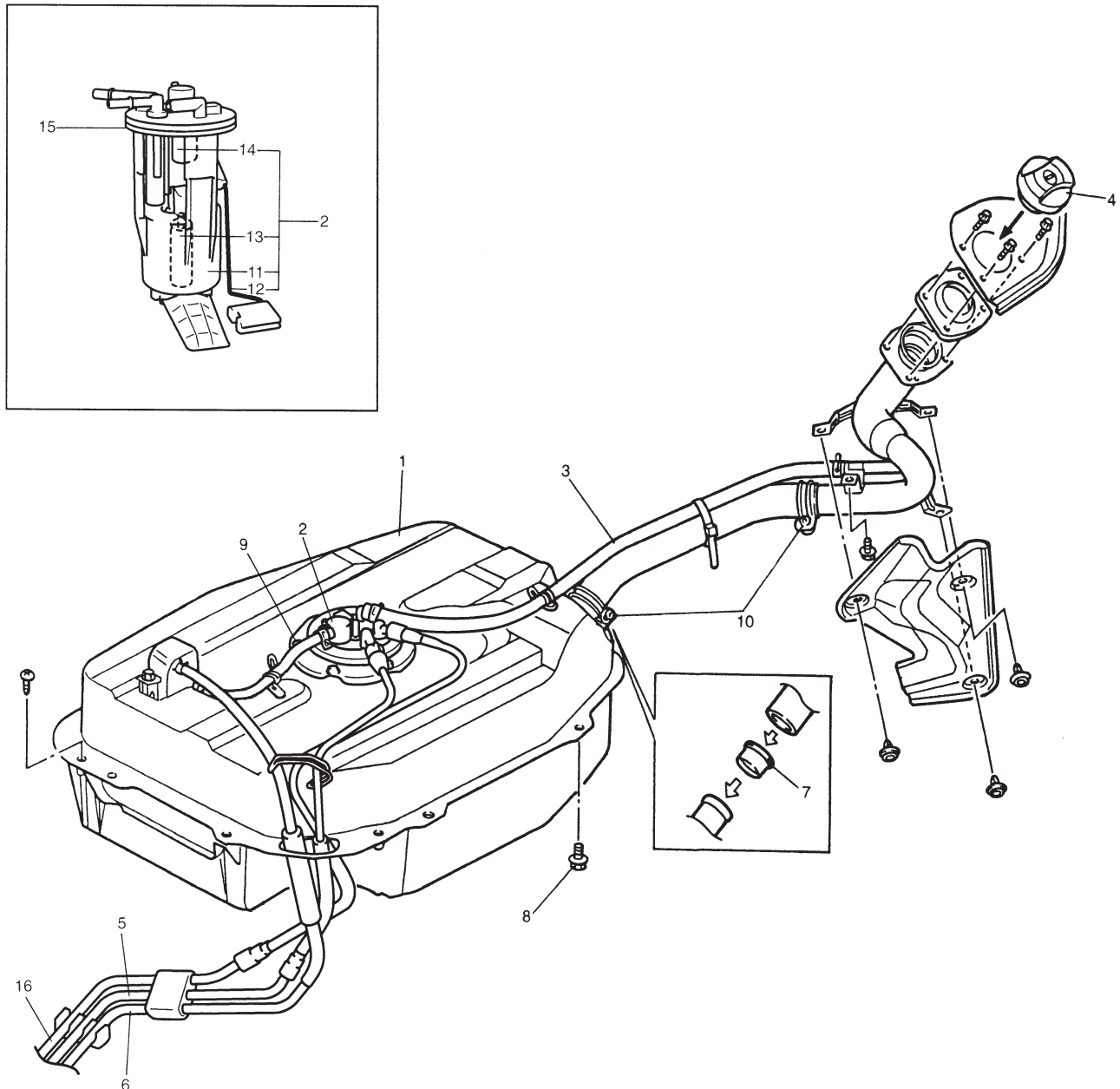
CAUTION:

The engine of this vehicle requires the use of unleaded fuel only. Use of leaded and/or low lead fuel can result in engine damage and reduce the effectiveness of the emission control system.

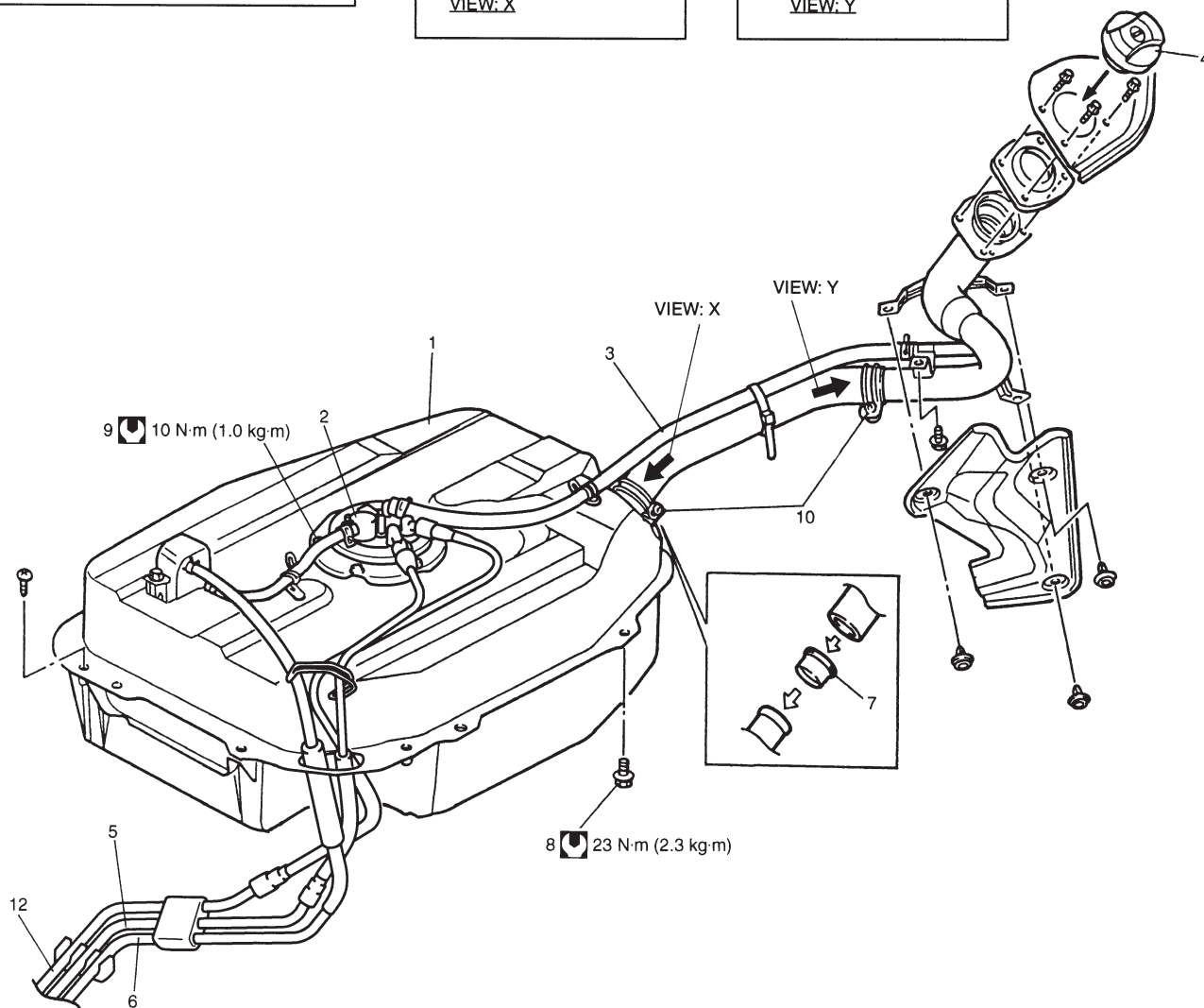
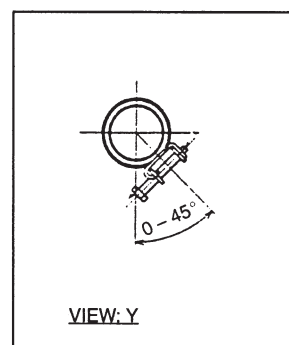
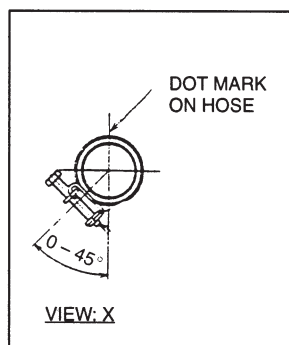
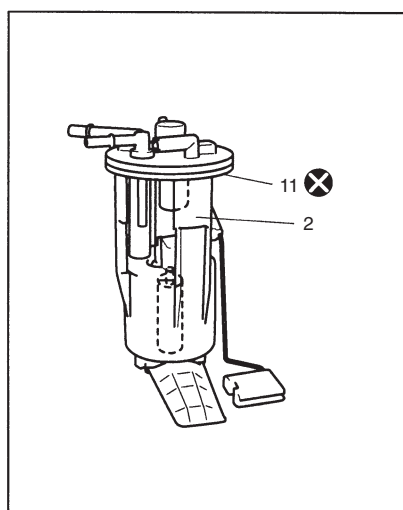
GENERAL DESCRIPTION**FUEL SYSTEM**

The main components of the fuel system are fuel tank, fuel pump assembly (with fuel filter, fuel level gauge, and fuel cut valve), fuel feed line, fuel return line, and fuel vapor line.

For the details of fuel flow and fuel vapor flow, refer to "ENGINE AND EMISSION CONTROL SYSTEM" section.





- | | |
|--------------------------|----------------------------|
| 1. Fuel tank | 9. Fuel pump bolt |
| 2. Fuel pump assembly | 10. Fuel filler hose clamp |
| 3. Breather hose | 11. Fuel filter |
| 4. Fuel filler cap | 12. Fuel level gauge |
| 5. Fuel feed line | 13. Fuel pump |
| 6. Fuel vapor line | 14. Fuel cut valve |
| 7. Fuel tank inlet valve | 15. Fuel pump gasket |
| 8. Fuel tank bolt | 16. Fuel return line |

ON-VEHICLE SERVICE

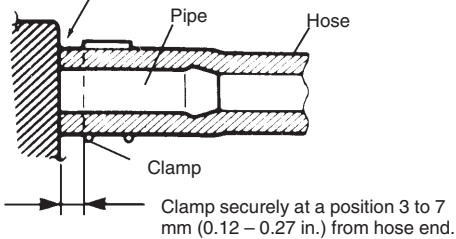
1. Fuel tank
2. Fuel pump assembly

CAUTION:
Do not disassemble fuel pump assembly. Disassembly will spoil its original performance.

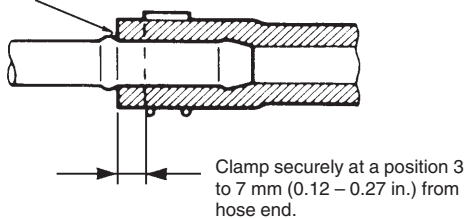
3. Breather hose
4. Fuel filler cap
5. Fuel feed line
6. Fuel vapor line
7. Fuel tank inlet valve
8. Fuel tank bolt
9. Fuel pump bolt
10. Fuel filler hose clamp
11. Fuel pump gasket
12. Fuel return line

 : Tightening Torque
 : Do not reuse

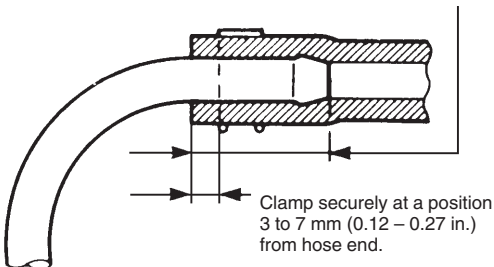
With short pipe, fit hose as far as it reaches pipe joint as shown.



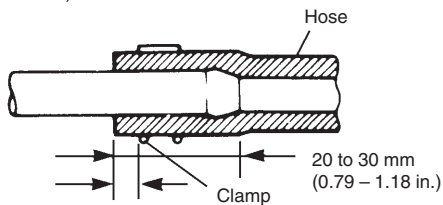
With following type pipe, fit hose as far as its peripheral projection as shown.



With bent pipe, fit hose as far as its bent part as shown or till pipe is about 20 to 30 mm (0.79-1.18 in.) into the hose.

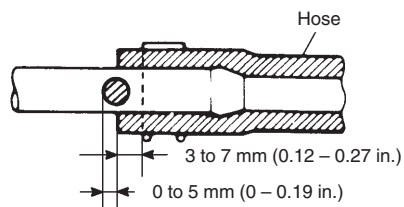


With straight pipe, fit hose till pipe is about 20 to 30 mm (0.79-1.18 in.) in the hose.

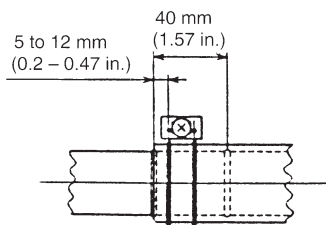


Clamp securely at a position 3 to 7 mm (0.12 – 0.27 in.) from hose end.

With red marked pipe, fit hose till hose end reaches red mark on pipe.



For fuel tank filler hose, insert it to spool or welding-bead.



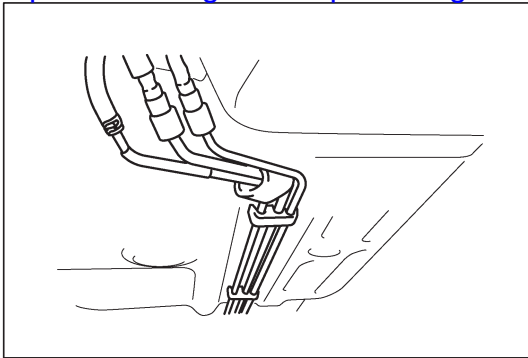
WARNING:

Before attempting service of any type on fuel system, following cautions should be always observed.

- Disconnect negative cable at battery.
- DO NOT smoke, and place “NO SMOKING” signs at work area.
- Be sure to have CO₂ fire extinguisher handy.
- Be sure to perform work in a well-ventilated area and away from any open flames (such as gas hot heater).
- Wear safety glasses.
- To relieve fuel vapor pressure in fuel tank, remove fuel filler cap from fuel filler neck and then reinstall it.
- As fuel feed line is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected.

Before loosening or disconnecting fuel feed line, make sure to relieve fuel pressure.

- A small amount of fuel may be released after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop towel. Be sure to put that towel in an approved container when disconnection is completed.
- Note that fuel hose connection varies with each type of pipe. Be sure to connect and clamp each hose correctly referring to the figure.



FUEL LINES

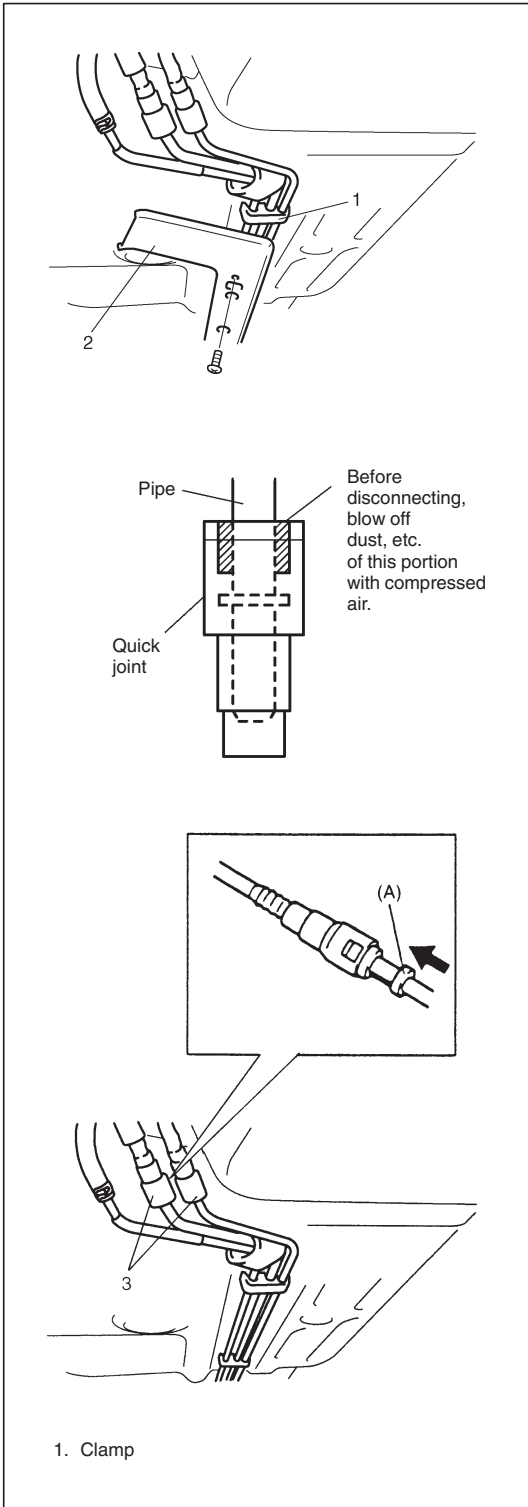
Due to the fact that fuel feed line is under high pressure, use special care when servicing it.

INSPECTION

Visually inspect fuel lines for evidence of fuel leakage, hose crack and deterioration, or damage.

Make sure that all clamps are secure.

Replace parts as needed.



FUEL PIPE

REMOVAL

- 1) Relieve fuel pressure in fuel feed line.
- 2) Disconnect negative cable at battery.
- 3) Remove steering gear box assembly. Refer to Section 3B of the Service Manual mentioned in FOREWORD of this manual.
- 4) Remove pipe cover (2) from vehicle.
- 5) Disconnect fuel pipe joints and fuel vapor hoses from the front end and the rear end of each fuel pipe.

For quick joint (3), disconnect it as follows:

- a) Remove mud, dust and/or foreign material between pipe and joint by blowing compressed air.
- b) Unlock joint lock by inserting special tool between pipe and joint.

Special Tool

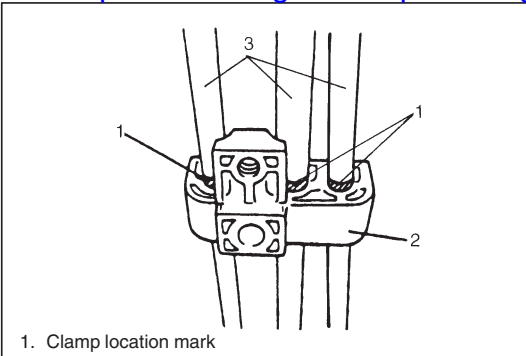
(A): 09919-47020

- c) Disconnect joint from pipe.

WARNING:

A small amount of fuel may be released after fuel hose is disconnected. In order to reduce the chance of personal injury, cover hose and pipe to be disconnected with a shop towel.

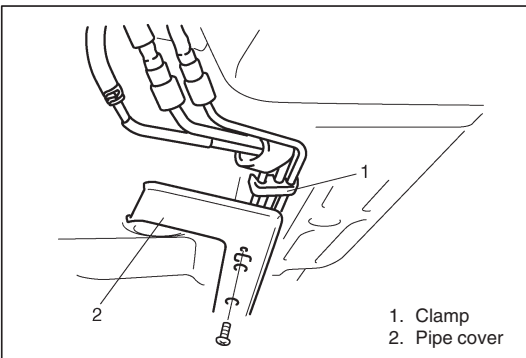
Be sure to put that towel in an approved container when disconnection is completed.



- 6) Mark the location of clamps on fuel pipes, so that the clamps can be reinstalled to where they were.
- 7) Remove pipes (3) with clamp (2) from vehicle.
- 8) Remove clamp from pipes.

INSTALLATION

- 1) Install clamps to marked location on pipes. If clamp is deformed or its claw is bent or broken, replace it with a new one.
- 2) Install pipes with pipe clamps to vehicle.



- 3) Connect fuel hoses and pipes to each pipe.

CAUTION:

When connecting joint, clean outside surfaces of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.

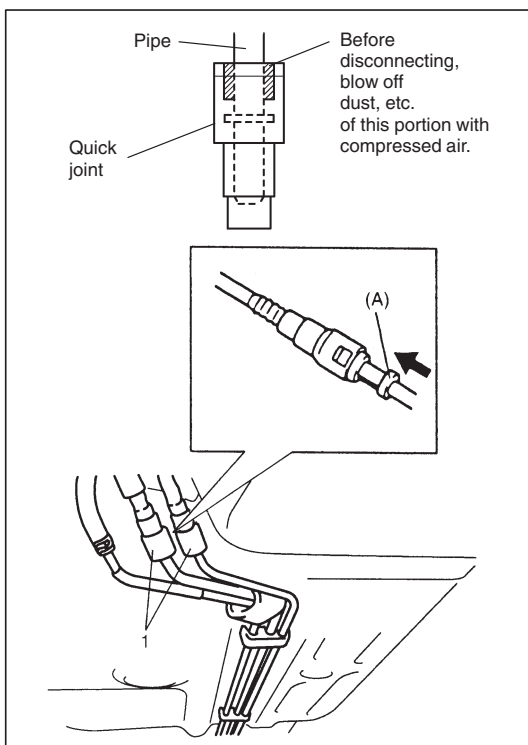
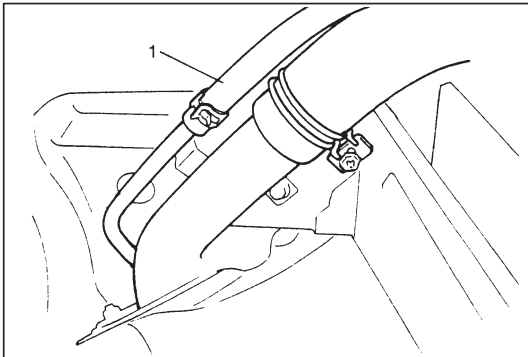
- 4) Install pipe cover (2) to vehicle.
- 5) Install steering gear box. Refer to Section 3B of the Service Manual mentioned in FOREWORD of this manual.
- 6) With engine "OFF" and ignition switch "ON", check for fuel leaks.

FUEL TANK REMOVAL

WARNING:

Refer to the **WARNING** at the beginning of **ON-VEHICLE SERVICE** in this section.

- 1) Relieve fuel pressure in fuel feed line.
- 2) Disconnect negative cable at battery.
- 3) Drain fuel tank, referring to Section 6C of the Service Manual mentioned in FOREWORD of this manual.
- 4) Disconnect breather hose (1) from filler neck.



- 5) Disconnect fuel pipe joints and fuel vapor hose from fuel pipes.
For quick joint (1), disconnect it as follows:
 - a) Remove mud, dust and/or foreign material between pipe and joint by blowing compressed air.
 - b) Unlock joint lock by inserting special tool between pipe and joint.

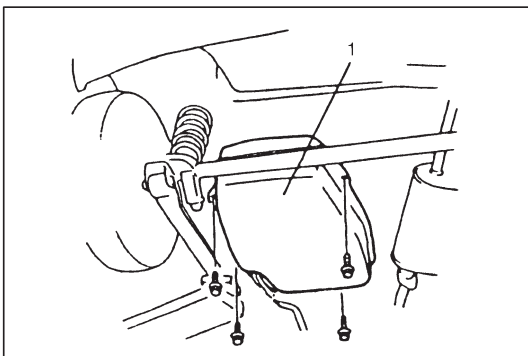
Special Tool

(A): 09919-47020

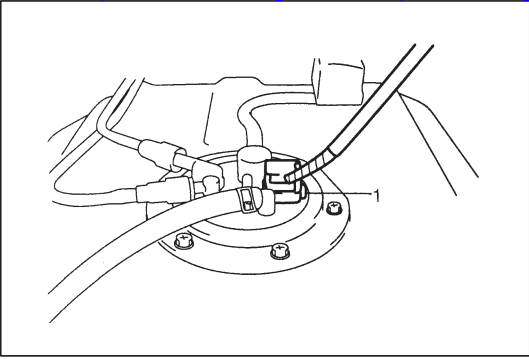
- c) Disconnect joint from pipe.

WARNING:

A small amount of fuel may be released after the fuel hose is disconnected. In order to reduce the chance of personal injury, cover the hose and pipe to be disconnected with a shop towel. Be sure to put that towel in an approved container when disconnection is completed.



- 6) Support fuel tank (1) with jack and remove its mounting bolts.

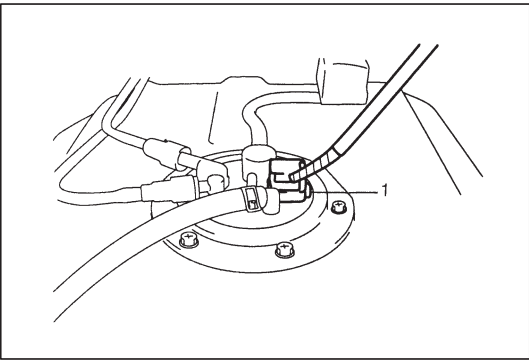


- 7) Lower fuel tank a little as to disconnect wire harness at connector (1), then remove fuel tank.

INSPECTION

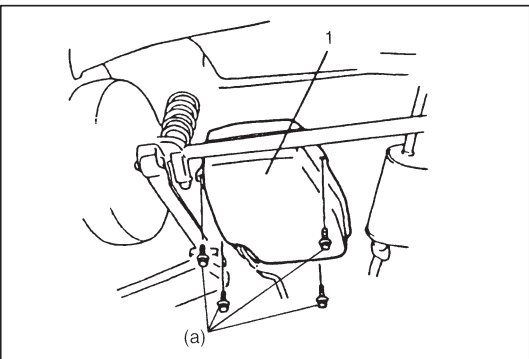
After removing fuel tank, check hoses and pipes connected to fuel tank for leaks, loose connections, deterioration or damage. Also check fuel pump assembly gaskets for leaks, visually inspect fuel tank for leaks and damage.

Replace any damaged or malfunctioned parts.



INSTALLATION

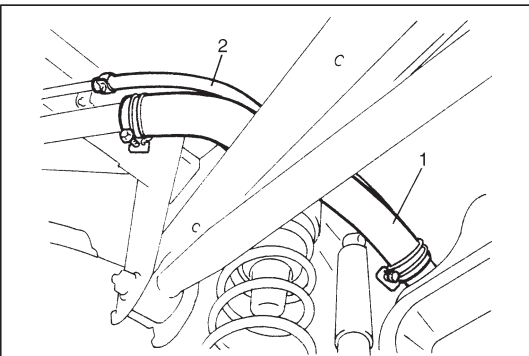
- 1) If parts have been removed from fuel tank, install them before installing fuel tank to vehicle.
- 2) Raise fuel tank with jack and connect connector (1) of fuel pump and gauge and clamp wire harness.



- 3) Install fuel tank (1) to vehicle.

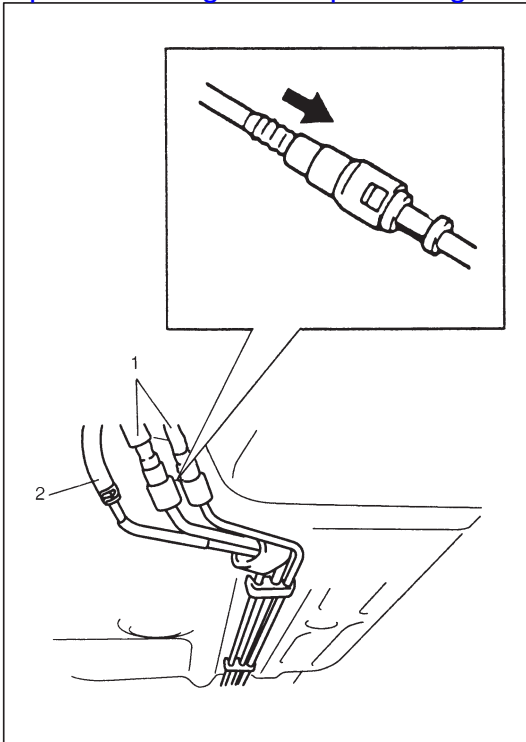
Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 4) Connect fuel filler hose (1) to fuel tank and breather hose (2) to filler neck and clamp them securely.

For proper installation, refer to the first figure of ON-VEHICLE SERVICE.



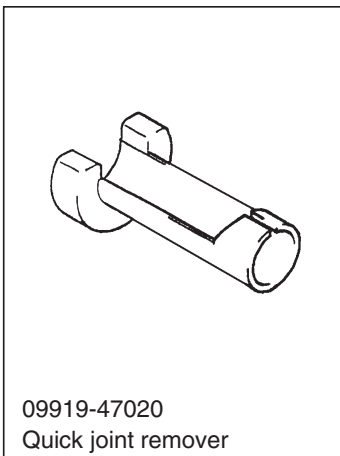
- 5) Connect fuel hoses (1) and vapor hose (2) to pipes as shown in figure and clamp them securely.

CAUTION:

When connecting joint, clean outside surfaces of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.

- 6) Connect negative cable at battery.
With engine "OFF" and ignition switch "ON", check for fuel leaks.

SPECIAL TOOL



SECTION 6E1

ENGINE AND EMISSION CONTROL SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

6E1

CONTENTS

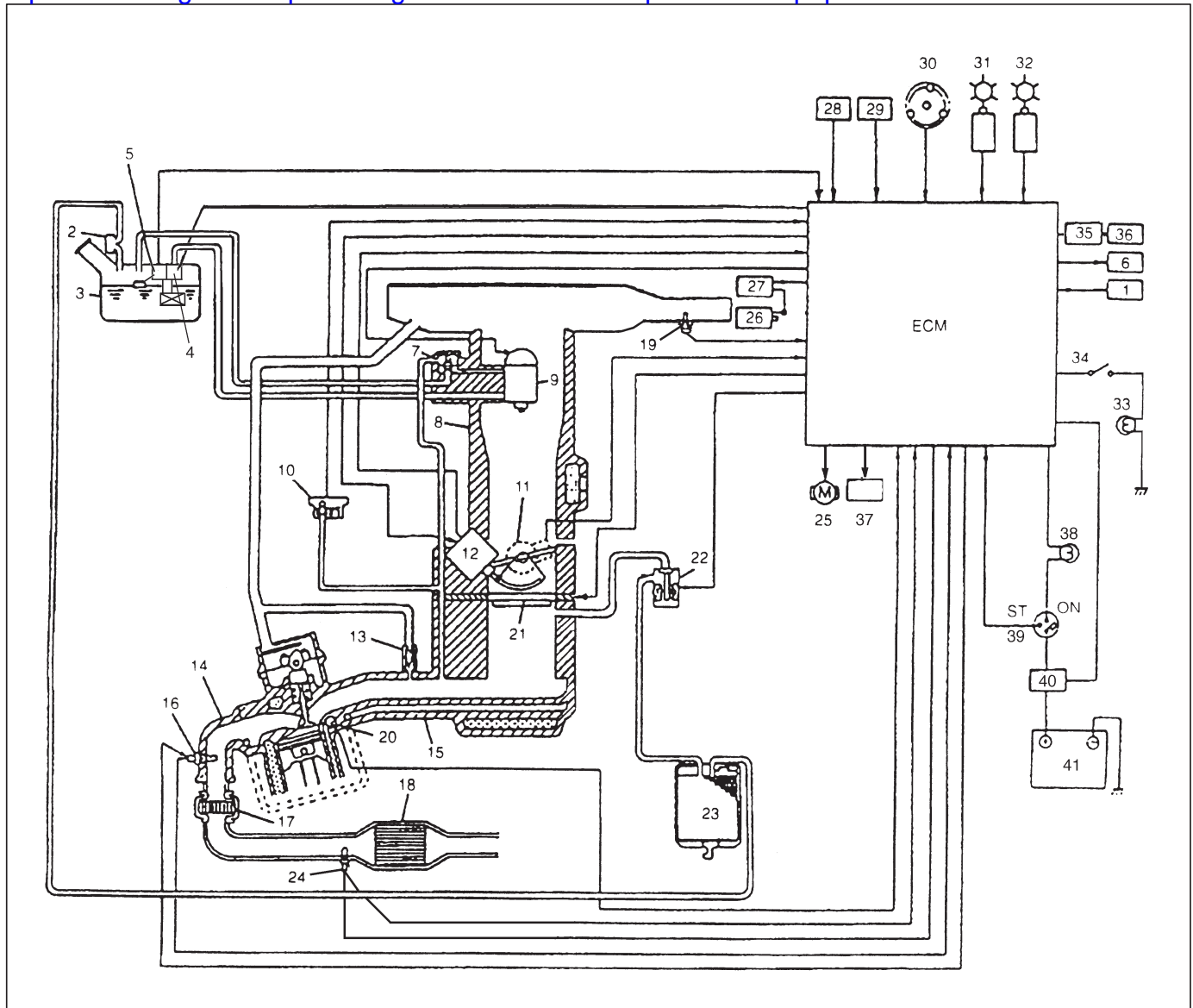
GENERAL DESCRIPTION	6E1- 2	Crankshaft Position Sensor	6E1-25
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ELECTRONIC CONTROL SYSTEM	6E1- 5	Fuel Pump Relay	6E1-26
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GENERAL DESCRIPTION

The engine and emission control system is divided into 3 major sub-systems: air/fuel delivery system, electronic control system and emission control system.

Air/fuel delivery system includes fuel pump, throttle body, etc. Electronic control system includes ECM, various sensors and controlled devices.

Emission control system includes EVAP and PCV system.



- | | | |
|---|--|---|
| 1. A/C switch (if equipped) | 15. Intake manifold | 29. A/C evaporator temp. sensor (if equipped) |
| 2. Fuel liquid separator | 16. Heated oxygen sensor-1 | 30. Camshaft position sensor |
| 3. Fuel tank | 17. Warm up three way catalytic convertor (WU-TWC) | 31. Crankshaft position sensor |
| 4. Fuel pump | 18. Three way catalytic convertor | 32. VSS |
| 5. Fuel level sensor (gauge) | 19. IAT sensor | 33. Stop lamp |
| 6. A/C compressor clutch (if equipped) | 20. ECT sensor | 34. Stop lamp switch |
| 7. Fuel pressure regulator | 21. EFE heater | 35. Immobilizer control module |
| 8. Throttle body | 22. EVAP canister purge valve | 36. Data link connector |
| 9. Fuel injector | 23. EVAP canister | 37. Tachometer (in combination meter) |
| 10. MAP sensor | 24. Heated oxygen sensor-2 | 38. Malfunction indicator lamp |
| 11. TP sensor | 25. Radiator fan motor | 39. Main (Ignition) switch |
| 12. ISC actuator (including CTP switch) | 26. Ignition coil | 40. Main fuse |
| 13. PCV valve | 27. Igniter | 41. Battery |
| 14. Exhaust manifold | 28. Electric load | |

AIR AND FUEL DELIVERY SYSTEM

The main components of this system are fuel tank, fuel pump (with built-in fuel filter), throttle body (including fuel injector, fuel pressure regulator and idle speed control actuator), fuel feed line, fuel return line and air cleaner.

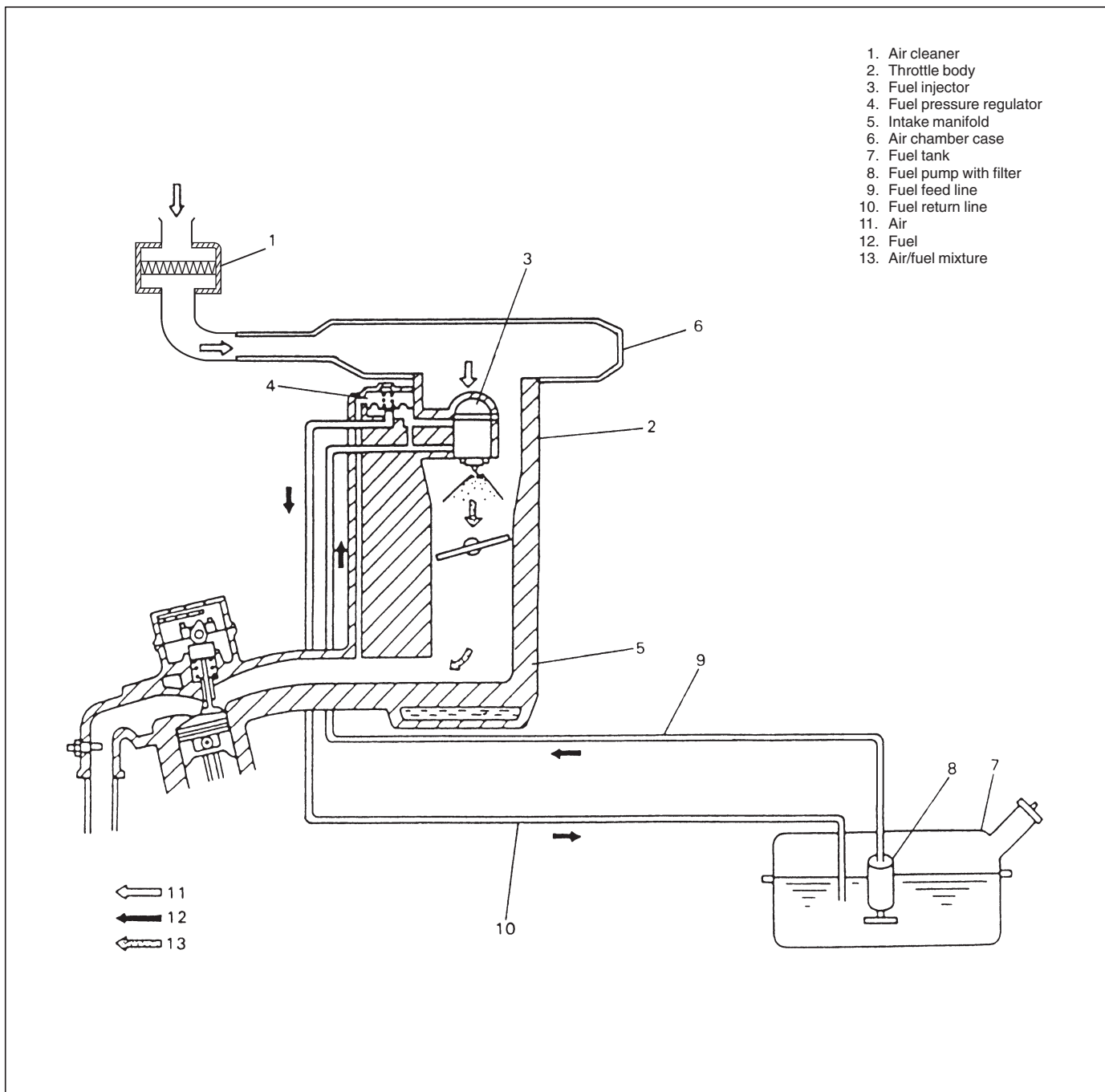
The fuel in the fuel tank is pumped up by the fuel pump, filtered by the fuel filter and fed under pressure to injector installed in throttle body. As the fuel pressure applied to the fuel injector (the fuel pressure in the fuel feed line) is always kept a certain amount higher than the pressure in the intake manifold by the fuel pressure regulator, the fuel is injected into the

throttle body in conic dispersion when the injector opens according to the injection signal from ECM. The fuel relieved by the fuel pressure regulator returns through the fuel return line to the fuel tank.

The injected fuel is mixed with the air which has been filtered through the air cleaner in the throttle body. The air/fuel mixture is drawn through clearance between throttle valve and bore.

Then the intake manifold distributes the air/fuel mixture to each combustion chamber.

For the structure and operation of the fuel tank and filter, refer to SECTION 6C "ENGINE FUEL".



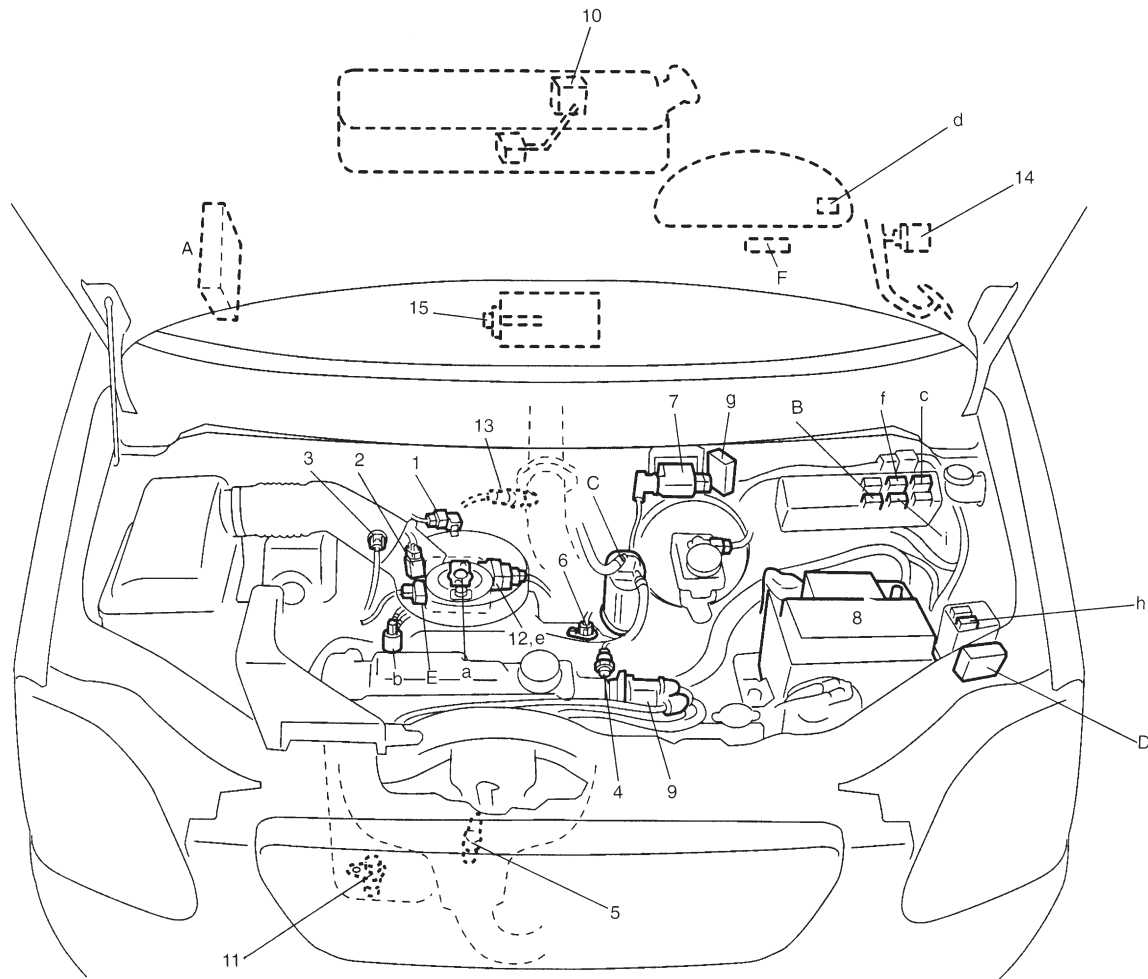
ELECTRONIC CONTROL SYSTEM

The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM which controls various devices according to the signals from the sensors and 3) various controlled devices.

Functionally, it is divided into following sub systems:

- Fuel injection control system
- Idle speed control system

- Fuel pump control system
- A/C control system (if equipped)
- Radiator fan control system
- Evaporative emission control system
- EFE heater control system
- Oxygen sensor heater control system
- Ignition control system



INFORMATION SENSORS

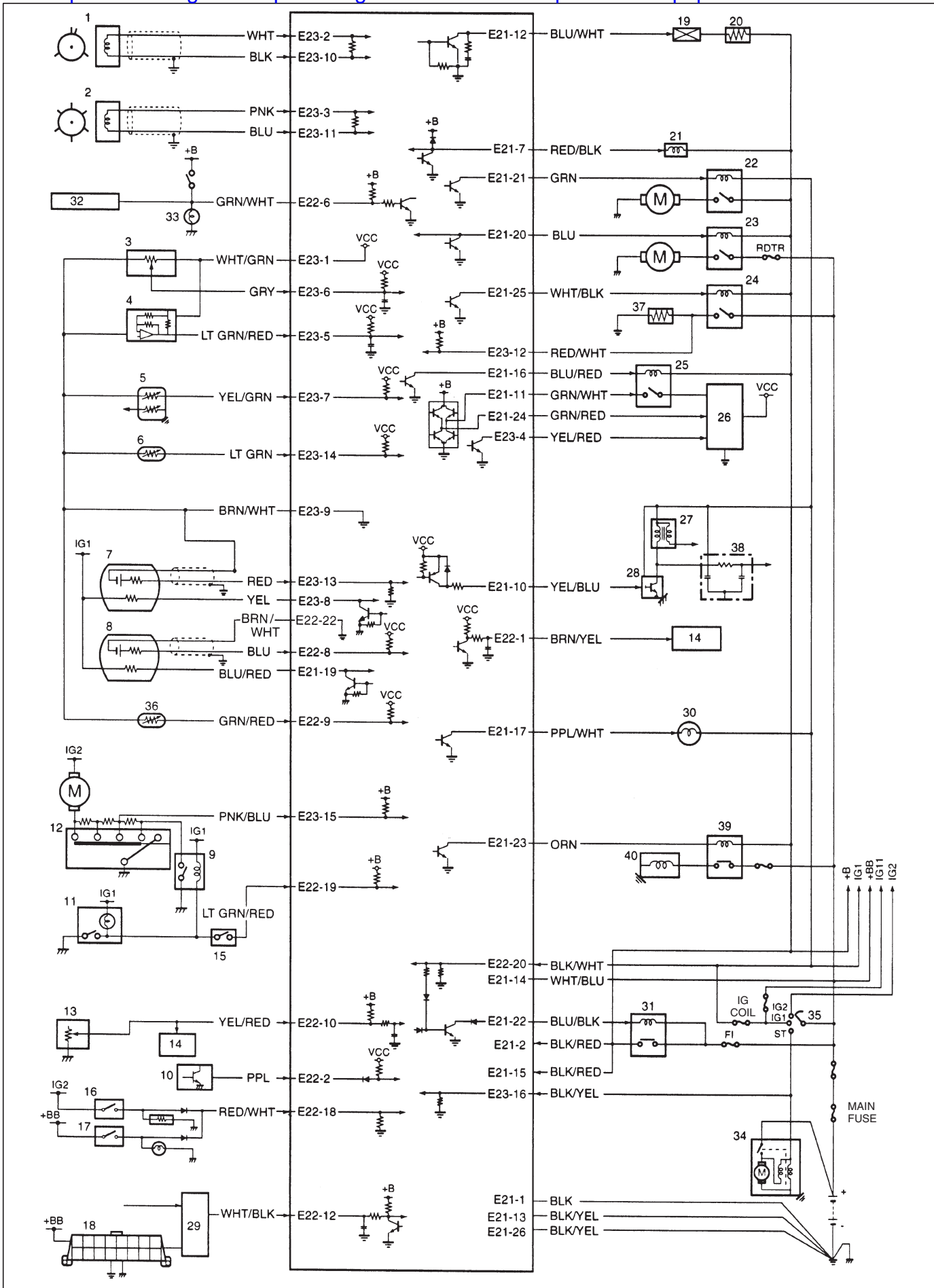
1. MAP sensor
2. TP sensor
3. IAT sensor
4. ECT sensor
5. Heated oxygen sensor-1
6. VSS
7. Ignition coil
8. Battery
9. Distributor (CMP sensor)
10. Fuel level sensor (gauge) (in fuel tank)
11. CKP sensor
12. CTP switch (in ISC actuator)
13. Heated oxygen sensor-2
14. Stop lamp switch
15. A/C EVAP temp. sensor (if equipped)

CONTROLLED DEVICES

- a : Fuel injector
 b : EVAP canister purge valve
 c : Fuel pump relay
 d : Malfunction indicator lamp
 e : ISC actuator
 f : Radiator fan control relay
 g : Igniter
 h : EFE heater relay
 i : ISC actuator relay

OTHERS

- A : ECM (PCM)
 B : Main relay
 C : EVAP canister
 D : Injector resistor
 E : EFE heater
 F : Data link connector



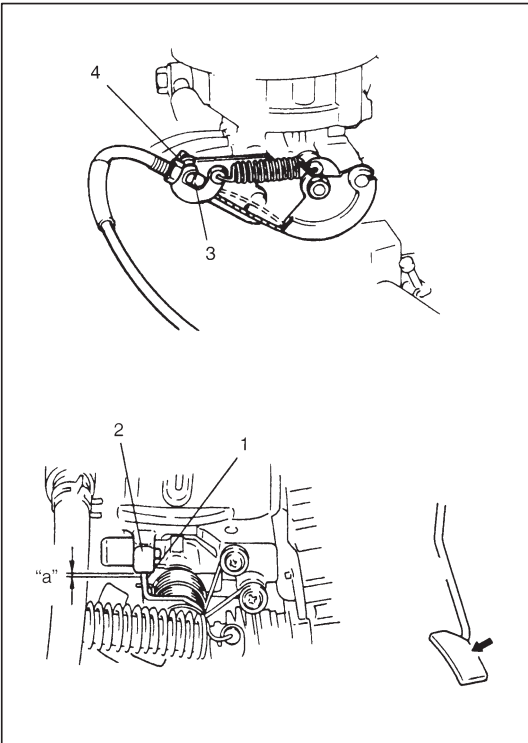
CON-NECTOR	TERMI-NAL	CIRCUIT	CON-NECTOR	TERMI-NAL	CIRCUIT
E21	1	ECM ground	E22	1	Tachometer signal
	2	Power source (from main relay)		2	Vehicle speed sensor
	3	Blank		3	Blank
	4	Blank		4	Blank
	5	Blank		5	Blank
	6	Blank		6	Stop lamp switch
	7	EVAP canister purge valve		7	Blank
	8	Blank		8	Heated oxygen sensor-2
	9	Blank		9	A/C EVAP temp. sensor
	10	Igniter		10	Fuel level sensor (gauge)
	11	Idle speed control actuator		11	Blank
	12	Fuel injector		12	Data link connector
	13	Ground		13	Blank
	14	Power source (from battery)		14	Blank
	15	Power source (from main relay)		15	Blank
	16	Idle speed control actuator relay		16	Blank
	17	Malfunction indicator lamp		17	Blank
	18	Blank		18	Electric load signal (+)
	19	Heater of HO2S-2		19	A/C (input) signal (if equipped)
	20	Radiator fan relay		20	Ignition switch
	21	Fuel pump relay		21	Blank
	22	Main relay		22	Sensor ground
	23	A/C compressor signal	1. CMP sensor (in Distributor) 21. Canister purge valve 2. CKP sensor 22. Fuel pump relay 3. TP sensor 23. Radiator fan relay 4. MAP sensor 24. EFE heater relay 5. ECT sensor 25. ISC actuator relay 6. IAT sensor 26. ISC actuator 7. HO2S-1 27. Ignition coil 8. HO2S-2 28. Igniter 9. Heater blower fan relay 29. Immobilizer control module 10. VSS 30. MIL 11. A/C switch (if equipped) 31. Main relay 12. Heater blower switch 32. ABS control module 13. Fuel level sensor 33. Stop lamp 14. Speedometer 34. Starter motor 15. A/C pressure switch (if equipped) 35. Ignition switch 16. Rear defogger switch 36. A/C EVAP temp. sensor 17. Light switch 37. EFE heater 18. DLC 38. Noise suppressor 19. Fuel injector 39. A/C compressor relay 20. Injector resistor (if equipped) 40. A/C compressor clutch (if equipped)		
	24	Idle speed control actuator			
	25	EFE heater relay			
	26	Ground			
E23	1	Power source for sensors	1. CMP sensor (in Distributor) 21. Canister purge valve 2. CKP sensor 22. Fuel pump relay 3. TP sensor 23. Radiator fan relay 4. MAP sensor 24. EFE heater relay 5. ECT sensor 25. ISC actuator relay 6. IAT sensor 26. ISC actuator 7. HO2S-1 27. Ignition coil 8. HO2S-2 28. Igniter 9. Heater blower fan relay 29. Immobilizer control module 10. VSS 30. MIL 11. A/C switch (if equipped) 31. Main relay 12. Heater blower switch 32. ABS control module 13. Fuel level sensor 33. Stop lamp 14. Speedometer 34. Starter motor 15. A/C pressure switch (if equipped) 35. Ignition switch 16. Rear defogger switch 36. A/C EVAP temp. sensor 17. Light switch 37. EFE heater 18. DLC 38. Noise suppressor 19. Fuel injector 39. A/C compressor relay 20. Injector resistor (if equipped) 40. A/C compressor clutch (if equipped)		
	2	Camshaft position sensor (+)			
	3	Crankshaft position sensor (+)			
	4	Closed throttle position switch			
	5	Manifold absolute pressure sensor			
	6	Throttle position sensor			
	7	Engine coolant temp. sensor			
	8	Heater of HO2S-1			
	9	Sensor ground			
	10	Camshaft position sensor (−)			
	11	Crankshaft position sensor (−)			
	12	EFE heater (monitor)			
	13	Heated oxygen sensor-1			
	14	Intake air temp sensor			
	15	Electric load signal (−)			
	16	Engine start signal			

E21												E23										E22									
13	12	11	10	9	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	11	10	9	8	7	6	5	4	3	2	1
26	25	24	23	22	21	20	19	18	17	16	15	14	16	15	14	13	12	11	10	9	22	21	20	19	18	17	16	15	14	13	12

ON-VEHICLE SERVICE

GENERAL

When the hoses have been disconnected and system's component removed for service, be sure to reinstall component properly, and route and connect hoses correctly after service. Refer to Emission Control Information Label for proper connection of hoses (if equipped).



ACCELERATOR CABLE ADJUSTMENT

- 1) With accelerator pedal depressed fully, check clearance between throttle lever (1) and lever stopper (2) (throttle body) which should be within following specification.

Clearance "a": 0.5 – 2.0 mm (0.02 – 0.07 in.)
(With pedal depressed fully)

If out of specification, loosen accelerator cable lock nut and adjust by turning adjusting nut (3). Be sure to tighten lock nut (4) securely after adjustment.

IDLE SPEED INSPECTION

Before inspecting idle speed, make sure of the following.

- Lead wires and hoses of Electronic Fuel Injection and engine emission control systems are connected securely.
- After warming up engine, accelerator cable has some play, that is, it is not tight.
- Ignition timing is within specification.
- All of electrical loads except ignition are switched off.
- Air cleaner has been properly installed and is in good condition.
- Malfunction indicator lamp does not light when engine running.

After above items are all confirmed, check idle speed as follows.

NOTE:

Before starting engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.

- 1) Warm up engine to normal operating temperature.
- 2) Set tachometer.
- 3) Check idle speed with A/C OFF.

If idle speed is not within specified range, check idle speed control system and any other system and parts which might affect idle speed. Refer to "Engine Diagnosis of Section 6-1" for inspection.

Engine idle speed: 800 \pm 50 r/min

NOTE:

Idle speed is not adjustable manually. If it is out of its specified range, there is a faulty condition somewhere. Check each of related systems and parts.

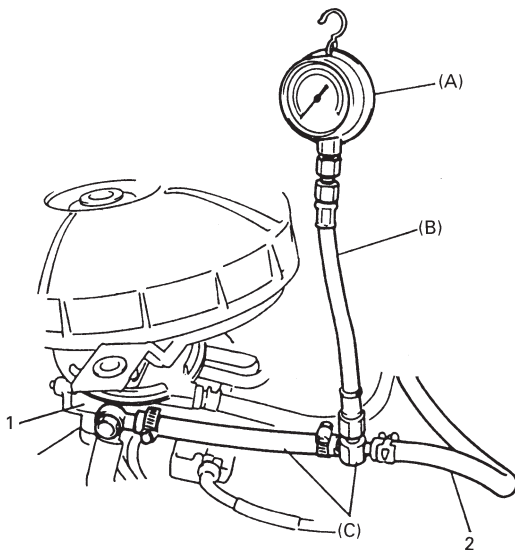
AIR AND FUEL DELIVERY SYSTEM**FUEL PRESSURE****INSPECTION**

- 1) Relieve fuel pressure, referring to Section 6-1.
- 2) Separate air chamber case from throttle body and shift its position.
- 3) Disconnect fuel feed hose from throttle body.

CAUTION:

A small amount of fuel may be released after fuel line is disconnected.

In order to reduce chance of personal injury, cover fitting to be disconnected with a shop cloth. Place that cloth in an approved container when disconnection is completed.



1. Throttle body
2. Fuel feed hose

- 4) Connect special tools and hose between throttle body and fuel feed pipe as shown in figure, and clamp hoses securely to ensure no leaks occur during checking.

Special Tool

(A): 09912-58441

(B): 09912-58431

(C): 09912-58490

- 5) Install air chamber case to throttle body and cylinder head cover.

- 6) Start engine and warm it up to normal operating temperature.

If engine doesn't start, turn ignition switch ON to operate fuel pump and after 2 seconds turn it OFF. Repeat this 3 or 4 times and then check fuel pressure.

NOTE:

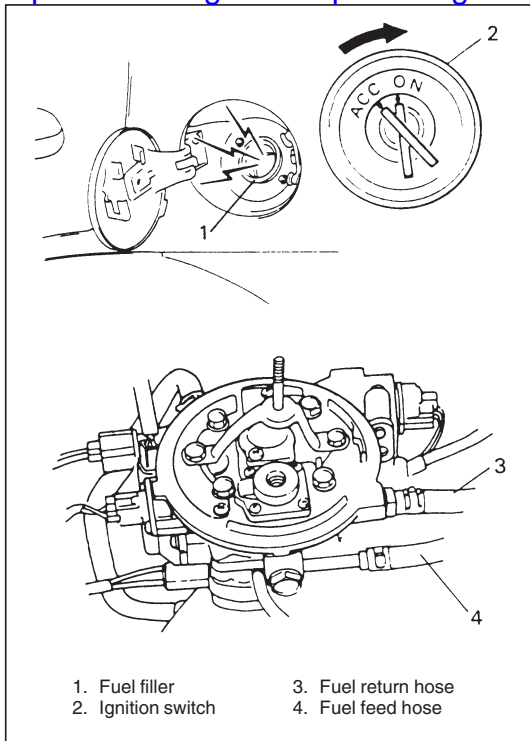
Check that battery voltage is 11 V or more before operating fuel pump.

- 7) Measure fuel pressure under each of the following conditions.

CONDITION	FUEL PRESSURE
At specified idle speed	0.9 – 1.4 kg/cm ² 90 – 140 kPa 12.8 – 20.0 psi
With fuel pump operating and engine at stop	1.6 – 2.1 kg/cm ² 160 – 210 kPa 22.7 – 29.9 psi
Within 1 min. after engine (fuel pump) stop (Pressure reduces as time passes)	Over 0.9 kg/cm ² 90 kPa 12.8 psi

If measured pressure doesn't satisfy specification, refer to "DIAGNOSTIC FLOW TABLE B-3" and check each possibly defective part. Replace if found defective.

- 8) Relieve fuel pressure, referring to Section 6-1.
- 9) Remove fuel pressure gauge, hose & 3-way joint after removing air chamber case.
- 10) Connect fuel feed hose to throttle body and clamp it securely.
- 11) Install air chamber case.
- 12) With engine "OFF" and ignition switch "ON", check for fuel leaks.



FUEL PUMP

ON-VEHICLE INSPECTION

WARNING:

When fuel filler cap is removed in any procedure, work must be done with no smoking, in a well-ventilated area and away from any open flames.

- 1) Remove filler cap and turn ON ignition switch.
Then fuel pump operating sound should be heard from fuel filler for about 2 seconds and stop. Be sure to reinstall fuel filler cap after checking.
If above check result is not satisfactory, advance to "DIAGNOSTIC FLOW TABLE B-2".
- 2) Fuel pressure should be felt at fuel return hose for 2 seconds after ignition switch ON.
If fuel pressure is not felt, advance to "DIAGNOSTIC FLOW TABLE B-3".

REMOVAL

- 1) Remove fuel tank from body according to procedure described in Section 6C and remove fuel pump from fuel tank.

INSPECTION

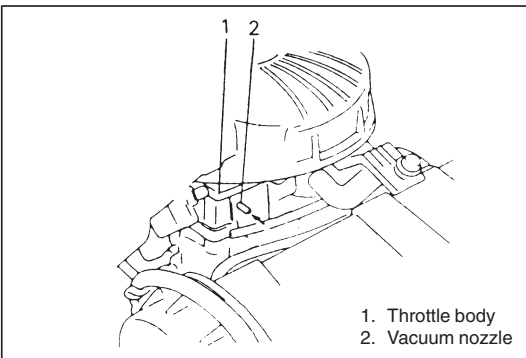
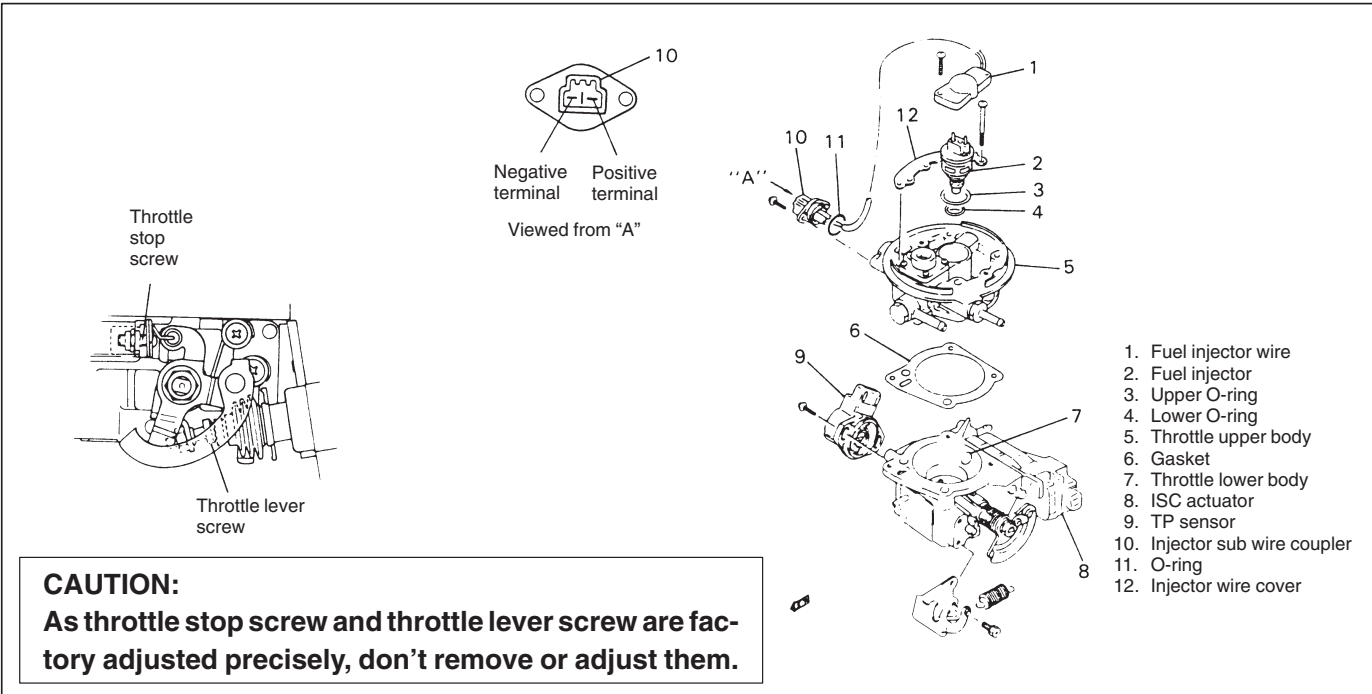
Check fuel pump filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in fuel tank.

INSTALLATION

- 1) Install fuel pump to fuel tank and then install fuel tank to body according to procedure described in Section 6C.

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THROTTLE BODY



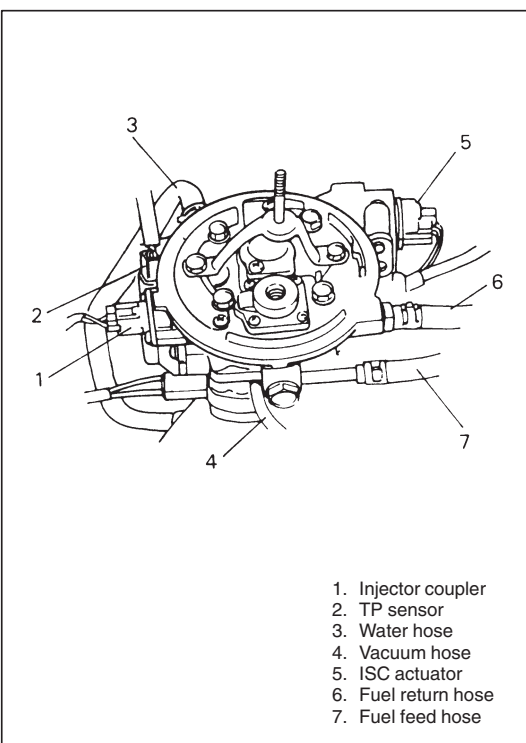
ON-VEHICLE INSPECTION

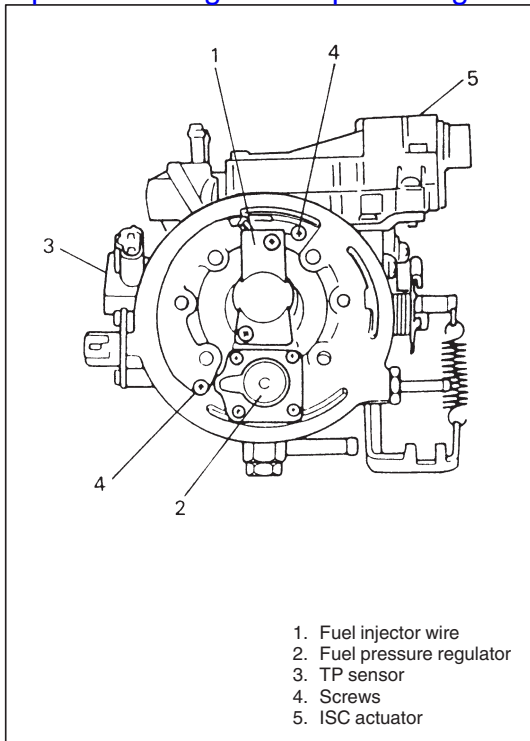
- Check that throttle valve lever moves smoothly.
- Vacuum passage inspection.

With fingers placed against vacuum nozzle, increase engine speed a little and check that vacuum is applied.

REMOVAL

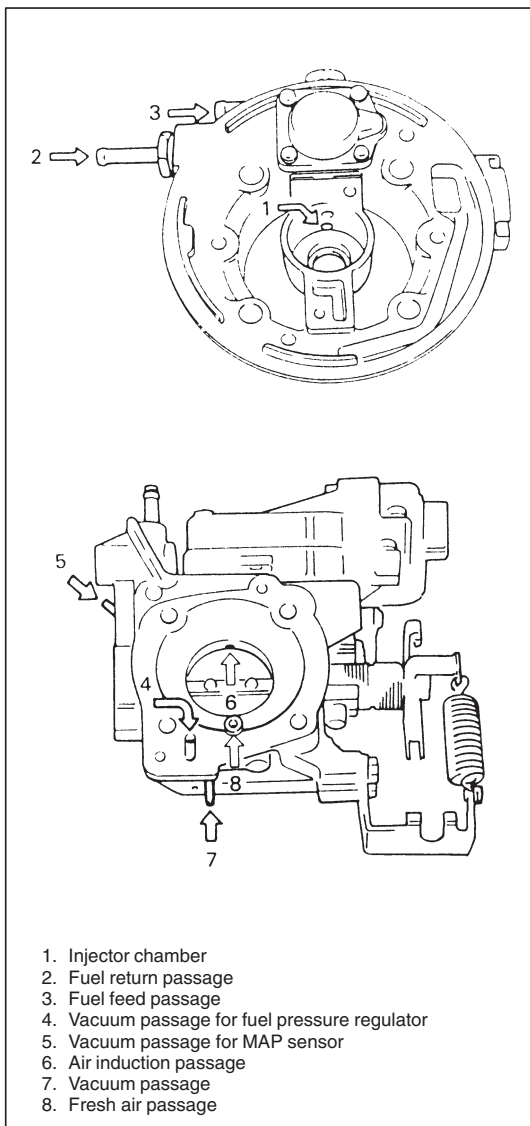
- 1) Relieve fuel pressure, referring to Section 6-1.
- 2) Disconnect battery negative cable at battery.
- 3) Remove air chamber case.
- 4) Drain cooling system.
- 5) Disconnect following wire harness couplers:
 - TP sensor
 - Fuel injector
 - ISC actuator
- 6) Disconnect following hoses from throttle body.
 - Fuel feed and return hoses
 - Engine cooling water hoses
 - Vacuum hoses
- 7) Disconnect accelerator cable from throttle valve lever and cable bracket.
- 8) Remove throttle body from intake manifold.



**DISASSEMBLY****NOTE:**

- Be sure not to remove either fuel pressure regulator or idle speed control actuator from throttle body. They are factory adjusted precisely.
- Be sure to replace gaskets and O-rings as well as worn or damaged parts.
- While disassembling and assembling throttle body, use special care not to deform levers on throttle valve shaft or cause damage to any other parts.

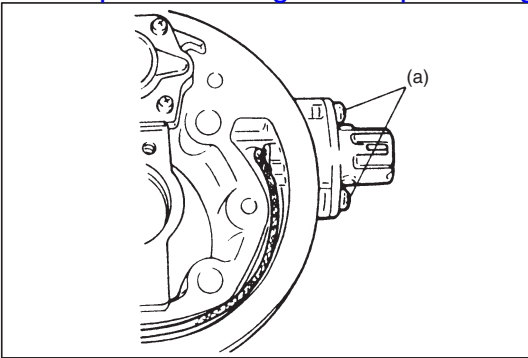
- 1) Remove fuel injector from throttle body according to procedure described in FUEL INJECTOR REMOVAL.
- 2) Remove TP sensor.
- 3) After removing screws, separate upper and lower bodies.

**CLEANING**

Clean passages and fuel injector chamber by blowing compressed air.

NOTE:

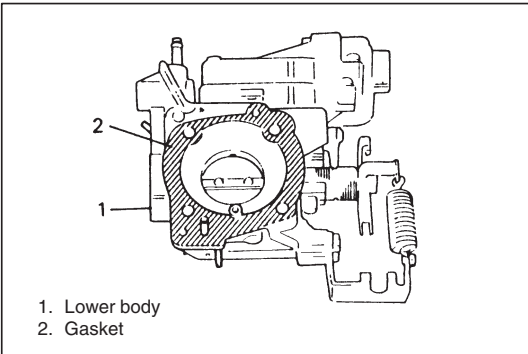
- TP sensor, fuel pressure regulator, fuel injector, ISC actuator, other components containing rubber (resin) or throttle valve shaft seal must not be placed in a solvent or cleaner bath. Chemical reaction will cause these parts to swell, harden or get distorted.
- Don't put drills or wires into passages for cleaning. It causes damage in passages.

**ASSEMBLY**

- 1) Install injector wire and coupler to throttle body.
Use new O-ring.
Tighten injector wire coupler screw to specified torque.

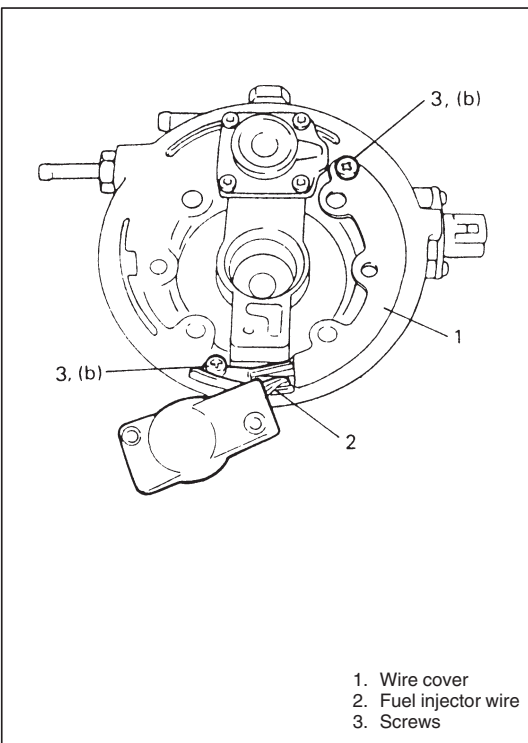
Tightening Torque

(a): 2.0 N·m (0.20 kg-m, 1.5 lb-ft)



1. Lower body
2. Gasket

- 2) Install new gasket to lower body.
- 3) Install upper body on gasket, using care not to cause gasket to slip out of place.



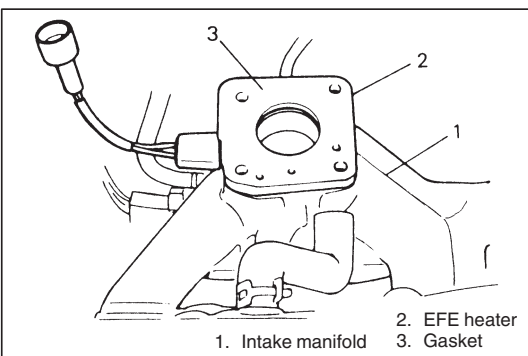
1. Wire cover
2. Fuel injector wire
3. Screws

- 4) Make sure to injector wire harness to fit in grooves of throttle body and install wire cover to throttle body.
Tighten screws to specified torque.

Tightening Torque

(b): 3.5 N·m (0.35 kg-m, 2.5 lb-ft)

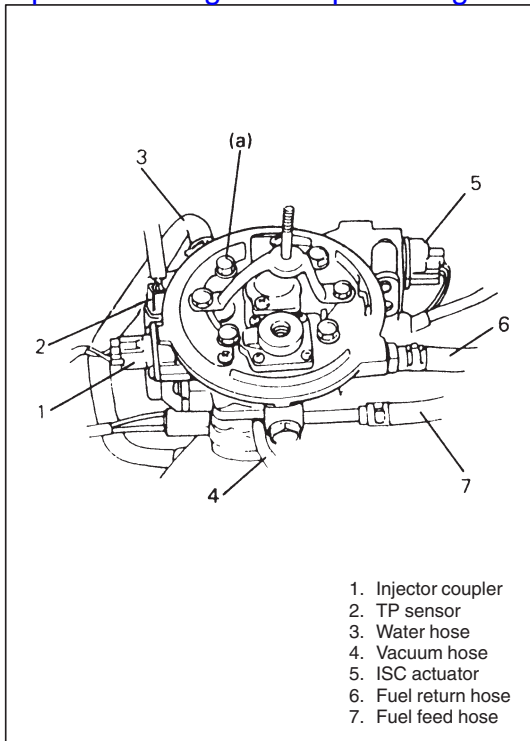
- 5) Install fuel injector according to procedure described in FUEL INJECTOR INSTALLATION.
- 6) Install TP sensor according to procedure described in THROTTLE POSITION SENSOR INSTALLATION.



1. Intake manifold
2. EFE heater
3. Gasket

INSTALLATION

- 1) Clean mating surfaces and install throttle body gasket to EFE heater. Use new gasket.



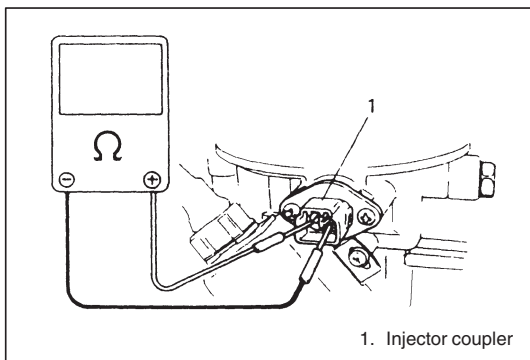
- 2) Install throttle body to EFE heater and tighten bolts to specified torque.

Tightening Torque

(a): 23 N·m (2.3 kg·m, 17.0 lb·ft)

- 3) Install accelerator cable to throttle valve lever and cable bracket.
4) Connect fuel, cooling water and vacuum hoses to throttle body, and clamp securely.
5) Connect TP sensor and injector couplers securely.
6) Refill cooling system referring to Section 6B.
7) Connect negative cable at battery.
8) With engine "OFF" and ignition switch "ON", check for fuel leaks around fuel line connection.
9) Install air chamber case.
10) Upon completion of installation, start engine and check for fuel leaks and engine coolant leaks.

Adjust accelerator cable to specification according to procedure described in ACCELERATOR CABLE ADJUSTMENT.



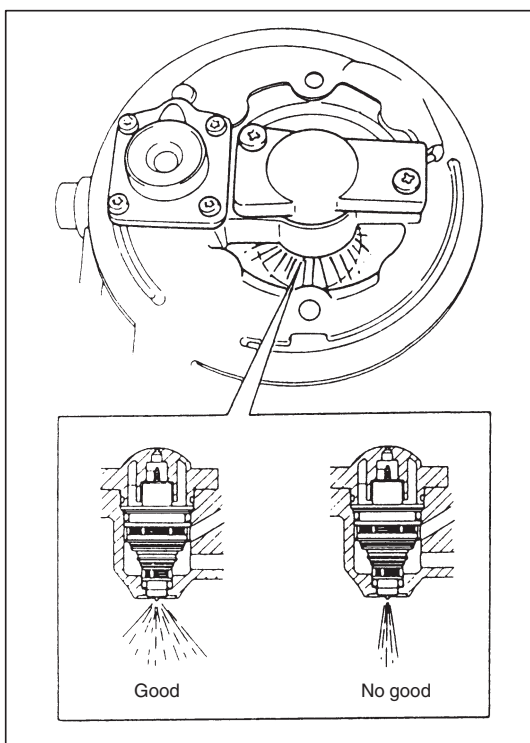
FUEL INJECTOR

ON-VEHICLE INSPECTION

- 1) With battery negative cable disconnected, disconnect injector coupler.
2) Connect ohmmeter to each injector terminal and measure resistance.

Resistance of injector: 0.5 – 1.5 Ω at 20°C (68°F)

If resistance is out of specification, replace fuel injector.



- 3) Connect injector coupler.
4) Remove air chamber case.
5) Check that fuel is injected out in conical shape from fuel injector when cranking or running engine.

If no fuel is injected, check wiring harness for continuity and couplers for proper connection referring to "DIAGNOSTIC FLOW TABLE B-1".

If fuel is not injected out in conical shape, replace injector.

- 6) Check injector for fuel leakage after injection is stopped (i.e., after cranking or engine stop).

Replace if leakage exists.

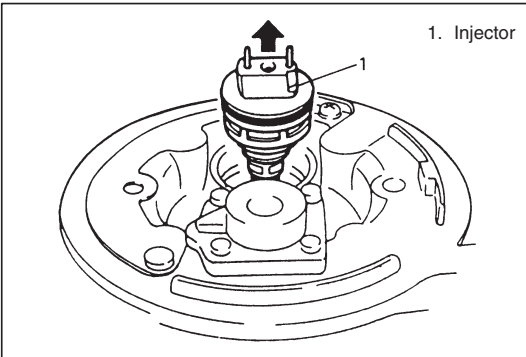
Fuel leakage: Less than 1 drop/min.

- 7) Install air chamber case.

REMOVAL**NOTE:**

Use care when handling fuel injector especially not to damage filter and its needle.

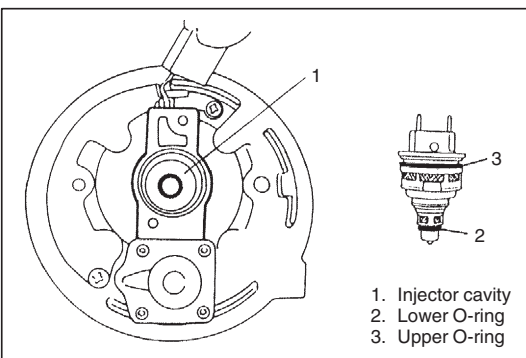
Also, because injector is an electrical component, it should not be immersed in any type of liquid solvent or cleaner, or it may get damaged.



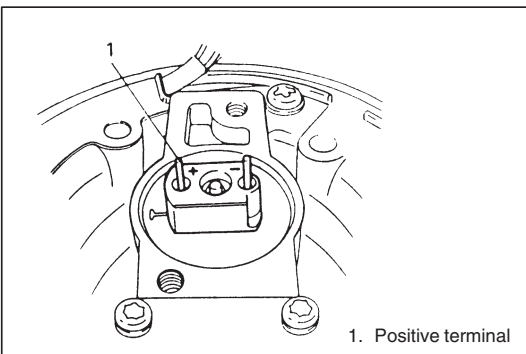
- 1) Relieve fuel pressure, referring to Section 6-1.
- 2) Disconnect battery negative cable at battery.
- 3) Remove air chamber case.
- 4) Remove air chamber case mounting stay from throttle body.
- 5) Remove injector wire and then remove fuel injector from throttle body.

INSPECTION

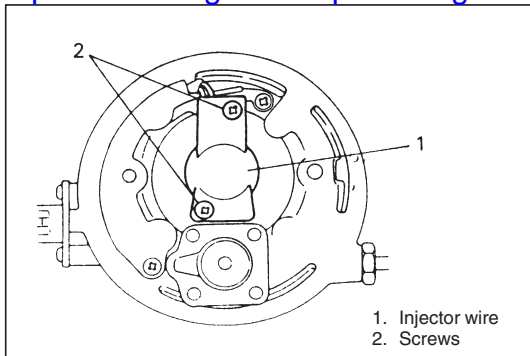
Check fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in fuel lines and fuel tank.

**INSTALLATION**

- 1) Apply thin coat of spindle oil or gasoline to new upper and lower O-rings, install lower O-ring and upper O-ring to injector.



- 2) Install injector by pushing it straight into fuel injector cavity. Never turn injector while pushing it.



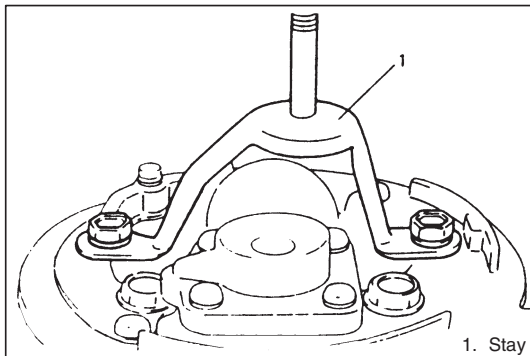
- 3) Make sure that injector wire O-ring is free from any damage and deterioration, and apply thin coat of spindle oil or gasoline to O-ring.

Install injector wire and tighten new wire screw to specified torque.

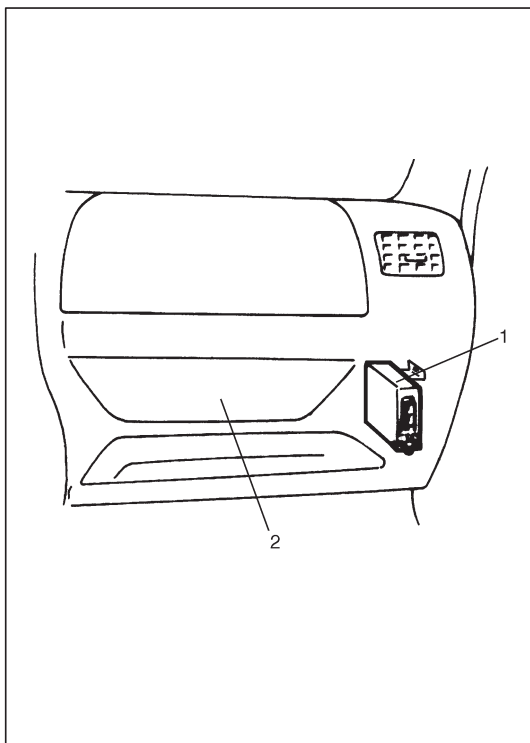
Tightening Torque

(a): 3.5 N·m (0.35 kg-m, 2.5 lb-ft)

- 4) Connect battery negative cable at battery.
5) With engine "OFF" and ignition switch "ON", check for fuel leaks.



- 6) Install air chamber case mounting stay as shown left.
7) Install air chamber case.



ELECTRONIC CONTROL SYSTEM ENGINE CONTROL MODULE (ECM)

CAUTION:

As ECM consists of precision parts, be careful not to expose it to excessive shock.

REMOVAL

- 1) Disconnect battery negative cable at battery.
- 2) Remove glove box (2).
- 3) Disconnect couplers from ECM (1) while releasing coupler lock.
- 4) Remove ECM from body.

INSTALLATION

- 1) Install ECM to body.
- 2) Connect couplers to ECM securely.
- 3) Install glove box.
- 4) Connect battery negative cable at battery.

MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP SENSOR)

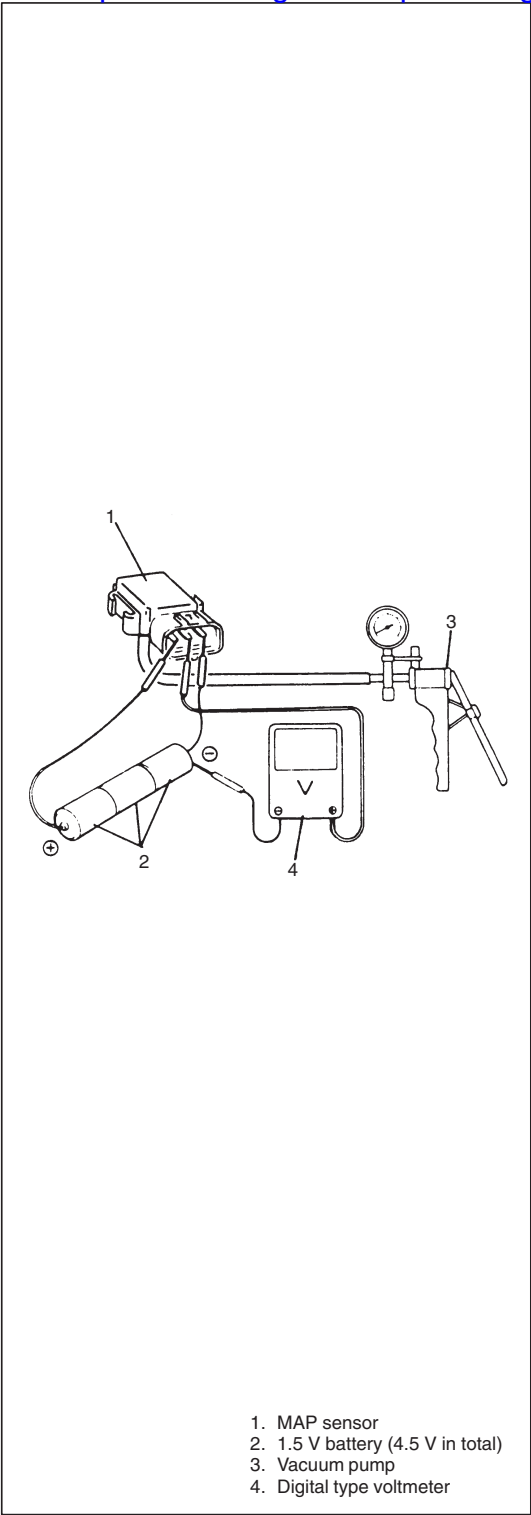
MAP SENSOR INDIVIDUAL CHECK

- 1) Disconnect MAP sensor vacuum hose from filter.
- 2) Disconnect coupler from MAP sensor.
- 3) Remove MAP sensor.
- 4) Arrange 3 new 1.5 V batteries in series (check that total voltage is 4.5 – 5.0 V) and connect its positive terminal to “Vin” terminal of sensor and negative terminal to “Ground” terminal. Then check voltage between “Vout” and “Ground”. Also, check if voltage reduces when vacuum is applied up to 40 cmHg by using vacuum pump.

Output voltage (Vin voltage 4.5 – 5.0 V, ambient temp. 20 – 30°C, 68 – 86°F)

ALTITUDE (Reference)		BAROMETRIC PRESSURE		OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	KPa	(V)
0 2 000	0 610	760 707	100 94	3.1 – 3.6
2 001 5 000	611 1 524	Under 707 over 634	94 85	
5 001 8 000	1 525 2 438	Under 634 over 567	85 76	2.8 – 3.4
8 001 10 000	2 439 3 048	Under 567 over 526	76 70	2.6 – 3.1
				2.4 – 2.9

If check result is not satisfactory, replace MAP sensor.



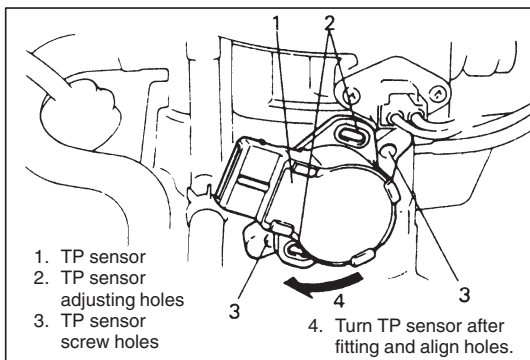
- 5) Install MAP sensor and connect vacuum hose securely.
- 6) Connect MAP sensor coupler securely.

THROTTLE POSITION SENSOR (TP SENSOR)**INSPECTION**

Check TP sensor referring to step 2 of DTC P0121 Flow Table. If malfunction is found, replace.

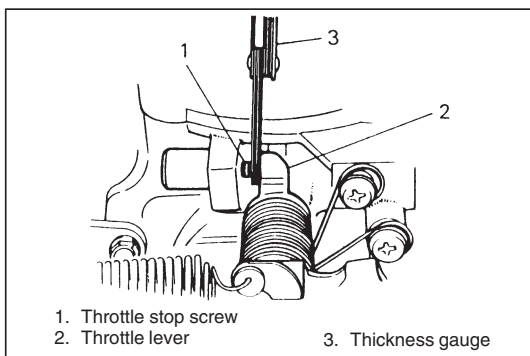
REMOVAL

- 1) Disconnect battery negative cable at battery.
- 2) Remove air chamber case.
- 3) Disconnect coupler from TP sensor.
- 4) Remove TP sensor from throttle body.

**INSTALLATION**

- 1) Install TP sensor to throttle body.
Fit TP sensor to throttle body in such way that its adjusting holes are a little away from TP sensor screw holes as shown in the figure and turn TP sensor clockwise so that those holes align. Then hand-tighten TP sensor screws.

- 2) Connect coupler to TP sensor securely.
- 3) Install air chamber case.
- 4) Connect battery negative cable at battery.
- 5) Adjust installation angle of TP sensor according to procedure described in item "ADJUSTMENT".

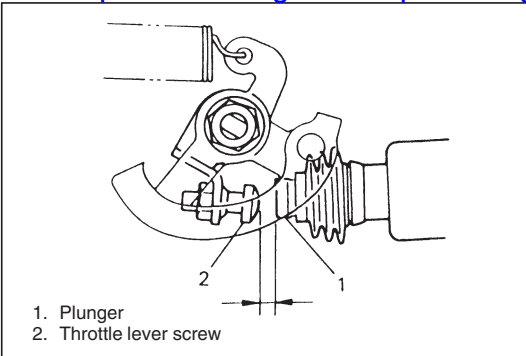
**ADJUSTMENT**

- 1) Insert 3.5 mm (0.14 in.) thickness gauge between throttle stop screw and throttle lever.

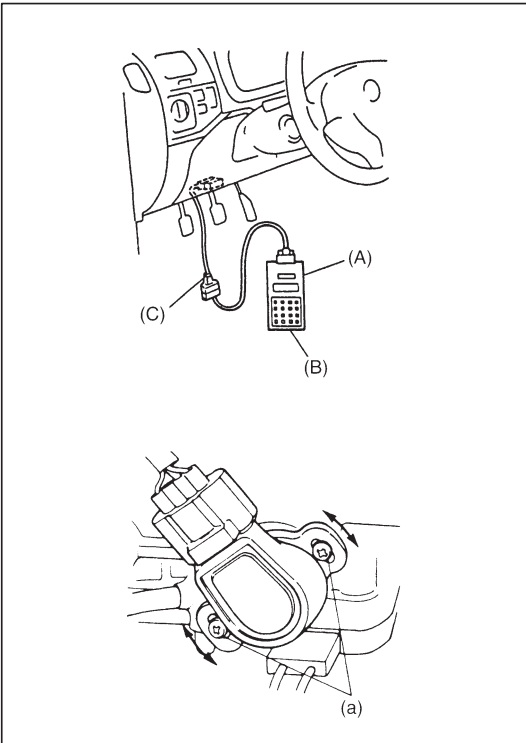
CAUTION:

As throttle stop screw is factory adjusted precisely, don't remove or adjust it.

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- 2) Check to make sure that plunger of ISC actuator and throttle lever screw are not in contact with each other. If they are, warm up engine.



- 3) Loosen TP sensor screws.
 - a) Connect SUZUKI scan tool to DLC with ignition switch OFF.

(A): 09931-76011 (SUZUKI scan tool)

(B): Mass storage cartridge

(C): 09931-76030 (16/14 pin DLC cable)

- b) Select "Data List" mode on SUZUKI scan tool.
 - c) Observe TP sensor voltage.

- 4) Turn TP sensor clockwise or counterclockwise and tighten TP sensor screw at a position where voltage as specified below is obtained.

**TP sensor voltage when lever-to-stop
screw clearance is 3.5 mm (0.14 in.) : 0.98 – 1.02 V**

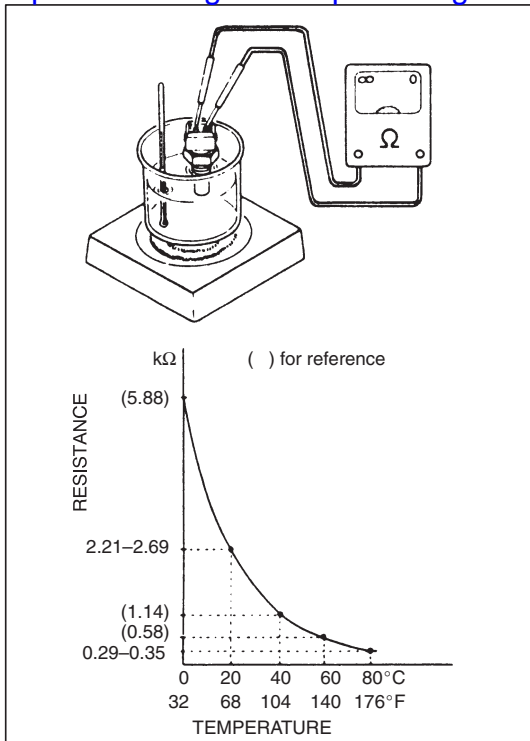
Tightening Torque

(a): 2.0 N·m (0.20 kg-m, 1.5 lb-ft)

- 5) Install ECM and connect couplers securely.

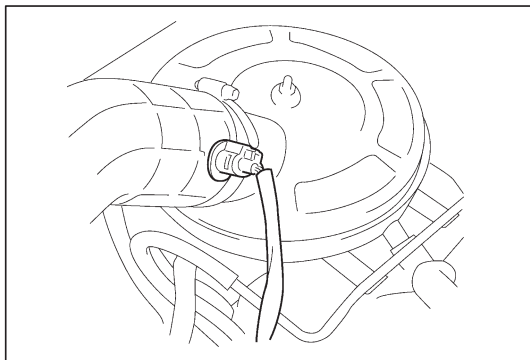
INTAKE AIR TEMPERATURE SENSOR (IAT SENSOR) REMOVAL

- 1) Disconnect battery negative cable at battery.
- 2) Disconnect coupler from IAT sensor.
- 3) Remove IAT sensor from air cleaner outlet hose.

**INSPECTION**

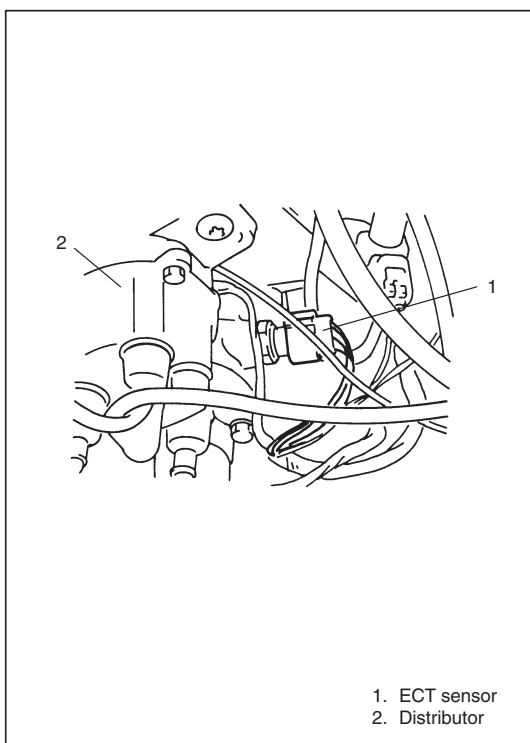
Immerse temperature sensing part of IAT sensor in water (or ice) and measure resistance between sensor terminals while heating water gradually.

If measured resistance doesn't show such characteristic as shown in the figure, replace IAT sensor.

**INSTALLATION**

Reverse removal procedure noting the following.

- Clean mating surfaces of IAT sensor and air cleaner outlet hose.
- Connect IAT sensor coupler securely.

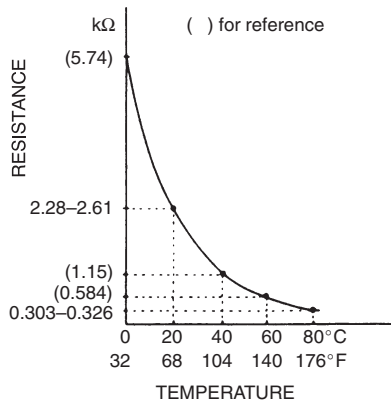
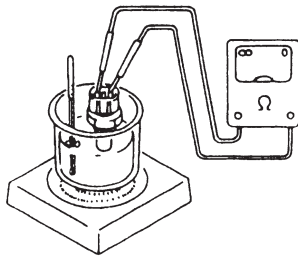
**ENGINE COOLANT TEMPERATURE SENSOR (ECT SENSOR)****REMOVAL**

- 1) Disconnect battery negative cable at battery.
- 2) Drain coolant referring to Section 6B.

WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

- 3) Disconnect coupler from ECT sensor.
- 4) Remove ECT sensor from thermostat case.



INSPECTION

Immerse temperature sensing part of ECT sensor in water (or ice) and measure resistance between sensor terminals while heating water gradually.

If measured resistance doesn't show such characteristic as shown in the figure, replace ECT sensor.

INSTALLATION

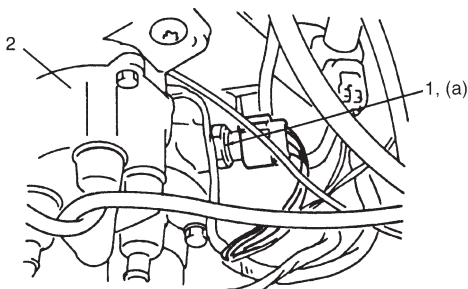
Reverse removal procedure noting the following.

- Clean mating surfaces of ECT sensor and thermostat case.
- Check O-ring for damage and replace if necessary.
- Tighten ECT sensor to specified torque.

Tightening Torque

(a): 15 N·m (1.5 kg-m, 11.0 lb-ft)

- Connect coupler to ECT sensor securely.
- Refill coolant referring to Section 6B.



1. ECT sensor
2. Distributor

HEATED OXYGEN SENSOR (SENSOR-1 AND SENSOR-2)**OXYGEN SENSOR HEATER INSPECTION**

- 1) Disconnect sensor coupler.
- 2) Using ohmmeter, measure resistance between terminals "V_B" and "GND" of sensor coupler.

NOTE:

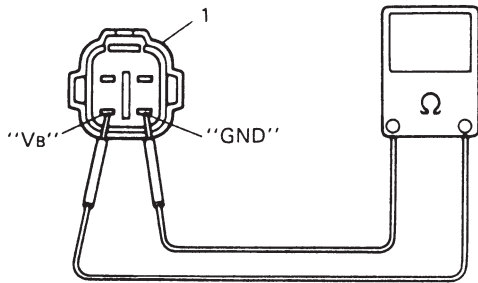
Temperature of sensor affects resistance value largely.
Make sure that sensor heater is at correct temperature.

Resistance of oxygen sensor heater:

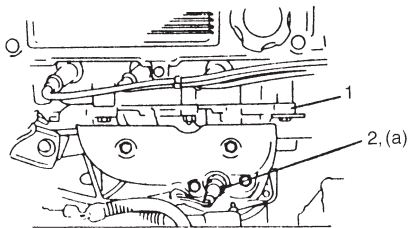
11.7 – 14.3 Ω at 20°C, 68°F

If found faulty, replace oxygen sensor.

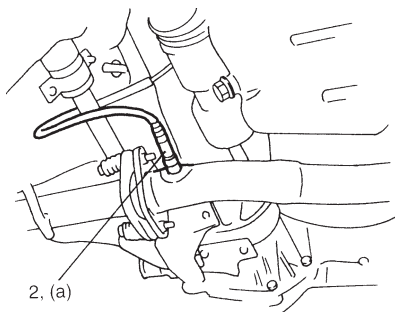
- 3) Connect sensor coupler securely.



1. Viewed from terminal side

Sensor-1

1. Exhaust manifold
2. Heated oxygen sensor

Sensor-2**REMOVAL****WARNING:**

To avoid danger of being burned, do not touch exhaust system when system is hot. Oxygen sensor removal should be performed when system is cool.

- 1) Disconnect negative cable from battery.
- 2) Hoist vehicle when removing sensor-2.
- 3) Disconnect coupler of heated oxygen sensor and release its wire harness from clamps.
- 4) Remove exhaust manifold cover when removing sensor-1.
- 5) Remove heated oxygen sensor from exhaust manifold or exhaust No.1 pipe.

INSTALLATION

Reverse removal procedure noting the following.

- Tighten heated oxygen sensor to specified torque.

Tightening Torque

(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

- Connect coupler of heated oxygen sensor and clamp wire harness securely.
- After installing heated oxygen sensor, start engine and check that no exhaust gas leakage exists.

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VEHICLE SPEED SENSOR (VSS)

INSPECTION

Check vehicle speed sensor referring to step 3 of DTC P0500 Flow Chart. If malfunction is found, replace.

REMOVAL/INSTALLATION

Refer to Section 7A.

FUEL LEVEL SENSOR (GAUGE)

Refer to Section 8.

CRANKSHAFT POSITION SENSOR**INSPECTION**

Check crankshaft position sensor referring to step 1 and 2 of DTC P0335 Flow Table. If malfunction is found, replace.

REMOVAL

- 1) Hoist vehicle.
- 2) Disconnect connector from crankshaft position sensor.
- 3) Remove crankshaft position sensor from oil pan.

INSTALLATION

- 1) Check to make sure that crankshaft position sensor and pulley tooth is free from any metal particles and damage.
- 2) Install crankshaft position sensor to oil pan.
- 3) Connect connector to it securely.

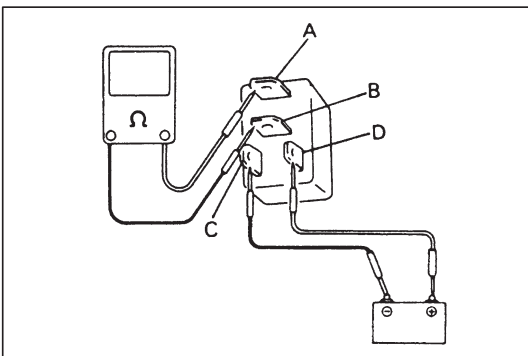
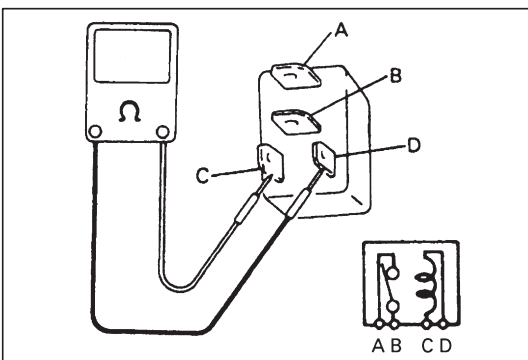
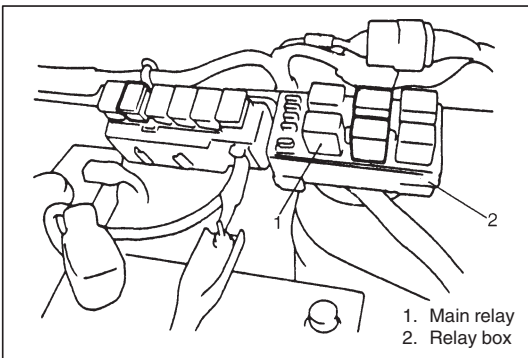
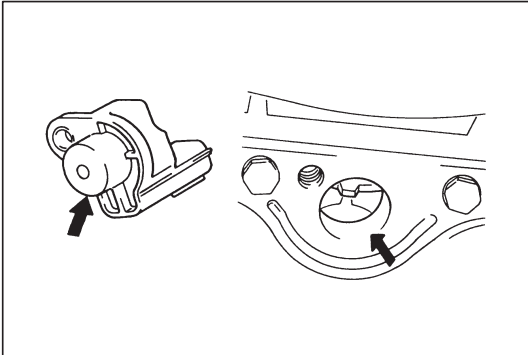
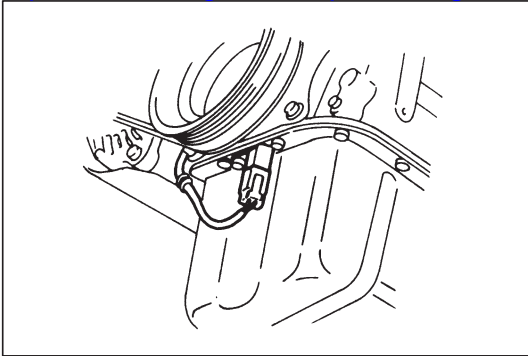
MAIN RELAY**INSPECTION**

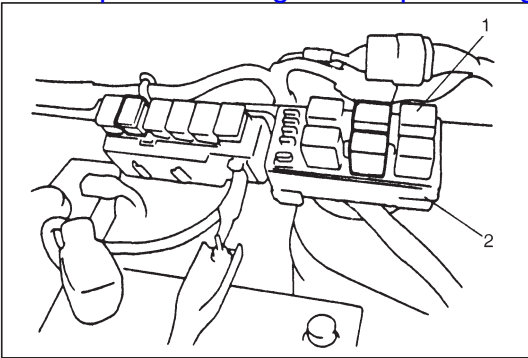
- 1) Disconnect negative cable at battery.
- 2) Remove main relay from relay box.

- 3) Check resistance between each two terminals as in table below. If check results are as specified, proceed to next operation check. If not, replace.

TERMINALS	RESISTANCE
Between A and B	∞ (infinity)
Between C and D	100 – 120 Ω

- 4) Check that there is continuity between terminals "A" and "B" when battery is connected to terminals "C" and "D". If found defective, replace.

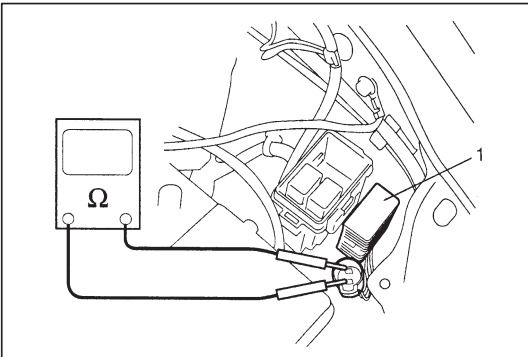




FUEL PUMP RELAY

INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Remove fuel pump relay (1) from relay box (2).
- 3) Structure of fuel pump relay is the same as that of main relay.
Check its resistance and operation using the same procedure as that for main relay.
If found defective, replace.



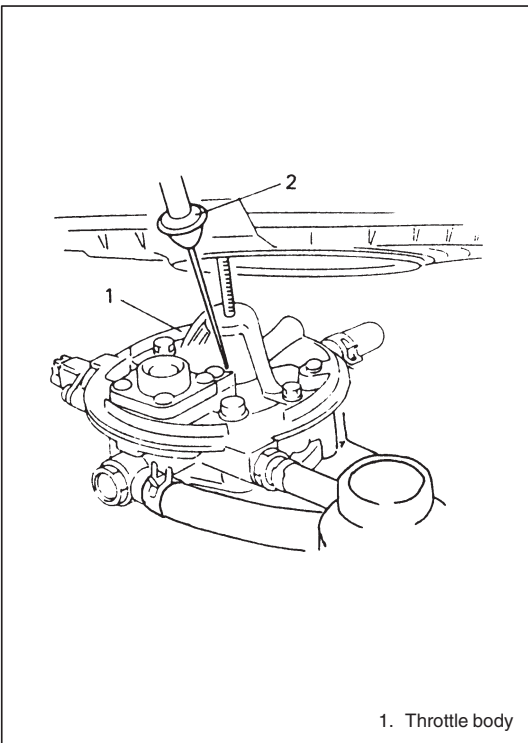
FUEL INJECTOR RESISTOR

INSPECTION

- 1) With ignition switch OFF, disconnect resistor coupler.
- 2) Check resistor (1) for resistance.

Resistance: 1.9 – 2.1 Ω at 20°C, 68°F

If check result is not satisfied, replace.



1. Throttle body

FUEL CUT OPERATION

INSPECTION

NOTE:

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range), A/C is OFF and that parking brake lever is pulled all the way up.

- 1) Warm up engine to normal operating temperature.
- 2) While listening to sound of injector by using sound scope (2) or such, increase engine speed to higher than 3,000 r/min.
- 3) Check to make sure that sound to indicate operation of injector stops when throttle valve operation of injector stops when throttle valve is closed instantly and it is heard again when engine speed is reduced to less than about 2,000 r/min.

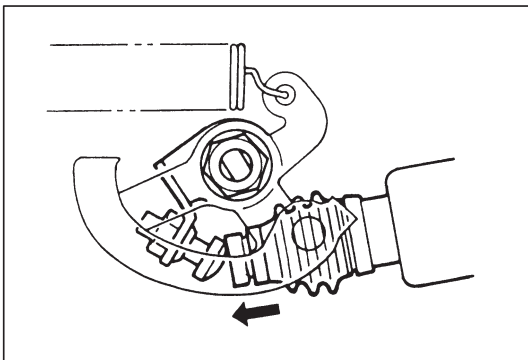
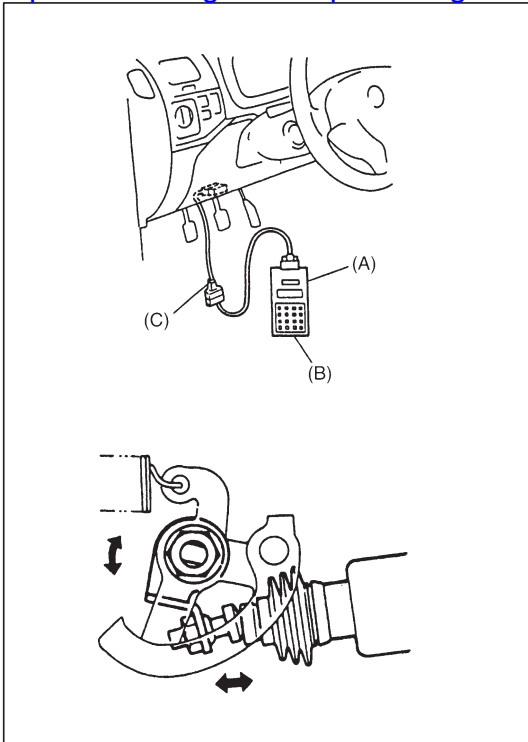
IDLE SPEED CONTROL SYSTEM

SYSTEM INSPECTION

NOTE:

Before inspection, check to make sure that:

- Gear shift lever is in neutral position (with A/T vehicle, selector lever in "P" range) and that parking brake lever is pulled all the way up.
- Battery voltage is higher than 11 V.
- Throttle valve moves smoothly.
- Ambient temperature is higher than 0°C (32°F)



- 1) Connect scan tool to DLC with ignition switch OFF, if it is available.
- 2) Warm up engine to normal operating temperature.
- 3) Select "Data List" mode on scan tool to check "IAC duty".
- 4) Apply load to engine as described below and check that idle speed is kept at specified level and "IAC duty" increases as specified below. At the same time, check that plunger of ISC actuator moves.

Increase of ISC duty

when headlight turns ON : About 3.5%

when A/C is operating : About 10%

- 5) Stop engine and leave it as it is till it cools off. Then check that plunger of ISC actuator moves when ignition switch is turned from OFF to ON once.

If abnormality is found in Steps 4) and 5), check ISC relay, ISC actuator, ISC electric circuit and closed throttle position switch signal.

If abnormality is found in Step 4) only, check A/C signal circuit first.

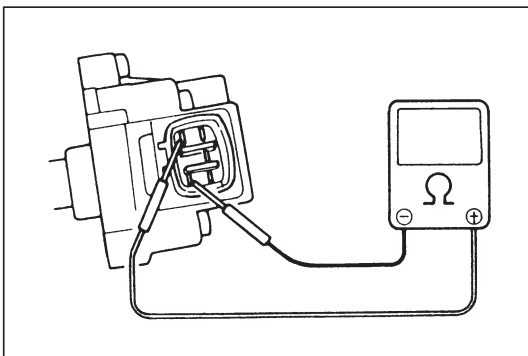
ISC ACTUATOR

NOTE:

As ISC actuator has been preadjusted precisely at factory, it must not be taken out of throttle body or disassembled.

INSPECTION

- 1) Disconnect connector from ISC actuator.

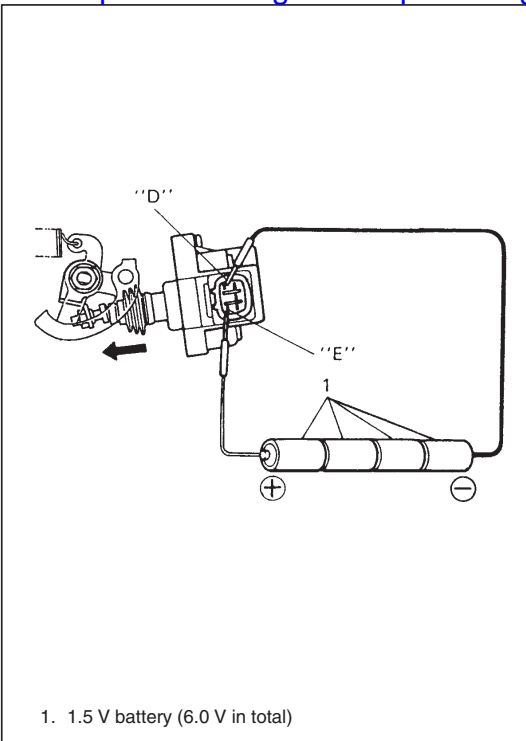


- 2) Check whether ISC actuator coil is open or short.

ISC actuator resistance at 20°C (68°F): 3 – 50 Ω

NOTE:

Above data should be used as reference value for determining whether coil is open or short only. ISC actuator resistance may be out of above specified range even when ISC actuator is normal.



3) Arrange 4 new 1.5 V batteries in series (6.0 V in total).

With throttle lever in contact with plunger of ISC actuator, connect these batteries to ISC actuator terminals and check ISC actuator for operation.

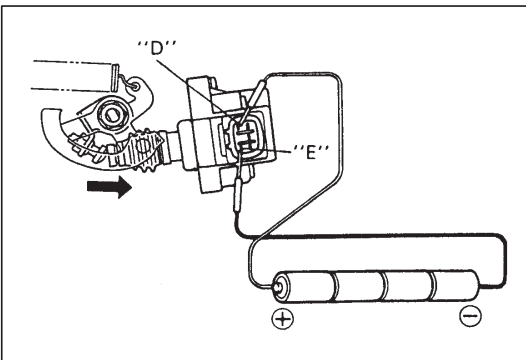
CAUTION:

- Make sure that connection is made correctly between batteries and terminals. Also, voltage must not be applied for longer than 1 second, or a faulty condition will occur.
- Make sure that connection is correct. Connecting to other terminals may cause damage to closed throttle position switch (idle switch).
- After inspection, be sure to check that CTP switch is ON. If it is OFF, move ISC actuator again and turn CTP switch ON.

When positive terminal is connected to "E" terminal while plunger is contracted: Plunger expands

When positive terminal is connected to "D" terminal while plunger is expanded : Plunger contracts

When an abnormality has been found in above checks 2) and 3), replace.



CLOSED THROTTLE POSITION (CTP) SWITCH (IDLE SWITCH) IN ISC ACTUATOR

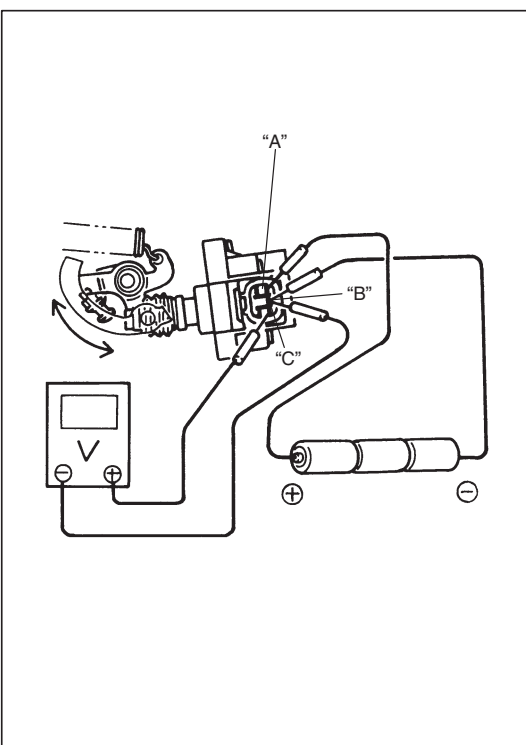
INSPECTION

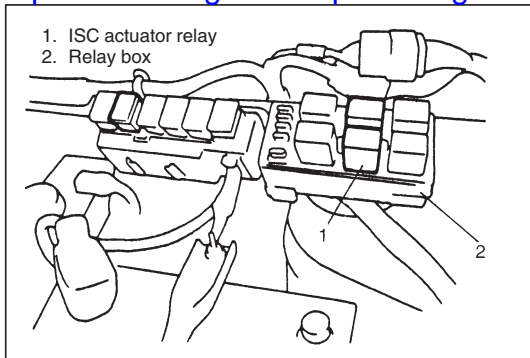
- 1) Disconnect connector from ISC actuator.
- 2) Arrange 3 new 1.5 V batteries in series (4.5 V in total) and connect these batteries to CTP switch terminals "A" and "B". Check voltage between terminals "B" and "C" under following each condition.

Throttle lever is in contact with ISC actuator plunger : 0 – 1 V

Throttle lever is apart from plunger : 3.5 – 5.5 V

If check result is not satisfactory, replace throttle lower body.

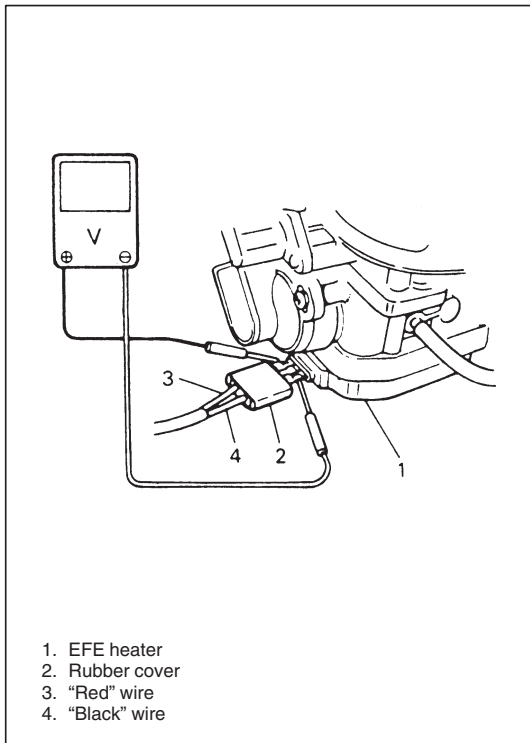




ISC ACTUATOR RELAY

INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Remove ISC actuator relay from relay box.
- 3) Structure of ISC actuator relay is the same as that of main relay.
Check its resistance and operation using the same procedure as that for main relay.



EFE HEATER CONTROL SYSTEM

SYSTEM CIRCUIT INSPECTION

NOTE:

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range) and that parking brake lever is pulled all the way up.

- 1) Turn up rubber cover of EFE heater to expose terminal-to-wire connections.
- 2) Connect voltmeter to EFE terminals and check for voltage under each condition given below.

CONDITION	VOLTAGE
Fast idle condition Coolant temp.: below 80°C (176°F) Engine speed: over 750 r/min.	Battery voltage
After warming up (other than above)	No voltage

If check results are not as specified in above table, check EFE heater, relay and wire harness.

- 3) Cover EFE heater connections with rubber cover.

EFE HEATER

CAUTION:

Do not bend wire harness of EFE heater excessively.

ON-VEHICLE INSPECTION

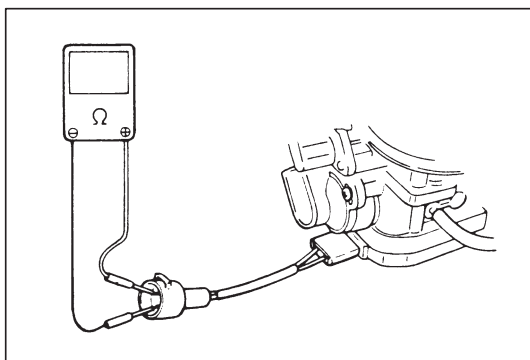
- 1) Disconnect EFE heater coupler.
- 2) Check resistance of EFE heater.
If it is not as specified below, replace.

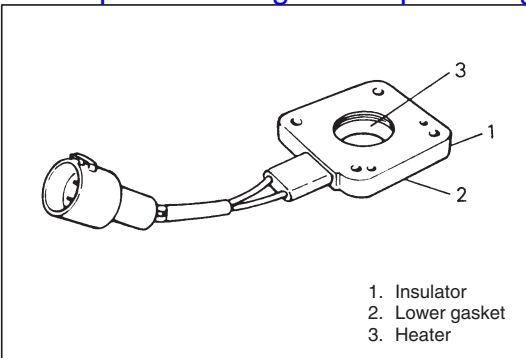
EFE heater resistance: 0.5 – 3.0 Ω at 20°C (68°F)

- 3) Connect EFE heater coupler securely.

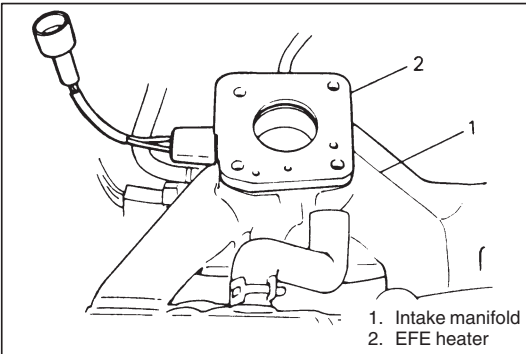
REMOVAL

- 1) Remove throttle body according to procedure described previously.
In this case, however, it is not necessary to disconnect fuel hoses and engine cooling water hoses from throttle body.
- 2) Disconnect EFE heater coupler.
- 3) Remove EFE heater from intake manifold.

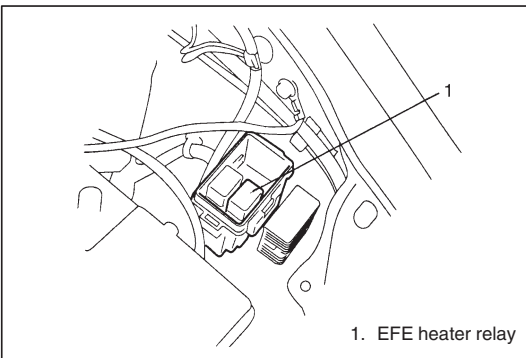


**INSPECTION**

- Check lower gasket for damage and deterioration. Replace as necessary.
- Check heater and insulator for crack, corrosion or any other damage. Replace as necessary.

**INSTALLATION**

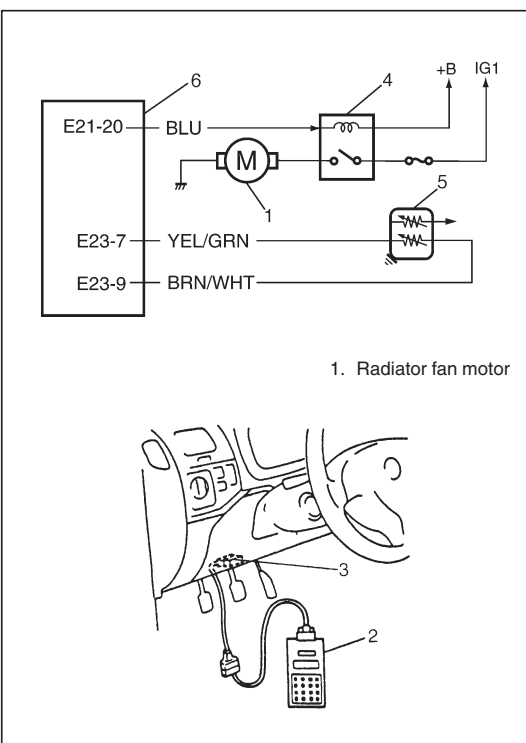
- 1) Clean mating surfaces of throttle body and intake manifold that mate with EFE heater.
- 2) Install EFE heater to intake manifold.
Use new upper gasket.
- 3) Install throttle body according to procedure described previously.
- 4) Connect EFE heater coupler.

**EFE HEATER RELAY****INSPECTION**

- 1) Disconnect negative cable at battery.
- 2) Remove EFE heater relay from relay box.
- 3) Structure of EFE heater relay is the same as that of main relay.
Check its resistance and operation using the same procedure as that for main relay.
If found defective, replace.

RADIATOR FAN CONTROL SYSTEM**SYSTEM INSPECTION****WARNING:**

Keep hands, tools, and clothing away from engine cooling fan to help prevent personal injury. This fan is electric and can come on whether or not the engine is running. The fan can start automatically in response to the ECT sensor with the ignition switch in the "ON" position.



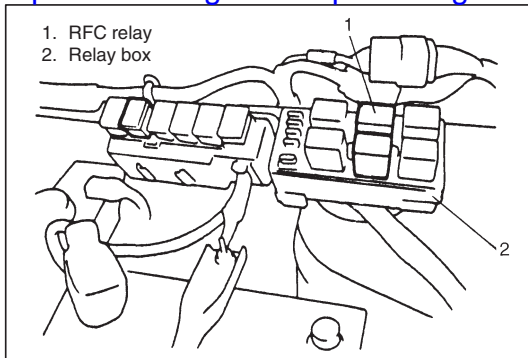
Connect SUZUKI scan tool (2) to DLC (3).

Start engine and keep it running to warm it up.

Now check to ensure that radiator fan is started when the coolant temperature displayed on SUZUKI scan tool reaches 96°C (205°F).

If check result is not satisfactory, check RFC relay (4), wire harness, ECT sensor (5), ECM (6), coolant temp. meter and sender gauge unit.

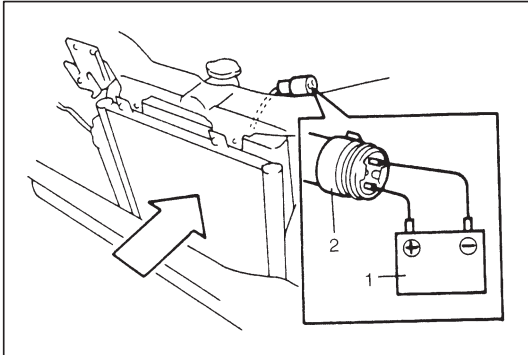
Refer to "DTC P0480 FLOW TABLE" of Section 6-1 and Section 8.



RADIATOR FAN CONTROL RELAY (RFC RELAY)

INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Remove RFC relay from relay box.
- 3) Structure of RFC relay is the same as that of main relay.
Check its resistance and operation using the same procedure as that for main relay. If found defective, replace.



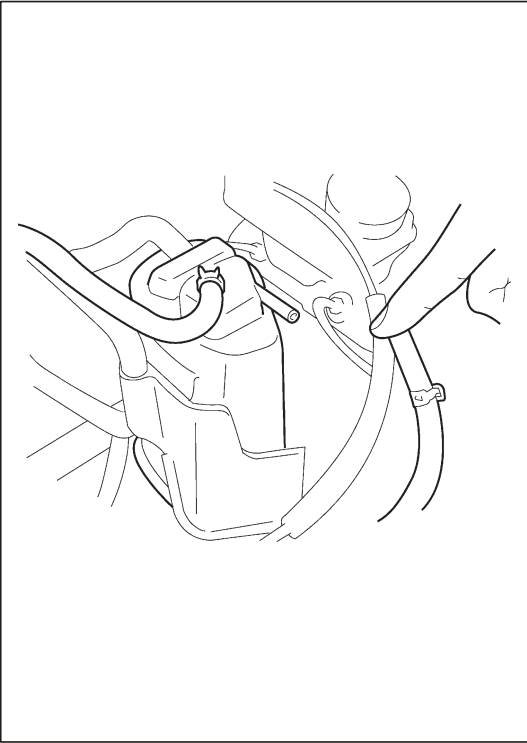
RADIATOR FAN

INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Disconnect radiator fan motor connector (2).
- 3) Connect battery (1) to the motor and check for operation.
If fan fails to operate, replace.

EMISSION CONTROL SYSTEM**EVAPORATIVE EMISSION CONTROL SYSTEM****EVAP CANISTER PURGE INSPECTION****NOTE:**

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range) and that parking brake lever is pulled all the way up.



- 1) Disconnect purge hose from EVAP canister.
- 2) Place finger against the end of disconnected hose and check that vacuum is not felt there when engine is cool and running at idle speed.
- 3) Connect purge hose to EVAP canister and warm up engine to normal operating temperature.
- 4) Disconnect purge hose from EVAP canister.
- 5) Also check that vacuum is felt when engine is running at in between 2000 and 4000 r/min.

NOTE:

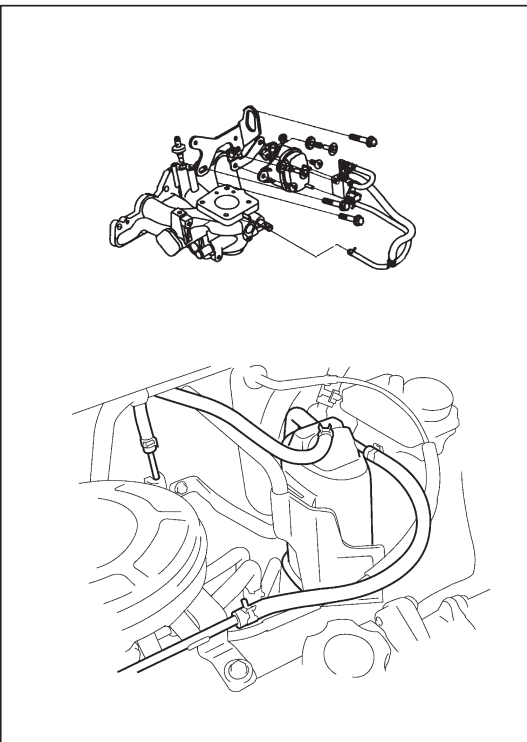
The EVAP canister purge system does not perform purging (vacuum is not detected at the purge hose) unless the engine is sufficiently warmed up and the heated oxygen sensor is activated fully. Also, when the purge hose is disconnected in Step 4), the air is drawn into the purge line. As a result, ECM detects a change in the purge gas concentration and sometimes stops purging but this indicates nothing abnormal.

If check result is not satisfactory, check vacuum passage, hoses, EVAP canister purge valve, wire harness and ECM.

VACUUM PASSAGE INSPECTION

Start engine and run it at idle speed. Disconnect vacuum hose from EVAP canister purge valve. With finger placed against hose disconnected, check that vacuum is applied.

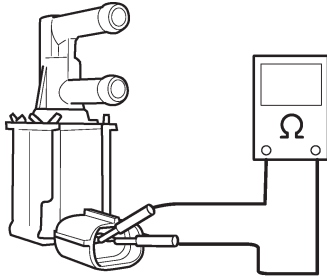
If it is not applied, clean vacuum passage by blowing compressed air.

**VACUUM HOSE INSPECTION**

Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

EVAP CANISTER PURGE VALVE INSPECTION**WARNING:**

Do not suck the air through valve. Fuel vapor inside valve is harmful.

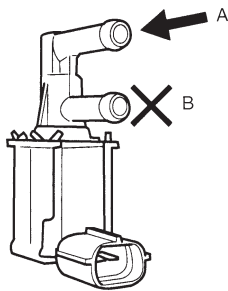


- 1) With the ignition switch OFF position, disconnect coupler from EVAP canister purge valve.
- 2) Check resistance between two terminals of EVAP canister purge valve.

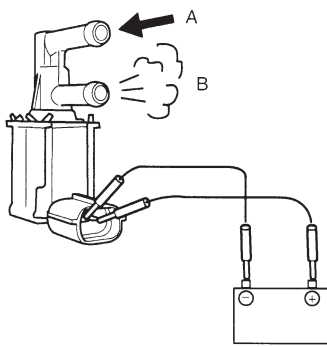
Resistance of EVAP canister purge valve:

30 – 34 Ω at 20°C (68°F)

If resistance is as specified, proceed to next operation check.
If not, replace.



- 3) Disconnect vacuum hoses from intake manifold and its pipe.
- 4) With coupler disconnected, blow into pipe "A". Air should not come out of pipe "B".

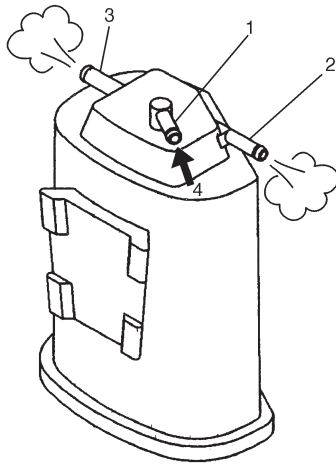


- 5) Connect 12 V-battery to EVAP canister purge valve terminals. In this state, blow pipe "A". Air should come out of pipe "B". If check result is not as described, replace canister purge valve.

- 6) Connect vacuum hoses.
- 7) Connect EVAP canister purge valve coupler securely.

EVAP CANISTER INSPECTION**WARNING:**

DO NOT SUCK nozzles on EVAP canister. Fuel vapor inside EVAP canister is harmful.



- 1. Tank pipe
- 2. Purge pipe
- 3. Air pipe
- 4. Blow air

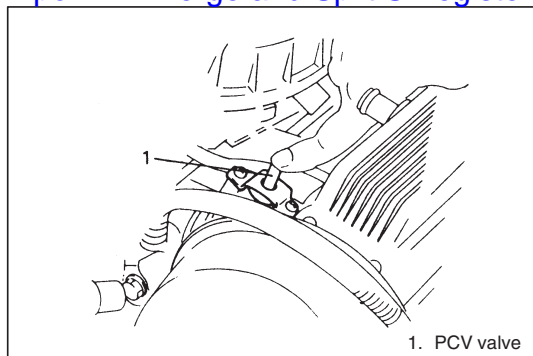
- 1) Disconnect vacuum hoses from EVAP canister and remove EVAP canister.
- 2) When air is blown into tank pipe, there should be no restriction of flow through purge pipe and air pipe.
If operation differs from above description, EVAP canister must be replaced.
- 3) Install EVAP canister and connect hoses to canister.

PCV SYSTEM**NOTE:**

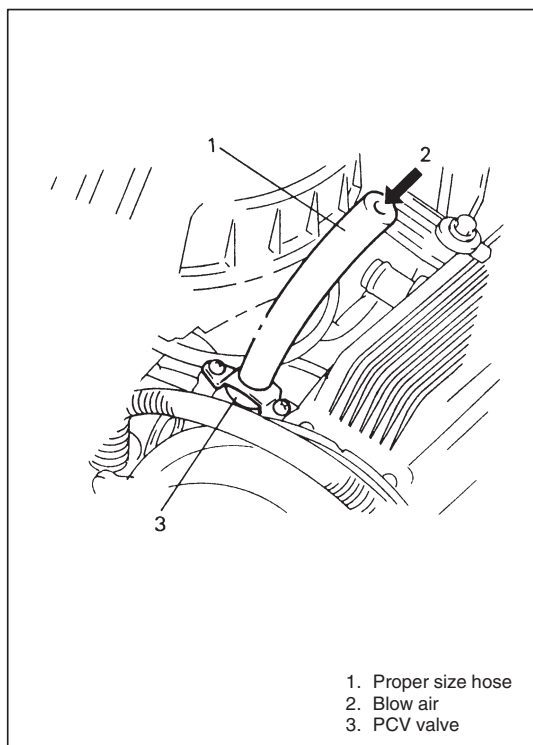
Be sure to check that there is no obstruction in PCV valve or its hoses before adjusting engine idle speed, for obstructed PCV valve or hose hampers its accurate adjustment.

PCV HOSE INSPECTION

Check hoses for connection, leakage, clog and deterioration.
Replace as necessary.

**PCV VALVE INSPECTION**

- 1) Disconnect PCV hose from PCV valve.
- 2) Run engine at idle.
- 3) Place your finger over end of PCV valve to check for vacuum. If there is no vacuum, check for clogged valve. Replace as necessary.



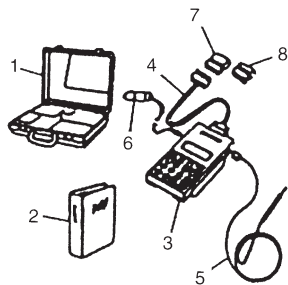
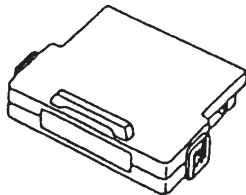
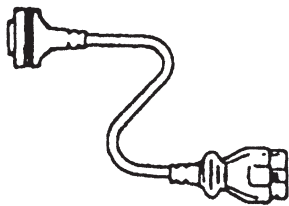
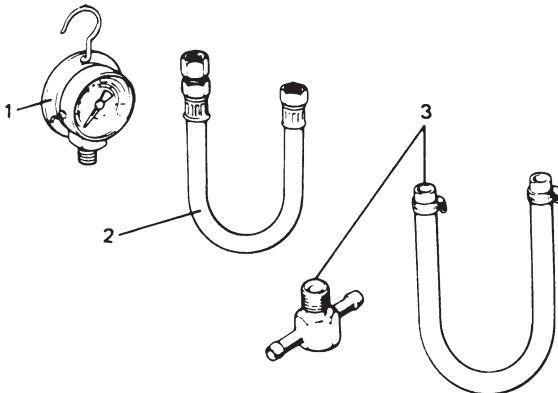
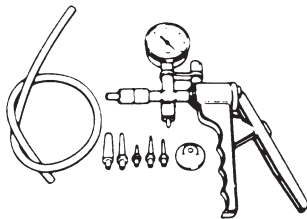
- 4) After checking vacuum, stop engine and check PCV valve for sticking. With engine stopped, connect a new hose to PCV valve for inspection. Blow air into the hose and check that air flows with difficulty from cylinder head side to intake manifold side. If air flows without difficulty, valve is stuck in "Open" position. Replace PCV valve.

WARNING:

Do not suck air through PCV valve. Petroleum substances inside the valve and fuel vapor inside the intake manifold are harmful.

- 5) After removing the hose, connect PCV hose and clamp securely.

SPECIAL TOOLS

 <ol style="list-style-type: none">1. Storage case2. Operator's manual3. Tech 1A4. DLC cable (14/26 pin, 09931-76040)5. Test lead/probe6. Power source cable7. DLC cable adaptor8. Self-test adaptor	 <p>Mass storage cartridge</p>	 <p>09931-76030 16/14 pin DLC cable</p>
 <ol style="list-style-type: none">1. Fuel pressure gauge 09912-584412. Pressure hose 09912-584313. 3-way joint & hose 09912-58490	 <p>09917-47010 Vacuum pump gauge</p>	

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Throttle body mounting bolt	23	2.3	17.0
Throttle upper and lower body screw	3.5	0.35	2.5
Fuel injector wire connector screw	2.0	0.20	1.5
Fuel injector cover screw	3.5	0.35	2.5
TP sensor mounting screw	2.0	0.20	1.5
ECT sensor	15	1.5	11.0
Heated oxygen sensor -1 and -2	45	4.5	32.5

SECTION 6F

IGNITION SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

6F

CONTENTS

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Ignition Spark Test	6F- 5	Ignition Timing	6F- 9
High-Tension Cords	6F- 5	Distributor Unit	6F-10
Spark Plugs	6F- 6	SPECIAL TOOLS	6F-11
Noise Suppressor	6F- 6		

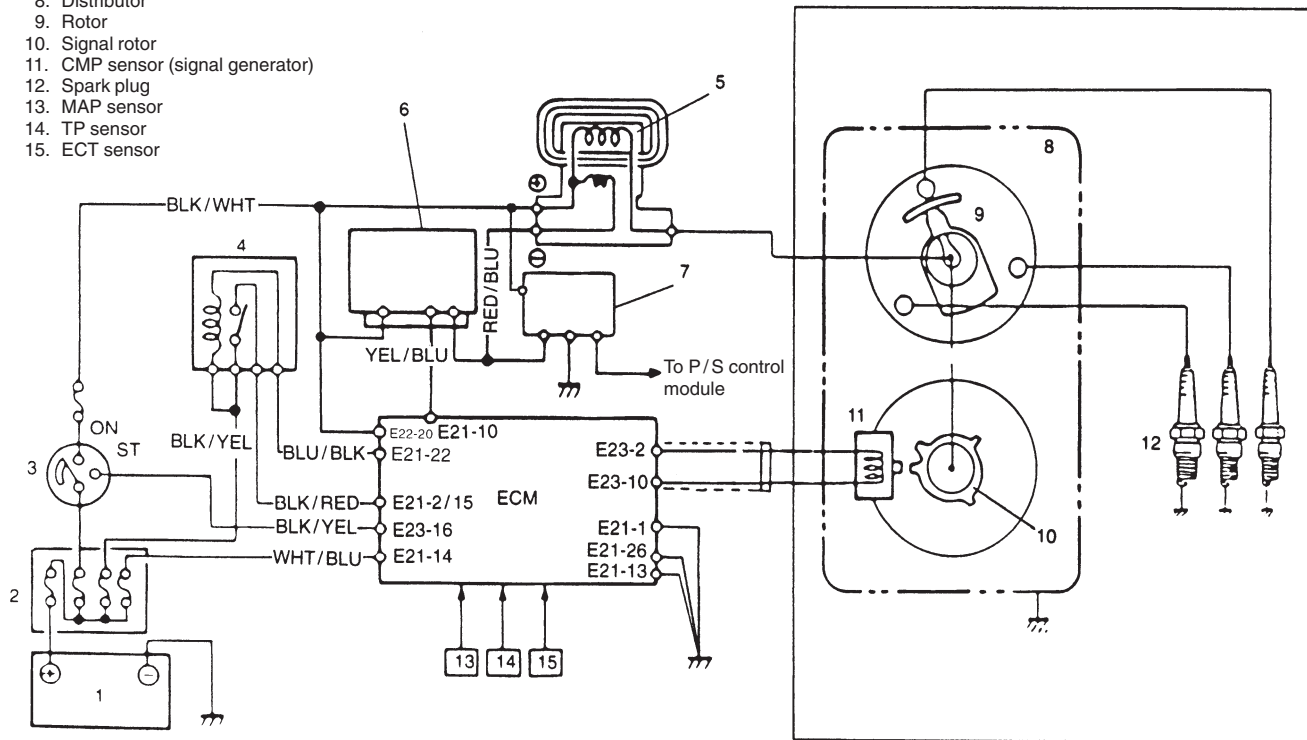
GENERAL DESCRIPTION

The ignition system used for this vehicle has an electronic ignition control system and consists of the following parts.

- **ECM**
It detects the engine condition through the signals from the sensors, determines the most suitable ignition timing and time for electricity to flow to the primary coil and sends a signal to the power unit.
- **Power unit (Igniter)**
It turns ON and OFF the primary current of the ignition coil according to the signal from ECM.
- **Ignition coil**
When the ignition coil primary current is turned OFF, a high voltage is induced in the secondary winding.
- **Distributor**
It distributes a high voltage current to each plug.

- **High-tension cords and spark plugs.**
 - **CMP sensor (Camshaft position Sensor)**
Located in the distributor, it converts the crank angle into voltage variation and sends it to ECM. For its details, refer to Section 6E1.
 - **TP sensor, ECT sensor and MAP sensor**
For their details, refer to Section 6E1.
- In electronic ignition control system, the ECM is programmed for the best ignition timing under every engine condition. Receiving signals which indicate the engine condition from the sensors, e.g., engine revolution, intake air pressure, coolant temperature, etc., it selects the most suitable ignition timing from its memory and operates the power unit.
- Thus ignition timing is controlled to yield the best engine performance.
- For more information, refer to Section 6E1.

1. Battery
2. Main fuse
3. Ignition switch
4. Main relay
5. Ignition coil
6. Igniter
7. Noise suppressor
8. Distributor
9. Rotor
10. Signal rotor
11. CMP sensor (signal generator)
12. Spark plug
13. MAP sensor
14. TP sensor
15. ECT sensor



DIAGNOSIS

Condition	Possible Cause	Correction
Engine cranks, but will not start or hard to start	<ul style="list-style-type: none"> ● Blown fuse for ignition coil ● Loose connection or disconnection of lead wire or high-tension cord(s) ● Faulty high-tension cord(s) ● Faulty spark plug(s) ● Cracked rotor or cap ● Maladjusted signal rotor air gap ● Faulty ignition coil ● Faulty noise suppressor ● Faulty CMP sensor ● Faulty igniter ● Faulty ECM (or PCM) ● Maladjusted ignition timing 	Replace Connect securely Replace Adjust, clean or replace Replace Adjust Replace Replace Replace Replace Replace Adjust
Poor fuel economy or engine performance	<ul style="list-style-type: none"> ● Incorrect ignition timing ● Faulty spark plug(s) or high-tension cord(s) ● Faulty ECM (or PCM) 	Adjust Adjust, clean or replace Replace

DIAGNOSTIC FLOW TABLE

STEP	ACTION	YES	NO
1	Was "Engine Diagnostic Flow Table" in SECTION 6-1 performed?	Go to Step 2.	Go to "Engine Diagnostic Flow Table" in SECTION 6-1.
2	Ignition Spark Test 1) Check all spark plug for condition and type, referring to "Spark Plugs" in this section. 2) If OK, perform ignition spark test, referring to "Ignition Spark Test" in this section. Is spark emitted from all spark plugs?	Go to Step 11 on the next page.	Go to Step 3.
3	Diagnostic Trouble Code (DTC) Check 1) Check DTC stored in ECM (or PCM), referring to "Diagnostic Trouble Code (DTC) Check" in SECTION 6-1. Is DTC stored?	Go to applicable flow table corresponding to that code No. in SECTION 6-1.	Go to Step 4.
4	Electrical Connection and Noise Suppressor Check 1) Check ignition coil for electrical connection and noise suppressor for conductivity. Are they good condition?	Go to Step 5.	Repair or replace.
5	High-tension Cord Check 1) Check high-tension cord for resistance, referring to "High-tension Cords" in this section. Is check result satisfactory?	Go to Step 6.	Replace high-tension cord(s).

STEP	ACTION	YES	NO
6	Ignition Coil Power Supply and Ground Circuit Check 1) Check ignition coil power supply ("BLK/WHT" wire) circuit for open and short. Are circuits in good condition?	Go to Step 7.	Repair or replace.
7	Ignition Coil Check 1) Check ignition coil for resistance, referring to "Ignition Coil" in this section. Is check result satisfactory?	Go to Step 8.	Replace ignition coil assembly.
8	CMP Sensor Check 1) Check CMP sensor and signal rotor, referring to "Distributor" in this section. Is check result satisfactory?	Go to Step 9.	Adjust or replace.
9	Ignition Trigger Signal Circuit Check 1) Check ignition trigger signal ("YEL/BLU" wire) circuit for open, short and poor connection. Are circuits in good condition?	Go to Step 10.	Repair or replace.
10	Igniter Check 1) Check igniter, referring to "Igniter" in this section. Is check result satisfactory?	Go to Step 11.	Replace igniter.
11	Ignition Timing Check 1) Check initial ignition timing and ignition timing advance, referring to "Ignition Timing" in this section. Is check result satisfactory?	Substitute a known-good ECM (or PCM) and then repeat Step 2.	Go to Step 12.
12	Ignition Timing Adjustment and Recheck 1) Adjust initial ignition timing, referring to "Ignition Timing" in this section. 2) Recheck initial ignition timing and ignition timing advance, referring to "Ignition Timing" in this section. Is check result satisfactory?	System is in good condition.	Substitute a known-good ECM (or PCM) and then repeat Step 2.

ON-VEHICLE SERVICE

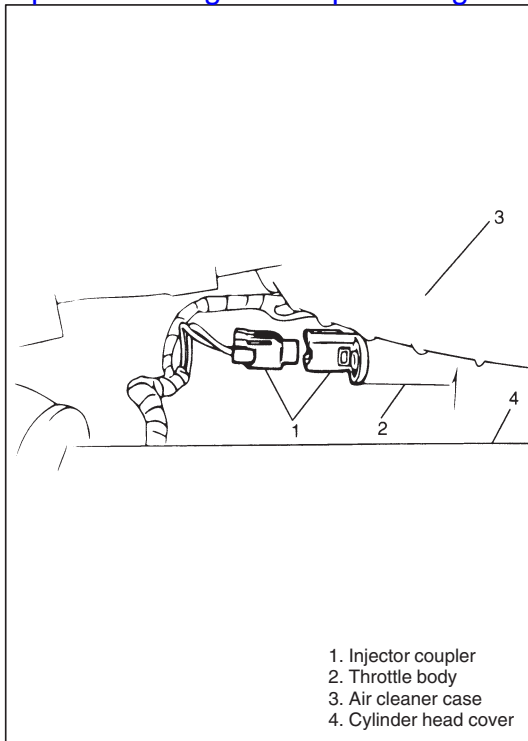
IGNITION SPARK TEST

- 1) Disconnect injector coupler at throttle body side.

WARNING:

Without disconnection of injector coupler, combustible gas may come out from spark plug holes during this test and may get ignited in engine room.

- 2) Remove spark plugs and connect them to high-tension cords, and then ground spark plugs.
- 3) Crank engine and check if each spark plug sparks.
- 4) If no spark is emitted, inspect high-tension cords, spark plugs, ignition coil, distributor, etc.

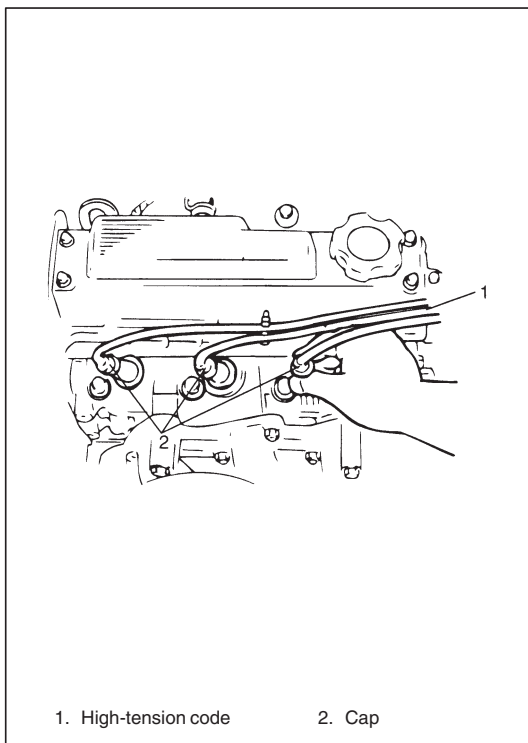


HIGH-TENSION CORDS

- 1) Remove high-tension cord at ignition coil while gripping its cap.
- 2) Remove distributor cap installed with high-tension cords.
- 3) Remove high-tension cord clamp from cylinder head cover.
- 4) Pull out high-tension cords from spark plugs while gripping each cap.

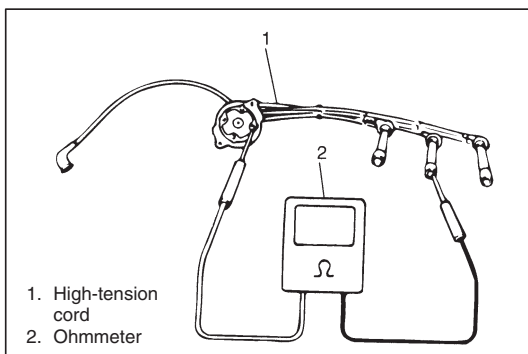
CAUTION:

- Removal of high-tension cords together with clamps will be recommended so as not to damage their inside wire (resistive conductor).
- For the same reason, pull out each connection by gripping cap portion.



- 5) Measure resistance of high-tension cord by using ohmmeter.

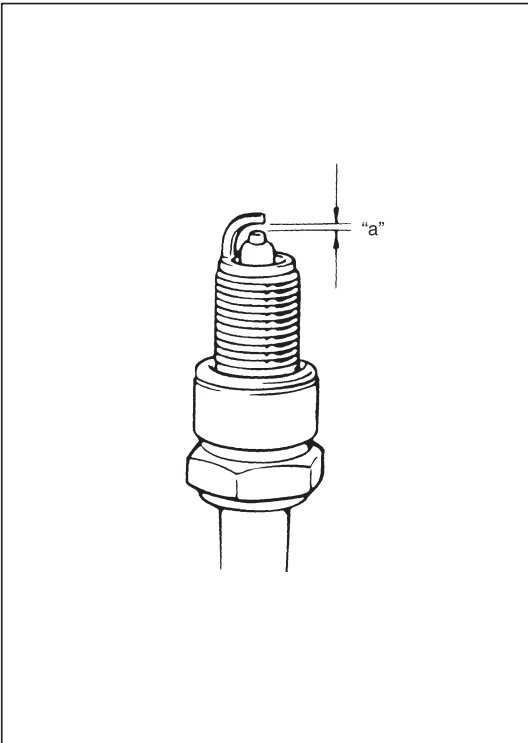
High-tension cord resistance: 10 – 22 k Ω /m (3.0 – 6.7 k Ω /ft)



- 6) If resistance exceeds specification, inspect distributor terminal and replace high-tension cord(s) and/or distributor cap as required.

CAUTION:

- Never attempt to use metal conductor high-tension cords as replacing parts.
- Insert each cap portion fully when installing high-tension cords.

**SPARK PLUGS**

- 1) Pull out high-tension cords by gripping their caps and then remove spark plugs.
- 2) Inspect them for:
 - Electrode wear
 - Carbon deposits
 - Insulator damage
- 3) If any abnormality is found, adjust air gap, clean with spark plug cleaner or replace them with specified new plugs.

Spark plug air gap "a": 1.0 – 1.1 mm (0.039 – 0.043 in.)

Spark plug type : NGK BPR6ES-11
: DENSO W20EPR-U11

- 4) Install spark plugs and torque them to specification.

Tightening Torque for spark plug
25 N·m (2.5 kg-m, 18.0 lb-ft)

- 5) Install high-tension cords securely by gripping their caps.

NOISE SUPPRESSOR**REMOVAL**

- 1) Unwrap tape from noise suppressor.
- 2) Disconnect coupler of noise suppressor.
- 3) Remove noise suppressor.

INSTALLATION

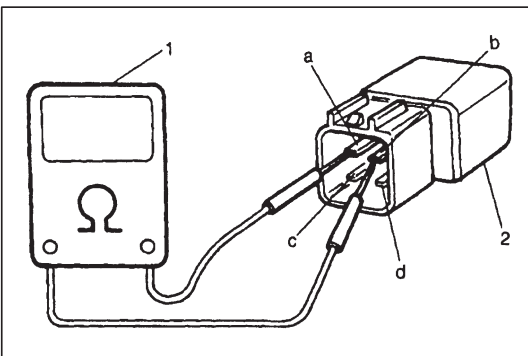
Reverse removal procedure for installation.

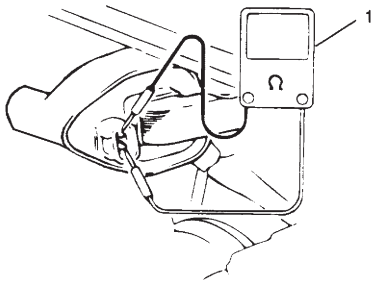
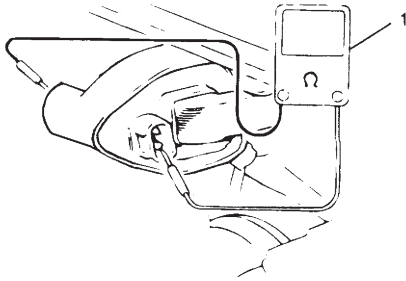
INSPECTION

Using an ohmmeter (1) to check continuity as the following.

- "a" – "b": No continuity
- "a" – "c": No continuity
- "c" – "d": Continuity (Approx. 2.2 kΩ)

If check result is not satisfactory, replace noise suppressor (2).



IGNITION COIL**PRIMARY****SECONDARY**

1. Ohmmeter

- 1) Pull out high-tension cord by gripping its cap.
- 2) Disconnect ignition coil coupler.
- 3) Measure primary and secondary coil resistances.

Ignition coil resistance (at 20°C, 68°F)**Primary : 0.87 – 1.05 Ω****Secondary: 11.2 – 15.2 kΩ**

- 4) If resistance is out of specification, replace coil with new one.

IGNITER

Before this inspection, prepare 5 V power supply (3 new 1.5 V batteries), one 12 V 3.4 W light bulb and one 12 V battery (fully charged).

- 1) Disconnect igniter coupler (1).
- 2) Remove igniter (2) from its bracket.

- 3) Arrange 3 new batteries in series (1) (check total voltage is about 4.7 V).

- 4) Connect light bulb (2) between “d” terminal of igniter (3) and battery (4) positive (+) terminal, then connect battery negative (–) terminal to igniter body.

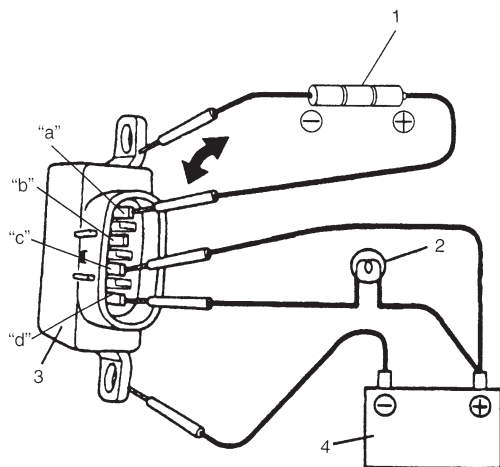
Also connect battery positive (+) terminal and “c” terminal of igniter.

Check that the light bulb does not illuminate.

- 5) Connect negative (–) terminal of batteries (1) and igniter body. Check that the light bulb illuminate when positive (+) terminal of batteries (1) is connected to “a” terminal of igniter.

If inspection result is not satisfactory, replace igniter.

- 6) Install igniter and connect igniter coupler.



DISTRIBUTOR**DISTRIBUTOR CAP AND ROTOR****INSPECTION**

Check cap and rotor for crack and their terminals for corrosion and wear. Replace as necessary.

SIGNAL ROTOR AIR GAP**INSPECTION**

- 1) Remove distributor cap and rotor.
- 2) Using thickness gauge, measure air gap, between signal rotor tooth and CMP sensor (signal generator).

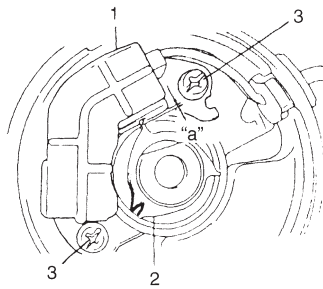
Signal rotor air gap "a": About 0.2 mm (about 0.008 in.)

- 3) If gap is out of specification, loose CMP sensor (signal generator) securing screws. Using blade (–) screw driver, move CMP sensor (signal generator) and adjust gap to specification. After adjustment, tighten securing screws and recheck gap.

NOTE:

Check to make sure that CMP sensor (signal generator) tooth is free from any metal particles.

- 4) Install distributor cap and rotor.



1. Pickup coil
2. Signal rotor
3. Screws

CMP SENSOR (PICKUP COIL) RESISTANCE**INSPECTION**

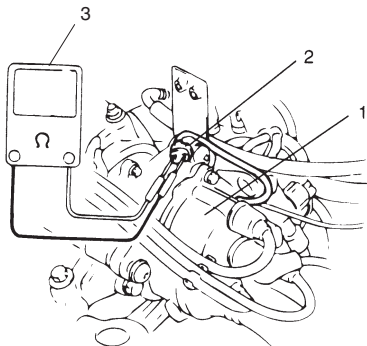
- 1) Disconnect distributor lead coupler.
- 2) Measure resistance of pickup coil by using ohmmeter.
- 3) If resistance is out of specification, replace CMP sensor (signal generator) as follows.

Pickup coil resistance:

185 – 275 Ω at – 10°C (14°F) – 50°C (122°F)

240 – 325 Ω at 50°C (122°F) – 100°C (212°F)

- 4) Remove distributor cap and rotor.
- 5) Remove CMP sensor (signal generator) securing screws and lead wire clamp screws.
- 6) Replace CMP sensor (signal generator).
- 7) Adjust signal rotor air gap to specifications as previously outlined.
- 8) Install rotor, distributor cap seal and cap.



1. Distributor
2. Coupler
3. Ohmmeter

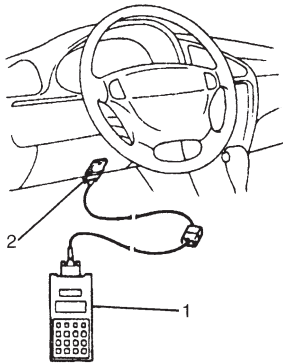
IGNITION TIMING

NOTE:

Before starting engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake.

INSPECTION AND ADJUSTMENT

- 1) Connect SUZUKI scan tool (1) to DLC (2) with ignition switch OFF.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Make sure that all of electrical loads except ignition are switched off.
- 4) Check to be sure that idle speed is within specification. (Refer to SECTION 6E1)
- 5) Set timing light to No.1 high-tension cord.
- 6) Fix ignition timing to initial one as follows:
Select "MISC" made on SUZUKI scan tool and fix ignition timing to initial one.



- 7) Remove air cleaner assembly.
- 8) Using timing light, check that timing is within specification.

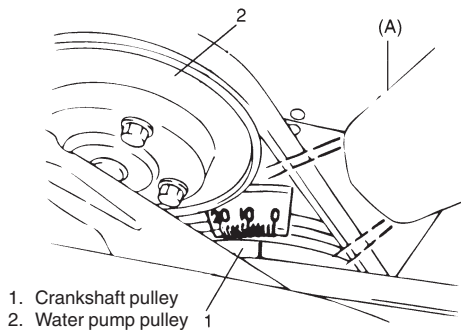
Initial ignition timing (Ignition timing fixed):

$5 \pm 3^\circ$ BTDC (at idle speed)

Ignition order: 1-3-2

Special Tool

(A): 09900-27301 or 09930-76420



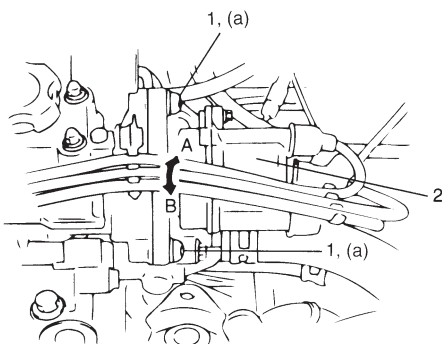
- 9) If ignition timing is out of specification, loosen flange bolts, adjust timing by turning distributor assembly while engine is running, and then tighten bolts.

Tightening Torque

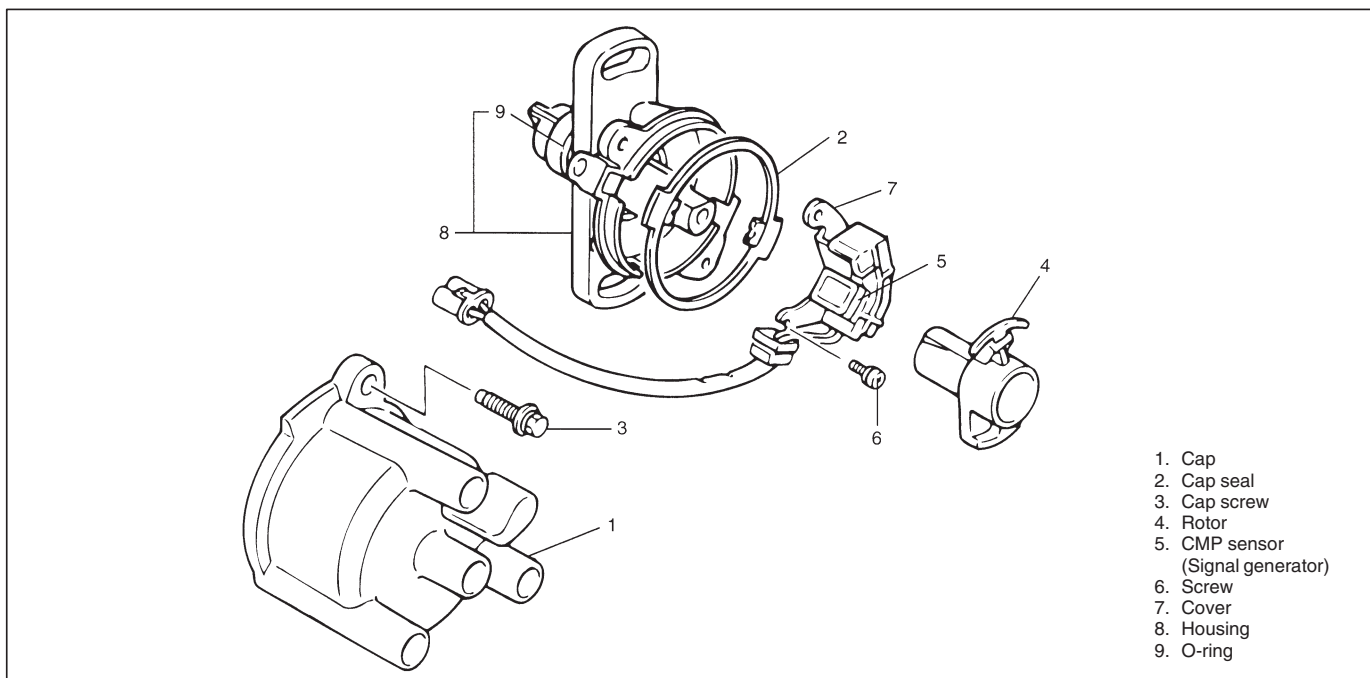
(a): 15 N·m (1.5 kg-m, 11.0 lb-ft)

- 10) After tightening distributor flange bolts, recheck that ignition timing is within specification.
- 11) After checking and/or adjusting Initial Ignition Timing, release ignition timing fixation by SUZUKI scan tool.
- 12) With engine idling (ignition timing not fixed, idle switch ON and car stopped), check that ignition timing is about 8° BTDC. (Constant variation within a few degrees from 8° indicates no abnormality but proves operation of electronic timing control system.) Also, check that increasing engine speed advances ignition timing.

If above check results are not satisfactory, check CTP switch and ECM.



- A: To be advanced
B: To be retarded
1. Distributor flange bolt
2. Distributor



DISMOUNTING

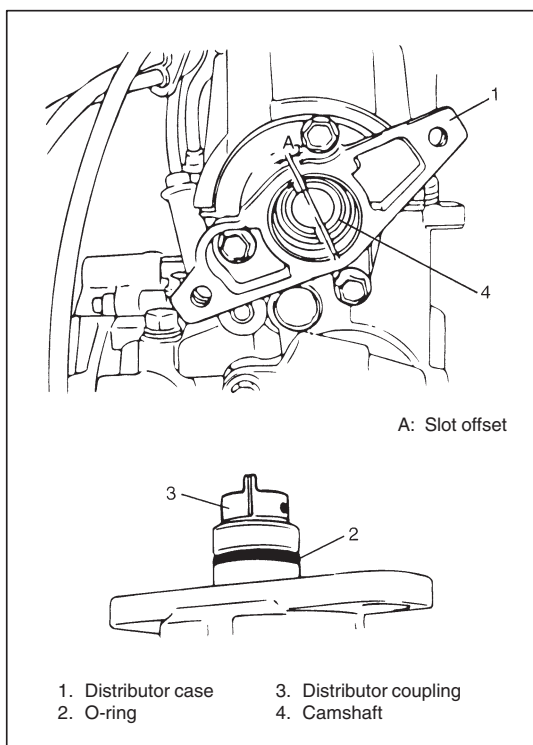
- 1) Disconnect distributor lead coupler.
- 2) Remove distributor cap screws and cap.
- 3) Remove distributor flange bolts.
- 4) Pull out distributor housing assembly.

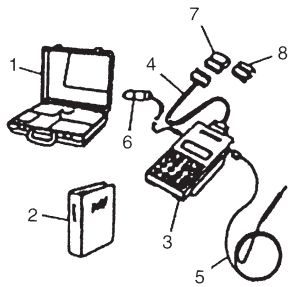
REMOUNTING

NOTE:

- Before installing distributor, check to make sure that its O-ring is in good condition.
- If new O-ring is installed, apply oil.

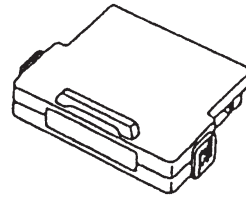
- 1) Install distributor without cap to camshaft.
Fit the dogs of distributor coupling into the slots of camshaft, when installing. The dogs of distributor coupling are offset. Therefore, if the dogs can not shaft by 180 degree and try again.
- 2) Lightly install flange bolts and prepare for ignition timing adjustment.
- 3) Check to make sure that rotor is in good condition.
- 4) Inspect distributor cap and clean or replace as required.
- 5) Make sure that distributor cap seal is placed properly and install cap, and then fasten it with screws.
- 6) Connect distributor lead coupler.
- 7) Check and adjust ignition timing as previously outlined.



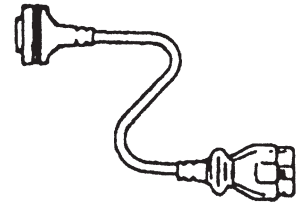
SPECIAL TOOLS

1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable (14/26 pin, 09931-76040)
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adaptor

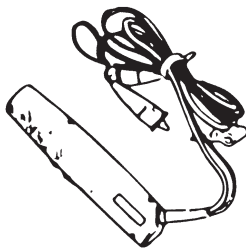
09931-76011
SUZUKI scan tool (Tech 1A) kit



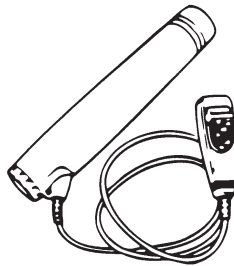
Mass storage cartridge



09931-76030
16/14 pin DLC cable



09900-27301
Timing light (DC 12 V)



09930-76420
Timing light (Dry cell type)

SECTION 6G2

CRANKING SYSTEM

(1.0 kW No-Reduction Type)

NOTE:

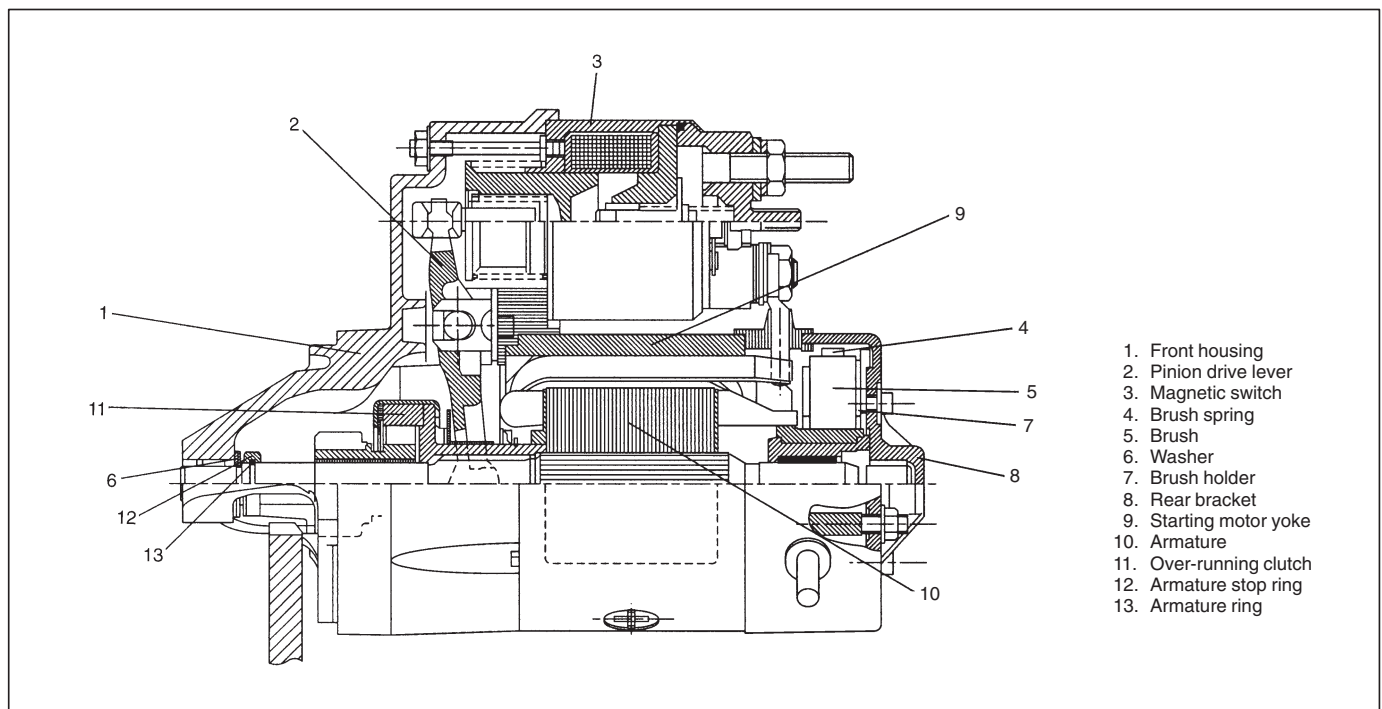
Starting motor vary depending on specifications, etc. Therefore, be sure to check model and specification of the vehicle being serviced before replacing parts.

CONTENTS**6G2**

GENERAL DESCRIPTION	6G2- 1	Reassembly	6G2-10
Starting Motor	6G2- 1	Performance Test	6G2-10
DIAGNOSIS	6G2- 2	Pull-in test	6G2-10
UNIT REPAIR OVERHAUL	6G2- 4	Hold-in test	6G2-10
Dismounting and Remounting	6G2- 4	Plunger and pinion return test	6G2-11
Disassembly	6G2- 5	No-load performance test	6G2-11
Inspection	6G2- 6	SPECIFICATIONS	6G2-12
		REQUIRED SERVICE MATERIAL	6G2-12

GENERAL DESCRIPTION**STARTING MOTOR**

The starting motor consist of the following parts.



DIAGNOSIS

Possible symptoms due to starting system trouble would be as follows:

- Starting motor does not run (or runs slowly)
- Starting motor runs but fails to crank engine
- Abnormal noise is heard
- Starting motor does not stop running

Proper diagnosis must be made to determine exactly where the cause of each trouble lies in battery, wiring harness, (including ignition and starter switch), starting motor or engine.

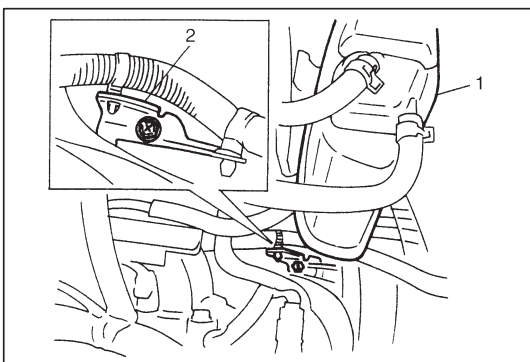
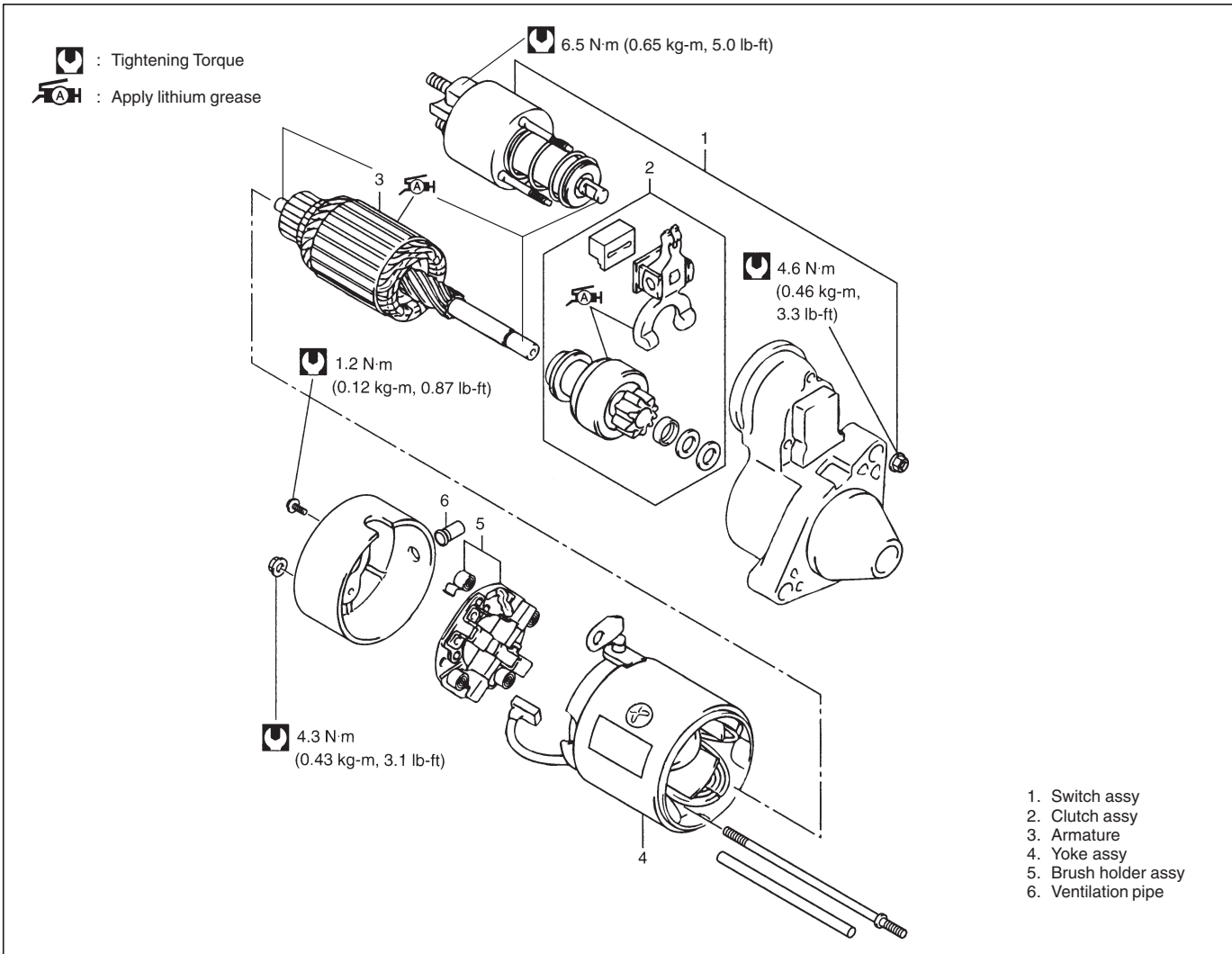
Do not remove motor just because starting motor does not run. Check the following items and narrow down scope of possible causes.

- Condition of trouble
- Tightness of battery terminals (including ground cable connection on engine side) and starting motor terminals
- Discharge of battery
- Mounting of starting motor

Condition	Possible Cause	Correction
Motor not running	No operating sound of magnetic switch <ul style="list-style-type: none"> ● Battery run down ● Battery voltage too low due to battery deterioration ● Poor contact in battery terminal connection ● Loose grounding cable connection ● Fuse set loose or blown off ● Poor contacting action of ignition switch and magnetic switch ● Lead wire coupler loose in place ● Open-circuit between ignition switch and magnetic switch ● Open-circuit in pull-in coil ● Poor sliding of plunger and/or pinion ● Shift lever switch is not in P or N, or not adjusted (A/T) ● Brushes are seating poorly or worn down 	Recharge battery. Replace battery. Retighten or replace. Retighten. Tighten or replace. Replace. Retighten. Repair. Replace magnetic switch. Repair. Shift in P or N, or adjust switch. Repair or replace.
	Operating sound of magnetic switch heard <ul style="list-style-type: none"> ● Battery run down ● Battery voltage too low due to battery deterioration ● Loose battery cable connections ● Burnt main contact point, or poor contacting action of magnetic switch ● Brushes are seating poorly or worn down ● Weakened brush spring ● Burnt commutator ● Grounding of field coil ● Layer short-circuit of armature ● Crankshaft rotation obstructed 	Recharge battery. Replace battery. Retighten. Replace magnetic switch. Repair or replace. Replace. Replace armature. Repair. Replace. Repair.

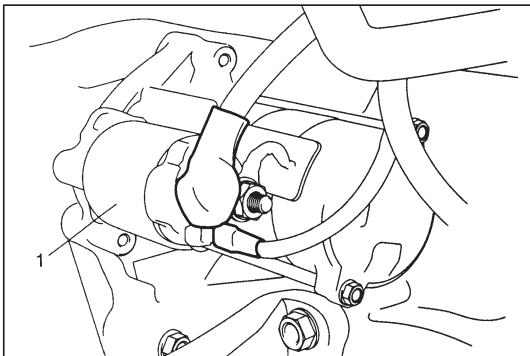
Condition	Possible Cause	Correction
Starting motor running but too slow (small torque)	If battery and wiring are satisfactory, inspect starting motor <ul style="list-style-type: none"> • Insufficient contact of magnetic switch main contacts • Layer short-circuit of armature • Disconnected, burnt or worn commutator • Grounding of field coil • Worn brushes • Weakened brush springs • Burnt or abnormally worn end bush 	Replace magnetic switch. Replace. Replace. Repair. Replace brush. Replace spring. Replace bush.
Starting motor running, but not cranking engine	<ul style="list-style-type: none"> • Worn pinion tip • Poor sliding of over-running clutch • Over-running clutch slipping • Worn teeth of ring gear 	Replace over-running clutch. Repair. Replace over-running clutch. Replace flywheel (M/T) or drive plate (A/T).
Noise	<ul style="list-style-type: none"> • Abnormally armature shaft clearance • Worn pinion or worn teeth of ring gear • Poor sliding of pinion (failure in return movement) • Lack of grease in each part 	Replace armature or starter assembly. Replace over-running clutch or flywheel (M/T), drive plate (A/T). Repair or replace. Lubricate.
Starting motor does not stop running	<ul style="list-style-type: none"> • Fused contact points of magnetic switch • Short-circuit between turns of magnetic switch coil (layer short-circuit) • Failure of returning action in ignition switch 	Replace magnetic switch. Replace magnetic switch. Replace.

UNIT REPAIR OVERHAUL

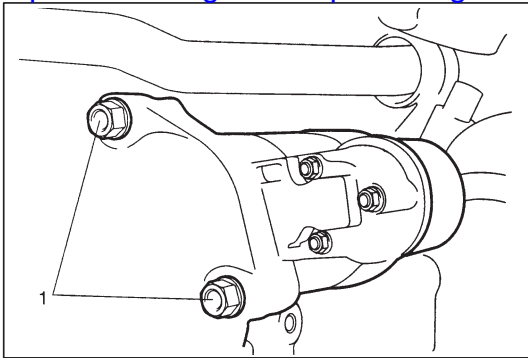


DISMOUNTING AND REMOUNTING

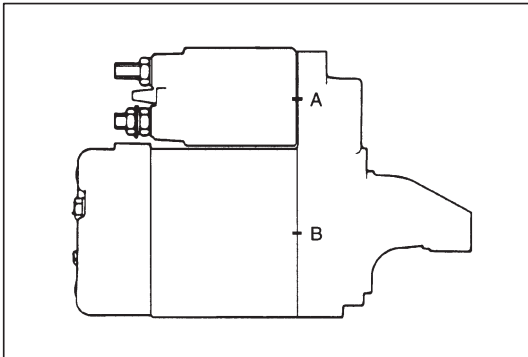
- 1) Disconnect positive (+) and negative (-) battery lead cables at battery.
- 2) Disconnect EVAP canister (1) and remove cable clamp (2).



- 3) Disconnect magnetic switch lead wire and battery cable from starting motor (1).



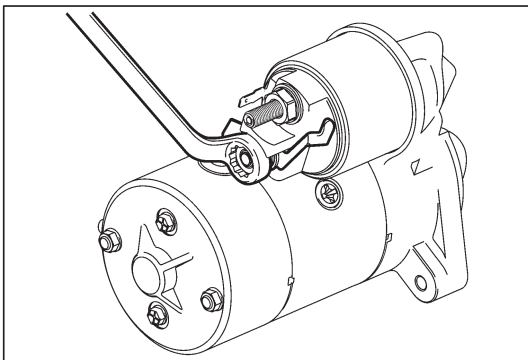
- 4) Remove two starting motor mount bolts (1).
- 5) Remove starting motor.
- 6) To install, reverse the above procedure.



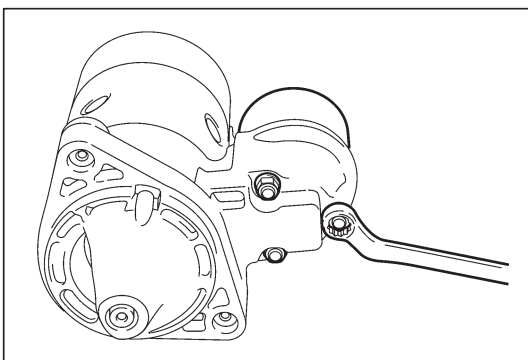
DISASSEMBLY

NOTE:

- Before disassembling starting motor, be sure to put match marks at two locations (A and B) as shown in left figure so that any possible mistakes can be avoided.
- Do not clamp yoke in a vise or strike it with a hammer during disassembling and reassembling.



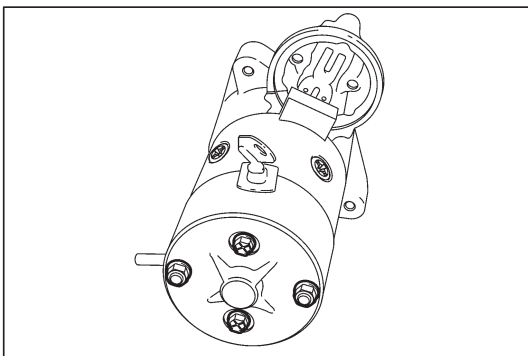
- 1) Remove nut securing the end of field coil lead to terminal on the head of magnetic switch.



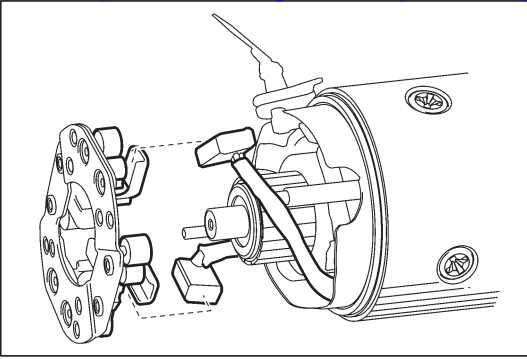
- 2) Remove 3 nuts and then take out magnetic switch. Then remove plunger by unhooking its hook from drive lever.

NOTE:

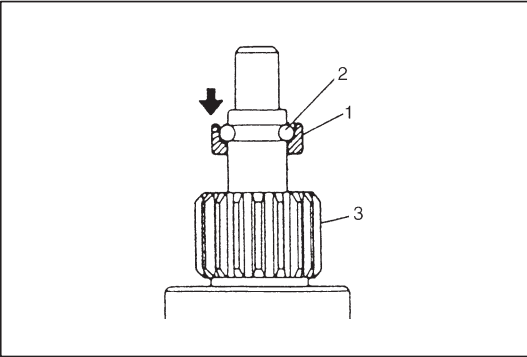
Don't disassemble this switch. If defective, replace as a complete assembly.



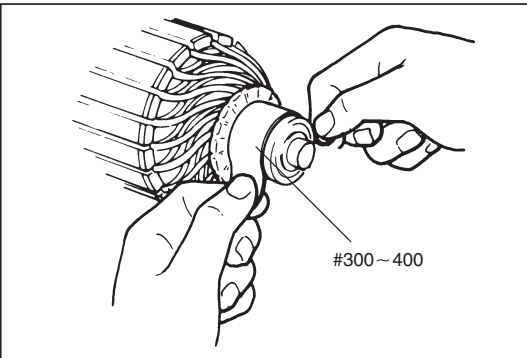
- 3) Loosen 2 nuts and 2 screws and then pull out commutator end housing.



- 4) Remove 2 brushes, which coming from yoke from its bracket by holding spring by long nose pliers or like. Then remove brush holder from armature.
- 5) Remove yoke, armature and drive lever.



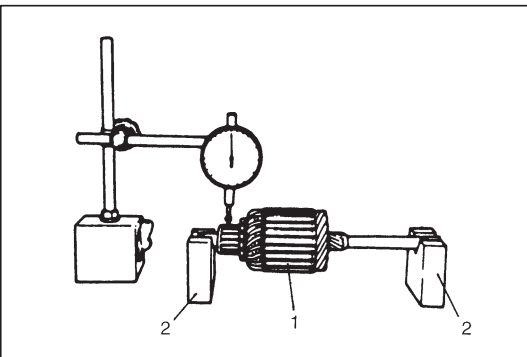
- 6) Loosen pinion stop ring (1) fixed by snap ring (2).
- 7) Remove snap ring, and then pull out pinion stop ring and over-running clutch (3).



INSPECTION

ARMATURE

- Inspect commutator for dirt or burn. Correct with sandpaper or lathe, if necessary.



- Check commutator for uneven wear with armature (1) supported on V blocks (2). If deflection of dial gauge pointer exceeds limit, repair or replace.

NOTE:

Below specification presupposes that armature is free from bend. Bent shaft must be replaced.

Commutator out of round

Standard: 0.05 mm (0.0019 in.) or less

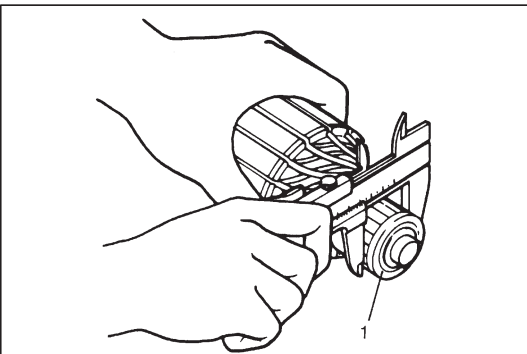
Limit: 0.4 mm (0.015 in.)

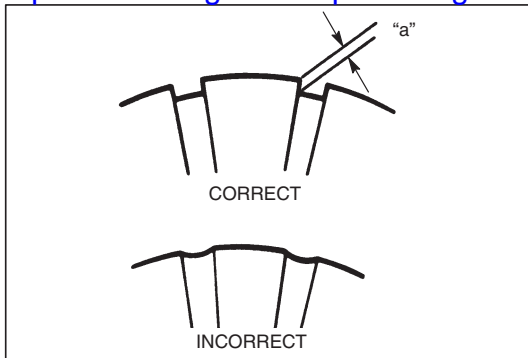
- Inspect commutator (1) for wear. If diameter is below limit, replace armature.

Commutator outside reference diameter

Standard: 30.0 mm (1.18 in.)

Limit: 29.5 mm (1.16 in.)



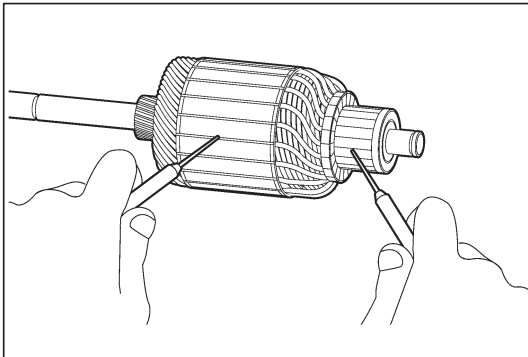


- Inspect commutator for wear or abnormal limit. Replace if necessary.

Commutator insulator reference depth "a"

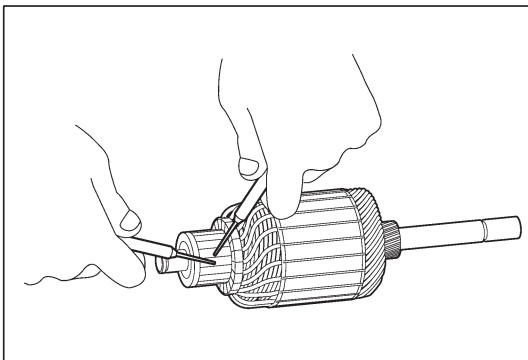
Standard: 0.7 – 0.9 mm (0.028 – 0.035 in.)

Limit: 0.5 mm (0.020 in.)



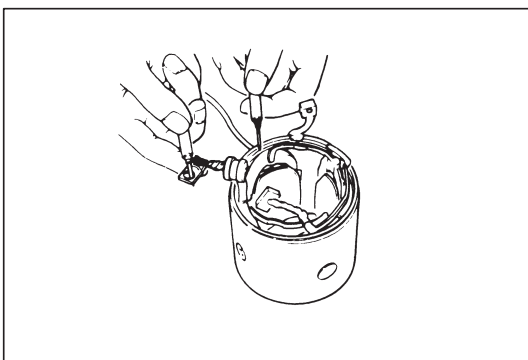
● Ground test

Check commutator and armature core. If there is continuity, armature is grounded and must be replaced.



● Open circuit test

Check for continuity between segments. If there is no continuity at any point, there is an open circuit and armature must be replaced.



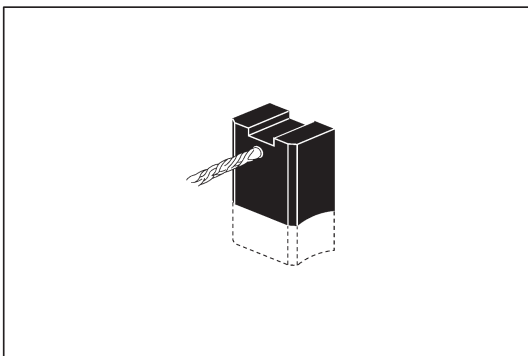
FIELD COIL

Ground test

Check continuity between brush and bare surface.

If there is continuity, field windings are grounded.

The yoke assembly must be replaced.



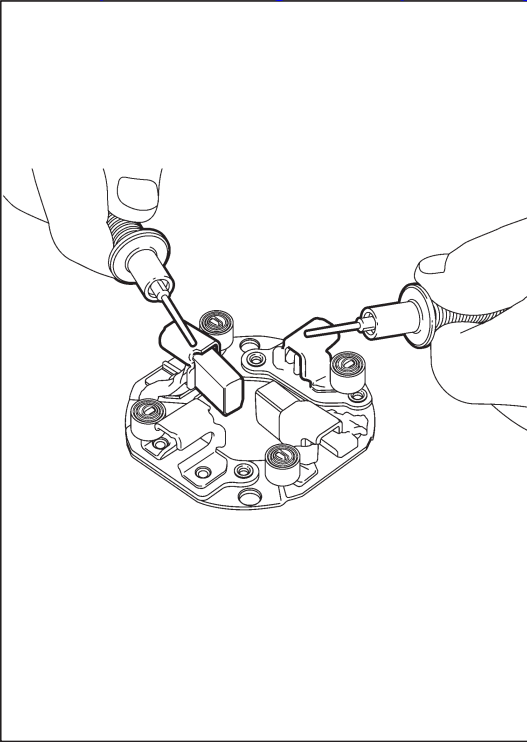
BRUSH

Check brushes for wear. If below limit, replace brush.

Brush length

Standard: 19.5 mm (0.77 in.)

Limit: 12.0 mm (0.48 in.)

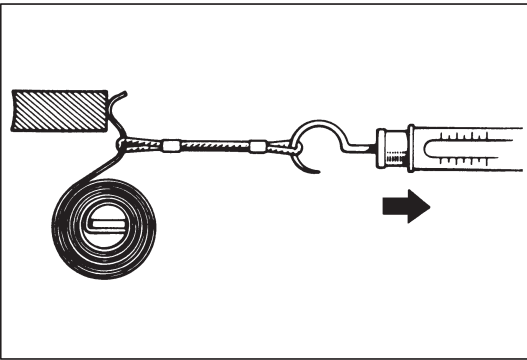
**BRUSH HOLDER**

Check movement of brush in brush holder. If brush movement within brush holder is sluggish, check brush holder for distortion and sliding faces for correct contamination.

Clean or correct as necessary.

Clean for continuity across insulated brush holder (positive side) and grounded brush holder (negative side).

If continuity exists, brush holder is grounded due to defective insulation and should be replaced.

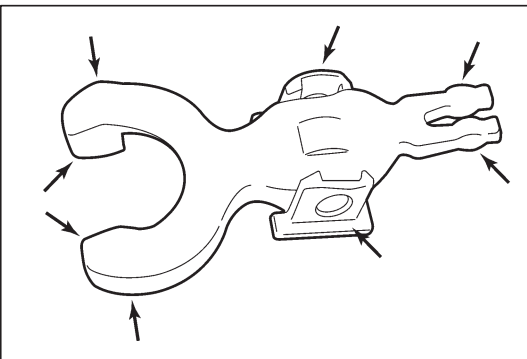
**SPRING**

Inspect brush spring for wear, damage or other abnormal conditions. Replace if necessary.

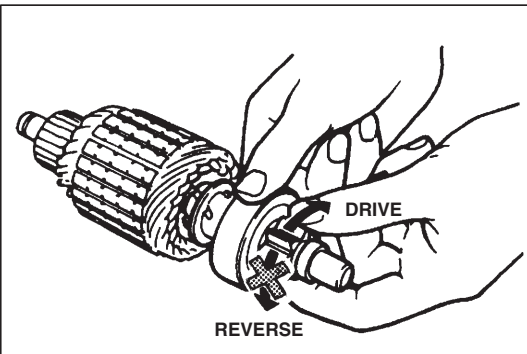
Brush spring tension

Standard: 2.5 kg (5.5 lb)

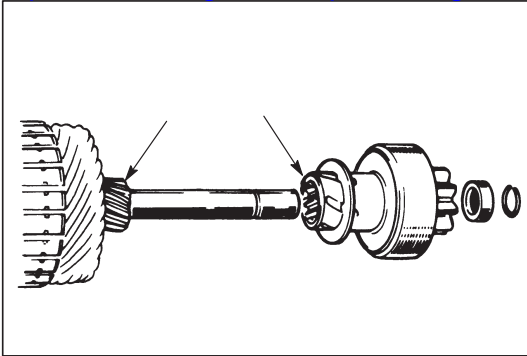
Limit: 1.3 kg (2.87 lb)

**DRIVE LEVER**

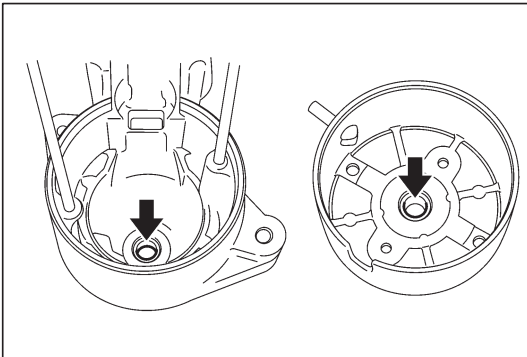
Inspect drive lever for wear. Replace if necessary.

**PINION AND OVER-RUNNING CLUTCH**

- Inspect pinion for wear, damage or other abnormal conditions. Check that clutch locks up when turned in direction of drive and rotates smoothly in reverse direction. Replace if necessary.

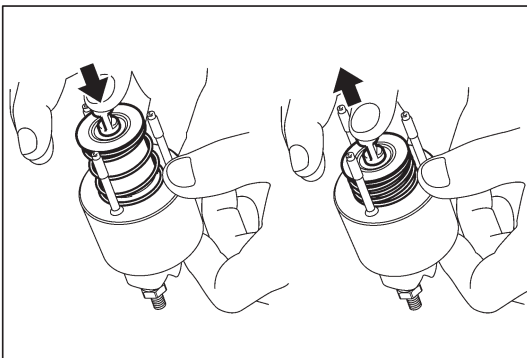


- Inspect spline teeth for wear or damage. Replace if necessary. Inspect pinion for smooth movement.



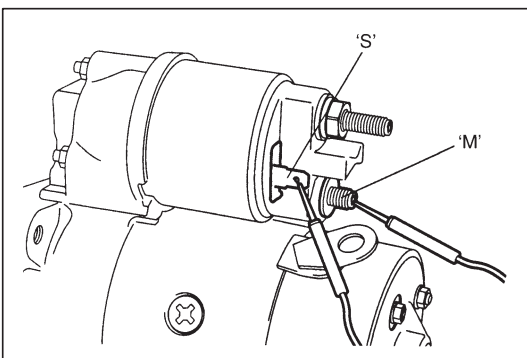
ARMATURE SHAFT BUSH

Inspect bearing bush for wear or damage.



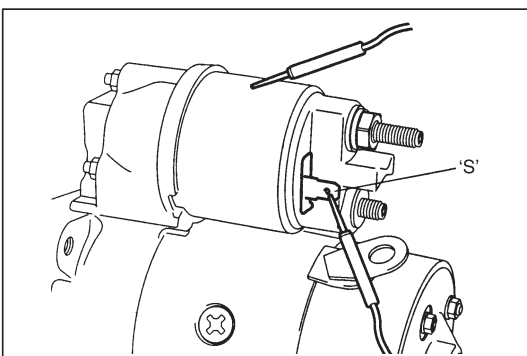
MAGNETIC SWITCH

Push in plunger and release it. Plunger should return quickly to its original position. Replace if necessary.



● Pull-in coil open circuit test

Check for continuity across magnetic switch 'S' terminal and 'M' terminal. If no continuity exists, coil is open and should be replaced.



● Hold-in coil open circuit test

Check for continuity across magnetic switch 'S' terminal and coil case. If no continuity exists, coil is open and should be replaced.

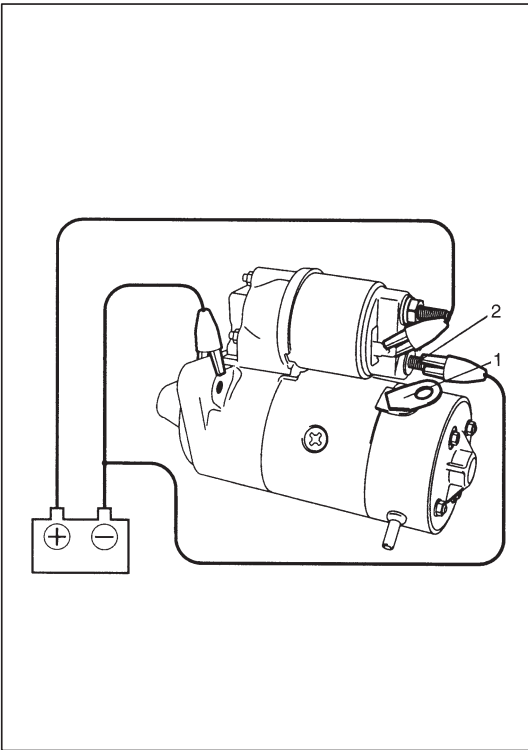
REASSEMBLY

Reverse disassembly procedure for reassembly noting the following.

- Apply grease to current part referring to figure in page 6G2-4.
- Install pinion drive lever into drive housing referring to page 6G2-4 especially for its direction.
- Tighten bolts and nuts to specified torque referring to page 6G2-4.
- Pay attention to an installation location of armature shaft washers referring to page 6G2-4.
- Upon completion of assembly, carry out "PERFORMANCE TEST" in this section.
- Tighten battery cable nut to specified torque.

Tightening Torque

9 N·m (0.9 kg-m, 6.5 lb-ft)



PERFORMANCE TEST

WARNING:

When performing the following test, be sure to connect the battery and the starting motor with a lead wire of the same size as the cable that was originally used there.

CAUTION:

Each test must be performed within 3 – 5 seconds to avoid coil from burning.

1) Pull-In Test

Disconnect lead wire (1) from terminal 'M' (2), and connect battery to magnetic switch as shown.

Check the plunger and pinion (over-running clutch) move outward.

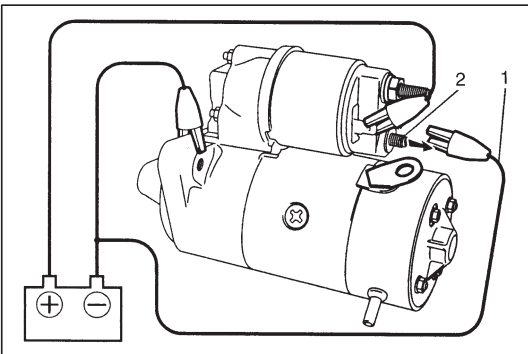
If plunger and pinion (over-running clutch) don't move, replace magnetic switch.

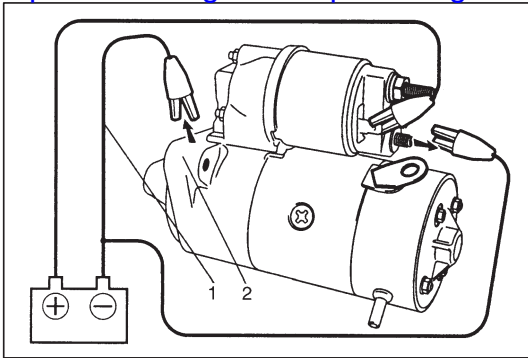
2) Hold-In Test

While connected as above with plunger out, disconnect negative lead (1) from terminal 'M' (2).

Check that plunger and pinion remain out.

If plunger and pinion return inward, replace magnetic switch.



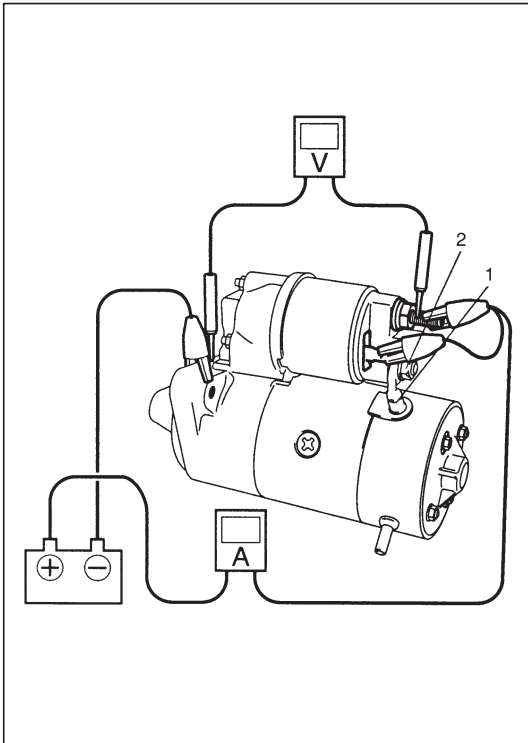


3) Plunger and Pinion Return Test

Disconnect negative lead (1) from switch body (2).

Check that plunger and pinion return inward.

If plunger and pinion don't return, disassemble and inspect starting motor.



4) No-Load Performance Test

a) Connect motor lead wire (switch to motor) (1) to terminal 'M' (2).

b) Connect battery and ammeter to starter as shown.

c) Check that starter rotates smoothly and steadily with pinion moving out. Check that ammeter indicates specified current.

Specified current: Less than 50 A MAX at 11.5 V

(between terminal 'B' and starter body)

SPECIFICATIONS

Voltage		12 volts	
Output		1.0 kW	
Rating		30 seconds	
Direction of rotation		Clockwise as viewed from pinion side	
Brush length		19.5 mm (0.77 in.)	
Number of pinion teeth		8	
Performance		Condition	Guarantee
Around at 20°C (68°F)	No load characteristic	11.5V	50 A maximum 7500 rpm minimum
	Load characteristic	8 V 200 A	4.3 N·m (0.43 kg-m, 3.1 lb-ft) minimum 1400 rpm minimum
	Locked characteristic	5 V	400 A maximum 8.4 N·m (0.84 kg-m, 6.1 lb-ft) minimum
	Magnetic switch operating voltage		8 volts maximum

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> ● Armature shaft. ● Over-running clutch. ● Armature shaft bushes. ● Drive lever.

SECTION 6H**CHARGING SYSTEM****NOTE:**

For the descriptions (items) not found in this section, refer to the same section of service manual mentioned in the FOREWORD of this manual.

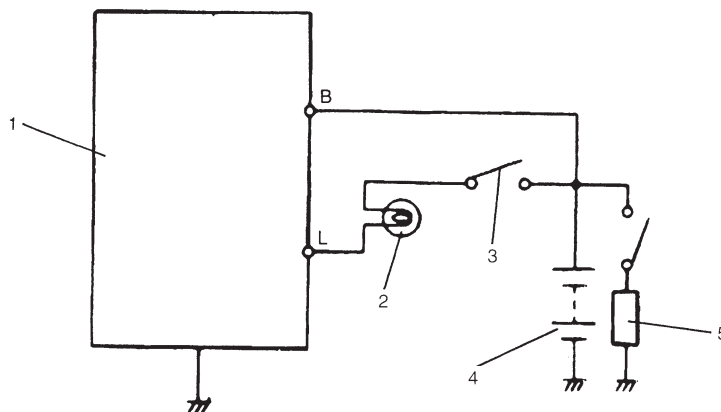
CONTENTS

GENERATOR	6H-2
GENERAL DESCRIPTION	6H-2
DIAGNOSIS	6H-3
UNIT REPAIR OVERHAUL	6H-6
Dismounting and Remounting	6H-6
Disassembly and Assembly	6H-7
SPECIFICATIONS	6H-7
GENERATOR	6H-7

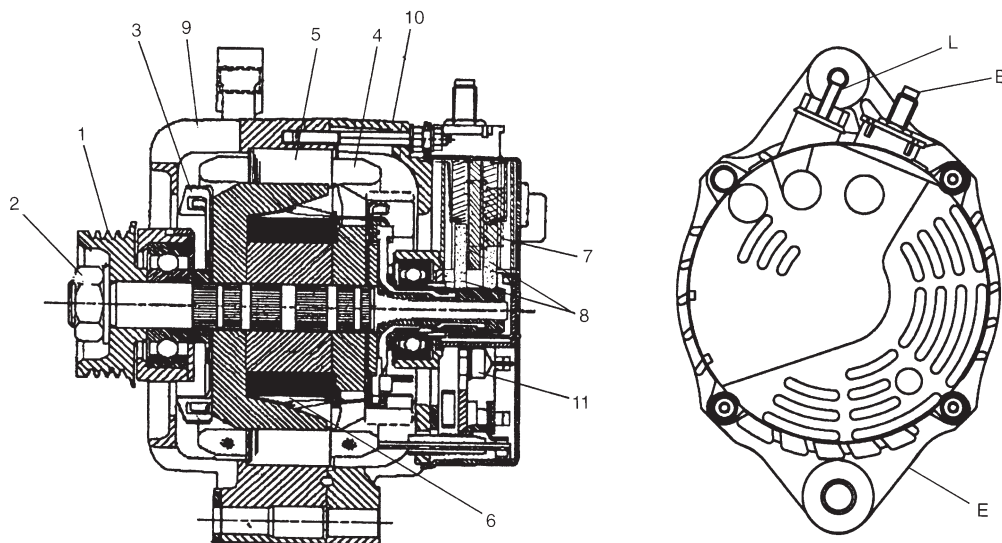
GENERATOR

GENERAL DESCRIPTION

The generator is a small and high performance type with an IC regulator incorporated.



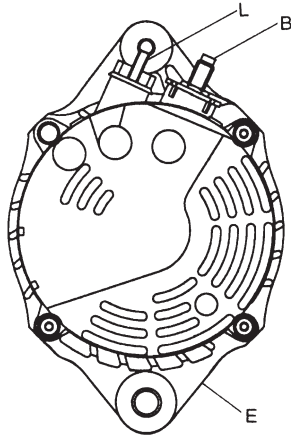
1. Generator with regulator assembly
2. Charge indicator light
3. Ignition switch
4. Battery
5. Load



1. Pulley
2. Pulley nut
3. Rotor fan
4. Stator coil
5. Stator core
6. Field coil

7. Regulator
8. Brush
9. Front housing
10. Rear housing
11. Rectifier

- B : Generator output (Battery terminal)
E : Ground
L : Lamp terminal

DIAGNOSIS

B : Generator output (Battery terminal)
 E : Ground
 L : Lamp terminal

CAUTION:

- Do not connect any load between L and E.
- When connecting a charger or a booster battery to vehicle battery, refer to this section describing battery charging.

Trouble in charging system will show up as one or more of the following conditions:

- 1) Faulty indicator lamp operation.
- 2) An undercharged battery as evidenced by slow cranking or indicator dark.
- 3) An overcharged battery as evidenced by excessive spewing of electrolyte from vents.

Noise from generator may be caused by a loose drive pulley, loose mounting bolts, worn or dirty bearings, defective diode, or defective stator.

FAULTY INDICATOR LAMP OPERATION

PROBLEM	POSSIBLE CAUSE	CORRECTION
Charge light does not light with ignition ON and engine off	<ul style="list-style-type: none"> ● Fuse blown ● Light burned out ● Wiring connection loose ● IC regulator 	Check fuse. Replace light. Tighten loose connection. Replace generator.
Charge light does not go out with engine running (battery requires frequent recharging)	<ul style="list-style-type: none"> ● Drive belt loose or worn ● IC regulator or generator faulty ● Wiring faulty 	Adjust or replace drive belt. Replace generator. Repair wiring.
Noise from radio	Condenser faulty	Replace generator.

UNDERCHARGED BATTERY

This condition, as evidenced by slow cranking or indicator clear with red dot can be caused by one or more of the following conditions even though indicator lamp may be operating normal. The following procedure also applies to cars with voltmeter and ammeter.

- 1) Make sure that undercharged condition has not been caused by accessories left on for extended period of time.
- 2) Check drive belt for proper tension.
- 3) If battery defect is suspected referring to BATTERY section.
- 4) Inspect wiring for defects. Check all connections for tightness and cleanliness, battery cable connections at battery, starting motor and ignition ground cable.
- 5) Connect voltmeter and ammeter as shown.

Voltmeter

Set between generator B terminal and ground.

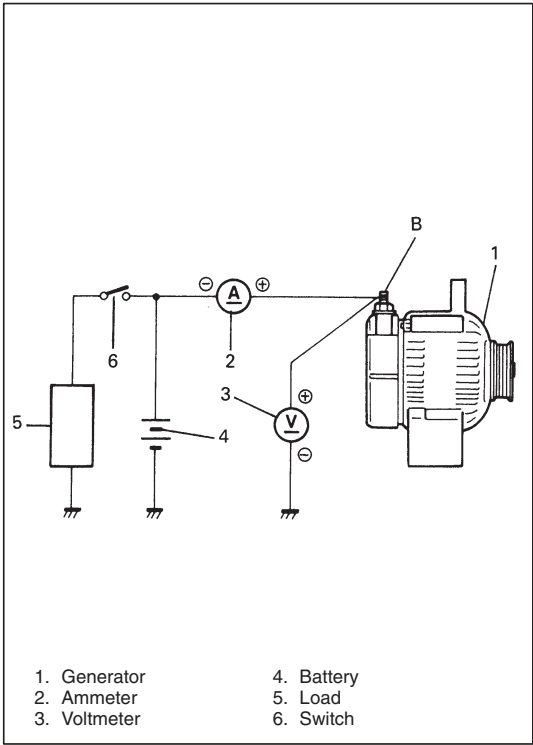
Ammeter

Set between generator B terminal and battery (+) terminal.

NOTE:

Use fully charged battery.

- 6) Measure current and voltage.



NO-LOAD CHECK

Run engine from idling up to 2,000 rpm and read meters.

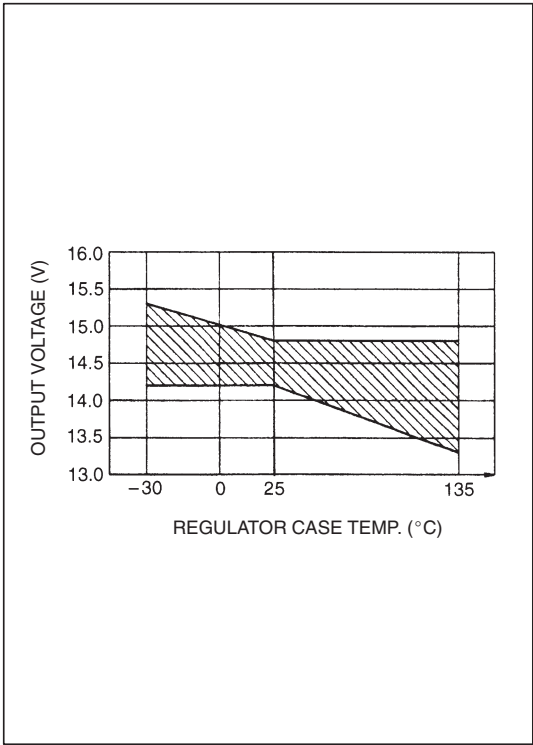
NOTE:

Turn off switches of all accessories (wiper, heater etc.).

Standard current	10 A maximum
Standard voltage	14.2 – 14.8 V at 25°C (77°F)

NOTE:

Consideration should be taken that voltage will differ somewhat with regulator case temperature as shown in left figure.



Higher Voltage

If voltage is higher than standard value, check ground of brushes.
If brushes are not grounded, replace generator.

Lower Voltage

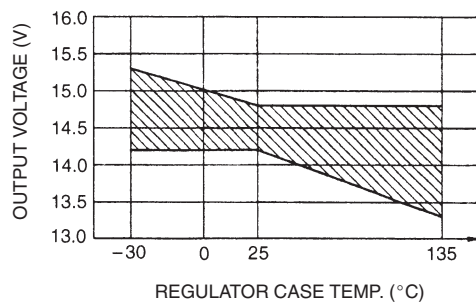
If voltage is lower than standard value, replace generator.

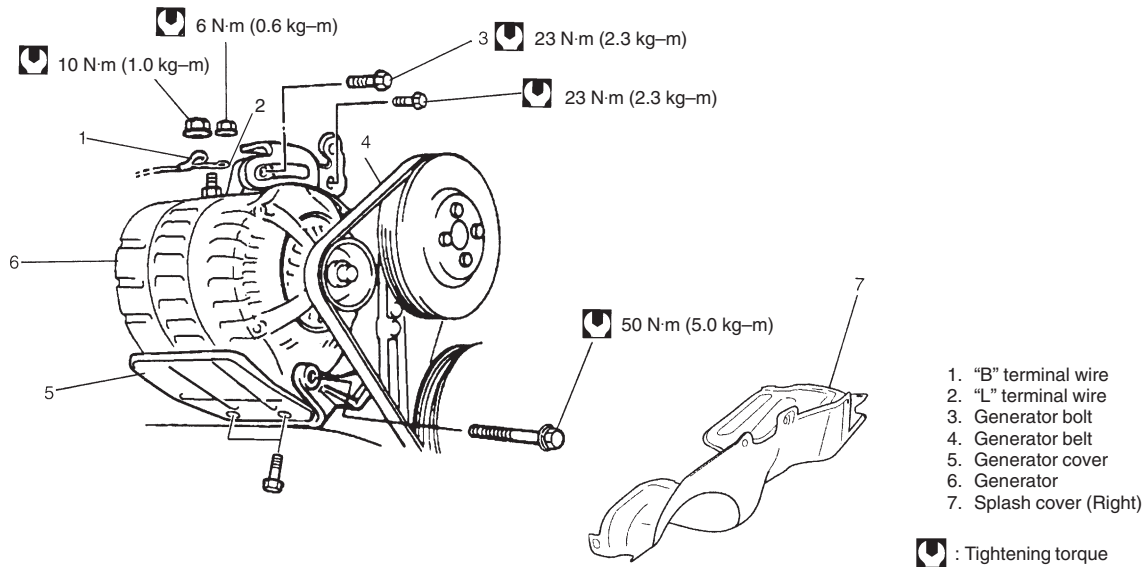
LOAD CHECK

- 1) Run engine at 2,000 rpm and turn on head light and heater motor.
- 2) Measure current and if it is less than 20 A, replace generator.

OVERCHARGED BATTERY

- 1) To determine battery condition, refer to BATTERY section.
- 2) If obvious overcharge condition exists as evidenced by excessive spewing of electrolyte, measure generator B terminal voltage at engine 2,000 rpm.
- 3) If measured voltage is higher than upper limit value replace generator.

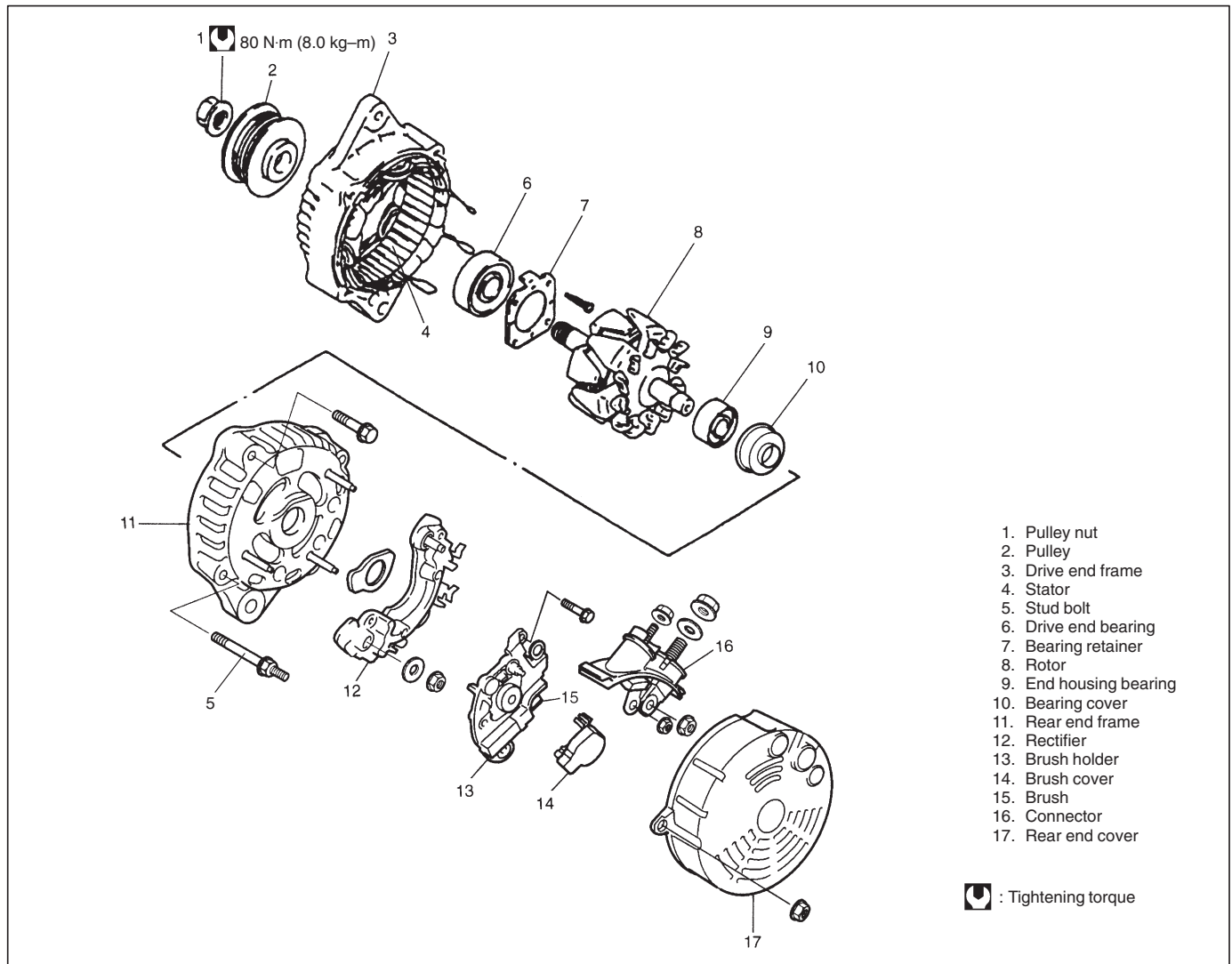


UNIT REPAIR OVERHAUL**DISMOUNTING AND REMOUNTING****DISMOUNTING**

- 1) Disconnect negative (–) cable at battery.
- 2) Hoist vehicle and remove right side splash cover.
- 3) Loosen generator belt adjusting bolt and generator pivot bolt.
When servicing vehicle equipped with A/C, remove compressor drive belt before removing generator belt.
Refer to "COMPRESSOR DRIVE BELT" in Section 1B.
- 4) Slacken belt by displacing generator and then remove it.
- 5) Disconnect (B) and (L) terminal wire from generator.
- 6) Remove generator cover from generator bracket.
- 7) Remove generator.

REMOUNTING

Reverse dismounting procedure and for water pump belt tension refer to SECTION 6B.

DISASSEMBLY AND ASSEMBLY**SPECIFICATIONS****GENERATOR**

Rated voltage	12 V
Nominal output	70 A
Permissible max. speed	18000 r/min.
No-load speed	1230 r/min (rpm)
Setting voltage	14.2 to 14.8 V (at 25°C (77°F))
Permissible ambient temperature	-30 to 90°C (-22 to 194°F)
Polarity	Negative ground
Rotation	Clockwise viewed from pulley side

Prepared by
MAGYAR SUZUKI CORPORATION

Service Department

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Important

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

This service manual is intended for authorized Suzuki dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and/or seat belt with pretensioner) beforehand to avoid component damage or unintended activation.

Foreword

This SUPPLEMENTARY SERVICE MANUAL is a supplement to RB413 SERVICE MANUAL. It has been prepared exclusively for the following applicable model.

Applicable model: RB413 4WD model

If describes only different service information of RB413 4WD model as compared with RB413 SERVICE MANUAL. Therefore, whenever servicing RB413 4WD model, consult this supplement first. And for any section, item or description not found in this supplement, refer to the related service manual below.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

Related Manual:

Manual Name	Manual No.
RB413 SERVICE MANUAL	99500-83E00-01E
RB310/413 WIRING DIAGRAM MANUAL	99512U83E10-669

MAGYAR SUZUKI CORPORATION

SERVICE DEPARTMENT

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NOTE:

For the screen toned sections in the above table, refer to the same section of Service Manual mentioned in FOREWORD of this manual.

SECTION 0A**0A****GENERAL INFORMATION****NOTE:**

For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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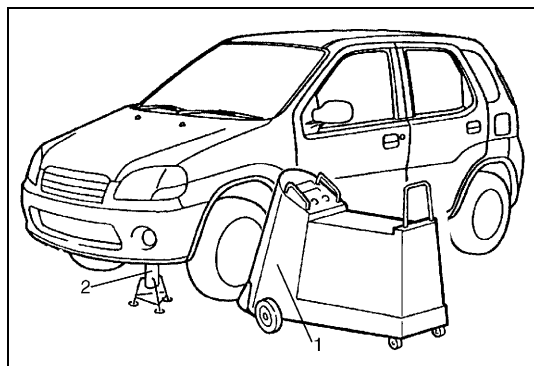
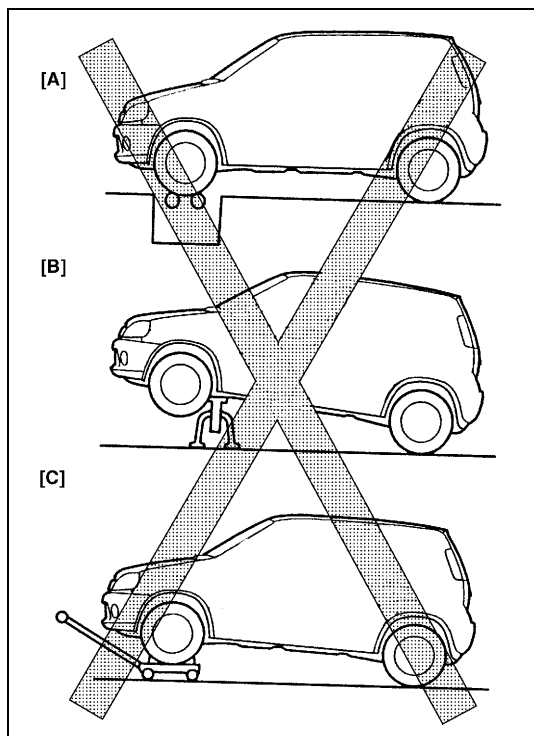
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Precautions

Precaution in Servicing Full-Time 4WD Vehicle

This full-time 4WD vehicle can not be converted to 2WD manually.

Observe the following caution in servicing. Otherwise, front wheels drive rear wheels or vice-versa and vehicle accidents, drivetrain damage and personal injury may result.



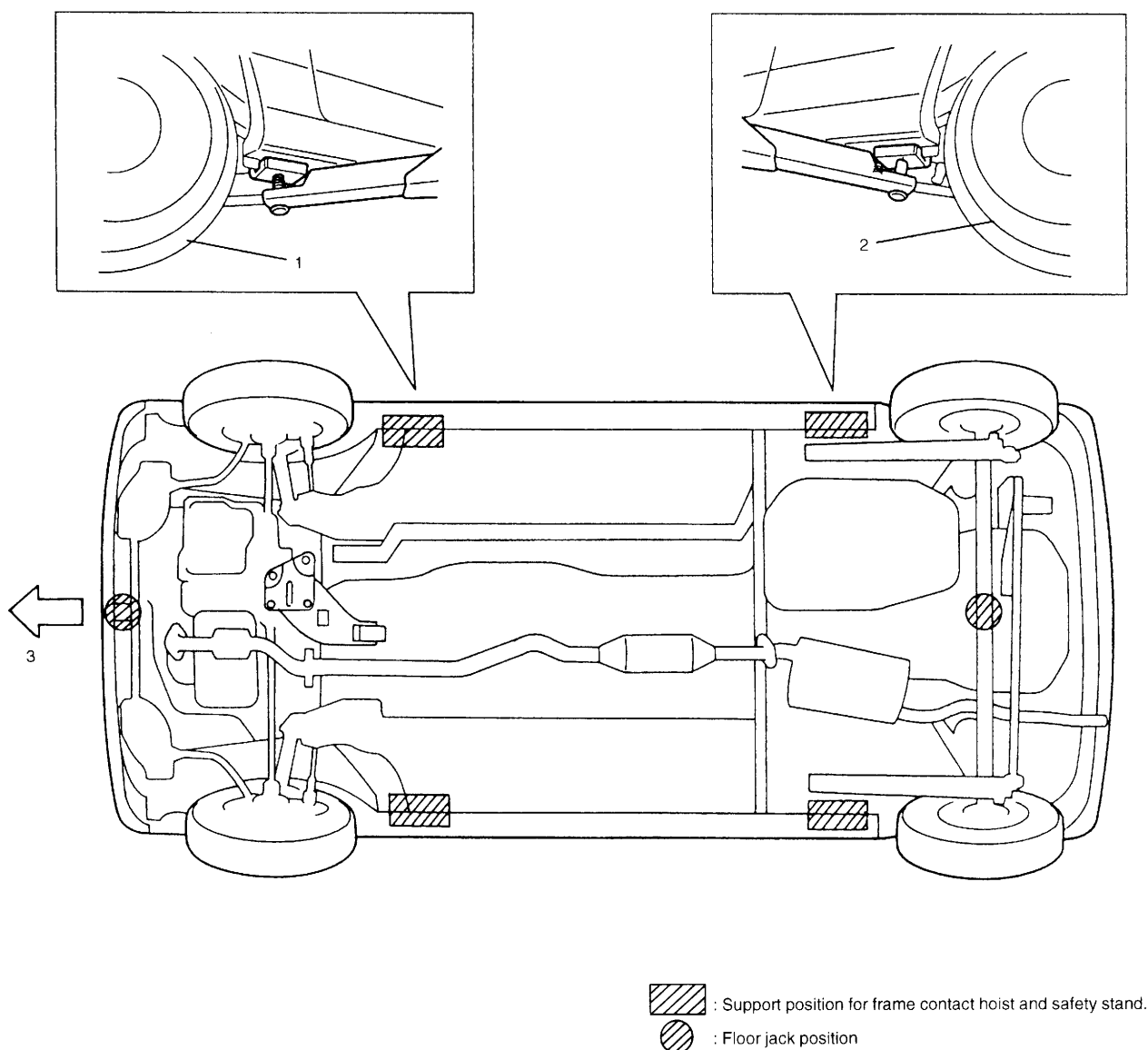
- Never perform any of the following types of service work.
 - [A] : Testing with 2-wheel chassis dynamometer, speedometer tester or brake tester.
 - [B] : Driving front wheels, which are jacked up.
 - [C] : Towing under the condition where either front or rear wheels can not rotate.
- When testing with 2-wheel chassis dynamometer, speedometer tester or brake tester, be sure to make the vehicle as front wheel drive by removing propeller shaft assembly.
- When using On-vehicle type wheel balancing equipment (1), be sure to jack up all four wheels, off the ground completely and support vehicle with safety stands (2). Be careful of the other wheels, which will rotate at the same time.
- This vehicle should be towed under one of the following conditions :
 - With all wheels on a flatbed truck.
 - With front or rear wheels lifted and a dolly under the other wheels.

Vehicle Lifting Points

WARNING:

- Before applying hoist to underbody, always take vehicle balance throughout service into consideration. Vehicle balance on hoist may change depending on what part to be removed.
- Before lifting up the vehicle, check to be sure that end of hoist arm is not in contact with brake pipe, fuel pipe, bracket or any other part.
- When using frame contact hoist, apply hoist as shown (right and left at the same position). Lift up the vehicle till 4 tires are a little off the ground and make sure that the vehicle will not fall off by trying to move vehicle body in both ways. Work can be started only after this confirmation.
- Make absolutely sure to lock hoist after vehicle is hoisted up.

When using frame contact hoist:

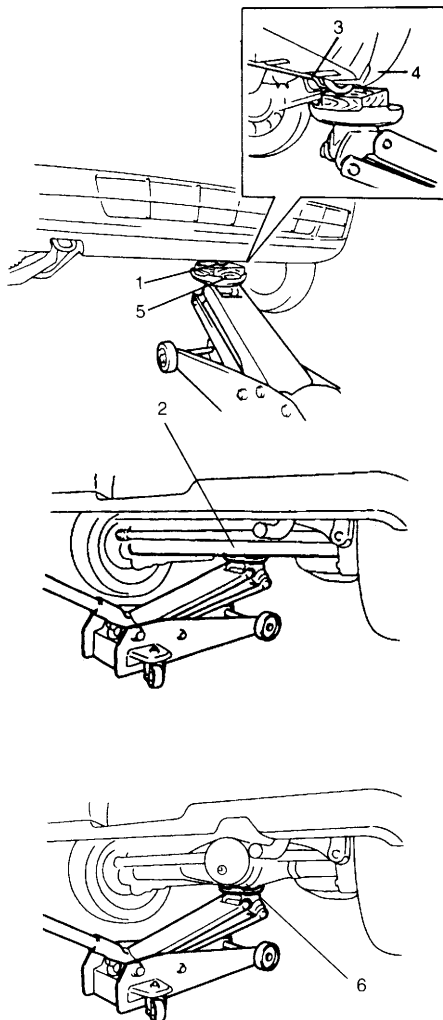


1. Front left tire

2. Rear left tire

3. Front

When using floor jack:



WARNING:

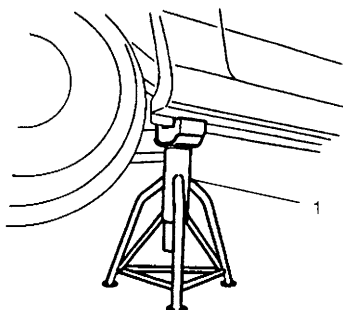
- If the vehicle to be jacked up only at the front or rear end, be sure to block the wheels on ground in order to ensure safety. After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone.

CAUTION:

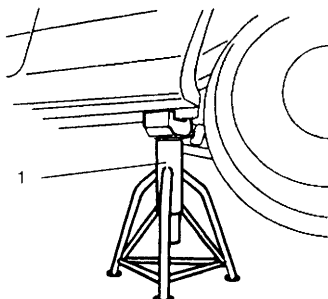
- Never apply jack against suspension parts (i.e., stabilizer (3), etc.), front bumper (4) or vehicle floor, otherwise it may get deformed.

When lifting front vehicle end with floor jack, be sure to put the wooden block (5) on the jack against front jacking bracket (1). When lifting rear vehicle end with floor jack, be sure to put the jack against the center portion of rear axle (2) (2WD vehicle) or rear axle housing (6) (4WD vehicle).

Front



Rear



To perform service with either front or rear vehicle end jacked up, be sure to place safety stands (1) under vehicle body so that vehicle body is securely supported. And then check to ensure that vehicle body does not slide on safety stands and the vehicle is held stable for safety's sake.

SECTION 0B**0B****MAINTENANCE AND LUBRICATION****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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Maintenance Schedule

Normal Condition Schedule

Interval: This interval should be judged by odometer reading or months, whichever comes first.		This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
		km (x 1,000)	15	30	45	60	75	90
		Miles (x 1,000)	9	18	27	36	45	54
		Months	12	24	36	48	60	72
1. ENGINE								
1-1. Drive belt (tension, damage)		V-rib belt	—	—	I	—	—	R
1-2. Camshaft timing belt			Replace every 100,000 km (60,000 miles)					
1-3. Valve lash (clearance)			—	I	—	I	—	I
1-4. Engine oil and	When SG, SH or SJ grade oil is used.		R	R	R	R	R	R
Engine oil filter	When SE or SF grade oil is used.		Replace every 10,000 km (6,000 miles) or 8 months					
1-5. Engine coolant			—	R	—	R	—	R
1-6. Exhaust system (leakage, damage, tightness)			—	I	—	I	—	I
2. IGNITION SYSTEM								
2-1. Spark plugs	When unleaded fuel is used		—	—	R	—	—	R
3. FUEL SYSTEM								
3-1. Air cleaner filter		Paved-road	I	I	R	I	I	R
		Dusty condition	Refer to “Severe Driving Condition” schedule					
3-2. Fuel lines (deterioration, leakage, damage)			—	I	—	I	—	I
3-3. Fuel tank			—	—	I	—	—	I
4. EMISSION CONTROL SYSTEM								
4-1. PCV (Positive Crankcase Ventilation) valve			—	—	—	—	—	I
4-2. Fuel evaporative emission control system			—	—	—	—	—	I
5. BRAKE								
5-1. Brake discs and pads (thickness, wear, damage)			I	I	I	I	I	I
Brake drums and shoes (wear, damage)			—	I	—	I	—	I
5-2. Brake hoses and pipes (leakage, damage, clamp)			—	I	—	I	—	I
5-3. Brake fluid			—	R	—	R	—	R
5-4. Brake lever and cable (damage, stroke, operation)			Inspect at first 15,000 km (9,000 miles) only					

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
	km (x 1,000)	15	30	45	60	75	90
	Miles (x 1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
6. CHASSIS AND BODY							
6-1.	Clutch pedal (For manual transmission)	–	I	–	I	–	I
6-2.	Tires/wheel discs (wear, damage, rotation)	I	I	I	I	I	I
6-3.	Drive shaft boots (breakage, damage) / Propeller shaft (4WD)	–	–	I	–	–	I
6-4.	Suspension system (tightness, damage, rattle, breakage)	–	I	–	I	–	I
6-5.	Steering system (tightness, damage, breakage, rattle)	–	I	–	I	–	I
6-6.	Manual transmission oil (leakage, level) ("I": 1st 15,000 km only)	I	–	R	–	–	R
6-7.	Automatic transmission	Fluid level	–	I	–	I	–
		Fluid change	Replace every 165,000 km (99,000 miles)				
6-7-1.	Transfer oil (4WD) (leakage, level)	I	–	I	–	I	–
6-7-2.	Rear differential oil (4WD) (level) ("R": 15,000 km only)	R or I	–	I	–	I	–
6-8.	All latches, hinges and locks	–	I	–	I	–	I
6-9.	Ventilator air filter (if equipped)	–	I	R	–	I	R

NOTE:

- "R": Replace or change
- "I": Inspect and correct or replace if necessary
- For Sweden, item 2-1, 4-1 and 4-2 should be performed by odometer reading only.
- For Item 1-2. Camshaft timing belt: This belt may be replaced every 90,000 km (54,000 miles) according to customer's maintenance convenience.

Maintenance Recommended under Severe Driving Conditions

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, it is recommended that applicable maintenance operation be performed at the particular interval as given in the chart below.

Severe condition code

A – Repeated short trips

B – Driving on rough and/or muddy roads

C – Driving on dusty roads

D – Driving in extremely cold weather and/or salted roads

E – Repeated short trips in extremely cold weather

H – Trailer towing (if admitted)

Severe Condition Code	Maintenance	Maintenance Operation	Maintenance Interval
– B C D – – – –	ITEM 1-1 Drive belt (V-rib belt)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months
A – C D E – – – H	ITEM 1-4 Engine oil and oil filter	R	Every 5,000 km (3,000 miles) or 4 months
A B C – E – – – H	ITEM 2-1 Spark plugs	R	Every 10,000 km (6,000 miles) or 8 months
– – – C – – – – –	ITEM 3-1 Air cleaner filter *1	I	Every 2,500 km (1,500 miles)
		R	Every 30,000 km (18,000 miles) or 24 months
– B – D E – – – H	ITEM 6-3 Drive shafts and propeller shafts (4WD)	I	Every 15,000 km (9,000 miles) or 12 months
– B – – – E – – – H	ITEM 6-6, 6-7-1, 6-7-2 Manual transmission oil, transfer oil (4WD) and differential oil (4WD)	R	Every 30,000 km (18,000 miles) or 24 months
– B – – – E – – – H	ITEM 6-7 Automatic transmission fluid	R	Every 30,000 km (18,000 miles) or 24 months
– B C D – – – – H	ITEM 6-2 Wheel bearings	I	Every 15,000 km (9,000 miles) or 12 months
– – – C D – – – –	ITEM 6-9 Ventilator air filter *2 (if equipped)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months

NOTE:

- “R” : Replace or change
- “I” : Inspect and correct or replace if necessary
- *1 : Inspect or replace more frequently if necessary.
- *2 : Clean or replace more frequently if the air from the ventilator decreases.

Maintenance Service

Chassis and Body

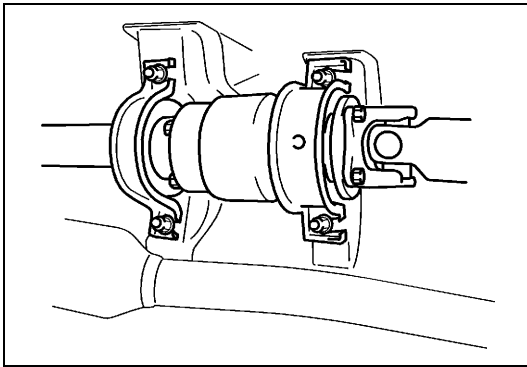
Drive Shaft (Axle) Boots / Propeller Shafts (4WD) (ITEM 6-3)

DRIVE SHAFT (AXLE) BOOTS INSPECTION



Check drive shaft boots (wheel side and differential side) for leaks, detachment, tear or other damage.
Replace boot as necessary.

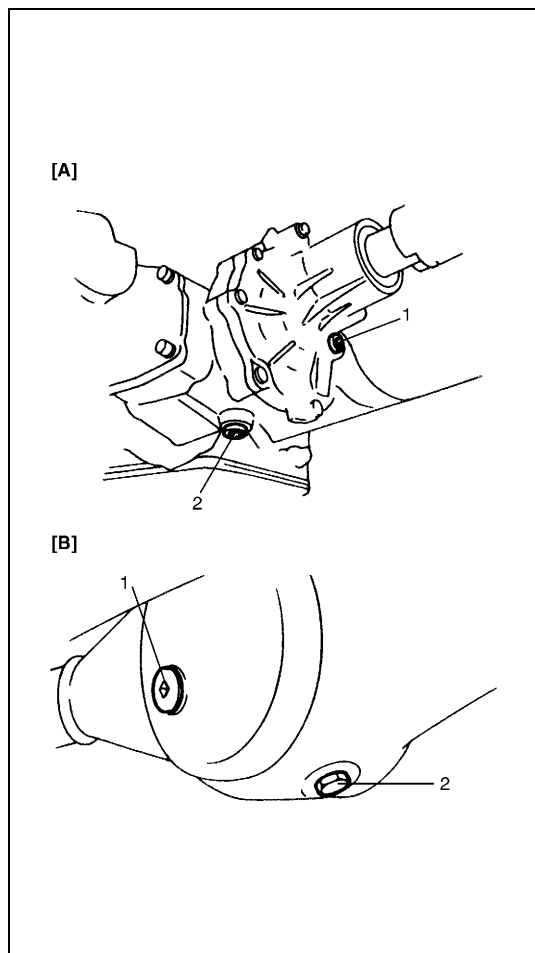
PROPELLER SHAFTS (4WD) INSPECTION



- 1) Check propeller shaft connecting bolts for looseness. If looseness is found, tighten to specified torque.
- 2) Check propeller shaft joints for wear, play and damage. If any defect is found, replace.
- 3) Check propeller shaft center support for biting of foreign matter, crack, abnormal noise and damage. If any defect is found, replace.

Transfer Oil (4WD) and Rear Differential Oil (4WD) (ITEM 6-7-1 and -2)

INSPECTION



- 1) Check transfer case or differential for evidence of oil leakage. Repair leaky point if any.
- 2) Make sure that vehicle is placed level for oil level check.
- 3) Remove level plug of transfer or differential and check oil level.

Oil level can be checked roughly by means of level plug hole. That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled. If oil is found insufficient, pour specified amount of specified oil referring to "TRANSFER OIL CHANGE" in Section 7D or "DIFFERENTIAL OIL CHANGE" in Section 7F.

[A] : Transfer
[B] : Rear differential
1. Oil level/filler plug
2. Drain plug

- 4) Tighten level plug to specified torque referring to "TRANSFER OIL CHANGE" in Section 7D or "CHANGING DIFFERENTIAL OIL" in Section 7F.

REPLACEMENT

Change transfer oil and differential oil with new specified oil referring to "TRANSFER OIL CHANGE" in Section 7D or "DIFFERENTIAL OIL CHANGE" in Section 7F.

Recommended Fluids and Lubricants

Engine oil	SE, SF, SG, SH or SJ (Refer to engine oil viscosity chart in item 1-4.)
Engine coolant (Ethylene glycol base coolant)	"Anti-freeze / Anti-corrosion coolant"
Brake fluid	DOT4 or SAE J1704
Manual transmission oil	API GL-4, SAE75W-90 (Refer to Section 7A for detail)
Transfer oil (4WD)	Refer to "OIL CHANGE" in Section 7D
Differential oil (4WD)	Refer to "OIL CHANGE" in Section 7F
Automatic transmission fluid	An equivalent of DEXRON®-III
Door hinges	Engine oil or water resistance chassis grease
Hood latch assembly	
Key lock cylinder	Spray lubricant

SECTION 3E

REAR SUSPENSION

NOTE:

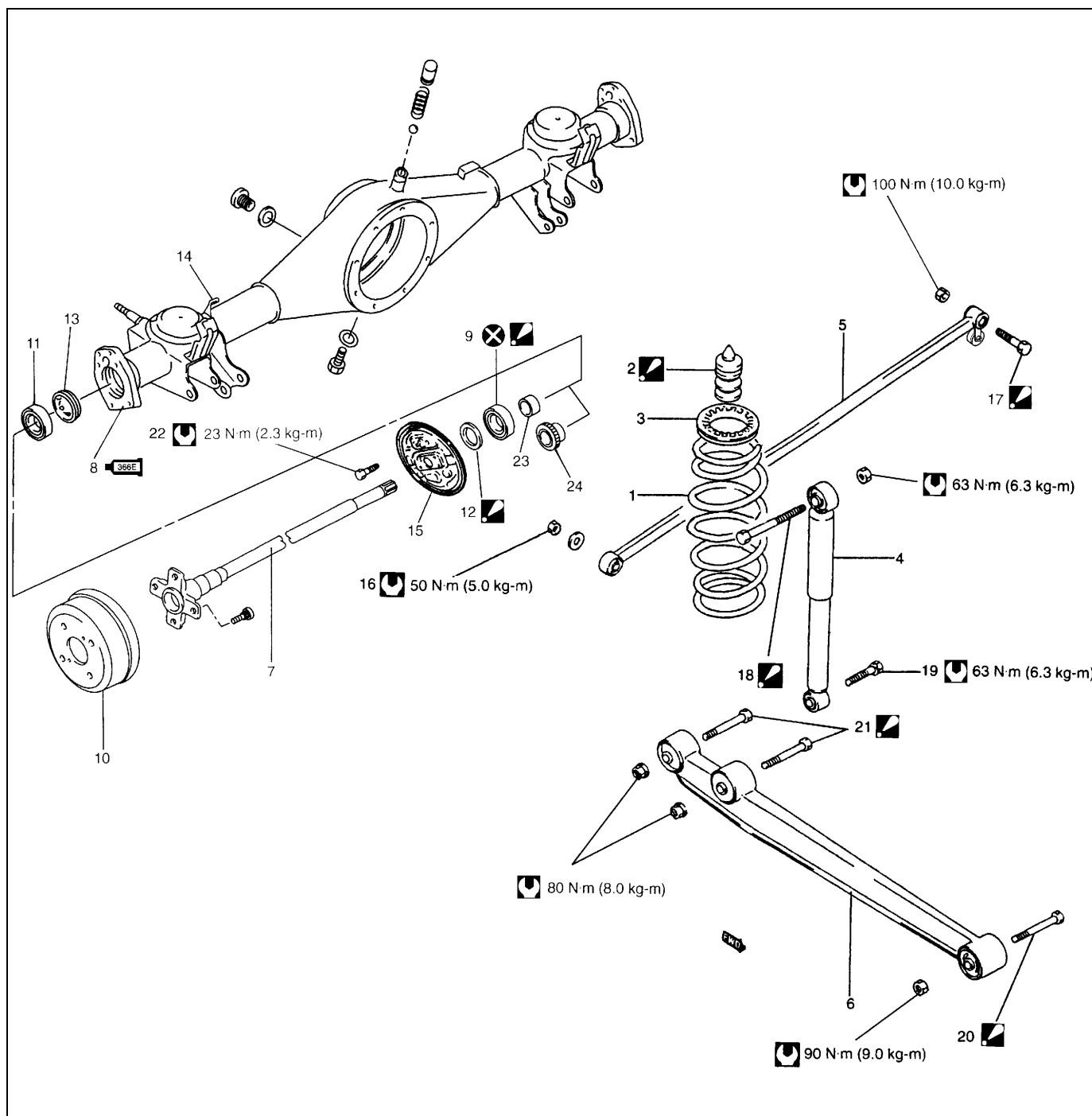
- All suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any suspension part. Replace it with a new part, or damage to the part may result.
- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

3E

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On-Vehicle Service

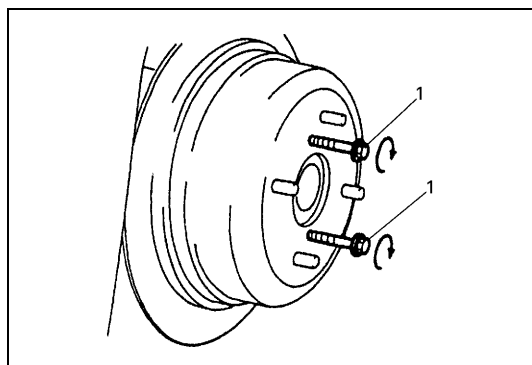


1. Rear coil spring	10. Brake drum	19. Shock absorber lower bolt
2. Rear bump stopper : Apply soap water, when installing.	11. Oil seal	20. Trailing arm front bolt : Insert from vehicle inside.
3. Rear spring upper seat	12. Spacer : The tapered side of spacer inner diameter directed toward outside (brake drum side).	21. Trailing arm rear bolt : Insert from vehicle inside.
4. Rear shock absorber	13. Oil seal protector	22. Brake back plate bolt
5. Lateral rod	14. LSPV bracket (only vehicle with LSPV)	23. Bearing retainer ring (without ABS)
6. Trailing arm	15. Brake back plate	24. Bearing retainer ring (with ABS)
7. Rear axle shaft	16. Lateral rod axle housing side nut	Tightening torque
8. Rear axle housing : Apply water tight sealant 99000-31090 to joint of plate and axle housing.	17. Lateral rod body side bolt : Insert from the direction as shown.	Do not reuse
9. Bearing : Seal side of bearing comes inside of brake drum.	18. Shock absorber upper bolt : Insert from vehicle outside.	

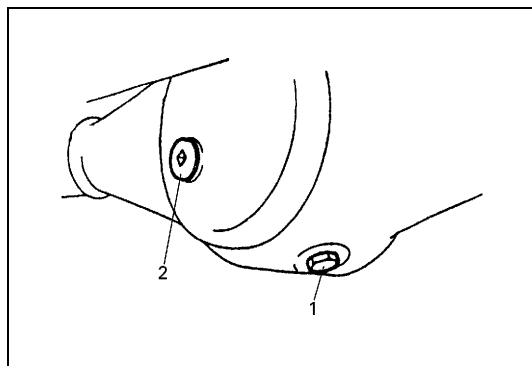
Rear Axle Shaft and Wheel Bearing

REMOVAL

- 1) Hoist vehicle and remove rear wheels.
- 2) Remove rear brake drum by using 8 mm bolts. For details referring to Section 5C.

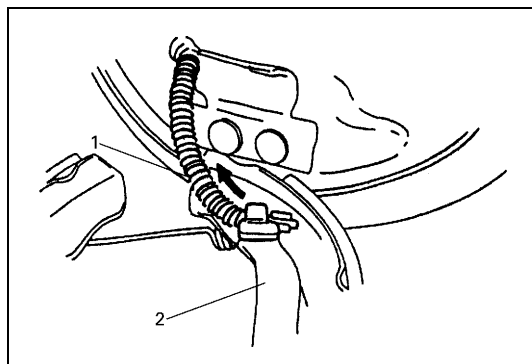


1. 8 mm bolt

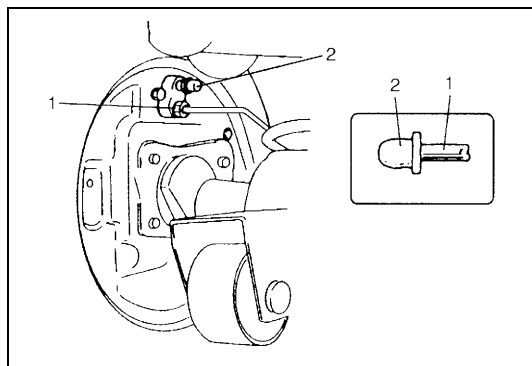


- 3) Drain gear oil from rear axle housing by loosening drain plug (1).

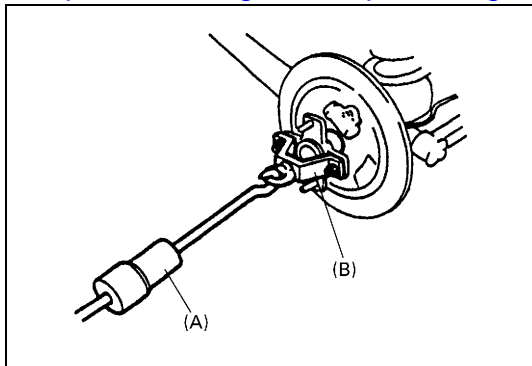
2. Level plug



- 4) Disconnect parking brake cable from parking brake shoe lever (2) and remove parking brake cable (1) from brake back plate.



- 5) Disconnect brake pipe (1) from wheel cylinder and put wheel cylinder bleeder plug cap (2) onto pipe to prevent fluid from spilling.
- 6) Remove wheel speed sensor from axle housing (if equipped with ABS).
- 7) Remove brake back plate bolts from axle housing.

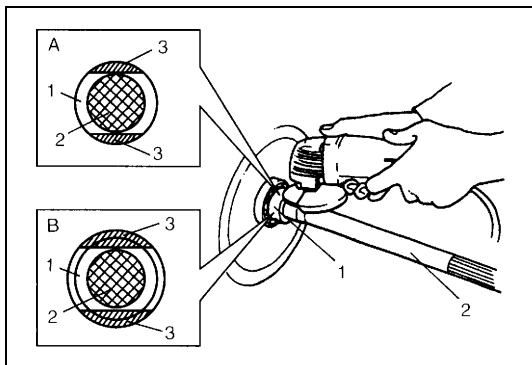


- 8) Using special tools indicated, draw out axle shaft with brake back plate.

Special tool

(A) : 09942-15511

(B) : 09943-17912



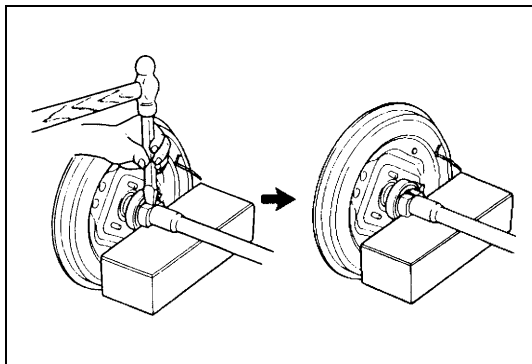
- 9) In order to remove the retainer ring (1) from the axle shaft (2), grind (3) with a grinder two parts of the bearing retainer ring as illustrated till it becomes thin.

CAUTION:

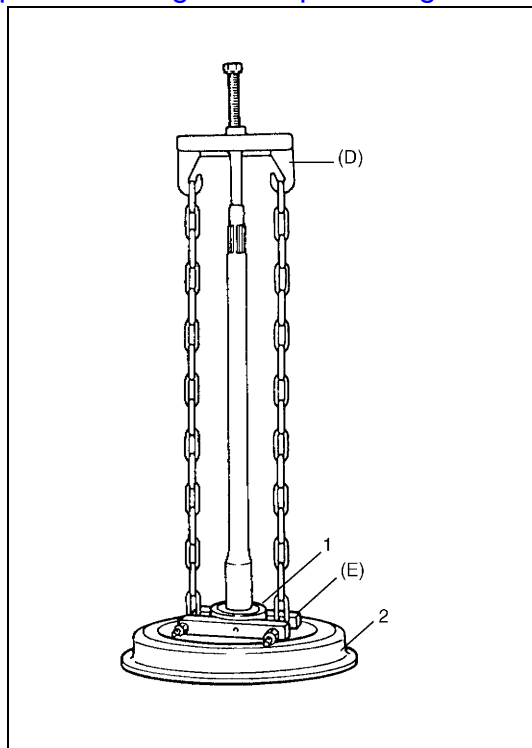
Be careful not to go so far as to grind the shaft.

A : Without ABS

B : With ABS



- 10) Break with a chisel the thin ground retainer ring, and it can be removed.

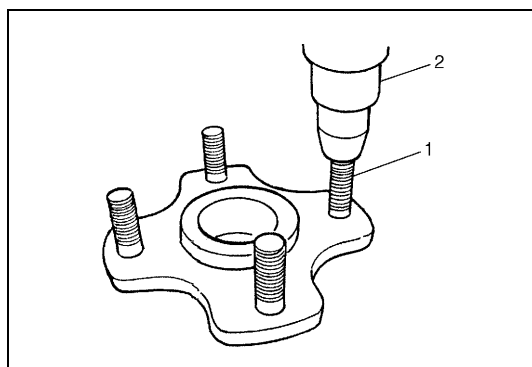


- 11) Using special tools, remove bearing (1) from shaft and then remove brake back plate (2).

Special tool

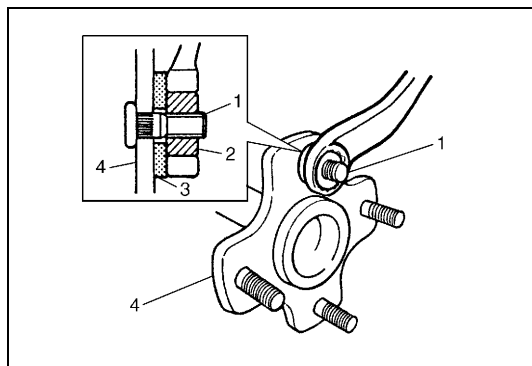
(D) : 09927-18411

(E) : 09921-57810



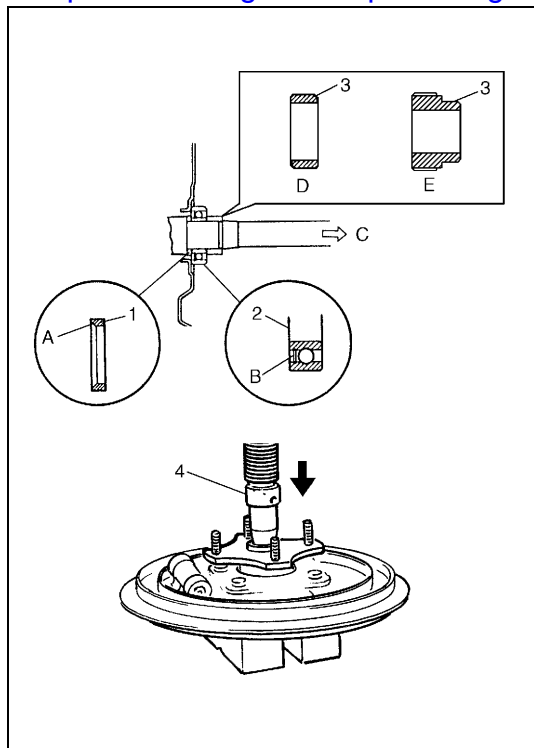
- 12) Remove stud bolts (1) by using hydraulic press (2).

INSTALLATION



- 1) Aligning serrations between new stud bolts (1) and flange (4), install new stud bolts by tightening nut as shown.

2.	Nut
3.	Washer

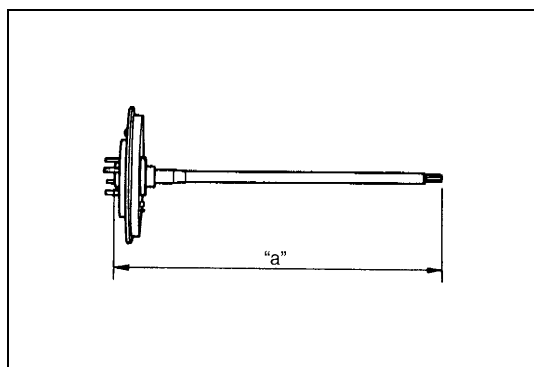


- 2) Press in a new bearing (2) and retainer ring (3) in order by using an hydraulic press (4).

NOTE:

- Install wheel bearing spacer (1) with the tapered side of its inner diameter directed toward outside (axle shaft flange side).
- Install wheel bearing with its sealed side directed toward outside (axle shaft flange side).
- Use care not to cause any damage to outside of retainer ring and wheels sensor ring (if equipped with ABS).

A :	Tapered side
B :	Sealed side
C :	Differential side
D :	Without ABS
E :	With ABS

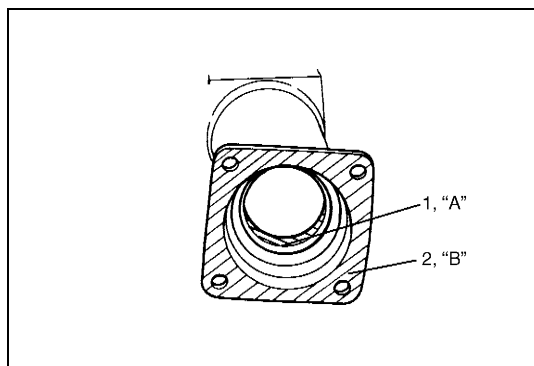


- 3) Inspect axle shaft length.

Rear axle shaft length "a"

Right side : 657.5 mm (25.9 in.)

Left side : 785.5 mm (30.9 in.)



- 4) Apply grease to axle shaft oil seal (1) lip as shown.

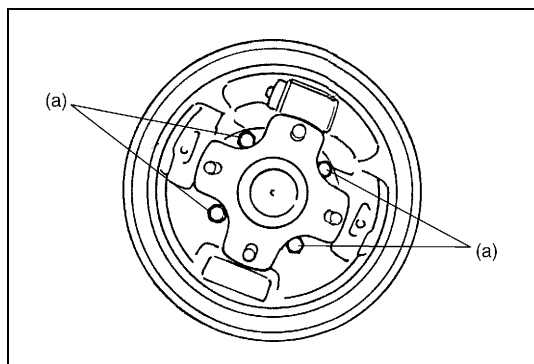
"A" : Grease 99000-25010

- 5) Apply sealant to mating surface (2) of axle housing and brake back plate.

NOTE:

Make sure to remove old sealant before applying it anew.

"B" : Sealant 99000-31090



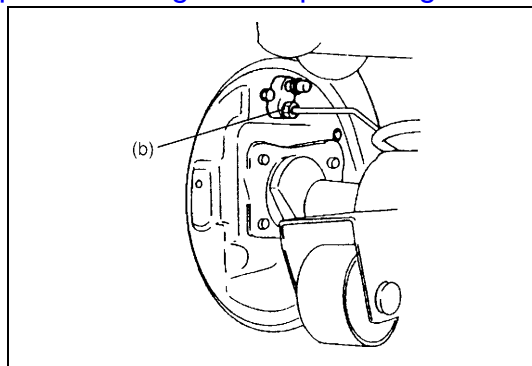
- 6) Install rear axle shaft to rear axle housing and tighten brake back plate bolts to specified torque.

NOTE:

When installing rear axle shaft, be careful not to cause damage to oil seal lip in axle housing.

Tightening torque

Brake back plate bolts (a) : 23 N·m (2.3 kg·m, 17.0 lb·ft)

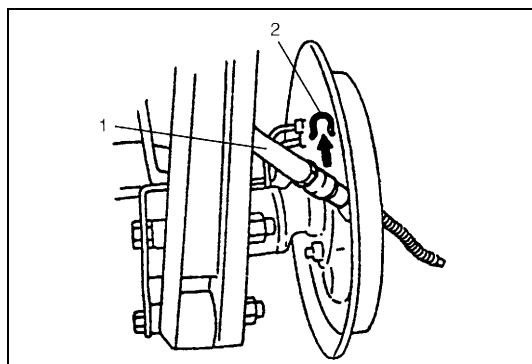


- 7) Connect brake pipe to wheel cylinder and tighten brake pipe flare nut to specified torque.

Tightening torque

Brake pipe flare nut (b) : 16 N·m (1.6 kg-m, 11.5 lb-ft)

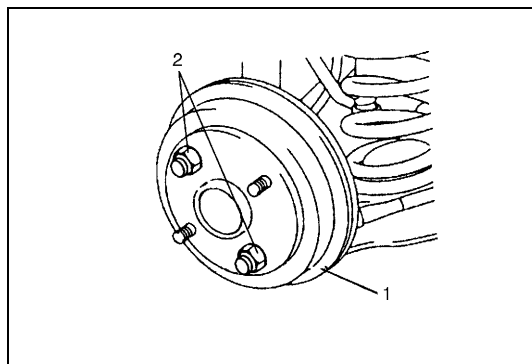
- 8) Tighten oil drain plug to specified torque and refill rear axle (differential) housing with new specified gear oil and tighten oil filler plug to specified torque. Refer to Section 7F for tightening torque data and refill.



- 9) Connect parking brake cable (1) to parking brake shoe lever. Install brake shoes and secure parking brake cable to brake back plate with clip (2).
Install wheel speed sensor (if equipped with ABS).

CAUTION:

Check to ensure that clip is in good condition before installing it. If deformed or broken, replace.

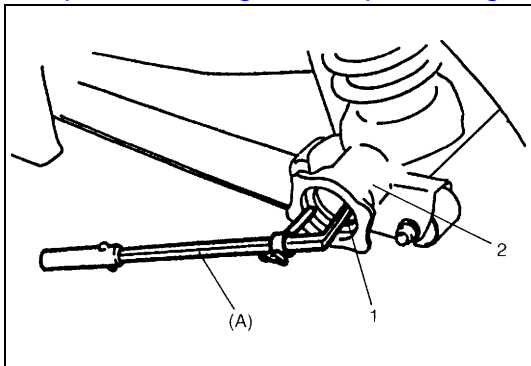


- 10) Install brake drum (1) (right & left) after marking sure that inside of brake drum and brake shoes are free from dirt and oil. Then tighten wheel nuts (2) temporarily by hand.
- 11) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, refer to "BLEEDING BRAKES" in Section 5.)
- 12) Install wheel and tighten wheel nuts to specified torque.
- 13) Upon completion of all jobs, pull parking brake lever with about 20 kg, (44 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable (for adjustment, refer to "PARKING BRAKE INSPECTION AND ADJUSTMENT" in Section 5).
- 14) Check to ensure that brake drum is free from dragging and proper braking is obtained.
- 15) Perform brake test (foot brake and parking brake).
(For brake test, see Section 5.)
- 16) Check each installed part for oil leakage.

Rear Axle Shaft Oil Seal

REMOVAL

- 1) Remove rear axle shaft. For details, refer to steps 1) to 8) of "REAR AXLE SHAFT AND WHEEL BEARING" in this section.



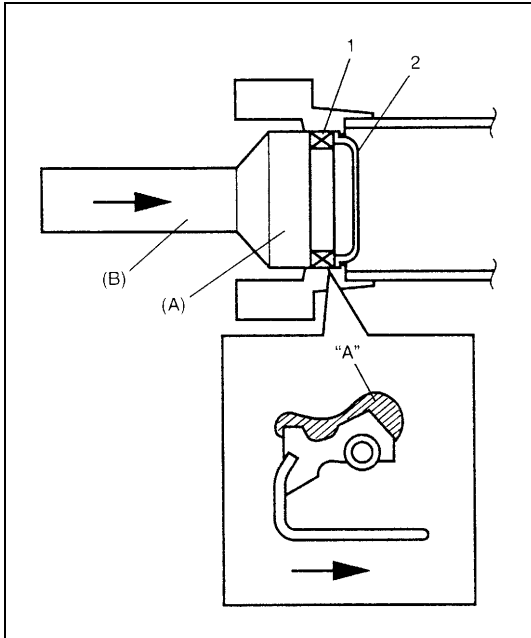
- 2) Remove rear axle shaft oil seal (1) by using special tool.

Special tool

(A) : 09913-50121

2. Axle housing

INSTALLATION



- 1) Using special tool, drive in oil seal (1) until it contacts oil seal protector (2) in axle housing.

NOTE:

- Make sure that oil seal is free from inclination as it is installed.
- Refer to figure so that oil seal is installed in proper direction.

Special tool

(A) : 09924-84510-004

(B) : 09913-75821

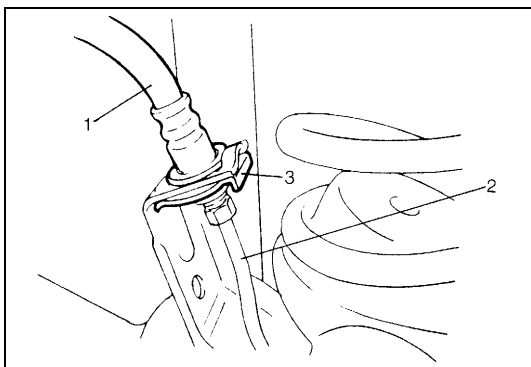
“A” : Grease 99000-25010

A : Differential side

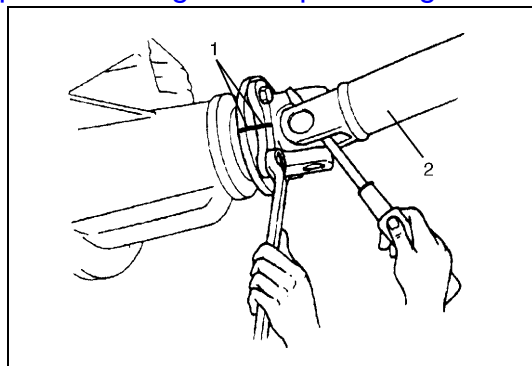
- 2) For procedure hereafter, refer to steps 4) to 16) of “REAR AXLE SHAFT AND WHEEL BEARING” in this section.

Rear Axle Housing

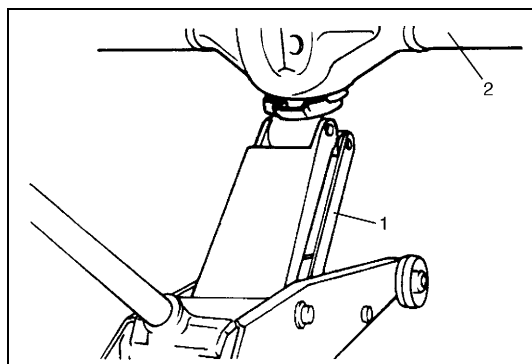
REMOVAL



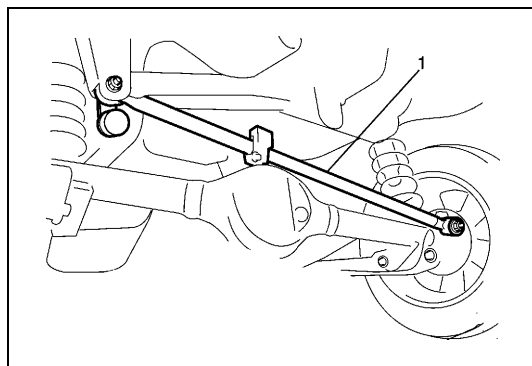
- 1) Remove rear axle shaft referring to item 1) to 8) of “REAR AXLE SHAFT AND WHEEL BEARING” in this section.
- 2) Disconnect brake pipes (2) (right & left) from flexible hoses (1) and remove E-rings (3).
- 3) Remove brake pipes from wheel cylinders (right & left).
- 4) Remove wheel speed sensors (right & left) and release clamps from axle housing (if equipped with ABS).
- 5) Remove LSPV adjust nut and detach spring end from rear axle housing (if equipped with LSPV).



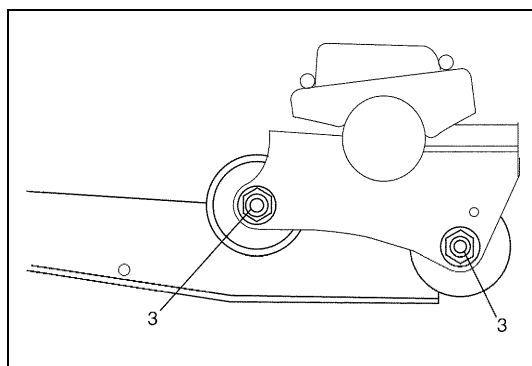
- 6) Before removing propeller shaft, give match marks (1) on joint flange and propeller shaft (2) as shown.
- 7) Remove propeller shaft.



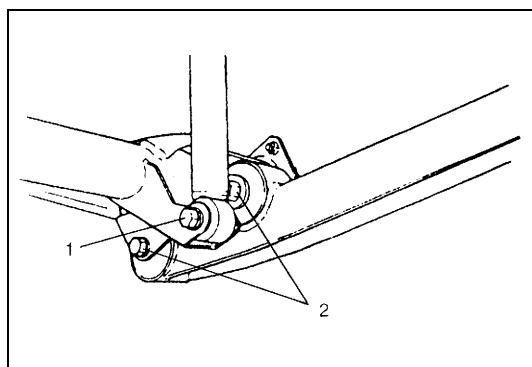
- 8) For jobs hereafter, support rear axle housing by using floor jack (1) under axle housing (2) and remove differential carrier assembly.



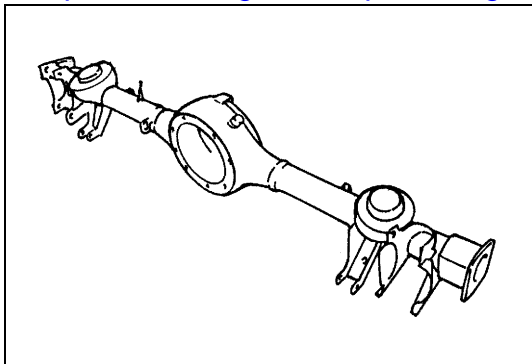
- 9) Remove lateral rod (1).



- 10) Loosen trailing arm rear mounting nuts (3) (right & left) from axle housing, but don't remove bolts.



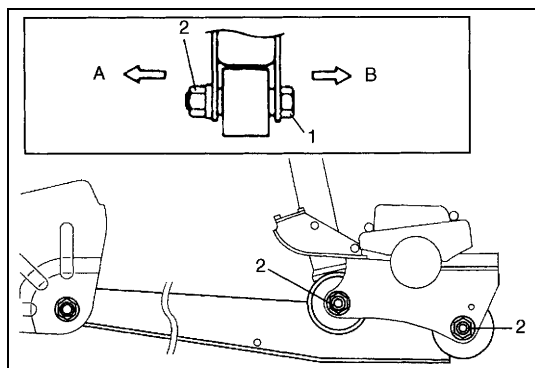
- 11) Remove shock absorber lower mounting bolts (1).
- 12) Lower floor jack until tension of suspension coil spring becomes a little loose and remove trailing arm rear mounting bolts (2) (right & left).
- 13) Lower rear axle housing gradually and remove coil springs.



14) Remove axle housing.

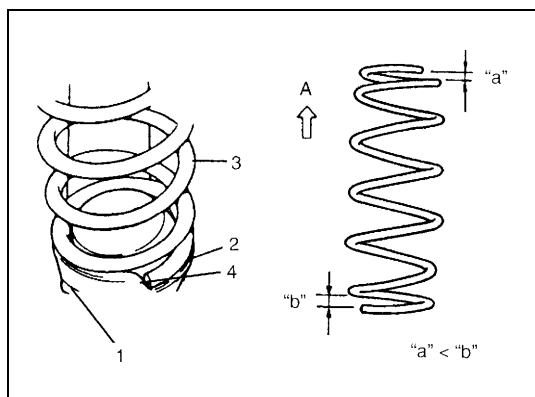
INSTALLATION

Install removed parts in reverse order of removal, noting the following.



- 1) Place rear axle housing on floor jack. Then install rear trailing arm bolts (1) (right & left) in proper direction as shown. Then tighten nuts (2) temporarily by hand.

A :	Vehicle out side
B :	Vehicle center side

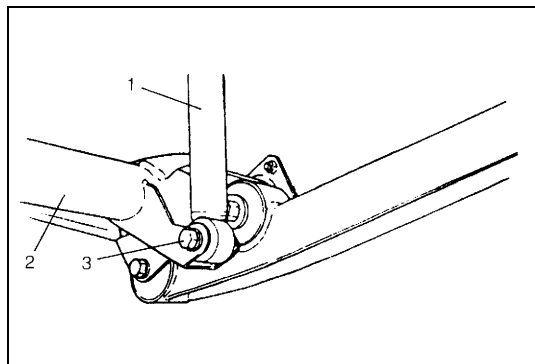


- 2) Install coil springs (3) (right & left) on spring seat (2) of axle housing (1) and raise axle housing.

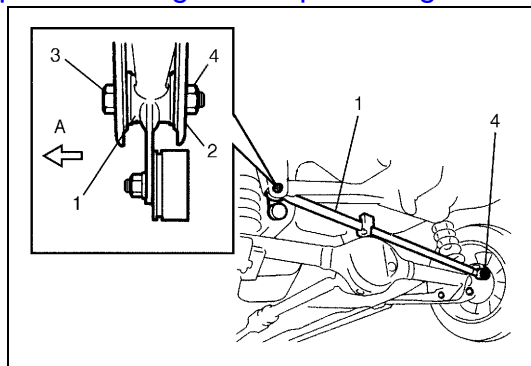
NOTE:

When seating coil spring (3), mate spring end with stepped part (4) of rear axle spring seat as shown.

A :	Upper side
"a" :	Small
"b" :	Large

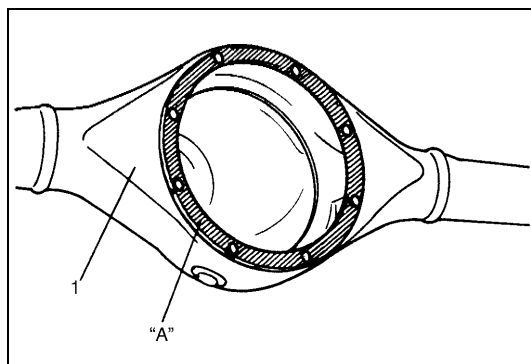


- 3) Install shock absorber (1) (right and left) to axle housing (2) and install bolts in proper direction as shown. Then tighten bolts (3) (right & left) temporarily by hand.



- 4) Install lateral rod (1) and bolt (3) in proper direction as shown. Then tighten nuts (4) temporarily by hand.

2. Vehicle body
A: Forward



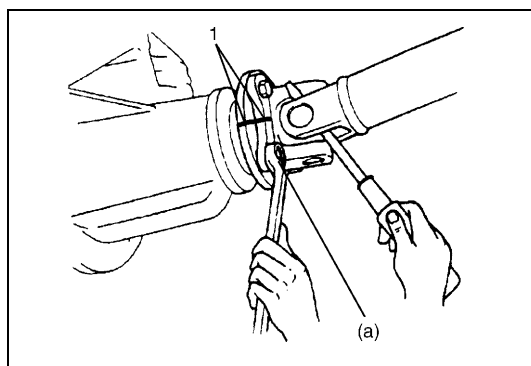
- 5) Clean mating surfaces of axle housing (1) and differential carrier and apply sealant to housing side.

“A” : Sealant 99000-31110

- 6) Install differential carrier assembly to axle housing and tighten carrier bolts to specified torque.

Tightening torque

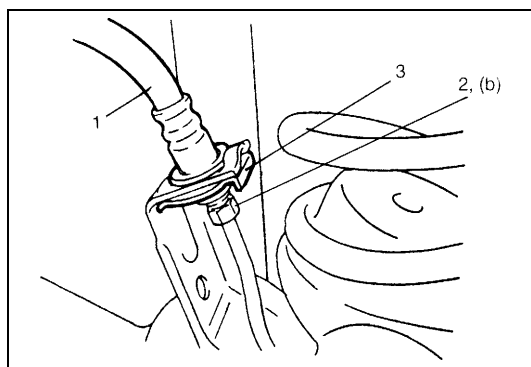
Rear differential carrier bolts : 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 7) Install propeller shaft to joint flange aligning match marks (1) and tighten flange bolts to specified torque.

Tightening torque

Companion flange bolts (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 8) Install LSPV spring to rear axle.
Tighten LSPV adjust nut temporarily at this step. (if equipped with LSPV).

- 9) Install wheel speed sensor and clamp wire securely (right & left) (if equipped with ABS).

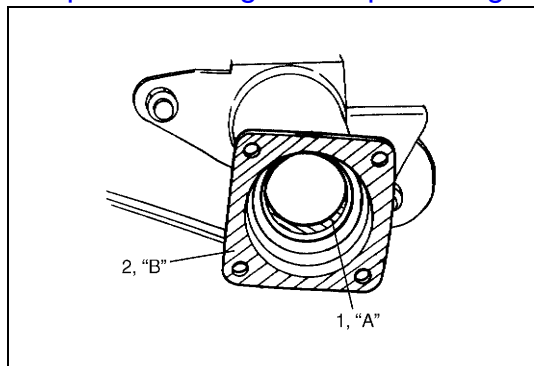
- 10) Remove floor jack from axle housing.

- 11) Connect brake flexible hoses (1) (right & left) to bracket on rear axle and secure it with E-rings (3) (right & left).

- 12) Connect brake pipes to brake flexible hoses (1) and tighten brake pipe flare nuts (2) to specified torque.

Tightening torque

Brake pipe flare nut (b) : 16 N·m (1.6 kg-m, 11.5 lb-ft)

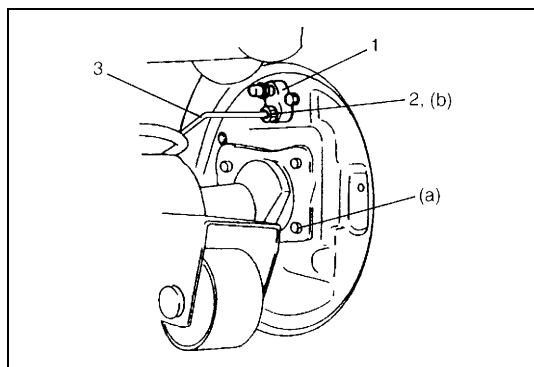


13) Apply grease to axle shaft oil seals (1) lip (right & left).

“A” : Grease 99000-25010

14) Clean mating surfaces (2) (right & left) of axle housing and brake back plate and apply water tight sealant as shown in figure.

“B” : Sealant 99000-31090



15) Install rear axle shaft (right & left) to rear axle housing and tighten brake back plate bolts to specified torque.

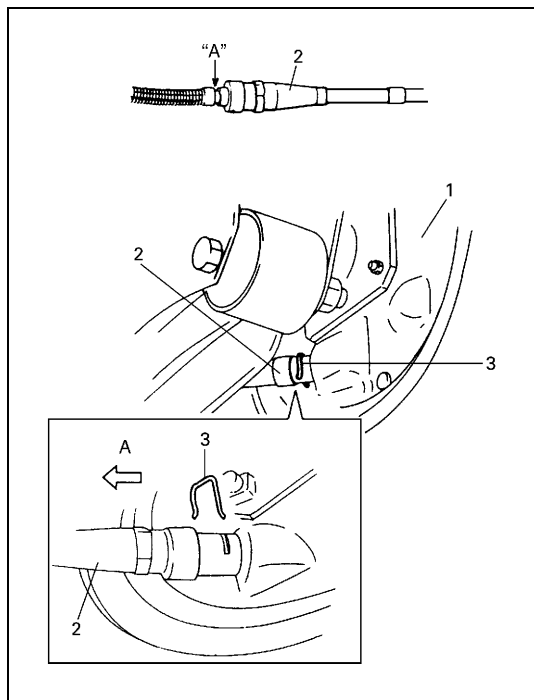
Tightening torque

Brake back plate bolts (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

16) Connect brake pipes (3) to wheel cylinders (1) (right & left) and tighten brake pipe flare nuts (2) to specified torque.

Tightening torque

Brake pipe flare nuts (b) : 16 N·m (1.6 kg-m, 11.5 lb-ft)



17) Apply water tight sealant where brake back plate (1) and parking brake cable contact.

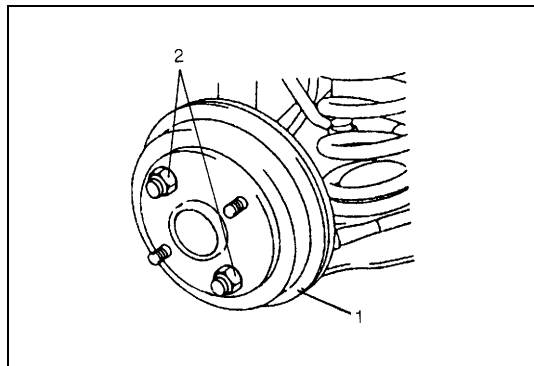
Connect parking brake cable (2) to brake back plate (right & left) and secure it with clip (3).

“A” : Sealant 99000-31090

NOTE:

Check to ensure that clip is in good condition before installing it. If deformed or broken, replace.

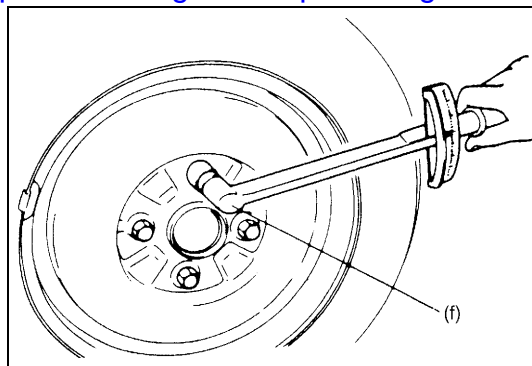
18) Install brake shoes (right & left) referring to “BRAKE SHOE” in Section 5C.



19) Install brake drums (1) (right & left) after making sure that inside of brake drum and brake shoes are free from dirt and oil. Then tighten wheel nuts (2) temporarily by hand.

20) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, refer to Section 5.)

21) Refill differential gear housing with new specified gear oil. Refer to Section 7F.



22) Install wheels and tighten wheel nuts to specified torque.

Tightening torque

Wheel nuts (f) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

23) Upon completion of all jobs, pull parking brake lever with about 20 kg, (44 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.

Adjust parking brake cable referring to "PARKING BRAKE" in Section 5C.

24) Lower hoist.

25) Tighten right and left trailing arm nuts (1) and shock absorber lower bolts (2) to specified torque.

Tighten lateral rod nuts (3) to specified torque.

NOTE:

When tightening these bolts and nuts, be sure that vehicle is off hoist and in non loaded condition.

Tightening torque

Rear trailing arm nuts (a) : 80 N·m (8.0 kg-m, 58.0 lb-ft)

Rear shock absorber lower bolts (b) : 63 N·m (6.3 kg-m, 45.5 lb-ft)

Lateral rod axle housing side nut (c) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

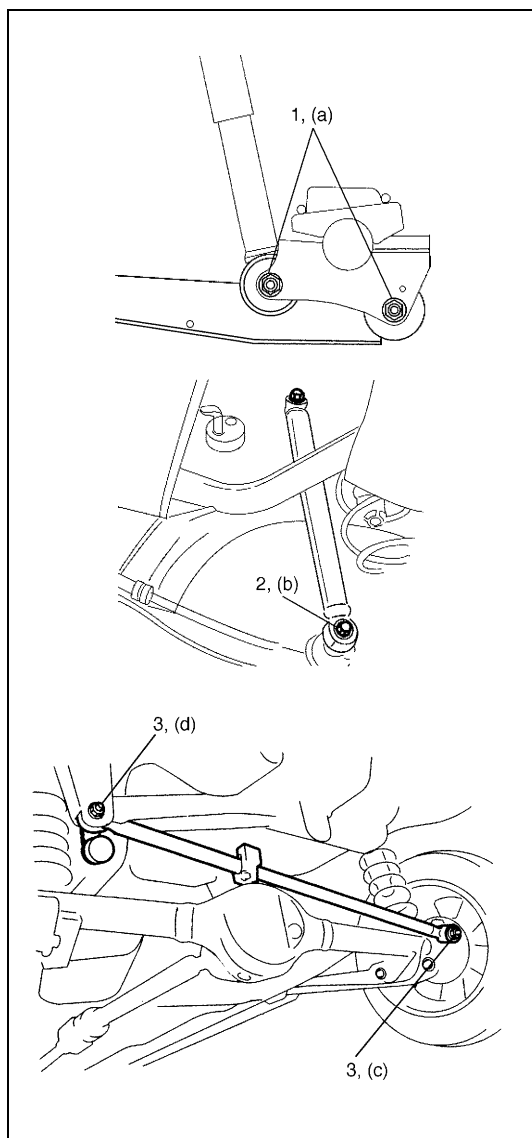
Lateral rod body side nut (d) : 100 N·m (10.0 kg-m, 72.5 lb-ft)

26) Check to ensure that brake drum is free from dragging and proper braking is obtained.

27) Perform brake test (foot brake and parking brake).

28) If equipped with LSPV, check and adjust LSPV spring referring to "LSPV INSPECTION AND ADJUSTMENT" in Section 5A and perform "FLUID PRESSURE TEST" in Section 5.

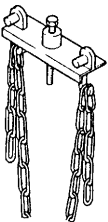
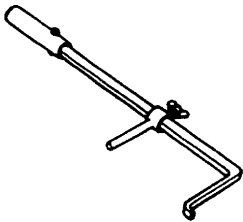
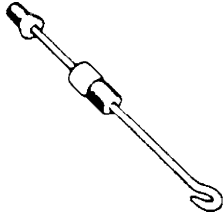
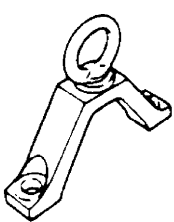
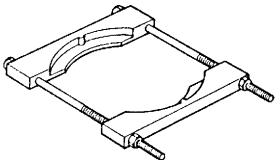
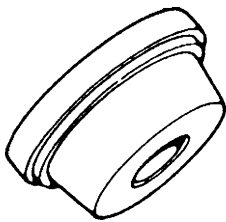
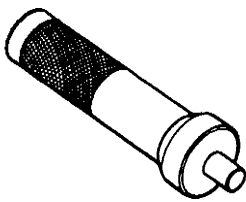
29) Check each installed part for oil leakage.



Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE (A) (99000-25010)	<ul style="list-style-type: none"> • Axle shaft oil seal • Wheel bearing
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	<ul style="list-style-type: none"> • Joint seam of differential carrier and axle housing
Gear oil	For gear oil information, refer to Section 7F.	<ul style="list-style-type: none"> • Differential gear (Rear axle housing)
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	<ul style="list-style-type: none"> • Joint seam of axle housing and brake back plate

Special Tool

 <p>09927-18411 Universal puller</p>	 <p>09913-50121 Oil seal remover</p>	 <p>09942-15511 Sliding hammer</p>	 <p>09943-17912 Brake drum remover</p>
 <p>09921-57810 Bearing remover</p>	 <p>09924-84510-004 Oil seal installer</p>	 <p>09913-75821 Installer attachment</p>	

SECTION 4B

PROPELLER SHAFTS

CONTENTS

General Description	4B-1	On-Vehicle Service	4B-2
Diagnosis	4B-1	Tightening Torque Specification	4B-6
Diagnosis Table	4B-1	Required Service Material	4B-6
Propeller Shaft Joint Check.....	4B-2		

General Description

Most universal and constant velocity joints require no maintenance. They are lubricated for life and can not be lubricated on the vehicle. If universal and constant velocity joints becomes noisy or worn, it must be replaced.

The propeller shaft is a balanced unit. Handle it carefully so that balance can be maintained.

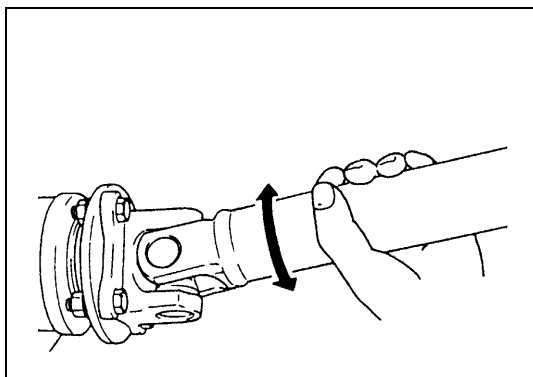
A viscous coupling is used for the coupling system which distributes an optimum driving force to the front and rear wheels according to the driving conditions. It is located at the center of the propeller shaft.

Diagnosis

Diagnosis Table

Condition	Possible Cause	Correction
Abnormal noise	• Loose universal joint bolt	Tighten universal joint bolt.
	• Spider bearing worn out or stuck	Replace.
	• Worn or broken constant velocity joint	Replace.
	• Worn or broken center support bearing	Replace.
	• Broken center support rubber	Replace.
	• Wear spider	Replace propeller shaft.
Vibration	• Performed propeller shaft	Replace.

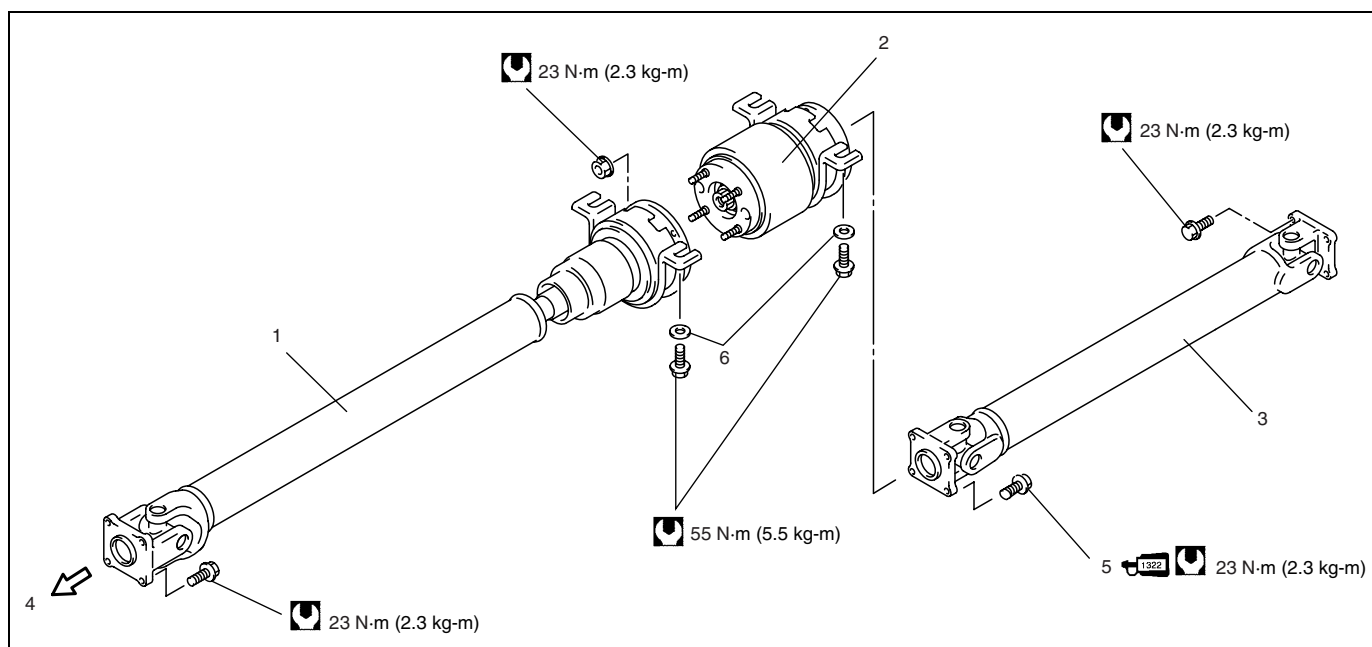
Propeller Shaft Joint Check



If universal joints are suspected of producing chattering or rattling noise, inspect them for wear. Check to see if cross spider rattles in yokes and replace defective propeller shaft with new one.

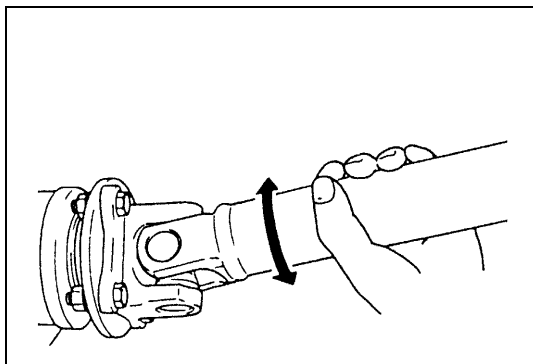
Noise coming from universal joint can be easily distinguished from other noises because rhythm of chattering or rattling is in step with cruising speed. Noise is pronounced particularly on standing start or in coasting condition (when braking effect of engine is showing in the drive line).

On-Vehicle Service



1.	Propeller shaft No.1 with center support
2.	Viscous coupling with center support
3.	Propeller shaft No.2
4.	Forward
5.	Propeller shaft No.2 bolt : Apply thread lock 99000-32110 to thread.
6.	Washer (if equipped)
	Tightening torque

PRECEDENTIAL INSPECTION



- Check propeller shaft connecting bolts for looseness. If looseness is found, tighten to specified torque.
- Check propeller shaft joints for wear, rattle and damage. If any defect is found, replace.
- Check propeller shaft center support for biting of foreign matter, crack, abnormal noise and damage. If any defect is found, replace.

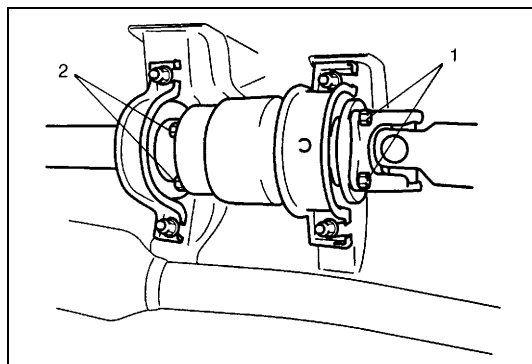
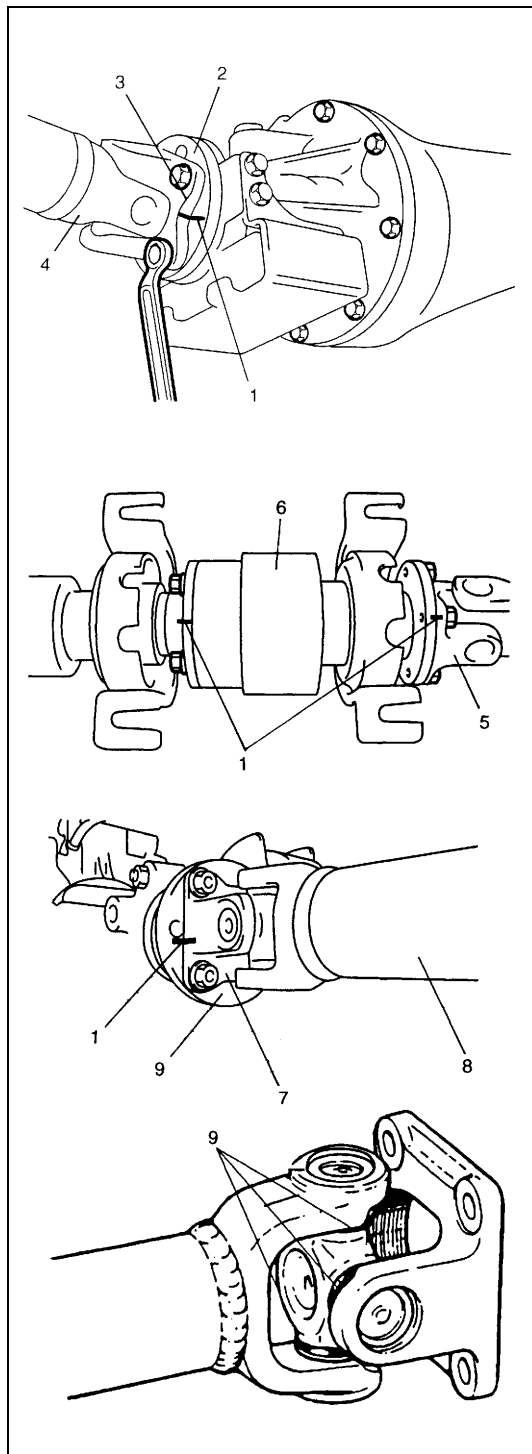
REMOVAL

- 1) Hoist vehicle.
- 2) Before removing propeller shafts, give match marks (1) on yoke (3) of propeller shaft No.2 (4) and companion flange (2) of differential as shown. Also give match marks (1) on propeller shaft No.2 yoke (5), viscous coupling with center support (6), yoke (7) of propeller shaft No.1 with center support (8) and transfer output flange (9).

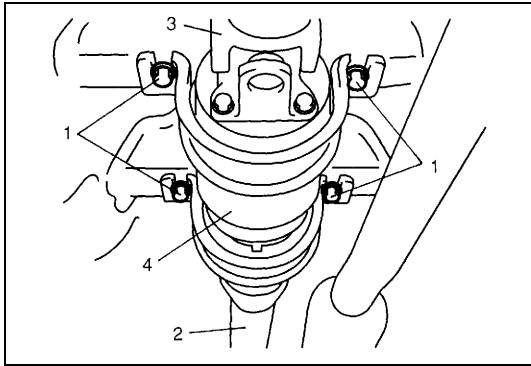
CAUTION:

Don't damage joint seal (10) to prevent lubrication defect of joint.

- 3) Loosen propeller shaft bolt at front and rear end, and separate propeller shafts from transfer and rear differential.



- 4) If disassembling propeller shaft assembly is necessary, loosen propeller shaft No.2 bolts (1) and viscous coupling nuts (2) to facilitate subsequent disassembling, but keeping each connection provisionally.



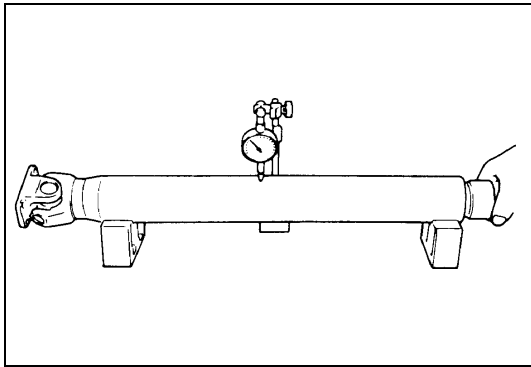
- 5) Loosen center support bolts (1), then remove propeller shaft No.1 with center support (2), propeller shaft No.2 (3) and viscous coupling with center support (4) all together.

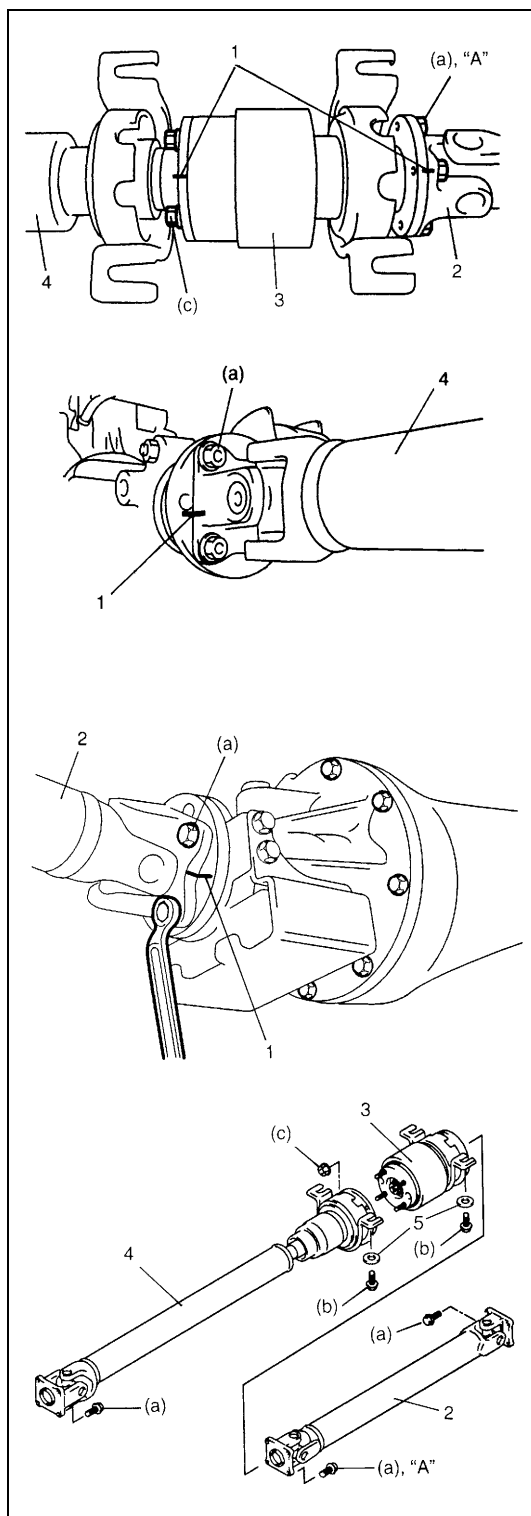
- 6) Disconnect propeller shaft No.1 with center support and propeller shaft No.2 from viscous coupling with center support.

INSPECTION

- Inspect propeller shaft and flange yoke for damage.
- Inspect propeller shaft for runout.
If damage is found or shaft runout exceeds its limit, replace.

Propeller shaft runout
Limit : 0.7 mm (0.028 in.)



INSTALLATION

Reverse removal procedure to install propeller shafts noting following point.

- When installing propeller shafts and viscous coupling with center support, align the match marks (1). Otherwise, vibration may occur during driving.
- Apply thread lock cement to thread of propeller shaft No.2 bolts.

“A” : Cement 99000-32110

- Use following specification to torque bolts.

Tightening torque

Propeller shaft bolts (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

Center support bolts (b) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

Viscous coupling nuts (c) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

2.	Propeller shaft No.2
3.	Viscous coupling with center support
4.	Propeller shaft No.1 with center support
5.	Washer (if equipped)

Tightening Torque Specification

Fastening portion	Tightening torque		
	N•m	kg-m	lb-ft
Propeller shaft bolts	23	2.3	17.0
Center support bolts	55	5.5	40.0
Viscous coupling nuts	23	2.3	17.0

Required Service Material

Material	Recommended SUZUKI Material (Part Number)	Use
Thread lock cement	THREAD LOCK CEMENT 1322 (99000-32110)	<ul style="list-style-type: none"> Propeller shaft No.2 bolt

SECTION 5

BRAKES

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.
- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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Fluid Pressure Test (If Equipped with LSPV) .	5-2	Special Tool.....	5-4

Check and Adjustment

Fluid Pressure Test (If Equipped with LSPV)

Test procedure for LSPV assembly is as follows.

Before testing, confirm the following.

- Fuel tank is filled with fuel fully.
- Vehicle is equipped with spare tire, tools, jack and jack handle.

- 1) Place vehicle on level floor and set approximately about 1,000 N (100 kg, 220 lbs) weight (1) on rear housing center so that rear axle weighs 4,500 N (450 kg, 992 lbs).

Rear axle weight "L" : 4,500 N (450 kg, 992 lbs)

- 2) Install special tool to front and rear brake.

NOTE:

Pressure gauge should be connected to bleeder plug hole of front (left side brake) and rear (right side brake). After testing front left side and rear right side, test front right side and rear left side in the same way.

Special tool

Front brake

(A) : 09956-02310

(B) : 09952-36310

(C) : 55473-82030 (Air bleeder plug as a spare part)

NOTE:

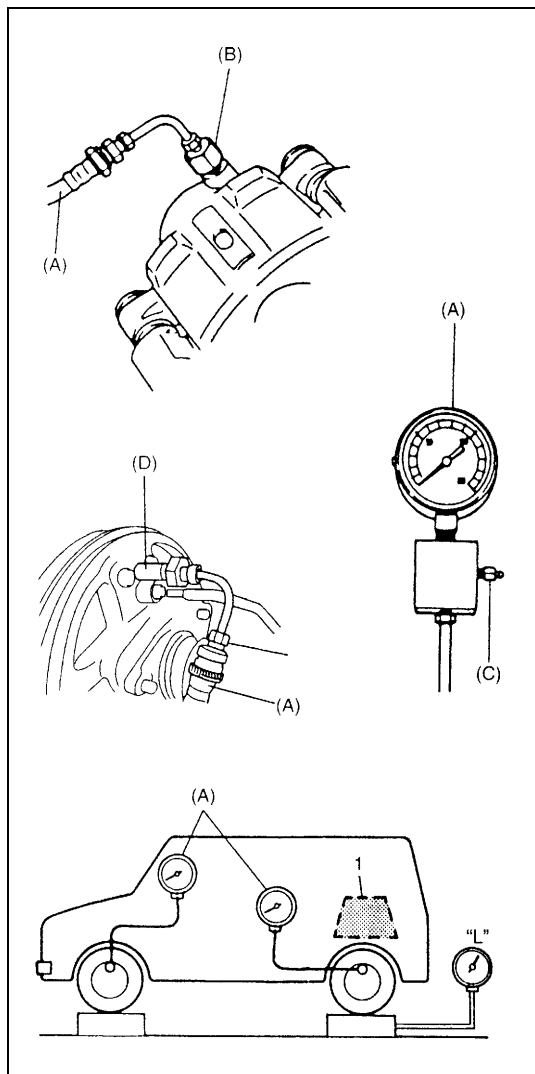
For front brake, use special tool (B) instead of thread diameter 10 mm attachment included in special tool (A).

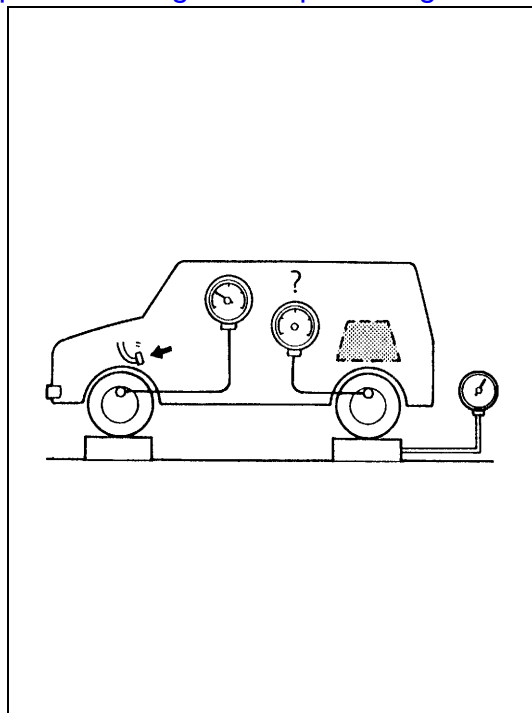
Rear brake

(A) : 09956-02310

(C) : 55473-82030 (Air bleeder plug as a spare part)

(D) : 09952-48320



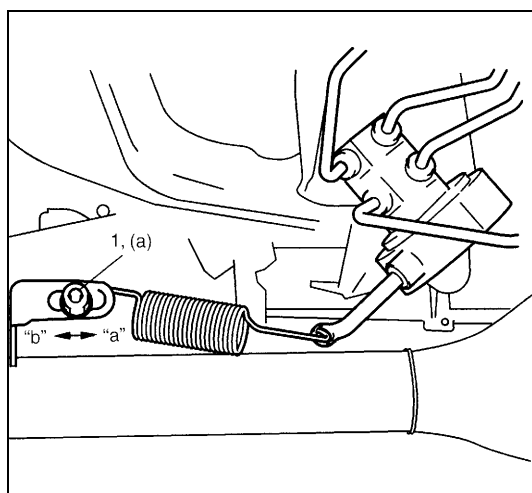


- 3) Depress brake pedal gradually till fluid pressure of front brake becomes as specified below and check corresponding pressure of rear brake then. It should be within specification given below.

Front brake	Rear brake
7,500 kPa	4,000 – 5,500 kPa
75 kg/cm²	40 – 55 kg/cm²
1,067 psi	569 – 782 psi

- 4) As done above, apply 100 kg/cm² pressure to front brake and check that rear brake pressure then is within specification as given below.

Front brake	Rear brake
10,000 kPa	4,700 – 6,200 kPa
100 kg/cm²	47 – 62 kg/cm²
1,422 psi	668 – 882 psi



- 5) If rear brake pressure is not within specification, adjust it by changing bolt (2) position as follows.
- If rear brake pressure is higher than specification, move bolt and nut (1) center side "a" and if it is lower, out side "b".
 - Repeat steps 3) and 4) until rear brake pressure is within specification.
 - After adjustment, be sure to torque nut (1) to specification.

Tightening torque

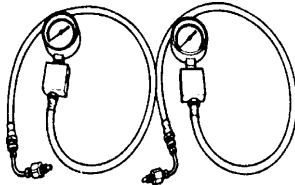
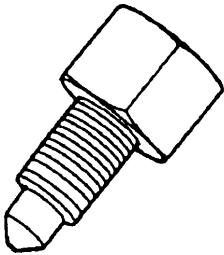
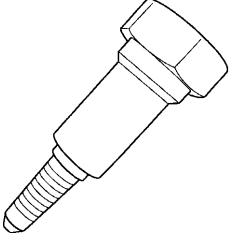
LSPV nut (a) : 25 N·m (2.5 kg·m, 18.0 lb·ft)

- 6) Upon completion of fluid pressure test, bleed brake system and perform brake test.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Brake pipe flare nut	16	1.6	11.5
Brake bleeder plug (Front caliper)	6.5	0.65	5.0
Brake bleeder plug (Wheel cylinder)	8.5	0.85	6.5
LSPV spring adjust nut	25	2.5	18.0

Special Tool

 <p>09956-02310 Fluid pressure gauge</p>	 <p>09952-36310 Pressure gauge attachment</p>	 <p>09952-48320 Pressure gauge attachment</p>
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SECTION 5A

BRAKES PIPE/HOSE/MASTER CYLINDER

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.
- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

5A

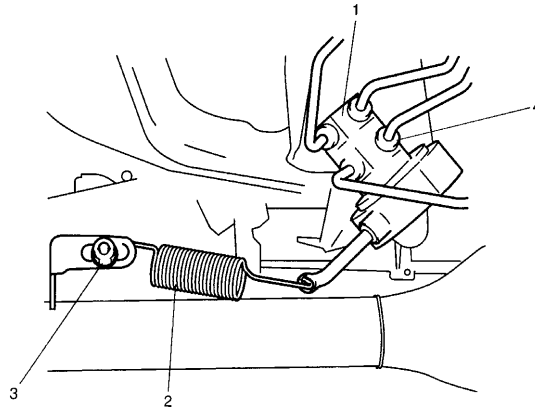
CONTENTS

General Description	5A-2	Rear Brake Hose/Pipe	
LSPV (Load Sensing Proportioning Valve)		(For Vehicle with LSPV)	5A-3
Assembly (if equipped)	5A-2	LSPV (Load Sensing Proportioning Valve)	
On-Vehicle Service	5A-3	Assembly (if equipped)	5A-4
		Special Tool	5A-6

General Description

LSPV (Load Sensing Proportioning Valve) Assembly (if equipped)

As shown in figure below, LSPV is included within the brake circuit which connects the master cylinder and the rear wheel brake. It controls the hydraulic pressure applied to the rear wheel brake according to the loaded state of the vehicle (or weight of the load), whereby preventing the rear wheels from getting locked prematurely.



1. LSPV assembly
2. Spring
3. Adjust nut
4. Brake pipe flare nut

On-Vehicle Service

CAUTION:

- Do not use lubricated shop air on brake parts as damage to rubber components may result.
- If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- The torque values specified are for dry, unlubricated fasteners.
- Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid.

Rear Brake Hose/Pipe (For Vehicle with LSPV)

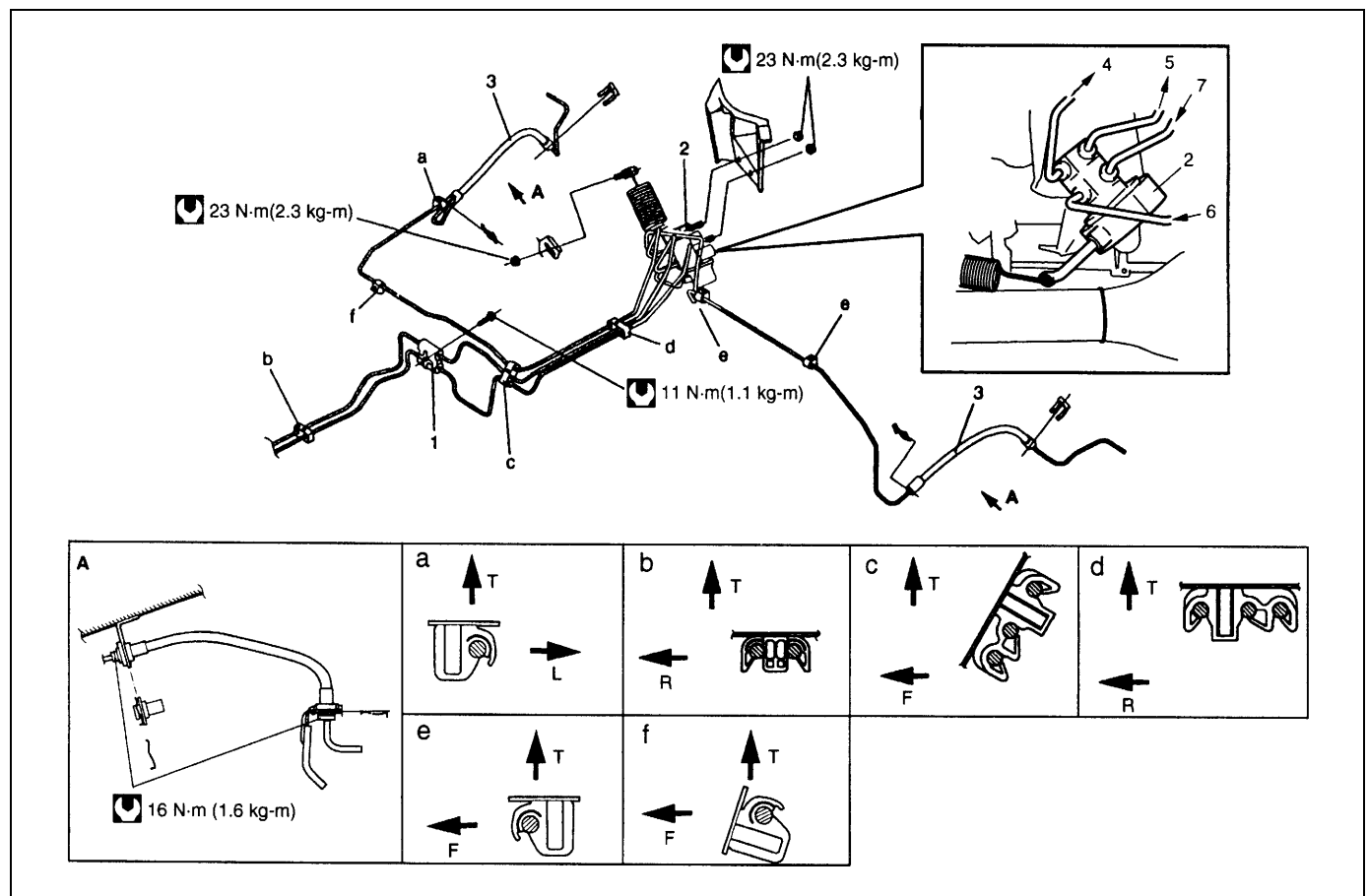
REMOVAL

- 1) Raise and suitably support vehicle. Remove tire and wheel.
- 2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.

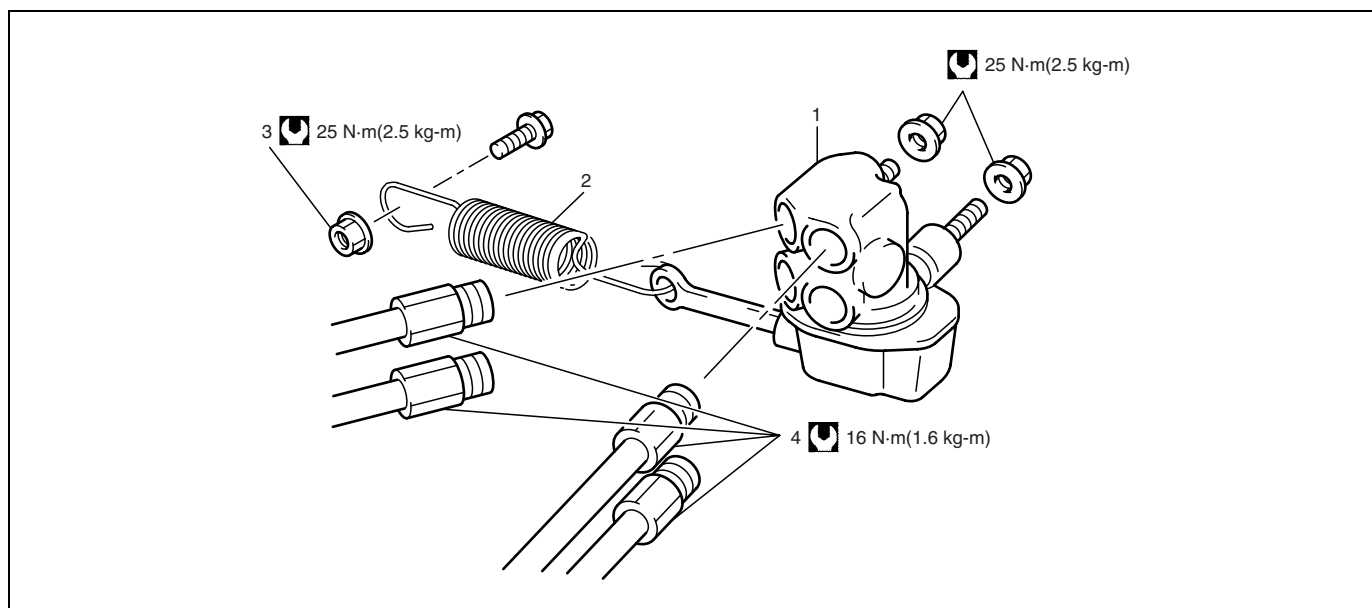
INSTALLATION

Reverse removal procedure for brake hose or pipe installation procedure.

- Install clamps properly referring to figure below.
- When installing hose, make sure that it has no twist or kink.
- Fill and maintain brake fluid level in reservoir. Bleed brake system.
- Perform brake test and check each installed part for fluid leakage.



1. 4 way joint	A : Viewed from A
2. LSPV assembly	F : Front side
3. Rear brake hose	L : Left side
4. To left rear wheel cylinder	R : Right side
5. To right rear wheel cylinder	T : Top side
6. From master cylinder (Primary)	a - f : Clamp
7. From master cylinder (Secondary)	Tightening Torque

LSPV (Load Sensing Proportioning Valve) Assembly (if equipped)

1.	LSPV assembly
2.	Spring
3.	Adjust nut
4.	Brake pipe
	Tightening Torque

CAUTION:

- Never disassemble LSPV assembly. Disassembly will spoil its original performance. Replace with new one if defective.
- Observe CAUTION at the beginning of ON-VEHICLE SERVICE.

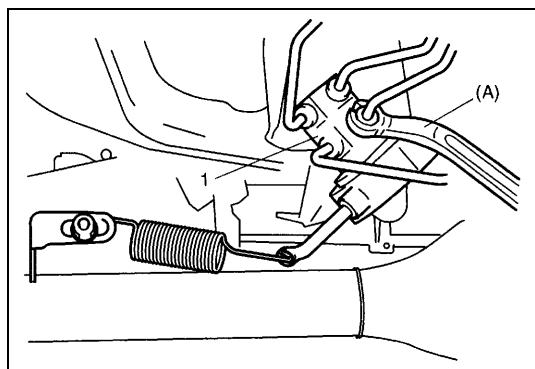
REMOVAL

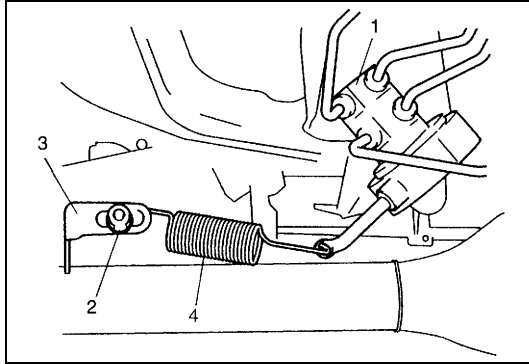
- 1) Clean around reservoir cap and take out fluid with syringe or such.
- 2) Hoist vehicle.

- 3) Disconnect brake pipes from LSPV assembly (1).

Special tool

(A) : 09950-78230 (10 x 11 mm)





- 4) Remove nut (2) and detach spring end from bracket (3).
- 5) Remove LSPV assembly (1) with spring (4) from vehicle body.

INSTALLATION

- 1) Install LSPV assembly with spring to vehicle body.
- 2) Tighten brake pipe flare nuts and LSPV adjusting nut (1) to specified torque.

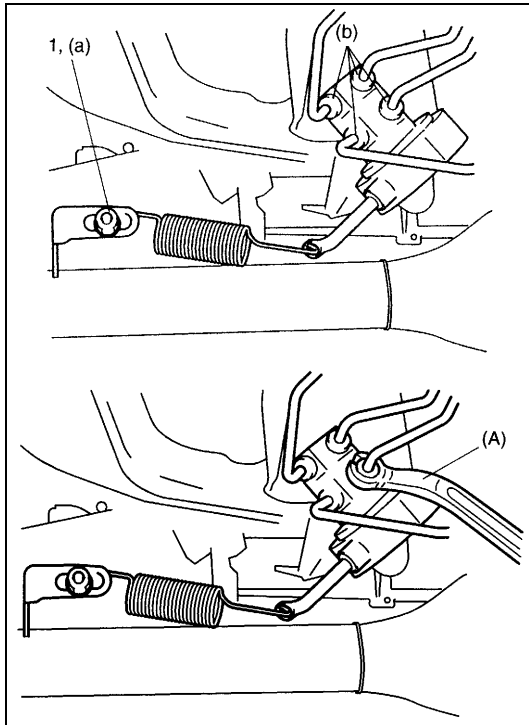
Special tool

(A) : 09950-78230 (10 x 11 mm)

Tightening torque

LSPV adjust nut (a) : 25 N·m (2.5 kg-m, 18.0 lb-ft)

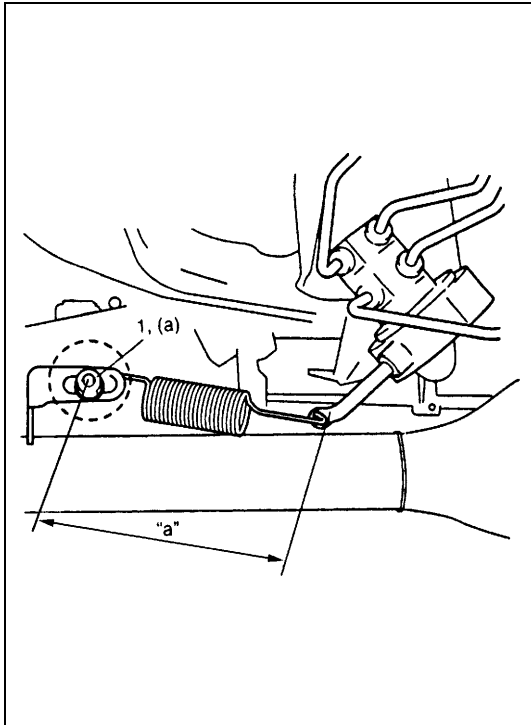
Brake pipe flare nut (b) : 16 N·m (1.6 kg-m, 11.5 lb-ft)



- 3) Fill reservoir with specified fluid and bleed air from brake system.
- 4) After bleeding air, check that LSPV is installed properly referring to following "INSPECTION & ADJUSTMENT".

INSPECTION & ADJUSTMENT

- 1) Confirm the following before inspection and adjustment.
 - Fuel tank is filled with fuel fully.
 - Vehicle is equipped with spare tire, tools, jack and jack handle.
 - Vehicle is free from any other load.
 - Vehicle is placed on level floor.



- 2) Push up LSPV lever with finger till it stops and measure length of coil spring ("a" in figure).
- 3) Spring length "a" should be as specified.

Spring length "a" :

4WD : 148 mm (5.83 in.)

- 4) If it isn't, adjust it to specification by changing LSPV adjusting bolt and nut position as shown in figure. After adjustment, tighten nut (1) to specified torque.

Tightening torque

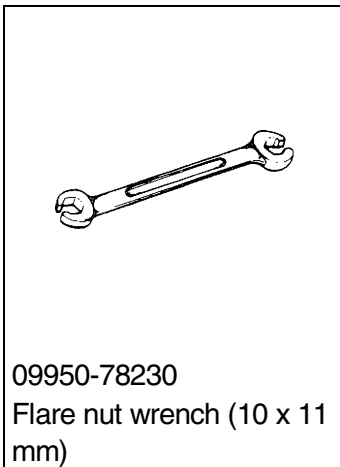
LSPV adjust nut (a) : 25 N·m (2.5 kg·m, 18.0 lb·ft)

NOTE:

Check to make sure that LSPV body and brake pipe joints are free from fluid leakage. Replace defective parts, if any.

- 5) Confirm fluid pressure referring to "Fluid Pressure Test" in Section 5.

Special Tool



SECTION 5C

PARKING AND REAR BRAKE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.
- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

5C

CONTENTS

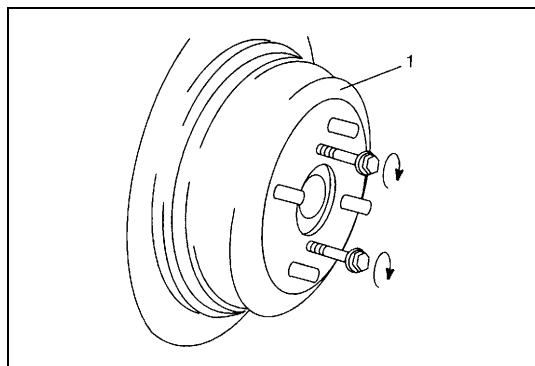
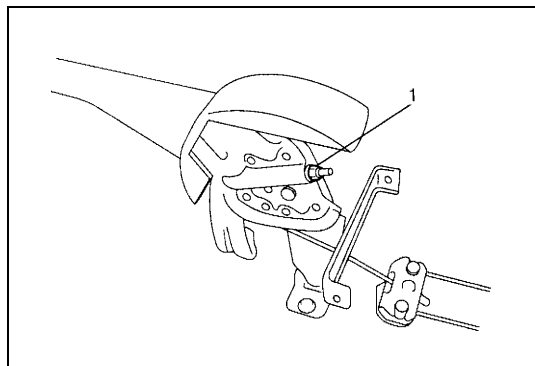
On-Vehicle Service.....	5C-2	Brake Back Plate	5C-3
Brake Drum	5C-2		

On-Vehicle Service

Brake Drum

REMOVAL

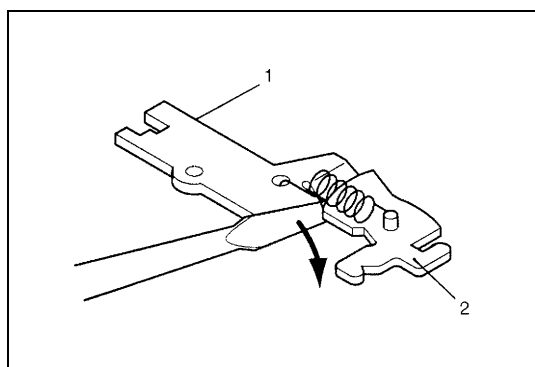
- 1) Hoist vehicle and remove wheel.
- 2) Release parking brake lever.
- 3) Remove brake drum.
If brake drum can not be removed easily, increase clearance between brake shoes and drum as follows.
 - a) Remove console box and loosen parking brake cable adjusting nut (1).



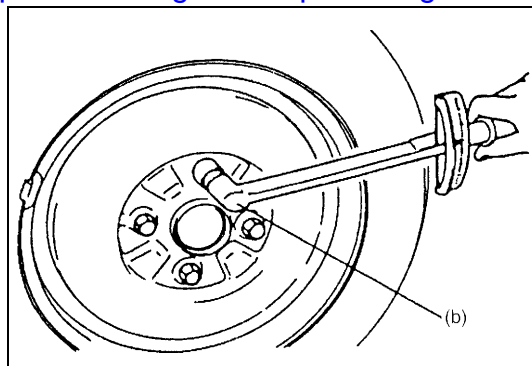
- b) Pull brake drum (1) off by using 8 mm bolts.

INSTALLATION

- 1) Put flat head rod or the like between rod (1) and ratchet (2) and pull ratchet as shown to maximize clearance between shoe and drum.
- 2) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.



- 3) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable. (For adjustment, see PARKING BRAKE INSPECTION AND ADJUSTMENT in Section 5.)
- 4) Install console box if removed.



5) Install wheel and tighten wheel nuts to specified torque.

Tightening torque

Wheel nut (b) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

6) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).

Brake Back Plate

REMOVAL AND INSTALLATION

Refer to "REAR AXLE SHAFT AND WHEEL BEARING (4WD VEHICLE)" in Section 3E.

SECTION 5E1

ANTILOCK BRAKE SYSTEM (ABS)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
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NOTE:

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- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.

5E1

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Diagnosis	5E1-6	Tightening Torque Specification	5E1-11
Diagnostic Trouble Code (DTC) Table	5E1-6		

General Description

Components and Parts Location

The ABS (Antilock Brake System) controls the fluid pressure applied to the Wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied.

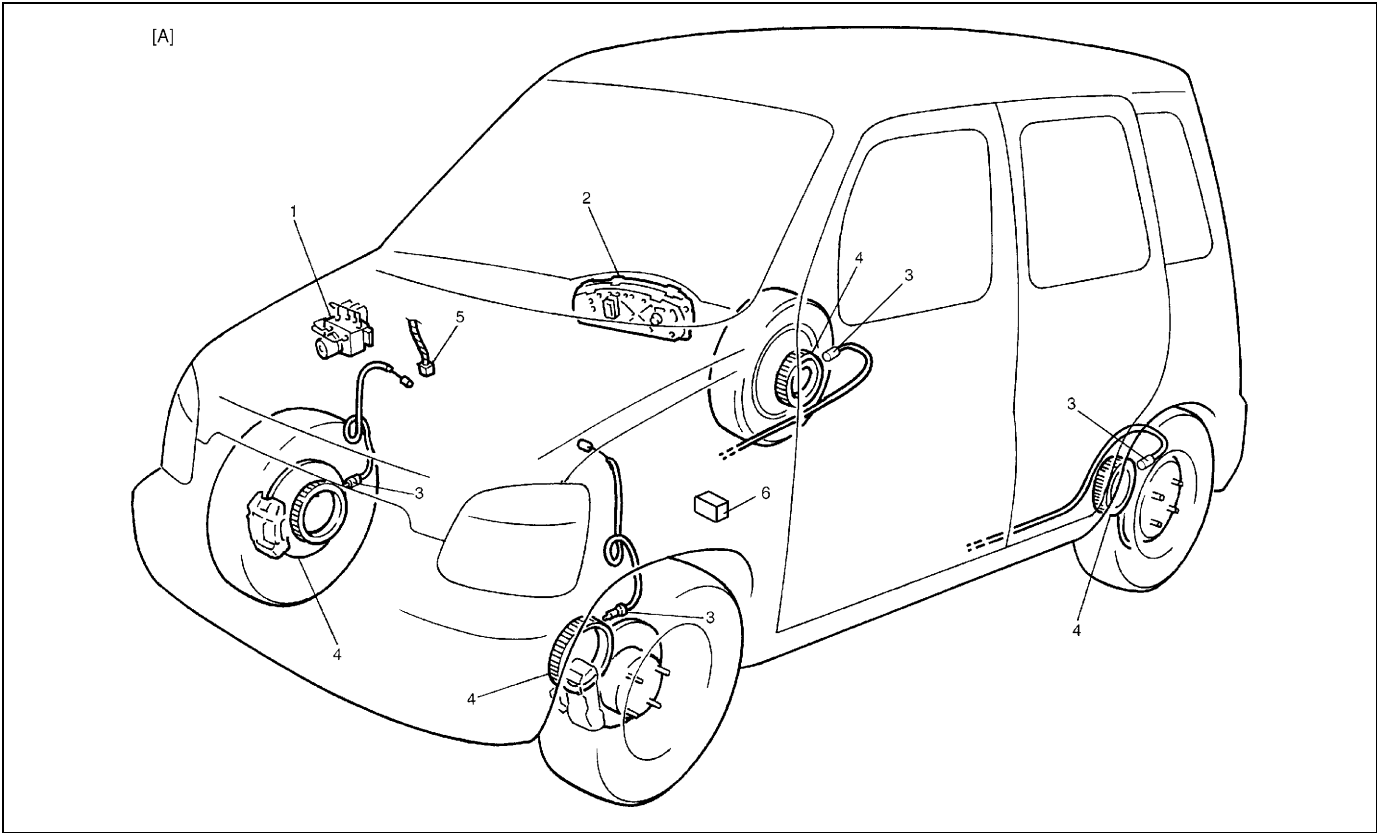
This ABS has also the following function.

While braking is applied, but before ABS control becomes effective, braking force is distributed between the front and rear so as to prevent the rear wheels from being locked too early for better stability of the vehicle.

The main component parts of this ABS include the following parts in addition to those of the conventional brake system.

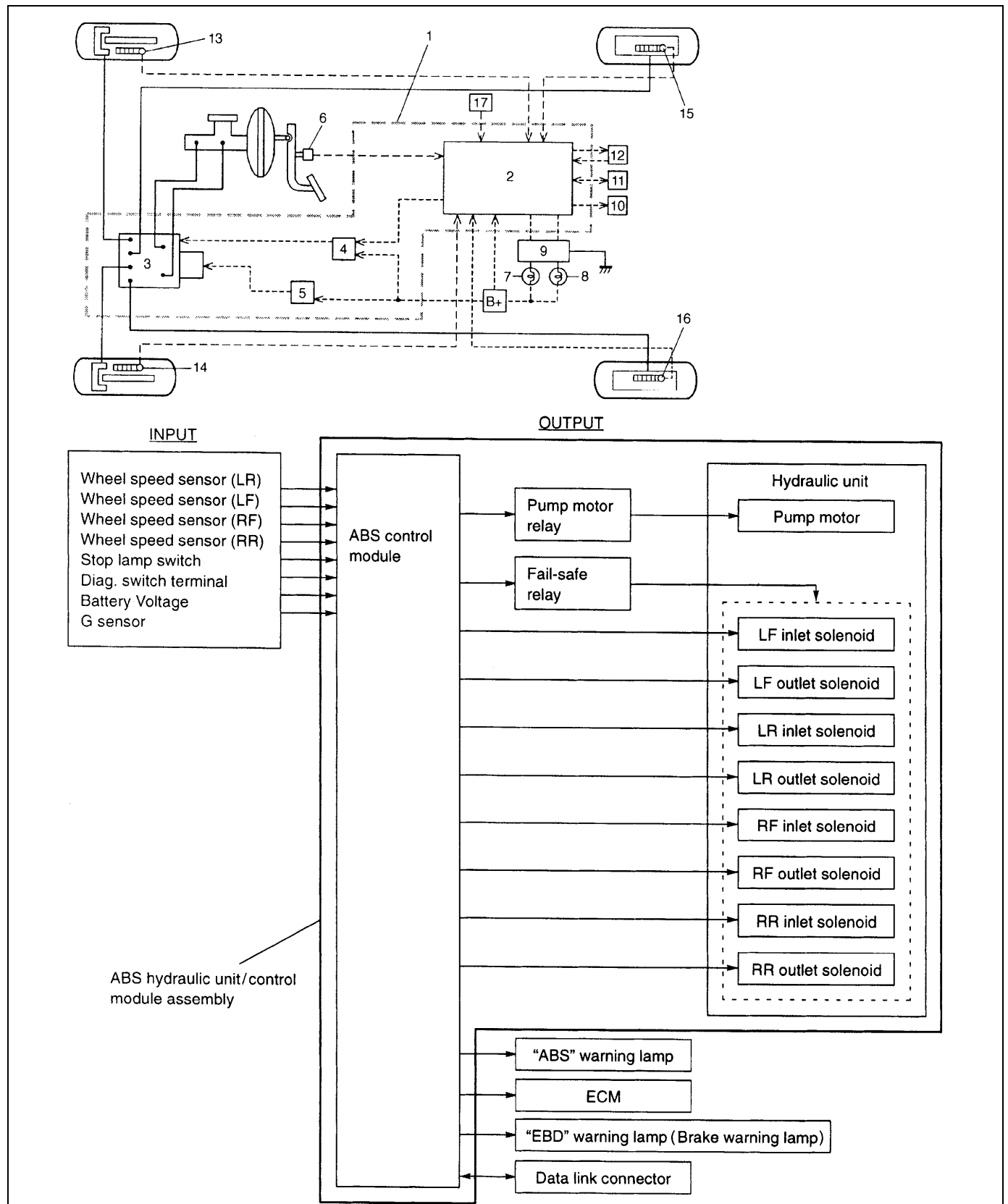
- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- “ABS” warning lamp which lights to inform abnormality when system fails to operate properly.
- ABS hydraulic unit/control module assembly is incorporated ABS control module, ABS hydraulic unit (actuator assembly), fail-safe relay and pump motor relay.
 - ABS control module which sends operation signal to ABS hydraulic unit to control fluid pressure applied to each wheel cylinder based on signal from each wheel speed sensor so as to prevent wheel from locking.
 - ABS hydraulic unit which operates according to signal from ABS control module to control fluid pressure applied to wheel cylinder of each 4 wheels.
 - Fail-safe relay (solenoid valve relay) which supplies power to solenoid valve in ABS hydraulic unit.
 - Pump motor relay which supplies power to pump motor in ABS hydraulic unit.
- G sensor which detects vehicle deceleration speed. (For 4WD model only)

This ABS is equipped with Electronic Brake force Distribution (EBD) system that controls a fluid pressure of rear wheels to best condition, which is the same function as that of proportioning valve, by the signal from wheel sensor independently of change of load due to load capacity and so on. And if the EBD system fails to operate properly, the brake warning lamp lights to inform abnormality.



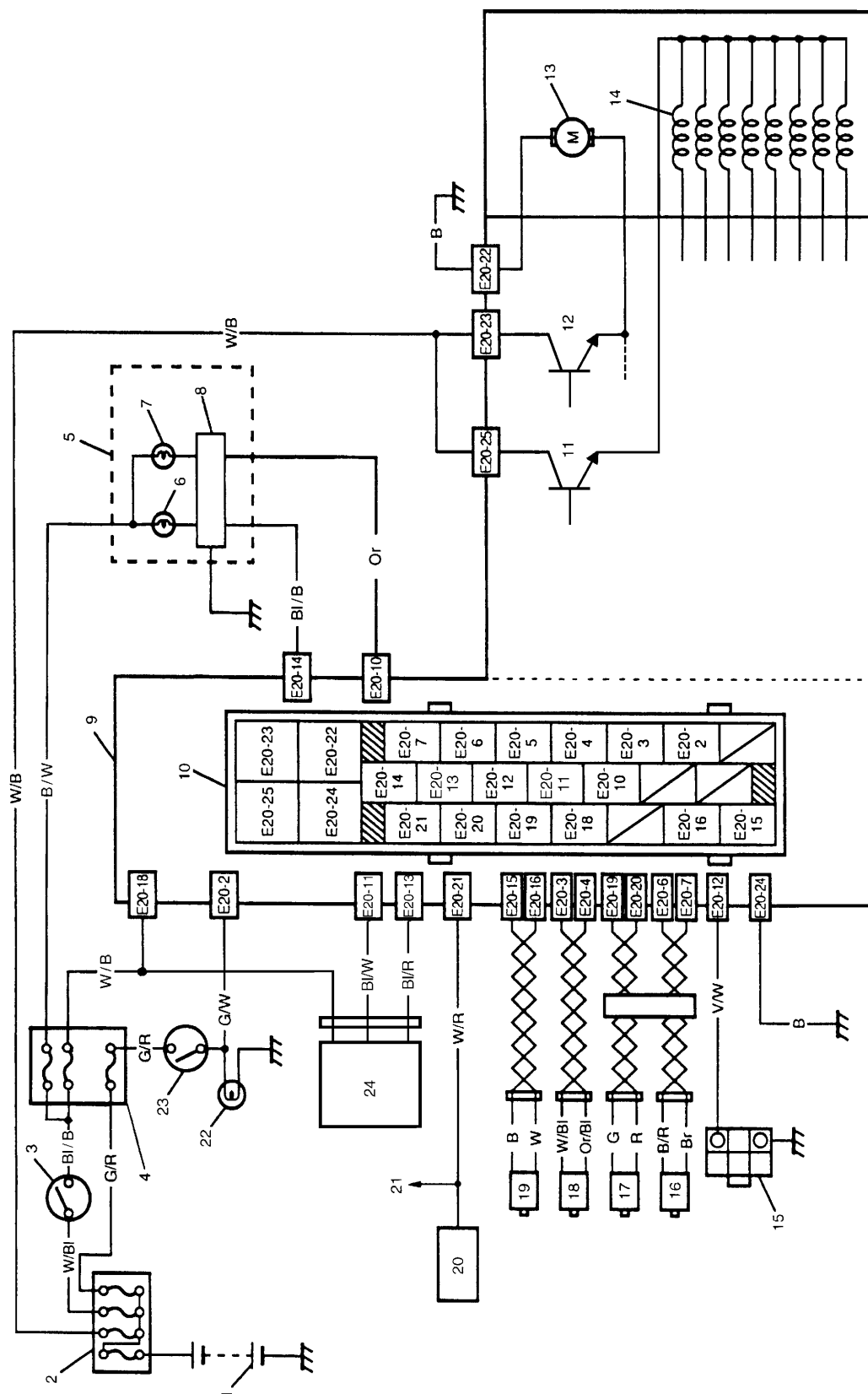
[A] : LH steering vehicle shown	2. Combination meter	4. Wheel speed sensor ring	6. G sensor
1. ABS hydraulic unit/control module assembly	3. Wheel speed sensor	5. Monitor coupler	

System Schematic



1. ABS hydraulic unit/control module assembly	7. "ABS" warning lamp	13. Wheel speed sensor (Right-front)
2. ABS control module	8. "EBD" warning lamp (Brake warning lamp)	14. Wheel speed sensor (Left-front)
3. ABS hydraulic unit	9. Lamp driver module	15. Wheel speed sensor (Right-rear)
4. Fail safe relay	10. ECM	16. Wheel speed sensor (Left-rear)
5. Pump motor relay	11. Data link connector	17. G sensor
6. Stop lamp switch	12. Monitor coupler	

System Circuit



1. Battery	9. ABS hydraulic unit/control module assembly	17. Left-rear wheel speed sensor
2. Main fuses	10. Terminal arrangement of ABS hydraulic unit/control module assembly	18. Right-front wheel speed sensor
3. Ignition switch	11. ABS fail-safe relay (Solenoid valve relay)	19. Left-front wheel speed sensor
4. Circuit fuses	12. ABS pump motor relay	20. Data link connector
5. Combination meter	13. Pump motor	21. To ECM, SDM and EPS controller (if equipped)
6. "ABS" warning lamp	14. Solenoid valves	22. Stop lamp
7. "EBD" warning lamp (Brake warning lamp)	15. Diagnosis monitor coupler	23. Stop lamp switch
8. Warning lamp driver module (for ABS)	16. Right-rear wheel speed sensor	24. G sensor

Wire color		
B :	Black	Br : Brown
B/R :	Black/Red	G : Green
B/W :	Black/White	G/R : Green/Red
Bl/B :	Blue/Black	G/W : Green/White
Bl/R :	Blue/Red	Or : Orange
Bl/W :	Blue/White	Or/Bl : Orange/Blue
		R : Red
		V/W : Violet/White
		W/B : White/Black
		W/Bl : White/Blue
		W/R : White/Red

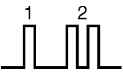
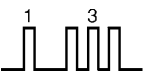

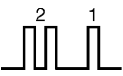



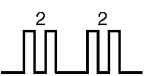







TERMINAL	CIRCUIT
E20-1	—
E20-2	Stop lamp switch
E20-3	Right-front wheel speed sensor (+)
E20-4	Right-front wheel speed sensor (–)
E20-5	—
E20-6	Right-rear wheel speed sensor (–)
E20-7	Right-rear wheel speed sensor (+)
E20-8	—
E20-9	—
E20-10	"EBD" warning lamp (Brake warning lamp)
E20-11	G sensor
E20-12	Diagnosis switch terminal
E20-13	Ground (for G sensor)
E20-14	"ABS" warning lamp
E20-15	Left-front wheel speed sensor (+)
E20-16	Left-front wheel speed sensor (–)
E20-17	—
E20-18	Ignition switch
E20-19	Left-rear wheel speed sensor (+)
E20-20	Left-rear wheel speed sensor (–)
E20-21	Data link connector
E20-22	Ground (for ABS pump motor)
E20-23	ABS pump motor relay
E20-24	Ground (for ABS control module)
E20-25	ABS fail-safe relay









Diagnosis

Diagnostic Trouble Code (DTC) Table

CAUTION:

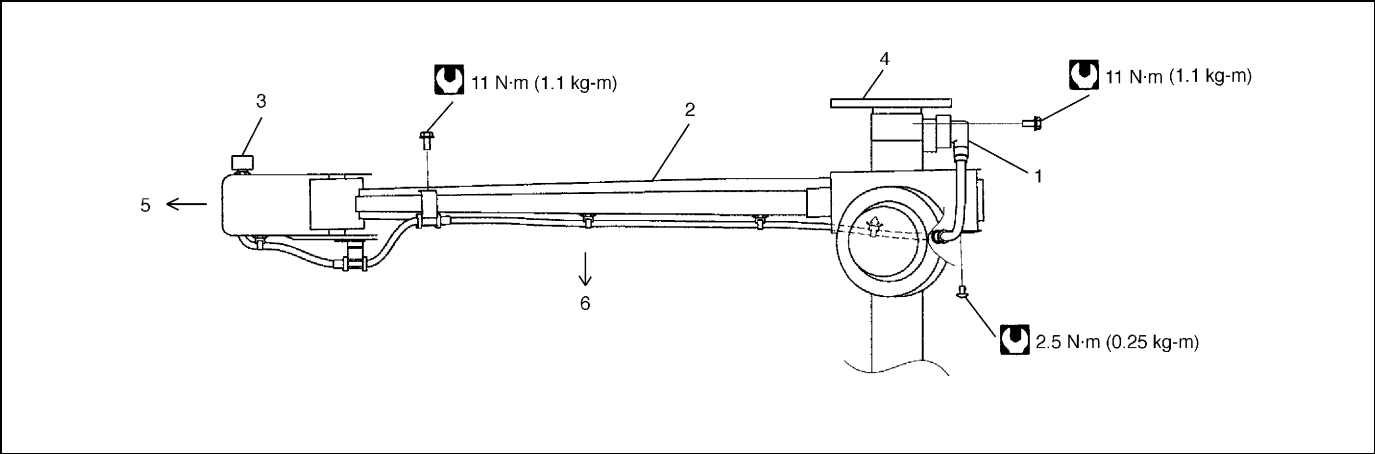
Be sure to perform "ABS DIAGNOSTIC FLOW TABLE" referring to Section 5E1 of the Service Manual mentioned in FOREWORD of this manual before starting diagnosis.

DTC (displayed on SUZUKI scan tool)	DTC (indicated by "ABS" warn- ing lamp)	ABS warning lamp flashing pattern	DIAGNOSTIC ITEMS	
NO DTC	12		Normal	
C1013	13		ABS control module	
C1015	15		G sensor circuit	
C1021	21		RF	Wheel speed sensor circuit
C1025	25		LF	
C1031	31		RR	
C1035	35		LR	
C1022	22		RF	Wheel speed sensor circuit or sensor ring
C1026	26		LF	
C1032	32		RR	
C1036	36		LR	
C1041	41		RF	Inlet solenoid valve circuit
C1042	42			Outlet solenoid valve circuit
C1045	45		LF	Inlet solenoid valve circuit
C1046	46			Outlet solenoid valve circuit

DTC (displayed on SUZUKI scan tool)	DTC (indicated by “ABS” warn- ing lamp)	ABS warning lamp flashing pattern	DIAGNOSTIC ITEMS	
C1051	51		RR	Inlet solenoid valve circuit
C1052	52			Outlet solenoid valve circuit
C1055	55		LR	Inlet solenoid valve circuit
C1056	56			Outlet solenoid valve circuit
C1057	57		Power source	
C1061	61		ABS pump motor and/or motor relay circuit	
C1063	63		Fail safe-relay	
C1071	71		ABS control module	

On-Vehicle Service

Rear Wheel Speed Sensor



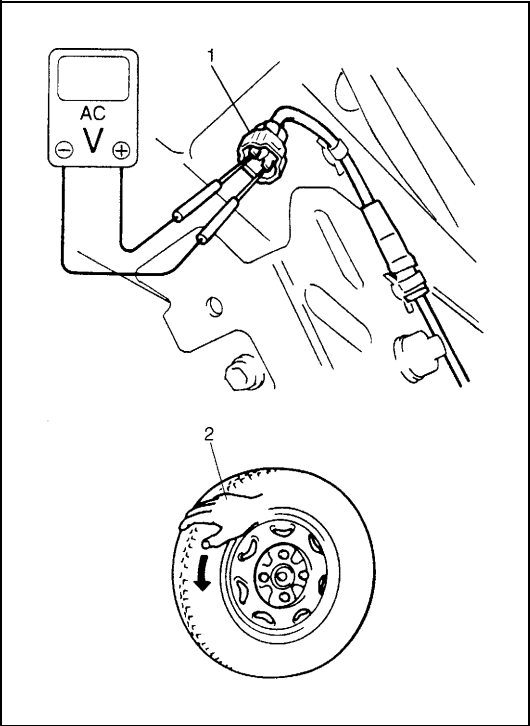
1. Rear wheel speed sensor (right side)	4. Rear axle housing	Tightening torque
2. Trailing arm	5. Forward	
3. Sensor coupler	6. Vehicle inside	

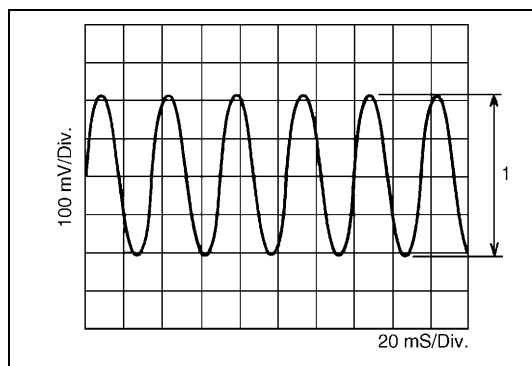
OUTPUT VOLTAGE INSPECTION

- 1) Turn ignition switch "OFF".
- 2) Hoist vehicle.
- 3) Disconnect connector of wheel speed sensor.
- 4) Connect voltmeter between connector (1) terminals.
- 5) While turning wheel at a speed of approximately 1/2 to 1 rotation per second, check AC voltage of sensor.
If measured voltage is not as specified, check sensor, rotor and their installation conditions.

Output AC voltage at 1/2 to 1 rotation per second
106 mV or more

- | |
|-------------------|
| 2. Rotate by hand |
|-------------------|



Reference

When using oscilloscope for this check, check if peak-to-peak voltage (1) meets specification and waveform is complete.

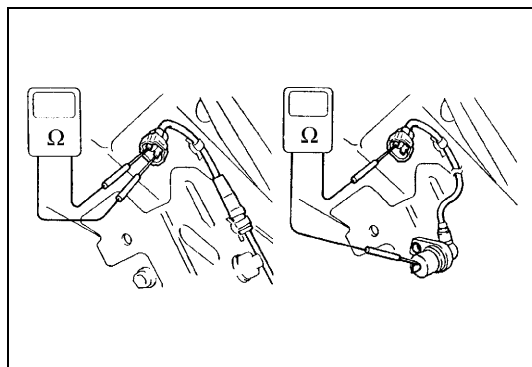
**Peak-to-peak voltage at 1/2 to 1 rotation per second
150 mV or more at 20 Hz**

SENSOR INSPECTION

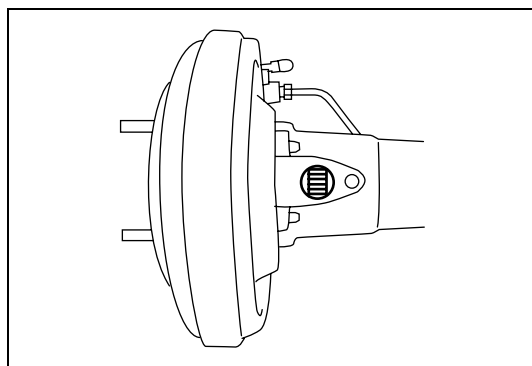
- Check sensor for damage.
- Check sensor for resistance and continuity.
If the check result is not as specified and any malcondition is found, replace.

**Between both terminals of sensor
1.2 – 1.6 k Ω at 20°C (68°F)**

**Between sensor terminal and sensor body
No continuity**

**Rear Wheel Speed Sensor Ring****INSPECTION**

- Check rotor serration (teeth) for being missing damaged or deformed.
- Turn wheel and check if rotor rotation is free from eccentricity and looseness.
- Check that no foreign material is attached.
- If any faulty is found, repair or replace.

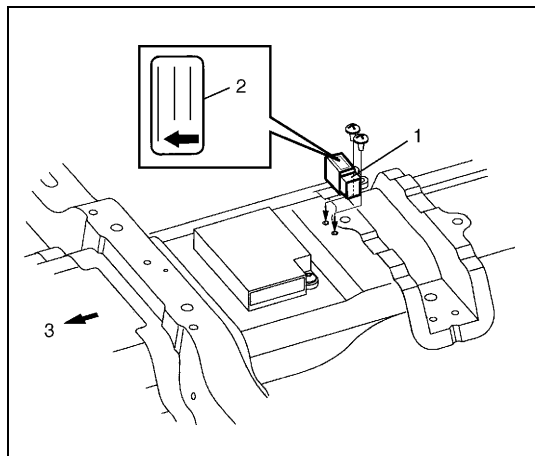
**REMOVAL/ INSTALLATION****NOTE:**

The rear wheel speed sensor ring can not be removed or replaced alone. If rear wheel speed sensor ring needs to be replaced, replace it as a retainer ring of rear axle shaft.

For removal and installation of retainer ring of rear axle shaft, refer to "REAR AXLE SHAFT AND WHEEL BEARING" in Section 3E.

G Sensor (For 4WD Vehicle Only)**REMOVAL**

- 1) Turn ignition switch OFF and disconnect battery negative cable.
- 2) Remove center console box.
- 3) Remove G sensor (1) from floor.
- 4) Disconnect connector from sensor.

**CAUTION:**

Sensor must not be dropped or shocked. It will affect its original performance.

- | |
|------------|
| 2. Label |
| 3. Forward |

INSPECTION

Connect positive cable of 12 volt battery to "A" terminal of sensor and ground cable to "C" terminal. Then using voltmeter, check voltage between "B" terminal and "C" terminal.

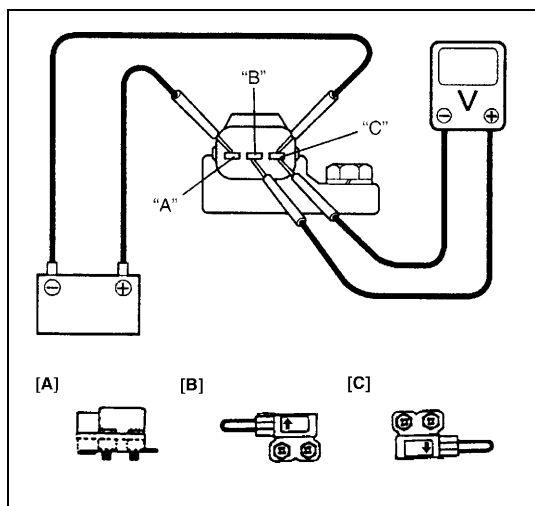
G sensor specification

When placed horizontally : 2 – 3 V

When placed upright with arrow upward : 3 – 4 V

When placed upright with arrow downward : 1 – 2 V

If measured voltage is not as specified, replace sensor.



- | |
|-----------------------------------|
| [A] : Horizontal |
| [B] : Upright with arrow upward |
| [C] : Upright with arrow downward |

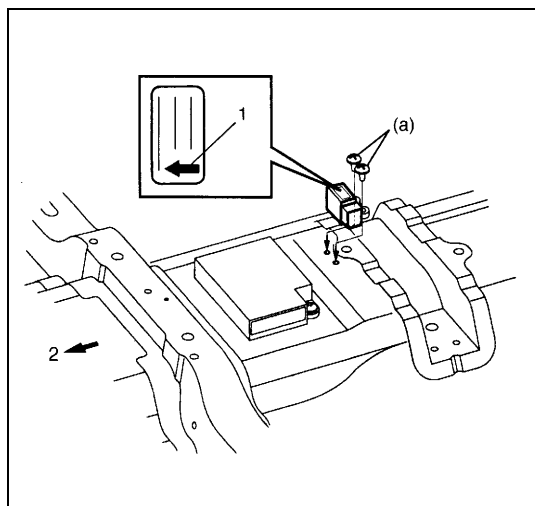
INSTALLATION

- 1) Connect connector to sensor securely.
- 2) Install sensor onto floor so that arrow mark (1) directs vehicle forward (2). Tighten bolts to specified torque.

Tightening torque

G sensor bolt (a) : 3.0 N·m (0.3 kg·m, 2.2 lb·ft)

- 3) Install rear console box.
- 4) Connect negative cable at battery.



Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
G sensor bolt	3.0	0.3	2.2

SECTION 6A1

ENGINE MECHANICAL

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.

CONTENTS

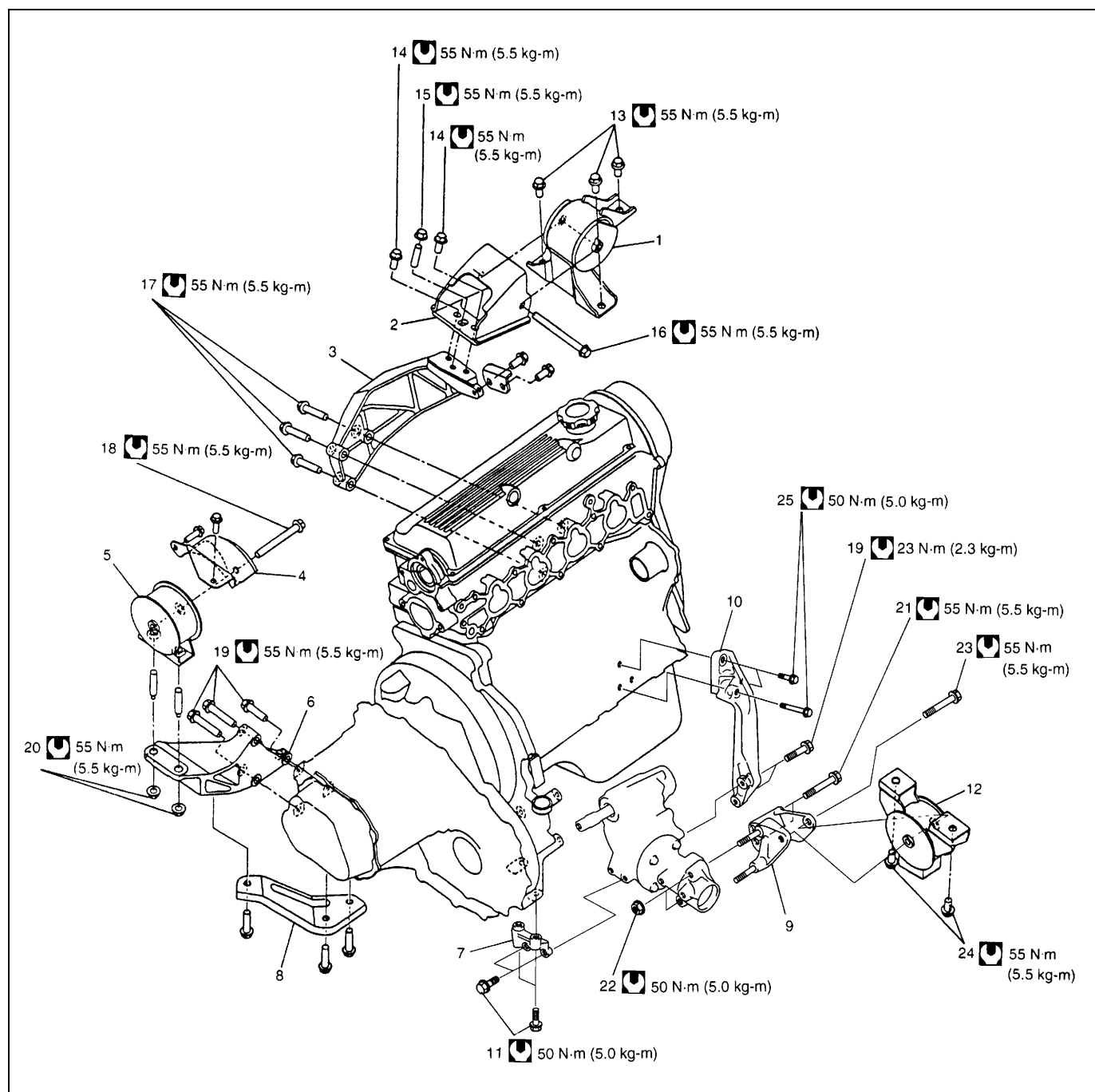
Unit Repair Overhaul6A1-2
 Engine Mounting6A1-2

Engine Assembly 6A1-3

6A1

Unit Repair Overhaul

Engine Mounting

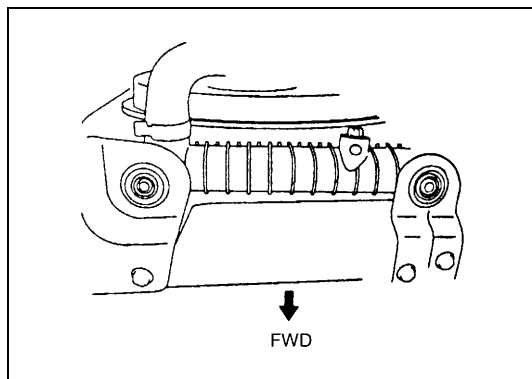


1. Right mounting	10. Transfer to engine stiffener (if equipped)	19. Transfer to engine stiffener No.1 bolt (if equipped)
2. Right mounting swing bracket	11. Transfer stiffener bolt	20. Left mounting nut
3. Right mounting bracket	12. Rear mounting	21. Rear mounting bracket bolt
4. Left mounting body bracket	13. Right mounting body bolt	22. Rear mounting bracket nut
5. Left mounting	14. Right mounting bracket & swing bolt	23. Rear mounting bush bolt
6. Left mounting bracket	15. Right mounting bracket & swing nut	24. Rear mounting body bolt
7. Transfer stiffener	16. Right mounting bush bolt	25. Transfer to engine stiffener No.2 bolt (if equipped)
8. Left mounting bracket stiffener	17. Right mounting bracket bolt	Tightening Torque
9. Rear mounting bracket	18. Left mounting bush bolt	

Engine Assembly

REMOVAL

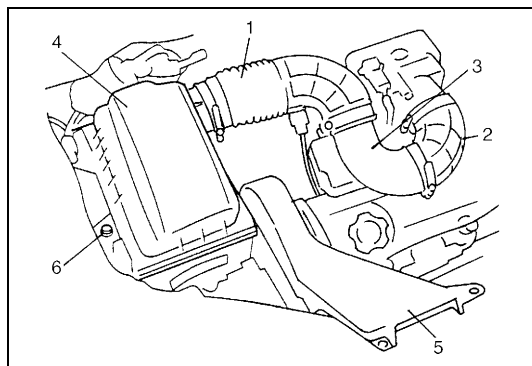
- 1) Release fuel pressure in fuel feed line by referring to Section 6 of the Service Manual mentioned in the FOREWORD of this manual.
- 2) After disconnect negative and positive cables at battery, remove battery and battery tray.
- 3) Remove engine hood after disconnecting windshield washer hose.
- 4) Drain cooling system.



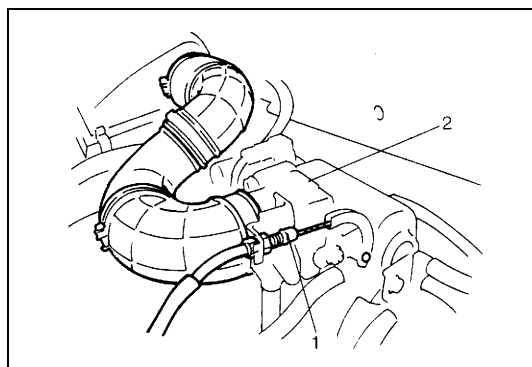
WARNING:

To help avoid danger of being burned, do not remove drain plug and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.

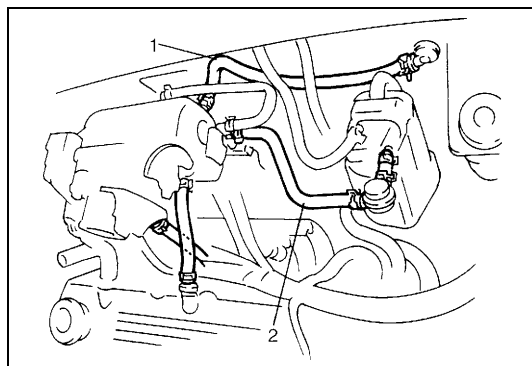
- 5) Disconnect radiator inlet hose from thermostat case and outlet hose from water inlet pipe.



- 6) Remove air cleaner outlet No.1 hose (1) and No.2 hose (2) with air intake joint (3).
- 7) Remove suction pipe (5) and remove air cleaner assembly (4) by removing its fastening bolt (6).

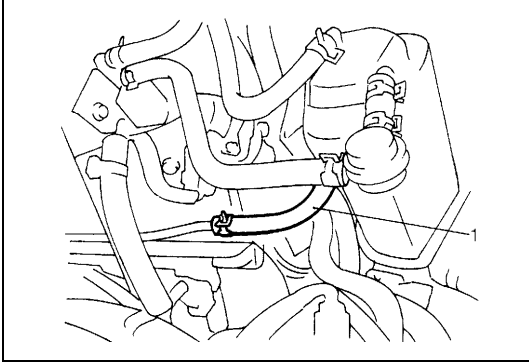


- 8) Disconnect the following cables.
 - Accelerator cable (1) from throttle body (2).
 - Clutch cable from transmission.
 - Gear shift and select control cables from transmission.

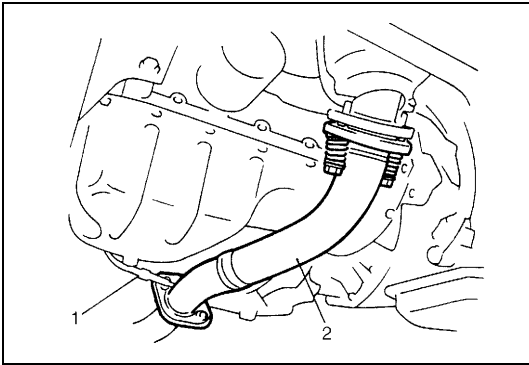


- 9) Disconnect the following vacuum hose.
 - Brake booster hose (1) from intake manifold.
 - Canister purge hose (2) from EVAP canister purge valve.

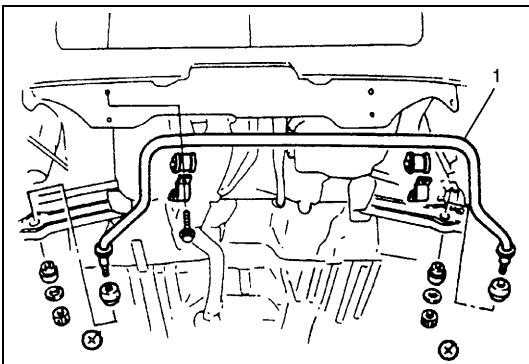
- 10) Disconnect the following electric wires:
 - Back-up light switch
 - Battery negative cable from transmission
 - Vehicle speed sensor
 - e.t.c.
 and release above wire harness from clamps.



- 11) Disconnect fuel feed hose (1) from fuel delivery pipe.
- 12) Disconnect heater inlet and outlet hoses.



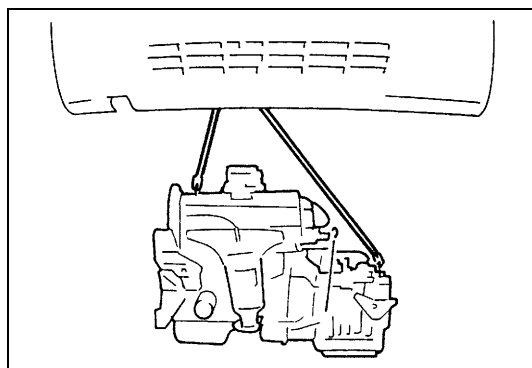
- 13) Remove right and left engine under covers.
- 14) Disconnect oxygen sensor No.2 (1) coupler and remove exhaust No.1 pipe (2).



- 15) Drain engine oil, transmission oil and transfer oil.
- 16) Remove propeller shafts referring to Section 4B.
- 17) Remove stabilizer bar (1) referring to Section 3D of the Service Manual mentioned in the FOREWORD of this manual.

- 18) Remove drive shaft joints from differential gear of transmission and intermediate shaft of transfer.
 Refer to Section 4 of the Service Manual mentioned in the FOREWORD of this manual for procedure to disconnect drive shaft joint.
 For engine and transmission removal, it is not necessary to remove drive shafts from steering knuckle.

- 19) Disconnect A/C suction and discharge hoses and then remove A/C compressor and its bracket (if equipped), refer to Section 1B of the Service Manual mentioned in the FOREWORD of this manual.
- 20) Install support device.
- 21) Remove the following bolts and nuts referring to the figure of "Engine Mounting" in this section.
 - a) Remove engine rear mounting bush bolt.
 - b) Remove engine left mounting nuts.
 - c) Remove engine right mounting bracket bolts and nut.
- 22) Before removing engine with transmission and transfer from body, recheck to make sure all hoses, electric wires and cables are disconnected from engine and transmission.



- 23) Lower engine with transmission and transfer from body.

INSTALLATION

- 1) Lift engine with transmission and transfer into engine compartment, but do not remove support device.
- 2) Install engine right mounting bracket bolts and nut.
- 3) Install engine left mounting nuts.
- 4) Install engine rear mounting bush bolt.
- 5) Tighten bolts and nuts to specified torque referring to the figure of "Engine Mounting" in this section.
- 6) Remove support device.
- 7) Reverse removal procedures for installation of remainder.
 - Install A/C compressor bracket and A/C compressor and connect A/C suction and discharge hoses, refer to Section 1B of the Service Manual mentioned in the FOREWORD of this manual.
 - Push in each drive shaft joint fully so that snap ring engages with differential gear and intermediate shaft of transfer. Use care not to damage oil seal lip when inserting.
 - Install stabilizer bar, refer to Section 3D of the Service Manual mentioned in the FOREWORD of this manual.
 - Install exhaust No.1 pipe.
 - Install right and left engine under covers.
 - Connect each hoses securely.
 - Clamp electric wire securely.
- 8) Adjust clutch pedal free travel, referring to Section 7C of the Service Manual mentioned in the FOREWORD of this manual.

Connect gear shift and select control cables referring to Section 7A.
- 9) Refill transmission with gear oil referring to Section 7A of the Service Manual mentioned in the FOREWORD of this manual.
- 10) Refill engine with engine oil, referring to Section 0B of the Service Manual mentioned in the FOREWORD of this manual.
- 11) Refill cooling system, referring to Section 6B of the Service Manual mentioned in the FOREWORD of this manual.
- 12) Adjust A/C compressor belt (if equipped), referring to Section 1B of the Service Manual mentioned in the FOREWORD of this manual.
- 13) Upon completion of installation, verify that there is no fuel leakage, coolant leakage, transmission oil leakage or exhaust gas leakage at each connection.
- 14) Adjust accelerator cable play, referring to Section 6E of the Service Manual mentioned in the FOREWORD of this manual.

SECTION 7A

7A

MANUAL TRANSMISSION

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.

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Gear Shift Control Lever and Cable	7A-6	Tightening Torque Specification	7A-20
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		Special Tools	7A-21

General Description

Construction and Servicing

The transmission provides five forward speeds and one reverse speed by means of three synchronizer mesh devices and three shafts-input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

The low speed synchronizer mesh device is mounted on counter shaft and engaged with counter shaft first gear or second gear, while the high speed synchronizer mesh device is done on input shaft and engaged with input shaft third gear or fourth gear. The fifth speed synchronizer mesh device on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

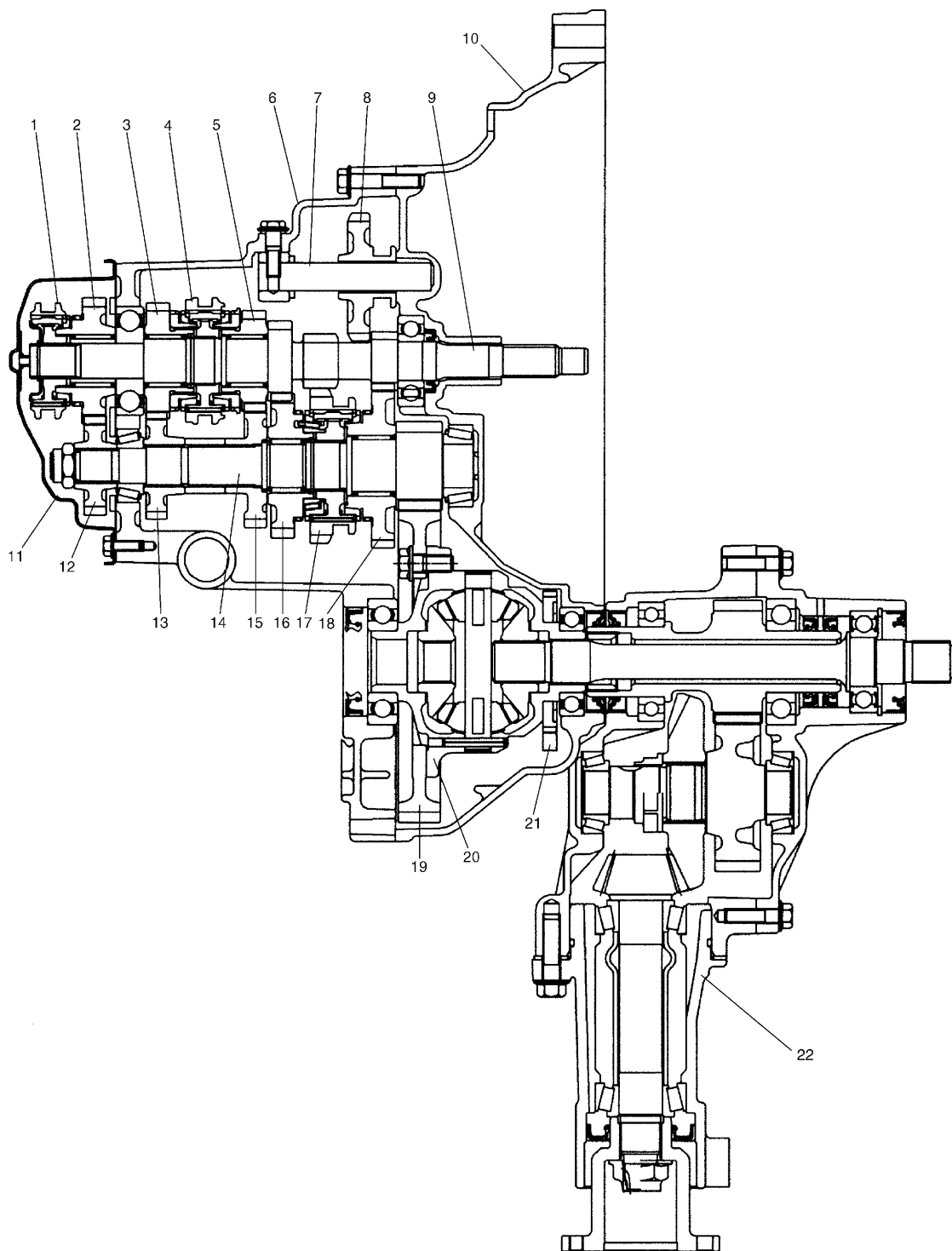
The double cone synchronizing mechanism is provided to 2nd gear synchromesh device for high performance of shifting to 2nd gear.

The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

4WD model is equipped with transfer assembly on transmission being mated to right side of differential output in transmission.

For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transmission case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

Further, care must be taken to adjust preload of counter shaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.



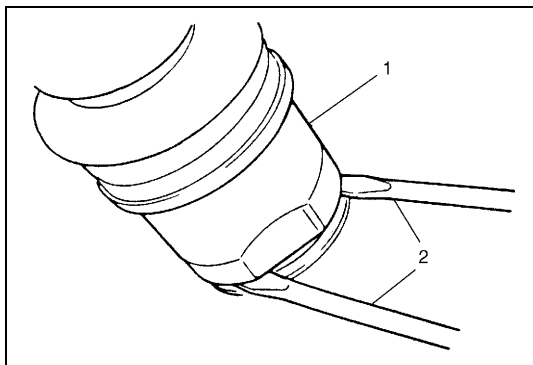
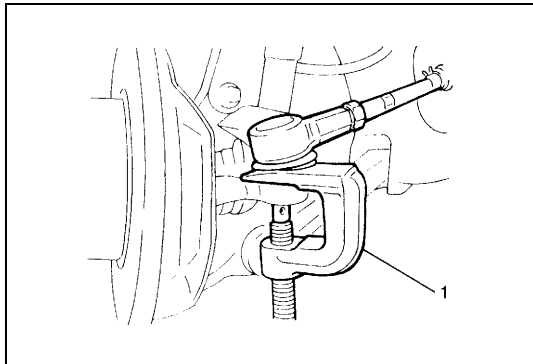
1. 5th speed sleeve & hub	7. Reverse gear shaft	13. Countershaft 4th gear	19. Final gear
2. Input shaft 5th gear	8. Reverse idler gear	14. Countershaft	20. Differential case
3. Input shaft 4th gear	9. Input shaft	15. Countershaft 3rd gear	21. Vehicle speed sensor
4. High speed sleeve & hub	10. Right case	16. Countershaft 2nd gear	22. Transfer assembly
5. Input shaft 3rd gear	11. Side cover	17. Low speed sleeve & hub	
6. Left case	12. Countershaft 5th gear	18. Countershaft 1st gear	

On-Vehicle Service

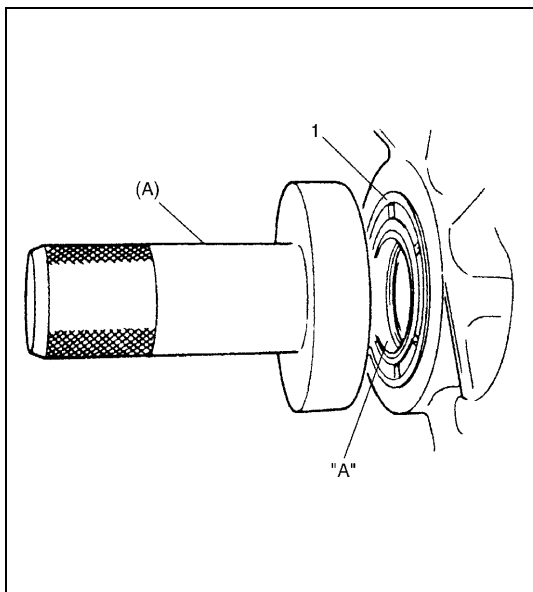
Differential Side Oil Seal

REPLACEMENT

- 1) Lift up vehicle and drain transmission and transfer oil.
- 2) Remove wheel, and then remove tie-rod end nut.
- 3) Disconnect tie-rod end from knuckle by using puller (1).
- 4) Remove two stabilizer mount brackets from vehicle body.
- 5) Remove ball stud bolt and then separate suspension arm from knuckle.
- 6) Separate transfer from transmission assembly.
For detail, refer to Section 7D.



- 7) By using large size screwdrivers (2), pull out drive shaft joint (1) so as to release snap ring fitting of joint spline at differential side.
Pushing knuckle portion outward, detach drive shaft at differential side.



- 8) Remove oil seal (1) and install a new one until it becomes flush with case surface by using special tool and hammer.

NOTE:

When installing oil seal, face its spring side inward.

Special tool

(A) : 09913-75510 (LH)

(A) : 09951-46010 (RH)

- 9) Apply grease to oil seal lip and at the same time check drive shaft where oil seal contacts and make sure of its smoothness.

“A” : Grease 99000-25010

- 10) Install transfer to transmission referring to Section 7D.

- 11) Insert drive shaft joint to differential gear.

CAUTION:



- **Be careful not to scratch oil seal lip with drive shaft joint while inserting.**
- **Make sure to insert drive shaft joint fully and seat its snap ring as it was.**
- **Do not hit joint boot with hammer or the like. Nothing but hands is allowed to use when inserting joint.**

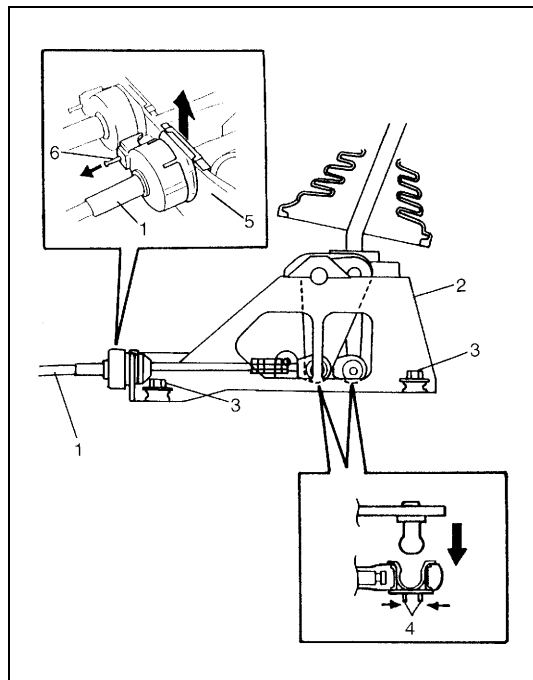
- 12) Connect ball stud with knuckle and fasten with bolt to specification referring to Section 3D of the Service Manual mentioned in the FOREWORD of this manual.
- 13) Connect tie-rod end with knuckle and fasten new nut to specified torque referring to Section 3D of the Service Manual mentioned in the FOREWORD of this manual.
- 14) Install stabilizer mount brackets, fasten bolts to specified torque referring to Section 3D of the Service Manual mentioned in the FOREWORD of this manual.
- 15) Pour transmission oil and transfer oil as specified and make sure that oil has been sealed with oil seal.

Diagram illustrating the assembly of a vehicle component, likely a shock absorber or suspension part, showing various bolts and their torque specifications:

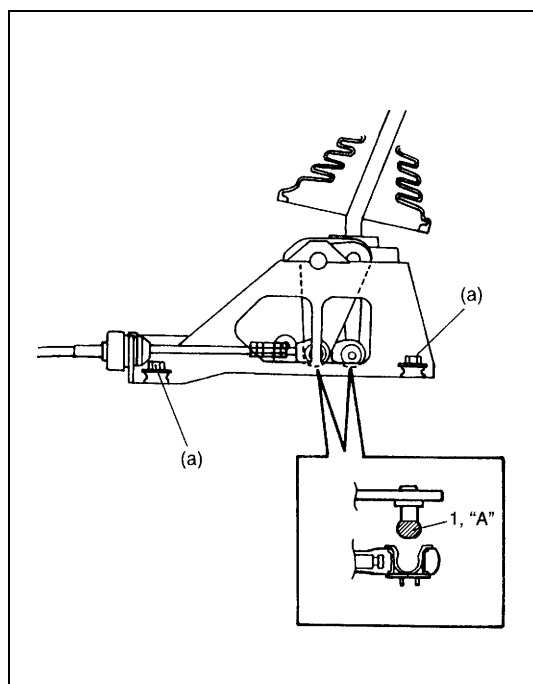
- 8** 5.5N-m (0.55 kg-m)
- 6** 13 N-m (1.3 kg-m)
- 9** 6 N-m (0.6 kg-m)
- 8** 5.5N-m (0.55 kg-m)

The diagram shows the assembly of a shock absorber and coil spring onto a rear axle housing. The components are labeled with numbers 1 through 9, corresponding to the torque specifications provided. The assembly includes a shock absorber, a coil spring, and various mounting brackets and bolts. The torque specifications are given in both N-m and kg-m.

1. Gear shift control lever knob	5. Gear select control cable	8. Cable nut
2. Lever boot holder	6. Gear shift control cable guide nut	9. Cable mounting bolt
3. Gear shift lever boot	 7. Gear shift control lever assembly : Apply grease 99000-25010 to pin ends to which shift and select cables are connected.	 Tightening Torque
4. Gear shift control cable		

REMOVAL

- 1) Remove console box.
- 2) Disconnect gear shift and select control cables (1) from gear shift control lever assembly (2).
 - a) Disconnect cable end from pivot while pushing cable end bush (4).
 - b) Detach cable from bracket (5) while pulling pin (6).
- 3) Remove gear shift control lever assembly mounting nuts (3) and gear shift lever assembly from body.
- 4) Disconnect shift and select cables from transmission in the same manner as step 2).
- 5) Remove cable grommet and cable clamp, and then remove shift and select cables from body.

INSTALLATION

Reverse removal procedure for installation and note as follows.

- Apply grease to pin ends (1) before installing shift and select cable ends to pin ends.

“A” : Grease 99000-25010

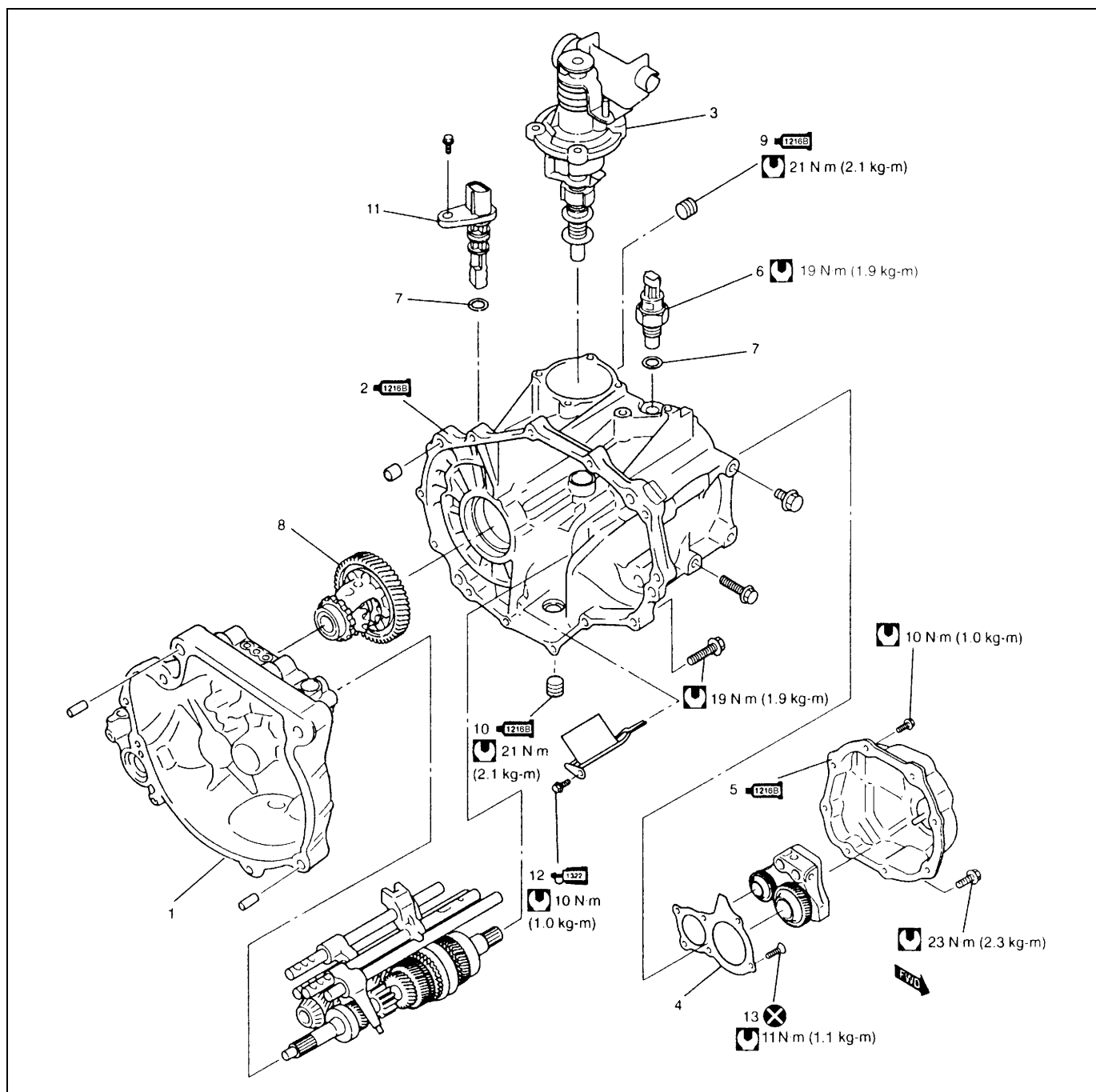
- Tighten gear shift control lever assembly mounting nuts to specified torque.

Tightening torque

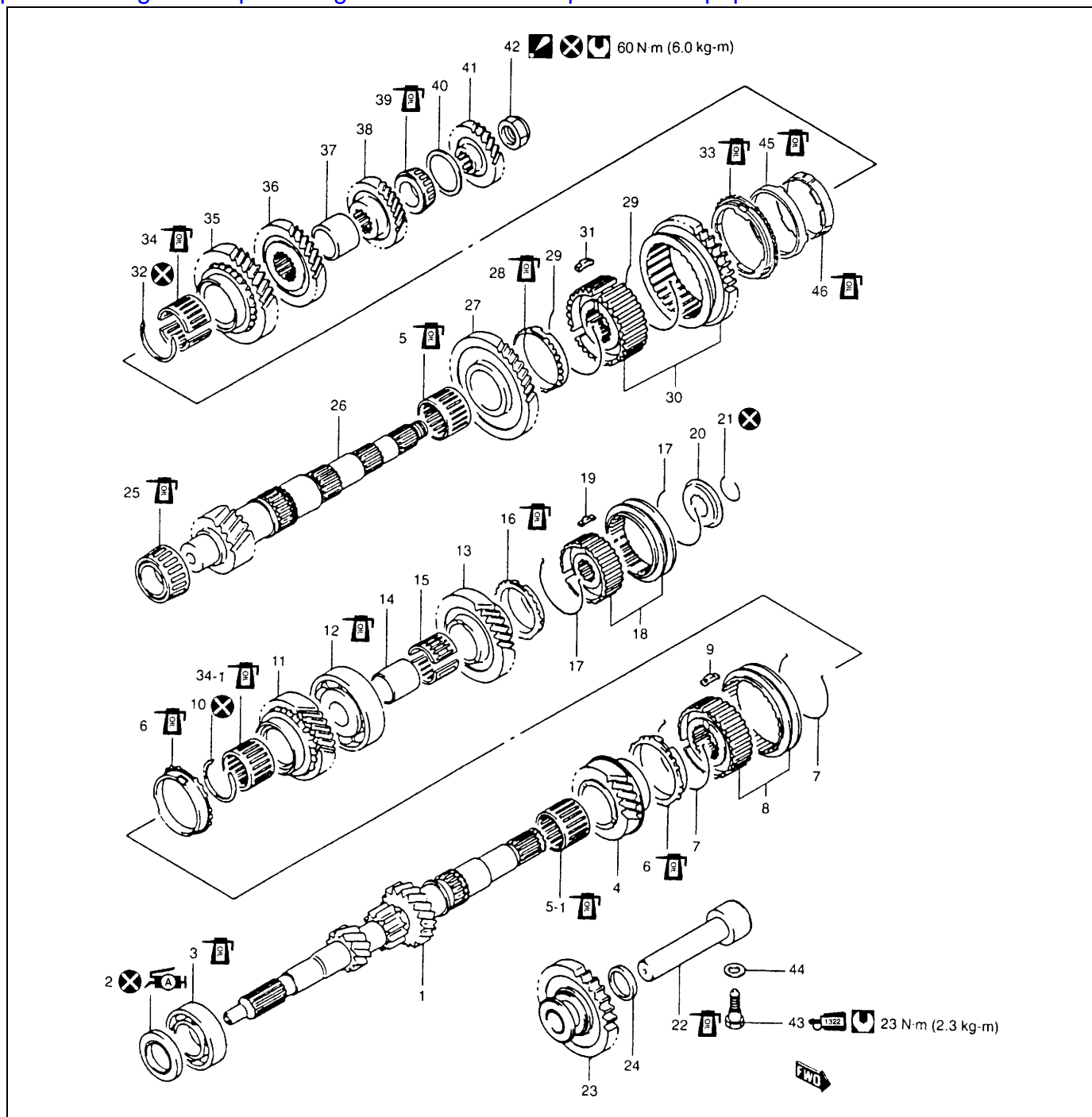
Gear shift control lever assembly nuts







(a) : 13 N·m (1.3 kg-m, 9.5 lb-ft)

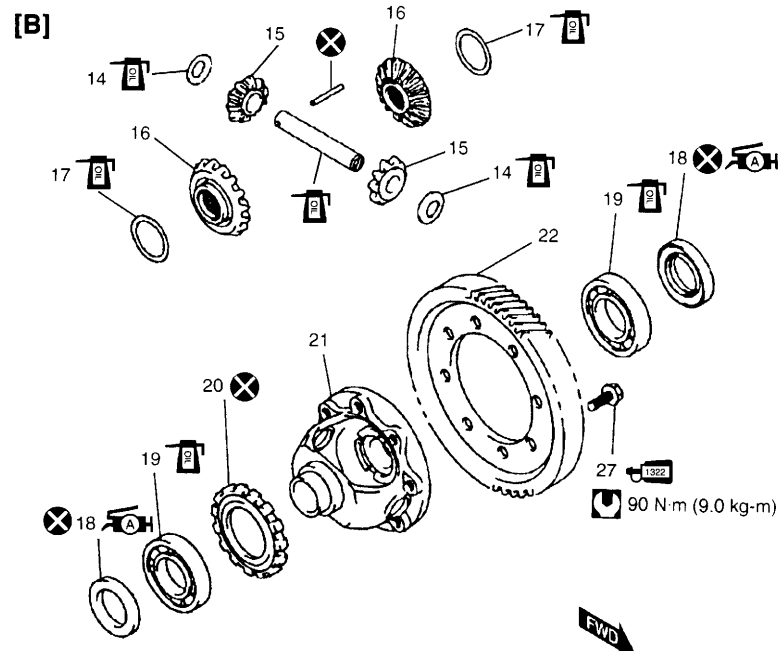
Unit Repair Overhaul












[A] : TRANSMISSION CASE	6. Back up light switch	11. VSS
1. Transmission right case	7. O-ring	12. Oil gutter bolt : Apply thread lock 99000-32110 to all around thread part of bolt.
2. Transmission left case : Apply sealant 99000-31230 to mating surface of left case and right case.	8. Differential assembly	13. Left case plate bolts and screw
3. Gear shifter assembly	9. Oil level/filler plug : Apply sealant 99000-31230 to all around thread part of plug.	Tightening Torque
4. Transmission left case plate	10. Oil drain plug : Apply sealant 99000-31230 to all around thread part of plug.	Do not reuse.
5. Transmission side cover : Apply sealant 99000-31230 to mating surface of side cover and left case.		



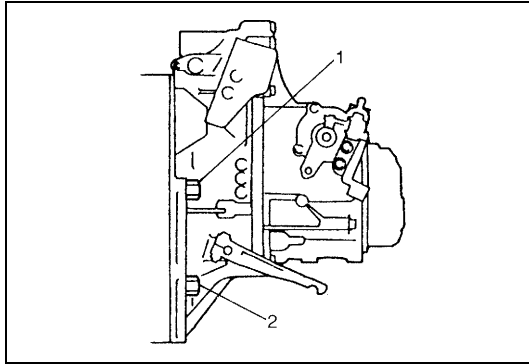
1. Input shaft	17. 5th synchronizer spring	34. Needle bearing (separated steel cage type)
 2. Oil seal : Apply grease 99000-25010 to oil seal lip.	18. 5th speed sleeve & hub	34-1. Needle bearing (steel cage type)
3. Input shaft right bearing	19. 5th synchronizer key	35. Countershaft 2nd gear
4. Input shaft 3rd gear	20. 5th synchronizer hub plate	36. Countershaft 3rd gear
5. Needle bearing (resin cage type)	21. Circlip	37. 3rd & 4th gear spacer
5-1. Needle bearing (resin cage type)	22. Reverse gear shaft	38. Countershaft 4th gear
6. High speed synchronizer ring	23. Reverse idler gear	39. Countershaft left bearing
7. High speed synchronizer spring	24. Reverse shaft washer	40. Bearing set shim
8. High speed sleeve & hub	25. Countershaft right bearing	41. Countershaft 5th gear
9. High speed synchronizer key	26. Countershaft	 42. Countershaft nut : After tightening nut to specified torque, caulk nut securely.
10. Circlip	27. Countershaft 1st gear	 43. Reverse shaft bolt : Apply thread lock cement 99000-32110 to thread.
11. Input shaft 4th gear	28. 1st gear synchronizer ring	44. Washer
12. Input shaft left bearing	29. Low speed synchronizer spring	45. Center cone
13. Input shaft 5th gear	30. Low speed sleeve & hub	46. 2nd gear synchronizer inner ring
14. 5th gear spacer	31. Low speed synchronizer key	 Apply transmission oil.
15. 5th gear needle bearing (separated steel cage type)	32. Circlip	 Tightening Torque
16. 5th speed synchronizer ring	33. 2nd gear synchronizer outer ring	 Do not reuse.



[A] : GEAR SHIFTER	10. Reverse gear shift lever	21. Differential case
[B] : DIFFERENTIAL	11. 5th & reverse gear shift guide shaft	22. Final gear
1. Gear shift & select shaft	12. Reverse gear shift arm	 23. 5th to reverse interlock guide bolt : Apply sealant 99000-31230 to bolt thread.
2. 5th & reverse gear shift cam	13. 5th gear shift fork	 24. Gear shift interlock bolt : Apply sealant 99000-31230 to bolt thread.
3. Gear shift interlock plate	14. Side gear washer	 25. Reverse gear shift lever bolt : Apply thread lock 99000-32110 to all around thread part of bolt.
4. Gear shift & select lever	15. Differential side pinion gear	 26. 5th gear shift fork plug : Apply thread lock 99000-32110 to all around thread part of plug.
5. Shift cable lever	16. Differential side gear	 27. Final gear bolt : Apply thread lock 99000-32110 to all around thread part of bolt.
6. Select cable lever	17. Side gear washer	 Apply transmission oil.
7. Low speed gear shift shaft	 18. Differential side oil seal : Apply grease 99000-25010 to oil seal lip.	 Tightening Torque
8. High speed gear shift shaft	19. Differential side bearing	 Do not reuse.
9. 5th & reverse gear shift shaft	20. Speed sensor ring	

DISMOUNTING**Under hood**

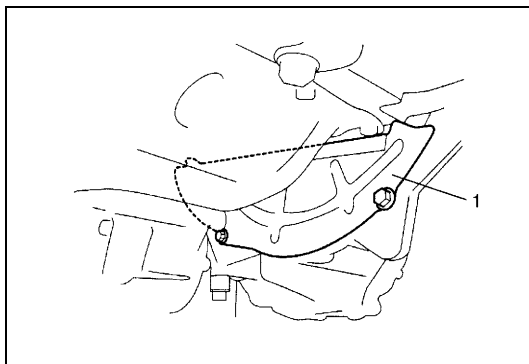
- 1) Disconnect negative cable at battery.
- 2) Undo wiring harness clamps, disconnect back up light switch coupler, VSS coupler and ground cable.
- 3) Disconnect clutch cable from clutch release lever and bracket.
- 4) Disconnect gear shift and select control cables.
- 5) Remove bolt (2), and loosen bolt (1) which is unable to be removed due to interference of water pipe.



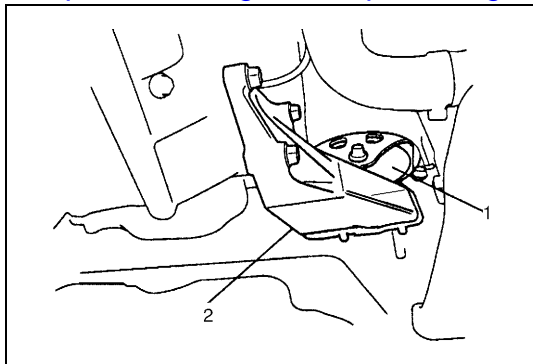
- 6) Remove starting motor taking out its bolts. Starting motor plate should also come down.
- 7) Support engine by using lifting device.

On lift

- 8) Drain transmission oil referring to Section 7A of the Service Manual mentioned in the FOREWORD of this manual.
- 9) Drain transfer oil referring to Section 7D.
- 10) Remove left and right drive shaft referring to Section 4 of the Service Manual mentioned in the FOREWORD of this manual.
- 11) Remove left side of engine under cover.
- 12) Remove transfer referring to Section 7D.
- 13) Remove clutch housing lower plate (1).



- 14) Remove transfer referring to Section 7D.
- 15) Remove transmission to engine bolt and nut.
- 16) Lower vehicle and support transmission with transmission jack.



17) Remove engine left mounting (1) with bracket (2).

18) Remove other attached parts from transmission, if any.

19) Pull transmission out so as to disconnect input shaft from clutch disc and then lower it.

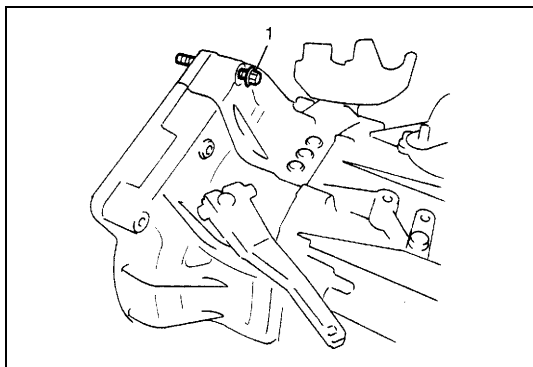
REMOUNTING

CAUTION:

Care should be taken not to scratch oil seal lip with drive shaft while raising transmission.

Do not hit drive shaft joint with hammer when installing it into differential gear.

Remount transmission in reverse order of dismounting procedure noting the following.



- Set bolt (1) to the original position of transmission before mounting transmission assembly to engine assembly.

- Refer to the first figure of "UNIT REPAIR OVERHAUL" in Section 7A of the Service Manual mentioned in the FOREWORD of this manual for fastener specified torque.
- Refer to Section 7D for installing transfer.
- Push in drive shaft joints (right & left) fully so as to snap ring of shaft engages with differential gear.
- Set each clamp for wiring securely.
- After connecting clutch cable, be sure to adjust its play properly.

Refer to Section 7C of the Service Manual mentioned in the FOREWORD of this manual.

- Fill transmission and transfer with oil as specified.
- Connect battery and check function of engine, clutch and transmission.

Sub Assembly Service

Differential assembly

ADJUSTMENT AND REASSEMBLY

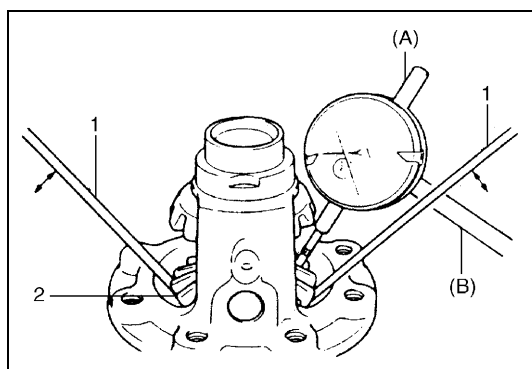
Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

- 1) Assemble differential gear and measure thrust play of differential gear as follows.

Differential gear thrust play

0.03 – 0.31 mm (0.001 – 0.012 in.)

Left side



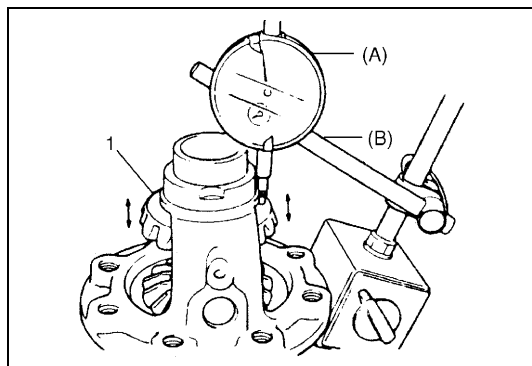
- Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear.
- Using 2 screwdrivers (1), move gear (2) up and down and read movement of dial gauge pointer.

Special tool

(A) : 09900-20607

(B) : 09900-20701

Right side



- Using similar procedure to the above, set dial gauge tip to gear (1) shoulder.
- Move gear up and down by hand and read dial gauge.

Special tool

(A) : 09900-20607

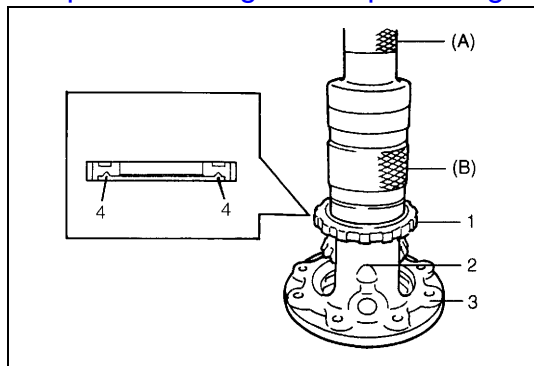
(B) : 09900-20701

- 2) If thrust play is out of specification, select suitable thrust washer from among the following available size, install it and check again that specified gear play is obtained.

Available thrust washer thickness

0.9, 0.95, 1.0, 1.05, 1.1, 1.15 and 1.2 mm

(0.035, 0.037, 0.039, 0.041, 0.043, 0.045, and 0.047 in.)

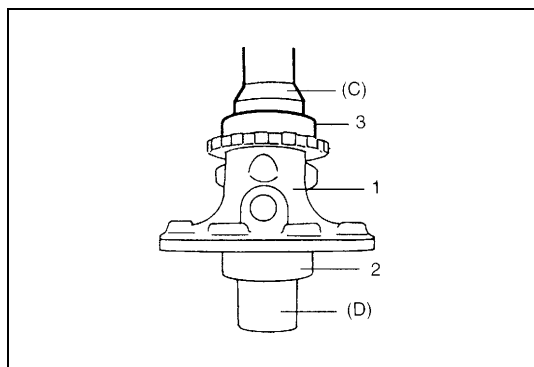


- 3) Drive in new differential side pin shaft pin (2) till the depth from differential case (3) surface is about 1 mm (0.04 in.).
- 4) Press-fit new sensor rotor (1) with groove (4) side downward as shown by using special tools and copper hammer.

Special tool

(A) : 09913-75510

(B) : 09940-54910

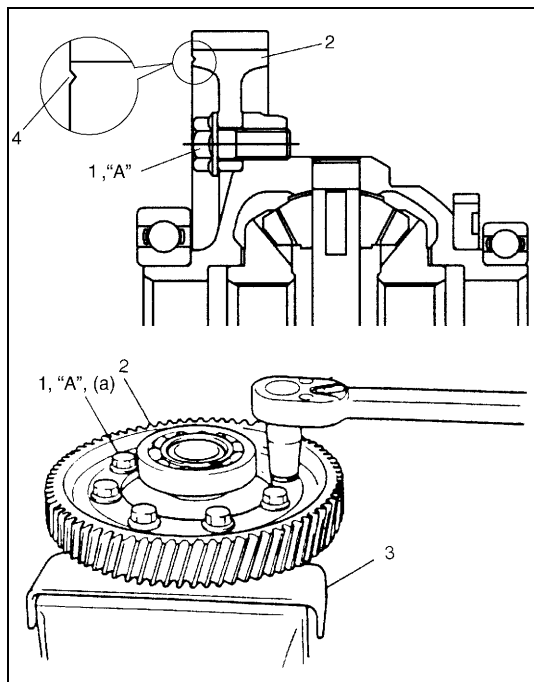


- 5) Press-fit left bearing by using special tools and copper hammer.
- 6) Support differential assembly (1) as illustrated so as to left bearing (2) is floating, and then press-fit right bearing (3) like left bearing in Step 5).

Special tool

(C) : 09951-76010

(D) : 09951-16060



- 7) Hold differential assembly with soft jawed vise (3), install final gear (2) as shown in figure and then tighten bolts (1) with thread lock cement applied to specified torque.

NOTE:

Make sure to install final gear in correct installing direction.

CAUTION:

Use of any other bolts than specified ones is prohibited.

“A” : Thread lock cement 99000-32110

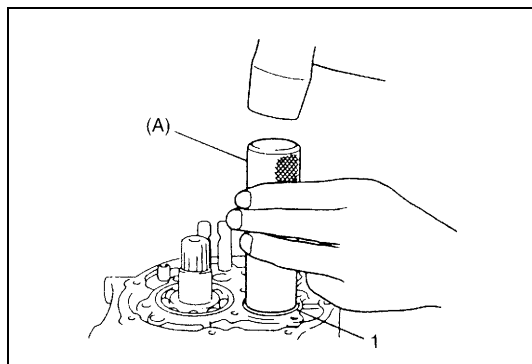
Tightening torque

Final gear bolts (a) : 90 N·m (9.0 kg-m, 65.0 lb-ft)

4. Groove

Assembling Unit

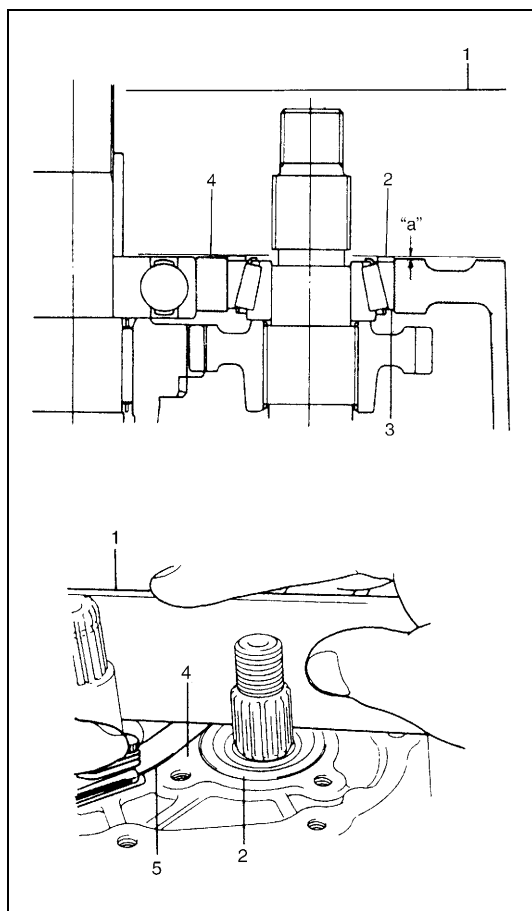
Fifth gears



- 1) To seat countershaft left bearing cup (1) to bearing cone, tap cup by using special tool and plastic hammer.

Special tool

(A) : 09913-84510



- 2) Put a shim (2) on bearing cup (3) provisionally, place straight edge (1) over it and compress it by hand through straight edge, and then measure "a" (Clearance between case surface (4) and straight edge) by using feeler gauge (5).

Clearance between case surface and straight edge

"a" : 0.13 – 0.17 mm (0.0051 – 0.0067 in.)

(Shim protrusion)

- 3) By repeating above step, select a suitable shim which adjusts clearance "a" to specification and put it on bearing cup.

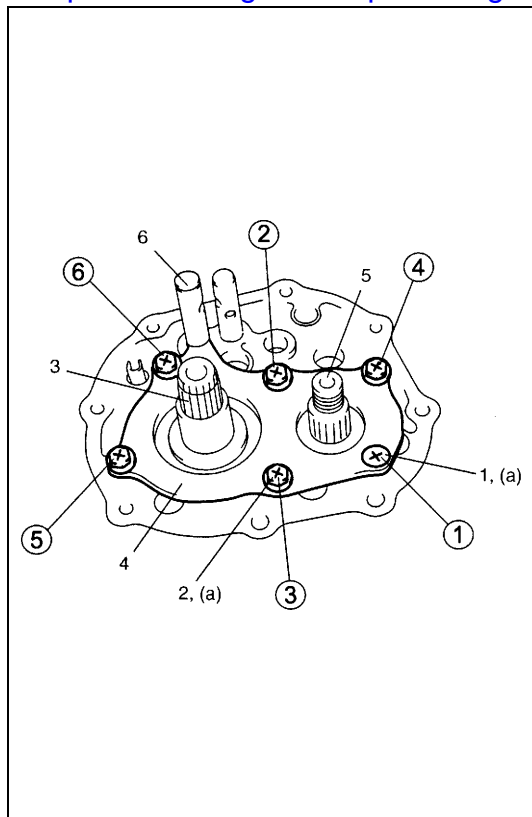
NOTE:

Insert 0.15 mm (0.0059 in.) feeler to know whether or not a shim fulfills specification quickly.

Available shim thickness

0.40, 0.45, 0.50, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0, 1.05, 1.1 and 1.15 mm

(0.015, 0.017, 0.019, 0.021, 0.023, 0.025, 0.027, 0.029, 0.031, 0.033, 0.035, 0.037, 0.039, 0.041, 0.043 and 0.045 in.)



- 4) Place left case plate (4) inserting its end in groove of shift guide shaft (6) and then tighten it with new screw (1) and bolts (2) with adhesive pre-coated temporarily with less than specified torque.

CAUTION:

Do not reuse left case plate screw and bolts. Be sure to use new screw and bolts with adhesive pre-coated. Otherwise, they may loosen.

- 5) Tighten new screw and bolts to specified torque finally in the order of circled numbers shown in figure.

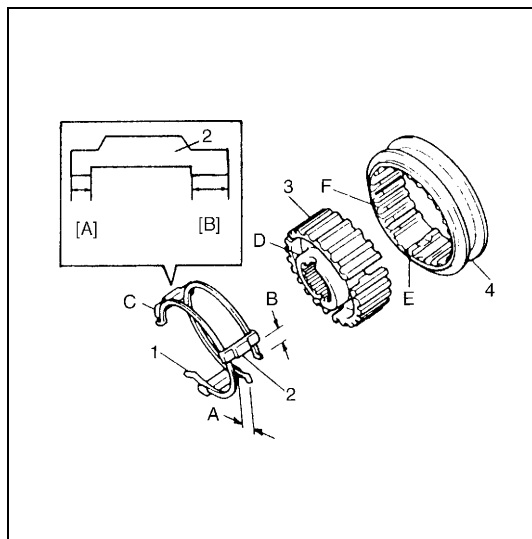
NOTE:

After tightening screw and bolts, make sure that counter-shaft can be rotated by hand feeling certain load.

Tightening torque**Left case plate screw and bolts**

(a) : 11 N·m (1.1 kg·m, 8.0 lb·ft)

3. Input shaft
5. Countershaft



- 6) Assemble 5th speed synchronizer sleeve (4) and hub (3) with keys (2) and springs (1).

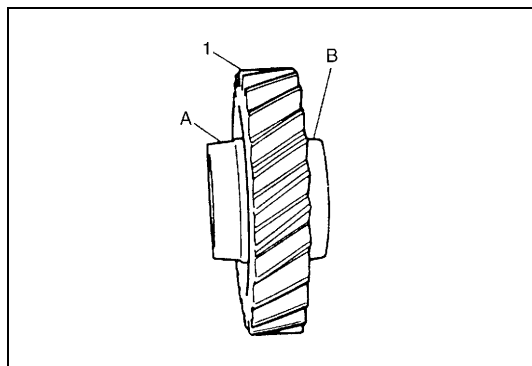
NOTE:

Short side C in keys, long boss D in hub and chamfered spline F in sleeve should face inward (5th gear side).

Synchronizer key installation position

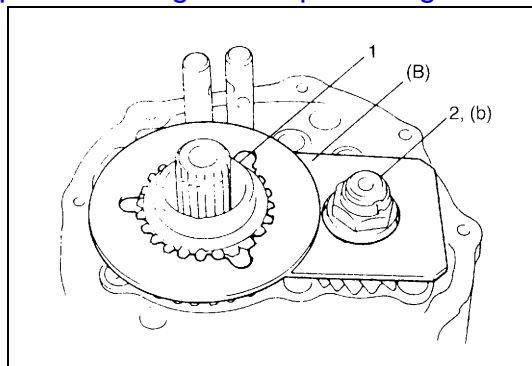
A = B

[A] : Short side C
[B] : Long side
C : Short side (Inward)
D : Long boss (Inward)
E : Key way
F : Chamfered spline (Inward)



- 7) Install 5th gear (1) to counter shaft facing machined boss A inward.

A : Machined boss (Inside)
B : No machining (Outside)



- 8) Install needle bearing of separated steel cage type to input shaft, apply oil then install 5th gear (1) and special tool to stop shaft rotation.

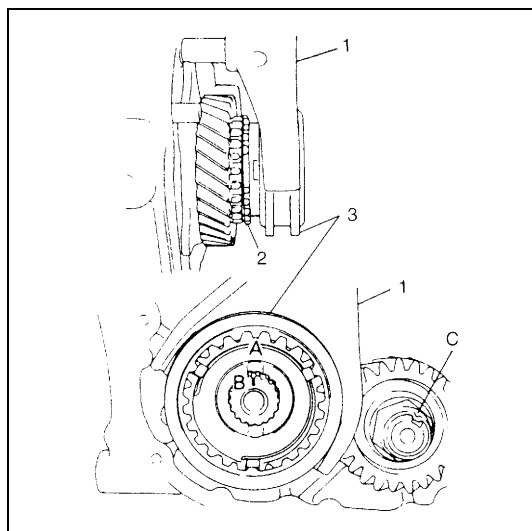
Special tool

(B) : 09927-76010

- 9) Install new countershaft nut (2) and tighten it to specification.

Tightening torque

Countershaft nut (b) : 60 N·m (6.0 kg-m, 43.5 lb-ft)



- 10) Remove special tool, then caulk nut at C with caulking tool and hammer.

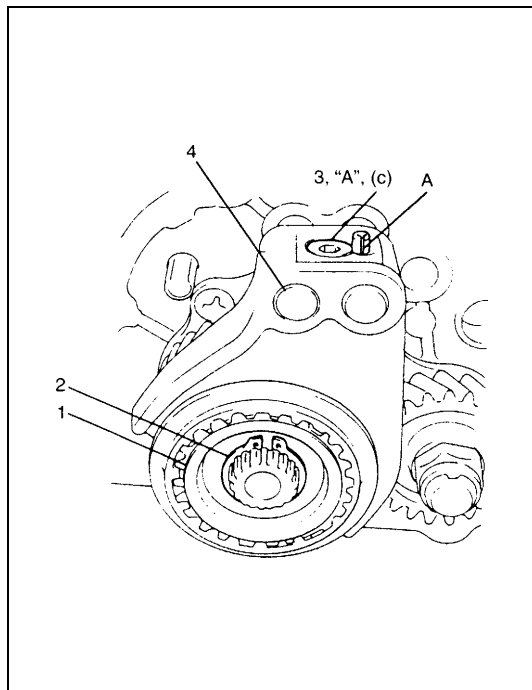
- 11) Install synchronizer ring (2).

- 12) Fit 5th gear shift fork (1) to sleeve & hub assembly (3) and install them into input shaft, shift shaft and shift guide shaft at once aligning hub oil groove A with shaft mark B.

NOTE:

Long flange of hub faces inward (gear side).

A :	Oil groove (Align with B)
B :	Punch mark
C :	Caulking



- 13) Drive in spring pin facing its slit A outward.

A :	Pin slit (Face outward)
-----	-------------------------

- 14) Install steel ball, tighten shift fork plug (3) to which thread lock cement has been applied.

“A” : Cement 99000-32110

Tightening torque

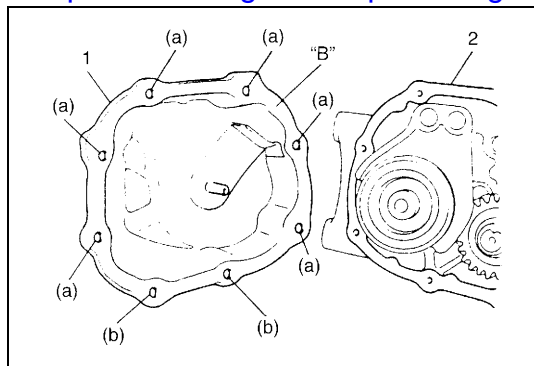
5th shift fork plug (c) : 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 15) Fit hub plate (1) and fix it with new circlip (2).

- 16) Install new circlip (4) to the end of 5th & reverse gear shift guide shaft.

CAUTION:

- Coat shift fork plug with thread lock cement reasonably. If it is done to much, excess may interfere in ball movement and cause hard shift to 5th speed.
- Make sure circlip is installed in shaft groove securely.



- 17) Clean mating surface of both left case (2) and side cover (1), coat mating surface with sealant evenly, mate it with left case and then tighten bolts.

“B” : Sealant 99000-31230

Tightening torque

Side cover No. 1 bolts (a) : 10 N·m (1.0 kg-m, 7.5 lb-ft)

Side cover No. 2 bolts (b) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

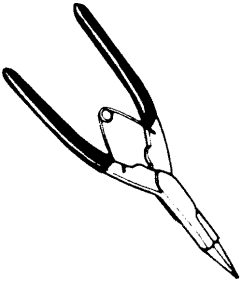
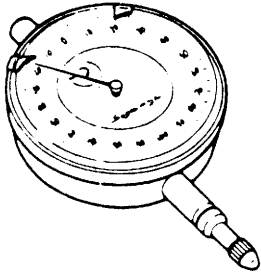
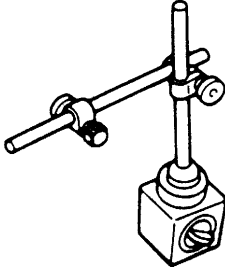
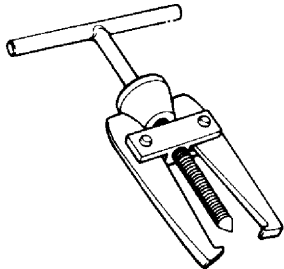
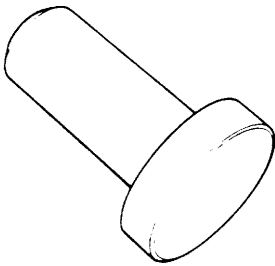
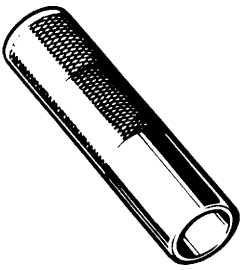
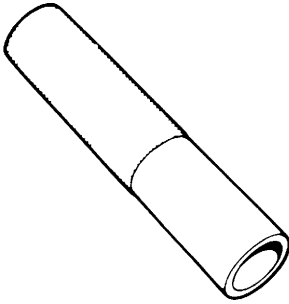
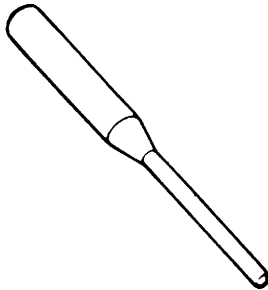
Tightening Torque Specification

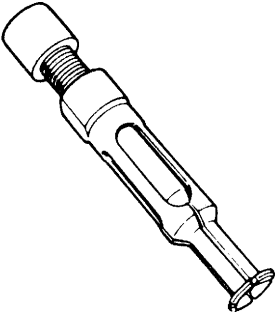
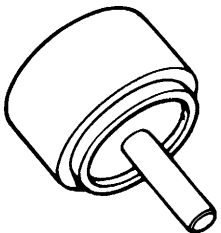
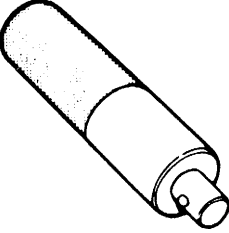
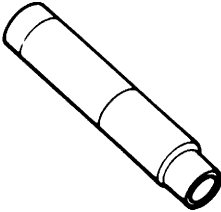
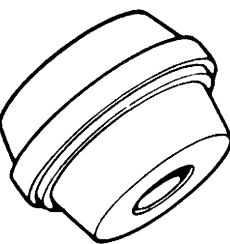
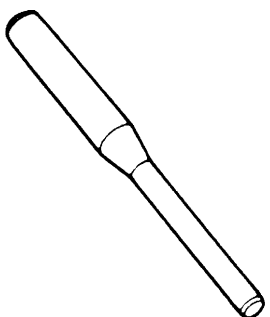
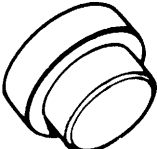
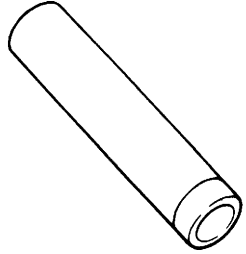
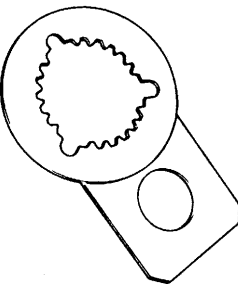
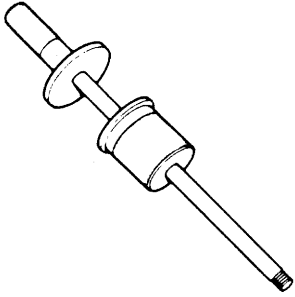
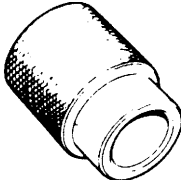

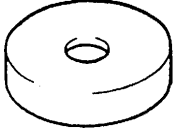
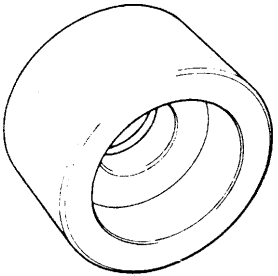
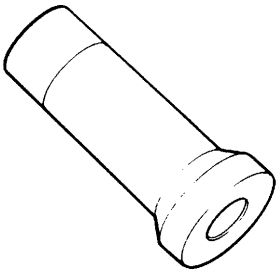
Fastening portion	Tightening torque		
	N·m	kg-m	lb-ft
Transmission oil level/filler and drain plugs	21	2.1	15.5
Gear shift control lever assembly nut	13	1.3	9.5
Final gear bolts	90	9.0	65.0
Reverse gear shift lever bolts	23	2.3	17.0
Transmission case bolts	19	1.9	14.0
Reverse shaft bolt	23	2.3	17.0
Locating spring bolts	13	1.3	9.5
Left case plate bolts and screw	11	1.1	8.0
Countershaft nut	60	6.0	43.5
5th shift fork plug	10	1.0	7.5
Side cover No.1 bolts	10	1.0	7.5
Side cover No.2 bolts	23	2.3	17.0
Guide case bolts	23	2.3	17.0
Gear shift interlock bolt	23	2.3	17.0
5th to reverse interlock guide bolt	23	2.3	17.0
Backup lamp switch	19	1.9	14.0

Required Service Materials

Material	Recommended SUZUKI Material	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> Oil seal lips
Sealant	SUZUKI BOND NO.1216B (99000-31230)	<ul style="list-style-type: none"> Oil drain plug and filler / level plug Gear shift shaft bolt Mating surface of transmission case Mating surface of side cover Gear shift interlock bolt 5th to reverse interlock guide bolt
Thread lock cement	THREAD LOCK 1322 (99000-32110)	<ul style="list-style-type: none"> Reverse gear shift lever bolts Oil gutter bolt Left case plate screws Shift fork plug Reverse shaft bolt

Special Tools

 <p>09900-06107 Snap ring pliers (Opening type)</p>	 <p>09900-20607 Dial gauge</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09913-60910 Bearing puller</p>
 <p>09913-75510 Bearing installer</p>	 <p>09913-80113 Bearing installer</p>	 <p>09913-84510 Bearing installer</p>	 <p>09922-85811 Spring pin remover 4.5 mm</p>

			
09923-74510 Bearing remover	09923-78210 Bearing installer	09924-74510 Installer attachment	09925-18011 Bearing installer
			
09925-68210 Bearing outer race installer	09925-78210 Spring pin remover 6 mm	09925-88210 Bearing puller attachment	09925-98221 Bearing installer
			
09927-76010 Gear holder	09930-30104 Sliding shaft	09940-53111 Bearing installer	09940-54910 Sensor rotor installer
			
09951-46010 Oil seal installer	09951-16060 Bush remover	09951-76010 Bearing installer	

SECTION 7C

CLUTCH

7C

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.

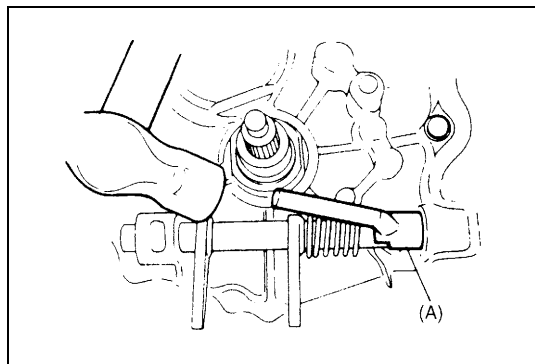
CONTENTS

Unit Repair Overhaul	7C-2	Required Service Materials	7C-5
Clutch Release System	7C-2	Special Tool	7C-5
Tightening Torque Specification	7C-4		

Unit Repair Overhaul

Clutch Release System

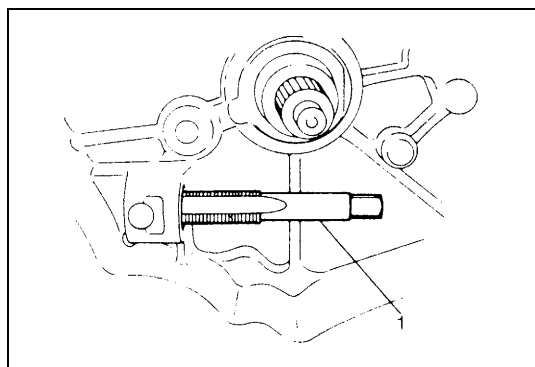
REMOVAL



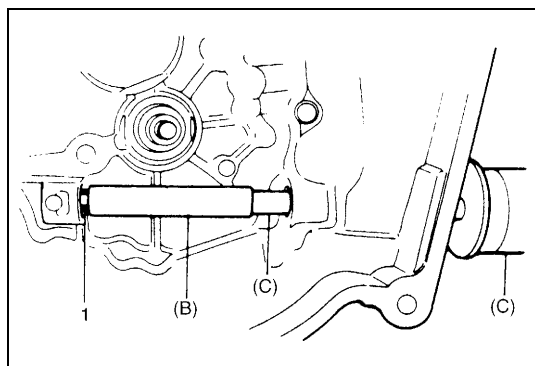
- 1) Remove B-pin from release shaft.
- 2) Remove release lever by loosening its nut.
- 3) Take out release bearing by turning release shaft (1).
- 4) Unhook return spring by using pliers.
- 5) Drive out No.2 bush by using special tool and hammer.
Release shaft seal will also be pushed out.

Special tool

(A) : 09922-46010



- 6) Remove release shaft and return spring.
- 7) Install tap (M16 X 1.5) (1) to clutch release shaft No.1 bush.



- 8) Pull out No.1 bush by using tap (1) and special tools.

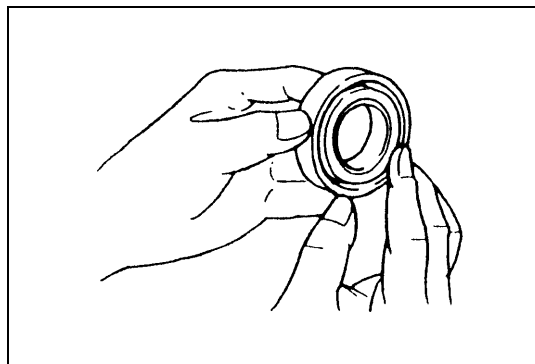
Special tool

(B) : 09923-46020

(C) : 09930-30104

INSPECTION

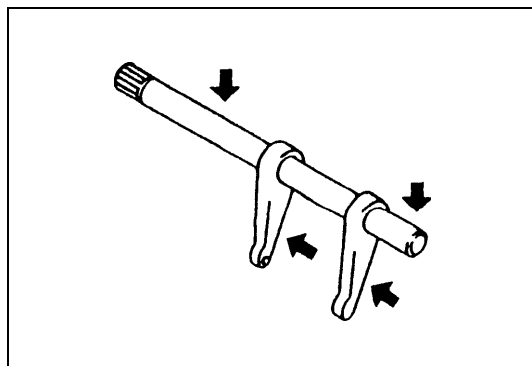
Clutch release bearing



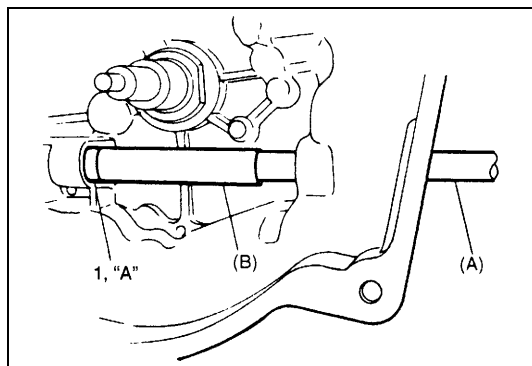
Check clutch release bearing for smooth rotation.
If abnormality is found, replace it.

CAUTION:

Do not wash release bearing. Washing may cause grease leakage and consequential bearing damage.

Clutch release shaft

Check clutch release shaft and its pin for deflection or damage. If abnormality is found, replace it.

INSTALLATION

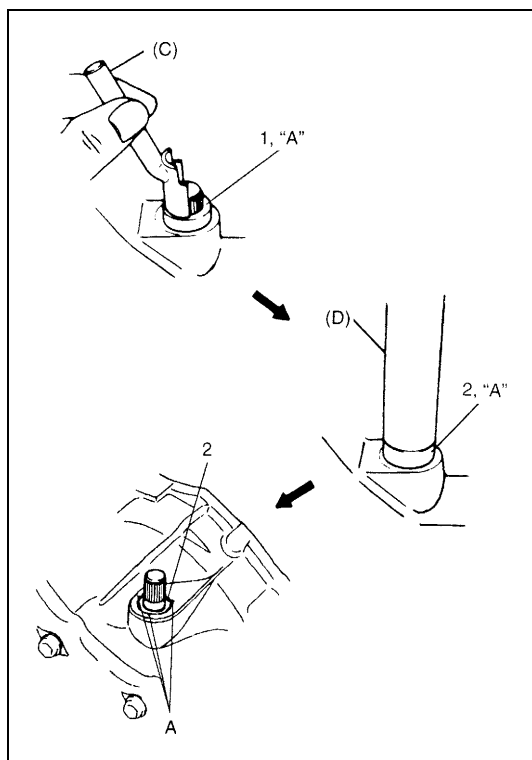
- 1) Drive in a new No.1 bush (1) by using special tools and then apply grease to bush inside.

Special tool

(A) : 09930-30104

(B) : 09923-46030

"A" : Grease 99000-25010



- 2) Install release shaft with return spring applied to it.

- 3) Apply grease to No.2 bush (1) inside and press-fit it by using the same special tool as in removal.

"A" : Grease 99000-25010

Special tool

(C) : 09922-46010

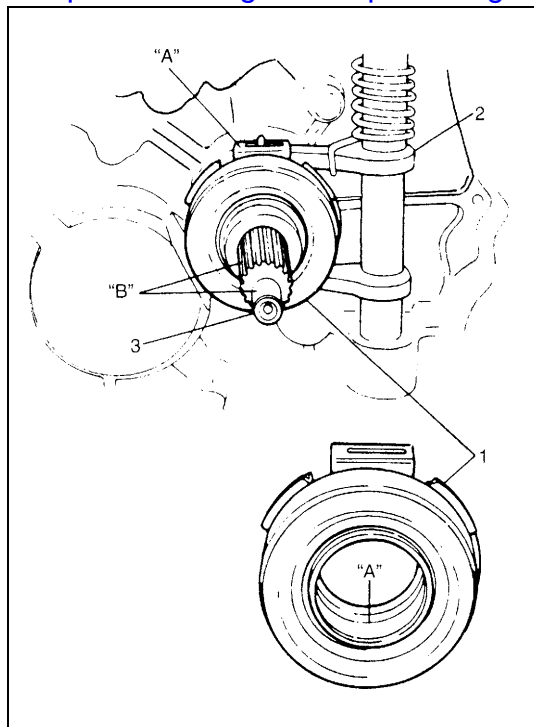
- 4) Coat grease to shaft seal (2) lip and then install it till it is flush with case surface. Use special tool for this installation and face seal lip downward (inside).

"A" : Grease 99000-25010

Special tool

(D) : 09925-98221

- 5) Caulk seal at A by using caulking tool and hammer.

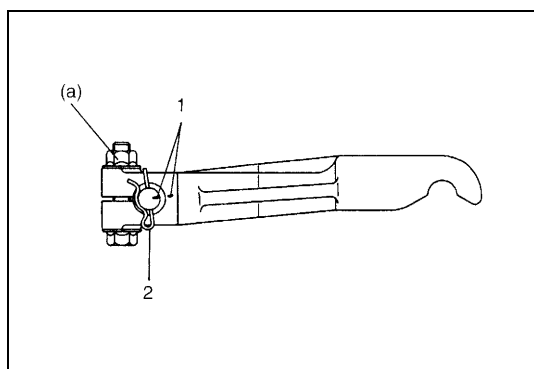


- 6) Hook return spring.
- 7) Apply grease to release bearing (1) inside and release shaft arm (2), then set bearing.

“A” : Grease 99000-25010

- 8) Apply small amount of grease to input shaft (3) spline and front end as well.

“B” : Grease 99000-25210



- 9) Set release lever to release shaft aligning their punch marks (1), then tighten nut.

Tightening torque

Release lever nut (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 10) Install β-pin (2) to release shaft.

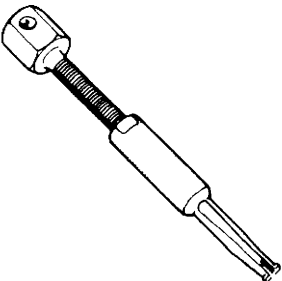
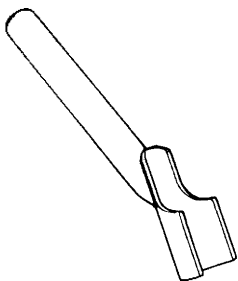
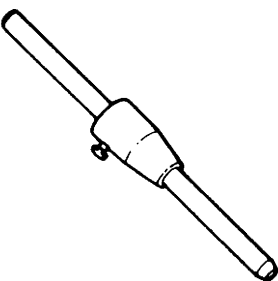
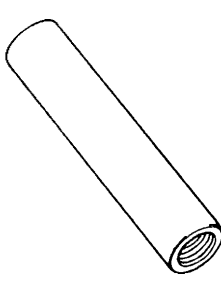
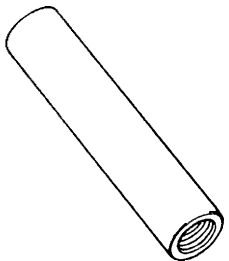
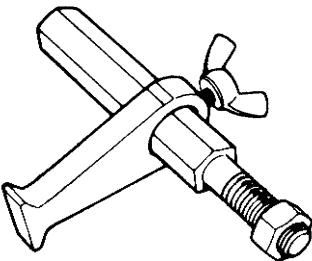
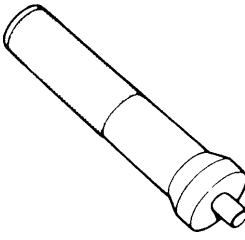
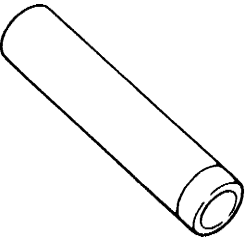
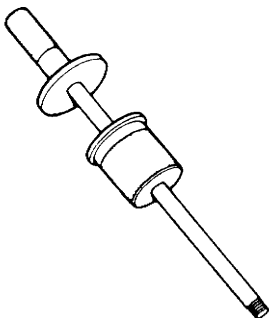
Tightening Torque Specification

Fastening portion	Tightening torque		
	N·m	kg-m	lb-ft
Clutch cable bolts	11	1.1	8.0
Flywheel bolts	76	7.6	55.0
Clutch cover bolts	23	2.3	16.5
Release lever nut	23	2.3	16.5

Required Service Materials

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> • Cable end hook and joint pin. • Release shaft bushes and seal. • Release shaft arm. • Release bearing inside.
	SUZUKI SUPER GREASE I (99000-25210)	Input shaft spline and front end.

Special Tool

 <p>09917-58010 Bearing remover</p>	 <p>09922-46010 Bush remover</p>	 <p>09923-36330 Clutch center guide</p>	 <p>09923-46020 Joint pipe</p>
 <p>09923-46030 Joint pipe</p>	 <p>09924-17811 Flywheel holder</p>	 <p>09925-98210 Input shaft bearing installer</p>	 <p>09925-98221 Bearing installer</p>
 <p>09930-30104 Sliding shaft</p>			

SECTION 7D

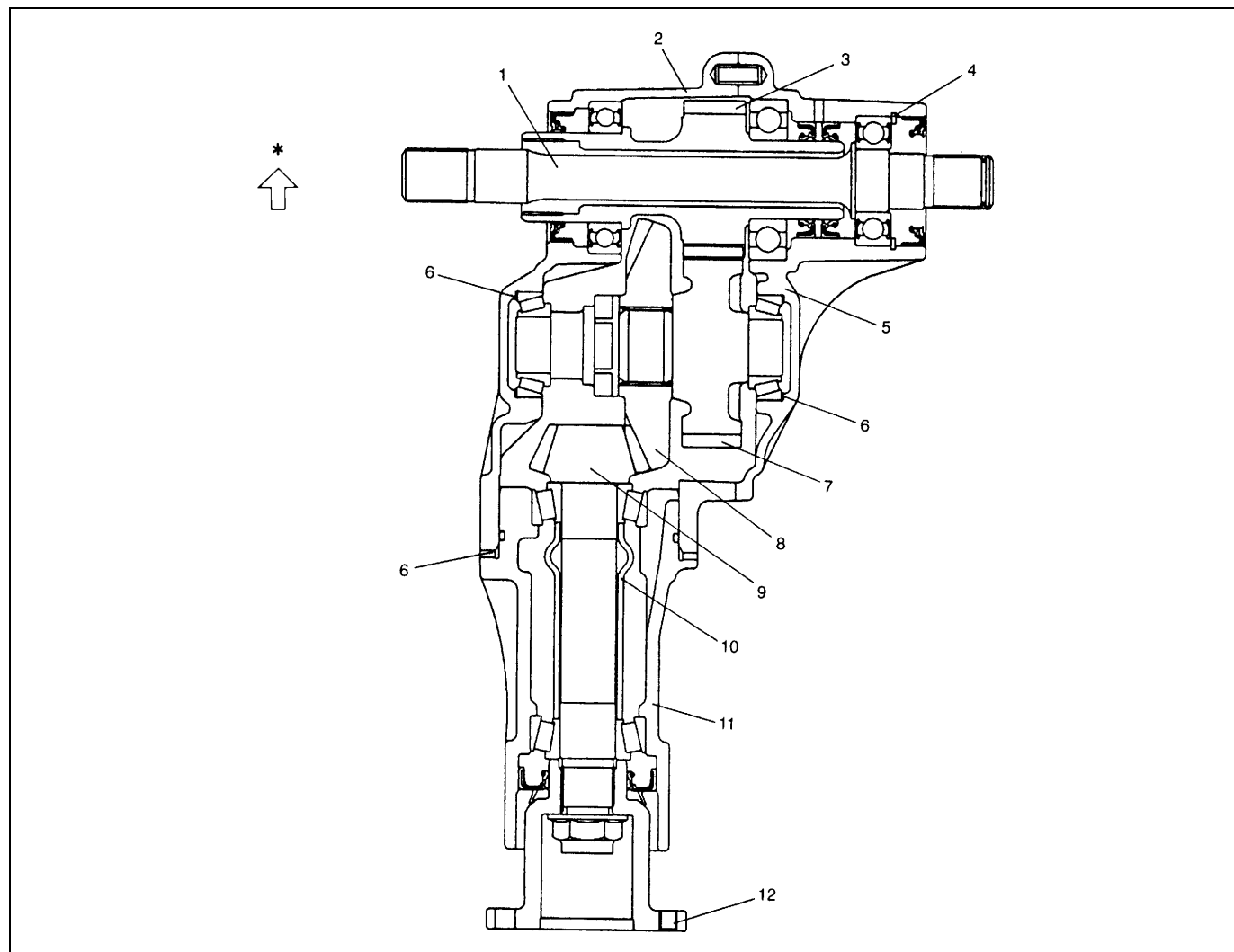
TRANSFER

CONTENTS

General Description	7D-2	Unit Assembly	7D-11
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On-Vehicle Service	7D-3	Bevel gear shim	7D-12
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Unit Repair Overhaul	7D-4	Right case	7D-17
Unit Dismounting	7D-5	Left case	7D-18
Unit Disassembly	7D-6	Transfer assembly	7D-19
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Transfer output retainer assembly	7D-9	Required Service Material	7D-24
Component Inspection	7D-10	Special Tool	7D-25

General Description

The transfer is mounted on transmission case by fastening bolts with reduction drive gear in transfer and differential case in transmission coupled by involute spline. Driving force from transmission is transmitted to propeller shaft through reduction drive gear, reduction driven gear and bevel gears in transfer. As bevel gears, which change the direction of driving torque axis to the direction of the angle with 90 degrees, hypoid gears are provided. Hypoid gears have an advantage of preventing gear noise, at the same time, they require accurate adjustment of tooth contact and backlash.



1. Intermediate shaft	6. Shim	11. Transfer output retainer
2. Left case	7. Reduction driven gear	12. Flange
3. Reduction drive gear	8. Bevel gear (hypoid gear)	* : Forward
4. Circlip	9. Bevel pinion shaft (hypoid gear)	
5. Right case	10. Pinion shaft spacer	

Diagnosis

Condition	Possible Cause	Correction
Noise	Inadequate or insufficient lubricant	Replenish.
	Damaged or worn bearing(s)	Replace.
	Damaged or worn gear(s)	Replace.
	Damaged or worn chamfered tooth on sleeve or gear	Replace.
	Preload of taper roller bearing is reduced	Adjust.

On-Vehicle Service

Oil Change

- 1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
- 2) With vehicle lifted up, check oil level and leakage. If leakage exists, correct or repair it.
- 3) Drain old oil, tighten drain plug (2) after applying sealant to its thread and pour new specified oil as shown below by specified amount (roughly up to level hole).

"A" : Sealant 99000-31230

Tightening torque

Transfer oil drain plug (a) : 21 N·m (2.1 kg-m, 15.5 lb-ft)

NOTE:

- It is highly recommended to use SAE 80W-90 Hypoid gear oil API GL-5.
- Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

Transfer gear oil

: Hypoid gear oil API GL-5

For oil viscosity, refer to the chart.

Oil Capacity

: 0.5 liters (1.1/0.9 US/Imp. pt)

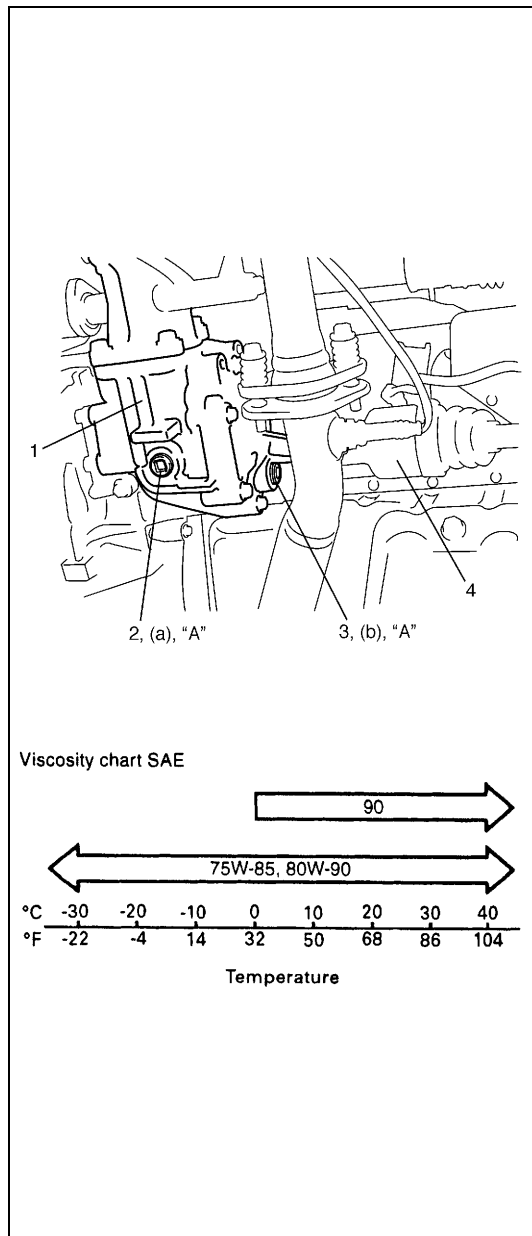
- 4) Torque level/filler plug (3) as specified below after applying sealant to its thread.

"A" : Sealant 99000-31230

Tightening torque

Transfer oil level / filler plug

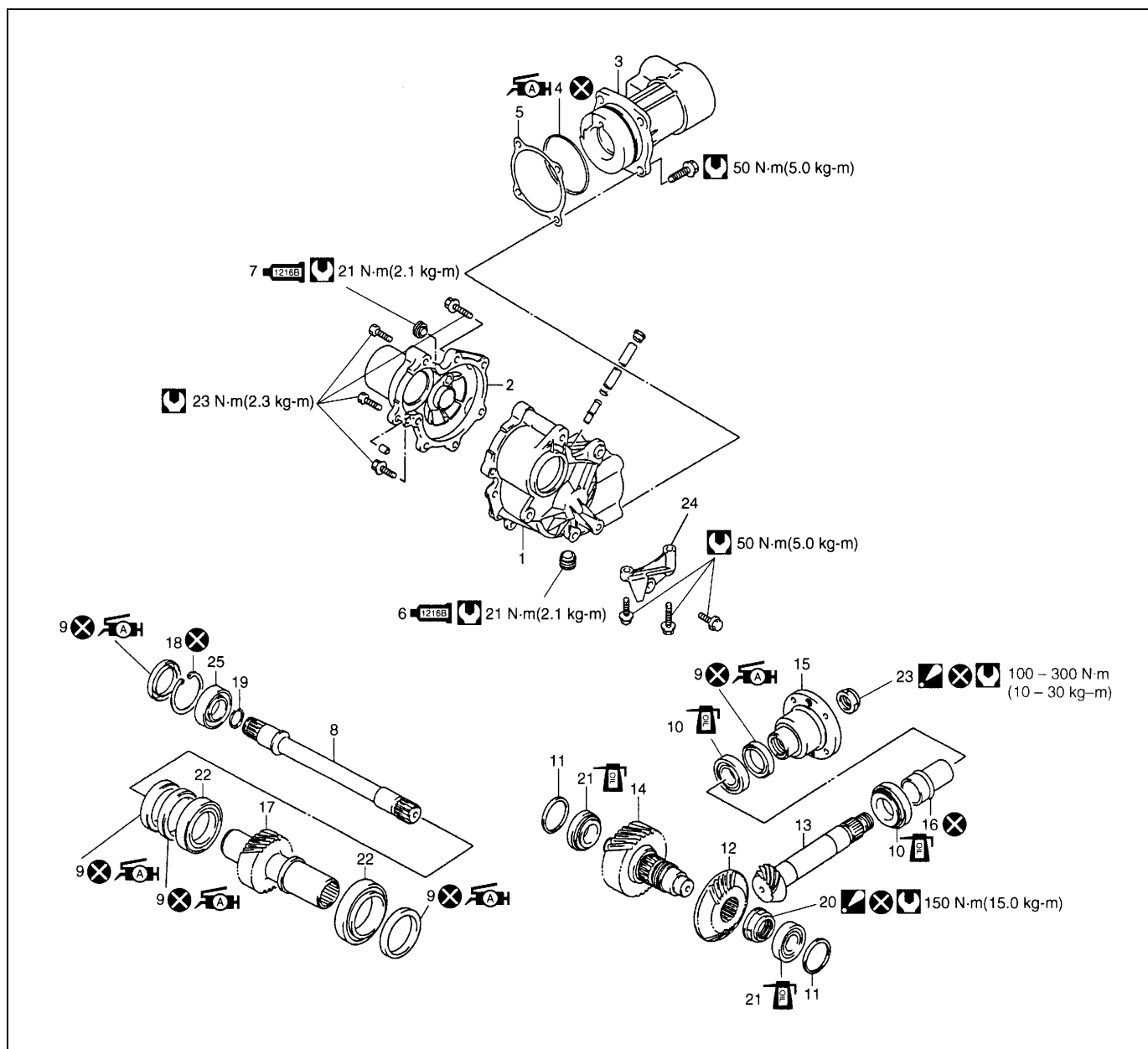
(b) : 21 N·m (2.1 kg-m, 15.5 lb-ft)



1. Transfer

4. Drive shaft

Unit Repair Overhaul

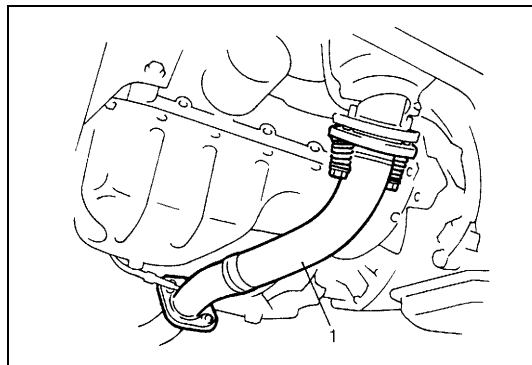


1. Transfer left case	11. Bevel gear shim	21. Driven gear bearing
2. Transfer right case	12. Bevel gear (Hypoid gear)	22. Reduction drive gear bearing
3. Transfer output retainer	13. Bevel pinion shaft (Hypoid gear)	23. Flange nut : After tightening nut so as rotation torque of bevel pinion shaft to be in specified value, caulk nut securely.
4. O-ring : Apply grease 99000-25010 to all around surface.	14. Reduction driven gear	24. Transfer stiffener
5. Bevel pinion shim	15. Flange	25. Intermediate shaft right bearing
6. Drain plug : Apply sealant 99000-31230 to all around thread part of drain plug.	16. Pinion shaft spacer	Do not reuse.
7. Level/filler plug : Apply sealant 99000-31230 to all around thread part of level plug.	17. Reduction drive gear	Tightening torque
8. Intermediate shaft	18. Circlip	Apply transfer oil.
9. Oil seal : Apply grease 99000-25010 to oil seal lip.	19. Snap ring	
10. Pinion shaft bearing	20. Bevel gear nut : After tightening nut to specified torque, caulk nut securely.	

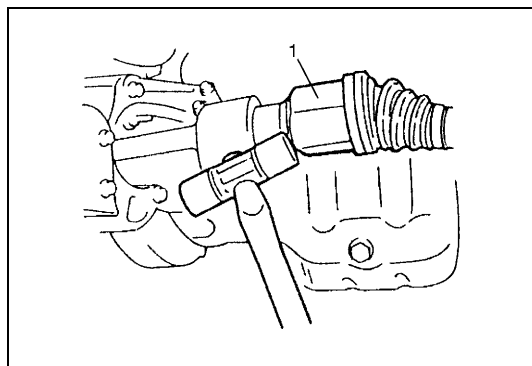
Unit Dismounting

DISMOUNTING

- 1) Disconnect negative cable at battery.
- 2) Hoist vehicle and remove wheels.
- 3) Drain transaxle oil and transfer oil

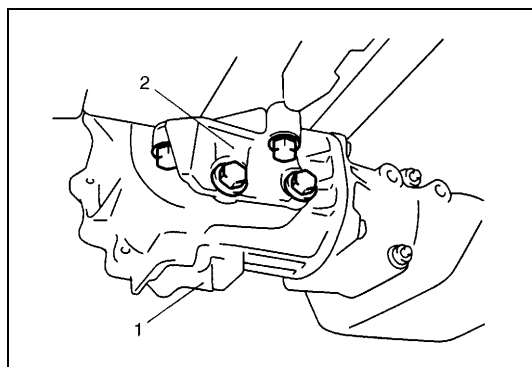


- 4) Remove exhaust pipe (1).



- 5) Remove propeller shaft referring to Section 4B.

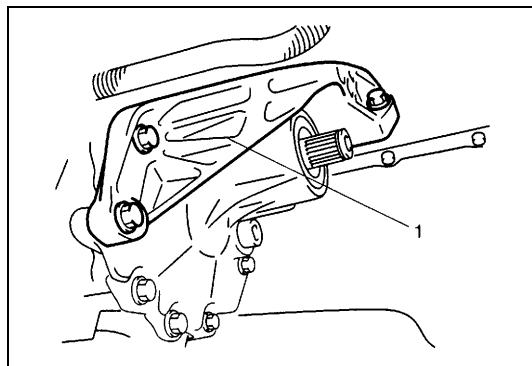
- 6) Remove right side drive shaft (1) referring to Section 4A.



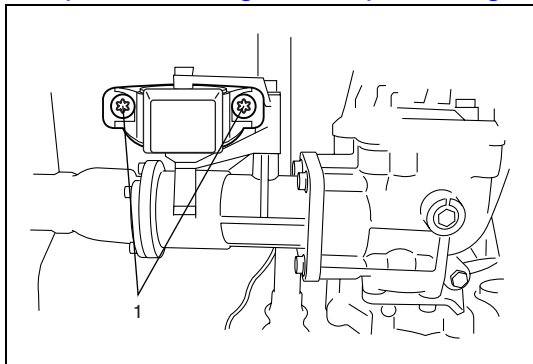
- 7) Disconnect breather hose from transfer assembly.

- 8) Remove transfer stiffener (2).

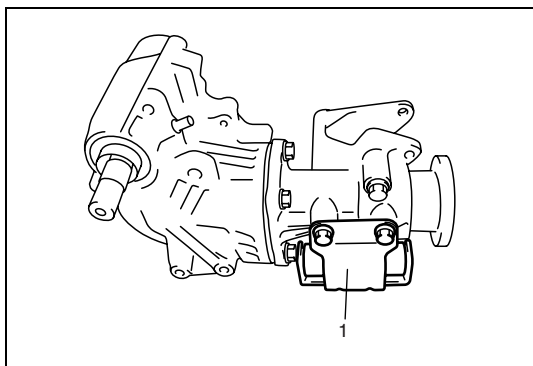
1. Transfer



- 9) Remove transfer to engine stiffener (1) by removing its 5 bolts, if equipped.

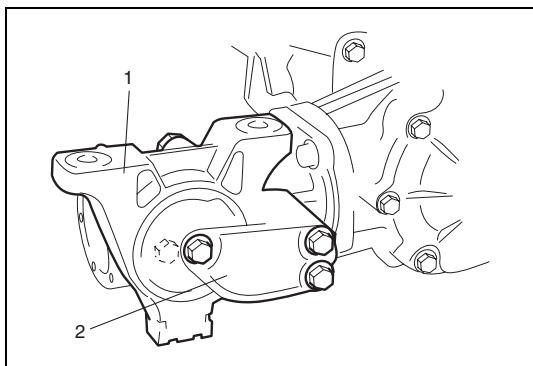


- 10) With transaxle assembly held on jack, remove rear mounting bracket bolts (1).



- 11) Remove transfer to transmission bolts and draw out transfer assembly from transmission assembly.

- 12) Remove dynamic damper (1) from transfer assembly, if equipped.



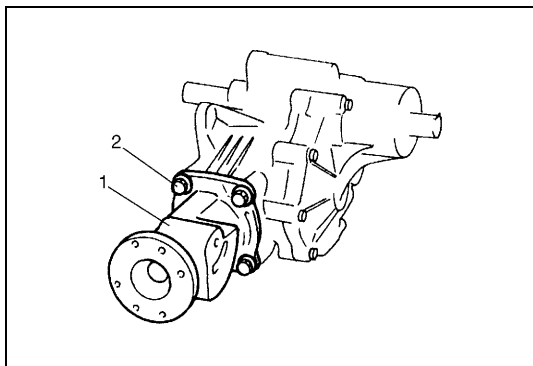
- 13) Remove rear mounting (1) and rear mounting bracket (2) from transfer assembly.

- 14) Remove breather hose from transfer assembly.

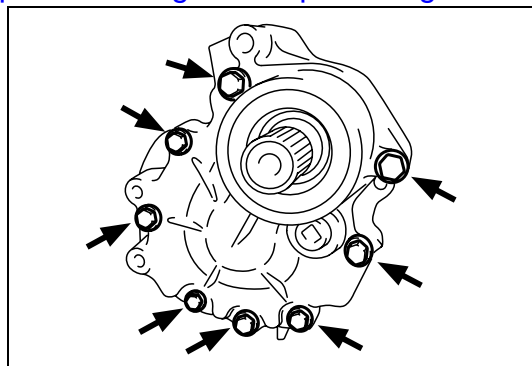
Unit Disassembly

Transfer assembly

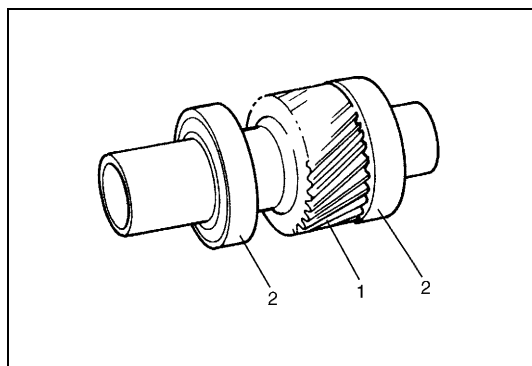
DISASSEMBLY



- 1) Remove retainer bolts (2) and remove transfer output retainer assembly (1).



2) Remove transfer case bolts.



3) Separate right case with intermediate shaft from left case by tapping with plastic hammer.

4) Remove reduction drive gear assembly (1) from left case by tapping with plastic hammer.

5) Remove reduction drive gear bearings (2) (right and left) from reduction drive gear by using bearing puller and hydraulic press.

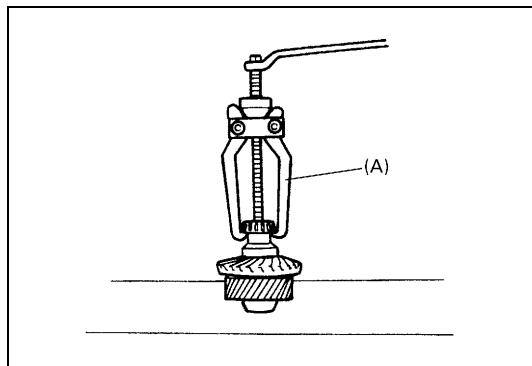
Reduction driven gear assembly

DISASSEMBLY

1) Drive out left side driven gear bearing by using special tool.

Special tool

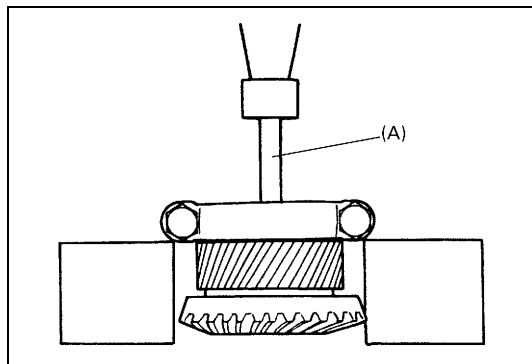
(A) : 09913-65135

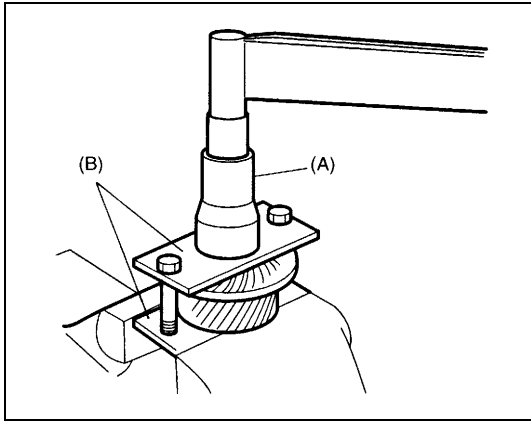


2) Drive out right side driven gear bearing by using bearing puller, hydraulic press and special tool.

Special tool

(A) : 09925-58210



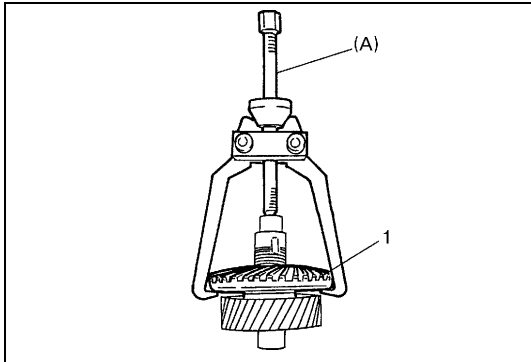


- 3) Uncaulk bevel gear nut, remove bevel gear nut while holding bevel gear with special tool and vise.

Special tool

(A) : 09941-58020

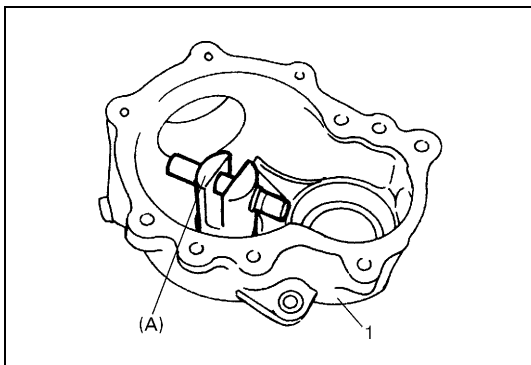
(B) : 09924-57610



- 4) Drive out bevel gear (1) by using special tool.

Special tool

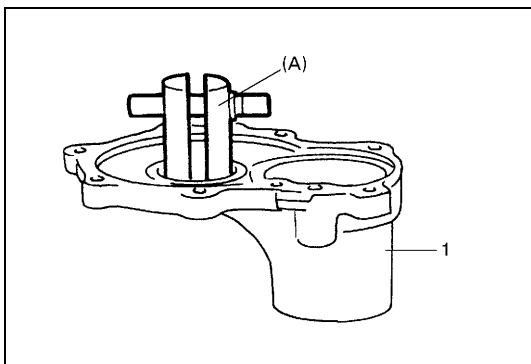
(A) : 09913-65135



- 5) Remove driven gear bearing outer race from left case (1) by using special tool.

Special tool

(A) : 09941-54911



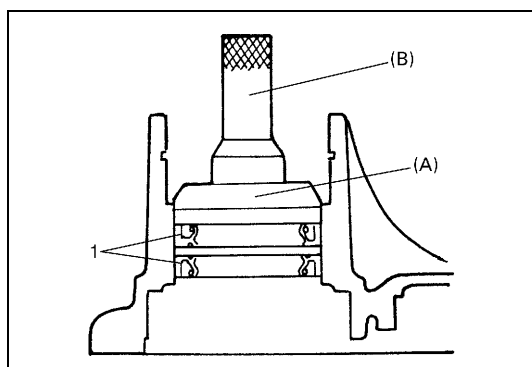
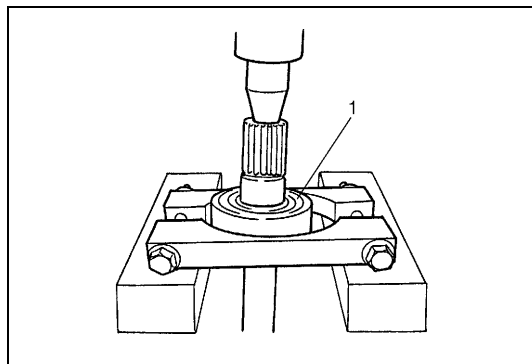
- 6) Remove driven gear bearing outer race from right case (1) by using special tool.

Special tool

(A) : 09941-54911

Intermediate shaft**DISASSEMBLY**

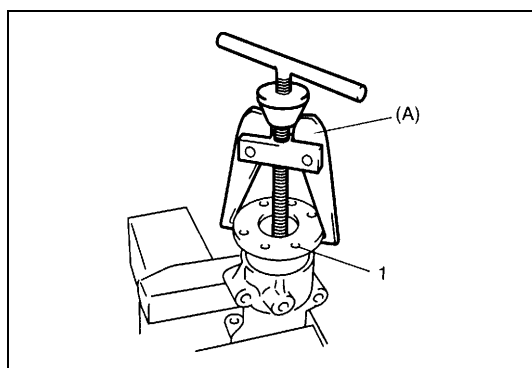
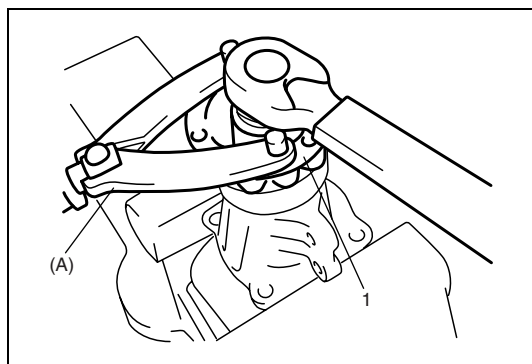
- 1) Remove reduction drive oil seal and snap ring, and then drive out intermediate shaft.
- 2) Drive out intermediate shaft right bearing (1) from intermediate shaft by using bearing puller and hydraulic press.



- 3) Remove reduction drive gear oil seals (1) by using hydraulic press and special tools.

Special tool**(A) : 09924-84510-005****(B) : 09913-75821****Transfer output retainer assembly****DISASSEMBLY**

- 1) Uncaulk flange nut.
- 2) Remove flange nut while holding flange (1) by using special tool.

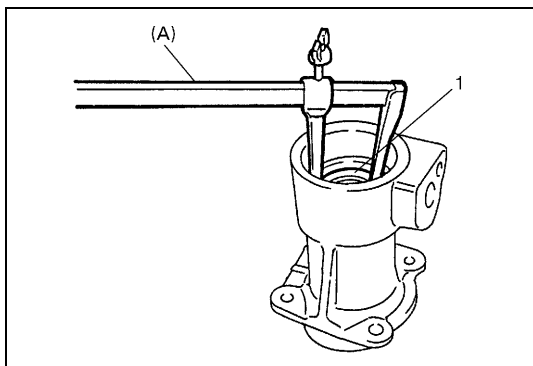
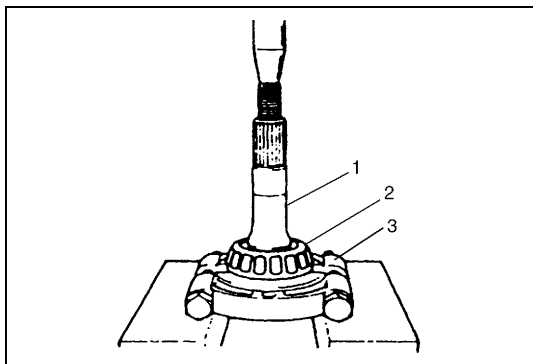
Special tool**(A) : 09930-40113**

- 3) Remove flange (1) by special tool.

Special tool**(A) : 09913-60910**

- 4) Drive out bevel pinion shaft from transfer output retainer by tapping with plastic hammer.
- 5) Drive out pinion spacer from bevel pinion shaft.
- 6) Drive out pinion shaft bearing (2) from bevel pinion shaft (1) by using hydraulic press.

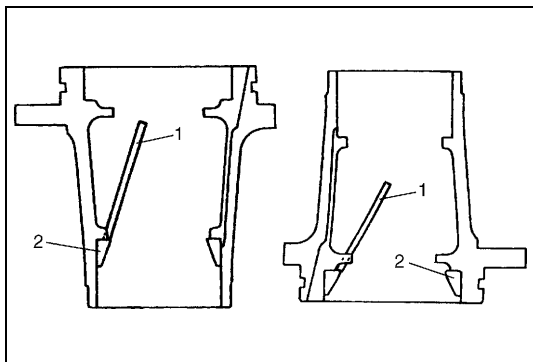
3. Bearing puller



- 7) Remove pinion shaft oil seal (1) by using special tool.

Special tool

(A) : 09913-50121



- 8) Drive out pinion shaft bearing outer races (2) (front and rear) by using brass bar (1).

Component Inspection

- Check each bearing for smooth rotation, wear or discoloration.
If found abnormal, replace.
- Check oil seal for leakage and its lip for excessive hardness.
If either is found, replace.
- Check transfer case for cracks.
- Check bevel pinion and bevel gear for wear or cracks.
- Check pinion gear and pinion shaft for wear or damage.

Unit Assembly

CAUTION:

- Bevel gear and pinion must be replaced as a set when either replacement becomes necessary.
- When replacing taper roller bearing, replace as inner race & outer race assembly.

Judging from faulty conditions noted before disassembly and what is found through visual check of bearing and gear tooth etc. after disassembly, prepare replacing parts and proceed to reassembly according to procedures as described below.

Reduction driven gear assembly

ASSEMBLY

- 1) Drive in bevel gear to reduction driven gear.
- 2) Tighten bevel gear nut to specified torque while holding bevel gear with special tool and vise, and then caulk nut.

Tightening torque

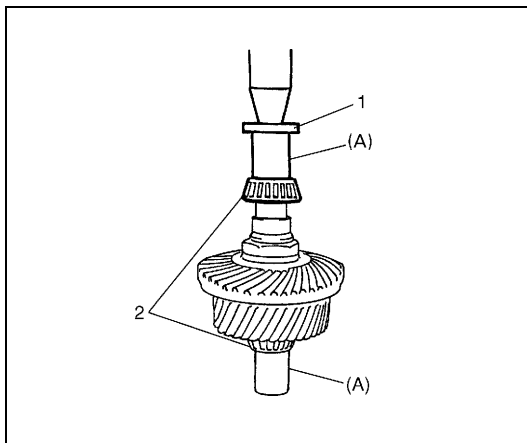
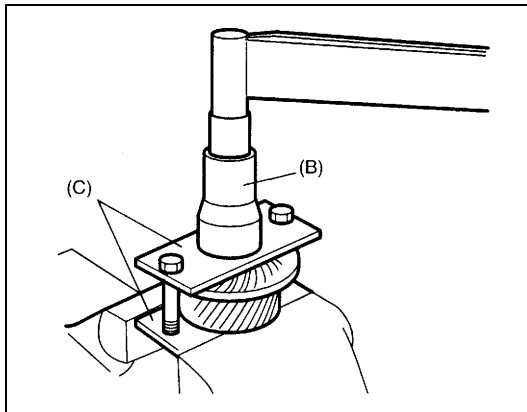
Transfer bevel gear nut

: 150 N·m (15.0 kg-m, 108.5 lb-ft)

Special tool

(B) : 09941-58020

(C) : 09924-57610



NOTE:

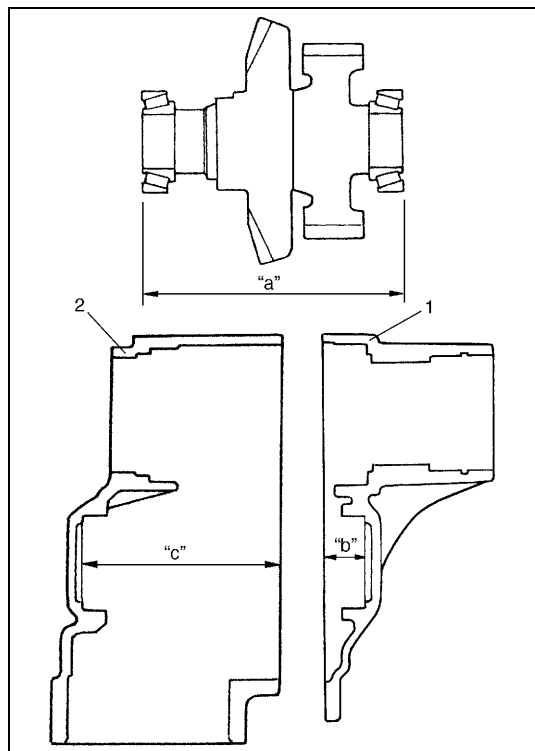
Support shaft with special tool as illustrated in the figure so that retainer of bearing cone will be free from compression.

- 3) Press-fit driven gear bearings (2) (right and left) to driven gear by using special tools.

Special tool

(A) : 09945-16070

1. Plate

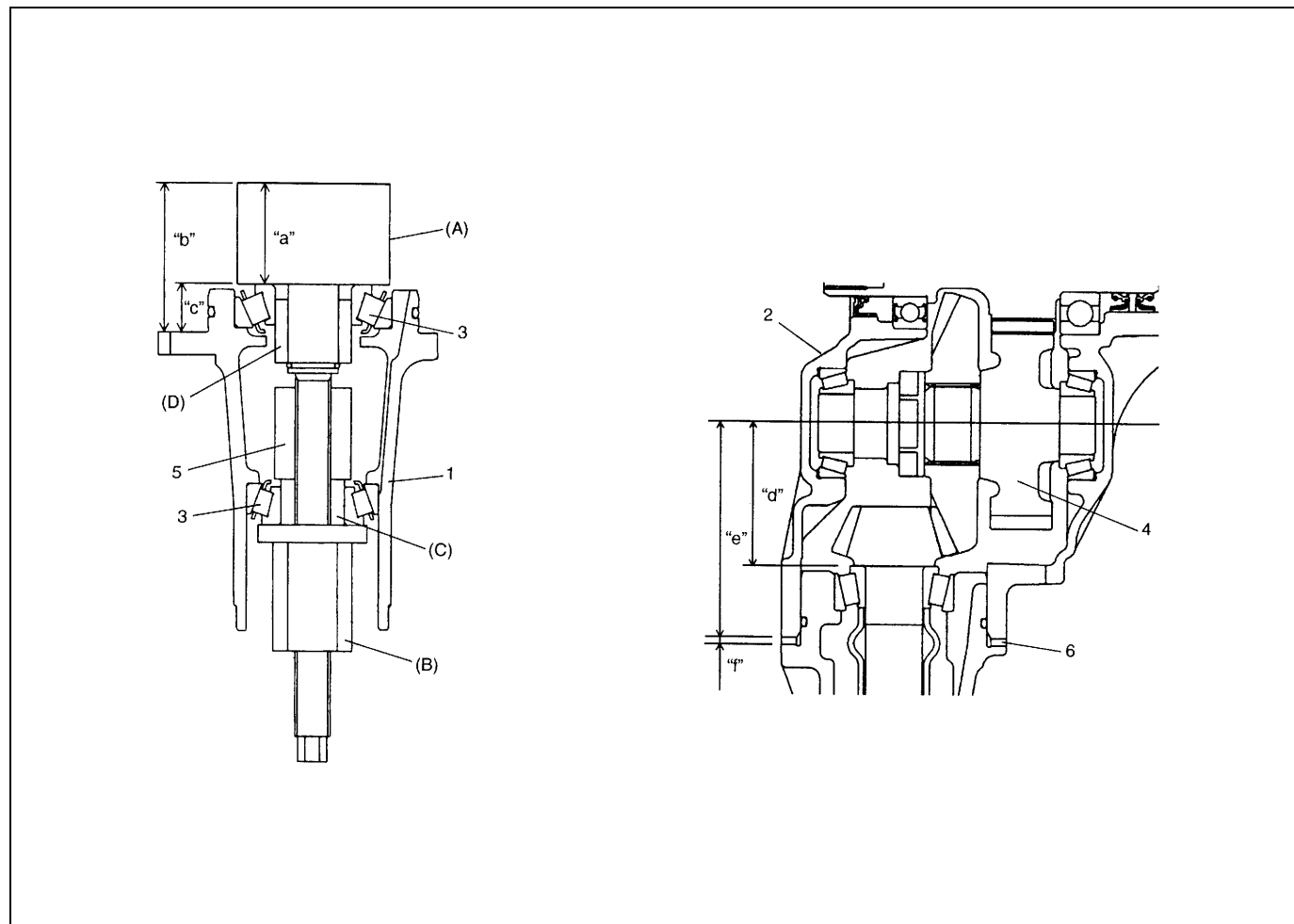
Bevel gear shim**ADJUSTMENT**

- 1) Install driven gear bearing outer races, take measurement of distance "a" between end faces of driven gear bearing outer races.
- 2) Measure depth "b" and "c" from mating face of right (left) case to face processed for installation of driven gear bearing.
- 3) Calculate shim thickness to be inserted.
Shim thickness = $\{ "b" + "c" - "a" + 0.1 \text{ mm (0.004 in.)} \} / 2$
- 4) Select shim(s) closest to calculated value.

Available shim thickness

: 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 0.95, 1.00 and 1.05 mm (0.024, 0.026, 0.028, 0.030, 0.031, 0.033, 0.035, 0.037, 0.040, and 0.041 in.)

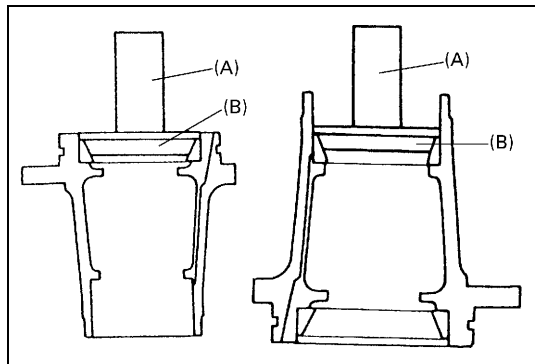
1. Right case
2. Left case

Transfer output retainer assembly**ASSEMBLY AND ADJUSTMENT**

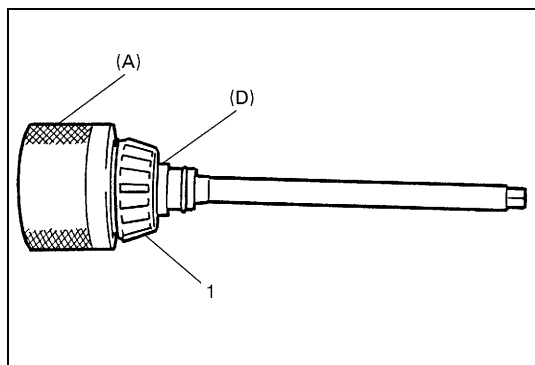
"a": Pinion dummy (special tool) height 40 mm (1.575 in.)	1. Transfer output retainer
"b": Height from retainer installation face to pinion dummy top face	2. Left case
"c": Distance from retainer installation face to end face of bearing race ("b" – "a")	3. Pinion shaft bearing
"d": Pinion shaft mounting distance 61.5 mm (2.421 in.)	4. Reduction driven gear
"e": Distance from end face of left case to axis of reduction driven gear 93.4 mm (3.677 in.)	5. Spacer Length : 82 mm – 84 mm (3.228 – 3.307 in.) Inside diameter : 14 mm (0.551 in.) Outside diameter : 30 mm – 35 mm (1.181 – 1.378 in.)
"f": Necessary shim thickness	6. Shim

Special tool**(A) : 09922-76140****(B) : 09922-76150****(C) : 09922-76340****(D) : 09922-76430**

To engage bevel pinion and gear correctly, it is prrerequired to install bevel pinion to transfer output retainer properly by using adjusting shim (bevel pinion shim) as selected below

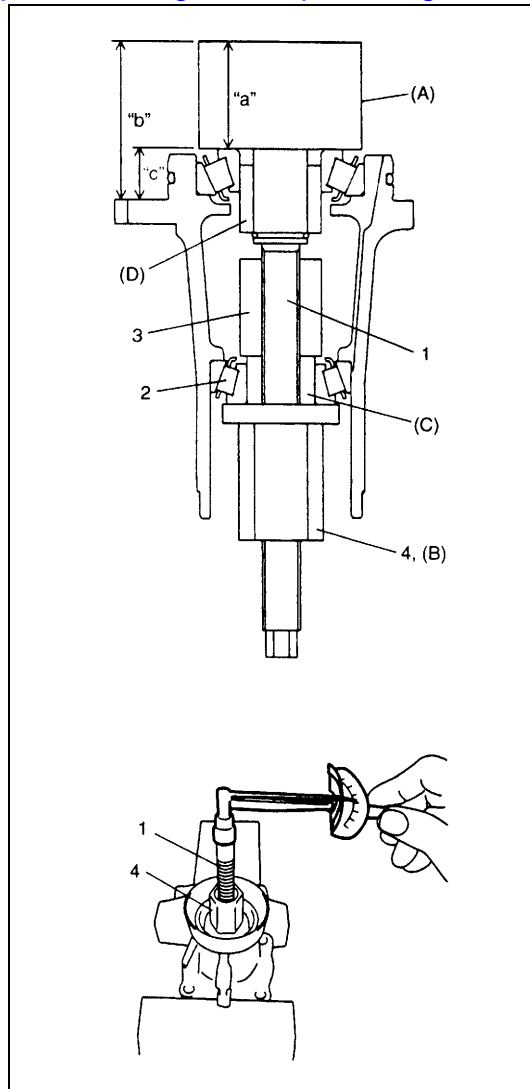


- 1) Press-fit pinion shaft bearing outer races (front and rear) by using special tools.

Special tool**(A) : 09913-75821****(B) : 09924-84510-005**

- 2) Install pinion shaft bearing (1) (front side) to bevel pinion dummy with front collar (special tools).

Special tool**(A) : 09922-76140****(D) : 09922-76430**

**NOTE:**

This installation requires no spacer or oil seal.

- 3) Install bevel pinion dummy (1), spacer (3), pinion shaft bearing (2) (rear side) and special tool (C) by using special tool (B) to transfer output retainer.

Special tool

(A) : 09922-76140

(B) : 09922-76150

(C) : 09922-76340

(D) : 09922-76430

- 4) Tighten bevel pinion nut (special tool) (4) so that specified bearing preload is obtained.

NOTE:

Before taking measurement, check for rotation by hand more than 15 revolutions.

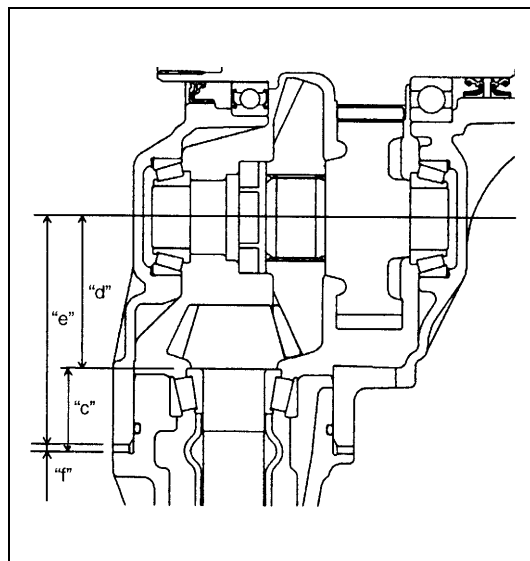
Pinion shaft bearing preload

: 0.5 – 1.3 N·m (5.0 – 13.0 kg·cm, 0.35 – 0.90 lb·ft)

- 5) Measure height "b" in figure by using vernier caliper. Calculate "c" by using measured value.

$$\text{Distance "c"} = \text{Height "b"} - \text{Height "a"} - 40 \text{ mm (1.575 in.)}$$

"a": Pinion dummy height
"b": Height from retainer installation face to pinion dummy top face
"c": Distance from retainer installation face to end face of bearing race



- 6) Obtain adjusting shim thickness by using calculated value in following equation.

$$\text{Necessary shim thickness "f"} = \text{Distance "c"} - \text{Distance "e"} + \text{Distance "d"}$$

93.4 mm (3.677 in.)
61.5 mm (2.421 in.)

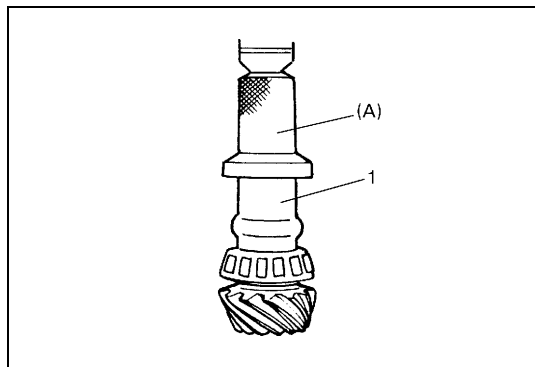
"c": Distance from retainer installation face to end face of bearing race
"d": Pinion shaft mounting distance 61.5 mm (2.421 in.)
"e": Distance from end face of left case to axis of reduction driven gear 93.4 mm (3.677 in.)
"f": Necessary shim thickness

- 7) Select adjusting shim closest to calculated value from among the following available sizes.

Available shims thickness

: 0.30, 2.00, 2.03, 2.06, 2.09, 2.12, 2.15, 2.18, 2.21, 2.24 and 2.27 mm (0.012, 0.079, 0.080, 0.081, 0.082, 0.083, 0.085, 0.086, 0.087, 0.088 and 0.089 in.)

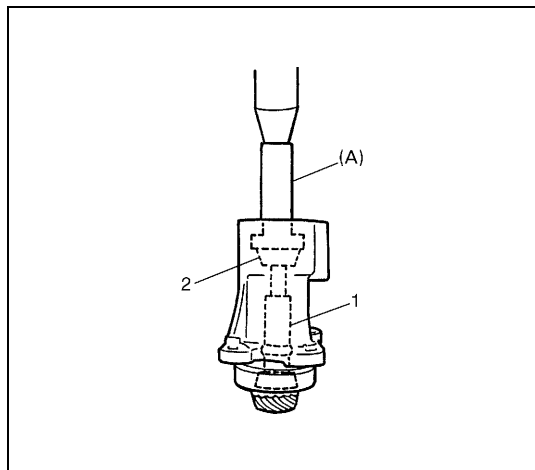
- 8) Disassemble bevel pinion dummy and special tools.



- 9) Press-fit pinion shaft bearing (front side) by using special tool, hydraulic press and pinion shaft spacer (1) removed in procedure "Unit Disassembly Transfer Output Retainer Assembly" in this section.

Special tool

(A) : 09913-75810



- 10) Install bevel pinion shaft with new pinion shaft spacer (1) to transfer output retainer.

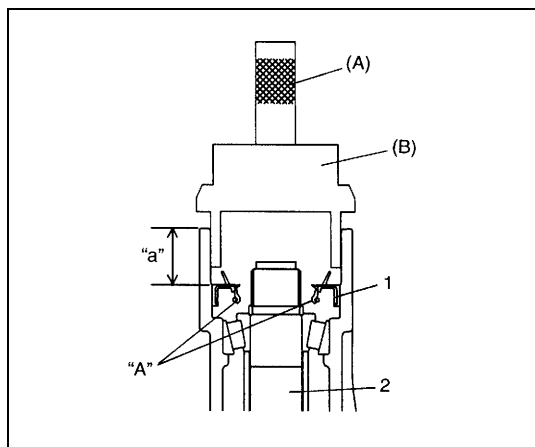
CAUTION:

Press-fit bearing to such an extent that spacer is not compressed. Excessive compression may cause a failure in bearing preload adjustment.

- 11) Press-fit pinion shaft bearing (rear side) (2) by using special tool and hydraulic press.

Special tool

(A) : 09913-75810



- 12) Drive in new oil seal (1) by using special tools and apply grease to oil seal lip.

Special tool

(A) : 09924-74510

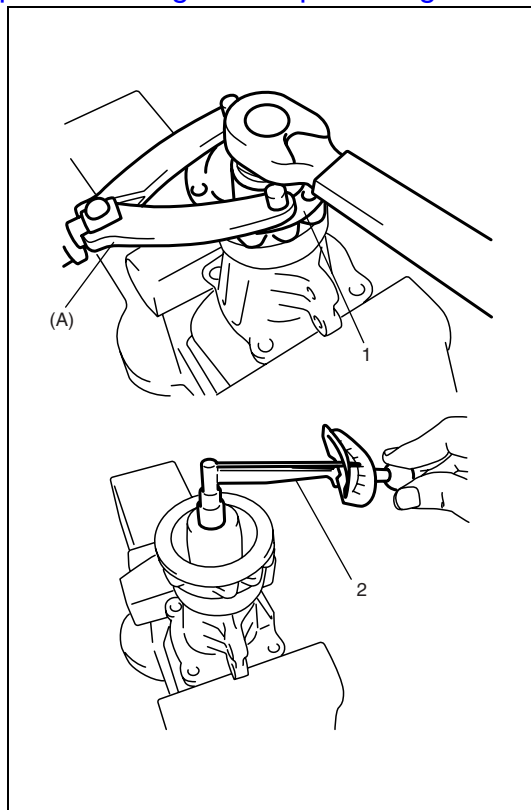
(B) : 09926-27610

"A" : Grease 99000-25010

Transfer bevel pinion shaft oil seal installing depth

"a" : 27.0 – 27.5 mm (1.063 – 1.083 in.)

2. Bevel pinion shaft



- 13) Install flange (1) and tighten flange nut gradually so as rotational torque of bevel pinion shaft to be in specified value.

NOTE:

- If rotational torque of bevel pinion shaft exceeds specification given below, replace pinion shaft spacer and tighten flange nut.
- Before taking measurement of rotational torque, rotate pinion shaft over ten rounds in advance.
- For measuring bevel pinion shaft rotational torque, turning bevel pinion at about 50 rpm is required.

Special tool

(A) : 09930-40113

Tightening torque

Transfer output flange nut (reference)

: 100 – 300 N·m (10.0 – 30.0 kg-m, 72.5 – 217.0 lb-ft)

Rotational torque for bevel pinion shaft (Bearing preload)

: 0.5 – 1.3 N·m (5.0 – 13.0 kg-cm, 0.35 – 0.90 lb-ft)

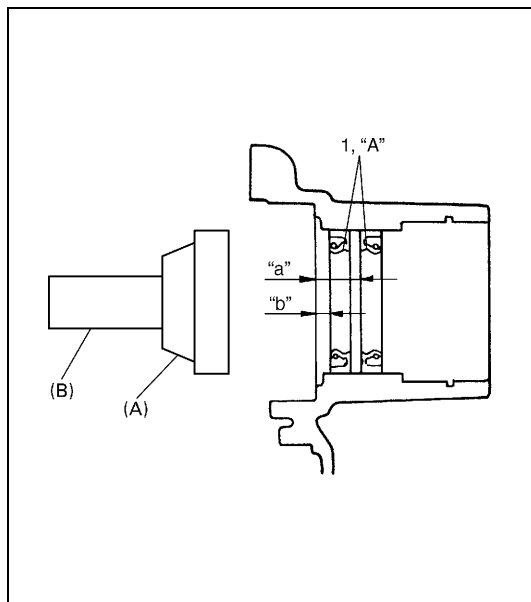
2. Torque wrench

- 14) Caulk flange nut.

Right case

ASSEMBLY

- 1) Press-fit intermediate shaft right bearing to intermediate shaft.



CAUTION:

Use care the installation direction and depth of oil seals for correct installation. Failure to install them may cause oil leakage.

- 2) Install new reduction drive gear oil seals (1) to case by using special tool and apply grease to oil seal lips.

Special tool

(A) : 09924-84510-005

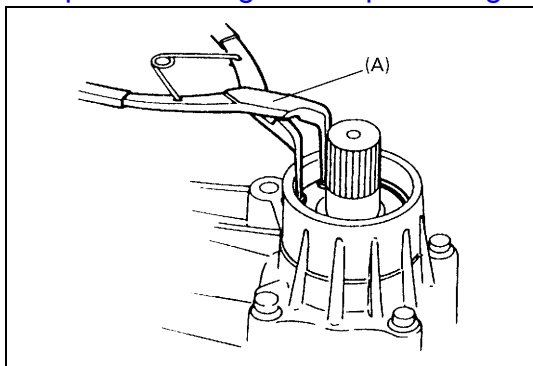
(B) : 09913-75821

“A” : Grease 99000-25010

Transfer reduction drive gear oil seal installing depth

“a” : 16.0 – 16.5 mm (0.630 – 0.650 in.)

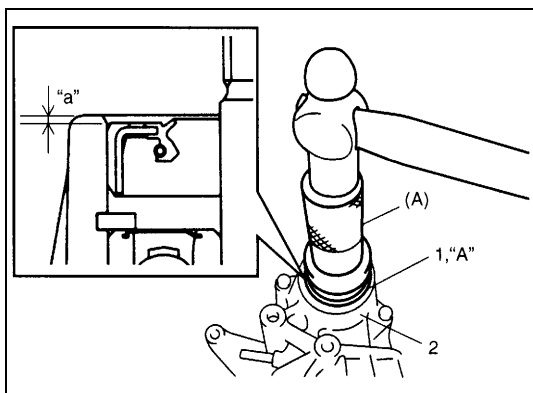
“b” : 4.0 – 4.5 mm (0.157 – 0.177 in.)



- 3) Install intermediate shaft to right case, and install snap ring.

Special tool

(A) : 09952-76011



- 4) Install new right case oil seal (1) to right case (2).

Special tool

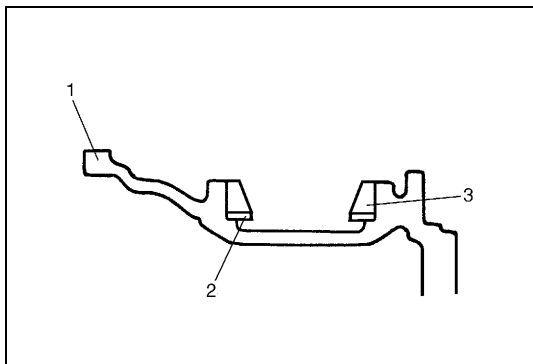
(A) : 09925-15410

Transfer right case oil seal installing depth

"a" : 1.0 – 1.5 mm (0.039 – 0.059 in.)

- 5) Fill inside of oil seal with about 3 g (0.11 oz) grease, and apply grease to oil seal lip.

"A" : Grease 99000-25010



- 6) Install bevel gear shim(s) (2) selected in item "Bevel Gear Shim Adjustment" and driven gear bearing outer race (3) to right case (1).

Left case

ASSEMBLY

- 1) Install the bevel gear shim(s) selected in item "Bevel Gear Shim Adjustment" and driven gear bearing outer race to left case.

- 2) Install new left case oil seal (1) to left case (2) by using special tool.

Special tool

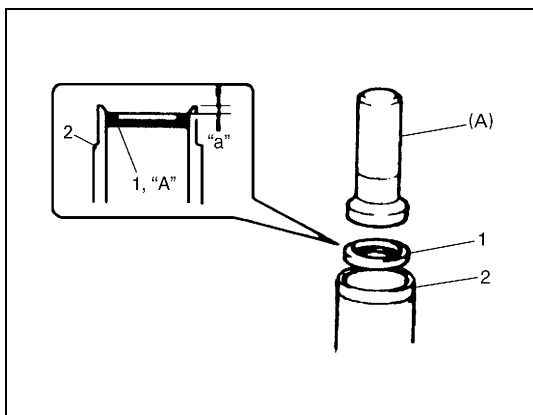
(A) : 09925-15410

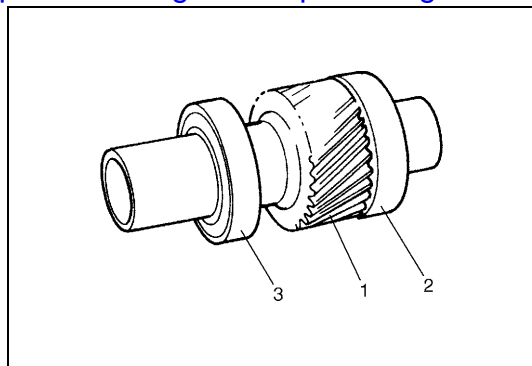
Transfer left case oil seal installing depth

"a" : 1.5 – 2.0 mm (0.059 – 0.078 in.)

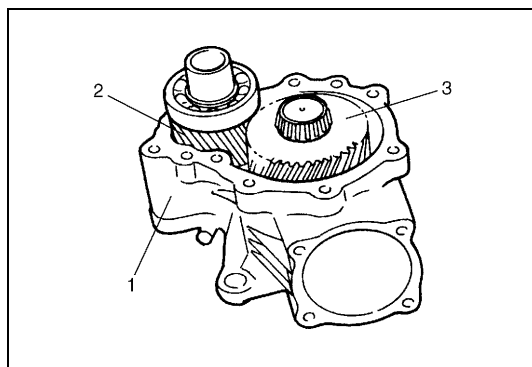
- 3) Fill inside of oil seal with about 3 g (0.11 oz) grease, and apply grease to oil seal lip.

"A" : Grease 99000-25010





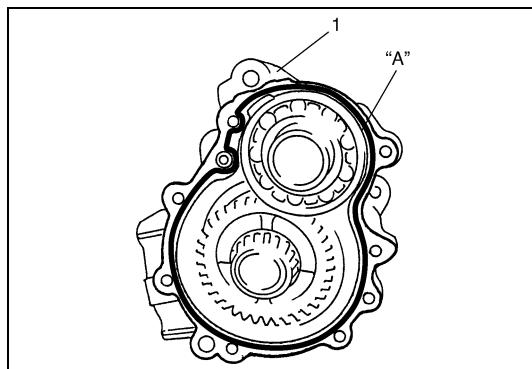
- 4) Press-fit drive gear bearings (right (2) and left (3)) to reduction drive gear (1).
Apply gear oil to ball of bearing.



- 5) Install reduction drive gear assembly (2) and reduction driven gear assembly (3) to left case (1).

Transfer assembly

ASSEMBLY



CAUTION:

Clean mating surfaces of cases with solvent completely, otherwise oil leakage might take place.

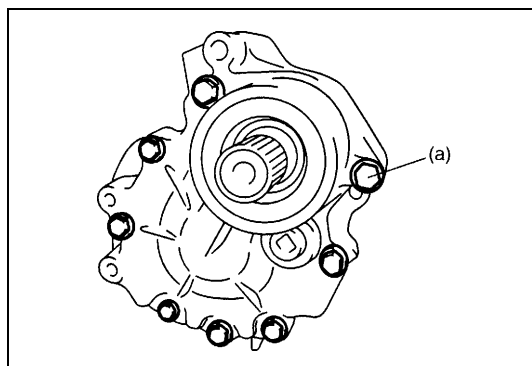
- 1) Clean mating surface of right case and left case (1), and apply sealant to left case (1) by using a nozzle as shown in figure by such amount that its section is 1.5 mm (0.059 in.) in diameter.

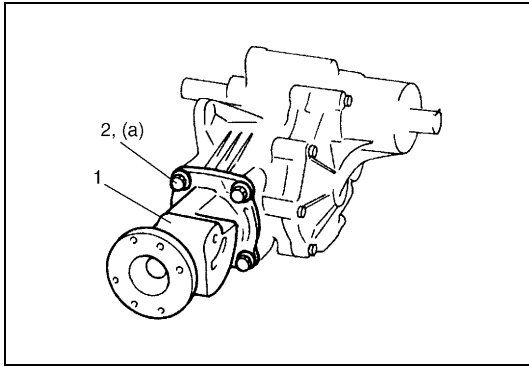
“A” : Sealant 99000-31230

- 2) Tighten transfer case bolts to specified torque.

Tightening torque

Transfer case bolts (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)





- 3) Install the bevel pinion shim(s) selected in preceding procedure ("Transfer Output Retainer Assembly, Assembly and Adjustment"), install transfer output retainer assembly (1) to transfer case and then tighten retainer bolts (2) to specified torque.

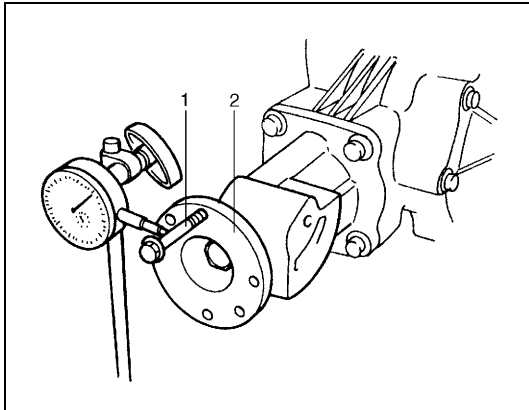
Tightening torque

Transfer output retainer bolts

(a) : 50 N·m (5.0 kg·m, 36.5 lb·ft)

Bevel gear back lash

MEASUREMENT



- 1) Install bolt to bolt hole of flange (2), set dial gauge measuring tip at right angles to bolt (1) as shown in figure. Take measurement backlash of pinion and bevel gear.

NOTE:

If backlash exceeds specification given below, replace bevel pinion shim (between transfer case and transfer output retainer) and measure backlash again.

Transfer pinion & bevel gear backlash

: 0.1 – 0.2 mm (0.0039 – 0.0078 in.)

- 2) As final step, check gear tooth contact as follows.

NOTE:

When applying red lead paste to teeth, be sure to paint tooth surfaces uniformly. The paste must not be too dry or too fluid.

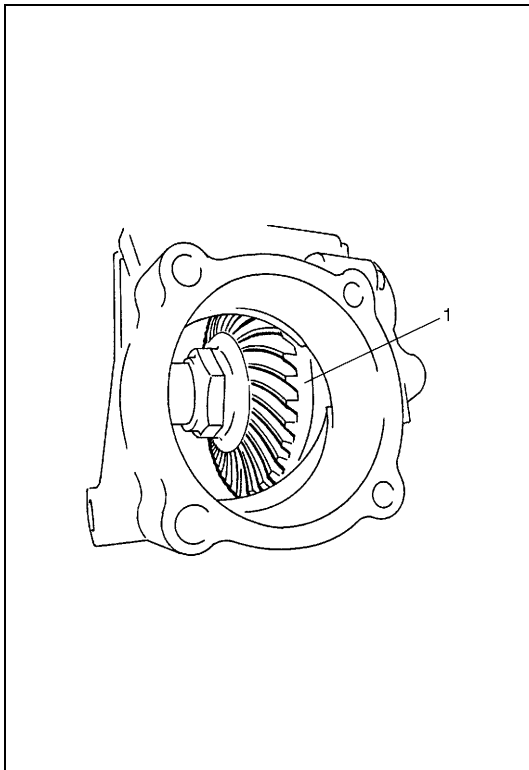
- a) After cleaning tooth surface of bevel gear (1), paint them with gear marking compound evenly by using brush or sponge etc.

NOTE:

Be careful not to turn bevel gear more than one full revolution, for it will hinder accurate check.

- b) Turn gear to bring its painted part in mesh with bevel pinion and turn it back and forth by hand to repeat their contact.
c) Bring painted part up and check contact pattern, referring to following chart.

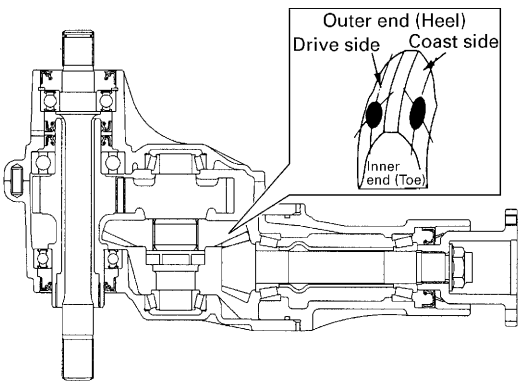

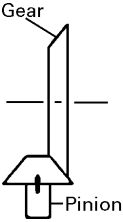

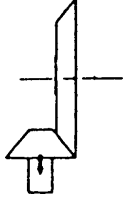
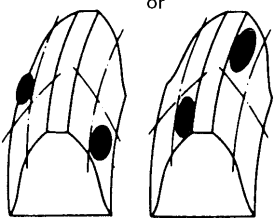
If contact pattern is not normal, readjust or replace as necessary according to instruction in chart.

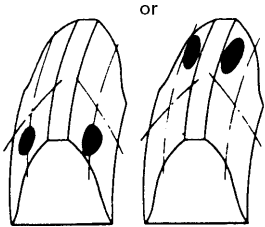
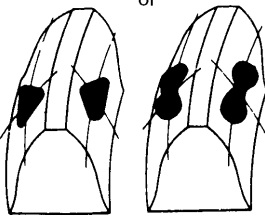


NOTE:

If bevel gear back lash and bevel pinion shims are adjusted properly, correct tooth contact should be provided.

If correct tooth contact is not provided even when they are adjusted properly, however, there may be an abnormal condition in worn tooth, transfer case or retainer. Check each component and replace as necessary.

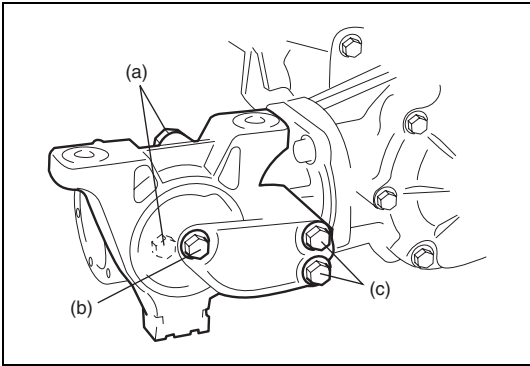
TOOTH CONTACT PATTERN	DIAGNOSIS AND REMEDY
	<p>NORMAL</p>
	<p>HIGH CONTACT Pinion is positioned too far from the center of drive bevel gear.</p> <ol style="list-style-type: none"> 1) Decrease thickness of bevel pinion shim and position pinion closer to gear center. 2) Adjust drive bevel gear backlash to specification. 
	<p>LOW CONTACT Pinion is positioned too close to the center of drive bevel gear.</p> <ol style="list-style-type: none"> 1) Increase thickness of bevel pinion shim and position pinion farther from gear center. 2) Adjust drive bevel gear backlash to specification. 
	<p>These contact patterns indicate that the "offset" of reduction driven gear is too much or too little. The remedy is to change the division of the bevel gear shim(s).</p>

TOOTH CONTACT PATTERN	DIAGNOSIS AND REMEDY
	These contact patterns, located on toe or heel on both drive and coast sides, mean that 1) both pinion and gear are defective, 2) retainer is not true, or 3) gear is not properly seated on transfer case. The remedy is to replace the defective member.
	Irregular patterns: If the pattern is not oval, it means that bevel gear is defective. High or low spots on tooth surfaces or on the seat of bevel gear are the cause of irregular patterns appearing on some teeth. The remedy is to replace the pinion and gear set and, if the seat is defective, so is transfer case.

Unit Installation

INSTALLATION

Install transfer assembly by reversing removal procedure and noting the following points.



- Tighten mounting bolt and mounting bracket bolts and nuts to specified torque.

Tightening torque

Transfer rear mounting bracket nuts

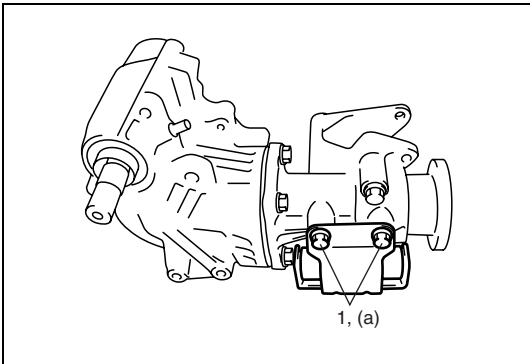
(a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

Transfer mounting bolt

(b) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

Transfer rear mounting bracket No.2 bolts

(c) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

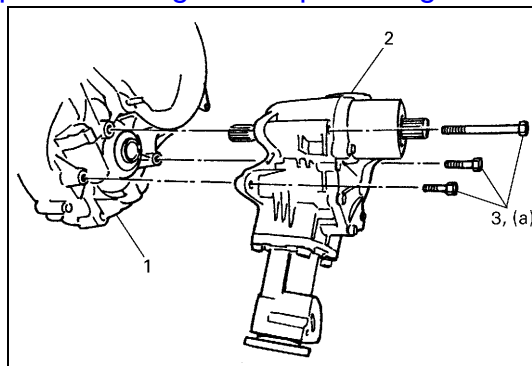


- Tighten dynamic damper bolts (1) to specified torque, if equipped.

Tightening torque

Dynamic damper bolts

(a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)



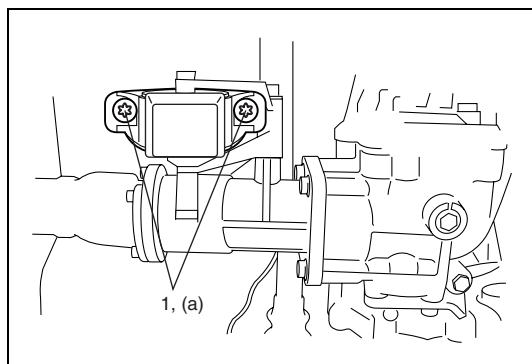
- Tighten transfer to transmission bolts (3) to specified torque.

Tightening torque

Transfer to transmission bolts

(a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

1. Transmission
2. Transfer assembly

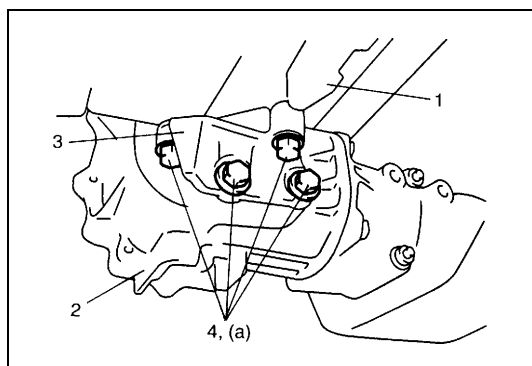


- Tighten rear mounting bracket bolts (1) to specified torque.

Tightening torque

Transfer rear mounting bracket bolts

(a) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

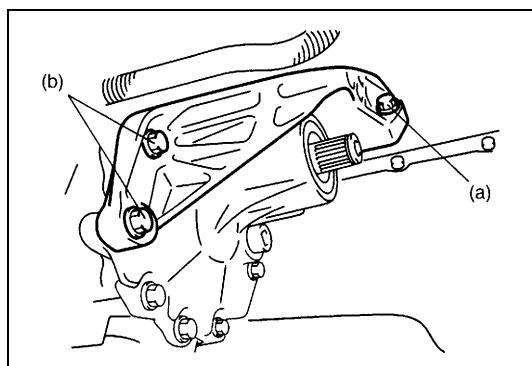


- Tighten transfer stiffener bolts (4) to specified torque.

Tightening torque

Transfer stiffener bolts (a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

1. Transmission
2. Transfer
3. Stiffener



- Tighten transfer to engine stiffener bolts to specified torque, if equipped.

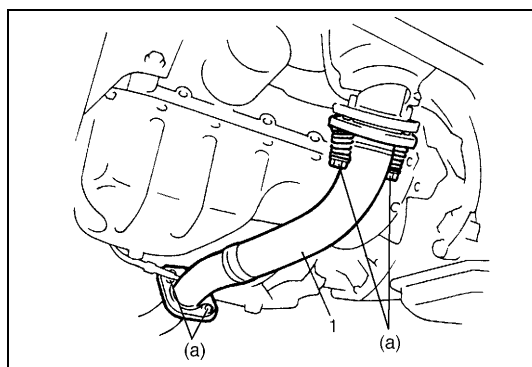
Tightening torque

Transfer to engine stiffener No.1 bolts

(a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

Transfer to engine stiffener No.2 bolts

(b) : 23 N·m (2.3 kg-m, 17.0 lb-ft)



- Tighten exhaust pipe bolts.

Tightening torque

Exhaust pipe bolts

(a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

1. Exhaust No.1 pipe

- Install right side drive shaft, referring to Section 4A of the service manual mentioned in the “Foreword” of this manual.
- Install propeller shaft and tighten propeller shaft bolts and center support bolts to specified torque (refer to Section 4B).
- Pour gear oil to transfer as specified, refer to “Oil Change” in this section.

Check oil level and leakage.

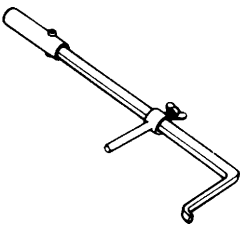
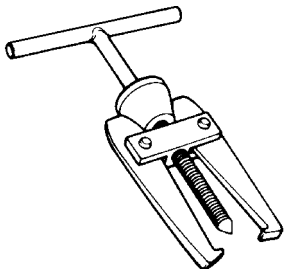
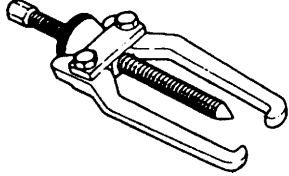
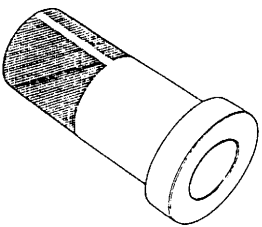
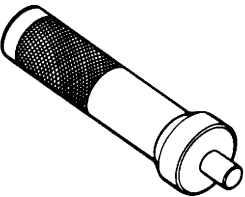
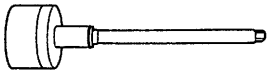
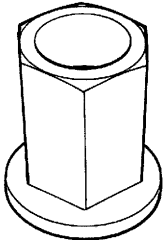
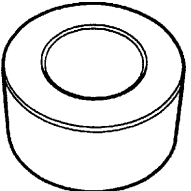
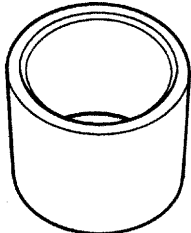
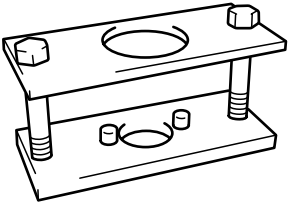
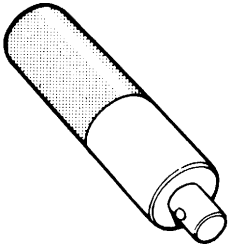
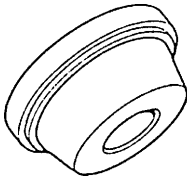
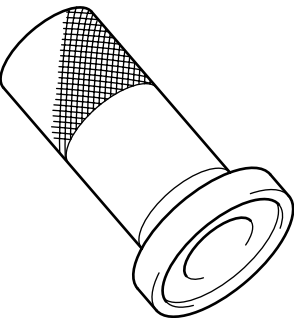
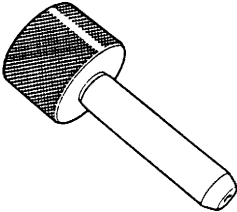
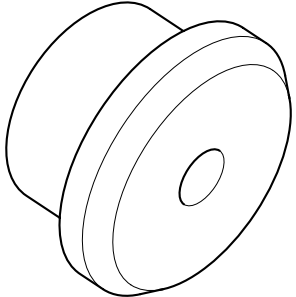
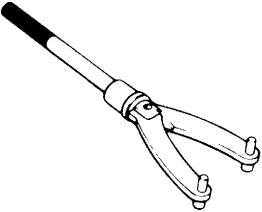
Tightening Torque Specification

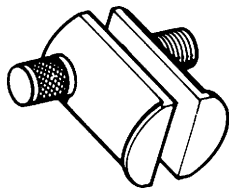
Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Transfer oil level/filler and drain plugs	21	2.1	15.5
Transfer bevel gear nut	150	15.0	108.5
Transfer case bolts	23	2.3	17.0
Transfer output retainer bolts	50	5.0	36.5
Transfer to transmission bolts	50	5.0	36.5
Transfer rear mounting bracket bolts	55	5.5	40.0
Transfer rear mounting bracket nuts	50	5.0	36.5
Transfer mounting bolt	55	5.5	40.0
Transfer rear mounting bracket No.2 bolts	55	5.5	40.0
Transfer stiffener bolts	50	5.0	36.5
Exhaust pipe bolts	50	5.0	36.5
Dynamic damper bolts (if equipped)	50	5.0	36.5
Transfer output flange nut (reference)	100 – 300	10.0 – 30.0	72.5 – 217.0
Transfer to engine stiffener No.1 bolts (if equipped)	50	5.0	36.5
Transfer to engine stiffener No.2 bolts (if equipped)	23	2.3	17.0

Required Service Material

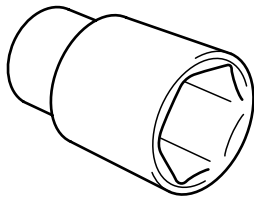
Material	Recommended SUZUKI products (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Oil seal lips
Sealant	SUZUKI BOND NO. 1216B (99000-31230)	• Oil drain plug • Oil level plug • Mating surface of transfer case

Special Tool

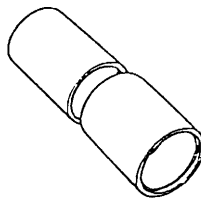
			
09913-50121 Oil seal remover	09913-60910 Bearing/Gear puller	09913-65135 Bearing puller	09913-75810 Bearing installer
			
09913-75821 Bearing installer attachment	09922-76140 Bevel pinion shaft	09922-76150 Bevel pinion nut	09922-76340 Rear collar
			
09922-76430 Front collar	09924-57610 Gear holder	09924-74510 Installer handle	09924-84510-005 Bearing installer attachment
			
09925-15410 Oil seal installer	09925-58210 Oil seal installer	09926-27610 Oil seal installer	09930-40113 Rotor holder



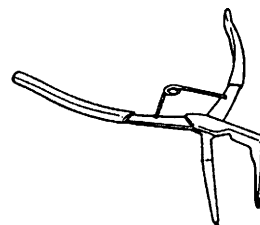
09941-54911
Bearing outer race
remover



09941-58020
Socket wrench (40 mm)



09945-16070
Retainer ring installer set



09952-76011
Snap ring pliers
(closing type)

SECTION 7F

REAR DIFFERENTIAL

7F

CONTENTS

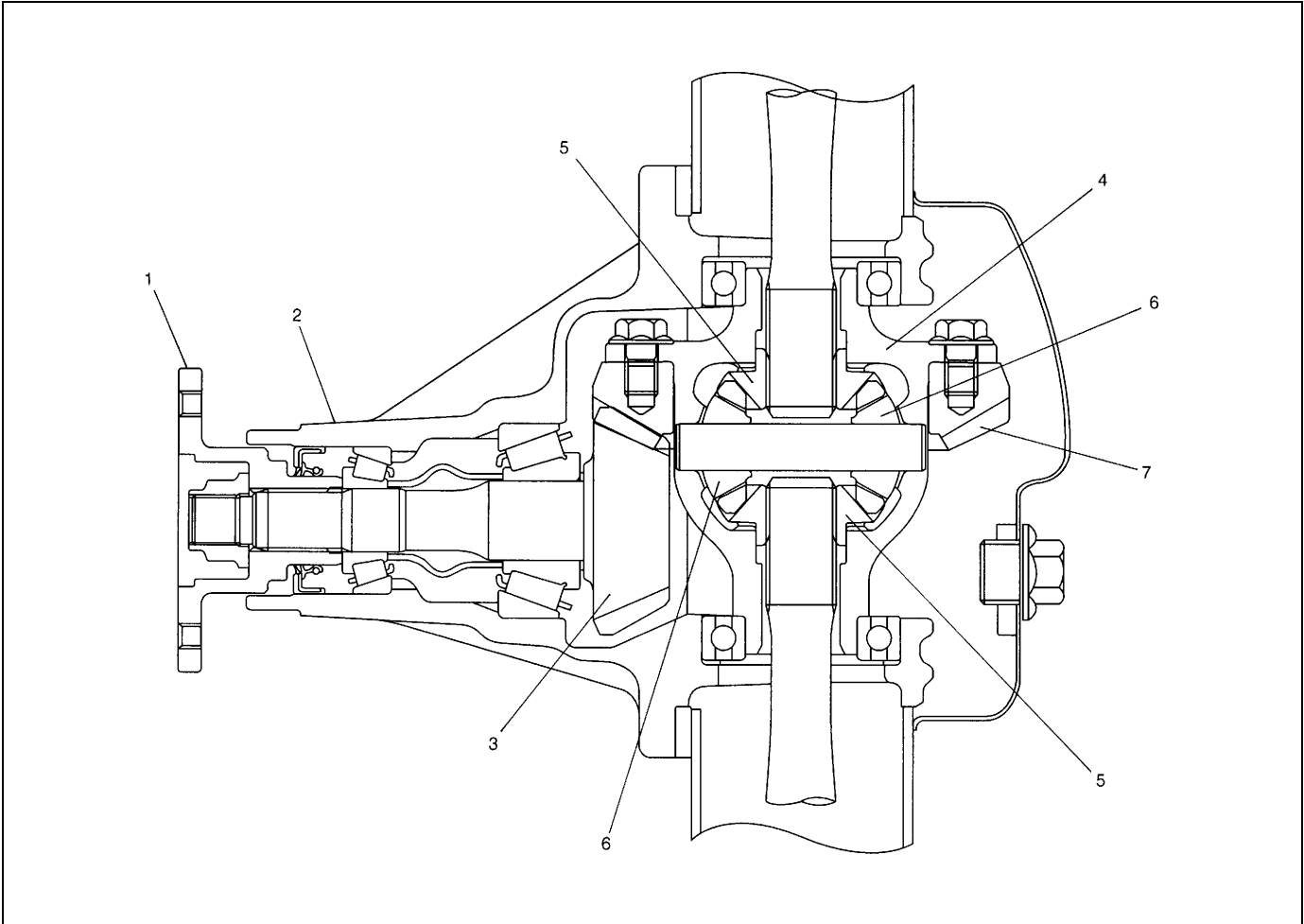
General Description	7F-2	Unit Repair Overhaul	7F-7
Diagnosis	7F-3	Tightening Torque Specification	7F-20
On-Vehicle Service.....	7F-4	Required Service Material	7F-20
Oil Change	7F-4	Special Tool.....	7F-21
Differential Unit.....	7F-5		

General Description

The differential assembly uses a hypoid drive bevel pinion and gear.

The differential assembly is decisive in that the drive power is concentrated there. Therefore, use of genuine parts and specified torque is compulsory. Further, because of sliding tooth meshing with high pressure between drive bevel pinion and gear, it is mandatory to lubricate them by hypoid gear oil.

The hypoid gears have an advantage of preventing gear noise, at the same time, they require accurate adjustment of tooth contact and backlash.



1. Companion flange	4. Differential case	7. Drive bevel gear (hypoid gear)
2. Differential carrier	5. Differential side gear	
3. Drive bevel pinion (hypoid gear)	6. Differential pinion	

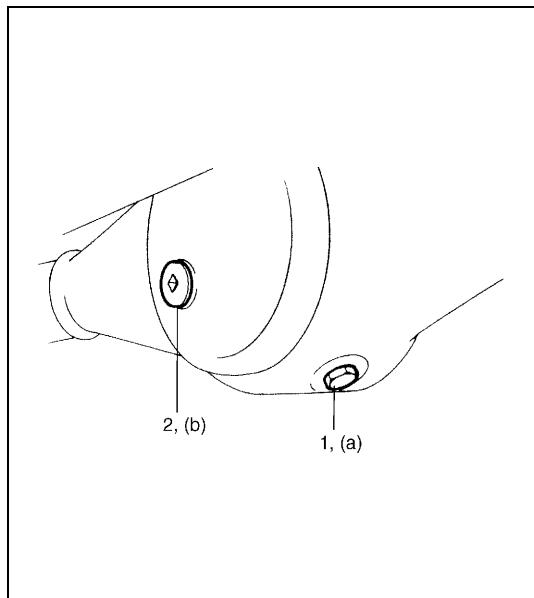
Diagnosis

Condition	Possible Cause	Correction
Gear noise	Deteriorated or water mixed lubricant	Repair and replenish.
	Inadequate or insufficient lubricant	Repair and replenish.
	Maladjusted backlash between drive bevel pinion and gear	Adjust and prescribed.
	Improper tooth contact in the mesh between drive bevel pinion and gear	Adjust or replace.
	Loose drive bevel gear securing bolts	Replace or retighten.
	Damaged side gear(s) or side pinion(s)	Replace.
Bearing noise	(Constant noise) Deteriorated or water mixed lubricant	Repair or replenish.
	(Constant noise) Inadequate or insufficient lubricant	Repair or replenish.
	(Noise while coasting) Damaged bearing(s) of drive bevel pinion	Replace.
	(Noise while turning) Damaged differential side bearing(s)	Replace.
Oil leakage	Clogged breather plug	Clean.
	Worn or damaged oil seal	Replace.
	Excessive oil	Adjust oil level.

On-Vehicle Service

Oil Change

- 1) Before oil change or inspection, be sure to stop engine and set vehicle horizontally.
- 2) Check oil level and existence of leakage. For checking oil level roughly, lower point of level hole can be assumed to be standard point of level. If leakage is found, correct its cause.



- 3) Remove level/filler plug (2) and drain plug (1), then drain old oil.
- 4) Install new gasket to drain plug and tighten drain plug to specified torque.

Tightening torque

Rear differential oil drain plug

(a) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

- 5) Pour proper amount of new hypoid gear oil as specified below (roughly up to level hole).
- 6) Install new gasket to level/filler plug and tighten level/filler plug to specified torque.

Tightening torque

Rear differential oil level/filler plug

(b) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

NOTE:

- It is highly recommended to use SAE 80W-90 viscosity.
- Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

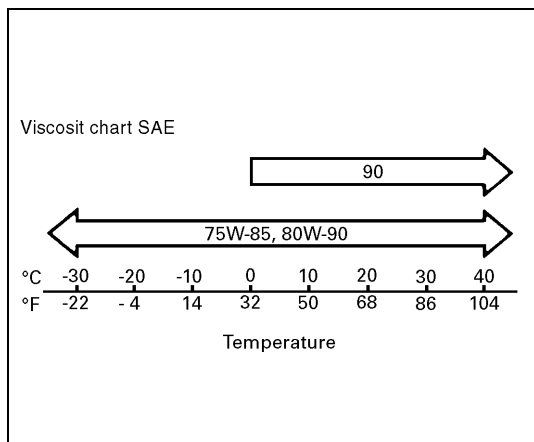
Differential oil

Hypoid gear oil API GL-5

For oil viscosity, refer to the chart.

Differential oil capacity

1.0 liters (2.1/1.8 US/Imp. pt)

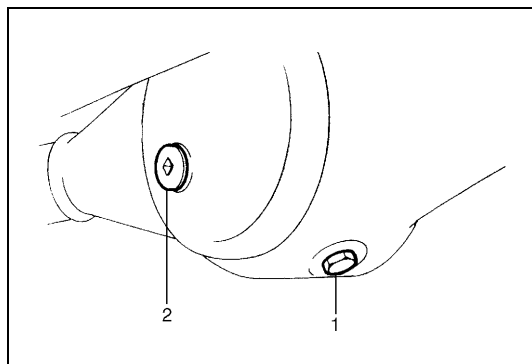


Differential Unit

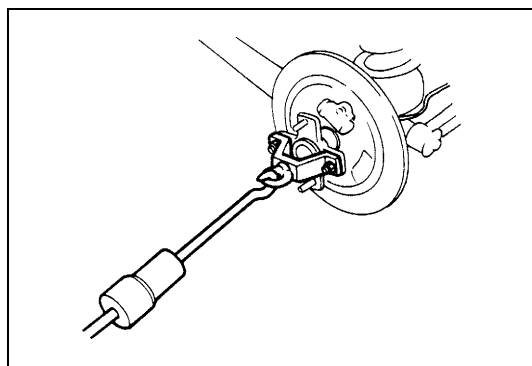
DISMOUNTING

- 1) Hoist vehicle and remove wheels.
- 2) Drain oil from rear differential. (Refer to "Oil Change" in this section.)

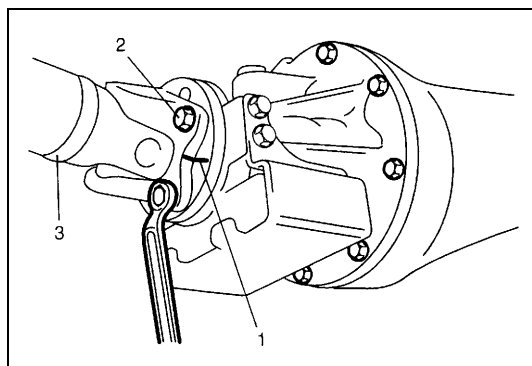
1. Drain plug
2. Level/filler plug



- 3) Remove brake drum and disconnect parking brake cable from brake back plate.
- 4) Remove axle shafts, referring to "Rear Axle Shaft and Wheel Bearing Removal" in Section 3E.

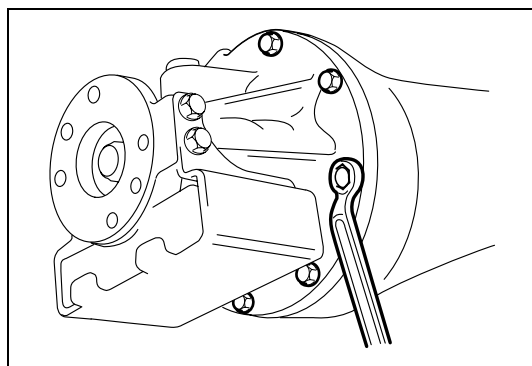


- 5) Before removing propeller shaft, give match marks (1) on companion flange and propeller shaft as shown.
- 6) Remove 4 propeller shaft flange bolts (2) from rear differential, and then pull out propeller shaft (3) from rear differential.



- 7) Support rear differential using jack.

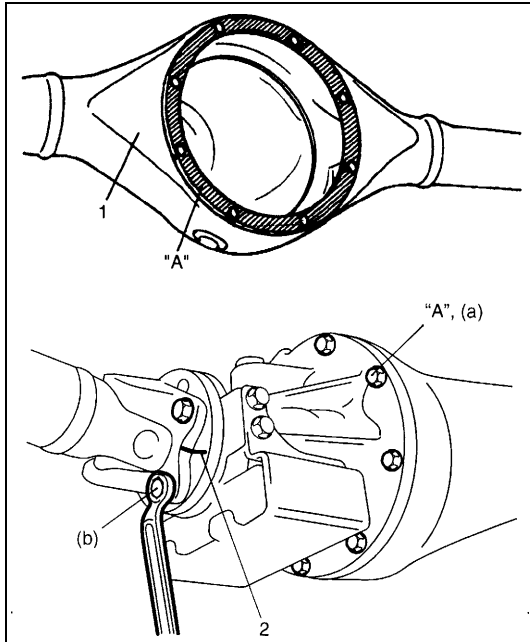
- 8) Remove differential carrier bolts.



- 9) Lower jack with rear differential assembly.

REMountING

Reverse removal procedure for installation, noting the following.

**Rear differential**

- Clean mating surfaces of axle housing (1) and differential carrier and apply sealant to housing side.

"A" : Sealant 99000-31110

- Apply sealant to carrier bolts and tighten carrier bolts to specified torque.

"A" : Sealant 99000-31110

Tightening torque**Differential carrier bolts**

(a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

- Install propeller shaft to joint flange aligning match marks (2) and tighten propeller shaft bolts to specified torque.

Tightening torque**Propeller shaft bolts**

(b) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

Rear axle shaft

For installation of rear axle shaft, refer to "Rear Axle Shaft and Wheel Bearing Installation" in Section 3E.

Rear brake drum

For installation of rear brake drum, refer to "Brake Drum Installation" in Section 5C.

Differential gear oil

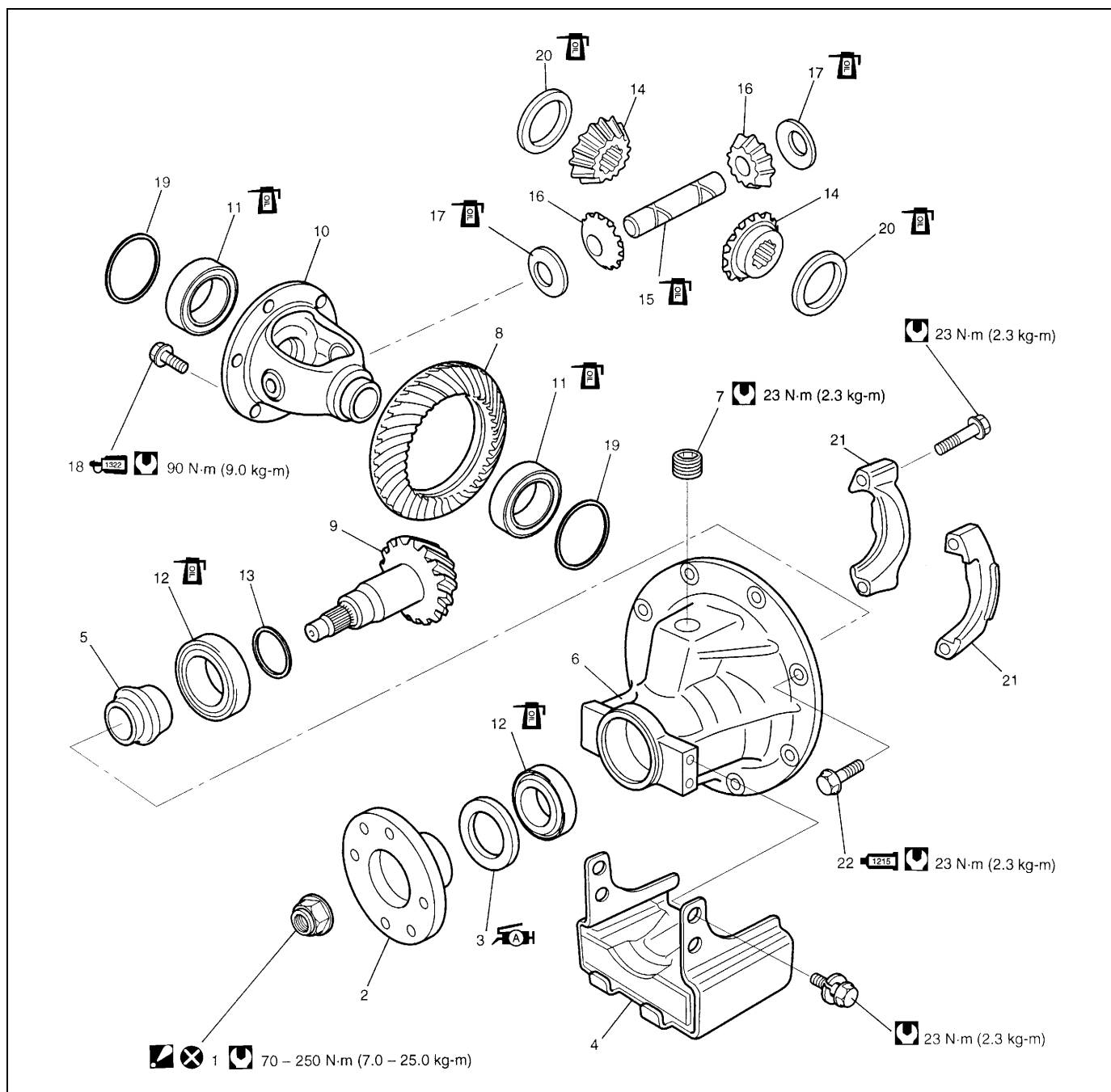
Refill differential housing with new specified oil. Refer to "Oil Change" in this section for refill.

Brake circuit air purging

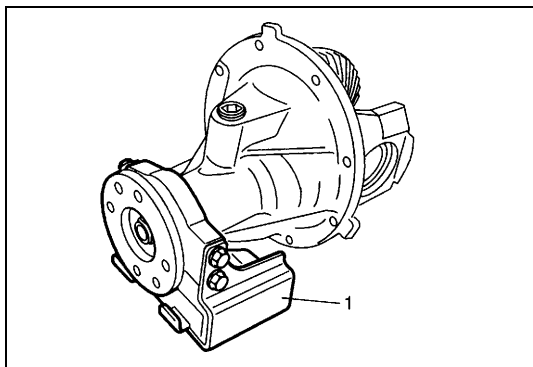
Make sure to purge air out of brake circuit. Refer to "Bleeding Brakes" in Section 5 of the Service Manual mentioned in the FOREWORD of this manual.

Then check that joint seam of pipe is free from oil leak.

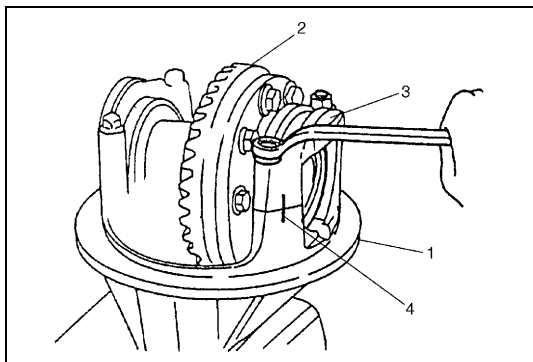
Unit Repair Overhaul



1. Companion flange nut : After tightening nut so as drive bevel pinion bearing preload to be in specified value, caulk nut securely.	10. Differential case	19. Side bearing shim
2. Companion flange	11. Differential side bearing	20. Differential gear washer
3. Oil seal : Apply grease 99000-25010 to oil seal lip.	12. Drive bevel pinion bearing	21. Differential side bearing cap
4. Dynamic damper	13. Drive bevel pinion shim	22. Differential carrier bolt : Apply sealant 99000-31110 to thread part.
5. Spacer	14. Differential gear	Do not reuse.
6. Differential carrier	15. Differential pinion shaft	Tightening torque
7. Plug	16. Differential pinion	Apply differential oil.
8. Drive bevel gear (hypoid gear)	17. Differential pinion washer	
9. Drive bevel pinion (hypoid gear)	18. Drive bevel gear bolt : Apply thread lock cement 99000-32110 to thread part of bolt.	

DISASSEMBLY

- 1) Remove dynamic damper (1).

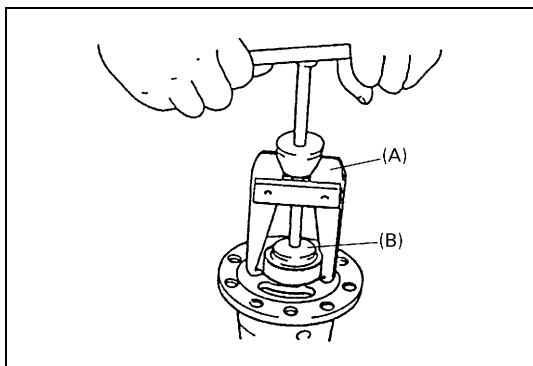


- 2) Put match marks (4) on differential side bearing caps (3) and differential carrier (1).
- 3) Take off differential side bearing caps by removing their bolts and remove differential gear assembly (2).

NOTE:

Check number of shims and thickness of each shim in advance.

- 4) With aluminum plates placed on vise first, grip differential case with it and remove drive bevel gear by removing its bolts.

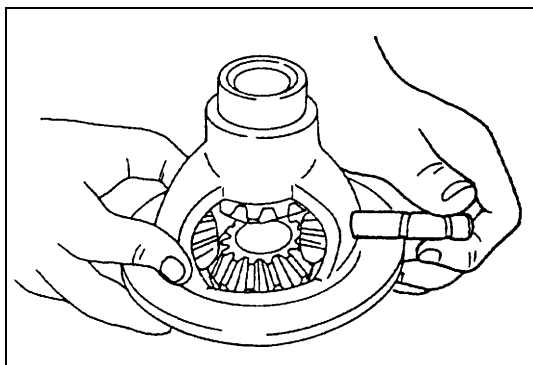


- 5) Using special tools, pull out differential side bearings.

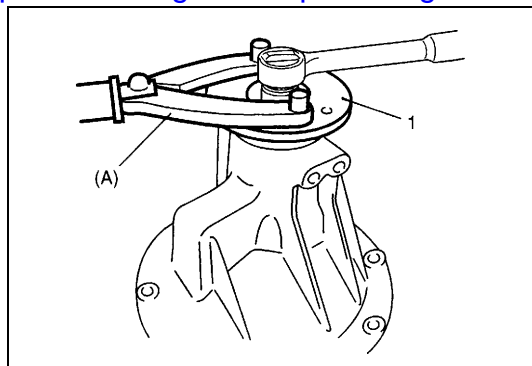
Special tool

(A) : 09913-60910

(B) : 09925-88210



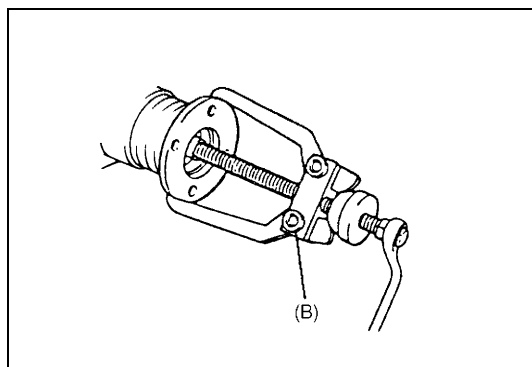
- 6) Remove differential pinion shaft.
- 7) Remove differential gears, pinions and washers.



- 8) Uncaulk companion flange nut.
- 9) Hold companion flange (1) with special tool and then remove companion flange nut.

Special tool

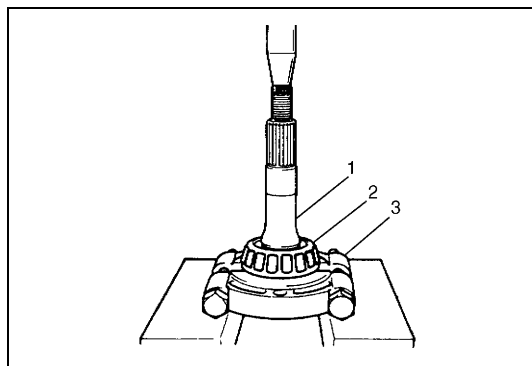
(A) : 09930-40113



- 10) Remove companion flange from pinion.
Use special tool if it is hard to remove.

Special tool

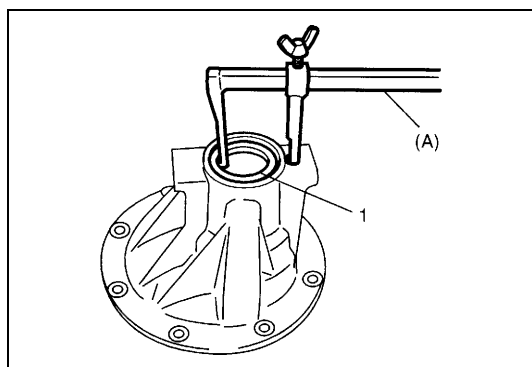
(B) : 09913-65135



- 11) Remove drive bevel pinion (1) with rear bearing and spacer from carrier.

- 12) Remove drive bevel pinion rear bearing (2) by using bearing puller (3) and hydraulic press.

1. Drive bevel pinion

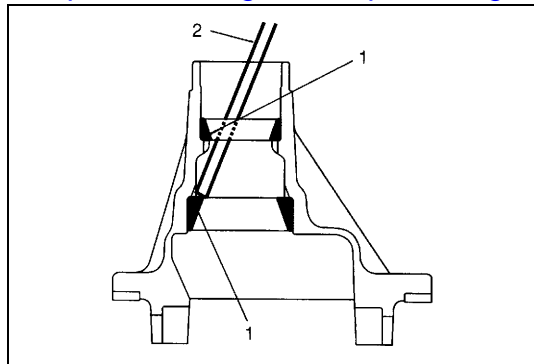


- 13) Remove oil seal (1) by using special tool.

Special tool

(A) : 09913-50121

- 14) Remove drive bevel pinion front bearing from differential carrier.



- 15) Drive out drive bevel pinion bearing outer races (1) by using metallic stick (2).

INSPECTION

- Check companion flange for wear or damage.
- Check bearings for wear or discoloration.
- Check differential carrier for cracks.
- Check drive bevel pinion and bevel gear for wear or cracks.
- Check differential gears, pinion gears and pinion shaft for wear or damage.
- Check differential gear spline for wear or damage.

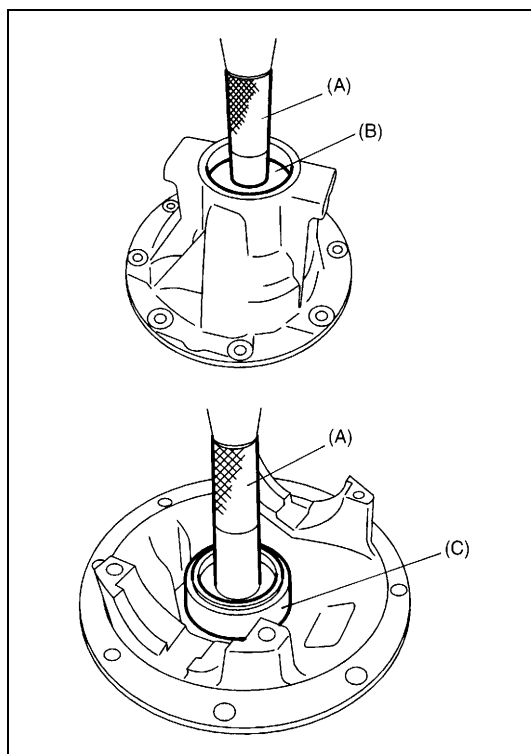
ADJUSTMENT AND ASSEMBLY

Judging from faulty conditions noted before disassembly and what is found through visual check of bearing and gear tooth etc. after disassembly, prepare replacing parts and proceed to reassembly according to procedures as described below. Make sure that all parts are clean.

CAUTION:

- Drive bevel gear and pinion must be replaced as a set when either replacement becomes necessary.
- When replacing taper roller bearing, replace as inner race & outer race assembly.

Drive bevel pinion bearing outer race



For press-fitting drive bevel pinion bearing outer races, use special tools as shown.

CAUTION:

Perform press-fitting carefully so as not to tilt outer race.

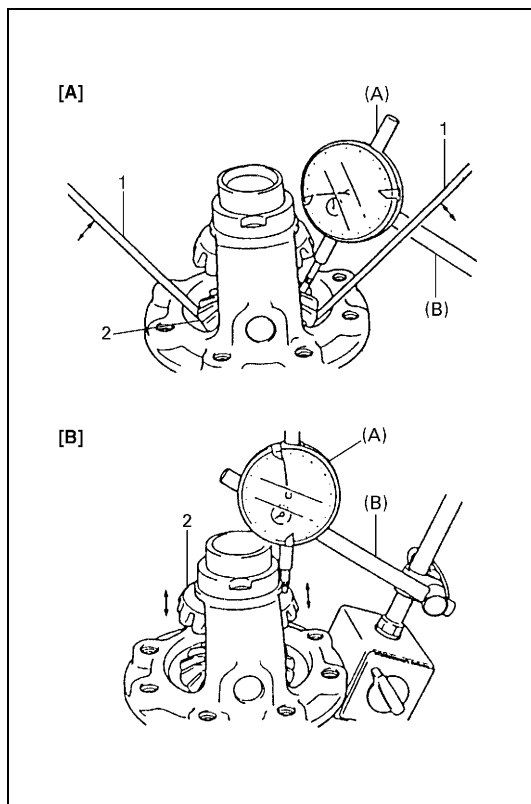
Special tool

(A) : 09924-74510

(B) : 09925-68210

(C) : 09951-16090

Differential case assembly



- 1) Assemble differential gears and measure thrust play of differential gear (2) as follows.

Special tool

(A) : 09900-20607

(B) : 09900-20701

Differential gear thrust play

0 – 0.37 mm (0 – 0.014 in.)

[A] : Right side

[B] : Left side

Right side

- Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear (2).
- Using 2 screwdrivers (1), move gear (2) up and down and read movement of dial gauge pointer.

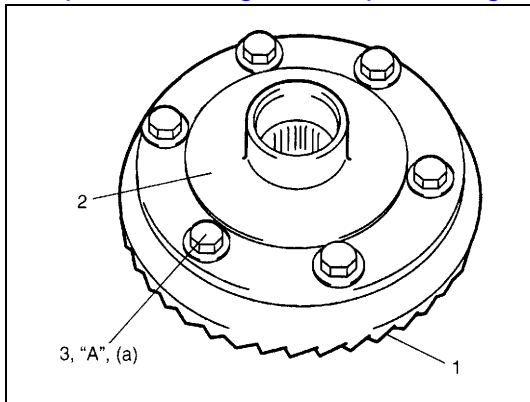
Left side

- Using similar procedure to the above, set dial gauge tip to gear shoulder.
- Move gear (2) up and down by hand and read dial gauge.

- 2) If thrust play is out of specification, select suitable differential gear washer from among following available size, install it and check again that specified gear play is obtained.

Available differential gear washer thickness

0.90, 1.00 and 1.10 mm (0.035, 0.039 and 0.043 in.)



- 3) Put drive bevel gear (1) on differential case (2) and fasten them with bolts (3) by tightening them to specified torque. Use thread lock cement for bolts (3).

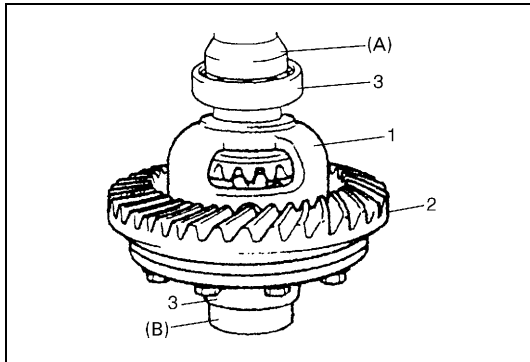
CAUTION:

Use of any other bolts than that specified is prohibited.

“A” : Thread lock cement 99000-32110

Tightening torque

Drive bevel gear bolts (a) : 90 N·m (9.0 kg-m, 65.0 lb-ft)



- 4) Press-fit differential side bearings (3) to differential case (1) by using special tools.

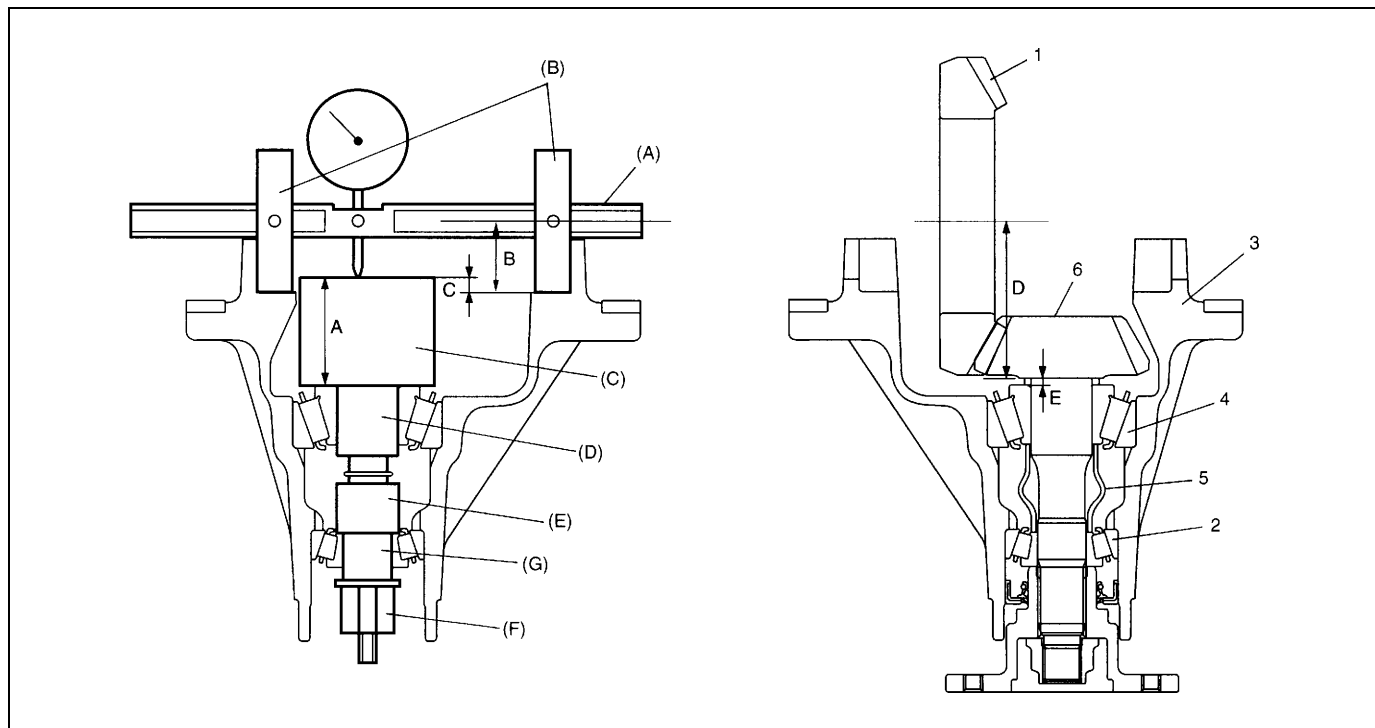
Special tool

(A) : 09951-76010

(B) : 09951-16060

2. Drive bevel gear

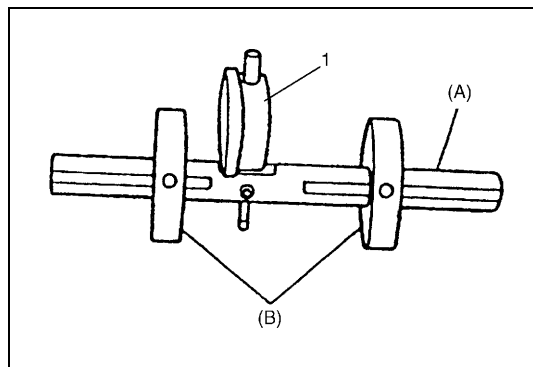
Differential carrier and drive bevel pinion



A: Dummy height of pinion form dummy 40 mm/1.757 in.	D: Drive bevel pinion mounting distance 68.00 mm/2.677 in.	3. Differential carrier
B: Radius of bearing form dummy with dummy shaft 31 mm/1.220 in.	E: Shim thickness for mounting distance adjustment (E = 3 mm (0.118 in.) - C)	4. Rear bearing
A+B: Mounting distance adjusting dummy total size 71.00 mm/2.795 in.	1. Drive bevel gear	5. Spacer
C: Measured dimension	2. Front bearing	6. Drive bevel pinion

Special tool

- (A) : 09922-76120
- (B) : 09922-76250
- (C) : 09922-76140
- (D) : 09922-76430
- (E) : 09922-76340
- (F) : 09922-76150
- (G) : 09922-76350

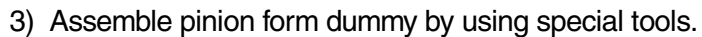


- 1) Assemble bearing form dummy with dummy shaft using special tools.

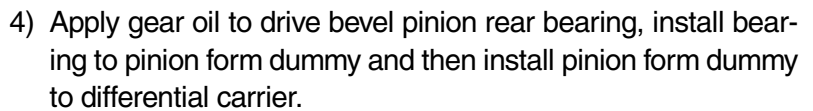
Special tool

- (A) : 09922-76120
- (B) : 09922-76250

- 2) Install dial gauge (1) to bearing form dummy with dammy shaft.



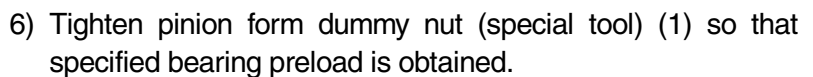
(B) : 09922-76430



- 5) Apply gear oil to drive bevel pinion front bearing and install bearing to pinion form dummy with other special tools as shown in figure.

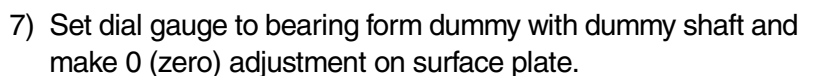
(E) : 09922-76140

This installation requires no spacer or oil seal.



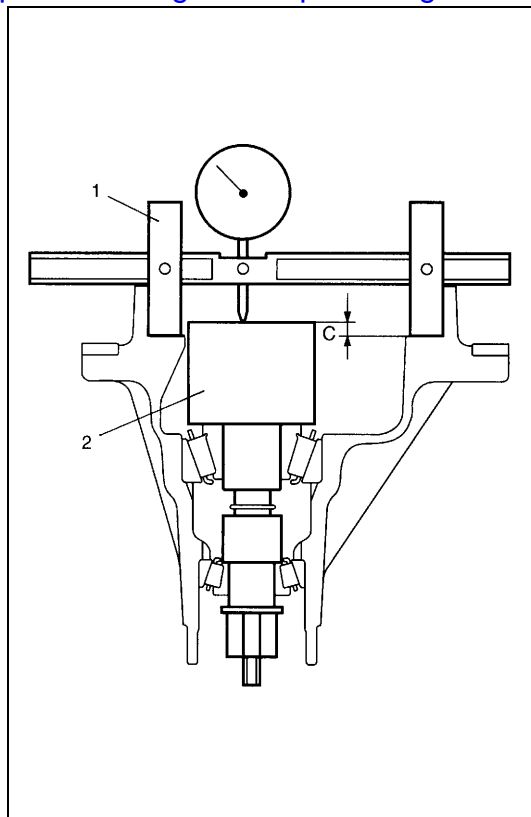
Before taking measurement, check for rotation by hand more than 15 revolutions.

0.5 – 1.3 N·m (5.0 – 13.0 kg-cm, 0.35 – 0.90 lb-ft)



- **When setting dial gauge to bearing form dummy with dummy shaft, tighten screw lightly. Be careful not to overtighten it, which will cause damage to dial gauge.**

- With dial gauge set, turn dummy back and forth by hand a couple of times and attain accurate 0 (zero) adjustment.



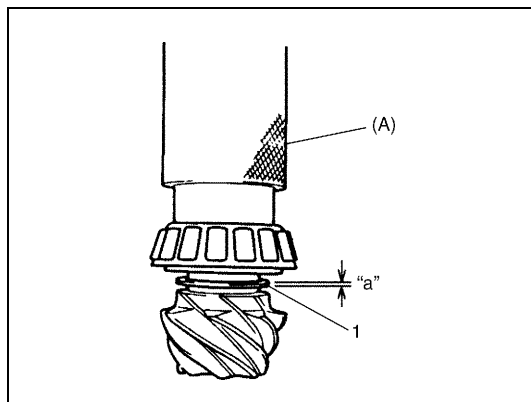
- 8) Place zero-adjusted bearing form dummy with dummy shaft (1) and dial gauge set on pinion form dummy (2) and take measurement between zero position and contracted dial gauge measuring tip.

NOTE:

- Repeat turning back and forth of dummy and measure distance as far as top surface of pinion form dummy from 0 (zero) position accurately.
- When dial gauge measuring tip contracts from 0 (zero) position, pointer turns clockwise.
- Measured value may exceed 1 mm. Therefore, it is also necessary to know reading of short pointer.

- 9) Obtain adjusting shim thickness by using measured value by dial gauge in the following equation.

Necessary shim thickness	=	3 mm/0.118 in. (Adjusting dummy total size – Drive bevel pinion mounting distance)	–	Dial gauge measured value C
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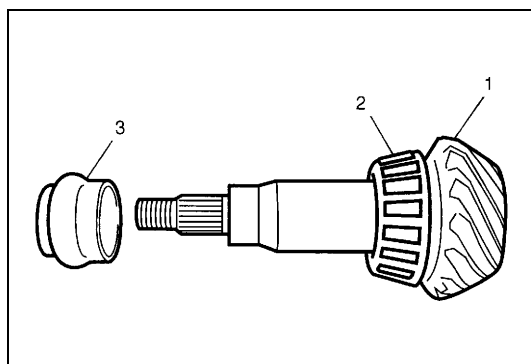
- 10) Select adjusting shim(s) (1) closest to calculated value from among following available sizes and put it in place and then press-fit rear bearing.

Special tool

(A) : 09913-80113

Available shim thickness

“a” : 0.30, 1.00, 1.03, 1.06, 1.09, 1.12, 1.15, 1.18, 1.21, 1.24, 1.27, and 1.30 mm (0.012, 0.039, 0.041, 0.042, 0.043, 0.044, 0.045, 0.046, 0.048, 0.049, 0.050 and 0.051 in.)

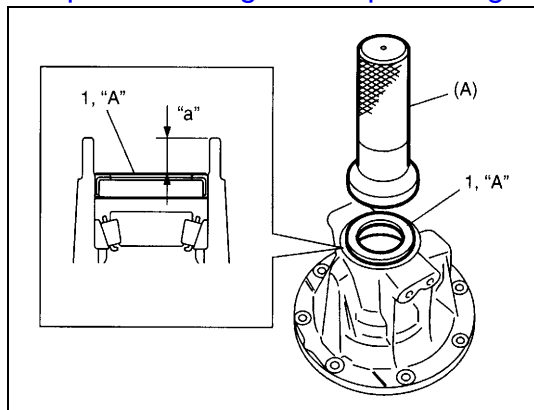


- 11) With new pinion spacer (3) inserted as shown, install front bearing to differential carrier.

NOTE:

- Make sure to use new spacer for reinstallation.
- Apply oil to bearings.

1.	Drive bevel pinion
2.	Rear bearing



- 12) Using special tool and hammer, drive new oil seal (1) into differential carrier. Then apply grease to oil seal lip.

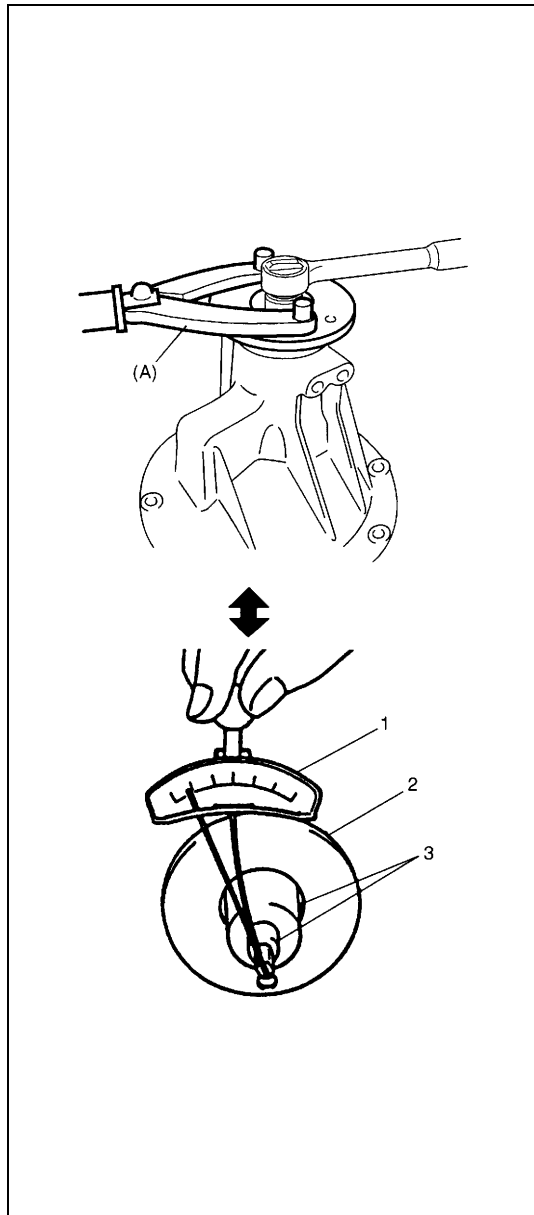
Special tool

(A) : 09913-76010

Differential carrier oil seal installing depth

"a" : 14.5 – 15.5 mm (0.57 – 0.61 in.)

"A" : Grease 99000-25010



- 13) While tightening companion flange nut gradually with special tool and wrench, set preload of drive bevel pinion bearing to specification.

NOTE:

- Before taking measurement, check for smooth rotation with turning drive bevel pinion 15 revolutions or more by hand.
- Drive bevel pinion bearing preload is adjusted by tightening companion flange nut to deform spacer. Therefore, be sure to use a new spacer for adjustment and tighten companion flange nut step by step and check for starting torque (preload) as often as tightening to prevent over crushing of spacer. If exceeds specification given below during adjustment, replace spacer and repeat preload adjustment procedure. Attempt to decrease starting torque (preload) by loosening companion flange nut will not do.
- Measure drive bevel pinion bearing preload while turning drive bevel pinion about 50 rpm.

Tightening torque

Companion flange nut : Reference 70 – 250 N·m (7.0 – 25.0 kg-m, 51.0 – 181.0 lb-ft)

Drive bevel pinion bearing preload

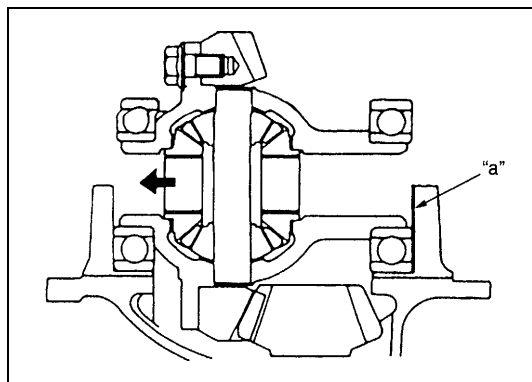
0.5 – 1.3 N·m (5.0 – 13.0 kg-cm, 0.35 – 0.90 lb-ft)

Special tool

(A) : 09930-40113

1. Torque wrench
2. Companion flange
3. Socket with adapter

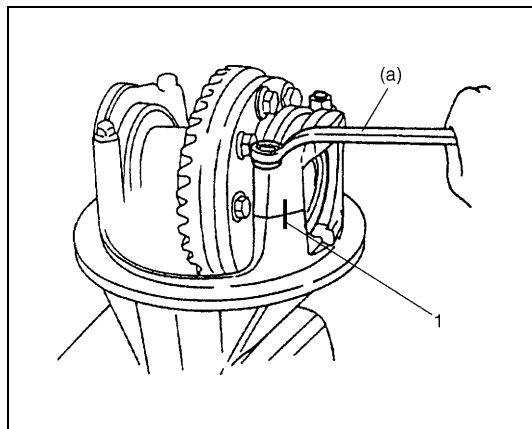
Differential assembly



- 1) Place differential case assembly to differential carrier, push differential case to left side as shown in figure.
Then measure clearance "a" between side bearing and differential carrier by using thickness gauge.
Select shims closest to measured value.

Available shim thickness

: 1.35, 1.40, 1.45, 1.50, 1.55, 1.60, 1.65, 1.70 and 1.75 mm
(0.0531, 0.0551, 0.0571, 0.0591, 0.0610, 0.0630, 0.0650, 0.669 and 0.0689 in.)



- 2) Divide selected shim(s) between both sides (right and left) and install them to differential carrier. Then install differential side bearing cap.

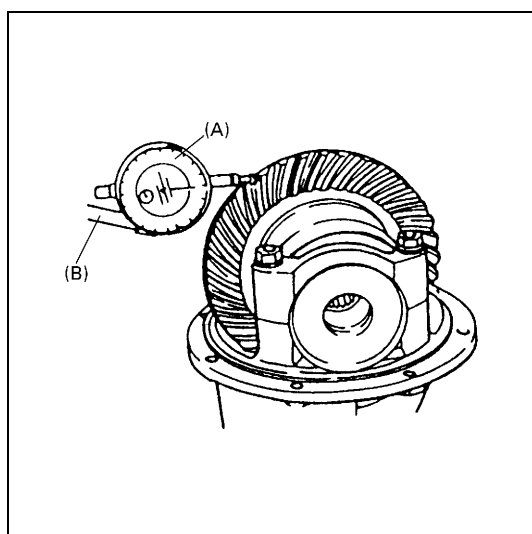
Tightening torque

Differential side bearing cap bolts

(a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

NOTE:

- Align match marks (1) on cap and carrier.
- Apply gear oil to bearing.



- 3) Measure backlash by using dial gauge.

Drive bevel gear backlash

0.10 – 0.20 mm (0.0039 – 0.0078 in.)

NOTE:

- Be sure to apply measuring tip of dial gauge at right angles to convex side (drive side) of tooth.
- If backlash is out of specification, change division of shims so that backlash is within specification.

Special tool

(A) : 09900-20607

(B) : 09900-20701

- 4) Check gear tooth contact as follows.
 - a) After cleaning tooth surface of drive bevel gears, paint them with gear marking compound evenly by using brush or sponge etc.

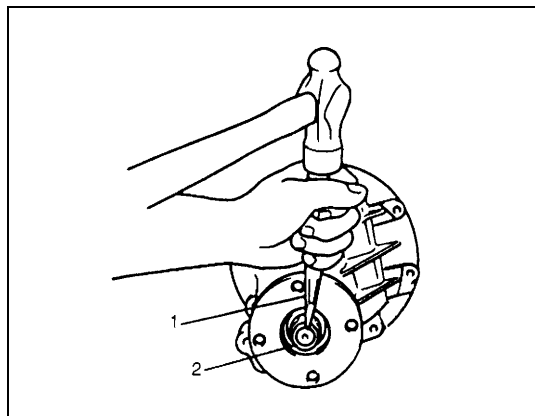
CAUTION:

When applying red lead paste to teeth, be sure to paint tooth surfaces uniformly. The paste must not be too dry or too fluid.

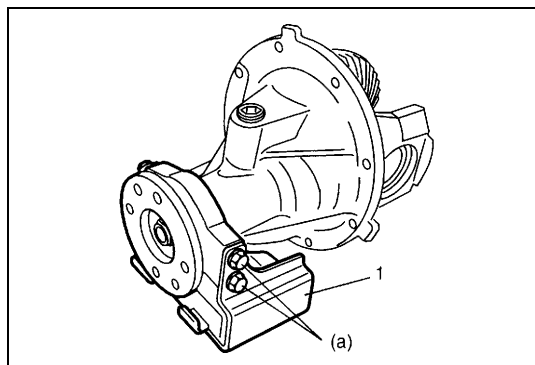
- b) Turn gear to bring its painted part in mesh with bevel pinion and turn it back and forth by hand to repeat their contact.
- c) Bring painted part up and check contact pattern, referring to the following chart. If contact pattern is not normal, readjust or replace as necessary according to instruction in chart.

NOTE:

Be careful not to turn bevel gear more than one full revolution, or it will hinder accurate check.



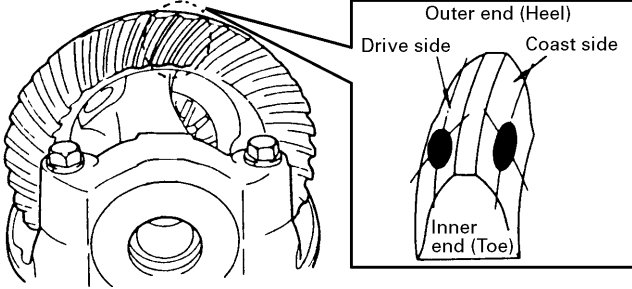

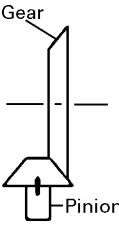

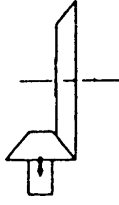
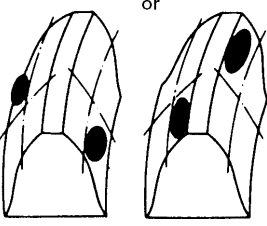
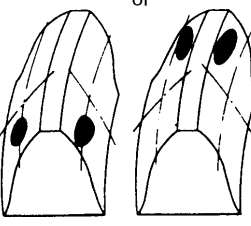
- 5) After completing of gear tooth contact check caulk companion flange nut (2) with caulking tool (1) and hammer.

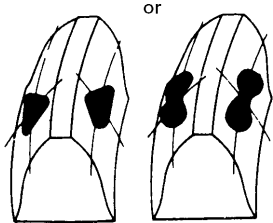


- 6) Install dynamic damper (1).
Tighten bolts to specified torque.

Dynamic damper bolt

(a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

TOOTH CONTACT PATTERN	DIAGNOSIS AND REMEDY
	<p>NORMAL</p>
	<p>HIGH CONTACT Pinion is positioned too far from the center of drive bevel gear.</p> <ol style="list-style-type: none"> 3) Increase thickness of pinion height adjusting shim and position pinion closer to gear center. 4) Adjust drive bevel gear backlash to specification. 
	<p>LOW CONTACT Pinion is positioned too close to the center of drive bevel gear.</p> <ol style="list-style-type: none"> 1) Decrease thickness of pinion height adjusting shim and position pinion farther from gear center. 2) Adjust drive bevel gear backlash to specification. 
	<p>These contact patterns indicate that the "offset" of differential is too much or too little. The remedy is to replace the carrier with a new one.</p>
	<p>These contact patterns, located on toe or heel on both drive and coast sides, mean that 1) both pinion and gear are defective, 2) carrier is not true and square, or 3) gear is not properly seated on differential case. The remedy is to replace the defective member.</p>

TOOTH CONTACT PATTERN	DIAGNOSIS AND REMEDY
	<p>Irregular patterns: If the pattern is not oval, it means that bevel gear is defective. High or low spots on tooth surfaces or on the seat of bevel gear are the cause of irregular patterns appearing on some teeth. The remedy is to replace the pinion and-gear set and, if the seat is defective, so is transfer case.</p>

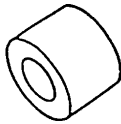
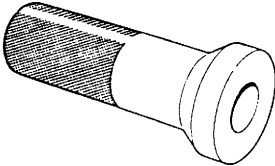
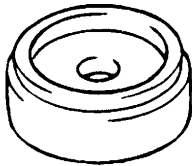
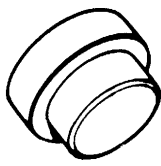
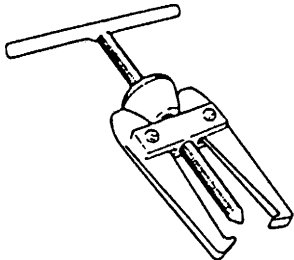
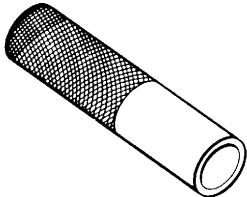
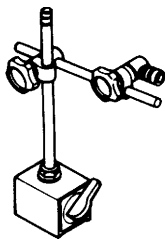
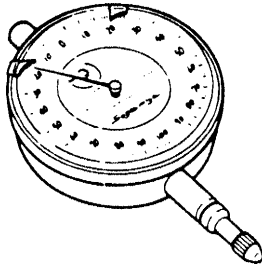
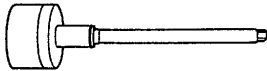
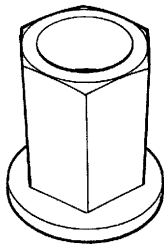
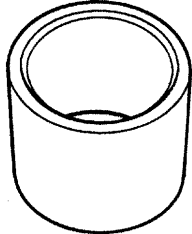
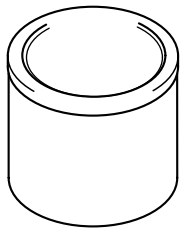
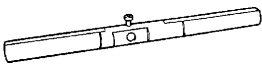
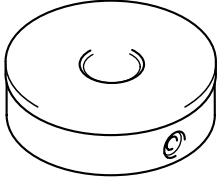
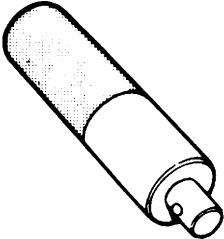
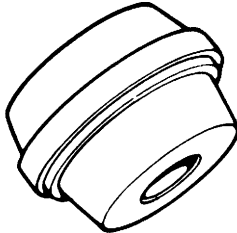
Tightening Torque Specification

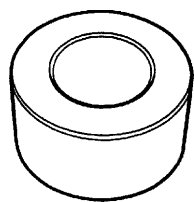
Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Rear differential oil drain plug	55	5.5	40.0
Rear differential oil level/filler plug	50	5.0	36.5
Companion flange nut (reference)	70 – 250	7.0 – 25.0	51.0 – 181.0
Dynamic damper bolts	23	2.3	17.0
Drive bevel gear bolts	90	9.0	65.0
Differential side bearing cap bolts	23	2.3	17.0
Rear differential plug	23	2.3	17.0
Differential carrier bolts	23	2.3	17.0
Propeller shaft bolts	23	2.3	17.0

Required Service Material

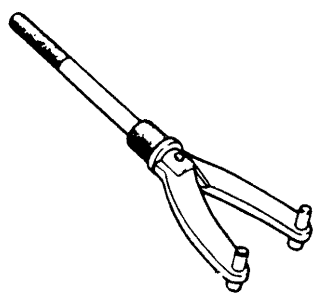
Material	Recommended SUZUKI product (Part Number)	Use
Thread lock cement	THREAD LOCK CEMENT 1322 (99000-32110)	Bevel gear bolts
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lips
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	<ul style="list-style-type: none"> • Thread part of differential carrier bolt • Mating surface of differential carrier • Mating surface of rear axle housing

Special Tool

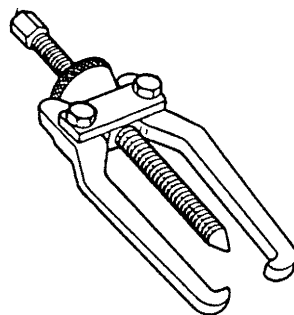
 <p>09951-16060 Lower arm bush remover</p>	 <p>09951-76010 Bearing installer</p>	 <p>09951-16090 Oil seal installer</p>	 <p>09925-88210 Bearing puller attachment</p>
 <p>09913-60910 Bearing puller</p>	 <p>09913-80113 Bearing installer</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09900-20607 Dial gauge</p>
 <p>09922-76140 Bevel pinion shaft</p>	 <p>09922-76150 Bevel pinion nut</p>	 <p>09922-76430 Front collar</p>	 <p>09922-76350 Gauge block</p>
 <p>09922-76120 Dummy shaft</p>	 <p>09922-76250 Bevel gear dummy</p>	 <p>09924-74510 Bearing installer handle</p>	 <p>09925-68210 Bearing installer</p>



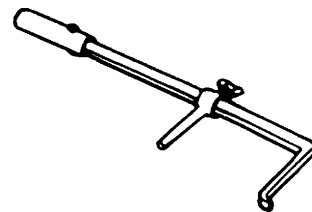
09922-76340
Rear collar



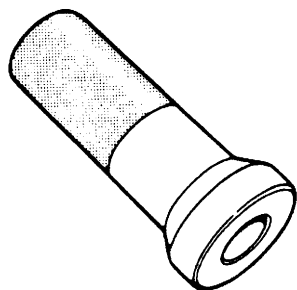
09930-40113
Flange holder



09913-65135
Bearing puller



09913-50121
Oil seal remover



09913-76010
Bearing installer

SECTION 8A-8

Note:

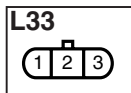
For descriptions (items) not found in this section, refer to the same section of Wiring Diagram Manual mentioned in FOREWORD of this manual.

LIST OF CONNECTORS

Note:

For the connectors not found in this section, refer to the same section of Wiring Diagram Manual 8A-8 mentioned in FOREWORD of this manual.

The connector below shows the modified connector for 4WD vehicle.



Prepared by
MAGYAR SUZUKI CORPORATION
Service Department

1st Ed. June, 2001

IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

This service manual is intended for authorized Suzuki dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.

Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and/or seat belt with pretensioner) beforehand to avoid component damage or unintended activation.

Foreword

This SUPPLEMENTARY SERVICE MANUAL is a supplement to RB413 SERVICE MANUAL. It has been prepared exclusively for the following applicable model.

Applicable model: RB310/413 of and after the vehicle identification number below.

☒ TSM MMA93S00 180001 ☒

☒ TSM MMB53S00 180001 ☒

☒ TSM MMA53S00 180001 ☒

☒ TSM MMA53S20 180001 ☒

If describes only different service information of the above applicable model as compared with RB413 SERVICE MANUAL. Therefore, whenever servicing the above applicable model, consult this supplement first. And for any section, item or description not found in this supplement, refer to the related service manual below.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

RELATED MANUAL:

Manual Name	Manual No.
RB413 SERVICE MANUAL	99500-83E00-01E
RB413 SUPPLEMENTARY SERVICE MANUAL	99501U83E00-01E
RB310 SERVICE MANUAL	99500U83E10-01E
RB310/413 WIRING DIAGRAM MANUAL	99512U83E12-669

MAGYAR SUZUKI CORPORATION

SERVICE DEPARTMENT

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	Maintenance and Lubrication	0B
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10B

NOTE:

For the screen toned Sections in the above table, refer to the same section of the Related Manuals mentioned in FOREWORD of this manual.

SECTION 0A**0A****GENERAL INFORMATION****NOTE:**

For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS**Precautions.....0A-2**

Precaution for Vehicles Equipped with a
Supplemental Restraint (Air Bag) System.....0A-2

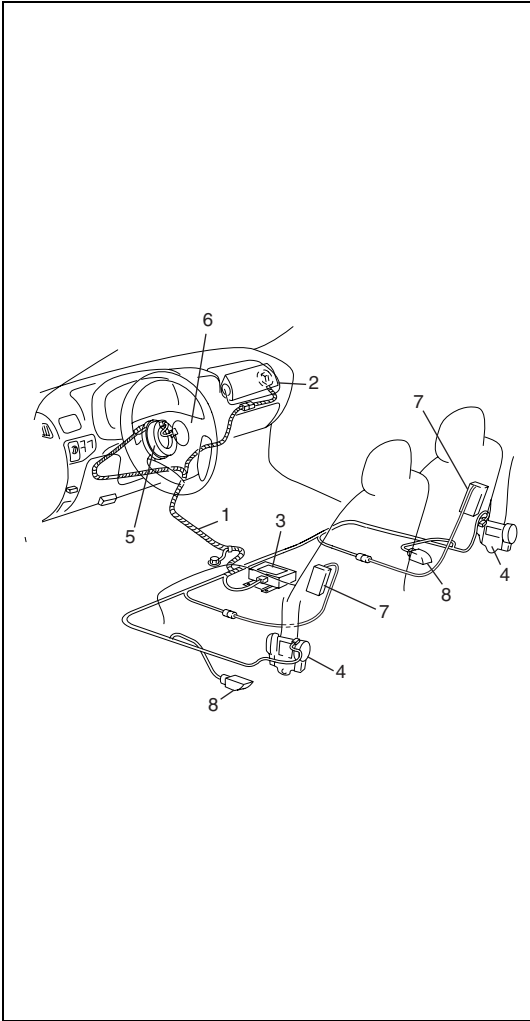
Diagnosis 0A-2

Servicing and handling 0A-3

Warning, Caution and Information Labels....0A-6

Precautions

Precaution for Vehicles Equipped with a Supplemental Restraint (Air Bag) System

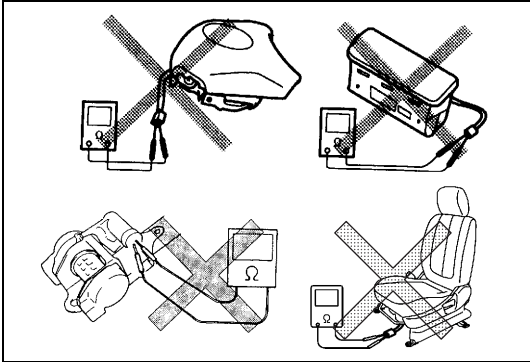


- WARNING:**
- The configuration of air bag system parts are as shown in the figure. When it is necessary to service (remove, reinstall and inspect) these parts, be sure to follow procedures described in Section 10B. Failure to follow proper procedures could result in possible air bag system activation, personal injury, damage to parts or air bag system being unable to activate when necessary.
 - If the air bag system and another vehicle system both need repair, SUZUKI recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
 - Do not modify the steering wheel, dashboard, or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.
 - If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended air bag system activation.

1. Air bag wire harness (in instrumental panel harness)	5. Contact coil
2. Passenger air bag (inflator) module (if equipped)	6. Driver air bag (inflator) module
3. SDM	7. Side air bag (inflator) module (if equipped)
4. Seat belt pretensioner	8. Side sensor (if equipped)

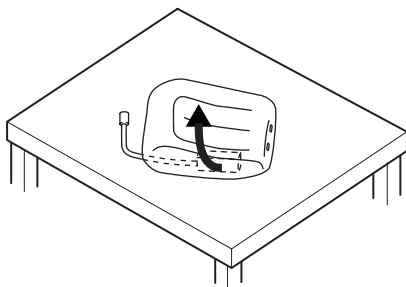
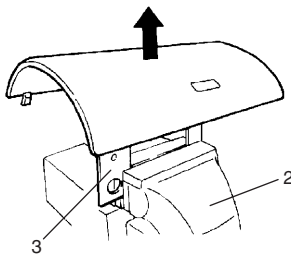
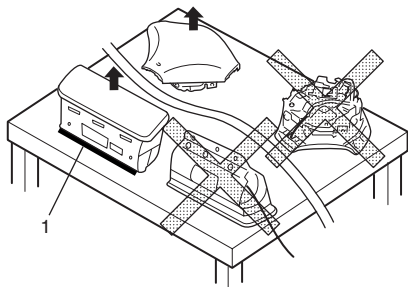
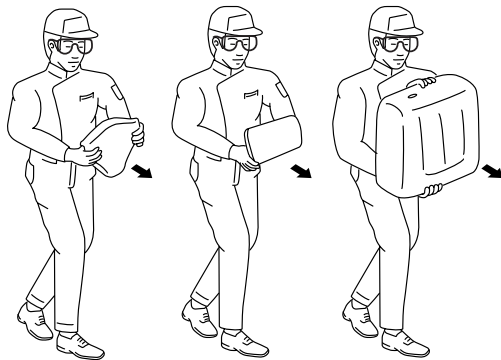
Diagnosis

- When troubleshooting air bag system, be sure to follow “DIAGNOSIS” in Section 10B. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacement.
- Never use electrical test equipment other than that specified in this manual.



- WARNING:**
- Never attempt to measure the resistance of the air bag (inflator) modules (driver, passenger and side) and seat belt pretensioners (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag or activate the pretensioner.

[A]

**WARNING:**

Many of service procedures require disconnection of "AIR BAG" fuse and all air bag (inflator) module(s) from initiator circuit to avoid an accidental deployment.

Driver, Passenger and Side Air Bag (Inflator) Modules

- For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module. When placing a live air bag (inflator) module on a bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit (1) or use the workbench vise (2) to hold it securely at its lower mounting bracket (3). The front seat back with the live air bag (inflator) module must be placed with its frontal seat cover facing up. It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) modules. This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment. Otherwise, personal injury may result.
- Never dispose of live (undeployed) air bag (inflator) modules (driver, passenger and side). If disposal is necessary, be sure to deploy them according to deployment procedures described in Section 10B before disposal.
- The air bag (inflator) module immediately after deployment is very hot. Wait for at least half an hour to cool it off before proceeding the work.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.

[A] : ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.

[B] : ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.

[C] : ALWAYS PLACE WITH ITS FRONTAL SEAT COVER FACING UP, AWAY FROM LOOSE OBJECTS.

WARNING:**SDM**

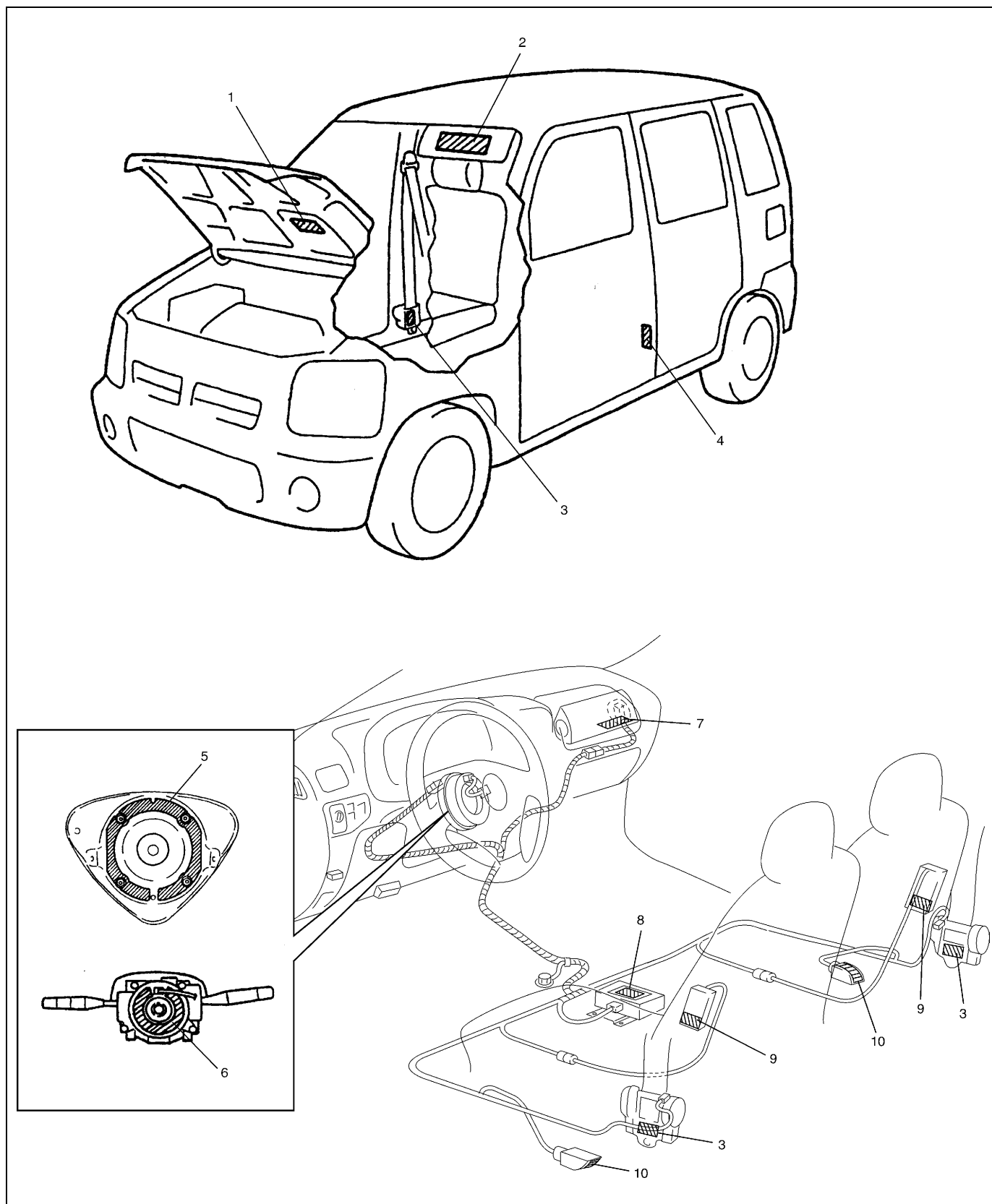
- For handling and storage of a SDM, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM). Never strike or jar the SDM.
- Never power up the air bag system when the SDM is not rigidly attached to the vehicle. All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointing toward the front of the vehicle to ensure proper operation of the air bag system.
The SDM could be activated when powered while not rigidly attached to the vehicle which could cause deployment and result in personal injury.

WARNING:**Driver and Passenger Seat Belt Pretensioners :**

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry seat belt pretensioner by webbing.
- When placing a live seat belt pretensioner on the workbench or other surface, it is also prohibited to put a seat belt pretensioner on top of another. Otherwise, personal injury may result.
- Never dispose of live (inactivated) seat belt pretensioners (driver and passenger). If disposal is necessary, be sure to activate them according to activation procedures described in Section 10B before disposal.
- The seat belt pretensioner immediately after activation is very hot. Wait for at least half an hour to cool it off before proceeding the work.
- With many service procedures, gloves and safety glasses should be worn to prevent any possible irritation of the skin or eyes.

CAUTION:

- Even when the accident was light enough not to cause air bags to activate, be sure to inspect system parts and other related parts according to instructions under “REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT” in Section 10B as well as when air bag is deployment.
- When servicing parts other than air bag system, if shocks may be applied to air bag system component parts, remove those parts beforehand.
- When handling the air bag (inflator) modules (driver, passenger and side), seat belt pretensioners (driver and passenger), side sensors or SDM, be careful not to drop it or apply an impact to it. If an excessive impact was applied, never attempt disassembly or repair but replace it with a new one.
- When grease, cleaning agent, oil, water, etc. has got onto air bag (inflator) modules (driver, passenger and side) or seat belt pretensioners (driver and passenger), wipe off immediately with a dry cloth.
- Air bag wire harness is included in instrument panel wire harness. Air bag wire harness branched off from instrument panel wire harness can be identified easily as it is covered with a yellow protection tube and it has yellow connectors. Be very careful when handling it.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
- Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.
- Never use air bag system component parts from another vehicle.
- When using electric welding, be sure to disconnect all air bag (inflator) module connectors and pretensioner connectors from air bag wire harness respectively.
- Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.
- WARNING/CAUTION labels are attached on each part of air bag system components. Be sure to follow the instructions.
- After vehicle is completely repaired, perform “AIR BAG DIAGNOSTIC SYSTEM CHECK” in Section 10B.

Warning, Caution and Information Labels

1. Air bag caution label on back side of engine hood	6. Air bag caution label on combination switch and contact coil assembly
2. Air bag caution label on sun visor (for vehicle with air bag system)	7. Air bag caution label on passenger air bag (inflator) module
3. Pretensioner label on seat belt retractor	8. Air bag caution label on SDM
4. Tire information placard	9. Air bag caution label on side air bag (inflator) module
5. Air bag caution label on driver air bag (inflator) module	10. Side sensor caution label

SECTION 0B**0B****MAINTENANCE AND LUBRICATION****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

Maintenance Schedule0B-2

Maintenance Recommended under
Severe Driving Conditions 0B-2

Maintenance Schedule

Maintenance Recommended under Severe Driving Conditions

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, IT IS RECOMMENDED that applicable maintenance operation be performed at the particular interval as shown in the following table.

Severe condition code :

A : Repeated short trips

B : Driving on rough and/or muddy roads

C : Driving on dusty roads

D : Driving in extremely cold weather and/or salted roads

E : Repeated short trips in extremely cold weather

F : Leaded fuel use

G : -----

H : Towing a trailer (if admitted)

Severe Condition Code	Maintenance	Maintenance Operation	Maintenance Interval
- B C D - - - -	Drive belt (V-rib belt)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months
A - C D E F - H	Engine oil and oil filter	R	Every 5,000 km (3,000 miles) or 4 months
- - C - - - - -	Air cleaner filter*1	I	Every 2,500 km (1,500 miles)
		R	Every 30,000 km (18,000 miles) or 24 months
A B C - E F - H	Spark plugs	R	Every 10,000 km (6,000 miles) or 8 months
- B C D - - - H	Wheel bearings	I	Every 15,000 km (9,000 miles) or 12 months
- B - D E - - H	Drive shafts and propeller shafts (4WD)	I	Every 15,000 km (9,000 miles) or 12 months
- B - - E - - H	Manual transmission oil, transfer oil (4WD A/T) and differential oil (4WD)	R	First: 15,000 km (9,000 miles) or 12 months Second and after: Every 30,000 km (18,000 miles) or 24 months reckoning from ϕ km (ϕ mile) or ϕ months
- B - - E - - H	Automatic transmission fluid	R	Every 30,000 km (18,000 miles) or 24 months
- - C D - - - -	Ventilator air filter *2 (if equipped)	I	Every 15,000 km (9,000 miles) or 12 months
		R	Every 45,000 km (27,000 miles) or 36 months

NOTE:

- **“R” : Replace or change**
- **“I” : Inspect and correct or replace if necessary**
- ***1 : Inspect or replace more frequently if necessary.**
- ***2 : Clean or replace more frequently if the air from the ventilator decreases.**

SECTION 3B1

ELECTRICAL POWER STEERING (EPS) SYSTEM 3B1 (IF EQUIPPED)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual. However, bear the following in mind when checking DTC (Diagnostic Trouble Code).

Be sure to use SUZUKI scan tool whenever checking DTC because this vehicle has no monitor connector for Electrical power steering system and DTC can not be displayed by EPS warning lamp flashing.

SECTION 5E

ANTILOCK BRAKE SYSTEM (ABS)

5E

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

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General Description

Components and Parts Location

The ABS (Antilock Brake System) controls the fluid pressure applied to the Wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied.

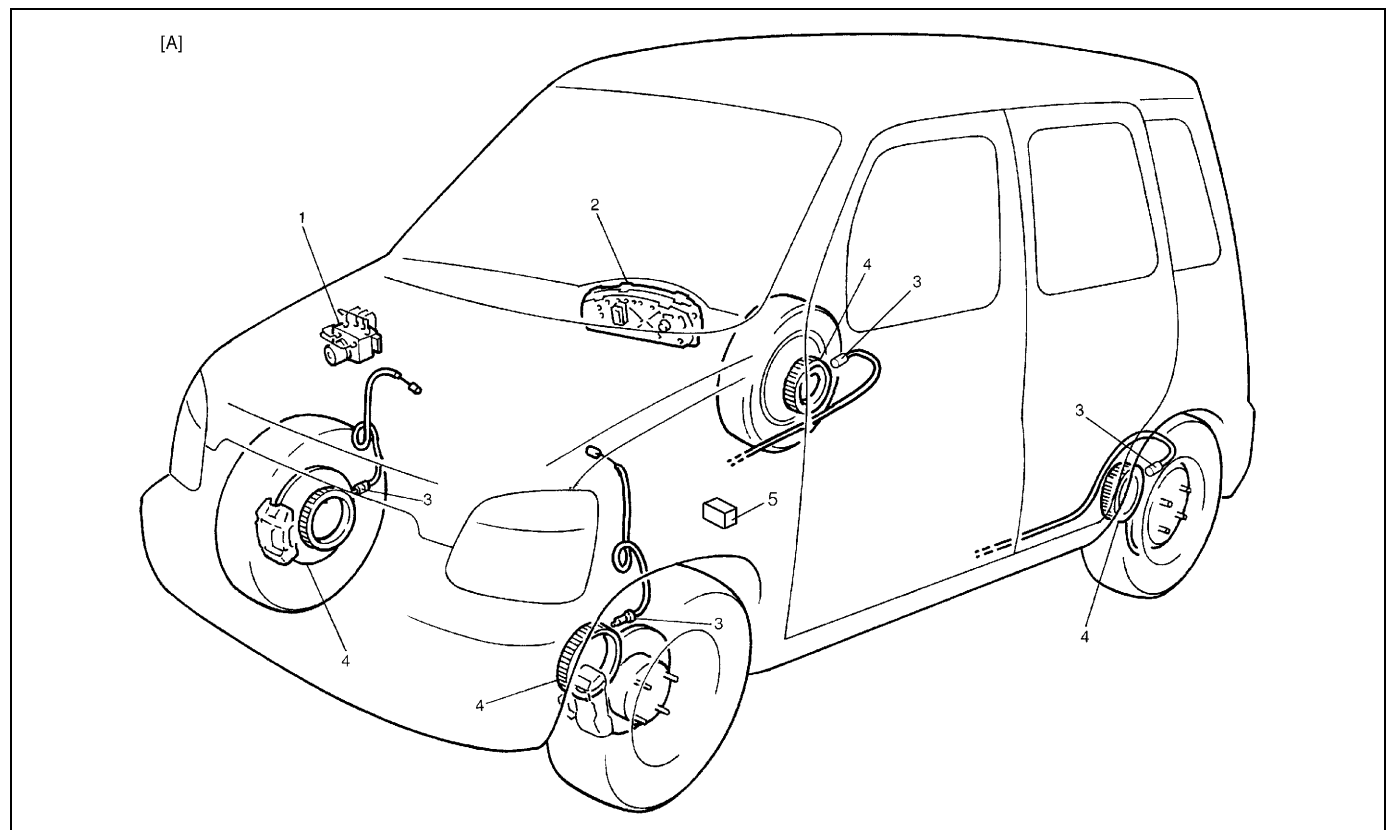
This ABS has also the following function.

While braking is applied, but before ABS control becomes effective, braking force is distributed between the front and rear so as to prevent the rear wheels from being locked too early for better stability of the vehicle.

The main component parts of this ABS include the following parts in addition to those of the conventional brake system.

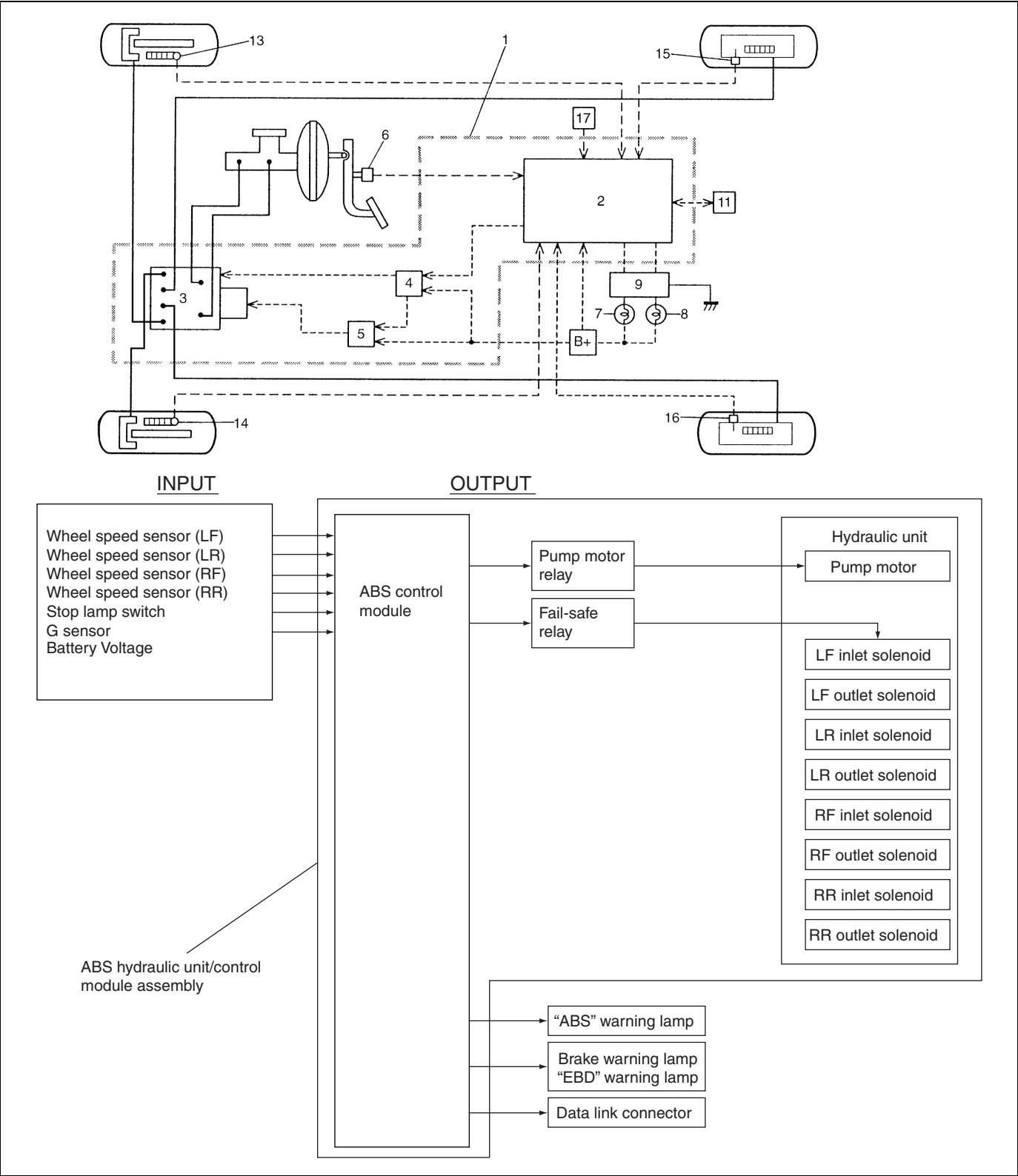
- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- “ABS” warning lamp which lights to inform abnormality when system fails to operate properly.
- ABS hydraulic unit/control module assembly is incorporated ABS control module, ABS hydraulic unit (actuator assembly), fail-safe relay and pump motor relay.
 - ABS control module which sends operation signal to ABS hydraulic unit to control fluid pressure applied to each wheel cylinder based on signal from each wheel speed sensor so as to prevent wheel from locking.
 - ABS hydraulic unit which operates according to signal from ABS control module to control fluid pressure applied to wheel cylinder of each 4 wheels.
 - Fail-safe relay (solenoid valve relay) which supplies power to solenoid valve in ABS hydraulic unit.
 - Pump motor relay which supplies power to pump motor in ABS hydraulic unit.
- G sensor which detects vehicle deceleration speed. (For 4WD model only)

This ABS is equipped with Electronic Brake force Distribution (EBD) system that controls a fluid pressure of rear wheels to best condition, which is the same function as that of proportioning valve, by the signal from wheel sensor independently of change of load due to load capacity and so on. And if the EBD system fails to operate properly, the brake warning lamp lights to inform abnormality.



[A] : LH steering vehicle shown	2. Combination meter	4. Wheel speed sensor ring
1. ABS hydraulic unit/control module assembly	3. Wheel speed sensor	5. G sensor (For 4WD model only)

System Schematic

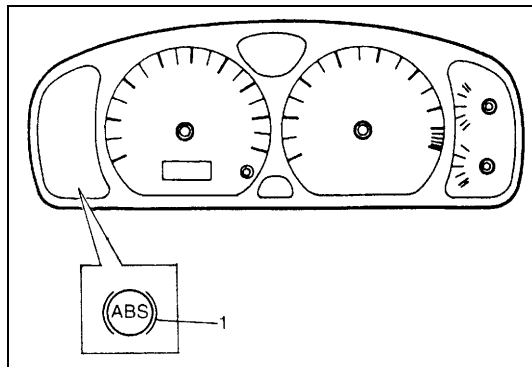


ABS Hydraulic Unit/Control Module Assembly

ABS control module is a component of ABS hydraulic unit/control module assembly and has the following functions.

Self-diagnosis function

ABS control module diagnoses conditions of the system component parts (whether or not there is any abnormality) all the time and indicates the results (warning of abnormality occurrence and DTC) through the ABS warning lamp (1) as described below.



- 1) When ignition switch is turned ON, ABS warning lamp lights for 2 seconds to check its bulb and circuit.
- 2) When no abnormality has been detected (the system is in good condition), ABS warning lamp turns OFF after 2 seconds.
- 3) When an abnormality in the system is detected, ABS warning lamp lights and the area where that abnormality lies is stored in the memory of EEPROM in ABS control module.

Fail-safe function

When an abnormality occurs (an abnormal DTC is detected), ABS control module turns OFF the fail-safe relay which supplies power to ABS hydraulic unit. Thus, with ABS not operating, brakes function just like the brake system of the vehicle without ABS.

1. Battery	9. ABS hydraulic unit/control module assembly	17. Left-rear wheel speed sensor
2. Main fuses	10. Terminal arrangement of ABS hydraulic unit/control module assembly	18. Right-front wheel speed sensor
3. Ignition switch	11. ABS fail-safe relay (Solenoid valve relay)	19. Left-front wheel speed sensor
4. Circuit fuses	12. ABS pump motor relay	20. Data link connector
5. Combination meter	13. Pump motor	21. To ECM, TCM, SDM and P/S control module (if equipped)
6. ABS warning lamp	14. Solenoid valves	22. Stop lamp
7. Brake warning lamp	15. Blank	23. Stop lamp switch
8. Warning lamp driver module (for ABS)	16. Right-rear wheel speed sensor	24. G sensor (For 4WD model only)

Wire color			
B :	Black	Br :	Brown
B/R :	Black/Red	G :	Green
B/W :	Black/White	G/R :	Green/Red
Bl/B :	Blue/Black	G/W :	Green/White
Bl/R :	Blue/Red	Or :	Orange
Bl/W :	Blue/White	Or/Bl :	Orange/Blue
		R :	Red
		V/W :	Violet/White
		W/B :	White/Black
		W/Bl :	White/Blue
		W/R :	White/Red

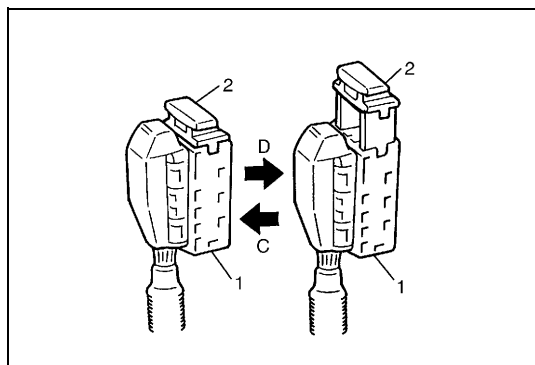
TERMINAL	CIRCUIT
E20	1 —
	2 Stop lamp switch
	3 Right-front wheel speed sensor (+)
	4 Right-front wheel speed sensor (–)
	5 —
	6 Right-rear wheel speed sensor (–)
	7 Right-rear wheel speed sensor (+)
	8 —
	9 —
	10 “EBD” warning lamp (Brake warning lamp)
	11 G sensor (For 4WD model only)
	12 —
	13 Ground (for G sensor) (For 4WD model only)
	14 ABS warning lamp
	15 Left-front wheel speed sensor (+)
	16 Left-front wheel speed sensor (–)
	17 —
	18 Ignition switch
	19 Left-rear wheel speed sensor (+)
	20 Left-rear wheel speed sensor (–)
	21 Data link connector
	22 Ground (for ABS pump motor)
	23 ABS pump motor relay
	24 Ground (for ABS control module)
	25 ABS fail-safe relay

Diagnosis

To ensure that the trouble diagnosis is done accurately and smoothly, observe "PRECAUTIONS IN DIAGNOSING TROUBLES" and follow "ABS DIAGNOSTIC FLOW TABLE".

Precaution in Diagnosing Troubles

- If the vehicles was operated in any of the following ways, ABS warning lamp may light momentarily but this does not indicate anything abnormal in ABS.
 - The vehicle was driven with parking brake pulled.
 - The vehicle was driven with brake dragging.
 - The vehicle was stuck in mud, sand, etc.
 - Wheel spin occurred while driving.
 - Wheel(s) was rotated while the vehicle was jacked up.
- Be sure to read "PRECAUTIONS FOR ELECTRONIC CIRCUIT SERVICE" in Section 0A before inspection and observe what is written there.
- Be sure to use the trouble diagnosis procedure as described in the flow table. Failure to follow the flow table may result in incorrect diagnosis. (Some other diagnosis trouble code may be stored by mistake in the memory of ABS control module during inspection.)
- When disconnecting ABS hydraulic unit/control module connector (1), pull up lock (2) of connector.
When connecting, set the connector on ABS hydraulic unit/control module assembly and push the lock (2) down.



D : Disconnect

C : Connect

ABS Diagnostic Flow Table

Refer to the following pages for the details of each step.

Step	Action	Yes	No
1	1) Perform "Customer Complaint Analysis". 2) Perform "Problem Symptom Confirmation". 3) Perform "Diagnostic Trouble Code Check, Record and Clearance". Is there any malfunction DTC?	Go to Step 2.	Go to Step 5.
2	1) Perform "DRIVING TEST". Is trouble symptom identified?	Go to Step 3.	Go to Step 6.
3	1) Check diagnostic trouble code. Is it malfunction code?	Go to Step 4.	Go to Step 5.
4	1) Inspect and repair referring to applicable diagnostic trouble code table in this section. 2) Perform "FINAL CONFIRMATION TEST" after cleared DTC. Does trouble recur?	Go to Step 7.	End.
5	1) Inspect and repair referring to "DIAGNOSIS" in "BRAKES" section. 2) Perform "FINAL CONFIRMATION TEST".	—	—
6	1) Check intermittent troubles referring to "INTERMITTENT AND POOR CONNECTION" in "GENERAL INFORMATION" section and related circuit of trouble code recorded in Step 2. 2) Perform "FINAL CONFIRMATION TEST" after cleared diagnostic trouble code. Does trouble recur?	Go to Step 7.	End.
7	1) Perform "Diagnostic Trouble Code Check, Record and Clearance". Is there any malfunction code?	Go to Step 2.	Go to Step 5.

1) MALFUNCTION ANALYSIS

a) Customer Complaint Analysis

Record details of the problem (failure, complaint) and how it occurred as described by the customer.

For this purpose, use of such a questionnaire form as shown below will facilitate collecting information to the point required for proper analysis and diagnosis.

CUSTOMER QUESTIONNAIRE (EXAMPLE)

Customer's name:	Model:	VIN:	
Date of issue:	Date of Reg:	Date of problem:	Mileage:

Problem Symptoms	<ul style="list-style-type: none"> • ABS warning lamp abnormal: fails to turn on/fails to go off/flashes • Abnormal noise while vehicle is running: from motor, from valve, other_____ • Wheel is locked at braking: • Pump motor does not stop (running): • Braking does not work: • Other:
Frequency of occurrence	<ul style="list-style-type: none"> • Continuous/Intermittent (_____ times a day, a month)/ other_____
Conditions for Occurrence of Problem	<ul style="list-style-type: none"> • Vehicle at stop & ignition switch ON: • When starting: at initial start only/at every start/Other_____ • Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other_____ • Road surface condition: Paved road/rough road/snow-covered road/ other_____ • Chain equipment:
Environmental Condition	<ul style="list-style-type: none"> • Weather: fair/cloudy/rain/snow/other_____ • Temperature: °F (_____ °C)
Diagnostic Trouble Code	<ul style="list-style-type: none"> • First check: _____ Normal code/malfunction code (_____) • Second check after test drive: Normal code/malfunction code (_____)

b) Problem Symptom Confirmation

Check if what the customer claimed in "CUSTOMER QUESTIONNAIRE" is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.) Check warning lamps related to brake system referring to "EBD WARNING LAMP (BRAKE WARNING LAMP) CHECK" and "ABS WARNING LAMP CHECK" in this section.

c) Diagnostic Trouble Code (DTC) Check, Record and Clearance

Perform "DIAGNOSTIC TROUBLE CODE CHECK" procedure in this section, record it and then clear it referring to "DIAGNOSTIC TROUBLE CODE CLEARANCE" in this section.

If the malfunction DTC which was once displayed and then cleared cannot be detected (indicated) again when the ignition switch is turned ON, attempt to diagnose the trouble based on the DTC recorded in this step may mislead the diagnosis or make diagnosing difficult. Proceed to Step 2) to check control module for proper self-diagnosis function.

If the malfunction DTC which was once displayed and then cleared can be detected (indicated) again when ignition switch is turned ON, proceed to Step 3).

2) DRIVING TEST

Test drive the vehicle at 40 km/h for more than a minute and check if any trouble symptom (such as abnormal lighting of ABS warning light) exists.

If the malfunction DTC is confirmed again at ignition switch ON, driving test as described in above is not necessary. Proceed to Step 3).

3) DIAGNOSTIC TROUBLE CODE CHECK

Recheck diagnostic trouble code referring to "DTC CHECK" as shown in the following page.

4) DIAGNOSTIC TROUBLE CODE FLOW TABLE

According to Diagnostic flow table for the diagnostic trouble code confirmation in Step 3), locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator assembly or other part and repair or replace faulty parts.

5) "DIAGNOSIS" IN "BRAKES" SECTION

Check the parts or system suspected as a possible cause referring to "DIAGNOSIS" in "BRAKES" section and based on symptoms appearing on the vehicle (symptom obtained through Steps 1)-a, 1)-b and 2) and repair or replace faulty parts, if any).

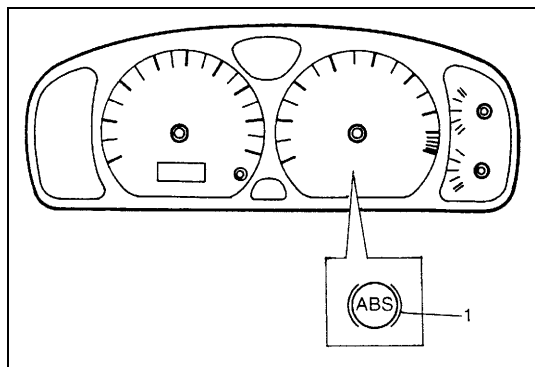
6) CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to "INTERMITTENT TROUBLE" in "GENERAL INFORMATION" section and related circuit of trouble code recorded in Step 1)-c.

7) FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the ABS is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that no DTC is indicated.

ABS Warning Lamp Check

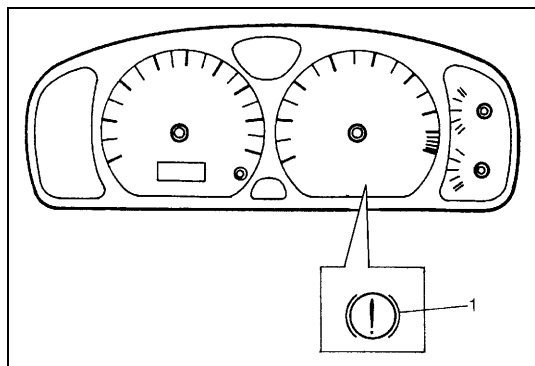


- 1) Turn ignition switch ON.
 - 2) Check that ABS warning lamp (1) comes ON for about 2 seconds and then goes off.
- If any faulty condition is found, advance to Diagnostic Flow Table-A, B, or C.

EBD Warning Lamp (Brake Warning Lamp) Check

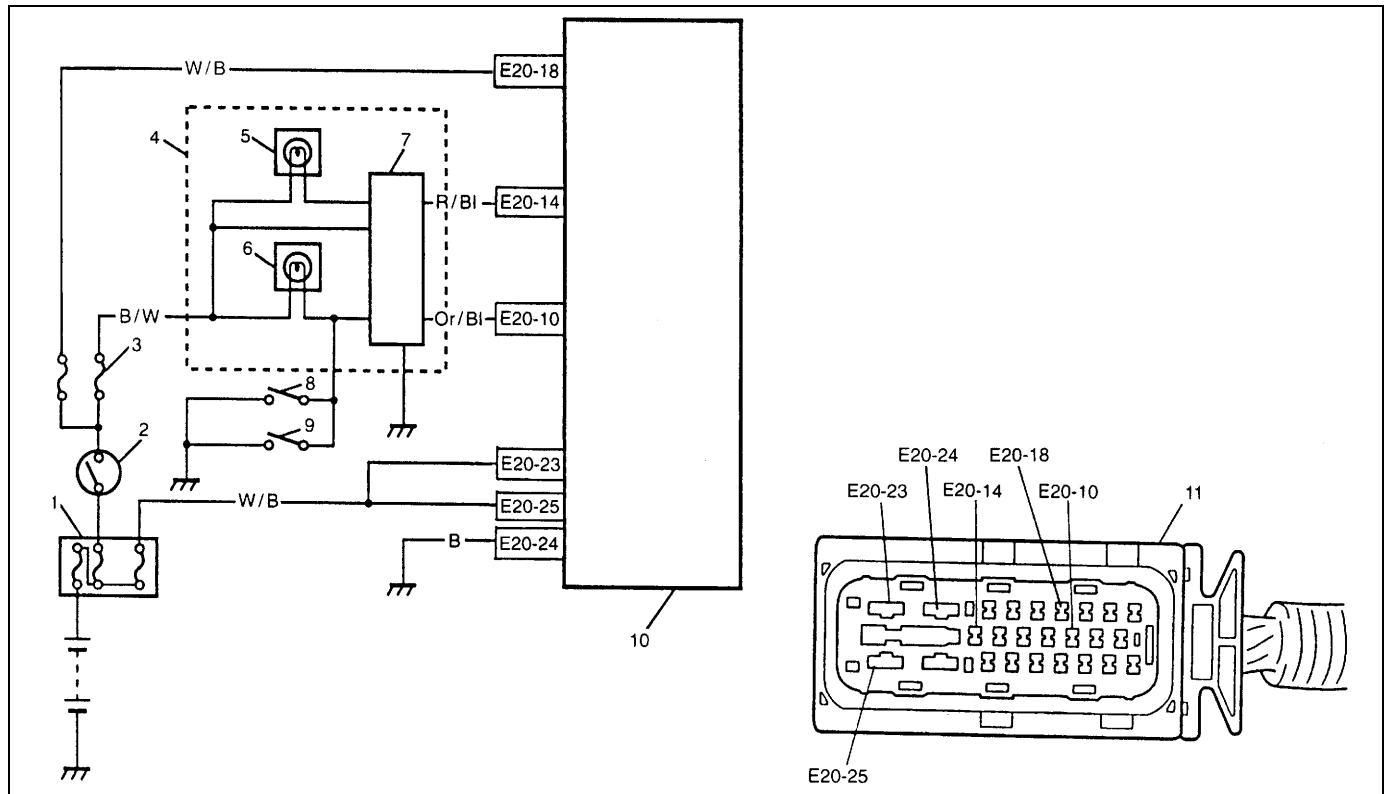
NOTE:

Perform this check on a level place.



- 1) Turn ignition switch ON with parking brake applied.
 - 2) Check that EBD warning lamp (brake warning lamp) (1) is turned ON.
 - 3) Release parking brake with ignition switch ON and check that EBD warning lamp (brake warning lamp) goes off.
- If it doesn't go off, go to "TABLE-D" in this section.

Table – A ABS Warning Lamp Circuit Check – Lamp Does Not Come “ON” at Ignition Switch ON



1. Main fuse	5. ABS warning lamp	9. Brake fluid level switch
2. Ignition switch	6. Brake warning lamp	10. ABS hydraulic unit/control module assembly
3. Circuit fuse	7. Lamp driver module	11. ABS hydraulic unit/control module connector
4. Combination meter	8. Parking brake switch	

CIRCUIT DESCRIPTION

Operation (ON/OFF) of ABS warning lamp is controlled by ABS control module through lamp driver module in combination meter.

If the Antilock brake system is in good condition, ABS control module turns ABS warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, ABS warning lamp is turned ON continuously by ABS control module. Also, it is turned ON continuously by lamp driver module when the connector of ABS control module is disconnected.

INSPECTION

Step	Action	Yes	No
1	1) Turn ignition switch ON. Do other warning lamp come ON?	Go to Step 2.	Go to Step 4.
2	1) Disconnect ABS hydraulic unit/control module connector. Does ABS warning lamp light with ignition switch ON?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 3.
3	1) Remove combination meter. Is bulb of ABS warning lamp in good condition?	"R/BI" circuit shorted to ground. If OK, replace combination meter (lamp driver module).	Replace bulb.
4	Is IG fuse in good condition?	Open in "B/W" wire to combination meter or poor connection.	Repair and replace.

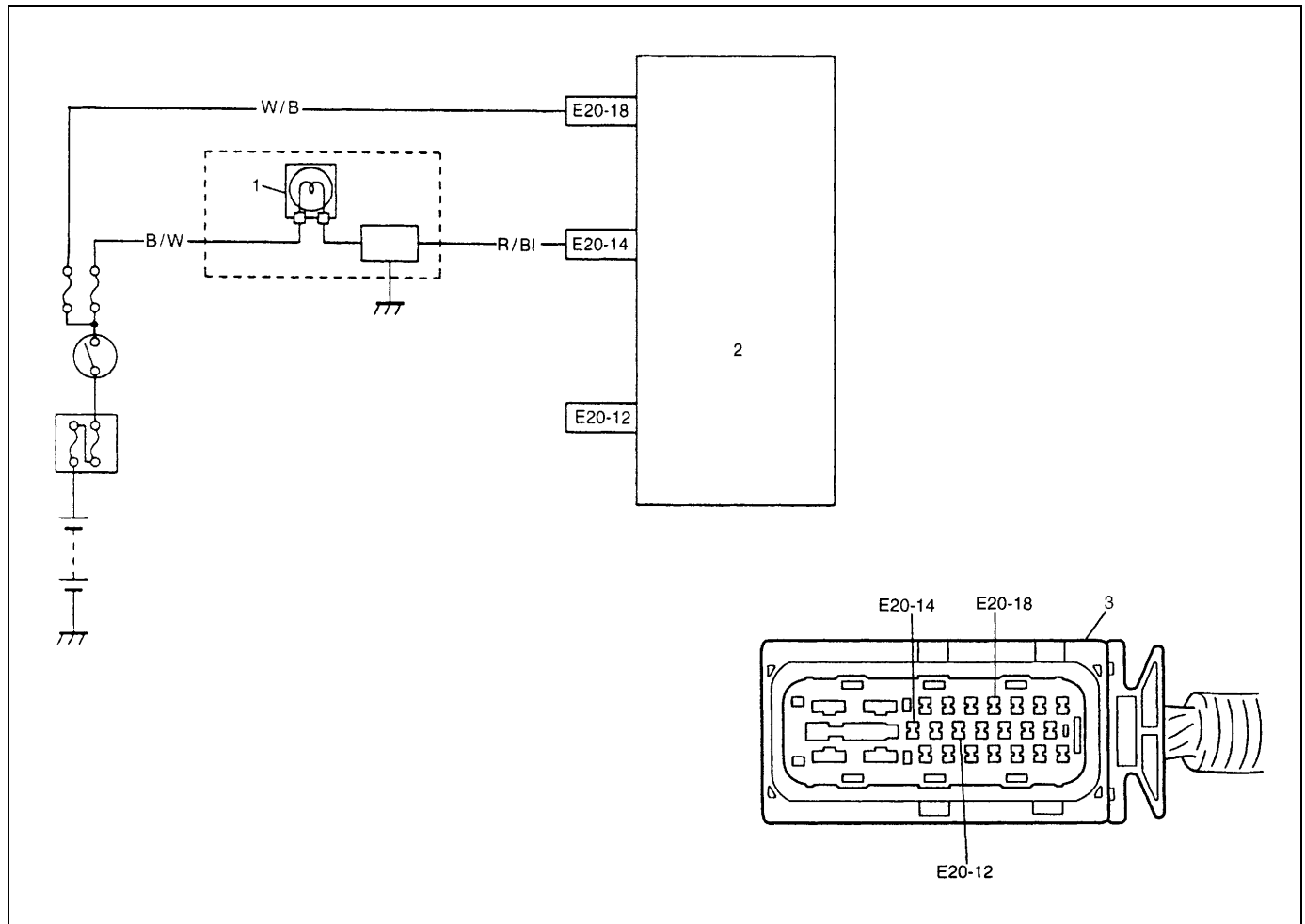
Table – B ABS Warning Lamp Circuit Check – Lamp Comes “ON” Steady

Refer to TABLE – A for System Circuit Diagram and Circuit Description.

INSPECTION

Step	Action	Yes	No
1	Perform diagnostic trouble code check. Is there any DTC (NO CODES on SUZUKI scan tool) exists?	Go to Step 2.	Go to Step 3.
2	Does malfunction DTC exist at Step 1?	Go to Step 7 of “ABS DIAGNOSTIC FLOW TABLE” in this section.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals “E20-14”, “E20-18” and “E20-24”. 3) If OK then ignition switch ON and measure voltage at terminal “E20-18” of connector. Is it 10 – 14 V?	Go to Step 4.	“W/B” circuit open.
4	1) With ABS hydraulic unit/control module connector disconnected, turn ignition switch ON and light ABS warning lamp. 2) Connect terminal “E20-14” of disconnected connector to ground using service wire. Does ABS warning lamp turn off?	Go to Step 5.	“R/BI” circuit open. If wire and connection are OK, replace combination meter (lamp driver module).
5	1) Measure resistance from connector terminal “E20-24” to body ground. Is continuity indicated?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“B” circuit open.

Table – C ABS Warning Lamp Circuit Check – The Lamp Flashes Continuously While Ignition Switch is ON



1. "ABS" warning lamp in combination meter

3. ABS hydraulic unit/control module connector

2. ABS hydraulic unit/control module assembly

INSPECTION

Step	Action	Yes	No
1	1) Check for proper connection to ABS control module at ABS hydraulic unit/control module connector. Is it in good condition?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"E20-12" terminal shorted to ground.

Table – D EBD Warning Lamp (Brake Warning Lamp) Check – Lamp Comes “ON” Steady

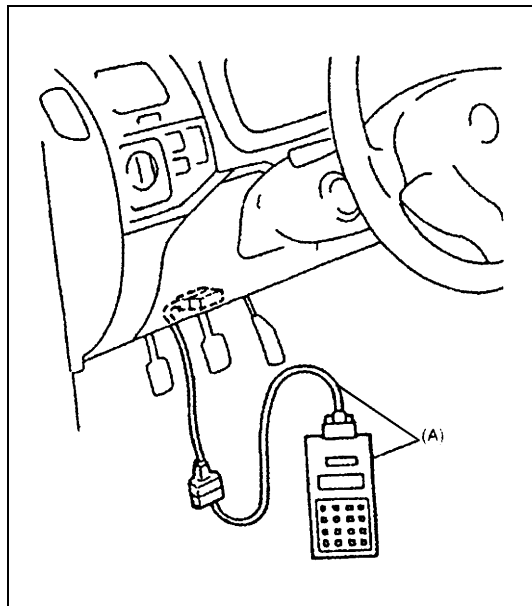
CIRCUIT DESCRIPTION

EBD warning lamp (Brake warning lamp) is controlled by parking brake switch, brake fluid level switch and ABS control module/hydraulic unit assembly through lamp driver module in combination meter. Refer to “TABLE – A” for circuit diagram.

INSPECTION

Step	Action	Yes	No
1	1) Make sure that : <ul style="list-style-type: none"> • Parking brake is completely released. • Brake fluid level is upper than the minimum level. Are the check results OK?	Go to Step 2.	Release parking brake completely and/or replenish brake fluid.
2	Does “ABS” warning lamp come on?	Perform “TABLE – B” previously outlined.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals “E20-10”. 3) If OK, apply chocks to wheels and select gear in neutral position (P range for A/T). 4) Keep brake pedal depressed and start engine. Release parking brake. 5) Connect terminal “E20-10” of disconnected connector to ground using service wire. Does brake warning lamp turn off?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“Or/BI” circuit open. If wire and connection are OK, replace combination meter.

Diagnostic Trouble Code (DTC) Check (Using SUZUKI Scan Tool)



- 1) After setting cartridge for ABS to SUZUKI scan tool, connect SUZUKI scan tool to data link connector.

Special tool

(A) : SUZUKI scan tool

- 2) Turn ignition switch ON.
- 3) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.

NOTE:

If SUZUKI scan tool cannot display DTC, perform "SERIAL DATA LINK CIRCUIT CHECK" described in this section.

- 4) After completing the check, turn ignition switch off and disconnect SUZUKI scan tool from DLC.

Diagnostic Trouble Code (DTC) Clearance

WARNING:

When performing a driving test, select a safe place where there is neither any traffic nor any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.

After repair or replace malfunction part(s), clear all DTCs by performing the following procedure.

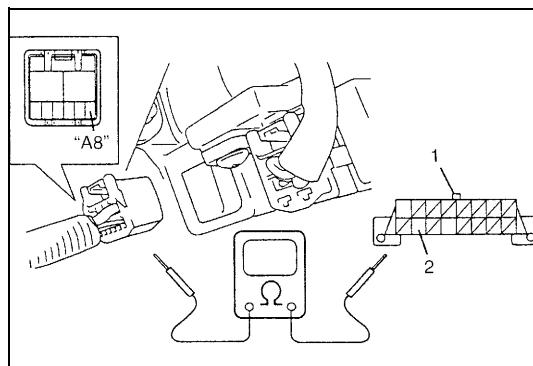
- 1) Connect SUZUKI scan tool to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch ON.
- 3) Erase DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch off and disconnect scan tool from data link connector.

Be sure to perform “SYSTEM CHECK FLOW TABLE” before starting diagnosis according to flow table.

INSPECTION

Step	Action	Yes	No
1	Was "ABS DIAGNOSTIC CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "ABS DIAGNOSTIC CHECK FLOW TABLE" in this section.
2	1) Make sure that SUZUKI scan tool is free from malfunction and correct cartridge for ABS is used. 1) Turn ignition switch to OFF position. 2) Check proper connection of SUZUKI scan tool to DLC. Is connection in good condition?	Go to Step 3.	Properly connect SUZUKI scan tool to DLC.
3	1) Check if communication is possible by trying communication with other controller (ECM, TCM, P/S control module or SDM). Is it possible to communicate with other controller?	Go to Step 4.	Repair open in common section of serial data circuit ("W/R" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("W/R" wire circuit).
4	1) With ignition switch OFF position, disconnect ABS hydraulic unit/control module connector from ABS hydraulic unit/control module. 2) Check proper connection at "E20-21" ("W/R" wire) terminal for serial data circuit. 3) If OK, then check resistance between "E20-21" ("W/R" wire) terminal and "W/R" wire terminal for serial data circuit in DLC. Is resistance 1 Ω or less?	Substitute a known-good P/S control module and recheck.	Repair high resistance or open in "W/R" wire circuit for ANTI LOCK BRAKE system.

Fig. for Step 4



1. DLC
2. "W/R" wire terminal

Diagnostic Trouble Code (DTC) Table**CAUTION:****Be sure to perform “ABS DIAGNOSTIC FLOW TABLE” before starting diagnosis.**

DTC (displayed on SUZUKI scan tool)	DIAGNOSTIC ITEMS	
NO DTC	Normal	
C1013	ABS control module	
C1015	G sensor circuit	
C1021	RF	Wheel speed sensor circuit
C1025	LF	
C1031	RR	
C1035	LR	
C1022	RF	Wheel speed sensor circuit or sensor ring
C1026	LF	
C1032	RR	
C1036	LR	
C1041	RF	Inlet solenoid valve circuit
C1042		Outlet solenoid valve circuit
C1045	LF	Inlet solenoid valve circuit
C1046		Outlet solenoid valve circuit
C1051	RR	Inlet solenoid valve circuit
C1052		Outlet solenoid valve circuit
C1055	LR	Inlet solenoid valve circuit
C1056		Outlet solenoid valve circuit
C1057	Power source	
C1061	ABS pump motor and/or motor relay circuit	
C1063	Fail safe-relay	
C1071	ABS control module	

DTC C1013 – Incorrect ABS Control Module Installed**DESCRIPTION**

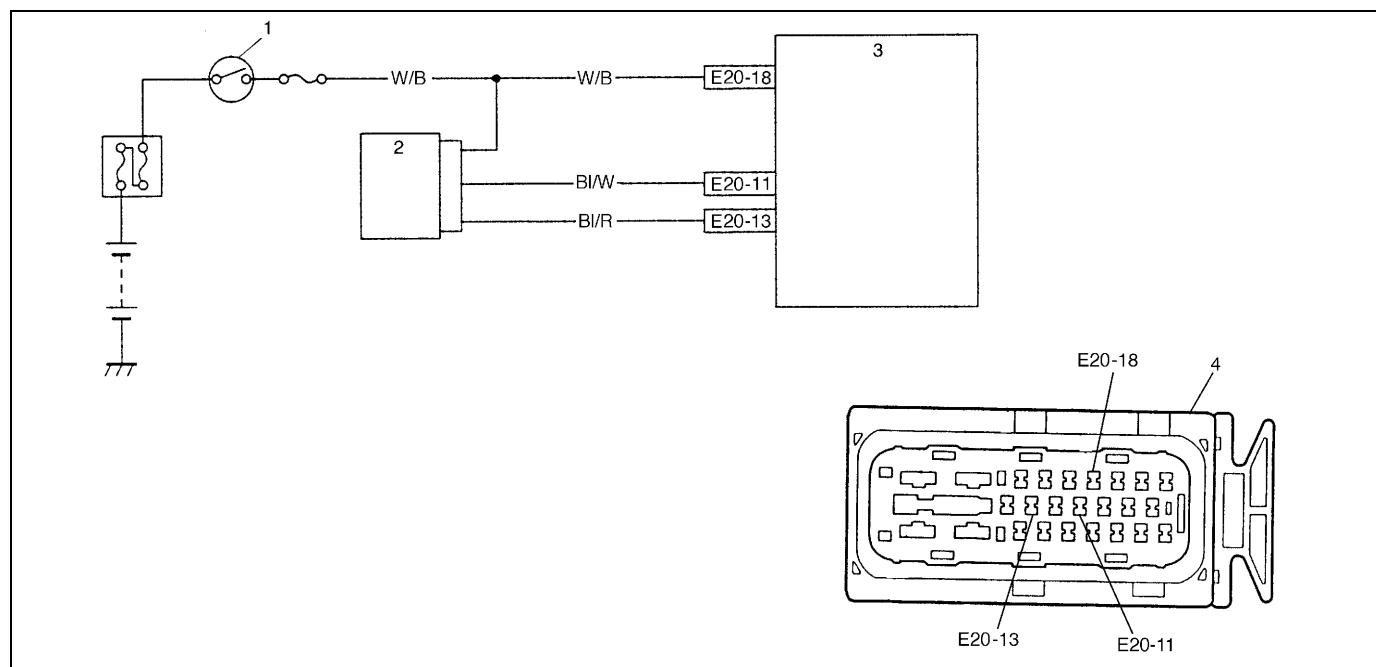
When abnormal signal is inputted to a no-used terminal of control module while running or incorrect ABS hydraulic unit/control module assembly is installed, this DTC will be set.

NOTE:

When ABS hydraulic unit/control module assembly for 2WD vehicle is installed to 4WD vehicle, this DTC is set. Before performing the INSPECTION as shown below, check part number for supply of ABS hydraulic unit/control module assembly referring to parts catalogue.

INSPECTION

- 1) Ignition switch OFF.
- 2) Check for proper connection from harness to control module.
- 3) If OK, substitute an ABS hydraulic unit/control module assembly with correct part number.
- 4) Recheck system.

DTC C1015 – G Sensor Circuit

1. Ignition switch	3. ABS hydraulic unit/control module assembly
2. G sensor	4. ABS hydraulic unit/control module connector

DESCRIPTION

While a vehicle is at stop or running, if the potential difference between the sensor signal terminal “E20-11” and the sensor ground terminal “E20-13” is not within the specified voltage value, or if the signal voltage while at a stop does not vary from that while running, this DTC is set.

Therefore, this DTC may be set when a vehicle is lifted up and its wheel(s) is turned. In such case, clear the DTC and check again.

NOTE:

When ABS hydraulic unit/control module assembly for 4WD vehicle is installed to 2WD vehicle, this DTC is set. Before performing the INSPECTION as shown below, check part number for supply of ABS hydraulic unit/control module assembly referring to parts catalogue.

INSPECTION

Step	Action	Yes	No
1	Is G sensor installed floor securely?	Go to Step 2.	Tighten sensor or bracket screw securely. If not, using new screw.
2	1) Ignition switch OFF. 2) Remove G sensor with bracket. 3) Check for proper connection to G sensor. 4) If OK then check G sensor referring to INSPECTION of "G SENSOR". Is it in good condition?	Go to Step 3.	Replace G sensor.
3	1) Disconnect connectors from ABS hydraulic unit/control module assembly and G sensor. 2) Check for proper connection to ABS control module at terminals "E20-11" and "E20-13". 3) If OK, then turn ignition switch ON and measure voltage between "W/B" terminal of sensor connector and body ground. Is it 10 – 14 V?	Go to Step 4.	"W/B" circuit open.
4	Measure voltage between "ORN" terminal of sensor connector and body ground. Is it 0 V?	Go to Step 5.	"ORN" circuit shorted to power circuit.
5	1) Ignition switch OFF. 2) Check that "BI/W" circuit is free from open or short to ground and "BI/R" circuit. Is it in good condition?	"BI/R" circuit open. If circuit is OK, substitute a known-good ABS hydraulic unit/control module assembly.	"BI/W" circuit open or shorted to ground or "BLK/ORN" circuit.

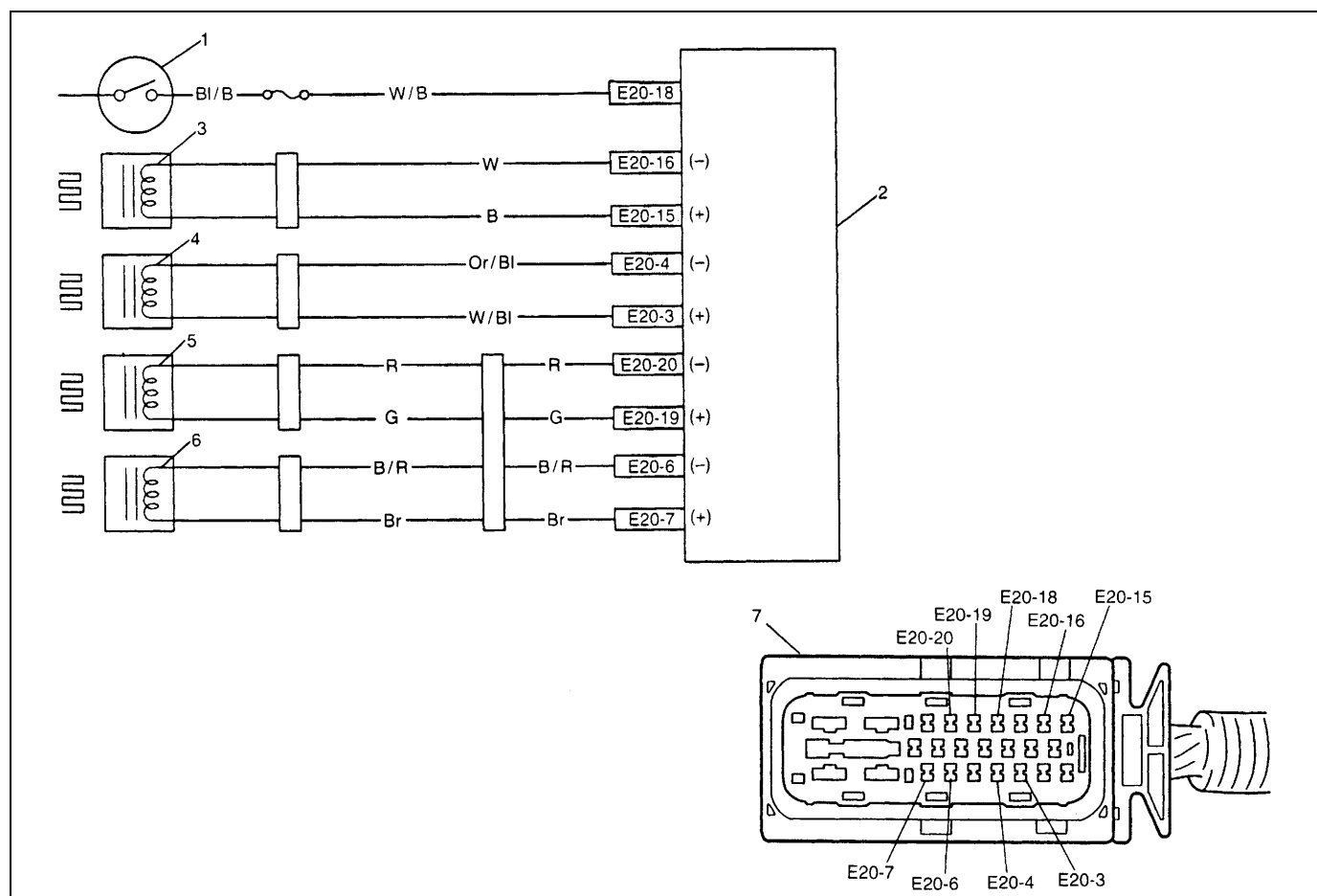
Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>

DTC C1021, DTC C1022 – Right-Front Wheel Speed Sensor Circuit or Sensor Ring

DTC C1025, DTC C1026 – Left-Front Wheel Speed Sensor Circuit or Sensor Ring

DTC C1031, DTC C1032 – Right-Rear Wheel Speed Sensor Circuit or Sensor Ring

DTC C1035, DTC C1036 – Left-Rear Wheel Speed Sensor Circuit or Sensor Ring



1. Ignition switch	4. Right-front wheel speed sensor	7. ABS hydraulic unit/control module connector
2. ABS control module/hydraulic unit assembly	5. Left-rear wheel speed sensor	
3. Left-front wheel speed sensor	6. Right-rear wheel speed sensor	

DESCRIPTION

The ABS control module monitors the voltage at the terminal of each sensor while the ignition switch is ON. When the voltage is not within the specified range, an applicable DTC will be set. Also, when no sensor signal is inputted at starting or while running, an applicable DTC will be set.

NOTE:

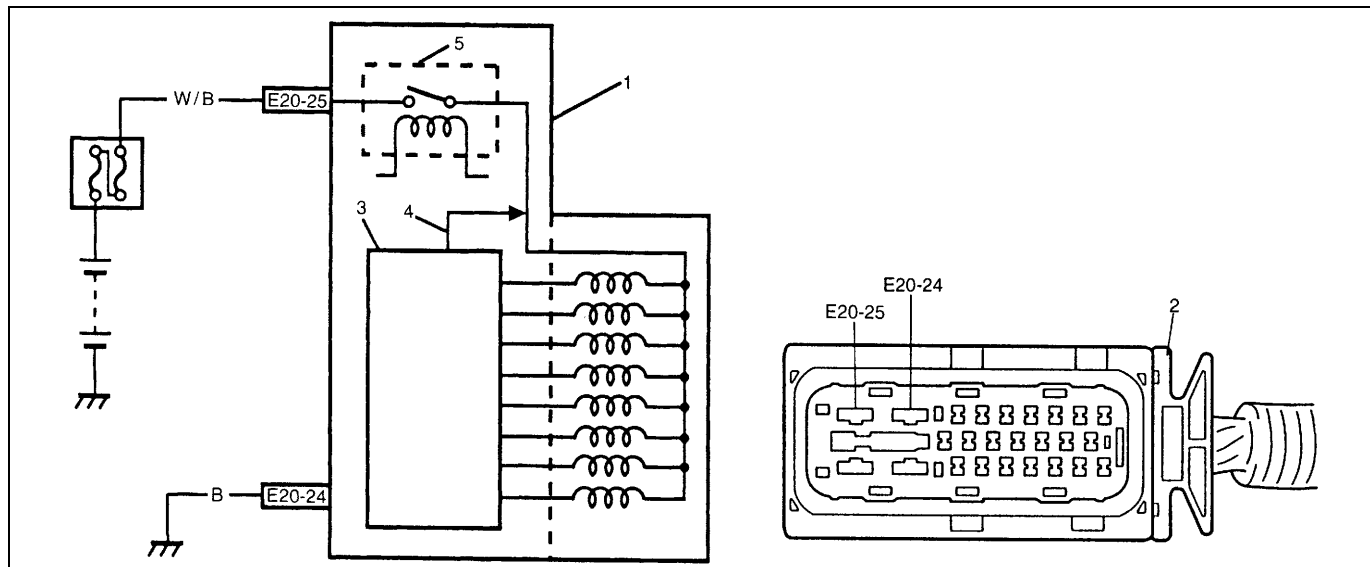
When the vehicle was operated in any of the following ways, one of these DTCs may be set even when the sensor is in good condition. If such possibility is suspected, repair the trouble (dragging of brake, etc.) of the vehicle, clear DTC once and then after performing the driving test as described in Step 2 of "ABS DIAGNOSIS FLOW TABLE", check whether or not any abnormality exists.

- The vehicle was driven with parking brake pulled.
- The vehicle was driven with brake dragging.
- Wheel spin occurred while driving.
- Wheel(s) was turned while the vehicle was jacked up.
- The vehicle was stuck.

INSPECTION

Step	Action	Yes	No
1	1) Disconnect applicable ABS wheel speed sensor coupler with ignition switch OFF. 2) Measure resistance between terminals of ABS wheel speed sensor. Refer to "FRONT WHEEL SPEED SENSOR" and/or "REAR WHEEL SPEED SENSOR" in this section. Is measured resistance value as specified?	Go to Step 2.	Replace ABS wheel speed sensor assembly.
2	1) Turn ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS control module at each sensor terminal. 4) If OK, then turn ignition switch ON and measure voltage between sensor terminal of module connector and body ground. Is it 0V?	Go to Step 3.	ABS wheel speed sensor circuit shorted to power.
3	1) Turn ignition switch OFF. 2) Connect ABS wheel speed sensor coupler. 3) Measure resistance between the following points. <ul style="list-style-type: none"> • Both ABS hydraulic unit/control module connector terminals of the corresponding sensor. This check result should be the same as above Step 1. • Either terminal of wheel speed sensor coupler and body ground. This check result should be no continuity. Are both check results OK?	Go to Step 4.	Circuit open or shorted to ground.
4	1) Remove applicable ABS wheel speed sensor. 2) Check sensor for damage or foreign material attached. Is it in good condition?	Go to Step 5.	Clean, repair or replace.
5	Check front and/or rear sensor ring for the following (remove rear drum as necessary) : <ul style="list-style-type: none"> • Rotor serration (teeth) neither missing nor damaged. • No foreign material being attached. • Rotor not being eccentric. • Wheel bearing free from excessive play. Are they in good condition?	Go to Step 6.	Clean, repair or replace.

Step	Action	Yes	No
6	1) Install ABS wheel speed sensor to knuckle. 2) Tighten sensor bolt to specified torque and check that there is no clearance between sensor and knuckle. Is it OK?	Go to Step 7.	Replace ABS wheel speed sensor.
7	Referring to "Reference" of "FRONT WHEEL SPEED SENSOR" and/or "Reference" of "REAR WHEEL SPEED SENSOR" in this section, check output voltage or waveform. Is specified voltage and/or waveform obtained?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Replace sensor and recheck.

DTC C1041 – Right-Front Inlet Solenoid Circuit**DTC C1045 – Left-Front Inlet Solenoid Circuit****DTC C1051 – Right-Rear Inlet Solenoid Circuit****DTC C1055 – Left-Rear Inlet Solenoid Circuit****DTC C1042 – Right-Front Outlet Solenoid Circuit****DTC C1046 – Left-Front Outlet Solenoid Circuit****DTC C1052 – Right-Rear Outlet Solenoid Circuit****DTC C1056 – Left-Rear Outlet Solenoid Circuit**

1. ABS hydraulic unit/control module assembly	3. ABS control module	5. Fail-safe relay
2. ABS hydraulic unit/control module assembly connector	4. Signal	

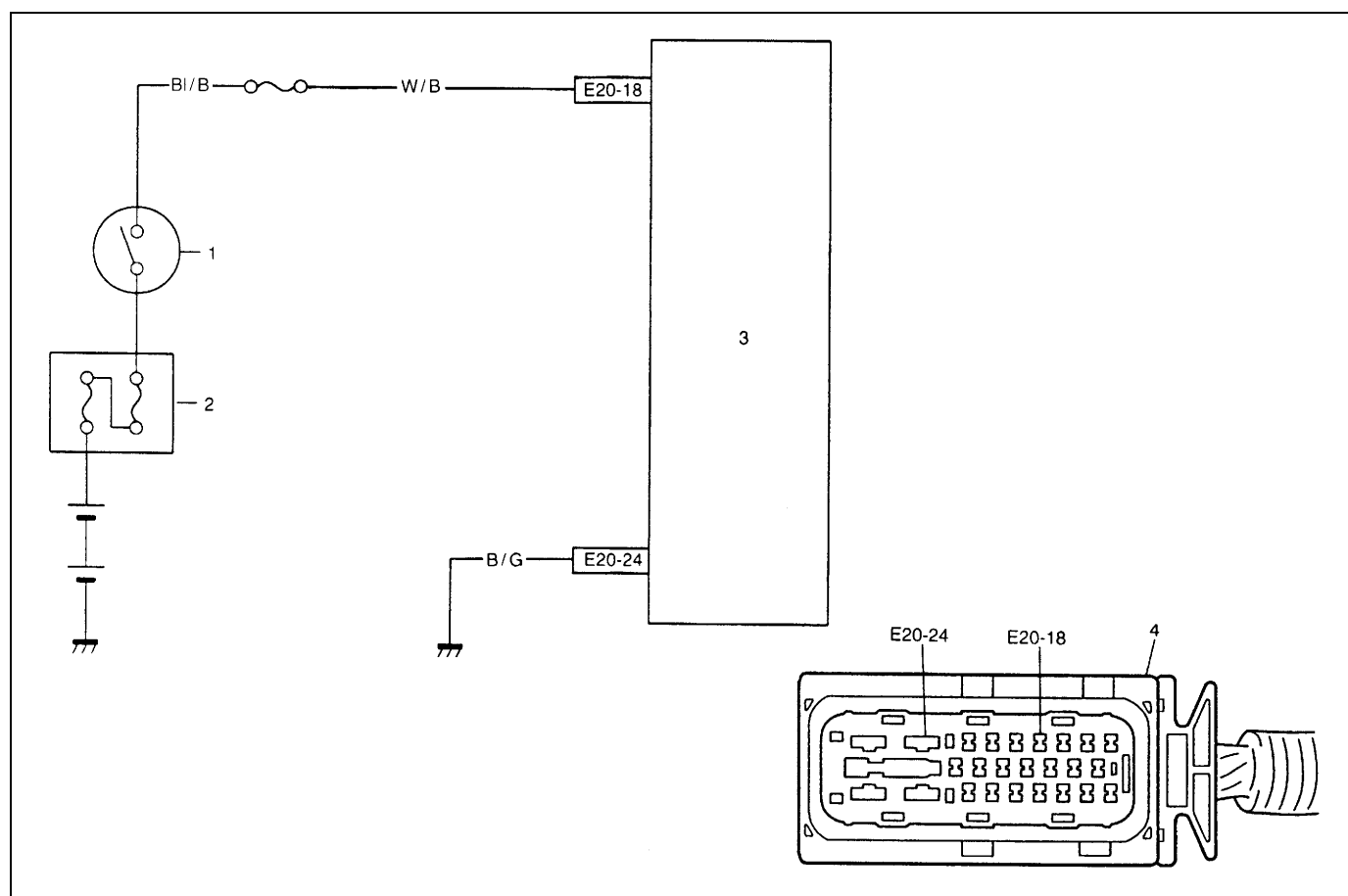
DESCRIPTION

The ABS control module monitors the output from the valve.

When the output of each valve exceeds the specified value compared with the signal sent from ABS control module, this DTC is set.

INSPECTION

Step	Action	Yes	No
1	1) Check solenoid operation referring to item "ABS HYDRAULIC UNIT OPERATION CHECK" in this section. Is it in good condition?	Check terminal "E20-25" connection. If connection is OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 2.
2	1) Turn ignition switch to OFF position. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal "E20-25". 4) If OK, then measure voltage between terminal "E20-25" of module connector and "E20-24". Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"WHT/BLU" or "BLK" circuit open.

DTC C1057 – Power Source Circuit

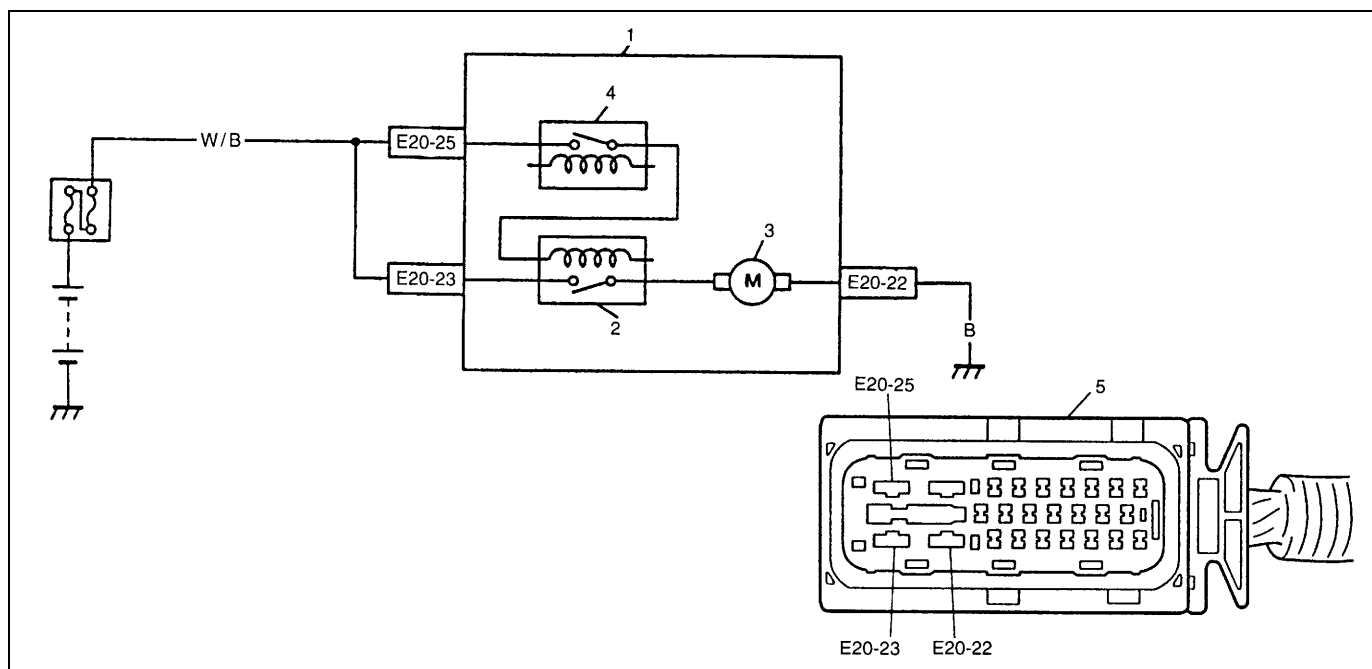
1. Ignition switch	3. ABS hydraulic unit/control module assembly
2. Main fuse	4. ABS hydraulic unit/control module connector

DESCRIPTION

The ABS control module monitors the power source voltage at terminal “E20-18”. When the power source voltage becomes extremely high or low, this DTC will be set. As soon as the voltage rises or lowers to the specified level, the set DTC will be cleared.

INSPECTION

Step	Action	Yes	No
1	1) Connect a voltmeter between battery positive (+) terminal and body ground. 2) Start the engine and measure the maximum voltage when racing the engine. Is it over 18 V?	Check charging system referring to “CHARGING SYSTEM” section.	Go to Step 2.
2	1) Disconnect ABS hydraulic unit/control module connector. 2) Keep the engine idling, measure the voltage between terminal “E20-18” of ABS control module and body ground. Is it always under 9 V?	Check charging system referring to “CHARGING SYSTEM” section. Imperfect short between wire “W/B” and ground.	Poor connection of terminal “E20-18” or “E20-24” of the ABS control module. If the above are in good condition, substitute a known-good ABS hydraulic unit/control module and recheck.

DTC C1061 – ABS Pump Motor Circuit

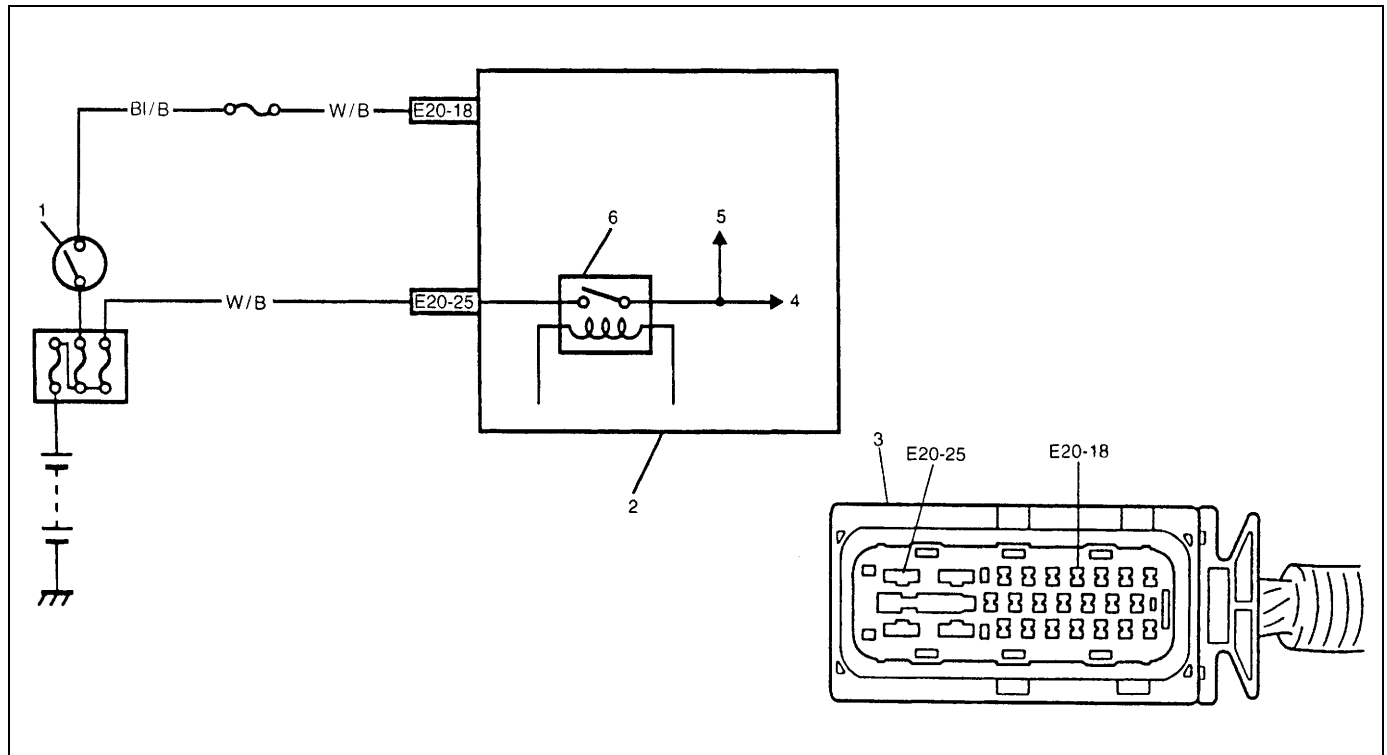
1. ABS hydraulic unit/control module assembly	3. ABS pump motor	5. ABS hydraulic unit/control module connector
2. ABS pump motor relay	4. ABS fail safe relay	

DESCRIPTION

The ABS control module monitors the voltage at monitor terminal of pump motor circuit constantly with the ignition switch turned ON. It sets this DTC when the voltage at the monitor terminal does not become high/low according to ON/OFF commands to the motor relay of the module (does not follow these commands).

INSPECTION

Step	Action	Yes	No
1	1) Check pump motor referring to "ABS HYDRAULIC UNIT OPERATION CHECK" in this section. Is it in good condition?	Check terminals "E20-25" and "E20-23" connection. If connections OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 2.
2	1) Turn Ignition switch to OFF position. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal "E20-23". 4) If OK, then measure voltage between terminal "E20-23" of module connector and body ground. Is it 10 – 14 V?	Go to Step 3.	"W/B" circuit open.
3	Measure resistance between terminal "E20-22" of ABS hydraulic unit/control module connector and body ground. Is it infinite (∞)?	"B" circuit open.	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

DTC C1063 – ABS Fail-Safe Relay Circuit

1. Ignition switch	3. ABS hydraulic unit/control module connector	5. To pump motor relay
2. ABS hydraulic unit/control module assembly	4. To solenoid valves	6. Fail-safe relay

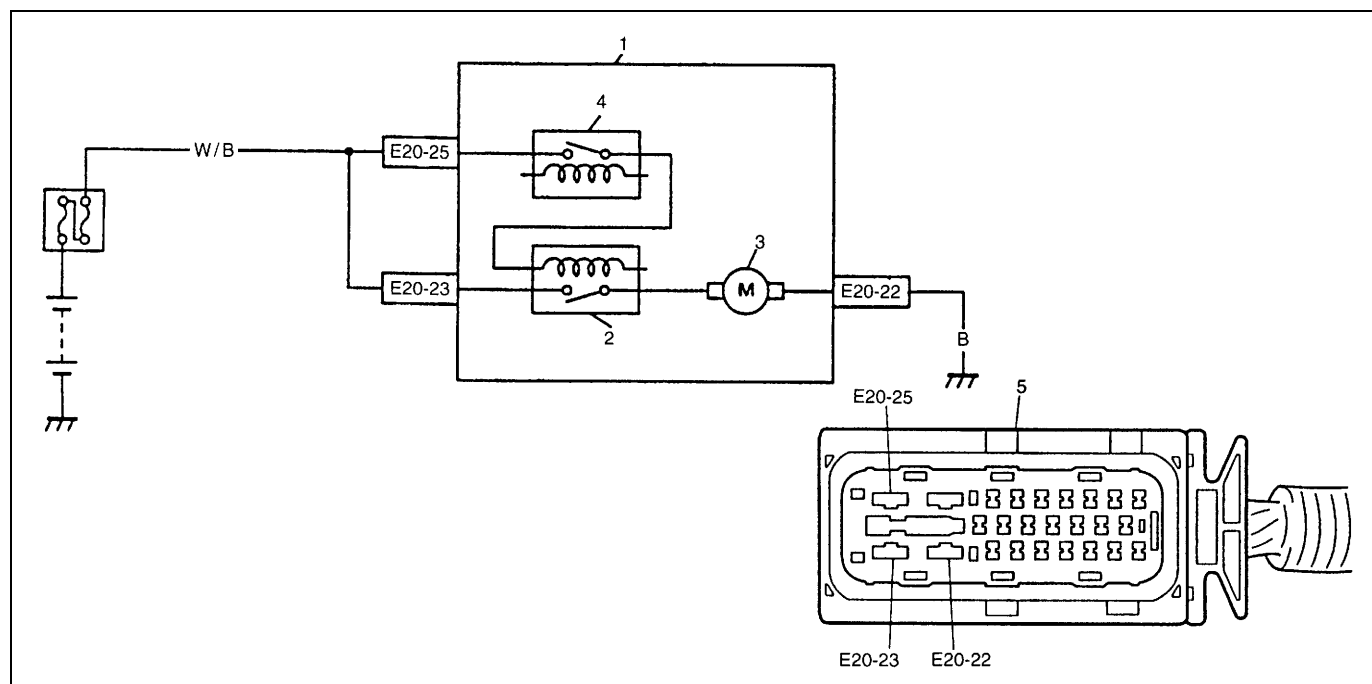
DESCRIPTION

ABS control module monitors the voltage at the terminal of solenoid circuit constantly with ignition switch turned ON. Also, immediately after ignition switch is turned ON, perform initial check as follows.

Switch fail-safe relay in the order of OFF → ON and check if voltage changes to Low → High. If anything faulty is found in the initial check and when the voltage is low with ignition switch turned ON, this DTC will be set.

INSPECTION

Step	Action	Yes	No
1	Check battery voltage. Is it about 11 V or higher?	Go to Step 2.	Check charging system referring to "CHARGING SYSTEM" section.
2	Check ABS main fuse and connection. Is it in good condition?	Go to Step 3.	Repair and/or replace fuse.
3	1) Turn ignition switch to OFF position. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check proper connection to ABS hydraulic unit/control module at terminal "E20-25". 4) If OK, then measure voltage between connector terminal "E20-25" and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"W/B" circuit open or short to ground.

DTC C1071 – ABS Control Module

1. ABS hydraulic unit/control module assembly	3. ABS pump motor	5. ABS hydraulic unit/control module connector
2. ABS pump motor relay	4. ABS fail safe relay	

DESCRIPTION

This DTC will be set when an internal malfunction is detected in the ABS control module.

INSPECTION

Step	Action	Yes	No
1	Clear all DTCs and check DTC. Is it DTC C1071?	Go to Step 2.	Could be a temporary malfunction of the ABS control module.
2	1) Check proper connection of ABS hydraulic unit/control module connector. 2) If OK, disconnect ABS hydraulic unit/control module connector and check the followings. • Voltage "E20-25" terminal : 10 – 14 V • Resistance between "E20-22" and body ground : Continuity Are the check result as specified above?	Replace ABS hydraulic unit/control module assembly.	Repair and recheck.

On-Vehicle Service

Precautions

When connector is connected to ABS hydraulic unit/control module assembly, do not disconnect connectors of sensors with ignition switch ON. Then DTC will be set in ABS control module.

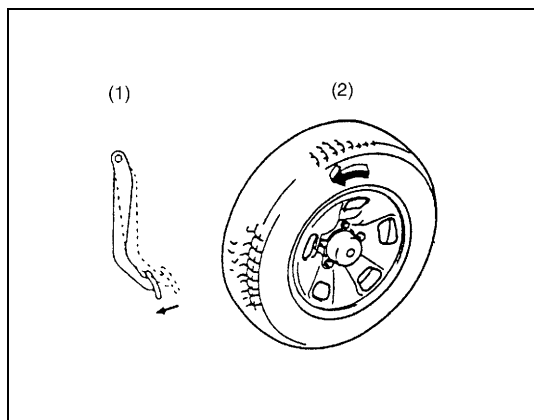
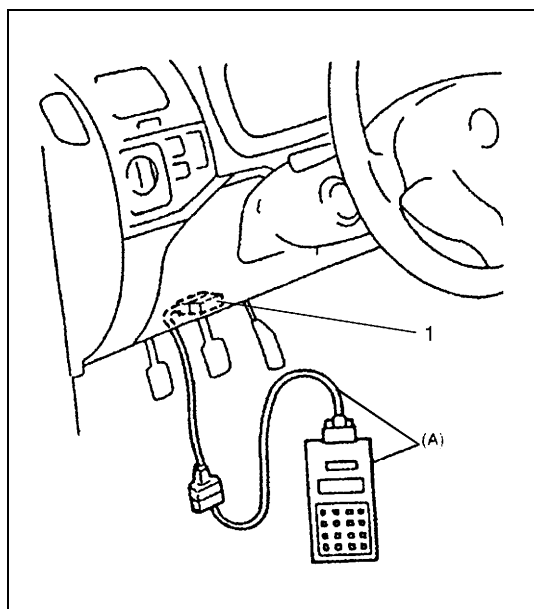
ABS Hydraulic Unit Operation Check (Using SUZUKI Scan Tool)

- 1) Check that basic brake system other than ABS is in good condition.
- 2) Check that battery voltage is 11 V or higher.
- 3) Lift up vehicle.
- 4) Set transmission to neutral and release parking brake.
- 5) Turn each wheel gradually by hand to check if brake dragging occurs. If it does, correct.
- 6) Remove steering column hole cover.
- 7) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A) : SUZUKI scan tool

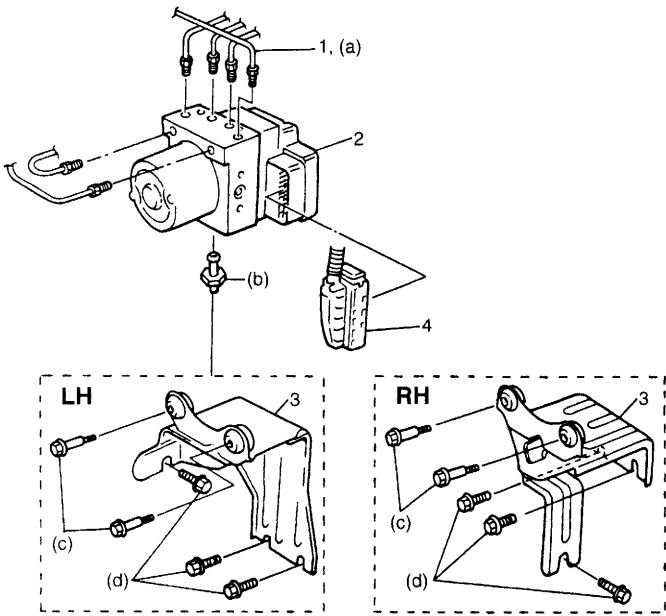
- 8) Turn ignition switch to ON position and select menu to "HYDRAULIC CONTROL TEST" under "miscellaneous test" ("MISC. TEST") mode of SUZUKI scan tool.



- 9) Perform the following checks with help of another person.
 Brake pedal (1) should be depressed and then select testing wheel by SUZUKI scan tool and the wheel (2) should be turned by another person's hand. At this time, check that:
 - Operation sound of solenoid is heard and the wheel turns only about 0.5 sec. (Brake force is depressurized).
 - Operation sound of pump motor is heard and pulsation is felt at brake pedal.
- 10) Check for all 4-wheels condition respectively. If a faulty condition is found, replace hydraulic unit/control module assembly.
- 11) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.

ABS Hydraulic Unit/Control Module Assembly

CAUTION:
Never disassemble ABS hydraulic unit/control module assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS hydraulic unit/control module assembly.

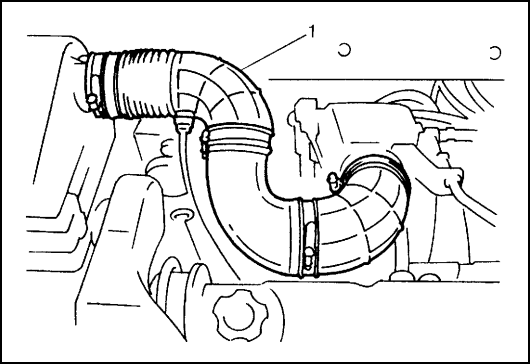


1. Brake pipe	3. Bracket
2. ABS hydraulic unit/control module assembly	4. Connector

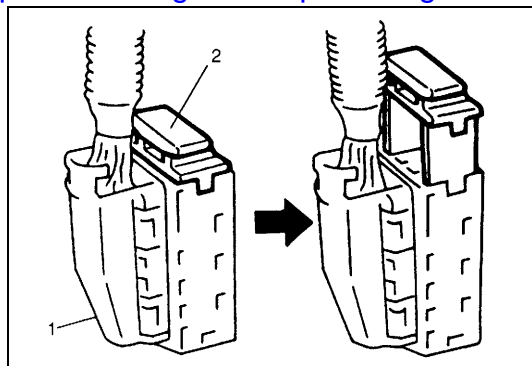
HYDRAULIC UNIT INSPECTION

Check hydraulic unit for fluid leakage.
If any, repair or replace.

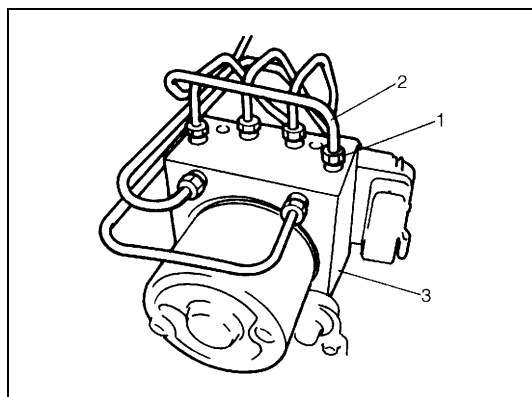
REMOVAL



- 1) Disconnect negative cable from battery.
- 2) For LH vehicle, remove air cleaner outlet pipe (1) referring to “Engine Mechanical” section.



- 3) Disconnect ABS hydraulic unit/control module assembly connector (1) by pulling up lock (2).

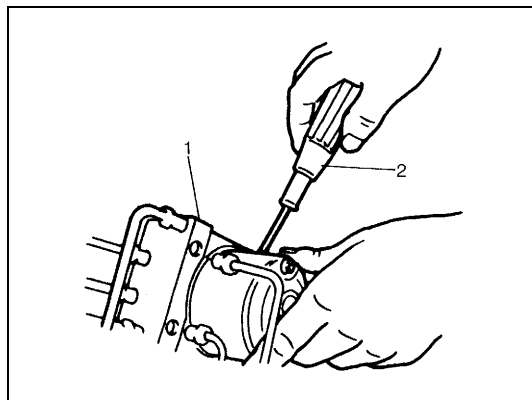


- 4) Using special tool, loosen flare nuts (1) and disconnect brake pipes (2) from ABS hydraulic unit/control module assembly (3).

Special tool
: 09950-78220

NOTE:

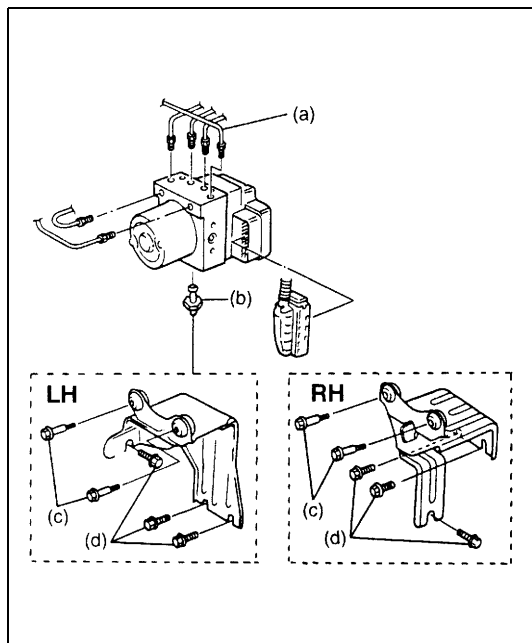
Put bleeder plug cap onto pipe to prevent fluid from spilling. Do not allow brake fluid to get on painted surfaces.



- 5) Remove two nuts and disconnect take out ABS hydraulic unit/control module assembly (1) from bracket using screwdriver (2).

CAUTION:

- Do not give an impact to hydraulic unit.
- Use care not to allow dust to enter hydraulic unit.
- Do not place hydraulic unit on its side or upside down. Handling it in inappropriate way will affect its original performance.



INSTALLATION

- 1) Install hydraulic unit by reversing removal procedure.

Tightening torque

(a) : 16 N·m (1.6 kg-m, 11.5 lb-ft)

(b) : 9 N·m (0.9 kg-m, 6.5 lb-ft)

(c) : 9 N·m (0.9 kg-m, 6.5 lb-ft)

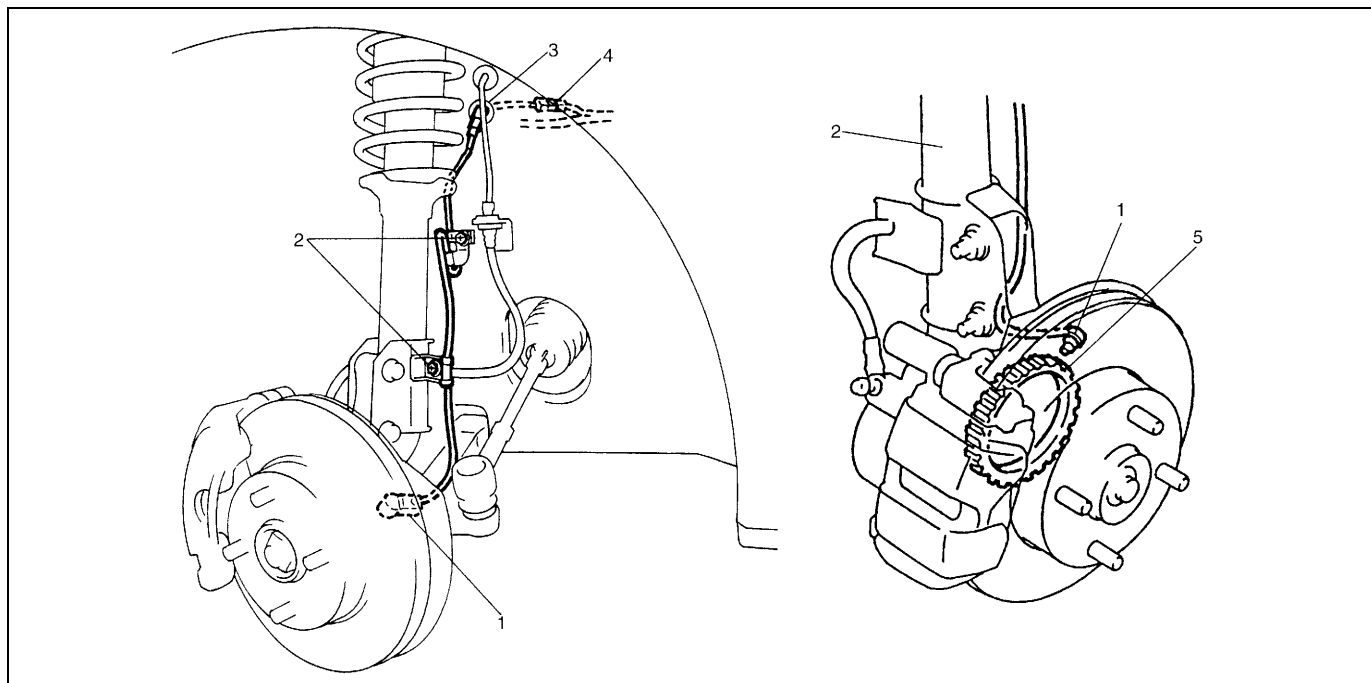
(d) : 26 N·m (2.6 kg-m, 18.0 lb-ft)

- 2) Bleed air from brake system referring to "BRAKE" section.
3) Check each installed part for fluid leakage and perform "ABS Hydraulic Unit Operation Check" in this section.

NOTE:

For new ABS hydraulic unit/control module assembly, if "ABS Hydraulic Unit Operation Check" procedure has not been performed, "ABS" warning lamp may flash when ignition switch is turned ON position.

Front Wheel Speed Sensor



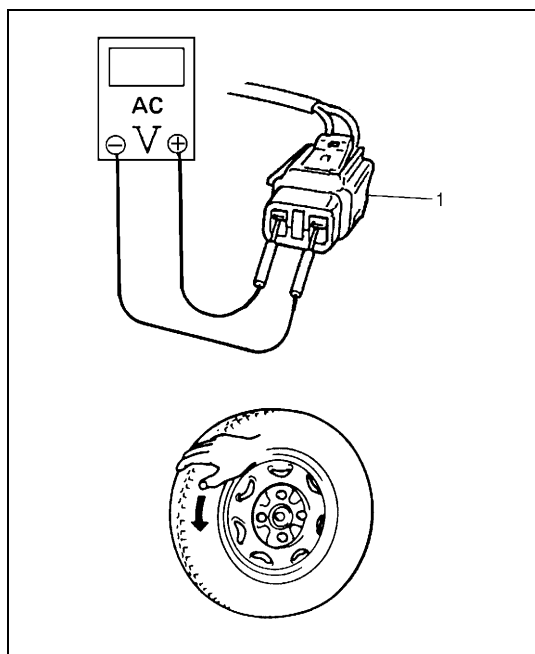
1. Left front wheel speed sensor	3. Grommet	5. Sensor ring
2. Clamp bolt	4. Connector	

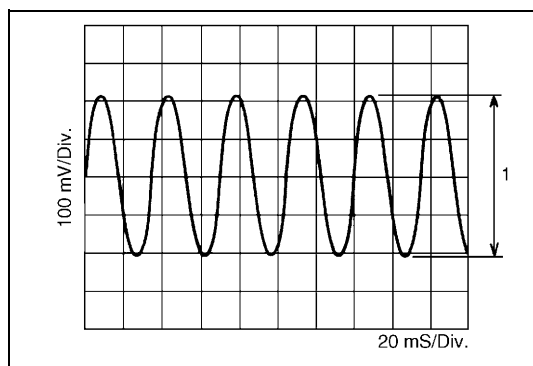
OUTPUT VOLTAGE INSPECTION

- 1) Turn ignition switch OFF.
- 2) Hoist vehicle a little.
- 3) Disconnect wheel speed sensor connector.
- 4) Disconnect wheel speed sensor grommet from vehicle body.
- 5) Connect voltmeter between connector (1) terminals.
- 6) While turning wheel by hand at a speed of approximately 1 full rotation to 1 1/3 rotation per second, check AC voltage of sensor.

**Output AC voltage at 1 to 1 1/3 rotation per second
: 100 mV or more**

- 7) If measured voltage is not as specified, check sensor, rotor and their installation conditions.



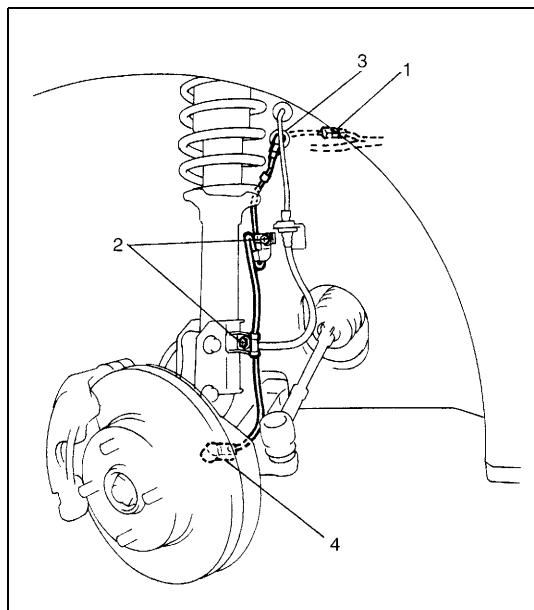
Reference

When using oscilloscope for this check, check if peak-to-peak voltage (1) meets specification and waveform is complete.

**Peak-to-peak voltage at 1 to 1 1/3 rotation per second
: 280 mV or more at 43 – 57 Hz**

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disconnect front wheel speed sensor coupler (1).
- 3) Hoist vehicle and remove wheel.
- 4) Remove harness clamp bolts (2) and grommet (3).
- 5) Remove front wheel speed sensor (4) from knuckle.

**CAUTION:**

- Do not pull wire harness when removing front wheel speed sensor.
- Do not cause damage to surface of front wheel speed sensor and do not allow dust, etc. to enter its installation hole.

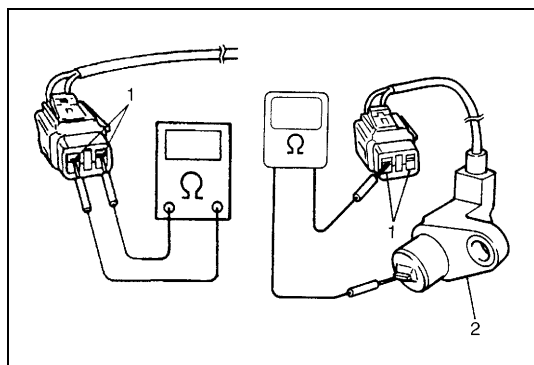
SENSOR INSPECTION

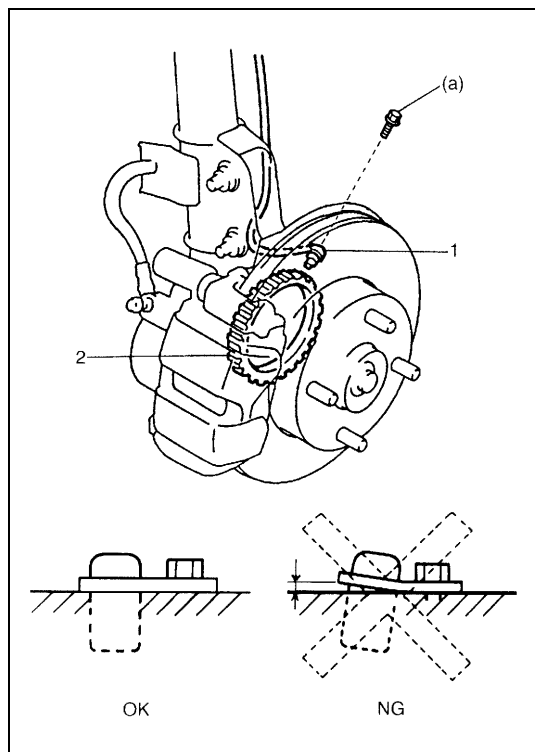
- Check sensor for damage.
- Check sensor for resistance and continuity.

**Between both terminals (1) sensor
: 1.2 – 1.6 k Ω at 20°C (68°F)**

**Between sensor terminal and sensor body (2)
: No continuity**

- If the check result is not as specified and any malfunction is found, replace.



INSTALLATION

- 1) Check that no foreign material is attached to sensor (1) and sensor ring (2).
- 2) Install it by reversing removal procedure.

Tightening torque**Front wheel speed sensor bolt****(a) : 10 N·m (1.0 kg-m, 7.5 lb-ft)****CAUTION:**

Do not pull or twist wire harness more than necessary when installing front wheel speed sensor.

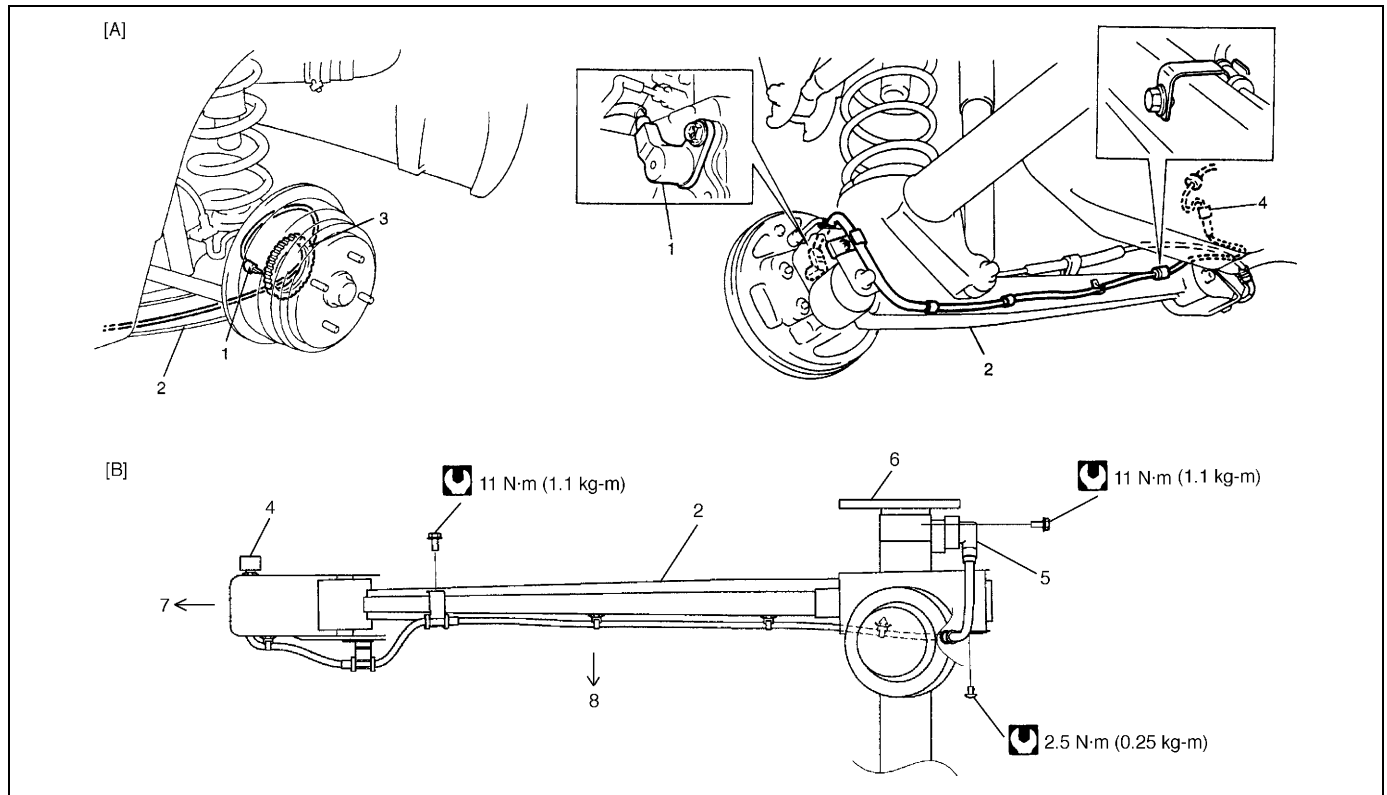
- 3) Check that there is no clearance between sensor and knuckle.

Front Wheel Speed Sensor Ring**NOTE:**

The front wheel sensor ring can not be removed or replaced alone. If front wheel sensor ring needs to be replaced, replace it as a wheel side joint assembly of drive shaft.

For removal and installation of wheel side joint assembly of drive shaft, refer to "FRONT DRIVE SHAFT" section.

Rear Wheel Speed Sensor



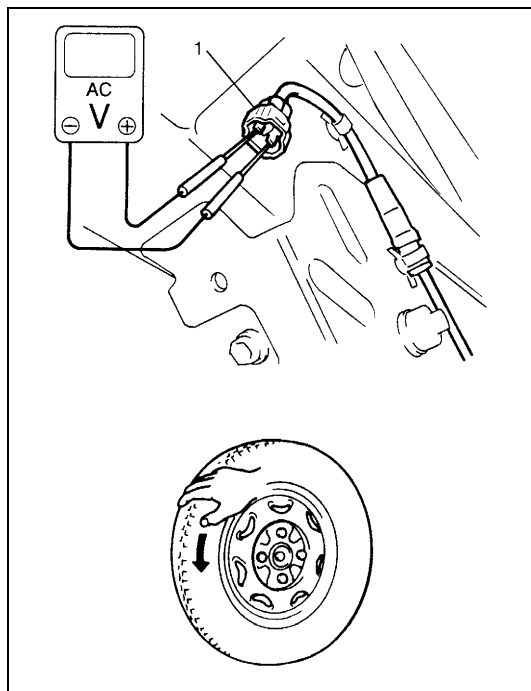
1. Left rear wheel sensor	3. Sensor ring	5. Right rear wheel sensor	7. Forward	[A] : For 2WD
2. Trailing arm	4. Sensor coupler	6. Rear axle housing	8. Vehicle inside	[B] : For 4WD

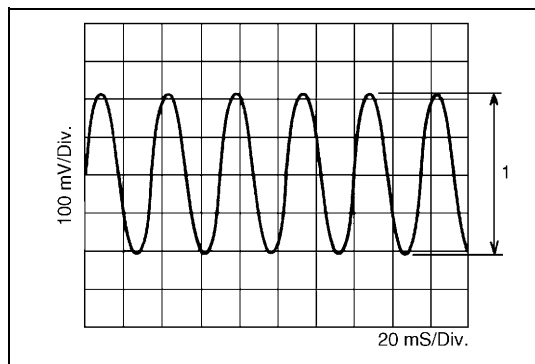
OUTPUT VOLTAGE INSPECTION

- 1) Turn ignition switch OFF.
- 2) Remove rear seat referring to Section 9.
- 3) Turn over floor carpet.
- 4) Hoist vehicle.
- 5) Disconnect connector of wheel speed sensor.
- 6) Connect voltmeter between connector (1) terminals.
- 7) While turning wheel at a speed of approximately 1/2 rotation to 1 rotation per second, check AC voltage of sensor.

Output AC voltage at 1 to 1 1/3 rotation per second
100 mV or more

- 8) If measured voltage is not as specified, check sensor, rotor and their installation conditions.



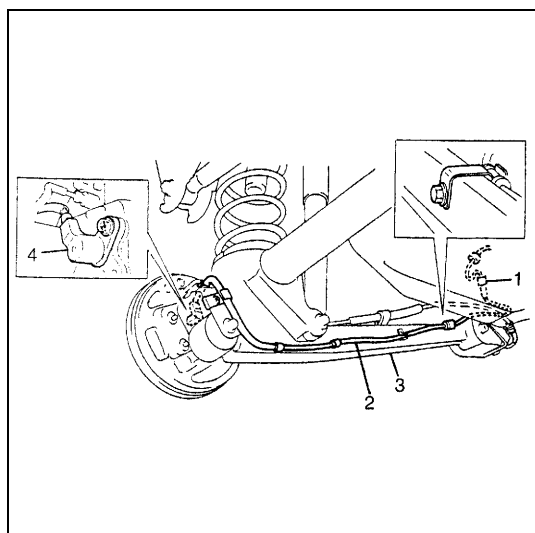
Reference

When using oscilloscope for this check, check if peak-to-peak voltage (1) meets specification and waveform is complete.

**Peak-to-peak voltage at 1 to 1 1/3 rotation per second
280 mV or more at 20 Hz**

REMOVAL

- 1) Disconnect negative cable from battery.
 - 2) Hoist vehicle.
 - 3) Disconnect rear wheel speed sensor coupler (1).
 - 4) Detach ABS wheel sensor wire harness (2) from suspension frame (3).
- Do not detach clip of rear wheel speed sensor connector from vehicle body unless replacement is necessary.
- 5) Remove rear wheel speed sensor (4) from rear axle housing.

**CAUTION:**

- Do not pull wire harness when removing rear wheel speed sensor.
- Do not cause damage to surface of rear wheel speed sensor and do not allow dust, etc. to enter its installation hole.

SENSOR INSPECTION

- Check sensor for damage.
- Check sensor for resistance and continuity.

Between both terminals of sensor

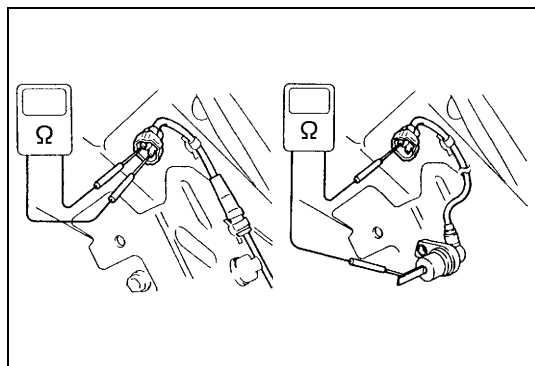
2WD vehicle : 0.9 – 1.3 k Ω at 20°C (68°F)

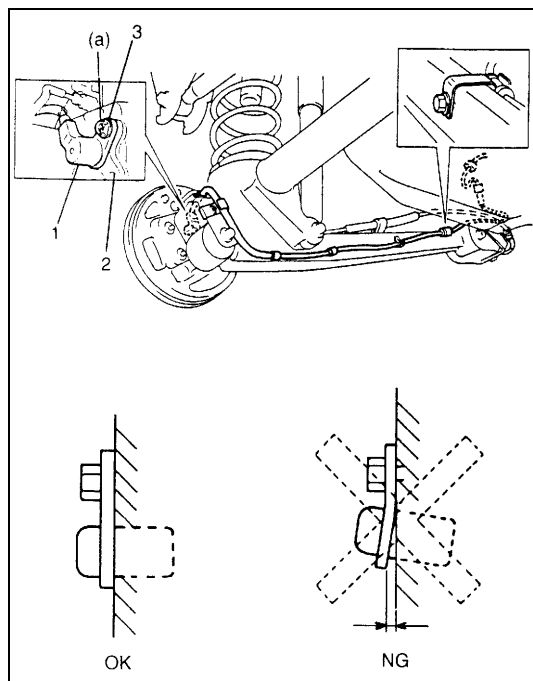
4WD vehicle : 1.2 – 1.6 k Ω at 20°C (68°F)

Between sensor terminal and sensor body

: No continuity

- If the check result is not as specified and any malfunction is found, replace.



INSTALLATION

- 1) Check that no foreign material is attached to sensor (1) and ring.
- 2) Reverse removal procedure for installation noting the following.
 - There is another bolt hole (2) that is fit for wheel speed sensor bolt by proper bolt hole (3).
 Be sure to install wheel speed sensor and its bolt at the correct (upper) position as shown in figure.

Tightening torque

(a) : 10 N·m (1.0 kg-m, 7.2 lb-ft)

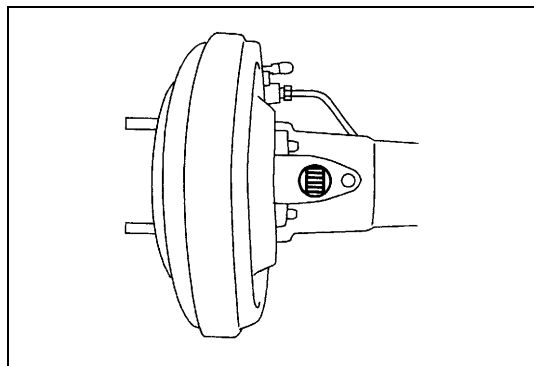
CAUTION:

Do not pull or twist wire harness more than necessary when installing rear wheel speed sensor.

- 3) Check that there is no clearance between sensor and rear axle shaft.

Rear Wheel Speed Sensor Ring (For 2WD vehicle)

For removal, inspection and installation of rear wheel sensor ring, refer to "BRAKE DRUM" in Section 5C.

Rear Wheel Speed Sensor Ring (For 4WD vehicle)**INSPECTION**

- Check rotor serration (teeth) for being missing damaged or deformed.
- Turn wheel and check if rotor rotation is free from eccentricity and looseness.
- Check that no foreign material is attached.
- If any faulty is found, repair or replace.

REMOVAL/INSTALLATION**NOTE:**

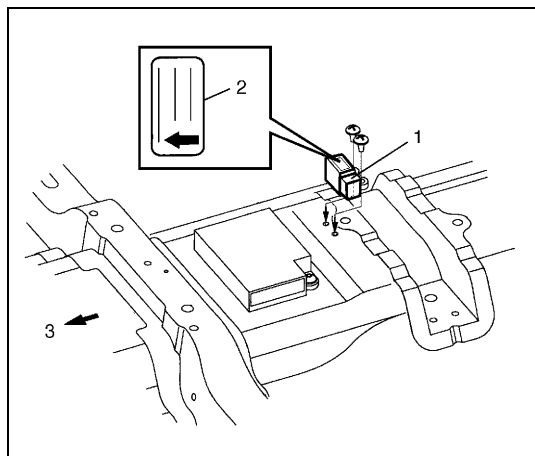
The rear wheel speed sensor ring can not be removed or replaced alone. If rear wheel speed sensor ring needs to be replaced, replace it as a retainer ring of rear axle shaft.

For removal and installation of retainer ring of rear axle shaft, refer to "REAR AXLE SHAFT AND WHEEL BEARING" in Section 3E.

G Sensor (For 4WD Vehicle Only)

REMOVAL

- 1) Turn ignition switch OFF and disconnect battery negative cable.
- 2) Remove center console box.
- 3) Remove G sensor (1) from floor.
- 4) Disconnect connector from sensor.



CAUTION:

Sensor must not be dropped or shocked. It will affect its original performance.

- | |
|------------|
| 2. Label |
| 3. Forward |

INSPECTION

Connect positive cable of 12 volt battery to "A" terminal of sensor and ground cable to "C" terminal. Then using voltmeter, check voltage between "B" terminal and "C" terminal.

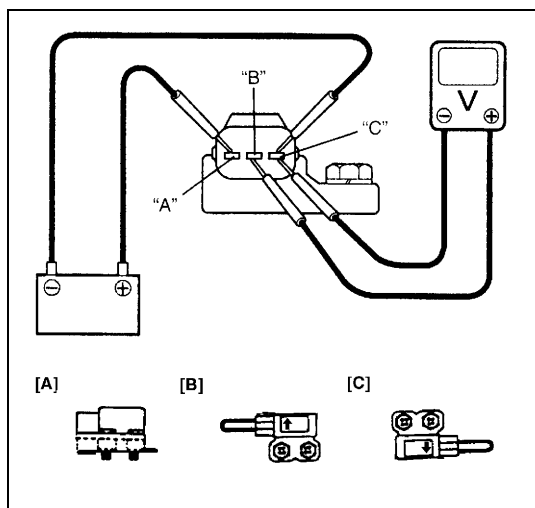
G sensor specification

When placed horizontally : 2 – 3 V

When placed upright with arrow upward : 3 – 4 V

When placed upright with arrow downward : 1 – 2 V

If measured voltage is not as specified, replace sensor.



- | |
|-----------------------------------|
| [A] : Horizontal |
| [B] : Upright with arrow upward |
| [C] : Upright with arrow downward |

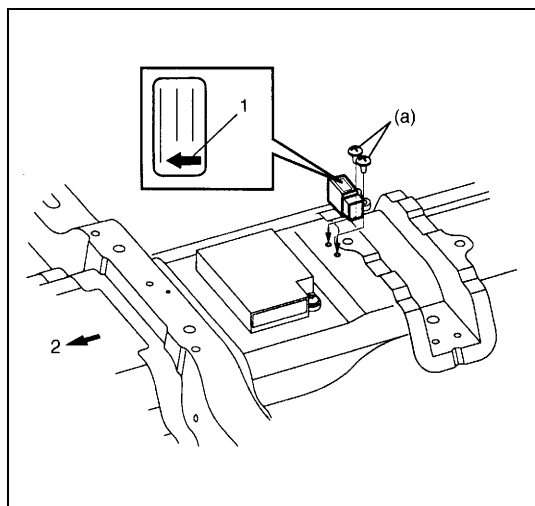
INSTALLATION

- 1) Connect connector to sensor securely.
- 2) Install sensor onto floor so that arrow mark (1) directs vehicle forward (2). Tighten bolts to specified torque.

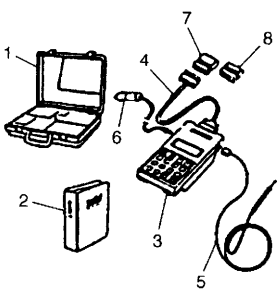
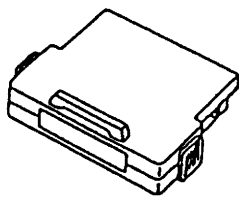
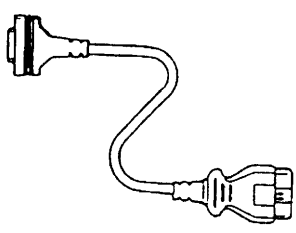
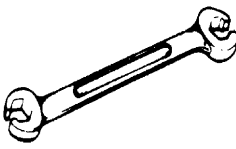
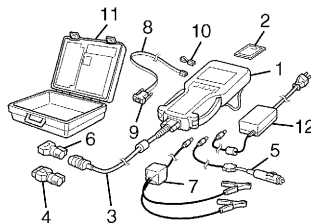
Tightening torque

G sensor bolt (a) : 3.0 N·m (0.3 kg-m, 2.2 lb-ft)

- 3) Install rear console box.
- 4) Connect negative cable at battery.



Special Tool

 <p>09931-76011 Tech 1A kit (SUZUKI scan tool) See NOTE "A" below.</p>	 <p>Mass storage cartridge for Tech 1A</p>	 <p>09931-76030 16/14 pin DLC cable for Tech 1A</p>	 <p>09950-78220 Flare nut wrench (10 mm)</p>
 <p>Tech 2 kit (SUZUKI scan tool) See NOTE "B" below.</p>			

NOTE:

- **"A"** : This kit includes the following items and substitutes for the Tech 2 kit.
1. Storage case, 2. Operator's manual, 3. Tech 1A, 4. DLC cable, 5. Test lead/probe, 6. Power source cable, 7. DLC cable adaptor, 8. Self-test adaptor
- **"B"** : This kit includes the following items and substitutes for the Tech 1A kit.
1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 6

ENGINE

6

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual. However, bear the following in mind when checking DTC (Diagnostic Trouble Code).

Be sure to use SUZUKI scan tool whenever checking DTC because this vehicle has no monitor connector for Engine and emission control system and DTC can not be displayed by malfunction indicator lamp (MIL) flashing.

SECTION 6E

ENGINE AND EMISSION CONTROL SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual. However, bear the following in mind when checking DTC (Diagnostic Trouble Code).

Be sure to use SUZUKI scan tool whenever checking DTC because this vehicle has no monitor connector for Engine and emission control system and DTC can not be displayed by malfunction indicator lamp (MIL) flashing.

SECTION 6F1**IGNITION SYSTEM
(ELECTRONIC IGNITION SYSTEM)****6F1****WARNING:****For vehicles equipped with Supplemental Restraint (Air Bag) System:**

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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Ignition spark test	6F1-5	Ignition timing	6F1-7
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General description

The ignition system is an electronic (distributorless) ignition system. It consists of the parts as described below and has an electronic ignition control system.

- ECM

It detects the engine and vehicle conditions through the signals from the sensors, determines the most suitable ignition timing and time for electricity to flow to the primary coil and sends a signal to the ignitor (power unit) in the ignition coil assembly.

- Ignition coil assembly (including an ignitor)

The ignition coil assembly has a built-in ignitor which turns ON and OFF the current flow to the primary coil according to the signal from ECM. When the current flow to the primary coil is turned OFF, a high voltage is induced in the secondary coil.

- High tension cords and spark plugs.

- CMP sensor (Camshaft position sensor) and CKP sensor (Crankshaft position sensor)

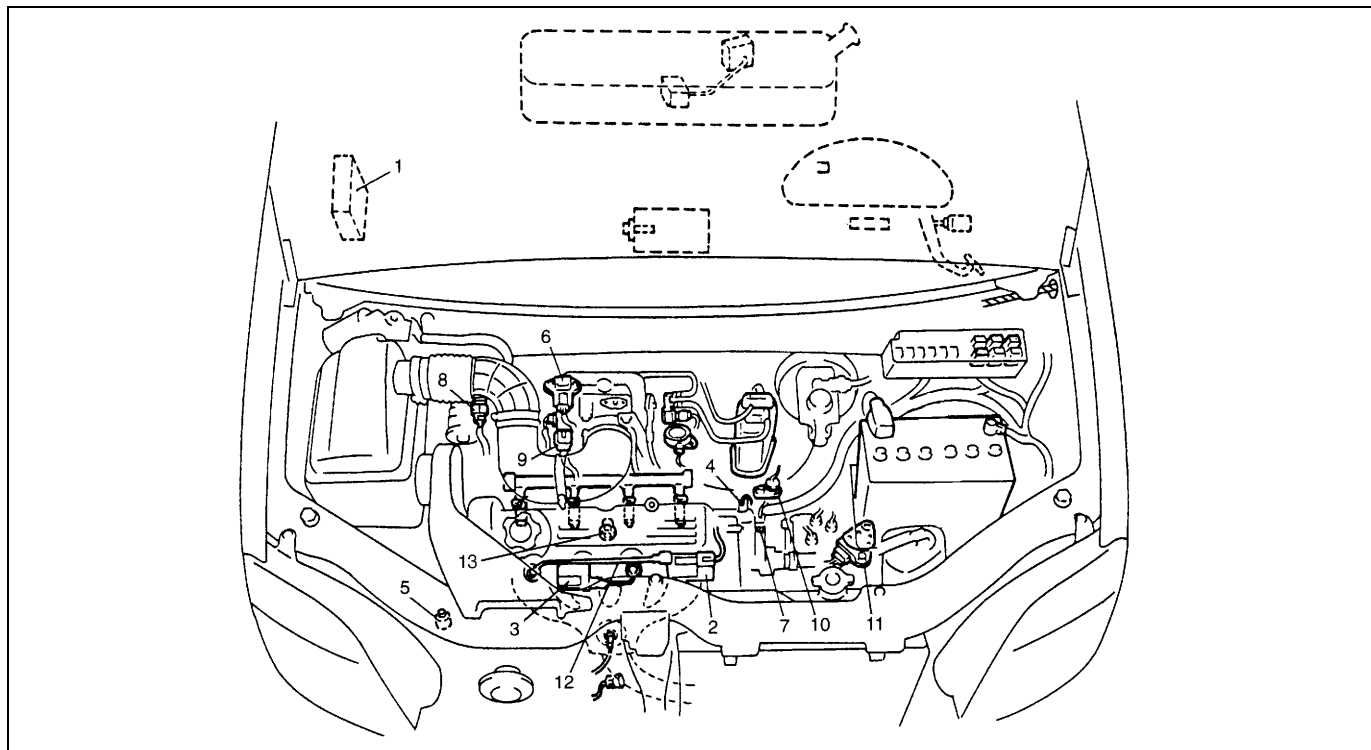
Using signals from these sensors, ECM identifies the specific cylinder whose piston is in the compression stroke and detects the crank angle.

- TP sensor, ECT sensor, MAP sensor and other sensors/switches

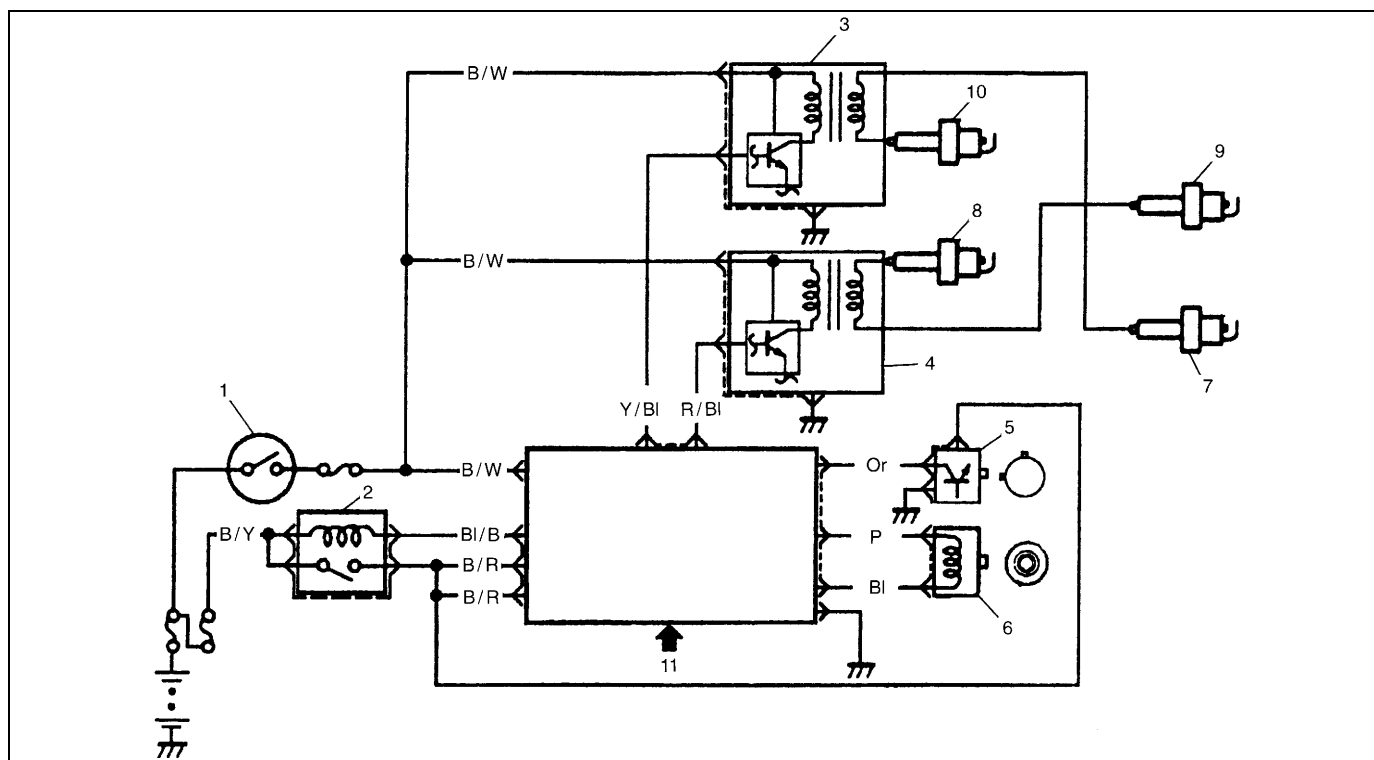
Refer to section 6E for details.

Although this ignition system does not have a distributor, it has two ignition coil assemblies (one is for No.1 and No.4 spark plugs and the other is for No.2 and No.3 spark plugs). When an ignition signal is sent from ECM to the ignitor in the ignition coil assembly for No.1 and No.4 spark plugs, a high voltage is induced in the secondary coil and that passes through the high-tension cords and causes No.1 and No.4 spark plugs to spark simultaneously. Likewise, when an ignition signal is sent to the ignitor in the other ignition coil assembly, No.2 and No.3 spark plugs spark simultaneously.

SYSTEM COMPONENTS



1. ECM	6. MAP sensor	11. Transmission range switch (A/T)
2. Ignition coil assembly for No.1 and No.4 spark plugs	7. ECT sensor	12. High-tension cords
3. Ignition coil assembly for No.2 and No.3 spark plugs	8. IAT sensor	13. Knock sensor
4. CMP sensor	9. TP sensor	
5. CKP sensor	10. VSS	

SYSTEM WIRING DIAGRAM

1. Ignition switch	7. No.1 spark plug
2. Main relay	8. No.2 spark plug
3. Ignition coil assembly for No.1 and No.4 spark plugs	9. No.3 spark plug
4. Ignition coil assembly for No.2 and No.3 spark plugs	10. No.4 spark plug
5. CMP sensor	11. Sensed information (MAP sensor, ECT sensor, IAT sensor, TP sensor, Knock sensor, VSS, Park/Neutral position signal, Electric load signal, Engine start signal)
6. CKP sensor	

Diagnosis

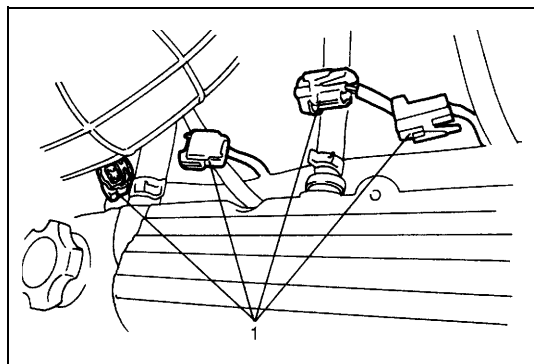
Condition	Possible Cause	Correction
Engine cranks, but will not start or hard to start	No spark	
	Blown fuse for ignition coil	Replace.
	Loose connection or disconnection of lead wire or high-tension cord(s)	Connect securely.
	Faulty high-tension cord(s)	Replace.
	Faulty spark plug(s)	Adjust, clean or replace.
	Faulty ignition coil	Replace ignition coil assembly.
	Faulty CKP sensor or crankshaft timing belt pulley	Clean, tighten or replace.
Poor fuel economy or engine performance	Faulty ECM	Replace.
	Incorrect ignition timing	Check related sensors and crankshaft timing belt pulley.
	Faulty spark plug(s) or high-tension cord(s)	Adjust, clean or replace.
	Faulty ignition coil assembly	Replace.
	Faulty CKP sensor or crankshaft timing belt pulley	Clean, tighten or replace.
	Faulty ECM	Replace.

IGNITION SYSTEM DIAGNOSTIC FLOW TABLE

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in section 6.
2	Ignition Spark Test 1) Check all spark plugs for condition and type referring to "Spark Plugs" section. 2) If OK, perform ignition spark test, referring to "Ignition Spark Test" section. Is spark emitted from all spark plugs?	Go to Step 11.	Go to Step 3.
3	Diagnostic Trouble Code (DTC) Check Is DTC stored in ECM?	Go to applicable DTC Diag. Flow Table in section 6.	Go to Step 4.
4	Electrical Connection Check 1) Check ignition coil assemblies and high-tension cords for electrical connection. Are they connected securely?	Go to Step 5.	Connect securely.
5	High-Tension Cords Check 1) Check high-tension cord for resistance referring to "High-Tension Cords" section. Is check result satisfactory?	Go to Step 6.	Replace high-tension cord(s).
6	Ignition Coil Assembly Power Supply and Ground Circuit Check 1) Check ignition coil assembly power supply and ground circuits for open and short. Are circuits in good condition?	Go to Step 7.	Repair or replace.
7	Ignition Coil Assembly Check 1) Check ignition coil for resistance referring to "Ignition Coil Assembly" section. Is check result satisfactory?	Go to Step 8.	Replace ignition coil assembly.
8	Crankshaft Position (CKP) Sensor Check 1) Check crankshaft position sensor referring to Step 3 and 4 of DTC P0335 Diag. Flow Table in section 6. Is check result satisfactory?	Go to Step 9.	Tighten CKP sensor bolt, replace CKP sensor or crankshaft timing belt pulley.
9	Ignition Trigger Signal Circuit Check 1) Check ignition trigger signal wire for open, short and poor connection. Is circuit in good condition?	Go to Step 10.	Repair or replace.
10	A Known-good Ignition Coil Assembly Substitution 1) Substitute a known-good ignition coil assembly and then repeat Step 2. Is check result of Step 2 satisfactory?	Go to Step 11.	Substitute a known-good ECM and then repeat Step 2.
11	Ignition Timing Check 1) Check initial ignition timing and ignition timing advance referring to "Ignition Timing" section. Is check result satisfactory?	System is in good condition.	Check CKP sensor, crankshaft timing belt pulley (signal rotor) and input signals related to this system.

On-vehicle service

Ignition spark test



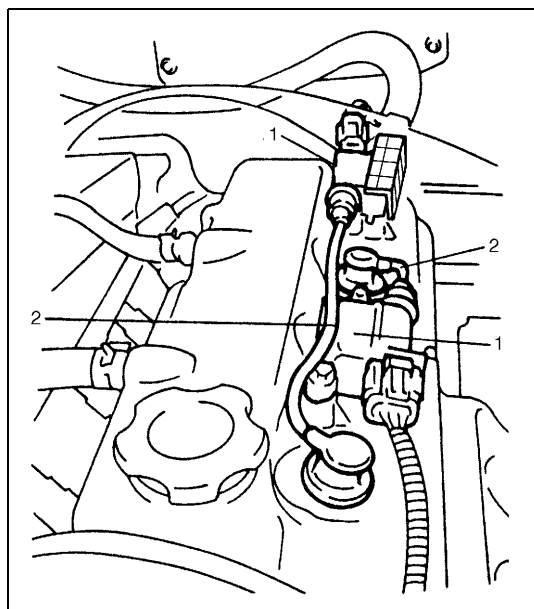
- 1) Disconnect all injector couplers (1) from injectors.

WARNING:

Without disconnection of injector couplers, combustible gas may come out from spark plug holes during this test and may get ignited in engine room.

- 2) Remove spark plug and check it for condition and type referring to "Spark Plugs" in this section.
- 3) If OK, connect ignition coil coupler to ignition coil assembly and connect spark plug to ignition coil assembly or high-tension cord. Ground spark plug.
- 4) Crank engine and check if each spark plug sparks.
- 5) If no spark is emitted, inspect the related parts as described under "Diagnosis" earlier in this section.

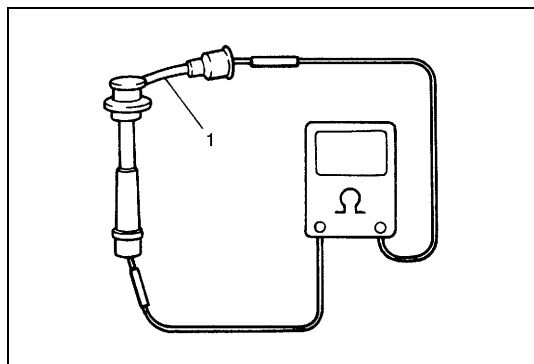
High-tension cords



- 1) Disconnect high-tension cords (2) from ignition coil assemblies (1) while gripping each cap.
- 2) Pull out high-tension cords from spark plugs while gripping each cap.

CAUTION:

- Removal of high-tension cords together with clamps will be recommended so as not to damage their inside wire (resistive conductor).
- For the same reason, pull out each connection by gripping cap portion.

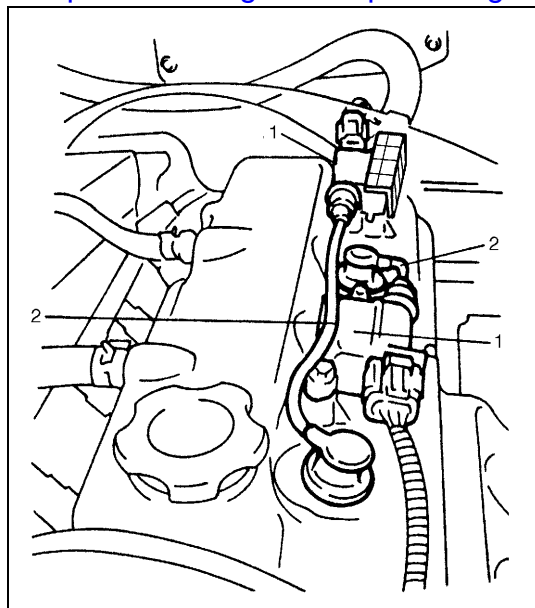


- 3) Measure resistance of high-tension cord (1) by using ohmmeter.

High-tension cord resistance

: 10 – 22 k Ω /m (3.0 – 6.7 k Ω /ft)

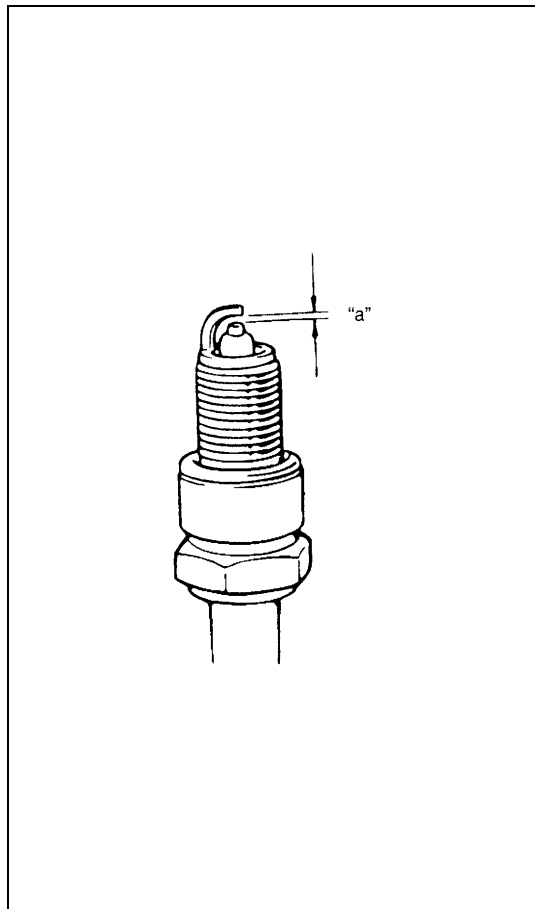
- 4) If resistance exceeds specification, replace high-tension cord(s).



- 5) Install high-tension cords (2) to spark plugs and ignition coil assemblies (1) while gripping each cap.

CAUTION:

- Never attempt to use metal conductor high-tension cords as replacing parts.
- Insert each cap portion fully when installing high-tension cords.

Spark plugs

- 1) Pull out high-tension cords by gripping their caps and then remove ignition coil assemblies referring to IGNITION COIL ASSEMBLY in this section.
- 2) Remove spark plugs.
- 3) Inspect them for:
 - Electrode wear
 - Carbon deposits
 - Insulator damage
- 4) If any abnormality is found, adjust air gap, clean with spark plug cleaner or replace them with specified new plugs.

Spark plug air gap

"a" : 1.0 – 1.1 mm (0.040 – 0.043 in.)

Spark plug type

NGK : BKR6E-11

DENSO : K20PR-U11

- 5) Install spark plugs and torque them to specification.

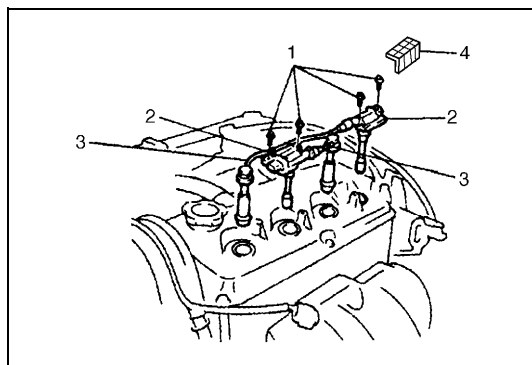
Tightening Torque for spark plug

28 N·m (2.8 kg-m, 20.0 lbft)

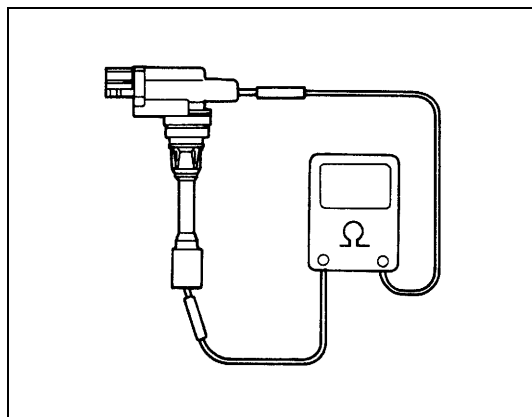
- 6) Install ignition coil assemblies referring to IGNITION COIL ASSEMBLY in this section.
- 7) Install high-tension cords securely by gripping their caps.

Ignition coil assembly (including ignitor)

Inspection



- 1) Disconnect negative cable at battery.
- 2) Pull out ignition coil cover (4).
- 3) Disconnect ignition coil coupler.
- 4) Disconnect high-tension cord (3) from ignition coil assembly (2).
- 5) Remove ignition coil bolts (1) and then pull out ignition coil assembly.



- 6) Measure secondary coil for resistance.

Secondary coil resistance

: 8.5 – 11.5 kΩ at 20°C, 68°F

If resistance is out of specification, replace ignition coil assembly.

- 7) Install ignition coil assembly.
- 8) Tighten ignition coil bolts, and then connect ignition coil coupler.
- 9) Install high-tension cord to ignition coil assembly while gripping its cap.
- 10) Install ignition coil cover certainly to ignition coil assembly.

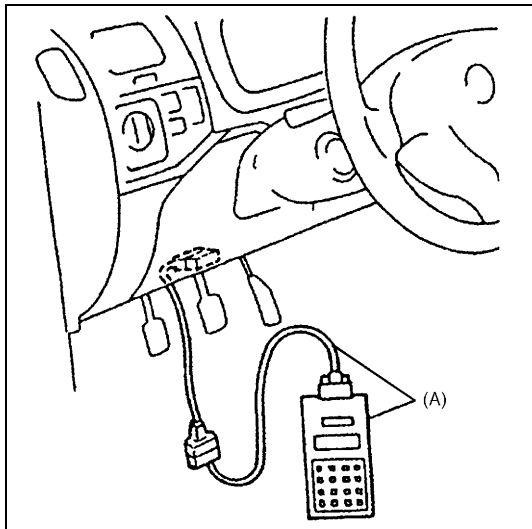
Crankshaft position sensor (CKP sensor)

Refer to section 6E for removal, inspection and installation.

Ignition timing

NOTE:

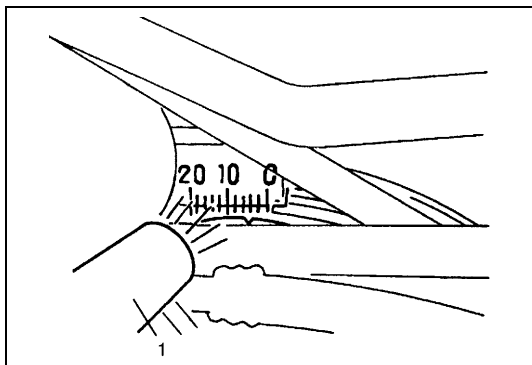
- Ignition timing is not adjustable. If ignition timing is out of specification, check system related parts.
- Before starting engine, place transmission gear shift lever in “Neutral” (shift selector lever to “P” range for A/T model), and set parking brake.

INSPECTION

- 1) Connect SUZUKI scan tool to DLC with ignition switch OFF.

Special tool**(A): SUZUKI scan tool**

- 2) Start engine and warm it up to normal operating temperature.
- 3) Make sure that all of electrical loads except ignition are switched off.
- 4) Check to be sure that idle speed is within specification.
(Refer to SECTION 6E)

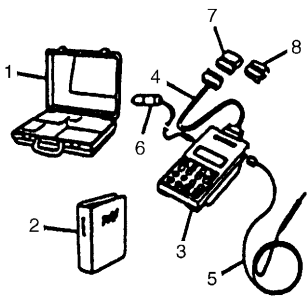
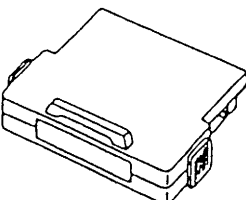
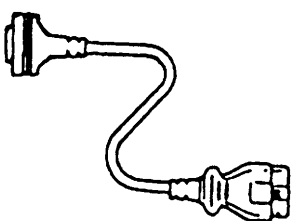
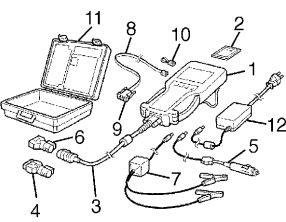


- 5) Select "MISC" mode on SUZUKI scan tool and fix ignition timing to initial one.
- 6) Open air cleaner upper case and shift upper case and hose position to observe ignition timing.
- 7) Using timing light (1), check that ignition timing is within specification.

Initial ignition timing (fixed with SUZUKI scan tool)**: $5 \pm 3^\circ$ BTDC at idle speed****Ignition order****: 1-3-4-2**

- 8) If ignition timing is out of specification, check the followings:
 - CKP sensor
 - Crankshaft timing belt pulley (signal rotor)
 - TP sensor
 - VSS
 - Timing belt cover installation
- 9) After checking Initial Ignition Timing, release ignition timing fixation by using SUZUKI scan tool.
- 10) With engine idling (throttle opening at closed position and car stopped), check that ignition timing is about 9° – 15° BTDC. (Constant variation within a few degrees from 9° – 15° indicates no abnormality but proves operation of electronic timing control system.) Also, check that increasing engine speed advances ignition timing.
If above check results are not satisfactory, check CKP sensor and ECM.
- 11) Install air cleaner upper case.

Special tools

 <p>09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE "A".)</p>	 <p>Mass storage cartridge for Tech 1A</p>	 <p>09931-76030 16/14 pin DLC adapter for Tech 1A</p>	 <p>Tech 2 kit (SUZUKI scan tool) (See NOTE "B".)</p>
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NOTE:

- **"A"** : This kit includes the following items and substitutes for the Tech 2 kit.
1. Storage case, 2. Operator's manual, 3. Tech 1A, 4. DLC cable (14/26 pin, 09931-76040), 5. Test lead/probe, 6. Power source cable, 7. DLC cable adaptor, 8. Self-test adaptor
- **"B"** : This kit includes the following items and substitutes for the Tech 1A kit.
1. Tech 2, 2. PCMCIA card, 2. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adaptor, 7. Battery power cable, 8. RS232 cable, 9. RS232 adaptor, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 7B

AUTOMATIC TRANSMISSION (4 A/T)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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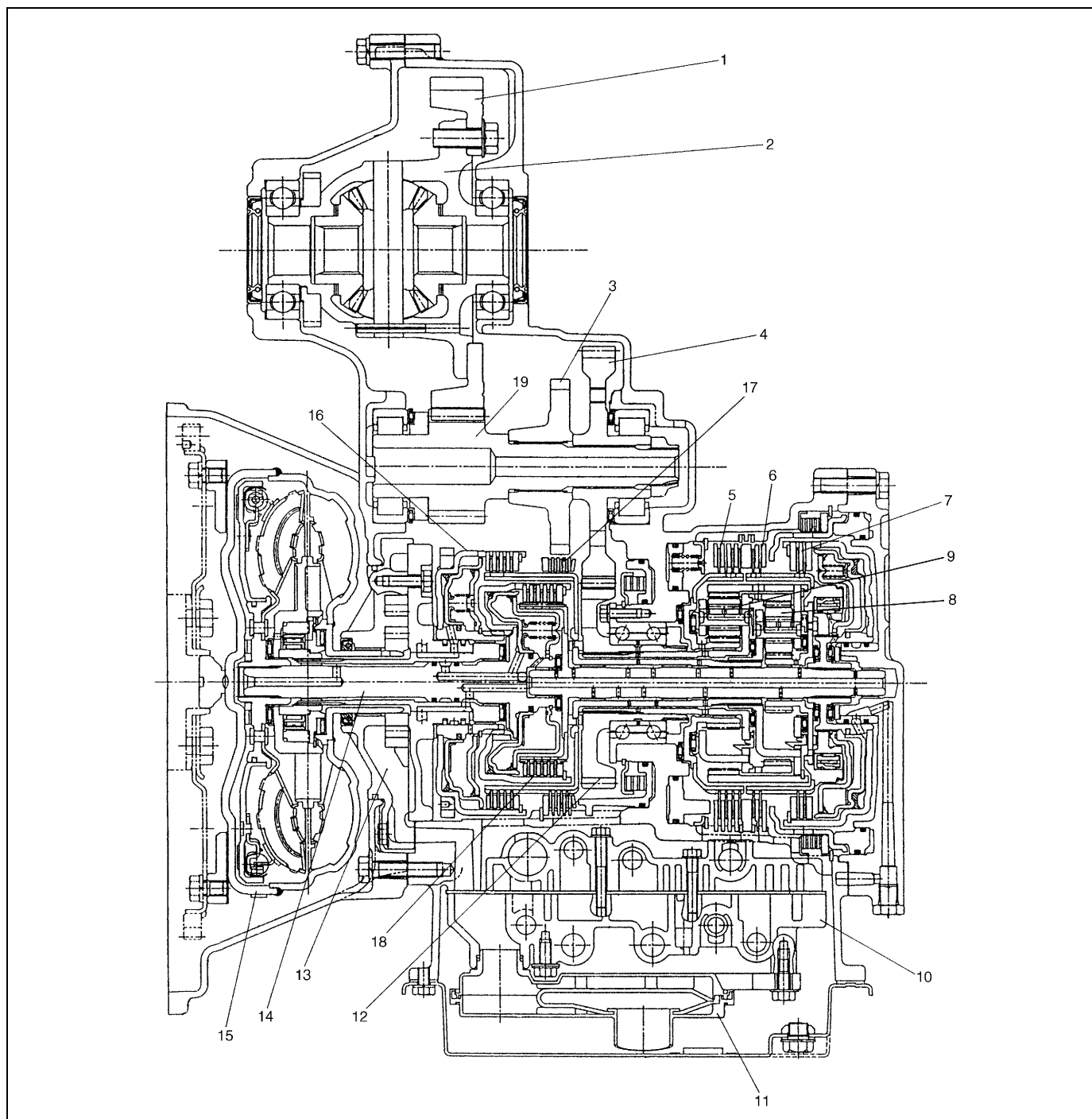
[Simpopdf Merge and Split Unregistered Version - http://www.simpopdf.com](http://www.simpopdf.com)

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General Description

This automatic transmission is a full automatic type with 3-speed plus overdrive (O/D).

The torque converter is a 3-element, 1-step and 2-phase type equipped with lock-up mechanism. The gear shift device consists of 2 sets of planetary gear units, sets of 3 disc type clutches, 3sets of disc type brakes and one-way clutch. The gear shift is done by selecting one of 6 positions ("P", "R", "N", "D", "2" and "L") by means of the select lever installed on the floor. On the shift knob, there is an overdrive (O/D) cut switch which allows shift-up to the overdrive mode and shift-down from the overdrive mode.



1. Final gear	6. Overdrive brake (B0)	11. Oil strainer	16. Front clutch (C2)
2. Differential gear assembly	7. Direct clutch (C0)	12. Counter drive gear (Reduction gear)	17. Reverse brake (B2)
3. Parking gear	8. Rear planetary gear	13. Oil pump	18. Rear clutch (C1)
4. Counter driven gear (Reduction gear)	9. Front planetary gear	14. Input shaft	19. Differential drive pinion shaft
5. 1st and 2nd brake (B1)	10. Valve body assembly	15. Torque converter	

Specifications

Item		Specifications	
Torque converter	Type	3-element, 1-step, 2-phase type	
	Stall torque ratio	1.65 – 1.85	
Oil pump	Type	Internal gear type oil pump	
	Drive system	Engine driven	
Gear change device	Type	Forward 4-step, reverse 1-step planetary gear type	
	Shift position	"P" range	Gear in neutral, output shaft fixed, engine start
		"R" range	Reverse
		"N" range	Gear in neutral, engine start
		"D" range (O/D ON)	Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change
		"D" range (O/D OFF)	Forward 1st ↔ 2nd ↔ 3rd ← 4th automatic gear change
		"2" range	Forward 1st ↔ 2nd ← 3rd automatic gear change
		"L" range	Forward 1st ← 2nd reduction, and fixed at 1st gear
	Gear ratio	1st	2.962
		2nd	1.515
		3rd	1.000
		4th (overdrive gear)	0.737
		Reverse (reverse gear)	2.809
	Control elements		Wet type multi-disc clutch ... 3 sets One-way clutch ... 1 set Wet type multi-disc brake ... 3 sets
	Reduction gear ratio		1.209
	Final gear ratio (Differential)		3.578
Lubrication	Lubrication system		Force feed system by oil pump
Cooling	Cooling system		Water-cooled
Fluid used		Equivalent of DEXRON®-III	

Functions

NOTE:

For operation of each part, refer to **TABLE OF COMPONENT OPERATION**.

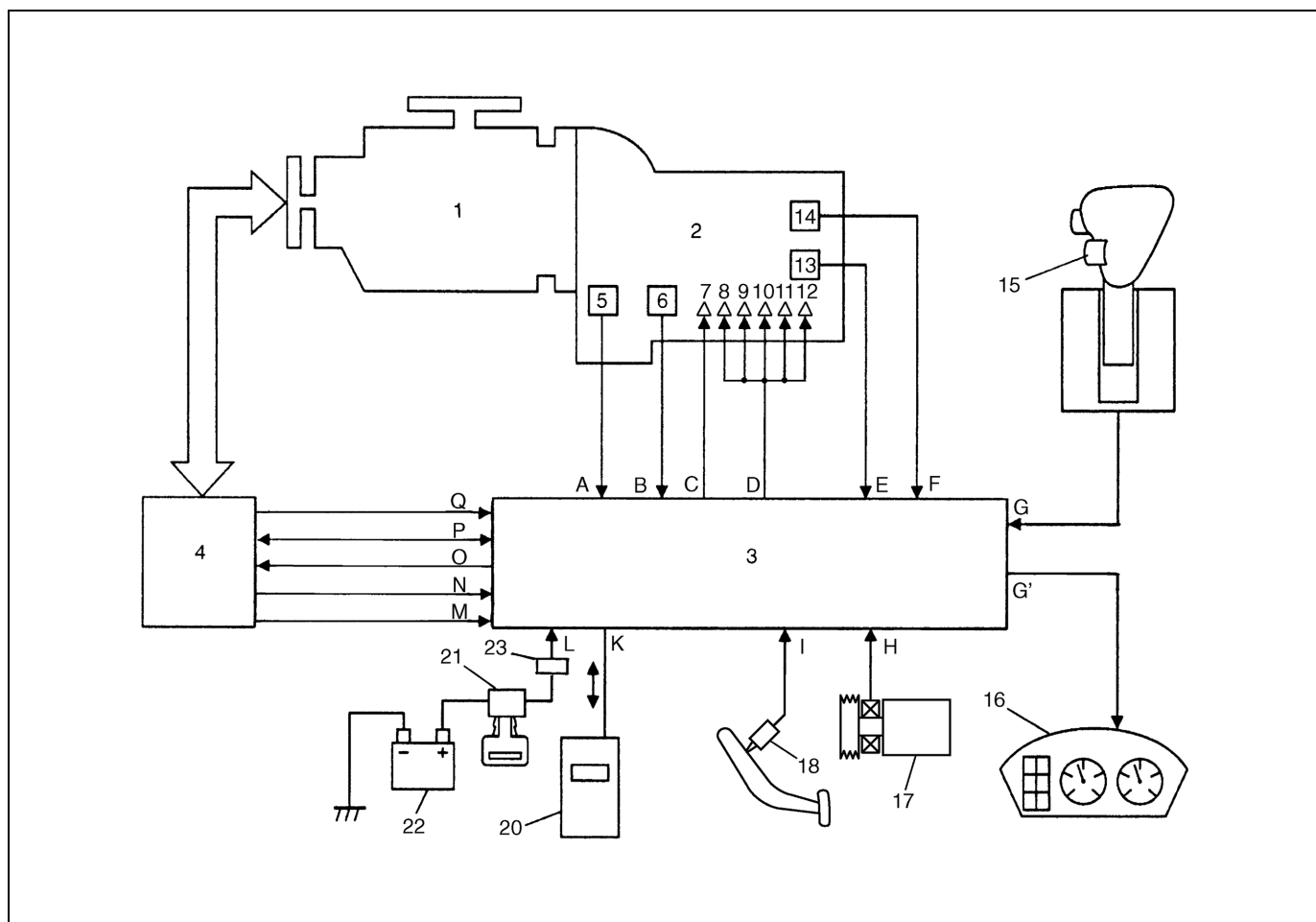
PART NAME	FUNCTION
Rear clutch	Meshes input shaft and rear sun gear through one-way clutch.
Front clutch	Meshes input shaft and front internal gear and rear carrier.
Overdrive brake	Fixes rear sun gear.
1st & 2nd brake	Fixes front sun gear.
Reverse brake	Fixes front internal gear and rear carrier.
Direct clutch	Meshes input shaft and rear sun gear.

Table of Component Operation

Part		Rear clutch	Front clutch	Overdrive brake	1st & 2nd brake	Reverse brake	Direct clutch	One-way clutch
Selector position	Gear position							
P		○	×	×	×	×	○	×
R		○	×	×	×	○	○	○
N		○	×	×	×	×	○	×
D	1st	○	×	×	○	×	×	○
	2nd	○	○	×	○	×	×	×
	3rd	○	○	×	×	×	○	×
	4th(O/D)	×	○	○	×	×	○	×
2	1st	○	×	×	○	×	×	○
	2nd	○	○	×	○	×	×	×
L	1st	○	×	×	○	×	○	○

○ :Operating × :Not operating

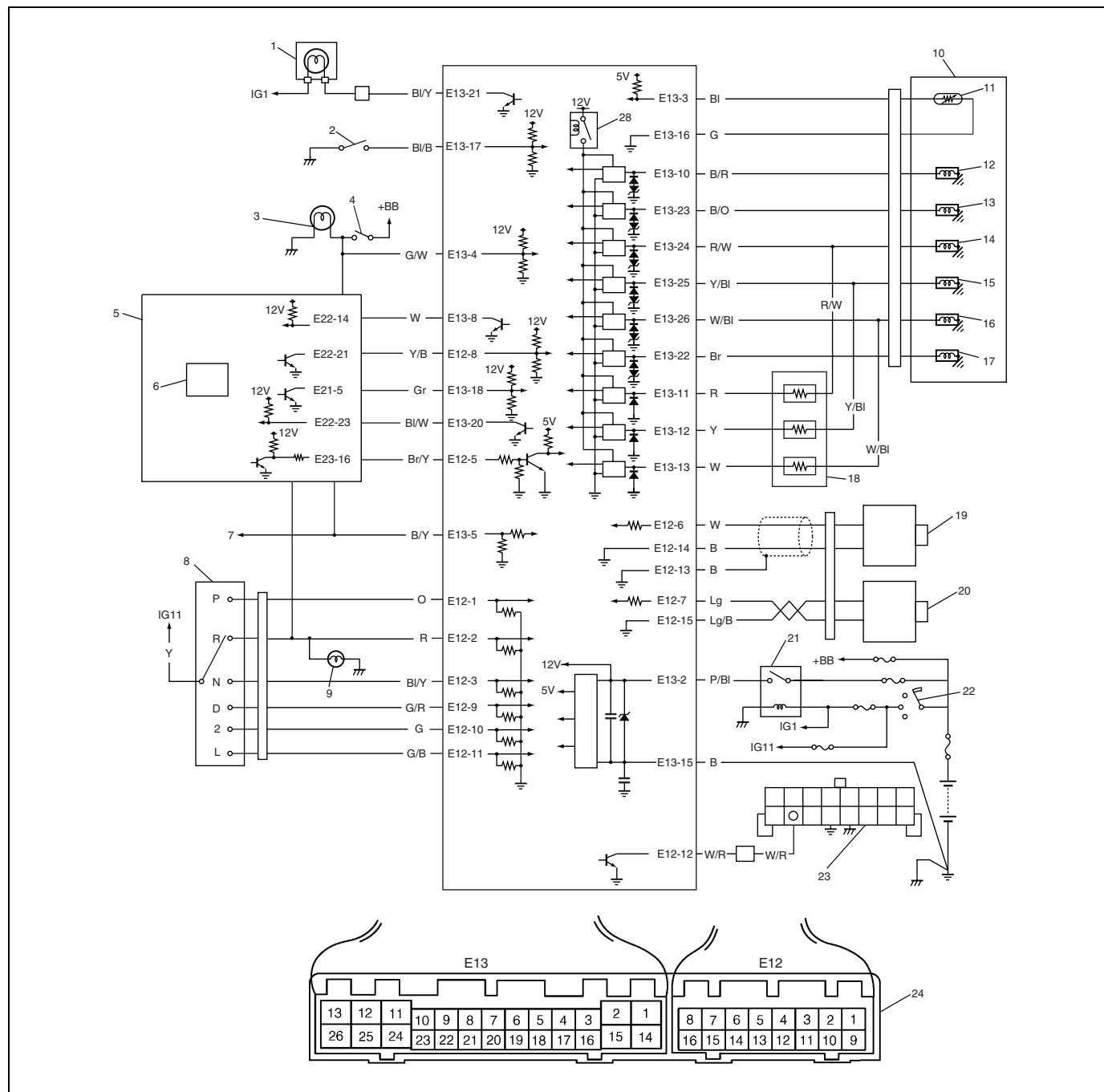
Electronic Shift Control System



1. Engine	15. O/D off switch	F. Range signal
2. Transmission	16. Combination meter (O/D off lamp)	G. O/D off switch signal
3. TCM	17. A/C compressor	G'. O/D off lamp signal
4. ECM	18. Brake lamp switch	H. A/C clutch signal
5. Input shaft speed sensor (Turbine rev. sensor)	19. Blank	I. Brake signal
6. Transmission fluid temperature sensor (A/T fluid temp. sensor)	20. Suzuki scan tool	J. Blank
7. TCC solenoid (Lock-up solenoid)	21. Ignition switch	K. Serial communication with Suzuki scan tool
8. Shift solenoid-A (Shift solenoid No.1)	22. Battery	L. Power supply
9. Shift solenoid-B (Shift solenoid No.2)	23. A/T relay	M. Throttle opening signal
10. Shift solenoid-C (Shift solenoid No.3)	A. Turbine speed signal	N. Engine coolant temp./Barometric pressure signal
11. Shift solenoid-D (Shift solenoid No.4)	B. A/T fluid temp signal	O. Idle up signal
12. Shift solenoid-E (Shift solenoid No.5)	C. TCC (lock-up) control signal	P. A/T failure signal
13. Output shaft speed sensor (A/T VSS)	D. Shift control signal	Q. Engine speed (rev.) signal.
14. Transmission range sensor (Shift switch)	E. A/T output shaft speed signal	

Transmission control module (TCM)

TCM is an electronic circuit component that controls gear shift, idle-up according to the signal from each sensor. Also it has learning control function for performing optimum control. It is a microcomputer consisting of an IC, transistor, diode, etc. It is installed behind glove box.



1. "O/D OFF" lamp	9. Backup lamp	17. TCC (lock-up) solenoid valve
2. O/D off switch	10. A/T	18. Dropping resistor
3. Brake light	11. Transmission fluid temperature sensor	19. Output shaft speed sensor
4. Brake light switch	12. Shift solenoid valve-A (No.1)	20. Input shaft speed sensor
5. ECM	13. Shift solenoid valve-B (No.2)	21. A/T relay
6. Barometric pressure sensor	14. Shift solenoid valve-C (No.3)	22. Ignition switch
7. To A/C compressor	15. Shift solenoid valve-D (No.4)	23. Data link connector (DLC)
8. Transmission range sensor	16. Shift solenoid valve-E (No.5)	24. Terminal arrangement of TCM connector (viewed from harness side)

Fail safe function

This function is provided by the safe mechanism that assures safe driveability even when the solenoid valve, sensor or its circuit fails.

The table below shows the fail safe function for each fail condition of sensor, solenoid or its circuit.

Area	Detecting condition	Fail safe function
Input/Turbine speed sensor circuit (DTC P0715)	Input shaft speed sensor signal voltage is too high or too low.	<ul style="list-style-type: none"> When vehicle running and in shift change by automatic electronic control, gear is fixed to gear which is going to be selected and lock-up function is turned OFF. When vehicle running and in no shift change, gear is fixed to gear right before the trouble occurred and lock-up function is turned OFF.
Output shaft speed sensor circuit (DTC P0720)	Output shaft speed sensor signal voltage is too high or too low.	<ul style="list-style-type: none"> When vehicle is at stop after or during detecting trouble, or in shift change by manual operation while running, gear is fixed as the followings and lock-up function is turned OFF. "P" range → P, "R" range → R, "N" range → N, "D" range → 3rd, "2" range → 2nd, "L" range → 1st
Shift solenoid (DTC P0753) (DTC P0758) (DTC P0763) (DTC P0768) (DTC P0773)	<ul style="list-style-type: none"> Solenoid output voltage is too high although TCM orders solenoid to turn off. Solenoid output voltage is too low although TCM orders solenoid to turn on. 	<ul style="list-style-type: none"> When select lever is "P", "R", "N", "D" or "2" range, A/T solenoid power relay is turned OFF and gear is fixed as follows : "P" range → P, "R" range → R, "N" range → N, "D" range → 3rd When select lever is "2" range, gear is fixed to pre programmed gear position of several patterns as follows : <ul style="list-style-type: none"> Malfunction of No.1 solenoid → 3rd Malfunction of No.2 solenoid → 3rd Malfunction of No.3 solenoid → 2nd Malfunction of No.4 solenoid → 1st or 2nd Malfunction of No.5 solenoid → 2nd or 3rd Malfunction of 2 or more solenoids → 3rd When select lever is "L" range, gear is fixed to pre programmed gear position of several patterns as follows : <ul style="list-style-type: none"> Malfunction of No.1 solenoid → 3rd Malfunction of No.2 solenoid → 1st Malfunction of No.3 solenoid → 2nd Malfunction of No.4 solenoid → 1st or 2nd Malfunction of No.5 solenoid → 1st Malfunction of 2 or more solenoids → 3rd
TCC circuit (DTC P0743)		Lock-up function is turned OFF.

Area	Detecting condition	Fail safe function
A/T hardware itself (DTC P0730)	Difference in detected revolution between input shaft speed sensor and output shaft speed sensor is too wide.	<p>“P” range → P, “R” range → R, “N” range → N, “D”/“2”/“L” range → To be controlled as follows :</p> <ol style="list-style-type: none"> 1) When detecting trouble at first, gear is selected well-suited gear calculated with parameters of each sensor's rev. number and gear position just when the trouble occurred. Lock-up function is turned OFF. 2) If A/T can transmit driving force under the above condition, gear is fixed the selected gear until ignition switch is turned OFF. 3) If A/T can not transmit driving force under the above condition, after once vehicle stop, gear which can transmit drive force is searched one by one until gear is found out. After gear is found out, position of gear is held until ignition switch is turned OFF.
Transmission range sensor circuit (DTC P0705)	No shift switch signal is inputted or two or more shift switch signals are inputted at the same time.	<ul style="list-style-type: none"> • When vehicle running, shift range position is fixed to shift range position right before the trouble occurred until vehicle stop and lock-up function is turned OFF. • When vehicle is at stop after or during detecting the trouble, gear is fixed as the followings and lock-up function is turned OFF. <ul style="list-style-type: none"> – When 2 adjoining gear position signals are inputted. “P”, “R” range → R, “R”, “N” range → R, “N”, “D” range → D, “D”, “2” range → D, “2”, “L” range → 2nd – When 2 or more signals excepting above or no signal are inputted. “P” range → P, “R” range → R, “N” range → N, “D”/“2”/“L” range → 3rd
Transmission fluid temperature sensor circuit (DTC P0710)	<ul style="list-style-type: none"> • A/T fluid temp. signal input voltage is too low. • A/T fluid temp. signal input voltage does not go down although standard value of engine rev. signal is inputted. 	<ul style="list-style-type: none"> • When detecting circuit open, TCM control as fluid temperature is 100°C (212°F). • Lock-up function is turned OFF.
Engine speed input circuit (DTC P0725)	Inputted engine rev. signal is too low or too high.	<ul style="list-style-type: none"> • Engine rev. is processed as 4000 rpm. • No compensation or judgement for gear shift control, for which engine rev. is considered, is processed. • Lock-up function is turned OFF.
Engine coolant temp./Barometric pressure signal circuit (DTC P1709)	No or abnormal engine coolant temp. signal is inputted	<ul style="list-style-type: none"> • No compensation for gear shift control, for which engine coolant temp. and barometric pressure are considered, is processed. • Lock-up function is turned OFF.

Area	Detecting condition	Fail safe function
Throttle position signal circuit (DTC P1700)	No or abnormal throttle opening signal is inputted	<ul style="list-style-type: none"> Scheduling of automatic gear shift is performed as throttle valve opening is 0%. Control of automatic gear shift (i.e. control of oil pressure) is performed as throttle valve opening is 100%. Coast down shifting is performed when brake is applied and engine rev. is less than 1,500 rpm. Lock-up function is turned OFF.
Transmission control system electrical (DTC P0702)	Solenoid power supply relay output voltage is too high although TCM orders relay to turn off or relay output voltage is too low although TCM orders relay to turn on.	<ul style="list-style-type: none"> When relay shorted, the gear is fixed as the followings and lock-up function is turned OFF. "P" range → P, "R" range → R, "N" range → N, "D" range → 3rd, "2" range → 2nd, "L" range → 1st When relay open, power supply to all solenoids is cut and the gear is fixed as the followings. Lock-up function is turned OFF. "P" range → P, "R" range → R, "N" range → N, "D"/"2"/"L" range → 3rd
Internal malfunction of TCM (DTC P1702)	Incorrect calculations of checking TCM programmed data indicated.	Power supply to all solenoid is cut and the gear is fixed as follows : "P" range P, "R" range R, "N" range N, "D"/"2"/"L" range "3rd"

Operation of shift solenoid valves and TCC solenoid valve

			Solenoid valve					
			A (No.1)	B (No.2)	C (No.3)	D (No.4)	E (No.5)	TCC
Range and gear position	P	Parking	×	×	×	○	×	×
	R	Reverse	×	×	×	×	×	×
	N	Neutral	×	×	×	○	×	×
	D	1st	○	×	×	○	○	×
		2nd	○	×	×	×	○	×
		3rd	×	×	×	×	×	(○)
		4th (O/D)	×	○	○	×	×	(○)
	2	1st	○	×	×	○	○	×
		2nd	○	×	×	×	○	×
	L	1st	○	×	×	○	×	×

○ : ON (Power ON)

× : OFF (Power OFF)

(○) : ON only when lock-up function operates

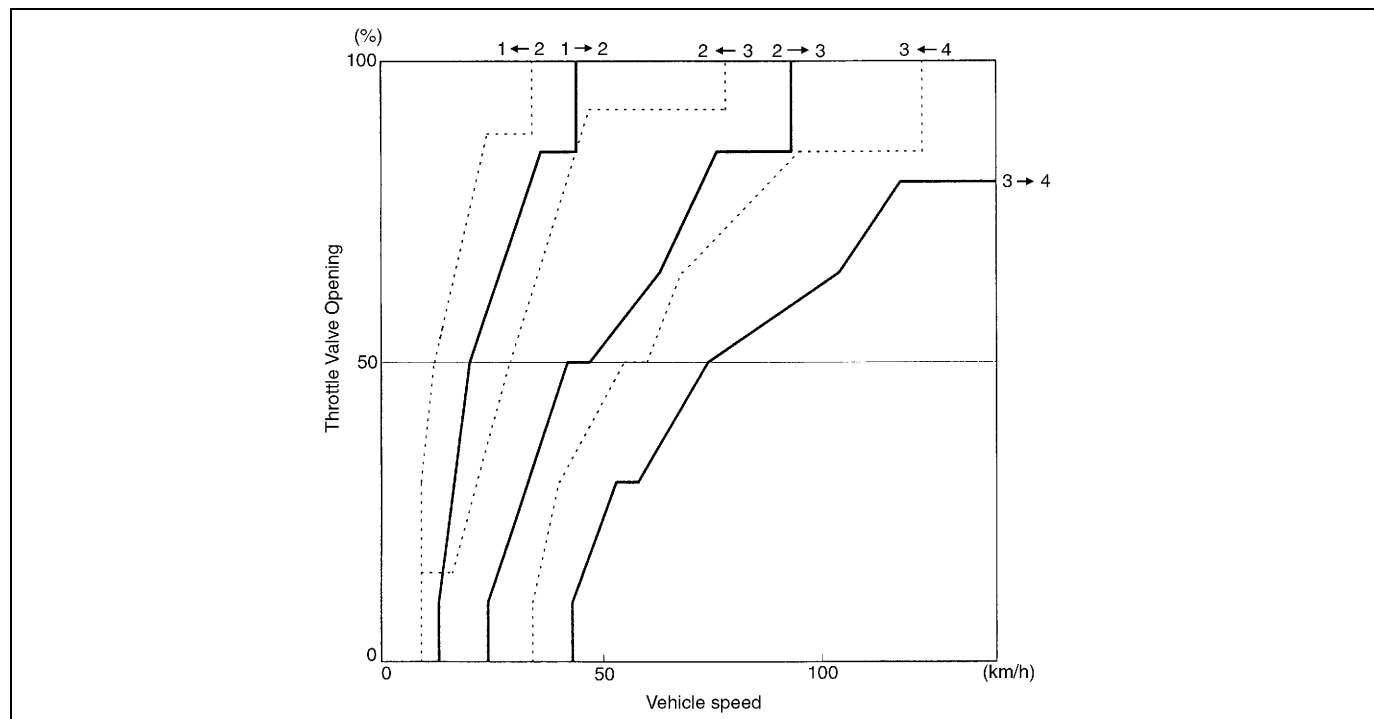
		Solenoid valve					
		A (No.1)	B (No.2)	C (No.3)	D (No.4)	E (No.5)	TCC
Valve status	Power ON	Open	Open	Close	Close	Close	Open
	Power OFF	Close	Close	Open	Open	Open	Close

Automatic gear shift diagram

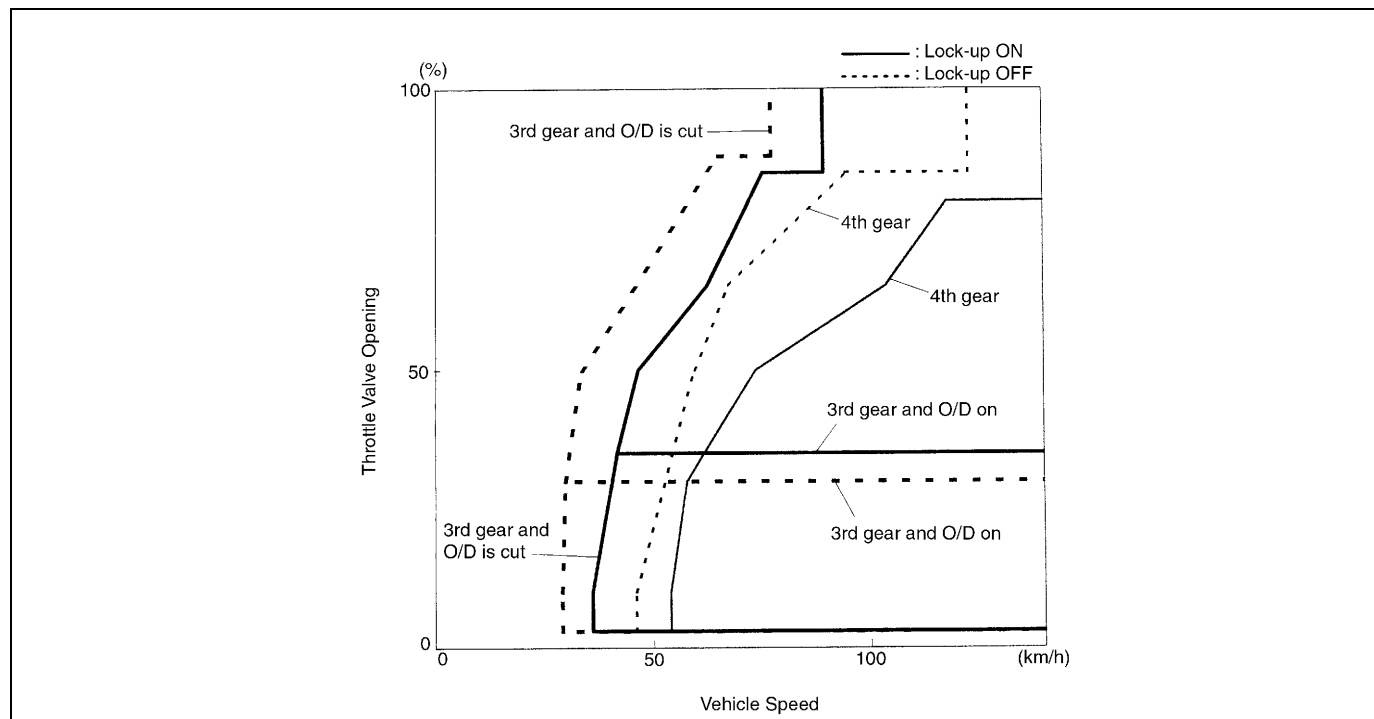
Automatic shift schedule as a result of shift control is shown below.

	Shift					
Throttle opening	1→2	2→3	3→4	4→3	3→2	2→1
Full throttle (km/h)	44	98	—	123	78	34
Closed throttle (km/h)	13	24	43	34	9	9

Gear Shift Diagram



TCC Lock-up Diagram



Diagnosis

This vehicle is equipped with an electronic transmission control system, which controls the automatic shift up and shift down timing, etc. suitably to vehicle driving conditions.

When diagnosing a trouble in the transmission including this system, follow "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE" given below to obtain correct result smoothly.

Automatic Transmission Diagnostic Flow Table

NOTE:

For the details of each step, refer to the following pages.

Step	Action	Yes	No
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the following page. Was customer complaint analysis performed according to instruction on the following page?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) Check, Record and Clearance 1) Check for DTC referring to the following page. Is there any DTC(s)?	1) Print DTC or write it down and clear it by referring to "DTC CLEARANCE" in this section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the following page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the following page. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the following page. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC. 1) Recheck for DTC referring to "DTC CHECK" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC. 1) Recheck for DTC referring to "DTC CHECK" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 10.

Step	Action	Yes	No
8	Automatic Transmission Basic Check and Trouble Diagnosis Table 1) Check and repair according to "A/T BASIC CHECK" and "TROUBLE DIAGNOSIS TABLE" in this section. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Troubleshooting for DTC 1) Check and repair according to applicable DTC Diagnostic Flow Table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the following page. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the following page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. Customer Complaint Analysis

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such a questionnaire form as shown below will facilitate collecting information to the point required for proper analysis and diagnosis.

CUSTOMER QUESTIONNAIRE (EXAMPLE)

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:
DESCRIPTION OF PROBLEM			
Engine does not start		Engine stops	
Vehicle does not move (forward, rearward)		Transmission does not shift (1st, 2nd, 3rd, 4th, Rev) gear	
No lock-up (Lock-up clutch operation)		Automatic shift does not occur	
Shift point too high or too low		Transmission slipping in (1st, 2nd, 3rd, 4th, Rev) gear	
Excessive gear change shock		Other	
VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS			
Environmental Condition			
Weather	fair/cloudy/rain/snow/always/other()		
Temperature	hot/warm/cool/cold/() °C/always		
Frequency	always/sometimes () times/ () day, month/only once		
Road	urban/suburb/highway/mountainous (uphill/downhill)/tarmacadam/gravel/other()		
Vehicle Condition			
Transmission range	(P, R, N, D, 2, L) range/(→) range		
Transmission temp.	cold/warming up phase/warmed up		
Vehicle	at stop/during driving (constant speed/accelerating/decelerating/right hand corner/left hand corner)/other ()/speed () km/h		
Engine	Speed () r/min/throttle opening (idle/about %/full)		
Brake	Apply/Not apply		
"O/D OFF" switch	ON/OFF		
MALFUNCTION INDICATOR LAMP FUNCTION			
always ON/sometimes ON/not on			
Diagnostic trouble code indicated/not indicated			
Diagnostic trouble code recorded			

NOTE:

The above form is a standard sample. It should be modified according to conditions characteristic of each market.

2. Diagnostic Trouble Code (DTC) Check, Record and Clearance

To check DTC, refer to “DTC CHECK” in this section. When a DTC exists, it means existence of a malfunction in the system represented by that code but whether it still exists (current) or it occurred in the past and has gone (history) is unknown. To know it, clear this DTC once (Refer to “DTC CLEARANCE” in this section.), perform test drive and/or “TROUBLE SYMPTOM CONFIRMATION” in this section and then check DTC again as described in “DTC CHECK”. Attempt to diagnose the trouble based on the DTC recorded in this step only or failure to clear the DTC in this step may mislead the diagnosis or make diagnosing difficult. Even after checking the DTC with the SUZUKI scan tool, diagnosis should be performed according to this flow chart to check TCM for proper self-diagnosis function.

3 and 4. Visual Inspection

As a preliminary step, perform visual check of the following items that support proper function of the automatic transmission.

INSPECTION ITEM	REFERRING SECTION
<ul style="list-style-type: none"> • Engine oil ----- level, leakage • Engine coolant ----- level, leakage • A/T fluid ----- level, leakage, color • Battery ----- fluid level, corrosion of terminal • A/T fluid hoses ----- disconnection, looseness, deterioration • Connectors of electric wire harness ----- disconnection, friction • Fuses ----- burning • Parts ----- installation, bolt ----- looseness • Parts ----- deformation • Other parts that can be checked visually <p>Also add following items at engine start.</p> <ul style="list-style-type: none"> • Indicator, warning lights in combination meter ----- ON (indicating abnormality in system) or OFF • Other parts that can be checked visually 	<p>Section 0B</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 8</p> <p>Section 8</p> <p>Section 8C</p>

5. Trouble Symptom Confirmation

Check if what the customer claimed in “CUSTOMER COMPLAINT ANALYSIS” is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.)

When the symptom is not actually found, possibility is :

- The symptom occurs under certain conditions.
----- Retry with the vehicle under different conditions.
- The trouble occurred only temporarily and normal operation has been restored.
----- Perform “DTC CHECK” and if the diagnostic trouble code is indicated, inspect according to the flow table for that DTC.

6 and 7. Rechecking and Record of DTC

Refer to “DTC CHECK” in this section.

8. Automatic Transmission Basic Check and Trouble Diagnosis Table

Perform basic automatic transmission check according to the list below first. When the end of the list has been reached, check the part of system suspected as a possible cause referring to "TROUBLE DIAGNOSIS TABLE" and based on symptoms appearing on vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or A/T basic check) and repair or replace faulty parts, if any.

AUTOMATIC TRANSMISSION BASIC CHECK LIST

- 1) Power Supply Voltage Check
Check that the battery voltage is within 10 – 14 V at engine stop.
- 2) A/T Fluid Check
Check A/T fluid level and quality.
- 3) STALL TEST
Perform stall test. Refer to "STALL TEST" in this section for details.
- 4) LINE PRESSURE TEST
Perform line pressure test. Refer to "LINE PRESSURE TEST" in this section.
- 5) ROAD TEST
Perform road test to understand correctly the trouble area.
- 6) Electrical Harness and Coupler Check
Check the connection of the harness coupler. Check for the loose connection of the harness, loose connection of the terminals.

9. Diagnostic Trouble Code Flow Table

Based on the DTC indicated in STEP 6 and STEP 7 and referring to "DTC CHECK", locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, TCM or other part and repair or replace faulty parts.

10. Check for Intermittent Problem

Check parts where an intermittent trouble is easy to occur (e.g. wire harness, connector, etc.), referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A and related circuit of DTC recorded in Step 2.

11. Final Confirmation Test

Confirm that the problem symptom has gone and the automatic transmission is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that a normal code is indicated.

Trouble Diagnosis Table

NOTE:

For the inspection of throttle position sensor, refer to “TP SENSOR” in Section 6E.

Trouble diagnosis table-1

Electrical Repair

Condition		Possible Cause	Correction
No up-shift	1st → 2nd 2nd → 3rd	• Output shaft speed sensor or its circuit faulty	Inspect output shaft speed sensor.
		• Shift solenoid -D (No.4) (1st → 2nd), -A (No.1) (1st → 3rd), -E (No.5) (2nd → 3rd), and/or its circuit faulty	Repair or replace.
		• Throttle position sensor or its circuit faulty	Inspect TP sensor.
		• TCM faulty	Replace TCM.
	3rd → 4th	• Output shaft speed sensor or its circuit faulty	Inspect output shaft speed sensor.
		• Shift solenoid -B (No.2), -C (No.3) or its circuit faulty	Repair or replace.
		• O/D CUT switch circuit faulty	Refer to “O/D OFF SWITCH” in this section and/or inspect its circuit.
		• Throttle position sensor or its circuit faulty	Inspect TP sensor.
• TCM faulty		Replace TCM.	
No down-shift	4th → 3rd 3rd → 2nd 2nd → 1st	• Shift solenoid -C (No.3) (4th → 3rd), -D (No.4) (2nd → 1st), -A (No.1) (3rd → 2nd), -B (No.2) (4th → 3rd), -E (No.5) (3rd → 2nd) or its circuit faulty	Repair or replace.
		• Throttle position sensor or its circuit faulty	Inspect TP sensor.
		• TCM fault	Replace TCM.
Shift point too high or too low		• Throttle position sensor, output shaft speed sensor or its circuit faulty	Inspect TP sensor and/or output shaft speed sensor.
Vehicle does not move		• Shift solenoid -A (No.1), -C (No.3), -D (No.4) or its circuit faulty	Repair or replace.
Excessive slip		• Shift solenoid -A (No.1) to -E (No.5) or its circuit faulty	Repair or replace.
Excessive shock at N → D or N → R		• Shift solenoid -A (No.1), -D (No.4), -E (No.5) or its circuit faulty	Repair or replace.
		• ISC circuit	Inspect ISC circuit.
No lock-up or No lock-up OFF		• TCC (lock-up) solenoid valve or its circuit faulty	Repair or replace.
		• Throttle position sensor or its circuit faulty	Refer to “THROTTLE POSITION SENSOR” in Section 6E.
		• Input shaft speed and/or output shaft speed sensor or its circuit faulty.	Refer to “ECT SENSOR” in Section 6E.
		• Abnormal engine rev. signal or its circuit.	Repair or replace.
		• ECM faulty	Inspect ECM.

Trouble diagnosis table-2

Mechanical Repair

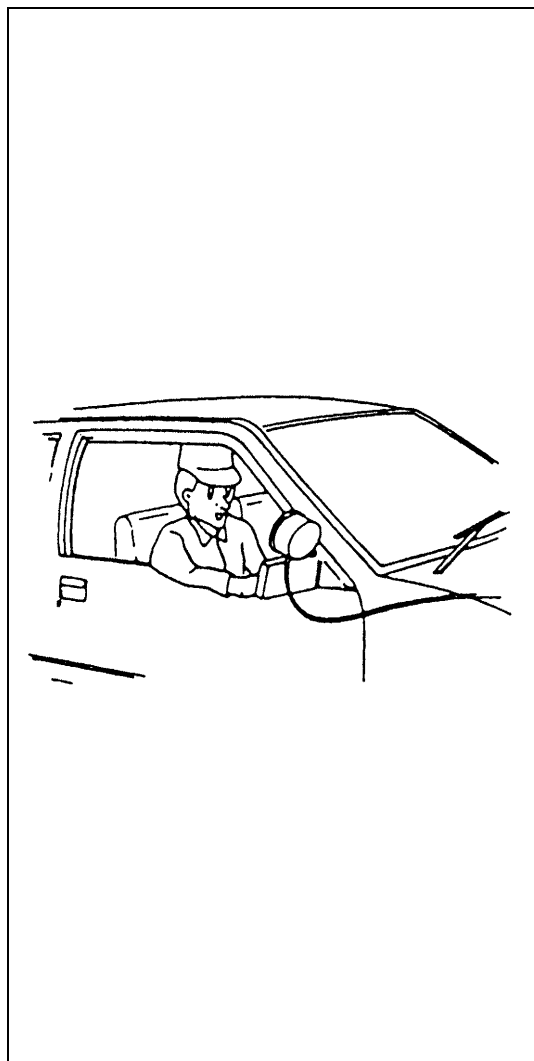
Condition		Possible Cause	Correction
Vehicle does not move at any range		• Manual valve faulty	Clean or replace.
		• Primary regulator valve faulty	Clean or replace.
No gear change	1st ↔ 2nd	• Shift solenoid -D (No.4) and/or -E (No.5) stuck	Clean or replace.
	2nd ↔ 3rd	• Shift solenoid -A (No.1), -C (No.3) and/or fail valve No.1 stuck	Clean or replace.
	3rd ↔ 4th	• Shift solenoid -B (No.2), -C (No.3) and/or fail valve No.2 stuck	Clean or replace.
Harsh engagement	P, N → R	• Front clutch accumulator faulty	Clean or replace.
	N → D	• 1st & 2nd brake accumulator faulty	Clean or replace.
	1st → 2nd at D range or 2 range	• Front clutch accumulator faulty	Clean or replace.
	2nd → 3rd at D range	• Shift solenoid -D (No.4)	Clean or replace.
		• Direct clutch accumulator faulty	Clean or replace.
	3rd → 4th at D range	• Shift solenoid -E (No.5)	Clean or replace.
		• Overdrive brake accumulator faulty	Clean or replace.
Excessive slip (low line pressure)	• Shift solenoid -B (No.2)	Clean or replace.	
	• Primary regulator valve faulty	Clean or replace.	
Vehicle does not move at	1st, 2nd, 3rd and reverse gear	• Rear clutch faulty	Repair or replace.
	Reverse gear	• Reverse brake faulty	Repair or replace.
	2nd, 3rd and 4th gear	• Front clutch faulty	Repair or replace.
	3rd and 4th gear	• Direct clutch faulty	Repair or replace.
	1st and 2nd gear	• 1st & 2nd brake faulty	Repair or replace.
	4th gear	• Overdrive brake faulty	Repair or replace.
	Any forward and reverse gear	• Parking lock pawl faulty	Repair or replace.
Shock or engine stalls when starting off and stopping		• TCC (lock-up clutch) faulty	Inspect and replace as necessary.
		• TCC (lock-up) solenoid faulty	Clean or replace.
		• Lock-up control valve faulty	Clean or replace.
		• Lock-up signal valve faulty	Clean or replace.
No up-shift	1st → 2nd	• Front clutch faulty	Repair or replace.
	2nd → 3rd	• Direct clutch faulty	Repair or replace.
	3rd → 4th	• Overdrive brake faulty	Repair or replace.
No engine braking	2nd or 3rd gear	• Front, rear or direct clutch or 1st & 2nd brake faulty	Repair or replace
	L range 1st gear	• Direct clutch or 1st & 2nd brake faulty	Repair or replace.
No lock-up		• Torque converter clutch faulty	Inspect and replace as necessary.
		• Lock-up control valve faulty	Clean or replace.
		• TCC (lock-up) solenoid faulty	Clean or replace.
		• Secondary regulator valve faulty	Clean or replace.
		• Signal valve faulty	Clean or replace.

Stall test

This test is to check overall performance of automatic transmission and engine by measuring stall speed at “D” and “R” ranges. Be sure to perform this test only when transmission fluid is at normal operating temperature and its level is between FULL and LOW marks.

CAUTION:

- Do not run engine at stall more than 5 seconds continuously, for fluid temperature may rise excessively high.
- After performing stall test, be sure to leave engine running at idle for longer than 30 seconds before another stall test.



- 1) Apply parking brake and block wheels.
- 2) Install tachometer.
- 3) Start engine with select lever shifted to “P”.
- 4) Depress brake pedal fully.
- 5) Shift select lever to “D” and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant (stall speed).
- 6) Release accelerator pedal immediately after stall speed is checked.
- 7) In the same way, check stall speed in “R” range.
- 8) Stall speed should be within following specification.

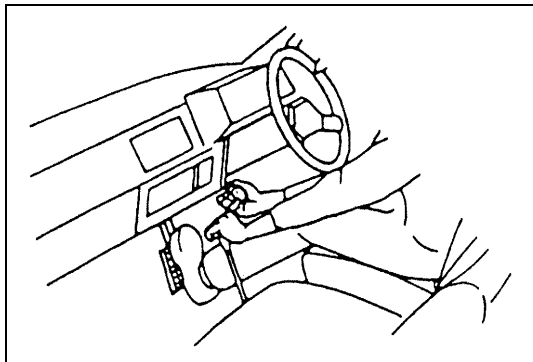
Stall speed

: 2,700 – 3,100 r/min

Test result	Possible cause
Lower than standard level	<ul style="list-style-type: none"> • Lack of engine output • Defective torque converter
Higher than standard level in “D” range	<ul style="list-style-type: none"> • Low line pressure • Malfunctioning 1st & 2nd brake • Malfunctioning rear clutch • Malfunctioning stator one-way clutch
Higher than standard level in “R” range	<ul style="list-style-type: none"> • Low line pressure • Malfunctioning rear clutch • Malfunctioning reverse brake • Malfunctioning stator one-way clutch • Malfunctioning direct clutch

Time lag test

This test is to check conditions of clutch, reverse brake and fluid pressure. "Time lag" means time elapsed since select lever is shifted with engine idling till shock is felt.



- 1) With chocks placed in front and behind front and rear wheels respectively, depress brake pedal.
- 2) Start engine.
- 3) With stop watch ready, shift select lever from "N" to "D" range and measure time from that moment till shock is felt.
- 4) Similarly measure time lag by shifting select lever from "N" to "R" range.

Specification for time lag

"N" → "D" : Less than 1.0 sec.

"N" → "R" : Less than 1.2 sec.

NOTE:

- Make sure that selector cable is properly adjusted.
- When repeating this test, be sure to wait at least minute after select lever is shifted back to "N" range.
- Engine should be warmed up fully for this test.

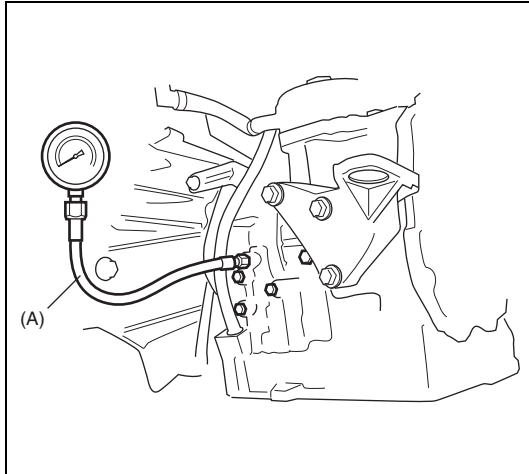
Test result	Possible cause
When "N" → "D" time lag exceeds specification.	<ul style="list-style-type: none"> • Low line pressure • Worn rear clutch • Worn 1st & 2nd brake
When "N" → "R" time lag exceeds specification.	<ul style="list-style-type: none"> • Low line pressure • Worn rear clutch • Worn direct clutch • Worn reverse brake

Line pressure test

Purpose of this test is to check operating conditions of each part by measuring fluid pressure in fluid pressure line.

Line pressure test requires following conditions.

- Automatic fluid is at normal operating temperature (70 – 80°C /158 – 176°F).
- Fluid is filled to proper level (between FULL and LOW on dipstick).



- 1) Apply parking brake securely and place chocks against wheels.
- 2) Remove fluid pressure check hole plug bolt.
- 3) Attach oil pressure gauge to fluid pressure check hole in transmission case.

Special tool

(A) : 09925-37811-001

CAUTION:

After attaching oil pressure gauge, check that no fluid leakage exists.

- 4) Depress foot brake fully, run engine at idle and stall then check fluid pressure in “D” or “R” range.

CAUTION:

Do not continue running engine at stall speed longer than 5 seconds.

Line pressure

	“D” range	“R” range
At idle speed	7.6 – 9.2 kg/cm ² 108.1 – 130.8 psi	14.1 – 17.3 kg/cm ² 200.6 – 246.0 psi
At stall speed	7.9 – 9.5 kg/cm ² 112.4 – 135.0 psi	14.4 – 17.6 kg/cm ² 204.8 – 250.2 psi

Test result	Possible cause
Line pressure higher than standard level in each range	<ul style="list-style-type: none"> • Malfunctioning regulator valve
Line pressure lower than standard level in each range	<ul style="list-style-type: none"> • Malfunctioning regulator valve • Defective oil pump
Line pressure lower than standard level only in “D” range	<ul style="list-style-type: none"> • Fluid leakage from “D” range pressure circuit • Fluid leakage from 1st & 2nd brake • Fluid leakage from rear clutch
Line pressure lower than standard level only in “R” range	<ul style="list-style-type: none"> • Fluid leakage from “R” range pressure circuit • Fluid leakage from rear clutch • Fluid leakage from direct clutch • Fluid leakage from reverse brake

Engine brake test**WARNING:**

Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.

- 1) While driving vehicle in 3rd gear of "D" range, shift select lever down to "2" range and check if engine brake operates.
- 2) In the same way as in Step 1), check engine brake for operation when select lever is shifted down to "L" range.
- 3) Engine brake should operate in above test.

Test result	Possible cause
Fails to operate when shifted down to "2" range	<ul style="list-style-type: none"> • Defective shift switch • 1st & 2nd brake defective • Direct clutch defective
Fails to operate when shifted down to "L" range	

"P" range test

- 1) Stop vehicle on a slope, shift select lever to "P" range and at the same time apply parking brake.
- 2) After stopping engine, depress brake pedal and release parking brake.
- 3) Then, release brake pedal gradually and check that vehicle remains stationary.
- 4) Depress brake pedal and shift select lever to "N" range.
- 5) Then, release brake pedal gradually and check that vehicle moves.

WARNING:

Before test, check to make sure no one is around vehicle or down on a slope and keep watchful for safety during test.

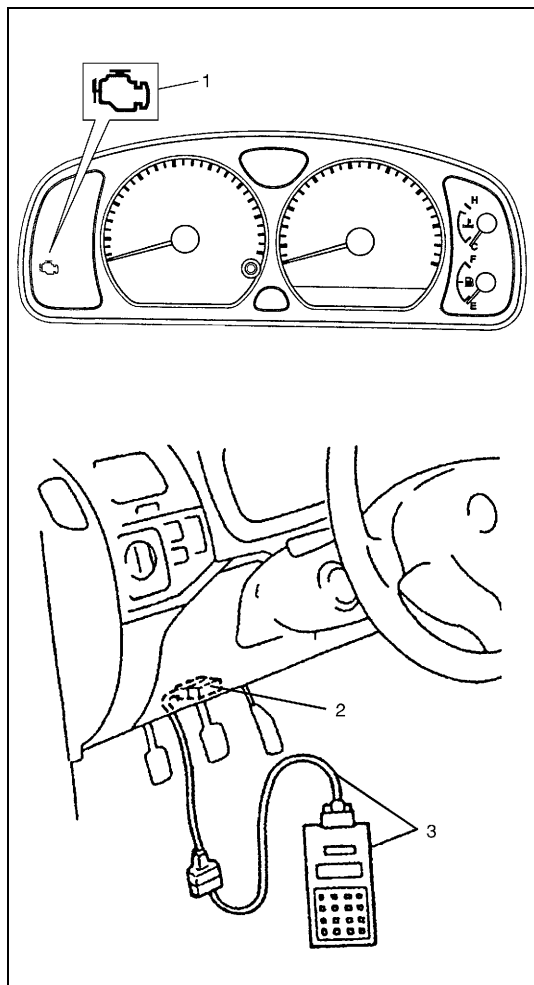
Test result	Possible cause
Vehicle moves at "P" range or remains stationary at "N" range	Defective parking lock pawl or spring

Electronic Control System Diagnosis

TCM has on-board diagnostic system (a system self-diagnosis function). Investigate where the trouble is by referring to "DIAGNOSTIC FLOW TABLE" and "DTC TABLE" in this section.

Precautions in diagnosing troubles

[PRECAUTIONS IN IDENTIFYING DTC]

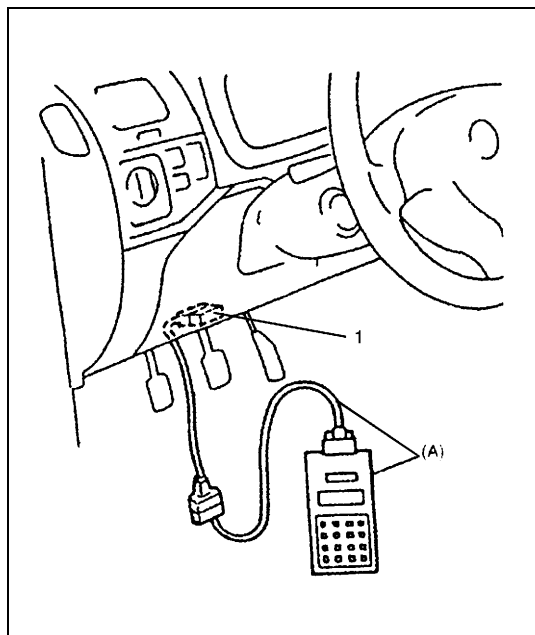


- For vehicle equipped with EGR valve, malfunction indicator lamp (MIL) (1) comes on when TCM detects malfunction of automatic transmission system.
- For vehicle equipped without EGR valve, malfunction indicator lamp (MIL) (1) does not come on although TCM detects malfunction of automatic transmission system.
- Using SUZUKI scan tool (3), diagnostic trouble code (DTC) stored in TCM memory can be checked and cleared as well. Before its use, be sure to read Operator's (instruction) Manual supplied with it carefully to have good understanding of its functions and usage.
- Be sure to read "PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE" in Section 0A before inspection and observe what is written there.
- When replacing TCM with used one, all learned contents which are stored in TCM memory should be erased after the replacement referring to "LEARNING CONTROL INITIALIZATION" in this section.

2. Data link connector (DLC)

[INTERMITTENT TROUBLES] and [NOTES ON SYSTEM CIRCUIT INSPECTION]

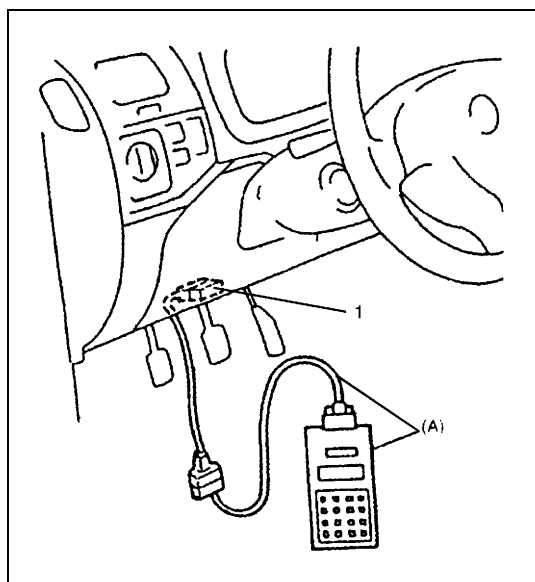
Refer to Section 0A.

DTC check

- 1) Turn ignition switch OFF.
- 2) Connect SUZUKI scan tool to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

Special tool**(A) : SUZUKI scan tool**

- 3) Turn ignition switch ON.
- 4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC) (1).

DTC clearance

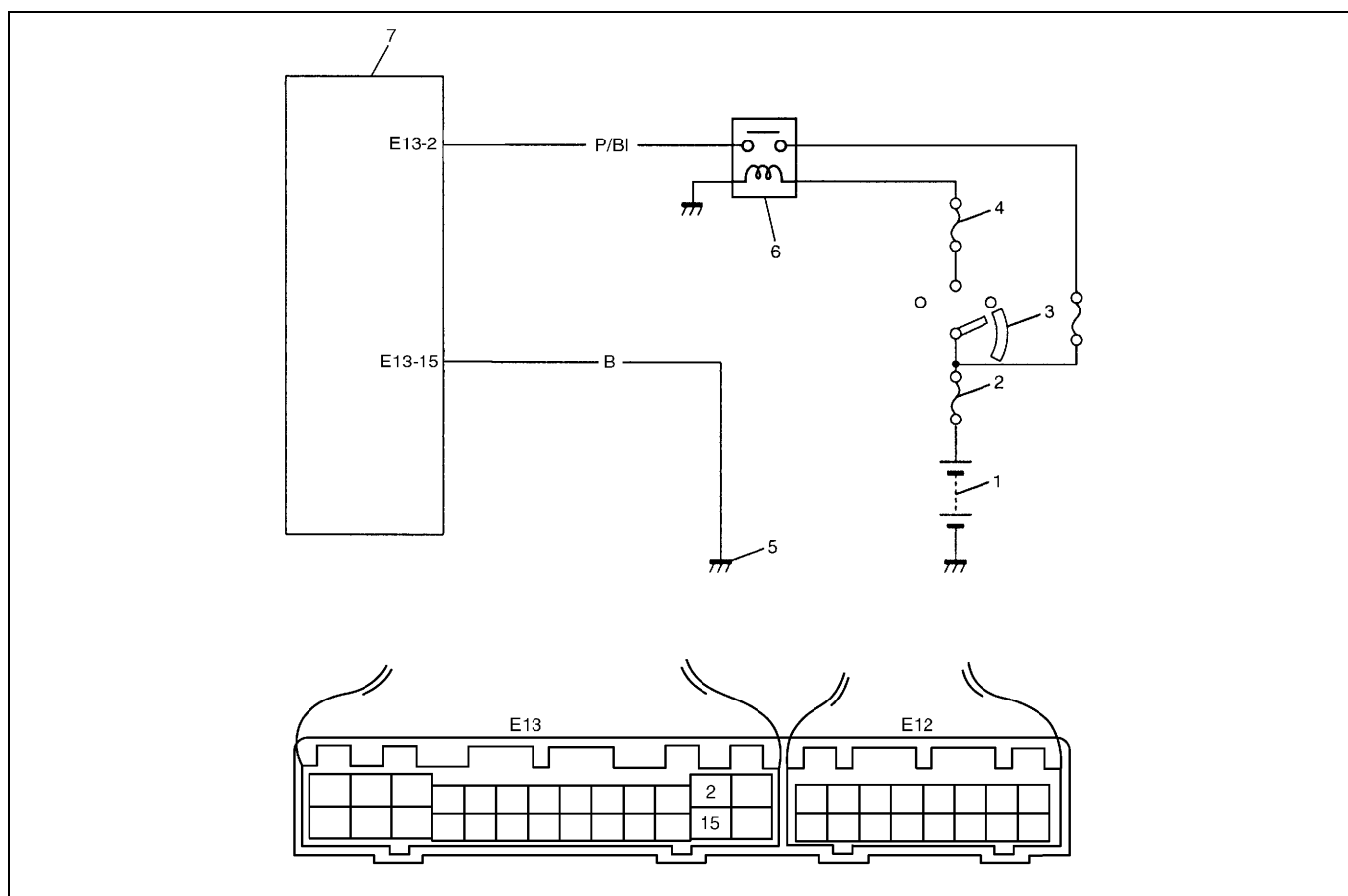
- 1) Turn ignition switch OFF.
- 2) Connect it to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

Special tool**(A) : SUZUKI scan tool**

- 3) Turn ignition switch ON.
- 4) Erase DTC according to instructions displayed on scan tool. Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the clearance, turn ignition switch OFF and disconnect scan tool from data link connector (DLC) (1).

DTC table

DTC NO.	DETECTING ITEMS	MIL	
		Vehicle equipped with EGR valve	Vehicle equipped without EGR valve
P0715	Input/Turbine speed sensor circuit malfunction	1 driving cycle	Not applicable
P0730	Incorrect gear ratio	2 driving cycles	Not applicable
P0753	Shift solenoid-A (No.1) electrical	1 driving cycle	Not applicable
P0758	Shift solenoid-B (No.2) electrical	1 driving cycle	Not applicable
P0763	Shift solenoid-C (No.3) electrical	1 driving cycle	Not applicable
P0768	Shift solenoid-D (No.4) electrical	1 driving cycle	Not applicable
P0773	Shift solenoid-E (No.5) electrical	1 driving cycle	Not applicable
P0743	Torque converter clutch (lock-up) system electrical	1 driving cycle	Not applicable
P0741	Torque converter clutch (lock-up) solenoid performance or stuck off	2 driving cycles	Not applicable
P0720	Output shaft speed sensor circuit malfunction	1 driving cycle	Not applicable
P1700	Throttle position signal input malfunction	1 driving cycle	Not applicable
P0705	Transmission range sensor circuit malfunction	1 driving cycle	Not applicable
P0725	Engine speed input circuit malfunction	2 driving cycles	Not applicable
P0710	Transmission fluid temperature sensor circuit malfunction	2 driving cycles	Not applicable
P1709	Engine coolant temperature signal circuit	1 driving cycle	Not applicable
P0702	Transmission control system electrical	1 driving cycle	Not applicable
P1702	Internal malfunction of TCM		

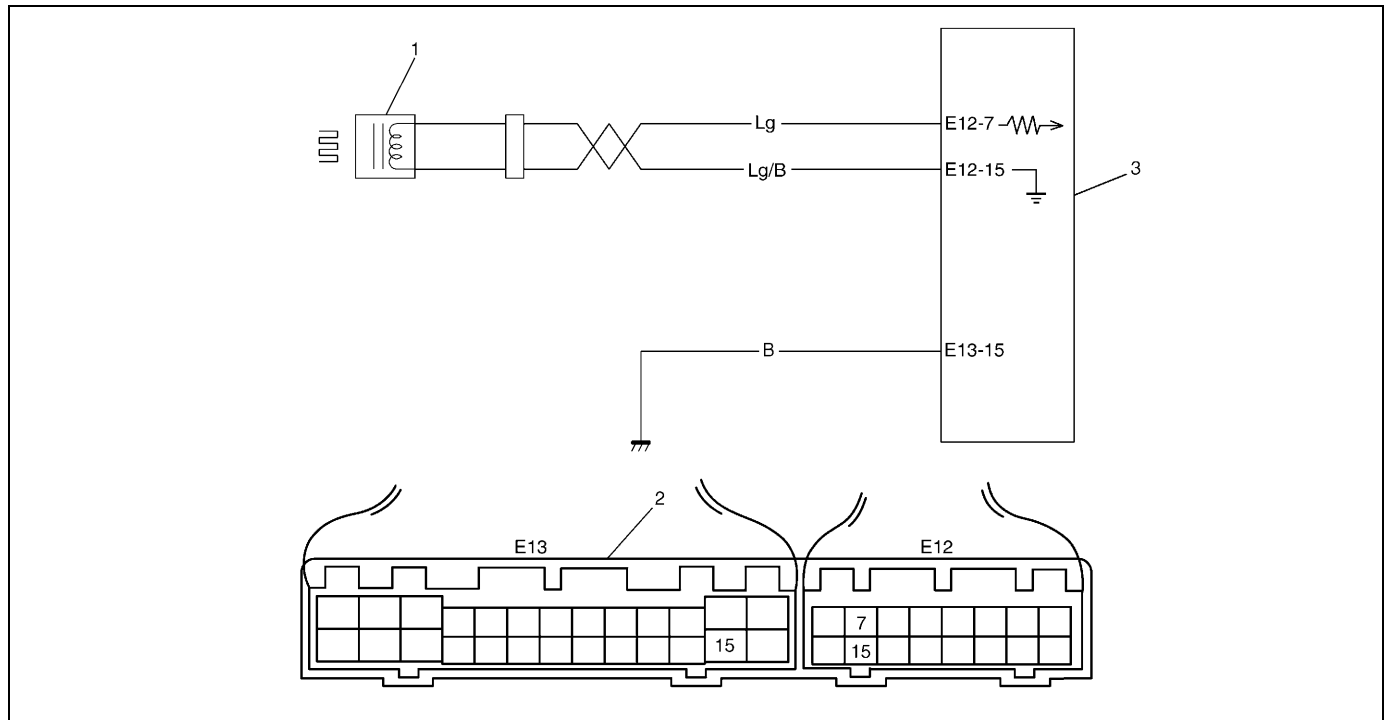
TCM power and ground circuit check

1. Battery	4. Circuit fuse (IG)	7. TCM
2. Main fuse	5. Ground	
3. Ignition switch	6. A/T relay	

DTC DETECTING CONDITION

- Automatic transmission doesn't shift to 1st gear at vehicle start in "D" range.

Step	Action	Yes	No
1	1) Disconnect TCM coupler with ignition switch OFF. 2) Check for proper connection to TCM at "E13-2" terminal. 3) If OK, turn ignition switch ON and check voltage at terminal "E13-2" of disconnected TCM coupler. Is it 10 – 14 V?	Go to Step 2.	"P/B" wire open or faulty A/T relay.
2	1) Turn ignition switch OFF. 2) With TCM couplers disconnected, check for proper connection to TCM at "E13-15" terminal. 3) If OK, check resistance between "E13-15" terminal of disconnected TCM coupler and body ground. Is continuity indicated?	TCM power and ground circuits are in good condition.	"B" wire open.

DTC P0715 Input/turbine speed sensor circuit malfunction

1. Input shaft speed sensor

2. TCM couplers (viewed from harness side)

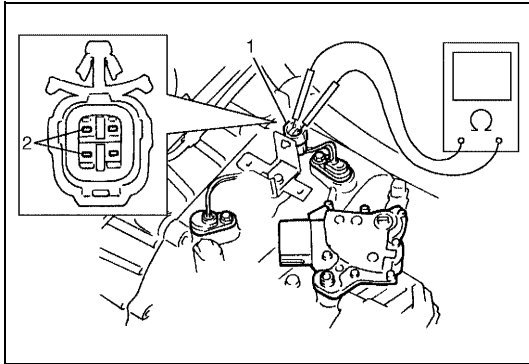
3. TCM

DTC DETECTING CONDITION

- Input shaft speed sensor signal voltage too high or too low.

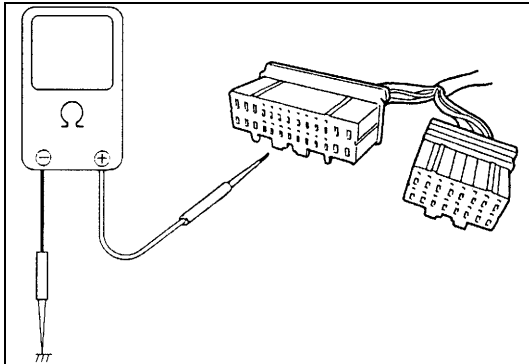
Step	Action	Yes	No
1	Was "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE" performed?	Go to Step 2.	Go to "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE".
2	1) Turn ignition switch OFF and disconnect output shaft speed sensor – input shaft speed sensor coupler. 2) Measure resistance between terminals of the disconnected sensor side coupler. Is it 160 – 200 Ω ? (See figure.)	Go to Step 3.	Replace input shaft speed sensor.
3	1) Connect output shaft speed sensor - input shaft speed sensor coupler then disconnect TCM couplers. 2) Measure resistance between terminal "E12-7" and "E12-15" of disconnected harness side coupler. Is it 160 – 200 Ω ?	Go to Step 4.	"Lg" or "Lg/B" wire open or shorted each other.
4	Measure resistance between terminal "E12-7" (of disconnected harness side coupler) and body ground then terminal "E12-15" (of disconnected harness side coupler) and body ground. Are they about 0 Ω ? (See figure.)	Short in between "Lg" wire and ground or "Lg/B" wire and ground.	Poor connection of terminal "E12-7" or "E12-15" of TCM. If all the above are in good condition, substitute a known-good TCM and recheck.

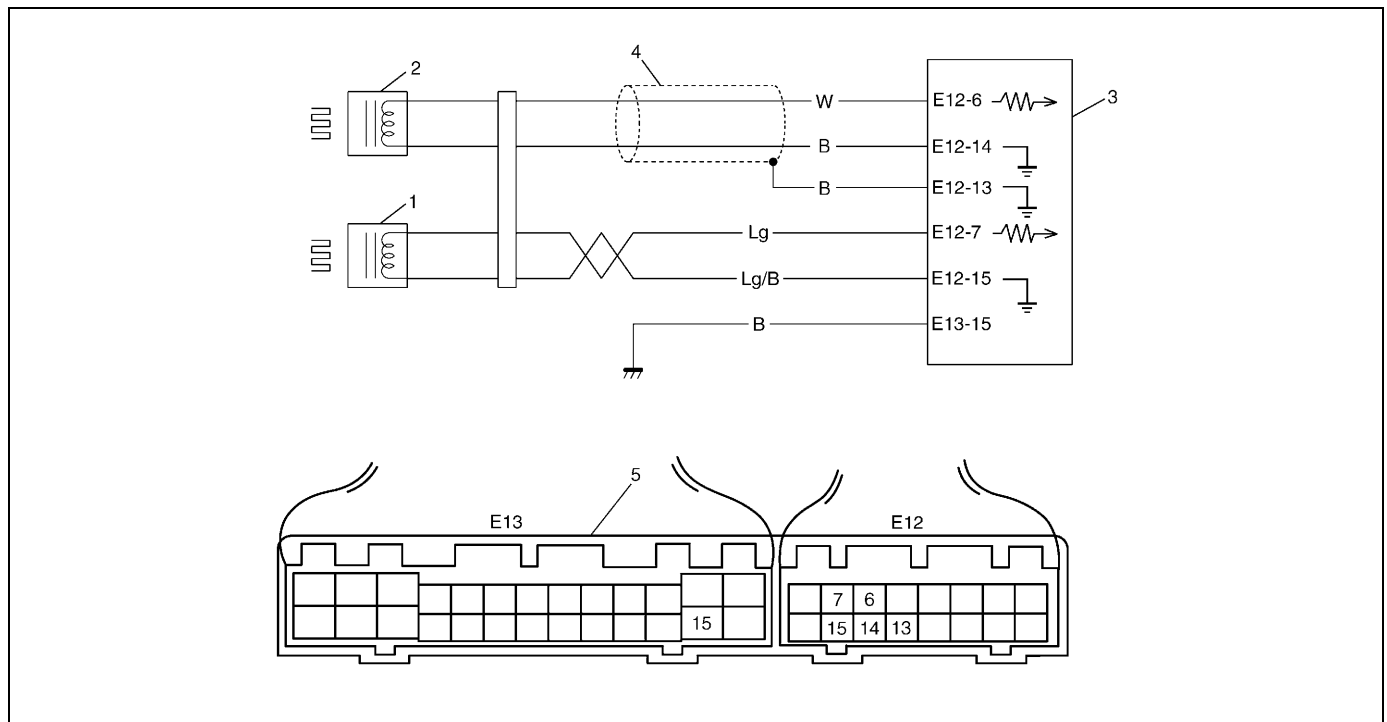
Figure for Step 2



- | |
|---|
| 1. Output shaft speed sensor - Input shaft speed sensor coupler |
| 2. Input shaft speed sensor terminal |

Figure for Step 4



DTC P0730 Incorrect gear ratio

1. Input shaft speed sensor	4. Shield wire
2. Output shaft speed sensor	5. TCM couplers (viewed from harness side)
3. TCM	

DTC DETECTING CONDITION

- Difference in detected revolution between input shaft speed sensor and output shaft speed sensor too wide.

Step	Action	Yes	No
1	Check if DTC P0730 displayed with DTC P0715 or DTC P0720. Is DTC P0730 displayed with DTC P0715 or DTC P0720?	Inspect according to DTC P0715 or DTC P0720 flow table first.	Go to Step 2.
2	1) Turn ignition switch OFF and disconnect TCM couplers. 2) Measure resistance between terminal "E12-13" of the disconnected harness side coupler and body ground. Is it about 0 Ω ? (See figure.)	Short in between shield portion or "B" wire and ground.	Go to Step 3.
3	Check input shaft speed sensor and output shaft speed sensor referring to each item in this section. Are they OK? (See figure.)	<ul style="list-style-type: none"> • Broken wire in shield portion or broken "B" wire, or shorted to power source circuit. • Malfunction of A/T itself (over revolving of C0 clutch drum by departing of C0 clutch drum snap ring, clutch slipping, etc.) If all the above are in good condition, substitute a known-good TCM and recheck.	Inspect and replace referring to each item in this section.

Figure for Step 2

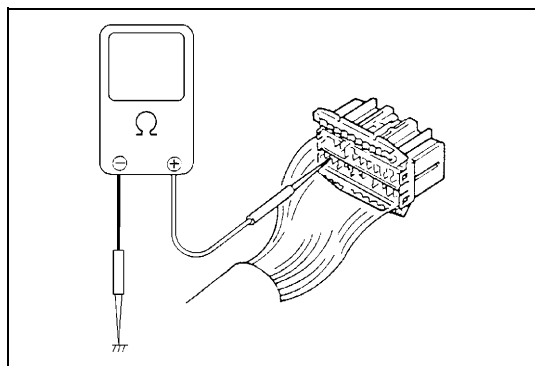
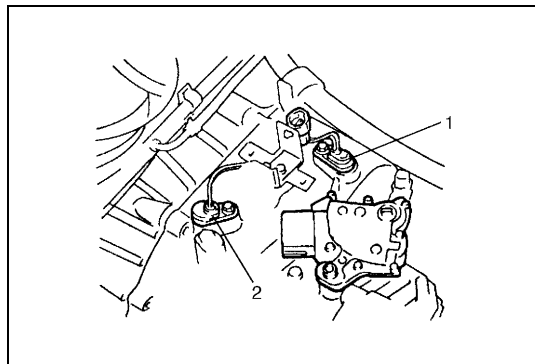
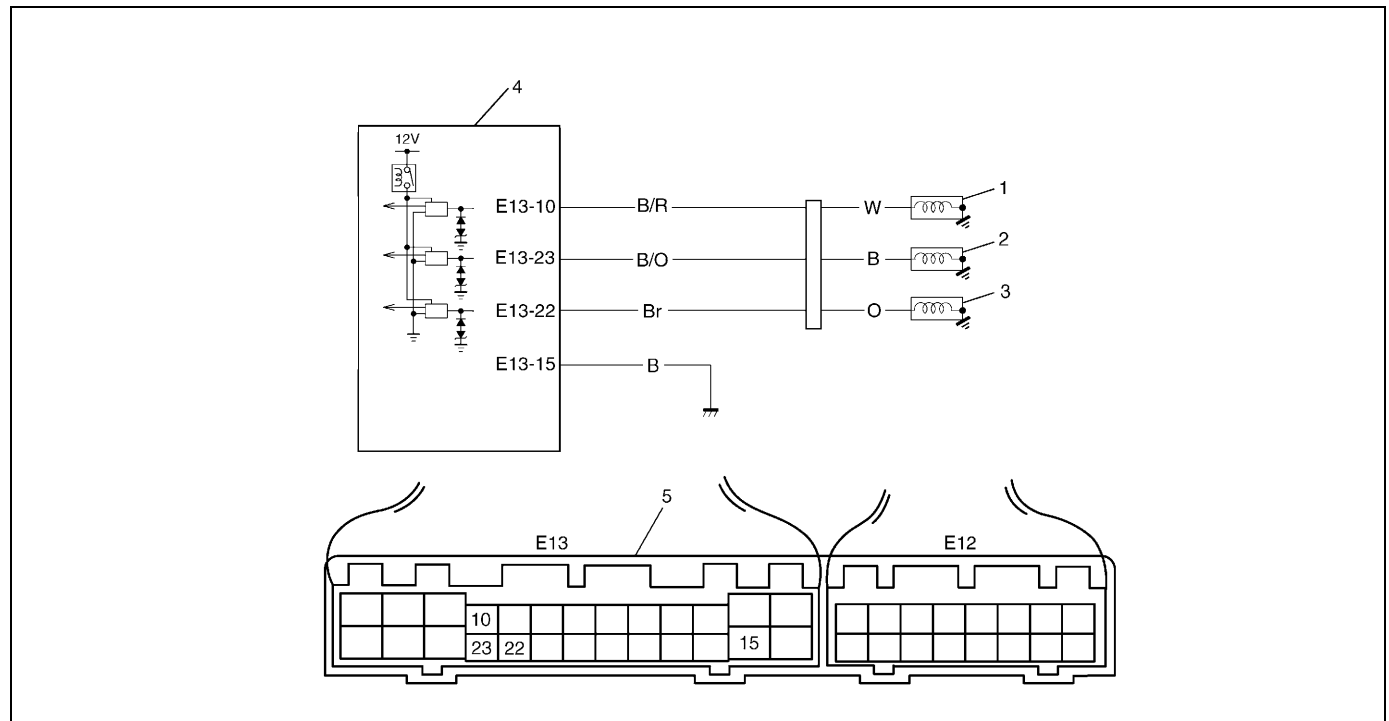


Figure for Step 3



- | |
|------------------------------|
| 1. Output shaft speed sensor |
| 2. Input shaft speed sensor |

DTC P0753 Shift solenoid-A (No.1) electrical**DTC P0758 Shift solenoid-B (No.2) electrical****DTC P0743 TCC (lock-up) system electrical**

1. Shift solenoid-A (No.1)	4. TCM
2. Shift solenoid-B (No.2)	5. TCM couplers (viewed from harness side)
3. TCC (lock-up) solenoid	

DTC DETECTING CONDITION

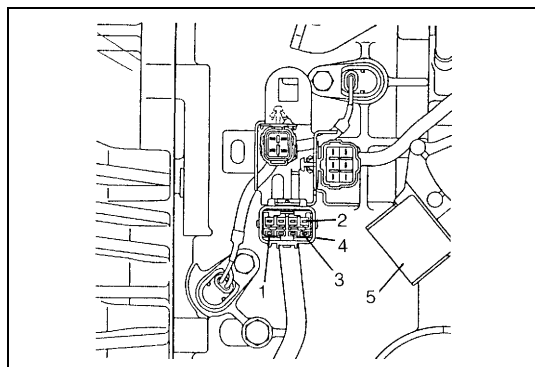
- Solenoid output voltage too high although TCM orders solenoid to turn OFF.
- Solenoid output voltage too low although TCM orders solenoid to turn ON.

Step	Action	Yes	No
1	1) Turn ignition switch OFF and disconnect solenoid coupler. 2) Measure the resistance between each solenoid terminal of the solenoid side coupler and transmission ground. Is it 11 – 15 Ω ? (See figure.)	Go to Step 2.	<ul style="list-style-type: none"> • Solenoid lead wire open or shorted to ground. • Malfunction of solenoid.
2	1) Disconnect TCM couplers. 2) Measure the resistance between terminal “E13-10”, “E13-23” or “E13-22” of the disconnected harness side TCM coupler and body ground. Is it about 0 Ω ? (See figure.)	“B/R”, “B/O”, or “Br” wire shorted to ground.	Go to Step 3.
3	1) Connect solenoid coupler. 2) Measure the resistance between each solenoid terminal of the disconnected harness side TCM coupler and body ground. Is it 11 – 15 Ω ?	Go to Step 4.	“B/R”, “B/O” or “Br” wire open or poor connection of shift solenoid coupler.

Step	Action	Yes	No
4	Turn ignition switch ON then measure voltage between terminal "E13-10", "E13-23" or "E13-22" of the disconnected harness side TCM coupler and body ground. Is it about 0 V?	Poor connection at terminal "E13-10", "E13-23" or "E13-22" of TCM. If all the above are in good condition, substitute a known-good TCM and recheck.	"B/R", "B/O" or "Br" wire or shift solenoid lead wire shorted to power source circuit.

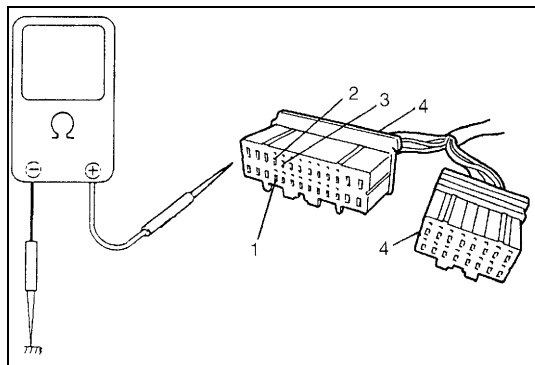
Solenoid	TCM Terminal Number	Lead Wire Color (between TCM and solenoid coupler)
Shift solenoid -A (No.1)	E13-10	B/R
Shift solenoid -B (No.2)	E13-23	B/O
TCC solenoid (Lock-up solenoid)	E13-22	Br

Figure for Step 1



- | |
|---|
| 1. Shift solenoid -A (No.1) terminal |
| 2. Shift solenoid -B (No.2) terminal |
| 3. TCC (Lock-up) solenoid terminal |
| 4. Solenoid coupler |
| 5. Transmission range sensor (Shift switch) |

Figure for Step 2, 3, 4



- | |
|----------------------|
| 1. "E13-10" terminal |
| 2. "E13-23" terminal |
| 3. "E13-22" terminal |
| 4. TCM couples |

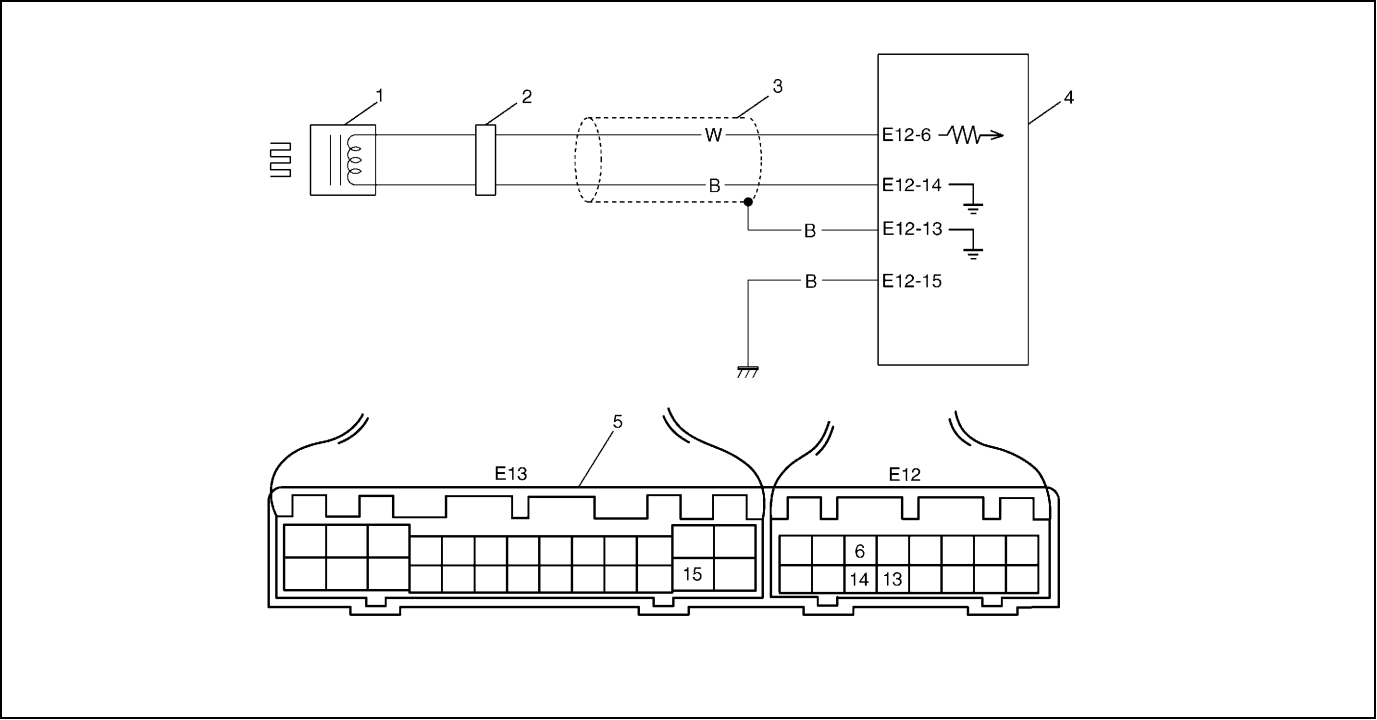
DTC P0741 TCC (lock-up) solenoid performance or stuck OFF

Step	Action	Yes	No
1	Was "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE" performed?	Go to Step 2.	Go to "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE".
2	Check TCC (lock-up) solenoid referring to "SHIFT SOLENOID VALVES" in this section. Is it in good condition?	Go to Step 3.	Replace TCC (lock-up) solenoid.
3	Check valve body for fluid passage clog, or lock-up control valve, secondary regulator valve or signal valve stuck, referring to "TRANSMISSION UNIT REPAIR OVERHAUL" in this section. Are they in good condition?	Go to Step 4.	Faulty valve body.
4	Substitute a known-good torque converter and recheck. Is it OK?	Torque converter malfunction.	Overhaul and repair automatic transmission.

DTC DETECTING CONDITION

- Difference between turbine rev. and engine rev. too close even though TCM ordered to turn OFF lock-up.
- Difference between turbine rev. and engine rev. too wide even though TCM ordered to turn ON lock-up.

DTC P0720 Output shaft speed sensor circuit malfunction



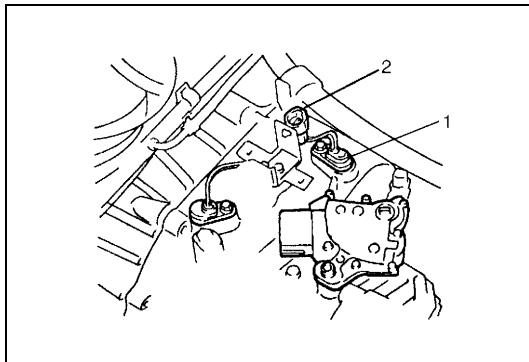
1. Output shaft speed sensor (A/T VSS)	4. TCM
2. Coupler	5. TCM couplers (viewed from harness side)
3. Shield wire	

DTC DETECTING CONDITION
<ul style="list-style-type: none"> Output shaft speed sensor signal voltage too high or too low.

Step	Action	Yes	No
1	1) Turn ignition switch OFF and disconnect output shaft speed sensor – input shaft speed sensor coupler. (See figure.) 2) Measure the resistance between terminals of disconnected sensor side coupler. Is it 160 – 200 Ω? (See figure.)	Go to Step 2.	Replace output shaft speed sensor.
2	1) Connect output shaft speed sensor – input shaft speed sensor coupler then disconnect TCM couplers. 2) Measure resistance between terminal “E12-6” and “E12-14” of disconnected harness side coupler. Is it 160 – 200 Ω? (See figure.)	Go to Step 3.	“W” or “B” wire open or shorted each other.

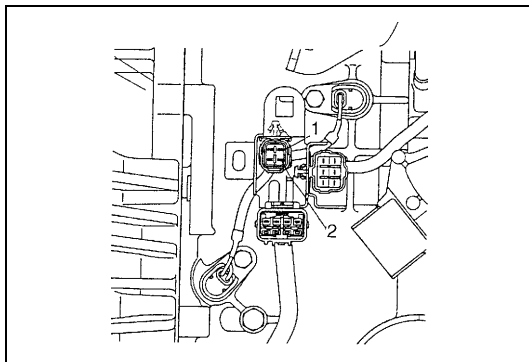
Step	Action	Yes	No
3	<p>1) Disconnect output shaft speed sensor – input shaft speed sensor coupler. (See figure.)</p> <p>2) Measure resistance between terminal “3” (of disconnected sensor side coupler) and body ground then terminal “4” (of disconnected sensor side coupler) and body ground.</p> <p>Is it about 0 Ω? (See figure.)</p>	Replace output shaft speed sensor.	Go to Step 4.
4	<p>1) Connect output shaft speed sensor coupler.</p> <p>2) Measure resistance between terminal “E12-6” (of disconnected harness side coupler) and body ground then terminal “E12-14” (of disconnected harness side coupler) and body ground.</p> <p>Is it about 0 Ω? (See figure.)</p>	“W” or “B” wire shorted to ground.	Go to Step 5.
5	<p>Measure resistance between terminal “E12-6” and “E12-13” (of disconnected harness side coupler) then terminal “E12-14” and “E12-13” (of disconnected harness side coupler).</p> <p>Is it about 0 Ω? (See figure.)</p>	“W” wire or “B” wire shorted to shield portion.	<p>Poor connection of terminal “E12-6” or “E12-14” of the TCM.</p> <p>If all the above are in good condition, substitute a known-good TCM and recheck.</p>

Figure for Step 1, 2



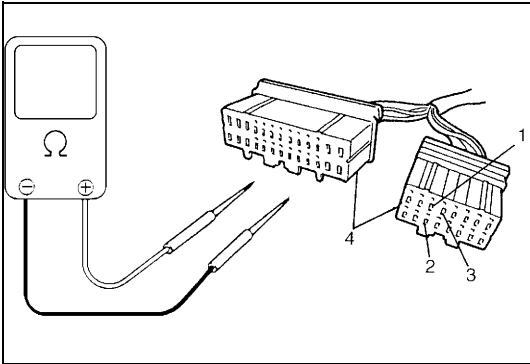
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| 1. Output shaft speed sensor |
| 2. Input shaft speed sensor coupler |

Figure for Step 2, 3



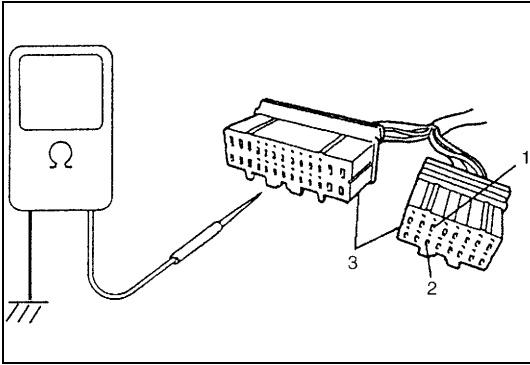
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| 1. Terminal "3" |
| 2. Terminal "4" |

Figure for Step 2, 5

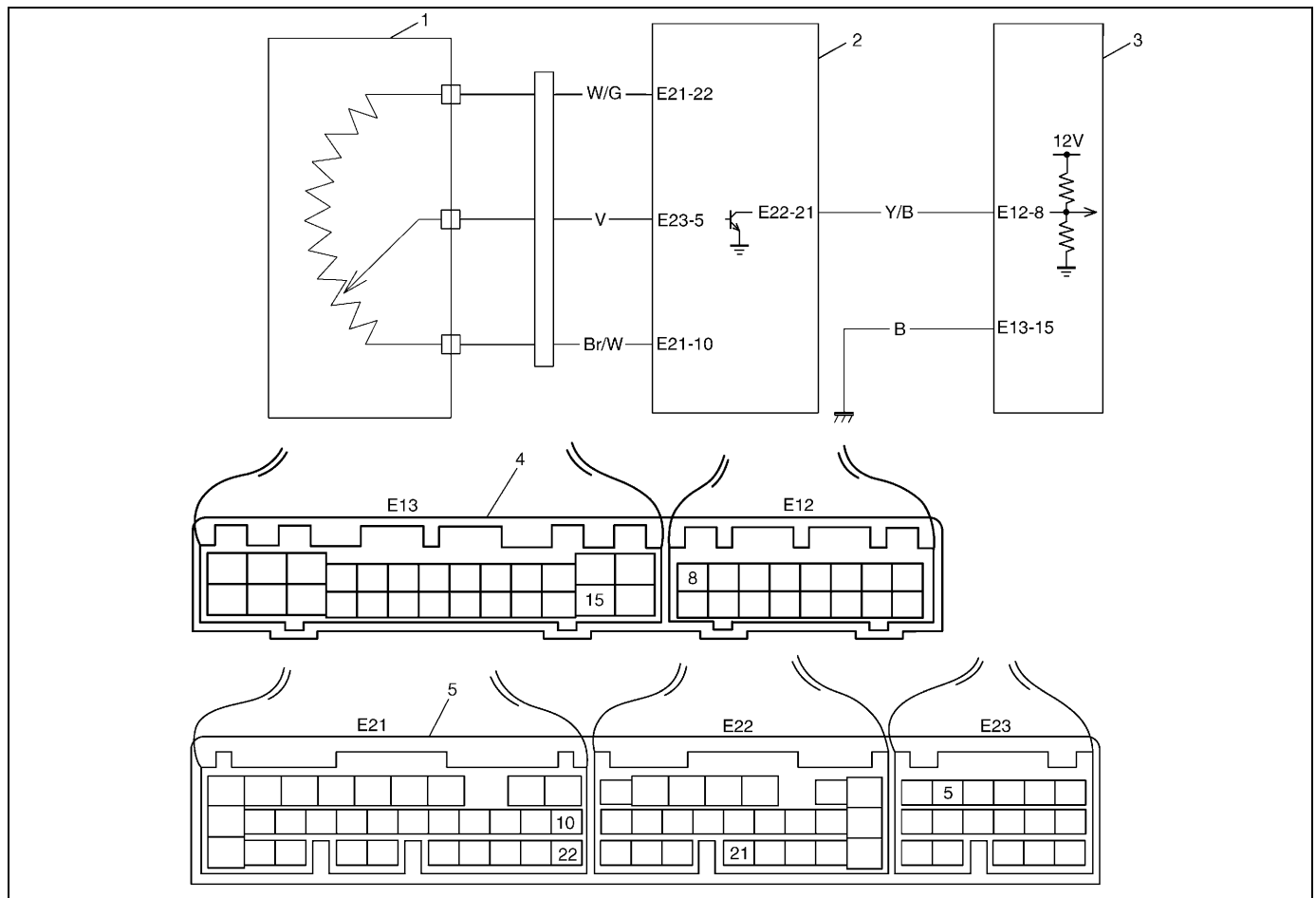


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|----------------------|
| 1. "E12-14" terminal |
| 2. "E12-6" terminal |
| 3. "E12-13" terminal |
| 4. TCM couplers |

Figure for Step 4



- | |
|----------------------|
| 1. "E12-14" terminal |
| 2. "E12-6" terminal |
| 3. TCM couplers |

DTC P1700 Throttle position signal input malfunction

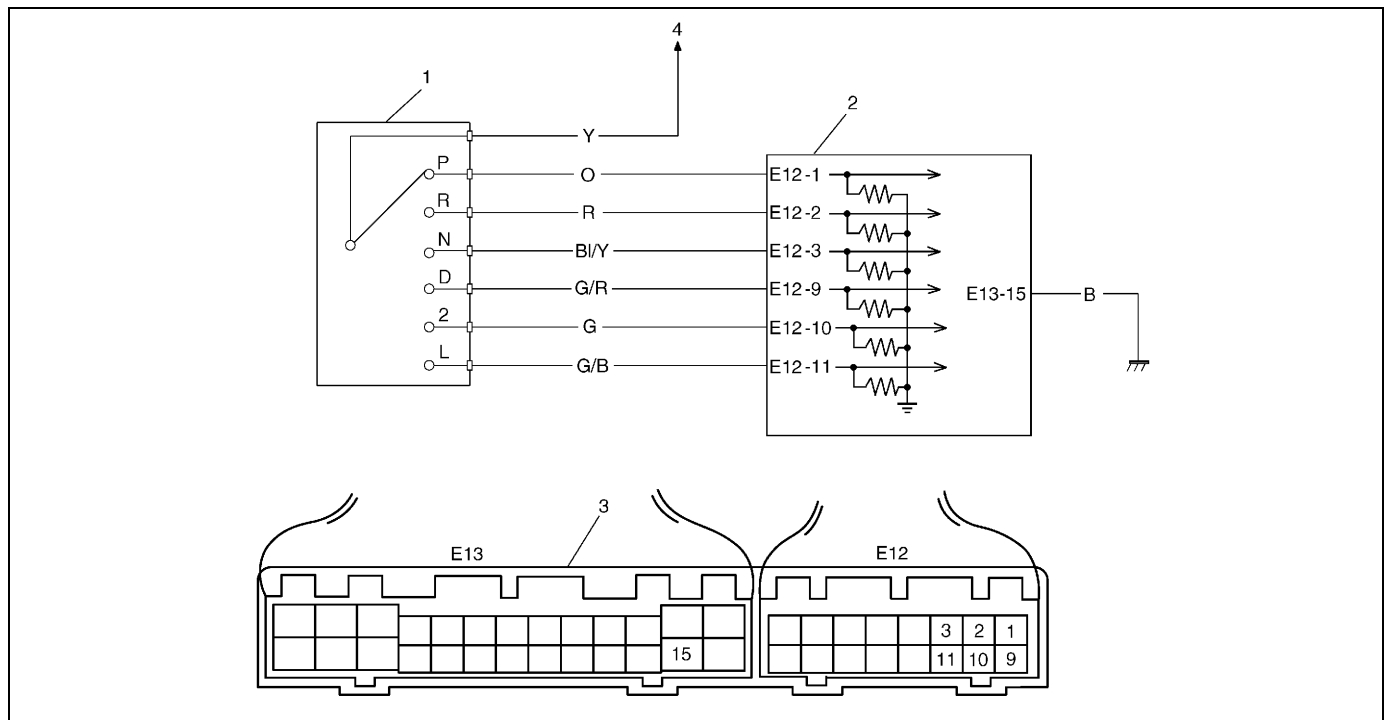
1. Throttle position (TP) sensor	4. TCM couplers (viewed from harness side)
2. ECM	5. ECM couplers (viewed from harness side)
3. TCM	

DTC DETECTING CONDITION

- NO or abnormal throttle opening signal inputted.

Step	Action	Yes	No
1	Check DTC of "ENGINE DIAGNOSIS" referring to Section 6. Is there DTC related to throttle position sensor detected?	Inspect and repair referring to DTC flow table of "ENGINE DIAGNOSIS" in Section 6.	Go to Step 2.
2	1) Check for proper connections of terminal "E12-8" to TCM and terminal "E22-21" to ECM. 2) Turn ignition switch OFF and disconnect TCM and ECM couplers. 3) Check continuity between terminal "E12-8" of disconnected harness side TCM coupler and terminal "E22-21" of disconnected harness side ECM coupler. Is continuity indicated?	Go to Step 3.	"Y/B" wire open.

Step	Action	Yes	No
3	Check continuity between terminal "E12-8" of disconnected harness side TCM coupler and ground. Is continuity indicated?	"Y/B" wire shorted to ground.	Go to Step 4.
4	1) Connect TCM couplers. 2) Turn ignition switch ON. 3) Measure voltage between terminal "E12-8" of connected harness side TCM coupler and ground. Is it 10 – 14 V?	Intermittent trouble or faulty ECM. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A. If no trouble found, substitute a known-good ECM and recheck.	Faulty TCM. Substitute a known-good TCM and recheck.

DTC P0705 Transmission range sensor (switch) circuit malfunction

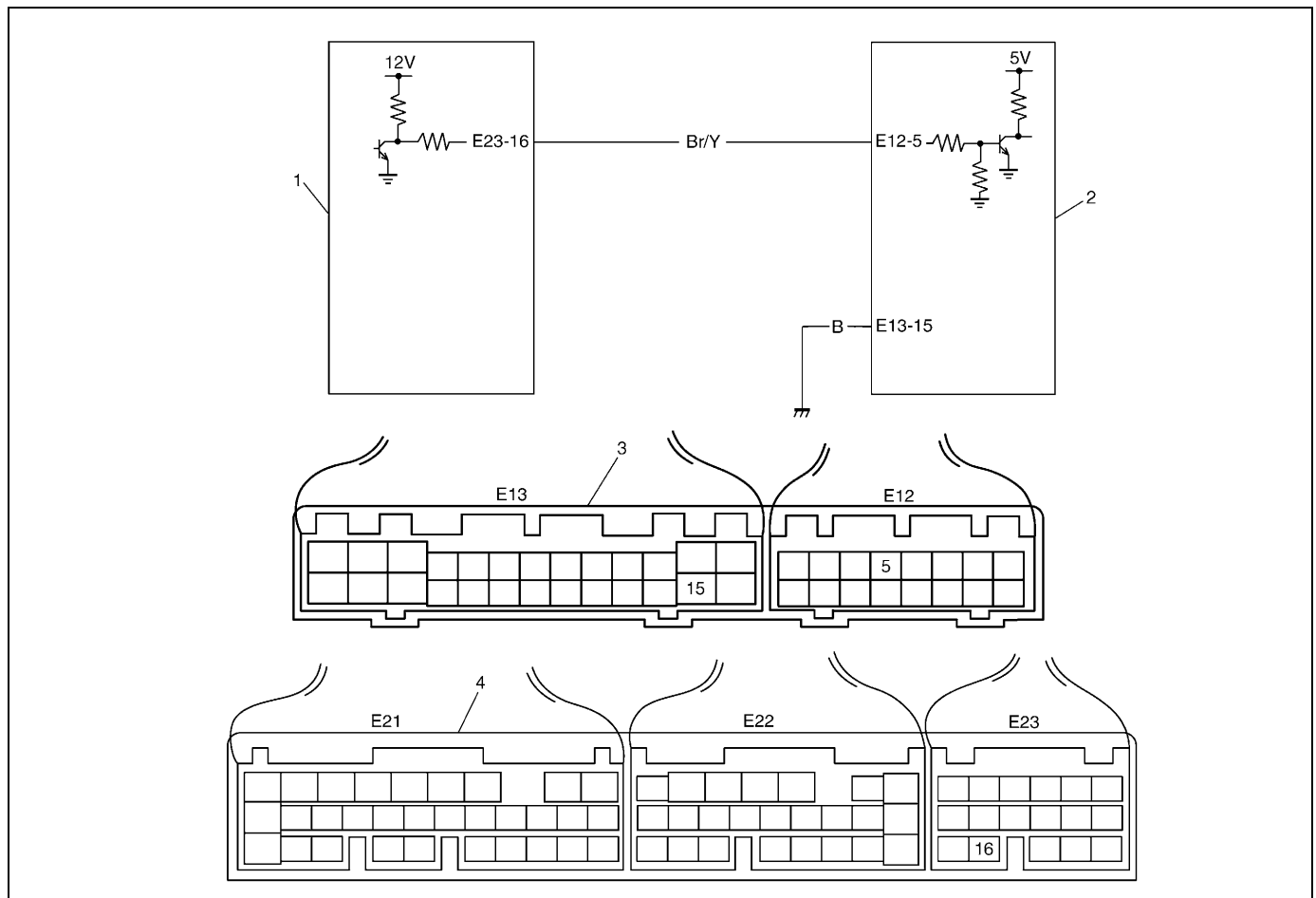
1. Transmission range sensor (shift switch)	3. TCM couplers (viewed from harness side)
2. TCM	4. Power source

DTC DETECTING CONDITION

- No shift switch signal inputted or two or more shift switch signals inputted at the same time.

Step	Action	Yes	No
1	1) Turn ignition switch OFF, disconnect TCM couplers. 2) Turn ignition switch ON, check voltage between terminal "E12-1" and "E13-15" of disconnected harness side TCM coupler. Is it 10 – 14 V at "P" range and 0 V at the other range?	Go to Step 2.	Go to Step 7.
2	While ignition switch ON, check voltage between terminal "E12-2" and "E13-15" of disconnected harness side TCM coupler. Is it 10 – 14 V at "R" range and 0 V at the other range?	Go to Step 3.	Go to Step 7.
3	While ignition switch ON, check voltage between terminal "E12-3" and "E13-15" of disconnected harness side TCM coupler. Is it 10 – 14 V at "N" range and 0 V at the other range?	Go to Step 4.	Go to Step 7.
4	While ignition switch ON, check voltage between terminal "E12-9" and "E13-15" of disconnected harness side TCM coupler. Is it 10 – 14 V at "D" range and 0 V at the other range?	Go to Step 5.	Go to Step 7.

Step	Action	Yes	No
5	While ignition switch ON, check voltage between terminal "E12-10" and "E13-15" of disconnected harness side TCM coupler. Is it 10 – 14 V at "2" range and 0 V at the other range?	Go to Step 6.	Go to Step 7.
6	While ignition switch ON, check voltage between terminal "E12-11" and "E13-15" of disconnected harness side TCM coupler. Is it 10 – 14 V at "L" range and 0 V at the other range?	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "INTERMITTENT AND POOR CONNECTION" in Section 0B.	Go to Step 7.
7	Check transmission range sensor referring in this section. Is it OK?	Transmission range sensor wire shorted. If wire harnesses are OK, substitute a known-good TCM and recheck.	Replace transmission range sensor.

DTC P0725 Engine speed input circuit malfunction

1. ECM	3. TCM couplers (viewed from harness side)
2. TCM	4. ECM couplers (viewed from harness side)

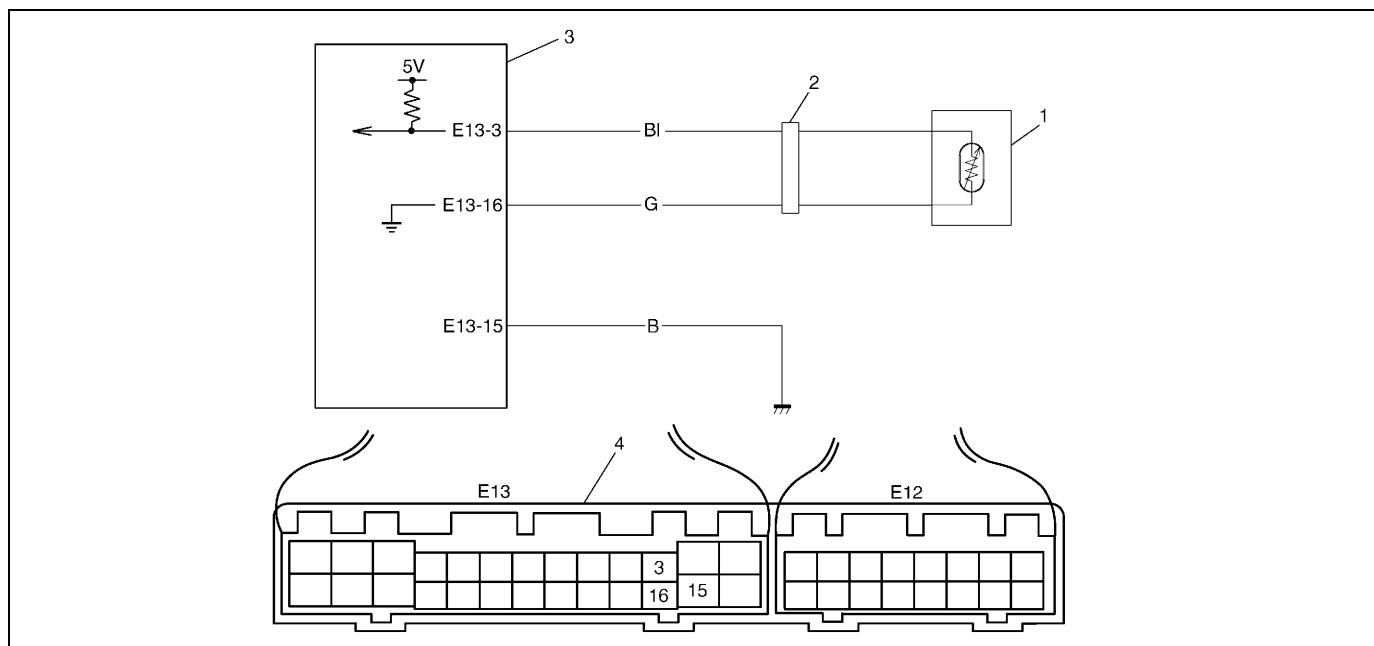
DTC DETECTING CONDITION

- Inputted engine rev. signal too low or too high.

Step	Action	Yes	No
1	Check DTC of "ENGINE DIAGNOSIS" referring to Section 6. Is there DTC related to engine speed sensor?	Inspect and repair referring to DTC flow table of "ENGINE DIAGNOSIS" in Section 6.	Go to Step 2.
2	1) Turn ignition switch OFF and disconnect ECM and TCM couplers. 2) Measure resistance between terminals "E23-16" and "E12-5" of disconnected harness side couplers. Is it about 0 Ω?	Go to Step 3.	"Br/Y" wire open.
3	Measure resistance between terminal "E12-5" of disconnected harness side coupler and body ground. Is it infinity?	Go to Step 4.	"Br/Y" wire shorted to ground.

Step	Action	Yes	No
4	1) Turn ignition switch OFF and connect ECM couplers. 2) Turn ignition switch ON and measure voltage between terminal "E12-5" of disconnected harness side TCM coupler and body ground. Is it 10 – 14 V?	Intermittent trouble or faulty ECM or TCM. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A. If no trouble found, substitute a known-good ECM or TCM and recheck.	Faulty ECM. Substitute a known-good ECM and recheck.

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DTC P0710 Transmission fluid temperature sensor circuit malfunction



1. Transmission fluid temperature sensor	3. TCM
2. Coupler	4. TCM couplers (viewed from harness side)

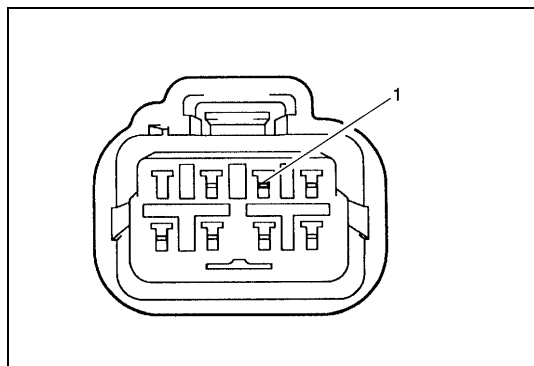
DTC DETECTING CONDITION

- A/T fluid temperature signal input voltage too low.
- A/T fluid temperature signal input voltage does not go down although standard value of engine revolution signal input.

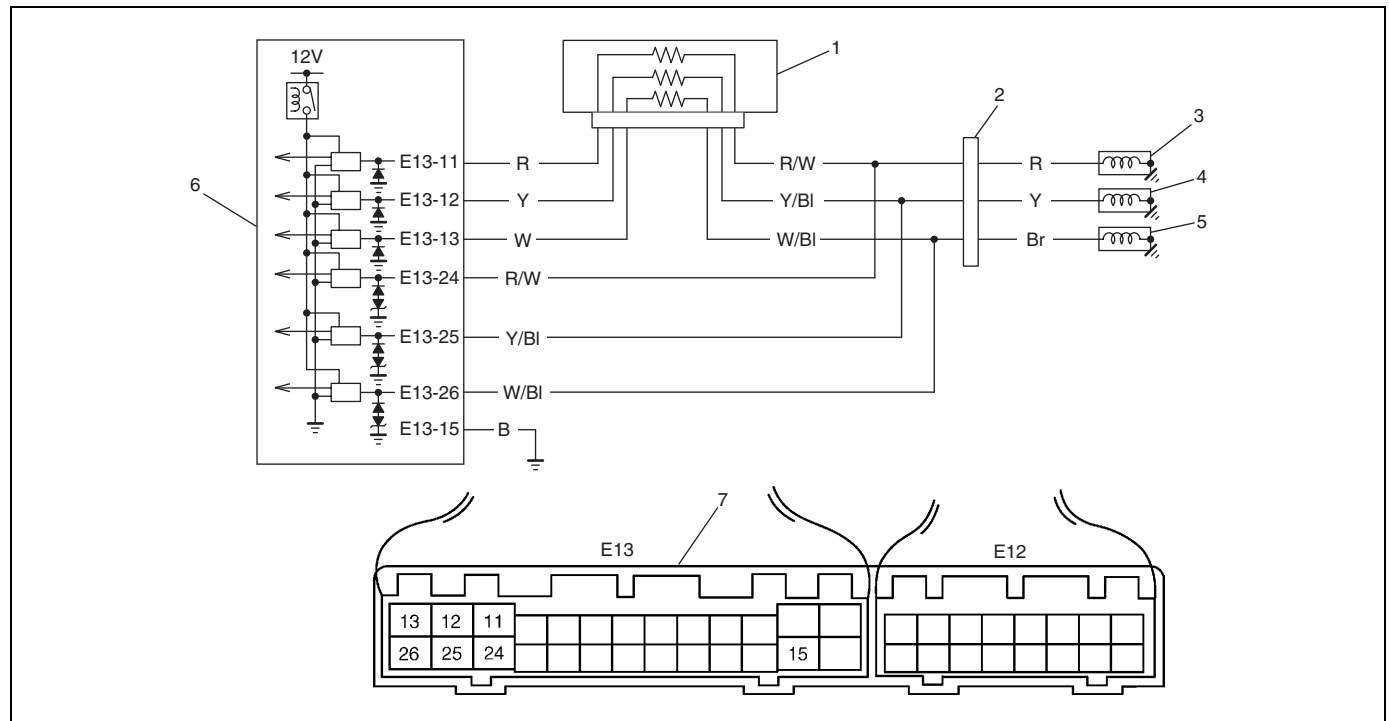
Step	Action	Yes	No
1	1) Turn ignition switch OFF and disconnect sensor wire harness coupler. 2) Measure resistance between "BI" wire and "G" wire terminal of sensor side coupler. Is it infinity or 0 Ω ?	Faulty transmission fluid temperature sensor. Replace transmission temperature sensor.	Go to Step 2.
2	1) Turn ignition switch OFF and disconnect TCM couplers. 2) Check continuity between terminal "E13-3" of disconnected harness side TCM coupler and ground. Is continuity indicated?	"BI" wire shorted to ground.	Go to Step 3.
3	1) Connect sensor wire harness coupler. 2) Measure resistance between terminals "E13-3" and "E13-16" of disconnected harness side coupler. Is it about 0 Ω or infinity?	"BI" or "G" wire open, shorted each other or poor connection of solenoid wire harness coupler.	Go to Step 4.

Step	Action	Yes	No
4	1) Connect TCM couplers. 2) Disconnect solenoid wire harness coupler. 3) Turn ignition switch ON then measure voltage between "BI" wire terminal of disconnected harness side coupler and engine ground. (See figure.) Is it 4 – 6 V?	Intermittent trouble or faulty TCM. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A. If no trouble found, substitute a known-good TCM and recheck.	"BI" wire shorted to power circuit or poor connection of terminal "E13-3". If wire and connection are OK, substitute a known-good TCM.

Figure for Step 4



1. "BI" wire terminal

DTC P0763 Shift solenoid-C (No.3) electrical**DTC P0768 Shift solenoid-D (No.4) electrical****DTC P0773 Shift solenoid-E (No.5) electrical**

1. Dropping resistor	4. Shift solenoid valve-D (No.4)	7. TCM couplers (viewed from harness side)
2. solenoid coupler	5. Shift solenoid valve-E (No.5)	
3. Shift solenoid valve-C (No.3)	6. TCM	

DTC DETECTING CONDITION

- Solenoid output voltage too high or too low differently from TCM order.

Step	Action	Yes	No
1	1) Turn ignition switch OFF and disconnect solenoid coupler. 2) Measure resistance between terminal of solenoid coupler and transmission ground. (See figure.) Is it 2.0 – 4.0 Ω?	Go to Step 2.	<ul style="list-style-type: none"> Solenoid lead wire open or shorted to ground. Malfunction of solenoid valve.
2	1) Disconnect TCM couplers. 2) Measure resistance between terminal of disconnected body side solenoid coupler and terminal “E13-11”, “E13-12” or “E13-13” of disconnected harness side TCM coupler. (See chart.) Is it 6.5 – 8.5 Ω?	Go to Step 3.	Inspect dropping resistor referring to “DROPPING RESISTOR” in this section. If OK, circuit between TCM and dropping resistor or dropping resistor and solenoid coupler open.
3	Check continuity between terminal “E13-24”, “E13-25” or “E13-26” of disconnected TCM coupler and terminal of disconnected body side solenoid coupler. (See chart.) Is there continuity?	Go to Step 4.	Circuit between TCM and solenoid coupler open.

Step	Action	Yes	No
4	Check continuity between terminal of disconnected body side solenoid coupler and transmission ground with TCM, dropping resistor and solenoid couplers disconnected. Is there continuity?	Circuit between TCM and transmission shorted to ground.	Go to Step 5.
5	Check continuity between terminal of disconnected body side dropping resistor coupler and transmission ground. (See chart.) Is there continuity?	Circuit between TCM and dropping resistor is shorted to ground.	Intermittent trouble or faulty TCM. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A. If no trouble found, substitute a known-good TCM and recheck.

Chart for Step 2

Solenoid	TCM terminal No.	Solenoid coupler lead wire color (body side)
C (No.3)	E13-11	R/W
D (No.4)	E13-12	Y/BI
E (No.5)	E13-13	W/BI

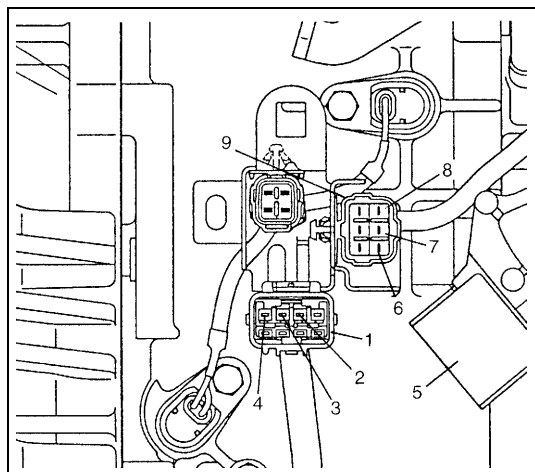
Chart for Step 3

Solenoid	TCM terminal No.	Solenoid coupler lead wire color (body side)
C (No.3)	E13-24	R/W
D (No.4)	E13-25	Y/BI
E (No.5)	E13-26	W/BI

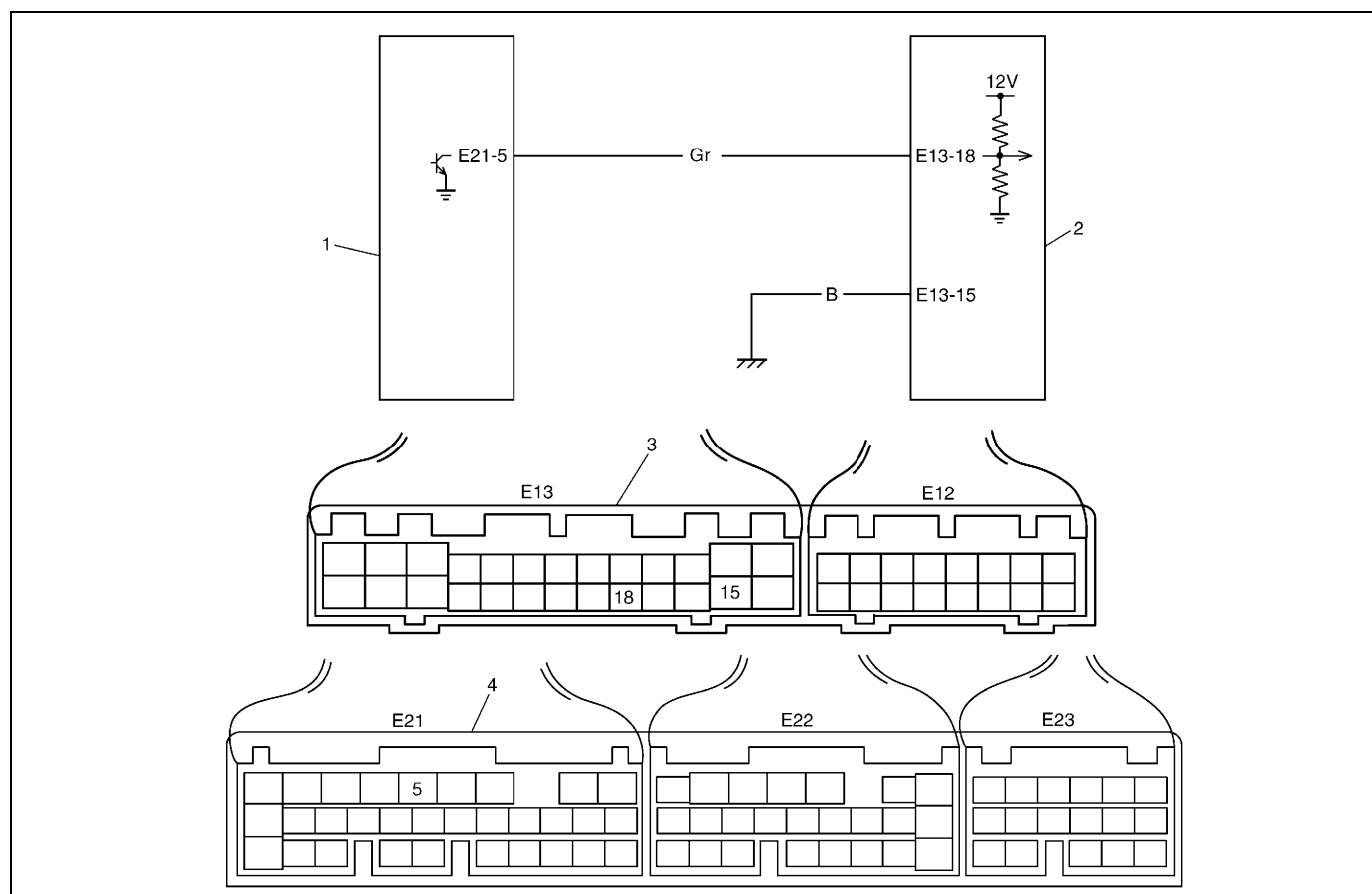
Chart for Step 5

Solenoid	TCM terminal No.	Dropping resistor lead wire color (body side)
C (No.3)	E13-11	R
D (No.4)	E13-12	Y
E (No.5)	E13-13	W

Figure for Step 1 and 5



1. Solenoid coupler
2. Terminal for shift solenoid-C (No.3)
3. Terminal for shift solenoid-D (No.4)
4. Terminal for shift solenoid-E (No.5)
5. Transmission range sensor (Shift switch)
6. Dropping resistor terminal for shift solenoid-C (No.3)
7. Dropping resistor terminal for shift solenoid-D (No.4)
8. Dropping resistor terminal for shift solenoid-E (No.5)
9. Dropping resistor coupler

DTC P1709 Engine coolant temperature/barometric pressure signal circuit

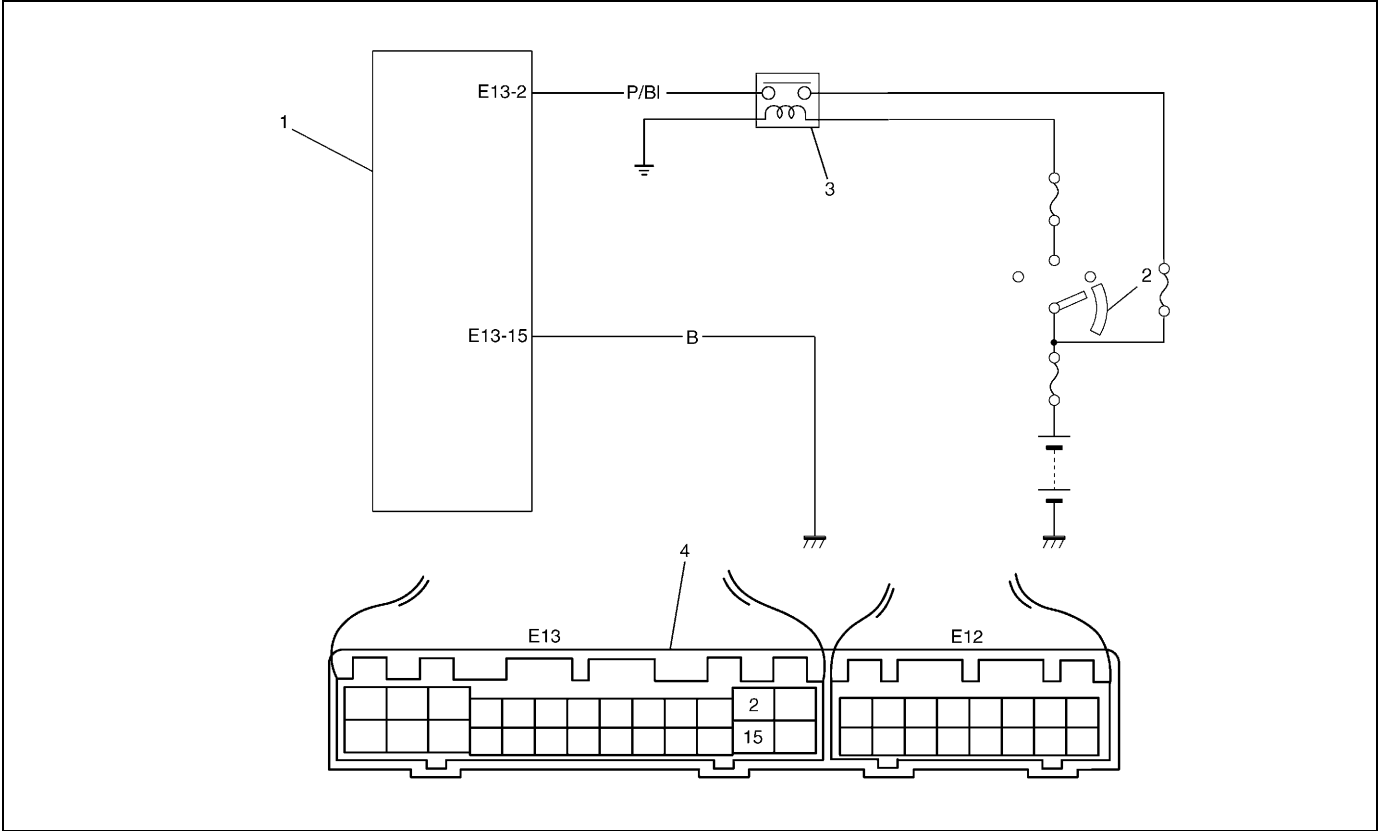
1. ECM	3. TCM couplers (viewed from harness side)
2. TCM	4. ECM couplers (viewed from harness side)

DTC DETECTING CONDITION

- Engine coolant temperature/barometric pressure signal voltage too low although A/T fluid temperature is normal operating temperature and engine revolution is standard.

Step	Action	Yes	No
1	Check DTC referring to "ENGINE DIAGNOSIS" in Section 6. Is any DTC detected?	Inspect and repair referring to DTC flow table in Section 6.	Go to Step 2.
2	1) Turn ignition switch OFF and disconnect TCM and ECM couplers. 2) Check continuity between terminal "E13-18" of disconnected harness side TCM coupler and body ground. Is continuity indicated?	"Gr" wire shorted to ground.	Go to Step 3.
3	Check continuity between terminals "E13-18" and "E21-5" of disconnected harness side couplers. Is continuity indicated?	Go to Step 4.	"Gr" wire open.
4	1) Connect TCM couplers. 2) Turn ignition switch ON and check voltage between terminal "E13-18" and body ground. Is it 0 V?	Substitute a known-good TCM and recheck.	Substitute a known-good ECM and recheck.

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DTC P0702/P1702 Transmission control system electrical or internal malfunction of TCM



1. TCM	3. A/T relay
2. Ignition switch	4. TCM couplers (viewed from harness side)

DTC DETECTING CONDITION

- Relay output voltage too high although TCM orders the relay to turn OFF or relay output voltage too low although TCM orders the relay to turn on.
- Incorrect calculations of checking TCM programmed data indicated.

Step	Action	Yes	No
1	1) Turn ignition switch ON. 2) Erase all DTCs referring to “HOW TO CLEAR DTC” in this section. 3) Turn ignition switch OFF. 4) Turn ignition switch ON once again and check for any DTC. Is it DTC P1702 or P0702?	Replace TCM.	Could be a temporary malfunction of the TCM.

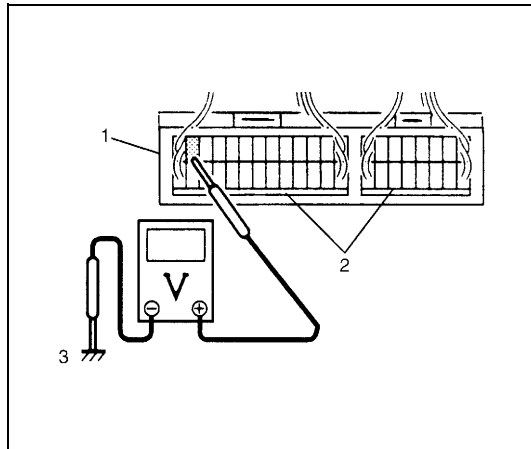
Inspection of TCM and ITS circuits

TCM and its circuits can be checked at TCM wiring couplers by measuring voltage and resistance.

CAUTION:

TCM cannot be checked by itself, it is strictly prohibited to connect voltmeter or ohmmeter to TCM with coupler disconnected from it.

INSPECTION



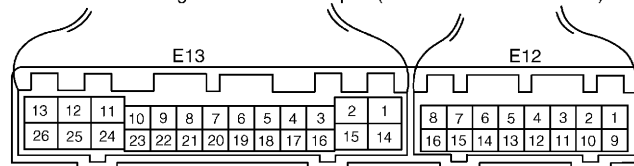
- 1) Remove TCM from vehicle referring to "TRANSMISSION CONTROL MODULE" in this section.
- 2) Connect TCM couplers to TCM.
- 3) Check voltage at each terminal of couplers connected.

NOTE:

As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.

1. TCM	3. Body ground
2. Couplers	

Terminal arrangement of TCM coupler (Viewed from harness side)



TERMINAL	CIRCUIT	STANDARD VOLTAGE	CONDITION
E12	1 Transmission range "P" switch	10 – 14 V	IG switch ON, selector lever at "P" range
		0 – 1 V	IG switch ON, selector lever other than "P" range
	2 Transmission range "R" switch	10 – 14 V	IG switch ON, selector lever at "R" range
		0 – 1 V	IG switch ON, selector lever other than "R" range
	3 Transmission range "N" switch	10 – 14 V	IG switch ON, selector lever at "N" range
		0 – 1 V	IG switch ON, selector lever other than "N" range
	4 Diagnosis switch	10 – 14 V	IG switch ON, diagnosis switch terminal not grounded
	5 Engine speed signal	0 – 1 V	IG switch ON, leaving engine OFF
	6 Output shaft speed sensor(+)	–	–
	7 Input shaft speed sensor(+)	–	–
	8 throttle opening signal	–	–
	9 Transmission range "D" switch	10 – 14 V	IG switch ON, selector lever at "D" range
		0 – 1 V	IG switch ON, selector lever other than "D" range
10	Transmission range "2" switch	10 – 14 V	IG switch ON, selector lever at "2" range
		0 – 1 V	IG switch ON, selector lever other than "2" range
11	Transmission range "L" switch	10 – 14 V	IG switch ON, selector lever at "L" range
		0 – 1 V	IG switch ON, selector lever other than "L" range

TERMINAL		CIRCUIT	STANDARD VOLTAGE	CONDITION
E12	12	Serial data link (SUZUKI scan tool)	10 – 14 V	IG switch ON
	13	Output shaft speed sensor shield	–	–
	14	Output shaft speed sensor(–)	–	–
	15	Input shaft speed sensor(–)	–	–
E13	2	IG power source	10 – 14 V	IG switch ON
	3	Transmission temperature sensor	0 – 4.5 V	IG switch ON
	4	Brake switch	10 – 14 V	IG switch ON, brake pedal depressed
	5	A/C compressor	0 – 2 V	A/C OFF
			10 – 14 V	A/C ON
	8	Idle up signal	10 – 14 V	Selector lever at “P” or “N” range
			0 – 1 V	Selector lever other than “P” or “N” range
	10	Shift solenoid-A (No.1)	0 – 1 V	IG switch ON, select lever at “P” range
	11	Shift solenoid-C (Dropping resistor)	0 – 1 V	IG switch ON, select lever at “P” range
	12	Shift solenoid-D (Dropping resistor)	10 – 14 V	IG switch ON, select lever at “P” range
	13	Shift solenoid-E (Dropping resistor)	0 – 1 V	IG switch ON, select lever at “P” range
	15	Ground	–	–
	16	Transmission temperature sensor ground	–	–
	17	O/D off switch	0 – 1 V	IG switch ON, O/D off switch ON
			10 – 14 V	IG switch ON, O/D off switch OFF
	18	Engine coolant temperature/ Barometric pressure signal	–	–
	20	A/T failure serial data	0 – 1 V	IG switch ON
	21	O/D OFF lamp	10 – 14 V	IG switch ON, O/D off switch OFF
			0 – 1 V	IG switch ON, O/D off switch ON
	22	Lock-up solenoid	0 – 1 V	IG switch ON, selector lever at “P” range
	23	Shift solenoid-B (No.2)	0 – 1 V	IG switch ON, selector lever at “P” range
	24	Shift solenoid-C (No.3)	0 – 1 V	IG switch ON, selector lever at “P” range
	25	Shift solenoid-D (No.4)	2.2 – 4.9 V	IG switch ON, selector lever at “P” range
	26	Shift solenoid-E (No.5)	0 – 1 V	IG switch ON, selector lever at “P” range

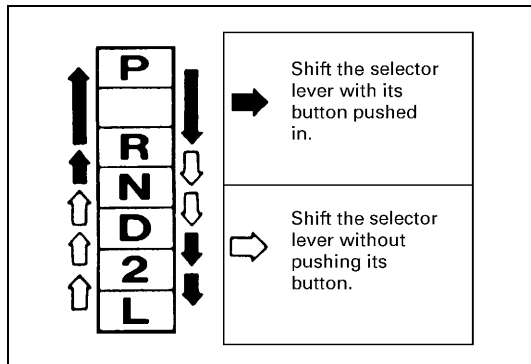
On-Vehicle Service

Maintenance Service

Fluid level at normal operating temperature

INSPECTION

- 1) Stop vehicle and place it level.
- 2) Apply parking brake and place chocks against wheels.
- 3) With selector at P position, start engine.
- 4) Warm up engine till fluid temperature reaches normal operating temperature (70 – 80°C/158 – 176°F). As a guide to check fluid temperature, warm up engine to normal operating temperature.
- 5) Keep engine idling and shift selector slowly to L and back to P position.
- 6) With engine idling, pull out dipstick, wipe it off with a clean cloth and put it back into place.



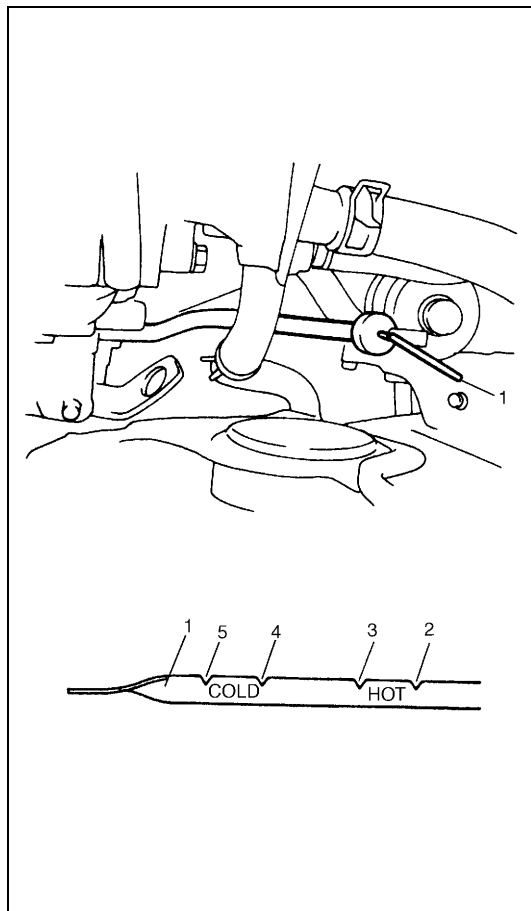
- 7) Pull out dipstick (1) again and check fluid level indicated on it. Fluid level should be between FULL HOT and LOW HOT. If it is below LOW HOT, add an equivalent of DEXRON®-III up to FULL HOT.

A/T fluid specification

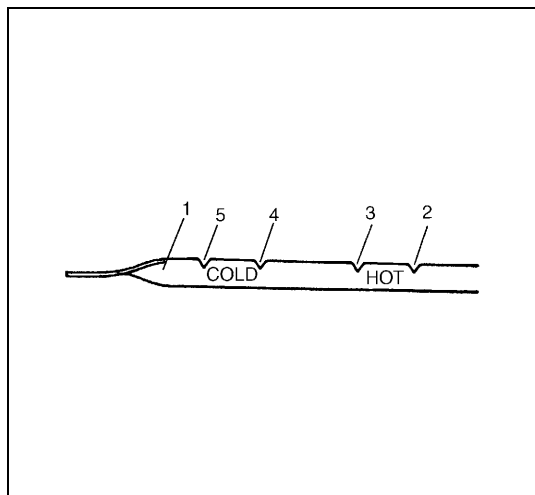
: An equivalent of DEXRON®-III

NOTE:

- **DO NOT RACE ENGINE** while checking fluid level, even after the engine start.
- **DO NOT OVERFILL.** Overfilling can cause foaming and loss of fluid through breather. Then slippage and transmission failure can result.
- Bringing the level from LOW HOT to FULL HOT requires 0.35 liters (0.74/0.62 US/Imp. pt).
- If vehicle was driven under high load such as pulling a trailer, fluid level should be checked about half an hour after it is stopped.



2. "FULL HOT" mark
3. "LOW HOT" mark
4. "FULL COLD" mark
5. "LOW COLD" mark

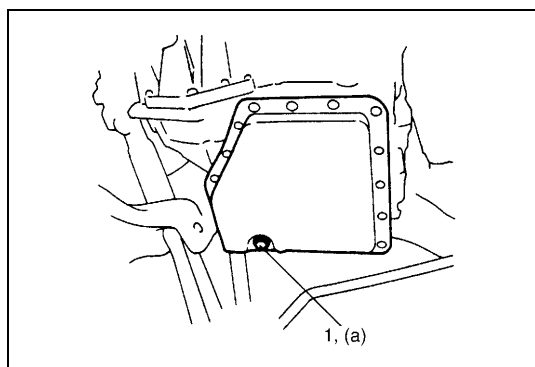
Fluid level at room temperature**INSPECTION**

The fluid level check at room temperature performed after repair or fluid change before test driving is just preparation for level check of normal operation temperature. The checking procedure itself is the same as that described previously. If the fluid level is between FULL COLD and LOW COLD, proceed to test drive. And when the fluid temperature has reached the normal operating temperature, check fluid again and adjust it as necessary.

1. Dipstick
2. "FULL HOT" mark
3. "LOW HOT" mark
4. "FULL COLD" mark
5. "LOW COLD" mark

Fluid change

- 1) Lift up vehicle.
- 2) When engine has cooled down, remove drain plug (1) from oil pan and drain A/T fluid.
- 3) Install drain plug.

**Tightening torque**

A/T fluid drain plug (a) : 23 N·m (2.3 kg-m, 16.5 lb-ft)

4) Lower vehicle and fill proper amount of an equivalent of DEXRON®-III.

5) Check fluid level according to procedure described under "FLUID LEVEL AT NORMAL OPERATING TEMPERATURE."

A/T fluid specification

: An equivalent of DEXRON®-III

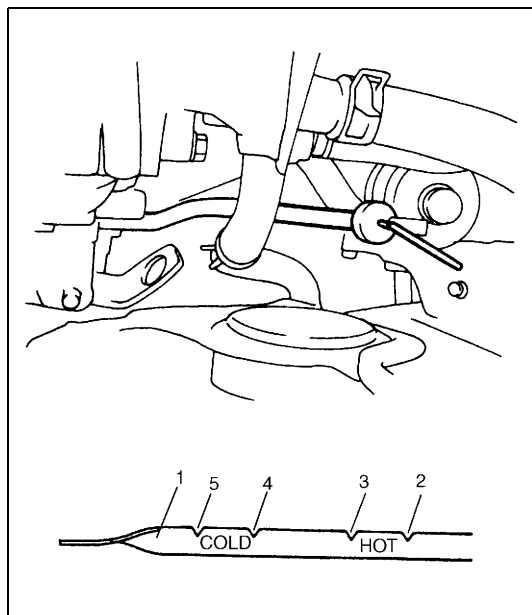
A/T fluid capacity

When draining from drain plug hole :

4.0 liters (8.45/7.04 US/Imp. pt.)

When overhauling :

5.1 liters (10.78/8.98 US/Imp. pt.)



1. Dipstick
2. "FULL HOT" mark
3. "LOW HOT" mark
4. "FULL COLD" mark
5. "LOW COLD" mark

Transmission Control Module (TCM)

CAUTION:

TCM and ECM consist of highly precise parts, so when handling it (or them), be careful not to expose to excessive shock.

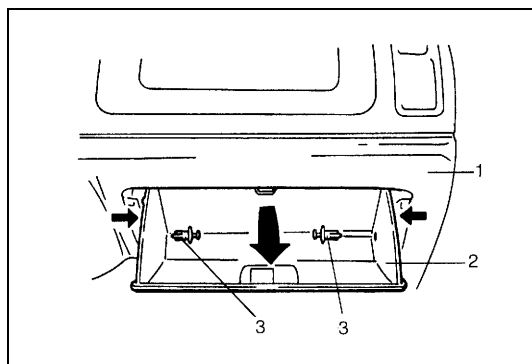
NOTE:

When replacing TCM with used one, all learned contents which are stored in TCM memory should be erased referring to "LEARNING CONTROL INITIALIZATION" in this section.

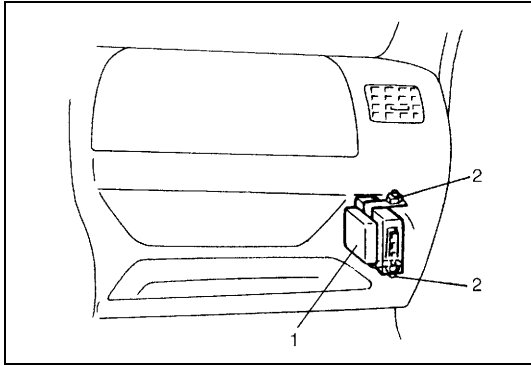
REMOVAL

- 1) Disconnect negative cable at battery.
- 2) If the vehicle is equipped with air bag system, disable air bag system. Refer to "DISABLING AIR BAG SYSTEM" in Section 10B.

- 3) Remove glove box (2).



1. Instrument panel
3. Clip



- 4) Disconnect couplers from TCM (1).
- 5) Loosen 2 nuts (2) and remove TCM from vehicle.

INSTALLATION

Reverse removal procedure noting the following.

- Connect ECM and TCM couplers securely.
- If the vehicle is equipped with air bag system, be sure to enable air bag system after TCM and ECM are back in place. Refer to "ENABLING AIR BAG SYSTEM" in Section 10B.

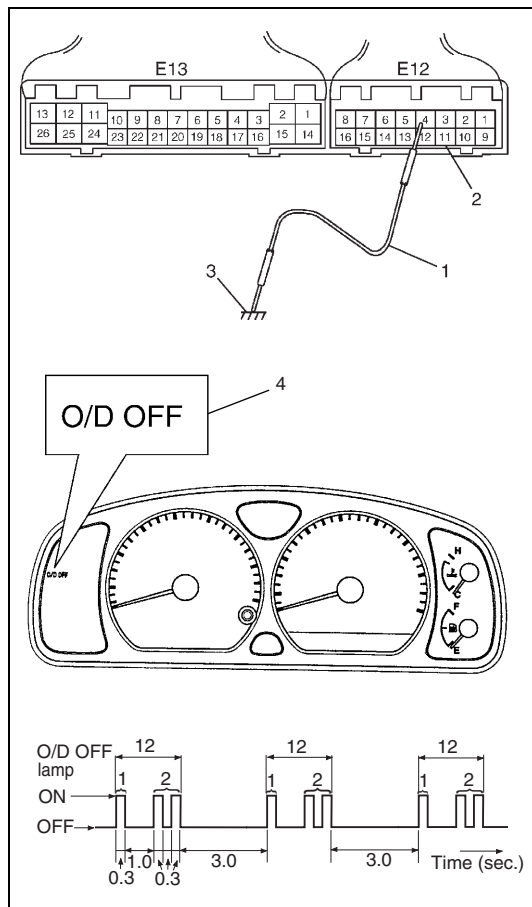
Learning control initialization

When one or more operations such as shown below are performed, all learned contents which are stored in TCM memory should be erased after the operations.

- Replacing transmission with new or used one.
- Repairing transmission partially by replacing any brake component parts with new and/or used brake disc(s), plate(s) and/or flange.
- Repairing transmission partially by replacing any clutch component parts with new and/or used clutch disc(s), plate(s) and/or flange.
- Replacing TCM with used one.

CAUTION:

Be sure to connect service wire to correct terminal.
Connection to incorrect terminal may cause damage to TCM.



- 1) Turn ignition switch ON, leaving engine OFF.
- 2) Using service wire (1), connect terminal "E12-4" of connected TCM harness side coupler with body ground (3).
- 3) Shift selector lever from "D" range to "2" range 3 times repeatedly within 10 seconds with terminal "E12-4" kept on connecting to body ground.
- 4) Check flashing pattern of "O/D OFF" lamp (4) with terminal "E12-4" kept on connecting to body ground and confirm that only 12 pattern is displayed.
 If not, repeat Step 1) to Step 3) and check again.

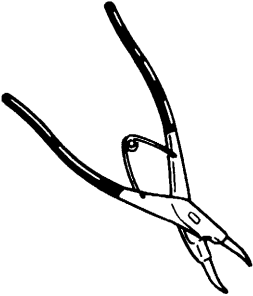
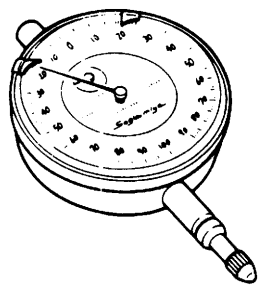
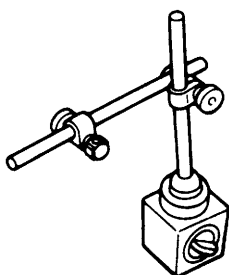
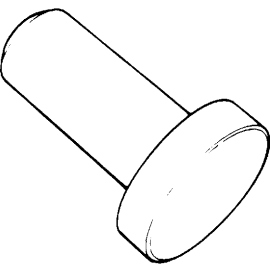
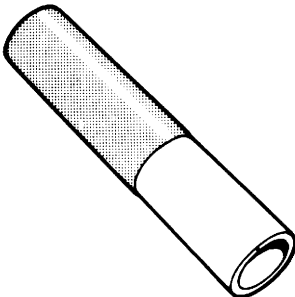
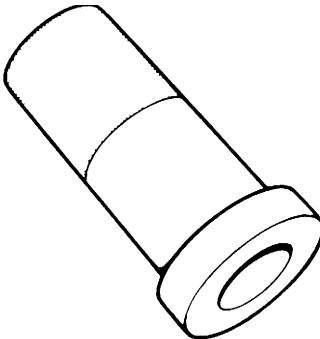
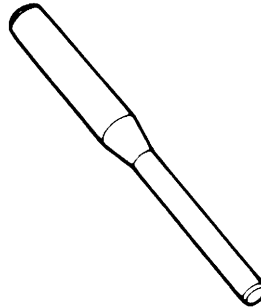
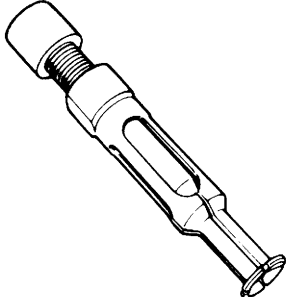
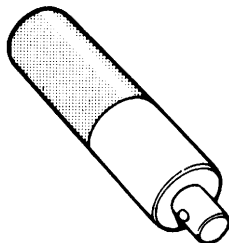
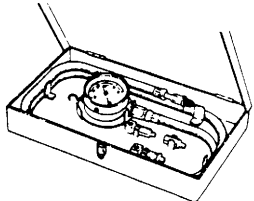
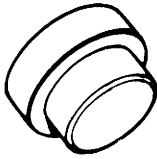
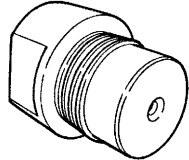
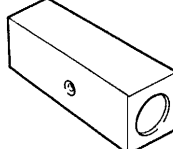
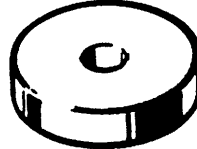
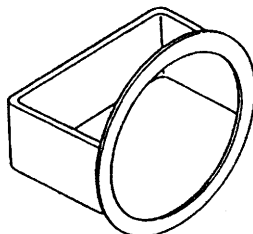
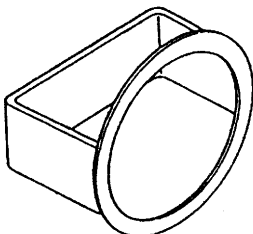
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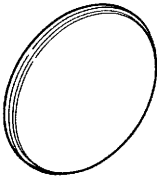
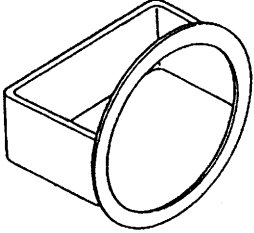
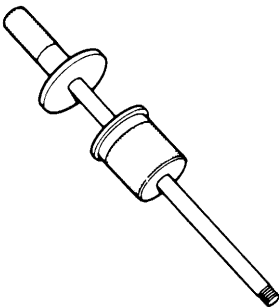
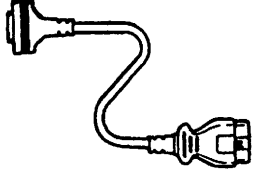
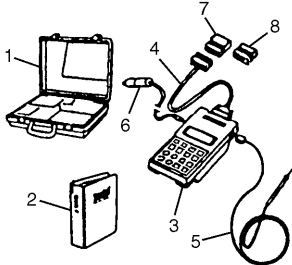
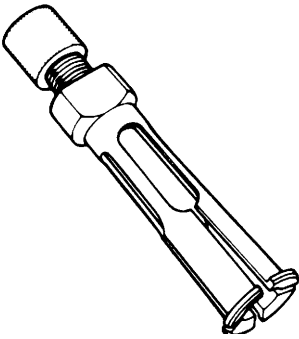
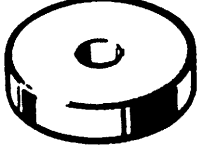
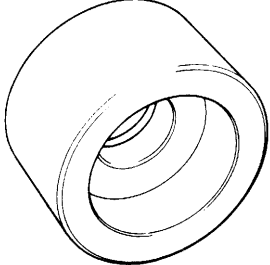
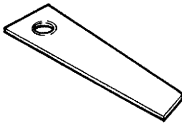
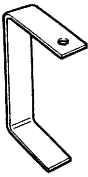
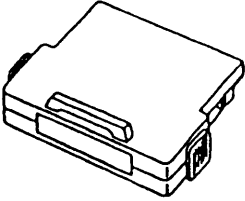
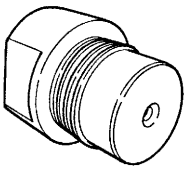
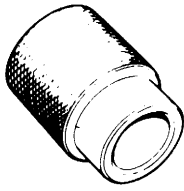
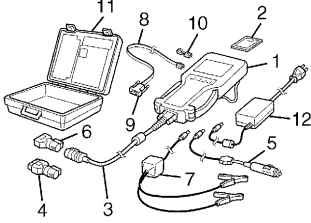
- "O/D OFF" lamp lights during initializing.
- Diagnostic trouble code(s) (DTC(s)) also are erased by performing this initializing procedure.
- If initializing is failed, 52 pattern of "O/D OFF" lamp flashing is displayed.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
A/T fluid drain plug	23	2.3	16.5
Transmission range sensor bolt	18	1.8	13.0
Output shaft speed sensor bolt	8	0.8	6.0
Input shaft speed sensor bolt	8	0.8	6.0
Dropping resistor bolts	20	2.0	14.5
Shift solenoid bolts	8	0.8	6.0
Transmission temperature sensor bolt	10	1.0	7.5
Transmission to engine bolts and nut	85	8.5	61.5
Drive plate to torque converter bolts	20	2.0	14.5
Starter motor bolts	23	2.3	16.5
Oil pump cover bolts	10	1.0	7.5
Valve body bolts	5.5	0.55	4.0
Final gear bolts	90	9.0	65.0
Counter drive gear installing bolts	5.5	0.55	4.0
Rear cover bolts	19	1.9	14.0
Control shift lever nuts	30	3.0	22.0
Detent spring bolt	11	1.1	8.0
Parking lock pawl sleeve bolt	19	1.9	14.0
Parking lock pawl bolts	11	1.1	8.0
Oil pump assembly bolts	12	1.2	9.0
Torque converter housing bolts	19	1.9	14.0
Wire-to-solenoid assembly bolt	8	0.8	6.0
Valve body to transmission case bolts	10	1.0	7.5
A/T oil pan bolts	7.5	0.75	5.5
A/T oil cooler bolt	60	6.0	43.5
Vehicle speed sensor bolt	5.5	0.55	4.0
Shift cable bracket bolt	13	1.3	9.5
Connector clamp bracket bolt	8	0.8	6.0
A/T fluid filler tube bolt	19.5	1.95	14.5
Engine mounting LH bracket bolts	55	5.5	40.0

Special Tool

 <p>09900-06108 Snap ring plier (Closing type)</p>	 <p>09900-20606 Dial gauge</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09913-75510 Bearing installer</p>
 <p>09913-80112 Bearing installer</p>	 <p>09913-85210 Bearing installer</p>	 <p>09922-85811 Spring pin remover (6 mm)</p>	 <p>09923-74510 Bearing remover</p>
 <p>09924-74510 Installer handle</p>	 <p>09925-37811-001 Oil pressure gauge</p>	 <p>09925-88210 Bearing puller attachment</p>	 <p>09926-26030 Air installer No.1</p>
 <p>09926-26040 Air installer No.2</p>	 <p>09926-68310 Bearing installer</p>	 <p>09926-96010 Clutch spring compressor</p>	 <p>09926-96020 Clutch spring compressor</p>

 <p>09926-96030 Clutch spring compressor No.7</p>	 <p>09926-96040 Clutch spring compressor No.8</p>	 <p>09930-30102 Sliding shaft</p>	 <p>09931-76030 16/14 pin DLC cable for Tech 1A</p>
 <p>09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE "A".)</p>	 <p>09941-64511 Bearing remover</p>	 <p>09944-68510 Bearing installer</p>	 <p>09951-16060 Bush remover</p>
 <p>09952-06010 Dial gauge plate No.1</p>	 <p>09952-06020 Dial gauge plate No.2</p>	 <p>Mass storage cartridge for Tech 1A</p>	 <p>09926-26050 Air installer No.3</p>
 <p>09940-53111 Oil seal install tool</p>	 <p>Tech 2 kit (SUZUKI scan tool) (See NOTE "B".)</p>		

NOTE:

- **“A”** : This kit includes the following items and substitutes for the Tech 2 kit.
 1. Storage case, 2. Operator's manual, 3. Tech 1A, 4. DLC cable (14/26 pin, 09931-76040),
 5. Test lead/probe, 6. Power source cable, 7. DLC cable adaptor, 8. Self-test adaptor
- **“B”** : This kit includes the following items and substitutes for the Tech 1 A kit.
 1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adaptor, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector,
 11. Storage case, 12. Power supply

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Automatic transmission fluid	An equivalent of DEXRON®-III	<ul style="list-style-type: none"> • Automatic transmission • Parts lubrication when installing
Sealant	SUZUKI BOND No. 1215 (99000-31110)	<ul style="list-style-type: none"> • Case housing star-shaped recess bolts (3 pcs only)
Lithium grease	SUZUKI SUPER GREASE C (99000-25030)	<ul style="list-style-type: none"> • Retaining parts in place when assembling • Oil seal lips • D-rings • O-rings
	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> • Cable ends • Converter center cup
Thread lock cement	THREAD LOCK 1322 (99000-32110)	<ul style="list-style-type: none"> • Final gear bolts • Torque converter housing bolts

SECTION 8C

INSTRUMENTATION/DRIVER INFORMATION

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

8C

NOTE:

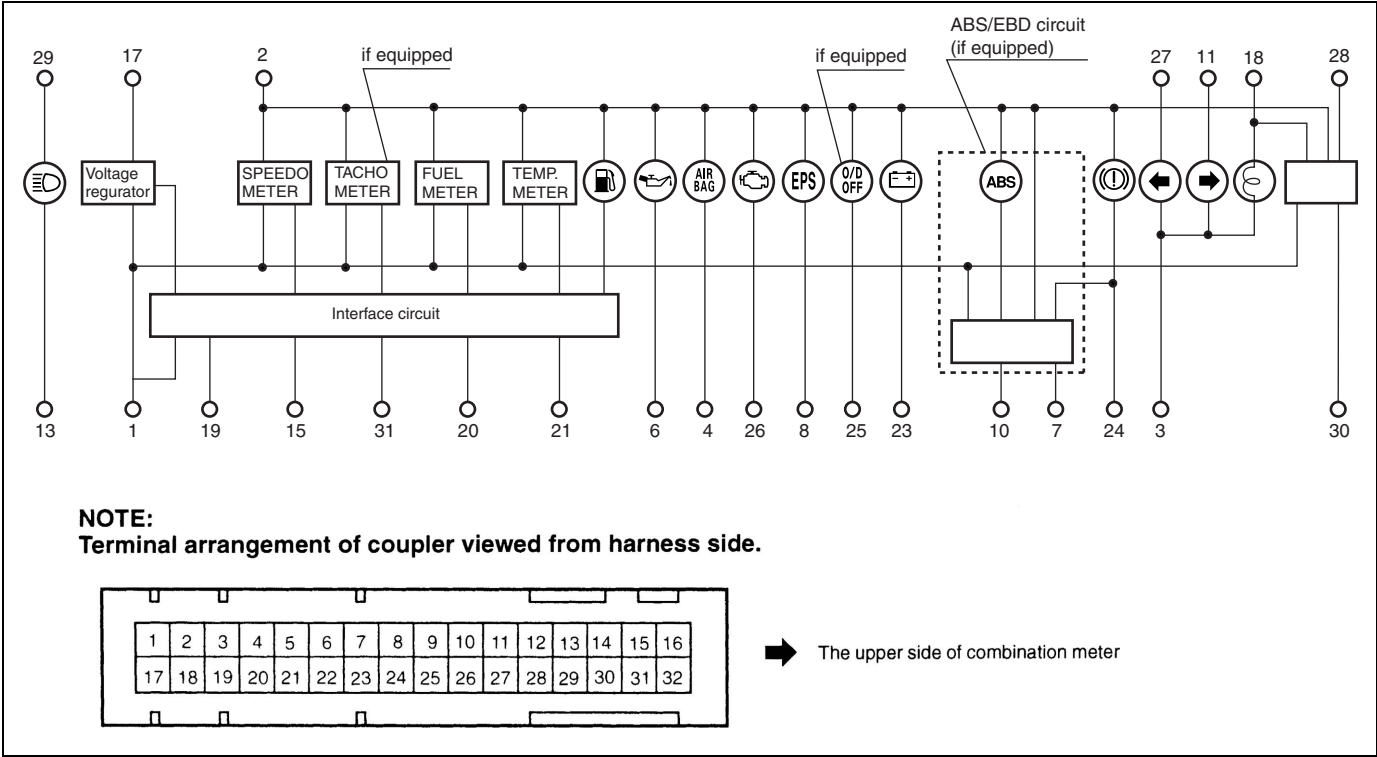
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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General Description	8C-2	Low Fuel Warning Lamp	8C-3
Combination Meter	8C-2	On-Vehicle Service	8C-3
Diagnosis	8C-3	Low Fuel Warning System	8C-3

General Description

Combination Meter



1. To ground	B	12. Blank	—	23. To generator	W/R
2. To ignition switch	B/W	13. To dimmer switch	R	24. To brake fluid level switch and parking brake switch	Y/G
3. To ground	B	14. Blank	—	25. To A/T control module	BI/Y
4. To SDM	BI	15. To speed sensor	V	26. To ECM	V/W
5. Blank	—	16. Blank	—	27. To turn and hazard switch	G/R
6. To oil pressure switch	Y/B	17. To positive terminal at battery	W/BI	28. To ignition switch (ACC)	Y/B
7. To ABS control module	O	18. To lighting switch	R/Y	29. To positive terminal at battery	W/BI
8. To EPS control module	Gr	19. To ground	Br	30. To door switch (driver side)	B/O
9. Blank	—	20. To fuel level gauge	Y/R	31. To ECM	Br/Y
10. To ABS control module	BI/B	21. To ECT sensor	W/G	32. Blank	—
11. To turn and hazard switch	G/Y	22. Blank	—		

Diagnosis

Low Fuel Warning Lamp

Condition	Possible Cause	Correction
Low fuel warning light does not come ON after ignition switch turns to ON position	Bulb blown	Check bulb.
	IG METER fuse blown	Check fuse.
	Combination meter internal circuit faulty	Check combination meter.
	Wiring or grounding faulty	Repair.
Low fuel warning light comes ON steady or flashing	Low fuel	Refill fuel.
	Combination meter internal circuit faulty	Check combination meter.
	Fuel gauge unit faulty	Check fuel gauge unit.
	Wiring or grounding faulty	Repair.

On-Vehicle Service

Low Fuel Warning System

OPERATION

This light comes ON for 4 seconds after ignition switch is turned to ON position, and goes out.

However, in insufficient fuel level, this light indicates low fuel level by the following operation.

Low fuel warning light operation :

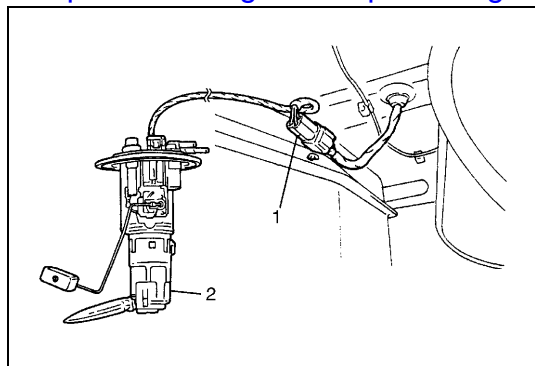
Low fuel warning light operation	Fuel level in fuel tank
OFF	6.0 litre (1.32 gal/Imp) or more
ON	2.9 – 6.0 litre (0.64 – 1.32 gal/Imp)
Flashing	0 – 2.9 litre (0 – 0.64 gal/Imp)

NOTE:

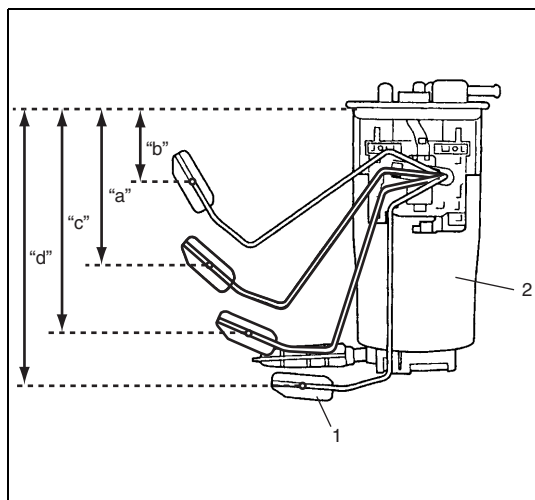
Low fuel warning light turns off until fuel level in fuel tank is more than 10 litre (2.2 gal/Imp) if it is turned ON or flashing once.

SYSTEM INSPECTION

- 1) Confirm that low fuel warning light comes ON for 4 seconds after ignition switch turned to ON position, and goes out.
- 2) Remove fuel pump assembly referring to “FUEL TANK” in Section 6C.
- 3) Check fuel sender gauge referring to “FUEL SENDER GAUGE” under “ON-VEHICLE SERVICE” in this Section.



- 4) Connect fuel pump connector (1) to fuel pump (2).
- 5) Connect negative (-) cable to battery.
- 6) Turn ignition switch to ON position.



- 7) After 4 seconds, check for low fuel warning lamp operation under the following each float position (1) of fuel pump (2).
If faulty condition is found, replace combination meter.

Low fuel warning light operation :

Float position		Low fuel warning light operation
"a"	140 mm (5.50 in.)	OFF
"b"	125 mm (4.70 in.)	OFF if low fuel warning light ON or flashing once
"c"	150 mm (5.90 in.)	ON
"d"	200 mm (7.90 in.)	Flashing

SECTION 8D

WINDOWS, MIRRORS, SECURITY AND LOCKS

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

8D

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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Power door lock system operation		Transmitter	8D-8
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Power door lock system circuit			
inspection	8D-4		

Diagnosis

NOTE:

Fuse name (“ ”) in the table below is shown on the fuse box cover.

Power Door Lock System (If Equipped)

Condition	Possible Cause	Correction
All doors are not locked/unlocked by all of switches	“DOOR LOCK” fuse blown	Replace fuse to check for short.
	Door switch faulty	Replace door switch.
	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM CIRCUIT INSPECTION in this section.
	Wiring or grounding faulty	
All doors are not locked/unlocked by only power door lock switch	Power door lock switch faulty	Check switch.
	Wiring harness connected to power door lock switch faulty	Repair.
	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM CIRCUIT INSPECTION in this section.
	Wiring or grounding faulty	
All are not locked/unlocked by only driver side key cylinder switch	Driver side key cylinder switch faulty	Replace key cylinder switch.
	Wiring harness connected to driver side door key cylinder switch faulty	Repair.
	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM CIRCUIT INSPECTION in this section.
	Wiring or grounding faulty	
Only one door is not locked/unlocked	Wiring harness connected to applicable door lock actuator faulty	Repair.
	Power door lock actuator faulty	Check actuator.

Keyless Entry System (If Equipped)

NOTE:

Diagnose keyless entry system referring to the following table after confirming that power door lock system is good condition.

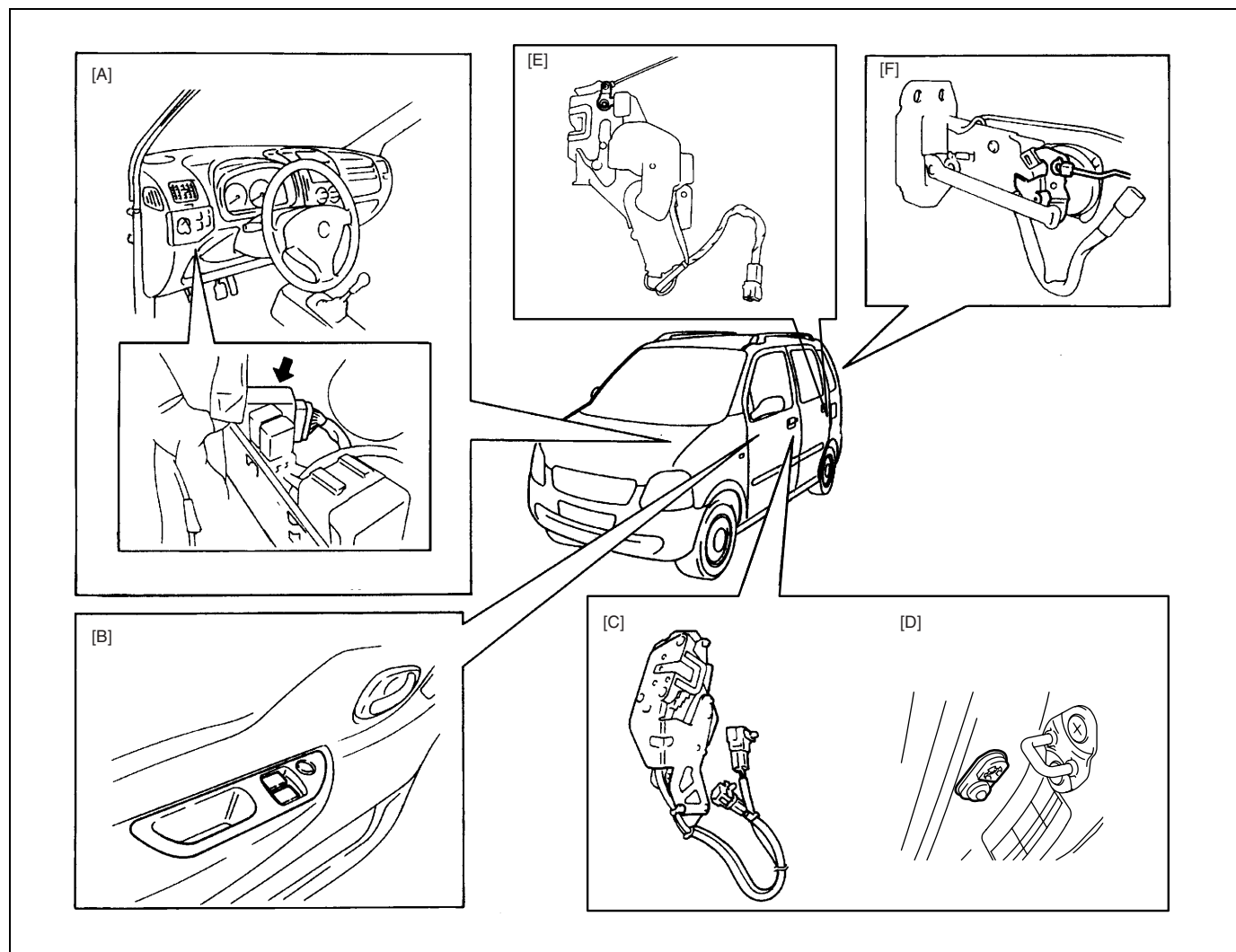
Condition	Possible Cause	Correction
All doors are not locked/unlocked by only keyless entry transmitter	Transmitter battery dead	Replace battery.
	Transmitter faulty	Replace transmitter.
	Code registration error	Perform code registration.
	Key remainder switch (in ignition switch) faulty	Replace ignition switch.
	Power door lock controller faulty	Replace controller.
	Wiring or grounding faulty	Repair.
Turn signal lights are not flashed when doors are locked/unlocked by keyless entry transmitter	Power door lock controller faulty	Check system referring to KEYLESS ENTRY SYSTEM CIRCUIT INSPECTION in this section.
	Wiring or grounding faulty	

Condition	Possible Cause	Correction
Interior light does not turn ON when doors are unlocked by keyless entry transmitter	Power door lock controller faulty	Check system referring to KEY-LESS ENTRY SYSTEM CIRCUIT INSPECTION in this section.
	Wiring or grounding faulty	

On-Vehicle Service

Power Door Lock System (If Equipped)

Power door lock system component location



[A] : Power door lock controller (the illustration shows LH steering vehicle. And RH steering vehicle is symmetrical.)	[C] : Front door actuator	[E] : Rear door actuator
[B] : Power door lock switch	[D] : Door switch	[F] : Back door actuator

Power door lock system operation inspection

- 1) Check the following operation:
 - a) When the driver side key cylinder is turned LOCK once, check all doors lock.
 - b) When the driver side door key cylinder is turned UNLOCK twice, check all doors unlock.

- c) For vehicle equipped dead lock system:
When the driver side door key cylinder is turned LOCK twice within 2 seconds, check all doors lock and not pulled up all door lock knobs by hand.

If check result is not satisfied, go to “Power Door Lock System Circuit Inspection” in this section.

Power door lock system circuit inspection

- 1) Disconnect negative cable at battery.
- 2) Disconnect door lock controller coupler (1).
- 3) Confirm that all doors are unlocked. Connect battery positive and negative terminals to door lock controller coupler terminals and check power door lock operation as follows.
If it does not operate as specified, repair applicable circuit or check actuator. If it operates as specified, go to next step.

Power door lock operation for vehicle with dead lock system:

Step	TERMINAL				OPERATION
	G02-1	G02-2	G02-3	G02-10	
1	—	⊖	⊕	⊖	UNLOCK → LOCK
2	⊕	⊖	—	⊖	LOCK → DEAD LOCK
3	⊖	⊕	⊖	⊕	DEAD LOCK → UNLOCK

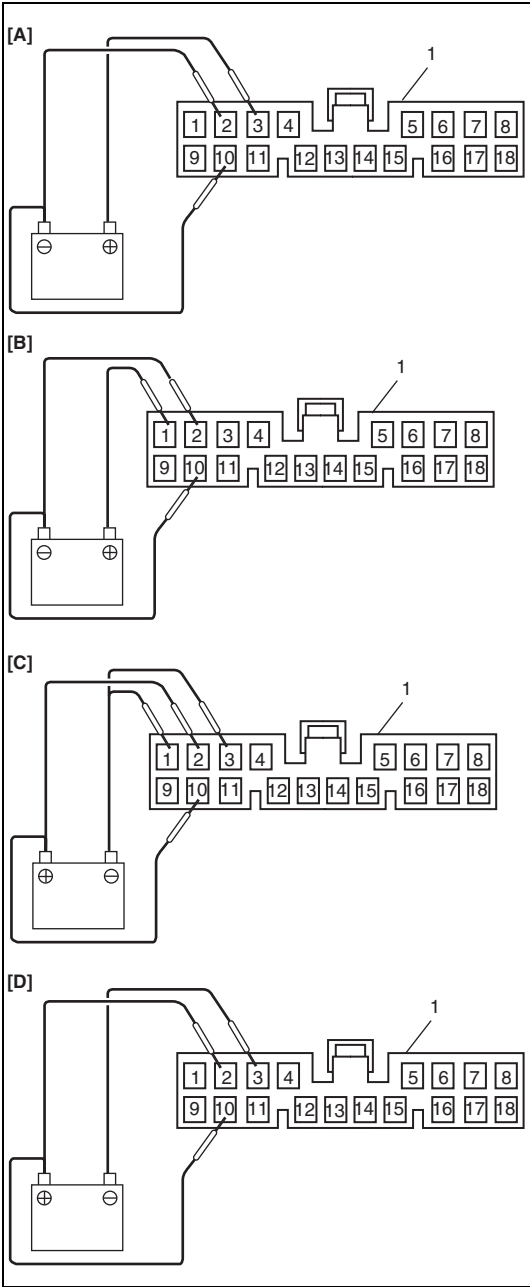
- [A] : Step 1: Lock operation check
- [B] : Step 2: Dead lock operation check
- [C] : Step 3: Unlock operation check

Power door lock operation for vehicle without dead lock system:

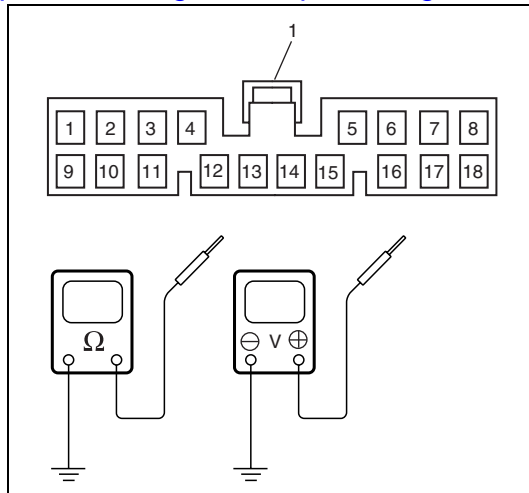
Step	TERMINAL			OPERATION
	G02-2	G02-3	G02-10	
1	⊖	⊕	⊖	UNLOCK → LOCK
2	⊕	⊖	⊕	LOCK → UNLOCK

- [A] : Step 1: Lock operation check
- [D] : Step 2: Unlock operation check

1. Power door lock controller coupler “G02”



- 4) Connect negative cable at battery.



- 5) Check that the voltage and resistance between the following terminals and body ground are specifications under each conditions.

If check result is OK, replace door lock controller. If check result is not as specified, repair circuit.

1 : Power door lock controller coupler "G02"

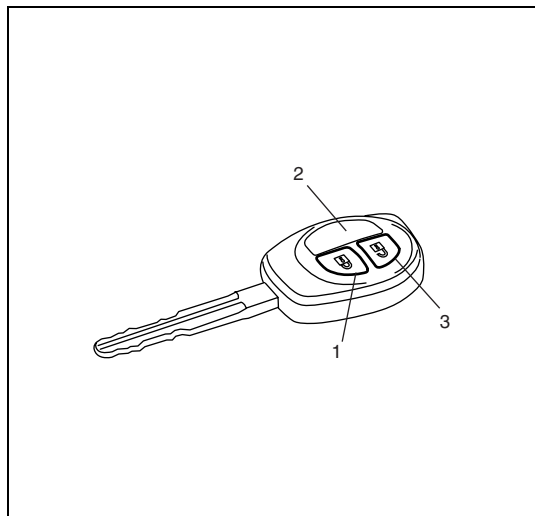
Power door lock system circuit check

Terminal	Wire	Circuit	Specification	Condition
G02-6	WHT	Power door lock switch circuit	Continuity	Power door lock switch is pushing position.
			No continuity	Power door lock switch is free position.
G02-9	WHT/GRN	Main power supply	10 – 14 V	–
G02-11	YEL/BLK	Key remainder circuit	10 – 14 V	Ignition key is in ignition switch.
			0 – 1 V	Ignition key is not in ignition.
G02-12	YEL	Ignition switch circuit	10 – 14 V	Ignition switch is ON position.
			0 – 1 V	Ignition switch is OFF position.
G02-13	WHT/BLK	Driver side key cylinder circuit (UNLOCK signal)	Continuity	Driver side key cylinder is UNLOCK position.
			No continuity	Except the above-mentioned condition.
G02-14	WHT/RED	Driver side key cylinder circuit (LOCK signal)	Continuity	Driver side key cylinder is LOCK position.
			No continuity	Except the above-mentioned condition.
G02-15	BLK/RED	Door switch circuit	0 – 1 V	Driver side, passenger side, rear driver side, rear passenger side or back door is open.
			10 – 14 V	All doors are close.
G02-17	BLK	Ground	0 – 1 V	–

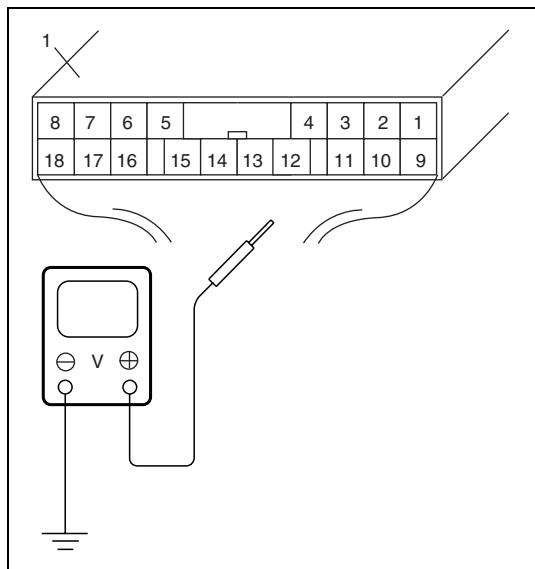
Keyless Entry System (If Equipped)

Keyless entry system operation inspection

- 1) Confirm that power door lock system is good condition.
- 2) Confirm that all doors are closed and unlocked.
- 3) Check the following operation:
 - a) When pushing "LOCK" button (1) on transmitter (2) once, check all doors lock and hazard warning lights flash once.
 - b) When pushing "UNLOCK" button (3) on transmitter (2) twice, check all doors unlock and hazard warning lights flash twice and interior light turn on several seconds with the interior light switch in the middle position.
 - c) For vehicle equipped dead lock system:
When pushing "LOCK" button (1) on transmitter (2) twice within 2 seconds, check all doors lock and not pulled up all door lock knobs by hand.



If check result is not satisfied, go to "Keyless Entry System Circuit Inspection" in this section.



Keyless entry system circuit inspection

Check that the voltage between the following terminals and body ground are specifications under each conditions.

If check result is not as specified, check applicable circuit.

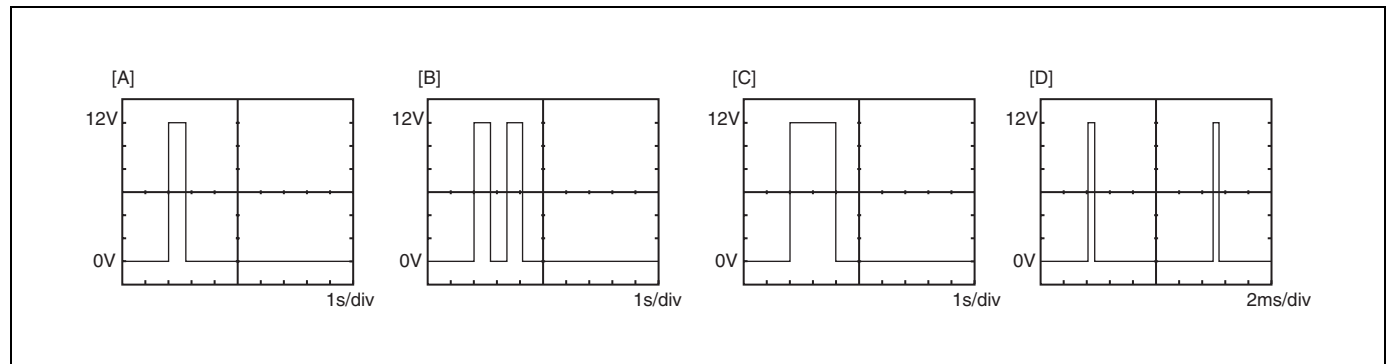
If circuit is normal, recheck keyless entry system circuit as follows.

- 1) Substitute a known-good door lock controller.
- 2) Register key code referring to "Code Registration Procedure" in this section.
- 3) Recheck keyless entry system circuit.

1. Door lock controller

Keyless entry system circuit check

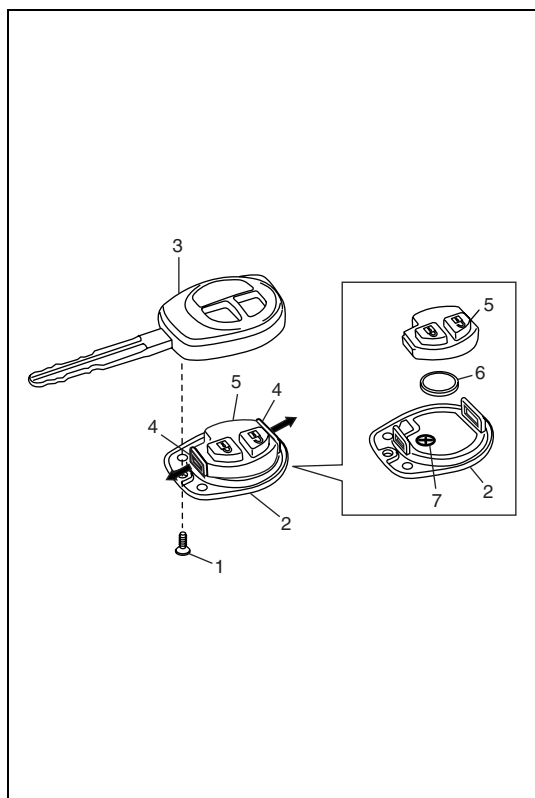
Terminal	Wire	Circuit	Specification	Condition
G02-7	GRN/YEL	Hazard waning signal circuit (right side)	Figure "A"	Push "LOCK" button on transmitter once.
			Figure "B"	Push "UNLOCK" button on transmitter once.
			Figure "C"	Push "LOCK" button on transmitter twice within 3 seconds.
G02-8	GRN/RED	Hazard waning signal circuit (left side)	Figure "A"	Push "LOCK" button on transmitter once.
			Figure "B"	Push "UNLOCK" button on transmitter once.
			Figure "C"	Push "LOCK" button on transmitter twice within 3 seconds.
G02-15	BRN/RED	Door switch & interior light circuit	Figure "D"	Fulfill the following conditions. <ul style="list-style-type: none"> • All door is close. • Interior light switch is middle position. • 20 seconds after pushing "UNLOCK" button on transmitter once



[A] : Figure "A"
[B] : Figure "B"
[C] : Figure "C"
[D] : Figure "D"

Transmitter**REPLACEMENT OF TRANSMITTER BATTERY**

If transmitter becomes unreliable, replace transmitter battery as follows.



- 1) Remove screw (1), and remove cover (2) from ignition key (3).
- 2) Unhook tabs (4) and remove transmitter (5).
- 3) Replace battery (lithium disc-type CR1616 or equivalent battery) (6) so its + terminal faces "+" mark (7) on transmitter (5).
- 4) Set transmitter to cover (2).
- 5) Install cover (2) to ignition key (3) and tighten screw (1).
- 6) Make sure that keyless entry system can be operated with transmitter.

CAUTION:

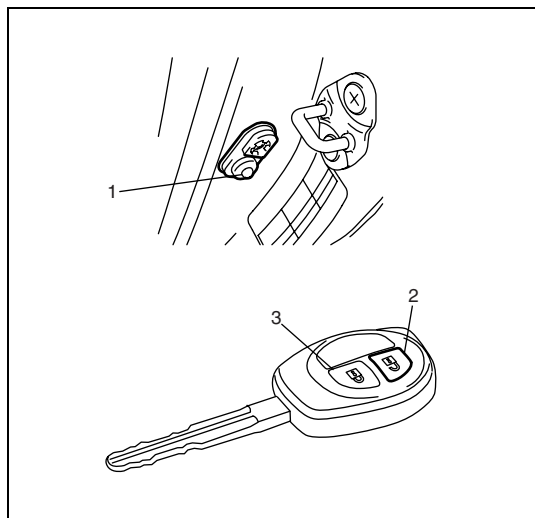
Use care not to allow grease or dirt to be attached on the printed circuit board and the battery.

NOTE:

- To prevent theft, be sure to break the transmitter before discarding it.
- Dispose of the used battery properly according to applicable rules or regulations. Do not dispose of lithium batteries with ordinary household trash.

CODE REGISTRATION PROCEDURE

If transmitter or door lock controller replace new one, register key code as follows.



- 1) Confirm that all doors are closed and ignition key is out of ignition key cylinder
- 2) Open driver side door.
- 3) Turn ignition switch to ON position, and then drawn ignition key from ignition key cylinder within 10 seconds after that.
- 4) Push and release driver side door switch (1) at 3 times by hand within 20 seconds after removing ignition key from ignition key cylinder.
- 5) Turn ignition switch to ON position, and then drawn ignition key from ignition key cylinder within 10 seconds after that.
- 6) Push "UNLOCK" button (2) on transmitter (3) and confirm that all doors are operated from lock to unlock.
With this, code registration is completed.

NOTE:

- Three transmitter codes can be registered.
- When a new transmitter code is registered, the oldest one will be cleared.

SECTION 8G

IMMOBILIZER CONTROL SYSTEM

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to AIR BAG SYSTEM COMPONENTS AND WIRING LOCATION VIEW under GENERAL DESCRIPTION in air bag section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNING and SERVICE PRECAUTIONS under ON-VEHICLE SERVICE in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual. However, bear the following in mind when checking DTC (Diagnostic Trouble Code).

Be sure to use SUZUKI scan tool whenever checking DTC because this vehicle has no monitor connector for Immobilizer control system and DTC can not be displayed by malfunction indicator lamp (MIL) flashing.

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On-Vehicle Service.....	8G-2	Procedure after immobilizer control module replacement.....	8G-3
Registration Procedure of Immobilizer System Components	8G-2	Procedure after ECM replacement.....	8G-3
How to register ignition key	8G-2	Special Tools.....	8G-4

On-Vehicle Service

Registration Procedure of Immobilizer System Components

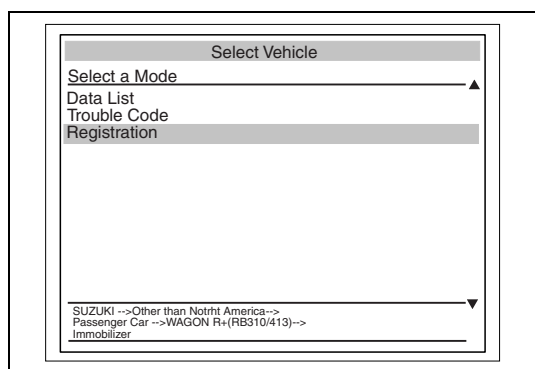
How to register ignition key

[When using Tech 1A]

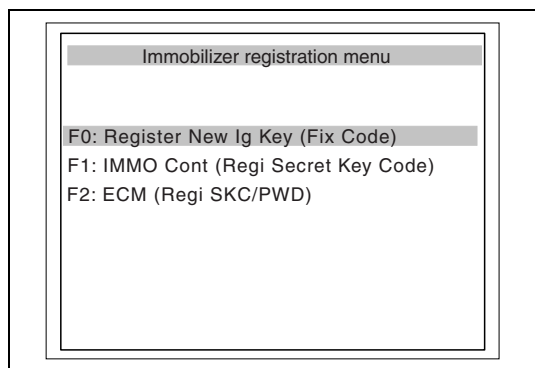
For the procedure, refer to “How to register ignition key” in the same section of the Service manual mentioned in FOREWORD of this manual.

[When using Tech 2]

- 1) Perform IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE.
- 2) Prepare ignition key(s) with built-in transponder(s) to be registered to IMMOBILIZER CONTROL MODULE.



- 3) Connect Tech 2 to DLC with ignition switch at OFF position. Insert ignition key to be registered into key cylinder and turn ignition switch to ON (II) position.
- 4) Select vehicle, “immobilizer” and “Registration” at each menu screen.



- 5) Select “Register New Ig Key (Fix code)” to register fix code from ignition key into immobilizer control module and register secret key code from immobilizer control module into ignition key.

In case that secret key has already registered in ignition key, only fix code will be registered.

NOTE:

Whether secret key has already registered or not is detected by Tech 2 automatically.

It is not necessary to care for secret key registration of ignition key.

The procedure here after, follow Tech 2 screen and operator's manual.

Procedure after immobilizer control module replacement

[When using Tech 1A]

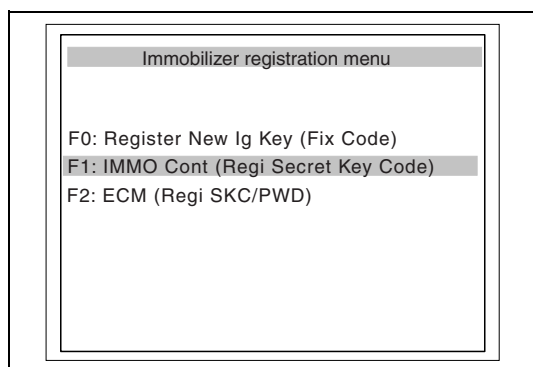
For the procedure, refer to "Procedure after immobilizer control module replacement" in the same section of the Service manual mentioned in FOREWORD of this manual.

[When using Tech 2]

- 1) Perform IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE.
- 2) Connect Tech 2 to DLC with ignition switch at OFF position.
- 3) Turn ignition switch to ON position.
- 4) Select "Registration" at mode select screen under Immobilizer.

NOTE:

For operation procedure of scan tool, refer to operator's manual.



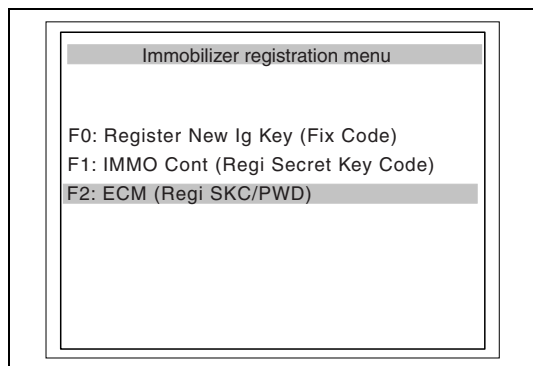
- 5) Perform immobilizer control module registration by selecting "IMMO Cont (Regi secret key code)".
- 6) After completing immobilizer control module registration, register ignition key (fix code) into immobilizer control module by performing "Register New Ig Key (Fix Code)" at Immobilizer Registration Menu.

Procedure after ECM replacement

[When using Tech 1A]

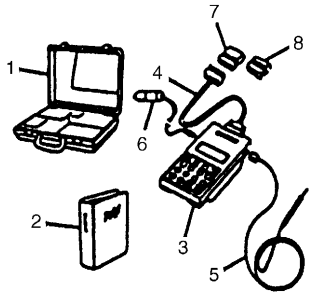
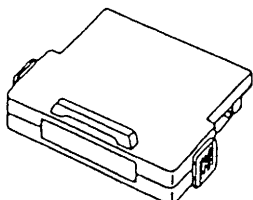
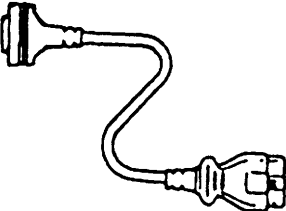
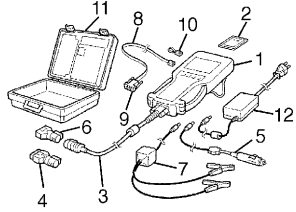
For the procedure, refer to "Procedure after ECM replacement" in the same section of the Service manual mentioned in FOREWORD of this manual.

[When using Tech 2]



- 1) Perform IMMOBILIZER SYSTEM COMPONENTS REGISTRATION FLOW TABLE.
- 2) Connect Tech 2 to DLC with ignition switch at OFF position.
- 3) Turn ignition switch to ON position.
- 4) Select "ECM (Regi SKC/PWD)" at Immobilizer Registration menu".

Special Tools

 <p>09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE "A".)</p>	 <p>Mass storage cartridge for Tech 1A</p>	 <p>09931-76030 16/14 pin DLC adapter for Tech 1A</p>	 <p>Tech 2 kit (SUZUKI scan tool) (See NOTE "B".)</p>
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NOTE:

- **"A"** : This kit includes the following items and substitutes for the Tech 2 kit.
1. Storage case, 2. Operator's manual, 3. Tech 1A, 4. DLC cable (14/26 pin, 09931-76040), 5. Test lead/probe, 6. Power source cable, 7. DLC cable adaptor, 8. Self-test adaptor
- **"B"** : This kit includes the following items and substitutes for the Tech 1A kit.
1. Tech 2, 2. PCMCIA card, 2. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adaptor, 7. Battery power cable, 8. RS232 cable, 9. RS232 adaptor, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 9

BODY SERVICE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- When servicing vehicle body, if shock may be applied to air bag system component parts, remove those parts beforehand. (Refer to Section 10B.)

NOTE:

- For the description (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.
- Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.
- Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

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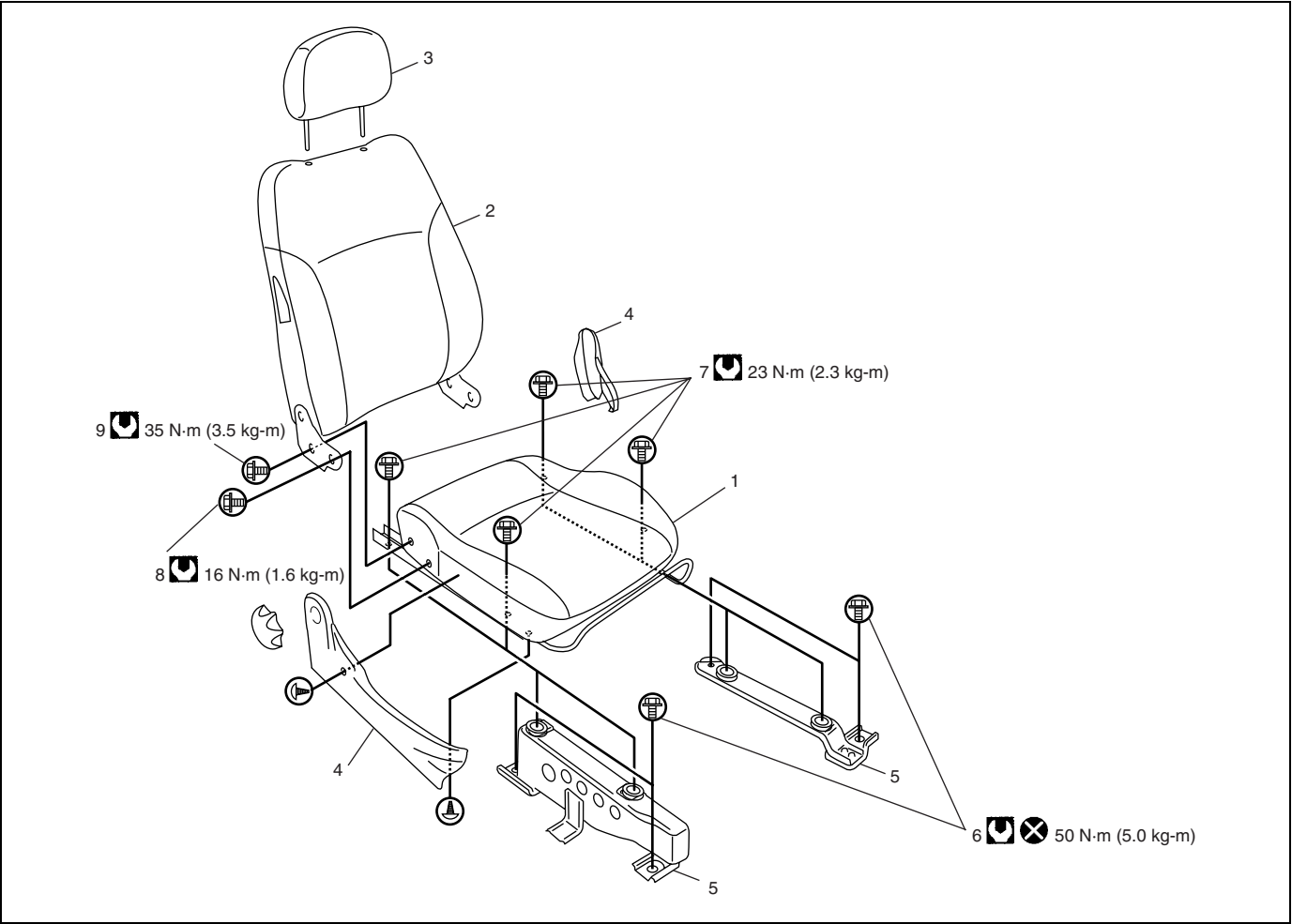
Seats



Front Seat

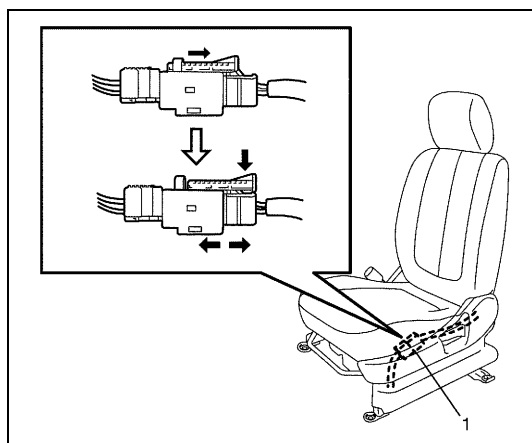
WARNING:

For vehicle equipped with side air bags:

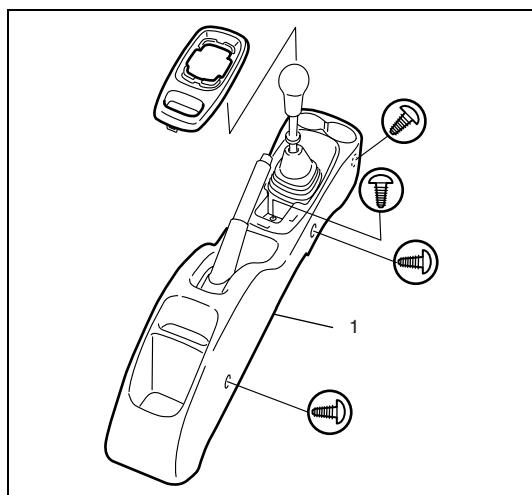
- Never attempt to disassemble front seat back. Do not remove side air bag (inflator) module from front seat back. If any abnormality is found, be sure to replace front seat back with new one as an assembly.
- Be sure to read “SERVICE PRECAUTIONS” in Section 10B before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.



1. Seat cushion	5. Bracket	9. Reclining bolt
2. Seat back	6. Seat adjuster bolt	 Tightening torque
3. Head rest	7. Seat cushion bolt	 Do not reuse.
4. Cover	8. Reclining bolt	

REMOVAL

- 1) Disable air bag system referring to "DISABLEING AIR BAG SYSTEM" in Section 10B.
- 2) Disconnect side air bag coupler (1), if equipped.



- 3) Remove center console box (1).

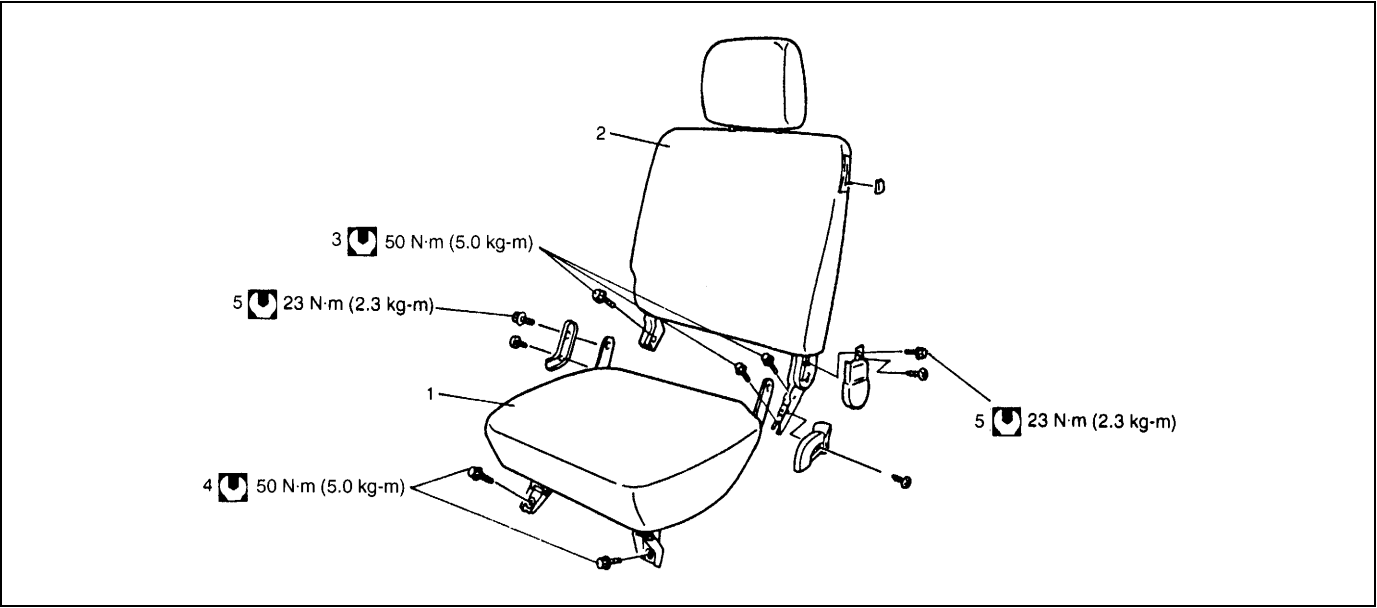
- 4) Remove 4 mounting bolts to remove front seat from vehicle floor.

INSTALLATION

Reverse removal procedure to install front seat.

Torque mounting bolts to specifications shown in previous figure.

Rear Seat



1. Seat cushion	4. Seat cushion bolt
2. Seat back	5. Folding bolt
3. Seat back bolt	

REMOVAL/INSTALLATION

For removal and Installation of rear seat, refer to above figure.

SECTION 10B

AIR BAG SYSTEM

WARNING:

- Service on or around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in this section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintended activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- The procedures in this section must be followed in the order listed to disable the air bag system temporarily and prevent false diagnostic trouble codes from setting. Failure to follow procedures could result in possible activation of the air bag system, personal injury or otherwise unneeded air bag system repairs.

CAUTION:

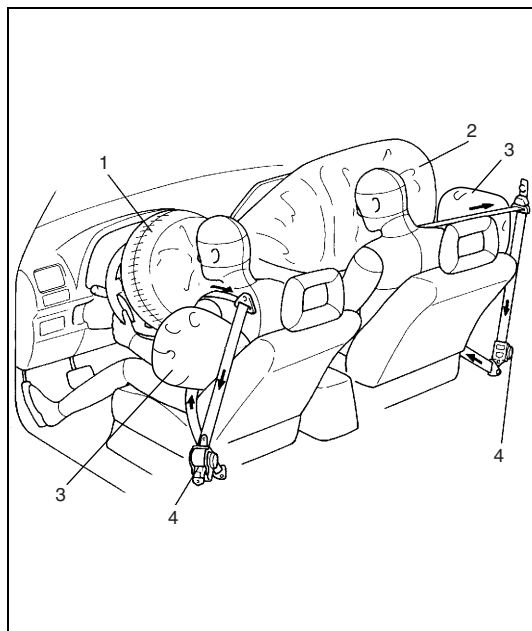
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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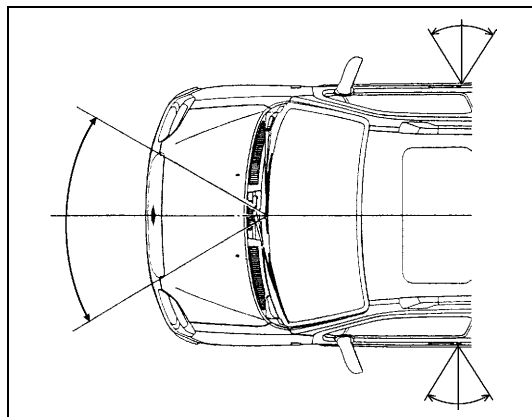
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General Description



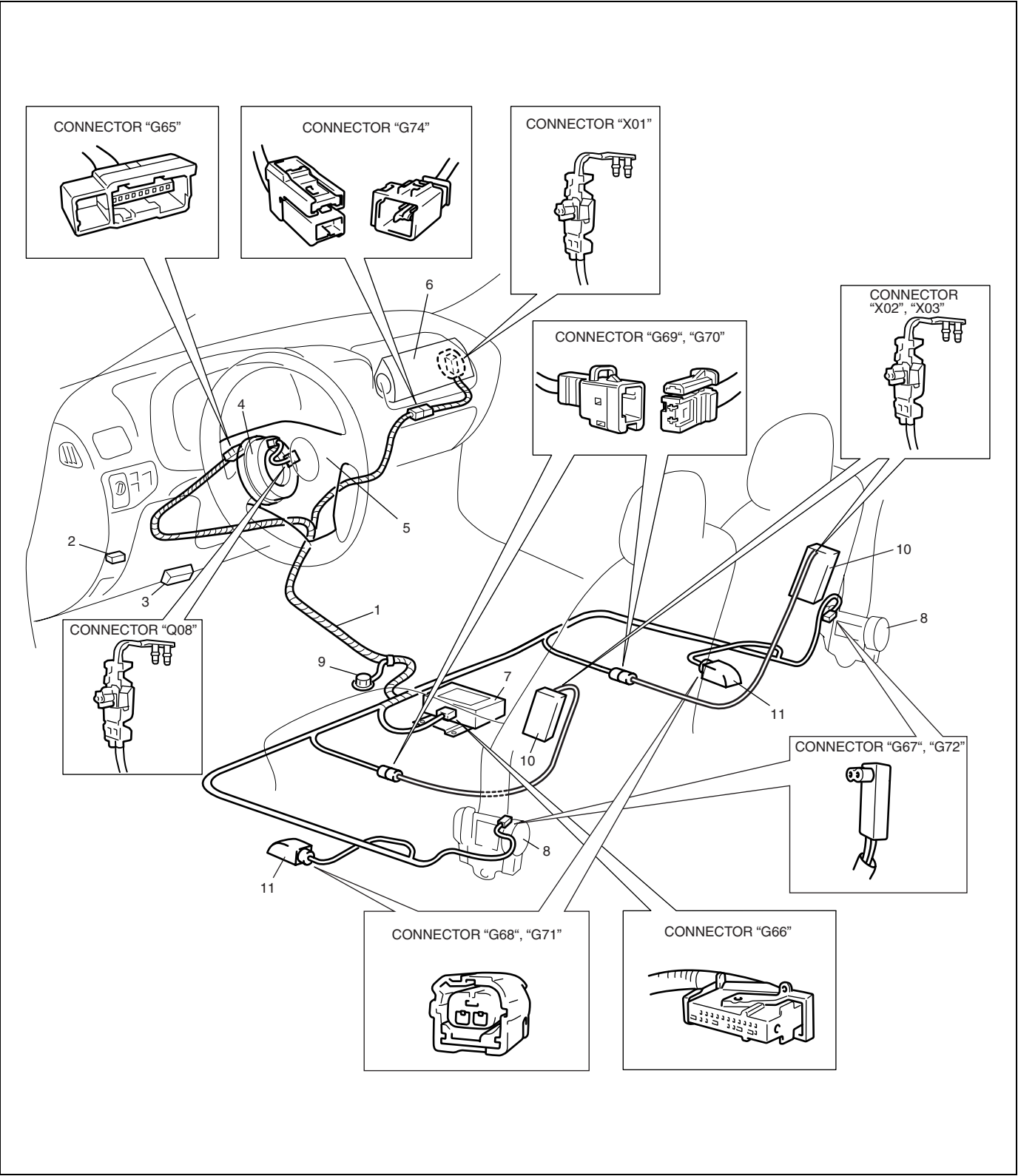
With the air bag system which includes front air bags and side air bags for both the driver's and passenger's sides as well as the seat belt pretensioners, the sag of the seat belt is taken up (for seat belt with pretensioner), the driver air bag (inflator) module is deployed from the center of the steering column and the passenger air bag (inflator) module from the top of the instrument panel in front of the front passenger seat in occurrence of a front collision with an impact larger than a certain set value to supplement protection offered by the driver and front passenger seat belts. Side air bag (inflator) module is deployed from the side of the seat back in occurrence of a sideward collision with an impact larger than a certain set value.

- | | |
|----|------------------------|
| 1. | Driver side air bag |
| 2. | Passenger side air bag |
| 3. | Side air bag |
| 4. | Seat belt pretensioner |



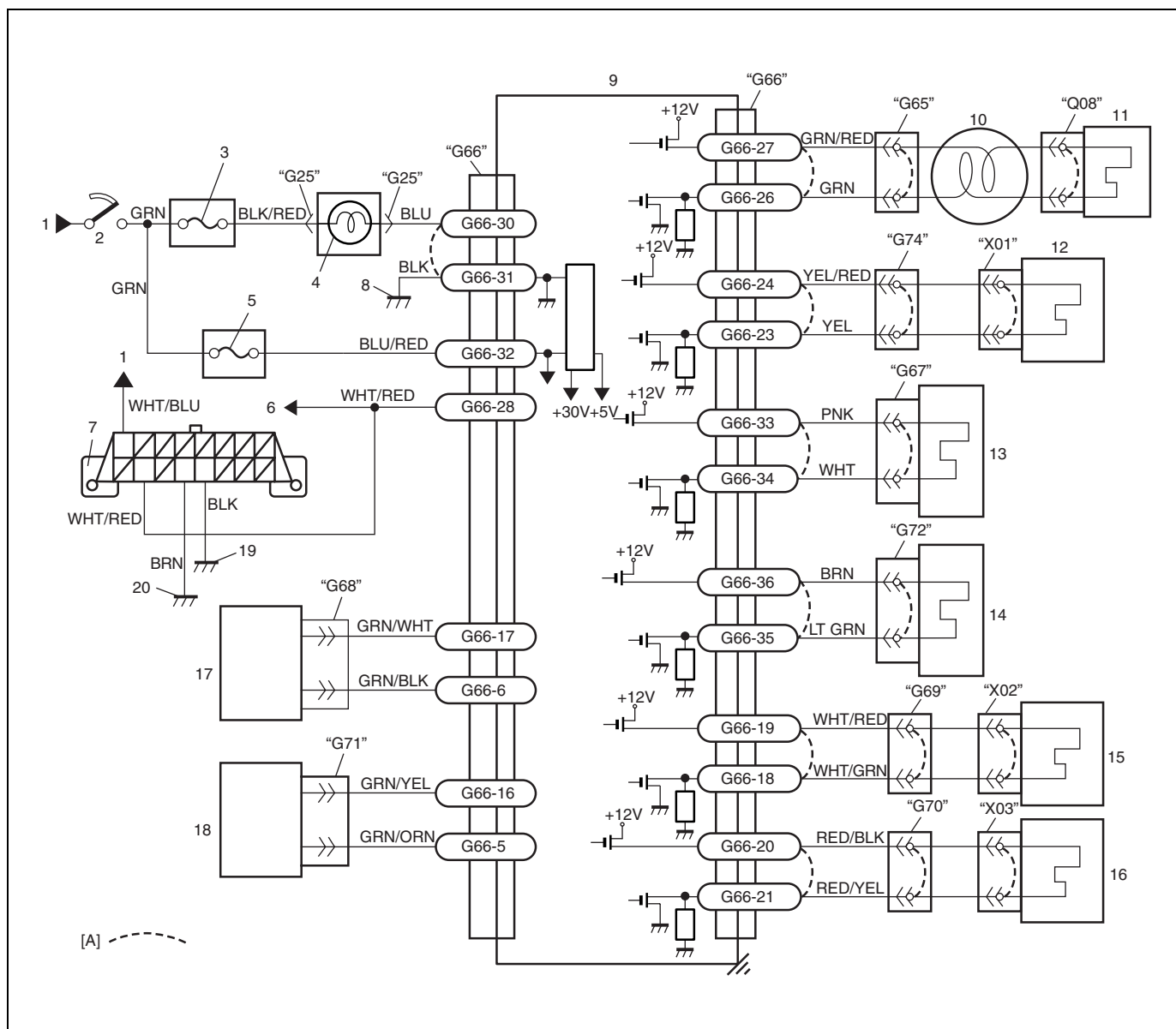
The air bag system is designed to activate only in severe frontal and sideward collisions. It is not designed to activate in rear impacts, rollovers, or minor frontal and sideward collisions, since it would offer no protection in those types of accidents.

System Components and Wiring Location View and Connectors



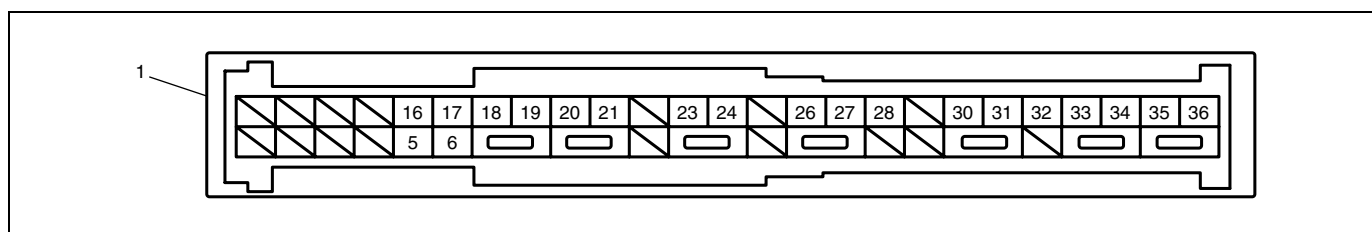
1. Air bag harness (in instrument panel harness)	5. Driver air bag (inflator) module	9. Ground for air bag system
2. "AIR BAG" fuse in circuit fuse box	6. Passenger air bag (inflator) module (if equipped)	10. Side air bag (inflator) module (if equipped)
3. DLC	7. SDM	11. Side Sensor (if equipped)
4. Contact coil assembly	8. Seat belt pretensioner (retractor assembly)	

System Wiring Diagram



[A] : Shorting bar	8. Ground for air bag system	16. Side air bag (inflator) module at passenger side (if equipped)
1. From main fuse	9. SDM	17. Side sensor at driver side (if equipped)
2. Ignition switch	10. Contact coil assembly	18. Side sensor at passenger side (if equipped)
3. "METER" fuse	11. Driver air bag (inflator) module	19. Ground on body
4. "AIR BAG" warning lamp in combination meter	12. Passenger air bag (inflator) module (if equipped)	20. Ground on engine block
5. "AIR BAG" fuse	13. Driver seat belt pretensioner	
6. To ECM and ABS control module (if equipped)	14. Passenger seat belt pretensioner	
7. Data link connector (DLC)	15. Side air bag (inflator) module at driver side (if equipped)	

TERMINAL ARRANGEMENT OF SDM CONNECTOR (VIEWED FROM HARNESS SIDE)



1. SDM connector "G66"

TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
G66-1	—	G66-20	Side air bag (inflator) High
G66-2	—	G66-21	module (passenger side) Low (if equipped)
G66-3	—	G66-22	—
G66-4	—	G66-23	Passenger air bag Low
G66-5	Side sensor (passenger side) Low (if equipped)	G66-24	(inflator) module (if equipped) High
G66-6	Side sensor (driver side) Low (if equipped)	G66-25	—
G66-7	—	G66-26	Driver air bag (inflator) Low
G66-8	—	G66-27	module High
G66-9	—	G66-28	Data link connector (DLC)
G66-10	—	G66-29	—
G66-11	—	G66-30	"AIR BAG" warning lamp
G66-12	—	G66-31	Ground
G66-13	—	G66-32	Ignition switch (power source)
G66-14	—	G66-33	Driver pretensioner High
G66-15	—	G66-34	Low
G66-16	Side sensor (passenger side) High (if equipped)	G66-35	Low
G66-17	Side sensor (driver side) High (if equipped)	G66-36	Passenger pretensioner High
G66-18	Side air bag (inflator) Low		
G66-19	module (driver side) High (if equipped)		

Diagnosis

WARNING:

To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

Diagnostic Trouble Code (DTC)

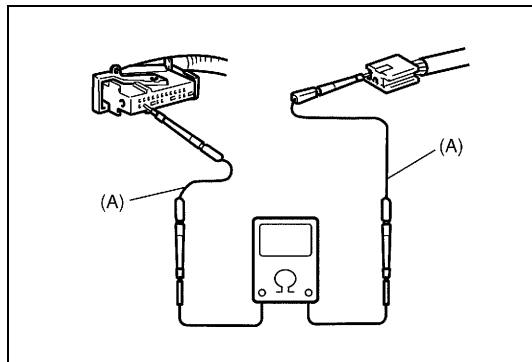
The AIR BAG DIAGNOSTIC SYSTEM CHECK must always be the starting point of any air bag system diagnosis. The AIR BAG DIAGNOSTIC SYSTEM CHECK checks for proper "AIR BAG" warning lamp operation and checks for air bag diagnostic trouble codes (DTCs) using SUZUKI scan tool.

Use of Special Tool

WARNING:

To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

You should be familiar with the tools listed in this section under the heading SPECIAL TOOLS. You should be able to measure voltage and resistance. You should be familiar with proper use of a scan tool such as Air Bag Driver/Passenger Load Tool, Connector Test Adapter Kit and the Digital Multimeter.

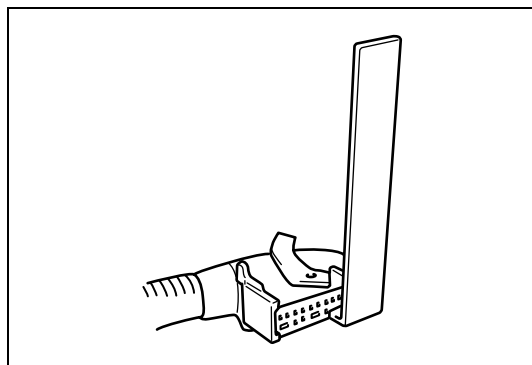


Special tool

(A) : 09932-76010 (Connector Test Adapter Kit)

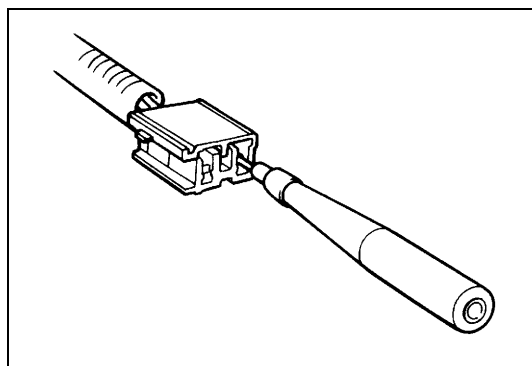
This must be used whenever a diagnostic procedure requests checking or probing a terminal.

Using the appropriate adapter in the special tool will ensure that no damage to the terminal will occur from the multimeter probe, such as spreading or bending.

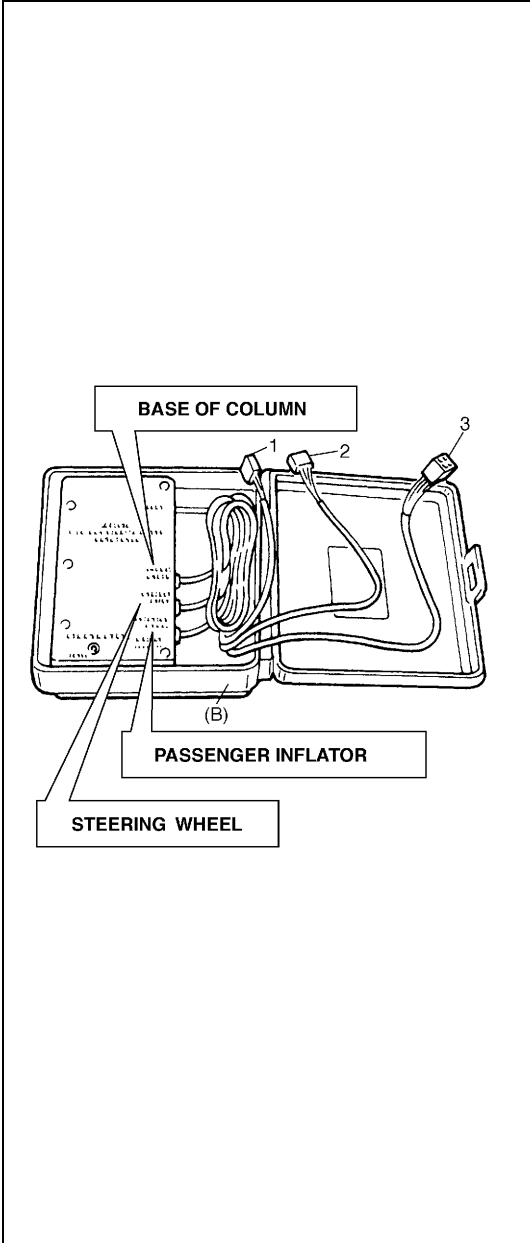


An SDM short bar release tool is included in the connector test adapter kit.

Inserting it into the SDM connector will release the shorting bar.



The adapter will also give an idea of whether contact tension is sufficient, helping to find an open or intermittent open due to poor terminal contact.



Special tool
(B) : 09932-75010 (Air Bag Driver/Passenger Load Tool)

This tool is used only when called for in this section. It is used as a diagnostic aid and safety device to prevent inadvertent air bag (inflator) module deployment.

The load tool has three connectors attached to its case which are electrically functional and serve as resistive load substitutions. No more than two connectors are used at any time.

One of connectors (“STEERING WHEEL”) is used to substitute the load of followings.

- Driver air bag (inflator) module when it is connected at the top of the column to the contact coil assembly.
- Passenger air bag (inflator) module when it is connected to the air bag harness connector in instrument panel harness for passenger air bag (inflator) module.
- Side air bag (inflator) module (driver and passenger side) when it is connected to the instrument panel harness connector for side air bag (inflator) module.
- Each of driver and passenger seat belt pretensioners when it is connected to instrument panel harness connector for driver and passenger seat belt pretensioners.

Another connector (“BASE OF COLUMN”) is used to substitute the load of the driver air bag (inflator) module and the contact coil assembly when it is connected at the base of the column to the air bag wire harness in instrument panel harness?

The third connector (“PASSENGER INFLATOR”) is not used.

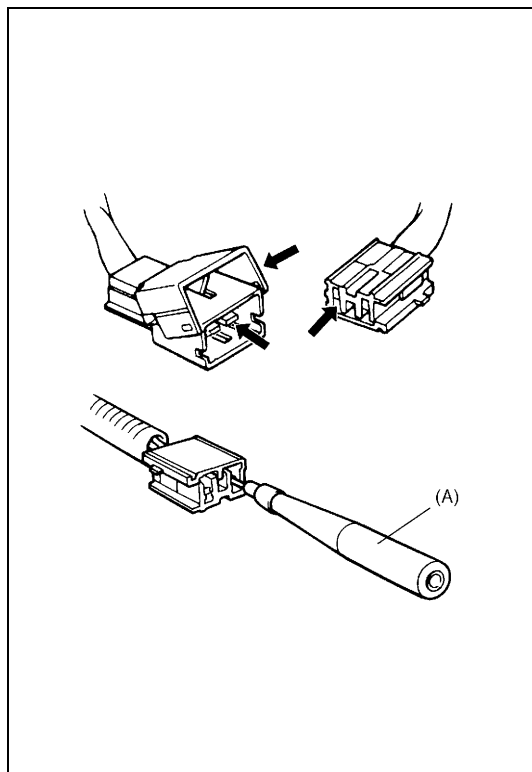
By substituting the resistance of the load tool when called for, a determination can be made as to whether an inflator circuit component is causing system malfunction and which component is causing the malfunction.

The load tool should be used only when specifically called for in the diagnostic procedures.

1. Connector for contact coil and driver air bag (inflator) module (Located near the base of the steering column)
2. Connector for driver and passenger air bag (inflator) module, side air bag (inflator) module (driver and passenger side) and driver and passenger seat belt pretensioners
3. Not used

Intermittents and Poor Connections

Most intermittents are caused by faulty electrical connections or wiring. When a check for proper connection is requested in a diagnostic flow table, perform careful check of suspect circuits for:



- Check connector for loose connection.
- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact.

However, cleaning the terminal with a sand paper or the like is prohibited.

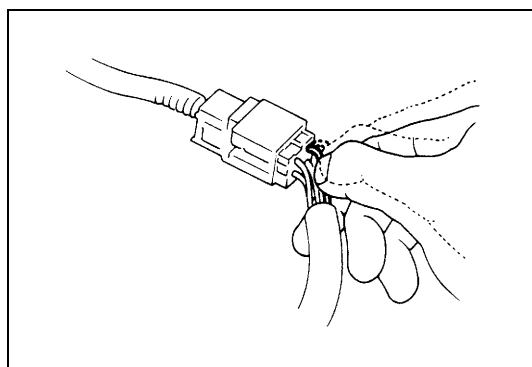
- Damaged connector body, exposing the terminals to moisture and dirt, as well as not maintaining proper terminal orientation with the component or mating connector.
- Improperly formed or damaged terminals.

Check each connector terminal in problem circuits carefully to ensure good contact tension by using the corresponding mating terminal included in the connector test adapter kit (special tool).

If contact tension is not enough, reform it to increase contact tension or replace.

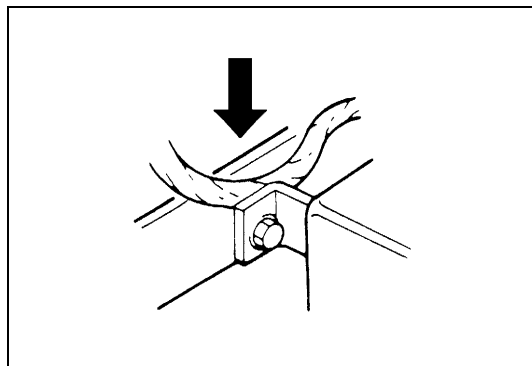
Special tool

(A) : 09932-76010 (Connector Test Adapter Kit)



- Poor terminal-to-wire connection.

Check each wire harness in problem circuits for poor connection by shaking it by hand lightly. If any abnormal condition is found, change the wire harness assembly or component parts with new ones.



- Wire insulation which is rubbed through, causing an intermittent short as the bare area touches other wiring or parts of the vehicle.
- Wire broken inside the insulation. This condition could cause a continuity check to show a good circuit, but if only 1 or 2 strands of a multi-strand-type wire are intact, resistance could be far too high.

If any abnormality is found, replace as a wire harness assembly.

Air Bag Diagnostic System Check

WARNING:

To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

CAUTION:

The order in which diagnostic trouble codes are diagnosed is very important. Failure to diagnose the diagnostic trouble codes in the order specified may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

The diagnostic procedures used in this section are designed to find and repair air bag system malfunctions. To get the best results, it is important to use the diagnostic flow tables and follow the sequence listed below.

- 1) Perform the AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE.
(The AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE must be the starting point of any air bag system diagnosis.
The AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE checks for proper "AIR BAG" warning lamp operation through "AIR BAG" warning lamp and whether air bag diagnostic trouble codes exist.)
- 2) Refer to the proper diagnostic table as directed by the AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE.
(The AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE will lead you to the correct table to diagnose any air bag system malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.)
- 3) Repeat the AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE after any repair or diagnostic procedures have been performed.
(Performing the AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE after all repair or diagnostic procedures will ensure that the repair has been made correctly and that no other malfunctions exist.)

FLOW TABLE TEST DESCRIPTION

STEP 1 : Check that "AIR BAG" warning lamp lights.

STEP 2 : Check that "AIR BAG" warning lamp lights.

STEP 3 : Check that "AIR BAG" warning lamp flashes 6 times after ignition switch is turned ON.

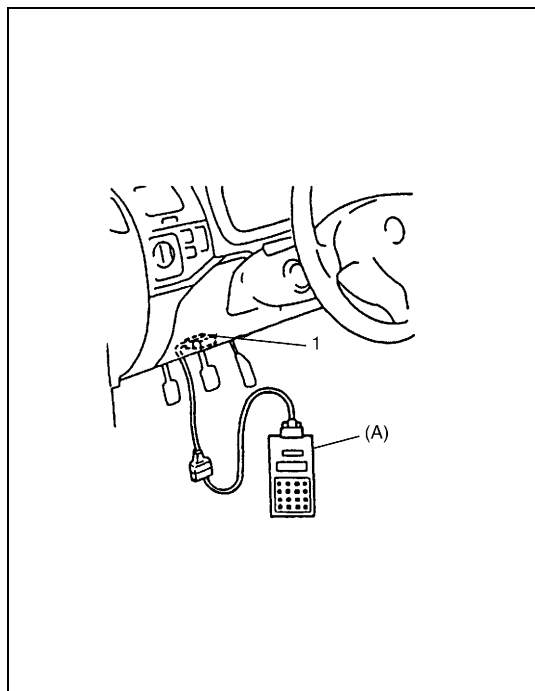
STEP 4 : Check that history codes are in SDM memory.

STEP 5 : Check that current code is in SDM memory.

Air Bag Diagnostic System Check Flow Table

Step	Action	Yes	No
1	1) Make sure that battery voltage is about 11 V or higher. 2) Note "AIR BAG" warning lamp as ignition switch is turned ON. Does "AIR BAG" warning lamp come ON when ignition switch is turned ON?	Go to step 2.	Proceed to "AIR BAG" Warning Lamp Does Not Come ON in this section.
2	Does "AIR BAG" warning lamp come ON steady?	Proceed to "AIR BAG" Warning Lamp Comes ON Steady in this section.	Go to step 3.
3	Does "AIR BAG" warning lamp turn OFF, after flashing 6 times?	"AIR BAG" warning lamp circuit is good condition. Go to step 4.	"AIR BAG" warning lamp circuit is good condition. Go to step 5.
4	1) Check DTC using SUZUKI scan tool. Refer to DTC CHECK in this section. Is "NO CODES" displayed on SUZUKI scan tool?	Air bag system is in good condition.	An intermittent trouble has occurred at some place. Check the connector harness, etc. related to the sensed DTC. Refer to INTERMITTENTS AND POOR CONNECTIONS in this section. Then clear DTC (Refer to DTC CLEARANCE in this section.) and repeat this table.
5	1) Check DTC using SUZUKI scan tool. Refer to DTC CHECK in this section. Is "NO CODES" displayed on SUZUKI scan tool?	Substitute a known-good SDM and recheck.	Check and repair according to Flow Table corresponding to that DTC.

DTC Check



- 1) Turn ignition switch to OFF position.
- 2) Connect SUZUKI scan tool to data link connector (DLC) located on underside of instrument panel at driver's seat side.

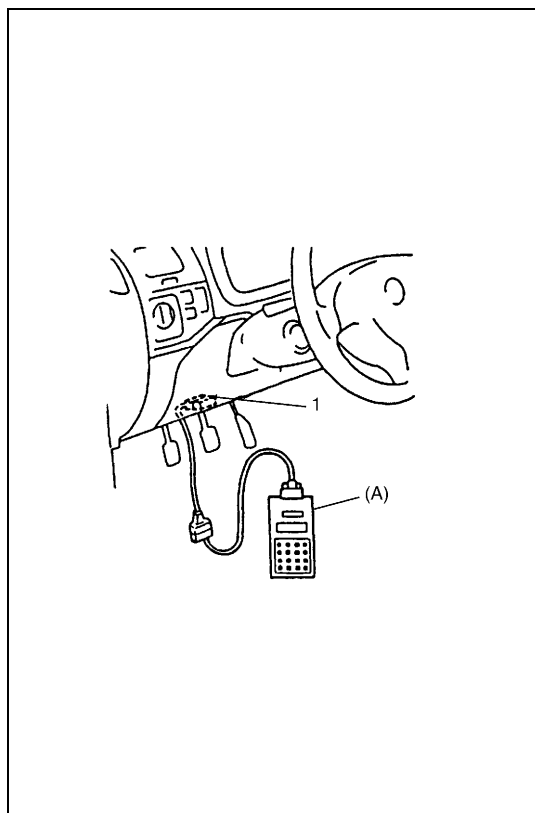
Special tool

(A) : SUZUKI scan tool

- 3) Turn ignition switch to ON position.
- 4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
If communication between scan tool and SDM is not possible, proceed to SDM Can not Communicate through the Serial Data Circuit in this section.
- 5) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from data link connector (DLC).

1. Data link connector (DLC)

DTC Clearance



- 1) Turn ignition switch to OFF position.
- 2) Connect SUZUKI scan tool to data link connector (DLC) in the same manner as when making this connection for DTC check.

Special tool

(A) : SUZUKI scan tool

- 3) Turn ignition switch to ON position.
- 4) Erase DTC according to instructions displayed on SUZUKI scan tool.
Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.
- 6) Perform DTC CHECK and confirm that normal DTC (NO CODES) is displayed and not malfunction DTC.

NOTE:

If DTC B1051, B1058 or B1071 is stored in SDM, it is not possible to clear it.

1. Data link connector (DLC)

DTC Table

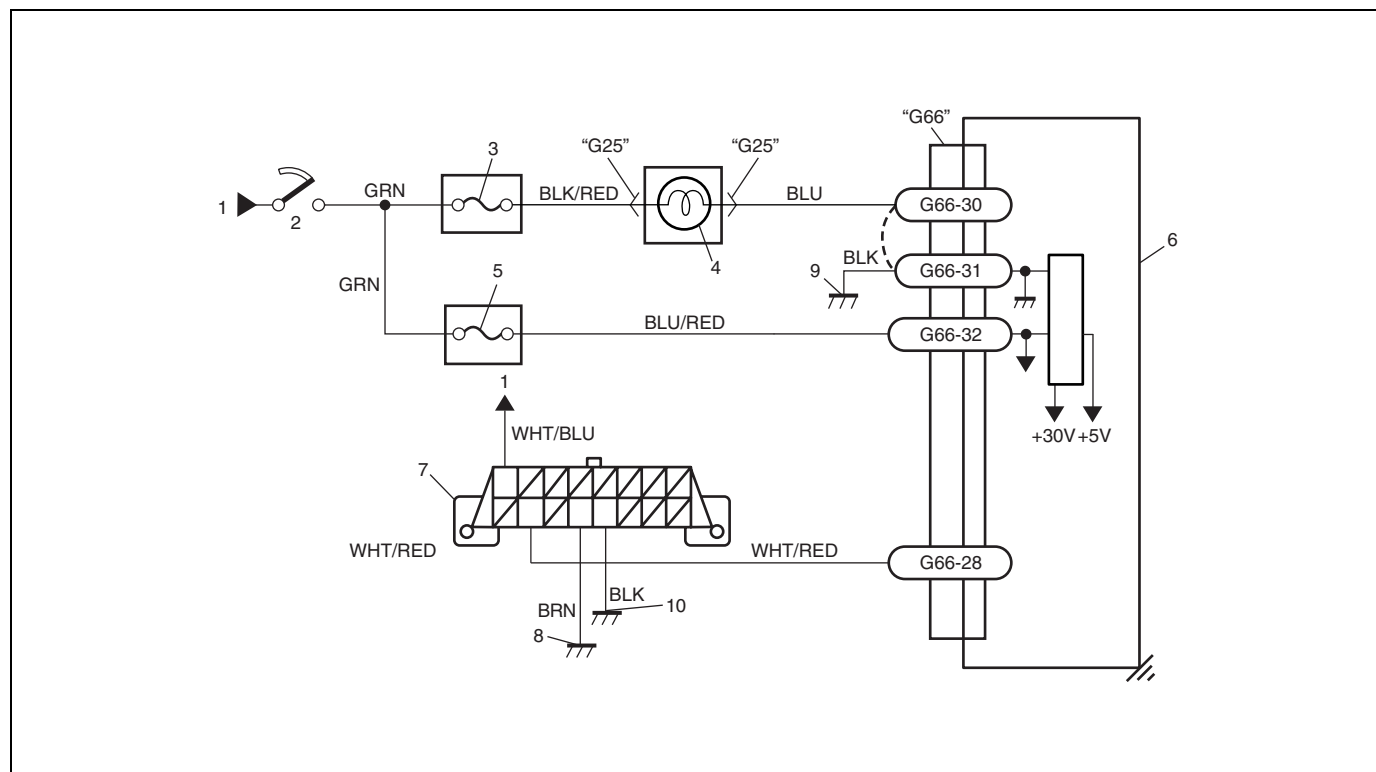
DTC	Diagnosis	
—	Normal	—
B1015	Passenger air bag circuit	Resistance high
B1016		Resistance low
B1018		Short to ground
B1019		Short to power circuit
B1021	Driver air bag circuit	Resistance high
B1022		Resistance low
B1024		Short to ground
B1025		Short to power circuit
B1031	Power source voltage	Too high
B1032		Too low
B1041	Driver pretensioner circuit	Resistance high
B1042		Resistance low
B1043		Short to ground
B1044		Short to power circuit
B1045	Passenger pretensioner circuit	Resistance high
B1046		Resistance low
B1047		Short to ground
B1048		Short to power circuit
B1051	SDM	Frontal crash detected
B1056		Sideward crash (driver side) detected
B1057		Sideward crash (passenger side) detected
B1058		Frontal crash detected (pretensioner activation command outputted)
B1061	"AIR BAG" warning lamp circuit	Circuit failure
B1063	Side sensor circuit (driver side)	Short to ground
B1064		Short to power circuit or open
B1065	Side sensor circuit (passenger side)	Short to ground
B1066		Short to power circuit or open
B1071	SDM	Internal fault
B1072	Side sensor (driver side)	Internal fault
B1073	Side sensor circuit (driver side)	Correspondence abnormality
B1074	Side sensor (passenger side)	Internal fault
B1075	Side sensor circuit (passenger side)	Correspondence abnormality

Diagnose trouble according to diagnostic flow table corresponding to each code No.

DTC	Diagnosis		
B1081	Side air bag circuit (driver side)	Resistance high	Diagnose trouble according to diagnostic flow table corre- sponding to each code No.
B1082		Resistance low	
B1083		Short to ground	
B1084		Short to power circuit	
B1085	Side air bag circuit (passenger side)	Resistance high	
B1086		Resistance low	
B1087		Short to ground	
B1088		Short to power circuit	

NOTE:

- When 2 or more codes are indicated by SUZUKI scan tool (Tech-1A), the lowest numbered code will appear first.

“AIR BAG” Warning Lamp Comes ON Steady**“AIR BAG” Warning Lamp Does Not Come ON****“AIR BAG” Warning Lamp Flashes****WIRING DIAGRAM**

1. From main fuse	5. “AIR BAG” fuse	9. Ground for air bag system
2. Ignition switch	6. SDM	10. Ground on body
3. “METER” fuse	7. DLC	
4. “AIR BAG” warning lamp in combination meter	8. Ground on engine block	

CAUTION:

- Be sure to perform **AIR BAG DIAGNOSTIC SYSTEM CHECK** before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to **SPECIAL TOOL** in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to **INTERMITTENTS AND POOR CONNECTIONS** in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

TABLE TEST DESCRIPTION**“AIR BAG” Warning Lamp Comes ON Steady:**

STEP 1 : Check for “AIR BAG” fuse blown.

STEP 2 : Check for loose connection between SDM connector and SDM.

STEP 3 : Check for power supply circuit.

STEP 4 : Check for short circuit between “AIR BAG” warning lamp circuit and ground.

“AIR BAG” Warning Lamp Does Not Come ON:

STEP 1 : Check for combination meter power supply circuit.

STEP 2 : Check for “AIR BAG” warning lamp blown.

STEP 3 : Check for open circuit in “AIR BAG” warning lamp circuit.

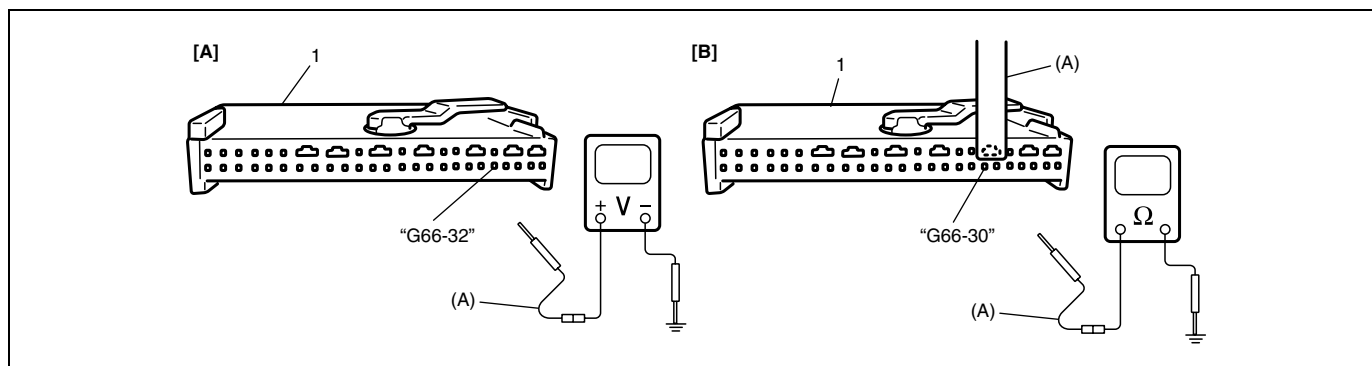
STEP 4 : Check for short circuit between “AIR BAG” warning lamp circuit and power supply circuit.

“AIR BAG” Warning Lamp Flashes:

Check for short circuit between SDM terminal and ground.

DIAGNOSTIC FLOW TABLE**“AIR BAG” Warning Lamp Comes ON Steady**

Step	Action	Yes	No
1	1) Turn ignition switch to OFF position. 2) Remove and inspect “AIR BAG” fuse. Is fuse good?	Go to step 2.	Clear up short circuit between “BLU/RED” wire and ground. After clearing up, replace “AIR BAG” fuse.
2	1) Check for loose connection between SDM connector “G66” and SDM. Is connection good?	Go to step 3.	Clear up loose connection between SDM connector “G66” and SDM.
3	1) Disconnect SDM connector “G66”. 2) Turn ignition switch to ON position. 3) Measure voltage between “G66-32” terminal and body ground. Is it 10 – 14V?	Go to step 4.	Check and clear up the following possible cause. • Open circuit in “BLU/RED” or “GRN” wire. • Short circuit between “GRN” and ground.
4	1) Disconnect “G25” connector from combination meter referring to COMBINATION METER in Section 8. 2) Release shorting bar of “G66-30” terminal inserting release tool (A). 3) Measure resistance between “G66-30” terminal and body ground. Is resistance infinity?	Substitute a known-good SDM and recheck.	Clear up short circuit between “BLU” wire and ground.



[A] : Fig. for Step 3

[B] : Fig. for Step 4

1. SDM connector "G66"

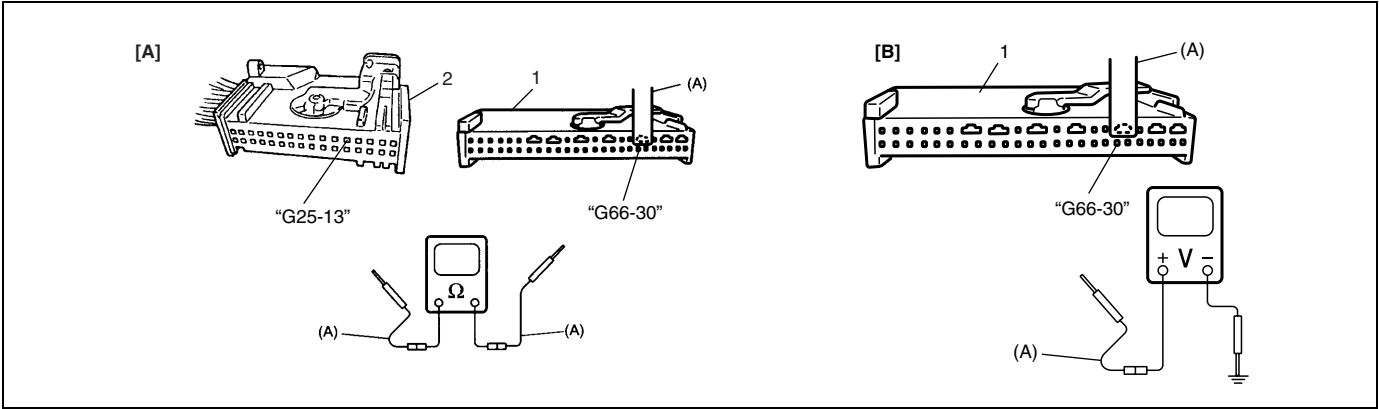
Special tool**(A) : 09932-76010****NOTE:**

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

"AIR BAG" Warning Lamp Does Not Come ON

Step	Action	Yes	No
1	1) Set parking brake. 2) Turn ignition switch to ON position. Does brake system warning light ("BRAKE") come ON?	Go to step 2.	Check and clear up the following possible cause. <ul style="list-style-type: none"> • Open circuit in "BLK/RED" or "GRN" wire. • Short circuit between "BLK/RED" or "GRN" and ground. • "METER" fuse blown.
2	1) Turn ignition switch to OFF position. 2) Remove combination meter. Refer to COMBINATION METER in Section 8. 3) Remove and inspect "AIR BAG" bulb. Is "AIR BAG" bulb good condition?	Go to step 3.	Replace "AIR BAG" bulb.
3	1) Turn ignition switch to OFF position. 2) Disconnect SDM connector "G66". 3) Release shorting bar of "G66-30" terminal inserting release tool (A). 4) Check continuity between "G25-13" and "G66-30" terminals. Is there any continuity?	Go to step 4.	Clear up open circuit in "BLU" wire.
4	1) With "G25" and "G66" connectors disconnected, turn ignition switch to ON position. 2) Measure voltage between "G66-30" terminal and body ground. Is voltage 0 V?	Substitute a known-good SDM and recheck.	Clear up short circuit between "BLU" wire circuit and power supply circuit.



[A] : Fig. for Step 3	1. SDM connector "G66"
[B] : Fig. for Step 4	2. "G25" connector for combination meter

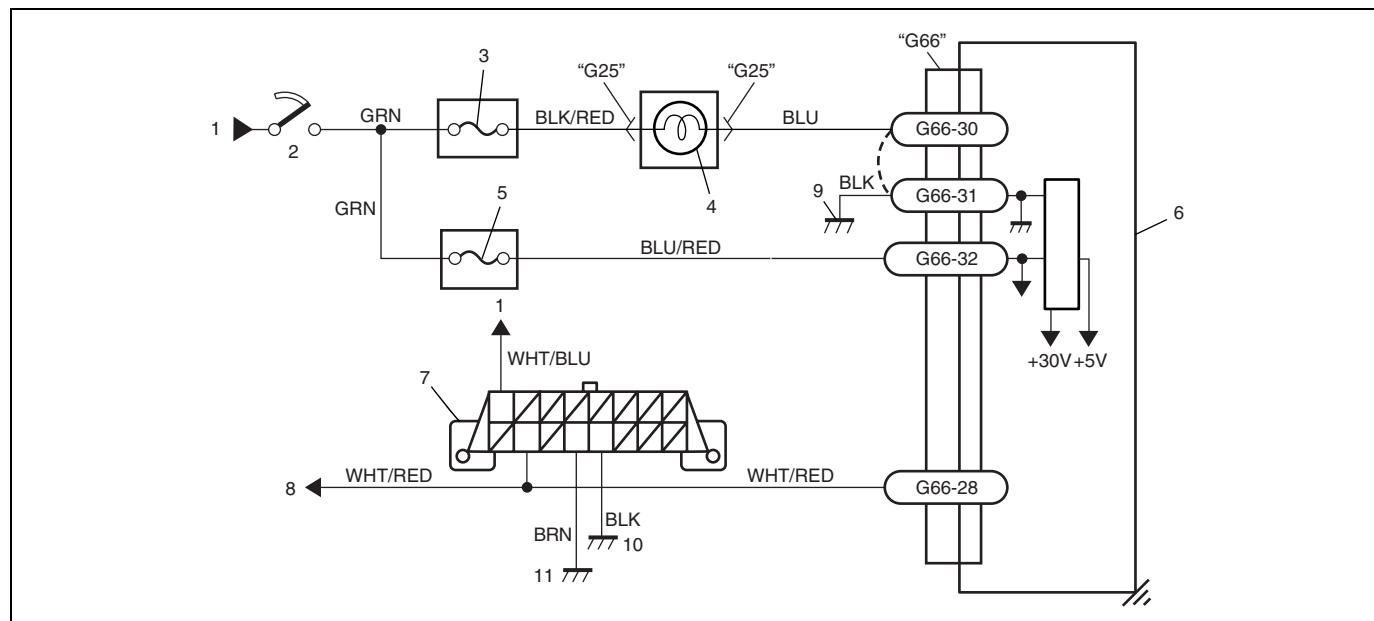
Special tool
(A) : 09932-76010

- NOTE:**
- Upon completion of inspection and repair work, perform the following items.
- Reconnect all air bag system components, ensure all components are properly mounted.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

"AIR BAG" Warning Lamp Flashes

Step	Action	Yes	No
1	1) Check "G66-8" terminal of SDM. Is it shorted to ground terminal or harness?	Clean up terminal.	Substitute a known-good SDM.

- NOTE:**
- Upon completion of inspection and repair work, perform following the items.
- Reconnect all air bag system components, ensure all components are properly mounted.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

SDM Cannot Communicate through the Serial Data Circuit**WIRING DIAGRAM**

1. From main fuse	5. "AIR BAG" fuse	9. Ground for air bag system
2. Ignition switch	6. SDM	10. Ground on body
3. "METER" fuse	7. DLC ("G09")	11. Ground on Engine block
4. "AIR BAG" warning lamp in combination meter	8. To ECM, and ABS control module (if equipped)	

CAUTION:

- Be sure to perform **AIR BAG DIAGNOSTIC SYSTEM CHECK** before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to **SPECIAL TOOL** in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to **INTERMITTENTS AND POOR CONNECTIONS** in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

TABLE TEST DESCRIPTION

STEP 1 : An improper connection to the data link connector (DLC) will prevent communications from being established.

STEP 2 : This test checks whether it is possible to communicate with other control module.

STEP 3 : This test checks for an open in serial data power circuit.

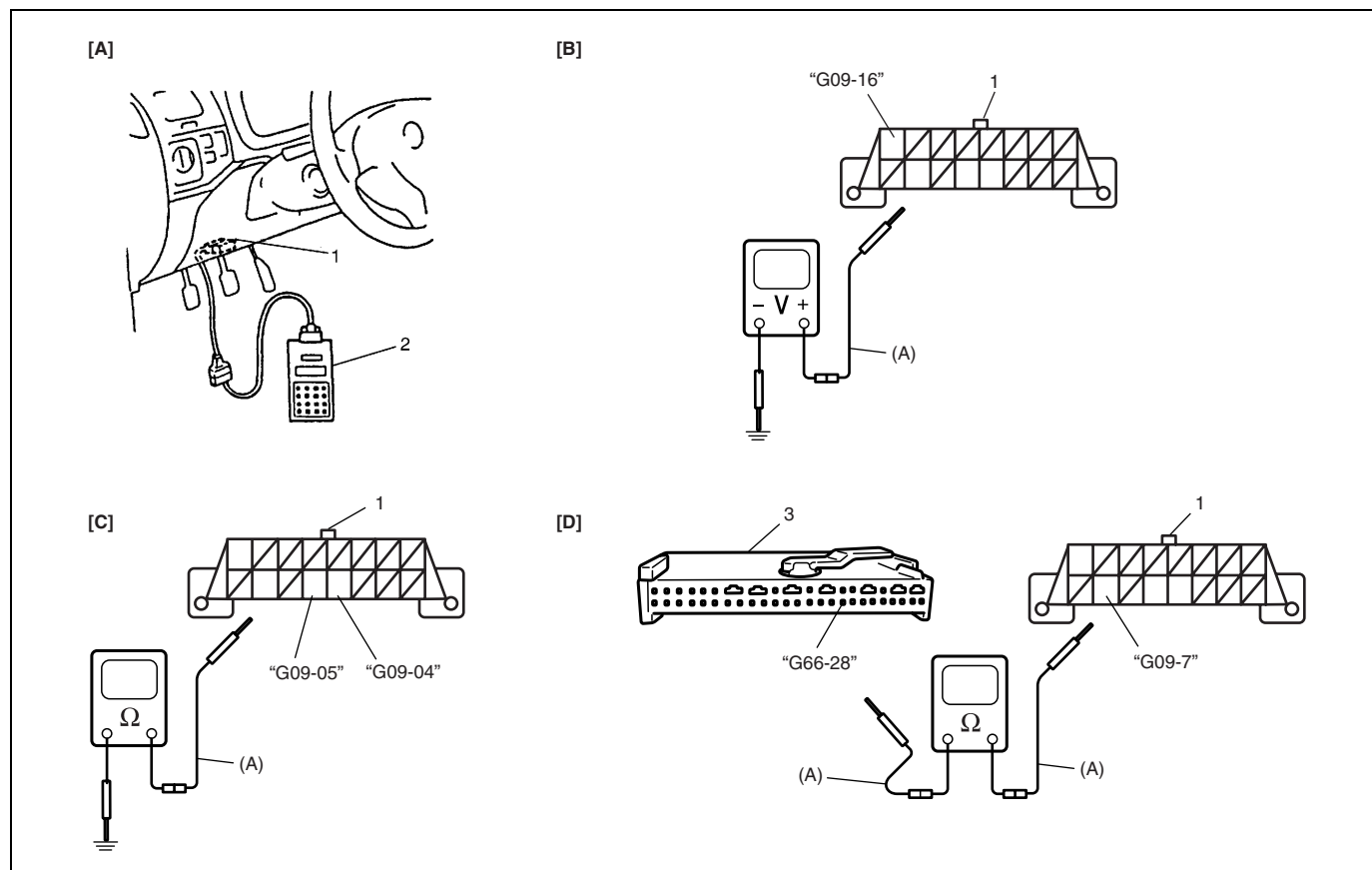
STEP 4 : This test checks for an open in serial data ground circuit.

STEP 5 : This test checks for an open in A/B serial data circuit.

DIAGNOSTIC FLOW TABLE

Step	Action	Yes	No
1	1) Make sure that SUZUKI scan tool is free from malfunction and set correctly for air bag system is used. 2) Ignition switch OFF. 3) Check proper connection of SUZUKI scan tool to DLC. Is scan tool connector connected to DLC securely?	Go to step 2.	Properly connect SUZUKI scan tool to DLC.

Step	Action	Yes	No
2	1) Check if communication is possible by trying communication with other control module (ECM or ABS control module (if equipped)). Is it possible to communicate with other control module?	Go to step 3.	Repair open in common section of serial data circuit ("WHT/RED" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("WHT/RED" wire circuit).
3	1) With ignition switch ON, check voltage between DLC terminal "G09-16" ("WHT/BLU" wire) terminal and body ground. Is voltage 10 – 14 V?	Go to step 4.	Repair open in serial data power circuit ("BLU/WHT" wire circuit).
4	1) Check resistance the following serial data ground circuits. <ul style="list-style-type: none"> Between DLC terminal "G09-4" ("BLK" wire) terminal and body ground. Between DLC terminal "G09-5" ("BRN" wire) terminal and body ground. Are resistances 0 – 1 Ω respectively?	Go to step 5.	Repair open in serial data ground circuit ("BLK" or "BRN" wire circuit).
5	1) With ignition switch OFF, disconnect SDM connector "G66". 2) Check proper connection at "G66-28" ("WHT/RED" wire) of SDM connector "G66". 3) If OK, then check resistance between "G66-28" ("WHT/RED") of SDM connector "G66" and "G09-7" ("WHT/RED") of DLC "G09". Is resistance 0 – 1 Ω ?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "WHT/RED" wire circuit (between SDM connector terminal "G66-28" and DLC).



[A] : Fig. for Step 1 and 2	1. DLC "G09"
[B] : Fig. for Step 3	2. Scan tool
[C] : Fig. for Step 4	3. SDM connector "G66"
[D] : Fig. for Step 5	

Special tool**(A) : 09932-76010****NOTE:**

Upon completion of inspection and repair work, perform following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

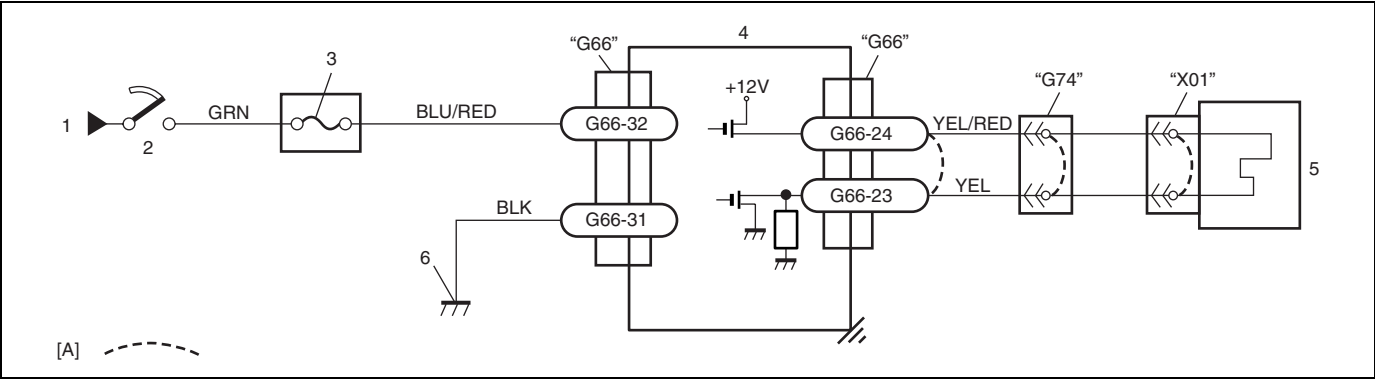
DTC B1015 – Passenger Air Bag Initiator Circuit Resistance High

DTC B1016 – Passenger Air Bag Initiator Circuit Resistance Low

DTC B1018 – Passenger Air Bag Initiator Circuit Short to Ground

DTC B1019 – Passenger Air Bag Initiator Circuit Short to Power Circuit

WIRING DIAGRAM



[A]: Shorting bar	2. Ignition switch	4. SDM	6. Ground for air bag system
1. From main fuse	3. "AIR BAG" fuse	5. Passenger air bag (inflator) module	

CAUTION:

- Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to SPECIAL TOOL in this section.) along with a correct terminal adaptor from special tool (Connector test adaptor kit).
- When a check for proper connection is required, refer to INTERMITTENTS AND POOR CONNECTIONS in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN

DTC B1015 :

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is above a specified value for specified time.

DTC B1016 :

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is below a specified value for specified time.

DTC B1018 :

The voltage measured at passenger air bag initiator circuit is below a specified value for specified time.

DTC B1019 :

The voltage measured at passenger air bag initiator circuit is above a specified value for specified time.

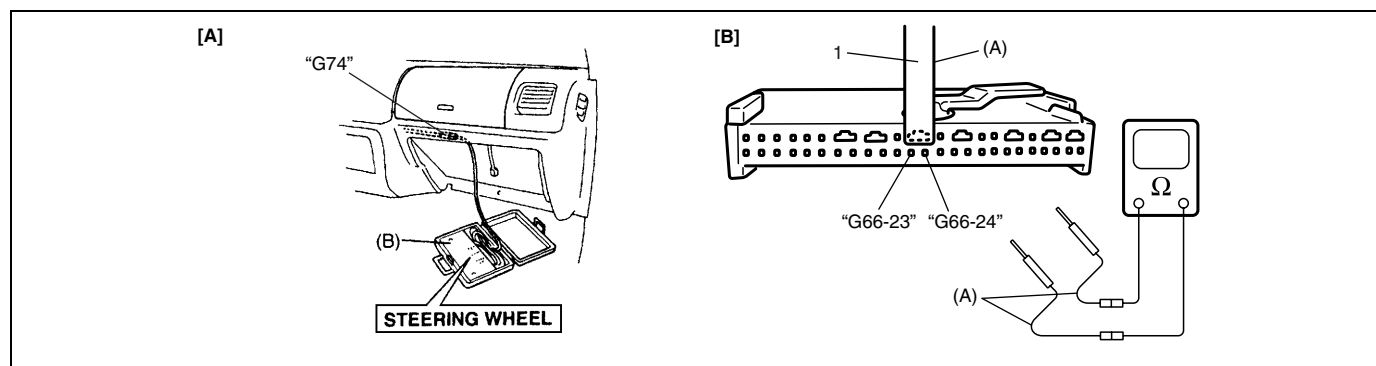
TABLE TEST DESCRIPTION

DTC B1015, B1016, B1018 or B1019 :

- STEP 1 : Check whether malfunction is in passenger air bag (inflator) module.
- STEP 2 : Check passenger air bag (inflator) module initiator circuit in air bag harness (in instrument panel harness).
- STEP 3 : Check passenger air bag (inflator) module initiator circuit in air bag harness (in instrument panel harness). (for DTC B1018 and B1019 only)

DIAGNOSTIC FLOW TABLE**DTC B1015 : Passenger Air Bag Initiator Circuit Resistance High**

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector "G74" behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "G74" connector. 3) If OK, then connect Special Tool (B) to passenger air bag (inflator) module connector "G74" disconnected at the step 1). With ignition switch ON, is DTC B1015 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect SDM connector "G66". 2) Check proper connection to SDM connector "G66" at terminals "G66-24" and "G66-23". 3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 4) Measure resistance between "G66-24" and "G66-23" terminals with Special Tool (B) connected to "G74" connector. Is resistance 3.8 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "YEL/RED" or "YEL" wire circuit.



[A] : Fig. for STEP 1 and 2	1. Release tool
[B] : Fig. for STEP 2	2. SDM connector "G66"

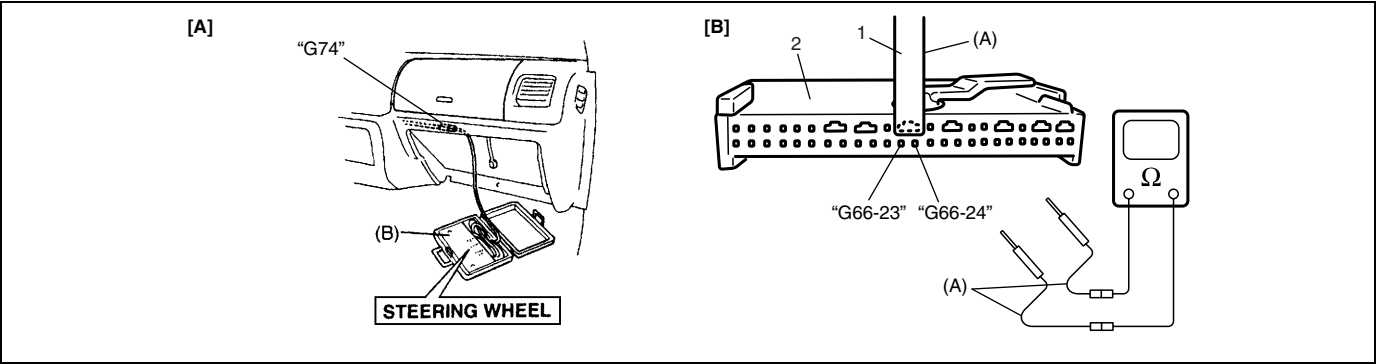
Special tool**(A) : 09932-76010****(B) : 09932-75010****NOTE:**

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1016 : Passenger Air Bag Initiator Circuit Resistance Low

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector “G74” behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in “G74” connector. 3) If OK, then connect Special Tool (B) to passenger air bag (inflator) module connector disconnected at the step 1). With ignition switch ON, is DTC B1016 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect SDM connector “G66”. 2) Check proper connection to SDM at terminals “G66-24” and “G66-23”. 3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 4) Measure resistance between “G66-24” and “G66-23” terminals with Special Tool (B) connected to “G74” connector. Is resistance 1.2 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from “YEL/RED” wire circuit to “YEL” wire circuit or from “YEL/RED” or “YEL” wire circuit to other wire circuit.



[A] : Fig. for STEP 1 and 2	1. Release tool
[B] : Fig. for STEP 2	2. SDM connector “G66”

Special tool
(A) : 09932-76010
(B) : 09932-75010

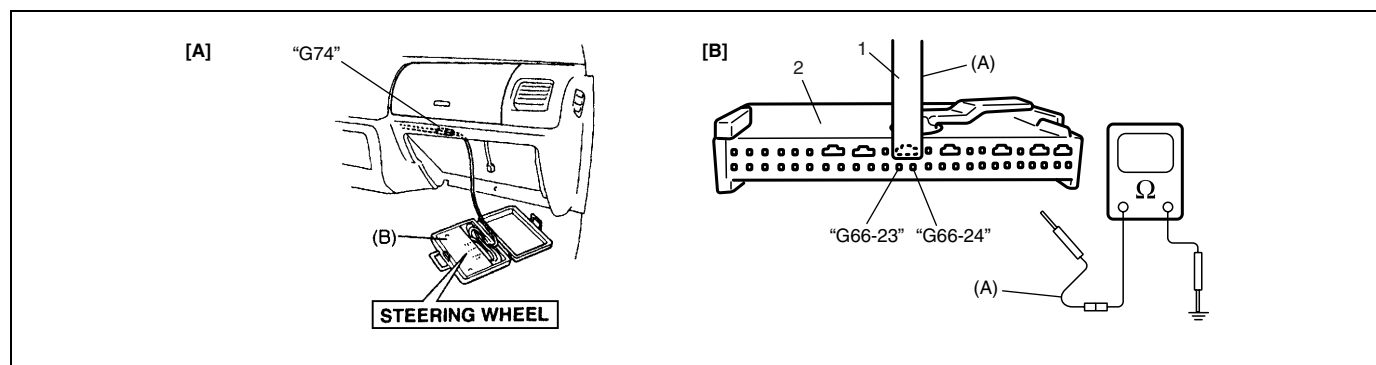
NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1018 : Passenger Air Bag Initiator Circuit Short to Ground

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector "G74" behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "G74" connector. 3) If OK, then connect Special Tool (B) to passenger air bag (inflator) module connector "G74" disconnected at the step 1). With ignition switch ON, is DTC B1018 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect Special Tool (B) from "G74" connector and SDM connector "G66" from SDM respectively. 2) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 3) Measure resistance between "G66-24" terminal and body ground. Is resistance infinity?	Go to step 3.	Repair short from "YEL/RED" wire circuit to ground.
3	1) Measure resistance between "G66-23" terminal and body ground. Is resistance infinity?	Substitute a known-good SDM and recheck.	Repair short from "YEL" wire circuit to ground.



[A] : Fig. for STEP 1, 2 and 3	1. Release tool
[B] : Fig. for STEP 2 and 3	2. SDM connector "G66"

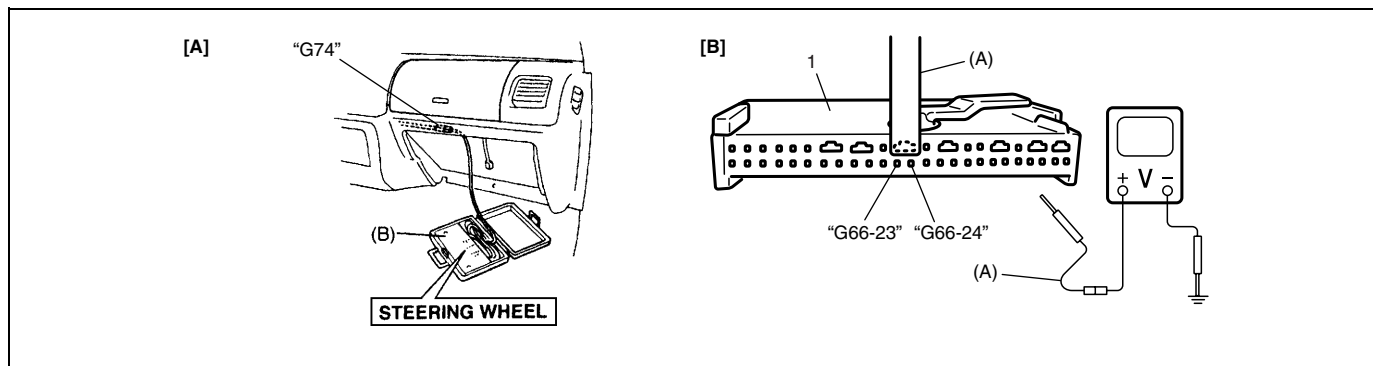
Special tool**(A) : 09932-76010****(B) : 09932-75010****NOTE:**

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1019 : Passenger Air Bag Initiator Circuit Short to Power Circuit

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector "G74" behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "G74" connector. 3) If OK, then connect Special Tool (B) to passenger air bag (inflator) module connector "G74" disconnected at the step 1). With ignition switch ON, is DTC B1019 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect Special Tool (B) from "G74" connector and SDM connector "G66" from SDM respectively. 2) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 3) Measure voltage from "G66-24" terminal to body ground. With ignition switch ON, is voltage 0 – 1 V?	Go to step 3.	Repair short from "YEL/RED" wire circuit to power circuit.
3	1) Measure voltage from "G66-23" terminal to body ground. With ignition switch ON, is voltage 0 – 1 V?	Substitute a known-good SDM and recheck.	Repair short from "YEL" wire circuit to power circuit.



[A] : Fig. for STEP 1, 2 and 3

1. SDM connector "G66"

[B] : Fig. for STEP 2 and 3

Special tool**(A) : 09932-76010****(B) : 09932-75010****NOTE:**

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

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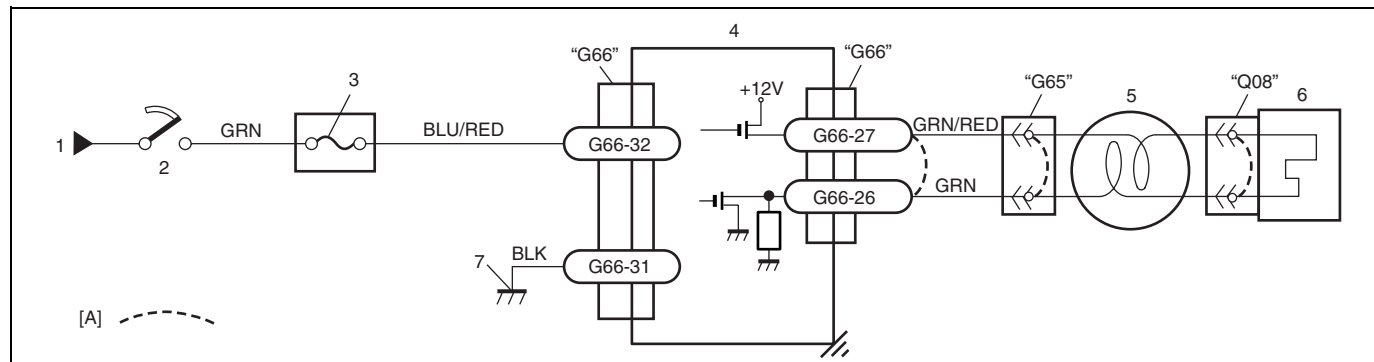
DTC B1021 – Driver Air Bag Initiator Circuit Resistance High

DTC B1022 – Driver Air Bag Initiator Circuit Resistance Low

DTC B1024 – Driver Air Bag Initiator Circuit Short to Ground

DTC B1025 – Driver Air Bag Initiator Circuit Short to Power Circuit

WIRING DIAGRAM



[A] : Shorting bar	3. "AIR BAG" fuse	6. Driver air bag (inflator) module
1. From main fuse	4. SDM	7. Ground for air bag system
2. Ignition switch	5. Contact coil assembly	

CAUTION:

Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.

- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to SPECIAL TOOL in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to INTERMITTENTS AND POOR CONNECTIONS in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN

DTC B1021 :

The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is above a specified value for specified time.

DTC B1022 :

The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is below a specified value for specified time.

DTC B1024 :

The voltage measured at driver air bag initiator circuit is below a specified value for specified time.

DTC B1025 :

The voltage measured at driver air bag initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

DTC B1021, B1022, B1024 or B1025 :

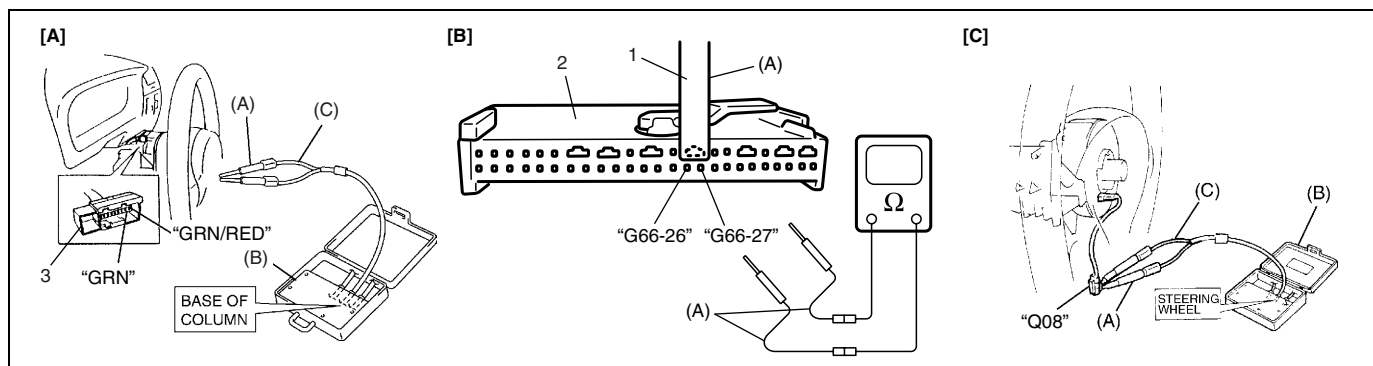
STEP 1 : Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.

STEP 2 : Check driver air bag (inflator) module initiator circuit in instrument panel harness.

STEP 3 : Check whether malfunction is in contact coil or driver air bag (inflator) module.

DIAGNOSTIC FLOW TABLE**DTC B1021 : Driver Air Bag Initiator Circuit Resistance High**

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect contact coil connector "G65" behind steering wheel. 2) Check proper connection to contact coil at terminals in "G65" connector. 3) If OK, then connect Special Tools (B) and (C) to contact coil connector "G65" disconnected at step 1). With ignition switch ON, is DTC B1021 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM connector "G66". 2) Check proper connection to SDM at terminals "G66-27" and "G66-26". 3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 4) Measure resistance between "G66-27" and "G66-26" terminals with connected Special Tools (B) and (C) to "G65" connector. Is resistance 5.1 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "GRN/RED" or "GRN" wire circuit.
3	1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G65" connector, then reconnect contact coil connector "G65" as it was. 2) Remove driver air bag (inflator) module from steering wheel (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C). 3) Check proper connection to driver air bag (inflator) module at terminals in "Q08" connector. 4) If OK, then connect Special Tools (B) and (C) to "Q08" connector. With ignition switch ON, is DTC B1021 current?	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3).



[A] : Fig. for STEP 1 and 2	1. Release tool
[B] : Fig. for STEP 2	2. SDM connector "G66"
[C] : Fig. for STEP 3	3. Contact coil connector "G65"

Special tool**(A) : 09932-76010****(B) : 09932-75010****(C) : 09932-78310**

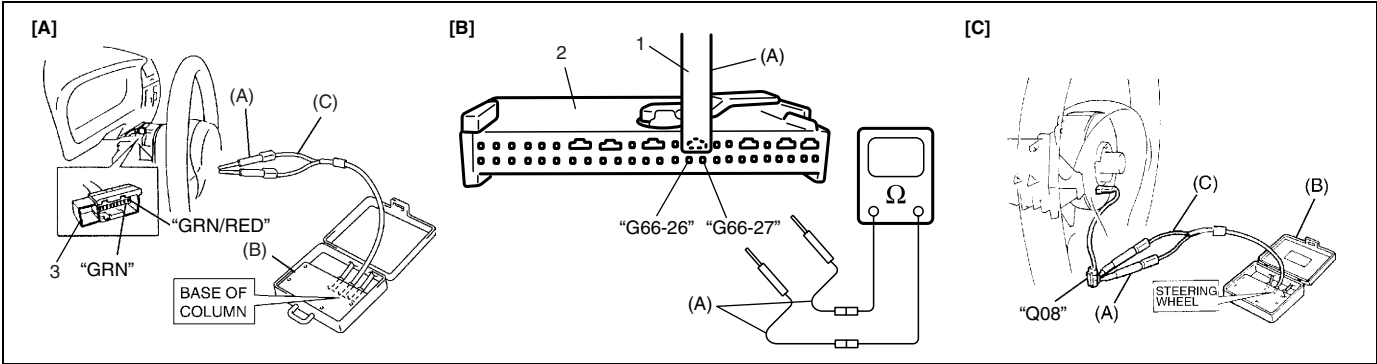
NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1022 : Driver Air Bag Initiator Circuit Resistance Low

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect contact coil connector "G65" behind steering wheel. 2) Check proper connection to contact coil at terminals in "G65" connector. 3) If OK, then connect Special Tools (B) and (C) to contact coil connector "G65" disconnected at step 1). With ignition switch ON, is DTC B1022 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM connector "G66". 2) Check proper connection to SDM at terminals "G66-27" and "G66-26". 3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 4) Measure resistance between "G66-27" and "G66-26" terminals with connected Special Tools (B) and (C) to "G65" connector. Is resistance 1.8 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from "GRN/RED" wire circuit to "GRN" wire circuit or from "GRN/RED" or "GRN" wire circuit to other wire circuit.
3	1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G65" connector, then reconnect contact coil connector "G65" as it was. 2) Remove driver air bag (inflator) module from steering wheel (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C). 3) Check proper connection to driver air bag (inflator) module at terminals in "Q08" connector. 4) If OK, then connect Special Tools (B) and (C) to "Q08" connector. With ignition switch ON, is DTC B1022 current?	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3).



[A] : Fig. for STEP 1 and 2	1. Release tool
[B] : Fig. for STEP 2	2. SDM connector "G66"
[C] : Fig. for STEP 3	3. Contact coil connector "G65"

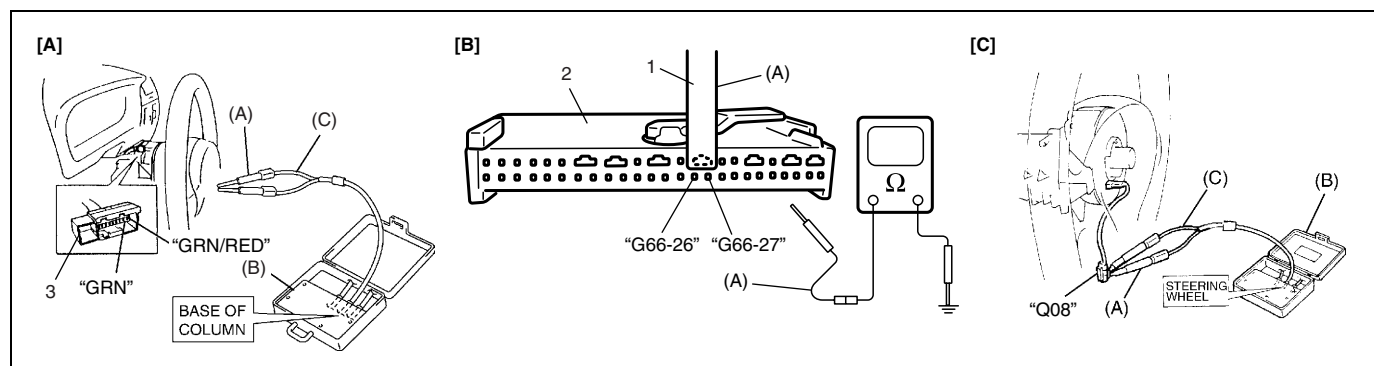
Special tool
(A) : 09932-76010
(B) : 09932-75010
(C) : 09932-78310

- NOTE:**
- Upon completion of inspection and repair work, perform the following items.
- Reconnect all air bag system components, ensure all components are properly mounted.
 - Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1024 : Driver Air Bag Initiator Circuit Short to Ground

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect contact coil connector "G65" behind steering wheel. 2) Check proper connection to contact coil at terminals in "G65" connector. 3) If OK, then connect Special Tool (B) and (C) to contact coil connector "G65" disconnected at step 1). With ignition switch ON, is DTC B1024 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G65" connector. 2) Disconnect SDM connector "G66" from SDM. 3) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 4) Measure resistance between "G66-27" terminal and body ground and between "G66-26" terminal and body ground. Are they infinity?	Substitute a known-good SDM and recheck.	Repair short from "GRN/RED" or "GRN" wire circuit to ground.

Step	Action	Yes	No
3	1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G65" connector, then reconnect contact coil connector "G65" as it was. 2) Remove driver air bag (inflator) module from steering wheel (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C). 3) Check proper connection to driver air bag (inflator) module at terminals in "Q08" connector. 4) If OK, then connect Special Tools (B) and (C) to "Q08" connector. With ignition switch ON, is DTC B1024 current?	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3).



[A] : Fig. for STEP 1 and 2	1. Release tool
[B] : Fig. for STEP 2	2. SDM connector "G66"
[C] : Fig. for STEP 3	3. Contact coil connector "G65"

Special tool**(A) : 09932-76010****(B) : 09932-75010****(C) : 09932-78310****NOTE:**

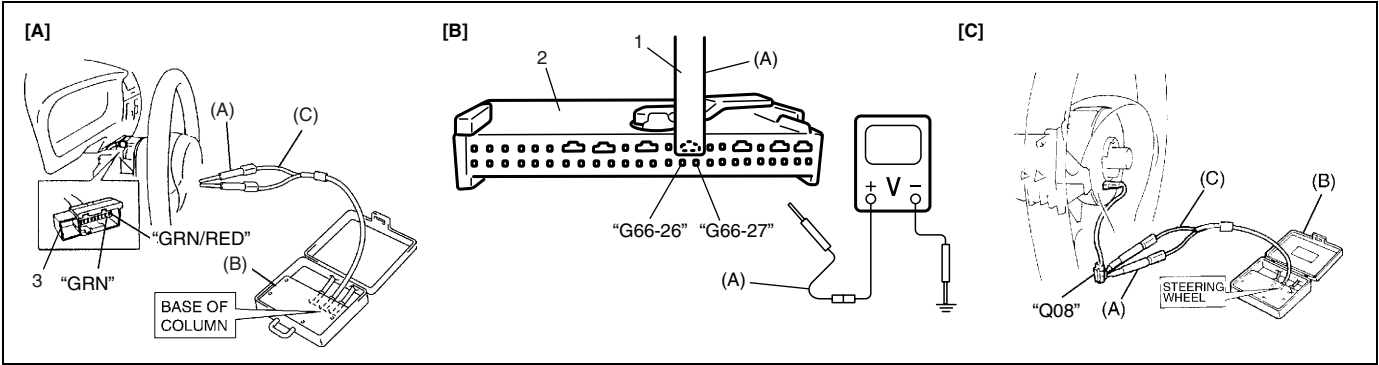
Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1025 : Driver Air Bag Initiator Circuit Short to Power Circuit

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect contact coil connector "G65" behind steering wheel. 2) Check proper connection to contact coil at terminals in "G65" connector. 3) If OK, then connect Special Tools (B) and (C) to contact coil connector "G65" disconnected at step 1). With ignition switch ON, is DTC B1025 current?	Go to step 2.	Go to step 3.

Step	Action	Yes	No
2	<p>1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G65" connector.</p> <p>2) Disconnect SDM connector "G66" from SDM.</p> <p>3) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A).</p> <p>4) Measure voltage from "G66-27" terminal to body ground and from "G66-26" terminal to body ground.</p> <p>With ignition switch ON, are they 0 – 1V?</p>	Substitute a known-good SDM and recheck.	Repair short from "GRN/RED" or "GRN" wire circuit to power circuit.
3	<p>1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G65" connector, then reconnect contact coil connector "G65" as it was.</p> <p>2) Remove driver air bag (inflator) module from steering wheel (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C).</p> <p>3) Check proper connection to driver air bag (inflator) module at terminals in "Q08" connector.</p> <p>4) If OK, then connect Special Tools (B) and (C) to "Q08" connector.</p> <p>With ignition switch ON, is DTC B1025 current?</p>	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/ CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3).

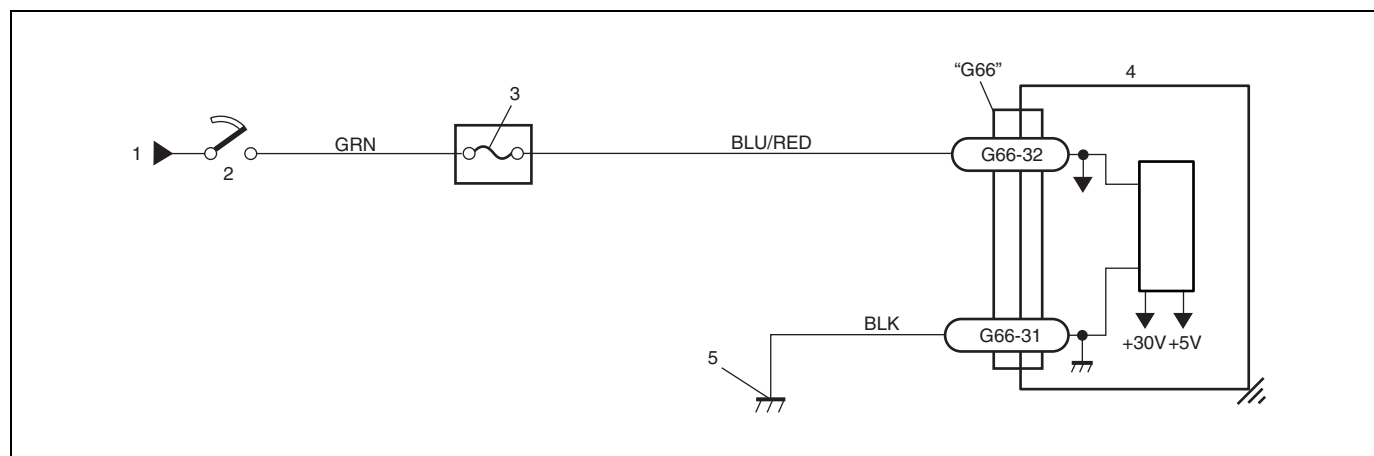


[A] : Fig. for STEP 1 and 2	1. Release tool
[B] : Fig. for STEP 2	2. SDM connector "G66"
[C] : Fig. for STEP 3	3. Contact coil connector "G65"

Special tool
(A) : 09932-76010
(B) : 09932-75010
(C) : 09932-78310

NOTE:

- Upon completion of inspection and repair work, perform the following items.
- Reconnect all air bag system components, ensure all components are properly mounted.
 - Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1031 – Power Source Voltage High**DTC B1032 – Power Source Voltage Low****WIRING DIAGRAM**

1. From main fuse	3. "AIR BAG" fuse	5. Ground for air bag system
2. Ignition switch	4. SDM	

CAUTION:

- Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to SPECIAL TOOL in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to INTERMITTENTS AND POOR CONNECTIONS in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN**DTC B1031 :**

The power source voltage to SDM is above specified value for specified time.

DTC B1032 :

The power source voltage is below an approx. 8V for specified time.

TABLE TEST DESCRIPTION**DTC B1031 :**

STEP 1 : Check if voltage applied to SDM is within normal range.

STEP 2 : Check if DTC B1031 still exists.

DTC B1032 :

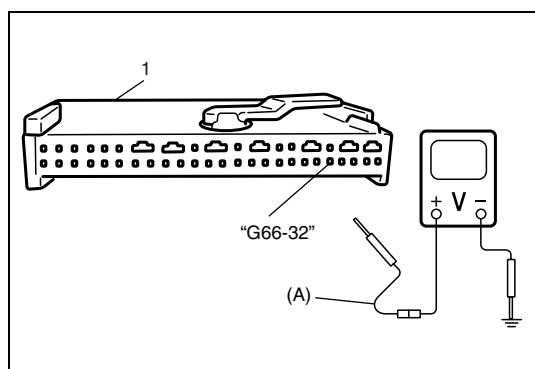
STEP 1 : Check if voltage on battery is within normal range.

STEP 2 : Check if voltage applied to SDM is within normal range.

STEP 3 : Check if DTC B1032 still exists.

DIAGNOSTIC FLOW TABLE**DTC B1031 : Power Source Voltage High**

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect SDM connector "G66" 2) Check proper connection to SDM at "G66-32" terminal. 3) If OK, then ignition switch ON, and then check voltage from "G66-32" terminal in SDM connector "G66" to body ground. Is voltage 14 V or less?	Go to step 2.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H.)
2	1) With ignition switch OFF, disconnect SDM connector "G66". With ignition switch ON, is DTC B1031 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H.)



1. SDM connector "G66"

Special tool**(A) : 09932-76010****NOTE:**

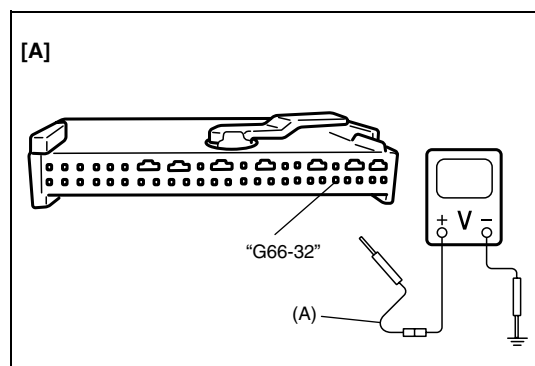
Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1032 : Power Source Voltage Low

Step	Action	Yes	No
1	1) Measure voltage on battery. Is voltage 11 V or more?	Go to Step 2.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H.)

2	1) With ignition switch OFF, disconnect SDM connector "G66". 2) Check proper connection to SDM at "G66-32" terminal. 3) If OK, then ignition switch ON, and then check voltage from "G66-32" terminal in SDM connector to body ground. Is voltage 8 V or more?	Go to Step 3.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H.)
3	1) With ignition switch OFF, reconnect SDM connector "G66". With ignition switch ON, is DTC B1032 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H.)



[A] : Fig. for STEP 2

1. SDM connector "G66"

Special tool

(A) : 09932-76010

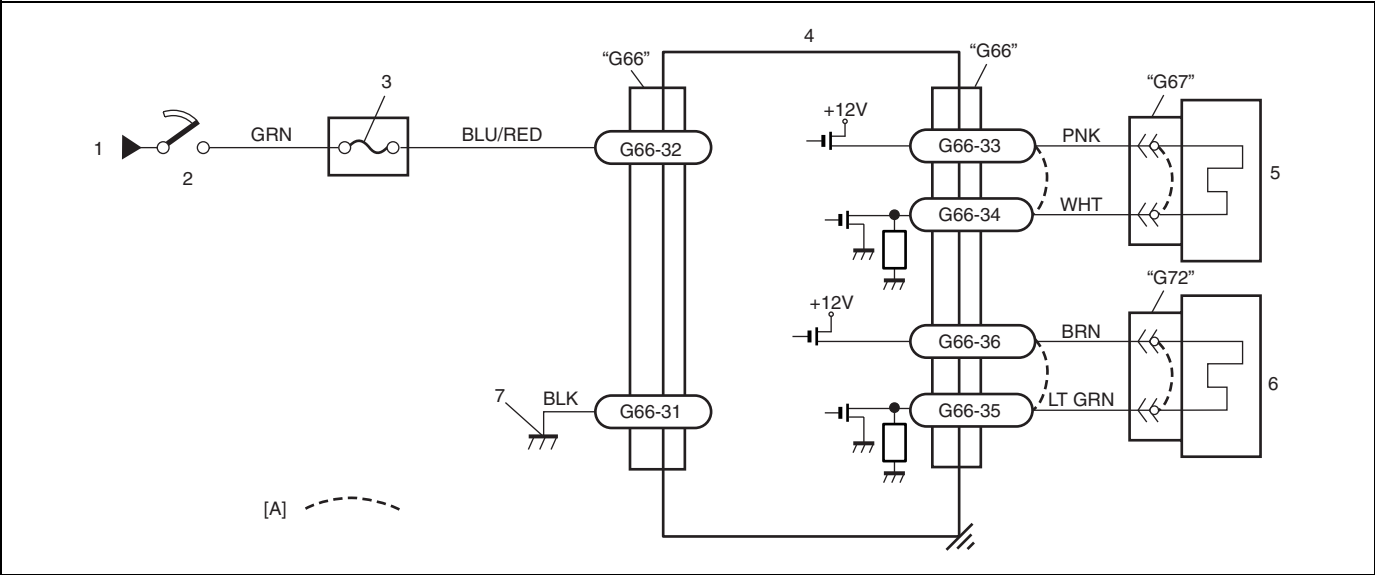
NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

- DTC B1041 – Driver Pretensioner Initiator Circuit Resistance High
- DTC B1042 – Driver Pretensioner Initiator Circuit Resistance Low
- DTC B1043 – Driver Pretensioner Initiator Circuit Short to Ground
- DTC B1044 – Driver Pretensioner Initiator Circuit Short to Power Circuit
- DTC B1045 – Passenger Pretensioner Initiator Circuit Resistance High
- DTC B1046 – Passenger Pretensioner Initiator Circuit Resistance Low
- DTC B1047 – Passenger Pretensioner Initiator Circuit Short to Ground
- DTC B1048 – Passenger Pretensioner Initiator Circuit Short to Power Circuit

WIRING DIAGRAM



[A] : Shorting bar	3. "AIR BAG" fuse	6. Passenger seat belt pretensioner
1. From main fuse	4. SDM	7. Ground for air bag system
2. Ignition switch	5. Driver seat belt pretensioner	

CAUTION:

- Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to SPECIAL TOOL in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to INTERMITTENTS AND POOR CONNECTIONS in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN**DTC B1041 or B1045 :**

The resistance of driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

DTC B1042 or B1046 :

The resistance of driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

DTC B1043 or B1047 :

The voltage measured at driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

DTC B1044 or B1048 :

The voltage measured at driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION**DTC B1041, B1042, B1043, B1044, B1045, B1046, B1047 or B1048 :**

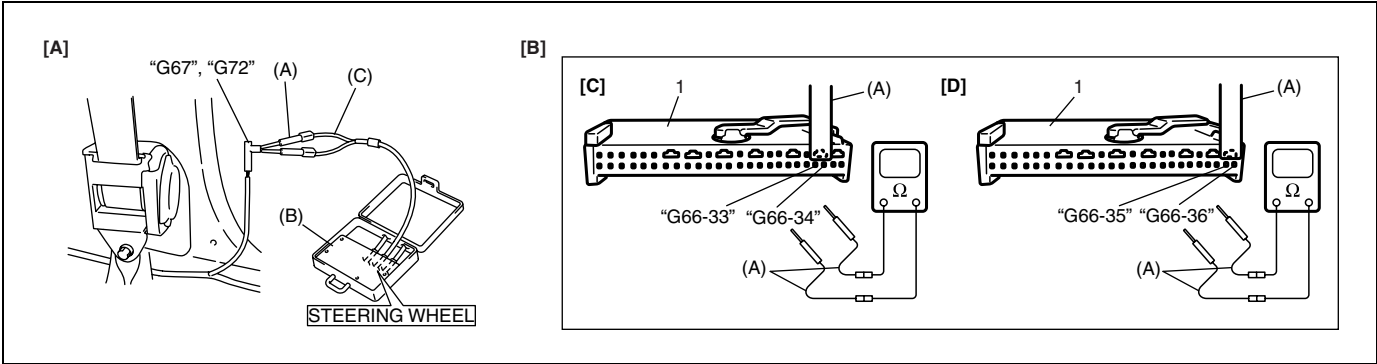
STEP 1 : Check whether malfunction is in seat belt pretensioner.

STEP 2 : Check seat belt pretensioner initiator circuit in instrument panel harness.

DIAGNOSTIC FLOW TABLE**DTC B1041 : Driver Pretensioner Initiator Circuit Resistance High****DTC B1045 : Passenger Pretensioner Initiator Circuit Resistance High**

Step	Action	Yes	No
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector "G67" or "G72". 2) Check proper connection to applicable seat belt pretensioner at terminals in "G67" or "G72" connector. 3) If OK, then connect Special Tools (A), (B) and (C) to seat belt pretensioner connector disconnected at the step 1). With ignition switch ON, is DTC B1041 or B1045 still current?	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Front Seat Belt in Section 10).

Step	Action	Yes	No
2	<div>1) With ignition switch OFF, disconnect SDM connector "G66".</div> <div>2) Check proper connection to SDM at terminals "G66-33" and "G66-34" or "G66-36" and "G66-35".</div> <div>3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A).</div> <div>4) Measure resistance with connected Special Tools (A), (B) and (C) to applicable seat belt pretensioner in "G67" or "G72" connector.</div> <div><div>• DTC B1041 : between "G66-33" and "G66-34" terminals.</div><div>• DTC B1045 : between "G66-36" and "G66-35" terminals.</div></div> <div>Is resistance 4.1 Ω or less?</div>	Substitute a known-good SDM and recheck.	<div>DTC B1041 : Repair high resistance or open in "PNK" or "WHT" wire circuit.</div> <div>DTC B1045 : Repair high resistance or open in "BRN" or "LT GRN" wire circuit.</div>



[A] : Fig. for STEP 1 and 2
[B] : Fig. for STEP 2
[C] : For DTC B1041
[D] : For DTC B1045
1. SDM connector "G66"

Special tool

- (A) : 09932-76010
- (B) : 09932-75010
- (C) : 09932-78310

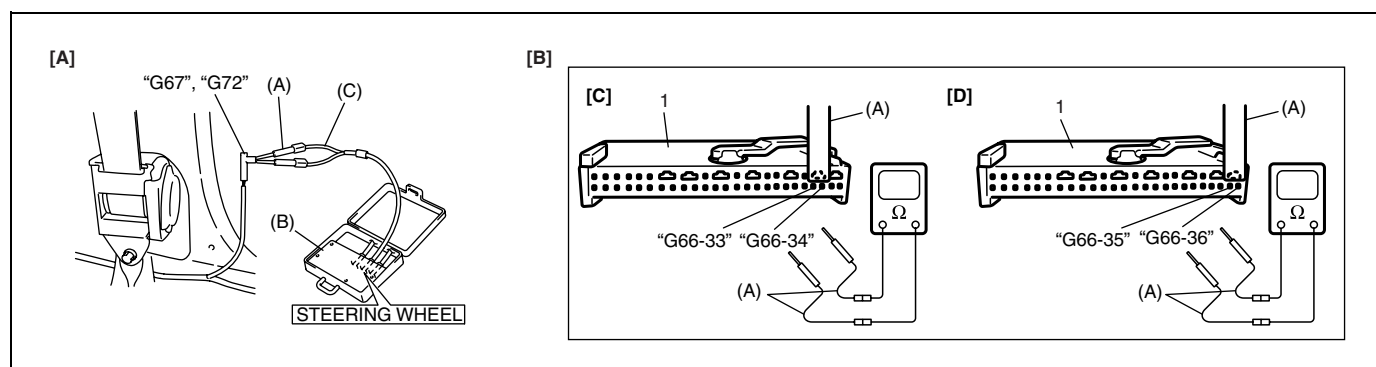
NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1042 : Driver Pretensioner Initiator Circuit Resistance Low**DTC B1046 : Passenger Pretensioner Initiator Circuit Resistance Low**

Step	Action	Yes	No
1	<p>1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector "G67" or "G72".</p> <p>2) Check proper connection to applicable seat belt pretensioner at terminals in "G67" or "G72" connector.</p> <p>3) If OK, then connect Special Tools (A), (B) and (C) to seat belt pretensioner connector disconnected at the step 1).</p> <p>With ignition switch ON, is DTC B1042 or B1046 still current?</p>	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Front Seat Belt in Section 10).
2	<p>1) With ignition switch OFF, disconnect SDM connector "G66".</p> <p>2) Check proper connection to SDM at terminals "G66-33" and "G66-34" or "G66-36" and "G66-35".</p> <p>3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A).</p> <p>4) Measure resistance with connected Special Tools (A), (B) and (C) to applicable seat belt Pretensioner at terminal in "G67" or "G72" connector.</p> <ul style="list-style-type: none"> • DTC B1042 : between "G66-33" and "G66-34" terminals. • DTC B1046 : between "G66-36" and "G66-35" terminals. <p>Is resistance 1.3 Ω or more?</p>	Substitute a known-good SDM and recheck.	<p>DTC B1042 : Repair short from "PNK" wire circuit to "WHT" wire circuit, or from "PNK" or "WHT" wire circuit to other wire circuit.</p> <p>DTC B1046 : Repair short from "BRN" wire circuit to "LT GRN" wire circuit, or from "BRN" or "LT GRN" wire circuit to other wire circuit.</p>



[A] : Fig. for STEP 1 and 2

[B] : Fig. for STEP 2

[C] : For DTC B1042

[D] : For DTC B1046

1. SDM connector "G66"

Special tool

(A) : 09932-76010

(B) : 09932-75010

(C) : 09932-78310

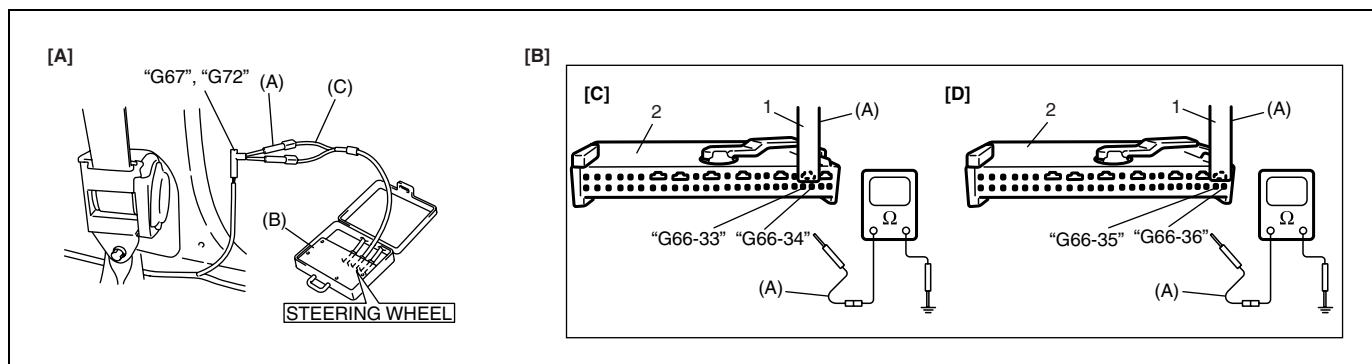
NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1043 : Driver Pretensioner Initiator Circuit Short to Ground**DTC B1047 : Passenger Pretensioner Initiator Circuit Short to Ground**

Step	Action	Yes	No
1	1) With ignition switch OFF, remove center pillar lower garnish of applicable side then disconnect seat belt pretensioner connector "G67" or "G72". 2) Check proper connection to applicable seat belt pretensioner at terminals in "G67" or "G72" connector. 3) If OK, then connect Special Tools (A), (B) and (C) to seat belt pretensioner connector disconnected at the step 1. With ignition switch ON, is DTC B1043 or B1047 still current?	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Front Seat Belt in Section 10).
2	1) With ignition switch OFF, disconnect Special Tools (A), (B) and (C) from "G67" or "G72" connector and SDM connector "G66" from SDM respectively. 2) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 3) Measure resistance. <ul style="list-style-type: none"> • DTC B1043 : between "G66-33" terminal and body ground, and between "G66-34" terminal and body ground. • DTC B1047 : between "G66-36" terminal and body ground, and between "G66-35" terminal and body ground. Is resistance infinity?	Substitute a known-good SDM and recheck.	DTC B1043 : Repair short "PNK" or "WHT" wire circuit to ground. DTC B1047 : Repair short from "BRN" or "LT GRN" wire circuit to ground.

**Special tool****(A) : 09932-76010****(B) : 09932-75010****(C) : 09932-78310****NOTE:**

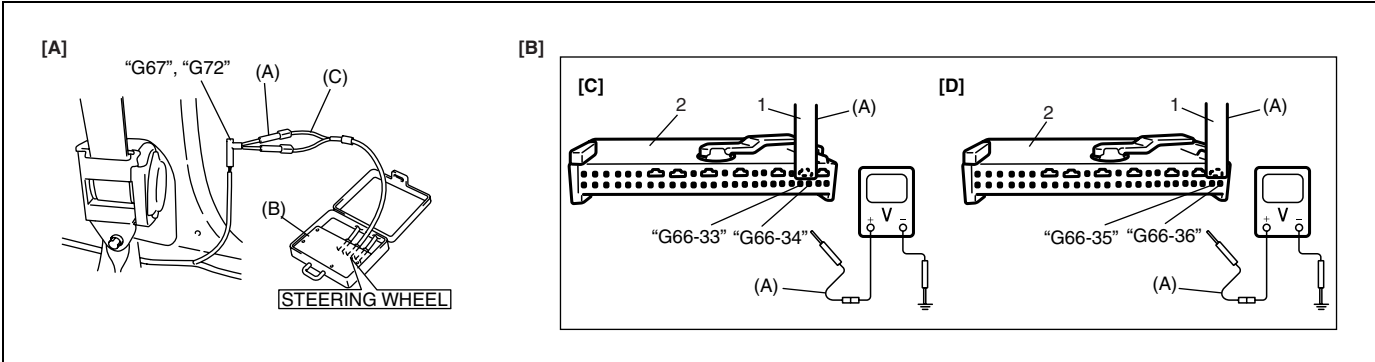
Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1044 : Driver Pretensioner Initiator Circuit Short to Power Circuit**DTC B1048 : Passenger Pretensioner Initiator Circuit Short to Power Circuit**

Step	Action	Yes	No
1	<p>1) With ignition switch OFF, remove center pillar lower garnish of applicable side then disconnect seat belt pretensioner connector "G67" or "G72".</p> <p>2) Check proper connection to applicable seat belt pretensioner at terminals in "G67" or "G72" connector.</p> <p>3) If OK, then connect Special Tools (A), (B) and (C) to seat belt pretensioner connector disconnected at the step 1).</p> <p>With ignition switch ON, is DTC B1044 or B1048 still current?</p>	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Front Seat Belt in Section 10).

Step	Action	Yes	No
2	<div>1) With ignition switch OFF, disconnect Special Tools (A) and (B) and (C) from “G67” or “G72” connector.</div> <div>2) Disconnect SDM connector “G66” from SDM respectively.</div> <div>3) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A).</div> <div>4) Measure voltage.<ul style="list-style-type: none">• DTC B1044 : between “G66-33” terminal and body ground, and between “G66-34” terminal and body ground.• DTC B1048 : between “G66-36” terminal and body ground, and between “G66-35” terminal and body ground.</div> <div>With ignition switch ON, is voltage 0 – 1 V?</div>	Substitute a known-good SDM and recheck.	<div>DTC B1044 : Repair short “PNK” or “WHT” wire circuit to power circuit.</div> <div>DTC B1048 : Repair short from “BRN” or “LT GRN” wire circuit to power circuit.</div>



[A] : Fig. for STEP 1 and 2
[B] : Fig. for STEP 2
[C] : For DTC B1044
[D] : For DTC B1048
1. Release tool
2. SDM connector “G66”

Special tool
(A) : 09932-76010
(B) : 09932-75010
(C) : 09932-78310

NOTE:

- Upon completion of inspection and repair work, perform the following items.
- Reconnect all air bag system components, ensure all components are properly mounted.
 - Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1051 – Frontal Crash Detected (System Activation Command Outputted)

CAUTION:

Be sure to perform Air Bag Diagnostic System Check before starting diagnosis according to flow table.

DTC WILL SET WHEN

The SDM detects a frontal crash of sufficient force to warrant activation of the air bag system. (SDM outputs a deployment command.)

TABLE TEST DESCRIPTION

STEP 1 : Check that DTC B1051 has been set although air bag has not been deployed.

STEP 2 : Check that DTC has been set due to failure of SDM.

DIAGNOSTIC FLOW TABLE

Step	Action	Yes	No
1	1) Ignition switch OFF. Has driver air bag (inflator) module deployed?	Replace components and perform inspections as directed in "REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT" in this section.	Go to step 2.
2	1) Inspect front of vehicle and undercarriage for signs of impact. Are there signs of impact?	Replace components and perform inspections as directed in "REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT" in this section.	Substitute a known-good SDM and recheck.

NOTE:

- DTC B1051 can never be cleared once it has been set.
- Upon completion of inspection and repair work, perform the following items.
 - Reconnect all air bag system components, ensure all components are properly mounted.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1056 – Sideward Crash (Driver Side) Detected (Side Air Bag System Activation Command Outputted)**DTC B1057 – Sideward Crash (Passenger Side) Detected (Side Air Bag System Activation Command Outputted)****CAUTION:**

Before starting diagnosis according to flow table, Air Bag Diagnostic System Check.

DTC WILL SET WHEN**DTC B1056 or B1057 :**

The SDM detects a sideward crash (driver or passenger side) of sufficient force to warrant activation of the side air bag system (driver or passenger side). (SDM outputs a deployment command.)

TABLE TEST DESCRIPTION**DTC B1056 or B1057 :**

STEP 1 : Check that DTC B1056 or B1057 has been set although side air bag (driver or passenger side) has not been deployed.

STEP 2 : Check that DTC has been set due to failure of SDM.

DIAGNOSTIC FLOW TABLE

DTC B1056 : Sideward Crash (Driver Side) Detected (Side Air Bag System Activation Command Outputted)

DTC B1057 : Sideward Crash (Passenger Side) Detected (Side Air Bag System Activation Command Outputted)

Step	Action	Yes	No
1	1) Ignition switch OFF. Has side air bag (inflator) module deployed?	Replace components and perform inspections as directed in "REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT" in this section.	Go to step 2.
2	1) Inspect sideward of vehicle and undercarriage for signs of impact. Are there signs of impact?	Replace components and perform inspections as directed in "REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT" in this section.	Substitute a known-good SDM and recheck.

NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE.), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1058 – Frontal Crash Detected (Pretensioner Activation Command Outputted)

CAUTION:

Be sure to perform Air Bag Diagnostic System Check before starting diagnosis according to flow table.

DTC WILL SET WHEN

The SDM detects a frontal crash of sufficient force to warrant activation of pretensioner. (SDM outputs a activation command.)

TABLE TEST DESCRIPTION

STEP 1 : Check that DTC B1058 has been set although pretensioner has not been activated.

STEP 2 : Check that DTC has been set due to failure of SDM.

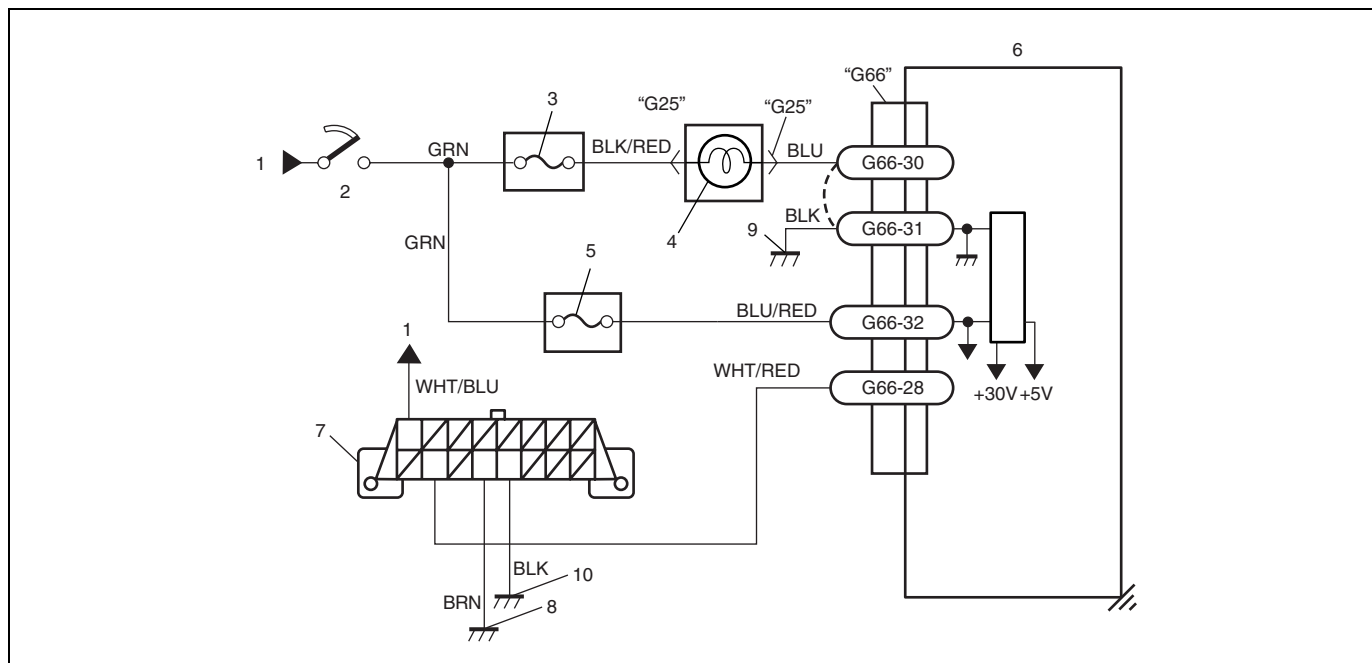
DIAGNOSTIC FLOW TABLE

Step	Action	Yes	No
1	1) Ignition switch OFF. Has air bag (inflator) module deployed?	Replace components and perform inspections as directed in "REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT" in this section.	Go to step 2.
2	1) Inspect front of vehicle and undercarriage for signs of impact. Are there signs of impact?	Replace components and perform inspections as directed in "REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT" in this section.	Substitute a known-good SDM and recheck.

NOTE:

- DTC B1058 can never be cleared once it has been set.
- Upon completion of inspection and repair work, perform the following items.
 - Reconnect all air bag system components, ensure all components are properly mounted.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

WIRING DIAGRAM



1. From main fuse	5. "AIR BAG" fuse	9. Ground for air bag system
2. Ignition switch	6. SDM	10. Ground on body
3. "METER" fuse	7. To DLC	
4. "AIR BAG" warning lamp in combination meter	8. Ground on engine block	

- Be sure to perform **AIR BAG DIAGNOSTIC SYSTEM CHECK** before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to **SPECIAL TOOL** in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to **INTERMITTENTS AND POOR CONNECTIONS** in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

The voltage at the “AIR BAG” warning lamp circuit terminal “G66-30” does not match the commanded state of the warning lamp driver for specified time.

STEP 1 : This test rechecks “AIR BAG” warning lamp operation.
STEP 2 : This test rechecks whether an abnormality is in SDM.

DIAGNOSTIC FLOW TABLE

Step	Action	Yes	No
1	1) This DTC is set when there is a trouble in "AIR BAG" warning lamp circuit. Check "AIR BAG" warning lamp circuit referring to AIR BAG DIAGNOSTIC SYSTEM CHECK in this section. Is "AIR BAG" warning lamp circuit in good condition?	Go to step 2.	Repair "AIR BAG" warning lamp circuit.
2	1) Clear DTC (Refer to DTC CLEARANCE in this section.) 2) Check DTC (Refer to DTC CHECK in this section.) Is DTC B1061 set?	Substitute a known-good SDM and recheck.	Recheck air bag system. Refer to AIR BAG DIAGNOSTIC SYSTEM CHECK in this section.

NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

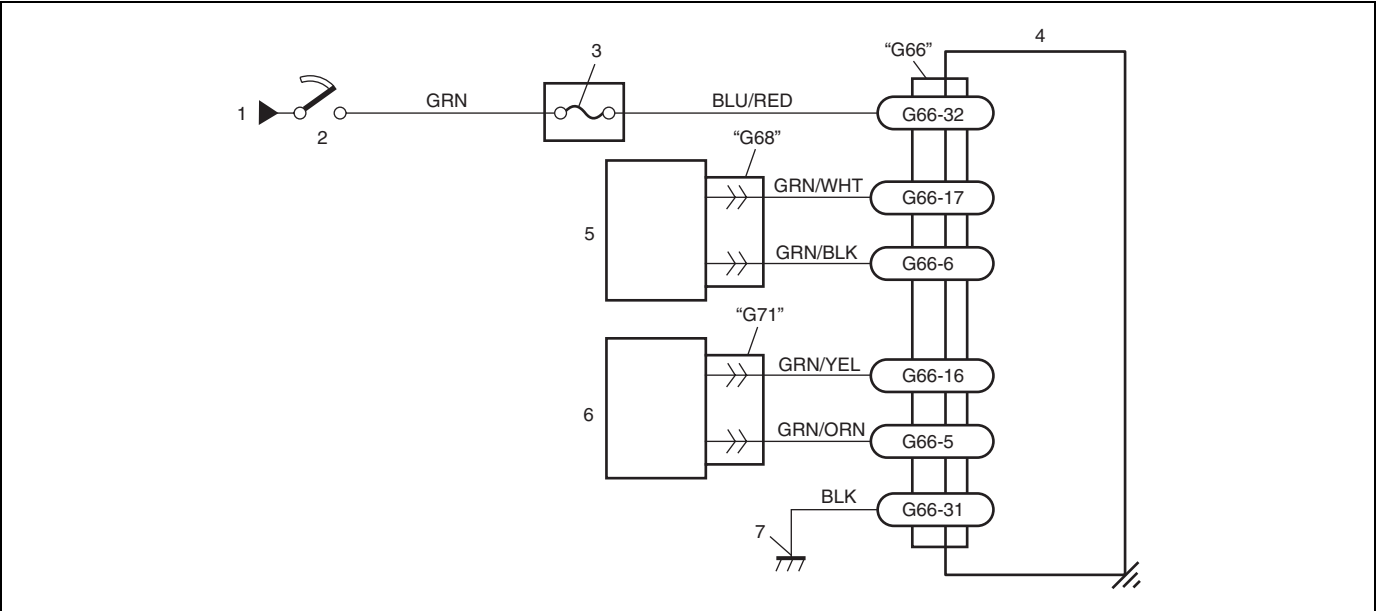
DTC B1063 – Side Sensor (Driver Side) Circuit Short to Ground

DTC B1064 – Side Sensor (Driver Side) Circuit Short to Power Circuit Or Open

DTC B1065 – Side Sensor (Passenger Side) Circuit Short to Ground

DTC B1066 – Side Sensor (Passenger Side) Circuit Short to Power Circuit or Open

WIRING DIAGRAM



1. From main fuse	4. SDM	7. Ground for air bag system
2. Ignition switch	5. Side sensor (driver side)	
3. "AIR BAG" fuse	6. Side sensor (passenger side)	

CAUTION:

- Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to SPECIAL TOOL in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to INTERMITTENTS AND POOR CONNECTIONS in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN

DTC B1063 or B1065 :

The voltage measured at side sensor (driver or passenger side) circuit is below a specified value for specified time.

DTC B1064 or B1066 :

The voltage measured at side sensor (driver or passenger side) circuit is above a specified value for specified time.

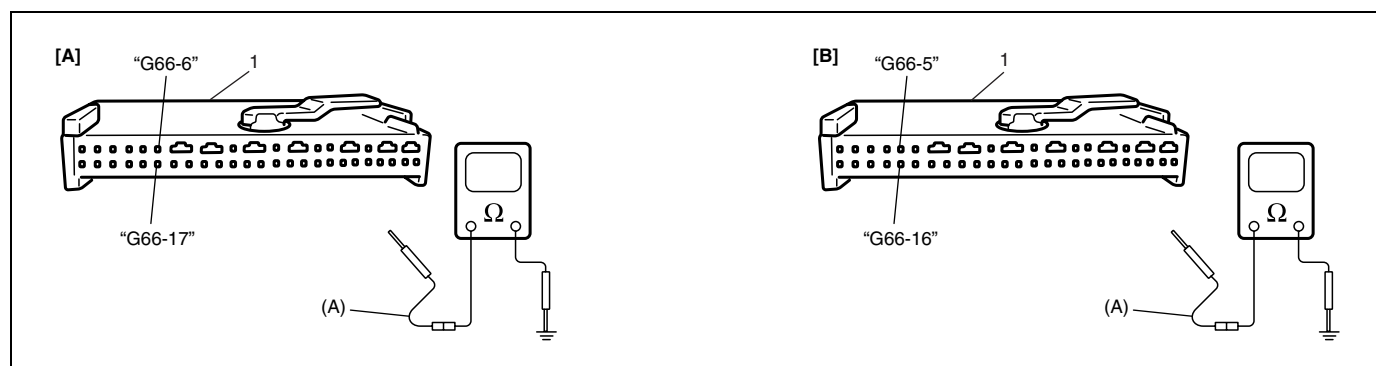
TABLE TEST DESCRIPTION**DTC B1063, B1064, B1065 or B1066 :**

STEP 1 : Check side sensor (driver or passenger side) circuit in floor harness.

STEP 2 : Check side sensor (driver or passenger side) circuit in floor harness. (for DTC B1064 and B1066 only)

DIAGNOSTIC FLOW TABLE**DTC B1063 : Side Sensor (Driver Side) Circuit Short to Ground****DTC B1065 : Side Sensor (Passenger Side) Circuit Short to Ground**

Step	Action	Yes	No
1	1) With ignition switch OFF, remove center pillar lower trim and side sill scuff, then disconnect side sensor connector "G68" or "G71". 2) Disconnect SDM connector "G66". 3) Check proper connection to applicable side sensor at terminals in "G68" or "G71" connector. 4) If OK, measure resistance with connected special tool (A). <ul style="list-style-type: none"> • DTC B1063: between "G66-17" terminal and body ground, and between "G66-6" terminal and body ground. • DTC B1065: between "G66-16" terminal and body ground, and between "G66-5" terminal and body ground. Is resistance infinity?	Substitute a known-good side sensor and/or SDM and recheck.	DTC B1063 : Repair short "GRN/WHT" or "GRN/BLK" wire circuit to ground. DTC B1065 : Repair short "GRN/YEL" or "GRN/ORN" wire circuit to ground.



[A] : Fig. for STEP 1 (DTC B1063)

[B] : Fig. for STEP 1 (DTC B1065)

1. SDM connector "G66"

Special tool

(A) : 09932-76010

NOTE:

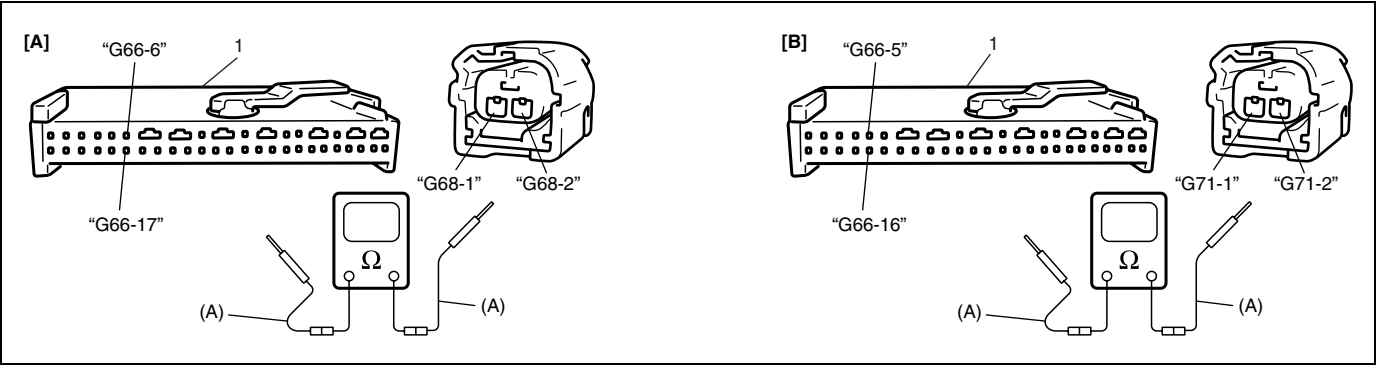
Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble code (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1064 : Side Sensor (Driver Side) Circuit Short to Power Circuit or Open

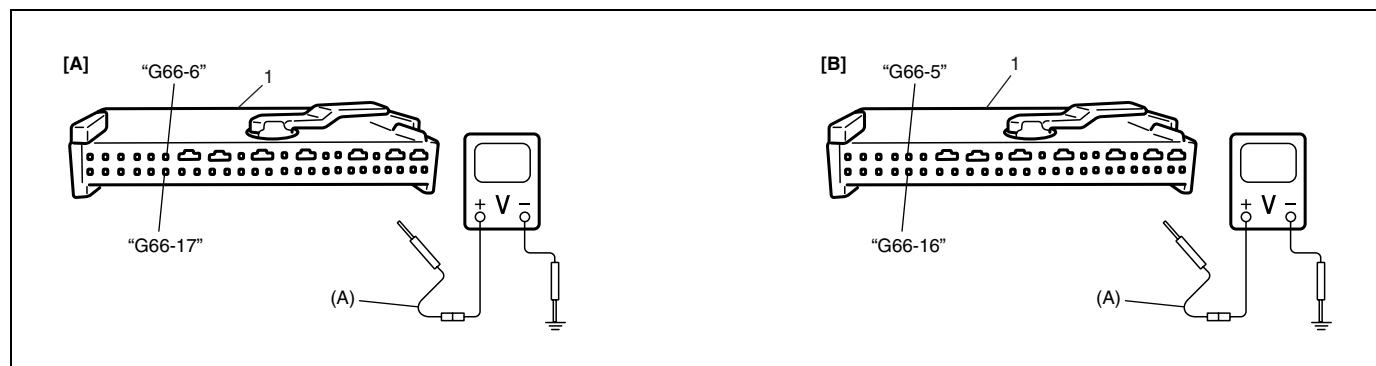
DTC B1066 : Side Sensor (Passenger Side) Circuit Short to Power Circuit or Open

Step	Action	Yes	No
1	<p>1) With ignition switch OFF, remove center pillar lower trim and side sill scuff, then disconnect side sensor connector "G68" or "G71".</p> <p>2) Disconnect SDM connector "G66".</p> <p>3) Check proper connection to applicable side sensor at terminals in "G68" or "G71" connector.</p> <p>4) If OK, measure resistance with connected special tool (A).</p> <ul style="list-style-type: none">• DTC B1064: between "G68-1" and "G66-17" terminals, and between "G68-2" and "G66-6" terminals.• DTC B1066: between "G71-1" and "G66-16" terminals, and between "G71-2" and "G66-5" terminals. <p>Is resistance 0 – 1 Ω?</p>	Got to Step 2.	<p>DTC B1064</p> <p>Repair open in "GRN/WHT" or "GRN/BLK" wire circuit.</p> <p>DTC B1066</p> <p>Repair open in "GRN/YEL" or "GRN/ORN" wire circuit.</p>
2	<p>1) Measure voltage with connected special tool (A).</p> <ul style="list-style-type: none">• DTC B1064: between "G66-17" terminal and body ground, and between "G66-6" terminal and body ground.• DTC B1066: between "G66-16" terminal and body ground, and between "G66-5" terminal and body ground. <p>With ignition switch ON, is voltage 0 – 1 V?</p>	Substitute a known-good side sensor and/or SDM and recheck.	<p>DTC B1064 :</p> <p>Repair short "GRN/WHT" or "GRN/BLK" wire circuit to power circuit.</p> <p>DTC B1066 :</p> <p>Repair short "GRN/YEL" or "GRN/ORN" wire circuit to power circuit.</p>



[A] : Fig. for STEP 1 (DTC B1064)
[B] : Fig. for STEP 1 (DTC B1066)
1. SDM connector "G66"

Special tool
(A) : 09932-76010



[A] : Fig. for STEP 2 (DTC B1064)

[B] : Fig. for STEP 2 (DTC B1066)

1. SDM connector "G66"

Special tool

(A) : 09932-76010

NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble code (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1071 – Internal SDM Fault**CAUTION:**

Be sure to perform Air Bag Diagnostic System Check before starting diagnosis according to flow table.

DTC WILL SET WHEN

An internal SDM fault is detected by SDM.

NOTE:

DTC B1071 can never be cleared once it has been set.

- 1) Ignition switch OFF.
- 2) Replace SDM.
- 3) Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK.

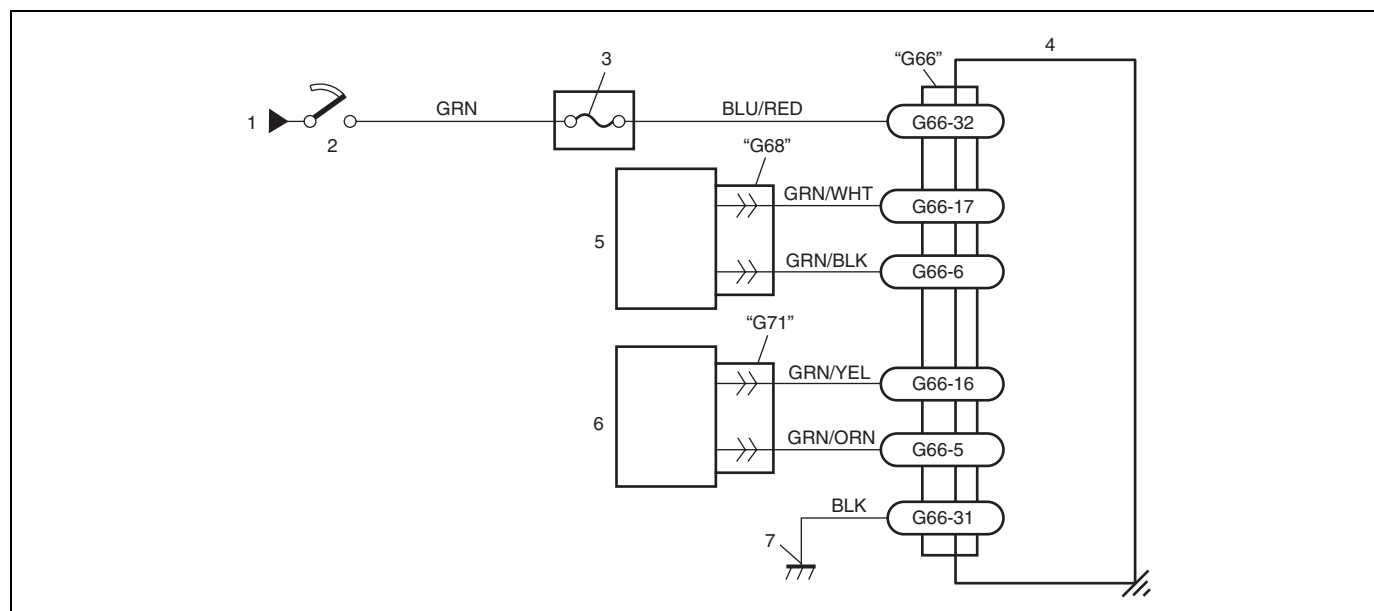
DTC B1072 – Internal Side Sensor (Driver Side) Fault**DTC B1074 – Internal Side Sensor (Passenger Side) Fault****CAUTION:**

Be sure to perform Air Bag Diagnostic System Check before starting diagnosis according to flow table.

DTC WILL SET WHEN**DTC B1072 or B1074 :**

SDM receive internal fault signal from side sensor.

- 1) Ignition switch OFF.
- 2) Replace side sensor.
- 3) Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK.

DTC B1073 – Side Sensor (Driver Side) Correspondence Abnormality**DTC B1075 – Side Sensor (Passenger Side) Correspondence Abnormality****WIRING DIAGRAM**

1. From main fuse	4. SDM	7. Ground for air bag system
2. Ignition switch	5. Side sensor (driver side)	
3. "AIR BAG" fuse	6. Side sensor (passenger side)	

CAUTION:

- Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to SPECIAL TOOL in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to INTERMITTENTS AND POOR CONNECTIONS in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN**DTC B1073 or B1075 :**

Side sensor abnormal signal is detected by SDM.

TABLE TEST DESCRIPTION**DTC B1073 or B1075 :**

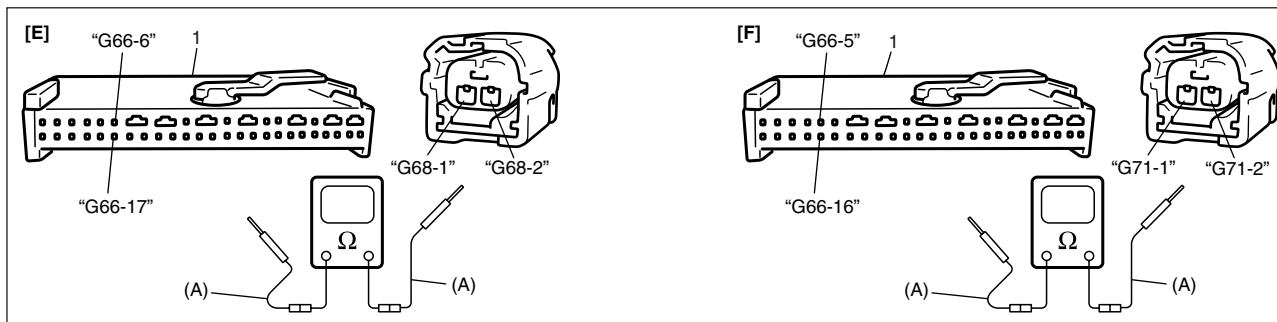
STEP 1 to 4 : Check side sensor circuit in instrument panel harness.

DIAGNOSTIC FLOW TABLE**DTC B1073 : Side Sensor (Driver Side) Correspondence Abnormality****DTC B1075 : Side Sensor (Passenger Side) Correspondence Abnormality**

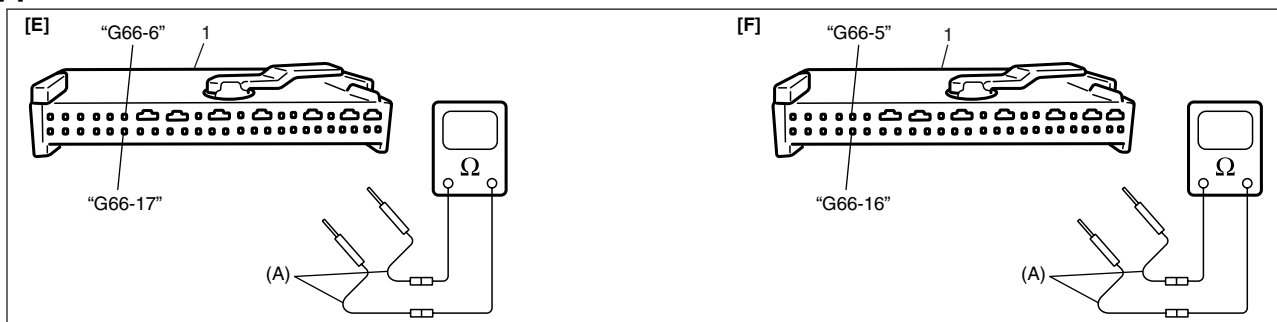
Step	Action	Yes	No
1	<p>1) With ignition switch OFF, disconnect SDM connector "G66" and side sensor connector "G68" or "G71".</p> <p>2) DTC B1073 : Check proper connection to side sensor at terminals in "G68" connector and to SDM at "G66-17" and "G66-6" terminals in SDM connector "G66". DTC B1075 : Check proper connection to side sensor at terminals in "G71" connector and to SDM at "G66-16" and "G66-5" terminals in SDM connector "G66".</p> <p>3) DTC B1073 : If OK, then measure resistance between "G68-1" and "G66-17" terminals, and between "G68-2" and "G66-6" terminals with connected special tool (A). Is resistance 0 – 1Ω? DTC B1075 : If OK, then measure resistance between "G71-1" and "G66-16" terminals, and between "G71-2" and "G66-5" terminals with connected special tool (A). Is resistance 0 – 1Ω?</p>	Go to step 2.	<p>DTC B1073 : Repair high resistance or open in "GRN/WHT" or "GRN/BLK" wire.</p> <p>DTC B1075 : Repair high resistance or open in "GRN/YEL" or "GRN/ORN" wire.</p>
2	<p>1) DTC B1073 : Measure resistance between "G66-17" and "G66-6" terminals with connected special tool (A). Is resistance infinity? DTC 1075 : Measure resistance between "G66-16" and "G66-5" terminals with connected special tool (A). Is resistance infinity?</p>	Go to step 3.	<p>DTC B1073 : Repair short from "GRN/WHT" wire to "GRN/BLK" wire.</p> <p>DTC B1075 : Repair short from "GRN/YEL" wire to "GRN/ORN" wire.</p>

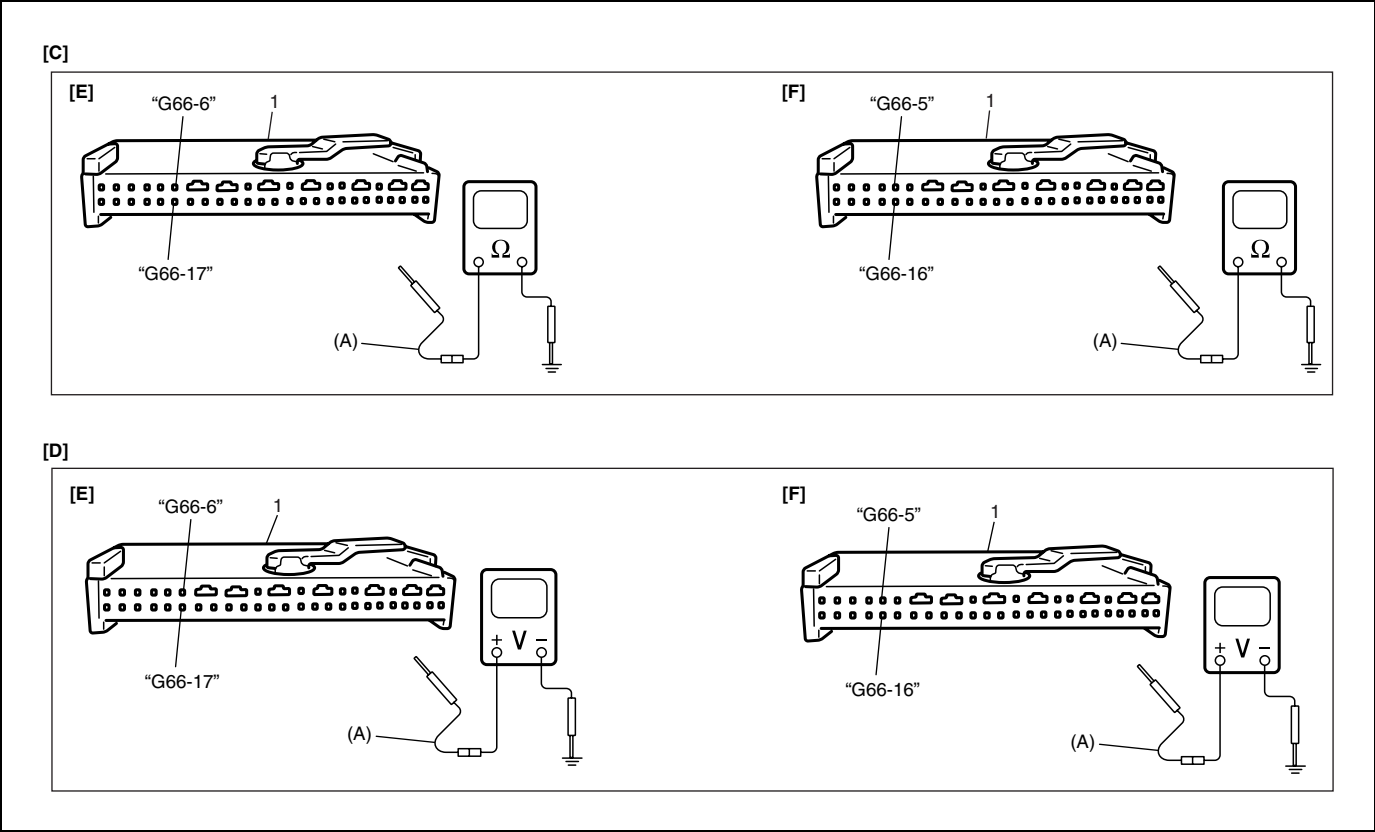
Step	Action	Yes	No
3	<p>1) DTC B1073 : Measure resistance between "G66-17" terminal and body ground, and between "G66-6" terminal and body ground with connected special tool (A). Is resistance infinity? DTC 1075 : Measure resistance between "G66-16" terminal and body ground, and between "G66-5" terminal and body ground with connected special tool (A). Is resistance infinity?</p>	Go to step 4.	<p>DTC B1073 : Repair short from "GRN/ WHT" or "GRN/BLK" wire to body ground. DTC B1075 : Repair short from "GRN/ YEL" or "GRN/ORN" wire to body ground.</p>
4	<p>1) DTC B1073 : Measure voltage from "G66-17" and "G66-6" terminals to body ground with connected special tool (A). With ignition switch ON, is voltage 0 – 1V? DTC B1075 : Measure voltage from "G66-16" and "G66-5" terminals to body ground with connected special tool (A). With ignition switch ON, is voltage 0 – 1V?</p>	Substitute a known-good side sensor and/or SDM and recheck.	<p>DTC B1073 : Repair short from "GRN/ WHT" or "GRN/BLK" wire to power circuit. DTC B1075 : Repair short from "GRN/ YEL" or "GRN/ORN" to power circuit.</p>

[A]



[B]





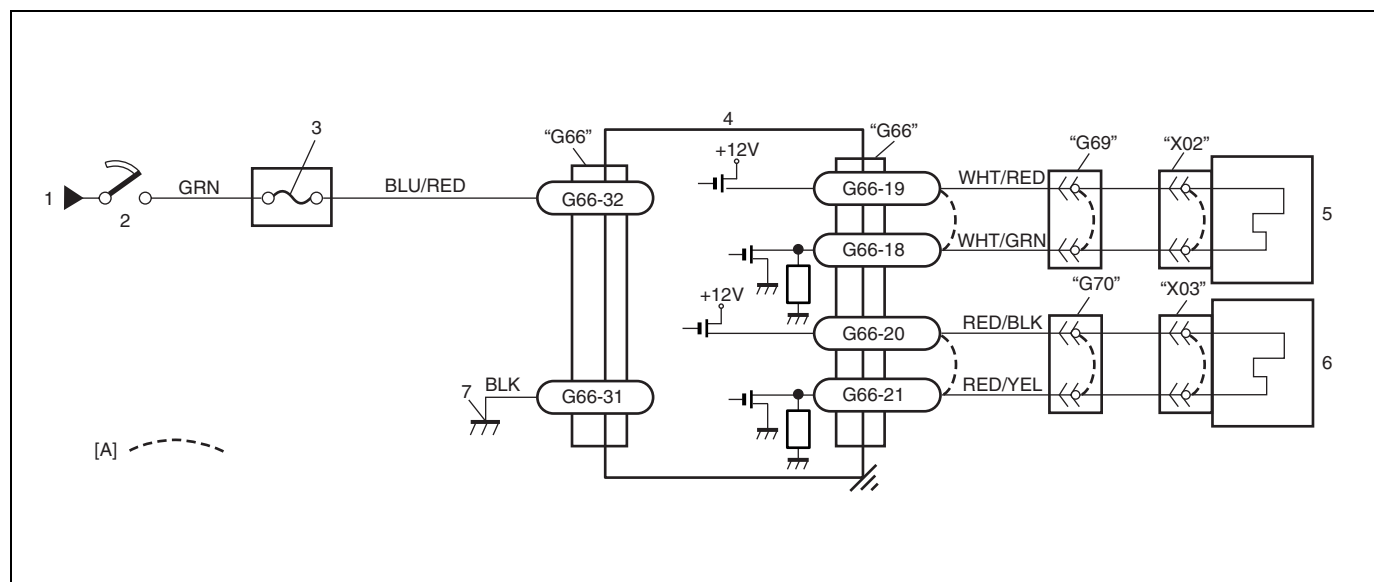
[A] : Fig. for STEP 1	[D] : Fig. for STEP 4	1. SDM connector "G66"
[B] : Fig. for STEP 2	[E] : For DTC B1073	
[C] : Fig. for STEP 3	[F] : For DTC B1075	

Special tool
(A) : 09932-76010

- NOTE:
- Upon completion of inspection and repair work, perform the following items.
- Reconnect all air bag system components, ensure all components are properly mounted.
 - Clear diagnostic trouble code (Refer to DTC CLEARANCE), if any.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1088 – Side Air Bag (Passenger Side) Initiator Circuit Short to Power Circuit

WIRING DIAGRAM



[A] : Shorting bar	2. Ignition switch	4. SDM	6. Side air bag (passenger side) (inflator) module
1. From main fuse	3. "AIR BAG" fuse	5. Side air bag (driver side) (inflator) module	7. Ground for air bag system

- Be sure to perform **AIR BAG DIAGNOSTIC SYSTEM CHECK** before starting diagnosis according to flow table.
- When measurement of resistance or voltage is required in this table, use a specified digital multimeter (refer to **SPECIAL TOOL** in this section.) along with a correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is required, refer to **INTERMITTENTS AND POOR CONNECTIONS** in this section.
- If there is open circuit in the air bag wire harness (in instrument panel harness), connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.

DTC WILL SET WHEN**DTC B1081 or B1085 :**

The combined resistance of the side air bag (inflator) module (driver or passenger side), harness wiring and connector terminal contact is above a specified value for specified time.

DTC B1082 or B1086 :

The combined resistance of the side air bag (inflator) module (driver or passenger side), harness wiring and connector terminal contact is below a specified value for specified time.

DTC B1083 or B1087 :

The voltage measured at side air bag (driver or passenger side) initiator circuit is below a specified value for specified time.

DTC B1084 or B1088 :

The voltage measured at side air bag (driver or passenger side) initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION**DTC B1081, B1082, B1083, B1084, B1085, B1086, B1087, or B1088 :**

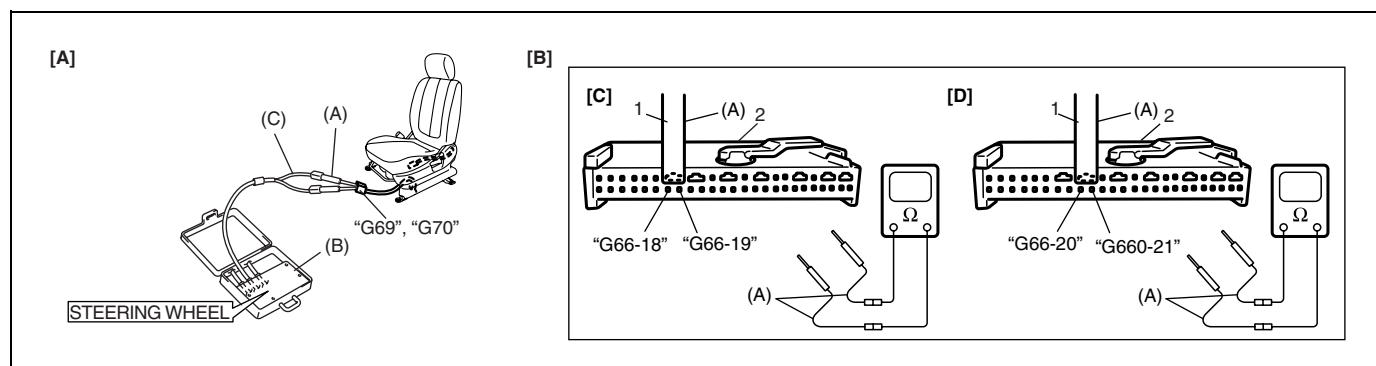
STEP 1 : Check whether malfunction is in side air bag (inflator) module.

STEP 2 : Check side air bag initiator circuit in instrument panel harness.

DIAGNOSTIC FLOW TABLE**DTC B1081 : Side Air Bag (Driver Side) Initiator Circuit Resistance High****DTC B1085 : Side Air Bag (Passenger Side) Initiator Circuit Resistance High**

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect side air bag (inflator) module connector "G69" or "G70" under front seat cushion. 2) Check proper connection to applicable side air bag (inflator) module at terminals in "G69" or "G70" connector. 3) If OK, then connect Special tools (B) and (C) to side air bag (inflator) module connector "G69" or "G70" disconnected at the step 1). With ignition switch ON, is DTC B1081 or B1085 still current?	Go to step 2.	Ignition switch OFF. Replace applicable front seat back referring to "FRONT SEAT" in Section 9.

Step	Action	Yes	No
2	<ol style="list-style-type: none"> 1) With ignition switch OFF, disconnect SDM connector "G66". 2) Check proper connection to SDM at terminals "G66-19" and "G66-18" or "G66-20" and "G66-21". 3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 4) Measure resistance with connected Special Tools (A), (B) and (C) to applicable side air bag in "G69" or "G70" connector. <ul style="list-style-type: none"> • DTC B1081 : between "G66-19" and "G66-18" terminals. • DTC B1085 : between "G66-20" and "G66-21" terminals. <p>Is resistance 2.6 Ω or less?</p>	Substitute a known-good SDM and recheck.	<p>DTC B1081 : Repair high resistance or open in "WHT/RED" or "WHT/GRN" wire circuit.</p> <p>DTC B1085 : Repair high resistance or open in "RED/BLK" or "RED/YEL" wire circuit.</p>



[A] : Fig. for STEP 1 and 2

[B] : Fig. for STEP 2

[C] : For DTC B1081

[D] : For DTC B1085

1. Release tool

2. SDM connector "G66"

Special tool**(A) : 09932-76010****(B) : 09932-75010****(C) : 09932-78310****NOTE:**

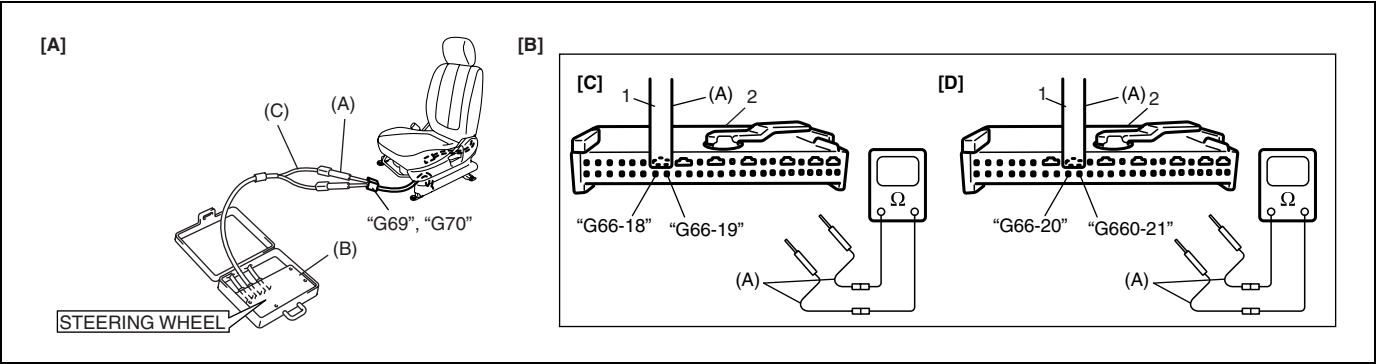
Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble code (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1082 : Side Air Bag (Driver Side) Initiator Circuit Resistance Low

DTC B1086 : Side Air Bag (Passenger Side) Initiator Circuit Resistance Low

Step	Action	Yes	No
1	<p>1) With ignition switch OFF, disconnect side air bag (inflator) module connector “G69” or “G70” under front seat cushion.</p> <p>2) Check proper connection to applicable side air bag (inflator) module at terminals in “G69” or “G70” connector.</p> <p>3) If OK, then connect Special tools (B) and (C) to side air bag (inflator) module connector “G69” or “G70” disconnected at the step 1.</p> <p>With ignition switch ON, is DTC B1082 or B1086 still current?</p>	Go to step 2.	Ignition switch OFF. Replace applicable front seat back referring to “FRONT SEAT” in Section 9.
2	<p>1) With ignition switch OFF, disconnect SDM connector “G66”.</p> <p>2) Check proper connection to SDM at terminals “G66-19” and “G66-18” or “G66-20” and “G66-21”.</p> <p>3) If OK, release shorting bar in SDM connector inserting release tool (1) included in special tool (A).</p> <p>4) Measure resistance with connected Special Tools (A), (B) and (C) to applicable side air bag in “G69” or “G70” connector.</p> <ul style="list-style-type: none">• DTC B1082 : between “G66-19” and “G66-18” terminals.• DTC B1086 : between “G66-20” and “G66-21” terminals. <p>Is resistance 2.2 Ω or more?</p>	Substitute a known-good SDM and recheck.	<p>DTC B1082 :</p> <p>Repair short from “WHT/ RED” wire circuit to “WHT/GRN” wire circuit or from “WHT/RED” or “WHT/GRN” wire circuit to other wire circuit.</p> <p>DTC B1086 :</p> <p>Repair short from “RED/ BLK” wire circuit to “RED/ YEL” wire circuit or from “RED/BLK” or “RED/YEL” wire circuit to other wire circuit.</p>



[A] : Fig. for STEP 1 and 2
[B] : Fig. for STEP 2
[C] : For DTC B1082
[D] : For DTC B1086
1. Release tool
2. SDM connector “G66”

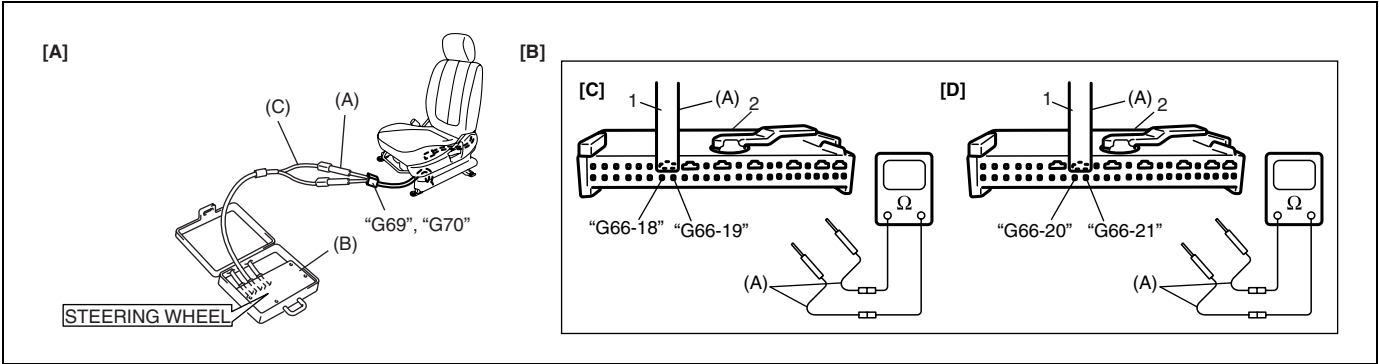
Special tool**(A) : 09932-76010****(B) : 09932-75010****(C) : 09932-78310****NOTE:**

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble code (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1083 : Side Air Bag (Driver Side) Initiator Circuit Short to Ground**DTC B1087 : Side Air Bag (Passenger Side) Initiator Circuit Short to Ground**

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect side air bag (inflator) module connector "G69" or "G70" under front seat cushion. 2) Check proper connection to applicable side air bag (inflator) module at terminals in "G69" or "G70" connector. 3) If OK, then connect Special Tools (B) and (C) to side air bag (inflator) module connector "G69" or "G70" disconnected at the step 1). With ignition switch ON, is DTC B1083 or B1087 still current?	Go to step 2.	Ignition switch OFF. Replace applicable front seat back referring to "FRONT SEAT" in Section 9.
2	1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G69" or "G70" connector and SDM connector "G66" from SDM respectively. 2) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A). 3) Measure resistance with connected Special tool (A). <ul style="list-style-type: none"> • DTC B1083 : between "G66-19" terminal and body ground, and between "G66-18" terminal and body ground. • DTC B1087 : between "G66-20" terminal and body ground, and between "G66-21" terminal and body ground. Is resistance infinity?	Substitute a known-good SDM and recheck.	DTC B1083 : Repair short from "WHT/RED" or "WHT/GRN" wire circuit to ground. DTC B1087: Repair short from "RED/BLK" or "RED/YEL" wire circuit to ground.



[A] : Fig. for STEP 1 and 2
[B] : Fig. for STEP 2
[C] : For DTC B1083
[D] : For DTC B1087
1. Release tool
2. SDM connector "G66"

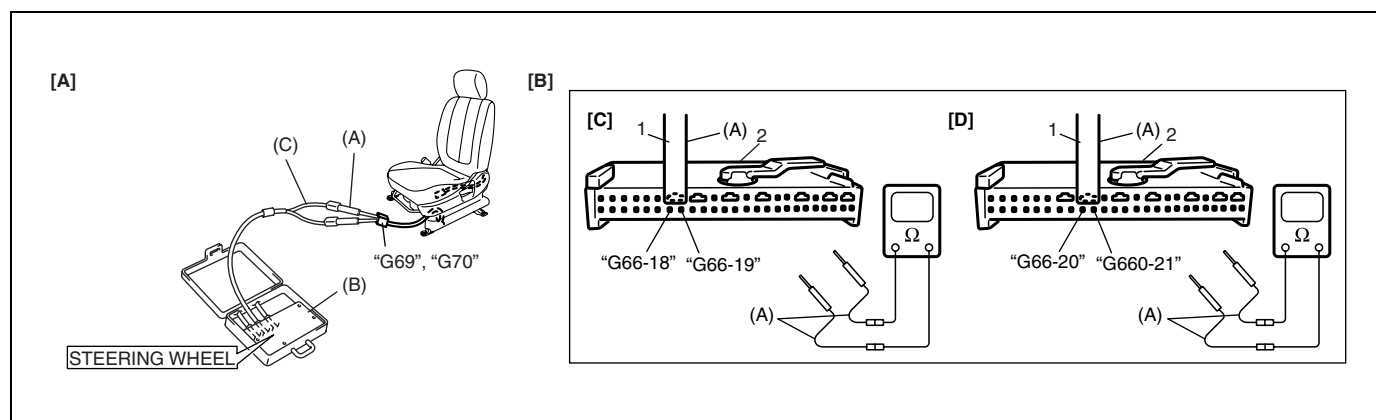
Special tool
(A) : 09932-76010
(B) : 09932-75010
(C) : 09932-78310

- NOTE:**
- Upon completion of inspection and repair work, perform the following items.
- Reconnect all air bag system components, ensure all components are properly mounted.
 - Clear diagnostic trouble code (Refer to DTC CLEARANCE), if any.
 - Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

DTC B1084 : Side Air Bag (Driver Side) Initiator Circuit Short to Power Circuit
DTC B1088 : Side Air Bag (Passenger Side) Initiator Circuit Short to Power Circuit

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect side air bag (inflator) module connector "G69" or "G70" under front seat cushion. 2) Check proper connection to applicable side air bag (inflator) module at terminals in "G69" or "G70" connector. 3) If OK, then connect Special Tools (B) and (C) to side air bag (inflator) module connector disconnected at the step 1). With ignition switch ON, is DTC B1084 or B1088 still current?	Go to step 2.	Ignition switch OFF. Replace applicable front seat referring to "FRONT SEAT" in Section 9.

Step	Action	Yes	No
2	<p>1) With ignition switch OFF, disconnect Special Tools (B) and (C) from "G69" or "G70" connector.</p> <p>2) Disconnect SDM connector "G66" from SDM respectively.</p> <p>3) Release shorting bar in SDM connector inserting release tool (1) included in special tool (A).</p> <p>4) Measure voltage with connected Special Tool (A).</p> <ul style="list-style-type: none"> • DTC B1084 : between "G66-19" terminal and body ground, and between "G66-18" terminal and body ground. • DTC B1088 : between "G66-20" terminal and body ground, and between "G66-21" terminal and body ground. <p>With ignition switch ON, is voltage 0 – 1V?</p>	Substitute a known-good SDM and recheck.	<p>DTC B1084 : Repair short from "WHT/RED" or "WHT/GRN" wire circuit to ground.</p> <p>DTC B1088 : Repair short from "RED/BLK" or "RED/YEL" wire circuit to power circuit.</p>



[A] : Fig. for STEP 1 and 2

[B] : Fig. for STEP 2

[C] : For DTC B1084

[D] : For DTC B1088

1. Release tool

2. SDM connector "G66"

Special tool**(A) : 09932-76010****(B) : 09932-75010****(C) : 09932-78310****NOTE:**

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble code (Refer to DTC CLEARANCE), if any.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.

On-Vehicle Service

Service Precautions

Service and diagnosis

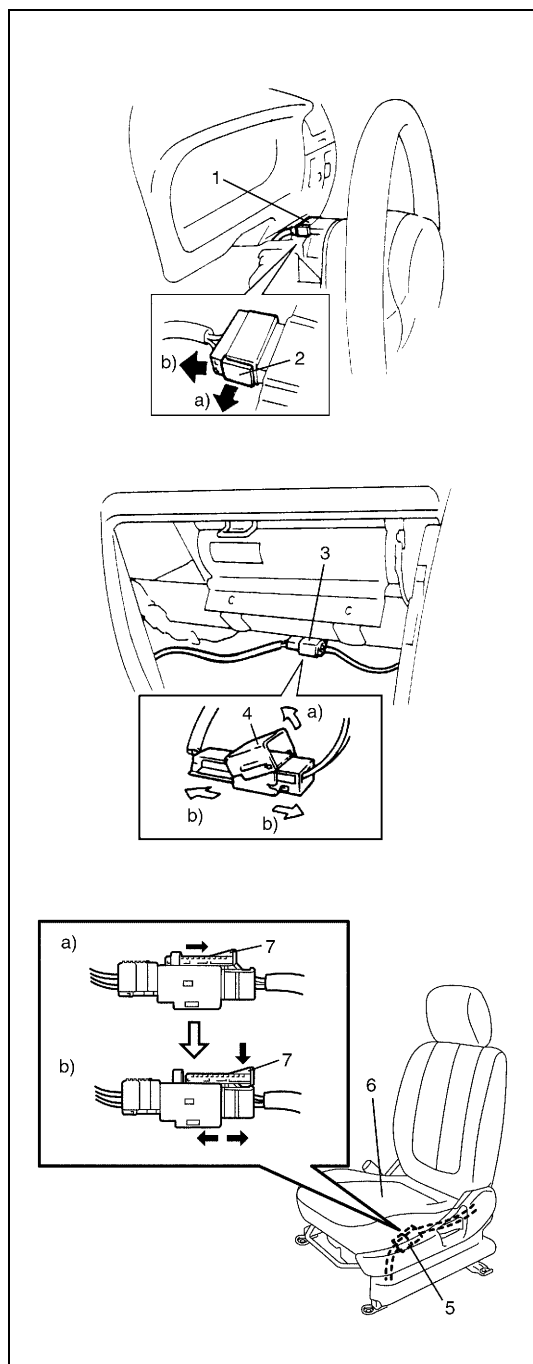
WARNING/CAUTION labels are attached on each part of air bag system components (SDM, air bag (inflator) modules and seat belt pretensioners). Be sure to follow the instructions.

WARNING:

- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
 - Do not modify the steering wheel, dashboard or any other on or around air bag system components. Modifications can adversely affect air bag system performance and lead to injury.
 - Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system repairs.
-
- Many of service procedures require disconnection of "AIR BAG" fuse and air bag (inflator) module(s) (driver, passenger and side air bag (inflator) modules and seat belt pretensioners) from initiator circuit to avoid an accidental deployment.
 - Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code (DTC).
 - The "AIR BAG DIAGNOSTIC SYSTEM CHECK" must be the starting point of any air bag diagnostics. The "AIR BAG DIAGNOSTIC SYSTEM CHECK" will verify proper "AIR BAG" warning lamp operation and will lead you to the correct table to diagnose any air bag malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacements.
 - Never use air bag component parts from another vehicle.
 - If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended system activation.
 - When handling the air bag (inflator) modules (driver, passenger and side of driver and passenger), seat belt pretensioners (driver and passenger), side sensors or SDM, be careful not to drop it or apply an impact to it. If an excessive impact was applied (e.g., side sensors are dropped, SDM is dropped, air bag (inflator) module is dropped from a height of 90 cm (3 ft) or more, seat belt pretensioner (retractor assembly) is dropped from a height of 30 cm (1 ft) or more), never attempt disassembly or repair but replace it with a new one.
 - When using electric welding, be sure to disconnect air bag (inflator) module connectors (driver, passenger and side of driver and passenger) and seat belt pretensioner connectors (driver and passenger) respectively.
 - When applying paint around the air bag system related parts, use care so that the harness or connector will not be exposed to the paint mist.
 - Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.

WARNING:

When performing service on or around air bag system components or air bag wiring, follow the procedures listed in the following pages to temporarily disable the air bag system.
Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system repairs.

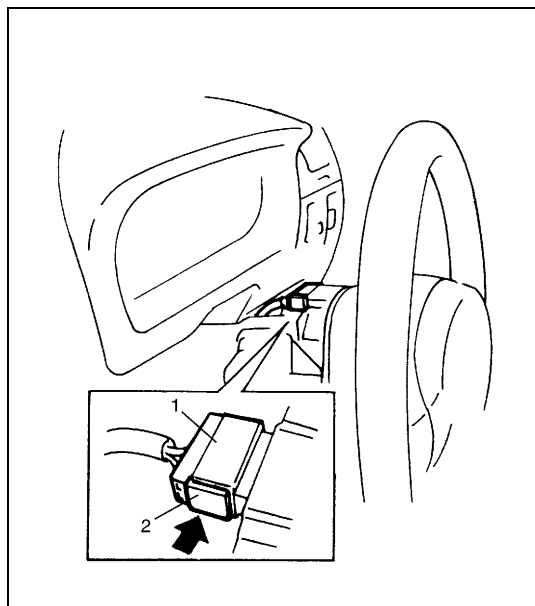
Disabling air bag system

- 1) Turn steering wheel so that vehicle's wheels (front tires) and pointing straight ahead.
- 2) Turn ignition switch to "LOCK" position and remove key.
- 3) Remove "AIR BAG" fuse from circuit fuse box referring to "System Components and Wiring Location View and Connectors" in this section.
- 4) Remove steering column upper and lower covers.
- 5) Disconnect connector (1) of contact coil and combination switch assembly as follows.
 - a) Release locking of lock lever (2).
 - b) After unlocked, disconnect connector.
- 6) If equipped with passenger air bag (inflator) module, remove glove box and disconnect Yellow connector (3) of passenger air bag (inflator) module.
 - a) Release locking of lock lever (4).
 - b) After unlocked, disconnect connector.
- 7) If equipped with side air bag (inflator) module, disconnect Yellow connector (5) of side air bag (inflator) module under front seat cushion (6).
 - a) Release locking of lock slider (7).
 - b) After unlocked, push down lock slider (7) and disconnect connector.

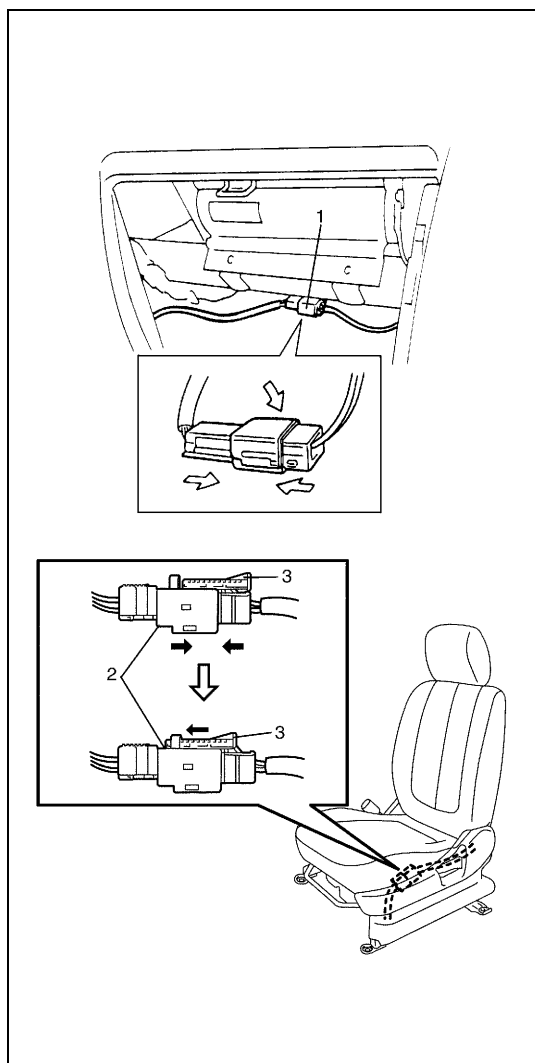
NOTE:

With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.

This is normal operation and does not indicate a air bag system malfunction.

Enabling air bag system

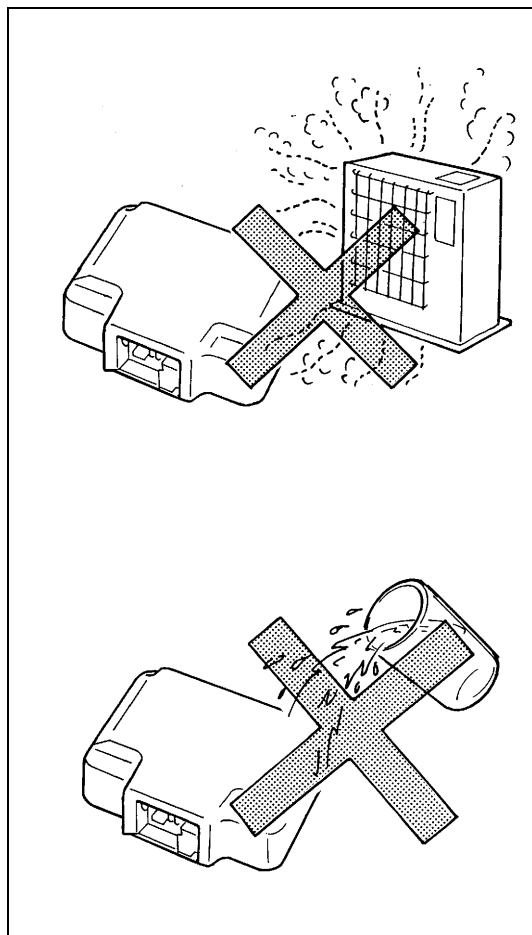
- 1) Turn ignition switch to "LOCK" position and remove key.
- 2) Connect contact coil connector (1) and combination switch assembly by pushing lock lever (2) as shown in figure securely.
- 3) Install steering column upper and lower covers.



- 4) If equipped with passenger air bag (inflator) module, connect Yellow connector (1) of passenger air bag (inflator) module by pushing connector till click is heard from it.
- 5) Install glove box.
- 6) If equipped with side air bag (inflator) module, connect Yellow connector (2) of side air bag (inflator) module, and be sure to lock connector with lock slider (3).
- 7) Install "AIR BAG" fuse to circuit fuse box.
- 8) Turn ignition switch to ON position and verify that "AIR BAG" warning lamp flashes 6 times and then turns OFF.
If it does not operate as described, perform "AIR BAG DIAGNOSTIC SYSTEM CHECK" in this section.

Handling and storage

SDM

**WARNING:**

Never power up air bag system when SDM is not rigidly attached to the vehicle. Otherwise, personal injury may result.

CAUTION:

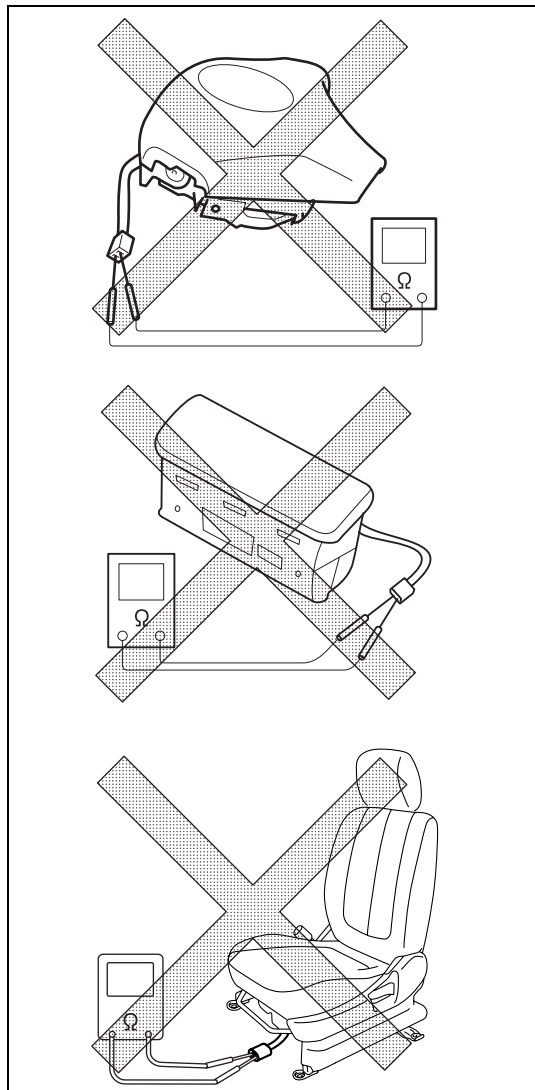
After detecting one time of such collision as to meet deployment conditions, the SDM must not be used. Refer to "AIR BAG DIAGNOSTIC SYSTEM CHECK" when checking the SDM.

- Never attempt disassembly of SDM.
- When storing SDM, select a place where neither high temperature nor high humidity is anticipated and oil, water and dust are kept off.
- If SDM has been dropped, replace it with a new one.
- If installation part of SDM was damaged, repair that part completely before reinstallation.
- All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointed toward the front of the vehicle to ensure proper operation of the air bag system.

LIVE (UNDEPLOYED) AIR BAG (INFLATOR) MODULES

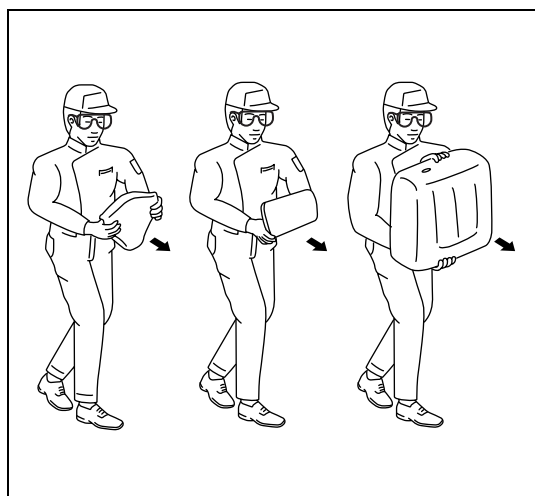
Special care is necessary when handling and storing a live (undeployed) air bag (inflator) modules.

The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.

**WARNING:**

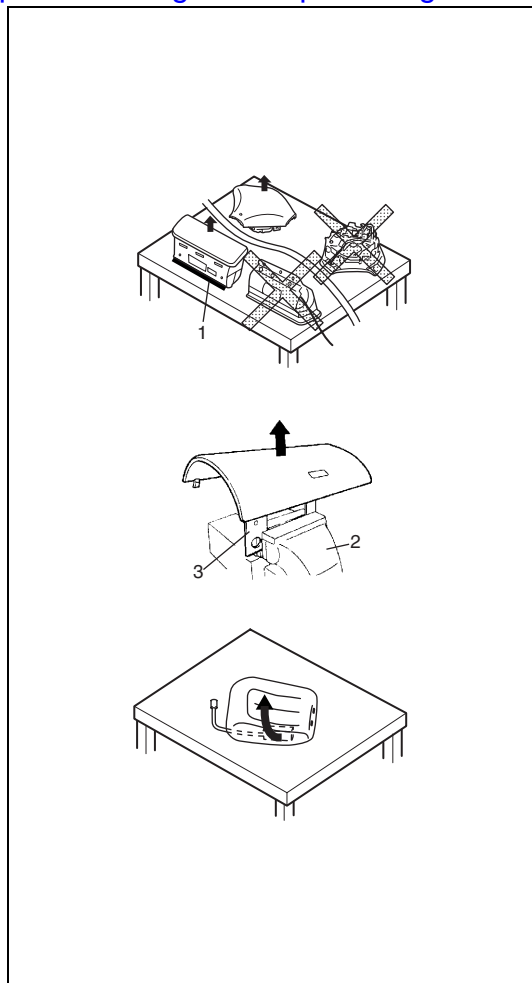
Never attempt to measure the resistance of the air bag (inflator) modules (driver, passenger and side). It is very dangerous as the electric current from the tester may deploy the air bag.

- Never attempt disassembly of the air bag (inflator) modules.
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (undeployed) air bag (inflator) module, be sure to deploy it before discarding it.
- When grease, cleaning agent, oil, water, etc., got on the air bag (inflator) modules (driver, passenger and side of driver and passenger), wipe it off immediately with a dry cloth.
- If air bag (inflator) module was dropped from a height of 90 cm (3 ft) or more, it should be replaced with a new one as an assembly.

**WARNING:**

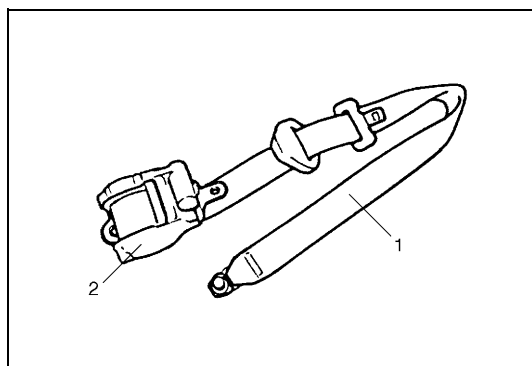
- For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module.

Otherwise, personal injury may result.

**WARNING:**

- For handling and storage of air bag (inflator) module and seat belt pretensioner, select place where ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Always carry live air bag (inflator) module with trim cover away from you.
- When storing live air bag (inflator) module or when leaving live air bag (inflator) module unattended on bench or other surface, always face trim cover up and away from surface. As live passenger air bag (inflator) module must be placed with its trim cover facing up, place it on workbench with slit (1) or use workbench vise (2) to hold it securely at its lower mounting bracket (3).
- This is necessary so that free space is provided to allow air bag to expand in the unlikely event of accidental deployment.
- Never carry seat belt pretensioner by wire or connector of seat belt pretensioner.
- When placing live seat belt pretensioner on workbench or other surface, be sure not to put something on seat belt pretensioner.

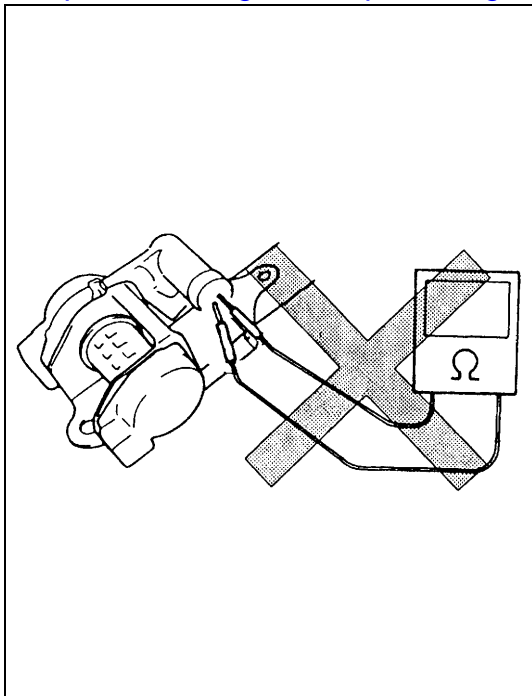
Failure to follow procedures may result in personal injury.

LIVE (INACTIVATED) SEAT BELT PRETENSIONER

Special care is necessary when handling and storing a live (inactivated) seat belt pretensioners.

Also, when the seat belt pretensioners activate, gas is generated and the seat belt (1) is retracted into the retractor assembly (2) quickly.

Note, therefore, that if they activate accidentally, the seat belt pretensioners and other object(s) around them may be thrown through the air.

**WARNING:**

Never attempt to measure the resistance of the seat belt pretensioners. It is very dangerous as the electric current from the tester may activate pretensioner.

- Never attempt to disassemble the seat belt pretensioner (retractor assembly).
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (inactivated) seat belt pretensioner, be sure to activate it before discarding it.
- When grease, cleaning agent oil, water, etc., got on the seat belt pretensioners (retractor assembly), wipe it off immediately with a dry cloth.
- If seat belt pretensioner was dropped from a height of 30 cm (1 ft) or more, it should be replaced with a new one as an assembly.

WARNING:

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by webbing.
- When placing live seat belt pretensioner on workbench or other surface, be sure not to put something on seat belt pretensioner.

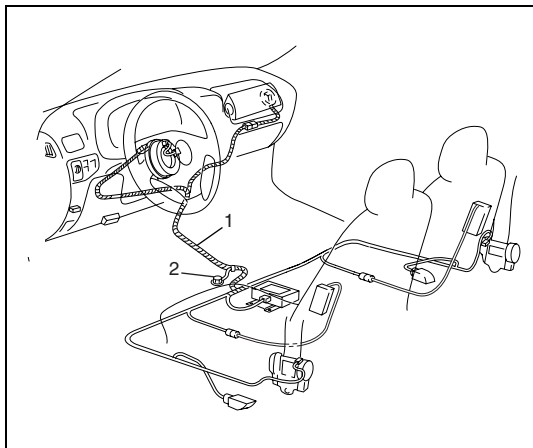
Otherwise, personal injury may result.

DEPLOYED AIR BAG (INFLATOR) MODULE AND ACTIVATED SEAT BELT PRETENSIONER**WARNING:**

- The air bag (inflator) module and seat belt pretensioner immediately after deployment/activation is very hot. Wait for at least 30 minutes to cool it off before proceeding the work.
- Do not apply water, oil, etc. to deployed air bag (inflator) module and to activate seat belt pretensioner.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.
- Wash your hands with mild soap and water after completing the work.

Refer to the procedure described under “DEPLOYED AIR BAG (INFLATOR) MODULE AND ACTIVATED SEAT BELT PRETENSIONER DISPOSAL” in this section.

AIR BAG WIRE HARNESS AND CONNECTOR IN FLOOR WIRE HARNESS



Air bag wire harness is included in instrument panel harness. The part of coupler side wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

- When an open in air bag wire harness (in floor harness) (1), damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
- When installing it, be careful so that the air bag wire harness (in instrument panel harness) (1) is not caught or does not interfere with other parts.
- Make sure air bag system grounding point (2) are clean and grounds are securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

Disposal

Do not dispose of the live (undeployed) air bag (inflator) modules and the live (inactivated) seat belt pretensioners. When disposal is necessary, be sure to deploy/activate the air bag and seat belt pretensioner according to deployment/activation procedure described in "AIR BAG (INFLATOR) MODULE AND SEAT BELT PRETENSIONER DISPOSAL" in this section.

WARNING:

Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which could cause personal injury. Undeployed air bag (inflator) module and inactivated seat belt pretensioner must not be disposed of through normal refuse channels.

The undeployed air bag (inflator) module and inactivated seat belt pretensioner contain substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

Repairs and Inspections Required after an Accident

CAUTION:

- All air bag system components, including the electrical harness (component mounting points), must be inspected after an accident. If any components are damaged or bent, they must be replaced even if air bag system activation did not occur.
- Never use air bag system parts from another vehicle.
- Do not attempt to service the parts below. Service of these parts is by replacement only.
 - Driver/Passenger/Side air bag (inflator) module, Driver/Passenger seat belt pretensioner
 - SDM
 - Side sensors
 - Contact coil and combination switch assembly
 - Air bag wire harness (in instrument panel wire harness)
- Proper operation of the air bag system requires that any repairs to the vehicle structure return it to its original production configuration.

CAUTION:

After detecting one time of such collision as to meet deployment conditions, the SDM must not be used. Refer to “AIR BAG DIAGNOSTIC SYSTEM CHECK” when checking the SDM.

Accident with deployment/activation - component replacement

When driver air bag (inflator) module and passenger air bag (inflator) module (if equipped) are deployed, the following components must be replaced.

- Driver air bag (inflator) module and passenger air bag (inflator) module (if equipped)
- Driver and passenger seat belt pretensioners
- SDM

When side air bag (inflator) module (if equipped) is deployed, the following components must be replaced.

- Front seat backs (with side air bag (inflator) module)
- Side sensors
- SDM

Accident with or without deployment/activation - component inspections

Certain air bag system components must be inspected after any crash, whether the air bag system activated or not.

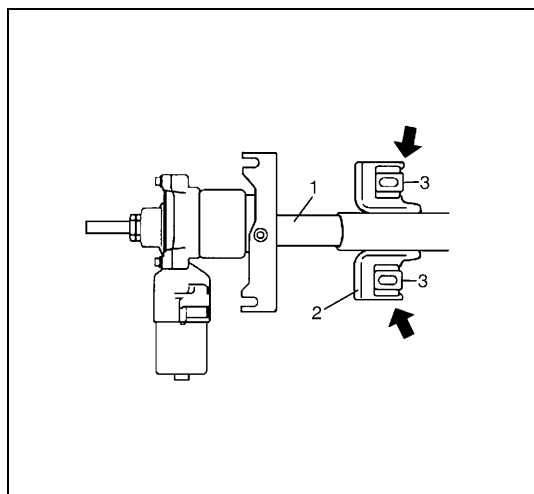
Those components are :

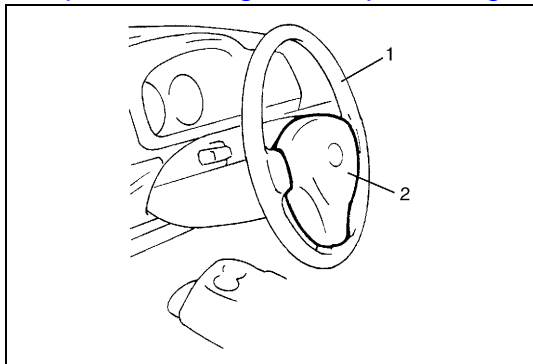
- Steering column (1) and shaft joints
 - Check for length, damage and bend according to “CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE” in SECTION 3C.

If any faulty condition is found in above checks, replace faulty part.

- Steering column bracket (2) and capsules (3)
 - Check for damage and bent.

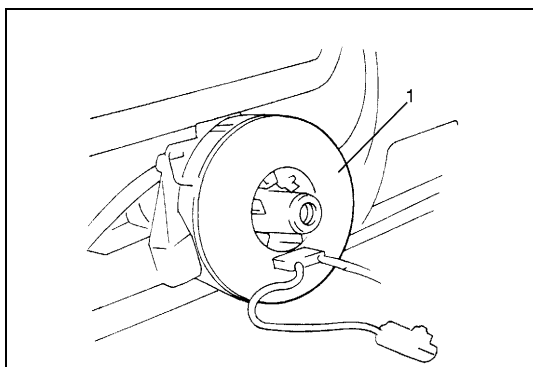
If any faulty condition is found in above checks, replace faulty part.





- Steering wheel (1) and driver air bag (inflator) module (2)
 - Check for damage or air bag (inflator) module fitness.
 - Check trim cover (pad surface) for cracks.
 - Check wire harness and connector for damage or tightness.

If any faulty condition is found in above checks, replace faulty part.

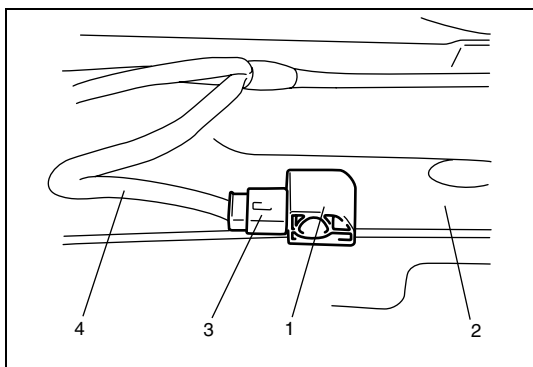


- Contact coil (1) and combination switch assembly
 - Check wire harness and connectors for damage or tightness.
 - Check contact coil case for damage.

If any faulty condition is found in above checks, replace.

- SDM
 - Check for external damage such as deformation, scratch, crack, peeled paint, etc.
 - Check that SDM cannot be installed properly due to a cause in itself.
 - Check that connector or lead wire of SDM has a scorching, melting or damage.
 - Check that connector is connected securely or locked.
 - Check SDM connector and terminals for tightness.
 - Check SDM sets a diagnostic trouble code (Refer to “DTC CHECK” in this section.) and the diagnostic table leads to a malfunctioning SDM.

If any faulty condition is found in above checks, replace.

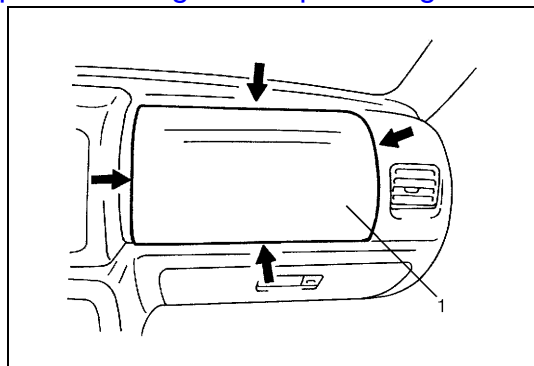


- Side sensors (if equipped)
 - Check sensor (1) and under body (2) for dents, cracks, deformation or rust.
 - Check sensor connector (sensor side and harness side) (3) or sensor lead wire (4) for damage, crack, scorching or melting.

If any faulty condition is found in above checks, replace.

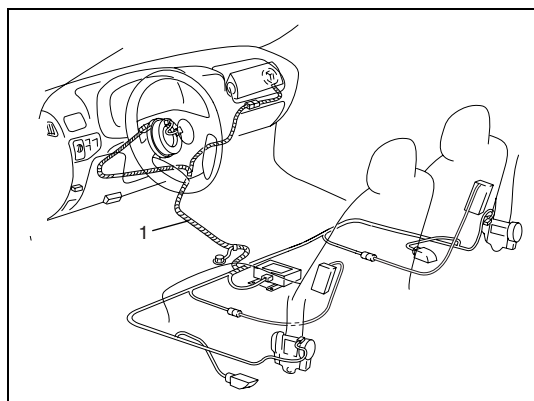
- Instrument panel member and reinforcement
 - Check for any distortion, bending, cracking or other damage.

If any faulty condition is found in above checks, replace.



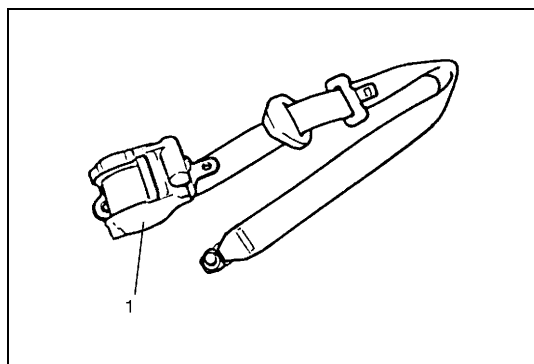
- Passenger air bag (inflator) module (1) (if equipped)
 - Check for dents, cracks, damage or fitness.
 - Check trim cover for cracks or deformities.
 - Check harness and connector for damage or tightness.

If any faulty condition is found in above checks, replace.



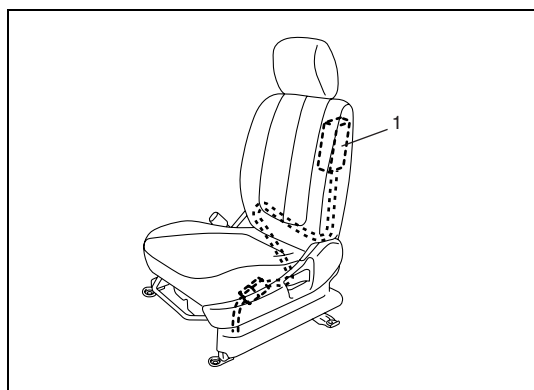
- Air bag wire harness (1) and connections
 - Check for damages, deformities or poor connections.
(Refer to “INTERMITTENTS AND POOR CONNECTIONS” in this section.)
 - Check wire harness clamps for tightness.

If any faulty condition is found, correct or replace.



- Seat belt pretensioner (1)
 - Check for dents, cracks, damage or fitness
 - Check harness and connector for damage or tightness.

If any faulty condition is found in above checks, replace.



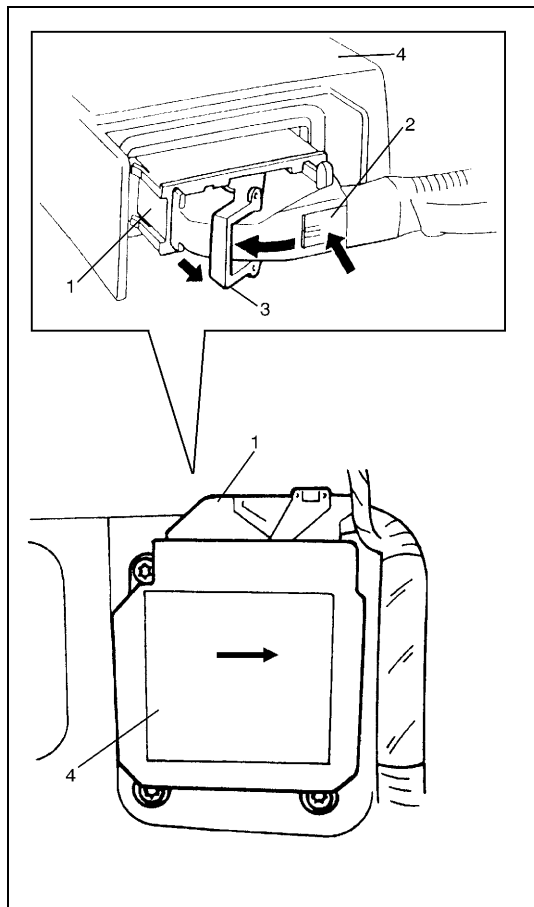
- Seat belts and mounting points
 - Refer to “FRONT SEAT BELT” in Section 10.
- “AIR BAG” warning lamp
 - After vehicle is completely repaired, perform “AIR BAG DIAGNOSTIC SYSTEM CHECK” in this section.
- Front seat (with side air bag (inflator) module (1) (if equipped))
 - Check front seat back for bend or damage.
 - Check front seat back attachment for rattle, looseness and damage
 - Check front seat attachment for rattle, looseness and damage
 - Check for seat reclining and seat sliding operations
 - Check wire harness and connector for damage or tightness

If any faulty condition is found in above checks, replace.

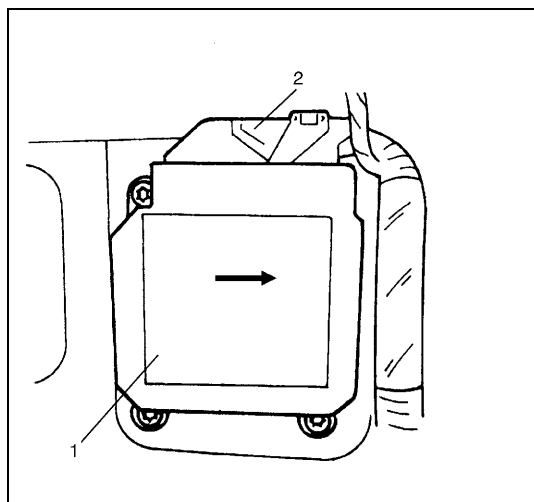
SDM**WARNING:**

During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).

Be sure to read "SERVICE PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or inactivation of the air bag system when necessary.

REMOVAL

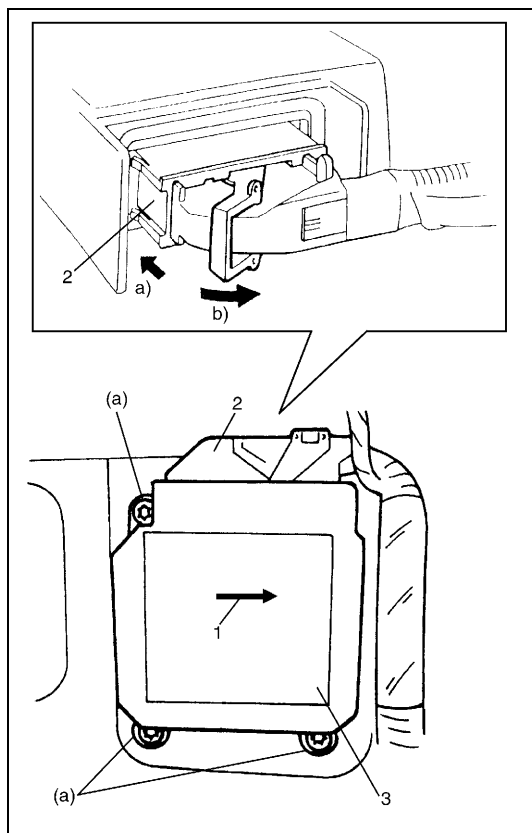
- 1) Disconnect negative cable at battery.
- 2) Disable air bag system. Refer to "DISABLING AIR BAG SYSTEM" of "SERVICE PRECAUTIONS" in this section.
- 3) Remove rear console box by removing screws.
- 4) Release SDM connector locking lever (3) with pushing lock button (2), and then disconnect SDM connector (1) from SDM (4).
- 5) Remove SDM (4) from vehicle.

INSPECTION**CAUTION:**

- Do not connect a tester whatever type it may be.
- Never repair or disassemble SDM (1).
- If SDM has been dropped, or if there are cracks, dents or other defects in the case or plate, replace it with a new one.

- Check SDM (1) for dents, cracks or deformation.
- Check SDM connector (2) for damage, cracks or lock mechanism.
- Check SDM terminal for bent, corrosion or rust.

If any faulty condition is found in above checks, replace.

INSTALLATION

For installation, reverse removal procedure noting the following points.

- Check none of the following conditions exists.
 - Bend, scratch, deformity in vehicle body which SDM is mounted.
 - Foreign matters or rusts on mating surface of vehicle body with SDM
- Ensure that arrow (1) on the SDM (3) is pointing toward the front of the vehicle.
- Tighten SDM bolts to specified torque.

Tightening torque

SDM mounting bolt (a) : 7 N·m (0.7 kg-m, 5.0 lb-ft)

- Connect SDM connector (2) to SDM (3) securely.
- Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in this section.

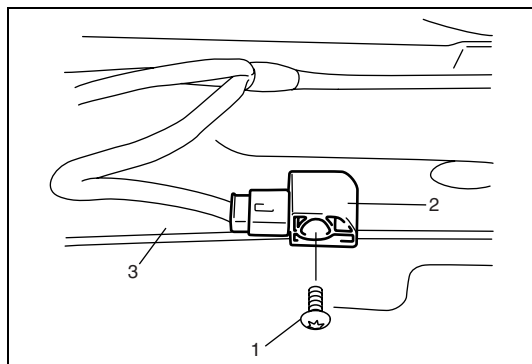
Side Sensor (if equipped)**WARNING:**

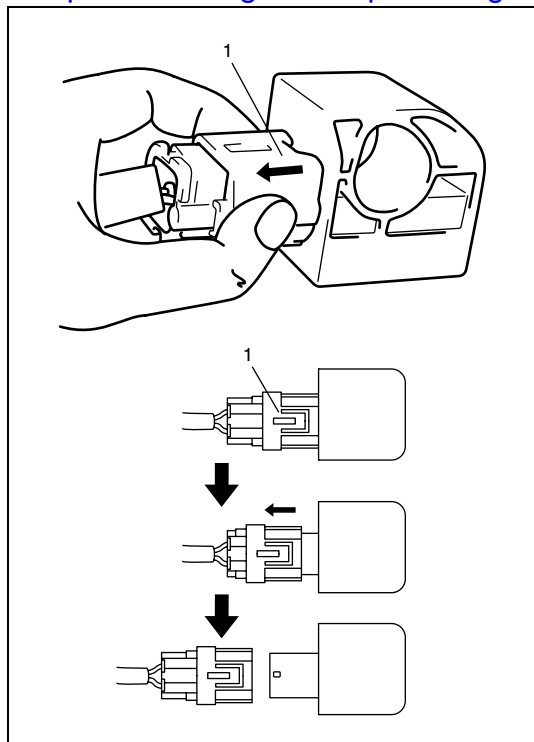
During service procedures, be very careful when handling a sensor.

- **Never strike or jar a sensor.**
- **Under some circumstance, it could cause improper operation of the air bag system. A sensor bolt must be carefully torqued to assure proper operation.**

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disable air bag system. Refer to “DISABLING AIR BAG SYSTEM” in this section.
- 3) Remove center pillar lower trim and side sill scuff.
- 4) Turn up floor carpet at front seat side.
- 5) Remove side sensor bolt (1) and side sensor (2) from under body (3).



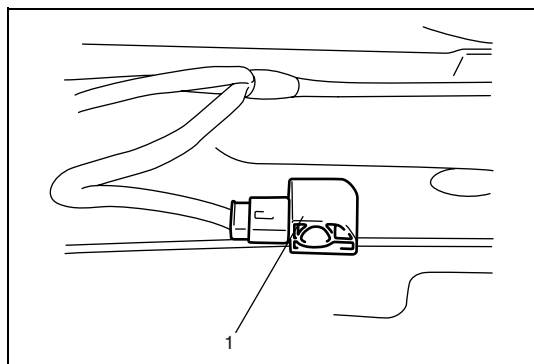


- 6) Disconnect side sensor connector sliding connector outer (1) as shown.

INSPECTION

CAUTION:

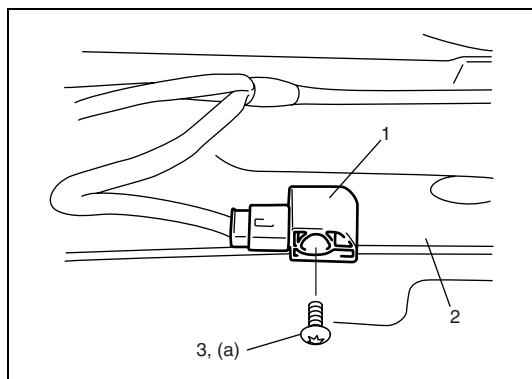
- **Never disassemble side sensor.**
- **Sensor should be replaced when it was dropped from a height of 90 cm (3 ft) or more.**



- Check sensor (1) for dents, crack, deformation.
 - Check sensor connector (sensor side and harness side), lock mechanism or sensor lead wire for damage, crack, scorching or melting.
 - Check connector terminals for bent, corrosion or rust.
- If any faulty condition is found in above checks, replace.

INSTALLATION**CAUTION:**

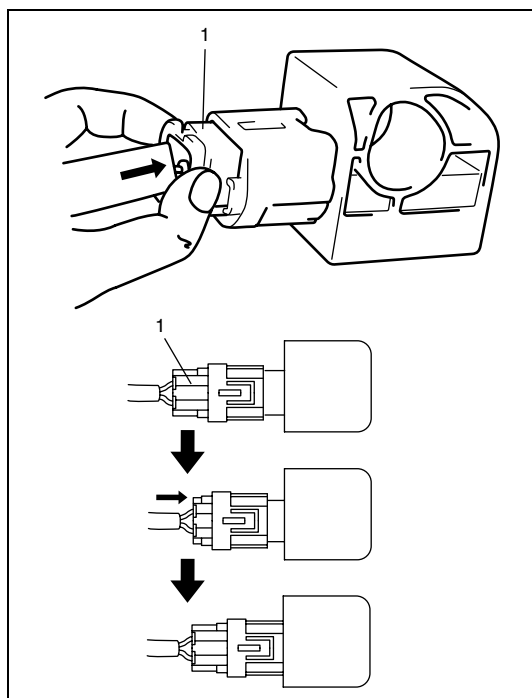
Proper operation of side sensor requires sensor be rigidly attached to vehicle structure.



- 1) Check that none of following faulty conditions exists.
 - Bend, deformity or rust of under body.
 - Foreign matter on mating surface of sensor.
- 2) Install side sensor (1) on under body (2) and tighten side sensor bolt (3) to specified torque.

Tightening torque

Side sensor bolt (a) : 9 N·m (0.9 kg-m, 6.5 lb-ft)



- 3) Push connector inner (1) until side sensor is connected as shown.

- 4) Connect negative cable at battery.
- 5) Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in this section.

Seat Belt Pretensioner

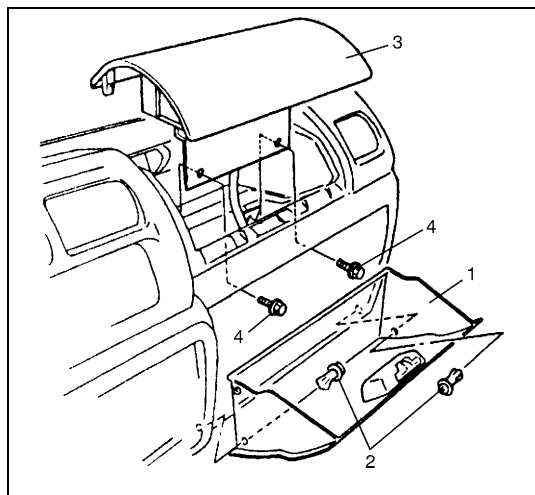
Refer to “FRONT SEAT BELT” in Section 10 for removal, inspection and installation.

Passenger Air Bag (Inflator) Module (if equipped)

WARNING:

- Never attempt to disassemble or repair the passenger air bag (inflator) module. If any abnormality is found, be sure to replace it with new one as an assembly.
- Be sure to read “SERVICE PRECAUTIONS” before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.

REMOVAL



- 1) Disconnect negative cable at battery.
- 2) Open glove box (1) and remove clips (2).
- 3) Press and unhook stoppers and then remove glove box (1).
- 4) Disable air bag system. Refer to “DISABLING AIR BAG SYSTEM” in this section.
- 5) Remove passenger air bag (inflator) module attaching bolts (4), and then remove passenger air bag (inflator) module (3) from vehicle.

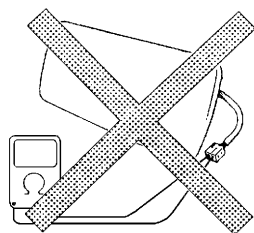
INSPECTION

WARNING:

Never measure resistance of passenger air bag (inflator) module or disassemble it. Otherwise personal injury may result.

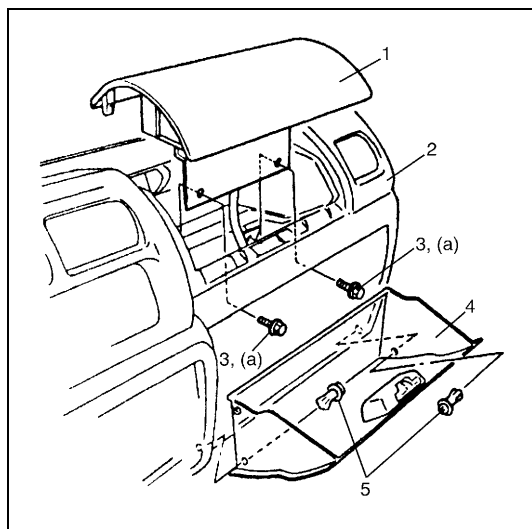
CAUTION:

If air bag (Inflator) module was dropped from a height of 90 cm (3 ft) or more, it should be replaced.



Check air bag (inflator) module appearance visually for following symptoms and if any one of them is applicable, replace with a new one.

- Air bag has deployed.
- There is a crack in trim cover (pad surface).
- Wire harness or connector is damaged.
- Air bag (inflator) module is damaged or a strong impact was applied to it.

INSTALLATION

- 1) Install passenger air bag (inflator) module (1) to instrument panel (2).
- 2) Tighten passenger air bag (inflator) module attaching bolts (3) to specified torque.

Tightening torque**Passenger air bag (inflator) module mounting bolt****(a) : 23 N·m (2.3 kg-m, 16.5 lb-ft)**

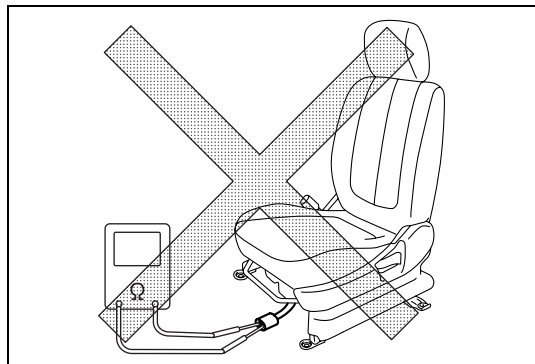
- 3) Set glove box (4) to original position of instrument panel (2) and install clips (5).
- 4) Connect negative cable to battery.
- 5) Enable air bag system. Refer to "ENABLING AIR BAG SYSTEM" in this section.

Side Air Bag (Inflator) Module (If Equipped)

WARNING:

- Never attempt to disassemble front seat back. It is impossible to remove side air bag (inflator) module from front seat back. If any abnormality is found, be sure to replace front seat back with new one as an assembly referring to "FRONT SEAT" in Section 9.
- Be sure to read "SERVICE PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.

INSPECTION



WARNING:

Never measure resistance of side air bag (inflator) module or disassemble it. Otherwise personal injury may result.

Check air bag (inflator) module appearance visually for following symptoms and if any one of them is applicable, replace with a new seat back, referring to "FRONT SEAT" in Section 9.

- Air bag has deployed.
- There is a bend or damage in front seat back.
- Wire harness or connector is damaged or tightness.

Driver Air Bag (Inflator) Module

Refer to "DRIVER AIR BAG (INFLATOR) MODULE" in Section 3C for removal, inspection and installation.

Contact Coil and Combination Switch Assembly

Refer to "CONTACT COIL AND COMBINATION SWITCH ASSEMBLY" in Section 3C for removal, inspection and installation.

Seat Belt Pretensioner

Refer to "FRONT SEAT BELT WITH PRETENSIONER" in Section 10 for removal, inspection and installation.

Air Bag (Inflator) Module and Seat Belt Pretensioner Disposal

WARNING:

Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which may cause personal injury.

Do not dispose of live (undeployed) air bag (inflator) modules and seat belt pretensioners. Because undeployed air bag (inflator) module/inactivated seat belt pretensioner must not be disposed of through normal refuse channels.

Undeployed air bag (inflator) module and inactivated seat belt pretensioner contain substances that can cause severe illness or personal injury if sealed container is damaged during disposal.

Air bag (inflator) module/seat belt pretensioner can be deployed/activated inside or outside of vehicle. Deployment/Activation method used depends upon final disposition of vehicle. Review the following instructions in order to determine which will work best in a given situation.

Deployment/Activation Outside of Vehicle :

When you intend to return vehicle to service, deploy air bag (inflator) module(s) or activate seat belt pretensioner(s) outside of vehicle.

Deployment/Activation Inside of Vehicle :

When vehicle will be destroyed, or salvaged for component parts, deploy air bag modules and/or activate seat belt pretensioners installed on vehicle.

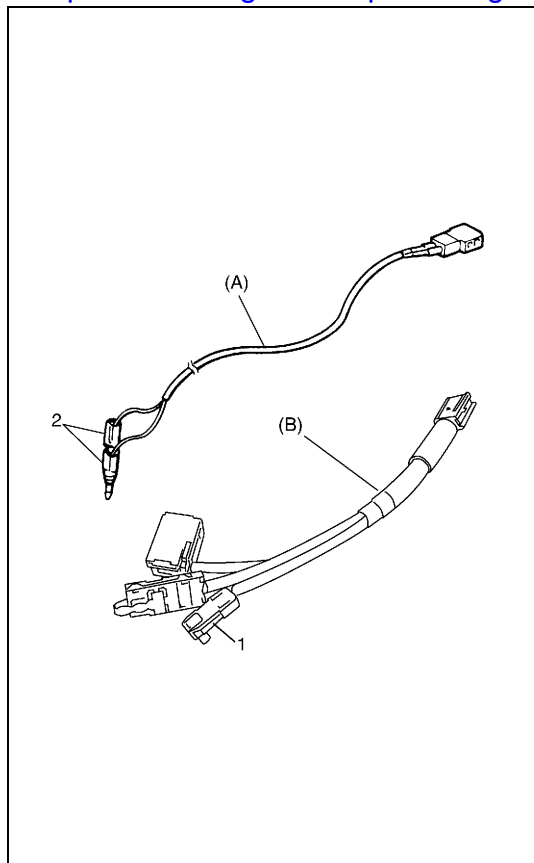
WARNING:

The following precautions must be observed for this work. Failure to observe any of them may result in personal injury.

- Procedure should be followed strictly as described here.
- Be sure to read "SERVICE PRECAUTIONS" beforehand.
- To avoid accidental deployment/activation, this work should be performed by no more than one person.
- Since smoke is produced when air bag (inflator) module is deployed and pretensioner is activated, select well-ventilated area.
- Air bag (inflator) module and seat belt pretensioner will immediately deploy/activate when 12 volts vehicle battery is connected to it. Wear safety glasses throughout this entire deployment/activation and disposal procedure.
- Wear suitable ear protection when deploying air bag (inflator) module/activating seat belt pretensioner. Also, advise those who are in area close to deployment/activation site to wear suitable ear protection.
- Do not deploy/activate two or more air bag system components (air bag (inflator) modules and seat belt pretensioners) at the same time.
- Never connect deployment harness to any 12 volts vehicle battery before connecting deployment harness to air bag (inflator) module and seat belt pretensioner. Deployment harness shall remain shorted and not be connected to 12 volts vehicle battery till you are ready to deploy air bag (inflator) module or activate seat belt pretensioner.

Deployment/Activation Outside of Vehicle

When you intend to return vehicle to service, deploy air bag (inflator) module(s) or activate seat belt pretensioner(s) outside of vehicle.



- 1) Turn ignition switch to "LOCK" position and remove key.
- 2) Wear safety glasses during this deployment/activation procedure.
- 3) Check that there is no open, short or damage in special tools (deployment harness (A) and adapter cable (B)). If any faulty is found, do not use it and be sure to use new deployment harness.

Special tool

(A) : 09932-75030

(B) : 09932-78320

NOTE:

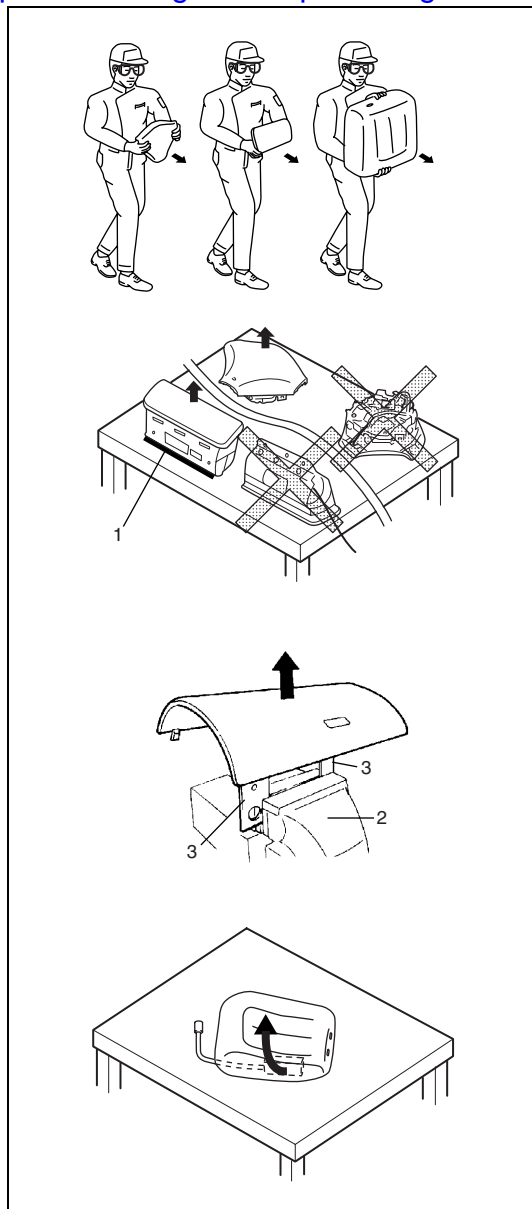
If faulty of seat belt pretensioner connector (1) of adapter cable (B) is found, replace it to spare connector (special tool)

- 4) Short two deployment harness leads (2) together by fully seating one banana plug into the other.

WARNING:

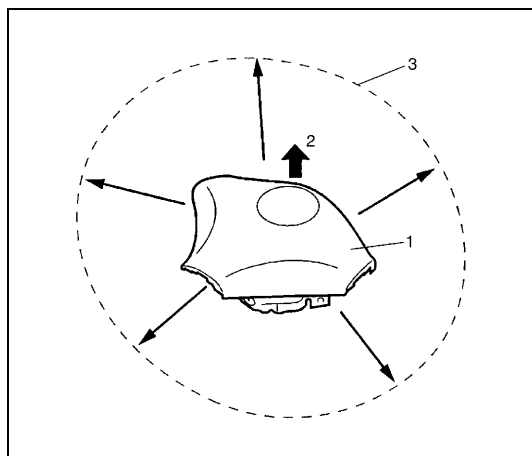
Deployment harness (A) shall remain shorted and not be connected to 12 volts vehicle battery till you are ready to deploy air bag module or activate seat belt pretensioner.

- 5) Remove air bag (inflator) module(s) or seat belt pretensioner(s) as follows.
 - For driver air bag (inflator) module
Remove driver air bag (inflator) module from steering wheel referring to "Driver Air Bag (inflator) Module" in Section 3C.
 - For passenger air bag (inflator) module
Remove passenger air bag (inflator) module from instrument panel referring to "Passenger Air Bag (inflator) Module" in this section.
 - For side air bag (inflator) module
Remove seat back (side air bag (inflator) module) from front seat referring to "Front Seat and Rear Seat" in Section 9.
 - For seat belt pretensioner
Remove seat belt pretensioner from vehicle referring to "Front Seat Belt with Pretensioner" in Section 10.

**WARNING:**

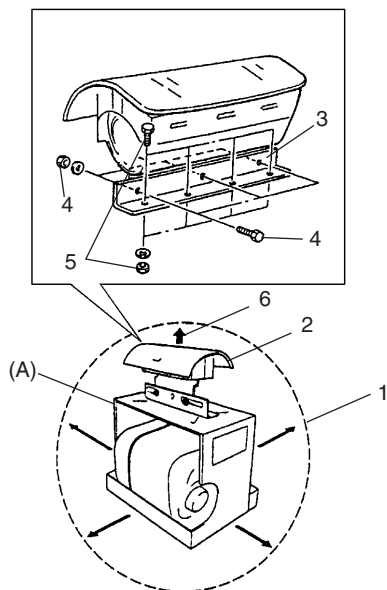
- For handling and storage of air bag (inflator) module and seat belt pretensioner, select place where ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Always carry live air bag (inflator) module with trim cover away from you.
- When storing live air bag (inflator) module or when leaving live air bag (inflator) module unattended on bench or other surface, always face air trim cover up and away from surface. As live passenger air bag (inflator) module must be placed with its trim cover facing up, place it on workbench with slit (1) or use workbench vise (2) to hold it securely at its lower mounting bracket (3).
- This is necessary so that free space is provided to allow air bag to expand in the unlikely event of accidental deployment.
- Never carry seat belt pretensioner by webbing.
- When placing live seat belt pretensioner on workbench or other surface, be sure not to put something on seat belt pretensioner.

Failure to follow procedures may result in personal injury.



6) Set air bag (inflator) module or seat belt pretensioner as follows.

- For driver air bag (inflator) module
 - a) Clear space (3) on ground about 185 cm (6 ft) in diameter where driver air bag (inflator) module (1) for deployment. Paved, outdoor location where there is no activity is preferred. If outdoor location is not available, space on shop floor where there is no activity and provide sufficient ventilation. Ensure no loose or flammable objects are within deployment area.
 - b) Place driver air bag (inflator) module (1) with its vinyl trim cover facing up (2) on ground in step i).



- For passenger air bag (inflator) module
 - a) Clear space (1) on ground about 185 cm (6 ft) in diameter where passenger air bag (inflator) module for deployment. Paved, outdoor location where there is no activity is preferred. If outdoor location is not available, space on shop floor where there is no activity and provide sufficient ventilation. Ensure no loose or flammable objects are within deployment area.
 - b) Place deployment fixture (A) on ground in step i).

Special tool**(A) : 09932-75041**

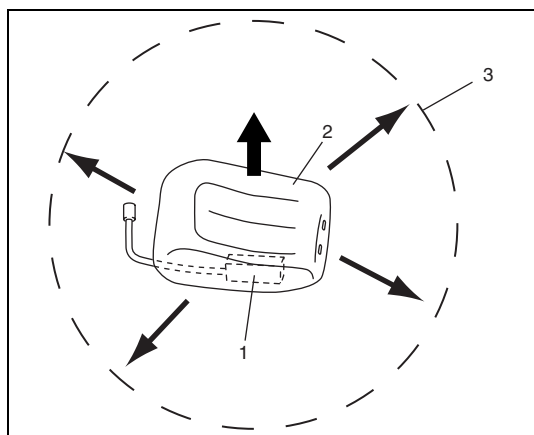
- c) Fill plastic reservoir in deployment fixture (A) with water or sand. This is necessary to provide sufficient stabilization of fixture during deployment.
- d) Attach passenger air bag (inflator) module (2) in deployment fixture (A) using mounting attachment (3), hold-down bolts & nuts (4) and M8 bolts & nuts (5).

NOTE:

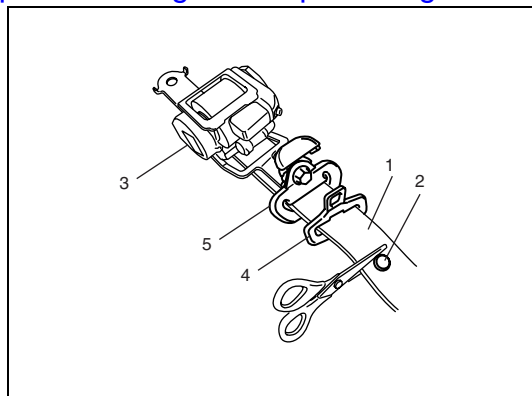
Make sure that deploying direction (6) faces as shown in figure against mounting attachment (3).

CAUTION:

Be sure to use M8 size and 7T strength bolts and nut (5) for fixing passenger air bag (inflator) module (2) to mounting attachment (3).



- For side air bag (inflator) module
 - a) Clear space (3) on ground about 185 cm (6 ft) in diameter where side air bag (inflator) module (1) for deployment. Paved, outdoor location where there is no activity is preferred. If outdoor location is not available, space on shop floor where there is no activity and provide sufficient ventilation. Ensure no loose or flammable objects are within deployment area.
 - b) Place front seat back (2) with side air bag (inflator) module (1) with its frontal seat cover facing up on ground in step i).

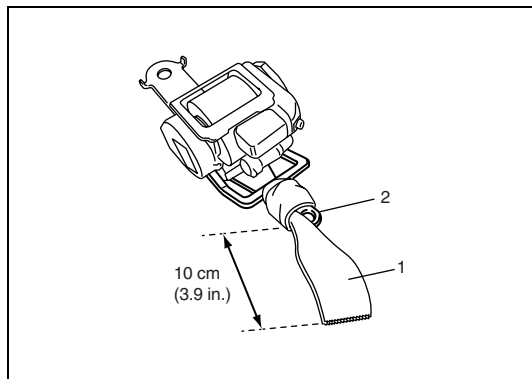


- For seat belt pretensioner
- a) Cut webbing (1) at tongue plate stopper (2) of seat belt pretensioner (3) side as shown.

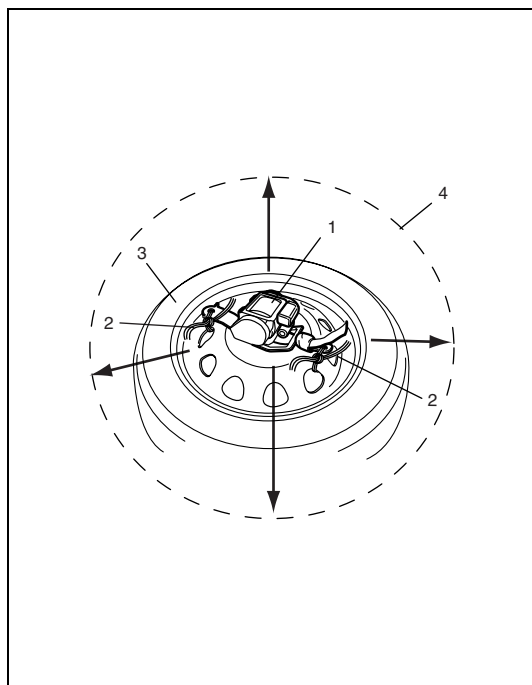
NOTE:

Hold seat belt pretensioner (3) vertically in the same condition as it is installed. Otherwise, webbing can't be pulled out.

- b) Remove tongue plate (4) and shoulder anchor (5) from webbing (1).



- c) Tie webbing (1) to seat belt pretensioner mounting plate (2) tightly at 10 cm (3.9 in.) from cutting edge as shown.



- d) Tie seat belt pretensioner (1) with wire harness (2) to wheel-installed tire (3) as shown.

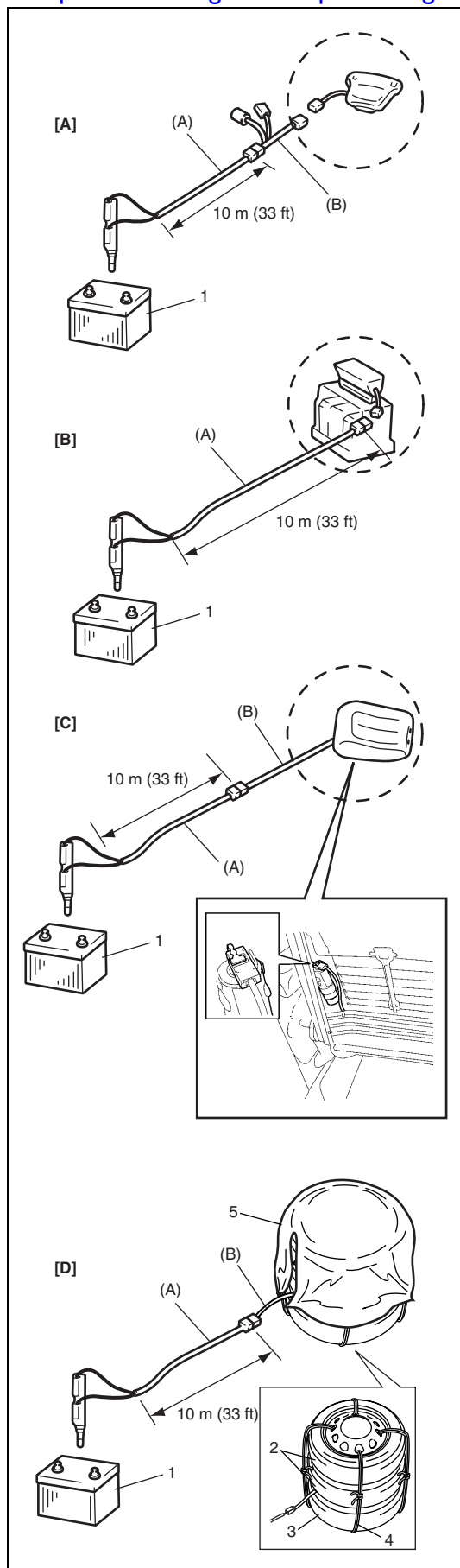
Wire harness specification:

Stripped wire harness section 1.25 mm² (0.0019 in.²) or more (Stripped wire harness diameter 1.25 mm (0.05 in.) or more)

NOTE:

Wind wire harness (2) around at least 3 times.

- e) Clear space (4) on ground about 185 cm (6 ft) in diameter where seat belt pretensioner (1) is to be activated. Paved, outdoor location where there is no activity is preferred. If outdoor location is not available, space on shop floor where there is no activity and provide sufficient ventilation. Ensure no loose or flammable objects are within activation area.
- f) Place wheel-installed tire (3) with seat belt pretensioner (1) on ground in step v).



- 7) Stretch deployment harness (A) from air bag (inflator) module or seat belt pretensioner to its full length 10 m (33 ft).

Special tool

(A): 09932-75030

- 8) Place 12 volts vehicle battery (1) near shorted end of deployment harness (A).
- 9) Verify that area around air bag (inflator) module or seat belt pretensioner is clear of all people and loose or flammable objects.
- 10) Connect adapter cable (B) as follows.

Special tool

(B): 09932-78320

- For driver air bag (inflator) module :
Verify that driver air bag (inflator) module is resting with its vinyl trim cover facing up, and connect adapter cable (B) to driver air bag (inflator) module.
- For passenger air bag (inflator) module :
Verify that passenger air bag (inflator) module is firmly and properly secured on deployment fixture (special tool).
- For side air bag (inflator) module :
To turn over seat back trim (6) and disconnect side air bag (inflator) module connector (7), then connect adapter cable (B) to side air bag (inflator) module.
- For seat belt pretensioner :
a) Connect adapter cable (B) to seat belt pretensioner.
b) Pile 2 wheel-installed tires (2) on top of tire with seat belt pretensioner (3), and tie them with wire harness (4) as shown.

Wire harness specification:

Stripped wire harness section 1.25 mm² (0.0019 in.²) or more (Stripped wire harness diameter 1.25 mm (0.05 in.) or more)

NOTE:

Wind wire harness (4) around at least 2 times.

- c) Drape blanket (5) over those tires.
- 11) Connect adapter cable (B) to deployment harness (A) and lock connector with lock slider or lock lever.

[A]: For driver air bag (inflator) module

[B]: For passenger air bag (inflator) module

[C]: For side air bag (inflator) module

[D]: For seat belt pretensioner

- 12) Notify all people in immediate area that you intend to deploy/activate air bag (inflator) module or seat belt pretensioner.

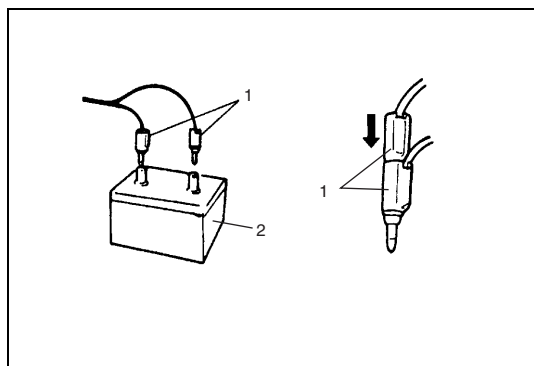
NOTE:

- When air bag (inflator) module deploys and seat belt pretensioner activates, rapid gas expansion will create substantial report. Wear suitable ear protection. Notify all people in immediate area that you intend to deploy air bag (inflator) module or activate seat belt pretensioner and suitable ear protection should be worn.
- When driver air bag (inflator) module deploys, driver air bag (inflator) module may jump about 30 cm (1 ft) vertically. This is normal reaction to force of rapid gas expansion inside of drive air bag (inflator) module.
- After air bag (inflator) module has been deployed, surface of air bag (inflator) may contain powdery residue. This powder consists primarily of cornstarch (used to lubricate bag (inflator) as it inflates) and byproducts of chemical reaction.

WARNING:

- Do not place deployed air bag (inflator) module and activated seat belt pretensioner near any flammable objects.
- Do not apply water, oil, etc. to deployed air bag (inflator) module and activated seat belt pretensioner.
- Wait for about 30 minutes before touching any metal surface of air bag (inflator) module or seat belt pretensioner module. Disregarding these precautions may cause fire or personal injury.

Failure to follow procedures may result in fire or personal injury.

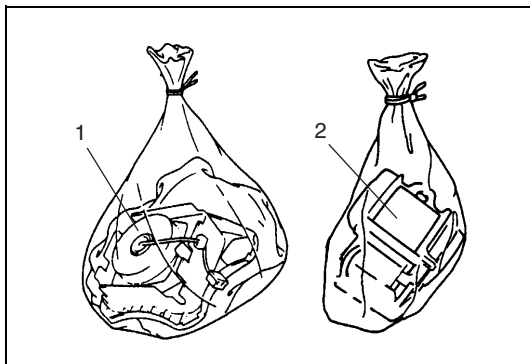


- 13) Separate two banana plugs (1) on deployment harness.
- 14) Connect deployment harness to 12 volts vehicle battery (2). This will immediately deploy or activate air bag (inflator) module or seat belt pretensioner.
- 15) Disconnect deployment harness from 12 volts vehicle battery (2) and short two deployment harness leads together by fully seating one banana plug into the other.
- 16) In the unlikely event that air bag (inflator) module or seat belt pretensioner did not deploy/activate after following these procedures, proceed immediately with Step 22) through 25). If air bag (inflator) module or seat belt pretensioner did deploy or activate, proceed with Steps 17) through 21).
- 17) Put on pair of shop gloves to protect your hands from possible irritation and heat when handling deployed air bag (inflator) module or activated seat belt pretensioner.

- 18) Disconnect adapter cable (special tool) from air bag (inflator) module or seat belt pretensioner as soon as possible. This will prevent adapter cable (special tool) from damage due to possible contact with hot air bag (inflator) module or hot seat belt pretensioner.
- 19) Check adapter cable connector as follows.
 - For air bag (inflator) module
Air bag (inflator) module connector of adapter cable (special tool) are designed to be reused. However they should be inspected for damage after deployment. Replace it with new adapter cable (special tool), if necessary.
 - For seat belt pretensioner
Seat belt pretensioner connector of adapter cable (special tool) should be inspected for damage when seat belt pretensioner is activated. Replace it with spare connector (special tool), if necessary.

NOTE:

Do not reuse faulty seat belt pretensioner connector of adapter cable (special tool) because it can be destroyed by shock when seat belt pretensioner is activated.



- 20) Dispose of deployed air bag (inflator) module (1) or activated seat belt pretensioner (2) through normal refuse channels after it has cooled for at least 30 minutes and tightly seal air bag (inflator) module (1) or seat belt pretensioner (2) in strong vinyl bag. (Refer to “Deployed Air Bag (Inflator) Module and Activated Seat Belt Pretensioner Disposal” in detail.)
- 21) Wash your hands with mild soap and water afterward.

NOTE:

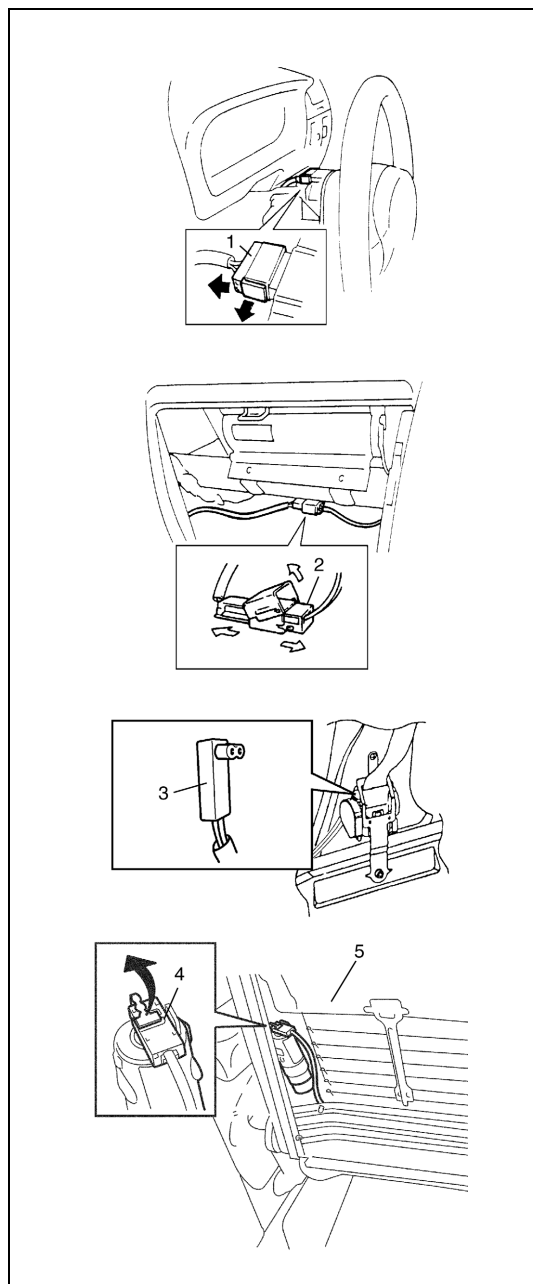
Remaining steps are to be followed in the unlikely event that air bag (inflator) module did not deploy or seat belt pretensioner did not activate.

- 22) Ensure that deployment harness has been disconnected from 12 volts vehicle battery and that its two banana plugs have been shorted together by fully seating one banana plug into the other.
- 23) Disconnect deployment harness and adapter cable (special tool) from air bag (inflator) module and seat belt pretensioner.
- 24) Temporarily store undeployed air bag (inflator) module or inactivated seat belt pretensioner referring to “Service Precautions” for details.
- 25) Contact your local distributor for further assistance.

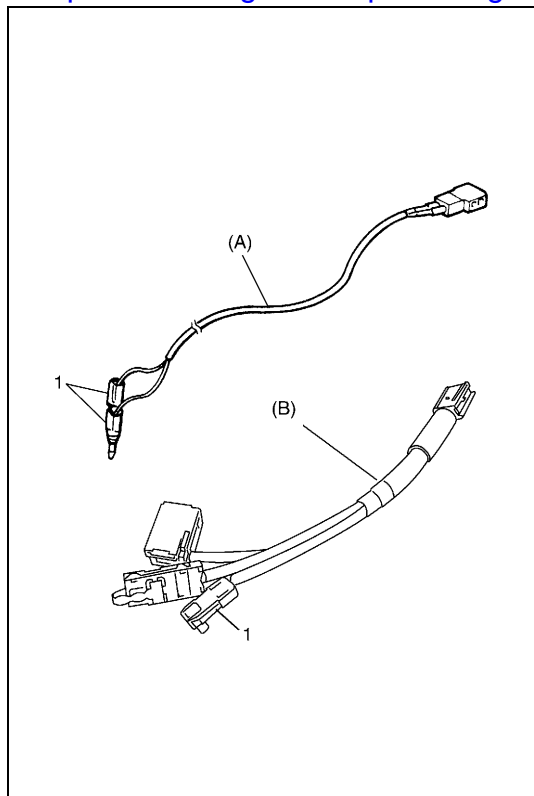
Deployment/Activation Inside of Vehicle

When vehicle will be destroyed, or salvaged for component parts, deploy air bag modules and/or activate seat belt pretensioners installed on vehicle.

- 1) Turn ignition switch to "LOCK" position, remove key and put on safety glasses.
- 2) Remove all loose objects from front seats and instrument panel.
- 3) Disconnect air bag (inflator) module or seat belt pretensioner connector as follows.
 - a) For driver air bag (inflator) module
Remove steering column upper and lower covers, then disconnect contact coil connector (1) located behind steering wheel.
 - b) For passenger air bag (inflator) module
Remove glove box from instrument panel and disconnect passenger air bag (inflator) module connector (2).
 - c) For seat belt pretensioner
Remove both side (driver and passenger side) center pillar lower trims and disconnect seat belt pretensioner connectors (3).
 - d) For side air bag (inflator) module
To turn over driver and passenger side seat back trims (5) and disconnect side air bag (inflator) module connectors (4).
- 4) Confirm that each air bag (inflator) module/seat belt pretensioner is securely mounted.



[A] :	For driver air bag (inflator) module
[B] :	For passenger air bag (inflator) module
[C] :	For seat belt pretensioner
[D] :	For side air bag (inflator) module



- 5) Check that there is no open, short or damage in special tools (deployment harness (A) and adapter cable (B)). If any faulty condition is found, do not use it and be sure to use new deployment harness (A) and/or adapter cable (B).

NOTE:

If faulty of seat belt pretensioner connector (1) of adapter cable (B) is found, replace it to spare connector (special tool).

Special tool

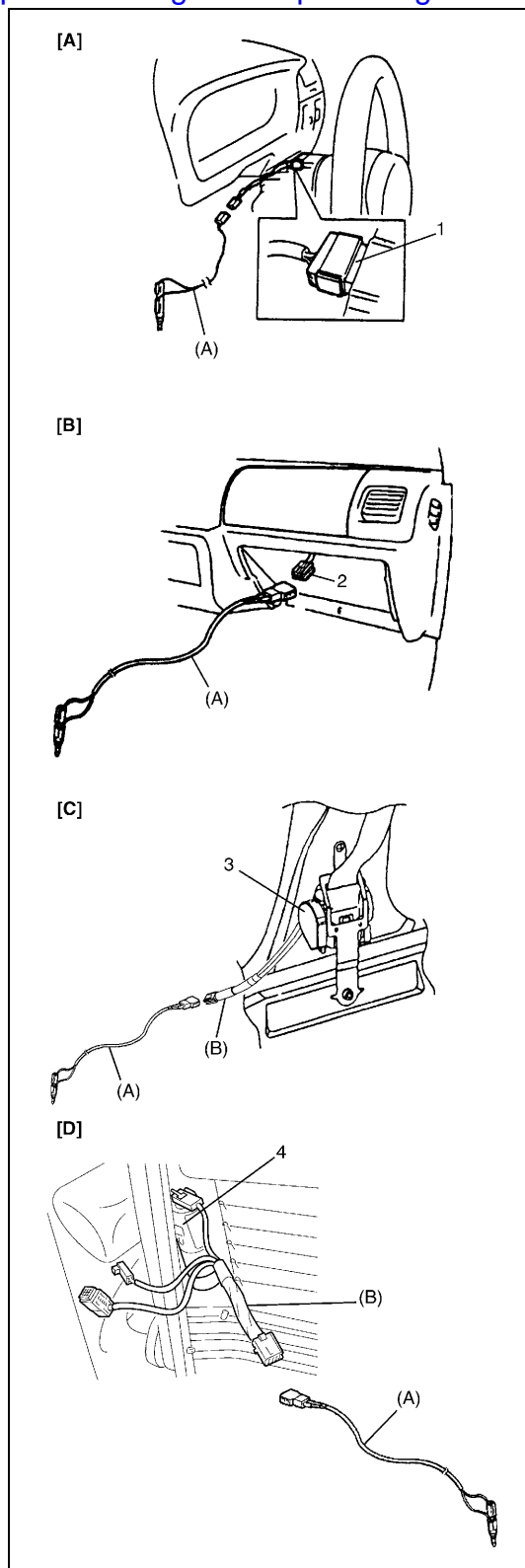
(A) : 09932-75030

(B) : 09932-78320

- 6) Short two deployment harness leads (1) together by fully seating one banana plug into the other.

WARNING:

Deployment harness (A) shall remain shorted and not be connected to 12 volts vehicle battery until you are ready to deploy air bag (inflator) module or activate seat belt pretensioner.



7) Connect deployment harness (A) and/or adapter cable (B) to air bag (inflator) module or seat belt pretensioner as follows.

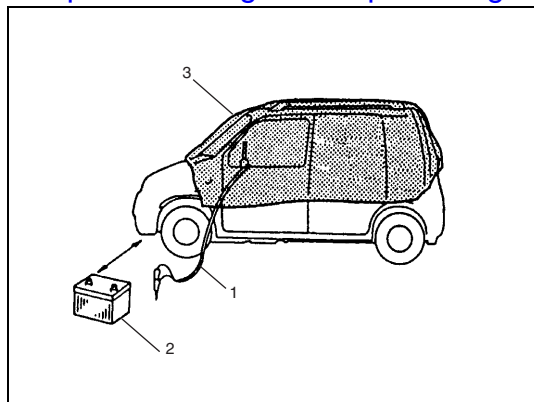
Special tool

(A) : 09932-75030

(B) : 09932-78320

- For driver air bag (inflator) module
Connect adapter cable (B) to deployment harness (A) and lock connectors with lock slider.
Connect adapter cable (B) in series with deployment harness (A) to contact coil connector (1) located behind steering wheel.
- For passenger air bag (inflator) module
Connect deployment harness (A) to passenger air bag (inflator) module connector (2) till click can be heard.
- For seat belt pretensioner
Connect adapter cable (B) to deployment harness (A) and lock connectors with lock slider.
Connect adapter cable (B) in series with deployment harness (A) to seat belt pretensioner (3).
- For side air bag (inflator) module
Connect adapter cable (B) to deployment harness (A) and lock connector with lock lever.
Connect adapter cable (B) in series with deployment harness (A) to side air bag (inflator) module (4).

[A] :	For driver air bag (inflator) module
[B] :	For passenger air bag (inflator) module
[C] :	For seat belt pretensioner
[D] :	For side air bag module



- 8) Route deployment harness (1) out of vehicle.
- 9) Verify that inside of vehicle and area surrounding vehicle are clear of all people and loose or flammable objects.
- 10) Stretch deployment harness (1) to its full length 10 m (33 ft).
- 11) Place 12 volts vehicle battery (2) near shorted end of deployment harness (1).
- 12) Completely cover windshield area and front door window openings with drop cloth, a blanket or any similar item (3). This reduces possibility of injury due to possible fragmentation of vehicle's glass or interior.
- 13) Notify all people in immediate area that you intend to deploy/activate air bag (inflator) module or seat belt pretensioner.

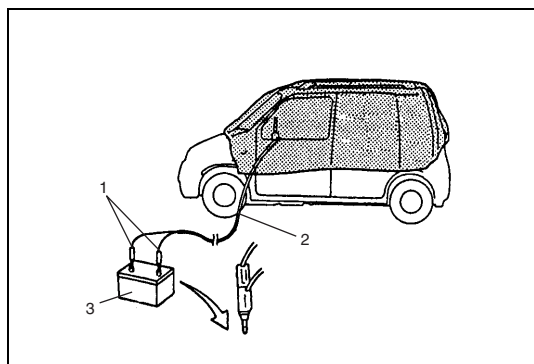
NOTE:

- When air bag (inflator) module deploys or seat belt pretensioner activates, rapid gas expansion will create substantial report. Wear suitable ear protection. Notify all people in immediate area that you intend to deploy air bag (inflator) module or to activate seat belt pretensioner and suitable ear protection should be worn.
- After air bag (inflator) module has been deployed, surface of air bag may contain powdery residue. This powder consists primarily of cornstarch (used to lubricate air bag (inflator) module as it inflates) and by-products of chemical reaction.

WARNING:

- Do not place deployed air bag (inflator) module and activated seat belt pretensioner near any flammable objects.
- Do not apply water, oil, etc. to deployed air bag (inflator) module and activated seat belt pretensioner.
- Wait for about 30 minutes before touching any metal surface of air bag (inflator) module or seat belt pretensioner module. Disregarding these precautions may cause fire or personal injury.

Failure to follow procedures may result in fire or personal injury.



- 14) Separate two banana plugs (1) on deployment harness (2).
- 15) Connect deployment harness (2) to 12 volts vehicle battery (3). This will immediately deploy or activate air bag (inflator) module or seat belt pretensioner.
- 16) Disconnect deployment harness (2) from 12 volts vehicle battery (3) and short two deployment harness leads together by fully seating one banana plug into the other.

- 17) Repeat Steps 2) through 16) to deploy/activate air bag (inflator) modules and seat belt pretensioners which has not been deployed/activated, if any.
- 18) In the unlikely event that air bag (inflator) module and seat belt pretensioner after following these procedures, proceed immediately with Step 24) through 26). If air bag (inflator) module and seat belt pretensioner did deploy/activate, proceed with Steps 19) through 23).
- 19) Carefully remove drop cloth from vehicle and clean off any fragments or discard it entirely.
- 20) Put on pair of shop gloves to protect your hands from possible irritation and heat when handling deployed air bag (inflator) module and activated seat belt pretensioner.
- 21) Disconnect adapter cable (special tool) from air bag (inflator) module or seat belt pretensioner as soon as possible. This will prevent adapter cable (special tool) from damage due to possible contact with hot air bag (inflator) module or hot seat belt pretensioner.
- 22) Check adapter cable connector as follows.
 - For air bag (inflator) module :
Air bag (inflator) module connector of adapter cable (special tool) are designed to be reused. However they should be inspected for damage after deployment. Replace it with new deployment harness, if necessary.
 - For seat belt pretensioner :
Seat belt pretensioner connector of adapter cable (special tool) should be inspected for damage when seat belt pretensioner is activated. Replace it with spare connector (special tool), if necessary.

NOTE:

Do not reuse faulty seat belt pretensioner connector of adapter cable (special tool) because it can be destroyed by shock when seat belt pretensioner is activated.

- 23) With air bag (inflator) modules deployed and seat belt pretensioners activated, vehicle may be scrapped in the same manner as non-air bag system/seat belt pretensioner equipped vehicle.

NOTE:

Remaining steps are to be followed in the unlikely event that air bag (inflator) module did not deploy or seat belt pretensioner did not activate.

- 24) Remove undeployed air bag (inflator) module(s) and/or inactivated seat belt pretensioner(s) from vehicle as follows.
 - For driver air bag (inflator) module :
Remove driver air bag (inflator) module from steering wheel referring to "Driver Air Bag (inflator) Module" in Section 3C.

- For passenger air bag (inflator) module :
Remove passenger air bag (inflator) module from instrument panel referring to “Passenger Air Bag (inflator) Module” in this section.
 - For side air bag (inflator) module :
Remove seat bag (side air bag (inflator) module) from front seat referring to “Front Seat and Rear Seat” in Section 9.
 - For seat belt pretensioner :
Remove seat belt pretensioner from vehicle referring to “Front Seat Belt with Pretensioner” in Section 10.
- 25) Temporarily store undeployed air bag (inflator) module and/or inactivated seat belt pretensioner referring to “SERVICE PRECAUTIONS” for details.
- 26) Contact your local distributor for further assistance.

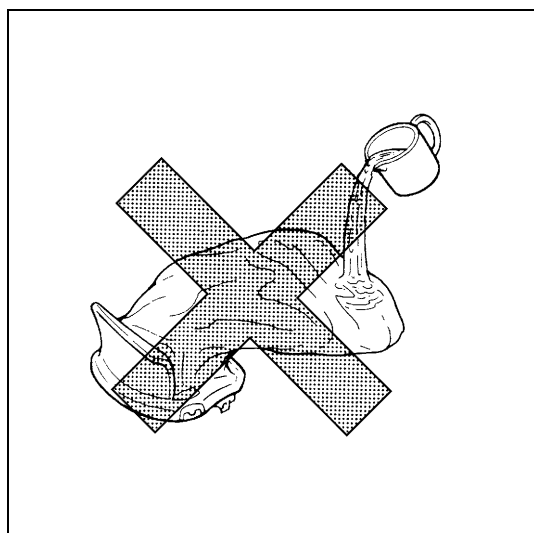
Deployed Air Bag (Inflator) Module and Activated Seat Belt Pretensioner Disposal

WARNING:

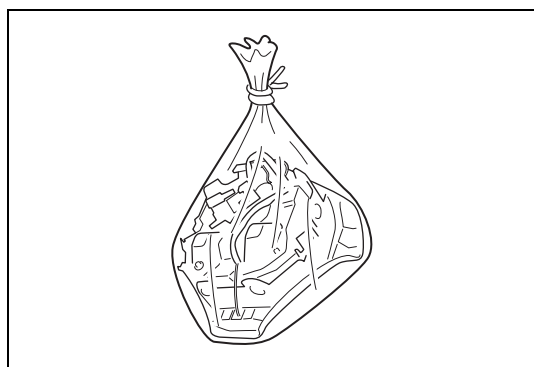
Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which may cause personal injury. Undeployed air bag (inflator) module and inactivated seat belt pretensioner must not be disposed of through normal refuse channels.

Undeployed air bag (inflator) module and inactivated seat belt pretensioner contains substances that can cause severe illness or personal injury if sealed container is damaged during disposal.

Deployed air bag (inflator) module and activated seat belt pretensioner can be disposed of through normal refuse channels just like any other parts. For their disposal, however, following points should be noted.



- Air bag (inflator) module and seat belt pretensioner immediately after deployment/activation is very hot. Wait for 30 minutes to cool it off before handling it.
- Never apply water, oil, etc. to deployed air bag (inflator) module and activated seat belt pretensioner to cool it off and be careful so that water, oil etc. does not get on deployed air bag (inflator) module and activated seat belt pretensioner.
- After air bag (inflator) module has been deployed, surface of air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate air bag (inflator) module as it inflates) and by-products of chemical reaction. As with many service procedures, you should wear gloves and safety glasses.

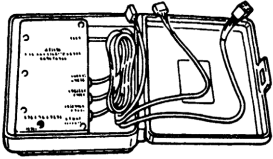
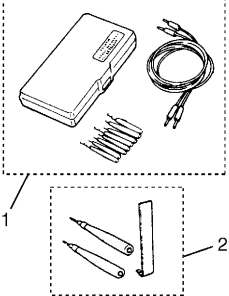
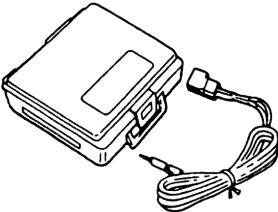
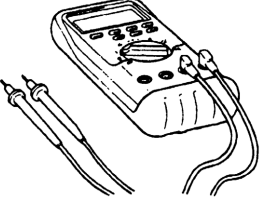
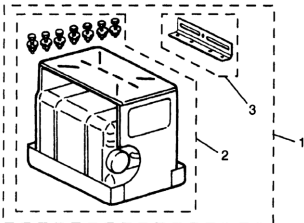
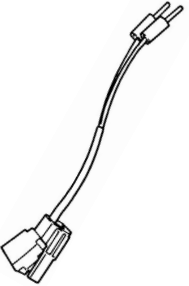
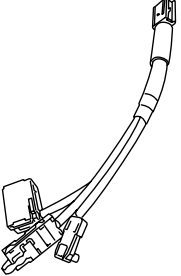
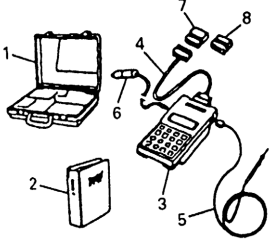
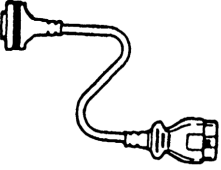
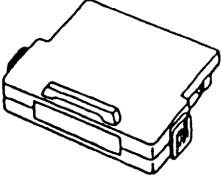
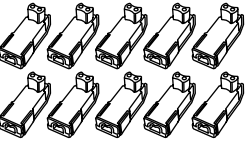
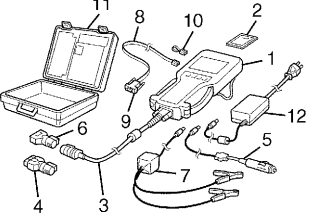


- When disposing of deployed air bag (inflator) module and activated seat belt pretensioner, be sure to seal it in a vinyl bag.
- When air bag (inflator) module and seat belt pretensioner have been deployed/activated inside of vehicle which is going to be scrapped, leave them as installed to vehicle.
- Be sure to wash your hands with mild soap and water after handling it.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
SDM mounting bolt	7	0.7	5.0
Passenger air bag (inflator) module bolt	23	2.3	16.5
Side sensor bolt	9	0.9	6.5

Special Tool

 <p>09932-75010 Air bag load tool</p>	 <p>09932-76010 Connector test adapter set (See NOTE "E".)</p>	 <p>09932-75031 Air bag deployment harness</p>	 <p>Digital multimeter (See NOTE "A" and WARNING.)</p>
 <p>09932-75041 Passenger air bag (inflator) module deployment fixture</p>	 <p>09932-78310 Adapter cable</p>	 <p>09932-78320 Deployment adapter cable</p>	 <p>09931-76011 SUZUKI scan tool (Tech 1A) kit (See NOTE "C".)</p>
 <p>09931-76030 16/14 pin DLC cable</p>	 <p>Mass storage cartridge for Tech 1A</p>	 <p>09932-75420 Spare connector (See NOTE "D".)</p>	 <p>Tech 2 kit (SUZUKI scan tool) (See NOTE "F".)</p>

WARNING:

Be sure to use the specified digital multimeter. Otherwise, air bag deployment or personal injury may result.

NOTE:

- “A” : Digital multimeter for which the maximum test current is 10 mA or less at the minimum range of resistance measurement.
- “B” : 1. 09932-75041 (PAB deployment fixture) or 2. 09932-75040 (PAB deployment fixture) and 3. 09932-75050 (PAB deployment fixture bracket) PAB : Passenger air bag (inflator) module.
- “C” : This kit includes the following items and substitutes for the Tech 2 kit.
1. Storage case, 2. Operator’s manual, 3. Tech 1A, 4. DLC cable, 5. Test lead/probe, 6. Power source cable, 7. DLC cable adapter, 8. Self-test adapter.
- “D” : These connector are spare connector for adaptor cable (09932-78320).
- “E” : This set includes the following items.
1. Connector test adapter kit (09932-75020), 2. Connector test adapter & shorting bar release tool (09932-76020)
- “F” : This kit includes the following items and substitutes for the Tech 1A kit.
1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

Prepared by
MAGYAR SUZUKI CORPORATION
Service Department

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IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

This service manual is intended for authorized Suzuki dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.

Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and/or seat belt with pretensioner) beforehand to avoid component damage or unintended activation.

Foreword

This SUPPLEMENTARY SERVICE MANUAL is a supplement to RB413 SERVICE MANUAL. It has been prepared exclusively for the following applicable model.

Applicable model: RB310/RB413 of and after the vehicle identification number below.

☒ TSM MMA93S00 210001 ☒
☒ TSM MMB53S00 210001 ☒
☒ TSM MMA53S00 210001 ☒
☒ TSM MMA53S30 210001 ☒

If describes only different service information of the above applicable model as compared with RB413 SERVICE MANUAL. Therefore, whenever servicing the above applicable model, consult this supplement first. And for any section, item or description not found in this supplement, refer to the related service manual below.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

RELATED MANUAL:

Manual Name	Manual No.
RB413 SERVICE MANUAL	99500-83E00-01E
Wagon R+ (RB413) SUPPLEMENTARY SERVICE MANUAL	99501U83E00-01E
RB310 SERVICE MANUAL	99500U83E10-01E
Wagon R+ (RB310/RB413) SUPPLEMENTARY SERVICE MANUAL	99501U83E10-01E
RB310/413 WIRING DIAGRAM MANUAL	99512U83E20-669

MAGYAR SUZUKI CORPORATION

SERVICE DEPARTMENT

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NOTE:

For the screen toned sections in the above table, refer to the same section of Service Manual mentioned in FOREWORD of this manual.

SECTION 3E

REAR SUSPENSION

NOTE:

- All suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any suspension part. Replace it with a new part, or damage to the part may result.
- For the item with asterisk (*) in the "CONTENTS" below, refer to the same section of the Service Manual mentioned in "FOREWORD" of this manual.

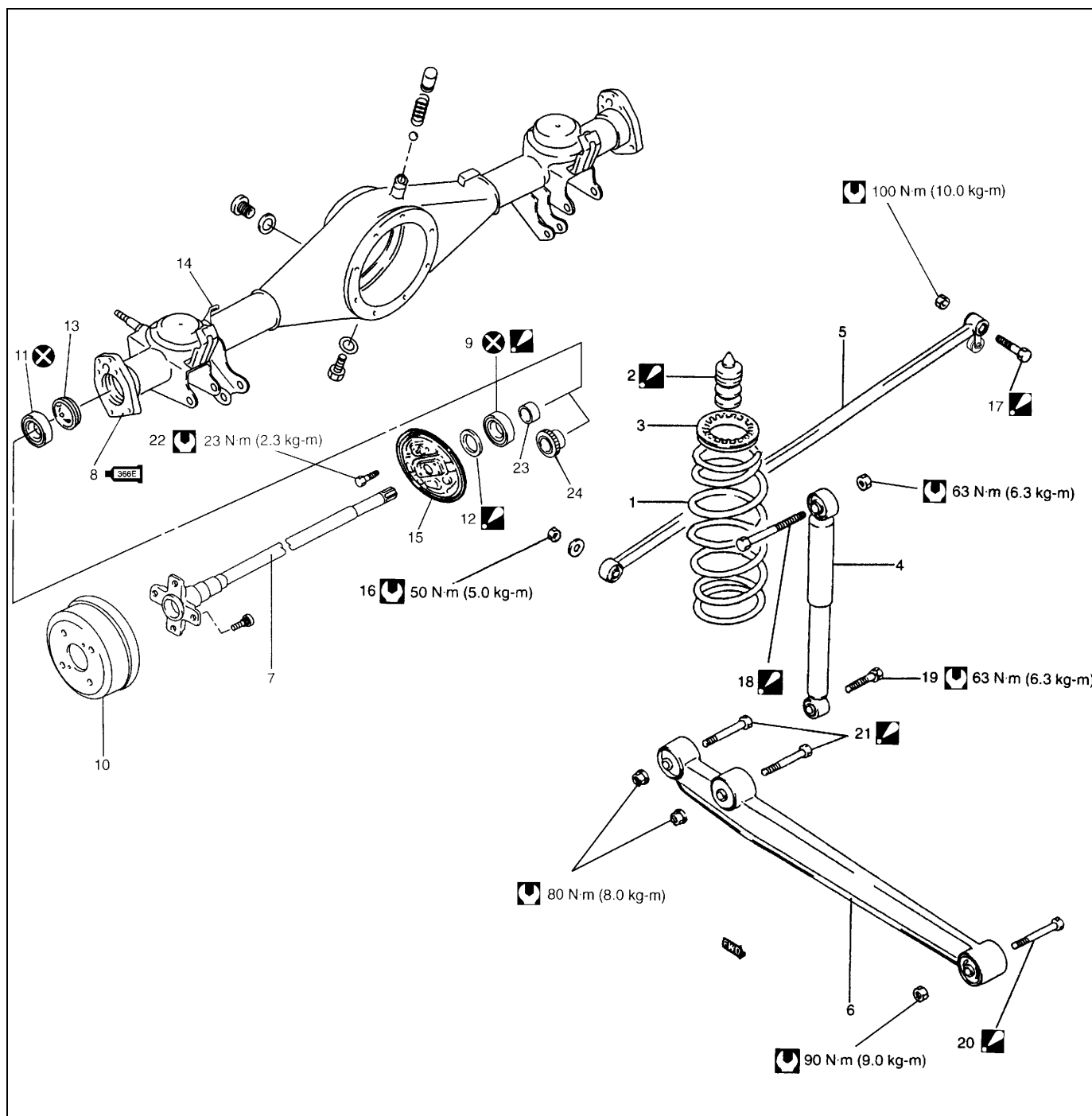
3E

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On-Vehicle Service

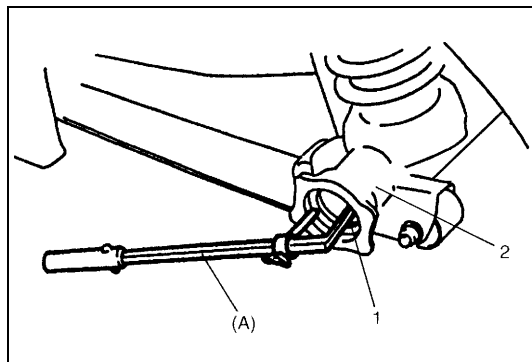


1. Rear coil spring	10. Brake drum	19. Shock absorber lower bolt
2. Rear bump stopper : Apply soap water, when installing.	11. Oil seal	20. Trailing arm front bolt : Insert from vehicle inside.
3. Rear spring upper seat	12. Spacer : The tapered side of spacer inner diameter directed toward outside (brake drum side).	21. Trailing arm rear bolt : Insert from vehicle inside.
4. Rear shock absorber	13. Oil seal protector	22. Brake back plate bolt
5. Lateral rod	14. LSPV bracket (only vehicle with LSPV)	23. Bearing retainer ring (without ABS)
6. Trailing arm	15. Brake back plate	24. Bearing retainer ring (with ABS)
7. Rear axle shaft	16. Lateral rod axle housing side nut	Tightening torque
8. Rear axle housing : Apply water tight sealant 99000-31090 to joint of plate and axle housing.	17. Lateral rod body side bolt : Insert from the direction as shown.	Do not reuse
9. Bearing : Seal side of bearing comes inside of brake drum.	18. Shock absorber upper bolt : Insert from vehicle outside.	

Rear Axle Shaft Oil Seal

REMOVAL

- 1) Remove rear axle shaft. For details, refer to steps 1) to 8) of "REAR AXLE SHAFT AND WHEEL BEARING" in this section.
- 2) Remove rear axle shaft oil seal (1) by using special tool.



Special tool

(A) : 09913-50121

2. Axle housing

INSTALLATION

- 1) Using special tool, drive in new oil seal (1) until it contacts oil seal protector (2) in axle housing.

NOTE:

- Make sure that oil seal is free from inclination as it is installed.
- Refer to figure so that oil seal is installed in proper direction.

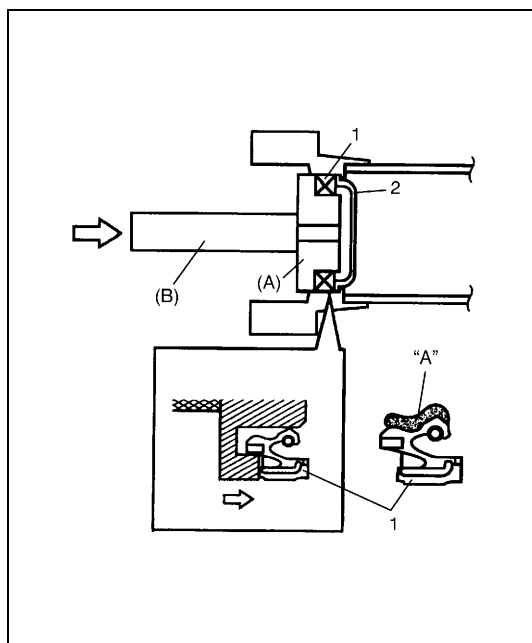
Special tool

(A) : 09944-67010

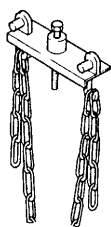
(B) : 09924-74510

"A" : Grease 99000-25010

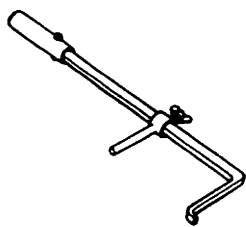
A : Differential side



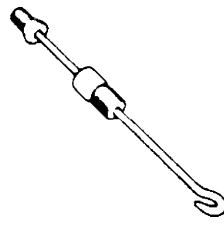
- 2) For procedure hereafter, refer to steps 4) to 16) of "REAR AXLE SHAFT AND WHEEL BEARING" in this section.

Special Tool

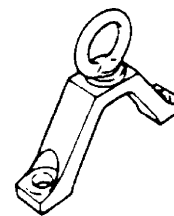
09927-18411
Universal puller



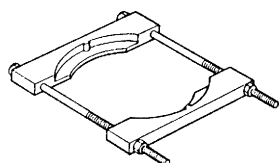
09913-50121
Oil seal remover



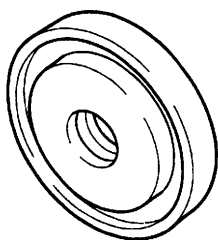
09942-15511
Sliding hammer



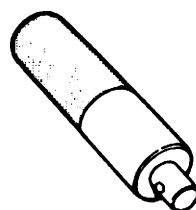
09943-17912
Brake drum remover



09921-57810
Bearing remover



09944-67010
Oil seal installer



09924-74510
Bearing and oil seal handle

SECTION 5A

BRAKES PIPE/HOSE/MASTER CYLINDER

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

5A

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

General Description*	Master Cylinder Reservoir*
LSPV (Load Sensing Proportioning Valve)	Master Cylinder Assembly*
Assembly (if equipped).....*	Brake Booster*
Diagnosis*	LSPV (Load Sensing Proportioning Valve)
Check and Adjustment*	Assembly (if equipped)*
On-Vehicle Service5A-2	Brake Pedal and Brake Pedal Bracket*
Front Brake Hose/Pipe.....5A-2	Required Service Material*
Rear Brake Hose/Pipe*	Special Tools*

On-Vehicle Service

CAUTION:

- Lubricate rubber parts with clean, fresh brake fluid to ease assembly.
- Do not use lubricated shop air on brake parts as damage to rubber components may result.
- If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- The torque values specified are for dry, unlubricated fasteners.
- Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid.

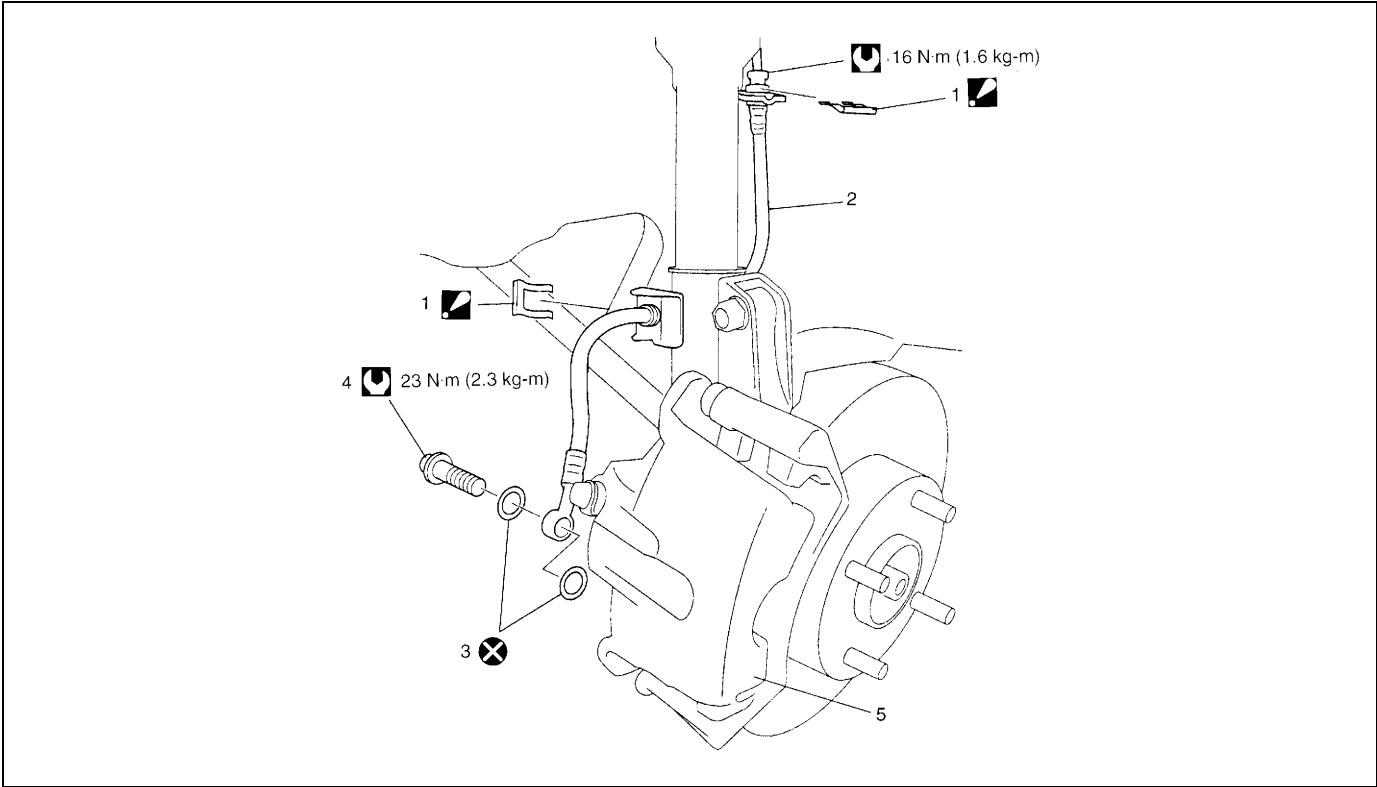
Front Brake Hose/Pipe




REMOVAL

- 1) Raise and suitably support vehicle. Remove tire and wheel.
This operation is not necessary when removing pipes connecting master cylinder and flexible hose.
- 2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.

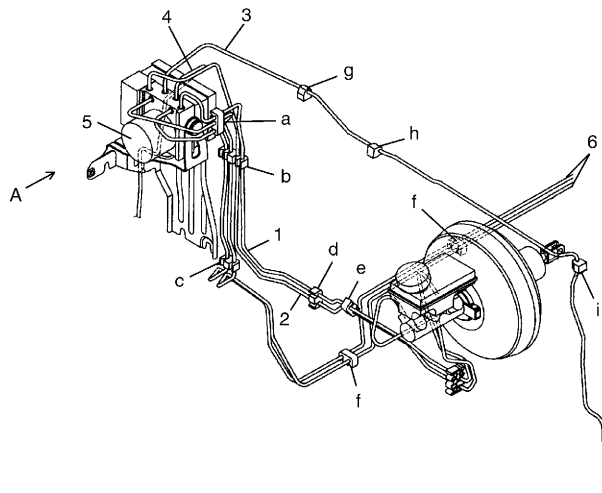
INSTALLATION

- 1) Reverse removal procedure for brake hose and pipe installation procedure.
For installation, make sure that steering wheel is in straightforward position and hose has no twist or kink. Check to make sure that hose doesn't contact any part of suspension, both in extreme right and extreme left turn conditions. If it does at any point, remove and correct. Fill and maintain brake fluid level in reservoir. Bleed brake system.
- 2) Perform brake test and check installed part for fluid leakage.

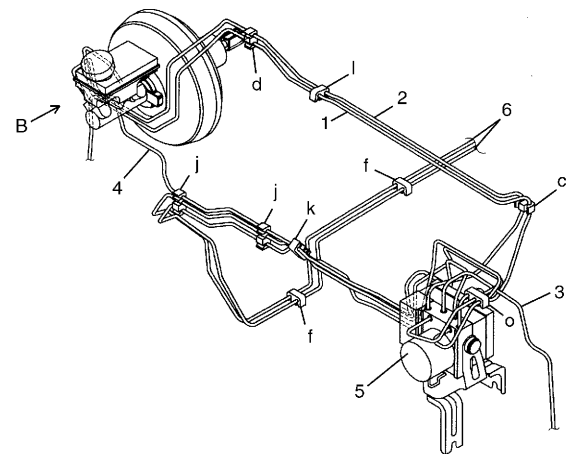


 1. E-ring: Insert E-ring till its end surface is flush with or deeper than bracket end surface.	5. Brake caliper
2. Flexible hose	 Tightening Torque
3. Hose washer	 Do not reuse
4. Hose bolt	

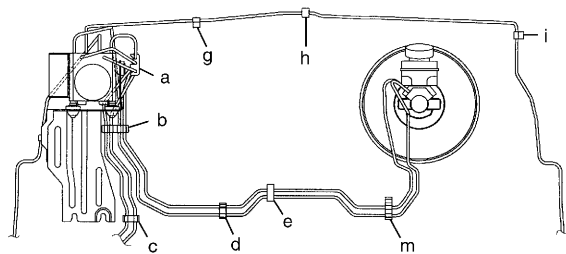
[A]



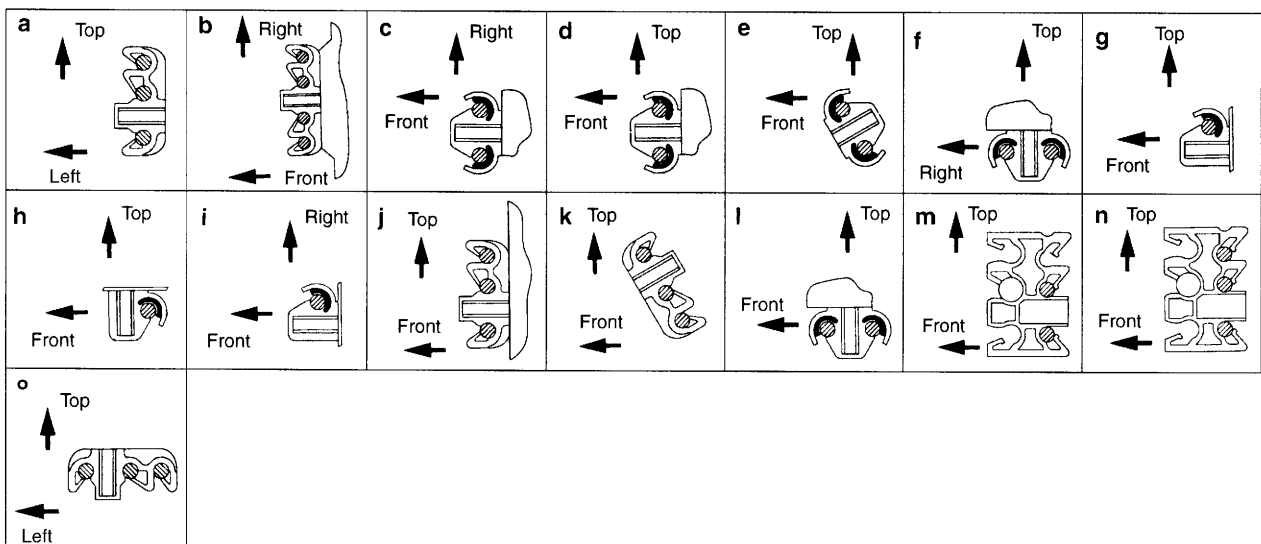
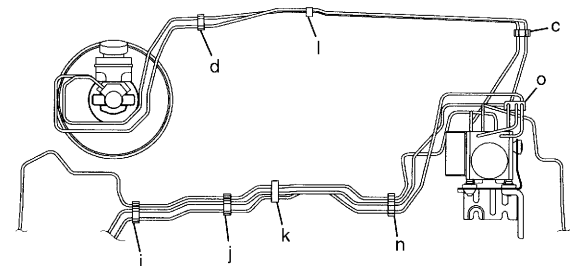
[B]




Viewed from A

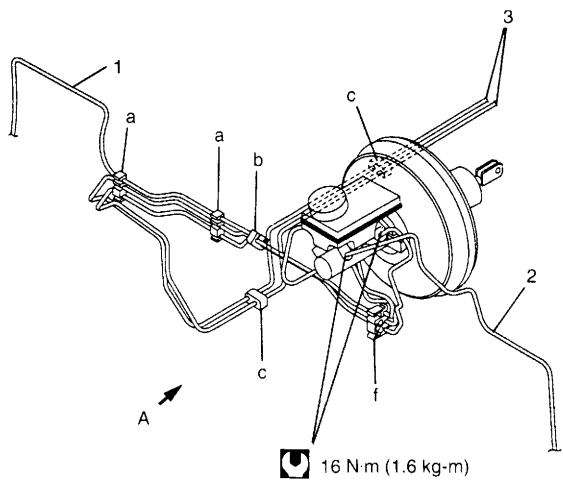


Viewed from B

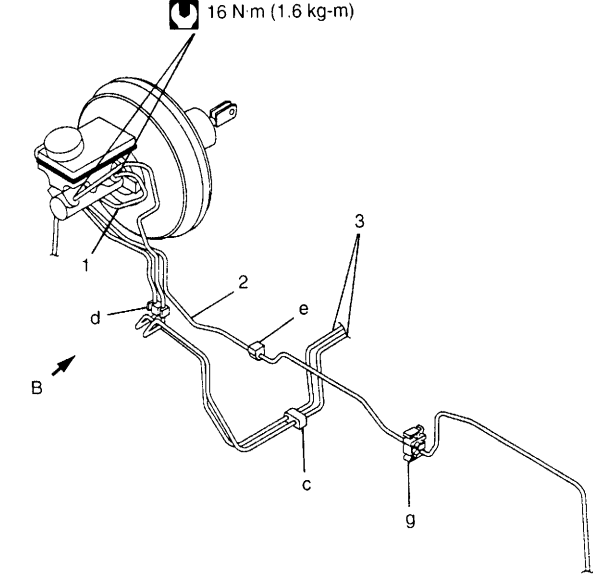


[A] : For left-hand steering vehicle	2. From master cylinder secondary to ABS hydraulic unit	6. To rear brakes
[B] : For right-hand steering vehicle	3. From ABS hydraulic unit to left front brake	 Tightening Torque
a – n : Clamp	4. From ABS hydraulic unit to right front brake	
1. From master cylinder primary to ABS hydraulic unit	5. ABS hydraulic unit	

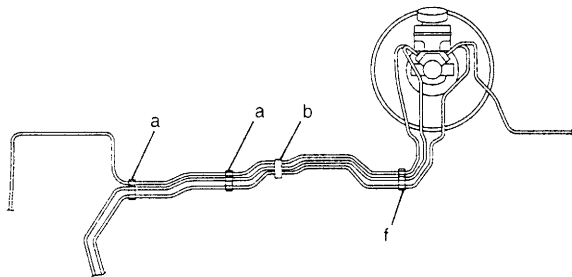
[A]



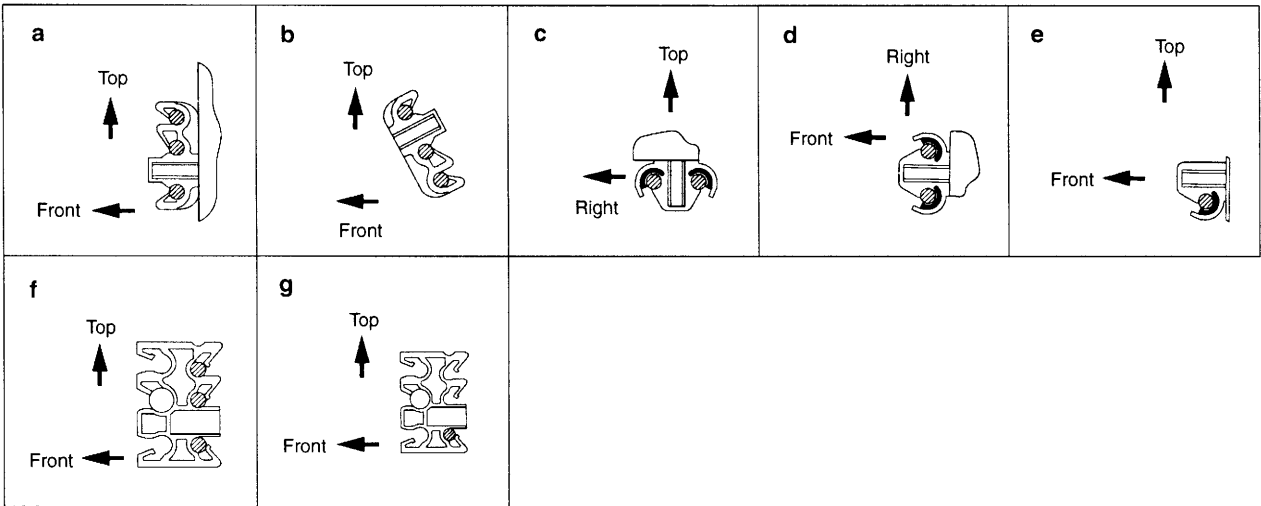
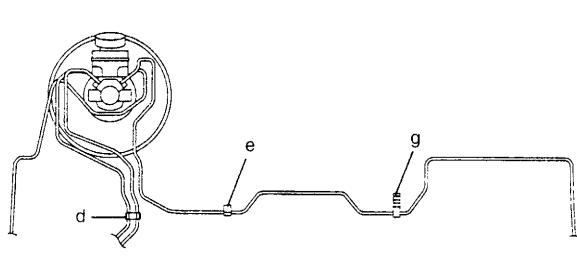
[B]



Viewed from A



Viewed from B



[A] : For left-hand steering vehicle	2. From master cylinder secondary to left front brake
[B] : For right-hand steering vehicle	3. To rear brakes
a – g : Clamp	Tightening Torque
1. From master cylinder primary to right front brake	

SECTION 5B

FRONT BRAKE

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

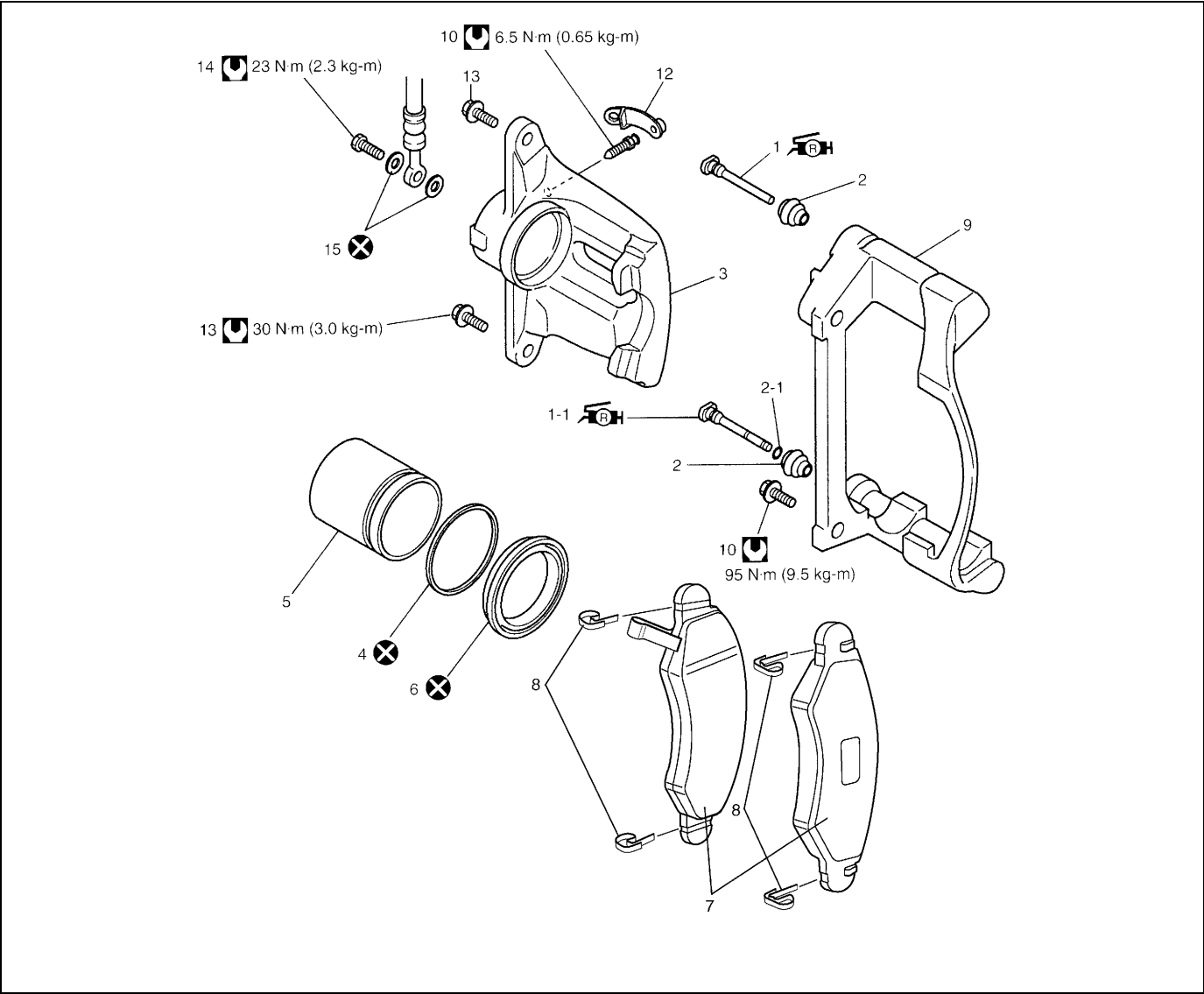
CONTENTS




General Description	*	Front Disc Brake Pad	5B-3	5B
Disc Brake Caliper Assembly	*	Front Disc Brake Caliper	*	
Diagnosis	*	Front Brake Disc	*	
Check and Adjustment	*	Required Service Material	5B-6	
On-Vehicle Service.....	5B-2	Special Tools.....	*	

On-Vehicle Service

CAUTION:

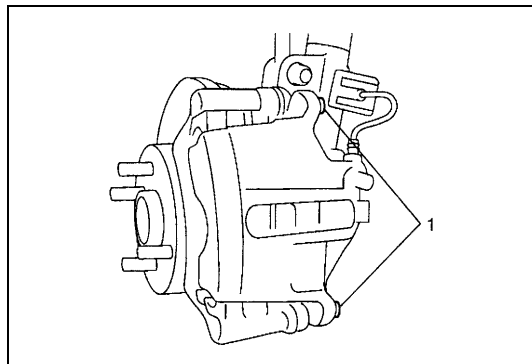
Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any component is removed or line disconnected, bleed the brake system. Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.



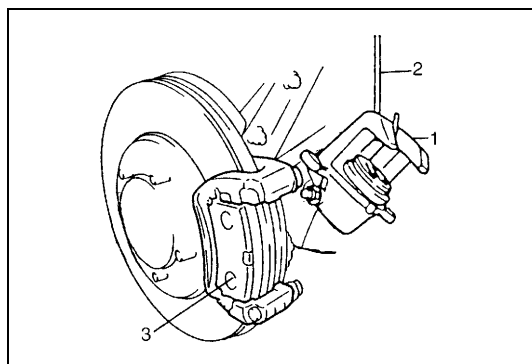
	1. Guiding pin :	6. Piston boot	13. Caliper pin bolt
	1-1. Locking pin : Apply specified rubber grease to guiding and locking pins surfaces for smooth movement.	7. Disc brake pad	14. Flexible hose bolt
	2. Pin boot	8. Pad spring	15. Gasket
	2-1. O-ring	9. Brake caliper carrier	 Tightening Torque
	3. Disc brake caliper (disc brake cylinder)	10. Caliper bolt	 Do not reuse
	4. Piston seal	11. Bleeder plug	
	5. Disc brake piston	12. Bleeder plug cap	

Front Disc Brake Pad

REMOVAL



- 1) Hoist vehicle and remove wheel.
- 2) Remove caliper pin bolts (1).



- 3) Remove E-ring from strut and then remove caliper (1) from caliper carrier.

NOTE:

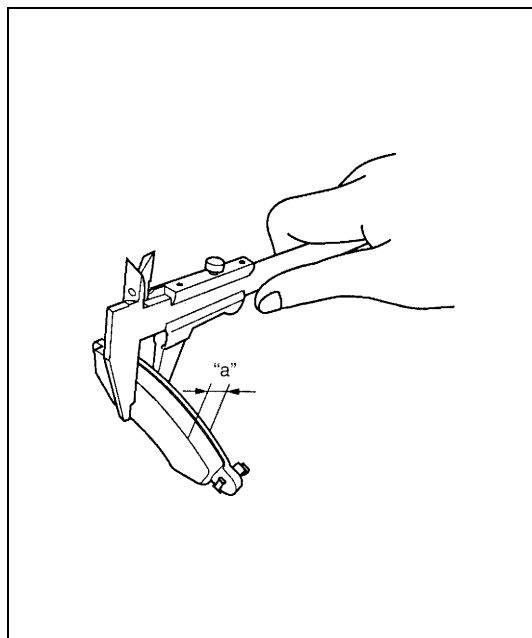
Hang removed caliper with a wire hook (2) or the like so as to prevent brake hose from bending and twisting excessively or being pulled. Don't operate brake pedal with pads removed.

- 4) Remove pads (3).

INSPECTION

Brake Pad

Check pad lining for wear. When wear exceeds limit, replace with new one.



CAUTION:

Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.

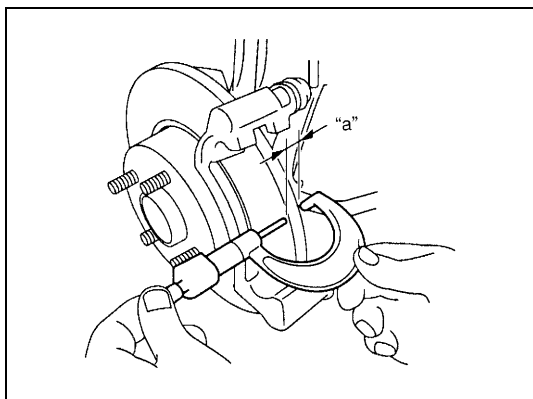
Pad thickness (lining + rim) "a"

Standard : 15.3 mm (0.60 in.)

Service limit : 8.2 mm (0.32 in.)

NOTE:

When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.

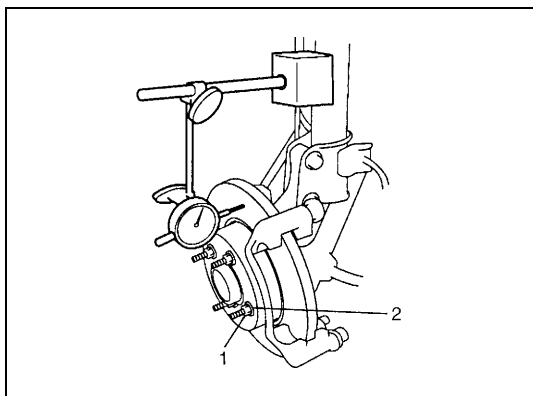
Brake Disc

Check disc surface for scratches in wearing parts. Scratches on disc surface noticed at the time of specified inspection or replacement are normal and disc is not defective unless they are serious. But when there are deep scratches or scratches all over disc surface, replace it. When only one side is scratched, polish and correct that side.

Disc thickness "a"

Standard : 17.0 mm (0.67 in.)

Service limit : 15.0 mm (0.59 in.)

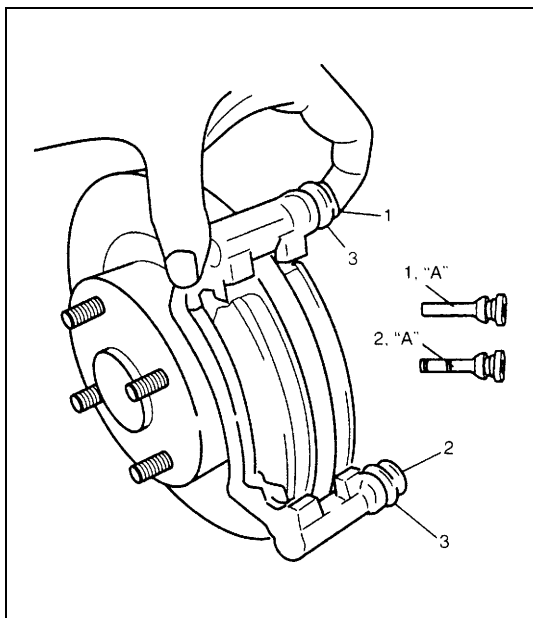


Use wheel nuts (1) and suitable plain washers (2) to hold the disc securely against the hub, then mount a dial indicator as shown and measure the runout at 20 mm (0.79 in.) from the outer edge of the disc.

Limit on disc deflection : 0.15 mm (0.006 in.)

NOTE:

Check front wheel bearing for looseness before measurement.

**Cylinder Slide Guiding and Locking Pins**

Check guiding pin (1) and locking pin (2) for smooth movement as shown.

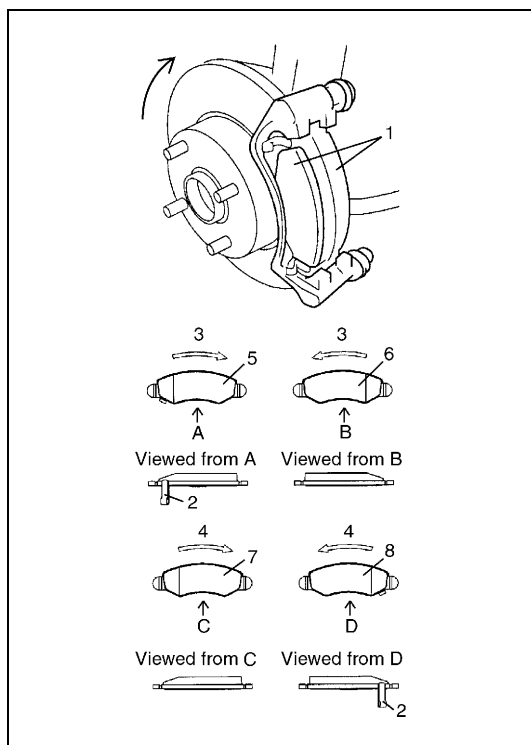
If it is found faulty, correct or replace. Apply rubber grease to guiding and locking pins outer surface. Rubber grease should be the one whose viscosity is less affected by such low temperature as -40°C (-40°F).

"A" : Rubber grease

Locking pin (2) has grooves and O-ring but guiding pin (1) has no groove. Install guiding pin into pin hole of carrier upper side.

Dust Boot

Check boot (3) for breakage, crack and damage. If defective, replace.

INSTALLATION**CAUTION:**

Observe CAUTION at the beginning of ON-VEHICLE SERVICE.

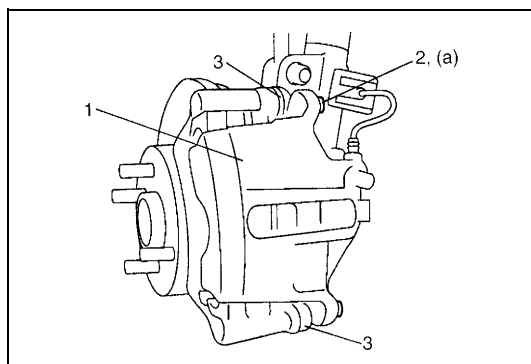
1) Install pads (1).

NOTE:

Install pad with sensor (2) to vehicle center side.

Note the direction of each pad as shown in the figure.

3.	Front right disc forward rotation
4.	Front left disc forward rotation
5.	Disc side of right inner pad
6.	Disc side of right outer pad
7.	Disc side of left outer pad
8.	Disc side of left inner pad



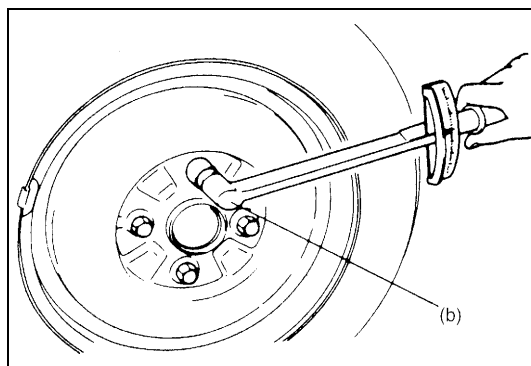
2) Install caliper (1) and torque caliper pin bolts (2) to specification.

Tightening torque

(a) : 30 N·m (3.0 kg-m, 22.0 lb-ft)

NOTE:

Make sure that boots (3) are fit into groove securely.



3) Torque front wheel nuts to specification.

Tightening torque

(b) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

4) Upon completion of installation, perform brake test.

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Brake fluid	DOT4	<ul style="list-style-type: none">• To fill master cylinder reservoir.• To clean and apply to inner parts of caliper and wheel cylinder when they are disassembled.
Rubber grease	Molykote G807 or equivalent	To caliper guide pin.

SECTION 5C

PARKING AND REAR BRAKE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

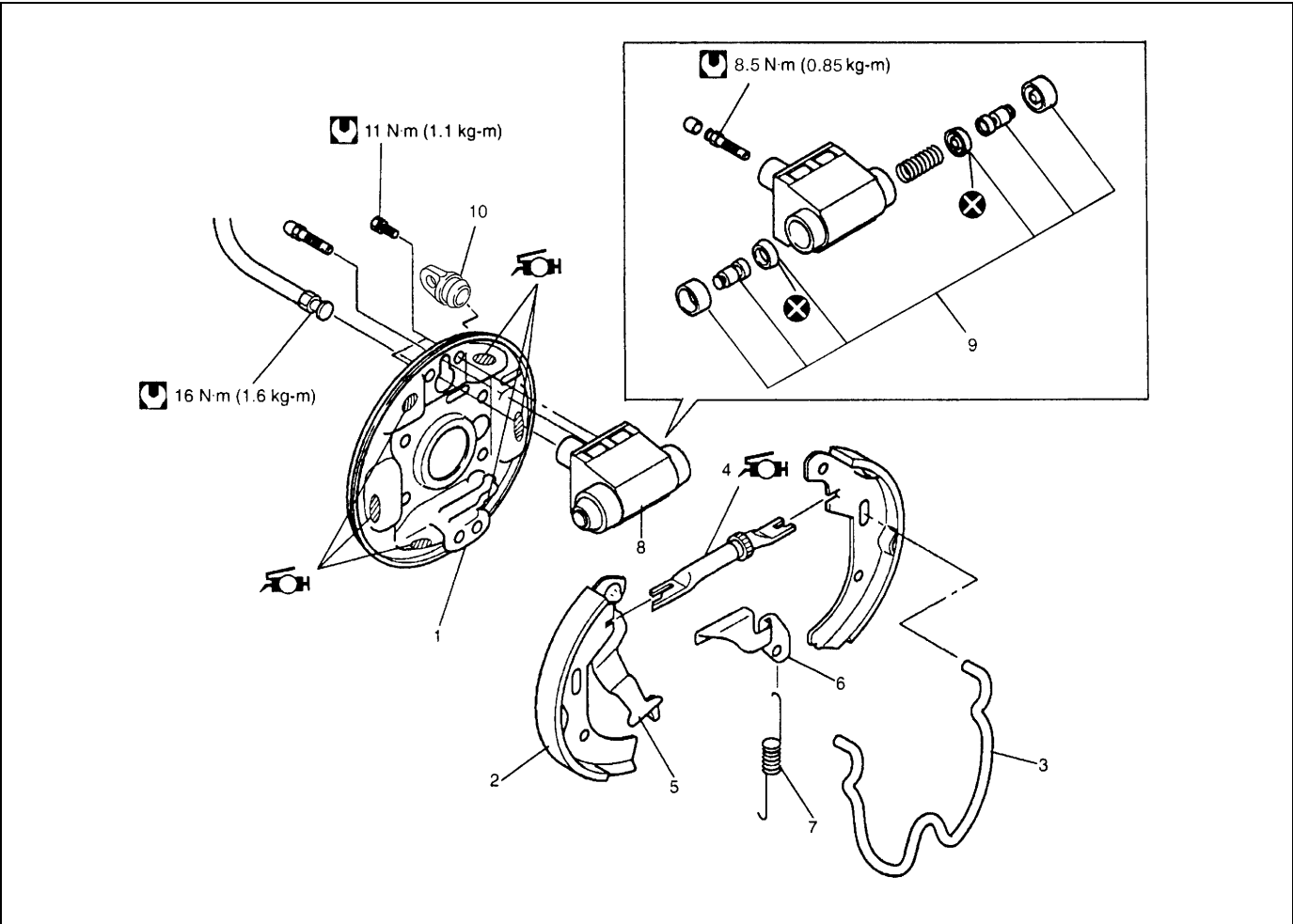
CONTENTS





General Description	*	Brake Drum	5C-3
Drum Brake Assembly	*	Brake Shoe	5C-7
Diagnosis	*	Wheel Cylinder	5C-10
Check and Adjustment	*	Brake Back Plate	5C-11
On-Vehicle Service	5C-2	Required Service Materials	5C-13
Parking Brake Lever	*	Special Tools	5C-13
Parking Brake Cable	*		

On-Vehicle Service

CAUTION:

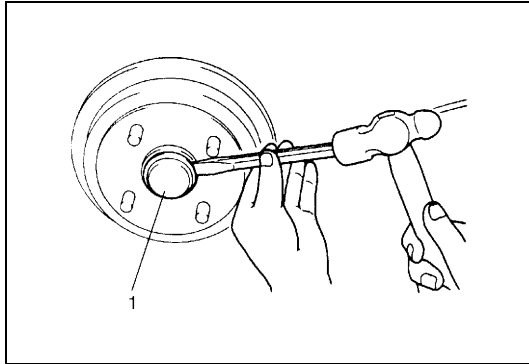
- Replace all components included in repair kits to service this drum brake. Lubricate parts as specified.
- If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- The torque values specified are for dry, unlubricated fasteners.



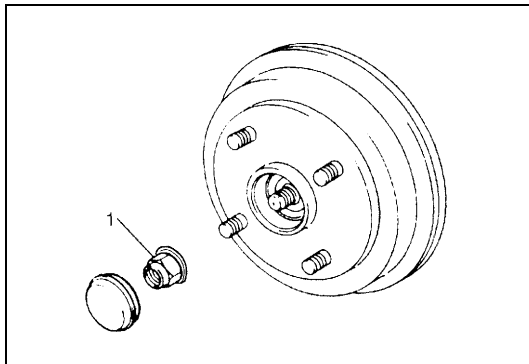
	1. Brake back plate : Clean back plate and apply thin coat of Bentonite base brake grease (anti-squeal agent) to six surfaces on which shoe rims rest.	7. Adjuster spring
	2. Brake shoe	8. Wheel cylinder
	3. Retractor spring	9. Piston assembly
	4. Brake adjuster (strut) : Apply Bentonite base brake grease between actuator and shoe rim and at actuator pivot points.	10. Cover
	5. Parking brake shoe lever	 Tightening Torque
	6. Adjuster actuator	 Do not reuse

Brake Drum

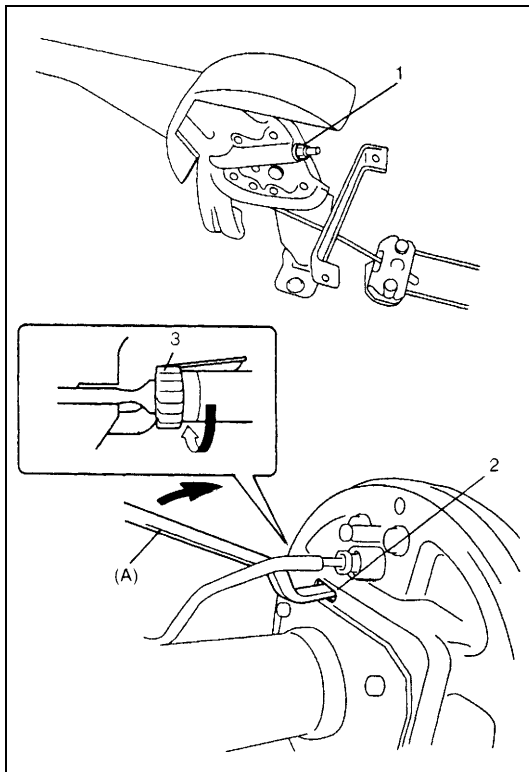
REMOVAL



- 1) Hoist vehicle and remove wheel.
- 2) Remove spindle cap (1) as shown (by hammering lightly at 3 locations around it so as not to deform or cause damage to seating part of cap).



- 3) Uncalk spindle nut, remove spindle nut (1).

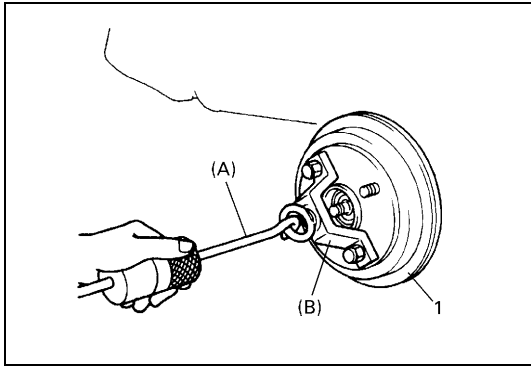


- 4) Release parking brake lever.
- 5) Remove brake drum.
If brake drum can not be removed easily, increase clearance between brake shoes and drum as follows.
 - a) Remove console box and loosen parking brake cable adjusting nut (1).
 - b) Remove adjuster cover on back plate.
 - c) Insert special tool through hole (2) in back plate.

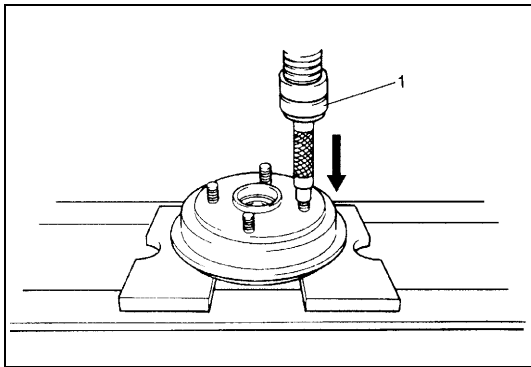
Special tool

(A) : Snap-on Part No. B3404B or equivalent

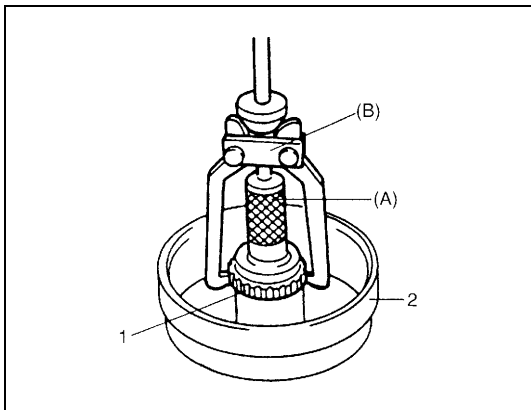
- d) Turn adjuster (3) with special tool in such direction as indicated in figure so as to obtain larger clearance.



- e) Pull brake drum (1) off by hand.
If it is hard to remove, use special tools.

Special tool**(A) : 09942-15510****(B) : 09943-17912**

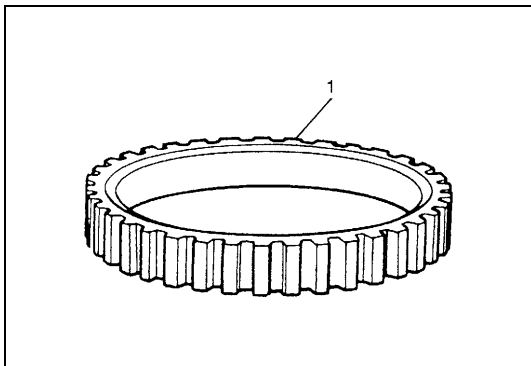
- 6) Remove wheel stud bolt by using hydraulic press (1).



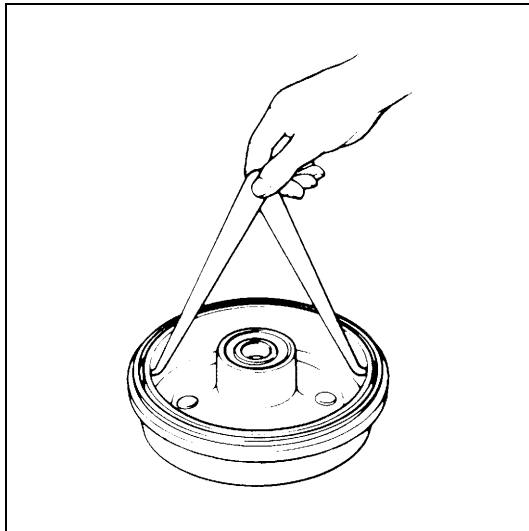
- 7) Remove sensor ring (1) from brake drum (2) using special tool (if equipped with ABS).

CAUTION:

Pull out sensor ring from brake drum gradually and evenly. Attempt to pull it out partially may cause it to be deformed.

Special tool**(A) : 09913-75520****(B) : 09913-65135****INSPECTION****Sensor Ring**

- Check ring serration (teeth) for being missing, damaged or deformed.
 - Check sensor ring for being deformed (warped).
 - Check that no foreign material is attached.
- If any malfunction is found, repair or replace.

Brake Drum

Inspect drum for cleanliness. Check wear of its braking surface by measuring its inside diameter.

Inside diameter

Standard : 200 mm (7.87 in.)

Service Limit : 202 mm (7.95 in.)

Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves.

Cracked, Scored, or Grooved Drum

A cracked drum is unsafe for further service and must be replaced. Do not attempt to weld a cracked drum.

Smooth up any slight scores. Heavy or extensive scoring will cause excessive brake lining wear and it will probably be necessary to resurface drum braking surface.

If brake linings are slightly worn and drum is grooved, drum should be polished with fine emery cloth but should not be turned.

NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point, if any.

Brake Shoe

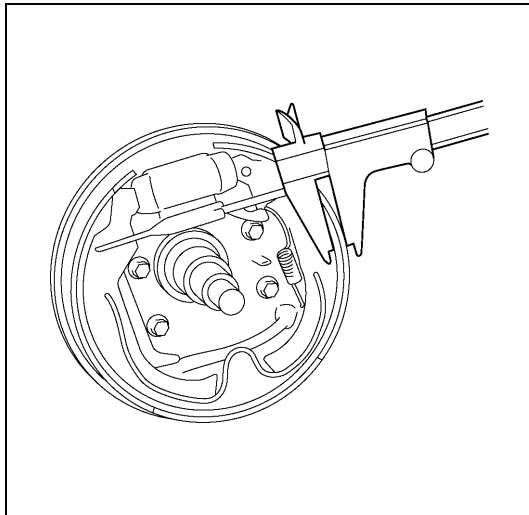
Where lining is worn out beyond service limit, replace shoe.

Thickness (lining + shoe rim)

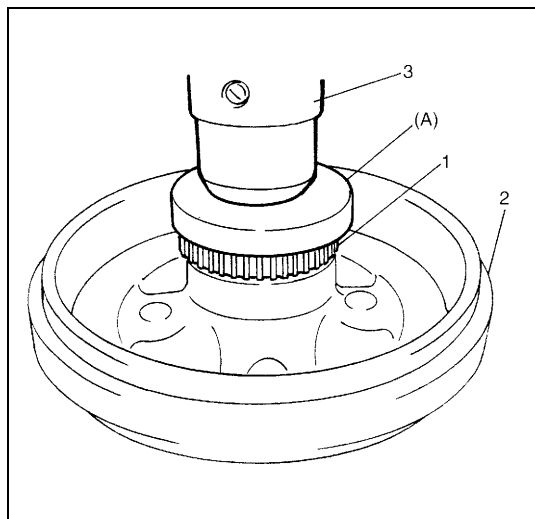
Standard : 6.4 mm (0.25 in.)

Service limit : 3.6 mm (0.14 in.)

If one of brake linings is to service limit, all linings must be replaced at the same time.

**CAUTION:**

Never polish lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage drum. When it is required to correct lining, replace it with a new one.

INSTALLATION

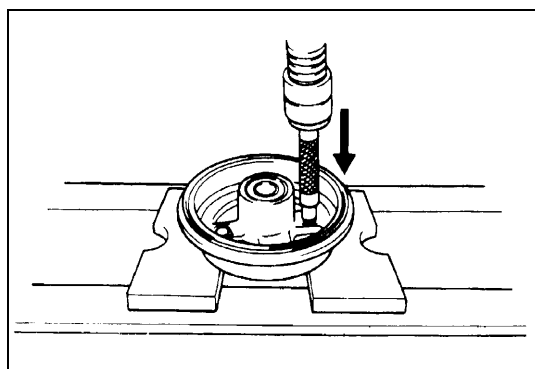
- 1) Install new sensor ring (1) to brake drum (2) by using special tool and hydraulic press (3) (if equipped with ABS).

CAUTION:

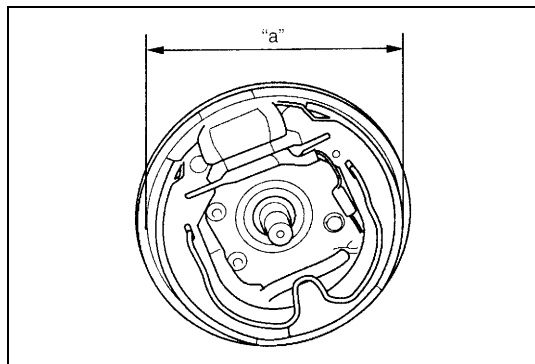
**Do not reuse (reinstall) removed sensor ring.
Used sensor ring can not be press-fitted securely.**

Special tool

(A) : 09926-68310

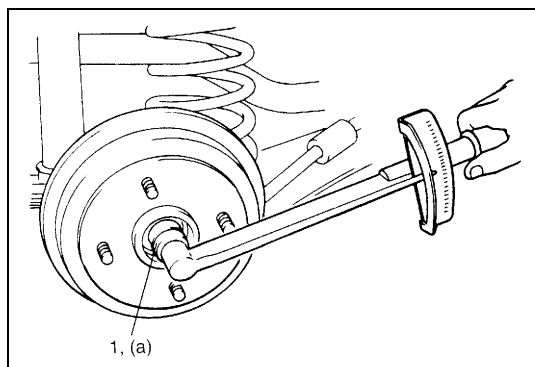


- 2) Insert new stud in drum hole and rotate it slowly to assure serrations are aligned with those made by replaced bolt.



- 3) Before installing brake drum, check outer diameter "a" of brake shoes. If it is not within value as specified below, adjust it to specification by turning adjuster.

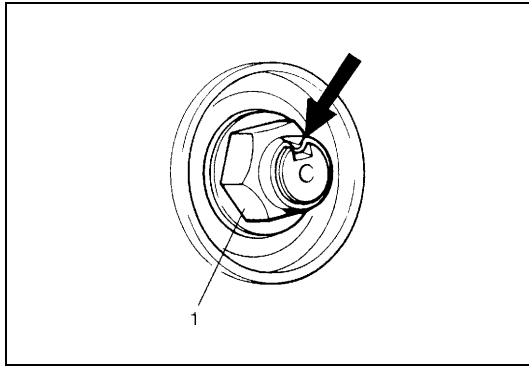
Brake shoes outer diameter "a"	=	Measured brake drum inside diameter	-	0.5 to 1.0 mm (0.02 to 0.04 in.)
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- 4) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.
- 5) Install new spindle nut (1).
- 6) Tighten spindle nut (1) to specified torque.

Tightening torque

(a) : 175 N·m (17.5 kg·m, 126.5 lb·ft)

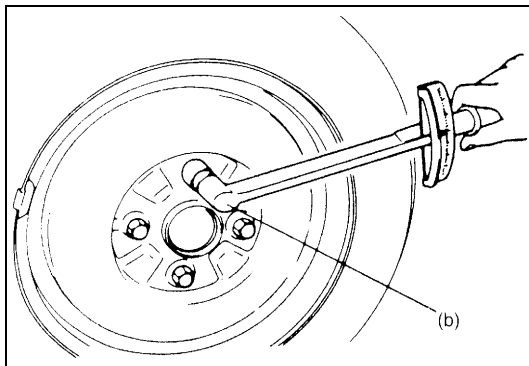


- 7) Calk spindle nut (1).
- 8) Install spindle cap.

NOTE:

- When installing spindle cap, hammer lightly several locations on the collar of cap until collar comes closely into contact with brake drum.
- If fitting part of cap is deformed or damaged or if it is fitted loosely, replace with new one.

- 9) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load at least 15 – 20 times until adjuster actuator clicking sound from drum brake can not be heard so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable. (For adjustment, see PARKING BRAKE INSPECTION AND ADJUSTMENT in SECTION 5.)
- 10) Install console box if removed.

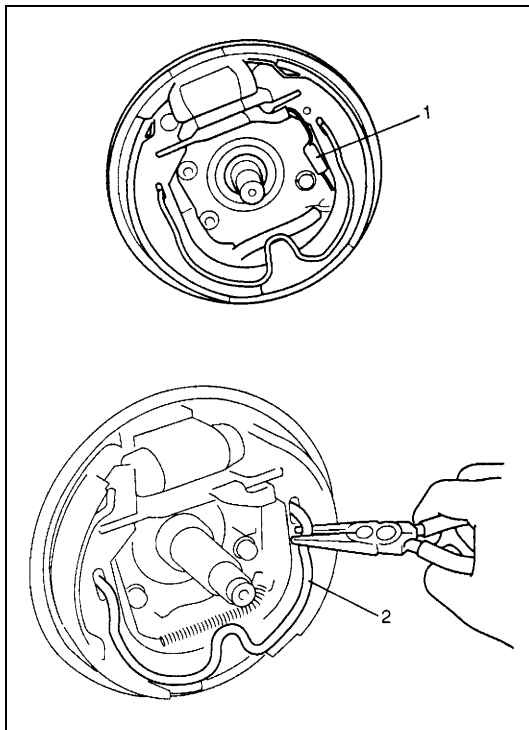


- 11) Install wheel and tighten wheel nuts so specified torque.

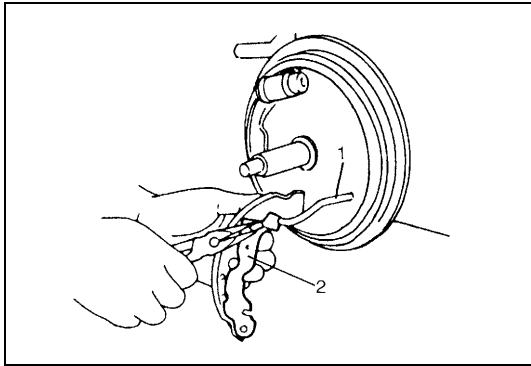
Tightening torque

(b) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 12) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).

Brake Shoe**REMOVAL**

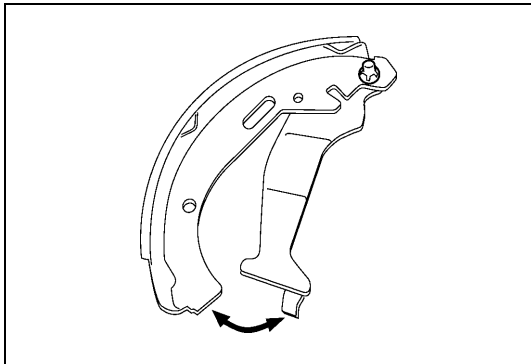
- 1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL.
- 2) Remove adjuster spring (1).
- 3) Remove retractor spring (2) as shown.



- 4) Remove brake shoes and disconnect parking brake cable (1) from parking brake shoe lever (2).

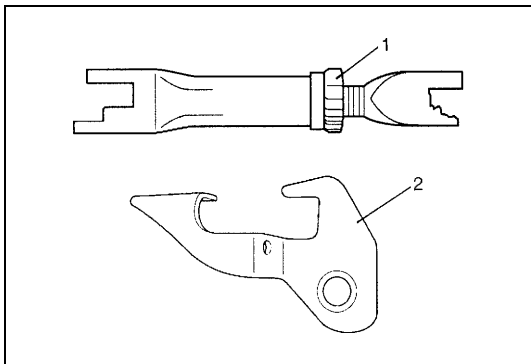
INSPECTION

Parking Shoe Lever



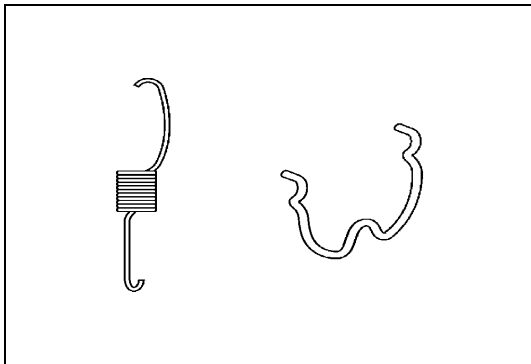
Inspect brake shoe lever for smooth movement along shoe rim. If defective, correct or replace.

Brake Adjuster (Strut) and Adjuster Actuator



Check ratchet (1) of adjuster and adjuster actuator (2) for operation, wear or damage.

Springs

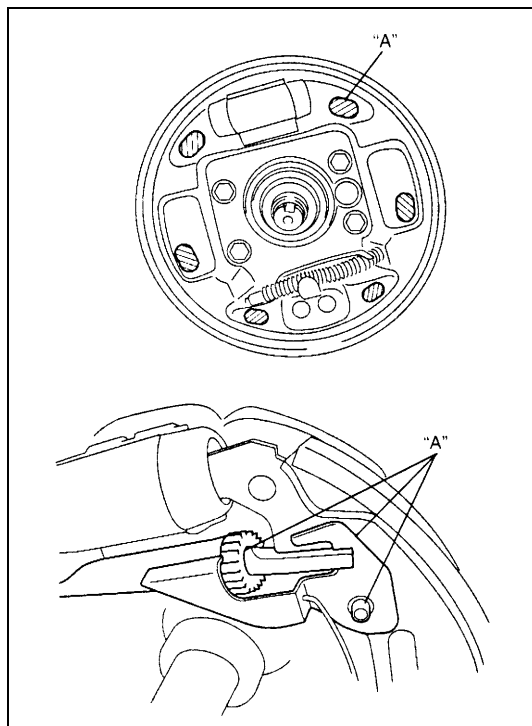


Inspect for damage or weakening.

Inspect each part with arrow for rust. If found defective, replace.

Brake Shoe

Refer to BRAKE DRUM INSPECTION of this section.

INSTALLATION

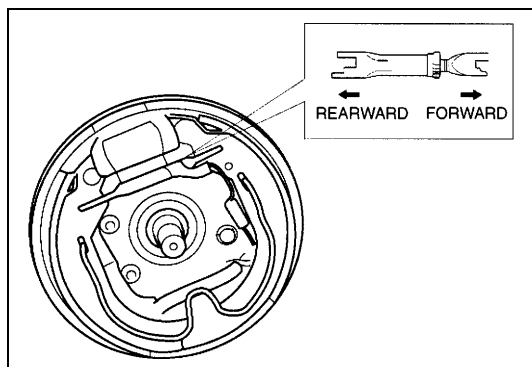
- 1) When reinstalling brake adjuster, disassemble and thoroughly clean screw threads with a wire brush and apply grease to screw threads.

Clean brake back plate and apply thin coat of grease to six surfaces on which shoe rims rest.

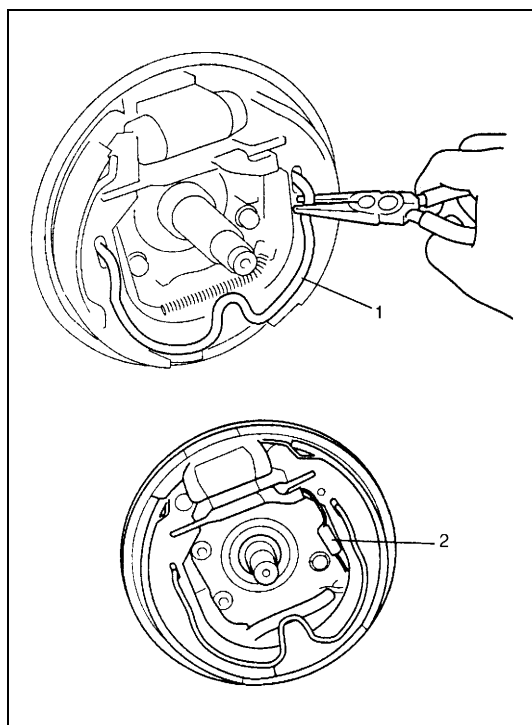
“A” : Bentonite base brake grease (Anti-squeal agent)

- 2) Apply thinly grease between actuator and shoe rim, and at actuator pivot point.

“A” : Bentonite base brake grease (Anti-squeal agent)



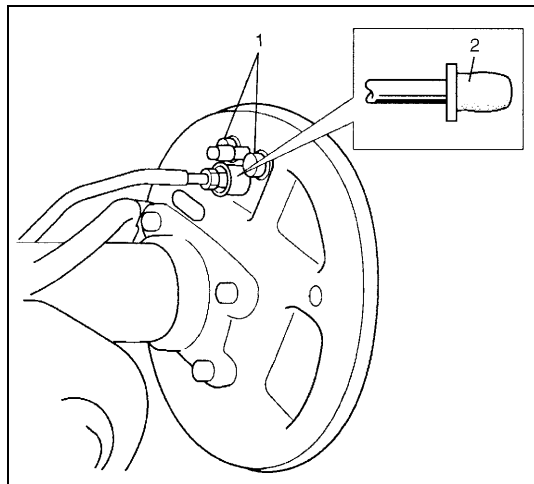
- 3) Assemble parts as shown in reverse order of REMOVAL.



- 4) Install retractor spring (1) as shown.
- 5) Install adjuster spring (2) as shown, with loop facing outward.
- 6) For procedure hereafter, refer to steps 3) to 12) of BRAKE DRUM INSTALLATION in this section.

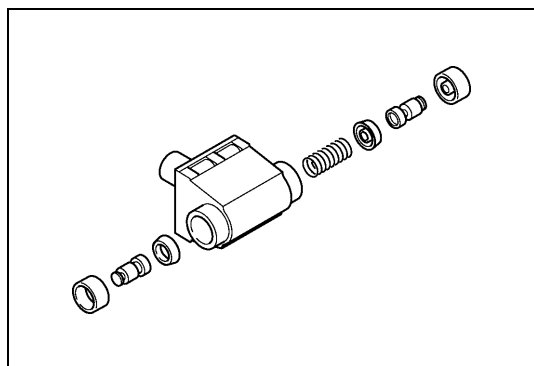
Wheel Cylinder

REMOVAL



- 1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL.
- 2) Perform steps 2) to 4) of BRAKE SHOE REMOVAL.
- 3) Loosen brake pipe flare nut but only within the extent that fluid does not leak.
- 4) Remove wheel cylinder mounting bolts (1). Disconnect brake pipe from wheel cylinder and put wheel cylinder bleeder plug cap (2) onto pipe to prevent fluid from spilling.

INSPECTION

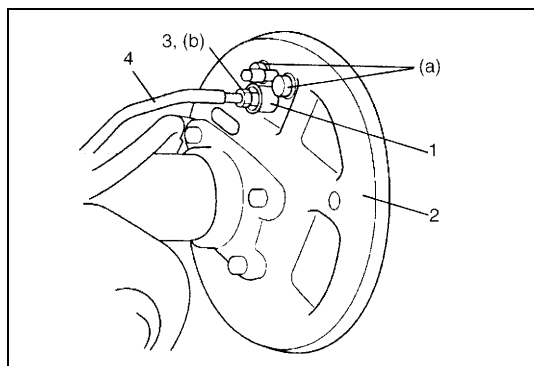


Inspect wheel cylinder disassembled parts for wear, cracks, corrosion or damage.

NOTE:

Clean wheel cylinder components with brake fluid.

INSTALLATION



- 1) Take off bleeder plug cap from brake pipe and connect pipe (for pipes) to wheel cylinder just enough to prevent fluid from leaking.
- 2) Tighten wheel cylinder (1) to brake back plate (2) to specified torque.
- 3) Torque flare nut (3) of brake pipe (4) which was connected in step 1) to specification.

Tightening torque

(a) : 11 N·m (1.1 kg-m, 8.0 lb-ft)

(b) : 16 N·m (1.6 kg-m, 12.0 lb-ft)

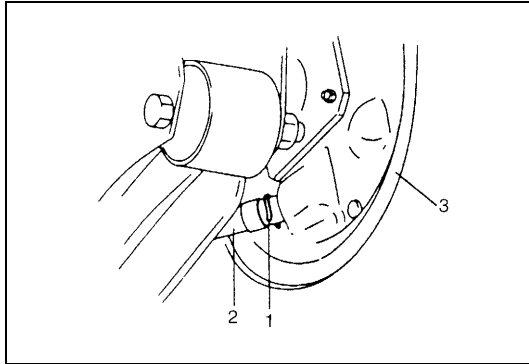
- 4) Install bleeder plug cap taken off from pipe back to bleeder plug.
- 5) For procedure hereafter, refer to steps 1) to 6) of BRAKE SHOE INSTALLATION.

NOTE:

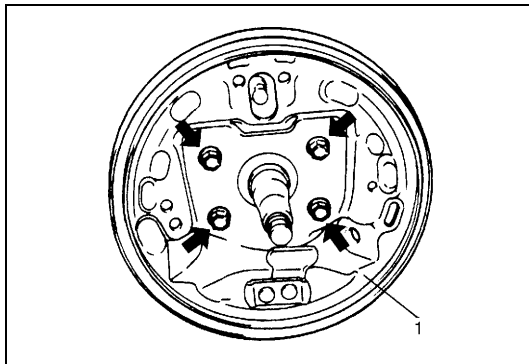
Be sure to bleed brake system. (for bleeding operation, see BLEEDING BRAKES in SECTION 5.)

Brake Back Plate

REMOVAL

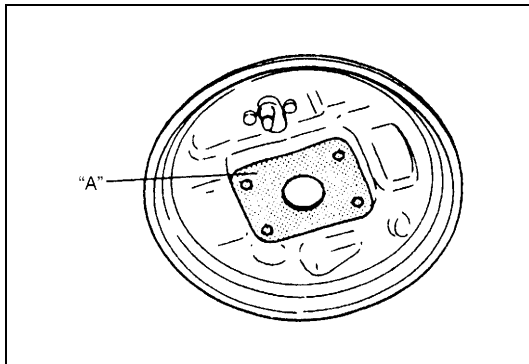


- 1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL in this section.
- 2) Perform steps 2) to 4) of BRAKE SHOE REMOVAL in this section.
- 3) Perform steps 3) and 4) of WHEEL CYLINDER REMOVAL in this section.
- 4) Remove parking brake cable securing clip (1) and disconnect brake cable (2) from brake back plate (3).



- 5) Remove brake back plate (1) from rear axle.

INSTALLATION

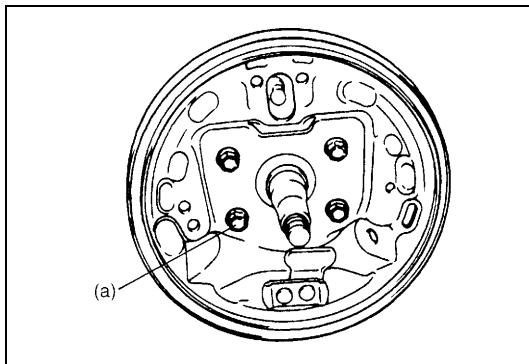


- 1) Apply water tight sealant to mating surfaces of brake back plate and rear axle.

"A" : Sealant 366E, 99000-31090

NOTE:

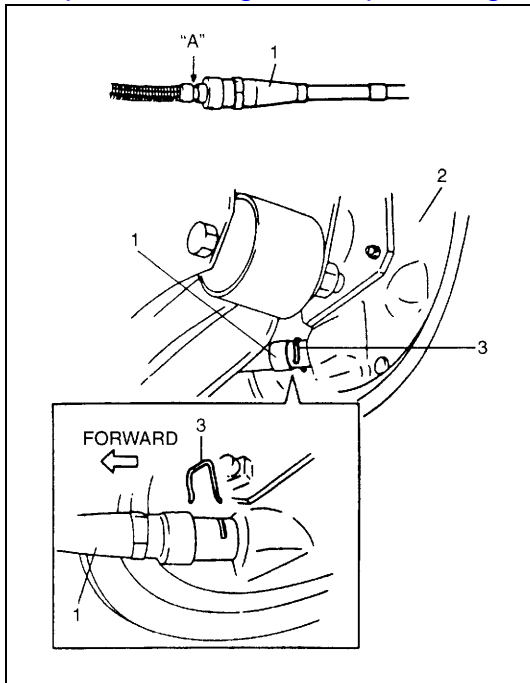
In case of vehicle equipped with ABS, do not apply sealant around hole for wheel speed sensor.



- 2) Install brake back plate and tighten back plate bolts to specified torque.

Tightening torque

(a) : 24 N·m (2.4 kg-m, 17.5 lb-ft)



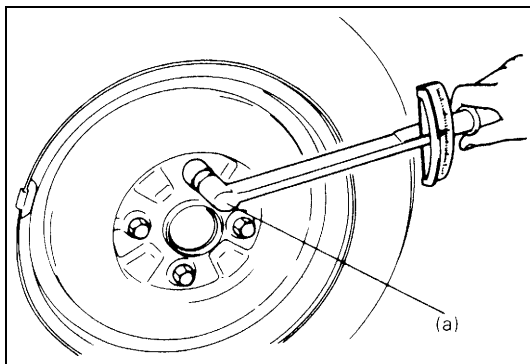
- 3) Apply water tight sealant where plate and cable contact, and run parking brake cable (1) through brake back plate (2) and secure it with clip (3).

"A" : Sealant 366E, 99000-31090

- 4) Install wheel cylinder, and tighten wheel cylinder bolts and brake pipe flare nut to specified torque. (Refer to steps 1) to 4) of WHEEL CYLINDER INSTALLATION in this section.)
- 5) Install brake shoes, referring to steps 1) to 5) of BRAKE SHOE INSTALLATION in this section.
- 6) Install brake drum. Refer to steps 3) to 8) of its INSTALLATION in this section.
- 7) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, see BLEEDING BRAKES in SECTION 5.)
- 8) Install wheel and tighten wheel nuts to specified torque.

Tightening torque

(a) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

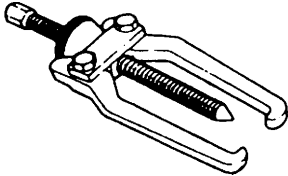
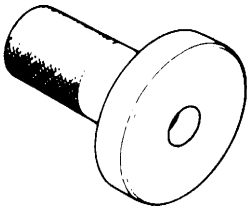
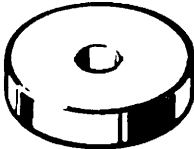
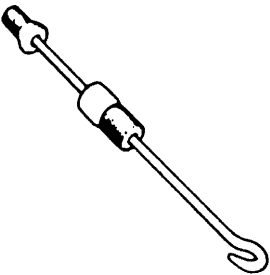
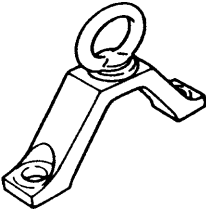
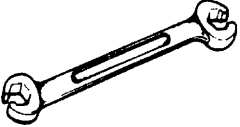
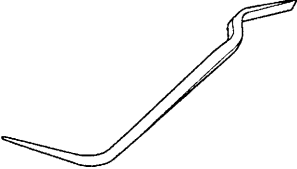


- 9) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load at least 10 – 15 times until adjuster actuator clicking sound from drum brake can not be heard so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable. (For adjustment, see PARKING BRAKE INSPECTION and ADJUSTMENT in SECTION 5.)
- 10) Install console box.
- 11) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).
- 12) Check each installed part for oil leakage.

Required Service Materials

Material	Recommended SUZUKI product (Part Number)	Use
Brake fluid	DOT 4	<ul style="list-style-type: none"> To fill master cylinder reservoir. To clean and apply to inner parts of caliper and wheel cylinder when they are disassembled.
Water tight sealant	SEALING COMPOUND 366E 99000-31090	<ul style="list-style-type: none"> To apply to mating surfaces of brake back plate and rear wheel cylinder. To apply to contact position of parking brake cable and back plate. To apply to mating surfaces of brake back plate and rear axle.
Bentonite base brake grease (Anti-squeal agent)	—	<ul style="list-style-type: none"> To coat thinly to surface on which shoe rims rest. To coat thinly between actuator and shoe rim, and at actuator pivot points.

Special Tools

 <p>09913-65135 Bearing puller</p>	 <p>09913-75520 Bearing installer</p>	 <p>09926-68310 Bearing installer</p>	 <p>09942-15510 Sliding hammer</p>
 <p>09943-17912 Brake drum remover (Front wheel hub remover)</p>	 <p>09950-78230 Flare nut wrench (10 – 11 mm)</p>	 <p>Snap-on Part NO. B3404B or equivalent</p>	

SECTION 5E

ANTILOCK BRAKE SYSTEM (ABS)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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Rear Wheel Speed Sensor Ring (For 2WD vehicle)	*
Rear Wheel Speed Sensor Ring (For 4WD vehicle)	*
G Sensor (For 4WD Vehicle Only).....	*
Special Tool	*

General Description

Components and Parts Location

The ABS (Antilock Brake System) controls the fluid pressure applied to the Wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied.

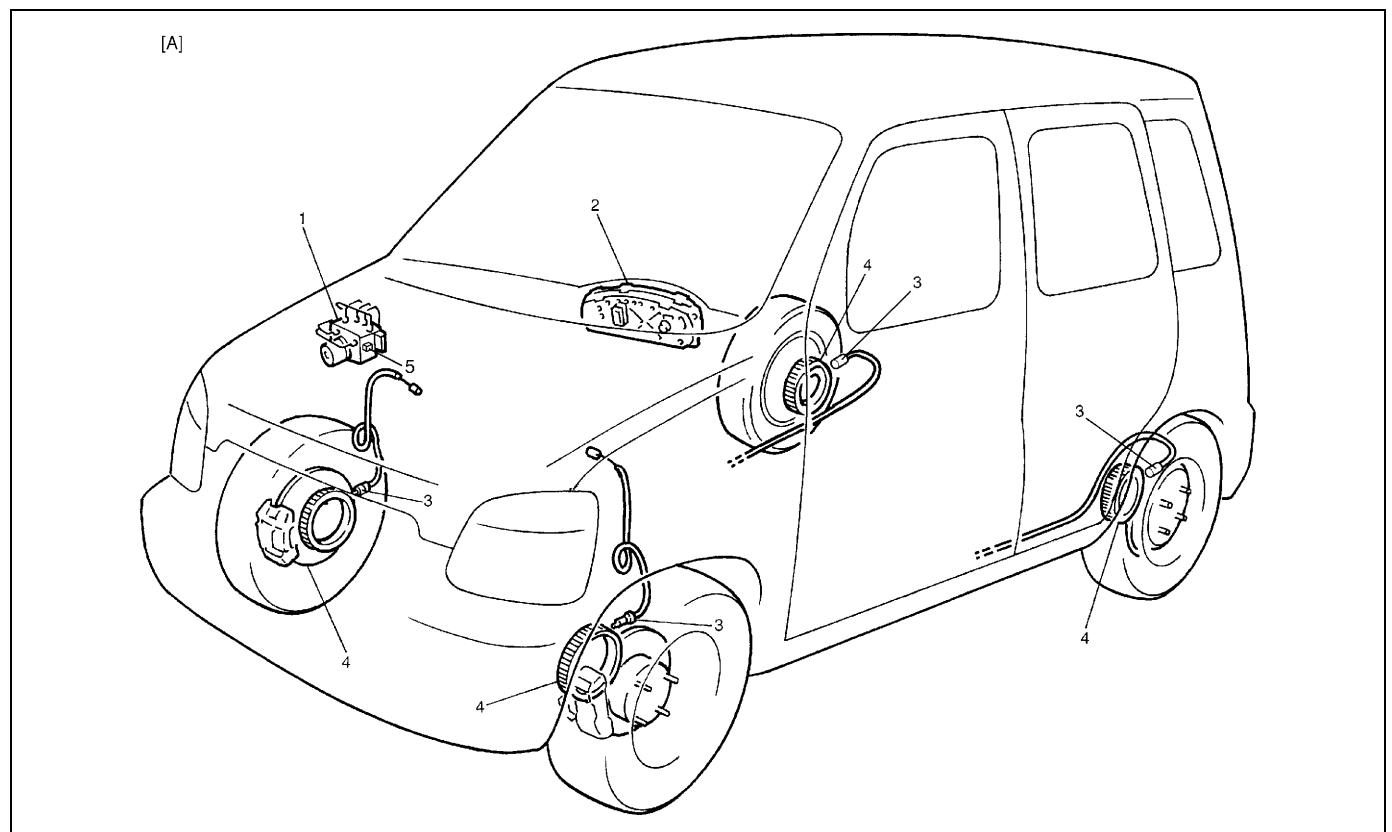
This ABS has also the following function.

While braking is applied, but before ABS control becomes effective, braking force is distributed between the front and rear so as to prevent the rear wheels from being locked too early for better stability of the vehicle.

The main component parts of this ABS include the following parts in addition to those of the conventional brake system.

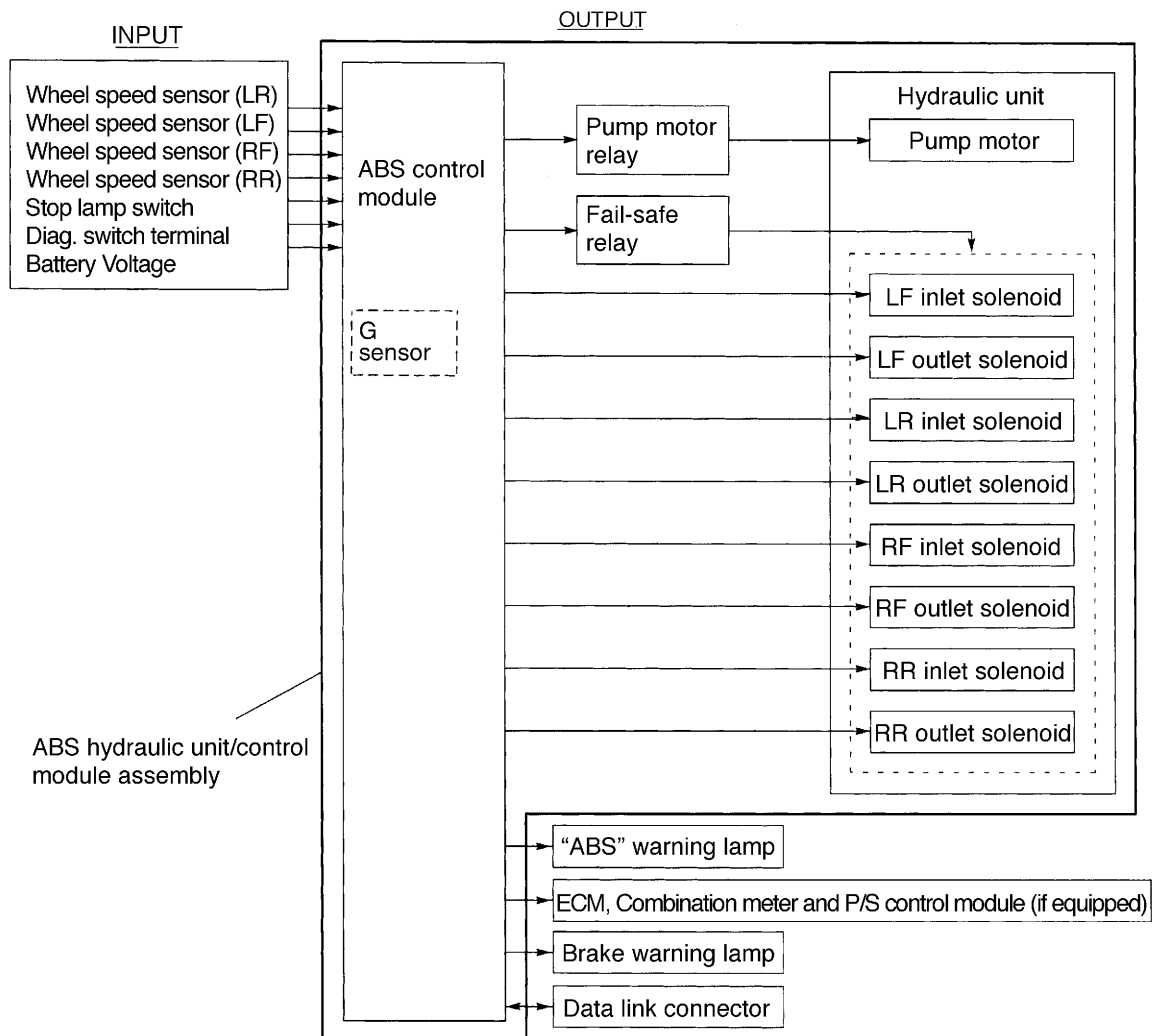
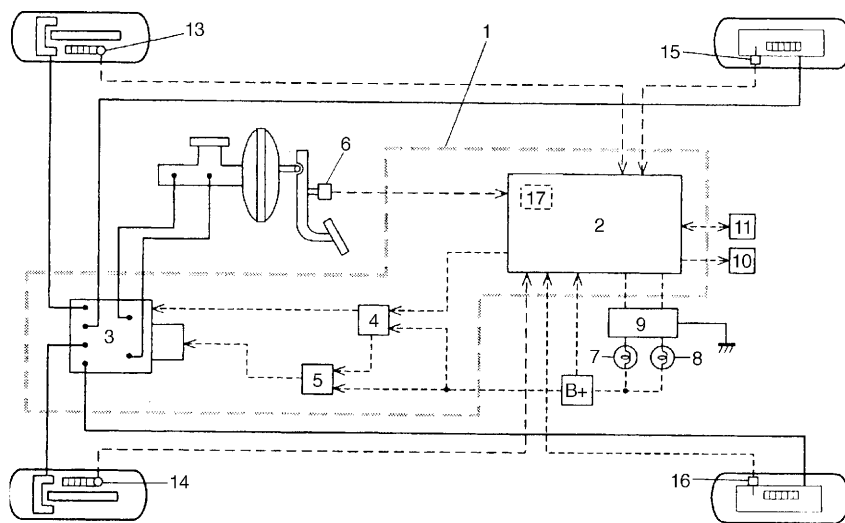
- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- “ABS” warning lamp which lights to inform abnormality when system fails to operate properly.
- ABS hydraulic unit/control module assembly is incorporated ABS control module, ABS hydraulic unit (actuator assembly), fail-safe relay and pump motor relay.
 - ABS control module which sends operation signal to ABS hydraulic unit to control fluid pressure applied to each wheel cylinder based on signal from each wheel speed sensor so as to prevent wheel from locking.
 - ABS hydraulic unit which operates according to signal from ABS control module to control fluid pressure applied to wheel cylinder of each 4 wheels.
 - Fail-safe relay (solenoid valve relay) which supplies power to solenoid valve in ABS hydraulic unit.
 - Pump motor relay which supplies power to pump motor in ABS hydraulic unit.
- G sensor (built in ABS hydraulic unit/control module assembly) which detects vehicle deceleration. (For 4WD model only)

This ABS is equipped with Electronic Brake force Distribution (EBD) system that controls a fluid pressure of rear wheels to best condition, which is the same function as that of proportioning valve, by the signal from wheel sensor independently of change of load due to load capacity and so on. And if the EBD system fails to operate properly, the brake warning lamp lights to inform abnormality.



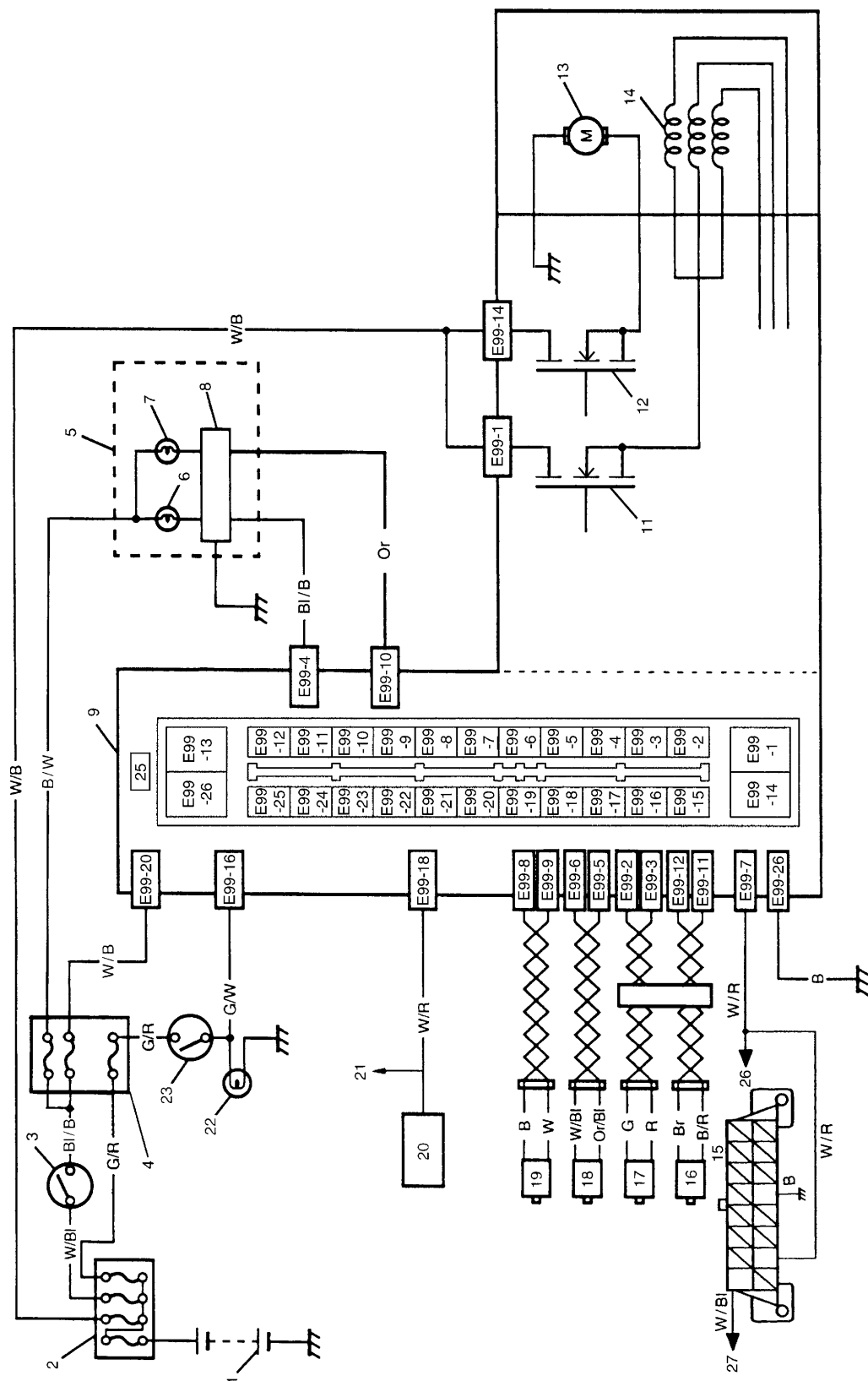
[A] : LH steering vehicle shown	2. Combination meter	4. Wheel speed sensor ring
1. ABS hydraulic unit/control module assembly	3. Wheel speed sensor	5. G sensor (For 4WD model only)

System Schematic



1. ABS hydraulic unit/control module assembly	7. "ABS" warning lamp	13. Wheel speed sensor (Right -front)
2. ABS control module	8. Brake warning lamp	14. Wheel speed sensor (Left-front)
3. ABS hydraulic unit	9. Lamp driver module	15. Wheel speed sensor (Right-rear)
4. Fail safe relay	10. ECM, Combination meter and P/S control module (if equipped)	16. Wheel speed sensor (Left-rear)
5. Pump motor relay	11. Data link connector	17. G sensor (For 4WD model only)
6. Stop lamp switch	12. Blank	

System Circuit



1. Battery	10. Terminal arrangement of ABS hydraulic unit/control module assembly	19. Left-front wheel speed sensor
2. Main fuses	11. ABS fail-safe FET (Solenoid valve FET)	20. ECM
3. Ignition switch	12. ABS pump motor FET	21. K-line tester
4. Circuit fuses	13. Pump motor	22. To ECM, SDM and P/S control module (if equipped)
5. Combination meter	14. Solenoid valves	23. Stop lamp
6. "ABS" warning lamp	15. Data link connector (DLC)	24. Stop lamp switch
7. Brake warning lamp	16. Right-rear wheel speed sensor	25. G sensor
8. Warning lamp driver module (for ABS)	17. Left-rear wheel speed sensor	26. To ECM, TCM, P/S control module and SDM
9. ABS hydraulic unit/control module assembly	18. Right-front wheel speed sensor	27. To main fuse box

Wire color

B :	Black	Br :	Brown	R/Y :	Red/Yellow
B/G :	Black/Green	G :	Green	V :	Violet
B/R :	Black/Red	G/R :	Green/Red	V/Y :	Violet/Yellow
B/W :	Black/White	G/W :	Green/White	W :	White
B/Y :	Black/Yellow	Or/Bl :	Orange/Blue	W/B :	White/Black
Bl :	Blue	R :	Red	W/Bl :	White/Blue
Bl/B :	Blue/Black	R/B :	Red/Black	W/G :	White/Green
Bl/Y :	Blue/Yellow	R/Bl :	Red/Blue	W/R :	White/Red
Bl/W :	Blue/White	R/W :	Red/White	W/Y :	White/Yellow

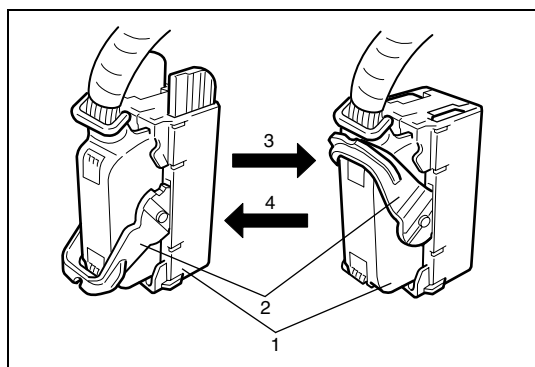
TERMINAL		CIRCUIT
E99	1	ABS fail-safe FET
	2	Left-rear wheel speed sensor (+)
	3	Left-rear wheel speed sensor (–)
	4	"ABS" warning lamp
	5	Right-front wheel speed sensor (–)
	6	Right-front wheel speed sensor (+)
	7	Serial data link terminal
	8	Left-front wheel speed sensor (+)
	9	Left-front wheel speed sensor (–)
	10	Brake warning lamp
	11	Right-rear wheel speed sensor (+)
	12	Right-rear wheel speed sensor (–)
	13	–
	14	ABS pump motor FET
	15	–
	16	Stop lamp switch
	17	–
	18	Vehicle speed signal
	19	–
	20	Ignition switch
	21	–
	22	–
	23	–
	24	–
	25	Data link connector
	26	Ground

Diagnosis

To ensure that the trouble diagnosis is done accurately and smoothly, observe "PRECAUTIONS IN DIAGNOSING TROUBLES" and follow "ABS DIAGNOSTIC FLOW TABLE".

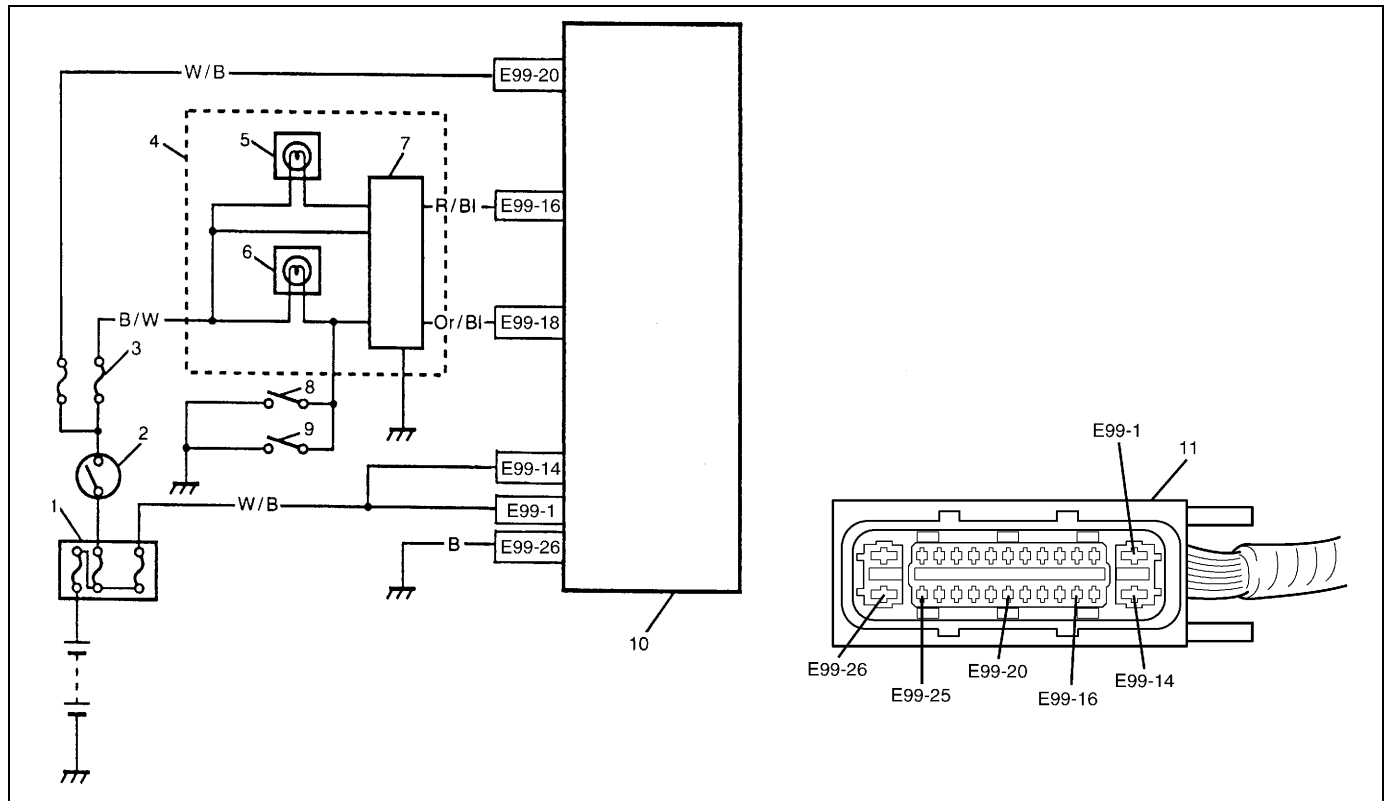
Precaution in Diagnosing Troubles

- If the vehicles was operated in any of the following ways, ABS warning lamp may light momentarily but this does not indicate anything abnormal in ABS.
 - The vehicle was driven with parking brake pulled.
 - The vehicle was driven with brake dragging.
 - The vehicle was stuck in mud, sand, etc.
 - Wheel spin occurred while driving.
 - Wheel(s) was rotated while the vehicle was jacked up.
- Be sure to read "PRECAUTIONS FOR ELECTRONIC CIRCUIT SERVICE" in Section 0A before inspection and observe what is written there.
- Be sure to use the trouble diagnosis procedure as described in the flow table. Failure to follow the flow table may result in incorrect diagnosis. (Some other diagnosis trouble code may be stored by mistake in the memory of ABS control module during inspection.)
- When disconnecting ABS hydraulic unit/control module connector (1), turn down lock (2) of connector. When connecting, set the connector on ABS hydraulic unit/control module assembly and push the lock (2) down.



3. Connect
4. Disconnect

Table – A ABS Warning Lamp Circuit Check – Lamp Does Not Come “ON” at Ignition Switch ON



1. Main fuse	5. ABS warning lamp	9. Brake fluid level switch
2. Ignition switch	6. Brake warning lamp	10. ABS hydraulic unit/control module assembly
3. Circuit fuse	7. Lamp driver module	11. ABS hydraulic unit/control module connector
4. Combination meter	8. Parking brake switch	

CIRCUIT DESCRIPTION

Operation (ON/OFF) of ABS warning lamp is controlled by ABS control module through lamp driver module in combination meter.

If the Antilock brake system is in good condition, ABS control module turns ABS warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, ABS warning lamp is turned ON continuously by ABS control module. Also, it is turned ON continuously by lamp driver module when the connector of ABS control module is disconnected.

INSPECTION

Step	Action	Yes	No
1	1) Turn ignition switch ON. Do other warning lamp come ON?	Go to Step 2.	Go to Step 4.
2	1) Disconnect ABS hydraulic unit/control module connector. Does ABS warning lamp light with ignition switch ON?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 3.
3	1) Remove combination meter. Is bulb of ABS warning lamp in good condition?	"R/BI" circuit shorted to ground. If OK, replace combination meter (lamp driver module).	Replace bulb.
4	Is IG fuse in good condition?	Open in "B/W" wire to combination meter or poor connection.	Repair and replace.

Table – B ABS Warning Lamp Circuit Check – Lamp Comes “ON” Steady

Refer to TABLE – A for System Circuit Diagram and Circuit Description.

INSPECTION

Step	Action	Yes	No
1	Perform diagnostic trouble code check. Is there any DTC (NO CODES on SUZUKI scan tool) exists?	Go to Step 2.	Go to Step 3.
2	Does malfunction DTC exist at Step 1?	Go to Step 7 of “ABS DIAGNOSTIC FLOW TABLE” in this section.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals “E99-4”, “E99-20” and “E99-26”. 3) If OK then ignition switch ON and measure voltage at terminal “E99-20” of connector. Is it 10 – 14 V?	Go to Step 4.	“W/B” circuit open.
4	1) With ABS hydraulic unit/control module connector disconnected, turn ignition switch ON and light ABS warning lamp. 2) Connect terminal “E99-4” of disconnected connector to ground using service wire. Does ABS warning lamp turn off?	Go to Step 5.	“R/B” circuit open. If wire and connection are OK, replace combination meter (lamp driver module).
5	1) Measure resistance from connector terminal “E99-26” to body ground. Is continuity indicated?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“B” circuit open.

Table – C EBD Warning Lamp (Brake Warning Lamp) Check – Lamp Comes “ON” Steady

CIRCUIT DESCRIPTION

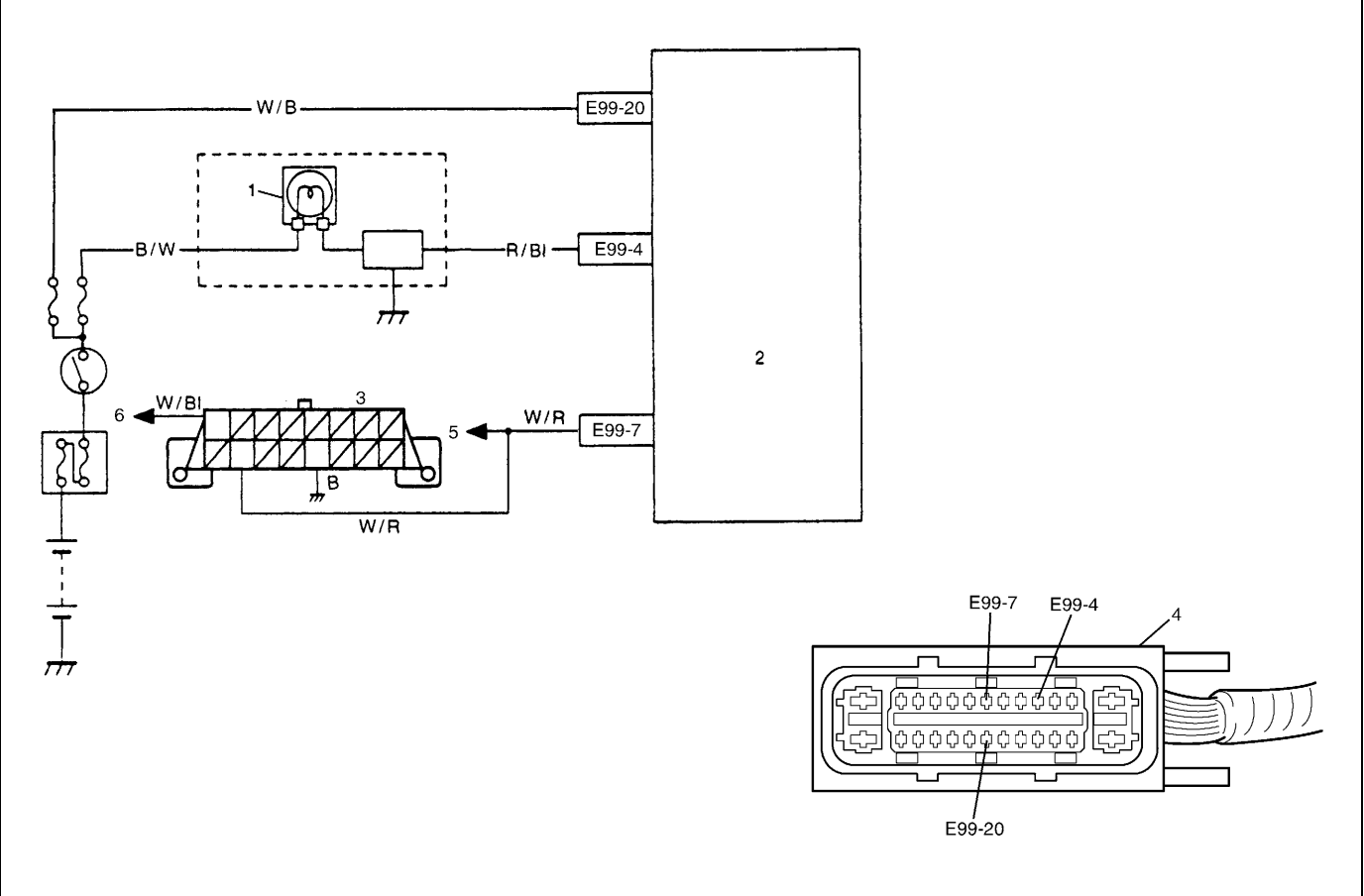
EBD warning lamp (Brake warning lamp) is controlled by parking brake switch, brake fluid level switch and ABS control module/hydraulic unit assembly through lamp driver module in combination meter. Refer to “TABLE – A” for circuit diagram.

INSPECTION

Step	Action	Yes	No
1	1) Make sure that : <ul style="list-style-type: none"> • Parking brake is completely released. • Brake fluid level is upper than the minimum level. Are the check results OK?	Go to Step 2.	Release parking brake completely and/or replenish brake fluid.
2	Does “ABS” warning lamp come on?	Perform “TABLE – B” previously outlined.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals “E99-10”. 3) If OK, apply chocks to wheels and select gear in neutral position (P range for A/T). 4) Keep brake pedal depressed and start engine. Release parking brake. 5) Connect terminal “E99-10” of disconnected connector to ground using service wire. Does brake warning lamp turn off?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“Or/BI” circuit open. If wire and connection are OK, replace combination meter.

Serial Data Link Circuit Check

CAUTION:
Be sure to perform “SYSTEM CHECK FLOW TABLE” before starting diagnosis according to flow table.

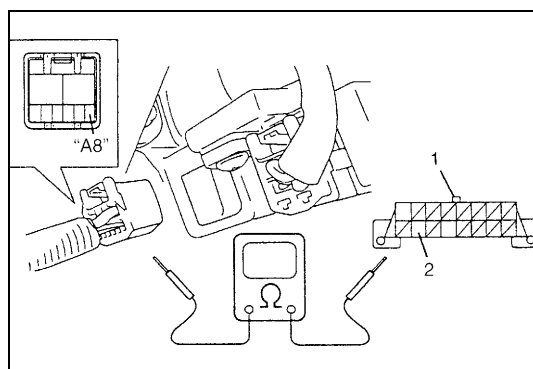


1. "ABS" warning lamp in combination meter	3. Data link connector (DLC)	5. To ECM, TCM, P/S control module and SDM
2. ABS hydraulic unit/control module assembly	4. ABS hydraulic unit/control module connector	6. To main fuse box

INSPECTION

Step	Action	Yes	No
1	Was "ABS DIAGNOSTIC CHECK FLOW TABLE" performed?	Go to Step 2.	Go to "ABS DIAGNOSTIC CHECK FLOW TABLE" in this section.
2	1) Make sure that SUZUKI scan tool is free from malfunction and correct cartridge for ABS is used. 2) Turn ignition switch to OFF position. 3) Check proper connection of SUZUKI scan tool to DLC. Is connection in good condition?	Go to Step 3.	Properly connect SUZUKI scan tool to DLC.
3	1) Check if communication is possible by trying communication with other controller (ECM, TCM, P/S control module or SDM). Is it possible to communicate with other controller?	Go to Step 4.	Repair open in common section of serial data circuit ("W/R" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("W/R" wire circuit).
4	1) With ignition switch OFF position, disconnect ABS hydraulic unit/control module connector from ABS hydraulic unit/control module. 2) Check proper connection at "E99-25" ("W/R" wire) terminal for serial data circuit. 3) If OK, then check resistance between "E99-25" ("W/R" wire) terminal and "W/R" wire terminal for serial data circuit in DLC. Is resistance 1 Ω or less?	Substitute a known-good P/S control module and recheck.	Repair high resistance or open in "W/R" wire circuit for ANTI LOCK BRAKE system.

Fig. for Step 4



- | |
|------------------------|
| 1. DLC |
| 2. "W/R" wire terminal |

Diagnostic Trouble Code (DTC) Table**CAUTION:****Be sure to perform “ABS DIAGNOSTIC FLOW TABLE” before starting diagnosis.**

DTC (displayed on SUZUKI scan tool)	DIAGNOSTIC ITEMS	
NO DTC	Normal	
C1015	G sensor circuit	
C1021	RF	Wheel speed sensor circuit
C1025	LF	
C1031	RR	
C1035	LR	
C1022	RF	Wheel speed sensor circuit or sensor ring
C1026	LF	
C1032	RR	
C1036	LR	
C1041	RF	Inlet solenoid valve circuit
C1042		Outlet solenoid valve circuit
C1045	LF	Inlet solenoid valve circuit
C1046		Outlet solenoid valve circuit
C1051	RR	Inlet solenoid valve circuit
C1052		Outlet solenoid valve circuit
C1055	LR	Inlet solenoid valve circuit
C1056		Outlet solenoid valve circuit
C1057	Power source	
C1061	ABS pump motor and/or motor relay circuit	
C1063	Fail safe-relay	
C1071	ABS control module	

DTC C1015 – G Sensor Circuit**DESCRIPTION**

If the signal voltage of G sensor while at a stop does not vary from that while running, this DTC is set. Therefore, this DTC may be set when a vehicle is lifted up and its wheel(s) is turned. In such case, clear the DTC and check again.

INSPECTION

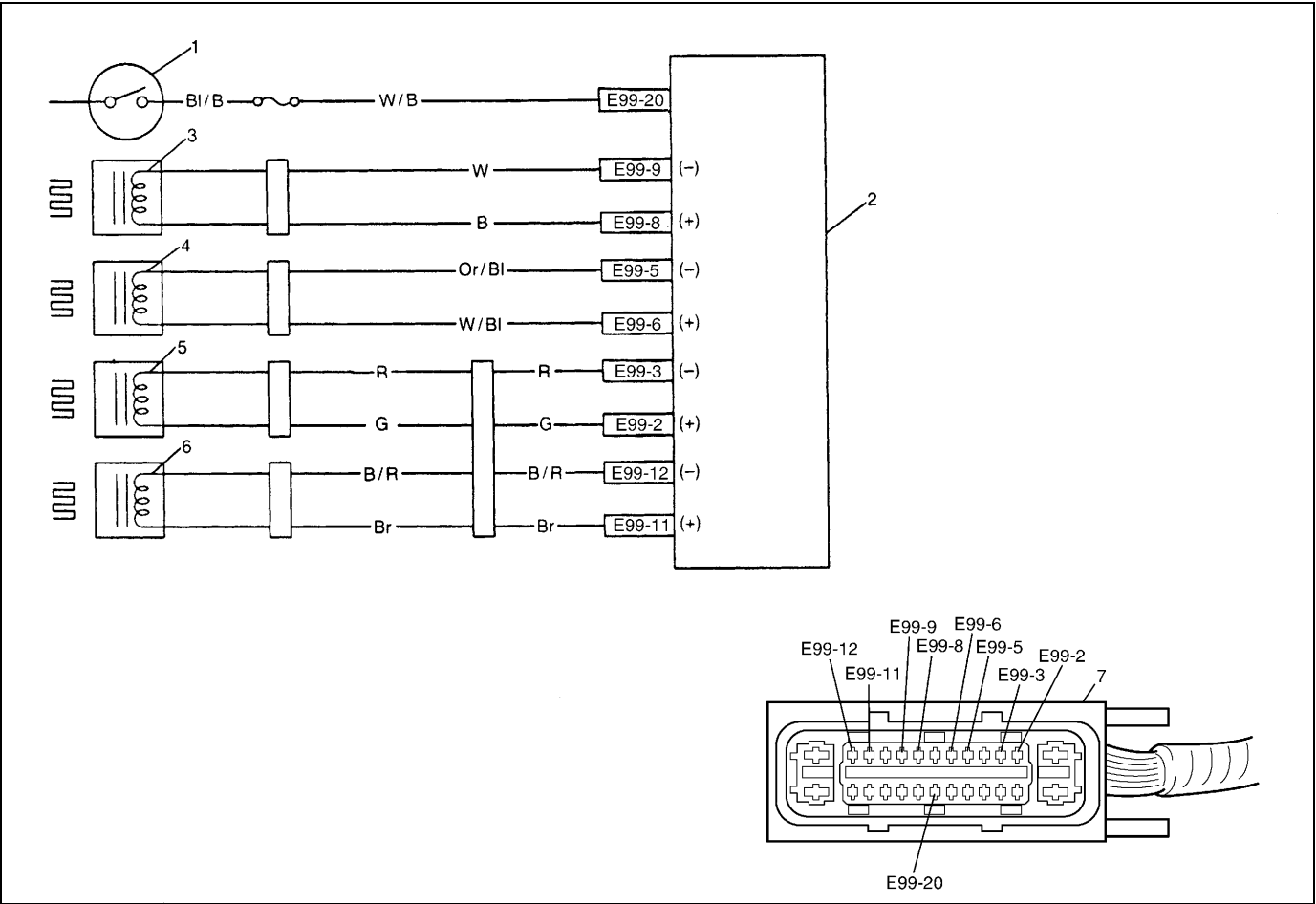
- 1) Ignition switch OFF.
- 2) Check for proper connection from harness to control module.
- 3) If OK, substitute an ABS hydraulic unit/control module assembly with correct part number.
- 4) Recheck system.

DTC C1021, DTC C1022 – Right-Front Wheel Speed Sensor Circuit or Sensor Ring

DTC C1025, DTC C1026 – Left-Front Wheel Speed Sensor Circuit or Sensor Ring

DTC C1031, DTC C1032 – Right-Rear Wheel Speed Sensor Circuit or Sensor Ring

DTC C1035, DTC C1036 – Left-Rear Wheel Speed Sensor Circuit or Sensor Ring



1. Ignition switch	4. Right-front wheel speed sensor	7. ABS hydraulic unit/control module connector
2. ABS control module/hydraulic unit assembly	5. Left-rear wheel speed sensor	
3. Left-front wheel speed sensor	6. Right-rear wheel speed sensor	

DESCRIPTION

The ABS control module monitors the voltage at the terminal of each sensor while the ignition switch is ON. When the voltage is not within the specified range, an applicable DTC will be set. Also, when no sensor signal is inputted at starting or while running, an applicable DTC will be set.

NOTE:

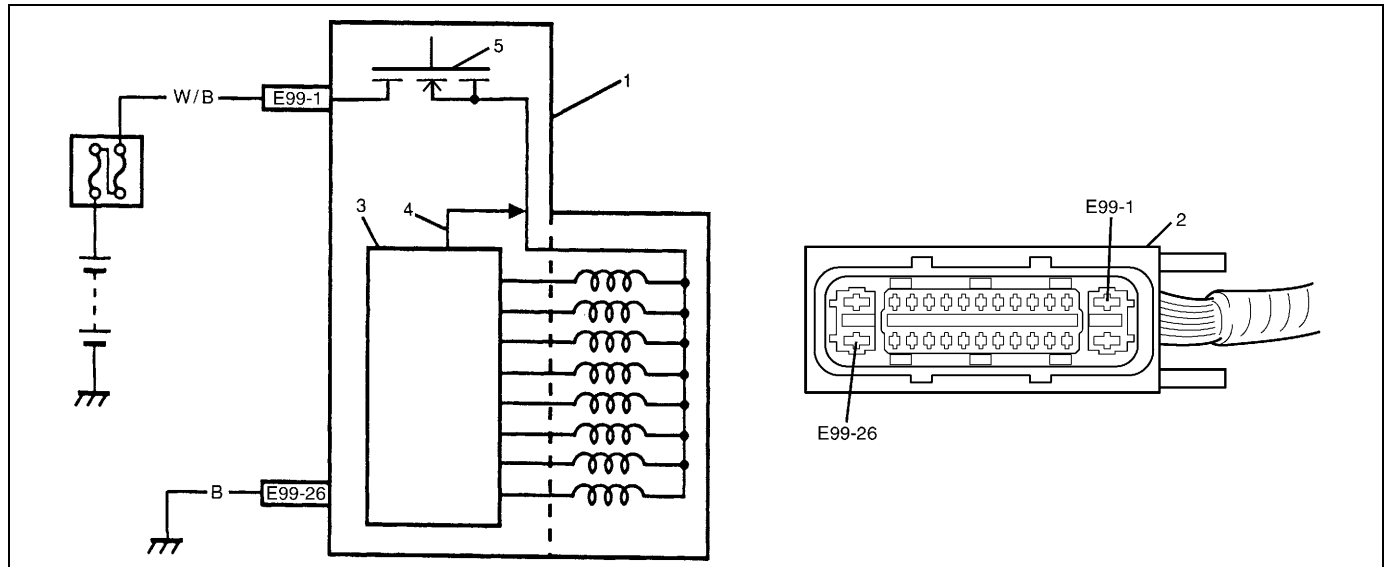
When the vehicle was operated in any of the following ways, one of these DTCs may be set even when the sensor is in good condition. If such possibility is suspected, repair the trouble (dragging of brake, etc.) of the vehicle, clear DTC once and then after performing the driving test as described in Step 2 of “ABS DIAGNOSIS FLOW TABLE”, check whether or not any abnormality exists.

- The vehicle was driven with parking brake pulled.
- The vehicle was driven with brake dragging.
- Wheel spin occurred while driving.
- Wheel(s) was turned while the vehicle was jacked up.
- The vehicle was stuck.

INSPECTION

Step	Action	Yes	No
1	1) Disconnect applicable ABS wheel speed sensor coupler with ignition switch OFF. 2) Measure resistance between terminals of ABS wheel speed sensor. Refer to “FRONT WHEEL SPEED SENSOR” and/or “REAR WHEEL SPEED SENSOR” in this section. Is measured resistance value as specified?	Go to Step 2.	Replace ABS wheel speed sensor assembly.
2	1) Turn ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS control module at each sensor terminal. 4) If OK, then turn ignition switch ON and measure voltage between sensor terminal of module connector and body ground. Is it 0V?	Go to Step 3.	ABS wheel speed sensor circuit shorted to power.
3	1) Turn ignition switch OFF. 2) Connect ABS wheel speed sensor coupler. 3) Measure resistance between the following points. <ul style="list-style-type: none"> • Both ABS hydraulic unit/control module connector terminals of the corresponding sensor. This check result should be the same as above Step 1. • Either terminal of wheel speed sensor coupler and body ground. This check result should be no continuity. Are both check results OK?	Go to Step 4.	Circuit open or shorted to ground.
4	1) Remove applicable ABS wheel speed sensor. 2) Check sensor for damage or foreign material attached. Is it in good condition?	Go to Step 5.	Clean, repair or replace.
5	Check front and/or rear sensor ring for the following (remove rear drum as necessary) : <ul style="list-style-type: none"> • Rotor serration (teeth) neither missing nor damaged. • No foreign material being attached. • Rotor not being eccentric. • Wheel bearing free from excessive play. Are they in good condition?	Go to Step 6.	Clean, repair or replace.

Step	Action	Yes	No
6	1) Install ABS wheel speed sensor to knuckle. 2) Tighten sensor bolt to specified torque and check that there is no clearance between sensor and knuckle. Is it OK?	Go to Step 7.	Replace ABS wheel speed sensor.
7	Referring to "Reference" of "FRONT WHEEL SPEED SENSOR" and/or "Reference" of "REAR WHEEL SPEED SENSOR" in this section, check output voltage or waveform. Is specified voltage and/or waveform obtained?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Replace sensor and recheck.

DTC C1041 – Right-Front Inlet Solenoid Circuit**DTC C1045 – Left-Front Inlet Solenoid Circuit****DTC C1051 – Right-Rear Inlet Solenoid Circuit****DTC C1055 – Left-Rear Inlet Solenoid Circuit****DTC C1042 – Right-Front Outlet Solenoid Circuit****DTC C1046 – Left-Front Outlet Solenoid Circuit****DTC C1052 – Right-Rear Outlet Solenoid Circuit****DTC C1056 – Left-Rear Outlet Solenoid Circuit**

1. ABS hydraulic unit/control module assembly	3. ABS control module	5. Fail-safe relay
2. ABS hydraulic unit/control module assembly connector	4. Signal	

DESCRIPTION

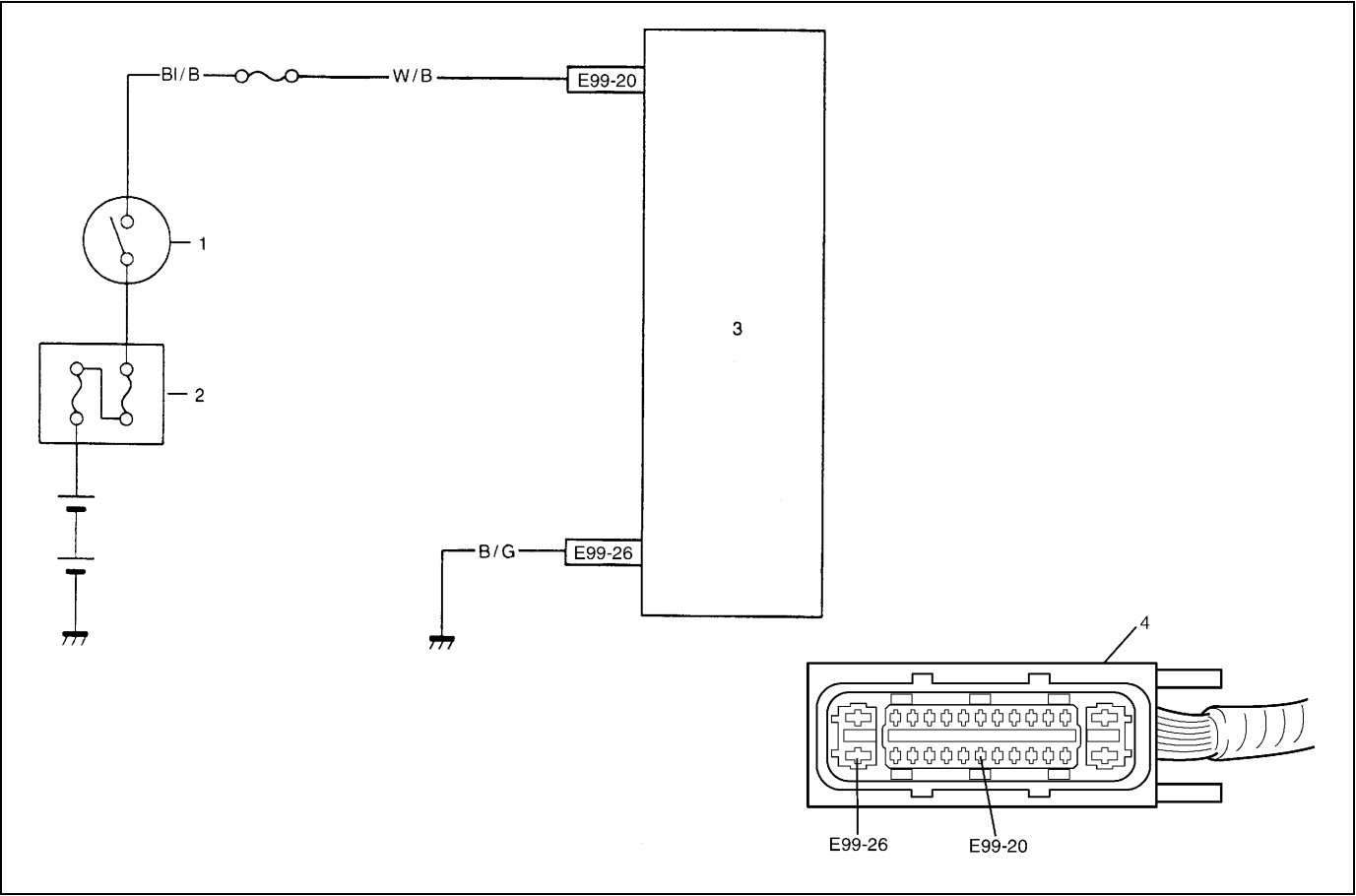
The ABS control module monitors the output from the valve.

When the output of each valve exceeds the specified value compared with the signal sent from ABS control module, this DTC is set.

INSPECTION

Step	Action	Yes	No
1	1) Check solenoid operation referring to item "ABS HYDRAULIC UNIT OPERATION CHECK" in this section. Is it in good condition?	Check terminal "E99-1" connection. If connection is OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 2.
2	1) Turn ignition switch to OFF position. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal "E99-1". 4) If OK, then measure voltage between terminal "E99-1" of module connector and "E99-26". Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"WHT/BLU" or "BLK" circuit open.

DTC C1057 – Power Source Circuit



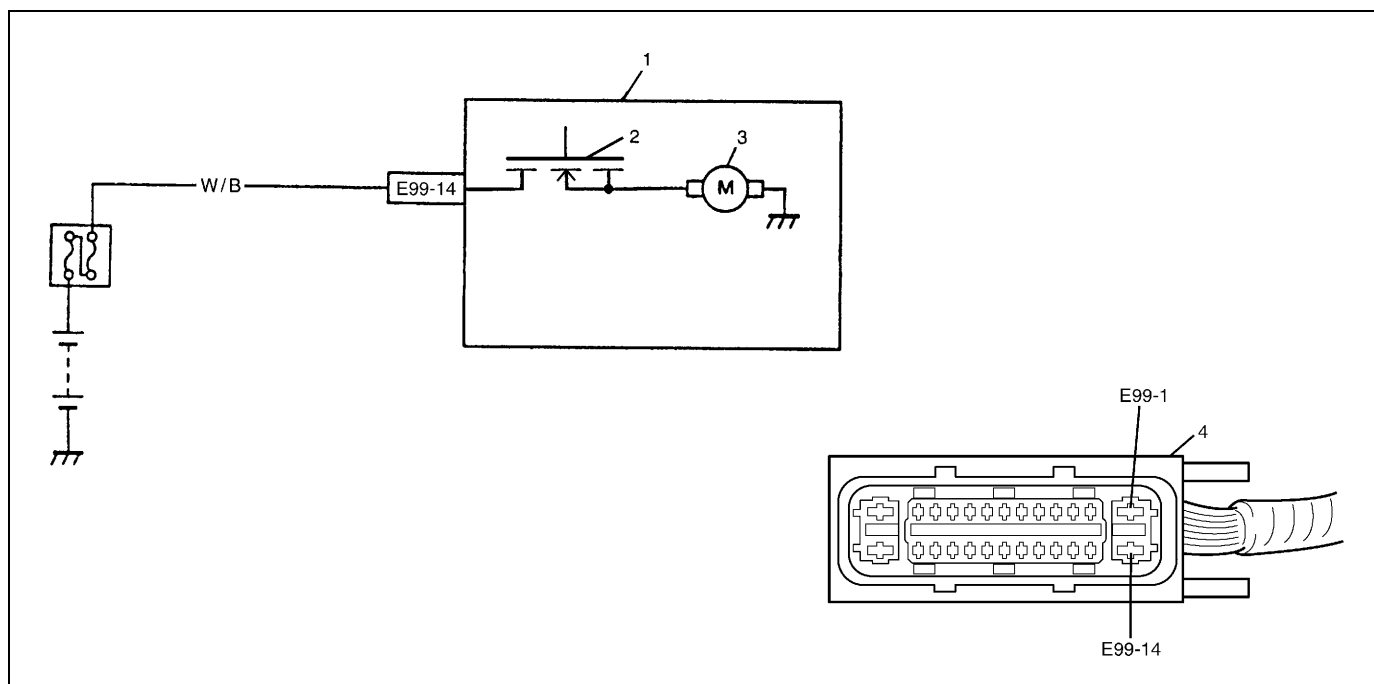
1. Ignition switch	3. ABS hydraulic unit/control module assembly
2. Main fuse	4. ABS hydraulic unit/control module connector

DESCRIPTION

The ABS control module monitors the power source voltage at terminal “E20-18”. When the power source voltage becomes extremely high or low, this DTC will be set. As soon as the voltage rises or lowers to the specified level, the set DTC will be cleared.

INSPECTION

Step	Action	Yes	No
1	1) Connect a voltmeter between battery positive (+) terminal and body ground. 2) Start the engine and measure the maximum voltage when racing the engine. Is it over 18 V?	Check charging system referring to “CHARGING SYSTEM” section.	Go to Step 2.
2	1) Disconnect ABS hydraulic unit/control module connector. 2) Keep the engine idling, measure the voltage between terminal “E99-20” of ABS control module and body ground. Is it always under 9 V?	Check charging system referring to “CHARGING SYSTEM” section. Imperfect short between wire “W/B” and ground.	Poor connection of terminal “E99-20” or “E99-26” of the ABS control module. If the above are in good condition, substitute a known-good ABS hydraulic unit/control module and recheck.

DTC C1061 – ABS Pump Motor Circuit

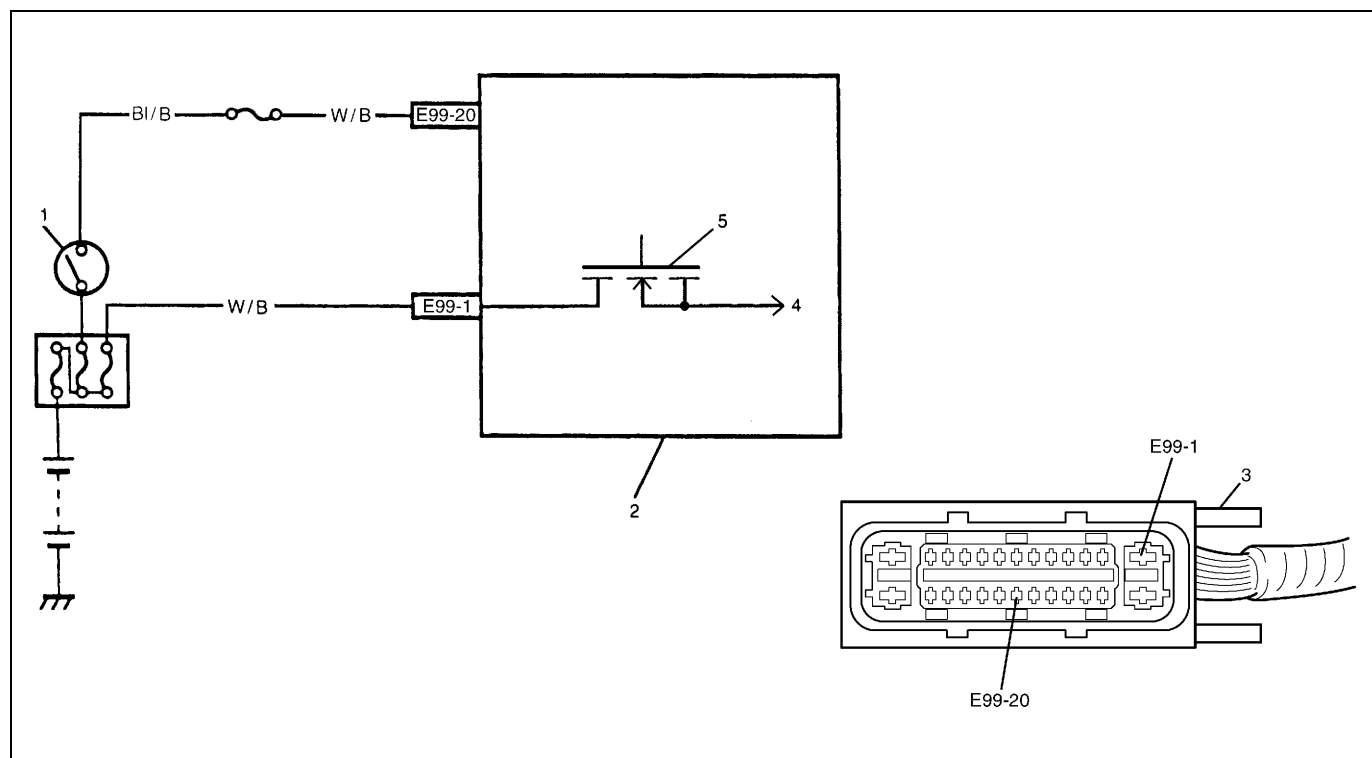
1. ABS hydraulic unit/control module assembly	3. ABS pump motor
2. ABS pump motor FET	4. ABS hydraulic unit/control module connector

DESCRIPTION

The ABS control module monitors the voltage at monitor terminal of pump motor circuit constantly with the ignition switch turned ON. It sets this DTC when the voltage at the monitor terminal does not become high/low according to ON/OFF commands to the motor relay of the module (does not follow these commands).

INSPECTION

Step	Action	Yes	No
1	1) Check pump motor referring to “ABS HYDRAULIC UNIT OPERATION CHECK” in this section. Is it in good condition?	Check terminal “E99-14” connection. If connections OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 2.
2	1) Turn Ignition switch to OFF position. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal “E99-14”. 4) If OK, then measure voltage between terminal “E99-14” of module connector and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“W/B” circuit open.

DTC C1063 – ABS Fail-Safe FET Circuit

1. Ignition switch	3. ABS hydraulic unit/control module connector	5. Fail-safe FET
2. ABS hydraulic unit/control module assembly	4. To solenoid valves	

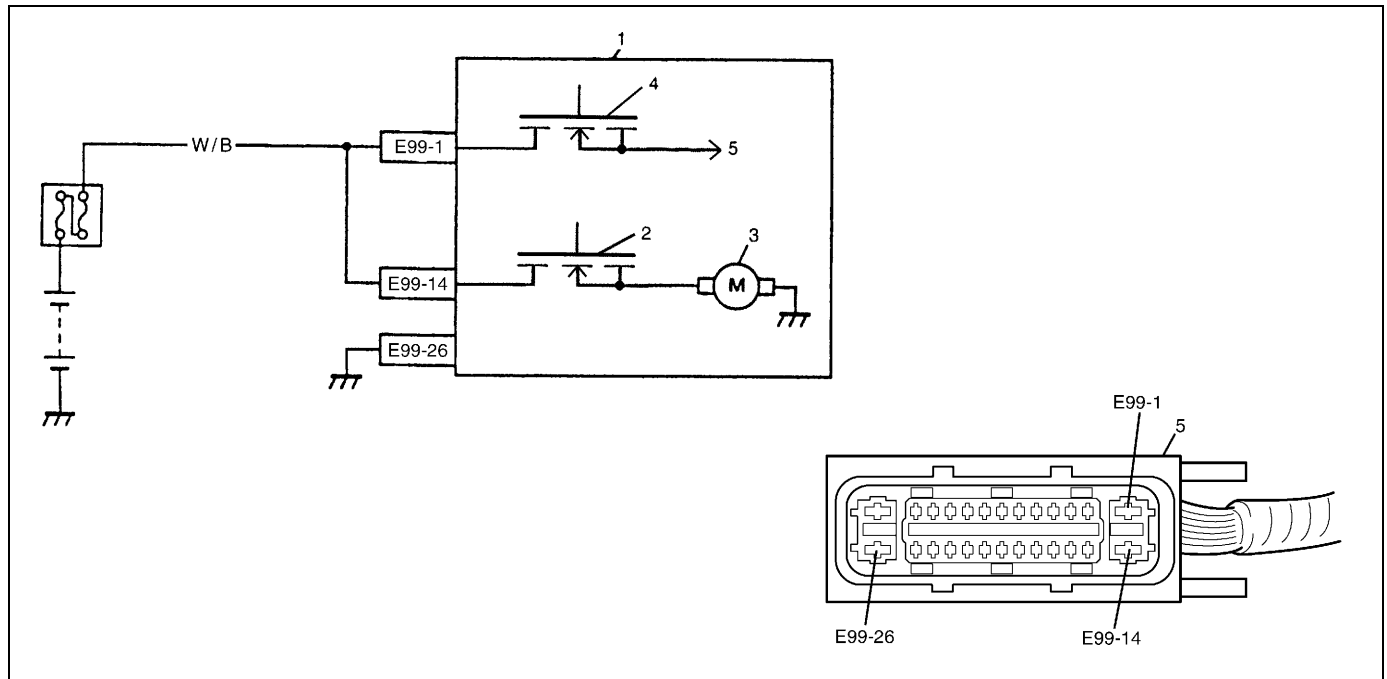
DESCRIPTION

ABS control module monitors the voltage at the terminal of solenoid circuit constantly with ignition switch turned ON. Also, immediately after ignition switch is turned ON, perform initial check as follows.

Switch fail-safe relay in the order of OFF → ON and check if voltage changes to Low → High. If anything faulty is found in the initial check and when the voltage is low with ignition switch turned ON, this DTC will be set.

INSPECTION

Step	Action	Yes	No
1	Check battery voltage. Is it about 11 V or higher?	Go to Step 2.	Check charging system referring to "CHARGING SYSTEM" section.
2	Check ABS main fuse and connection. Is it in good condition?	Go to Step 3.	Repair and/or replace fuse.
3	1) Turn ignition switch to OFF position. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check proper connection to ABS hydraulic unit/control module at terminal "E99-1". 4) If OK, then measure voltage between connector terminal "E99-1" and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"W/B" circuit open or short to ground.

DTC C1071 – ABS Control Module

1. ABS hydraulic unit/control module assembly	3. ABS pump motor	5. ABS hydraulic unit/control module connector
2. ABS pump motor FET	4. ABS fail safe FET	

DESCRIPTION

This DTC will be set when an internal malfunction is detected in the ABS control module.

INSPECTION

Step	Action	Yes	No
1	Clear all DTCs and check DTC. Is it DTC C1071?	Go to Step 2.	Could be a temporary malfunction of the ABS control module.
2	1) Check proper connection of ABS hydraulic unit/control module connector. 2) If OK, disconnect ABS hydraulic unit/control module connector and check the followings. <ul style="list-style-type: none"> • Voltage "E99-1" terminal : 10 – 14 V • Resistance between "E99-26" and body ground : Continuity Are the check result as specified above?	Replace ABS hydraulic unit/control module assembly.	Repair and recheck.

On-Vehicle Service

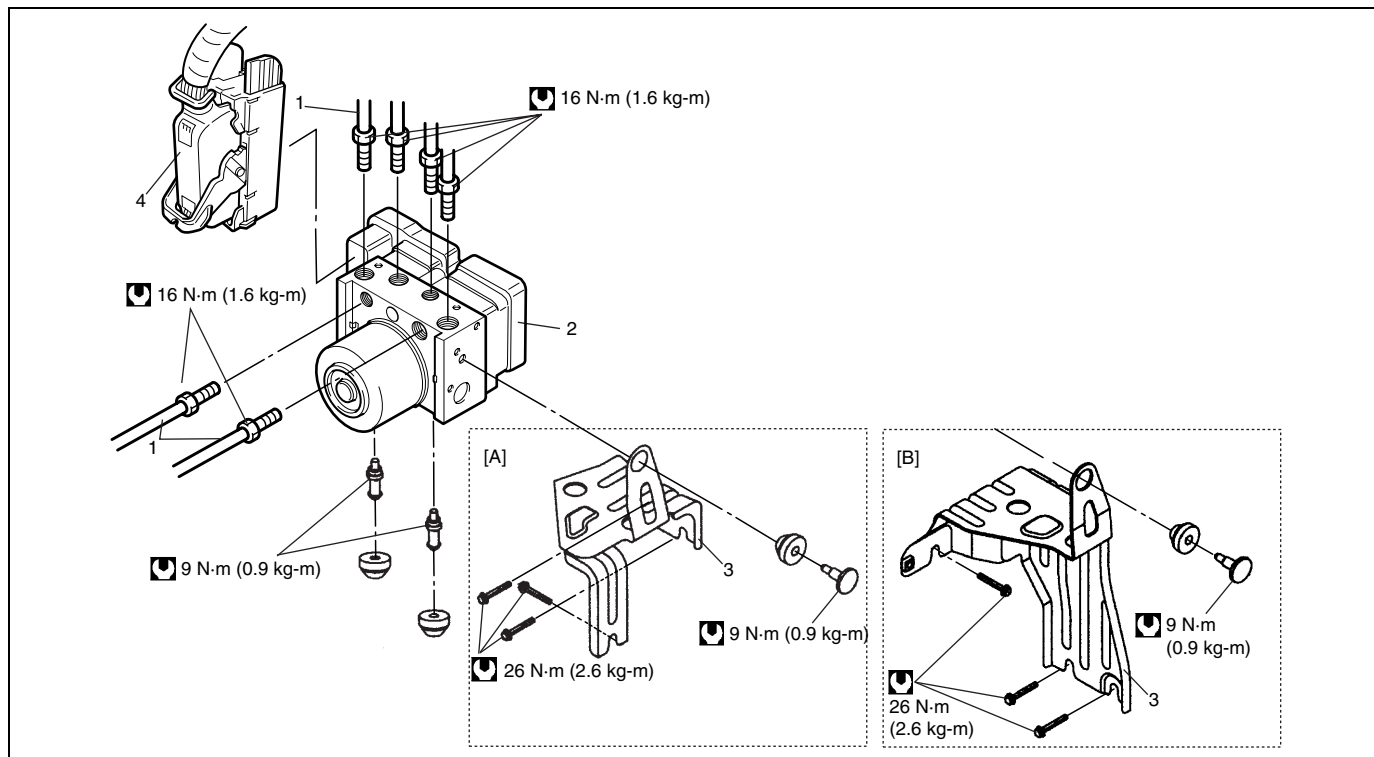
Precautions

When connector is connected to ABS hydraulic unit/control module assembly, do not disconnect connectors of sensors with ignition switch ON. Then DTC will be set in ABS control module.

ABS Hydraulic Unit/Control Module Assembly

CAUTION:

Never disassemble ABS hydraulic unit/control module assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS hydraulic unit/control module assembly.

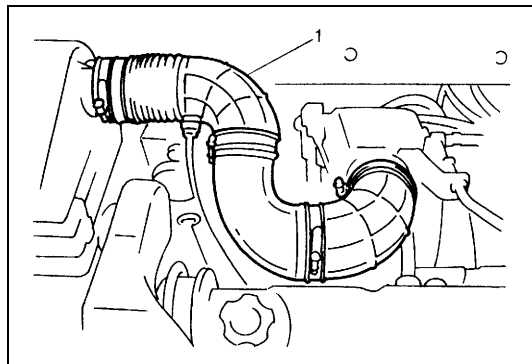


[A] : RH	1. Brake pipe	3. Bracket
[B] : LH	2. ABS hydraulic unit/control module assembly	4. Connector

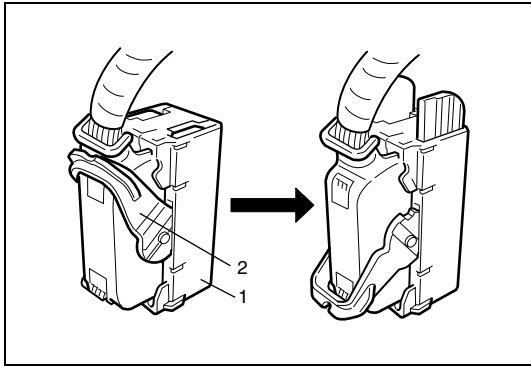
HYDRAULIC UNIT INSPECTION

Check hydraulic unit for fluid leakage.
If any, repair or replace.

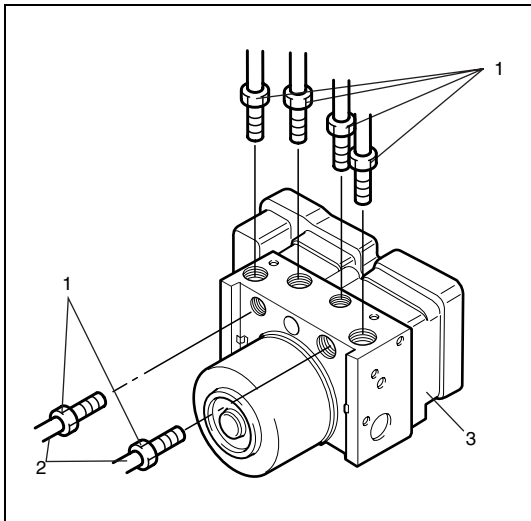
REMOVAL



- 1) Disconnect negative cable from battery.
- 2) For LH vehicle, remove air cleaner outlet pipe (1) referring to "Engine Mechanical" section.



- 3) Disconnect ABS hydraulic unit/control module assembly connector (1) by turning down lock (2).

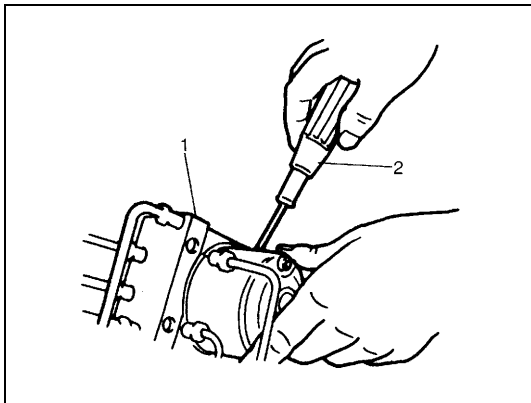


- 4) Using special tool, loosen flare nuts (1) and disconnect brake pipes (2) from ABS hydraulic unit/control module assembly (3).

Special tool
: 09950-78220

NOTE:

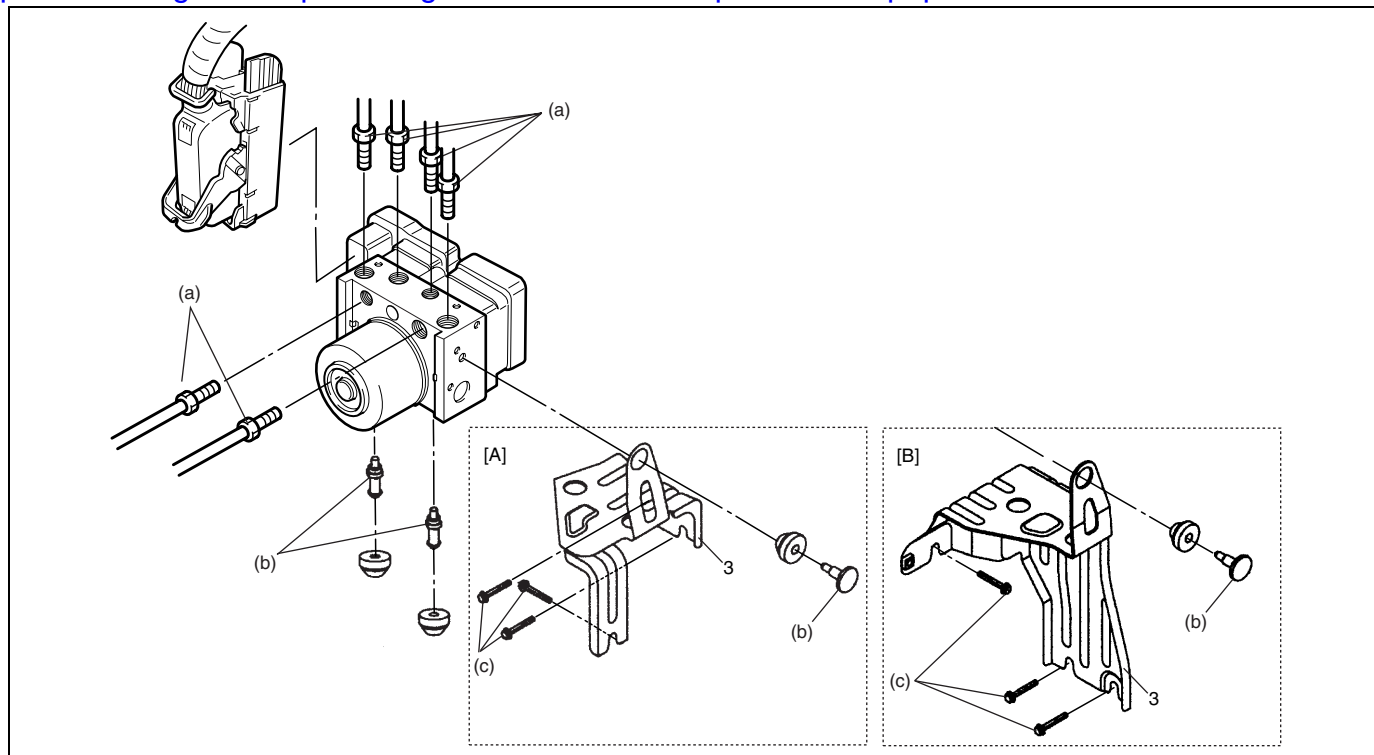
Put bleeder plug cap onto pipe to prevent fluid from spilling. Do not allow brake fluid to get on painted surfaces.



- 5) Remove one screw and disconnect take out ABS hydraulic unit/control module assembly (1) from bracket using screwdriver (2).

CAUTION:

- Do not give an impact to hydraulic unit.
- Use care not to allow dust to enter hydraulic unit.
- Do not place hydraulic unit on its side or upside down. Handling it in inappropriate way will affect its original performance.



[A] : RH

[B] : LH

INSTALLATION

- 1) Install hydraulic unit by reversing removal procedure.

Tightening torque

(a) : 16 N·m (1.6 kg-m, 11.5 lb-ft)

(b) : 9 N·m (0.9 kg-m, 6.5 lb-ft)

(c) : 26 N·m (2.6 kg-m, 18.0 lb-ft)

- 2) Bleed air from brake system referring to "BRAKE" section.
- 3) Check each installed part for fluid leakage and perform "ABS Hydraulic Unit Operation Check" in this section.

NOTE:

For new ABS hydraulic unit/control module assembly, if "ABS Hydraulic Unit Operation Check" procedure has not been performed, "ABS" warning lamp may flash when ignition switch is turned ON position.

SECTION 6F1

IGNITION SYSTEM

(ELECTRONIC IGNITION SYSTEM)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

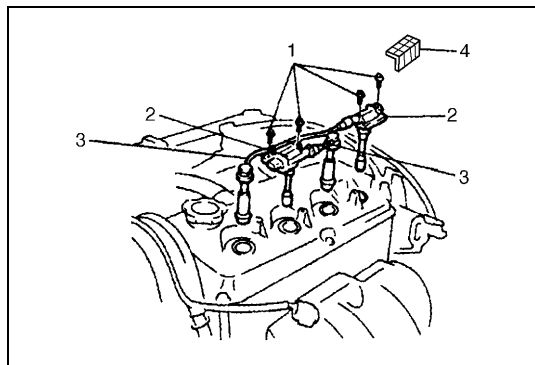
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General Description	*	Ignition Coil Assembly	
Diagnosis	*	(Including Ignitor)	6F1-2
On-Vehicle Service	6F1-2	Crankshaft Position Sensor	
Ignition Spark Test	*	(CKP Sensor)	*
High-Tension Cords	*	Ignition Timing	*
Spark Plugs	*	Special Tools	*

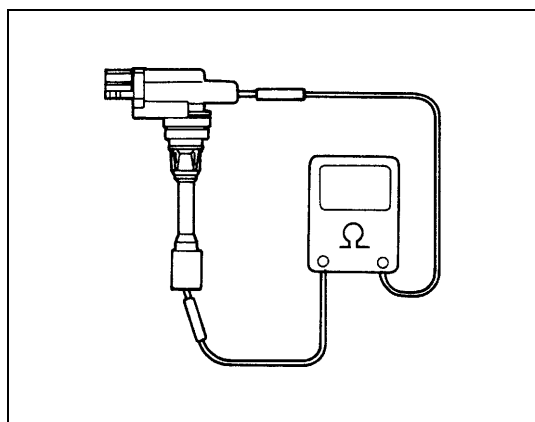
On-Vehicle Service

Ignition Coil Assembly (Including Ignitor)

Inspection



- 1) Disconnect negative cable at battery.
- 2) Pull out ignition coil cover (4).
- 3) Disconnect ignition coil coupler.
- 4) Disconnect high-tension cord (3) from ignition coil assembly (2).
- 5) Remove ignition coil bolts (1) and then pull out ignition coil assembly.



- 6) Measure secondary coil for resistance.

Secondary coil resistance

: 7.1 – 9.5 k Ω at 20°C, 68°F

If resistance is out of specification, replace ignition coil assembly.

- 7) Install ignition coil assembly.
- 8) Tighten ignition coil bolts, and then connect ignition coil coupler.
- 9) Install high-tension cord to ignition coil assembly while gripping its cap.
- 10) Install ignition coil cover certainly to ignition coil assembly.

SECTION 8D

WINDOWS, MIRRORS, SECURITY AND LOCKS

WARNING:

For vehicles equipped with a Supplement Restraint (Air Bag) System

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

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General Description*	Front and rear washer pump.....*
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Symbols and Marks.....*	Auto stop circuit.....*
Wiring Color Symbols.....*	Intermittent circuit.....*
Abbreviations.....*	Washer linked circuit.....*
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Fuse Box and Relay.....*	Rear wiper motor.....*
Power Supply Diagram.....*	Rear wiper arm.....*
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Front wiper and washer.....*	Defogger switch (in blower fan and
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Power Door Lock System (If Equipped).....*	Defogger wire.....*
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Power Door Mirror Control System	inspection.....*
(If Equipped).....*	Power door lock system circuit
On-Vehicle Service8D-3	inspection.....*
Windshield Wiper and Washer.....*	Power door lock system circuit check.....*
Front wiper and washer switch.....*	Key cylinder switch.....8D-3
Front wiper motor.....*	Power door lock actuator.....8D-3
	Keyless Entry System (If Equipped).....*

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Keyless entry system operation
inspection *

Keyless entry system circuit
inspection *

Keyless entry system circuit check *

Transmitter *

Power Door Mirror Control System
(If Equipped) *

Mirror switch..... *

Door mirror actuator..... *

Special Tool *

On-Vehicle Service

Power Door Lock System (If Equipped)

Key cylinder switch

INSPECTION

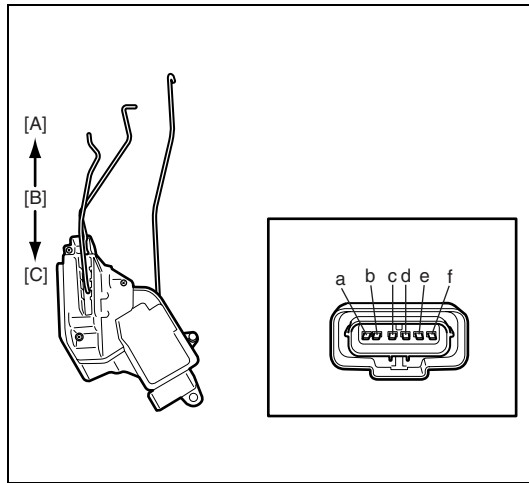
Inspect continuity between terminals under the following key positions.

For right side switch terminals	a	b	c
For left side switch terminals	f	e	d
Key position	Neutral		
	Unlock	○	○
	Lock	○	○

[A]: Lock

[B]: Neutral

[C]: Lock



Power door lock actuator

INSPECTION

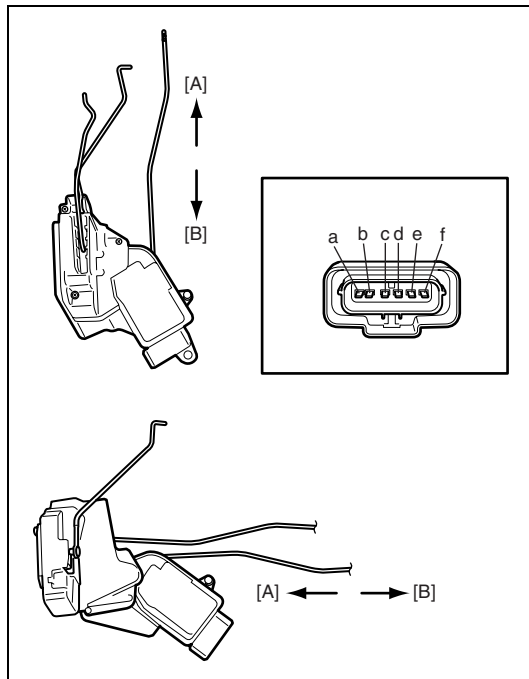
- 1) Disconnect power door lock actuator coupler.
- 2) Connect 12 V battery positive and negative terminals to the door lock actuator terminals shown below.
If it does not operate as specified in table below, replace door lock actuator.

For Front & Rear Door

For right side switch terminals	f	e	d
For left side switch terminals	a	b	c
Unlock ⇒ Lock	⊖	⊖	⊕
Lock ⇒ Dead lock	⊖	⊕	⊕
Lock ⇒ Unlock	⊕	⊖	⊖
Dead lock ⇒ Unlock			

[A]: Unlock

[B]: Lock

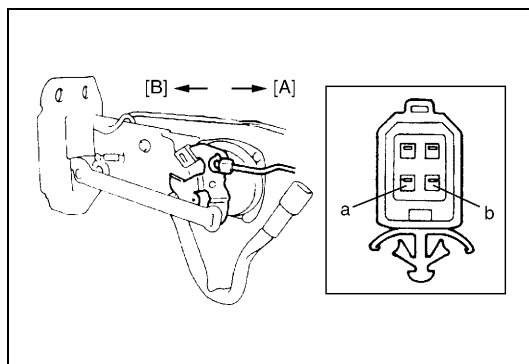


For Back Door

	a	b
Unlock ⇒ Lock	⊕	⊖
Lock ⇒ Unlock	⊖	⊕

[A]: Unlock

[B]: Lock



SECTION 9

BODY SERVICE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- When body servicing, if shock may be applied to air bag system component parts, remove those parts beforehand. (Refer to Section 10B.)

NOTE:

Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.

Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

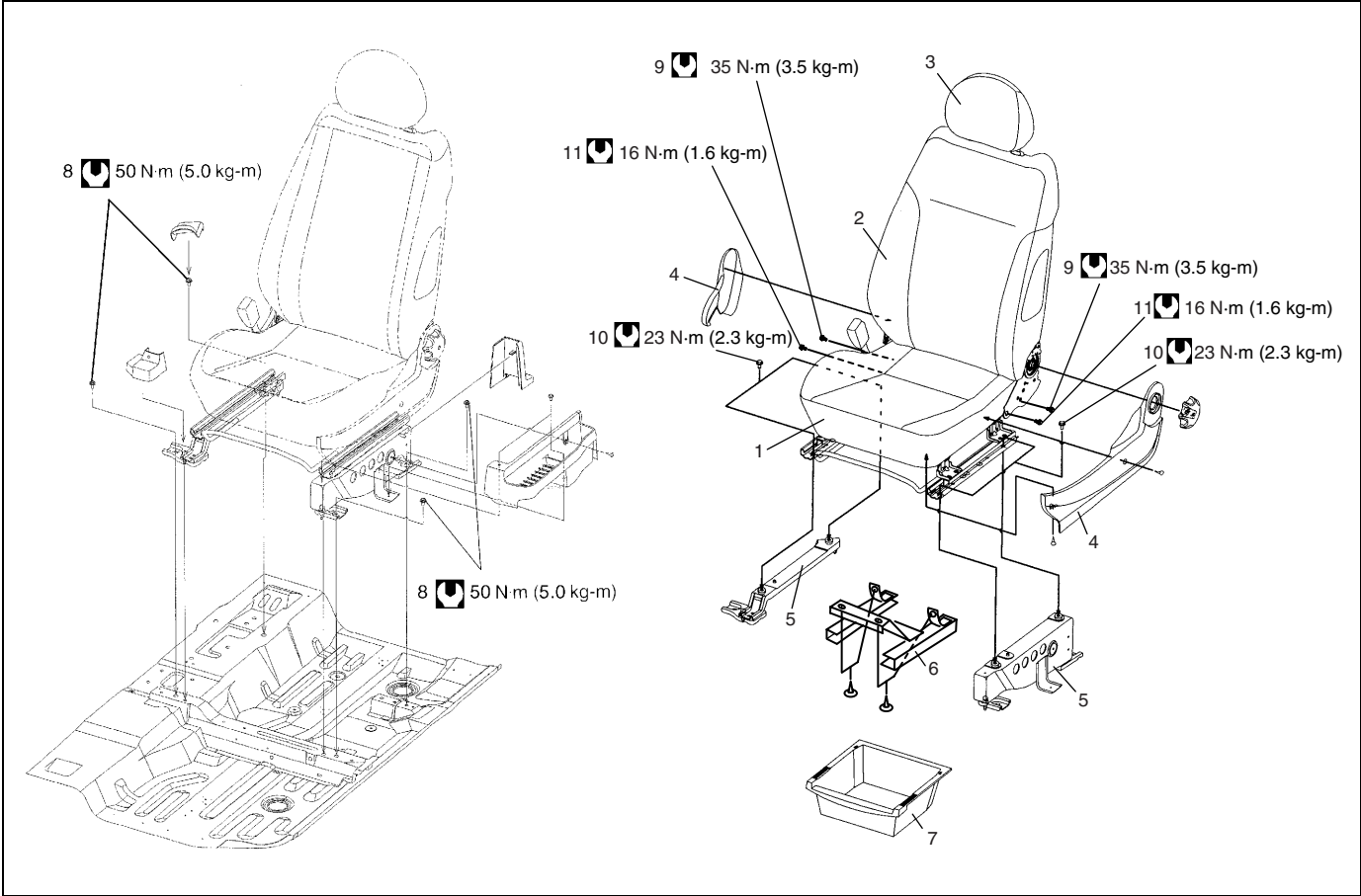
For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

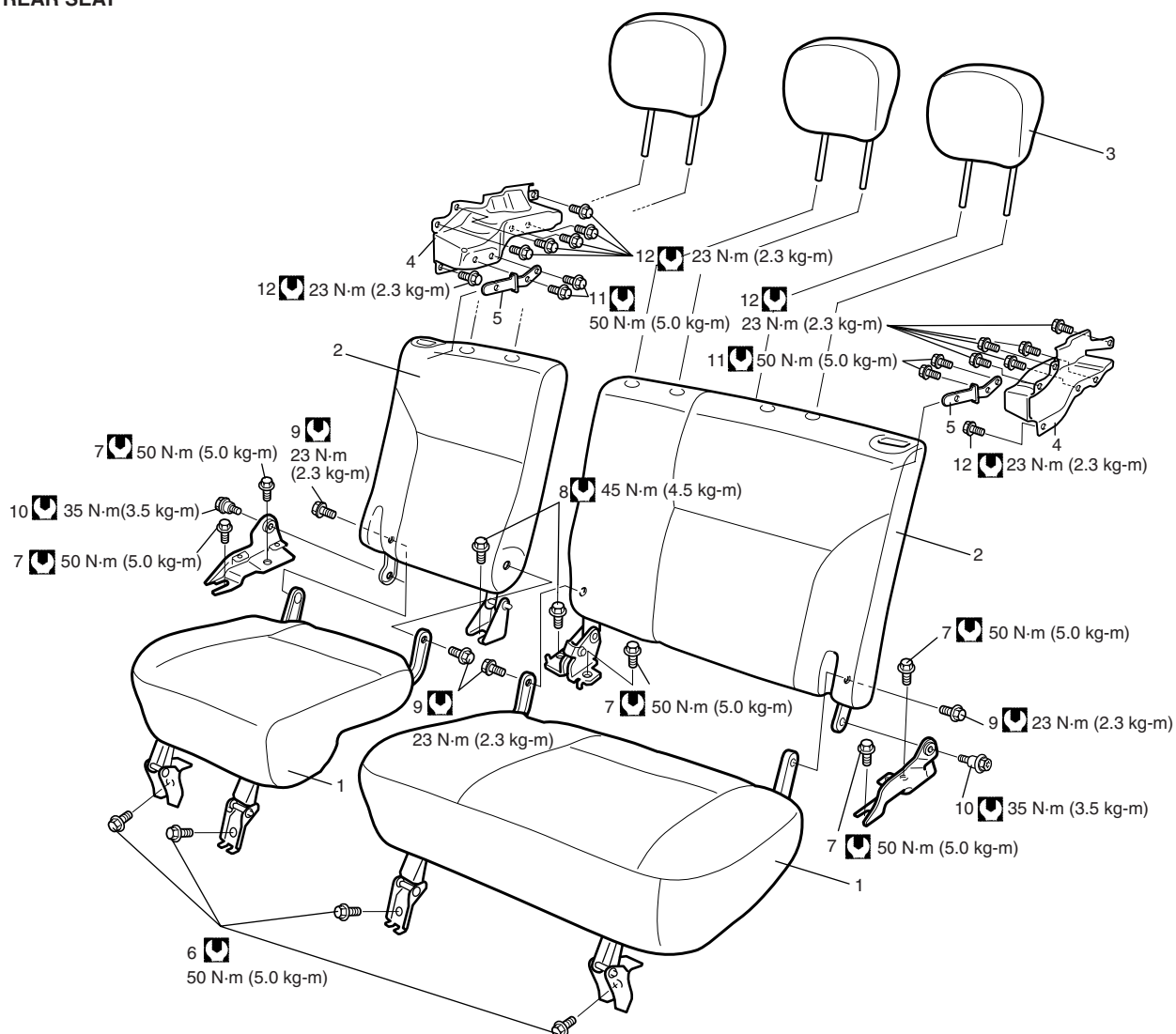
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Rear Door Assembly *	Roof Rail (If equipped) *
Back Door Assembly *	Door Molding *
Hood *	back Door Emblem *
Front Fender *	Panel Clearance *
Front Bumper and Rear Bumper *	Required Service Material *
Instrumentation and Driver Information *	Special Tools *
Instrument Panel *	

Seats

Front Seat and Rear Seat



1. Seat cushion	5. Bracket	9. Reclining bolt
2. Seat back	6. Tray bracket	10. Bracket bolt
3. Head rest	7. Tray	11. Reclining bolt
4. Cover	8. Seat adjuster bolt	Tightening Torque

REAR SEAT

1. Seat cushion	6. Seat cushion bolt	11. Rear seat striker bolt
2. Seat back	7. Seat back bolt	12. Rear seat striker bracket bolt
3. Head restraint	8. Seat back bolt	Tightening Torque
4. Rear seat striker bracket	9. Folding bolt	
5. rear seat striker	10. Folding bolt	

REMOVAL

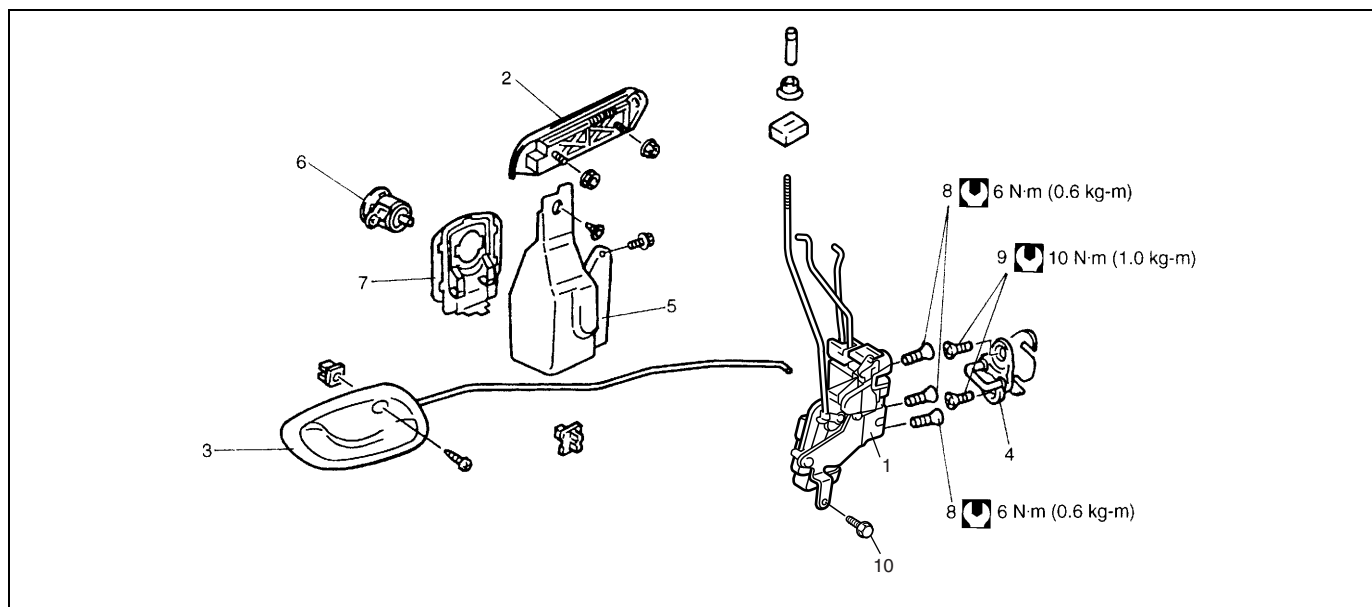
- 1) Remove seat cushion bolts and seat back bolts.
- 2) Fold seat back to remove it from rear seat striker.
- 3) Disassemble and repair seat as necessary.

INSTALLATION

Reverse removal procedure to install front seat.
Torque to specifications, as shown.

Security and Locks

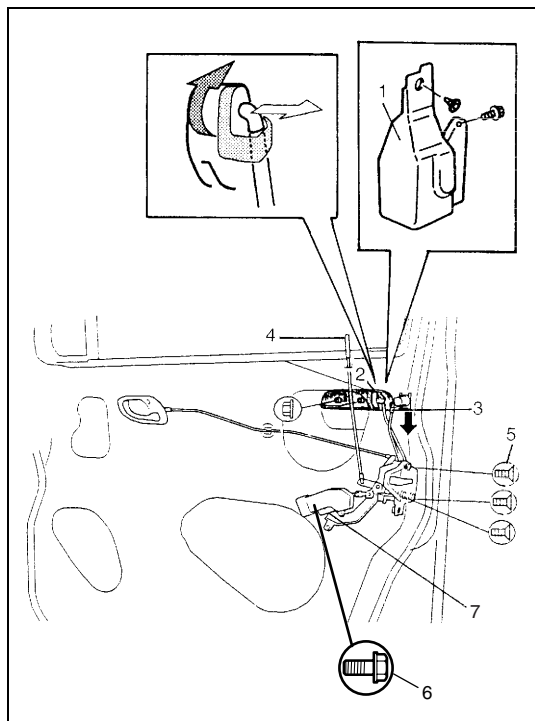
Front Door Lock Assembly



1. Door latch	6. Key cylinder
2. Outside handle	7. Key cylinder retainer
3. Inside handle bezel	8. Door lock screw
4. Latch striker	9. Door latch striker screw
5. Cover	10. Door lock bolt (vehicle with power door lock system)

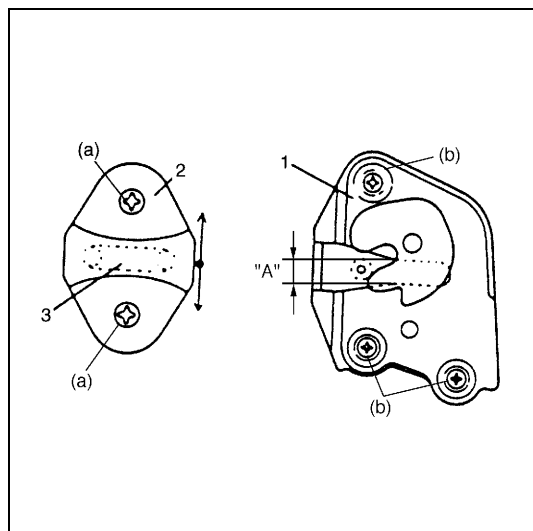
REMOVAL

- 1) Remove door trim and door sealing cover, refer to steps 1) to 9) of FRONT DOOR GLASS REMOVAL in this section.
- 2) Raise window all the way up.
- 3) Remove door sash.
- 4) Remove door lock cover (1).
- 5) Disconnect door opening control rod (2) from outside handle.
- 6) Disconnect door lock control rod (3).
- 7) Disconnect door lock motor lead wire (if equipped).
- 8) Remove door lock nob (4).
- 9) Loosen door lock mounting screw (5), door lock mounting bolt (6) (vehicle with power door lock system) and remove door lock assembly (7).



INSTALLATION

To install front door lock, reverse removal procedure, noting the following.



- Door latch striker.

Move door latch striker (2) up or down so its center aligns with the center of groove "A" on the door lock assembly (1), as shown.

NOTE:

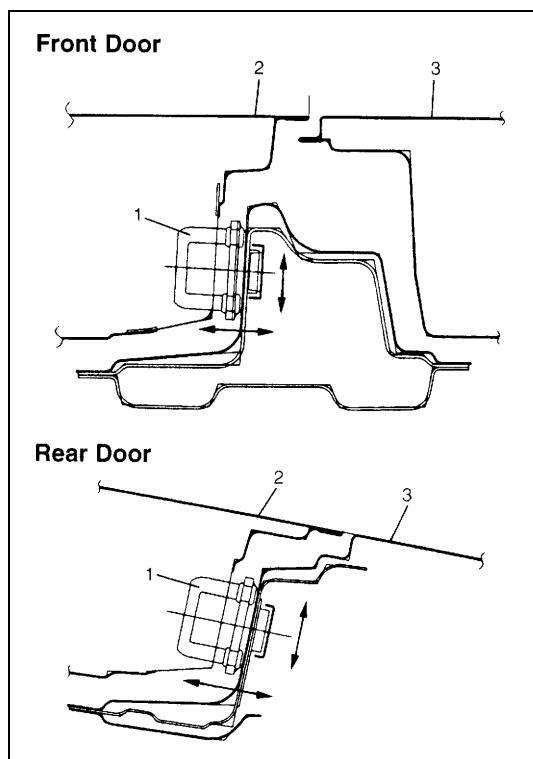
Striker should be moved vertically and placed level. Do not adjust door lock.

Tightening torque

(a) : 10 N·m (1.0 kg-m, 7.2 lb-ft)

(b) : 6 N·m (0.6 kg-m, 4.3 lb-ft)

3. Shaft



- Move door latch striker (1) sideways to adjust door outer panel surface (2) flush with rear door outer panel or body outer panel surface (3), as shown.

In order to correctly obtain door lock operates, increase or decrease number of shims inserted between body and striker (1) to adjust it.

NOTE:

Apply grease to striker contact parts periodically.

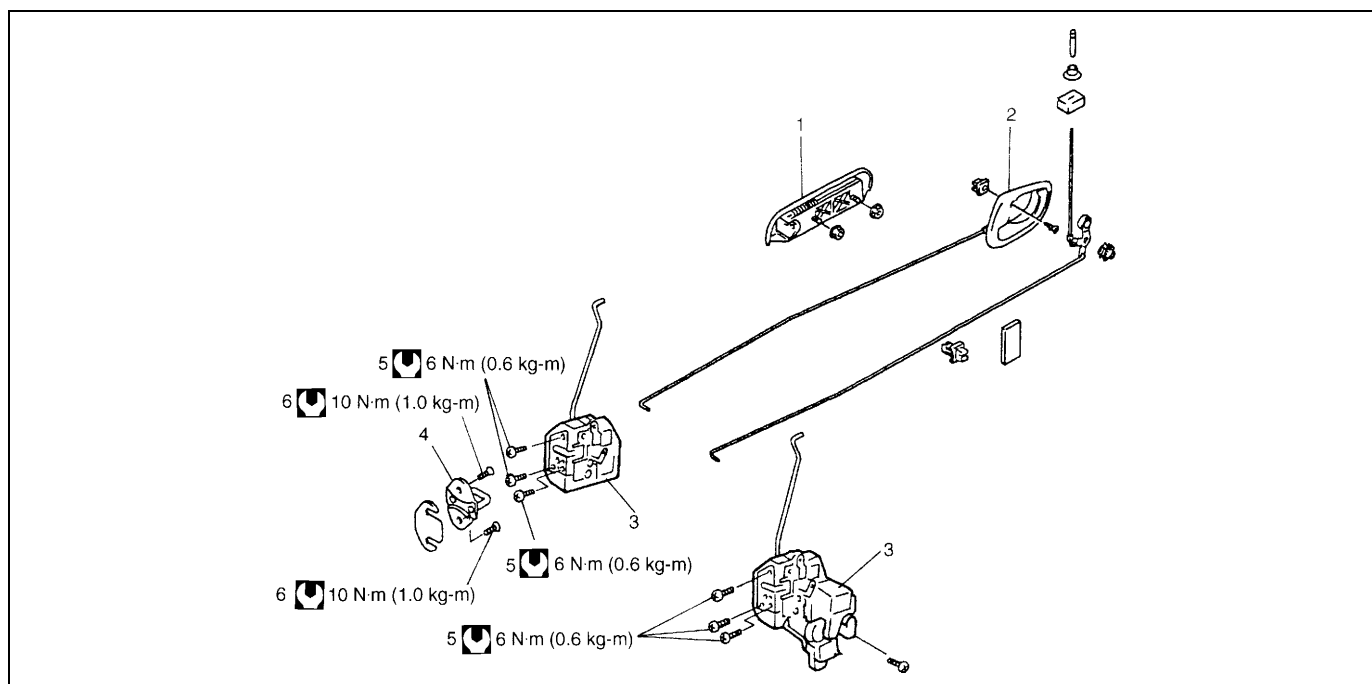
INSPECTION

Check that door open and closes smoothly and properly.

Also check that door latch half lock operates properly (check that door latch half lock keeps door from opening all the way) and door latch full locks securely when closed.

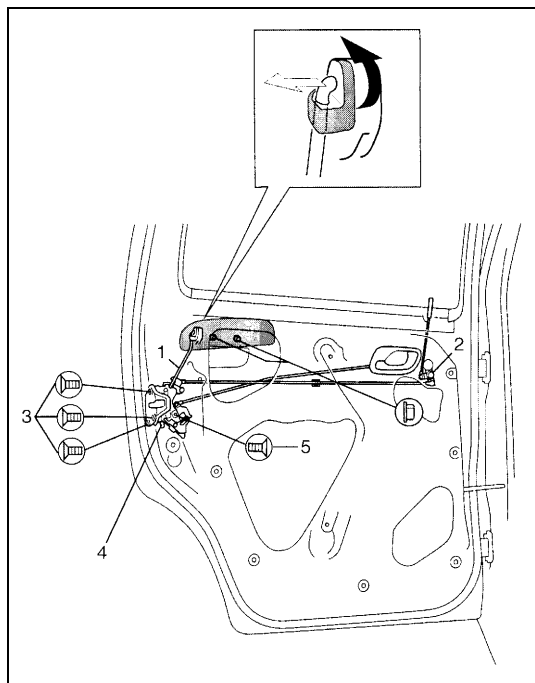
Adjust door latch striker position if necessary.

Rear Door Lock Assembly



1. Outside handle	4. Latch striker
2. Inside handle bezel	5. Door lock screw
3. Door lock assembly	6. Door latch striker screw

REMOVAL



- 1) Remove door trim and door sealing cover, refer to steps 1) to 4) of REAR DOOR GLASS REMOVAL in this section.
- 2) Disconnect door opening control rod (1) and door lock control rod (2).
- 3) Loosen door lock mounting screw (3), door lock actuator screw (5) (if equipped power door lock) and remove door lock assembly (4).

INSTALLATION

Reverse removal sequence to install rear door lock, noting points mentioned in "FRONT DOOR LOCK ASSEMBLY".

SECTION 10

RESTRAINT SYSTEM

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- The procedures in this section must be followed in the order listed to temporarily disable the air bag system and prevent false diagnostic codes from setting. Failure to follow procedures could result in possible air bag system activation, personal injury or otherwise unneeded air bag system repairs.

Seat Belt. Section 10A

Air Bag System Section 10B

CONTENTS

General Description 10-1

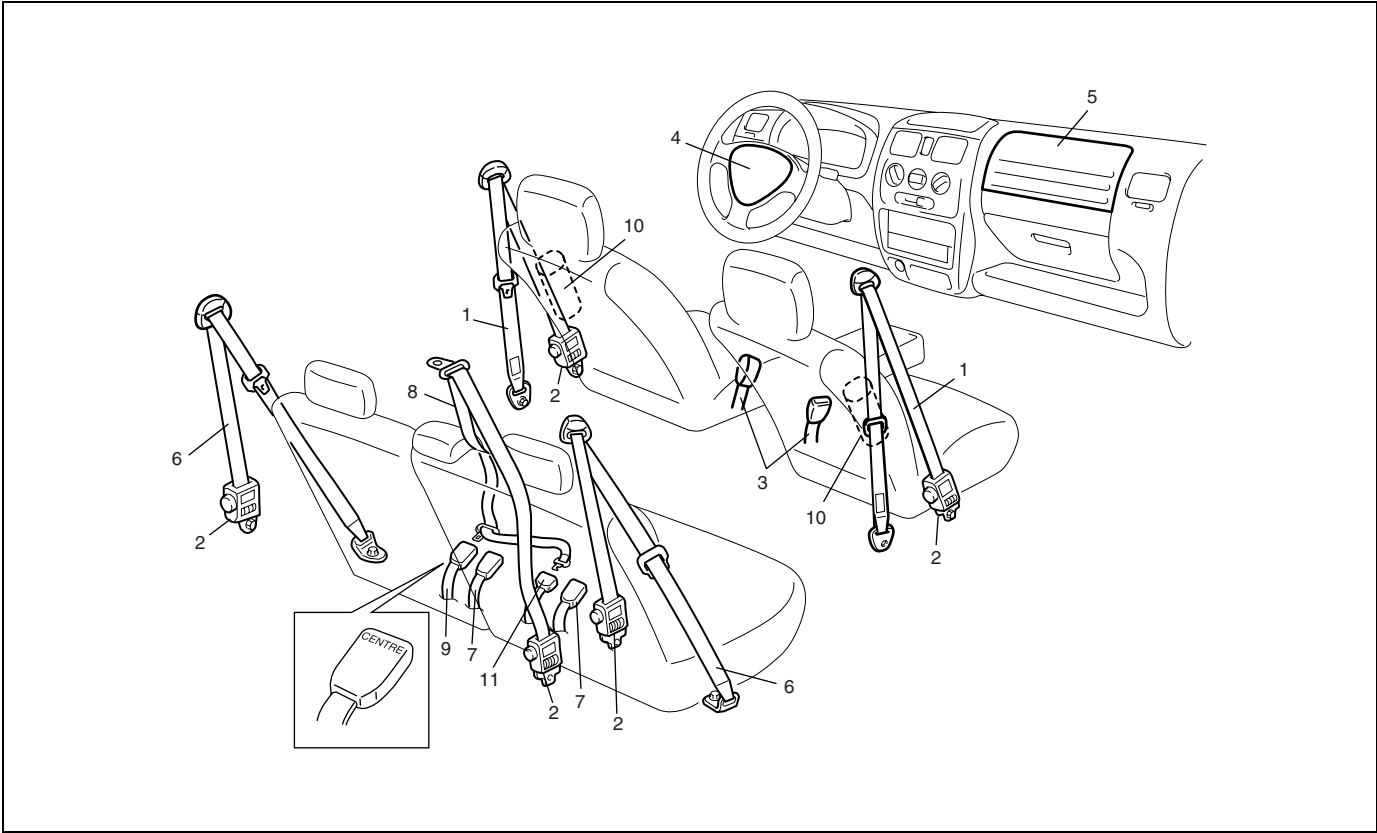
System Specification 10-1

General Description

System Specification

There are three types of restraint system for this vehicle.

	Type 1	Type 2	
Front seat belt	• Seat belt with ELR	• Seat belt with ELR	• Seat belt with ELR
Rear seat belt	• Seat belt with A-ELR • Center seat belt with ELR	• Seat belt with A-ELR • Center seat belt with ELR	• Seat belt with A-ELR • Center seat belt with ELR
Supplemental restraint system	• Driver air bag (inflator) module • Driver and front passenger pretensioners	• Driver and front passenger air bag (inflator) modules • Driver and front passenger pretensioners	• Driver and front passenger air bag (inflator) modules • Driver and front passenger pretensioners • Driver and front passenger side air bag (inflator) modules



1. Front seat belt	5. Passenger air bag (inflator) module (if equipped)	9. Buckle for rear center seat belt
2. Retractor assembly	6. Rear seat belt	10. Side air bag (inflator) module (if equipped)
3. Buckle for front seat belt	7. Buckle for rear seat belt	11. Connector for rear center seat belt
4. Driver air bag (inflator) module	8. Rear center seat belt	

Seat belt with ELR

The seat belt with emergency locking retractor (ELR) is designed so that it locks immediately (to prevent the webbing from being pulled out of the retractor any further) when any of the following items is detected as exceeding each set value;

- Speed at which the webbing is pulled out of the retractor.
- Acceleration or deceleration of the vehicle speed.
- Inclination.

Seat belt with A-ELR

The automatic and emergency locking retractor (A-ELR) works as an Emergency Locking Retractor (ELR) till its webbing is pulled all the way out and then on as an Automatic Locking Retractor (ALR) till it is retracted fully. ALR: Automatically locks when the webbing is pulled out from the retractor and allowed to retract even a little. Then the webbing can not be pulled out any further, unless it is wound all the way back into the retractor, which releases the lock and allows the webbing to be pulled out.

Seat belt with ELR and pretensioner

The seat belt with ELR and a pretensioner has a pretensioner mechanism which operates in linkage with the air bag in addition to the above described ELR. The pretensioner takes up the sag of the seat belt in occurrence of a front collision with an impact larger than a certain set value, thereby enhancing restraint performance.

SECTION 10A

SEAT BELT

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on or around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- The procedures in this section must be followed in the order listed to disable the air bag system temporarily and prevent false diagnostic trouble codes from setting. Failure to follow procedures could result in possible activation of the air bag system, personal injury or otherwise unneeded air bag system repairs.

10A

CAUTION:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above procedures are not followed, parts or system damage could result.

NOTE:

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

CONTENTS

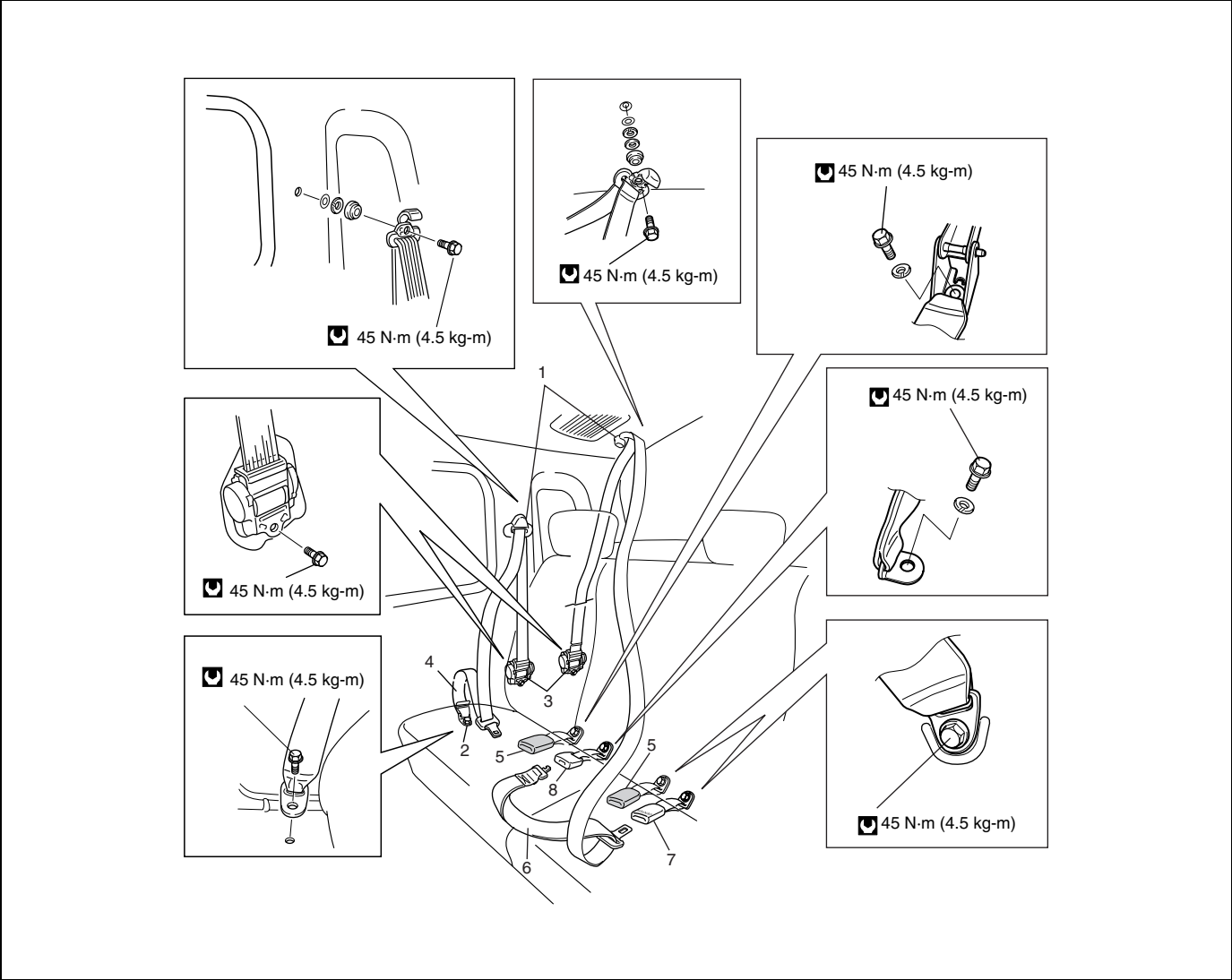
General Description	*	Service and diagnosis	*
Seat Belt	*	Disabling air bag system	*
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Service Precautions	*	Tightening Torque Specification	10A-3


On-Vehicle Service

Rear Seat Belt

WARNING:
Be sure to read “SERVICE PRECAUTIONS” before starting to work and observe every precaution during work.

COMPONENT



1. Upper anchor	4. Rear seat belt with A-ELR	7. Buckle for rear center seat belt
2. Lower anchor	5. Buckle for rear seat belt	8. Connector for rear center seat belt
3. Retractor assembly	6. Rear center seat belt with ELR	 Tightening torque

REMOVAL

Remove rear seat belts referring “Component” under “Rear Seat Belt” in this section.

INSPECTION

- Check the rear seat belt in the same way as “INSPECTION” of “FRONT SEAT BELT”, in this section.
- As to seat belts with A-ELR, check them as follows in addition to above check.
 - With vehicle at stop, pull seat belt all the way out, let it retract a little and try to pull it. It should not be pulled out, that is, it should be locked where retracted.
 - Let seat belt retract to its original state. Next, pull it half way out, let it retract a little and try to pull it again. It should be pulled out smoothly, that is it should not be locked at this time.

INSTALLATION

Install in reverse order of removal, noting the following.

- Seat belt anchor bolts should have an unified fine thread (7/16-20 UNF). Under no circumstances should any different sized or metric screw threads be used.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Upper and lower anchor bolt	45	4.5	32.5
Retractor assembly bolt	45	4.5	32.5
Retractor assembly screw	3.5	0.35	2.55
Front seat belt buckle mounting bolt	35	3.5	25.5
Rear seat belt, rear center seat belt buckle mounting bolts	45	4.5	32.5
Rear center seat belt connector mounting bolt	45	4.5	32.5

Prepared by
MAGYAR SUZUKI CORPORATION
Service Department

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IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

This service manual is intended for authorized Suzuki dealers and qualified service technicians only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.

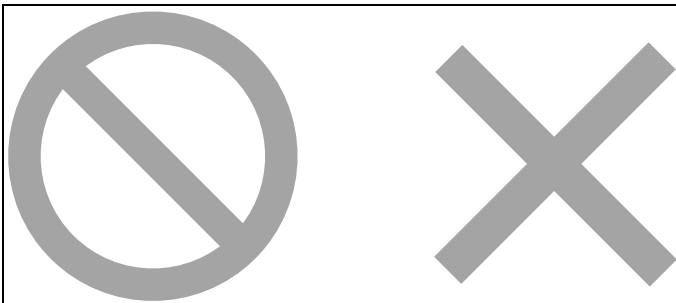
Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all **WARNINGS** and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow **WARNINGS** could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended activation.

The circle with a slash or a cross on illustration in this manual means “Do not do this” or “Do not let this happen”.



Foreword

This SUPPLEMENTARY SERVICE MANUAL is a supplement to RB413 SERVICE MANUAL. It has been prepared exclusively for the following applicable model.

Applicable model: Wagon R+ (RB310/RB413/RB413D) of and after the vehicle identification number below.

ⓧ TSM MMA93S00 280001	ⓧ
ⓧ TSM MMA33S00 280001	ⓧ
ⓧ TSM MMB33S00 280001	ⓧ
ⓧ TSM MMA33S40 280001	ⓧ
ⓧ TSM MMA43S00 280001	ⓧ

If describes only different service information of the above applicable model as compared with RB413 SERVICE MANUAL. Therefore, whenever servicing the above applicable model, consult this supplement first. And for any section, item or description not found in this supplement, refer to the related service manual below.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

NOTE:

“SUZUKI Dealers” means Authorized Suzuki Service Workshop (in Europe).

RELATED MANUAL:

Manual Name	Manual No.
RB413 SERVICE MANUAL	99500-83E00-01E
Wagon R+ (RB413) SUPPLEMENTARY SERVICE MANUAL	99501U83E00-01E
RB310 SERVICE MANUAL	99500U83E10-01E
Wagon R+ (RB310/RB413) SUPPLEMENTARY SERVICE MANUAL	99501U83E10-01E
Wagon R+ (RB310/RB413) SUPPLEMENTARY SERVICE MANUAL	99501U83E20-01E
Ignis (RM413D)/Wagon R+ (RB413D) SUPPLEMENTARY SERVICE MANUAL FOR Z13DT ENGINE AND M/T	99501U86G30-01E
Wagon R+ (RB310/RB413/RB413D) WIRING DIAGRAM MANUAL	99512U83E30-669

MAGYAR SUZUKI CORPORATION

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NOTE:

- For the screen toned sections in the above table, refer to the same section of Service Manuals mentioned in FOREWORD of this manual.
- For the screen toned sections with “*” in the above table, refer to the same section of the Related Manual “IGNIS (RM413D)/WAGON R+ (RB413D) SUPPLEMENTARY SERVICE MANUAL FOR Z13DT ENGINE AND M/T” mentioned in FOREWORD of this manual.

SECTION 0A

0A

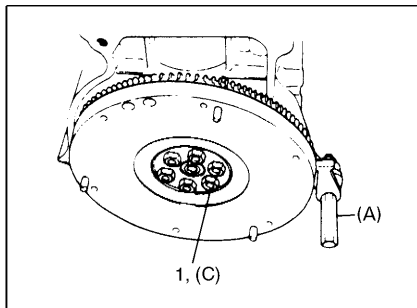
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How to Use This Manual

- 1) There is a "Table of Contents" on the third page of this manual, whereby you can easily find the section that offers the information you need. Also, there is a "Contents" on the first page of each section, where the main items in that section are listed.
- 2) Each section of this manual has its own pagination. It is indicated at the top of each page along with the Section name.
- 3) The special tool usage and torque specification are given as shown in the figure.



- 6) Install oil pump. Refer to "Oil pump" in this section.
- 7) Install flywheel (for M/T vehicle) or drive plate (for A/T vehicle).
Using special tool, lock flywheel or drive plate, and tighten flywheel or drive plate bolts (1) to specified torque.

Special Tool

(A) : 09924-17810

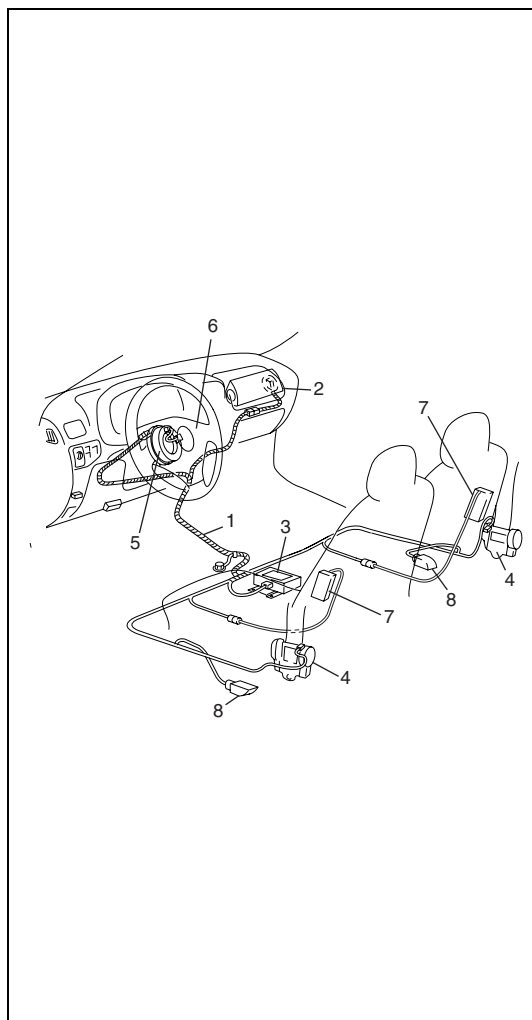
Tightening Torque

(c) : 78 N·m (7.8 kg-m, 56.0 lb-ft)

- 4) A number of abbreviations and symbols are used in the text. For their full explanations, refer to "Abbreviations and Symbols May Be Used In This Manual" in this section.
- 5) The SI, metric and foot-pound systems are used as units in this manual.
- 6) "Diagnosis" are included in each section as necessary.
- 7) At the end of each section, there are descriptions of "Special Tool", "Required Service Material" and "Tightening Torque Specification" that should be used for the servicing work described in that section.

Precautions

Precaution for Vehicles Equipped with a Supplemental Restraint (Air Bag) System



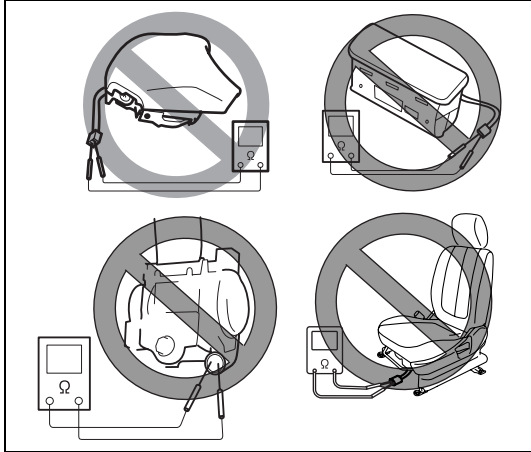
WARNING:

- The configuration of air bag system parts are as shown in the figure. When it is necessary to service (remove, reinstall and inspect) these parts, be sure to follow procedures described in Section 10B. Failure to follow proper procedures could result in possible air bag system activation, personal injury, damage to parts or air bag system being unable to activate when necessary.
- If the air bag system and another vehicle system both need repair, SUZUKI recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
- Do not modify the steering wheel, dashboard, or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended air bag system activation.

1. Air bag wire harness (in instrument panel harness)	5. Contact coil
2. Passenger air bag (inflator) module (if equipped)	6. Driver air bag (inflator) module
3. SDM	7. Side air bag (inflator) module (if equipped)
4. Seat belt pretensioner	8. Side sensor (if equipped)

Diagnosis

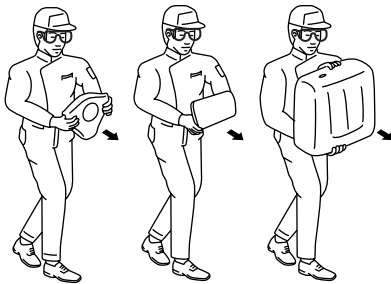
- When troubleshooting air bag system, be sure to follow “Diagnosis” in Section 10B. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacement.
- Never use electrical test equipment other than that specified in this manual.



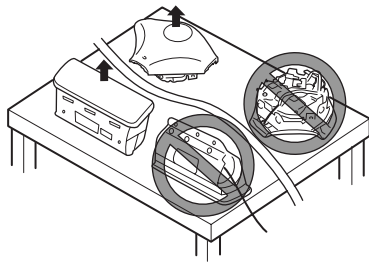
WARNING:

Never attempt to measure the resistance of the air bag (inflator) modules (driver, passenger and side) and seat belt pretensioners (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag or activate the pretensioner.

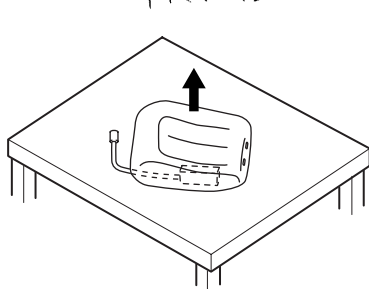
[A]



[B]



[C]

**WARNING:**

Many of service procedures require disconnection of "AIR BAG" fuse and all air bag (inflator) module(s) from initiator circuit to avoid an accidental deployment.

Driver, Passenger and side Air Bag (Inflator) Modules

- For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65 °C (150 °F), without high humidity and away from electric noise.
- When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module. When placing a live air bag (inflator) module on a bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit (1) or use the workbench vise (2) to hold it securely at its lower mounting bracket (3). The front seat back with the live air bag (inflator) module must be placed with its frontal seat cover facing up. It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) modules. This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment. Otherwise, personal injury may result.
- Never dispose of live (undeployed) air bag (inflator) modules (driver, passenger and side). If disposal is necessary, be sure to deploy them according to deployment procedures described in Section 10B before disposal.
- The air bag (inflator) module immediately after deployment is very hot. Wait for at least half an hour to cool it off before proceeding the work.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.

[A]: Always carry air bag (inflator) module with trim cover (air bag opening) away from body.

[B]: Always place air bag (inflator) module on workbench with trim cover (air bag opening) up, away from loose objects.

[C]: Always place with its frontal seat cover facing up, away from loose objects.

WARNING:**SDM**

- For handling and storage of a SDM, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM). Never strike or jar the SDM.
- Never power up the air bag system when the SDM is not rigidly attached to the vehicle. All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointing toward the front of the vehicle to ensure proper operation of the air bag system.
The SDM could be activated when powered while not rigidly attached to the vehicle which could cause deployment and result in personal injury.

WARNING:**Driver and Passenger Seat Belt Pretensioners (If equipped)**

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
 - Never carry seat belt pretensioner by wire or connector of pretensioner. When placing a live seat belt pretensioner on the workbench or some place like that, never put something on seat belt pretensioner. Otherwise, personal injury may result.
 - Never dispose of live (inactivated) seat belt pretensioners (driver and passenger). If disposal is necessary, be sure to activate them according to activation procedures described in Section 10B before disposal.
 - The seat belt pretensioner immediately after activation is very hot. Wait for at least half an hour to cool it off before proceeding the work.
 - With many service procedures, gloves and safety glasses should be worn to prevent any possible irritation of the skin or eyes.
-
- Even when the accident was light enough not to cause air bags to activate, be sure to inspect system parts and other related parts according to instructions under "Repair and Inspection Required After an Accident" in Section 10B.
 - When servicing parts other than air bag system, if shocks may be applied to air bag system component parts, remove those parts beforehand.
 - When handling the air bag (inflator) modules (driver, passenger and side), seat belt pretensioners (driver and passenger), side sensors or SDM, be careful not to drop it or apply an impact to it. If an excessive impact was applied, never attempt disassembly or repair but replace it with a new one.
 - When grease, cleaning agent, oil, water, etc. has got onto air bag (inflator) modules (driver, passenger and side) or seat belt pretensioners (driver and passenger), wipe off immediately with a dry cloth.
 - Air bag wire harness is included in floor and instrument panel wire harnesses. Air bag wire harness branched off from floor and instrument panel wire harnesses can be identified easily as it is covered with a yellow protection tube and it has yellow connectors. Be very careful when handling it.
 - When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
 - Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.
 - Never use air bag system component parts from another vehicle.
 - When using electric welding, be sure to disconnect all air bag (inflator) module connectors and pretensioner connectors from air bag wire harness respectively.
 - Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.

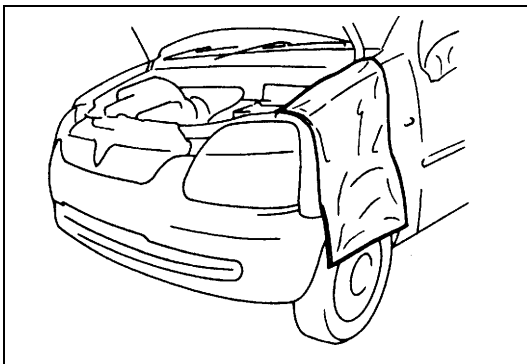
- **WARNING/CAUTION** labels are attached on each part of air bag system components. Be sure to follow the instructions.
- After vehicle is completely repaired, perform “Air Bag Diagnostic System Check” in Section 10B.

General Precautions

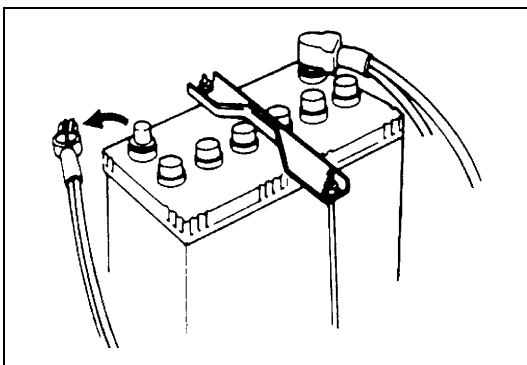
The WARNING and CAUTION below describe some general precautions that you should observe when servicing a vehicle. These general precautions apply to many of the service procedures described in this manual, and they will not necessarily be repeated with each procedure to which they apply.

WARNING:

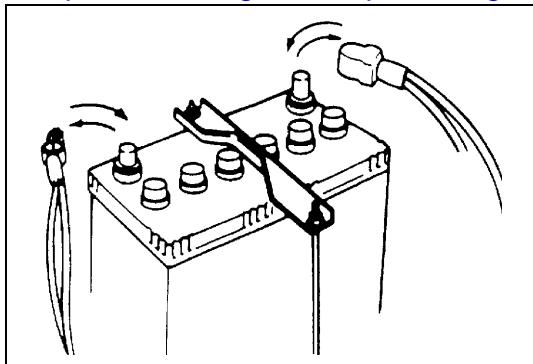
- Whenever raising a vehicle for service, be sure to follow the instructions under “Vehicle Lifting Points” in this section.
- When it is necessary to do service work with the engine running, make sure that the parking brake is set fully and the transmission is in Neutral (for manual transmission vehicles) or Park (for automatic transmission vehicles), Keep hands, hair, clothing, tools, etc. away from the fan and belts when the engine is running.
- When it is necessary to run the engine indoors, make sure that the exhaust gas is forced outdoors.
- Do not perform service work in areas where combustible materials can come in contact with a hot exhaust system. When working with toxic or flammable materials (such as gasoline and refrigerant), make sure that the area you work in is well-ventilated.
- To avoid getting burned, keep away from hot metal parts such as the radiator, exhaust manifold, tail pipe, muffler, etc.
- New and used engine oil can be hazardous. Children and pets may be harmed by swallowing new or used oil. Keep new and used oil and used engine oil filters away from children and pets. Continuous contact with used engine oil has been found to cause [skin] cancer in laboratory animals. Brief contact with used oil may irritate skin. To minimize your exposure to used engine oil, wear a long-sleeve shirt and moisture-proof gloves (such as dish washing gloves) when changing engine oil. If engine oil contacts your skin, wash thoroughly with soap and water. Launder any clothing or rags if wet with oil, recycle or properly dispose of used oil and filters.
- Make sure the bonnet is fully closed and latched before driving. If it is not, it can fly up unexpectedly during driving, obstructing your view and resulting in an accident.



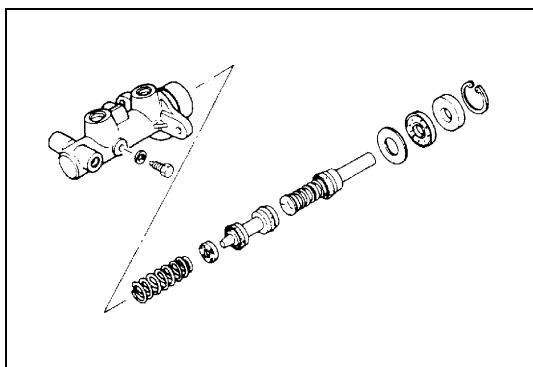
- Before starting any service work, cover fenders, seats and any other parts that are likely to get scratched or stained during servicing. Also, be aware that what you wear (e.g, buttons) may cause damage to the vehicle's finish.



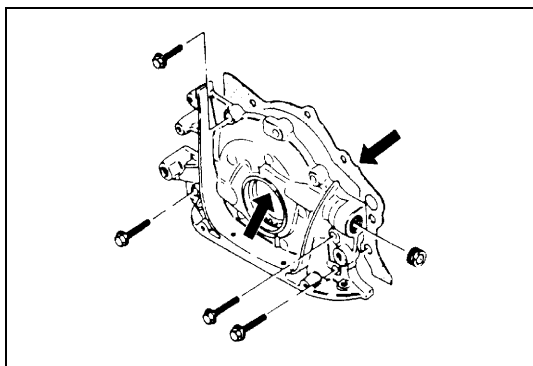
- When performing service to electrical parts that does not require use of battery power, disconnect the negative cable of the battery.
- When disconnecting the battery negative cable, record displayed contents of clock and audio system before disconnecting and reset them as before after connecting.



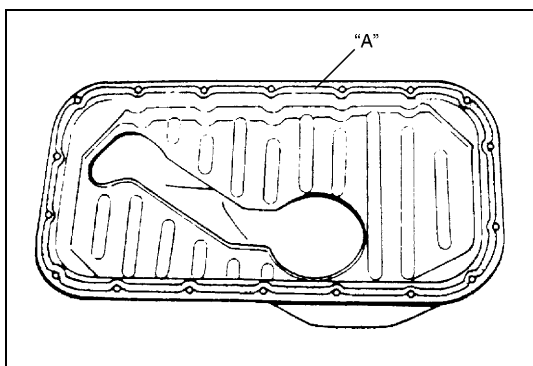
- When removing the battery, be sure to disconnect the negative cable first and then the positive cable. When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover.



- When removing parts that are to be reused, be sure to keep them arranged in an orderly manner so that they may be reinstalled in the proper order and position.

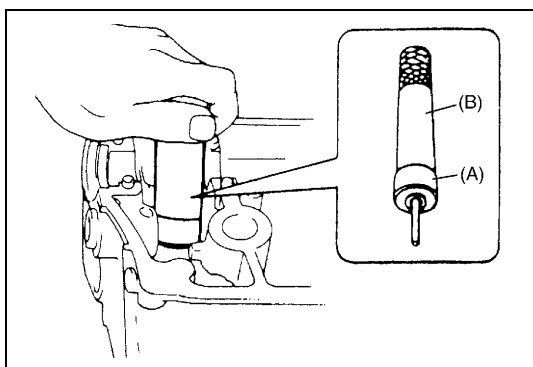


- Whenever you use oil seals, gaskets, packing, O-rings, locking washers, split pins, self-locking nuts, and certain other parts as specified, be sure to use new ones. Also, before installing new gaskets, packing, etc., be sure to remove any residual material from the mating surfaces.



- Make sure that all parts used in reassembly are perfectly clean.
When use of a certain type of lubricant, bond or sealant is specified, be sure to use the specified type.

“A”: Sealant 99000-31250

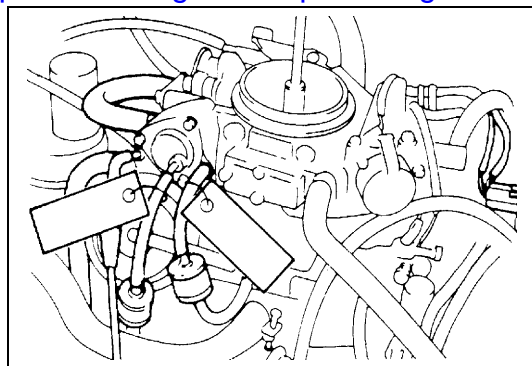


- Be sure to use special tools when instructed.

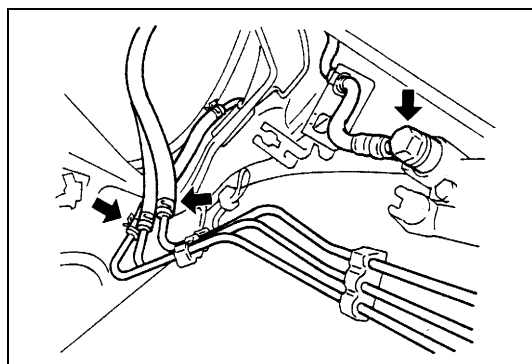
Special tool

(A): 09917-98221

(B): 09916-58210

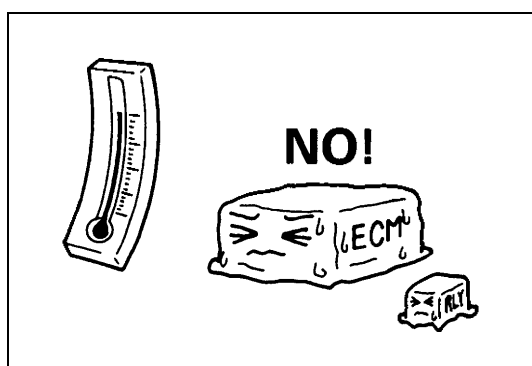


- When disconnecting vacuum hoses, attach a tag describing the correct installation positions so that the hoses can be reinstalled correctly.

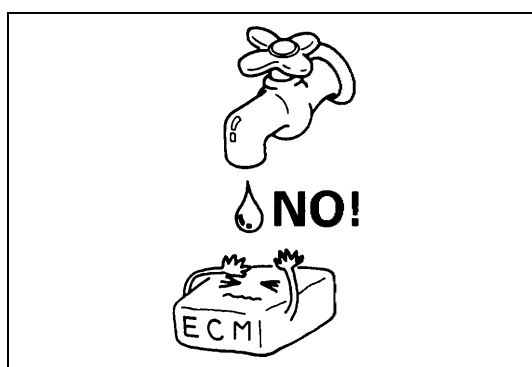


- After servicing fuel, oil, coolant, vacuum, exhaust or brake systems, check all lines related to the system for leaks.

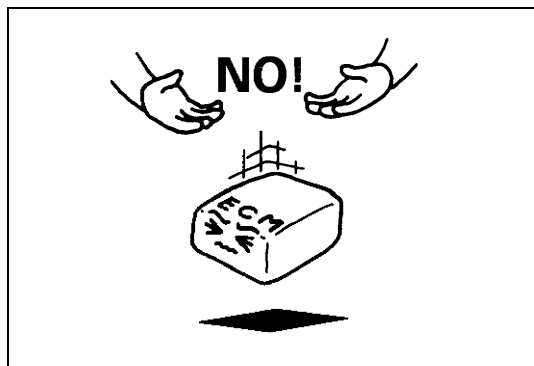
- For vehicles equipped with fuel injection systems, never disconnect the fuel line between the fuel pump and injector without first releasing the fuel pressure, or fuel can be sprayed out under pressure.
Refer to "Fuel Pressure Relief Procedure" in section 6 for fuel pressure releasing.
- For vehicles equipped with diesel engine, never disconnect fuel line within 60 sec. after ignition switch turned to OFF position, or fuel can be sprayed out under pressure.



- When performing a work that produces a heat exceeding 80°C (176°F) in the vicinity of the electrical parts, remove the heat sensitive electrical part(s) beforehand.

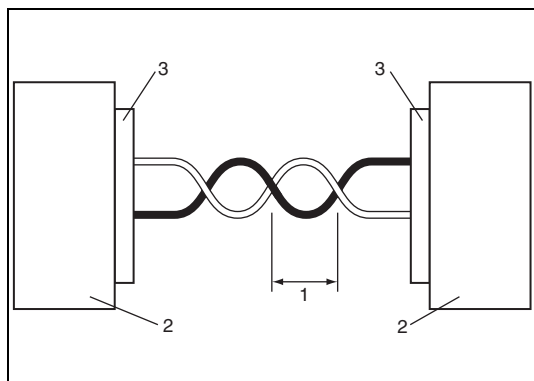


- Use care not to expose connectors and electrical parts to water which will be a cause of a trouble.



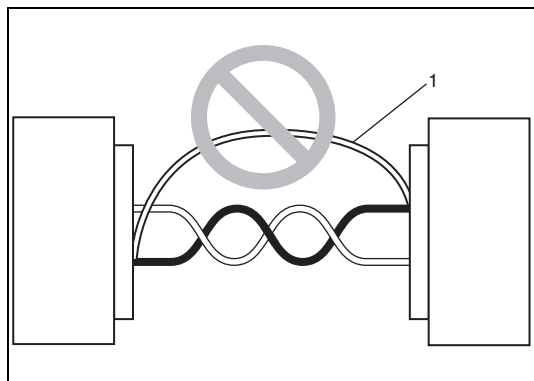
- Always be careful not to handle electrical parts (computer, relay, etc.) in a rough manner or drop them.

Precaution for CAN Communication System



- The loose (1) in the wire harnesses twist of the CAN lines except around the connector (3) should be within 100 mm (3.9 in.) Refer to the wiring diagram for the CAN line discrimination. Excessive loosed lines may be influenced by the electric noise.

2. Controller



- Do not connect terminals of the CAN line using a bypass wire (1). Otherwise, the CAN line may be influenced by the electric noise.

Precaution for Wheel (with Tire) Removal

Each wheel of this vehicle is installed using wheel bolts. When removing any of these wheels, never remove all wheel bolts at the same time. Leave at least 1 bolt for each wheel as it is to prevent wheel from dropping. When removing this remaining 1 bolt, hold wheel and tire so as not to allow them to come off.

Precautions for Catalytic Converter

For vehicles equipped with a catalytic converter, use only unleaded gasoline and be careful not to let a large amount of unburned gasoline enter the converter or it can be damaged.

- Conduct a spark jump test only when necessary, make it as short as possible, and do not open the throttle.
- Conduct engine compression checks within the shortest possible time.
- Avoid situations which can result in engine misfire (e.g. starting the engine when the fuel tank is nearly empty.)

Precaution for Installing Mobile Communication Equipment

When installing mobile communication equipment such as CB (Citizens-Band) -radio or cellular-telephone, be sure to observe the following precautions.

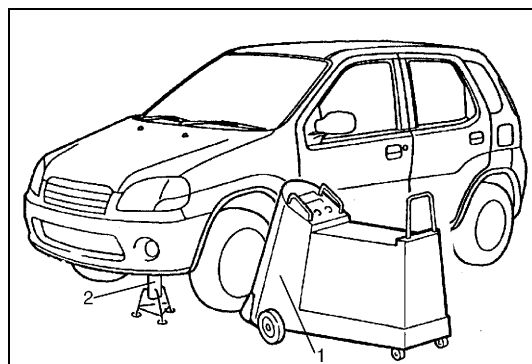
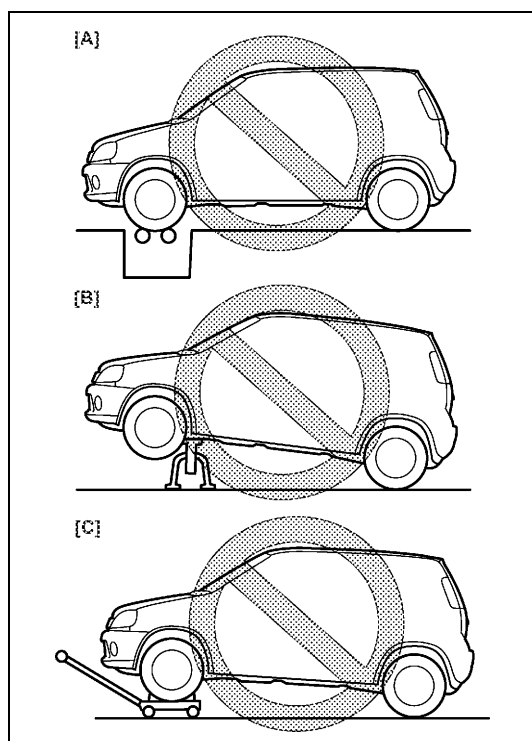
Failure to follow cautions may adversely affect electronic control system.

- Keep the antenna as far away as possible from the vehicle's electronic control unit.
- Keep the antenna feeder more than 20 cm (7.9 in) away from electronic control unit and its wire harnesses.
- Do not run the antenna feeder parallel with other wire harnesses.
- Confirm that the antenna and feeder are correctly adjusted.

Precaution in Servicing Full-Time 4WD Vehicle

This full-time 4WD vehicle can not be converted to 2WD manually.

Observe the following caution in servicing. Otherwise, front wheels drive rear wheels or vice-versa and vehicle accidents, drivetrain damage and personal injury may result.



- Never perform any of the following types of service work.

[A]: Testing with 2-wheel chassis dynamometer, speedometer tester or brake tester.

[B]: Driving front wheels, which are jacked up.

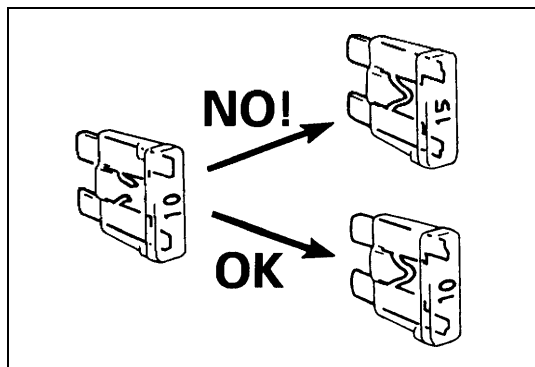
[C]: Towing under the condition where either front or rear wheels can not rotate.

- When testing with 2-wheel chassis dynamometer, speedometer tester or brake tester, be sure to make the vehicle as front wheel drive by removing propeller shaft.

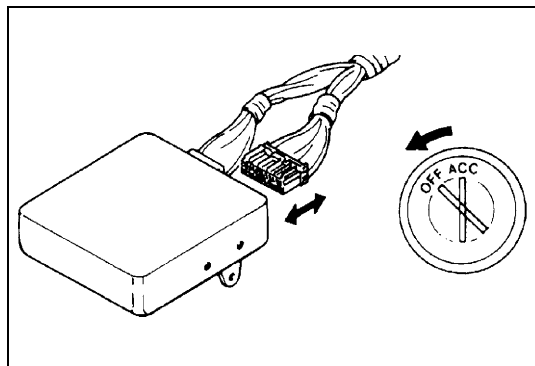
- When using On-vehicle type wheel balancing equipment (1), be sure to jack up all four wheels, off the ground completely and support vehicle with safety stands (2). Be careful of the other wheels, which will rotate at the same time.

- This vehicle should be towed under one of the following conditions:
 - With all wheels on a flatbed truck.
 - With front or rear wheels lifted and a dolly under the other wheels.

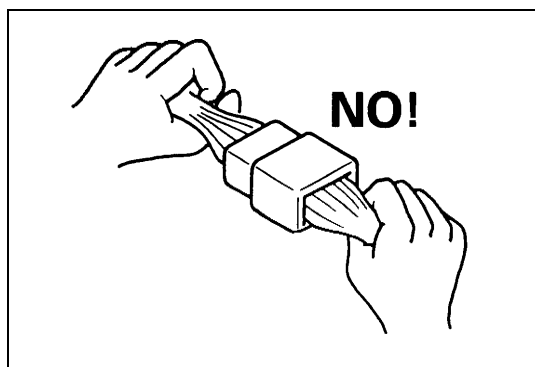
Precautions for Electrical Circuit Service



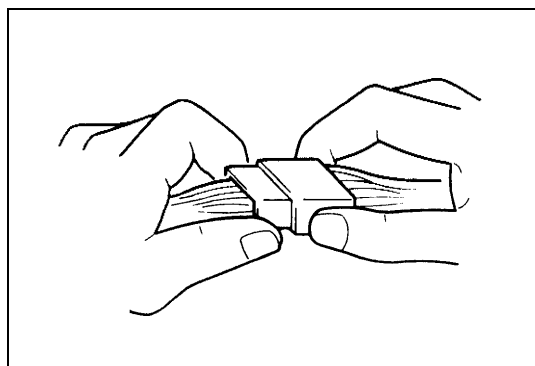
- When replacing a fuse, make sure to use a fuse of the specified capacity. Use of a fuse with a larger capacity will cause a damage to the electrical parts and a fire.



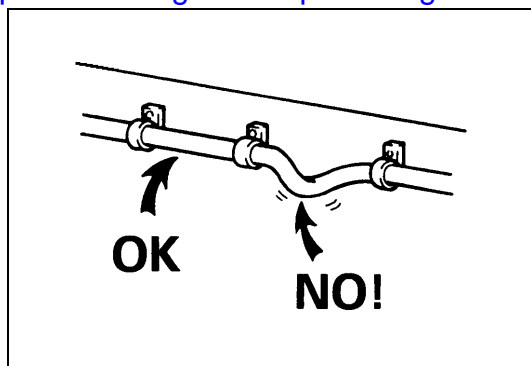
- When disconnecting and connecting coupler, make sure to turn ignition switch OFF, or electronic parts may get damaged.



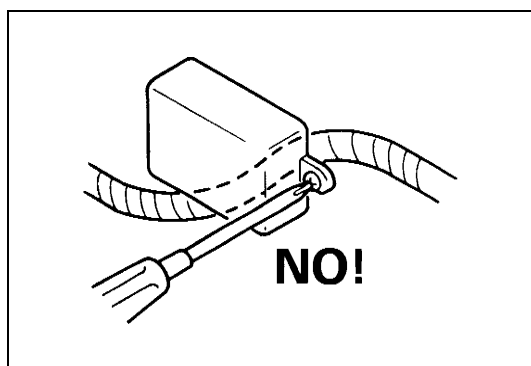
- When disconnecting connectors, never pull the wiring harness. Unlock the connector lock first and then pull them apart by holding connectors themselves.



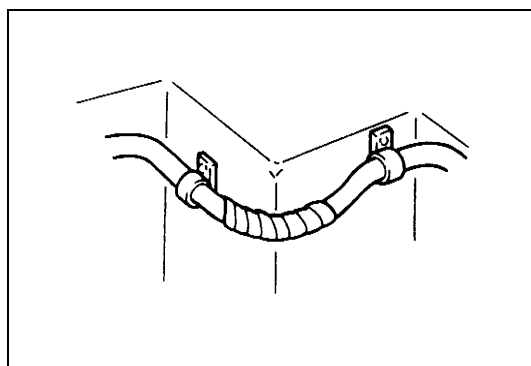
- When connecting connectors, also hold connectors and put them together until they lock securely (a click is heard).



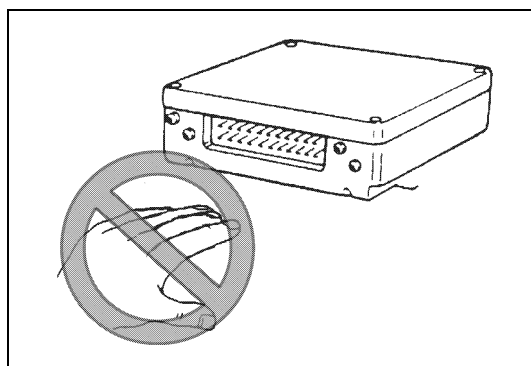
- When installing the wiring harness, fix it with clamps so that no slack is left.



- When installing vehicle parts, be careful so that the wiring harness is not interfered with or caught by any other part.

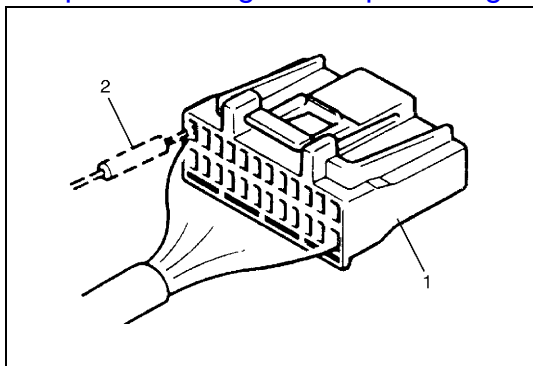


- To avoid damage to the harness, protect its part which may contact against a part forming a sharp angle by winding tape or the like around it.

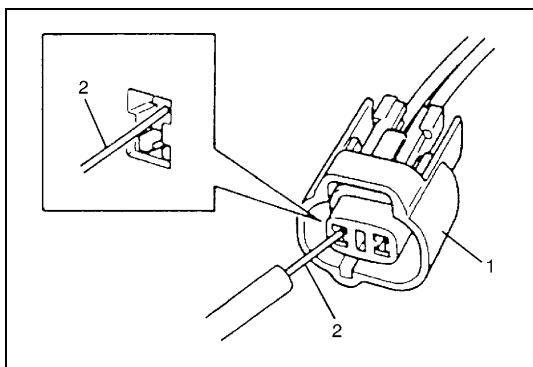


- Be careful not to touch the electrical terminals of parts which use microcomputers (e.g. electronic control unit like as ECM, PCM, P/S controller, etc.). The static electricity from your body can damage these parts.
- Never connect any tester (voltmeter, ohmmeter, or whatever) to electronic control unit when its coupler is disconnected. Attempt to do it may cause damage to it.

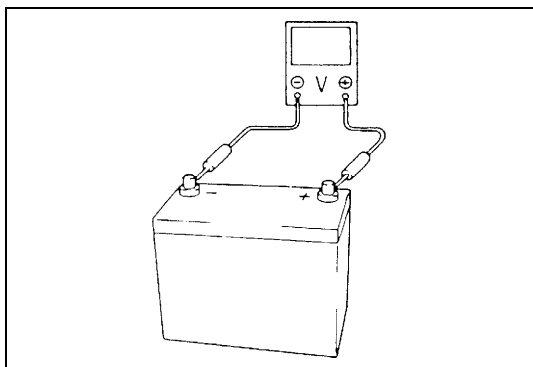
- Never connect an ohmmeter to electronic control unit with its coupler connected to it. Attempt to do it may cause damage to electronic control unit and sensors.
- Be sure to use a specified voltmeter/ohmmeter. Otherwise, accurate measurements may not be obtained or personal injury may result. If not specified, use a voltmeter with high impedance ($M\Omega / V$ minimum) or a digital type voltmeter.



- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe (2) from the wire harness side (backside) of the connector (1).



- When connecting meter probe (2) from terminal side of coupler (1) because it can't be connected from harness side, use extra care not to bend male terminal of coupler or force its female terminal open for connection. In case of such coupler as shown connect probe as shown to avoid opening female terminal. Never connect probe where male terminal is supposed to fit.
- When checking connection of terminals, check its male half for bend and female half for excessive opening and both for locking (looseness), corrosion, dust, etc.



- Before measuring voltage at each terminal, check to make sure that battery voltage is 11 V or higher. Such terminal voltage check at low battery voltage will lead to erroneous diagnosis.

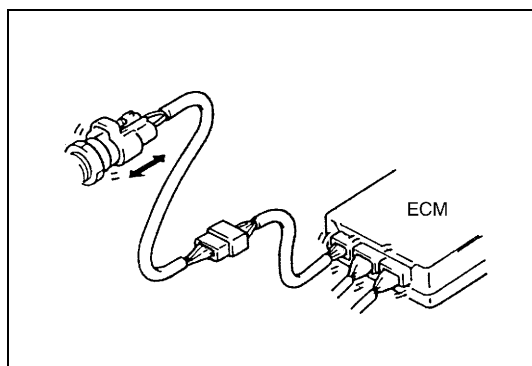
Electrical Circuit Inspection Procedure

While there are various electrical circuit inspection methods, described here is a general method to check its open and short circuit by using an ohmmeter and a voltmeter.

Open circuit check

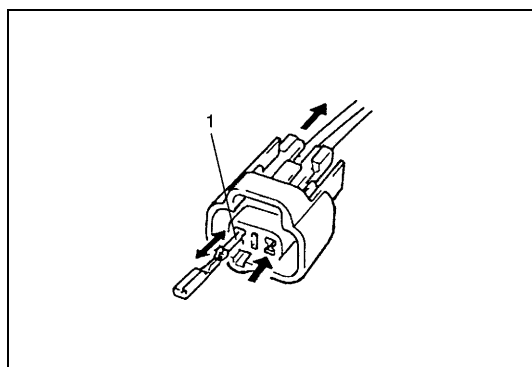
Possible causes for the open circuit are as follows. As the cause is in the connector or terminal in many cases, they need to be checked particularly carefully.

- Loose connection of connector
- Poor contact of terminal (due to dirt, corrosion or rust on it, poor contact tension, entry of foreign object etc.)
- Wire harness being open



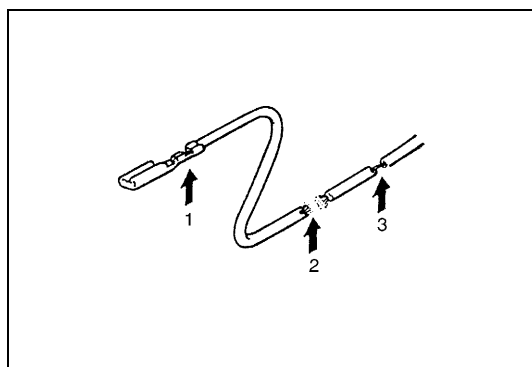
When checking system circuits including an electronic control unit such as ECM, TCM, ABS control module, etc., it is important to perform careful check, starting with items which are easier to check.

- 1) Disconnect negative (–) cable from battery
- 2) Check each connector at both ends of the circuit being checked for loose connection. Also check lock condition of connector if equipped with connector lock.



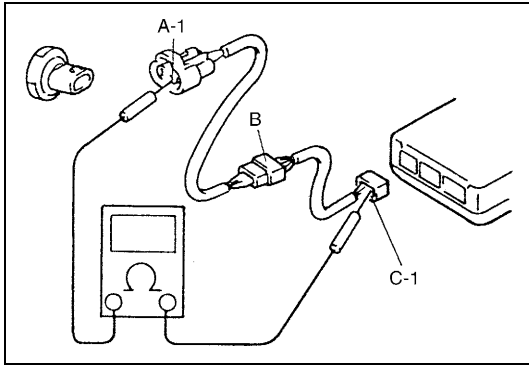
- 3) Using a test male terminal, check both terminals of the circuit being checked for contact tension of its female terminal. Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust entry of foreign object, etc.). At the same time, check to make sure that each terminal is locked in the connector fully.

1. Check contact tension by inserting and removing just for once.

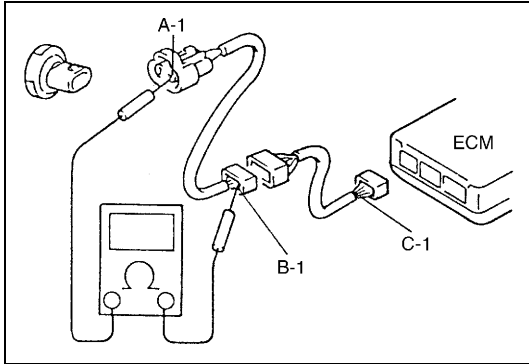


- 4) Using continuity check or voltage check the following procedure, check the wire harness for open circuit and poor connection with its terminals. Locate abnormality, if any.

- | |
|--------------------------------------|
| 1. Looseness of crimping |
| 2. Open |
| 3. Thin wire (single strand of wire) |

Continuity check

- 1) Measure resistance between connector terminals at both ends of the circuit being checked (between A-1 and C-1 in the figure). If no continuity is indicated (infinity or over limit), that means that the circuit is open between terminals A-1 and C-1.

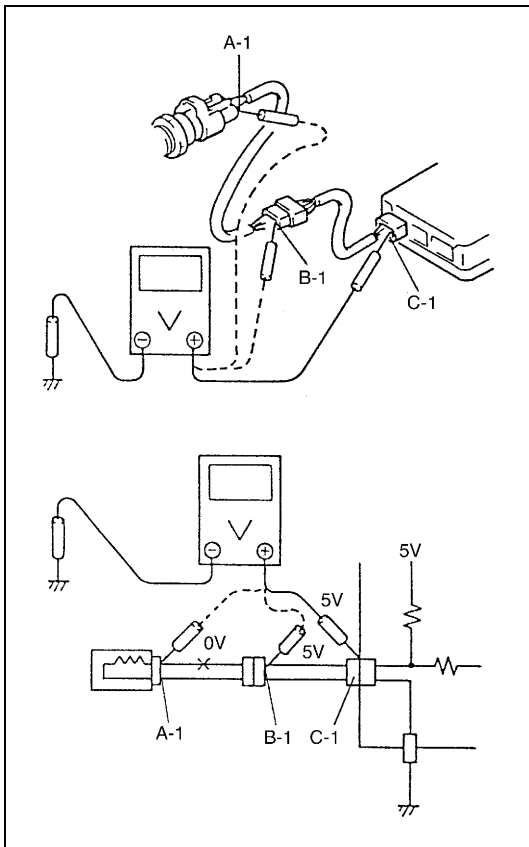


- 2) Disconnect the connector included in the circuit (connector-B in the figure) and measure resistance between terminals A-1 and B-1.

If no continuity is indicated, that means that the circuit is open between terminals A-1 and B-1. If continuity is indicated, there is an open circuit between terminals B-1 and C-1 or an abnormality in connector-B.

Voltage check

If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.



- 1) With all connectors connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.
 - a) If measurements were taken as shown in the figure and results were as listed below, it means that the circuit is open between terminals B-1 and A-1.

Voltage between

C-1 and body ground: Approx. 5 V

B-1 and body ground: Approx. 5 V

A-1 and body ground: 0 V

- b) Also, if measured values were as listed below, it means that there is a resistance (abnormality) of such level that corresponds to the voltage drop in the circuit between terminals A-1 and B-1.

Voltage between

C-1 and body ground: Approx. 5 V

B-1 and body ground: Approx. 5 V

A-1 and body ground: Approx. 3 V

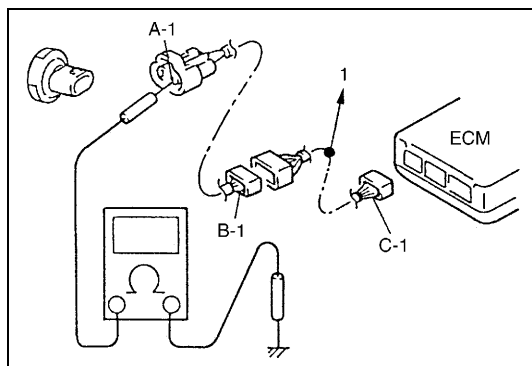
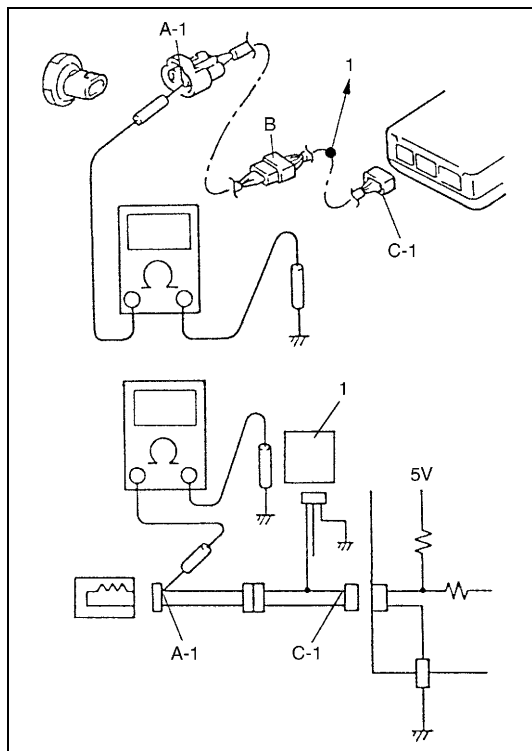
Short circuit check (wire harness to ground)

- 1) Disconnect negative (–) cable at battery.
- 2) Disconnect connectors at both ends of the circuit to be checked.

NOTE:

If the circuit to be checked is connected to other parts (1), disconnect all connectors of those parts. Otherwise, diagnosis will be misled.

- 3) Measure resistance between terminal at one end of circuit (A-1 terminal in the figure) and body ground. If continuity is indicated, it means that there is a short to ground between terminals A-1 and C-1 of the circuit.

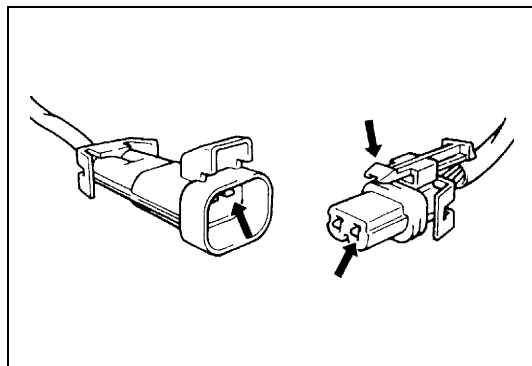


- 4) Disconnect the connector included in circuit (connector B) and measure resistance between A-1 and body ground. If continuity is indicated, it means that the circuit is shorted to the ground between terminals A-1 and B-1.

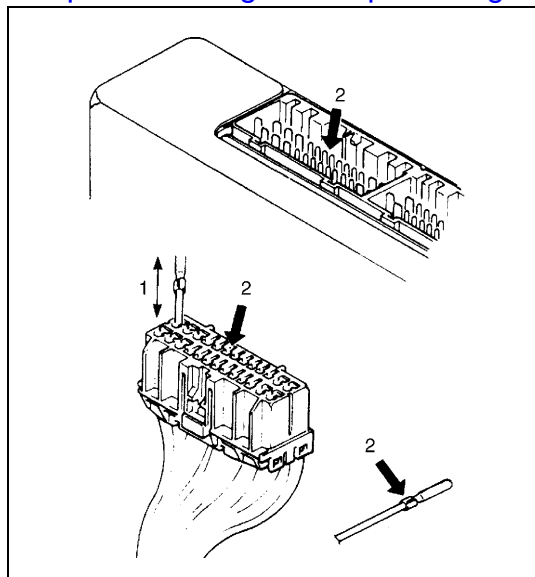
1. To other parts

Intermittent and Poor Connection

Most intermittent are caused by faulty electrical connections or wiring, although a sticking relay or solenoid can occasionally be at fault. When checking it for proper connection, perform careful check of suspect circuits for:

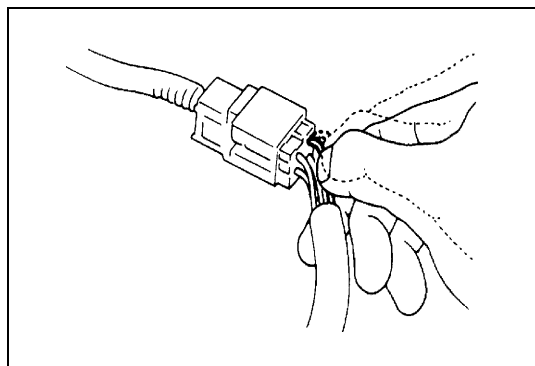


- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact. However, cleaning the terminal with a sand paper or the like is prohibited.
- Damaged connector body, exposing the terminals to moisture and dirt, as well as not maintaining proper terminal orientation with the component or mating connector.

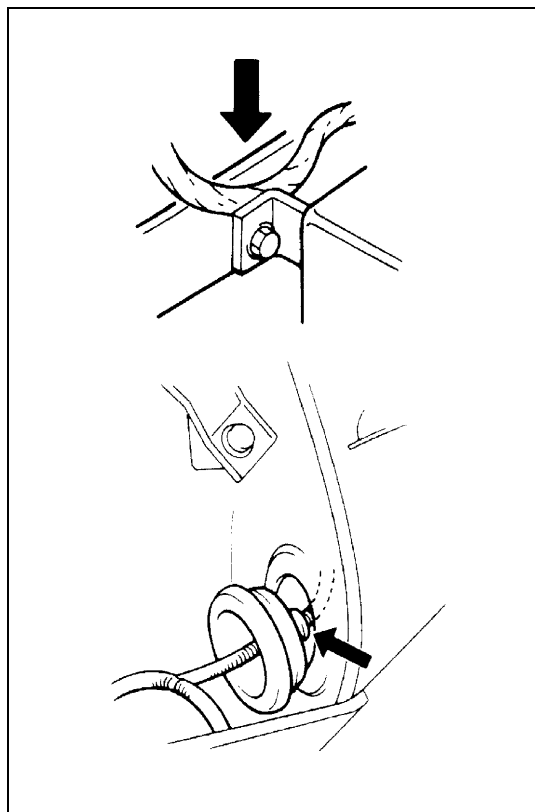


- Improperly formed or damaged terminals.
Check each connector terminal in problem circuits carefully to ensure good contact tension by using the corresponding mating terminal.
If contact tension is not enough, reform it to increase contact tension or replace.

- | |
|---|
| 1. Check contact tension by inserting and removing just once. |
| 2. Check each terminal for bend and proper alignment. |



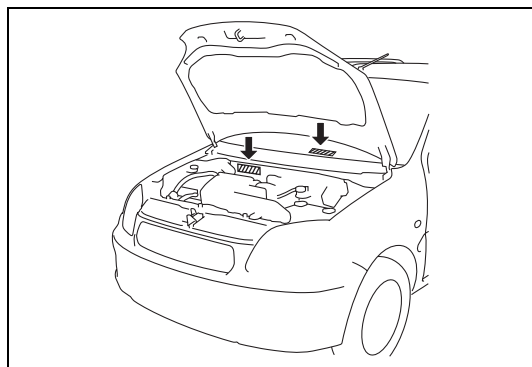
- Poor terminal-to-wire connection.
Check each wire harness in problem circuits for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.



- Wire insulation which is rubbed through, causing an intermittent short as the bare area touches other wiring or parts of the vehicle.
- Wiring broken inside the insulation. This condition could cause continuity check to show a good circuit, but if only 1 or 2 strands of a multi-strand-type wire are intact, resistance could be far too high.
If any abnormality is found, repair or replace.

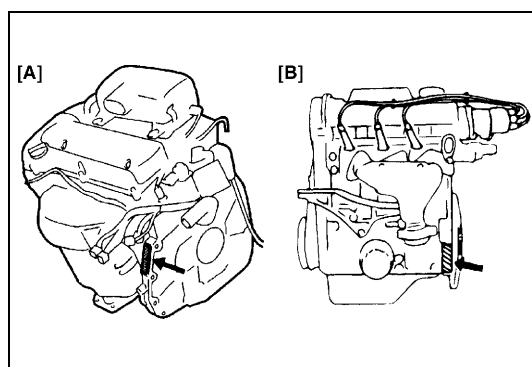
Identification Information

Vehicle Identification Number



The number is punched on front dash panel in engine room and it is also on the left side of instrument panel depending on the vehicle specification.

Engine Identification Number

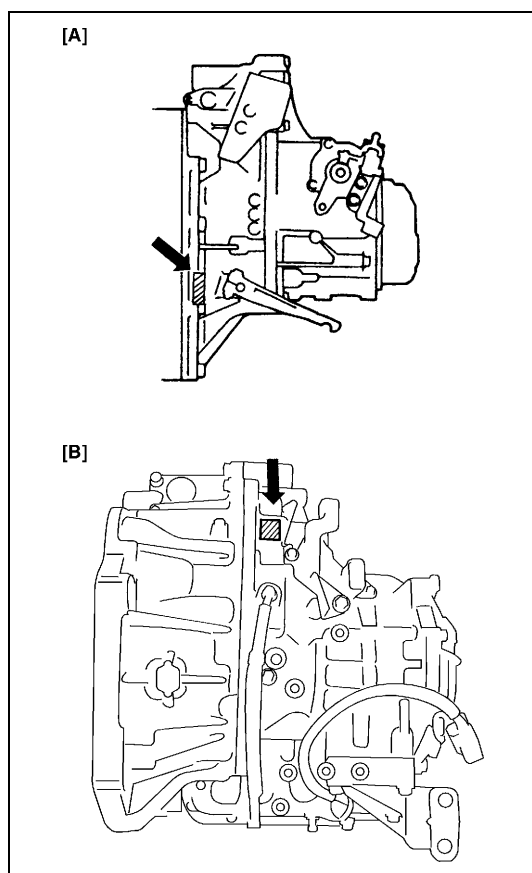


The number is punched on cylinder block.

- | |
|----------------------------|
| 1. M13 engine/Z13DT engine |
| 2. G10 engine |

Transmission Identification Number

The number is located on the transmission case.

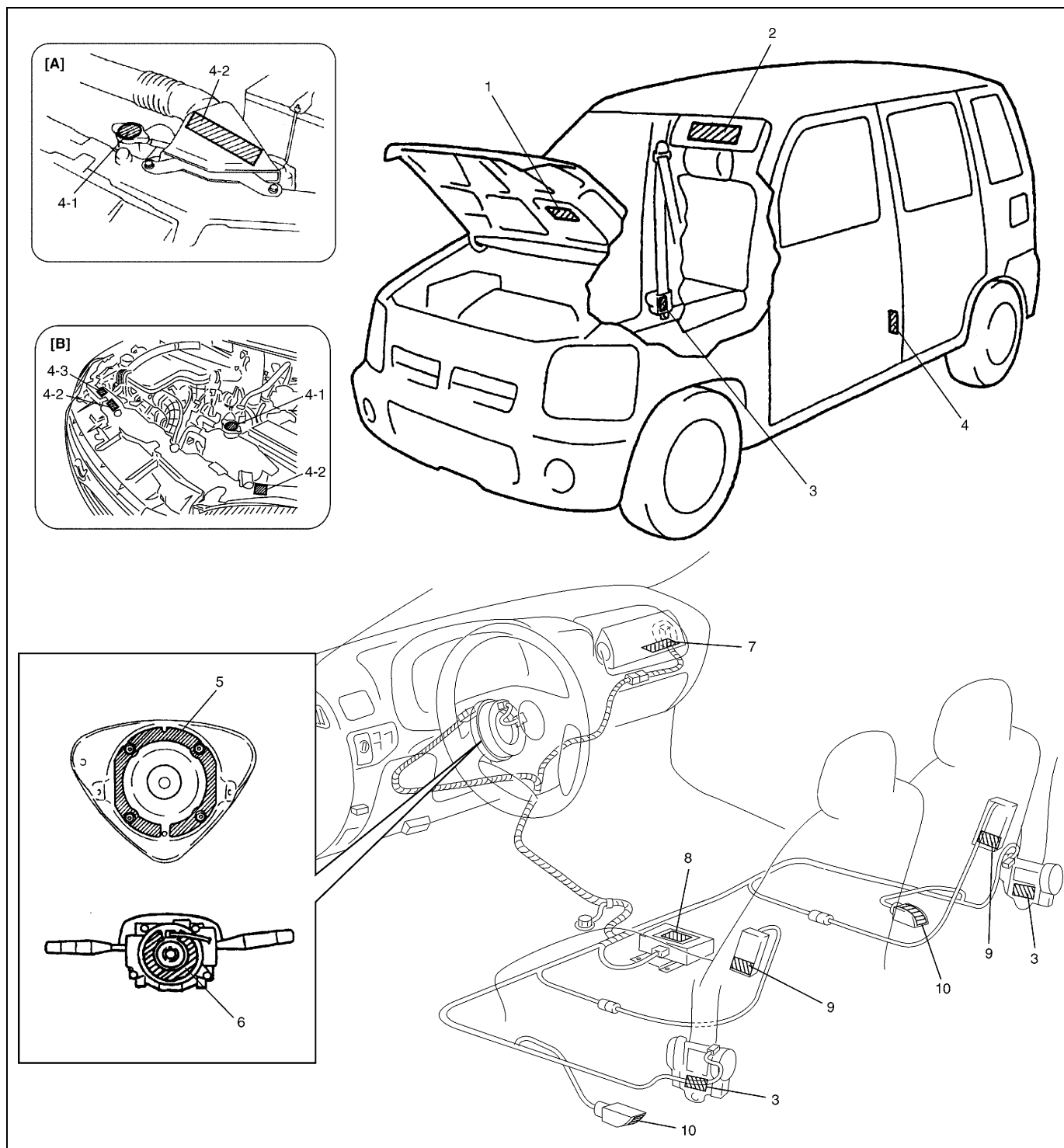


[A]: M/T for G10 engine

[B]: A/T for M13 engine

Warning, Caution and Information Labels

The figure below shows main labels among others that are attached to vehicle component parts. When servicing and handling parts, refer to WARNING/CAUTION instructions printed on labels. If any WARNING/CAUTION label is found stained or damaged, clean or replace it as necessary.



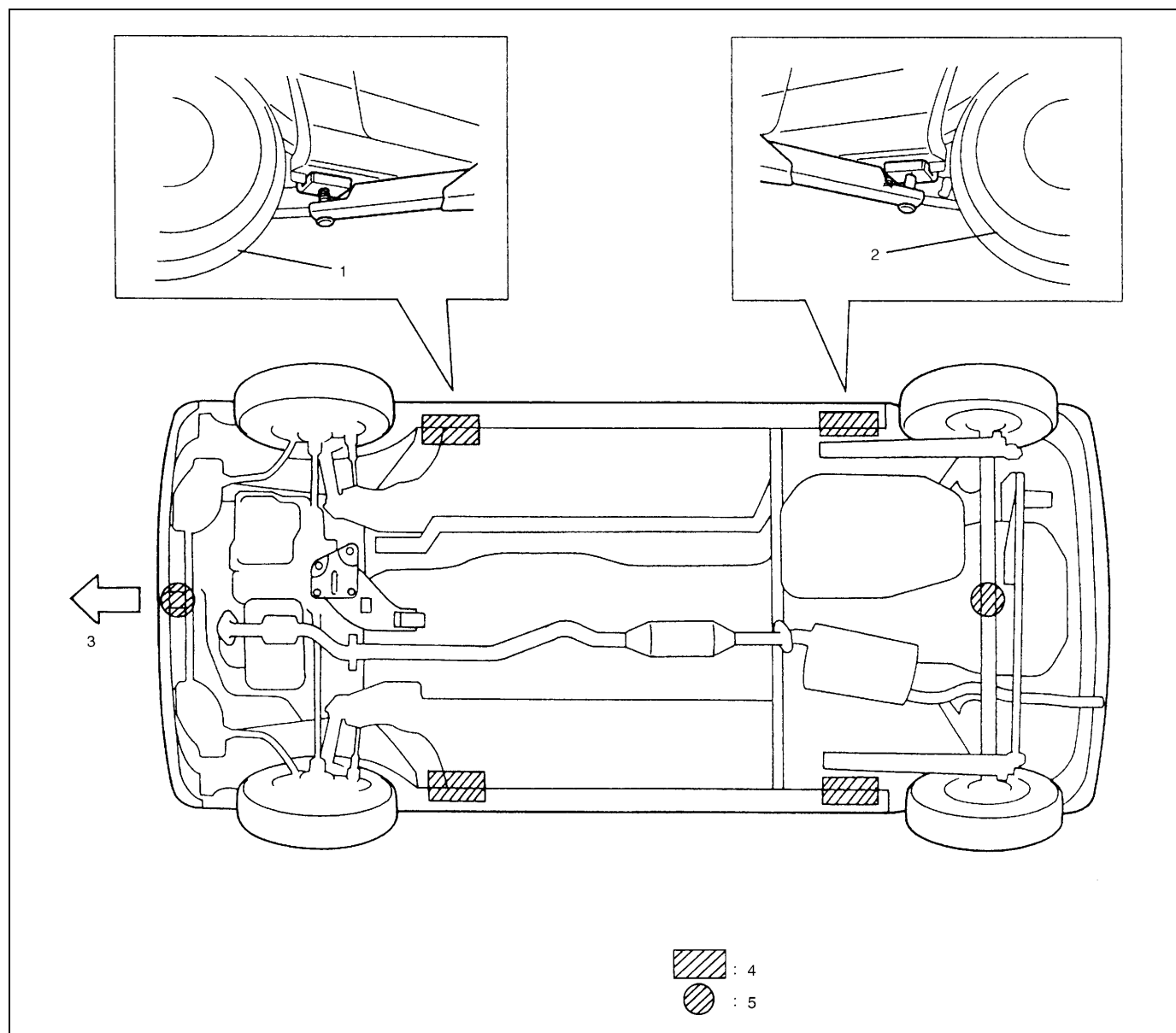
1. Air bag label on back side of engine hood (if equipped)	6. Air bag label on combination switch and contact coil assembly
2. Air bag label on sun visor (for vehicle with air bag system)	7. Air bag label on passenger air bag (inflator) module
3. Pretensioner label on seat belt retractor	8. Air bag label on SDM
4. Tire information placard	9. Air bag label on side air bag (inflator) module
4-1. Radiator cap label	10. Side sensor label
4-2. Engine cooling fan label (location is different depending on vehicle specification)	[A]: M13 engine model
4-3. Smoke level label (Z13DT engine)	[B]: Z13DT engine model
5. Air bag label on driver air bag (inflator) module	

Vehicle Lifting Points

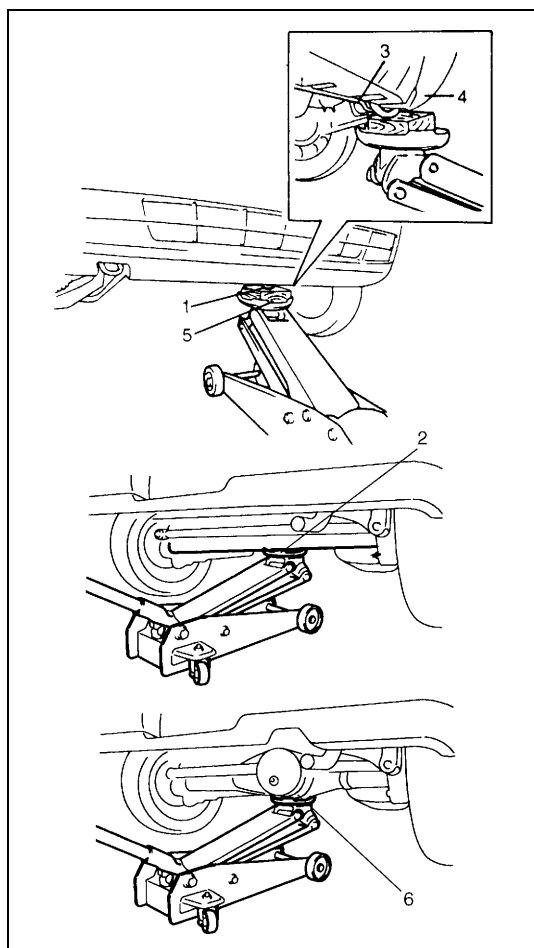
WARNING:

- Before applying hoist to underbody, always take vehicle balance throughout service into consideration. Vehicle balance on hoist may change depending on what part to be removed.
- Before lifting up the vehicle, check to be sure that end of hoist arm is not in contact with brake pipe, fuel pipe, bracket or any other part.
- When using frame contact hoist, apply hoist as shown (right and left at the same position). Lift up the vehicle till 4 tires are a little off the ground and make sure that the vehicle will not fall off by trying to move vehicle body in both ways. Work can be started only after this confirmation.
- Make absolutely sure to lock hoist after vehicle is hoisted up.

When using frame contact hoist



1. Front left tire	4. Support position for frame contact hoist and safety stand
2. Rear left tire	5. Floor jack position
3. Vehicle front	

When using floor jack**WARNING:**

If the vehicle to be jacked up only at the front or rear end, be sure to block the wheels on ground in order to ensure safety.

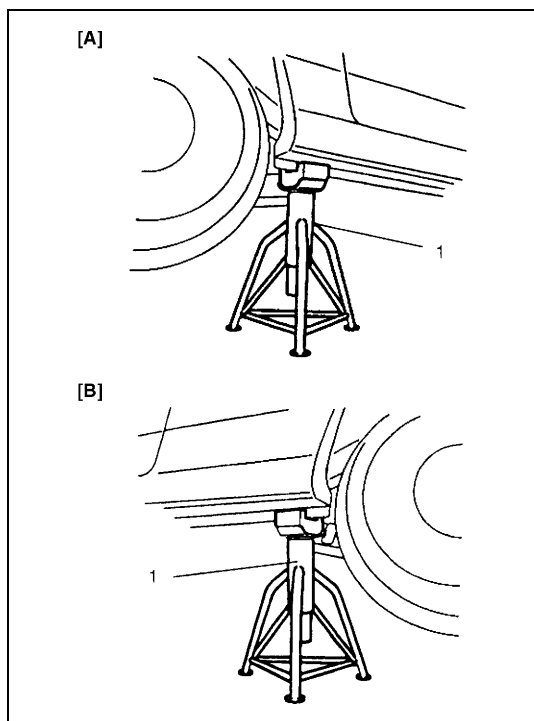
After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone.

CAUTION:

Never apply jack against suspension parts (i.e., stabilizer (3), etc.), front bumper (4) or vehicle floor, or it may get deformed.

When lifting front vehicle end with floor jack, be sure to put the wooden block (5) on the jack against front jacking bracket (1).

When lifting rear vehicle end with floor jack, be sure to put the jack against the center portion of rear axle (2) (2WD vehicle) or rear axle housing (6) (4WD vehicle).



To perform service with either front or rear vehicle end jacked up, be sure to place safety stands (1) under vehicle body so that vehicle body is securely supported. And then check to ensure that vehicle body does not slide on safety stands (1) and the vehicle is held stable for safety's sake.









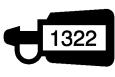

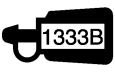







[A]: Front
[B]: Rear

Abbreviations

A	ABS	Anti-lock Brake System	E	EFE Heater	Early Fuel Evaporation Heater (Positive Temperature Coefficient, PTC Heater)	
	ATDC	After Top Dead Center		EPS	Electronic Power Steering	
	API	American Petroleum Institute		EVAP	Evaporative Emission	
	ATF	Automatic Transmission Fluid		EVAP Canister	Evaporative Emission Canister (Charcoal Canister)	
	ALR	Automatic Locking Retractor				
	AC	Alternating Current				
	A/T	Automatic Transmission				
	A/C	Air Conditioning		F	4WD	4 Wheel Drive
	ABDC	After Bottom Dead Center		G	GEN	Generator
	A/F	Air Fuel Mixture Ratio			GND	Ground
A-ELR	Automatic-Emergency Locking Retractor	H	HC	Hydrocarbons		
			HO2S	Heated Oxygen Sensor		
B	B+	Battery Positive Voltage	I	IAC Valve	Idle Air Control Valve (Idle Speed Control Solenoid Valve ISC Solenoid Valve)	
	BTDC	Before Top Dead Center		IAT Sensor	Intake Air Temperature Sensor (Air temperature Sensor, ATS)	
	BBDC	Before Bottom Dead Center		ICM	Immobilizer Control Module	
C	CAN	Controller Area Network		IG	Ignition	
	CKT	Circuit		ISC Actuator	Idle Speed Control Actuator	
	CKP sensor	Crankshaft Position Sensor				
	CMP sensor	Camshaft Position Sensor				
	CO	Carbon Monoxide				
	CPP switch	Clutch Pedal Position Switch (Clutch Switch, Clutch Start Switch)		L	LH	Left Hand
				LSPV	Load Sensing Proportioning Valve	
D	CPU	Central Processing Unit	M	MAF Sensor	Mass Air Flow Sensor (Air Flow Sensor, AFS, Air Flow Meter, AFM)	
	CRS	Child Restraint System		MAP Sensor	Manifold Absolute Pressure Sensor (Pressure Sensor, PS)	
	DC	Direct Current		Max	Maximum	
	DLC	Data Link Connector (Assembly Line Diag. Link, ALDL, Serial Data Link, SDL)		MFI	Multiport Fuel Injection (Multipoint Fuel Injection)	
	DOHC	Double Over Head Camshaft		MIN	Minimum	
	DOJ	Double Offset Joint		MIL	Malfunction Indicator Lamp (“SERVICE ENGINE SOON” Light)	
DRL	Daytime Running Light					
DTC	Diagnostic Trouble Code (Diagnostic Code)					
E	EBCM	Electronic Brake Control Module, ABS Control Module		M/T	Manual Transmission	
	EBD	Electronic Brake Force Distribution	N	NOx	Nitrogen Oxides	
	ECM	Engine Control Module	O	O/D	Overdrive	
	ECT sensor	Engine Coolant Temperature Sensor (Water Temp. Sensor, WTS)		OHC	Over Head Camshaft	
				O2S	Oxygen Sensor	
	EGR	Exhaust Gas Recirculation	P	PNP	Park/Neutral Position	
	EGRT sensor	EGR Temperature Sensor (Recirculated Exhaust Gas Temp. Sensor, REGTS)		P/S	Power Steering	
				PPS	Pedal Position Sensor	

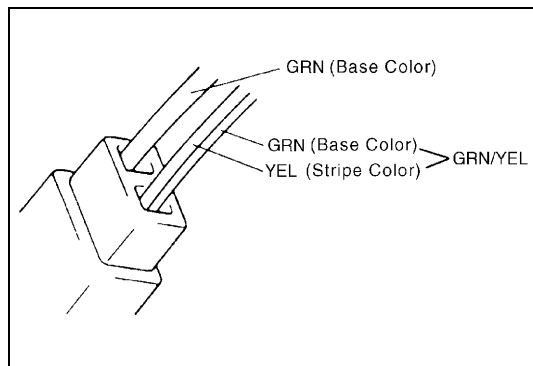
P	PSP Switch	Power Steering Pressure Switch (P/S Pressure Switch)
	PCM	Powertrain Control Module
	PCV	Positive Crankcase Ventilation
R	RH	Right Hand
S	SAE	Society of Automotive Engineers
	SDM	Sensing and Diagnostic Module (Air bag controller, Air bag control module)
	SFI	Sequential Multiport Fuel Injection
	SOHC	Single Over Head Camshaft
	SOI	Start of Injection
T	TBI	Throttle Body Fuel Injection (Single-Point Fuel Injection, SPI)
	TCC	Torque Converter Clutch
	TCM	Transmission Control Module (A/T Controller, A/T Control Module)
	TP Sensor	Throttle Position Sensor
	TVV	Thermal Vacuum Valve (Thermal Vacuum Switching Valve, TVSV, Bimetal Vacuum Switching Valve, BVSV)
	TWC	Three Way Catalytic Converter (Three Way Catalyst)
	2WD	2 Wheel Drive
V	VIN	Vehicle Identification Number
	VSS	Vehicle Speed Sensor
	VVT	Variable Valve Timing
W	WU-OC	Warm Up Oxidation Catalytic Converter
	WU-TWC	Warm Up Three Way Catalytic Converter

Symbols

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Tightening torque		Apply SEALANT 1216B 99000-31230
	Apply oil (engine, transmission, transfer, differential)		Apply SILICONE SEALANT 99000-31120
	Apply fluid (brake, power steering or automatic transmission fluid)		Apply SEALING COMPOUND 366E 99000-31090
	Apply GREASE A 99000-25010		
	Apply GREASE C 99000-25030		Apply THREAD LOCK 1322 99000-32110
	Apply GREASE E 99000-25050		Apply THREAD LOCK 1333B 99000-32020
	Apply GREASE H 99000-25120		Apply THREAD LOCK 1342 99000-32050
	Apply GREASE I 99000-25210		
	Apply SEALANT 1215 99000-31110		Do not reuse
	Apply SEALANT 1207F 99000-31250		Note on reassembly

Wire Color Symbols

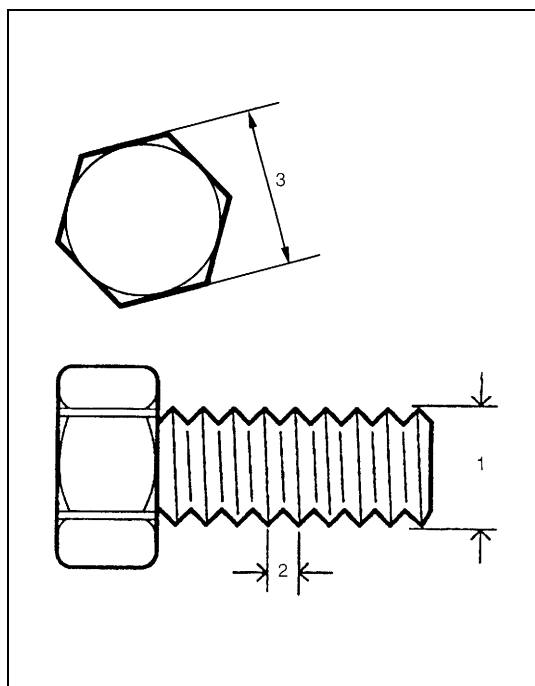
Symbol		Wire Color	Symbol		Wire Color
B	BLK	Black	O, Or	ORN	Orange
Bl	BLU	Blue	R	RED	Red
Br	BRN	Brown	W	WHT	White
G	GRN	Green	Y	YEL	Yellow
Gr	GRY	Gray	P	PNK	Pink
Lbl	LT BLU	Light blue	V	PPL	Violet
Lg	LT GRN	Light green			



There are two kinds of colored wire used in this vehicle. One is single-colored wire and the other is dual-colored (striped) wire. The single-colored wire uses only one color symbol (i.e. "GRN"). The dual-colored wire uses two color symbols (i.e. "GRN/YEL"). The first symbol represents the base color of the wire ("GRN" in the figure) and the second symbol represents the color of the stripe ("YEL" in the figure).

Fastener Information

Metric Fasteners Information



Most of the fasteners used for this vehicle are JIS-defined and ISO-defined metric fasteners. When replacing any fasteners, it is most important that replacement fasteners be the correct diameter, thread pitch and strength.

CAUTION:

Even when the nominal diameter (1) of thread is the same, the thread pitch (2) or the width across flats (3) may vary between ISO and JIS. Refer to JIS-TO-ISO Main Fasteners Comparison Table below for the difference. Installing a mismatched bolt or nut will cause damage to the thread.

Before installing, check the thread pitch for correct matching and then tighten it by hand temporarily. If it is tight, recheck the thread pitch.

JIS-TO-ISO Main Fasteners Comparison Table

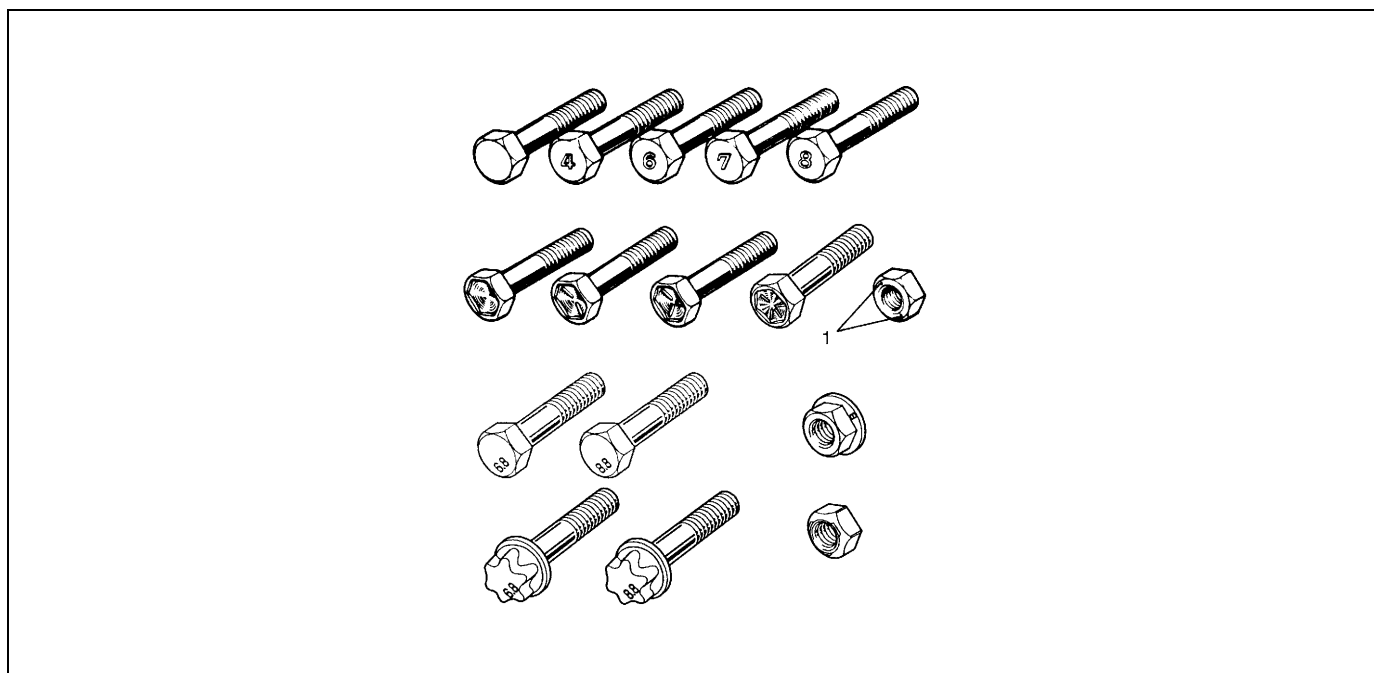
Nominal diameter		M6	M8	M10	M12	M14
Standard	Thread pitch	1.0	1.25	1.25	1.25	1.5
	Width across flats	10	12	14	17	19
ISO	Thread pitch	1.0	1.25	1.5	1.5	1.5
	Width across flats	10	13	16	18	21

Fastener Strength Identification

Most commonly used metric fastener strength property classes are 4T, 6.8, 7T, 8.8 and radial line with the class identification embossed on the head of each bolt. Some metric nuts will be marked with punch, 6 or 8 mark strength identification on the nut face. Figure shows the different strength markings.

When replacing metric fasteners, be careful to use bolts and nuts of the same strength or greater than the original fasteners (the same number marking or higher). It is likewise important to select replacement fasteners of the correct diameter and thread pitch. Correct replacement bolts and nuts are available through the parts division.

Metric bolts: Identification class numbers or marks correspond to bolt strength (increasing numbers represent increasing strength).



1. Nut strength identification

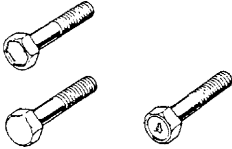

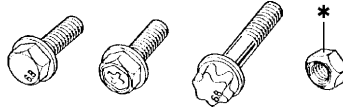

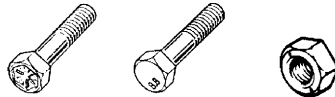

Standard Tightening Torque

Each fastener should be tightened to the torque specified in each section of this manual. If no description or specification is provided, refer to the following tightening torque chart for the applicable torque for each fastener. When a fastener of greater strength than the original one is used, however, use the torque specified for the original fastener.

NOTE:

- For the flanged bolt, flanged nut and self-lock nut of 4T and 7T strength, add 10% to the tightening torque given in the chart below.
- The chart below is applicable only where the fastened parts are made of steel light alloy.

Tightening torque chart:

			Thread Diameter (Nominal Diameter) (mm)								
			4	5	6	8	10	12	14	16	18
Strength	A equivalent of 4T strength fastener 	N·m	1.5	3.0	5.5	13	29	45	65	105	160
		kg-m	0.15	0.30	0.55	1.3	2.9	4.5	6.5	10.5	16
		lb-ft	1.0	2.5	4.0	9.5	21.0	32.5	47.0	76.0	116.0
	A equivalent of 6.8 strength fastener without flange 	N·m	2.4	4.7	8.4	20	42	80	125	193	280
		kg-m	0.24	0.47	0.84	2.0	4.2	8.0	12.5	19.3	28
		lb-ft	2.0	3.5	6.0	14.5	30.5	58.0	90.5	139.5	202.5
	A equivalent of 6.8 strength fastener with flange 	N·m	2.4	4.9	8.8	21	44	84	133	203	298
		kg-m	0.24	0.49	0.88	2.1	4.4	8.4	13.3	20.3	29.8
		lb-ft	2.0	3.5	6.5	15.5	32.0	61.0	96.5	147.0	215.5
	A equivalent of 7T strength fastener 	N·m	2.3	4.5	10	23	50	85	135	210	240
		kg-m	0.23	0.45	1.0	2.3	5.0	8.5	13.5	21	24
		lb-ft	2.0	3.5	7.5	17.0	36.5	61.5	98.0	152.0	174.0
	A equivalent of 8.8 strength fastener without flange 	N·m	3.1	6.3	11	27	56	105	168	258	373
		kg-m	0.31	0.63	1.1	2.7	5.6	10.5	16.8	25.8	37.3
		lb-ft	2.5	4.5	8.0	19.5	40.5	76.0	121.5	187.0	270.0
	A equivalent of 8.8 strength fastener with flange 	N·m	3.2	6.5	12	29	59	113	175	270	395
		kg-m	0.32	0.65	1.2	2.9	5.9	11.3	17.5	27	39.5
		lb-ft	2.5	5.0	9.0	21.0	43.0	82.0	126.5	195.5	286.0

*: Self-lock nut

SECTION 0B

0B

MAINTENANCE AND LUBRICATION

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “System Components and Wiring Location View and Connectors” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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Maintenance Schedule

Maintenance Schedule Under Normal Driving Conditions

NOTE:

- This interval should be judged by odometer reading or months, whichever comes first.
- This table includes service as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.

G10/M13 Engine Models:

Interval		Km (x 1,000)	15	30	45	60	75	90
		Miles (x 1,000)	9	18	27	36	45	54
		Months	12	24	36	48	60	72
ENGINE								
Drive belt (Engine accessory drive belt)			–	–	I	–	–	R
Camshaft timing belt (G10 engine)			Replace every 100,000 km (60,000 miles)					
Valve lash (clearance) (M13 engine)			–	I	–	I	–	I
Engine oil and oil filter	When SG, SH, SJ, or SL grade oil is used.		R	R	R	R	R	R
Engine coolant			–	R	–	R	–	R
Exhaust system			–	I	–	I	–	I
IGNITION SYSTEM								
*Spark plugs	When unleaded fuel is used	M13 engine	Iridium plug	Replace every 105,000 km (63,000 miles) or 84 months				
		G10 engine		–	–	R	–	–
	When leaded fuel is used, refer to “Maintenance Recommended Under Severe Driving Condition” in this section.							
Distributor cap and rotor (G10 engine)			–	–	I	–	–	I
FUEL SYSTEM								
Air cleaner filter		Paved-road	I	I	R	I	I	R
		Dusty conditions	Refer to “Maintenance Recommended Under Severe Driving Conditions” in this section.					
Fuel lines and connections			–	I	–	I	–	I
Fuel tank			–	–	I	–	–	I
EMISSION CONTROL SYSTEM								
*PCV valve			–	–	–	–	–	I
*Fuel evaporative emission control system			–	–	–	–	–	I

NOTE:

- “R”: Replace or change
- “I”: Inspect and correct, replace or lubricate if necessary
- For Sweden, items with * (asterisk) should be performed by odometer reading only.
- For spark plugs, replace every 50,000 km if the local law requires.
- Iridium spark plug: IFR6J11 (NGK)
- For camshaft timing belt (G10 engine), it may be replaced every 90,000 km (54,000 miles) according to customer’s maintenance convenience.

Z13DT Engine Model:

Interval		Km (x 1,000)	15	30	45	60	75	90
		Miles (x 1,000)	9	18	27	36	45	54
		Months	12	24	36	48	60	72
ENGINE								
Engine accessory drive belt			–	I	–	I	–	I
			Replace every 150,000 km (90,000 miles) or 120 months					
Engine oil and oil filter	With a synthetic engine oil of oil grade: ACEA B3, and oil viscosity: SAE 0W-30, 0W-40, 5W-30, 5W-40		Replace every 20,000 km (12,000 miles) or 16 months					
	With engine oils other than specified synthetic engine oils		Replace every 10,000 km (6,000 miles) or 8 months					
Engine coolant			–	–	R	–	–	R
Exhaust system			–	I	–	I	–	I
FUEL SYSTEM								
Air cleaner filter			Replace every 50,000 km (30,000 miles) or 40 months					
Fuel lines and connections			–	I	–	I	–	I
Fuel filter			–	R	–	R	–	R
			Drain water every 15,000 km (90,000 miles) or 12 months					
Fuel tank			–	–	I	–	–	I

NOTE:

- “R”: Replace or change
- “I”: Inspect and correct, replace or lubricate if necessary
- Some maintenance items are required to be serviced at times other than the regular maintenance times shown at the top of above table. These items can be serviced at an earlier service opportunity according to customer’s maintenance convenience. Their next maintenance service should be done within the specified period.

G10/M13/Z13DT Engine Models:

Interval	Km (x 1,000)	15	30	45	60	75	90
	Miles (x 1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
BRAKE							
Brake discs and pads (thickness, wear, damage)		I	I	I	I	I	I
Brake drums and shoes (wear, damage)		–	I	–	I	–	I
Brake hoses and pipes (leakage, damage, clamp)		–	I	–	I	–	I
Brake fluid		–	R	–	R	–	R
Brake lever and cable (damage, stroke, operation)		Inspect at first 15,000 km (9,000 miles only)					
CHASSIS AND BODY							
Clutch (pedal height and/or travel)		–	I	–	I	–	I
Tires (wear, damage, rotation)/wheels (damage)		I	I	I	I	I	I
Suspension system (tightness, damage, rattle, breakage)		–	I	–	I	–	I
Steering system (tightness, damage, breakage, rattle)		–	I	–	I	–	I
Drive shaft (axle) boots/Propeller shafts (4WD)		–	–	I	–	–	I
Manual Transmission oil	G10/M13 engines (I: 15,000 km only)	I	–	R	–	–	R
	Z13DT engine	–	R	–	R	–	R
Automatic transmission	Fluid level	–	I	–	I	–	I
	Fluid change	Replace every 165,000 km (99,000 miles)					
	Fluid hose	–	–	–	I	–	–
Transfer oil (4WD) (leakage, level)		I	–	I	–	I	–
Rear differential oil (4WD) (leakage, level) (R: 1st 15,000 km only)		R or I	–	I	–	I	–
All latches, hinges and locks		–	I	–	I	–	I
Ventilator air filter (if equipped)		–	I	R	–	I	R

NOTE:

- “R”: Replace or change
- “I”: Inspect and correct or replace if necessary

Maintenance Recommended Under Severe Driving Conditions

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, IT IS RECOMMENDED that applicable maintenance operation be performed at the particular interval as shown in the following table.

Severe condition code:

- A: Repeated short trips
 B: Driving on rough and/or muddy roads
 C: Driving on dusty roads
 D: Driving in extremely cold weather and/or salted roads
 E: Repeated short trips in extremely cold weather
 F: Leaded fuel use
 G: -----
 H: Towing a trailer (if admitted)

Severe Condition Code	Maintenance		Maintenance Operation	Maintenance Interval
- B C D - - - -	Drive belt (Engine accessory drive belt)		I	Every 15,000 km (9,000 miles) or 12 months
			R	Every 45,000 km (27,000 miles) or 36 months
A - C D E F - H	Engine oil and oil filter	G10/M13 engines	R	Every 5,000 km (3,000 miles) or 4 months
A - C D E - - H		Z13DT engine		Every 10,000 km (6,000 miles) or 8 months
- - C - - - - -	Air cleaner filter *1		I	Every 2,500 km (1,500 miles)
			R	Every 30,000 km (18,000 miles) or 24 months
A B C - E F - H	Spark plugs	Iridium spark plug of M13 engine	R	Every 30,000 km (18,000 miles) or 24 months
		G10 engine	R	Every 10,000 km (6,000 miles) or 8 months
- B C D - - - - H	Wheel bearings		I	Every 15,000 km (9,000 miles) or 12 months
- B - D E - - - H	Drive shafts and propeller shafts (4WD)		I	Every 15,000 km (9,000 miles) or 12 months
- B - - E - - - H	Manual transmission oil, transfer oil (4WD) and differential oil (4WD)		R	First time only: 15,000 km (9,000 miles) or 12 months
				Second time and after: Every 30,000 km (18,000 miles) or 24 months reckoning from 0 km (0 miles) or 0 month
- - C D - - - -	Ventilator air filter *2 (if equipped)		I	Every 15,000 km (9,000 miles) or 12 months
			R	Every 45,000 km (27,000 miles) or 36 months
- B - - E - - - H	Automatic transmission fluid		R	Every 30,000 km (18,000 miles) or 24 months

NOTE:

- **“I”:** Inspect and correct or replace if necessary
- **“R”:** Replace or change
- ***1:** Inspect more frequently if the vehicle is used under dusty conditions.
- ***2:** Clean or replace more frequently if the air from the ventilator decreases.

Maintenance Service

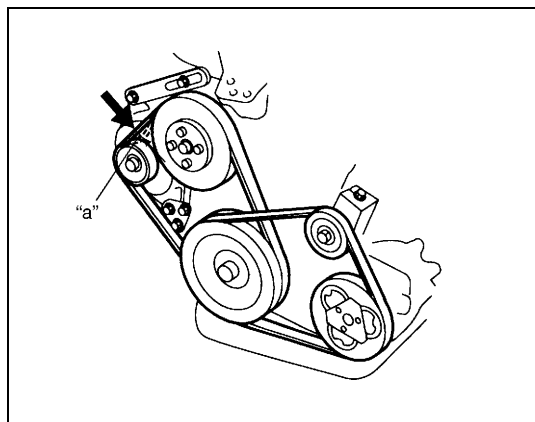
Drive Belt Inspection (M13 Engine)

WARNING:

All inspection and replacement are to be performed with **ENGINE NOT RUNNING**.

Water pump and generator drive belt inspection

- 1) Disconnect negative (–) cable at battery.
- 2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If any defect exists, replace.
Check belt for tension.


Water pump and generator belt tension

“a”: 4.5 – 5.5 mm (0.18 – 0.22 in.) deflection under 100 N (10 kg, 22 lb) pressure

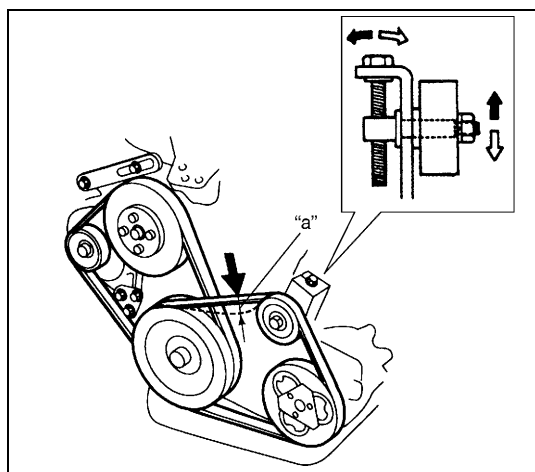
NOTE:

When replacing belt with a new one, adjust belt tension to 3 – 4 mm (0.12 – 0.16 in.)

- 3) If belt is too tight or too loose, adjust it to specification by adjusting alternator position.
- 4) Tighten alternator adjusting bolts and pivot bolt.
- 5) Connect negative (–) cable to battery.

A/C Compressor drive belt (if equipped) inspection

- 1) Disconnect negative (–) cable at battery.
- 2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If any defect exists, replace.
Check belt for tension.
If belt tension is out of specification, adjust it referring to “A/C Compressor Driver Belt (M13 engine model)” in Section 1B.


A/C compressor drive belt tension

“a”: 3 – 5 mm (0.12 – 0.20 in.) deflection under 100 N (10 kg, 22 lb) pressure

- 3) Connect negative (–) cable to battery.

Drive Belt Replacement (M13 Engine)

Water pump and generator drive belt replacement

Replace belt with new one referring to “Water Pump/Generator Drive Belt Removal and Installation” in Section 6B2.

A/C Compressor drive belt (if equipped) replacement

Replace belt with new one referring to “A/C Compressor Drive Belt (M13 engine model)” in Section 1B.

Drive Belt Inspection (G10 Engine)

WARNING:

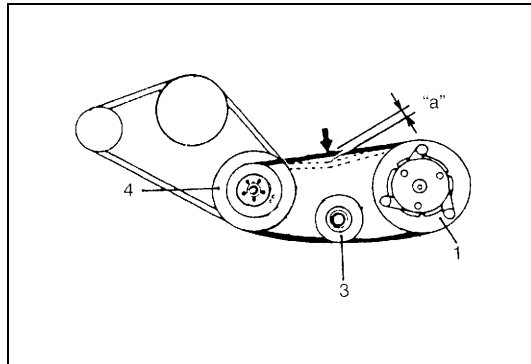
Disconnect negative cable at battery before checking and replacing belt.

A/C compressor drive belt inspection (If equipped)

- 1) Hoist vehicle and remove engine under cover of right side from vehicle body.
- 2) Inspect belt for wear, deterioration and tension. Replace or adjust, if necessary.

A/C compressor drive belt tension "a":

7 – 9 mm (0.28 – 0.35 in.) deflection under 100 N, 10 kg or 22 lb pressure



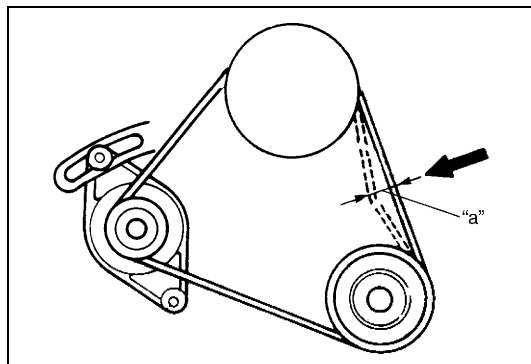
1.	A/C compressor pulley
2.	Blank
3.	Tension pulley
4.	Crankshaft pulley

Water pump belt inspection

- 1) Inspect belt for cracks, cuts, deformation, wear and cleanliness. Replace, if necessary.
- 2) Check pump belt for tension and adjust it as necessary.

Water pump belt tension "a":

7 – 9 mm (0.27 – 0.35 in.) deflection under 100 N, 10 kg or 22 lb pressure



Drive Belt Replacement (G10 Engine)

A/C compressor drive belt replacement

- 1) Disconnect negative cable from battery.
- 2) Remove engine under cover of right side.
- 3) Loosen belt tension and replace belt with new one.
- 4) Adjust belt tension to specification.
- 5) Install engine under cover and connect negative cable to battery.

Water pump belt replacement

Replace belt with a new one. Refer to Section 6B for replacement procedure of pump belt.

NOTE:

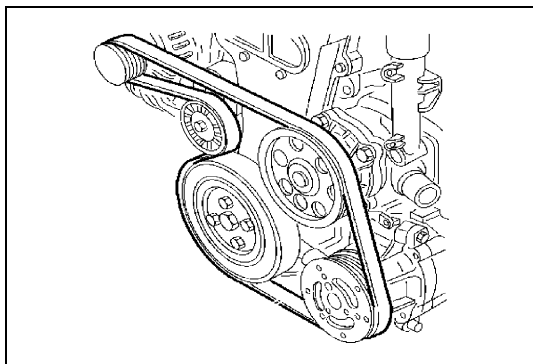
When replacing belt with a new one, adjust belt tension to 6 – 7 mm (0.24 – 0.27 in.).

Engine Accessory Drive Belt Inspection (Z13DT Engine)

WARNING:

All inspection and replacement are to be performed with
ENGINE NOT RUNNING.

Water pump and generator drive belt inspection



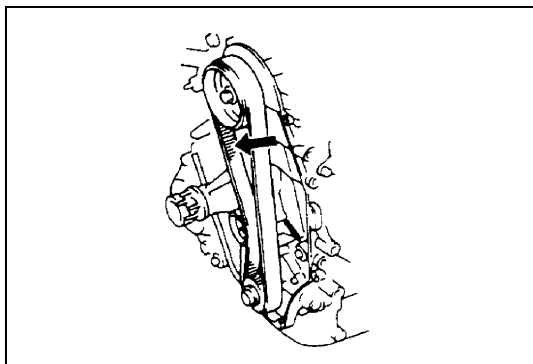
Inspect belt for cracks, cuts, deformation, wear, tension and cleanliness referring to “Water Pump and Generator Drive Belt Inspection” in Section 6B3. If any defect exists, replace.

Engine Accessory Drive Belt Replacement (Z13DT Engine)

Water pump and generator drive belt replacement

Replace belt with new one referring to “Water Pump/Generator Drive Belt Removal and Installation” in Section 6B3.

Camshaft Timing Belt Replacement (G10 Engine)

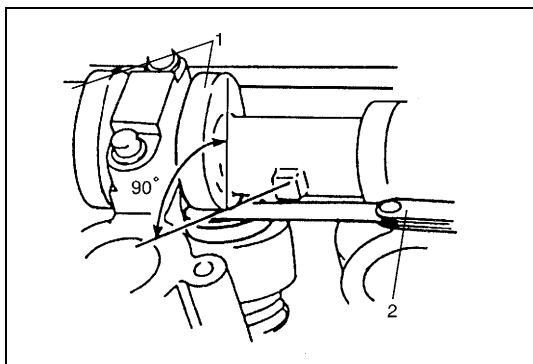


Replace belt with new one. Refer to Section 6A for replacement procedure.

CAUTION:

- Do not bend or twist timing belt.
- Do not allow timing belt to come into contact with oil, water, etc.

Valve Lash (Clearance) Inspection (M13 Engine)



- 1) Inspect intake and exhaust valve lash and adjust as necessary.

Refer to “Valve Lash (Clearance) Inspection” in Section 6A2 for valve lash inspection and adjustment procedure.

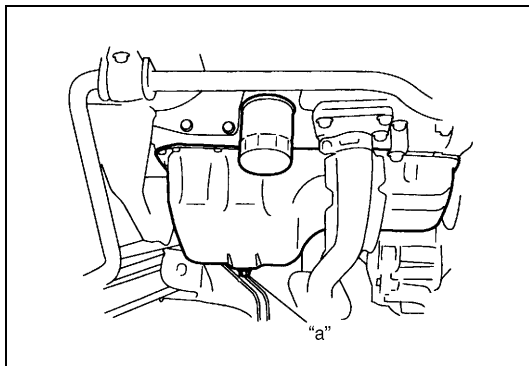
- | |
|--------------------|
| 1. Camshaft |
| 2. Thickness gauge |

Engine Oil and Oil Filter Replacement (G10/M13 Engines)

WARNING:

- New and used engine oil can be hazardous. Be sure to read "WARNING" in General Precaution in Section 0A and observe what is written there.
- Step 1) – 7) outlined below must be performed with **ENGINE NOT RUNNING**. For step 8), be sure to have adequate ventilation while engine is running.

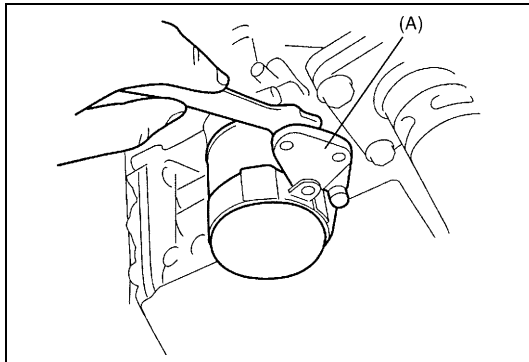
Before draining engine oil, check engine for oil leakage. If any evidence of leakage is found, make sure to correct defective part before proceeding to the following work.



- 1) Drain engine oil by removing drain plug.
- 2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

Tightening torque

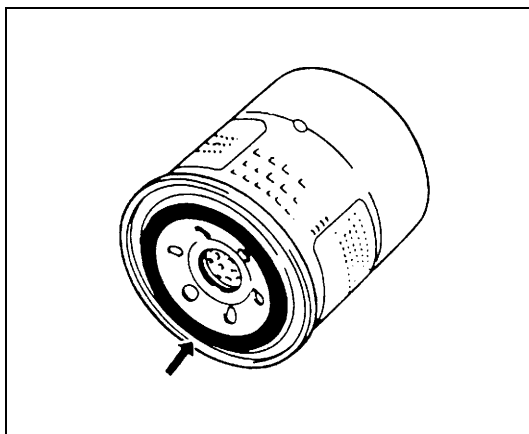
Engine oil drain plug (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



- 3) Loosen oil filter by using oil filter wrench (special tool).

Special tool

(A): 09915-47330



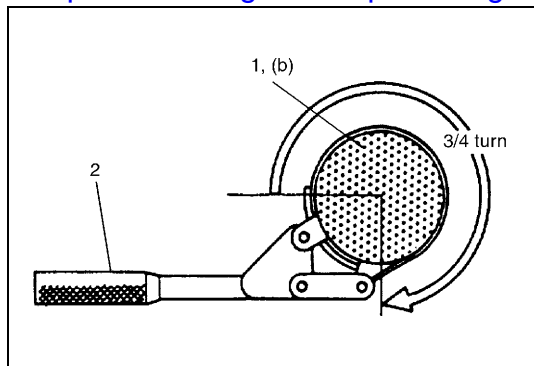
NOTE:

Before fitting new oil filter, be sure to oil its O-ring. Use engine oil for this purpose.

- 4) Screw new filter on oil filter stand by hand until the filter O-ring contacts the mounting surface.

CAUTION:

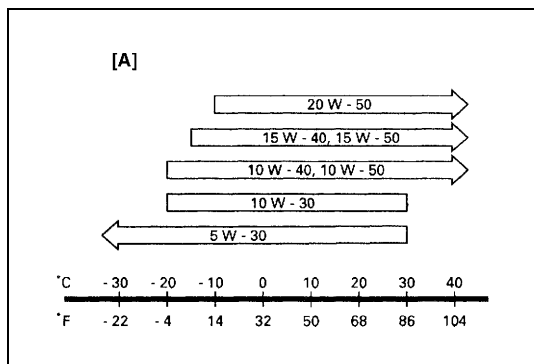
To tighten oil filter properly, it is important to accurately identify the position at which filter O-ring first contacts the mounting surface.



- 5) Tighten the filter (1) 3/4 turn from the point of contact with the mounting surface using an oil filter wrench (2).

Tightening torque

Oil filter (b): 14 N·m (1.4 kg-m, 10.5 lb-ft) (for reference)



- 6) Replenish oil until oil level is brought to FULL level mark on dipstick. (oil pan and oil filter capacity). The filler inlet is at the top of the cylinder head cover.

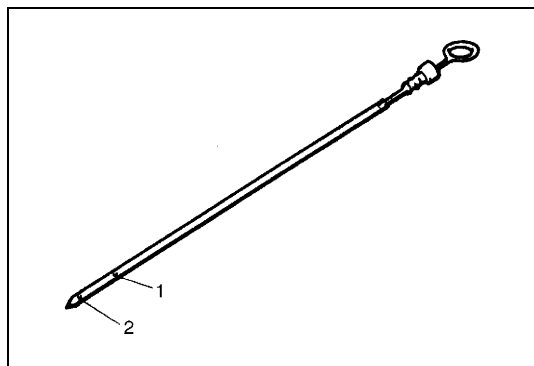
It is recommended to use engine oil of SG, SH, SJ or SL grade. Select the appropriate oil viscosity according to the proper engine oil viscosity chart [A].

Engine oil specification

	M13 Engine	G10 Engine
Oil pan capacity	About 3.6 liters (7.6/6.3 US/Imp pt.)	About 3.1 liters (6.5/5.5 US/Imp pt.)
Oil filter capacity	About 0.2 liter (0.4/0.3 US/Imp pt.)	
Others	About 0.3 liter (0.6/0.5 US/Imp pt.)	
Total	About 4.1 liters (8.7/7.2 US/Imp pt.)	About 3.6 liters (7.5/6.3 US/Imp pt.)

NOTE:

Engine oil capacity is specified. However, note that the amount of oil required when actually changing oil may somewhat differ from the data in the table depending on various conditions (temperature, viscosity, etc.)



- 7) Check oil filter and drain plug for oil leakage.
- 8) Start engine and run it for 3 minutes. Stop it and wait 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

1. Full level mark (hole)

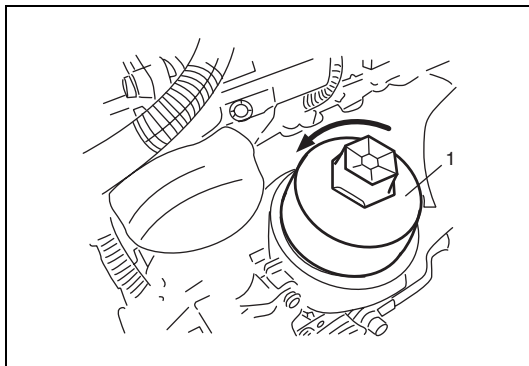
2. Low level mark (hole)

Engine Oil and Oil Filter Replacement (Z13DT Engine)

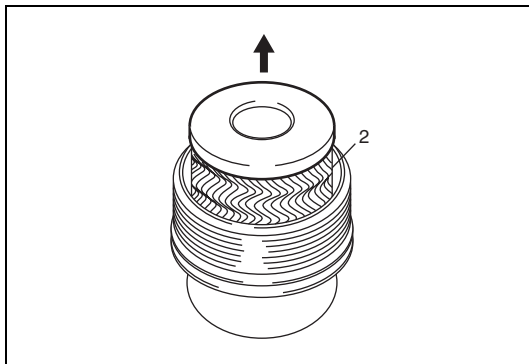
WARNING:

- New and used engine oil can be hazardous. Be sure to read "WARNING" in General Precaution in Section 0A and observe what is written there.
- Step 1) – 6) outlined below must be performed with **ENGINE NOT RUNNING**. For step 8), be sure to have adequate ventilation while engine is running.

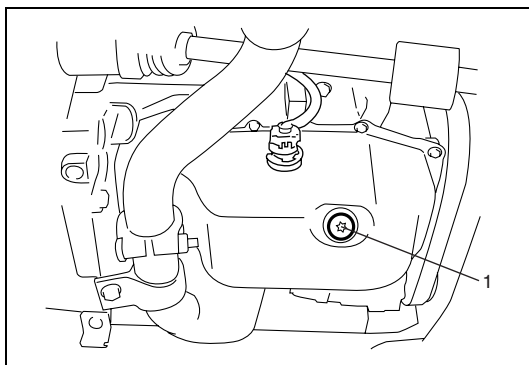
Before draining engine oil, check engine for oil leakage. If any evidence of leakage is found, make sure to correct defective part before proceeding to the following work.



- 1) Remove oil filter element.
 - a) Place oil collecting basin under filter.
 - b) Loosen and remove oil filter housing cover (1).



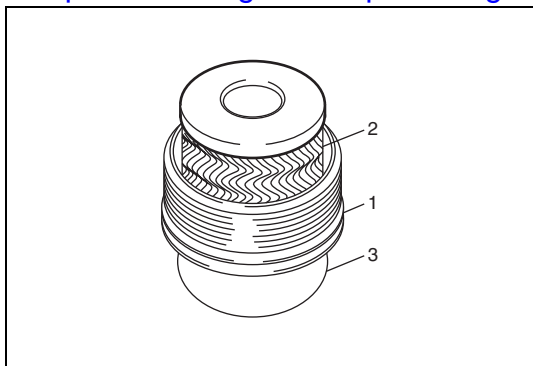
- c) Pull out oil filter element (2) from cover.



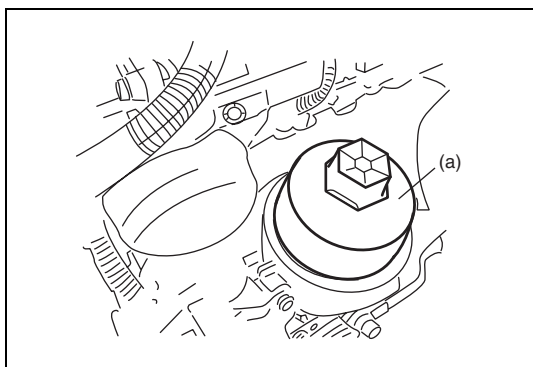
- 2) Drain engine oil by removing drain plug (1).
- 3) After draining oil, wipe drain plug clean and replace seal ring with a new one. Reinstall drain plug, and tighten it securely as specified below.

Tightening torque

Engine oil drain plug (a): 20 N·m (2.0 kg-m, 14.5 lb-ft)



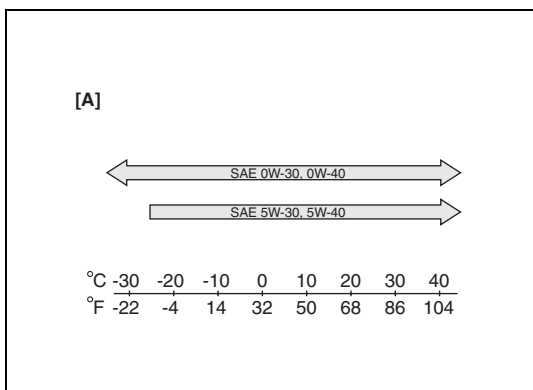
- 4) Install oil filter element.
 - a) Replace seal ring (1) of oil filter housing cover (3) with new one and apply engine oil to seal ring.
 - b) Install new oil filter element (2) to cover.



- c) Install oil filter housing cover with element.

Tightening torque

Oil filter housing cover (a): 25 N·m (2.5 kg-m) 18.5 lb-ft



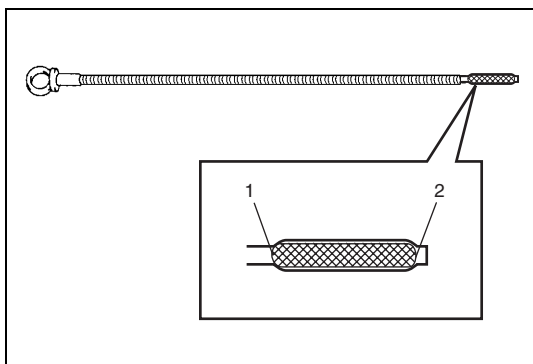
- 5) Replenish oil until oil level is brought to FULL level mark on dipstick. (about 3.2 liters (5.6 Imp pt.)) The filler inlet is by the engine oil filter.

Use specified engine oil. Select the appropriate oil viscosity according to the proper engine oil viscosity chart [A].

NOTE:

Note that the amount of oil required when actually changing oil may somewhat differ from the data depending on various conditions (temperature, viscosity, etc.)

- 6) Check oil filter and drain plug for oil leakage.



- 7) Start engine and run it for 3 minutes. Stop it and wait 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

1.	Full level mark
2.	Low level mark

Engine Coolant Replacement

WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

CAUTION:

When changing engine coolant, use mixture of 50% specified water and 50% ANTIFREEZE/ANTICORROSION COOLANT for the purpose of corrosion protection and lubrication.

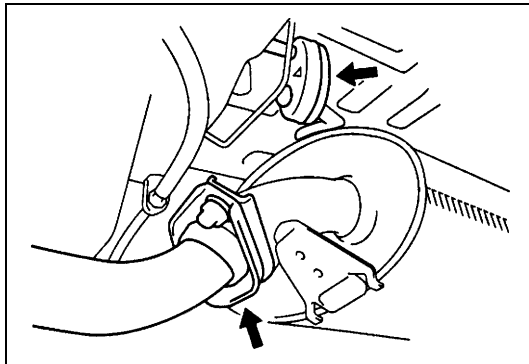
Change engine coolant with new one referring to "Cooling System Flush and Refill" in Section 6B (G10 engine), 6B2 (M13 engine) or 6B3 (Z13DT engine).

Exhaust System Inspection

WARNING:

To avoid danger of being burned, do not touch exhaust system when it is still hot. Any service on exhaust system should be performed when it is cool.

When carrying out periodic maintenance, or the vehicle is raised for other service, check exhaust system as follows:

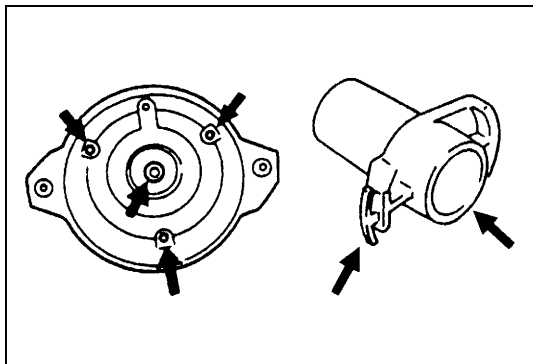


- Check rubber mountings for damage, deterioration, and out of position.
- Check exhaust system for leakage, loose connections, dents and damages.
If bolts or nuts are loose, tighten them to specification.
- Check nearby body areas for damaged, missing, or mispositioned parts, open seams, holes, loose connections or other defects which could permit exhaust fumes to seep into the vehicle.
- Make sure that exhaust system components have enough clearance from the underbody to avoid overheating and possible damage to the floor carpet.
- Any defects should be fixed at once.

Spark Plugs Replacement

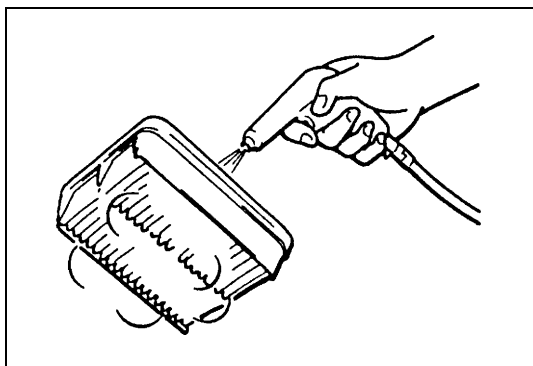
Replace spark plugs with new ones referring to "Spark Plugs Removal and Installation" in Section 6F (G10 engine) or 6F2 (M13 engine).

Distributor Cap and Rotor Inspection (G10 Engine)



- Check distributor cap and rubber caps for cracks.
 - Clean dusty and stained parts using a dry, soft cloth.
 - Check center electrode and terminals for wear.
 - Check rotor for cracks and its electrode for wear.
- Repair or replace any component which is found to be in malcondition.

Air Cleaner Filter Inspection (G10/M13 Engines)

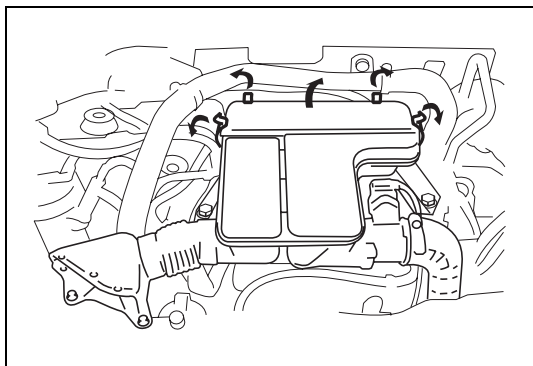


- 1) Unclamp air cleaner case clamps.
- 2) Take air cleaner filter out of case.
- 3) Check that filter is not excessively dirty, damaged or oily, clean filter with compressed air from air outlet side of filter.
- 4) Install air cleaner filter and clamp upper case securely.

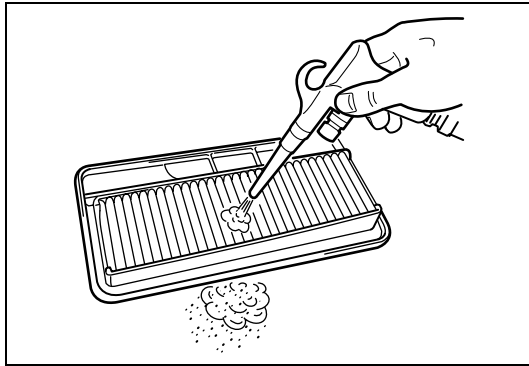
Air Cleaner Filter Replacement (G10/M13 Engines)

Replace air cleaner filter with new one according to steps 1), 2) and 4) of inspection procedure.

Air Cleaner Filter Inspection (Z13DT Engine)



- 1) Remove air cleaner case clamps.
- 2) Take air cleaner filter out of case.

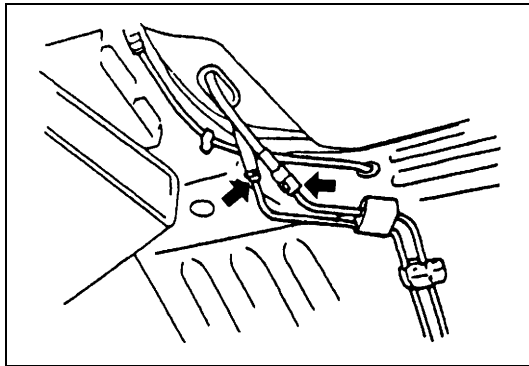


- 3) Check that filter is not excessively dirty, damaged or oily, clean filter with compressed air from air outlet side of filter.
- 4) Install air cleaner filter and clamp upper case securely.

Air Cleaner Filter Replacement (Z13DT Engine)

Replace air cleaner filter with new one according to steps 1), 2) and 4) of inspection procedure.

Fuel Lines and Connections Inspection



Visually inspect fuel lines and connections for evidence of fuel leakage, hose cracking and damage. Make sure all clamps are secure.

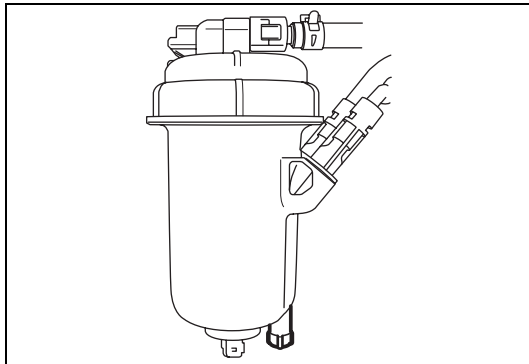
Repair leaky joints, if any.

Replace hoses that are suspected of being cracked.

Fuel Filter Replacement (Z13DT Engine)

WARNING:

This work must be performed in a well ventilated area and away from any open flames (such as gas hot water heaters).

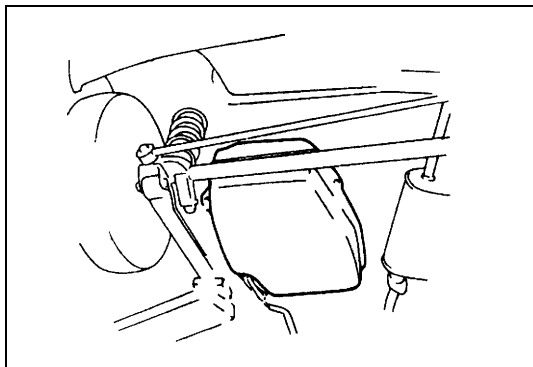


Replace fuel filter element in fuel filter assembly (1) with new one referring to "Fuel Filter" in Section 6C3.

Water Draining of Fuel Filter (Z13DT Engine)

Bleed fuel filter of water referring to "Water Draining of Fuel Filter" in Section 6C3.

Fuel Tank Inspection



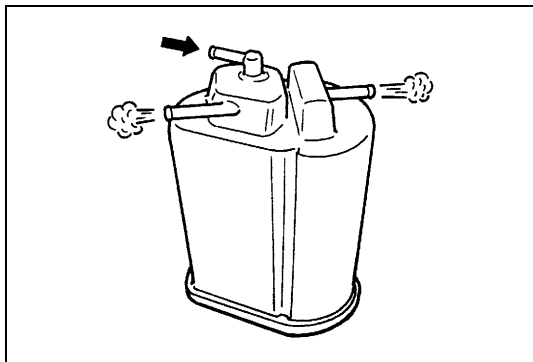
Check fuel tank damage, cracks, fuel leakage, corrosion and tank bolts looseness.

If a problem is found, repair or replace.

PCV Valve Inspection

Check crankcase ventilation hose and PCV hose for leaks, cracks or clog, and PCV valve for stick or clog. Refer to "PCV valve" under "PCV System Inspection" of Section 6E1 or 6E2 for PCV valve checking procedure.

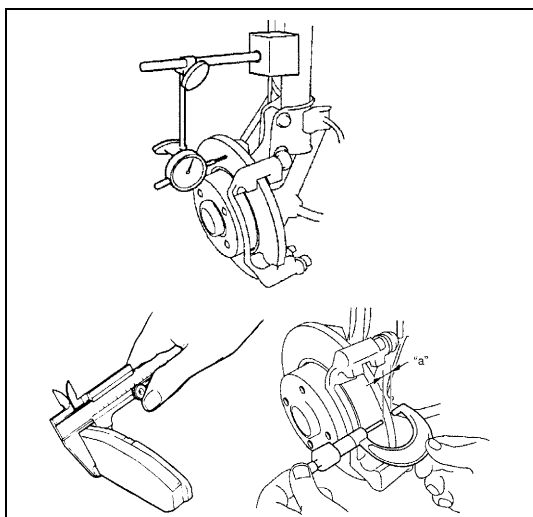
Fuel Evaporative Emission Control System Inspection



- 1) Visually inspect hoses for cracks, damage, or excessive bends. Inspect all clamps for damage and proper position.
- 2) Check EVAP canister for operation and clog, referring to "EVAP Canister" under "EVAP Control System Inspection" in Section 6E1 or 6E2.

If a malfunction is found, repair or replace.

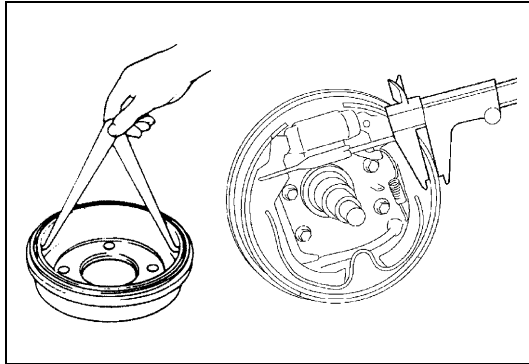
Brake Discs and Pads (Front) Inspection



- 1) Remove wheel and caliper but don't disconnect brake hose from caliper.
- 2) Check front disc brake pads and discs for excessive wear, damage and deflection. Replace parts as necessary. For details, refer to "Front Disc Brake Pad Inspection" and "Front Brake Disc Inspection" in Section 5B.
Be sure to torque caliper pin bolts to specification.

Brake Drums and Shoes (Rear) Inspection

- 1) Remove wheel and brake drum.
- 2) Check rear brake drums and brake linings for excessive wear and damage, while wheels and drums are removed. At the same time, check wheel cylinders for leaks. Replace these parts as necessary.

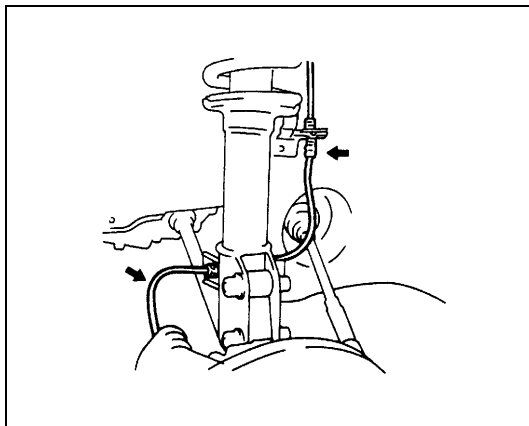


Brake Hoses and Pipes Inspection

Perform this inspection where there is enough light and use a mirror as necessary.

- Check brake hoses and pipes for proper hookup, leaks, cracks, chafing and other damage.
- Check that hoses and pipes are clear of sharp edges and moving parts.

Repair or replace any of these parts as necessary.



CAUTION:

After replacing any brake pipe or hose, be sure to carry out air purge operation.

Brake Fluid Replacement

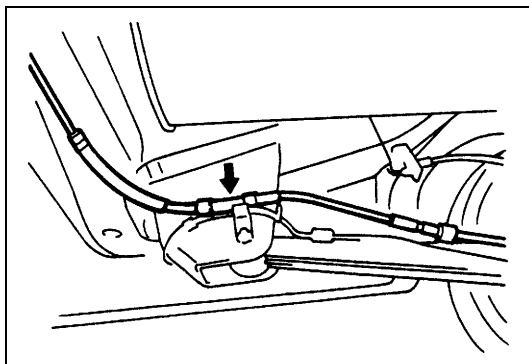
Change brake fluid as follows.

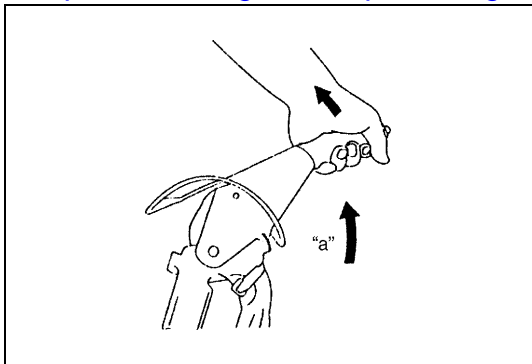
Drain existing fluid from brake system completely, fill system with specified fluid and carry out air purge operation.

For air purging procedure, refer to "Bleeding Brake" in Section 5.

Brake Lever and Cable Inspection

- 1) Inspect brake cable for damage and smooth movement. Replace cable if it is in deteriorated condition.





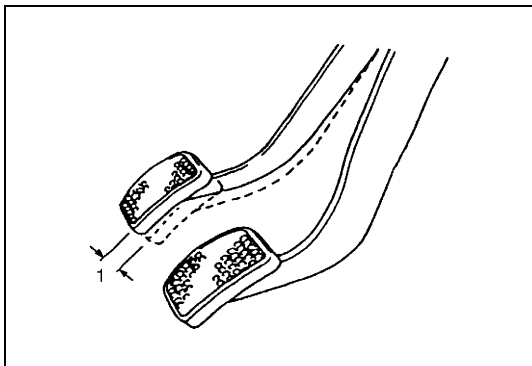
- 2) Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking lever.
 - 3) Check parking brake lever for proper operation and stroke, and adjust it if necessary.
- For checking and adjusting procedures, refer to "Parking Brake Inspection and Adjustment" in Section 5.

Parking brake lever stroke

"a": 4 – 9 notches (with 20 kg (44 lbs) of pull pressure)

Clutch Inspection

G10/M13 engine models:

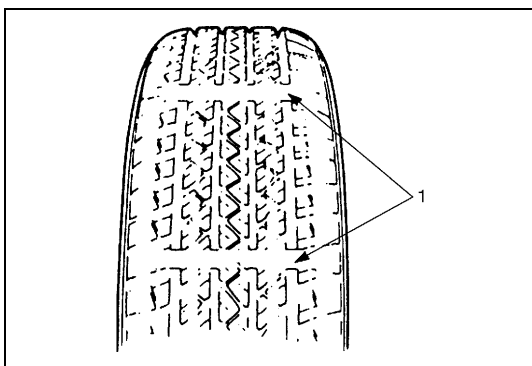


Check clutch pedal for height and free travel (1) referring to "Clutch Pedal Height Check" and "Clutch Pedal Free Travel Check" in Section 7C. Adjust or correct if necessary.

Z13DT engine model:

Check clearance between cable nut and release shaft referring to "Clutch Cable Adjustment" in Section 7C3. Adjust or correct if necessary.

Tires Inspection



- 1) Check tires for uneven or excessive wear, or damage. If defective, replace. Refer to "Tire Diagnosis" in Section 3 for details.

1. Wear indicator

- 2) Check inflating pressure of each tire and adjust pressure to specification as necessary.

NOTE:

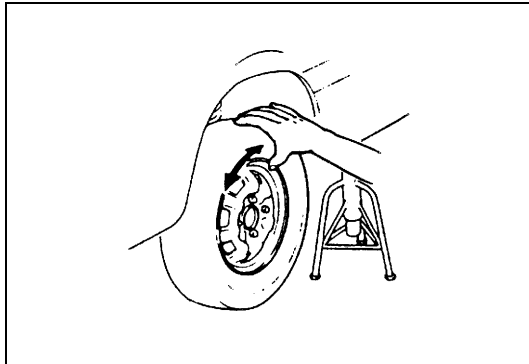
- Tire inflation pressure should be checked when tires are cool.
- Specified tire inflation pressure should be found on tire placard or in owner's manual which came with the vehicle.

- 3) Rotate tires.

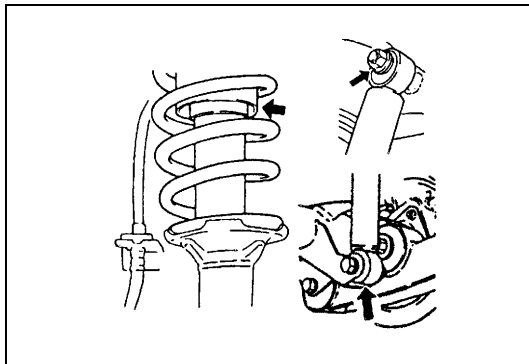
For details, refer to "Tire Rotation" in Section 3F.

Wheel Discs Inspection

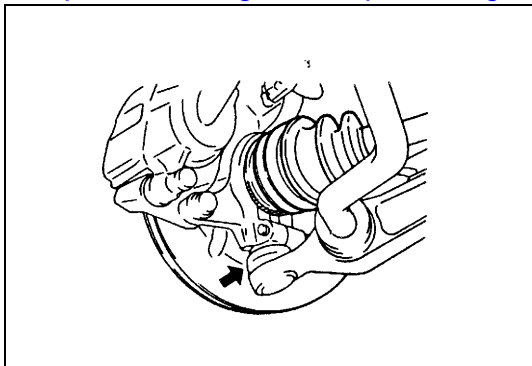
Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.

Wheel Bearing Inspection

- 1) Check front wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to "Wheel Disc, Nut and Bearing Check" in Section 3D.
- 2) Check rear wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to "Wheel Disc, Nut and Bearing Check" in Section 3E.

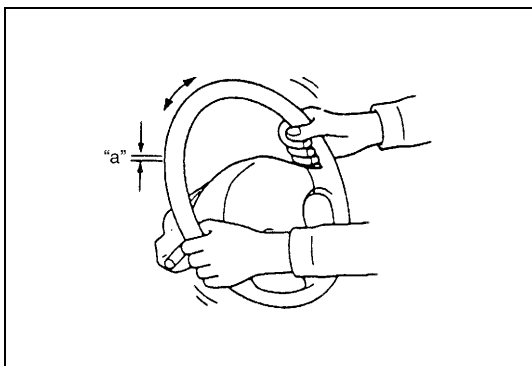
Suspension System Inspection

- Inspect front struts & rear shock absorbers for evidence of oil leakage, dents or any other damage on sleeves; and inspect anchor ends for deterioration.
Replace defective parts, if any.
- Check front and rear suspension systems for damaged, loose or missing parts; also for parts showing signs of wear or lack of lubrication.
Repair or replace defective parts, if any.



- Check front suspension arm ball joint stud dust seals for leakage, detachment, tear or any other damage. Replace defective boot, if any.

Steering System Inspection

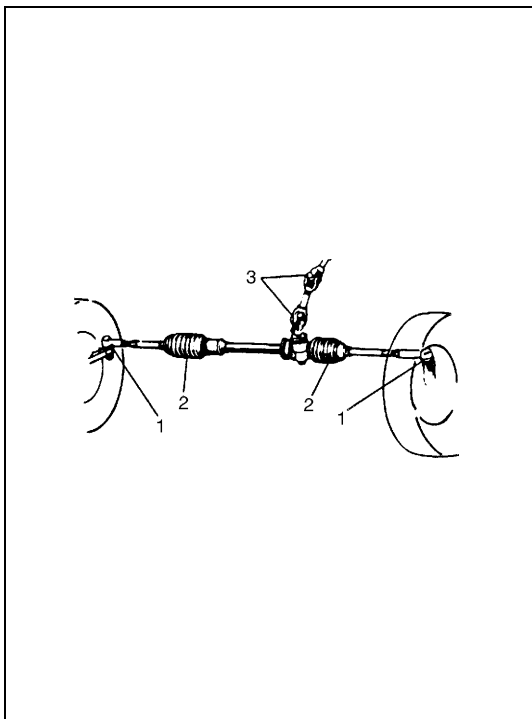


- 1) Check steering wheel for play and rattle, holding vehicle straight on ground.

Steering wheel play

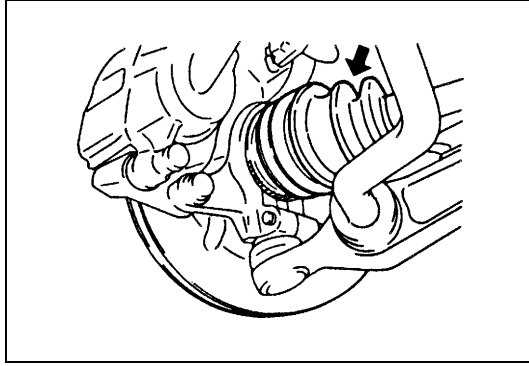
"a": 0 – 30 mm (0 – 1.1 in.)

- 2) Check bolts and nuts for tightness and retighten them as necessary. Repair or replace defective parts, if any.



- 3) Check steering linkage for looseness and damage. Repair or replace defective parts, if any.
- 4) Check boots (1) and (2) of steering linkage and steering gear case for damage (leak, detachment, tear, etc.). If damage is found, replace defective boot with new one.
If any dent is found on steering gear case boots, correct it to original shape by turning steering wheel to the right or left as far as it stops and holding it for a few seconds.
- 5) Check universal joints (3) of steering shaft for rattle and damage. If rattle or damage is found, replace defective part with a new one.
- 6) Check that steering wheel can be turned fully to the right and left. Repair or replace defective parts, if any.
- 7) If equipped with power steering system, check also, in addition to above check items, that steering wheel can be turned fully to the right and left more lightly when engine is running at idle speed than when it is stopped. Repair, if found faulty.
- 8) Check wheel alignment referring to "Front Wheel Alignment Inspection and Adjustment" in Section 3A.

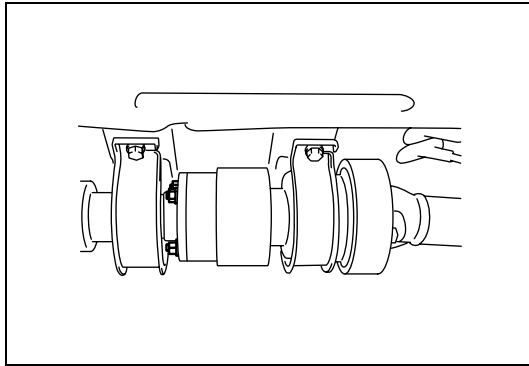
Drive Shaft (Axle) Boots Inspection



Check drive shaft boots (wheel side and differential side) for leaks, detachment, tear or other damage.

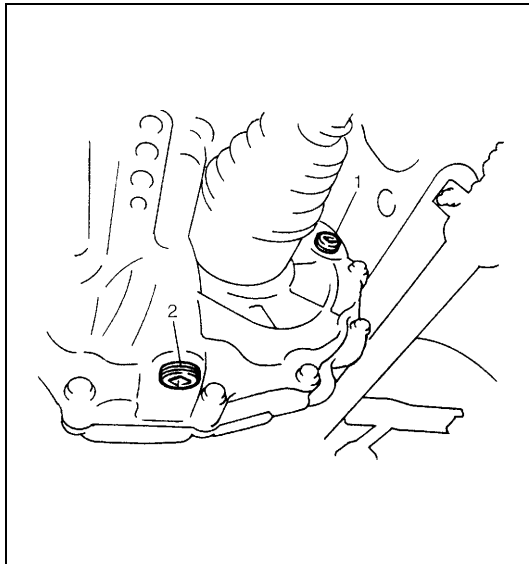
Replace boot as necessary.

Propeller Shafts (4WD) Inspection



- 1) Check propeller shaft connecting bolts for looseness. If looseness is found, tighten to specified torque.
- 2) Check propeller shaft joints for wear, play and damage. If any defect is found, replace.
- 3) Check propeller shaft center support for biting of foreign matter, crack, abnormal noise and damage. If any defect is found, replace.

Manual Transmission Oil Inspection (G10/M13 Engines)



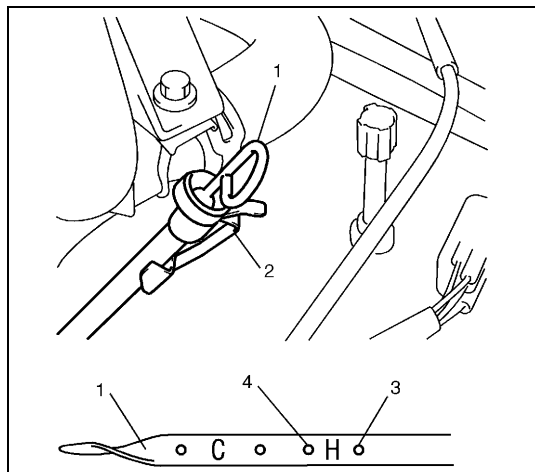
- 1) Inspect transmission case for evidence of oil leakage. Repair leaky point if any.
- 2) Make sure that vehicle is placed level for oil level check.
- 3) Remove oil filler/level plug (1) of transmission.
- 4) Check oil level.
Oil level can be checked roughly by means of filler/level plug hole. That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled.
If oil is found insufficient, pour specified oil up to level hole. For specified oil, refer to "Manual Transaxle Oil Change" in Section 7A or 7A2.
- 5) Apply sealant to filler/level plug and tighten it to specified torque.

Manual Transmission Oil Replacement

Replace manual transmission oil referring to "Manual Transaxle Oil Change" in Section 7A (G10 engine), 7A2 (M13 engine) or 7A3 (Z13DT engine).

Automatic Transmission Fluid Level Inspection

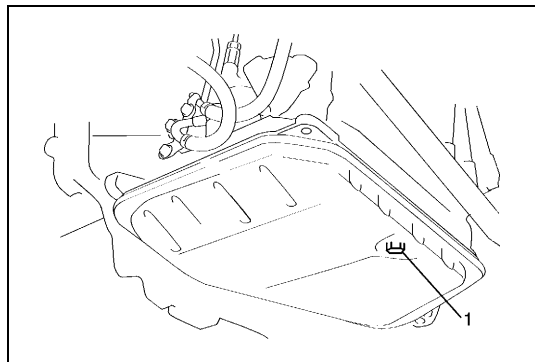
- 1) Inspect transmission case for evidence of fluid leakage.
Repair leaky point, if any.
- 2) Make sure that vehicle is placed level for fluid level check.
- 3) Pull out dipstick and check fluid level.
For fluid level checking procedure, refer to "Fluid Level Check at Normal Operating (Hot) Temperature (Hot Check)" in Section 7B and be sure to perform it under specified conditions. If fluid level is low, replenish specified fluid.



1. Dipstick
2. Clamp
3. FULL HOT mark
4. LOW HOT mark

Automatic Transmission Fluid Replacement

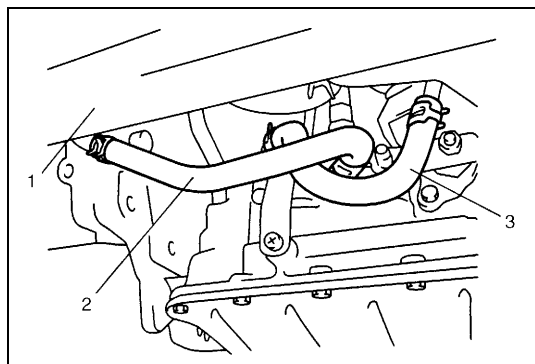
- 1) Inspect transmission case for evidence of fluid leakage.
Repair leaky point, if any.
- 2) Make sure that vehicle is placed level for fluid level check.
- 3) Change fluid. For its procedure, refer to "Fluid Change" in Section 7B.



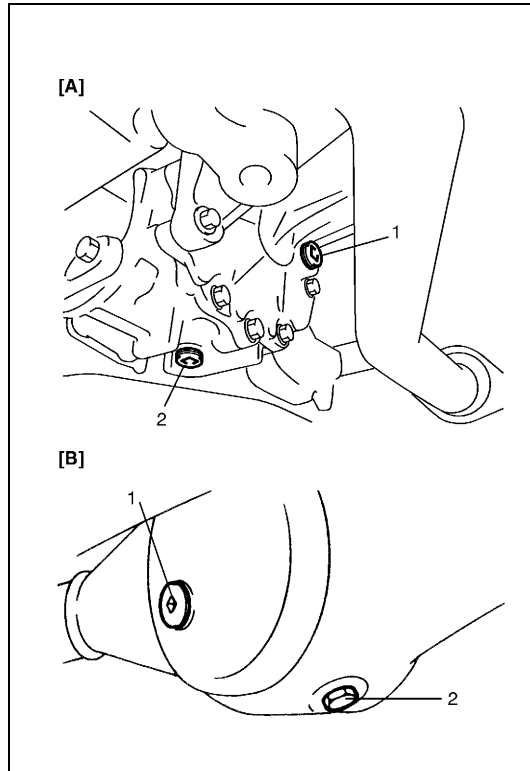
1. Drain plug

Automatic Transmission Fluid Cooler Hose Inspection

Check automatic transaxle fluid cooler hose for fluid leakage, cracks, damage and deterioration.
Replace hose and/or clamp if any faulty condition is found.



Transfer Oil (4WD) and Rear Differential Oil (4WD) Inspection



- 1) Check transfer case or differential for evidence of oil leakage. Repair leaky point if any.
- 2) Make sure that vehicle is placed level for oil level check.
- 3) Remove level plug of transfer or differential and check oil level.

Oil level can be checked roughly by means of level plug hole. That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled.

If oil is found insufficient, pour specified amount of specified oil referring to "Transfer Oil Change" in Section 7D or "Rear Differential Oil Change" in Section 7F.

[A]:	Transfer
[B]:	Rear differential
1.	Oil level/filler plug
2.	Drain plug

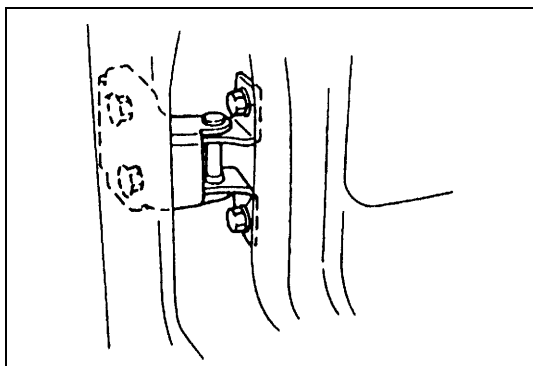
- 4) Tighten level plug to specified torque referring to "Transfer Oil Change" in Section 7D or "Rear Differential Oil Change" in Section 7F.

Transfer Oil (4WD) and Rear Differential Oil (4WD) Replacement

Change transfer oil and differential oil with new specified oil referring to "Transfer Oil Change" in Section 7D or "Rear Differential Oil Change" in Section 7F.

All Latches, Hinges and Locks Inspection

Doors



Check that each door of front, rear and back doors opens and closes smoothly and locks securely when closed.

If any malfunction is found, lubricate hinge and latch or repair door lock system.

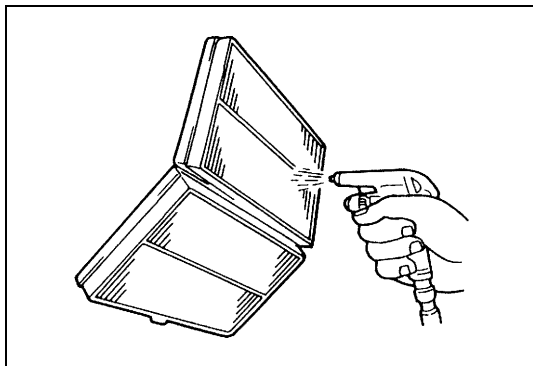
Engine hood

Check that secondary latch operates properly (check that secondary latch keeps hood from opening all the way even when pulling hood release handle inside vehicle.) Also check that hood opens and closes smoothly and properly and hood locks securely when closed.

If any malfunction is found, lubricate hinge and latch, or repair hood lock system.

Ventilator Air Filter (If Equipped)

Inspection



- 1) Remove air filter from air inlet box or cooling unit by removing filter cover located on bottom of case.
- 2) Check filter for dirt. Replace excessively dirty filter.
- 3) Blow off dust by compressed air from air outlet side of filter.
- 4) Install filter to air inlet box or cooling unit.

Replacement

Replace ventilator air filter with new one.

Final Inspection

WARNING:

When carrying out road tests, select a safe place where no man or no running vehicle is seen so as to prevent any accident.

SEATS

Check that seat slides smoothly and locks securely at any position. Also check that reclining mechanism of front seat back allows it to be locked at any angle.

SEAT BELT

Inspect belt system including webbing, buckles, latch plates, retractors and anchors for damage or wear. Check that seat belt is securely locked. If "REPLACE BELT" label on front seat belt is visible, replace belt.

BATTERY ELECTROLYTE LEVEL CHECK

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case. If battery is equipped with built-in indicator, check battery condition by the indicator.

ACCELERATOR PEDAL OPERATION

Check that pedal operates smoothly without getting caught or interfered by any other part.

ENGINE START

Check engine start for readiness.

WARNING:

Before performing the following check, be sure to have enough room around the vehicle. Then, firmly apply both the parking brake and the regular brakes. Do not use the accelerator pedal. If the engine starts, be ready to turn off the ignition promptly. Take these precautions because the vehicle could move without warning and possibly cause personal injury or property damage.

On automatic transmission vehicles, try to start the engine in each select lever position. The starting motor should crank only in "P" (Park) or "N" (Neutral).

On manual transmission vehicles, place the shift lever in "Neutral," depress clutch pedal fully any try to start.

EXHAUST SYSTEM CHECK

Check for leakage, cracks or loose supports.

CLUTCH (FOR MANUAL TRANSMISSION)

Check for the following.

- Clutch is completely released when depressing clutch pedal,
- No slipping clutch occurs when releasing pedal and accelerating.
- Clutch itself is free from any abnormal condition.

GEARSHIFT OR SELECT LEVER (TRANSMISSION)

Check gear shift or select lever for smooth shifting to all positions and for good performance of transmission in any position.

With automatic transmission equipped vehicle, also check that shift indicator indicates properly according to which position select lever is shifted to.

With automatic transmission equipped vehicle, make sure that vehicle is at complete stop when shifting select lever to "P" range position and release all brakes.

FOOT BRAKE

Check the followings:

- that brake pedal has proper travel,
- that brake works properly,
- that it is free from noise,
- that vehicle does not pull to one side when brake is applied.
- and that brake do not drag.

PARKING BRAKE

Check that lever has proper travel.

WARNING:

With vehicle parked on a fairly steep slope, make sure nothing is in the way downhill to avoid any personal injury or property damage. Be prepared to apply regular brake quickly even if vehicle should start to move.

Check to ensure that parking brake is fully effective when the vehicle is stopped on the safe slope and brake lever is pulled all the way.

STEERING

- Check to ensure that steering wheel is free from instability, or abnormally heavy feeling.
- Check that the vehicle does not wander or pull to one side.

ENGINE

- Check that engine responds readily at all speeds.
- Check that engine is free from abnormal noise and abnormal vibration.

BODY, WHEELS AND POWER TRANSMITTING SYSTEM

Check that body, wheels and power transmitting system are free from abnormal noise and abnormal vibration or any other abnormal condition.

METERS AND GAUGE

Check that speedometer, odometer, fuel meter, temperature gauge, etc. are operating accurately.

LIGHTS

Check that all lights operate properly.

WINDSHIELD DEFROSTER

Periodically check that air comes out from defroster outlet when operating heater or air conditioning. Set mode control lever to defroster position and fan switch lever to "HI" position for this check.

Recommended Fluids and Lubricants

Engine oil (G10/M13 engines)	SG, SH, SJ or SL grade (Refer to “Engine Oil and Oil Filter Replacement for G10/M13 engines” in this section for engine oil viscosity.)
Engine oil (Z13DT engine)	Refer to “Engine Oil and Oil Filter Replacement (Z13DT Engine)” in this section for engine oil grade and viscosity.
Engine coolant (Ethylene glycol base coolant)	“Antifreeze/Anticorrosion coolant”
Brake fluid	DOT 4 or SAE J1704
Manual transmission oil	Refer to “Manual transaxle Oil Change” in Section 7A (G10 engine), 7A2 (M13 engine) or 7A3 (Z13DT engine).
Automatic transmission fluid	An equivalent of DEXRON®-III
Transfer oil (4WD)	Refer to “Transfer Oil Change” in Section 7D.
Differential oil (4WD)	Refer to “Rear Differential Oil Change” in Section 7F.
Door hinges	Engine oil or water resistance chassis grease
Hood latch assembly	Engine oil or water resistance chassis grease
Key lock cylinder	Spray lubricant

SECTION 1A

HEATER AND VENTILATION

1A

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either or these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.
- The link mechanism of the heater varies depending on the specifications.

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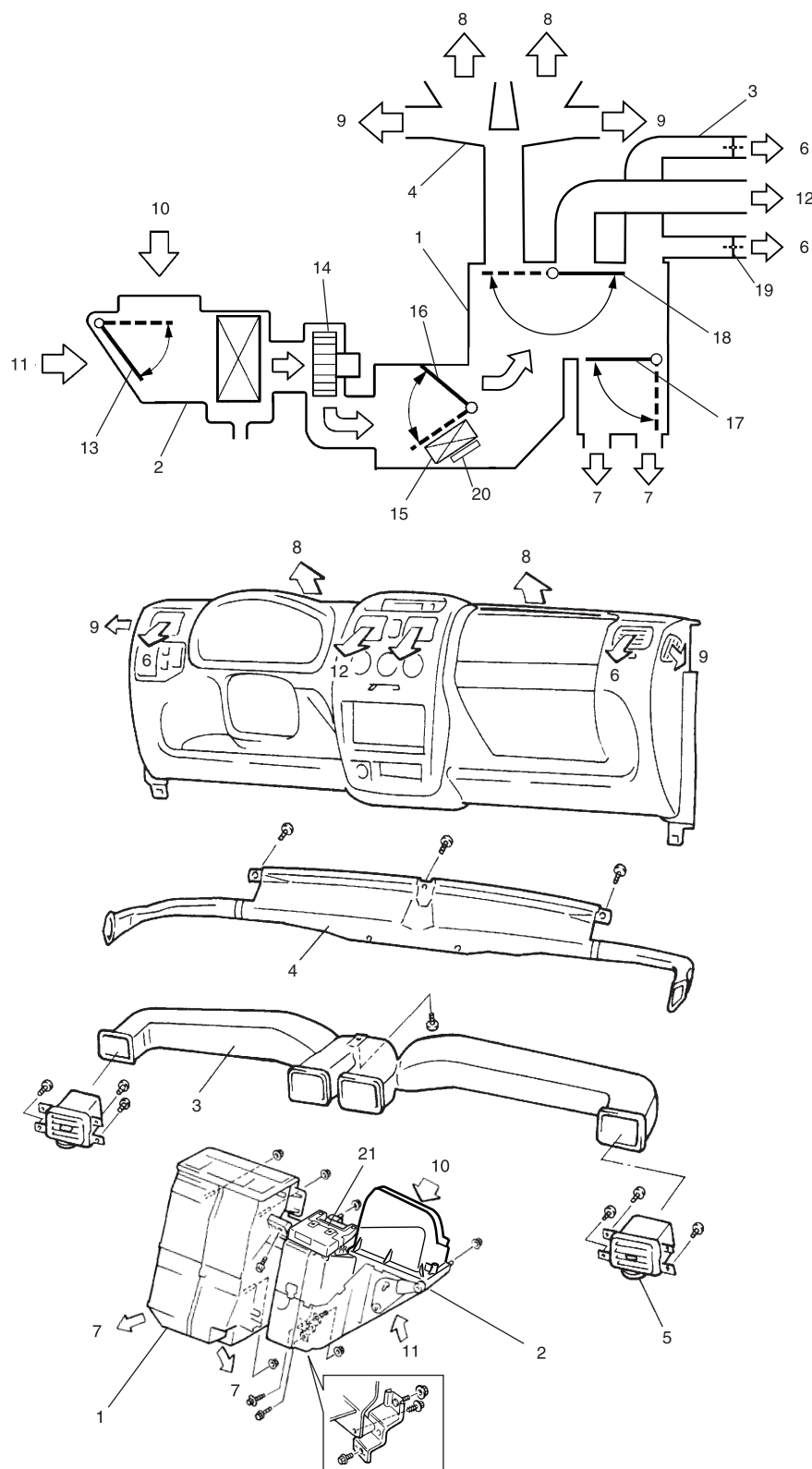
General Description	1A-2	On-Vehicle Service	1A-10
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General Description

Major Components and Location

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.



1. Heater unit	7. Foot air	13. Air inlet select door	19. Side ventilation control door
2. Air inlet box	8. Front defroster air	14. Blower motor	20. Supplementary heater (if equipped)
3. Ventilator duct	9. Side defroster air	15. Heater core	21. Supplementary heater controller (if equipped)
4. Defroster nozzle	10. Fresh air	16. Temperature control door	
5. Ventilator outlet	11. Recirculation air	17. Foot air control door	
6. Side ventilation air	12. Center ventilation air	18. Ventilation defroster air control door	

On-Board Diagnostic System (Z13DT Engine Model)

NOTE:

- The on-board diagnostic system is available only for Z13DT engine model with the supplementary heater system.
- The SUZUKI scan tool cannot be used.

For Z13DT Engine Model with the supplementary heater system, the on-board diagnostic system is available. The supplementary heater controller detects malfunctions related to the supplementary heater system. When the controller detects some malfunction, the diagnostic information as diagnostic trouble code (DTC) is stored in the memory of the controller. By performing the DTC check procedure, the diagnostic information can be known. For the procedure, refer to “Diagnostic Trouble Code (DTC) Check (Z13DT Engine Model)” and “Diagnostic Trouble Code (DTC) Table (Z13DT Engine Model)” in this section.

Diagnosis

Diagnosis Table

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Z13DT Engine Model

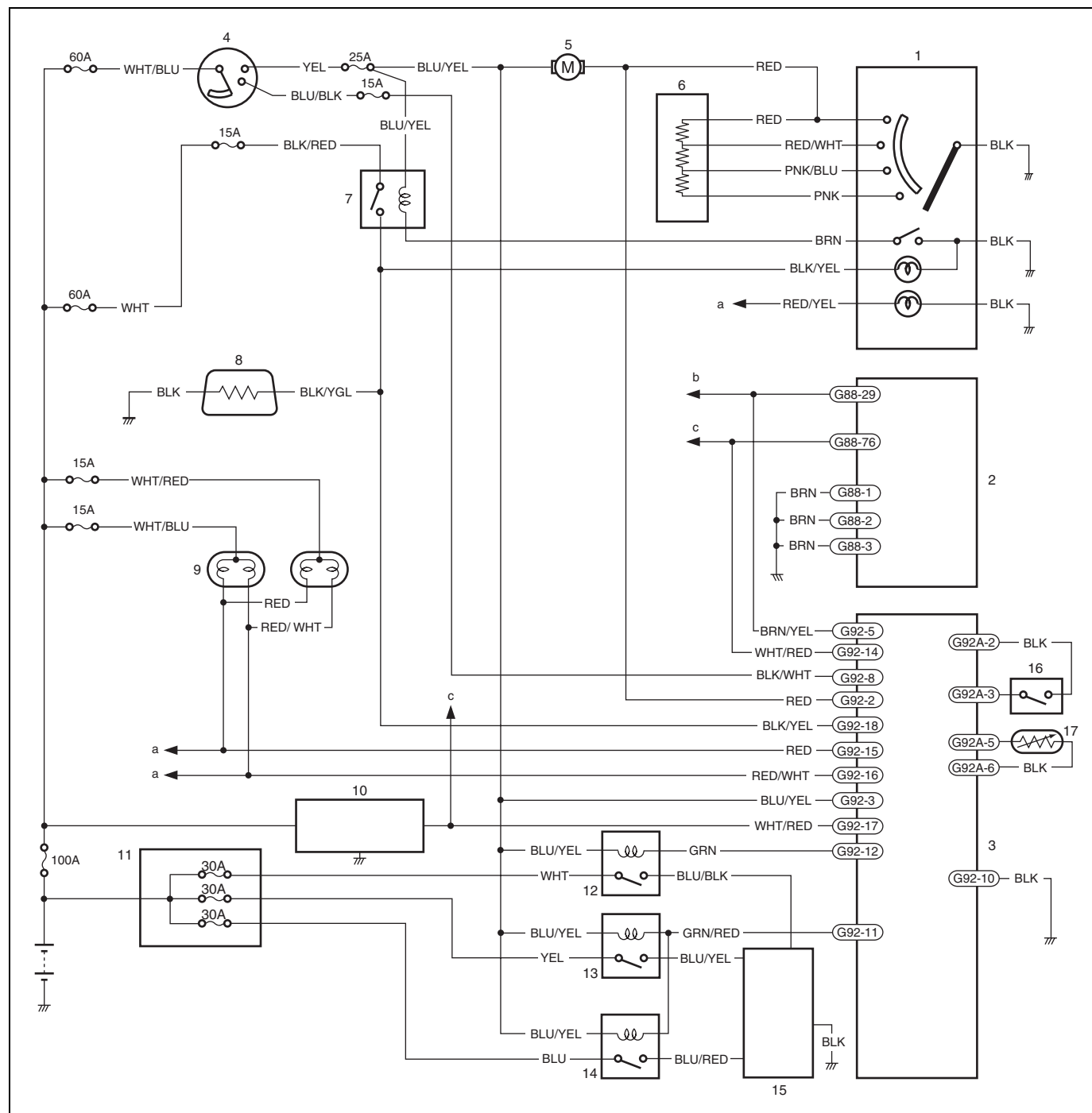
Condition	Possible Cause	Correction
Heater blower doesn't work even when its switch is ON.	<ul style="list-style-type: none"> Blower fuse blown Blower resistor faulty Blower switch faulty Blower motor faulty Wiring or grounding faulty 	Check for short to ground and replace fuse. Check resistor. Check blower switch. Replace motor. Repair as necessary.
Incorrect temperature output	<ul style="list-style-type: none"> Control cables broken or binding Temperature control lever faulty Control cable clamp position faulty Air damper broken Air ducts clogged Heater radiator leaking or clogged Heater hoses leaking or clogged Thermostat faulty Fuse blown Supplementary heater faulty Supplementary heater controller faulty Supplementary heater relay faulty Water temperature sensor faulty Max hot switch faulty 	Check cables. Check control lever. Check and adjustment. Repair damper. Repair air ducts. Replace radiator. Replace hoses. Check thermostat. Check supplementary heater fuses. Check supplementary heater (if equipped). Check supplementary heater controller (if equipped). Check supplementary heater relay (if equipped). Check water temperature sensor (if equipped). Check max hot switch (if equipped).
When mode control lever is changed, air outlet port is not changed or lever position disagree with air outlet port.	<ul style="list-style-type: none"> Control cables broken or binding Air damper broken Air ducts clogged Air damper broken Air ducts leaking or clogged 	Check cable. Check control lever. Check and adjustment. Repair damper. Repair air ducts.

Wiring Circuit

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Z13DT Engine Model



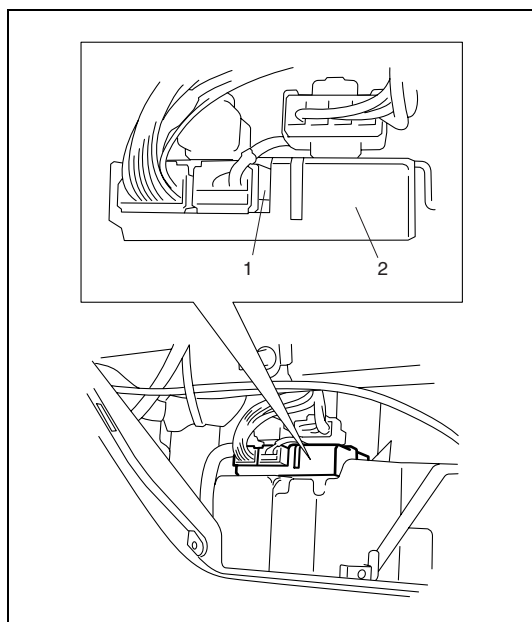
1. Heater controller	8. Rear defogger	15. Supplementary heater
2. ECM	9. Head light	16. Max hot switch
3. Supplementary heater controller	10. Generator	17. Water temperature sensor
4. Ignition switch	11. Supplementary heater fuse	a: To DRL or lighting switch
5. Blower fan motor	12. Supplementary heater relay No.1	b: To fuel temperature and heater relay
6. Blower fan motor resistor	13. Supplementary heater relay No.2	c: To speedometer
7. Rear defogger relay	14. Supplementary heater relay No.3	

Diagnostic Trouble Code (DTC) Check (Z13DT Engine Model)

NOTE:

- This checking procedure is available only for Z13DT engine model with the supplementary heater system.
- If more than two DTCs are detected, only DTC, which has the highest priority, is indicated. After the DTC is trouble-shot, DTC, which has the next priority, is indicated.
- The following procedure has to be performed two times. For the first time, the headlight has to be set at LOW position in the Step 7 below. For the second time, the headlight has to be set at HIGH position in the same step. Otherwise, it cannot be judged whether the DTC No.111 and 112 are detected or not.
- Be sure that the rear defogger switch is set at the ON position in the Step 4. Otherwise, the DTC No.101 is indicated even if the system is normal.

- 1) Remove the glove box from the instrument panel.
- 2) Set the blower speed selector at the OFF position.
- 3) Set the temperature selector at the MAX hot position.
- 4) Set the rear defogger switch at the ON position.
- 5) Turn the headlight ON.
- 6) Set the headlight at the LOW position (or HIGH position).
- 7) Start the engine.
- 8) Refer to "Diagnostic Trouble Code (DTC) Table (Z13DT Engine Model)" in this section, and see what DTC is detected by reading the flashing pattern of the LED (1) in the supplementary heater controller (2).

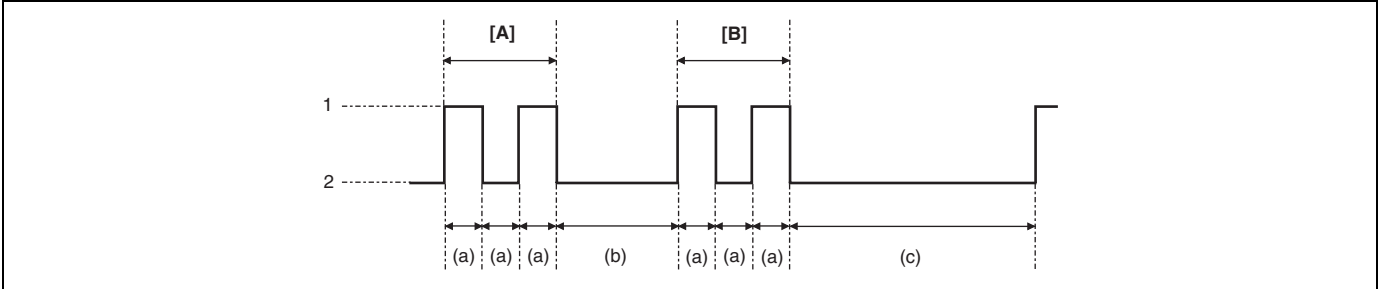


Diagnostic Trouble Code (DTC) Table (Z13DT Engine Model)**NOTE:**

- This table is available only for Z13DT engine model with the supplementary heater system.
- Refer to “A/C System Wiring Circuit Diagram (Z13DT Engine)” in this section for details of system components, wire colors, and terminal numbers of supplementary heater controller.
- In case that DTC 2-1, 2-2, 3-1, 3-2, 4-3, 7-1, and/or 8-1 are detected, the supplementary heater is not activated by the supplementary heater controller.

DTC	LED flashing pattern		Priority	Possible cause
	First figure	Second figure		
–	Lighted ON		1	Normal
–	Lighted OFF		2	<ul style="list-style-type: none"> • “BLK/WHT” wire at “G92-8” terminal open • “BLK” wire at “G92-10” terminal open • “IG COIL” fuse faulty
1-2	1	2	3	<ul style="list-style-type: none"> • “WHT/RED” wire at “G92-17” terminal open • Alternator not generated
2-1	2	1	4	<ul style="list-style-type: none"> • “BRN/YEL” wire at “G92-5” terminal open
2-2	2	2	5	<ul style="list-style-type: none"> • “BRN/YEL” wire at “G92-5” terminal short
3-1	3	1	6	<ul style="list-style-type: none"> • “BLK” wire at “G92A-5” terminal open • “BLK” wire at “G92A-6” terminal open
3-2	3	2	7	<ul style="list-style-type: none"> • “BLK” wire at “G92A-5” terminal short • “BLK” wire at “G92A-6” terminal short
4-3	4	3	8	<ul style="list-style-type: none"> • “BLU/YEL” wire at “G92-3” terminal open • “BLU/YEL” wire at “G92-3” terminal short • “HEATER” fuse faulty
5-3	5	3	9	<ul style="list-style-type: none"> • “RED” wire at “G92-2” terminal open • “RED” wire at “G92-2” terminal short
6-1	6	1	10	<ul style="list-style-type: none"> • “BLK” wire at “G92A-2” terminal open • “BLK” wire at “G92A-3” terminal open
7-1	7	1	11	<ul style="list-style-type: none"> • “GRN” wire at “G92-12” terminal open • “GRN” wire at “G92-12” terminal short • Supplementary heater relay 1 faulty • “HEATER” fuse faulty
8-1	8	1	12	<ul style="list-style-type: none"> • “GRN/RED” wire at “G92-11” terminal open • “GRN/RED” wire at “G92-11” terminal short • Supplementary heater relay 2 and 3 faulty • “HEATER” fuse faulty
10-1	10	1	13	<ul style="list-style-type: none"> • “BLK/YEL” wire at “G92-18” terminal open • “BLK/YEL” wire at “G92-18” terminal short • Rear defogger relay faulty • “REAR DEFG” fuse faulty
11-1	11	1	14	<ul style="list-style-type: none"> • “RED/WHT” wire at “G92-16” terminal open • “RED/WHT” wire at “G92-16” terminal short • Headlight bulbs faulty • “HEAD LIGHT” fuses faulty
11-2	11	2	15	<ul style="list-style-type: none"> • “RED” wire at “G92-15” terminal open • “RED” wire at “G92-15” terminal short • Headlight bulbs faulty • “HEAD LIGHT” fuses faulty

Example (DTC No.2-2) of LED Flashing Pattern



[A]: First figure	1. LED ON	(a). 0.3 seconds	(c). 2.0 seconds
[B]: Second figure	2. LED OFF	(b). 1.0 seconds	

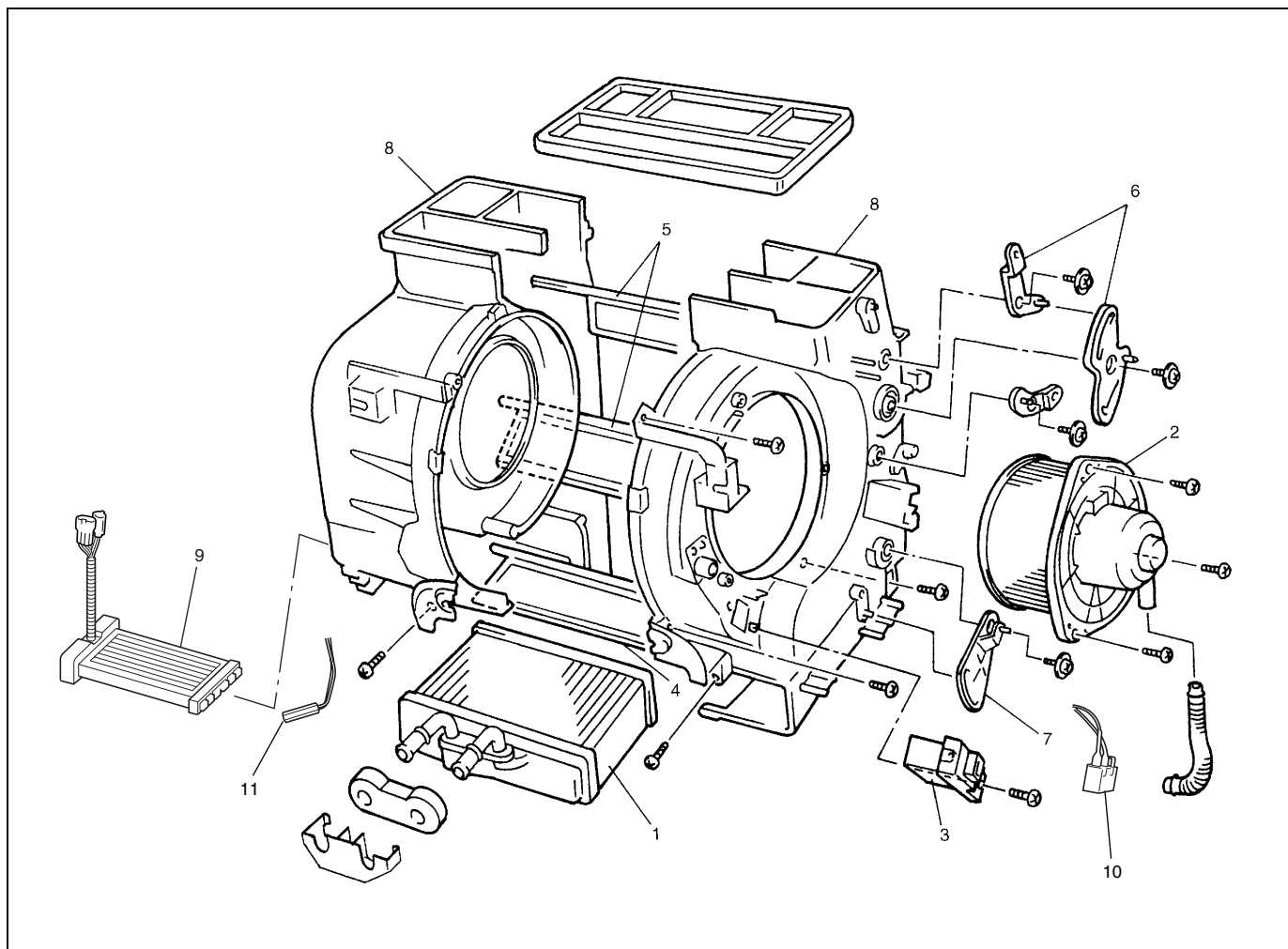
On-Vehicle Service

Heater Unit

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

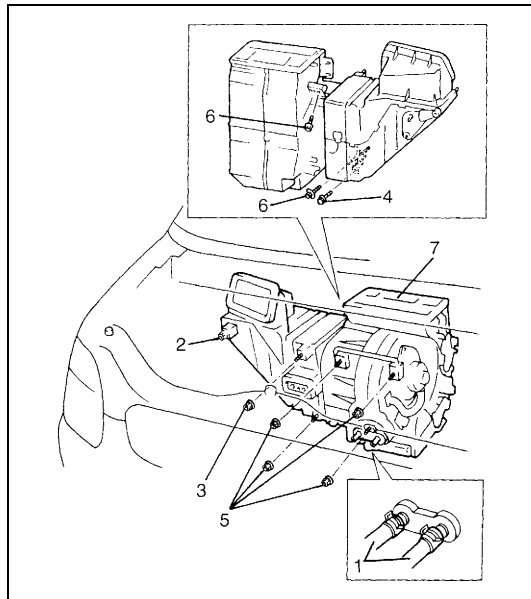
Z13DT Engine Model



1. Heater core	4. Temperature control door assembly	7. Temperature control lever	10. Full hot switch (if equipped)
2. Blower motor assembly	5. Mode door assembly	8. Heater case	11. Water temperature sensor (if equipped)
3. Blower motor resistor	6. Air flow control lever	9. Supplementary heater (if equipped)	

Removal

Z13DT Engine Model



- 1) Disconnect negative (–) cable at battery.
- 2) If equipped with air bag system, disable air bag system referring to “Disabling Air Bag System” in Section 10B.
- 3) Drain engine coolant and disconnect heater hoses (1) from heater unit.
- 4) Remove instrument panel referring to “Instrument Panel” in Section 9.
- 5) Remove 20-pin connector from supplementary heater controller and two connectors located on supplementary heater controller.
- 6) Loosen air inlet box (cooling unit) mounting nut (2), and remove mounting nut (3).
- 7) Remove bolts (4), nuts (5) and screws (6).
- 8) Remove heater unit (7).

M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Installation

Z13DT Engine Model

Install heater unit by reversing removal procedure noting the following items.

- When installing each part, be careful not to catch any cable or wiring harness.
- Adjust heater control cable referring to “Heater Control Lever Assembly” in this section.
- Fill engine coolant to radiator.
- If equipped with air bag system, enable air bag system referring to “Enabling Air Bag System” in Section 10B.

M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Supplementary Heater (if equipped) (Z13DT Engine)

Removal

- 1) Remove heater unit referring to "Heater Unit" in this section.
- 2) Remove supplementary heater cover and supplementary heater referring to illustration in "Heater Unit" in this section.

Installation

- 1) Install supplementary heater and supplementary heater cover referring to illustration in "Heater Unit" in this section.
- 2) Install heater unit referring to "Heater Unit" in this section.

Inspection

- Check if there is continuity between supplementary heater terminals. If there is no continuity, replace supplementary heater.
- Check supplementary heater for crack or any other damage. Replace if needed.

Supplementary Heater Controller (if equipped) (Z13DT Engine)

Removal

- 1) Remove air inlet box referring to "Air Inlet Box" in this section.
- 2) Remove supplementary heater controller referring to illustration in "Air Inlet Box" in this section.

Installation

Reverse removal procedure for installation.

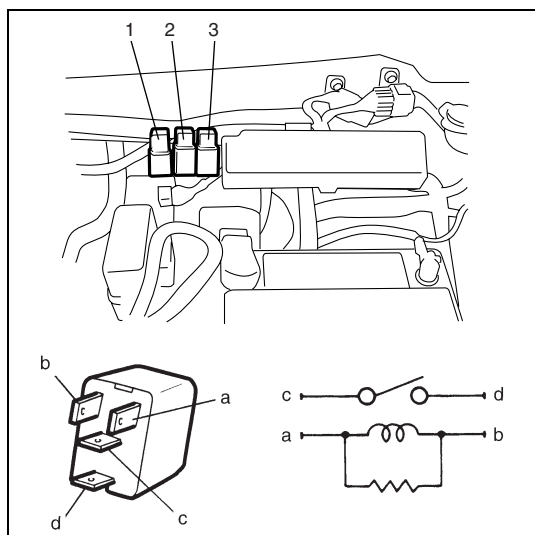
Supplementary Heater Relay (if equipped) (Z13DT Engine)

Inspection

- 1) Disconnect negative (–) cable at battery.
- 2) Remove supplementary heater relays (No.1, No.2 and No.3).

1.	Supplementary heater relay No.1
2.	Supplementary heater relay No.2
3.	Supplementary heater relay No.3

- 3) Check if there is no continuity between terminal "c" and "d". If there is continuity, replace relay.
- 4) Check if there is continuity between terminal "c" and "d" when a 12 V battery is connected to terminals "a" and "b". If there is no continuity, replace relay.

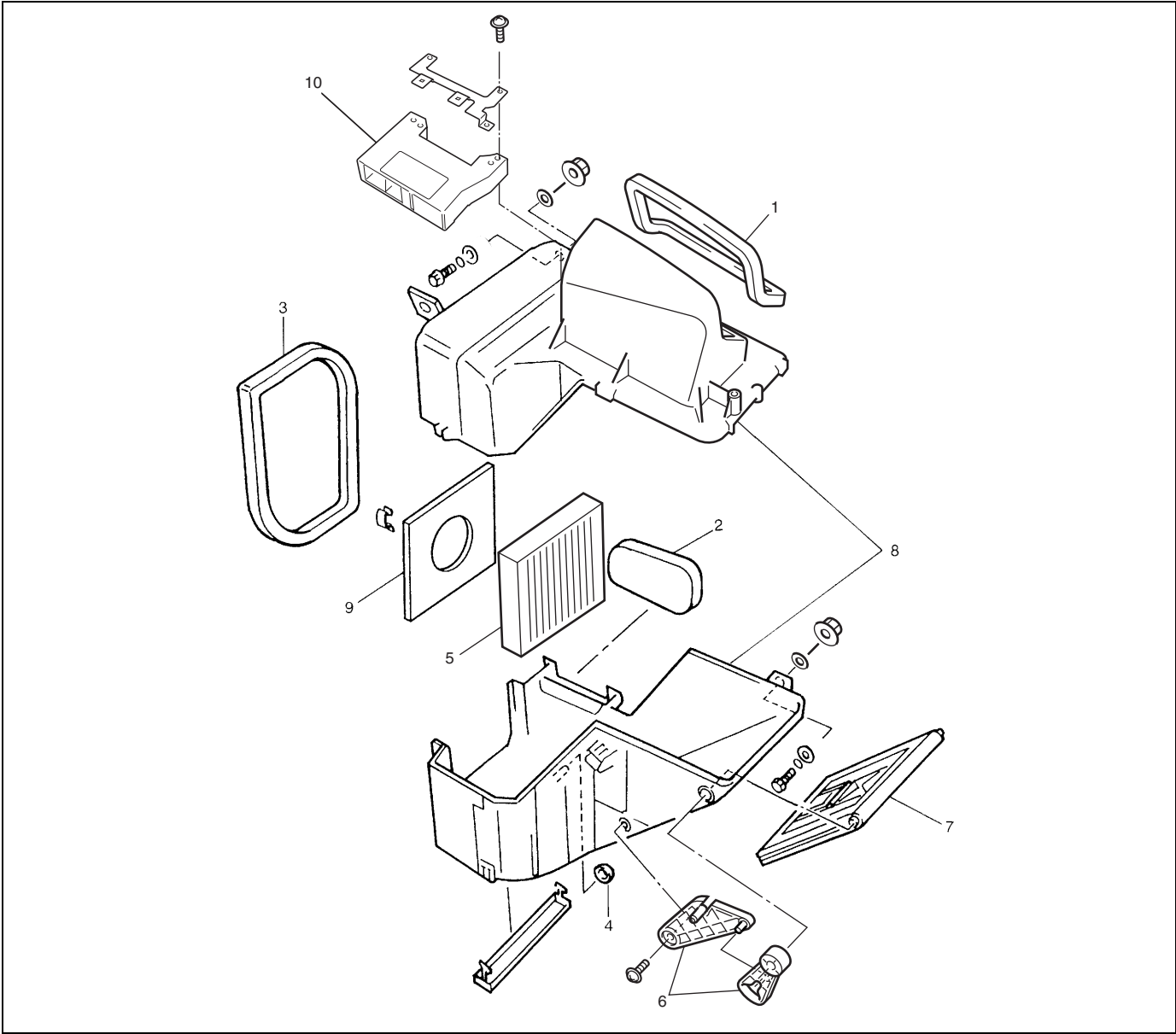


Air Inlet Box

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Z13DT Engine Model



1. Air inlet box	4. Grommet	7. Air inlet door	10. Supplementary heater controller (if equipped)
2. Dash packing	5. Air filter (if equipped)	8. Air inlet box	
3. Packing	6. Door link	9. Air resistance board	

Removal and Installation

Z13DT Engine Model

Refer to “Cooling Unit (Evaporator)” in Section 1B.

M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

SECTION 1B

AIR CONDITIONING (OPTIONAL)

1B

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CAUTION:

The air conditioning system of this vehicle uses refrigerant HFC-134a (R-134a).

None of refrigerant, compressor oil and component parts is interchangeable between two types of A/C: one using refrigerant CFC-12 (R-12) and the other using refrigerant HFC-134a (R-134a).

Be sure to check which refrigerant is used before any service work including inspection and maintenance. For identification between these two types, refer to the description in page 1B-2.

When replenishing or changing refrigerant and compressor oil and when replacing parts, make sure that the material or the part to be used is appropriate to the A/C installed in the vehicle being serviced. Use of incorrect one will result in leakage of refrigerant, damage in parts or other faulty condition.

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

CONTENTS

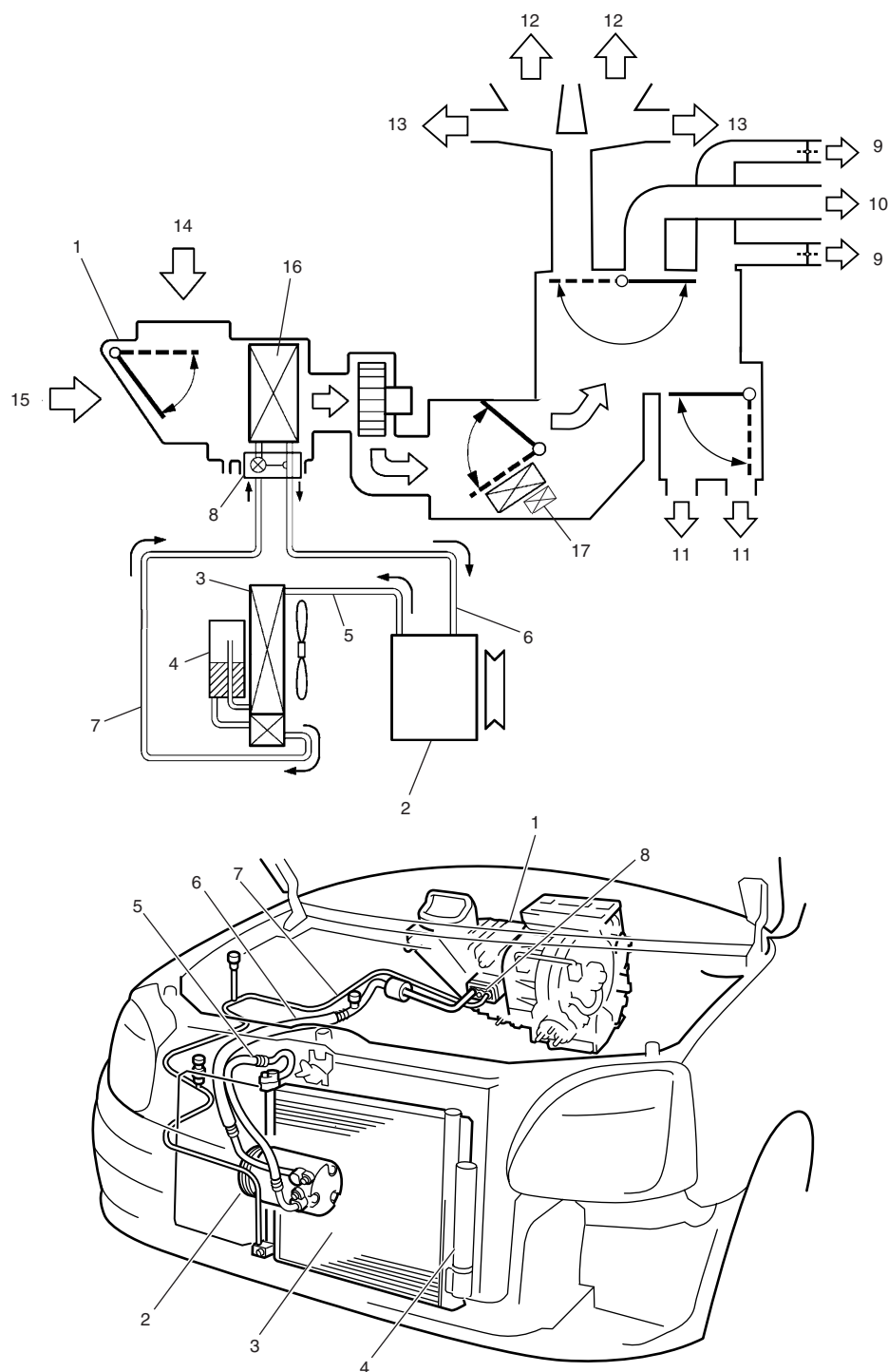
General Description	1B-2	A/C Condenser Assembly.....	1B-15
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General Description

Major Components and Location

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.



1. Cooling unit	5. Discharge hose	9. Side ventilation air	13. Side defroster air	17. Supplementary heater
2. Compressor	6. Suction hose	10. Center ventilation air	14. Fresh air	
3. Condenser assembly	7. Liquid pipe	11. Foot air	15. Recirculation air	
4. Receiver / dryer	8. Expansion valve	12. Front defroster air	16. Evaporator	

Diagnosis

General Diagnosis Table

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Z13DT Engine Model

Condition	Possible Cause	Correction
Cool air does not come out (A/C system improper operative)	A/C system inoperative <ul style="list-style-type: none"> No refrigerant Fuse blown A/C switch faulty Blower fan switch faulty A/C thermistor faulty Dual pressure switch faulty Wiring or grounding faulty ECT sensor faulty ECM faulty 	Recover, evacuation and charging. Check "IG COIL" fuse, "HEATER" fuse and check for short circuit to ground. Check A/C switch. Check blower fan switch. Check A/C thermistor. Check dual pressure switch. Repair as necessary. Check ECT sensor. Check ECM.
	Compressor inoperative (dose not rotate) <ul style="list-style-type: none"> Magnet clutch faulty Drive belt loose or broken Compressor faulty ECM faulty 	Check magnet clutch. Adjust or replace drive belt. Check compressor. Check ECM.
	Radiator (and condenser), cooling fan motor inoperative <ul style="list-style-type: none"> Fuse blown Radiator cooling fan relay faulty Wiring or grounding faulty Radiator cooling fan motor faulty ECM faulty 	Check RDTR fuse and check short circuit to ground. Check radiator cooling fan relay. Repair as necessary. Check radiator cooling fan motor. Check ECM.
	Blower motor inoperative <ul style="list-style-type: none"> Fuse blown Blower resistor faulty Blower fan switch faulty Wiring or grounding faulty Blower motor faulty 	Check "HEATER" fuse and check for short circuit to ground. Check blower motor resistor. Check blower fan switch. Repair as necessary. Check blower motor.
When the blower fan switch is OFF position, blower motor does not operate at A/C switch is ON	<ul style="list-style-type: none"> A/C blower motor relay faulty Wiring or grounding faulty A/C switch faulty 	Check A/C blower motor relay. Repair as necessary. Check A/C switch.

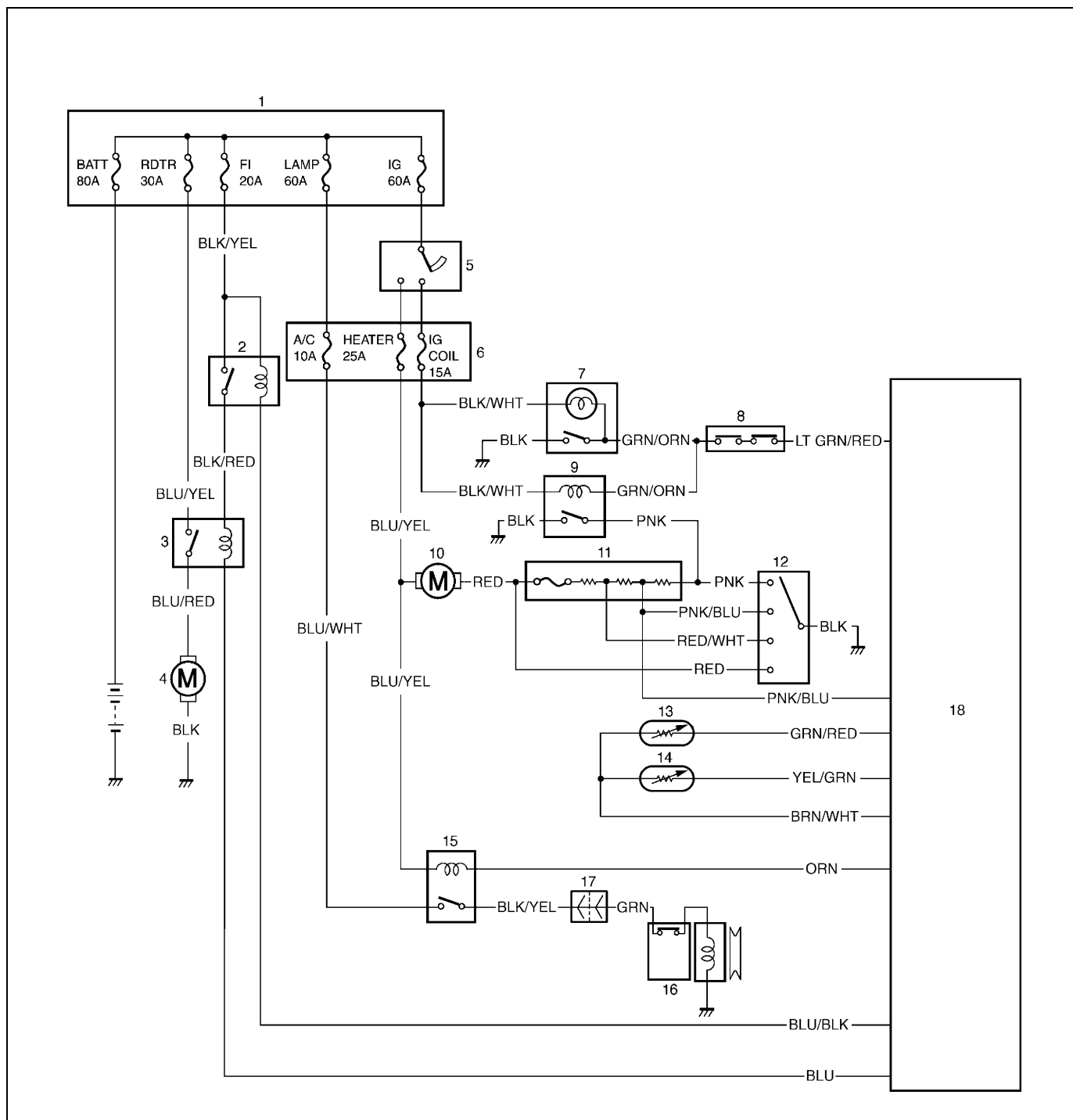
Condition	Possible Cause	Correction
Cool air does not come out or insufficient cooling (A/C system normal operative)	<ul style="list-style-type: none"> • Insufficient or excessive charge of refrigerant • Condenser clogged • Evaporator clogged or frosted • Expansion valve faulty • Receiver / dryer clogged • Drive belt slipping • Magnetic clutch faulty • Compressor faulty • Air in A/C system • Air leaking from cooling unit or air duct • Heater and ventilation system faulty • Blower motor faulty • Excessive compressor oil existing in A/C system 	<p>Check charge of refrigerant. Check system for leaks. Check condenser. Check evaporator and position of A/C thermostat. Check expansion valve. Check receiver / dryer. Check or replace drive belt. Check magnetic clutch. Check compressor. Replace receiver / dryer, and evacuation and charging. Repair as necessary.</p> <p>Check air inlet box assembly. Check heater control lever assembly. Check heater assembly. Check blower motor. Pull out compressor oil in A/C system circuit, and replace compressor.</p>
Cool air does not come out only intermittently	<ul style="list-style-type: none"> • Wiring connection faulty • Expansion valve faulty • Excessive moisture in A/C system • Magnetic clutch faulty • Excessive charge of refrigerant 	<p>Repair as necessary. Check expansion valve. Replace receiver / dryer, and evacuation and charging. Check magnetic clutch. Check charge of refrigerant.</p>
Cool air comes out only at high speeds	<ul style="list-style-type: none"> • Condenser clogged • Insufficient charge of refrigerant • Air in A/C system • Drive belt slipping • Compressor faulty 	<p>Check condenser. Check charge of refrigerant. Replace receiver / dryer, and evacuation and charging. Check or replace drive belt. Check compressor.</p>
Cool air does not come out only at high speeds	<ul style="list-style-type: none"> • Excessive charge of refrigerant • Evaporator frosted 	<p>Check charge refrigerant. Check evaporator.</p>
Insufficient velocity of cooled air	<ul style="list-style-type: none"> • Evaporator clogged or frosted • Air leaking from cooling unit or air duct • Blower motor faulty • Wiring or grounding faulty • Air filter element clogged 	<p>Check evaporator. Repair as necessary.</p> <p>Check blower motor. Repair as necessary. Check air filter element.</p>

Wiring Circuit

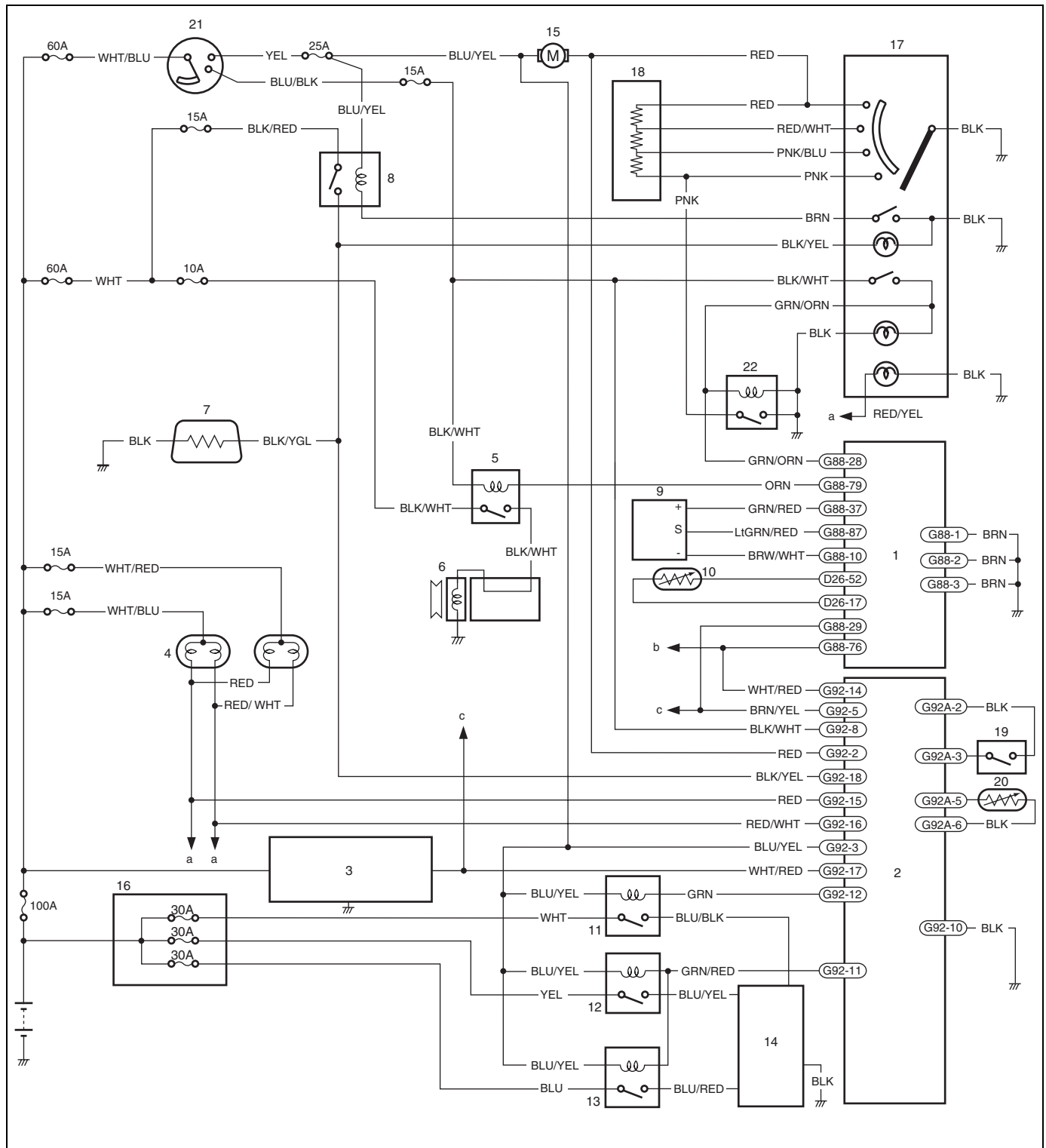
NOTE:

For G10 engine model, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

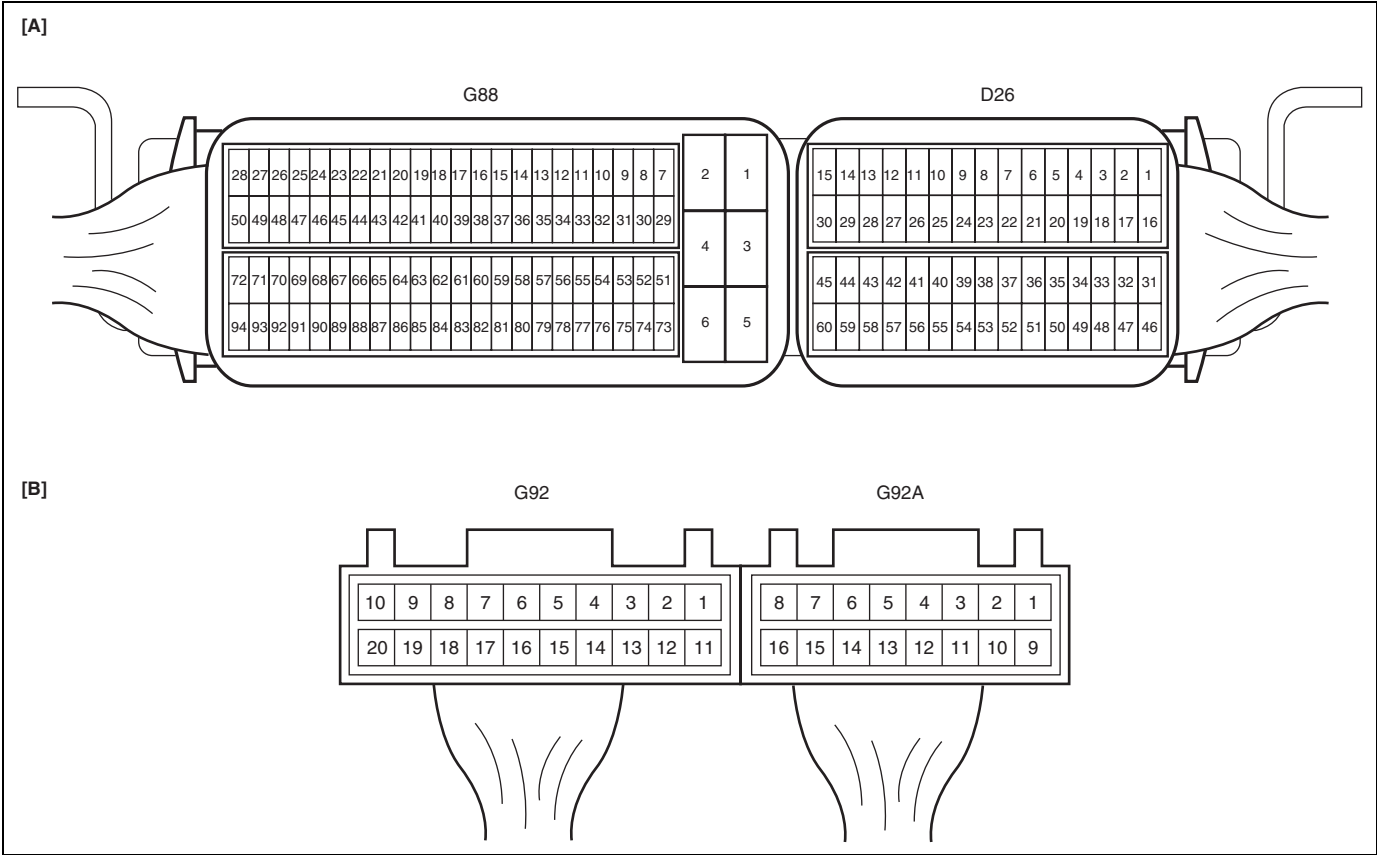
M13 Engine



1. Main fuse box	7. A/C switch	13. A/C evaporator thermistor
2. Main relay	8. Dual pressure switch	14. ECT sensor
3. Radiator (and condenser) cooling fan motor relay	9. Blower fan motor relay	15. Compressor relay
4. Radiator (and condenser) cooling fan motor	10. Blower fan motor	16. Compressor
5. Ignition switch	11. Blower fan motor resistor	17. Connector
6. Circuit fuse box	12. Blower fan switch	18. ECM

Z13DT Engine Model

1. ECM	8. Rear defogger relay	15. Blower fan motor	22. A/C relay
2. Supplementary heater controller	9. Pressure sensor	16. Supplementary heater fuse box	a: To DRL or lighting switch
3. Generator	10. ECT sensor	17. A/C control panel	b: To fuel temperature and heater relay
4. Head light	11. Supplementary heater relay No.1	18. Blower fan motor resistor	c: To speedometer
5. Compressor relay	12. Supplementary heater relay No.2	19. Max hot switch	
6. Compressor	13. Supplementary heater relay No.3	20. Water temperature sensor	
7. Rear defogger	14. Supplementary heater	21. Ignition switch	



[A]: ECM coupler [B]: Supplementary heater controller coupler

A/C System Inspection of ECM and Its circuits (M13 Engine Model)

NOTE:

For G10 engine model, refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

ECM and its circuits can be checked at ECM wiring couplers by measuring voltage.

CAUTION:

ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with couplers disconnected from it.

Inspection

- 1) Remove ECM (1) from vehicle.
- 2) Connect ECM (1) couplers to ECM.

[A]: Fig. A

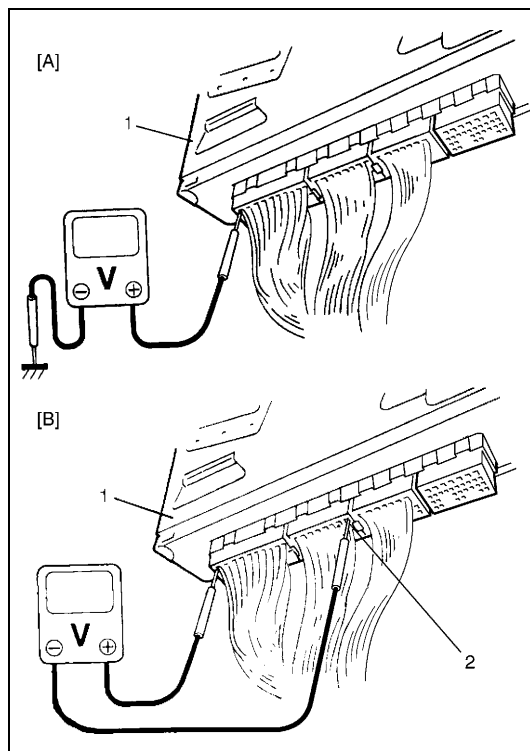
[B]: Fig. B

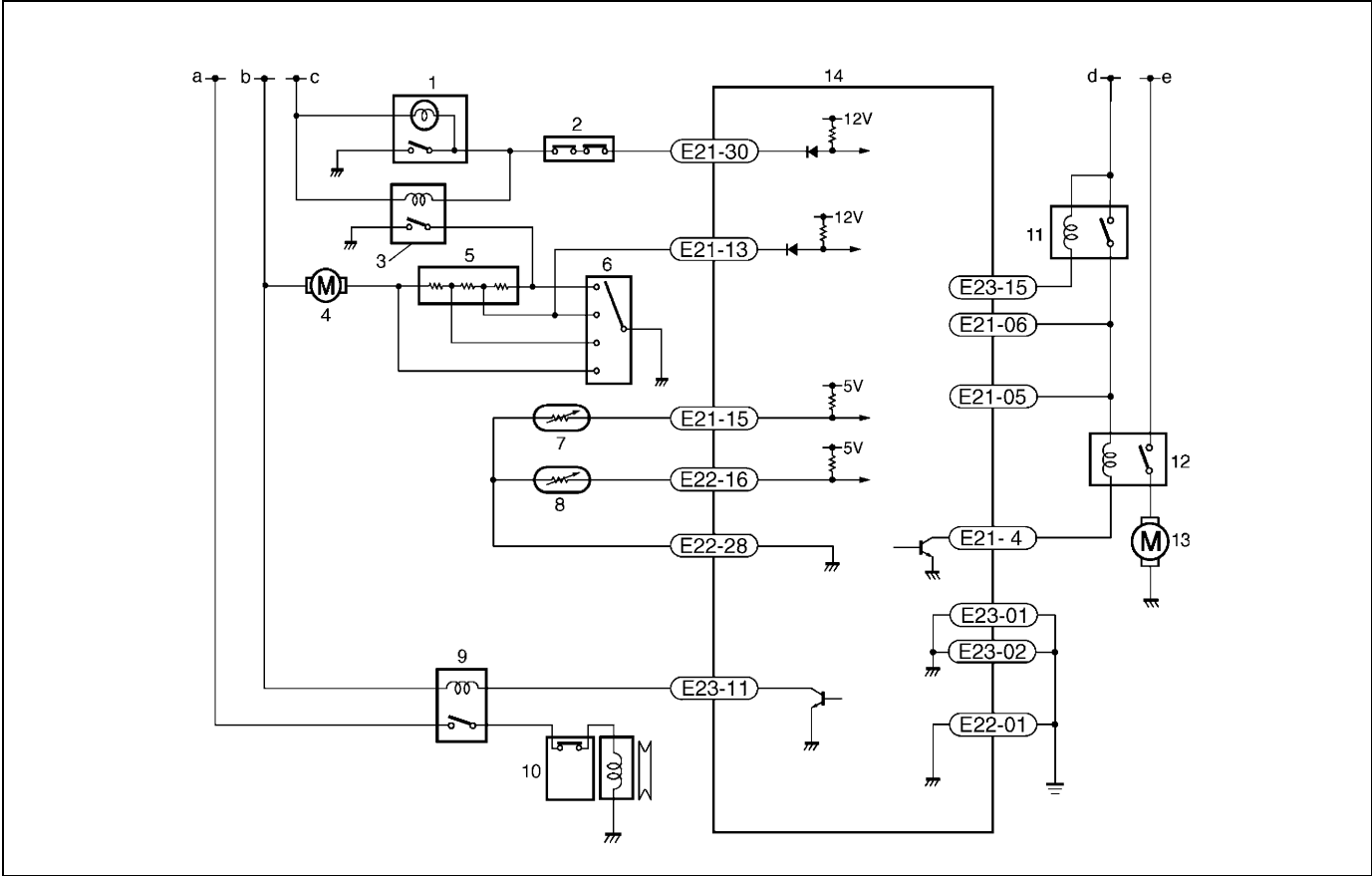
2. E22-01

- 3) Check voltage at each terminal of couplers connected. Refer to next page and "Inspection of ECM and Its Circuits" in Section 6-2.

NOTE:

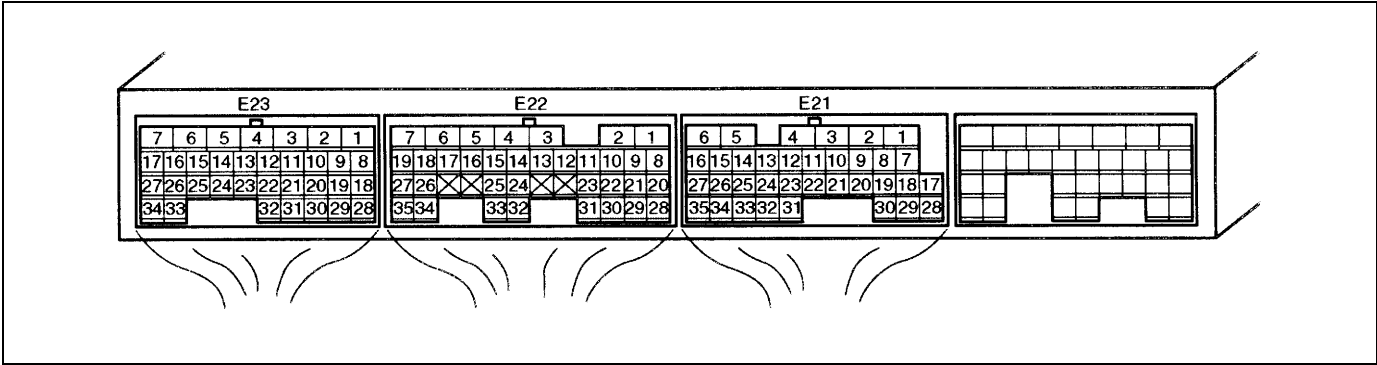
As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.





a. To "A/C" fuse (10A) in circuit fuse box	1. A/C switch	6. Blower fan switch	11. Main relay
b. To "HEATER" fuse (25A) in circuit fuse box	2. Dual pressure switch	7. A/C evaporator thermistor	12. Radiator (and condenser) cooling fan motor relay
c. To "IG COIL" fuse (15A) in circuit fuse box	3. Blower fan motor relay	8. ECT sensor	13. Radiator (and condenser) cooling fan motor
d. To "FI" fuse (20A) in main fuse box	4. Blower fan motor	9. Compressor relay	14. ECM
e. To "RDTR" fuse (30A) in main fuse box	5. Blower fan motor resistor	10. Compressor	

Terminal Arrangement of ECM Coupler (viewed from Harness Side)



ECM Voltage Values Table

Termi- nal	Wire	Circuit	Measurement ground	Normal value	Condition
E22-01	BLK	Main ground for ECM	Ground to body (Fig A)	-0.3 – 0.3 V	Ignition switch ON

Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
E21-05	BLK/ RED	Power supply for engine control	Ground to engine (Fig B)	10 – 14 V	Ignition switch ON
E23-01	BLK/ YEL	ECM ground for power circuit	Ground to body (Fig A)	–0.3 – 0.3 V	Ignition switch ON
E21-06	BLK/ RED	Power supply for engine control	Ground to engine (Fig B)	10 – 14 V	Ignition switch ON
E21-4	BLU	Radiator (condenser) cooling fan relay output	Ground to engine (Fig B)	0 – 1 V	A/C switch ON or engine coolant temp. sensor more than 96 °C (205 °F) with engine running
				10 – 14 V	Except the above-mentioned with engine running
E23-15	BLU/ BLK	Main relay	Ground to engine (Fig B)	0 – 1 V	Ignition switch ON
				10 – 14 V	Ignition switch OFF
E23-11	ORN	Compressor magnet clutch relay output	Ground to engine (Fig B)	0 – 1 V	A/C switch ON with engine running
				10 – 14 V	Except the above-mentioned with engine running
E23-02	BLK/ YEL	ECM ground for power circuit	Ground to body (Fig A)	–0.3 – 0.3 V	Ignition switch ON
E21-15	GRN/ RED	Evaporator thermistor temp. input	Ground to engine (Fig B)	2.0 – 2.3 V (1800 – 2200 Ω)	Evaporator thermistor temp. at Approx. 25 °C (77 °F) with ignition switch ON
				3.5 – 3.6 V (6300 – 7000 Ω)	Evaporator thermistor temp. at Approx. 0 °C (32 °F) with ignition switch ON
E21-30	LT GRN/ RED	A/C switch input	Ground to engine (Fig B)	0 – 1 V	A/C switch ON with ignition switch ON
				10 – 14 V	A/C switch OFF with ignition switch ON
E22-16	YEL/ GRN	Engine coolant temperature sensor input	Ground to engine (Fig B)	0.71 – 0.76 V (290 – 320 Ω)	Engine coolant temperature at Approx. 80 °C (176 °F) with ignition ON
				0.35 – 0.37 V (136 – 144 Ω)	Engine coolant temperature at Approx. 110 °C (230 °F) with ignition ON
E22-28	BRN/ WHT	Sensor ground	Ground to body (Fig A)	–0.3 – 0.3 V	Ignition switch ON
E21-13	PNK/ BLU	Blower fan speed input	Ground to engine (Fig B)	0 – 2 V	Blower switch 2nd, 3rd or 4th position with ignition switch ON
				3 – 5 V	<ul style="list-style-type: none"> Blower switch 1st position with ignition switch ON A/C switch ON and blower switch off with ignition ON
				10 – 14 V	Blower switch OFF position with ignition switch ON

Compressor Drive Belt

NOTE:

For G10 engine model, refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Inspection

M13 Engine Model

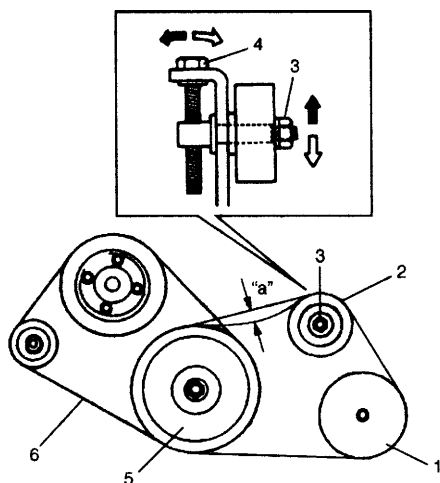
- Check compressor drive belt (6) for wear and cracks, and replace as required.
- Check compressor drive belt (6) tension by measuring how much it deflects when pushed at intermediate point between compressor pulley (1) and tension pulley (2) with about 100 N (10 kg, 22 lbs) force after crankshaft pulley 1 rotating. If belt tension is without specification, adjust belt tension referring to below procedures.

Compressor drive belt tension

"a": 3 – 5 mm (0.12 – 0.20 in.)

New compressor drive belt tension

"a": 2 – 4 mm (0.08 – 0.16 in.)



Z13DT Engine Model

Refer to "Water Pump / Generator Drive Belt Removal and Installation" in Section 6B3.

Adjustment

M13 Engine Model

- 1) Loosen tension pulley nut (3).
- 2) Adjust belt tension by tighten or loosen tension pulley adjusting bolt (4).
- 3) Tighten tension pulley nut (3).
- 4) Turn the crank pulley (5) 1 revolution, then check belt tension.

Z13DT Engine Model

Refer to "Water Pump / Generator Drive Belt Removal and Installation" in Section 6B3.

Replacement

M13 Engine Model

- 1) Loosen tension pulley nut (3).
- 2) Loosen belt tension by loosen tension pulley adjusting bolt (4).
- 3) Remove compressor drive belt (6).
- 4) Install new compressor drive belt.
- 5) Adjust belt tension referring to above procedure.

Z13DT Engine Model

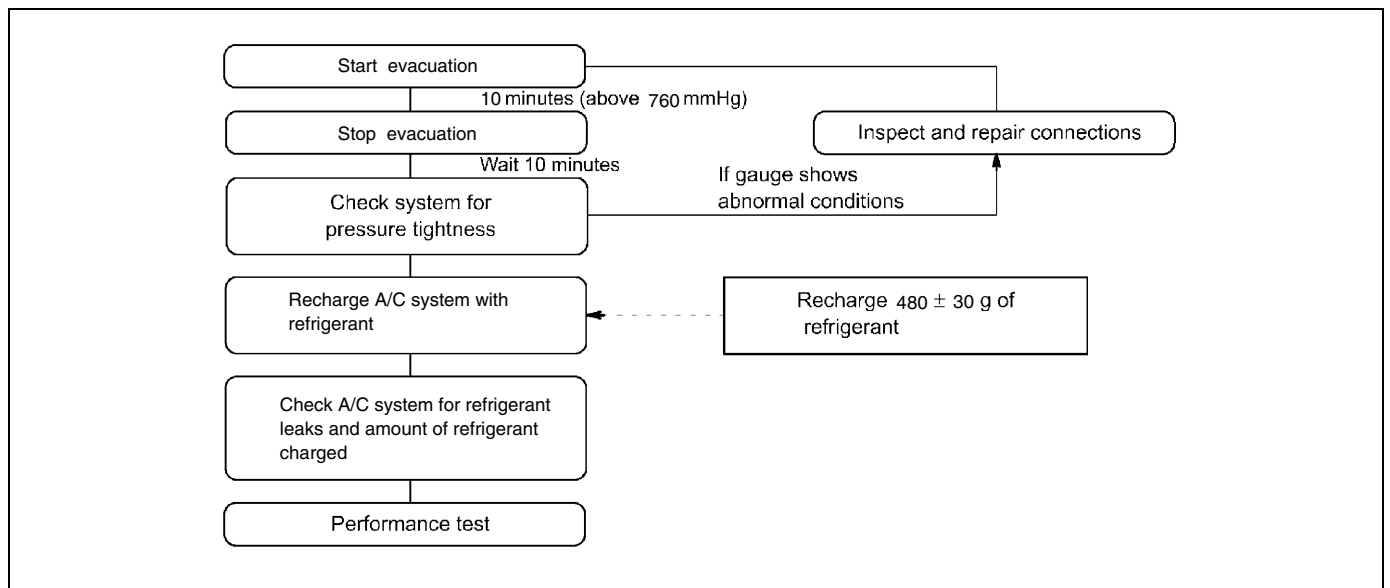
Refer to “Water Pump / Generator Drive Belt Removal and Installation” in Section 6B3.

Recovery, Evacuation and Charging

Operation Procedure for Charging A/C with Refrigerant

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

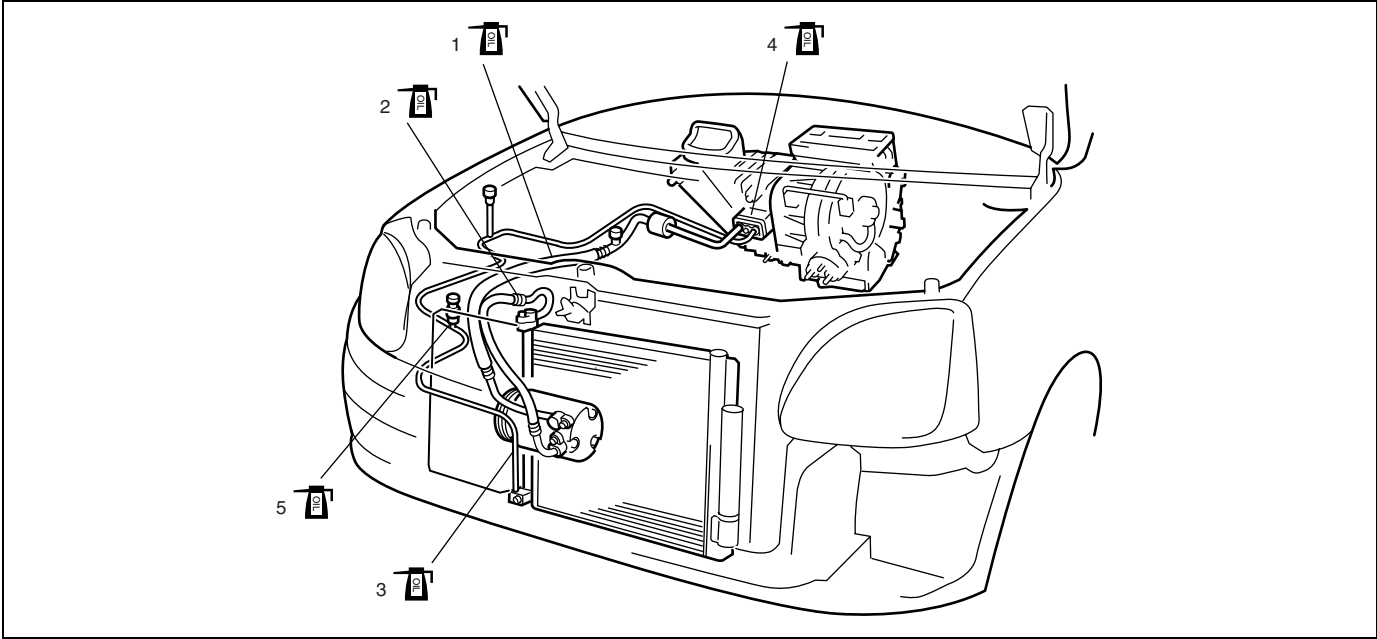
Z13DT Engine Model






On-Vehicle Service

NOTE:

- When refrigerant line must be disconnected and connected to remove and reinstall any component of A/C system, be sure to observe the following instructions.
 - When disconnecting any line from the system, install a blinding plug or cap to fitting of such line immediately.
 - When connecting hoses and pipes to each other respectively, previously apply a few drops of compressor oil (refrigerating oil) to O-ring.
- For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Z13DT Engine Model



 1. Suction hose	 3. Liquid pipe	 Apply compressor oil (refrigerant oil) to O-ring
 2. Discharge hose	 4. Expansion valve	

Procedure After ECM Replacement (Z13DT Engine Model)

Refer to "Procedure After ECM Replacement" under "ECM Registration" in Section 6E3.

A/C Condenser Assembly

CAUTION:

Be careful not to damage condenser fins. If condenser fin is bent, straighten it by using flat head screwdriver or pair of pliers.

Removal

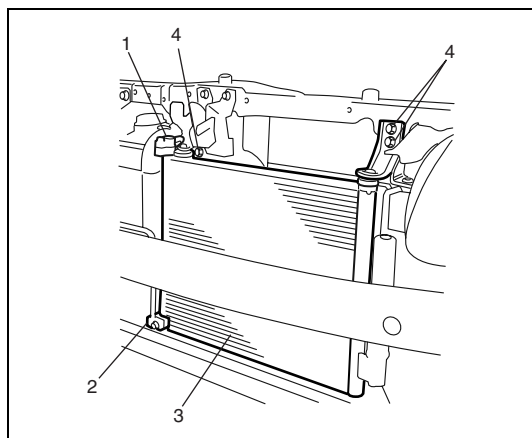
Z13DT Engine Model

- 1) Disconnect negative (–) cable at battery.
- 2) Recover refrigerant from A/C system by referring to "Recovery" in this section.

NOTE:

The amount of removed compressor oil must be measured for replenishing compressor oil.

- 3) Remove front bumper referring to "Front Bumper and Rear Bumper" in Section 9.
- 4) Disconnect discharge hose (1) and liquid pipe (2) from condenser assembly (3).
- 5) Remove condenser bracket bolts (4).
- 6) Remove condenser assembly (3).



M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Installation

Z13DT Engine Model

Reverse removal sequence to install condenser, noting the following point.

- If replace condenser, pour 15 cc of refrigerating oil to compressor suction-side.
- Evacuate and charge system according to previously described procedure.

M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Inspection

Z13DT Engine Model

Check the following.

- Condenser fins for leakage, blockage and damage
- Condenser fittings for leakage

Clogged condenser fins should be washed with water, and should be dried with compressed air.

NOTE:

Be careful not to damage condenser fins. If condenser fin is bent, straighten it by using a screwdriver or pair of pliers. If any leakage is found from fitting or tube, repair or replace condenser.

M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Receiver / Dryer

Removal

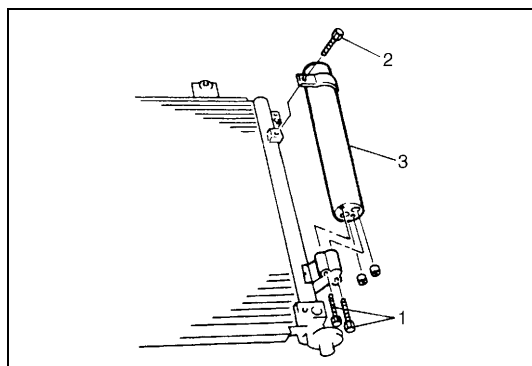
Z13DT Engine Model

- 1) Recover refrigerant from refrigeration system by using recovery and recycling equipment.

NOTE:

The amount of removed compressor oil must be measured for replenishing compressor oil.

- 2) Remove A/C condenser assembly referring to A/C condenser assembly in this section.
- 3) Loosen receiver / dryer attachment bolt (1), (2).
- 4) Remove receiver / dryer (3).



M13 and G10 Engine Models

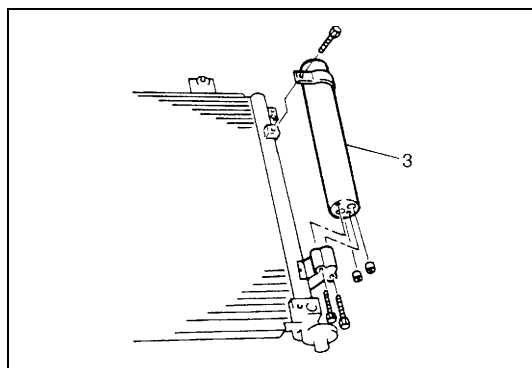
Refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Installation

Z13DT Engine Model

Reverse removal sequence to install receiver / dryer noting the following points.

- If receiver / dryer (3) is replaced, pour 20 cc of refrigerating oil to compressor suction-side.
- Evacuate and charge system according to previously described procedure.



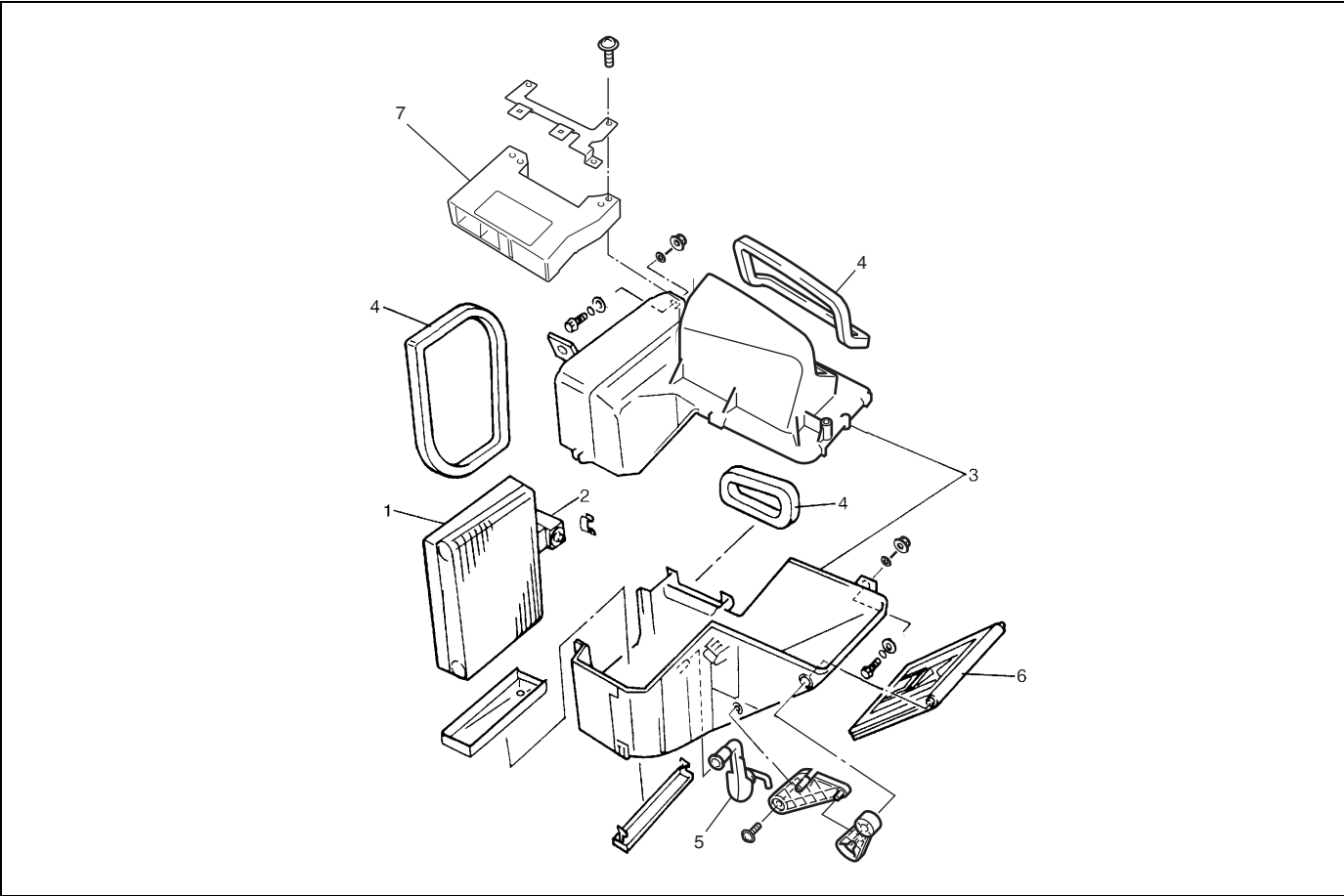
M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

NOTE:

For M13 and G10 engine models, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Z13DT Engine Model

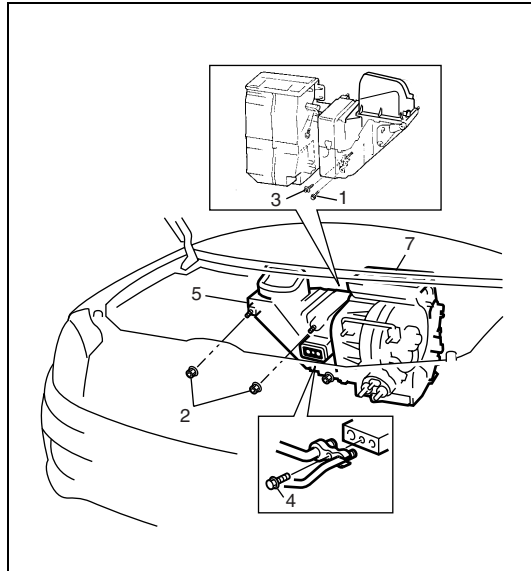


1. Evaporator	3. Evaporator case	5. Drain hose	7. Supplementary heater controller (if equipped)
2. Expansion valve	4. Packing	6. Air inlet door	

Removal

Z13DT Engine Model

- 1) Disconnect negative (–) cable at battery.
- 2) If equipped with air bag system, disable air bag system referring to “Disabling Air Bag System” in Section 10B.
- 3) Recover refrigerant from refrigeration system by using recovery and recycling equipment referring to “Operation Procedure for Refrigerant Charge” in this section.
- 4) Remove heater control cable, main harness clamp.
- 5) Remove 20-pin connector from supplementary heater controller and two connectors located on supplementary heater controller.



- 6) Loosen suction hose & liquid pipe bolt (4).
- 7) Loosen cooling unit bolt (1), nut (2) and screw (3) as shown in figure.
- 8) Remove cooling unit (5).

M13 and G10 Engine Models

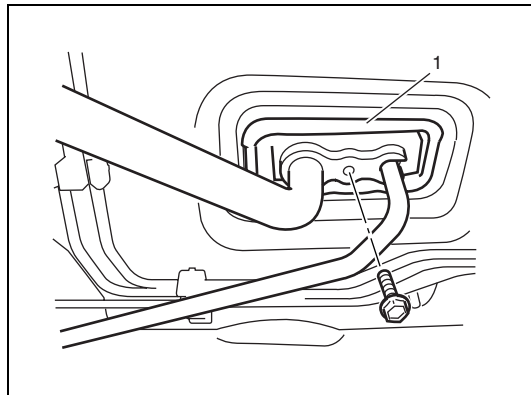
Refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Installation

Z13DT Engine Model

Reverse removal sequence to install cooling unit, noting the following points.

- If cooling unit or evaporator is replaced, pour 25 cc of refrigerating oil to compressor suction-side.
- Install uniformly the padding (1) to installation hole.
- Evacuate and charge system according to previously described procedure.
- Adjust heater control cable, referring to "Heater Control Lever Assembly" in Section 1A.
- Enable air bag system, if equipped.



M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the "FOREWORD" of this service manual.

Dual Pressure Switch (M13 and G10 Engine Models)

Removal

- 1) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 2) Disconnect negative (-) cable at battery.
- 3) Remove dual pressure switch.

Installation

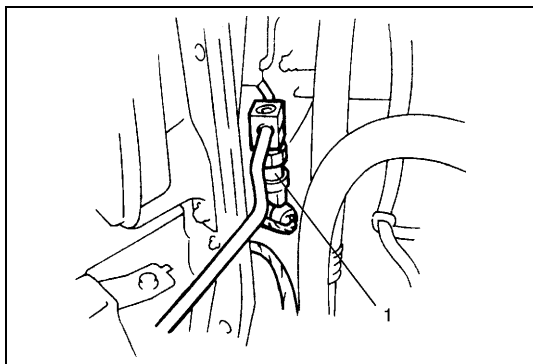
Reverse removal procedure for installation, noting the following points.

- Apply compressor oil to dual pressure switch O-ring.
- Evacuate and charge system according to previously described procedure.

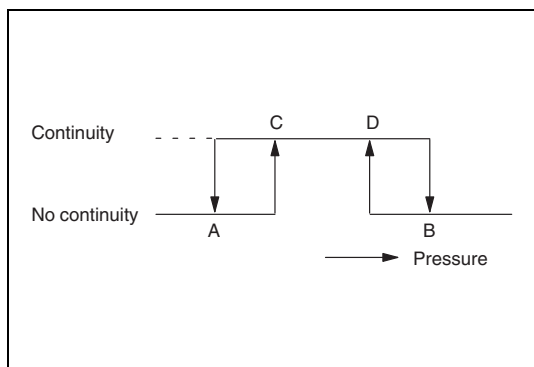
Tightening torque

Pressure switch: 11 N·m (1.1 kg-m, 8.0 lb-ft)

Inspection



- 1) Check dual pressure switch (1) for continuity at normal temperature (approx. 25 °C (77 °F)) when A/C system has a proper charge of refrigerant and when A/C system (compressor) is under operation. In each of these cases, switch should show proper continuity.



- 2) Check switch for continuity at specified pressure as shown.

A: Approx 200 KPa (2.0 kg/cm²)

B: Approx 3200 KPa (32 kg/cm²)

C: Approx 260 KPa (2.6 kg/cm²)

D: Approx 2600 KPa (26 kg/cm²)

Pressure Sensor (Z13DT Engine Model)

Removal

- 1) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 2) Disconnect negative (–) cable at battery.
- 3) Remove pressure sensor.

Installation

Reverse removal procedure for installation, noting the following points.

- Apply compressor oil to pressure sensor O-ring.
- Evacuate and charge system according to previously described procedure.

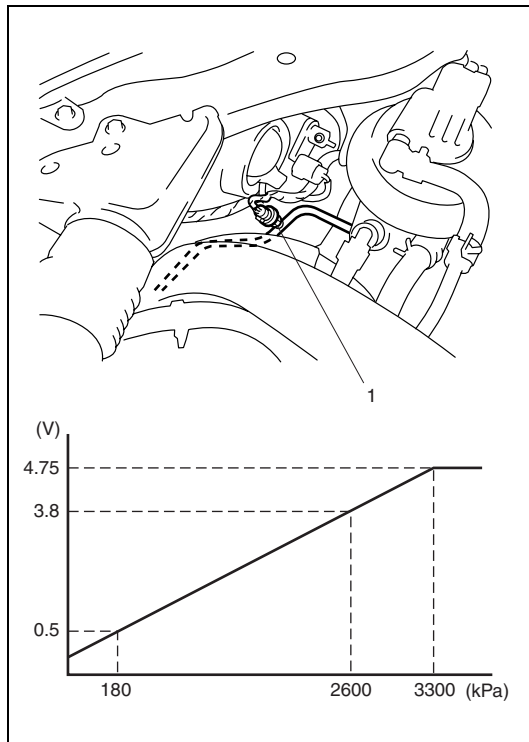
Tightening torque

Pressure sensor: 11 N·m (1.1 kg-m, 8.0 lb-ft)

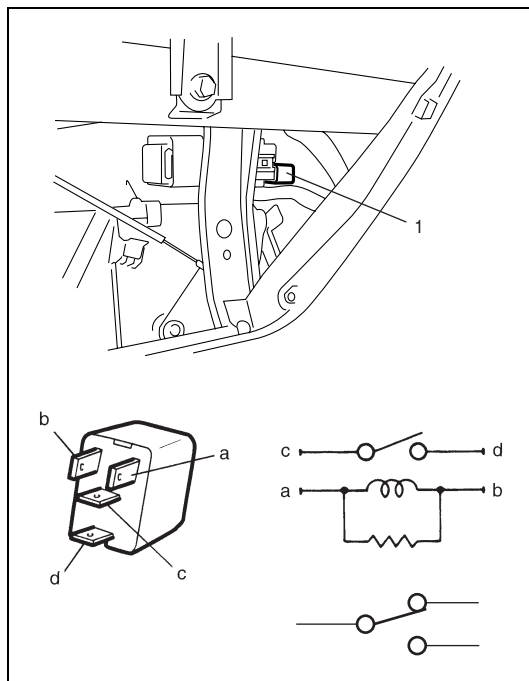
Inspection

- 1) Connect manifold gauge to A/C system and operate A/C system.
- 2) Check output voltage for pressure sensor (1) between GRY/BLU and BRN/WHT wire terminals, and then compare measured voltage with specified voltage in graph.

If it does not show such characteristic as shown in graph, replace pressure sensor.

**A/C Relay (Z13DT Engine)****Inspection**

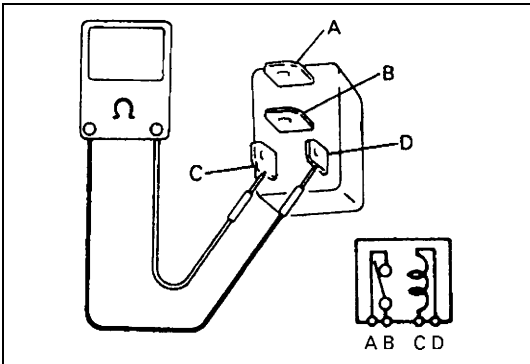
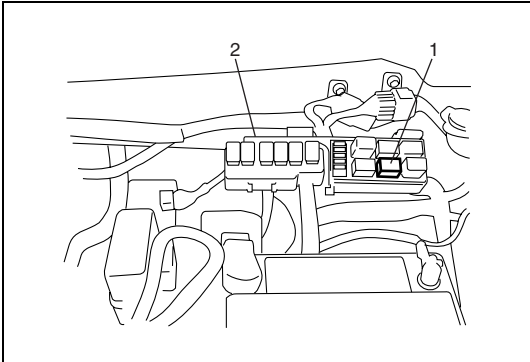
- 1) Disconnect negative (–) cable at battery.
- 2) Remove steering column hole cover.
- 3) Remove A/C relay (1).
- 4) Check that there is no continuity between terminal “c” and “d”. If there is continuity, replace relay.
- 5) Connect battery positive (+) terminal to terminal “b” of relay. Connect battery negative (–) terminal to terminal “a” of relay. Check for continuity between terminal “c” and “d”. If there is no continuity when relay is connected to the battery, replace relay.



A/C Compressor Relay

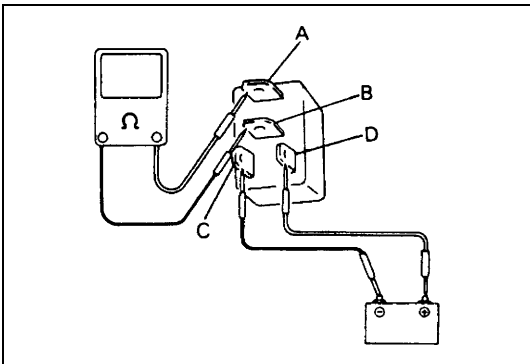
Inspection

- 1) Disconnect negative cable at battery.
- 2) Remove A/C compressor relay (1) from relay box (2).



- 3) Check resistance between each two terminals as in table below. If check results are as specified, proceed to next operation check. If not, replace.

Terminals	Resistance
Between A and B	∞ (infinity)
Between C and D	Approx. 170 Ω



- 4) Check that there is continuity between terminals “A” and “B” when battery is connected to terminals “C” and “D”. If found defective, replace.

Compressor

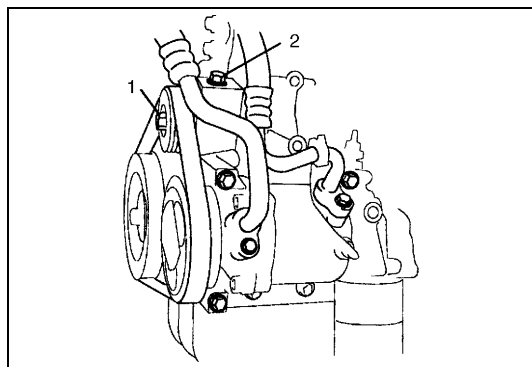
NOTE:
For G10 engine model, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Removal

M13 Engine

- 1) Run engine at idle speed with air conditioning ON for 10 minutes. After that, stop the engine.
- 2) Disconnect negative (–) cable at battery.
- 3) Recover refrigerant from refrigeration system by using recovery and recycling equipment.
- 4) Remove front bumper.
- 5) Remove engine front cover.

6) Disconnect magnet clutch lead wire and disengage lead wire clamp.

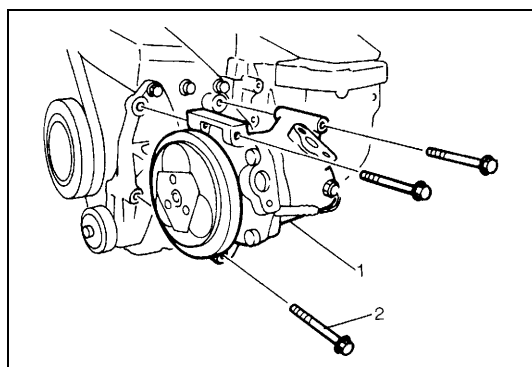


7) Remove compressor drive belt by loosening tension pulley bolt (1) and adjust bolt (2).

8) Disconnect suction and discharge hoses from compressor.

NOTE:

Cap open fittings immediately to keep moisture out of system.

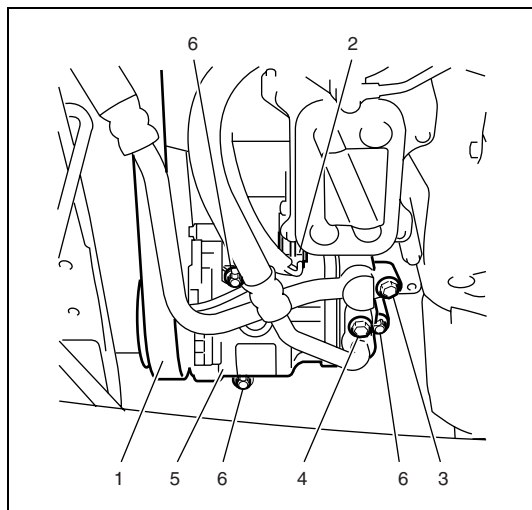


9) Remove compressor with magnet clutch assembly (1) from its mount by loosening mounting bolts (2).

10) Drain oil from compressor, and measure its amount.

Z13DT Engine Model

1) Run engine at idle speed with air conditioning ON for 10 minutes. After that stop the engine.
 2) Disconnect negative (–) cable at battery.
 3) Remove front bumper by referring to “Front Bumper and Rear Bumper” in Section 9.



4) Remove belt (1).
 5) Disconnect magnet clutch lead wire coupler (2).
 6) Disconnect suction pipe (3) and discharge hose (4) from compressor (5).

NOTE:

Cap open fittings immediately to keep moisture out of system.

7) Remove compressor mounting bolts (6), and then remove compressor (5) from its bracket.

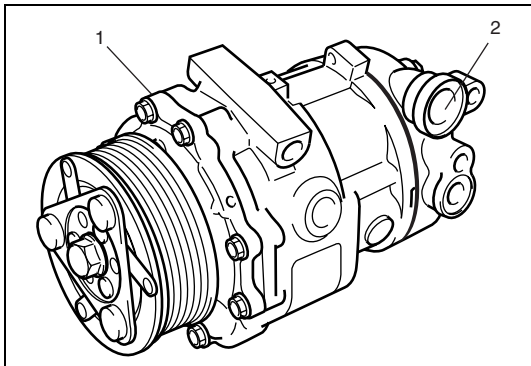
Installation

Reverse removal procedure to install compressor noting the following instructions.

- If compressor is replaced, pour new compressor oil by referring to “Replenishing Compressor Oil” under “Compressor” in this section.
- Evacuate and charge system by referring to “Recovery” in this section.
- Adjust drive belt tension by referring to “Compressor Drive Belt” in this section.

Replenishing Compressor Oil

Z13DT Engine Model



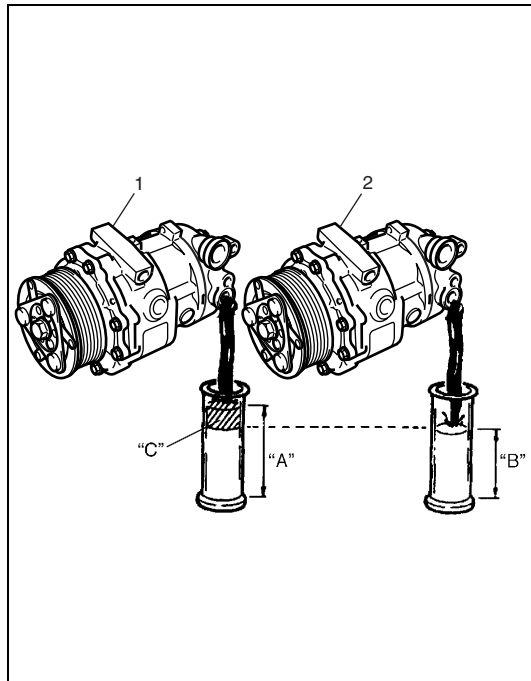
It is necessary to replenish specified amount of compressor oil to compressor (1) from compressor suction side hole (2) before evacuating and charging refrigerant.

When Charging Refrigerant Only

When evacuating and charging refrigerant without replacing any component part, replenish the same amount of measured oil when recovering refrigerant (if not measured, replenish 30 cc oil).

When Replacing Compressor**CAUTION:**

Be sure to use P/N: 99000-990C5-00A compressor oil or an equivalent compressor oil.



Compressor oil is sealed in each new compressor by the amount required for A/C system. Therefore, when using a new compressor for replacement, drain oil from it by the amount calculated as follows.

$$“C” = “A” - “B”$$

“C”: Amount of oil to be drained

“A”: Amount of oil sealed in a new compressor

“B”: Amount of oil remaining in removed compressor

NOTE:

Compressor assembly supplied from factory is filled up with the following amount of oil.

Oil amount in compressor

100 cm³ (100 cc, 6.1 in³)

1. New compressor
2. Removed compressor

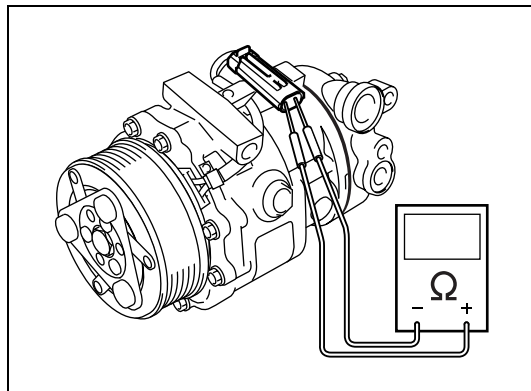
M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Magnet Clutch**Inspection****Z13DT Engine Model**

- Check armature plate and magnet clutch pulley for wear and oil soaked conditions respectively.
- Check magnet clutch pulley bearing for noise, wear and grease leakage.
- Measure magnet clutch coil for resistance at 20 °C (68 °F).
If the measured resistance does not remain within above tolerance, replace compressor assembly.

Standard Resistance: approximately 3.7 Ω

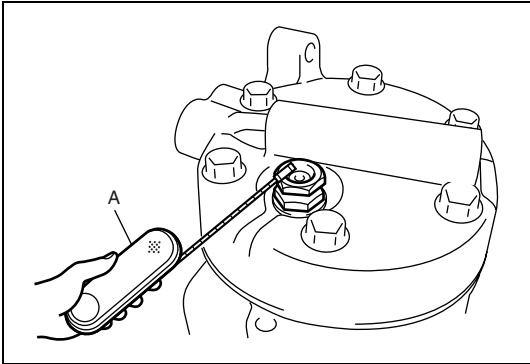


M13 and G10 Engine Models

Refer to the same section of the Service Manual mentioned in the “FOREWORD” of this service manual.

Relief Valve (Z13DT Engine Model)

Inspection



By using special tool, check if there is refrigerant leakage.
If there is refrigerant leakage, replace the compressor assembly.

Special tool
(A): 09990–86011

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Compressor oil (refrigerant oil)	COMPRESSOR OIL P/No.: 99000-990C5-00A	<ul style="list-style-type: none">• O-ring• Each component

SECTION 3A

FRONT WHEEL ALIGNMENT

WARNING:

Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.

Leave a bolt at least not to drop the wheel.

Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

3A**NOTE:**

For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

General Description	3A-2
Front Wheel Alignment Specifications	3A-2

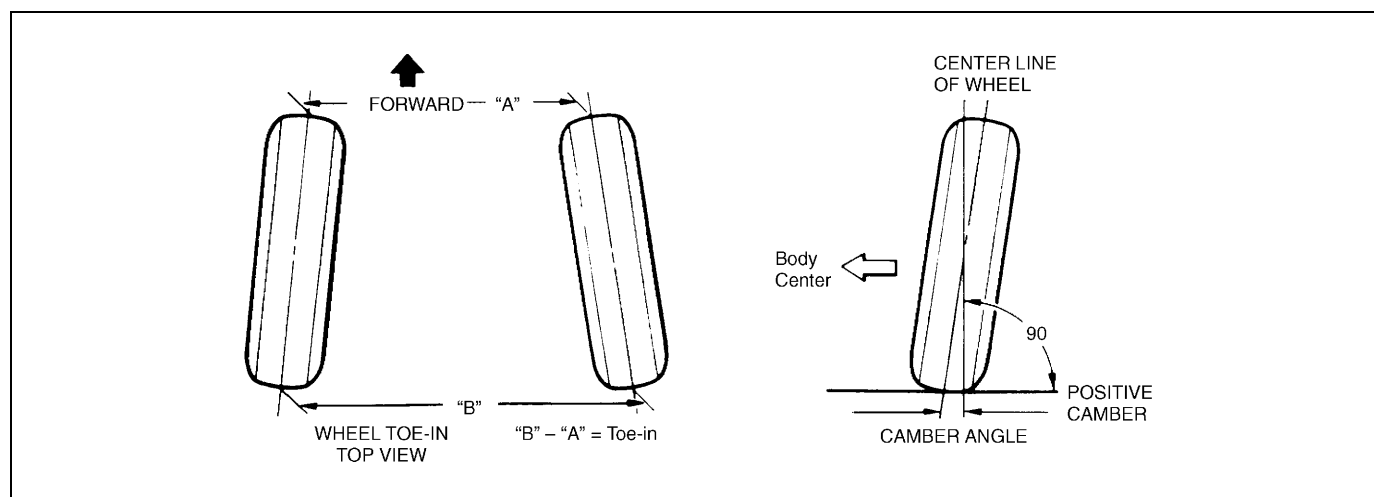
General Description

Front Wheel Alignment Specifications

Item		Front Wheel
Toe (total)		$0 \pm 1 \text{ mm}$
Camber		$-0^\circ 20' \pm 1^\circ$
Caster		$3^\circ 40' \pm 1^\circ$
Side Slip Limit mm/m		0 – IN 3 mm/m
Steering Angle (Turning angle)	Inside	$35^\circ \pm 3^\circ$
	Outside (Reference)	$31^\circ \pm 3^\circ$

NOTE:

Toe value in the specifications table was measured by using a toe-in gauge.



Front alignment refers to the angular relationship between the front wheels, the front suspension attaching parts and the ground. Generally, the only adjustment required for front alignment is toe setting.

Camber and caster can't be adjusted. Therefore, should camber or caster be out of specification due to the damage caused by hazardous road conditions or collision, whether the damage is in body or in suspension should be determined. If the body is damaged, it should be repaired and if suspension is damaged, it should be replaced.

SECTION 3B

MANUAL RACK AND PINION

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an autho-rized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “Gener-al Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precau-tions” under “On-Vehicle Service” in air bag system section before performing ser-vice on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.
Leave a bolt at least not to drop the wheel.
Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

NOTE:

- All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/ or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as speci-fied during reassembly to assure proper retention of these parts.
- For discriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

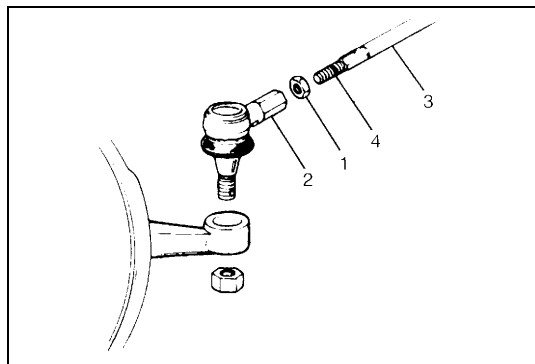
CONTENTS

On-Vehicle Service.....	3B-2	Tightening Torque Specifications	3B-4
Tie Rod End	3B-2		
Manual Rack and Pinion Assembly			
(Steering Gear Case)	3B-3		

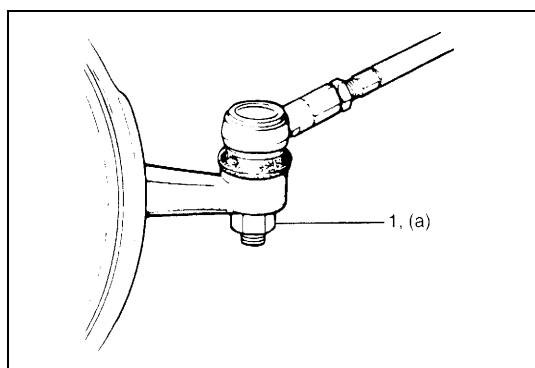
On-Vehicle Service

Tie Rod End

Installation



- 1) Install tie rod end lock nut (1) and tie rod end (2) to tie rod (3). Align lock nut with mark (4) on tie rod thread.

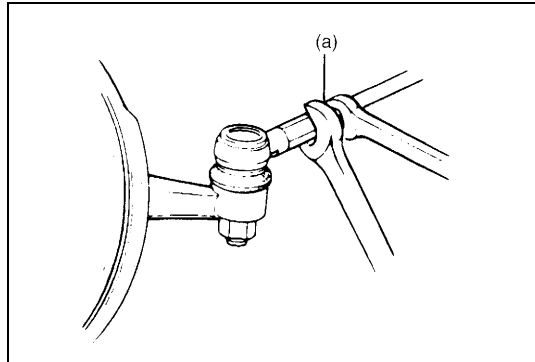


- 2) Connect tie rod end to knuckle. Tighten new tie rod end nut (1) to specified torque.

Tightening torque

Tie rod end nut (a): 40 N·m (4.0 kg-m, 29.0 lb-ft)

- 3) Inspect for proper toe (Refer to "Front Wheel Alignment").



- 4) After confirming proper toe, tighten tie rod end lock nut to specified torque.

Tightening torque

Tie rod end lock nut (a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

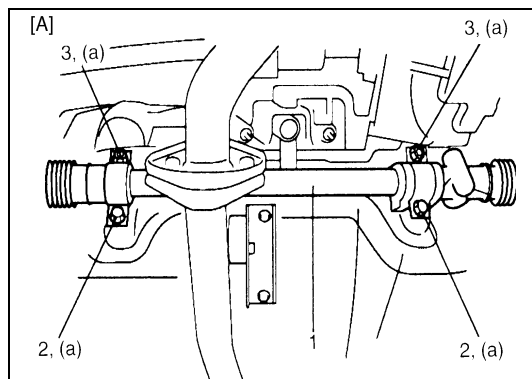
- 5) Tighten wheel to specified torque and lower hoist.

Tightening torque

Wheel bolt: 95 N·m (9.5 kg-m, 69.0 lb-ft)

Manual Rack and Pinion Assembly (Steering Gear Case)

Installation

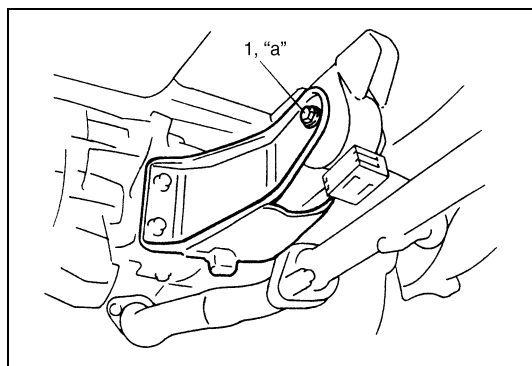


- 1) Apply grease to inside of pinion packing and install pinion packing onto pinion. Mount steering gear case (1) to body and tighten gear case mount bolts (2) and nuts (3) to specified torque.

Tightening torque

Steering gear case mounting bolt and nut

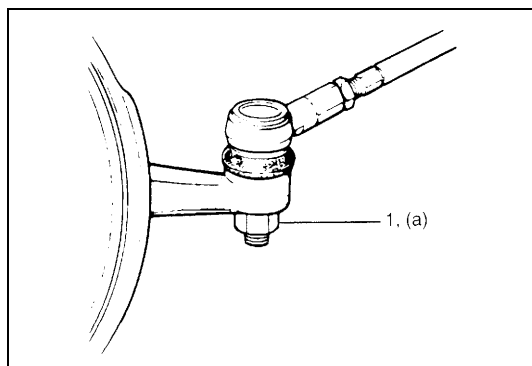
(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)



- 2) Install engine rear mounting bolt (1). Tighten bolts to specified torque.

Tightening torque

Engine rear mounting bolt (a): 55 N·m (5.5 kg-m, 40 lb-ft)



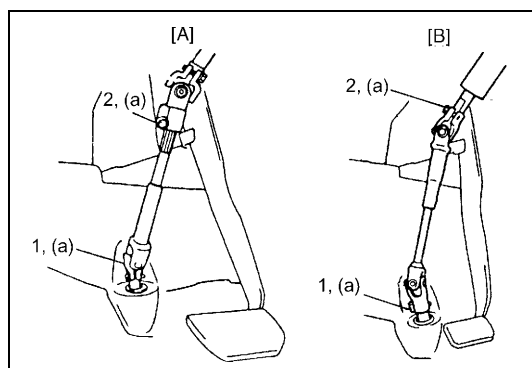
- 3) Remove transmission jack.

- 4) Install tie rod ends to knuckles (right & left). Tighten each new tie rod end nut (1) to specified torque.

Tightening torque

Tie rod end nut (a): 40 N·m (4.0 kg-m, 29.0 lb-ft)

- 5) Be sure that steering wheel and brake discs (right & left) are all straight-ahead position and then insert steering lower joint into steering pinion shaft.



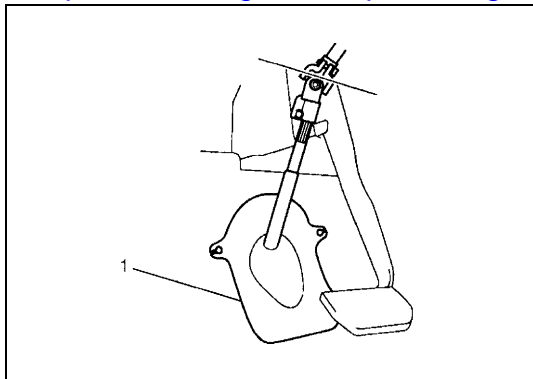
- 6) Tighten steering shaft joint bolts (1) and (2) to specified torque (Lower side first and then upper side).

Tightening torque

Steering shaft joint bolt (a): 28 N·m (2.8 kg-m, 20.5 lb-ft)

[A]: Power steering

[B]: Manual steering

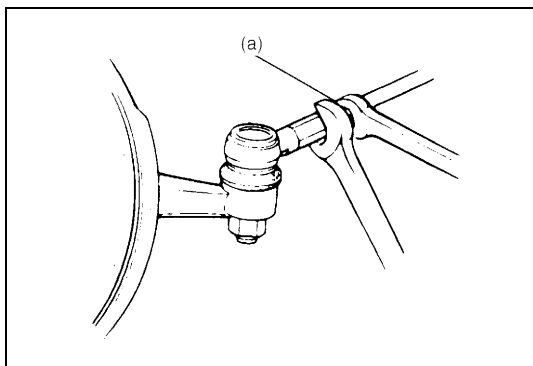


- 7) Reinstall cover (1) removed previously to steering shaft joint.
- 8) Put back floor mat as it was.
- 9) Install both wheels and tighten wheel bolts to specified torque.

Tightening torque

Wheel bolt: 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 10) Lower hoist.
- 11) Check toe setting. Adjust as required (refer to "Front Wheel Alignment" in Section 3A).



- 12) Tighten both tie rod end lock nuts to specified torque.

Tightening torque

Tie rod end lock nut (a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

Tightening Torque Specifications

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Engine rear mounting bolt	55	5.5	40.0
Steering gear case mounting bolt and nut	25	2.5	18.0
Steering shaft joint bolt	28	2.8	20.5
Tie rod end lock nut	45	4.5	32.5
Tie rod end nut	40	4.0	29.0
Wheel bolt	95	9.5	69.0

SECTION 3B1**ELECTRICAL POWER STEERING (EPS) SYSTEM
(IF EQUIPPED)****WARNING:**

For vehicles equipped with the Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in Section 10B in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in Section 10B performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

3B1**NOTE:**

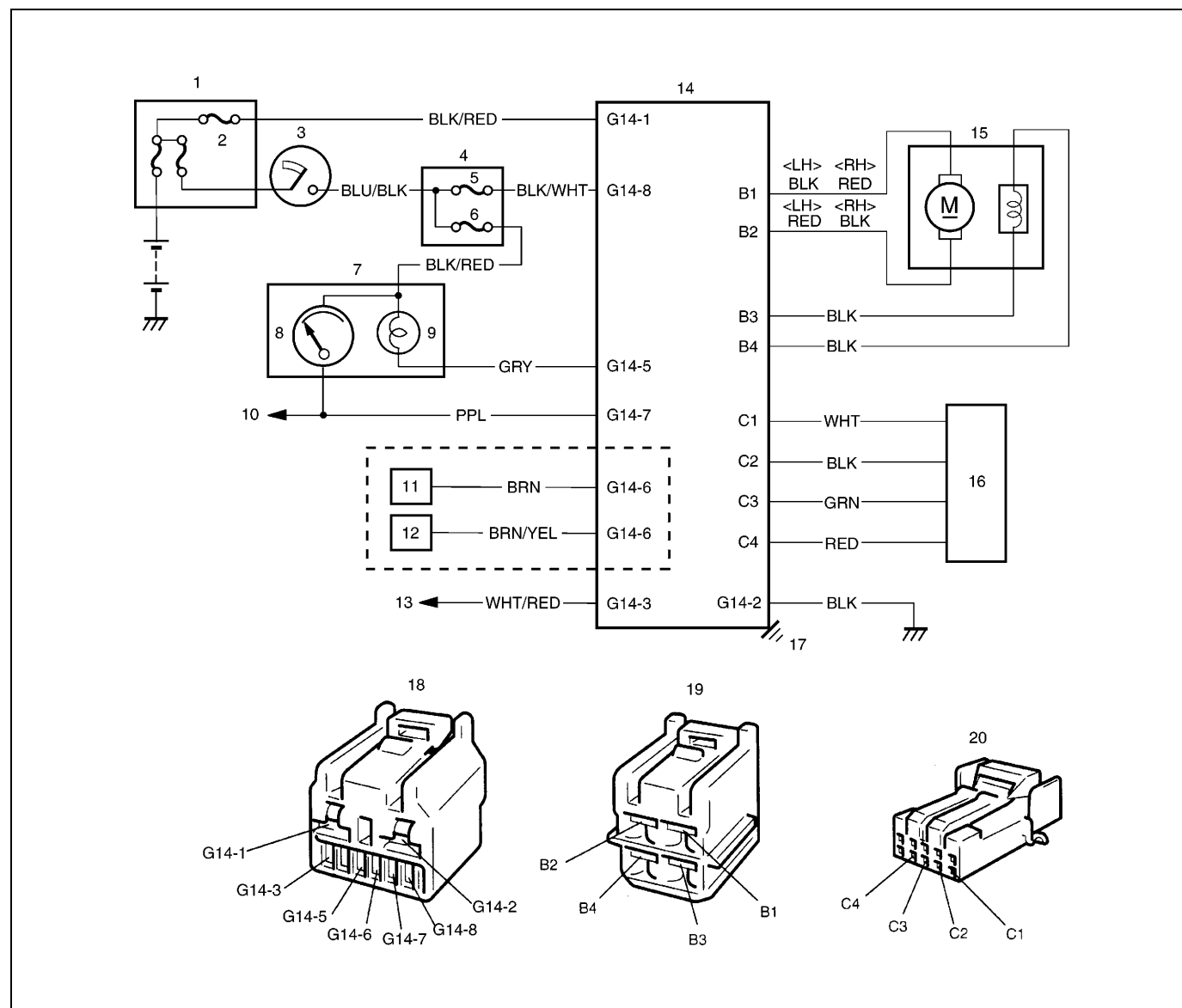
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

General Description	3B1-2	“EPS” Warning Lamp Circuit Check	
Wiring Diagram	3B1-2	Flow Table for M13 Engine Model	3B1-3
Diagnosis	3B1-3	Table-B “EPS” Warning Lamp	
		Remains ON	3B1-4

General Description

Wiring Diagram



1. Main fuse box	8. Speedometer	15. Motor assembly (with clutch incorporated)
2. "EPS" fuse (30 A)	9. "EPS" warning lamp	16. Torque sensor
3. Ignition switch	10. To vehicle speed sensor (VSS) for G10 engine model, To ECM/PCM for M13 engine model	17. P/S control module body ground
4. Circuit fuse box	11. Noise suppressor for G10 engine model	18. Connector "G14"
5. "IG COIL" fuse (15A)	12. ECM/PCM	19. Connector "B"
6. "METER" fuse (10A)	13. To data link connector (DLC)	20. Connector "C"
7. Combination meter	14. P/S control module	

Diagnosis

“EPS” Warning Lamp Circuit Check Flow Table for M13 Engine Model

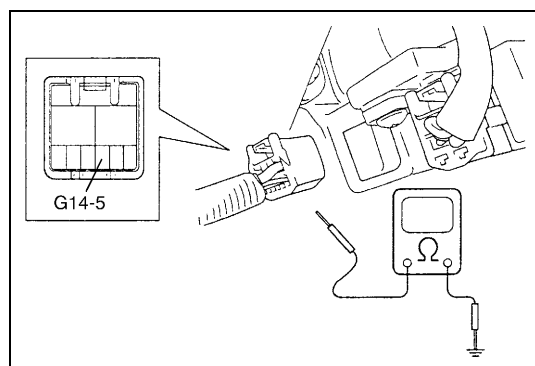
CAUTION:

Be sure to perform “System Check Flow Table” before starting diagnosis according to flow table.

Step	Action	Yes	No
1	1) Make sure that battery voltage is about 11 V or higher. 2) Note “EPS” warning lamp as ignition switch is turned to ON position. Does “EPS” warning lamp come ON when ignition switch is turned to ON position?	Go to Step 2.	Proceed to “Table-A “EPS” Warning Lamp Does Not Light”.
2	Check that “EPS” warning lamp lights for 2 sec. and then goes OFF.	“EPS” warning lamp is in good condition.	Check for any DTC referring to “Diagnostic Trouble Code (DTC) Check” in Section 6-1 for G10 engine model or in Section 6-2 for M13 engine model. If there is any, troubleshoot the problem(s). If not, proceed to “Table-B “EPS” Warning Lamp Remains ON”.

Table-B “EPS” Warning Lamp Remains ON

Step	Action	Yes	No
1	Was “System Check Flow Table” performed?	Go to Step 2.	Go to “System Check Flow Table” in this section.
2	1) With ignition switch OFF, disconnect 8 pin (“A”) connector from P/S control module. 2) Measure resistance between “G14-5” terminal of “A” connector and body ground. Is resistance 1 Ω or less?	Go to step 3.	Substitute a known-good P/S control module and recheck.
3	1) Disconnect “G25” connector from Combination meter. 2) Turn ignition switch to ON position. 3) Check voltage between “G25-9” and body ground. Is it 10 – 14 V?	Replace bulb in combination meter, and then recheck.	Repair short to ground in “G14-5” wire circuit.



[A]: Fig. for Step 2

SECTION 3D

FRONT SUSPENSION

WARNING:

Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.

Leave a bolt at least not to drop the wheel.

Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

NOTE:

- All front suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any front suspension part. Replace it with a new part or damage to the part may result.
- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

3D

CONTENTS

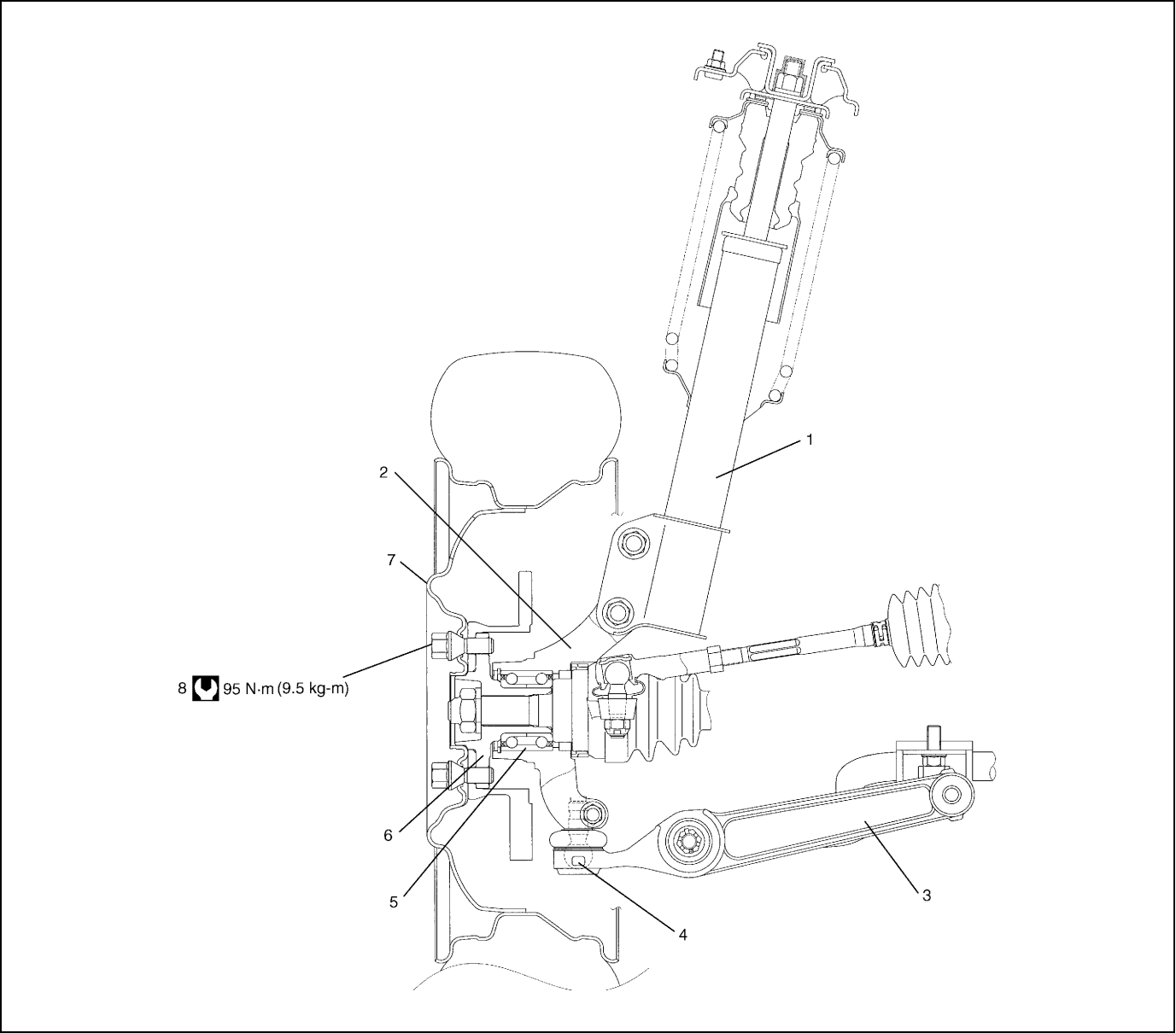
General Description	3D-2	Steering Knuckle / Bearing	3D-6
Diagnosis	3D-3	Suspension Control Arm / Bushing	3D-12
Wheel Disc, Bolt & Bearing Check.....	3D-3	Tightening Torque Specifications	3D-14
On-Vehicle Service	3D-4	Required Service Material	3D-15
Stabilizer Bar and/or Bushings	3D-4	Special Tool	3D-15
Strut Assembly	3D-5		


General Description

The front suspension is the strut type independent suspension. The upper end of a strut is anchored to the vehicle body by a strut support. The strut and strut support are isolated by a rubber mount. A strut bearing is also installed a little lower to the rubber mount.

The lower end of the strut is connected to the upper end of a steering knuckle and lower end of knuckle is attached to the stud of a ball joint which is incorporated in a unit with a suspension control arm. And connected to this steering knuckle is the tie-rod end.

Thus, movement of the steering wheel is transmitted to the tie-rod end and then to the knuckle, eventually causing the wheel-and-tire to move. In this operation, with the movement of the knuckle, the strut also rotates by means of the strut bearing and lower ball joint.



1. Strut assembly	3. Suspension control arm	5. Wheel bearing	7. Wheel	 Tightening torque
2. Steering knuckle	4. Ball stud	6. Front wheel hub	8. Wheel bolt	

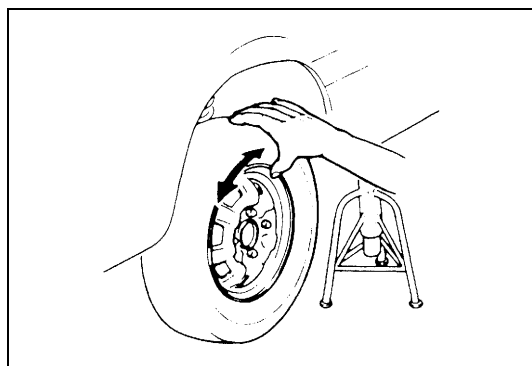
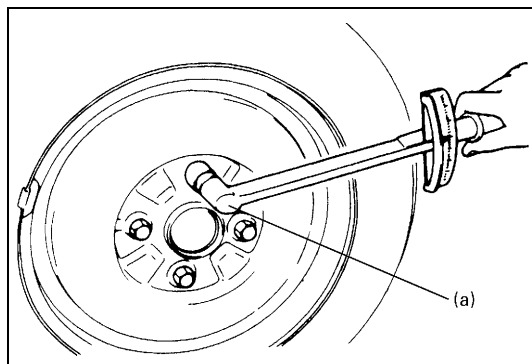
Diagnosis

Wheel Disc, Bolt & Bearing Check

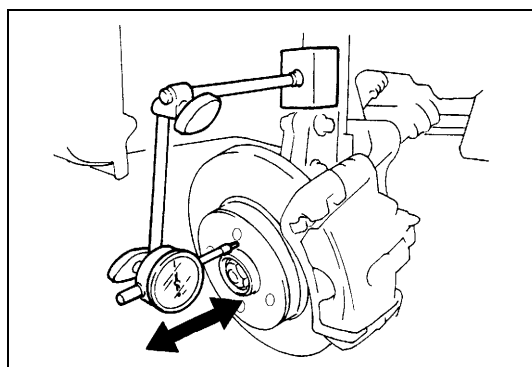
- 1) Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.
- 2) Check wheel bolts for tightness and retighten them to specification as necessary.

Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



- 3) By rotating wheel actually, check wheel bearing for noise and smooth rotation. If defective, replace bearing.



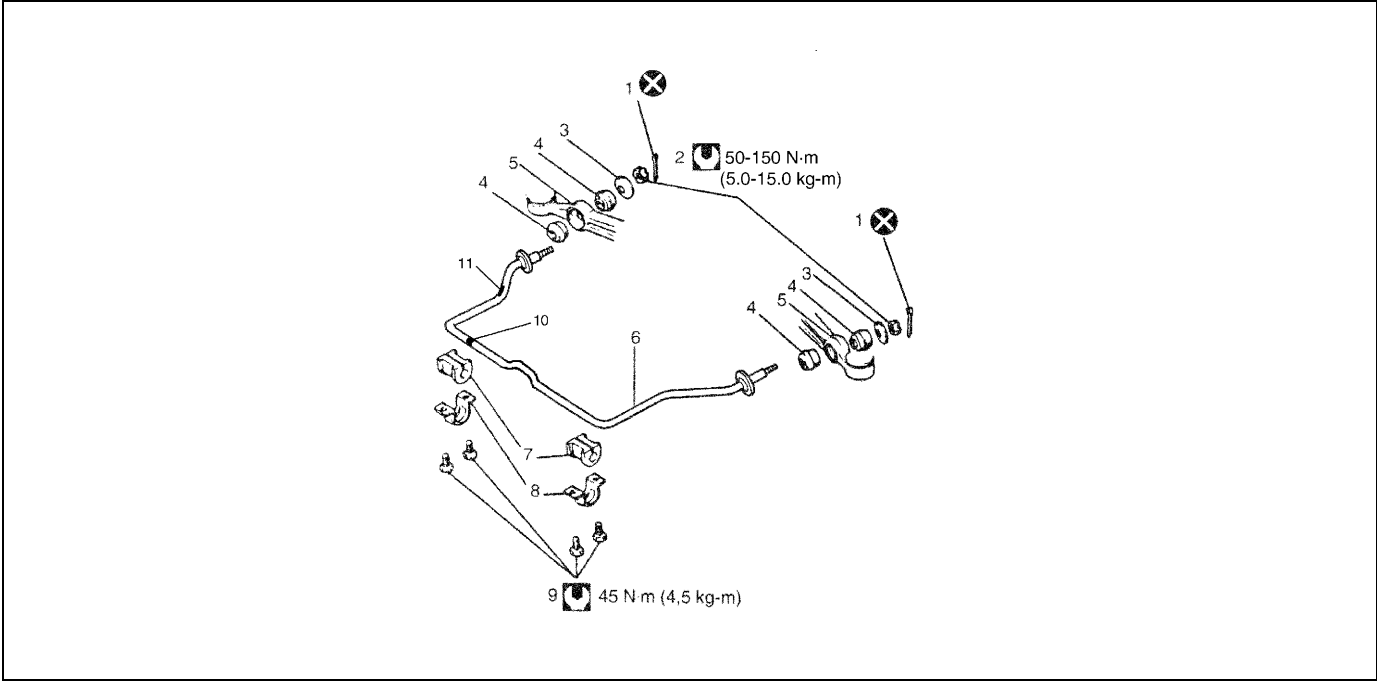
- 4) Check wheel bearing for wear. When measuring thrust play,
 - a) Remove wheel.
 - b) Fix brake disc tightening wheel bolts.
 - c) Set a dial gauge.
 - d) Check wheel bearing for thrust play.
 When measurement exceeds limit, replace bearing.

Thrust play limit "a": 0.1 mm (0.004 in.)

On-Vehicle Service

Stabilizer Bar and/or Bushings

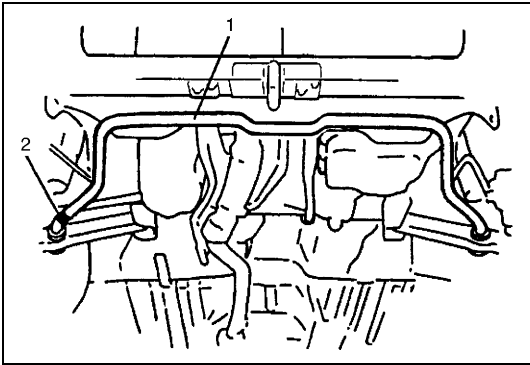
Components



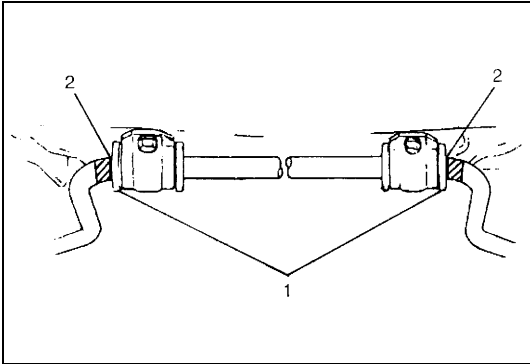
1. Split pin	4. Stabilizer bar bushing	7. Mount bushing	10. Paint mark	Tightening torque
2. Castle nut	5. Suspension control arm	8. Mount bush bracket	11. Paint mark (RH side)	Do not reuse.
3. Stabilizer bar washer	6. Stabilizer bar	9. Mount bracket bolt		

Installation

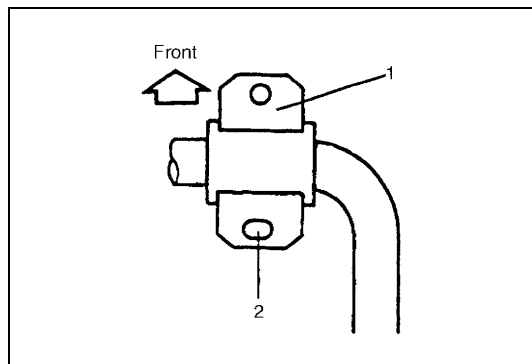
For installation, reverse removal procedure, observing the following instructions.



- Install stabilizer bar (1) so that paint mark (2) on it comes to the right side of vehicle.



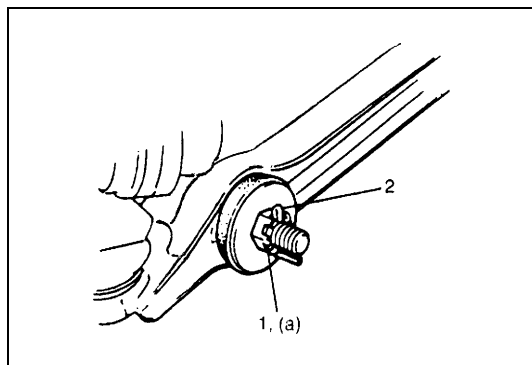
- Align the outside edge (1) of mount bushing with the inside edge (2) of paint as shown in figure.



- Install mounting bracket (1) so that its oblong hole side (2) comes to the rear.
- Tighten stabilizer bar bracket bolts to specified torque.

Tightening torque

Stabilizer bar bracket bolt: 45 N·m (4.5 kg-m, 32.5 lb-ft)

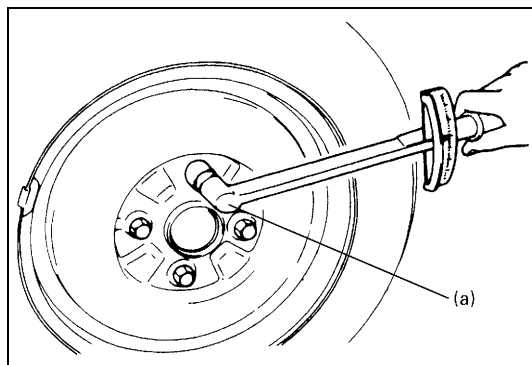


- After tightening castle nut (1) to specified torque, install new split pin (2) as shown.

Tightening torque

Castle nut

(a): 50 – 150 N·m (5.0 – 15.0 kg-m, 36.5 – 108.5 lb-ft)



- Install wheels and tighten wheel bolts to specified torque.

Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)

Strut Assembly

Installation

- Install strut assembly by reversing removal procedure.

CAUTION:

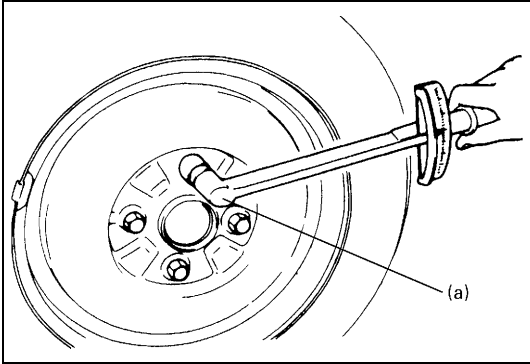
- Don't twist brake hose when installing it.
- Install E-ring as far as it fits to bracket.

- Torque all fasteners to specification.

Tightening torque

Strut support nut: 23 N·m (2.3 kg-m, 17.0 lb-ft)

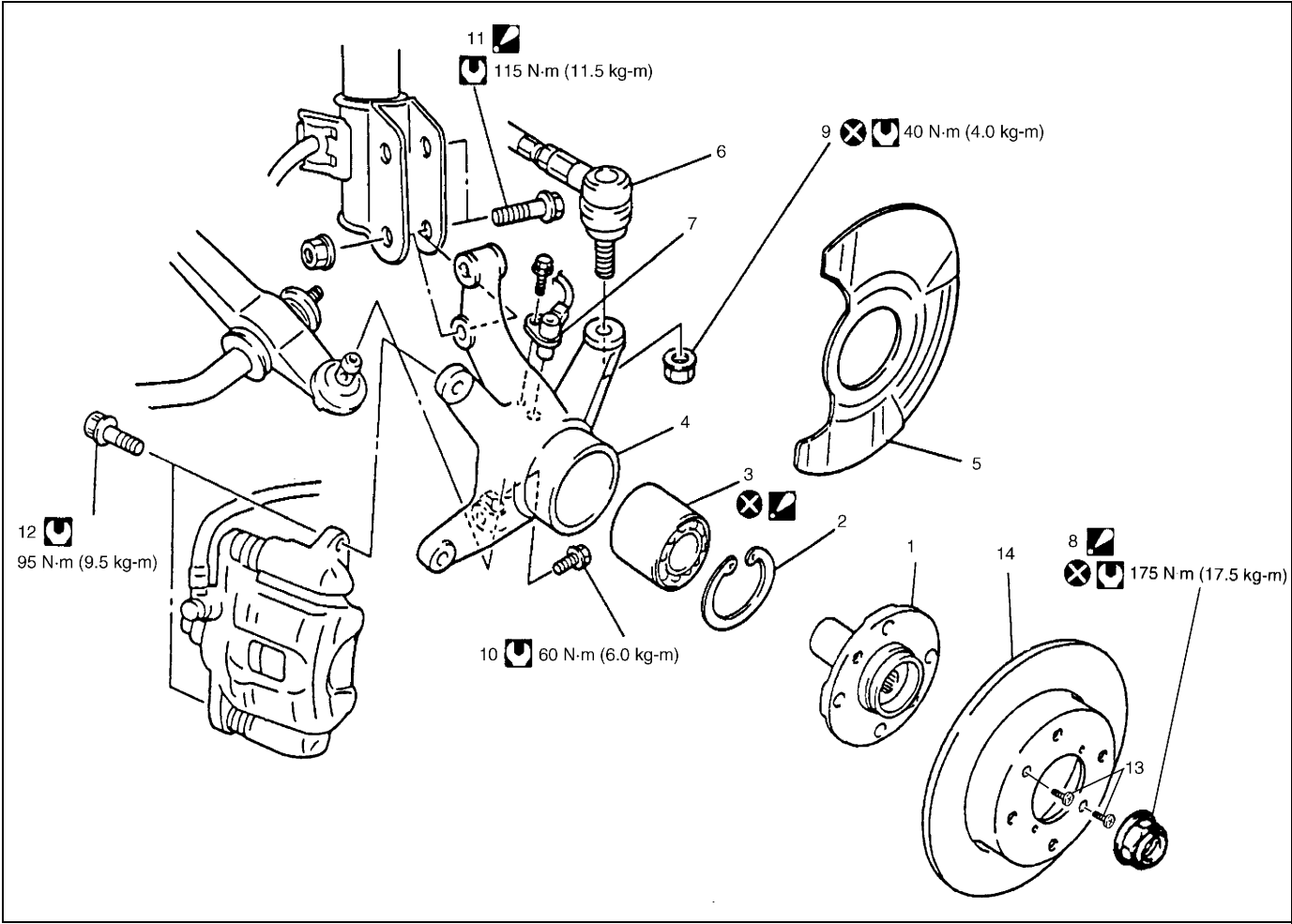
Strut bracket bolt: 115 N·m (11.5 kg-m, 83.5 lb-ft)



- Install wheel and tighten wheel bolts to specified torque.
- Tightening torque**
- Wheel bolt (a) 95 N·m (9.5 kg·m, 69.0 lb·ft)**
- Confirm front end (wheel) alignment, referring to Section 3A.

Steering Knuckle / Bearing

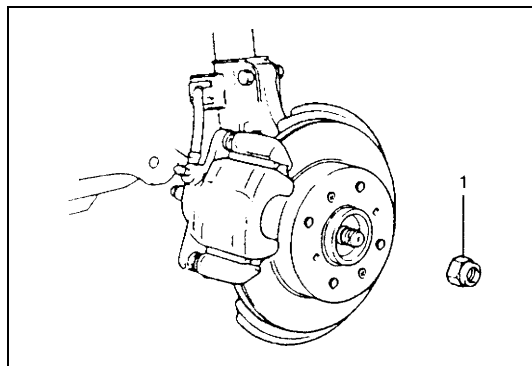
Components



1. Wheel hub	5. Dust cover	9. Tie-rod end nut	13. Brake disk screw
2. Circlip	6. Tie-rod end	10. Control arm ball stud bolt	14. Brake disc
3. Wheel bearing: Face grooved rubber seal side to wheel hub.	7. Wheel speed sensor (if equipped)	11. Strut bracket bolt: Insert from the direction as shown.	Tightening torque
4. Steering knuckle	8. Drive shaft nut: Calk, after tightening.	12. Brake caliper carrier bolt	Do not reuse.

Removal

- 1) Hoist vehicle and remove wheel.
- 2) Uncaulk drive shaft nut (1).
- 3) Depress foot brake pedal and hold it there. Remove drive shaft nut.



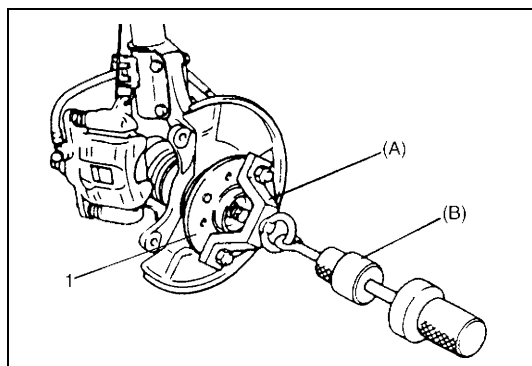
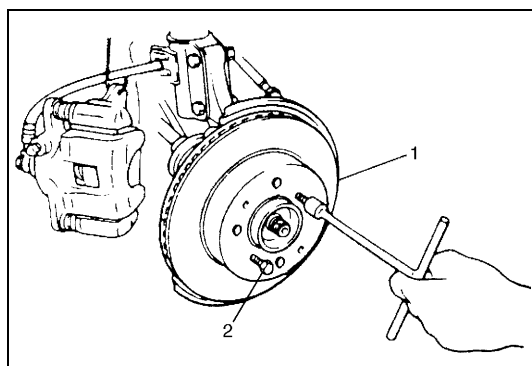
- 4) Remove caliper carrier bolts.
- 5) Remove caliper with carrier.

NOTE:

Hang removed caliper with a wire hook of the like so as to prevent brake hose from bending and twisting excessively or being pulled.

Don't operate brake pedal with pads removed.

- 6) Remove brake disk screws.
- 7) Pull brake disc (1) off by using two 8 mm bolts (2).

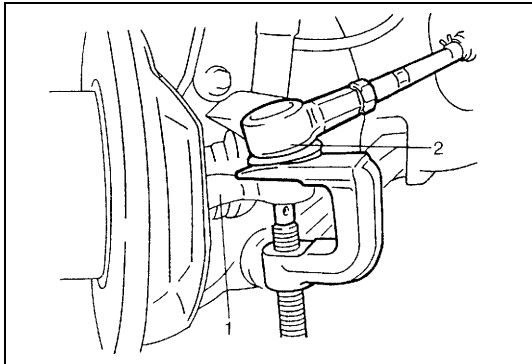


- 8) Pull out wheel hub (1) with special tools.

Special tool

(A): 09943-17912

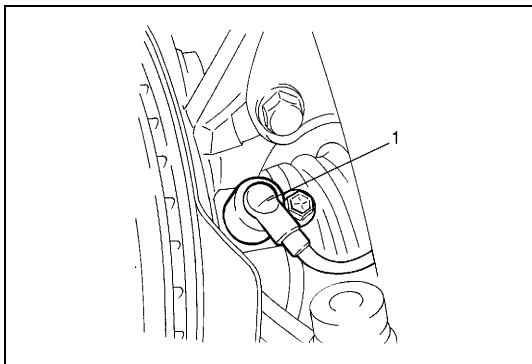
(B): 09942-15511



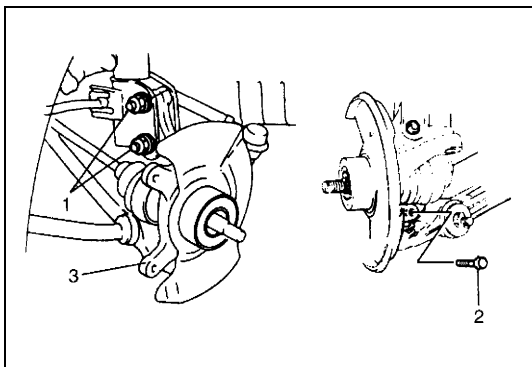
- 9) Remove tie-rod end nut and disconnect tie-rod end (2) from knuckle (1) with puller.

CAUTION:

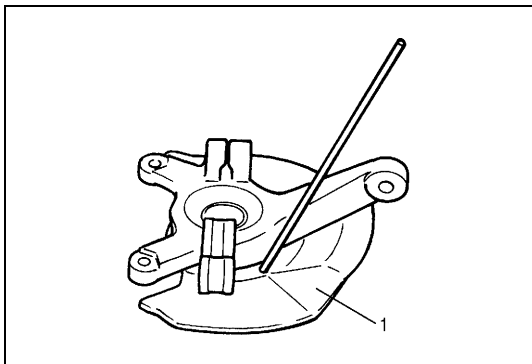
- Never reuse tie-rod end nut.
- Reused nut will not be locked securely.



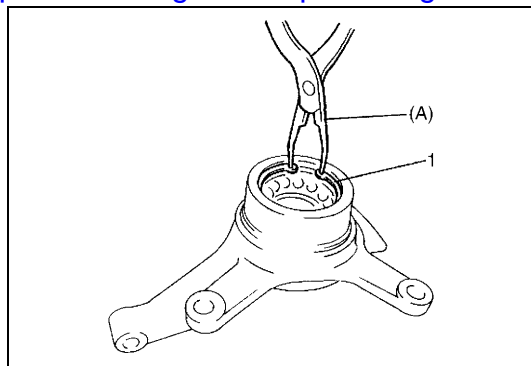
- 10) Remove wheel speed sensor (1) from knuckle (if equipped).



- 11) Remove strut bracket bolts (1) from strut bracket and then control arm ball stud bolt (2).
- 12) Remove knuckle (3).

Disassembly

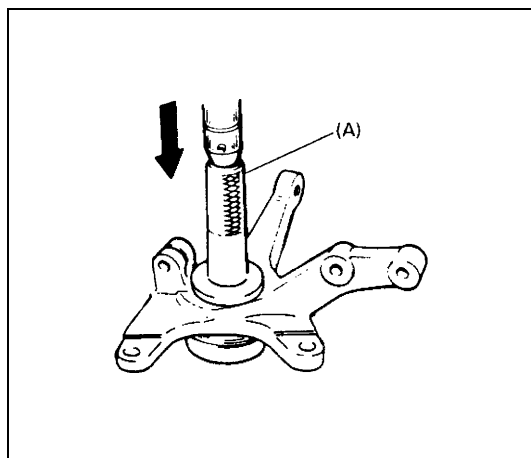
- 1) Uncaulk and remove dust cover (1).



2) Remove circlip (1).

Special tool

(A): 09900-06108



3) Remove wheel bearing using special tool and hydraulic press.

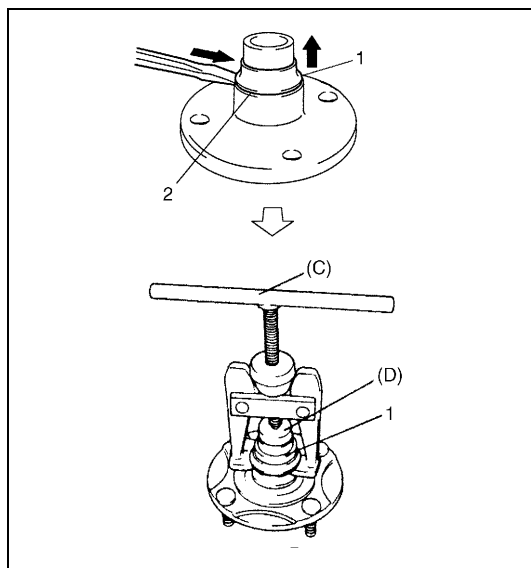
Special tool

(A): 09913-75810 (for gasoline engine model)

(A): 09913-85210 (for diesel engine model)

CAUTION:

- Never reuse wheel bearing.
- When replacing bearing, inner races or outer race, be sure to replace them with new ones as a set.



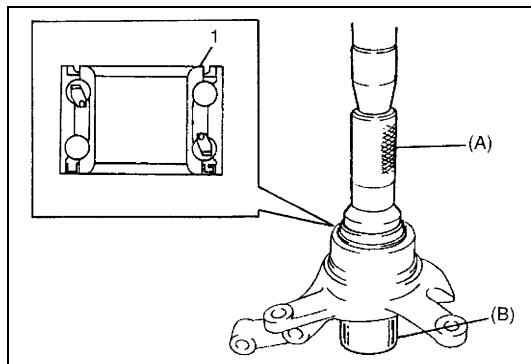
4) Remove wheel bearing outside inner race (1) as shown by hammering lightly at 3 locations around it so as not to cause damage to seating part (2) of wheel hub.

Special tool

(C): 09913-61110

(D): 09925-88210

Assembly



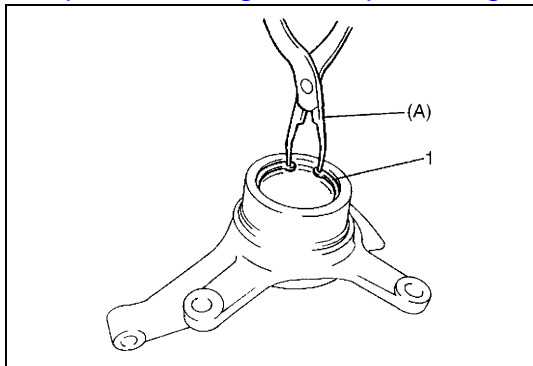
1) Face grooved rubber seal side (1) of new wheel bearing upward as shown and press-fit new wheel bearing into knuckle using special tools.

Special tool

(A): 09913-75520 (for gasoline engine model)

(A): 09913-75510 (for diesel engine model)

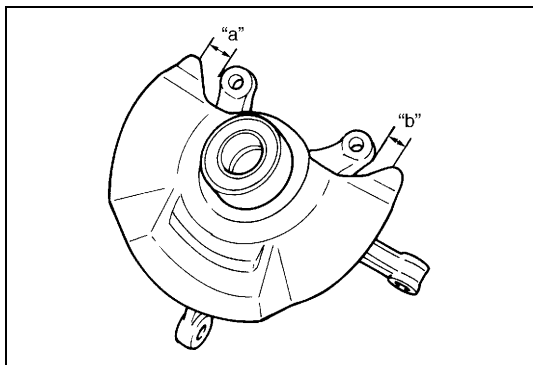
(B): 09951-18210



2) Install circlip (1).

Special tool

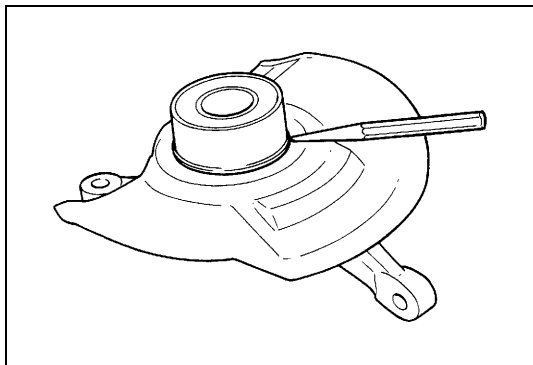
(A): 09900-06108



3) Drive in dust cover (1) so that dimensions "a" and "b" become equal as shown.

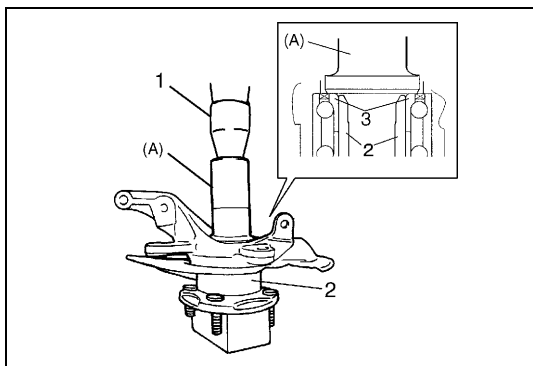
CAUTION:

When drive in dust cover, be careful not to deform it.



4) Caulk with a punch.

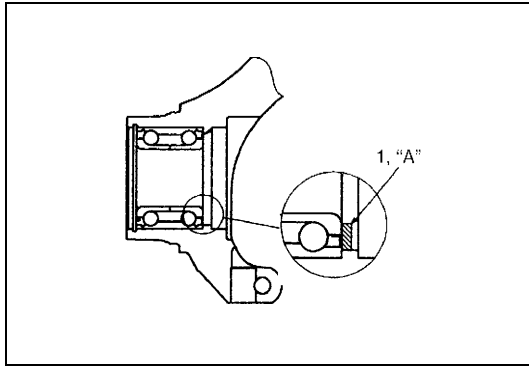
Installation



1) Using special tools and hydraulic press (1), drive wheel hub (2) into wheel bearing (3) as shown.

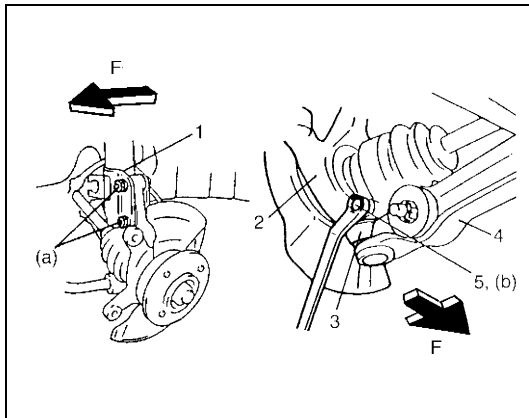
Special tool

(A): 09913-75810



- Apply grease lightly to contact part (1) of wheel bearing and drive shaft.

“A”: Grease 99000-25050



- 2) Install knuckle (2) to ball stud (3) on suspension control arm (4) and strut bracket (1). Installing direction of each bolt is as shown.

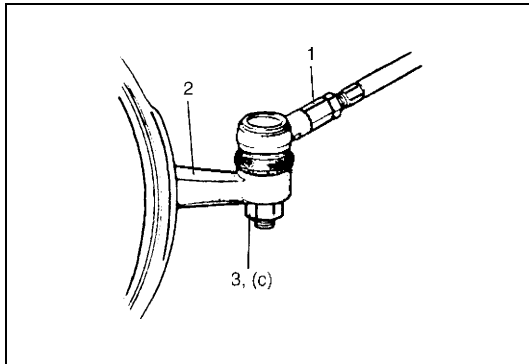
Align knuckle bolt hole with ball stud groove and install control arm ball stud bolt (5). Tighten each bolt and nuts to specified torque.

Tightening torque

Strut bracket bolt (a): 115 N·m (11.5 kg-m, 83.5 lb-ft)

Control arm ball stud bolt (b): 60 N·m (6.0 kg-m, 43.5 lb-ft)

F. Forward

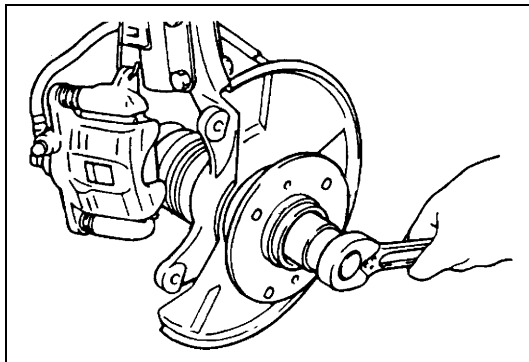


- 3) Install wheel speed sensor (if equipped).
- 4) Connect tie-rod end (1) to knuckle (2) and install new tie-rod end nut.

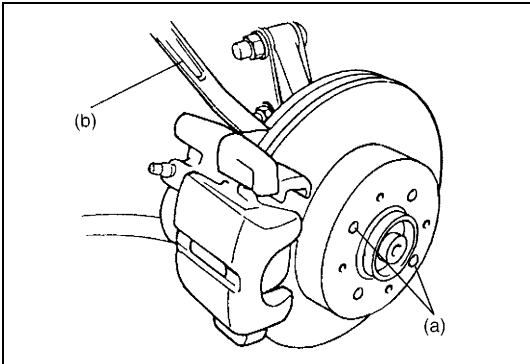
Tighten tie-rod end nut (3) to specified torque.

Tightening torque

Tie-rod end nut (c): 40 N·m (4.0 kg-m, 29.0 lb-ft)



- 5) Tighten new drive shaft nut temporarily.

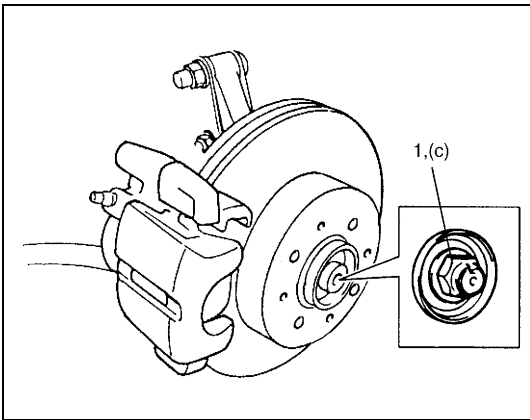


- 6) Install brake disc.
- 7) Tighten brake disc screws.

Tightening torque
Brake disc screw (a): 9 Nm (0.9 kg-m, 6.5 lb-ft)

- 8) Install brake caliper/caliper carrier.
- 9) Tighten caliper carrier bolts to specified torque.

Tightening torque
Brake caliper carrier bolt (b): 95 N-m (9.5 kg-m, 69.0 lb-ft)



- 10) Depress foot brake pedal and hold it there.
Tighten new drive shaft nut (1) to specified torque.

Tightening torque
Drive shaft nut (c): 175 N-m (17.5 kg-m, 127.0 lb-ft)

- 11) Calk drive shaft nut as shown.

CAUTION:
Be careful while caulking nut so that no crack will occur in caulked part of nut. Cracked nut must be replaced with new one.

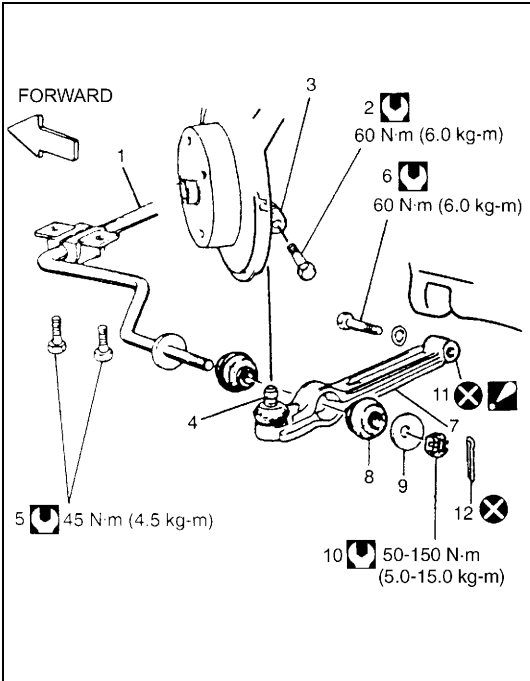
- 12) Install wheel and tighten wheel bolts to specified torque.

Tightening torque
Wheel bolt: 95 N-m (9.5 kg-m, 69.0 lb-ft)

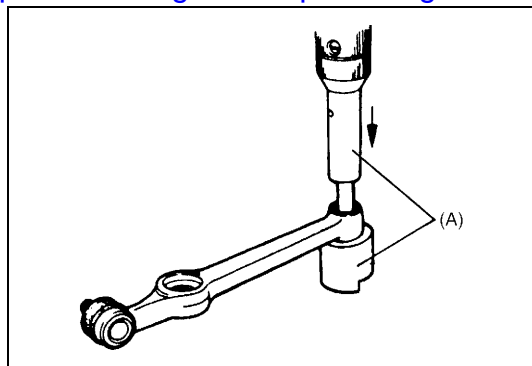
Suspension Control Arm / Bushing

Removal

- 1) Hoist vehicle and remove wheel referring to “Wheel Removal” in Section 3F.
- 2) Remove split pin (12), stabilizer bar nut (10), washer (9) and bushing (8).
- 3) Remove stabilizer bar mount bracket (right & left) bolts (5).
- 4) Remove ball stud bolt (2).
- 5) Remove suspension Control arm mounting bolt (6) and washer.
- 6) Remove suspension control arm (7).



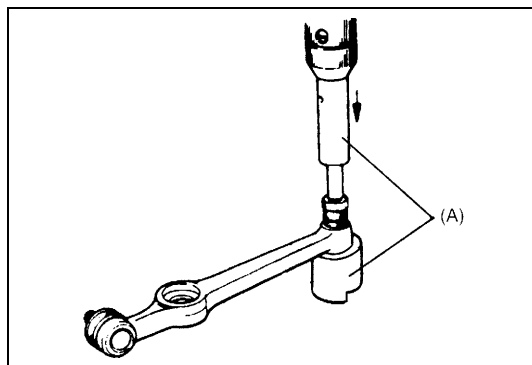
1. Stabilizer bar	8. Stabilizer bar bushing
2. Control arm ball stud bolt	9. Washer
3. Knuckle	10. Stabilizer bar nut
4. Ball stud	11. Suspension control arm bushing: Before installing, apply soap water.
5. Stabilizer bar bracket bolt	12. Split pin
6. Control arm mounting bolt	Tightening torque
7. Suspension control arm	Do not reuse.



- 7) Remove bushing.
Place suspension control arm onto flat surface side of special tool and push out bushing with special tool and oil hydraulic press as shown.

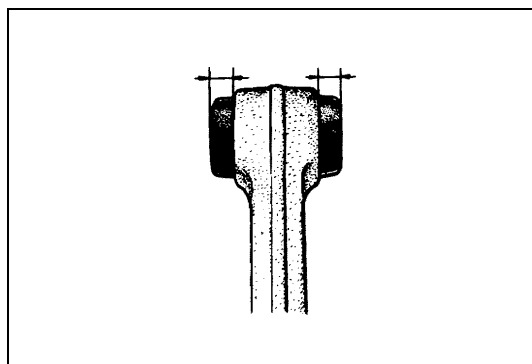
Special tool
(A): 09943-77910

Installation



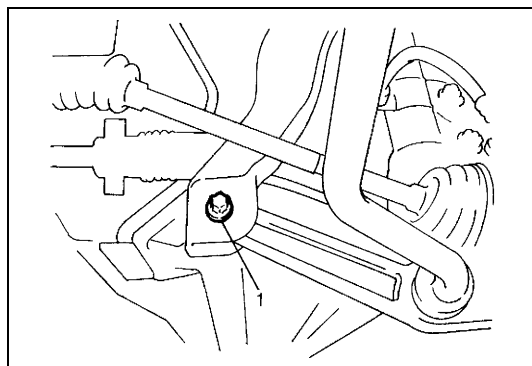
- 1) Place suspension control arm onto flat surface side of special tool and install new bushing with special tool and oil hydraulic press as shown.

Special tool
(A): 09943-77910

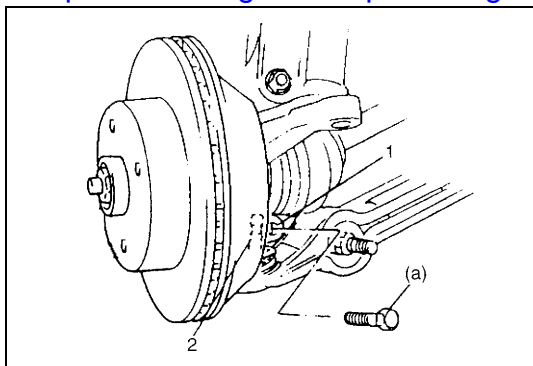


NOTE:

- Before installing bushing, apply soap water on its circumference to facilitate installation.
- When installed, bush should be equal on the right and left of arm as shown.



- 2) Install suspension control arm to vehicle body and tighten suspension Control arm mounting bolt (1) and washer temporarily.

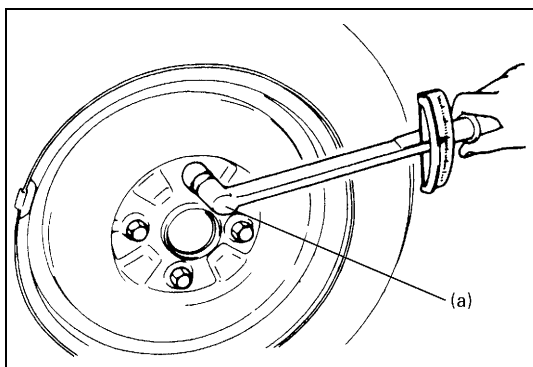


- 3) Install ball stud (2) to knuckle (1). Align ball stud groove with knuckle bolt hole as shown.
Then install ball stud bolt from the direction as shown.
Tighten control arm ball stud bolt to specified torque.

Tightening torque

Control arm ball stud bolt

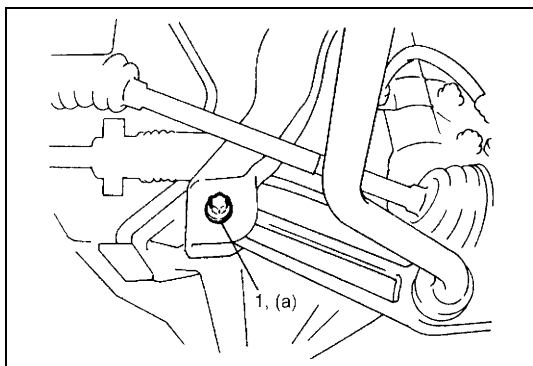
(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)



- 4) Install wheel and tighten wheel bolts to specified torque.

Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



- 5) Lower hoist and vehicle in non-loaded condition, tighten control arm mounting bolt (1) to specified torque.

Tightening torque

Control arm mounting bolt (a): 60 N·m (6.0 kg-m, 43.5 lb-ft)

- Install stabilizer bar, referring to “Stabilizer Bar Installation” in this section.

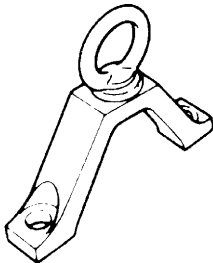
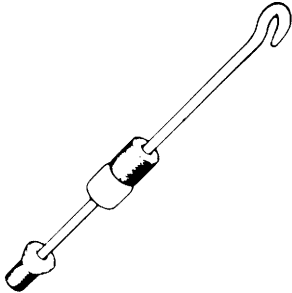
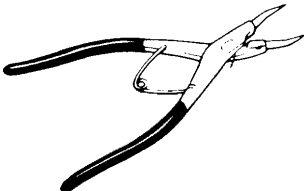
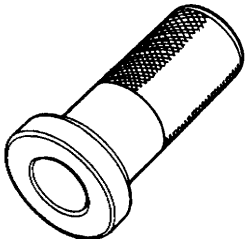
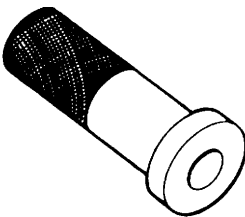
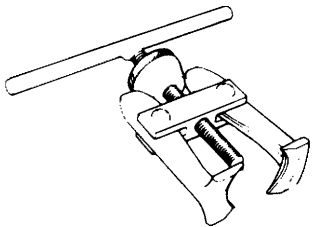
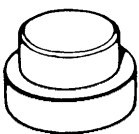
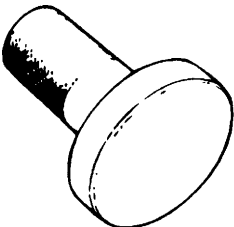
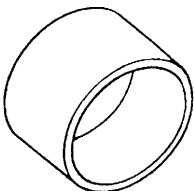
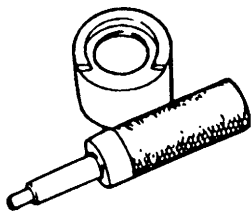
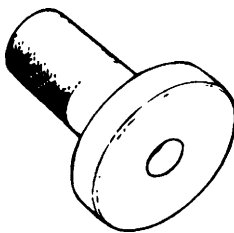
Tightening Torque Specifications

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Brake caliper carrier bolt	95	9.5	69.0
Brake disk screw	9	0.9	6.5
Castle nut	50 – 150	5.0 – 15.0	36.5 – 108.5
Control arm ball stud bolt	60	6.0	43.5
Control arm mounting bolt	60	6.0	43.5
Drive shaft nut	175	17.5	127.0
Stabilizer bar bracket bolt	45	4.5	32.5
Strut bracket bolt	115	11.5	83.5
Strut support nut	23	2.3	17.0
Tie-rod end nut	40	4.0	29.0
Wheel bolt	95	9.5	69.0

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium Grease (Should be applicable for -40 °C – 130 °C or -40 °F – 266 °F)	SUZUKI SUPER GREASE (E) (99000-25050)	• Wheel bearing

Special Tool

 <p>09943-17912 Front wheel hub remover</p>	 <p>09942-15511 Sliding hammer</p>	 <p>09900-06108 Snap ring pliers (closing type)</p>	 <p>09913-75810 Bearing installer (for gasoline engine model)</p>
 <p>09913-85210 (for diesel engine model)</p>	 <p>09913-61110 Bearing puller</p>	 <p>09925-88210 Bearing puller attachment</p>	 <p>09913-75510 Bearing installer (for diesel engine model)</p>
 <p>09951-18210 Remover booster body oil No.2</p>	 <p>09943-77910 Suspension lower arm bush remover</p>	 <p>09913-75520 Bearing installer (for gasoline engine model)</p>	

SECTION 3E

REAR SUSPENSION

WARNING:

Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.

Leave a bolt at least not to drop the wheel.

Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

NOTE:

- All suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any suspension part. Replace it with a new part, or damage to the part may result.
- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

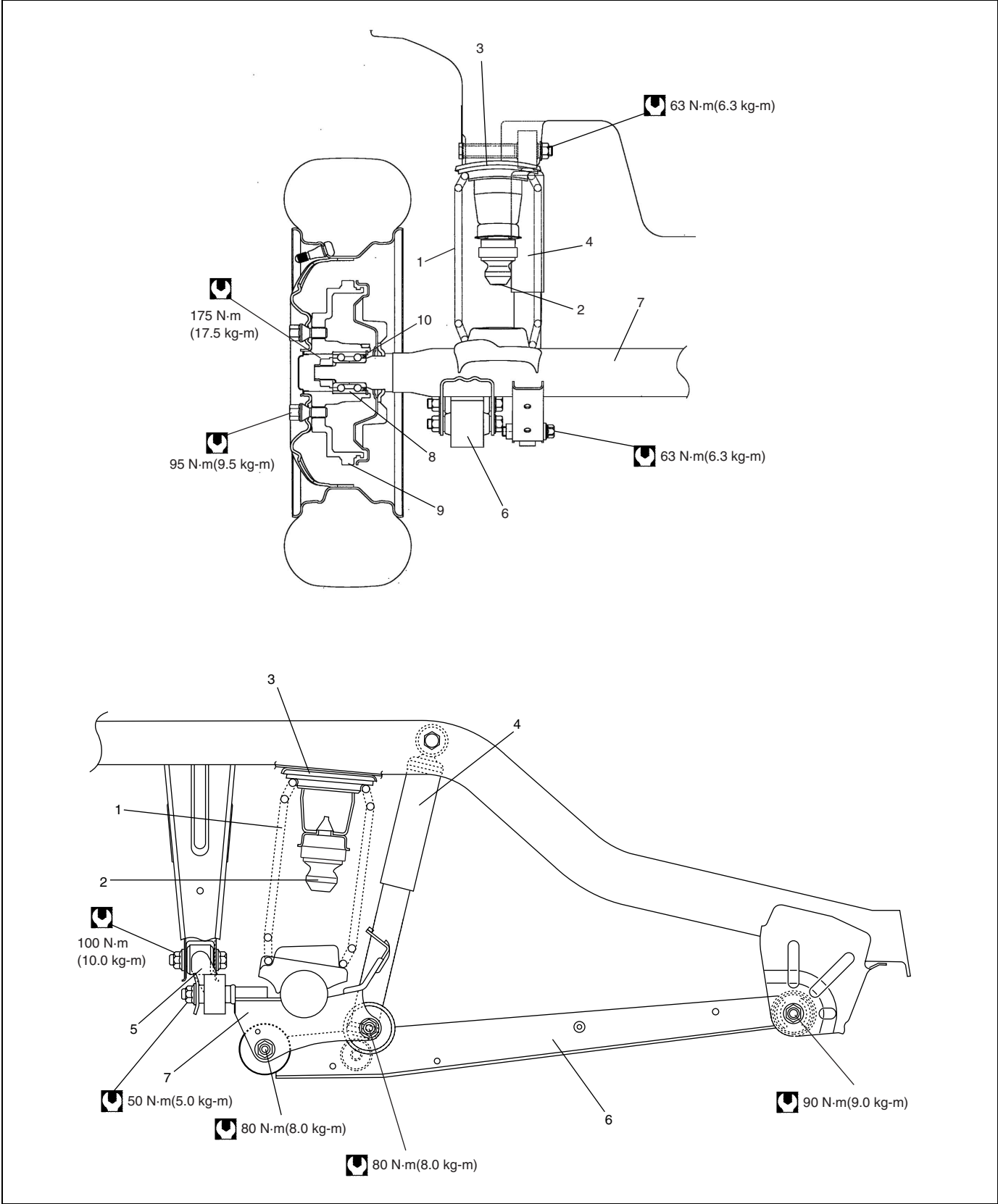
3E

CONTENTS

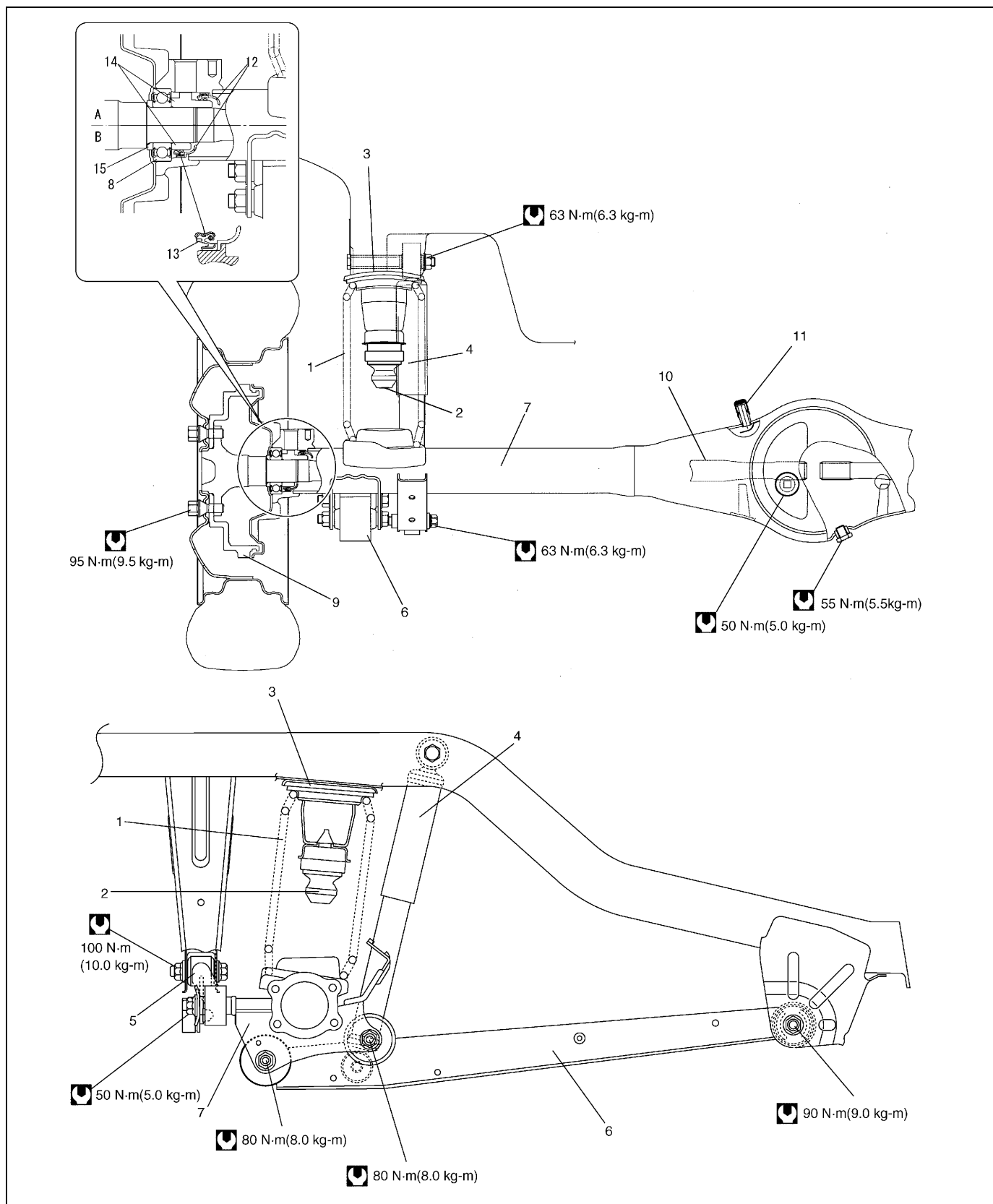
General Description	3E-2	Rear Axle (for 2WD Model)	3E-11
Diagnosis	3E-4	Wheel Bearing (for 2WD Model)	3E-13
Wheel Disc, Bolt and Bearing Check	3E-4	Rear Axle Shaft and Wheel Bearing (for 4WD Model)	3E-15
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Trailing Arm.....	3E-9		

General Description

2WD model



1. Rear coil spring	4. Rear shock absorber	7. Rear axle	10. Circlip
2. Rear bump stopper	5. Lateral rod	8. Wheel bearing	Tightening torque
3. Rear spring upper seat	6. Trailing arm	9. Brake drum	



A: With ABS	4. Rear shock absorber	9. Brake drum	14. Wheel bearing retainer ring or rear wheel sensor ring (if equipped with ABS)
B: Without ABS	5. Lateral rod	10. Rear axle shaft	15. Spacer
1. Rear coil spring	6. Trailing arm	11. Breather cap	Tightening torque
2. Rear bump stopper	7. Rear axle housing	12. Oil seal protector	
3. Rear spring upper seat	8. Wheel bearing	13. Oil seal	

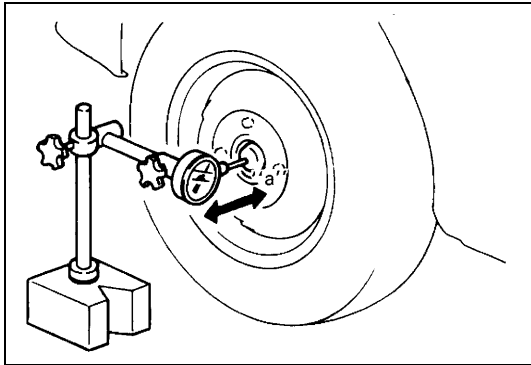
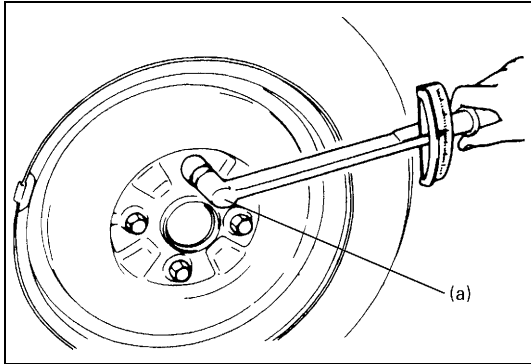
Diagnosis

Wheel Disc, Bolt and Bearing Check

- Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.
- Check wheel bolts for tightness and, as necessary, retighten to specification.

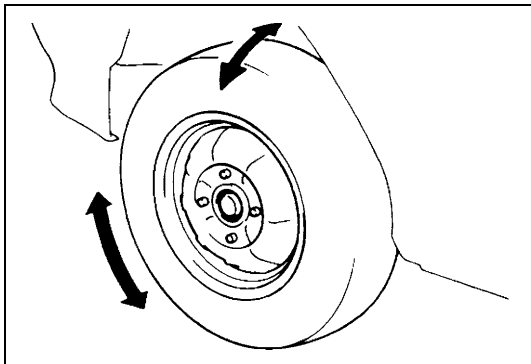
Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



- Check wheel bearings for wear. When measuring thrust play, apply a dial gauge to spindle cap center. When measurement exceeds limit, replace bearing.

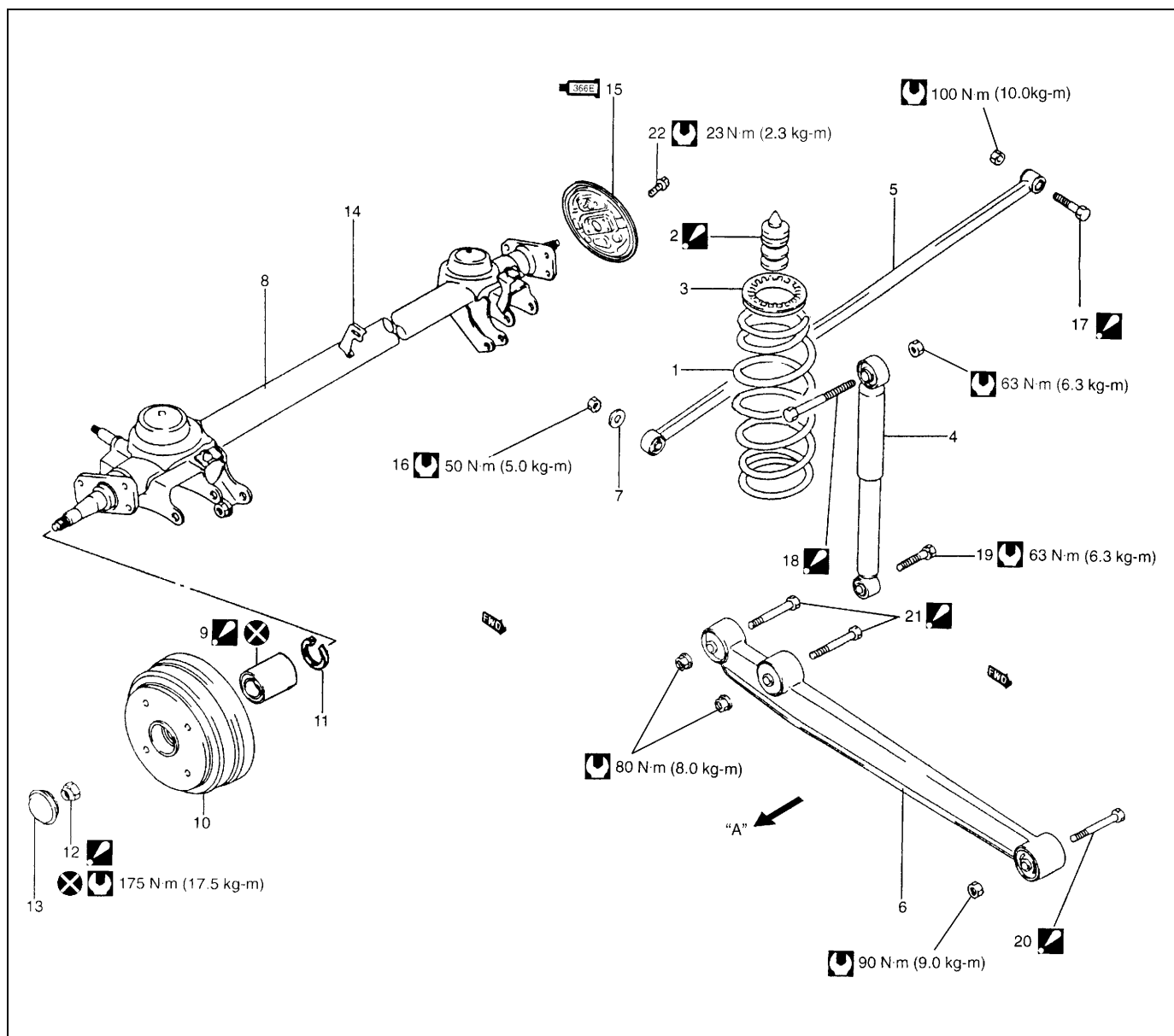
Thrust play limit "a": 0.1 mm (0.004 in.)



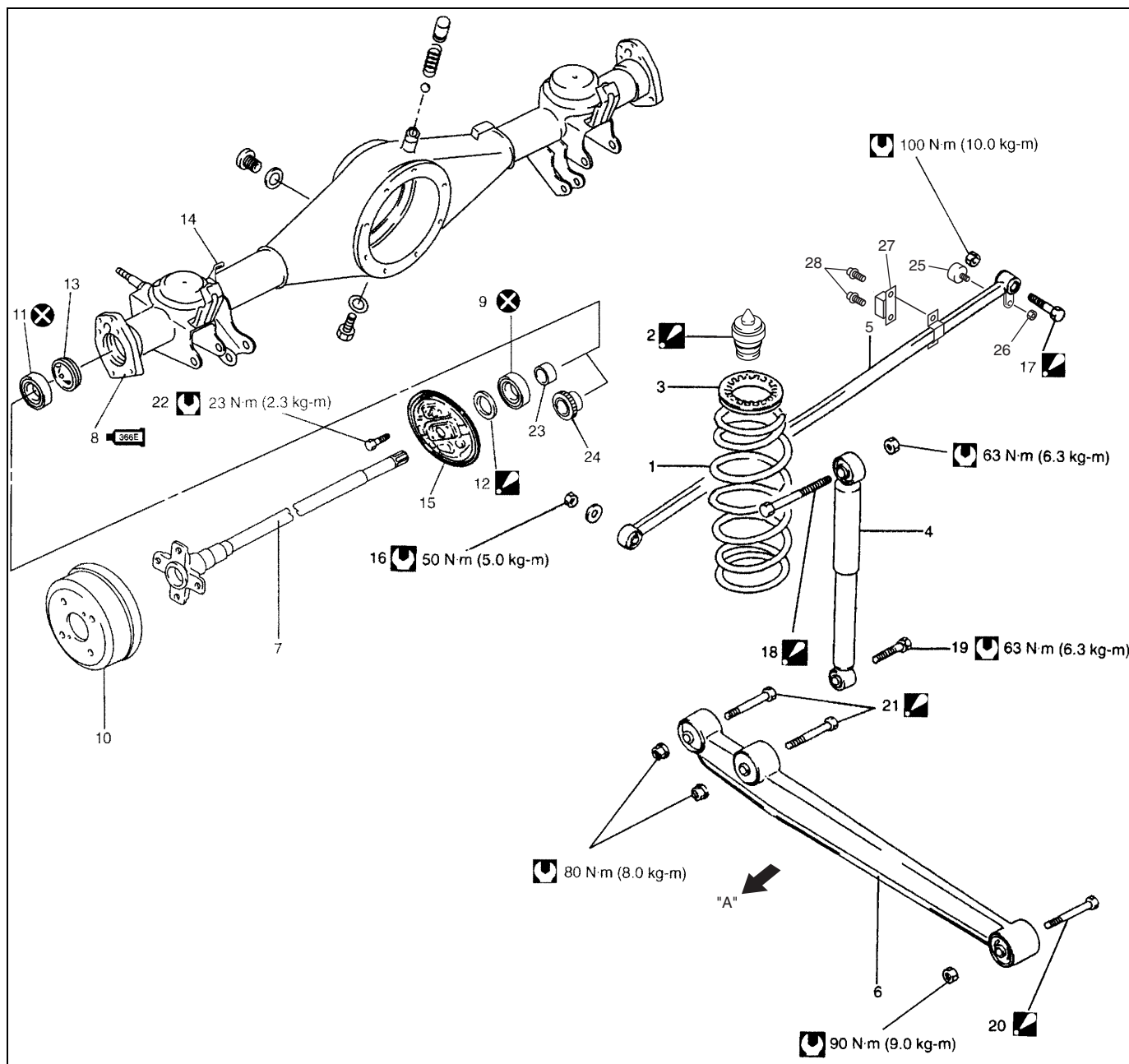
- By rotating wheel actually, check wheel bearing for noise and smooth rotation. If it is defective, replace bearing.

On-Vehicle Service

2WD model



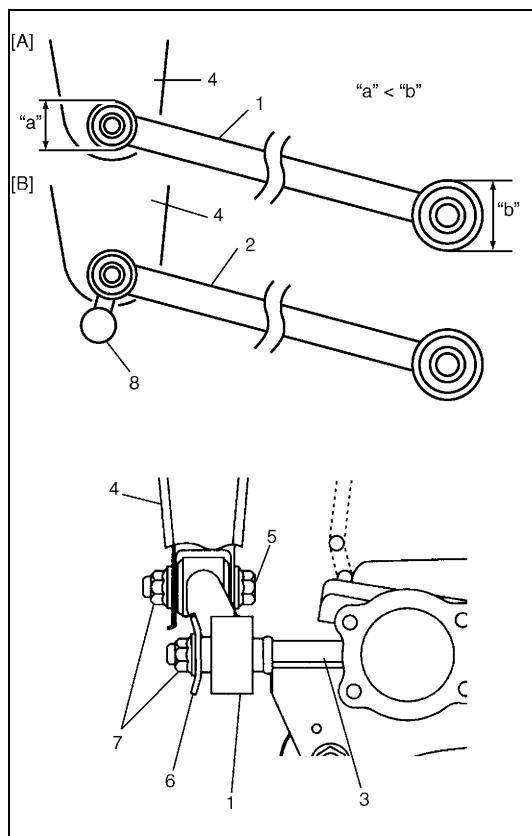
"A": Body outside	7. Lateral rod outer washer	14. LSPV bracket (only vehicle with LSPV)	21. Trailing arm rear bolt: Insert from vehicle inside.
1. Rear coil spring	8. Rear axle	15. Brake back plate: Apply water tight sealant 99000-31090 to joint of plate and axle.	22. Brake back plate bolt
2. Rear bump stopper: Apply soap water, when installing.	9. Bearing: Seal side of bearing comes brake back plate side.	16. Lateral rod axle side nut	Tightening torque
3. Rear spring upper seat	10. Brake drum	17. Lateral rod body side bolt: Insert from the direction as shown.	Do not reuse.
4. Rear shock absorber	11. Circlip	18. Shock absorber upper bolt: Insert from vehicle outside.	
5. Lateral rod	12. Spindle nut: Caulk, after tightening.	19. Shock absorber lower bolt	
6. Trailing arm	13. Spindle cap	20. Trailing arm front bolt: Insert from vehicle inside.	



"A": Body outside	11. Oil seal	22. Brake back plate bolt
1. Rear coil spring	12. Spacer: The tapered side of spacer inner diameter directed toward outside (brake drum side).	23. Bearing retainer ring (without ABS)
2. Rear bump stopper: Apply soap water, when installing.	13. Oil seal protector	24. Bearing retainer ring (with ABS)
3. Rear spring upper seat	14. LSPV bracket (only vehicle with LSPV)	25. Lateral rod dumper
4. Rear shock absorber	15. Brake back plate	26. Lateral rod dumper nut
5. Lateral rod	16. Lateral rod axle housing side nut	27. Lateral rod dumper
6. Trailing arm	17. Lateral rod body side bolt: Insert from the direction as shown.	28. Lateral rod dumper bolt
7. Rear axle shaft	18. Shock absorber upper bolt: Insert from vehicle outside.	Tightening torque
8. Rear axle housing: Apply water tight sealant 99000-31090 to joint of plate and axle housing.	19. Shock absorber lower bolt	Do not reuse.
9. Bearing	20. Trailing arm front bolt: Insert from vehicle inside.	
10. Brake drum	21. Trailing arm rear bolt: Insert from vehicle inside.	

Lateral Rod

Installation



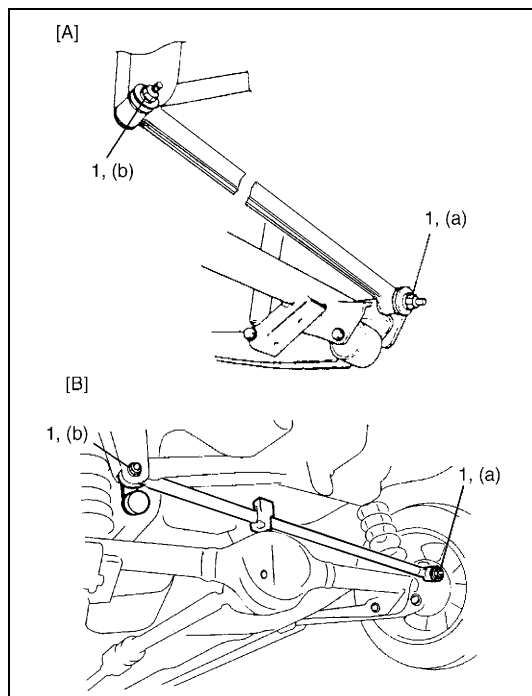
- 1) Install lateral rod (1) or (2) to rear axle (or axle housing) (3) and vehicle body (4) referring to figure for proper installing direction of bolt (5) and washer (6). Tighten nuts (7) temporarily at this step.

NOTE:

- When installing Rod (1) for 2WD, identify rod end by smaller diameter "a" and install that end to vehicle body side.
- When installing rod (2) for 4WD, identify rod end by damper (8) and install that end to vehicle body side. Also make sure that both dampers are directed rearward of vehicle.

[A]: 2WD model

[B]: 4WD model



- 2) Lower hoist.

- 3) Tighten lateral rod nuts (1) to specified torque. It is the most desirable to have vehicle off hoist and in non-loaded condition when tightening them.

Tightening torque

Lateral rod nut (axle side) (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

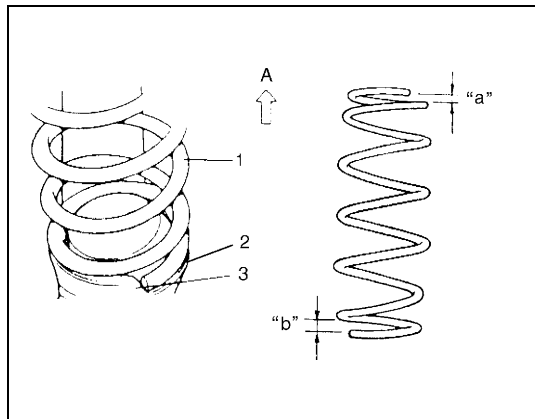
Lateral rod nut (body side) (b): 100 N·m (10.0 kg-m, 72.5 lb-ft)

[A]: 2WD model

[B]: 4WD model

Coil Spring

Installation

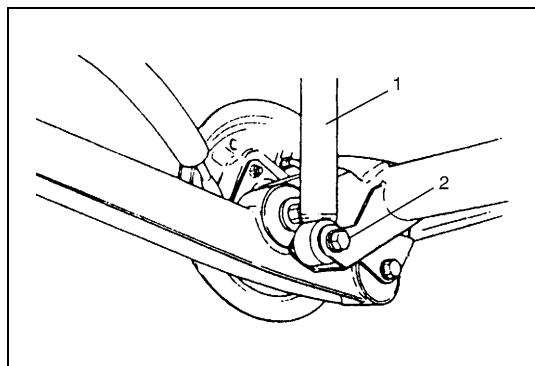


- 1) Install coil springs (1) (right & left) on spring seat (2) of rear axle as shown in figure and then raise rear axle.

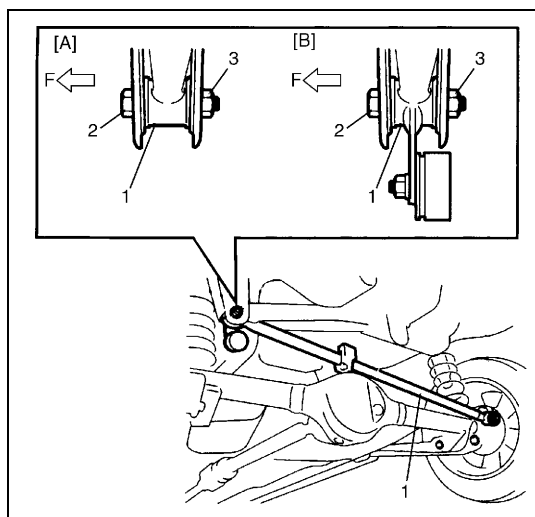
NOTE:

When seating coil spring (1), mate spring end with stepped part (3) of rear axle spring seat as shown.

A. Upper side
"a": Small
"b": Large



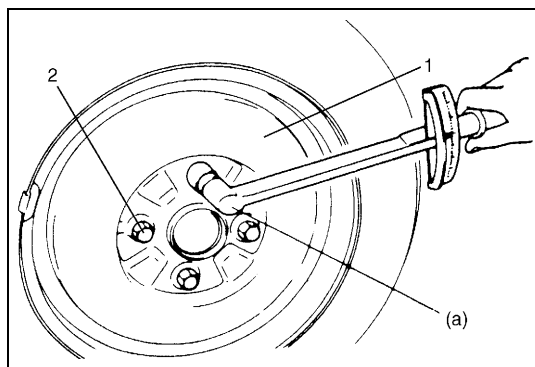
- 2) Install shock absorber (1) lower side to rear axle (or axle housing).
Tighten shock absorber lower bolt (2) temporarily by hand at this step.



- 3) Install lateral rod (1) to vehicle body, referring to the figure for proper installing direction of bolt (2).
Tighten nut (3) temporarily by hand at this step.
- 4) Remove floor jack from rear axle (or axle housing).

[A]: 2WD model
[B]: 4WD model
F: Forward

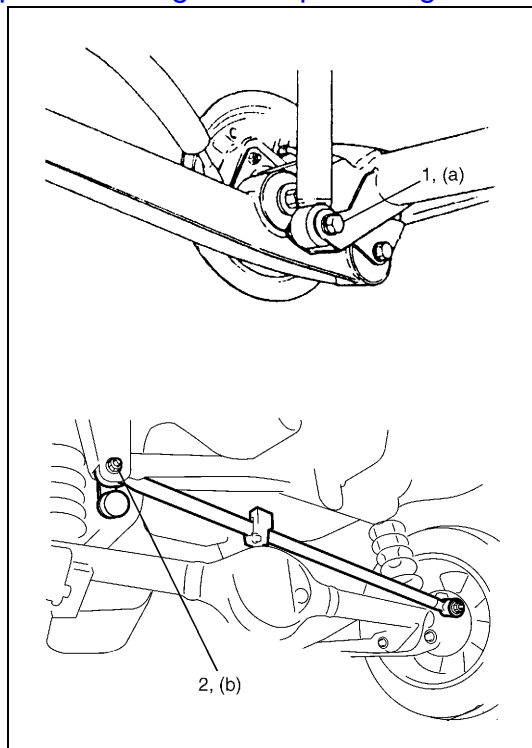
- 5) Install brake flexible hose E-ring.
- 6) Install LSPV spring to rear axle. Tighten LSPV adjust nut temporarily at this step (if equipped with LSPV).



- 7) Install wheel (1) and tighten wheel bolts (2) to specified torque.

Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg·m, 69.0 lb·ft)



- 8) Lower hoist and vehicle in non-loaded condition, tighten absorber lower bolt (1) and lateral rod body side nut (2) to specified torque.

Tightening torque

Rear shock absorber lower bolt

(a): 63 N·m (6.3 kg-m, 45.5 lb-ft)

Lateral rod nut (body side)

(b): 100 N·m (10.0 kg-m, 72.5 lb-ft)

- 9) If equipped with LSPV, check and adjust LSPV spring referring to "LSPV (Load Sensing Proportioning Valve) Inspection and Adjustment" in Section 5A and "Brake Fluid Pressure Test (if equipped with LSPV)" in Section 5.

Bump Stopper

Installation

- 1) Install bumper stopper.

NOTE:

Before installing bump stopper apply soap water on it.

- 2) Install wheel and tighten wheel bolts to specified torque.

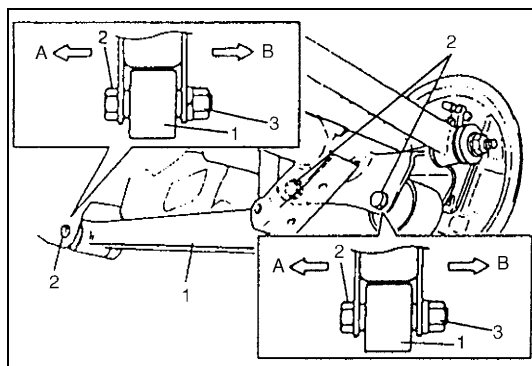
Tightening torque

Wheel bolt: 95 N·m (9.5 kg-m, 69.0 lb-ft)

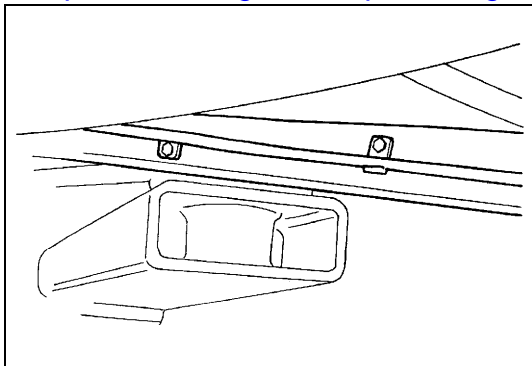
Trailing Arm

Installation

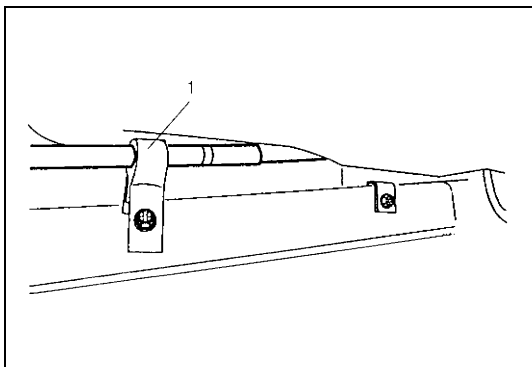
- 1) Install trailing arm (1) to vehicle body and rear axle, referring to figure for proper installing direction of bolts (2) and then tighten nuts (3) temporarily by hand.



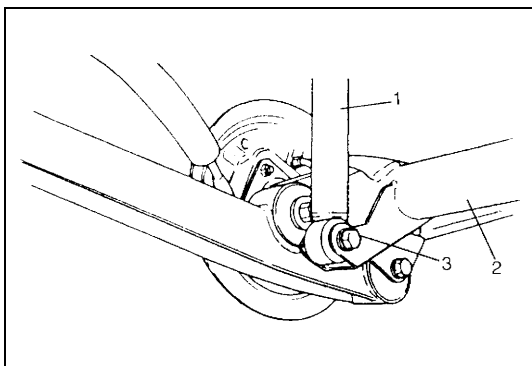
A.	Vehicle center side
B.	Vehicle outside



2) Install wheel speed sensor lead wire clamp, if equipped.



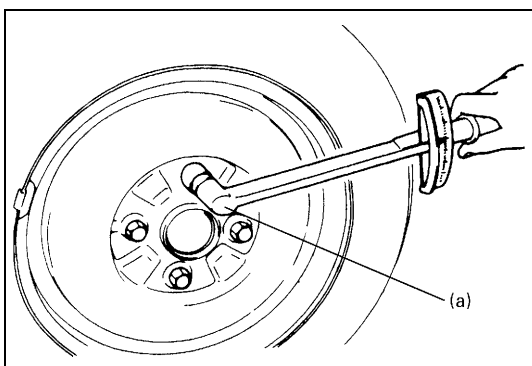
3) Install parking brake cable clamp (1).



4) Install shock absorber (1) to rear axle (2).

5) Tighten shock absorber lower bolt (3) temporarily by hand.

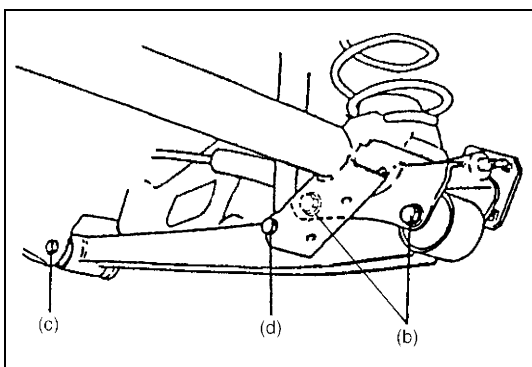
6) Remove floor jack from rear axle.



7) Install wheel and tighten wheel bolts to specified torque.

Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



8) Lower hoist and vehicle in non loaded condition, tighten trailing arm front and rear nuts and shock absorber lower bolt to specified torque.

Tightening torque

Trailing arm rear nut (b): 80 N·m (8.0 kg-m, 58.0 lb-ft)

Trailing arm front nut (c): 90 N·m (9.0 kg-m, 65.0 lb-ft)

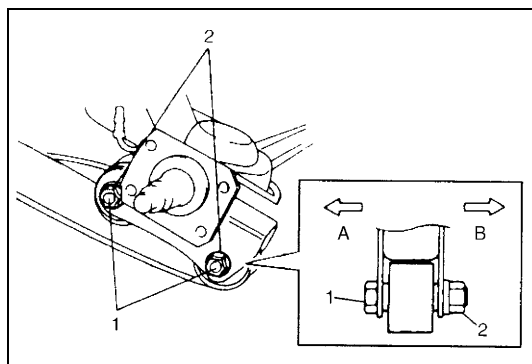
Shock absorber lower bolt (d): 63 N·m (6.3 kg-m, 45.5 lb-ft)

Rear Axle (for 2WD Model)

Installation

Install removed parts in reverse order of removal, noting the following points.

- 1) Place rear axle on floor jack. Then install lateral rod to rear axle and tighten nut temporarily by hand.



- 2) Install trailing arm rear bolts (1) (right & left) in proper direction as shown in figure. Then tighten nuts (2) temporarily by hand.

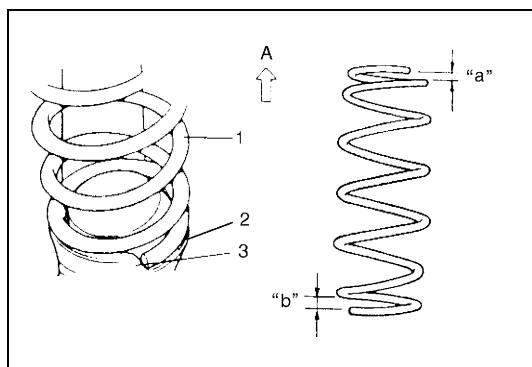
A.	Vehicle center side
B.	Vehicle outside

- 3) Install coil springs (1) (right & left) on spring seat (2) of rear axle as shown in figure and then raise rear axle.

NOTE:

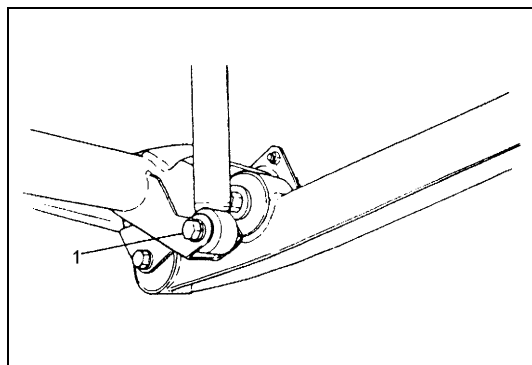
When seating coil spring (1), mate spring end with stepped part (3) of rear axle spring seat as shown.

A.	Upper side
"a".	Small
"b".	Large



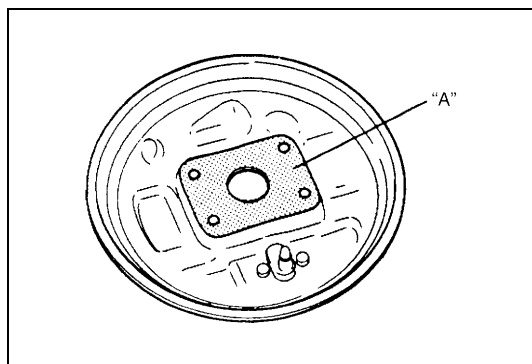
- 4) Tighten shock absorber lower bolts (1) (right & left) temporarily by hand.

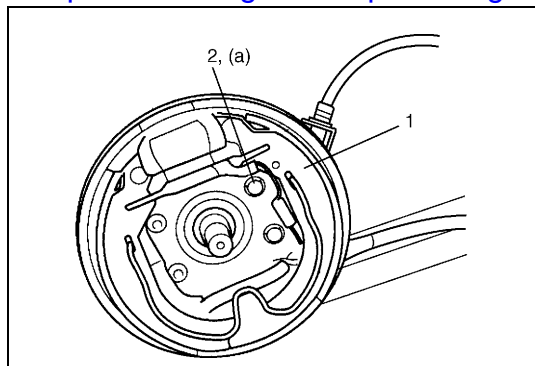
- 5) Remove floor jack from rear axle.



- 6) Clean mating surface of rear axle (right & left) with brake back plate and apply water tight sealant as shown in figure.

"A": Sealant 99000-31090

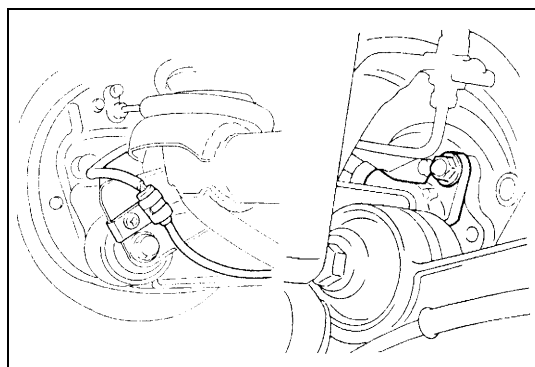




- 7) Install brake back plates (1) and tighten back plate bolts (2) to specified torque.

Tightening torque

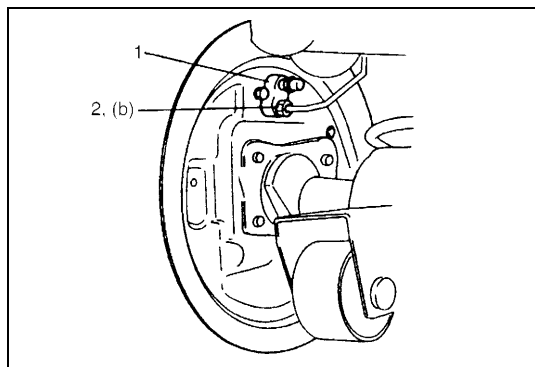
Brake back plate bolt (a): 23 N·m (2.3kg-m, 16.5 lb-ft)



- 8) Connect wheel speed sensor and lead wire clamps (right & left) (if equipped).

CAUTION:

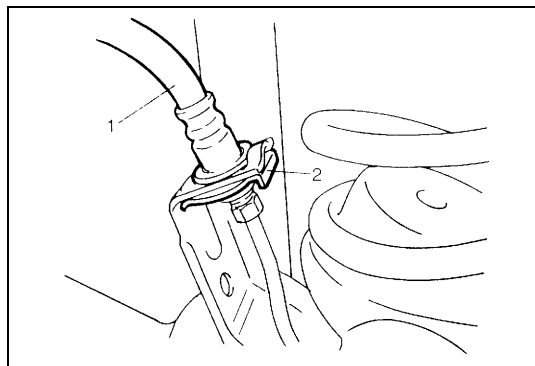
Since there are two holes on each side of rear axle, be sure to install wheel speed sensor at the position as shown in the figure.



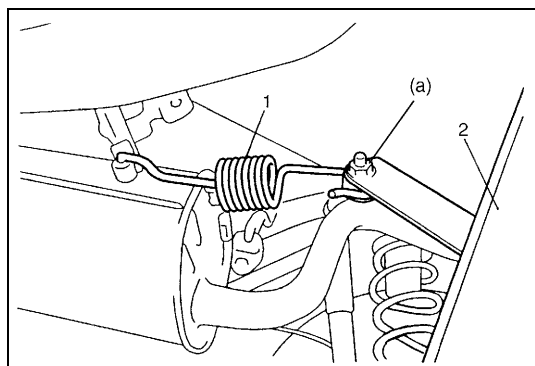
- 9) Connect brake pipes to wheel cylinders (1) (right & left) and tighten brake pipe flare nuts (2) to specified torque.

Tightening torque

Brake pipe flare nut (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)



- 10) Connect brake flexible hoses (1) (right & left) to bracket on rear axle and secure it with E-rings (2) (right & left).

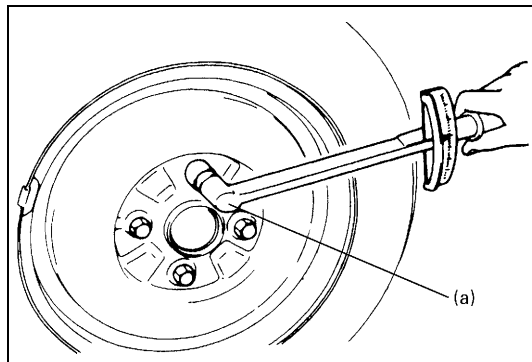


- 11) Install LSPV spring (1) to rear axle (2) (if equipped with LSPV).

Tightening torque

LSPV bolt (a): 26 N·m (2.6 kg-m, 19.0 lb-ft)

- 12) Install brake drums (right & left). For details, refer to steps 3) to 8) of "Brake Drum Installation" in Section 5C.
- 13) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, refer to Section 5.)



- 14) Install wheel and tighten wheel bolts to specified torque.

Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 15) Upon completion of all jobs, depress brake pedal with about 300 N (30 kg, 66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance. Adjust parking brake cable. (For adjustment, refer to Section 5.)
- 16) Install console box.
- 17) Lower hoist and bounce vehicle up and down several times to stabilize suspension.
- 18) Tighten right and left trailing arm rear nuts, shock absorber lower bolts and lateral rod rear axle side nut to specified torque.

NOTE:

When tightening these nuts and bolts, be sure that vehicle is off hoist and in non loaded condition.

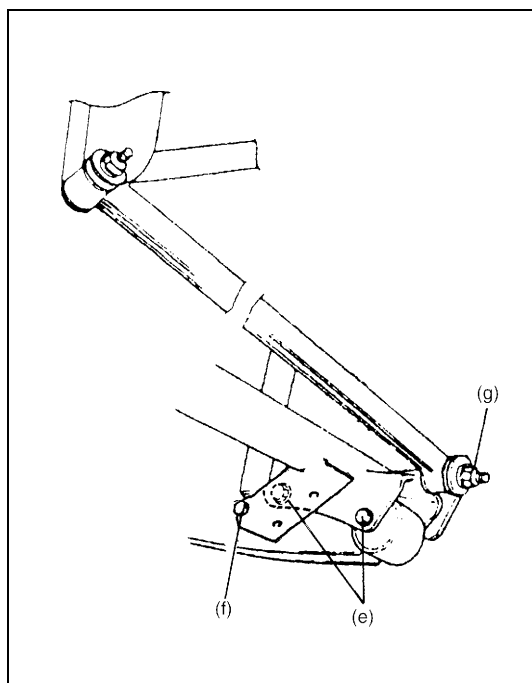
Tightening torque

Trailing arm rear nut

(e): 80 N·m (8.0 kg-m, 58.0 lb-ft)

Shock absorber lower bolt (f): 63 N·m (6.3 kg-m, 45.5 lb-ft)

Lateral rod nut (axle side) (g): 50 N·m (5.0 kg-m, 36.5 lb-ft)

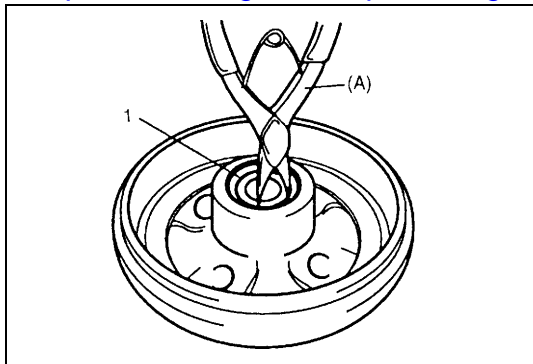


- 19) Check to ensure that brake drum is free from dragging and proper braking is obtained.
- 20) Perform brake test (foot brake and parking brake).

Wheel Bearing (for 2WD Model)

Removal

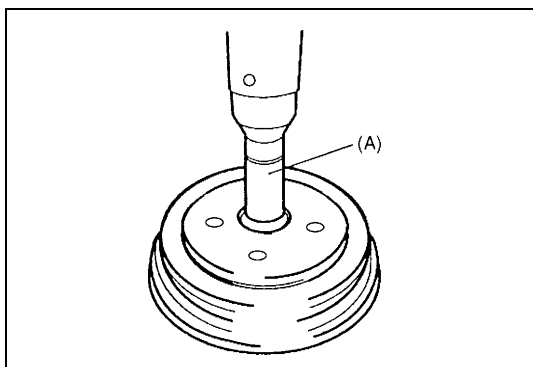
- 1) Remove rear brake drum, referring to "Rear Brake Drum Removal" in Section 5C.



2) Remove circlip (1).

Special tool

(A): 09900-06108



3) Remove wheel bearing by using special tool and hydraulic press.

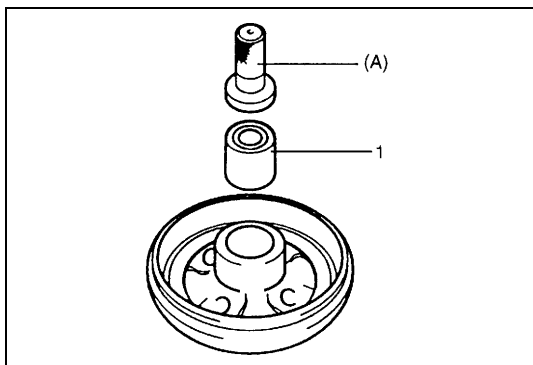
Special tool

(A): 09913-76010

CAUTION:

- Never reuse wheel bearing.
- Reused bearing should have excessive play.

Installation



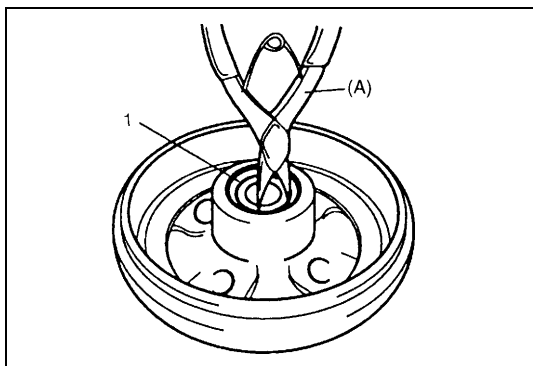
1) Install new wheel bearing (1) by using special tool and hydraulic press.

NOTE:

Seal side of bearing comes brake back plate side.

Special tool

(A): 09913-75810



2) Install circlip (1).

Special tool

(A): 09900-06108

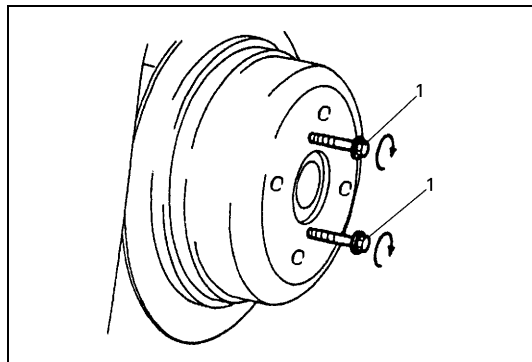
3) Install brake drum and wheel, referring to "Brake Drum" Installation in Section 5C.

Rear Axle Shaft and Wheel Bearing (for 4WD Model)

Removal

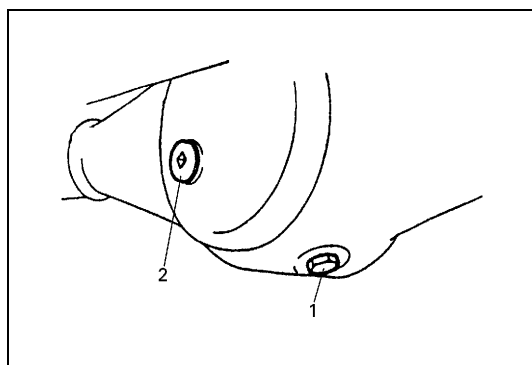
- 1) Hoist vehicle and remove rear wheels.
- 2) Remove brake drum screw and rear brake drum by using 8 mm bolts. For details referring to Section 5C.

1. 8 mm bolt

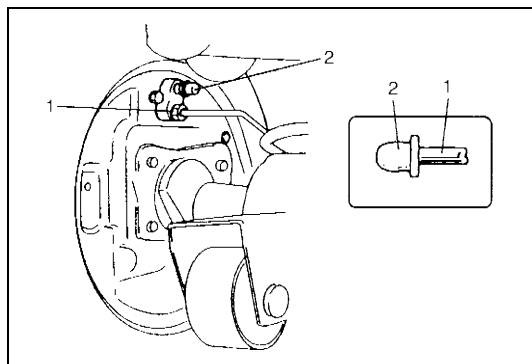


- 3) Drain gear oil from rear axle housing by loosening drain plug (1).

2. Filler and level plug



- 4) Remove brake shoe referring to "Brake Shoe" in Section 5C.
- 5) Remove parking brake cable from brake back plate.



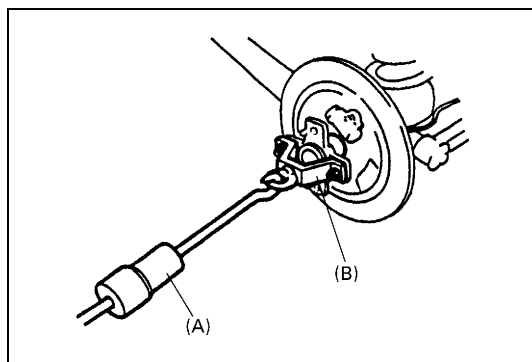
- 6) Disconnect brake pipe (1) from wheel cylinder and put wheel cylinder bleeder plug cap (2) onto pipe to prevent fluid from spilling.
- 7) Remove wheel speed sensor from axle housing (if equipped with ABS).
- 8) Remove brake back plate bolts from axle housing.

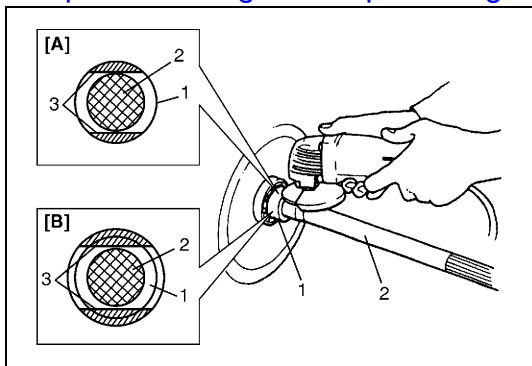
- 9) Using special tools indicated, draw out axle shaft with brake back plate.

Special tool

(A): 09942-15511

(B): 09943-17912





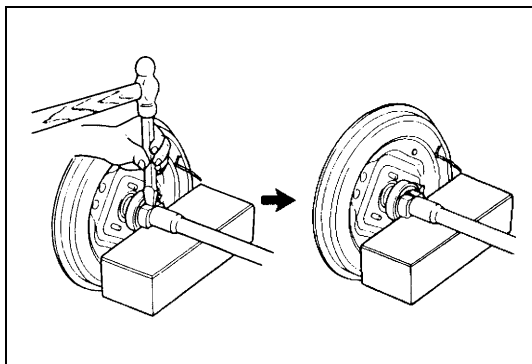
- 10) In order to remove the retainer ring (1) from the axle shaft (2), grind (3) with a grinder two parts of the bearing retainer ring as illustrated till it becomes thin.

CAUTION:

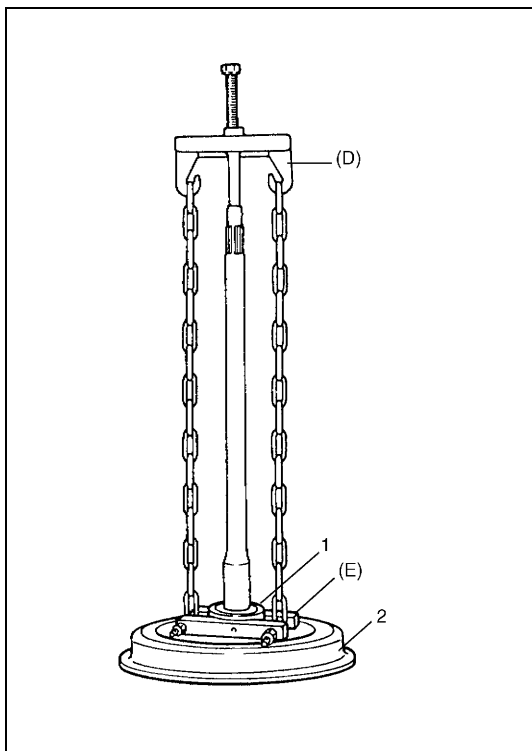
Be careful not to go so far as to grind the shaft.

[A]: Without ABS

[B]: With ABS



- 11) Break with a chisel the thin ground retainer ring, and it can be removed.



- 12) Using special tools, remove bearing (1) from shaft and then remove brake back plate (2).

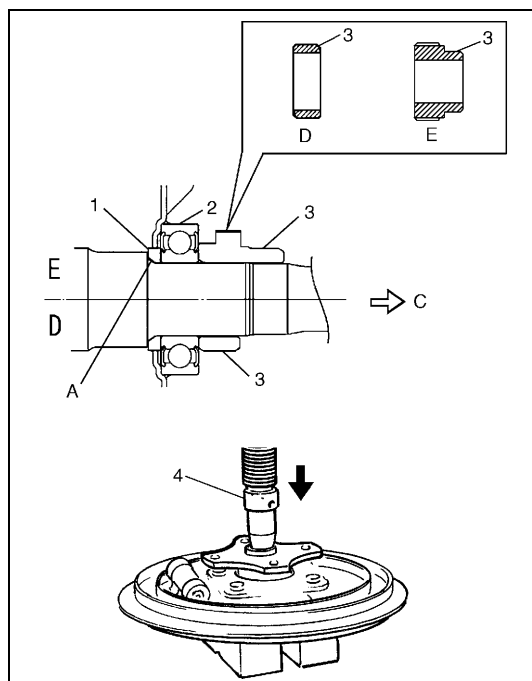
Special tool

(D): 09927-18411

(E): 09921-57810

Installation

Install removed parts in reverse order of removal, noting the following points.

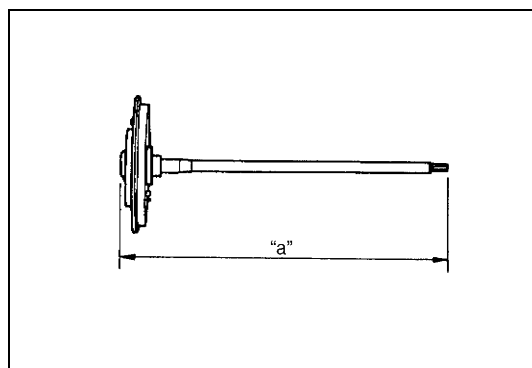


- 1) Install wheel bearing spacer (1) with the tapered side of its inner diameter directed toward outside, or brake drum side.
- 2) Press in a new bearing (2) and retainer ring (3) in order by using an hydraulic press (4).

NOTE:

Use care not to cause any damage to outside of retainer ring.

A :	Tapered side
B :	Blank
C :	Differential side
D :	Without ABS
E :	With ABS

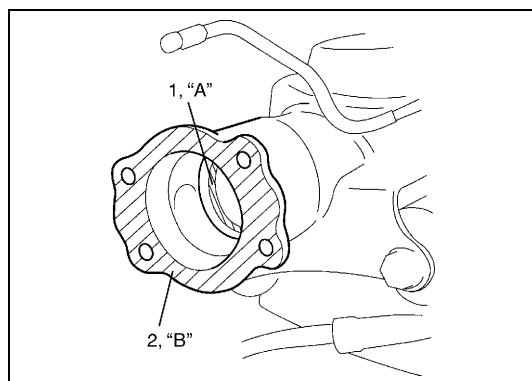


- 3) Inspect axle shaft length.

Rear axle shaft length "a"

Right side: 657.5 mm (25.9 in.)

Left side: 785.5 mm (30.9 in.)



- 4) Apply grease to axle shaft oil seal (1) lip as shown.

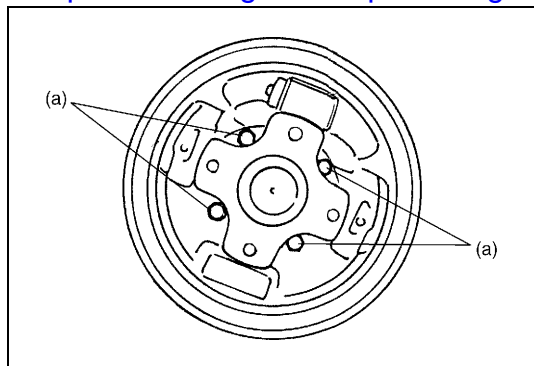
"A": Grease 99000-25010

- 5) Apply sealant to mating surface (2) of axle housing and brake back plate.

NOTE:

Make sure to remove old sealant before applying it anew.

"B": Sealant 99000-31090



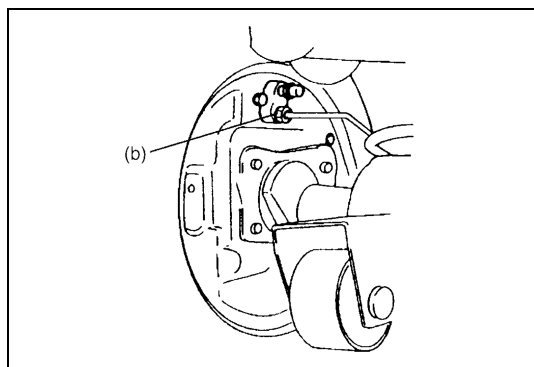
- 6) Install rear axle shaft to rear axle housing and tighten brake back plate bolts to specified torque.

NOTE:

When installing rear axle shaft, be careful not to cause damage to oil seal lip in axle housing.

Tightening torque

Brake back plate bolt (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

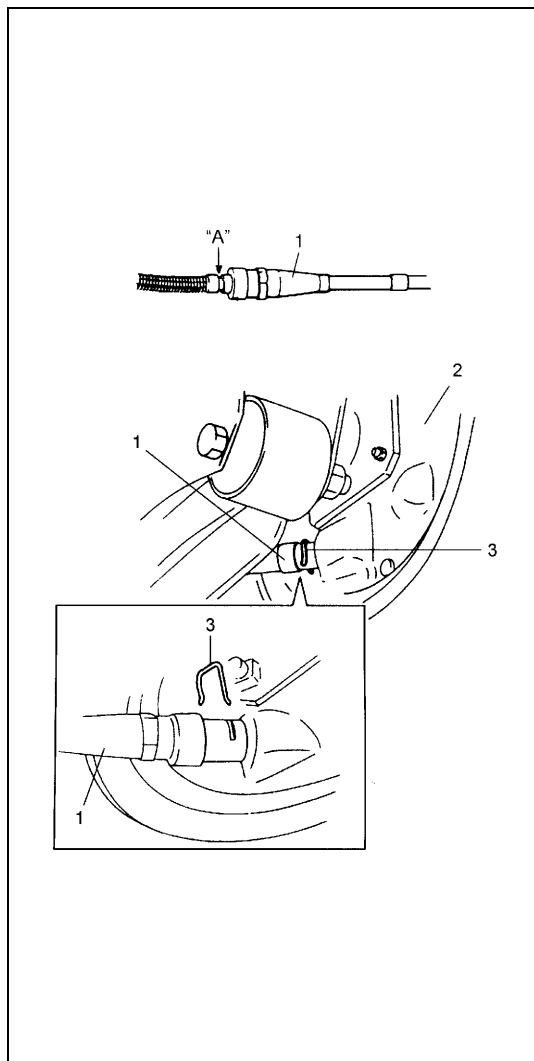


- 7) Connect brake pipe to wheel cylinder and tighten brake pipe flare nut to specified torque.

Tightening torque

Brake pipe flare nut (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

- 8) Tighten oil drain plug to specified torque and refill rear axle (differential) housing with new specified gear oil and tighten oil filler plug to specified torque. Refer to Section 7F for tightening torque data and refill.



- 9) Apply watertight sealant where plate and cable contact, and run parking brake cable (1) through brake back plate (2) and secure it with clip (3).

“A”: Sealant 99000-31090

CAUTION:

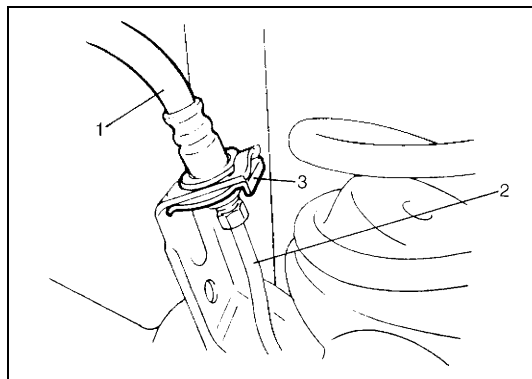
Check to ensure that clip is in good condition before installing it. If deformed or broken, replace.

- 10) Connect parking brake cable (1) to parking brake shoe lever. Install brake shoes referring to “Brake Shoe Installation” in Section 5C.
- 11) Install wheel speed sensor (if equipped with ABS).
- 12) Install brake drum (right & left) after marking sure that inside of brake drum and brake shoes are free from dirt and oil. Then tighten brake drum screw.
- 13) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, refer to “Bleeding Brakes” in Section 5.)
- 14) Install wheel and tighten wheel bolts to specified torque.
- 15) Upon completion of all jobs, pull parking brake lever with about 200 N (20 kg, 44 lbs) load three to five times so as to obtain proper drum-to-shoe clearance. Adjust parking brake cable (for adjustment, refer to “Parking Brake” in Section 5).
- 16) Check to ensure that brake drum is free from dragging and proper braking is obtained.
- 17) Perform brake test (foot brake and parking brake). (For brake test, see Section 5.)
- 18) Check each installed part for oil leakage.

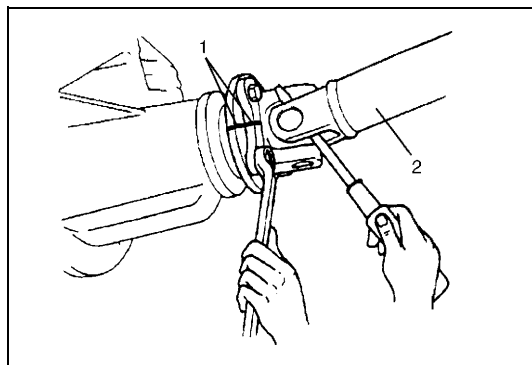
Rear Axle Housing (for 4WD Model)

Removal

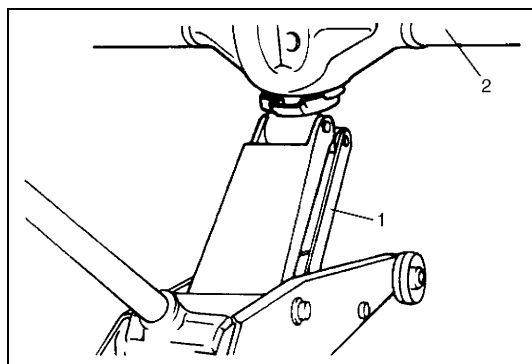
- 1) Hoist vehicle and remove rear wheels referring to "Wheel Removal and Installation" in Section 3F.
- 2) Remove rear axle shafts (right & left) referring to Steps 2) – 9) of "Rear Axle Shaft and Wheel Bearing (for 4WD Model)" in this section.
- 3) Disconnect brake pipes (2) (right & left) from flexible hoses (1) and remove E-rings (3).
- 4) Remove brake pipes from wheel cylinders (right & left).
- 5) Remove wheel speed sensors (right & left) and release clamps from axle housing (if equipped with ABS).
- 6) Remove LSPV adjust nut and detach spring end from rear axle housing (if equipped with LSPV).



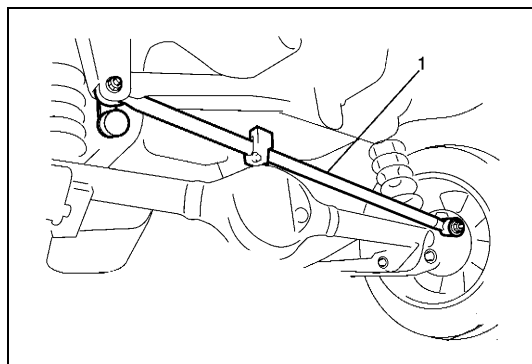
- 7) Before removing propeller shaft, give match marks (1) on joint flange and propeller shaft (2) as shown.
- 8) Remove propeller shaft.

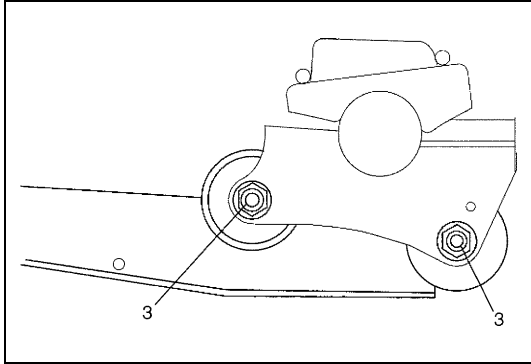


- 9) For jobs hereafter, support rear axle housing by using floor jack (1) under axle housing (2) and remove differential carrier assembly.

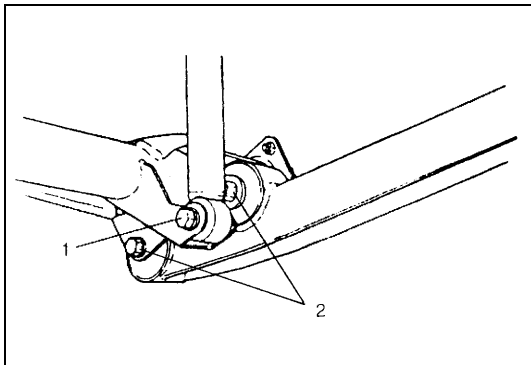


- 10) Remove lateral rod (1).

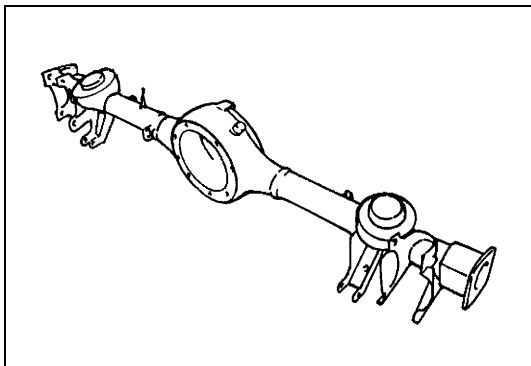




- 11) Loosen trailing arm rear mounting nuts (3) (right & left) from axle housing, but don't remove bolts.



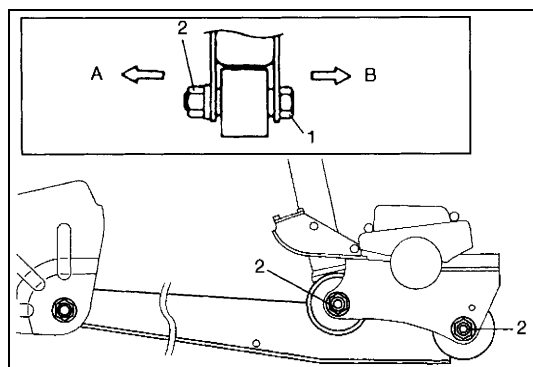
- 12) Remove shock absorber lower mounting bolts (1).
- 13) Lower floor jack until tension of suspension coil spring becomes a little loose and remove trailing arm rear mounting bolts (2) (right & left).
- 14) Lower rear axle housing gradually and remove coil springs.



- 15) Remove axle housing.

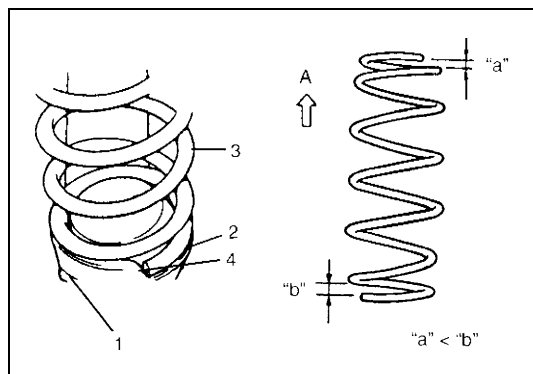
Installation

Install removed parts in reverse order of removal, noting the following.



- 1) Place rear axle housing on floor jack. Then install rear trailing arm bolts (1) (right & left) in proper direction as shown. Then tighten nuts (2) temporarily by hand.

A :	Vehicle out side
B :	Vehicle center side

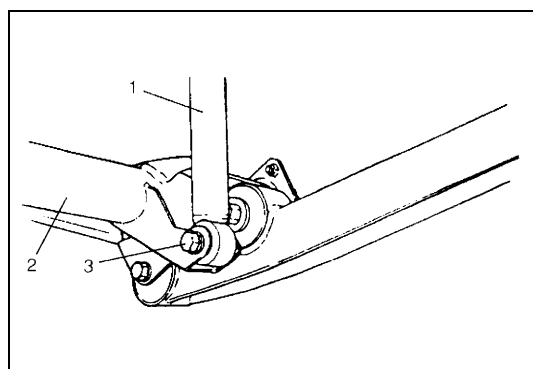


- 2) Install coil springs (3) (right & left) on spring seat (2) of axle housing (1) and raise axle housing.

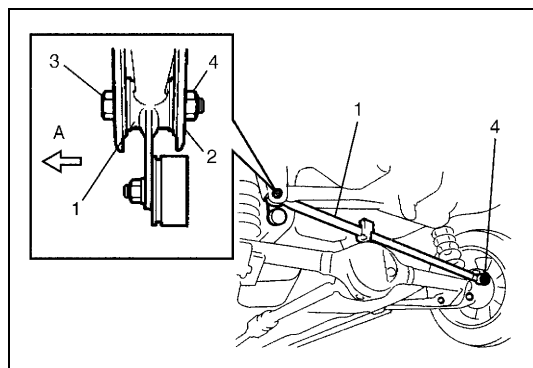
NOTE:

When seating coil spring (3), mate spring end with stepped part (4) of rear axle spring seat as shown.

A.	Upper side
"A":	Small
"b":	Large

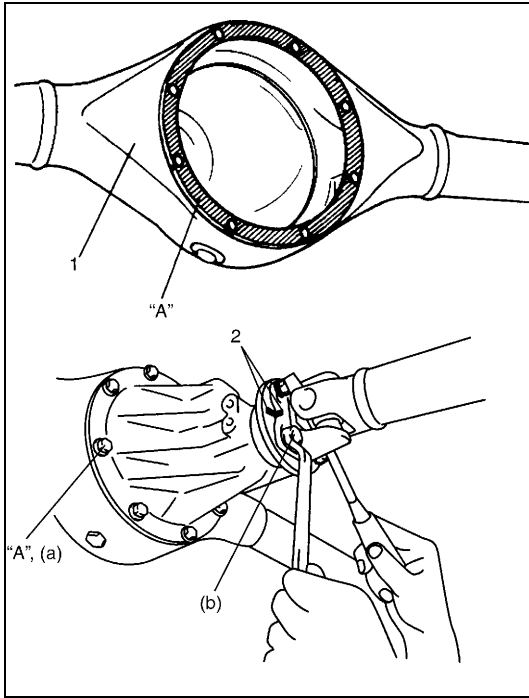


- 3) Install shock absorber (1) (right & left) to axle housing (2) and install bolts in proper direction as shown. Then tighten bolts (3) (right & left) temporarily by hand.



- 4) Install lateral rod (1) and bolt (3) in proper direction as shown. Then tighten nuts (4) temporarily by hand.

2.	Vehicle body
A :	Forward



- 5) Clean mating surfaces of axle housing (1) and differential carrier and apply sealant to housing side.

"A": Sealant 99000-31110

- 6) Install differential carrier assembly to axle housing and tighten carrier bolts to specified torque.

Tightening torque

Rear differential carrier bolt

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 7) Install propeller shaft to joint flange aligning match marks (2) and tighten flange bolts to specified torque.

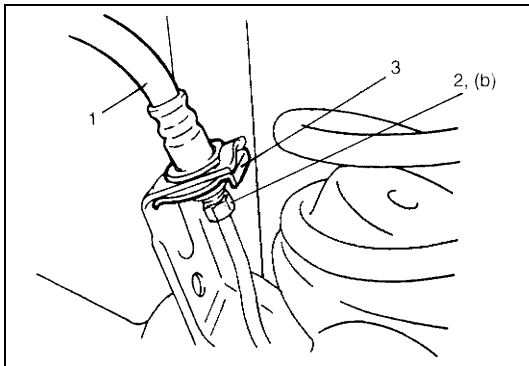
Tightening torque

Differential flange bolt (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 8) Install LSPV spring to rear axle.
Tighten LSPV adjust nut temporarily at this step. (if equipped with LSPV).

- 9) Install wheel speed sensor and clamp wire securely (right & left) (if equipped with ABS).

- 10) Remove floor jack from axle housing.

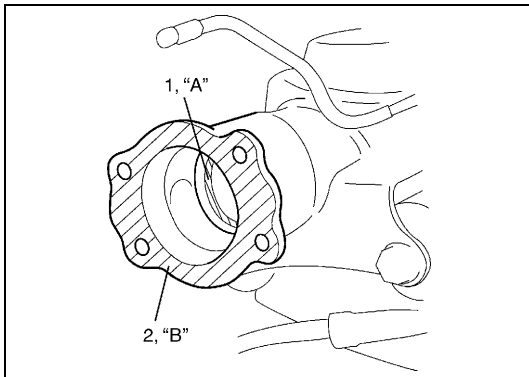


- 11) Connect brake flexible hoses (1) (right & left) to bracket on rear axle and secure it with E-rings (3) (right & left).

- 12) Connect brake pipes to brake flexible hoses (1) and tighten brake pipe flare nuts (2) to specified torque.

Tightening torque

Brake pipe flare nut (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

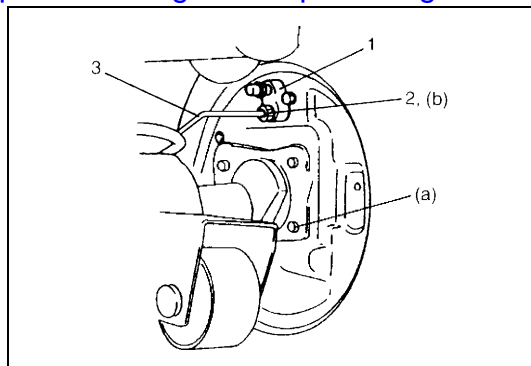


- 13) Apply grease to axle shaft oil seals (1) lip (right & left).

"A": Grease 99000-25010

- 14) Clean mating surfaces (2) (right & left) of axle housing and brake back plate and apply water tight sealant as shown in figure.

"B": Sealant 99000-31090



- 15) Install rear axle shaft (right & left) to rear axle housing.
- 16) Tighten brake back plate bolts to specified torque.

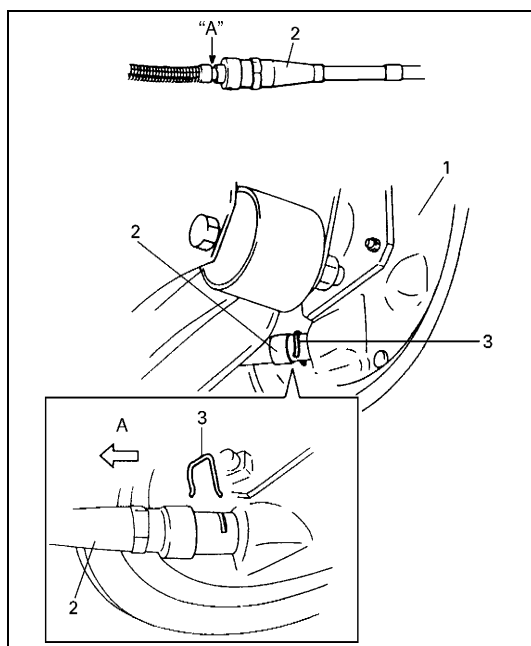
Tightening torque

Brake back plate bolt (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 17) Connect brake pipes (3) to wheel cylinders (1) (right & left) and tighten brake pipe flare nuts (2) to specified torque.

Tightening torque

Brake pipe flare nut (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)



- 18) Apply water tight sealant where brake back plate (1) and parking brake cable contact.
Connect parking brake cable (2) to brake back plate (right & left) and secure it with clip (3).

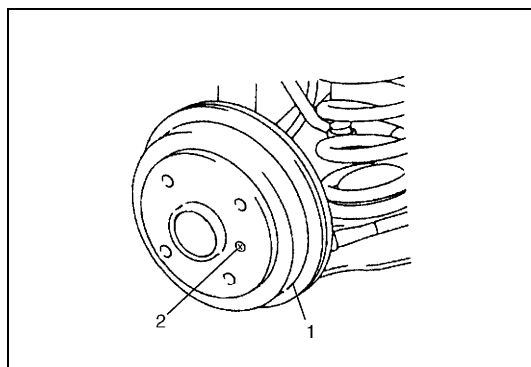
“A”: Sealant 99000-31090

NOTE:

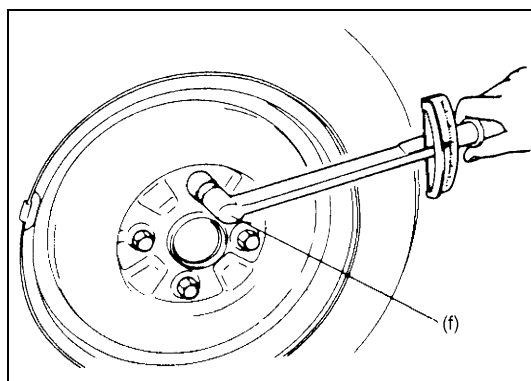
Check to ensure that clip is in good condition before installing it. If deformed or broken, replace.

- 19) Install brake shoes (right & left) referring to “Brake Shoe” in Section 5C.

A: Forward



- 20) Install brake drums (1) (right & left) after making sure that inside of brake drum and brake shoes are free from dirt and oil. Then tighten brake drum screw (2).
- 21) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, refer to Section 5.)
- 22) Refill differential gear housing with new specified gear oil. Refer to Section 7F.

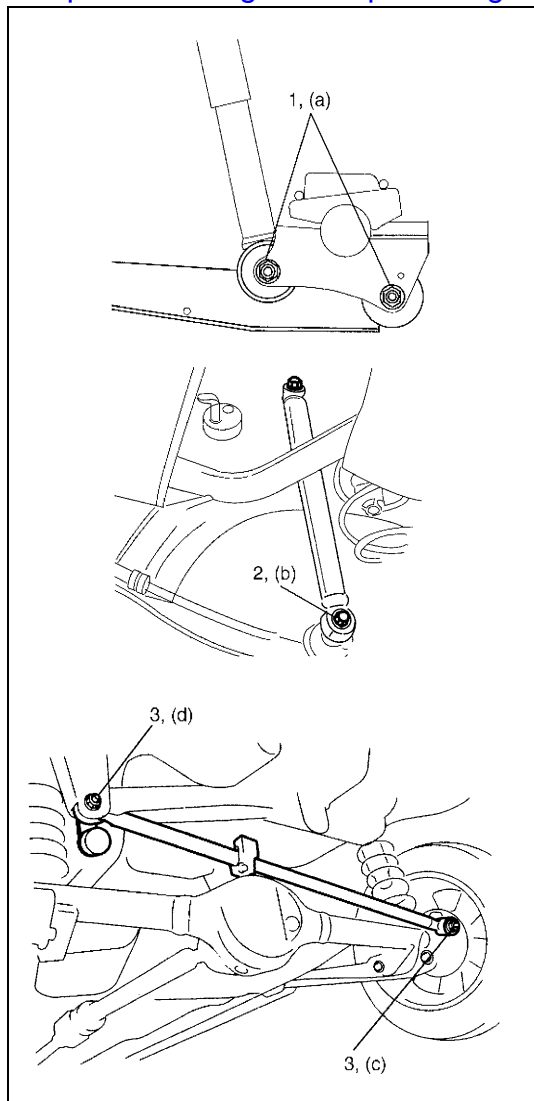


- 23) Install wheels and tighten wheel bolts to specified torque.

Tightening torque

Wheel bolt (f): 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 24) Upon completion of all jobs, pull parking brake lever with about 200 N (20 kg, 44 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable referring to “Parking Brake” in Section 5.
- 25) Lower hoist.



- 26) Tighten right and left trailing arm nuts (1) and shock absorber lower bolts (2) to specified torque.
Tighten lateral rod nuts (3) to specified torque.

NOTE:

When tightening these bolts and nuts, be sure that vehicle is off hoist and in non loaded condition.

Tightening torque**Trailing arm rear nut**

(a): 80 N·m (8.0 kg-m, 58.0 lb-ft)

Rear shock absorber lower bolt

(b): 63 N·m (6.3 kg-m, 45.5 lb-ft)

Lateral rod nut (axle side)

(c): 50 N·m (5.0 kg-m, 36.5 lb-ft)

Lateral rod nut (body side)

(d): 100 N·m (10.0 kg-m, 72.5 lb-ft)

Trailing arm front nut

(e): 90 N·m (9.0 kg-m, 65.0 lb-ft)

- 27) Check to ensure that brake drum is free from dragging and proper braking is obtained.
28) Perform brake test (foot brake and parking brake).
29) If equipped with LSPV, check and adjust LSPV spring referring to "LSPV Inspection and Adjustment" in Section 5A and perform "Fluid Pressure Test" in Section 5.
30) Check each installed part for oil leakage.

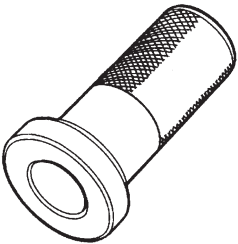
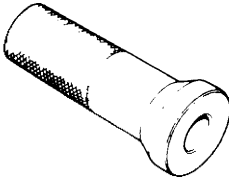
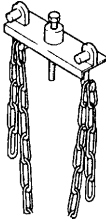
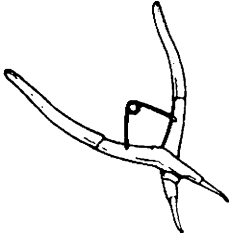
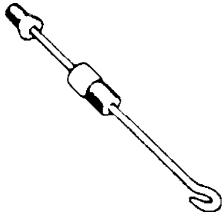
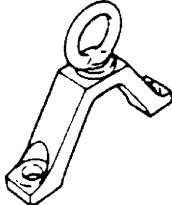
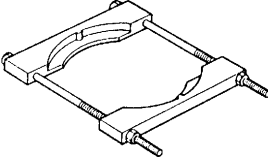
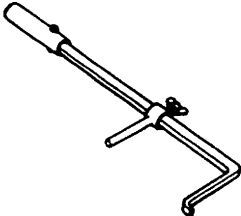
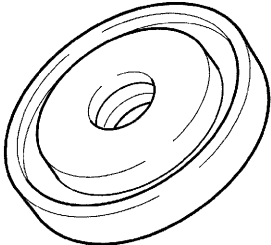
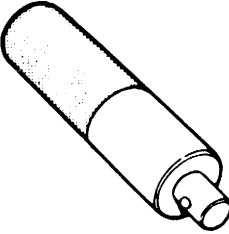
Tightening Torque Specifications

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Brake back plate bolt	23	2.3	17.0
Brake pipe flare nut	16	1.6	11.5
Differential flange bolt	23	2.3	17.0
Lateral rod nut (axle side)	50	5.0	36.5
Lateral rod nut (body side)	100	10.0	72.5
LSPV bolt	26	2.6	19.0
Rear differential carrier bolt (4WD model)	23	2.3	17.0
Rear shock absorber lower bolt	63	6.3	45.5
Shock absorber lower bolt	63	6.3	45.5
Trailing arm front nut	90	9.0	65.0
Trailing arm rear nut	80	8.0	58.0
Wheel bolt	95	9.5	69.0

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE (A) (99000-25010)···(for 4WD Model)	<ul style="list-style-type: none"> • Axle shaft oil seal
Sealant	SUZUKI BOND NO. 1215 (99000-31110)···(for 4WD Model)	<ul style="list-style-type: none"> • Joint seam of differential carrier and axle housing • Differential carrier bolt
Gear oil	For gear oil information, refer to Section 7F. (for 4WD Model)	<ul style="list-style-type: none"> • Differential gear (Rear axle housing)
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	<ul style="list-style-type: none"> • Joint seam of axle housing and brake back plate
Brake fluid	Indicated on reservoir cap or described in owner's manual of vehicle.	<ul style="list-style-type: none"> • To fill master cylinder reservoir • To clean and apply to inner parts of caliper and wheel cylinder when they are disassembled.

Special Tool

			
09913-75810 Bearing installer (for 2WD Model)	09913-76010 Rear wheel bearing installer (for 2WD Model)	09927-18411 Universal puller (for 4WD Model)	09900-06108 Snap ring pliers (for 2WD Model)
			
09942-15511 Sliding hammer	09943-17912 Brake drum remover	09921-57810 Bearing remover (for 4WD Model)	09913-50121 Oil seal remover (for 4WD Model)
			
09944-67010 Oil seal installer (for 4WD Model)	09924-74510 Installer attachment (for 4WD Model)		

SECTION 3F**WHEELS AND TIRES****NOTE:**

- All wheel fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts.
There is to be no welding as it may result in extensive damage and weakening of the metal.
- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

3F**CONTENTS**

General Description	3F-2	On-Vehicle Service	3F-3
Tires	3F-2	Service Operations	3F-3
Maintenance And Minor Adjustments	3F-2	Wheel Bolts	3F-3
Wheel Maintenance	3F-2	Wheel	3F-3
Tire Rotation	3F-2	Tightening Torque Specifications	3F-4

General Description

Tires

This vehicle is equipped with the following tire.

Tire specification

165/60R14 75T Gasoline engine model

165/60R14 79T Diesel engine model

The tire is of tubeless type. The tire is designed to operate satisfactorily with loads up to the full rated load capacity when inflated to the recommended inflation pressures.

Correct tire pressures and driving habits have an important influence on tire life. Heavy cornering, excessively rapid acceleration, and unnecessary sharp braking increase tire wear.

Maintenance And Minor Adjustments

Wheel Maintenance

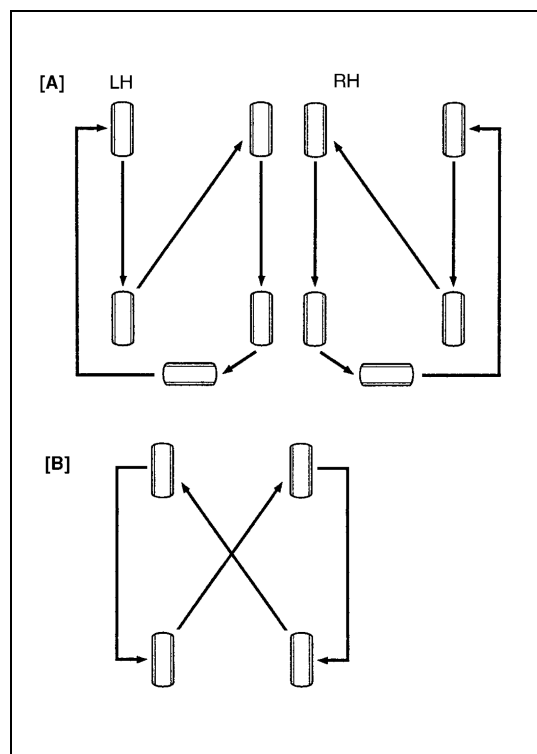
Wheel repairs that use welding, heating, or peening are not approved. All damaged wheels should be replaced.

Tire Rotation

To equalize wear, rotate tires according to left figure. Radial tires should be rotated periodically. Set tire pressure.

NOTE:

Due to their design, radial tires tend to wear faster in the shoulder area, particularly in front positions. This makes regular rotation especially necessary.



[A]: 5-tire rotation

NOTE:

Applicable to vehicles equipped with 5 tires including spare tire all of which are identical in size

[B]: 4-tire rotation

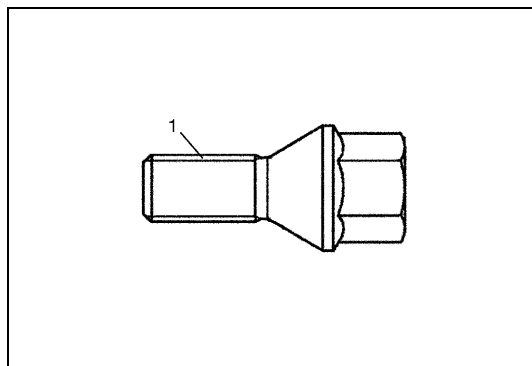
LH: Left-hand steering vehicle

RH: Right-hand steering vehicle

On-Vehicle Service

Service Operations

Wheel Bolts



All models use metric lug wheel bolts.

Metric lug bolt size

(1): M12 x 1.5

Wheel

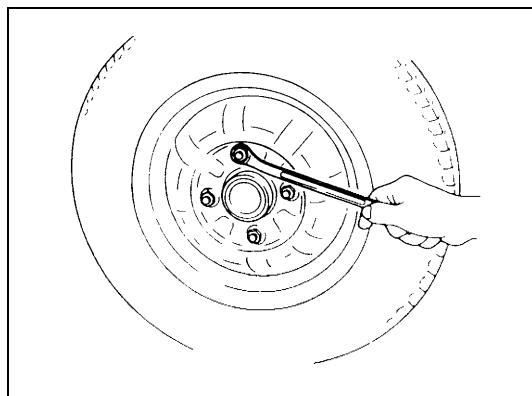
Removal

WARNING:

Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.

Leave a bolt at least not to drop the wheel.

Support the wheel and/or tire and then remove the bolt(s) left with the wheel.



- 1) Loosen wheel bolts by approximately 180 ° (half a rotation).
- 2) Hoist vehicle.
- 3) Make sure that the Vehicle will not fall off by trying to move vehicle body in both ways.
- 4) Remove wheel bolts except one.
- 5) Support the wheel and/or tire not to drop the wheel and then remove the bolt left with the wheel.

CAUTION:

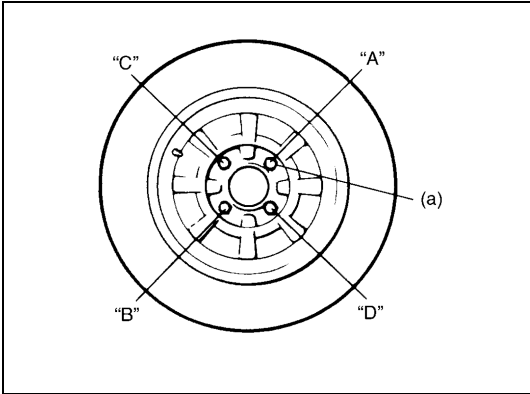
Never use heat to loosen tight wheel because application of heat to wheel can shorten life of wheel and damage wheel bearings.

Installation

For installation, reverse removal procedure, noting the flowing. Wheel bolts must be tightened in sequence and to proper torque to avoid bending wheel or brake disc, left figure.

NOTE:

Before installing wheels, remove any build-up of corrosion on wheel mounting surface and brake disc mounting surface by scraping and wire brushing. Installing wheels without good metal-to-metal contact at mounting surfaces can cause wheel bolts to loosen, which can later allow a wheel to come off while vehicle is moving.



Tightening order
“A” – “B” – “C” – “D”:

Tightening torque
Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)

Tightening Torque Specifications

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Wheel bolt	95	9.5	69.0

SECTION 4A

FRONT DRIVE SHAFT (G10/M13 ENGINE MODELS)

CONTENTS

General Description	4A-1	Front Drive Shaft Disassembly and	
Diagnosis	4A-1	Assembly	4A-7
On-Vehicle Service.....	4A-2	Front Drive Shaft Inspection	4A-16
Front Drive Shaft Assembly Construction	4A-2	Center Shaft and Center Bearing Support	
Front Drive Shaft Assembly Removal and		Disassembly and Assembly (2WD model	
Installation	4A-3	with M13 Engine)	4A-17
Front Drive Shaft Assembly Inspection	4A-5	Tightening Torque Specification	4A-18
Front Drive Shaft Components.....	4A-6	Required Service Material	4A-19
		Special Tools.....	4A-19

4A**General Description**

A constant velocity double offset joint (DOJ) and tripod joint are used on the differential side of drive shaft as the following table.

A constant velocity ball joint (fixed type) is used on the wheel side of both right and left drive shaft assemblies. The drive shaft can slide through the tripod joint or DOJ in the extension/contraction direction.

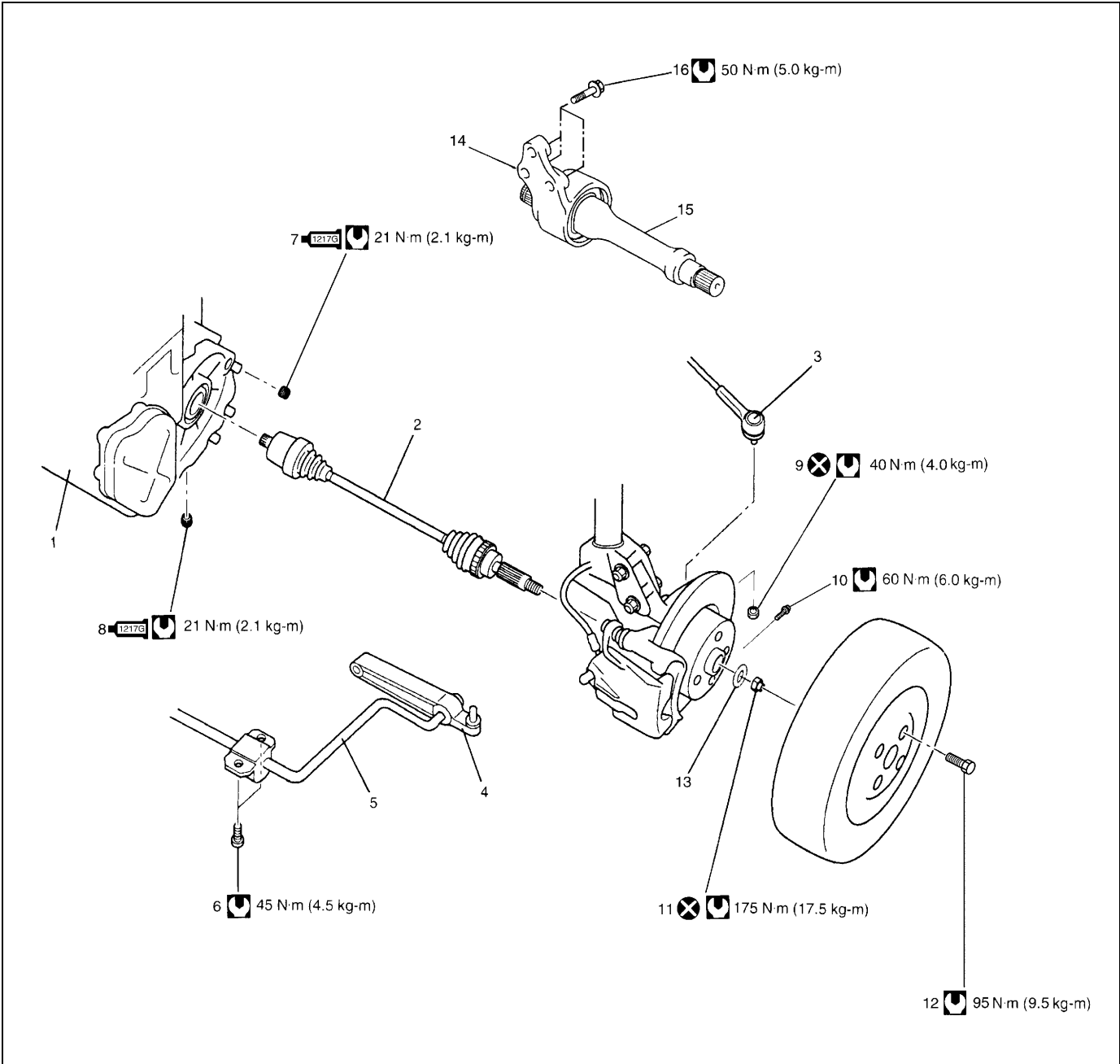
Type			Differential side joint	Wheel side joint
M13 engine	2WD	—	DOJ	Constant velocity ball joint (Fixed type)
	4WD	Right side	Tripod joint	
		Left side	DOJ	
G10 engine	2WD	Right side	Tripod joint	
		Left side	DOJ	

Diagnosis

Condition	Possible Cause	Correction
Abnormal noise	<ul style="list-style-type: none"> Worn or breakage of the drive shaft joint Worn or breakage center bearing 	Replace. Replace.

On-Vehicle Service

Front Drive Shaft Assembly Construction



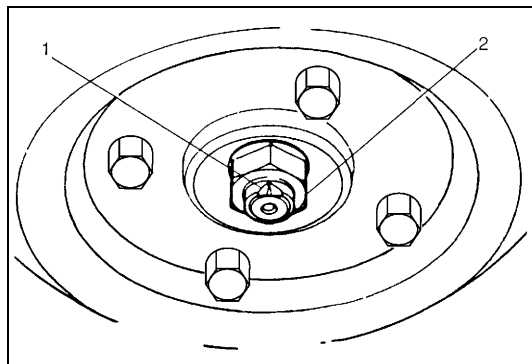
1. Transaxle		7. Oil filler/level plug : Apply sealant 99000-31260 to plug thread	13. Drive shaft washer
2. Drive shaft assembly		8. Oil drain plug : Apply sealant 99000-31260 to plug thread	14. Center bearing support
3. Tie-rod end		9. Tie-rod end nut	15. Center shaft
4. Suspension control arm		10. Ball stud bolt	16. Center bearing support bolts
5. Stabilizer		11. Drive shaft nut	Do not reuse.
6. Stabilizer mount bracket bolt		12. Wheel bolt	Tightening torque

Front Drive Shaft Assembly Removal and Installation

Removal

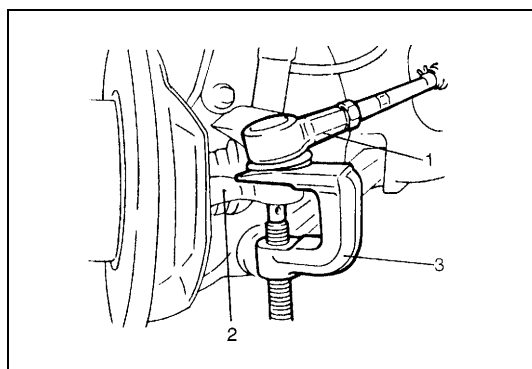
CAUTION:

To prevent the breakage of boots, be careful not to damage the boots when removing drive shaft assembly.

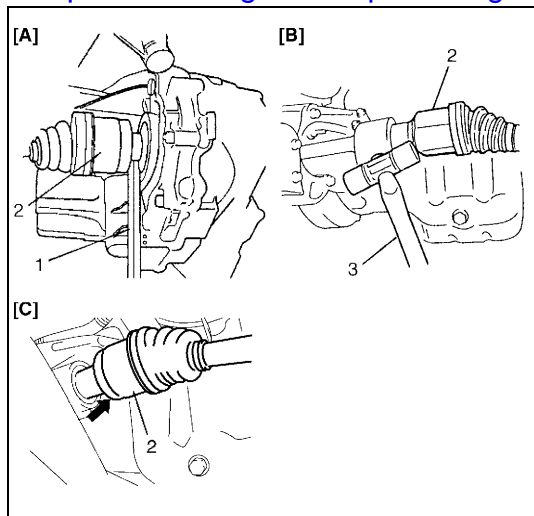


- 1) Undo caulking (1) and remove drive shaft nut (2).
- 2) Loosen wheel bolts.
- 3) Hoist vehicle.
- 4) Remove wheel.

- 5) Drain transaxle oil as follows.
 - For M/T model with G10 engine
Refer to "Oil Change" in Section 7A of the Service Manual mentioned in the FOREWORD of this manual.
 - For M/T model with M13 engine
Refer to "Transaxle Oil Change" in Section 7A2.
 - For A/T model
Refer to "Fluid Change" in Section 7B1.
- 6) Drain transfer oil referring to "Oil Change" in Section 7D of the Service Manual mentioned in the FOREWORD of this manual, if equipped.
- 7) Remove tie-rod end nut.



- 8) Disconnect tie-rod end (1) from steering knuckle (2) by using puller (3).



9) Pull out drive shaft joint (2) as follows.

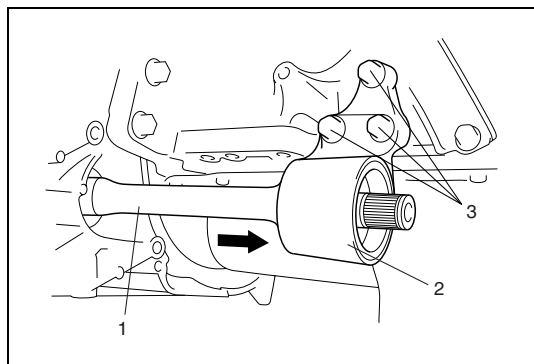
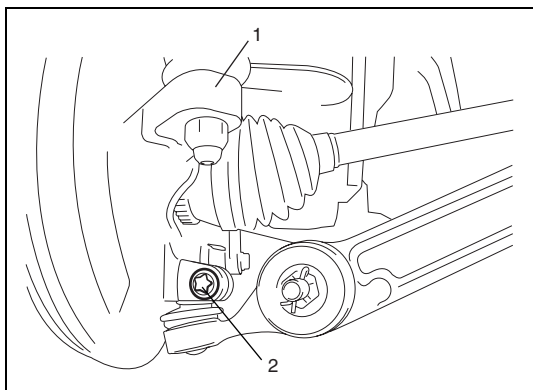
- For left side of all model and right side of G10 engine model
Using tire lever (1), pull out drive shaft joint (2) so as to release snap ring fitting of joint spline at differential side.
- For right side of 2WD model with M13 engine
Using plastic hammer (3), drive out drive shaft joint (2) so as to release snap ring fitting of joint spline at center shaft.
- For right side of 4WD model with M13 engine
Using plastic hammer, drive out drive shaft joint (2) so as to release snap ring fitting of joint spline at transfer side.

[A]: Left side of all model and right side of G10 engine model
[B]: Right side of 2WD model with M13 engine
[C]: Right side of 4WD model with M13 engine

10) Remove two stabilizer mount brackets from vehicle body.

11) Disconnect front suspension control arm ball joint stud from steering knuckle (1) by pushing down stabilizer bar after removing ball joint bolt (2).

12) Remove drive shaft assembly.



13) For vehicle with center shaft, remove center bearing support bolts (3) and remove center bearing support (2) with center shaft (1) from differential side gear.

Installation

CAUTION:

- Be careful not to damage oil seals and boots when installing drive shafts.
- Do not hit joint boot with hammer. Inserting joint only by hands is allowed.
- Make sure that differential side joint is inserted fully and its snap ring is seated as it was.

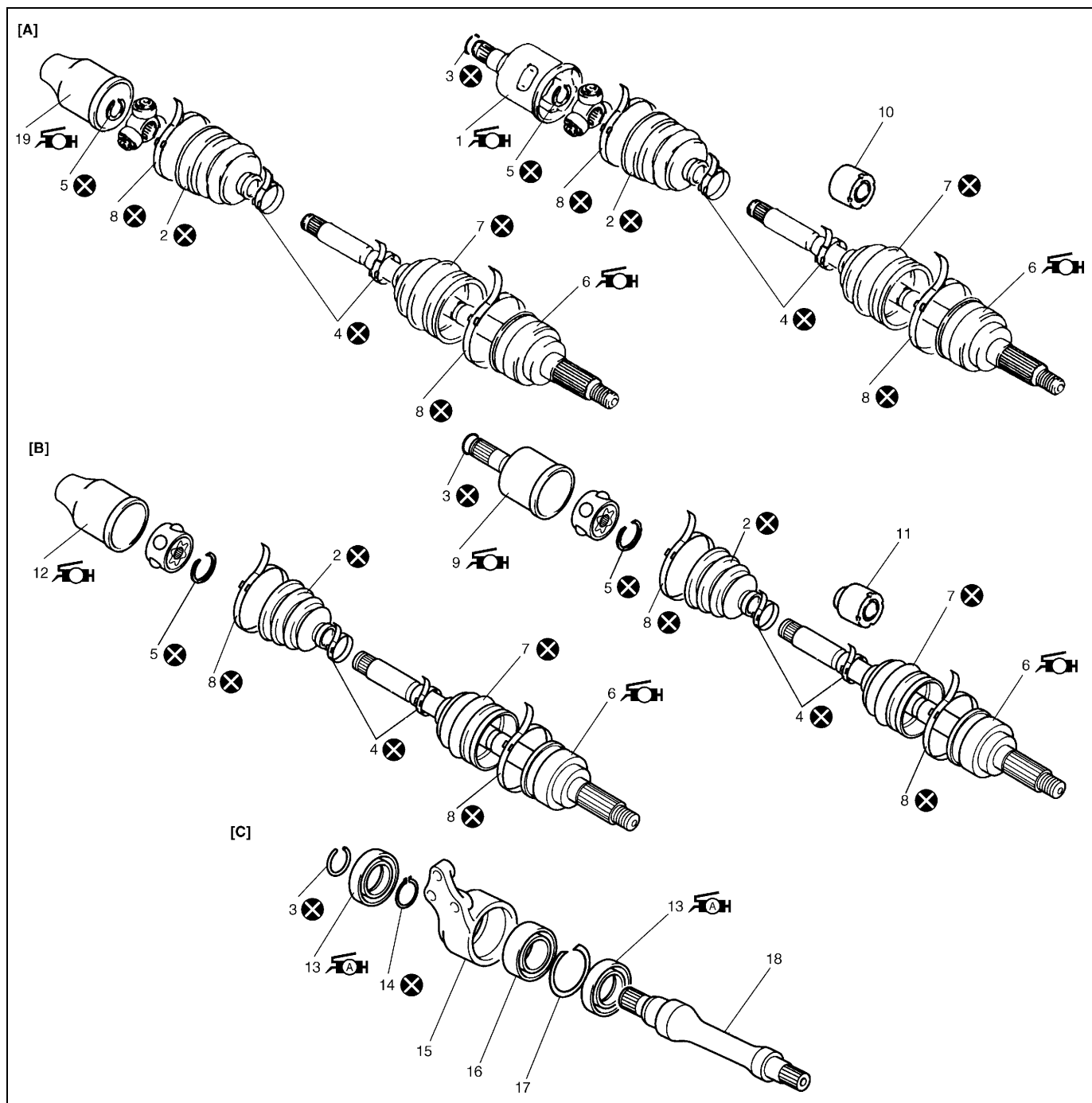
Reverse removal procedure for installation noting the following.

- Install wheel side joint to steering knuckle first, and then differential side joint to transaxle.
- Tighten each bolt and nut to the specified torque referring to "Front Drive Shaft Assembly Construction" in this section.
- Fill transaxle oil as follows.
 - For M/T model with G10 engine
Refer to "Oil Change" in Section 7A of the Service Manual mentioned in the FOREWORD of this manual.
 - For M/T model with M13 engine
Refer to "Transaxle Oil Change" in Section 7A2.
 - For A/T model
Refer to "Fluid Change" in Section 7B1.
- Fill transfer oil referring to "Oil Change" in Section 7D of the Service Manual mentioned in the FOREWORD of this manual.
- Check toe setting and adjust referring to "Toe Setting" and "Toe Adjustment" in Section 3A.

Front Drive Shaft Assembly Inspection

- Check boots for breakage or deterioration.
 - Check wheel side joint for rattle or smoothness.
 - Check differential side joint for smoothness.
- If any abnormality is found, replace.

Front Drive Shaft Components

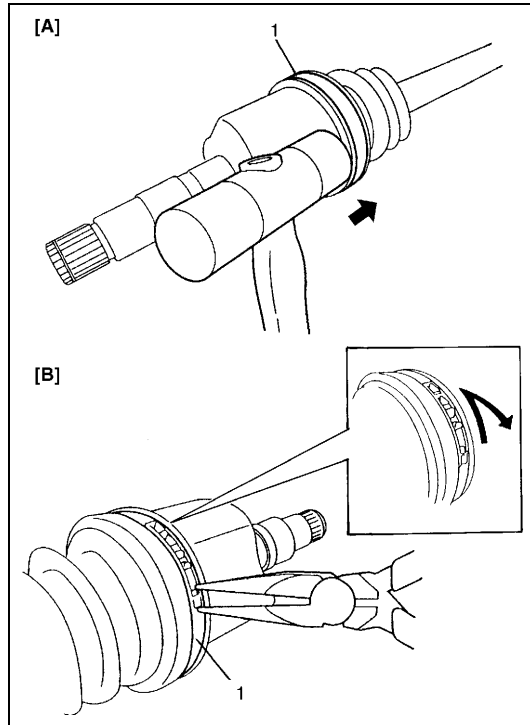


[A]: Tripod joint type	6. Wheel side joint (Constant velocity ball joint) : Apply Black grease included in spare part to joint.	14. Circlip
[B]: DOJ type	7. Boot (Wheel side)	15. Center bearing support
[C]: Center shaft for 2WD model with M13 engine	8. Boot band (Large)	16. Center bearing
1. Differential side joint (Right side of 4WD model with M13 engine) : Apply Black grease included in spare part to joint.	9. Differential side joint (LH of all models) : Apply Black grease included in spare part to joint.	17. Circlip
2. Boot (Differential, transfer or center shaft side)	10. Damper (Right side of G10 engine)	18. Center shaft
3. Circlip	11. Damper (Other than right side of G10 engine)	19. Center shaft side joint (Right side of 2WD model with M13 engine) : Apply Dark brown grease included in spare part to joint.
4. Boot band (Small)	12. Center shaft side joint (Right side of 2WD model with M13 engine)	Tightening torque
5. Snap ring	13. Oil seal : Apply grease 99000-25010 to oil seal lip.	Do not reuse.

Front Drive Shaft Disassembly and Assembly

Disassembly

For DOJ type



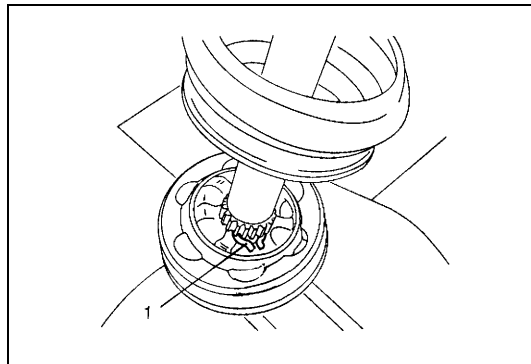
CAUTION:

Disassembly of wheel side joint is not allowed. If any abnormality is found, replace it as assembly.

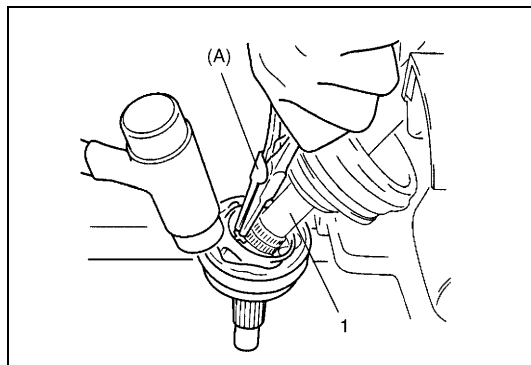
- 1) Remove differential side boot big band (1) as follows.
 - For boot big band without joint
Remove boot big band by tapping boot and band with plastic hammer. If it is hard to remove boot big band, cut it using a nipper or a iron saw with care not to damage DOJ housing.
 - For boot big band with joint
Draw hooks of boot big band together and remove band.

[A]: For boot big band without joint

[B]: For boot big band with joint



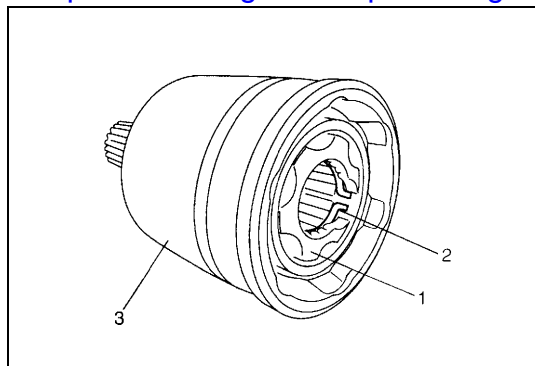
- 2) Remove DOJ from shaft as follows.
 - a) Fold over boot and remove old grease so that retaining ring (1) is accessible.



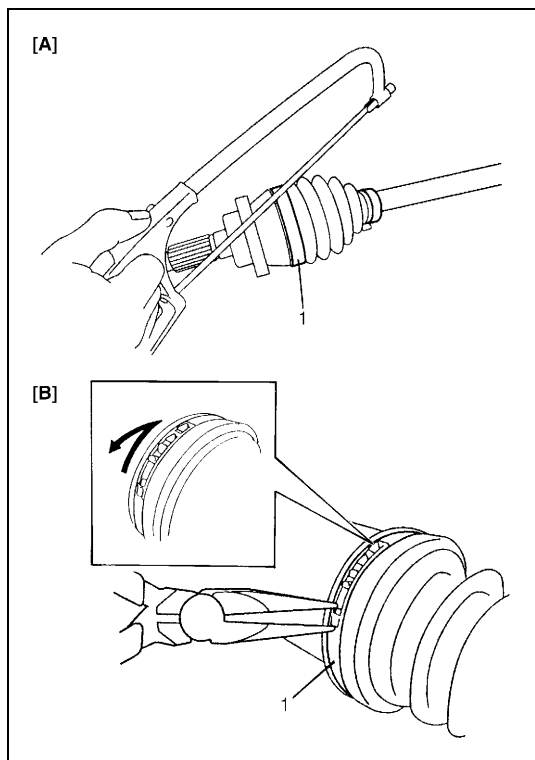
- b) Clamp drive shaft in soft jawed vise, and then open retaining ring using special tool and tap DOJ of drive shaft (1) using plastic hammer until retaining ring no longer engages in groove of shaft.

Special tool

(A): 09900-06107



- c) Remove cage (1) with retaining ring (2) from housing (3) if necessary.
- 3) Remove differential side boot small band, and then pull out differential side boot from shaft.
- 4) Pull out damper through shaft.



- 5) Remove wheel side boot big band (1) as follows.
 - For boot big band without joint
Cut boot big band using a iron saw or a nipper with care not to damage wheel side joint housing.
 - For boot big band with joint
Draw hooks of boot big band together and remove band.
- 6) Remove wheel side small band, and then pull out wheel side boot from shaft.

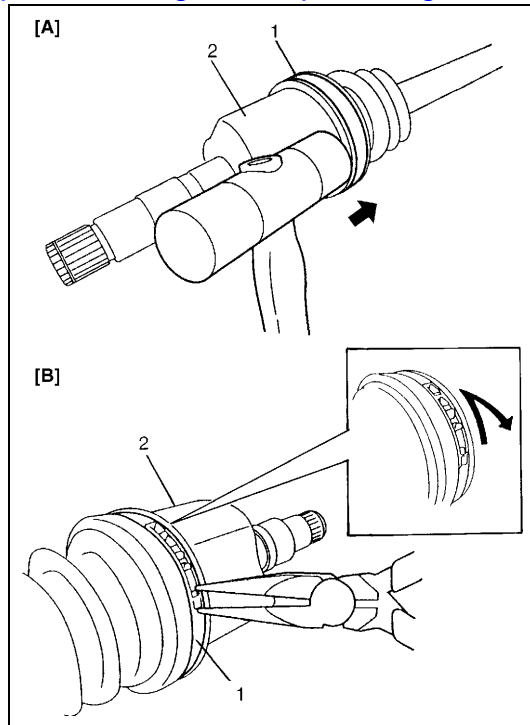
[A]: For boot big band without joint

[B]: For boot big band with joint

For tripod joint type

CAUTION:

- Disassembly of wheel side joint is not allowed. If noise or damage exists in it, replace it as assembly.
- Do not disassemble tripod joint spider. If any malcondition is found in it, replace it as differential side joint assembly.

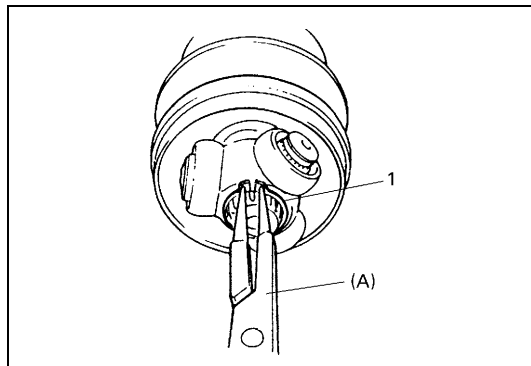


- 1) Remove differential side boot big band (1) as follows.
 - For boot big band without joint
Remove boot big band by tapping boot and band with plastic hammer.
If it is hard to remove boot big band, cut it using a nipper or a iron saw with care not to damage tripod joint housing.
 - For boot big band with joint
Draw hooks of boot big band together and remove band.

[A]: For boot big band without joint

[B]: For boot big band with joint

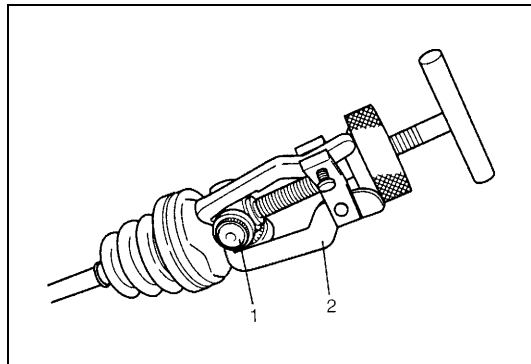
- 2) Take out tripod joint housing (2).



- 3) Wipe off grease from shaft and take off snap ring (1) by using special tool.

Special tool

(A): 09900-06107

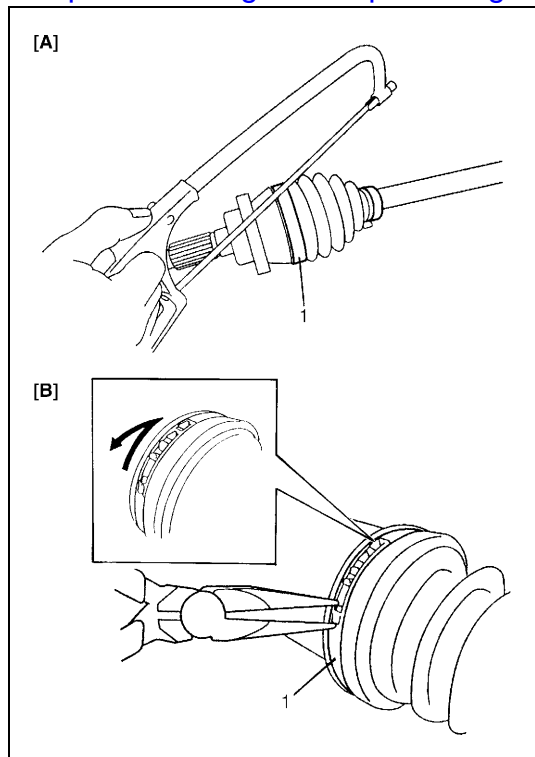


- 4) Remove spider (1) by using 3 arms puller (2).

CAUTION:

To prevent needle bearing of joint from being degreased, do not wash it if it is to be reused.

- 5) Remove differential side boot small band, then pull out differential side boot from shaft.
- 6) Pull out damper through shaft, if equipped.



7) Remove wheel side boot big band (1) as follows.

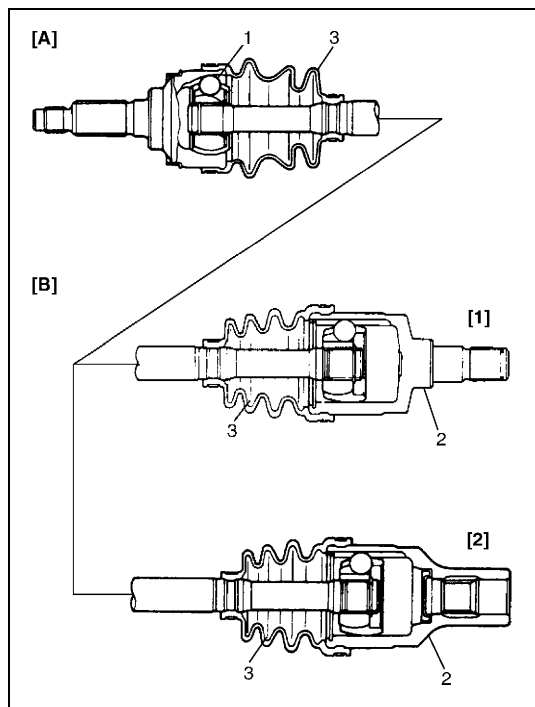
- For boot big band without joint
Cut boot big band using a iron saw or a nipper with care not to damage wheel side joint housing.
- For boot big band with joint
Draw hooks of boot big band together and remove band.

[A]: For boot big band without joint

[B]: For boot big band with joint

8) Remove wheel side small band, then pull out wheel side boot from shaft.

Assembly For DOJ type



CAUTION:

- Do not wash boots in degrease, such as gasoline or kerosene, etc. Washing in degrease causes deterioration of boots.
- To ensure full performance of joint as designed, be sure to distinguish two types of grease in spare part and apply the specified amount of grease to each joint.

Judging from abnormality noted before disassembly and what is found though visual check of each component after disassembly, prepare replacement parts and start assembly, and make sure that wheel side joint (1) and differential side joint (2) are washed thoroughly and air dried, and boots (3) are cleaned with cloth if they are to be reused.

[A]: For wheel side joint

[B]: For differential side joint

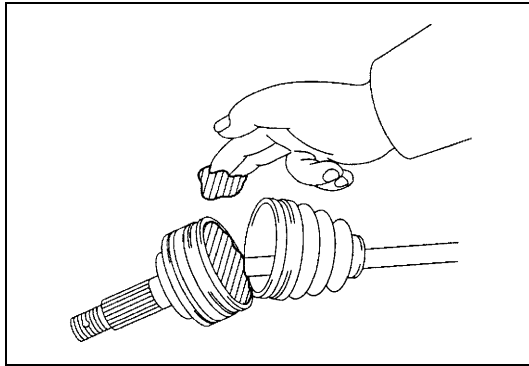
[1]: For left side shaft

[2]: For right side shaft

- 1) Wash disassembled parts (except boots), and then dry parts completely by blowing air.
- 2) Clean boots with cloth.

NOTE:

Do not wash boot in degreaser, such as gasoline or kerosene, etc. Washing in degreaser causes deterioration of boot.

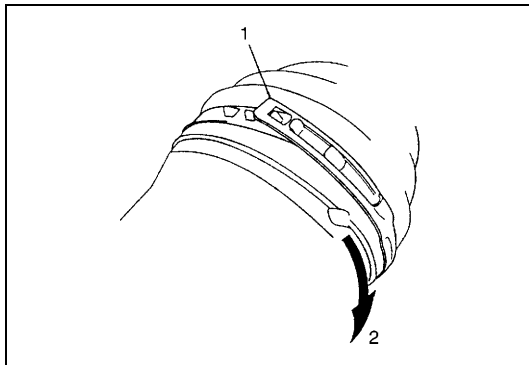


- 3) Install new wheel side boot on shaft temporarily.
- 4) Apply grease in the supplied parts to the inside of joint housing.

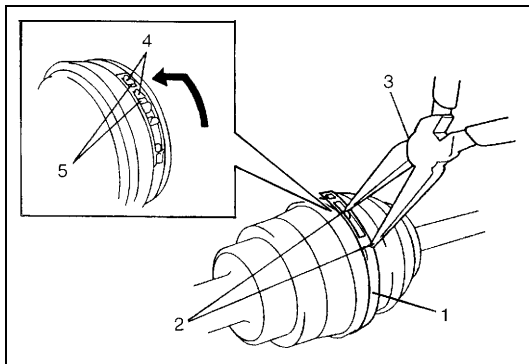
Grease color: Black

Grease amount: Approx. 70 g (2.5 oz)

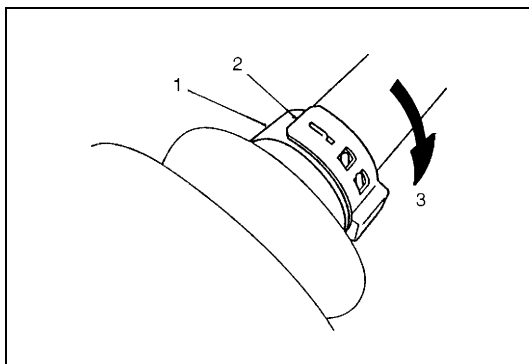
- 5) Fit wheel side boot onto grooves of housing and shaft.



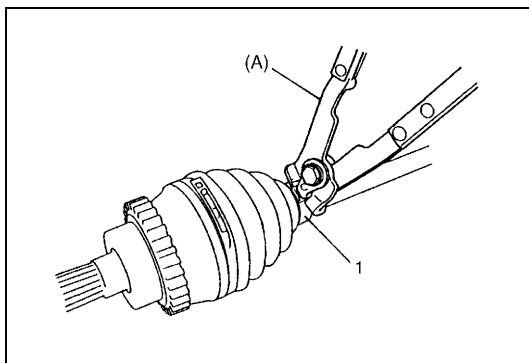
- 6) Place new wheel side boot big band onto boot putting band outer end (1) against forward rotation (2) as shown in figure.



- 7) Fasten wheel side boot big band (1) by drawing hooks (2) with plier (3) and engage hooks (4) in slot and window (5).



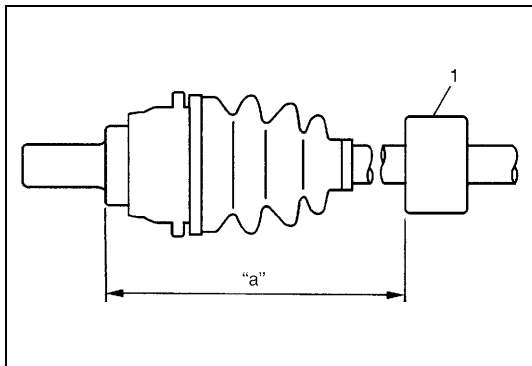
- 8) Place new wheel side boot small band (1) onto boot putting band outer end (2) against forward rotation (3) as shown in figure.



- 9) Confirm that wheel side boot is not stretched or contracted, and then fasten boot small band (1) securely using special tool.

Special tool

(A): 09943-55010



- 10) Install damper (1) on left side drive shaft according to dimension specified below.

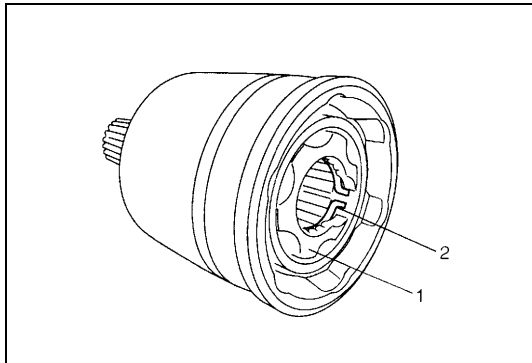
Damper installation position

For M/T model with M13 engine

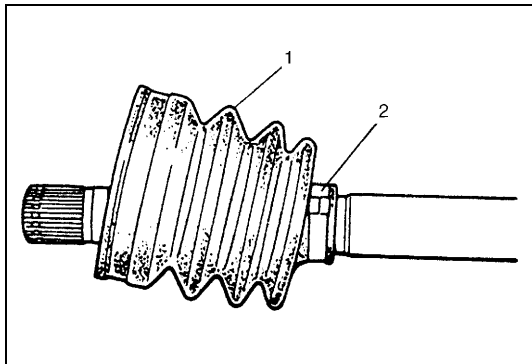
"a": 134 – 140 mm (5.28 – 5.51 in.)

For A/T model with M13 engine

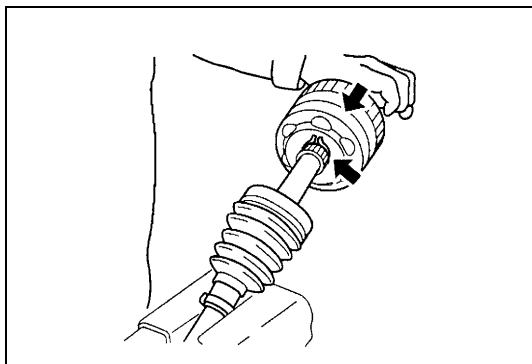
"a": 157 – 163 mm (6.18 – 6.42 in.)



- 11) Install retaining ring (2) to cage (1).



- 12) Set new differential side small band (2) and differential side boot (1) on shaft temporarily.

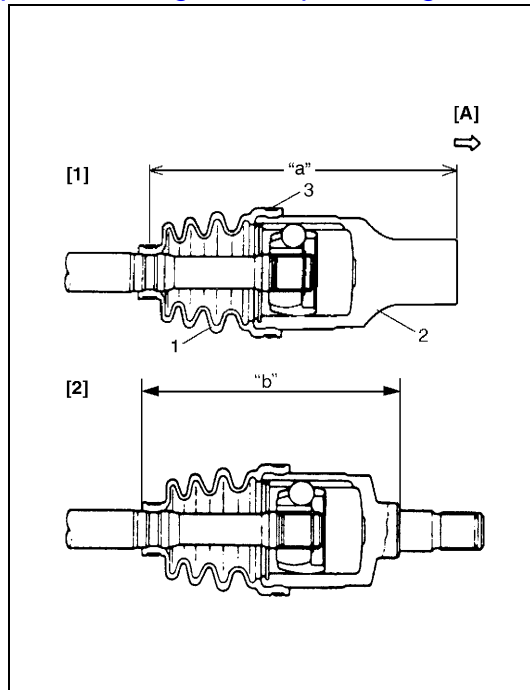


- 13) Apply grease in the supplied parts to DOJ and inside of housing.

Grease color: Black

Grease amount: Approx. 60 g (2.1 oz)

- 14) Place DOJ onto spline of drive shaft and drive onto drive shaft by using plastic hammer until retaining ring engages.



15) Install boot on joint housing.

- For right side

When fixing boot (1) to joint housing (2) with differential side boot big band (3), adjust so that measurements become as indicated below.

- For left side

Fit boot to grooves of shaft and housing and adjust length "b" to specification below.

Insert screwdriver into boot and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

Length

"a": 181.4 mm (7.26 in.)

"b": 147.1 mm (5.88 in.)

[A]: For differential side

[1]: For right side

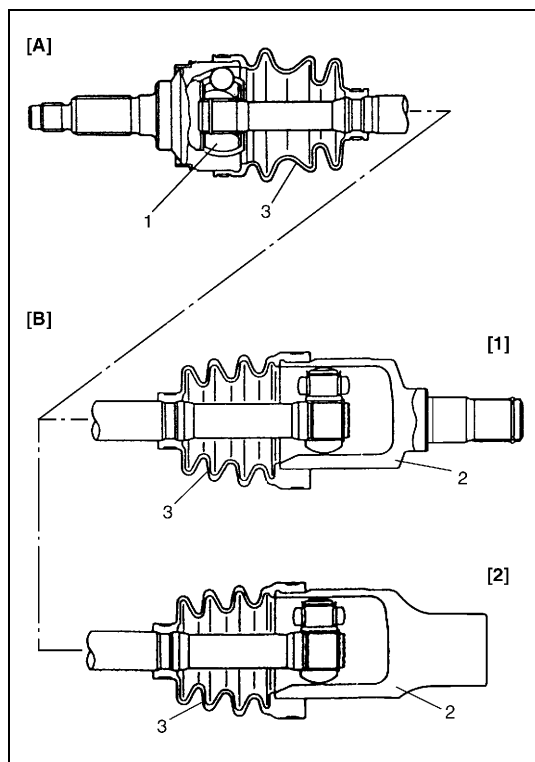
[2]: For left side

CAUTION:

- To prevent any problem caused by washing solution, do not wash joint boots. Degreasing of those parts with cloth is allowed.
- Do not squeeze or distort boot when fastening it with bands.
Distorted boot caused by squeezing air may reduce its durability.

16) Install and fasten new big and small bands at the position of step 15) referring to steps 6) to 9).

For Tripod Joint Type

**CAUTION:**

- Do not wash boots in degrease, such as gasoline or kerosene, etc. Washing in degrease causes deterioration of boots.
- To ensure full performance of joint as designed, be sure to distinguish two types of grease in spare part and apply the specified amount of grease to each joint.

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly.

Make sure that wheel side joint (1) and differential side joint housing (2) are washed thoroughly and air dried, and boots (3) are cleaned with cloth if they are to be reused.

[A]:	For wheel side
[B]:	For differential side
[1]:	For 2WD model
[2]:	For 4WD model

- 1) Wash disassembled parts (except boots). After washing, dry parts completely by blowing air.
- 2) Clean boots with cloth.
- 3) Apply grease in the supplied parts to the inside of joint housing.

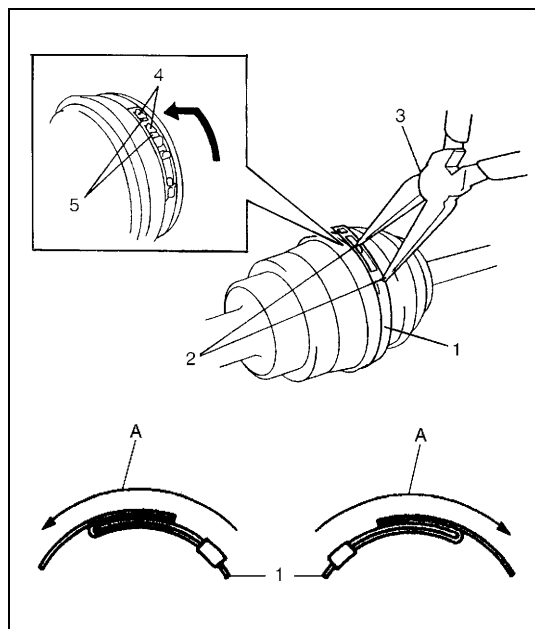
Grease color

For 2WD model: Dark brown

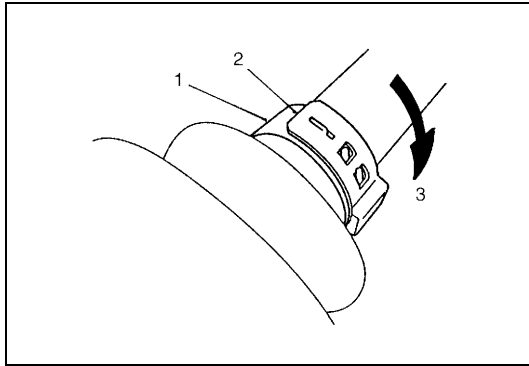
For 4WD model: Black

Grease amount: Approx. 70 g (2.5 oz)

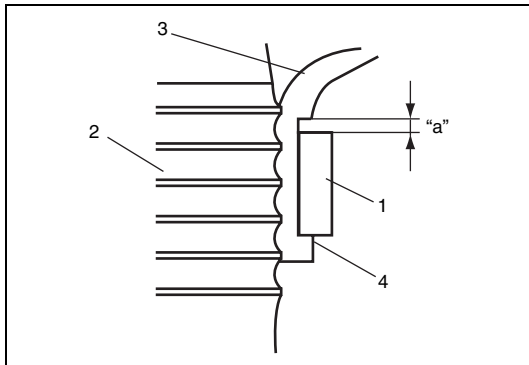
- 4) Install wheel side boot on shaft, fill up boot inside with grease and then fasten boot big band (1) by drawing hooks (2) with plier (3) and engage hooks (4) in slot and window (5).

**CAUTION:**

- Bend each boot band against forward rotation (A).
- Do not squeeze or distort boot when fastening it with bands.
Distorted boot caused by squeezing air may reduce its durability.

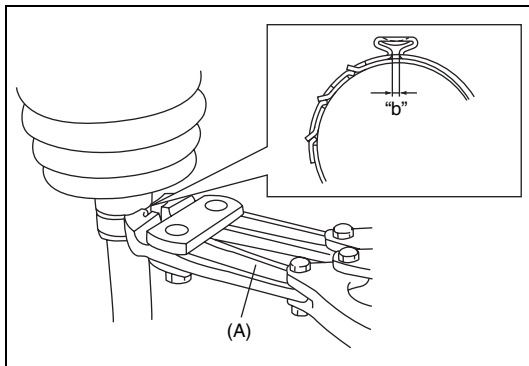


- 5) Place new wheel side boot small band (1) onto boot putting band outer end (2) against forward rotation (3) as shown in figure.



- 6) Install wheel side boot small band (1), putting its lower edge against projected end (4) of boot (3) so that clearance "a" is provided as shown in figure.

2. Shaft



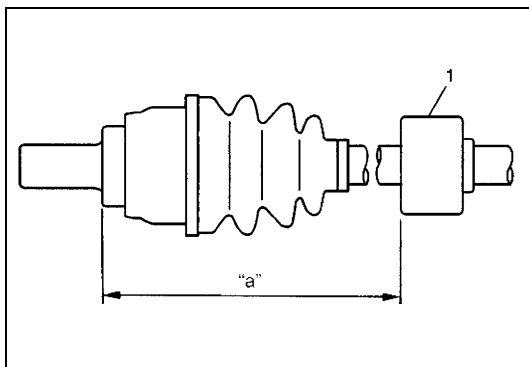
- 7) Fasten small band by using special tool.

NOTE:

- Small band must not come out of its installation section.
- Be sure to caulk small band securely until complete contact "b" is obtained.

Special tool

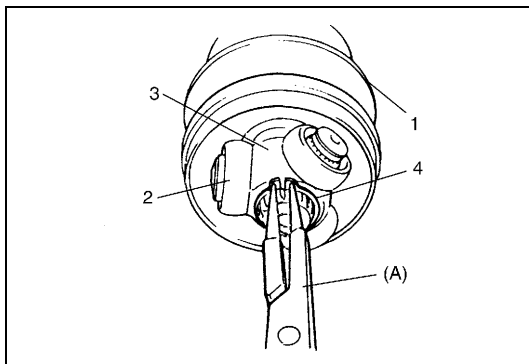
(A): 09943-57010



- 8) Install damper (1) on right side drive shaft according to dimension specified below, if equipped.

Damper installing position

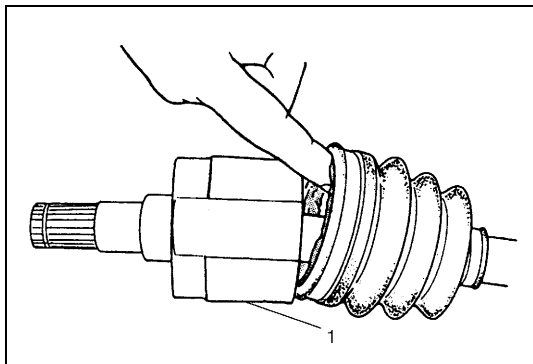
"a": 347 – 353 mm (13.66 – 13.90 in.)



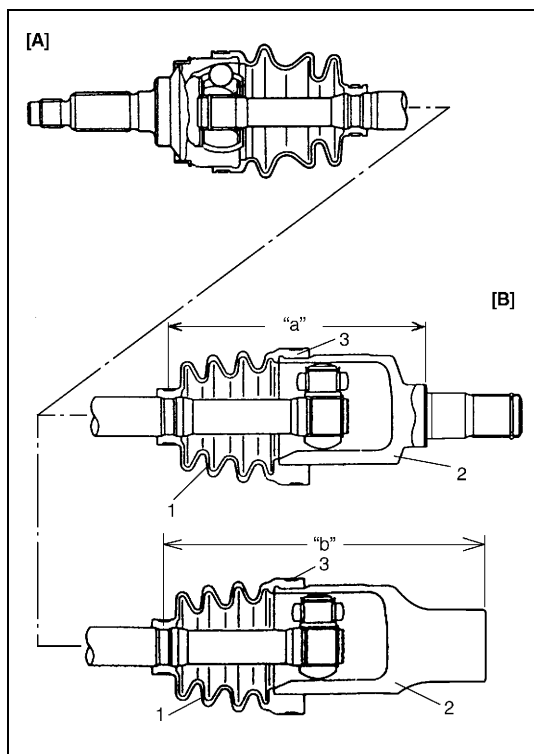
- 9) Set new differential side small band and differential side boot (1) on shaft temporarily.
Apply grease to tripod joint (2). Use specified grease in tube included in spare parts.
- 10) Install tripod joint spider (3) on shaft, facing its chamfered spline inward (wheel side), then fasten it with snap ring (4).

Special tool

(A): 09900-06107



- 11) Apply grease to inside of joint housing (1), then install housing, joint it with boot and fit boot to joint housing. After fitting boot, insert screwdriver into boot on joint housing side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

Grease color**For 2WD model: Dark brown****For 4WD model: Black****Grease amount: Approx. 95 g (3.3 oz)**

- 12) When fixing boot (1) to joint housing (2) with differential side big band (3), adjust so that measured dimensions become as indicated below.

Length**"a": 152.7 mm (6.11 in.) for right side of G10 engine model****"b": 188.2 mm (7.53 in.) for right side of 4WD with M13 engine model****CAUTION:**

To prevent any problem caused by washing solution, do not wash joint boots and tripod joint except its housing. Degreasing of those parts with cloth is allowed.

[A]: For wheel side

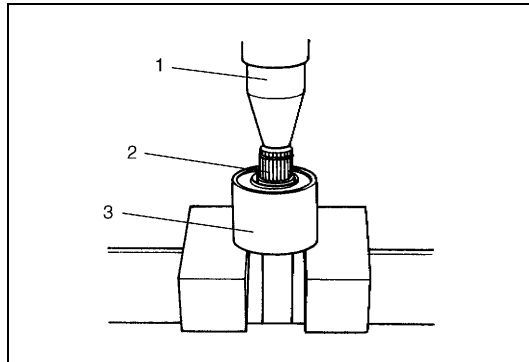
[B]: For differential side

Front Drive Shaft Inspection

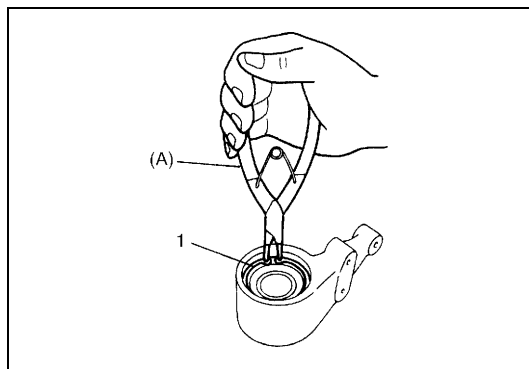
- Check shaft and joint for damage, wear or bend.
Replace them as necessary.
- Check retaining ring and snap ring for breakage or deformation.
Replace as necessary.

Center Shaft and Center Bearing Support Disassembly and Assembly (2WD Model with M13 Engine)

Disassembly



- 1) For M/T model, go to the next step. For A/T model, remove wheel side oil seal and circlip from center bearing support bracket (3).
- 2) Using hydraulic press (1), draw out center shaft (2) from center shaft support bearing.
- 3) Remove oil seals from center bearing support bracket (3).



- 4) Remove bearing support circlip(s) (1) by using special tool.

Special tool

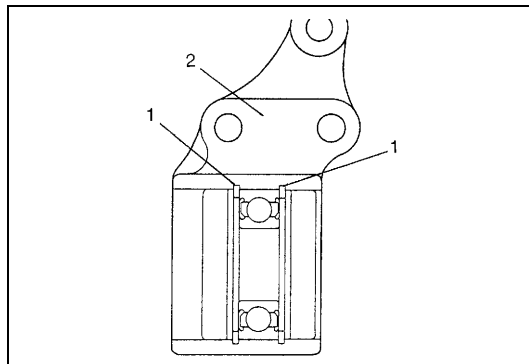
(A): 09900-06108

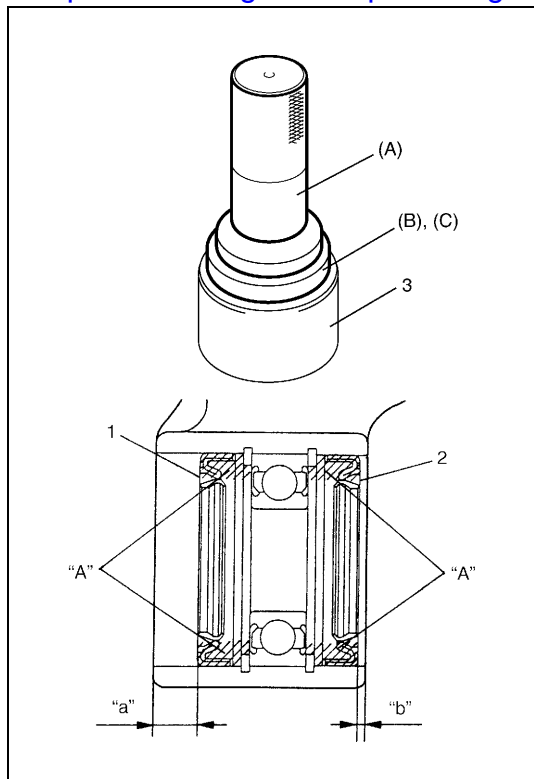
- 5) Remove center shaft support bearing from center bearing support bracket.

Assembly

Install center shaft by reversing removal procedure and noting following points

- When installing circlips (1), make sure that it fits in circlip groove in center bearing support bracket (2) securely as shown.





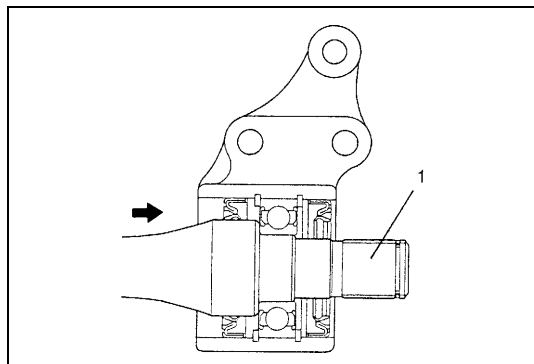
- When installing left oil seal (1) and right oil seal (2) to center bearing support bracket (3) by using special tools, use care so that the oil seals installed in proper direction and position as shown figure.

Special tool**(A): 09913-76010 (For A/T model)****(B): 09951-46010 (For A/T model)****(C): 09944-66020 (For A/T model)****09925-15410 (For M/T model)****Distance****For M/T model****"a": 8 – 9 mm (0.31 – 0.35 in.)****"b": 2 – 3 mm (0.08 – 0.12 in.)****For A/T model****"a": 0 mm (0 in.)****"b": 0 mm (0 in.)**

- Be sure to apply grease to oil seal lip and bearing side space indicated in figure.

"A": Grease 99000-25010

- Press-fit center shaft (1) from transaxle side.



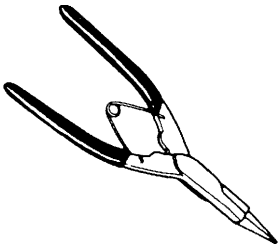
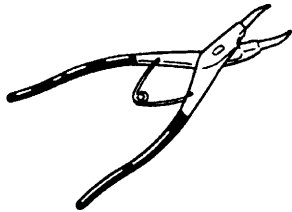
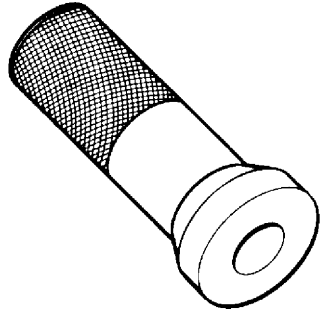
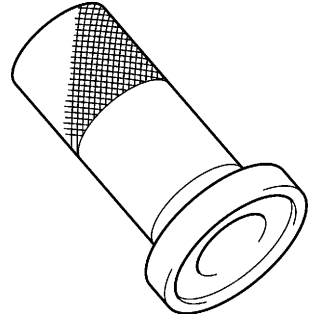
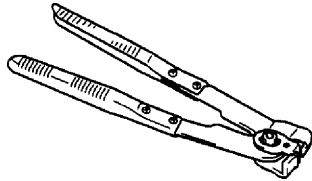
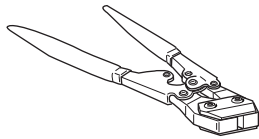
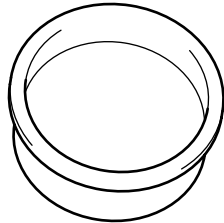
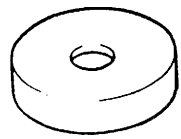
Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Transfer oil filler/level and drain plugs	21	2.1	15.5
Transmission oil filler/level and drain plugs	23	2.3	17.0
Ball stud bolt	60	6.0	43.5
Tie rod end nut	40	4.0	29.0
Drive shaft nut	175	17.5	127.0
Wheel bolt	95	9.5	69.0
Stabilizer mount bracket bolt	45	4.5	33.0
Center bearing support bolt	50	5.0	37.0

RequirPed Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Oil seal lip
Sealant	SUZUKI BOND NO. 1217G (99000-31260)	• Oil drain and filler/level plugs for manual transmission

Special Tools

 <p>09900-06107 Snap ring plier (Open type)</p>	 <p>09900-06108 Snap ring plier (Close type)</p>	 <p>09913-76010 Differential bearing race inst</p>	 <p>09925-15410 Oil seal installer</p>
 <p>09943-55010 Boot clamp plier</p>	 <p>09943-57010 Band compressor</p>	 <p>09944-66020 Installer bearing</p>	 <p>09951-46010 Installer drive shaft oil seal</p>

SECTION 4A3**FRONT DRIVE SHAFT
(Z13DT ENGINE MODEL)****CONTENTS**

General Description	4A3-1	Front Drive Shaft Components	4A3-5
Diagnosis	4A3-1	Front Drive Shaft Disassembly and	
On-Vehicle Service.....	4A3-2	Assembly	4A3-6
Front Drive Shaft Assembly Construction ..	4A3-2	Front Drive Shaft Inspection	4A3-12
Front Drive Shaft Assembly Removal and		Tightening Torque Specification	4A3-12
Installation	4A3-3	Special Tools.....	4A3-12
Front Drive Shaft Assembly Inspection	4A3-4		

4A3**General Description**

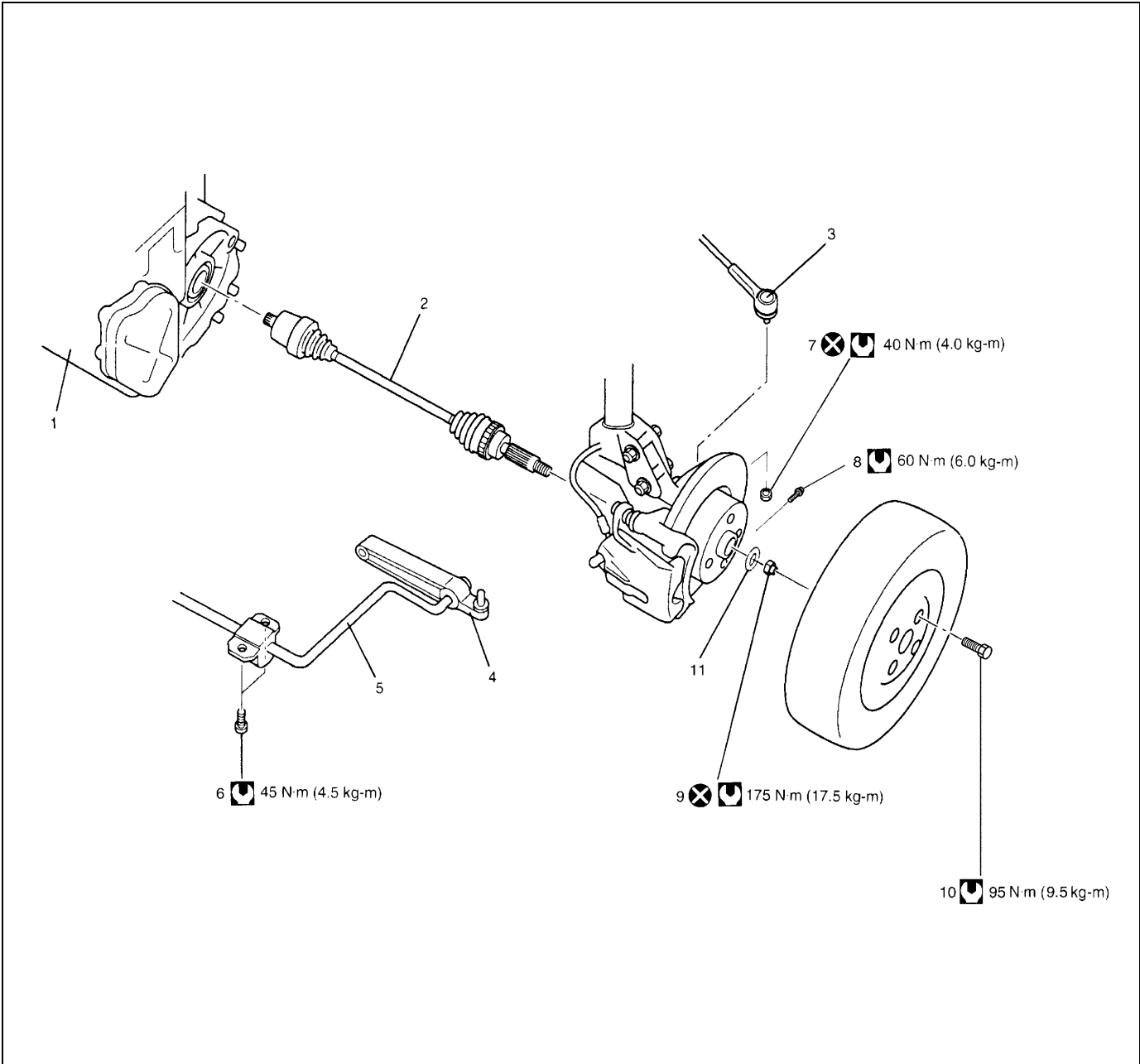
A constant velocity cross groove joint is used on the differential side of the left side drive shaft assembly. A constant velocity tripod joint is used on the differential side of the right side drive shaft assembly. A constant velocity ball joint is used on the wheel side of both the right and left drive shaft assemblies. The drive shaft can slide through the tripod joint or cross groove joint in the extension/contraction direction.



Diagnosis

Condition	Possible Cause	Correction
Abnormal noise	Wear or breakage of the drive shaft joint	Replace.

On-Vehicle Service

Front Drive Shaft Assembly Construction



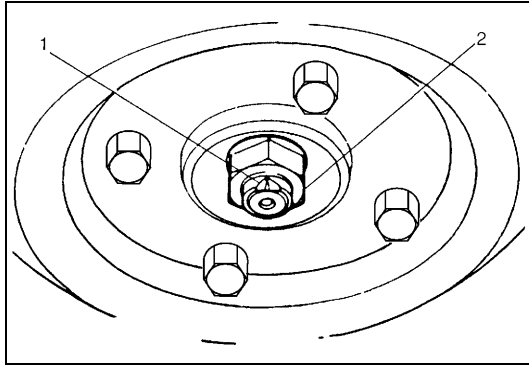
1. Transaxle	6. Stabilizer mount bracket bolt	11. Drive shaft washer
2. Drive shaft assembly	7. Tie-rod end nut	 Do not reuse.
3. Tie-rod end	8. Ball stud bolt	 Tightening torque
4. Suspension control arm	9. Drive shaft nut	
5. Stabilizer	10. Wheel bolt	

Front Drive Shaft Assembly Removal and Installation

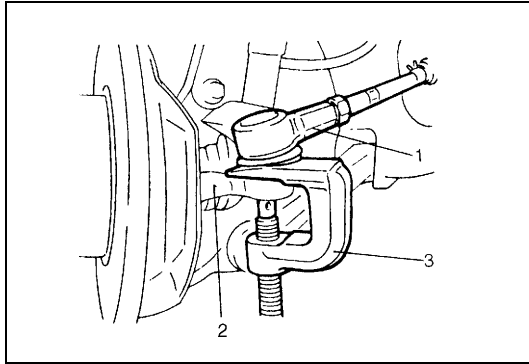
Removal

CAUTION:

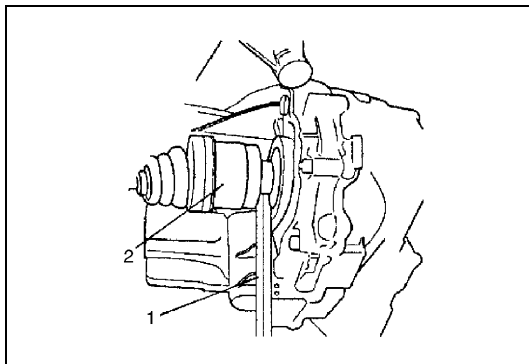
To prevent the breakage of boots, be careful not to damage the boots when removing drive shaft assembly.



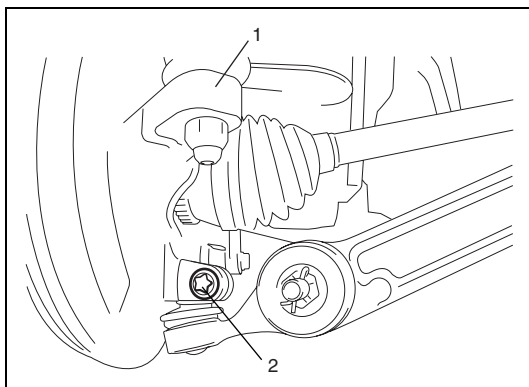
- 1) Undo caulking (1) and remove drive shaft nut (2).
- 2) Loosen wheel bolts.
- 3) Hoist vehicle.
- 4) Remove wheel.
- 5) Drain transaxle oil referring to "Manual Transaxle Oil Change" in Section 7A3.
- 6) Remove tie-rod end nut.



- 7) Disconnect tie-rod end (1) from steering knuckle (2) by using puller (3).



- 8) Using tire lever (1), pull out drive shaft joint (2) so as to release snap ring fitting of joint spline at differential side.
- 9) Remove two stabilizer mount brackets from vehicle body.



- 10) Disconnect front suspension control arm ball joint stud from steering knuckle (1) by pushing down stabilizer bar after removing ball joint bolt (2).
- 11) Remove drive shaft assembly.

Installation

CAUTION:

- Be careful not to damage oil seals and boots when installing drive shafts.
- Do not hit boot with hammer. Inserting boot only by hands is allowed.
- Make sure that differential side joint is inserted fully and its snap ring is seated as it was.

Install drive shaft assembly by reversing removal procedure noting the following points.

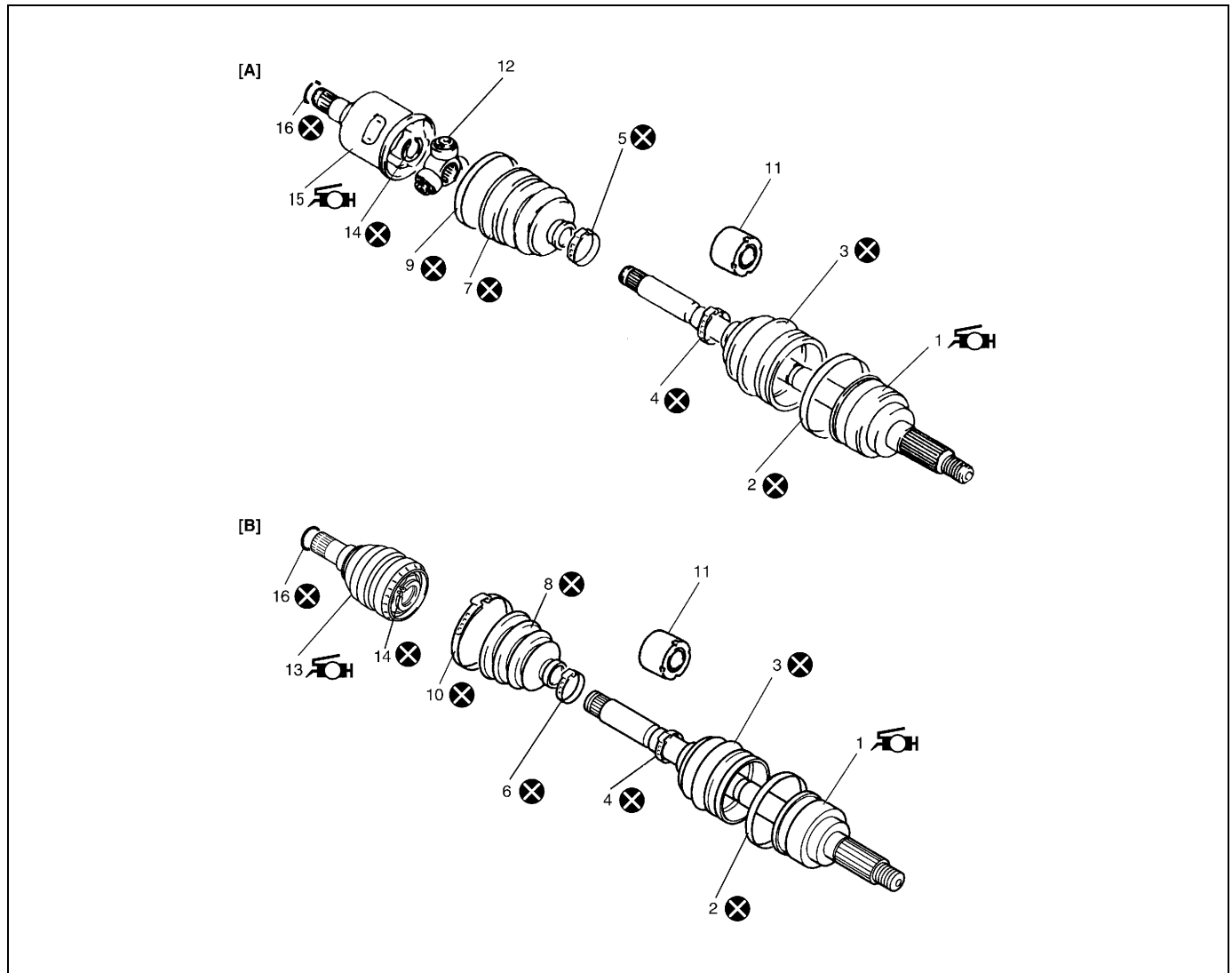
- Install wheel side joint to steering knuckle first, and then differential side joint to transaxle.
- Tighten each bolt and nut to the specified torque referring to “Front Drive Shaft Assembly Components” in this section.
- Fill transaxle with oil referring to “Manual Transaxle Oil Change” in Section 7A3.
- Check toe setting and adjust referring to “Toe Setting” and “Toe Adjustment” in Section 3.





Front Drive Shaft Assembly Inspection

Inspection

- Check boots for breakage or deterioration.
 - Check wheel side joint for rattle or smoothness.
 - Check differential side joint for smoothness.
- If any abnormality is found, replace.

Front Drive Shaft Components



[A]: Right side drive shaft assembly	6. Cross groove joint boot small band		13. Cross groove joint assembly : Apply dark brown grease included in spare parts.
[B]: Left side drive shaft assembly	7. Tripod joint boot		14. Circlip
 1. Wheel side joint housing (constant velocity ball joint) : Apply dark brown grease included in spare parts.	8. Cross groove joint boot		15. Differential side joint housing (Tripod joint) : Apply black grease included in spare parts.
2. Ball joint boot big band	9. Tripod joint boot big band		16. Snap ring
3. Ball joint boot	10. Cross groove joint boot big band		Do not reuse.
4. Ball joint boot small band	11. Damper		
5. Tripod joint boot small band	12. Tripod joint		

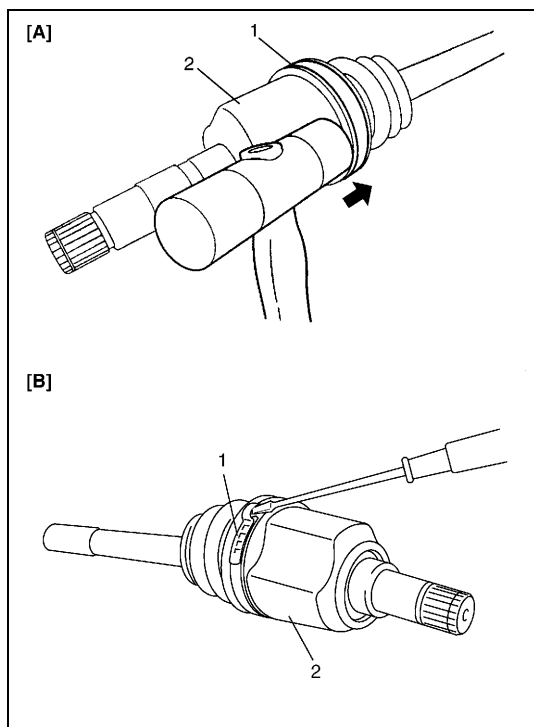
Front Drive Shaft Disassembly and Assembly

Disassembly

For Tripod joint type (right side)

CAUTION:

- Disassembly of wheel side joint is not allowed. If any abnormality is found, replace it as assembly.
- Do not disassemble tripod joint. If any malcondition is found in it, replace it as differential side joint assembly.



1) Remove differential side boot big band (1) as follows.

For boot big band without joint

- a) Remove boot big band by tapping boot and band with plastic hammer. If it is hard to remove boot big band, cut it using a nipper or a iron saw with care not to damage tripod joint housing.

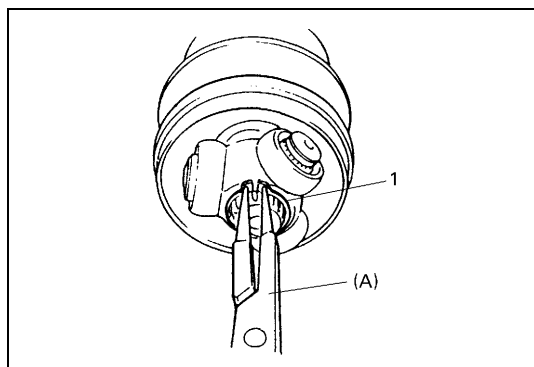
For boot big band with joint

- a) Remove boot big band by using flat end rod or the like.

[A]: For boot big band without joint

[B]: For boot big band with joint

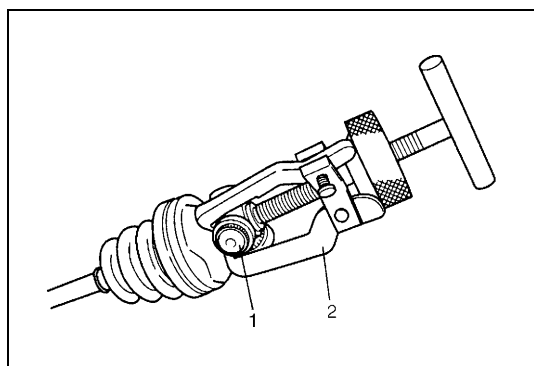
2) Take out tripod joint housing (2).



3) Remove grease from shaft, and then take off snap ring (1) by using special tool.

Special tool

(A): 09900-06107



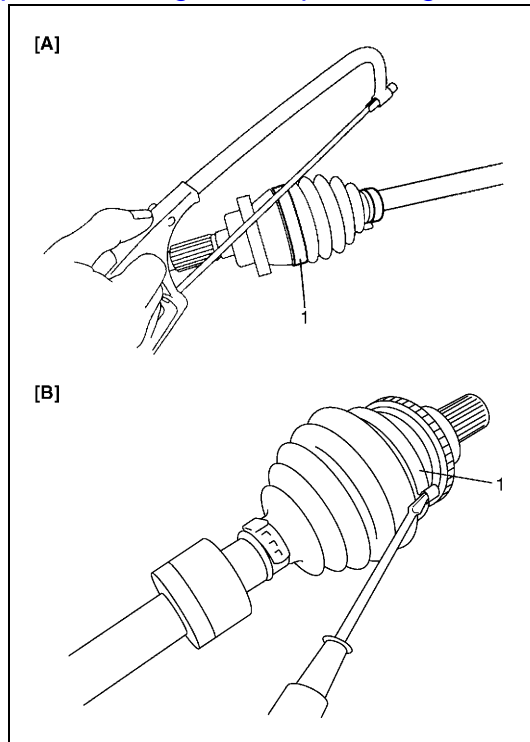
4) Remove tripod joint (1) by using 3 arms puller (2).

CAUTION:

To prevent needle bearing of joint from being degreased, do not wash it if it is to be reused.

5) Remove differential side boot small band, and then pull out differential side boot from shaft.

6) Pull out damper through shaft.



7) Remove wheel side boot big band (1) as follows.

For boot big band without joint

- a) Cut boot big band using a iron saw or a nipper with care not to damage wheel side joint housing.

For boot big band with joint

- a) Remove boot big band by using flat end rod or the like.

8) Remove wheel side boot small band, then pull out wheel side boot from shaft.

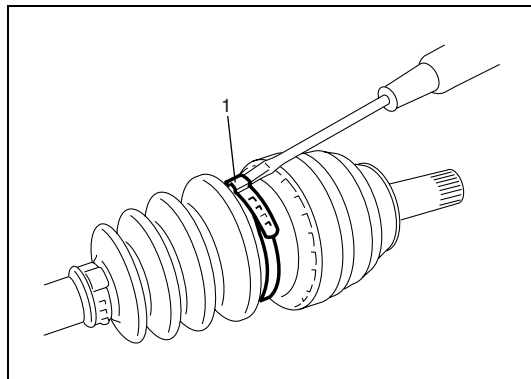
[A]: For boot big band without joint

[B]: For boot big band with joint

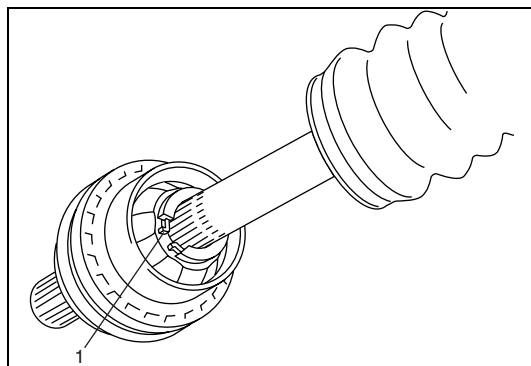
For Cross groove joint type (left side)

CAUTION:

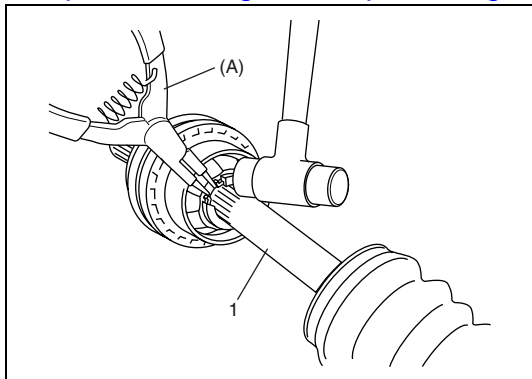
Disassembly of wheel side joint is not allowed. If any abnormality is found, replace it as assembly.



- 1) Remove differential side boot big band (1) by using flat end rod or the like.



- 2) Remove cross groove joint with housing from shaft as follows.
- a) Fold over boot and remove old grease so that circlip (1) is accessible.

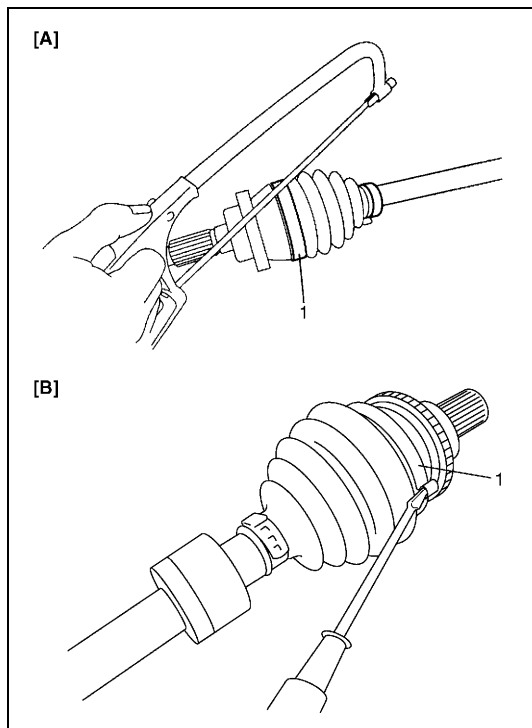


- b) Clamp drive shaft in soft jawed vise, and then remove circlip using special tool and pull out cross groove joint with housing from drive shaft (1) using plastic hammer until circlip no longer engages in groove of shaft.

Special tool

(A): 09900-06107

- 3) Remove differential side boot small band, and then pull out differential side boot from shaft.
4) Pull out damper through shaft.



- 5) Remove wheel side boot big band (1) as follows.

For boot big band without joint

- a) Cut boot big band using a iron saw or a nipper with care not to damage wheel side joint housing.

For boot big band with joint

- a) Remove boot big band by using flat end rod or the like.
6) Remove wheel side boot small band, and then pull out wheel side boot from shaft.

[A]: For boot big band without joint

[B]: For boot big band with joint

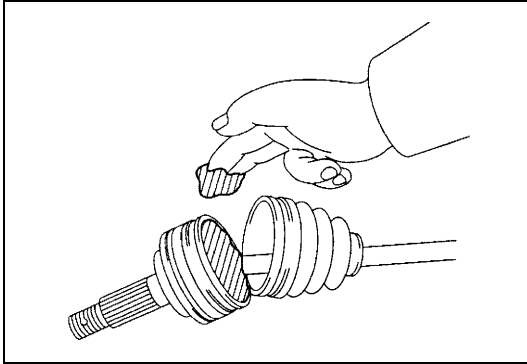
Assembly

For Tripod joint type (right side)

CAUTION:

Do not wash boot in degreaser, such as gasoline or kerosene, etc. Washing in degreaser causes deterioration of boot.

- 1) Wash disassembled parts (except boots), and then dry parts completely by blowing air.
- 2) Clean boots with cloth.
- 3) Install new wheel side boot on shaft temporarily.

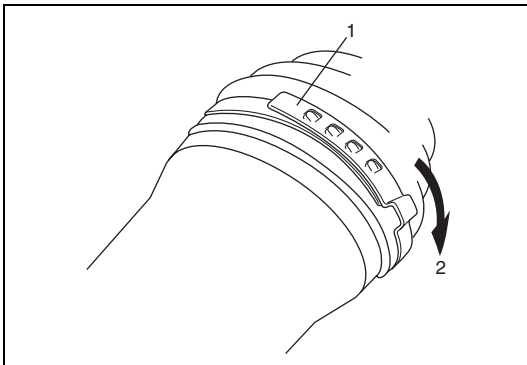


4) Apply grease in the supplied parts to wheel side joint.

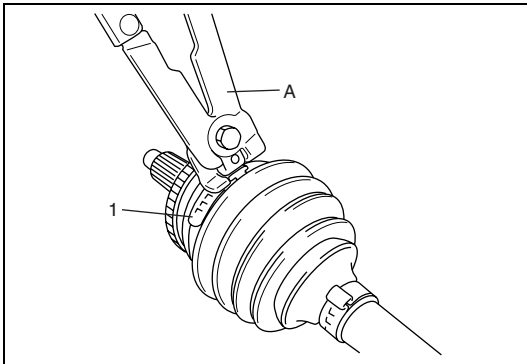
Grease color: Dark brown

Amount: Approximately 110 g (3.88 oz)

5) Fit wheel side boot onto grooves of housing and shaft.



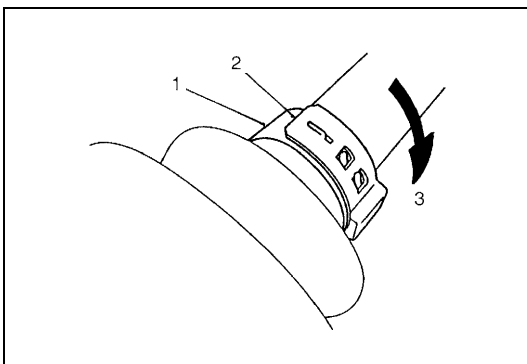
6) Place new wheel side boot big band onto boot putting band outer end (1) against forward rotation (2) as shown in figure.



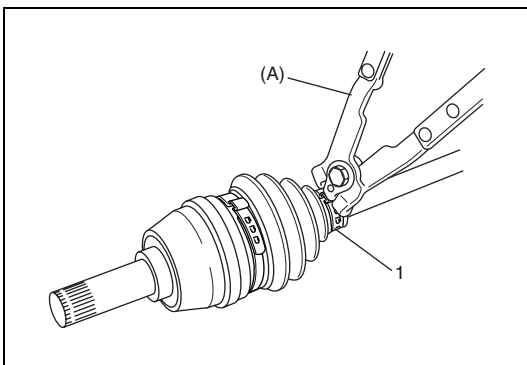
7) Confirm that wheel side boot is not stretched or contracted, and then fasten boot big band (1) securely using special tool.

Special tool

(A): 09943-55010 or 09943-57010



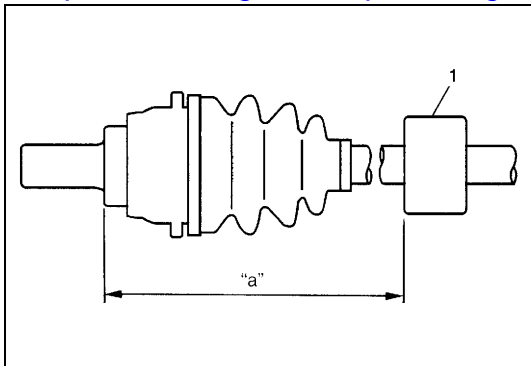
8) Place new wheel side boot small band (1) onto boot putting band outer end (2) against forward rotation (3) as shown in figure.



9) Confirm that wheel side boot is not stretched or contracted, and then fasten boot small band (1) securely using special tool.

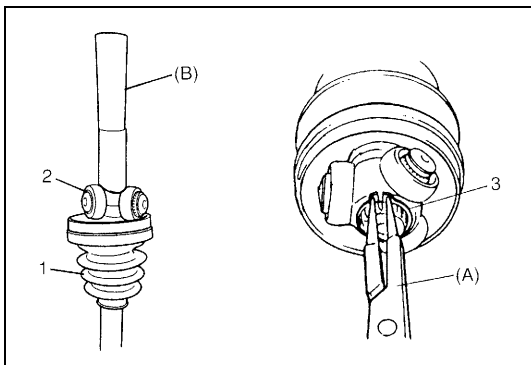
Special tool

(A): 09943-55010 or 09943-57010



- 10) Install damper (1) on right side drive shaft according to dimension specified below.

Length "a": 337 – 343 mm (13.28 – 13.50 in.)

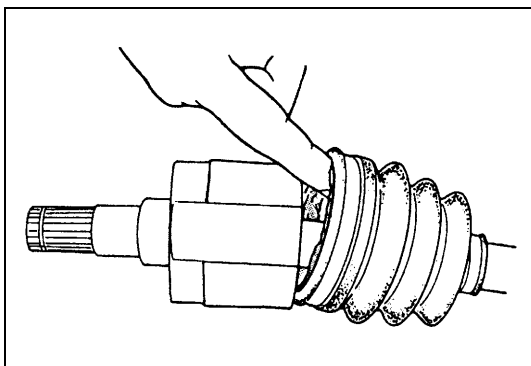


- 11) Set new differential side boot small band and differential side boot (1) on shaft temporarily.
 12) Install tripod joint (2) on shaft by using special tool with hammer, facing its chamfered spline inward (wheel side), then fasten it with snap ring (3).

Special tool

(A): 09900-06107

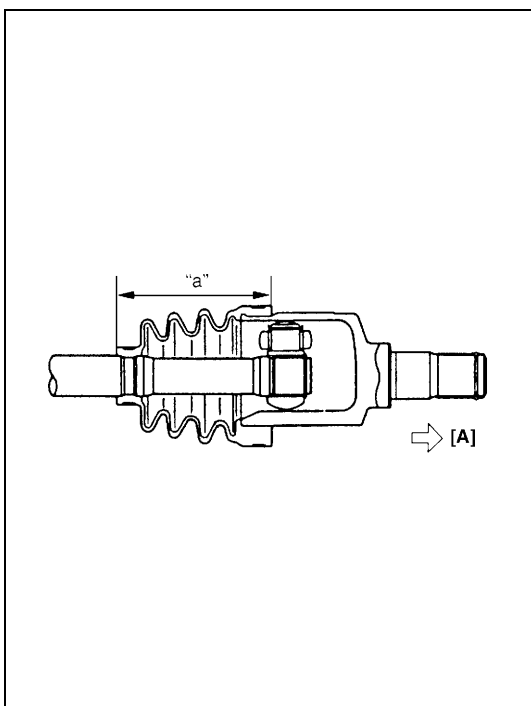
(B): 09925-98221



- 13) Apply grease to tripod joint and inside of housing then install housing. Use grease supplied with spare parts.

Grease color: Black

Amount: Approximately 160 g (5.6 oz)



- 14) Fit boot to grooves of shaft and housing and adjust boot length to specification below. Insert screwdriver into boot and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

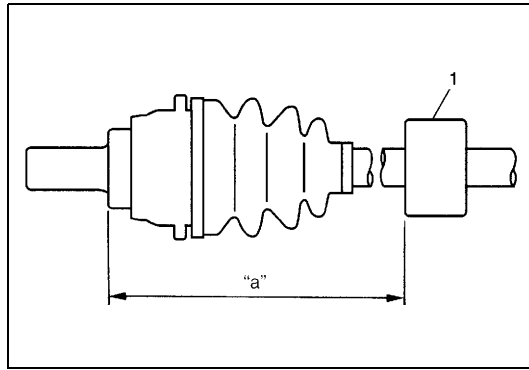
Length "a": Approximately 85.5 mm (3.37 in.)

CAUTION:

- To prevent any problem caused by washing solution, do not wash boot and tripod joint except its housing. Degreasing of those parts with cloth is allowed.
- Do not squeeze or distort boot when fastening it with bands. Distorted boot caused by squeezing air may reduce its durability.

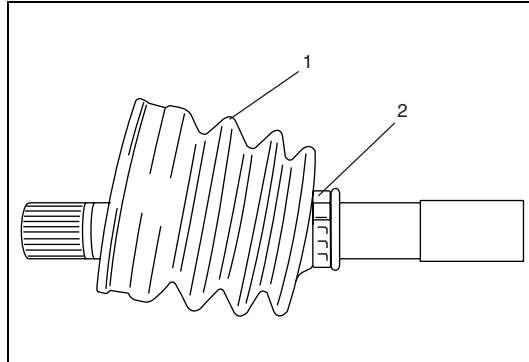
[A]: Differential side

- 15) Install and fasten new boot big and small bands at that position of step 14) in the same procedure as previous steps 6) to 9).

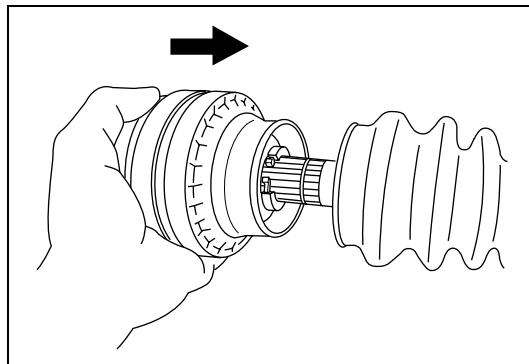
For Cross groove joint type (left side)

- 1) Install new wheel side boot on shaft according to step 3) to 9) for Tripod joint Type Drive Shaft Assembly.
- 2) Install damper (1) on drive shaft according to dimension specified below.

Length "a": 157 – 163 mm (6.2 – 6.4 in.)



- 3) Set new differential side boot small band (2) and differential side boot (1) on shaft temporarily.

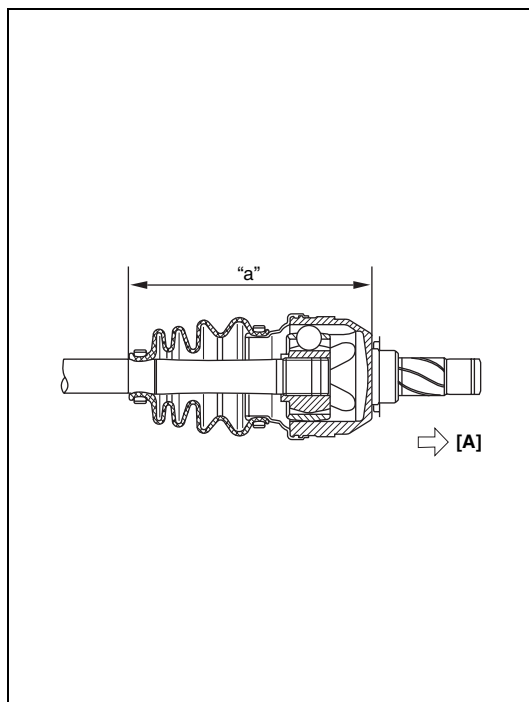


- 4) Apply grease in the supplied parts to cross groove joint and inside of housing.

Grease color: Dark brown

Amount: Approximately 110 g (3.88 oz)

- 5) Place cross groove joint with housing onto spline of drive shaft and drive onto drive shaft by using plastic hammer until circlip engages.



- 6) Fit boot to grooves of shaft and housing and adjust length "a" to specification below. Insert screwdriver into boot and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

Length "a": Approximately 168.7 mm (6.64 in.)

CAUTION:

- To prevent any problem caused by washing solution, do not wash boot. Degreasing of those parts with cloth is allowed.
- Do not squeeze or distort boot when fastening it with bands. Distorted boot caused by squeezing air may reduce its durability.

[A]: Differential side

- 7) Install and fasten new boot big and small bands at that position of step 6) in the same procedure as steps 6) to 9) of Tripod Joint Type Drive Shaft Assembly.

Front Drive Shaft Inspection

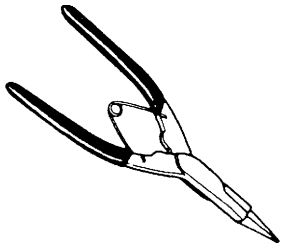
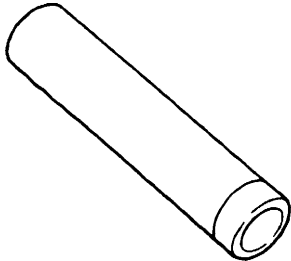
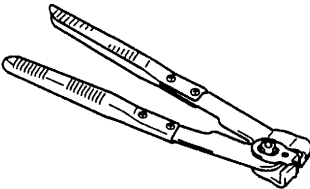
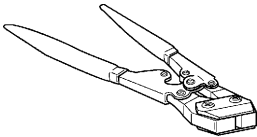
Inspection

- Check shaft and joint for damage, wear or bend.
Replace them as necessary.
- Check retaining ring and snap ring for breakage or deformation.
Replace as necessary.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Ball stud bolt	60	6.0	43.5
Tie rod end nut	40	4.0	29.0
Drive shaft nut	175	17.5	127.0
Wheel bolt	95	9.5	69.0
Stabilizer mount bracket bolt	45	4.5	33.0

Special Tools

 <p>09900-06107 Snap ring pliers (Open type)</p>	 <p>09925-98221 Bearing installer</p>	 <p>09943-55010 (J-22610) Boot clamp plier</p>	 <p>09943-57010 Band compressor</p>
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SECTION 4B

PROPELLER SHAFTS

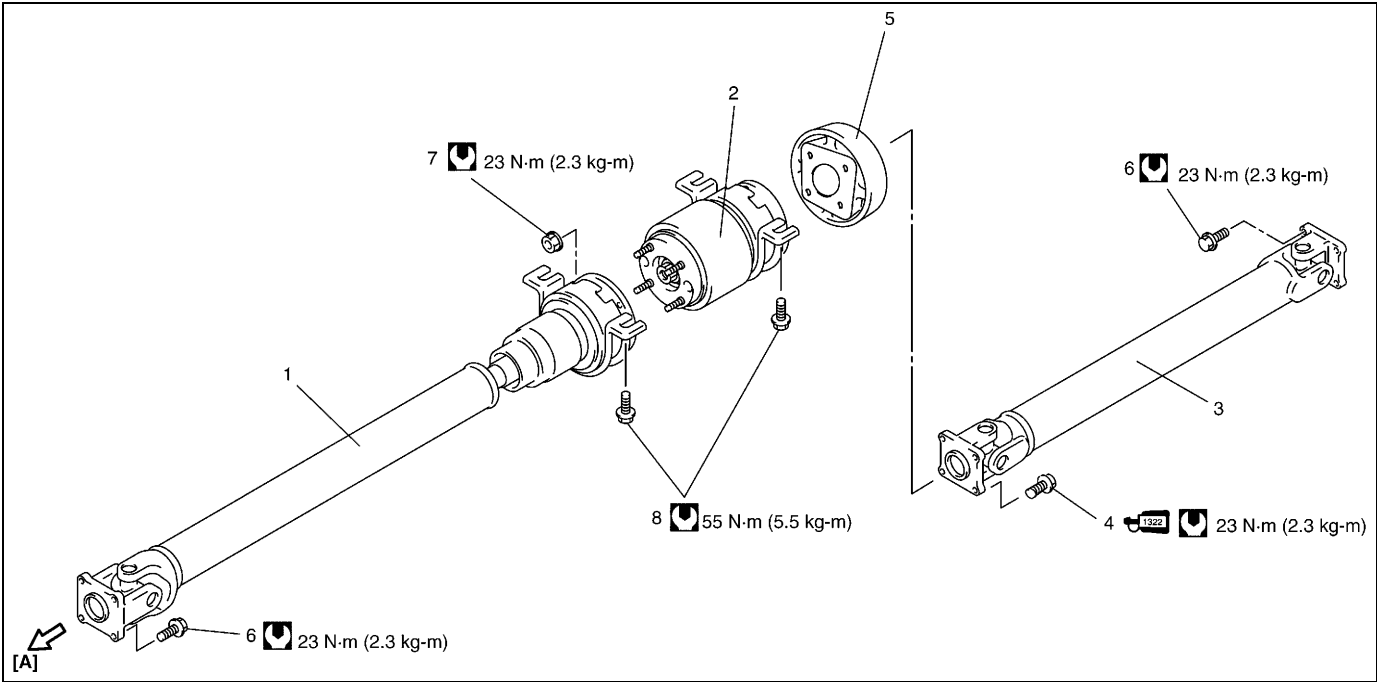
NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

CONTENTS

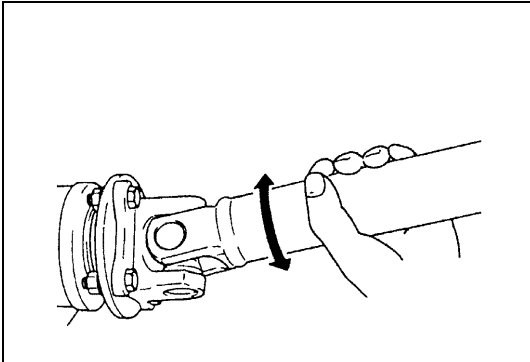
On-Vehicle Service.....	4B-2	Tightening Torque Specification.....	4B-6
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On-Vehicle Service



[A]: Forward.	4. Propeller shaft No.2 bolt : Apply thread lock 99000-32110 to thread.	8. Center support bolt
1. Propeller shaft No.1 with center support	5. Dynamic damper	Tightening torque
2. Viscous coupling with center support	6. Propeller shaft bolt	
3. Propeller shaft No.2	7. Viscous coupling nut	

ON-VEHICLE INSPECTION



- Check propeller shaft connecting bolts for looseness. If looseness is found, tighten to specified torque.
- Check propeller shaft joints for wear, rattle and damage. If any defect is found, replace.
- Check propeller shaft center support for biting of foreign matter, crack, abnormal noise and damage. If any defect is found, replace.

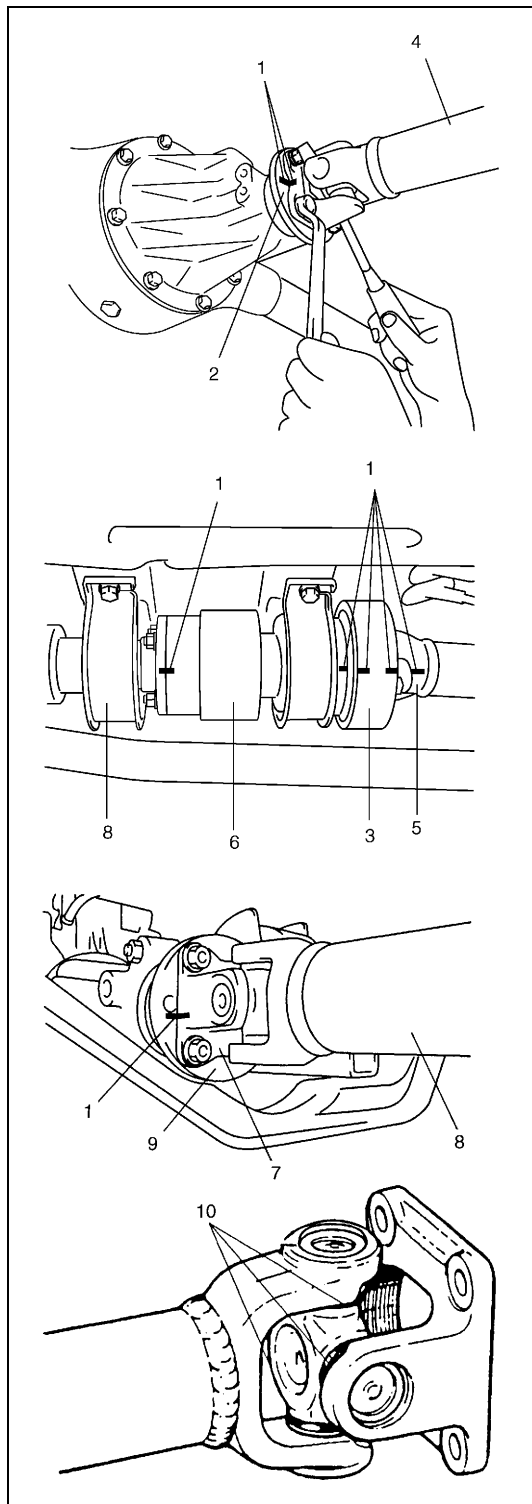
REMOVAL

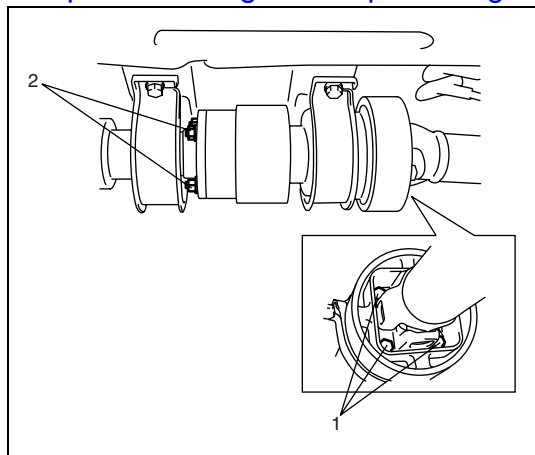
- 1) Hoist vehicle.
- 2) Before removing propeller shafts, give match marks (1) on propeller shaft No.2 (4) and companion flange (2) of rear differential as shown. Also give match marks (1) on propeller shaft No.2 yoke (5), dynamic damper (3), viscous coupling with center support (6), yoke (7) of propeller shaft No.1 with center support (8) and transfer output flange (9).

CAUTION:

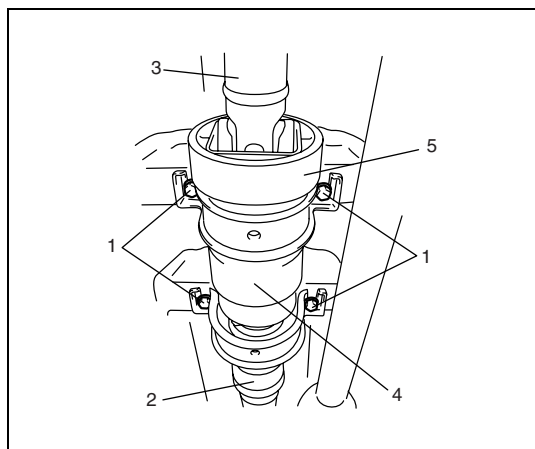
Don't damage joint seal (10) to prevent lubrication defect of joint.

- 3) Loosen propeller shaft bolts at front and rear end, and separate propeller shafts from transfer and rear differential.





- 4) If disassembling propeller shaft assembly is necessary, loosen propeller shaft No.2 bolts (1) and viscous coupling nuts (2) to facilitate subsequent disassembling, but keeping each connection provisionally.



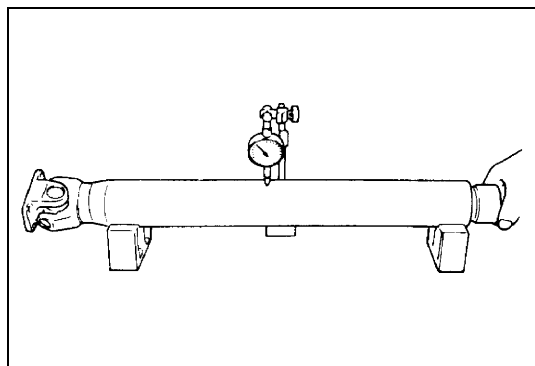
- 5) Loosen center support bolts (1), then remove propeller shaft No.1 with center support (2), propeller shaft No.2 (3), dynamic damper (5) and viscous coupling with center support (4) all together.

- 6) Disconnect propeller shaft No.1 with center support and propeller shaft No.2 from viscous coupling with center support

INSPECTION

- Inspect propeller shaft and flange yoke for damage.
- Inspect propeller shaft for runout.
If damage is found or shaft runout exceeds its limit, replace.

Propeller shaft runout
Limit: 0.7 mm (0.028 in.)



INSTALLATION

Reverse removal procedure to install propeller shafts noting the following points.

- When installing propeller shafts, dynamic damper and viscous coupling with center support, align the match marks (1).
Otherwise, vibration may occur during driving.
- Apply thread lock cement to thread of propeller shaft No.2 bolts.

“A”: Cement 99000-32110

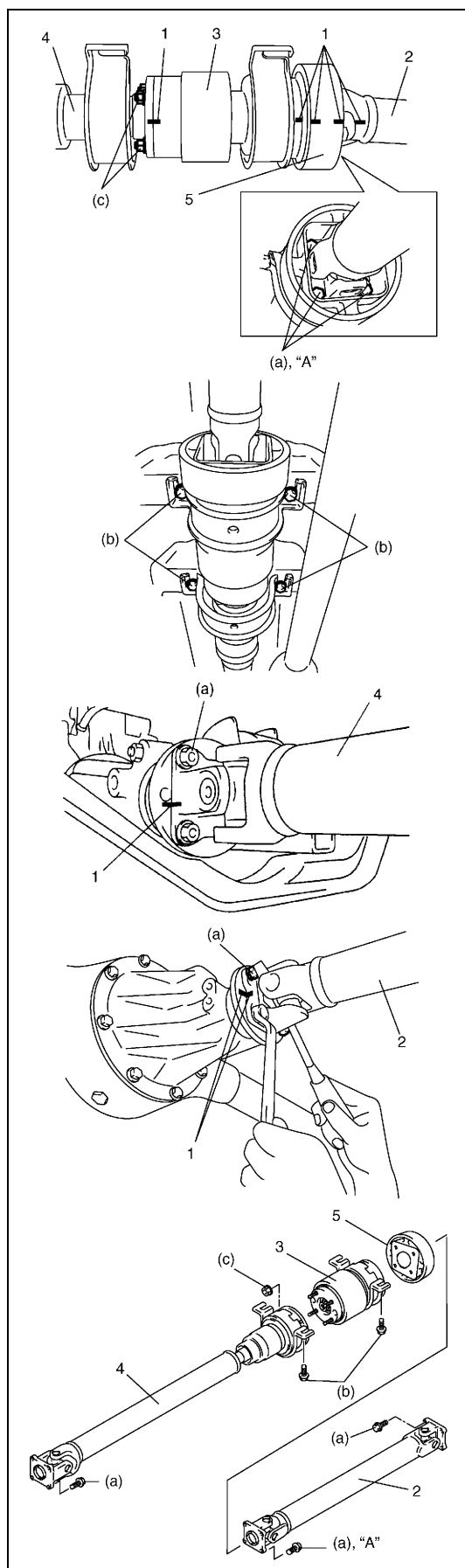
- Use following specification to torque bolts.

Tightening torque

Propeller shaft bolt (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

Center support bolt (b): 55 N·m (5.5 kg-m, 40.0 lb-ft)

Viscous coupling nut (c): 23 N·m (2.3 kg-m, 17.0 lb-ft)



2.	Propeller shaft No.2
3.	Viscous coupling with center support
4.	Propeller shaft No.1 with center support
5.	Dynamic damper

Tightening Torque Specification

Fastening portion	Tightening torque		
	N•m	kg-m	lb-ft
Propeller shaft bolt	23	2.3	17.0
Propeller shaft No.2 bolt	23	2.3	17.0
Center support bolt	55	5.5	40.0
Viscous coupling nut	23	2.3	17.0

SECTION 5

BRAKES

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.
Leave a bolt at least not to drop the wheel.
Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

NOTE:

- When inspecting and servicing vehicle equipped with ABS, be sure to refer to section 5E1 first.
- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.
- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

General Description	5-2	Bleeding Brakes	5-3
Check and Adjustment	5-3	Brake Shoe Check	5-5
		Tightening Torque Specifications	5-5

General Description

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and four in rear).

The master cylinder is a tandem master cylinder. Brake pipes are connected to the master cylinder and they make two independent circuits. One connects front right & rear left brakes and the other connects front left & rear right brakes.

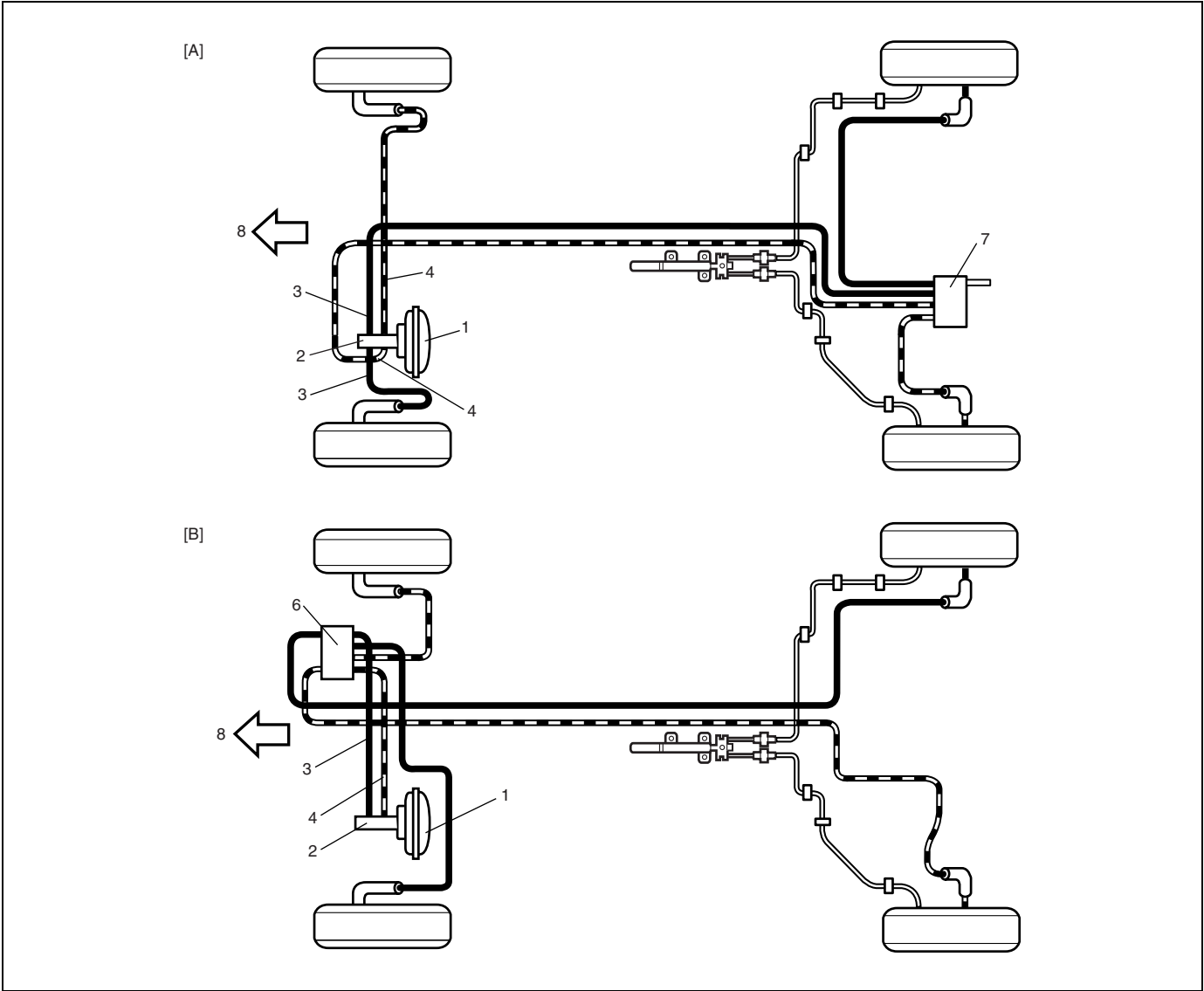
The load sensing proportioning valve (LSPV) is included in these circuits between the master cylinder and the rear brake for the vehicle without ABS.

In this brake system, the disc brake type is used for the front wheel brake and a drum brake type (leading / trailing shoes) for the rear brake.

The parking brake system is mechanical. It applies brake force to only rear wheels by means of the cable and mechanical linkage system. The same brake shoes are used for both parking and foot brakes.

NOTE:

The figures shows left-hand steering vehicle.
The figure for right-hand steering vehicle should be symmetrical.



[A]: For vehicle without ABS	3. Secondary side	7. LSPV (Load Sensing Proportioning Valve)
[B]: For vehicle with ABS	4. Primary side	8. Forward
1. Brake booster	5. Blank	
2. Master cylinder	6. ABS hydraulic unit / control module assembly	

Check and Adjustment

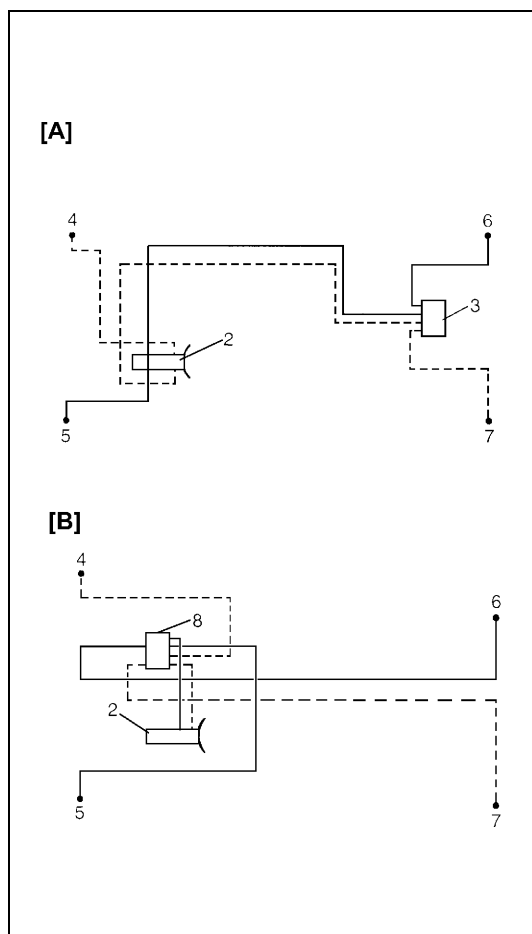
Bleeding Brakes

CAUTION:

Brake fluid is extremely damaging to paint. If fluid should accidentally touch painted surface, immediately wipe fluid from paint and clean painted surface.

NOTE:

For vehicle equipped with ABS, make sure that ignition switch is turned off.



Bleeding operation is necessary to remove air whenever it entered hydraulic brake system.

Hydraulic lines of brake system are based on the diagonal split system. When a brake pipe or hose was disconnected at the wheel, bleeding operation must be performed at both ends of the line of the removed pipe or hose. When any joint part of the master cylinder or other joint part between the master cylinder and each brake (wheel) was removed, the hydraulic brake system must be bled at all 4 wheel brakes.

NOTE:

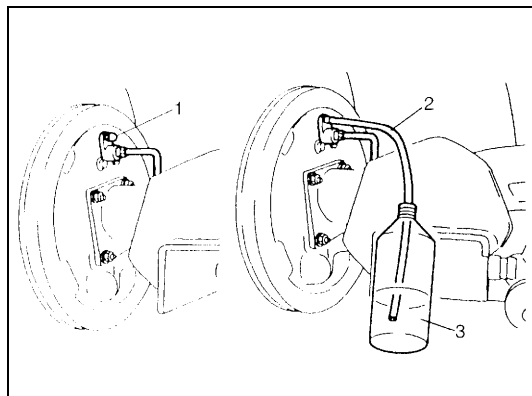
Perform bleeding operation starting with wheel cylinder farthest from master cylinder and then at front caliper of the same brake line. Do the same on the other brake line.

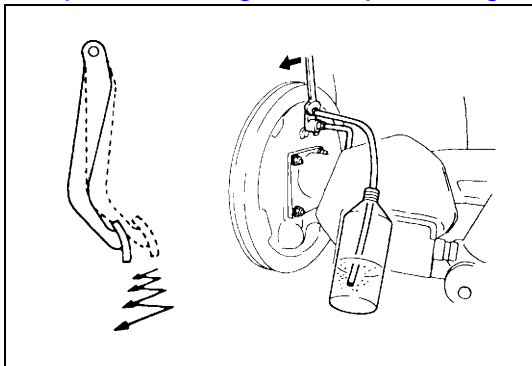
[A]:	Without ABS
[B]:	With ABS
1.	Blank
2.	Master cylinder
3.	LSPV
4.	Right brake caliper
5.	Left brake caliper
6.	Right wheel cylinder
7.	Left wheel cylinder
8.	ABS hydraulic unit
●:	Air bleeding point

1) Fill master cylinder reservoir with brake fluid and keep at least one-half full of fluid during bleeding operation.

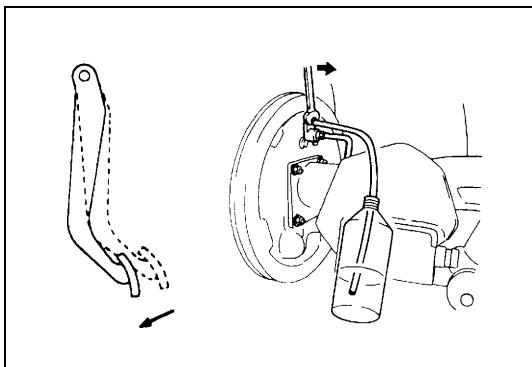
2) Remove bleeder plug cap (1).

Attach a vinyl tube (2) to bleeder plug of wheel cylinder, and insert the other end into container (3).

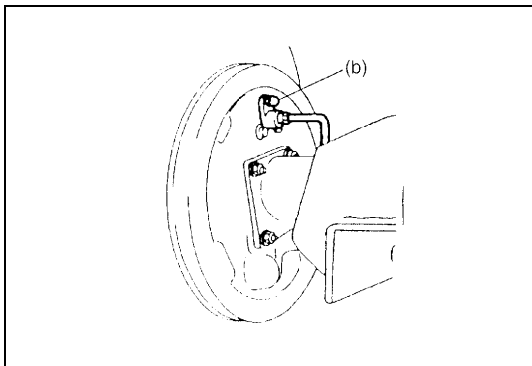




- 3) Depress brake pedal several times, and then while holding it depressed, loosen bleeder plug about one-third to one half turn.



- 4) When fluid pressure in the cylinder is almost depleted, retighten bleeder plug.
- 5) Repeat this operation until there are no more air bubbles in hydraulic line.



- 6) When bubbles stop, with depressing brake pedal, tighten bleeder plug.

Tightening torque

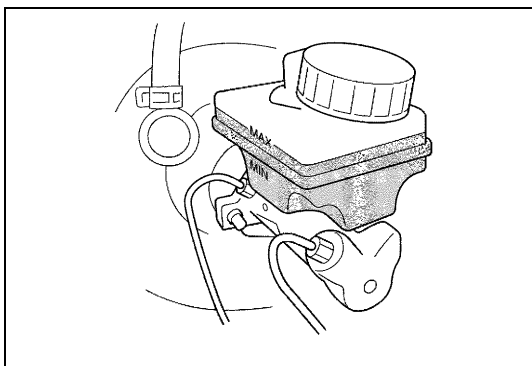
Brake bleeder plug

(b): 8.5 N·m (0.85 kg-m, 6.5 lb-ft)for rear brake

Brake bleeder plug

(b): 6.5 N·m (0.65 kg-m, 5.0 lb-ft)for front brake

- 7) Then attach bleeder plug cap.
- 8) After completing bleeding operation, apply fluid pressure to pipe line and check for leakage.



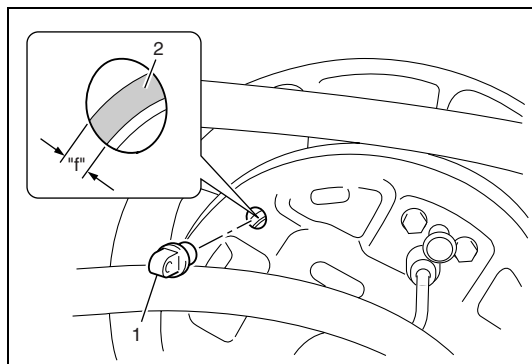
- 9) Replenish fluid into reservoir up to specified level.
- 10) Check brake pedal for "sponginess". If found spongy, repeat entire procedure of bleeding.

Brake Shoe Check

Inspection should be carried out on the following points after brake pedal travel “c” (pedal to silencer clearance) check as described on previous page of this section, even when it is more than specification.

Amount of brake shoe wear can be checked as follows.

- 1) Hoist vehicle.
- 2) Remove rubber cover (plug) (1) from brake back plate.
- 3) Through hole of back plate, visually check for thickness of brake shoe lining (2). If lining thickness “f” is found less than below specified wear limit, replace all brake shoes with new ones.



Thickness “f”

Service limit: 1.0 mm (0.04 in.)

Tightening Torque Specifications

Fastening part		Tightening torque		
		N•m	kg-m	lb-ft
Brake pipe flare nut		16	1.6	11.5
Brake bleeder plug	Front caliper	6.5	0.65	5.0
	Wheel cylinder	8.5	0.85	6.5
Wheel bolt		95	9.5	69.0

SECTION 5A**BRAKES PIPE/HOSE/MASTER CYLINDER****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.
Leave a bolt at least not to drop the wheel.
Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

5A**NOTE:**

- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.
- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

On-Vehicle Service.....	5A-2
Rear Brake Hose/Pipe	5A-2

On-Vehicle Service

Rear Brake Hose/Pipe

CAUTION:

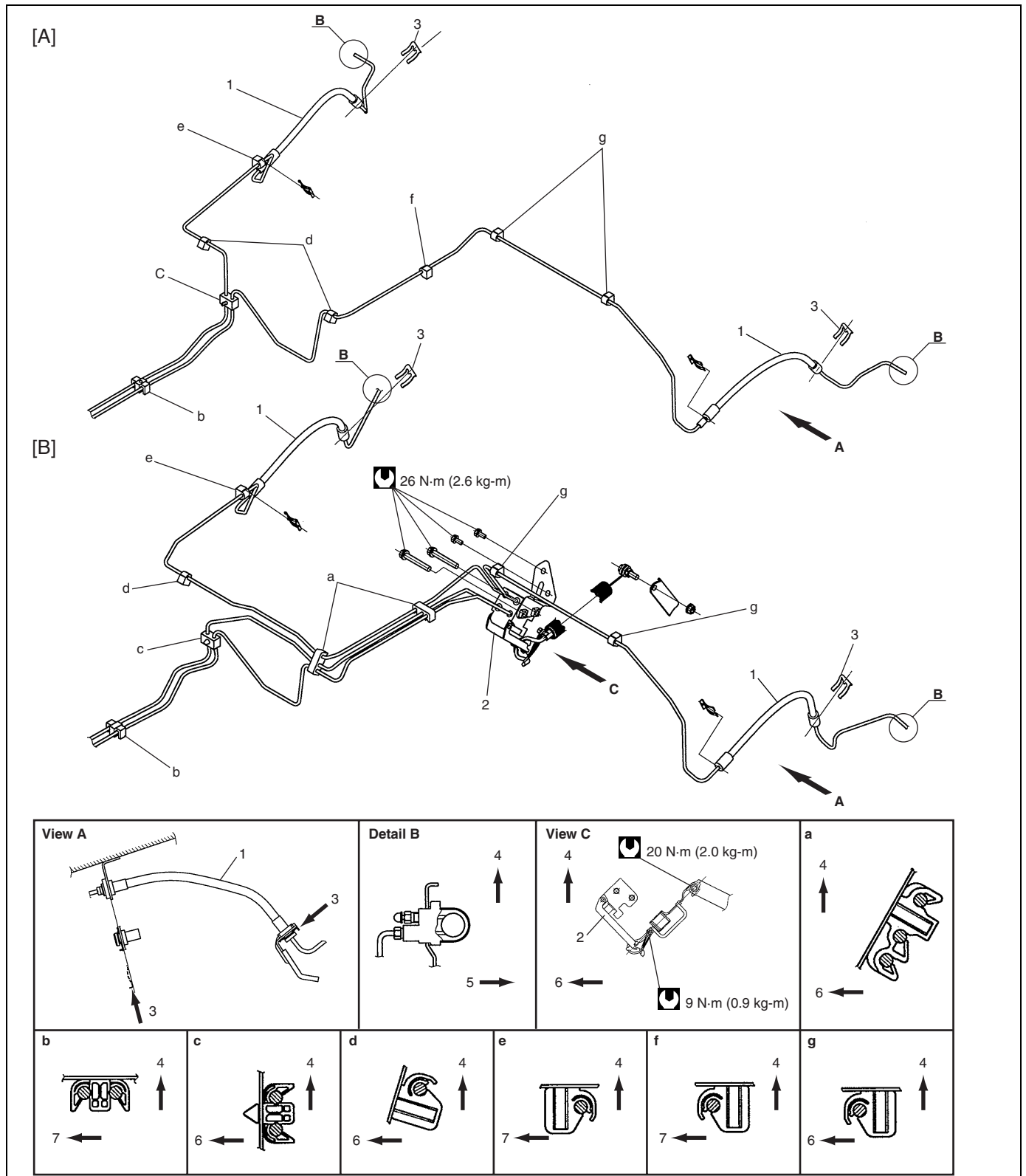
- Do not use lubricated shop air on brake parts as damage to rubber components may result.
- If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- The torque values specified are for dry, unlubricated fasteners.
- Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid.

Removal

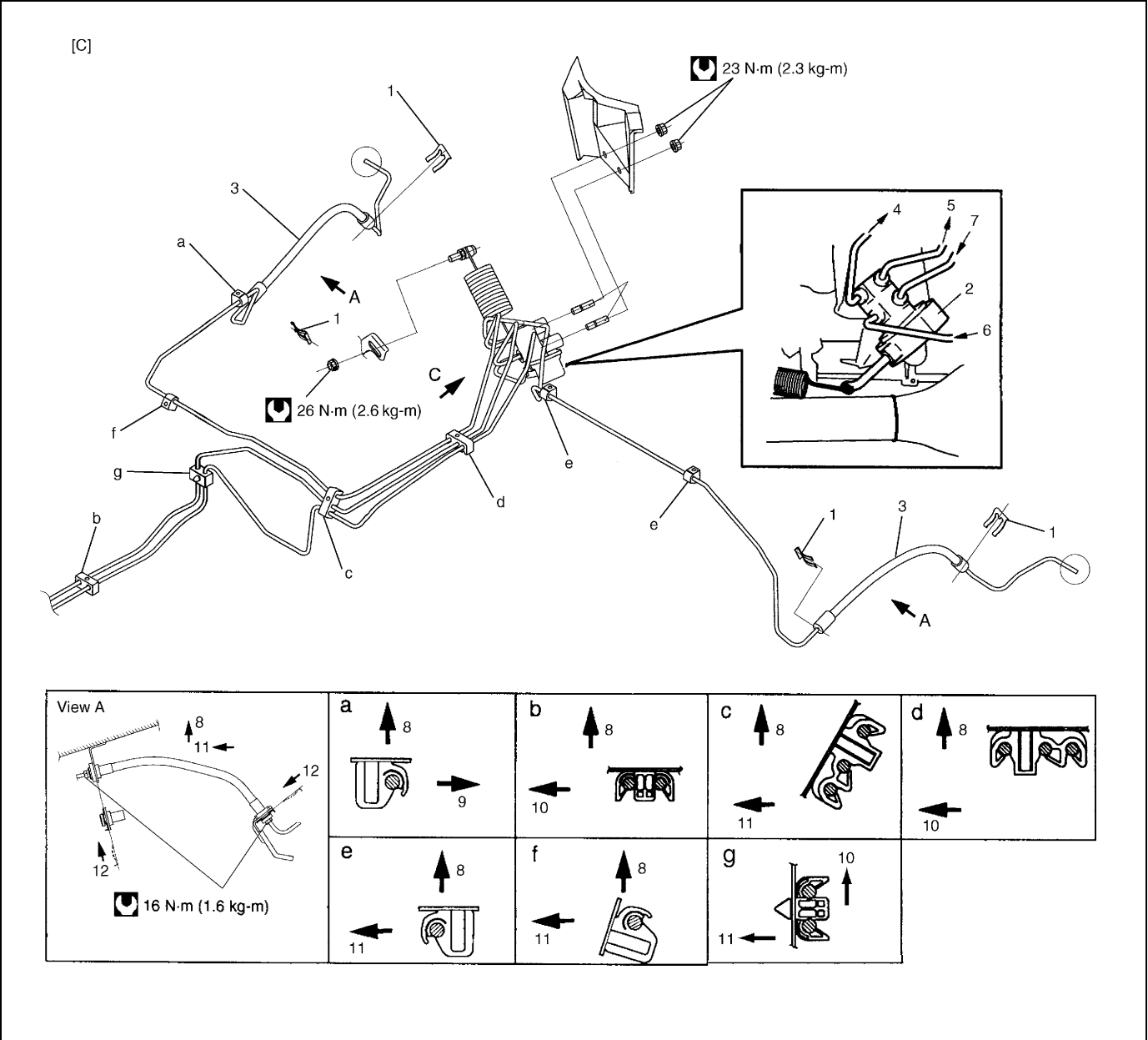
- 1) Raise and suitably support vehicle. Remove tire and wheel.
- 2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.


Installation

- 1) Reverse removal procedure for brake hose or pipe installation procedure.
 - Install clamps properly referring to figure below.
 - When installing hose, make sure that it has no twist or kink.
- 2) Fill and maintain brake fluid level in reservoir. Bleed brake system.
- 3) Perform brake test and check each installed part for fluid leakage.



[A]: with ABS vehicle	1. Rear brake hose	4. Top side	7. Right side
[B]: without ABS vehicle (2WD)	2. LSPV assembly	5. Out side	Tightening torque
a - g: Clamp	3. E-ring (Insert deletion)	6. Front side	



[C]: without ABS vehicle (4WD)	3. Rear brake hose	7. From master cylinder (Secondary)	11. Front side
a – g: Clamp	4. To left rear wheel cylinder	8. Top side	12. E-ring (Insert deletion)
1. E-ring	5. To right rear wheel cylinder	9. Left side	 Tightening torque
2. LSPV assembly	6. From master cylinder (Primary)	10. Right side	

SECTION 5B**FRONT BRAKE****WARNING:**

Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.

Leave a bolt at least not to drop the wheel.

Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

NOTE:

- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.
- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

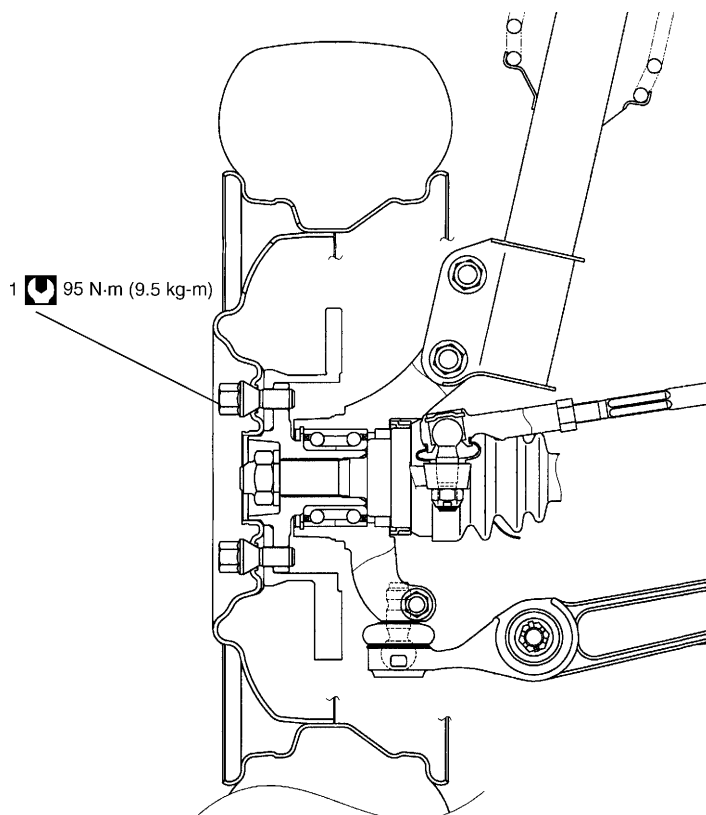
CONTENTS**5B**

On-Vehicle Service.....	5B-2	Front Brake Disc	5B-4
Front Disc Brake Pad	5B-2	Tightening Torque Specification	5B-5
Front Disc Brake Caliper	5B-3		

On-Vehicle Service

CAUTION:

Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any component is removed or line disconnected, bleed the brake system. Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.



1. Wheel bolt



Tightening torque

Front Disc Brake Pad

Installation

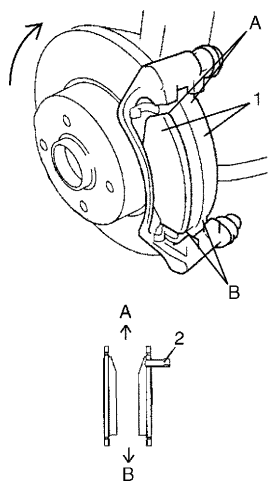
- 1) Install pads (1).

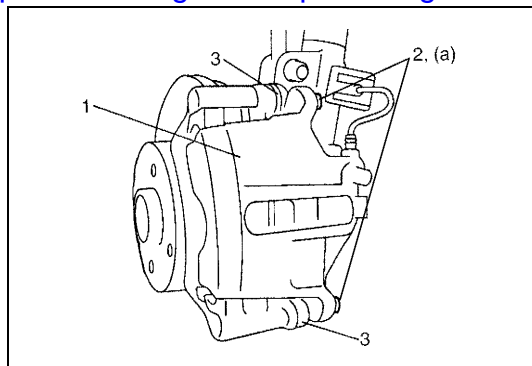
NOTE:

- When installing brake pad, make sure that its tapered side is positioned upward (A) as shown in figure.
- Install pad with sensor (2) to vehicle center side on right wheel brake.

A: Upper side

B: Lower side





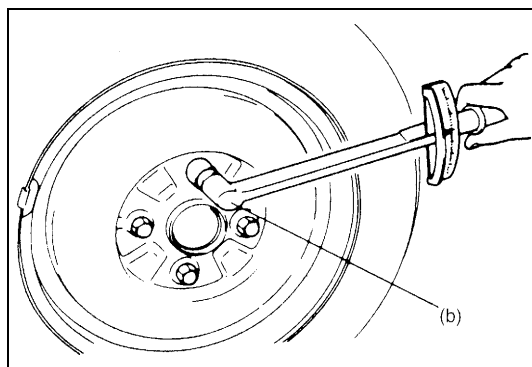
- 2) Install caliper (1) and tighten caliper pin bolts (2) to specification.

NOTE:

Make sure that boots (3) are fit into groove securely.

Tightening torque

Caliper pin bolt (a): 30 N·m (3.0 kg-m, 22.0 lb-ft)



- 3) Tighten front wheel bolts to specification.

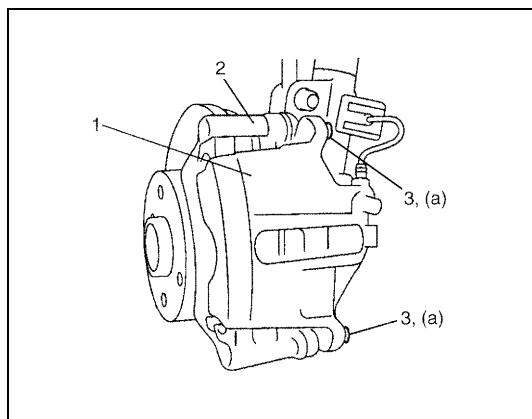
Tightening torque

Wheel bolt (b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 4) Upon completion of installation, perform brake test.

Front Disc Brake Caliper

Installation



CAUTION:

Observe CAUTION at the beginning of On-Vehicle Service.

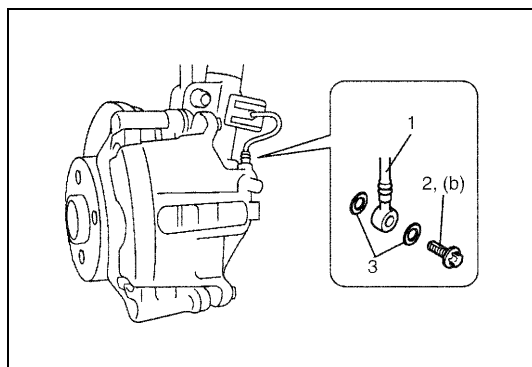
- 1) Install caliper (1) to caliper carrier (2).
2) Torque caliper pin bolts (3) to specifications.

NOTE:

Make sure that boots are fit into groove securely.

Tightening torque

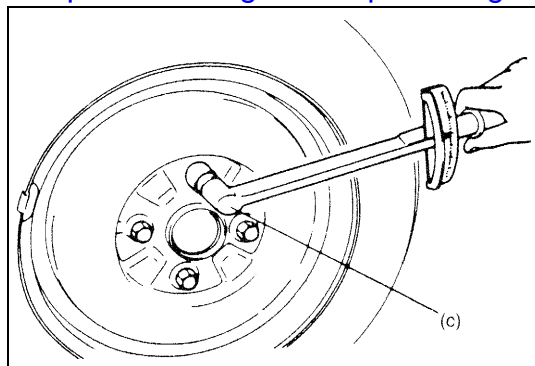
Caliper pin bolt (a): 30 N·m (3.0 kg-m, 22.0 lb-ft)



- 3) Install brake flexible hose (1) and new gaskets (3) as shown and torque hose bolt (2) to specification.

Tightening torque

Flexible hose bolt (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 4) Torque wheel bolts to specification.

Tightening torque

Wheel bolt (c): 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 5) After completing installation, fill reservoir with brake fluid and bleed brake system. Perform brake test and check each installed part for oil leakage.

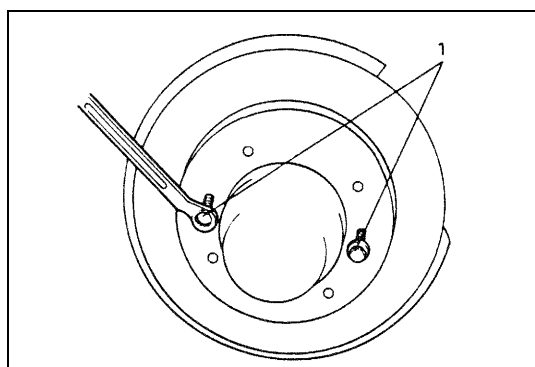
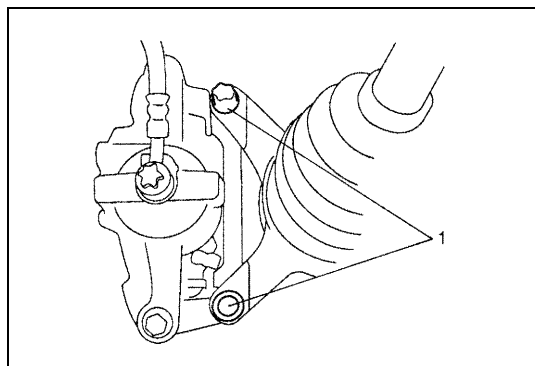
Front Brake Disc

CAUTION:

During removal, be careful not to damage brake flexible hose and not to depress brake pedal.

Removal

- 1) Hoist vehicle and remove wheel.
- 2) Remove caliper assembly by loosening carrier bolts (1).
- 3) Remove brake disc screws.



- 4) Remove disc by using M8 x 1.25 bolts (1) (2 pcs).

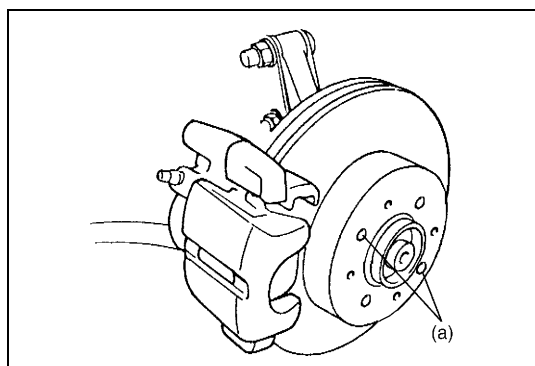
Installation

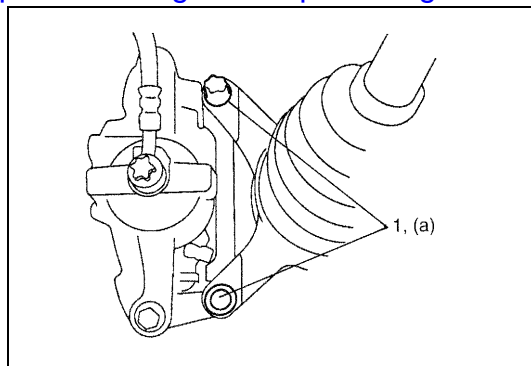
- 1) Install brake disc to wheel hub and tighten brake disc screws.

Tightening torque

Disc securing screw (a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

- 2) Install caliper assembly to steering knuckle.

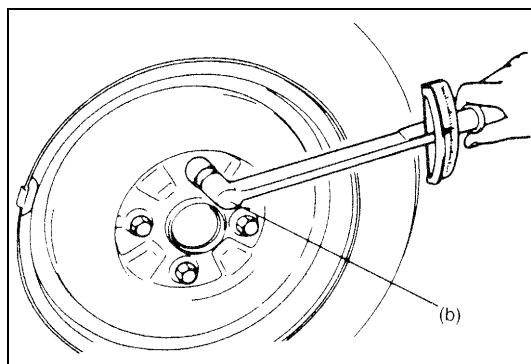




3) Torque caliper carrier bolts (1) to specification.

Tightening torque

Caliper carrier bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



4) Torque front wheel bolts to specifications.

Tightening torque

Wheel bolt (b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

5) Upon completion of installation, perform brake test.

Tightening Torque Specification

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Caliper pin bolt	30.0	3.0	22.0
Wheel bolt	95.0	9.5	69.0
Flexible hose bolt	23.0	2.3	17.0
Caliper carrier bolt	95.0	9.5	69.0
Brake disc securing screw	9.0	0.9	6.5

SECTION 5C

PARKING AND REAR BRAKE

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- Do not removal all of the wheel bolts at once, because all the wheels of this vehicle are mounted by the wheel bolts.
Leave a bolt at least not to drop the wheel.
Support the wheel and/or tire and then remove the bolt(s) left with the wheel.

NOTE:

- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.
- For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

5C

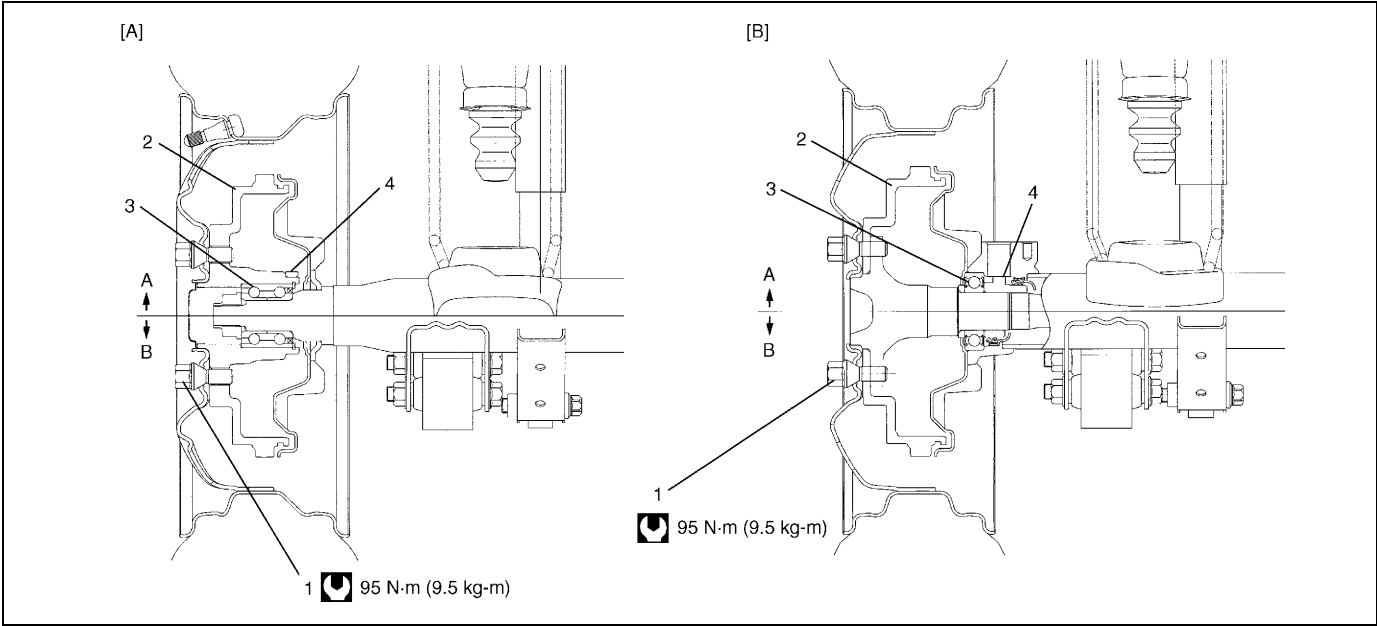
CONTENTS


On-Vehicle Service.....	5C-2	Brake Back Plate (for 4WD Model)	5C-11
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Brake Back Plate (for 2WD Model)	5C-9		

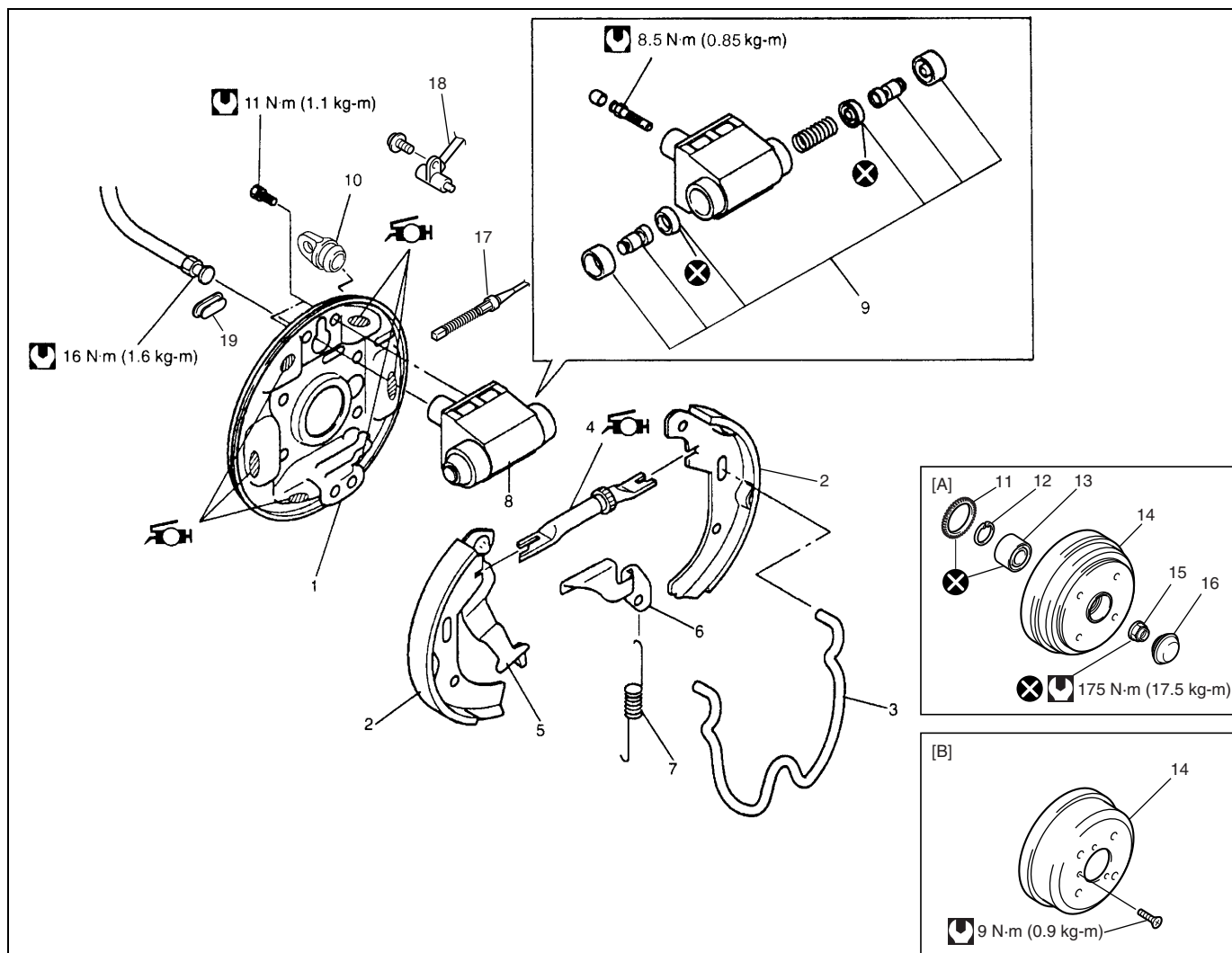
On-Vehicle Service





CAUTION:

- Replace all components included in repair kits to service this drum brake. Lubricate parts as specified.
- If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- The torque values specified are for dry, unlubricated fasteners.

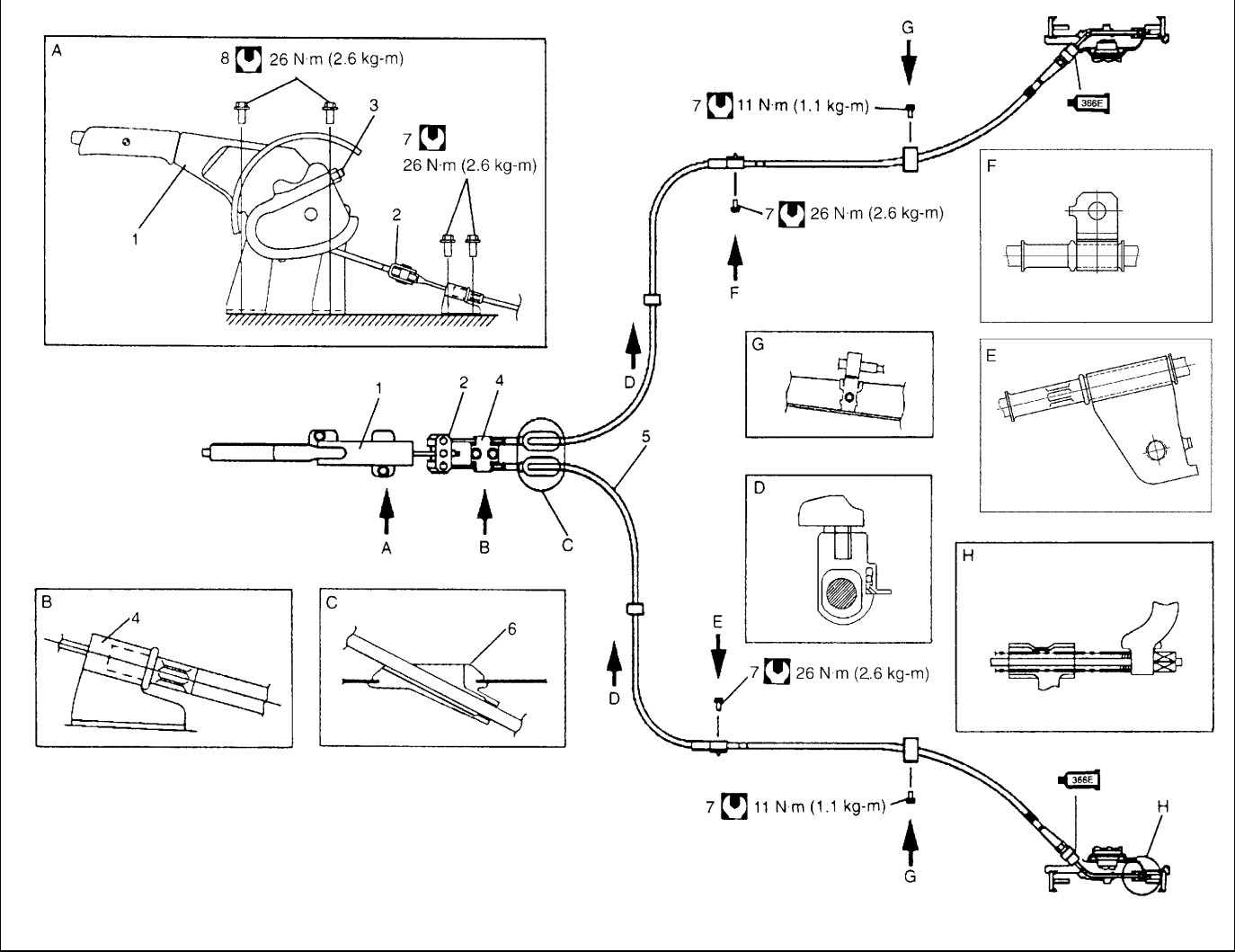



[A]: 2WD Model	A: with ABS	1. Wheel bolt	3. Wheel bearing	 Tightening torque
[B]: 4WD Model	B: without ABS	2. Brake drum	4. ABS sensor ring	



	1. Brake back plate: Clean back plate and apply thin coat of Bentonite base brake grease (anti-squeal agent) to six surfaces on which shoe rims rest.	9. Piston assembly	17. Parking brake cable
	2. Brake shoe	10. Cover	18. Wheel speed sensor ...if equipped with ABS
	3. Retractor spring	11. Sensor ring ...if equipped with ABS	19. Adjuster cover
	4. Brake adjuster (strut): Apply Bentonite base brake grease between actuator and shoe rim and at actuator pivot points.	12. Circlip	[A] 2WD model
	5. Parking brake shoe lever	13. Wheel bearing	[B] 4WD model
	6. Adjuster actuator	14. Brake drum	 Tightening torque
	7. Adjuster spring	15. Spindle nut	 Do not reuse.
	8. Wheel cylinder	16. Spindle cap	

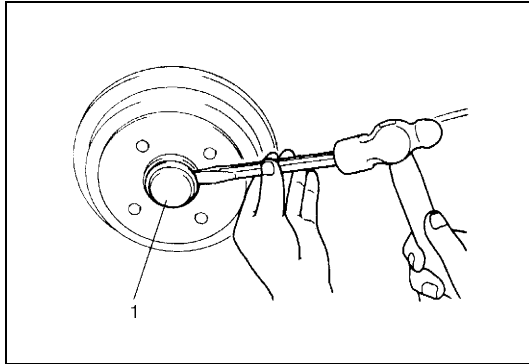
Parking Brake Cable Component Location



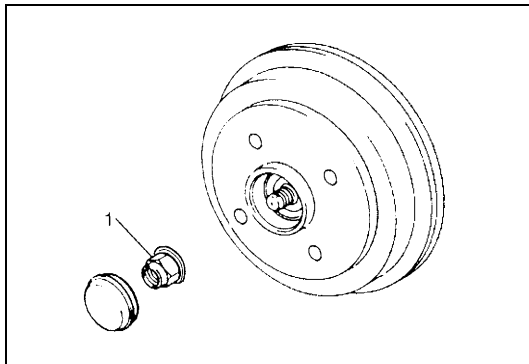
1. Parking brake lever assembly	4. Parking cable bracket	7. Parking brake cable bolt
2. Equalizer	5. Parking brake cable: Apply water tight sealant 99000-31090 to plate and cable contact.	8. Parking brake lever bolt
3. Adjusting nut	6. Grommet	 Tightening torque

Brake Drum (for 2WD Model)

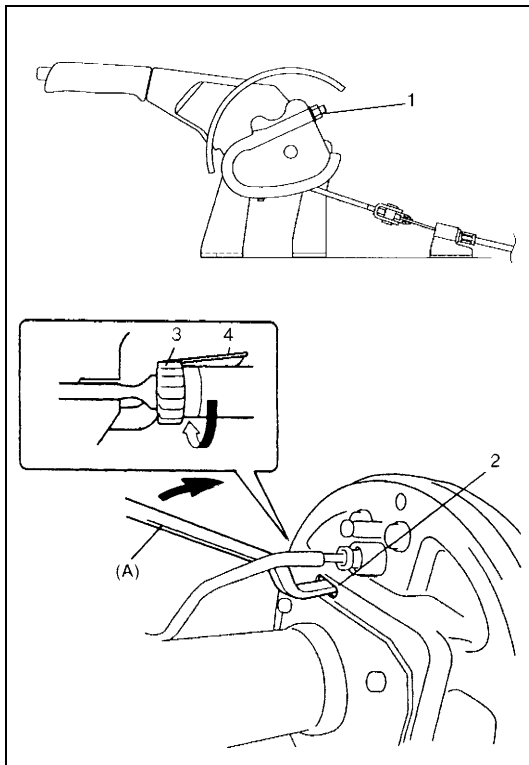
Removal



- 1) Hoist vehicle and remove wheel referring to "Wheel" Removal in Section 3F.
- 2) Remove spindle cap (1) as shown (by hammering lightly at 3 locations around it so as not to deform or cause damage to seating part of cap).



- 3) Uncaulk spindle nut, remove spindle nut (1).

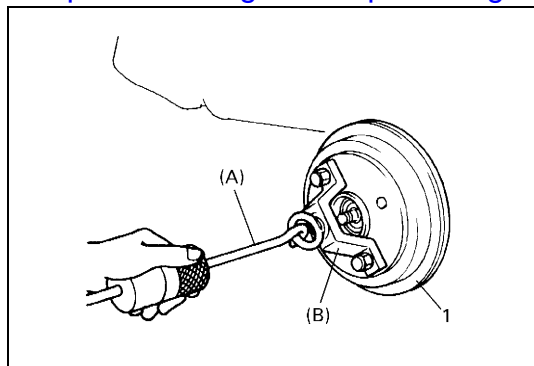


- 4) Release parking brake lever.
- 5) Remove brake drum.
If brake drum can not be removed easily, increase clearance between brake shoes and drum as follows.
 - a) Remove console box cap and loosen parking brake cable adjusting nut (1).
 - b) Remove adjuster cover on back plate.
 - c) Insert special tool through hole (2) in back plate.

Special tool

(A): Snap-on Part No. B3404B or equivalent

- d) Pressing adjuster actuator (4) to the outside of the vehicle, turn adjuster (3) with special tool (A) in such direction as indicated in figure so as to obtain larger clearance.



- e) Pull brake drum (1) off by hand.
If it is hard to remove, use special tools.

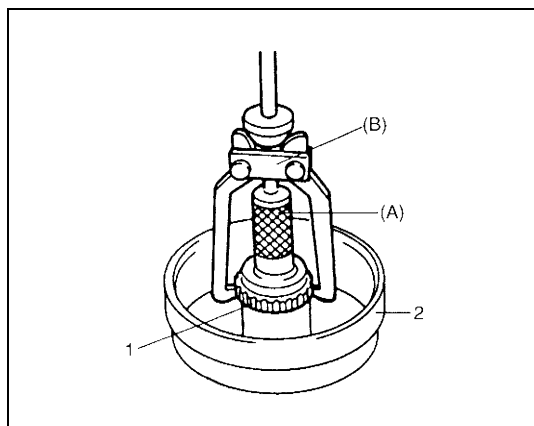
NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point if any.

Special tool

(A): 09942-15511

(B): 09943-17912



- 6) Remove sensor ring (1) from brake drum (2) using special tool (if equipped with ABS).

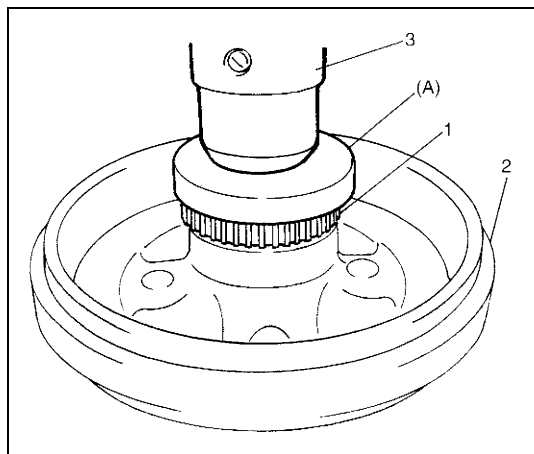
CAUTION:

Pull out sensor ring from brake drum gradually and evenly. Attempt to pull it out partially may cause it to be deformed.

Special tool

(A): 09913-75520

(B): 09913-65135

Installation

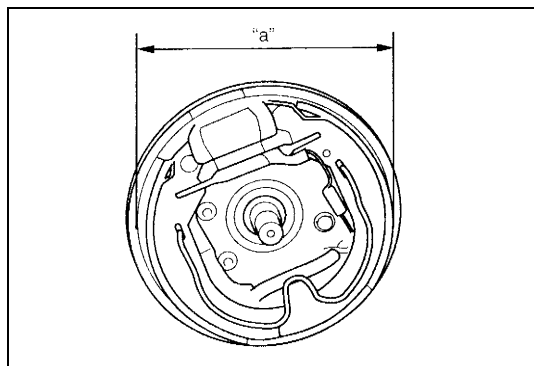
- 1) Install new sensor ring (1) to brake drum (2) by using special tool and hydraulic press (3) (if equipped with ABS).

CAUTION:

- Do not reuse (reinstall) removed sensor ring.
- Used sensor ring can not be press-fitted securely.

Special tool

(A): 09926-68310



- 2) Before installing brake drum, check outer diameter "a" of brake shoes. If it is not within value as specified below, adjust it to specification by turning adjuster.

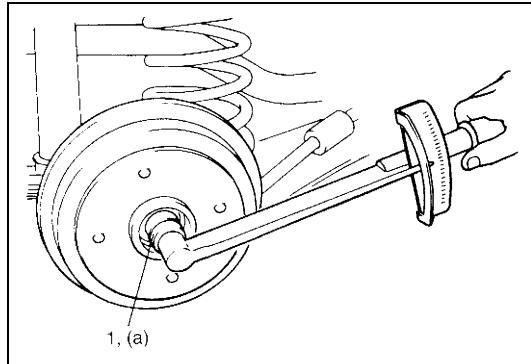
Brake shoes
outer diameter
"a"

=

Measured brake
drum inside
diameter

–

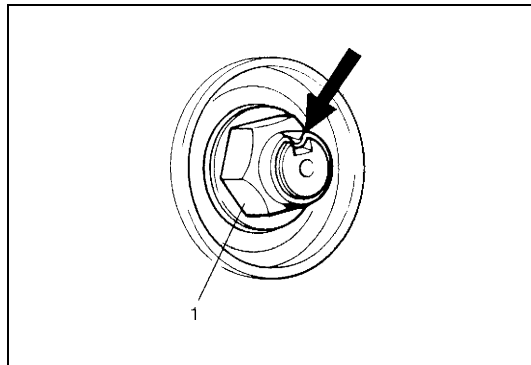
0.5 to 1.0 mm
(0.02 to 0.04 in.)



- 3) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.
- 4) Install new spindle nut (1).
- 5) Tighten spindle nut (1) to specified torque.

Tightening torque

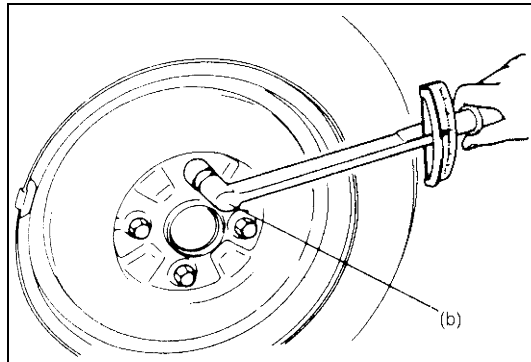
Spindle nut (a): 175 N·m (17.5 kg-m, 126.5 lb-ft)



- 6) Calk spindle nut (1).
- 7) Install spindle cap.

NOTE:

- When installing spindle cap, hammer lightly several locations on the collar of cap until collar comes closely into contact with brake drum.
- If fitting part of cap is deformed or damaged or if it is fitted loosely, replace with new one.



- 8) Upon completion of all jobs, depress brake pedal with about 300 N (30 kg, 66 lbs) load at least 15 – 20 times until adjuster actuator clicking sound from drum brake can not be heard so as to obtain proper drum-to-shoe clearance. Adjust parking brake cable. (For adjustment, refer to "Parking Brake Inspection and Adjustment" in Section 5.)
- 9) Install console box cap if removed.

- 10) Install wheel and tighten wheel bolts to specified torque.

Tightening torque

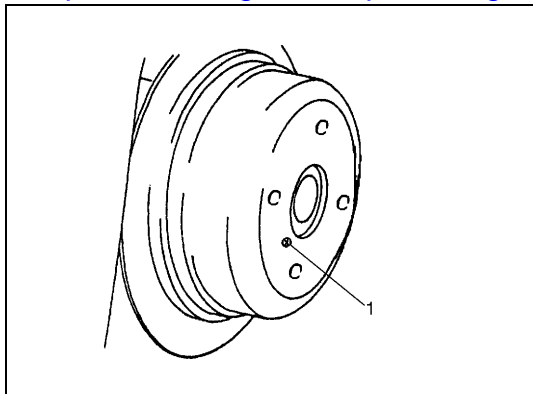
Wheel bolt (b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 11) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).

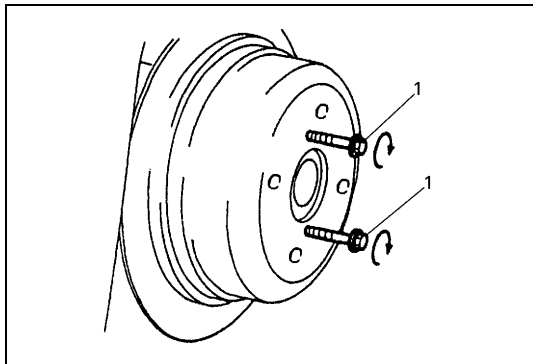
Brake Drum Removal and Installation (for 4WD Model)

Removal

- 1) Hoist vehicle and remove wheel referring to "Wheel Removal" in Section 3F.



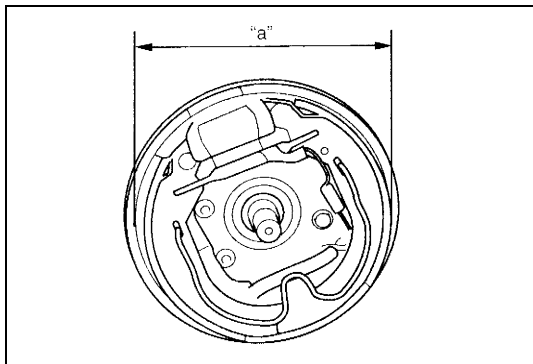
- 2) Remove brake drum screw (1) and release parking brake lever.



- 3) Remove brake drum.
If brake drum can not be removed easily, increase clearance between brake shoes and drum, referring to step a) – d) in “Brake Drum (for 2WD Model)”.
- a) Pull brake drum off by using 8 mm bolts (1).

NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point, if any.

Installation

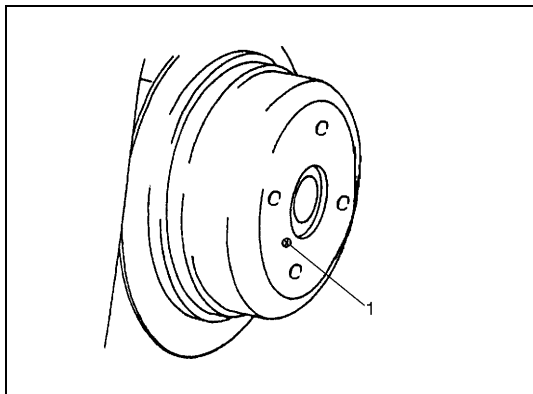
- 1) Before installing brake drum, check outer diameter “a” of brake shoes. If it is not within value as specified below, adjust it to specification by turning adjuster.

Brake shoes
outer diameter
“a”

= Measured brake
drum inside
diameter

– 0.5 to 1.0 mm
(0.02 to 0.04 in.)

- 2) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.

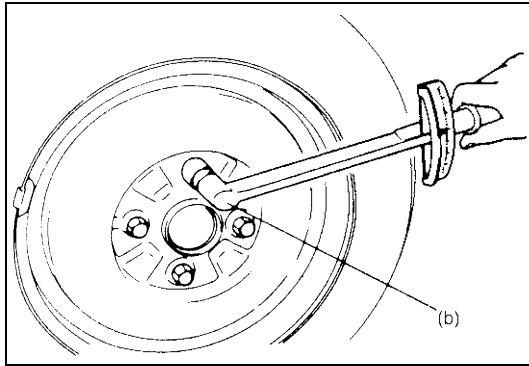


- 3) Tighten screw (1) to specified torque.

Tightening torque

Brake drum screw (a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

- 4) Upon completion of all jobs, depress brake pedal with about 300 N (30 kg, 66 lbs) load at least 15 – 20 times until adjuster actuator clicking sound from drum brake can not be heard so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable. For adjustment refer to “Parking Brake Inspection and Adjustment” in Section 5.
- 5) Install console box cap if removed.



6) Install wheel and tighten wheel bolts to specified torque.

Tightening torque

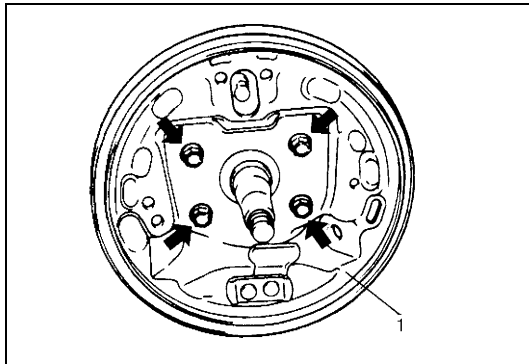
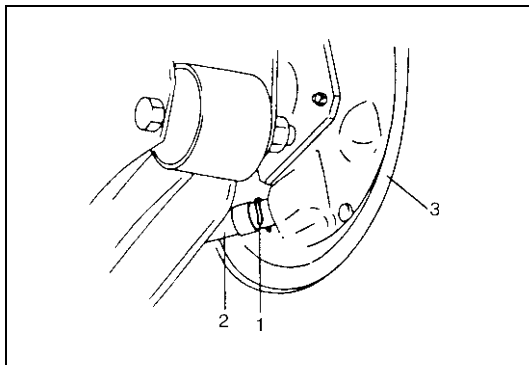
Wheel bolt (b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

7) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).

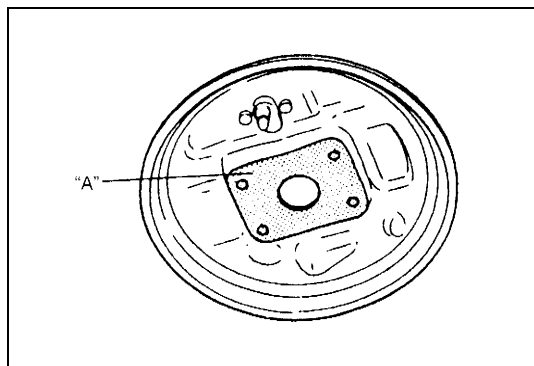
Brake Back Plate (for 2WD Model)

Removal

- 1) Remove brake drum referring to step 1) to 5) of "Brake Drum Removal" in this section.
- 2) Remove brake shoe referring to step 2) to 4) of "Brake Shoe Removal" in this section.
- 3) Remove wheel cylinder referring to step 3) to 4) of "Wheel Cylinder Removal" in this section.
- 4) Remove parking brake cable securing clip (1) and disconnect brake cable (2) from brake back plate (3).



5) Remove brake back plate (1) from rear axle.

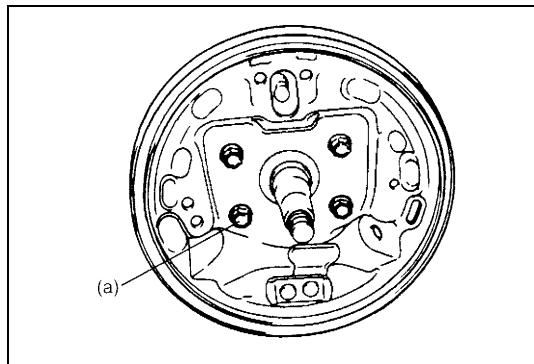
Installation

- 1) Apply water tight sealant to mating surfaces of brake back plate and rear axle.

"A": Sealant 366E, 99000-31090

NOTE:

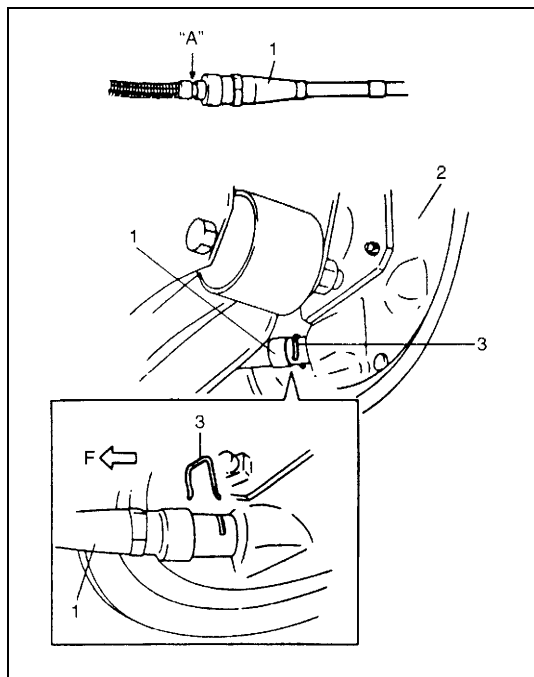
In case of vehicle equipped with ABS, do not apply sealant around hole for wheel speed sensor.



- 2) Install brake back plate and tighten back plate bolts to specified torque.

Tightening torque

Brake back plate bolt (a): 24 N·m (2.4 kg-m, 17.5 lb-ft)

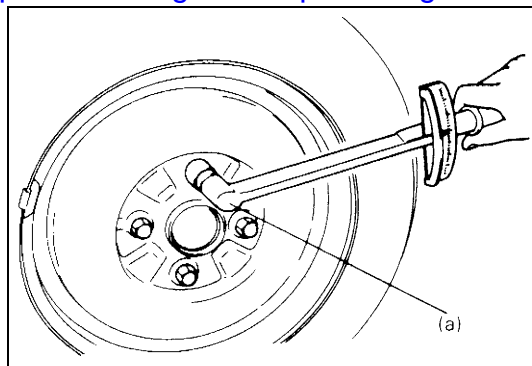


- 3) Apply water tight sealant where plate and cable contact, and run parking brake cable (1) through brake back plate (2) and secure it with clip (3).

"A": Sealant 366E, 99000-31090

F: Forward

- 4) Install wheel cylinder, and tighten wheel cylinder bolts and brake pipe flare nut to specified torque. Refer to steps 1) to 4) of "Wheel Cylinder Installation" in this section.
- 5) Install brake shoes, referring to steps 1) to 5) of "Brake Shoe Installation" in this section.
- 6) Install brake drum. Refer to steps 3) to 8) of its "Installation" in this section.
- 7) Fill reservoir with brake fluid and bleed brake system. For bleeding operation, referring to "Bleeding Brake" in Section 5.



8) Install wheel and tighten wheel bolts to specified torque.

Tightening torque

Wheel bolt (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 9) Upon completion of all jobs, depress brake pedal with about 300 N (30 kg, 66 lbs) load at least 10 – 15 times until adjuster actuator clicking sound from drum brake can not be heard so as to obtain proper drum-to-shoe clearance. Adjust parking brake cable. (For adjustment, refer to “Parking Brake Inspection and Adjustment” in Section 5.)
- 10) Install console box cap.
- 11) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).
- 12) Check each installed part for oil leakage.

Brake Back Plate (for 4WD Model)

Refer to “Rear Axle Shaft and Wheel Bearing (for 4WD Model)” in Section 3E.

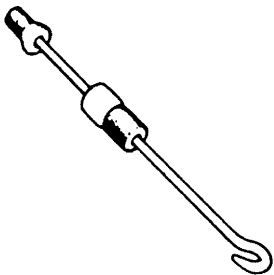
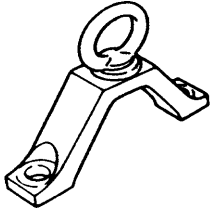
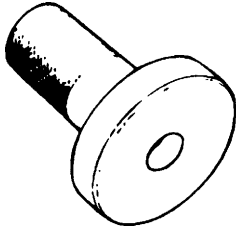
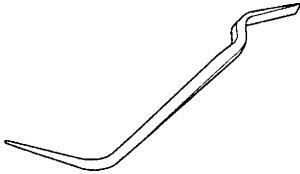
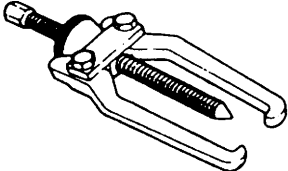
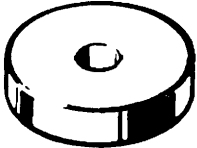
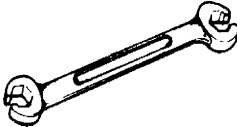
Tightening Torque Specifications

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Brake back plate bolt	24	2.4	17.5
Brake drum screw	9	9.0	6.5
Spindle nut	175	17.5	126.5
Wheel bolt	95	9.5	69.0

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	<ul style="list-style-type: none"> To apply to mating surfaces of brake back plate and rear axle To apply to mating surfaces of brake back plate and parking brake cable.

Special Tools

			
09942-15511 Sliding hammer	09943-17912 Brake drum remover (Front wheel hub remover)	09913-75520 Bearing installer (for 2WD model)	Snap-on Part NO. B3404B or equivalent
			
09913-65135 Bearing puller (for 2WD model)	09926-68310 Bearing installer (for 2WD model)	09950-78230 Flare nut wrench (10 – 11mm)	

SECTION 6-2

ENGINE GENERAL INFORMATION AND DIAGNOSIS (M13 ENGINE)

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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General Information

Statement on Cleanliness and Care

An automobile engine is a combination of many machined, honed, polished and lapped surfaces with tolerances that are measured in the thousands of an millimeter (ten thousands of an inch).

Accordingly, when any internal engine parts are serviced, care and cleanliness are important.

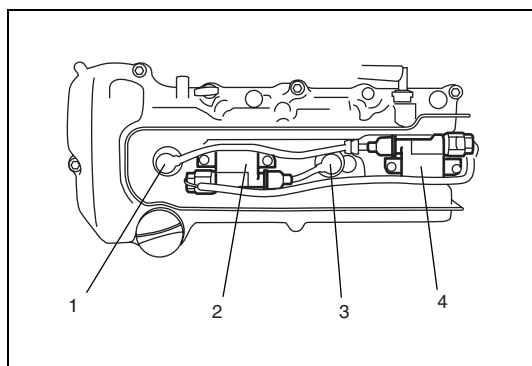
Throughout this section, it should be understood that proper cleaning and protection of machined surfaces and friction areas is part of the repair procedure. This is considered standard shop practice even if not specifically stated.

- A liberal coating of engine oil should be applied to friction areas during assembly to protect and lubricate the surfaces on initial operation.
- Whenever valve train components, pistons, piston rings, connecting rods, rod bearings, and crankshaft journal bearings are removed for service, they should be retained in order.

At the time of installation, they should be installed in the same locations and with the same mating surfaces as when removed.

- Battery cables should be disconnected before any major work is performed on the engine.
Failure to disconnect cables may result in damage to wire harness or other electrical parts.

- Throughout this manual, the four cylinders of the engine are identified by numbers; No.1 (1), No.2 (2), No.3 (3) and No.4 (4) counted from crankshaft pulley side to flywheel side.



Precaution

Precaution on engine service

THE FOLLOWING INFORMATION ON ENGINE SERVICE SHOULD BE NOTED CAREFULLY, AS IT IS IMPORTANT IN PREVENTING DAMAGE, AND IN CONTRIBUTING TO RELIABLE ENGINE PERFORMANCE.

- When raising or supporting engine for any reason, do not use a jack under oil pan. Due to small clearance between oil pan and oil pump strainer, jacking against oil pan may cause it to be bent against strainer resulting in damaged oil pick-up unit.
- It should be kept in mind, while working on engine, that 12-volt electrical system is capable of violent and damaging short circuits.

When performing any work where electrical terminals can be grounded, ground cable of the battery should be disconnected at battery.

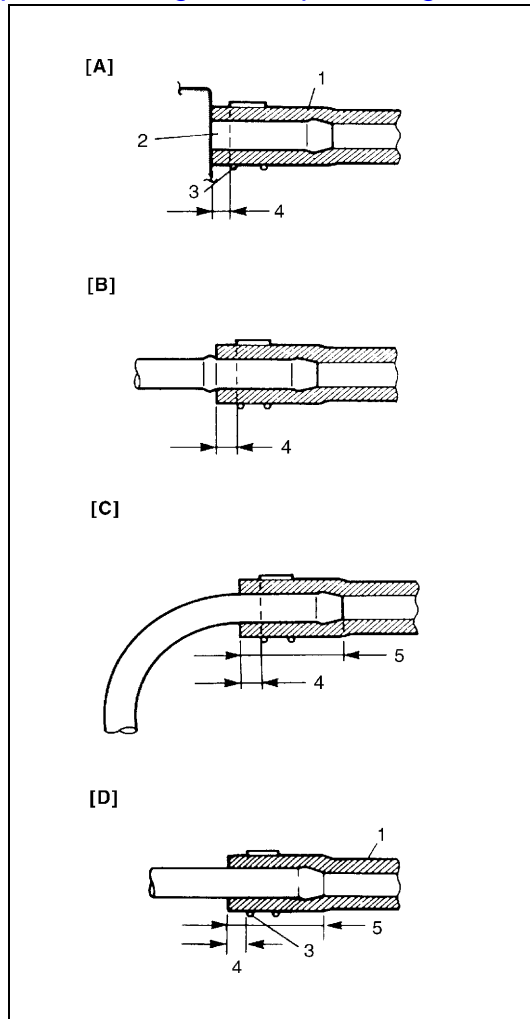
- Any time the air cleaner, throttle body or intake manifold is removed, the intake opening should be covered. This will protect against accidental entrance of foreign material which could follow intake passage into cylinder and cause extensive damage when engine is started.

Precaution on fuel system service

- Work must be done with no smoking, in a well-ventilated area and away from any open flames.
- As fuel feed line (between fuel pump and fuel pressure regulator) is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected.

Before loosening or disconnecting fuel feed line, make sure to release fuel pressure according to "Fuel Pressure Relief Procedure". A small amount of fuel may be released after the fuel line is disconnected. In order to reduce the possibility of personal injury, cover the fitting to be disconnected with a shop cloth. Put that cloth in an approved container when disconnection is completed.

- Never run engine with fuel pump relay disconnected when engine and exhaust system are hot.



- Fuel or fuel vapor hose connection varies with each type of pipe. When reconnecting fuel or fuel vapor hose, be sure to connect and clamp each hose correctly referring to the figure Hose Connection. After connecting, make sure that it has no twist or kink.
- When installing injector, fuel feed pipe or lubricate its O-ring with gasoline.

[A]: With short pipe, fit hose as far as it reaches pipe joint as shown.

[B]: With following type pipe, fit hose as far as its peripheral projection as shown.

[C]: With bent pipe, fit hose as its bent part as shown or till pipe is about 20 to 30 mm (0.79 – 1.18 in.) into the hose.

[D]: With straight pipe, fit hose till pipe is, about 20 to 30 mm (0.79 – 1.18 in.) into the hose.

1. Hose

2. Pipe

3. Clamp

4. Clamp securely at a position 3 to 7 mm (0.12 – 0.27 in.) from hose end.

5. 20 to 30 mm (0.79 – 1.18 in.)

Fuel pressure relief procedure

CAUTION:

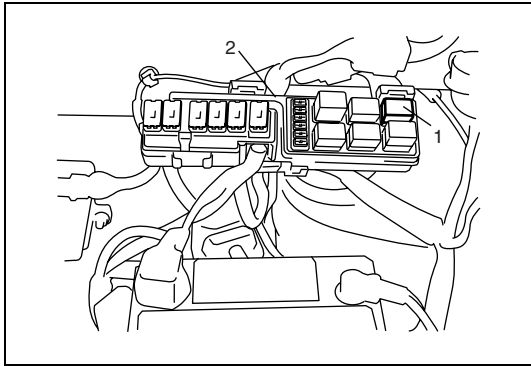
This work must not be done when engine is hot. If done so, it may cause adverse effect to catalyst.

NOTE:

If any service shown below is performed, ECM may detect DTC(s). Therefore, clear DTC(s) by referring to “DTC Clearance” in this section in case that DTC(s) is detected after all services are done.

After making sure that engine is cold, release fuel pressure as follows.

- Place transmission gear shift lever in “Neutral” (Shift selector lever to “P” range for A/T model), set parking brake, and block drive wheels.
- Remove relay box cover.



- 3) Disconnect fuel pump relay (1) from relay box (2).
- 4) Remove fuel filter cap to release fuel vapor pressure in fuel tank and then reinstall it.
- 5) Start engine and run it till it stops for lack of fuel. Repeat cranking engine 2-3 times for about 3 seconds each time to dissipate fuel pressure in lines. Fuel connections are now safe for servicing.
- 6) Upon completion of servicing, connect fuel pump relay (1) to relay box (2) and install relay box cover.

Fuel leakage check procedure

After performing any service on fuel system, check to make sure that there are no fuel leakages as follows.

- 1) Turn ON ignition switch for 3 seconds (to operate fuel pump) and then turn it OFF.
Repeat this (ON and OFF) 3 or 4 times and apply fuel pressure to fuel line (till fuel pressure is felt by hand placed on fuel feed hose).
- 2) In this state, check to see that there are no fuel leakages from any part of fuel system.

Diagnosis

Engine Diagnosis General Description

This vehicle is equipped with an engine and emission control system which are under control of ECM.

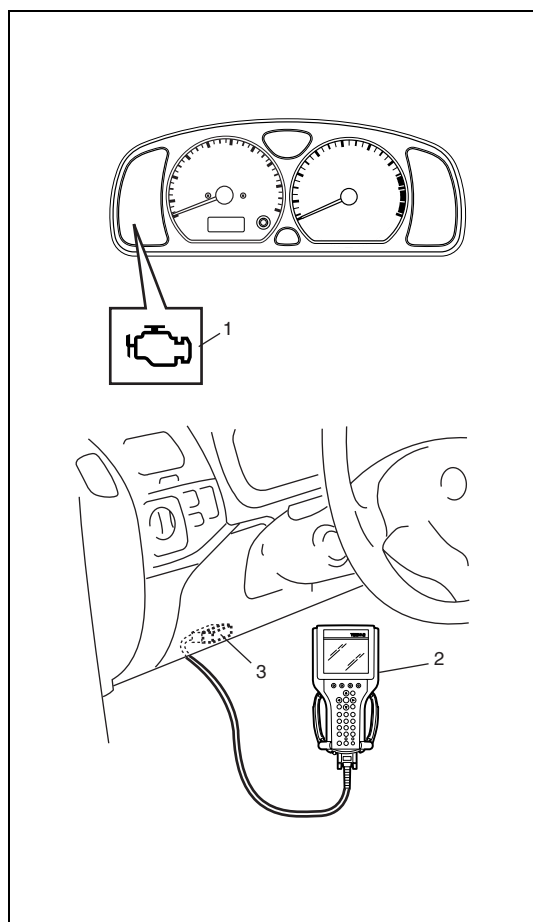
The engine and emission control system in this vehicle are controlled by ECM. ECM has an On-Board Diagnostic system which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission. When diagnosing engine troubles, be sure to have full understanding of the outline of "On-Board Diagnostic System" and each item in "Precaution in Diagnosing Trouble" and execute diagnosis according to "Engine and Emission Control System Check".

There is a close relationship between the engine mechanical, engine cooling system, ignition system, exhaust system, etc. and the engine and emission control system in their structure and operation. In case of an engine trouble, even when the malfunction indicator lamp (MIL) doesn't turn ON, it should be diagnosed according to this flow.

On-Board Diagnostic System Description

ECM in this vehicle has following functions.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the circuit of the malfunction indicator lamp (1).
- When ECM detects a malfunction which gives an adverse effect to vehicle emission while the engine is running, it makes the malfunction indicator lamp (1) in the meter cluster of the instrument panel turn ON or flash (flashing only when detecting a misfire which can cause damage to the catalyst) and stores the malfunction area in its memory.
(If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL (1) turn OFF although DTC stored in its memory will remain.)
- As a condition for detecting a malfunction in some areas in the system being monitored by ECM and turning ON the malfunction indicator lamp (1) due to that malfunction, 2 driving cycle detection logic is adopted to prevent erroneous detection.
- When a malfunction is detected, engine and driving conditions then are stored in ECM memory as freeze frame data. (For the details, refer to description on Freeze frame data.)
- It is possible to communicate by using not only SUZUKI scan tool (2) but also OBD generic scan tool. (Diagnostic information can be accessed by using a scan tool.)



3. Data link connector (DLC)

Warm-up Cycle

A warm-up cycle means sufficient vehicle operation such that the coolant temperature has risen by at least 22°C (40°F) from engine starting and reaches a minimum temperature of 70°C (160°F).

Driving Cycle

A "Driving Cycle" consists of engine startup and engine shutoff.

2 Driving Cycle Detection Logic

The malfunction detected in the first driving cycle is stored in ECM memory (in the form of pending DTC) but the malfunction indicator lamp does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

Pending DTC

Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycle detection logic.

Freeze Frame Data

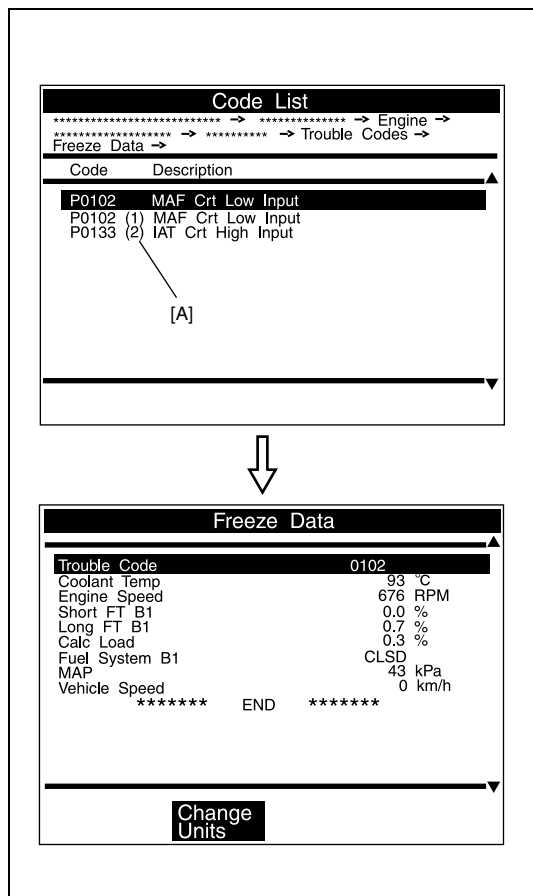
ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called "Freeze frame data".

Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the vehicle was running or stopped, where air/fuel mixture was lean or rich) when a malfunction was detected by checking the freeze frame data. Also, ECM has a function to store each freeze frame data for three different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.

Priority of Freeze Frame Data:

ECM has 4 frames where the freeze frame data can be stored. The first frame stores the freeze frame data of the malfunction which was detected first. However, the freeze frame data stored in this frame is updated according to the priority described below. (If malfunction as described in the upper square "1" below is detected while the freeze frame data in the lower square "2" has been stored, the freeze frame data "2" will be updated by the freeze frame data "1".)

[A]: 1st or 2nd in parentheses here represents which position in the order the malfunction is detected.



PRIORITY	FREEZE FRAME DATA IN FRAME 1
1	Freeze frame data at initial detection of malfunction among misfire detected (P0300-P0304), fuel system too lean (P0171) and fuel system too rich (P0172)
2	Freeze frame data when a malfunction other than those in "1" above is detected

In the 2nd through the 4th frames, the freeze frame data of each malfunction is stored in the order as the malfunction is detected.

These data are not updated.

Shown in the table below are examples of how freeze frame data are stored when two or more malfunctions are detected.

		FRAME			
		FRAME 1	FRAME 2	FRAME 3	FRAME 4
		FREEZE FRAME DATA to be updated	1st FREEZE FRAME DATA	2nd FREEZE FRAME DATA	3rd FREEZE FRAME DATA
MALFUNCTION DETECTED ORDER	No malfunction	No freeze frame data			
	1 P0401 (EGR) detected	Data at P0401 detection	Data at P0401 detection	—	—
	2 P0171 (Fuel system) detection	Data at P0171 detection	Data at P0401 detection	Data at P0171 detection	—
	3 P0300 (Misfire) detected	Data at P0171 detection	Data at P0401 detection	Data at P0171 detection	Data at P0300 detection
	4 P0301 (Misfire) detected	Data at P0171 detection	Data at P0401 detection	Data at P0171 detection	Data at P0300 detection

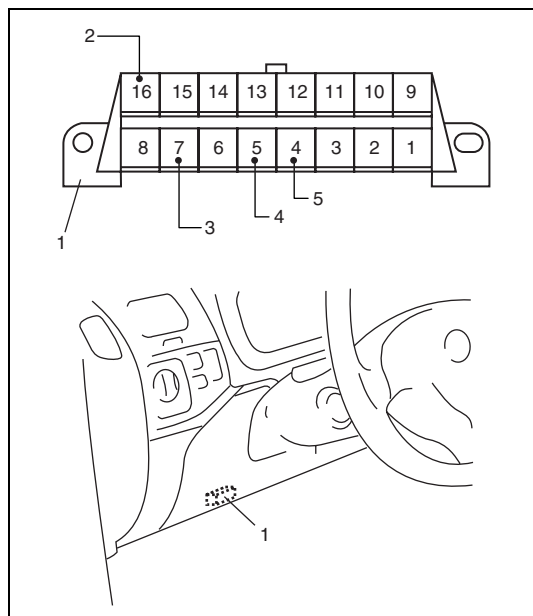
Freeze Frame Data Clearance:

The freeze frame data is cleared at the same time as clearance of diagnostic trouble code (DTC).

Data Link Connector (DLC)

DLC (1) is in compliance with SAE J1962 in the shape of connector and pin assignment.

OBD serial data line (3) (K line of ISO 9141) is used for SUZUKI scan tool or OBD generic scan tool to communicate with ECM, Air bag SDM, immobilizer control module and ABS control module.



- | |
|--|
| 2. B + (Unswitched Vehicle Battery Positive) |
| 4. ECM ground (Signal Ground) |
| 5. Vehicle body ground (Chassis Ground) |

Precaution in Diagnosing Trouble for Engine

- Don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine or main fuse before confirming diagnostic information (DTC, freeze frame data, etc.) stored in ECM memory. Such disconnection will erase memorized information in ECM memory.
- Diagnostic information stored in ECM memory can be cleared as well as checked by using SUZUKI scan tool or OBD generic scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it. It is indistinguishable which module turns on MIL because not only ECM but also TCM turns on MIL. Therefore, check both ECM and TCM for DTC when MIL lights on.
When checking ECM for DTC, keep in mind that DTC is displayed on the scan tool as follows depending on the scan tool used.
 - SUZUKI scan tool displays DTC detected by ECM.
 - OBD-II generic scan tool displays DTC detected by each of ECM and TCM simultaneously.
- Priorities for diagnosing troubles
If two or more diagnostic trouble codes (DTCs) are stored, proceed to the flow table of the DTC which has detected earliest in the order and follow the instruction in that table.
If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.
 - Diagnostic trouble codes (DTCs) other than DTC P0171/P0172 (Fuel system too lean/too rich), DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected) and DTC P0401/P0402 (EGR flow malfunction)
 - DTC P0171/P0172 (Fuel system too lean/too rich) and DTC P0401/P0402 (EGR flow malfunction)
 - DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected)
- Be sure to read "Precautions for Electrical Circuit Service" in Section 0A before inspection and observe what is written there.
- ECM Replacement
When substituting a known-good ECM, check for the following conditions. Neglecting this check may cause damage to a known-good ECM.
 - Resistance value of all relays, actuators is as specified respectively.
 - MAP sensor and TP sensor are in good condition and none of power circuits of these sensors is shorted to ground.
- Communication of ECUs, ECM and TCM, is established by CAN (Computer Area Network). Therefore, handle CAN communication line with care referring to "Precaution" described in Section 0A.

Engine and Emission Control System Check

Refer to the following items for the details of each step.

Step	Action	Yes	No
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to "Customer Complaint Analysis" in followings. Was customer complaint analysis performed?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance 1) Check for DTC (including pending DTC) referring to the "Diagnostic Trouble Code (DTC)/Freeze Frame Data Check, Record and Clearance" in followings. Is there any DTC(s)?	Print DTC and freeze frame data or write them down and clear them by referring to "DTC Clearance" in this section, and go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the "Visual Inspection" in followings. Is there any faulty condition?	Repair or replace malfunction part, and go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the "Visual Inspection" in followings. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the "Trouble Symptom Confirmation" in followings. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "Diagnostic Trouble Code (DTC) Check" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "Diagnostic Trouble Code (DTC) Check" in this section. Is there any DTC(s)?		Go to Step 10.
8	Engine Basic Inspection and Engine Symptom Diagnosis 1) Check and repair according to "Engine Basic Inspection" and "Engine Symptom Diagnosis" in this section. Are check and repair complete?	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.
9	Trouble Shooting for DTC 1) Check and repair according to applicable DTC diag. flow table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to "Check for Intermittent Problem" in followings. Is there any faulty condition?	Repair or replace malfunction part(s), and go to Step 11.	Go to Step 11.

Step	Action	Yes	No
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to "Final Confirmation Test" in followings. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

2. DIAGNOSTIC TROUBLE CODE (DTC)/FREEZE FRAME DATA CHECK, RECORD AND CLEARANCE

First, check DTC (including pending DTC), referring to "DTC Check" in this section. If DTC is indicated, print it and freeze frame data or write them down and then clear them by referring to "DTC Clearance" in this section. DTC indicates malfunction that occurred in the system but does not indicate whether it exists now or it occurred in the past and the normal condition has been restored now. To check which case applies, check the symptom in question according to Step 4 and recheck DTC according to Step 6 and 7.

Attempt to diagnose a trouble based on DTC in this step only or failure to clear the DTC in this step will lead to incorrect diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting.

3. and 4. VISUAL INSPECTION

As a preliminary step, be sure to perform visual check of the items that support proper function of the engine referring to "Visual Inspection" in this section.

5. TROUBLE SYMPTOM CONFIRMATION

Based on information obtained in Step 1 Customer complaint analysis and Step 2 DTC/freeze frame data check, confirm trouble symptoms. Also, reconfirm DTC according to "DTC Confirmation Procedure" described in each "DTC Diagnosis Flow Table".

6. and 7. RECHECKING AND RECORD OF DTC/FREEZE FRAME DATA

Refer to "DTC check" in this section for checking procedure.

8. ENGINE BASIC INSPECTION AND ENGINE SYMPTOM DIAGNOSIS

Perform basic engine check according to the "Engine Basic Inspection" first. When the end of the flow table has been reached, check the parts of the system suspected as a possible cause referring to "Engine Symptom Diagnosis" and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or basic engine check) and repair or replace faulty parts, if any.

9. DIAGNOSTIC TROUBLE CODE FLOW TABLE (See each DTC Diag. Flow Table)

Based on the DTC indicated in Step 6 or 7 and referring to the applicable DTC diag. flow table in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ECM or other part and repair or replace faulty parts.

10. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to "Intermittent and Poor Connection" in Section 0A and related circuit of DTC recorded in Step 2.

11. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the engine is free from any abnormal conditions. If what has been repaired is related to the DTC, clear the DTC once, perform DTC confirmation procedure and confirm that no DTC is indicated.

Customer Problem Inspection Form (Example)

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

PROBLEM SYMPTOMS	
<input type="checkbox"/> Difficult Starting <input type="checkbox"/> No cranking <input type="checkbox"/> No initial combustion <input type="checkbox"/> No combustion <input type="checkbox"/> Poor starting at (<input type="checkbox"/> cold <input type="checkbox"/> warm <input type="checkbox"/> always) <input type="checkbox"/> Other _____	<input type="checkbox"/> Poor Driveability <input type="checkbox"/> Hesitation on acceleration <input type="checkbox"/> Back fire/ <input type="checkbox"/> After fire <input type="checkbox"/> Lack of power <input type="checkbox"/> Surging <input type="checkbox"/> abnormal knocking <input type="checkbox"/> Other _____
<input type="checkbox"/> Poor Idling <input type="checkbox"/> Poor fast idle <input type="checkbox"/> Abnormal idling speed (<input type="checkbox"/> High <input type="checkbox"/> Low) (r/min.) <input type="checkbox"/> Unstable <input type="checkbox"/> Hunting (r/min. to r/min.) <input type="checkbox"/> Other _____	<input type="checkbox"/> Engine Stall when <input type="checkbox"/> Immediately after start <input type="checkbox"/> Accel. pedal is depressed <input type="checkbox"/> Accel. pedal is released <input type="checkbox"/> Load is applied <input type="checkbox"/> A/C <input type="checkbox"/> Electric load <input type="checkbox"/> P/S <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____
<input type="checkbox"/> OTHERS:	

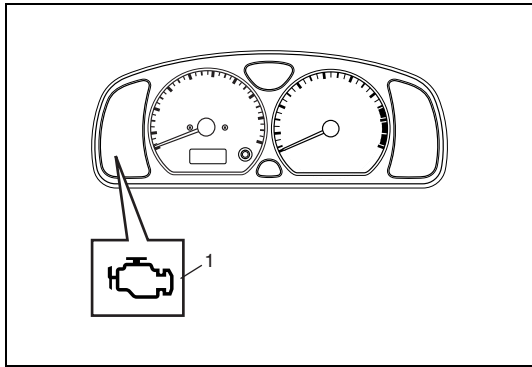
VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental Condition	
Weather	<input type="checkbox"/> Fair <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Snow <input type="checkbox"/> Always <input type="checkbox"/> Other _____
Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold (°F/ °C) <input type="checkbox"/> Always
Frequency	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes (times/ day, month) <input type="checkbox"/> Only once <input type="checkbox"/> Under certain condition
Road	<input type="checkbox"/> Urban <input type="checkbox"/> Suburb <input type="checkbox"/> Highway <input type="checkbox"/> Mountainous (<input type="checkbox"/> Uphill <input type="checkbox"/> Downhill) <input type="checkbox"/> Tarmacadam <input type="checkbox"/> Gravel <input type="checkbox"/> Other _____
Vehicle Condition	
Engine condition	<input type="checkbox"/> Cold <input type="checkbox"/> Warming up phase <input type="checkbox"/> Warmed up <input type="checkbox"/> Always <input type="checkbox"/> Other at starting <input type="checkbox"/> Immediately after start <input type="checkbox"/> Racing without load <input type="checkbox"/> Engine speed (r/min)
Vehicle condition	During driving: <input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Right hand corner <input type="checkbox"/> Left hand corner <input type="checkbox"/> When shifting (Lever position) <input type="checkbox"/> At stop <input type="checkbox"/> Vehicle speed when problem occurs (km/h, Mile/h) <input type="checkbox"/> Other

Malfunction indicator lamp condition	<input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Diagnostic trouble code	First check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code ()
	Second check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code ()

NOTE:

The above form is a standard sample. It should be modified according to conditions characteristic of each market.

Malfunction Indicator Lamp (MIL) Check



- 1) Turn ON ignition switch (but the engine at stop) and check that MIL (1) lights.
If MIL does not light up (or MIL dims), go to "Malfunction Indicator Lamp Does Not Come "ON" at Ignition Switch ON (But Engine Stops)" for troubleshooting.
- 2) Start engine and check that MIL turns OFF.
If MIL remains ON and no DTC is stored in ECM, go to "Malfunction Indicator Lamp Remains "ON" after Engine Starts" for troubleshooting.

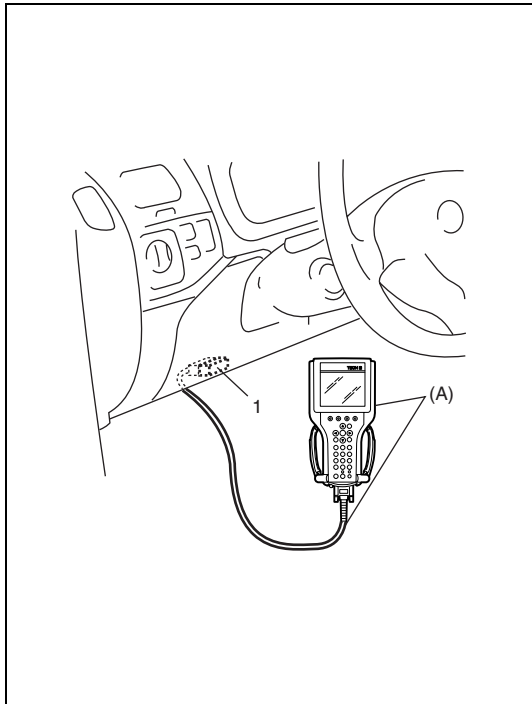
Diagnostic Trouble Code (DTC) Check

- 1) Prepare OBD generic scan tool or SUZUKI scan tool.
- 2) With ignition switch OFF, connect it to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

Special tool

(A): SUZUKI scan tool

- 3) Turn ignition switch ON and confirm that MIL lights.
- 4) Read DTC, pending DTC and freeze frame data according to instructions displayed on scan tool and print it or write it down. Refer to scan tool operator's manual for further details.
If communication between scan tool and ECM is not possible, check if scan tool is communicable by connecting it to ECM in another vehicle. If communication is possible in this case, scan tool is in good condition. Then check data link connector and serial data line (circuit) in the vehicle with which communication was not possible.
- 5) After completing the check, turn ignition switch off and disconnect scan tool from data link connector.



Diagnostic Trouble Code (DTC) Clearance

- 1) Connect OBD generic scan tool or SUZUKI scan tool to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch OFF and then ON.
- 3) Erase DTC and pending DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch off and disconnect scan tool from data link connector.

NOTE:

DTC and freeze frame data stored in ECM memory are also cleared in the following cases. Be careful not to clear them before keeping their record.

- When power to ECM is cut off (by disconnecting battery cable, removing fuse or disconnecting ECM connectors).
- When the same malfunction (DTC) is not detected again during 40 engine warm-up cycles (see item “Warm-up Cycle” of “On-Board Diagnostic System Description” in this section).

DTC Table

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL
P0010	Camshaft position actuator circuit	Actual valve timing fails to become close to target advance level of each function although advance control function or retarding control function is at work.	1 driving cycle
P0011	Camshaft position – timing over-advanced or system performance	Actual valve of advanced valve timing does not reach target value, or valve timing is advanced although ECM command is most retarding.	2 driving cycles
P0012	Camshaft position – timing over-retarded		2 driving cycles
P0031	HO2S heater control circuit low (Sensor–1)	Heater current is less than specification while heater ON.	2 driving cycles
P0032	HO2S heater control circuit high (Sensor–1)	Heater current is more than specification while heater ON.	2 driving cycles
P0037	HO2S heater control circuit low (Sensor–2)	Heater current is less than specification while heater ON.	2 driving cycles
P0038	HO2S heater control circuit high (Sensor–2)	Heater current is more than specification while heater ON.	2 driving cycles
P0102	Mass air flow circuit low input	Low voltage	1 driving cycle
P0103	Mass air flow circuit high input	High voltage	
P0107	Manifold absolute pressure low input	Low voltage (or manifold absolute pressure sensor circuit open or shorted to ground)	1 driving cycle
P0108	Manifold absolute pressure high input	High voltage (or manifold absolute pressure sensor circuit shorted to power circuit)	1 driving cycle
P0112	Intake air temperature sensor circuit low	High temperature – low voltage (or IAT sensor circuit shorted to ground)	1 driving cycle
P0113	Intake air temperature sensor circuit high	Low temperature – high voltage (or IAT sensor circuit open)	
P0117	Engine coolant temperature sensor circuit low	High temperature – low voltage (or ECT sensor circuit shorted to ground)	1 driving cycle
P0118	Engine coolant temperature sensor circuit high	Low temperature – high voltage (or ECT sensor circuit open)	
P0121	Throttle position circuit range/performance	Poor performance of TP sensor	2 driving cycles
P0122	Throttle position circuit low	Low voltage (or TP sensor circuit shorted to ground)	1 driving cycle
P0123	Throttle position circuit high	High voltage (or TP sensor circuit open)	
P0131	O2 sensor (HO2S) circuit low voltage (Sensor–1)	Min. output voltage of HO2S–1 higher than specification	2 driving cycles
P0132	O2 sensor (HO2S) circuit high voltage (Sensor–1)	Max. output voltage of HO2S–1 is lower or higher than specification	
P0133	O2 sensor (HO2S) circuit slow response (Sensor–1)	Response time of HO2S–1 output voltage between rich and lean is longer than specification.	

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL
P0134	O2 sensor (HO2S) circuit no activity detected (Sensor-1)	Output voltage of HO2S-1 fails to go above specification. (or HO2S-1 circuit open or short)	2 driving cycles
P0136	O2 sensor (HO2S) circuit (Sensor-2)	Maximum output voltage of HO2S-2 is lower than specification or minimum output voltage of HO2S-2 is higher than specification.	2 driving cycles
P0171	System too lean	Total fuel trim is larger than specification for specified time or longer. (Fuel trim toward rich side is large.)	2 driving cycles
P0172	System too rich	Total fuel trim is smaller than specification for specified time or longer. (Fuel trim toward lean side is large.)	2 driving cycles
P0300	Random misfire detected	Misfire of such level as to cause damage to three way catalyst.	*2 driving cycles
P0301 P0302 P0303 P0304	Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected Cylinder 4 misfire detected	Misfire of such level as to deteriorate emission but not to cause damage to three way catalyst.	2 driving cycles
P0327	Knock sensor circuit low	Knock sensor circuit shorted to ground (low voltage)	1 driving cycle
P0328	Knock sensor circuit high	Knock sensor circuit open (high voltage)	1 driving cycle
P0335	Crankshaft position sensor circuit	No signal during engine running	1 driving cycle
P0340	Camshaft position sensor circuit	No reference signal during engine cranking or pulse number of position signal is out of specification.	
P0401	Exhaust gas recirculation flow insufficient detected	Insufficient EGR flow	2 driving cycles
P0402	Exhaust gas recirculation flow excessive detected	Excessive EGR flow	2 driving cycles
P0420	Catalyst system efficiency below threshold	Output waveforms of HO2S-1 and HO2S-2 are similar.	2 driving cycles
P0443	Evaporative emission system purge control valve circuit	Monitor signal of EVAP canister purge valve is different from command signal (circuit open or shorted to ground)	2 driving cycles
P0480	Fan 1 (Radiator cooling fan) control circuit	Radiator cooling fan relay terminal voltage is low when cooling temp. is lower than specification.	2 driving cycles
P0500	Vehicle speed sensor	No signal during fuel cut for specified time or longer	2 driving cycles
P0505	Idle air control system	Voltage is out of specification for longer than specified time	2 driving cycles
P0601	Internal control module memory check sum error	Data write error or check sum error	1 driving cycle
P0602	Control module programming error	Data programming error	1 driving cycle
P1500	Starter signal circuit malfunction	Starter signal is not inputted from engine cranking till its start and after or it is always inputted.	2 driving cycles
P1510	ECM backup power supply malfunction	Backup power voltage is out of specification after starting engine.	1 driving cycle

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL
P1601	CAN communication error	Transmitting or receiving error detected to ECM for specified time continuously.	1 driving cycle
P1603	TCM trouble code detected	When ECM receives a trouble code from TCM, which indicates that some problem occurred in sensor circuits and its calculated values used for operations such as idle speed control, engine power control, and so on by TCM, this DTC is detected by ECM.	1 driving cycle
P2227	Barometric pressure circuit range/performance	Difference between barometric pressure sensor value and calculated barometric pressure value is larger than specification.	2 driving cycles
P2228	Barometric pressure circuit low	Barometric pressure sensor circuit shorted to ground.	1 driving cycle
P2229	Barometric pressure circuit high	Barometric pressure sensor circuit open	1 driving cycle
P1610	Secret key and password not registered	Refer to "DTC Table" in Section 8G	
P1611	Password not matched		
P1612	No signal from immobilizer		
P1613			
P1614	Incorrect signal		

NOTE:

- **1 driving cycle:** MIL lights up when DTC is detected while 1 driving cycle.
- **2 driving cycles:** MIL lights up when the same DTC is detected also in the next driving cycle after DTC is detected and stored temporarily in the first driving cycle.
- ***2 driving cycles:**
MIL blinks or lights up. Refer to "DTC P0300/P0301/P0302/P0303/P0304: Random Misfire/Cylinder 1 Misfire/Cylinder 2 Misfire/Cylinder 3 Misfire/Cylinder 4 Misfire Detected" for details.

Fail-Safe Table

When any of the following DTCs is detected, ECM enters fail-safe mode as long as malfunction continues to exist but that mode is canceled when ECM detects normal condition after that.

DTC NO.	DETECTED ITEM	FAIL-SAFE OPERATION
P0102	Mass air flow circuit low input	<ul style="list-style-type: none"> ECM controls injector drive time (fuel injection volume) according to throttle valve opening (closed throttle position or not). ECM stops EGR control.
P0103	Mass air flow circuit high input	
P0112	Intake air temperature sensor circuit low	<ul style="list-style-type: none"> ECM controls actuators assuming that intake air temperature is 20°C (68°F).
P0113	Intake air temperature sensor circuit high	
P0117	Engine coolant temperature circuit low	<ul style="list-style-type: none"> ECM controls actuators assuming that engine coolant temperature is 80°C (176°F). ECM operates radiator fan.
P0118	Engine coolant temperature circuit high	
P0122	Throttle position circuit low input	<ul style="list-style-type: none"> ECM controls actuators assuming that throttle opening is about 20 deg.
P0123	Throttle position circuit high input	
P0335	Crankshaft position sensor circuit	<ul style="list-style-type: none"> Fix ignition timing. ECM changes injection control system from sequential injection to simultaneous one.
P0340	Camshaft position sensor circuit	ECM changes injection control system from sequential injection to simultaneous one.
P0500	Vehicle speed sensor	ECM controls actuators assuming vehicle speed is 0 km/h (0 mile/h).
P2227	Barometric pressure sensor performance problem	ECM controls actuators assuming that barometric pressure is 101.33 kPa (762 mmHg).

Visual Inspection

Visually check the following parts and systems.

INSPECTION ITEM	REFERRING SECTION
<ul style="list-style-type: none"> • Engine oil – level, leakage • Engine coolant – level, leakage • Fuel – level, leakage • Air cleaner element – dirt, clogging • Battery – fluid level, corrosion of terminal • Water pump belt – tension damage • Throttle cable – play (under warm engine), installation • Vacuum hoses of air intake system – disconnection, looseness, deterioration, bend • Connectors of electric wire harness – disconnection, friction • Fuses – burning • Parts – installation, bolt – looseness • Parts – deformation • Other parts that can be checked visually <p>Also check the following items at engine start, if possible</p> <ul style="list-style-type: none"> • Malfunction indicator lamp – Operation • Charge warning lamp – Operation • Engine oil pressure warning lamp – Operation • Engine coolant temp. meter – Operation • Fuel level meter – Operation • Tachometer – Operation • Abnormal air being inhaled from air intake system • Exhaust system – leakage of exhaust gas, noise • Other parts that can be checked visually 	<p>“Engine Oil and Oil Filter” in Section 0B. “Engine Coolant” in Section 0B. “Fuel System” in Section 0B. “Air Cleaner Filter” in Section 0B. “Battery” in Section 6H. “Drive Belt” in Section 0B. “Accelerator Cable Adjustment” in Section 6E2. “Evaporative Emission Control System Inspection” in Section 6E2.</p> <p>“Malfunction Indicator Lamp (MIL) Check” in this section. “Charging Indicator Lamp Operation” in Section 6H. “Engine Oil Pressure Switch Inspection” in Section 8C. “Engine Coolant Temperature (ECT) Gauge Inspection” in Section 8C. “Fuel Gauge Inspection” in Section 8C.</p> <p>“Exhaust System” in Section 0B.</p>

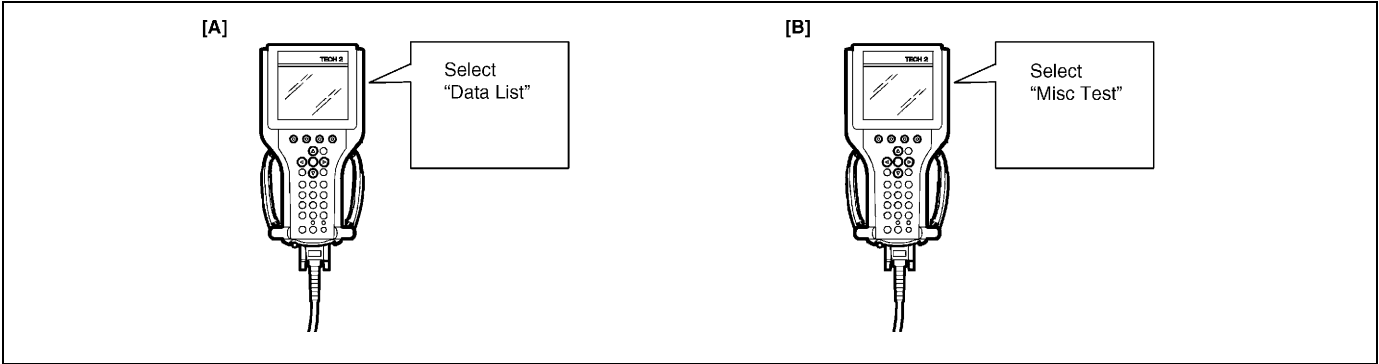
Engine Basic Inspection

This check is very important for troubleshooting when ECM has detected no DTC and no abnormality has been found in visual inspection.

Follow the flow table carefully.

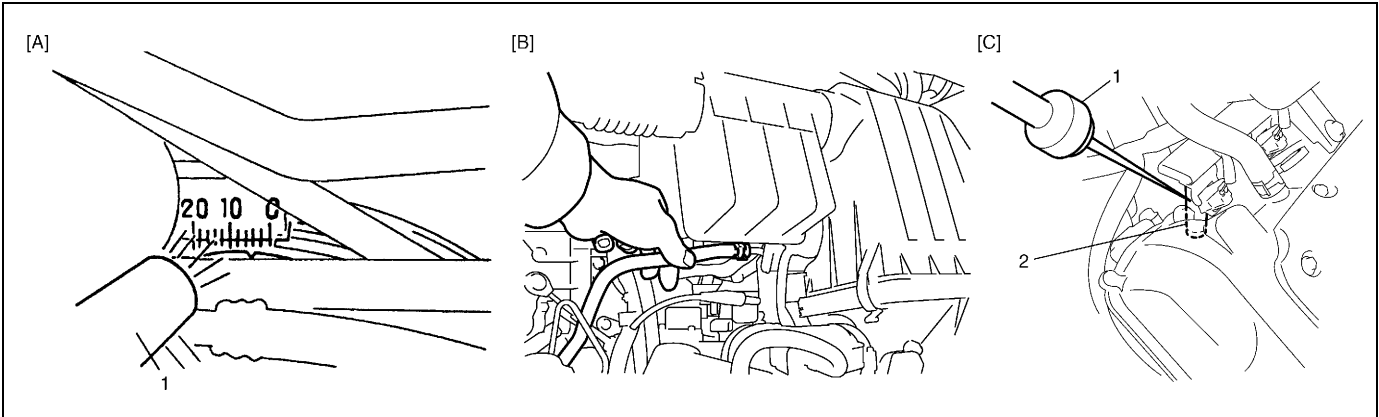
Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check battery voltage. Is it 11 V or more?	Go to Step 3.	Charge or replace battery.
3	Is engine cranked?	Go to Step 4.	Go to "Cranking System Symptom Diagnosis" in Section 6G.
4	Does engine start?	Go to Step 5.	Go to Step 7.
5	Check idle speed as follows: 1) Warm up engine to normal operating temp. 2) Shift transmission to neutral position for M/T. ("P" position for A/T.) 3) All of electrical loads are switched off. 4) Check engine idle speed with scan tool. See Fig. 1. Is it 650 – 750 r/min?	Go to Step 6.	Go to "Engine Symptom Diagnosis" in this section.
6	Check ignition timing as follows: 1) Using SUZUKI scan tool, select "MISC" mode on SUZUKI scan tool and fix ignition timing to initial one. See Fig. 2. 2) Using timing light (1), check initial ignition timing. See Fig. 3. Is it $5^{\circ} \pm 3^{\circ}$ BTDC at specified idle speed?	Go to "Engine Symptom Diagnosis" in this section.	Check ignition control related parts referring to "Ignition Timing Inspection in Section 6F2.
7	Is immobilizer control system equipped?	Go to Step 8.	Go to Step 9.
8	Check immobilizer system malfunction as follows. 1) Check immobilizer indicator lamp for flashing. Is it flashing when ignition switch is turned to ON position?	Go to "DTC Check" in Section 8G.	Go to Step 9.
9	Check fuel supply as follows: 1) Check to make sure that enough fuel is filled in fuel tank. 2) Turn ON ignition switch for 3 seconds and then OFF. Repeat this a few times. See Fig. 4. Is fuel pressure felt from fuel feed hose (4) when ignition switch is turned ON?	Go to Step 11.	Go to Step 10.
10	Check fuel pump for operating. Was fuel pump operating sound heard from fuel filler for about 3 seconds after ignition switch ON and stop?	Go to "Table B-3 Fuel Pressure Check" in this section.	Go to "Table B-2 Fuel Pump and Its Circuit Check" in this section.

Step	Action	Yes	No
11	Check ignition spark as follows: 1) Disconnect injector couplers. 2) Remove spark plugs and connect them to high-tension cords or ignition coils. 3) Ground spark plugs. 4) Crank engine and check if each spark plug sparks. Is it in good condition?	Go to Step 12.	Go to "Ignition Spark Test" in Section 6F2.
12	Check fuel injector for operation as follows: 1) Install spark plugs and connect injector connectors. 2) Using sound scope (1), check operating sound of each injector (2) when cranking engine. See Fig. 5. Was injector operating sound heard from all injectors?	Go to "Engine Symptom Diagnosis" in this section.	Go to "Table B-1 Fuel Injector Circuit Check" in this section.



[A]: Fig. 1 for Step 5

[B]: Fig. 2 for Step 6



[A]: Fig. 3 for Step 6

[B]: Fig. 4 for Step 9

[C]: Fig. 5 for Step 12

Engine Symptom Diagnosis

Perform troubleshooting referring to following table when ECM has detected no DTC and no abnormality has been found in visual inspection and engine basic inspection previously.

Condition	Possible Cause	Reference Item
Hard Starting (Engine cranks OK)	Faulty spark plug	"Spark Plugs Inspection" in Section 6F2.
	Leaky high-tension cord	"High-tension Cords Inspection" in Section 6F2.
	Loose connection or disconnection of high-tension cords or lead wires	"High-tension Cords Inspection" in Section 6F2.
	Faulty ignition coil	"Ignition Coil Assembly (Including Ignitor) Inspection" in Section 6F2.
	Dirty or clogged fuel hose or pipe	"Table B-3 Fuel Pressure Check" in this section.
	Malfunctioning fuel pump	"Table B-3 Fuel Pressure Check" in this section.
	Air inhaling from intake manifold gasket or throttle body gasket	
	Faulty idle air control system	"Table B-4 Idle Air Control System Check" in this section.
	Faulty ECT sensor or MAF sensor	"ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty ECM	
	Low compression	"Compression Check" in Section 6A1.
	Poor spark plug tightening or faulty gasket	"Spark Plugs Removal and Installation" in Section 6F2.
	Compression leak from valve seat	"Valves and Cylinder Head Inspection" in Section 6A2.
	Sticky valve stem	"Valves and Cylinder Head Inspection" in Section 6A2.
	Weak or damaged valve springs	"Valves and Cylinder Head Inspection" in Section 6A2.
	Compression leak at cylinder head gasket	"Valves and Cylinder Head Inspection" in Section 6A2.
	Sticking or damaged piston ring	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Worn piston, ring or cylinder	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Malfunctioning PCV valve	"PCV System Inspection" in Section 6E2.
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.

Condition	Possible Cause	Reference Item
Low oil pressure	Improper oil viscosity	"Engine Oil and Oil Filter Replacement" in Section 0B.
	Malfunctioning oil pressure switch	"Oil Pressure Switch Inspection" in Section 8C.
	Clogged oil strainer	"Oil Pan and Oil Pump Strainer" in Section 6A2.
	Functional deterioration of oil pump	"Oil Pan and Oil Pump Strainer" in Section 6A2.
	Worn oil pump relief valve	"Oil Pan and Oil Pump Strainer" in Section 6A2.
	Excessive clearance in various sliding parts	
Engine noise Note: Before checking mechanical noise, make sure that: Specified spark plug is used. Specified fuel is used.	Improper valve lash	"Valves and Cylinder Head Inspection" in Section 6A2.
	Worn valve stem and guide	"Valves and Cylinder Head Inspection" in Section 6A2.
	Weak or broken valve spring	"Valves and Cylinder Head Inspection" in Section 6A2.
	Warped or bent valve	"Valves and Cylinder Head Inspection" in Section 6A2.
	Worn piston, ring and cylinder bore	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Worn rod bearing	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Worn crank pin	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Loose connecting rod nuts	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Low oil pressure	"Low Oil Pressure" in this table.
	Low oil pressure	"Low Oil Pressure" in this table.
	Worn bearing	"Main bearings, Crankshaft and Cylinder Block Inspection" in Section 6A2.
	Worn crankshaft journal	"Main bearings, Crankshaft and Cylinder Block Inspection" in Section 6A2.
	Loose bearing cap bolts	"Main bearings, Crankshaft and Cylinder Block Inspection" in Section 6A2.
	Excessive crankshaft thrust play	"Main bearings, Crankshaft and Cylinder Block Inspection" in Section 6A2.

Condition	Possible Cause	Reference Item
Overheating	Inoperative thermostat	"Thermostat Inspection" in Section 6B2.
	Poor water pump performance	"Water Pump Inspection" in Section 6B2.
	Clogged or leaky radiator	"Radiator Inspection" in Section 6B2.
	Improper engine oil grade	"Engine Oil and Oil Filter Replacement" in Section 0B.
	Clogged oil filter or oil strainer	"Oil Pressure Check" in Section 6A2.
	Poor oil pump performance	"Oil Pressure Check" in Section 6A2.
	Faulty radiator fan control system	"Table B-7 Radiator Fan Control System Check" in this section.
	Dragging brakes	"Diagnosis Table" in Section 5.
	Slipping clutch	"Diagnosis Table" in Section 7C.
	Blown cylinder head gasket	"Valves and Cylinder Head Inspection" in Section 6A2.
Poor gasoline mileage	Leaks or loose connection of high-tension cord	"High-tension Cords Inspection" in Section 6F2.
	Faulty spark plug (improper gap, heavy deposits and burned electrodes, etc.)	"Spark Plugs Inspection" in Section 6F2.
	Malfunctioning EGR valve	"EGR Valve Inspection" Section 6E2.
	High idle speed	"Improper Engine Idling or Engine Fails to Idle" in this table.
	Poor performance of TP sensor, ECT sensor or MAF sensor	"TP Sensor On-Vehicle Inspection", "ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty fuel injector(s)	"Table B-1 Fuel Injector Circuit Check" in this section.
	Faulty ECM	
	Low Compression	"Low Compression" in this table.
	Poor valve seating	"Valves and Cylinder Head Inspection" in Section 6A2.
	Dragging brakes	"Diagnosis Table" in Section 5.
	Slipping clutch	"Diagnosis Table" in Section 7C.
	Thermostat out of order	"Thermostat Inspection" in Section 6B2.
	Improper tire pressure	"Replacement Tires" in Section 3F.
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.

Condition	Possible Cause	Reference Item
Excessive engine oil consumption	Blown cylinder head gasket	"Valves and Cylinder Head Inspection" in Section 6A2.
	Leaky camshaft oil seals	"Camshaft, Tappet and Shim" in Section 6A2.
	Sticky piston ring	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Worn piston and cylinder	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Worn piston ring groove and ring	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	Improper location of piston ring gap	"Pistons, Piston rings, Connecting Rods and Cylinders Disassembly and Assembly" in Section 6A2.
	Worn or damaged valve stem seal	"Valves and Cylinder Head Disassembly and Assembly" in Section 6A2.
	Worn valve stem	"Valves and Cylinder Head Inspection" in Section 6A2.
Engine hesitates (Momentary lack of response as accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make vehicle move, as from a stop sign.)	Spark plug faulty or plug gap out of adjustment	"Spark Plugs Inspection" in Section 6F2.
	Leaky high-tension cord	"High-tension Cords Inspection" in Section 6F2.
	Fuel pressure out of specification	"Table B-3 Fuel Pressure Check" in this section.
	Malfunctioning EGR valve	"EGR Valve Inspection" in Section 6E2.
	Poor performance of TP sensor, ECT sensor or MAF sensor	"TP Sensor On-Vehicle Inspection", "ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty fuel injector	"Table B-1 Fuel Injector Circuit Check" in this section.
	Faulty ECM	
	Engine overheating	"Overheating" in this table.
	Low compression	"Low Compression" in this table.
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.

Condition	Possible Cause	Reference Item
Surge (Engine power variation under steady throttle or cruise. Feels like vehicle speeds up and down with no change in accelerator pedal.)	Leaky or loosely connected high-tension cord	"High-tension Cords Inspection" in Section 6F2.
	Faulty spark plug (excess carbon deposits, improper gap, and burned electrodes, etc.)	"Spark Plugs Inspection" in Section 6F2.
	Variable fuel pressure	"Table B-3 Fuel Pressure Check" in this section.
	Kinky or damaged fuel hose and lines	
	Faulty fuel pump (clogged fuel filter)	
	Malfunctioning EGR valve	"EGR Valve Inspection" in Section 6E2.
	Poor performance of MAF sensor	"Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty fuel injector	"Table B-1 Fuel Injector Circuit" in this section.
	Faulty ECM	
Excessive detonation (Engine makes continuously sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.)	Faulty spark plug	"Spark Plugs Inspection" in Section 6F2.
	Loose connection of high-tension cord	"High-tension Cords Removal and Installation" in Section 6F2.
	Engine overheating	"Overheating" in this table.
	Clogged fuel filter (faulty fuel pump) or fuel lines	"Table B-1 Fuel Injector Circuit Check" or "Table B-2 Fuel Pump and Its Circuit Check" in this section.
	Air inhaling from intake manifold or throttle body O-ring	
	Malfunctioning EGR valve	"EGR Valve Inspection" in Section 6E2.
	Poor performance of knock sensor, ECT sensor or MAF sensor	"DTC P0327 Knock Sensor Circuit Low" or "DTC P0328 Knock Sensor Circuit High" in this section, "ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty fuel injector(s)	"Table B-1 Fuel Injector Circuit Check" in this section.
	Faulty ECM	
	Excessive combustion chamber deposits	"Pistons, Piston rings, Connecting Rods and Cylinders Inspection" in Section 6A2.
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.

Condition	Possible Cause	Reference Item
Engine has no power	Faulty spark plug	"Spark Plugs Inspection" in Section 6F2.
	Faulty ignition coil with ignitor	"Ignition Coil Assembly (Including Ignitor) Inspection" in Section 6F2.
	Leaks, loose connection or disconnection of high-tension cord	"High-tension Cords Inspection" in Section 6F2.
	Faulty knock sensor	"DTC P0327 Knock Sensor Circuit Low" or "DTC P0328 Knock Sensor Circuit High" in this section.
	Clogged fuel hose or pipe	"Table B-3 Fuel Pressure Check" in this section.
	Malfunctioning fuel pump	"Table B-2 Fuel Pump and Its Circuit Check" in this section.
	Air inhaling from intake manifold gasket or throttle body gasket	
	Engine overheating	"Overheating" in this table.
	Malfunctioning EGR valve	"EGR Valve Inspection" in Section 6E2.
	Maladjusted accelerator cable play	"Accelerator cable Adjustment" in Section 6E2.
	Poor performance of TP sensor, ECT sensor or MAF sensor	"TP Sensor On-Vehicle Inspection", "ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty fuel injector(s)	"Table B-1 Fuel Injector Circuit Check" in this section.
	Faulty ECM	
	Dragging brakes	"Diagnosis Table" in Section 5.
	Slipping clutch	"Diagnosis Table" in Section 7C.
	Low compression	"Compression Check" in Section 6A2.
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.

Condition	Possible Cause	Reference Item
Improper engine idling or engine fails to idle	Faulty spark plug	"Spark Plugs Inspection" in Section 6F2.
	Leaky or disconnected high-tension cord	"High-tension Cords Inspection" in Section 6F2.
	Faulty ignition coil with ignitor	"Ignition Coil Assembly (Including Ignitor) Inspection" in Section 6F2.
	Fuel pressure out of specification	"Table B-3 Fuel Pressure Check" in this section.
	Leaky manifold, throttle body, or cylinder head gasket	
	Malfunctioning EGR valve	"EGR Valve Inspection" in Section 6E2.
	Faulty idle air control system	"Table B-4 Idle Air Control System Check" in this section.
	Faulty evaporative emission control system	"Evaporative Emission Control System Inspection" in Section 6E2.
	Faulty EGR system	"EGR Valve Inspection" in Section 6E2.
	Faulty fuel injector(s)	"Table B-1 Fuel Injector Circuit Check" in this section.
	Poor performance of ECT sensor, TP sensor or MAF sensor	"TP Sensor On-Vehicle Inspection", "ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty ECM	
	Loose connection or disconnection of vacuum hoses	
	Malfunctioning PCV valve	"PCV System Inspection" in Section 6E2.
	Engine overheating	"Overheating" in this section.
	Low compression	"Compression Check" in Section 6A2.
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.

Condition	Possible Cause	Reference Item
Excessive hydrocarbon (HC) emission or carbon monoxide (CO)	Faulty spark plug	"Spark Plugs Inspection" in Section 6F2.
	Leaky or disconnected high-tension cord	"High-tension Cords Inspection" in Section 6F2.
	Faulty ignition coil with ignitor	"Ignition Coil Assembly (Including Ignitor) Inspection" in Section 6F2.
	Low compression	"Compression Check" in Section 6A2.
	Lead contamination of three way catalytic converter	Check for absence of filler neck restrictor.
	Faulty evaporative emission control system	"Evaporative Emission Control System Inspection" in Section 6E2.
	Fuel pressure out of specification	"Table B-3 Fuel Pressure Check" in this section.
	Closed loop system (A/F feed back compensation) fails <ul style="list-style-type: none"> Faulty TP sensor Poor performance of ECT sensor or MAF sensor 	"TP Sensor On-Vehicle Inspection" in Section 6E2. "ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty injector(s)	"Table B-1 Fuel Injector Circuit Check" in this section.
	Faulty ECM	
	Engine not at normal operating temperature	
	Clogged air cleaner	
	Vacuum leaks	
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.
Excessive nitrogen oxides (NOx) emission	Improper ignition timing	"Ignition Timing Inspection" in Section 6F2.
	Lead contamination of catalytic converter	Check for absence of filler neck restrictor.
	Faulty EGR system	"EGR Valve Inspection" in Section 6E2.
	Fuel pressure out of specification	"Table B-3 Fuel Pressure Check" in this section.
	Closed loop system (A/F feed back compensation) fails <ul style="list-style-type: none"> Faulty TP sensor Poor performance of ECT sensor or MAF sensor 	"TP Sensor On-Vehicle Inspection" in Section 6E2. "ECT Sensor Inspection" or "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2.
	Faulty injector(s)	"Table B-1 Fuel Injector Circuit Check" in this section.
	Faulty ECM	
	VVT system out of order	"Oil Control Valve Inspection" in Section 6E2.

Scan Tool Data

As the data values given below are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference values. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.

Also, conditions in the table below that can be checked by the scan tool are those detected by ECM and output from ECM as commands and there may be cases where the engine or actuator is not operating (in the condition) as indicated by the scan tool. Be sure to use the timing light to check the ignition timing.

NOTE:

- With the generic scan tool, only star (*) marked data in the table below can be read.
- When checking the data with the engine running at idle or racing, be sure to shift M/T gear to the neutral gear position and A/T gear to the "Park" position and pull the parking brake fully. Also, if nothing or "no load" is indicated, turn OFF A/C, all electric loads, P/S and all the other necessary switches.

	SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
*	COOLANT TEMP (ENGINE COOLANT TEMP.)	At specified idle speed after warming up		80 – 100°C, 176 – 212°F
*	INTAKE AIR TEMP	At specified idle speed after warming up		–5°C (23°F) + environmental temp. to 40°C (104°F) + environmental temp.
*	ENGINE SPEED	At idling with no load after warming up		Desired idle speed ±50 RPM
	VVT GAP (TARGET-ACTUAL POSITION)	At specified idle speed after warming up		0 – 3°
	INJ PULSE WIDTH (FUEL INJECTION PULSE WIDTH)	At specified idle speed with no load after warming up		2.0 – 4.0 msec.
		At 2500 r/min with no load after warming up		2.0 – 3.6 msec.
	TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE)	Ignition switch ON/ warmed up engine stopped	Accelerator pedal released	0.5 – 1.0 V
			Accelerator pedal depressed fully	Less than 4.8 V
	DESIRED IDLE (DESIRED IDLE SPEED)	At idling with radiator cooling fan stopped and all electrical parts turned OFF after warming up, M/T at neutral		700 RPM
	IAC FLOW DUTY (IDLE AIR CONTROL FLOW DUTY)	At idling with no load after warming up		5 – 55%
*	SHORT FT B1 (SHORT TERM FUEL TRIM)	At specified idle speed after warming up		– 20 – +20%
*	LONG FT B1 (LONG TERM FUEL TRIM)	At specified idle speed after warming up		– 20 – +20%
	TOTAL FUEL TRIM	At specified idle speed after warming up		– 35 – +35%

	SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
*	MAF (MASS AIR FLOW RATE)	At specified idle speed with no load after warm- ing up		1.0 – 4.0 g/s 0.14 – 0.52 lb/min
		At 2500 r/min with no load after warming up		4.0 – 12.0 g/s 0.53 – 1.58 lb/min
*	CALC LOAD (CALCULATED LOAD VALUE)	At specified idle speed with no load after warm- ing up		0 – 10%
		At 2500 r/min with no load after warming up		0 – 10%
*	THROTTLE POSITION (ABSOLUTE THROTTLE POSITION)	Ignition switch ON/ warmed up engine stopped	Accelerator pedal released	0 – 5%
			Accelerator pedal depressed fully	90 – 100%
*	O2S B1 S1 (HEATED OXYGEN SEN- SOR-1)	At specified idle speed after warming up		0.1 – 0.95 V
*	O2S B1 S2 (HEATED OXYGEN SEN- SOR-2)	When engine is running at 2000 r/min. for 3 min or longer after warming up.		0.1 – 0.95 V
	FUEL SYSTEM B1 (FUEL SYSTEM STATUS)	At specified idle speed after warming up		CLOSED (closed loop)
*	MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE)	At specified idle speed with no load after warm- ing up		24 – 38 kPa 180 – 285 mmHg
	BAROMETRIC PRES	–		Display the barometric pres- sure
	STEP EGR FLOW DUTY	At specified idle speed after warming up		0%
	FUEL CUT	When engine is at fuel cut condition		ON
		Other than fuel cut condition		OFF
	CLOSED THROTTLE POS (CLOSED THROTTLE POSITION)	Throttle valve at idle position		ON
		Throttle valve opens larger than idle position		OFF
	CANIST PRG DUTY (EVAP CANISTER PURGE FLOW DUTY)	At specified idle speed after warming up		0%
*	IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYL- INDER)	At specified idle speed with no load after warm- ing up		3 – 13° BTDC
	BATTERY VOLTAGE	Ignition switch ON/engine stop		10 – 14 V
	FUEL PUMP	Within 3 seconds after ignition switch ON or engine running		ON
		Engine stop at ignition switch ON		OFF
	ELECTRIC LOAD	Ignition switch ON/Headlight, small light, all turned OFF		OFF
		Ignition switch ON/Headlight, small light, turned ON		ON
	BRAKE SWITCH	Ignition switch ON	Brake pedal is released	OFF
			Brake pedal is depressed	ON

SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
RADIATOR FAN (RADIATOR FAN CON- TROL RELAY)	Ignition switch ON	Engine coolant temp.: Lower than 92.5°C (198.5°F)	OFF
		Engine coolant temp.: 97.5°C (208°F) or higher	ON
BLOWER FAN	Ignition switch ON	Blower fan switch: 2nd speed position or more	ON
		Blower fan switch: under 2nd speed position	OFF
A/C SWITCH (if equipped with A/C)	Engine running after warming up, A/C not oper- ating		OFF
	Engine running after warming up, A/C operat- ing		ON
A/C MAG CLUTCH (if equipped with A/C)	Engine running	A/C switch and blower motor switch turned ON	ON
		A/C switch and blower motor switch turned OFF	OFF
VEHICLE SPEED	At stop		0 km/h

Scan Tool Data Definitions**COOLANT TEMP (ENGINE COOLANT TEMPERATURE, °C, °F)**

It is detected by engine coolant temp. sensor.

INTAKE AIR TEMP. (°C, °F)

It is detected by intake air temp. sensor.

ENGINE SPEED (rpm)

It is computed by reference pulses from the camshaft position sensor.

TOTAL FUEL TRIM B1 (%)

The value of Total Fuel Trim is obtained by calculating based on values of short Term Fuel Trim and Long Term Fuel Trim. This value indicates how much correction is necessary to keep the air/fuel mixture stoichiometrical.

INJ PULSE WIDTH (FUEL INJECTION PULSE WIDTH, msec.)

This parameter indicates time of the injector drive (valve opening) pulse which is output from ECM (but injector drive time of NO.1 cylinder for multiport fuel injection).

TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE, V)

The Throttle Position Sensor reading provides throttle valve opening information in the form of voltage.

DESIRED IDLE (DESIRED IDLE SPEED, rpm)

The Desired Idle Speed is an ECM internal parameter which indicates the ECM requested idle. If the engine is not running, this number is not valid.

IAC FLOW DUTY (IDLE AIR (SPEED) CONTROL DUTY, %)

This parameter indicates current flow time rate within a certain set cycle of IAC valve (valve opening rate) which controls the amount of bypass air (idle speed).

SHORT FT B1 (SHORT TERM FUEL TRIM, %)

Short term fuel trim value represents short term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

[Simpopdf Merge and Split Unregistered Version - http://www.simpopdf.com](http://www.simpopdf.com)

LONG FT B1 (LONG TERM FUEL TRIM, %)

Long term fuel trim value represents long term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

VVT GAP [TARGET-ACTUAL POSITION] (°)

It is calculated using the formula: target valve timing advance – actual valve timing advance.

MAF (MASS AIR FLOW RATE, g/s, lb/min)

It represents total mass of air entering intake manifold which is measured by mass air flow sensor.

CALC LOAD (CALCULATED LOAD VALUE, %)

Engine load displayed as a percentage of maximum possible load. Value is calculated mathematically using the formula: actual (current) intake air volume ÷ maximum possible intake air volume x 100%

THROTTLE POS (ABSOLUTE THROTTLE POSITION, %)

When throttle position sensor is fully closed position, throttle opening is indicated as 0% and 90 – 100% full open position.

O2S SENSOR B1 S1 (HEATED OXYGEN SENSOR–1, V)

It indicates output voltage of HO2S–1 installed on exhaust manifold (pre-catalyst).

O2S SENSOR B1 S2 (HEATED OXYGEN SENSOR–2, V)

It indicates output voltage of HO2S–2 installed on exhaust pipe (post-catalyst). It is used to detect catalyst deterioration.

FUEL SYSTEM (FUEL SYSTEM STATUS)

Air/fuel ratio feedback loop status displayed as one of the followings.

OPEN: Open loop-has not yet satisfied conditions to go closed loop.

CLOSED: Closed loop-using oxygen sensor(s) as feedback for fuel control.

OPEN-DRIVE COND: Open loop due to driving conditions (Power enrichment, etc.).

OPEN SYS FAULT: Open loop due to detected system fault.

CLOSED-ONE O2S: Closed loop, but fault with at least one oxygen sensor-may be using single oxygen sensor for fuel control.

MAP (MANIFOLD ABSOLUTE PRESSURE, mmHg, kPa)

This value indicates how much correction is necessary to keep the air/fuel mixture stoichiometrical.

It is detected by manifold absolute pressure sensor.

BAROMETRIC PRESS (kPa, inHg)

This parameter represents a measurement of barometric air pressure and is used for altitude correction of the fuel injection quantity and IAC valve control.

STEP EGR FLOW DUTY (%)

This parameter indicates opening rate of EGR valve which controls the amount of EGR flow.

FUEL CUT (ON/OFF)

ON: Fuel being cut (output signal to injector is stopped)

OFF: Fuel not being cut

CLOSED THROTTLE POSITION (ON/OFF)

This parameter will read ON when throttle valve is fully closed, or OFF when the throttle is not fully closed.

CANIST PURGE DUTY (EVAP CANISTER PURGE FLOW DUTY, %)

This parameter indicates valve ON (valve open) time rate within a certain set cycle of EVAP canister purge valve which controls the amount of EVAP purge.

IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYLINDER, °)

Ignition timing of NO.1 cylinder is commanded by ECM. The actual ignition timing should be checked by using the timing light.

BATTERY VOLTAGE (V)

This parameter indicates battery positive voltage inputted from main relay to ECM.

FUEL PUMP (ON/OFF)

ON is displayed when the ECM activates the fuel pump via the fuel pump relay switch.

ELECTRIC LOAD (ON/OFF)

ON: Headlight or small light ON signal inputted.

OFF: Above electric loads all turned OFF.

BRAKE SW (ON/OFF)

This parameter indicates the state of the brake switch.

RADIATOR FAN (RADIATOR FAN CONTROL RELAY, ON/OFF)

ON: Command for radiator fan control relay operation being output.

OFF: Command for relay operation not being output.

BLOWER FAN (ON/OFF)

This parameter indicates the state of the blower fan motor switch.

A/C SWITCH (ON/OFF)

ON: Command for A/C operation being output from ECM to A/C amplifier.

OFF: Command for A/C operation not being output.

A/C MAG SWITCH (A/C COMPRESSOR RELAY, ON/OFF)

This parameter indicates the state of the A/C switch.

VEHICLE SPEED (km/h)

It is computed based on pulse signals from vehicle speed sensor.

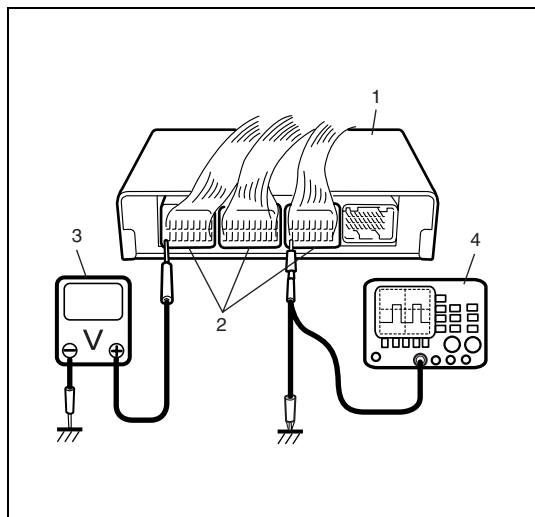
Inspection of ECM and Its Circuits

ECM and its circuits can be checked at ECM wiring couplers by measuring voltage, pulse signal and resistance.

CAUTION:

ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with coupler disconnected from it.

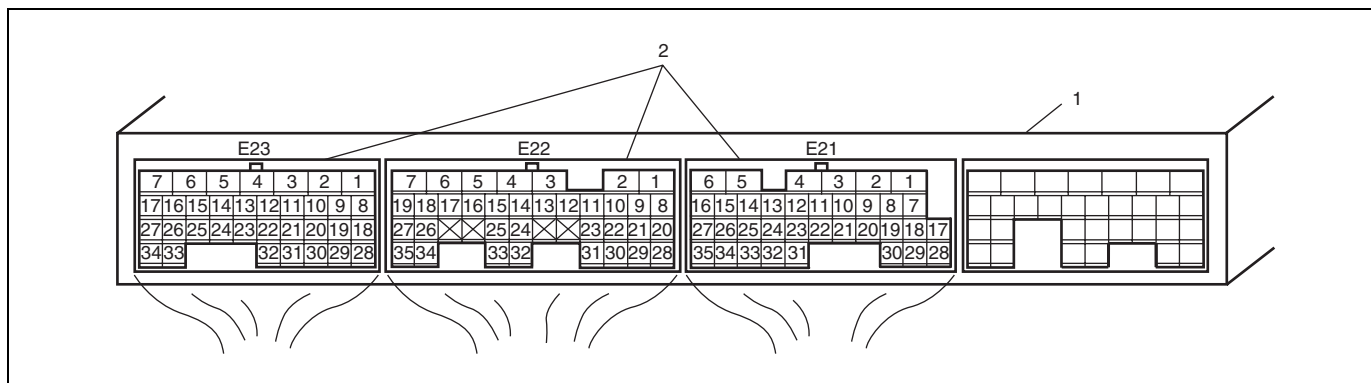
Voltage Check



- 1) Remove ECM (1) from vehicle body referring to "Engine Control Module (ECM) Removal and Installation" in Section 6E2.
- 2) Check voltage and/or pulse signal at each terminal of couplers (2) connected, using voltmeter (3) and oscilloscope (4).

NOTE:

- As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is turned ON.
- Voltage with asterisk(*) cannot be measured by voltmeter because it is pulse signal. Check it with oscilloscope if necessary.



1. ECM

2. ECM couplers (Viewed from harness side)

TERMINAL NUMBER	WIRE COLOR	CIRCUIT	NORMAL VOLTAGE	CONDITION
E23-1	BLK/YEL	Ground for ECM	Below 0.3 V	Ignition switch turned ON
E23-2	BLK/YEL	Ground for ECM	Below 0.3 V	Ignition switch turned ON
E23-3	BLU/RED	Heater output of heated oxygen sensor-2	10 – 14 V	Ignition switch turned ON
			0 – 1 V (Reference waveform No.1)	Engine running at idling after vehicle running over 30 km/h, 19ml/h for 5 min.
E23-4	YEL	Heater output of heated oxygen sensor-1	10 – 14 V	Ignition switch turned ON
			*0 – 2 V ↑↓ 13.5 – 14.8 V (Reference waveform No.2 and No.3)	Engine running at idling with after warming up. (Output signal is active low duty pulse. Duty ratio varies depending on engine condition.)
E23-5	–	–	–	–
E23-6	–	–	–	–
E23-7	–	–	–	–
E23-8	GRN/YEL	IAC valve output	0 – 1 V	Ignition switch turned ON
			*0 – 2 V ↑↓ 8 – 14 V (Reference waveform No.4)	Engine running at idling with after warming up. (Output signal is active low duty pulse. Pulse generated times depending on vehicle condition)
E23-9	–	–	–	–
E23-10	–	–	–	–
E23-11	ORN	A/C compressor relay output (if equipped)	10 – 14 V	Engine running, A/C request signal high input
			0 – 1 V	Engine running, A/C request signal low input
E23-12	–	–	–	–
E23-13	RED/BLK	EVAP canister purge valve output	10 – 14 V	Ignition switch turned ON with engine stop
			*0 – 0.6 V ↑↓ 10 – 14 V (Reference waveform No.25)	Engine running and vehicle running over 40 km/h, 25 ml/h (Output signal is 10 Hz duty pulse. Duty ratio varies depending on vehicle condition.)
E23-14	GRN	Fuel pump relay output	0 – 2.5 V	For 3 sec. from the time is ignition switch turned to ON or while engine is running
			10 – 14 V	On and after 3 sec. from the time is ignition switch turned to ON or while engine is stop
E23-15	BLU/BLK	Main power supply relay output	10 – 14 V	Ignition switch is turned OFF
			0 – 2 V	Ignition switch is turned ON

TERMINAL NUMBER	WIRE COLOR	CIRCUIT	NORMAL VOLTAGE	CONDITION
E23-16	BLK/RED	EGR valve (stepper motor coil 3) output	10 – 14 V	Ignition switch is turned ON
			*0 – 2 V ↑↓ 8 – 14 V (Reference wave-form No.5)	Ignition switch is turned to ST (cranking) position. (Output signal is active low duty pulse. Pulse generated times depending on vehicle condition)
E23-17	GRN/YEL	EGR valve (stepper motor coil 1) output	0 – 2 V	Ignition switch turned ON
			*0 – 2 V ↑↓ 8 – 14 V (Reference wave-form No.5)	Ignition switch is turned to ST (cranking) position. (Output signal is active low duty pulse. Pulse generated times depending on vehicle condition)
E23-18	—	—	—	—
E23-19	—	—	—	—
E23-20	—	—	—	—
E23-21	—	—	—	—
E23-22	—	—	—	—
E23-23	—	—	—	—
E23-24	—	—	—	—
E23-25	—	—	—	—
E23-26	—	—	—	—
E23-27	—	—	—	—
E23-28	—	—	—	—
E23-29	—	—	—	—
E23-30	—	—	—	—
E23-31	RED/BLU	Ignition coil No.2 and No.3 output	0 – 0.6 V	Ignition switch turned ON
			*0 – 0.6 V ↑↓ 2 – 5 V (Reference wave-form No.6)	Engine running (Output signal is active high pulse. Pulse frequency varies depending on engine speed.)
E23-32	YEL/BLU	Ignition coil No.1 and No.4 output	0 – 0.6 V	Ignition switch turned ON
			*0 – 0.6 V ↑↓ 2 – 5 V (Reference wave-form No.7)	Engine running (Output signal is active high pulse. Pulse frequency varies depending on engine speed.)
E23-33	GRN/ORN	EGR valve (stepper motor coil 4) output	0 – 2 V	Ignition switch turned ON
			*0 – 2 V ↑↓ 8 – 14 V (Reference wave-form No.5)	Ignition switch is turned to ST (cranking) position. (Output signal is active low duty pulse. Pulse generated times depending on vehicle condition)

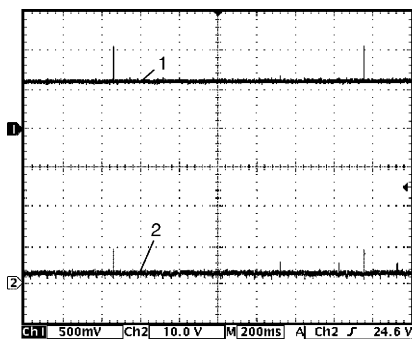
TERMINAL NUMBER	WIRE COLOR	CIRCUIT	NORMAL VOLTAGE	CONDITION
E23-34	GRN/BLK	EGR valve (stepper motor coil 2) output	10 – 14 V	Ignition switch turned ON
			*0 – 2 V ↑↓ 8 – 14 V (Reference wave-form No.5)	Ignition switch is turned to ST (cranking) position. (Output signal is active low duty pulse. Pulse generated times depending on vehicle condition)
E22-1	BLK	Ground for ECM	Below 0.3 V	Ignition switch turned ON
E22-2	BRN/YEL	Oil control valve ground	Below 0.3 V	Ignition switch turned ON
E22-3	BLK/YEL	Oil control valve output	*0 – 0.6 V ↑↓ 13 – 14 V (Reference wave-form No.8 and No.9)	Ignition switch turned ON
				Vehicle running. (Output signal is active low duty pulse. Duty ratio varies depending on vehicle condition)
E22-4	BLU/ORN	Fuel injector No.4 output	10 – 14 V	Ignition switch turned ON
			*0 – 0.6 V ↑↓ 10 – 14 V (Reference wave-form No.10 and No.11)	Engine running (Output signal is active low pulse. Pulse frequency varies depending on engine speed.)
E22-5	BLU/RED	Fuel injector No.3 output	10 – 14 V	Ignition switch turned ON
			*0 – 0.6 V ↑↓ 10 – 14 V (Reference wave-form No.10 and No.12)	Engine running (Output signal is active low pulse. Pulse frequency varies depending on engine speed.)
E22-6	BLU/YEL	Fuel injector No.2 output	10 – 14 V	Ignition switch turned ON
			*0 – 0.6 V ↑↓ 10 – 14 V (Reference wave-form No.10 and No.13)	Engine running (Output signal is active low pulse. Pulse frequency varies depending on engine speed.)
E22-7	BLU/WHT	Fuel injector No.1 output	10 – 14 V	Ignition switch turned ON
			*0 – 0.6 V ↑↓ 10 – 14 V (Reference wave-form No.10 and No.14)	Engine running (Output signal is active low pulse. Pulse frequency varies depending on engine speed.)
E22-8	WHT/GRN	Output of 5 V power source for throttle position (TP) sensor	4.5 – 5.5 V	Ignition switch turned ON

TERMINAL NUMBER	WIRE COLOR	CIRCUIT	NORMAL VOLTAGE	CONDITION
E22-9	WHT	Knock sensor signal	*2 – 3 V (Reference wave-form No.15 and No.16)	Ignition switch turned ON
				Engine running at idling with after warming up
E22-10	ORN	Reference (classified cylinder) signal for CMP sensor	*0 – 0.6 V ↑↓ 4 – 5 V (Reference wave-form No.17)	Engine running at idling with after warming up (Sensor signal is pulse. Pulse frequency varies depending on engine speed.) (6 pulses are generated par 1camshaft revolution)
E22-11	RED	Oxygen signal of heated oxygen sensor-1	0.5 – 1.5 V	Ignition switch turned ON
			*Deflects between over 0.5 V and under 0.45 V (Reference wave-form No.2 and No.3)	While engine running at 2,000 r/min. for 1min. or longer after warmed up
E22-12	–	–	–	–
E22-13	–	–	–	–
E22-14	WHT	Mass air flow (MAF) sensor signal	0.5 – 1.5 V	Ignition switch turned ON and engine stops
			1.5 – 2.0 V (Reference wave-form No.18)	When engine running at specified idle speed after warming up
E22-15	LT GRN/RED	Manifold absolute pressure (MAP) sensor signal	About 4 V (Reference wave-form No.19)	Ignition switch turned ON with barometric pressure at 100kPa, 760mmHg
			0.4 – 1.8 V (Reference wave-form No.20)	While specified idle speed after warming up with barometric pressure at 100kPa, 760mmHg
E22-16	YEL/GRN	Engine coolant temp. (ECT) sensor signal	3.3 – 3.6 V	Ignition switch turned ON, ECT at 0°C, 32°F
			1.1 – 1.5 V	Ignition switch turned ON, ECT at 50°C, 122°F
			0.3 – 0.45 V	Ignition switch turned ON, ECT at 100°C, 212°F
E22-17	LT GRN	Intake air temperature (IAT) sensor signal	3.3 – 3.6 V	Ignition switch turned ON, IAT at 0°C, 32°F
			1.6 – 1.9 V	Ignition switch turned ON, IAT at 40°C, 104°F
			0.6 – 0.8 V	Ignition switch turned ON, IAT at 80°C, 176°F
E22-18	–	–	–	–
E22-19	YEL	Vehicle speed sensor signal	*0 – 1 V ↑↓ 10 – 14 V (Reference wave-form No.21)	Vehicle running. (Sensor signal is pulse. Pulse frequency varies depending on vehicle speed. (8190 pulses are generated par 60 km/h, 37.5 ml/h)
E22-20	–	–	–	–

TERMINAL NUMBER	WIRE COLOR	CIRCUIT	NORMAL VOLTAGE	CONDITION
E22-21	—	—	—	—
E22-22	—	—	—	—
E22-23	—	—	—	—
E22-24	—	—	—	—
E22-25	—	—	—	—
E22-26	—	—	—	—
E22-27	—	—	—	—
E22-28	BRN/WHT	Ground for sensors	Below 0.3 V	Ignition switch turned ON
E22-29	—	—	—	—
E22-30	PNK	CKP sensor signal	0 – 1 V	Ignition switch turned ON
			*4.4 – 4.6 V ↑↓ 0.1 – 0.3 V (Reference wave- form No.17)	Engine running at idling with after warm- ing up. (Sensor signal is pulse. Pulse frequency varies depending on engine speed.) (31 (34–4) pulses are generated per 1 crankshaft revolution)
E22-31	BLK	Ground of ECM for shield wire	Below 0.3 V	Ignition switch turned ON
E22-32	—	—	—	—
E22-33	BLU	Oxygen signal of heated oxygen sen- sor–2	0.5 – 1.5 V	Ignition switch turned ON
			*Deflects between over 0.5 V and under 0.45 V (Reference wave- form No.1)	While engine running at 2,000 r/min. for 1min. or longer after vehicle running over 30 km/h, 19 ml/h
E22-34	GRY	Throttle position (TP) sensor signal	0.5 – 1.0 V	Ignition switch turned ON and throttle valve at idle position with warmed engine
			3.4 – 4.7 V	Ignition switch turned ON and throttle valve at full open position
E22-35	BLK/YEL	Starting motor signal	0 – 1 V	Ignition switch turned ON
			6 – 14 V	While engine cranking
E21-1	PPL/WHT	MIL (Malfunction indi- cator lamp) output	0 – 2.5 V	Ignition switch turned ON with engine stop
			10 – 14 V	Engine running
E21-2	GRY/RED	Immobilizer indicator lamp output (if equipped)	10 – 14 V	While engine running
			0 – 1 V	Ignition switch turned ON with engine stop
E21-3	—	—	—	—
E21-4	BLU	Radiator fan motor relay output	10 – 14 V	Ignition switch turned ON, engine cool- ant temperature under 95°C, 203°F
			0 – 1 V	Ignition switch turned ON, engine cool- ant temperature more than 97.5°C, 207.5°F
E21-5	BLK/RED	Main power supply	10 – 14 V	Ignition switch turned ON
E21-6	BLK/RED	Main power supply	10 – 14 V	Ignition switch turned ON
E21-7	—	—	—	—
E21-8	—	—	—	—

TERMINAL NUMBER	WIRE COLOR	CIRCUIT	NORMAL VOLTAGE	CONDITION
E21-9	GRN/WHT	Electric load signal for stop lamp	0 – 1 V	Ignition switch turned ON, stop lamp not lighted up
			10 – 14 V	Ignition switch turned ON, stop lamp lighted up
E21-10	—	—	—	—
E21-11	WHT/BLK	Serial communication line of data link connector 12 V	10 – 14 V	Ignition switch turned ON
E21-12	BRN/YEL	Engine revolution signal output for tachometer	0 – 0.8 V	Ignition switch turned ON with engine stop
			*0 – 1 V ↑↓ 8 – 14 V (Reference waveform No.22 and No.23)	While engine running. (Output signal is pulse. Pulse frequency varies depending on engine speed.) (2 pulses are generated per 1 crankshaft revolution.) (3000 r/min = 100 Hz)
E21-13	PNK/BLU	Electric load signal for heater blower motor	10 – 14 V	Ignition switch turned ON, blower fan selector selected at OFF
			0 – 1 V	Ignition switch turned ON, blower fan selector selected at 2nd speed position or more
E21-14	YEL/RED	Fuel level sensor signal	0 – 6 V	Ignition switch turned ON Voltage depends on fuel level
E21-15	GRN/RED	A/C evaporator outlet air temp. sensor signal (if equipped)	3.3 – 3.8 V	Ignition switch turned ON at A/C evaporator inlet air temperature 0°C (32°F)
			2.5 – 2.9 V	Ignition switch turned ON at A/C evaporator inlet air temperature 15°C (59°F)
			1.9 – 2.3 V	Ignition switch turned ON at A/C evaporator inlet air temperature 25°C (77°F)
E21-16	WHT/BLU	Power source for ECM internal memory	10 – 14 V	Ignition switch turned ON and turned OFF
E21-17	—	—	—	—
E21-18	—	—	—	—
E21-19	—	—	—	—
E21-20	—	—	—	—
E21-21	—	—	—	—
E21-22	—	—	—	—
E21-23	—	—	—	—
E21-24	—	—	—	—
E21-25	—	—	—	—
E21-26	—	—	—	—
E21-27	—	—	—	—
E21-28	BLK/WHT	Ignition switch signal	0 – 1 V	Ignition switch turned OFF
			10 – 14 V	Ignition switch turned ON
E21-29	—	—	—	—

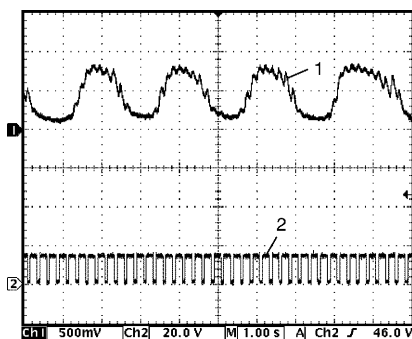
TERMINAL NUMBER	WIRE COLOR	CIRCUIT	NORMAL VOLTAGE	CONDITION
E21-30	LT GRN/ RED	A/C request signal (if equipped)	10 – 14 V (High input)	Ignition switch turned ON, blower fan selector selected OFF position or A/C switch turned OFF or A/C evaporator temp. less than 2.5°C, 36.5°F
			0 – 1 V (Low input)	Ignition switch turned ON, blower fan selector selected other than OFF position and A/C switch turned ON with A/C evaporator temp. more than 4°C, 39.2°F
E21-31	PPL	Vehicle speed sensor signal for speedometer	*0 – 1 V ↑↓ 10 – 14 V (Reference waveform No.21)	Vehicle running. (Sensor signal is pulse. Pulse frequency varies depending on vehicle speed.) (8190 pulses/sec. are generated per 60 km/h, 37.5 ml/h)
E21-32	WHT/GRN	ECT sensor signal for combination meter	*0 – 0.6 V ↑↓ 13 – 14 V (Reference waveform No.24)	Ignition switch turned ON (Output signal is 5 Hz active low duty pulse. Duty ratio varies depending on ECT.) ECT –30°C = 10% ON duty ECT 130°C = 90% ON duty
E21-33	RED/YEL	Electric load signal for clearance lamp	0 – 1 V	Ignition switch turned ON, clearance lamp not lighted up
			10 – 14 V	Ignition switch turned ON, clearance lamp lighted up
E21-34	–	–	–	–
E21-35	–	–	–	–

**1. Reference waveform No.1**

Heated oxygen sensor–2 heater signal at engine idling

Measurement terminal	CH1: E22-33 to E23-1 CH2: E23-3 to E23-1
Oscilloscope setting	CH1: 500 mV/DIV, CH2: 10 V/DIV TIME: 200 ms/DIV
Measurement condition	<ul style="list-style-type: none"> • After warmed up to normal operating temperature • Drive vehicle at 60 km/h (37 mil/h) for 10 min. • Engine at specified idle speed

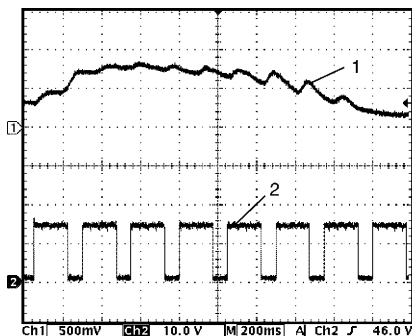
- | |
|---|
| 1. Heated oxygen sensor–2 signal |
| 2. Heated oxygen sensor–2 heater signal |

**2. Reference waveform No.2**

Heated oxygen sensor–1 signal at engine idling

Measurement terminal	CH1: E22-11 to E23-1 CH2: E23-4 to E23-1
Oscilloscope setting	CH1: 500 mV/DIV, CH2: 20 V/DIV TIME: 1 s/DIV
Measurement condition	<ul style="list-style-type: none"> • After warmed up to normal operating temperature • Engine at specified idle speed

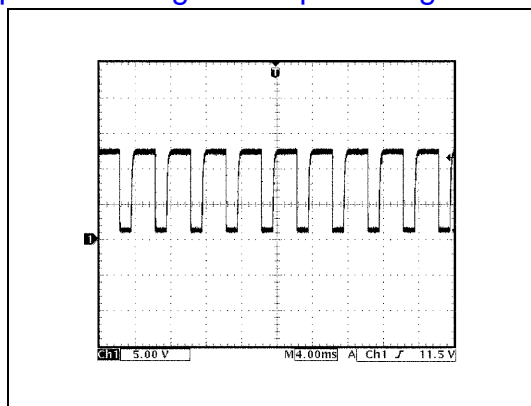
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|---|
| 1. Heated oxygen sensor–1 signal |
| 2. Heated oxygen sensor–1 heater signal |

**3. Reference waveform No.3**

Heated oxygen sensor–1 heater signal at engine idling

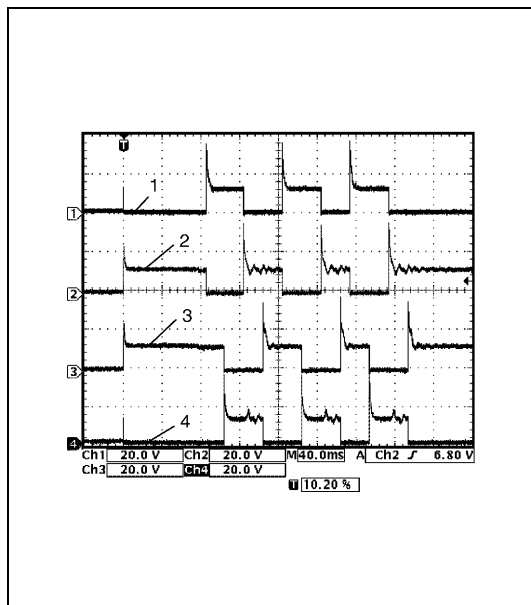
Measurement terminal	CH1: E22-11 to E23-1 CH2: E23-4 to E23-1
Oscilloscope setting	CH1: 500 mV/DIV, CH2: 10 V/DIV TIME: 200 ms/DIV
Measurement condition	<ul style="list-style-type: none"> • After warmed up to normal operating temperature • Engine at specified idle speed

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|---|
| 1. Heated oxygen sensor–1 signal |
| 2. Heated oxygen sensor–1 heater signal |

**4. Reference waveform No.4**

IAC valve signal

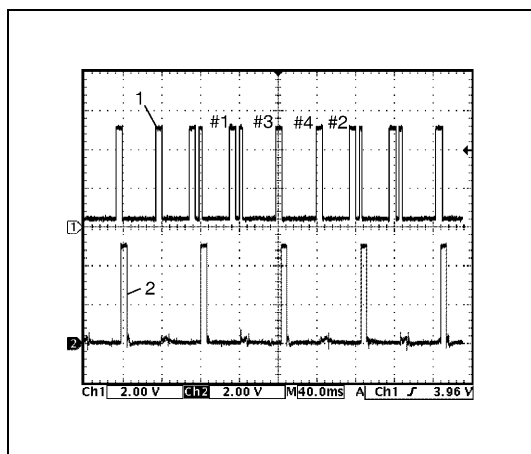
Measurement terminal	CH1: E23-8 to E23-1
Oscilloscope setting	CH1: 5 V/DIV TIME: 4 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

**5. Reference waveform No.5**

EGR valve signal

Measurement terminal	CH1: E23-17 to E23-1 CH2: E23-34 to E23-1 CH3: E23-16 to E23-1 CH4: E23-33 to E23-1
Oscilloscope setting	CH1: 20 V/DIV, CH2: 20 V/DIV CH3: 20 V/DIV, CH4: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	At the moment of the ignition switch in turned on

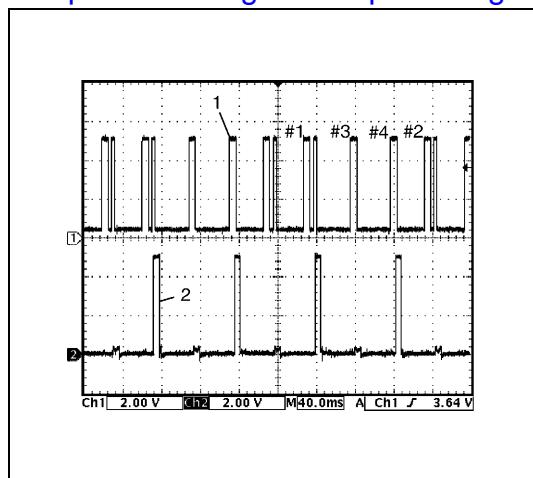
1. EGR valve stepper motor coil 1 signal
2. EGR valve stepper motor coil 2 signal
3. EGR valve stepper motor coil 3 signal
4. EGR valve stepper motor coil 4 signal

**6. Reference waveform No.6**

Ignition coil No.2 and No.3 signal at engine idling

Measurement terminal	CH1: E22-10 to E23-1 CH2: E23-31 to E23-1
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

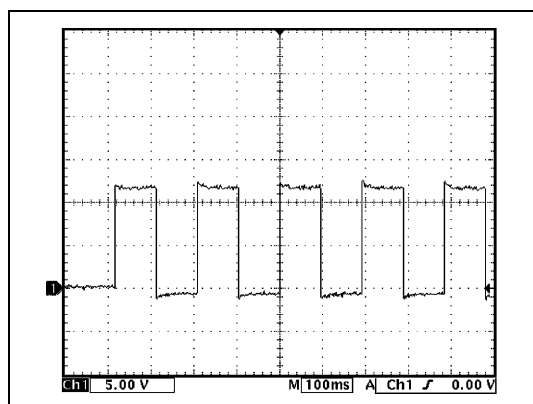
1. Cylinder reference signal (CMP reference signal)
2. No.2 and No.3 ignition signal

**7. Reference waveform No.7**

Ignition coil No.1 and No.4 signal at engine idling

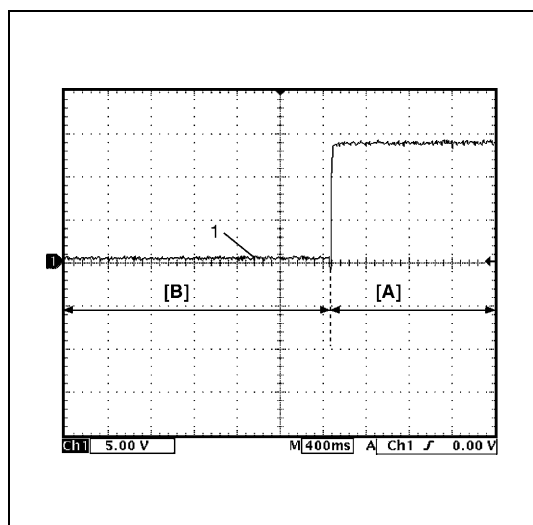
Measurement terminal	CH1: E22-10 to E23-1 CH2: E23-32 to E23-1
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 2. No.1 and No.4 ignition signal |

**8. Reference waveform No.8**

Oil control valve signal at engine idling

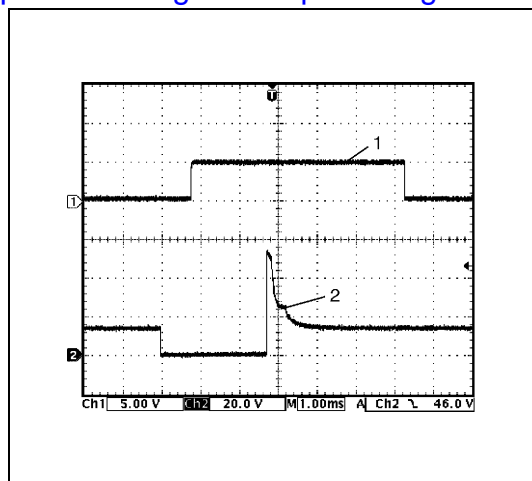
Measurement terminal	CH1: E22-3 to E23-1
Oscilloscope setting	CH1: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	At the moment of the ignition switch in turned on

**9. Reference waveform No.9**

Oil control valve signal at vehicle driving

Measurement terminal	CH1: E22-3 to E23-1
Oscilloscope setting	CH1: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Drive vehicle at 20 km/h (12 mil/h) and depress accelerator pedal fully

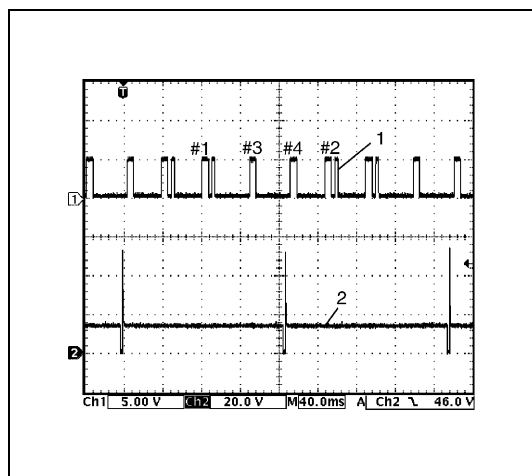
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| [A]: Accelerator pedal depress fully |
| [B]: Accelerator pedal depress partially |
| 1. Oil control valve signal |

**10. Reference waveform No.10**

Fuel injector signal at engine racing

Measurement terminal	CH1: E22-10 to E23-1 CH2: E22-6 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 1 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

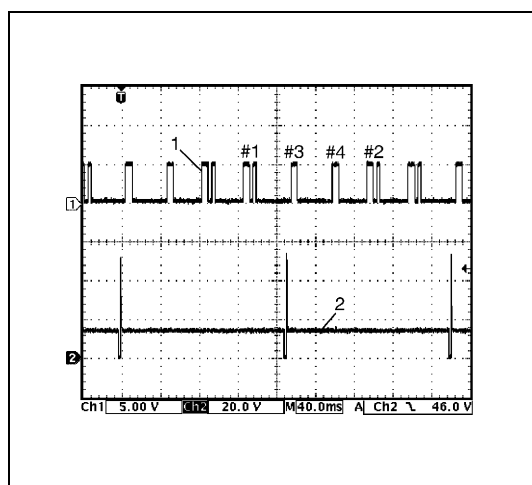
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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 2. Fuel injector signal |

**11. Reference waveform No.11**

No.4 fuel injector signal at engine idling

Measurement terminal	CH1: E22-10 to E23-1 CH2: E22-4 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

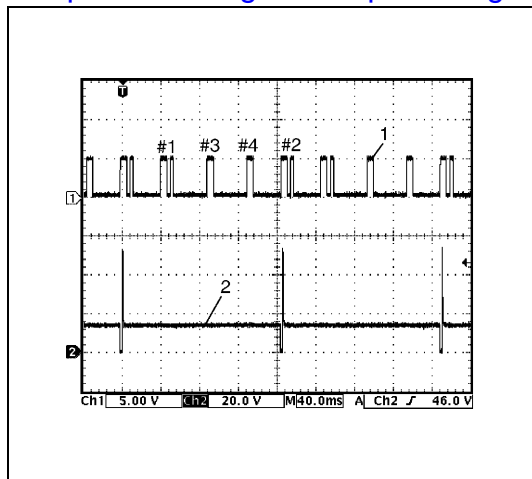
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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 2. No.4 fuel injector signal |

**12. Reference waveform No.12**

No.3 fuel injector signal at engine idling

Measurement terminal	CH1: E22-10 to E23-1 CH2: E22-5 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

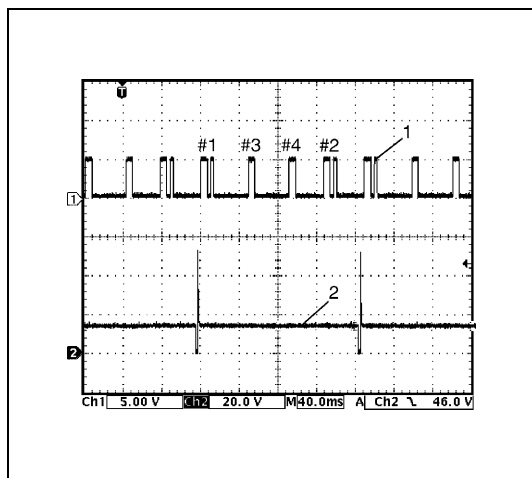
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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 2. No.3 fuel injector signal |

**13. Reference waveform No.13**

No.2 fuel injector signal at engine idling

Measurement terminal	CH1: E22-10 to E23-1 CH2: E22-6 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

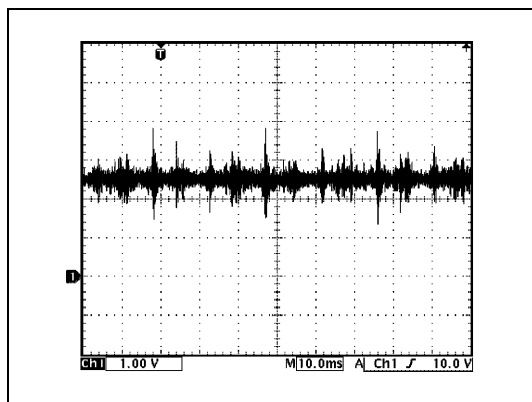
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| 1. Cylinder reference signal (CMP reference signal) |
| 2. No.2 fuel injector signal |

**14. Reference waveform No.14**

No.1 fuel injector signal at engine idling

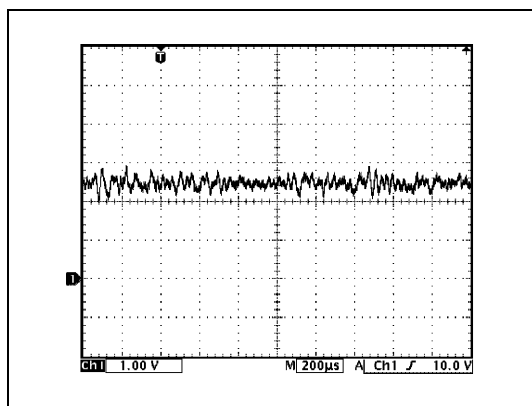
Measurement terminal	CH1: E22-10 to E23-1 CH2: E22-7 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 2. No.1 fuel injector signal |

**15. Reference waveform No.15**

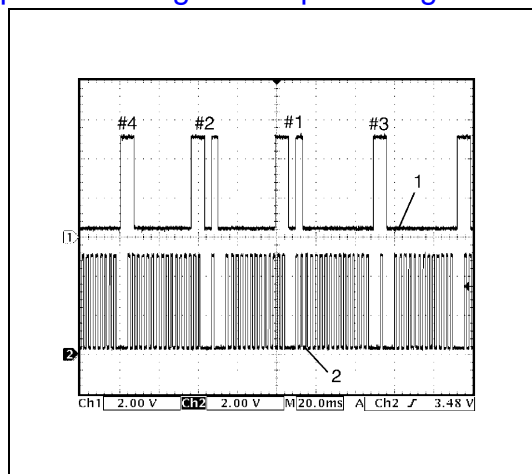
Knock sensor signal at engine speed 4000 r/min.

Measurement terminal	CH1: E22-9 to E23-1
Oscilloscope setting	CH1: 1 V/DIV TIME: 10 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Run engine at 4000 r/min.

**16. Reference waveform No.16**

Knock sensor signal at engine speed 4000 r/min.

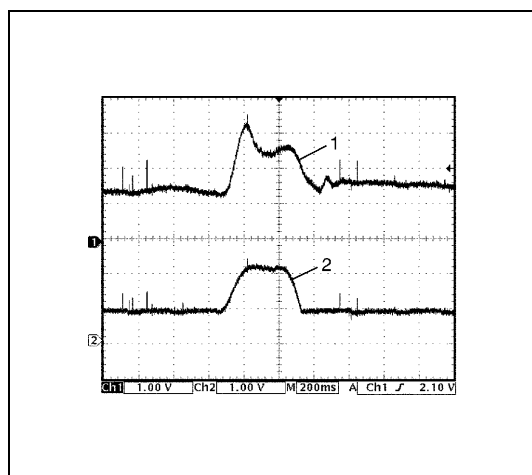
Measurement terminal	CH1: E22-9 to E23-1
Oscilloscope setting	CH1: 1 V/DIV TIME: 200 μs/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Run engine at 4000 r/min.

**17. Reference waveform No.17**

CMP sensor signal at engine idling

Measurement terminal	CH1: E22-10 to E23-1 CH2: E22-30 to E23-1
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 20 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

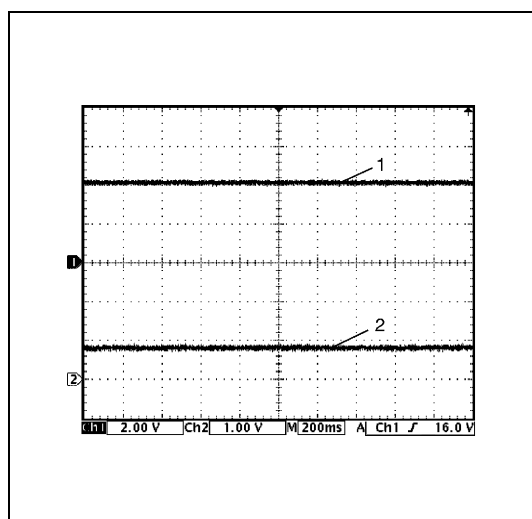
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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 2. CKP signal |

**18. Reference waveform No.18**

Mass air flow sensor signal at engine racing

Measurement terminal	CH1: E22-14 to E22-28 CH2: E22-34 to E22-28
Oscilloscope setting	CH1: 1 V/DIV, CH2: 1 V/DIV TIME: 200 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine racing

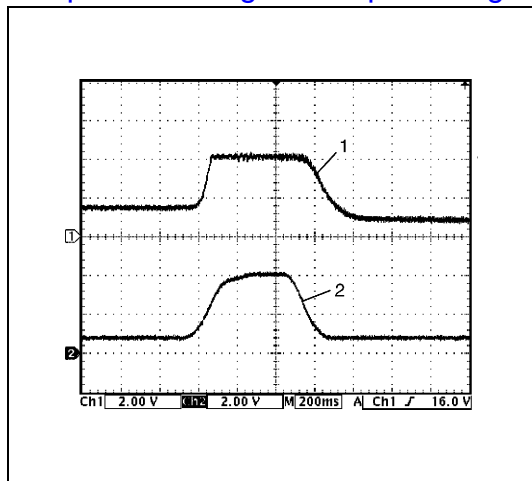
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|------------------------------------|
| 1. Mass air flow sensor signal |
| 2. Throttle position sensor signal |

**19. Reference waveform No.19**

Manifold absolute pressure sensor signal at ignition switch turned ON

Measurement terminal	CH1: E22-15 to E22-28 CH2: E22-34 to E22-28
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 200 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Ignition switch turned ON

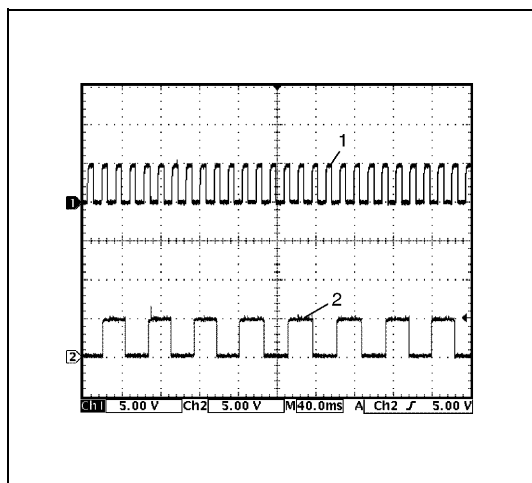
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|---|
| 1. Manifold absolute pressure sensor signal |
| 2. Throttle position sensor signal |

**20. Reference waveform No.20**

Manifold absolute pressure sensor signal at engine racing

Measurement terminal	CH1: E22-15 to E22-28 CH2: E22-34 to E22-28
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 200 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine racing

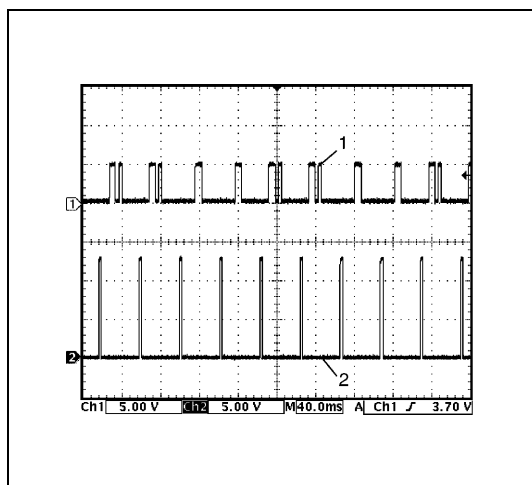
1. Manifold absolute pressure sensor signal
2. Throttle position sensor signal

**21. Reference waveform No.21**

VSS signal at 30 km/h (19 mil/h)

Measurement terminal	CH1: E21-31 to E23-1 CH2: E22-19 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Drive vehicle at 30 km/h (19 mil/h)

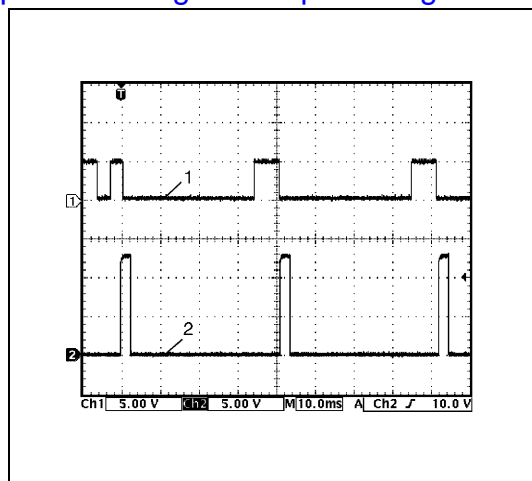
1. VSS signal for speedometer
2. VSS signal

**22. Reference waveform No.22**

Ignition pulse (engine revolution) signal at engine idling

Measurement terminal	CH1: E22-10 to E23-1 CH2: E21-12 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

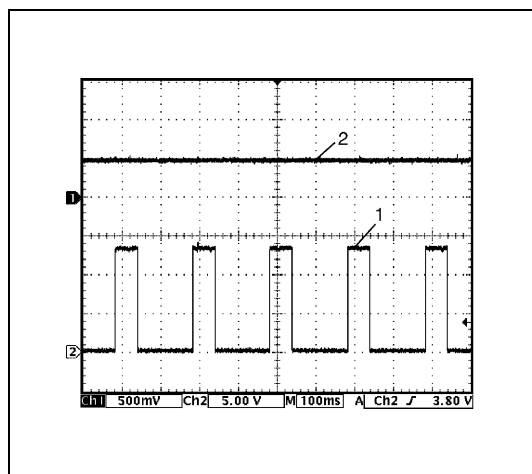
1. Cylinder reference signal (CMP reference signal)
2. Ignition pulse signal

**23. Reference waveform No.23**

Ignition pulse (engine revolution) signal at engine idling

Measurement terminal	CH1: E22-10 to E23-1 CH2: E21-12 to E23-1
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 10 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

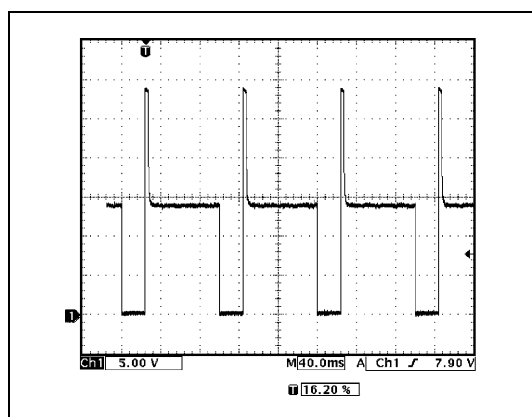
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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 2. Ignition pulse signal |

**24. Reference waveform No.24**

Engine coolant temperature signal at engine idling

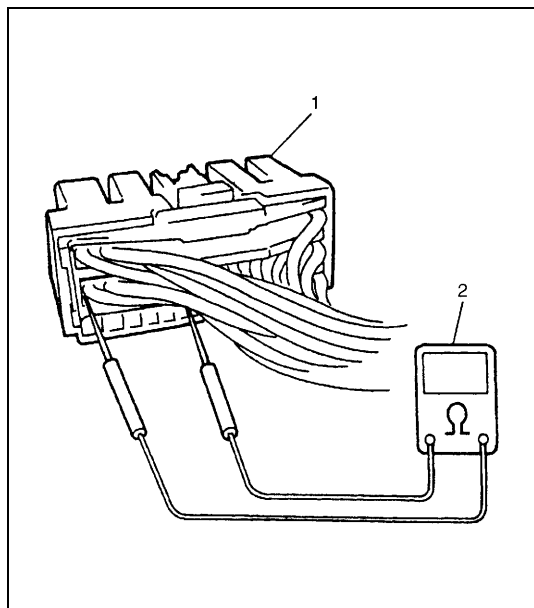
Measurement terminal	CH1: E22-16 to E22-28 CH2: E21-32 to E23-1
Oscilloscope setting	CH1: 500 mV/DIV, CH2: 5 V/DIV TIME: 100 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed

- | |
|--|
| 1. Engine coolant temperature signal for combination meter |
| 2. Engine coolant temperature sensor signal |

**25. Reference waveform No.25**

EVAP canister purge valve signal

Measurement terminal	CH1: E23-13 to E23-1
Oscilloscope setting	CH1: 5 V/DIV TIME: 40 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Drive vehicle at 40 km/h (25 mil/h) or more

Resistance Check

- 1) Disconnect ECM couplers (1) from ECM with ignition switch OFF.

CAUTION:

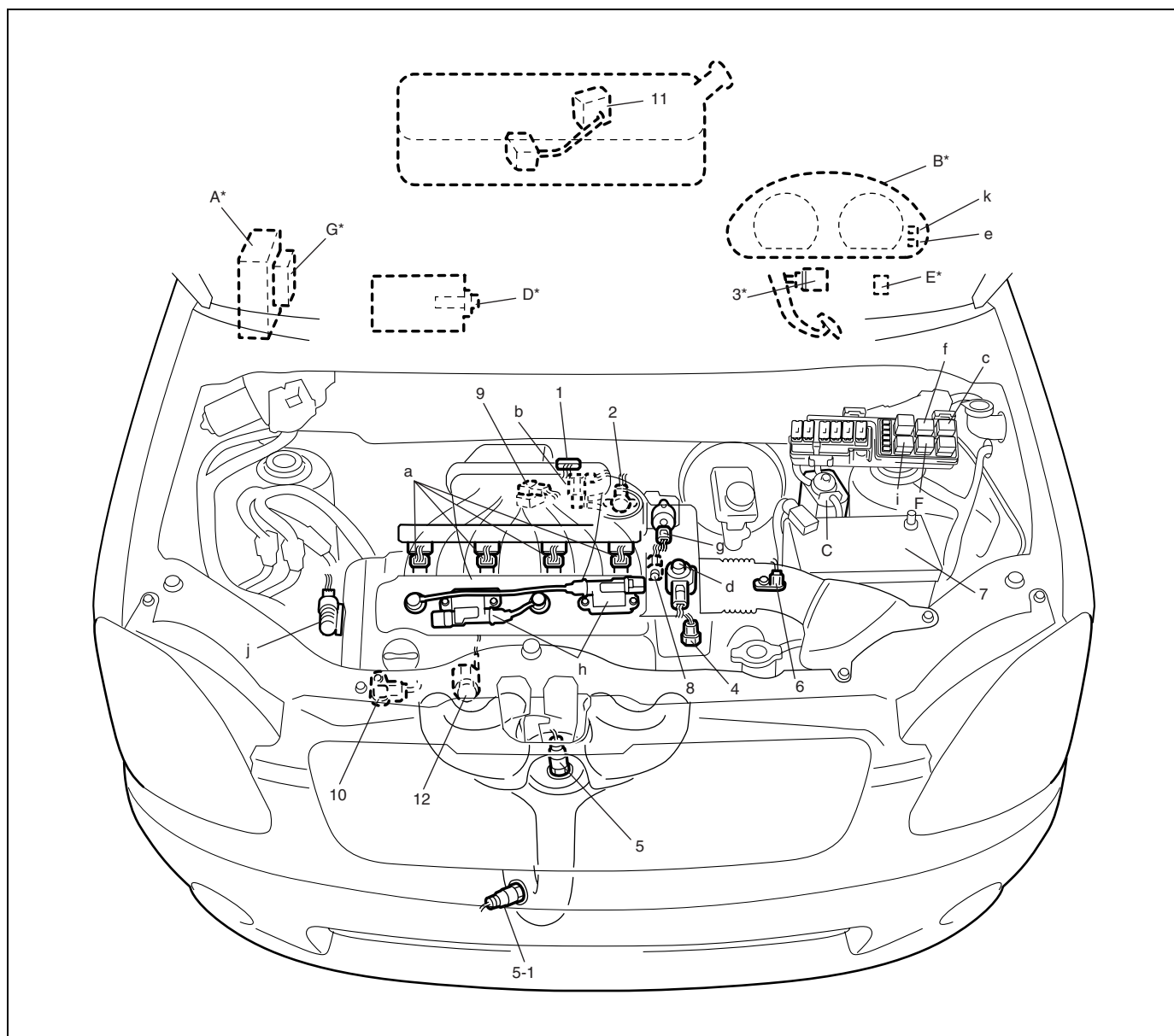
Never touch terminals of ECM itself or connect voltmeter or ohmmeter (2).

- 2) Check resistance between each pair of terminals of disconnected couplers as listed in the following table.

CAUTION:

- Be sure to connect ohmmeter probe from wire harness side of coupler.
- Be sure to turn OFF ignition switch for this check.
- Resistance in table below represents that when parts temperature is 20°C (68°F).

TERMINALS	CIRCUIT	STANDARD RESISTANCE	CONDITION
E23-3 to E21-28	Heater of HO2S-2	4 – 15 Ω	–
E21-4 to E21-5/6	Radiator fan relay	160 – 240 Ω	–
E23-15 to E21-28	Main relay	160 – 240 Ω	Battery disconnected and ignition switch ON
E23-14 to E21-28	Fuel pump relay	160 – 240 Ω	–
E23-5 to E21-5/6	A/C condenser fan relay No.2 (if equipped)	100 – 150 Ω	–
E22-5 to E21-5/6	No.3 fuel injector	10.8 – 18.2 Ω	–
E22-4 to E21-5/6	No.4 fuel injector		
E23-17 to E21-5/6	EGR valve (stepping motor No.1 coil)	20 – 29 Ω	–
E23-13 to E21-5/6	EVAP canister purge valve	28 – 35 Ω	–
E22-6 to E21-5/6	No.2 fuel injector	10.8 – 18.2 Ω	–
E23-34 to E21-5/6	EGR valve (stepping motor No.2 coil)	20 – 31 Ω	–
E23-33 to E21-5/6	EGR valve (stepping motor No.4 coil)		
E23-16 to E21-5/6	EGR valve (stepping motor No.3 coil)		
E23-4 to E21-28	Heater of HO2S-1	2 – 11 Ω	–
E22-7 to E21-5/6	No.1 fuel injector	10.8 – 18.2 Ω	–
E23-8 to E21-5/6	Idle air control valve	24 – 35 Ω	–
E23-11 to E21-5/6	A/C compressor relay (if equipped)	160 – 240 Ω	–
E22-2 to E22-3	Oil control valve	6 – 15 Ω	–

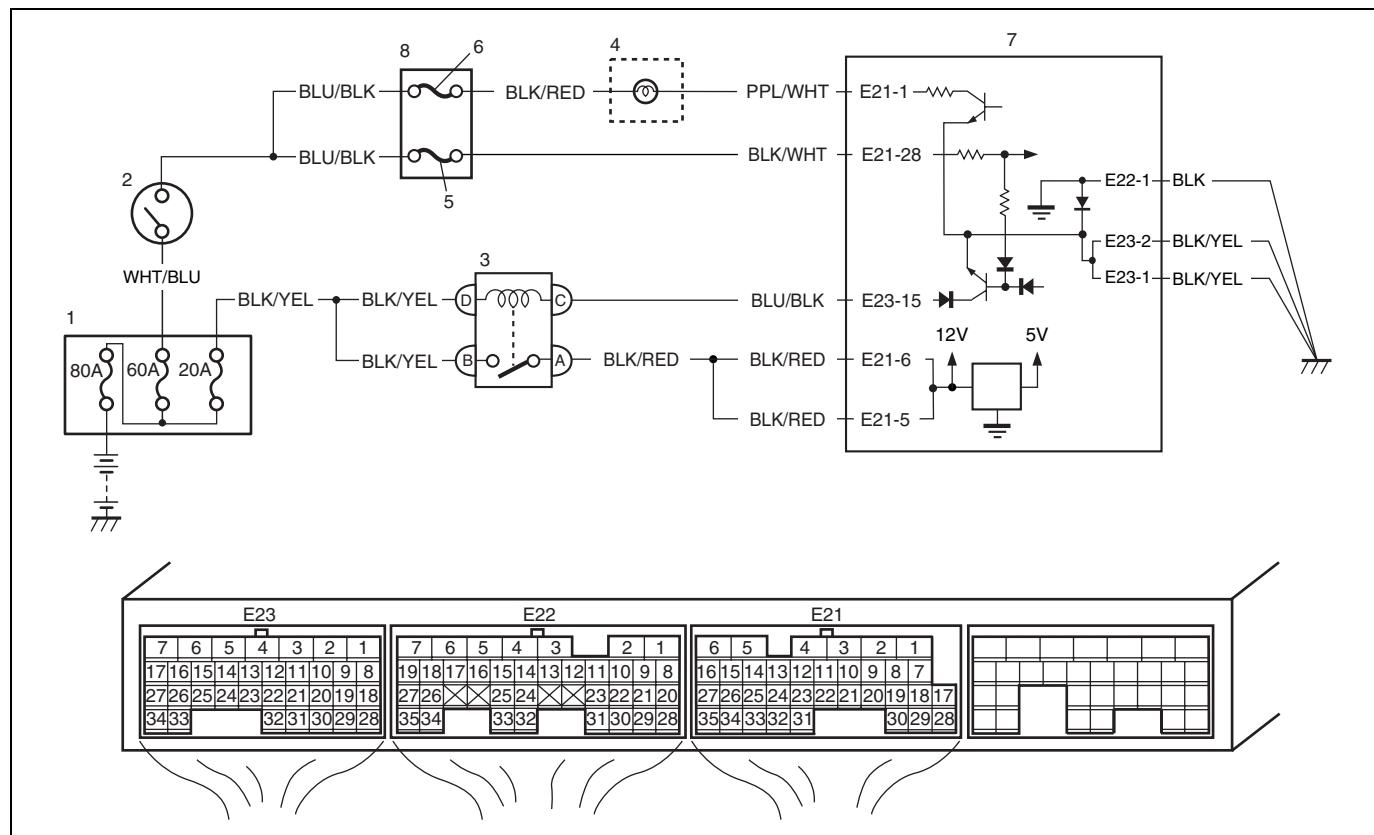
Component Location

INFORMATION SENSORS	CONTROL DEVICES	OTHERS
1. MAF and IAT sensor	a: Fuel injector	A: ECM
2. TP sensor	b: EVAP canister purge valve	B: Combination meter
3. Stop lamp switch	c: Fuel pump relay	C: EVAP canister
4. ECT sensor	d: EGR valve	D: A/C evaporator inlet air temp. sensor (if equipped)
5. Heated oxygen sensor-1	e: Malfunction indicator lamp	E: Data link connector
5-1. Heated oxygen sensor-2	f: Radiator fan control relay	F: A/C compressor relay (if equipped)
6. VSS	g: IAC valve	G: TCM (A/T)
7. Battery	h: Ignition coil assembly (with ignitor)	
8. CMP sensor	i: Main relay	
9. MAP sensor	j: Oil control valve	
10. CKP sensor	k: Immobilizer indicator lamp	
11. Fuel level sensor		
12. Knock sensor		

NOTE:

Above figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the opposite side.

Wiring Diagram



1. Relay box	4. Malfunction indicator lamp in combination meter	7. ECM
2. Ignition switch	5. "IG COIL" fuse	8. Circuit fuse box
3. Main relay	6. "METER" fuse	

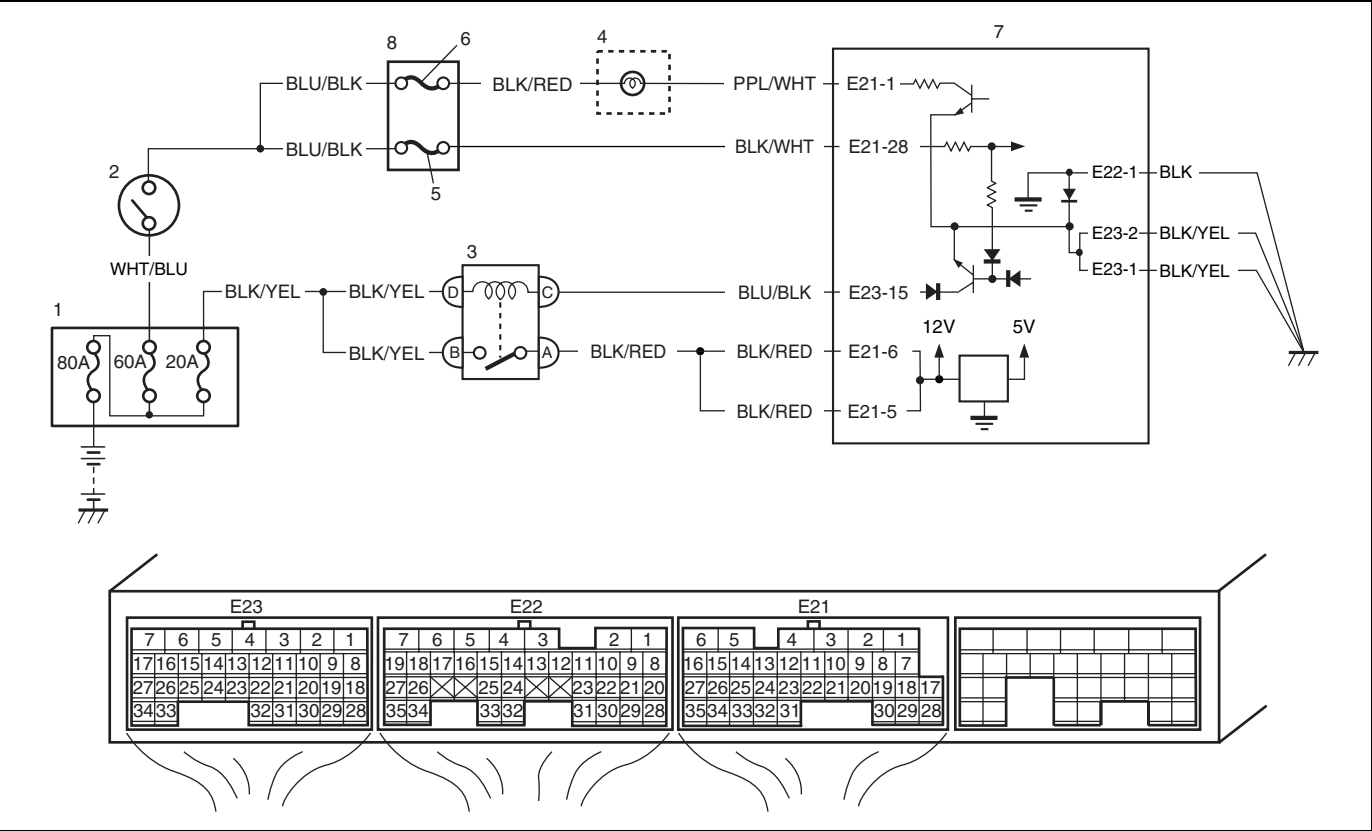
When the ignition switch is turned ON, ECM causes the main relay to turn ON (close the contact point). Then, ECM being supplied with the main power, turns ON the malfunction indicator lamp (MIL). When the engine starts to run and no malfunction is detected in the system, MIL goes OFF but if a malfunction was or is detected, MIL remains ON even when the engine is running.

Step	Action	Yes	No
1	MIL Power Supply Check 1) Turn ignition switch to ON position. Do other warning lights come ON?	Go to Step 4.	Go to Step 2.
2	METER Fuse Check 1) Turn ignition switch to OFF position. 2) Check for fuse blow at "METER" fuse. Is "METER" fuse in good condition?	Go to Step 3.	Replace "METER" fuse and check for short.

Step	Action	Yes	No
3	<p>MIL Power Supply Check</p> <ol style="list-style-type: none"> 1) Disconnect ignition switch connector. 2) Remove "METER" fuse. 3) Measure resistance between "BLU/BLK" wire terminal of ignition switch connector and "BLU/BLK" wire terminal of "METER" fuse connector. <p>Is resistance 1Ω or less?</p>	Go to Step 4.	"BLU/BLK" wire circuit open or poor connection.
4	<p>MIL Power Supply Check</p> <ol style="list-style-type: none"> 1) Connect ignition switch connector. 2) Install "METER" fuse. 3) Remove combination meter referring to "Combination Meter Removal and Installation" in Section 8. 4) Check for proper connection to combination meter connector at "BLK/RED" wire and "PPL/WHT" wire terminals. 5) If OK, then turn ignition switch to ON position and measure voltage between combination meter connector at "BLK/RED" wire terminal and body ground. <p>Is it 10 – 14 V?</p>	Go to Step 5.	"BLK/RED" wire circuit open.
5	<p>MIL Circuit Check</p> <ol style="list-style-type: none"> 1) Turn ignition switch OFF position. 2) Disconnect ECM connector "E21". 3) Check for proper connection to ECM connector at "E21-1" wire terminal. 4) Measure resistance between "PPL/WHT" wire terminal of combination meter connector and "E21-1" wire terminal of ECM connector. <p>Is resistance 1 Ω or less?</p>	Go to Step 6.	"PPL/WHT" wire circuit open.
6	<p>MIL Circuit Check</p> <ol style="list-style-type: none"> 1) Connect combination meter connectors. 2) Turn ignition switch to ON position. 3) Using service wire, ground "E21-1" terminal wire of disconnected ECM connector. <p>Does MIL turn ON?</p>	Substitute a known-good ECM and recheck.	Replace bulb.

Table A-2 Malfunction Indicator Lamp Circuit Check-lamp Remains “ON” after Engine Starts

Wiring Diagram



1. Relay box	4. Malfunction indicator lamp in combination meter	7. ECM
2. Ignition switch	5. "IG COIL" fuse	8. Circuit fuse box
3. Main relay	6. "METER" fuse	

Circuit Description

When the ignition switch is turned ON, ECM causes the main relay to turn ON (close the contact point). Then, ECM being supplied with the main power, turns ON the malfunction indicator lamp (MIL). When the engine starts to run and no malfunction is detected in the system, MIL goes OFF but if a malfunction was or is detected, MIL remains ON even when the engine is running.

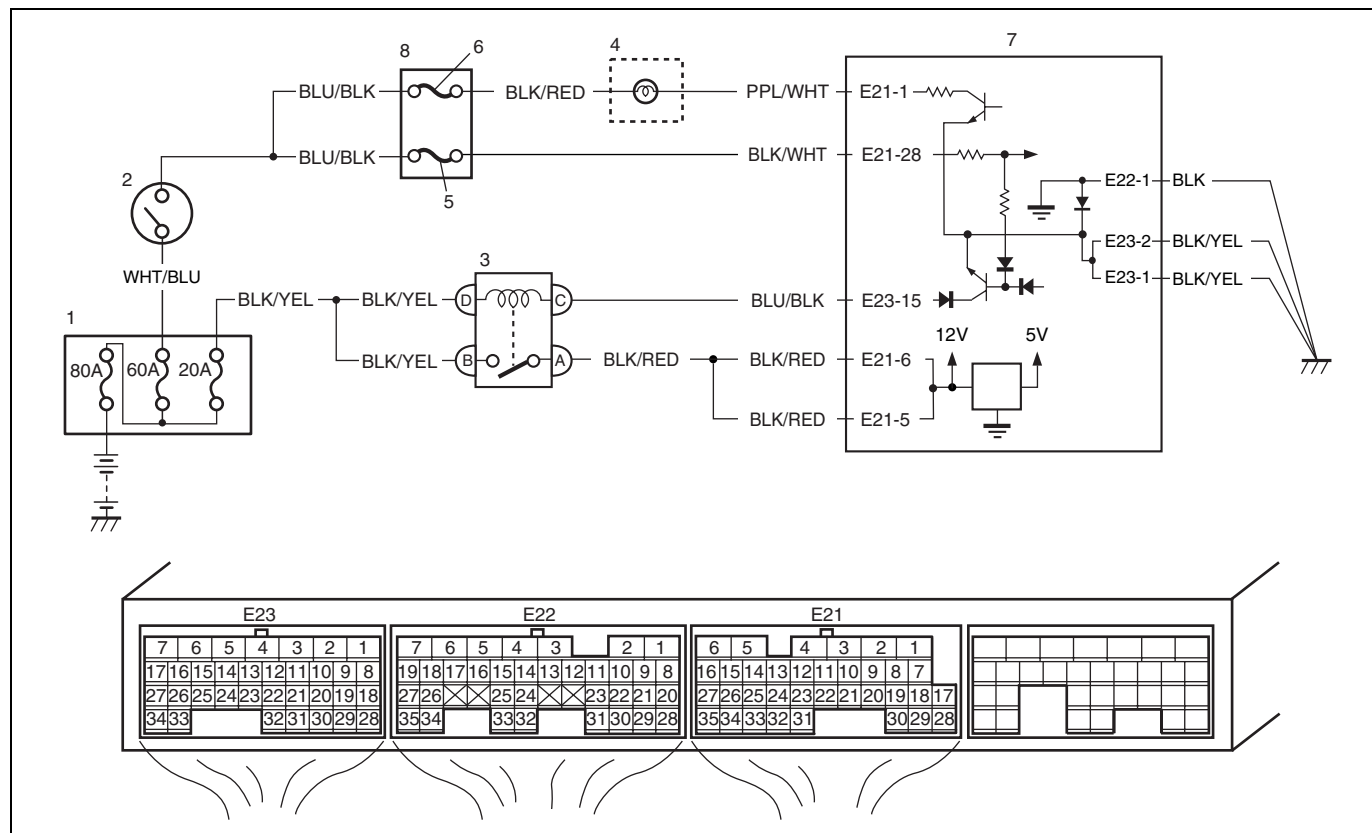
Troubleshooting

Step	Action	Yes	No
1	DTC Check 1) Start engine and recheck DTC while engine running. Is there any DTC(s)?	Go to Step 2 of "Engine and Emission Control System Check" in this section.	Go to Step 2.

Step	Action	Yes	No
2	MIL Circuit Check 1) Turn ignition switch to OFF position. 2) Remove combination meter referring to "Combination Meter Removal and Installation" in Section 8. 3) Disconnect connectors from ECM. 4) Measure resistance between "PPL/WHT" wire terminal of combination meter connector and body ground. Is resistance infinity?	Go to Step 3.	"PPL/WHT" wire circuit shorted to ground.
3	MIL Circuit Check 1) Connect connectors to combination meter. Does MIL turn ON at ignition switch turned ON?	Replace combination meter.	Substitute a known-good ECM and recheck.

Table A-3 ECM Power and Ground Circuit Check-MIL Doesn't Light with Ignition Switch ON and Engine Doesn't Start Though It Is Cranked Up

Wiring Diagram



1. Relay box	4. Malfunction indicator lamp in combination meter	7. ECM
2. Ignition switch	5. "IG COIL" fuse	8. Circuit fuse box
3. Main relay	6. "METER" fuse	

Circuit Description

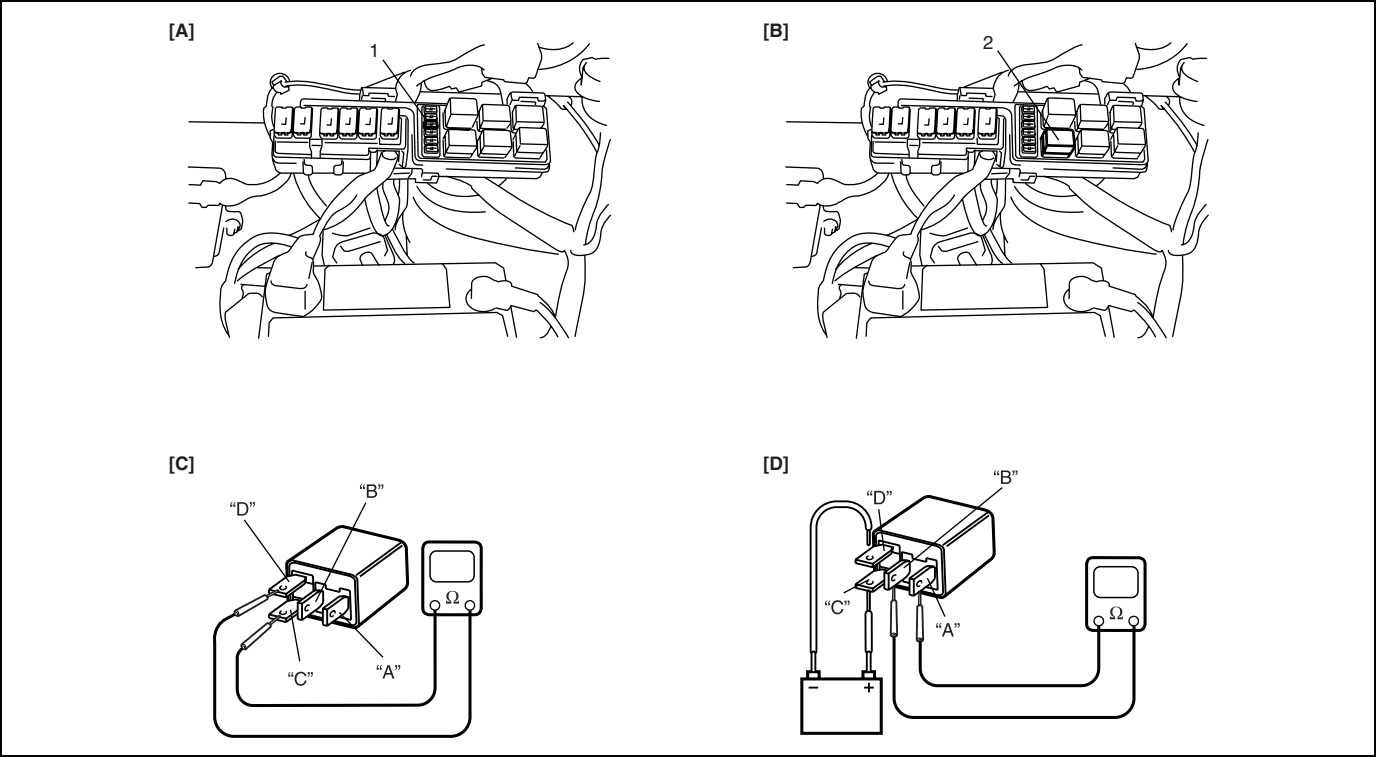
When the ignition switch turned ON, the main relay turns ON (the contact point closes) and the main power is supplied to ECM.

Troubleshooting

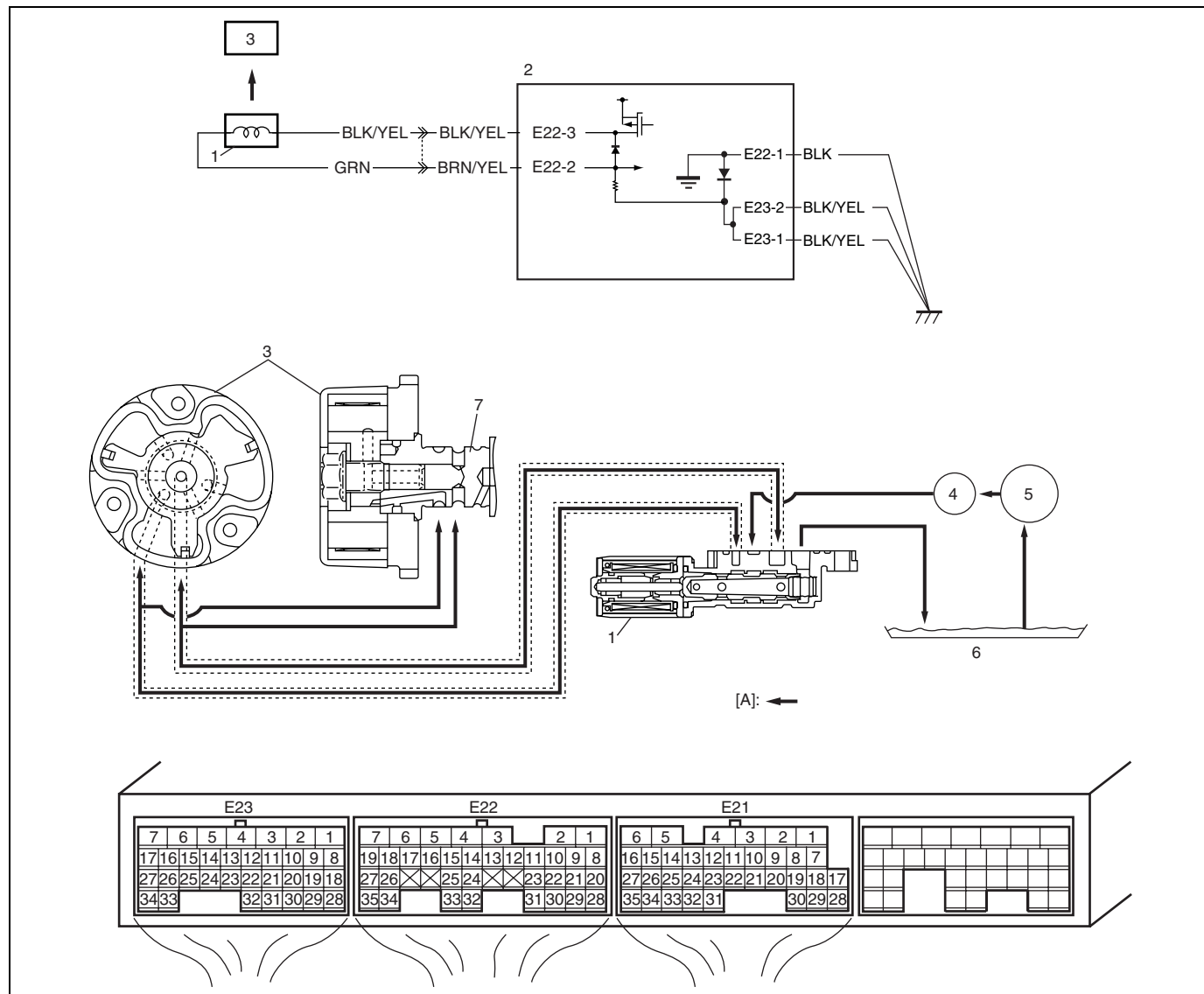
Step	Action	Yes	No
1	IG COIL Fuse Check 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Check for proper connection to ECM connector at "E21-1", "E21-28", "E23-15", "E21-6", "E21-5", "E22-1", "E23-1" and "E23-2" wire terminals. 3) If OK, check "IG COIL" fuse for fuse blow. Is "IG COIL" fuse in good condition?	Go to Step 2.	Replace fuse and check for short in circuits connected to this fuse.
2	Ignition Signal Check 1) Turn ignition switch to ON position. 2) Measure voltage between "E21-28" wire terminal of ECM connector and body ground. Is voltage 10 – 14 V?	Go to Step 3.	"BLK/WHT" or "BLU/BLK" wire circuit open.

Step	Action	Yes	No
3	Main Relay Circuit Check 1) Turn ignition switch to OFF position. 2) Check for fuse blow at FI fuse (20 A). (See Fig. 1.) 3) If OK, measure voltage between "E23-15" wire terminal of ECM connector and body ground. Is voltage 10 – 14 V?	Go to Step 4.	Go to Step 8.
4	Main Relay Circuit Check 1) Remove ECM from vehicle body and connect connectors to ECM. 2) Turn ignition switch to ON position. 3) Measure voltage between "E23-15" wire terminal of ECM connector and body ground. Is voltage 0 – 1 V?	Go to Step 6.	Go to Step 5.
5	ECM Ground Circuit Check 1) Turn ignition switch to OFF position. 2) Disconnect connectors from ECM. 3) Measure resistance between each "E22-1", "E23-1" and "E23-2" wire terminals of ECM connector and body ground. Is resistance 1 Ω or less?	Substitute a known-good ECM and recheck.	"BLK/YEL" or "BLK" wire open circuit or high resistance circuit.
6	Main Relay Circuit Check 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Using service wire, ground "E23-15" wire terminal of ECM connector and measure voltage between each "E21-5" and "E21-6" wire terminals of ECM connector and body ground. Is voltage 10 – 14 V?	Substitute a known-good ECM and recheck.	Go to Step 7.
7	Main Relay Circuit Check 1) Remove main relay from relay box. (See Fig. 2.) 2) Check for proper connection to main relay connector at "BLK/YEL" and "BLK/RED" wire terminals. 3) If OK, measure resistance between each "E21-5" and "E21-6" wire terminals of ECM connector and "BLK/RED" wire terminal of main relay connector. Is resistance 1 Ω or less?	Go to Step 8.	"BLK/RED" wire open circuit or high resistance circuit.
8	Main Relay Circuit Check 1) Remove main relay from relay box. 2) Measure voltage between "BLK/YEL" wire terminals of main relay connector and body ground. Is voltage 10 – 14 V?	Go to Step 9.	"BLK/YEL" wire circuit open.

Step	Action	Yes	No
9	<p>Main Relay Check</p> <p>1) Measure resistance between each two terminals of main relay. (See Fig. 3).</p> <p>Between main relay terminals</p> <p>“A” and “B”: Infinity</p> <p>“C” and “D”: 160 – 240 Ω at 20°C (68°F)</p> <p>2) Check that there is continuity between terminals “A” and “B” when battery is connected to terminals “C” and “D”</p> <p>(See Fig. 4).</p> <p>Is main relay in good condition?</p>	<p>“BLU/BLK” wire open circuit or high resistance circuit.</p>	<p>Replace main relay.</p>



[A]: Fig. 1 for Step 3	[C]: Fig. 3 for Step 9	1. FI fuse (20 A)
[B]: Fig. 2 for Step 7	[D]: Fig. 4 for Step 9	2. Main relay

DTC P0010 Camshaft Position Actuator Circuit**Wiring Diagram**

[A]: Oil flow	3. Camshaft timing sprocket	6. Oil pan
1. Oil control valve	4. Oil filter	7. Intake camshaft
2. ECM	5. Oil pump	

Circuit Description

Actual valve timing fails to become close to target advance level of each function although advance control function or retarded advance control function is at work.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Monitor signal of oil control valve is different from command signal. (Circuit open or short) (1 driving cycle detection logic)	<ul style="list-style-type: none"> Oil control valve Oil control valve circuit ECM

DTC Confirmation Procedure

- 1) Clear DTC. Refer to "DTC Clearance".
- 2) Start engine and keep it at idle for 10 seconds.
- 3) Check DTC. Refer "DTC Check".

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check oil control valve power supply circuit. 1) Disconnect connectors from oil control valve with ignition switch turned OFF. 2) Connect oscilloscope between "E22-3" terminal of ECM connector and engine ground with ignition switch turned ON. 3) Check waveform of oil control valve referring to "Inspection of ECM and Its Circuits" in this section. Is it in good condition?	Go to Step 3.	Go to Step 8.
3	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure voltage between "E22-3" terminal of ECM connector and vehicle body ground. Is voltage 0 – 1 V?	Go to Step 4.	"BLK/YEL" wire shorted to power supply circuit.
4	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Check for proper connection to "E22-2" and "E22-3" terminals of ECM connector 3) If OK, measure resistance between "E22-2" terminal of ECM connector and vehicle body ground. Is resistance infinity?	Go to Step 5.	"GRN" or "BRN/YEL" wire shorted to ground circuit.
5	Check wire circuit 1) Measure voltage between "E22-2" terminal of ECM connector and engine ground with ignition switch turned ON. Is voltage 0 – 1 V?	Go to Step 6	"GRN" or "BRN/YEL" wire shorted to power supply circuit.
6	Check wire circuit 1) Turn ignition switch to OFF position. 2) Measure resistance between "E22-2" terminal of ECM connector and "GRN" wire terminal of oil control valve connector. Is resistance 1 Ω or less?	Go to Step 7.	"GRN" or "BRN/YEL" wire open or high resistance circuit.
7	Check oil control valve. 1) Check oil control valve referring to "Oil Control Valve Inspection" in Section 6E2. Is it in good condition?	Substitute a known-good ECM and recheck.	Replace oil control valve.

Step	Action	Yes	No
8	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "E22-3" terminal of ECM connector and "BLK/YEL" wire terminal of oil control valve connector. Is resistance 1 Ω or less?	Go to Step 9.	"BLK/YEL" wire open or high resistance circuit.
9	Check wire circuit. 1) Measure resistance between "E22-3" terminal of ECM connector and vehicle body ground. Is resistance infinity?	Substitute a known-good ECM and recheck.	"BLK/YEL" wire shorted to ground circuit.

DTC P0011 Camshaft Position – Timing Over-Advanced or System Performance**DTC P0012 Camshaft Position – Timing Over-Retarded****Description**

Actual value of advanced valve timing does not reach target value.

Valve timing is advanced although ECM command is most retarding.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Actual valve of advanced valve timing does not reach target value, or valve timing is advanced although ECM command is most retarding. (2 driving cycle detection logic)	<ul style="list-style-type: none"> Oil control valve Oil galleries of timing sprocket Intake camshaft timing sprocket (VVT actuator)

DTC Confirmation Procedure

- 1) Clear DTC. Refer to “DTC Clearance”
 - 2) Start engine and drive vehicle under usual driving condition for 5 minutes or longer until engine is warmed up to normal operating temperature.
 - 3) Stop vehicle.
 - 4) Run engine at idle speed for 1 minute.
 - 5) Start vehicle and increase vehicle speed up to 80 km/h (50 mile/h).
 - 6) Keep vehicle speed at 80 km/h (50 mile/h) for 1 minute or longer at 5th gear position or D range.
 - 7) Decrease vehicle speed gradually.
 - 8) Stop vehicle and ignition switch OFF.
 - 9) Repeat step 4) to 7) one time.
 - 10) Stop vehicle.
- Check DTC. Refer to “DTC Check” in this section.

Troubleshooting

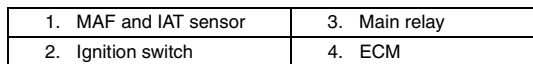
Step	Action	Yes	No
1	Is DTC P0010 detected together?	Go to “DTC P0010 Camshaft Position Actuator Circuit” in this section.	Go to Step 2.
2	Do you have SUZUKI scan tool?	Go to Step 3.	Go to Step 5.
3	VVT GAP Check 1) With ignition switch turned OFF, connect SUZUKI scan tool. 2) Start engine and warm up to normal operating temperature. 3) Select menu to DATA LIST. 4) Check that the VVT GAP displayed on SUZUKI scan tool is 0 – 5°. Is it OK?	Go to Step 4.	Check valve timing referring to “2nd Timing Chain and Chain Tensioner Removal and Installation” in Section 6A1. If OK, go to Step 5.

Step	Action	Yes	No
4	VVT Signal Check 1) Drive vehicle the following condition. • Vehicle speed at 80 km/h (50 mile/h). • Gear position at 5th or D range. 2) Check that the VVT GAP displayed on SUZUKI scan tool is 0 – 5°. Is it OK?	Substitute a known-good ECM and recheck.	Go to Step 5.
5	Oil Control Circuit Visual Inspection 1) Remove cylinder head cover referring to “Cylinder Head Cover Removal and Installation” in Section 6A1. 2) Check oil pressure leakage from oil control circuit. Is it in good condition?	Go to Step 6.	Repair or replace.
6	Check Oil Control Circuit. 1) Remove oil control valve referring to “Oil Control Valve Removal and Installation” in Section 6A1. 2) Remove oil gallery pipe referring to “Oil Gallery Pipe Removal and Installation” in Section 6A1. 3) Check oil gallery pipe and oil control valve for clog or sludge. Is it in good condition?	Go to Step 7.	Clean oil control valve and oil gallery pipe. Replace oil control valve if a problem is not solved after cleaning oil control valve and oil gallery pipe.
7	Check Oil Control Valve 1) Check oil control valve referring to “Oil Control Valve Inspection” in Section 6E1. Is it in good condition?	Replace camshaft timing sprocket.	Replace oil control valve.

NOTE:

Upon completion of inspection and repair work, perform “DTC Confirmation Procedure” and confirm that the trouble has been corrected.

Wiring Diagram



DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
<p>DTC will be set when all of the following conditions are detected for 0.5 seconds continuously.</p> <ul style="list-style-type: none"> • Engine is running • Voltage of MAF sensor output is less than the specified value for the specified time continuously. 	<ul style="list-style-type: none"> • Open or short in MAF sensor circuit • MAF sensor • ECM

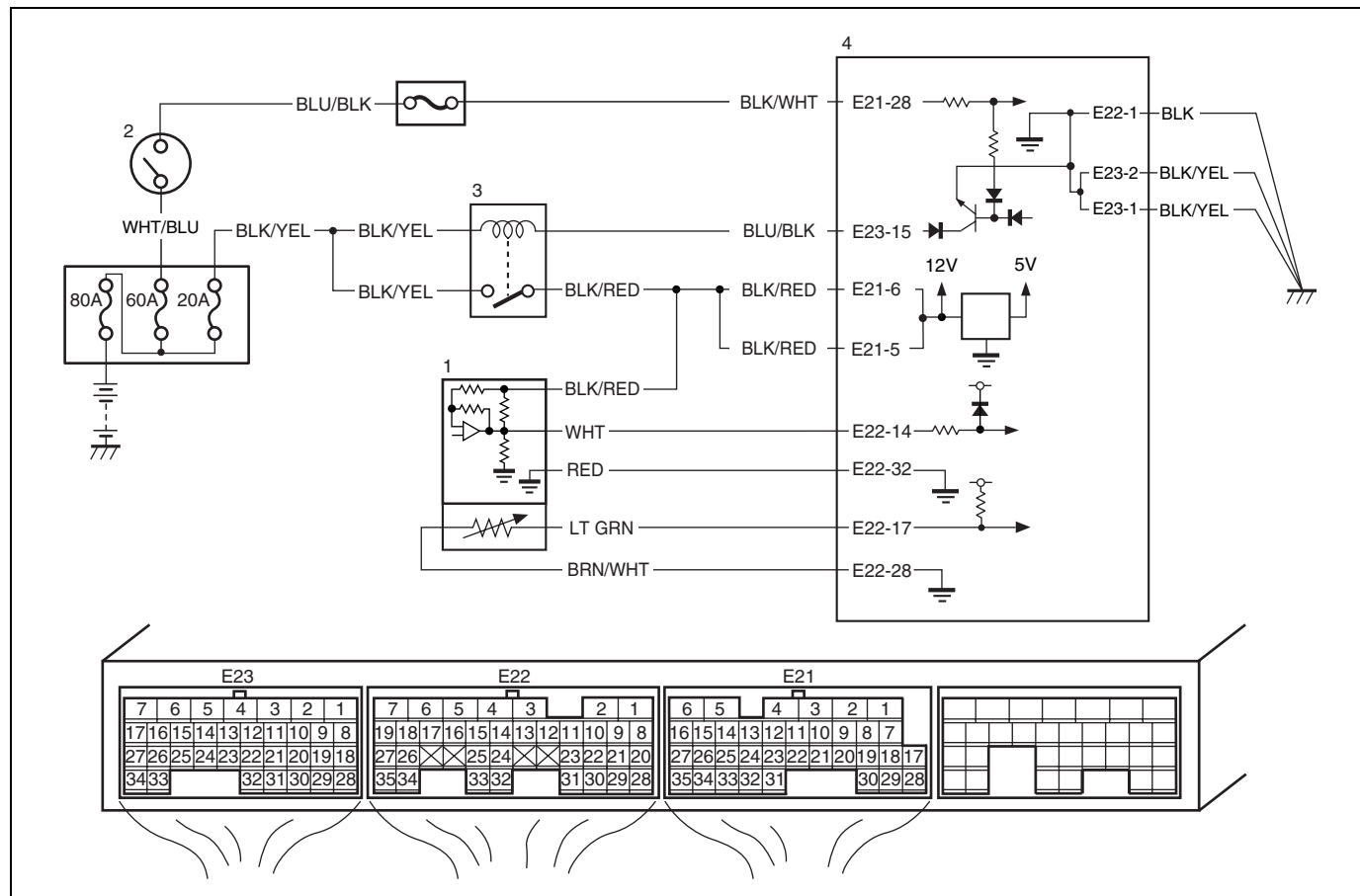
DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	MAF Sensor Check. 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Start engine and check MAF value displayed on scan tool. (Refer to "Scan Tool Data" in this section for normal value.) Is normal value indicated?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check MAF sensor power supply voltage. 1) Disconnect connector from MAF sensor with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between engine ground and "BLK/RED" wire terminal of MAF sensor connector. Is voltage 10 – 14 V?	Go to Step 4.	"BLK/RED" wire in open circuit.
4	Check MAF sensor ground circuit. 1) Measure resistance between "RED" wire terminal of MAF sensor connector and engine ground. Is resistance below 5 Ω ?	Go to Step 6.	Go to Step 5.
5	Check ground circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure resistance between "E22-32" terminal of ECM connector and vehicle body ground. Is resistance below 5 Ω ?	"RED" wire in open or high resistance circuit.	ECM grounds "E22-1", "E23-1" and/or "E23-2" circuit open or high resistance. If wires are OK, substitute a known-good ECM and recheck.
6	Check MAF sensor signal circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure voltage between "WHT" wire terminal of MAF sensor connector and engine ground with ignition switch turned ON. Is voltage 0 V?	Go to Step 7.	"WHT" wire shorted to other circuit.
7	Check MAF sensor signal circuit. 1) Measure resistance between "WHT" wire terminal of MAF sensor connector and vehicle body ground with ignition switch turned OFF. Is resistance infinity?	Go to Step 8.	"WHT" wire shorted to ground circuit.
8	Check MAF sensor signal circuit. 1) Measure resistance between "WHT" wire terminal of MAF sensor connector and "E22-14" terminal of ECM connector. Is resistance below 3 Ω ?	Go to Step 9.	"WHT" wire in open or high resistance circuit.

Step	Action	Yes	No
9	<p>Check MAF sensor output signal.</p> <p>1) Connect connectors to MAF sensor and ECM with ignition switch turned OFF.</p> <p>2) Check voltage between “E22-14” and “E22-32” under the following condition.</p> <p>Voltage between “E22-14” and “E22-32” of ECM connector at ignition switch ON, leaving engine stop: 0.5 – 1.2 V</p> <p>Idling: 1.0 – 1.8 V</p> <p>Is each value as specified?</p>	Substitute a known-good ECM and recheck.	Faulty MAF and IAT sensor.

DTC P0103 Mass Air Flow Circuit High Input**Wiring Diagram**

1. MAF and IAT sensor	3. Main relay
2. Ignition switch	4. ECM

DTC Detecting Condition and Trouble Area

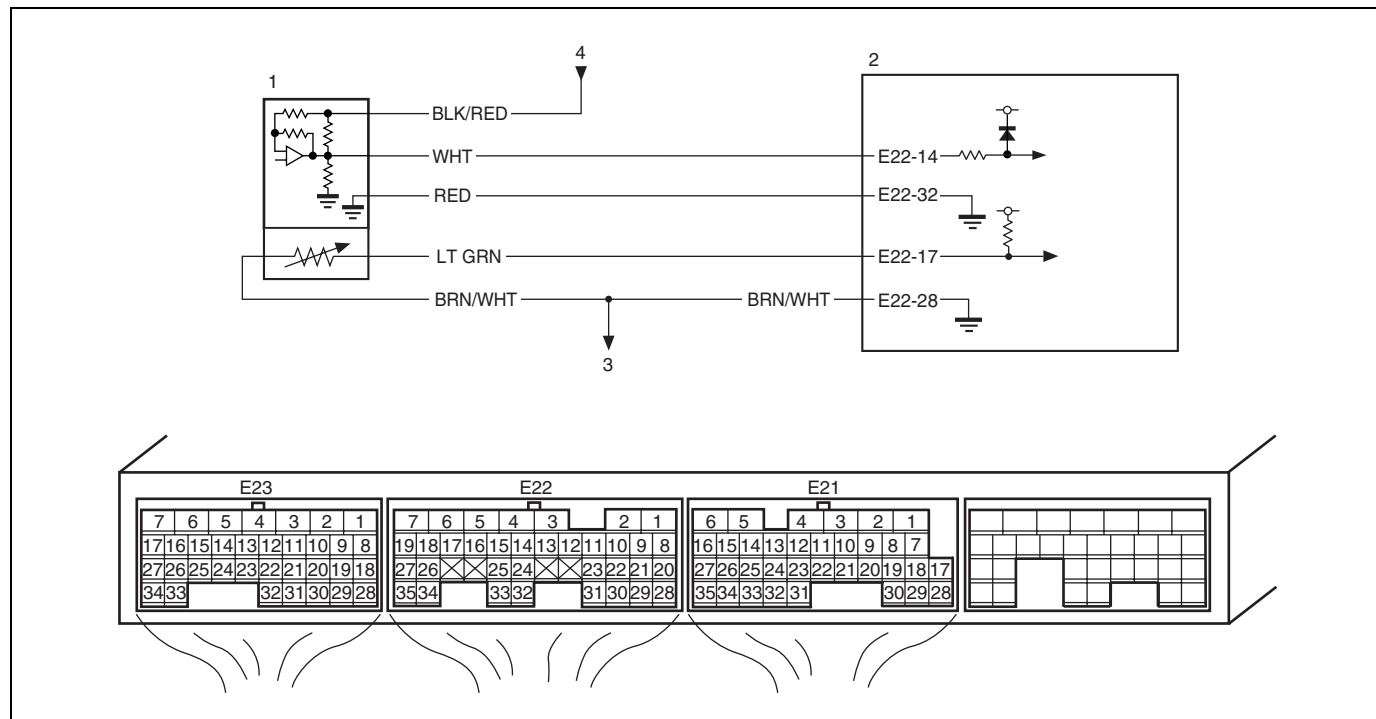
DTC Detecting Condition	Trouble Area
<p>DTC will be set when all of the following conditions are detected for 0.5 seconds continuously.</p> <ul style="list-style-type: none"> Engine is running Voltage of MAF sensor output is more than the specified value for the specified time continuously. 	<ul style="list-style-type: none"> Open or short in MAF sensor circuit MAF sensor ECM

DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	MAF sensor check. 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Start engine and check MAF value displayed on scan tool. (Refer to "Scan Tool Data" in this section for normal value.) Is normal value indicated?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	Check MAF sensor power supply voltage. 1) Disconnect connector from MAF sensor with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between engine ground and "BLK/RED" wire terminal of MAF sensor connector. Is voltage 10 – 14 V?	Go to Step 4.	"BLK/RED" wire in open circuit.
4	Check MAF sensor ground circuit. 1) Measure resistance between "RED" wire terminal of MAF sensor connector and engine ground. Is resistance below 5 Ω ?	Go to Step 6.	Go to Step 5.
5	Check ground circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure resistance between "E22-32" terminal of ECM connector and vehicle body ground. Is resistance below 5 Ω ?	"RED" wire in open or high resistance circuit.	ECM grounds "E22-1", "E23-1" and/or "E23-2" circuit in open or high resistance. If wires are OK, substitute a known-good ECM and recheck.
6	Check MAF sensor signal circuit. 1) Disconnect connectors from MAF sensor and ECM with ignition switch turned OFF. 2) Measure voltage between "WHT" wire terminal of MAF sensor connector and engine ground. Is voltage 0 V?	Go to Step 7.	"WHT" wire shorted to others circuit.
7	Check MAF sensor output signal 1) Connect connector to MAF sensor with ignition switch turned OFF. 2) Check voltage between "E22-14" and "E22-32" under the following condition. Voltage between "E22-14" and "E22-32" of ECM connector at ignition switch ON, leaving engine OFF: 0.5 – 1.0 V Idling: 1.0 – 1.8 V Is each value as specified?	Substitute a known-good ECM and recheck.	Faulty MAF and IAT sensor.

DTC P0112 Intake Air Temperature Sensor Circuit Low**Wiring Diagram**

1. MAF and IAT sensor	3. To other sensor
2. ECM	4. From main relay

DTC Detecting Condition and Trouble Area

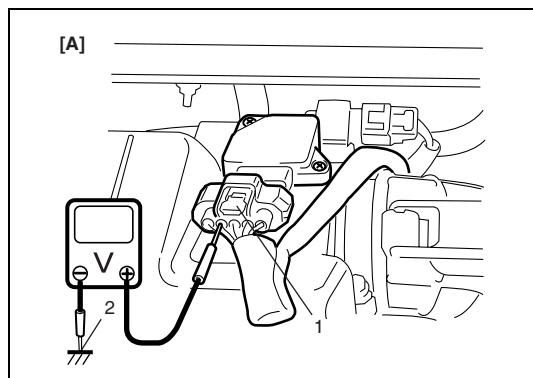
DTC Detecting Condition	Trouble Area
DTC will be set when all of the following conditions are detected for 0.5 seconds continuously. <ul style="list-style-type: none"> Engine is running Voltage of IAT sensor output is less than the specified value (High intake air temperature (low voltage/low resistance)) 	<ul style="list-style-type: none"> IAT sensor circuit IAT sensor ECM

DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec.
- 4) Check DTC and pending DTC.

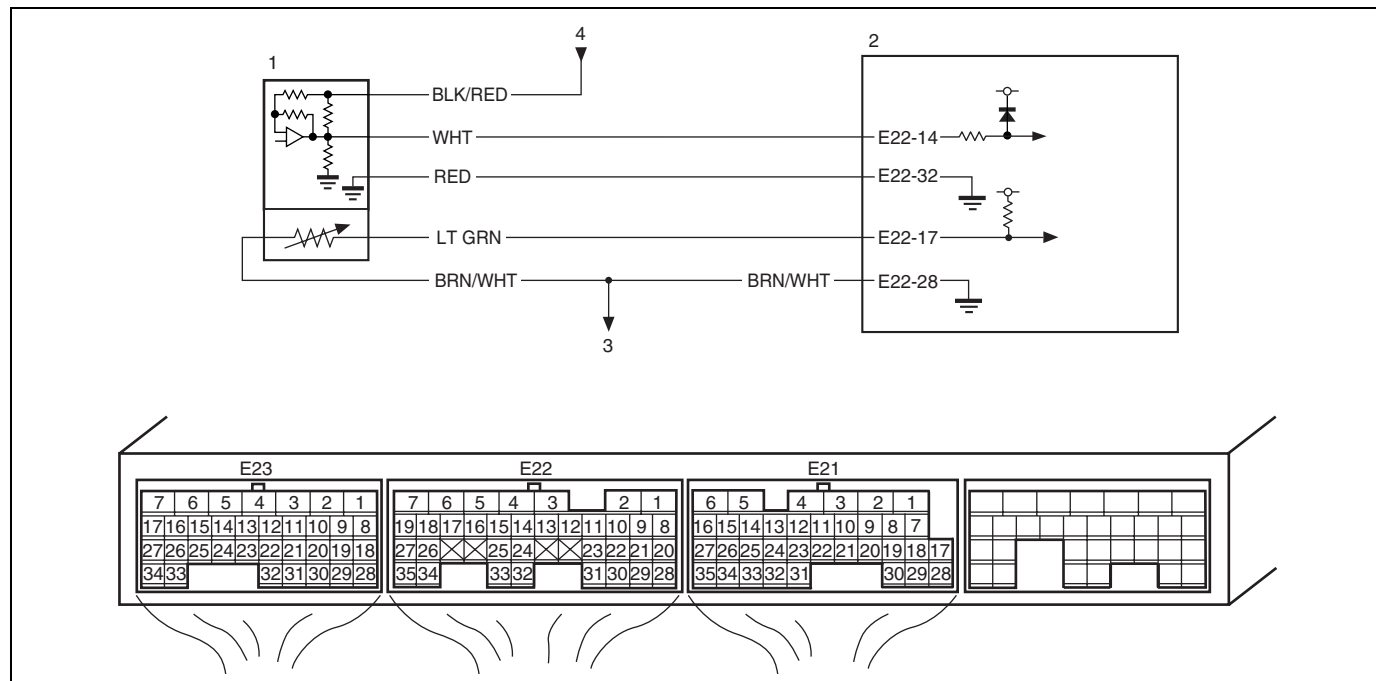
Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	IAT sensor and its circuit check. 1) Connect scan tool with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Check intake air temp. displayed on scan tool. Is 165°C (329°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.
3	Check ECM voltage. 1) Disconnect connector from IAT sensor with ignition switch turned OFF. 2) Check for proper connection to IAT sensor at "LT GRN" and "BRN/WHT" wire terminals. 3) If OK, then turn ON ignition switch, check voltage between "LT GRN" wire terminal of IAT sensor connector and vehicle body ground. See Fig. 1. Is voltage about 4 – 6 V?	Go to Step 6.	Go to Step 4.
4	Check IAT circuit insulation. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "LT GRN" wire terminal of IAT sensor connector and body ground. Is resistance infinity?	Go to Step 5.	"LT GRN" wire shorted to ground circuit. If wire are OK, substitute a known-good ECM and recheck.
5	Check IAT short circuit. 1) Turn ON ignition switch. 2) Check voltage between "LT GRN" wire terminal of IAT sensor connector and vehicle body ground. Is voltage about 0 V?	Go to Step 6.	"LT GRN" wire shorted to other circuits. If wire are OK, substitute a known-good ECM and recheck.
6	Check IAT sensor according to "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2. Is it in good condition?	Substitute a known-good ECM and recheck.	Replace MAF and IAT sensor.



[A]: Fig.1 for Step 3

1. Disconnected MAF and IAT sensor connector
2. Engine ground

DTC P0113 Intake Air Temperature Sensor Circuit High**Wiring Diagram**

1. MAF and IAT sensor	3. To other sensor
2. ECM	4. From main relay

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC will be set when all of the following conditions are detected for 0.5 seconds continuously. <ul style="list-style-type: none"> Engine is running Voltage of IAT sensor output is more than the specified value (Low intake air temperature (high voltage/high resistance)) 	<ul style="list-style-type: none"> IAT sensor circuit IAT sensor ECM

DTC Confirmation Procedure

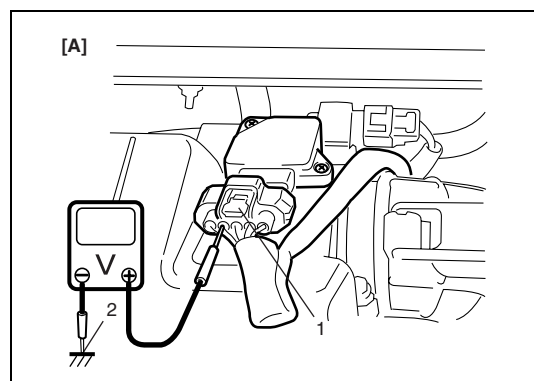
- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.

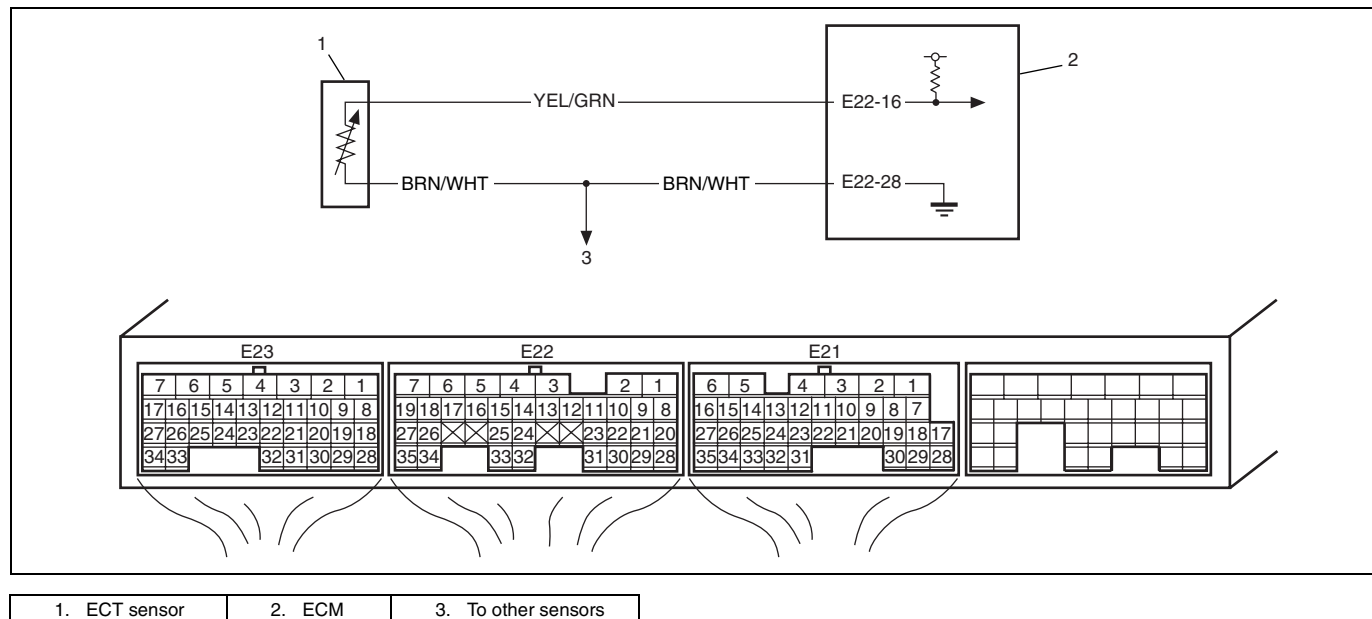
Step	Action	Yes	No
2	IAT sensor and its circuit check. 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Check intake air temp. displayed on scan tool. Is -40°C (-40°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.
3	Check IAT sensor voltage. 1) Disconnect connector from IAT sensor with ignition switch turned OFF. 2) Check for proper connection to IAT sensor at "LT GRN" and "BRN/WHT" wire terminals. 3) If OK, then turn ON ignition switch, check voltage between "LT GRN" wire terminal of IAT sensor connector and vehicle body ground. See Fig. 1. Is voltage about 4 – 6 V?	Go to Step 7.	Go to Step 4.
4	Check ECM voltage. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Check for proper connection of ECM connector at "E22-17" terminal. 4) If OK, then turn ON ignition switch, check voltage between "E22-17" terminal of ECM connector and vehicle body ground. Is voltage about 4 – 6 V?	"LT GRN" wire open circuit. If wire and connection are OK, go to Step 5.	Go to Step 5.
5	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Check voltage between "LT GRN" wire terminal of IAT sensor connector and vehicle body ground. Is voltage about 0 V?	Go to Step 6.	"LT GRN" wire shorted to other circuits. If wire are OK, substitute a known-good ECM and recheck.
6	Check wire circuit. 1) Measure resistance between "E22-17" terminal of ECM connector and "LT GRN" wire terminal of IAT sensor connector with ignition switch turned OFF. Is resistance below 5 Ω ?	Go to Step 7.	"LT GRN" wire in high resistance circuit.

Step	Action	Yes	No
7	Check ground circuit. 1) Connect connectors to ECM. 2) Check for proper connection of IAT sensor connector at "BRN/WHT" wire terminal. 3) Measure resistance between "BRN/WHT" wire terminal of IAT sensor connector and body ground. Is resistance below 5 Ω ?	Go to Step 9.	Go to Step 8.
8	Check ground circuit. 1) Measure resistance between "E22-28" terminal of ECM connector and body ground. Is resistance below 5 Ω ?	"BRN/WHT" wire open circuit or high resistance circuit. Poor "E22-28" connection.	Faulty ECM ground circuit. If circuit are OK, substitute a known-good ECM and recheck.
9	Check IAT sensor according to "Mass Air Flow (MAF) and Intake Air Temperature (IAT) Sensor Inspection" in Section 6E2. Is it in good condition?	Substitute a known-good ECM and recheck.	Replace MAF and IAT sensor.



[A]: Fig. 1 for Step 3

- | |
|--|
| 1. Disconnected MAF and IAT sensor connector |
| 2. Engine ground |

DTC P0117 Engine Coolant Temperature Circuit Low**Wiring Diagram****DTC Detecting Condition and Trouble Area**

DTC Detecting Condition	Trouble Area
DTC will be set when all of the following conditions are detected for 0.5 seconds continuously. <ul style="list-style-type: none"> Engine is running Voltage of ECT sensor output is less than the specified value (High engine coolant temperature (low voltage/low resistance)) 	<ul style="list-style-type: none"> ECT sensor circuit ECT sensor ECM

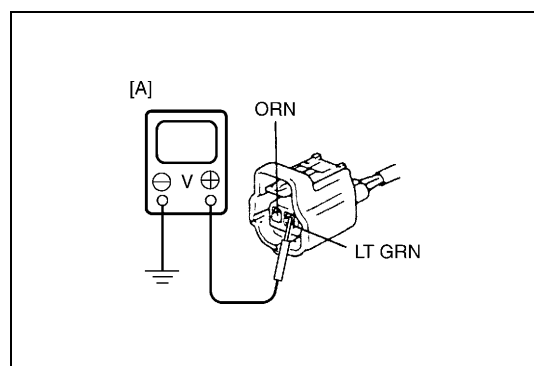
DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec. or more.
- 4) Check DTC and pending DTC.

Troubleshooting

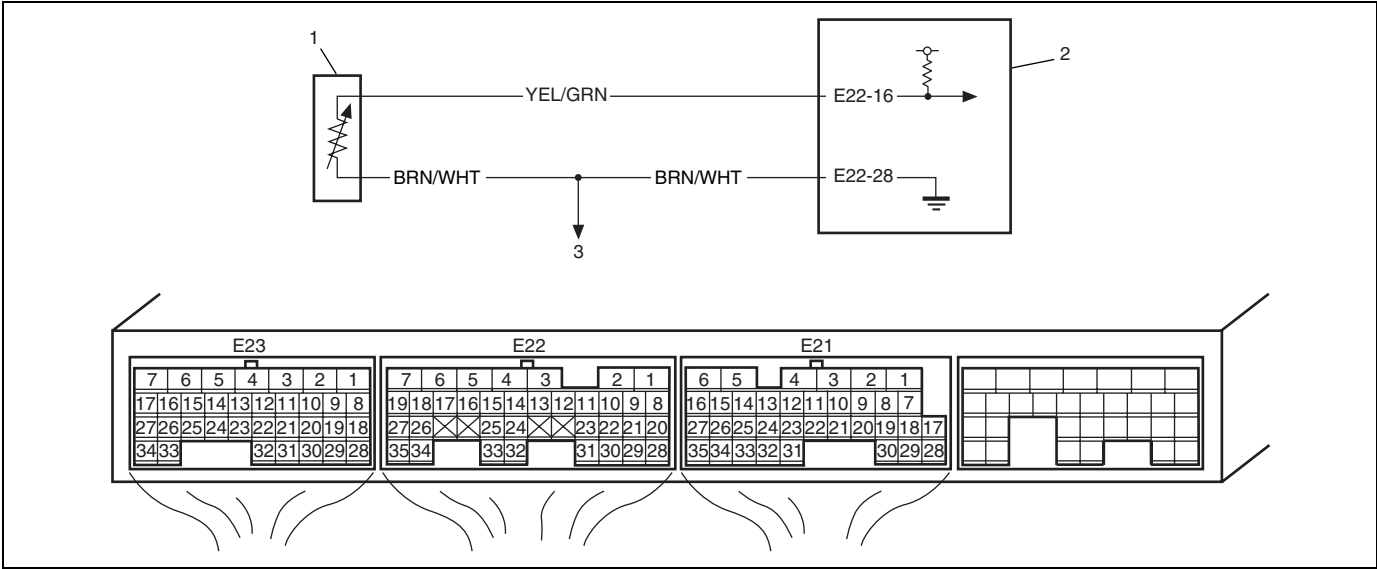
Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	ECT sensor and its circuit check. 1) Connect scan tool with ignition switch turned OFF. 2) Turn ignition switch ON. 3) Check engine coolant temp. displayed on scan tool. Is 164°C (327°F) indicated?	Go to Step 3.	Intermittent trouble check for intermittent referring to "Intermittent and Poor Connection Inspection" in section 0A.

Step	Action	Yes	No
3	Check ECM voltage. 1) Disconnect connector from ECT sensor with ignition switch turned OFF. 2) Check for proper connection to ECT sensor at "YEL/GRN" and "BRN/WHT" wire terminals. 3) If OK, then turn ON ignition switch, check voltage between "YEL/GRN" wire terminal and vehicle body ground. See Fig. 1. Is voltage about 4 – 6 V?	Got to Step 6.	Go to Step 4.
4	Check ECT sensor circuit insulation. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "YEL/GRN" wire terminal of ECT sensor connector and body ground. Is resistance infinity?	Got to Step 5.	"YEL/GRN" wire shorted to ground circuit. If wire are OK, substitute a known-good ECM and recheck.
5	Check ECT sensor short circuit. 1) Turn ON ignition switch. 2) Check voltage between "YEL/GRN" wire terminal of ECT sensor connector and vehicle body ground. Is voltage about 0 V?	Got to Step 6.	"YEL/GRN" wire shorted to other circuits. If wire are OK, substitute a known-good ECM and recheck.
6	Check ECT sensor according to "Engine Coolant Temperature Sensor (ECT Sensor) Inspection" in Section 6E2. Is it in good condition?	Substitute a known-good ECM and recheck.	Replace ECT sensor.



[A]: Fig. 1 for Step 3

Wiring Diagram



1. ECT sensor
2. ECM
3. To other sensors

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC will be set when all of the following conditions are detected for 0.5 seconds continuously. <ul style="list-style-type: none">Engine is runningVoltage of ECT sensor output is more than the specified value (Low engine coolant temperature (high voltage/high resistance))	<ul style="list-style-type: none">ECT sensor circuitECT sensorECM

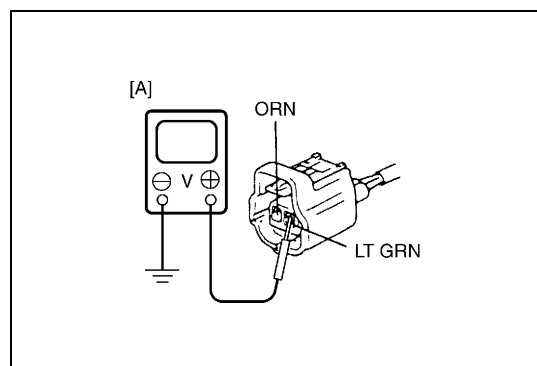
DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec. or more.
- 4) Check DTC and pending DTC.

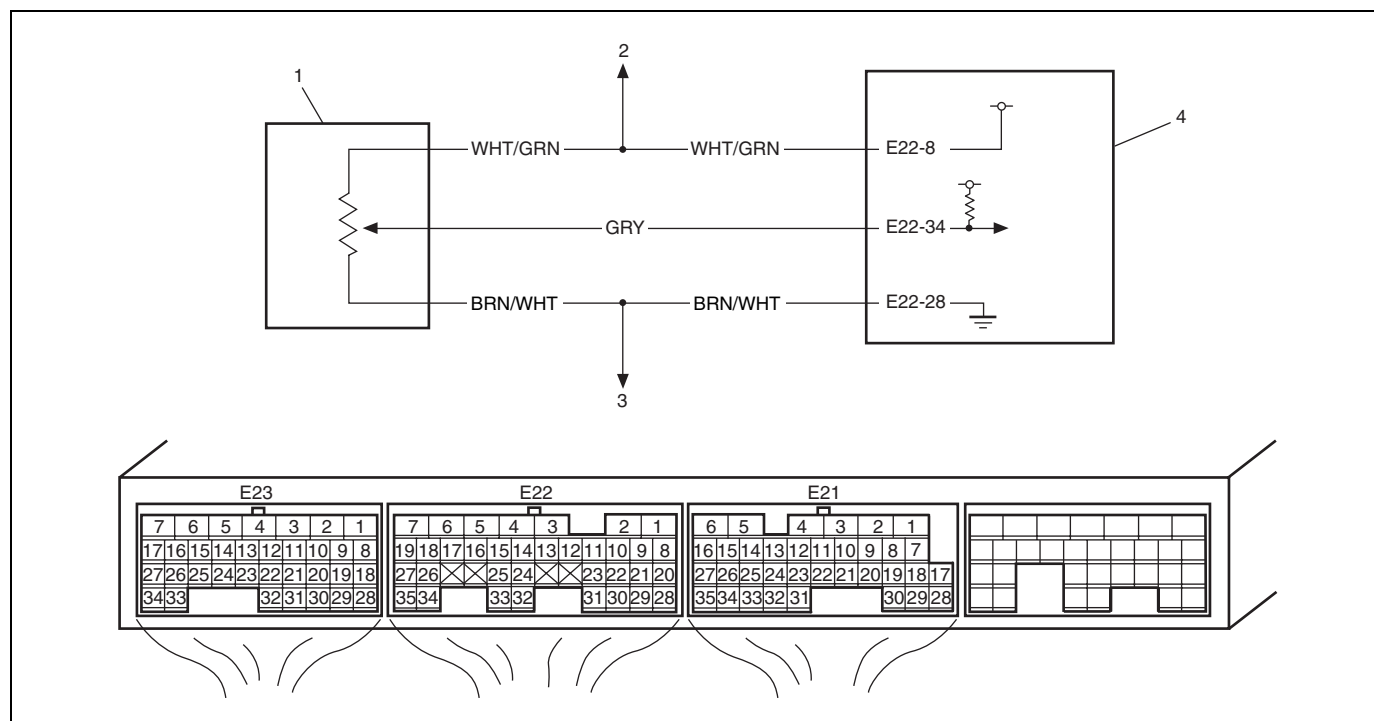
Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	ECT sensor and its circuit check. 1) Connect scan tool with ignition switch turned OFF. 2) Turn ignition switch ON. 3) Check engine coolant temp. displayed on scan tool. Is -40°C (-40°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.
3	Check ECT voltage. 1) Disconnect connector from ECT sensor with ignition switch turned OFF. 2) Check for proper connection to ECT sensor at "YEL/GRN" and "BRN/WHT" wire terminals. 3) If OK, then turn ON ignition switch, check voltage between "YEL/GRN" wire terminal of ECT sensor connector and vehicle body ground. See fig. 1. Is voltage about 4 – 6 V?	Go to Step 6.	Go to Step 4.
4	Check ECM voltage. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Check for proper connection of ECM connector at "E22-16" terminals. 4) If OK, then turn ON ignition switch, check voltage between "E22-16" wire terminal of ECM connector and vehicle body ground. Is voltage about 4 – 6 V?	"YEL/GRN" wire open circuit. If wire and connection are OK, go to Step 5.	Go to Step 5.
5	Check ECT sensor harness voltage. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Check voltage between "YEL/GRN" wire terminal of ECT sensor connector and vehicle body ground. Is voltage about 0 V?	Go to Step 6.	"YEL/GRN" wire shorted to other circuits. If wire are OK, substitute a known-good ECM and recheck.
6	Check ECT sensor harness resistance. 1) Measure resistance between "E22-16" terminal of ECM connector and "YEL/GRN" wire terminal of ECT sensor connector with ignition switch turn OFF. Is resistance below 5 Ω ?	Go to Step 7.	"YEL/GRN" wire in high resistance circuit.

Step	Action	Yes	No
7	Check ECT sensor ground circuit. 1) Connect connectors to ECM. 2) Check for proper connection of ECT sensor connector at "BRN/WHT" wire terminal. 3) Measure resistance between "BRN/WHT" wire terminal of ECT sensor connector and vehicle body ground. Is resistance below 5 Ω ?	Go to Step 9.	Go to Step 8.
8	Check ECT sensor ground circuit. 1) Measure resistance between "E22-28" terminal of ECM connector and vehicle body ground. Is resistance below 5 Ω ?	"BRN/WHT" wire open circuit or high resistance circuit. Poor "E22-28" connection.	Faulty ECM ground circuit. If circuit are OK, substitute a known-good ECM and recheck.
9	Check ECT sensor according to "Engine Coolant Temperature Sensor (ECT Sensor) Inspection" in Section 6E2. Is it in good condition?	Substitute a known-good ECM and recheck.	Replace ECT sensor.



[A]: Fig. 1 for Step 3

DTC P0121 Throttle Position Sensor Circuit Range/Performance**Wiring Diagram**

1. TP sensor	3. To other sensors
2. To MAP sensor	4. ECM

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Difference between actual throttle opening (detected from TP sensor) and opening calculated by ECM (obtained on the basis of engine speed and intake manifold pressure) is larger than specified value. (2 driving cycle detection logic)	<ul style="list-style-type: none"> Air intake system TP sensor TP sensor circuit ECM MAF sensor Idle air control valve

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

NOTE:

Check to make sure that the following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

- Intake air temp.: -7°C , 19.4°F or higher
- Engine coolant temp.: 70°C , 158°F or higher
- Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and warm up to normal operating temperature.
- 4) Drive vehicle at 60 km/h (38 mile/h) at 5th gear or D range.
- 5) Increase vehicle speed to 65 km/h (40 mile/h) at 5th gear or D range.
- 6) Release accelerator pedal to decrease vehicle speed till 60 km/h (38 mile/h).
- 7) Repeat Step 4) to 6) for 3 times.
- 8) Stop vehicle and check DTC and pending DTC.

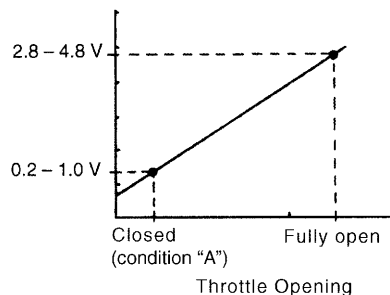
Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check TP sensor and its circuit. 1) Turn OFF ignition switch and connect SUZUKI scan tool to DLC. 2) Turn ON ignition switch and check TP sensor output voltage when throttle valve is at idle position and fully opened. See Fig. 1. Does voltage vary within specified value linearly as shown in figure?	Go to Step 11.	Go to Step 3.
3	Check TP sensor voltage. 1) Disconnect connector from TP sensor with ignition switch turned OFF. 2) Check for proper connection to TP sensor connector at "WHT/GRN", "GRY" and "BRN/WHT" wire terminals. 3) If OK, then with ignition switch turned ON, check for the following terminal voltages. <ul style="list-style-type: none"> Between "WHT/GRN" terminal of TP sensor connector and body ground Between "GRY" terminal of TP sensor connector and body ground Is each terminal voltage about 4 – 6 V?	Go to Step 7.	Go to Step 4.
4	Check ECM voltage. 1) Turn ignition switch to OFF position. 2) Check for proper connection of ECM connector at "E22-8" and "E22-34" wire terminals. 3) If OK, disconnect connector from MAP sensor. 4) Turn ignition switch to ON position. 5) Check for the following terminal voltages. <ul style="list-style-type: none"> Between "E22-8" terminal of ECM connector and body ground Between "E22-34" terminal of ECM connector and body ground Is each terminal voltage about 4 – 6 V?	"GRY/RED" wire open or high resistance circuit. Faulty MAP sensor, check MAP sensor according to "MAP Sensor Individual Check" under "DTC P0108 Manifold Absolute Pressure High Input" in this section. If they are OK, go to Step 5.	Go to Step 5.

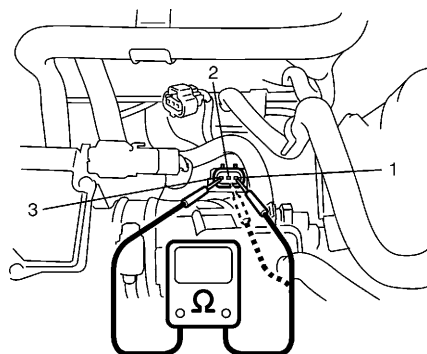
Step	Action	Yes	No
5	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "WHT/GRN" wire terminal of ECM connector and body ground and between "GRY" wire terminal of ECM connector and body ground. Is resistance infinity?	Go to Step 6.	"WHT/GRN" and/or "GRY" wire shorted to ground circuit. If wire are OK, substitute a known-good ECM and recheck.
6	Check wire circuit. 1) Turn ON ignition switch. 2) Check voltage between "WHT/GRN" wire terminal of ECM connector and body ground and between "GRY" wire terminal of ECM connector and body ground. Is voltage about 0 V at each terminal?	Go to Step 7.	"WHT/GRN" and/or "GRY" wire shorted to power circuit. If wire are OK, substitute a known-good ECM and recheck.
7	Check wire circuit. 1) Measure resistance between "E22-34" wire terminal of ECM connector and "GRY" wire terminal of TP sensor connector with ignition switch turned OFF. Is resistance below 5 Ω ?	Go to Step 8.	"GRY" wire in high resistance circuit.
8	Check ground circuit. 1) Connect connectors to ECM. 2) Check for proper connection of MAP sensor connector at "BRN/WHT" wire terminal. 3) Measure resistance between "BRN/WHT" wire terminal of MAP sensor connector and body ground. Is resistance below 5 Ω ?	Go to Step 10.	Go to Step 9.
9	Check ground circuit. 1) Measure resistance between "E22-28" wire terminal of ECM connector and body ground. Is resistance below 5 Ω ?	"BRN/WHT" wire open circuit or high resistance circuit. Poor "E22-28" connection.	Faulty ECM ground circuit. If circuit are OK, substitute a known-good ECM and recheck.
10	Check TP sensor. 1) Turn OFF ignition switch. 2) Disconnect TP sensor connector. 3) Check for proper connection to TP sensor at each terminal. 4) If OK, then measure resistance between TP sensor terminals and check if each measured value is as specified. See Fig. 2. TP sensor resistance Between 1 and 3: 4.0 – 6.0 kΩ Between 1 and 2: 0.1 – 6.5 kΩ, varying according to throttle valve opening. Are measured values as specified?	Go to Step 11.	Replace TP sensor.

Step	Action	Yes	No
11	Check MAF sensor and its circuit. 1) Check MAF sensor and its circuit, referring to "DTC P0102 Mass Air Flow Circuit Low Input" and "DTC P0103 Mass Air Flow Circuit High Input" in this section. Is it in good condition?	Go to Step 12.	Repair or replace it.
12	Is DTC P0506 or P0507 detected?	Go to applicable DTC diag. flow table.	Go to Step 13.
13	Check idle air control (IAC) valve 1) Check idle air control valve referring to "Idle Air Control (IAC) Valve Operation Check" in this section. Is it in good condition?	Go to Step 14.	Repair or replace idle air control valve.
14	Check throttle body. 1) Check throttle body for clog or leak. Is it OK?	Substitute a known-good ECM and recheck.	Repair throttle body.

[A]

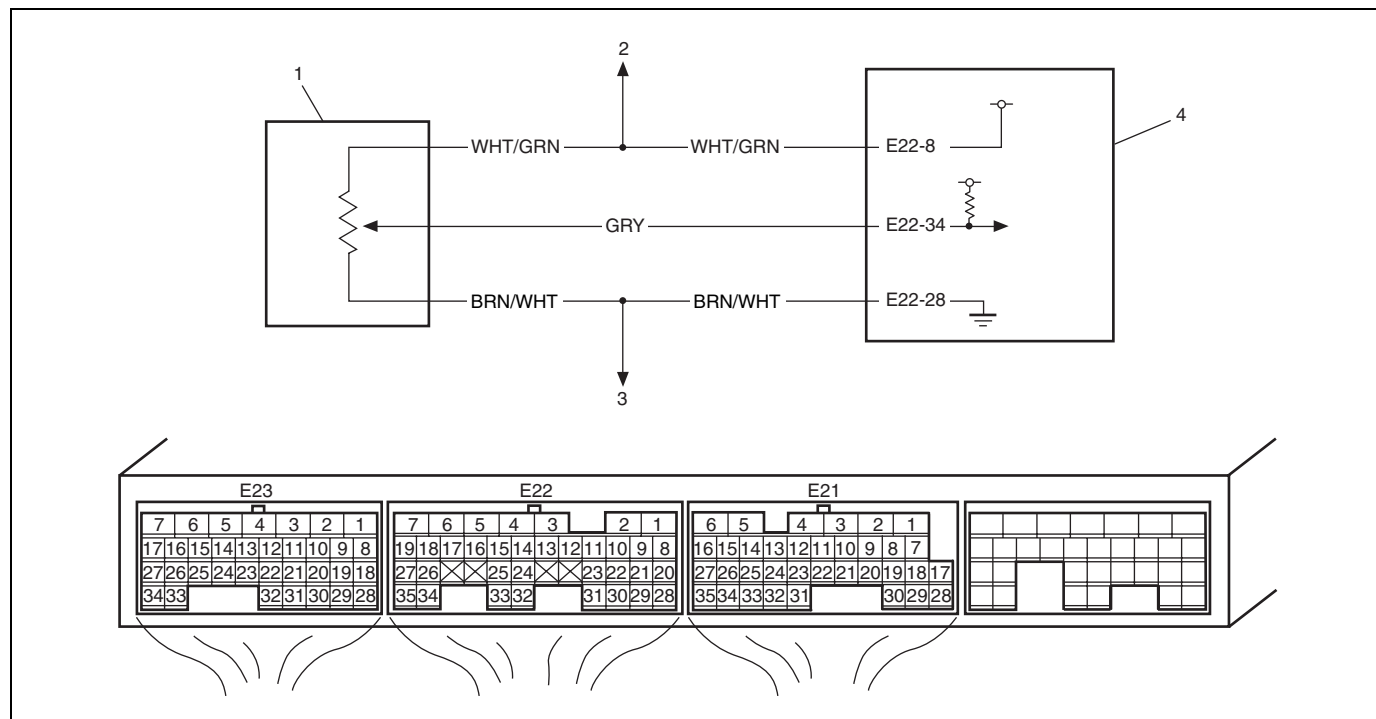


[B]



[A]: Fig. 1 for Step 2

[B]: Fig. 2 for Step 10

DTC P0122 Throttle Position Sensor Circuit Low**Wiring Diagram**

1. TP sensor

2. To MAP sensor

3. To other sensors

4. ECM

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC will be set when all of the following conditions are detected for 0.5 seconds continuously. <ul style="list-style-type: none"> Engine is running Voltage of TP sensor output is less than the specified value 	<ul style="list-style-type: none"> TP sensor circuit TP sensor ECM

DTC Confirmation Procedure

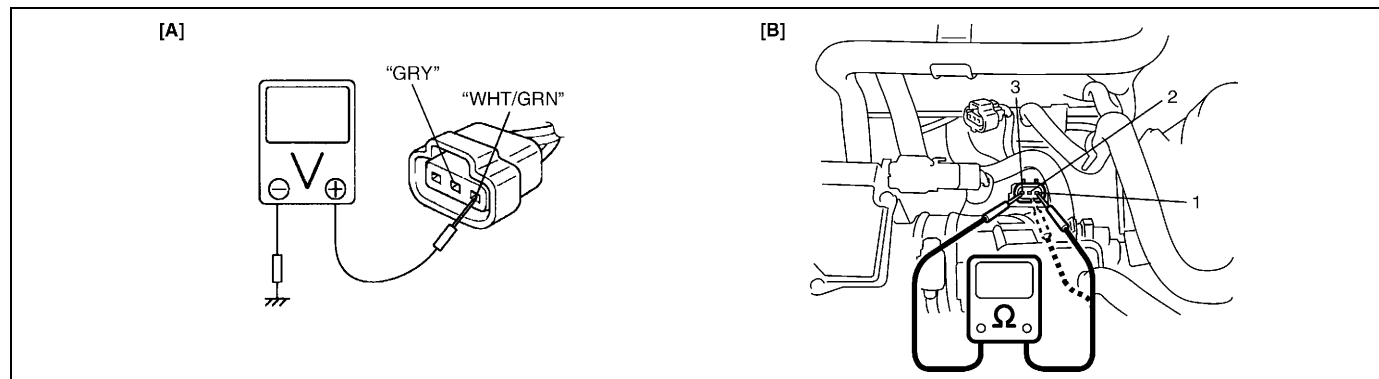
- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec. or more.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.

Step	Action	Yes	No
2	<p>Check TP sensor and its circuit.</p> <ol style="list-style-type: none"> 1) Connect scan tool to DLC with ignition switch turned OFF and then turn ON ignition switch. 2) Check throttle valve opening percentage displayed on scan tool. 3) Check throttle valve opening percentage displayed on scan tool while opening throttle valve from idle position to full open position. <p>Is it displayed 0%?</p>	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.
3	<p>Check wire harness.</p> <ol style="list-style-type: none"> 1) Disconnect connector from TP sensor with ignition switch turned OFF. 2) Check for proper connection to TP sensor at "WHT/GRN", "GRY" and "BRN/WHT" wire terminals. 3) If OK, then with ignition switch turned ON, check for the following terminal voltages. <ul style="list-style-type: none"> • Between "WHT/GRN" terminal of TP sensor connector and body ground • Between "GRY" terminal of TP sensor connector and body ground (See Fig. 1) <p>Is each terminal voltage about 4 – 6 V?</p>	Go to Step 5.	Go to Step 4.
4	<p>Check ECM voltage.</p> <ol style="list-style-type: none"> 1) Check for proper connection of ECM connector at "E22-8" and "E22-34" wire terminals. 2) If OK, disconnect connector from MAP sensor. 3) Turn ignition switch to ON position. 4) Check for the following terminal voltages. <ul style="list-style-type: none"> • Between "E22-8" terminal of ECM connector and body ground • Between "E22-34" terminal of ECM connector and body ground <p>Is each terminal voltage about 4 – 6 V?</p>	<p>Check MAP sensor referring to "Manifold Absolute Pressure Sensor (MAP Sensor) Inspection" in Section 6E2.</p> <p>If they are OK, go to Step 5.</p>	Go to Step 5.
5	<p>Check wire circuit.</p> <ol style="list-style-type: none"> 1) Disconnect connectors from ECM with ignition switch turn OFF. 2) Check that there is insulation between "WHT/GRN" wire terminal of TP sensor connector and body ground and between "GRY" wire terminal of TP sensor connector and body ground. <p>Is there insulation?</p>	Go to Step 6.	"WHT/GRN" and/or "GRY" wire shorted to ground circuit. If wires are OK, substitute a known-good ECM and recheck.

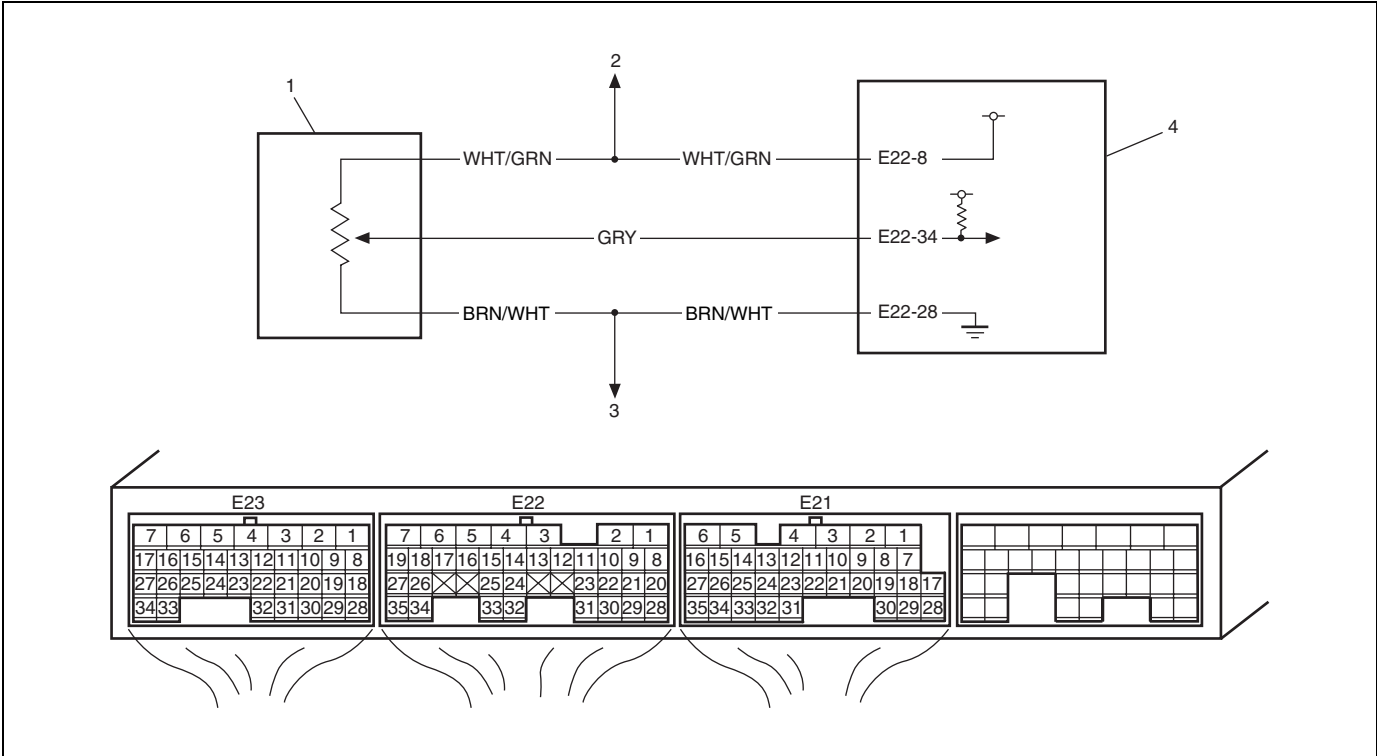
Step	Action	Yes	No
6	Check TP sensor. 1) Check resistance between terminals of TP sensor. See Fig. 2. TP sensor resistance Between 1 and 3: 4.0 – 6.0 kΩ Between 1 and 2: 0.1 – 6.5 kΩ Are measured values within specifications?	Substitute a known-good ECM and recheck.	Replace TP sensor.



[A]: Fig. 1 for Step 3

[B]: Fig. 2 for Step 6

Wiring Diagram



1. TP sensor	3. To other sensors
2. To MAP sensor	4. ECM

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC will be set when all of the following conditions are detected for 0.5 seconds continuously. <ul style="list-style-type: none">Engine is runningVoltage of TP sensor output is more than the specified value	<ul style="list-style-type: none">TP sensor circuitTP sensorECM

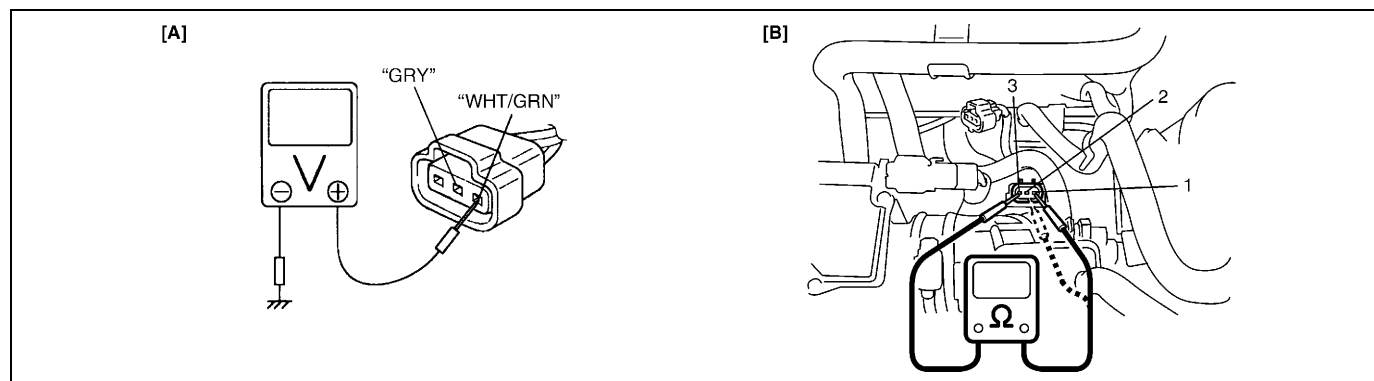
DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it for 10 sec. or more.
- 4) Check DTC and pending DTC.

Troubleshooting

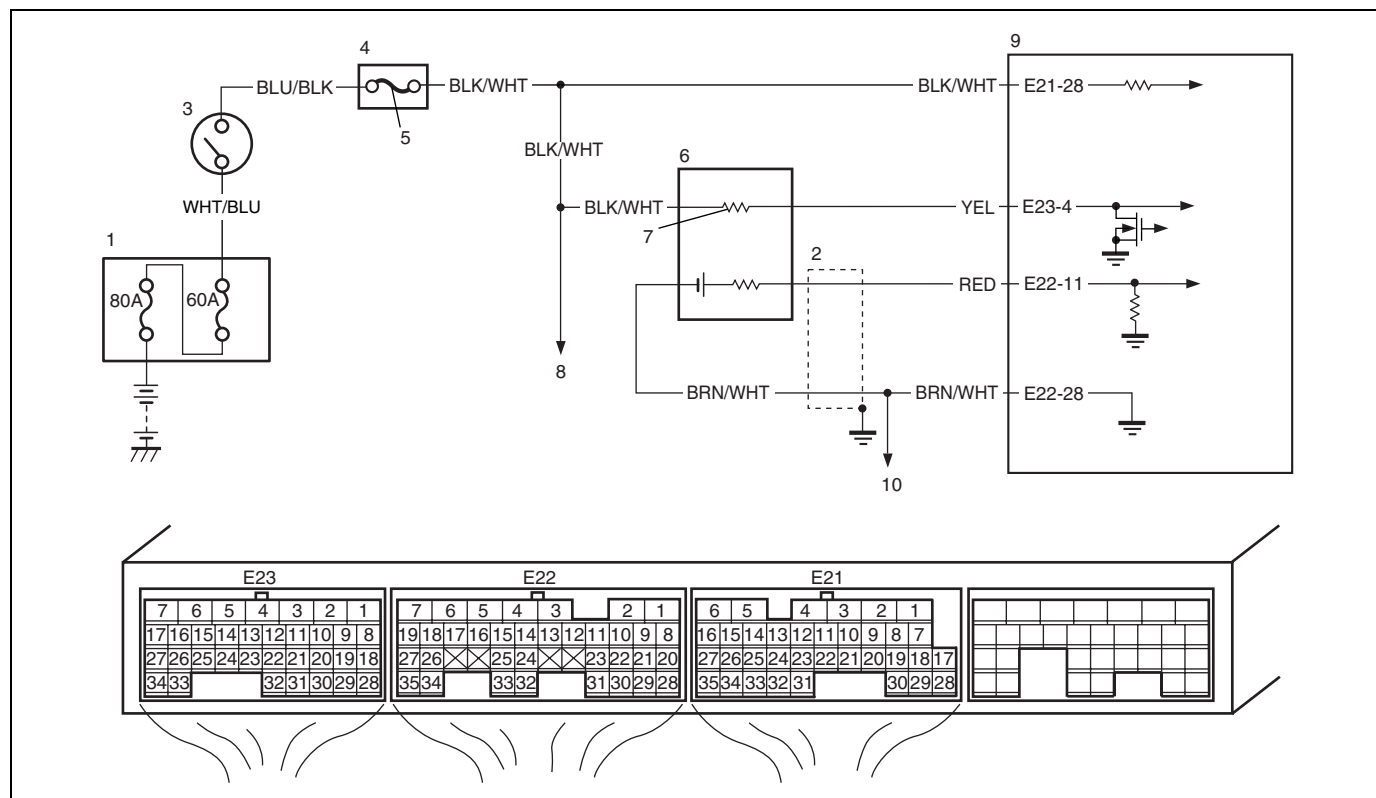
Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check TP sensor and its circuit. 1) Connect scan tool to DLC with ignition switch turned OFF and then turn ignition switch ON. 2) Check throttle valve opening percentage displayed on scan tool. 3) Check throttle valve opening percentage displayed on scan tool while opening throttle valve from idle position to full open position. Is it displayed 100%?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.
3	Check wire harness. 1) Disconnect connector from TP sensor with ignition switch turned OFF. 2) Check for proper connection to TP sensor at "WHT/GRN", "GRY" and "BRN/WHT" wire terminals. 3) If OK, then with ignition switch turned ON, check for the following terminal voltages. • Between "WHT/GRN" terminal of TP sensor connector and body ground • Between "GRY" terminal of TP sensor connector and body ground (See Fig. 1.) Is each terminal voltage about 4 – 6 V?	Go to Step 6.	Go to Step 4.
4	Check ECM voltage. 1) Check for proper connection of connector at "E22-8" and "E22-34" wire terminals. 2) If OK, disconnect connector from MAP sensor. 3) Turn ignition switch to ON position. 4) Check for the following terminal voltages. • Between "E22-8" terminal of ECM connector and body ground • Between "E22-34" terminal of ECM connector and body ground Is each terminal voltage about 4 – 6 V?	"GRY/RED" and/or "GRY/BLU" wire open circuit. Check MAP sensor referring to "Manifold Absolute Pressure Sensor (MAP Sensor) Inspection" in Section 6E2. If they are OK, go to Step 5.	Go to Step 5.
5	Check wire circuit. 1) Disconnect connector from ECM with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Check voltage between "WHT/GRN" wire terminal of TP sensor connector and body ground and between "GRY" wire terminal of TP sensor connector and body ground. Is voltage about 0 V at each terminal?	Go to Step 7.	"WHT/GRN" and/or "GRY" wire shorted to power circuit. If wire are OK, substitute a known-good ECM and recheck.

Step	Action	Yes	No
6	Check wire circuit. 1) Measure resistance between "E22-34" wire terminal of ECM connector and "GRY" wire terminal of TP sensor connector with ignition switch turned OFF. Is resistance below 5 Ω ?	Go to Step 8.	"GRY" wire open circuit or high resistance circuit.
7	Check ground circuit. 1) Connect connector to ECM. 2) Check for proper connection of MAP sensor at "BRN/WHT" wire terminal. 3) Measure resistance between "BRN/WHT" wire terminal of MAP sensor connector and body ground. Is resistance below 5 Ω ?	Go to Step 9.	Go to Step 8.
8	Check ground circuit. 1) Measure resistance between "E22-28" wire terminal of ECM connector and body ground. Is resistance below 5 Ω ?	"BRN/WHT" wire open circuit or high resistance circuit. Poor "E22-28" connection.	Faulty ECM ground circuit. If circuit are OK, substitute a known-good ECM and recheck.
9	Check TP sensor. 1) Check resistance between terminals of TP sensor. See Fig. 2. TP sensor resistance Between 1 and 3: 4.0 – 6.0 kΩ Between 1 and 2: 0.1 – 6.5 kΩ Are measured values within specifications?	Substitute a known-good ECM and recheck.	Replace TP sensor.



[A]: Fig. 1 for Step 3

[B]: Fig. 2 for Step 9

DTC P0131 O2 Sensor (HO2S) Circuit Low Voltage (Sensor-1)**DTC P0132 O2 Sensor (HO2S) Circuit High Voltage (Sensor-1)****Wiring Diagram**

1. Relay box	4. Circuit fuse box	7. Heater	10. To other sensor
2. Shield wire	5. "IG COIL" fuse	8. To HO2S-2 heater	
3. Ignition switch	6. HO2S-1	9. ECM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC P0131: <ul style="list-style-type: none"> HO2S voltage is higher than 4.5 V even after engine running for specified time continuously from engine start Maximum HO2S voltage is less than 0.6 V or minimum HO2S voltage is less than 0.3 V (2 driving cycle detection logic) DTC P0132: <ul style="list-style-type: none"> HO2S voltage is less than 3.0 V even after engine running for specified time continuously from engine start Maximum HO2S voltage is 0.74 V or more or minimum HO2S voltage is 0.34 V or more (*2 driving cycle detection logic, monitoring once/1 driving) 	<ul style="list-style-type: none"> HO2S-1 sensor circuit HO2S-1 sensor Fuel system ECM Fuel shortage

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 person, a driver and tester, on a level road.

NOTE:

Check to make sure that the following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

- **Intake air temp.: -7°C, 19.4°F or higher**
- **Engine coolant temp.: 70°C, 158°F or higher**
- **Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)**

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and warm up to normal operating temperature.
- 4) Drive vehicle at 40 mph (60 km/h) or higher. (engine speed: 2500 – 3000 r/min.)
- 5) Keep above vehicle speed for 6 min. or more. (Throttle valve opening is kept constant in this step.)
- 6) Release accelerator pedal and with engine brake applied, keep vehicle coasting (with fuel cut for 3 sec. or more) and then stop vehicle.
- 7) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Is there DTC(s) other than HO2S-1?	Go to applicable DTC diag. flow table.	Go to Step 3.
3	Check HO2S-1 signal. 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture). Does HO2S-1 output voltage deflect between below 0.3 V and over 0.5 V repeatedly?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A. If they are OK, go to Step 8.	Go to Step 4.
4	Check HO2S-1 sensor ground. 1) Disconnect connector from HO2S-1 sensor with ignition switch turned OFF. 2) Check for proper connection to HO2S-1 sensor connector at "YEL", "RED", "BLK/WHT" and "BRN/WHT" wire terminals. 3) If wire and connection are OK, check there is continuity between "BRN/WHT" wire terminal of HO2S-1 sensor connector and engine ground. Is it continuity?	Go to Step 5.	"BRN/WHT" wire open circuit. Poor "E22-28" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.

Step	Action	Yes	No
5	Check HO2S-1 sensor ground. 1) With ignition switch turned ON, check voltage between "BRN/WHT" wire terminal of HO2S-1 sensor connector and engine ground. Is voltage about 0.1 V or less?	Go to Step 6.	"BRN/WHT" wire high resistance circuit. Poor "E22-28" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.
6	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure resistance between "RED" wire terminal of HO2S-1 connector and "E22-11" wire terminal of ECM connector. Is resistance less than 5 Ω ?	Go to Step 7.	"RED" wire high resistance circuit or open circuit. Poor "E22-11" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.
7	Check wire circuit. 1) Disconnect connector from ECM with ignition switch turn OFF. 2) Measure resistance between "RED" wire terminal of HO2S-1 sensor connector and body ground. Is resistance infinity?	Go to Step 8.	"RED" wire shorted to ground circuit.
8	Check HO2S-1 signal circuit. 1) Measure voltage between "RED" wire terminal of HO2S-1 connector and vehicle body ground. Is voltage 0 V?	Go to Step 9.	"RED" wire shorted to others circuit.
9	Check HO2S-1 heater circuit. 1) Check HO2S-1 heater circuit, referring to DTC P0031 and P0032 diagnosis flow table. Is circuit in good condition?	Go to Step 10.	Repair or replace it.
10	Check exhaust system. 1) Check exhaust system for exhaust gas leakage. Is it OK?	Go to Step 4 in DTC P0171 and P0172 diagnosis flow table. If it is in good condition, go to Step 11.	Repair exhaust system for leakage.
11	Check air intake system. 1) Check air intake system for clog or leak. Is it OK?	Check HO2S-1 sensor, referring to "Heated Oxygen Sensor (HO2S-1 and HO2S-2) Heater On-Vehicle Inspection" in Section 6E2. If it in good condition, substitute a known-good ECM and recheck.	Repair or replace.

- Intake air temp.: -7°C (19.4°F) or higher
- Engine coolant temp.: 70°C (158°F) or higher
- Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)

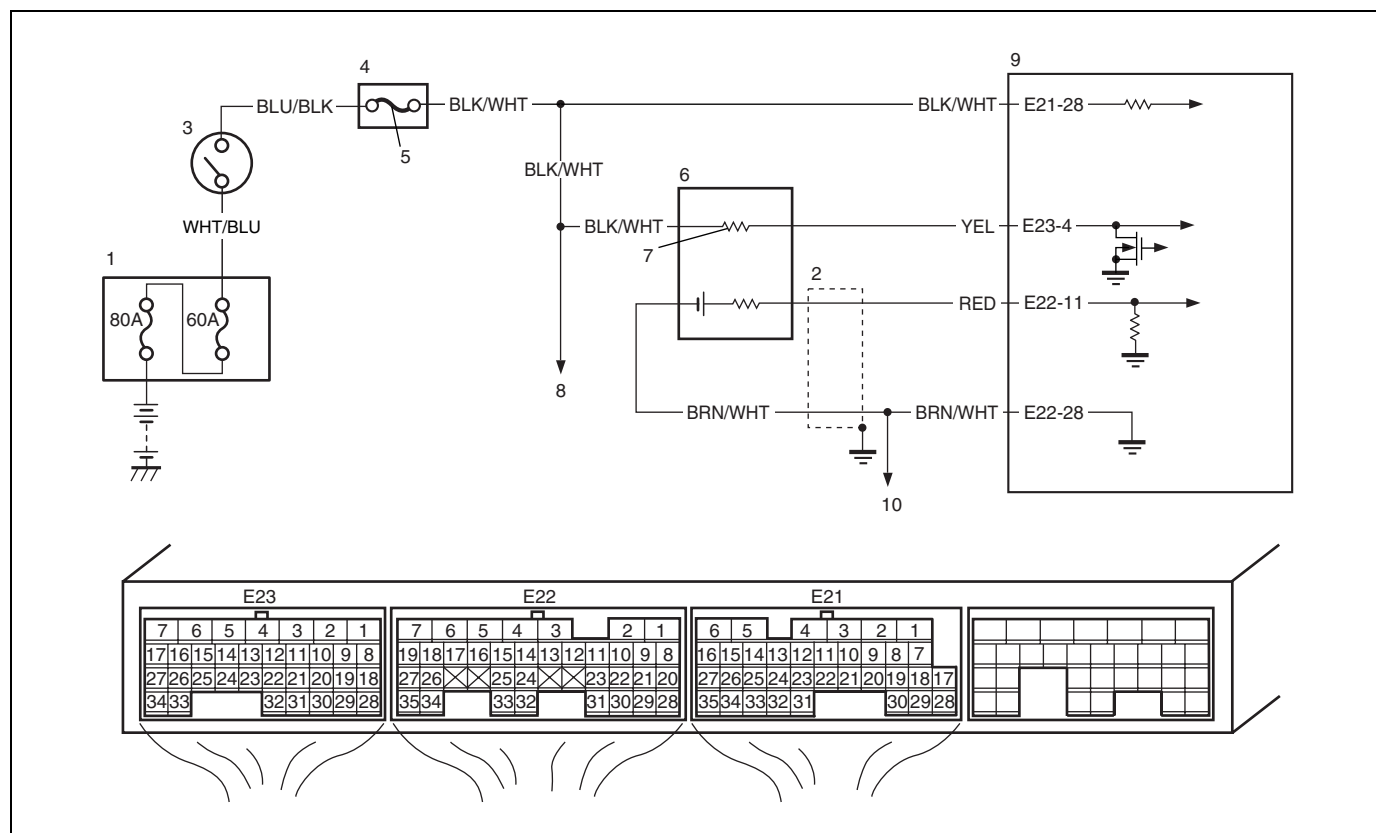
- 1) Perform step 1) to 6) of DTC P0131/P0132 confirmation procedure.
- 2) Check if DTC and pending DTC exists by using scan tool. If not, check if oxygen sensor monitoring test has completed by using scan tool. If not in both of above checks (i.e., no DTC and pending DTC and oxygen sensor monitoring test not completed), check vehicle condition (environmental) and repeat step 3) through 6) of DTC P0131/P0132 confirmation procedure.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Is there DTC(s) other than HO2S-1 (DTC P0133)?	Go to applicable DTC diag. flow table.	Replace HO2S-1.

DTC P0134 O2 Sensor (HO2S) No Activity Detected (Sensor-1)

Wiring Diagram



1. Relay box	4. Circuit fuse box	7. Heater	10. To other sensor
2. Shield wire	5. "IG COIL" fuse	8. To HO2S-2 heater	
3. Ignition switch	6. HO2S-1	9. ECM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Maximum HO2S voltage is lower than 0.45 V. (2 driving cycle detection logic)	<ul style="list-style-type: none"> • HO2S-1 • HO2S-1 circuit • Fuel system • Exhaust gas leakage • ECM • Fuel shortage

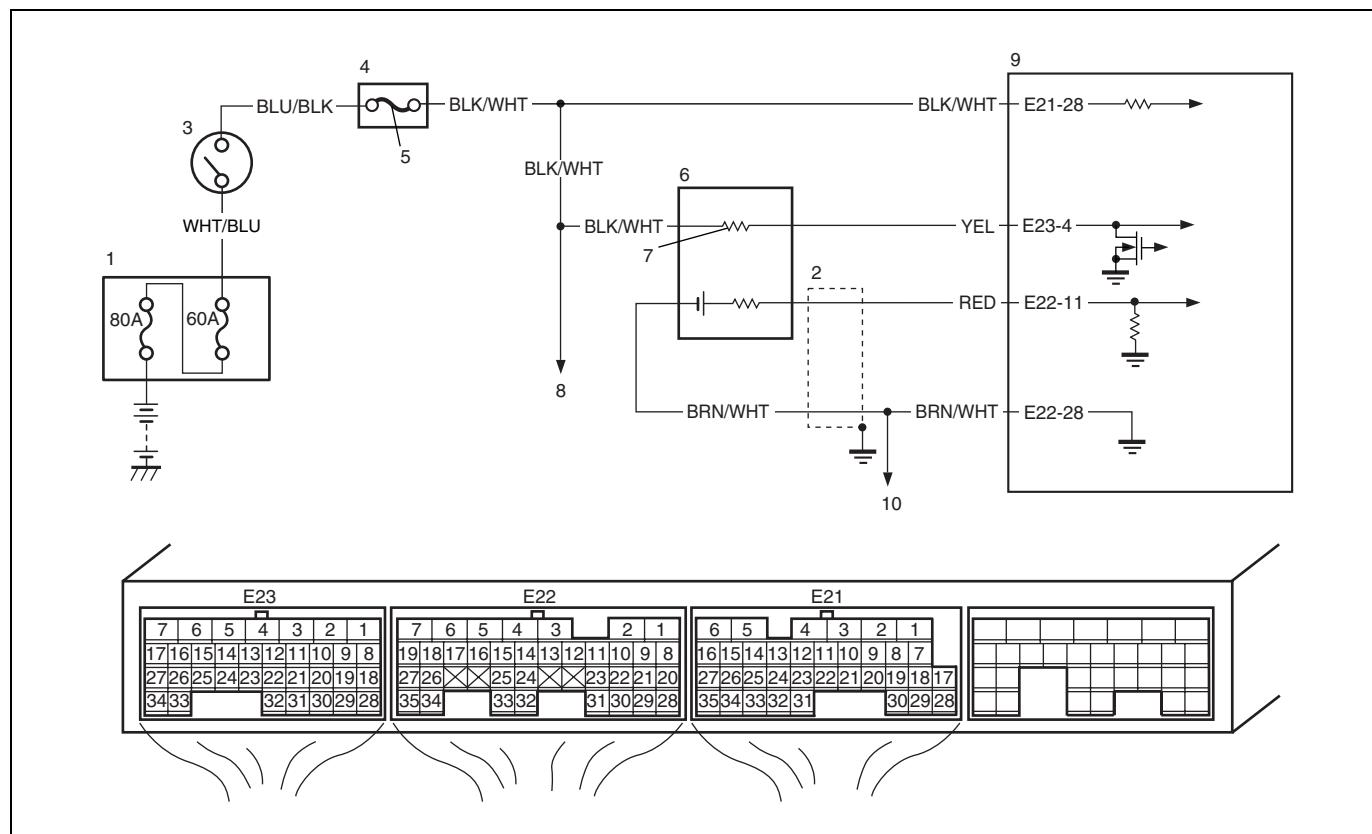
DTC Confirmation Procedure

Refer to "DTC P0133 O2 Sensor (HO2S) Circuit Slow Response (Sensor-1)" in this section.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	HO2S-1 output voltage check. 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously to enrich A/F mixture and take foot off from pedal to enlean) and check HO2S output voltage displayed on scan tool. Is over 0.5 V and below 0.3 V indicated?	Go to Step 4.	Go to Step 3.
3	Check HO2S-1 sensor ground. 1) Disconnect connector from HO2S-1 sensor with ignition switch turned OFF. 2) Check for proper connection to HO2S-1 sensor at "YEL", "RED", "BLK/WHT" and "BRN/WHT" wire terminals. 3) If wire and connection are OK, check there is continuity between "BRN/WHT" wire terminal of HO2S-1 sensor connector and engine ground. Is it continuity?	Go to Step 4.	"BRN/WHT" wire open circuit. Poor "E22-28" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.
4	Check HO2S-1 sensor ground. 1) With ignition switch turn ON, check voltage between "BRN/WHT" wire terminal of HO2S-1 sensor connector and engine ground. Is voltage about 0.1 V or less?	Go to Step 5.	"BRN/WHT" wire high resistance circuit. Poor "E22-28" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.

Step	Action	Yes	No
5	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure resistance between "RED" wire terminal of HO2S-1 harness connector and "E22-11" terminal. Is resistance less than 5 Ω ?	Go to Step 6.	"RED" wire high resistance circuit or open circuit. Poor "E22-11" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.
6	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "RED" wire terminal of HO2S-1 sensor connector and body ground. Is resistance infinity?	Go to Step 7.	"RED" wire shorted to ground circuit.
7	Check HO2S-1 heater circuit. 1) Check HO2S-1 heater circuit, referring to DTC P0031 and P0032 diagnosis flow table. Is result in good condition?	Go to Step 8.	Repair or replace it.
8	Check exhaust system. 1) Check exhaust system for exhaust gas leakage. Is it OK?	Go to Step 4 in DTC P0171 and P0172 diagnosis flow table. If it is in good condition, go to Step 9.	Repair exhaust system for leakage.
9	Check air intake system. 1) Check air intake system for clog or leak. Is it OK?	Check HO2S-1 sensor, referring to "Heated Oxygen Sensor (HO2S-1 and HO2S-2) Heater On-Vehicle Inspection" in Section 6E2. If it in good condition, substitute a known-good ECM and recheck.	Repair or replace.

DTC P0031 HO2S Heater Control Circuit Low (Sensor-1)**DTC P0032 HO2S Heater Control Circuit High (Sensor-1)****Wiring Diagram**

1. Relay box	4. Circuit fuse box	7. Heater	10. To other sensor
2. Shield wire	5. "IG COIL" fuse	8. To HO2S-2 heater	
3. Ignition switch	6. HO2S-1	9. ECM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Current of HO2S-2 heater is more than specified value or lower than specified value for 5 seconds continuously (2 driving cycle detection logic)	<ul style="list-style-type: none"> HO2S-1 heater HO2S-1 heater circuit ECM

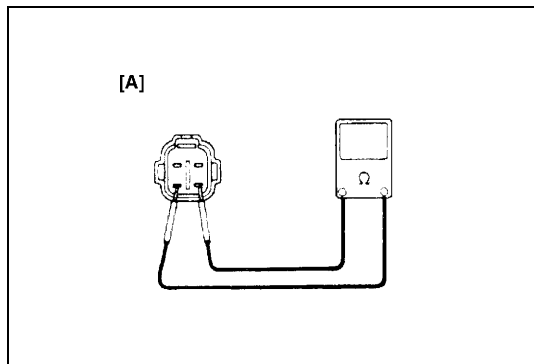
DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and warm up to normal operating temperature.
- 4) Run engine at idle speed for 1 min. or more.
- 5) Check DTC and pending DTC.

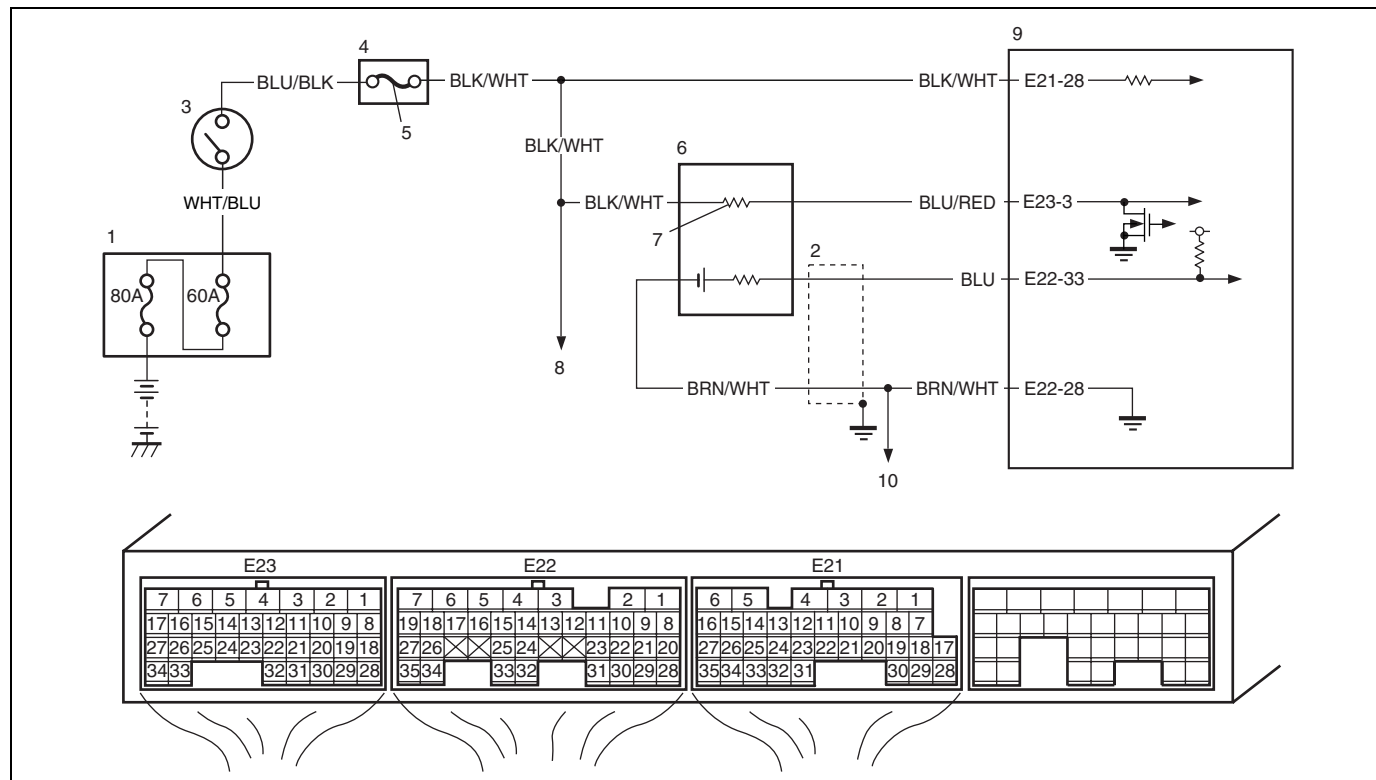
Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check HO2S-1 heater power circuit. 1) Disconnect connector from HO2S-1 sensor with ignition switch turned OFF. 2) Check for proper connection to HO2S-1 sensor at "BLK/WHT" and "YEL" wire terminals. 3) If wire and connection are OK, measure voltage between "BLK/WHT" wire terminal and engine ground with ignition switch turned ON. Is voltage over 10 V?	Go to Step 3.	"BLK/WHT" wire open circuit or shorted to ground circuit.
3	Check HO2S-1 heater power circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "BLK/WHT" wire terminal of HO2S-1 connector and "E21-28" terminal wire of ECM connector. Is resistance below 5 Ω ?	Go to Step 4.	"BLK/WHT" wire high resistance circuit.
4	Check HO2S-1 heater drive circuit. 1) Measure resistance between "E23-4" wire terminal of ECM connector and vehicle body ground. Is resistance infinity?	Go to Step 5.	"YEL" wire shorted to ground circuit.
5	Check HO2S-1 heater drive circuit. 1) Turn ON ignition switch. 2) Measure voltage between "E23-4" wire terminal of ECM connector and vehicle body ground. Is voltage 0 V?	Go to Step 6.	"YEL" wire shorted to power circuit.
6	Check HO2S-1 heater drive circuit. 1) Connect connector to HO2S-1 with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Measure voltage between "E23-4" wire terminal of ECM connector and vehicle body ground with disconnect connector from ECM. Is voltage over 10 V?	Go to Step 7.	"YEL" wire open circuit.
7	Check heater of sensor-1. 1) Disconnect HO2S-1 coupler with ignition switch turned OFF. 2) Check HO2S-1 heater resistance. See Fig. 1. It is 5.0 – 6.4 Ω at 20°C (68°F)?	Go to Step 8.	Replace HO2S-1.

Step	Action	Yes	No
8	<p>Check HO2S-1 heater power circuit.</p> <p>1) Disconnect connector from ECM with ignition switch turned OFF.</p> <p>2) Connect connector to HO2S-1 with ignition switch turned OFF.</p> <p>3) Measure resistance between "E23-4" wire and "E21-28" wire terminals of ECM connector.</p> <p>Is resistance below 12 Ω?</p>	<p>HO2S-1 heater circuit are OK.</p> <p>Substitute a known-good ECM and recheck.</p>	<p>"BLK/WHT" and "YEL" wire high resistance circuit.</p>



[A]: Fig. 1 for Step 7

DTC P0136 O2 Sensor (HO2S) Circuit (Sensor-2)**Wiring Diagram**

1. Relay box	3. Ignition switch	5. "IG COIL" fuse	7. Heater	9. ECM
2. Shield wire	4. Circuit fuse box	6. HO2S-2	8. To HO2S-1 heater	10. To other sensor

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
<p>DTC will set when one of the following conditions is detected.</p> <ul style="list-style-type: none"> Maximum output voltage of HO2S-2 is lower than specified value or minimum output voltage is higher than specified value while vehicle driving. Engine is warmed up and HO2S-2 voltage is higher than specified value (circuit open) <p>(2driving cycle detection logic)</p>	<ul style="list-style-type: none"> HO2S-2 HO2S-2 circuit Fuel system ECM Fuel shortage Exhaust gas leakage

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 person, a driver and tester, on a level road.

NOTE:

Check to make sure that the following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

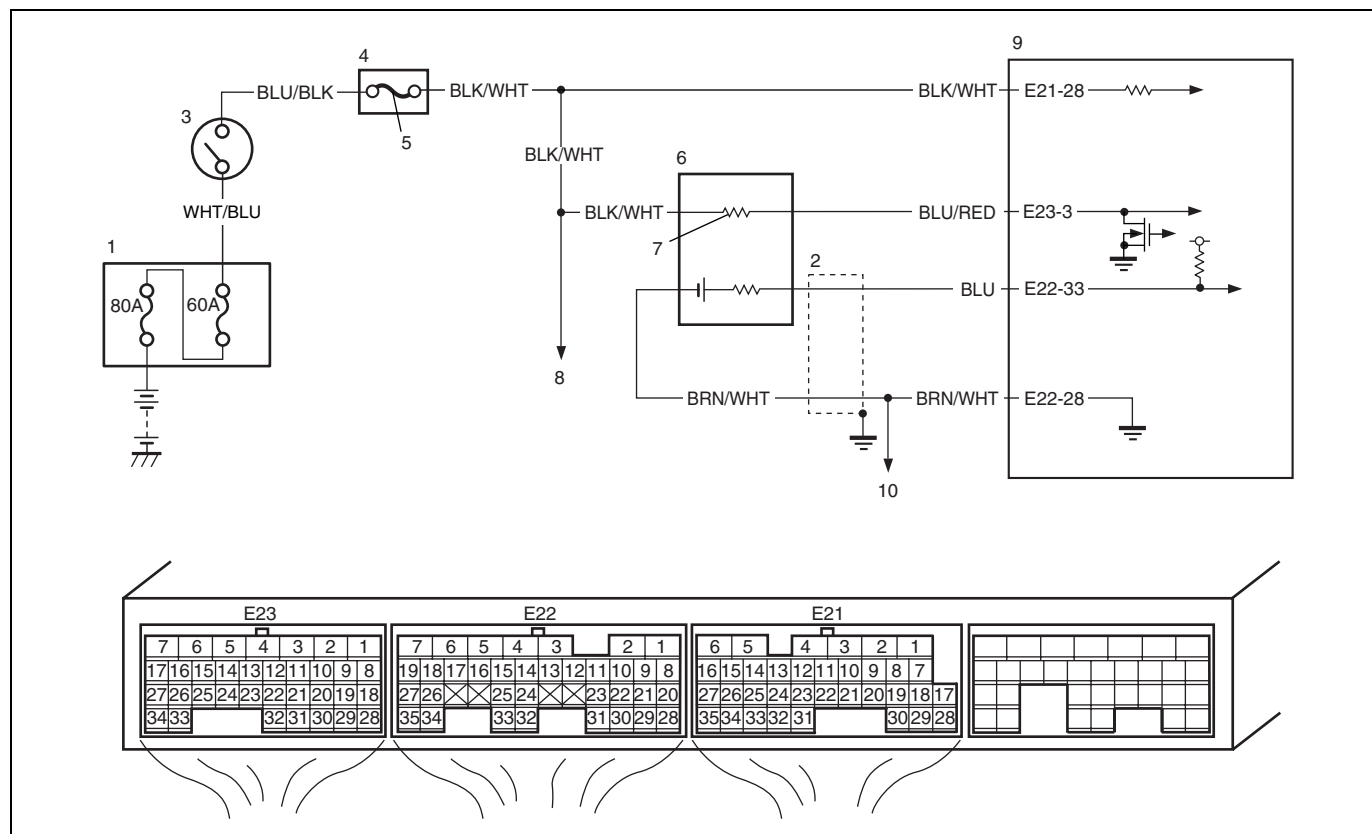
- Intake air temp.: -7°C , 19.4°F or higher
- Engine coolant temp.: 70°C , 158°F or higher
- Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and warm up to normal operating temperature.
- 4) Increase vehicle speed to 60 – 80 km/h (37 – 50 mile/h) at 5th gear or D range.
- 5) Release accelerator pedal and with engine brake applied, keep vehicle coasting (with fuel cut for 4 sec. or more), then stop vehicle and run engine at idle speed for 6 sec. or more.
- 6) Repeat Step 4).
- 7) Keep above vehicle speed for 8 min. or more. (Throttle valve opening is kept constant in this Step.)
- 8) Repeat Step 5).
- 9) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Is there DTC(s) other than fuel system (DTC P0171/P0172) and HO2S-2 (DTC P0134)?	Go to applicable DTC diag. flow table.	Go to Step 3.
3	Check HO2S-2 and its circuit. 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture). Does HO2S-2 output voltage indicate deflect between over 0.35 V and below 0.25 V?	Go to DTC P0171 and P0172 diag. flow table (Fuel System Check).	Go to Step 4.
4	Check HO2S-2 sensor ground. 1) Disconnect connector from HO2S-2 sensor with ignition switch turned OFF. 2) Check for proper connection to HO2S-2 sensor connector at "BLU/RED", "BLU", "BRN/WHT" and "BLK/WHT" wire terminals. 3) If wire and connection are OK, check there is continuity between "BRN/WHT" wire terminal of HO2S-2 sensor connector and engine ground. Is it continuity?	Go to Step 5.	"BRN/WHT" wire open circuit. Poor "E22-28" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.
5	Check HO2S-2 sensor ground. 1) With ignition switch turn ON, check voltage between "BRN/WHT" wire terminal of HO2S-2 sensor connector and engine ground. Is voltage about 0.1 V or less?	Go to Step 6.	"BRN/WHT" wire high resistance circuit. Poor "E22-28" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.

Step	Action	Yes	No
6	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure resistance between "BLU" wire terminal of HO2S-2 sensor connector and "E22-33" wire terminal of ECM connector. Is resistance less than 5 Ω ?	Go to Step 7.	"BLU" wire high resistance circuit or open circuit. Poor "E22-33" terminal connection. Faulty ECM ground. If they are OK, substitute a known-good ECM and recheck.
7	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "BLU" wire terminal of HO2S-2 sensor connector and body ground. Is resistance infinity?	Go to Step 8.	"BLU" wire shorted to ground circuit.
8	Check HO2S-2 signal circuit. 1) Measure voltage between "BLU" wire terminal of HO2S-2 sensor connector and vehicle body ground. Is voltage 0 V?	Go to Step 9.	"BLU" wire shorted to others circuit.
9	Check HO2S-2 heater circuit. 1) Check HO2S-2 heater circuit, referring to DTC P0037 and P0038 diagnosis flow table. Is circuit in good condition?	Go to Step 10.	Repair or replace it.
10	Check exhaust system. 1) Check exhaust system for exhaust gas leakage. Is it OK?	Go to Step 4 in DTC P0171 and P0172 diagnosis flow table. If it is in good condition, go to Step 11.	Repair exhaust system for leakage.
11	Check air intake system. 1) Check air intake system for clog or leak. Is it OK?	Check HO2S-2 sensor, referring to "Heated Oxygen Sensor (HO2S-1 and HO2S-2) Heater On-Vehicle Inspection" in Section 6E2. If it is in good condition, substitute a known-good ECM and recheck.	Repair or replace.

DTC P0037 HO2S Heater Control Circuit Low (Sensor-2)**DTC P0038 HO2S Heater Control Circuit High (Sensor-2)****Wiring Diagram**

1. Relay box	4. Circuit fuse box	7. Heater	10. To other sensor
2. Shield wire	5. "IG COIL" fuse	8. To HO2S-1 heater	
3. Ignition switch	6. HO2S-2	9. ECM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Current of HO2S-2 heater is more than specified value or less than specified value for 5 seconds continuously (2 driving cycle detection logic)	<ul style="list-style-type: none"> HO2S-2 heater HO2S-2 heater circuit ECM

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 person, a driver and tester, on a level road.

- With ignition switch turned OFF, connect scan tool.
- Turn ON ignition switch and clear DTC using scan tool.
- Start engine and warm up to normal operating temperature.
- Run engine at idle speed for 1 min.
- Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check HO2S-2 heater power circuit. 1) Disconnect connector from HO2S-2 sensor with ignition switch turned OFF. 2) Check for proper connection to HO2S-2 sensor at "BLK/WHT" and "BLU/RED" wire terminals. 3) If wire and connection are OK, measure voltage between "BLK/WHT" wire terminal of HO2S-2 sensor connector and engine ground with ignition switch turned ON. Is voltage over 10 V?	Go to Step 3.	"BLK/WHT" wire open circuit or shorted to ground circuit.
3	Check HO2S-2 heater power circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "BLK/WHT" wire terminal of HO2S-2 sensor connector and "E21-28" terminal wire of ECM connector. Is resistance below 5 Ω ?	Go to Step 4.	"BLK/WHT" wire high resistance circuit.
4	Check HO2S-2 heater drive circuit. 1) Measure resistance between "BLU/RED" wire terminal of HO2S-2 sensor connector and vehicle body ground. Is resistance infinity?	Go to Step 5.	"BLU/RED" wire shorted to ground circuit.
5	Check HO2S-2 heater drive circuit. 1) Turn ON ignition switch. 2) Measure voltage between "BLU/RED" wire terminal of HO2S-2 sensor connector and vehicle body ground. Is voltage 0 V?	Go to Step 6.	"BLU/RED" wire shorted to power circuit.
6	Check HO2S-2 heater drive circuit. 1) Connect connector to HO2S-2 with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Measure voltage between "E23-3" wire terminal of disconnected ECM connector and vehicle body ground. Is voltage over 10 V?	Go to Step 7.	"BLU/RED" wire open circuit.
7	Check heater of sensor-2. 1) Disconnect HO2S-2 coupler with ignition switch turned OFF. 2) If OK, then check heater resistance. Is it 11.7 – 14.3 Ω at 20°C, 68°F?	Go to Step 8.	Replace HO2S-2.

Step	Action	Yes	No
8	Check HO2S-2 heater power circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Connect connector to HO2S-2 with ignition switch turned OFF. 3) Measure resistance between "E23-3" and "E21-28" wire terminals of ECM connector. Is resistance below 30 Ω ?	HO2S-2 heater circuit are OK. Substitute a known-good ECM and recheck.	"BLU/RED" wire high resistance circuit.

DTC P0171 System Too Lean**DTC P0172 System Too Rich****DTC Detecting Condition and Trouble Area**

DTC Detecting Condition	Trouble Area
P0171: Total fuel trim is higher than 35%. P0172: Total fuel trim is lower than -35%. (2 driving cycle detection logic)	<ul style="list-style-type: none"> • Vacuum leaks • Exhaust gas leakage • Fuel pressure out of specification • Fuel injector malfunction • Heated oxygen sensor-1 malfunction • MAF sensor malfunction • ECT sensor malfunction

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 person, a driver and tester, on a level road.

NOTE:

Check to make sure that the following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

- Intake air temp.: -7°C (19.4°F) or higher
- Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and warm up to normal operating temperature.
- 4) Operate vehicle within freeze frame data condition as noted for 5 min.
- 5) Stop vehicle and check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Is there DTC(s) other than "P0171" and "P0172"?	Go to applicable DTC flow table.	Go to Step 3.
3	Check intake system and exhaust system for leakage. Are intake system and exhaust system in good condition?	Go to Step 4.	Repair or replace.
4	Check fuel pressure referring to "Table B-3 Fuel Pressure Check" in this section. Is check result satisfactory?	Go to Step 5.	Repair or replace.
5	Check fuel injectors referring to "Fuel Injector Inspection" in Section 6E2. Is check result satisfactory?	Go to Step 6.	Faulty injector(s) or its circuit.
6	Visual inspection. Check MAF sensor and air intake system for: 1) Objects which block measuring duct and resistor of MAF sensor. 2) Other air flow which does not pass the MAF sensor. Are there in good condition?	Go to Step 7.	Repair or replace.
7	MAF sensor performance check. 1) With ignition switch turned OFF, install scan tool. 2) Start engine and warm up to normal operation temperature. 3) Check MAF value using scan tool, under the following conditions. MAF value specification Idling: 1.0 – 4.0 g/sec. Racing at 2500 r/min: 4.0 – 12.0 g/sec. Is each value as specified?	Go to Step 8.	Go to "DTC P0102 Mass Air Flow Circuit Low Input" and "DTC P0103 Mass Air Flow Circuit High Input" in this section.
8	Check ECT sensor referring to Step 3 and 4 of DTC P0118 diag. flow table. Is check result satisfactory?	Go to Step 9.	Faulty ECT sensor or its circuit.
9	Check HO2S-1 referring to Step 2 of DTC P0131 diag. flow table. Is check result satisfactory?	Substitute a known-good ECM and recheck.	Faulty HO2S-1 or its circuit.

DTC P0300 Random Misfire Detected**DTC P0301 Cylinder 1 Misfire Detected****DTC P0302 Cylinder 2 Misfire Detected****DTC P0303 Cylinder 3 Misfire Detected****DTC P0304 Cylinder 4 Misfire Detected****SYSTEM DESCRIPTION**

ECM measure the angle of the crankshaft based on the pulse signal from the CKP sensor and CMP sensor for each cylinder. If it detects a large change in the angle speed of the crankshaft, it concludes occurrence of a misfire. When the number of misfire is counted by ECM beyond the DTC detecting condition, it determine the cylinder where the misfire occurred and output it as DTC.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
P0300 <ul style="list-style-type: none"> Misfire, which causes catalyst to overheat during 200 engine revolutions, is detected at 2 or more cylinders. (MIL flashes as long as this misfire occurs continuously.) or <ul style="list-style-type: none"> Misfire, which affects exhaust emission adversely during 1000 engine revolution, is detected at 2 or more cylinders. (2 driving cycle detection logic) 	<ul style="list-style-type: none"> Ignition system Fuel injector and its circuit Fuel pressure EGR system Abnormal air drawn in Engine compression Valve lash adjuster Valve timing Fuel shortage
P0301, P0302, P0303, P0304 <ul style="list-style-type: none"> Misfire, which causes catalyst to overheat during 200 engine revolutions, is detected at 1 cylinder. (MIL flashes as long as this misfire occurs continuously.) or <ul style="list-style-type: none"> Misfire, which affects exhaust emission adversely during 1000 engine revolution, is detected at 1 cylinder. (2 driving cycle detection logic) 	

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 person, a driver and tester, on a level road.

NOTE:

Check to make sure that the following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

- Intake air temp.: -7°C, 19.4°F or higher
- Engine coolant temp.: -10°C (14°F) or higher
- Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Drive vehicle under freeze frame data condition as noted for 1 min. or more.
- 4) Stop vehicle and check DTC and pending DTC.

Troubleshooting

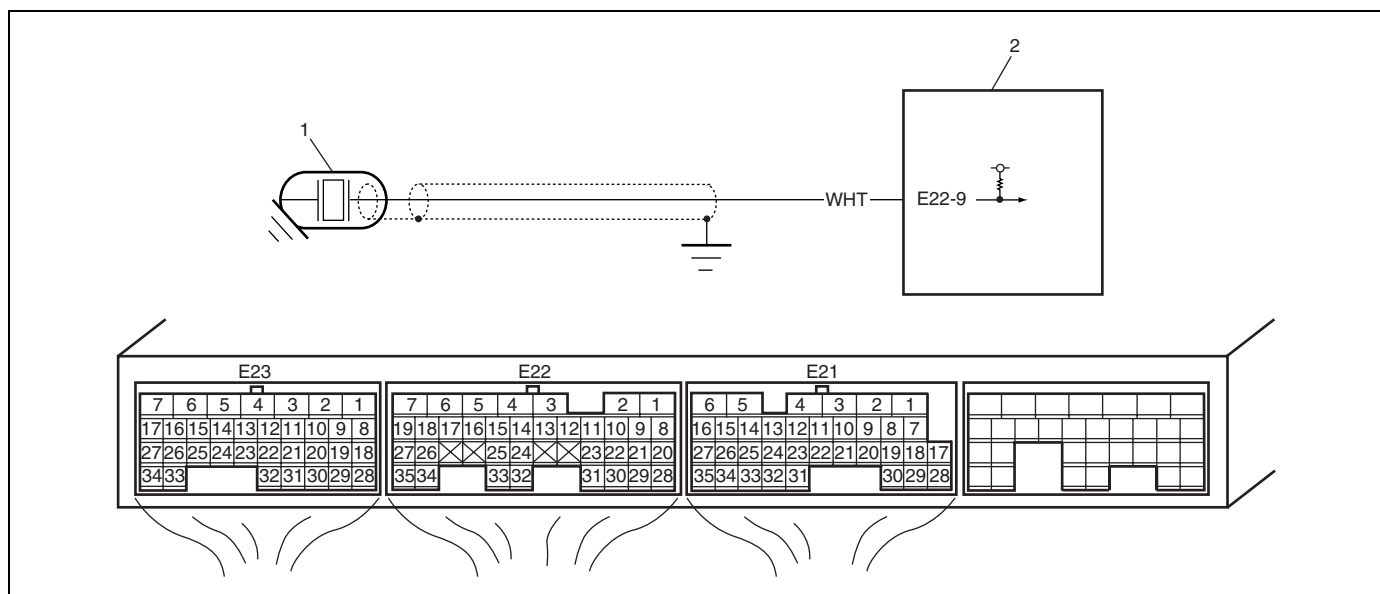
Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Does fuel level meter indicate "E" level (empty)?	Add fuel and recheck.	Go to Step 3.
3	Ignition system inspection. 1) Check spark plug and ignition spark of cylinder where misfire occurs, referring to "Spark Plugs Inspection" and "Ignition Spark Test" in Section 6F2. Is it in good condition?	Go to Step 4.	Faulty ignition coil, wire harness, spark plug or other system parts.
4	Fuel injector circuit check. 1) Using sound scope, check each injector operating sound at engine cranking or idling. Do all injectors make operating sound?	Go to Step 5.	Check coupler connection and wire harness of injector not making operating sound and injector itself. If OK, substitute a known-good ECM and recheck.
5	Fuel pressure inspection. 1) Check fuel pressure referring to "TABLE B-3 Fuel Pressure Check" in this section. Is check result satisfactory?	Go to Step 6.	Repair or replace.
6	Fuel injector inspection. 1) Check fuel injector(s) referring to "Fuel Injector Inspection" in Section 6E2. Is check result satisfactory?	Go to Step 7.	Replace.
7	Ignition timing inspection. 1) Check ignition timing referring to "Ignition Timing Inspection" in Section 6F2. Is check result satisfactory?	Go to Step 8.	Check related sensors.
8	EGR system inspection. 1) Check EGR system referring to "EGR Valve Inspection" in Section 6E2. Is check result satisfactory?	Go to Step 9.	Repair or replace.

Step	Action	Yes	No
9	Engine mechanical systems check. Check engine mechanical parts or system which can cause engine rough idle or poor performance. <ul style="list-style-type: none"> – Engine compression (Refer to “Compression Check” in Section 6A2.) – Valve lash adjuster (Refer to “Valve Lash (Clearance) Inspection in Section 6A2.) – Valve timing (Refer to “Timing Chain and Chain Tensioner Removal and Installation in Section 6A2.) Are they in good condition?	Check wire harness and connection of ECM ground, ignition system and fuel injector for intermittent open and short.	Repair or replace.

DTC P0327 Knock Sensor Circuit Low

DTC P0328 Knock Sensor Circuit High

Wiring Diagram



1. Knock sensor	2. ECM
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DTC Detecting Condition and Trouble Area

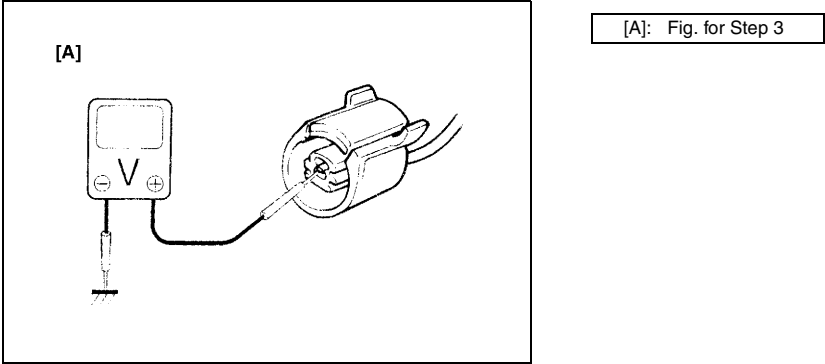
DTC Detecting Condition	Trouble Area
DTC will be set when all of the following conditions are detected for 0.5 seconds continuously. P0327 <ul style="list-style-type: none"> • Engine is running • Voltage of knock sensor is less than 1.23 V P0328 <ul style="list-style-type: none"> • Engine is running • Voltage of knock sensor is 3.91 V or more 	<ul style="list-style-type: none"> • Open or short in knock sensor circuit • Knock sensor • ECM

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
- 3) Start engine and run it for 10 sec.
- 4) Check DTC by using scan tool.

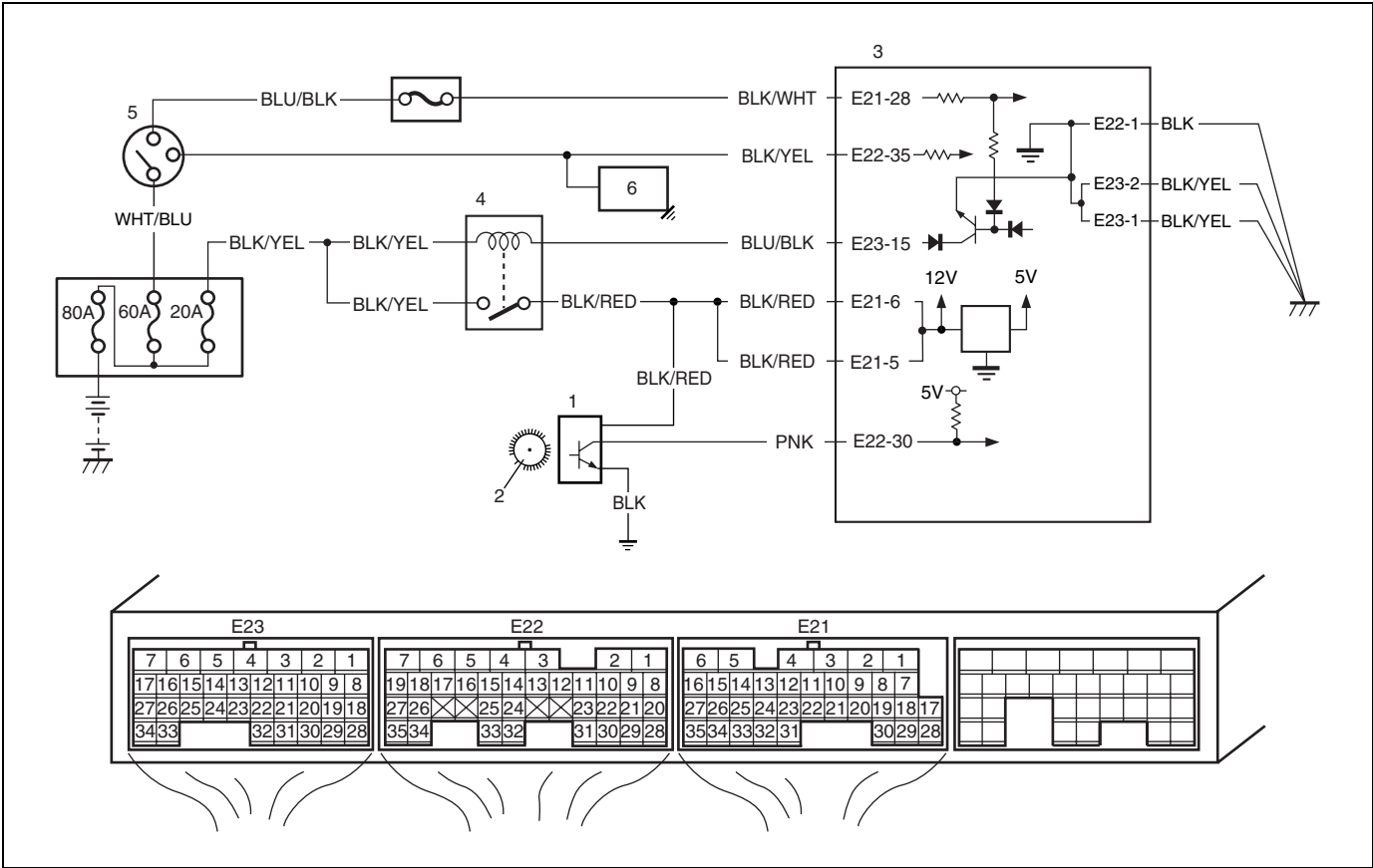
Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check sensor circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure voltage between "E22-9" wire terminal of ECM connector and vehicle body ground with engine running. Is voltage within 1.23 – 3.91 V?	Intermittent trouble. Check for intermittent refer to "Intermittent and Poor Connection Inspection" in Section 0A. If OK, substitute a known-good ECM and recheck.	Go to Step 3.
3	Check sensor circuit for open. 1) Disconnect connector from knock sensor with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between "WHT" wire of knock sensor connector and engine ground. See Fig. 1. Is voltage 4 – 6 V?	Go to Step 6.	Go to Step 4.
4	Check sensor circuit for open. 1) Turn ON ignition switch, measure voltage between "E22-9" wire terminal of ECM connector and engine ground. Is voltage 4 – 6 V?	"WHT" wire in open circuit.	Go to Step 5.
5	Check sensor circuit for short. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "E22-9" terminal of ECM connector and vehicle body ground. Is resistance infinity?	Go to Step 6.	"WHT" wire in shorted to ground circuit. If wire is OK, substitute a known-good ECM and recheck.
6	Check sensor circuit for short. 1) Turn ON ignition switch, measure voltage between "E22-9" terminal of ECM connector and vehicle body ground. Is voltage 0 V?	Go to Step 7.	"WHT" wire in shorted to other circuit.
7	Check sensor circuit for high resistance. 1) Measure resistance between "E22-9" wire terminal of ECM connector and "WHT" wire terminal of knock sensor harness connector. Is resistance below 5Ω?	Faulty knock sensor	"WHT" wire in high resistance circuit.



DTC P0335 Crankshaft Position (CKP) Sensor Circuit

Wiring Diagram



1. CKP sensor	4. Main relay
2. Sensor plate on crankshaft	5. Ignition switch
3. ECM	6. Starting motor

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
No CKP sensor signal for 2 seconds at engine cranking while starting motor signal is inputting	<ul style="list-style-type: none">• CKP sensor circuit open or short• Crankshaft timing pulley teeth damaged• CKP sensor malfunction, foreign material being attached or improper installation• ECM• Engine start signal circuit malfunction

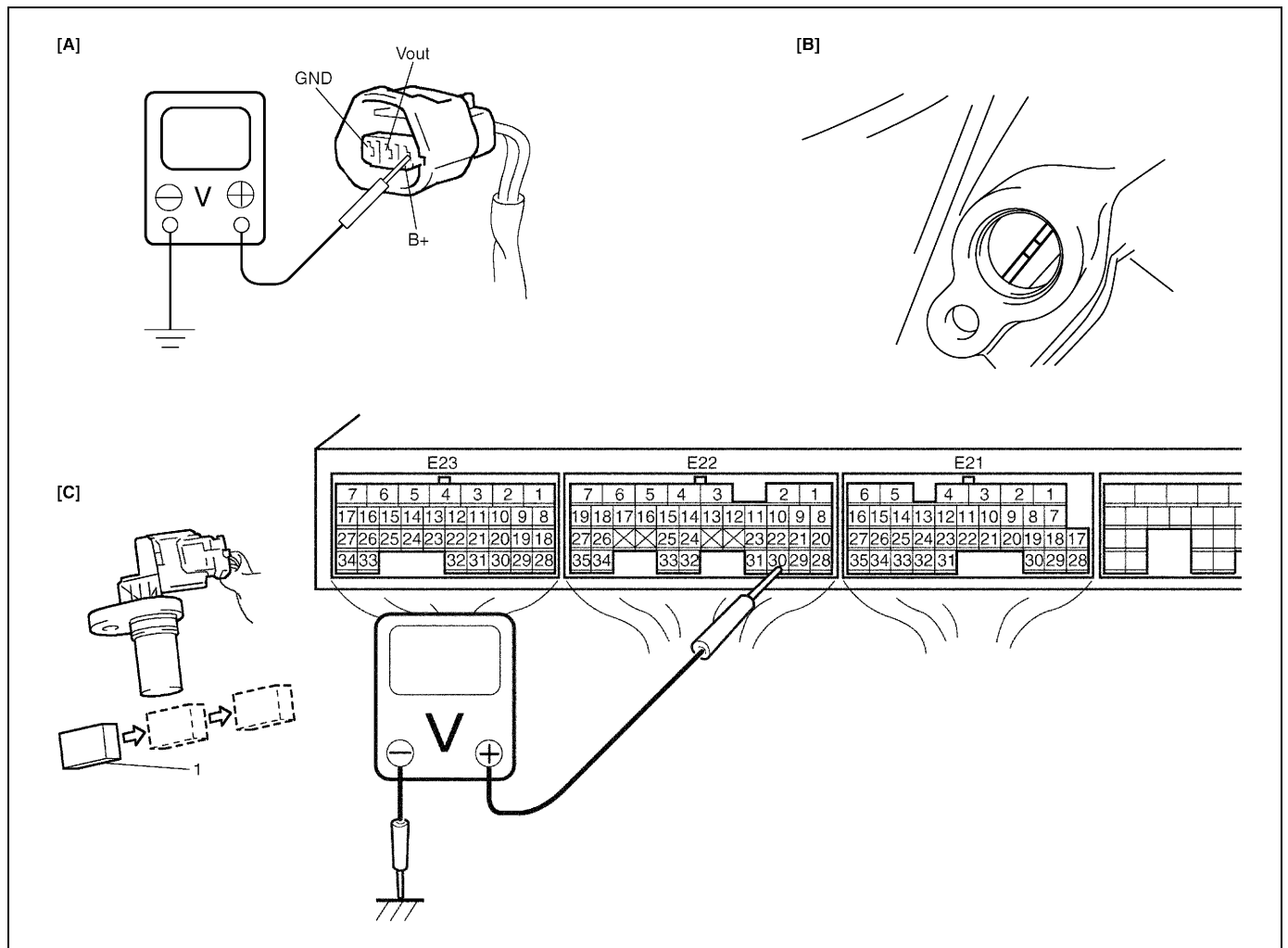
DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Crank engine for 3 – 5 sec.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was “Engine and Emission Control System Check” performed?	Go to Step 2.	Go to “Engine and Emission Control System Check” in this section.
2	Check CKP sensor and connector for proper installation. Is CKP sensor installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check Wire Harness and Connection. 1) Disconnect connector from CKP sensor. 2) Check for proper connection to CKP sensor at “BLK/RED”, “PNK” and “BLK” wire terminals. 3) If OK, turn ignition switch ON and check for voltage at “BLK/RED”, “PNK” and “BLK” wire terminals of disconnected CKP sensor connector. See fig. 1. Terminal “B+”: 10 – 14 V Terminal “Vout”: 4 – 5 V Terminal “GRD”: 0 V Is check result satisfactory?	Go to Step 5.	Go to Step 4.
4	Was terminal “Vout” voltage in Step 3 out of specification?	“PNK” wire open, short or poor connection. If wire and connection are OK, substitute a known-good ECM and recheck.	“BLK/RED” and “BLK” wire open, short or poor connection.
5	Check Ground Circuit. 1) Turn ignition switch to OFF position. 2) Measure resistance between “BLK” wire terminal of CKP sensor connector and engine ground. Is resistance below 5 Ω ?	Go to Step 6.	“BLK” wire open or high resistance.
6	Check Engine Start Signal. 1) Check voltage between “E22-35” wire terminal of ECM connector and engine ground with engine cranking. Does it voltage more than 6 V?	Go to Step 7.	“BLK/YEL” wire circuit open, high resistance or shorted to ground. If wire are OK, check starting motor referring to “Performance Test” in Section 6G.

Step	Action	Yes	No
7	<p>Check CKP Sensor.</p> <ol style="list-style-type: none"> 1) Remove CKP sensor referring to "CKP Sensor Removal and Installation" in Section 6E2. 2) Remove metal particles on end face of CKP sensor, if any. 3) Connect CKP sensor connector. 4) Turn ignition switch to ON position. 5) Check voltage between "E22-30" wire terminal of ECM connector and engine ground by passing magnetic substance (iron) (1) while keeping approx. 1 mm (0.03 in.) gap with respect to end face of CKP sensor. See fig. 2. <p>Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?</p>	Go to Step 8.	Replace CKP sensor.
8	<p>Check signal rotor for the following. See fig. 3.</p> <ul style="list-style-type: none"> • Damage • No foreign material attached <p>Is it in good condition?</p>	<p>Intermittent trouble or faulty ECM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.</p>	Clean rotor teeth or replace signal rotor.

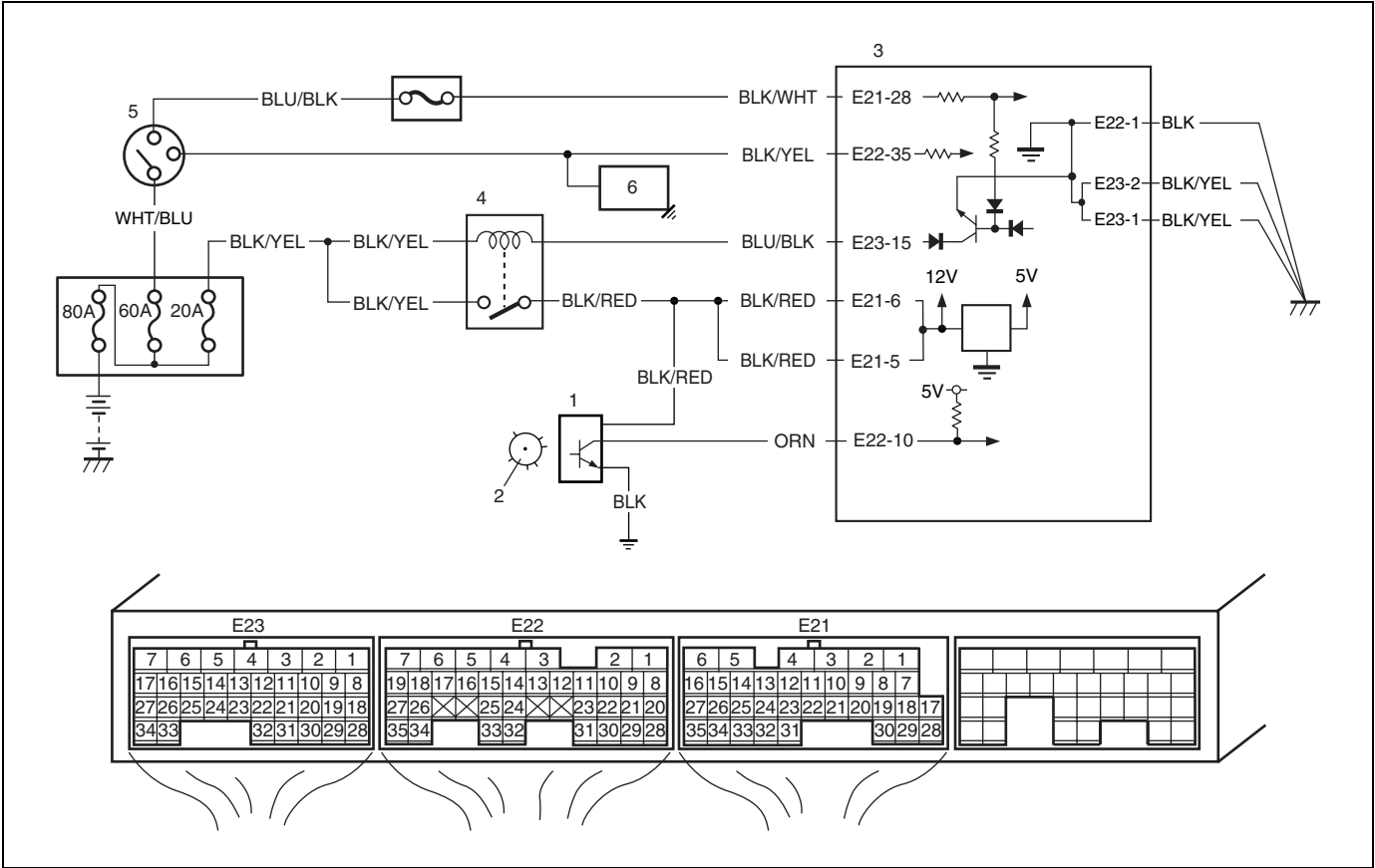


[A]: Fig. 1 for Step 3

[B]: Fig. 3 for Step 8

[C]: Fig. 2 for Step 7

Wiring Diagram



1. CMP sensor	3. ECM	5. Ignition switch
2. Signal rotor	4. Main relay	6. Starting motor

System Description

The CMP sensor located on the transmission side of cylinder head consists of the signal generator (magnetic sensor) and signal rotor (intake camshaft portion). The signal generator generates Reference signal through slits in the slit plate which turns together with the camshaft.

Reference signal

The CMP sensor generates 6 pulses of signals each of which has a different waveform length while the camshaft makes one full rotation. Refer to "Inspection of ECM and Its Circuits" in this section. Based on these signals, ECM judges which cylinder piston is in the compression stroke and the engine speed.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
No CMP sensor signal for 2.4 seconds at engine cranking while starting motor signal is inputting	<ul style="list-style-type: none">CMP sensor circuit open or shortSignal rotor teeth damagedCMP sensor malfunction, foreign material being attached or improper installationECMEngine start signal circuit malfunction

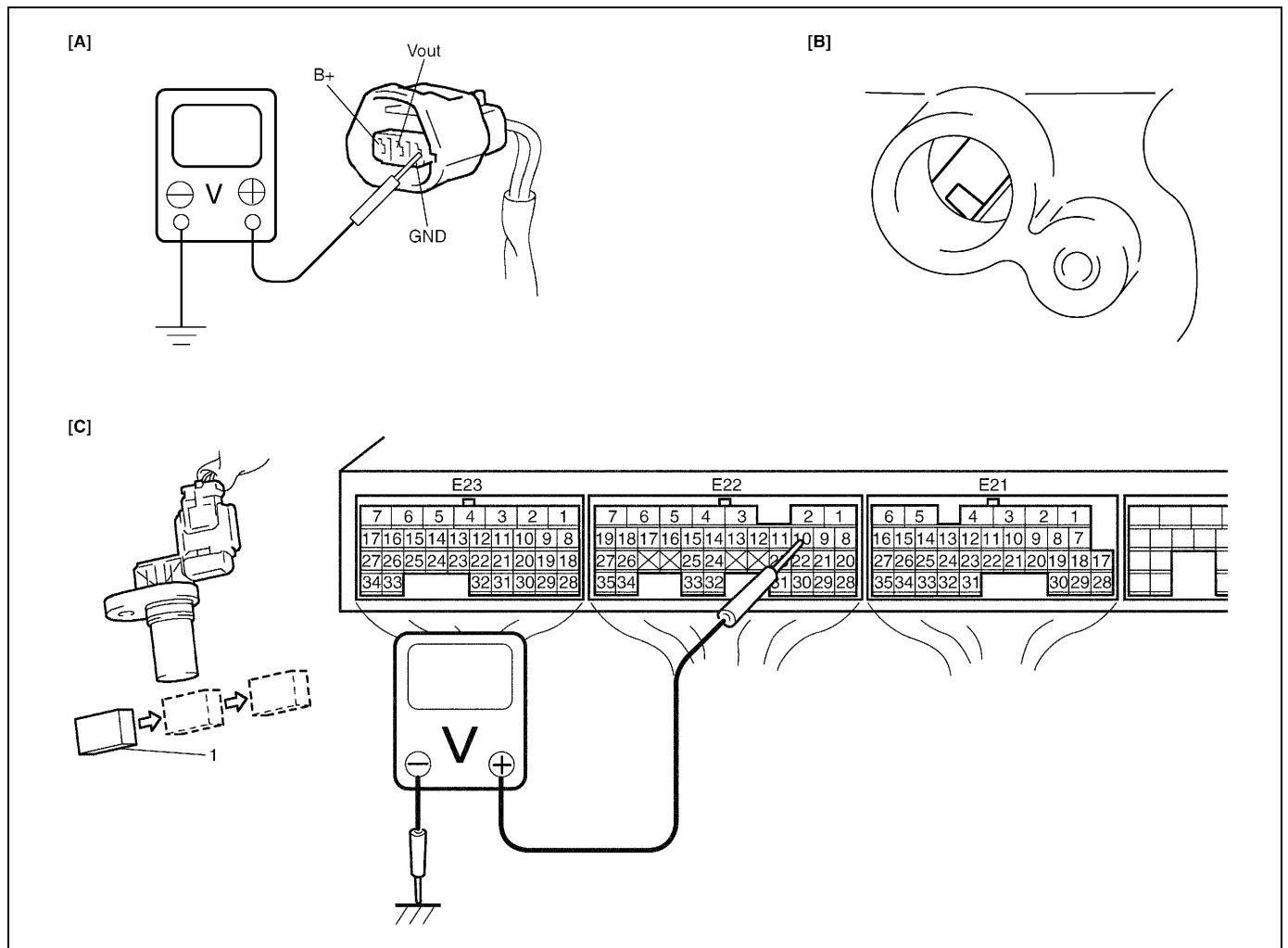
DTC Confirmation Procedure

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Crank engine for 5 sec.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check CMP sensor and connector for proper installation. Is CMP sensor installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check Wire Harness and Connection. 1) Disconnect connector from CMP sensor. 2) Check for proper connection to CMP sensor at "BLK/RED", "ORN" and "BLK" wire terminals. 3) If OK, turn ignition switch ON and check for voltage at "BLK/RED", "ORN" and "BLK" wire terminals of disconnected CMP sensor connector. See fig. 1. Terminal "B+": 10 – 14 V Terminal "Vout": 4 – 5 V Terminal "GRD": 0 V Is check result satisfactory?	Go to Step 5.	Go to Step 4.
4	Was terminal "Vout" voltage in Step 3 out of specification?	"ORN" wire open, short or poor connection. If wire and connection are OK, substitute a known-good ECM and recheck.	"BLK/RED" and "BLK" wire open, short or poor connection.
5	Check Ground Circuit. 1) Turn ignition switch to OFF position. 2) Check for continuity between "BLK" wire terminal of CKP sensor connector and engine ground. Is continuity indicated?	Go to Step 6.	"BLK" wire open or poor connection.
6	Check Engine Start Signal. 1) Check voltage between "E22-35" wire terminal of ECM connector and engine ground with engine cranking. Does it voltage more than 6 V?	Go to Step 7.	"BLK/YEL" wire circuit open or shorted to ground. If wire are OK, check starting motor referring to "Performance Test" in Section 6G.

Step	Action	Yes	No
7	<p>Check CMP Sensor.</p> <ol style="list-style-type: none"> 1) Remove CMP sensor referring to "CMP Sensor Removal and Installation" in Section 6E2. 2) Remove metal particles on end face of CMP sensor, if any. 3) Connect CMP sensor connector. 4) Turn ignition switch to ON position. 5) Check voltage between "E22-10" terminal of ECM connector and engine ground by passing magnetic substance (iron) (1) while keeping approx. 1 mm (0.03 in.) gap with respect to end face of CMP sensor. See fig. 2. <p>Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?</p>	Go to Step 8.	Replace CMP sensor.
8	<p>Check signal rotor for the following. See fig. 3.</p> <ul style="list-style-type: none"> • Damage • No foreign material attached <p>Is it in good condition?</p>	<p>Intermittent trouble or faulty ECM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.</p>	Clean rotor teeth or replace signal rotor.

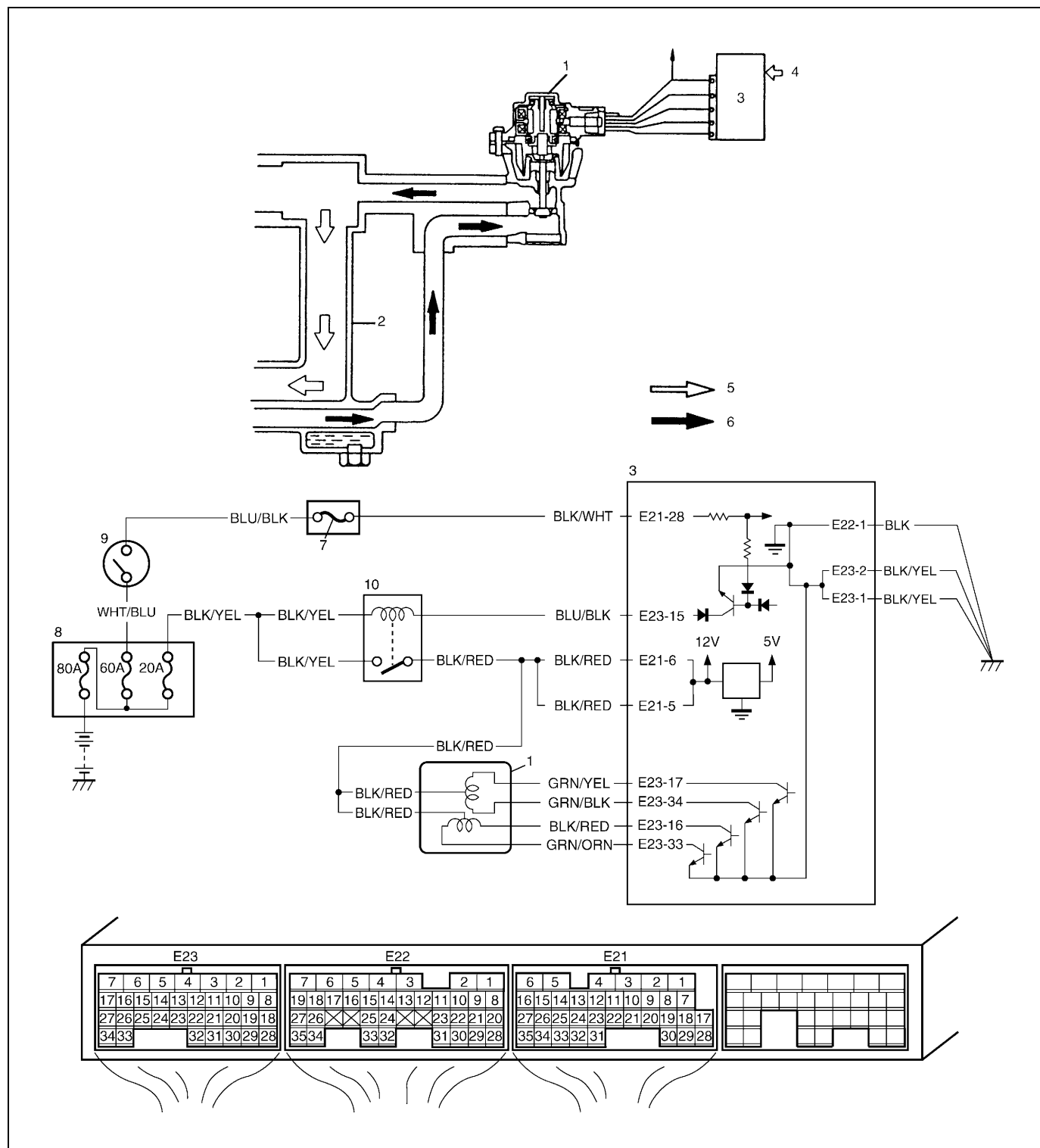


[A]: Fig. 1 for Step 3

[B]: Fig. 3 for Step 8

[C]: Fig. 2 for Step 7

DTC P0402 Exhaust Gas Recirculation Flow Excessive Detected



1. EGR valve	4. Sensed information	7. "IG COIL" fuse	10. Main relay
2. Intake manifold	5. Fresh air	8. Relay box	
3. ECM	6. Exhaust gas	9. Ignition switch	

DTC Detecting Condition and Trouble Area (DTC P0401/P0402)

DTC Detecting Condition	Trouble Area
<p>DTC P0401: Difference in intake manifold absolute pressure between opened EGR valve and closed EGR valve is smaller than specified value.</p> <p>DTC P0402: Difference in intake manifold absolute pressure between opened EGR valve and closed EGR valve is larger than specified value.</p> <p>(*2 driving cycle detection logic, monitoring once/1 driving)</p>	<ul style="list-style-type: none"> • EGR valve • EGR passage • MAP sensor • ECM

DTC Confirmation Procedure (DTC P0401/P0402)**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

NOTE:

Check to make sure that following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

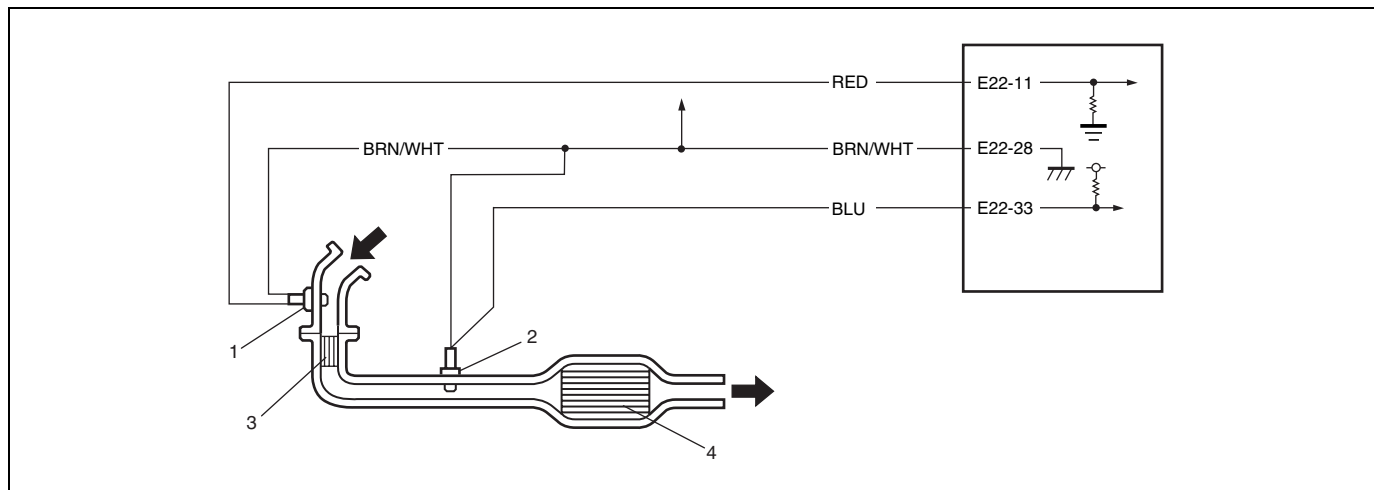
- Intake air temp.: -7°C (19.4°F) or higher
- Engine coolant temp.: 70°C (158°F) or higher
- Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)

- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and warm up to normal operating temperature.
- 4) Increase engine speed to 3000 rpm in 3rd gear.
- 5) Release accelerator pedal and with engine brake applied, keep vehicle coasting for 5 sec. or more. (Keep fuel cut condition for 5 sec. or more) If fuel cut condition is not kept for 5 sec. or more, coast down a slope in engine speed 1000 – 3000 rpm for 5 sec. or more.
- 6) Stop vehicle and run engine at idle.
- 7) Check DTC and pending DTC by using scan tool.

Troubleshooting

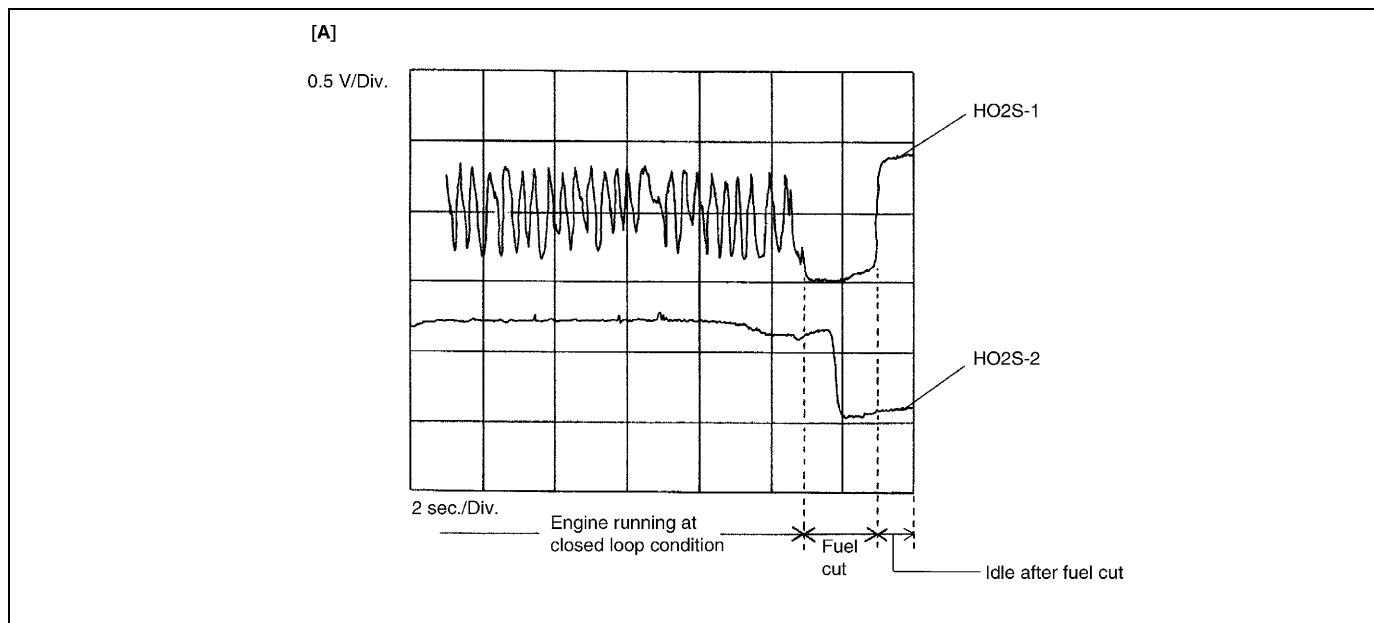
Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Do you have SUZUKI scan tool?	Go to Step 3.	Go to Step 5.
3	<p>EGR valve operation check.</p> <p>1) With ignition switch turned OFF, install SUZUKI scan tool.</p> <p>2) Check EGR system referring to "EGR System Inspection" in Section 6E2.</p> <p>Is it in good condition?</p>	Go to Step 4.	Go to Step 10.

Step	Action	Yes	No
4	MAP sensor check. 1) Check MAP sensor for performance referring to "MAP Sensor Individual Check" in "DTC P0108" Diag. Flow Table. Is check result satisfactory?	Intermittent trouble or faulty ECM Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.	Repair or replace.
5	EGR valve power supply circuit check. 1) With ignition switch turned OFF, disconnect EGR valve coupler. 2) With ignition switch turned ON, check voltage between "BLK/RED" wire terminal of EGR valve coupler and engine ground. Is each voltage 10 – 14 V?	Go to Step 6.	Faulty "BLK/RED" wire.
6	Check wire circuit. 1) Measure voltage between engine ground and each "GRN/YEL", "GRN/BLK", "BLK/RED" and "GRN/ORN" wire terminal of EGR valve connector. Is each voltage 0 V?	Go to Step 7.	Some wire shorted to other circuits. If wires are OK, substitute a known-good ECM and recheck.
7	Check wire circuit. 1) With ignition switch turned OFF, check that there are insulating between engine ground and each "GRN/YEL", "GRN/BLK", "BLK/RED" and "GRN/ORN" wire terminal of EGR valve connector. Are there insulating?	Go to Step 8.	Some wire shorted to ground circuit. If wires are OK, substitute a known-good ECM and recheck.
8	EGR valve stepping motor coil circuit check. 1) With ignition switch turned OFF, connect EGR valve coupler and disconnect ECM couplers. 2) Check resistance between "E21-5/6" and "E23-17", "E23-34", "E23-16", "E23-33" wire terminal of ECM connector. Is each resistance 20 – 24 Ω at 20°C, 68°F.	Go to Step 9.	Faulty "GRN/YEL", "GRN/BLK", "BLK/RED" and "GRN/ORN" wire or EGR valve.
9	Check wire circuit. 1) Measure voltage between engine ground and each "GRN/YEL", "GRN/BLK", "BLK/RED" and "GRN/ORN" wire terminal of EGR valve connector. Is each voltage 10 – 14 V?	Some wire in high resistance circuit. If wires are good condition, faulty EGR valve.	Some wire open circuit. If wires are good condition, faulty EGR valve.
10	MAP sensor check: 1) Check MAP sensor for performance referring to "MAP Sensor Individual Check" in "DTC P0108" Diag. Flow Table. Is check result satisfactory?	EGR passage clogged or EGR valve malfunction, If all above are OK, substitute known-good ECM and recheck.	Repair or replace.

DTC P0420 Catalyst System Efficiency Below Threshold**System/Wiring Diagram****Circuit Description**

ECM monitors oxygen concentration in the exhaust gas which has passed the three way catalytic converter by HO2S-2 (2).

When the catalyst is functioning properly, the variation cycle of HO2S-2 (2) output voltage (oxygen concentration) is slower than that of HO2S-1 (1) output voltage because of the amount of oxygen in the exhaust gas which has been stored in warm up three way catalytic converter (3) and three way catalytic converter (4).

Reference

[A]: Oscilloscope Waveforms

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
<ul style="list-style-type: none"> • While vehicle running at constant speed under other than high load. • Time from rich or lean switching command is output till HO2S-2 output voltage crosses 0.45 V is less than specified value. <p>*2 driving cycle detection logic, monitoring once/1 driving</p>	<ul style="list-style-type: none"> • Exhaust gas leak • Three way catalytic converter malfunction • HO2S-2 malfunction • HO2S-1 malfunction

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

NOTE:

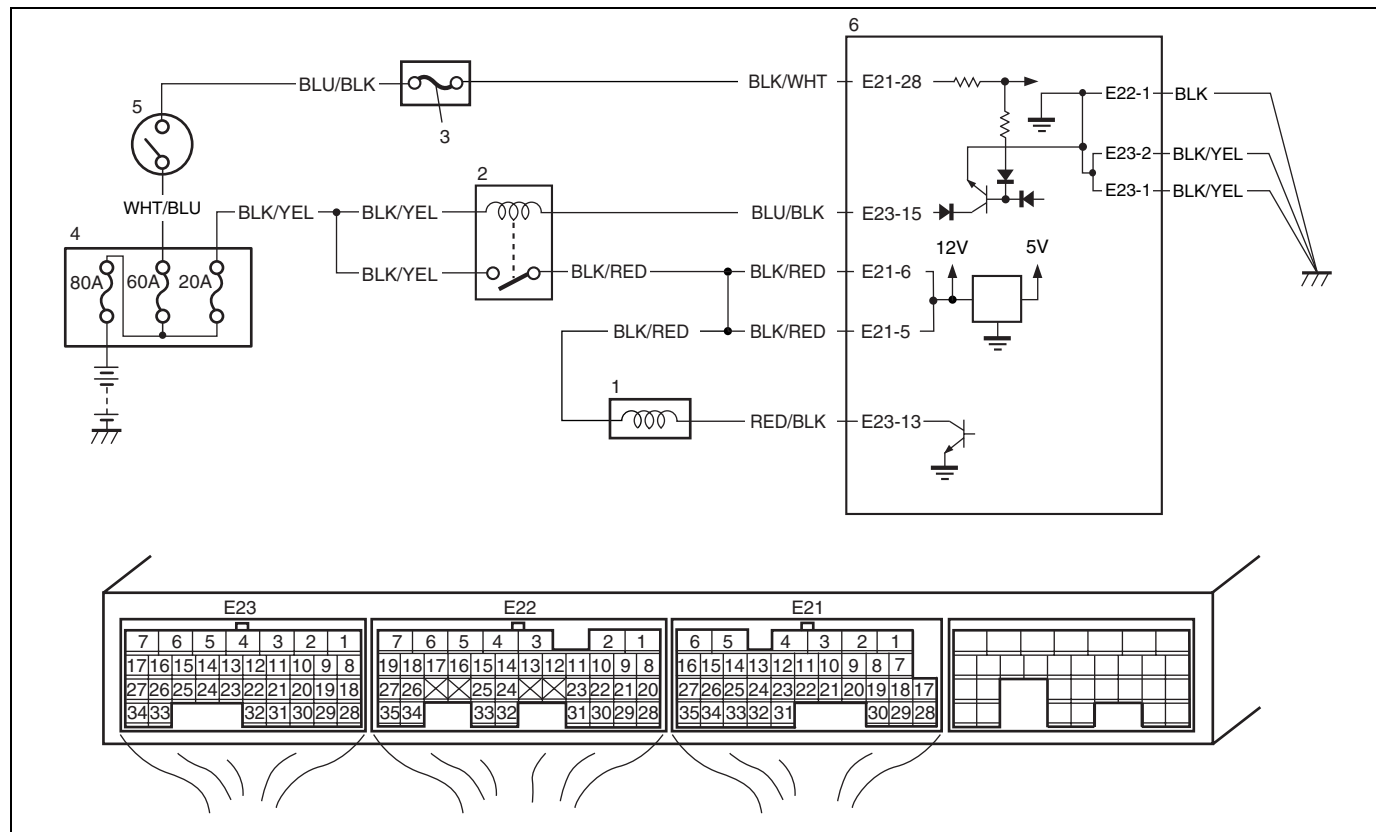
Check to make sure that following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

- Intake air temp.: -7°C (19.4°F) or higher
- Engine coolant temp.: 70°C (158°F) or higher
- Altitude (barometric pressure): 2500 m, 8200 ft or less (540 mmHg, 72 kPa or more)

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Increase vehicle speed to 50 – 60 mph, 80 – 100 km/h. (engine speed: 2500 – 3000 r/min.)
- 4) Keep above vehicle speed for 10 min. or more (Throttle valve opening is kept constant in this step).
- 5) Stop vehicle and check if DTC/pending DTC exists using scan tool. If not, check if catalyst monitoring test has completed using scan tool. If not in both of above checks (i.e., no DTC/pending DTC and catalyst monitoring test not completed), check vehicle condition (environmental) and repeat step 3) through 5).

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Exhaust system visual inspection. 1) Check exhaust system for leaks, damage and loose connection. Is it in good condition?	Go to Step 3.	Repair or replace.
3	HO2S-2 output voltage check. 1) Check output voltage of HO2S-2 referring to DTC P0137 or P0138 Diag. Flow Table. Is check result satisfactory?	Replace three way catalytic converter.	Check "BLU" and "BRN/WHT" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-2.

DTC P0443 Evaporative Emission System Purge Control Valve Circuit**Wiring Diagram**

1. EVAP canister purge valve	3. "IG COIL" fuse	5. Ignition switch
2. Main relay	4. Relay box	6. ECM

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Monitor signal of EVAP canister purge valve is different from command signal. (Circuit open or short) (2 driving cycle detection logic)	<ul style="list-style-type: none"> • EVAP canister purge valve • EVAP canister purge valve circuit • ECM

DTC Confirmation Procedure**WARNING:**

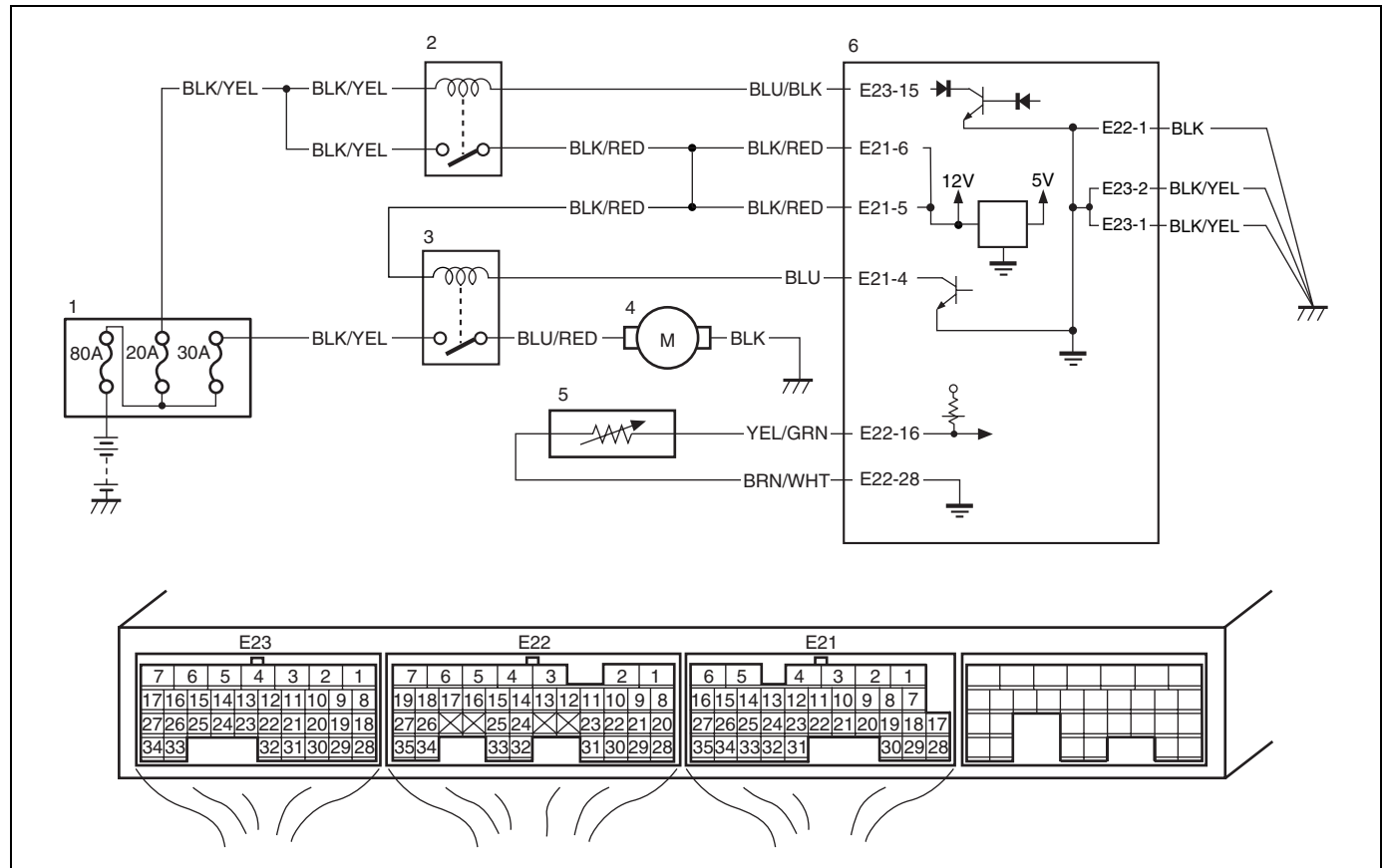
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) With ignition switch OFF, connect scan tool to DLC.
- 2) Turn On ignition switch and clear DTC using scan tool.
- 3) Start engine and run engine at idle speed (600 rpm or more) for 1 minute with all electric loads turned OFF.
- 4) Check DTC and pending DTC.

Troubleshooting**WARNING:**

In order to reduce risk of fire and personal injury, this work must be performed in a well ventilated area and away from any open flames such as gas hot water.

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Check EVAP canister purge power supply circuit. 1) Turn OFF ignition switch, disconnect connector from EVAP canister purge valve. 2) Measure voltage between engine ground and "BLK/RED" wire terminal of EVAP canister purge valve connector with ignition switch turned ON. Is it voltage 10 – 14 V?	Go to step 3.	"BLK/RED" wire open circuit.
3	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "E23-13" terminal of ECM connector and vehicle body ground. Is resistance infinity?	Go to Step 4.	"RED/BLK" wire shorted to ground circuit.
4	Check wire circuit. 1) Measure voltage between "E23-13" terminal of ECM connector and vehicle body ground. Is voltage 0 V?	Go to Step 5.	"RED/BLK" wire shorted to others circuit.
5	Check wire circuit. 1) Connect connector to purge control valve with ignition switch turned OFF. 2) Remove ECM from vehicle body and then connect connectors to ECM. 3) Turn ON ignition switch, measure voltage between "E23-13" terminal of ECM connector and vehicle body ground. Is it voltage 10 – 14 V?	Go to Step 6.	"RED/BLK" wire open circuit.
6	Check EVAP canister purge control valve. 1) Check EVAP canister purge control valve referring to "Evaporative Emission Control System Inspection" in Section 6E2. Is it in good condition?	Go to Step 7.	Faulty EVAP canister purge control valve.
7	Check EVAP canister purge control circuit. 1) With ignition switch turn OFF, measure resistance between "E21-5/6" terminal and "E23-13" terminal of ECM connector. Is resistance below 40 Ω at 20°C, 68°F?	Faulty ECM, substitute a known-good ECM and recheck.	"BLK/RED" and/or "RED/BLK" wire in high resistance circuit.

DTC P0480 Fan 1 (Radiator Cooling Fan) Control Circuit**Wiring Diagram**

1. Relay box	3. Radiator fan relay	5. ECT sensor
2. Main relay	4. Radiator fan motor	6. ECM

Circuit Description

Radiator fan relay is controlled by ECM if ECT is specified value.

When A/C condenser fan motor is running while head light is turned ON and engine is running at below 1500 r/min, radiator fan relay is turned OFF for 2 sec. by ECM.

DTC Detecting Condition	Trouble Area
<ul style="list-style-type: none"> Monitor signal of radiator fan relay is different from command signal. 	<ul style="list-style-type: none"> "BLK/RED" or "BLU" circuit open or short Radiator fan relay malfunction ECM malfunction

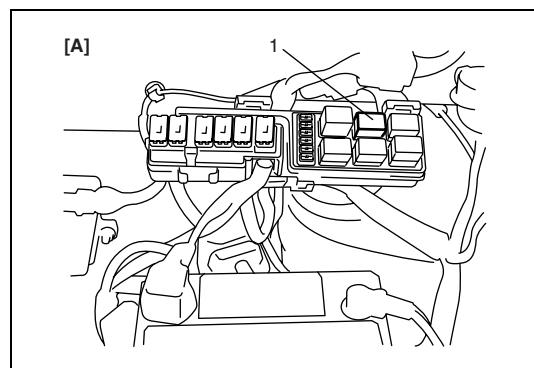
DTC Confirmation Procedure

- 1) Turn ignition switch turned OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Warm up engine until radiator cooling fan starts to operate.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Check Relay Circuit 1) Disconnect radiator fan relay from relay box with ignition switch turned OFF. (See Fig. 1.) 2) Turn ignition switch to ON position. 3) Measure voltage between "BLK/RED" wire terminal of radiator fan relay connector and engine ground. Is voltage 10 – 14 V?	Go to Step 3.	"BLK/RED" wire in open or high resistance circuit.
3	Check Relay Circuit 1) Turn ignition switch to OFF position. 2) Install radiator fan relay to relay box. 3) Disconnect connectors from ECM. 4) Remove ECM from vehicle body and then connect connectors to ECM. 5) Turn ignition switch to ON position. 6) Measure voltage between "E21-4" wire terminal of ECM connector and vehicle body ground. Is voltage 10 – 14 V?	Go to Step 4.	Go to Step 6.
4	Check Relay Circuit 1) Turn ignition switch to OFF position. 2) Disconnect connectors from ECM. 3) Remove radiator fan relay from relay box. 4) Measure voltage between "E21-4" wire terminal of ECM connector and vehicle body ground with ignition switch turned ON. Is voltage 0 V?	Go to Step 5.	"BLU" wire shorted to power circuit.
5	Radiator Fan Control Signal Check 1) Disconnect negative (–) cable at battery. 2) Disconnect connector from ECT sensor. 3) Connect connectors to ECM. 4) Install radiator fan relay to relay box. 5) Connect negative (–) cable to battery. 6) Measure voltage between "E21-4" wire terminal of ECM connector and vehicle body ground with ignition switch turned ON. Is voltage about 0 V?	System is in good condition.	Substitute a known-good ECM and recheck.
6	Radiator Fan Control Signal Check 1) Turn ignition switch to OFF position. 2) Install radiator fan relay to relay box. 3) Disconnect connectors from ECM. 4) Measure voltage between "E21-4" wire terminal of ECM connector and vehicle body ground with ignition switch turned ON. Is voltage 10 – 14 V?	Substitute a known-good ECM and recheck.	Go to Step 7.

Step	Action	Yes	No
7	Check Relay Circuit 1) Turn ignition switch to OFF position. 2) Disconnect connectors from ECM. 3) Remove radiator fan relay from relay box. 4) Check for proper connection to "E21-4" wire terminal of ECM connector and "BLU" wire terminal of radiator fan relay connector. 5) If OK, measure resistance between "E21-4" wire terminal of ECM connector and "BLU" wire terminal of radiator fan relay connector. Is resistance 1 Ω or less?	Go to Step 8.	"BLU" wire in open or high resistance circuit.
8	Check Relay Circuit 1) Measure resistance between "E21-4" wire terminal of ECM connector and vehicle body ground. Is it infinite?	Go to Step 9.	"BLU" wire shorted to ground circuit.
9	Check Radiator Fan Relay 1) Check radiator fan relay referring to "Main Relay, Fuel Pump Relay and Radiator Fan Relay Inspection" in Section 6E2. Is it in good condition?	System is in good condition. Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.	Replace radiator fan relay.

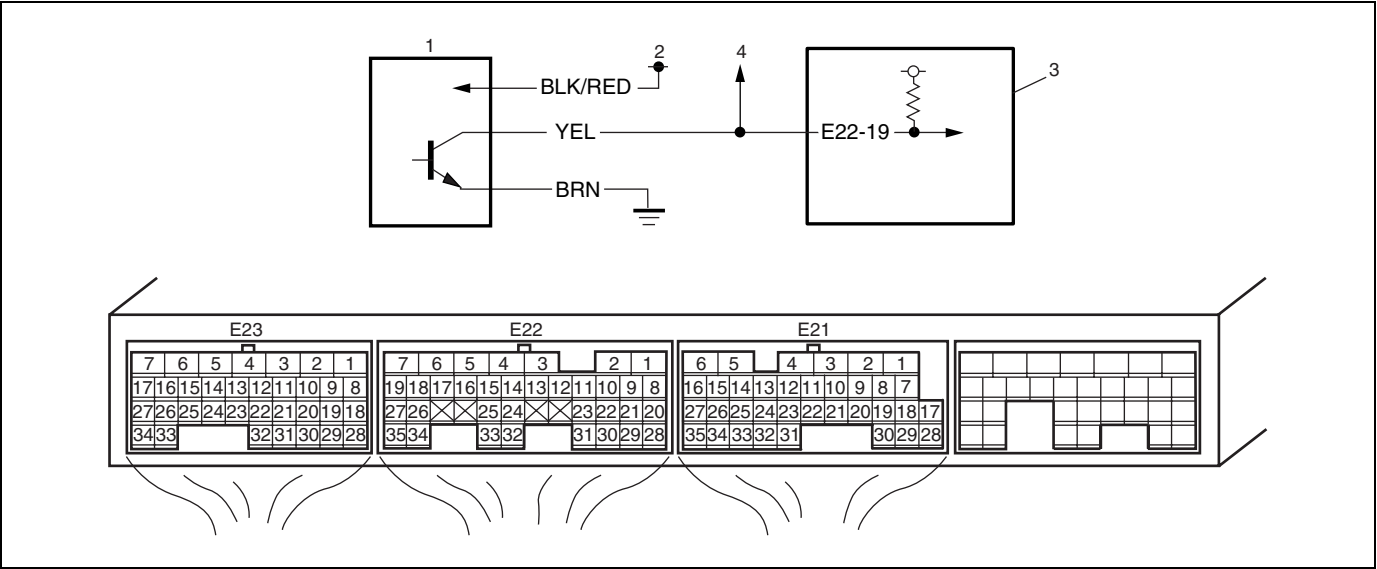


[A]: Fig. 1 for Step 2

1. Radiator fan relay

DTC P0500 Vehicle Speed Sensor (VSS) Malfunction

Wiring Diagram



1. VSS	3. ECM
2. To main relay	4. To TCM (if equipped)

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
<ul style="list-style-type: none">Vehicle speed signal is not input while fuel cut at deceleration for 4 seconds continuously.	<ul style="list-style-type: none">“BRN” circuit open“YEL” or “BLK/RED” circuit open or shortVSS malfunctionECM malfunction

DTC Confirmation Procedure

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

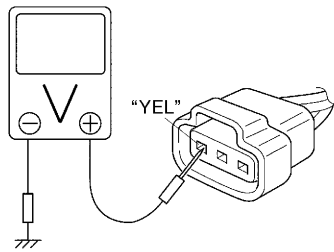
- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Warm up engine to normal operating temperature.
- 4) Increase vehicle speed to 50 mph, 80 km/h.
- 5) Release accelerator pedal and with engine brake applied, keep vehicle coasting for 6 sec. or more (fuel cut condition for 5 sec. or more) and stop vehicle.
- 6) Check pending DTC and DTC.

Troubleshooting

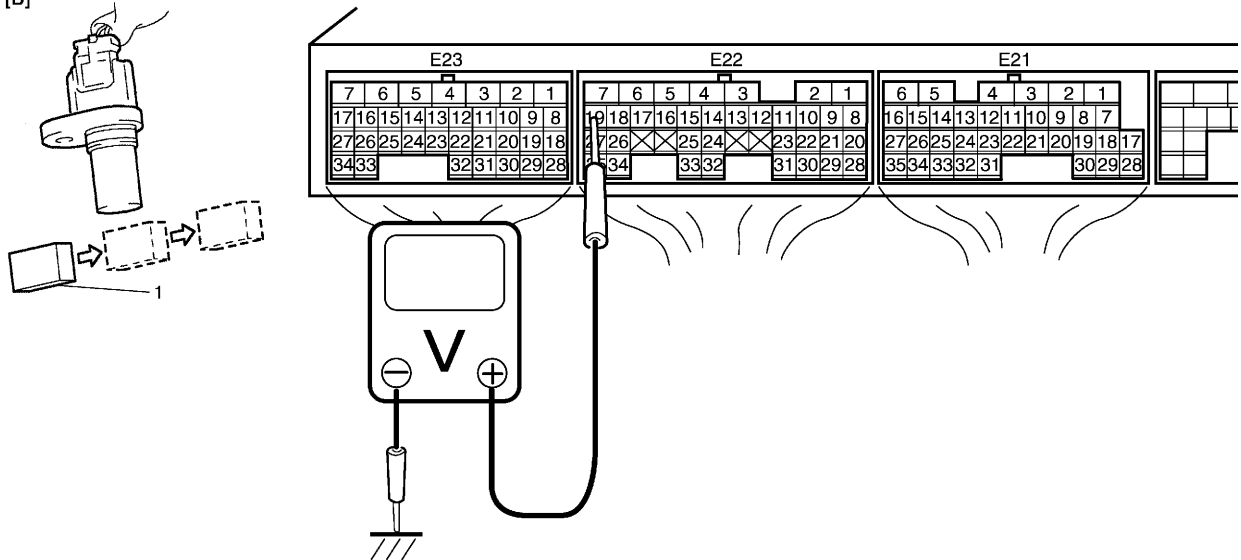
Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Check vehicle speed signal. Is vehicle speed displayed on scan tool in step 4) and 5) of DTC confirmation procedure?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.	Go to Step 3.
3	Check power supply circuit. 1) With ignition switch turned OFF, disconnect connector from VSS. 2) Check for proper connection for "BLK/RED", "BRN" and "YEL" wire terminal. 3) If wires are OK, turn ON ignition switch, measure voltage between engine ground and "BLK/RED" wire terminal. Is it voltage 10 – 14 V?	Go to Step 4.	"BLK/WHT" wire open circuit.
4	Check ground circuit. 1) Measure resistance between engine body ground and "BRN" wire terminal with ignition switch turn OFF. Is resistance below 5 Ω ?	Go to Step 5.	"BRN" wire open or high resistance circuit.
5	Check wire circuit. 1) Turn ON ignition switch, measure voltage between engine ground and "YEL" wire terminal at VSS connector. See Fig. 1. Is it voltage 4 – 5 V?	Go to Step 9.	Go to Step 6.
6	Check ECM voltage. 1) Turn ON ignition switch, measure voltage between vehicle body ground and "E22-19" terminal at ECM connector. Is it voltage 4 – 5 V?	"YEL" wire open circuit.	Go to Step 7.
7	Check short circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between engine ground and "E22-19" terminal. Is it voltage 0 V?	Go to Step 8.	"YEL" wire shorted to power supply circuit.
8	Check short circuit. 1) Measure resistance between engine ground and "E22-19" terminal with ignition switch turned OFF. Is resistance infinity?	Go to Step 9.	"YEL" wire shorted to ground circuit. If wire are OK, substitute a known-good ECM and recheck.

Step	Action	Yes	No
9	<p>Check vehicle speed sensor signal.</p> <ol style="list-style-type: none"> 1) Remove VSS referring to "Vehicle Speed Sensor (VSS)" in Section 7A2 or "Output Shaft Speed Sensor (VSS)" in Section 7B1. 2) Remove metal particles on end face of VSS, if any. 3) Connect connectors to ECM and VSS with ignition switch turned OFF. 4) Turn ignition switch to ON position. 5) Check voltage between "E22-19" terminal of ECM connector and engine ground by passing magnetic substance (iron) (1) while keeping approx. 1 mm (0.03 in.) gap with respect to end face of VSS. See Fig. 2. <p>Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?</p>	Go to Step 12.	Go to Step 10.
10	<p>Check vehicle speed sensor signal.</p> <ol style="list-style-type: none"> 1) Turn ignition switch to OFF position. 2) Disconnect connectors from combination meter. 3) Turn ignition switch to ON position. 4) Check voltage between "E22-19" terminal of ECM connector and engine ground by passing magnetic substance (iron) (1) while keeping approx. 1 mm (0.03 in.) gap with respect to end face of VSS. <p>Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?</p>	Replace combination meter.	Go to Step 11.
11	<p>Check vehicle speed sensor signal.</p> <ol style="list-style-type: none"> 1) Turn ignition switch to OFF position. 2) Disconnect connectors from TCM. 3) Turn ignition switch to ON position. 4) Check voltage between "E22-19" terminal of ECM connector and engine ground by passing magnetic substance (iron) (1) while keeping approx. 1 mm (0.03 in.) gap with respect to end face of VSS. <p>Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?</p>	Substitute a known-good TCM and recheck.	Replace VSS.
12	<p>Check signal rotor.</p> <ol style="list-style-type: none"> 1) Remove VSS referring to "Vehicle Speed Sensor (VSS)" in Section 7A2 or "Output Shaft Speed Sensor (VSS)" in Section 7B1. 2) Visually inspect VSS sensor signal rotor for damage. <p>Was any damage found?</p>	Faulty VSS signal rotor.	Substitute a known-good VSS and recheck.

[A]

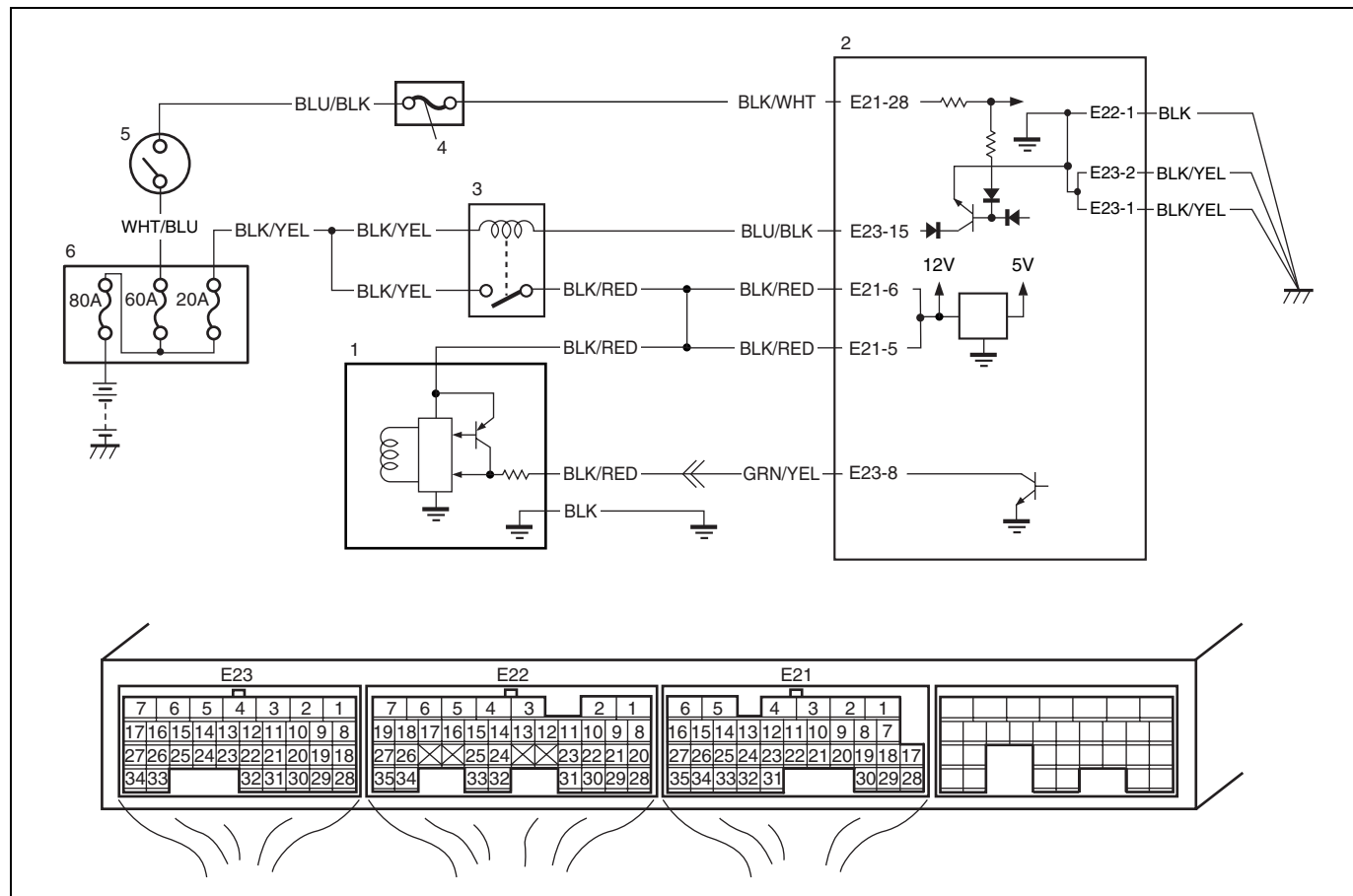


[B]



[A]: Fig. 1 for Step 5

[B]: Fig. 2 for Step 9

DTC P0505 Idle Air Control System**System/Wiring Diagram**

1. IAC valve	4. "IG COIL" fuse
2. ECM	5. Ignition switch
3. Main relay	6. Relay box

DTC Detecting Condition and Trouble Area (DTC P0505)

DTC Detecting Condition	Trouble Area
IAC valve signal voltage is out of specification for specified time continuously. (2 driving cycle detection logic)	<ul style="list-style-type: none"> Idle air control valve or its circuit ECM

DTC Confirmation Procedure**NOTE:**

Check to make sure that the following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

Electric load (lighting, heater blower, rear defogger, etc.) and A/C are turned OFF.

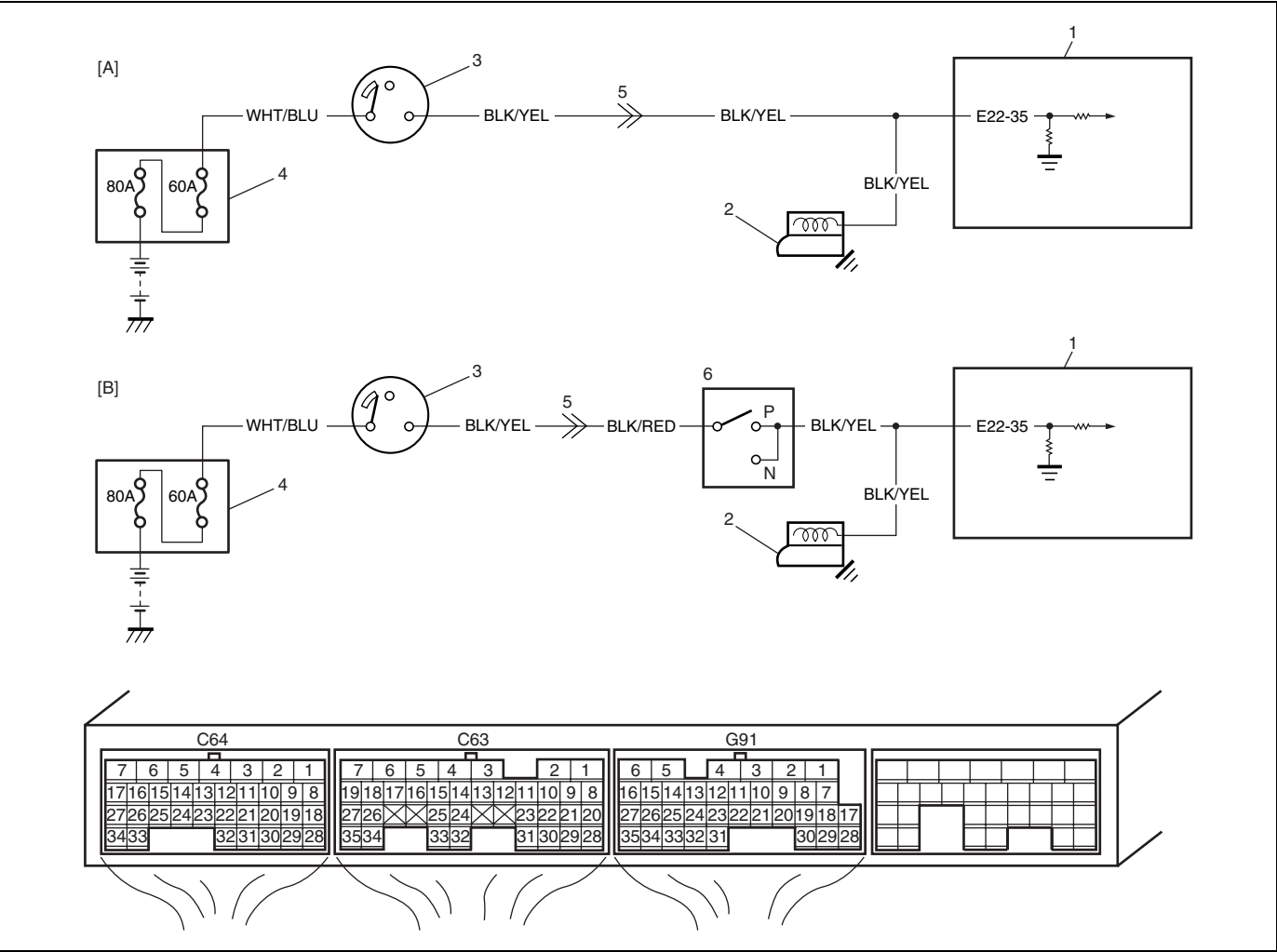
- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and warm up to normal operating temperature (80°C – 110°C, 176°F – 230°F).
- 4) Run engine at idle speed (600 – 1000 r/min.) for 1 min. or more.
- 5) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	Idle Speed Check 1) Check idle speed/idle air control duty referring to "Idle Speed/Idle Air Control Duty Inspection" in Section 6E1. Is check result as specified?	Go to Step 3.	Go to Step 4.
3	Idle Air Control Valve Operation Check 1) Check idle air control valve for operation referring to "Idle Air Control (IAC) Valve Operation Check" in this section. Is check result satisfactory?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A. If OK, substitute a known-good ECM and recheck.	Go to Step 4.
4	Idle Air Control Valve Circuit Check 1) Disconnect connector from idle air control valve with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between "BLK/RED" wire terminals of idle air control valve connector and engine ground. Is voltage 10 – 14 V?	Go to Step 5.	"BLK/RED" wire in open or high resistance circuit.
5	Idle Air Control Valve Check 1) Check idle air control valve for resistance referring to "Idle Air Control (IAC) Valve Check" in this section. Is check result satisfactory?	Go to Step 6.	Replace idle air control valve.
6	Idle Air Control Valve Circuit Check 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "BLK/RED" wire terminal of idle air control valve connector and "E23-8" terminal of ECM connector. Are resistance 2 Ω or less?	Go to Step 7.	"BLK/RED" or "GRN/YEL" wire in open or high resistance circuit.
7	Idle Air Control Valve Circuit Check 1) Measure resistance between "E23-8" terminal of ECM connector and vehicle body ground. Is resistance infinite?	Go to Step 8.	"BLK/RED" or "GRN/YEL" wire in shorted to ground circuit.
8	Idle Air Control Valve Circuit Check 1) Connect connectors to ECM. 2) Turn ON ignition switch, measure voltage between "E23-8" terminal of ECM connector and vehicle body ground. Is each voltage 0 V?	Replace idle air control valve.	"BLK/RED" or "GRN/YEL" wire in shorted to power circuit.

DTC P1500 Starter Signal Circuit Malfunction

Wiring Diagram



[A]: M/T Vehicle	1. ECM	3. Ignition switch	5. Instrument panel harness/engine harness connector
[B]: A/T Vehicle	2. Starter motor	4. Relay box	6. Transmission range sensor (shift switch)

DTC Detecting Condition	Trouble Area
<ul style="list-style-type: none">Low voltage at terminal "E22-35" when cranking engineHigh voltage at terminal "E22-35" after starting engine (2 driving cycle detection logic)	<ul style="list-style-type: none">Engine starter signal circuitECM

DTC Confirmation Procedure

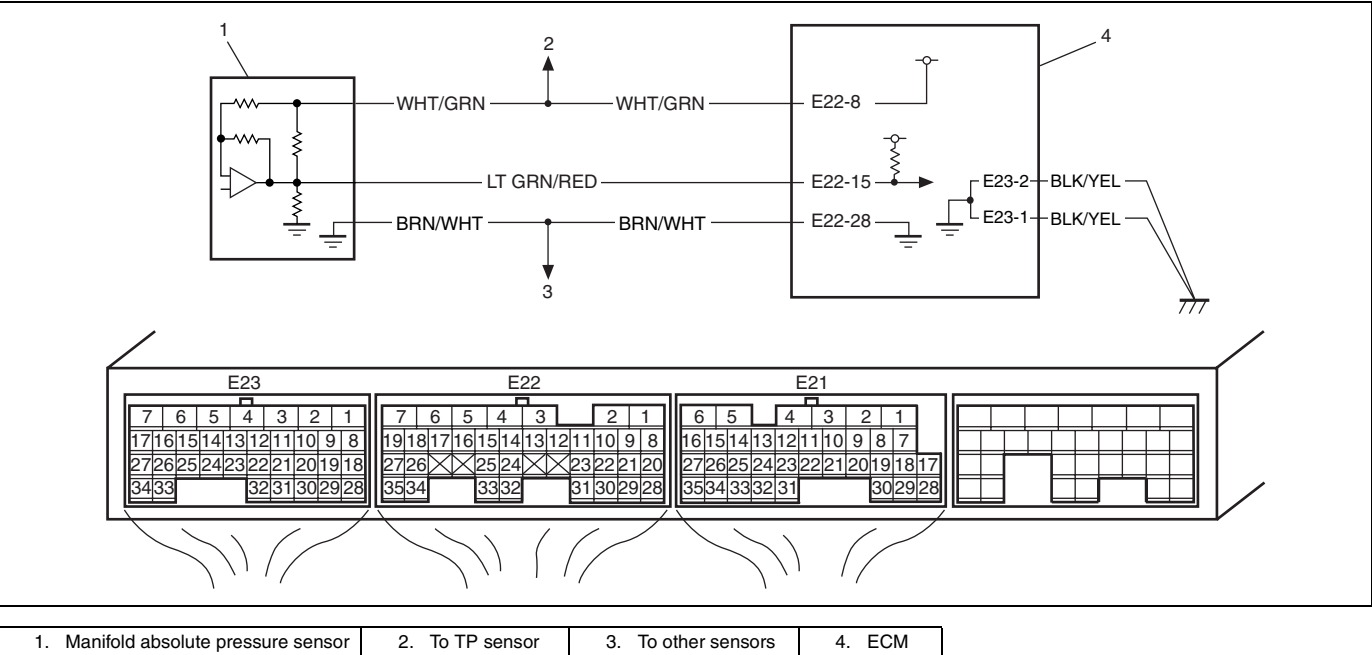
- 1) With ignition switch turned OFF, connect scan tool.
- 2) Turn ON ignition switch and clear DTC using scan tool.
- 3) Start engine and run it at idle for 3 min. or more.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Signal circuit check 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and then connect connectors to ECM. 3) Check for voltage at terminal "E22-35", under the following condition. While engine cranking: 6 – 14 V After starting engine: 0 – 1 V Is voltage as specified?	Poor "E22-35" connection or intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A. If wire and connections are OK, substitute a known-good ECM and recheck.	"BLK/YEL" wire or "BLK/RED" wire circuit open.

DTC P0107 Manifold Absolute Pressure Low Input

Wiring Diagram



DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
<ul style="list-style-type: none">Manifold absolute pressure sensor output voltage is lower than specified value for specified time continuously. (1 driving cycle detection logic)	<ul style="list-style-type: none">Manifold absolute pressure sensor circuitManifold absolute pressure sensorManifold absolute pressure sensor vacuum passageECM

DTC Confirmation Procedure

WARNING:

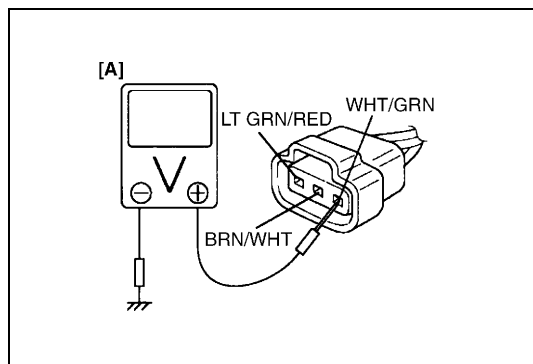
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Turn ON ignition switch and clear DTC using scan tool and warm up engine completely.
- 3) Drive the vehicle with the speed of 40 km/h (25 mile/h) in the 5th gear or D range, and then accelerate the vehicle for more than 5 seconds by stepping only half of the accelerator pedal.
- 4) Check DTC and pending DTC.

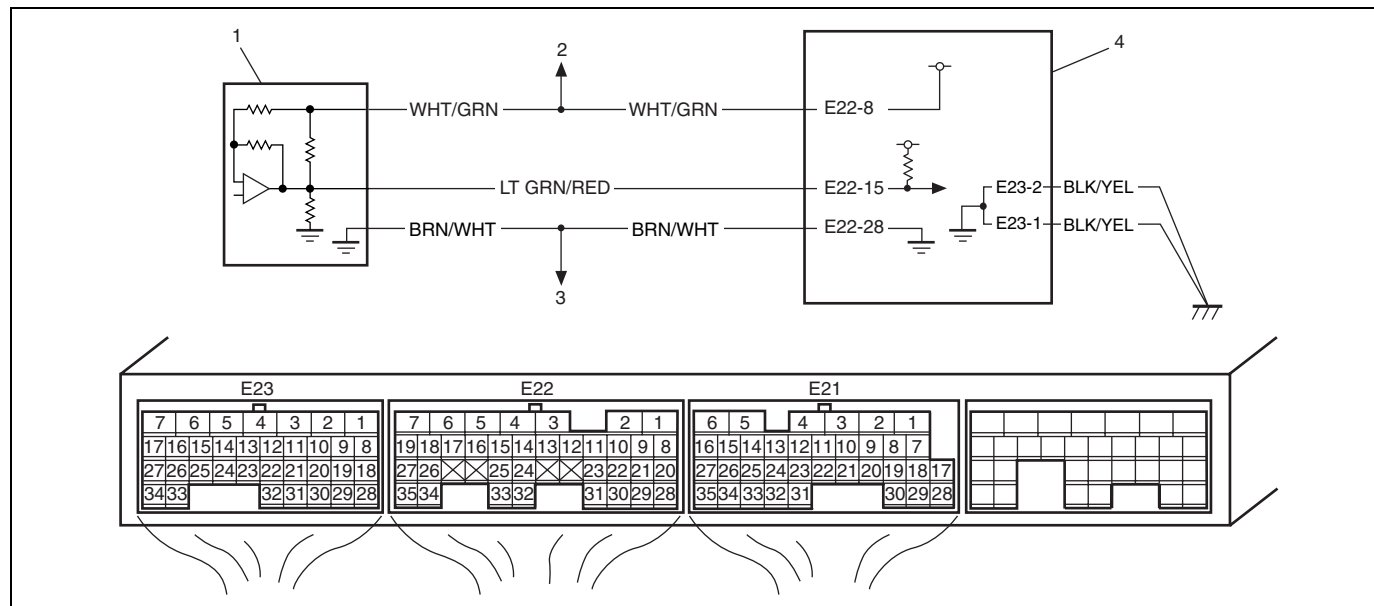
Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Check MAP sensor and its circuit. 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch ON. 3) Check intake manifold pressure. Is it 146 kPa (43.1 in.Hg) or 0 kPa (0 in.Hg)?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A. If OK, go to Step 9.
3	Check MAP sensor power supply voltage. 1) Disconnect connector from MAP sensor with ignition switch turned OFF. 2) Check for proper connection of MAP sensor at "WHT/GRN", "LT GRN/RED" and "BRN/WHT" wire terminals. 3) Turn ON ignition switch, measure voltage between engine ground and "WHT/GRN" wire terminal. See Fig. 1. Is voltage 4 – 5 V?	Go to Step 6.	Go to Step 4.
4	Check MAP sensor power supply voltage. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and then connect connectors to ECM. 3) Turn ON ignition switch, measure voltage between vehicle body ground and "E22-8" terminal. Is voltage 4 – 5 V?	"WHT/GRN" wire in open circuit.	Go to Step 5.
5	Check MAP sensor power supply circuit. 1) Disconnect connectors from TP sensor with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between vehicle body ground and "E22-8" terminal. Is voltage 4 – 5 V?	Faulty TP sensor.	"WHT/GRN" wire shorted to ground or other circuit. If wires are OK, substitute a known-good ECM and recheck.
6	Check MAP sensor ground circuit. 1) Measure resistance between "BRN/WHT" wire terminal in MAP sensor harness connector and engine ground. Is resistance below 5 Ω ?	Go to Step 8.	Go to Step 7.
7	Check ground circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure resistance between "E22-28" terminal and vehicle body ground. Is resistance below 5 Ω ?	"BRN/WHT" wire in open or high resistance circuit.	ECM grounds "E23-1" and/or "E23-2" circuit in open or high resistance. If wires are OK, substitute a known-good ECM and recheck.

Step	Action	Yes	No
8	Check MAP sensor signal circuit. 1) Turn ON ignition switch. 2) Measure voltage between “LT GRN/RED” wire terminal in MAP sensor harness connector and engine ground. Is voltage 4 – 5 V?	Go to Step 11.	Go to Step 9.
9	Check MAP sensor signal circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between “E22-15” terminal and vehicle body ground. Is resistance infinity?	Go to Step 10.	“LT GRN/RED” wire shorted to ground circuit.
10	Check MAP sensor signal circuit. 1) Measure resistance between “LT GRN/RED” wire terminal in MAP sensor harness connector and “E22-15” terminal in ECM connector. Is resistance below 5 Ω ?	Go to Step 12.	“LT GRN/RED” wire in open or high resistance circuit.
11	Check MAP sensor signal circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure voltage between “LT GRN/RED” wire terminal of MAP sensor connector and engine ground with ignition switch turned ON. Is voltage 4 – 5 V?	“LT GRN/RED” wire shorted to other circuit	Go to Step 12.
12	Check MAP sensor output signal. 1) Check MAP sensor according to “Manifold Absolute Pressure Sensor (MAP Sensor) Inspection” in Section 6E2. Is it in good condition?	Substitute a known-good ECM and recheck.	Faulty MAP sensor.



[A]: Fig. 1 for Step 3

DTC P0108 Manifold Absolute Pressure High Input**Wiring Diagram**

1. Manifold absolute pressure sensor	3. To other sensors
2. To TP sensor	4. ECM

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
<ul style="list-style-type: none"> Manifold absolute pressure sensor output voltage is higher than specified value for specified time continuously. (1 driving cycle detection logic) 	<ul style="list-style-type: none"> Manifold absolute pressure sensor circuit Manifold absolute pressure sensor Manifold absolute pressure sensor vacuum passage ECM

DTC Confirmation Procedure**WARNING:**

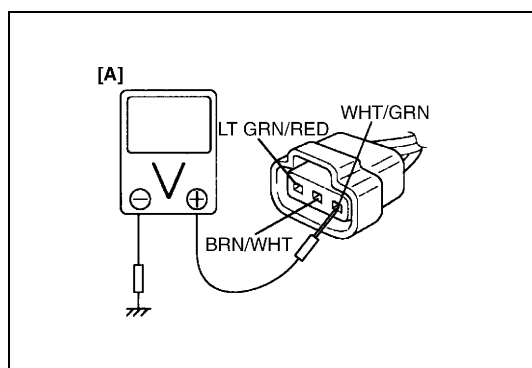
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC using scan tool and warm up engine completely.
- 3) Run engine at idle speed for 1 min.
- 4) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Check MAP sensor and its circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake manifold pressure. Is it 146 kPa (43.1 in.Hg) or 0 kPa (0 in.Hg)?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A. If OK, go to Step 8.
3	Check MAP sensor power supply voltage. 1) Disconnect connector from MAP sensor with ignition switch tuned OFF. 2) Check for proper connection of MAP sensor at "WHT/GRN", "LT GRN/RED" and "BRN/WHT" wire terminals. 3) Turn ON ignition switch, measure voltage between engine ground and "WHT/GRN" wire terminal. See Fig. 1. Is voltage 4 – 5 V?	Go to Step 5.	Go to Step 4.
4	Check MAP sensor power supply voltage. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and then connect connectors to ECM. 3) Turn ON ignition switch, measure voltage between vehicle body ground and "E22-8" terminal. Is voltage 4 – 5 V?	"WHT/GRN" wire in open circuit.	"WHT/GRN" wire shorted to other circuit. If wires are OK, substitute a known-good ECM and recheck.
5	Check MAP sensor ground circuit. 1) Measure resistance between "BRN/WHT" wire terminal in MAP sensor harness connector and engine ground. Is resistance below 5 Ω ?	Go to Step 7.	Go to Step 6.
6	Check ground circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and connect connectors to ECM. 3) Measure resistance between "E22-28" terminal and vehicle body ground. Is resistance below 5 Ω ?	"BRN/WHT" wire in open or high resistance circuit.	ECM grounds "E23-1" and/or "E23-2" circuit in open or high resistance. If wires are OK, substitute a known-good ECM and recheck.

Step	Action	Yes	No
7	Check MAP sensor signal circuit. 1) Disconnect connectors from ECM with ignition switch turn OFF. 2) Turn ON ignition switch. 3) Measure voltage between "LT GRN/RED" wire terminal in MAP sensor harness connector and engine ground. Is voltage 0 V?	Go to Step 8.	"LT GRN/RED" wire shorted to power supply or other circuit.
8	Check MAP sensor output signal. 1) Check MAP sensor according to "Manifold Absolute Pressure Sensor (MAP Sensor) Inspection" in Section 6E2. Is it in good condition?	Substitute a known-good ECM and recheck.	Faulty MAP sensor.



[A]: Fig. 1 for Step 3

DTC P0601 Internal Control Module Memory Check Sum Error

DTC P0602 Control Module Programming Error

System Description

Internal control module is installed in ECM.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Data write error or check sum error	ECM

DTC Confirmation Procedure

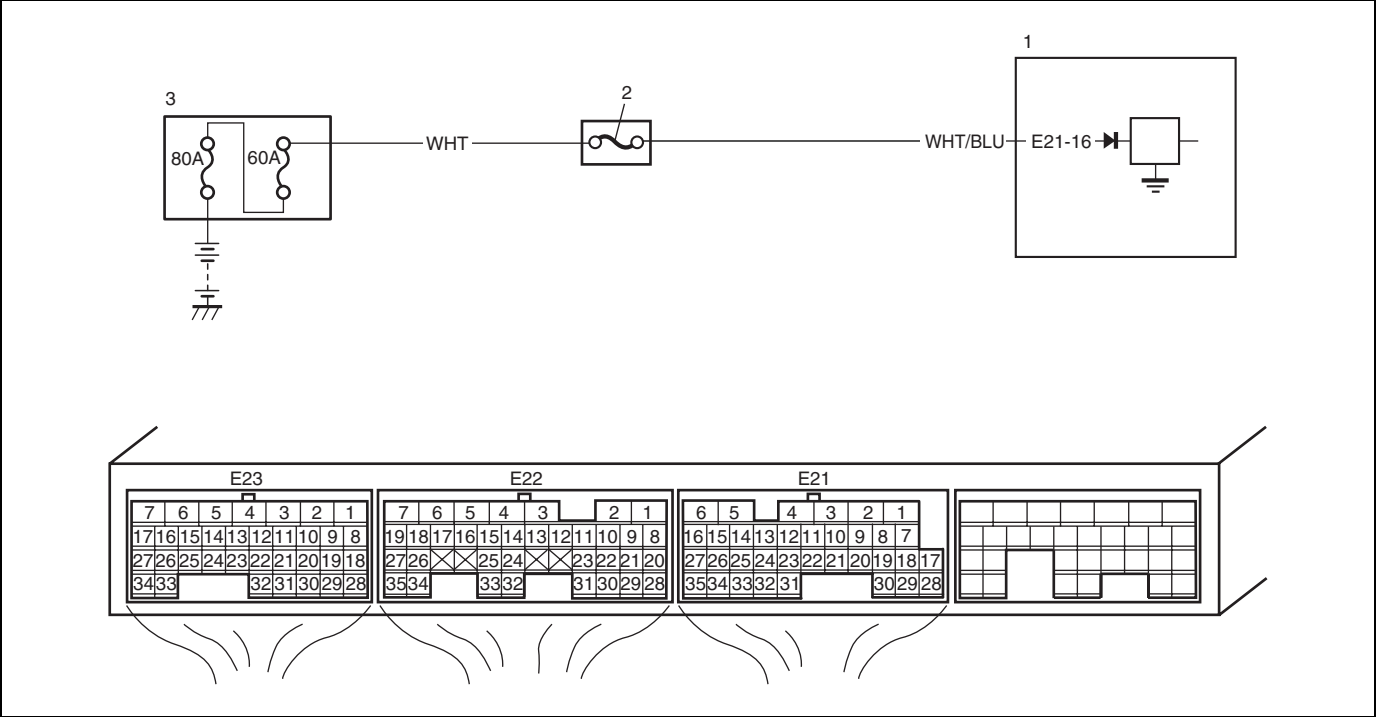
- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
- 3) Start engine and run it at idle if possible.
- 4) Check DTC and pending DTC by using scan tool.

Troubleshooting

Substitute a known-good ECM and recheck.

DTC P1510 ECM Back-up Power Supply Malfunction

Wiring Diagram



- | |
|----------------------|
| 1. ECM |
| 2. "DOME RADIO" fuse |
| 3. Relay box |

Circuit Description

Battery voltage is supplied so that diagnostic trouble code memory, values for engine control learned by ECM, etc. are kept in ECM even when the ignition switch is turned OFF.

DTC Detecting Condition and Trouble Area

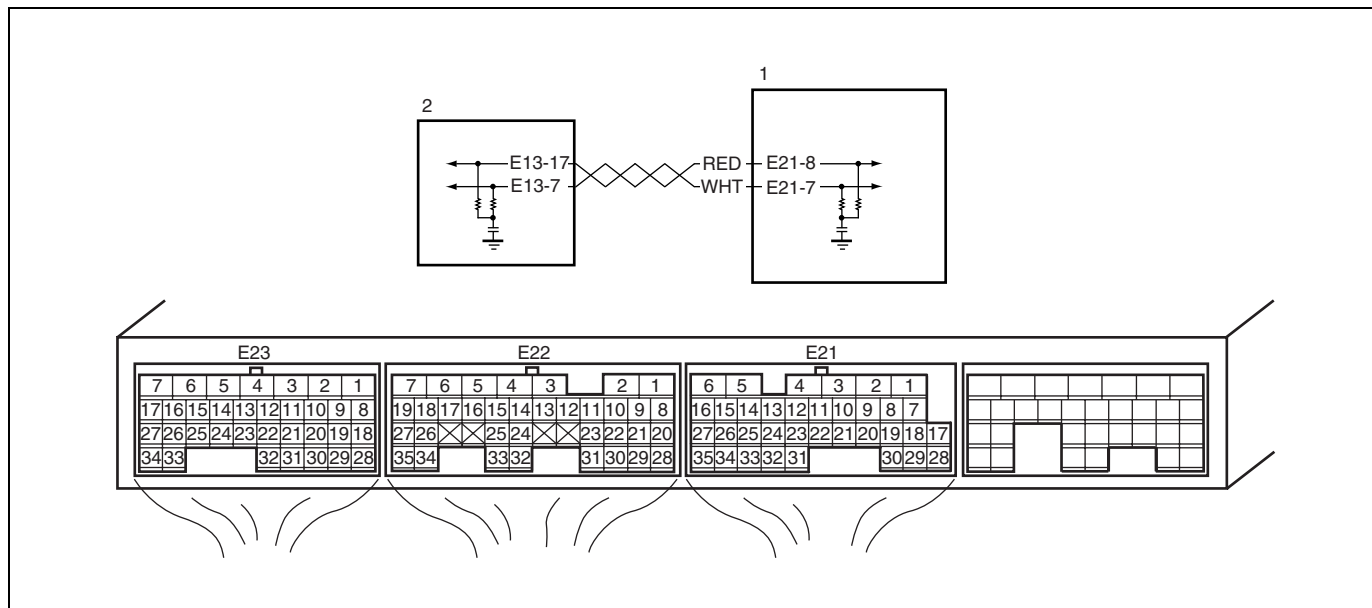
DTC Detecting Condition	Trouble Area
Back-up circuit voltage is less than specified value for 5 seconds continuously while engine running.	Battery voltage supply circuit

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC using scan tool and run engine at idle speed for 1 min.
- 3) Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Battery voltage supply circuit check 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Remove ECM from vehicle body and then connect connectors to ECM. 3) While engine running, check voltage between "E21-16" and ground. Is voltage 10 – 14 V?	Poor "E21-16" connection or intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A. If wire and connections are OK, substitute a known-good ECM and recheck.	"DOME RADIO" fuse blown "WHT" or "WHT/BLU" wire circuit open or short.

DTC P1601 Can Communication Error**Wiring Diagram**

1. ECM

2. TCM

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Transmission or reception error of communication data is detected by ECM for specified time continuously. (1 driving cycle detection logic)	<ul style="list-style-type: none"> • “RED” or “WHT” wire circuit open or short • TCM malfunction • ECM malfunction

DTC Confirmation Procedure

- Connect scan tool to DLC with ignition switch turned OFF.
- Turn ON ignition switch and clear DTC by using scan tool, then start engine and run it for 1 min. or more.
- Check DTC and pending DTC.

Troubleshooting

Step	Action	Yes	No
1	Was “Engine and Emission Control System” performed?	Go to Step 2.	Go to “Engine and Emission Control System” in this section.
2	DTC check 1) Check DTC of ECM and TCM. Is there any DTC(s) (other than DTC P1601 and DTC P1701)?	Go to applicable DTC diag. flow table.	Go to Step 3.

Step	Action	Yes	No
3	Circuit Check 1) Turn ignition switch to OFF position. 2) Disconnect connectors from ECM and TCM. 3) Check for proper connection to "E21-7" terminal of ECM connector and "E13-7" terminal of TCM connector. 4) If OK, measure resistance between "E21-7" terminal of ECM connector and "E13-7" terminal of TCM connector. Is resistance 1 Ω or less?	Go to Step 4.	"WHT" wire circuit open or high resistance.
4	Circuit Check 1) Turn ignition switch to ON position. 1) Measure voltage between "E21-7" terminal of ECM connector and vehicle body ground. Is voltage 0 – 1 V ?	Go to Step 4.	"WHT" wire in shorted to power circuit.
5	Circuit Check 1) Turn ignition switch to OFF position. 2) Measure resistance between "E21-7" terminal of ECM connector and vehicle body ground. Is it infinite?	Go to Step 6.	"WHT" wire in shorted to ground circuit.
6	Circuit Check 1) Check for proper connection to "E21-8" terminal of ECM connector and "E13-17" terminal of TCM connector. 2) If OK, measure resistance between "E21-8" terminal of ECM connector and "E13-17" terminal of TCM connector. Is resistance 1 Ω or less?	Go to Step 7.	"RED" wire circuit open or high resistance.
7	Circuit Check 1) Turn ignition switch to ON position. 2) Measure voltage between "E21-8" terminal of ECM connector and vehicle body ground. Is voltage 0 – 1 V?	Go to Step 8.	"RED" wire in shorted to power circuit.
8	Circuit Check 1) Turn ignition switch to OFF position. 2) Measure resistance between "E21-8" terminal of ECM connector and vehicle body ground. Is it infinite?	Go to Step 9.	"RED" wire in shorted to ground circuit.
9	DTC Check 1) Connect connectors to ECM and TCM. 2) Connect scan tool to DLC. 3) Check DTC of TCM. Is DTC P1701 indicated?	Substitute a known-good TCM and recheck. If OK, substitute a known-good ECM and recheck.	Substitute a known-good ECM and recheck.

DTC P1603 TCM Trouble Code Detected

DTC Detecting Condition

When ECM receives a trouble code from TCM, which indicates that some problem occurred in sensor circuits and its calculated values used for operations such as idle speed control, engine power control, and so on by TCM, ECM sets DTC P1603. (TCM outputs the trouble code to ECM when TCM can not compute the engine control signal due to malfunctions of sensor circuits used for gear shift control.)

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in this section.
2	DTC Check Check DTC of TCM referring to "Diagnostic Trouble Code (DTC) Check" in Section 7B1. Is there any DTC(s)?	Go to applicable DTC troubleshooting.	Substitute a known-good ECM and recheck.

DTC P2227 Barometric Pressure Circuit Range/Performance**DTC P2228 Barometric Pressure Circuit Low****DTC P2229 Barometric Pressure Circuit High****System Description**

Barometric pressure sensor is installed in ECM (PCM).

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC P2227: While running under conditions described for "DTC Confirmation Procedure", barometric pressure value compared with intake manifold vacuum value in fuel cut state is not as specified. (2 driving cycle detection logic)	<ul style="list-style-type: none"> • Manifold absolute pressure sensor performance problem • Barometric pressure sensor in ECM
DTC P2228: Barometric pressure signal less than specified value is detected.	<ul style="list-style-type: none"> • Barometric pressure sensor in ECM
DTC P2229: Barometric pressure signal more than specified value is detected.	

DTC Confirmation Procedure**DTC P2228/P2229**

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool and run engine for 1 min.
- 3) Check DTC and pending DTC by using scan tool.

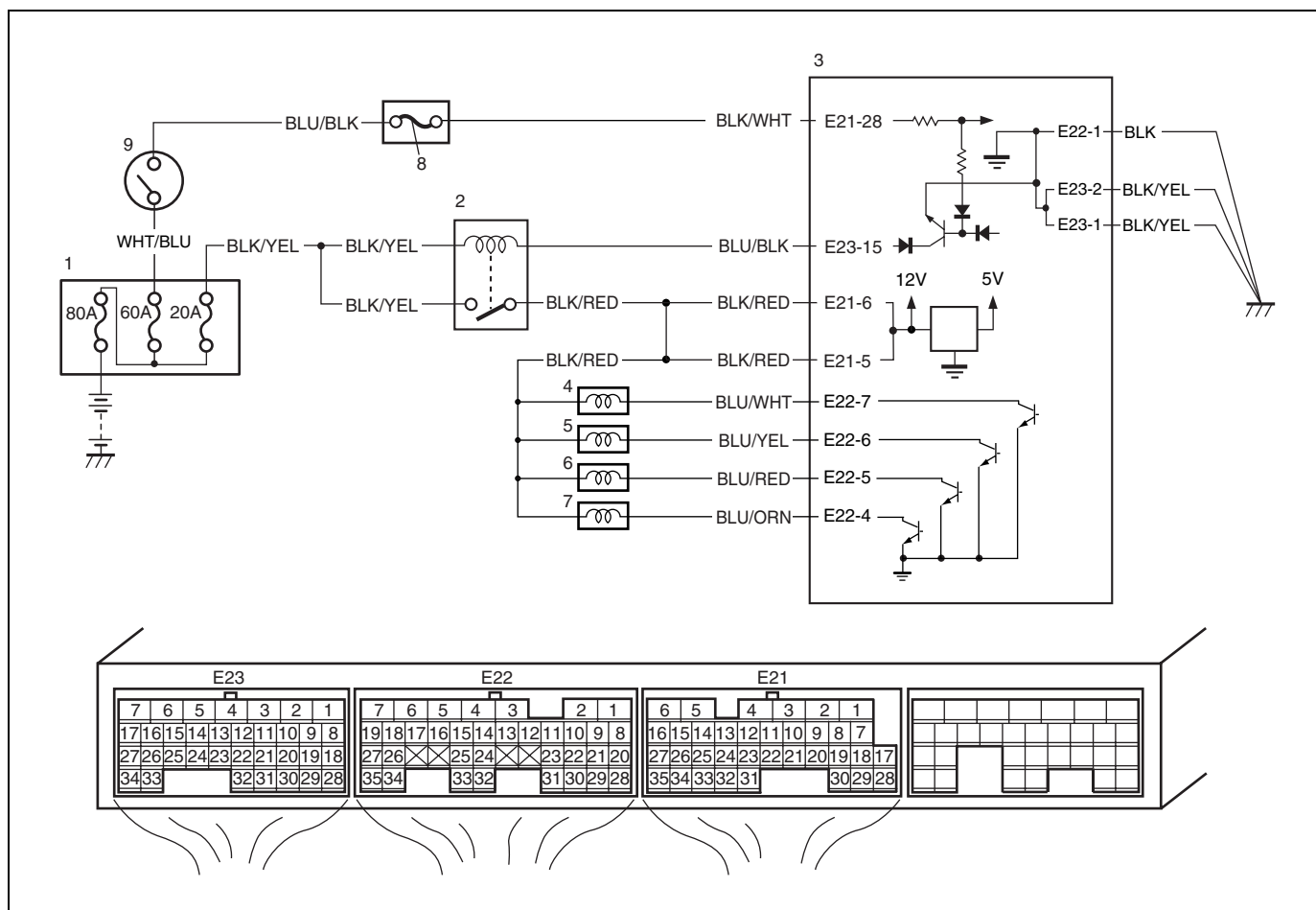
DTC P2227**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine to normal operating temperature.
- 3) Increase engine speed to 3000 rpm in 3rd gear in case of M/T.
- 4) Release accelerator pedal and with engine brake applied, keep vehicle coasting for 5 sec. or more. (Keep fuel cut condition for 5 sec. or more) If fuel cut condition is not kept for 5 sec. or more, coast down a slope in engine speed 1000 – 3000 rpm for 5 sec. or more.
- 5) Stop vehicle and run engine at idle.
- 6) Repeat Steps 3) – 5) 2 times.
- 7) Check DTC and pending DTC by using scan tool.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Is DTC P2227 set?	Go to Step 3.	Substitute a known-good ECM and recheck.
3	MAP sensor check 1) Check MAP sensor and its circuit referring to "DTC P0107/P0108 Manifold Absolute Pressure Low Input/High Input". Is check result satisfactory?	Substitute a known-good ECM and recheck.	MAP sensor or its circuit malfunction.

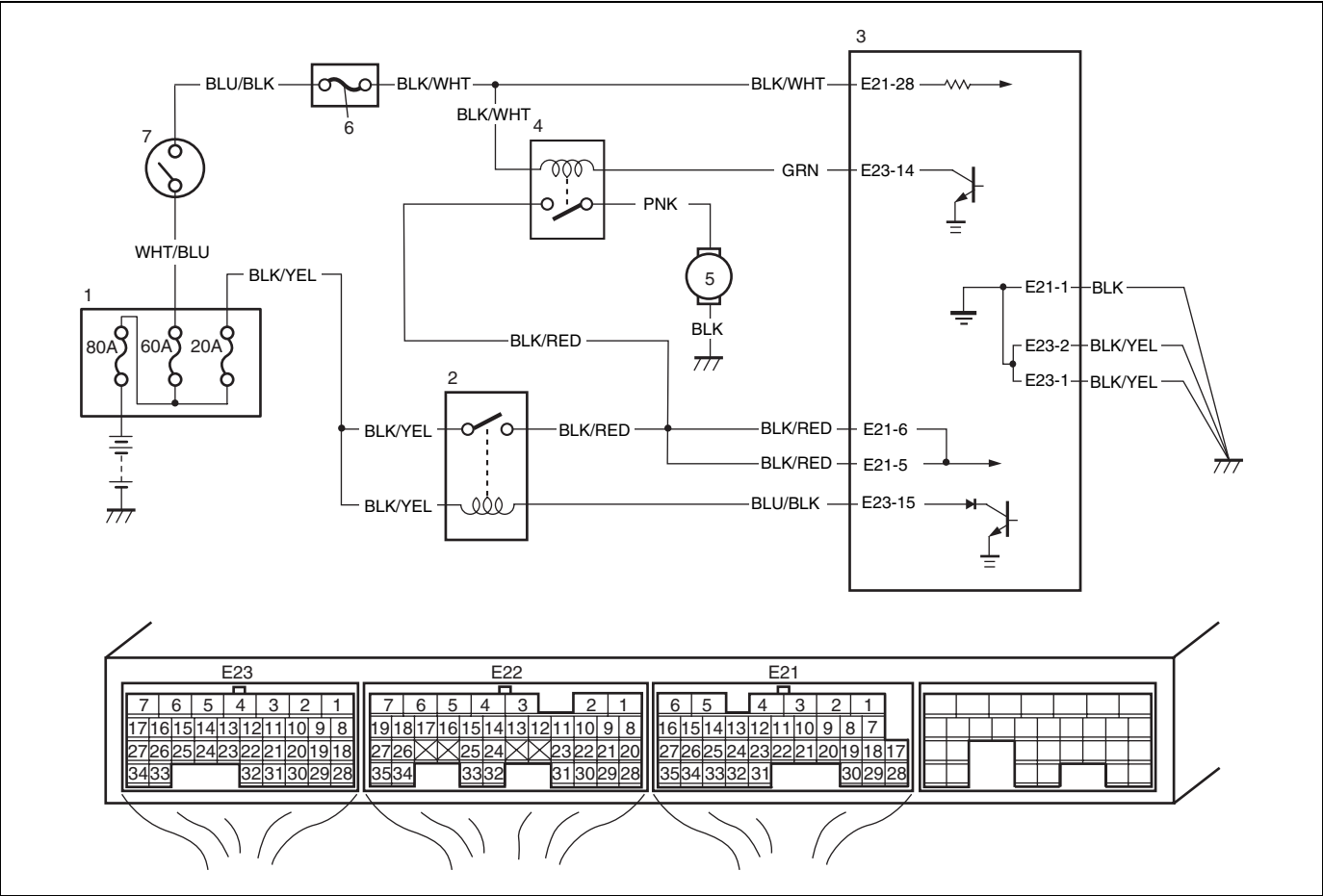
Table B-1 Fuel Injector Circuit Check

1. Relay box	4. No.1 injector	7. No.4 injector
2. Main relay	5. No.2 injector	8. "IG COIL" fuse
3. ECM	6. No.3 injector	9. Ignition switch

Troubleshooting

Step	Action	Yes	No
1	Check each injector for operating sound at engine cranking using sound scope. Do all 4 injector make operating sound?	Fuel injector circuit is in good condition.	Go to Step 2.
2	Check fuel injector resistance. 1) Disconnect connectors from fuel injectors with ignition switch turn OFF. 2) Check for proper connection to fuel injector at each terminals. 3) If OK, check all 4 fuel injectors for resistance, referring to "Fuel Injector Inspection" in Section 6E2. Are all injectors in good condition?	Go to Step 3.	Faulty fuel injector.
3	Check fuel injector insulation resistance. 1) Check that there is insulating between each fuel injector terminals and engine ground. Is there insulating?	Go to Step 4.	Faulty fuel injector.
4	Check fuel injector power supply. 1) Measure voltage between each "BLK/RED" wire terminal and engine ground with ignition switch turned ON. Is voltage 10 – 14 V?	Go to Step 5.	"BLK/RED" wire in open circuit or shorted to ground circuit. If it is in good condition, go to diag flow table A-3.
5	Check wire circuit. 1) Turn OFF ignition switch. 2) Disconnect connectors from ECM. 3) Measure resistance between each "BLU/YEL", "BLU/WHT", "BLU/RED", "BLU/ORN" wire terminal and vehicle body ground. Is resistance infinity?	Go to Step 6.	"BLU/YEL", "BLU/WHT", "BLU/RED", "BLU/ORN" wire shorted to ground.
6	Check wire circuit. 1) Measure voltage between each "BLU/YEL", "BLU/WHT", "BLU/RED", "BLU/ORN" wire terminal and vehicle body ground with ignition switch turned ON. Is voltage 0 V?	Go to Step 7.	"BLU/YEL", "BLU/WHT", "BLU/RED", "BLU/ORN" wire shorted to power supply circuit.
7	Check fuel injector drive signal. 1) Connect connectors to each fuel injectors and ECM with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Measure voltage "E22-7", "E22-6", "E22-5", "E22-4" terminal and vehicle body ground. Is voltage 10 – 14 V?	Check fuel injector, referring to "Fuel Injector Inspection" in Section 6E2. If result in good condition, substitute a known-good ECM and recheck.	"BLU/YEL", "BLU/WHT", "BLU/RED", "BLU/ORN" open circuit.

Table B-2 Fuel Pump and Its Circuit Check

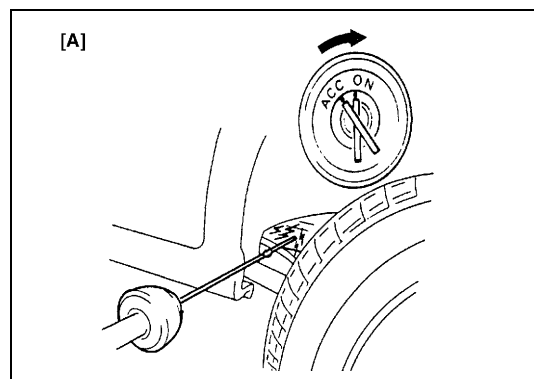


1. Relay box	4. Fuel pump relay	7. Ignition switch
2. Main relay	5. Fuel pump	
3. ECM	6. "IG COIL" fuse	

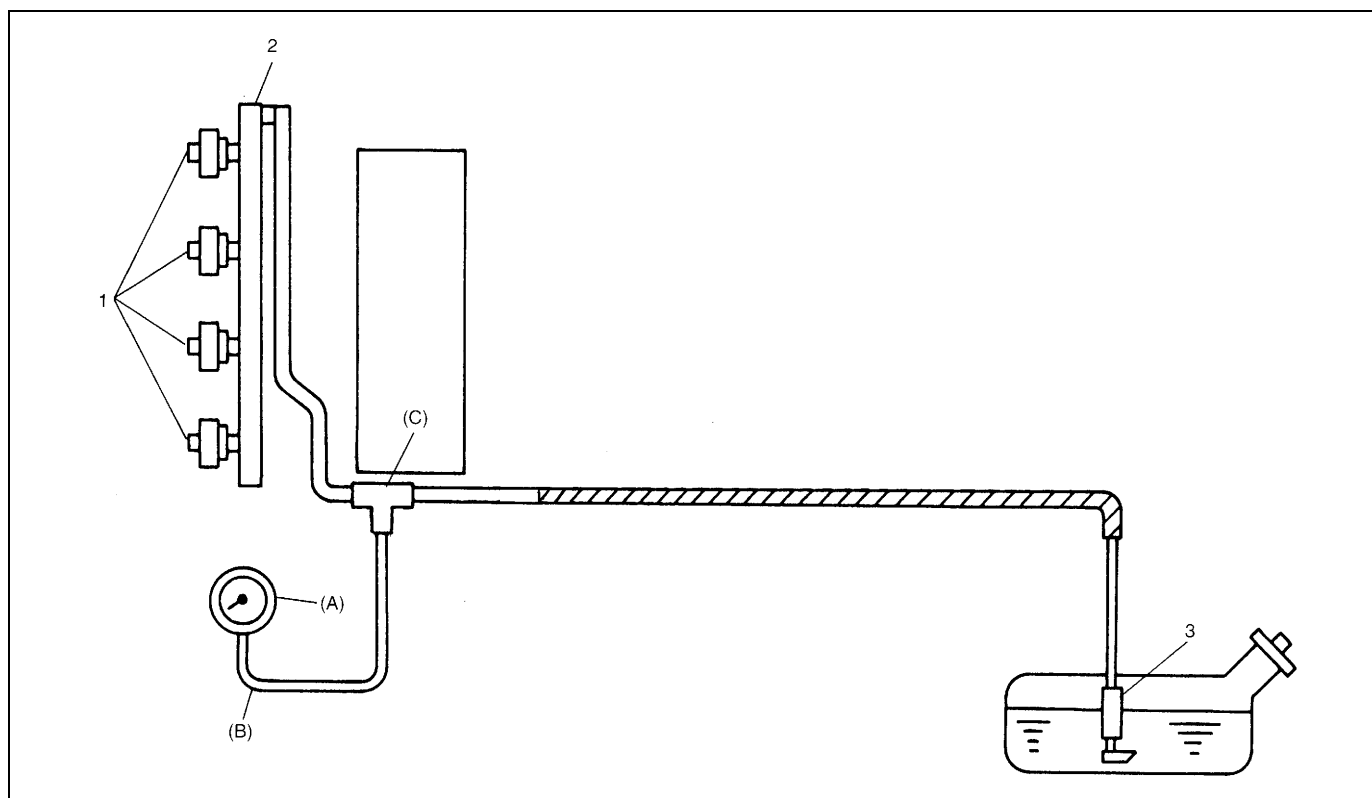
Troubleshooting

Step	Action	Yes	No
1	Check fuel pump control system for operation. See Fig.1. Is fuel pump heard to operate for 3 sec. after ignition switch ON?	Fuel pump circuit is in good condition.	Go to Step 2.
2	Check fuel pump relay power supply. 1) Disconnect fuel pump relay from relay box with ignition switch turned OFF. 2) Check for proper connection to fuel pump relay at each terminals. 3) If OK, turn ON ignition switch, measure voltage between "BLK/WHT" wire terminal and engine ground. Is voltage 10 – 14 V?	Go to Step 3.	"BLK/WHT" wire open or shorted to ground circuit.
3	Check fuel pump relay power supply. 1) Turn ON ignition switch, measure voltage between "BLK/RED" wire terminal of fuel pump relay connector and engine ground. Is voltage 10 –14 V?	Go to Step 4.	"BLK/RED" wire open circuit.

Step	Action	Yes	No
4	Check fuel pump relay. 1) Check fuel pump relay, referring to "Main Relay, Fuel Pump Relay and Radiator Fan Relay Inspection" in Section 6E2. Is relay in good condition?	Go to Step 5.	Faulty relay.
5	Check fuel pump relay drive signal. 1) Connect fuel pump relay to relay box. 2) Connect voltmeter between "E23-14" terminal and vehicle body ground. 3) Measure voltage at after 3 second ignition switch turned ON. Is voltage 10 – 14 V?	Go to Step 6.	"GRN" wire open circuit or shorted to ground circuit.
6	Check fuel pump relay drive signal. 1) Measure voltage at within 3 second after ignition switch turned ON. Is voltage 0 – 1 V?	Go to Step 7.	Substitute a known-good ECM and recheck.
7	Check wire circuit. 1) Turn OFF ignition switch. 2) Detach fuel tank, referring to "Fuel Tank Removal and Installation" in Section 6C. 3) Disconnect connector from fuel pump. 4) Measure resistance between "PNK" wire terminal and vehicle body ground. Is resistance infinity?	Go to Step 8.	"PNK" wire shorted to ground.
8	Check fuel pump circuit. 1) Turn OFF ignition switch. 2) Connect service wire between "E23-14" terminal and vehicle body ground. 3) Turn ON ignition switch, measure voltage between "PNK" terminal at fuel pump connector and vehicle body ground. Is voltage 10 – 14 V?	Go to Step 9.	"PNK" wire open circuit.
9	Check fuel pump circuit. 1) Turn OFF ignition switch. 2) Check that there is continuity between "BLK" terminal at fuel pump connector and vehicle body ground. Is there continuity?	Faulty fuel pump.	"BLK" wire open circuit.



[A]: Fig. 1 for Step 1

Table B-3 Fuel Pressure Check

1. Injector	3. Fuel filter and fuel pump	B: Hose
2. Delivery pipe	A: Gauge	C: 3-way joint

Troubleshooting

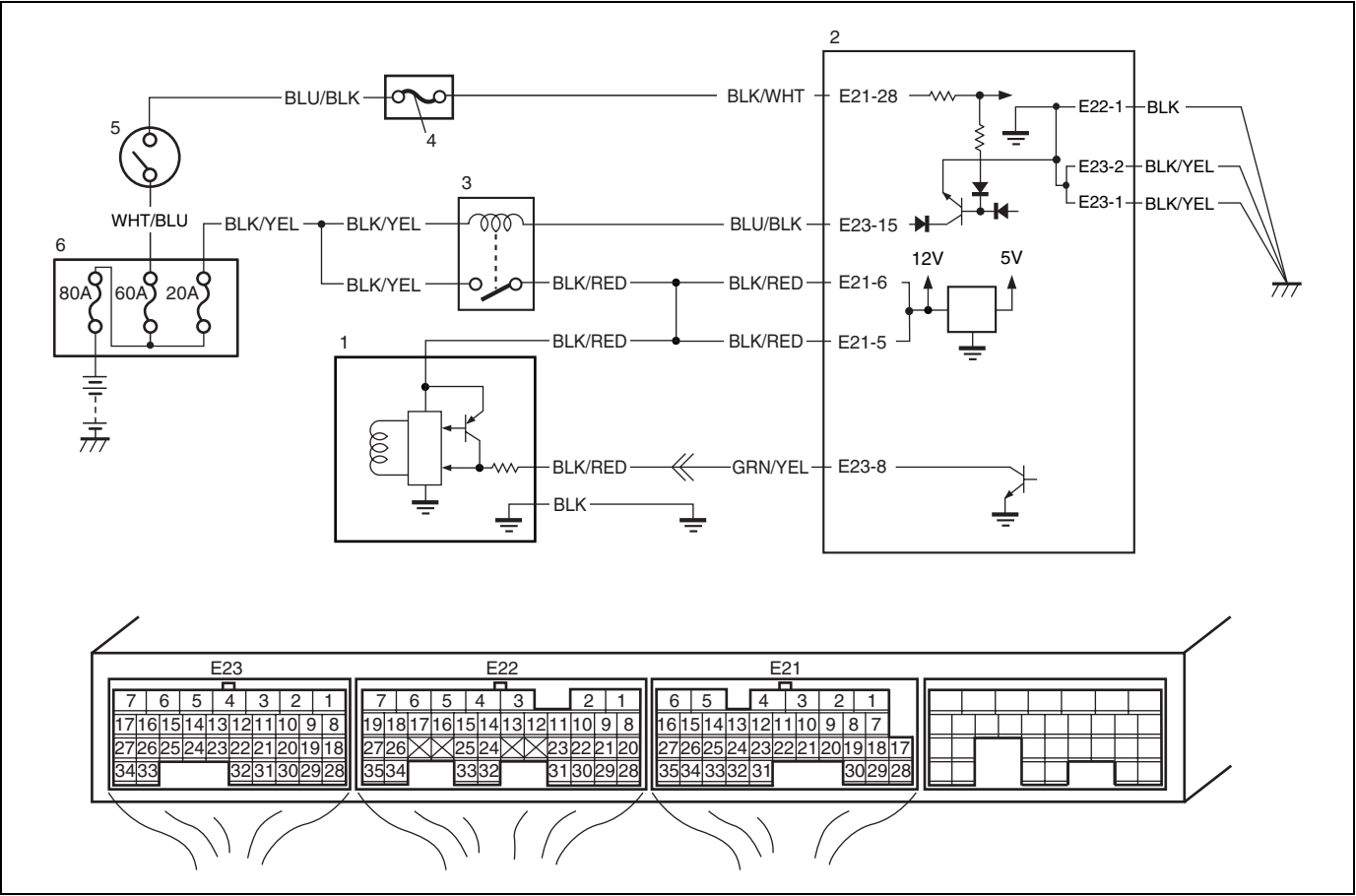
NOTE:

Before using the following table, check to make sure that battery voltage is higher than 11 V. If battery voltage is low, pressure becomes lower than specification even if fuel pump and line are in good condition.

Step	Action	Yes	No
1	Fuel Pressure Check 1) Check fuel pressure referring to "Fuel Pressure Inspection" under "Fuel Delivery System" in Section 6E2. Are they satisfied each condition?	Go to Step 2.	Go to Step 5.
2	Fuel Pressure Check 1) Start engine and warm it up to normal operating temperature. 2) Keep engine speed to 4000 rpm. Does fuel pressure shows the value which is about the same as Step 1?	Go to Step 3.	Go to Step 8.
3	Fuel Line Check 1) Check fuel pipe, fuel hose and joint for fuel leakage. Are they in good condition?	Go to Step 4.	Repair or replace.

Step	Action	Yes	No
4	Fuel Line Check 1) Check fuel pipe, fuel hose and joint for damage or deform. Are they in good condition?	Faulty fuel pressure regulator.	Repair or replace.
5	Was fuel pressure higher than specification in Step 1?	Go to Step 6.	Go to Step 7.
6	Fuel Line Check 1) Check fuel pipe, fuel hose and joint for damage or deform. Are they in good condition?	Faulty fuel pressure regulator.	Repair or replace.
7	Fuel Pump Operating Sound Check 1) Remove fuel filler cap and then turn ON ignition switch. Can you hear operation sound?	Go to Step 8.	Faulty fuel pump.
8	Fuel Line Check 1) Check fuel pipe, fuel hose and joint for damage or deform. Are they in good condition?	Clogged fuel filter, faulty fuel pump, faulty fuel pressure regulator or fuel leakage from hose connection in fuel tank.	Repair or replace.

Table B-4 Idle Air Control System Check

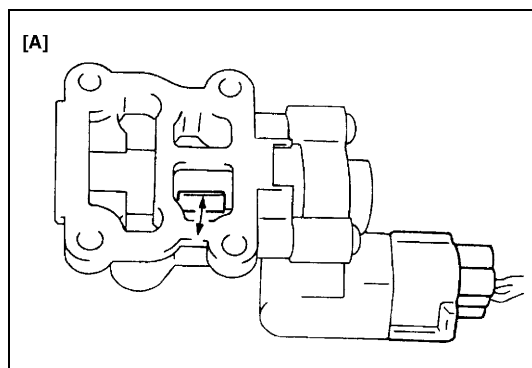


1. IAC valve	3. Main relay	5. Ignition switch
2. ECM	4. "IG COIL" fuse	6. Relay box

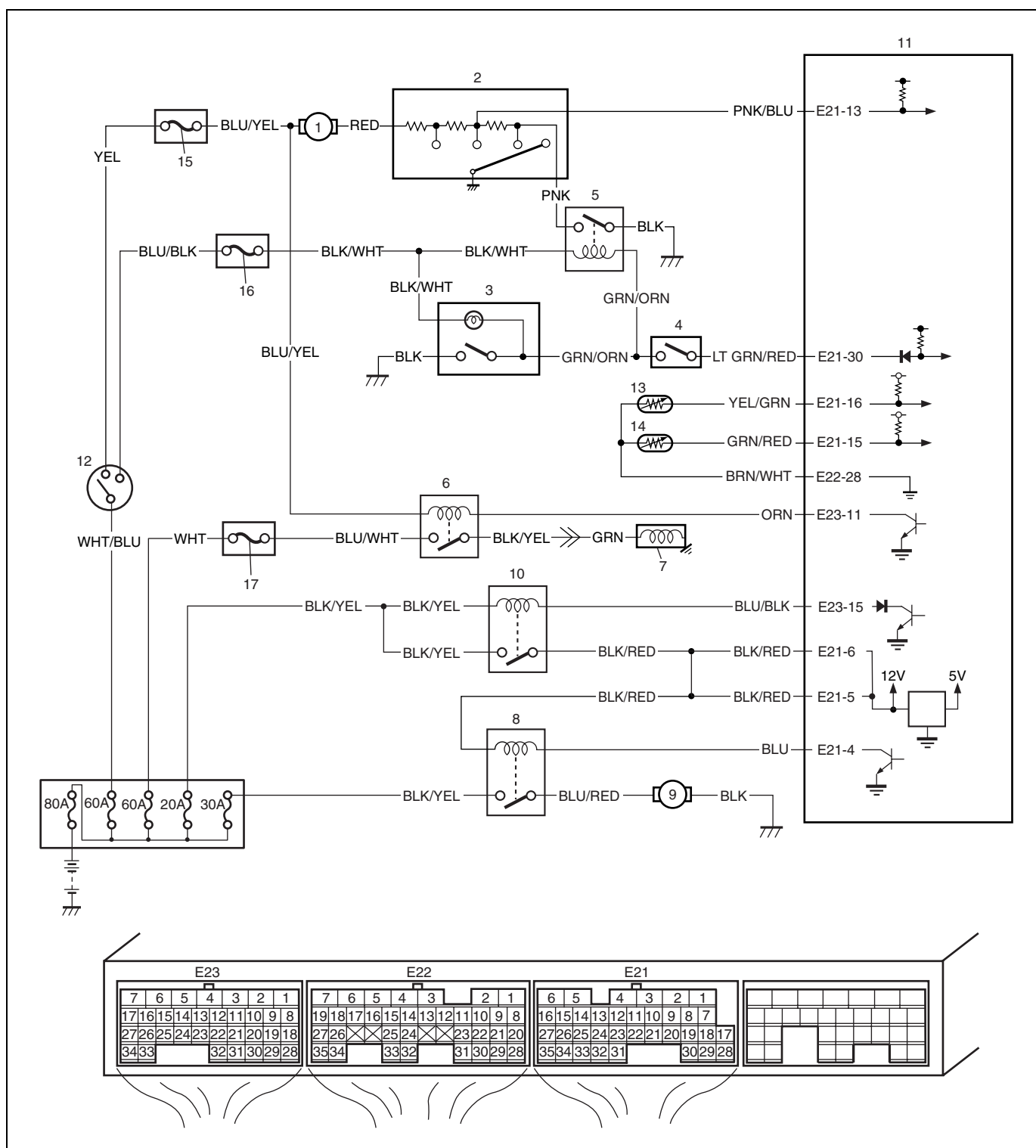
Troubleshooting

Step	Action	Yes	No
1	Check engine idle speed and IAC duty referring to "Idle Speed/IAC Duty Inspection" in Section 6E2. Is idle speed within specification?	Go to Step 2.	Go to Step 4.
2	Is IAC duty within specification in Step 1?	Go to Step 3.	Check for followings: <ul style="list-style-type: none">• Vacuum leak• EVAP canister purge control system• Clog of IAC air passage• Accessory engine load• "Table B-6 Electric Load Signal Circuit Check" Closed throttle position (TP sensor)• Stuck to PCV valve
3	Is engine idle speed kept specified speed even with headlight ON?	System is in good condition.	Go to Step 6.
4	Was idle speed higher than specification in Step 1?	Go to Step 5.	Go to Step 6.

Step	Action	Yes	No
5	Check A/C (input) signal circuit referring to Step 1 of "Table B-5 A/C Signal Circuit Check", if equipped. Is it in good condition?	Go to Step 6.	Repair or replace A/C signal circuit or A/C system.
6	Check Idle Air Control system. 1) Remove IAC valve from throttle body referring to "IAC Valve Removal and Installation" in Section 6E2. 2) Check IAC valve for operation referring to "IAC Valve Inspection" in Section 6E2. See Fig. 1. Is check result satisfactory?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection Inspection" in Section 0A.	Go to Step 7.
7	Check Wire Harness for Open or Short. 1) Turn ignition switch OFF. 2) Disconnect IAC valve connector. 3) Check for proper connection to IAC valve at each terminals. 4) If OK, disconnect connectors from ECM. 5) Check for proper connection to ECM at "E23-28" terminal. 6) If OK, check "BLK/RED" and "GRN/YEL" circuit for open or short. Are they in good condition?	Replace IAC valve and recheck.	Repair or replace.



[A]: Fig. 1 for Step 6

Table B-5 A/C Signal Circuits Check (Vehicle with A/C)

1. Blower fan motor	6. Compressor relay	11. ECM	16. "IG COIL" fuse
2. Blower fan switch	7. A/C compressor	12. Ignition switch	17. "A/C" fuse
3. A/C switch	8. Radiator fan motor relay	13. ECT sensor	
4. A/C pressure switch	9. Radiator fan motor	14. Evaporator thermistor	
5. Blower motor relay	10. Main relay	15. "HEATER" fuse	

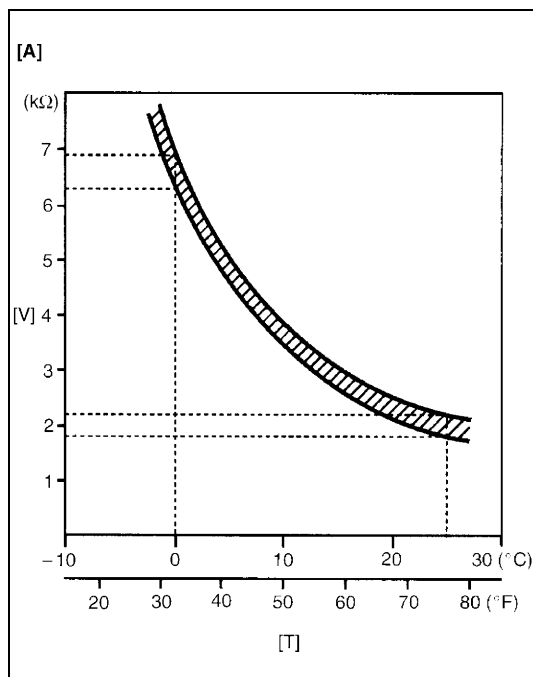
Troubleshooting

Step	Action	Yes	No
1	Check Evaporator Temp. Sensor 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Check for proper connection to "E21-15" and "E22-28" wire terminals of ECM connector. 3) If OK, measure resistance between "E21-15" and "E22-28" wire terminals of ECM connector. (See Fig. 1.) At 0°C: 6.3 – 6.9 kΩ At 25°C: 1.8 – 2.2 kΩ Is it within specification?	Go to Step 2.	Faulty A/C evaporator temperature sensor or its circuit.
2	Check A/C signal 1) Measure voltage between "E21-30" terminal of ECM connector and vehicle body ground under the following condition. With ignition switch ON and A/C switch OFF: 10 – 14 V With ignition switch ON, A/C and heater blower switch ON: 0 – 1 V Is check result as specified?	Go to Step 3.	A/C and heater blower switch circuit, A/C refrigerant pressure switch or heater controller malfunction.
3	Check A/C signal 1) Connect connectors to ECM with ignition switch turned OFF. 2) Measure voltage between "E21-30" wire terminal of ECM connector and vehicle body ground under the following condition. With ignition switch ON and A/C switch OFF: 10 – 14 V With ignition switch ON, A/C and heater blower switch ON: 0 – 1 V Is check result as specified?	Go to Step 4.	Poor "E21-30" terminal connection. If OK, substitute a known-good ECM and recheck.
4	Check Radiator Fan Control System Is radiator cooling fan started when A/C and heater blower switch turned ON?	Go to Step 7.	Go to Step 5.
5	Check Radiator Fan Control Circuit 1) Check DTC with scan tool. Is DTC P0480 displayed?	Go to "DTC P0480 Fan 1 (Radiator Cooling Fan) Control Circuit" in this section.	Go to Step 6.
6	Check Radiator Cooling Fan 1) Check radiator cooling fan referring to "Radiator Cooling Fan Inspection" in Section 6B2. Is check result satisfactory?	Radiator cooling fan drive circuit malfunction. If circuit OK, go to Step 7.	Replace radiator cooling fan motor.
7	Check A/C Compressor Control System Is A/C compressor started when A/C and heater blower switch turned ON while engine running?	A/C system is in good condition.	Go to Step 8.

Step	Action	Yes	No
8	Check A/C Compressor Relay Circuit 1) Check voltage between "E23-11" wire terminal of ECM connector and vehicle body ground under the following condition. While engine running and A/C switch OFF: 10 – 14 V While engine running, A/C and heater blower switch ON: 0 – 1 V Are check result satisfactory?	Go to Step 9.	Go to Step 10.
9	Check A/C Compressor Relay 1) Check A/C compressor relay referring to "A/C Compressor Relay Inspection" in Section 1B. Is it in good condition?	A/C Compressor drive circuit malfunction.	Replace A/C compressor relay.
10	Check A/C Compressor Relay Circuit 1) Remove A/C compressor relay with ignition switch turned OFF. 2) Turn ON ignition switch, check voltage between "BLU/YEL" wire terminal of A/C compressor relay connector and vehicle body ground. Is voltage 10 – 14 V?	Go to Step 12.	"BLU/YEL" wire circuit open.
11	Check A/C Compressor Relay 1) Check A/C compressor relay referring to "A/C Compressor Relay" in Section 1B. Is it in good condition?	"ORN" wire circuit open. If OK, substitute a known-good ECM and recheck.	Replace A/C compressor relay.

NOTE:

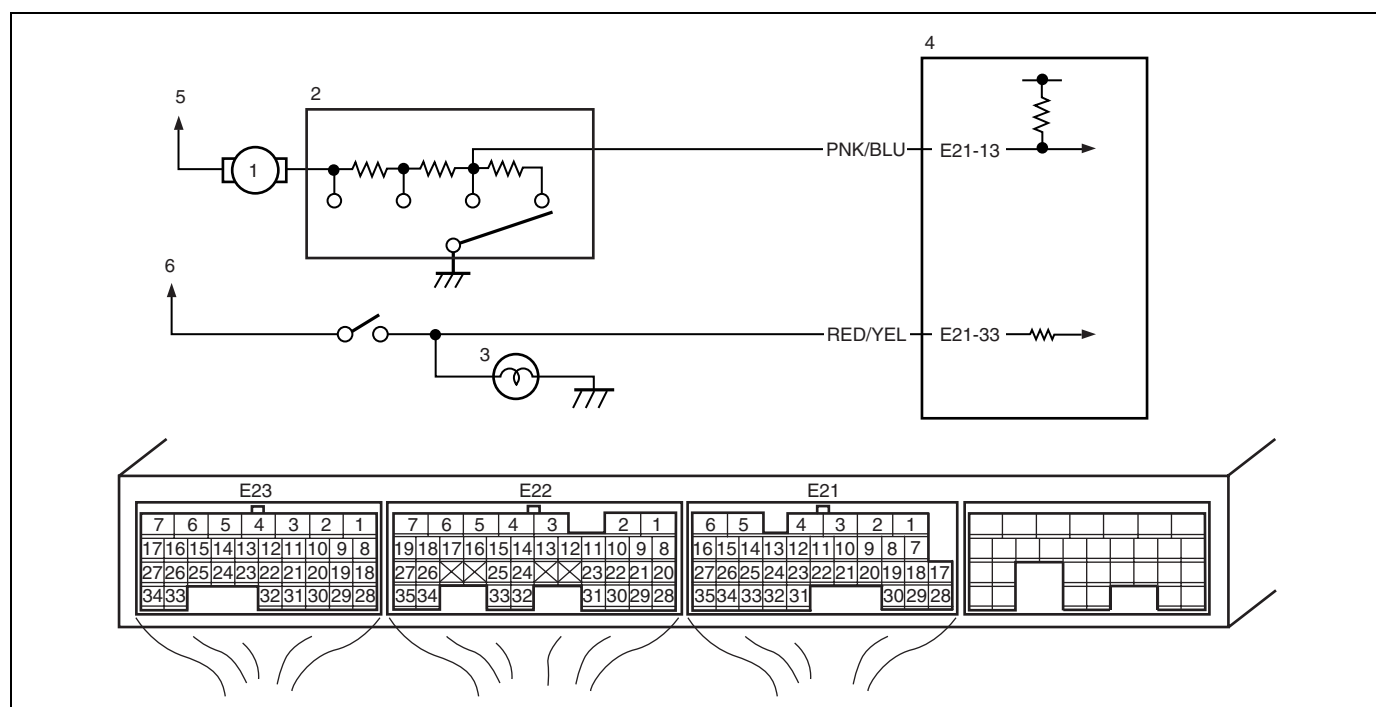
When A/C evaporator thermistor temp. is below 2.5°C (36.5°F), A/C remains OFF (E23-11 terminal voltage becomes 0 – 1 V). This condition is not abnormal.



[A]: Fig. 1 for Step 1

[V]: Resistance

[T]: Temperature

Table B-6 Electric Load Signal Circuit Check

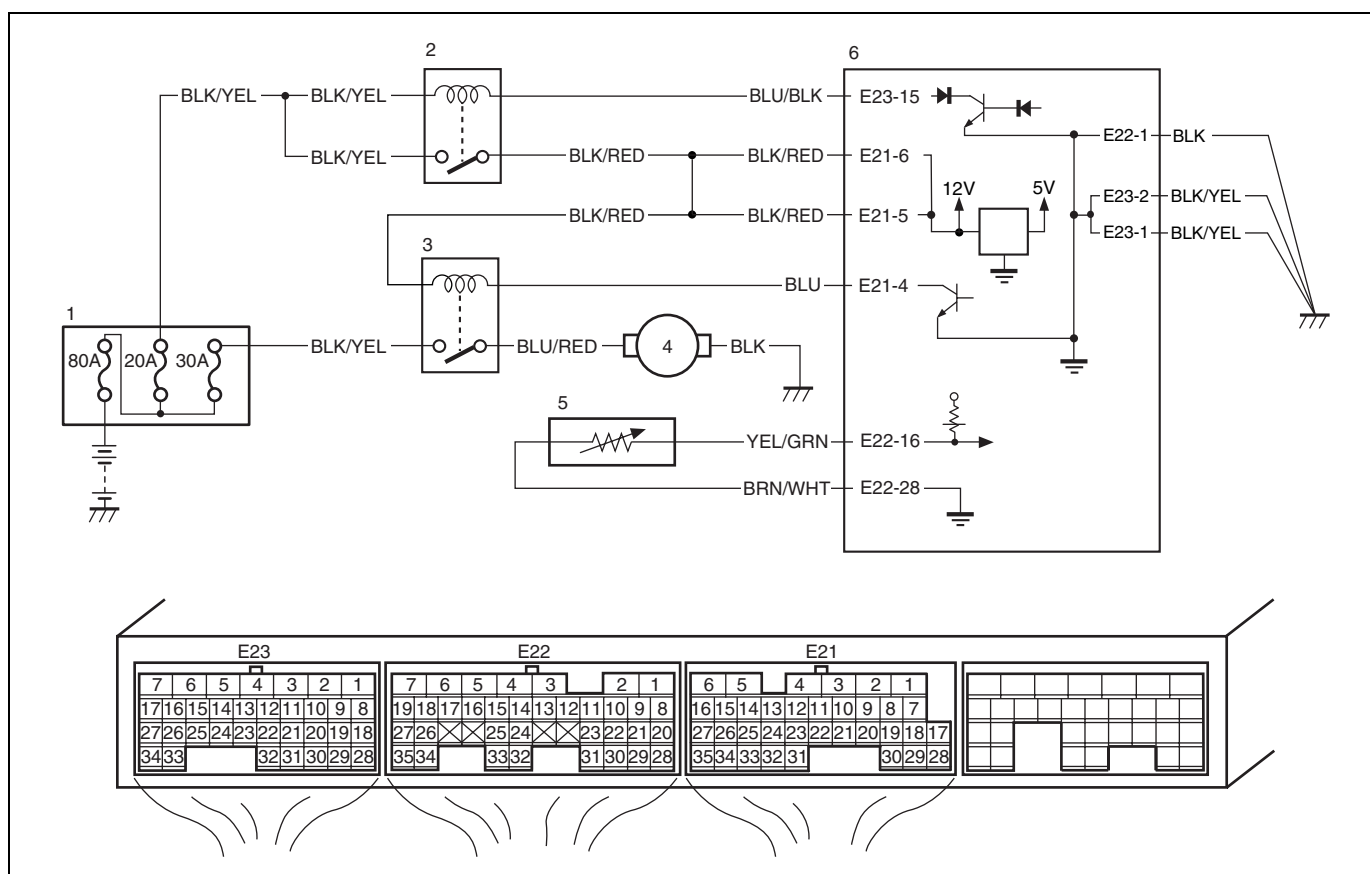
1. Blower fan motor	3. Position lamp	5. To "HEATER" fuse
2. Blower fan switch	4. ECM	6. To "TAIL" fuse

Troubleshooting

Step	Action	Yes	No
1	Do you have SUZUKI scan tool?	Go to Step 2.	Go to Step 3.
2	Check electric load signal circuit. 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Start engine and select "DATA LIST" mode on scan tool. 3) Check electric load signal under following each condition. See Table 1. Is check result satisfactory?	Electric load signal circuit is in good condition.	"PNK/BLU" and/or "RED/YEL" circuit open or short, electric load diodes malfunction or each electric load circuit malfunction.
3	Check electric load signal circuit. 1) Turn ignition switch ON. 2) Check voltage at each terminals "E21-13" and "E21-33" of ECM connector connected, under above each condition. See Table 1. Is each voltage as specified?	Electric load signal circuit is in good condition.	"PNK/BLU" and/or "RED/YEL" circuit open or short, electric load diodes malfunction or each electric load circuit malfunction.

Table 1 for Step 2 and 3

		Scan tool or voltmeter		
		SUZUKI SCAN TOOL	VOLTAGE AT E21-33	VOLTAGE AT E21-13
Ignition switch ON, Small light and heater blower fan all turned	OFF	OFF	0 V	10 – 14 V
	ON	ON	10 – 14 V	0 V

Table B-7 Radiator Fan Control System Check

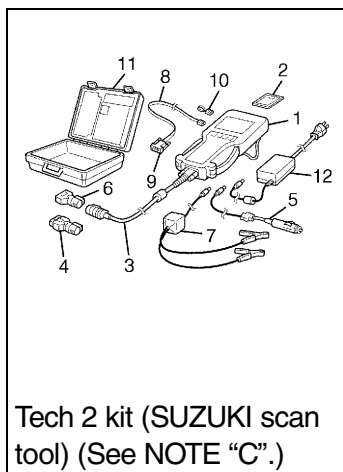
1. Relay box	3. Radiator fan relay	5. ECT sensor
2. Main relay	4. Radiator fan motor	6. ECM

Troubleshooting

Step	Action	Yes	No
1	DTC Check Is there DTC(s) ETC sensor circuit (DTC P0117/P0118) and/or radiator fan circuit (DTC P0480) displayed?	Go to corresponding DTC diag. flow table.	Go to Step 2.
2	Radiator Fan Motor Check 1) Disconnect negative cable at battery. 2) Disconnect connector from ECT sensor. 3) Connect negative cable to battery. Does radiator fan motor rotate at ignition switch turned ON?	System is in good condition.	Go to Step 3.
3	Main Fuse Check 1) Turn ignition switch to OFF position. 2) Remove main fuse from relay box. Is main (30 A) fuse in good condition?	Go to Step 4.	Replace main fuse.
4	Radiator Fan Motor Circuit Check 1) Remove radiator fan relay from relay box. 2) Measure voltage between "BLK/YEL" wire terminal of radiator fan relay connector and vehicle body ground. Is voltage 10 – 14 V?	Go to Step 5.	"BLK/YEL" wire open or high resistance circuit.

Step	Action	Yes	No
5	Check Radiator Fan Relay 1) Check radiator fan relay referring to “Main Relay, Fuel Pump Relay and Radiator Fan Relay Inspection” in Section 6E2. Is it in good condition?	Go to Step 6.	Replace radiator fan relay.
6	Radiator Fan Control Circuit Check 1) Disconnect radiator fan motor connector. 2) Measure resistance between “BLU/RED” wire terminal of radiator fan motor connector and “BLU/RED” wire terminal of radiator fan relay connector. Is resistance 1Ω or less?	Go to Step 7.	“BLU/RED” wire circuit open or poor connection.
7	Radiator Fan Control Circuit Check 1) Measure resistance between “BLU/RED” wire terminal of radiator fan motor connector and vehicle body ground. Is it infinite?	Go to Step 8.	“BLU/RED” wire circuit shorted to ground.
8	Radiator Fan Control Circuit Check 1) Turn ON ignition switch. 2) Measure voltage between “BLU/RED” wire terminal of radiator fan motor connector and vehicle body ground. Is voltage 0 V?	Go to Step 9.	“BLU/RED” wire shorted to power circuit.
9	Radiator Fan Control Circuit Check 1) Measure resistance between “BLK” wire terminal of radiator fan motor connector and vehicle body ground. Is resistance 1Ω or less?	Replace radiator fan motor.	“BLK” wire open or high resistance circuit.

Special Tool



Tech 2 kit (SUZUKI scan tool) (See NOTE "C".)

NOTE:

"C": This kit includes the following items.

1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable,
6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter,
10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 6A2

ENGINE MECHANICAL (M13 ENGINE)

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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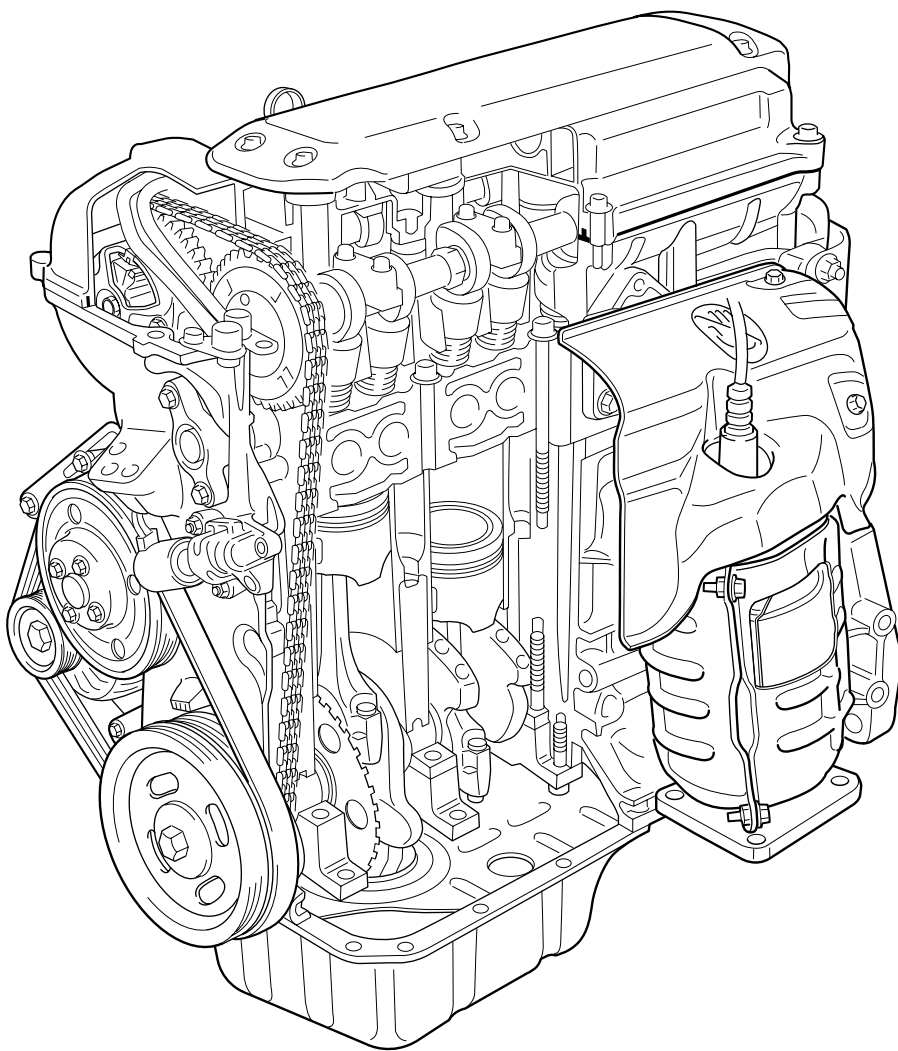
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General Description

Engine Construction Description

The engine is water-cooled, in line 4 cylinders, 4 stroke cycle gasoline unit with its DOHC (Double overhead camshaft) valve mechanism arranged for "V" type valve configuration and 16 valves (4 valves/one cylinder). The double overhead camshaft is mounted over the cylinder head; it is driven from crankshaft through timing chain, and no push rods are provided in the valve train system.



Engine Lubrication Description

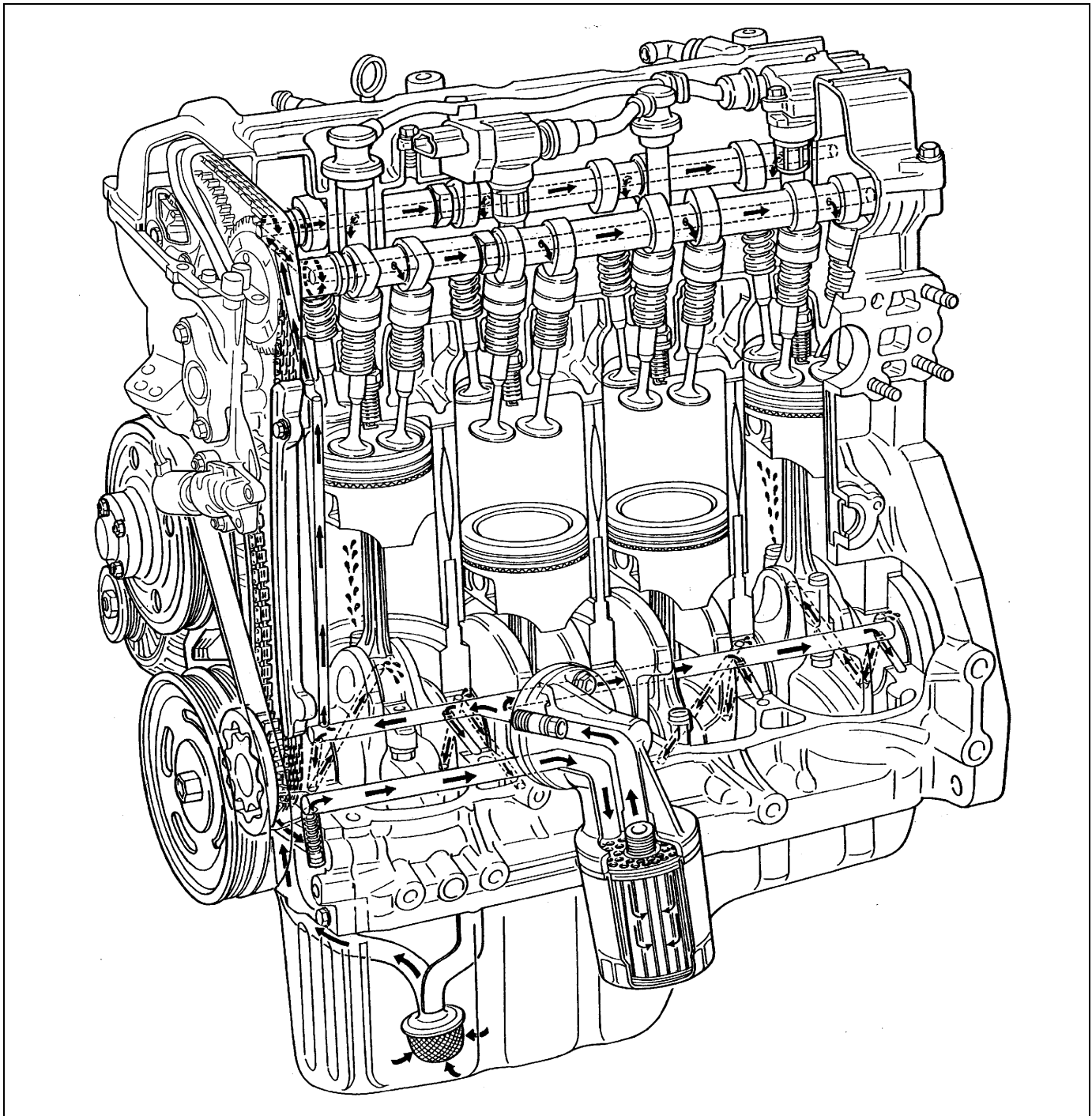
The oil pump is of a trochoid type, and mounted on the crankshaft. Oil is drawn up through the oil pump strainer and passed through the pump to the oil filter.

The filtered oil flows into 2 paths in cylinder block.

In one path, oil reaches the crankshaft journal bearings. Oil from the crankshaft journal bearings is supplied to the connecting rod bearings by means of intersecting passages drilled in the crankshaft, and then injected from the big end of connecting rod to lubricate piston, rings, and cylinder wall.

In other path oil goes up to the cylinder head and lubricates valves and camshafts, etc., after passing through the internal oilway of camshafts.

An oil relief valve is provided on the oil pump. This valve starts relieving oil pressure when the pressure exceeds about 390 kPa (3.9 kg/cm², 56.6 psi).



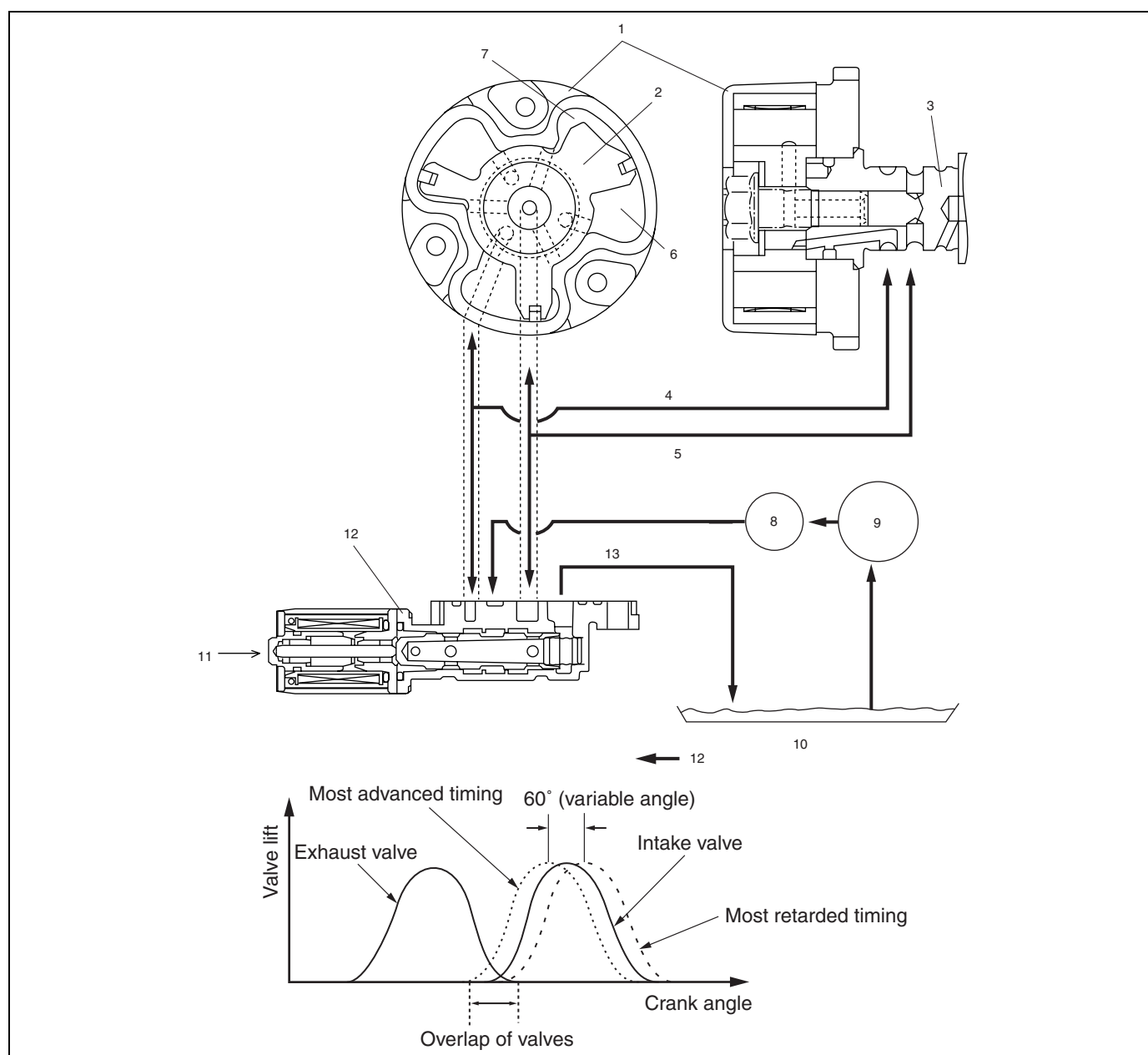
Variable Valve Timing (VVT) System Description

System description

The VVT system is an electronic control system which continuously vary and optimize the intake valve timing in response to the engine operating condition.

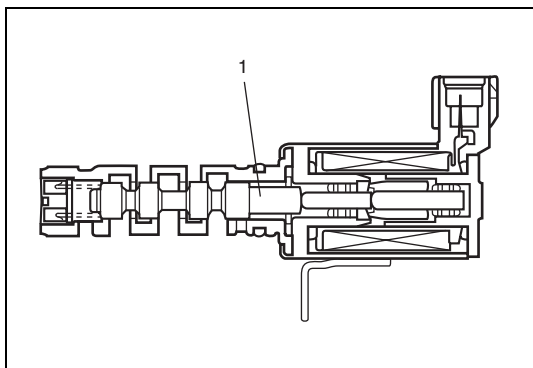
The optimized intake valve timing produce such an air intake with high efficiency that both the higher power generation and lower fuel consumption can be attained in the whole engine speed range from low to high. In the area of the average engine load, low emission of nitrogen oxides (NOx) and high fuel efficiency can also be attained by making the valve opening overlap between the intake and exhaust valves longer.

For the brief of the system operation, the intake valve timing is varied by the cam timing sprocket (1) which varies the rotational phase between the intake camshaft (3) and sprocket. The rotor (2) in the cam timing sprocket is actuated by switching or adjusting the hydraulic pressure applied to the chambers for the timing advancing (7) and/or retarding (6). To switch or adjust the hydraulic pressure appropriately, ECM operates the oil control valve (12) with detecting the engine speed, intake air value, throttle opening, engine coolant temperature and cam-shaft position (angle).



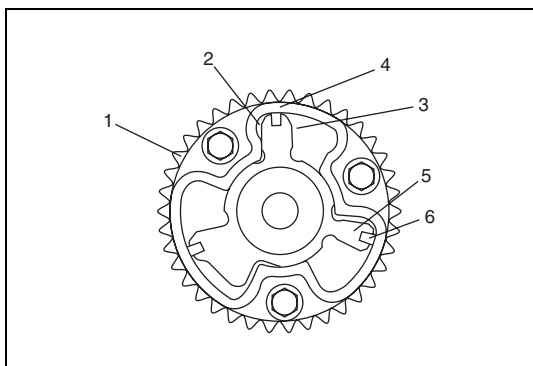
4. Oil passage to chamber for timing retarding	8. Oil filter	10. Oil pan	12. Oil flow
5. Oil passage to chamber for timing advancing	9. Oil pump	11. Control signal from ECM	

Oil control valve



The oil control valve switches and adjusts the hydraulic pressure applied to the cam timing sprocket by moving the spool valve (1) according to the duty pulse signals output from the ECM. By this operation, the intake valve timing is varied continuously. Signals output from the ECM are the duty pulse of about 240 Hz.

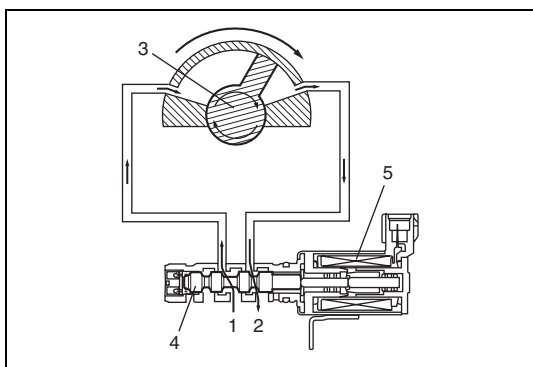
Cam timing sprocket



The cam timing sprocket is equipped with the chambers for timing advancing (2) and retarding (3) which are separated by the rotor (5). The rotor rotates receiving the hydraulic pressure applied to both the chambers. The sprocket (1) is installed on the housing (4) and the rotor is secured on the intake camshaft by fastening the bolts. Therefore, the actuation of the rotor makes the phase difference between the sprocket and intake camshaft.

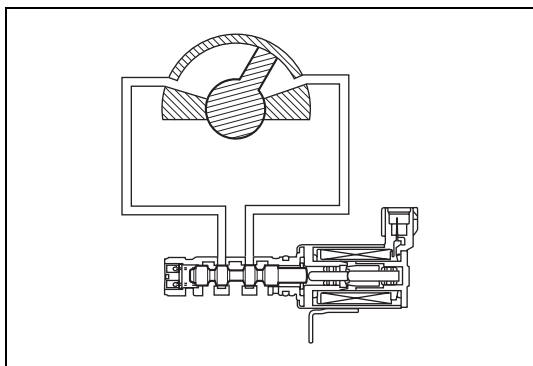
6. Seal

Timing advancing



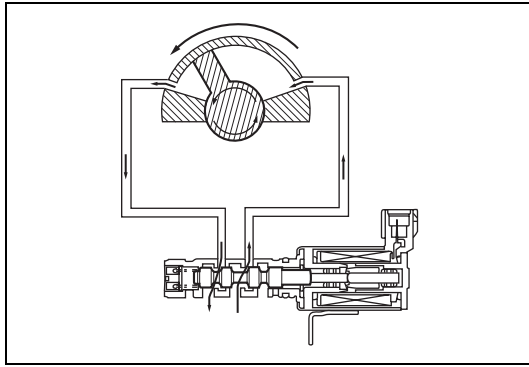
2. Drain

Timing holding



When the duty ratio of the signal output from the ECM shows that of holding, the spool valve of the oil control valve is located at hold position. Because this condition generates no oil pressure changes in both chambers, the rotor is fixed at a target position.

Timing retarding



When the duty ratio of the signal output from the ECM is light, the spool valve of the oil control valve moves to the right (head for the coil). By this spool valve movement, the pressurized oil is led into the chambers for timing retarding and the oil in the chambers for timing advancing is drained. This operations actuate the rotor and result in the retarded timing of the intake valve.

Targeted timing varying operation

DRIVING CONDITION	VALVE TIMING	TARGET OF CONTROL	EFFECT
Engine running at idle speed	Most retarded	To shorten the valve opening overlap in order to prevent the exhaust gas counterflow to intake manifold.	Stabilization of the engine rotation at idle speed.
Average engine load range	To the advanced side	To lengthen the valve opening overlap in order to enhance the internal exhaust gas recirculation and reduce the pumping loss.	Improvement of the fuel efficiency. Lowering of the exhaust emission.
Light engine load range	To the retarded side	To shorten the valve opening overlap in order to prevent the exhaust gas counterflow to intake manifold.	Keeping of the engine stability.
Low or average engine speed range with heavy engine load	To the advanced side	To advance the closing timing of the intake valve in order to improve the volumetric efficiency.	Improvement of generating the engine torque at low and average engine speed.
High engine speed range with heavy engine load	To the retarded side	To retard the closing timing of the intake valve in order to improve the volumetric efficiency.	Improvement of generating the engine power.
Low engine coolant temperature	Most retarded	To shorten the valve opening overlap in order to prevent the exhaust gas counterflow to intake manifold and reduce the fuel increasing. To slow the fast idle speed of the engine as a result of stabilizing the engine idling.	Stabilization of the fast idling of the engine. Improvement of the fuel efficiency.
At engine starting and stopping	Most retarded	To shorten the valve opening overlap in order to prevent the exhaust gas counterflow to intake manifold.	Improvement of start ability

Diagnosis

Diagnosis Table

Refer to "Engine and Emission Control System Check" in Section 6-2.

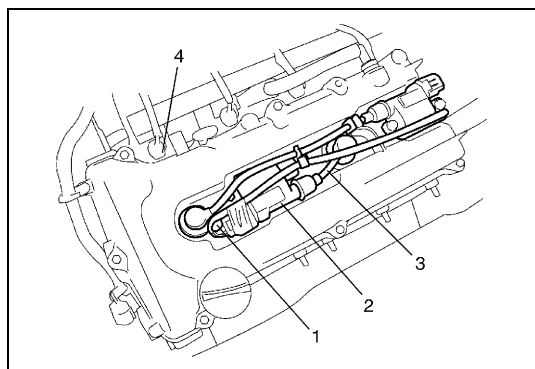
Compression Check

Check compression pressure on all 4 cylinders as follows:

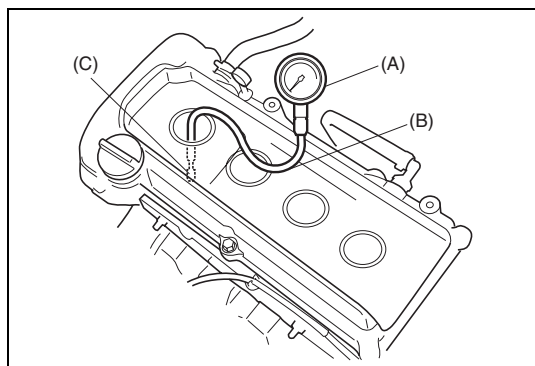
- 1) Warm up engine to normal operating temperature.
- 2) Stop engine after warming up.

NOTE:

After warming up engine, place transaxle gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.



- 3) Disconnect ignition coil couplers (1).
- 4) Remove ignition coil assemblies (2) with high-tension cord (3).
- 5) Remove all spark plugs.
- 6) Disconnect fuel injector wires (4) at the coupler.



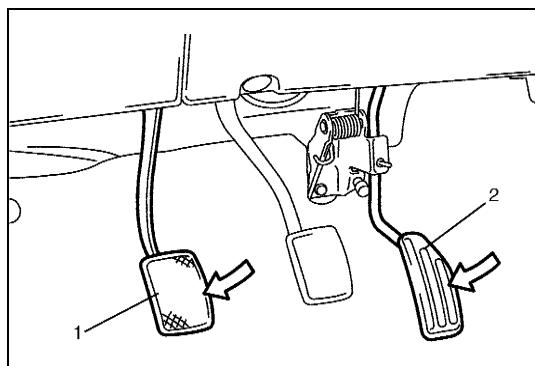
- 7) Install special tools (compression gauge) into spark plug hole.

Special tool

(A): 09915-64512

(B): 09915-64530

(C): 09915-67010



- 8) Disengage clutch (1) (to lighten starting load on engine) for M/T vehicle, and depress accelerator pedal (2) all the way to make throttle fully open.
- 9) Crank engine with fully charged battery, and read the highest pressure on compression gauge.

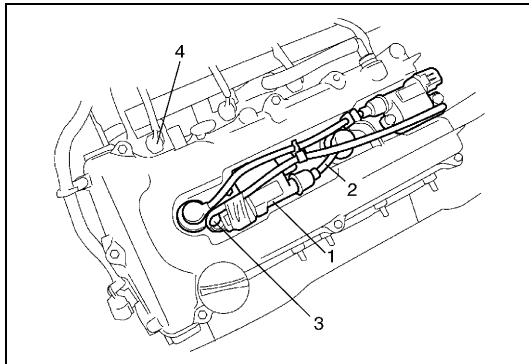
NOTE:

- For measuring compression pressure, crank engine at least 250 rpm by using fully charged battery.
- If measured compression pressure is lower than limit value, check installation condition of special tool. If it is properly installed, possibility is compression pressure leakage from where piston ring or valve contact.

Compression pressure

Standard	1400 kPa (14.0 kg/cm², 199.0 psi)
Limit	1100 kPa (11.0 kg/cm², 156.0 psi)
Max. difference between any two cylinders	100 kPa (1.0 kg/cm², 14.2 psi)

10) Carry out Steps 7) through 9) on each cylinder to obtain 4 readings.



- 11) After checking, install spark plugs and ignition coil assemblies (1) with high-tension cord (2).
- 12) Connect ignition coil couplers (3).
- 13) Connect fuel injector wires(4) at the coupler.

Engine Vacuum Check

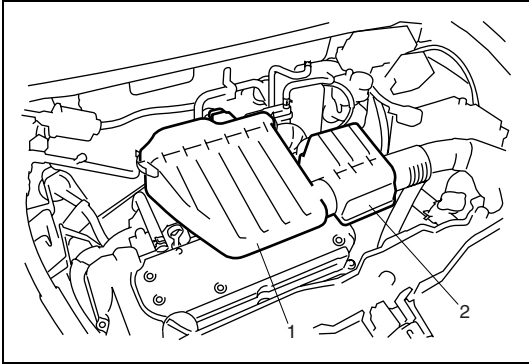
The engine vacuum that develops in the intake line is a good indicator of the condition of the engine. The vacuum checking procedure is as follows:

- 1) Warm up engine to normal operating temperature.

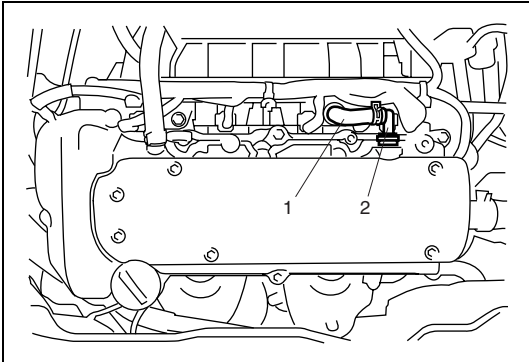
NOTE:

After warming up engine, be sure to place transaxle gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.

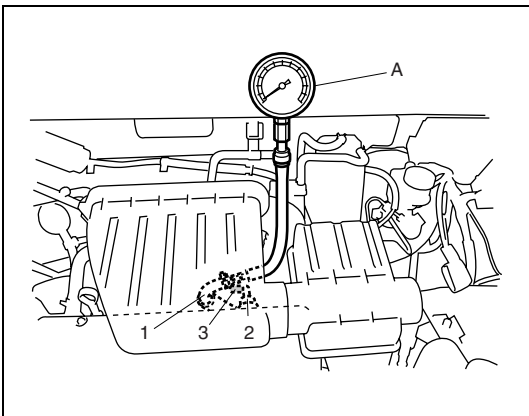
- 2) Stop engine and turn off the all electric switches.



3) Remove air cleaner case (1) and resonator (2).



4) Remove PCV hose (1) from PCV valve (2).



5) Connect special tool (Vacuum gauge) to PCV hose (1).

Special tool

(A): 09915-67311

- 6) Blind PCV valve (2) using tape (3) or the like.
- 7) Install air cleaner case and resonator.
- 8) Run engine at specified idle speed and read vacuum gauge.
Vacuum should be within specification.

Vacuum specification (at sea level)

59 – 73 kPa (45 – 55 cmHg, 17.7 – 21.6 inHg)

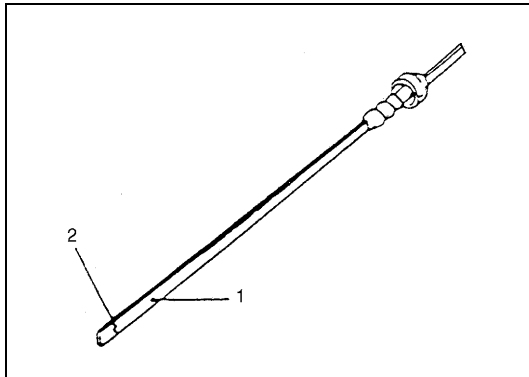
at specified idle speed

- 9) After checking, disconnect special tool (Vacuum gauge) from PCV valve.
- 10) Detach blind cap from PCV valve.
- 11) Install air cleaner case and resonator.

Oil Pressure Check

NOTE:

Prior to checking oil pressure, check the following items.

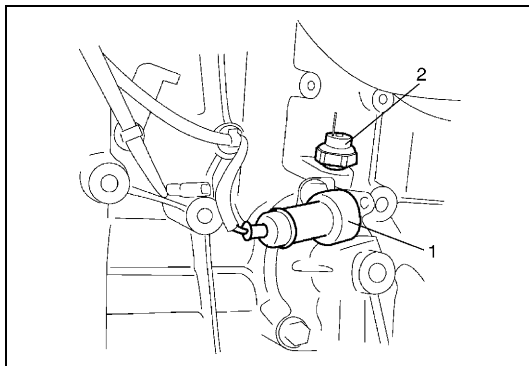


- Oil level in oil pan
If oil level is low, add oil up to Full level mark (hole) on oil level gauge.
- Oil quality
If oil is discolored or deteriorated, change it.
For particular oil to be used, refer to “Engine Oil and Filter Change” in Section 0B.

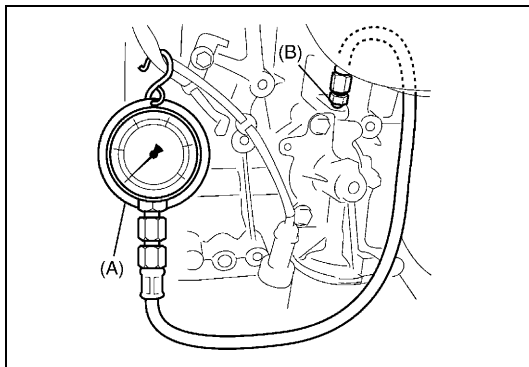
1. Full level mark (hole)

2. Low level mark (hole)

- Oil leaks
If leak is found, repair it.



- 1) Disconnect oil pressure switch coupler (1).
- 2) Remove exhaust manifold cover, if necessary.
- 3) Remove oil pressure switch (2) from cylinder block.



- 4) Install special tools (Oil pressure gauge) to threaded hole of oil pressure switch.

Special tool

(A): 09915-77310

(B): 09915-78211

- 5) Start engine and warm it up to normal operating temperature.

NOTE:

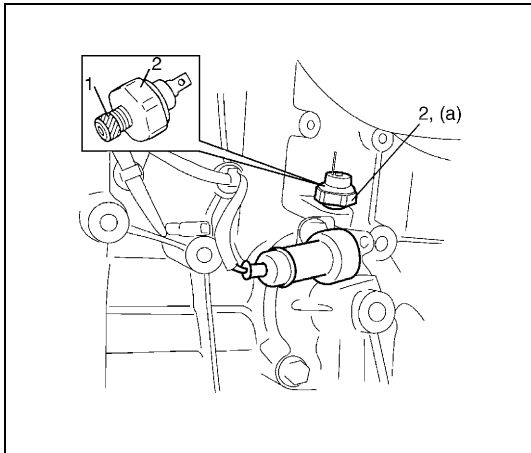
Be sure to place transaxle gear shift lever in “Neutral” (shift selector lever to “P” range for A/T model), and set parking brake and block drive wheels.

- 6) After warming up, raise engine speed to 4,000 rpm and measure oil pressure.

Oil pressure specification

**More than 270 kPa (2.7 kg/cm², 39.8 psi)
at 4,000 rpm**

- 7) Stop engine and remove oil pressure gauge and attachment.



- 8) Before reinstalling oil pressure switch (2), be sure to wrap its screw threads with sealing tape (1) and tighten switch to specified torque.

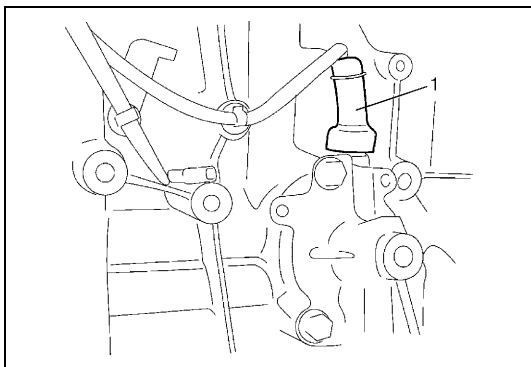
NOTE:

If sealing tape edge is bulged out from screw threads of switch, cut it off.

Tightening torque

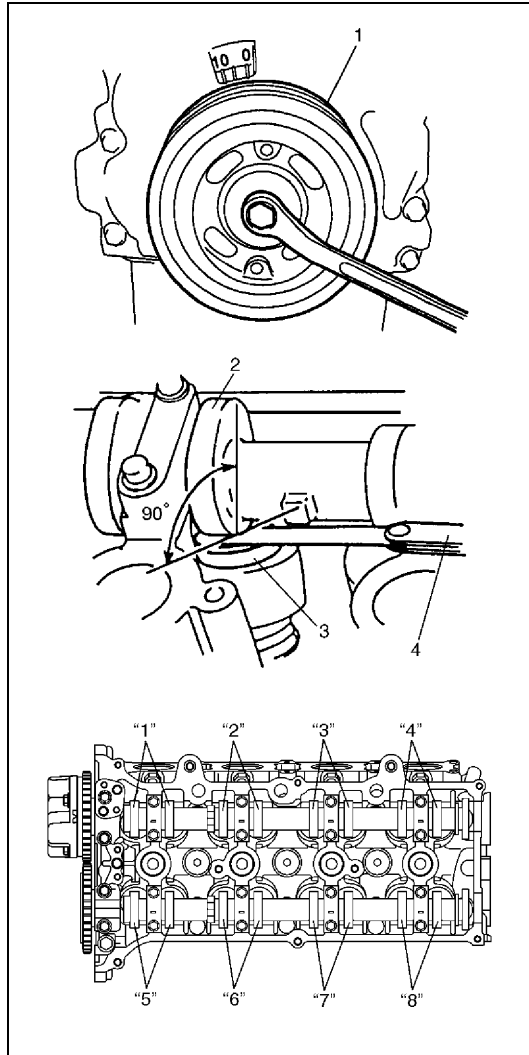
Oil pressure switch (a): 14 N·m (1.4 kg-m, 10.5 lb-ft)

- 9) Start engine and check oil pressure switch (2) for oil leakage.
If oil leakage is found, repair it.



- 10) Connect oil pressure switch coupler and fit cover (1) firmly.

Valve Lash (Clearance) Inspection



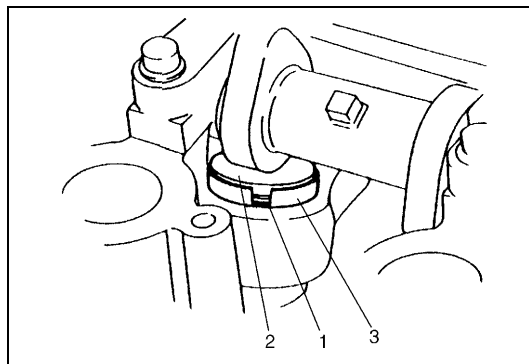
- 1) Remove negative cable at battery.
- 2) Remove cylinder head cover referring to "Cylinder Head Cover Removal and Installation" in this section.
- 3) Remove right side engine under cover, if necessary.
- 4) Using 17 mm wrench, turn crankshaft pulley (1) clockwise until cam lobes (2) become perpendicular to shim faces (3) at valves "1" and "7" as shown in figure.
- 5) Check valve lashes with thickness gauge (4) according to the following procedure.
 - a) Check valve lashes at valves "1" and "7".
 - b) Turn camshafts by 90° (by turning crankshaft with wrench).
 - c) Make sure that cam lobes (2) are perpendicular to shim faces (3) at valves to be checked (in this case, "3" and "8"), if not, adjust it by turning crankshaft. Check valve lashes.
 - d) In the same manner as b) – c), check valve lashes at valves "4" and "6".
 - e) In the same manner as b) – c) again, check valve lashes at valves "2" and "5".

If valve lash is out of specification, record valve lash and adjust it to specification referring to "Shim Replacement" in this section.

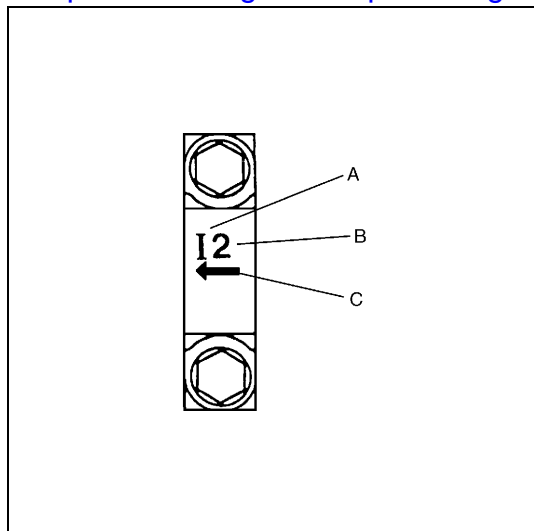
Valve clearance specification

	When cold (Coolant temperature is 15 – 25°C (59 – 77°F))	When hot (Coolant temperature is 60 – 68°C (140 – 154°F))
Intake	0.18 – 0.22 mm (0.007 – 0.009 in.)	0.21 – 0.27 mm (0.008 – 0.011 in.)
Exhaust	0.28 – 0.32 mm (0.011 – 0.013 in.)	0.30 – 0.36 mm (0.012 – 0.014 in.)

Shim Replacement



- 1) Close the valve whose shim (2) is to be replaced by turning crankshaft, then turn tappet (3) till its cut section (1) faces inside as shown in figure.
- 2) Lift down the valve by turning crankshaft to 360°.
- 3) Hold tappet at that position using special tool as follows.
 - a) Remove its housing bolts.

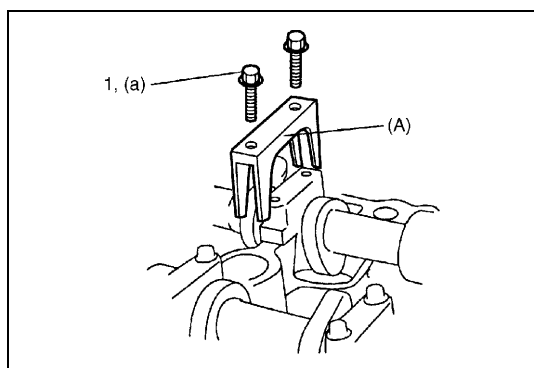


- b) Check housing No. and select special tool corresponding to housing No. referring to the following table.

Special tool selection table

No. on camshaft housing	Embossed mark on special tool
I2	IN2
I3, I4, I5	IN345
E2	EX2
E3, E4, E5	EX345

A: I: Intake side or E: Exhaust side
B: Position from timing chain side
C: Pointing to timing chain side



- c) Hold down the tappet so as not to contact the shim by installing special tool on camshaft housing with housing bolt (1) tighten housing bolts to specified torque.

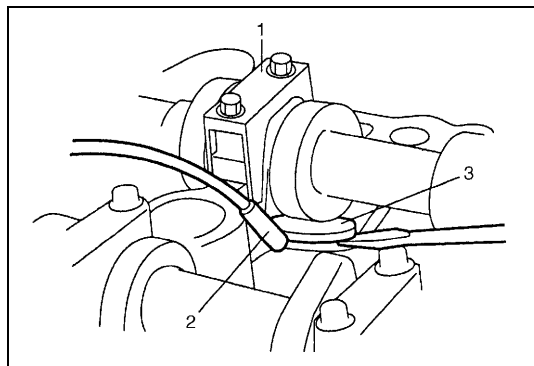
Special tool

(A): 09916-67020 or 09916-67021

Tightening torque

Camshaft housing bolt (for tightening of special tool)

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

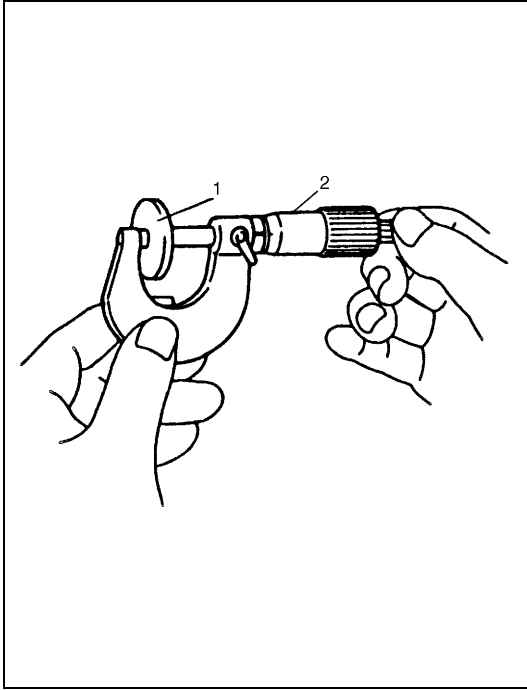


- 4) Turn camshaft by approximately 90° clockwise and remove shim (3).

WARNING:

Never put in the hand between cam shaft and tappet.

1. Special tool
2. Magnet



- 5) Using a micrometer (2), measure the thickness of the removed shim (1), and determine replacement shim by calculating the thickness of new shim with the following formula and table.

Intake side:

$$A = B + C - 0.200 \text{ mm (0.0078 in.)}$$

Exhaust side:

$$A = B + C - 0.300 \text{ mm (0.0118 in.)}$$

A: Thickness of new shim

B: Thickness of removed shim

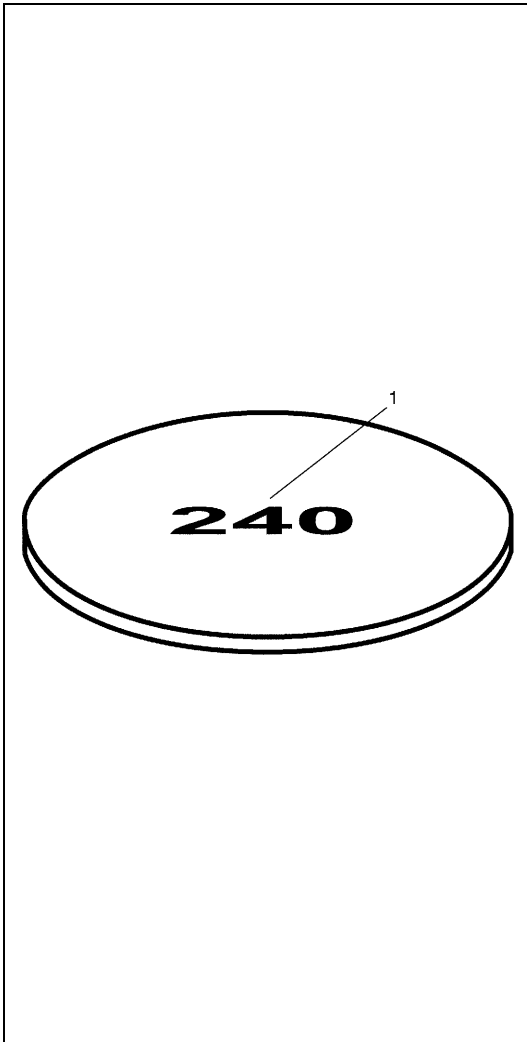
C: Measured valve clearance

For example of intake side:

When thickness of removed shim is 2.400 mm (0.0945 in.), and measured valve clearance is 0.450 mm (0.0177 in.).

$$A = 2.400 \text{ mm (0.0945 in.)} + 0.450 \text{ mm (0.0177 in.)} - 0.200 \text{ mm (0.0078 in.)} = 2.650 \text{ mm (0.1044 in.)}$$

Calculated thickness of new shim = 2.650 mm (0.1043 in.)

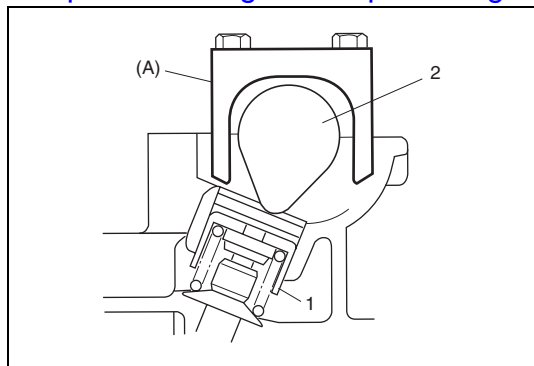


- 6) Select new shim No. (1) with a thickness as close as possible to calculated value.

Available new shims No.

Thickness mm (in.)	Shim No.	Thickness mm (in.)	Shim No.
2.175 (0.0856)	218	2.675 (0.1053)	268
2.200 (0.0866)	220	2.700 (0.1063)	270
2.225 (0.0876)	223	2.725 (0.1073)	273
2.250 (0.0886)	225	2.750 (0.1083)	275
2.275 (0.0896)	228	2.775 (0.1093)	278
2.300 (0.0906)	230	2.800 (0.1102)	280
2.325 (0.0915)	233	2.825 (0.1112)	283
2.350 (0.0925)	235	2.850 (0.1122)	285
2.375 (0.0935)	238	2.875 (0.1132)	288
2.400 (0.0945)	240	2.900 (0.1142)	290
2.425 (0.0955)	243	2.925 (0.1152)	293
2.450 (0.0965)	245	2.950 (0.1161)	295
2.475 (0.0974)	248	2.975 (0.1171)	298
2.500 (0.0984)	250	3.000 (0.1181)	300
2.525 (0.0994)	253		
2.550 (0.1004)	255		
2.575 (0.1014)	258		
2.600 (0.1024)	260		
2.625 (0.1033)	263		
2.650 (0.1043)	265		

- 7) Install new shim facing shim No. side with tappet.

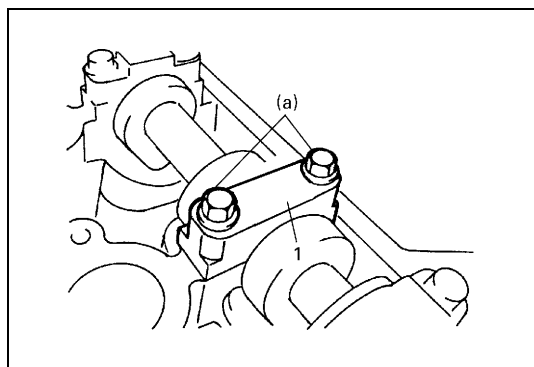


- 8) Lift valve by turning crankshaft counterclockwise (in opposite direction against above Step 4) and remove special tool.

Special tool

(A): 09916-67020 or 09916-67021

1. Tappet
2. Camshaft



- 9) Install camshaft housing (1) and tighten bolts to specified torque.

Tightening torque

Camshaft housing bolt

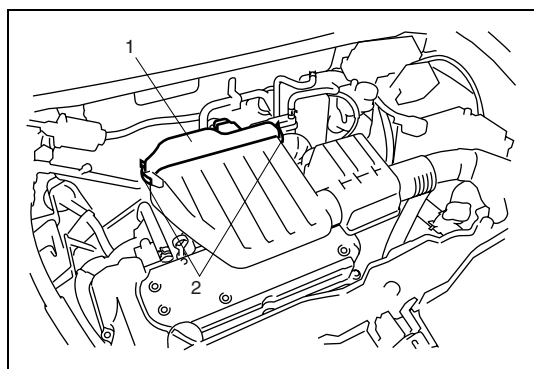
(a): Tighten 11 N·m (1.1 kg-m, 8.0 lb-ft)
by the specified procedure.

- 10) Check valve clearance again after adjusting it.
11) After checking and adjusting all valves.
12) Install cylinder head cover referring to "Cylinder Head Cover Removal and Installation" in this section.

On-Vehicle Service

Air Cleaner Element Removal and Installation

Removal



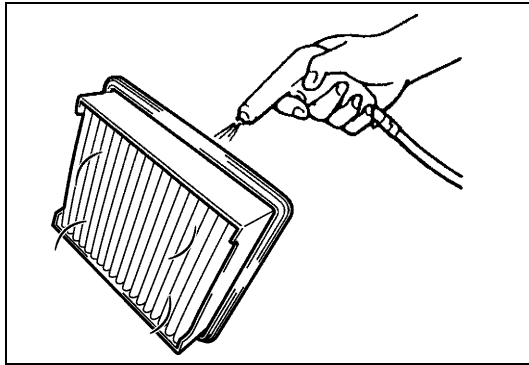
- 1) Open air cleaner case (1) by unhooking its clamps (2).
2) Remove air cleaner element from case.

Installation

Reverse removal procedure for installation.

Air Cleaner Element Inspection and Cleaning

- Check air cleaner element for dirt. Replace excessively dirty element.
- Blow off dust by compressed air from air outlet side of element.



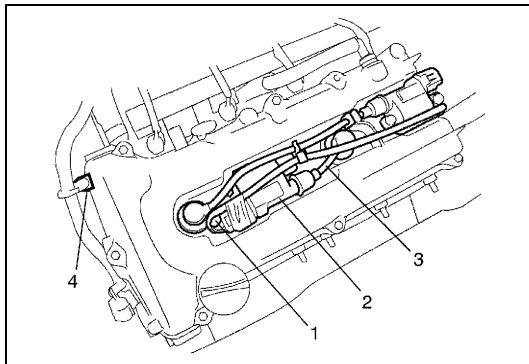
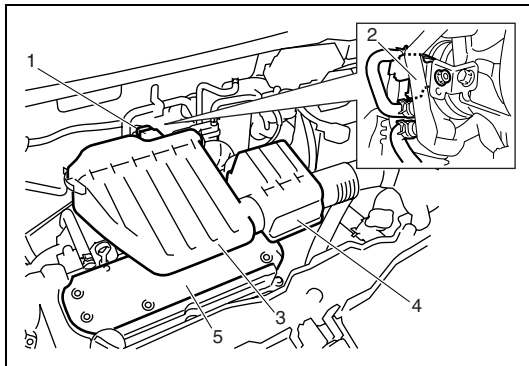
Knock Sensor Removal and Installation

Refer to "Knock Sensor Removal and Installation" in Section 6E2.

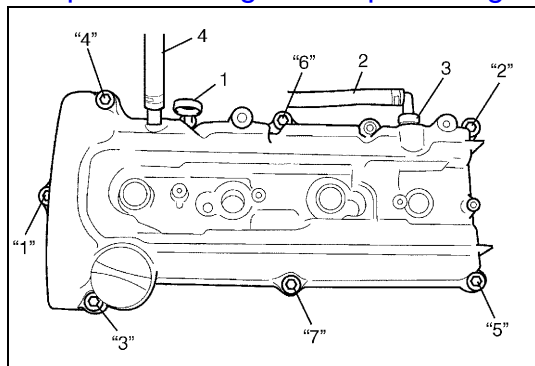
Cylinder Head Cover Removal and Installation

Removal

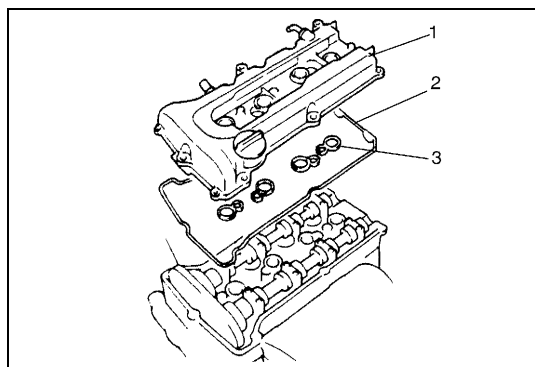
- 1) Disconnect negative cable at battery.
- 2) Disconnect MAF sensor coupler (1).
- 3) Remove EVAP canister purge valve (2).
- 4) Remove air cleaner case (3) and resonator (4).
- 5) Remove cylinder head upper cover (5).



- 6) Disconnect ignition coil couplers (1).
- 7) Remove ignition coil assemblies (2) with high-tension cord (3).
- 8) Remove wire harness clamp (4) from cylinder head cover.



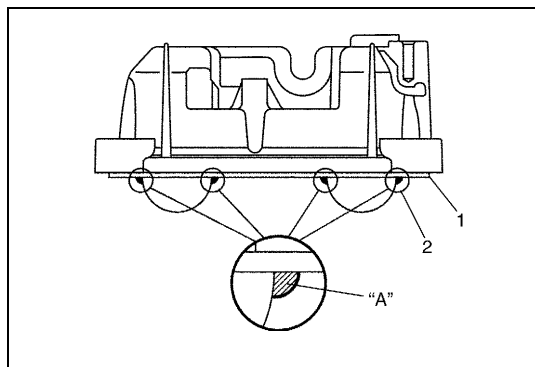
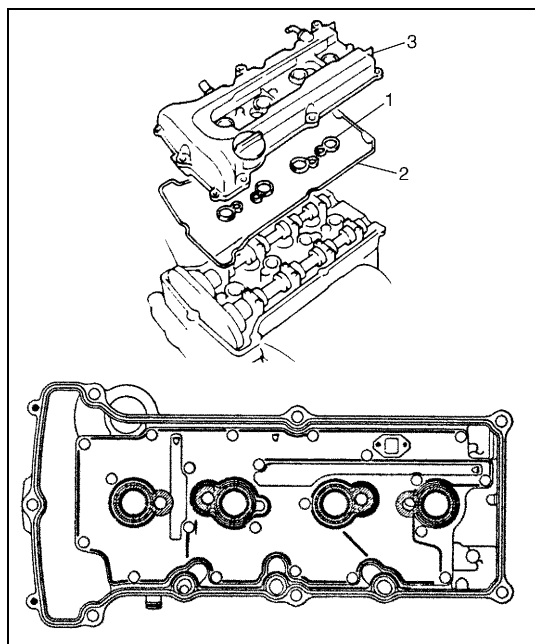
- 9) Remove oil level gauge (1).
- 10) Disconnect PCV hose (2) from PCV valve (3) and disconnect breather hose (4) from cylinder head cover.
- 11) Remove cylinder head cover mounting bolts in such order as indicated in figure.



- 12) Remove cylinder head cover (1) with cylinder head cover gasket (2) and spark plug hole gasket (3).

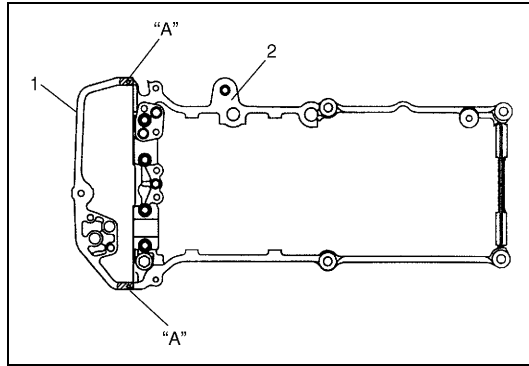
Installation

- 1) Install new spark plug hole gaskets (1) and new cylinder head cover gasket (2) to cylinder head cover (3) as shown in figure.



- 2) Remove oil, old sealant and dust from sealing surface on cylinder head and cover. After cleaning, apply sealant "A" to the following point.
 - Cylinder head cover gasket (1) sealing surface area (2) as shown.

"A": Sealant 99000-31250



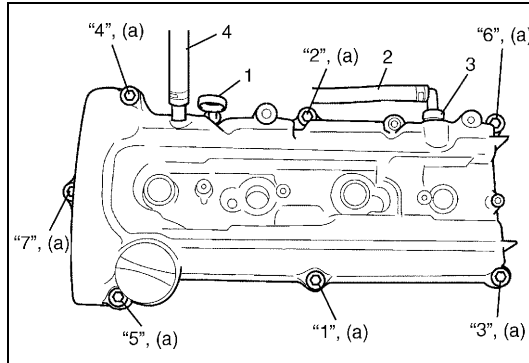
- Timing chain cover (1) and cylinder head (2) mating surface as shown.

"A": Sealant 99000-31250

3) Install cylinder head cover to cylinder head.

NOTE:

When installing cylinder head cover, use care so that cylinder head cover gasket or spark plug hole gaskets will not get out of place or fall off.



4) Tighten bolts in such order as indicated in figure a little at a time till they are tightened to specified torque.

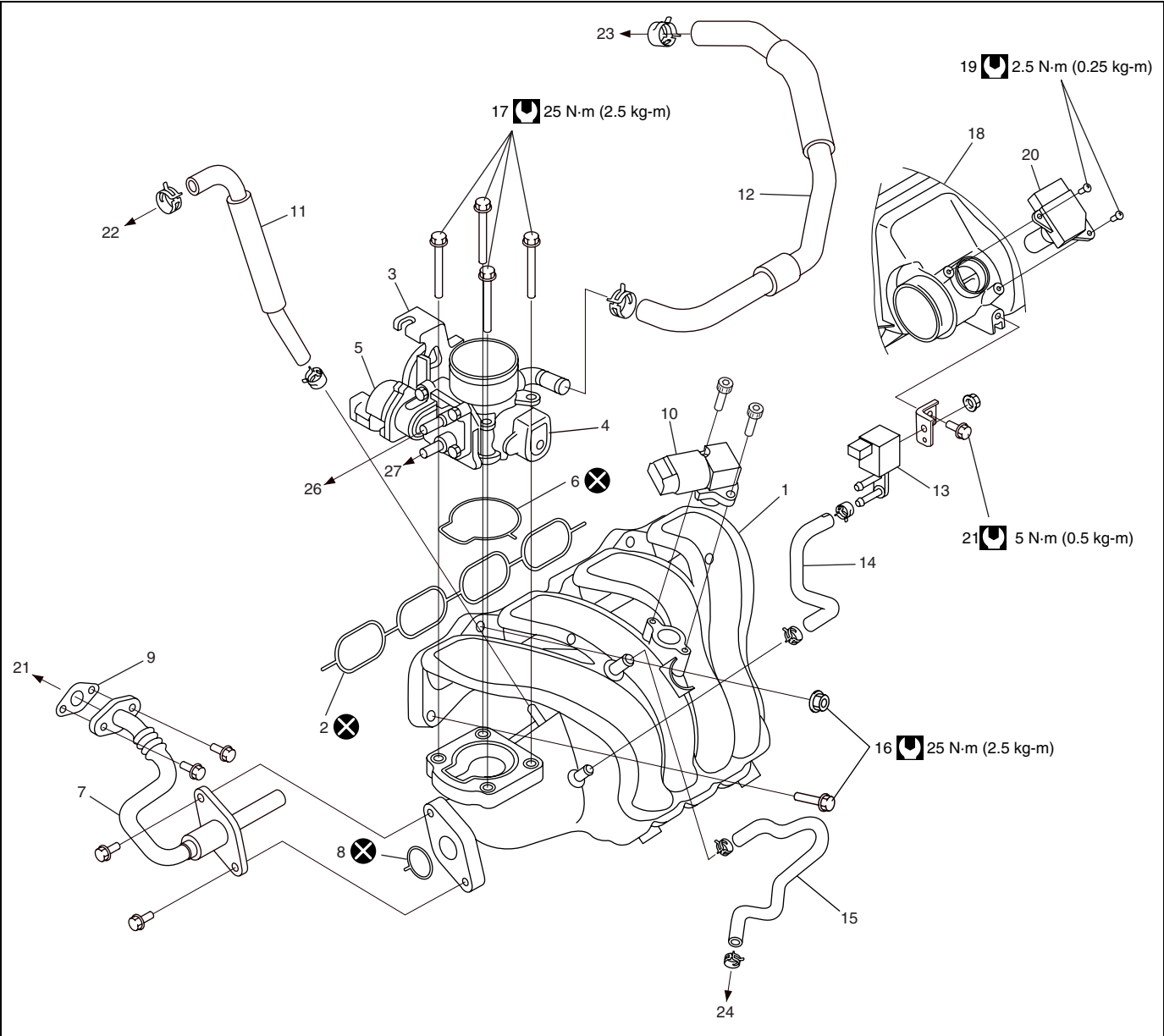
Tightening torque



Cylinder head cover bolt

(a): Tighten 5.0 N·m (0.5 kg-m, 3.5 lb-ft), 7.5 N·m (0.75 kg-m, 5.5 lb-ft) by the specified procedure.

- 5) Connect PCV hose (2) to PCV valve (1).
- 6) Connect breather hose (4).
- 7) Install oil level gauge (3).
- 8) Install wire harness clamp to cylinder head cover.
- 9) Install ignition coil assemblies with high-tension cord.
- 10) Connect ignition coil couplers and clamp harness securely.
- 11) Install cylinder head upper cover.
- 12) Install air cleaner case and resonator.
- 13) Connect negative cable at battery.

Throttle Body and Intake Manifold Components

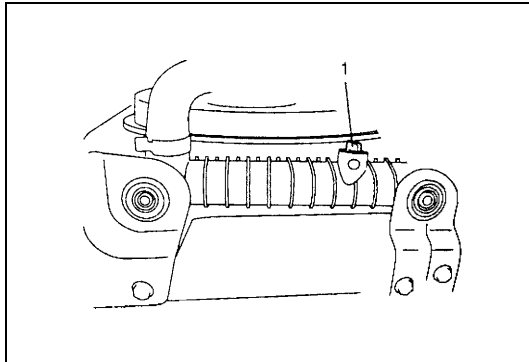


1. Intake manifold	9. Gasket	17. Throttle body mounting bolt	25. To brake booster
2. Intake manifold O-Ring	10. MAP sensor	18. Air cleaner case	26. To water outlet cap
3. Throttle body	11. PCV valve hose	19. MAF sensor bolt	27. To heater union
4. TP sensor	12. Breather hose	20. MAF sensor	 Tightening torque
5. IAC valve	13. EVAP canister purge valve	21. VSV bracket bolt	 Do not reuse.
6. O-Ring	14. EVAP canister purge valve hose	22. To EGR valve	
7. EGR pipe	15. Brake booster hose	23. To PCV valve	
8. O-Ring	16. Intake manifold mounting bolt and nut	24. To cylinder head cover	

Throttle Body Removal and Installation

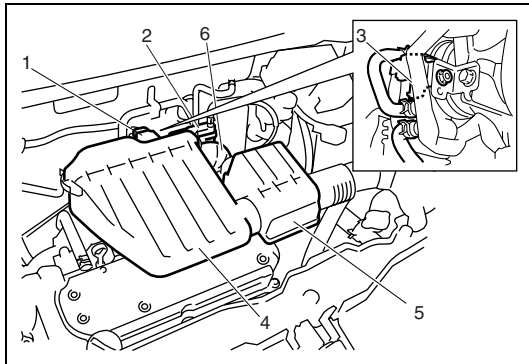
Removal

- 1) Relieve fuel pressure referring to "Fuel pressure Relief Procedure" in Section 6-2.
- 2) Disconnect negative cable at battery.
- 3) Drain coolant by loosening drain plug (1).

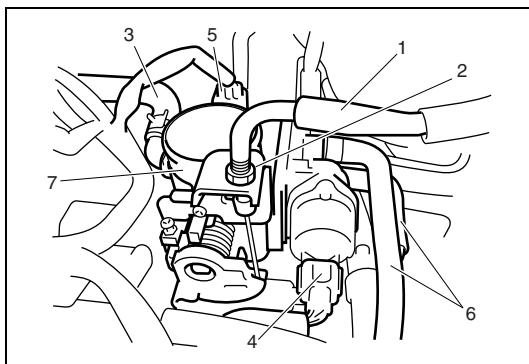


WARNING:

To help avoid danger of being burned, do not remove drain plug (1) and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.



- 4) Disconnect MAF sensor coupler (1).
- 5) Remove EVAP canister purge valve chamber (2) from air cleaner outlet hose.
- 6) Remove EVAP canister purge valve (3).
- 7) Remove air cleaner case (4) and resonator (5).
- 8) Remove air cleaner outlet hose (6).



- 9) Remove accelerator cable (1) by loosening lock nut (2).
- 10) Disconnect breather hose (3) and water hoses (6) from throttle body.
- 11) Disconnect IAC valve coupler (4) and TP sensor coupler (5).
- 12) Remove throttle body (7) from intake manifold.

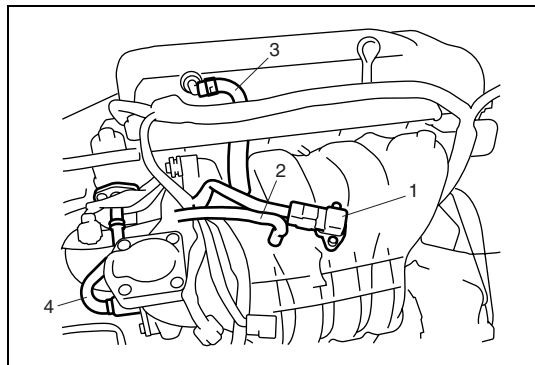
Installation

Reverse removal procedure for installation noting the followings.

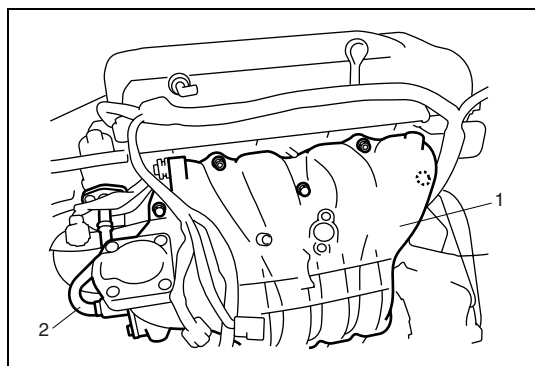
- Use new throttle body O-ring.
- Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
- Adjust accelerator cable play referring to "Accelerator Cable Adjustment" in Section 6E2.
- Refill cooling system referring to "Cooling System Flush and Refill" in Section 6B2.
- Upon completion of installation, turn ignition switch ON but engine OFF and check for fuel leaks.
- Finally, start engine and check for engine coolant leaks.

Intake Manifold Removal and Installation

Removal



- 1) Remove throttle body referring to "Throttle Body Removal and Installation" in this section.
- 2) Disconnect MAP sensor coupler (1).
- 3) Disconnect the following hoses:
 - Brake booster hose (2) from cylinder head cover
 - PCV hose (3) from PCV valve
- 4) Disconnect EGR pipe (4) from EGR valve.



- 5) Remove intake manifold (1) and EGR pipe (2) from cylinder head, and then remove its gasket and O-ring.

Installation

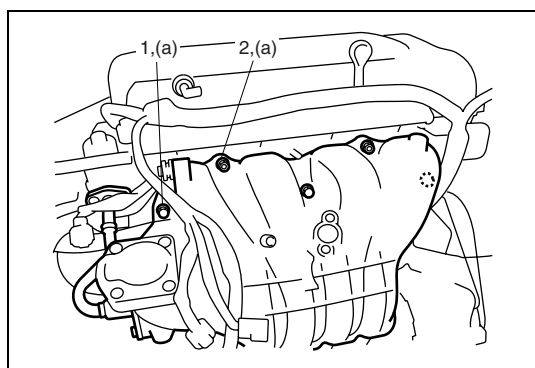
Reverse removal procedure for installation noting the followings.

- Use new intake manifold O-ring.
- Use new EGR pipe gasket and O-ring.
- Tighten bolts (1) and nuts (2) to specified torque.

Tightening torque

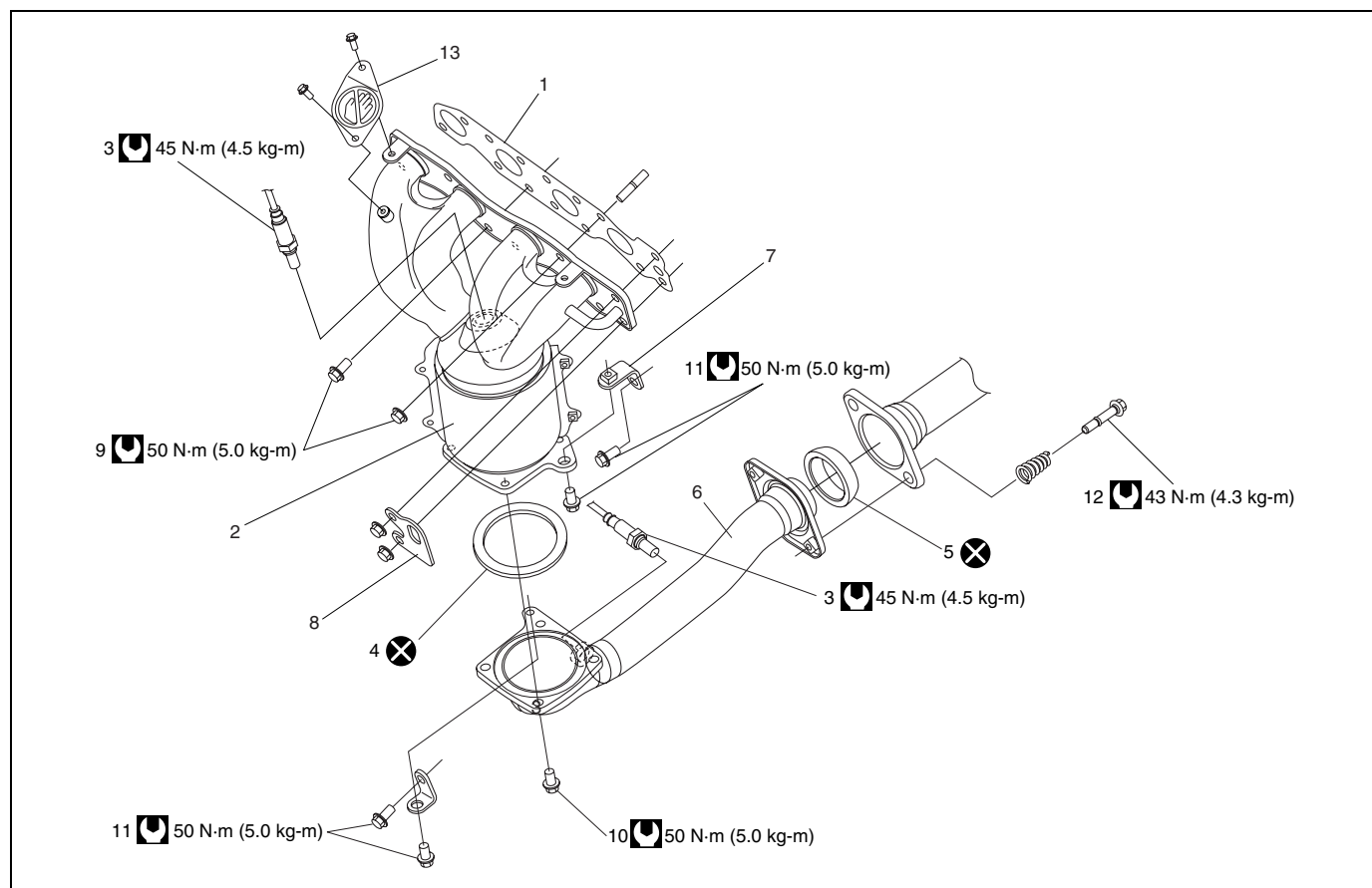
Intake manifold bolt and nut

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)



- Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
- Adjust accelerator cable play referring to "Accelerator Cable Adjustment" in Section 6E2.
- Refill cooling system referring to "Cooling System Flush and Refill" in Section 6B2.
- Upon completion of installation, turn ignition switch ON but engine OFF and check for fuel leaks.
- Finally, start engine and check for engine coolant leaks.

Exhaust Manifold Components



1. Exhaust manifold gasket	6. Exhaust No.1 pipe	11. Exhaust manifold stiffener bolt
2. Exhaust manifold	7. Exhaust manifold stiffener	12. Exhaust pipe No.2 bolt
3. Exhaust oxygen sensor	8. Engine hook	Tightening torque
4. Exhaust pipe gasket	9. Exhaust manifold mounting bolt and nut	Do not reuse.
5. Seal ring No.1	10. Exhaust pipe No.1 bolt	

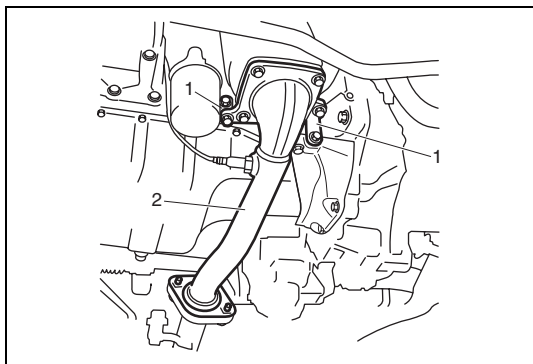
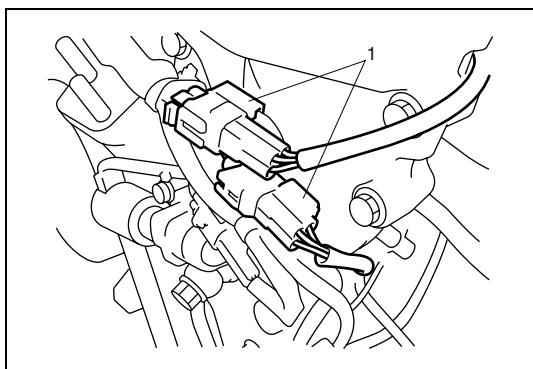
Exhaust Manifold Removal and Installation

WARNING:

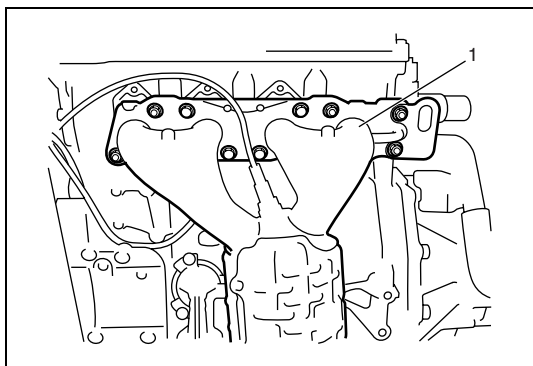
To avoid danger of being burned, do not service exhaust system while it is still hot. Service should be performed after system cools down.

Removal

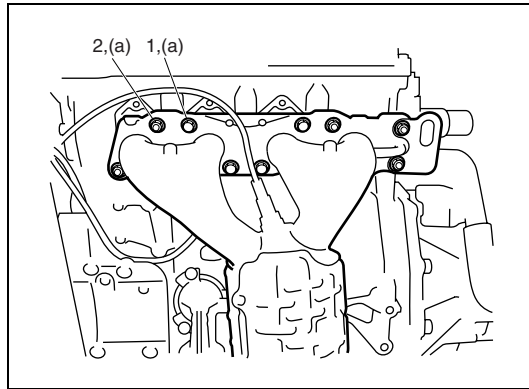
- 1) Disconnect negative cable at battery.
- 2) Remove front bumper with front grille referring to "Front Bumper and Rear Bumper" in Section 9.
- 3) Remove radiator referring to "Radiator Removal and Installation" in Section 6B2 for equipped with A/C.
- 4) With hose connected, detach A/C condenser from vehicle body for equipped with A/C.
- 5) Disconnect heated oxygen sensor coupler (1) and detach it from its stay.



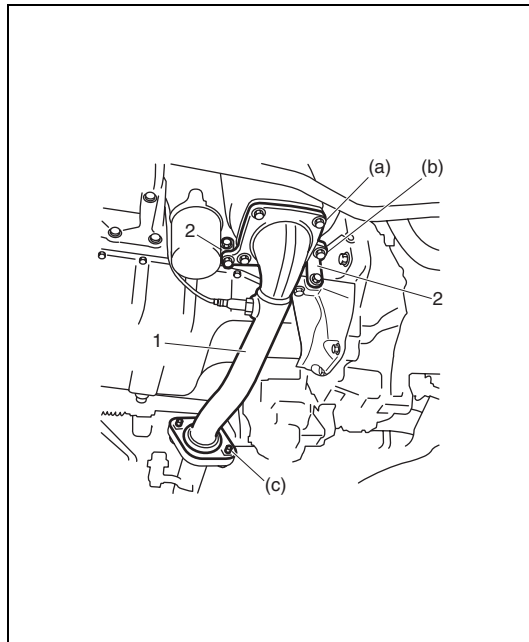
- 6) Remove exhaust manifold stiffener (1).
- 7) Disconnect exhaust No.1 pipe (2) from exhaust manifold.



- 8) Remove exhaust manifold (1) and its gasket from cylinder head.

Installation

- 1) Install new gasket to cylinder head.
Then install exhaust manifold.
Tighten manifold bolts (1) and nuts (2) to specified torque.

Tightening torque**Exhaust manifold bolt and nut****(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)****NOTE:****The figure on the left varies with specification.**

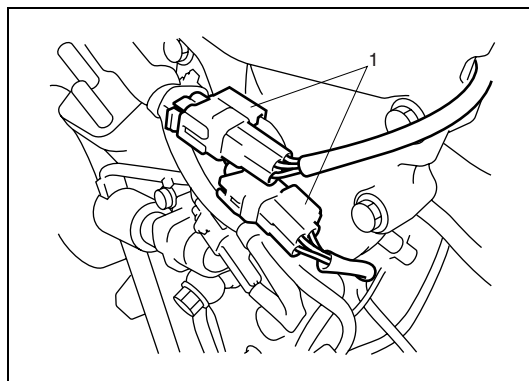
- 2) Install new seal ring and connect exhaust No.1 pipe (1) to exhaust manifold.
Tighten pipe fasteners to specified torque.

Tightening torque**Exhaust No.1 pipe bolt (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)**

- 3) Install exhaust manifold stiffener (2).
Tighten exhaust manifold stiffener bolts to specified torque.

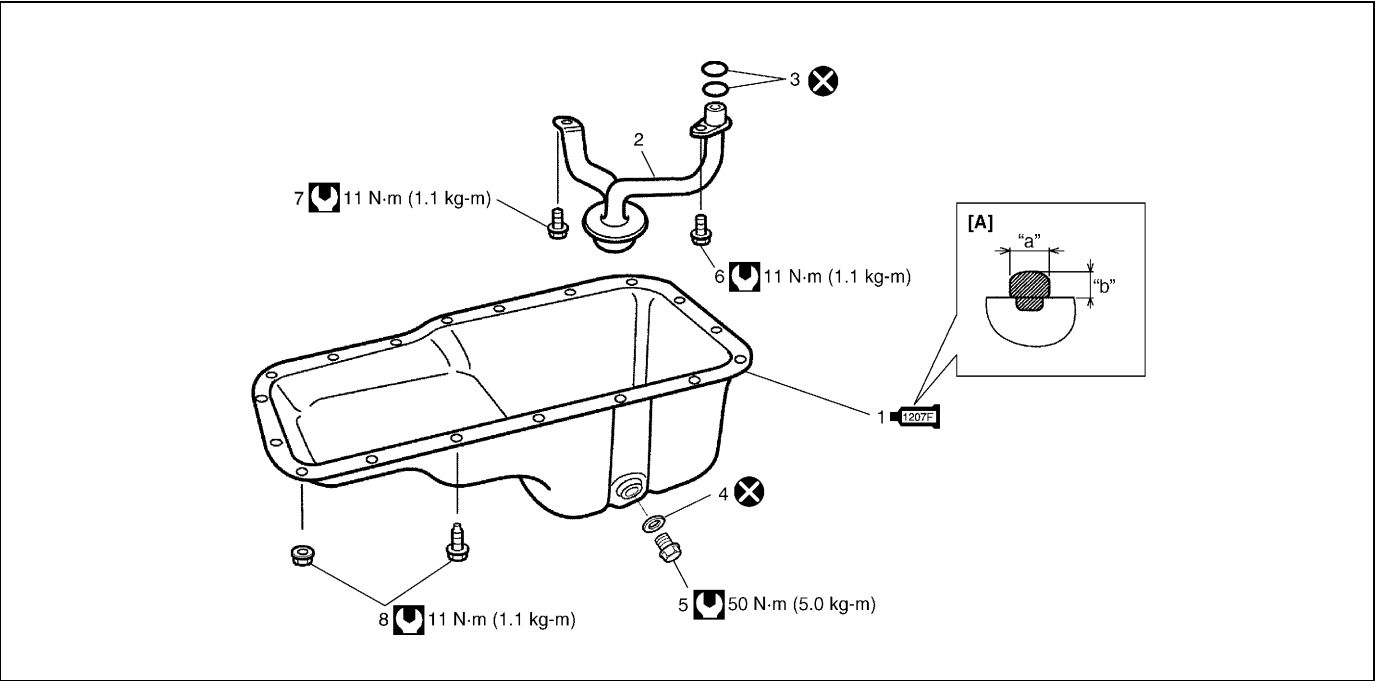
Tightening torque**Exhaust manifold stiffener bolt****(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)**

- 4) Install new seal ring and connect exhaust No.1 pipe (1) to exhaust No.2 pipe.
Tighten pipe fasteners to specified torque.

Tightening torque**Exhaust No.2 pipe bolt (c): 43 N·m (4.3 kg-m, 31.5 lb-ft)**

- 5) Connect heated oxygen sensor coupler (1) and fit coupler to bracket securely.
- 6) Install A/C condenser to vehicle body for equipped with A/C.
- 7) Install radiator referring to "Radiator Removal and Installation" in Section 6B2 for equipped with A/C.
- 8) Install front bumper with front grille by referring to "Front Bumper and Rear Bumper" in Section 9.
- 9) Connect negative cable to battery.
- 10) Check exhaust system for exhaust gas leakage.

Oil Pan and Oil Pump Strainer Components

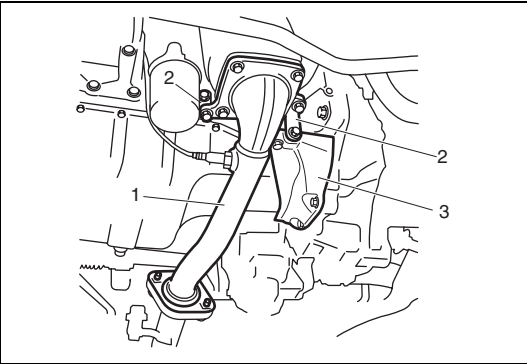


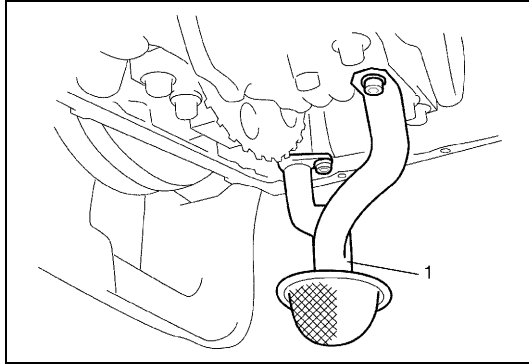
[A]: Sealant application amount	3. O-ring	8. Oil pan bolt and nut
"a": 3 mm (0.12 in.)	4. Gasket	Tightening torque
"b": 2 mm (0.08 in.)	5. Oil pan drain plug bolt	Do not reuse.
1. Oil pan : Apply sealant 99000-31250 to mating surface.	6. Oil pump strainer bolt	
2. Strainer	7. Oil pump strainer bracket bolt	

Oil Pan and Oil Pump Strainer Removal and Installation

Removal

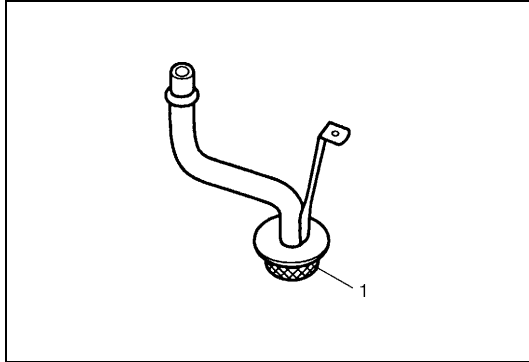
- 1) Remove oil level gauge.
- 2) Drain engine oil by removing drain plug.
- 3) Remove exhaust No.1 pipe (1), exhaust manifold stiffener (2) and clutch housing lower plate (3).
- 4) For 2WD vehicle, remove engine rear mounting bracket.
- 5) For 4WD vehicle, remove transfer referring to "Transfer Dis-mounting and Mounting" in Section 7D.



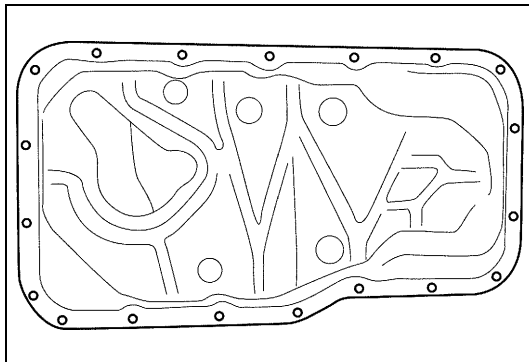


- 6) Remove oil pan and then oil pump strainer (1) from cylinder block.

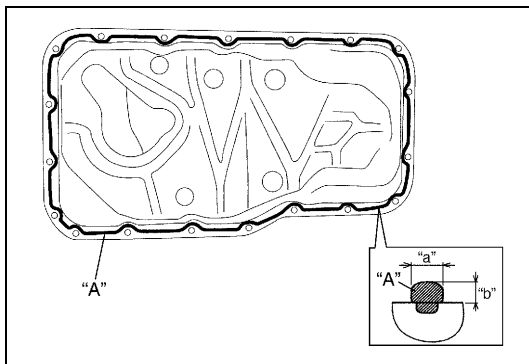
Installation



- 1) Clean oil pump strainer screen (1).



- 2) Clean sealing surface on oil pan and cylinder block.
Remove oil, old sealant and dust from sealing surface.



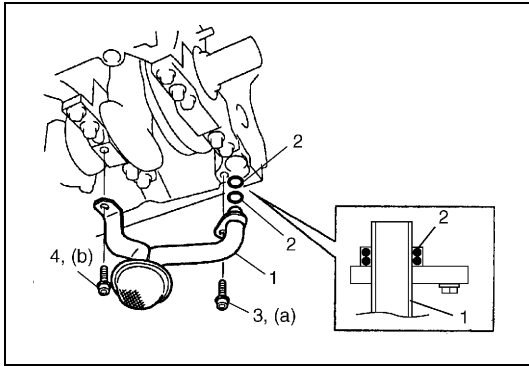
- 3) Apply sealant continuously to oil pan mating surface as shown in figure.

"A": sealant 99000-31250

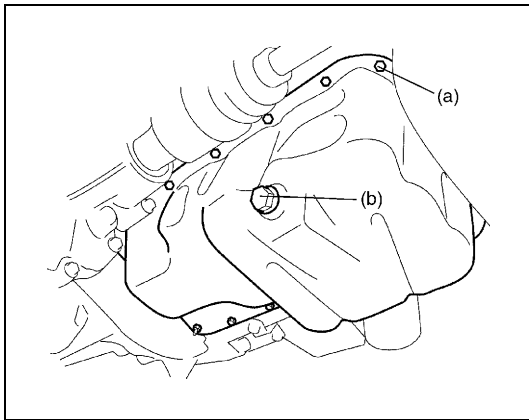
Sealant amount for oil pan

Width "a": 3 mm (0.12 in.)

Height "b": 2 mm (0.08 in.)



- 4) Install new O-rings (2) in the position as shown in figure and install oil pump strainer (1).
Tighten strainer bolt (3) first and then bracket bolt (4) to specified torque.

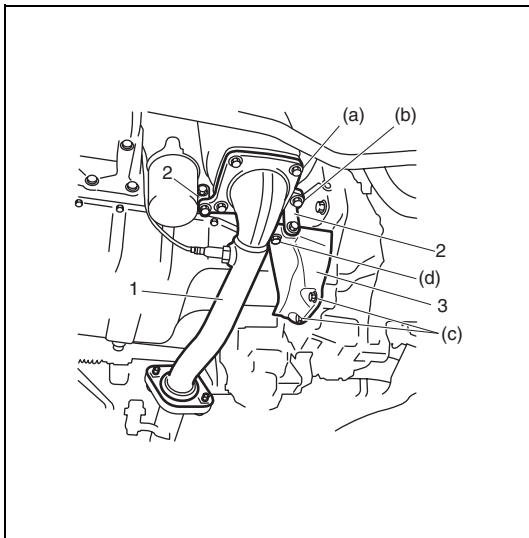
Tightening torque**Oil pump strainer bolt (a): 11 N·m (1.1 kg-m, 8.0 lb-ft)****Oil pump strainer bracket bolt****(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)**

- 5) After fitting oil pan to cylinder block, run in securing bolts and start tightening at the center:
move wrench outward, tightening one bolt at a time. Tighten bolts and nuts to specified torque.

Tightening torque**Oil pan bolt and nut (a): 11 N·m (1.1 kg-m, 8.0 lb-ft)**

- 6) Install new gasket and drain plug to oil pan.

Tighten drain plug to specified torque.

Tightening torque**Oil pan drain plug bolt (b): 50 N·m (5.0 kg-m, 36.5 lb-ft)**

- 7) For 2WD vehicle, install Engine rear mounting bracket.
8) For 4WD vehicle, install transfer referring to "Transfer Dis-mounting and Mounting" in Section 7D.
9) Install clutch housing lower plate (3).
Tighten clutch housing lower plate bolts (c) first and next (d) with specified torque.

Tightening torque**Clutch housing lower plate bolt (c and d)****: 50 N·m (5.0 kg-m, 36.5 lb-ft)**

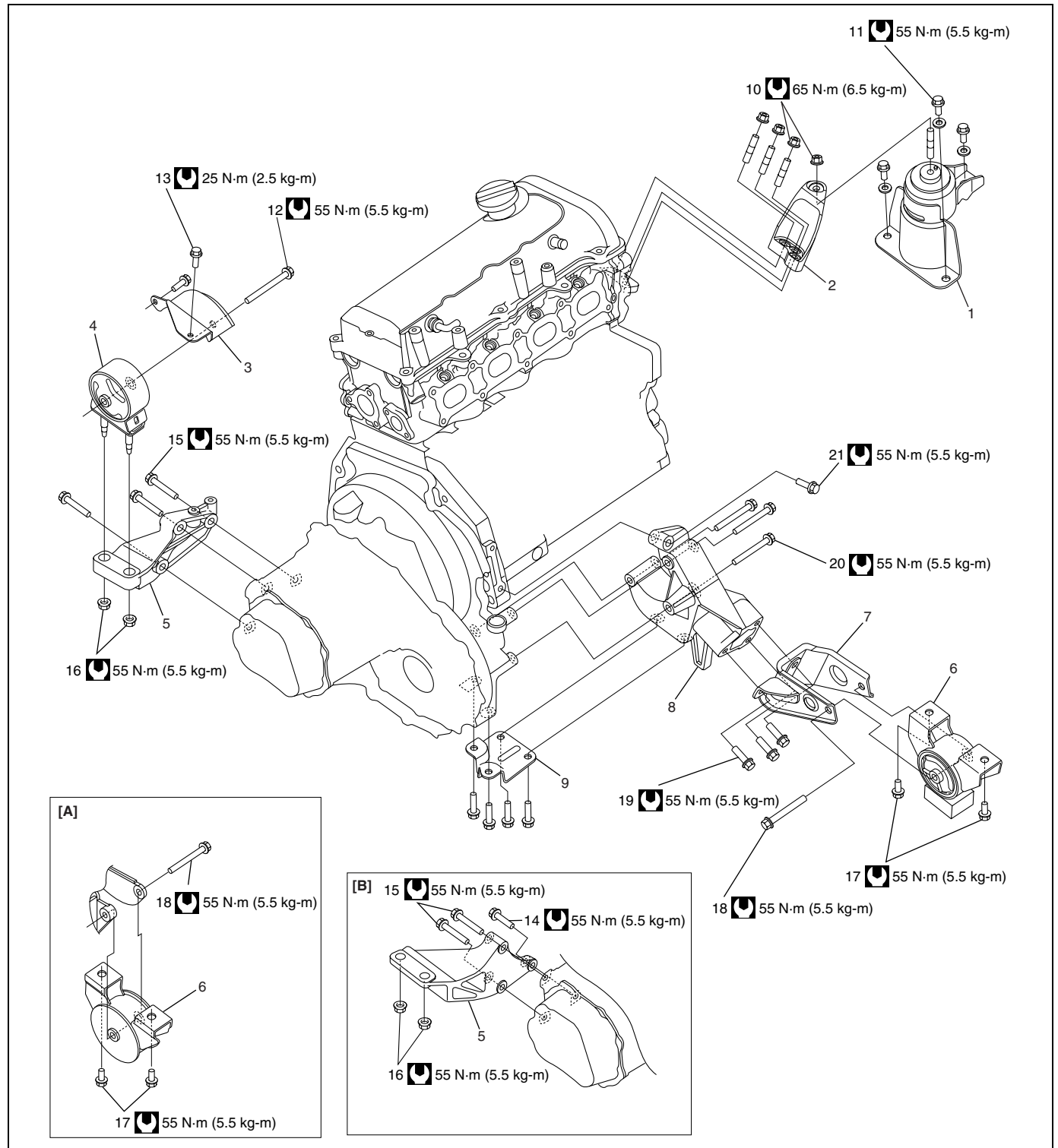
- 10) Install exhaust manifold stiffener (2) and exhaust No.1 pipe (1).

Tighten bolts to specified torque.

Tightening torque**Exhaust pipe No.1 bolt (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)****Exhaust manifold stiffener bolt (b):****50 N·m (5.0 kg-m, 36.5 lb-ft)**

- 11) Install oil level gauge.
12) Refill engine with engine oil referring to "Engine Oil and Filter Change" in Section 0B.
13) Verify that there is no engine oil leakage and exhaust gas leakage at each connection.

Engine Mountings Components



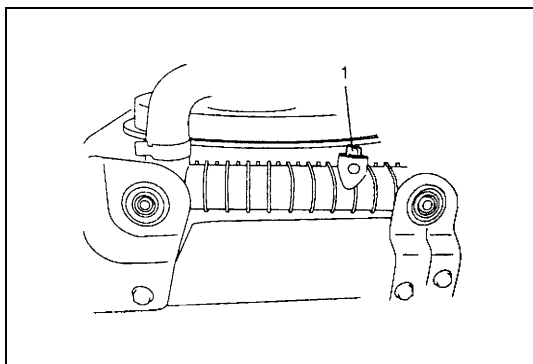
[A]: 4WD model	7. Engine rear mounting No.1 bracket	15. Engine left mounting bracket bolt (long)
[B]: M/T model	8. Engine rear mounting No.2 bracket	16. Engine left mounting nut
1. Engine right mounting	9. Engine rear mounting bracket stiffener	17. Engine rear mounting bolt (short)
2. Engine right engine side bracket	10. Engine right mounting nut	18. Engine rear mounting bolt (long)
3. Engine left body side bracket	11. Engine right mounting bolt	19. Engine rear mounting No.1 bracket bolt
4. Engine left mounting	12. Engine left mounting bolt	20. Engine rear mounting No.2 bracket bolt (long)
5. Engine left mounting bracket	13. Engine left body side bracket bolt	21. Engine rear mounting No.2 bracket bolt (short)
6. Engine rear mounting	14. Engine left mounting bracket bolt (short)	Tightening torque

Unit Repair Overhaul

Engine Assembly Removal and Installation

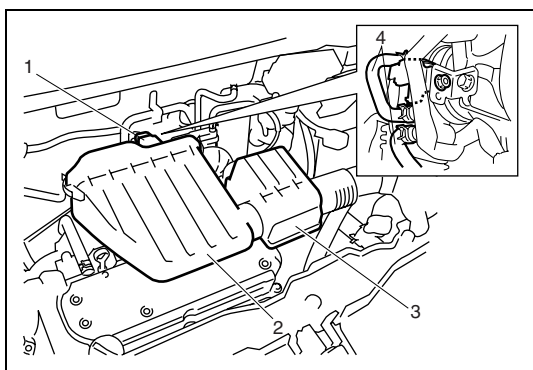
Removal

- 1) Relieve fuel pressure referring to "Fuel Pressure Relief Procedure" in Section 6-2.
- 2) Disconnect negative and positive cables at battery.
- 3) Remove engine hood after disconnecting windshield washer hose.
- 4) Remove right and left side engine under covers.
- 5) Remove A/C compressor belt by referring to "Compressor Drive Belt Removal and Installation" in Section 1B (if equipped).
- 6) Drain engine oil referring to "Engine Oil and Filter Change" in Section 0B.
- 7) Drain transaxle oil referring to "Manual Transaxle Oil Change" in Section 7A2.
- 8) Drain transfer oil referring to "Transfer Oil Change" in Section 7D (for 4WD vehicle).
- 9) Drain coolant by referring to "Cooling System Flush and Refill" in Section 6B2.



WARNING:

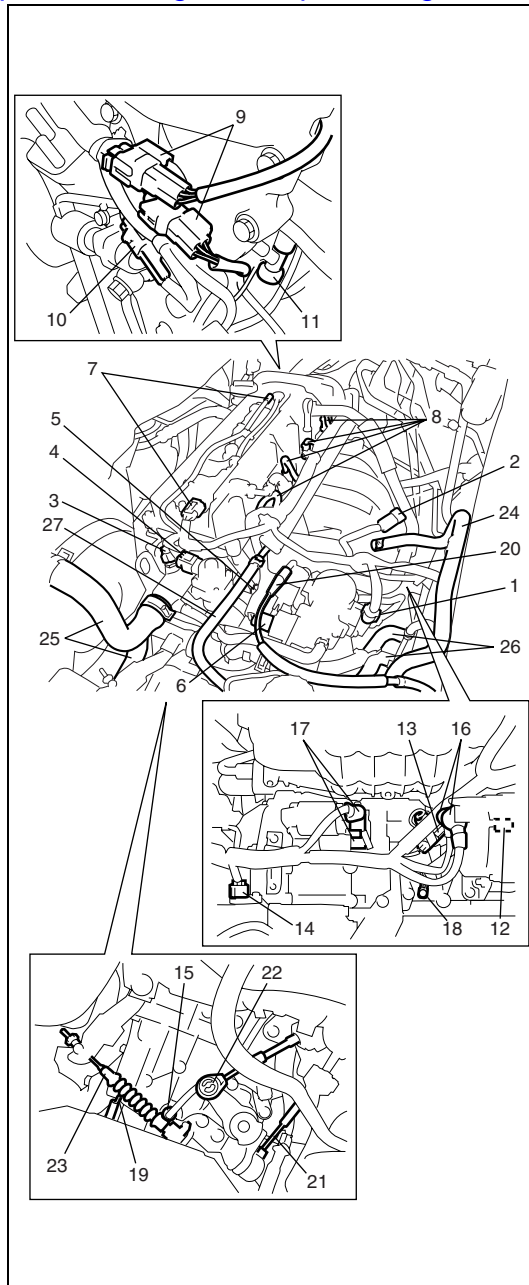
To help avoid danger of being burned, do not remove drain plug (1) and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.



- 10) Disconnect MAF sensor coupler (1).
- 11) Remove air cleaner case (2) and resonator (3).
- 12) Remove canister purge hose (4) from EVAP canister purge valve.
- 13) With hose connected, detach A/C compressor from its bracket (if equipped).

NOTE:

Suspend removed A/C compressor at a place where no damage will be caused during removal and installation of engine assembly.



14) Disconnect the following electric lead wires:

- TP sensor (1)
- MAP sensor (2)
- ECT sensor (3)
- EGR valve (4)
- CMP sensor (5)
- IAC valve (6)
- Ignition coil assembly (7)
- Injectors (8)
- Heated oxygen sensor (9)
- Oil control valve (10)
- Engine oil pressure switch (11)
- CKP sensor (12)
- Knock sensor (13)
- VSS (14)
- Back up light switch (15)
- Generator (16)
- Starting motor (17)
- Ground terminal (18) from cylinder block
- Battery ground cable (19) from transaxle
- Magnet clutch switch of A/C compressor (if equipped)
- Each wire harness clamps

15) Remove fuse box from its bracket.

16) Disconnect the following cables:

- Accelerator cable (20)
- Gear select control cable (21)
- Gear shift control cable (22)
- Clutch cable (23)

17) Disconnect the following hoses:

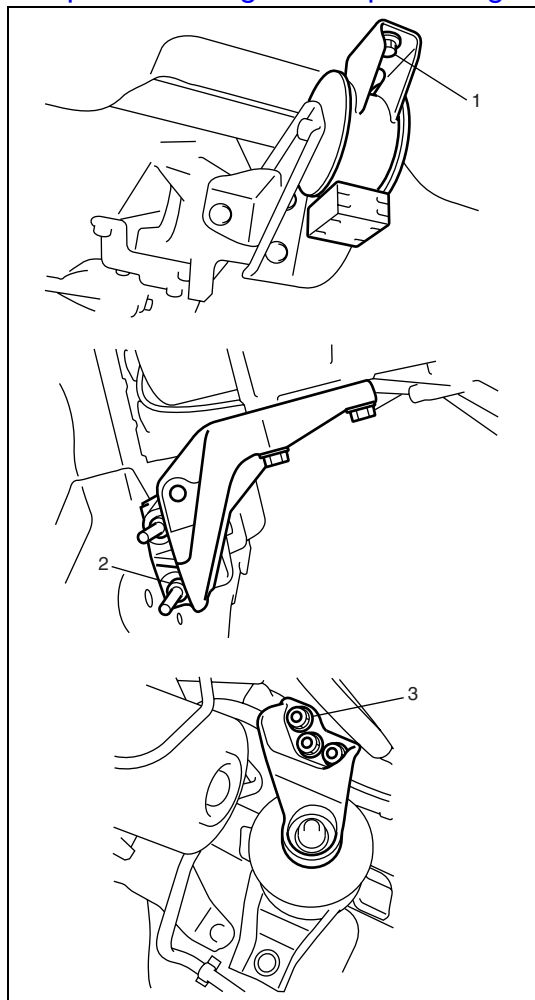
- Brake booster hose (24) from intake manifold
- Radiator inlet and outlet hoses (25) from each pipe
- Heater inlet and outlet hoses (26) from each pipe
- Fuel feed hoses (27) from fuel feed pipe

18) Remove exhaust No.1 pipe referring to "Exhaust Manifold Removal and Installation" in this section.

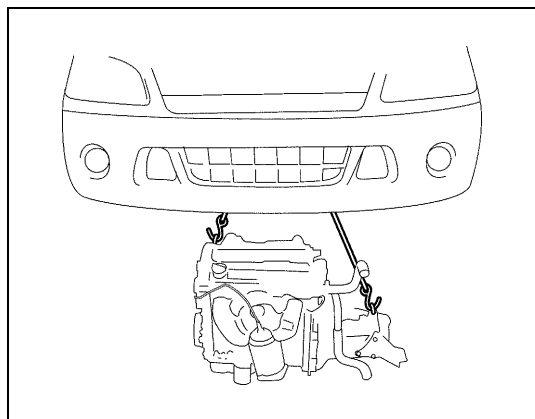
19) Disconnect right and left drive shaft joints to differential gear referring to "Removal" in Section 4.

For engine and transaxle removal, it is not necessary to remove drive shafts from steering knuckle.

20) For 4WD vehicle, remove propeller shaft referring to "On-Vehicle Service" in Section 4B.



- 21) Install lifting device.
- 22) Remove engine rear mounting bolts (1), engine left mounting bracket nuts (2) and engine right mounting nuts (3).



- 23) Before removing engine with transaxle from body, recheck to make sure all hoses, electric wires and cables are disconnected from engine and transaxle.
- 24) Lower engine with transaxle from body.

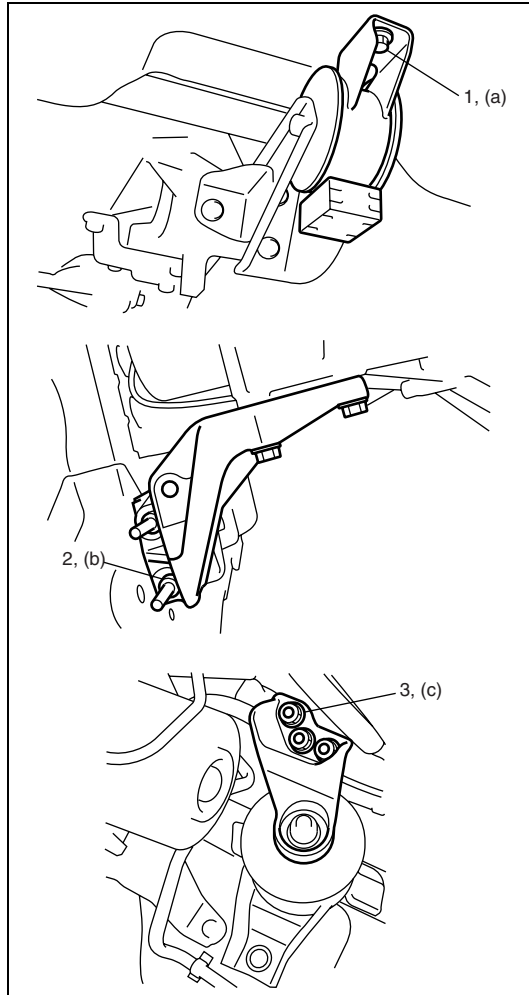
NOTE:

Before lowering engine, to avoid damage to A/C compressor, raise it through clearance made on engine crankshaft pulley side. At this time, use care so that no excessive force is applied to hoses.

- 25) Disconnect transaxle from engine referring to "Transaxle Unit Dismounting and Remounting" in Section 7A2.
- 26) Remove clutch cover and clutch disk referring to "Clutch Cover, Clutch Disc and Flywheel Removal and Installation" in Section 7C2.

Installation

- 1) Install clutch cover and clutch disk referring to "Clutch Cover, Clutch Disc and Flywheel Removal and Installation" in Section 7C2.
- 2) Connect transaxle to engine referring to "Transaxle Unit Dismounting and Remounting" in Section 7A2.



3) Lift engine with transaxle into engine compartment, but do not remove lifting device.

4) Install engine rear mounting bolts (1), engine left mounting bracket nuts (2) and engine right mounting nuts (3). Tighten these bolts and nuts to specified torque.

Tightening torque

Engine rear mounting bolt

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

Engine left mounting bolt

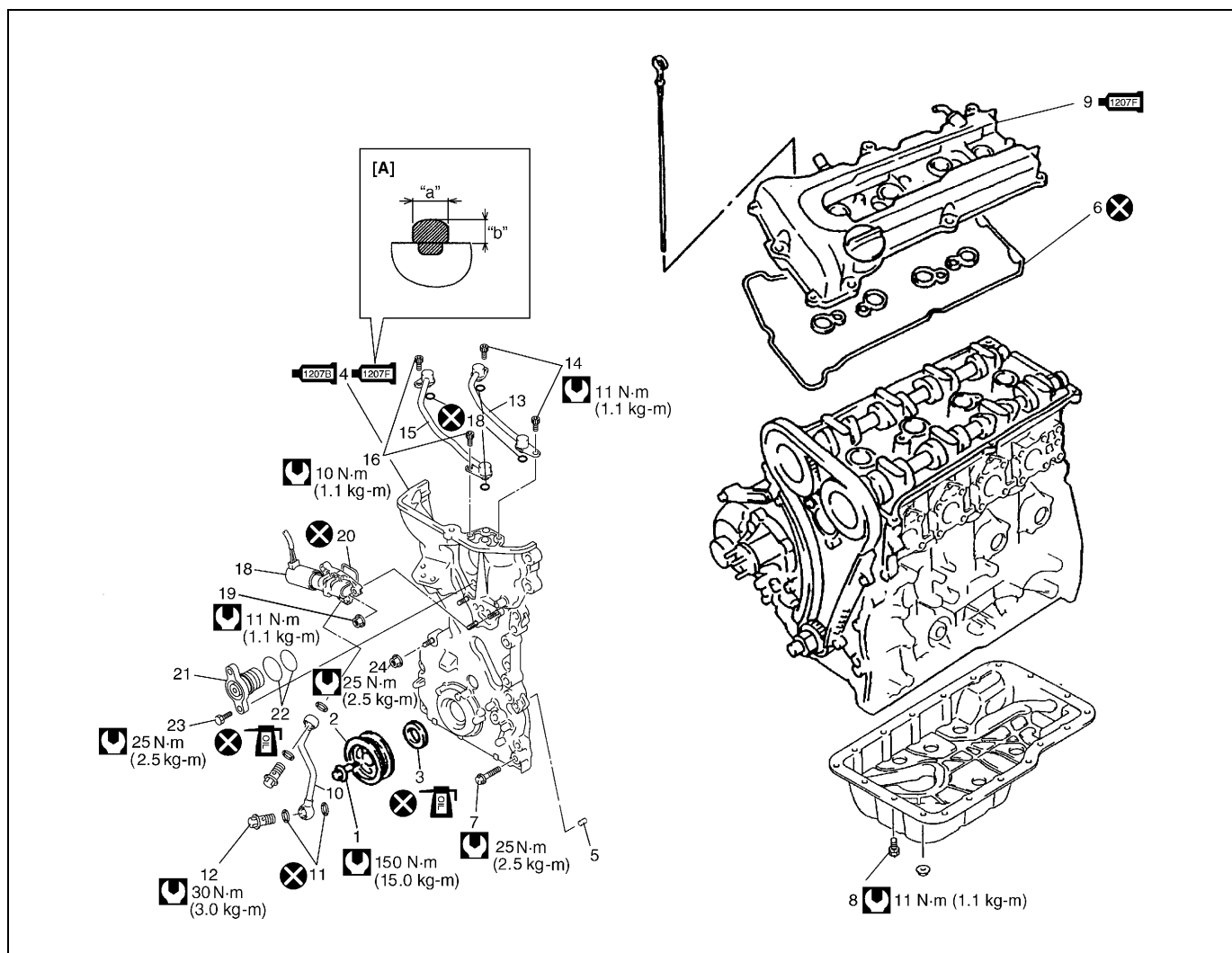
(b): 55 N·m (5.5 kg-m, 40.0 lb-ft)

Engine right mounting nut

(c): 65 N·m (6.5 kg-m, 47.0 lb-ft)

- 5) Remove lifting device.
- 6) For 4WD vehicle, install propeller shaft referring to "On-Vehicle Service" in Section 4B.
- 7) Connect drive shaft joints referring to "Installation" in Section 4.
- 8) Install exhaust No.1 pipe referring to "Exhaust Manifold Removal and Installation" in this section.
- 9) Reverse disconnected hoses, cables and electric wires for connection.
- 10) Install air cleaner case and resonator.
- 11) Install A/C compressor to its bracket (if equipped).
- 12) Adjust A/C compressor belt tension (if equipped) referring to "Compressor Drive Belt Inspection and Adjustment" in Section 1B.
- 13) Adjust accelerator cable play referring to "Accelerator Cable Adjustment" in Section 6E2.
- 14) Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
- 15) Refill cooling system with coolant referring to "Cooling System Flush and Refill" in Section 6B2.
- 16) Refill engine with engine oil referring to "Engine Oil and Filter Change" in Section 0B.
- 17) Refill transaxle with transaxle oil referring to "Transaxle Oil Change" in Section 7A2.
- 18) Refill transfer with transfer oil referring to "Transfer Oil Change" in Section 7D (for 4WD vehicle).
- 19) Connect negative cable at battery.
- 20) Verify that there is no fuel leakage, coolant leakage, oil leakage and exhaust gas leakage at each connection.

Timing Chain Cover Components



[A]: Sealant application amount	8. Oil pan mounting bolt and nut	18. Oil control valve
"a": 3 mm (0.12 in.)	1207F 9. Cylinder head cover : Apply sealant 99000-31250 to the sealing point for timing chain cover mating surface and cylinder head gasket sealing point referring to "Installation" under "Cylinder Head Cover Removal and Installation" in this section.	19. Oil control valve mounting nut
"b": 2 mm (0.08 in.)	10. Oil gallery pipe No.1	20. O-ring
1. Crankshaft pulley bolt	11. Copper washer	21. Water outlet cap
2. Crankshaft pulley	12. Oil gallery pipe No.1 bolt	1207B 22. O-ring
3. Oil seal : Apply engine oil to oil seal lip.	13. Oil gallery pipe No.2	23. Water outlet cap bolt
1207B 1207F 4. Timing chain cover : Apply sealant 99000-31140 to the mating surface of cylinder and cylinder head. : Apply sealant 99000-31250 to the mating surface of timing chain cover referring to the figure of Step 1) of "Installation" under "Timing Chain Cover Removal and Installation" in this section.	14. Oil gallery pipe No.2 bolt	24. Timing chain cover mounting nut
5. Pin	15. Oil gallery pipe No.3	1207B Tightening torque
6. Cylinder head cover gasket	16. Oil gallery pipe No.3 bolt	1207F Do not reuse.
7. Timing chain cover mounting bolts	17. O ring	

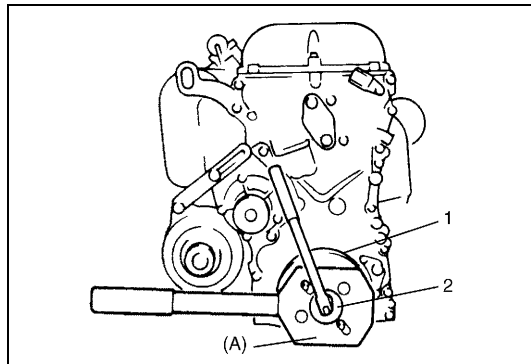
Timing Chain Cover Removal and Installation

Removal

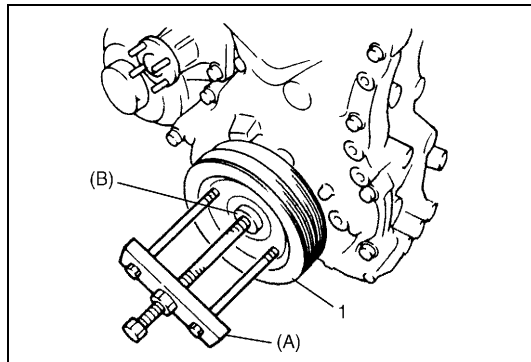
CAUTION:

- Keep working table, tools and hands clean while overhauling.
- Use special care to handle aluminum parts so as not to damage them.
- Do not expose removed parts to dust. Keep them always clean.

- 1) Remove engine assembly from vehicle referring to "Engine Assembly Removal and Installation" in this section.
- 2) Remove crankshaft pulley bolt (2).
To lock crankshaft pulley (1), use special tool with it as shown in figure.

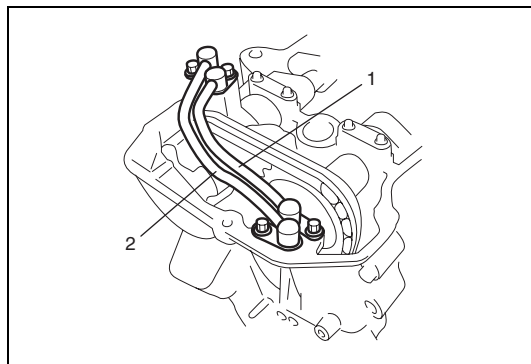


Special tool (A): 09917-68221

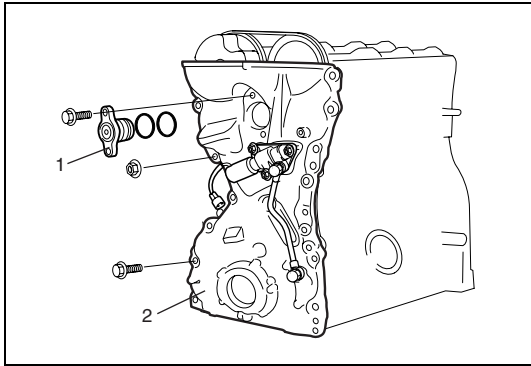


- 3) Remove crankshaft pulley (1).
If it is hard to remove, use special tools as shown in figure.

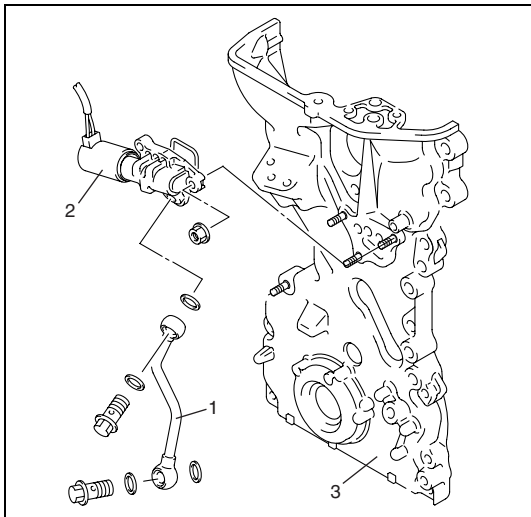
Special tool (A): 09944-36011 (B): 09926-58010



- 4) Remove cylinder head cover referring to "Cylinder Head Cover Removal and Installation" in this section.
- 5) Remove oil pan referring to "Oil Pan and Oil Pump Strainer Removal and Installation" in this section.
- 6) Remove water pump pulley.
- 7) Remove oil gallery pipes No.2 (1) and No.3 (2).



- 8) Remove water outlet cap (1) from timing chain cover (2).
- 9) Remove timing chain cover.



- 10) Remove oil gallery pipe No.1 (1) and oil control valve (2) from timing chain cover (3).

Installation

- 1) Clean sealing surface on timing chain cover, cylinder block and cylinder head.
Remove oil, old sealant and dust from sealing surface.

- 2) Install new O-ring (1) to oil control valve (2).
- 3) Install oil control valve to timing chain cover (3).
Tighten nuts to specification.

Tightening torque

Oil control valve mounting nut

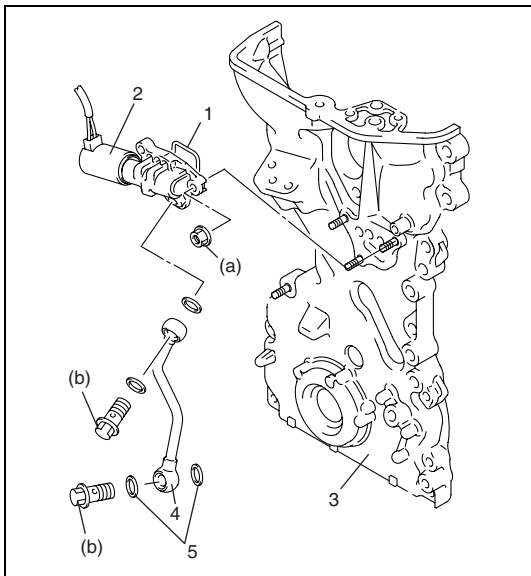
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

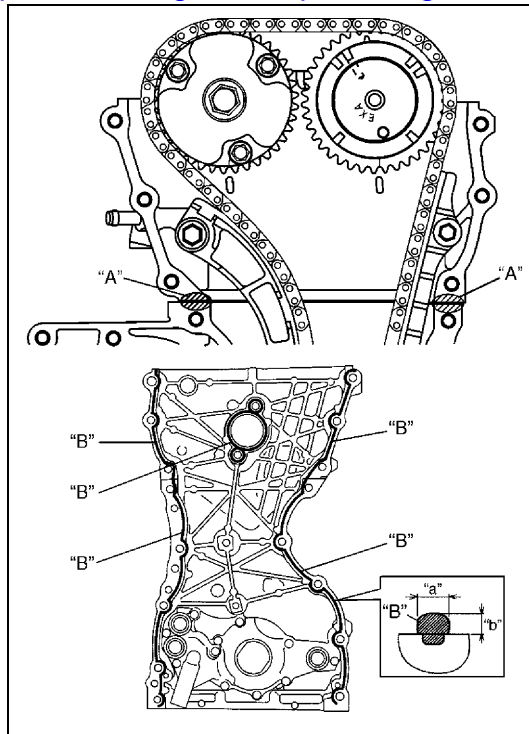
- 4) Install oil gallery pipe No.1 (4) with new copper washers (5) to timing chain cover.
Tighten bolts to specification.

Tightening torque

Oil gallery pipe No.1 bolt

(b): 30 N·m (3.0 kg-m, 21.5 lb-ft)





- 5) Apply sealant "A" to mating surface of cylinder and cylinder head and "B" to mating surface of timing chain cover as shown in figure.

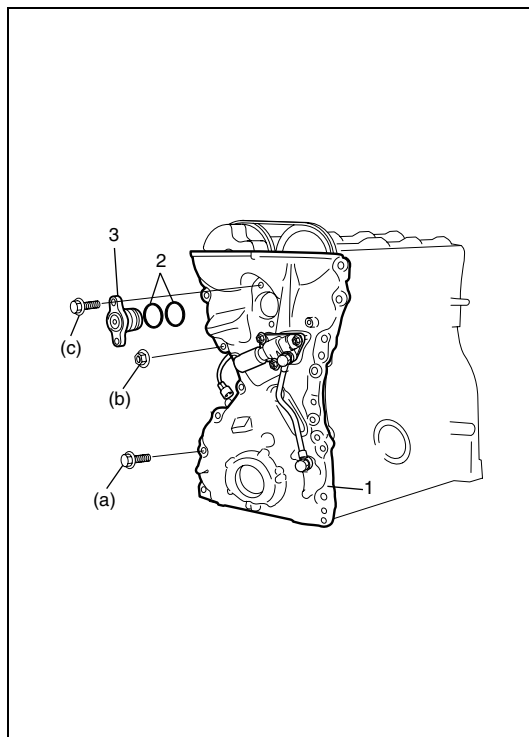
"A": Sealant 99000-31140

"B": Sealant 99000-31250

Sealant amount for timing chain cover

Width "a": 3 mm (0.12 in.)

Height "b": 2 mm (0.08 in.)



- 6) Apply engine oil to oil seal lip, then install timing chain cover (1).

Tighten bolts and nut to specified torque.

NOTE:

Before installing timing chain cover, check that pin is securely fitted.

Tightening torque

Timing chain cover mounting bolt

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

Timing chain cover mounting nut

(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)

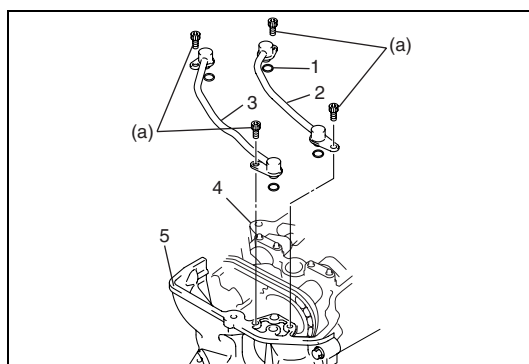
- 7) Apply engine oil to new O-rings (2) and install them to cap (3).

- 8) Install water outlet cap (3) to timing chain cover (1).

Tighten bolts to specified torque.

Tightening torque

Water outlet cap bolt (c): 25 N·m (2.5 kg-m, 18.0 lb-ft)



- 9) Install new O-ring (1) to oil gallery pipes No.2 (2) and No.3 (3).

- 10) Install oil gallery pipes No.2 and No.3 to cylinder head (4) and timing chain cover (5).

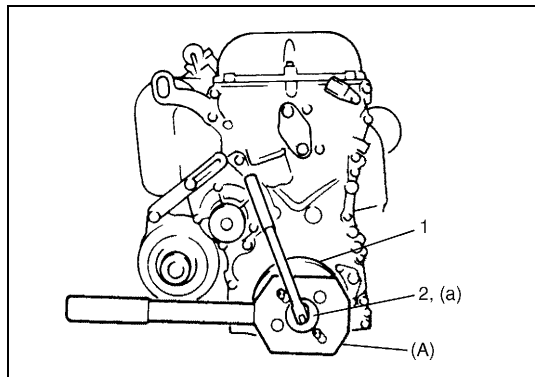
Tighten bolts to specified torque.

Tightening torque

Oil gallery pipes No.2 and No.3 bolt

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

- 11) Install water pump pulley.
- 12) Install cylinder head cover referring to "Cylinder Head Cover Removal and Installation" in this section.
- 13) Install oil pan referring to "Oil Pan and Oil Pump Strainer Removal and Installation" in this section.
- 14) Install crankshaft pulley (1). Tighten bolt (2) to specified torque. To lock crankshaft pulley, use special tool with it as shown in the figure.

**Special tool****(A): 09917-68221****Tightening torque****Crankshaft pulley bolt (a): 150 N·m (15.0 kg-m, 108.5 lb-ft)**

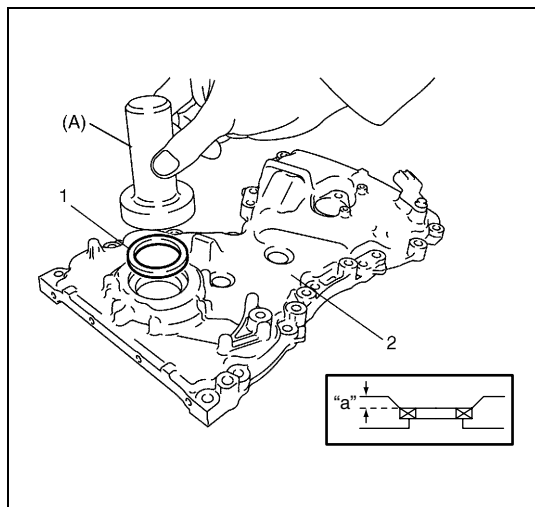
- 15) Install engine assembly to vehicle referring to "Engine Assembly Removal and Installation" in this section.

Timing Chain Cover Inspection**Oil seal**

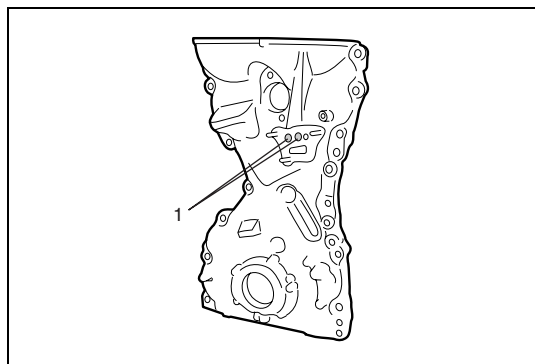
- Check oil seal (1) lip for fault or other damage. Replace as necessary.

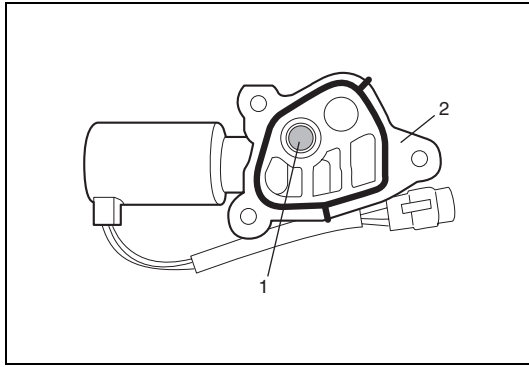
NOTE:

When installing new oil seal, press fit to timing chain cover (2) by using special tool (Bearing installer) as shown in the figure.

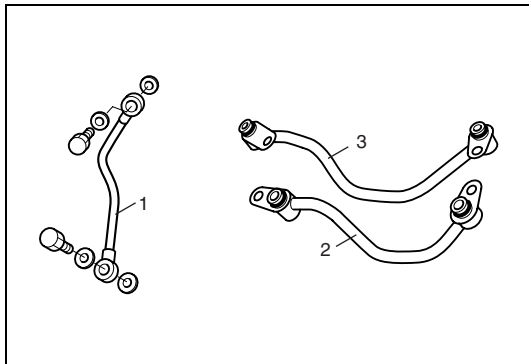
Special tool**(A): 09913-75810****Drive in dimension****"a": 1.5 mm (0.06 in.)****Timing chain cover**

Inspect strainer (1) of oil passage for driving intake cam timing sprocket assembly (VVT actuator).
If clog or foreign matter exists, clean strainer.

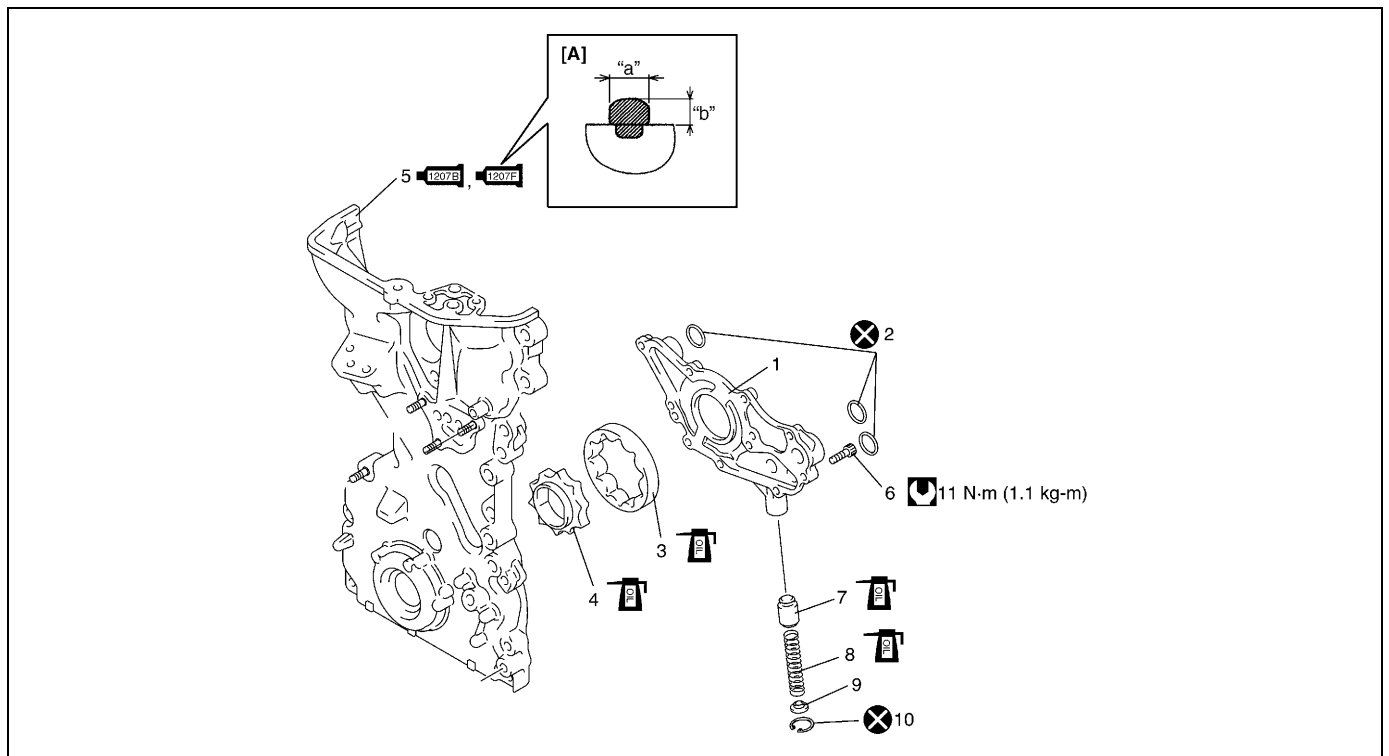











Oil control valve

Inspect strainer (1) and mating surface (2) of oil control valve.
Clean oil control valve.

Oil gallery pipe

Inspect oil gallery pipes No.1 (1), No.2 (2) and No.3 (3).
Replace if crack, deformation or clog exists.

Oil Pump Components

[A]: Sealant application amount	 4. Inner rotor	10. Circlip
"a": 3 mm (0.12 in.)	  5. Timing chain cover : Apply sealant 99000-31140 to the mating surface of cylinder and cylinder head. : Apply sealant 99000-31250 to mating surface of timing chain cover referring to the figure of Step 4) of "Installation" under "Timing Chain Cover Removal and Installation" in this section.	 Tightening torque
"b": 2 mm (0.08 in.)	6. Oil pump rotor plate bolt	 Do not reuse.
1. Rotor plate	 7. Relief valve	 Apply thin coat of engine oil to sliding surface of each parts.
2. O ring	 8. Spring	
 3. Outer rotor	9. Retainer	

Oil Pump Removal and Installation

Removal

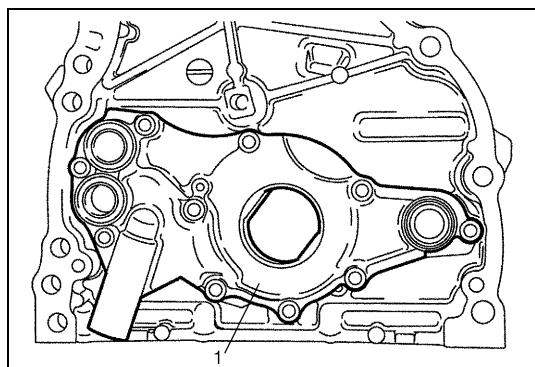
Remove timing chain cover referring to "Timing Chain Cover Removal and Installation" in this section.

Installation

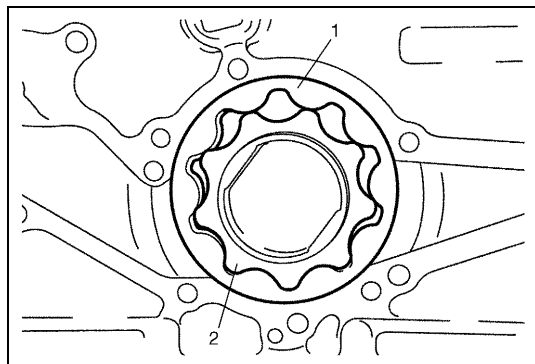
For installation referring to "Timing Chain Cover Removal and Installation" in this section.

Oil Pump Disassembly and Assembly

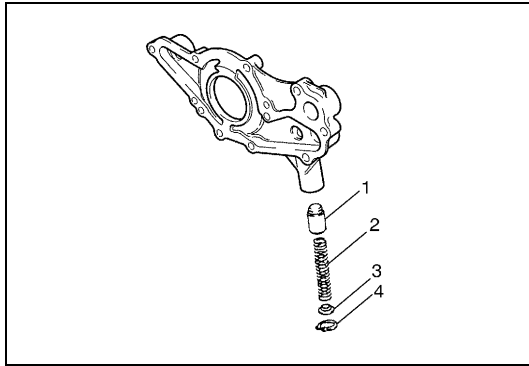
Disassembly



- 1) Remove rotor plate (1) by removing its mounting bolts.



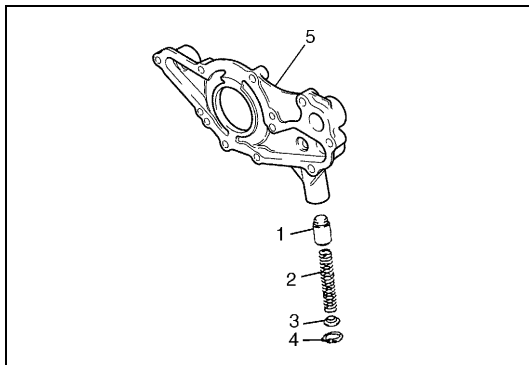
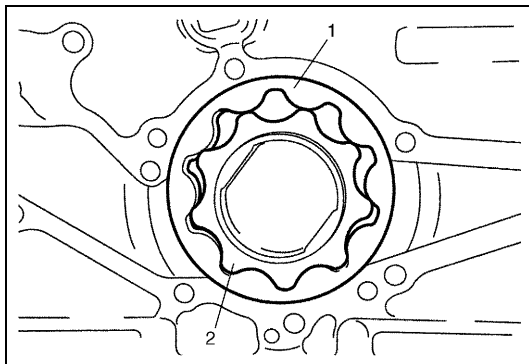
- 2) Remove outer rotor (1) and inner rotor (2).



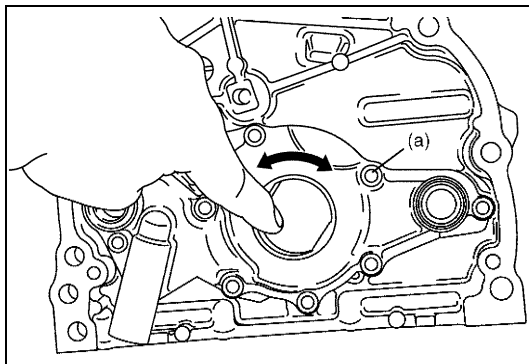
- 3) Remove relief valve (1), spring (2) and retainer (3) by removing circlip (4).

Assembly

- 1) Wash, clean and then dry all disassembled parts.
- 2) Apply thin coat of engine oil to inner and outer rotors, oil seal lip portion, inside surfaces of oil pump case and plate.
- 3) Install outer (1) and inner rotors (2) to oil pump case.



- 4) Apply engine oil to relief valve (1) and spring (2), and install them with retainer (3) and new circlip (4) to rotor plate (5).



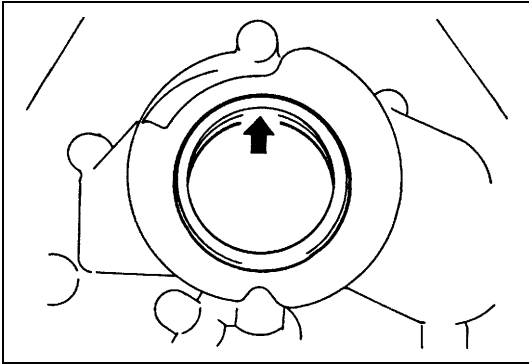
- 5) Install rotor plate and tighten all bolts to specified torque. After installing plate, check to be sure that rotors turn smoothly by hand (0.3 N·m (0.03 kg-m, 0.25 lb-ft) torque or below).

Tightening torque

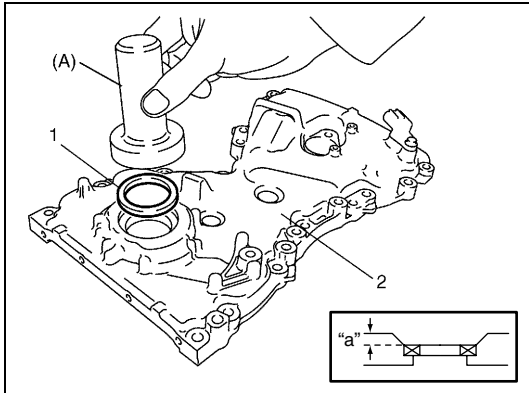
Oil pump rotor plate bolt (a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

Oil Pump Inspection

Oil seal



- Check oil seal lip for fault or other damage. Replace as necessary.



NOTE:

When installing new oil seal (1), press-fit it to oil pump case (2) by using special tool as shown in the figure.

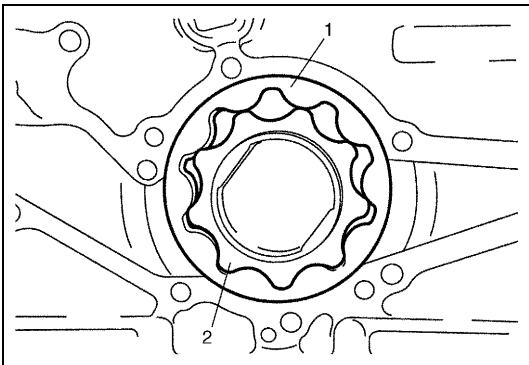
Special tool

(A): 09913-75810

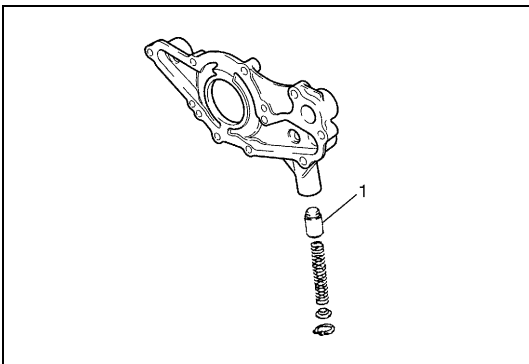
Drive in dimension

"a": 1.5 mm (0.06 in.)

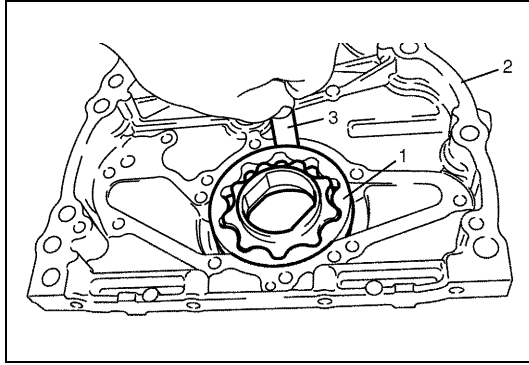
Oil pump assembly



- Check outer (1) and inner rotors (2), rotor plate, and oil pump case for excessive wear or damage.



- Check relief valve (1) for excessive wear or damage and operates smoothly.

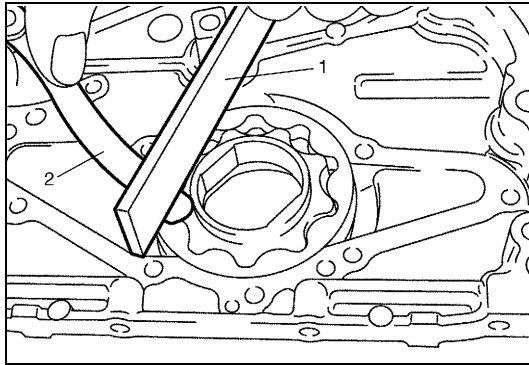
Radial clearance

Check radial clearance between outer rotor (1) and case (2), using thickness gauge (3).

If clearance exceeds its limit, replace oil pump assembly.

Limit on radial clearance between outer rotor and case for oil pump

: 0.310 mm (0.0122 in.)

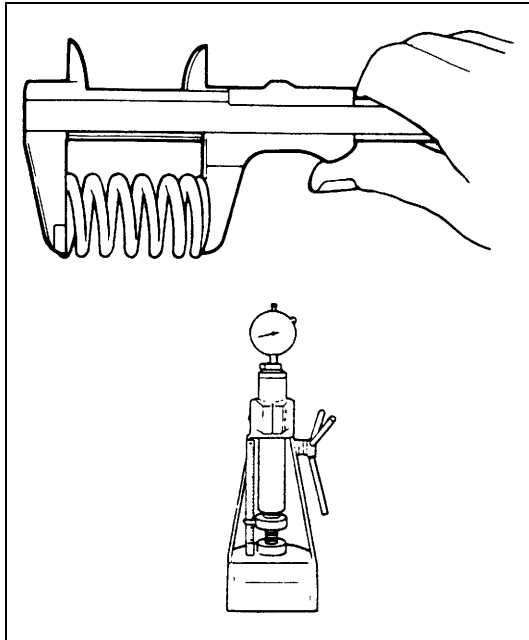
Side clearance

Using straight edge (1) and thickness gauge (2), measure side clearance.

If clearance exceeds its limit, replace oil pump assembly.

Limit on side clearance for oil pump inner rotor

: 0.15 mm (0.0059 in.)

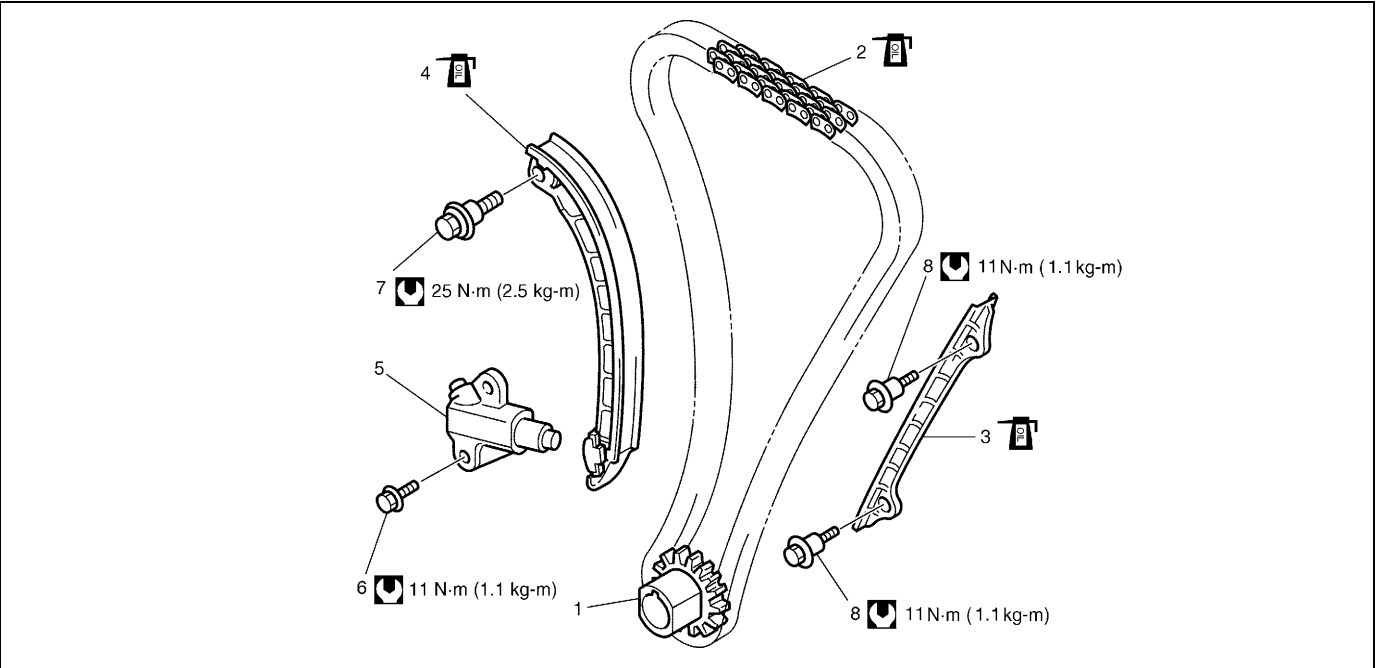
Relief valve spring free length and load

Check relief valve spring free length and load as shown in figure.

If the measured valve spring length is lower than the specification, replace relief valve spring.

	Standard	Limit
Free length	52.4 mm (2.06 in.)	—
Load at spring length 38.5 mm (1.52 in.)	79 N (7.9 kgf, 17.5 lb)	69 N (6.9 kgf, 15.0 lb)

Timing Chain and Chain Tensioner Components



1. Crankshaft timing sprocket	4. Timing chain tensioner : Apply engine oil to sliding surface.	7. Timing chain tensioner bolt
2. Timing chain : Apply engine oil.	5. Timing chain tensioner adjuster assembly	8. Timing chain guide bolt
3. Timing chain No.1 guide : Apply engine oil to sliding surface.	6. Tensioner adjuster bolt	Tightening torque

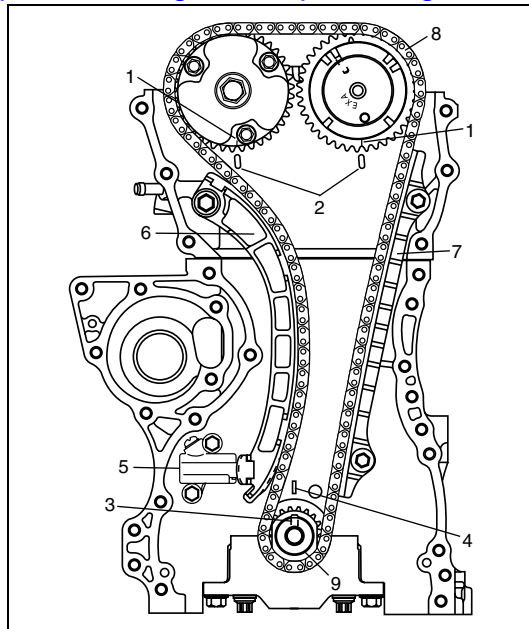
Timing Chain and Chain Tensioner Removal and Installation

Removal

CAUTION:

After timing chain is removed, never turn crankshaft and camshafts independently more than its allowable turning range described in “Installation” section.
If turned, interference may occur between piston and valves and valves themselves, and parts related to piston and valves may be damaged.

- 1) Remove timing chain cover referring to “Timing Chain Cover Removal and Installation” in this section.



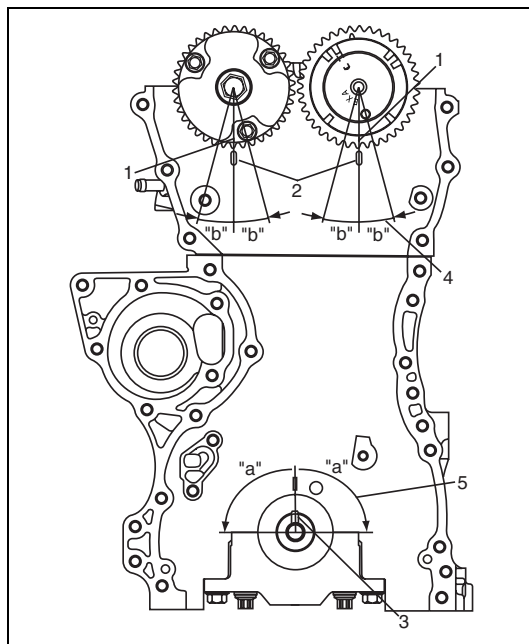
- 2) By turning crankshaft, align both intake and exhaust camshaft timing sprocket marks (1) with notches (2) of cylinder head respectively and align crank shaft sprocket key (3) with notch of cylinder block (4).
- 3) Remove timing chain tensioner adjuster assembly (5).
- 4) Remove timing chain tensioner (6).
- 5) Remove timing chain No.1 guide (7).
- 6) Remove timing chain (8) with crankshaft timing sprocket (9)

Installation

CAUTION:

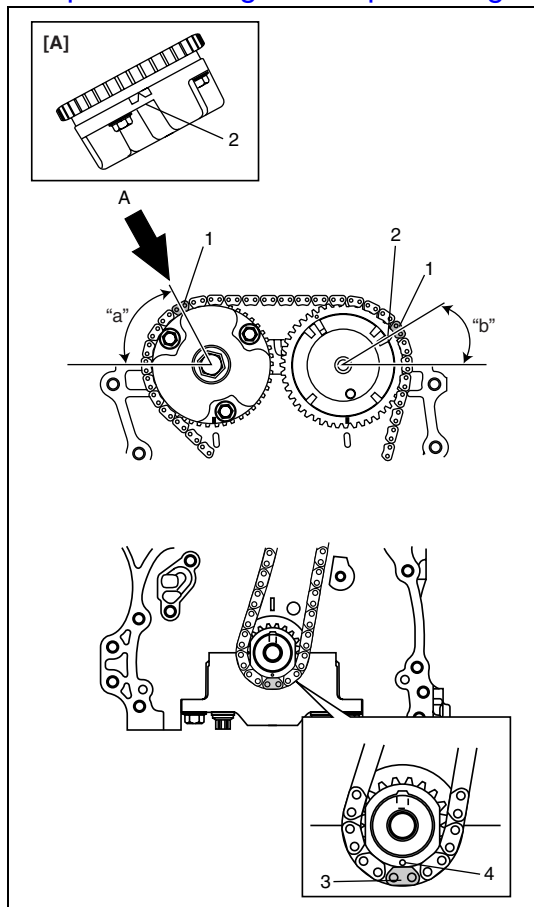
After timing chain is removed, never turn crankshaft and camshafts independently more than such an extent ("a", "b") as shown in figure.

If turned, interference may occur between piston and valves and valves themselves, and parts related to piston and valves may be damaged.



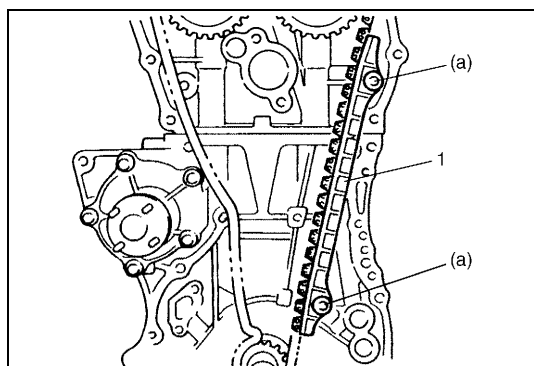
- 1) Check that match marks (1) on intake and exhaust camshaft timing sprockets are in match with notches (2) on cylinder head as shown in figure.
- 2) Set key (3) and turn crankshaft to position key on upside of crankshaft.

"a": 90°	4. Camshaft (IN and EX) allowable turning range. By marks on camshaft timing sprocket within 15° from notches on cylinder head on both right and left.
"b": 15°	5. Crankshaft allowable turning range. By key on crankshaft, within 90° from top on both right and left.



- 3) Install timing chain by aligning dark blue plate (1) of timing chain and triangle mark (2) on camshaft timing sprocket as shown in figure.
- 4) Fit crankshaft timing sprocket to timing chain by aligning gold plate (3) of timing chain and circle mark (4) on crankshaft timing sprocket. Then install crankshaft timing sprocket fitted with chain to crankshaft.

[A]:	View A
"a":	Approx. 60°
"b":	Approx. 30°

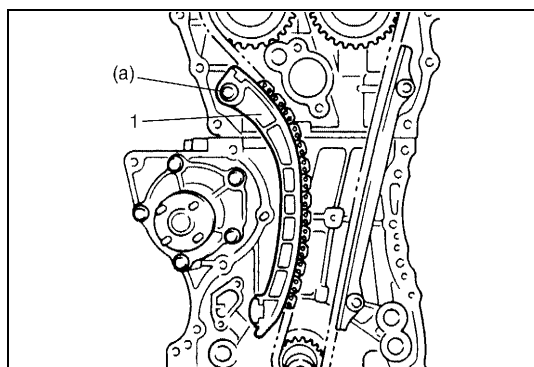


- 5) Apply engine oil to sliding surface of timing chain No.1 guide (1) and install it as shown in figure.
Tighten guide bolts to specified torque.

Tightening torque

Timing chain guide bolt

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

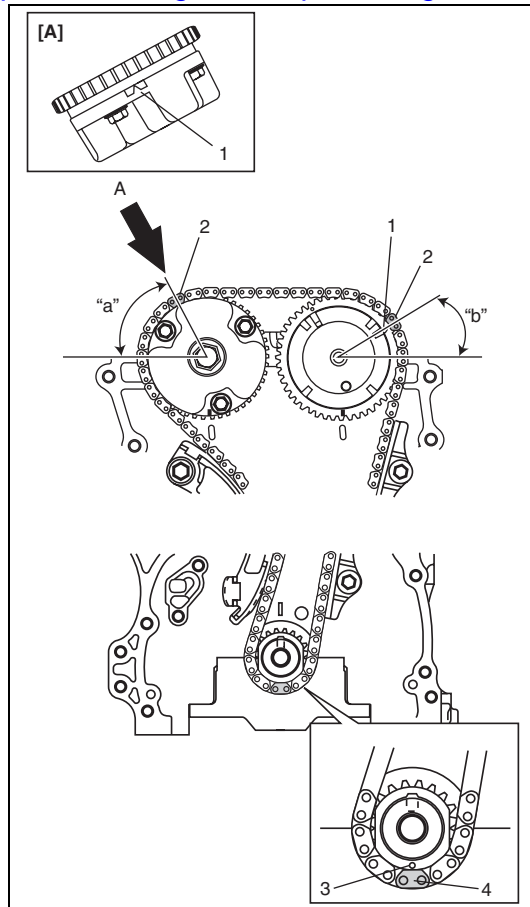


- 6) Apply engine oil to sliding surface of chain tensioner (1) and install chain tensioner and spacer.
Tighten tensioner bolt to specified torque

Tightening torque

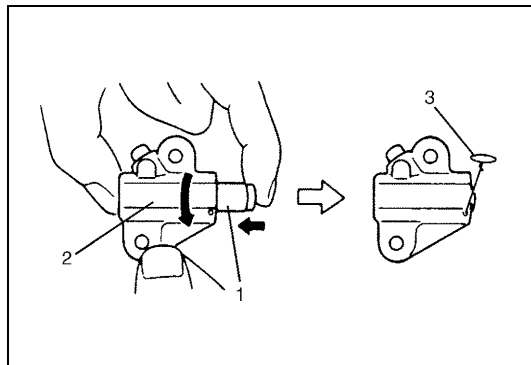
Timing chain tensioner bolt

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

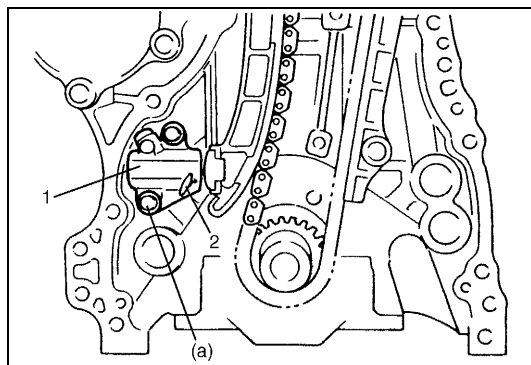


- 7) Check that match marks (1) on intake and exhaust camshaft timing sprockets are in match with marking of timing chain (2) and match mark on crankshaft timing sprocket (3) are in with marking of timing chain (4).

[A]: View A
"a": Approx. 60°
"b": Approx. 30°



- 8) Screw in plunger (1) by turning body (2) in arrow direction and install a retainer (3) (wire) to hold plunger in place.

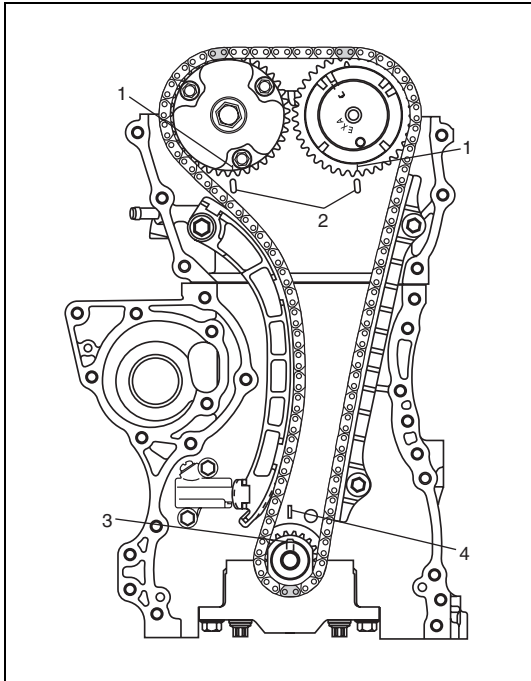


- 9) Install timing chain tensioner adjuster assembly (1) with a retainer (2).
Tighten adjuster bolts to specified torque and then remove a retainer from chain tensioner adjuster assembly.

Tightening torque

Tensioner adjuster bolt

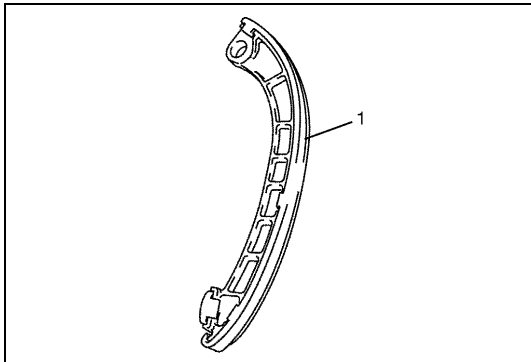
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



- 10) Apply engine oil to timing chain and then turn crankshaft clockwise by 2 revolutions and check that match marks (1) on intake and exhaust camshaft timing sprockets are in match with notches (2) on cylinder head and key (3) is in match with notch (4) on cylinder block as shown in figure.
If each marking chain and each match mark are no matches, adjust each sprockets and timing chain.
- 11) Install timing chain cover referring to "Timing Chain Cover Removal and Installation" in this section.
- 12) Perform Steps 3) to 8) of "Installation" of "Timing Chain Cover Removal and Installation" in this section.

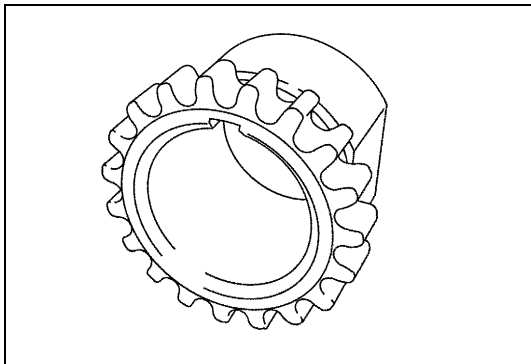
Timing Chain and Timing Chain Tensioner Inspection

Timing chain tensioner

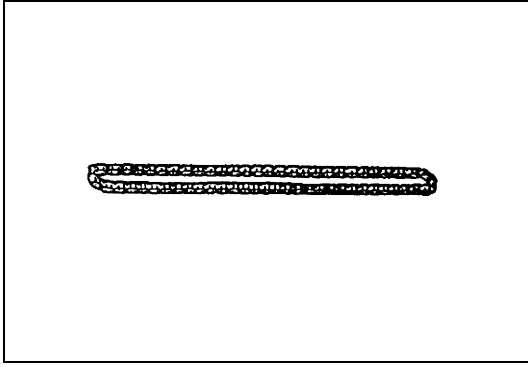


- Check timing chain tensioner (1) for wear or damage.

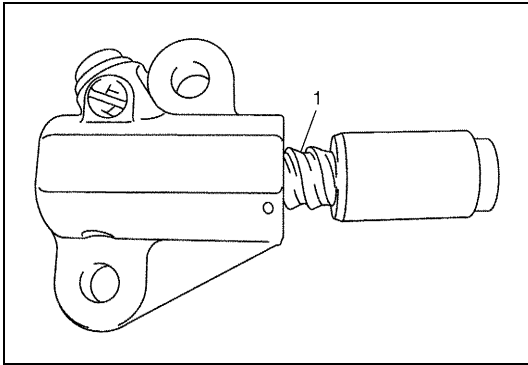
Crankshaft timing sprocket



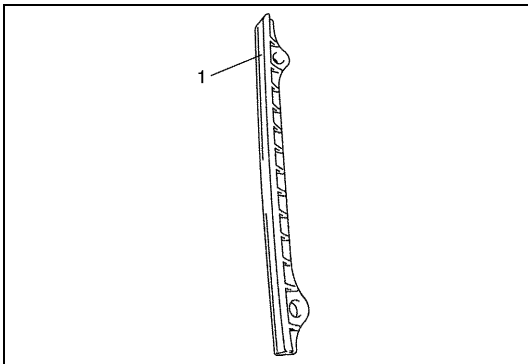
- Check teeth of sprocket for wear or damage.

Timing chain

- Check timing chain for wear or damage.

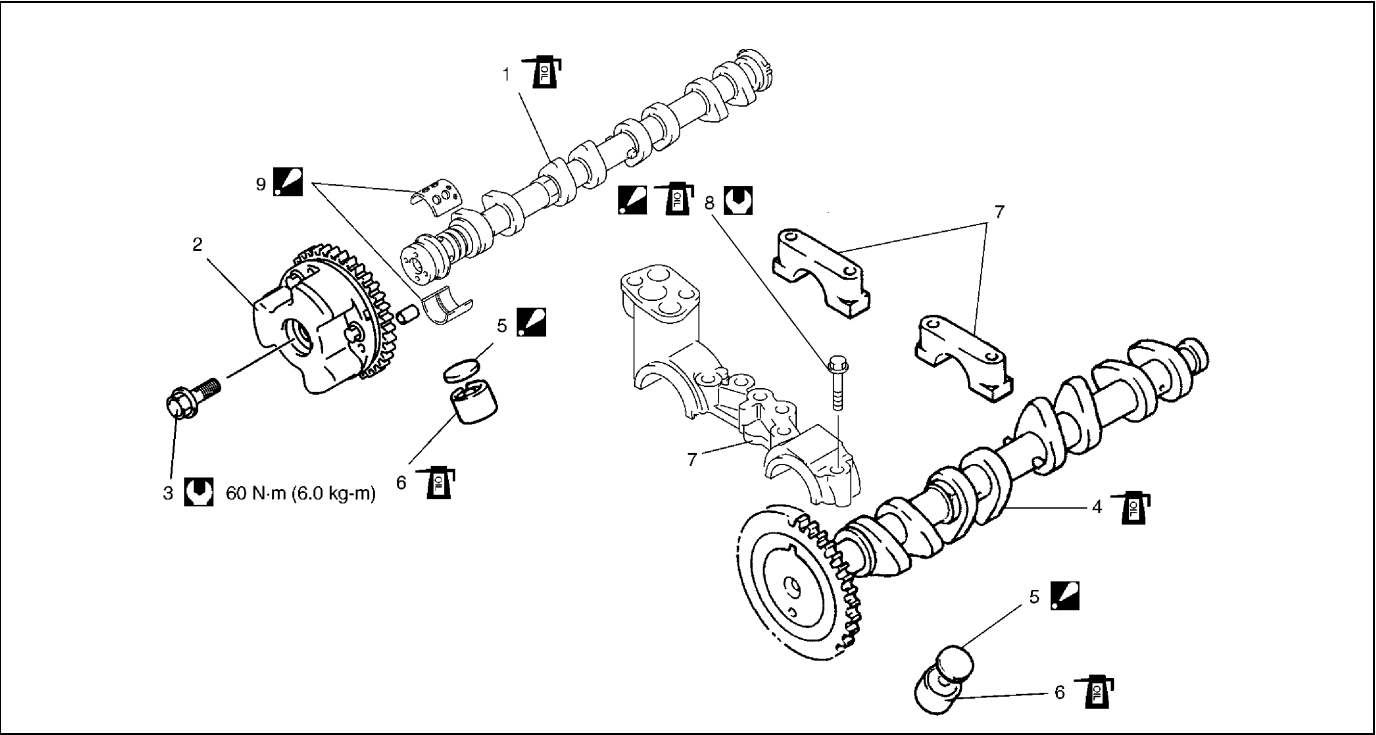
Timing chain tensioner adjuster

- Check that tooth surface (1) are free from damage.

Timing chain No.1 guide

- Check timing chain No.1 guide (1) for wear or damage.

Camshaft, Tappet and Shim Components



1. Intake camshaft	5. Shim : Shim No. on it faces tappet side.	9. Upper camshaft bearing : Install a bearing half with some holes to upper side of intake camshaft No.1 bearing.
2. Intake camshaft sprocket assembly	6. Tappet	Tightening torque
3. Intake camshaft sprocket bolt	7. Camshaft housing	Apply engine oil to sliding surface of each part.
4. Exhaust camshaft	8. Camshaft housing bolt Tighten 11 N·m (1.1 kg·m, 8.0 lb·ft) by the specified procedure.	

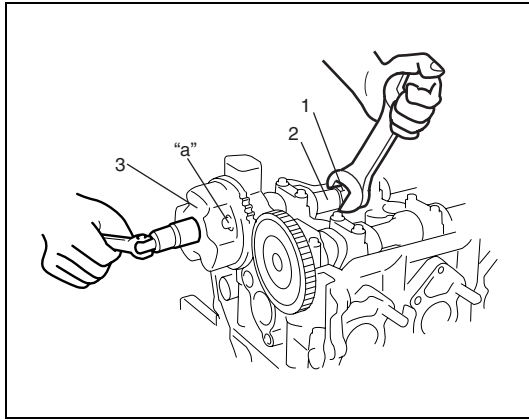
Camshaft, Tappet and Shim Removal and Installation

Removal

CAUTION:

- Keep working table, tools and hands clean while overhauling.
- Use special care to handle aluminum parts so as not to damage them.
- Do not expose removed parts to dust. Keep them always clean.

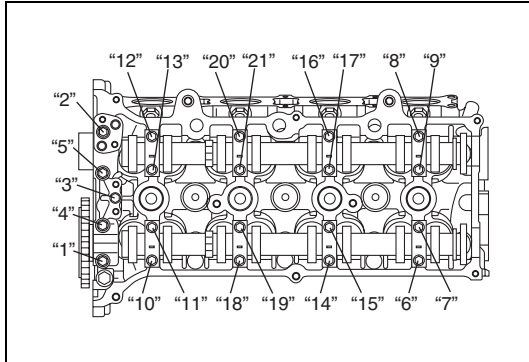
- 1) Remove timing chain cover referring to “Timing Chain Cover Removal and Installation” in this section.
- 2) Remove timing chain referring to “Timing Chain and Chain Tensioner Removal and Installation” in this section.



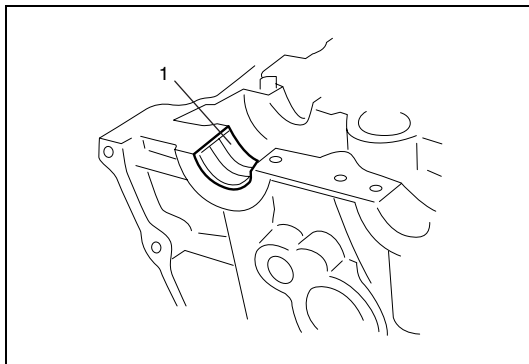
- 3) With hexagonal section (1) of intake camshaft (2) held stationary with spanner or the like, loosen mounting bolt of intake cam timing sprocket assembly (3) and remove it.

CAUTION:

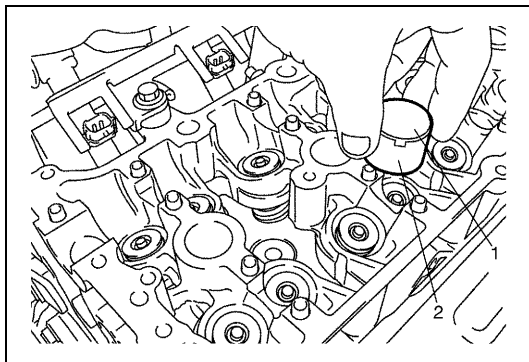
Never attempt to loosen mounting bolt with intake cam timing sprocket assembly held stationary. Failure to follow this could result in damage to lock pin.
Do not loosen bolt "a" because intake cam timing sprocket assembly is not serviceable.



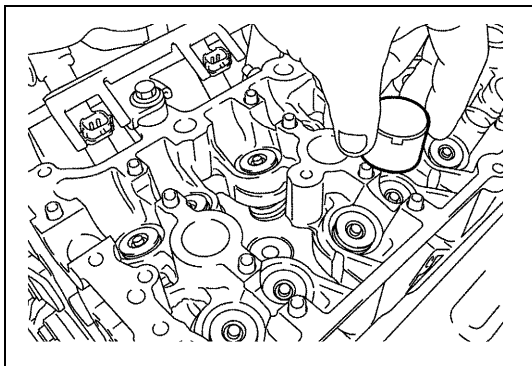
- 4) Loosen camshaft housing bolts in such order as indicated in figure and remove them.
 5) Remove camshaft housings.
 6) Remove intake and exhaust camshafts.



- 7) Remove camshaft bearing (1).



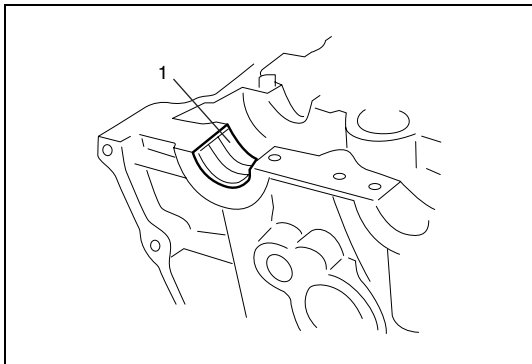
- 8) Remove tappets (2) with shims (1).

Installation

- 1) Install tappets and shims to cylinder head.
Apply engine oil around tappet and then install it to cylinder head.

NOTE:

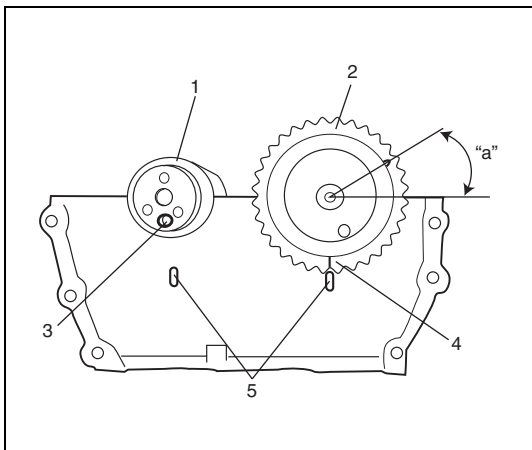
When installing shim, make sure to direct shim No. side toward tappet.



- 2) Install camshaft bearing (1) to cylinder head.

CAUTION:

**Do not apply engine oil to camshaft bearing back.
Only a upper half bearing of intake camshaft bearing No.1 has some holes. Other bearings.**



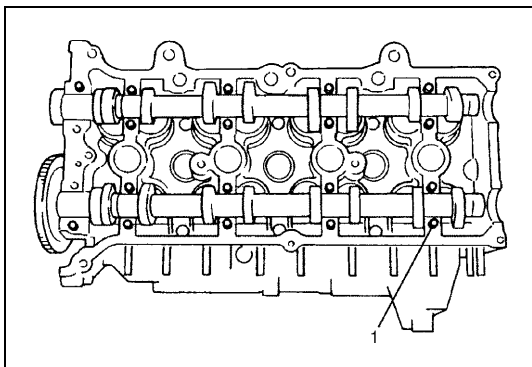
- 3) Install intake camshaft (1) and exhaust camshaft (2).
Align knock pin (3) and match mark (4) with notches (5) as shown in the figure.

"a": Approx. 30°

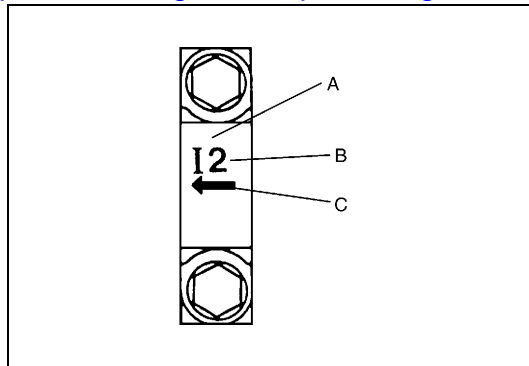
NOTE:

Before installing camshafts, turn crankshaft until key faces upward. Refer to "Timing Chain and Chain Tensioner".

- 4) Apply engine oil to sliding surface of each camshaft and camshaft journal then install them as shown in figure.



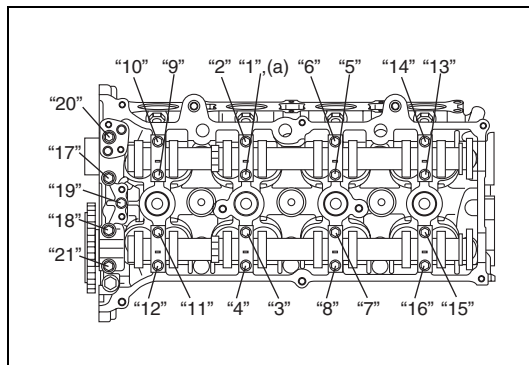
- 5) Install camshaft housing pins (1) as shown in figure.



6) Check position of camshaft housings.

Embossed marks are provided on each camshaft housing, indicating position and direction for installation. Install housings as indicated by these marks.

A.	I: Intake side or E: Exhaust side
B.	Position from timing chain side
C.	Pointing to timing chain side

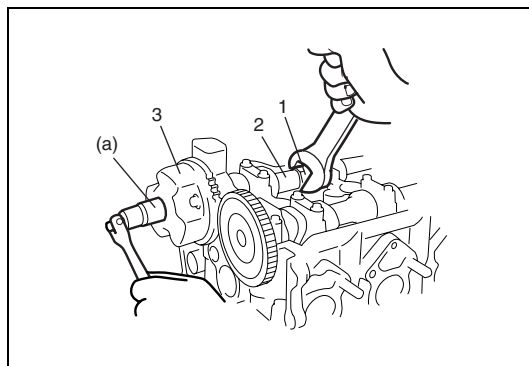


7) After applying engine oil to housing bolts, tighten them temporarily first. Then tighten them by the numerical order in figure. Tighten a little at a time and evenly among bolts and repeat tightening sequence two or three times before they are tightened to specified torque.

Tightening torque

Camshaft housing bolt

(a): Tighten 11 N·m (1.1 kg-m, 8.0 lb-ft)
by the specified procedure.



8) With hexagonal section (1) of intake camshaft (2) held stationary with spanner or the like, tighten bolt of intake cam timing sprocket assembly (3) to specification.

Tightening torque

Intake cam timing sprocket bolt

(a): 60 N·m (6.0 kg-m, 43 lb-ft)

- 9) Install timing chain with crankshaft sprocket referring to "Timing Chain and Chain Tensioner Removal and Installation" in this section.
- 10) Install timing chain cover referring to "Timing Chain Cover Removal and Installation" in this section.
- 11) Check valve lashes as previously outlined.
- 12) Perform Steps 3) to 8) of "Installation" of "Timing Chain Cover Removal and Installation" in this section.

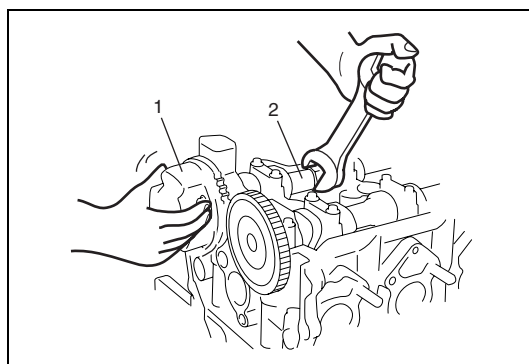
Camshaft, Tappet and Shim Inspection

Intake cam timing sprocket assembly

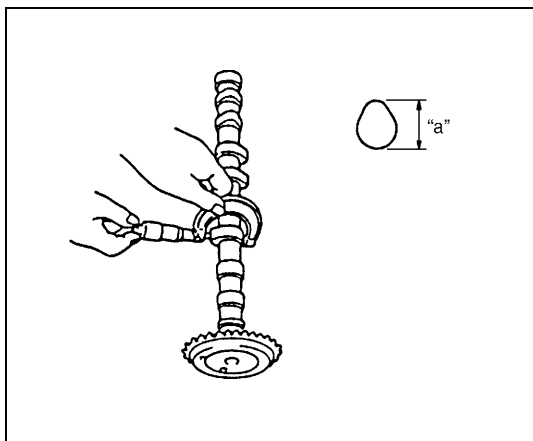
Fit intake cam timing sprocket assembly to camshaft (2) and hold hexagonal section of camshaft by using spanner or the like.

Check if sprocket (1) is not turned by hand.

If moved, replace intake cam timing sprocket assembly.



Cam wear

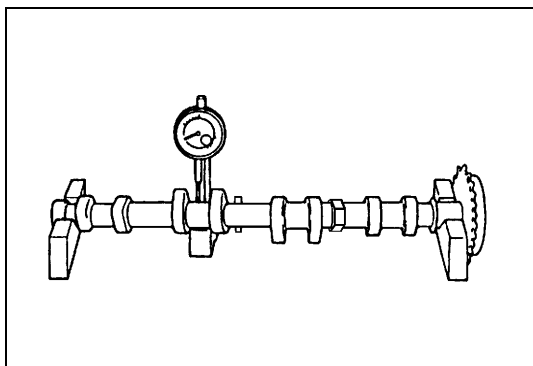


Using a micrometer, measure cam height "a". If measured height underruns its limit, replace camshaft.

Cam height "a" of camshaft

	Standard	Limit
Intake cam	44.929 – 45.089 mm (1.769 – 1.775 in.)	44.80 mm (1.764 in.)
Exhaust cam	44.399 – 44.559 mm (1.748 – 1.754 in.)	44.28 mm (1.743 in.)

Camshaft runout



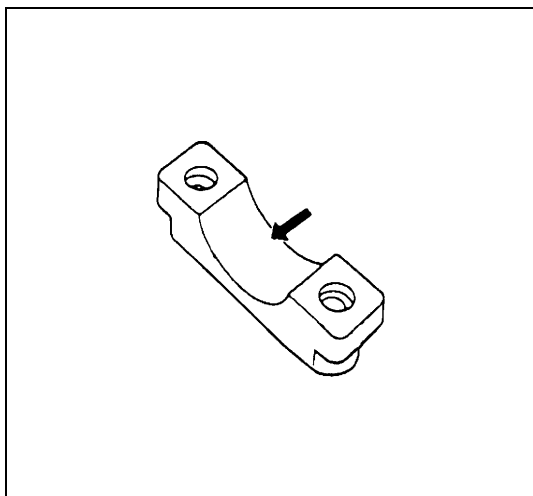
Set camshaft between two "V" blocks, and measure its runout by using a dial gauge.

If measured runout exceeds limit, replace camshaft.

Camshaft runout limit

: 0.10 mm (0.0039 in.)

Camshaft journal wear



Check camshaft journals and camshaft housings for pitting, scratches, wear or damage.

If any malcondition is found, replace camshaft or cylinder head with housing. Never replace cylinder head without replacing housings.

Check clearance by using gaging plastic. Checking procedure is as follows.

- 1) Clean housings and camshaft journals.
- 2) Remove all tappets with shims.
- 3) Install camshafts to cylinder head.
- 4) Place a piece of gaging plastic to full width of journal of camshaft (parallel to camshaft).
- 5) Install camshaft housing.
- 6) Tighten camshaft housing bolts in such order as indicated in figure a little at a time till they are tightened to specified torque.

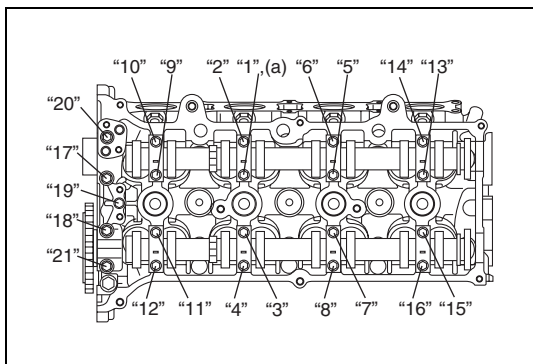
NOTE:

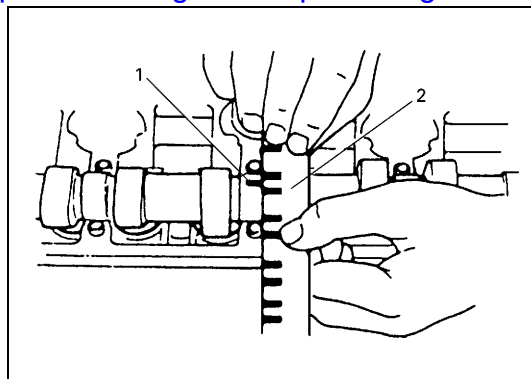
Do not rotate camshaft while gaging plastic is installed.

Tightening torque

Camshaft housing bolt

(a): Tighten 11 N·m (1.1 kg-m, 8.0 lb-ft) by the specified procedure.





- 7) Remove housing, and using scale (2) on gaging plastic (1) envelop, measure gaging plastic width at its widest point.

Camshaft journal clearance

	Standard	Limit
Intake side No.1 housing	0.020 – 0.072 mm (0.0008 – 0.0028 in.)	0.10 mm (0.0039 in.)
Others	0.045 – 0.087 mm (0.0018 – 0.0034 in.)	0.12 mm (0.0047 in.)

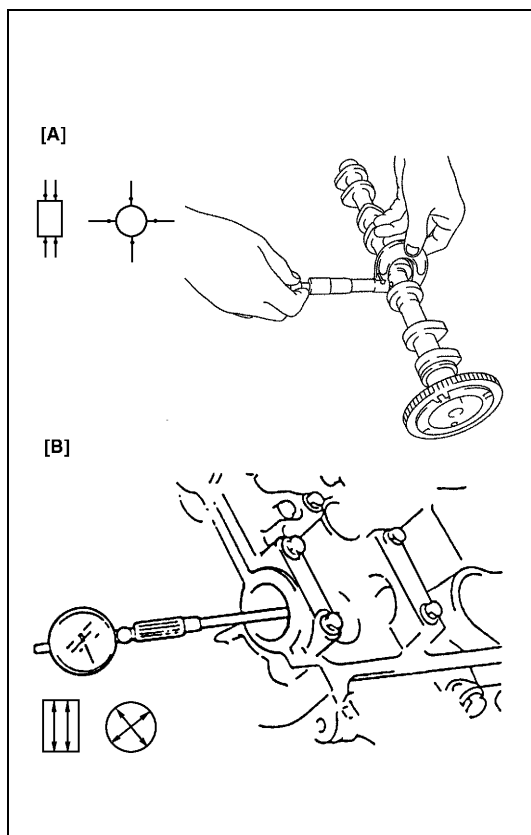
If measured camshaft journal clearance exceeds limit, measure journal (housing) bore and outside diameter of camshaft journal. Replace camshaft or cylinder head assembly whichever the difference from specification is greater.

Camshaft journal diameter [A]

Item	Standard
Intake side No.1 housing	26.940 – 26.955 mm (1.0607 – 1.0612 in.)
Exhaust side No.1 housing	26.934 – 26.955 mm (1.0604 – 1.0612 in.)
Others	22.934 – 22.955 mm (0.9030 – 0.9037 in.)

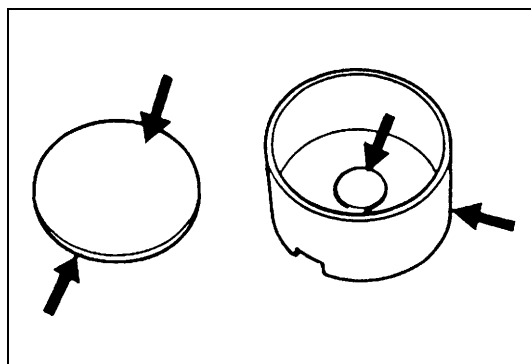
Camshaft journal bearing bore [B]

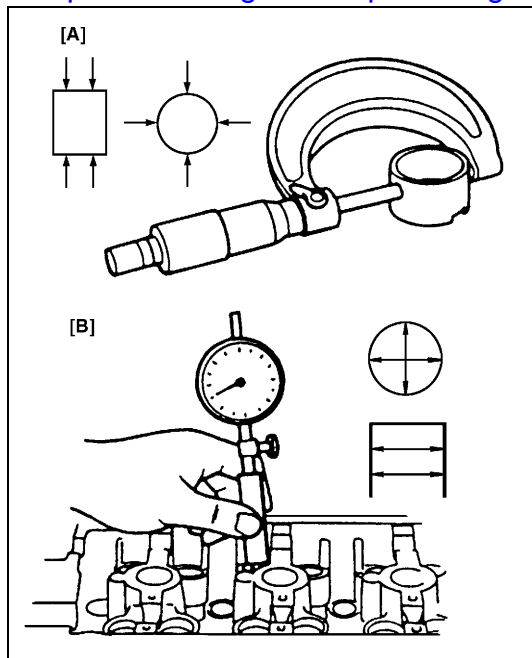
Item	Standard
Intake side No.1 housing	–
Exhaust side No.1 housing	27.000 – 27.021 mm (1.0630 – 1.0638 in.)
Others	23.000 – 23.021 mm (0.9056 – 0.9063 in.)



Wear of tappet and shim

Check tappet and shim for pitting, scratches or damage. If any malcondition is found, replace.





Measure cylinder head bore and tappet outside diameter to determine cylinder head-to-tappet clearance. If clearance exceeds limit, replace tappet or cylinder head.

Cylinder head to tappet clearance

Standard: 0.025 – 0.066 mm (0.0010 – 0.0025 in.)

Limit: 0.15 mm (0.0059 in.)

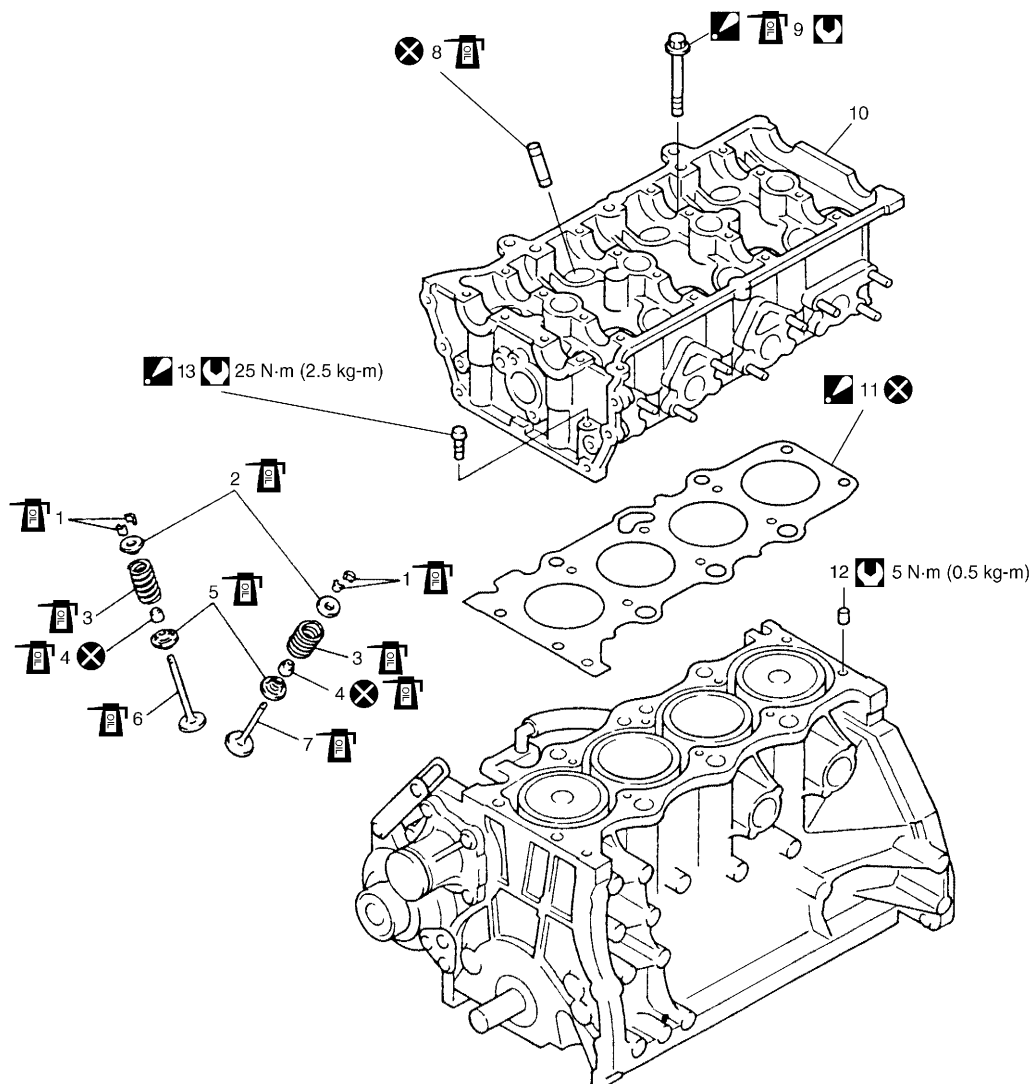
Tappet outside diameter [A]







Standard: 30.959 – 30.975 mm (1.2189 – 1.2194 in.)

Cylinder head tappet bore [B]

Standard: 31.000 – 31.025 mm (1.2205 – 1.2214 in.)

Valves and Cylinder Head Components

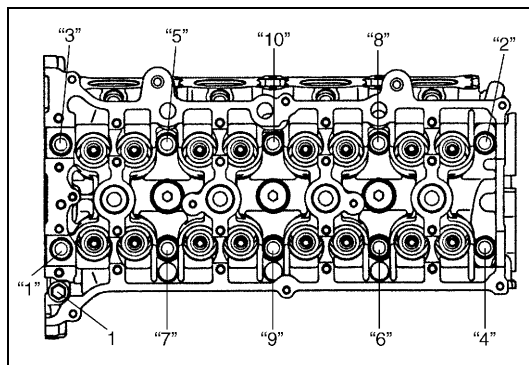


1. Valve cotteners	7. Exhaust valve	 13. Cylinder head bolt (M8) : Be sure to tighten cylinder head bolt (M8) after securing the other cylinder head bolt (M10).
2. Valve spring retainer	8. Valve guide	 Tightening torque
3. Valve spring	 9. Cylinder head bolt (M10) Tighten 20 N·m (2.0 kg·m, 14.5 lb·ft), 40 N·m (4.0 kg·m, 29.0 lb·ft), 60° and 60° by the specified procedure. : Never reuse cylinder head bolts once disassembled it due to plastic deformation tightening. Be sure to use new cylinder head bolts when installing.	 Do not reuse.
4. Valve stem seal	10. Cylinder head	 Apply engine oil to sliding surface of each part.
5. Valve spring seat	 11. Cylinder head gasket : "TOP" mark provided on gasket comes to crankshaft pulley side, facing up.	
6. Intake valve	12. Knock pin	

Valves and Cylinder Head Removal and Installation

Removal

- 1) Remove engine assembly from vehicle referring to "Engine Assembly Removal and Installation" in this section.
- 2) Remove oil pan referring to "Oil Pan and Oil Pump Strainer Removal and Installation" in this section.
- 3) Remove cylinder head cover referring to "Cylinder Head Cover Removal and Installation" in this section.
- 4) Remove timing chain cover referring to Steps 2) to 7) of "Removal" in "Timing Chain Cover Removal and Installation" in this section.
- 5) Remove timing chain referring to Steps 2) to 6) of "Removal" under "Timing Chain and Chain Tensioner Removal and Installation" in this section.
- 6) Remove intake and exhaust camshafts referring to Steps 3) to 7) of "Removal" under "Camshaft, Tappet and Shim Removal and Installation" in this section.
- 7) Loosen cylinder under head bolts in such order as indicated in figure by using a 12 corner socket wrenches and remove them.



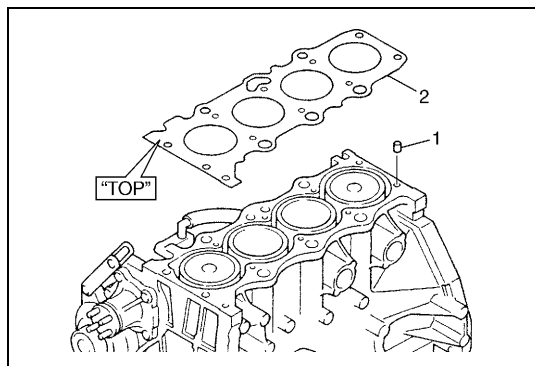
NOTE:

- Don't forget to remove bolt (M8) (1) as shown in figure.
- Never reuse cylinder head bolts once disassembled it due to plastic deformation tightening. Be sure to use new cylinder head bolts when installing.

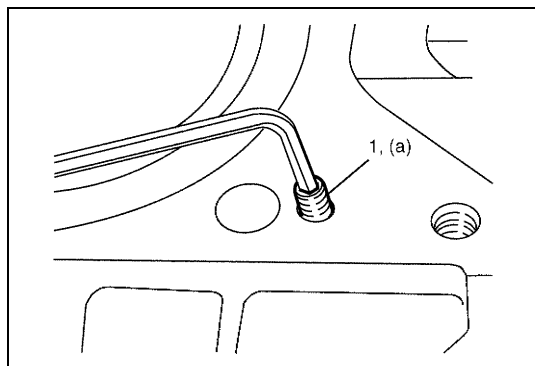
- 8) Check all around cylinder head for any other parts required to be removed or disconnected and remove or disconnect whatever necessary.
- 9) Remove exhaust manifold, if necessary, referring to "Exhaust Manifold Removal and Installation" in this section.
- 10) Remove cylinder head with intake manifold and exhaust manifold. Use lifting device, if necessary.

Installation

- 1) Clean mating surface of cylinder head and cylinder block.
Remove oil, old gasket and dust from mating surface.



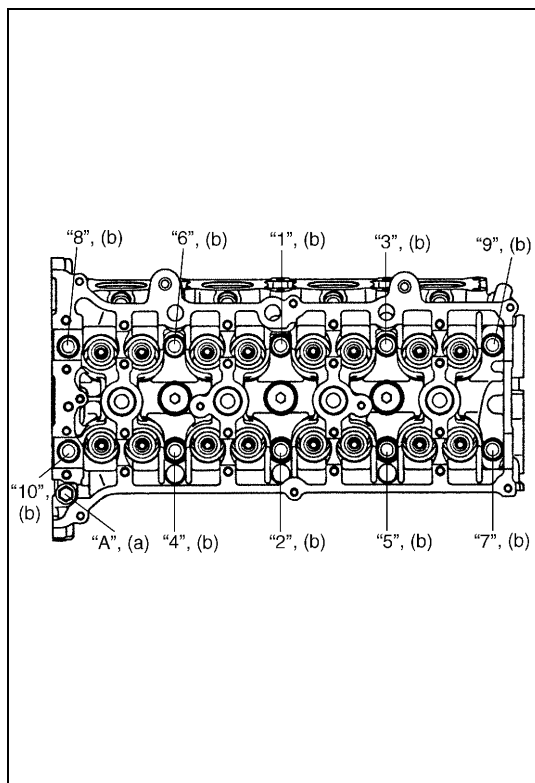
- 2) Install knock pins (1) to cylinder block.
- 3) Install new cylinder head gasket (2) to cylinder block.
"TOP" mark provided on gasket comes to crankshaft pulley side, facing up (toward cylinder head side).



- 4) Make sure that oil jet (venturi plug) (1) is not clogged.
If it is not installed, install it as specified torque.

Tightening torque

Venturi plug (a): 5 N·m (0.5 kg-m, 3.5 lb-ft)



- 5) Install cylinder head to cylinder block.
Apply engine oil to new cylinder head bolts and tighten them gradually as follows.
 - a) Tighten cylinder head bolts ("1" – "10") to 20 N·m (2.0 kg-m, 14.5 lb-ft) according to numerical order as shown by using a 12 corner socket wrenches.
 - b) In the same manner as in Step a), tighten them to 40 N·m (4.0 kg-m, 29.0 lb-ft).
 - c) Turn all bolts 60° according to numerical order in figure.
 - d) Repeat Step c).
 - e) Tighten bolt "A" to specified torque.

NOTE:

Be sure to tighten M8 bolt ("A") after securing the other bolt.

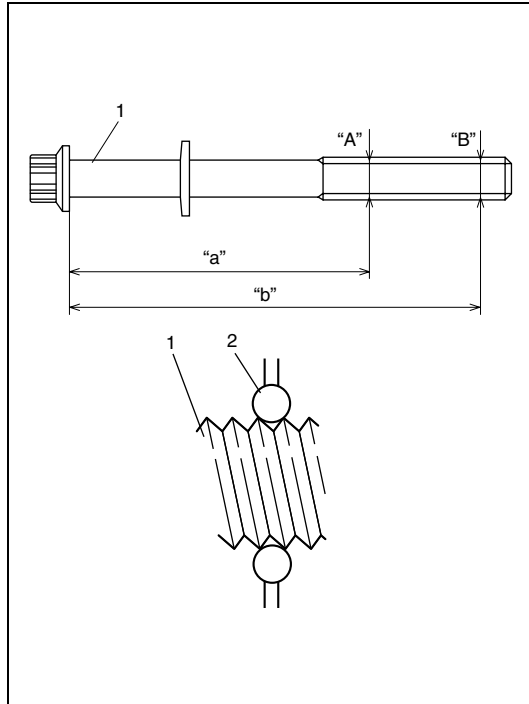
Tightening torque

Cylinder head bolt for M8 (a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

Cylinder head bolt for M10

(b): Tighten 20 N·m (2.0 kg-m, 14.5 lb-ft),

40 N·m (4.0 kg-m, 29.0 lb-ft), 60° and 60° by the specified procedure.

**NOTE:**

If they are reused, check thread diameters of cylinder head bolt (1) for deformation according to the follows and replace them with new ones if thread diameter difference exceeds limit.

Measure each thread diameter of cylinder head bolt (1) at "A" on 83.5mm(2.81in.) from seat side of flange bolt and "B" on 115mm(4.53in.) from seat side of flange bolt by using a micrometer (2).

Then calculate difference in diameters ("A" – "B").

If it exceeds limit, replace with new one.

Cylinder head bolt diameter measurement points

"a": 83.5mm (2.81in.)

"b": 115mm (4.53in.)

Cylinder head bolt diameter difference (deformation)

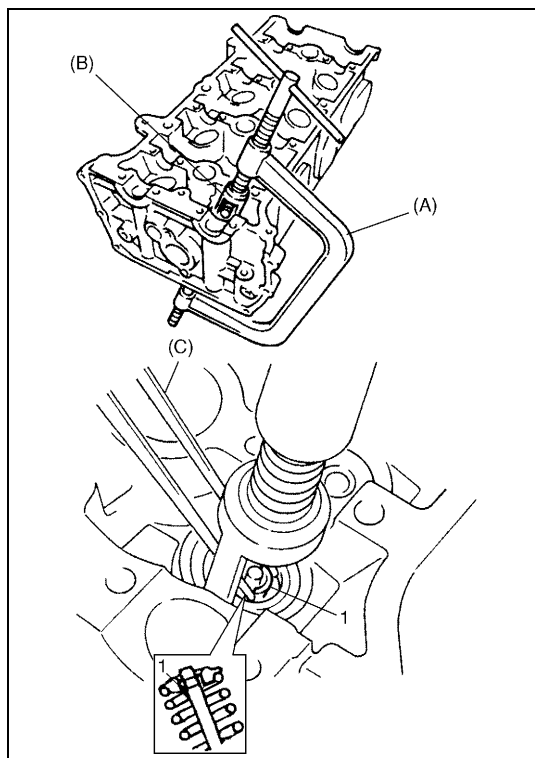
Limit ("A" – "B"): 0.1mm (0.004in.)

- 6) Install camshafts, tappet and shim referring to "Camshaft, Tappet and Shim Removal and Installation" in this section.
- 7) Install timing chain referring to "Timing Chain and Chain Tensioner Removal and Installation" in this section.
- 8) Install timing chain cover referring to "Timing Chain Cover Removal and Installation" in this section.
- 9) Install cylinder head cover referring to "Cylinder Head Cover Removal and Installation" in this section.
- 10) Install oil pan referring to "Oil Pan and Oil Pump Strainer Removal and Installation" in this section.

Valves and Cylinder Head Disassembly and Assembly

Disassembly

- 1) For ease in servicing cylinder head, remove intake manifold, injectors and exhaust manifold from cylinder head.
- 2) Using special tools (valve lifter), compress valve spring and then remove valve cotters (1) by using special tool (forceps).



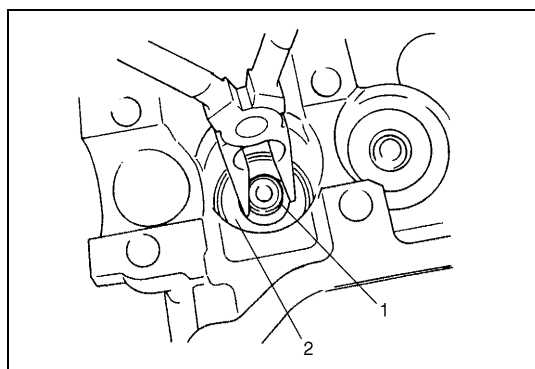
Special tool

(A): 09916-14510

(B): 09916-14521

(C): 09916-84511

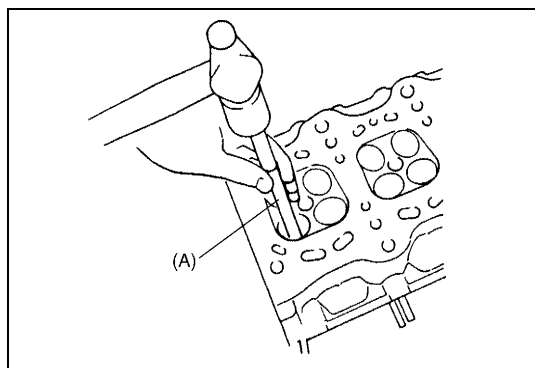
- 3) Release special tools (valve lifter), and remove spring retainer and valve spring.
- 4) Remove valve from combustion chamber side.



- 5) Remove valve stem seal (1) from valve guide and valve spring seat (2).

NOTE:

Do not reuse valve stem seal (1) once disassembled. Be sure to use new valve stem seal when assembling.



- 6) Using special tool (valve guide remover), drive valve guide out from combustion chamber side to valve spring side.

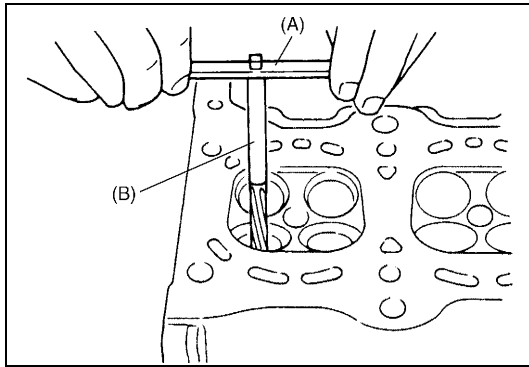
Special tool

(A): 09916-44910

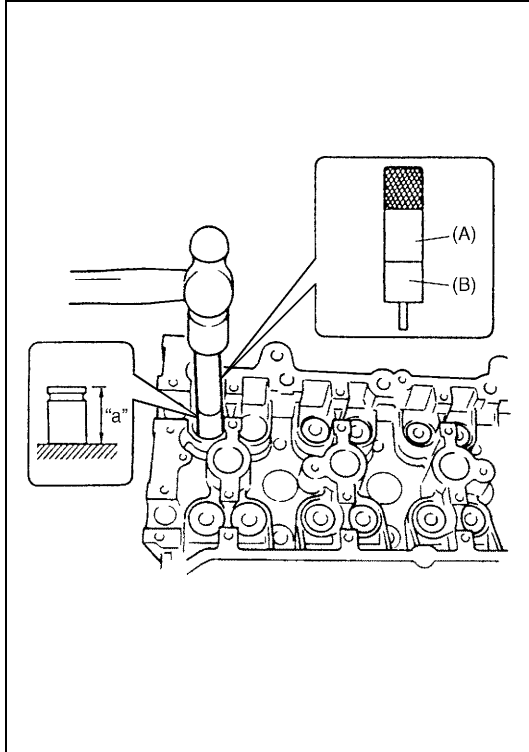
NOTE:

Do not reuse valve guide once disassembled. Be sure to use new valve guide (oversize) when assembling.

- 7) Place disassembled parts except valve stem seal and valve guide in order so that they can be installed in their original position.

Assembly

- 1) Before installing valve guide into cylinder head, ream guide hole with special tool (10.5 mm reamer) so as to remove burrs and make it truly round.

Special tool**(A): 09916-34542****(B): 09916-37320**

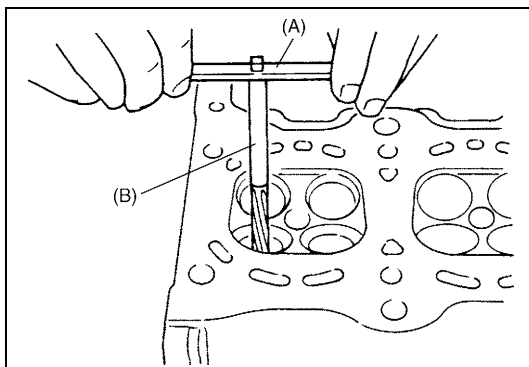
- 2) Install valve guide to cylinder head.

Heat cylinder head uniformly to a temperature of 80 to 100 °C (176 to 212 °F) so that head will not be distorted, and drive new valve guide into hole with special tools. Drive in new valve guide until special tool (Valve guide installer) contacts cylinder head.

After installing, make sure that valve guide protrudes by specified dimension "a" from cylinder head.

Special tool**(A): 09916-58210****(B): 09916-56011****NOTE:**

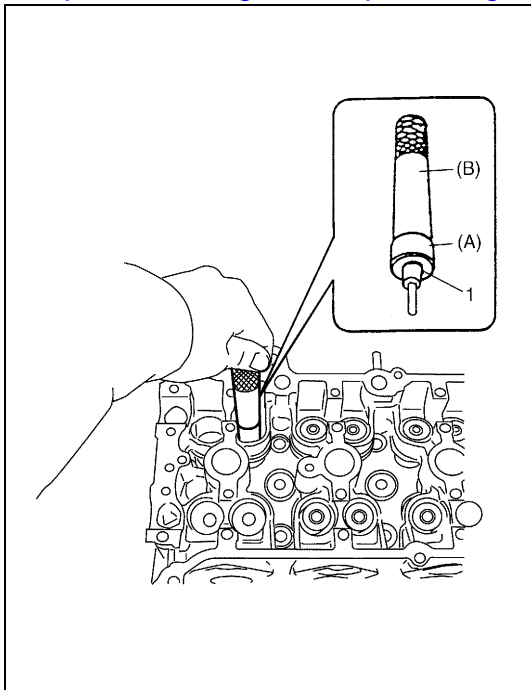
- Never reuse once-disassembled valve guide. Make sure to install new valve guide.
- Intake and exhaust valve guides are identical.

Specification for valve guide protrusion "a"**Intake side: 11.3 mm (0.44 in.)****Exhaust side: 11.3 mm (0.44 in.)**

- 3) Ream valve guide bore with special tool (5.5 mm reamer). After reaming, clean bore.

Special tool**(A): 09916-34542****(B): 09916-34550**

- 4) Install valve spring seat to cylinder head.



- 5) Install new valve stem seal (1) to valve guide.

After applying engine oil to seal and spindle of special tool (Valve guide installer handle), fit oil seal to spindle, and then install seal to valve guide by pushing special tool by hand.

After installing, check to be sure that seal is properly fixed to valve guide.

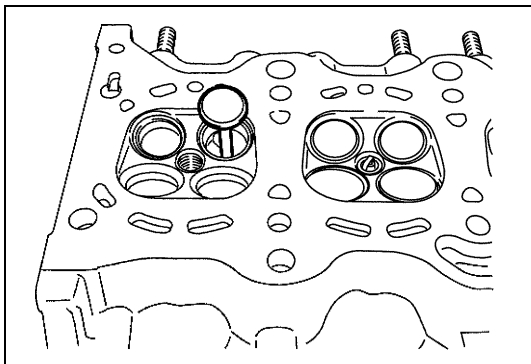
Special tool

(A): 09916-58210

(B): 09917-98221

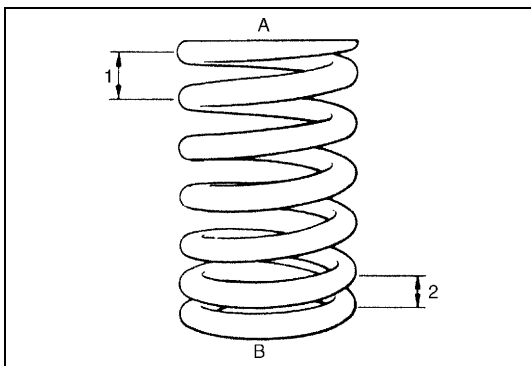
NOTE:

- Do not reuse once-disassembled seal. Be sure to install new seal.
- When installing, never tap or hit special tool with a hammer or else. Install seal to guide only by pushing special tool by hand. Tapping or hitting special tool may cause damage to seal.



- 6) Install valve to valve guide.

Before installing valve to valve guide, apply engine oil to stem seal, valve guide bore and valve stem.

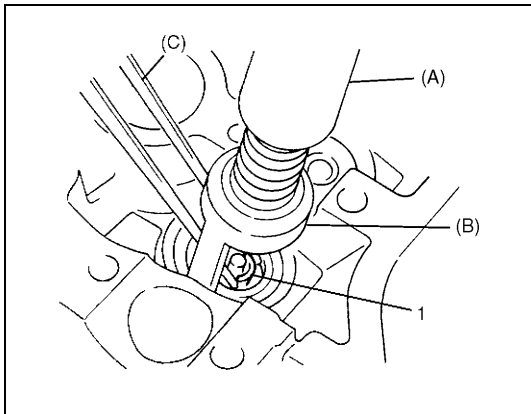


- 7) Install valve spring and spring retainer.

Each valve spring has top end (large-pitch end (1)) and bottom end (small-pitch end (2)). Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).

A: Valve spring retainer side

B: Valve spring seat side



- 8) Using special tools (Valve lifter), compress valve spring and fit two valve cotters (1) into groove in valve stem.

Special tool

(A): 09916-14510

(B): 09916-14521

(C): 09916-84511

NOTE:

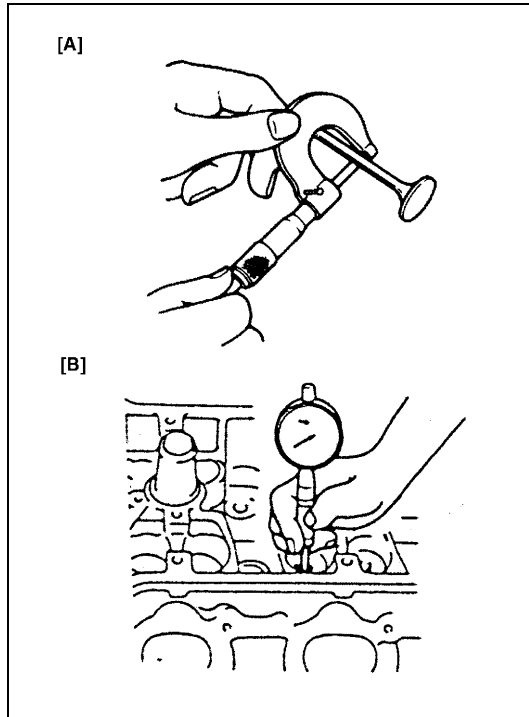
When compressing the valve spring, be carefully to free from damage in inside face of tappet installing hole.

- 9) Install intake manifold referring to "Intake Manifold Removal and Installation" in this section.
- 10) Install fuel injectors referring to "Fuel Injector Removal and Installation" in Section 6E2.
- 11) Install exhaust manifold referring to "Exhaust Manifold Removal and Installation" in this section.

Valves and Cylinder Head Inspection

Valve guides

Valve stem-to-guide clearance



Using a micrometer and bore gauge, take diameter readings on valve stems and guides to check stem-to-guide clearance. Be sure to take reading at more than one place along the length of each stem and guide.

If clearance exceeds limit, replace valve and valve guide.

Valve stem-to-guide clearance

Item	Standard	Limit
In	0.020 – 0.047 mm (0.0008 – 0.0018 in.)	0.07 mm (0.0028 in.)
Ex	0.045 – 0.072 mm (0.0018 – 0.0028 in.)	0.09 mm (0.0035 in.)

Valve stem diameter [A] standard

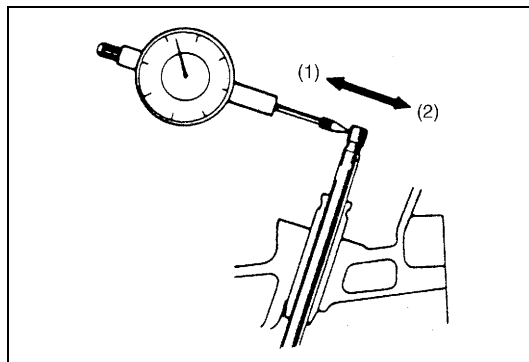
In: 5.465 – 5.480 mm (0.2152 – 0.2157 in.)

Ex: 5.440 – 5.455 mm (0.2142 – 0.2147 in.)

Valve guide bore [B] standard

In and Ex: 5.500 – 5.512 mm (0.2166 – 0.2170 in.)

Valve stem end deflection



If bore gauge is not available, check end deflection of valve stem with a dial gauge instead.

Move stem end in directions (1) and (2) to measure end deflection.

If deflection exceeds its limit, replace valve stem and valve guide.

Valve stem end deflection limit

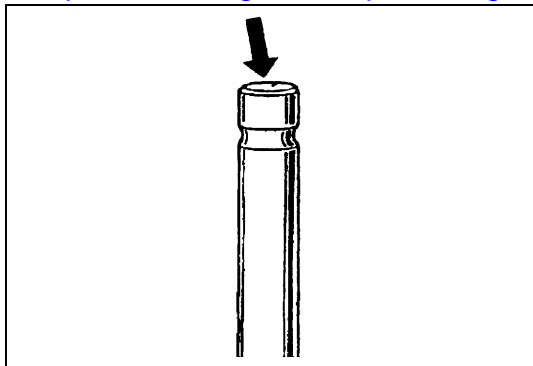
In: 0.14 mm (0.005 in.)

Ex: 0.18 mm (0.007 in.)

Valves

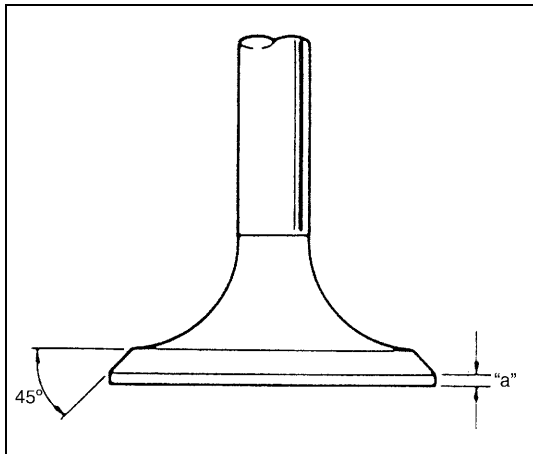
Visual inspection

- Remove all carbon from valves.
- Inspect each valve for wear, burn or distortion at its face and stem end, as necessary, replace it.



- Inspect valve stem end face for pitting and wear. If pitting or wear is found there, valve stem end may be resurfaced, but not too much to grind off its chamber. When it is worn out too much that its chamber is gone, replace valve.

Valve head thickness



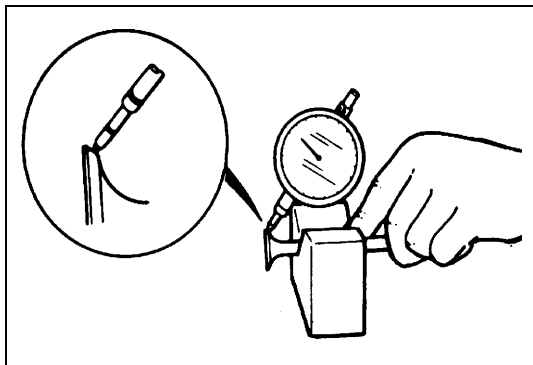
Measure thickness "a" of valve head. If measured thickness exceeds limit, replace valve.

Valve head thickness "a" (In and Ex)

Standard: 1.25 – 1.55 mm (0.050 – 0.061 in.)

Limit: 0.9 mm (0.035 in.)

Valve head radial runout

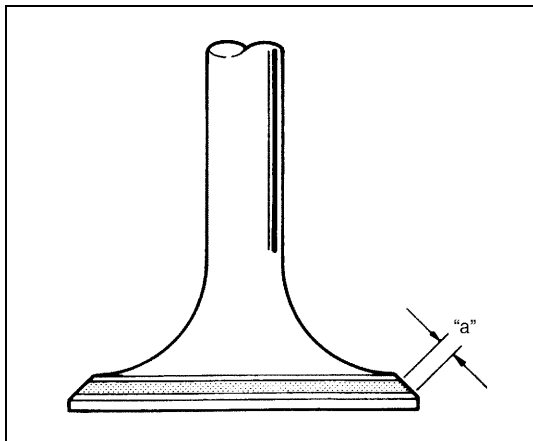


Check each valve for radial runout with a dial gauge and "V" block. To check runout, rotate valve slowly. If runout exceeds its limit, replace valve.

Limit on valve head radial runout

0.08 mm (0.003 in.)

Seating contact width

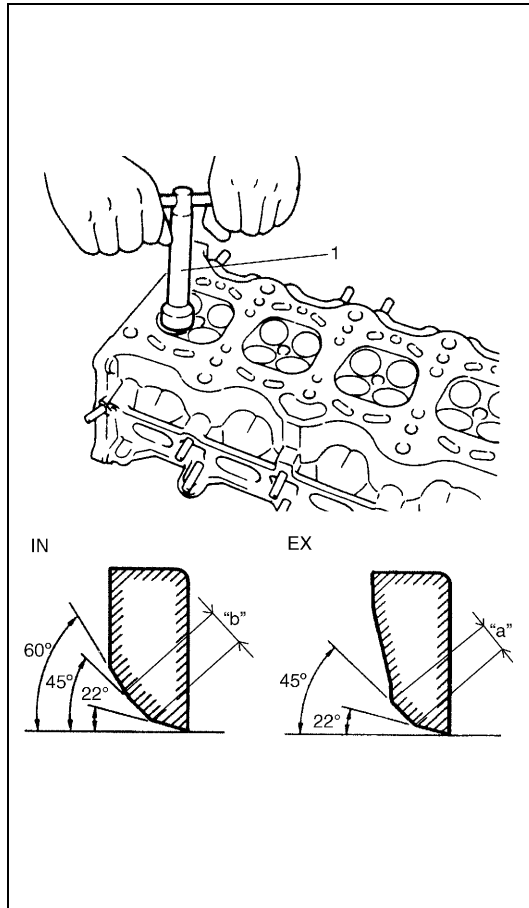


Create contact pattern on each valve in the usual manner, i.e. by giving uniform coat of marking compound to valve seat and by rotatingly tapping seat with valve head. Valve lapper (tool used in valve lapping) must be used.

Pattern produced on seating face of valve must be a continuous ring without any break, and the width of pattern must be within specified range.

Standard seating width "a" revealed by contact pattern on valve face

In and Ex: 1.0 – 1.4 mm (0.0394 - 0.0551 in.)

Valve seat repair

A valve seat not producing a uniform contact with its valve or showing width of seating contact that is out of specified range must be repaired by regrinding or by cutting and regrinding and finished by lapping.

- 1) **EXHAUST VALVE SEAT:** Use valve seat cutters (1) to make two cuts as illustrated in figure. Two cutters must be used: the first for making 22° angle, and the second for making 45° angle. The second cut must be made to produce desired seat width.

Seat width for exhaust valve seat

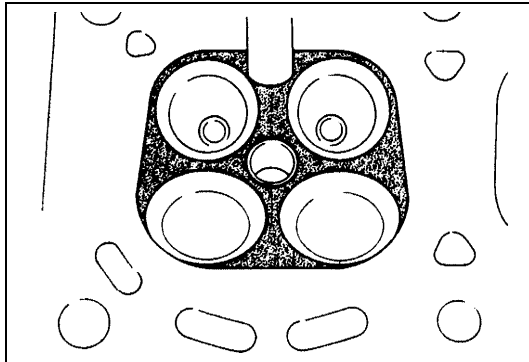
"a": 1.0 – 1.4 mm (0.0394 – 0.0551 in.)

- 2) **INTAKE VALVE SEAT:** Use valve seat cutters (1) to make three cuts as illustrated in figure. Three cutters must be used: the 1st for making 15° angle, the 2nd for making 60° angle, and 3rd for making 45° angle. The 3rd cut (45°) must be made to produce desired seat width.

Seat width for intake valve seat

"b": 1.0 – 1.4 mm (0.0394 – 0.0551 in.)

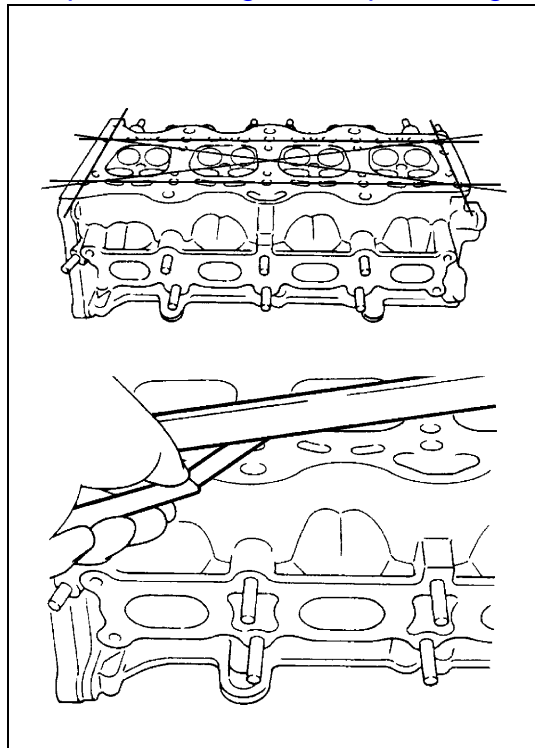
- 3) **VALVE LAPPING:** Lap valve on seat in two steps, first with coarse size lapping compound applied to face and the second with fine-size compound, each time using valve lapper according to usual lapping method.

Cylinder head

- Remove all carbon deposits from combustion chambers.

NOTE:

Do not use any sharp-edged tool to scrape off carbon deposits. Be careful not to scuff or nick metal surfaces when decarbonizing. The same applies to valves and valve seats, too.

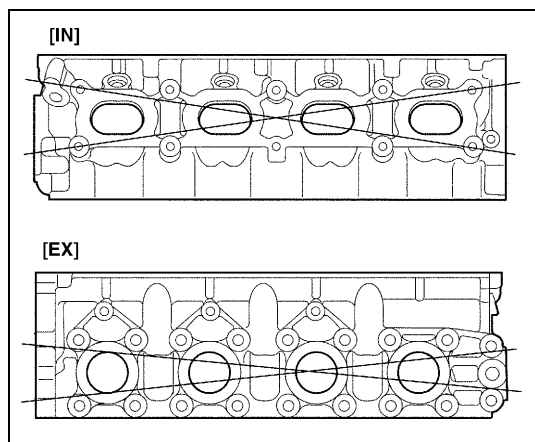


- Check cylinder head for cracks on intake and exhaust ports, combustion chambers, and head surface.

Using a straightedge and thickness gauge, check flatness of gasketed surface at a total of 6 locations. If distortion limit, given below, is exceeded, correct gasketed surface with a surface plate and abrasive paper of about #400 (Waterproof silicon carbide abrasive paper): place abrasive paper on and over surface plate, and rub gasketed surface against paper to grind off high spots. Should this fail to reduce thickness gauge readings to within limit, replace cylinder head.

Leakage of combustion gases from this gasketed joint is often due to warped gasketed surface: such leakage results in reduced power output.

Limit of distortion for cylinder head surface on piston side
: 0.03 mm (0.001 in.)



- Distortion of manifold seating faces:
Check seating faces of cylinder head for manifolds, using a straightedge and thickness gauge, in order to determine whether these faces should be corrected or cylinder head replaced.

Limit of distortion for cylinder head surface on intake and exhaust manifold
0.05 mm (0.002 in.)

Valve springs

Valve spring free length and preload

Referring to data given below, check to be sure that each spring is in sound condition, free of any evidence of breakage or weakening. Remember, weakened valve springs can cause chatter, not to mention possibility of reducing power output due to gas leakage caused by decreased seating pressure.

Valve spring free length

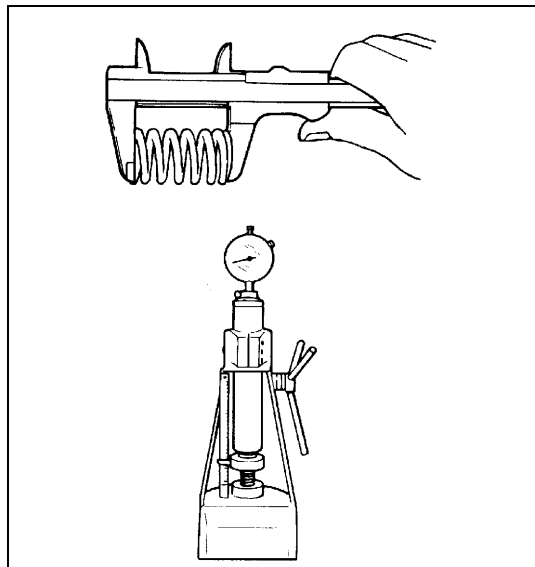
Standard: 36.83 mm (1.450 in.)

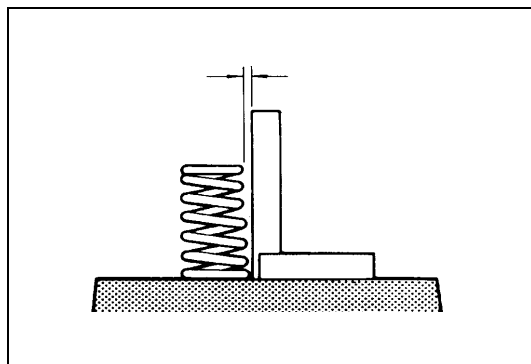
Limit: 35.83 mm (1.411 in.)

Valve spring preload

Standard: 107 – 125 N (10.7 – 12.5 kg) for 31.50 mm (23.6 – 27.6 lb/1.240 in.)

Limit: 102 N (10.2 kg) for 31.50 mm (22.5 lb/1.240 in.)

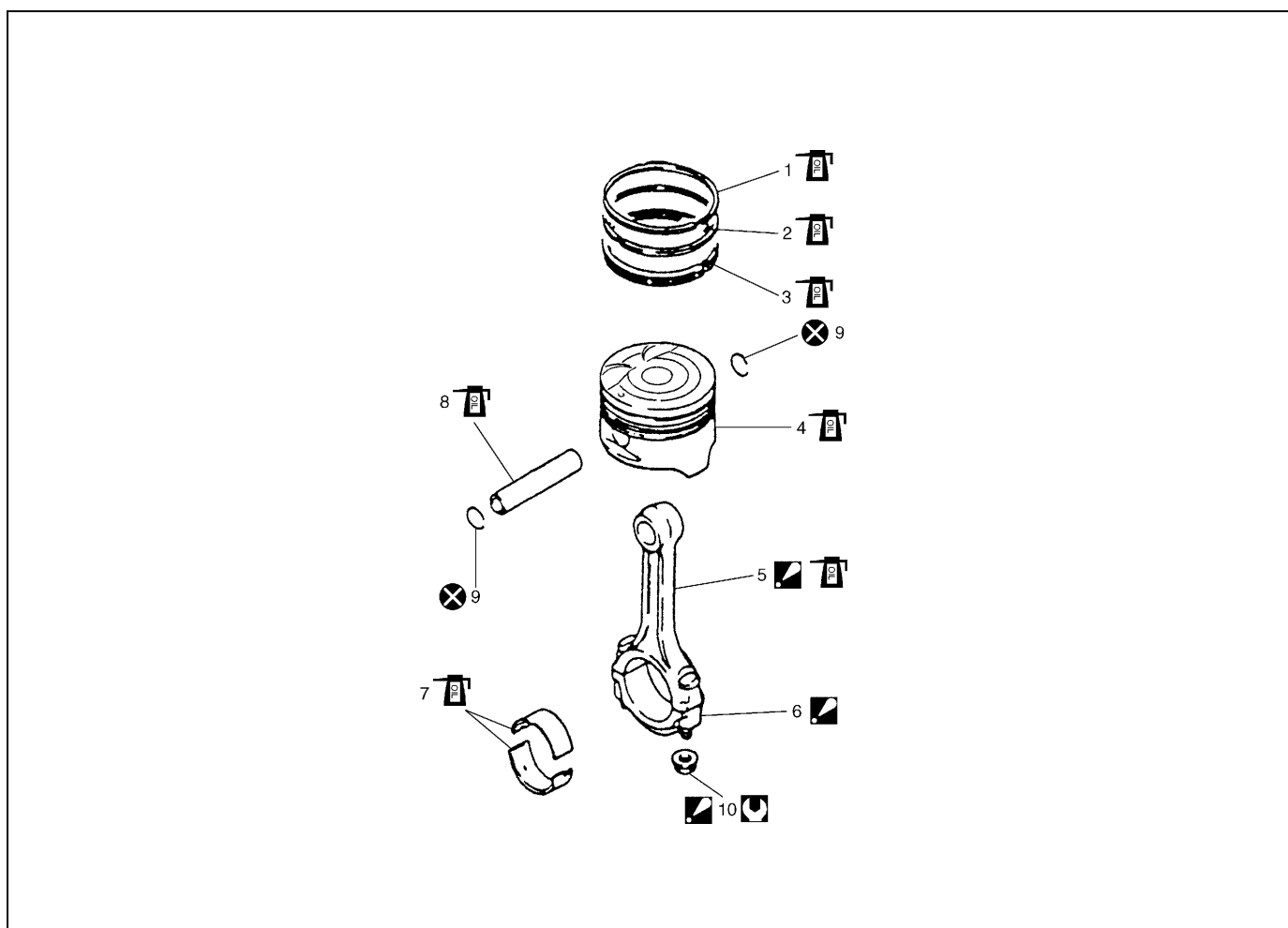


Spring squareness

Use a square and surface plate to check each spring for squareness in terms of clearance between end of valve spring and square. Valve springs found to exhibit a larger clearance than limit given below must be replaced.

Valve spring squareness limit

1.6 mm (0.079 in.)

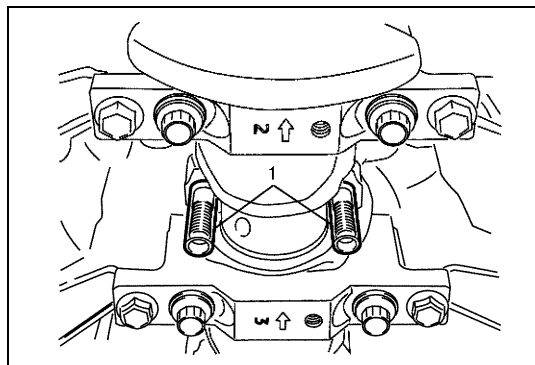
Pistons, Piston Rings, Connecting Rods and Cylinders Components

1. Top ring	8. Piston pin
2. 2nd ring	9. Piston pin circlip
3. Oil ring	10. Bearing cap nut Tighten 15 N·m (1.5 kg-m, 11.0 lb-ft), 45° and 45° by the specified procedure.
4. Piston	Tightening torque
5. Connecting rod : Apply engine oil to sliding surface except inner surface of big end, and rod bolts. Make sure rod bolt diameter when reuse it due to plastic deformation tightening. Refer to "Inspection" of "Connecting Rod".	Apply engine oil to sliding surface of each parts.
6. Connecting rod bearing cap : Point arrow mark on cap to crankshaft pulley side.	Do not reuse.
7. Connecting rod bearing	

Pistons, Piston Rings, Connecting Rods and Cylinders Removal and Installation

Removal

- 1) Remove engine assembly from vehicle referring to "Engine Assembly Removal and Installation" in this section.
- 2) Remove cylinder head referring to "Valves and Cylinder Head Removal and Installation".
- 3) Mark cylinder number on all pistons, connecting rods and connecting rod caps using silver pencil or quick drying paint.
- 4) Remove rod bearing caps.
- 5) Install guide hose (1) over threads of rod bolts.
This prevents damage to bearing journal and rod bolt threads when removing connecting rod.
- 6) Decarbonize top of cylinder bore before removing piston from cylinder.
- 7) Push piston and connecting rod assembly out through the top of cylinder bore.

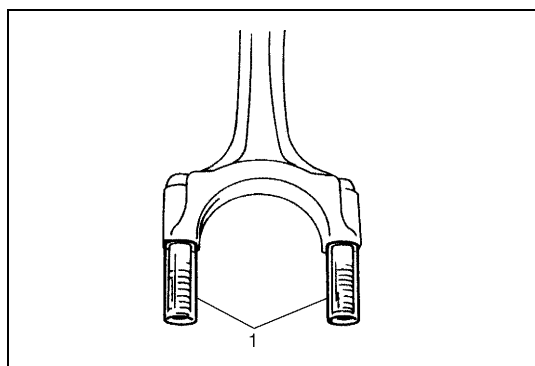


Installation

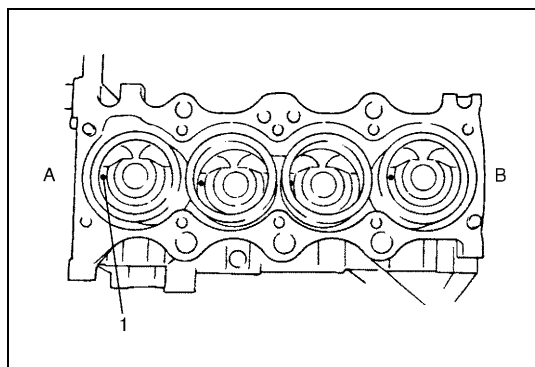
- 1) Apply engine oil to pistons, rings, cylinder walls, connecting rod bearings and crank pins.

NOTE:

Do not apply oil between connecting rod and bearing or between bearing cap and bearing.

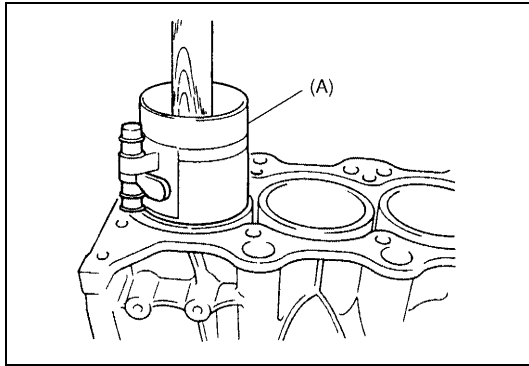


- 2) Install guide hoses (1) over connecting rod bolts.
These guide hoses protect crank pin and threads of rod bolt from damage during installation of connecting rod and piston assembly.



- 3) When installing piston and connecting rod assembly into cylinder bore, point front mark (1) on piston head to crankshaft pulley side.

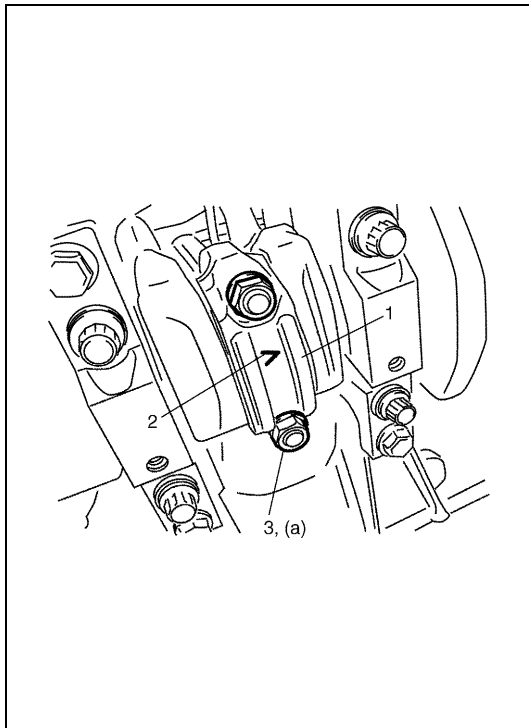
A:	Crankshaft pulley side
B:	Flywheel side



- 4) Install piston and connecting rod assembly into cylinder bore. Use special tool (Piston ring compressor) to compress rings. Guide connecting rod into place on crankshaft. Using a hammer handle, tap piston head to install piston into bore. Hold ring compressor firmly against cylinder block until all piston rings have entered cylinder bore.

Special tool

(A): 09916-77310



- 5) Install bearing cap (1):
Point arrow mark (2) on cap to crankshaft pulley side.
After applying oil to rod bolts and tighten cap nuts (3) gradually as follows.
a) Tighten all cap nuts to 15 N·m (1.5 kg-m, 11.0 lb-ft).
b) Retighten them to 45°.
c) Repeat Step b) once again.

Tightening torque

Bearing cap nut

(a): Tighten 15 N·m (1.5 kg-m, 11.0 lb-ft), 45° and 45° by the specified procedure.

NOTE:

Before installing bearing cap, make sure that checking for connecting rod bolt deformation.

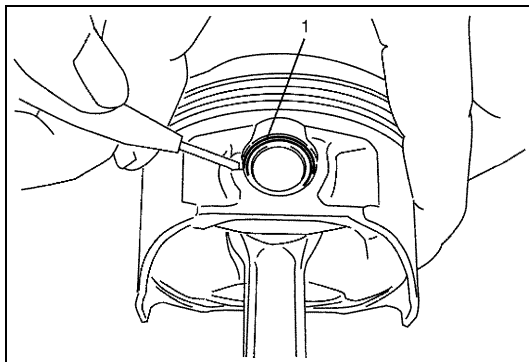
Refer to "Connecting Rod" of "Pistons, Piston Rings, Connecting Rods and Cylinders Inspection" in this section.

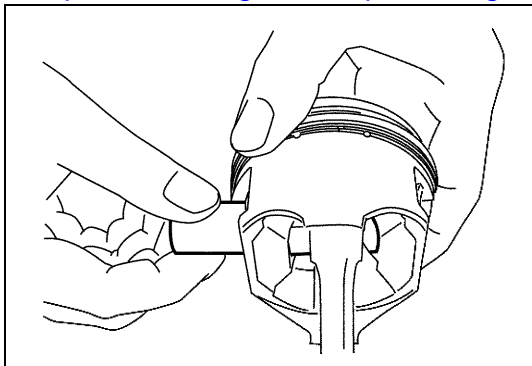
- 6) Install cylinder head referring to "Valves and Cylinder Head Removal and Installation" in this section.

Pistons, Piston Rings, Connecting Rods and Cylinders Disassembly and Assembly

Disassembly

- 1) Using piston ring expander, remove two compression rings (Top and 2nd) and oil ring from piston.
2) Remove piston pin from connecting rod as follows.
a) Ease out piston pin circlips (1), as shown.

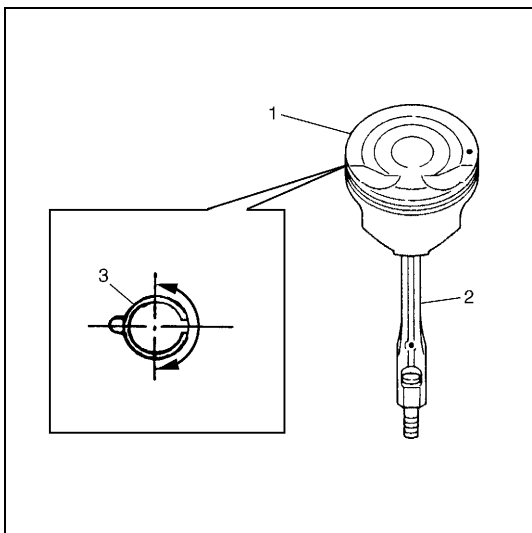




b) Force piston pin out.

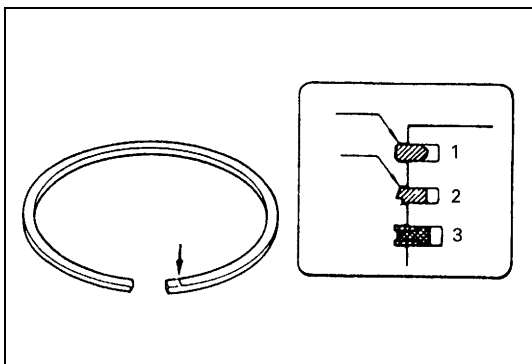
Assembly

- 1) Decarbonize piston head and ring grooves using a suitable tool.
- 2) Install piston pin to piston (1) and connecting rod (2):
 - a) After applying engine oil to piston pin and piston pin holes in piston and connecting rod.
 - b) Fit connecting rod as shown in figure.
 - c) Insert piston pin to piston and connecting rod.
 - d) Install piston pin circlips (3).

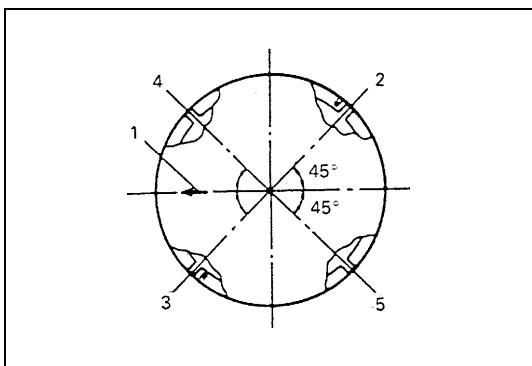


NOTE:

Circlip should be installed with its cut part facing as shown in figure. Install so that circlip end gap comes within such range as indicated by arrow.



- 3) Install piston rings to piston:
 - a) As indicated in figure, 1st and 2nd rings have "T" mark respectively. When installing these piston rings to piston, direct marked side of each ring toward top of piston.
 - b) 1st ring (1) differs from 2nd ring (2) in thickness, shape and color of surface contacting cylinder wall. Distinguish 1st ring from 2nd ring by referring to figure.
 - c) When installing oil ring (3) install spacer first and then two rails.



- 4) After installing three rings (1st, 2nd and oil rings), distribute their end gaps as shown in figure.

1. Arrow mark
2. 1st ring end gap
3. 2nd ring end gap and oil ring spacer gap
4. Oil ring upper rail gap
5. Oil ring lower rail gap

Pistons, Piston Rings, Connecting Rods and Cylinders Inspection

Cylinder

Visual inspection

Inspect cylinder walls for scratches, roughness or ridges which indicate excessive wear. If cylinder bore is very rough or deeply scratched or ridged, rebore cylinder and use oversize piston.

Cylinder bore diameter, taper and out-of-round

Using a cylinder gauge (1), measure cylinder bore in thrust and axial directions at two positions ("a" and "b") as shown in figure.

If any of the following conditions is noted, rebore cylinder.

- 1) Cylinder bore dia. exceeds limit.
- 2) Difference of measurements at two positions exceeds taper limit.
- 3) Difference between thrust and axial measurements exceeds out-of-round limit.

Cylinder bore diameter

Standard: 78.00 – 78.014 mm (3.0709 – 3.0714 in.)

Limit: 78.050 mm (3.073 in.)

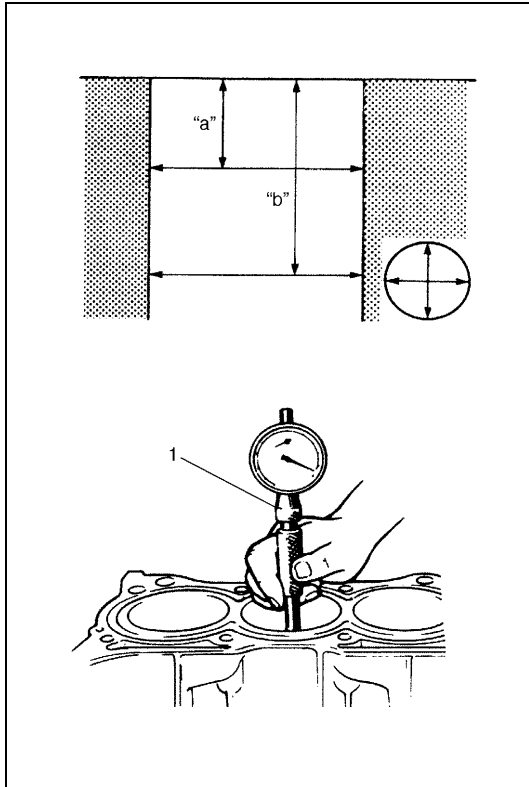
Cylinder taper and out-of-round

Limit: 0.10 mm (0.004 in.)

"a": 50 mm (1.96 in.)
"b": 100 mm (3.94 in.)

NOTE:

If any one of four cylinders has to be rebored, rebore all four to the same next oversize. This is necessary for the sake of uniformity and balance.



Pistons

Visual inspection

Inspect piston for faults, cracks or other damaged.

Damaged or faulty piston should be replaced.

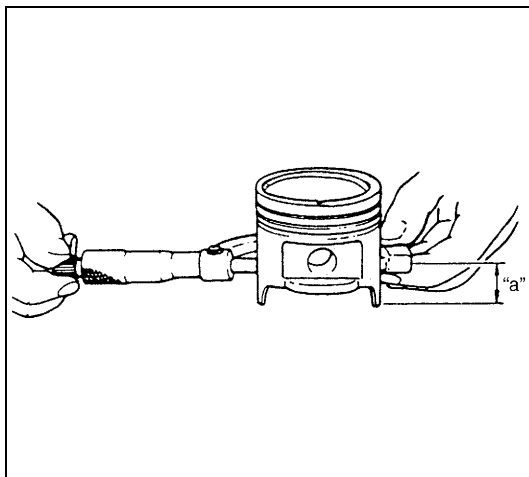
Piston diameter

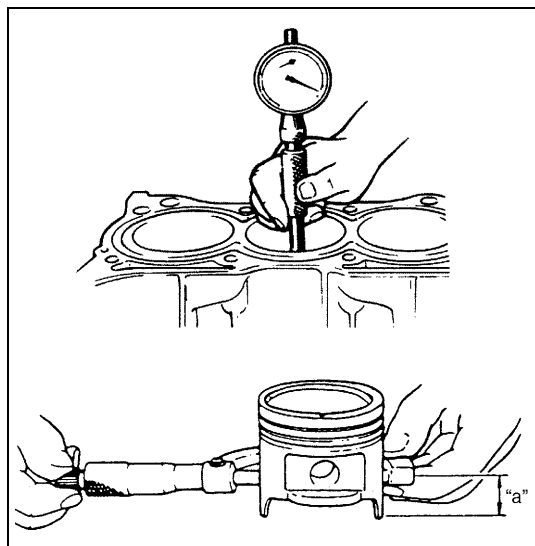
As indicated in figure, piston diameter should be measured at a position 19.5 mm (0.77 in.) from piston skirt end in the direction perpendicular to piston pin.

Piston diameter specification

Standard size	77.953 – 77.968 mm (3.0691 – 3.0696 in.)
Oversize 0.50 mm (0.0196 in.)	78.453 – 78.468 mm (3.0887 – 3.0892 in.)

"a": 19.5 mm (0.77 in.)



Piston clearance

Measure cylinder bore diameter and piston diameter to find their difference which is piston clearance. Piston clearance should be within specification as given below. If it is out of specification, rebore cylinder and use oversize piston.

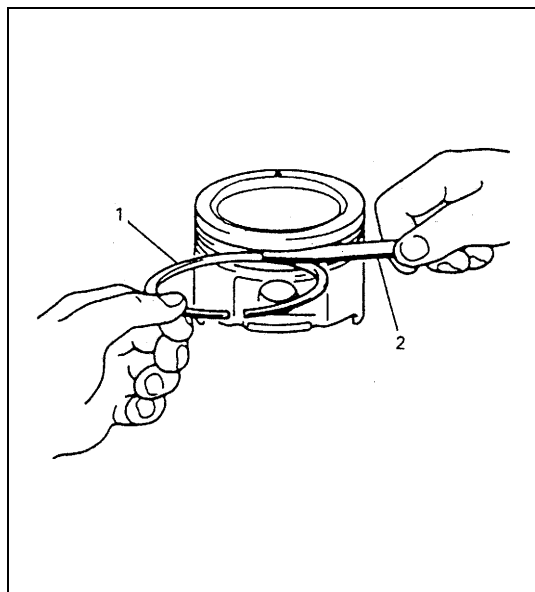
Piston clearance

Standard: 0.032 – 0.061 mm (0.0013 – 0.0024 in.)

NOTE:

Cylinder bore diameters used here are measured in thrust direction at two positions.

"a": 19.5 mm (0.77 in.)

Ring groove clearance

Before checking, piston grooves must be clean, dry and free of carbon deposits.

Fit new piston ring (1) into piston groove, and measure clearance between ring and ring land by using thickness gauge (2). If clearance is out of limit, replace piston.

Ring groove clearance**Top ring**

Standard: 0.03 – 0.07 mm (0.0012 – 0.0028 in.)

Limit: 0.12 mm (0.0047 in.)

2nd ring

Standard: 0.02 – 0.06 mm (0.0008 – 0.0024 in.)

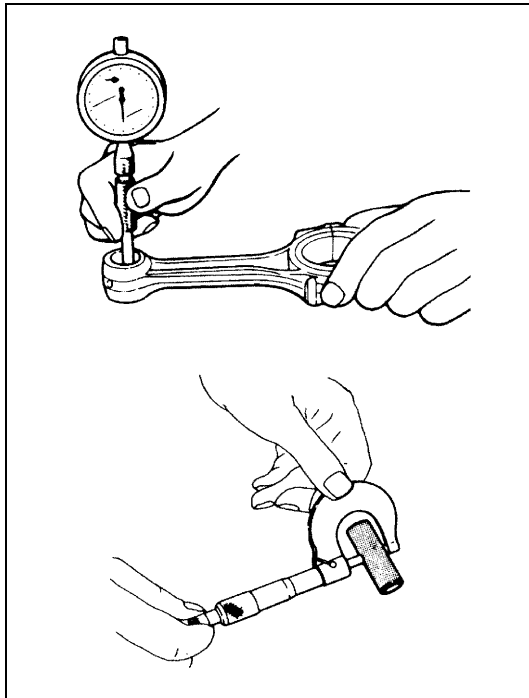
Limit: 0.10 mm (0.0039 in.)

Oil ring

Standard: 0.03 – 0.17 mm (0.0012 – 0.0067 in.)

Piston pin**Visual inspection**

Check piston pin, connecting rod small end bore and piston bore for wear or damage, paying particular attention to condition of small end bore bush. If pin, connecting rod small end bore or piston bore is badly worn or damaged, replace pin, connecting rod and/or piston.

Piston pin clearance

Check piston pin clearance in small end and piston. Replace connecting rod and/or piston if its small end is badly worn or damaged or if measured clearance exceeds limit.

Piston pin clearance in connecting rod small end

Standard: 0.003 – 0.014 mm (0.00012 – 0.00055 in.)

Limit: 0.05 mm (0.0020 in.)

Piston pin clearance in piston

Standard: 0.006 – 0.017 mm (0.00024 – 0.00066 in.)

Limit: 0.05 mm (0.0020 in.)

Small-end bore

20.003 – 20.011 mm (0.7876 – 0.7878 in.)

Piston pin dia.

19.997 – 20.000 mm (0.7873 – 0.7874 in.)

Piston bore

20.006 – 20.014 mm (0.7877 – 0.7879 in.)

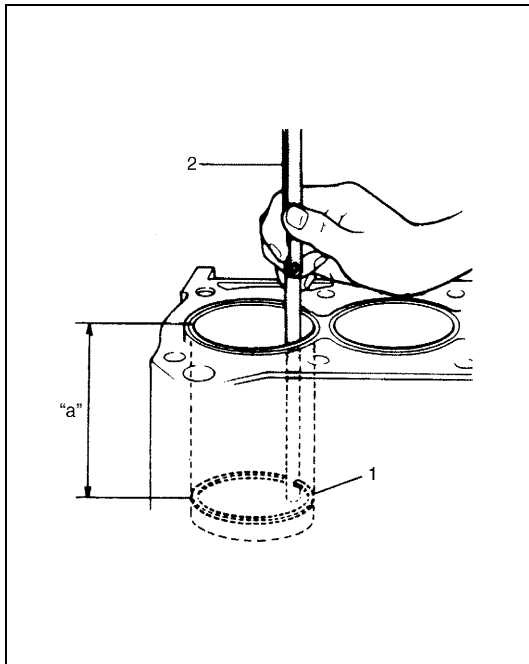
Piston rings**Piston ring end gap**

To measure end gap, insert piston ring (1) into cylinder bore and then measure the gap by using thickness gauge (2).

If measured gap exceeds limit, replace ring.

NOTE:

Decarbonize and clean top of cylinder bore before inserting piston ring.

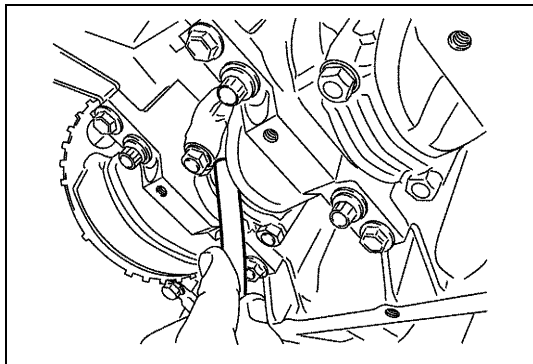
Piston ring end gap

Item	Standard	Limit
Top ring	0.20 – 0.35 mm (0.0079 – 0.0137 in.)	0.7 mm (0.0276 in.)
2nd ring	0.30 – 0.45 mm (0.0119 – 0.0177 in.)	1.0 mm (0.0394 in.)
Oil ring	0.20 – 0.70 mm (0.0079 – 0.0275 in.)	1.2 mm (0.0472 in.)

"a": 120 mm (4.72 in.)

Connecting rod

Big-end side clearance



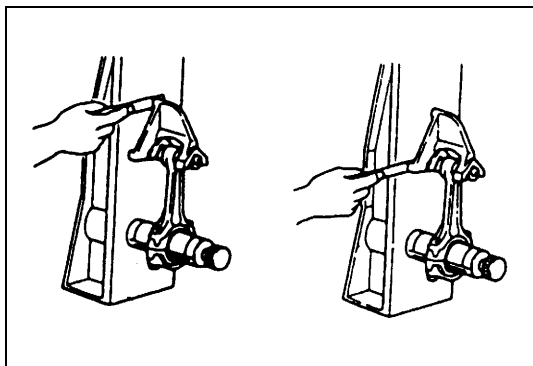
Check big-end of connecting rod for side clearance, with rod fitted and connected to its crank pin in the normal manner. If measured clearance is found to exceed its limit, replace connecting rod.

Big-end side clearance

Standard: 0.25 – 0.40 mm (0.0099 – 0.0157 in.)

Limit: 0.55 mm (0.0217 in.)

Connecting rod alignment



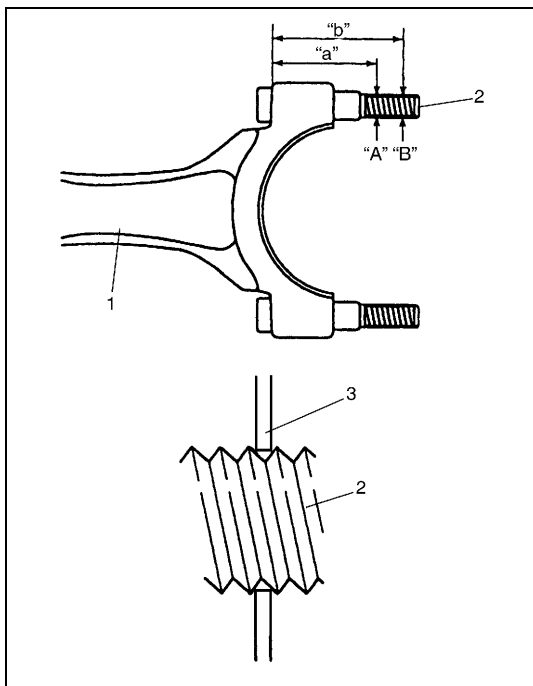
Mount connecting rod on aligner to check it for bow and twist. If the measured value exceeds the limit, replace it.

Connecting rod alignment

Limit on bow: 0.05 mm (0.0020 in.)

Limit on twist: 0.10 mm (0.0039 in.)

Connecting rod bolt deformation (Plastic deformation tightening bolt)



Measure each thread diameter of connecting rod (1) bolt (2) at "A" on 32 mm (1.25 in.) from bolt mounting surface and "B" on 40 mm (1.57 in.) from bolt mounting surface by using a micrometer (3). Calculate difference in diameters ("A" – "B"). If it exceeds limit, replace connecting rod.

Connecting rod bolt measurement points

"a": 32 mm (1.25 in.)

"b": 40 mm (1.57 in.)

Connecting rod bolt diameter difference

limit ("A" – "B"): 0.1 mm (0.004 in.)

Crank pin and connecting rod bearings

Crank pin diameter

Inspect crank pin for uneven wear or damage. Measure crank pin for out-of-round or taper with a micrometer. If crank pin is damaged or out-of round or taper is out of limit, replace crankshaft or regrind crank pin to undersize and use undersize bearing.

Crank pin diameter

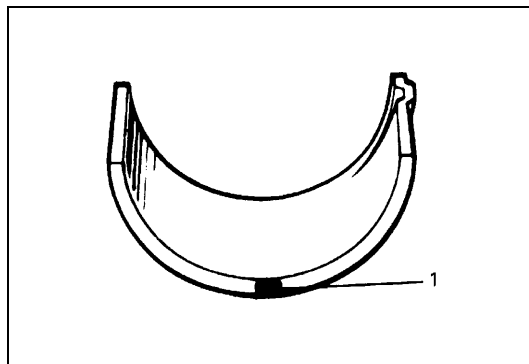
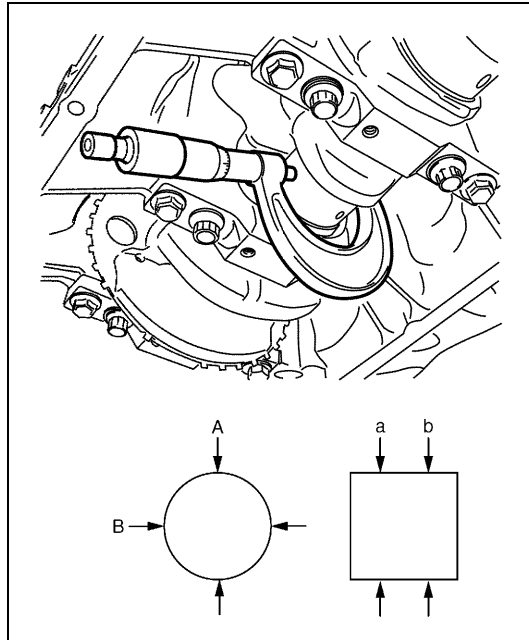
Connecting rod bearing size	Crank pin diameter
Standard	41.982 – 42.000 mm (1.6529 – 1.6535 in.)
Undersize 0.25 mm (0.0098 in.)	41.732 – 41.750 mm (1.6430 – 1.6436 in.)

Crank pin taper and out-of-round

Limit: 0.01 mm (0.0004 in.)

Out-of-round: $A - B$

Taper: $a - b$



Connecting rod bearing general information

Service connecting rod bearings are available in standard size and 0.25 mm (0.0098 in.) undersize, and standard size bearing has 5 kinds of bearings differing in tolerance.

For identification of undersize bearing, it is painted red at the position as indicated in figure, undersize bearing thickness is 1.605 – 1.615 mm (0.0632 – 0.0635 in.) at the center of it.

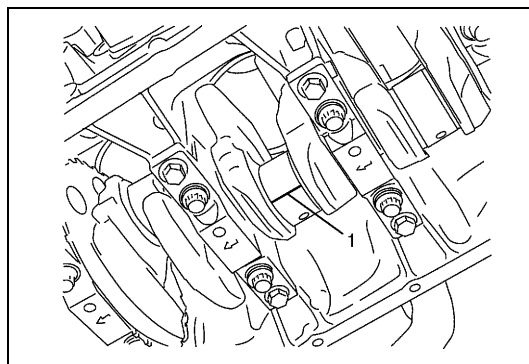
1. Painting

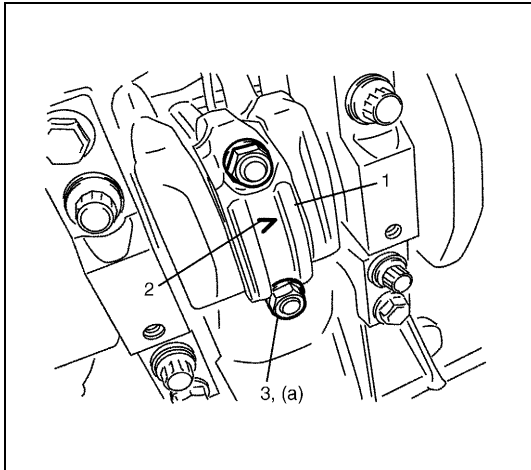
Connecting rod bearing visual inspection

Inspect bearing shells for signs of fusion, pitting, burn or flaking and observe contact pattern. Bearing shells found in defective condition must be replaced.

Connecting rod bearing clearance

- 1) Before checking bearing clearance, clean bearing and crank pin.
- 2) Install bearing in connecting rod and bearing cap.
- 3) Place a piece of gaging plastic (1) to full width of crank pin as contacted by bearing (parallel to crankshaft), avoiding oil hole.





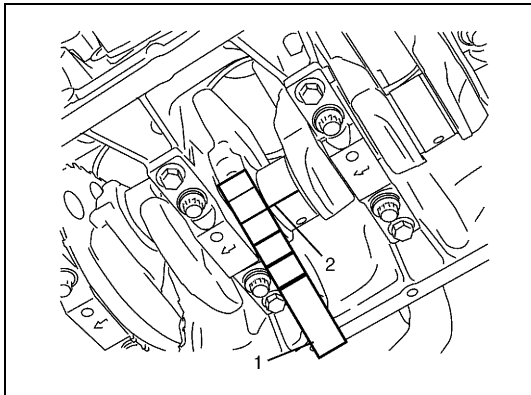
- 4) Install rod bearing cap (1) to connecting rod.
When installing cap, be sure to point arrow mark (2) on cap to crankshaft pulley side, as shown in figure. After applying engine oil to rod bolts and tighten cap nuts (3) gradually as follows.

- Tighten all cap nuts to 15 N·m (1.5 kg·m, 11.0 lb·ft).
- Retighten them to 45°.
- Repeat step b) once again.

Tightening torque

Bearing cap nut

(a): Tighten 15 N·m (1.5 kg·m, 11.0 lb·ft), 45° and 45° by the specified procedure.



- 5) Remove cap and using a scale (1) on gaging plastic (2) envelope, measure gaging plastic width at the widest point (clearance).

If clearance exceed its limit, use a new standard size bearing referring to "Selection of Connecting Rod Bearings" in this section.

After selecting new bearing, recheck clearance.

Connecting rod bearing clearance

Standard: 0.029 – 0.047 mm (0.0011 – 0.0018 in.)

Limit: 0.065 mm (0.0026 in.)

- 6) If clearance can not be brought to its limit even by using a new standard size bearing, regrind crank pin to undersize and use 0.25 mm undersize bearing.

NOTE:

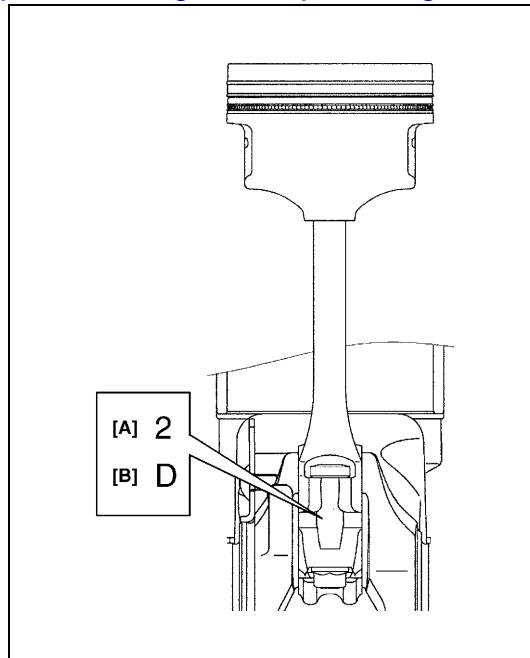
After checking the rod bearing clearance, make sure that checking for Connecting rod bolt deformation.

Refer to "Connecting Rod" under "Pistons, Piston Rings, Connecting Rods and Cylinders Inspection".

Selection of connecting rod bearings

NOTE:

- If bearing is in malcondition, or bearing clearance is out of specification, select a new standard bearing according to the following procedure and install it.
- When replacing crankshaft or connecting rod and its bearing due to any reason, select new standard bearings to be installed by referring to numbers stamped on connecting rod and its cap and/or alphabets stamped on crank web of No.3 cylinder.



- 1) Check stamped numbers on connecting rod and its cap as shown.

Three kinds of numbers ("1", "2" and "3") represent the following connecting rod big end inside diameters.

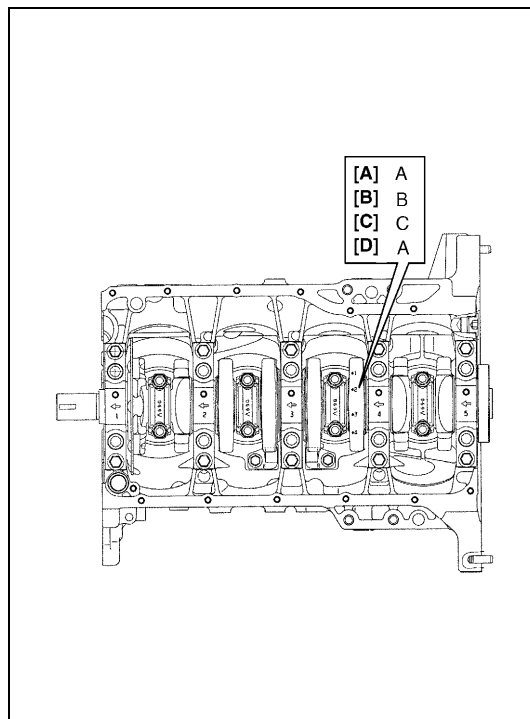
For example, stamped number "1" indicates that corresponding connecting rod big end inside diameter is 45.0000 – 45.0060 mm (1.7717 – 1.7718 in.).

Connecting rod big end inside diameter

Stamped numbers	connecting rod big end inside diameter
1	45.0000 – 45.0060 mm (1.7717 – 1.7718 in.)
2	45.0061 – 45.0120 mm (1.7719 – 1.7721 in.)
3	45.0121 – 45.0180 mm (1.7722 – 1.7723 in.)

[A]: Connecting rod big end inside diameter number

[B]: Weight indication mark



- 2) Next, check crankshaft pin diameter. On crank web No.3, four alphabets are stamped as shown in figure.

Three kinds of alphabet ("A", "B" and "C") represent the following crankshaft pin diameter respectively.

For example, stamped "A" indicates that corresponding crankshaft pin diameter is 41.9940 – 42.0000 mm (1.6534 – 1.6535 in.).

Crankshaft pin outer diameter

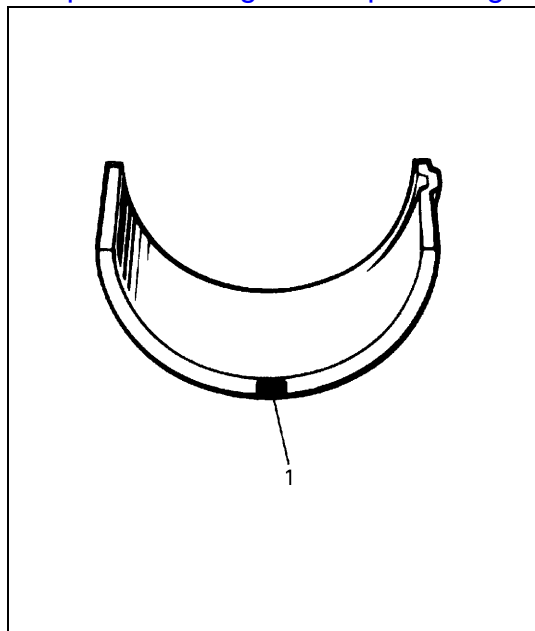
Stamped alphabet	Crankshaft pin diameter
A	41.9940 – 42.0000 mm (1.6534 – 1.6535 in.)
B	41.9880 – 41.9939 mm (1.6531 – 1.6533 in.)
C	41.9820 – 41.9879 mm (1.6529 – 1.6530 in.)

[A]: Crankshaft pin diameter for No.1 cylinder

[B]: Crankshaft pin diameter for No.2 cylinder

[C]: Crankshaft pin diameter for No.3 cylinder

[D]: Crankshaft pin diameter for No.4 cylinder



- 3) There are five kinds of standard bearings differing in thickness. To distinguish them, they are painted in the following colors at the position as indicated in figure.

Each color indicated the following thickness at the center of bearing.

Standard size of connecting rod bearing thickness

Color painted	Bearing thickness
Blue	1.4991 – 1.5020 mm (0.05902 – 0.05913 in.)
Yellow	1.4961 – 1.4990 mm (0.05890 – 0.05901 in.)
Nothing	1.4931 – 1.4960 mm (0.05879 – 0.05889 in.)
Black	1.4901 – 1.4930 mm (0.05867 – 0.05878 in.)
Green	1.4870 – 1.4900 mm (0.05855 – 0.05866 in.)

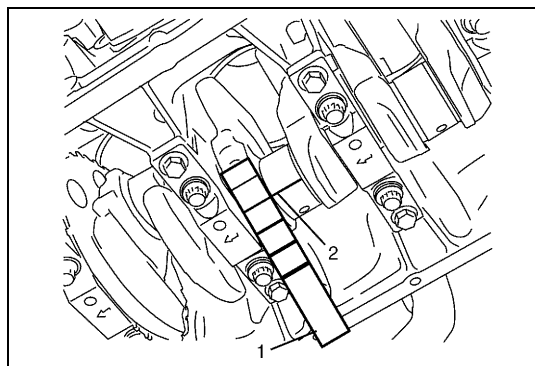
1. Paint

- 4) From number stamped on connecting rod and its cap and alphabets stamped on crank web No.3, determine new standard bearing to be installed to connecting rod big end inside, by referring to table.

For example, if number stamped on connecting rod and its cap is "1" and alphabet stamped on crank web No.3 is "B", install a new standard bearing painted in "Black" to its connecting rod big end inside.

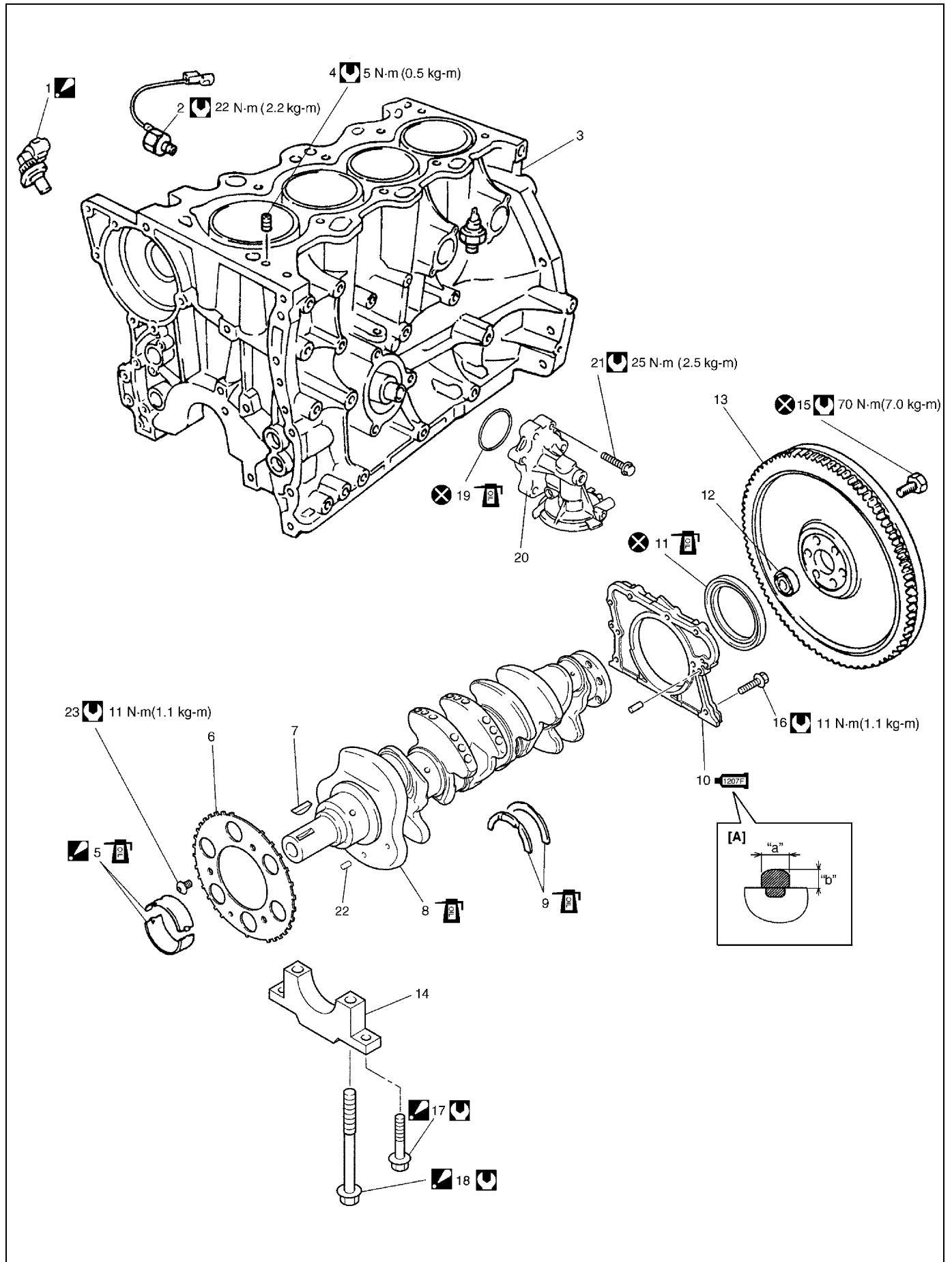
Specification of new standard connecting rod bearing size








		Number stamped on connecting rod and its cap (connecting rod big end inside diameter)		
		1	2	3
Alphabet stamped on crank web No.3 (Crankshaft pin diameter)	A	Green	Black	Nothing
	B	Black	Nothing	Yellow
	C	Nothing	Yellow	Blue
		New standard bearing to be installed.		



- 5) Using scale (1) on gaging plastic (2), check bearing clearance with newly selected standard bearing. If clearance still exceeds its limit, use next thicker bearing and recheck clearance.

Simpo PDF Merge and Split Unregistered Version - <http://www.simpopdf.com>
Main Bearings, Crankshaft and Cylinder Block Components



[A]: Sealant application amount	 5. Main bearing : Upper half of bearing has an oil groove	15. Flywheel mounting bolt
 Tightening torque	6. Sensor plate	16. Rear oil seal housing bolt
 Do not reuse.	7. Crankshaft timing sprocket key	17. Main bearing cap No.2 bolt Tighten 25 N·m (2.5 kg-m, 18.0 lb-ft) by the specified procedure.
 Apply engine oil to inside / sliding surface.	8. Crankshaft	 18. Main bearing cap No.1 bolt Tighten 30 N·m (3.0 kg-m, 22.0 lb-ft), 50 N·m (5.0 kg-m, 36.5 lb-ft) and 60° by the specified procedure. : Never reuse main bearing cap No.1 bolts once disassembled it due to plastic deformation tightening. Be sure to use new main bearing cap No.1 bolts when installing.
"a": 3 mm (0.12 in.)	9. Thrust bearing	19. O-ring
"b": 2 mm (0.08 in.)	 10. Rear oil seal housing : Apply sealant 99000-31250 to mating surface.	20. Oil filter adapter case
 1. CKP sensor (if equipped) : When installing CKP sensor, use new sensor mounting bolt.	11. Rear oil seal	21. Oil filter adapter bolt
2. Knock sensor	12. Input shaft bearing	22. Spring pin
3. Cylinder block	13. Flywheel	23. Sensor plate bolt
4. Venturi plug	14. Main bearing cap	

Main Bearings, Crankshaft and Cylinder Block Removal and Installation

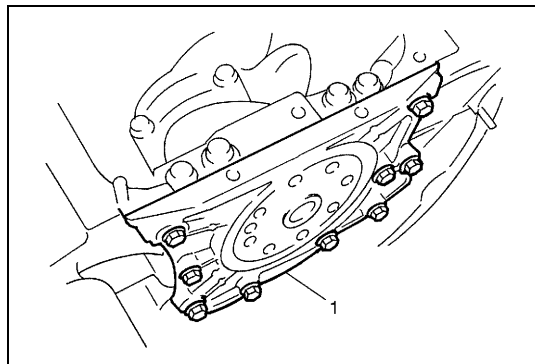
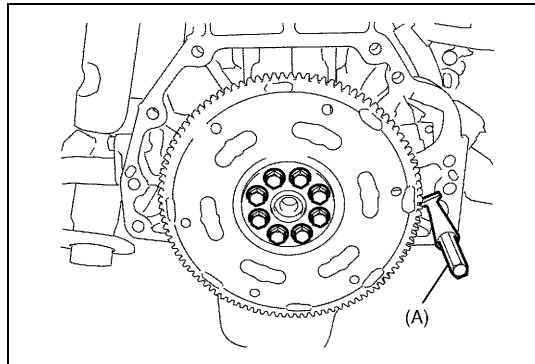
Removal

- 1) Remove engine assembly from vehicle referring to "Engine Assembly Removal and Installation" in this section.
- 2) Remove clutch cover, clutch disc and flywheel (drive plate for A/T) by using special tool.

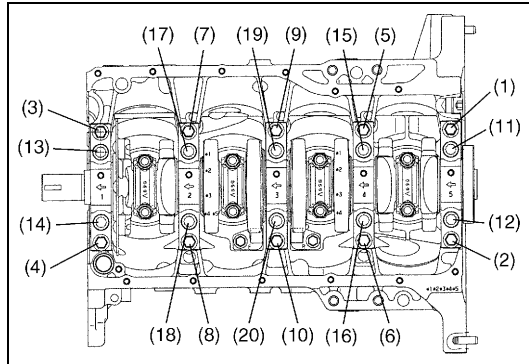
Special tool

(A): 09924-17810

- 3) Remove piston and connecting rod referring to "Pistons, Piston Rings, Connecting Rods and Cylinders Removal and Installation" in this section.



- 4) Remove rear oil seal housing (1).

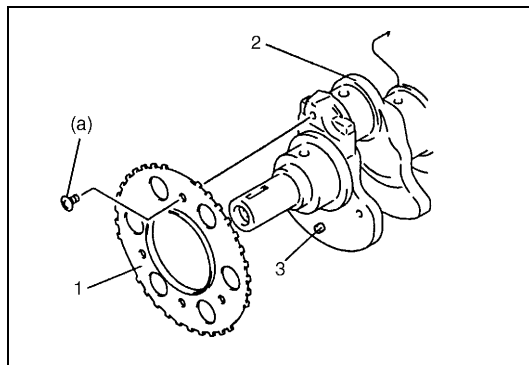


- 5) Loosen main bearing cap No.1 and No.2 bolts in such order as indicated in figure and remove them.
- 6) Remove crankshaft from cylinder block.

Installation

CAUTION:

- Use new bearing cap No.1 bolts. They are deformed once they are used because they are plastic deformation tightening bolts.
- All parts to be installed must be perfectly clean.
- Be sure to oil crankshaft journals, journal bearings, thrust bearings, crankpins, connecting rod bearings, pistons, piston rings and cylinder bores.
- Journal bearings, bearings caps, connecting rods, rod bearings, rod bearing caps, pistons and piston rings are in combination sets. Do not disturb such combination and make sure that each part goes back to where it came from, when installing.



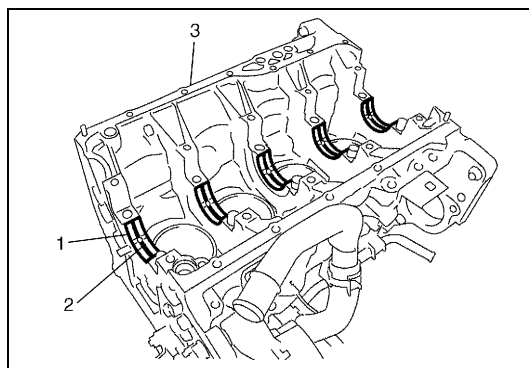
- 1) Install sensor plate (1) to crankshaft (2) and tighten bolts to specified torque.

NOTE:

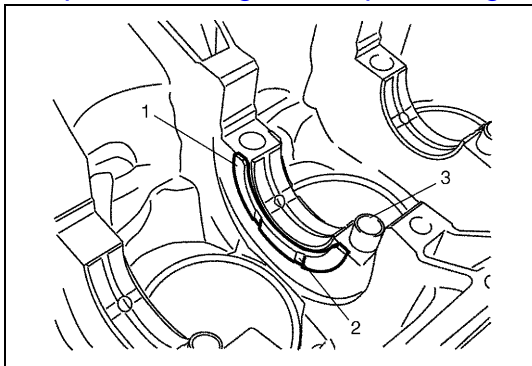
When installing sensor plate, align spring pin (3) on crankshaft and hole of sensor plate.

Tightening torque

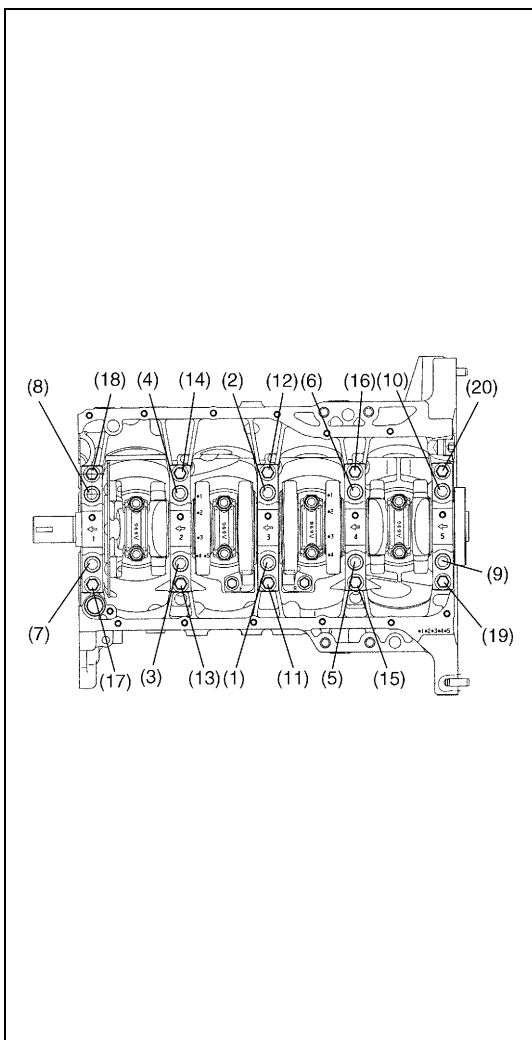
Sensor plate bolt (a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



- 2) Install main bearings to cylinder block.
Upper half of bearing (1) has an oil groove (2).
Install it to cylinder block (3), and the other half without oil groove to bearing cap.
Make sure that two halves are painted in the same color.



- 3) Install thrust bearings (1) to cylinder block between No.2 and No.3 cylinders. Face oil groove (2) sides to crank webs.
- 4) Confirm that dowel pins (3) are installed to intake side of each journal.
- 5) Install crankshaft to cylinder block.



- 6) Install bearing cap to cylinder block, making sure to point arrow mark (on each cap) to crankshaft pulley side. Fit them sequentially in ascending order, 1, 2, 3, 4 and 5, starting from pulley side.

After applying engine oil to main bearing cap No.1 bolts ((1) – (10)) and main bearing cap No.2 bolts ((11) – (20)), tighten them gradually as follows.

- a) Tighten bolts (1) – (10) to 30 N·m (3.0 kg-m, 22.0 lb-ft) according to numerical order as shown by using a 12 corner socket wrenches.
- b) In the same manner as in Step a), tighten them to 50 N·m (5.0 kg-m, 36.5 lb-ft).
- c) In the same manner as in Step a), retighten them to 60°.
- d) Tighten bolts (11) – (20) to 25 N·m (2.5 kg-m, 18.0 lb-ft) according to numerical order as shown.

Tightening torque

Main bearing cap No.1 bolt (1) – (10)

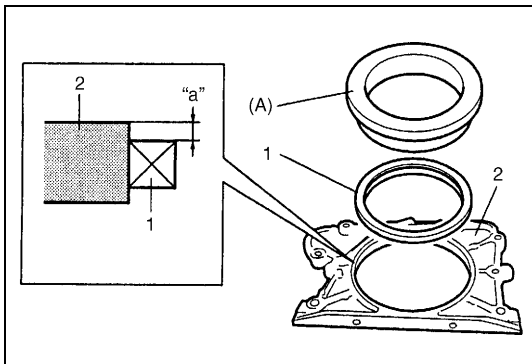
: Tighten 30 N·m (3.0 kg-m, 22.0 lb-ft), 50 N·m (5.0 kg-m, 36.5 lb-ft) and 60° by the specified procedure.

Main bearing cap No.2 bolt (11) – (20)

: Tighten 25 N·m (2.5 kg-m, 18.0 lb-ft) by the specified procedure.

CAUTION:

After tightening cap bolts, check to be sure that crankshaft rotates smoothly when turning it by 12 N·m (1.2 kg-m, 9.0 lb-ft) torque or below.



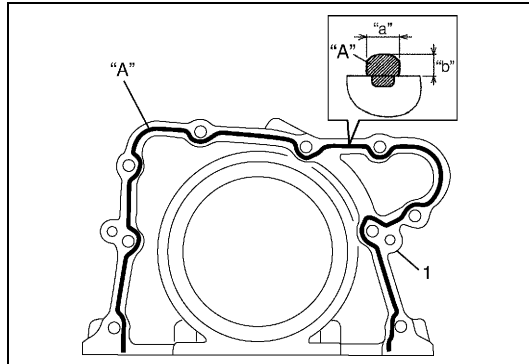
- 7) If necessary, press-fit rear oil seal (1) to oil seal housing (2) by using special tool as shown in the figure.

Special tool

(A): 09911-97820

Crank rear oil seal installing position (dimension)

“a”: 3 mm (0.12 in.)



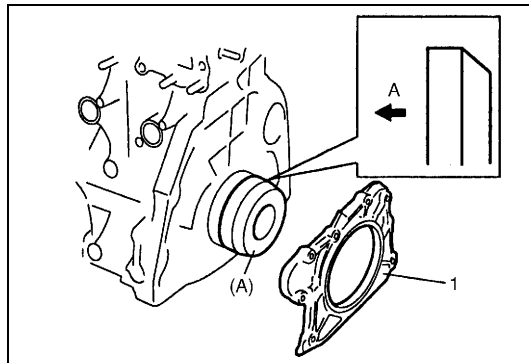
8) Apply sealant to mating surface of rear oil seal housing (1).

"A": Sealant 99000-31250

Sealant amount for rear oil seal housing

Width "a": 3 mm (0.12 in.)

Height "b": 2 mm (0.08 in.)



9) Install rear oil seal housing (1) and tighten bolts to specified torque by using special tool.

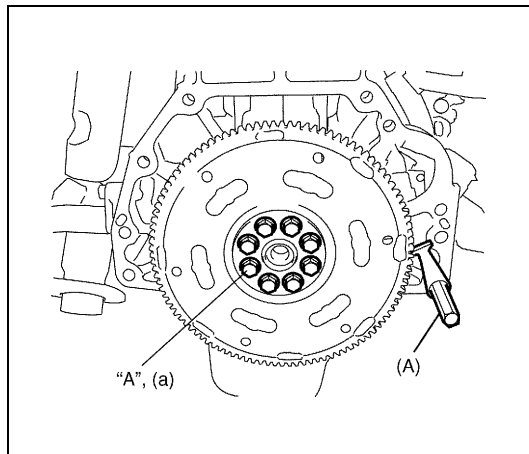
Special tool

(A): 09911-97720

Tightening torque

Rear oil seal bolt: 11 N·m (1.1 kg-m, 8.0 lb-ft)

A: Crankshaft side



10) Install flywheel ((for M/T) or drive plate (for A/T)).

Using special tool, lock flywheel or drive plate, and tighten flywheel or drive plate bolts to specified torque.

NOTE:

Use new flywheel or drive plate bolts.

Special tool

(A): 09924-17810

Tightening torque

Flywheel or drive plate bolt

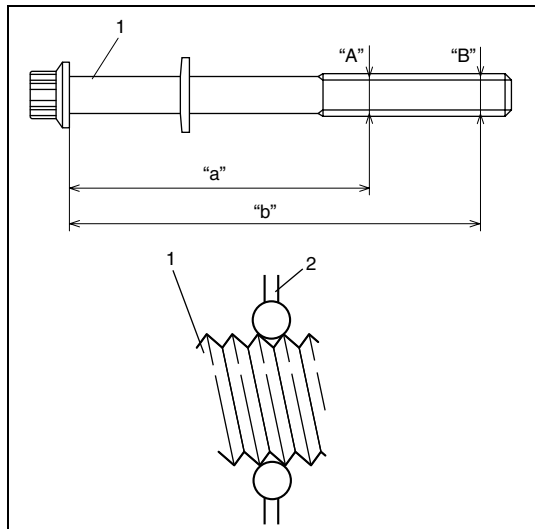
(a): 70 N·m (7.0 kg-m, 51.0 lb-ft)

11) Install piston and connecting rod referring to "Pistons, Piston Rings, Connecting Rods and Cylinders Removal and Installation" in this section.

12) Install engine assembly to vehicle referring to "Engine Assembly Removal and Installation" in this section.

Main Bearings, Crankshaft and Cylinder Block Inspection

Main bearing cap No.1 bolt



Measure each thread diameter main bearing cap No.1 bolts (1) at "A" on 60mm(2.36in.) from seat side of flange bolt and "B" on 90mm(3.54in.) from seat side of flange bolt by using a micrometer (2).

Calculate difference in diameters ("A" – "B").

If it exceeds limit, replace with new one.

Main bearing cap No.1 bolt diameter measurement points

"a": 60mm (2.36in.)

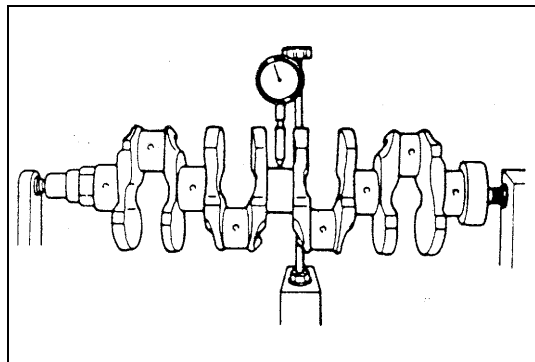
"b": 90mm (3.54in.)

Main bearing cap No.1 bolt diameter difference

Limit ("A" – "B"): 0.2mm (0.008in.)

Crankshaft

Crankshaft runout

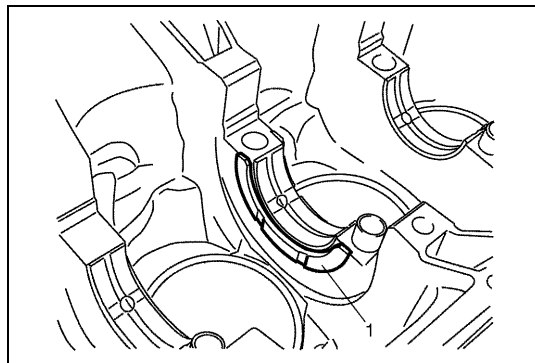


Using a dial gauge, measure runout at center journal. Rotate crankshaft slowly. If runout exceeds its limit, replace crankshaft.

Crankshaft runout

Limit: 0.02 mm (0.0008 in.)

Crankshaft thrust play

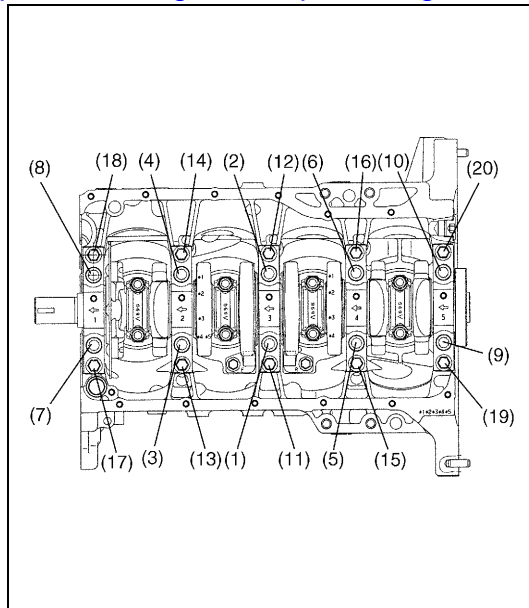


- 1) Measure this play with crankshaft set in cylinder block in the normal manner, that is with thrust bearing (1) and journal bearing caps installed.

Thickness of crankshaft thrust bearing

Standard: 2.500 mm (0.0984 in.)

Oversize (0.125 mm (0.0049 in.)): 2.563 mm (0.1009 in.)



- 2) Tighten main bearing cap No.1 bolts (1) – (10) and main bearing cap No.2 bolts (11) – (20) gradually as follows.
 - a) Tighten bolts (1) – (10) to 30 N·m (3.0 kg·m, 22.0 lb·ft) according to numerical order in figure.
 - b) In the same manner as in Step 1), tighten them to 50 N·m (5.0 kg·m, 36.5 lb·ft).
 - c) In the same manner as in step 1), retighten them to 60°.
 - d) Tighten bolts (11) – (20) to 25 N·m (2.5 kg·m, 18.0 lb·ft) according to numerical order in figure.

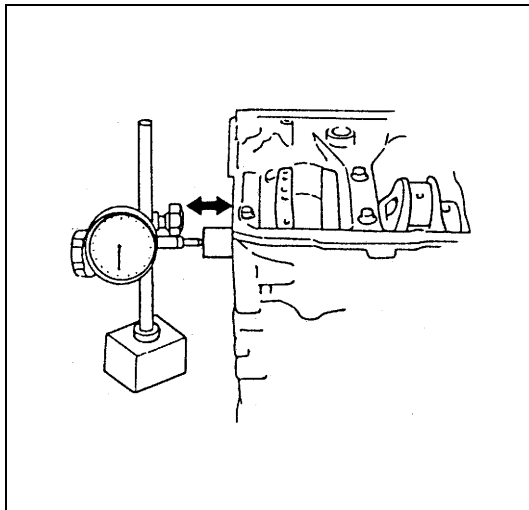
Tightening torque

Main bearing cap No.1 bolt (1) – (10)

: Tighten 30 N·m (3.0 kg·m, 22.0 lb·ft), 50 N·m (5.0 kg·m, 36.5 lb·ft) and 60° by the specified procedure.

Main bearing cap No.2 bolt (11) – (20)

: Tighten 25 N·m (2.5 kg·m, 18.0 lb·ft) by the specified procedure.



- 3) Use a dial gauge to read displacement in axial (thrust) direction of crankshaft.
If its limit is exceeded, replace thrust bearing with new standard one or oversize one to obtain standard thrust play.

Crankshaft thrust play

Standard: 0.11 – 0.31 mm (0.0043 – 0.0122 in.)

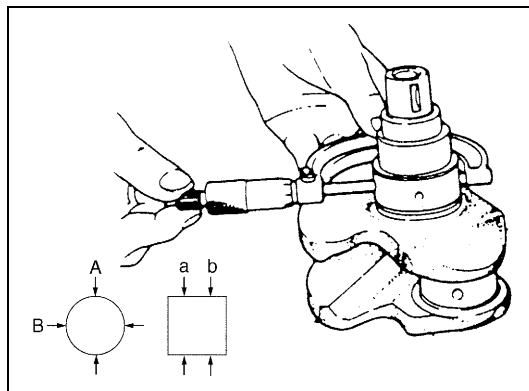
Limit: 0.35 mm (0.0138 in.)

NOTE:

After checking the thrust play, make sure that thread deformation of each main bearing cap No.1 bolt referring to “Main Bearing Cap No.1 Bolt” in this section.

Out-of-round and taper (uneven wear) of journals

An unevenly worn crankshaft journal shows up as a difference in diameter at a cross section or along its length (or both). This difference, if any, is determined by taking micrometer readings. If any one of journals is badly damaged or if amount of uneven wear in the sense explained below exceeds its limit, regrind or replace crankshaft.



Crankshaft out-of-round and taper

Limit: 0.01 mm (0.0004 in.)

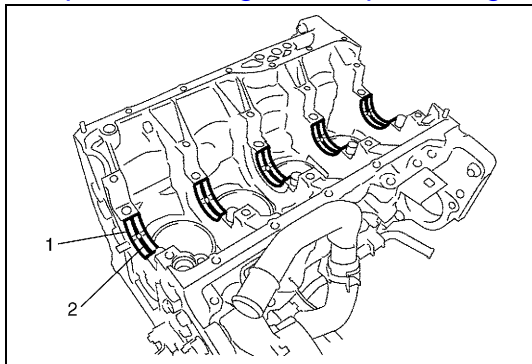
Out-of-round: A – B

Taper: a – b

Main bearings

General information

- Service main bearings are available in standard size and 0.25 mm (0.0098 in.) undersize, and each of them has 5 kinds of bearings differing in tolerance.



- Upper half of bearing (1) has an oil groove (2) as shown in figure.
Install this half with oil groove to cylinder block.
- Lower half of bearing does not have an oil groove.

Visual inspection

Check bearings for pitting, scratches, wear or damage.

If any malcondition is found, replace both upper and lower halves.
Never replace either half without replacing the other half.

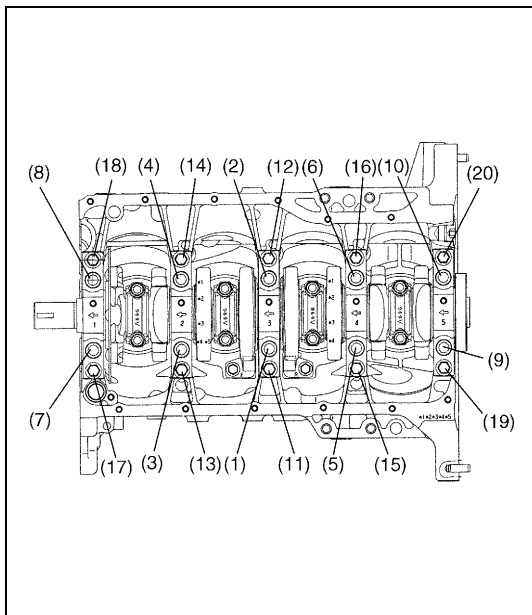
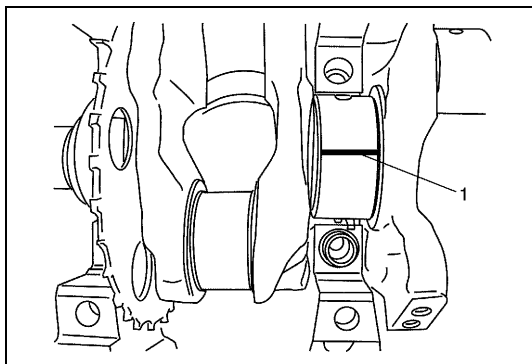
Main bearing clearance

CAUTION:

Do not rotate crankshaft while gaging plastic is installed.

Check clearance by using gaging plastic according to the following procedure.

- 1) Remove bearing caps.
- 2) Clean bearings and main journals.
- 3) Place a piece of gaging plastic (1) the full width of bearing (parallel to crankshaft) on journal, avoiding oil hole.



- 4) Tighten main bearing cap No.1 bolts (1) – (10) and main bearing No.2 cap bolts (11) – (20) gradually as follows.
 - a) Tighten bolts (1) – (10) to 30 N·m (3.0 kg-m, 22.0 lb-ft) according to numerical order in figure.
 - b) In the same manner as in Step a), tighten them to 50 N·m (5.0 kg-m, 36.5 lb-ft).
 - c) In the same manner as in step a), retighten them to 60°.
 - d) Tighten bolts (11) – (20) to 25 N·m (2.5 kg-m, 18.0 lb-ft) according to numerical order in figure.

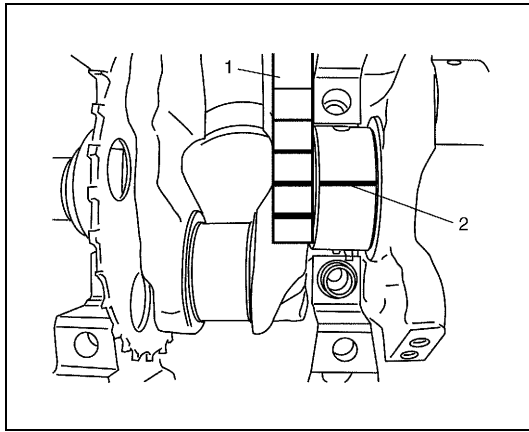
Tightening torque

Main bearing cap No.1 bolt (1) – (10)

: Tighten 30 N·m (3.0 kg-m, 22.0 lb-ft), 50 N·m (5.0 kg-m, 36.5 lb-ft) and 60° by the specified procedure.

Main bearing cap No.2 bolt (11) – (20)

: Tighten 25 N·m (2.5 kg-m, 18.0 lb-ft) by the specified procedure.



- 5) Remove bearing caps and using scale (1) on gaging plastic (2) envelop, measure gaging plastic width at its widest point. If clearance exceeds its limit, replace bearing. Always replace both upper and lower inserts as a unit.

A new standard bearing may produce proper clearance. If not, it will be necessary to regrind crankshaft journal for use of 0.25 mm (0.0098 in.) undersize bearing.

After selecting new bearing, recheck clearance.

Main bearing clearance

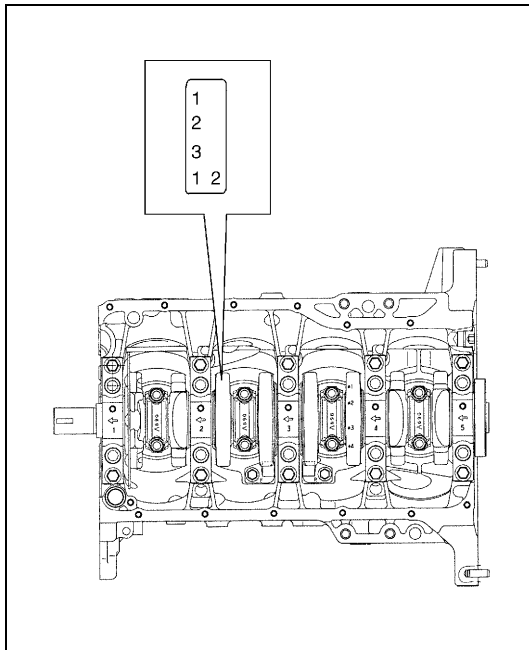
Standard: 0.025 – 0.045 mm (0.0010 – 0.0017 in.)

Limit: 0.058 mm (0.0023 in.)

Selection of main bearings

Standard bearing

If bearing is in malcondition, or bearing clearance is out of specification, select a new standard bearing according to the following procedure and install it.



- 1) First check journal diameter. As shown in figure, crank web No.2 has stamped numbers.

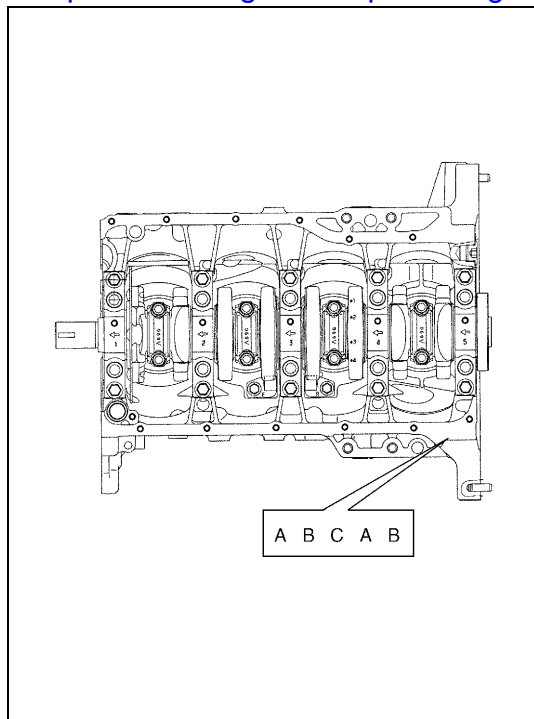
Three kinds of numbers ("1", "2" and "3") represent the following journal diameters.

Stamped numbers on crank web No.2 represent journal diameters marked with an arrow in figure respectively.

For example, stamped number "1" indicates that corresponding journal diameter is 44.9940 – 45.0000 mm (1.7715 – 1.7716 in.).

Crankshaft journal diameter

Stamped numbers	Journal diameter
1	44.9940 – 45.0000 mm (1.7715 – 1.7716 in.)
2	44.9880 – 44.9939 mm (1.7712 – 1.7714 in.)
3	44.9820 – 44.9879 mm (1.7710 – 1.7711 in.)



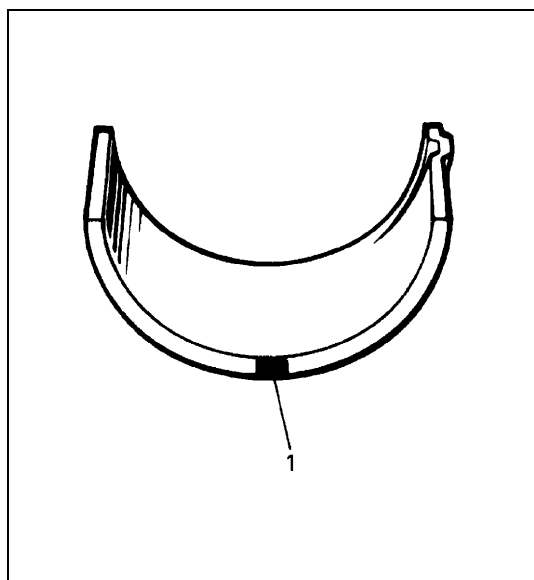
- 2) Next, check bearing cap bore diameter without bearing. On mating surface of cylinder block, five alphabets are stamped as shown in figure.

Three kinds of alphabets ("A", "B" and "C") or numbers ("1", "2" and "3") represent the following cap bore diameters.

Stamped alphabets or numbers on cylinder block represent bearing cap bore diameter marked with an arrow in figure respectively. For example, stamped "A" or "1" indicates that corresponding bearing cap bore diameter is 49.0000 – 49.0060 mm (1.9292 – 1.9293 in.).

Crankshaft bearing cap bore

Stamped alphabet (number)	Bearing cap bore diameter (without bearing)
A (1)	49.0000 – 49.0060 mm (1.9292 – 1.9293 in.)
B (2)	49.0061 – 49.0120 mm (1.9294 – 1.9296 in.)
C (3)	49.0121 – 49.0180 mm (1.9297 – 1.9298 in.)



- 3) There are five kinds of standard bearings differing in thickness. To distinguish them, they are painted in the following colors at the position as indicated in figure.

Each color indicated the following thickness at the center of bearing.

Standard size of crankshaft main bearing thickness

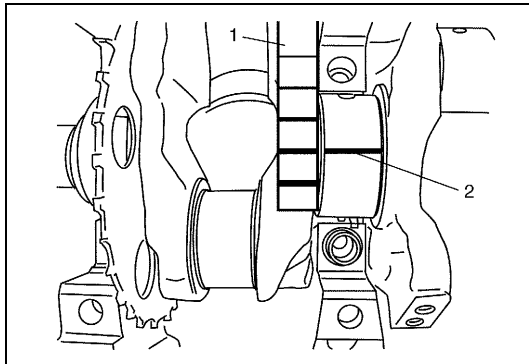
Color painted	Bearing thickness
Pink	1.990 – 1.994 mm (0.0784 – 0.0785 in.)
Purple	1.993 – 1.997 mm (0.0785 – 0.0786 in.)
Brown	1.996 – 2.000 mm (0.0786 – 0.0787 in.)
Green	1.999 – 2.003 mm (0.0787 – 0.0788 in.)
Black	2.002 – 2.006 mm (0.0789 – 0.0789 in.)

1. Paint

- 4) From number stamped on crank web No.2 and alphabets stamped on cylinder block, determine new standard bearing to be installed to journal, by referring to table shown below. For example, if number stamped on crank web No.2 is "1" and alphabet stamped on cylinder block is "B", install a new standard bearing painted in "Purple" to its journal.

Specification of new standard crankshaft main bearing size

		Number stamped on crank web No.2 (Journal diameter)		
		1	2	3
Alphabet stamped on cylinder block (Cap bore dia.)	A (1)	Pink	Purple	Brown
	B (2)	Purple	Brown	Green
	C (3)	Brown	Green	Black
		New standard bearing to be installed.		



- 5) Using scale (1) on gaging plastic (2), check bearing clearance with newly selected standard bearing.
If clearance still exceeds its limit, use next thicker bearing and recheck clearance.
- 6) When replacing crankshaft or cylinder block due to any reason, select new standard bearings to be installed by referring to number stamped on new crankshaft or alphabets stamped on new cylinder block.

Undersize bearing (0.25 mm (0.0098 in.))

- 0.25 mm (0.0098 in.) undersize bearing is available, in five kinds varying in thickness.
To distinguish them, each bearing is painted in the following colors at such position as indicated in figure.
Each color represents the following thickness at the center of bearing.

Undersize of crankshaft main bearing thickness

Color painted	Bearing thickness
Red and Pink	2.115 – 2.119 mm (0.08327 – 0.08342 in.)
Red and Purple	2.118 – 2.122 mm (0.08339 – 0.08354 in.)
Red and Brown	2.121 – 2.125 mm (0.08351 – 0.08366 in.)
Red and Green	2.124 – 2.128 mm (0.08363 – 0.08377 in.)
Red and Black	2.127 – 2.131 mm (0.08374 – 0.08389 in.)

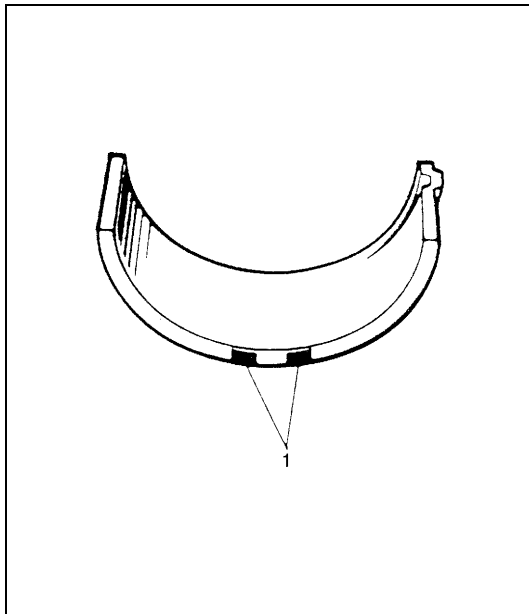
1. Paint

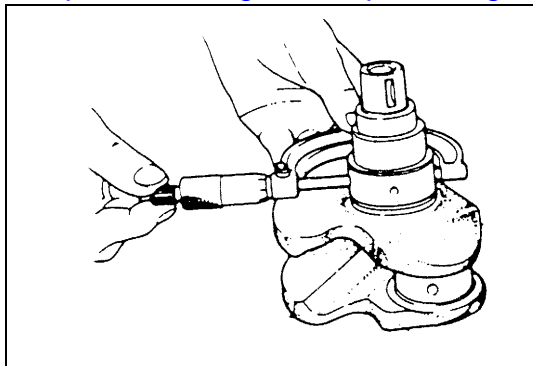
- If necessary, regrind crankshaft journal and select undersize bearing to use with it as follows.

- 1) Regrind journal to the following finished diameter.

Finished diameter

44.732 – 44.750 mm (1.7611 – 1.7618 in.)



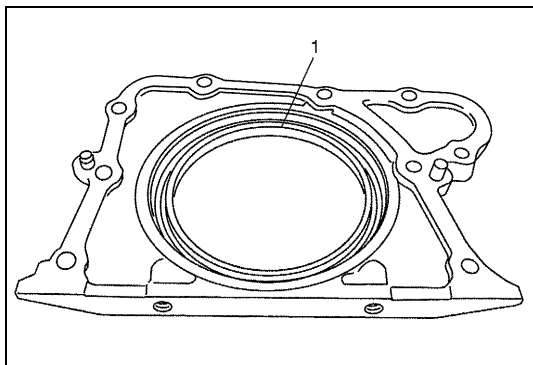


- 2) Using micrometer, measure reground journal diameter. Measurement should be taken in two directions perpendicular to each other in order to check for out-of-round.
- 3) Using journal diameter measured above and alphabets stamped on cylinder block, select an undersize bearing by referring to table given below. Check bearing clearance with newly selected undersize bearing.

Specification of new standard undersize crankshaft main bearing

		Measured journal diameter		
		44.7440 – 44.7500 mm (1.7616 – 1.7618 in.)	44.7380 – 44.7439 mm (1.7614 – 1.7615 in.)	44.7320 – 44.7379 mm (1.7611 – 1.7613 in.)
Alphabets stamped on cylinder block	A (1)	Red and Pink	Red and Purple	Red and Brown
	B (2)	Red and Purple	Red and Brown	Red and Green
	C (3)	Red and Brown	Red and Green	Red and Black
		Undersize bearing to be installed		

Rear oil seal



Carefully inspect oil seal (1) for wear or damage. If its lip is worn or damaged, replace it.

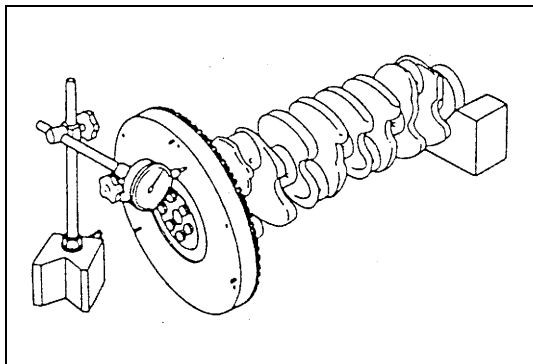
Flywheel

Visual inspection

- If ring gear is damaged, cracked or worn, replace flywheel.
- If the surface contacting clutch disc is damaged, or excessively worn, replace flywheel.

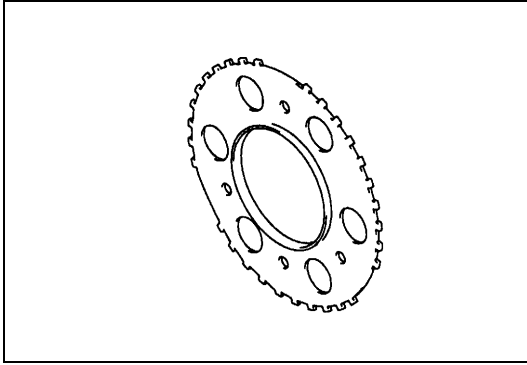
Flywheel face runout

Check flywheel face runout with a dial gauge. If runout exceeds its limit, replace flywheel.

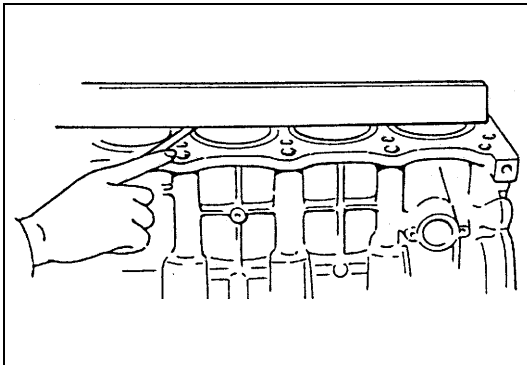


Flywheel face runout

Limit: 0.2 mm (0.0079 in.)

Sensor plate

Check sensor plate for crack or damage. If malfunction is found, replace it.

Cylinder block**Distortion of gasketed surface**

Using straightedge and thickness gauge, check gasketed surface for distortion and, if flatness exceeds its limit, correct it.

Cylinder block flatness

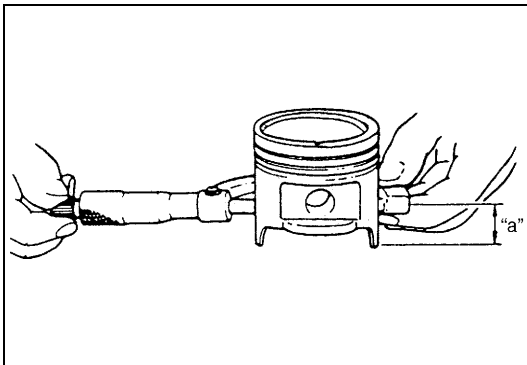
Limit: 0.03 mm (0.0012 in.)

Honing or reboring cylinders

- 1) When any cylinder needs reboring, all other cylinders must also be rebored at the same time.
- 2) Select oversized piston according to amount of cylinder wear.

Oversize piston diameter

Size	Piston diameter
Oversize 0.50	78.453 – 78.468 mm (3.0887 – 3.0892 in.)



- 3) Using micrometer, measure piston diameter.

Measurement position for piston diameter

"a": 19.5 mm (0.77 in.)

- 4) Rebore and hone cylinder to the following dimension.

Cylinder bore diameter to be rebored

Oversize 0.50: 78.500 – 78.514 mm (3.0906 – 3.0911 in.)

NOTE:

Before reboring, install all main bearing caps in place and tighten to specification to avoid distortion of bearing bores.

- 5) Measure piston clearance after honing.

Piston clearance: 0.032 – 0.061 mm (0.0013 – 0.0024 in.)

Required Service Material

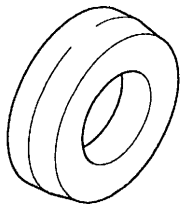
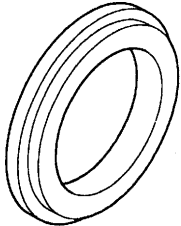
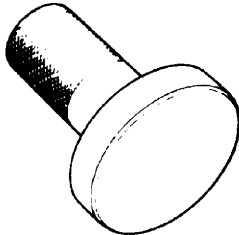
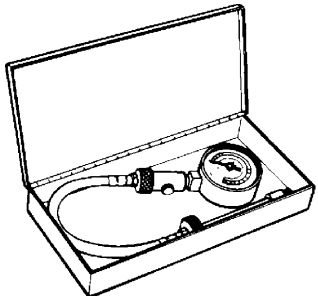
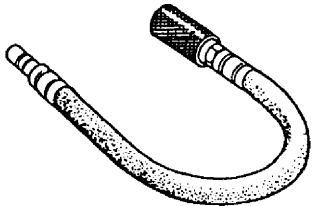
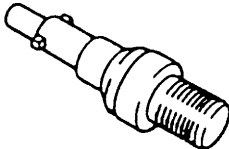
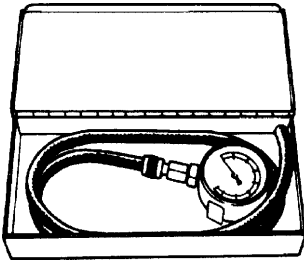
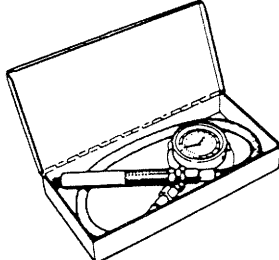
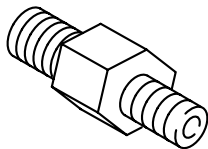
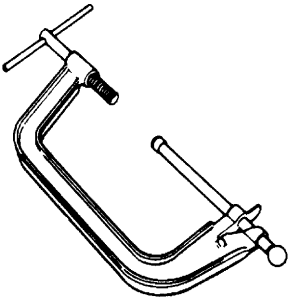
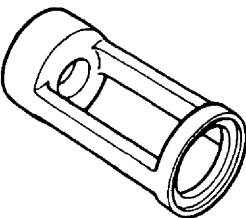
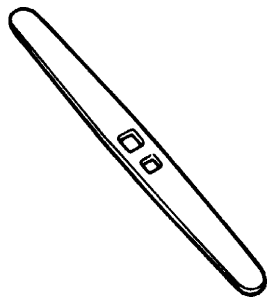
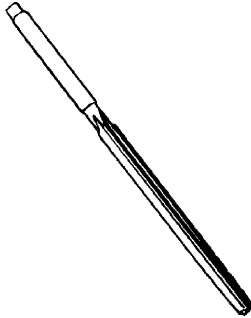
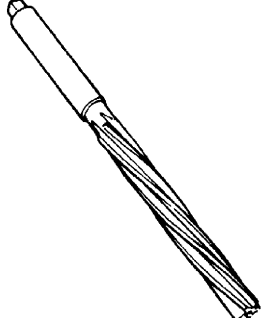
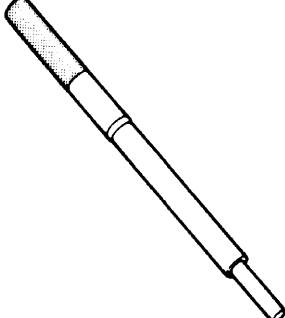
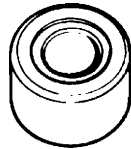
Material	Recommended SUZUKI product (Part Number)	Use
Sealant	SUZUKI BOND NO. 1207F (99000-31250)	<ul style="list-style-type: none"> To apply to mating surfaces of cylinder block and oil pan. To apply to mating surfaces of cylinder block and timing chain cover. To apply to sealing surfaces of cylinder head cover. To apply to mating surfaces to rear oil seal housing.
	SUZUKI BOND NO. 1207B (99000-31140)	<ul style="list-style-type: none"> To apply to mating surface of cylinder block, cylinder head and timing chain cover.
	SUZUKI BOND NO. 1215 (99000-31110)	<ul style="list-style-type: none"> To apply to the thread of the bolt of water outlet pipe.

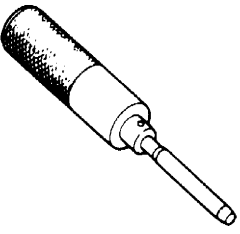
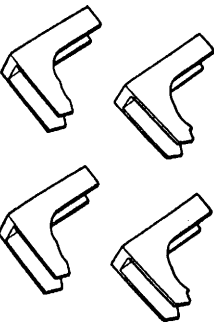
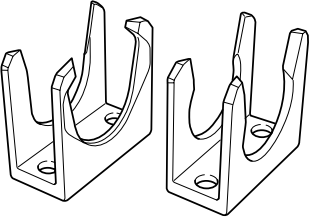
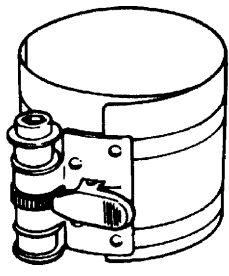
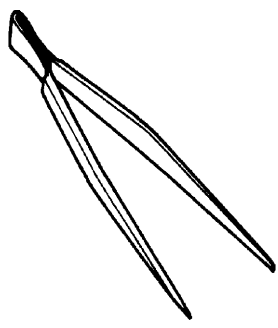
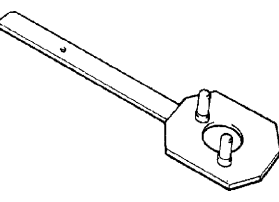

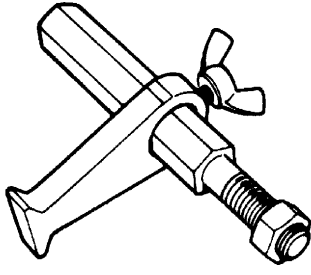
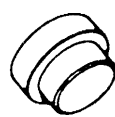
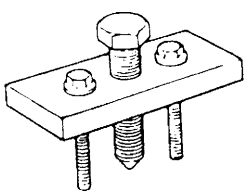
Tightening Torque Specification

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Oil pressure switch	14	1.4	10.5
Camshaft housing bolt (for tightening of special tool)	11	1.1	8.0
Camshaft housing bolt	Tighten 11 N·m (1.1 kg-m, 8.0 lb-ft) by the specified procedure.		
Cylinder head cover bolt	Tighten 5.0 N·m (0.5 kg-m, 3.5 lb-ft), 7.5 N·m (0.75 kg-m, 5.5 lb-ft) by the specified procedure.		
Intake manifold bolt and nut	25	2.5	18.0
Throttle body mounting bolt	25	2.5	18.0
MAF sensor bolt	2.5	0.25	2.0
VSV bracket bolt	5	0.5	3.5
Exhaust manifold bolt and nut	50	5.0	36.5
Exhaust pipe No.1 bolt	50	5.0	36.5
Exhaust manifold stiffener bolt	50	5.0	36.5
Exhaust pipe No.2 bolt	43	4.3	31.5
Exhaust oxygen sensor	45	4.5	32.5
Oil pump strainer bolt	11	1.1	8.0
Oil pump strainer bracket bolt	11	1.1	8.0
Oil pan bolt and nut	11	1.1	8.0
Oil pan drain plug bolt	50	5.0	36.5
Timing chain cover mounting bolt	25	2.5	18.0
Timing chain cover mounting nut	25	2.5	18.0
Crank shaft pulley bolt	150	15.0	108.5
Oil pump rotor plate bolt	11	1.1	8.0
Timing chain guide bolt	11	1.1	8.0
Tensioner adjuster bolt	11	1.1	8.0
Venturi plug	5	0.5	3.5
Cylinder head bolt for M8	25	2.5	18.0

Fastening part	Tightening torque		
	N·m	kg·m	lb·ft
Cylinder head bolt for M10	Tighten 20 N·m (2.0 kg·m, 14.5 lb·ft), 40 N·m (4.0 kg·m, 29.0 lb·ft), 60° and 60° by the specified procedure.		
Bearing cap nut	Tighten 15 N·m (1.5 kg·m, 11.0 lb·ft), 45° and 45° by the specified procedure.		
Engine mounting bolt for M8	25	2.5	18.0
Engine mounting bolt and nut for M10	55	5.5	40.0
Engine right mounting nut	65	6.5	47.0
Main bearing cap No.1 bolt	Tighten 30 N·m (3.0 kg·m, 22.0 lb·ft), 50 N·m (5.0 kg·m, 36.5 lb·ft) and 60° by the specified procedure.		
Main bearing cap No.2 bolt	Tighten 25 N·m (2.5 kg·m, 18.0 lb·ft) by the specified procedure.		
Sensor plate bolt	11	1.1	8.0
Rear oil seal housing bolt	11	1.1	8.0
Flywheel mounting bolt	70	7.0	51.0
Oil filter adapter bolt	25	2.5	18.0
Clutch housing lower plate bolt	50	5.0	36.5
Timing chain tensioner bolt	25	2.5	18.0
Oil gallery pipe No.1 bolt	30	3.0	21.5
Oil gallery pipe No.2 bolt	11	1.1	8.0
Oil gallery pipe No.3 bolt	11	1.1	8.0
Oil control valve mounting nut	11	1.1	8.0
Water outlet cap bolt	25	2.5	18.0
Intake camshaft sprocket bolt	60	6.0	43.0

Special Tool

			
09911-97720 Oil seal guide	09911-97820 Oil seal installer	09913-75810 Bearing installer	09915-64512 Compression gauge
			
09915-64530 Hose	09915-67010 Attachment	09915-67311 Vacuum gauge	09915-77310 Oil pressure gauge
			
09915-78211 Oil pressure gauge attachment	09916-14510 Valve lifer	09916-14521 Valve lifer attachment	09916-34542 Reamer handle
			
09916-34550 Reamer (5.5 mm)	09916-37320 Reamer (10.5 mm)	09916-44910 Valve guide remover	09916-56011 Valve guide installer

 <p>09916-58210 Valve guide installer handle</p>	<p>[A]</p>  <p>09916-67020 Tappet holder See NOTE below</p>	<p>[B]</p>  <p>09916-67021 Tappet holder</p>	 <p>09916-77310 Piston ring compressor</p>
 <p>09916-84511 Forceps</p>	 <p>09917-68221 Camshaft lock holder</p>	 <p>09917-98221 Valve stem seal installer</p>	 <p>09924-17810 Flywheel holder</p>
 <p>09926-58010 Bearing puller attachment</p>	 <p>09944-36011 Steering wheel remover</p>		

NOTE:

[A] and [B] tools in the above table are interchangeable.

SECTION 6B2**ENGINE COOLING (M13 ENGINE)****CONTENTS**

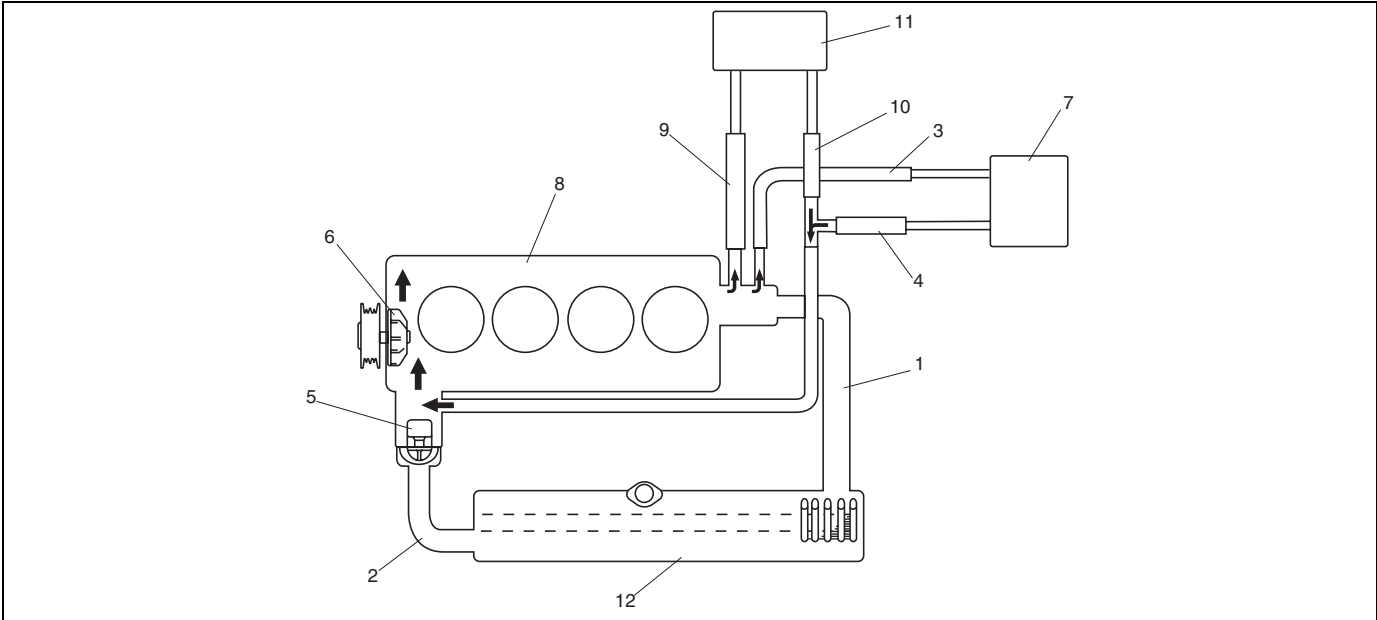
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General Description

The cooling system consists of the radiator cap, radiator, coolant reservoir, hoses, water pump, cooling fan and thermostat. The radiator is tube-and-fin type one.

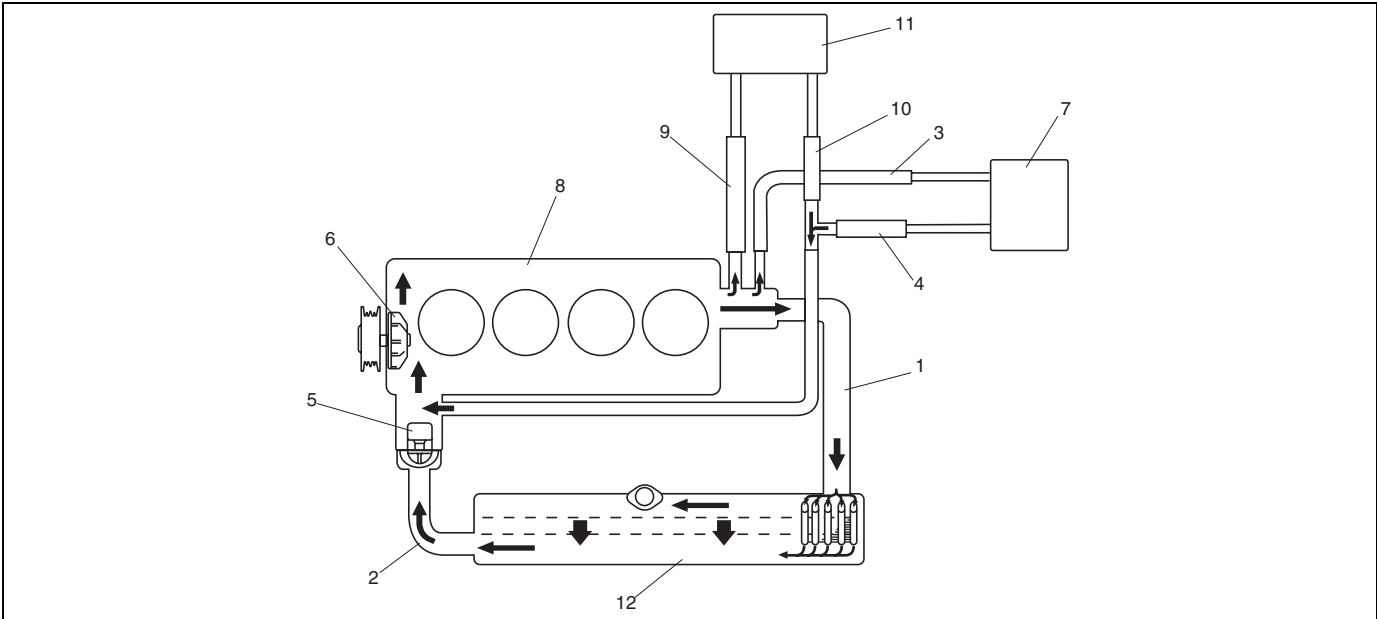
Cooling System Circulation

While the engine is warmed up (thermostat closed), coolant circulates as follows.



1. Radiator inlet hose	5. Thermostat	9. Heater core inlet hose
2. Radiator outlet hose	6. Water pump	10. Heater core outlet hose
3. Throttle body inlet hose	7. Throttle body	11. Heater core
4. Throttle body outlet hose	8. Engine	12. Radiator

When coolant is warmed up to normal temperature and the thermostat opens, coolant passes through the radiator core to be cooled as follows.



1. Radiator inlet hose	5. Thermostat	9. Heater core inlet hose
2. Radiator outlet hose	6. Water pump	10. Heater core outlet hose
3. Throttle body inlet hose	7. Throttle body	11. Heater core
4. Throttle body outlet hose	8. Engine	12. Radiator

Coolant

The coolant recovery system is standard. The coolant in the radiator expands with heat, and the coolant is overflowed to the reservoir.

When the system cools down, the coolant is drawn back into the radiator.

The cooling system has been filled with a quality coolant that is a 50/50 mixture of water and ethylene glycol antifreeze.

This 50/50 mixture coolant solution provides freezing protection to -36°C (-33°F).

- Maintain cooling system freeze protection at -36°C (-33°F) to ensure protection against corrosion and loss of coolant from boiling. This should be done even if freezing temperatures are not expected.
- Add ethylene glycol base coolant when coolant has to be added because of coolant loss or to provide added protection against freezing at temperature lower than -36°C (-33°F).

NOTE:

- Alcohol or methanol base coolant or plain water alone should not be used in cooling system at any time as damage to cooling system could occur.
- Coolant must be mixed with demineralized water or distilled water.

Anti-freeze proportioning table

		For M/T model	For A/T model
Freezing temperature	$^{\circ}\text{C}$	-36	-36
	$^{\circ}\text{F}$	-33	-33
Anti-freeze/Anti-corrosion coolant concentration	%	50	50
Ratio of compound to cooling water	ltr.	2.80/2.80	2.70/2.70
	US pt.	5.97/5.97	5.76/5.76
	Imp pt.	4.93/4.93	4.75/4.75

Coolant capacity

	For M/T model	For A/T model
Engine radiator and heater	5.0 liters (10.67/8.80 US/Imp. pt.)	4.8 liters (10.24/8.45 US/Imp. pt.)
Reservoir	0.6 liters (1.28/1.06 US/Imp. pt.)	0.6 liters (1.28/1.06 US/Imp. pt.)
Total	5.6 liters (11.94/9.86 US/Imp. pt.)	5.4 liters (11.52/9.51 US/Imp. pt.)

Diagnosis

Diagnosis Table

Condition	Possible Cause	Correction
Engine overheats (It is in case that radiator fan operates)	Loose or broken water pump belt	Adjust or replace.
	Not enough coolant	Check coolant level and add as necessary.
	Faulty thermostat	Replace.
	Faulty water pump	Replace.
	Dirty or bent radiator fins	Clean or remedy.
	Coolant leakage on cooling system	Repair.
	Clogged radiator	Check and replace radiator as necessary.
	Faulty radiator cap	Replace.
	Improper ignition timing	Adjust.
	Dragging brakes	Adjust brake.
	Slipping clutch	Adjust or replace.
	Poor charge battery	Check and replace as necessary.
	Poor generation generator	Check and repair.
	Wiring or grounding faulty	Repair and necessary.
	Equipped with too much electric load part(s)	Dismount.
	Radiator cooling fan motor faulty	Check and replace as necessary.
Engine overheats (It is in case that radiator fan won't operate)	Fuse blown	Check 30A fuse of relay/fuse box and check for short circuit to ground.
	Radiator cooling fan relay faulty	Check and replace as necessary.
	ECT sensor faulty	Check and replace as necessary.
	Radiator cooling fan motor faulty	Check and replace as necessary.
	Wiring or grounding faulty	Repair as necessary
	ECM faulty	Check and replace as necessary.

System Circuit Inspection

Refer to "Table B-7 Radiator Fan Control System Check" in Section 6-2

Maintenance

WARNING:

- Do not remove radiator cap to check engine coolant level; check coolant visually at the see-through coolant reservoir.
Coolant should be added only to reservoir as necessary.
- As long as there is pressure in the cooling system, the temperature can be considerably higher than the boiling temperature of the solution in the radiator without causing the solution to boil. Removal of the radiator cap while engine is hot and pressure is high will cause the solution to boil instantaneously and possibly with explosive force, spewing the solution over engine, fenders and person removing cap. If the solution contains flammable anti-freeze such as alcohol (not recommended for use at any time), there is also the possibility of causing a serious fire.

Coolant Level Check

WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure radiator cap is taken off too soon.

To check level, lift hood and look at “see-through” coolant reservoir.

It is not necessary to remove radiator cap to check coolant level.

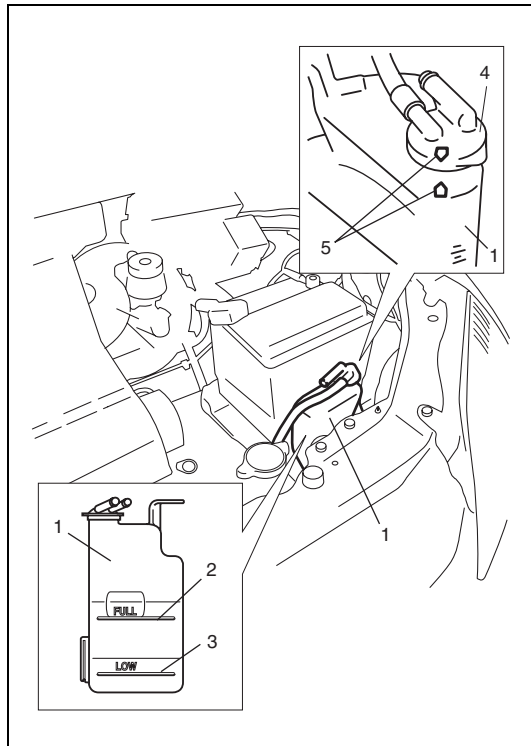
When engine is cool, check coolant level in reservoir (1).

A normal coolant level should be between “FULL” mark (2) and “LOW” mark (3) on reservoir (1).

If coolant level is below “LOW” mark (3), remove reservoir cap (4) and add proper coolant to reservoir to bring coolant level up to “FULL” mark (2). Then, reinstall cap (4) and align match marks (5) on reservoir and cap (4).

NOTE:

- If proper quality antifreeze is used, there is no need to add extra inhibitors or additives that claim to improve system.
They may be harmful to proper operation of system, and are unnecessary expense.
- When installing reservoir cap, align arrow marks (5) on reservoir and cap (4).

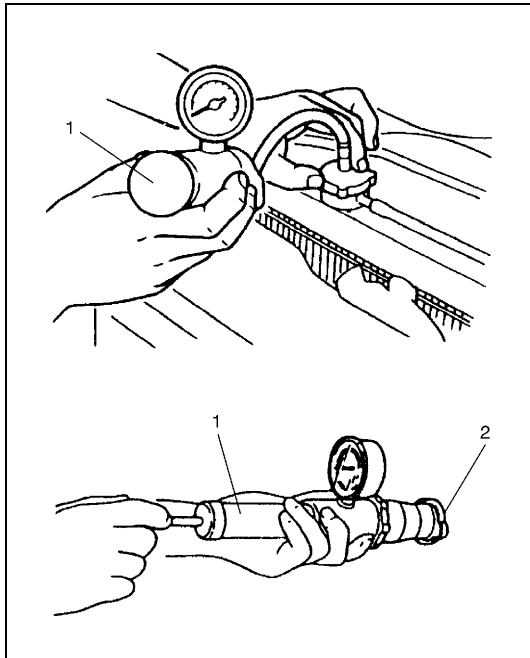


Engine Cooling System Inspection and Service

WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

- 1) Check cooling system for leakage or damage.
- 2) Wash radiator cap and filler neck with clean water by removing radiator cap when engine is cold.
- 3) Check coolant for proper level and freeze protection.
- 4) Using a pressure tester (1), check system and radiator cap (2) for proper pressure holding capacity.
If replacement of cap is required, use a proper cap for this vehicle.



Cooling system and radiator cap holding pressure (for inspection)

: 110 kPa (1.1 kg/cm², 15.6 psi)

NOTE:

After installing radiator cap to radiator, make sure that the ear of cap lines is parallel to radiator.

- 5) Tighten hose clamps and inspect all hoses. Replace hoses whenever cracked, swollen or otherwise deteriorated.
- 6) Clean frontal area of radiator core.

Cooling System Flush and Refill

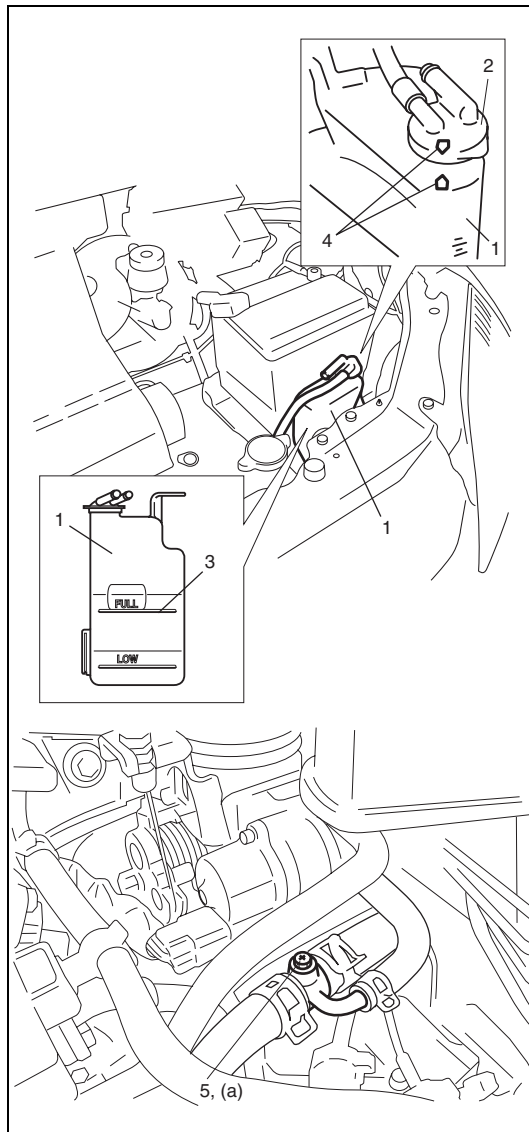
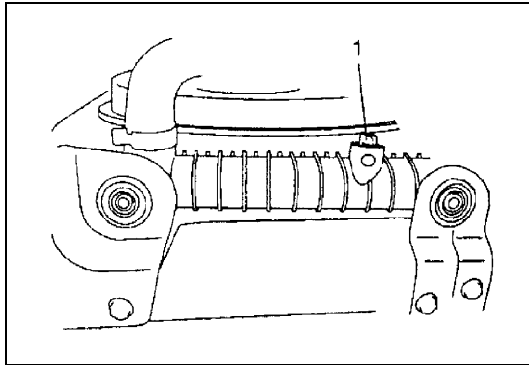
WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

NOTE:

For detail of coolant specification, refer to "Coolant" in this section.

- 1) Remove radiator cap when engine is cool as follows.
 - a) Turn cap counterclockwise slowly until it reaches a "stop". (Do not press down while turning it).
 - b) Wait until pressure is relieved (indicated by a hissing sound) then press down on cap and continue to turn it counterclockwise.



- 2) With radiator cap removed, run engine until upper radiator hose is hot (this shows that thermostat is open and coolant is flowing through system).
- 3) Stop engine and drain coolant from radiator drain plug (1).
- 4) Close radiator drain plug (1). Add water until system is filled and run engine until upper radiator hose is hot again.
- 5) Repeat Steps 3) and 4) several times until drained liquid is nearly colorless.
- 6) Close radiator drain plug (1) tightly.

- 7) Remove reservoir (1), and remove cap (2) from reservoir (1).
- 8) Pour out any fluid, scrub and clean inside of reservoir with soap and water.
Flush it well with clean water and drain. Reinstall reservoir.
- 9) Fill reservoir with coolant up to "Full" level mark (3).
- 10) Install reservoir cap (2) and align match marks (4) on reservoir and its cap.
- 11) Loosen air ventilation bolt (5) one and a half turns.
- 12) Fill radiator with coolant up to spilling coolant from air ventilation bolt (5).
- 13) Tighten air ventilation bolt (5) to specified torque.

Tightening torque

Air ventilation bolt (a): 4.5 N·m (0.45 kg-m, 3.5 lb-ft)

- 14) Fill radiator with coolant up to bottom of radiator filler neck and install radiator cap, making sure that the ear of cap lines is parallel to radiator.
- 15) Run engine at idle speed.
- 16) Loosen air ventilation bolt (5) one and a half turns.
- 17) Run engine at 2000-3000 rpm, and tighten air ventilation bolt (5) to specified torque after spilling coolant from air ventilation bolt (5).

Tightening torque

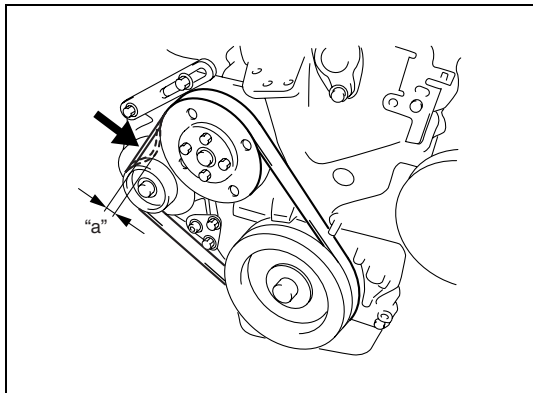
Air ventilation bolt (a): 4.5 N·m (0.45 kg-m, 3.5 lb-ft)

- 18) Run engine until radiator fan motor is operated.
- 19) Stop engine and wait until engine comes cooled down to help avoid danger of being burned.
- 20) Add coolant to radiator up to bottom of radiator filler neck, and install radiator cap, making sure that the ear of cap lines is parallel to radiator.
- 21) Repeat step 15) through 20).
- 22) Confirm that reservoir coolant level is "Full" level mark (3). If coolant is insufficient, repeat step 9) and 10).

Water Pump/Generator Drive Belt Tension Inspection and Adjustment

WARNING:

- Disconnect negative cable at battery before checking and adjusting belt tension.
- To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.



1) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If it is necessary to replace belt, refer to "Water Pump/Generator Drive Belt Removal and Installation" in this section.

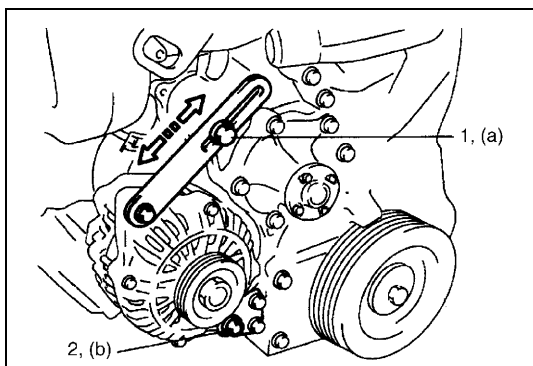
2) Check belt for tension. Belt is in proper tension when it deflects the following specification under thumb pressure (about 10 kg or 22 lb.).

Water pump / generator drive belt tension "a"

4.5 – 5.5 mm (0.18 – 0.22 in.) as deflection/10 kg (22 lbs)

NOTE:

When replacing belt with a new one, adjust belt tension to 3 – 4 mm (0.12 – 0.16 in.).



3) If belt is too tight or too loose, adjust it to proper tension by displacing generator position.

4) Tighten generator adjusting bolt (1) and pivot bolts (2) as specified torque.

Tightening torque

Generator adjusting bolt (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

Generator pivot bolt (b): 50 N·m (5.0 kg-m, 36.0 lb-ft)

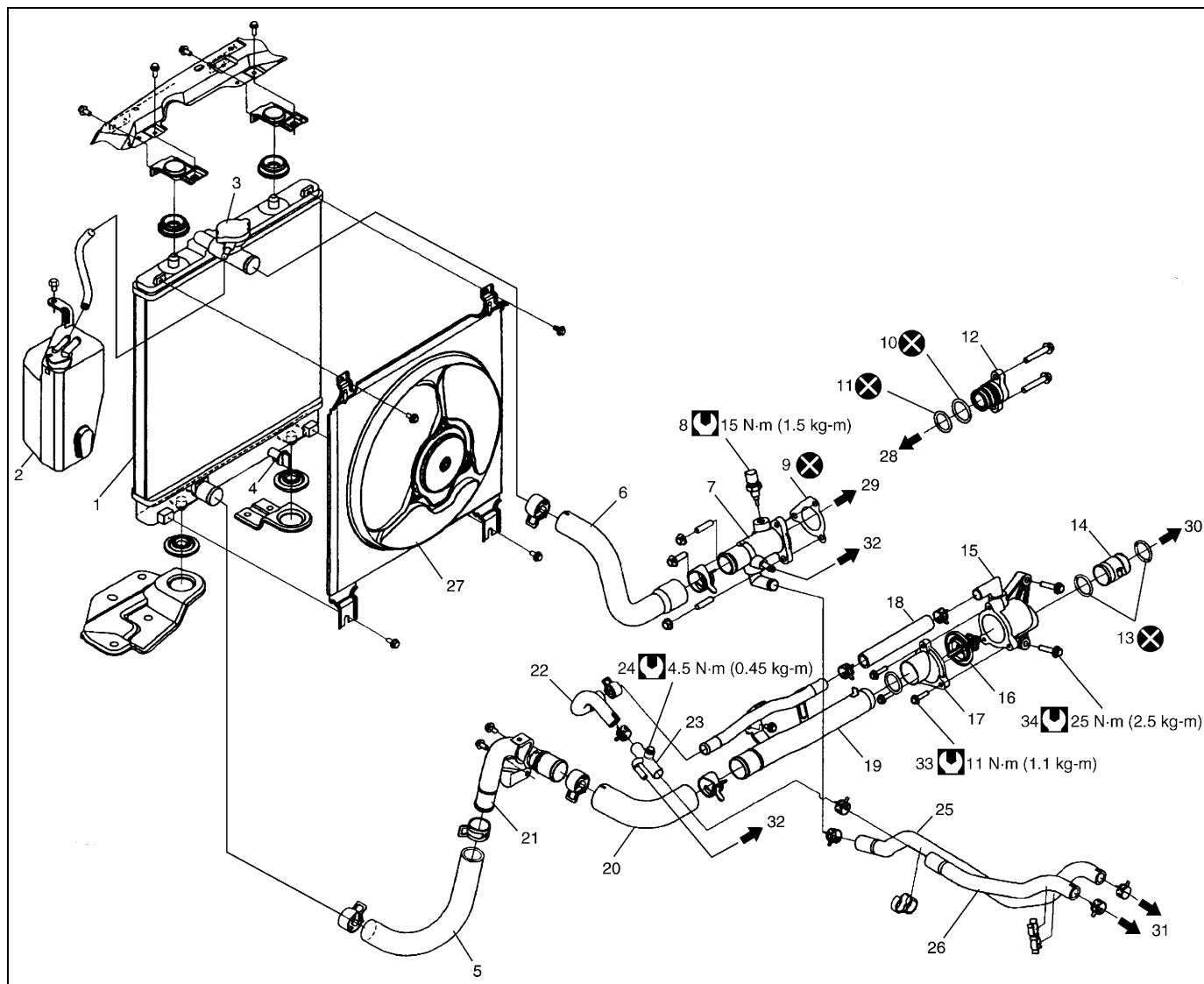
5) Connect negative cable at battery.

On-Vehicle Service

WARNING:

- Check to make sure that engine coolant temperature is cold before removing any part of cooling system.
- Also be sure to disconnect negative cord from battery terminal before removing any part.

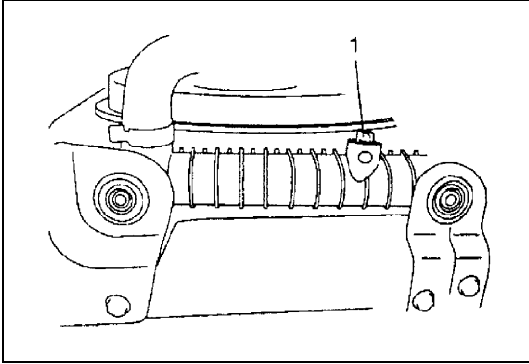
Cooling System Components



1. Radiator	13. O-ring	25. Heater core inlet hose
2. Reservoir	14. Thermostat case water outlet pipe	26. Heater core outlet hose
3. Radiator cap	15. Thermostat case	27. Radiator cooling fan assembly
4. Drain plug	16. Thermostat	28. To timing chain cover
5. Radiator outlet hose	17. Thermostat cap	29. To cylinder head
6. Radiator inlet hose	18. Water bypass hose	30. To water pump
7. Water outlet cap	19. Water inlet pipe No.1	31. To heater core
8. ECT sensor	20. Water inlet hose	32. To throttle body
9. Gasket	21. Water inlet pipe No.2	33. Thermostat cap bolt
10. Water outlet cap O-ring No.1	22. Heater outlet hose No.2	34. Thermostat case bolt
11. Water outlet cap O-ring No.2	23. Heater union	35. Tightening torque
12. Water outlet plug	24. Air ventilation bolt	36. Do not reuse.

Cooling System Draining

- 1) Remove radiator cap.
- 2) Drain coolant from radiator drain plug (1).
- 3) After draining coolant, be sure to tighten drain plug (1) securely.



Cooling System Refill

Refer to step 7) to 22) of “Cooling System Flush and Refill” in this section.

Cooling Water Pipes or Hoses

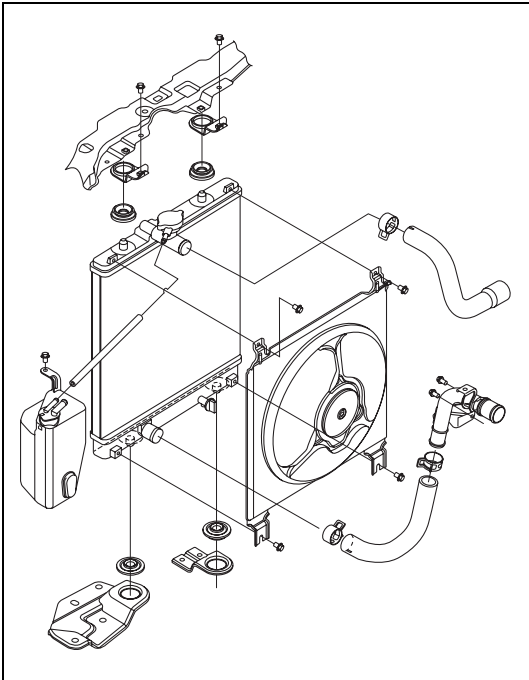
Removal

- 1) Drain coolant referring to “Cooling System Draining” in this section.
- 2) To remove these pipes or hoses, loosen clamp on each hose and pull hose end off.

Installation

Install removed parts in reverse order of removal procedure, noting the following.

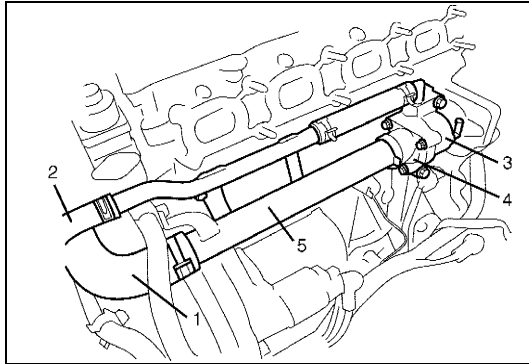
- Tighten each clamp securely.
- Refill cooling system referring to step 7) to 22) of “Cooling System Flash and Refill” in this section.



Thermostat Removal and Installation

Removal

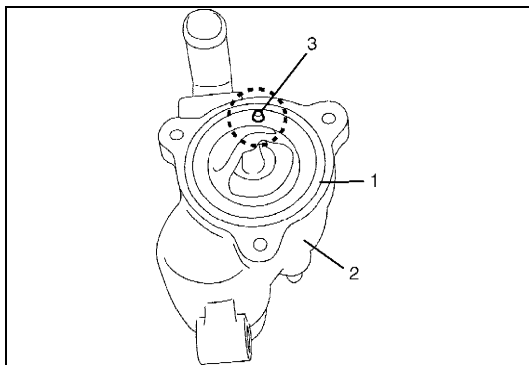
- 1) Drain coolant referring to "Cooling System Draining" in this section.
- 2) Remove intake manifold referring to "Intake Manifold Removal and Installation" in Section 6A2.
- 3) Remove generator referring to "Generator Dismounting and Remounting" in Section 6H.
- 4) Disconnect water hose (1) and heater hose (2) from each pipe.
- 5) Remove thermostat case (3) with thermostat cap (4) and water inlet pipe (5).
- 6) Remove water inlet pipe (5) with thermostat cap (4) from thermostat case.
- 7) Remove thermostat.



Installation

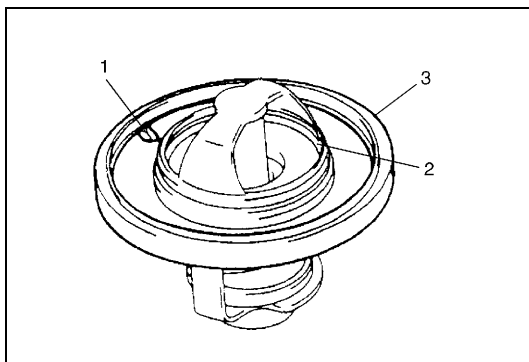
Reverse removal procedure for installation noting the following points.

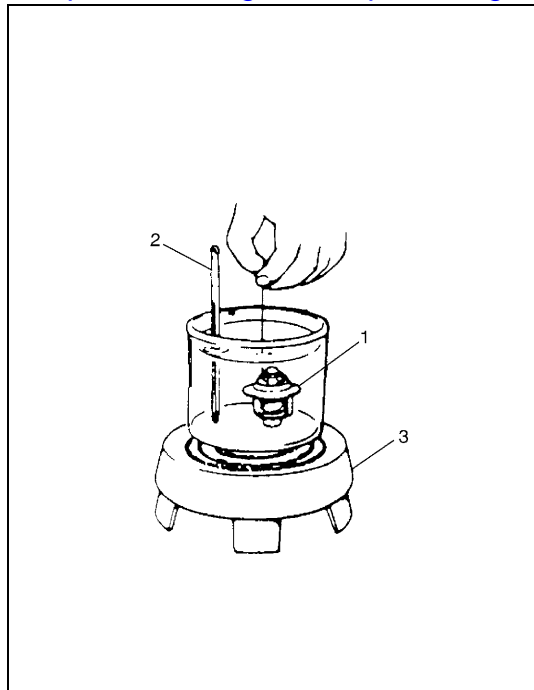
- When positioning thermostat (1) on thermostat case (2), be sure to position it so that jiggle valve (3) comes at position as shown in figure.
- Use new O-rings when installing.
- Adjust water pump belt tension referring to "Water Pump/Generator Drive Belt Tension Inspection and Adjustment" in this section.
- Adjust A/C compressor belt tension (if equipped) referring to "Compressor Drive Belt Inspection and Adjustment" in Section 1B.
- Refill cooling system referring to step 7) to 22) of "Cooling System Flush and Refill" in this section.
- Verify that there is no coolant leakage at each connection.



Thermostat Inspection

- Make sure that jiggle valve (1) of thermostat is clean. Should this valve be clogged, engine would tend to overheat.
- Check to make sure that valve seat (2) is free from foreign matters which would prevent valve from seating tight.
- Check thermostat seal (3) for breakage, deterioration or any other damage.





- Check thermostatic movement of wax pellet as follows:
 - a) Immerse thermostat (1) in water, and heat water gradually as shown.
 - b) Check that valve starts to open at specific temperature.

Temperature at which valve begins to open

: 80 – 84°C (176 – 183°F)

Temperature at which valve become fully open

: 95 – 97°C (203°F)

Valve lift

: More than 8 mm (0.315 in.) at 95°C (203°F)

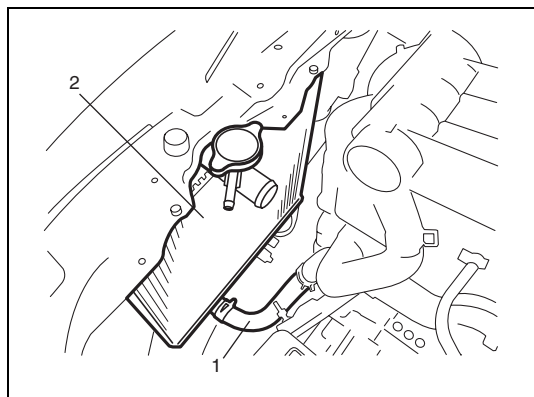
If valve starts to open at a temperature substantially below or above specific temperature, thermostat unit should be replaced with a new one. Such a unit, if reused, will bring about overcooling or overheating tendency.

2.	Thermometer
3.	Heater

Radiator Removal and Installation

Removal

- 1) Disconnect negative cable at battery.
- 2) Drain cooling system referring to “Cooling System Draining” in this section.
- 3) Remove cooling fan assembly referring to “Radiator Cooling Fan Removal and Installation” in this section.
- 4) Remove radiator outlet hose (1) from radiator (2).
- 5) Remove radiator (2) from vehicle.

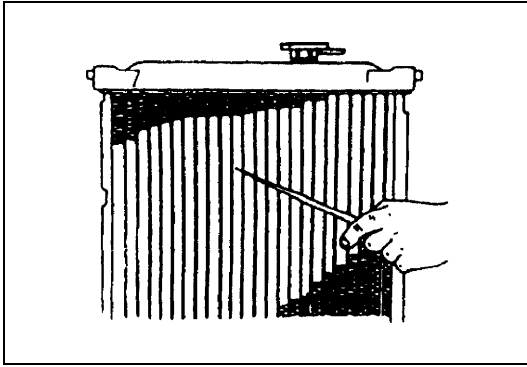


Installation

Reverse removal procedures noting the followings.

- Refill cooling system referring to step 7) to 22) of “Cooling System Flush and Refill” in this section.
- After installation, check each joint for leakage.

Radiator Inspection



Check radiator for leakage or damage. Straighten bent fins, if any.

Radiator Cleaning

Clean frontal area of radiator cores.

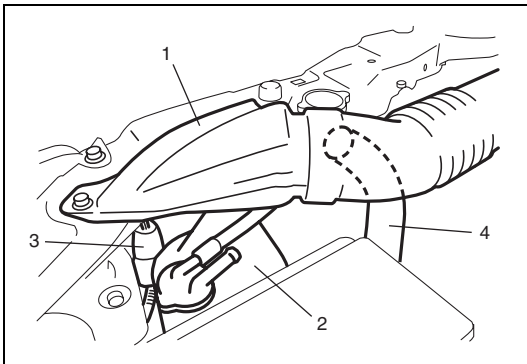
Radiator Cooling Fan Relay Inspection

Refer to “Main Relay, Fuel Pump Relay and Radiator Fan Relay” in Section 6E2.

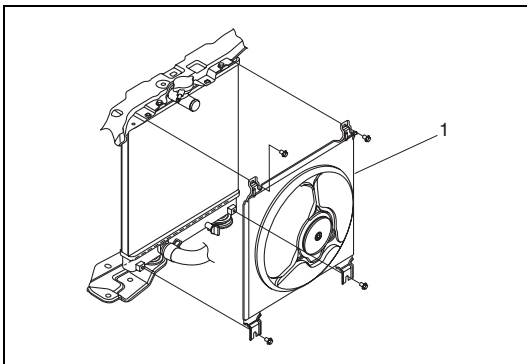
Radiator Cooling Fan Removal and Installation

Removal

- 1) Disconnect negative cable at battery.
- 2) Drain coolant referring to “Cooling System Draining” in this section.
- 3) Remove air cleaner suction pipe (1) and reservoir (2).
- 4) Disconnect cooling fan motor connector (3).
- 5) Remove radiator inlet hose (4) from radiator.



- 6) Remove radiator cooling fan motor (1) from radiator.



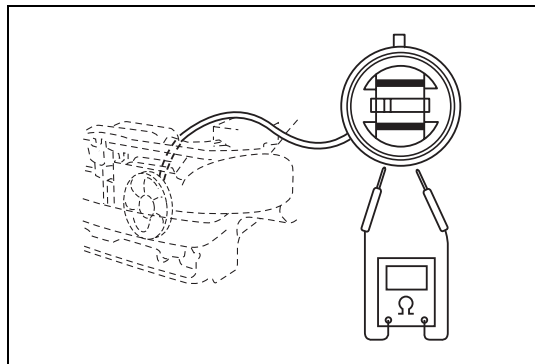
Installation

Reverse removal procedure for installation noting the following.

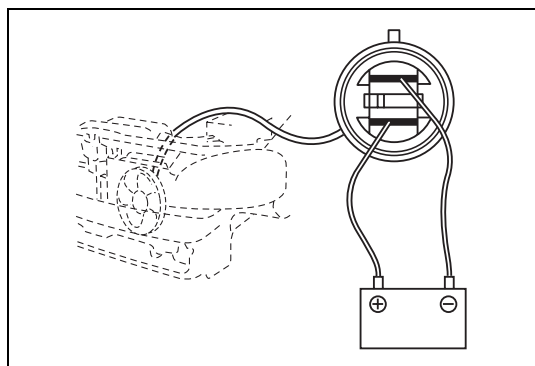
- Refill cooling system referring to step 7) to 18) of “Cooling System Flush and Refill” in this section.
- After installation, verify there is no coolant leakage at each connection.

Radiator Cooling Fan Inspection

For M/T vehicle



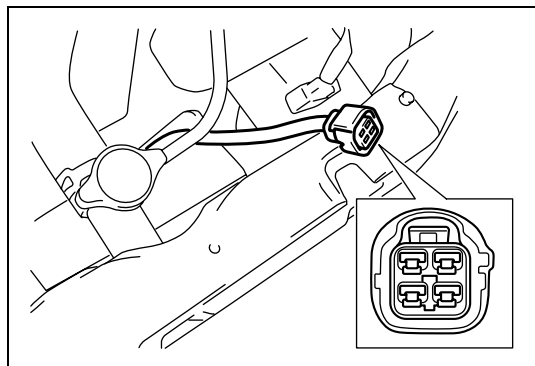
- 1) Check continuity between terminals. If there is no continuity, replace radiator fan motor.



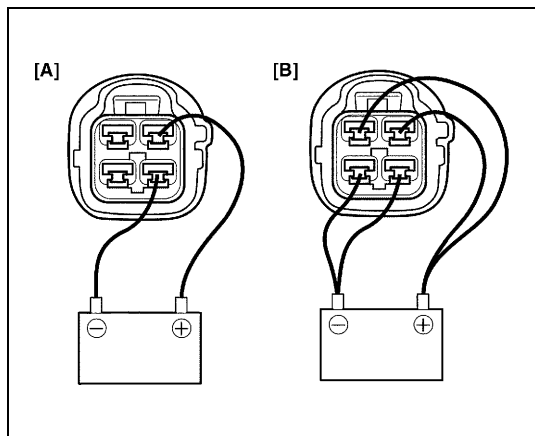
- 2) Connect battery to radiator fan motor coupler as shown in figure, then check that the radiator fan motor operates smoothly. If radiator fan motor does not operate smoothly, replace motor.

Radiator cooling fan motor specified current at 12 V
10.0 A maximum

For A/T vehicle



- 1) Check continuity between terminals.
If there is no continuity, replace radiator fan motor.



- 2) Connect battery to radiator fan motor coupler as shown in figure, then check that the radiator fan motor operates smoothly, fan speed varies and that specified current.
If radiator fan motor does not operate smoothly, replace motor.

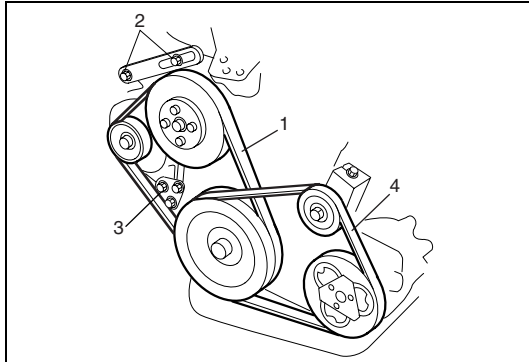
Radiator cooling fan motor specified current at 12 V
LOW: 10 A maximum
HIGH: 15 A maximum

[A]: LOW
[B]: HIGH

Water Pump/Generator Drive Belt Removal and Installation

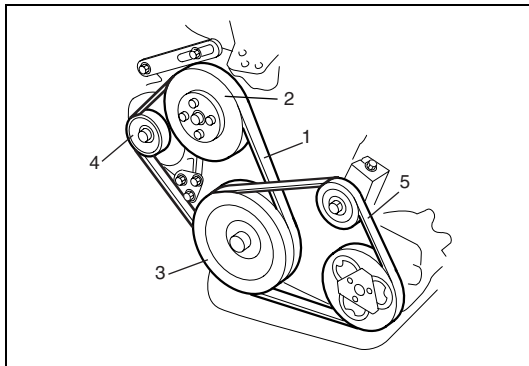
Removal

- 1) Disconnect negative cable at battery.
- 2) If vehicle equipped with A/C, remove compressor drive belt (4) before removing water pump belt (1).
Refer to "Compressor Drive Belt Removal and Installation" in Section 1B.
- 3) Loosen drive belt adjusting bolt (2) and generator pivot bolt (3).
- 4) Slacken belt by displacing generator and then remove it.



Installation

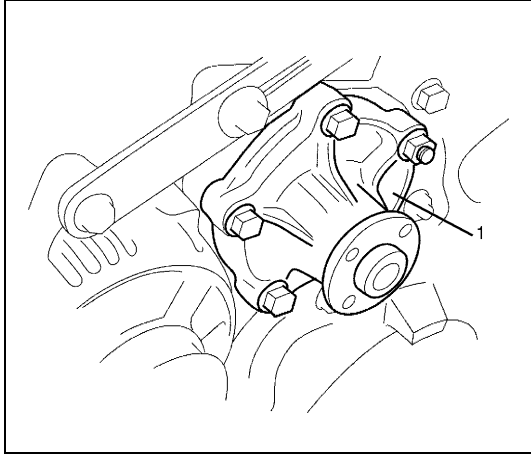
- 1) Install belt (1) to water pump pulley (2), crankshaft pulley (3) and generator pulley (4).
- 2) Adjust belt tension by referring to "Water Pump/Generator Drive Belt Tension Inspection and Adjustment" in this section.
- 3) If vehicle equipped with A/C, install compressor drive belt (5) referring to "Compressor Drive Belt Removal and Installation" in Section 1B.
- 4) Connect negative cable at battery.



Water Pump Removal and Installation

Removal

- 1) Disconnect negative cable at battery.
- 2) Drain coolant referring to "Cooling System Draining" in this section.
- 3) Remove water pump/generator drive belt referring to "Water Pump/Generator Drive Belt Removal and Installation" in this section.
- 4) Remove water pump assembly (1).



Installation

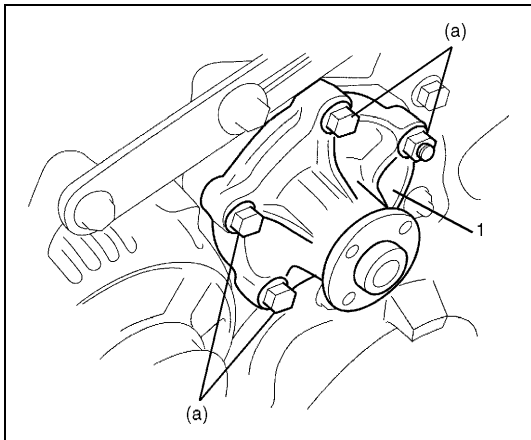
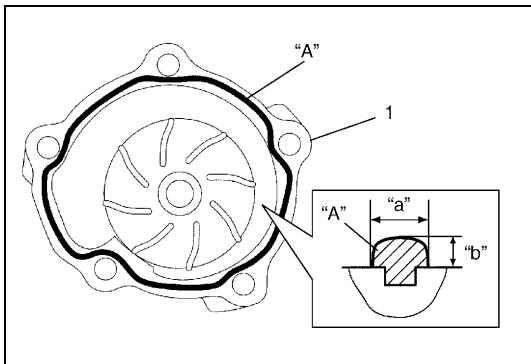
- 1) Apply sealant to mating surface of water pump (1) as shown in figure.

"A": Sealant 99000-31250

Sealant quantity (to mating surface of water pump)

Width "a": 3mm (0.12 in.)

Height "b": 2mm (0.08 in.)



- 2) Install water pump assembly (1) to cylinder block and tighten bolts and nut to specified torque.

Tightening torque

Water pump bolt and nut (a): 22 N·m (2.2 kg-m, 16.0 lb-ft)

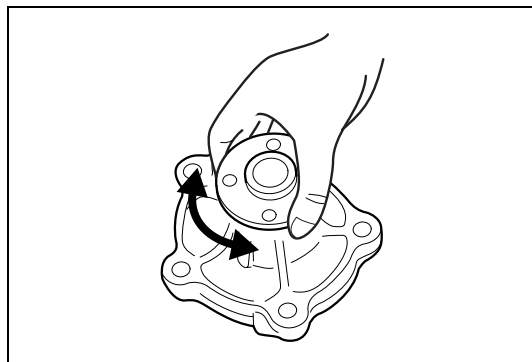
- 3) Install water pump pulley.
- 4) Install water pump/generator drive belt referring to "Water Pump/Generator Drive Belt Removal and Installation" in this Section.
- 5) Install A/C compressor belt (if equipped) referring to "Compressor Drive Belt Removal and Installation" in Section 1B.
- 6) Refill cooling system referring to step 7) to 22) of "Cooling System Flush and Refill" in this section.
- 7) Connect negative cable at battery.
- 8) Check each part for leakage.

Water Pump Inspection

CAUTION:

Do not disassemble water pump.

If any repair is required on pump, replace it as assembly.



- Rotate water pump by hand to check for smooth operation. If pump does not rotate smoothly or makes abnormal noise, replace it.

Engine Coolant Temperature Sensor (ECT Sensor) Removal and Installation

Refer to “Engine Coolant Temperature Sensor (ECT Sensor) Removal and Installation” in Section 6E2.

Engine Coolant Temperature Sensor (ECT Sensor) Inspection

Refer to “Engine Coolant Temperature Sensor (ECT Sensor)” in Section 6E2.

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Ethylene glycol base coolant (Anti-freeze/ Anti-corrosion coolant)	—	Additive to engine cooling system for improving cooling efficiency and for protection against rusting.
Water tight sealant	SUZUKI BOND NO. 1207F (99000-31250)	To apply to mating surface of water pump

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
ETC sensor	15	1.5	11.0
Air ventilation bolt	4.5	0.45	3.5
Thermostat cap bolt	11	1.1	8.0
Thermostat case bolt	25	2.5	18.0
Generator adjusting bolt	23	2.3	17.0
Generator pivot bolt	50	5.0	36.5
Water pump bolt and Nut	22	2.2	16.0

SECTION 6E2

6E2

ENGINE AND EMISSION CONTROL SYSTEM (M13 ENGINE)

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in Section 10B in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in Section 10B before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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General Description

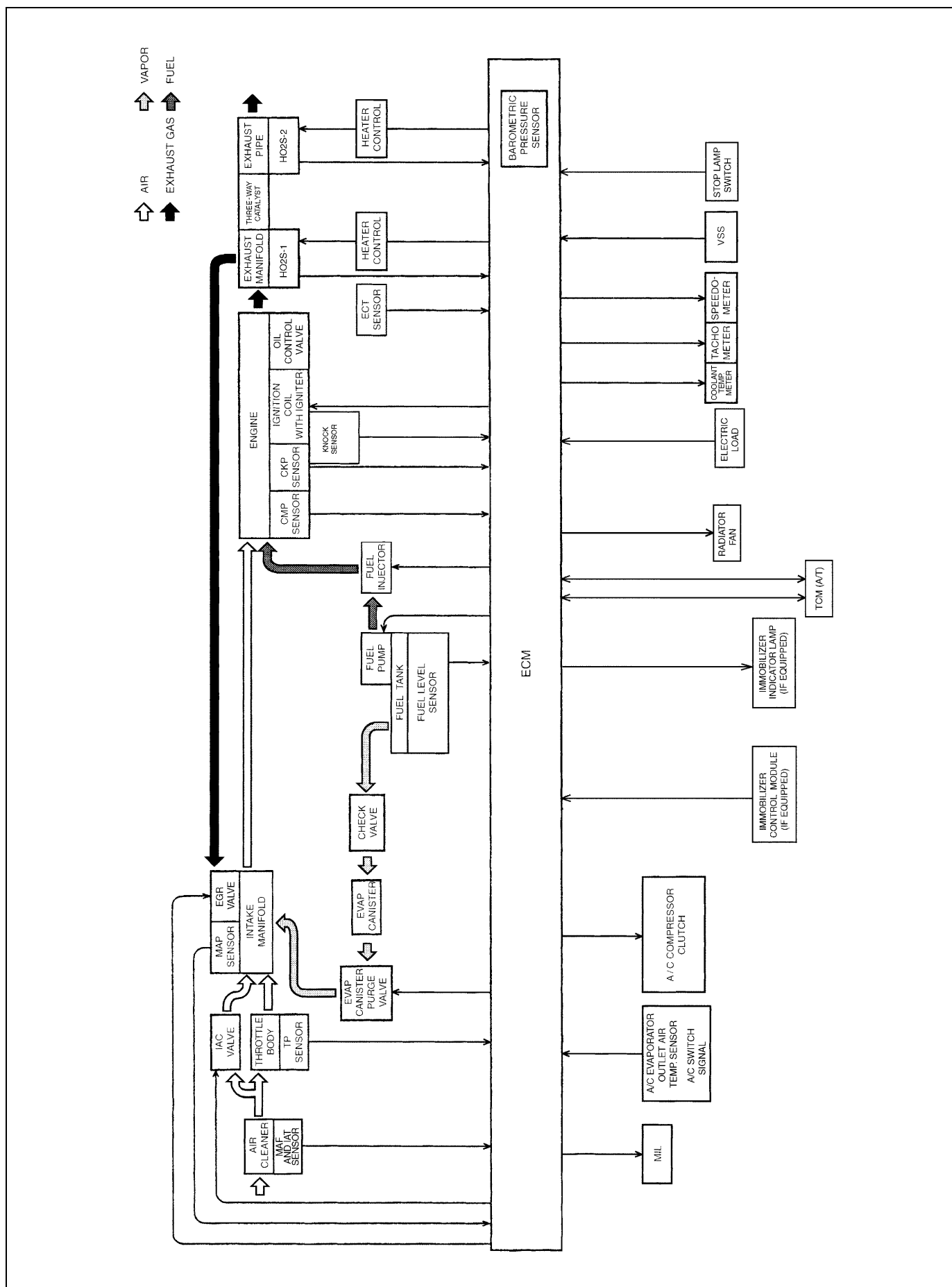
Engine and Emission Control System Construction

The engine and emission control system is divided into 4 major sub-systems: air intake system, fuel delivery system, electronic control system and emission control system.

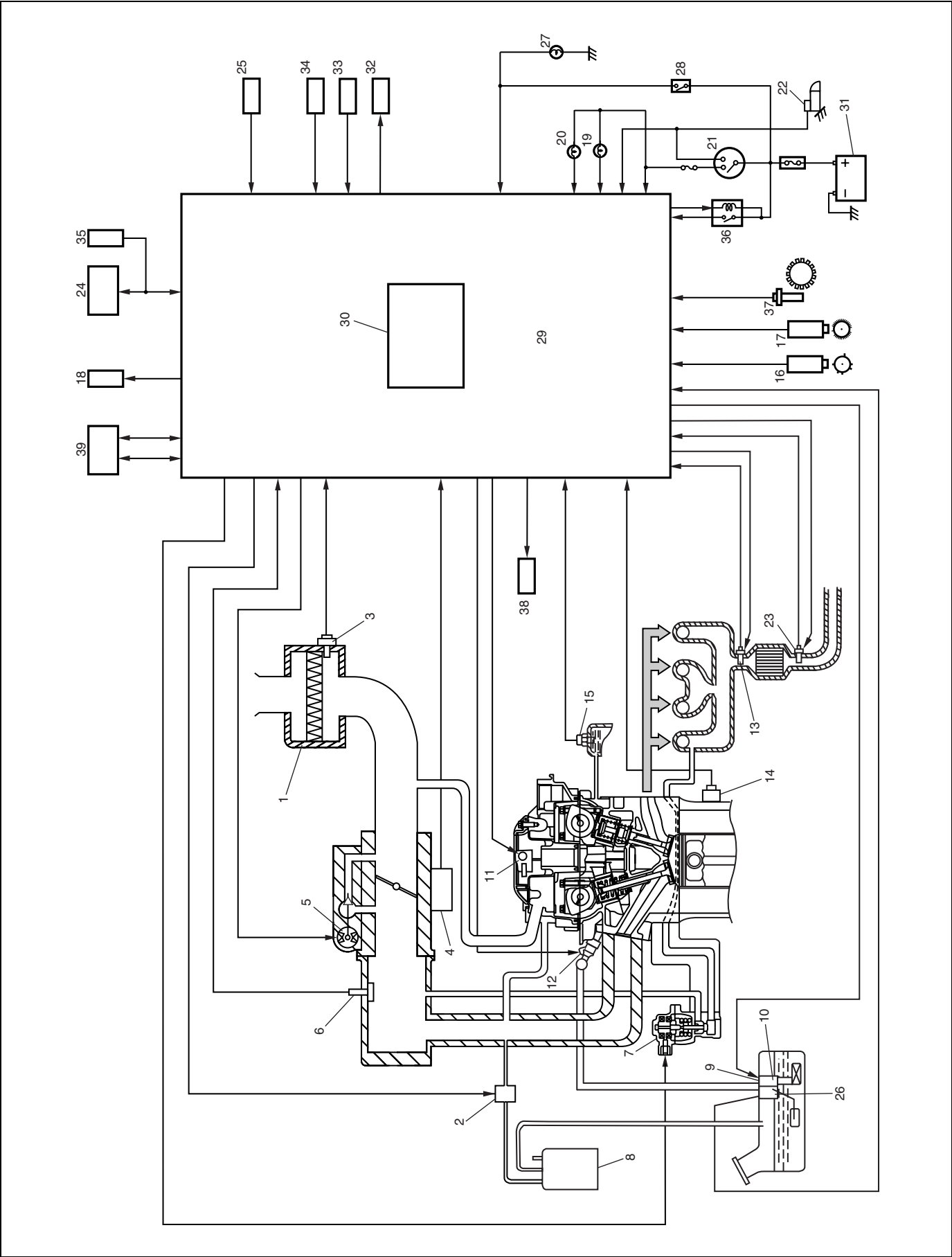
Air intake system includes air cleaner, throttle body, IAC valve and intake manifold.

Fuel delivery system includes fuel pump, delivery pipe, etc. Electronic control system includes ECM, various sensors and controlled devices.

Emission control system includes EGR, EVAP and PCV system.



Engine and Emission Control System Diagram



1. Air Cleaner	14. Knock sensor	27. Stop lamp
2. EVAP canister purge valve	15. ECT sensor	28. Stop lamp switch
3. MAF and IAT sensor	16. CMP sensor	29. ECM
4. TP sensor	17. CKP sensor	30. Barometric pressure sensor
5. IAC valve	18. Radiator fan	31. Battery
6. MAP sensor	19. Malfunction indicator lamp in combination meter	32. A/C compressor relay (if equipped)
7. EGR valve	20. Immobilizer indicator lamp in combination meter	33. A/C switch (if equipped)
8. EVAP canister	21. Ignition switch	34. A/C evaporator outlet air temp. sensor (if equipped)
9. Tank pressure control valve (built-in fuel pump)	22. Starter magnetic switch	35. Immobilizer control module (if equipped)
10. Fuel pump (with pressure regulator)	23. Heated Oxygen Sensor-2 (HO2S-2)	36. Main relay
11. Ignition coil assembly	24. DLC	37. VSS
12. Fuel injector	25. Electric load	38. Oil control valve
13. Heated Oxygen Sensor-1 (HO2S-1)	26. Fuel level sensor	39. TCM (A/T)

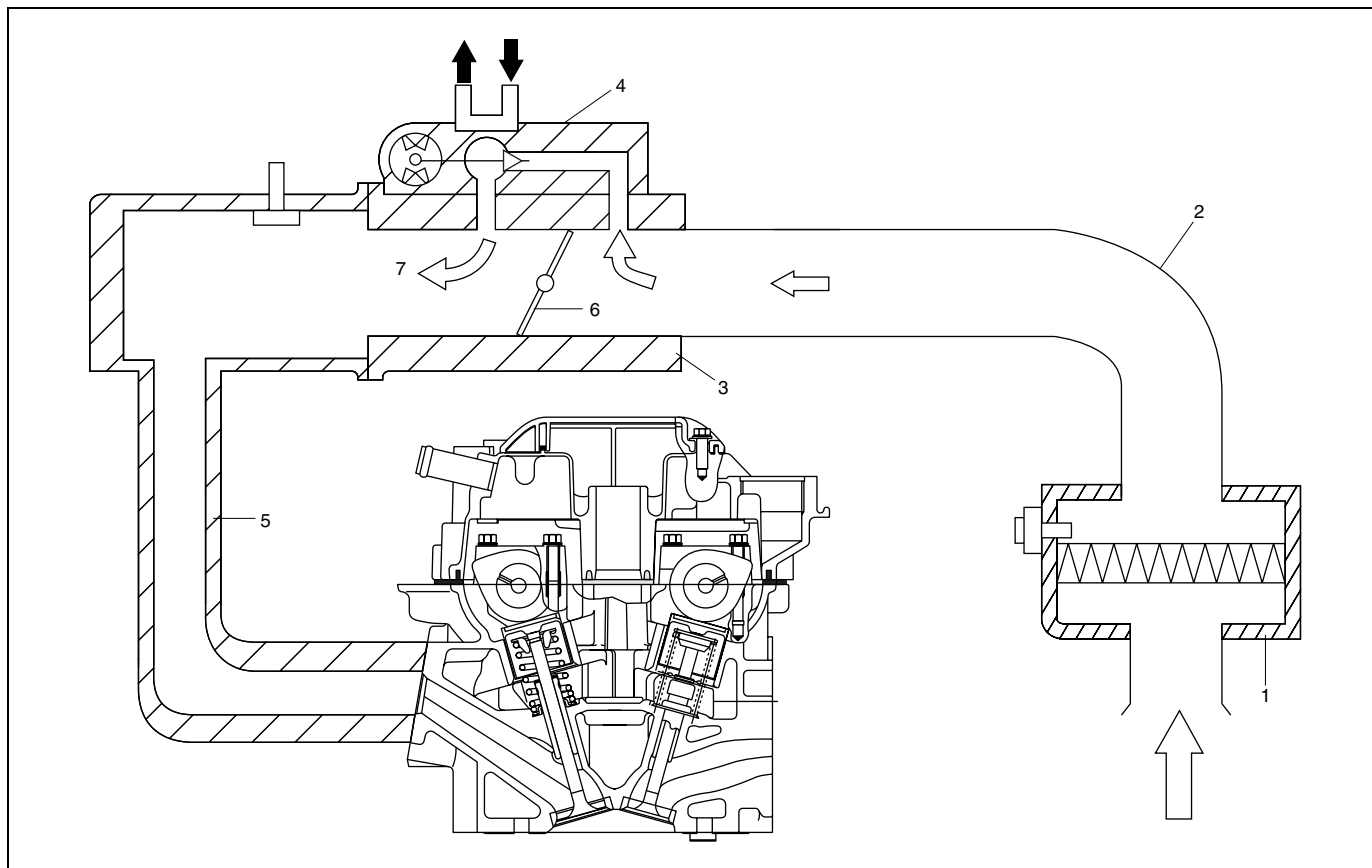
Air Intake System Description

The main components of the air intake system are air cleaner (1), air cleaner outlet hose (2), throttle body (3), idle air control valve (4) and intake manifold (5).

The air (by the amount corresponding to the throttle valve (6) opening and engine speed) is filtered by the air cleaner (1), passes through the throttle body (3), is distributed by the intake manifold (5) and finally drawn into each combustion chamber.

When the idle air control valve (4) is opened according to the signal from ECM, the air (7) bypasses the throttle valve (6) through bypass passage and is finally drawn into the intake manifold (5).

Air Intake System Diagram



Fuel Delivery System Description

The fuel system consists of fuel tank (1), fuel pump (2) (with built-in fuel filter (3) and fuel pressure regulator (4)), delivery pipe (5), injectors (6) and fuel feed line (7).

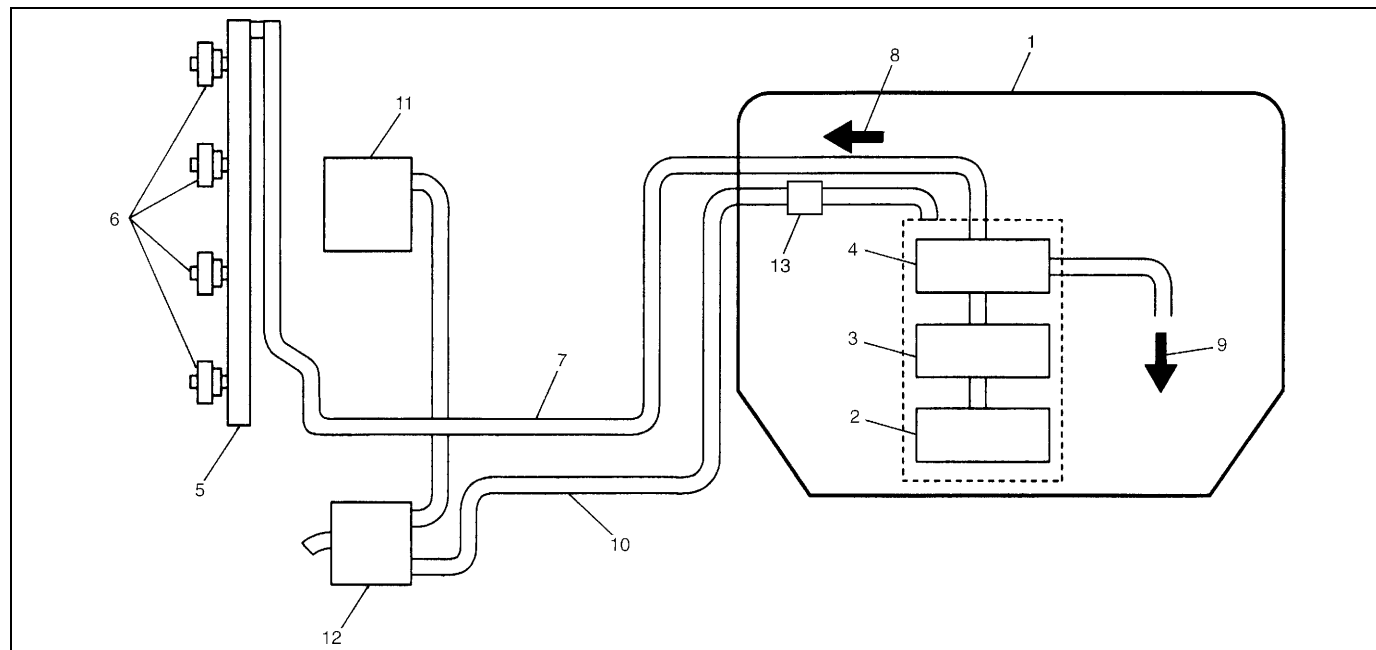
The fuel (8) in the fuel tank (1) is pumped up by the fuel pump (2), sent into delivery pipe (5) and injected by the injectors (6).

As the fuel pump assembly is equipped with built-in fuel filter (3) and fuel pressure regulator (4), the fuel (8) is filtered and its pressure is regulated before being sent to the delivery pipe (5).

The excess fuel from fuel pressure regulation process is returned back (9) into the fuel tank.

Also, fuel vapor generated in fuel tank is led through the fuel vapor line (10) into the EVAP canister (12).

Fuel Delivery System Diagram



11. Intake manifold

13. Fuel vapor separator

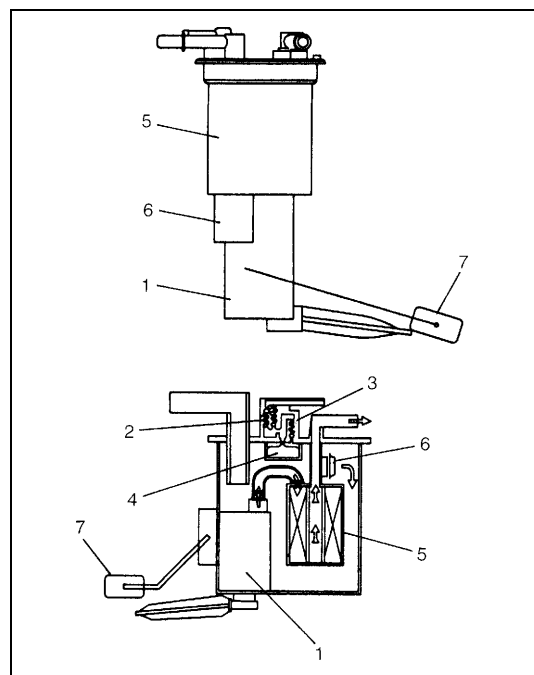
Fuel Pump

An in-tank type electric pump has been adopted for the fuel pump (1). Incorporated in the pump assembly are;

- Tank pressure control valve (2) which keeps the pressure in the fuel tank constant, and prevents the fuel from spouting and tank itself from being deformed.
- Relief valve (3) which prevents the pressure in tank from rising excessively.
- Fuel cut valve (4) which closes as the float rises so that the fuel will not enter the canister when the fuel level in the tank rises high depending on the fuel level in the tank and the vehicle tilt angle.

Also, a fuel filter (5) and a fuel pressure regulator (6) are included and a fuel level gauge (7) is attached.

Addition of the fuel pressure regulator (6) to the fuel pump makes it possible to maintain the fuel pressure at constant level and ECM controls compensation for variation in the intake manifold pressure.



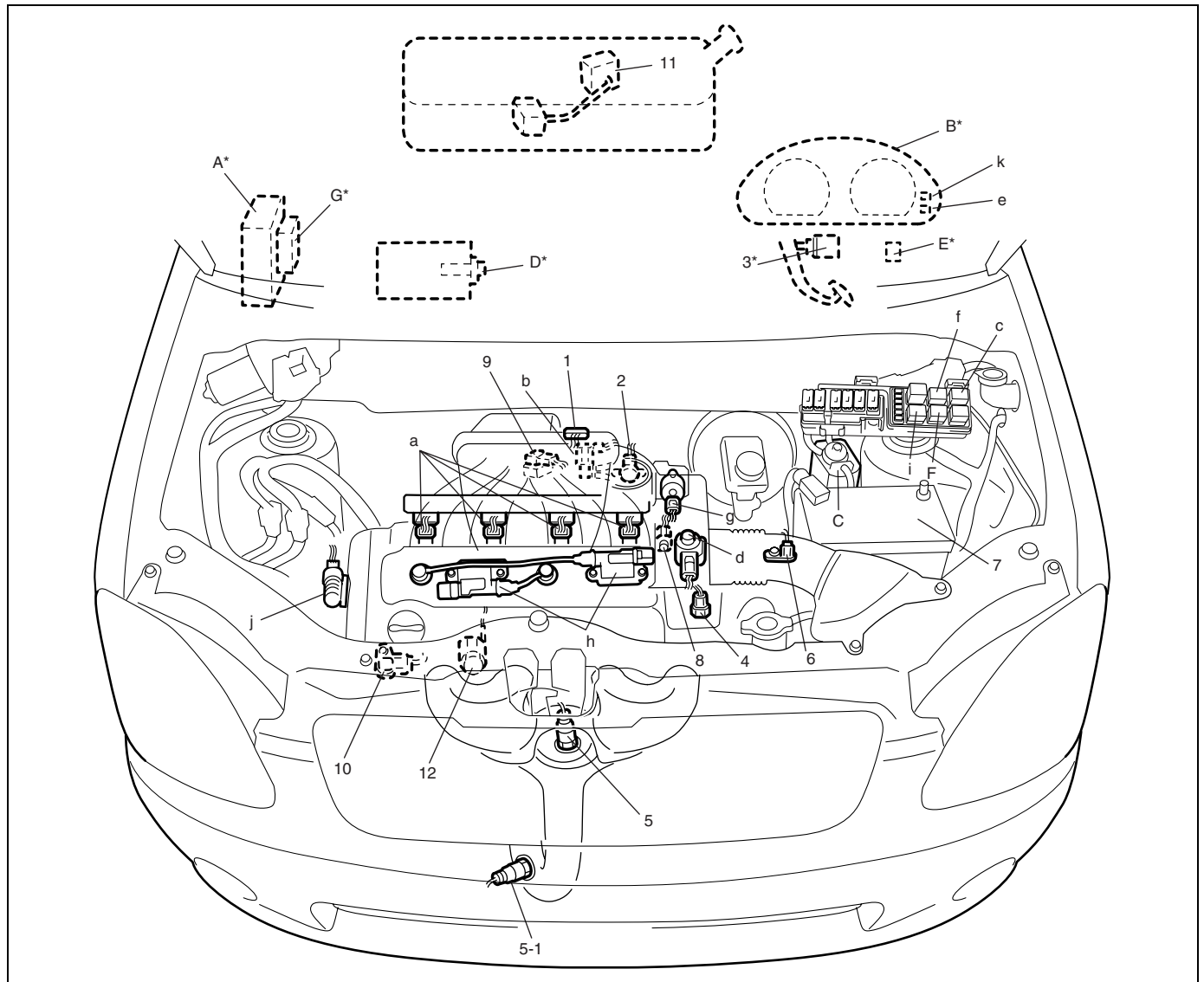
Electronic Control System Description

The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM which controls various devices according to the signals from the sensors and 3) various controlled devices.

Functionally, it is divided into nine sub systems:

- Fuel injection control system
- Idle speed control system
- Fuel pump control system
- A/C control system (if equipped)
- Radiator fan control system
- EGR system
- Evaporative emission control system
- Oxygen sensor heater control system
- Ignition control system
- Variable intake valve timing control system

ECM (Engine Control Module) and TCM (Transmission Control Module) intercommunicate by CAN (Controller Area Network). (For A/T vehicle only)

Electronic Control System Component Location

INFORMATION SENSORS	CONTROL DEVICES	OTHERS
1. MAF and IAT sensor	a: Fuel injector	A: ECM
2. TP sensor	b: EVAP canister purge valve	B: Combination meter
3. Stop lamp switch	c: Fuel pump relay	C: EVAP canister
4. ECT sensor	d: EGR valve	D: A/C evaporator outlet air temp. sensor (if equipped)
5. Heated oxygen sensor-1	e: Malfunction indicator lamp	E: Data link connector
5-1. Heated oxygen sensor-2	f: Radiator fan relay	F: A/C compressor relay (if equipped)
6. VSS	g: IAC valve	G: TCM (A/T)
7. Battery	h: Ignition coil assembly (with ignitor)	
8. CMP sensor	i: Main relay	
9. MAP sensor	j: Oil control valve	
10. CKP sensor	k: Immobilizer indicator lamp	
11. Fuel level sensor		
12. Knock sensor		

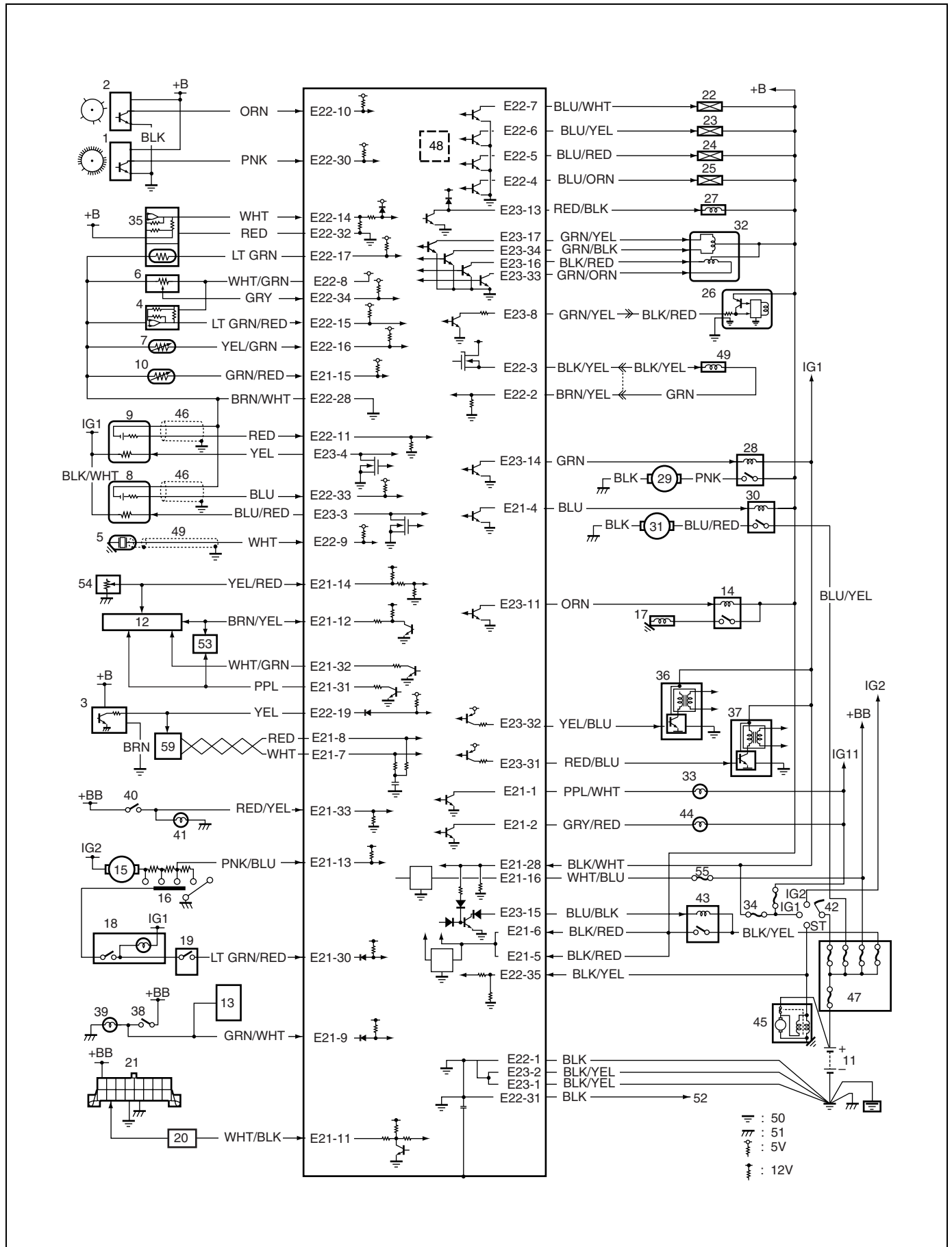
NOTE:

Above figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the opposite side.

Engine and Emission Control Input/output Table

<div>INPUT</div> <div>OUTPUT</div>		ELECTRIC CONTROL DEVICE											
		FUEL PUMP RELAY	FUEL INJECTOR	HO2S HEATER	IAC VALVE	IGNITION COIL WITH IGNITER	EGR VALVE	EVAP CANISTER PURGE VALVE	A/C COMPRESSOR RELAY	RADIATOR FAN RELAY	MIL	MAIN RELAY	OIL CONTROL VALVE
SIGNAL FROM SENSOR, SWITCH AND CONTROL MODULE	FUEL LEVEL SENSOR	For detecting fuel level											
	BAROMETRIC PRESSURE SENSOR		<input type="radio"/>		<input type="radio"/>	<input type="radio"/>		<input type="radio"/>			<input type="radio"/>		
	STOP LAMP SWITCH				<input type="radio"/>								
	START SWITCH	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
	IGNITION SWITCH	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	
	LIGHTING SWITCH				<input type="radio"/>								
	BLOWER SWITCH				<input type="radio"/>				<input type="radio"/>				
	A/C SWITCH				<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	A/C EVAP OUTLET AIR TEMP. SENSOR				<input type="radio"/>				<input type="radio"/>				
	VSS		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>
	HEATED OXYGEN SENSOR-1		<input type="radio"/>					<input type="radio"/>			<input type="radio"/>		
	HEATED OXYGEN SENSOR-2	For detecting deterioration of three way catalytic converter										<input type="radio"/>	
	MAF SENSOR		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>		
	IAT SENSOR		<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>		
	ECT SENSOR		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>
	TP SENSOR		<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
	MAP SENSOR		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
	CMP SENSOR	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>					<input type="radio"/>		<input type="radio"/>
CKP SENSOR	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>	
KNOCK SENSOR					<input type="radio"/>					<input type="radio"/>			

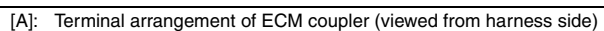
Simpo PDF Merge and Split Unregistered Version - <http://www.simpopdf.com>
ECM Input/output Circuit Diagram



1. CKP sensor	20. Immobilizer control module	39. Stop lamp
2. CMP sensor	21. Data link connector	40. Lighting switch
3. VSS	22. Injector No.1	41. Position lamp
4. MAP sensor	23. Injector No.2	42. Ignition switch
5. Knock sensor	24. Injector No.3	43. Main relay
6. TP sensor	25. Injector No.4	44. Immobilizer indicator lamp
7. ECT sensor	26. IAC valve	45. Starting motor
8. Heated oxygen sensor-2	27. EVAP canister purge valve	46. Shield wire
9. Heated oxygen sensor-1	28. Fuel pump relay	47. Main fuse
10. A/C evaporator outlet air temp. sensor	29. Fuel pump	48. Barometric pressure sensor
11. Battery	30. Radiator fan relay	49. Oil control valve
12. Combination meter	31. Radiator fan motor	50. Engine ground
13. ABS control module	32. EGR valve	51. Body ground
14. A/C compressor relay	33. Malfunction indicator lamp	52. Shield ground
15. Heater fan motor	34. "IG COIL" fuse	53. EPS control module
16. Heater fan switch	35. MAF and IAT sensor	54. Fuel level sensor
17. A/C compressor clutch	36. Ignition coil assembly (for No.1 and No.4 spark plugs)	55. "DOME RADIO" fuse
18. A/C switch	37. Ignition coil assembly (for No.2 and No.3 spark plugs)	
19. A/C pressure switch	38. Stop lamp switch	

ECM Terminal Arrangement Table

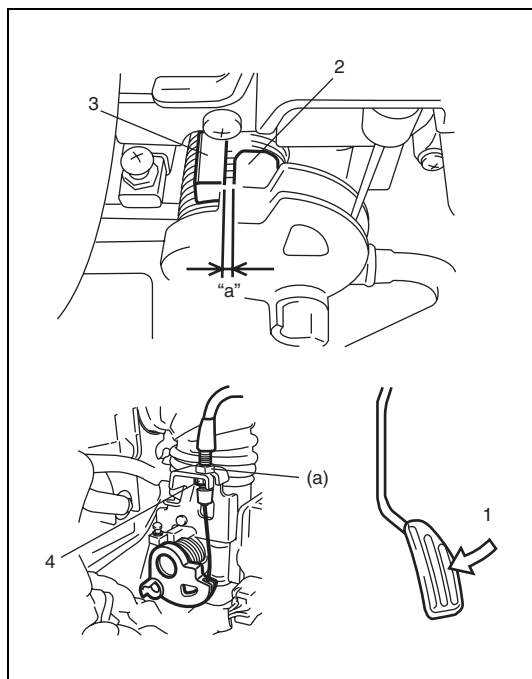
CON-NECTOR	TERMI-NAL	WIRE COLOR	CIRCUIT	CON-NECTOR	TERMI-NAL	WIRE COLOR	CIRCUIT
E23	1	BLK/YEL	Ground for ECM	E22	21	—	—
	2	BLK/YEL	Ground for ECM		22	—	—
	3	BLU/RED	Heater output of heated oxygen sensor-2		23	—	—
	4	YEL	Heater output of heated oxygen sensor-1		24	—	—
	5	—	—		25	—	—
	6	—	—		26	—	—
	7	—	—		27	—	—
	8	GRN/YEL	IAC valve output		28	BRN/WHT	Ground for sensors
	9	—	—		29	—	—
	10	—	—		30	PNK	CKP sensor signal
	11	PNK/BLK	A/C compressor relay output (if equipped)		31	BLK	Ground of ECM for shield wire
	12	—	—		32	RED	Ground for MAF sensor
	13	RED/BLK	EVAP canister purge valve output		33	BLU	Oxygen signal of heated oxygen sensor-2
	14	GRN	Fuel pump relay output		34	GRY	Throttle position (TP) sensor signal
	15	BLU/BLK	Main power supply relay output		35	BLK/YEL	Starting motor signal
	16	BLK/RED	EGR valve (stepper motor coil 3) output	E21	1	PPL/WHT	MIL (Malfunction indicator lamp) output
	17	GRN/YEL	EGR valve (stepper motor coil 1) output		2	GRY/RED	Immobilizer indicator lamp output (if equipped)
	18	—	—		3	—	—
	19	—	—		4	BLU	Radiator fan motor relay output
	20	—	—		5	BLK/RED	Main power supply
	21	—	—		6	BLK/RED	Main power supply
	22	—	—		7	WHT	CAN communication line (active low signal)
	23	—	—		8	RED	CAN communication line (active high signal)
	24	—	—		9	GRN/WHT	Electric load signal for stop lamp
	25	—	—		10	—	—
	26	—	—		11	WHT/BLK	Serial communication line of data link connector 12 V
	27	—	—		12	BRN/YEL	Engine revolution signal output for tachometer
	28	—	—		13	PNK/BLU	Electric load signal for heater blower motor
	29	—	—		14	YEL/RED	Fuel level sensor signal
	30	—	—		15	GRN/RED	A/C evaporator outlet air temp. sensor signal (if equipped)
	31	RED/BLU	Ignition coil No.2 and No.3 output		16	WHT/BLU	Power source for ECM internal memory
	32	YEL/BLU	Ignition coil No.1 and No.4 output		17	—	—
	33	GRN/ORN	EGR valve (stepper motor coil 4) output		18	—	—
	34	GRN/BLK	EGR valve (stepper motor coil 2) output		19	—	—
E22	1	BLK	Ground for ECM		20	—	—
	2	BRN/YEL	Oil control valve output		21	—	—
	3	BLK/YEL	Output of 12 V power source for oil control valve		22	—	—
	4	BLU/ORN	Fuel injector No.4 output		23	—	—
	5	BLU/RED	Fuel injector No.3 output		24	—	—
	6	BLU/YEL	Fuel injector No.2 output		25	—	—
	7	BLU/WHT	Fuel injector No.1 output		26	—	—
	8	WHT/GRN	Output of 5V power source for throttle position (TP) sensor		27	—	—
	9	WHT	Knock sensor signal		28	BLK/WHT	Ignition switch signal
	10	ORN	Reference signal for CMP sensor		29	—	—
	11	RED	Oxygen signal of heated oxygen sensor-1		30	LT GRN/RED	A/C request signal (if equipped)
	12	—	—		31	PPL	Vehicle speed sensor signal for speedometer
	13	—	—		32	WHT/GRN	ECT sensor signal for combination meter
	14	WHT	Mass air flow (MAF) sensor signal		33	RED/YEL	Electric load signal for clearance lamp
	15	LT GRN/RED	Manifold absolute pressure (MAP) sensor signal		34	—	—
	16	YEL/GRN	Engine coolant temp. (ECT) sensor signal		35	—	—
	17	LT GRN	Intake air temperature (IAT) sensor signal				
	18	—	—				
	19	YEL	Vehicle speed sensor signal				
	20	—	—				



For abbreviation of wire color, refer to “Abbreviations and Symbols May be Used in This Manual” in Section 0A.

On-Vehicle Service

Accelerator cable adjustment



With accelerator pedal depressed fully (1), check clearance between throttle lever (2) and lever stopper (3) of throttle body. If measured value is out of specification, adjust it to specification with cable adjusting nut (4).

Accelerator cable adjustment clearance (with pedal depressed fully)

“a”: 0.5 – 2.0 mm (0.02 – 0.07 in.)

Tightening torque

Accelerator cable lock nut (a): 12 N·m (1.2 kg-m, 9.0 lb-ft)

Idle speed/idle air control (IAC) duty inspection

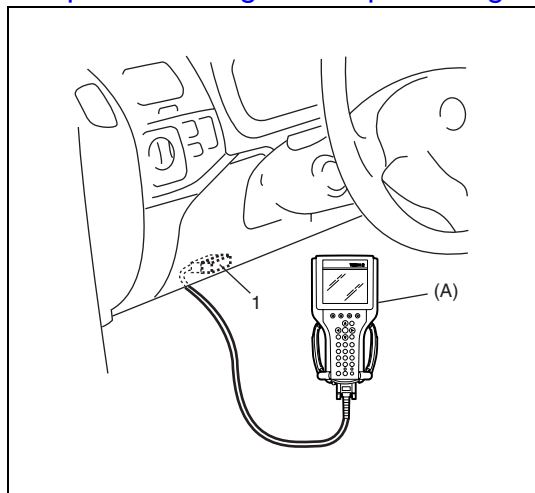
Before idle speed/IAC duty check, make sure of the following.

- Lead wires and hoses of Electronic Fuel Injection and engine emission control systems are connected securely.
- Accelerator cable has some play, that is, it is not tight.
- Valve lash is checked according to maintenance schedule.
- Ignition timing is within specification.
- All accessories (wipers, heater, lights, A/C, etc.) are out of service.
- Air cleaner has been properly installed and is in good condition.
- No abnormal air inhaling from air intake system.

After above items are all confirmed, check idle speed and IAC duty as follows.

NOTE:

Before starting engine, place transmission gear shift lever in “Neutral” (shift selector lever to “P” range for A/T vehicle), and set parking brake and block drive wheels.



- 1) Connect scan tool to DLC (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool

- 2) Warm up engine to normal operating temperature.
- 3) Check engine idle speed and "IAC duty" by using "Data List" mode on scan tool to check "IAC duty".
- 4) If duty and/or idle speed is out of specifications, inspect idle air control system referring to "Diagnostic Flow Table B-4 Idle Air Control System Check" in Section 6-2.

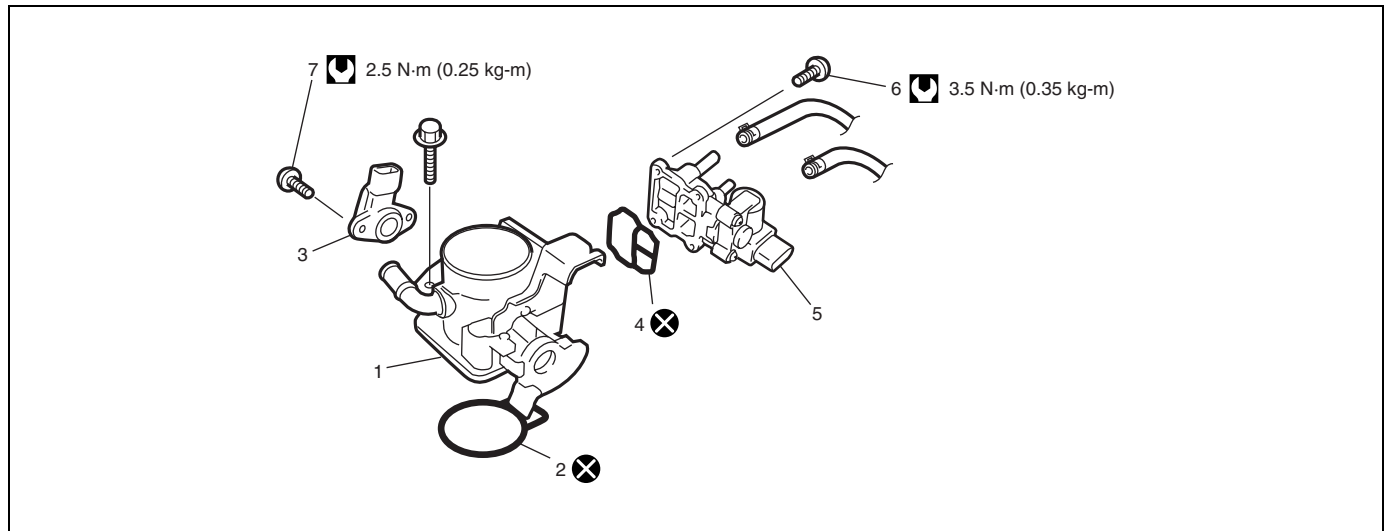
Engine idle speed and IAC duty



	A/C OFF	A/C ON
M/T vehicle	700 ± 50 r/min (rpm) 10 – 55%	850 ± 50 r/min (rpm)
A/T vehicle at P/N range	750 ± 50 r/min (rpm) 10 – 55%	850 ± 50 r/min (rpm)

- 5) Check that specified engine idle speed is obtained with A/C ON if vehicle is equipped with A/C.
If not, check A/C request signal circuit and idle air control system.

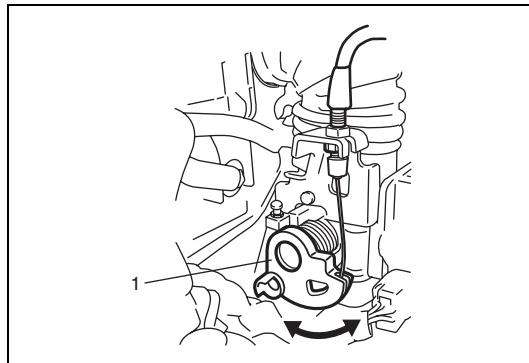
Air Intake System

Throttle body Components



1. Throttle body	4. Gasket	7. TP sensor screws
2. Throttle body gasket	5. Idle air control valve	 Tightening torque
3. TP sensor	6. IAC valve screws	 Do not reuse.

Throttle body on-vehicle inspection

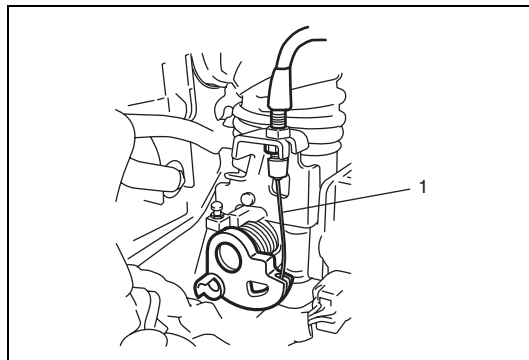


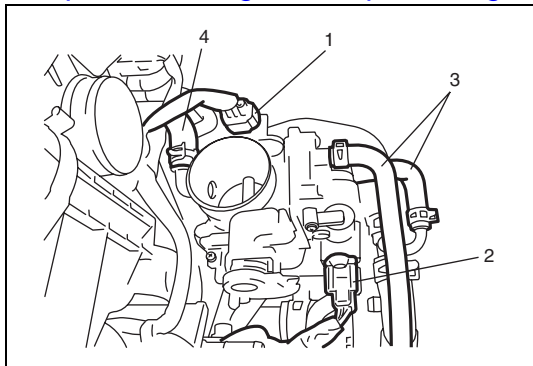
- Check that throttle valve lever (1) moves smoothly.

Throttle body removal and installation

Removal

- 1) Disconnect negative cable at battery.
- 2) Drain coolant referring to "Cooling System Draining" in Section 6B2.
- 3) Disconnect accelerator cable (1) from throttle body.
- 4) Detach purge valve chamber, and remove air cleaner outlet hose.





- 5) Disconnect connectors from TP sensor (1) and IAC valve (2).
- 6) Disconnect engine coolant hoses (3) and breather hose (4) from throttle body.
- 7) Remove throttle body from intake manifold.

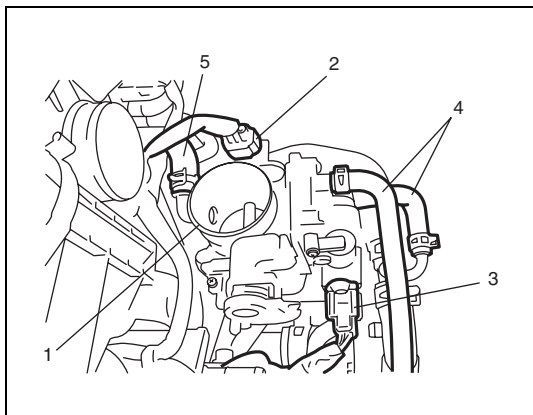
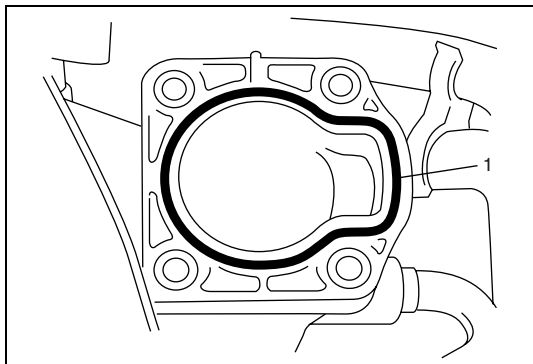
- 8) Remove TP sensor and IAC valve from throttle body.

NOTE:

While disassembling and assembling throttle body, use special care not to deform levers on throttle valve shaft or cause damage to any other parts.

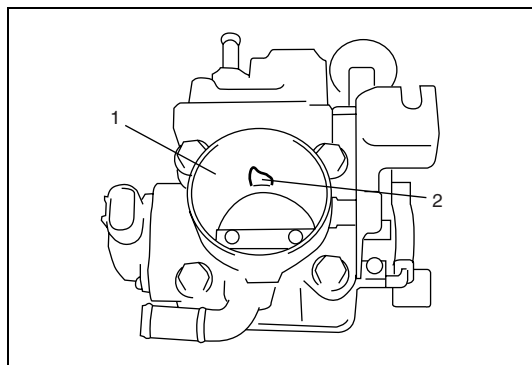
Installation

- 1) Install IAC valve to throttle body referring to "Installation" under "IAC Valve Removal and Installation" in this section.
- 2) Install TP sensor to throttle body referring to "Installation" under "TP Sensor Removal and Installation" in this section.
- 3) Clean mating surfaces and install new throttle body gasket (1) to intake manifold.



- 4) Install throttle body (1) to intake manifold.
- 5) Connect connectors to TP sensor (2) and IAC valve (3) securely.
- 6) Connect engine coolant hoses (4) and breather hose (5).
- 7) Connect accelerator cable and adjust cable play to specification.
- 8) Install air cleaner outlet hose and purge valve chamber.
- 9) Refill coolant referring to "Cooling System Refill" in Section 6B2.
- 10) Connect negative cable at battery.

Throttle body cleaning



Clean throttle body bore (1) and idle air passage (2) by blowing compressed air.

NOTE:

TP sensor, idle air control valve or other components containing rubber must not be placed in a solvent or cleaner bath. A chemical reaction will cause these parts to swell, harden or get distorted.

Idle air control (IAC) valve operation check

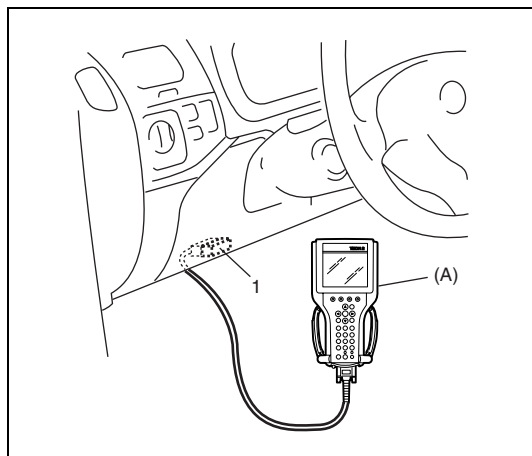
Using Suzuki Scan Tool

- 1) Connect SUZUKI scan tool to DLC (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool

- 2) Warm up engine to normal operating temperature.
- 3) Clear DTC and select "MISC TEST" mode on SUZUKI scan tool.
- 4) Check that idle speed increases and/or reduces when IAC valve is opened and/or when closed by SUZUKI scan tool.
If idle speed does not change, check IAC valve and wire harness.



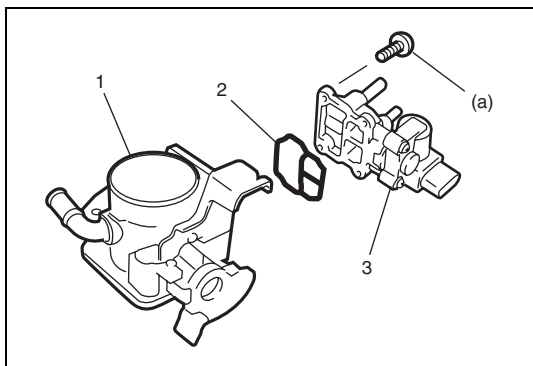
Not Using SUZUKI Scan Tool

- 1) Warm up engine to normal operating temperature.
- 2) Stop engine.
- 3) Turn ignition switch to ON position.
- 4) Disconnect IAC valve connector.
- 5) Start engine.
- 6) Connect IAC valve connector.
- 7) Check that idle speed increases and/or reduces when connector is connected to IAC valve.
If idle speed does not change, check IAC valve and wire harness.

Idle air control (IAC) valve removal and installation

Removal

- 1) Remove throttle body referring to "Throttle Body Removal and Installation" in this section.
- 2) Remove IAC valve from throttle body.

Installation

- 1) Install new gasket (2) to throttle body (1).
- 2) Install IAC valve (3) to throttle body (1).
Tighten IAC valve screws to specified torque.

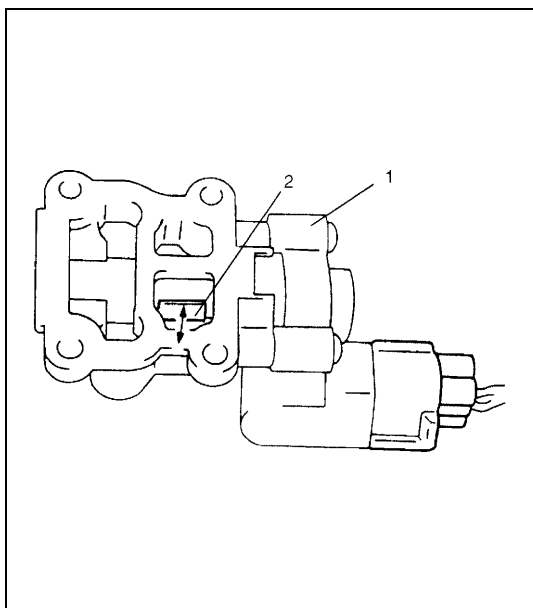
Tightening torque

IAC valve screw (a): 3.5 N·m (0.35 kg-m, 2.5 lb-ft)

- 3) Install throttle body referring to "Throttle Body Removal and Installation" in this section.

Idle air control (IAC) valve check

- 1) Remove IAC valve referring to "Idle Air Control (IAC) Valve Removal and Installation" in this section.
- 2) Connect each connector to IAC valve (1) and TP sensor.
- 3) Check that rotary valve (2) of IAC valve opens and closes once and then stops in about 60 ms as soon as ignition switch is turned ON.

**NOTE:**

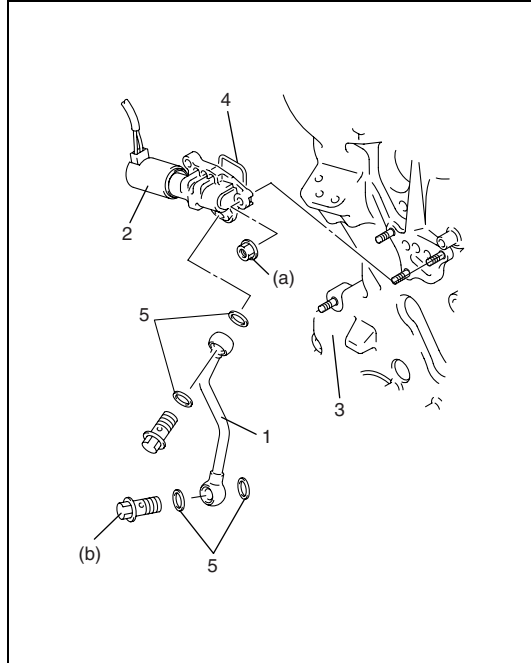
- This check should be performed by two people, one person turns on ignition switch while the other checks valve operation.
- As valve operation is momentary, it may be overlooked. To prevent this, perform this operation check 3 times or more continuously.
If rotary valve of IAC valve does not operate at all, check wire harness for open and short. If wire harness is in good condition, replace IAC valve and recheck.

- 4) Install IAC valve referring to "Idle Air Control (IAC) Valve Removal and Installation" in this section.

Oil control valve removal and installation

Removal

Remove oil gallery pipe No.1 (1) and oil control valve (2) from timing chain cover (3).



Installation

- 1) Install new O-ring (4) to oil control valve.
- 2) Install oil control valve to timing chain cover. Tighten nuts to specification.

Tightening torque

Oil control valve mounting nuts

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

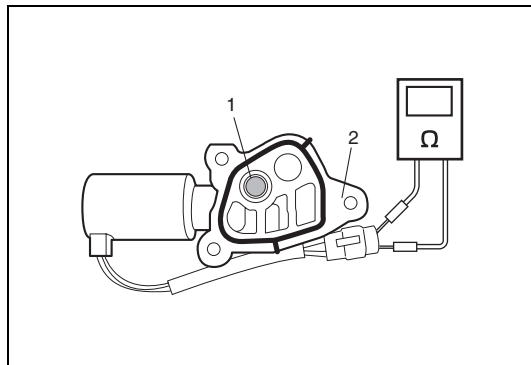
- 3) Install oil gallery pipe No.1 with new copper washers (5) to timing chain cover. Tighten bolts to specification.

Tightening torque

Oil gallery pipe No.1 bolts

(b): 30 N·m (3.0 kg-m, 21.5 lb-ft)

Oil control valve inspection



- 1) Inspect strainer (1) and mating surface (2) of oil control valve for clog or damage. Clean oil control valve if clog or foreign matter is present on strainer or mating surface of oil control valve. Replace oil control valve if its mating surface is damaged.
- 2) Check resistance between terminals of oil control valve.

Resistance: 6.7 – 7.7 Ω (at 20°C (68°F))

Fuel Delivery System

Fuel pressure inspection

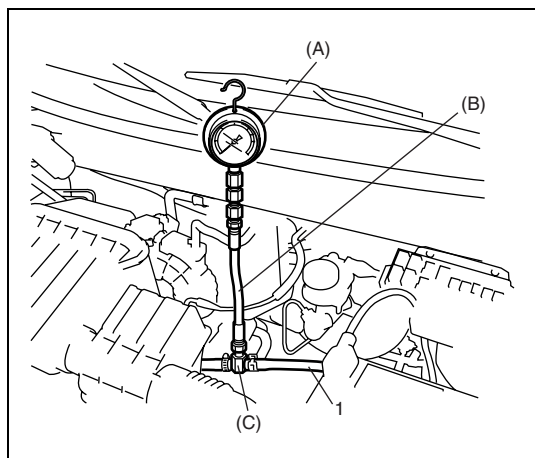
WARNING:

Be sure to perform work in a well-ventilated area and away from any open flames, or there is a risk of a fire breaking out.

- 1) Relieve fuel pressure in fuel feed line referring to "Fuel Pressure Relief Procedure" in Section 6-2.
- 2) Disconnect fuel feed hose from fuel delivery pipe.

CAUTION:

A small amount of fuel may be released when fuel hose is disconnected. Place container under the joint with a shop cloth so that released fuel is caught in container or absorbed in cloth. Place that cloth in an approved container.



- 3) Connect special tools and hose between fuel delivery pipe and fuel feed hose (1) as shown in figure, and clamp hoses securely to ensure no leaks occur during checking.

Special tool

(A): 09912-58442

(B): 09912-58432

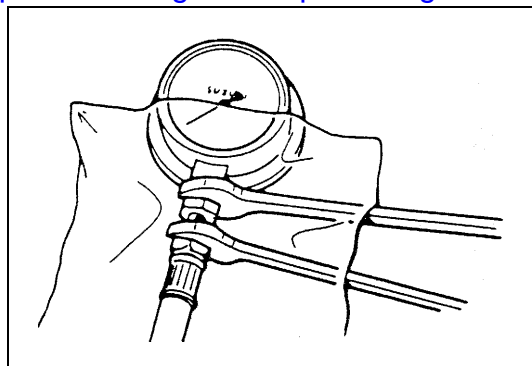
(C): 09912-58490

- 4) Check that battery voltage is above 11 V.
- 5) Turn ignition switch ON to operate fuel pump and after 2 seconds turn it OFF. Repeat this 3 or 4 times and then check fuel pressure.

Fuel pressure specification

CONDITION	FUEL PRESSURE
With fuel pump operating and engine stopped	270 – 310 kPa (2.7 – 3.1 kg/cm ² , 38.4 – 44.0 psi)
At specified idle speed	
With 1 min. after engine (fuel pump) stop (Pressure reduces as time passes)	over 250 kPa (2.5 kg/cm ² , 35.6 psi)

- 6) Start engine and warm it up to normal operating temperature.
- 7) Measure fuel pressure at idling.
If measured pressure does not satisfy specification, refer to "Diagnostic Flow Table B-3" in Section 6-2 and check each possibly defective part. Replace if found defective.



8) After checking fuel pressure, remove fuel pressure gauge.

CAUTION:

As fuel feed line is still under high fuel pressure, make sure to release fuel pressure according to following procedures.

- Place fuel container under joint.
- Cover joint with rag and loosen joint nut slowly to release fuel pressure gradually.

9) Remove special tools from fuel delivery pipe and fuel feed hose.

10) Connect fuel feed hose to fuel delivery pipe and clamp it securely.

11) With engine "OFF" and ignition switch "ON", check for fuel leaks.

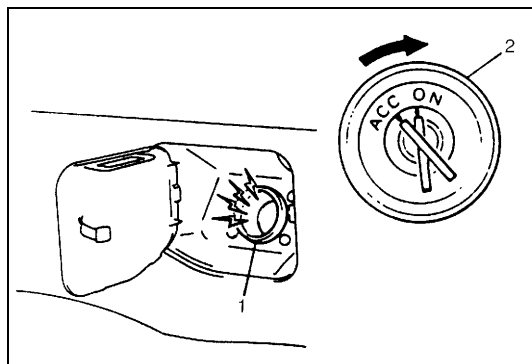
Fuel pump with pressure regulator on-vehicle inspection

CAUTION:

When fuel filler cap is removed in any procedure, work must be done in a well-ventilated area, keep away from any open flames and without smoking.

NOTE:

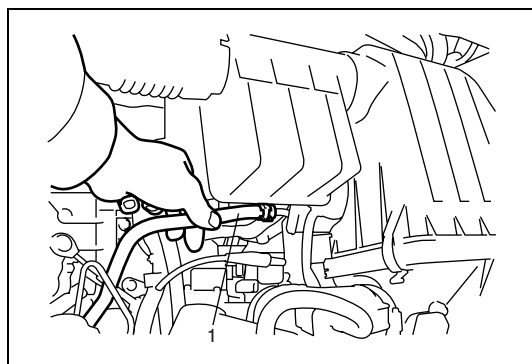
The fuel pressure regulator is the one body with the fuel pump assembly so individual inspection of it is impossible.



1) Remove filler cap and turn ON ignition switch. Then fuel pump operating sound should be heard from fuel filler for about 2 seconds and stop. Be sure to reinstall fuel filler cap after checking.

If above check result is not satisfactory, advance to "Diagnostic Flow Table B-2" in Section 6-2.

- | |
|--------------------|
| 1. Fuel filler |
| 2. Ignition switch |



2) Turn OFF ignition switch and leave over 10 minutes as it is.

3) Fuel pressure should be felt at fuel feed hose (1) for about 2 seconds after ignition switch ON.

If fuel pressure is not felt, advance to "Diagnostic Flow Table B-3" in Section 6-2.

Fuel pump with pressure regulator removal and installation

Removal

Remove fuel tank from body according to procedure described in "Fuel Tank Removal and Installation" of Section 6C and remove fuel pump from fuel tank.

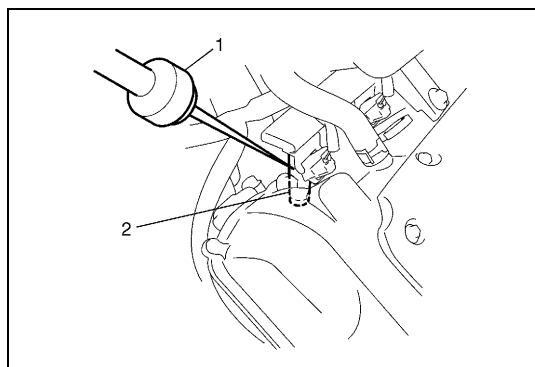
Installation

- 1) Install fuel pump to its bracket.
- 2) Install fuel pump to fuel tank and then install fuel tank to body according to procedure described in "Fuel Tank Removal and Installation" of Section 6C.

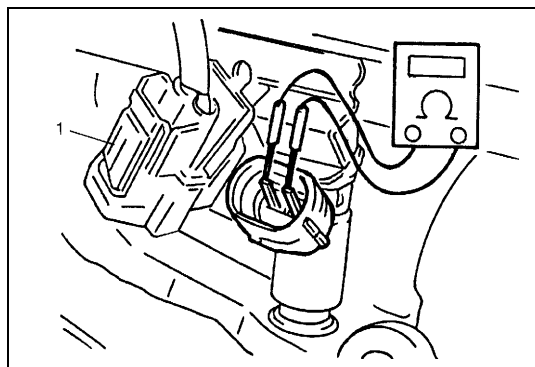
Fuel pump with pressure regulator inspection

Check fuel pump filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in fuel tank.

Fuel injector on-vehicle inspection



- 1) Using sound scope (1) or such, check operating sound of injector (2) when engine is running or cranking. Cycle of operating sound should vary according to engine speed. If no sound or an unusual sound is heard, check injector circuit (wire or connector) or injector (2).



- 2) Disconnect connector (1) from injector, connect ohmmeter between terminals of injector and check resistance. If resistance is out of specification, replace.

Resistance of fuel injector

11.3 – 13.8 Ω at 20°C (68°F)

- 3) Connect connector (1) to injector securely.

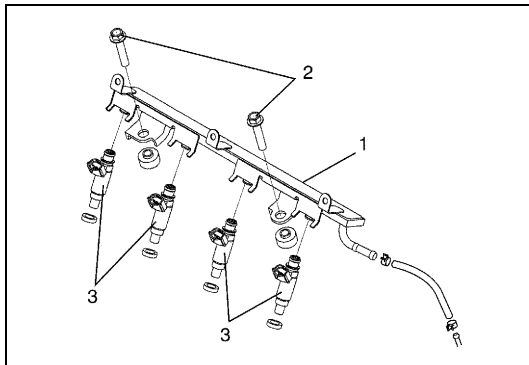
Fuel injector removal and installation

Removal

CAUTION:

A small amount of fuel may come out after removal of fuel injectors, cover them with shop cloth.

- 1) Relieve fuel pressure according to procedure described in "Fuel Pressure Relief Procedure" of Section 6-2.
- 2) Disconnect battery negative cable at battery.
- 3) Disconnect MAF and IAT sensor connector, and detach EVAP canister purge valve.
- 4) Remove air cleaner assembly with air intake pipe.
- 5) Disconnect fuel injector couplers.
- 6) Disconnect fuel feed hose from fuel delivery pipe (1).
- 7) Remove fuel delivery pipe bolts (2).
- 8) Remove fuel injector(s) (3).



Installation

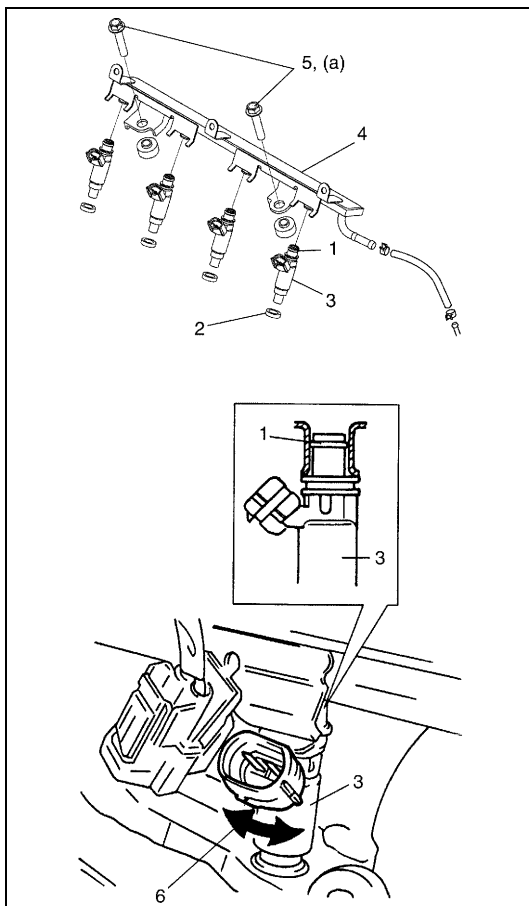
For installation, reverse removal procedure and note following precautions.

- Replace injector O-ring (1) with new one using care not to damage it.
- Check if cushion (2) is scored or damaged. If it is, replace with new one.
- Apply thin coat of fuel to O-rings (1) and then install injectors (3) into delivery pipe (4) and cylinder head. Make sure that injectors (3) rotate smoothly (6). If not, probable cause is incorrect installation of O-ring (1). Replace O-ring (1) with new one.
- Tighten delivery pipe bolts (5) and make sure that injectors (3) rotate smoothly (6).

Tightening torque

Delivery pipe bolts (a): 25 N·m (2.5 kg·m, 18.0 lb·ft)

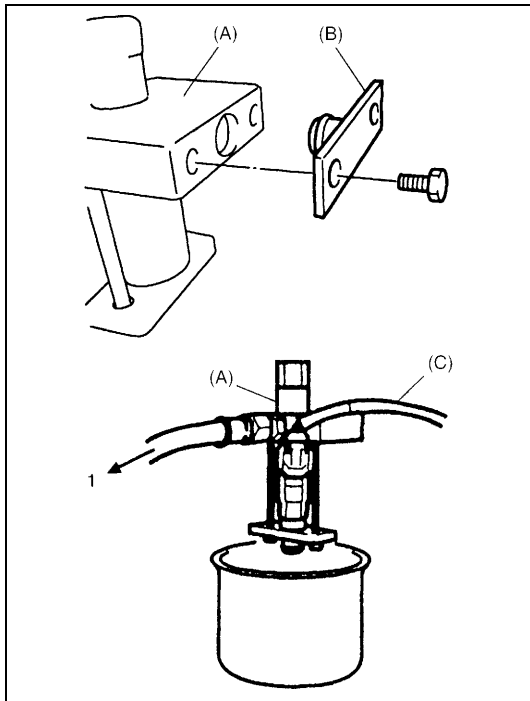
- After installation, with engine "OFF" and ignition switch "ON", check for fuel leaks around fuel line connection.



Fuel injector inspection**WARNING:**

As fuel is injected in this inspection, perform in a well ventilated area and away from open flames.

Use special care to prevent sparking when connecting and disconnecting test lead to and from battery.



- 1) Install injector to special tool (injector checking tool).

Special tool

(A): 09912-58421

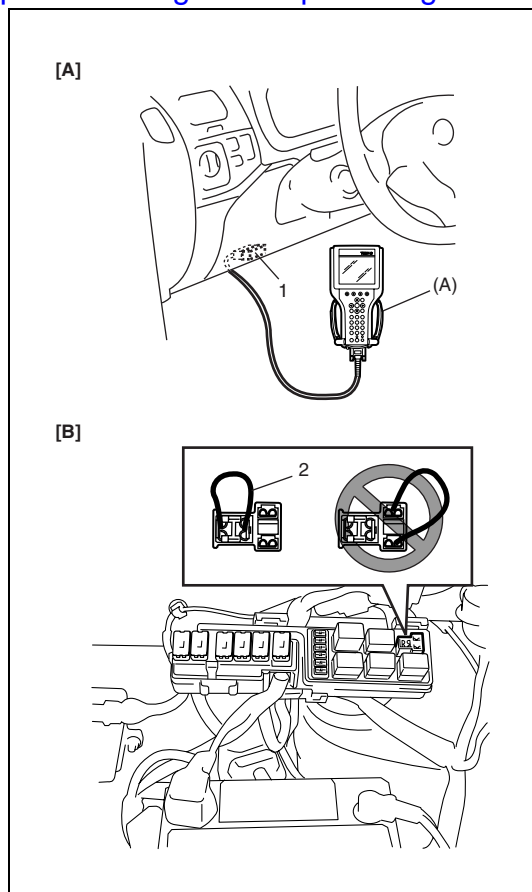
(B): 09912-57610

- 2) Connect special tools (hose and attachment) to fuel feed pipe (1) of vehicle.
- 3) Connect special tool (test lead) to injector.

Special tool

(C): 09930-88530

- 4) Install suitable vinyl tube onto injector nozzle to prevent fuel from splashing out when injecting.
- 5) Put graduated cylinder under injector.



6) Operate fuel pump and apply fuel pressure to injector as follows:

a) When using scan tool:

i) Connect scan tool to DLC (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool

ii) Turn ignition switch ON, clear DTC and select "MISC TEST" mode on scan tool.

iii) Turn fuel pump ON by using scan tool.

b) Without using scan tool:

i) Remove fuel pump relay from connector.

ii) Connect two terminals of relay connector using service wire (2) as shown in figure.

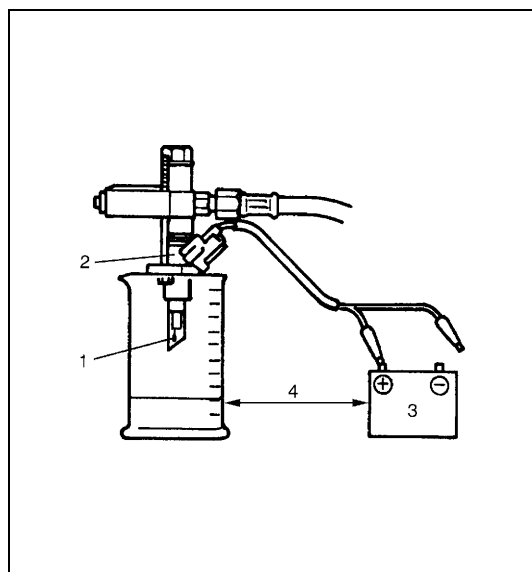
CAUTION:

Check to make sure that connection is made between correct terminals. Wrong connection can cause damage to ECM, wire harness, etc.

iii) Turn ignition switch ON.

[A]: When using SUZUKI scan tool

[B]: When not using SUZUKI scan tool



7) Apply battery voltage (3) to injector (2) for 15 seconds and measure injected fuel volume with graduated cylinder.

Test each injector two or three times.

If not within specification, replace injector.

Injected fuel volume

43 – 47 cc/15 sec. (1.45/1.51 – 1.58/ 1.65 US/Imp. oz/15 sec.)

8) Check fuel leakage from injector nozzle. Do not operate injector for this check (but fuel pump should be at work).

If fuel leaks (1) more than following specifications, replace.

Fuel leakage

Less than 1 drop/min.

4. Keep as far apart as possible

Electronic Control System

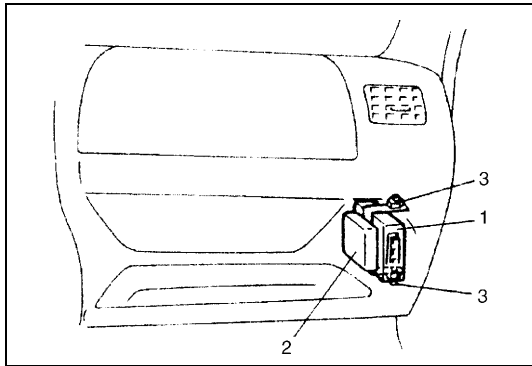
Engine control module (ECM) removal and installation

CAUTION:

As ECM consists of precision parts, be careful not to expose it to excessive shock.

Removal

- 1) Disconnect battery negative cable at battery.
- 2) Disable air bag system, refer to "Disabling Air Bag System" in Section 10B if equipped.
- 3) Remove glove box.
- 4) Disconnect ECM (1) and TCM (2) (if equipped) couplers.
- 5) Loosen 2 nuts (3) and remove ECM and TCM (if equipped).

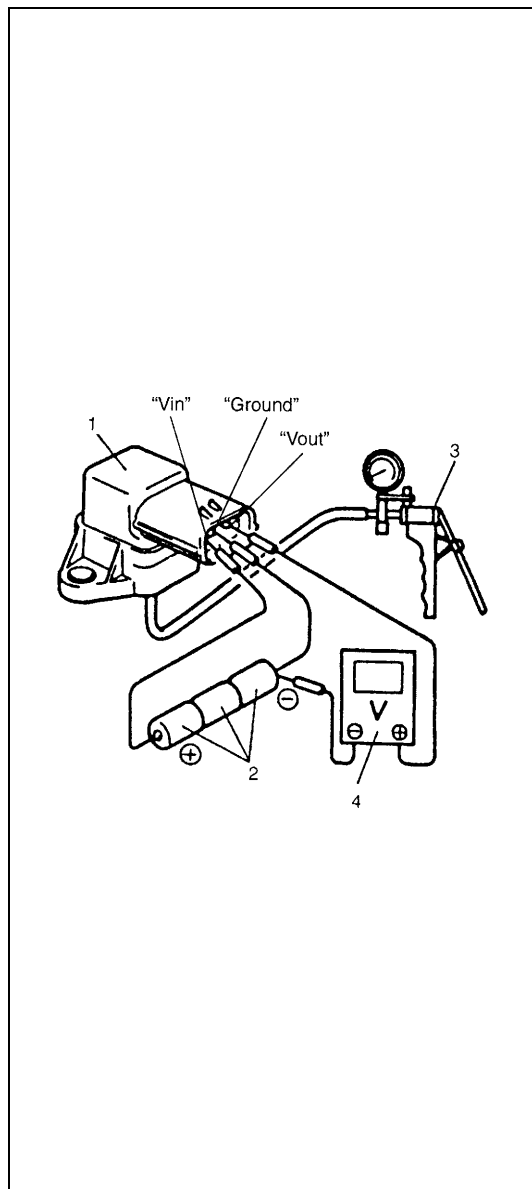


Installation

Reverse removal procedure noting the following:

- Connect couplers to ECM and TCM (if equipped) securely.

Manifold absolute pressure sensor (MAP sensor) inspection



- 1) Disconnect connector from MAP sensor (1).
- 2) Remove MAP sensor (1).
- 3) Arrange 3 new 1.5 V batteries (2) in series (check that total voltage is 4.5 – 5.0 V) and connect its positive terminal to “Vin” terminal of sensor and negative terminal to “Ground” terminal. Then check voltage between “Vout” and “Ground”. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump (3).

Output voltage (When input voltage is 4.5 – 5.5 V, ambient temp. 20 – 30°C, 68 – 86°F)

ALTITUDE (Reference)		BAROMETRIC PRESSURE		OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	(kPa)	(V)
0	0	760	100	3.3 – 4.3
2 000	610	707	94	
2 001	611	Under 707 over 634	94	3.0 – 4.1
5 000	1 524		85	
5 001	1 525	Under 634 over 567	85	2.7 – 3.7
8 000	2 438		76	
8 001	2 439	Under 567 over 526	76	2.5 – 3.3
10 000	3 048		70	

If check result is not satisfactory, replace MAP sensor (1).

- 4) Install MAP sensor (1) securely.
- 5) Connect MAP sensor (1) connector securely.

4. Digital type voltmeter

Throttle position sensor (TP sensor) on-vehicle inspection

- 1) Disconnect negative cable at battery.
- 2) Detach purge valve chamber, and remove air cleaner outlet hose.
- 3) Disconnect TP sensor connector.
- 4) Using ohmmeter, check resistance between terminals under each condition given in table below.
If check result is not satisfactory, replace TP sensor.

TP sensor resistance

TERMINALS	RESISTANCE
Between 1 and 3 terminals	4.0 – 6.0 k Ω
Between 2 and 3 terminals	20 Ω – 6.0 k Ω , varying according to throttle valve opening.

NOTE:

There should be more than 2 k Ω resistance difference between when throttle valve is at idle position and when it is fully open.

- | |
|-------------------------------|
| 1. Reference voltage terminal |
| 2. Output voltage terminal |
| 3. Ground terminal |

- 5) Connect TP sensor connector securely.
- 6) Connect negative cable to battery.

Throttle position sensor (TP sensor) removal and installation

Removal

- 1) Disconnect battery negative cable at battery.
- 2) Detach purge valve chamber, and remove air cleaner outlet hose.
- 3) Disconnect TP sensor connector and remove TP sensor from throttle body.

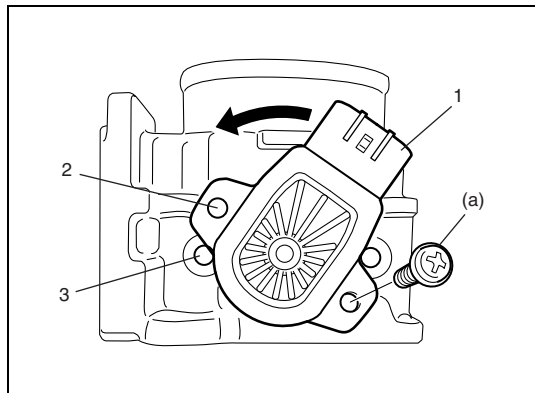
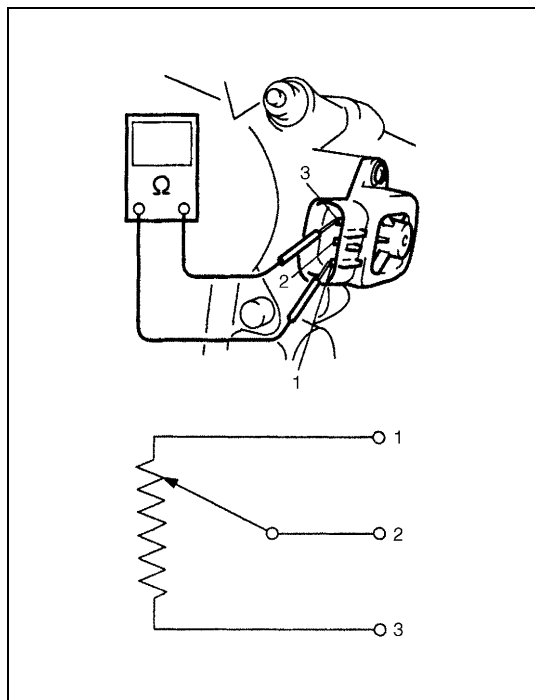
Installation

- 1) Install TP sensor (1) to throttle body.
Fit TP sensor to throttle body in such way that its holes (3) are a little away from TP sensor screw holes (2) as shown in figure and turn TP sensor clockwise so that those holes align.

Tightening torque

TP sensor screw (a): 2.5 N·m (0.25 kg·m, 1.8 lb·ft)

- 2) Connect connector to TP sensor securely.
- 3) Connect battery negative cable to battery.



Engine coolant temperature sensor (ECT sensor) removal and installation

Removal

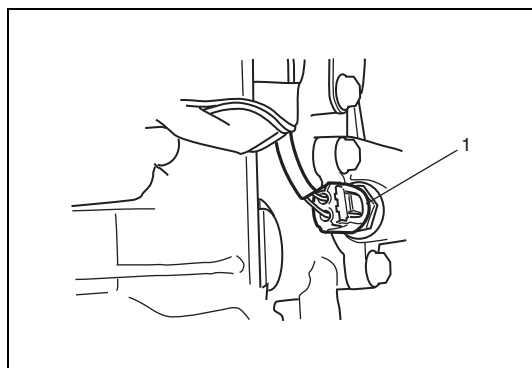
- 1) Disconnect battery negative cable at battery.
- 2) Drain coolant referring to "Cooling System Draining" in Section 6B2.

WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot.

Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

- 3) Remove air intake pipe.
- 4) Disconnect connector from ECT sensor.
- 5) Remove ECT sensor (1) from thermostat case.



Installation

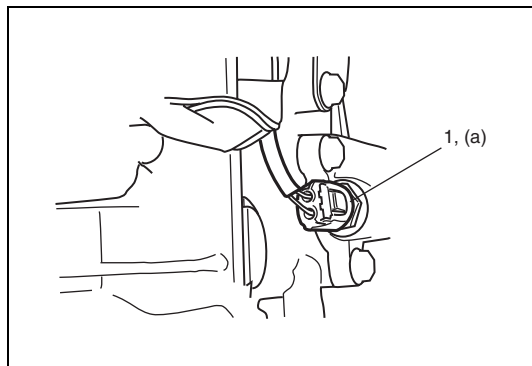
Reverse removal procedure noting the following:

- Clean mating surfaces of ECT sensor (1) and water outlet cap.
- Check O-ring for damage and replace if necessary.
- Tighten ECT sensor (1) to specified torque.

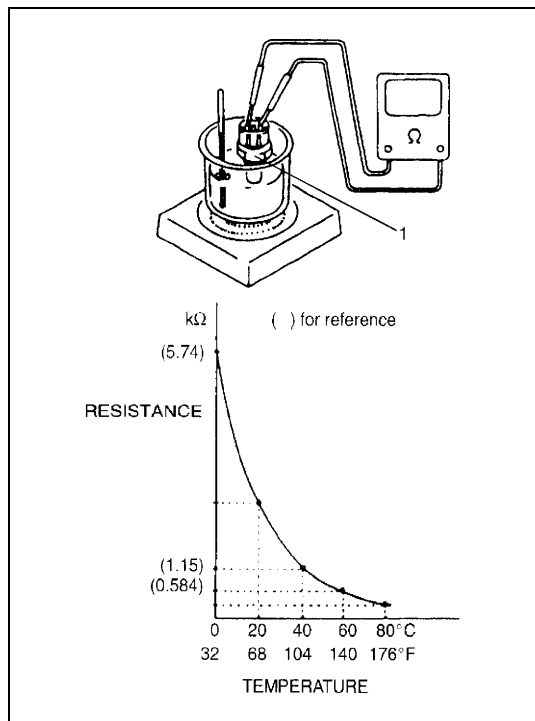
Tightening torque

ECT sensor (a): 15 N·m (1.5 kg-m, 11.5 lb-ft)

- Connect connector to ECT sensor (1) securely.
- Refill coolant referring to "Cooling System Refill" in Section 6B2.



Engine coolant temperature sensor (ECT sensor) inspection



Immerse temperature sensing part of ECT sensor (1) in water (or ice) and measure resistance between terminals while heating water gradually.

If measured resistance does not show such characteristic as shown in the graph, replace ECT sensor (1).

Heated oxygen sensor (HO2S-1 and HO2S-2) heater on-vehicle inspection

- 1) Disconnect sensor connector.
- 2) Using ohmmeter, measure resistance between terminals "V_B" and "GND" of sensor connector.
If found faulty, replace oxygen sensor.

NOTE:

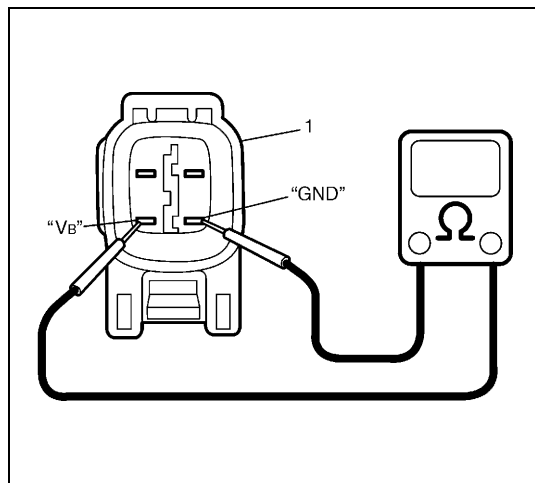
**Temperature of sensor affects resistance value largely.
Make sure that sensor heater is at correct temperature.**

Resistance of oxygen sensor heater

HO2S-1: 5.0 – 6.4 Ω at 20 $^{\circ}C$ (68 $^{\circ}F$)

HO2S-2: 11.7 – 14.3 Ω at 20 $^{\circ}C$ (68 $^{\circ}F$)

1. Viewed from terminal side



- 3) Connect sensor connector securely.

Heated oxygen sensor (HO2S-1 and HO2S-2) removal and installation

Removal

WARNING:

To avoid danger of being burned, do not touch exhaust system when system is hot. Oxygen sensor removal should be performed when system is cool.

- 1) Disconnect negative cable at battery.
- 2) For HO2S-1, disconnect connector of heated oxygen sensor and release its wire harness from clamps.
- 3) Remove front bumper and engine front cover.
- 4) For HO2S-2, disconnect connector of heated oxygen sensor and release its wire harness from clamp and hoist vehicle.
- 5) Remove heated oxygen sensor (1) from exhaust pipe.

Installation

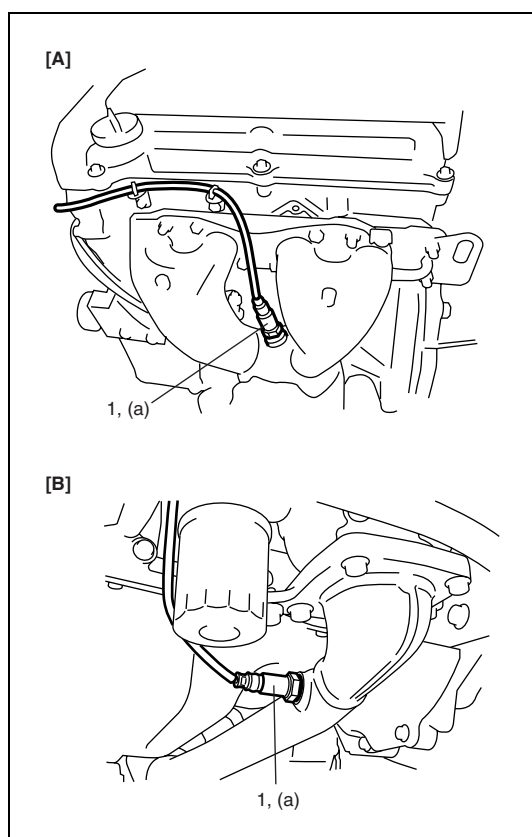
Reverse removal procedure noting the following.

- Tighten heated oxygen sensor (1) to specified torque.

Tightening torque

Heated oxygen sensor (a): 45 N·m (4.5 kg·m, 32.5 lb·ft)

- Connect connector of heated oxygen sensor (1) and clamp wire harness securely.
- After installing heated oxygen sensor (1), start engine and check that no exhaust gas leakage exists.



[A]: HO2S-1

[B]: HO2S-2

Camshaft position sensor (CMP sensor) and its circuit inspection

- 1) Confirm that terminal voltages and ground circuit continuity at CMP sensor connector terminals are in good condition referring to Step 3 and 5 of "DTC P0340 Diag. Flow" in Section 6-2.
If not, repair CMP sensor circuit.
- 2) Check that CMP sensor signal voltage varies from low to high or from high to low as specified referring to Step 7 of "DTC P0340 Diag. Flow" in Section 6-2.
If signal voltage varies as specified, CMP sensor is in good condition.
If not, replace CMP sensor.

Camshaft position sensor (CMP sensor) removal and installation

Removal

- 1) Disconnect negative cable at battery.
- 2) Disconnect connector from camshaft position sensor.
- 3) Remove camshaft position sensor from cylinder head.

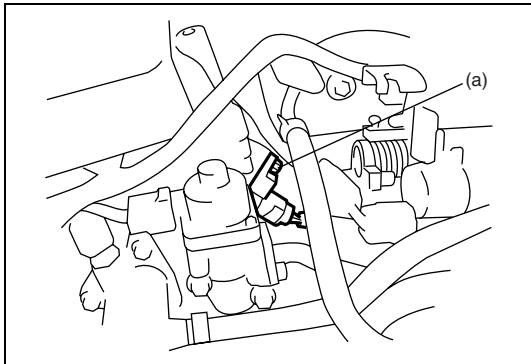
Installation

- 1) Check that O-ring is free from damage.
- 2) Check that camshaft position sensor and signal rotor teeth are free from any metal particles and damage.
- 3) Install camshaft position sensor to cylinder head.

Tightening torque

Camshaft position sensor bolt

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 4) Connect connector to it securely.
- 5) Connect negative cable to battery.

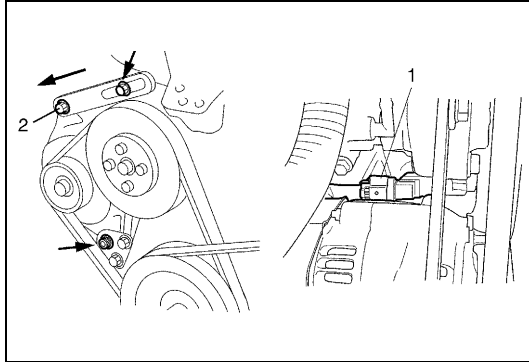
Crankshaft position sensor (CKP sensor) and its circuit inspection

- 1) Confirm that terminal voltages and ground circuit continuity at CKP sensor connector terminals are in good condition referring to Step 3 and 5 of "DTC P0335 Diag. Flow" in Section 6-2.
If not, repair CKP sensor circuit.
- 2) Check that CKP sensor signal voltage varies from low to high or from high to low as specified referring to Step 7 of "DTC P0335 Diag. Flow" in Section 6-2.
If signal voltage varies as specified, CKP sensor is in good condition.
If not, replace CKP sensor.

Crankshaft position sensor (CKP sensor) removal and installation

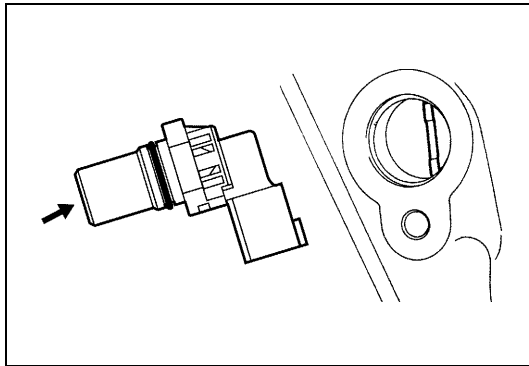
Removal

- 1) Disconnect negative cable at battery.
- 2) Remove generator drive belt, loosen pivot bolt (2) and move generator rearward.
- 3) Disconnect connector from crankshaft position sensor.
- 4) Remove crankshaft position sensor (1) from cylinder block.



Installation

- 1) Check to make sure that crankshaft position sensor and pulley teeth are free from any metal particles and damage.



- 2) Install crankshaft position sensor to cylinder block.
- 3) Connect connector to it securely.
- 4) Adjust generator belt tension, refer to "Water Pump/Generator Drive Belt Tension Inspection and Adjustment" in Section 6B2.
- 5) Connect negative cable to battery.

Fuel Level Sensor Removal and Installation

Refer to "Fuel Pump Assembly Removal and Installation" in Section 6C.

Fuel Level Sensor Inspection

Refer to "Fuel Meter/Fuel Gauge Unit" in Section 8C.

Vehicle speed sensor (VSS) and its circuit inspection

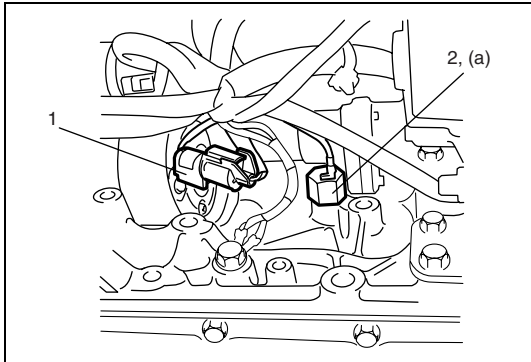
- 1) Confirm that terminal voltage and ground circuit continuity at VSS connector terminals are in good condition referring to Step 3 to 5 of "DTC P0500 Diag. Flow" in Section 6-2.
If not, repair VSS circuit.
- 2) Check that VSS signal voltage varies from low to high or from high to low as specified voltage referring to Step 9 of "DTC P0500 Diag. Flow" in Section 6-2.
If signal voltage varies as specified, VSS is in good condition.
If not, replace VSS.

Vehicle speed sensor (VSS) removal and installation

Refer to "Vehicle Speed Sensor (VSS) Removal and Installation" in Section 7A2.

Knock sensor removal and installation**Removal**

- 1) Disconnect negative cable from battery.
- 2) Hoist vehicle.
- 3) Disconnect knock sensor connector (1).
- 4) Remove knock sensor (2) from cylinder block.

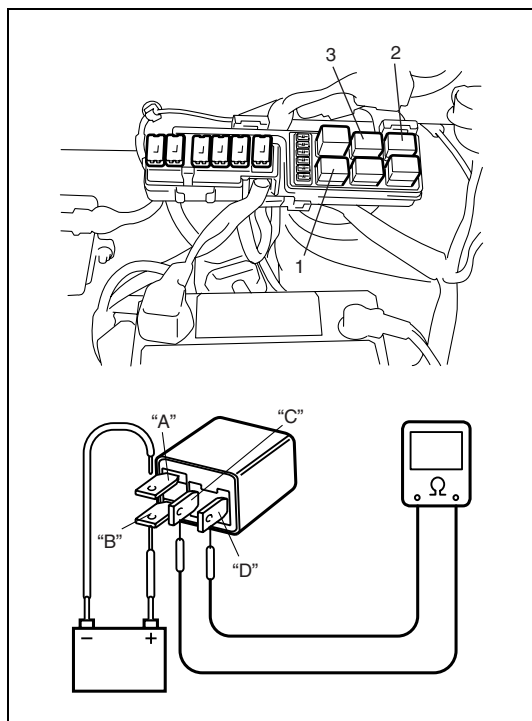
**Installation**

Reverse removal procedure for installation.

Tightening torque

Knock sensor (a): 22 N·m (2.2 kg-m, 16.0 lb-ft)

Main relay, fuel pump relay and radiator fan relay inspection

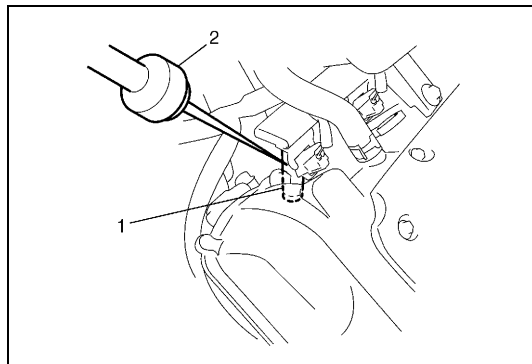


- 1) Disconnect negative cable at battery.
- 2) Remove main relay (1), fuel pump relay (2) and radiator fan relay (3) from relay box.
- 3) Check that there is no continuity between terminal "C" and "D". If there is continuity, replace relay.
- 4) Connect battery positive (+) terminal to terminal "B" of relay. Connect battery negative (-) terminal "A" of relay. Check continuity between terminal "C" and "D". If there is no continuity when relay is connected to the battery, replace relay.

Fuel cut operation inspection

NOTE:

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range), A/C is OFF and that parking brake lever is pulled all the way up.



- 1) Warm up engine to normal operating temperature.
- 2) While listening to sound of injector (1) by using sound scope (2) or such, increase engine speed to higher than 3,000 r/min.
- 3) Check to make sure that sound to indicate operation of injector stops when throttle valve is closed instantly and it is heard again when engine speed is reduced to less than about 2,000 r/min.

Radiator fan control system inspection**System Inspection****WARNING:**

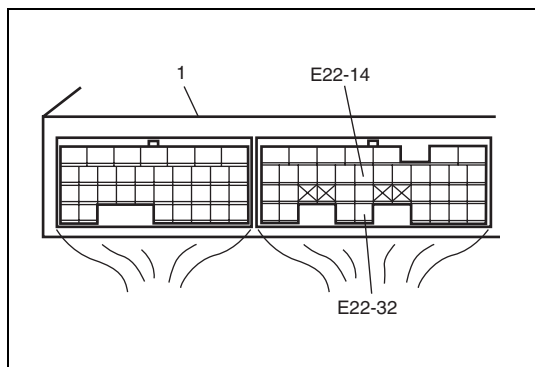
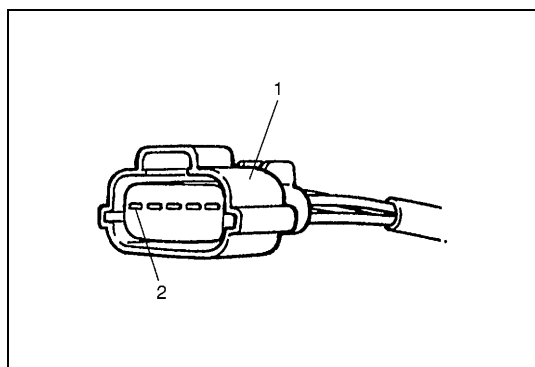
Keep hands, tools, and clothing away from engine cooling fan to help prevent personal injury. This fan is electric and can come on whether or not the engine is running. The fan can start automatically in response to the ECT sensor with the ignition switch in the "ON" position.

Check system for operation referring to "Diag. Flow Table B-7" in Section 6-2.

If radiator fan fails to operate properly, check relay, radiator fan and electrical circuit.

Mass air flow (MAF) and intake air temperature (IAT) sensor on-vehicle inspection

- 1) Disconnect negative cable at battery.
- 2) Disconnect MAF and IAT sensor connector.
- 3) Connect voltmeter to "BLK/RED" wire terminal (2) of MAF and IAT sensor coupler (1) disconnected and ground.
- 4) Turn ignition switch ON and check that voltage is battery voltage.
If not, check if wire harness is open or connection is poor.



- 5) Turn ignition switch OFF and connect coupler to MAF and IAT sensor.
- 6) Turn ignition switch ON and check MAF signal voltage between "E22-14" terminal and "E22-32" terminal of ECM coupler.

MAF signal voltage of MAF and IAT sensor at ignition switch ON: 0.5 – 1.0 V

1. ECM

- 7) Start engine and check that voltage is lower than 5 V and it rises as engine speed increases.

MAF signal reference voltage of MAF and IAT sensor at specified Idle speed: 1.3 – 1.8 V

- 8) If check result is not as specified above, cause may lie in wire harness, coupler connection, MAF and IAT sensor or ECM.

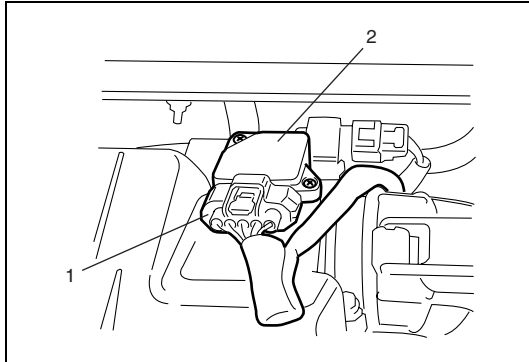
Mass air flow (MAF) and intake air temperature (IAT) sensor removal and installation

CAUTION:

- Do not disassemble MAF and IAT sensor.
- Do not expose MAF and IAT sensor to any shock.
- Do not cleansing MAF and IAT sensor.
- If MAF and IAT sensor has been dropped, it should be replaced.
- Do not blow compressed air by using air gun or the like.
- Do not put finger or any other object into MAF and IAT sensor. Malfunction may occur.

Removal

- 1) Disconnect negative cable at battery.
- 2) Disconnect MAF and IAT sensor coupler (1).
- 3) Remove MAF and IAT sensor (2) from air cleaner assembly.



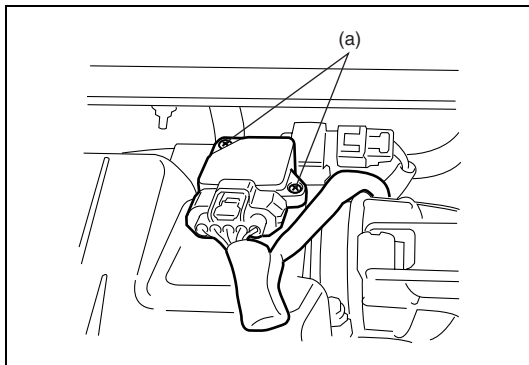
Installation

Reverse removal procedure noting the followings.

- Tighten MAF and IAT sensor screws to specified torque.

Tightening torque

MAF sensor screw (a): 2.5 N·m (0.25 kg-m, 1.8 lb-ft)



- Connect MAF and IAT sensor coupler securely.

Mass air flow (MAF) and intake air temperature (IAT) sensor inspection

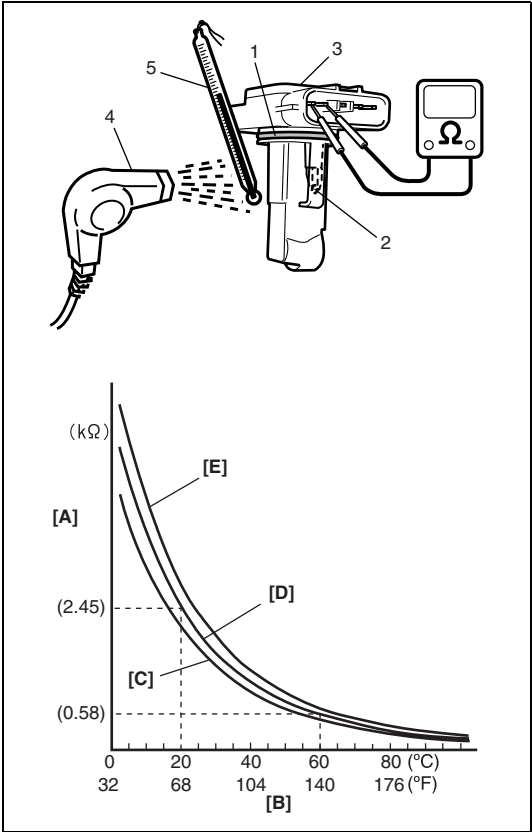
CAUTION:
Do not heat up the MAF and IAT sensor more than 100°C (212°F). Otherwise, the MAF and IAT sensor is damaged.

- Check sensor O-ring (1) for damage and deterioration. Replace as necessary.
- Blow hot air to temperature sensing part (2) of MAF and IAT sensor (3) using hot air drier (4) and measure resistance between sensor terminals while heating air gradually. If measured resistance does not show such characteristic as shown, replace MAF and IAT sensor.

Intake air temperature sensor resistance

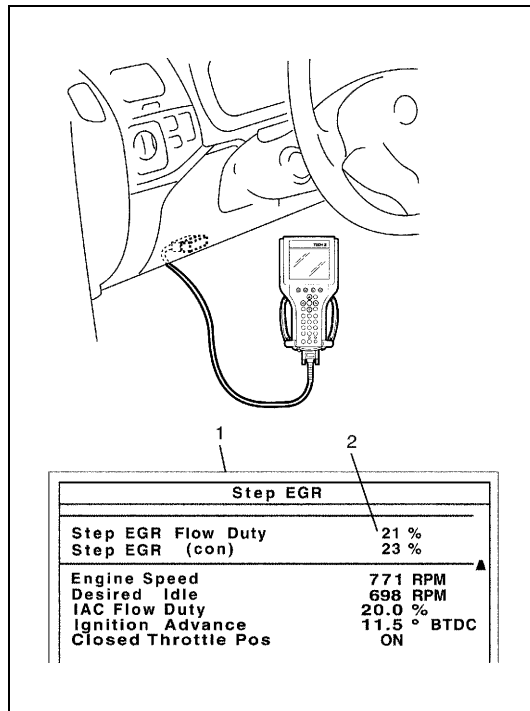
Temperature	Resistance
20°C (68°F)	2.21 – 2.69 kΩ
60°C (140°F)	0.493 – 0.667 kΩ

[A]: Resistance
[B]: Temperature
[C]: Lower limit
[D]: Nominal
[E]: Upper limit
5. Temperature gauge



Emission Control System

EGR system inspection



- 1) Connect SUZUKI scan tool to data link connector (DLC) with ignition switch turn OFF.
- 2) Turn ON ignition switch and erase DTC using "CLEAR DTC" in "TROUBLE CODES" menu.
- 3) Start engine and warm up it to normal operating temperature then select "DATA LIST" mode on scan tool.
- 4) Make sure that vehicle condition is as following.
 - Vehicle speed = 0 km/h (0 KPH)
 - Engine speed ≤ 900 rpm
 - Engine coolant temp. ≥ 90°C, 164°F
- 5) With engine idling (without depressing accelerator pedal), open EGR valve using "STEP EGR" mode in "MISC. TEST" menu.

In this state, according as EGR valve opening increases engine idle speed drops. If not, possible cause is clogged EGR gas passage, stuck or faulty EGR valve.

- | |
|---|
| 1. SUZUKI scan tool display |
| 2. EGR valve opening (0: Close, 100: Full Open) |

EGR valve removal and installation

Removal

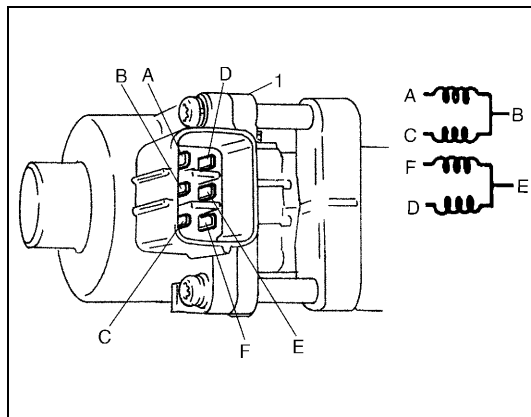
- 1) Disconnect negative cable at battery.
- 2) Remove air intake pipe.
- 3) Remove EGR pipe.
- 4) Disconnect EGR valve connector.
- 5) Remove EGR valve and gasket from cylinder head.

Installation

Reverse removal procedure noting following.

- Clean mating surface of valve and cylinder head.
- Use new gaskets.

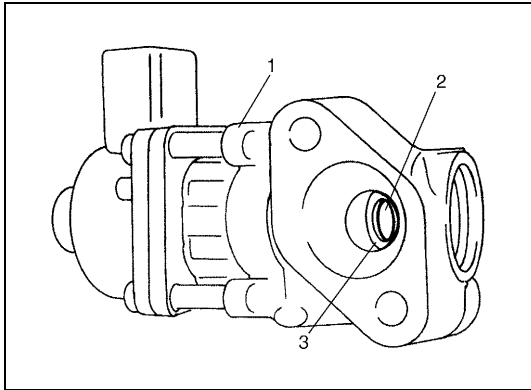
EGR valve inspection



- 1) Check resistance between following terminals of EGR valve (1) in each pair.
If found faulty, replace EGR valve assembly.

EGR valve resistance

Terminal	Standard resistance
A – B	20 – 24 Ω
C – B	
F – E	
D – E	



- 2) Remove carbon from EGR valve gas passage.

NOTE:

Do not use any sharp-edged tool to remove carbon. Be careful not to damage or bend EGR valve (1), valve seat (3) and rod.

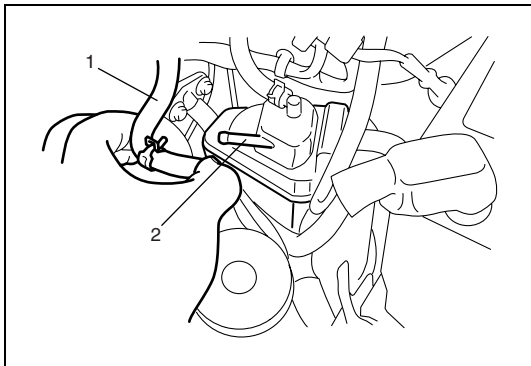
- 3) Inspect valve (2), valve seat and rod for fault, cracks, bend or other damage.
If found faulty, replace EGR valve assembly.

Evaporative emission control system inspection

EVAP Canister Purge

NOTE:

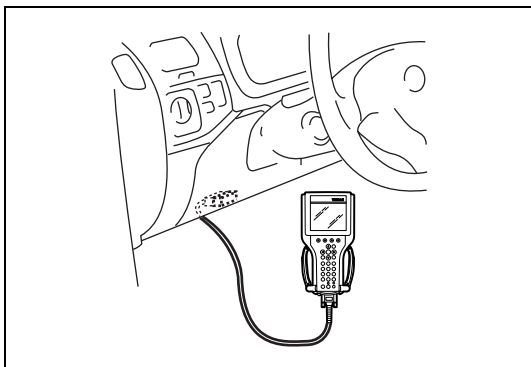
Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range) and that parking brake lever is pulled all the way up.

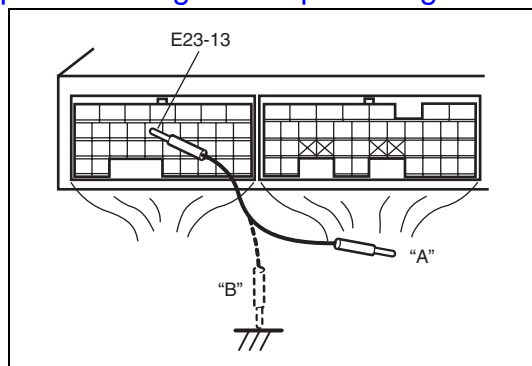


- 1) Disconnect purge hose (1) from EVAP canister (2).
- 2) Place finger against the end of disconnected hose and check that vacuum is not felt there when engine is cool and running at idle speed.
If check result is not satisfactory, check EVAP canister purge valve, wire harness and ECM.

EVAP Canister Purge Valve and Its Circuit

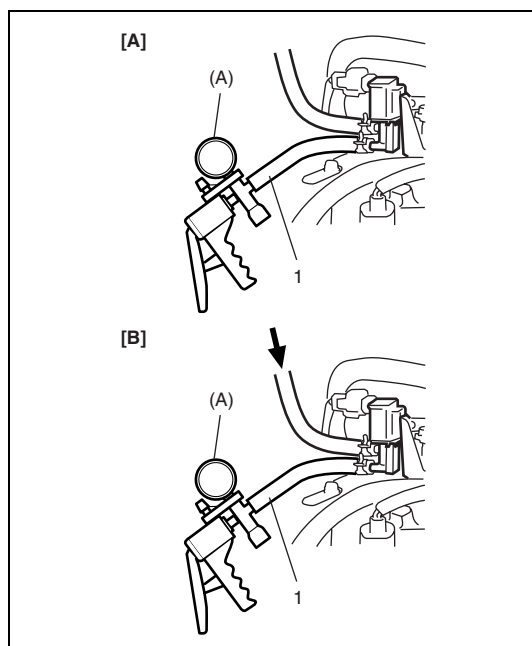
- 1) Prepare to operate EVAP canister purge valve as follows.
 - a) When using SUZUKI scan tool:
 - i) Connect SUZUKI scan tool to DLC with ignition switch OFF and disconnect purge valve vacuum hoses from intake manifold and purge valve chamber.
 - ii) Turn ON ignition switch, clear DTC and select "MISC TEST" mode on SUZUKI scan tool.
 - b) When not using SUZUKI scan tool:
 - i) Disconnect purge valve vacuum hoses from intake manifold and purge valve chamber.





ii) Turn ON ignition switch.

Using service wire, ground "E23-13" terminal of ECM connector (valve ON) "B" and unground it (valve OFF) "A".



2) Check purge valve for operation and vacuum passage for clog when valve is switched ON and OFF by using SUZUKI scan tool or service wire.

If check result is not described, check vacuum hoses, EVAP canister purge valve, wire harness and connections.

EVAP canister purge valve specification

[A] Valve OFF:

When vacuum is applied to hose (1), vacuum can be applied.

[B] Valve ON:

When vacuum is applied to hose (1), vacuum can not be applied.

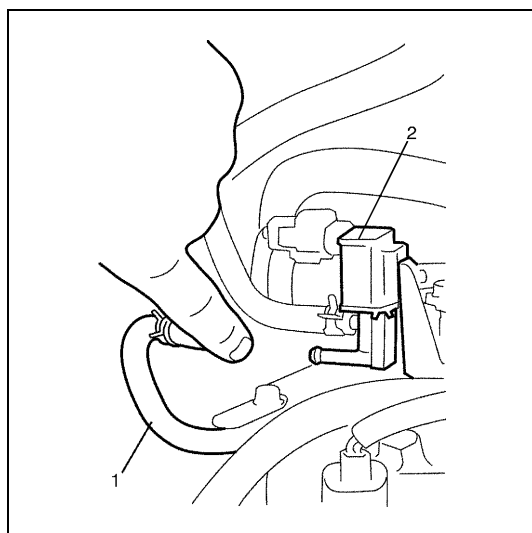
Special tool

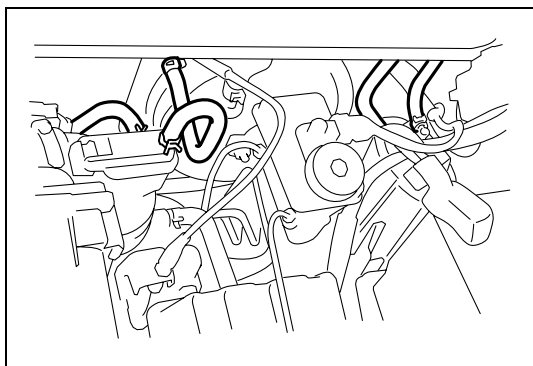
(A): 09917-47911

Vacuum Passage

Start engine and run it at idle speed. Disconnect vacuum hose (1) from EVAP canister purge valve (2). With finger placed against hose disconnected, check that vacuum is applied.

If it is not applied, clean vacuum passage by blowing compressed air.



Vacuum Hose

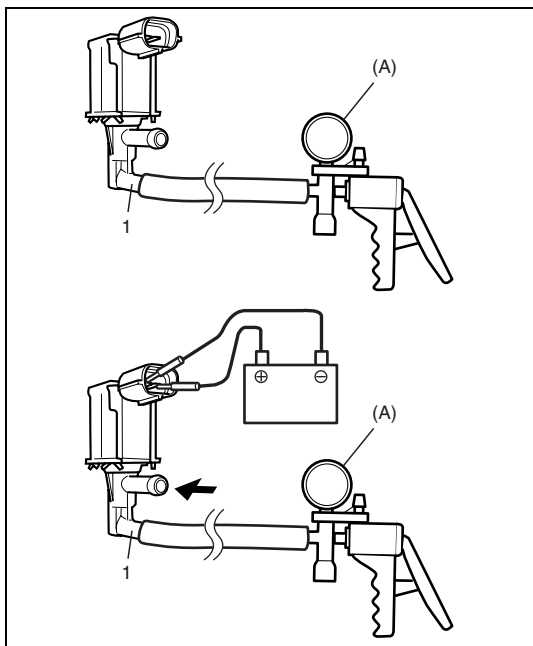
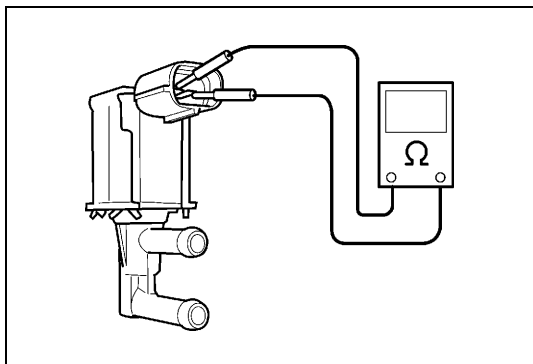
Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

EVAP Canister Purge Valve

- 1) With ignition switch OFF, disconnect coupler from canister purge valve.
- 2) Remove EVAP canister purge valve from air cleaner assembly.
- 3) Check resistance between two terminals of EVAP canister purge valve.
If resistance is not as specified, replace.

EVAP canister resistance

30 – 34 Ω at 20°C (68°F)



- 4) With coupler disconnected, apply vacuum to pipe (1).
If vacuum can be applied, go to next step.
If vacuum can not be applied, replace EVAP canister purge valve.
- 5) Connect 12 V-battery to EVAP canister purge valve terminals. In this state, apply vacuum to pipe (1).
If vacuum can not be applied, EVAP canister purge valve is in good condition.
If applied, replace EVAP canister purge valve.

WARNING:

Do not suck the air through valve. Fuel vapor inside valve is harmful.

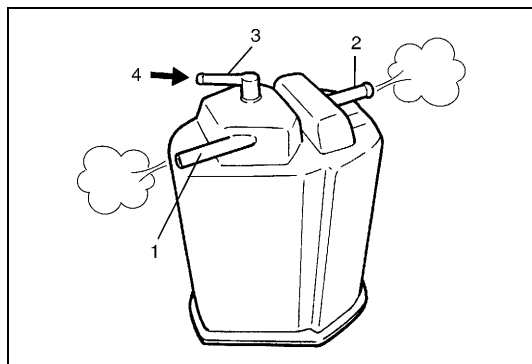
Special tool

(A): 09917-47911

- 6) Install EVAP canister purge valve to air cleaner assembly.

EVAP Canister**WARNING:**

DO NOT SUCK nozzles on EVAP canister. Fuel vapor inside EVAP canister is harmful.



- 1) Check outside of EVAP canister visually.
 - 2) Disconnect vacuum hoses from EVAP canister.
 - 3) Check that there should be no restriction of flow through purge pipe (1) and air pipe (2) when air is blown (4) into tank pipe (3).
- If any faulty condition is found in above inspection, replace.

PCV system inspection**NOTE:**

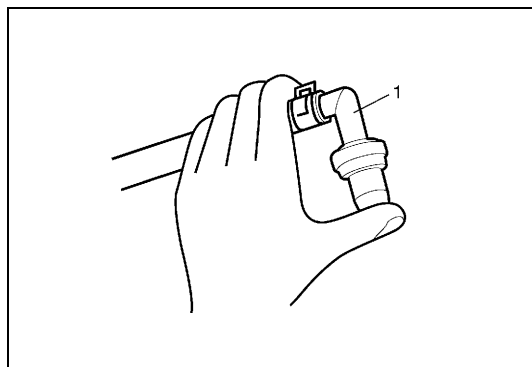
Be sure to check that there is no obstruction in PCV valve or its hoses before checking IAC duty, for obstructed PCV valve or hose hampers its accurate adjustment.

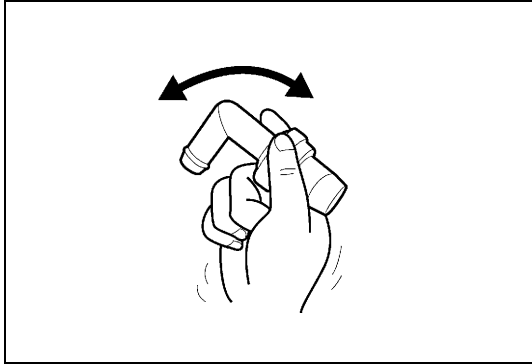
PCV Hose

Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

PCV Valve

- 1) Detach air cleaner assembly.
 - 2) Disconnect PCV valve from cylinder head cover and install plug to head cover hole.
 - 3) Install air cleaner assembly temporarily.
 - 4) Run engine at idle.
 - 5) Place your finger over end of PCV valve (1) to check for vacuum.
- If there is no vacuum, check for clogged valve. Replace as necessary.


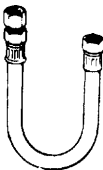
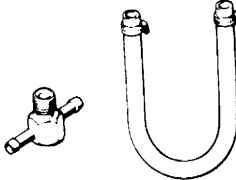
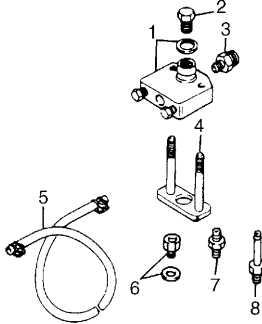

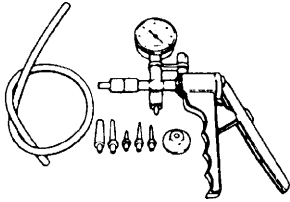
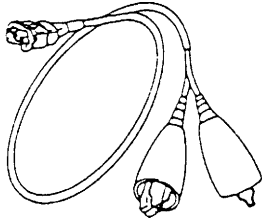
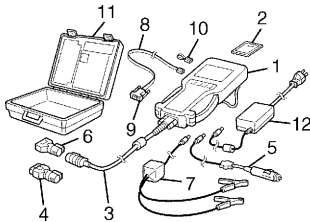




- 6) After checking vacuum, stop engine and remove PCV valve. Shake valve and listen for the rattle of check needle inside the valve. If valve does not rattle, replace valve.

- 7) After checking, remove plug and install PCV valve.
- 8) Install air cleaner assembly securely.

Special Tool

 <p>09912-58442 Pressure gauge</p>	 <p>09912-58432 Pressure hose</p>	 <p>09912-58490 3-way joint & hose</p>	 <p>09912-58421 Checking tool set (See NOTE "A".)</p>
 <p>09912-57610 Checking tool plate</p>	 <p>09917-47911 Vacuum pump gauge</p>	 <p>09930-88530 Injector test lead</p>	 <p>Tech 2 kit (SUZUKI scan tool) (See NOTE "B".)</p>

NOTE:

- "A": This kit includes the following items.

1. Tool body & washer, 2. Body plug, 3. Body attachment-1, 4. Holder, 5. Return hose & clamp, 6. Body attachment-2 & washer, 7. Hose attachment-1, 8. Hose attachment-2

- "B": This kit includes the following items.

1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adaptor, 5. Cigarette cable, 6. DLC loopback adaptor, 7. Battery power cable, 8. RS232 cable, 9. RS232 adaptor, 10. RS 232 loopback connector, 11. Storage case, 12. Power supply

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
TP sensor mounting screw	2.5	0.25	1.8
IAC valve screw	3.5	0.35	2.5
ECT sensor	15	1.5	11.5
Heated oxygen sensor	45	4.5	32.5
Camshaft position sensor	10	1.0	7.5
Knock sensor	22	2.2	16.0
Oil control valve mounting nut	11	1.1	8.0
Oil gallery pipe No.1 bolt	30	3.0	21.5
Delivery pipe bolt	25	2.5	18.0
MAF and IAT sensor screw	2.5	0.25	1.8
Accelerator cable lock nut	12	1.2	9.0

SECTION 6F2

IGNITION SYSTEM

(M13 ENGINE)

6F2

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View under “General Description” in Section 10B in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in Section 10B before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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General Description

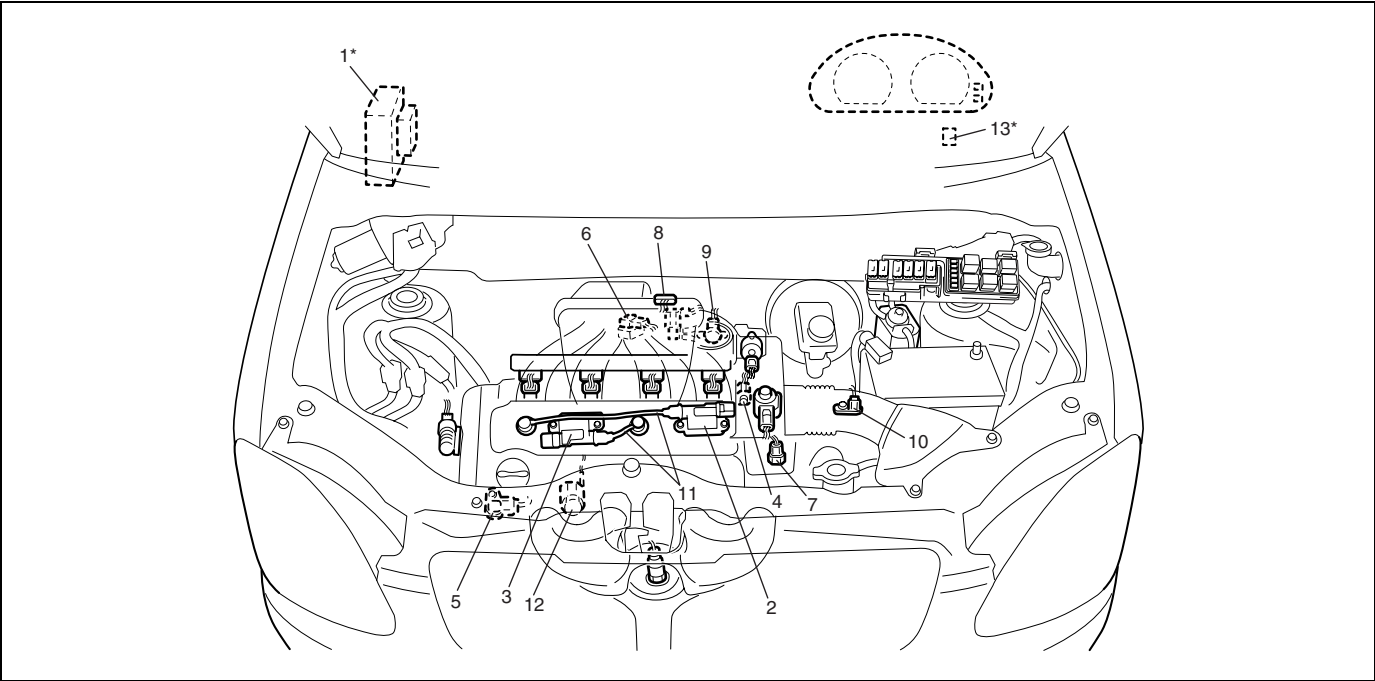
Ignition System Construction

The ignition system is an electronic (distributorless) ignition system. Its consists of the parts as described below.

- ECM
It detects the engine and vehicle conditions through the signals from the sensors, determines the most suitable ignition timing and time for electricity to flow to the primary coil and sends a signal to the ignitor (power unit) in the ignition coil assembly.
- Ignition coil assembly (including an igniter)
The ignition coil assembly has a built-in ignitor which turns ON and OFF the current flow to the primary coil according to the signal from ECM. When the current flow to the primary coil is turned OFF, a high voltage is induced in the secondary coil.
- High tension cords and spark plugs.
- CMP sensor (Camshaft position sensor) and CKP sensor (Crankshaft position sensor)
Using signals from these sensors, ECM identifies the specific cylinder whose piston is in the compression stroke, detects the crank angle and adjusts ignition timing automatically.
- TP sensor, ECT sensor, MAP sensor, MAF sensor, IAT sensor and other sensors/switches
Refer to “Electronic Control System” in Section 6E2 for details.

Although this ignition system does not have a distributor, it has two ignition coil assemblies (one is for No.1 and No.4 spark plugs and the other is for No.2 and No.3 spark plugs). When an ignition signal is sent from ECM to the ignitor in the ignition coil assembly for No.1 and No.4 spark plugs, a high voltage is induced in the secondary coil and that passes through the high-tension cords and causes No.1 and No.4 spark plugs to spark simultaneously. Likewise, when an ignition signal is sent to the ignitor in the other ignition coil assembly, No.2 and No.3 spark plugs spark simultaneously.

Ignition System Components Locator Diagram

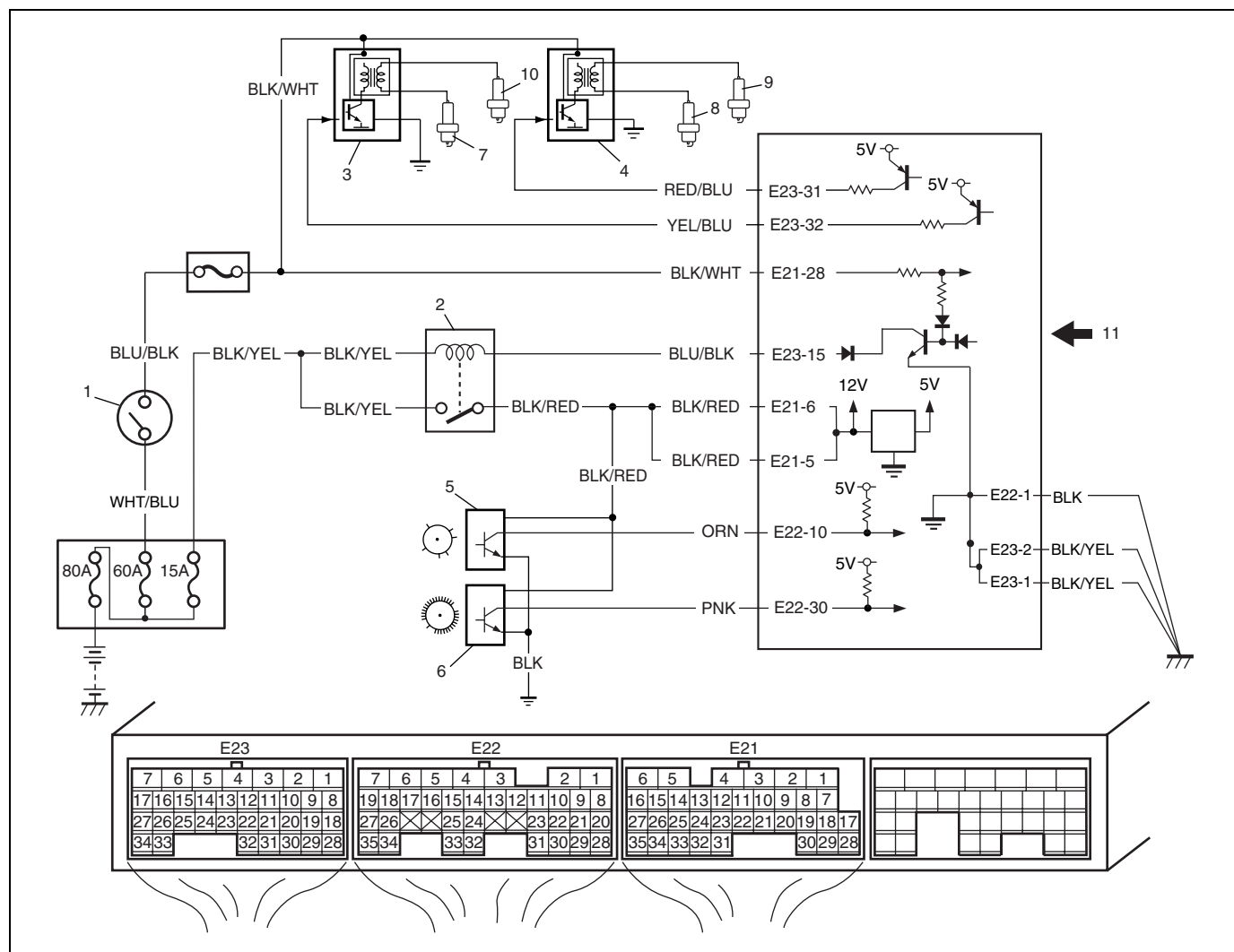


1. ECM	4. CMP sensor	7. ECT sensor	10. VSS	13. Data link connector
2. Ignition coil assembly for No.1 and No.4 spark plugs	5. CKP sensor	8. MAF and IAT sensor	11. High-tension cords	
3. Ignition coil assembly for No.2 and No.3 spark plugs	6. MAP sensor	9. TP sensor	12. Knock sensor	

NOTE:

Above figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the opposite side.

Ignition System Wiring Circuit Diagram



Diagnosis

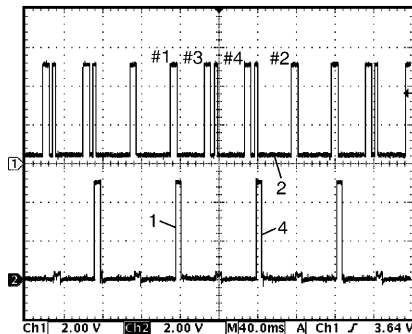
Ignition System Symptom Diagnosis

Condition	Possible Cause	Correction
Engine cranks, but will not start or hard to start (No spark)	Blown fuse for ignition coil	Replace.
	Loose connection or disconnection of lead wire or high-tension cord(s)	Connect securely.
	Faulty high-tension cord(s)	Replace.
	Faulty spark plug(s)	Replace.
	Faulty ignition coil	Replace ignition coil assembly.
	Faulty CKP sensor or CKP sensor plate	Clean, tighten or replace.
	Faulty CMP sensor or sensor rotor tooth of camshaft	Clean, tighten or replace.
	Faulty ECM	Replace.
Poor fuel economy or engine performance	Incorrect ignition timing	Check related sensors and CKP sensor plate.
	Faulty spark plug(s) or high-tension cord(s)	Adjust, clean or replace.
	Faulty ignition coil assembly	Replace.
	Faulty CKP sensor or CKP sensor plate	Clean, tighten or replace.
	Faulty CMP sensor or sensor rotor tooth of camshaft	Clean, tighten or replace.
	Faulty ECM	Replace.

Reference Waveform

Oscilloscope waveforms of CMP sensor and No.1/No.4 ignition trigger signal are as shown in figure when connecting oscilloscope between terminals E22-10 of ECM connectors connected to ECM and ground, and between terminal E23-32 and ground.

[A]



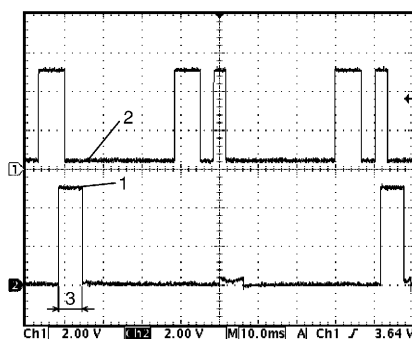
Measurement condition for waveform [A]

Measurement terminal	CH1: E22-10 to E23-1 CH2: E23-32 to E23-1
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 40 ms/DIV
Measurement condition	After warmed up engine to normal operating temperature Engine at specified idle speed

Measurement condition for waveform [B]

Measurement terminal	CH1: E22-10 to E23-1 CH2: E23-32 to E23-1
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 10 ms/DIV
Measurement condition	After warmed up engine to normal operating temperature Engine at specified idle speed

[B]



[A]: Oscilloscope waveforms at specified idle speed

[B]: Detail waveforms at specified idle speed

1. No.1 ignition trigger signal

2. CMP sensor signal

3. Primary coil current flow time

4. No.4 ignition trigger signal

Ignition System Diagnostic Flow Table

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" in Section 6-2 performed?	Go to Step 2.	Go to "Engine and Emission Control System Check" in Section 6-2.
2	Ignition Spark Test 1) Check all spark plugs for condition and type referring to "Spark Plugs Inspection" in this section. 2) If OK, perform ignition spark test, referring to "Ignition Spark Test" in this section. Is spark emitted from all spark plugs?	Go to Step 11.	Go to Step 3.
3	Diagnostic Trouble Code (DTC) Check Is DTC stored in ECM?	Go to applicable DTC Diag. Flow Table in Section 6-2.	Go to Step 4.

Step	Action	Yes	No
4	Electrical Connection Check 1) Check ignition coil assemblies and high-tension cords for electrical connection. Are they connected securely?	Go to Step 5.	Connect securely.
5	High-tension Cords Check 1) Check high-tension cord for resistance referring to "High-Tension Cords Inspection" in this section. Is check result satisfactory?	Go to Step 6.	Replace high-tension cord(s).
6	Ignition Coil Assembly Power Supply and Ground Circuit Check 1) Check ignition coil assembly power supply and ground circuits for open and short. Are circuits in good condition?	Go to Step 7.	Repair or replace.
7	Ignition Coil Assembly Check 1) Check ignition coil for resistance referring to "Ignition Coil Assembly (Including Ignitor) Inspection" in this section. Is check result satisfactory?	Go to Step 8.	Replace ignition coil assembly.
8	Crankshaft Position (CKP) Sensor Check 1) Check crankshaft position sensor referring to "Crank Position Sensor (CKP Sensor) Inspection" in Section 6E2. Is check result satisfactory?	Go to Step 9.	Tighten CKP sensor bolt, replace CKP sensor or CKP sensor plate.
9	Ignition Trigger Signal Circuit Check 1) Check ignition trigger signal wire for open, short and poor connection. Is circuit in good condition?	Go to Step 10.	Repair or replace.
10	A Known-good Ignition Coil Assembly Substitution 1) Substitute a known-good ignition coil assembly and then repeat Step 2. Is check result of Step 2 satisfactory?	Go to Step 11.	Substitute a known-good ECM and then repeat Step 2.
11	Ignition Timing Check 1) Check initial ignition timing and ignition timing advance referring to "Ignition Timing Inspection" in this section. Is check result satisfactory?	System is in good condition.	Check CMP sensor, CMP sensor rotor tooth of camshaft, CKP sensor, CKP sensor plate and/or input signals related to this system.

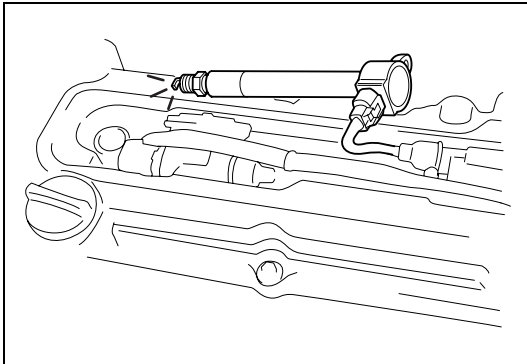
On-Vehicle Service

Ignition Spark Test

- 1) Remove air cleaner assembly with air intake pipe.
- 2) Disconnect all injector couplers from injectors.

WARNING:

Without disconnection of injector couplers, combustible gas may come out from spark plug holes during this test and may get ignited in engine room.

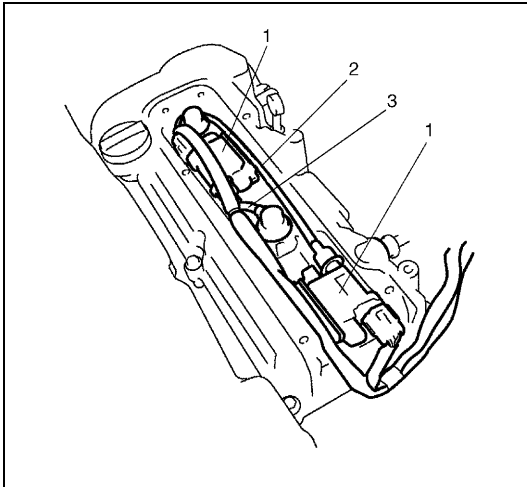


- 3) Remove spark plug and check it for condition and type referring to "Spark Plugs Removal and Installation" in this section.
- 4) If OK, connect ignition coil coupler to ignition coil assembly and connect spark plug to ignition coil assembly or high-tension cord. Ground spark plug.
- 5) Crank engine and check if each spark plug sparks.
- 6) If no spark is emitted, inspect the related parts as described under "Ignition System Symptom Diagnosis" in this section.

High-Tension Cords Removal and Installation

Removal

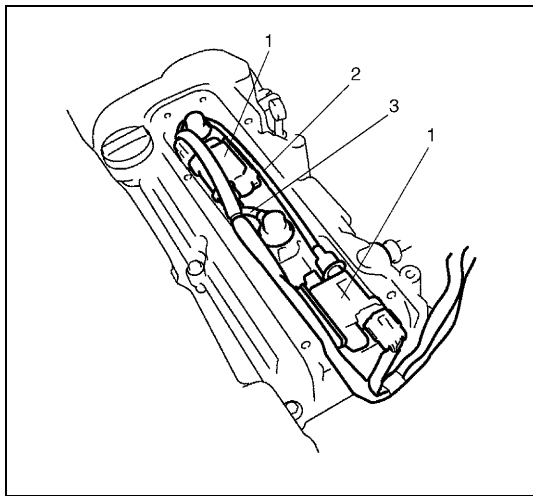
- 1) Remove air cleaner assembly with air intake pipe and cylinder head upper cover.
- 2) Disconnect No.1 cylinder (2) and No.3 cylinder (3) high-tension cords from ignition coil assemblies (1) while gripping each cap.
- 3) Pull out high-tension cords from spark plugs while gripping each cap.



CAUTION:

- Removal of high-tension cords together with clamps will be recommended so as not to damage their inside wire (resistive conductor).
- For the same reason, pull out each connection by gripping cap portion.

Installation



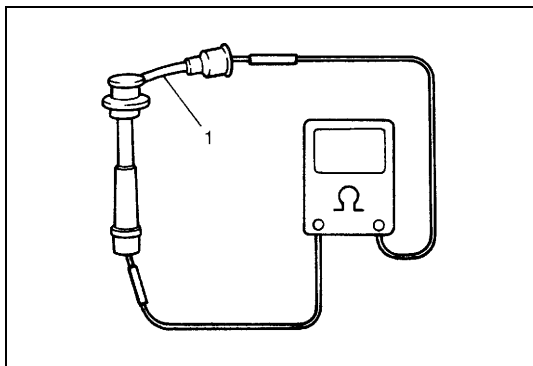
- 1) Install No.1 cylinder (2) and No.3 cylinder (3) high-tension cords to spark plugs and ignition coil assemblies (1) while gripping each cap.

CAUTION:

- Never attempt to use metal conductor high-tension cords as replacing parts.
- Insert each cap portion fully when installing high-tension cords.

- 2) Install cylinder head upper cover and air cleaner assembly with air intake pipe.

High-Tension Cords Inspection



Measure resistance of high-tension cord (1) by using ohmmeter. If resistance exceeds specification, replace high-tension cord(s).

No.1 cylinder high-tension cord resistance

1.4 – 4.0 k Ω

No.3 cylinder high-tension cord resistance

0.6 – 2.0 k Ω

Spark Plugs Removal and Installation

CAUTION:

- When servicing the iridium/platinum spark plugs (slender center electrode type plugs), do not touch the center electrode to avoid damage to it. The electrode is not strong enough against mechanical force as it is slender and its material is not mechanically tough
- Do not clean or adjust gap for the iridium/platinum spark plugs.

Removal

- 1) Remove air cleaner assembly with air intake pipe and cylinder head upper cover.
- 2) Pull out high-tension cords by gripping their caps and then remove ignition coil assemblies referring to "Ignition Coil Assembly (Including Ignitor) Removal and Installation" in this section.
- 3) Remove spark plugs.

Installation

- 1) Install spark plugs and torque them to specification.

Tightening torque

Spark plug: 25 N·m (2.5 kg-m, 18.0 lb-ft)

- 2) Install ignition coil assemblies referring to "Ignition Coil Assembly (Including Ignitor) Removal and Installation" in this section.
- 3) Install high-tension cords securely by gripping their caps.
- 4) Install cylinder head upper cover and air cleaner assembly with air intake pipe.

Spark Plugs Inspection

- Inspect them for:
 - Electrode wear
 - Carbon deposits
 - Insulator damage

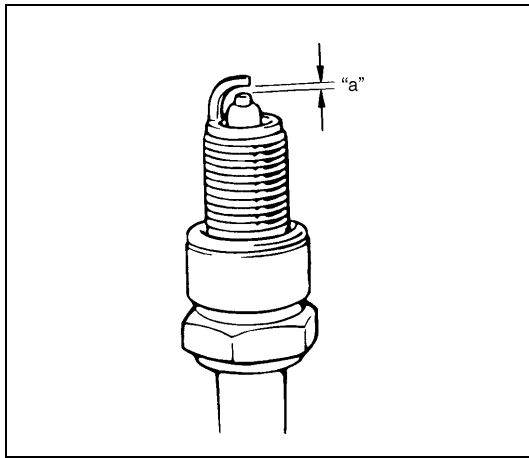
- If any abnormality is found, replace them with new plugs.

Spark plug air gap

"a": 1.0 – 1.1 mm (0.040 – 0.043 in.)

Spark plug type

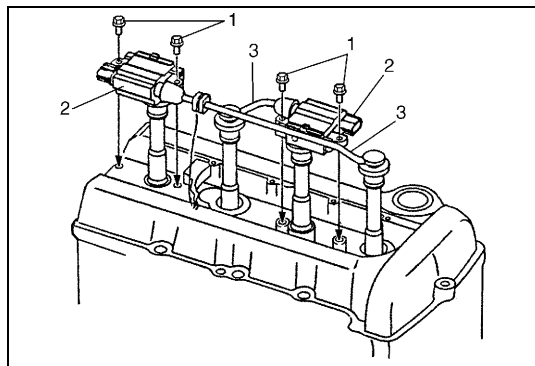
NGK: IFR6J11 (iridium/platinum spark plug)



Ignition Coil Assembly (Including Ignitor) Removal and Installation

Removal

- 1) Disconnect negative cable at battery.
- 2) Remove air cleaner assembly with air intake pipe and cylinder head upper cover.
- 3) Disconnect ignition coil coupler.
- 4) Disconnect high-tension cord (3) from ignition coil assembly (2).
- 5) Remove ignition coil bolts (1) and then pull out ignition coil assembly.



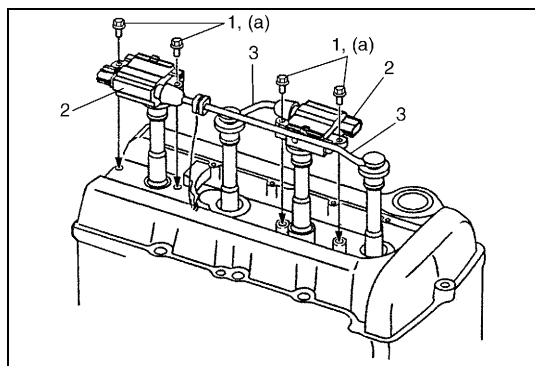
Installation

- 1) Install ignition coil assembly (2).
- 2) Tighten ignition coil bolts (1) to specified torque, and then connect ignition coil coupler.

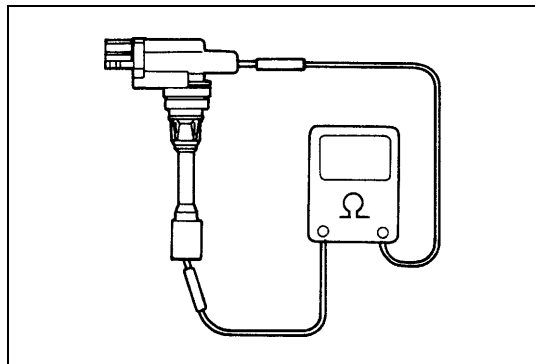
Tightening torque

Ignition coil bolt (a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 3) Install high-tension cord (3) to ignition coil assembly while gripping its cap.
- 4) Install cylinder head upper cover and air cleaner assembly with air intake pipe.
- 5) Connect negative cable to battery.



Ignition Coil Assembly (Including Ignitor) Inspection



Measure secondary coil for resistance.

If resistance is out of specification, replace ignition coil assembly.

Secondary coil resistance

7.1 – 9.5 k Ω at 20°C, 68°F

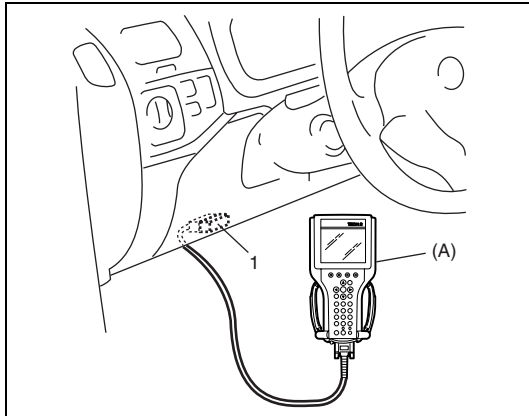
Crankshaft Position (CKP) Sensor

Refer to "Crankshaft Position Sensor (CKP Sensor) Removal and Installation" and "Crankshaft Position Sensor (CKP Sensor) Inspection" in Section 6E2 for removal, inspection and installation.

Ignition Timing Inspection

NOTE:

- Ignition timing is not adjustable. If ignition timing is out of specification, check system related parts.
- Before starting engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake.

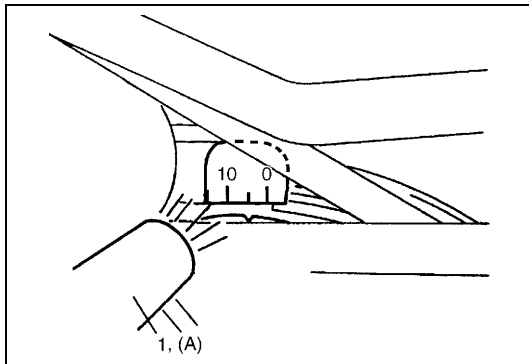


- 1) Connect scan tool to DLC (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool

- 2) Start engine and warm it up to normal operating temperature.
- 3) Make sure that all of electrical loads except ignition are switched off.
- 4) Check to be sure that idle speed is within specification referring to "Idle Speed/Idle Air Control (IAC) Duty Inspection" in Section 6E2.
- 5) Fix ignition timing by using "Fixed Spark" or "Misc Test" mode on scan tool.



- 6) Set timing light (1) to high-tension cord for No.1 cylinder and check that ignition timing is within specification.

Initial ignition timing (fixed with scan tool)

$5 \pm 3^\circ$ BTDC at idle speed

Ignition order

1-3-4-2

Special tool

(A): 09930 – 76420

- 7) If ignition timing is out of specification, check the followings:
 - CKP sensor
 - CKP sensor plate
 - TP sensor
 - CMP sensor
 - CMP sensor rotor tooth of camshaft
 - VSS
 - Timing chain cover installation

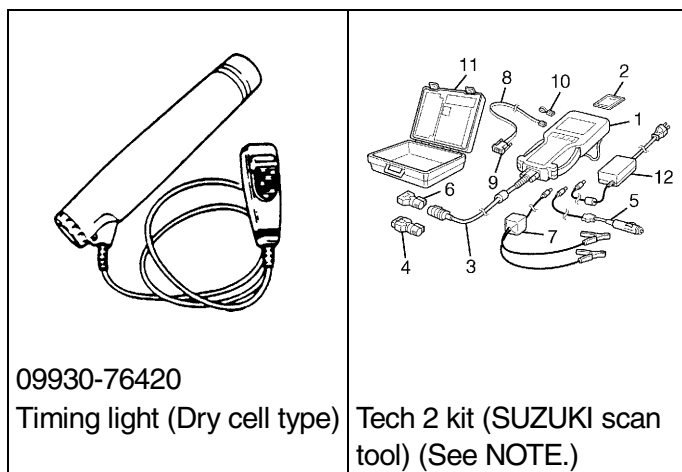
- 8) After checking Initial Ignition Timing, release ignition timing fixation by using scan tool.
- 9) With engine idling (throttle opening at closed position and car stopped), check that ignition timing is about 3° – 13° BTDC. (Constant variation within a few degrees from 3° – 13° indicates no abnormality but proves operation of electronic timing control system.) Also, check that increasing engine speed advances ignition timing.

If above check results are not satisfactory, check CKP sensor and ECM.

Tightening Torque Specification

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Spark plug	25	2.5	18.0
Ignition coil bolt	10	1.0	7.5

Special Tool



NOTE:

This kit includes the following items.

1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable,
6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loop-back connector, 11. Storage case, 12. Power supply

SECTION 6G

CRANKING SYSTEM (0.9 KW REDUCTION TYPE)

6G

NOTE:

- Starting motor vary depending on specifications, etc.
Therefore, be sure to check model and specification of the vehicle being serviced before replacing parts.
- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

Specifications..... 6G-2

Specifications

Voltage		12 volts	
Output		0.9 kW	
Rating		30 seconds	
Direction of rotation		Clockwise as viewed from pinion side	
Brush length		12.3 mm (0.44 in.)	
Number of pinion teeth		8	
Performance		Condition	Guarantee
Around at 20 °C (68 °F)	No load characteristic	11.0 V	90 A maximum 2,800 rpm minimum
	Load characteristic	8 V 200 A	4.8 N·m (0.48 kg-m, 3.5 lb-ft) minimum 1,260 rpm minimum
	Locked characteristic	3.5 V	550 A maximum 12.2 N·m (1.22 kg-m, 8.8 lb-ft) minimum
	Magnetic switch operating voltage		8 volts maximum

SECTION 6H

CHARGING SYSTEM (G10/M13 ENGINES)

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

6H

CONTENTS

Generator	6H-2	Removal and installation	6H-3
Diagnosis	6H-2	Specifications	6H-3
Undercharged battery.....	6H-2	Generator	6H-3
Unit Repair Overhaul.....	6H-3		

Generator

Diagnosis

Undercharged battery

This condition, as evidenced by slow cranking or indicator clear with red dot can be caused by one or more of the following conditions even though indicator lamp may be operating normal.

The following procedure also applies to cars with voltmeter and ammeter.

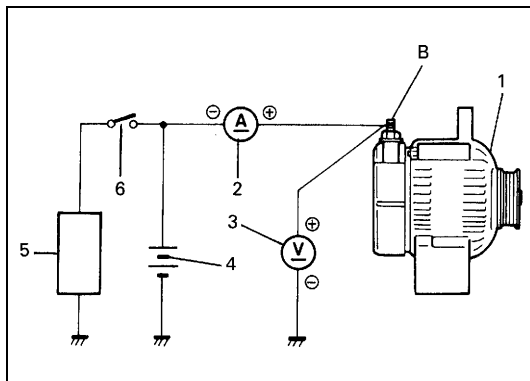
- Make sure that undercharged condition has not been caused by accessories left on for extended period of time.
- Check drive belt for proper tension.
- If battery defect is suspected referring to BATTERY section.
- Inspect wiring for defects. Check all connections for tightness and cleanliness, battery cable connections at battery, starting motor and ignition ground cable.

No-load Check

- 1) Connect voltmeter and ammeter as shown in the figure.

NOTE:

Use fully charged battery.



- 2) Run engine from idling up to 2,000 rpm and read meters.
If voltage is higher than standard value, check ground of brushes.
If brushes are not grounded, replace IC regulator.
If voltage is lower than standard value, proceed to following check.

NOTE:

- Turn off switches of all accessories (wiper, heater etc.).
- Consideration should be taken that voltage will differ somewhat with regulator case temperature as shown in the figure.

Specification for undercharged battery (No-load check)

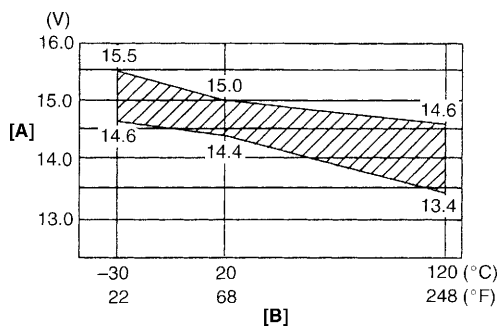
Current: 10 A

Standard voltage for G10 engine:

14.4 – 15.0 V at 20°C (68°F)

Standard voltage for M13 engine:

14.2 – 14.8 V at 25°C (77°F)



[A]: Regulated voltage

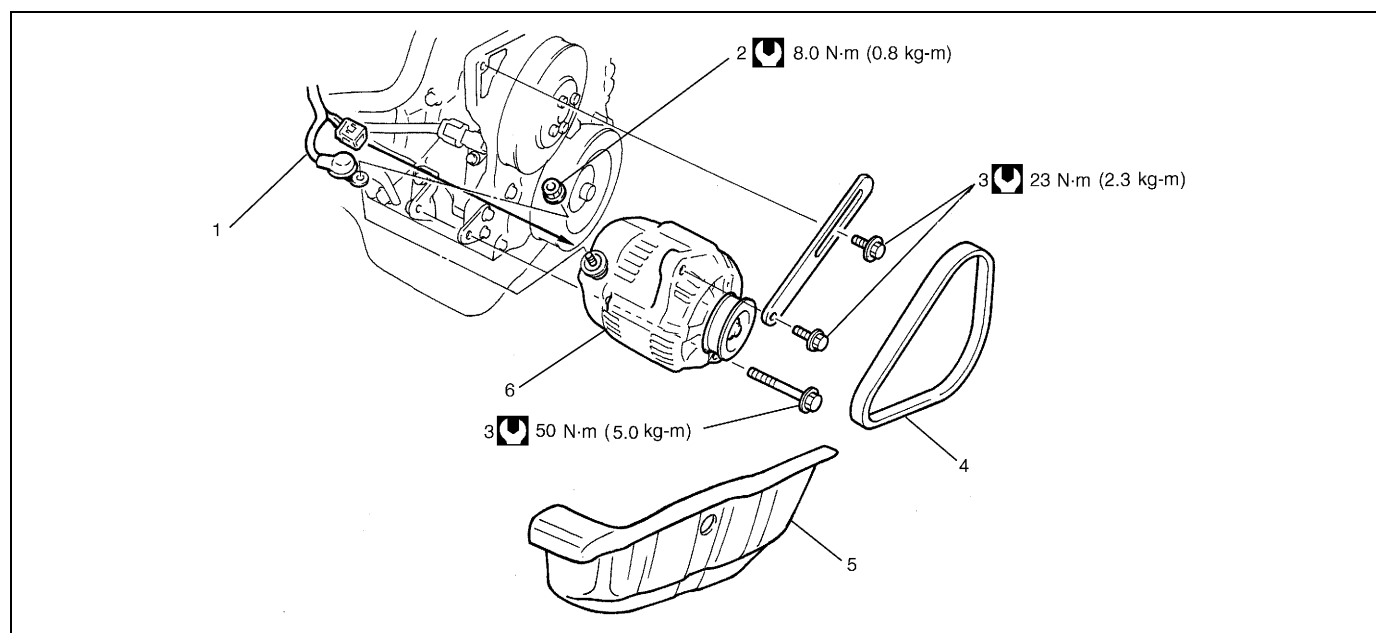
[B]: Regulator case temperature

Load Check

- 1) Run engine at 2,000 rpm and turn on head light and heater motor.
- 2) Measure current and if it is less than 20 A repair or replace generator.

Unit Repair Overhaul**Removal and installation****For G10 Engine**

Refer to "Unit Repair Overhaul" in the same section of the Service Manual mentioned in FOREWORD of this manual.

For M13 Engine

1. "B" terminal wire	3. Generator bolt	5. Splash cover	Tightening torque
2. "B" terminal nut	4. Generator belt	6. Generator	

Specifications**Generator**

Rated voltage	12 V	
Nominal output	70 A	75 A
Permissible max. speed	18000 r/min.	
No-load speed	1300 r/min (rpm)	
Setting voltage	14.4 to 15.0 V (at 20°C (68°F))	14.2 to 14.8 V (at 25°C (77°F))
Permissible ambient temperature	-30 to 100°C (-22 to 212°F)	
Polarity	Negative ground	
Rotation	Clockwise viewed from pulley side	

SECTION 6K2

EXHAUST SYSTEM (M13 ENGINE)

CONTENTS

General Description	6K2-2	Exhaust Manifold Removal and	
Maintenance	6K2-2	Installation	6K2-4
On-Vehicle Service	6K2-3	Exhaust Manifold Inspection	6K2-4
Exhaust System Components	6K2-3	Exhaust Pipe Removal and Installation	6K2-4
		Tightening Torque Specification	6K2-4

General Description

The exhaust system consists of an exhaust manifold, three-way catalytic converter (TWC) in catalyst case, exhaust pipes, a muffler and seals, gasket and etc.

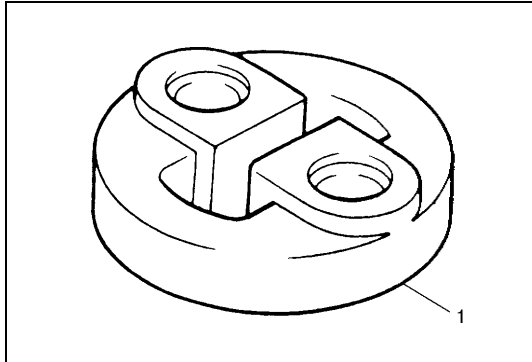
The three-way catalytic converter is an emission control device added to the exhaust system to lower the levels of Hydrocarbon (HC), Carbon Monoxide (CO), and Oxides of Nitrogen (NOx) pollutants in the exhaust gas.

Maintenance

WARNING:

To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.

At every interval of periodic maintenance service, and when vehicle is raised for other service, check exhaust system as follows:



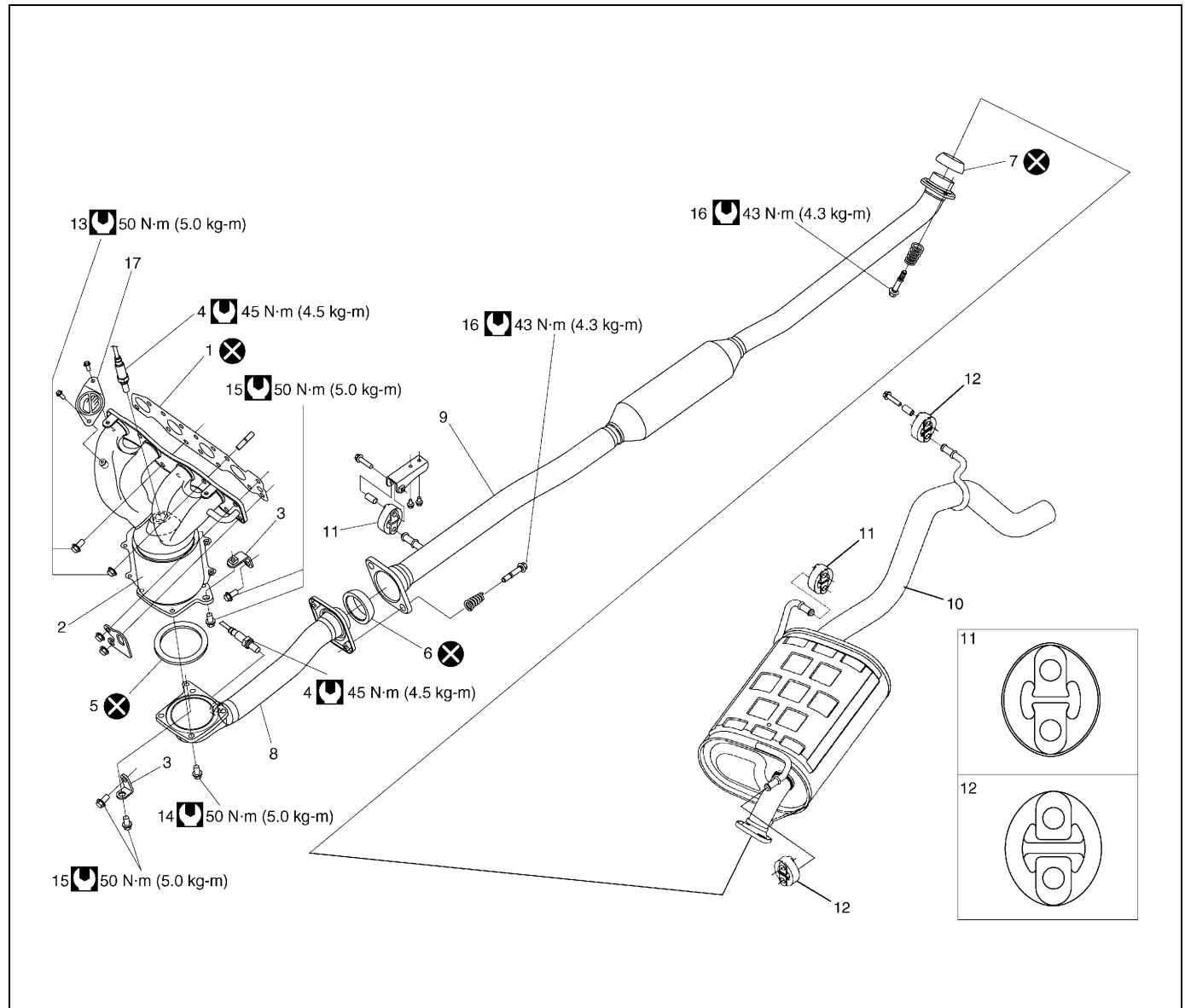
- Check rubber mountings (1) for damage, deterioration, and out of position.
- Check exhaust system for leakage, loose connection, dent and damage.
- If bolts or nuts are loosened, tighten them to specified torque referring to "Exhaust System Components" in this section.
- Check nearby body areas damaged, missing, or mispositioned part, open seam, hole connection or any other defect which could permit exhaust fumes to seep into vehicle.
- Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to passenger compartment carpet.
- Any defect should be fixed at once.

On-Vehicle Service

Exhaust System Components

WARNING:

To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.



1. Gasket	8. Exhaust No.1 pipe	15. Exhaust manifold stiffener bolt
2. Exhaust manifold	9. Exhaust No.2 pipe	16. Exhaust No.2 pipe bolt
3. Exhaust manifold stiffener	10. Muffler	17. Caution plate
4. Oxygen sensor	11. Muffler mounting type 1	Tightening torque
5. Exhaust pipe gasket	12. Muffler mounting type 2	Do not reuse.
6. Seal ring No.1	13. Exhaust manifold bolt and nut	
7. Seal ring No.2	14. Exhaust No.1 pipe bolt	

Exhaust Manifold Removal and Installation

Removal and installation

Refer to “Exhaust Manifold Removal and Installation” in Section 6A2.

Exhaust Manifold Inspection

Check gasket and seal for deterioration or damage.

Replace them as necessary.

Exhaust Pipe Removal and Installation

Removal and installation

For replacement of exhaust pipe, be sure to hoist vehicle and observe “Warning” under “Maintenance” in this section and the following.

CAUTION:

Exhaust manifold have three way catalytic converter in it, it should not be exposed to any impulse.
Be careful not to drop it or hit it against something.

- Tighten bolts and nuts to specified torque when reassembling referring to “Exhaust System Components” in this section.
- After installation, start engine and check each joint of exhaust system for leakage.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Exhaust manifold bolt and nut	50	5.0	36.5
Exhaust No.1 pipe bolt	50	5.0	36.5
Exhaust manifold stiffer bolt	50	5.0	36.5
Exhaust No.2 pipe bolt	43	4.3	31.5
Oxygen sensor	45	4.5	32.5

SECTION 7A2

MANUAL TRANSAXLE (M13 ENGINE MODEL)

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

7A2

CONTENTS

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General Description

Manual Transaxle Construction and Servicing

The transaxle provides five forward speeds and one reverse speed by means of three synchronizers and three shafts-input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

The low speed synchronizer is mounted on counter shaft and engaged with counter shaft first gear or second gear, while the high speed synchronizer is done on input shaft and engaged with input shaft third gear or fourth gear.

The fifth speed synchronizer on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

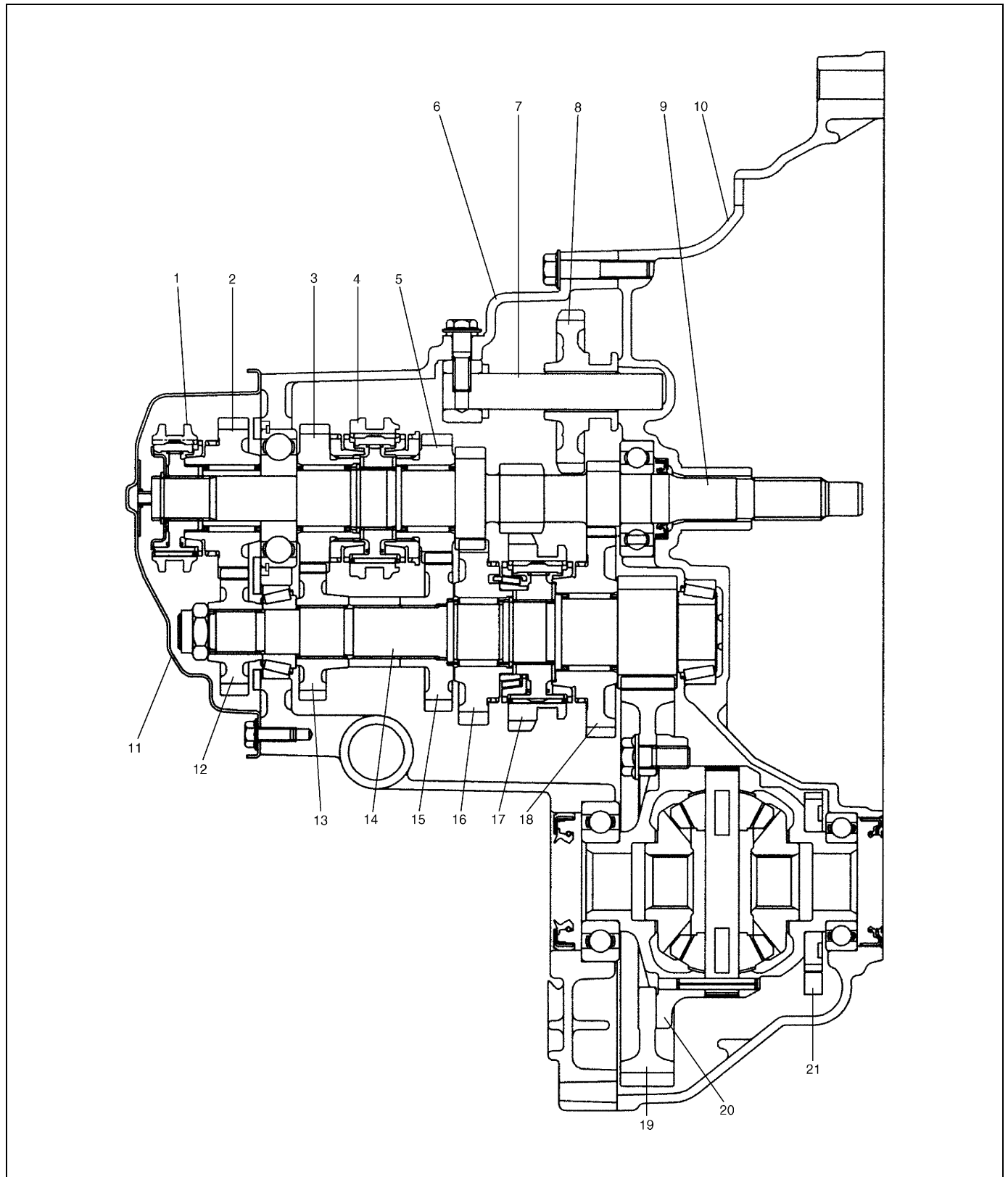
The double cone synchronizing mechanism is provided to 2nd gear synchromesh device for high performance of shifting to 2nd gear.

The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

4WD model is equipped with transfer assembly on transaxle being mated to right side of differential output in transaxle.

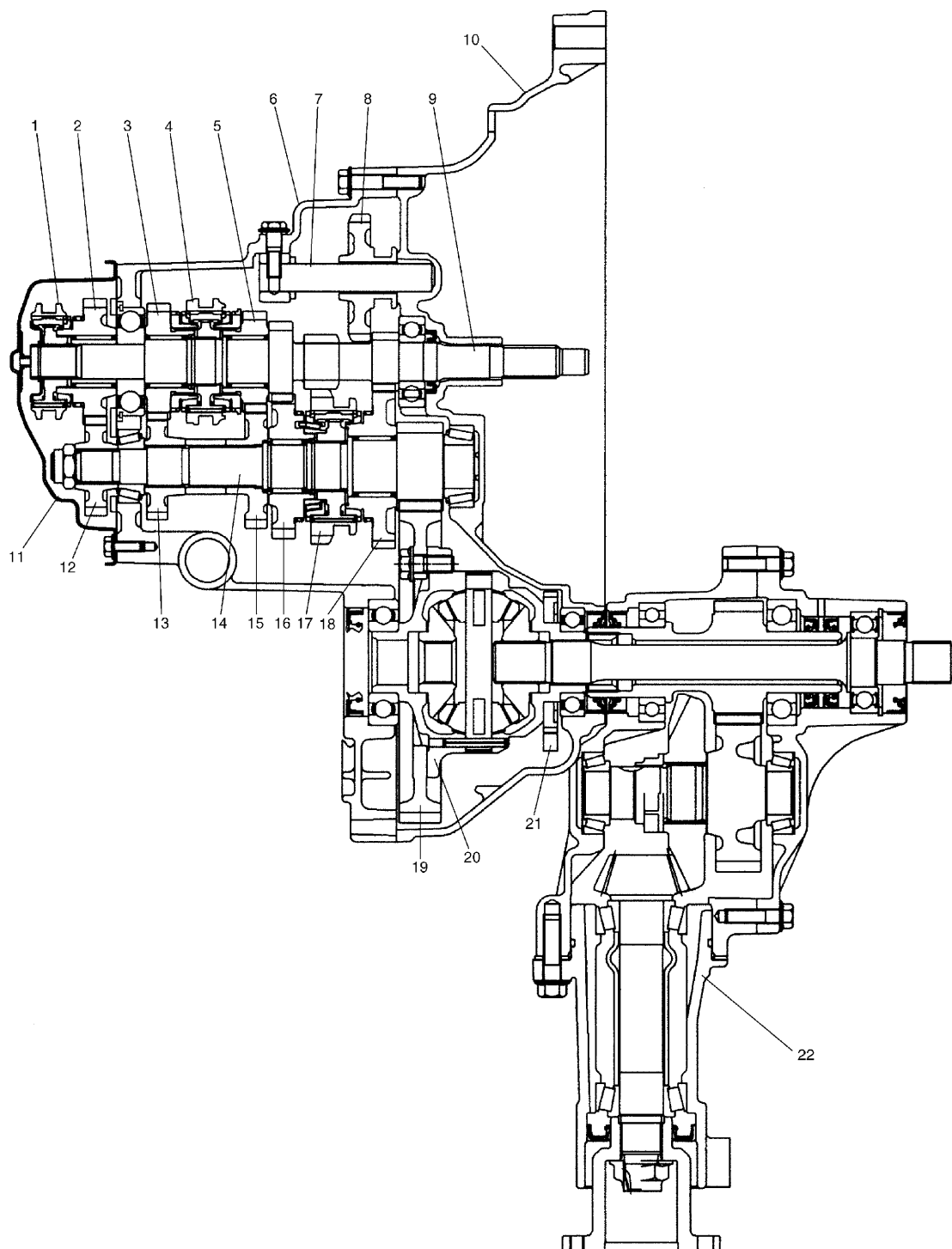
For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transaxle case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

Further, care must be taken to adjust preload of counter shaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.

Transaxle for 2wd Model

1. 5th speed sleeve & hub	8. Reverse idler gear	15. Countershaft 3rd gear
2. Input shaft 5th gear	9. Input shaft	16. Countershaft 2nd gear
3. Input shaft 4th gear	10. Right case	17. Low speed sleeve & hub
4. High speed sleeve & hub	11. Side cover	18. Countershaft 1st gear
5. Input shaft 3rd gear	12. Countershaft 5th gear	19. Final gear
6. Left case	13. Countershaft 4th gear	20. Differential case
7. Reverse gear shaft	14. Countershaft	21. Vehicle speed sensor

Transaxle for 4wd Model



1. 5th speed sleeve & hub	7. Reverse gear shaft	13. Countershaft 4th gear	19. Final gear
2. Input shaft 5th gear	8. Reverse idler gear	14. Countershaft	20. Differential case
3. Input shaft 4th gear	9. Input shaft	15. Countershaft 3rd gear	21. Vehicle speed sensor
4. High speed sleeve & hub	10. Right case	16. Countershaft 2nd gear	22. Transfer assembly
5. Input shaft 3rd gear	11. Side cover	17. Low speed sleeve & hub	
6. Left case	12. Countershaft 5th gear	18. Countershaft 1st gear	

Diagnosis

Manual Transaxle Symptom Diagnosis

Condition	Possible Cause	Correction
Gears slipping out of mesh	Maladjusted gear shift/select control cables	Adjust.
	Worn shift fork shaft	Replace.
	Worn shift fork or synchronizer sleeve	Replace.
	Weak or damaged locating springs	Replace.
	Worn bearings on input shaft or counter shaft	Replace.
	Worn chamfered tooth on sleeve and gear	Replace sleeve and gear.
Hard shifting	Maladjusted gear shift/select control cables	Adjust.
	Inadequate or insufficient lubricant	Replenish.
	Improper clutch pedal free travel	Adjust.
	Distorted or broken clutch disc	Replace.
	Damaged clutch pressure plate	Replace clutch cover.
	Worn synchronizer ring	Replace.
	Worn chamfered tooth on sleeve or gear	Replace sleeve or gear.
	Worn gear shift/select control cables joint	Replace.
	Distorted shift shaft	Replace.
Noise	Inadequate or insufficient lubricant	Replenish.
	Damaged or worn bearing(s)	Replace.
	Damaged or worn gear(s)	Replace.
	Damaged or worn synchronizer parts	Replace.
	Maladjusted backlash between bevel pinion and gear	Adjust as prescribed
	Improper tooth contact in the mesh between bevel pinion and gear	Adjust or replace

On-Vehicle Service

CAUTION:

Do not reuse circlip, spring pin, E-ring, oil seal, gasket, self locking nut and specified parts. Reuse of it can result in trouble.

Manual Transaxle Oil Change

- 1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
- 2) With vehicle lifted up, check oil level and leakage.
If leakage exists, correct it.
- 3) Drain old oil and fill new specified oil by specified amount (up to level hole).
- 4) Apply sealant to thread of drain plug (2) and level/filler plug (3) and torque them as specified below.

“A”: Sealant 99000-31260

Tightening torque

Transaxle oil level/filler and drain plugs

(a): 21 N·m (2.1 kg·m, 15.5 lb·ft)

NOTE:

- It is highly recommended to use API GL-4 75W-90 gear oil.
- Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

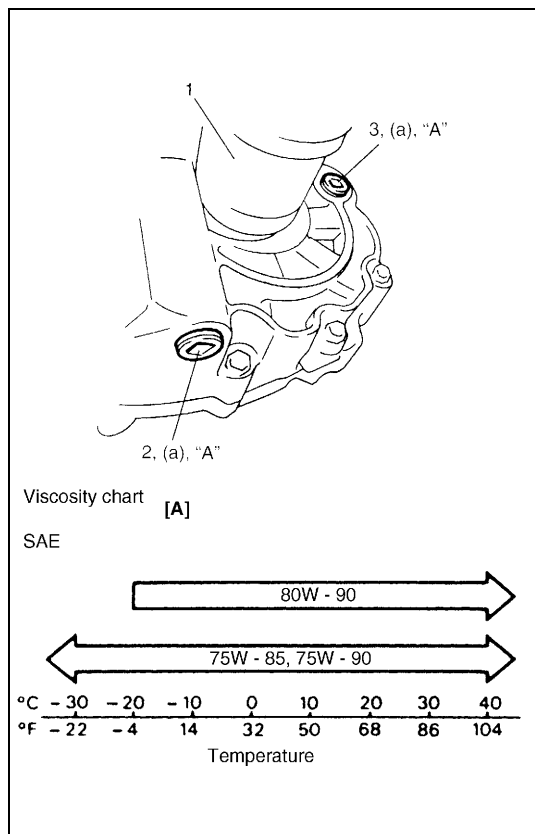
Transaxle oil

: API GL-4

For SAE classification, refer to viscosity chart [A] in the figure.

Transaxle oil capacity

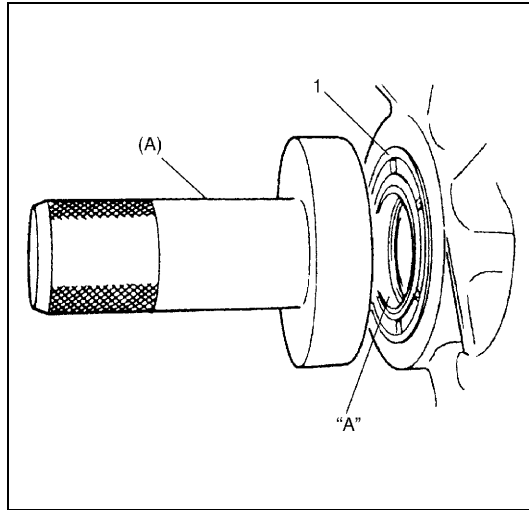
: 2.2 liters (4.6/3.9 US/Imp. pt)



Differential Side Oil Seal Replacement

Replacement

- 1) Lift up vehicle and drain transaxle oil.
- 2) Remove front drive shafts referring to “Drive Shaft Assembly Removal and Installation” in Section 4A.
- 3) Separate transfer from transaxle assembly. (for 4WD vehicle)
For detail, refer to “Transfer Dismounting and Remounting” in Section 7D.



- 4) Remove oil seal (1) and install a new one until it becomes flush with case surface using special tool and hammer.

NOTE:

When installing oil seal, face its spring side inward.

Special tool

(A): 09913-75510 (2WD and LH of 4WD)

(A): 09951-46010 (RH of 4WD)

- 5) Apply grease to oil seal lip and at the same time check drive shaft where oil seal contacts and make sure of its smoothness.

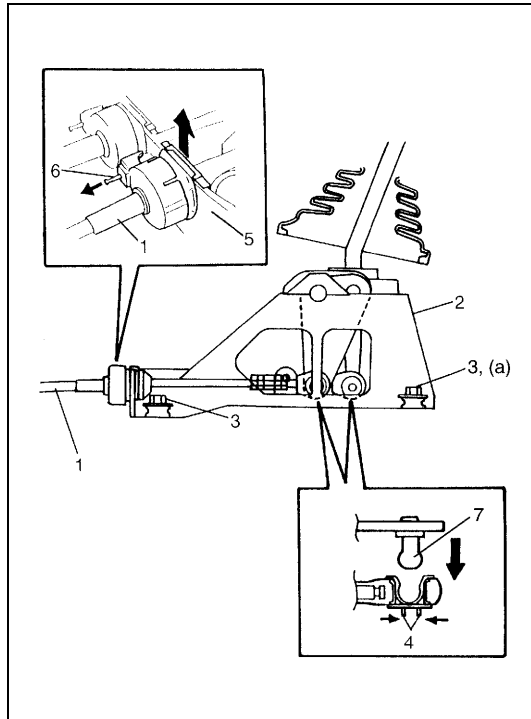
“A”: Grease 99000-25010

- 6) Install transfer referring to “Transfer Dismounting and Remounting” in Section 7D.
- 7) Insert front drive shafts referring to “Drive Shaft Assembly Removal and Installation” in Section 4A.
- 8) Install ball stud and stabilizer mount brackets referring to “Wheel Hub and Steering Knuckle Removal and Installation” and “Stabilizer Bar and Bushings Removal and Installation” in Section 3D.
- 9) Install tie-rod end referring to “Suspension Control Arm/ Bushing Removal and Installation” in Section 3B.
- 10) Fill transaxle oil as specified referring to “Manual Transaxle Oil Change” in this section, and make sure that oil has been sealed with oil seal.

Gear Shift Control Lever and Cable Removal and Installation

Removal

- 1) Remove console box.
- 2) Disconnect gear shift and select control cables (1) from gear shift control lever assembly (2).
 - a) Disconnect cable end from pivot (7) while pushing cable end bush (4).
 - b) Detach cable from bracket (5) while pulling pin (6).
- 3) Remove gear shift control lever assembly mounting nuts (3) and gear shift lever assembly (2) from body.
- 4) Disconnect shift and select cables (1) from transmission in the same manner as step 2).
- 5) Remove cable grommet and cable clamp, and then remove shift and select cables (1) from body.



Installation

Reverse removal procedure for installation noting the following.

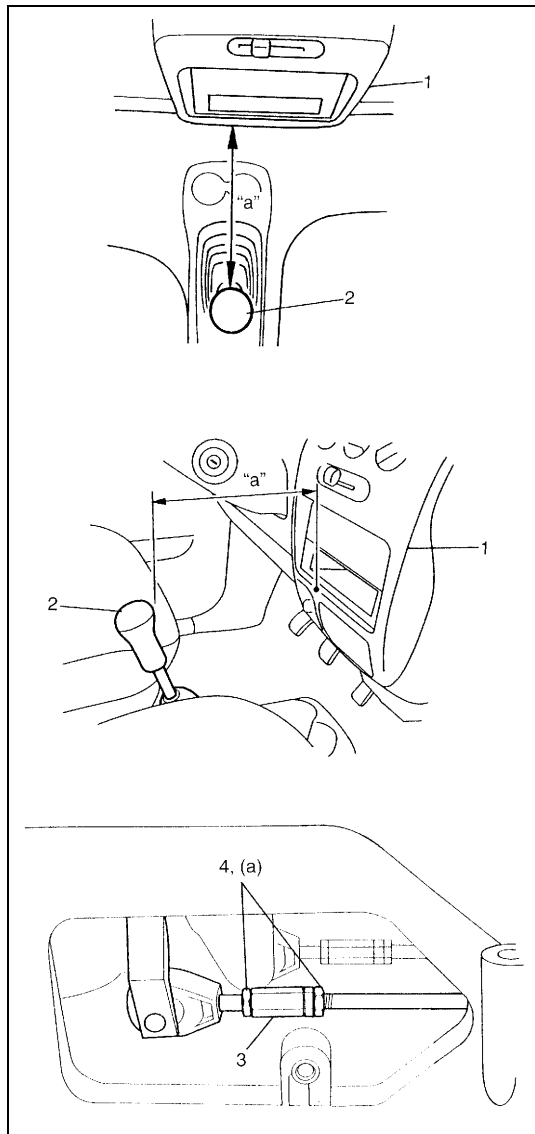
- Tighten gear shift control lever assembly mounting nuts (3) to specified torque.

Tightening torque

Gear shift control lever assembly mounting nut

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

Gear Shift Control Lever and Cable Adjustment



- Adjustment of shift cable:

- a) With shift control lever in "NEUTRAL" position, adjust shift cable adjusting nut (3) so that distance "a" between edge of instrument panel (1) and center of shift knob (2) measured as specified value.

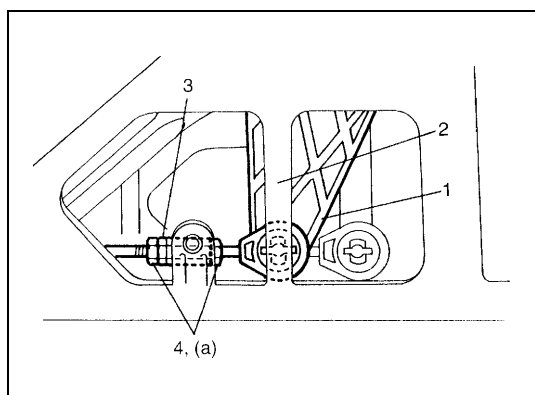
Distance "a": 156 mm (6.14 in.)

- b) After shift cable adjustment, tighten cable lock nut (4) to specified torque.

Tightening torque

Cable lock nut (a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

- c) Make sure that boots are installed correctly.



- Adjustment of select cable:

- a) With shift control lever in "NEUTRAL" position, adjust select cable adjusting nut (3) so that the tip of select arm (cable joint point) (1) and the center rip of gear shift control lever assembly (2) are aligned as shown.
- b) After select cable adjustment, tighten cable lock nut (4) to specified torque.

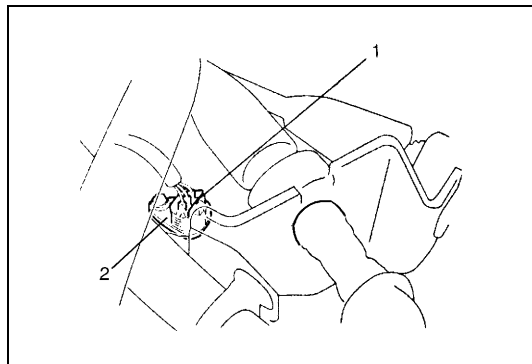
Tightening torque

Cable lock nut (a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

Vehicle Speed Sensor (VSS) Removal and Installation

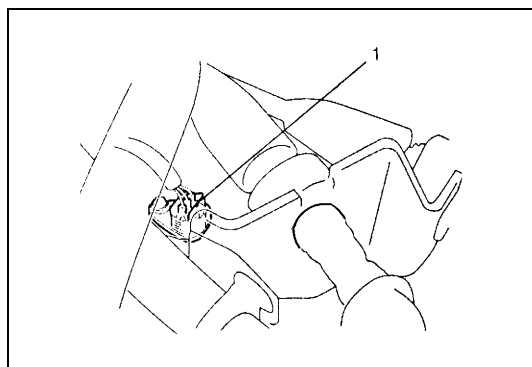
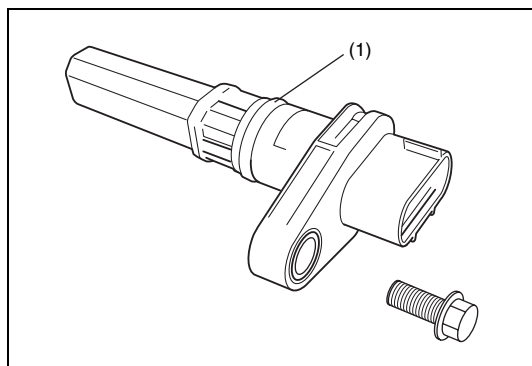
Removal

- 1) Disconnect negative cable at battery.
- 2) Disconnect VSS coupler (1).
- 3) Remove VSS (2).



Installation

- 1) Apply oil to new O-ring (1) and then install VSS to transaxle.
- 2) Connect VSS coupler (1).

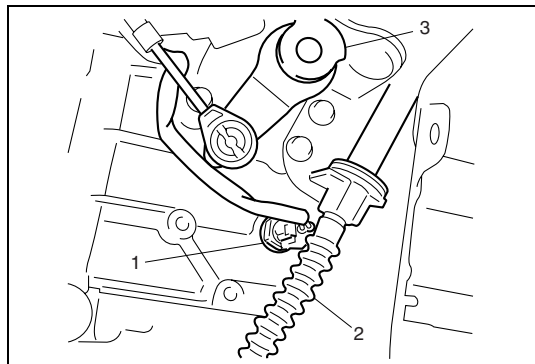


- 3) Connect negative cable at battery.

Back Up Lamp Switch Removal and Installation

Removal

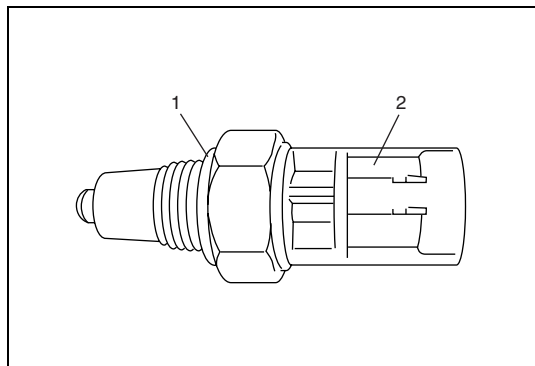
- 1) Disconnect negative cable at battery.
- 2) Disconnect back up lamp switch coupler.
- 3) Remove back up lamp switch (1).



2. Clutch cable
3. Gear shift and select shaft assembly

Installation

- 1) Apply oil to new O-ring (1) and tighten back up lamp switch (2) to specified torque.



Tightening torque

Back up lamp switch (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

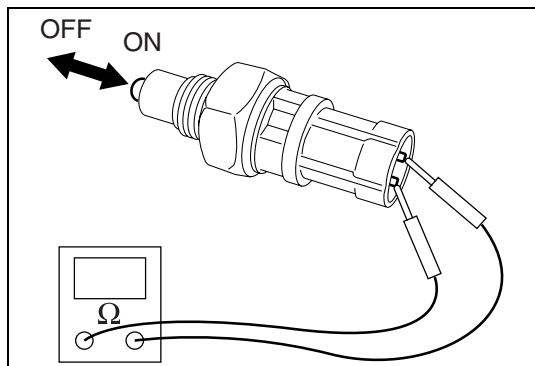
- 2) Connect back up lamp switch coupler.
- 3) Connect negative cable at battery.

Back Up Lamp Switch Inspection

Check backup lamp switch for function using ohmmeter.

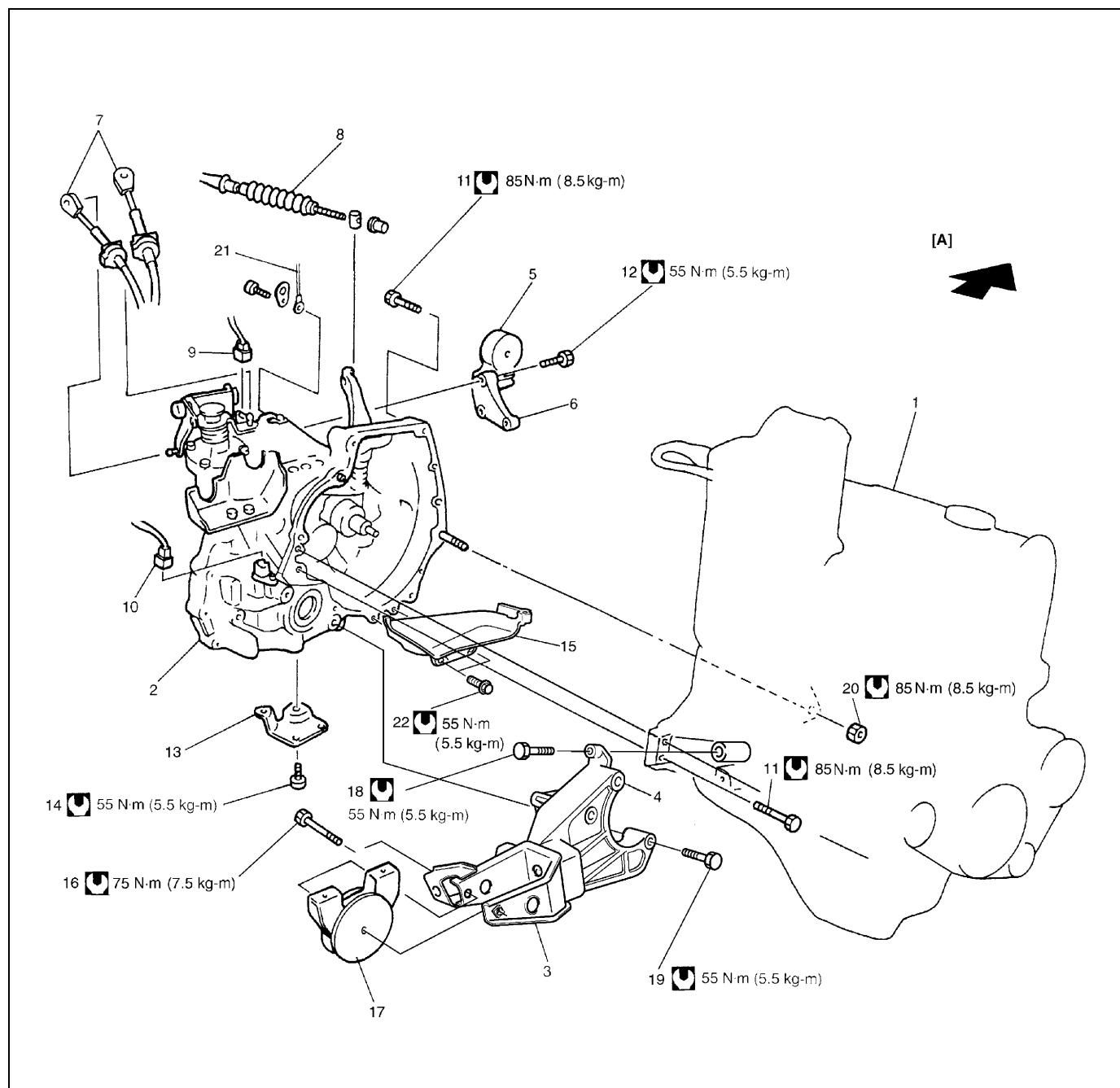
Switch ON: Continuity

Switch OFF: No continuity



Unit Repair Overhaul

Transaxle Unit Components



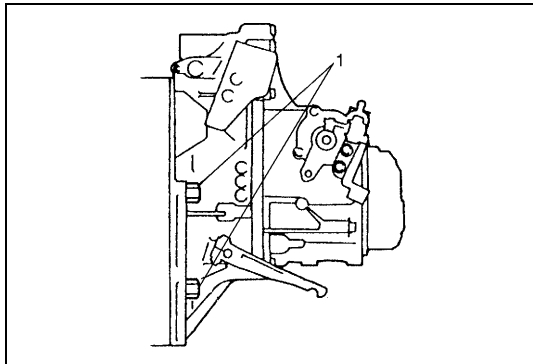
[A]: Forward	8. Clutch cable	16. Engine rear mounting bolt
1. Engine	9. Backup lamp switch connector	17. Engine rear mounting
2. Transaxle	10. VSS connector	18. Engine rear mounting No.2 bracket bolts
3. Engine rear mounting No.1 bracket	11. Transaxle to engine bolts	19. Transaxle to engine rear mounting No.2 bracket bolt
4. Engine rear mounting No.2 bracket	12. Engine left mounting bracket bolts	20. Transaxle to engine nut
5. Engine left mounting	13. Engine rear mounting bracket stiffener	21. Ground cable
6. Engine left mounting bracket	14. Stiffener bolts	22. Clutch housing lower plate bolts
7. Shift & select control cables	15. Clutch housing lower plate	Tightening torque

Transaxle Unit Dismounting and Remounting

Dismounting

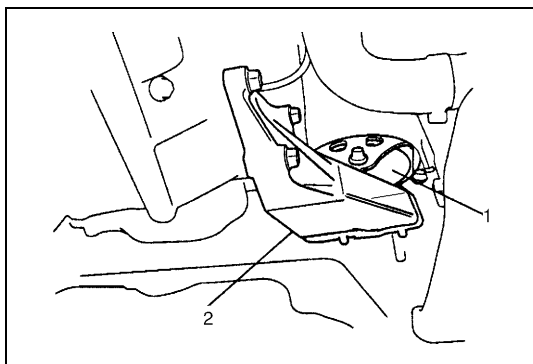
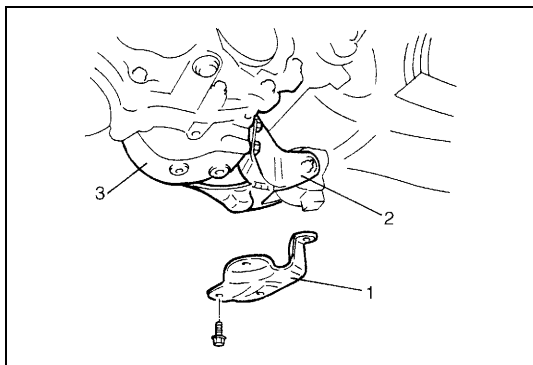
Under hood

- 1) Disconnect negative cable at battery.
- 2) Undo wiring harness clamps, disconnect backup lamp switch coupler, VSS coupler and ground cable.
- 3) Disconnect clutch cable from clutch release lever and bracket.
- 4) Disconnect gear shift and select control cables.
- 5) Remove transaxle control cable bracket.
- 6) Remove water pipe bracket bolts from transaxle.
- 7) Remove transaxle to engine bolts (1).
- 8) Remove starting motor referring to "Starting Motor Dismounting and Remounting" in Section 6G.
- 9) Support engine by using lifting device.



On lift

- 10) Drain transaxle oil referring to "Manual Transaxle Oil Change" in this section.
- 11) Remove front drive shafts referring to "Front Drive Shaft Assembly Removal and Installation" in Section 4A.
- 12) Remove left side of engine under cover.
- 13) Remove engine rear mounting bracket stiffener (1).
- 14) Remove clutch housing lower plate.
- 15) Remove engine rear mounting No.1 bracket (2) with No.2 bracket (3).
- 16) Remove transfer referring to "Transfer Dismounting and Remounting" in Section 7D, if equipped.
- 17) Remove transaxle to engine bolts and nut.
- 18) Lower vehicle and support transaxle with transaxle jack.



- 19) Remove engine left mounting (1) with bracket (2).
- 20) Remove other attached parts from transaxle, if any.
- 21) Pull transaxle out so as to disconnect input shaft from clutch disc and then lower it.

Remounting

CAUTION:

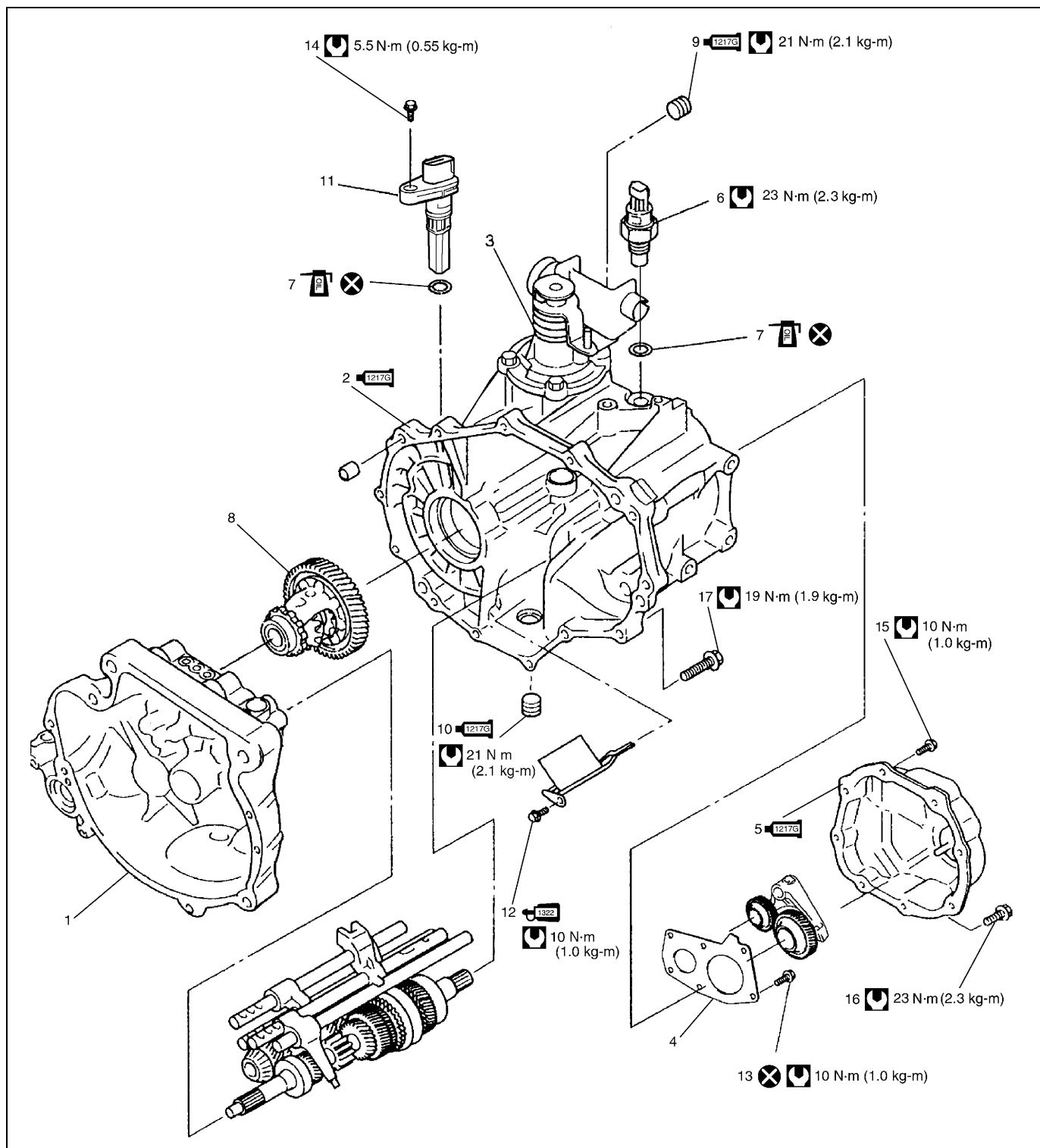
Care should be taken not to scratch oil seal lip with drive shaft while raising transaxle.









Do not hit drive shaft joint with hammer when installing it into differential gear.

Reverse dismounting procedure for remounting noting the following.

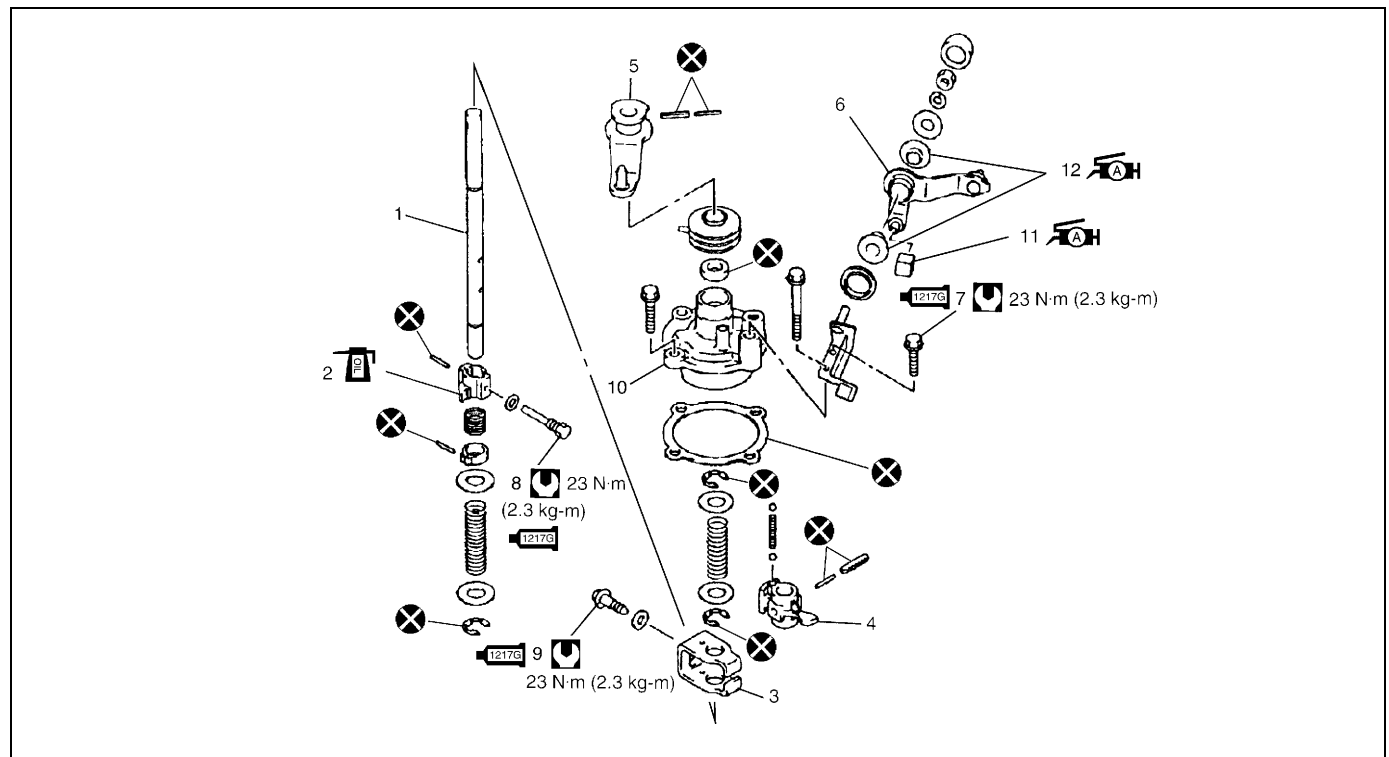
- Install transfer referring to “Transfer Dismounting and Remounting” in Section 7D, if equipped.
- Refer to “Transaxle Unit Components” for fastener specified torque.
- Push in drive shaft joints (right & left) fully so as to snap ring of shaft engages with differential gear.
- Set each clamp for wiring securely.
- Install starting motor referring to “Starting Motor Dismounting and Remounting” in Section 6G.
- After connecting clutch cable, be sure to adjust its play properly.
Refer to “Clutch Pedal Inspection” in Section 7C.
- Fill transaxle with oil as specified referring to “Manual Transaxle Oil Change” in this section.
- Connect battery and check function of engine, clutch and transaxle.









Transaxle Case Components



1. Transaxle right case	11. VSS
 2. Transaxle left case : Apply sealant 99000-31260 to mating surface of left case and right case.	 12. Oil gutter bolt : Apply thread lock 99000-32110 to all around thread part of bolt.
3. Gear shift and select shaft assembly	13. Left case plate screw and bolts
4. Transaxle left case plate	14. VSS bolt
 5. Transaxle side cover : Apply sealant 99000-31260 to mating surface of side cover and left case.	15. Side cover bolt No.1
6. Back up lamp switch	16. Side cover bolt No.2
7. O-ring	17. Transaxle case bolt
8. Differential assembly	 Tightening torque
 9. Oil level/filler plug : Apply sealant 99000-31260 to all around thread part of plug.	 Do not reuse.
 10. Oil drain plug : Apply sealant 99000-31260 to all around thread part of plug.	 Apply transaxle oil

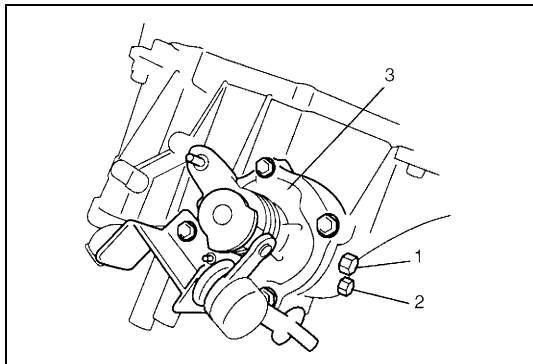
Gear Shift and Select Shaft Assembly Components



1. Gear shift & select shaft	6. Select cable lever	 11. Select lever shaft bush : Apply grease 99000-25010 to whole area of bush.
2. 5th & reverse gear shift cam	 7. Guide case bolt No.1 : Apply sealant 99000-31260 to bolt thread.	 12. Select lever boss : Apply grease 99000-25010 to internal and external diameter
3. Gear shift interlock plate	 8. 5th to reverse interlock guide bolt : Apply sealant 99000-31260 to bolt thread.	 Tightening torque
4. Gear shift & select lever	 9. Gear shift interlock bolt : Apply sealant 99000-31260 to bolt thread.	 Do not reuse.
5. Shift cable lever	10. Guide case	 Apply transaxle oil.

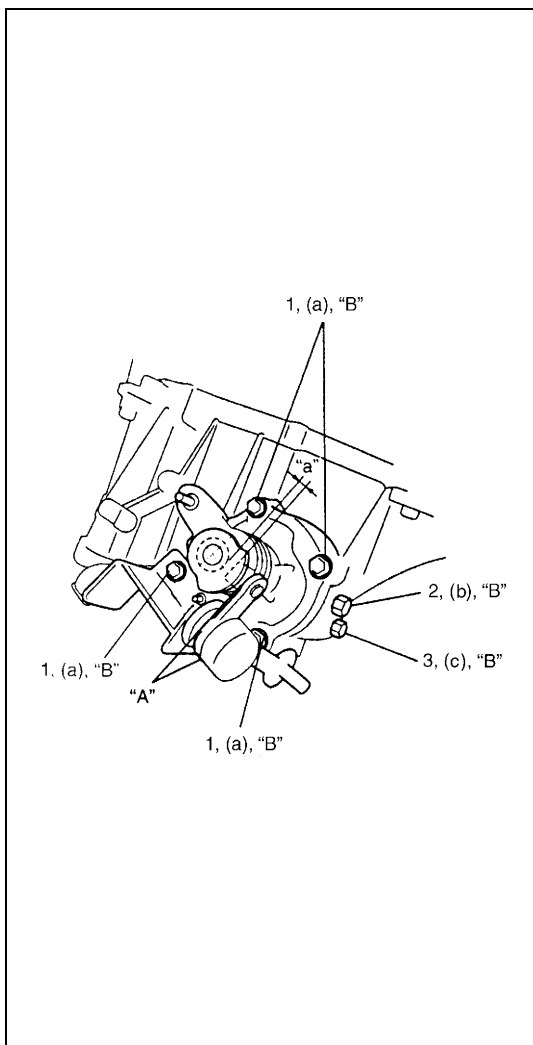
Gear Shift and Select Shaft Assembly Removal and Installation

Removal



- 1) Remove gear shift interlock bolt (1) and 5th to reverse interlock guide bolt (2) from transaxle case.
- 2) Remove gear shift and select shaft assembly (3).

Installation



- 1) Apply grease to select lever shaft bush and select lever boss, and install gear shift and select shaft assembly with new gasket into transaxle.

“A”: Grease 99000-25010

- 2) Apply sealant to gear shift guide case bolts (1). Tighten gear shift guide case bolts (1) to specified torque at the position that clearance “a” is within 1 - 1.5 mm (0.04 - 0.06 in.).

“B”: Sealant 99000-31260

Tightening torque

Gear shift guide case bolt

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 3) Install washer and gear shift interlock bolt (2) to which sealant have been applied and them tighten it to specified torque.

“B”: Sealant 99000-31260

Tightening torque

Gear shift interlock bolt (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 4) Install washer and 5th to reverse interlock guide bolt (3) to which sealant have been applied and then tighten it to specified torque.

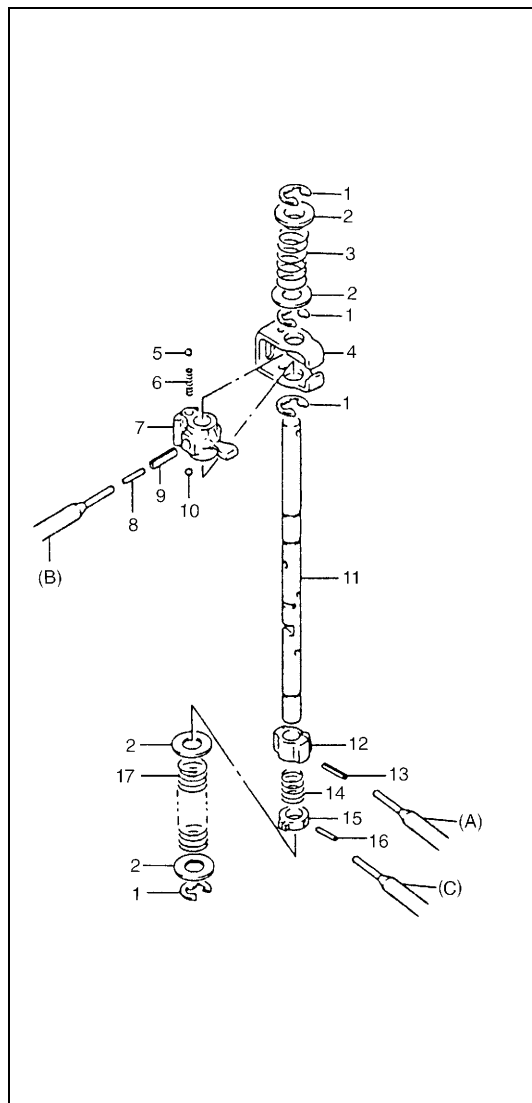
“B”: Sealant 99000-31260

Tightening torque

5th to reverse interlock guide bolt

(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

Gear Shift and Select Shaft Disassembly and Assembly



- 1) Push spring pins out using specified spring pin removers as shown below.

Special tool

(A): 09922-85811 (4.5 mm)

(B): 09925-78210 (6.0 mm)

(C): 2.8 – 3.0 mm (0.11 – 0.12 in.) Commercially available spring pin remover

- 2) Inspect component parts for wear, distortion or damage. If any defect is found, replace defective part with new one.

NOTE:

- When driving in spring pins, prevent shaft from being bent by supporting it with wood block.
- Assemble 5th & reverse gear shift cam with its pit and spring pin aligned.
- Make sure to select an appropriate spring by identifying the painted colors to keep gear shifting performance as designed.
 - Low speed select spring - No paint
 - Reverse select spring - Pink

1. E-ring	10. Ball
2. Washer	11. Gear shift & select shaft
3. Reverse select spring	12. 5th & reverse gear shift cam
4. Gear shift interlock plate	13. Spring pin
5. Ball	14. Cam guide return spring
6. Gear shift interlock spring	15. 5th & reverse gear shift cam guide
7. Gear shift & select lever	16. Spring pin
8. Spring pin	17. Low speed select spring
9. Spring pin	

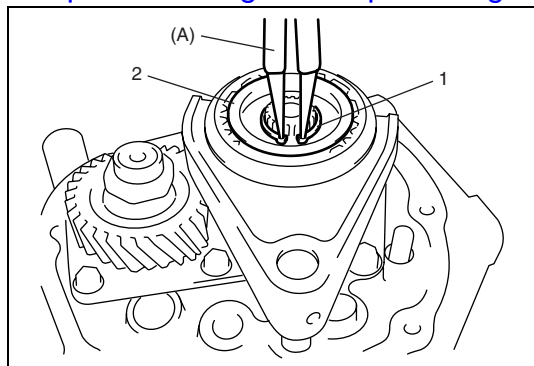
Fifth Gear Disassembly and Assembly

Disassembly

- 1) Remove side cover bolts and take off transaxle side cover.

CAUTION:

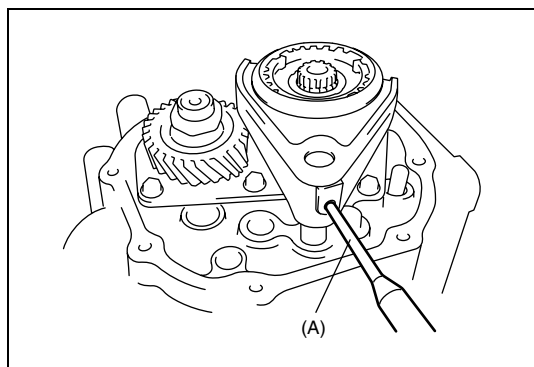
Care should be taken not to distort side cover when it is removed from left case.



- 2) Using special tool, remove circlip (1) and then remove hub plate (2).

Special tool

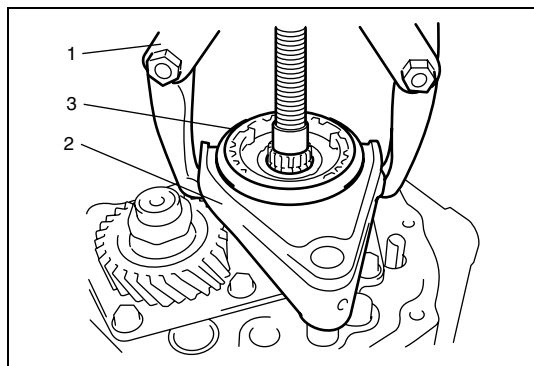
(A): 09900-06107



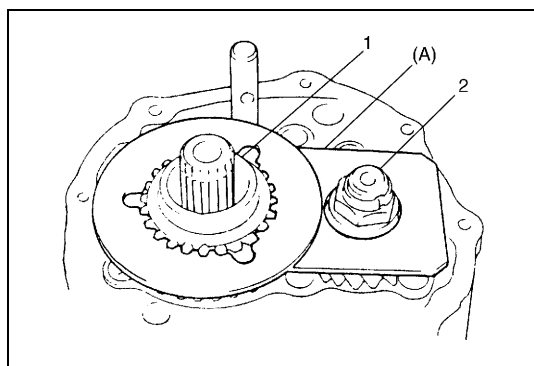
- 3) Drive out spring pin using special tool and hammer.

Special tool

(A): 09922-85811



- 4) Remove gear shift fork (2), sleeve & hub assembly (3), synchronizer ring spring, synchronizer ring and 5th gear all together. Use gear puller (1) for removal if spline fitting of hub is tight.

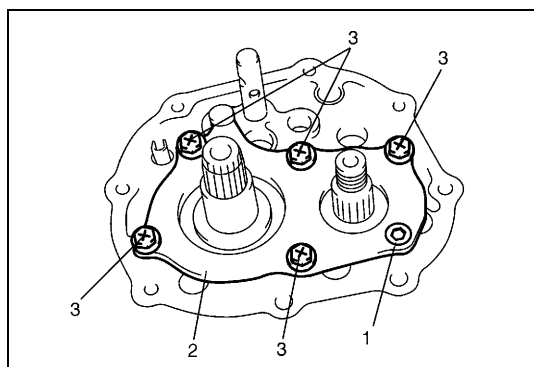


- 5) Install input shaft 5th gear (1) and special tool to stop rotation of shafts, and remove countershaft nut (2).

Special tool

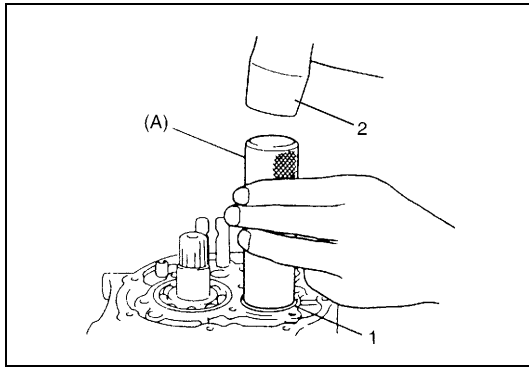
(A): 09927-76010

- 6) Remove special tool, input shaft 5th gear, needle bearing of separated steel cage type and then remove counter shaft 5th gear.

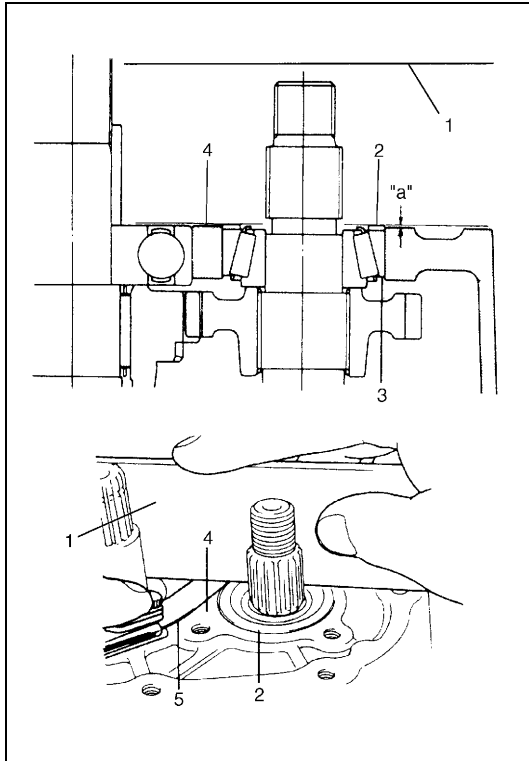


- 7) Remove left case plate screw (1) and bolts (3), and take off left case plate (2).

- 8) Remove bearing set shim.

Assembly

- 1) Install seat countershaft left bearing outer race (1) to bearing cone, tap cup using special tool and plastic hammer (2).

Special tool**(A): 09913-84510**

- 2) With putting a shim (2) on bearing outer race (3), place straight edge (1) over it and compress it by hand through straight edge, and then measure clearance "a" between case surface (4) and straight edge using feeler gauge (5).

Clearance between case surface and straight edge**"a": 0.13 – 0.17 mm (0.0051 – 0.0067 in.)****(Shim protrusion)**

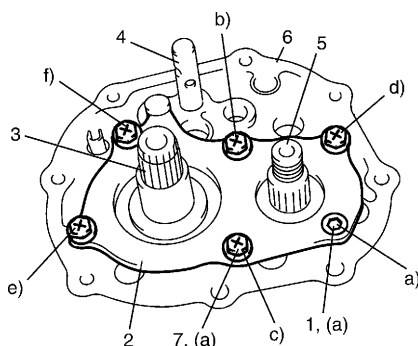
- 3) By repeating above step, select a suitable shim which adjusts clearance "a" to specification and put it on bearing outer race.

NOTE:

Insert 0.15 mm (0.0059 in.) feeler to know whether or not a shim fulfills specification quickly.

Available shim thickness

0.40, 0.45, 0.50, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0, 1.05, 1.1 and 1.15 mm (0.015, 0.017, 0.019, 0.021, 0.023, 0.025, 0.027, 0.029, 0.031, 0.033, 0.035, 0.037, 0.039, 0.041, 0.043 and 0.045 in.)

**CAUTION:**

Do not reuse left case plate screw (1) and bolts (7). Be sure to use new adhesive pre-coated screw and bolts. Otherwise, screw and bolts may loosen.

- 4) Place left case plate (2) inserting its end in groove of shift guide shaft (4) and tighten new adhesive pre-coated screw (1) and bolts (7) temporarily with less than specified torque.
- 5) Tighten new screw and new bolts to specified torque finally in the order of alphabet shown in figure.

NOTE:

After tightening screw and bolts, make sure that counter-shaft (5) can be rotated by hand feeling certain load.

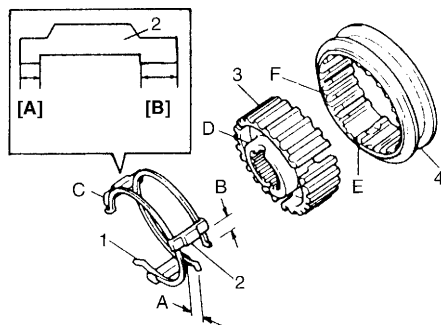
Tightening torque

Left case plate screw and bolt

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

3. Input shaft

6. Transaxle left case



- 6) Assemble 5th speed synchronizer sleeve (4) and hub (3) with keys (2) and springs (1).

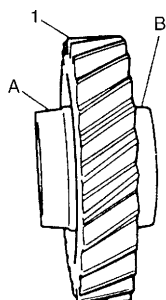
NOTE:

Short side C in keys, long flange D in hub and chamfered spline F in sleeve should face inward (5th gear side).

Synchronizer key installation position

: A = B

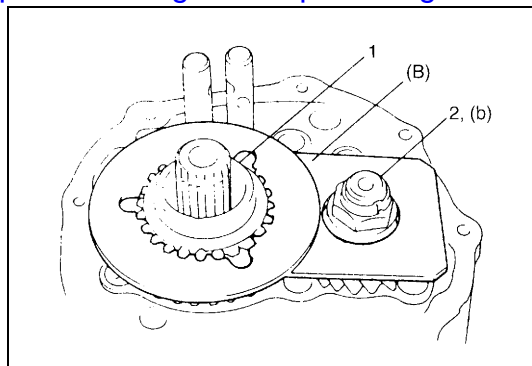
[A]: Short side C	D: Long flange (Inward)
[B]: Long side	E: Key way
C: Short side (Inward)	F: Chamfered spline (Inward)



- 7) Install 5th gear (1) to counter shaft facing machined boss A inward.

A: Machined boss (Inside)

B: No machining (Outside)



- 8) Install needle bearing of separated steel cage type to input shaft, apply oil then install 5th gear (1) and special tool to stop shaft rotation.

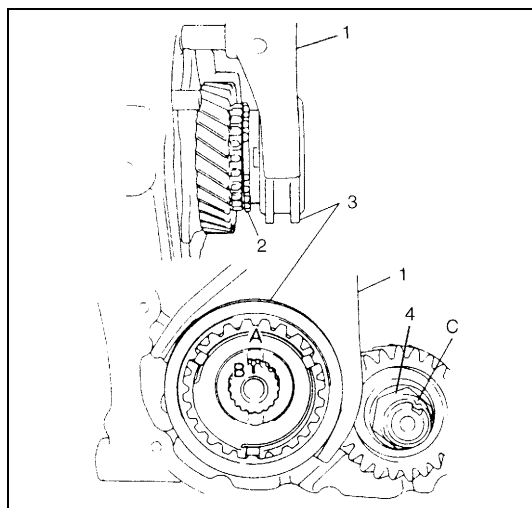
Special tool

(B): 09927-76010

- 9) Install new countershaft nut (2) and tighten it to specification.

Tightening torque

Countershaft nut (b): 70 N·m (7.0 kg-m, 51.0 lb-ft)



- 10) Remove special tool, then caulk countershaft nut (4) at C with caulking tool and hammer.

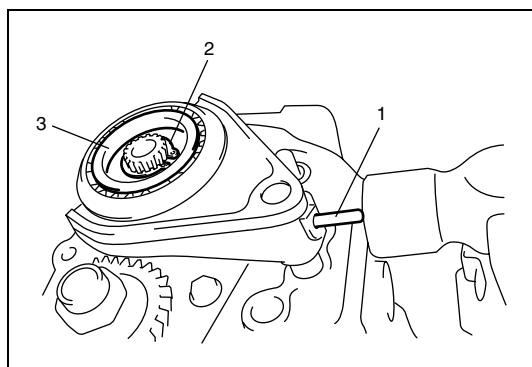
- 11) Install synchronizer ring (2).

- 12) Fit 5th gear shift fork (1) to sleeve & hub assembly (3) and install them into input shaft, shift shaft and shift guide shaft at once aligning hub oil groove A with shaft mark B.

NOTE:

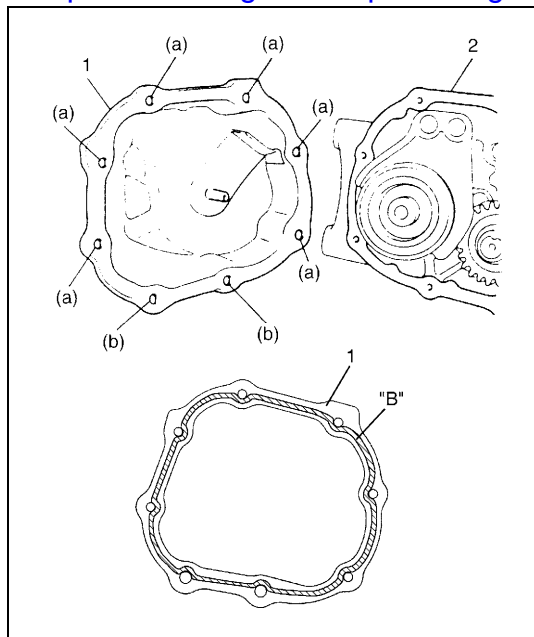
Long flange of hub faces inward (gear side).

A:	Oil groove (Align with B)
B:	Punch mark
C:	Caulking



- 13) Drive in spring pin (1).

- 14) Fit hub plate (3) and fix it with circlip (2).



- 15) Clean mating surface of both left case (2) and side cover (1), apply sealant to side cover (1) as shown in figure by such amount that its section is 1.5mm (0.059 in.) in diameter, mate it with left case and then tighten bolts.

“B”: Sealant 99000-31260

Tightening torque

Side cover No.1 bolt (a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

Side cover No.2 bolt (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

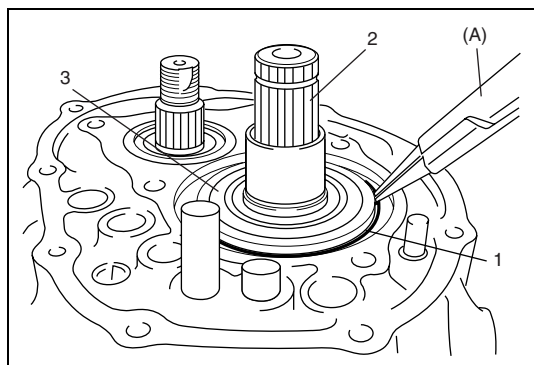
Gear Shift Shaft, Input Shaft and Counter Shaft Removal and Installation

Removal

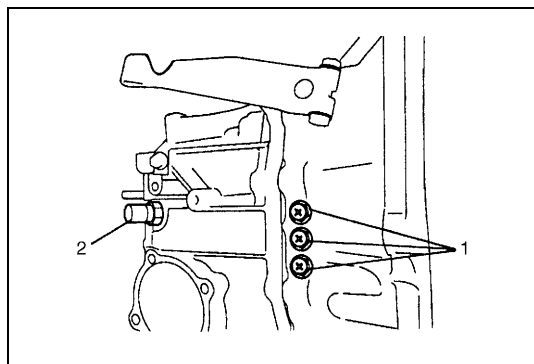
- 1) Remove gear shift and select shaft assembly referring to “Gear Shift and Select Shaft Assembly Removal and Installation” in this section.
- 2) Remove fifth gear referring to “Fifth Gear Disassembly and Assembly” in this section.
- 3) Remove snap ring (1) using special tool.

Special tool

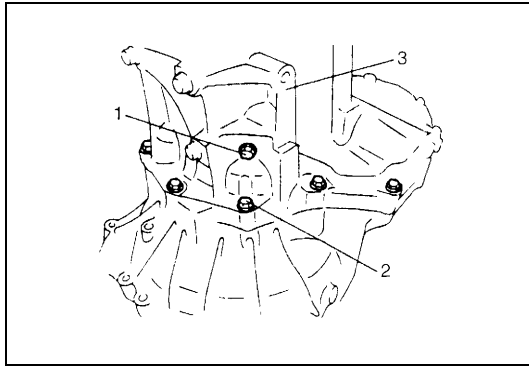
(A): 09900-06107



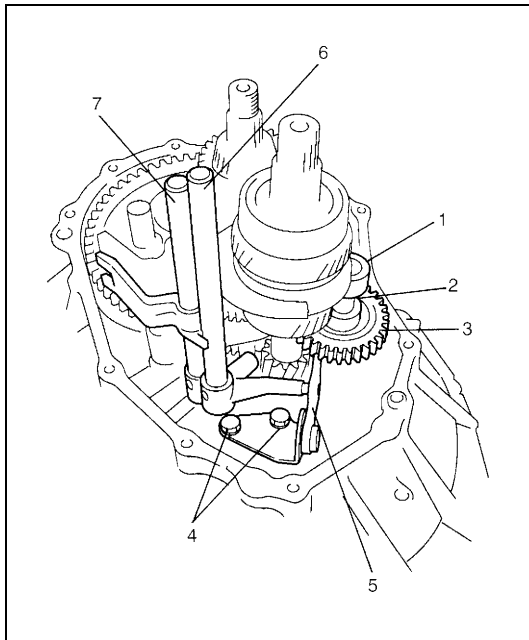
2. Input shaft
3. Input shaft left bearing



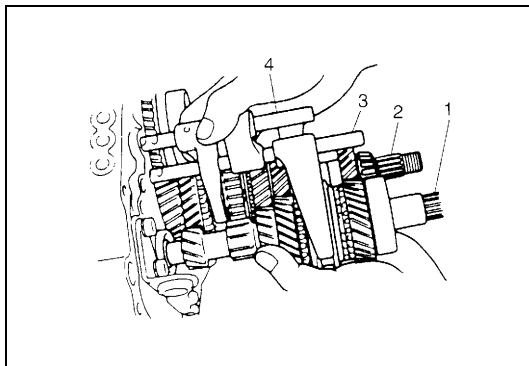
- 4) Remove gear shift locating bolts (1) with washers, then take out locating springs and steel balls.
- 5) Remove back up lamp switch (2).



- 6) Remove reverse shaft bolt (1) with washer.
- 7) Remove case bolts (2) from outside and another bolts from clutch housing side.
- 8) Tapping left case (3) flanges with plastic hammer, remove left case.

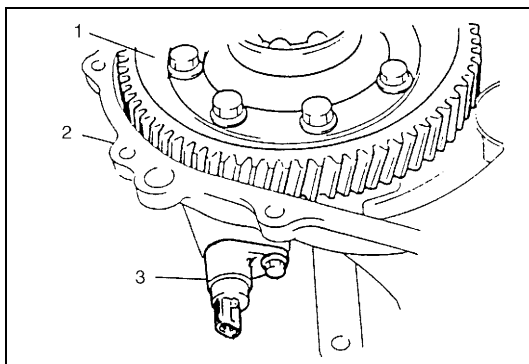


- 9) Pull out reverse gear shaft (1) with washer (2), then take off reverse idler gear (3).
- 10) Remove reverse gear shift lever bolts (4) and reverse gear shift lever (5).
- 11) Pull out 5th & reverse gear shift guide shaft (6) together with 5th & reverse gear shift shaft (7).



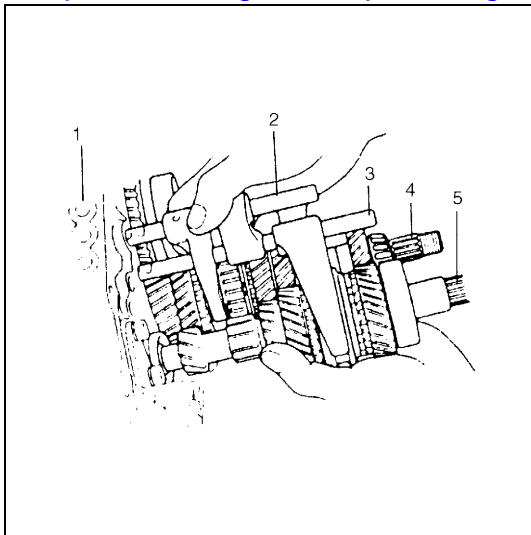
- 12) Tapping input shaft end with plastic hammer, push it out as assembly from case a little, then take out input shaft assembly (1), counter shaft assembly (2), high speed gear shift shaft (3) and low speed gear shift shaft (4) all at once.

Installation



- 1) Install differential assembly (1) into right case (2).
- 2) Insert VSS (3) with grease applied to its new O-ring, then tighten it with bolt.

Grease 99000-25010



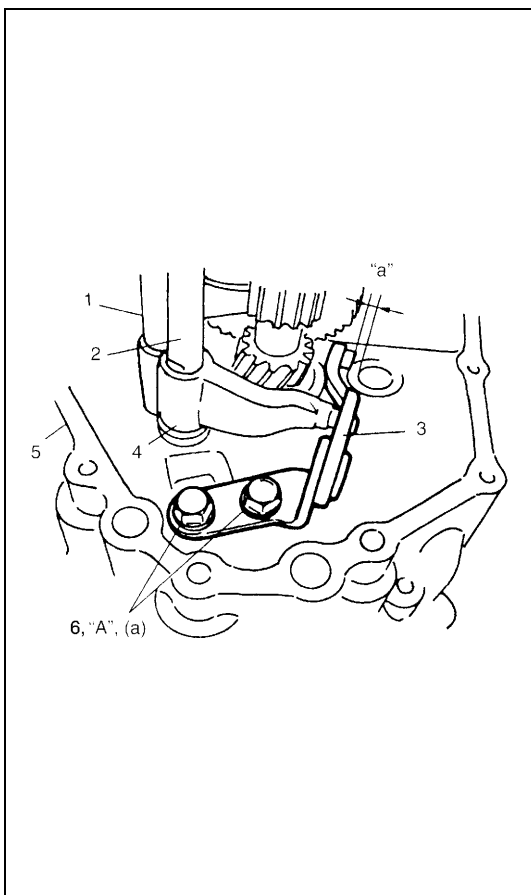
- 3) Join input shaft (5), countershaft (4), low speed gear shift shaft (2) and high speed gear shift shaft (3) assemblies all together, then install them into right case (1).

CAUTION:

Take care not to damage oil seal lip by input shaft, or oil leakage may take place.

NOTE:

- Input shaft right bearing on shaft can be installed into right case tapping shaft with plastic hammer.
- Check to make sure that counter shaft is engaged with final gear while installing.



- 4) Install 5th & reverse gear shift shaft (1) with 5th & reverse gear shift guide shaft (2) into right case (5). Reverse gear shift arm (4) has to be joined with reverse gear shift lever (3) at the same time.
- 5) Place reverse gear shift lever (3), fasten it with bolts (6) after applying thread lock cement.

“A”: Thread lock cement 99000-32110

Tightening torque

Reverse gear shift lever bolt

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

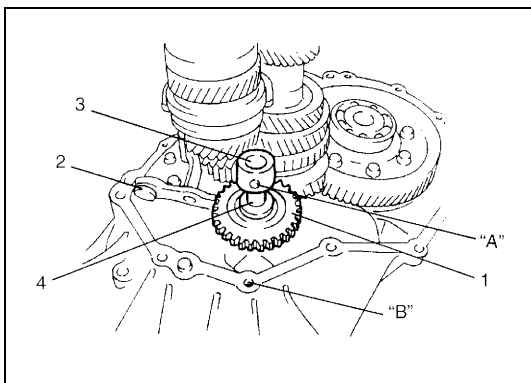
NOTE:

- When installing reverse gear shift lever (3), set it as the following specification.

Distance between lever end and shaft bore

“a”: 5 mm (0.2 in.)

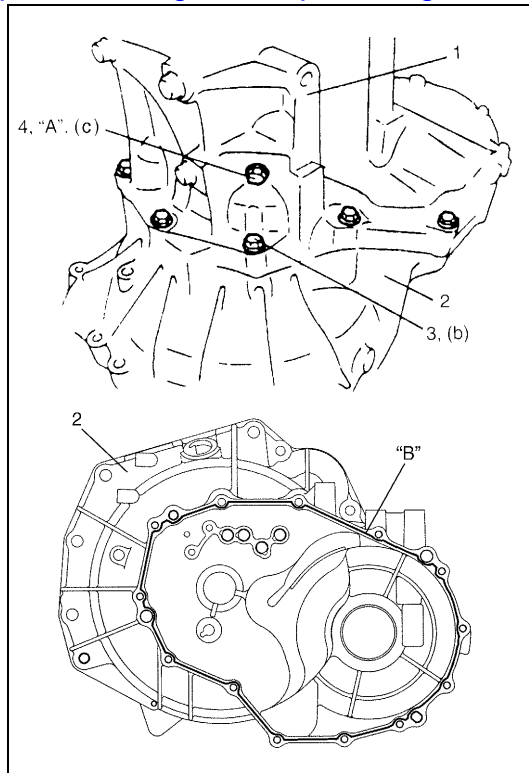
- Distance “a” must be measured after installing reverse gear shaft.
- When “a” is 5 mm (0.2 in.), clearance between reverse idler gear groove and shift lever end will be 1 mm (0.04 in.).



- 6) Make reverse idler gear (1) with reverse gear shift lever (2), insert reverse gear shaft (3) into case through idler gear and then align “A” in shaft with “B” in case.

NOTE:

- Make sure that washer (4) has been installed in shaft at above the gear.
- Check to confirm that reverse gear shift lever end has clearance 1 mm (0.04 in.) to idler gear groove.



- 7) Clean mating surfaces of both right and left cases, apply sealant to right case (2) as shown in figure by such amount that its section is 1.5mm (0.059 in.) in diameter then mate it with left case (1).

“B”: Sealant 99000-31260

- 8) Tighten case bolts (3) from left case side to specified torque.

Tightening torque

Transaxle case bolt (b): 19 N·m (1.9 kg-m, 14.0 lb-ft)

- 9) Install reverse shaft bolt (4) to which thread lock cement have been applied with aluminum washer and tighten it.

“A”: Thread lock cement 99000-32110

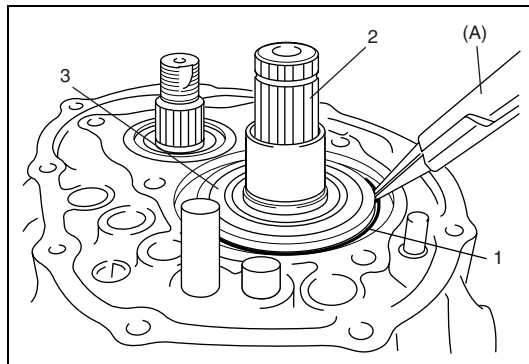
Tightening torque

Reverse shaft bolt (c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 10) Install another case bolts from clutch housing side and tighten them to specification.

Tightening torque

Transaxle case bolt: 19 N·m (1.9 kg-m, 14.0 lb-ft)

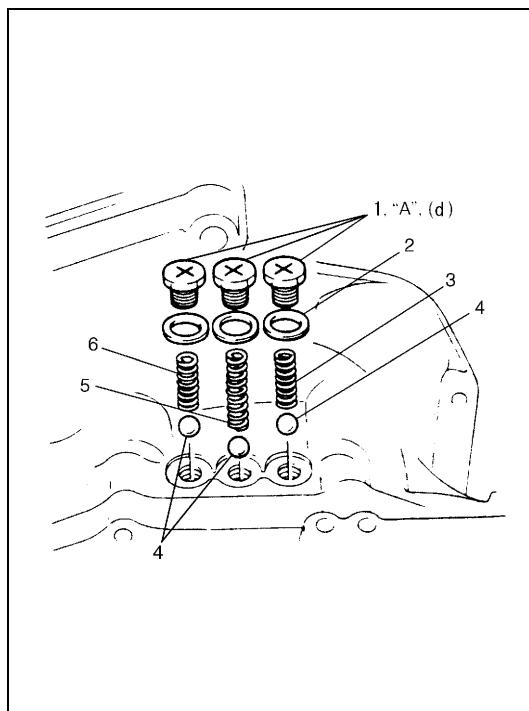


- 11) Install new snap ring (1) using special tool.

Special tool

(A): 09900-06107

2.	Input shaft
3.	Input shaft left bearing



- 12) Check locating spring for deterioration and replace with new one as necessary.

Locating spring free length

For Low speed (3) and 5th & reverse (6)

Standard: 26.1 mm (1.028 in.)

Service Limit: 25.0 mm (0.984 in.)

For High speed (5)

Standard: 40.1 mm (1.579 in.)

Service Limit: 39.0 mm (1.535 in.)

- 13) Install steel balls (4) and locating springs (4, 5 and 6) for respective gear shift shaft and tighten bolts (1) to which sealant have been applied to its thread part.

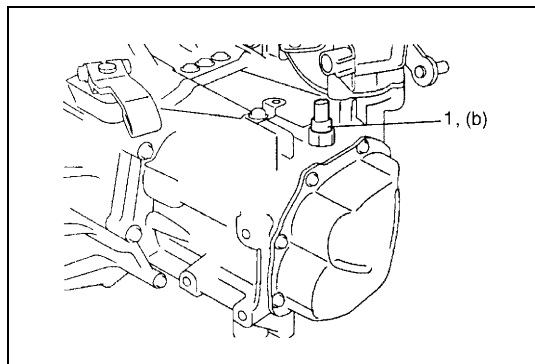
“A”: Sealant 99000-31260

Tightening torque

Gear shift locating bolt (d): 13 N·m (1.3 kg-m, 9.5 lb-ft)

2.	Washer
----	--------

- 14) Clean mating surface of guide case.
- 15) Install fifth gear referring to "Fifth Gear Disassembly and Assembly" in this section.
- 16) Install gear shift and select shaft assembly referring to "Gear Shift and Select Shaft Assembly Removal and Installation" in this section.



- 17) Tighten back up lamp switch (1) to specified torque.

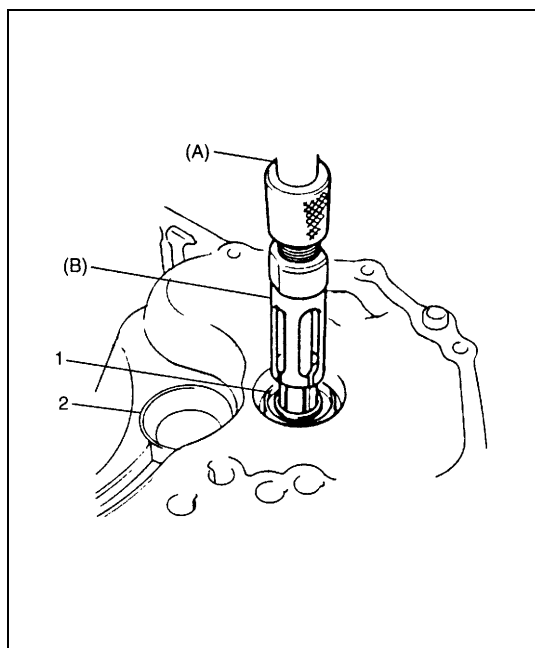
Tightening torque

Back up lamp switch (b): 23 N·m (2.3 kg·m, 17.0 lb·ft)

- 18) Check input shaft for rotation in each gear position.
- 19) Also confirm continuity of back up lamp switch in reverse position using ohmmeter.

Transaxle Case Disassembly and Assembly

Disassembly



- 1) Remove input shaft oil seal (1) using special tools, if necessary.

Special tool

(A): 09930-30104

(B): 09923-74510

- 2) If input shaft right bearing has been left in right case, pull it out using special tools.

Special tool

(A): 09930-30104

(B): 09923-74510

- 3) Also pull out countershaft right bearing cup (2) using special tools, if necessary.

Special tool

09941-64511

09930-30104

- 4) Remove counter shaft left bearing cup from left case using special tools.

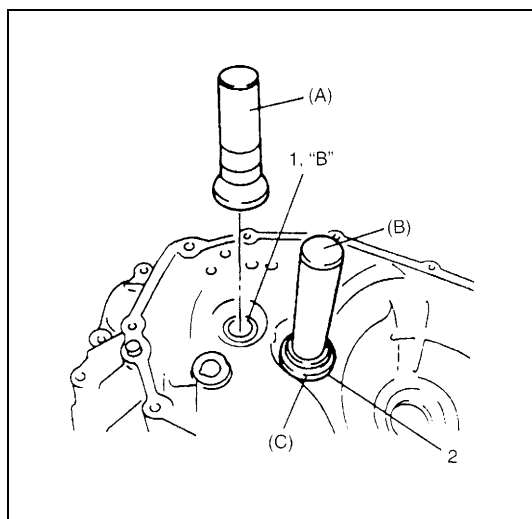
Special tool

09913-84510

- 5) Replace differential side oil seal(s) referring to "Differential Side Oil Seal Replacement" in this section, if necessary.
- 6) Remove oil gutter from left case, if necessary.

Assembly**NOTE:**

Before installation, wash each part and apply specified transaxle oil to sliding faces of bearing and gear.



- 1) If input shaft oil seal (1) has been removed, install it with its spring side facing upward.

Use special tool and hammer for installation and apply grease to oil seal lip.

“B”: Grease 99000-25010

Special tool

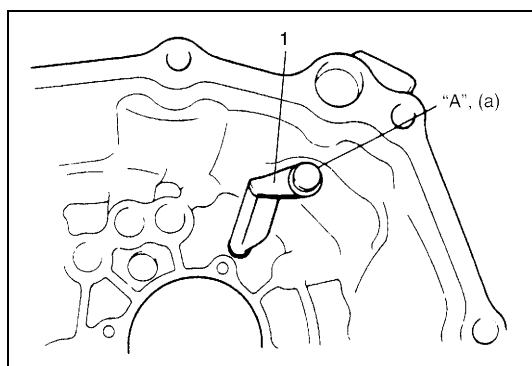
(A): 09951-76010

- 2) If counter shaft right bearing outer race (2) has been removed, install it using special tools and hammer.

Special tool

(B): 09924-74510

(C): 09925-68210



- 3) If input oil gutter (1) has been removed, install it with bolt to which thread lock cement have been applied.

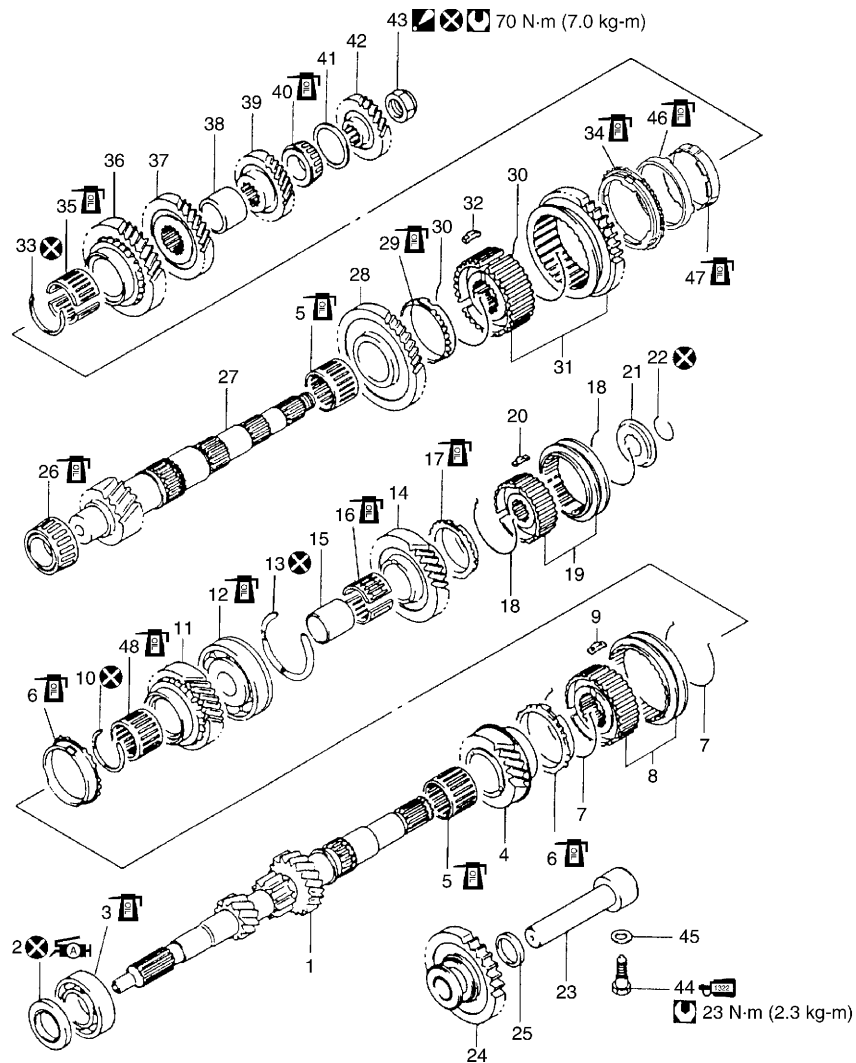
“A”: Thread lock cement 99000-32110

Tightening torque

Oil gutter bolt (a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 4) Install counter shaft left bearing outer race into case bore tapping it with plastic hammer lightly.

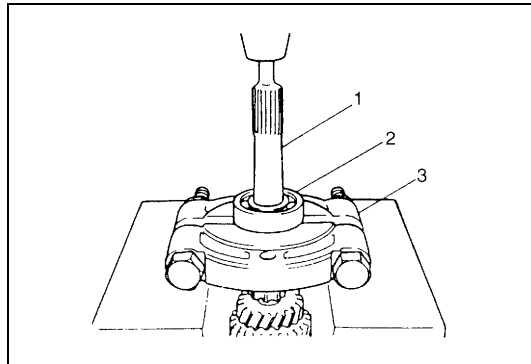
Input & Counter Shaft Components



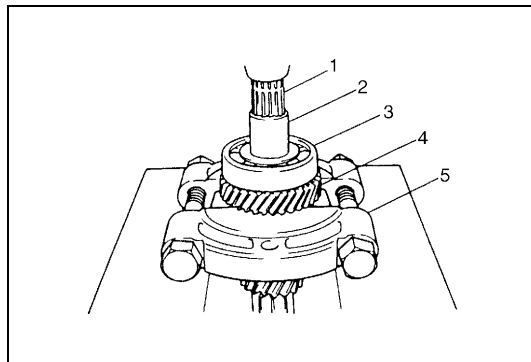
1. Input shaft	18. 5th synchronizer spring	35. Needle bearing (separated steel cage type)
2. Oil seal : Apply grease 99000-25010 to oil seal lip	19. 5th speed sleeve & hub	36. Countershaft 2nd gear
3. Input shaft right bearing	20. 5th synchronizer key	37. Countershaft 3rd gear
4. Input shaft 3rd gear	21. 5th synchronizer hub plate	38. 3rd & 4th gear spacer
5. Needle bearing (resin cage type)	22. Circlip	39. Countershaft 4th gear
6. High speed synchronizer ring	23. Reverse gear shaft	40. Countershaft left bearing
7. High speed synchronizer spring	24. Reverse idler gear	41. Bearing set shim
8. High speed sleeve & hub	25. Reverse shaft washer	42. Countershaft 5th gear
9. High speed synchronizer key	26. Countershaft right bearing	43. Countershaft nut : After tightening nut to specified torque, caulk nut securely.
10. Circlip	27. Countershaft	44. Reverse shaft bolt : Apply thread lock cement 99000-32110 to thread part of bolt.
11. Input shaft 4th gear	28. Countershaft 1st gear	45. Washer
12. Input shaft left bearing	29. 1st gear synchronizer ring	46. Center cone
13. Snap ring	30. Low speed synchronizer spring	47. 2nd gear synchronizer inner ring
14. Input shaft 5th gear	31. Low speed sleeve & hub	48. Needle bearing (steel cage type)
15. 5th gear spacer	32. Low speed synchronizer key	Tightening torque
16. 5th gear needle bearing (separated steel cage type)	33. Circlip	Do not reuse.
17. 5th speed synchronizer ring	34. 2nd gear synchronizer outer ring	Apply transaxle oil.

Input Shaft Disassembly and Assembly

Disassembly



- 1) Remove input shaft right bearing (2) from input shaft (1) using bearing puller (3) and press.

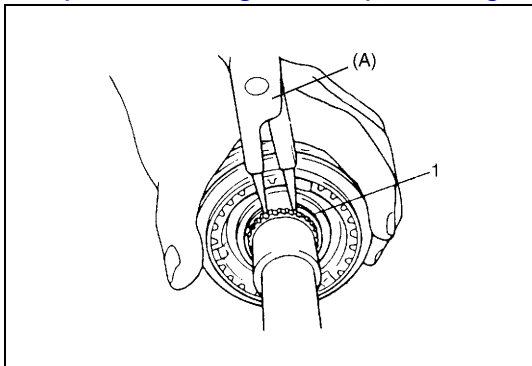


- 2) Drive out 5th gear spacer (2), left bearing (3) and 4th gear (4) all at once from input shaft (1) using puller (5) and press.

CAUTION:

To avoid gear tooth from being damaged, support it at flat side of bearing puller.

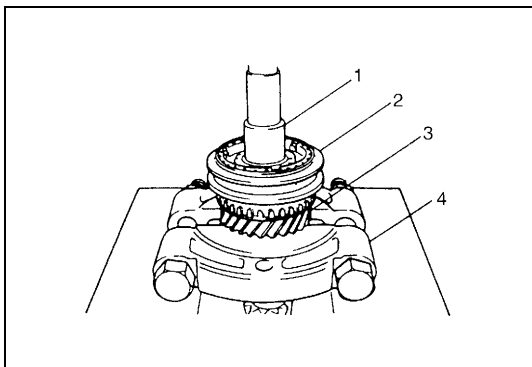
- 3) Take out 4th gear needle bearing and high speed synchronizer ring.



- 4) Using special tool, remove circlip (1).

Special tool

(A): 09900-06107



- 5) Drive out high speed synchronizer sleeve & hub assembly (2) together with 3rd gear (3) from input shaft (1) using puller (4) and press.

CAUTION:

Make sure to use flat side of puller to avoid causing damage to 3rd gear tooth.

- 6) Take out 3rd gear needle bearing from shaft.
7) Disassemble synchronizer sleeve & hub assembly.

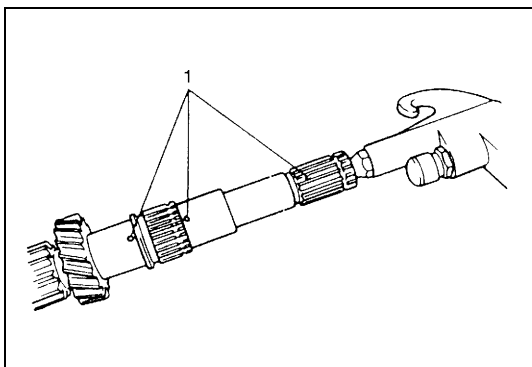
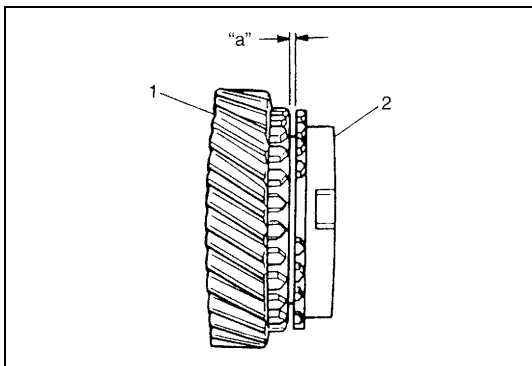
Assembly

- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
2) If synchronizer parts need to be repaired, check clearance "a" between ring (2) and gear (1), each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

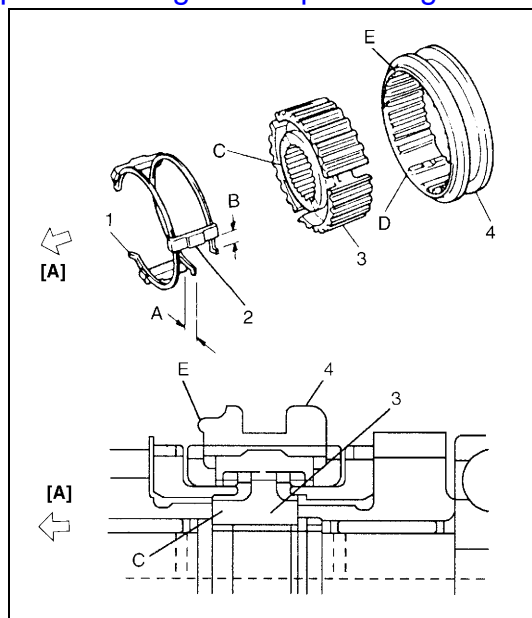
Clearance between synchronizer ring and gear

Standard "a": 1.0 – 1.4 mm (0.039 – 0.055 in.)

Service limit "a": 0.5 mm (0.019 in.)



- 3) To ensure lubrication, air blow oil holes (1) and make sure that they are free from any obstruction.



- 4) Fit high speed synchronizer sleeve (4) to hub (3), insert 3 keys (2) in it and then set springs (1) as shown in figure.

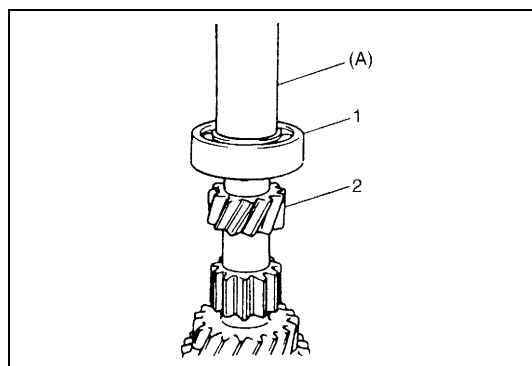
NOTE:

- No specific direction is assigned to each key but it is assigned as sleeve & hub assembly.
- Size of high speed synchronizer sleeve, hub, keys and springs is between those of low speed and 5th speed ones.

Synchronizer key installation position

: A = B

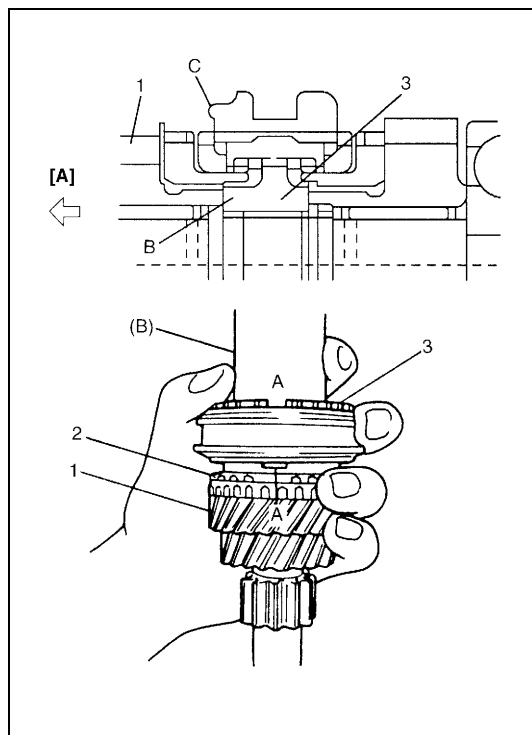
[A]:	3rd gear side
C:	Long flange
D:	Key way
E:	Projecting end



- 5) Drive in right bearing (1) to input shaft (2) using special tool and hammer.

Special tool

(A): 09913-80112



- 6) Install 3rd gear needle bearing of resin cage type, apply oil to it, then install 3rd gear (1) and synchronizer ring (2).

- 7) Drive in high speed sleeve & hub assembly (3) using special tool and hammer, facing long flange side of hub to 3rd gear.

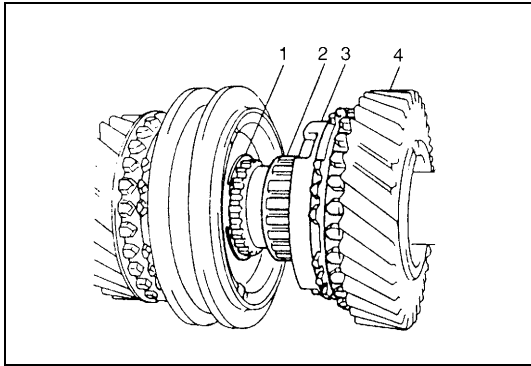
NOTE:

- While press-fitting sleeve & hub, make sure that synchronizer ring key slots are aligned with keys in sleeve & hub assembly.
- Check free rotation of 3rd gear after press-fitting sleeve & hub assembly.
- Synchronizer rings for 3rd and 4th are identical.

Special tool

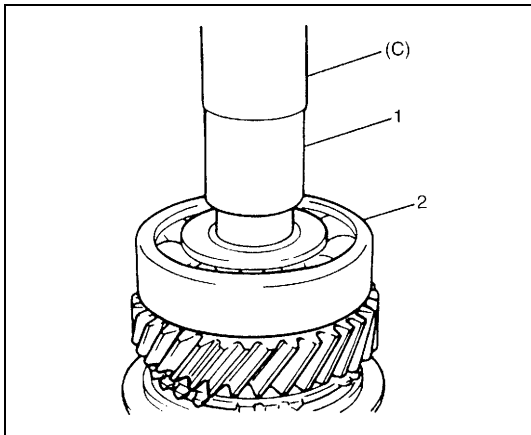
(B): 09913-84510

[A]:	3rd gear side
A:	Key way
B:	Long flange
C:	Projecting end



- 8) Install circlip (1) and confirm that circlip is installed in groove securely.

Install needle bearing (2) of steel cage type, apply oil to bearing and then install synchronizer ring (3) and 4th gear (4).



- 9) Press-fit left bearing (2) using special tool and hammer.

Special tool

(C): 09925-98221

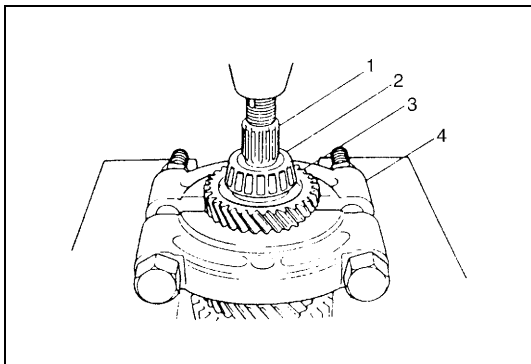
- 10) Using the same special tool at step 9), drive in 5th gear spacer (1).

CAUTION:

To prevent 5th gear spacer from being distorted because of excessive compression, do not press-fit it with left bearing at once.

Counter Shaft Disassembly and Assembly

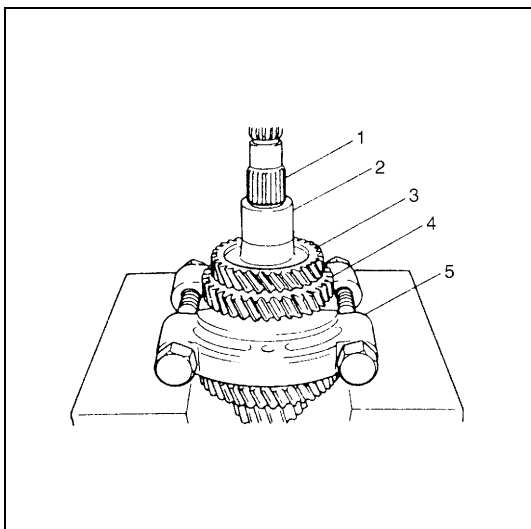
Disassembly



- 1) Drive out left bearing cone (2) with 4th gear (3) from counter shaft (1) using puller (4) and press.

CAUTION:

- Use puller and press that will bear at least 5 ton (11,000 lb) safely.
- To avoid tooth damage, support 4th gear at flat side of puller.

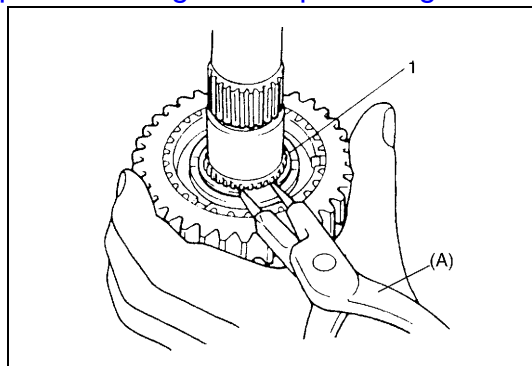


- 2) Apply puller (5) to 2nd gear (4) and drive out 3rd & 4th gear spacer (2) and 3rd gear (3) together with 2nd gear (4) from counter shaft (1) using press. Take out needle bearing of separated steel cage type from counter shaft.

CAUTION:

- If compression exceeds 5 ton (11,000 lb), release compression once, reset puller support and then continue press work again.
- To avoid gear tooth from being damaged, support it at flat side of bearing puller.

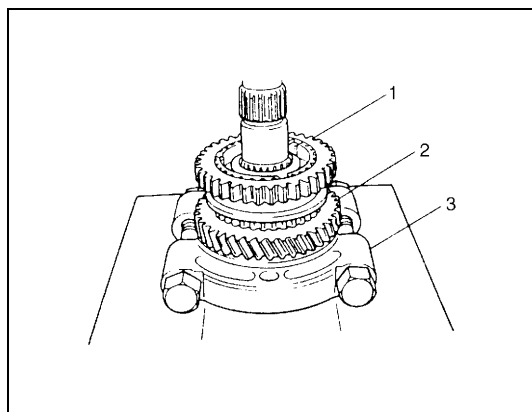
- 3) Take out 2nd synchronizer outer ring, center cone and inner ring.



4) Using special tool, remove circlip (1).

Special tool

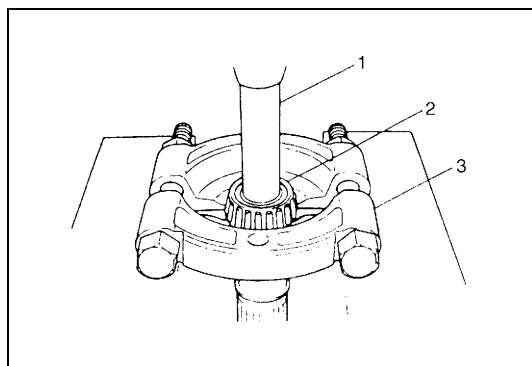
(A): 09900-06107



5) Apply puller (3) to 1st gear (2) and drive out low speed synchronizer sleeve & hub assembly (1) with 1st gear (1) using press.

CAUTION:

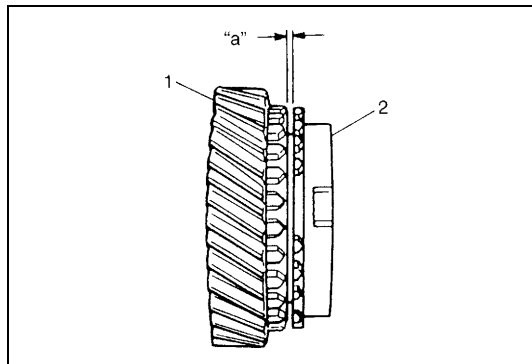
To avoid gear tooth from being damaged, support it at flat side of bearing puller.



6) Disassemble synchronizer sleeve & hub assembly.

7) Take out 1st gear needle bearing of resin cage type from shaft.

8) Remove right bearing cone (2) using puller (3), metal stick (1) and press.



Assembly

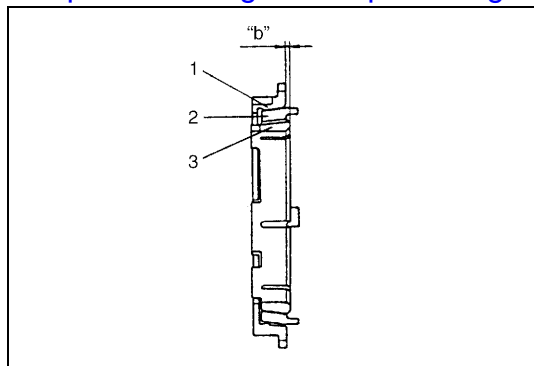
1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.

2) If synchronizer parts need to be repaired, check clearance "a" between ring (2) and gear (1), each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

Clearance between synchronizer ring and gear

Standard "a": 1.0 – 1.4 mm (0.039 – 0.055 in.)

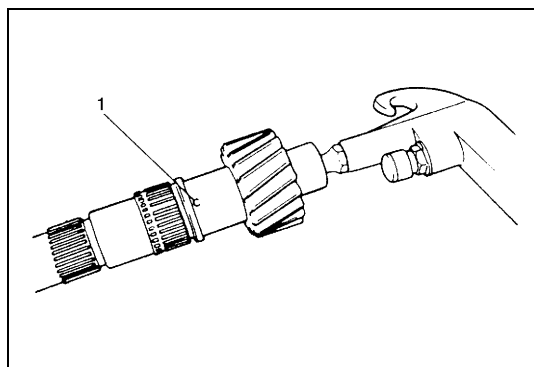
Service limit "a": 0.5 mm (0.019 in.)



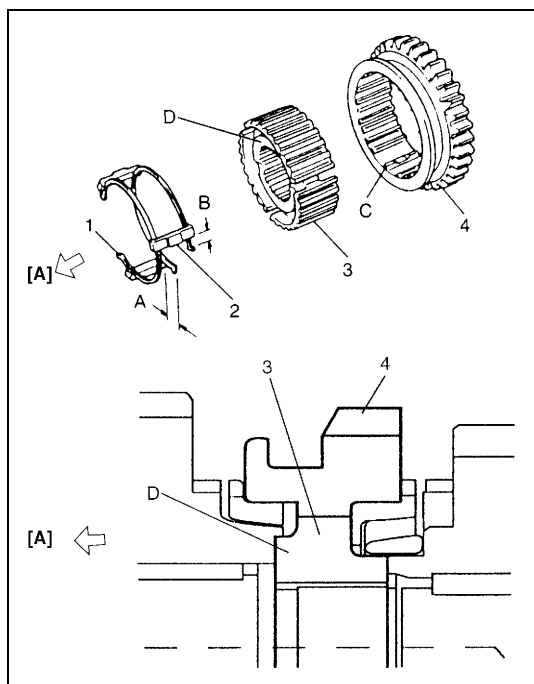
- 3) Put the synchronizer outer ring (1), inner ring (3) and the cone (2) together and then measure the step difference between the outer ring and the inner ring. And also check each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

Difference between synchronizer outer ring and inner ring
Standard "b": 1.0 – 1.4 mm (0.039 – 0.055 in.)

Service limit "b": 0.5 mm (0.019 in.)



- 4) To ensure lubrication, air blow oil holes (1) and make sure that they are free from any obstruction.



- 5) Fit low speed synchronizer sleeve (4) to hub (3), insert 3 keys (2) in it and then set springs (1) as shown in figure.

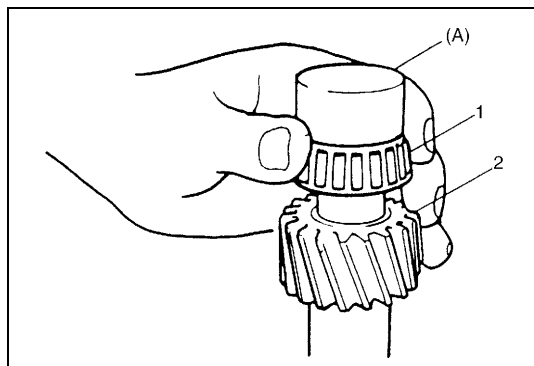
NOTE:

- No specific direction is assigned to each key but it is assigned as sleeve & hub assembly.
- Size of low speed synchronizer keys and springs are the largest compared with those of high speed and 5th speed ones.

Synchronizer key installation position

: A = B

[A]:	1st gear side
C:	Key way
D:	Short flange

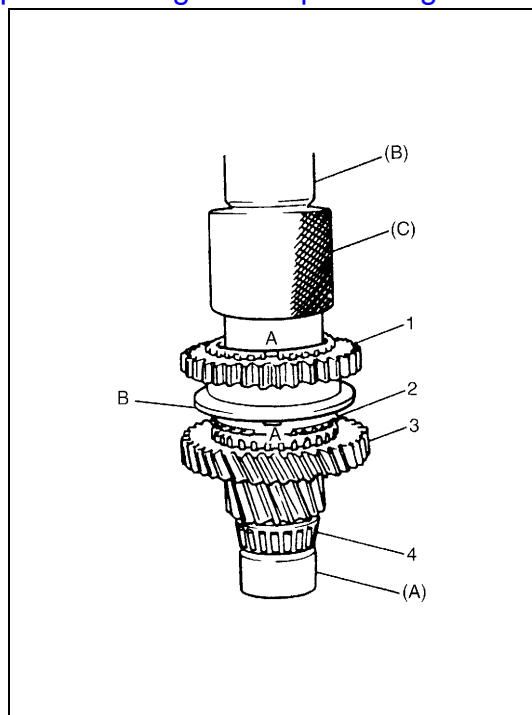


- 6) Install right bearing cone (1) to counter shaft (2) using special tool and hammer.

Special tool

(A): 09923-78210

- 7) Install needle bearing of resin cage type, apply oil to it, then install 1st gear and 1st gear synchronizer ring.



- 8) Drive in low speed sleeve & hub assembly (1) using special tools and hammer, facing "B" side of sleeve to 1st gear.

NOTE:

- Support shaft with special tool as shown in figure so that retainer of bearing cone (4) will be free from compression.
- Make sure that synchronizer ring (2) key slots are aligned with keys while press-fitting sleeve & hub assembly.
- Check free rotation of 1st gear (3) after press-fitting sleeve & hub assembly.

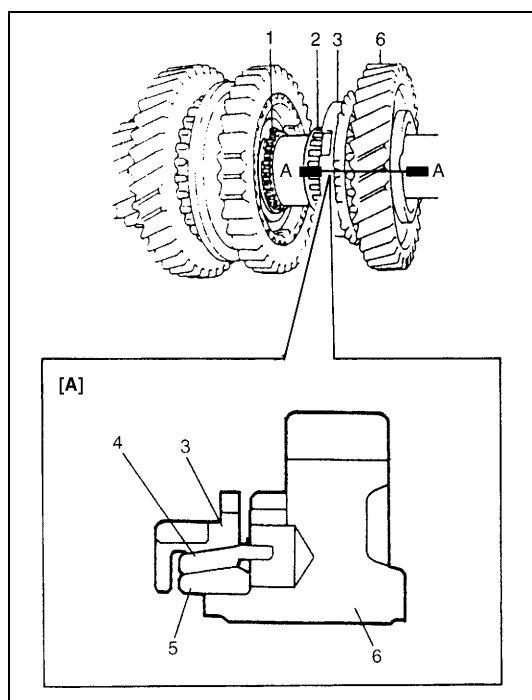
Special tool

(A): 09923-78210

(B): 09925-18011

(C): 09940-53111

A: Align key slots with keys

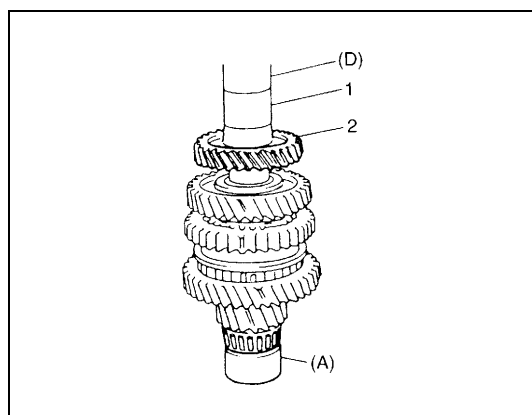


- 9) Install circlip (1) and confirm that circlip is installed in groove securely.

Install needle bearing (2) of separated steel cage type, apply oil to bearing.

With synchronizer outer ring (3), center cone (4) & inner ring (5) put together and installed to 2nd gear (6) as shown in figure.

[A]: SECTION A - A



- 10) Press-fit 3rd gear (2) and spacer (1) using special tools and press.

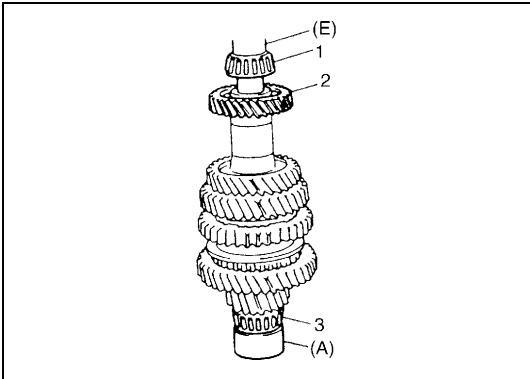
CAUTION:

Press-fit 3rd gear (2) and spacer (1) first, and then 4th gear later separately so that counter shaft will not be compressed excessively.

Special tool

(A): 09923-78210

(D): 09913-80112



- 11) Press-fit 4th gear (2) using the same procedure as step 10).
- 12) Install left bearing cone (1) using special tools and hammer.

NOTE:

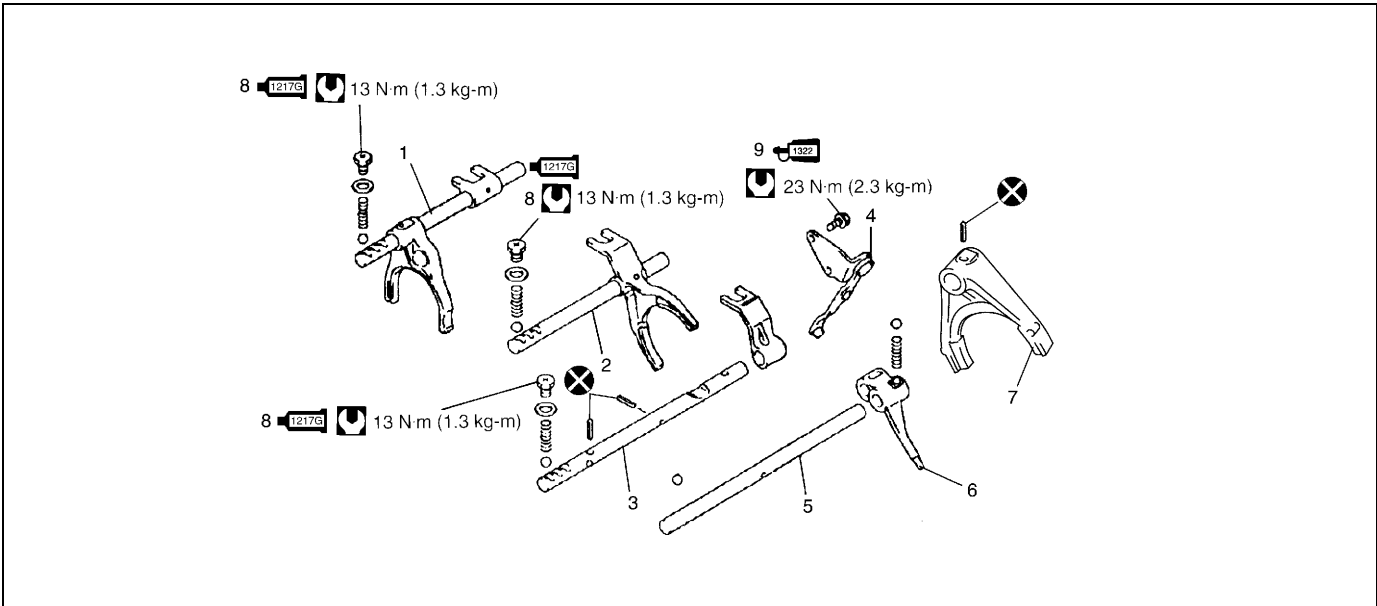
For protection of right bearing cone (3), always support shaft with special tool as illustrated.

Special tool

(A): 09923-78210

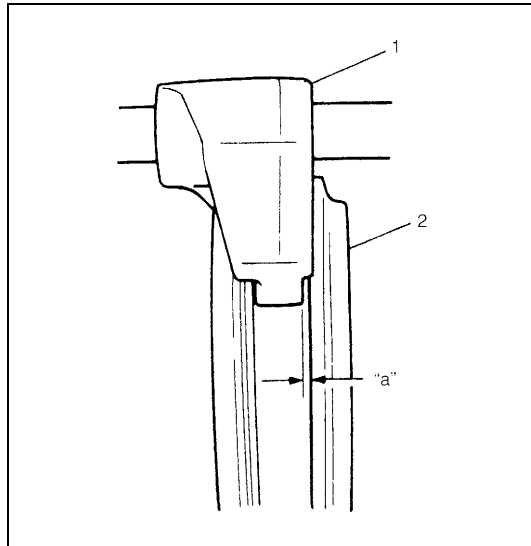
(E): 09925-98221

Gear Shift Shaft Components



1. Low speed gear shift shaft	5. 5th & reverse gear shift guide shaft	9. Reverse gear shift lever bolt : Apply thread lock 99000-32110 to all around thread part to bolt.
2. High speed gear shift shaft	6. Reverse gear shift arm	Tightening torque
3. 5th & reverse gear shift shaft	7. 5th gear shift fork	Do not reuse.
4. Reverse gear shift lever	8. Gear shift locating bolt : Apply sealant 99000-31260 to bolt thread.	

High Speed and Low Speed Gear Shift Shafts Inspection



- 1) Using feeler gauge, check clearance between fork (1) and sleeve (2) and replace those parts if it exceeds limit below.

NOTE:

For correct judgement of parts replacement, carefully inspect contact portion of fork and sleeve.

Clearance between fork and sleeve
Service limit "a": 1.0 mm (0.039 in.)

- 2) Insert each gear shift shaft into case and check that it moves smoothly. If it doesn't, correct using oilstone, reamer or the like.

5th & Reverse Gear Shift Shafts Disassembly and Assembly

Disassembly

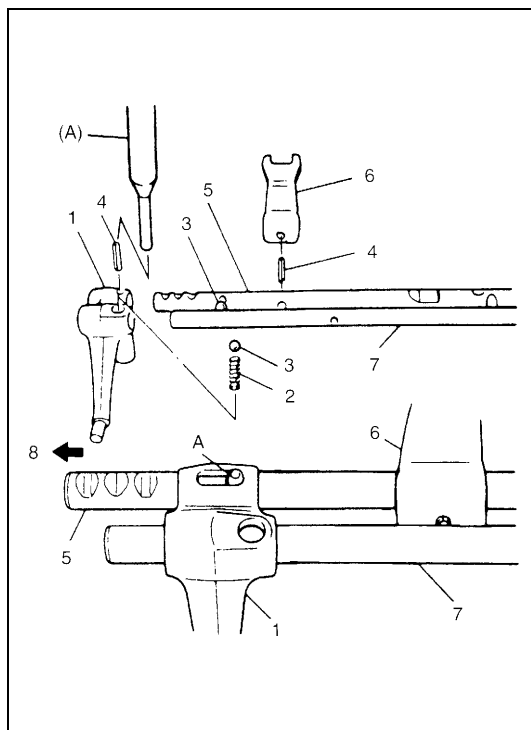
Disassemble component parts using special tool and hammer.

Special tool

(A): 09922-85811

Assembly

Replace or correct parts as required and assemble shafts making sure that component parts are in proper order as shown in figure.

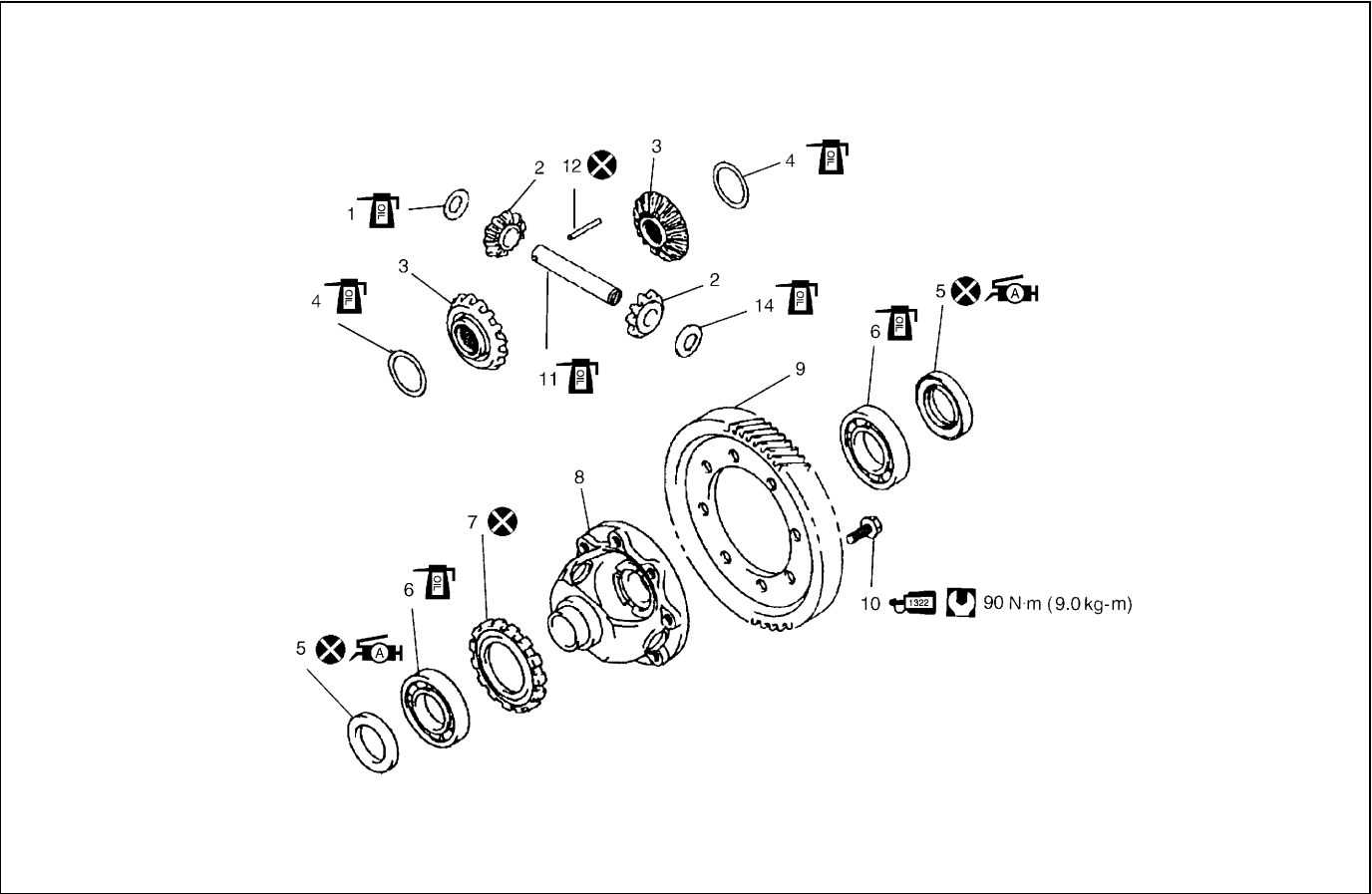


NOTE:

- Distinguish reverse gear shift arm spring (Blue) (2) from low speed locating spring (Yellow).
- Install 2 steel balls (3) in reverse gear shift arm (1) without fail.
- Drive in spring pin for reverse gear shift arm (1) facing slit A toward front.

4. Spring pin	7. 5th & reverse gear shift guide shaft
5. 5th & reverse gear shift shaft	8. 5th gear side
6. 5th & reverse gear shift yoke	A: Face pin slit toward 5th gear side

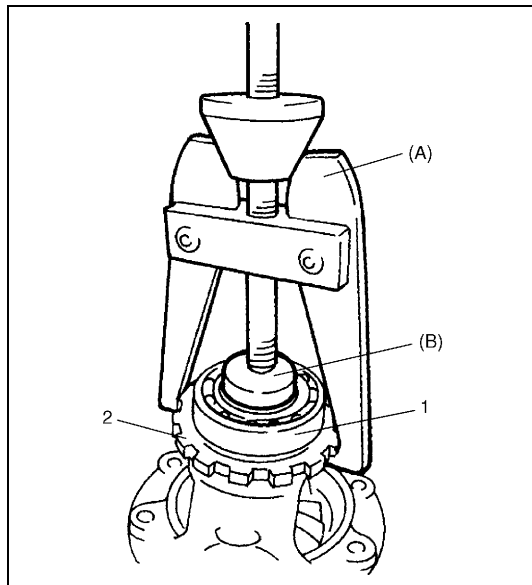
Differential Components



1. Differential pinion washer	9. Final gear
2. Differential side pinion gear	10. Final gear bolt : Apply thread lock 99000-32110 to all around thread part of bolt
3. Differential side gear	11. Differential pinion shaft
4. Side gear washer	12. Differential pinion shaft pin
5. Differential side oil seal : Apply grease 99000-25010 to oil seal lip.	Tightening torque
6. Differential side bearing	Do not reuse.
7. Speed sensor ring	Apply transaxle oil.
8. Differential case	

Differential Disassembly and Assembly

Disassembly



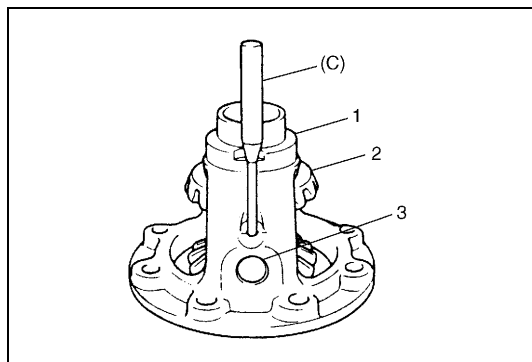
- 1) Using special tools, remove right bearing (1) and sensor rotor (2).

Special tool

(A): 09913-60910

(B): 09925-88210

- 2) Remove left bearing in the same manner at step 1).
- 3) Support differential case with soft jawed vise and remove final gear bolts then take out final gear.



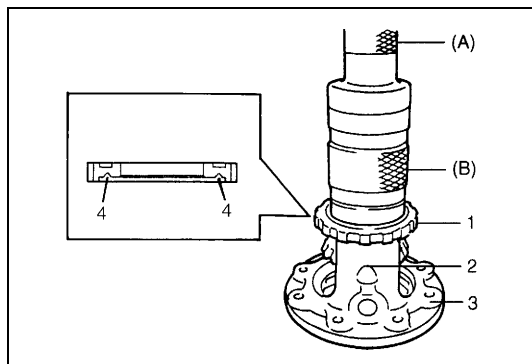
- 4) Using special tool and hammer, drive out differential pinion shaft and then disassemble component parts.

Special tool

(C): 09922-85811

1.	Differential case
2.	Differential gear
3.	Differential pinion shaft

Assembly

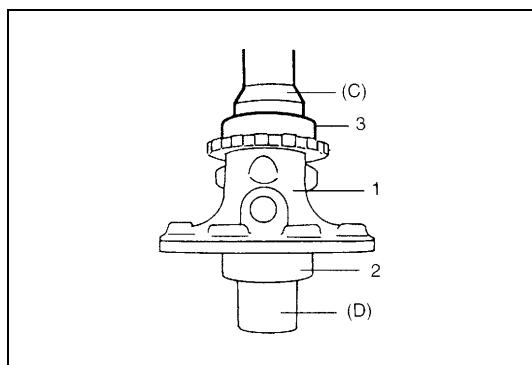


- 1) Drive in new differential pinion shaft pin (2) till the depth from differential case (3) surface is about 1 mm (0.04 in.).
- 2) Press-fit new sensor rotor (1) with groove (4) side downward as shown using special tools and copper hammer.

Special tool

(A): 09913-75510

(B): 09940-54910

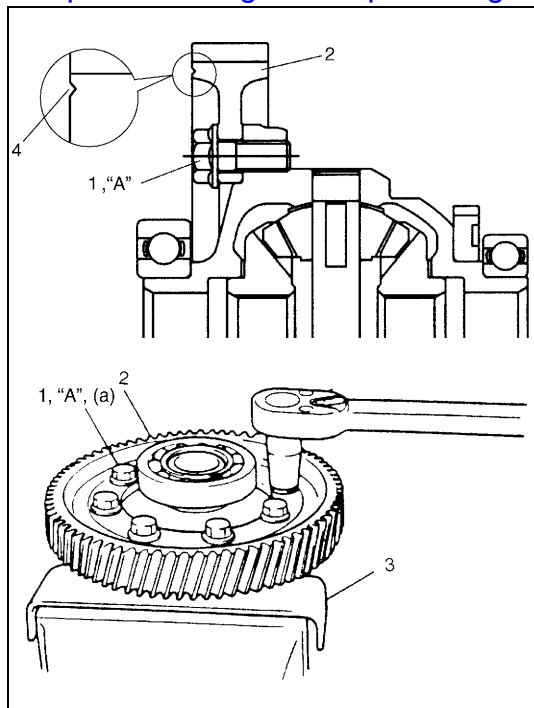


- 3) Press-fit left bearing (2) using special tools and copper hammer.
- 4) Support differential assembly (1) as illustrated so as to left bearing (2) is floating, and then press-fit right bearing (3) like left bearing in Step 3).

Special tool

(C): 09951-76010

(D): 09951-16060



- 5) Hold differential assembly with soft jawed vise (3), install final gear (2) as shown in figure and then tighten bolts (1) with thread lock cement applied to specified torque.

NOTE:

Make sure to install final gear in correct installing direction.

CAUTION:

Use of any other bolts than specified ones is prohibited.

“A”: Thread lock cement 99000-32110

Tightening torque

Final gear bolt (a): 90 N·m (9.0 kg·m, 65.0 lb·ft)

4. Groove

Differential Adjustment

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

- 1) Assemble differential gear and measure thrust play of differential gear as follows.

Differential gear thrust play

: 0.03 – 0.31 mm (0.001 – 0.012 in.)

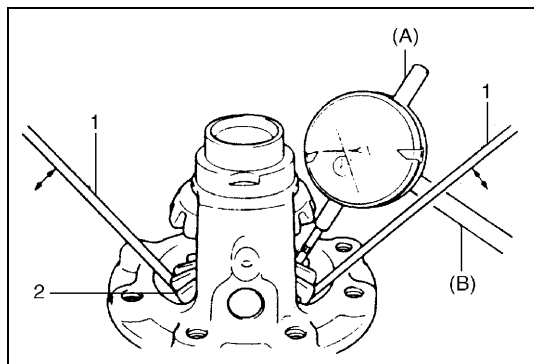
- For left side

- Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear.
- Using 2 screwdrivers (1), move gear (2) up and down and read movement of dial gauge pointer.

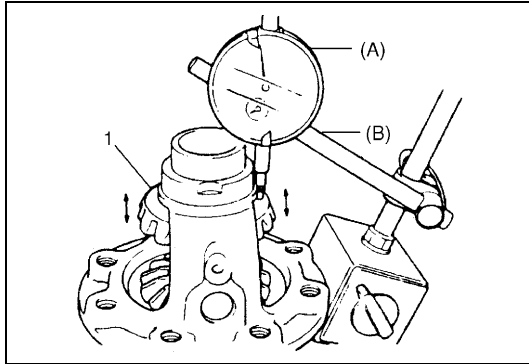
Special tool

(A): 09900-20606

(B): 09900-20701



- For right side



- Using similar procedure to the above, set dial gauge tip to gear (1) shoulder.
- Move gear up and down by hand and read dial gauge.

Special tool

(A): 09900-20606

(B): 09900-20701

- If thrust play is out of specification, select suitable thrust washer from among the following available size, install it and check again that specified gear play is obtained.

Available thrust washer thickness

0.9, 0.95, 1.0, 1.05, 1.1, 1.15 and 1.2 mm

(0.035, 0.037, 0.039, 0.041, 0.043, 0.045, and 0.047 in.)

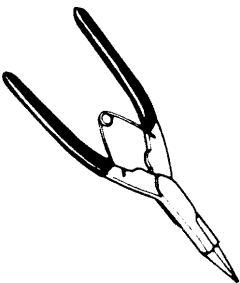
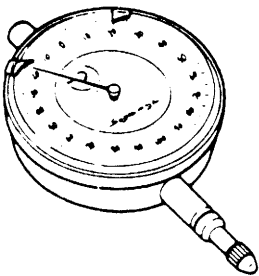
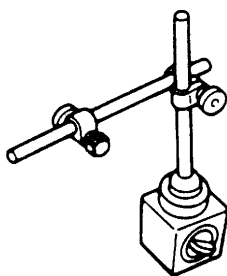
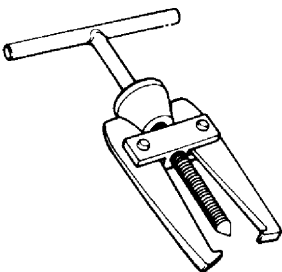
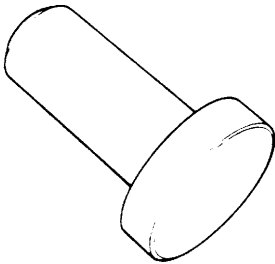

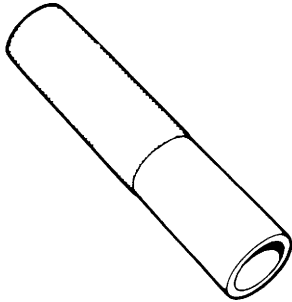
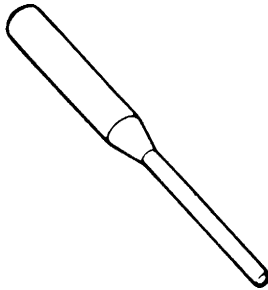
Tightening Torque Specification

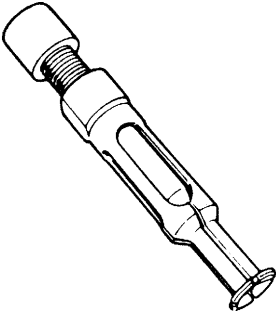
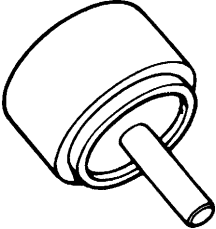
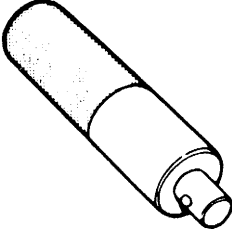
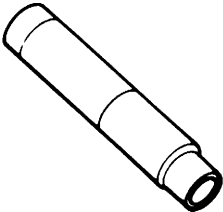
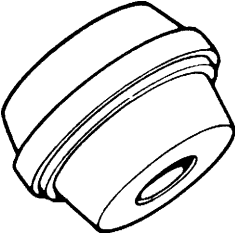
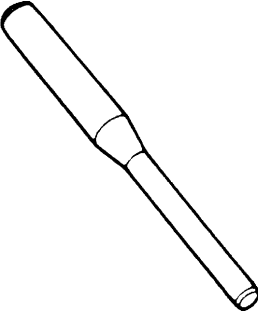
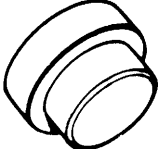
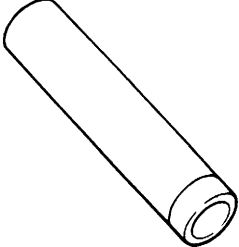
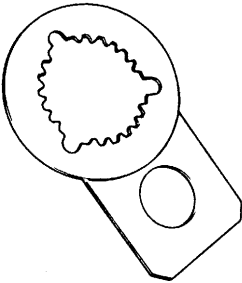
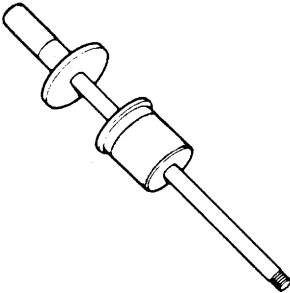
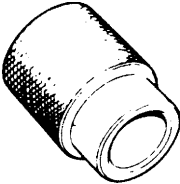

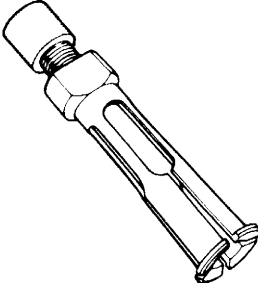
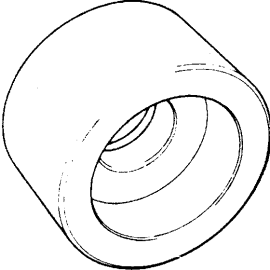
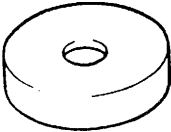
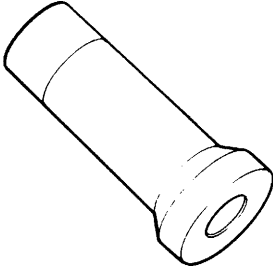
Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Transaxle oil level/filler and drain plugs	21	2.1	15.5
Oil gutter bolt	10	1.0	7.5
Final gear bolt	90	9.0	65.0
Reverse gear shift lever bolt	23	2.3	17.0
Transaxle case bolt	19	1.9	14.0
Reverse shaft bolt	23	2.3	17.0
Gear shift locating bolt	13	1.3	9.5
Left case plate screw and bolt	10	1.0	7.5
Countershaft nut	70	7.0	51.0
Side cover No.1 bolt	10	1.0	7.5
Side cover No.2 bolt	23	2.3	17.0
Gear shift guide case bolt	23	2.3	17.0
Gear shift interlock bolt	23	2.3	17.0
5th to reverse interlock guide bolt	23	2.3	17.0
Back up lamp switch	23	2.3	17.0
Gear shift control lever assembly mounting nut	13	1.3	9.5
Cable lock nut	5.5	0.55	4.0
Cable mounting bolt	5.5	0.55	4.0
Cable bracket bolt	50	5.0	37.5
Transaxle to engine bolt	85	8.5	63.5
Engine left mounting bracket bolt	55	5.5	42.0
Stiffener bolt	55	5.5	42.0
Engine rear mounting bolt	75	7.5	57.0
Engine rear mounting No.2 bracket bolt	55	5.5	42.0
Transaxle to engine rear mounting No.2 bracket bolt	55	5.5	42.0
Transaxle to engine nut	85	8.5	64.0
Clutch housing lower plate bolt	55	5.5	42.0
VSS bolt	5.5	0.55	4.0

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> Oil seal lip Select lever boss Select lever shaft bush
Sealant	SUZUKI BOND NO.1217G (99000-31260)	<ul style="list-style-type: none"> Oil drain plug and filler/level plug Locating spring bolt Mating surface of transaxle case Mating surface of side cover Gear shift interlock bolt 5th to reverse interlock guide bolt Guide case bolt
Thread lock cement	THREAD LOCK 1322 (99000-32110)	<ul style="list-style-type: none"> Reverse gear shift lever bolt Oil gutter bolt Reverse shaft bolt Final gear bolt

Special Tool

 <p>09900-06107 Snap ring pliers (Opening type)</p>	 <p>09900-20606 Dial gauge</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09913-60910 Bearing puller</p>
 <p>09913-75510 Bearing installer</p>	 <p>09913-80112 Bearing installer</p>	 <p>09913-84510 Bearing installer</p>	 <p>09922-85811 Spring pin remover 4.5 mm (0.18 in.)</p>

			
09923-74510 Bearing remover	09923-78210 Bearing installer	09924-74510 Installer attachment	09925-18011 Bearing installer
			
09925-68210 Bearing outer race installer	09925-78210 Spring pin remover 6 mm (0.24 in.)	09925-88210 Bearing puller attachment	09925-98221 Bearing installer
			
09927-76010 Gear holder	09930-30104 Sliding shaft	09940-53111 Bearing installer	09940-54910 Sensor rotor installer
			
09941-64511 Bearing remover	09951-16060 Bush remover	09951-46010 Bearing installer	09951-76010 Bearing installer

SECTION 7B1

AUTOMATIC TRANSAXLE (M13 ENGINE MODEL)

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System :

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in Section 10B in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in Section 10B before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

7B1

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General Description

This automatic transaxle is electronic control full automatic transaxle with forward 3-speed plus overdrive (O/D) and reverse 1-speed.

The torque converter is a 3-element, 1-step and 2-phase type and is equipped with an automatically controlled lock-up mechanism.

The gear change device consists of a ravigneau type planetary gear unit, 3 multiple disc type clutches, 3 multiple disc type brakes and 2 one-way clutches.

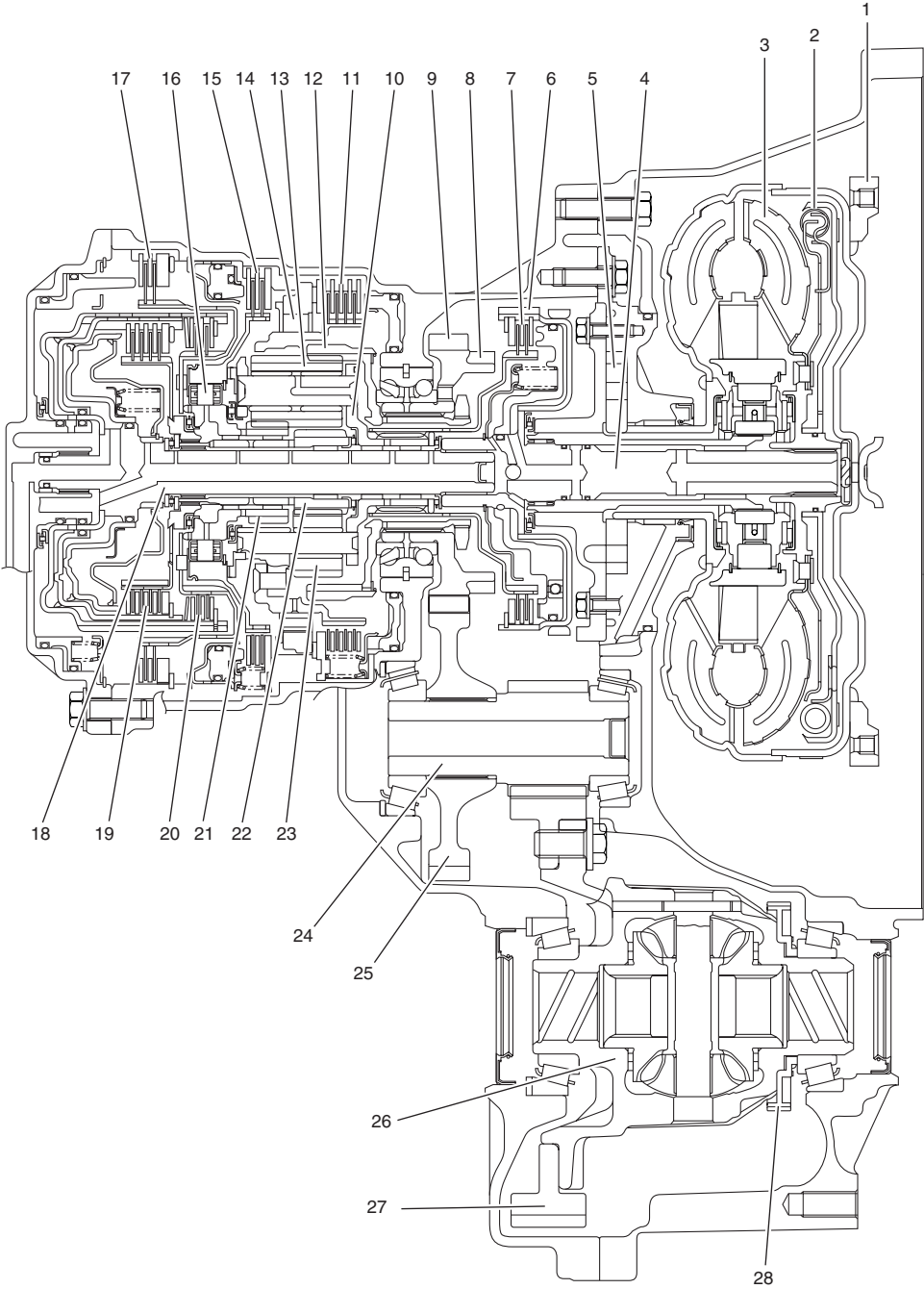
The hydraulic pressure control device consists of a valve body assembly, pressure control solenoid valve (linear solenoid), 2 shift solenoid valves, TCC (lock-up) solenoid valve and a timing solenoid valve. Optimum line pressure complying with engine torque is produced by the pressure control solenoid valve in dependence upon control signal from transmission control module (TCM). This makes it possible to control the line pressure with high accuracy in accordance with the engine power and running conditions to achieve smooth shifting characteristics and high efficiency.

A clutch-to-clutch control system is provided for shifting between 3rd gear and 4th gear. This clutch-to-clutch control system is made to function optimally, so that hydraulic pressure controls such as shown below are conducted.

- When upshifting from 3rd gear to 4th gear, to adjust the drain hydraulic pressure at releasing the forward clutch, a timing solenoid valve is used to switch a hydraulic passage with an orifice to another during shifting.
- When downshifting from 4th gear to 3rd gear, to adjust the line pressure applied to the forward clutch at engaging the forward clutch, a timing solenoid valve is used to switch a hydraulic passage with an orifice to another during shifting.
- When upshifting from 3rd gear to 4th gear with engine throttle opened, to optimize the line pressure applied to the forward clutch at releasing the forward clutch, the learning control is processed to compensate the switching timing of the timing solenoid at every shifting.
- When downshifting from 4th gear to 3rd gear with engine throttle opened, to optimize the line pressure applied to the forward clutch at engaging the forward clutch, the learning control is processed to compensate the line pressure every shifting.

Employing a ravigneau type planetary gear unit and this clutch-to-clutch control system greatly simplifies the construction to make possible a lightweight and compact transaxle.

A line pressure learning control is conducted to provide optimum shifting time at every upshifting with engine throttle opened. If long upshifting time is detected, the subsequent line pressure applied during upshifting is intensified. On the contrary, if short upshifting time is detected, the subsequent line pressure applied during upshifting is weakened.

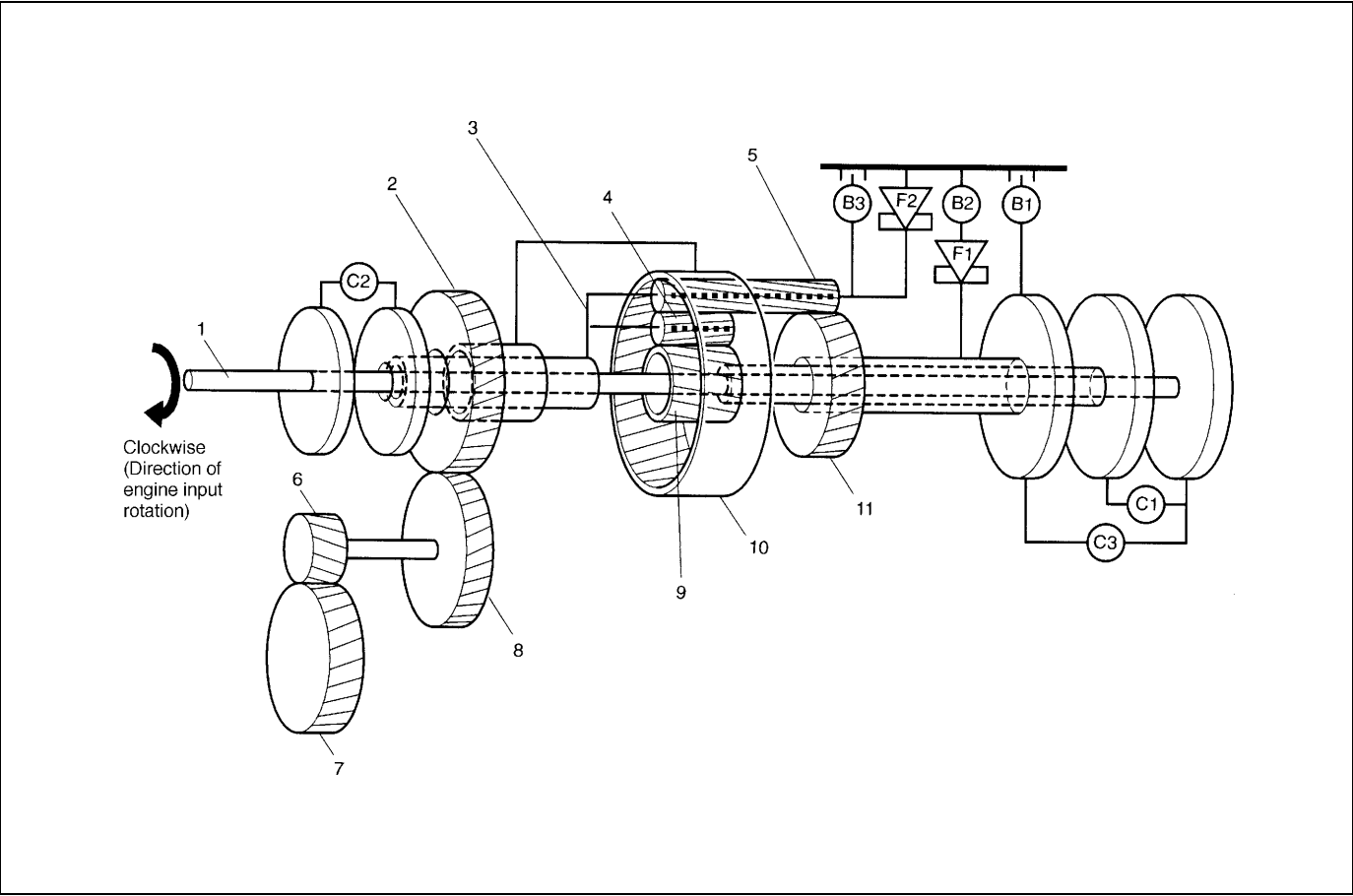


1. Drive plate	11. 1st and reverse brake	21. Rear sun gear
2. Torque converter clutch (TCC)	12. Ring gear	22. Front sun gear
3. Torque converter	13. Long planet pinion	23. Short planet pinion
4. Input shaft	14. One-way No.2 clutch	24. Countershaft
5. Oil pump	15. 2nd brake	25. Reduction driven gear
6. Direct clutch drum (double as sensor rotor for input shaft speed sensor)	16. One-way No.1 clutch	26. Differential case assembly
7. Direct clutch	17. O/D and 2nd coast brake	27. Final gear
8. Parking lock gear	18. Intermediate shaft	28. Output shaft speed sensor (VSS) drive gear
9. Reduction drive gear	19. Forward clutch	
10. Planet carrier	20. Reverse clutch	

Specifications

Item			Specifications			
Torque converter	Type		3-element, 1-step, 2-phase type (with TCC (lock-up) mechanism)			
	Stall torque ratio		1.9 – 2.1			
Oil pump	Type		Internal involute gear type oil pump (non crescent type)			
	Drive system		Engine driven			
Gear change device	Type		Forward 4-step, reverse 1-step planetary gear type			
	Shift position		“P” range	Gear in neutral, output shaft fixed, engine start		
			“R” range	Reverse		
			“N” range	Gear in neutral, engine start		
			“D” range (O/D ON)	Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change		
			“D” range (O/D OFF)	Forward 1st ↔ 2nd ↔ 3rd ← 4th automatic gear change		
			“2” range	Forward 1st ↔ 2nd ← 3rd automatic gear change		
			“L” range	Forward 1st ← 2nd ← 3rd reduction, and fixed at 1st gear		
	Gear ratio	1st	2.875	Number of teeth	Front sun gear: 24	
		2nd	1.568		Rear sun gear: 30	
		3rd	1.000		Long planet pinion: 20	
		4th (overdrive gear)	0.697		Short planet pinion: 19	
		Reverse (reverse gear)	2.300		Ring gear: 69	
	Control elements		Wet type multiple-disc clutch ... 3 sets Wet type multiple-disc brake ... 3 sets One-way clutch ... 2 sets			
	Reduction gear ratio		1.019			
	Final gear reduction ratio		4.277			
Lubrication	Lubrication system		Force feed system by oil pump			
Cooling	Cooling system		Radiator assisted cooling (water-cooled)			
Fluid used			DEXRON®-III			

Clutch/Brake/Planetary Gear



1. Input shaft and intermediate shaft	8. Reduction driven gear	B1: O/D and 2nd coast brake
2. Reduction drive gear	9. Front sun gear	B2: 2nd brake
3. Planet carrier	10. Ring gear	B3: 1st and reverse brake
4. Short planet pinion	11. Rear sun gear	F1: One-way No.1 clutch
5. Long planet pinion	C1: Forward clutch	F2: One-way No.2 clutch
6. Final drive gear	C2: Direct clutch	
7. Final driven gear	C3: Reverse clutch	

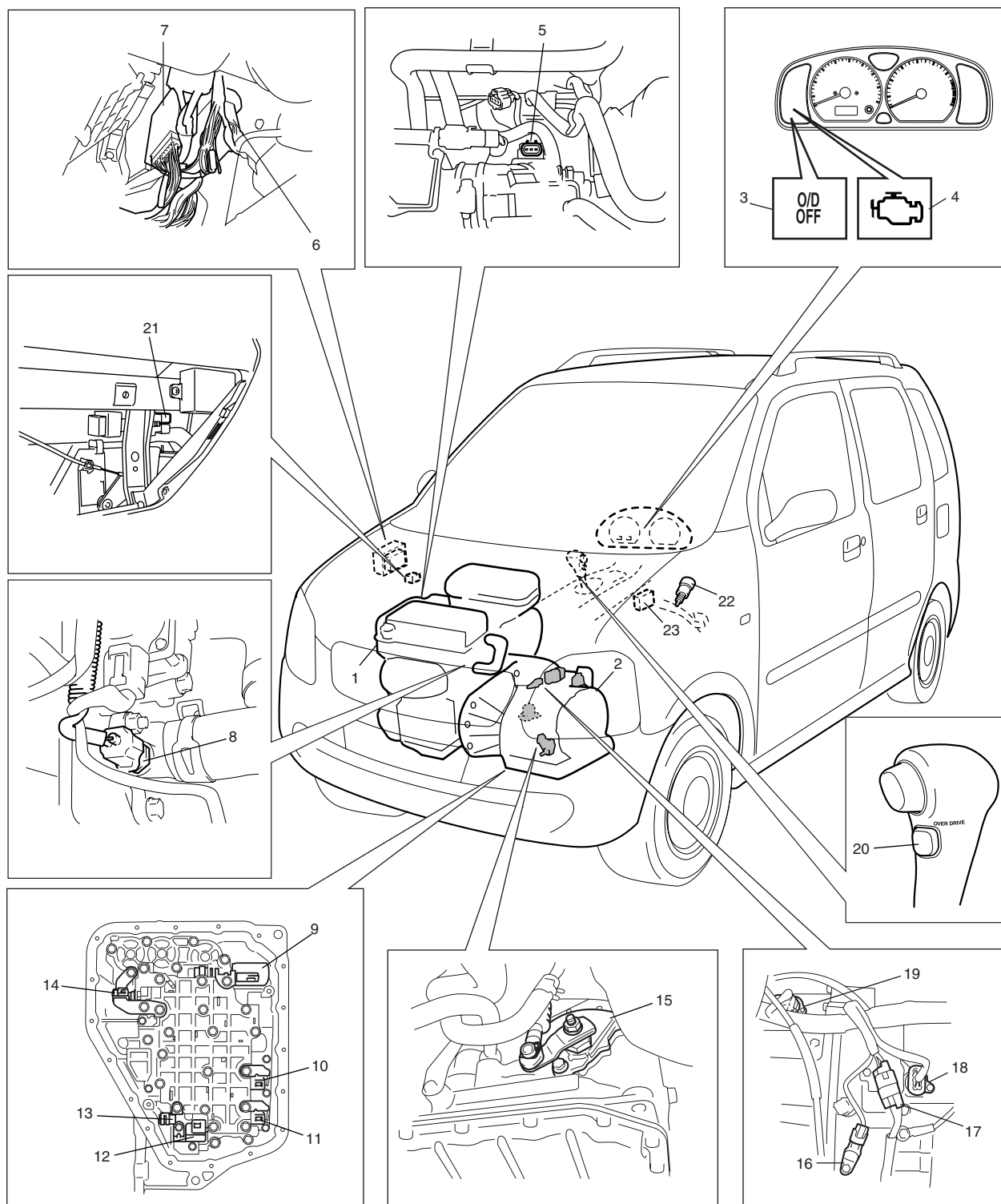
Functions

PART NAME	FUNCTION
Forward clutch	Meshes intermediate shaft and front sun gear
Direct clutch	Meshes input shaft and planet carrier
Reverse clutch	Meshes intermediate shaft and rear sun gear
O/D and 2nd coast brake	Fixes rear sun gear
2nd brake	Fixes rear sun gear
1st and reverse brake	Fixes planet carrier
One-way No.1 clutch	Prevents rear sun gear from turning counterclockwise
One-way No.2 clutch	Prevents planet carrier from turning counterclockwise

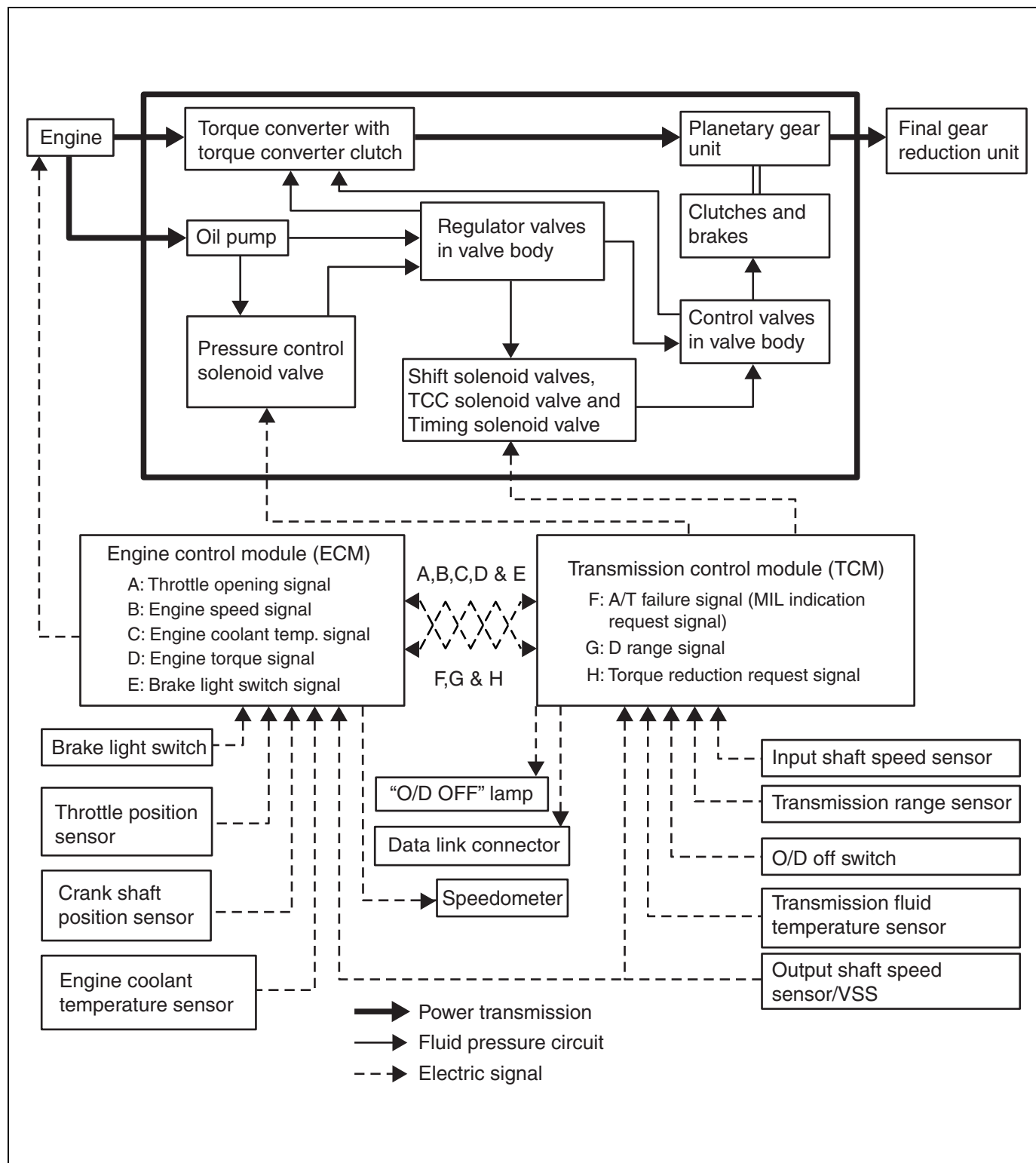
Table of Component Operation

Selector position	Part Gear position	Shift solenoid valve-A (No.1)	Shift solenoid valve-B (No.2)	TCC solenoid valve	Forward clutch	Direct clutch	Reverse clutch	O/D and 2nd coast brake	2nd brake	1st and reverse brake	One-way No.1 clutch	One-way No.2 clutch
P	Parking	○	○	×	×	×	×	×	×	×	×	×
R	Reverse	○	○	×	×	×	○	×	×	○	×	×
N	Neutral	○	○	×	×	×	×	×	×	×	×	×
D	1st	○	○	×	○	×	×	×	×	×	×	○
	2nd	○	×	×	○	×	×	×	○	×	○	×
	3rd	×	×	△	○	○	×	×	○	×	×	×
	4th	×	○	△	×	○	×	○	○	×	×	×
2	1st	○	○	×	○	×	×	×	×	×	×	○
	2nd	○	×	×	○	×	×	○	○	×	○	×
L	1st	○	○	×	○	×	×	×	×	○	×	○

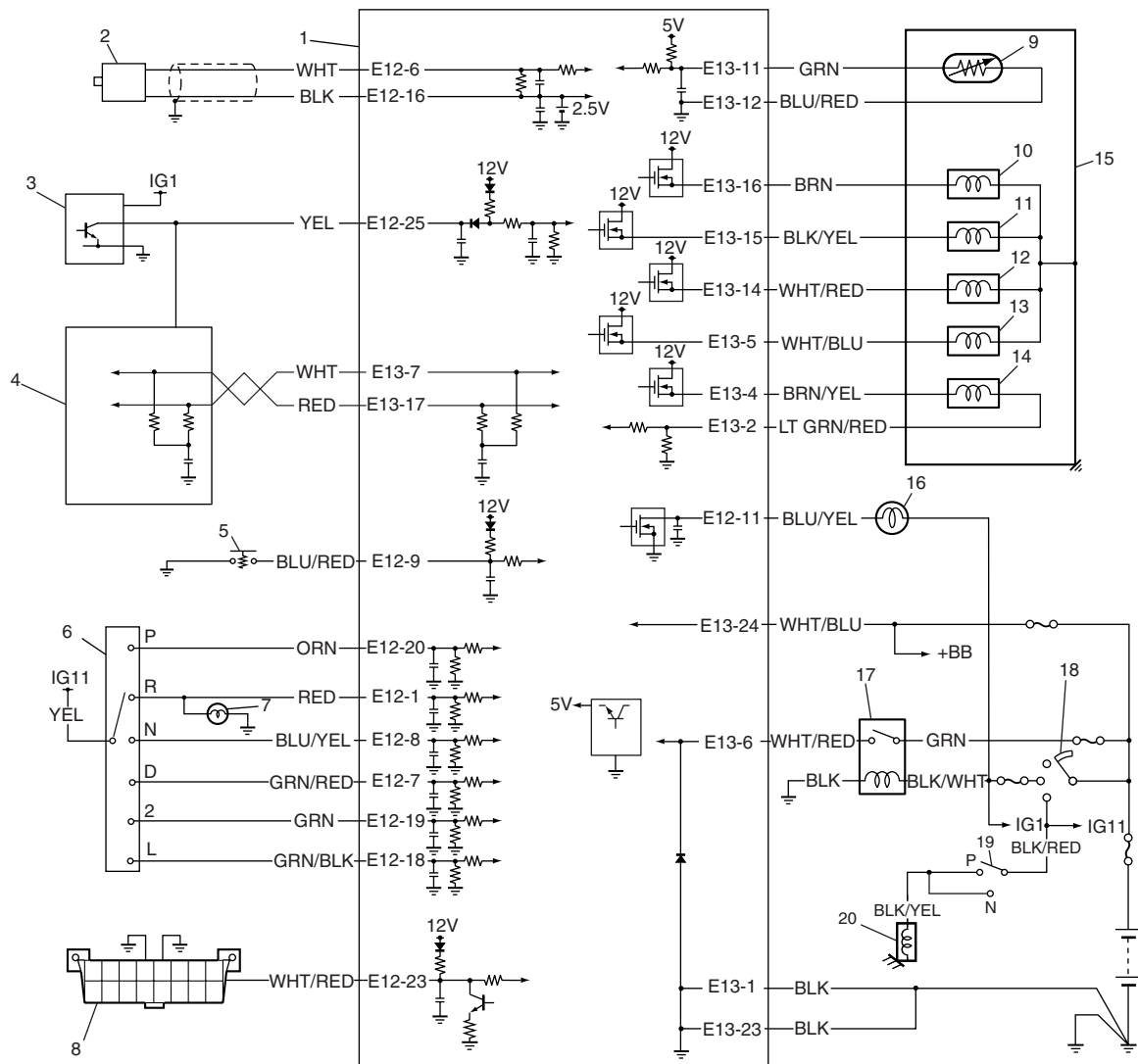
○ : ON × : OFF △ : ON only when TCC is operating

Electronic Shift Control System

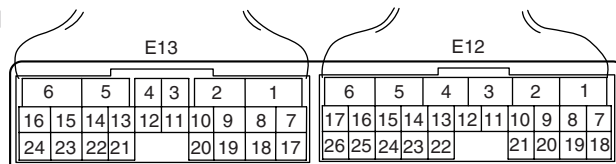
1. Engine	9. Pressure control solenoid valve	17. Transmission range sensor coupler
2. Transaxle	10. Shift solenoid valve-B (No.2)	18. Solenoid valve coupler
3. "O/D OFF" lamp	11. Shift solenoid valve-A (No.1)	19. Output shaft speed sensor (VSS)
4. MIL	12. Timing solenoid valve	20. O/D OFF switch
5. Throttle position (TP) sensor	13. Transmission fluid temperature sensor	21. A/T relay
6. ECM	14. TCC (lock-up) solenoid valve	22. Brake light switch
7. TCM	15. Transmission range sensor	23. Data link connector (DLC)
8. Engine coolant temperature (ECT) sensor	16. Input shaft speed sensor	



Transmission Control Module (TCM)



[A]



1. TCM	8. Data link connector (DLC)	15. A/T
2. Input shaft speed sensor	9. Transmission fluid temperature sensor	16. "O/D OFF" lamp
3. Output shaft speed sensor (VSS)	10. Shift solenoid valve-A (No.1)	17. A/T relay
4. ECM	11. Shift solenoid valve-B (No.2)	18. Ignition switch
5. O/D off switch	12. Timing solenoid valve	19. Inhibitor switch
6. Transmission range sensor	13. TCC (lock-up) solenoid valve	20. Starter motor relay
7. Backup lamp	14. Pressure control solenoid valve	[A]: Terminal arrangement of TCM connector (viewed from harness)

Operation of shift solenoid valves, timing solenoid valve and TCC solenoid valve

Selector position	Solenoid Gear position	Shift solenoid valve-A (No.1)	Shift solenoid valve-B (No.2)	Timing solenoid valve	TCC solenoid valve	Condition
P	Parking	○	○	×	×	
R	Reverse	○	○	×	×	When vehicle is traveling forwards in less than 9 km/h, 6 mile/h vehicle speed.
		○	○	○	×	When vehicle is traveling forwards in 11km/h, 7mile/h or more vehicle speed.
	(Reverse)	×	×	×	×	When fail safe function is operating.
N	Neutral	○	○	×	×	
D	Neutral → 1st			○		Timing solenoid is turned ON for about 0.5 sec. while on gear shifting
	1st	○	○	×	×	
	2nd	○	×	×	×	
	3rd	×	×	×	△	
	3rd ↔ 4th			○		Timing solenoid is turned ON for about 0.5 sec. while on gear shifting
	4th (O/D)	×	○	×	△	
	(3rd)	×	×	×	×	When fail safe function is operating.
2	1st	○	○	×	×	
	2nd	○	×	×	×	
	(3rd)	×	×	×	×	When fail safe function is operating.
L	1st	○	○	×	×	
	(3rd)	×	×	×	×	When fail safe function is operating.

○ : ON (Turn power ON)

× : OFF (Turn power OFF)

△ : ON only when TCC is operating

	Valve status	
	Turn power ON	Turn power OFF
Shift solenoid valve-A (No.1)	Close	Open
Shift solenoid valve-B (No.2)	Close	Open
Timing solenoid	Open	Close
TCC (lock-up) solenoid	Close	Open

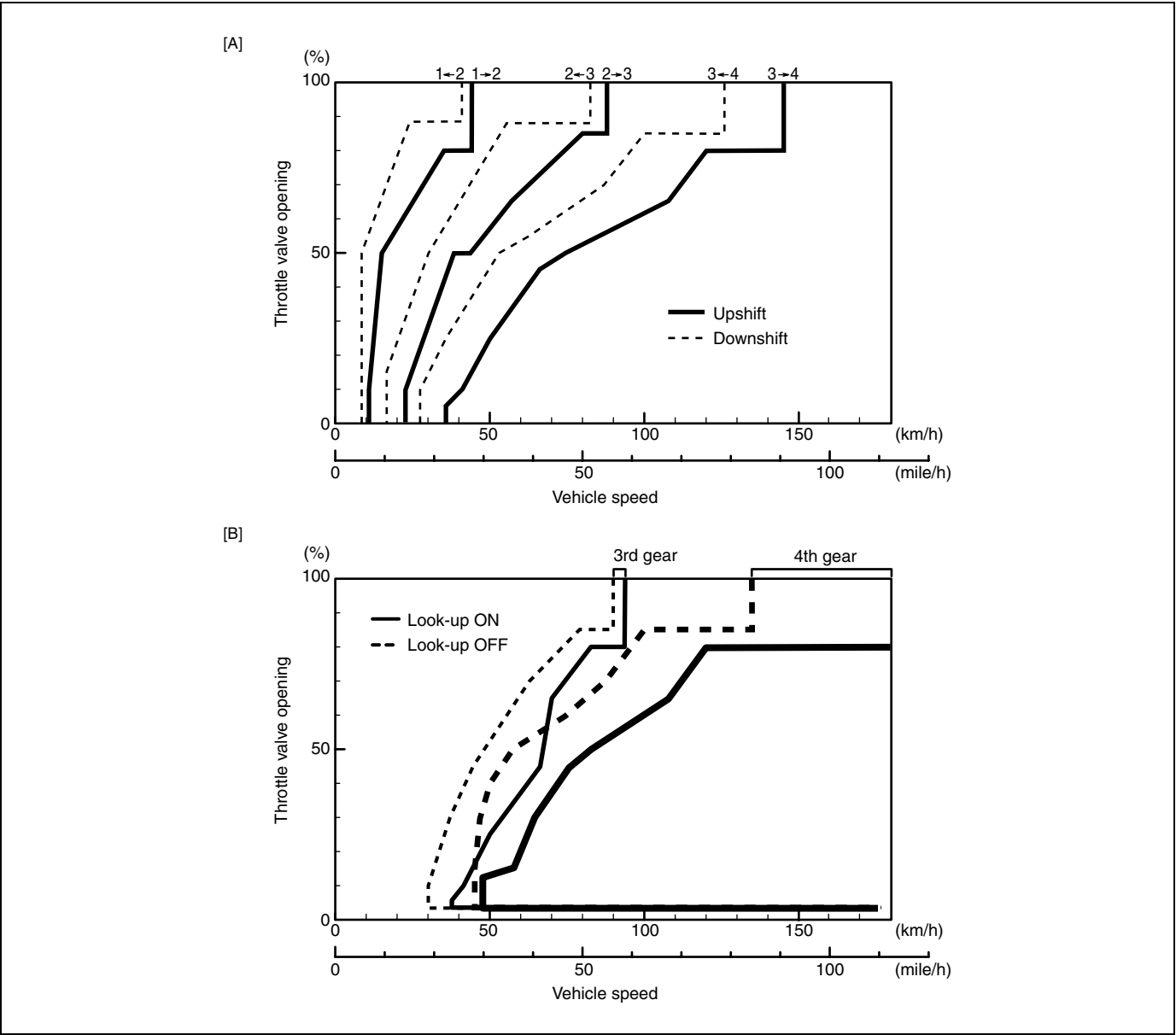
Automatic gear shift diagram

Automatic shift schedule as a result of shift control is shown below. In case that selector lever is shifted to “L” range at a higher than 44 km/h (27 mile/h) speed, 2nd gear is operated and then down shifts to 1st at a speed lower than that.

The same as, the select lever is shifted to “2” range at a higher than 88 km/h (55 mile/h) speed, 3rd gear is operated and then down shifts to 2nd at a speed lower than that.

	Shift					
Throttle opening	1→2	2→3	3→4	4→3	3→2	2→1
Full throttle km/h (mile/h)	44 (27)	88 (55)	145 (90)	126 (78)	82 (51)	41(25)
Closed throttle km/h (mile/h)	11 (7)	22(14)	36 (22)	27 (17)	17 (11)	9 (6)

Gear Shift Diagram [A] and TCC Lock-up Diagram [B]



Diagnosis

General Description

This vehicle is equipped with an electronic transaxle control system, which controls the automatic shift up and shift down timing, TCC operation, etc. suitably to vehicle driving conditions.

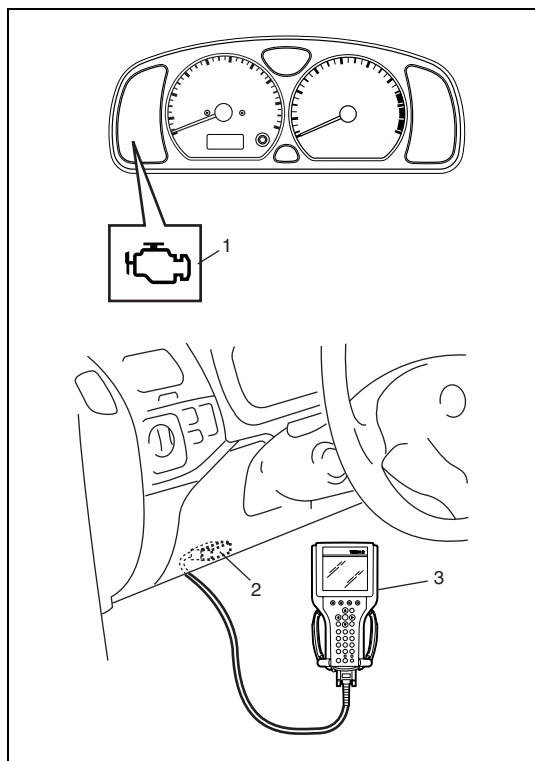
TCM has an On-Board Diagnosis System which detects a malfunction in this system.

When diagnosing a trouble in transaxle including this system, be sure to have full understanding of the outline of "On-Board Diagnostic System" and each item in "Precaution in Diagnosing Trouble" and execute diagnosis according to "Automatic Transaxle Diagnostic Flow Table" given below to obtain correct result smoothly.

On-board Diagnostic System

For automatic transaxle control system, TCM has following functions.

- When ignition switch is turned ON with O/D off switch turned OFF and no malfunction in A/T control system is detected, "O/D OFF" lamp (1) lights for about 2 seconds after ignition switch is turned ON and then goes OFF for bulb check.
- When TCM detects a malfunction in A/T control system, TCM desire turning on malfunction indicator lamp (MIL) (1) to ECM and stores malfunction DTC in TCM memory.
- It is possible to communicate with TCM through data link connector (DLC) (2) by using scan tool (3). (Diagnostic information can be checked and erased by using scan tool.)



Warm-up Cycle

A warm-up cycle means sufficient vehicle operation such that the coolant temperature has risen by at least 22°C (40°F) from engine starting and reaches a minimum temperature of 70°C (160°F).

Driving Cycle

A "Driving Cycle" consists of engine startup, driving mode where a malfunction would be detected if present, and engine shutoff.

2 Driving Cycles Detection Logic

The malfunction detected in the first driving cycle is stored in TCM memory (in the form of pending DTC and freeze frame data) but the malfunction indicator lamp (MIL) does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

Pending DTC

Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycle detection logic.

Precaution in Diagnosing Trouble

- Don't disconnect couplers from TCM, battery cable from battery, TCM ground wire harness from engine or main fuse before checking the diagnosis information stored in TCM memory.
Such disconnection will clear memorized information in TCM memory.
- Using scan tool the diagnostic information stored in TCM memory can be checked and cleared as well.
Before its use, be sure to read Operator's (instruction) Manual supplied with it carefully to have good understanding of its functions and usage.
- Be sure to read "Precautions for Electrical Circuit Service" in Section 0A before inspection and observe what is written there.
- TCM and/or ECM replacement
 - When substituting a known-good TCM and/or ECM, check that all relays and actuators have resistance of specified value.
Neglecting this check may result in damage to good TCM and/or ECM.
- Communication of ECUs, ECM and TCM, is established by CAN (Computer Area Network).
Therefore, handle CAN communication line with care referring to "Precaution" described in Section 0A.

Automatic Transaxle Diagnostic Flow Table

Refer to the following items for the details of each step.

Step	Action	Yes	No
1	Customer Complaint Analysis 1) Perform customer complaint analysis. Was customer complaint analysis performed according to instruction?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC)/Freeze Frame Data Check, Record and Clearance 1) Check for DTC referring to the followings. Is there any DTC(s)?	1) Print DTC or write them down and clear them by referring to "DTC Clearance" in this section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the followings. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the followings. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the followings. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Recording of DTC 1) Recheck for DTC referring to "DTC Check" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Recording of DTC/Freeze Frame Data 1) Recheck for DTC referring to "DTC Check" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 10.
8	Automatic Transaxle Basic Inspection and Trouble Diagnosis Table 1) Check and repair according to "A/T Basic Check" and "Trouble Diagnosis Table" in this section. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Troubleshooting for DTC 1) Check and repair according to applicable DTC Flow Table. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the followings. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.

Step	Action	Yes	No
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the followings. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. Customer Complaint Analysis (See Customer Problem Inspection Form)

Record details of the problem (failure, complaint) and how it occurred as described by the customer.

For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

2. Diagnostic Trouble Code (DTC)/Freeze Frame Data Check, Record and Clearance

First, check DTC (including pending DTC) referring to “DTC Check” in this section. If DTC exists, print or write down DTC/Freeze frame data and then clear malfunction DTC(s) by referring to “DTC Clearance” in this section. Malfunction DTC indicates malfunction in the system but it is not possible to know from it whether the malfunction is occurring now or it occurred in the past and normal condition has been restored. In order to know that, check symptom in question according to Step 5 and then recheck DTC according to Step 6.

Diagnosing a trouble based on the DTC in this step only or failure to clear the DTC in this step may result in an faulty diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting which is otherwise unnecessary.

3 and 4. Visual Inspection

As a preliminary step, be sure to perform visual check of the items that support proper function of the engine and automatic transaxle referring to “Visual Inspection” in this section.

5. Trouble Symptom Confirmation

Check trouble symptoms based on information obtained in Step 1 Customer Complaint Analysis and Step 2 DTC Check.

Also, reconfirm DTC according to “DTC Confirmation Procedure” described in each DTC Flow Table.

6 and 7. Rechecking and Record of DTC/Freeze Frame Data

Refer to “DTC Check” in this section for checking procedure.

8. Automatic Transmission Basic Check and Trouble Diagnosis Table

Perform basic check of A/T according to flow table of “Automatic Transaxle Basic Check” first. When the end of the flow table has been reached, check the parts of the system suspected as a possible cause referring to “Trouble Diagnosis Table” and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or A/T basic check) and repair or replace faulty parts, if any.

9. Diagnostic Trouble Code Flow Table (See each DTC Flow Table)

Based on the DTC indicated in Step 6/7 and referring to Diagnostic Trouble Code Flow Table in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, TCM or other part and repair or replace faulty parts.

10. Check for Intermittent Problem

Check parts where an intermittent trouble is easy to occur (e.g. wire harness, connector, etc.), referring to “Intermittent and Poor Connection” in Section 0A and related circuit of DTC recorded in Step 2.

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11. Final Confirmation Test

Confirm that the problem symptom has gone and the vehicle is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and check to ensure that no malfunction DTC is indicated.

Customer Problem Inspection Form (Example)

User name:	Model:	VIN:	
Date of issue:	Date of Reg.:	Date of problem:	Mileage:

PROBLEM SYMPTOMS
<input type="checkbox"/> Vehicle does not move (R, D, 2, L or any range) <input type="checkbox"/> No upshift automatically (<input type="checkbox"/> 1st to 2nd <input type="checkbox"/> 2nd to 3rd <input type="checkbox"/> 3rd to 4th (O/D) <input type="checkbox"/> 2 range <input type="checkbox"/> D range) <input type="checkbox"/> No downshift automatically (<input type="checkbox"/> 3rd to 2nd <input type="checkbox"/> 2nd to 1st <input type="checkbox"/> 4th (O/D) to 3rd <input type="checkbox"/> 2 range <input type="checkbox"/> D range) <input type="checkbox"/> No gear change manually (<input type="checkbox"/> 1st ↔ 3rd <input type="checkbox"/> 3rd ↔ 4th) <input type="checkbox"/> TCC no lock-up <input type="checkbox"/> TCC no lock-up off <input type="checkbox"/> Automatic shift point too high or too low <input type="checkbox"/> Excessive gear change shock (1st/2nd/3rd/4th (O/D)/Reverse) <input type="checkbox"/> No kickdown <input type="checkbox"/> Transmission slipping in (1st/2nd/3rd/4th (O/D)/Reverse) <input type="checkbox"/> Others _____

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental Condition	
Weather	<input type="checkbox"/> Fair <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Always <input type="checkbox"/> Other _____
Temperature	(°F/ °C) <input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> always
Frequency	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes (times/ day, month) <input type="checkbox"/> Only once <input type="checkbox"/> Under certain condition
Road	<input type="checkbox"/> Urban <input type="checkbox"/> Suburb <input type="checkbox"/> Highway <input type="checkbox"/> Mountainous <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Tarmacadam <input type="checkbox"/> Gravel <input type="checkbox"/> Other _____
Vehicle Condition	
Engine & transmission condition	<input type="checkbox"/> Cold/ <input type="checkbox"/> Warming up phase/ <input type="checkbox"/> Warmed up Engine speed (r/min.) Throttle opening (<input type="checkbox"/> Idle/ <input type="checkbox"/> About % <input type="checkbox"/> full) O/D cut switch (<input type="checkbox"/> ON/ <input type="checkbox"/> OFF)
Vehicle condition	<input type="checkbox"/> At stop/ <input type="checkbox"/> During driving (<input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Braking) <input type="checkbox"/> Right hand corner <input type="checkbox"/> Left hand corner <input type="checkbox"/> Vehicle speed (km/h mile/h) <input type="checkbox"/> Other _____

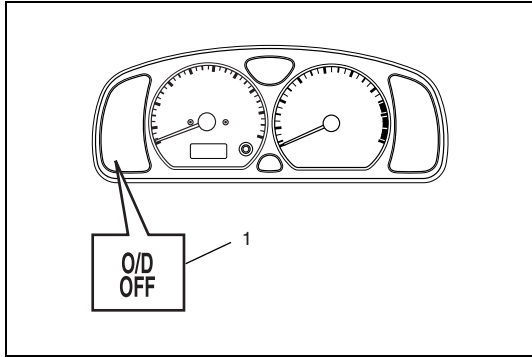
"O/D OFF" lamp	<input type="checkbox"/> Blink <input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Malfunction indicator lamp	<input type="checkbox"/> Blink <input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Diagnostic trouble code	First check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code () Second check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code ()

NOTE:

The above form is a standard sample. It should be modified according to conditions characteristic of each market.

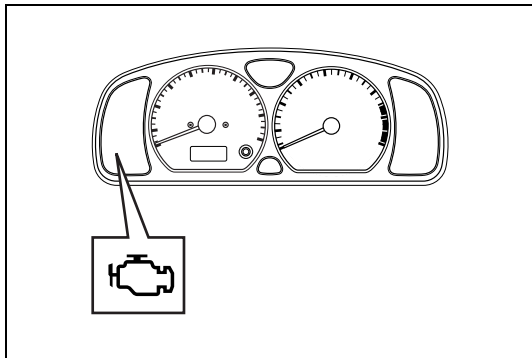
“O/D OFF” Lamp Check

- 1) Turn ignition switch ON.
- 2) Check that “O/D OFF” lamp (1) lights for about 2 sec. and then goes OFF.
If anything faulty is found, advance to “Diagnostic Flow Table A-3” or “Diagnostic Flow Table A-4”.



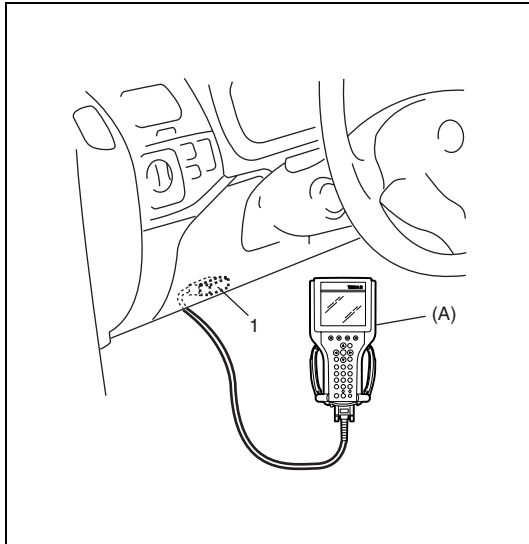
Malfunction Indicator Lamp (MIL) Check

Refer to the same item in Section 6 for checking procedure.



Diagnostic Trouble Code (DTC) Check

- 1) Turn ignition switch to OFF position.



- 2) Connect scan tool to data link connector (DLC) (1).

Special tool

(A): SUZUKI scan tool

- 3) Turn ignition switch ON.
- 4) Read DTC, pending DTC and freeze frame data according to instructions displayed on scan tool and print it down. Refer to scan tool operator's manual for further details.

NOTE:

If SUZUKI scan tool cannot communicate TCM, perform "Serial Data Circuit Check" described in this section.

- 5) After completing the check, turn ignition switch OFF and disconnect scan tool from data link connector (DLC) (1).

Diagnostic Trouble Code (DTC) Clearance

WARNING:

When performing a driving test, select a safe place where there is neither any traffic nor any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.

After repair or replace malfunction part(s), clear all DTCs by performing the following procedure.

- 1) Connect SUZUKI scan tool to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch ON.
- 3) Erase DTC and pending DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch off and disconnect scan tool from data link connector.

NOTE:

DTC and freeze frame data stored in TCM memory are also cleared in following cases. Be careful not to clear them before keeping their record.

- When power to TCM is cut off (by disconnecting battery cable, removing fuse or disconnecting TCM connectors).
- When the same malfunction (DTC) is not detected again during 40 engine warm-up cycles.

Diagnostic Trouble Code (DTC) Table

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	Driving cycle when MIL lighted
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	Multiple signals are inputted simultaneously.	1 driving cycle
P0707	Transmission Range Sensor Circuit Low	No sensor signal is inputted.	2 driving cycles
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	Sensor output voltage is too low.	1 driving cycle
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	Sensor output voltage is too high.	1 driving cycle
P0717	Input/Turbine Speed Sensor Circuit No Signal	No sensor signal is detected although output speed sensor signal is inputted.	1 driving cycle
P0722	Output Speed Sensor Circuit No Signal	No sensor signal is inputted although input speed sensor signal is inputted.	1 driving cycle
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Difference in revolution between engine and input shaft is too large although TCM is commanding TCC solenoid to turn ON.	2 driving cycles
P0742	Torque Converter Clutch Circuit Stuck On	Difference in revolution between engine and input shaft is too small although TCM is commanding TCC solenoid to turn OFF.	2 driving cycles
P0751	Shift Solenoid "A" Performance or Stuck Off	Actual gear position is 3rd gear although TCM command is for 2nd gear.	2 driving cycles
P0752	Shift Solenoid "A" Stuck On	Actual gear position is 2nd gear although TCM command is for 3rd gear.	2 driving cycles
P0756	Shift Solenoid "B" Performance or Stuck Off	Actual gear position is 3rd gear although TCM command is for 4th gear.	2 driving cycles
P0757	Shift Solenoid "B" Stuck On	Actual gear position is 4th gear although TCM command is for 3rd gear.	2 driving cycles
P0785	Shift/Timing Solenoid	Voltage of timing solenoid terminal is high although TCM is commanding timing solenoid to turn OFF. or Voltage of timing solenoid terminal is low although TCM is commanding timing solenoid to turn ON.	1 driving cycle
P0962	Pressure Control Solenoid "A" Control Circuit Low	No electric flow is detected on pressure control solenoid circuit.	1 driving cycle
P0963	Pressure Control Solenoid "A" Control Circuit High	Too much electric flow is detected on pressure control solenoid circuit.	1 driving cycle
P0973	Shift Solenoid "A" Control Circuit Low	Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.	1 driving cycle
P0974	Shift Solenoid "A" Control Circuit High	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1 driving cycle
P0976	Shift Solenoid "B" Control Circuit Low	Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.	1 driving cycle

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	Driving cycle when MIL lighted
P0977	Shift Solenoid "B" Control Circuit High	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1 driving cycle
P1701	CAN Communication Problem - TCM	No signal inputted from ECM to TCM for specified time continuously.	1 driving cycle
P1702	Internal Control Module Memory Check Sum Error	Calculation of current data stored in TCM is not correct comparing with pre-stored checking data in TCM.	1 driving cycle
P1703	CAN Invalid Data- TCM	TCM receives malfunction signal of throttle position, engine coolant temperature, engine revolution and engine torque from ECM.	*1
P2769	Torque Converter Clutch Circuit Low	No electric flow is detected on TCC solenoid circuit.	1 driving cycle
P2770	Torque Converter Clutch Circuit High	Too much electric flow is detected on TCC solenoid circuit.	1 driving cycle

NOTE:

***1: TCM does not desire turning on malfunction indicator lamp to ECM but DTC is stored in TCM memory.**

Fail Safe Table

This function is provided by the safe mechanism that assures safe driveability even when the solenoid valve, sensor or its circuit fails.

The table below shows the fail safe function for each fail condition of solenoid, solenoid or its circuit.

DTC No.	Trouble Area	Fail Safe Operation
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	<ul style="list-style-type: none"> Selected range is set in priority order shown below. D>2>L>R>N>P Lock-up function is inhibited to operate. Learning control is inhibited.
P0707	Transmission Range Sensor Circuit Low	<ul style="list-style-type: none"> Selected range is assumed to be "D" range. Lock-up function is inhibited to operate. Learning control is inhibited.
P0712 P0713	Transmission Fluid Temperature Sensor "A" Circuit Low	<ul style="list-style-type: none"> A/T fluid temperature is assumed to be 200°C (392°F). Upshifting to O/D is inhibited. Lock-up function is inhibited to operate. Garage shift control is inhibited. Learning control is inhibited.
P0717	Input/Turbine Speed Sensor Circuit No Signal	<ul style="list-style-type: none"> Upshifting to O/D is inhibited. Lock-up function is inhibited to operate. Line pressure control at gear shifting is inhibited. Torque reducing request to ECM (torque reduction control) is inhibited. Garage shift control is inhibited. Learning control is inhibited.
P0722	Output Speed Sensor Circuit No Signal	<ul style="list-style-type: none"> Vehicle speed which is calculated by input shaft speed sensor signal is used for gear shifting control instead of vehicle speed calculated by output shaft speed sensor (VSS) signal. Upshifting to O/D is inhibited. Lock-up function is inhibited to operate. Line pressure control at gear shifting is inhibited. Torque reducing request to ECM (torque reduction control) is inhibited. Garage shift control is inhibited. Learning control is inhibited.
P0785	Shift/Timing Solenoid	<ul style="list-style-type: none"> Power supply for all solenoid valves is cut. Gear position is fixed in 3rd gear. Line pressure control at gear shifting is inhibited. Lock-up function is inhibited to operate.
P0962	Pressure Control Solenoid "A" Control Circuit Low	
P0963	Pressure Control Solenoid "A" Control Circuit High	
P0973	Shift Solenoid "A" Control Circuit Low	
P0974	Shift Solenoid "A" Control Circuit High	
P0976	Shift Solenoid "B" Control Circuit Low	
P0977	Shift Solenoid "B" Control Circuit High	

DTC No.	Trouble Area	Fail Safe Operation
P1701	CAN Communication Problem - TCM	<ul style="list-style-type: none"> Throttle opening used for line pressure control is assumed to be 100%. Throttle opening used for gear shifting control is assumed to be 0%. After 15 minutes pass from detecting malfunction, engine coolant temperature is assumed to be 90°C (194°F). Upshifting to O/D is inhibited. Lock-up function is inhibited to operate. Line pressure control at gear shifting is inhibited. Torque reducing request to ECM (torque reduction control) is inhibited. Learning control is inhibited. Garage shift control is inhibited.
P1702	Internal Control Module Memory Check Sum Error	<ul style="list-style-type: none"> Power supply for all solenoid valves is cut. Gear position is fixed in 3rd gear. Line pressure control at gear shifting is inhibited. Lock-up function is inhibited to operate.
P1703	CAN Invalid Data- TCM	<p>In case of throttle position signal malfunction:</p> <ul style="list-style-type: none"> Throttle opening used for line pressure control is assumed to be 100%. Throttle opening used for gear shifting control is assumed to be 0%. Upshifting to O/D is inhibited. Lock-up function is inhibited to operate. Garage shift control is inhibited. Learning control is inhibited. <p>In case of engine coolant temperature signal malfunction:</p> <ul style="list-style-type: none"> After 15 minutes pass from detecting malfunction, engine coolant temperature is assumed to be normal operating temperature, and controls of overdrive and lock-up is released from inhibition. <p>In case of engine revolution signal malfunction:</p> <ul style="list-style-type: none"> Upshifting to O/D is inhibited. Lock-up function is inhibited to operate. Line pressure control at gear shifting is inhibited. Torque reducing request to ECM (torque reduction control) is inhibited. Garage shift control is inhibited. Learning control is inhibited.
P2769	Torque Converter Clutch Circuit Low	<ul style="list-style-type: none"> Lock-up function is inhibited to operate.
P2770	Torque Converter Clutch Circuit High	<ul style="list-style-type: none"> Lock-up function is inhibited to operate. Vehicle speed is slower than 15 km/h (9 mile/h), gear position is fixed in 1st gear for prevention of engine stall.

Visual Inspection

Visually check the following parts and systems.

INSPECTION ITEM	REFERRING SECTION
<ul style="list-style-type: none"> • A/T fluid ----- level, leakage, color • A/T fluid hoses ----- disconnection, looseness, deterioration • Throttle cable ----- play (under warm engine), installation • A/T select cable ----- installation • Engine oil ----- level, leakage • Engine coolant ----- level, leakage • Engine mountings ----- play, looseness, damage • Suspension ----- play, looseness • Drive shafts ----- damage • Battery ----- indicator condition, corrosion of terminal • Connectors of electric wire harness ----- disconnection, friction • Fuses ----- burning • Parts ----- installation, damage • Bolts ----- looseness • Other parts that can be checked visually <p>Also check the following items at engine start, if possible.</p> <ul style="list-style-type: none"> • "O/D OFF" lamp ----- Operation • Malfunction indicator lamp ----- Operation • Charge warning lamp ----- Operation • Engine oil pressure warning lamp ----- Operation <ul style="list-style-type: none"> • Engine coolant temp. meter ----- Operation • Other parts that can be checked visually 	<p>Section 0B</p> <p>Section 7B1</p> <p>Section 6E2</p> <p>Section 7B1</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 6A2</p> <p>Section 3</p> <p>Section 4A</p> <p>Section 6E2</p> <p>Section 8</p> <p>Section 6E2</p> <p>Section 6H</p> <p>Section 8 (Section 6A2 for pressure check)</p>

Automatic Transaxle Basic Check

This check is important for troubleshooting when TCM has detected no DTC and no abnormality has been noted in visual inspection. Follow the flow table carefully.

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" preformed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table".
2	Perform "Road Test" in this section. Is it OK?	Go to Step 3.	Proceed to "Troubleshooting" in "Road Test".
3	Perform "Manual Road Test" in this section. Is it OK?	Go to Step 4.	Proceed to "Troubleshooting" in "Manual Road Test".
4	Perform "Engine Brake Test" in this section. Is it OK?	Go to Step 5.	Proceed to "Troubleshooting" in "Engine Brake Test".
5	Perform "Stall Test" in this section. Is it OK?	Go to Step 6.	Proceed to "Troubleshooting" in "Stall Test".
6	Perform "Time Lag Test" in this section. Is it OK?	Go to Step 7.	Proceed to "Troubleshooting" in "Time Lag Test".
7	Perform "Line Pressure Test" in this section. Is it OK?	Go to Step 8.	Proceed to "Troubleshooting" in "Line Pressure Test".
8	Proceed to "Trouble Diagnosis Table-1" in this section. Is trouble identified?	Repair or replace faulty parts.	Go to Step 9.
9	Proceed to "Trouble Diagnosis Table-2" in this section. Is trouble identified?	Repair or replace faulty parts.	Proceed to "Trouble Diagnosis Table-3" in this section.

Trouble Diagnosis Table**Trouble diagnosis table-1****Electrical Repair**

Condition	Possible Cause	Correction
Excessive shift shock	Shift solenoid valve-A and/or-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	(Only when N→D or 3↔O/D shifting)	
	Timing solenoid valve circuit faulty	
	Output shaft speed sensor (VSS) circuit faulty	
	Input shaft speed sensor circuit faulty	
	Transmission fluid temperature sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	CAN communication circuit faulty	
	Throttle position sensor circuit faulty	
	Crank position sensor circuit faulty	
	TCM	
	ECM	
No gear shift as 3rd gear	Shift solenoid valve-A and/or-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Timing solenoid valve circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
Poor 1→2 shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor (VSS) circuit faulty	
	Transmission range sensor circuit faulty	
	CAN communication circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	
	ECM	Substitute a known-good ECM and recheck.
Poor 2→3 shift	Shift solenoid valve-A circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor (VSS) circuit faulty	
	Transmission range sensor circuit faulty	
	CAN communication circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	
	ECM	Substitute a known-good ECM and recheck.

Condition	Possible Cause	Correction
Poor 3→O/D shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Timing solenoid valve circuit faulty	
	Output shaft speed sensor (VSS) circuit faulty	
	Input shaft speed sensor circuit faulty	
	Transmission range sensor circuit faulty	
	Transmission fluid temperature sensor circuit faulty	
	CAN communication circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	Throttle position sensor circuit faulty	
	Engine coolant temperature sensor circuit faulty	
	Crank position sensor circuit faulty	Refer to "Diagnostic Flow Table A-1" in this section.
	O/D off switch circuit faulty	
	TCM	
	ECM	Substitute a known-good ECM and recheck.
Poor O/D→3 shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Timing solenoid valve circuit faulty	
	Output shaft speed sensor (VSS) circuit faulty	
	Input shaft speed sensor circuit faulty	
	CAN communication circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	O/D off switch circuit faulty	Refer to "Diagnostic Flow Table A-1" in this section.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Poor 3→2 shift	Shift solenoid valve-A circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor (VSS) circuit faulty	
	CAN communication circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Poor 2→1 shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor (VSS) circuit faulty	
	CAN communication circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.

Condition	Possible Cause	Correction
Incorrect gear shift point	Output shaft speed sensor (VSS) circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	CAN communication circuit faulty	
	Pressure control solenoid valve circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Non operate TCC (lock-up) system	TCC solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Shift solenoid valve-A and/or-B circuit faulty	
	Pressure control solenoid valve circuit faulty	
	Output shaft speed sensor (VSS) circuit faulty	
	Input shaft speed sensor circuit faulty	
	Transmission range sensor circuit faulty	
	Transmission fluid temperature sensor circuit faulty	
	CAN communication circuit faulty	
	Brake light switch circuit faulty	Refer to "Diagnostic Flow Table A-2" in this section.
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	Engine coolant temperature sensor circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Higher or lower stall speed	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
Excessive "N"→"D" or "N"→"R" time lag	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent. if NG, repair
	Transmission fluid temperature sensor circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
Higher or lower line pressure	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.

Trouble diagnosis table-2**On-vehicle Repair**

Condition	Possible Cause	Correction
Unable to run in all range	Faulty valve body component	Replace valve body assembly
Excessive shift shock	Engine abnormal condition	Inspect and repair engine
	Malfunction of shift solenoid valve-A and/or-B	Inspect. If NG, replace
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of input shaft speed sensor	
	Malfunction of transmission range sensor	
	Malfunction of Transmission fluid temperature sensor	
	(Only when N→D or 3↔O/D shifting)	
	Malfunction of timing solenoid valve	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	(Except N→D or N→R shifting)	Inspect referring to Section 5. If NG, replace.
	Malfunction of brake light switch	
	Malfunction of crank position sensor	Inspect referring to Section 6E2. If NG, replace.
	Malfunction of throttle position sensor	Inspect referring to Section 6E2. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Poor 1→2 shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of transmission range sensor	
	Malfunction of throttle position sensor	Inspect referring to Section 6E2. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Poor 2→3 shift	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of transmission range sensor	
	Malfunction of throttle position sensor	Inspect referring to Section 6E2. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Poor 3→O/D shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of timing solenoid valve	
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of input shaft speed sensor	
	Malfunction of transmission range sensor	
	Malfunction of Transmission fluid temperature sensor	
	Malfunction of O/D off switch	
	Malfunction of engine coolant temperature sensor	Inspect referring to Section 6E2. If NG, replace.
	Malfunction of throttle position sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.

Condition	Possible Cause	Correction
Poor O/D→3 shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of timing solenoid valve	
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of input shaft speed sensor	
	Malfunction of O/D off switch	Inspect referring to Section 6E2. If NG, replace.
	Malfunction of throttle position sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
Poor 3→2 shift	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of throttle position sensor	Inspect referring to Section 6E2. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Poor 2→1 shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of throttle position sensor	Inspect referring to Section 6E2. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Incorrect shift point	Engine abnormal condition	Inspect and repair engine
	Malfunction of output shaft speed sensor (VSS)	Inspect. If NG, replace.
	Malfunction of throttle position sensor	Inspect referring to Section 6E2. If NG, replace.
Non operate TCC (lock-up) system	Malfunction of TCC solenoid valve	Inspect. If NG, replace.
	Malfunction of shaft solenoid valve-A and/or-B	
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of input shaft speed sensor	
	Malfunction of transmission range sensor	
	Malfunction of transmission fluid temperature sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Malfunction of brake light switch	Inspect referring to Section 5. If NG, replace.
	Malfunction of throttle position sensor	Inspect referring to Section 6E2. If NG, replace.
	Malfunction of engine coolant temperature sensor	
	Faulty valve body component	Replace valve body assembly.
Excessive "N"→"D" or "N"→"R" time lag	Malfunction of transmission fluid temperature sensor	Inspect. If NG, replace.
	Pressure control solenoid valve circuit faulty	Inspect. If NG, replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty valve body component	Replace valve body assembly.

Trouble diagnosis table-3**Off-vehicle Repair**

Condition	Possible Cause	Correction
Unable to run in all range	Faulty oil pump	Inspect. If NG, replace.
	Seized or broken planetary gear	
	Faulty one-way No.2 clutch	
	Damaged drive plate	
	Faulty forward clutch	
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Faulty torque converter	Replace
Excessive "N"→"D" shift shock	Faulty forward clutch	Inspect. If NG, replace.
Excessive "N"→"R" shift shock	Faulty reverse clutch	Inspect. If NG, replace.
	Faulty 1st and reverse brake	
Poor 1→2 shift, excessive shock or slippage	Faulty 2nd brake	Inspect. If NG, replace.
	Faulty one-way No.1 clutch	
Poor 2→3 shift, excessive shock or slippage	Faulty direct clutch	Inspect. If NG, replace.
Poor 3↔O/D shift, excessive shock or slippage	Faulty forward clutch	Inspect. If NG, replace.
	Faulty O/D and 2nd coast brake	
Poor 3→2 shift, excessive shock or slippage	Faulty direct clutch	Inspect. If NG, replace.
	Faulty one-way No.1 clutch	
Poor 2→1 shift, excessive shock or slippage	Faulty 2nd brake	Inspect. If NG, replace.
	Faulty one-way No.2 clutch	
Non operate TCC (lock-up) system	Faulty torque converter	Replace.
Excessive "N"→"D" time lag	Faulty oil pump	Inspect. If NG, replace.
	Faulty forward clutch	
	Faulty one-way No.2 clutch	
	Leakage from "D" range fluid pressure circuit	Overhaul or replace valve body assembly.
Excessive "N"→"R" time lag	Faulty oil pump	Inspect. If NG, replace.
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Leakage from "R" range fluid pressure circuit	Overhaul or replace valve body assembly.
Poor engine brake in downshift to "2" range	Faulty O/D and 2nd coast brake	Inspect. If NG, replace.
Poor engine brake in downshift to "L" range	Faulty 1st and reverse brake.	Inspect. If NG, replace.

Road Test

This test is to check if upshift, downshift and lock-up take place at specified speeds while actually driving vehicle on a level road.

WARNING:

- Carry out test in very little traffic area to prevent an accident.
- Test requires 2 persons, a driver and a tester.

- 1) Warm up engine.
- 2) With engine running at idle, shift selector lever to "D" range.
- 3) Accelerate vehicle speed by depressing accelerator pedal gradually.
- 4) While driving in "D" range, check if gear shift and lock-up occur properly as shown in "Gear Shift Diagram and Lock-Up Diagram". (Refer to "Automatic Gear Shift Diagram" in this section.)

Troubleshooting

Condition	Possible Cause	Correction
Unable to run in all range	Faulty valve body component	Replace valve body assembly
	Faulty oil pump	Inspect. If NG, replace.
	Seized or broken planetary gear	
	Faulty one-way No.2 clutch	
	Faulty forward clutch	
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Damaged drive plate	
	Faulty torque converter	Replace.
No gear shift as 3rd gear	Malfunction of shift solenoid valve-A and/or-B	Inspect. If NG, replace.
	Malfunction of timing solenoid valve	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
1→2 upshift fails to occur	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Faulty valve body component	Replace valve body assembly
	Faulty 2nd brake	Inspect. If NG, replace.
	Faulty one-way No.1 clutch	
2→3 upshift fails to occur	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Faulty valve body component	Replace valve body assembly.
	Faulty direct clutch	Inspect. If NG, replace.

Condition	Possible Cause	Correction
3→O/D upshift fails to occur	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of O/D off switch	
	Malfunction of engine coolant temperature sensor	
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of input shaft speed sensor	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Malfunction of crankshaft position sensor	
	Malfunction of timing solenoid valve	
	Malfunction of transmission fluid temperature sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Faulty O/D and 2nd coast brake	Inspect. If NG, replace.
O/D→3 downshift fails to occur	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of O/D off switch	
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of input shaft speed sensor	
	Malfunction of throttle position sensor	
	Malfunction of timing solenoid valve	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Faulty forward clutch	Inspect. If NG, replace.
3→2 downshift fails to occur	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of throttle position sensor	
	Faulty valve body component	Replace valve body assembly.
	Faulty one-way No.1 clutch	Inspect. If NG, replace.
2→1 downshift fails to occur	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of throttle position sensor	
	Faulty valve body component	Replace valve body assembly.
	Faulty one-way No.2 clutch	Inspect. If NG, replace.
Gear shift point is incorrect	Abnormal engine condition	Inspect and repair engine.
	Malfunction of output shaft speed sensor (VSS)	Inspect. If NG, replace.
	Malfunction of throttle position sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.

Condition	Possible Cause	Correction
TCC (lock-up) function does not operate	Malfunction of TCC solenoid valve	Inspect. If NG, replace.
	Malfunction of shift solenoid valve-A and/or-B	
	Malfunction of brake light switch	
	Malfunction of engine coolant temperature sensor	
	Malfunction of output shaft speed sensor (VSS)	
	Malfunction of input shaft speed sensor	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Malfunction of transmission fluid temperature sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Faulty torque converter	Replace.

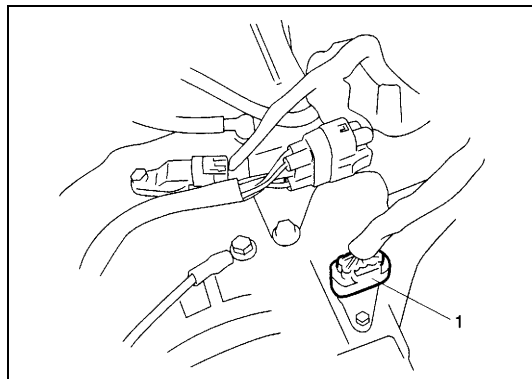
Manual Road Test

This test checks the gears being used in “L”, “2” or “D” range when driven with unoperated gear shift control system. Test drive vehicle on a level road.

NOTE:

Before this test, check diagnostic trouble code (DTC).

- 1) With select lever in “P”, start engine and warm it up.
- 2) After warming up engine, turn ignition switch OFF and disconnect valve body harness connector (1).



- 3) With select lever in “L” range, start vehicle and check that 3rd gear is being used referring to table shown below.

Vehicle speed per 1,000 rpm in engine speed (V1,000 table, reference)

Gear position	Vehicle speed
1st	8.1 km/h (5.0 mile/h)
2nd	14.8 km/h (9.2 mile/h)
3rd	23.3 km/h (14.5 mile/h)
4th (O/D)	33.3 km/h (20.7 mile/h)
Reverse	10.1 km/h (6.3 mile/h)

- 4) While vehicle is running, shift select lever to “2” range and check that 3rd gear is being used.
- 5) While vehicle is running, shift select lever to “D” range and check that 3rd gear is being used.
- 6) After above checks, stop vehicle then turn ignition switch OFF, and connect valve body harness connector.
- 7) Clear DTC.

Troubleshooting

Condition	Possible Cause	Correction
Operated gear is not correct	Faulty valve body component	Replace valve body assembly.
	Faulty clutch or brake	Inspect clutch and brake. If any parts are faulty, replace them.

Engine Brake Test

WARNING:

Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.

- 1) While driving vehicle in 3rd gear of "D" range, shift select lever down to "2" range and check if engine brake operates.
- 2) In the same way as in Step 1), check engine brake for operation when select lever is shifted down to "L" range.
- 3) Engine brake should operate in above test.

Troubleshooting

Condition	Possible Cause	Correction
Failure to operate when shifted down to "2" range	Faulty valve body component	Replace valve body assembly.
	Faulty O/D and 2nd coast brake	Inspect. If NG, replace.
Failure to operate when shifted down to "L" range	Faulty valve body component	Replace valve body assembly.
	Faulty 1st and reverse brake	Inspect. If NG, replace.

Stall Test

This test is to check overall performance of automatic transaxle and engine by measuring stall speed at “D” and “R” ranges. Be sure to perform this test only when transaxle fluid is at normal operating temperature and its level is between FULL and LOW marks.

CAUTION:

- Do not run engine at stall more than 5 seconds continuously, or fluid temperature may rise excessively high.
- After performing stall test, be sure to leave engine running at idle for longer than 1 minute before another stall test.

- 1) Apply parking brake and block wheels.
- 2) Install tachometer.
- 3) Start engine with select lever shifted to “P” range.
- 4) Depress brake pedal fully.
- 5) Shift select lever to “D” range and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant (stall speed).
- 6) Release accelerator pedal immediately after stall speed is checked.
- 7) In the same way, check stall speed in “R” range.
- 8) Stall speed should be within following specification.

Engine stall speed

Standard: 2,050 – 2,350 rpm

Troubleshooting

Condition	Possible Cause	Correction
Lower than standard level in both “D” and “R” range	Engine output torque failure	Inspect and repair engine.
	Faulty one-way clutch of torque converter	Replace torque converter.
Higher than standard level in “D” range	Malfunction of pressure control solenoid valve (Low line pressure)	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Slippery forward clutch	Inspect. If NG, replace.
	Faulty one-way No.2 clutch	
	Leakage from “D” range fluid pressure circuit	Overhaul or replace valve body assembly.
Higher than standard level in “R” range	Malfunction of pressure control solenoid valve (Low line pressure)	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Slippery reverse clutch	Inspect. If NG, replace.
	Slippery 1st and reverse brake	
	Leakage from “R” range fluid pressure circuit	Overhaul or replace valve body assembly.
Higher than standard level in both “D” and “R” range	Malfunction of pressure control solenoid valve (Low line pressure)	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Leakage from both “D” and “R” range fluid pressure circuit	Overhaul or replace valve body assembly.

Time Lag Test

This test is to check conditions of clutch, brake and fluid pressure. "Time lag" means time elapsed since selector lever is shifted with engine idling till shock is felt.

- 1) With chocks placed before and behind front and rear wheels respectively, depress brake pedal.
- 2) Start engine.
- 3) With stop watch ready, shift select lever from "N" to "D" range and measure time from that moment till shock is felt.
- 4) Similarly measure time lag by shifting select lever from "N" to "R" range.

Gear shifting time lag

"N" → "D": Less than 0.7 sec.

"N" → "R": Less than 1.2 sec.

NOTE:

- When repeating this test, be sure to wait at least one minute after select lever is shifted back to "N" range.
- Engine should be warmed up fully for this test.
- Repeat test 3 times and take average of those data for final time lag data.

Troubleshooting

Condition	Possible Cause	Correction
"N" → "D" time lag exceeds specification	Malfunction of transmission fluid temperature sensor	Inspect. If NG, replace.
	Malfunction of pressure control solenoid valve (Low line pressure)	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Faulty forward clutch	
	Faulty one-way No.2 clutch	
"N" → "R" time lag exceeds specification	Leakage from "D" range fluid pressure circuit	Overhaul or replace valve body assembly.
	Malfunction of transmission fluid temperature sensor	Inspect. If NG, replace.
	Malfunction of pressure control solenoid valve (Low line pressure)	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Leakage from "R" range fluid pressure circuit	Overhaul or replace valve body assembly.

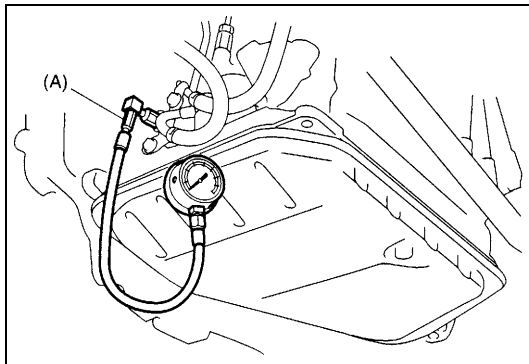
Line Pressure Test

Purpose of this test is to check operating conditions of each part by measuring fluid pressure in fluid pressure line.

Line pressure test requires following conditions.

- Automatic fluid is at normal operating temperature (70 – 80°C / 158 – 176°F).
- Fluid is replenished to proper level (between FULL and LOW on dipstick).
- Air conditioner switch is turned OFF.

- 1) Apply parking brake securely and place chocks against wheels.
- 2) Remove fluid pressure check hole plug bolt.
- 3) Attach oil pressure gauge to fluid pressure check hole in transaxle case.



Special tool

(A): 09925-37811-001

CAUTION:

After attaching oil pressure gauge, check that no fluid leakage exists.

- 4) Depress foot brake fully, run engine at idle and stall then check fluid pressure in “D” or “R” range.

CAUTION:

- Do not continue running engine at stall speed longer than 5 seconds.
- After performing line pressure test, be sure to leave engine running at idle for longer than one minute before performing another line pressure test.

Automatic transmission line pressure

	“D” range	“R” range
At idle speed	3.6 – 4.0 kg/cm ² 51 – 57 psi	5.8 – 6.7 kg/cm ² 82 – 95 psi
At stall speed	12.3 – 13.4 kg/cm ² 175 – 191 psi	16.2 – 18.6 kg/cm ² 230 – 264 psi

Troubleshooting

Condition	Possible Cause	Correction
Higher than standard level in each range	Malfunction of pressure control solenoid valve (Low line pressure)	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
Lower than standard level in each range	Malfunction of pressure control solenoid valve (Low line pressure)	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Leakage from both "D" and "R" range fluid pressure circuit	Overhaul or replace valve body assembly.
Lower than standard level only in "D" range	Leakage from "D" range fluid pressure circuit	Overhaul or replace valve body assembly.
Lower than standard level only in "R" range	Leakage from "R" range fluid pressure circuit	Overhaul or replace valve body assembly.

"P" Range Test

- 1) Stop vehicle on a slope of 5 degrees or more, shift select lever to "P" range and at the same time apply parking brake.
- 2) After stopping engine, depress brake pedal and release parking brake.
- 3) Then, release brake pedal gradually and check that vehicle remains stationary.
- 4) Depress brake pedal and shift select lever to "N" range.
- 5) Then, release brake pedal gradually and check that vehicle moves.

WARNING:

Before test, make sure no one is around vehicle or down on a slope and keep watchful for safety during test.

Troubleshooting

Condition	Possible Cause	Correction
Vehicle moves at "P" range or remains stationary at "N" range	Defective parking lock pawl or spring	Inspect. If NG, repair.

Diagnostic Flow Table A-1: No Gear Shift to O/D**System Description**

TCM does not shift to O/D gear under any of the following conditions.

- O/D OFF switch is turned ON ("O/D OFF" lamp lights).
- Engine coolant temperature is less than 50°C (122°F).
- A/T fluid temperature is less than 20°C (68°F).
- TCM detects the following DTCs.

P0712/P0713/P0717/P0722/P0785/P0962/P0963/P0973/P0974/P0976/P0977/P1701/P1702/P1703

Troubleshooting**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

Step	Action	Yes	No
1	Was "A/T System Check" performed?	Go to Step 2.	Go to "A/T System Check".
2	Check DTC. Is DTC P0712, P0713, P0717, P0722, P0785, P0962, P0963, P0973, P0974, P0976, P0977, P1701, P1702 and/or P1703 detected?	Perform DTC flow table to repair and retry.	Go to Step 3.
3	Perform running test under the following conditions and measure voltage between terminal "E13-16" of TCM connector and ground, terminal "E13-15" of TCM connector and ground. <ul style="list-style-type: none"> • O/D OFF switch is turned OFF. ("O/D OFF" lamp does not light) • Engine coolant temperature is in normal operating temperature. • Select lever is in "D" range. • Drive vehicle with 4th gear condition referring to "Automatic Gear Shift Diagram" in this section. Do results satisfy the value as follows? Voltage between terminal "E13-16" of TCM connector and ground: 0 – 1 V Voltage between terminal "E13-15" of TCM connector and ground: 9 – 14 V	Faulty shift solenoid valve, circuit or transaxle.	"BRN" circuit shorted to power circuit or open, or "BLK/YEL" circuit shorted to ground. If wire is OK, go to Step 4.
4	O/D OFF switch signal inspection. With ignition switch ON, check voltage between terminal "E12-9" of TCM connector and ground. O/D OFF switch OFF ("O/D OFF" lamp does not light): 8 – 14 V O/D OFF switch ON ("O/D" OFF" lamp lights): 0 – 1 V Is result as specified?	Substitute a known-good TCM and recheck.	Faulty O/D OFF switch or its circuit. If OK substitute a known-good TCM and recheck.

Diagnostic Flow Table A-2: No Lock-Up Occurs**System Description**

TCM turns TCC solenoid OFF under any of the following conditions.

- Brake light switch is turned ON. (Brake pedal is depressed)
- Engine coolant temperature is less than 60°C (140°F).
- Throttle opening is as much as 0%.
- TCM detects the following DTCs.
P0705/P0707/P0712/P0713/P0717/P0722/P0785/P0962/P0963/P0973/P0974/P0976/P0977/P1701/
P1702/P1703/P2769/P2770

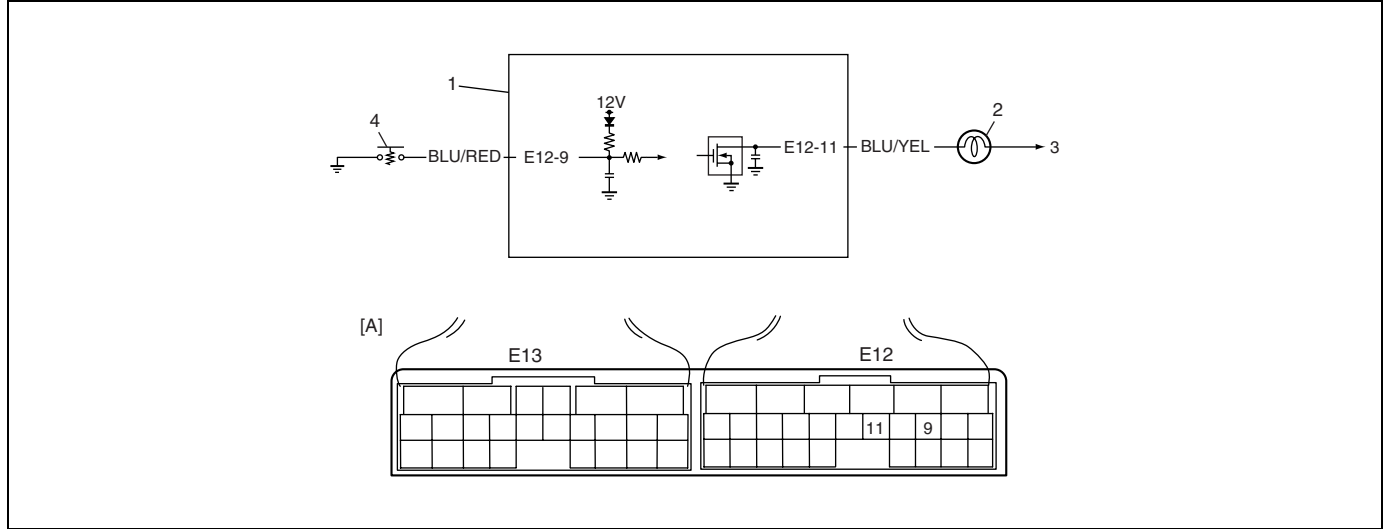
Troubleshooting**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

Step	Action	Yes	No
1	Was "A/T System Check" performed?	Go to Step 2.	Go to "A/T System Check".
2	Check DTC. Is DTC P0705, P0707, P0712, P0713, P0717, P0722, P0785, P0962, P0963, P0973, P0974, P0976, P0977, P1701, P1702, P1703, P2769 and/or P2770 detected?	Perform DTC flow table to repair and retry.	Go to Step 3.
3	Perform running test under the following conditions and measure voltage between terminal "E13-5" of TCM connector and ground. <ul style="list-style-type: none"> • O/D OFF switch is turned OFF. ("O/D OFF" lamp does not light) • Engine coolant temperature is in normal operating temperature. • Select lever is in "D" range. • Brake pedal is released. • Drive vehicle with 4th gear and TCC ON condition referring to "Automatic Gear Shift Diagram" in this section. Is terminal voltage about 9 – 14 V?	Faulty TCC solenoid valve, circuit or transaxle.	"WHT/BLU" circuit shorted to ground. If wire is OK, go to step 4
4	Brake light switch signal inspection. With ignition switch ON, check voltage between terminal "E21-9" of ECM connector and ground. Brake pedal is released: 0 – 1 V Brake pedal is depressed: 8 – 14 V Is result as specified?	Substitute a known-good TCM and recheck.	Mis-adjusted brake light switch, faulty brake light switch or its circuit. If OK, substitute a known-good TCM and recheck.

Diagnostic Flow Table A-3: "O/D OFF" Lamp Circuit Check ("O/D OFF" Lamp Lights Steadily)

Wiring Diagram



1. TCM	4. O/D off switch
2. "O/D OFF" lamp	[A]: Terminal arrangement of TCM connector (viewed from harness side)
3. To ignition switch	

Circuit Description

"O/D OFF" lamp operation of ON/OFF is controlled by transmission control module (TCM) and combination meter.

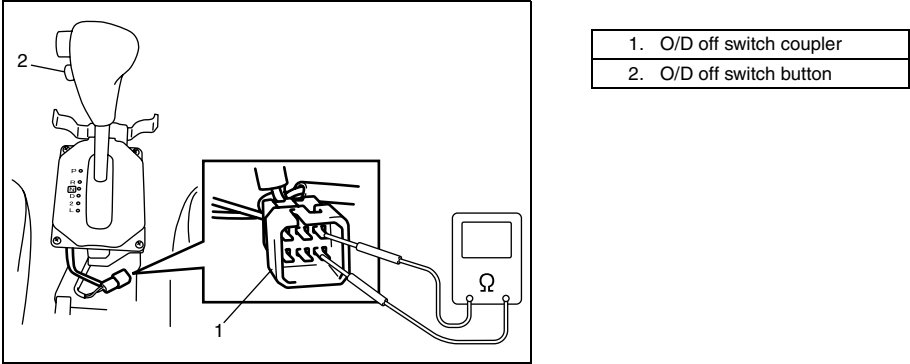
When ignition switch is turned ON with O/D OFF switch OFF and malfunction is not detected, TCM turn "O/D OFF" lamp ON only for 2 seconds to check bulb and turns it OFF.

Troubleshooting

Step	Action	Yes	No
1	Check O/D off switch status. Press O/D off switch button. Does "O/D OFF" lamp light steadily?	Go to Step 2.	System is OK.
2	Check "O/D OFF" lamp circuit for short. 1) Turn ignition switch OFF and disconnect TCM connectors. 2) Turn ignition switch ON. Does "O/D OFF" lamp light steadily yet?	"BLU/YEL" circuit shorted to ground.	Go to Step 3.
3	Check O/D off switch circuit. 1) Turn ignition switch OFF. 2) Check continuity between terminal "E12-9" of disconnected harness side connector and ground. Is continuity indicated?	Go to step 4.	Substitute a known-good TCM and recheck.

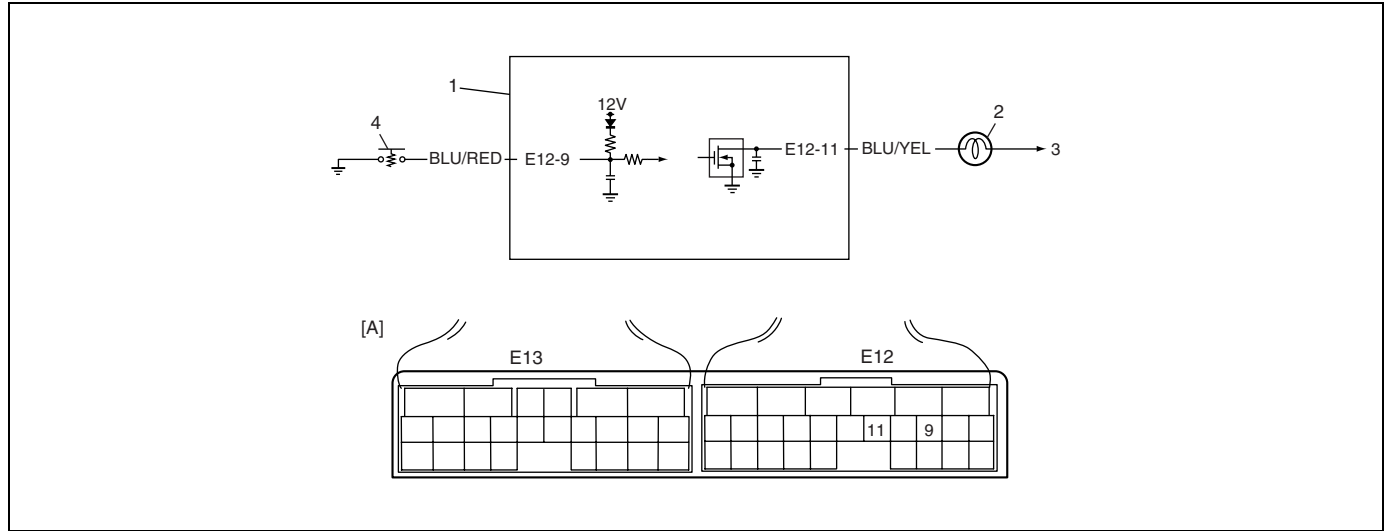
Step	Action	Yes	No
4	Check O/D off switch for operation. 1) Disconnect O/D off switch coupler. 2) Check continuity between terminals under each condition below. (See fig.) O/D off switch under being released: No continuity O/D off switch under being pressed: Continuity Is check result satisfactory?	“BLU/RED” circuit shorted to ground.	Replace O/D off switch.

Fig. for Step 2 and Step 4



Diagnostic Flow Table A-4: "O/D OFF" Lamp Circuit Check ("O/D OFF" Lamp Does Not Light Anytime)

Wiring Diagram



1. TCM	4. O/D off switch
2. "O/D OFF" lamp	[A]: Terminal arrangement of TCM connector (viewed from harness side)
3. To ignition switch	

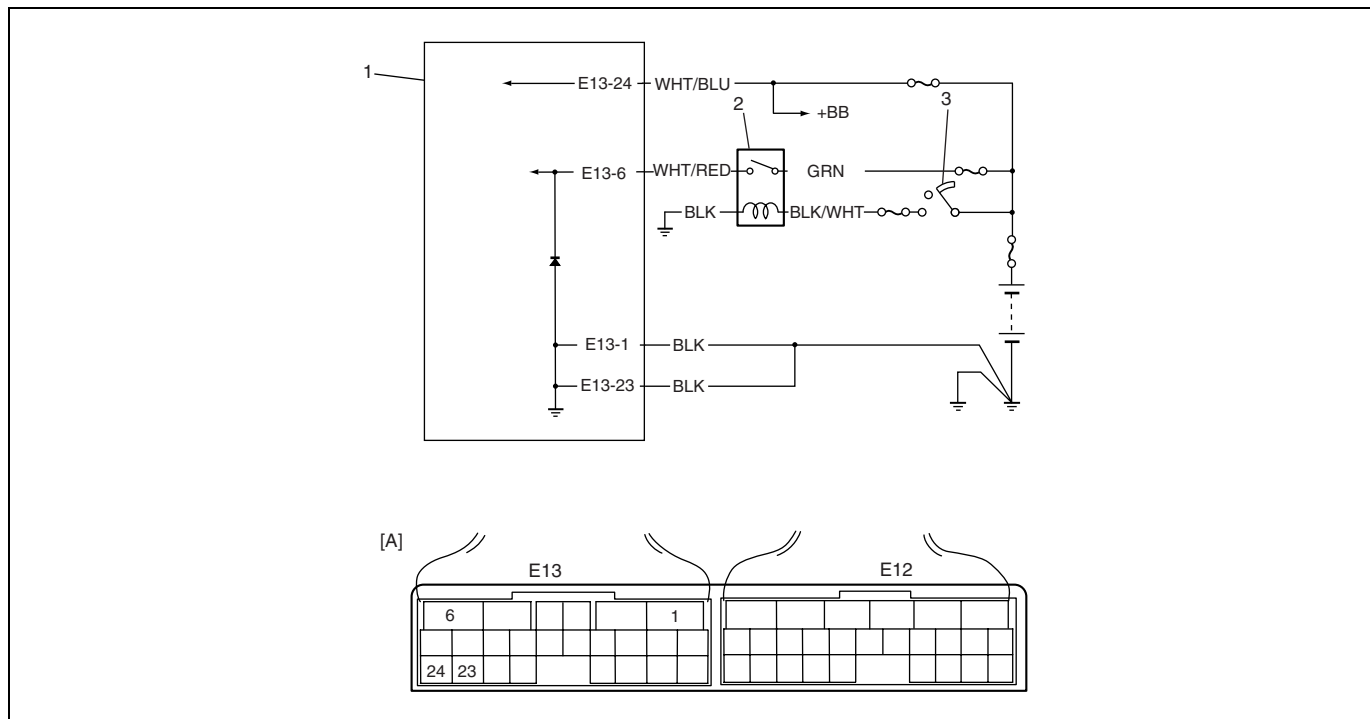
Circuit Description

"O/D OFF" lamp operation of ON/OFF is controlled by transmission control module (TCM) and combination meter.

When ignition switch is turned ON with O/D OFF switch OFF and malfunction is not detected, TCM turn "O/D OFF" lamp ON only for 2 seconds to check bulb and turn it OFF.

Troubleshooting

Step	Action	Yes	No
1	Check "O/D OFF" lamp circuit. 1) Turn ignition switch OFF and disconnect TCM connectors. 2) Using service wire, connect terminal "E12-11" of disconnected harness side TCM connector and ground. 3) Turn ignition switch ON. Does "O/D OFF" lamp light?	Poor terminal "E12-11" connection. If OK, substitute a known-good TCM and recheck.	"BLU/YEL" circuit open or bulb burned out.

Diagnostic Flow Table A-5: TCM Power and Ground Circuit Check**Wiring Diagram**

1. TCM	3. Ignition switch
2. A/T relay	[A]: Terminal arrangement of TCM connector (viewed from harness side)

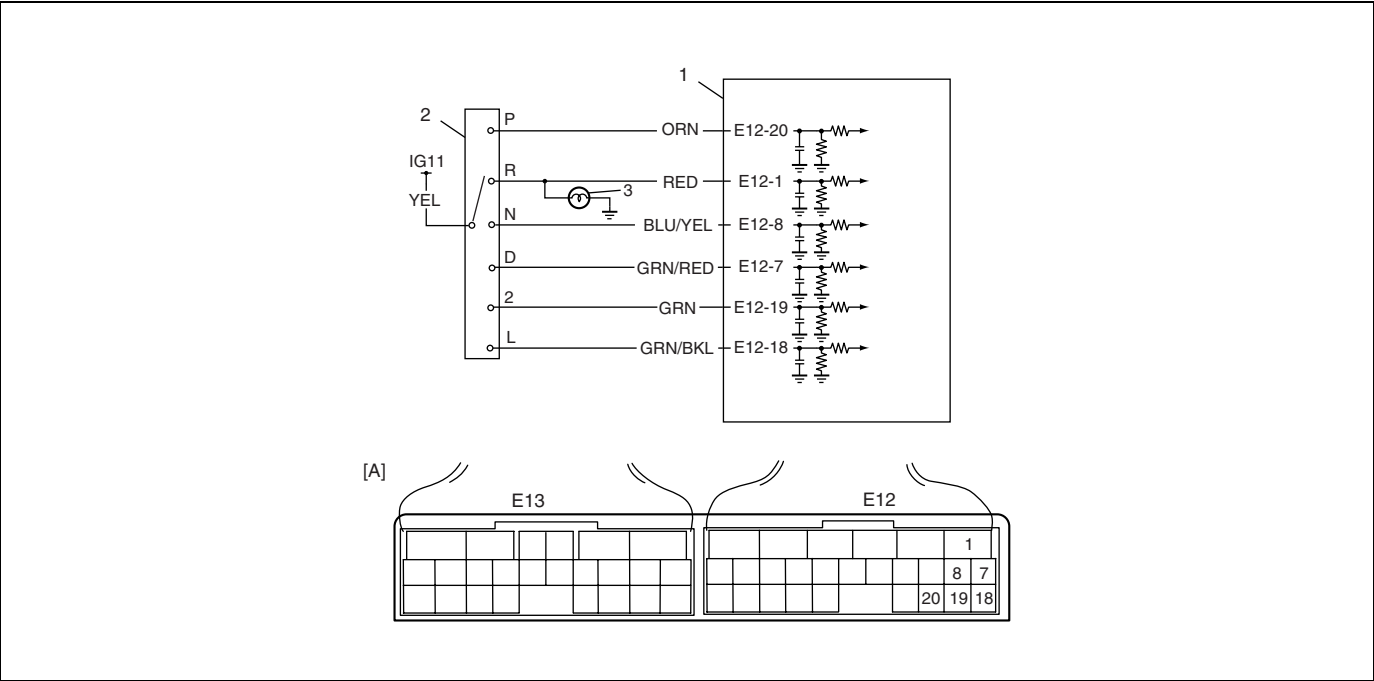
Troubleshooting

Step	Action	Yes	No
1	Check TCM Back-up Power Circuit 1) Disconnect TCM connector with ignition switch OFF. 2) Check for proper connection to TCM at "E13-24" terminal. 3) If OK, check voltage at terminal "E13-24" of disconnected TCM connector. Is it 10 – 14 V?	Go to Step 2.	"WHT/BLU" circuit open or shorted to ground.
2	Check TCM Power Circuit. 1) Disconnect TCM connector with ignition switch OFF. 2) Check for proper connection to TCM at "E13-6" terminal. 3) If OK, turn ignition switch ON and check voltage at terminal "E13-6" of disconnected TCM connector. Is it 10 – 14 V?	Go to Step 4.	Go to Step 3.
3	Check A/T Relay Operation. Check A/T relay operation referring to "A/T Relay Inspection" in this section. Is check result satisfactory?	"WHT/RED", "GRN". "BLK/WHT" or "BLK" circuit for power supply open.	Replace A/T relay.

Step	Action	Yes	No
4	Check TCM Ground Circuit. 1) Turn ignition switch OFF. 2) With TCM connectors disconnected, check for proper connection to TCM at "E13-1"/"E13-23" terminal. 3) If OK, check resistance between "E13-1"/"E13-23" terminal of disconnected TCM connector and body ground. Is continuity indicated?	TCM power and ground circuits are in good condition.	"BLK" circuit for TCM ground open.

DTC P0705 Transmission Range Sensor Circuit Malfunction

Wiring Diagram



1. TCM	3. Backup lamp
2. Transmission range sensor	[A]: Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> Multiple signals are inputted simultaneously for 12 seconds. 	<ul style="list-style-type: none"> Select cable maladjusted. Transmission range sensor (switch) maladjusted. Transmission range sensor (switch) or its circuit malfunction. TCM

DTC Confirmation Procedure

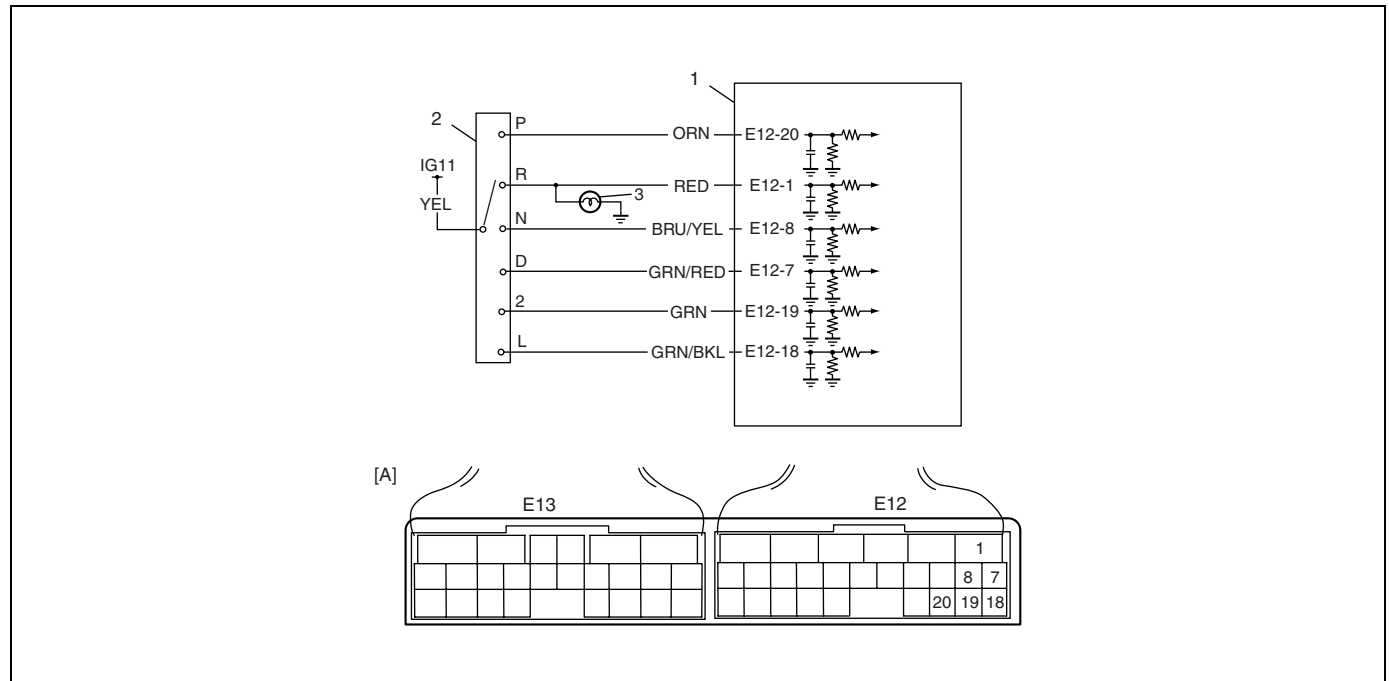
- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM memory by using scan tool.
- 3) Start engine and shift select lever to "D" range.
- 4) Keep engine running at idle speed for 25 seconds or more.
- 5) Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Do you have SUZUKI scan tool?	Go to Step 3.	Go to Step 4.
3	Check Transmission range sensor(switch) circuit for operation. Check by using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range signal (P, R, N, D, 2 or L) on display when shifting select lever to each range. Is applicable range indicated? Are check results satisfactory?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 5.
4	Check Transmission range sensor(switch) circuit for operation. Check by not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminals "E12-1", "E12-7", "E12-8", "E12-18", "E12-19" and "E12-20" respectively with select lever shifted to each range. Taking terminal E12-19 as an example, is battery voltage indicated only when select lever is shifted to "2" range and 0 V for other ranges as shown in table below? Check voltage at other terminals likewise, referring to figure. Are check results satisfactory?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 5.
5	Check transmission range sensor for installation position. 1) Shift select lever to "N" range. 2) Check that "N" reference line on sensor and needle direction shaped on lock washer are aligned. Are they aligned?	Go to Step 7.	Adjust.
6	Check select cable for adjustment referring to "Select Cable Adjustment" in this section. Is it adjusted correctly?	Go to Step 6.	Adjust.
7	Check Transmission range sensor(switch) referring to "Transmission Range Sensor" in this section. Are check results satisfactory?	"YEL", "ORN", "RED", "BUL/YEL", "GRN/RED", "GRN" or "GRN/BLK" circuit shorted to power circuit or shorted each other. If wires and connections are OK, substitute a know-good TCM and recheck.	Replace Transmission range sensor.

Table for Step 4

		Terminal					
		E12-20	E12-1	E12-8	E12-7	E12-19	E12-18
Select lever position	P	8 – 14 V	0 V	0 V	0 V	0 V	0 V
	R	0 V	8 – 14 V	0 V	0 V	0 V	0 V
	N	0 V	0 V	8 – 14 V	0 V	0 V	0 V
	D	0 V	0 V	0 V	8 – 14 V	0 V	0 V
	2	0 V	0 V	0 V	0 V	8 – 14 V	0 V
	L	0 V	0 V	0 V	0 V	0 V	8 – 14 V

DTC P0707 Transmission Range Sensor Circuit Low**Wiring Diagram**

1. TCM	3. Backup lamp
2. Transmission range sensor	[A]: Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> Transmission range switch signal (P, R, N, D, 2, or L) is not inputted for more than 32 seconds when vehicle speed is faster than 30 km/h (19 mile/h) and engine speed is faster than 1,500 rpm. 	<ul style="list-style-type: none"> Select cable maladjusted. Transmission range sensor (switch) maladjusted. Transmission range sensor (switch) or its circuit malfunction. TCM

DTC Confirmation Procedure**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM memory by using scan tool.
- 3) Start engine and shift select lever.
- 4) Shift select lever to "D" range.
- 5) Start vehicle and increase vehicle speed to 40 km/h (25 mile/h) or more for 1 minutes.
- 6) Stop vehicle and turn ignition switch OFF.
- 7) Repeat Step 3) to 5) one time.
- 8) Stop vehicle and check DTC.

Troubleshooting

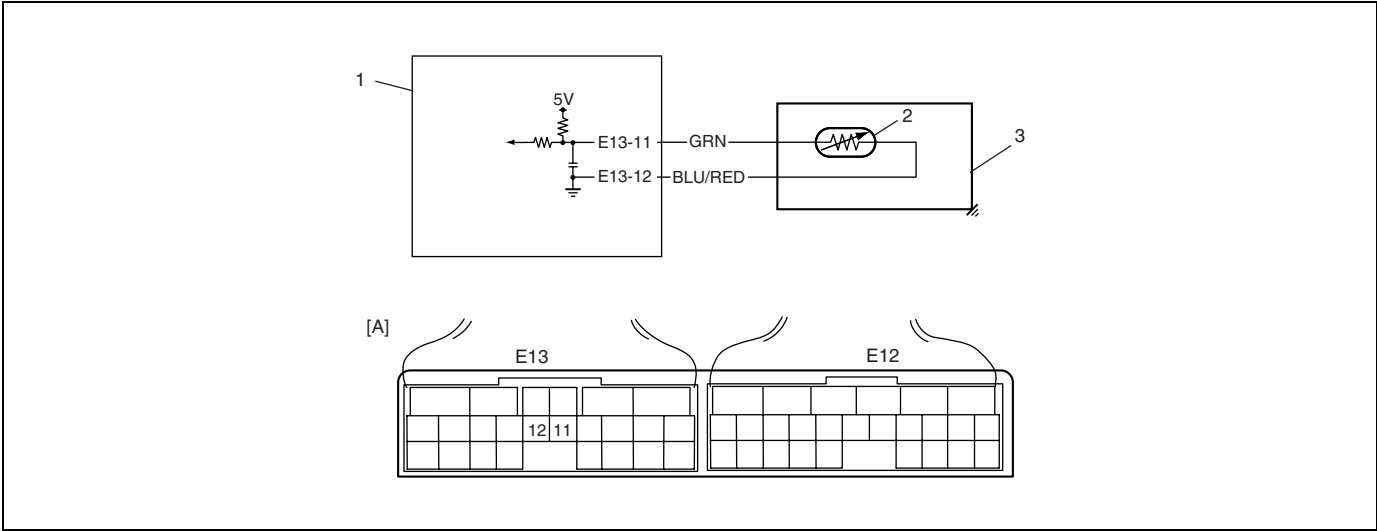
Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Do you have SUZUKI scan tool?	Go to Step 3.	Go to Step 4.
3	Check Transmission range sensor(switch) circuit for operation. Check by using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range signal (P, R, N, D, 2 or L) on display when shifting select lever to each range. Is applicable range indicated? Are check results satisfactory?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 5.
4	Check Transmission range sensor(switch) circuit for operation. Check by not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminals E12-1, E12-7, E12-8, E12-18, E12-19 and E12-20 respectively with select lever shifted to each range. Taking terminal E12-19 as an example, is battery voltage indicated only when select lever is shifted to "2" range and 0 V for other ranges as shown in table below? Check voltage at other terminals likewise, referring to figure. Are check results satisfactory?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 5.
5	Check transmission range sensor for installation position. 1) Shift select lever to "N" range. 2) Check that "N" reference line on sensor and needle direction shaped on lock washer are aligned. Are they aligned?	Go to Step 7.	Adjust.
6	Check select cable for adjustment referring to "Select Cable Adjustment" in this section. Is it adjusted correctly?	Go to Step 6.	Adjust.
7	Check Transmission range sensor(switch) referring to "Transmission Range Sensor" in this section. Are check results satisfactory?	"YEL", "ORN", "RED", "BLU/YEL", "GRN/RED", "GRN" or "GRN/BLK" circuit open or short to ground. If wires and connections are OK, substitute a know-good TCM and recheck.	Replace Transmission range sensor.

Table for Step 4

		Terminal					
		E12-20	E12-1	E12-8	E12-7	E12-19	E12-18
Select lever position	P	8 – 14 V	0 V	0 V	0 V	0 V	0 V
	R	0 V	8 – 14 V	0 V	0 V	0 V	0 V
	N	0 V	0 V	8 – 14 V	0 V	0 V	0 V
	D	0 V	0 V	0 V	8 – 14 V	0 V	0 V
	2	0 V	0 V	0 V	0 V	8 – 14 V	0 V
	L	0 V	0 V	0 V	0 V	0 V	8 – 14 V

DTC P0712 Transmission Fluid Temperature Sensor Circuit Low

Wiring Diagram



1. TCM	3. A/T
2. Transmission fluid temperature sensor	[A]: Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
Transmission temperature sensor terminal voltage is less than 0.05 V for 5 minutes or more after turning ignition switch ON.	<ul style="list-style-type: none"> Transmission fluid temperature sensor or its circuit malfunction. TCM

DTC Confirmation Procedure

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

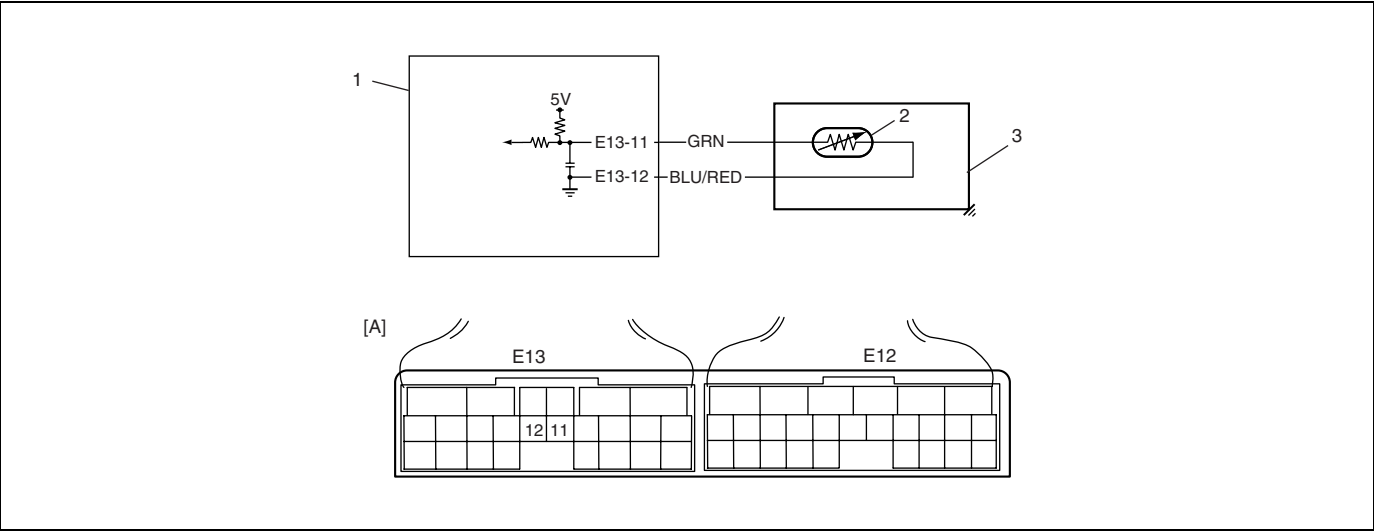
- Connect scan tool to DLC with ignition switch OFF if available.
- Clear DTC in TCM memory and start engine.
- Keep engine running at idle speed for 10 minutes or more.
- Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Transmission Fluid Temperature Circuit for Ground Short. Check continuity between terminal E13-11 of disconnected harness side TCM connector and ground. Is continuity indicated?	"GRN" circuit shorted to ground.	Go to Step 3.
3	Check Transmission Fluid Temperature Circuit for IG Short. 1) Cool down A/T fluid temperature under ambient temperature. 2) Connect TCM connectors to TCM with ignition switch OFF. 3) Turn ignition switch ON. 4) Measure voltage between terminal E13-11 of TCM connector and ground. Is it 4.6 V or more?	"GRN" circuit shorted to power circuit. If circuit is OK, go to Step 4.	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.
4	Inspect Transmission Fluid Temperature Sensor. Inspect transmission temperature sensor referring to "Transmission Fluid Temperature Sensor" in this section. Is result satisfactory?	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	Replace transmission fluid temperature sensor.

DTC P0713 Transmission Fluid Temperature Sensor Circuit High

Wiring Diagram



1. TCM	3. A/T	[A]: Terminal arrangement of TCM connector (viewed from harness side)
2. Transmission fluid temperature sensor	4. Valve body connector	

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> Transmission temperature sensor terminal voltage is more than 4.6 V and shift range is in “R”, “D”, “2” or “L” for 15 minutes after starting engine. 	<ul style="list-style-type: none"> Transmission fluid temperature sensor or its circuit malfunction. TCM

DTC Confirmation Procedure

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

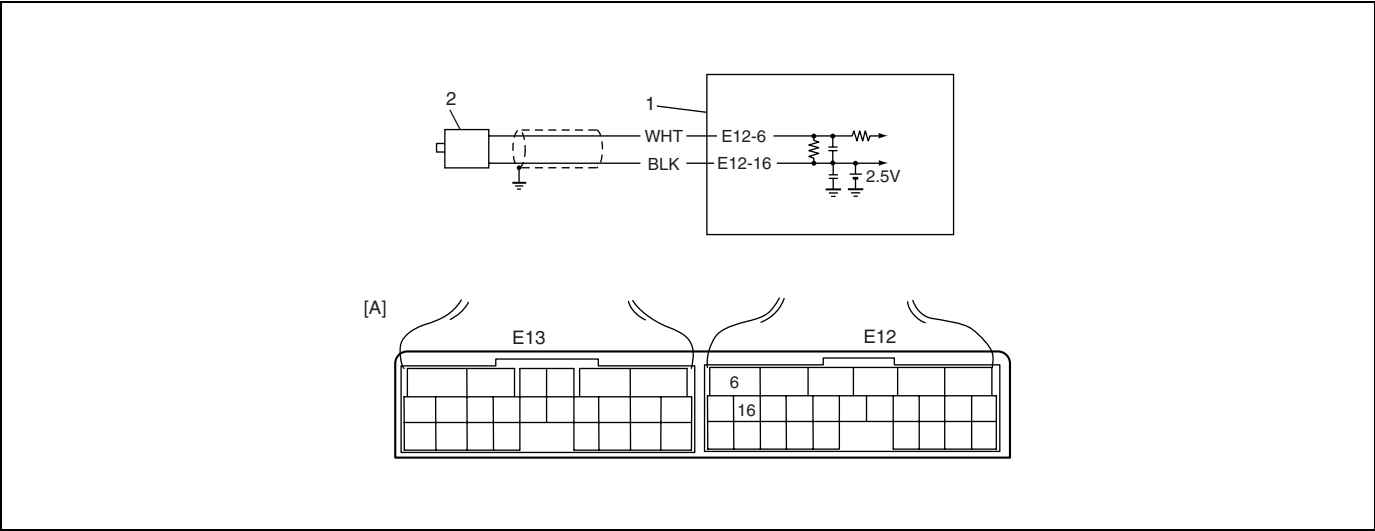
- 1) Connect scan tool to DLC with ignition switch OFF if available.
- 2) Clear DTC in TCM memory and start engine.
- 3) Start vehicle and increase vehicle speed to about 40 km/h (25 mile/h) for 20 minutes or more.
- 4) Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Transmission Fluid Temperature Circuit for Open. 1) Turn ignition switch OFF. 2) Disconnect TCM connectors from TCM. 3) Check for proper connection to transmission fluid temperature sensor at terminals E13-11 and E13-12. 4) If OK, check continuity between terminals E13-11 and E13-12 of disconnected harness side TCM connector. Is continuity indicated?	Go to Step 3.	"BLU/RED" or "GRN/RED" circuit open.
3	Check Transmission Fluid Temperature Circuit for IG Short. 1) Cool down A/T fluid temperature under ambient temperature. 2) Connect TCM connectors to TCM with ignition switch OFF. 3) Turn ignition switch ON. 4) Measure voltage between terminal E13-11 of TCM connector and ground. Is it 4.6 V or more?	"GRN" circuit shorted to power circuit. If circuit is OK, go to Step 4.	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.
4	Inspect Transmission Fluid Temperature Sensor. Inspect transmission temperature sensor referring to "Transmission Fluid Temperature Sensor" in this section. Is result satisfactory?	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	Replace transmission fluid temperature sensor.

DTC P0717 Input/Turbine Speed Sensor Circuit Malfunction

Wiring Diagram



1. TCM	2. Input shaft speed sensor	[A]: Terminal arrangement of TCM connector (viewed from harness side)
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DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
No input shaft speed sensor signal is detected although output shaft speed sensor signals are detected.	<ul style="list-style-type: none">Input shaft speed sensor or its circuit malfunction.Improper input shaft speed sensor installation.Damaged direct clutch drum.Foreign material attachment to sensor or drum.TCM

DTC Confirmation Procedure

WARNING:

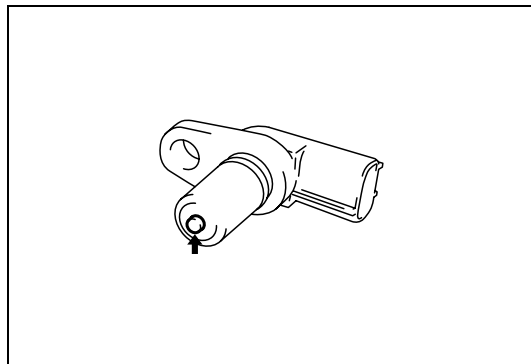
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- Connect scan tool to DLC with ignition switch OFF if available.
- Clear DTC in TCM memory and start engine.
- Shift selector lever to “D” range and drive vehicle at 50 km/h (31 mile/h) or more with 3rd gear at least for 5 minutes.
- Stop vehicle and check DTC.

Troubleshooting

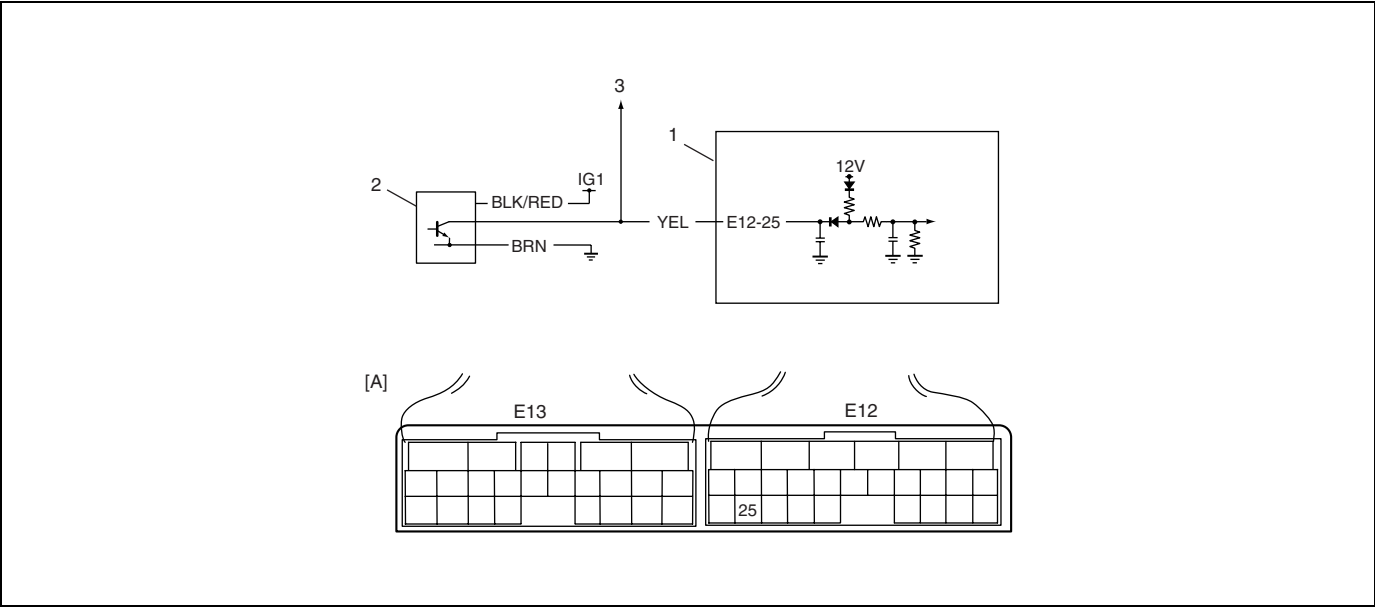
Step	Action	Yes	No
1	Was "A/T System Check" performed?	Go to Step 2.	Go to "A/T System Check" in this section.
2	Check Input Shaft Speed Sensor Circuit. 1) Disconnect TCM connectors with ignition switch OFF. 2) Check for proper connection to input shaft speed sensor at E12-6 and E12-16 terminals. 3) If OK, check resistance of sensor circuit. Resistance between terminals E12-6 and E12-16 of disconnected harness side TCM connector: 560 – 680 Ω at 20°C (68°F) Continuity between terminal E12-6/E12-16 of disconnected harness side TCM connector and ground: No continuity Are check result satisfactory?	Go to Step 4.	Go to Step 3.
3	Inspect Input Shaft Speed Sensor. Inspect input shaft speed sensor referring to "Input Shaft Speed Sensor Inspection". Is result satisfactory?	"WHT" or "BLK" circuit open or short.	Replace input shaft speed sensor.
4	Check visually input shaft speed sensor and direct clutch drum for the followings. See Fig. <ul style="list-style-type: none"> No damage No foreign material attached Correct installation Are they in good condition?	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	Clean, repair or replace.

Fig. for Step 4



DTC P0722 Output Speed Sensor (VSS) Circuit No Signal

Wiring Diagram



1. TCM	2. Output shaft speed sensor (VSS)	3. To ECM	[A]: Terminal arrangement of TCM connector (viewed from harness side)
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DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
No output shaft speed sensor signal is detected although input shaft speed sensor signals are detected while vehicle is running at 5 km/h (3 mile/h) or more vehicle speed with “D”, “2” or “L” range.	<ul style="list-style-type: none">• Output shaft speed sensor or its circuit malfunction.• Damaged sensor gear (driven gear).• Damaged output shaft speed sensor (VSS) drive gear.• TCM

DTC Confirmation Procedure

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF if available.
- 2) Clear DTC in TCM memory and start engine.
- 3) Shift selector lever to “D” range and drive vehicle at 50 km/h (31 mile/h) or more vehicle speed at least for 3 minutes.
- 4) Stop vehicle check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" in this section performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Output Shaft Speed Sensor (VSS) Power Circuit. 1) Turn ignition switch OFF. 2) Disconnect output shaft speed sensor connector. 3) Turn ignition switch ON. 4) Measure voltage between "BLK/RED" wire terminal of disconnected output shaft speed sensor harness side connector and ground. Is it 10 – 14 V?	Go to Step 3.	"BLK/RED" wire open or shorted to ground.
3	Check Output Shaft Speed Sensor (VSS) Ground Circuit. 1) Turn ignition switch OFF. 2) Check continuity between "BRN" wire terminal of disconnected output shaft speed sensor harness side connector and ground. Is continuity indicated?	Go to Step 4.	"BRN" wire open.
4	Check Output Shaft Speed Sensor (VSS) Signal Circuit for short. 1) Disconnect TCM connectors. 2) Check continuity between "YEL" wire terminal of disconnected output shaft speed sensor harness side connector and ground. Is continuity indicated?	"YEL" wire shorted to ground.	Go to Step 5.
5	Check Output Shaft Speed Sensor (VSS) Signal Circuit for open. 1) Check continuity between "YEL" wire terminal of disconnected output shaft speed sensor harness side connector and terminal E12-25 of disconnected harness side TCM connector. Is continuity indicated?	Go to Step 6.	"YEL" wire open.
6	Inspect Output Shaft Speed Sensor (VSS). Inspect output shaft speed sensor referring to "Output Shaft Speed Sensor (VSS) Inspection" in this section. Is check result satisfactory?	Go to Step 7.	Replace output shaft speed sensor.

Step	Action	Yes	No
7	<p>Check Output Shaft Speed Sensor (VSS) Gears Visually.</p> <p>Check output shaft speed sensor gears for the followings.</p> <ul style="list-style-type: none"> • No damage in drive gear on differential case • No damage in driven gear in output shaft speed sensor <p>Is result satisfactory?</p>	<p>Intermittent trouble or Faulty TCM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p> <p>If OK, substitute a known-good TCM and recheck.</p>	<p>Replace drive gear and/or driven gear of output shaft speed sensor.</p>

DTC P0741/P0742 TCC Circuit Performance or Stuck OFF/TCC Circuit Stuck ON

DTC Detecting Condition and Trouble Area

[DTC P0741]

DTC DETECTING CONDITION	TROUBLE AREA
When driving vehicle with 3rd or 4th gear in "D" range, difference in revolution between engine and A/T input (input shaft speed) is larger than specification although TCM commanded TCC solenoid to turn ON.	<ul style="list-style-type: none"> • Mechanical malfunction of TCC solenoid valve. • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Torque converter clutch malfunction.

[DTC P0742]

DTC DETECTING CONDITION	TROUBLE AREA
When driving vehicle with 2nd, 3rd or 4th gear in "D" range, difference in revolution between engine and A/T input (input shaft speed) is smaller than specification although TCM commanded TCC solenoid to turn OFF.	<ul style="list-style-type: none"> • Mechanical malfunction of TCC solenoid valve. • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Torque converter clutch malfunction.

DTC Confirmation Procedure

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTC in TCM memory.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Shift select lever to "N" and "D" range for each 10 seconds.
- 5) Drive vehicle with 4th in "D" range and lock-up ON for 20 seconds or longer referring to "Automatic Gear Shift Diagram" in this section.
- 6) Turn O/D OFF switch ON keeping on driving in "D" range. (Confirm "O/D OFF" lamp lights.)
- 7) Drive vehicle with 2nd or 3rd gear in "D" range, 15 – 20% throttle opening and at vehicle speed of 25 – 40 km/h (16 – 25 mile/h).
- 8) Stop vehicle and turn ignition switch OFF.
- 9) Repeat Step 3) to 7) one time.
- 10) Stop vehicle and check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check TCC solenoid valve for operation referring to "Shift Solenoid Valves, TCC solenoid valve and Timing solenoid valve Inspection" in this section. Are they in good condition?	Clean fluid passage or replace valve body assembly.	Replace TCC solenoid valve.

DTC P0751/P0752/P0756/P0757 Shift Solenoid-A (No.1) Performance or Stuck OFF/Shift Solenoid-A (No.1) Stuck ON/Shift Solenoid-B (No.2) Performance or Stuck OFF/Shift Solenoid-B (No.2) Stuck ON

DTC Detecting Condition and Trouble Area

[DTC P0751]

DTC DETECTING CONDITION	TROUBLE AREA
3rd gear ratio is detected although TCM command is for 2nd gear while vehicle running at 15 km/h (10 mile/h) or more in "D" range after engine being warmed up.	<ul style="list-style-type: none"> • Mechanical malfunction of shift solenoid valve-A (No.1). • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Mechanical malfunction of automatic transaxle (clutch, brake or gear etc.).

[DTC P0752]

DTC DETECTING CONDITION	TROUBLE AREA
2nd gear ratio is detected although TCM command is for 3rd gear while vehicle running at 15 km/h (10 mile/h) or more in "D" range after engine being warmed up.	<ul style="list-style-type: none"> • Mechanical malfunction of shift solenoid valve-A (No.1). • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Mechanical malfunction of automatic transaxle (clutch, brake or gear etc.).

[DTC P0756]

DTC DETECTING CONDITION	TROUBLE AREA
3rd gear ratio is detected although TCM command is for 4th gear while vehicle running at 15 km/h (10 mile/h) or more in "D" range after engine being warmed up.	<ul style="list-style-type: none"> • Mechanical malfunction of shift solenoid valve-B (No.2). • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Mechanical malfunction of automatic transaxle (clutch, brake or gear etc.).

[DTC P0757]

DTC DETECTING CONDITION	TROUBLE AREA
4th gear ratio is detected although TCM command is for 3rd gear while vehicle running at 15 km/h (10 mile/h) or more in "D" range after engine being warmed up.	<ul style="list-style-type: none"> • Mechanical malfunction of shift solenoid valve-B (No.2). • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Mechanical malfunction of automatic transaxle (clutch, brake or gear etc.).

DTC Confirmation Procedure

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

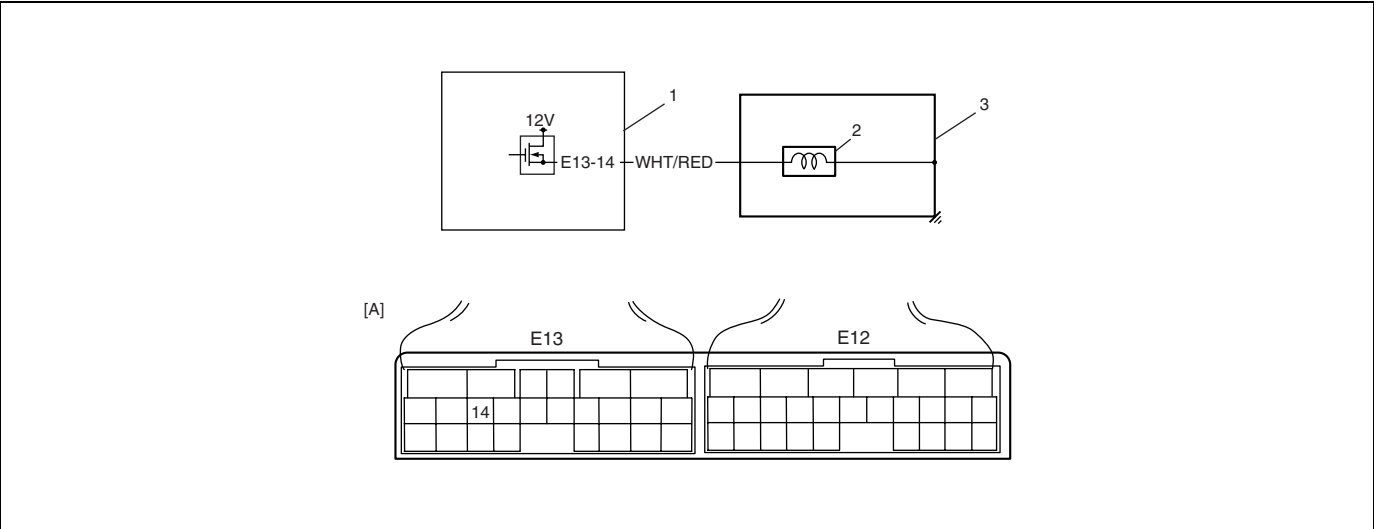
- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTC in TCM memory.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Shift select lever to "N" and "D" range for each 10 seconds.
- 5) Start vehicle and increase vehicle speed to 65 km/h (40 mile/h) with throttle position 10% or more.
- 6) Stop vehicle and turn ignition switch OFF.
- 7) Repeat Step 3) to 5) one time.
- 8) Stop vehicle and check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check shift solenoid valve-A (No.1) or -B (No.2) for operation referring to "Shift Solenoid Valves, TCC Solenoid Valve and Timing Solenoid Valve Inspection" in this section. Are they in good condition?	Clean fluid passage or replace valve body assembly.	Replace shift solenoid valve-A or -B.

DTC P0785 Timing Solenoid

Wiring Diagram



1. TCM	3. A/T
2. Timing solenoid valve	[A]: Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none">• Voltage of timing solenoid valve TCM terminal is low although TCM is commanding timing solenoid valve to turn ON. or <ul style="list-style-type: none">• Voltage of timing solenoid valve TCM terminal is high although TCM is commanding timing solenoid valve to turn OFF.	<ul style="list-style-type: none">• Timing solenoid valve circuit shorted to ground.• Timing solenoid valve circuit open or shorted to power circuit.• Timing solenoid valve malfunction.• TCM

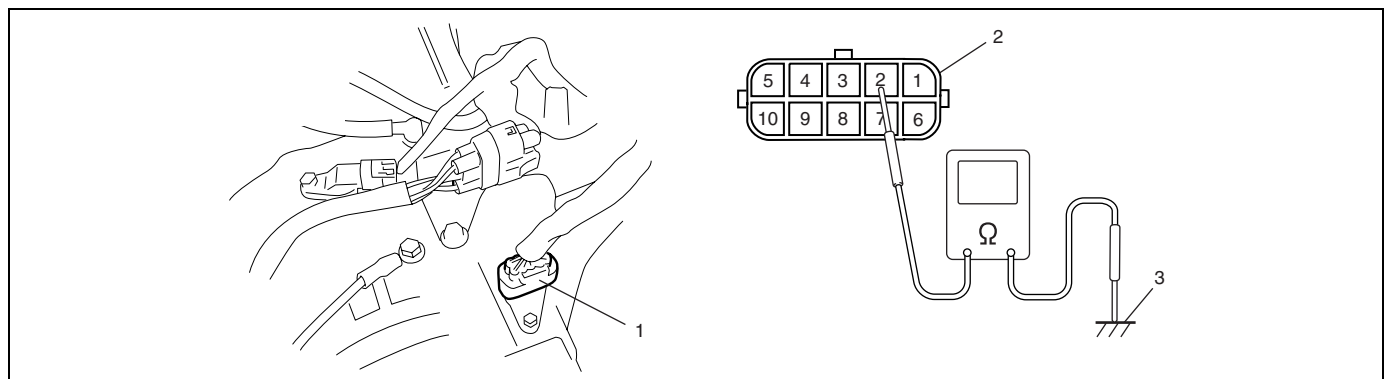
DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTC in TCM memory.
- 3) Start engine and shift selector lever to “N” range.
- 4) Repeat shifting selector lever from “N” range to “D” range and vice versa for 3 times.
- 5) Check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "A/T System Check" performed?	Go to Step 2.	Go to "A/T System Check" in this section.
2	Check Timing Solenoid Valve Circuit for IG Short or Open. 1) Turn ignition switch ON and measure voltage between terminal "E13-14" of harness side TCM connector and ground. 2) Is it 0 – 1 V?	Go to Step 3.	"WHT/RED" circuit shorted to power circuit or open.
3	Check Timing Solenoid Valve Resistance 1) Turn ignition switch OFF. 2) Disconnect valve body harness connector on transaxle. 3) Check for proper connection to solenoid valve at "WHT/RED" circuit. 4) Check resistance of solenoid valve. See Fig. Resistance between terminal of transaxle side valve body harness connector and transaxle: 11 – 15 Ω (at 20°C (68°F)) Is check result satisfactory?	Go to Step 4.	Replace timing solenoid valve or lead wire.
4	Check Timing Solenoid Valve Circuit for Ground Short. 1) Connect valve body harness connector. 2) Disconnect TCM connectors. 3) Measure resistance between terminal "E13-14" of disconnected harness side TCM connector and ground. Is it 11 – 15 Ω (at 20°C (68°F))	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	"WHT/RED" circuit shorted to ground.

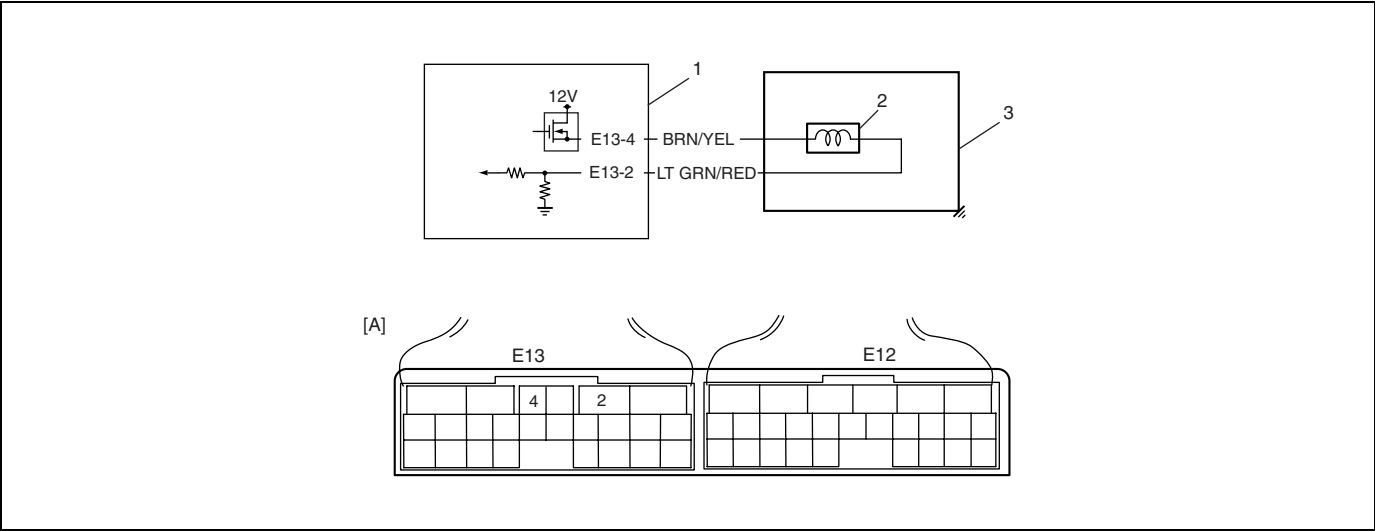
Fig. for Step 4



- | |
|--|
| 1. Valve body harness connector on harness |
| 2. Valve body harness connector on transaxle |
| 3. Ground (Transaxle) |

DTC P0962 Pressure Control Solenoid Control Circuit Low

Wiring Diagram



1. TCM	3. A/T
2. Pressure control solenoid valve	[A]: Terminal arrangement of TCM connector (Viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
Pressure control solenoid valve output voltage is too low comparing with TCM command value.	<ul style="list-style-type: none"> Pressure control solenoid valve circuit open or shorted to ground. Malfunction of pressure control solenoid valve TCM

DTC Confirmation Procedure

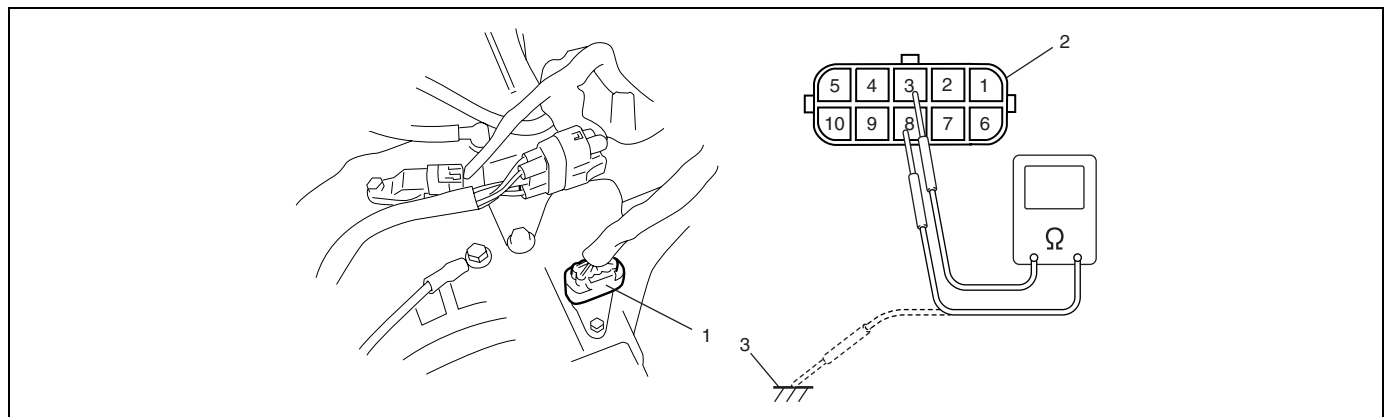
- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTC in TCM memory.
- 3) Start engine.
- 4) Keep engine running at idle speed for 30 seconds or more.
- 5) Stop vehicle and check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.

Step	Action	Yes	No
2	<p>Check pressure control solenoid valve resistance</p> <ol style="list-style-type: none"> 1) Turn ignition switch OFF 2) Disconnect valve body harness connector on automatic transmission. 3) Check for proper connection to solenoid at "BRN/YEL" and "LT GRN/RED" circuit. 4) Check resistance of pressure control solenoid. See Fig. <p>Resistance between pressure control solenoid valve terminals of transmission side valve body harness connector: $5.0 - 5.6 \Omega$ (at 20°C (68°F))</p> <p>Resistance between pressure control solenoid valve terminals of transmission side valve body harness connector and transmission body: Infinity</p> <p>Is check results satisfactory?</p>	Go to Step 3.	Replace pressure control solenoid valve or valve body harness.
3	<p>Check pressure control solenoid valve circuit for ground short</p> <ol style="list-style-type: none"> 1) Connect valve body harness connector. 2) Disconnect TCM connectors. 3) Check for proper connection to TCM at terminals "E13-2" and "E13-4". <p>If connection is OK, check continuity between terminal "E13-4" of disconnected harness side TCM connector and ground.</p> <p>Is continuity indicated?</p>	"BRN/YEL" or "LT GRN/RED" circuit shorted to ground.	Go to Step 4.
4	<p>Check pressure control solenoid valve circuit for open</p> <ol style="list-style-type: none"> 1) Check resistance between terminals "E13-2" and "E13-4" of disconnected harness side TCM connector. <p>Is it infinity?</p>	"BRN/YEL" or "LT GRN/RED" circuit open.	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck

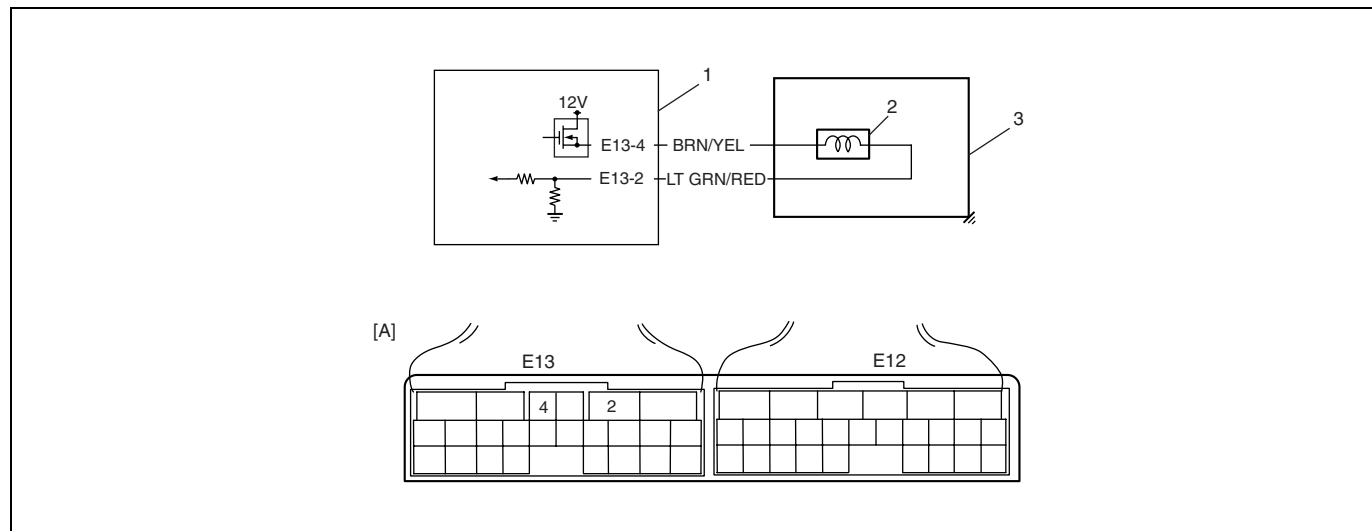
Fig. for Step 2.



1. Valve body harness connector on harness

2. Valve body harness connector on transaxle

3. Ground (transaxle)

DTC P0963 Pressure Control Solenoid Control Circuit High**Wiring Diagram**

1. TCM	3. A/T
2. Pressure control solenoid valve	[A]: Terminal arrangement of TCM connector (Viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
Pressure control solenoid valve output voltage is too high comparing with TCM command value.	<ul style="list-style-type: none"> Pressure control solenoid valve circuit shorted to power circuit. Pressure control solenoid valve malfunction TCM

DTC Confirmation Procedure

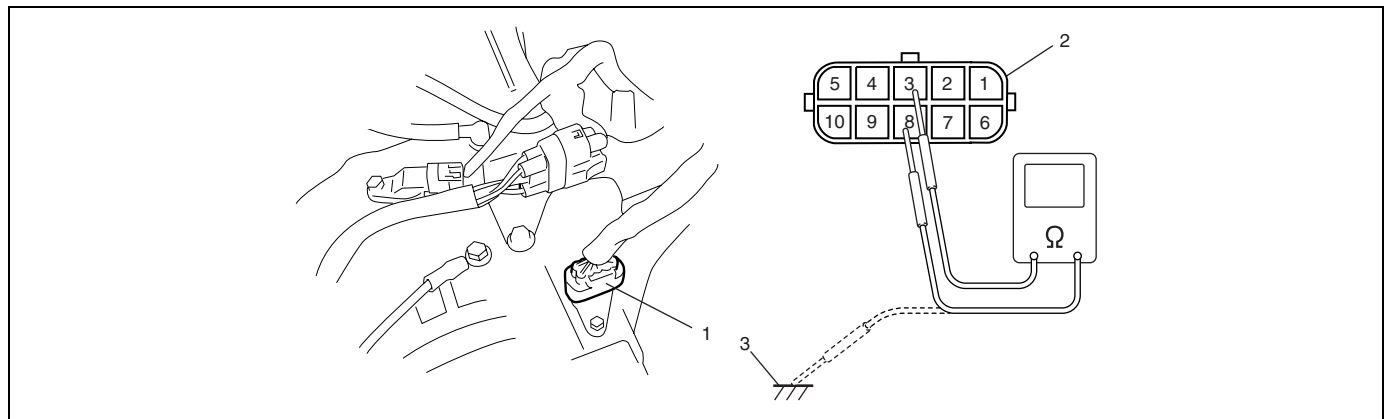
- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTC in TCM memory.
- 3) Start engine.
- 4) Keep engine running at idle speed for 10 seconds or more.
- 5) Check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check pressure control solenoid circuit for IG short <ol style="list-style-type: none"> 1) Connect valve body harness connector. 2) Disconnect TCM connectors. 3) Check for proper connection to TCM at terminal "E13-2" and "E13-4". 4) If connection is OK, turn ignition switch ON and measure voltage between terminal "E13-4" of disconnected harness side TCM connector and ground. Is it 0 – 2 V?	Go to Step 3.	"BRN/YEL" or "LT GRN/RED" circuit shorted to power circuit.

Step	Action	Yes	No
3	<p>Check pressure control solenoid valve resistance</p> <p>1) Turn ignition switch OFF</p> <p>2) Disconnect valve body harness connector on automatic transmission.</p> <p>3) Check for proper connection to solenoid at "BRN/YEL" and "LT GRN/RED" circuit.</p> <p>4) Check resistance of pressure control solenoid. See Fig.</p> <p>Resistance between pressure control solenoid valve terminals of transmission side valve body harness connector:</p> <p>5.0 – 5.6 Ω (at 20°C (68°F))</p> <p>Resistance between pressure control solenoid valve terminals of transmission side valve body harness connector and transmission body:</p> <p>Infinity</p> <p>Is check results satisfactory?</p>	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	Replace pressure control solenoid valve or valve body harness.

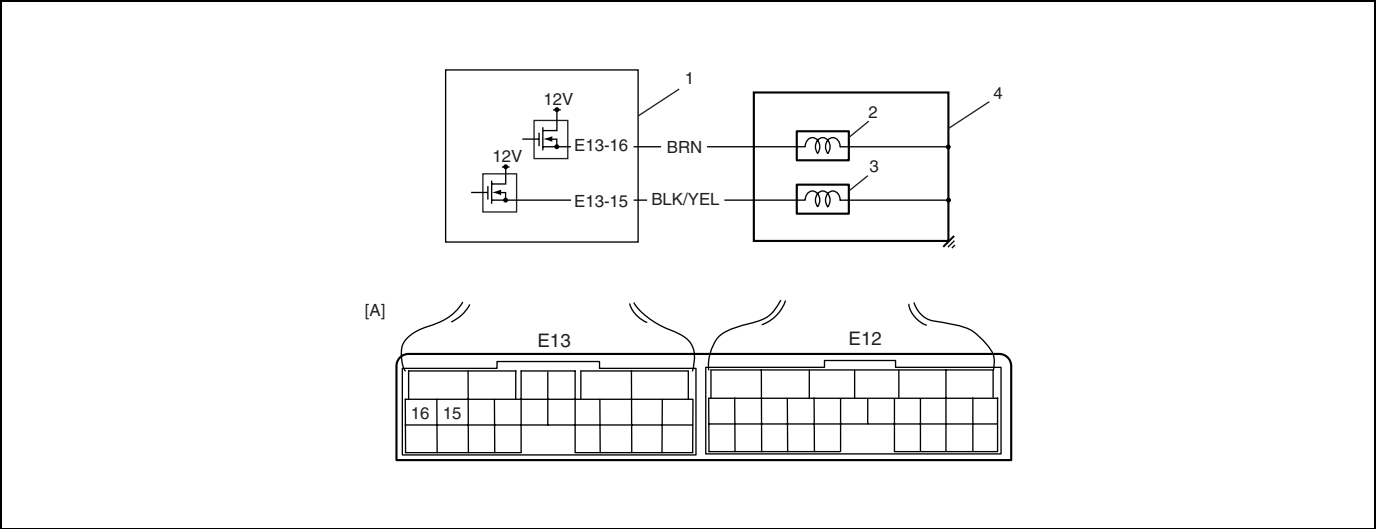
Fig. for Step 3.



1. Valve body harness connector on harness
2. Valve body harness connector on transaxle
3. Ground (transaxle)

DTC P0974/P0977 Shift Solenoid-A (No.1) Control Circuit High/Shift Solenoid-B (No.2) Control Circuit High

Wiring Diagram



1. TCM	3. Shift solenoid valve-B (No.2)	[A]: Terminal arrangement of TCM connector (Viewed from harness side)
2. Shift solenoid valve-A (No.1)	4. A/T	

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
Voltage of shift solenoid valve TCM terminal is high although TCM is commanding shift solenoid to turn OFF	<ul style="list-style-type: none"> Shift solenoid valve circuit open or shorted to power circuit. Malfunction of shift solenoid valve TCM

DTC Confirmation Procedure

WARNING:

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

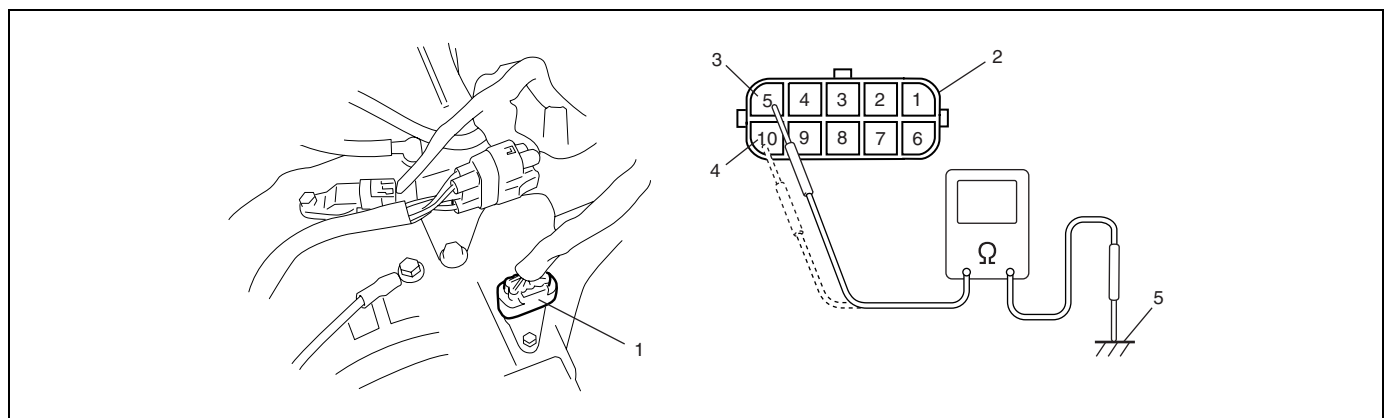
- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTC in TCM memory.
- 3) Start engine shift select lever to “D” range.
- 4) Start vehicle and increase vehicle speed until gear position reaches 3rd or 4th gear.
- 5) Decrease vehicle speed and stop vehicle.
- 6) Check DTC.

DTC Troubleshooting

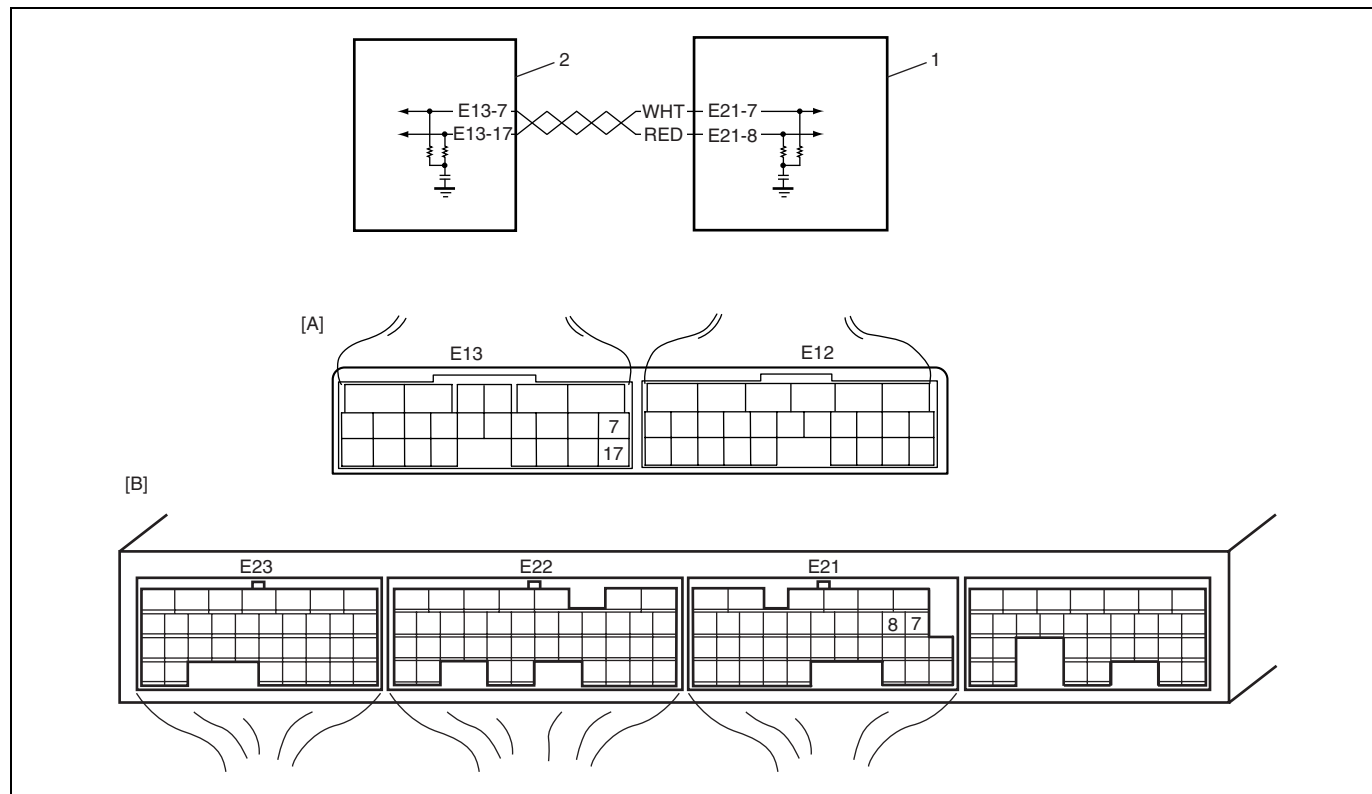
Step	Action	Yes	No
1	Was “Automatic Transaxle Diagnostic Flow Table” performed?	Go to Step 2.	Go to “Automatic Transaxle Diagnostic Flow Table” in this section.

Step	Action	Yes	No
2	<p>Check shift solenoid valve circuit for IG short</p> <ol style="list-style-type: none"> 1) Connect valve body harness connector. 2) Disconnect TCM connectors. 3) Check for proper connection to TCM at terminal "E13-16" (for shift solenoid valve-A (No.1)) or "E13-15" (for shift solenoid valve-B (No.2)). 4) If connection is OK, turn ignition switch ON and measure voltage between terminal "E13-16" (for shift solenoid valve-A (No.1)) or "E13-15" (for shift solenoid valve-B (No.2)) of disconnected harness side TCM connector and ground. <p>Is it 0 – 2 V?</p>	Go to Step 3.	<p>DTC P0974: "BRN" circuit shorted to power circuit.</p> <p>DTC P0977: "BLK/YEL" circuit shorted to power circuit.</p>
3	<p>Check shift solenoid valve resistance</p> <ol style="list-style-type: none"> 1) Turn ignition switch OFF. 2) Disconnect valve body harness connector on automatic transmission. 3) Check for proper connection to solenoid at "BRN" (for shift solenoid valve-A (No.1)) or "BLK/YEL" (for shift solenoid valve-B (No.2)) circuit. <p>Check resistance of solenoid valve. See Fig.</p> <p>Resistance between shift solenoid valve-A (No.1) terminal and transaxle: 11 – 15 Ω at 20°C? (68°F)</p> <p>Resistance between shift solenoid valve-B (No.2) terminal and transaxle: 11 – 15 Ω at 20°C? (68°F)</p> <p>Is check results satisfactory?</p>	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	Replace applicable shift solenoid valve or valve body harness.

Fig. for Step 3.



1. Valve body harness connector on harness
2. Valve body harness connector on transaxle
3. Shift solenoid valve-A (No.1) terminal
4. Shift solenoid valve-B (No.2) terminal
5. Ground (transaxle)

DTC P1701 CAN Communication Error**Wiring Diagram**

1. ECM	[A]: Terminal arrangement of TCM connector (Viewed from harness side)
2. TCM	[B]: Terminal arrangement of ECM connector (Viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
Transmission or reception error of communication data is detected by TCM for specified time continuously.	<ul style="list-style-type: none"> • “RED” or “WHT” wire circuit open or short • TCM • ECM

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTC in TCM memory.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	Was “Automatic Transaxle Diagnostic Flow Table” performed?	Go to Step 2.	Go to “Automatic Transaxle Diagnostic Flow Table” in this section.

Step	Action	Yes	No
2	<p>Check CAN communication circuit for open.</p> <p>1) Turn ignition switch to OFF position.</p> <p>2) Disconnect connectors from ECM and TCM.</p> <p>3) Check for proper connection to "E21-7" terminal of ECM connector and "E13-7" terminal of TCM connector.</p> <p>If OK, measure resistance between "E21-7" terminal of ECM connector and "E13-7" terminal of TCM connector.</p> <p>Is resistance 1 Ω or less?</p>	Go to Step 3.	"RED" wire circuit open or high resistance.
3	<p>Check CAN communication circuit for power short.</p> <p>1) Turn ignition switch to ON position.</p> <p>2) Measure voltage between "E13-7" terminal of TCM connector and vehicle body ground.</p> <p>Is voltage 0 – 1 V?</p>	Go to Step 4.	"RED" wire circuit shorted to power circuit.
4	<p>Check CAN communication circuit for ground short.</p> <p>1) Turn ignition switch to OFF position.</p> <p>2) Measure resistance between "E21-7" terminal of ECM connector and vehicle body ground.</p> <p>Is it infinite?</p>	Go to Step 5.	"RED" wire circuit shorted to ground.
5	<p>Check CAN communication circuit for open.</p> <p>1) Turn ignition switch to OFF position.</p> <p>2) Disconnect connectors from ECM and TCM.</p> <p>3) Check for proper connection to "E21-8" terminal of ECM connector and "E13-17" terminal of TCM connector.</p> <p>4) If OK, measure resistance between "E21-8" terminal of ECM connector and "E13-17" terminal of TCM connector</p> <p>Is resistance 1 Ω or less?</p>	Go to Step 6.	"WHT" wire circuit open or high resistance.
6	<p>Check CAN communication circuit for power short.</p> <p>1) Turn ignition switch to ON position.</p> <p>2) Measure voltage between "E13-17" terminal of TCM connector and vehicle body ground.</p> <p>Is voltage 0 – 1 V?</p>	Go to Step 7.	"WHT" wire circuit shorted to power circuit.
7	<p>Check CAN communication circuit for ground short.</p> <p>1) Turn ignition switch to OFF position.</p> <p>2) Measure resistance between "E13-17" terminal of ECM connector and vehicle body ground.</p> <p>Is it infinite?</p>	<p>Substitute a known-good TCM and recheck.</p> <p>If OK, substitute a known-good ECM and recheck.</p>	"WHT" wire circuit shorted to ground.

DTC P1702 Internal Control Module Memory Check Sum Error**DTC Detecting Condition and Trouble Area**

DTC DETECTING CONDITION	TROUBLE AREA
Calculation of current data stored in TCM is not correct comparing with pre-stored checking data in TCM.	TCM

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTC in TCM memory.
- 3) After 10 seconds passed from turning ignition switch ON, check DTC.

Troubleshooting

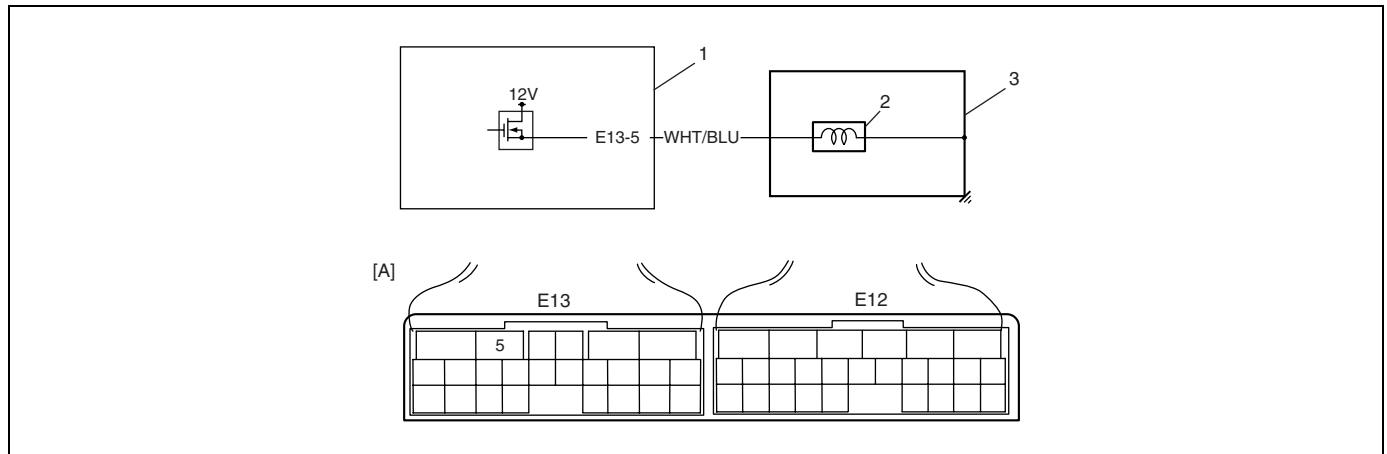
Step	Action	Yes	No
1	Is DTC P1702 detected after performing "DTC Confirmation Procedure"?	Faulty TCM. Replace TCM.	Could be a temporary malfunction of TCM.

DTC P1703 CAN Invalid Data-TCM**DTC Detecting Condition and Trouble Area**

When abnormality either on the gear shift control signal from ECM is detected by TCM, TCM sets DTC P1703.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	DTC check. Check DTC of ECM referring to "DTC check" in section 6. Is there any DTC (s)?	Go to applicable DTC diag. flow.	Substitute a known-good TCM and recheck. If OK, substitute a known-good ECM and recheck.

DTC P2769 Torque Converter Clutch (TCC) Circuit Low**Wiring Diagram**

1. TCC solenoid valve

2. TCM

3. A/T

[A]: Terminal arrangement of TCM connector (Viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
Voltage of TCC solenoid valve TCM terminal is low although TCM is commanding TCC solenoid to turn ON	<ul style="list-style-type: none"> TCC solenoid valve circuit shorted to ground. Malfunction of TCC solenoid valve TCM

DTC Confirmation Procedure**WARNING:**

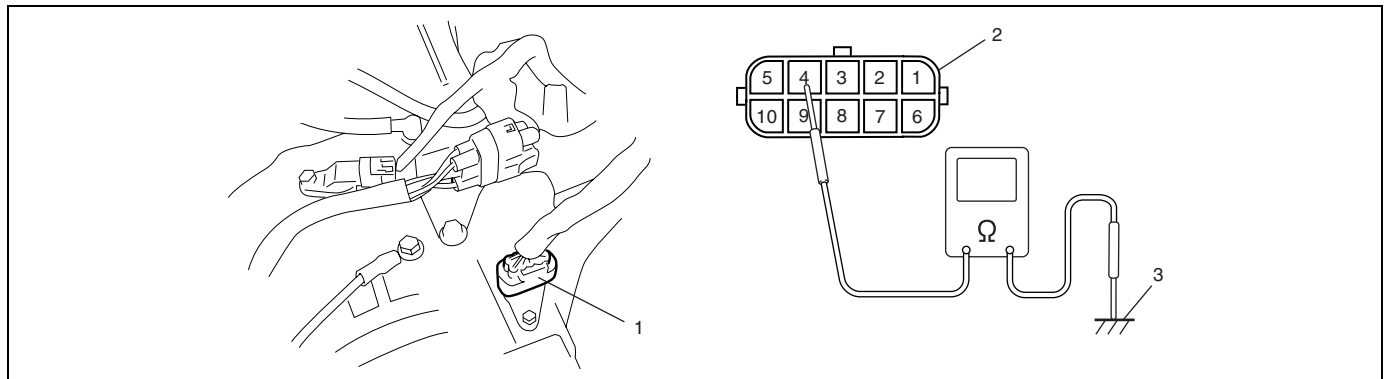
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTCs in TCM memory.
- 3) Start engine.
- 4) Keep engine running at idle speed in "P" range for 20 seconds or more.
- 5) Check DTC.

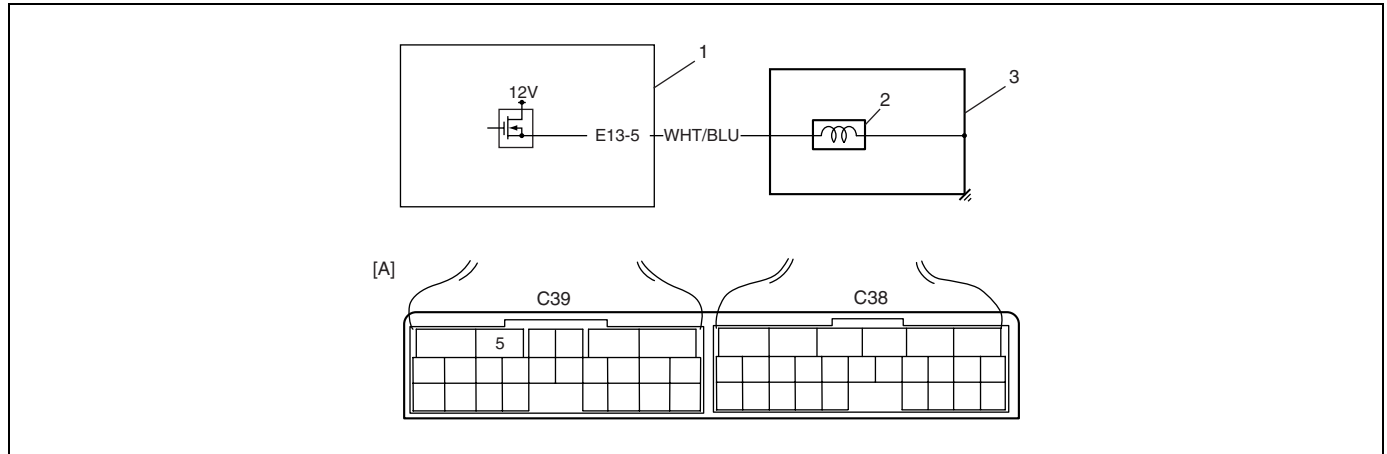
DTC Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check TCC solenoid valve resistance 1) Turn ignition switch OFF 2) Disconnect valve body harness connector on automatic transmission. 3) Check for proper connection to solenoid at "WHT/BLU" circuit. 4) Check resistance of solenoid valve. See Fig. Resistance between TCC solenoid valve terminals of transmission side valve body harness connector: 11 – 15 Ω at 20°C (68°F) Resistance between TCC solenoid valve terminals of transmission side valve body harness connector and transmission body: Infinity Is check results satisfactory?	Go to Step 3.	Replace TCC solenoid valve or lead wire.
3	Check TCC solenoid valve circuit for ground short 1) Disconnect TCM connectors. 2) Check for proper connection to TCM at terminals "E13-5". 3) If connection is OK, check continuity between terminal "E13-5" of disconnected harness side TCM connector and ground. Is continuity indicated?	"WHT/BLU" circuit shorted to ground.	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.

Fig. for Step 3.



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|--|
| 1. Valve body harness connector on harness |
| 2. Valve body harness connector on transaxle |
| 3. Ground (transaxle) |

DTC P2770 Torque Converter Clutch (TCC) Circuit High**Wiring Diagram**

1. TCC solenoid valve

2. TCM

3. A/T

[A]: Terminal arrangement of TCM connector (Viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
Voltage of TCC solenoid valve TCM terminal is high although TCM is commanding TCC solenoid to turn OFF	<ul style="list-style-type: none"> TCC solenoid valve circuit shorted to ground. Malfunction of TCC solenoid valve TCM

DTC Confirmation Procedure**WARNING:**

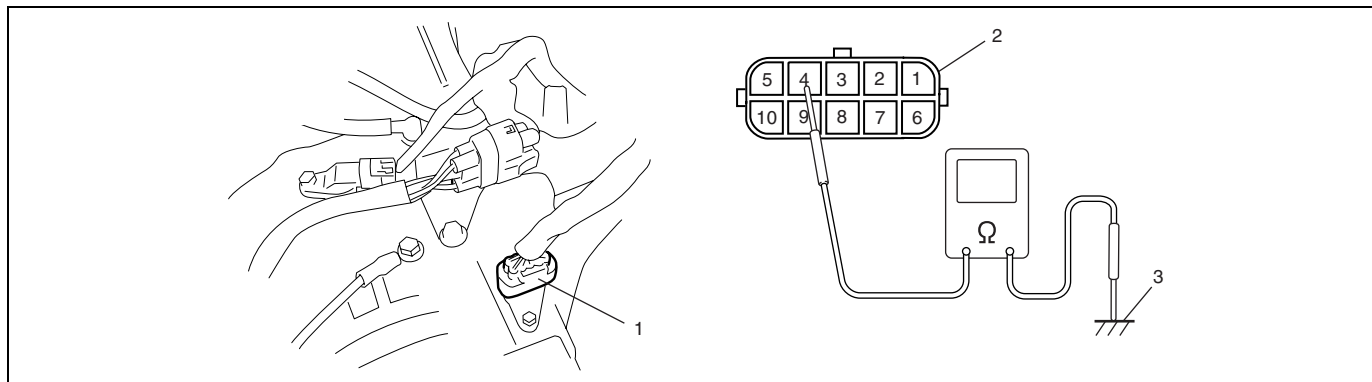
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF, if available.
- 2) Clear DTCs in TCM memory.
- 3) Start engine.
- 4) Keep engine running at idle speed in "P" range for 10 seconds or more.
- 5) Check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check TCC solenoid valve circuit for IG short 1) Connect valve body harness connector. 2) Disconnect TCM connectors. 3) Check for proper connection to TCM at terminal "E13-5". 4) If connection is OK, turn ignition switch ON and measure voltage between terminal "E13-5" of disconnected harness side TCM connector and ground. Is it 0 – 2 V?	Go to Step3.	"WHT/BLU" circuit shorted to power circuit.
3	Check TCC solenoid valve resistance 1) Turn ignition switch OFF 2) Disconnect valve body harness connector on automatic transmission. 3) Check for proper connection to solenoid at "WHT/BLU" circuit. 4) Check resistance of solenoid valve. See Fig. Resistance between TCC solenoid valve terminals of transmission side valve body harness connector: 11 – 15 Ω at 20°C (68°F) Resistance between TCC solenoid valve terminals of transmission side valve body harness connector and transmission body: Infinity Is check results satisfactory?	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	Replace TCC solenoid valve or lead wire.

Fig. for Step 3.



- | |
|--|
| 1. Valve body harness connector on harness |
| 2. Valve body harness connector on transaxle |
| 3. Ground (transaxle) |

Scan Tool Data

As the data values given below are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference values. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.

Also, condition in the below table that can be checked by the scan tool are those detected by TCM and output from TCM as commands and there may be cases where the automatic transaxle or actuator is not operating (in the condition) as indicated by the scan tool.

NOTE:

The following scan tool data related to automatic transaxle can be checked only by communicating with TCM.

SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/REFERENCE VALUES
GEAR POSITION	Ignition switch ON	Selector lever is in "P" position	P or N
		Selector lever is in "R" position	R
		Selector lever is in "N" position	P or N
		Selector lever is in "D" position	1
		Selector lever is in "2" position	1
		Selector lever is in "L" position	1
ENGINE SPEED	At engine idle speed		Engine idle speed is displayed
INPUT SHAFT REVOLUTION	Ignition switch ON and engine stop		0 RPM
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear ("D" range)		2,600 RPM (displayed in increments of 50 rpm)
OUTPUT SHAFT REVOLUTION	At vehicle stop		0 RPM
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		2,600 RPM (displayed in increments of 50 rpm)
BATTERY VOLT-AGE	Ignition switch ON and engine stop		Battery voltage is displayed (8 – 16 V)
ATF TEMPERATURE	After driving at 60 km/h (37.5 mile/h) for 15 minutes or more, and A/T fluid temperature around sensor reaches 70 – 80°C (158 – 176°F)		70 – 80°C, 158 – 176°F
SHIFT SOLENOID-A COMMAND	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
SHIFT SOLENOID-A MONITOR	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
SHIFT SOLENOID-B COMMAND	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
SHIFT SOLENOID-B MONITOR	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
TIMING SOLENOID COMMAND	Ignition switch ON and selector lever is in "N" range		OFF
	For about 0.5 sec. while on gear shifting between 3rd and 4th or gear shifting N to D		ON

SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/REFERENCE VALUES
TIMING SOLENOID MONITOR	Ignition switch ON and selector lever is in "N" range		OFF
	For about 0.5 sec. while on gear shifting between 3rd and 4th or gear shifting N to D		ON
TCC SOLENOID COMMAND	At 5 km/h (3 mile/h) constant speed, O/D off switch ON, closed throttle and 1st gear		OFF
	At 100 km/h (62.5 mile/h) constant speed, O/D off switch OFF, 20% or less throttle opening and 4th gear		ON
TCC SOLENOID COMMAND	At 5 km/h (3 mile/h) constant speed, O/D off switch ON, closed throttle and 1st gear		OFF
	At 100 km/h (62.5 mile/h) constant speed, O/D off switch OFF, 20% or less throttle opening and 4th gear		ON
PRESSURE CONTROL SOLENOID	At vehicle stop, closed throttle, engine idle speed and 1st gear		0%
VEHICLE SPEED	At vehicle stop		0 KM/H, 0 MPH
O/D OFF SWITCH	Ignition switch ON	O/D off switch OFF	OFF
		O/D off switch ON	ON
TRANSAXLE	Ignition switch ON	Selector lever is in "P" position	P
		Selector lever is in "R" position	R
		Selector lever is in "N" position	N
		Selector lever is in "D" position	D
		Selector lever is in "2" position	2
		Selector lever is in "L" position	L
D RANGE SIGNAL	Ignition switch ON	Selector lever is in "P" position	OFF
		Selector lever is in "R" position	ON
		Selector lever is in "N" position	OFF
		Selector lever is in "D" position	ON
		Selector lever is in "2" position	ON
		Selector lever is in "L" position	ON
THROTTLE POSITION	Ignition switch ON	Accelerator pedal is released	0%
		Accelerator pedal is depressed	0 – 100% (Varies depending on depressed value)
BRAKE SWITCH	Ignition switch ON	Brake pedal is depressed	ON
		Brake pedal is released	OFF
TORQUE REDUCTION SIGNAL	While on gear upshifting with 25% or more throttle opening		ON
	Under condition of not shifting gear		OFF
ENGINE COOLANT TEMPERATURE	Ignition switch ON		Engine coolant temperature is displayed
AIR CONDITIONER SIGNAL	Ignition switch ON and air conditioner switch OFF		OFF
ENGINE TORQUE SIGNAL	Ignition switch ON and engine stop		0 N·m

SCAN TOOL DATA DEFINITIONS:**GEAR POSITION**

Current gear position computed by throttle position coming from ECM and vehicle speed.

ENGINE SPEED (RPM)

Engine speed computed by reference pulses from crankshaft position sensor.

INPUT SHAFT REVOLUTION (RPM)

Input shaft revolution computed by reference pulses coming from input shaft speed sensor on transaxle case.

OUTPUT SHAFT REVOLUTION (RPM)

Output shaft revolution computed by reference pulses coming from output shaft speed sensor (VSS) on transaxle case.

BATTERY VOLTAGE (V)

Battery voltage read by TCM as analog input signal by TCM.

ATF TEMPERATURE (°C, °F)

ATF temperature decided by signal from transmission fluid temperature sensor installed on valve body.

SHIFT SOLENOID-A COMMAND

ON: ON command being outputted to shift solenoid valve-A (No.1)

OFF: ON command not being outputted to shift solenoid valve-A (No.1)

SHIFT SOLENOID-A MONITOR

ON: Electricity being passed to shift solenoid valve-A (No.1)

OFF: Electricity not being passed to shift solenoid valve-A (No.1)

SHIFT SOLENOID-B COMMAND

ON: On command being outputted to shift solenoid valve-B (No.2)

OFF: ON command not being outputted to shift solenoid valve-B (No.2)

SHIFT SOLENOID-B MONITOR

ON: Electricity being passed to shift solenoid valve-B (No.2)

OFF: Electricity not being passed to shift solenoid valve-B (No.2)

TIMING SOLENOID COMMAND

ON: ON command being outputted to timing solenoid valve

OFF: ON command not being outputted to timing solenoid valve

TIMING SOLENOID MONITOR

ON: Electricity being passed to timing solenoid valve

OFF: Electricity not being passed to timing solenoid valve

TCC SOLENOID COMMAND

ON: ON command being outputted to TCC solenoid valve

OFF: ON command not being outputted to TCC shift solenoid valve

TCC SOLENOID MONITOR

ON: Electricity being passed to TCC solenoid valve

OFF: Electricity not being passed to TCC solenoid valve

PRESSURE CONTROL SOLENOID (%)

Electric current value ratio between electric current value being outputted from TCM to solenoid and maximum value can be outputted by TCM.

VEHICLE SPEED (KM/H/MPH)

Vehicle speed computed by reference pulse signals coming from vehicle speed sensor on transaxle case.

O/D OFF SWITCH

Inputted signal from O/D off switch on selector knob.

ON: O/D off switch ON

OFF: O/D off switch OFF

TRANSAXLE RANGE

Transaxle range detected by signal fed from transmission range sensor.

D RANGE SIGNAL

ON: Signal which TCM require ECM to increase idle speed

OFF: Signal which TCM does not require ECM to increase idle speed

THROTTLE POSITION (%)

Throttle opening ratio computed by duty pulse signal from ECM.

BRAKE SWITCH

Inputted signal from brake light switch on pedal bracket.

ON: Brake pedal depressed

OFF: Brake pedal released

TORQUE REDUCTION SIGNAL

ON: Signal which TCM require ECM to reduce output torque at shifting gear

OFF: Signal which TCM does not require ECM to reduce output torque

ENGINE COOLANT TEMPERATURE (°C, °F)

Engine coolant temperature computed by duty pulse signal from ECM.

AIR CONDITIONER SIGNAL

ON: Signal which inform that air conditioner compressor is turned ON.

OFF: Signal which inform that air conditioner compressor is not turned ON.

ENGINE TORQUE SIGNAL (N·m)

Engine torque computed by duty pulse signal outputted from ECM.

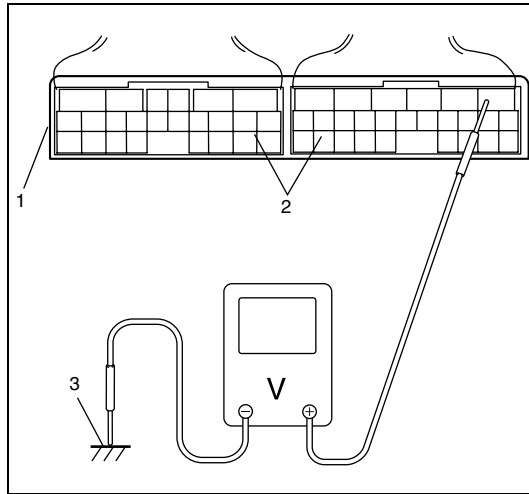
Inspection of TCM and Its Circuits

TCM and its circuits can be checked at TCM wiring connectors by measuring voltage and resistance.

CAUTION:

TCM cannot be checked by itself, it is strictly prohibited to connect voltmeter or ohmmeter to TCM with connector disconnected from it.

Inspection



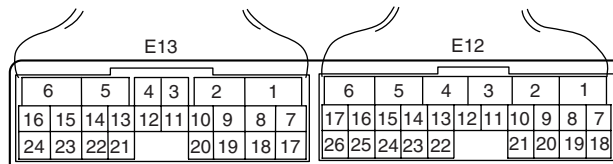
- 1) Remove TCM (1) from vehicle referring to “Transmission Control Module” in this section.
- 2) Connect TCM connectors (2) to TCM.
- 3) Check voltage at each terminal of connectors connected.

NOTE:

As each terminal voltage is affected by battery voltage, confirm that it is 11 V or more when ignition switch is ON.

3. Body ground

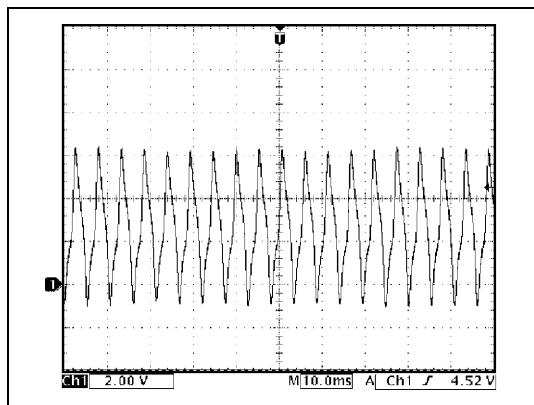
Terminal Arrangement of TCM Coupler (Viewed From Harness Side)



Con- nector	Terminal number	Wire color	Circuit	Normal Voltage	Condition
E12	1	RED	Transmission range sensor (“R” range)	8 – 14 V	Ignition switch ON, selector lever at “R” range
				0 – 1 V	Ignition switch ON, selector lever at other than “R” range
	2	—	—	—	—
	3	—	—	—	—
	4	—	—	—	—
	5	—	—	—	—

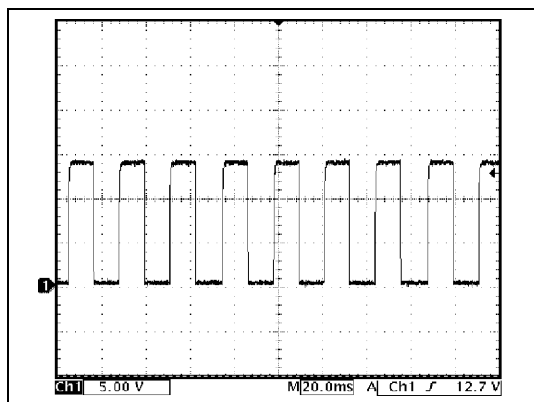
Con- nector	Terminal number	Wire color	Circuit	Normal Voltage	Condition
E12	6	WHT	Input shaft speed sensor (+)	2 – 3 V	Ignition switch turned ON, engine stops.
				(Reference waveform No.1)	While engine running. (Output signal is waveform. Waveform frequency varies depending on output shaft speed. (16 pulses are generated per 1 input shaft revolution.))
	7	GRN/RED	Transmission range sensor ("D" range)	8 – 14 V	Ignition switch ON, selector lever at "R" range
				0 – 1 V	Ignition switch ON, selector lever at other than "R" range
	8	BUL/YEL	Transmission range sensor ("N" range)	8 – 14 V	Ignition switch ON, selector lever at "N" range
				0 – 1 V	Ignition switch ON, selector lever at other than "N" range
	9	BLU/RED	O/D OFF switch	0 – 1 V	O/D OFF switch pressed
				8 – 14 V	O/D OFF switch released
	10	–	–	–	–
	11	BLU/YEL	"O/D OFF" light	0 – 1 V	Ignition switch ON (lamp turned ON)
				8 – 14 V	Ignition switch ON (lamp turned OFF)
	12	–	–	–	–
	13	–	–	–	–
	14	–	–	–	–
	15	–	–	–	–
	16	BLK	Input shaft speed sensor (–)	2 – 3 V	Ignition switch ON, engine at stop
	17	–	–	–	–
	18	GRN/BLK	Transmission range sensor ("L" range)	8 – 14 V	Ignition switch ON, selector lever at "L" range
				0 – 1 V	Ignition switch ON, selector lever at other than "L" range
	19	GRN	Transmission range sensor ("2" range)	8 – 14 V	Ignition switch ON, selector lever at "2" range
				0 – 1 V	Ignition switch ON, selector lever at other than "2" range
	20	ORN	Transmission range sensor ("P" range)	8 – 14 V	Ignition switch ON, selector lever at "P" range
				0 – 1 V	Ignition switch ON, selector lever at other than "P" range
	21	–	–	–	–
	22	–	–	–	–
	23	WHT/RED	Data link connector	8 – 14 V	Ignition switch ON
	24	–	–	–	–
	25	YEL	Output shaft speed sensor (VSS)	8 – 14 V	Ignition switch ON
				0 – 1 V ↑↓ 10 – 14 V (Reference waveform No.2)	Vehicle running. (Sensor signal is pulse. Pulse frequency varies depending on vehicle speed.)
	26	–	–	–	–

Con- nector	Terminal number	Wire color	Circuit	Normal Voltage	Condition
E13	1	BLK	Ground	0 – 1 V	Ignition switch ON
	2	LT GRN/RED	Pressure control solenoid valve (-)	0.6 – 1.0 V	Ignition switch ON
	3	–	–	–	–
	4	BRN/YEL	Pressure control solenoid valve (+)	0 – 0.6 V ↑↓ 10 – 14 V (Reference waveform No.3)	Engine running at idling. (Output signal is duty pulse. Duty ratio varies depending on throttle valve opening.)
	5	WHT/BLU	TCC solenoid valve	0 – 1 V	Engine running at idling speed.
	6	WHT/RED	Power source	10 – 14V	Ignition switch ON
	7	WHT	CAN communication line (Low)	2.5 – 3.6 V ↑↓ 1.6 – 2.5 V (Reference waveform No.4)	Engine running at idling with after warming up. (CAN communication signal is pulse. Pulse signal frequency varies depending on engine condition.)
	8	–	–	–	–
	9	–	–	–	–
	10	–	–	–	–
	11	GRN	Transmission fluid temperature sensor (+)	2.9 – 3.1 V	Ignition switch ON, fluid temperature is 20°C (68°F)
				0.3 – 0.5 V	Ignition switch ON, fluid temperature is 100°C (212°F)
	12	BLU/RED	Transmission fluid temperature sensor (-)	0 – 1 V	Ignition switch ON
	13	–	–	–	–
	14	WHT/RED	Timing solenoid valve	0 – 1 V	Ignition switch ON
	15	BLK/YEL	Shift solenoid valve-B (No.2)	9 – 14 V	Ignition switch ON, select lever in “P” range
	16	BRN	Shift solenoid valve-A (No.1)	9 – 14 V	Ignition switch ON, select lever in “P” range
	17	RED	CAN communication line (High)	2.5 – 3.6 V ↑↓ 1.6 – 2.5 V (Reference waveform No.4)	Engine running at idling with after warming up. (CAN communication signal is pulse. Pulse signal frequency varies depending on engine condition.)
	18	–	–	–	–
	19	–	–	–	–
	20	–	–	–	–
	21	–	–	–	–
	22	–	–	–	–
	23	BLK	Ground	0 – 1 V	Ignition switch ON
	24	WHT/BLU	Power source for back-up	10 – 14 V	Constantly

1. Reference waveform No.1

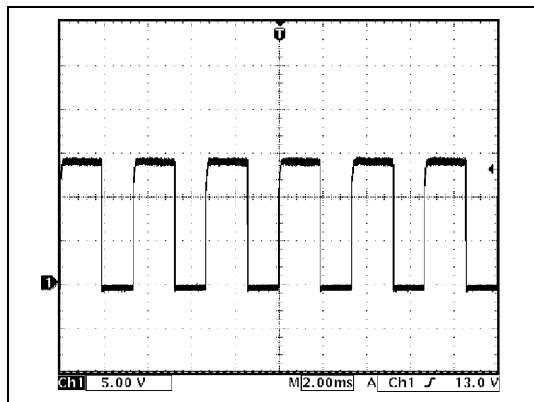
Input shaft speed sensor signal at engine idling.

Measurement terminal	CH1: E12-6 to E13-1
Oscilloscope setting	CH1: 2 V/DIV TIME: 10 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed with "P" range.

2. Reference waveform No.2

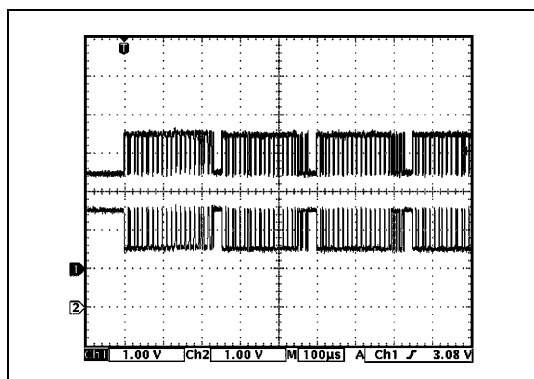
Output shaft speed sensor (VSS) signal at vehicle speed 60 km/h (37 mile/h).

Measurement terminal	CH1: E12-25 to E13-1
Oscilloscope setting	CH1: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Drive vehicle at 60 km/h (37 mile/h).

3. Reference waveform No.3

Pressure control solenoid valve signal at engine idling.

Measurement terminal	CH1: E13-4 to E13-1
Oscilloscope setting	CH1: 5 V/DIV TIME: 20 ms/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed with "P" range.

4. Reference waveform No.4

CAN communication line (High & Low) signal at engine idling

Measurement terminal	CH1: E13-7 to E13-1 CH2: E13-17 to E13-1
Oscilloscope setting	CH1: 1 V/DIV TIME: 100 μs/DIV
Measurement condition	<ul style="list-style-type: none"> After warmed up to normal operating temperature Engine at specified idle speed with "P" range.

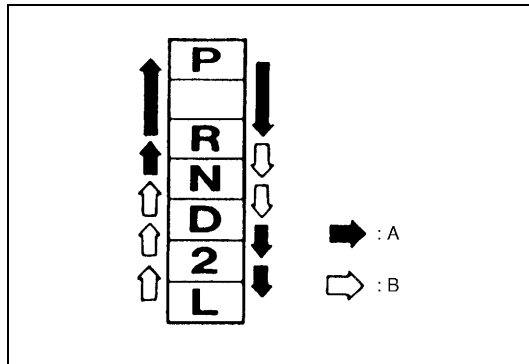
On-Vehicle Service

Maintenance Service

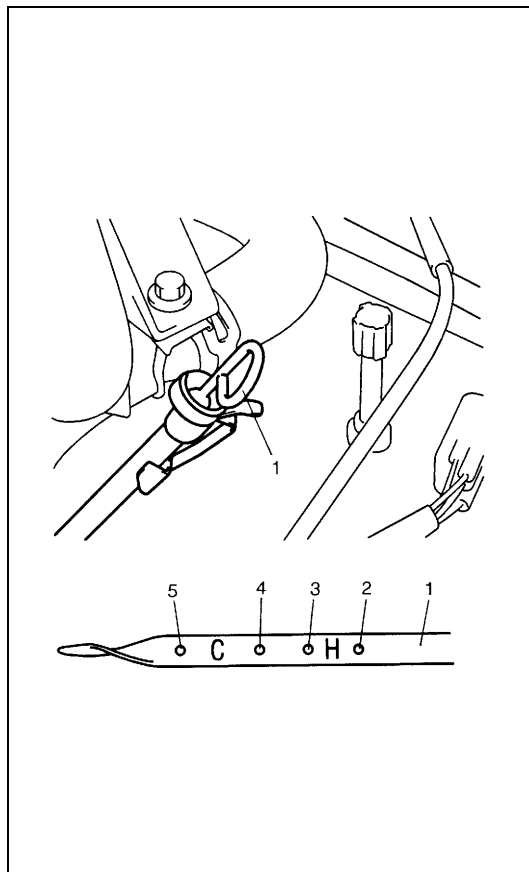
Fluid level check at normal operating (hot) temperature (Hot check)

Inspection

- 1) Stop vehicle and place it level.
- 2) Apply parking brake and place chocks against wheels.
- 3) With selector at P position, start engine.
- 4) Warm up engine till fluid temperature reaches normal operating temperature (70 – 80°C/158 – 176°F). As a guide to check fluid temperature, warm up engine to normal operating.
- 5) Keep engine idling and shift selector slowly to “L” and back to “P” position.
- 6) With engine idling, pull out fluid level gauge, wipe it off with a clean cloth and put it back into place.



- | | |
|----|--|
| A. | Shift the select lever with its button pushed in. |
| B. | Shift the select lever without pushing its button. |



- 7) Pull out fluid level gauge (1) again and check fluid level indicated on it. The lowest fluid level should be between FULL HOT and LOW HOT. If it is below LOW HOT, add an equivalent of DEXRON®-III up to FULL HOT.

Automatic transaxle fluid

An equivalent of DEXRON®-III

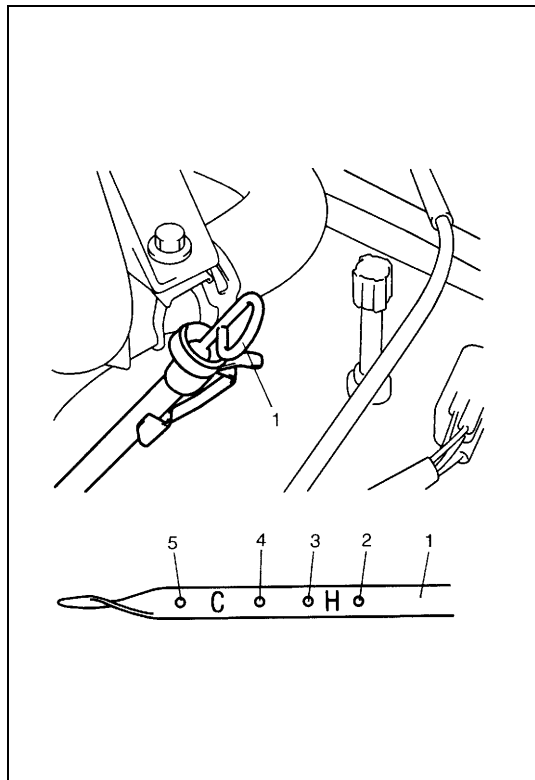
NOTE:

- Do not race engine while checking fluid level, even after the engine start.
- Do not overfill. Overfilling can cause foaming and loss of fluid through breather. Then slippage and transaxle failure can result.
- Bringing the level from LOW HOT to FULL HOT requires 0.4 liters (0.85/0.70 US/Imp. pt).
- If vehicle was driven under high load such as pulling a trailer, fluid level should be checked about half an hour after it is stopped.

- | | |
|----|------------------|
| 2. | “FULL HOT” mark |
| 3. | “LOW HOT” mark |
| 4. | “FULL COLD” mark |
| 5. | “LOW COLD” mark |

Fluid level check at room (cold) temperature (Cold check)

Inspection



Fluid level can be checked temporarily at room (cold) temperature which correspond to 20 – 30°C (68 – 86°F). This level check is considered to be preparation before performing level check under normal operating (hot) temperature. Checking procedure itself is the same as that described in “Fluid Level Check at Normal Operating (Hot) Temperature (Hot Check)”. If fluid level is between FULL COLD and LOW COLD, proceed to test drive. And when fluid temperature has reached normal operating (hot) temperature, check fluid level again and adjust it as necessary.

CAUTION:

Fluid level check at room (cold) temperature is recommended only for preparation of level check under normal (hot) operating condition.

Failure to perform fluid level check under normal (hot) operating temperature may result in damage to transaxle.

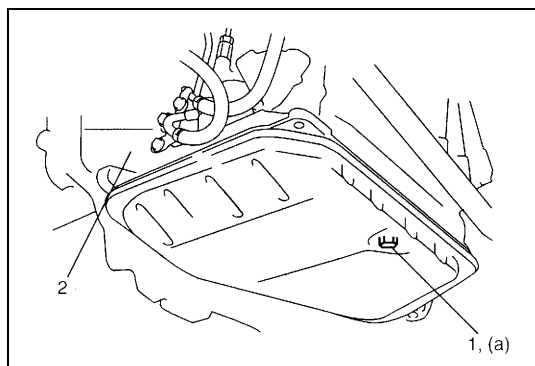
- | |
|----------------------|
| 1. Fluid level gauge |
| 2. “FULL HOT” mark |
| 3. “LOW HOT” mark |
| 4. “FULL COLD” mark |
| 5. “LOW COLD” mark |

Fluid change

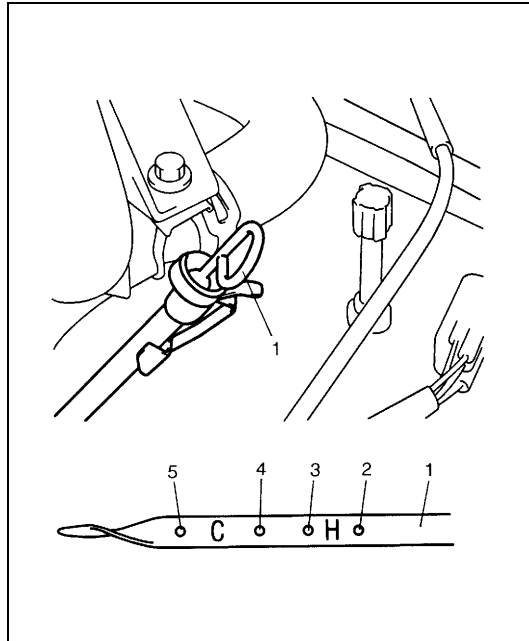
- 1) Lift up vehicle.
- 2) When engine is cool, remove drain plug (1) from transaxle housing (2) and drain A/T fluid.
- 3) Install drain plug (1).

Tightening torque

A/T fluid drain plug (a): 17 N·m (1.7 kg-m, 12.5 lb-ft)



- 4) Lower vehicle and fill proper amount of an equivalent of DEXRON®-III.



- 5) Check fluid level referring to “Fluid Level Check at Room (Cold) Temperature (Cold Check)” and “Fluid Level Check at Normal Operating (Hot) Temperature (Hot Check)” in this section.

Automatic transaxle fluid

An equivalent of DEXRON®-III

Automatic transaxle fluid capacity

When draining from drain plug hole:

3.3 liters (6.97/5.81 US/Imp. pt.)

When overhauling:

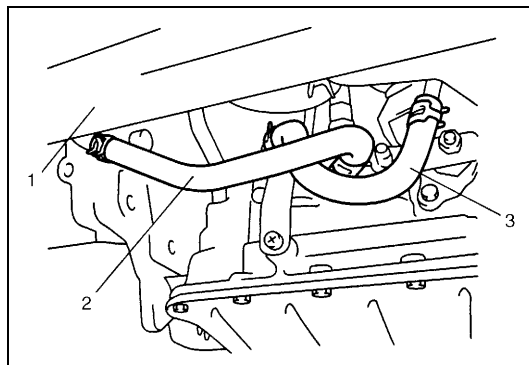
5.6 liters (11.83/9.86 US/Imp. pt.)

1.	Fluid level gauge
2.	“FULL HOT” mark
3.	“LOW HOT” mark
4.	“FULL COLD” mark
5.	“LOW COLD” mark

A/T fluid cooler hoses

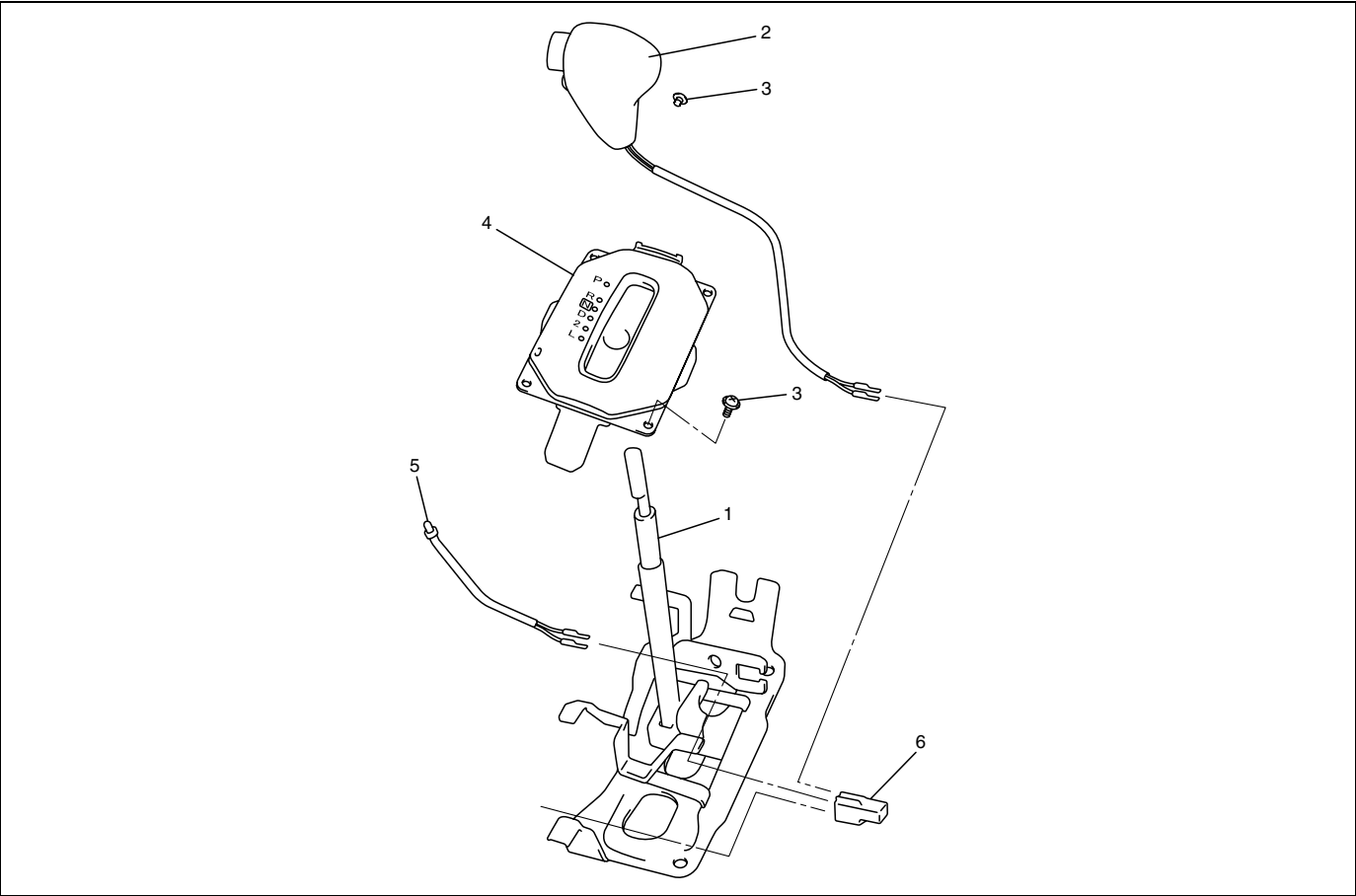
The rubber hoses for the A/T fluid cooler should be replaced at specified interval. When replacing them, be sure to note the following.

- to replace clamps at the same time
- to insert hose as far as its limit mark
- to clamp clamps securely



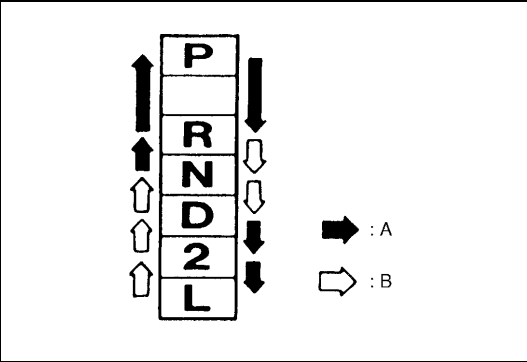
1.	Radiator
2.	Inlet hose (Outlet from A/T fluid cooler)
3.	Outlet hose (Inlet to A/T fluid cooler)

Selector Lever



1. Selector lever assembly	4. Indicator assembly
2. Knob assembly	5. Illumination lamp assembly
3. Screw	6. Connector

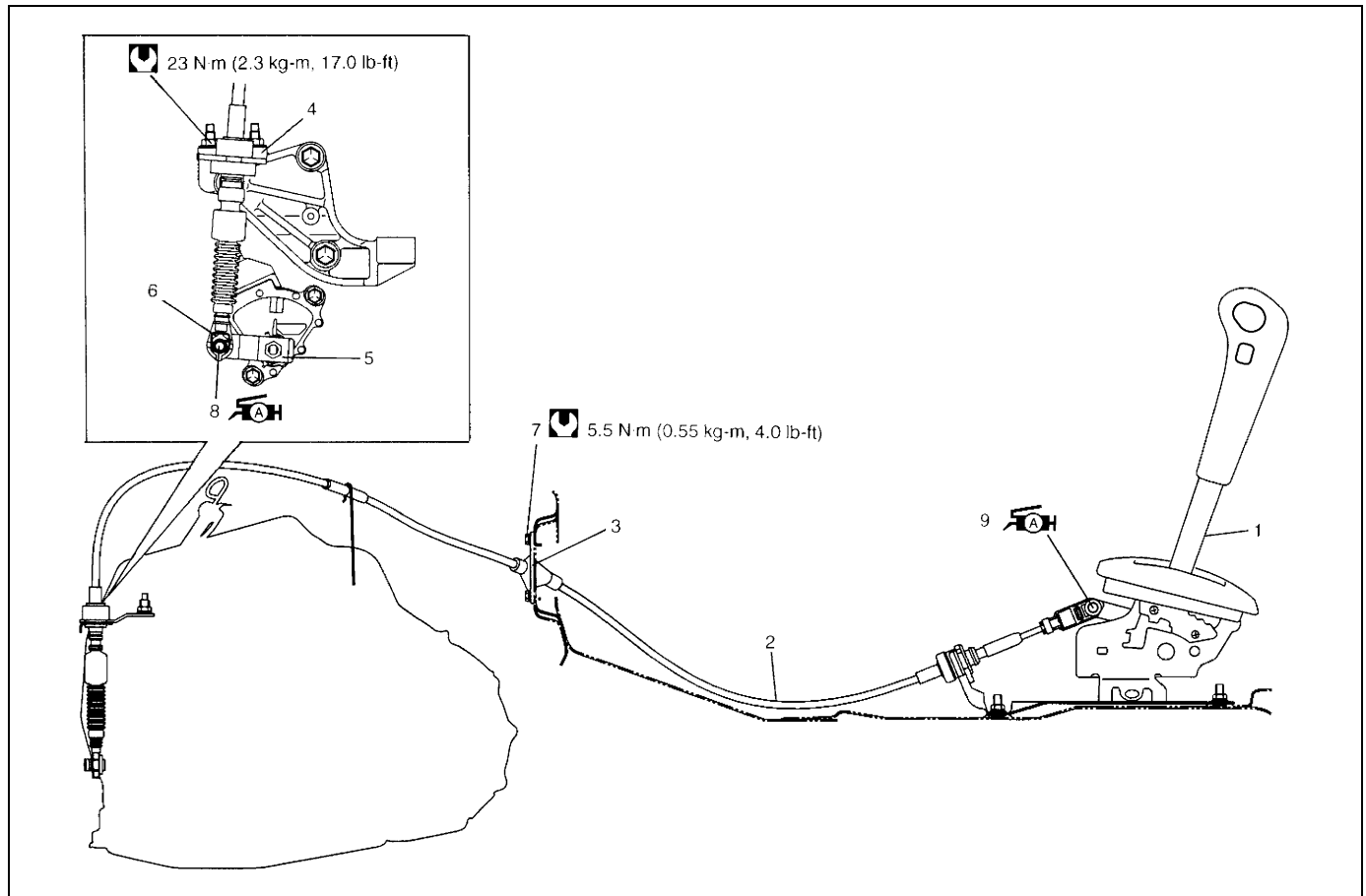
Inspection



Check selector lever for smooth and clear-cut movement and position indicator for correct indication.
For operation of select lever, refer to the figure.

A.	Shift the selector lever with its button pushed in.
B.	Shift the selector lever without pushing its button.

Select Cable



1. Selector lever assembly	6. Clip
2. Select cable	7. Select cable retainer bolt
3. Select cable retainer	8. Manual select lever pin : Apply lithium grease 99000-25010 to all around pin (0.15 g)
4. Cable bracket	9. Selector lever pin : Apply lithium grease 99000-25010 to all around pin (0.15 g)
5. Manual select lever	Tightening torque

Removal

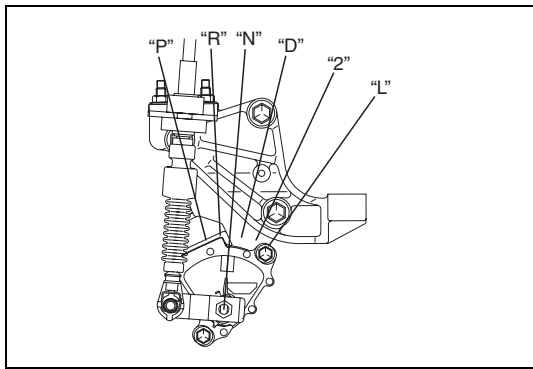
- 1) Remove parking brake lever cover.
- 2) Remove console box.
- 3) Disconnect select cable from selector lever and then detach from bracket.
- 4) Remove clip and disconnect select cable from manual select lever.
- 5) Remove select cable retainer from dash panel.

Installation

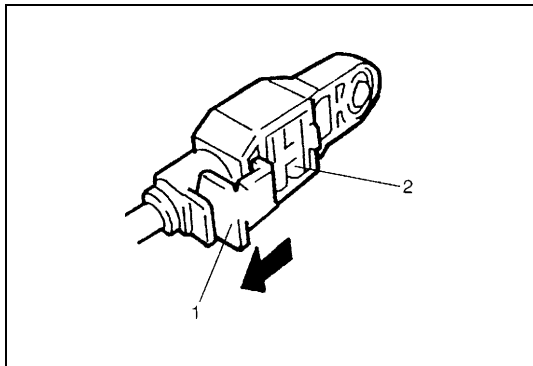
Install select cable by reversing removal procedure.

The important steps in installation are as follows.

- Apply grease to pin and cable joint.
- Tighten bolts in upper figure to specified torque.
- Adjusting procedure is as follows.

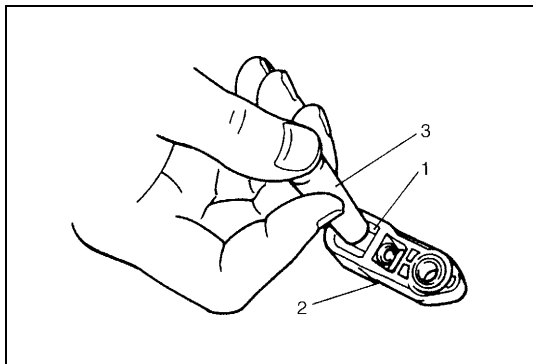
Adjustment

- 1) Shift manual shift lever to "N" range (transmission range sensor "N" range).



- 2) Remove adjuster (cable end) from selector lever pin of selector lever assembly.

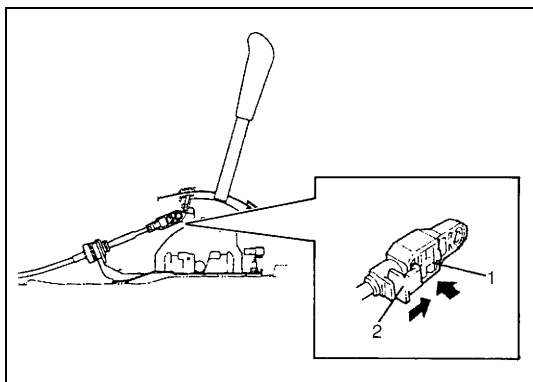
- 3) Release lock plate (1) which restrict moving of cable end holder (2).



- 4) Push cable end holder (1) out from eye-end (2) using an appropriate tool (3) to disengage cable.

- 5) Shift selector lever to "N" position.

- 6) Apply grease to selector lever pin and install adjuster (cable end) to it.

Grease 99000-25010

- 7) With both selector lever and transmission range sensor kept each "N" position, drive cable end holder (1) in until it locks cable.

- 8) Slide lock plate (2) to secure cable end holder in position.

- 9) After select cable was installed, check for the following.

- Push vehicle with selector lever shifted to "P" range.

Vehicle should not move.

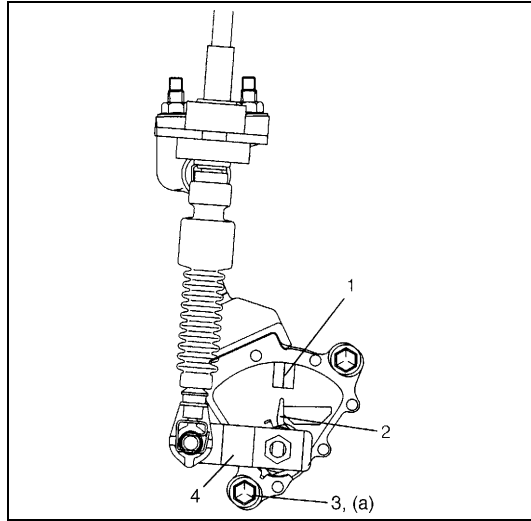
- Vehicle can not be driven in "N" range.

- Vehicle can be driven in "D", "2" and "L" ranges.

- Vehicle can be backed in "R" range.

Transmission Range Sensor (Shift Switch)

Adjustment and Inspection



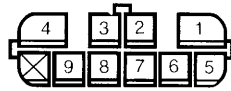
- 1) Shift manual select lever (4) to "N" range.
- 2) Check that needle direction shaped on lock washer (2) and "N" reference line (1) on transmission range sensor are aligned. If not, loosen sensor bolts (3) and align them.
- 3) Check that engine starts in "N" and "P" ranges but it does not start in "D", "2", "L" or "R" range. Also, check that back-up lamp lights in "R" range.

Tightening torque

Transmission range sensor bolt

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

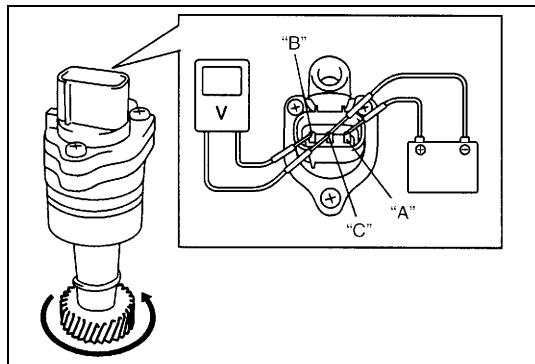
If faulty condition cannot be corrected by adjustment, disconnect transmission range sensor connector and check that continuity exists as shown by moving manual select lever.



		Terminal No.								
		1	2	3	4	5	6	7	8	9
Sensor Position	P	○			○			○		○
	R							○	○	
	N	○			○	○		○		
	D			○				○		
	2						○	○		
	L		○					○		

Output Shaft Speed Sensor (VSS)

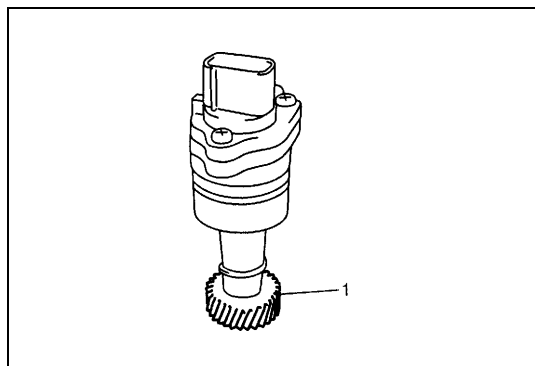
Inspection



- 1) Connect positive cable of 12 volt battery to "A" terminal of sensor and ground cable to "C" terminal. Then using voltmeter, check voltage between "B" terminal and "C" terminal with output shaft speed sensor (VSS) driven gear rotated. If measured voltage (pulse signal) is not as specified, replace sensor.

Output shaft speed sensor (VSS) output voltage

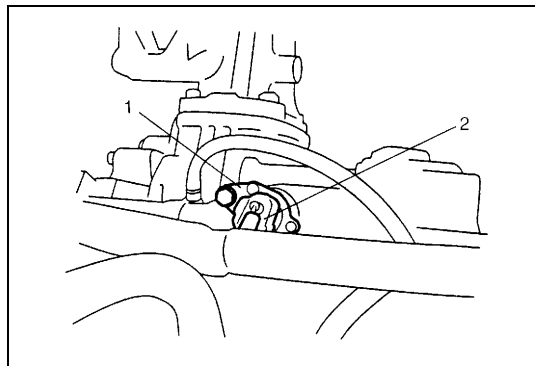
Pulse signal of alternating 0 – 1 V and 10 – 14 V



- 2) Check output shaft speed sensor (VSS) driven gear (1) for wear. Replace if necessary.

Removal

- 1) Disconnect negative cable at battery.
- 2) Disconnect output shaft speed sensor connector (2).
- 3) Remove output shaft speed sensor (VSS) (1) by removing its bolt.



Installation

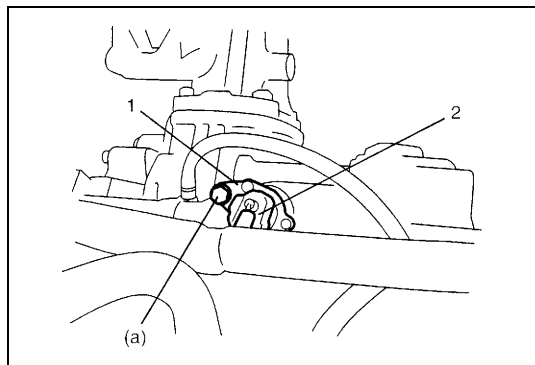
- 1) Apply A/T fluid to output shaft speed sensor O-ring.
- 2) Install output shaft speed sensor (VSS) (1) to A/T case and tighten bolt to specified torque.

Tightening torque

Output shaft speed sensor (VSS) bolt

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

- 3) Connect output shaft speed sensor connector (2) to output shaft speed sensor (1).



- 4) Connect negative cable to battery.

Input Shaft Speed Sensor

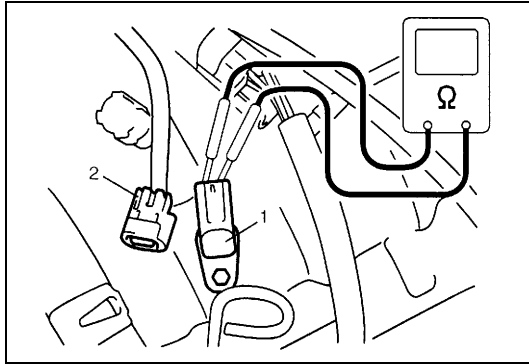
Inspection

- 1) Disconnect negative cable at battery.
- 2) Disconnect input shaft speed sensor connector (2).
- 3) Check resistance between input shaft speed sensor terminals.

Input shaft speed sensor resistance

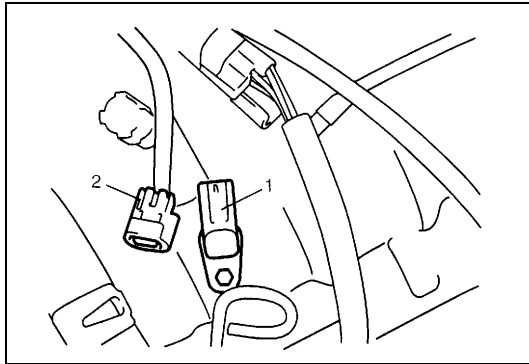
Standard: 560 – 680 Ω at 20°C (68°F)

1. Input shaft speed sensor



Removal

- 1) Disconnect negative cable at battery.
- 2) Disconnect input shaft speed sensor connector (2).
- 3) Remove input shaft speed sensor (1) by removing its bolt.



Installation

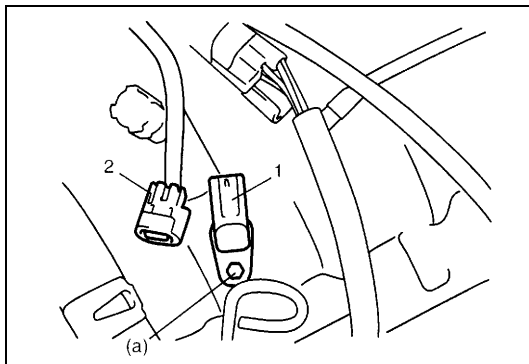
- 1) Apply A/T fluid to input shaft speed sensor O-ring.
- 2) Install input shaft speed sensor (1) to A/T case and tighten bolt to specified torque.

Tightening torque

Input shaft speed sensor bolt

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

- 3) Connect input shaft speed sensor connector (2) to input shaft speed sensor (1).



- 4) Connect negative cable to battery.

Throttle Position Sensor

Inspection

Check throttle position sensor referring to "Throttle Position Sensor" in Section 6E1.

Engine Coolant Temperature Sensor

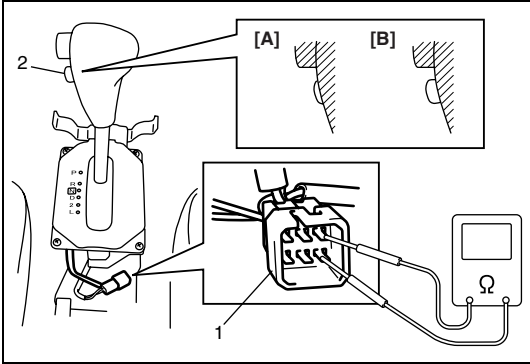
Inspection

Check engine coolant temperature sensor referring to “Engine Coolant Temperature Sensor” in Section 6E1.

O/D Off Switch

Inspection

- 1) Remove console box.
- 2) Disconnect O/D off switch connector (1).
- 3) Check continuity between O/D off switch terminals.



O/D off switch	Pushing	Free
Continuity	Continuity	No continuity

[A]: Pushing position
[B]: Free position
2. O/D off switch

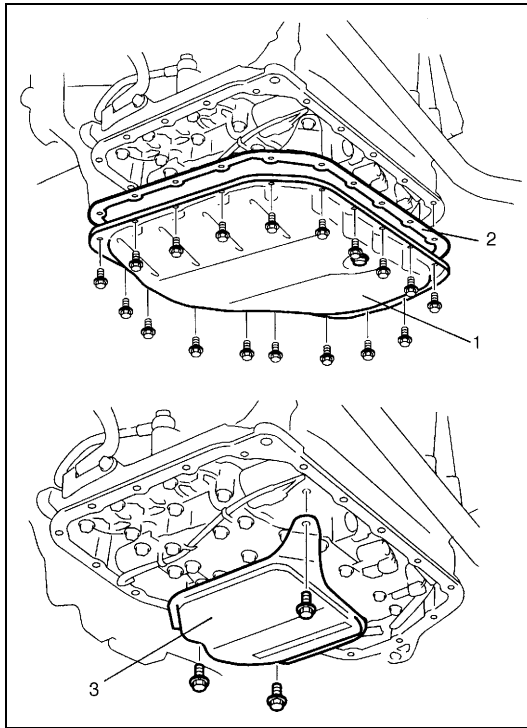
Solenoid Valves (Shift Solenoid Valves, TCC Solenoid Valve and Timing Solenoid Valve)

Removal

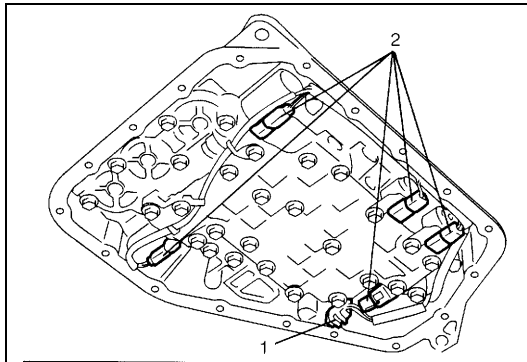
- 1) Disconnect negative cable at battery.
- 2) Lift up vehicle.
- 3) Remove drain plug and drain A/T fluid.
- 4) Install drain plug.

Tightening torque

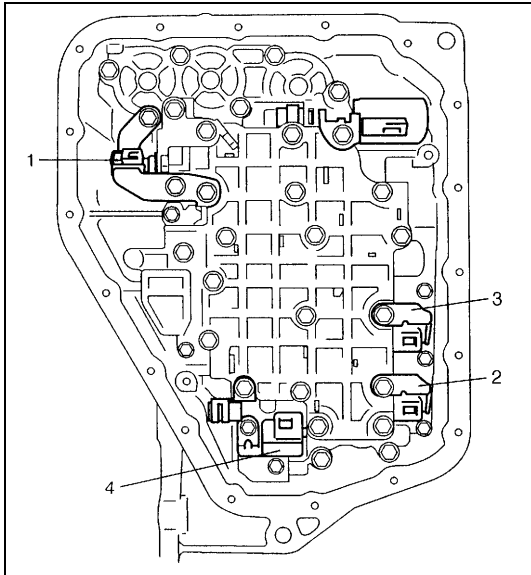
A/T fluid drain plug: 17 N·m (1.7 kg-m, 12.5 lb-ft)



- 5) Remove A/T oil pan (1) and oil pan gasket (2).
- 6) Remove oil strainer assembly (3).



- 7) Remove transmission fluid temperature sensor (1) from sensor clamp.
- 8) Disconnect solenoid connectors (2).



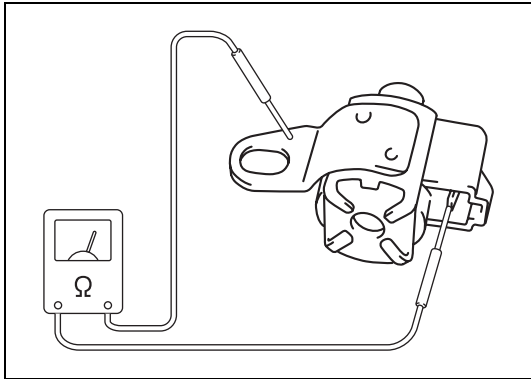
- 9) Remove TCC solenoid valve (1), shift solenoid valve-A (No.1) (2), shift solenoid valve-B (No.2) (3) and timing solenoid valve (4) by removing bolts.

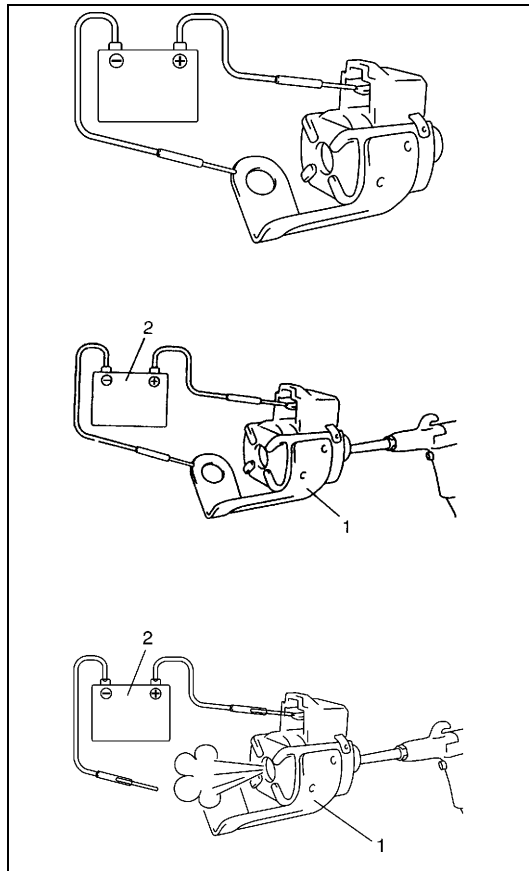
Inspection

Resistance Check

Shift solenoid valves, Timing solenoid valve and TCC solenoid valve resistance

Standard: 11 – 15 Ω at 20°C (68°F)



Operation Check**Shift solenoid valve-A (No.1), -B (No.2) and TCC solenoid valve****CAUTION:**

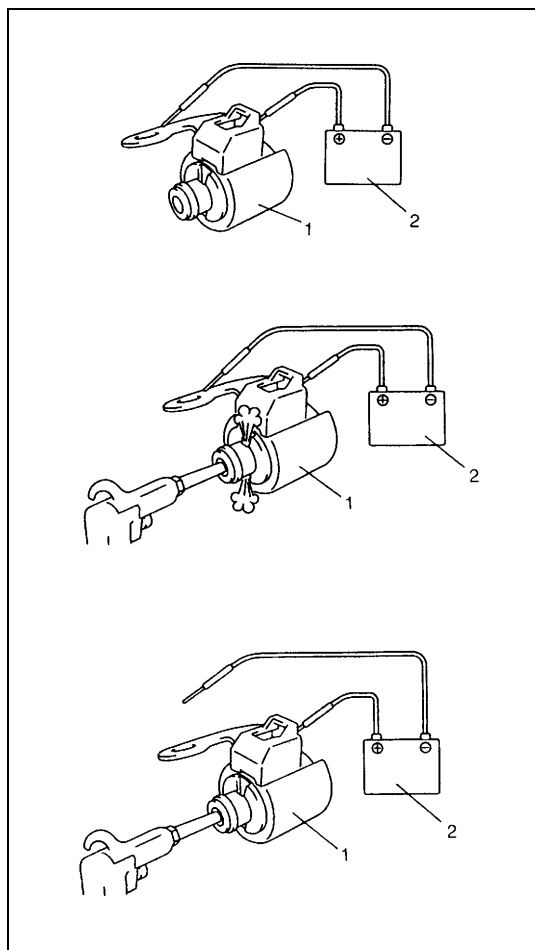
Do not insert air gun against strainer installed on inlet of solenoid valve too deeply, when blowing air into solenoid valve. If not, the strainer will be damaged.

- Check that solenoid valve (1) actuate with click sound when battery voltage is conducted.
- When solenoid valve (1) is connected to battery (2), confirm that solenoid valve is close condition by blowing air (50 – 200 kPa, 0.5 – 2.0 kg/cm², 7 – 28.5 psi) into solenoid valve as shown in the figure.
- When solenoid valve (1) is not connected to battery (2), confirm that solenoid valve is open condition by blowing air (50 – 200 kPa, 0.5 – 2.0 kg/cm², 7 – 28.5 psi) into solenoid valve as shown in the figure.

NOTE:

Do not fail to inspect with air to prevent mistaken checking because return spring for valve is not installed into solenoid valve.

Timing solenoid valve

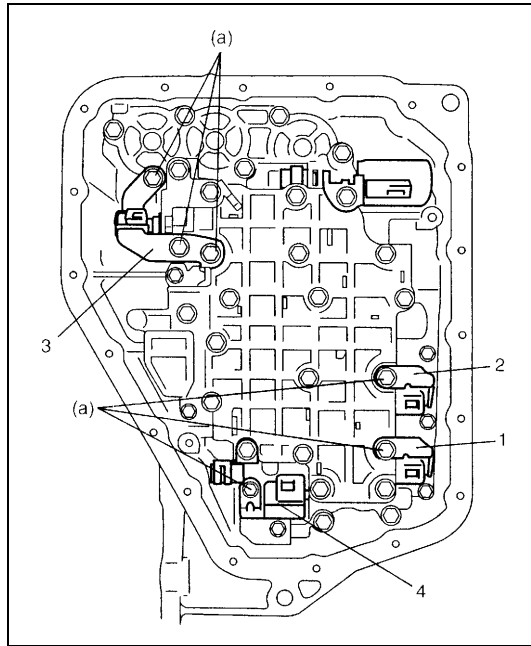
**CAUTION:**

Do not insert air gun against strainer installed on inlet of solenoid valve too deeply, when blowing air into solenoid valve. If not, the strainer will be damaged.

- Check that solenoid valve (1) actuate with click sound when battery voltage is conducted.
- When timing solenoid valve (1) is connected to battery (2), confirm that timing solenoid valve is open condition by blowing air (50 – 200 kPa, 0.5 – 2.0 kg/cm², 7 – 28.5 psi) into solenoid valve as shown in the figure.
- When timing solenoid valve (1) is not connected to battery (2), confirm that timing solenoid valve is close condition by blowing air (50 – 200 kPa, 0.5 – 2.0 kg/cm², 7 – 28.5 psi) into solenoid valve as shown in the figure.

NOTE:

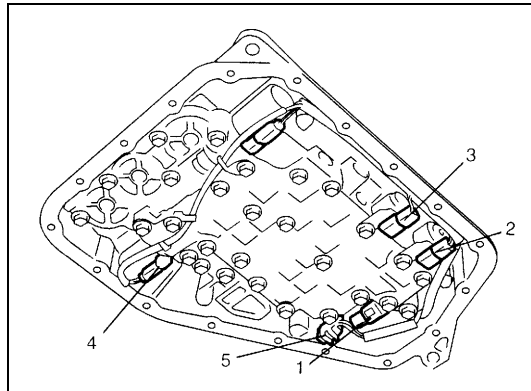
Do not fail to inspect with air to prevent mistaken checking because return spring for valve is not installed into solenoid valve.

Installation

- 1) Install shift solenoid valve-A (No.1) (1), shift solenoid valve-B (No.2) (2), TCC solenoid valve (3) and timing solenoid valve (4).

Tightening torque

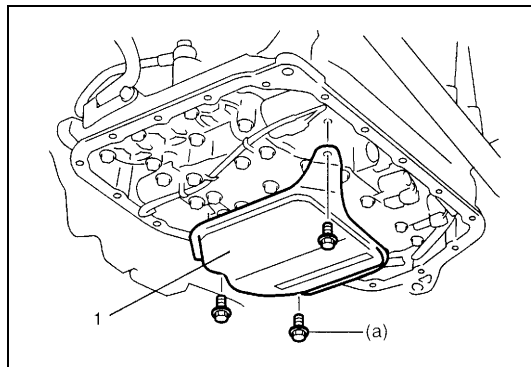
Solenoid valve bolt (a): 11 N·m (1.1 kg-m, 8.0 lb-ft)



- 2) Connect solenoid connectors identifying their installing positions by wire color.

Solenoid coupler	Wire color
Shift solenoid valve-A (No.1) (2)	White
Shift solenoid valve-B (No.2) (3)	Black
Timing solenoid valve (1)	Yellow
TCC solenoid valve (4)	Light Green

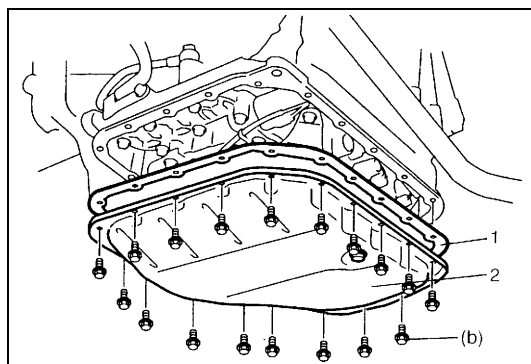
- 3) Install transmission fluid temperature sensor (5) to sensor clamp.



- 4) Install oil strainer assembly (1).

Tightening torque**Oil strainer bolt**

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 5) Install new oil pan gasket (1) and oil pan (2).

Tightening torque**Oil pan bolt**

(b): 7.0 N·m (0.7 kg-m, 5.0 lb-ft)

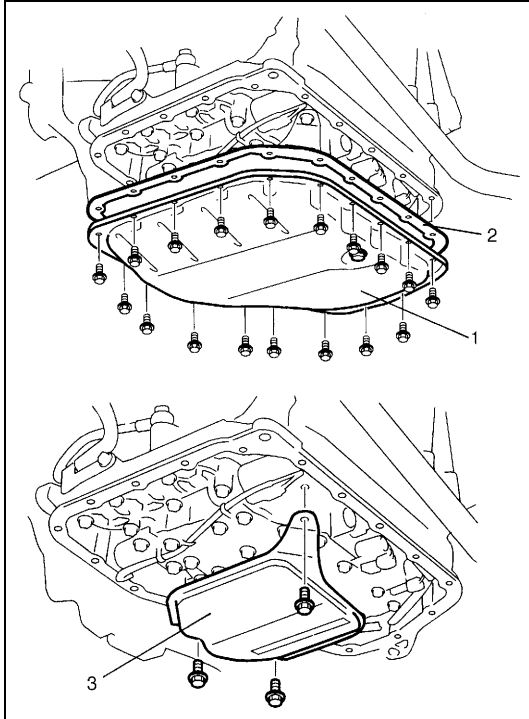
Pressure Control Solenoid Valve

Removal

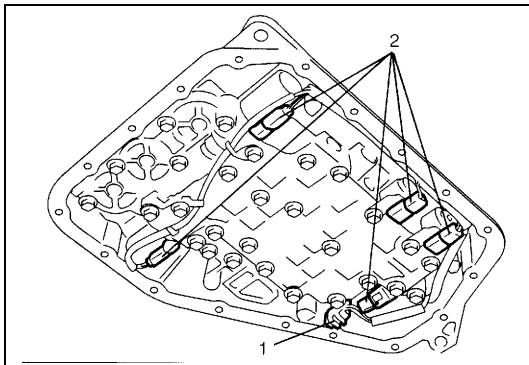
- 1) Disconnect negative cable at battery.
- 2) Lift up vehicle.
- 3) Remove drain plug and drain A/T fluid.
- 4) Install drain plug.

Tightening torque

A/T fluid drain plug: 17 N·m (1.7 kg-m, 12.5 lb-ft)

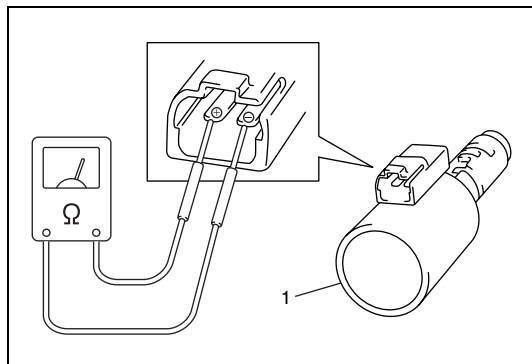


- 5) Remove A/T oil pan (1) and oil pan gasket (2).
- 6) Remove oil strainer assembly (3).



- 7) Remove transmission fluid temperature sensor (1) from sensor clamp.
- 8) Disconnect solenoid connectors (2).

- 9) Remove valve body assembly referring to “Unit Disassembly” in this section.
- 10) Remove pressure control solenoid valve referring to “Valve Body Assembly” in this section.

Inspection**Resistance Check**

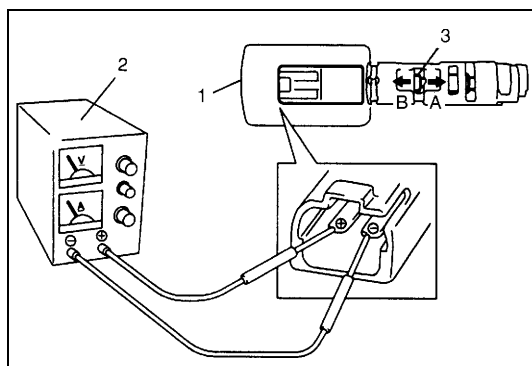
Measure resistance between pressure control solenoid valve (1) terminals.

Pressure control solenoid valve resistance

Standard: 5.0 – 5.6 Ω (at 20°C (68°F))

Operation Check

Check pressure control solenoid valve operation in the either manner of the followings.

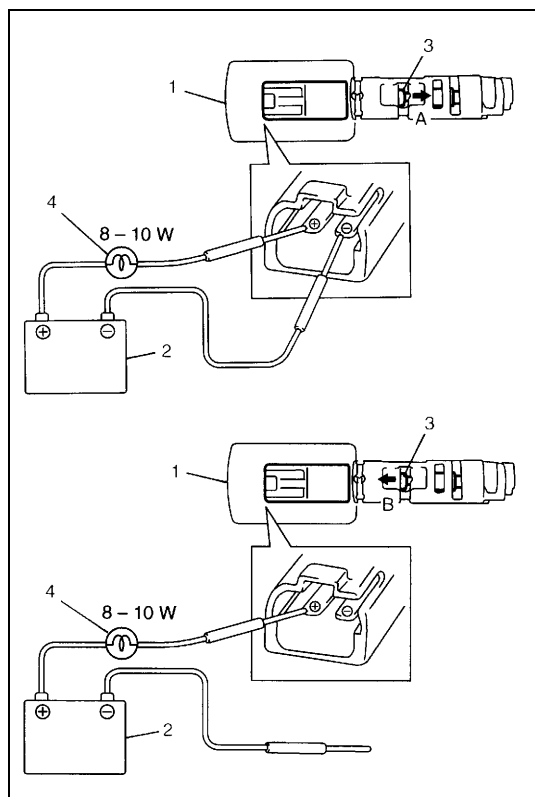
[Using regulated DC power supply]

- 1) Connect pressure control solenoid valve (1) to regulated DC power supply (2) as shown in the figure.
- 2) Turn regulated DC power supply switch ON, increase voltage of power supply keeping current within 1.0 A.
- 3) Check for gradual movement of valve (3) in the direction of arrow "A" as voltage is increased.
- 4) Check for movement of valve (3) in the direction of arrow "B" as voltage is decreased.

- 5) Turn power supply switch OFF.

CAUTION:

Do not pass current 1.0 A or more, or pressure control solenoid is burned out.

[Not using regulated DC power supply]

- 1) Connect pressure control solenoid valve (1) to battery (2) setting the 8 – 10 W bulb (4) on the way as shown in the figure.
- 2) Check for movement of valve (3) in the direction of arrow “A”.
- 3) Disconnect pressure control solenoid valve (1) from battery (2) and check for movement of valve (3) in the direction of arrow “B” as shown in the figure.

CAUTION:

Set 8 – 10 W bulb on the way, or pressure control solenoid valve is burned out.

Installation

Reverse removal procedure to install pressure control solenoid valve and valve body assembly noting the following points.

- For detail of pressure control solenoid valve installation, refer to “Valve Body Assembly” in this section.
- For detail of valve body assembly installation, refer to “Unit Assembly” in this section.
- For detail of installing wire harness for solenoid valves and sensor, refer to “Unit Assembly” in this section. Use new O-rings.
- For detail of A/T oil pan and oil strainer assembly installation, refer to “Unit Assembly” in this section. Use new oil pan gasket.
- Pour A/T fluid and check fluid level according to procedure described in “Fluid Change” in this section.
- Check for fluid leakage after warming up A/T.

Transmission Control Module (TCM)

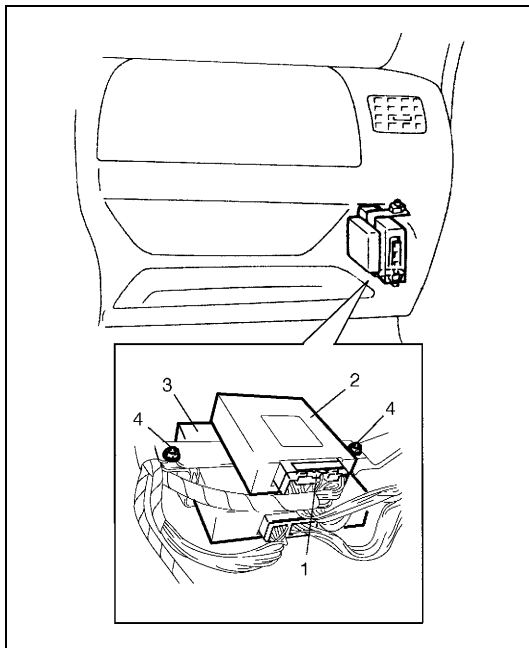
CAUTION:

- TCM and ECM consists of highly precise parts, therefore when handling it, be careful not to expose to excessive shock.
- When replacing TCM with used one, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized after replacement.

Removal

- 1) Disconnect negative cable at battery.
- 2) If the vehicle is equipped with air bag system, disable air bag system. Refer to "Disabling Air Bag System" in Section 10B.
- 3) Disconnect connectors (1) from TCM (2).
- 4) Remove TCM (2) by removing its nuts (4).

3. ECM



Installation

Reverse removal procedure noting the following.

- Connect TCM connectors securely.
- If the vehicle is equipped with air bag system, be sure to enable air bag system after TCM is back in place. Refer to "Enabling Air Bag System" in Section 10B.

A/T Relay

Inspection

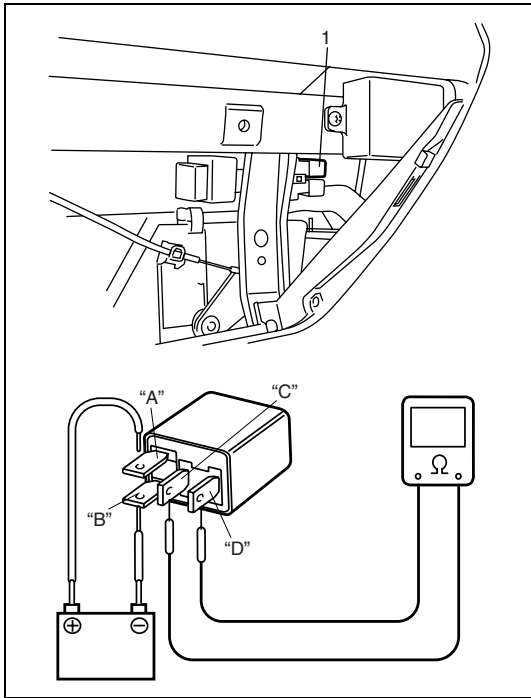
- 1) Disconnect negative cable at battery.
- 2) Remove glove box.
- 3) Remove A/T relay (1) from instrument panel wire harness.
- 4) Check that there is no continuity between terminal "C" and "D".

If continuity is indicated, replace A/T relay.

- 5) Connect battery positive (+) terminal to terminal "A" of A/T relay and battery negative (–) terminal to terminal "B" of A/T relay.

Check continuity between terminal "C" and "D" of A/T relay.

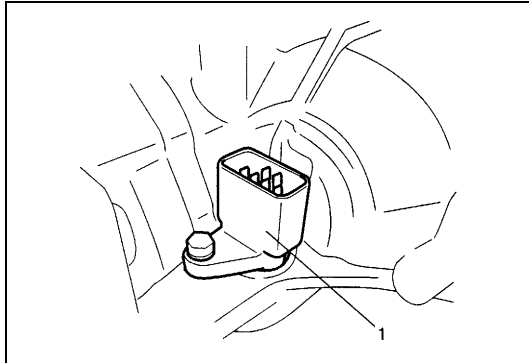
If continuity does not indicated, replace A/T relay.



Transmission Fluid Temperature Sensor

Inspection

- 1) Disconnect negative cable at battery.
- 2) Lift up vehicle.
- 3) With engine is cool, remove drain plug and drain A/T fluid.
- 4) Install drain plug. (Refer to "Fluid Change" in this section.)
- 5) Remove A/T oil pan.
- 6) Remove oil strainer assembly.
- 7) Remove valve body assembly referring to "Unit Disassembly" in this section.

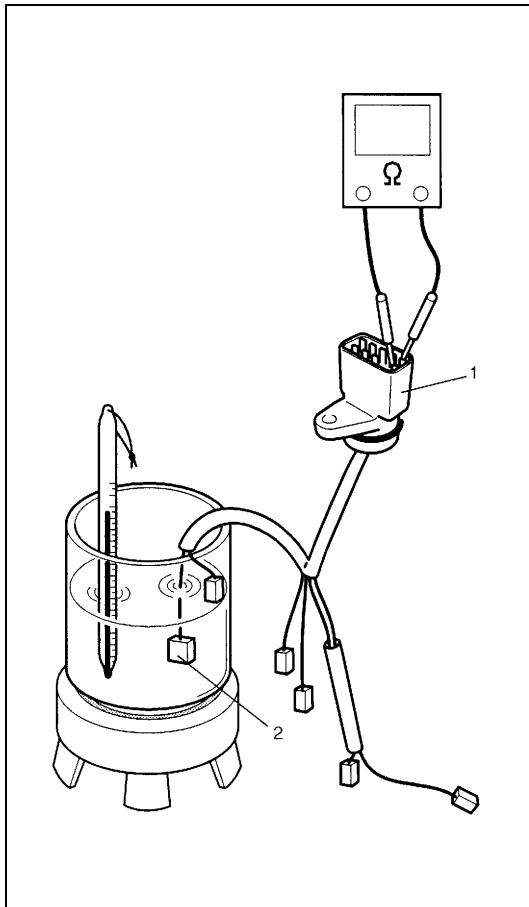


CAUTION:

When pulling solenoid wire harness out of transaxle case, take care not to damage transmission fluid temperature sensor at narrow exit of case.

Careless sensor treatment might cause sensor malfunction.

- 8) Remove solenoid wire harness (1).



- 9) Warm up transmission fluid temperature sensor (2). Check resistance between terminals of valve body harness connector (1). Thus make sure its resistance decrease as its temperature increase.

Transmission fluid temperature sensor resistance

Temperature	Resistance
10°C (50°F)	5.8 – 7.1 kΩ
110°C (230°F)	231 – 263 Ω
145°C (293°F)	105 – 117 Ω

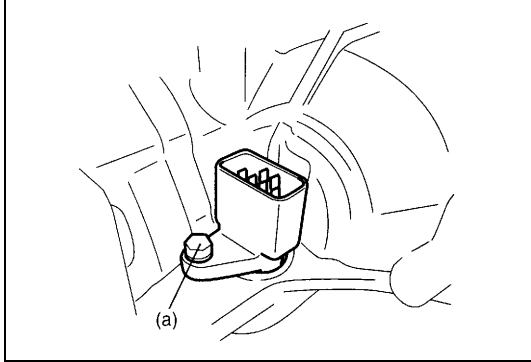
Installation

Reverse removal procedure to install solenoid wire harness and valve body assembly noting the following points.

- For details of valve body assembly and their connectors installation, refer to "Unit Assembly" in this section.
- For details of A/T oil pan installation, refer to "Unit Assembly" in this section. Use new oil pan gasket.
- Tighten valve body harness connector bolt to specified torque.

Tightening torque**Valve body harness connector bolt**

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

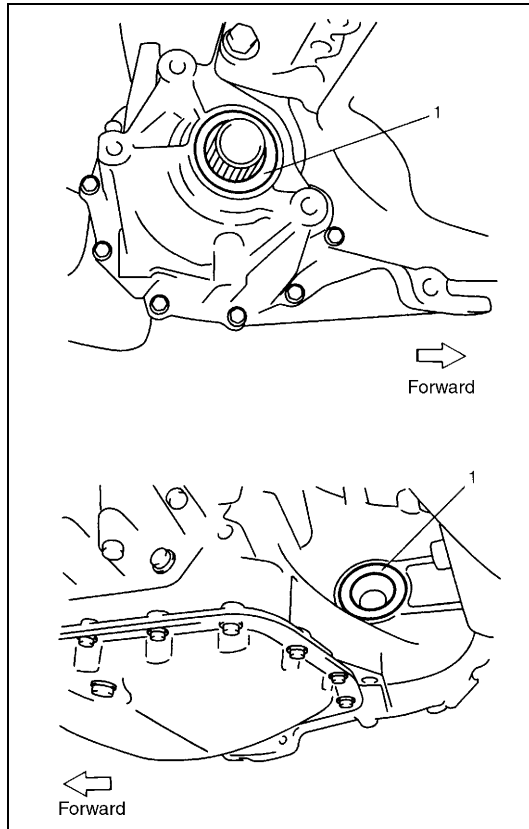


- Pour A/T fluid and check fluid level according to procedure described in "Fluid Change" in this section.
- Check for fluid leakage after warming up A/T.

Differential Side Oil Seal

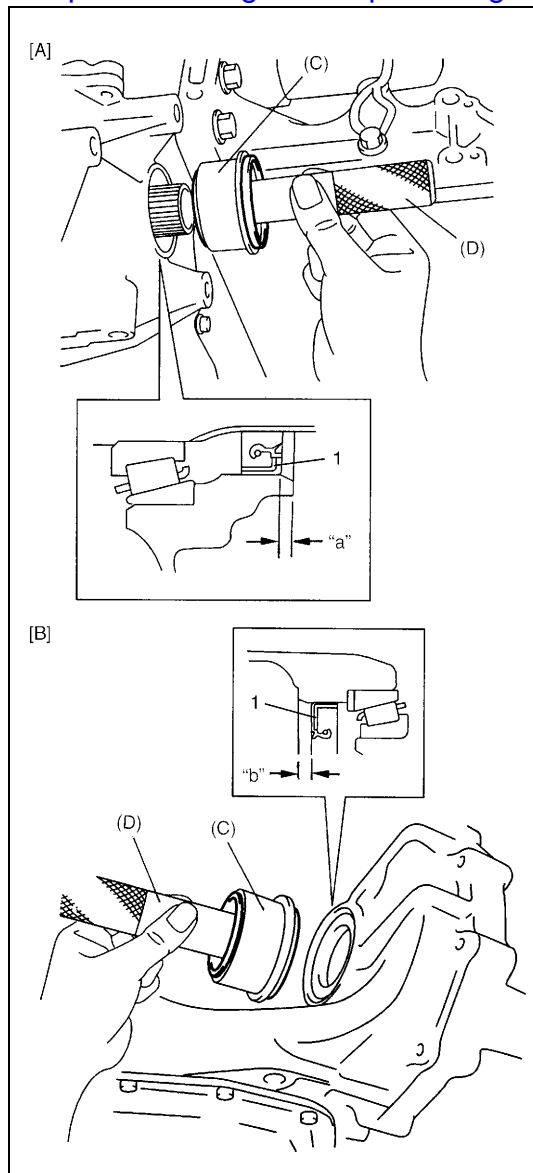
Replacement

- 1) Lift up vehicle and drain automatic transaxle fluid.
- 2) Remove drive shaft joints from differential gear of transaxle.
Refer to "Drive Shaft Assembly" in Section 4A for procedure to disconnect drive shaft joints.
For differential side oil seal removal, it is not necessary to remove drive shafts from steering knuckle.
- 3) Remove differential side oil seal (1) by using screw driver or like.



- 4) Apply grease to new differential side oil seal lips.

Grease 99000-25030



5) Install new differential side oil seals (1) by using special tool.

Special tool

(C): 09944-88220

(D): 09924-74510

Differential side oil seal installing depth

Right side "a": 2.6 – 3.6 mm (0.10 – 0.14 in)

Left side "b": 3.8 – 4.8 mm (0.15 – 0.19 in)

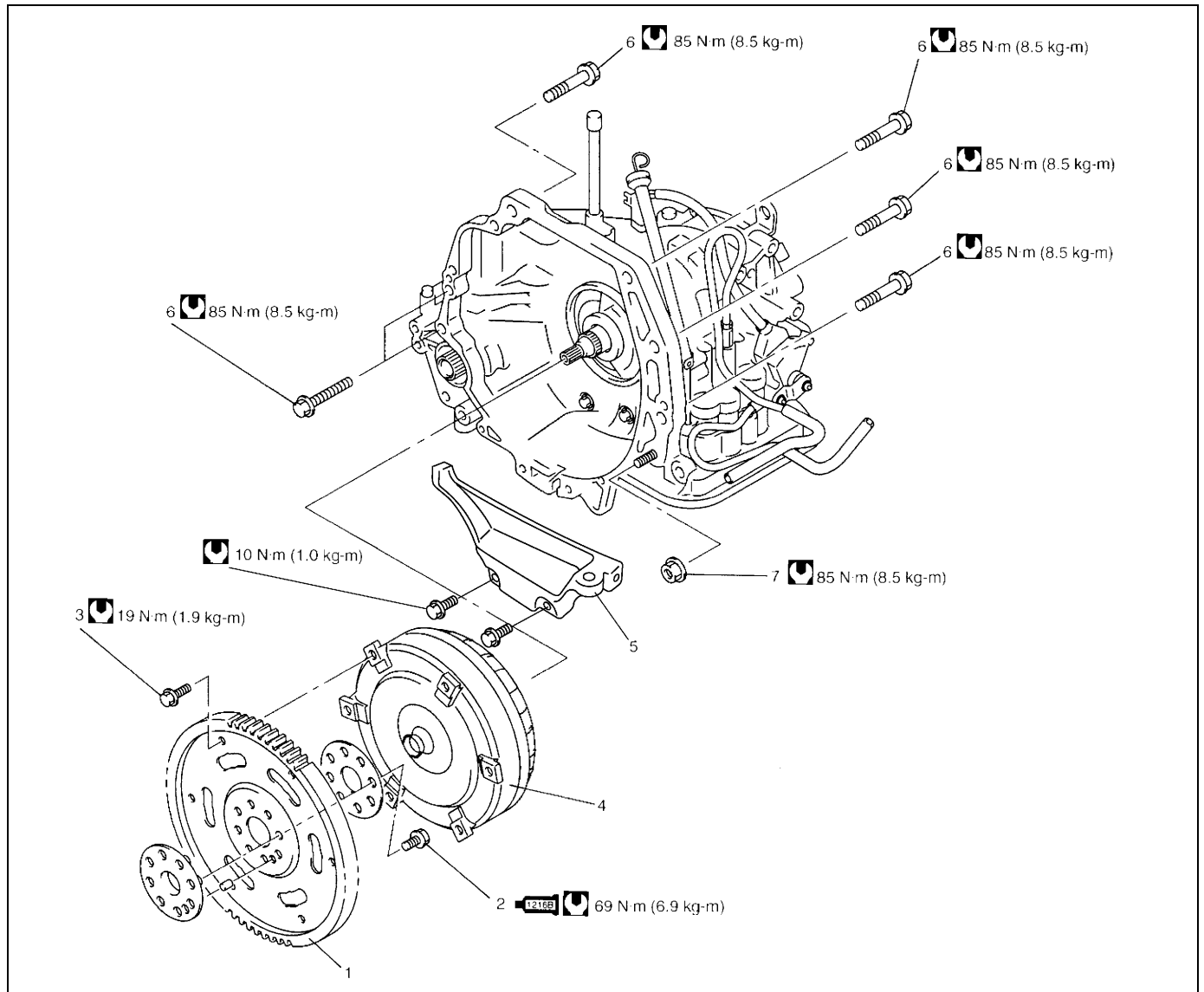
[A]: Right side
[B]: Left side

6) Install drive shaft referring to "Drive Shaft Assembly" in Section 4A.

7) Pour A/T fluid referring to "Fluid Change" in this section.

Automatic Transaxle Assembly

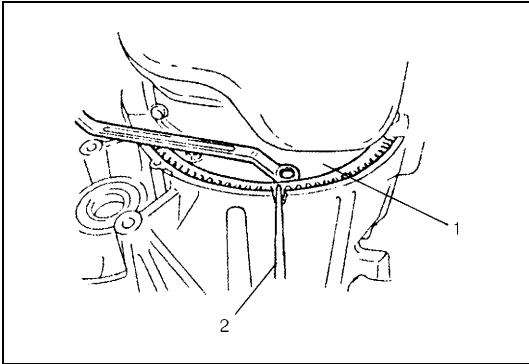
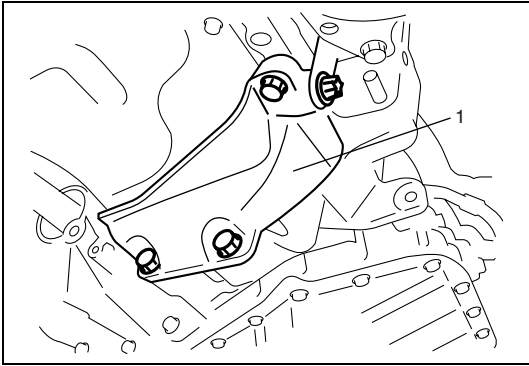
Components



1. Drive plate	5. Lower stiffener
2. Drive plate bolt : Apply sealant 99000-31230 to thread.	6. Transaxle and engine fastening bolt
3. Drive plate to torque converter bolt	7. Transaxle and engine fastening nut
4. Torque converter	Tightening torque

Dismounting

- 1) Take down transaxle with engine. For its procedure, refer to "Engine Assembly" in Section 6A2.
- 2) Remove lower stiffener (1).



- 3) Remove drive plate to torque converter bolts.
To lock drive plate (1), engage flat head rod or the like (2) with drive plate ring gear.

- 4) Remove starting motor.

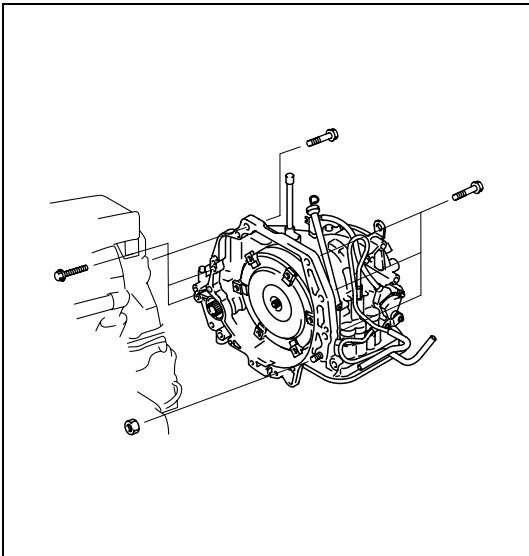
WARNING:

Be sure to keep transaxle with torque converter horizontal or facing up throughout the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury.

NOTE:

When detaching transaxle from engine, move it in parallel with crankshaft and use care so as not to apply excessive force to drive plate and torque converter.

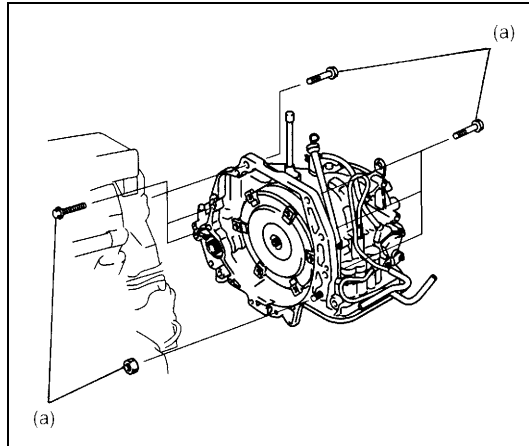
- 5) Remove bolts and nut fastening engine and transaxle, then detach transaxle from engine.



Remounting

- 1) Make sure that torque converter is installed correctly to transaxle.

Refer to "Unit Assembly" in this section.

**WARNING:**

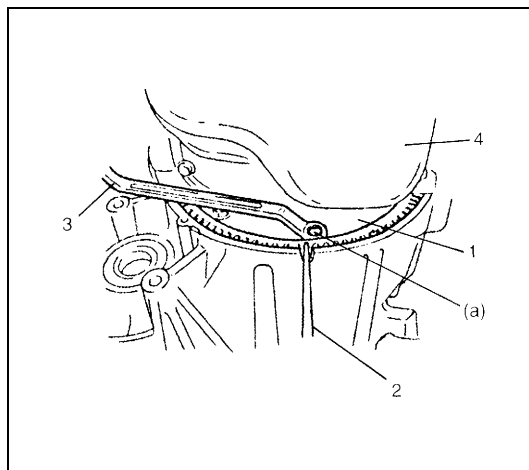
Be sure to keep transaxle with torque converter horizontal or facing up throughout the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury.

- 2) Attach transaxle to engine.

Tightening torque

Transaxle and engine fastening bolt and nut

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



- 3) Tighten drive plate to torque converter bolts.

Align bolt hole of drive plate and torque converter then tighten bolts through torque converter housing lower plate opening.

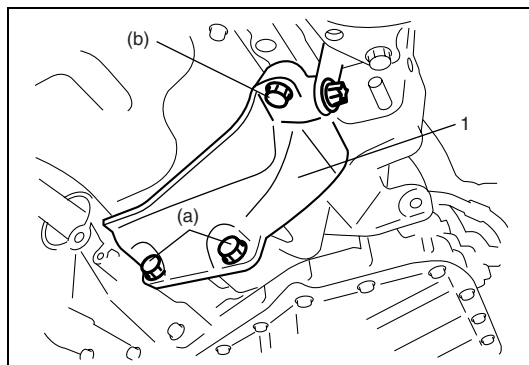
Lock drive plate (1) by engaging flat head rod or the like (2) with drive plate gear.

Tightening torque

Drive plate to torque converter bolt

(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

3.	Wrench
4.	Engine oil pan



- 4) Install lower stiffener (1).

Tighten lower stiffener bolts (a) first and next (b) with specified torque.

Tightening torque

Lower stiffener bolt

(a): 55 N·m (5.5 kg-m, 40 lb-ft)

(b): 55 N·m (5.5 kg-m, 40 lb-ft)

- 5) Install starter motor.

Tightening torque

Starter motor bolt and nut: 50 N·m (5.0 kg-m, 36.5 lb-ft)

- 6) Remount engine with transaxle assembly to vehicle. Refer to "Engine Assembly" in Section 6A2 for its procedure.

Unit Repair

When repairing automatic transaxle, it is necessary to conduct the on-vehicle test to investigate where the cause of the trouble lies first.

Then whether overhaul should be done or not is determined. If the transaxle is disassembled without such preliminary procedure, not only the cause of the trouble would be unknown, but also a secondary trouble may occur and often time would be wasted.

Precautions

As the automatic transaxle consists of high precision component, the following cautions should be strictly observed when handling its parts in disassembly and reassembly.

- Disassembling valve body assembly is prohibited essentially. However, a few parts can be disassembled. When disassembling valve body component parts, confirm whether their parts are allowed to disassemble or not referring to "Valve Body Assembly" in this section.
- Make sure to wash dirt off from the transaxle so that no such dirt will enter the transaxle during dismounting and remounting.
- Select a clean place free from dust and dirt for overhauling.
- Place a rubber mat on the work bench to protect parts from damage.
- Work gloves or shop cloth should not be used. (Use a nylon cloth or a paper towel.)
- When separating the case joint, do not pry with a screwdriver or such but tap with a plastic hammer lightly.
- Make sure to wash dirt off from the transaxle so that no such dirt will enter the transaxle during disassembly and reassembly.
- Wash the disassembled parts in ATF (Automatic Transaxle Fluid) or kerosene (using care not to allow ATF or kerosene to get on your face, etc.) and confirm that each fluid passage is not clogged by blowing air into it. But use kerosene to wash the discs, resin washers and rubber parts.
- Replace each gasket, oil seal and O-ring with a new one.
- Apply ATF to sliding or rotating parts before reassembly.
- A new discs should be soaked in ATF at least 2 hours before use.

Part Inspection and Correction Table

Part	Inspect for	Correction
Casted part, machined part	Small flaw, burr	Remove with oil stone.
	Deep or grooved flaw	Replace part.
	Clogged fluid passage	Clean with air or wire.
	Flaw on installing surface, residual gasket	Remove with oil stone or replace part.
	Crack	Replace part.
Bearing	Unsmooth rotation	Replace.
	Streak, pitting, flaw, crack	Replace.
Bushing, thrust washer	Flaw, burr, wear, burning	Replace.
Oil seal, gasket	Flawed or hardened seal ring	Replace.
	Worn seal ring on its periphery or side	Replace.
	Piston seal ring, oil seal, gasket, etc.	Replace.
Gear	Flaw, burr	Replace.
	Worn gear tooth	Replace.
Splined part	Burr, flaw, torsion	Correct with oil stone or replace.
Snap ring	Wear, flaw, distortion	Replace.
	No interference	Replace.
Thread	Burr	Replace.
	Damage	Replace.
Spring	Settling, sign of burning	Replace.
Friction plate	Wear, burning, distortion, damaged claw	Replace.
Separator plate, retaining plate	Wear, burning, distortion, damaged claw	Replace.
Sealing surface (where lip contacts)	Flaw, rough surface, stepped wear, foreign material	Replace.

Unit Disassembly

CAUTION:

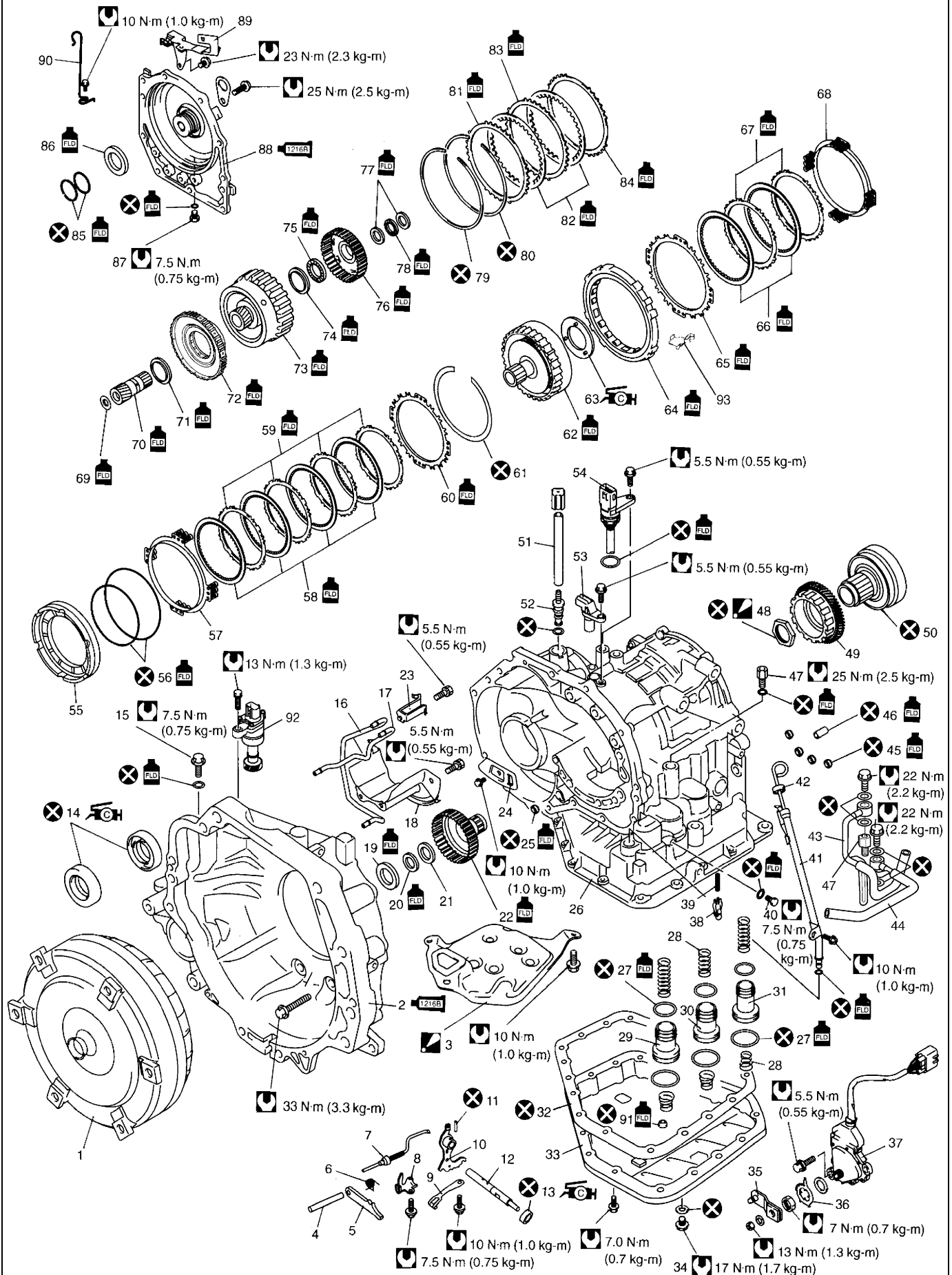
- Thoroughly clean transaxle exterior before overhauling it.
- Keep working table, tools and hands clean while overhauling.
- Use special care to handle aluminum parts so as not to damage them.
- Do not expose removed parts to dust. Keep them always clean.











Components

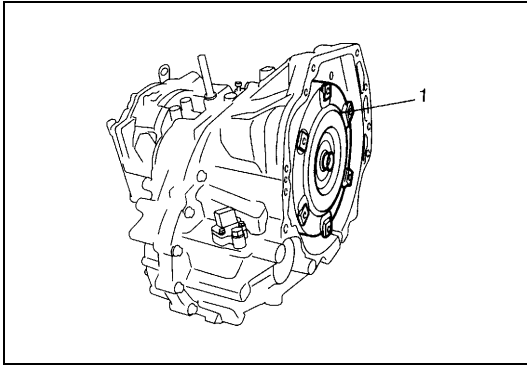
NOTE:

Oil pump assembly, direct clutch assembly, forward and reverse clutch assembly, 2nd brake piston assembly, O/D and 2nd coast brake piston and return spring, differential assembly, countershaft assembly and valve body assembly are not shown in figure below.

For the detail of these components, refer to “Disassembly/Assembly of Subassembly” in this section.

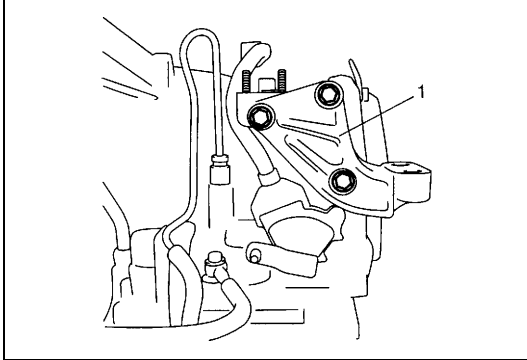


1. Torque converter	33. Oil pan	65. 2nd brake retaining plate
 2. Torque converter housing : Apply sealant 99000-31230 to mating surface to transaxle case.	34. A/T fluid drain plug	66. 2nd brake disc
 3. Oil strainer assembly : Replace oil strainer when overhauling.	35. Manual select lever	67. 2nd brake separator plate
4. Parking lock pawl shaft	36. Lock washer	68. 2nd brake return spring subassembly
5. Parking lock pawl	37. Transmission range sensor	69. Front sun gear thrust bearing race
6. Parking lock pawl return spring	38. Cooler check valve	70. Front planetary sun gear
7. Parking lock pawl rod	39. Spring	71. Planetary gear thrust bearing
8. Parking lock pawl bracket	40. Transaxle case plug	72. One-way clutch No.1 assembly
9. Manual detent spring	41. Fluid filler tube	73. Rear planetary sun gear subassembly
10. Manual valve lever	42. Fluid level gauge	74. Rear sun gear thrust bearing race
11. Manual valve lever pin	43. Fluid cooler inlet pipe	75. Rear sun gear thrust bearing
12. Manual shift shaft	44. Fluid cooler outlet pipe	76. Forward clutch hub
 13. Manual shift shaft oil seal : Apply grease 99000-25030 to oil seal lip.	45. 2nd brake gasket	77. Intermediate shaft thrust bearing race
 14. Differential side oil seal : Apply grease 99000-25030 to oil seal lip.	46. Brake drum gasket	78. Intermediate shaft thrust bearing
15. Torque converter housing plug	47. Pipe union	79. 2nd brake piston snap ring
16. Lubrication LH tube	 48. Reduction drive gear nut : After tightening nut so as rotational torque of reduction drive gear to be in specified value, caulk nut securely.	80. O/D and 2nd coast brake retaining plate snap ring
17. Lubrication RH tube	49. Reduction drive gear	81. O/D and 2nd coast brake retaining plate
18. Fluid reservoir RH plate	50. Planetary ring gear subassembly	82. O/D and 2nd coast brake disc
19. Input shaft front thrust bearing	51. Breather hose	83. O/D and 2nd coast brake separator plate
20. Input shaft rear thrust bearing	52. Breather union	84. O/D and 2nd coast brake rear plate
21. Input shaft rear thrust bearing race	53. Input shaft speed sensor	85. Rear cover seal ring
22. Direct clutch hub	54. Valve body harness	86. Reverse clutch drum thrust bearing
23. Lubrication tube clamp	55. 1st and reverse brake piston	87. Rear cover plug
24. Fluid reservoir LH plate	56. O-ring	 88. Transaxle rear cover : Apply sealant 99000-31230 to mating surface.
25. Governor apply No.2 gasket	57. 1st and reverse brake return spring subassembly	89. Harness bracket
26. Automatic transaxle case	58. 1st and reverse brake disc	90. Select cable clamp
27. Accumulator piston O-ring	59. 1st and reverse brake separator plate	91. Governor apply No.1 gasket
28. Accumulator spring	60. 1st and reverse brake retaining plate	92. Output shaft speed sensor (VSS)
29. C2 accumulator piston	61. 1st and reverse brake snap ring	93. One-way clutch outer race retainer
30. C1 accumulator piston	62. Planetary gear assembly	 Do not reuse.
31. B1 accumulator piston	 63. Planetary carrier thrust washer : Apply grease 99000-25030 to slide contact face.	 Apply automatic transaxle fluid.
32. Oil pan gasket	64. One-way clutch No.2 assembly	 Tightening torque

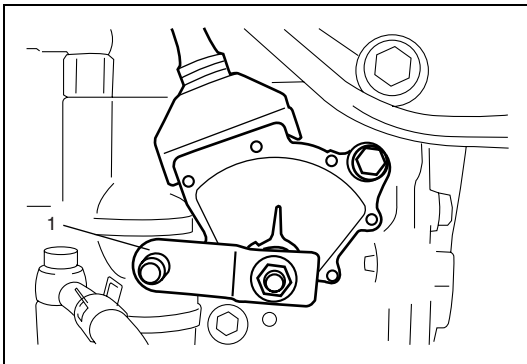
Disassembly**CAUTION:**

Remove torque converter as much straight as possible. Leaning it may cause to damage oil seal lip.

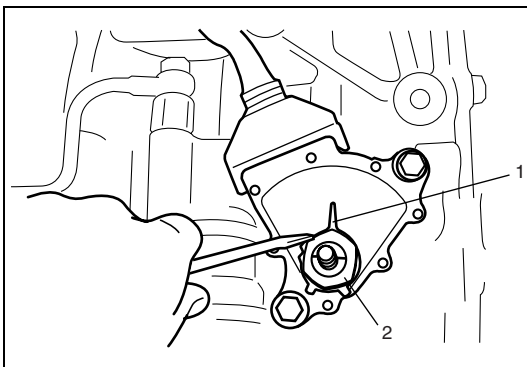
1) Remove torque converter (1).



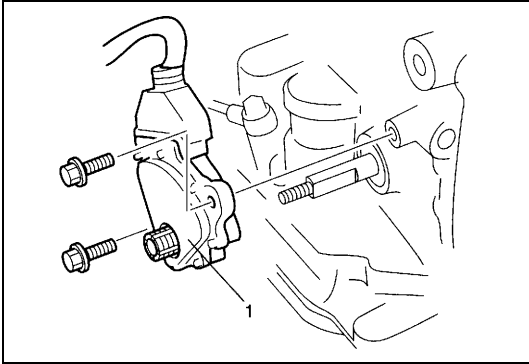
2) Remove engine mounting LH bracket (1).



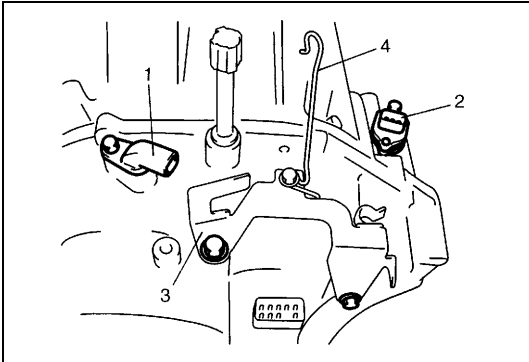
3) Remove manual select lever (1).



4) Uncaulk lock washer (1), then remove lock nut (2) and lock washer (1).

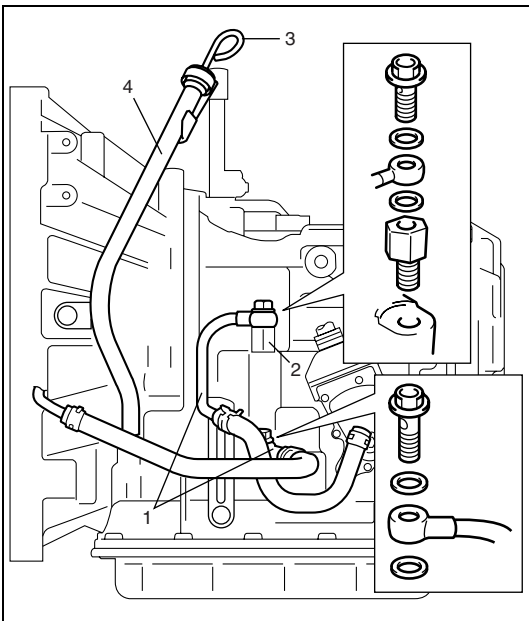


5) Remove transmission range sensor (1).



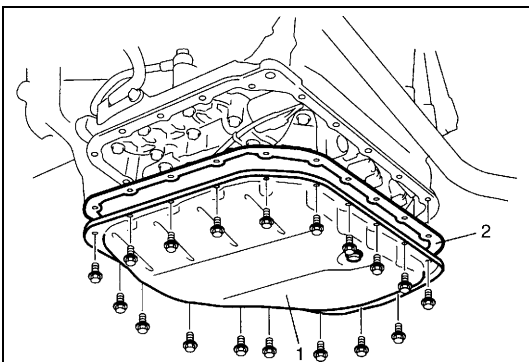
6) Remove input shaft speed sensor (1) and output shaft speed sensor (VSS) (2).

7) Remove harness bracket (3) and select cable clamp (4).



8) Remove fluid cooler pipes (1) and pipe union (2).

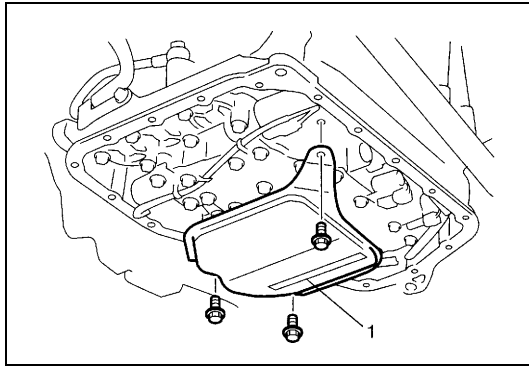
9) Remove fluid level gauge (3) and fluid filler tube (4).



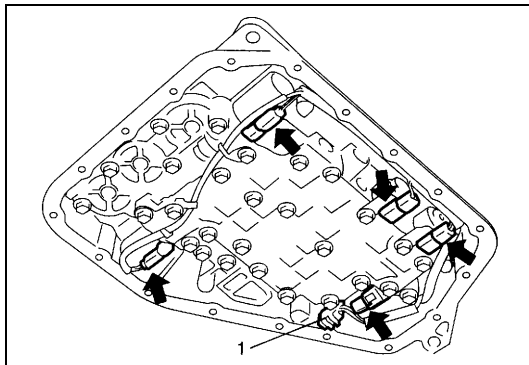
10) Remove oil pan (1) and oil pan gasket (2).

NOTE:

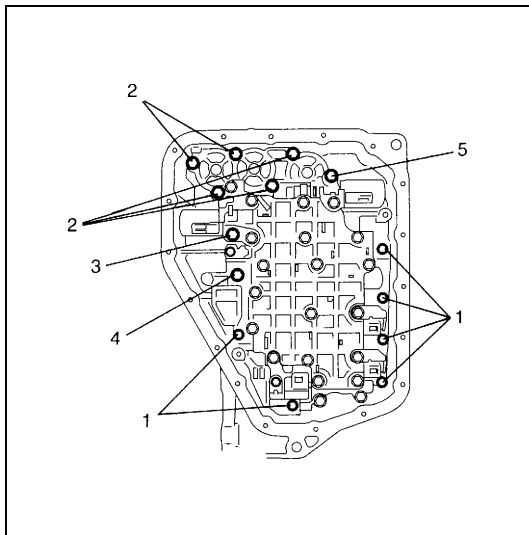
- For removal of oil pan, do not turn transaxle over as this will contaminate valve body with foreign materials in bottom of oil pan.
- When removing oil pan, tap around it lightly with plastic hammer. Do not force it off by using screwdriver or the like.



11) Remove oil strainer assembly (1).



12) Disconnect connectors from solenoid valves, and transmission fluid temperature sensor (1).



13) Remove valve body assembly bolts.

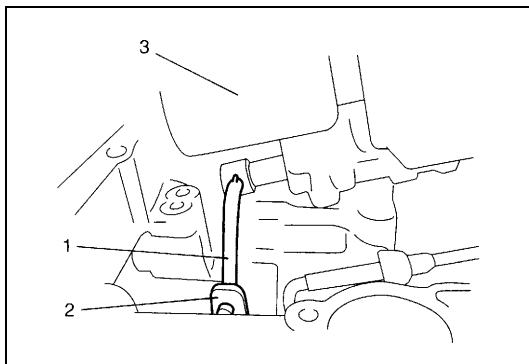
CAUTION:

Be careful not to let manual valve fall off when removing valve body assembly.

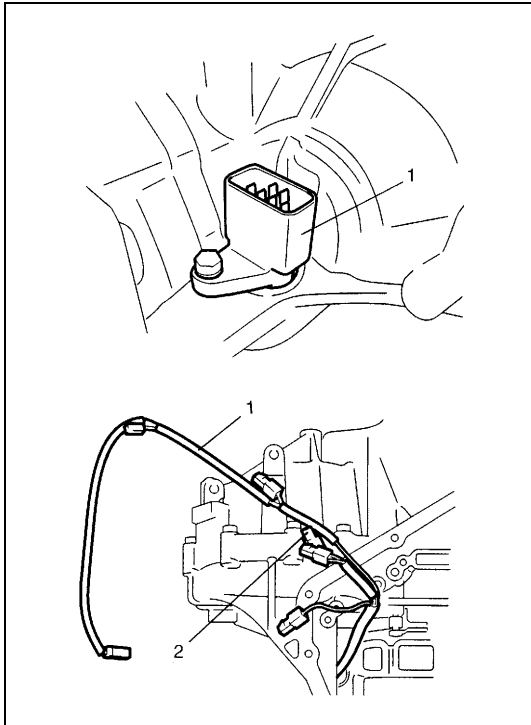
NOTE:

There are five kinds of bolts (bolts A, B, C, D and E) fixing valve body assembly

1.	Bolt A
2.	Bolt B
3.	Bolt C
4.	Bolt D
5.	Bolt E



14) Remove manual valve rod (1) from manual valve lever (2), then remove valve body assembly (3).

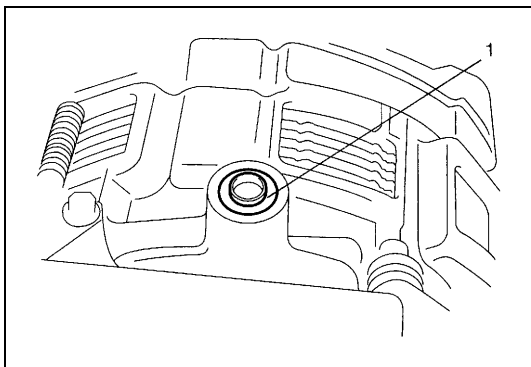


15) Remove valve body harness (1).

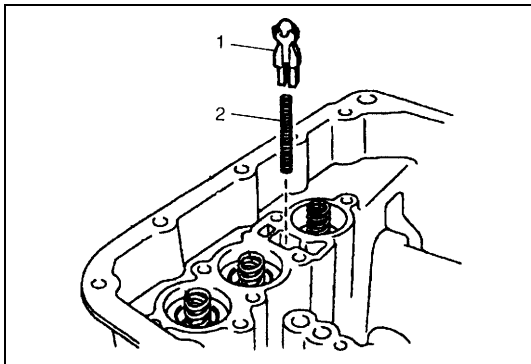
CAUTION:

When pulling valve body harness (1) out of transaxle case, take care not to damage transmission fluid temperature sensor (2) at narrow exit of case.

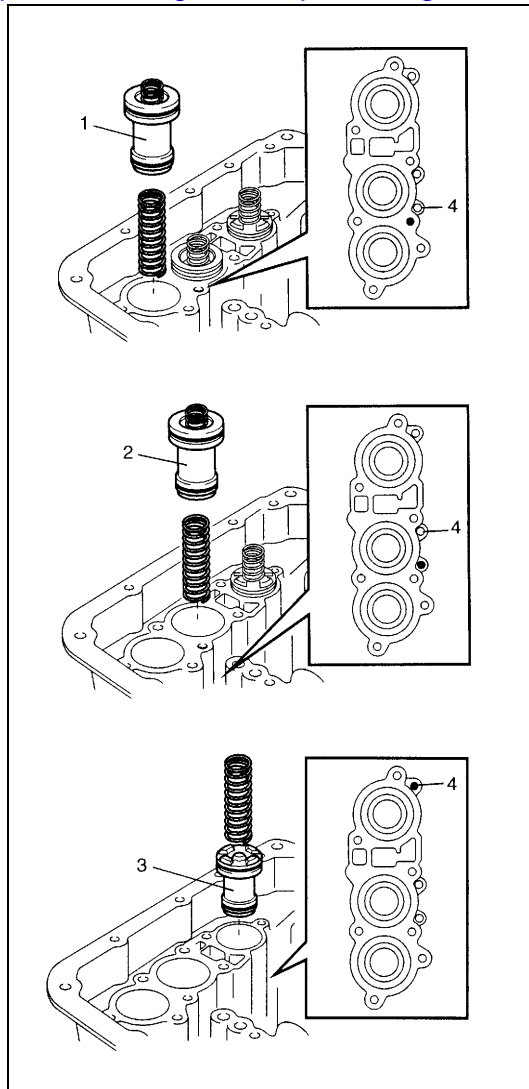
Careless sensor treatment might cause sensor malfunction.



16) Remove governor apply No.1 gasket (1).



17) Remove cooler check valve (1) and spring (2).

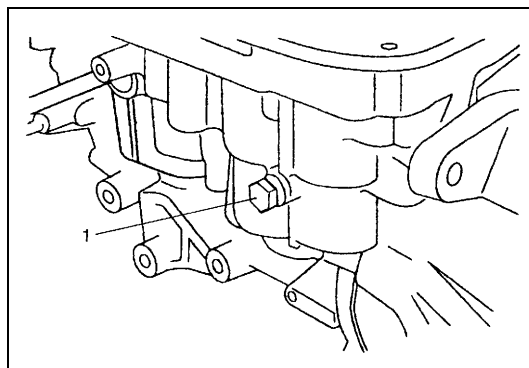


18) Remove accumulator pistons and springs.

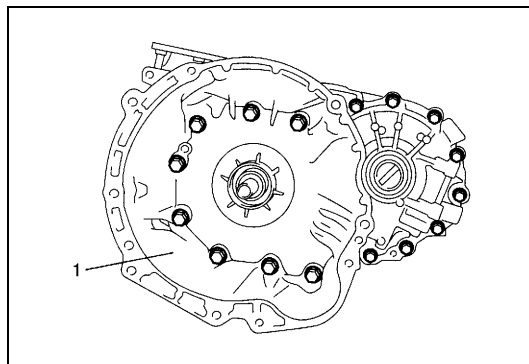
To remove C2 (1), C1 (2) and B1 (3) accumulator pistons and springs, position rag on pistons to catch each piston. To remove pistons, force low-pressure compressed air (1 kg/cm², 15 psi, 100 kPa, max) into hole (4) as shown in figure, and pop each piston into rag.

NOTE:

Do not push accumulator pistons with fingers or anything before removing them. Pushing them may cause compressed fluid in accumulator to spew out of hole and get to your face and clothes.

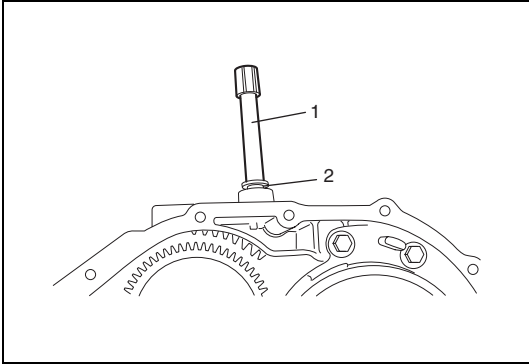


19) Remove transaxle case plug (1).



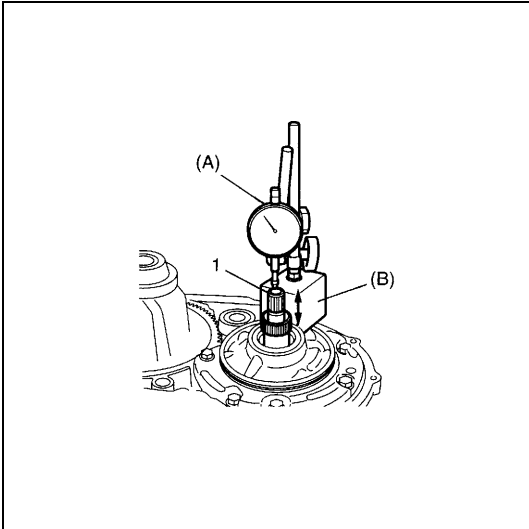
20) Remove torque converter housing bolts.

21) Remove torque converter housing (1) while tapping around it lightly with plastic hammer.



22) Remove breather hose (1).

23) Remove breather union (2).



24) Measure input shaft thrust play.

Apply dial gauge onto input shaft end (1) and measure thrust play of input shaft.

When input shaft thrust play is out of specification, select input shaft front thrust bearing with proper thickness from among the list below and replace it.

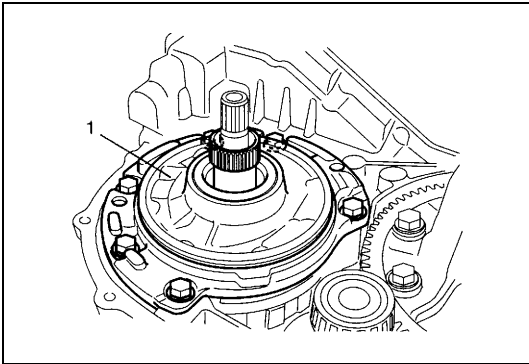
Special tool

(A): 09900-20607

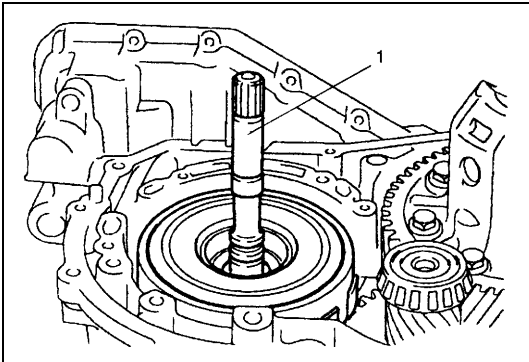
(B): 09900-20701

Input shaft thrust play: 0.3 – 0.9 mm (0.012 – 0.035 in.)

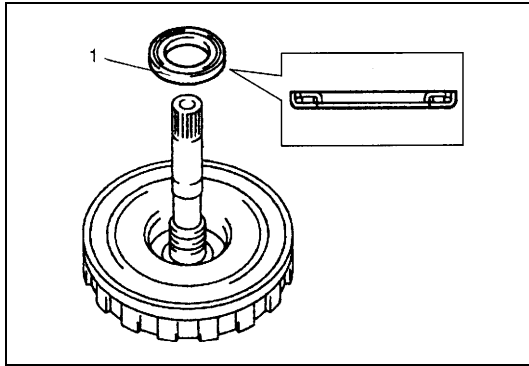
**Available input shaft front thrust bearing thickness
0.8, 1.4 mm (0.032, 0.055 in.)**



25) Remove oil pump assembly (1).



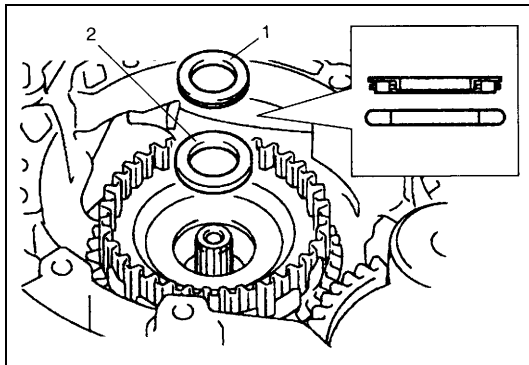
26) Remove direct clutch assembly (1).



27) Remove input shaft front thrust bearing (1).

NOTE:

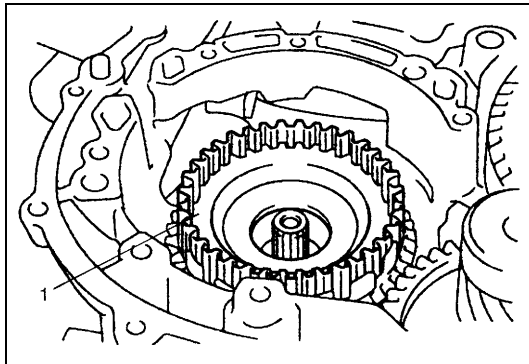
If input shaft front thrust bearing is not found, it may have been taken out with oil pump assembly.



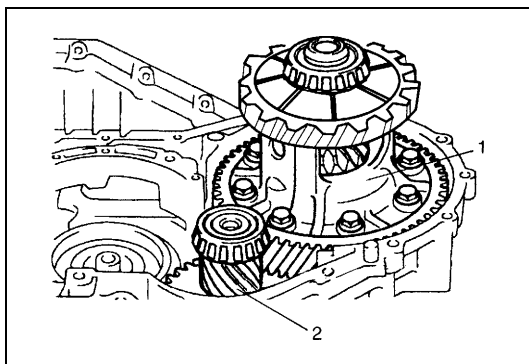
28) Remove input shaft rear thrust bearing (1) and thrust bearing race (2).

NOTE:

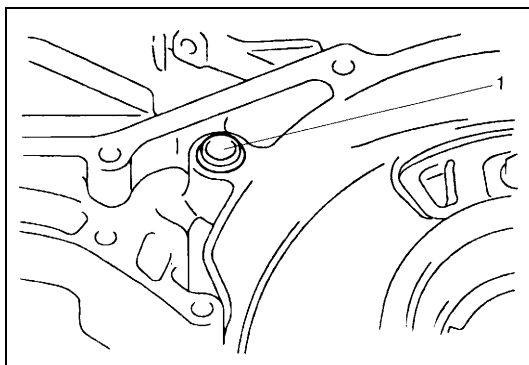
If input shaft rear thrust bearing is not found, it may have been taken out with direct clutch assembly.



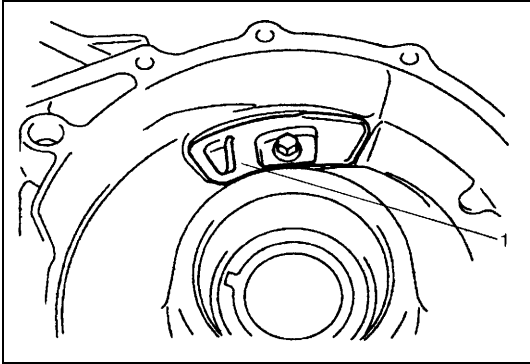
29) Remove direct clutch hub (1).



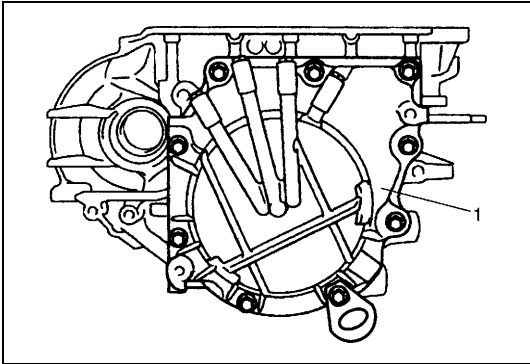
30) Remove differential assembly (1) and counter shaft assembly (2).



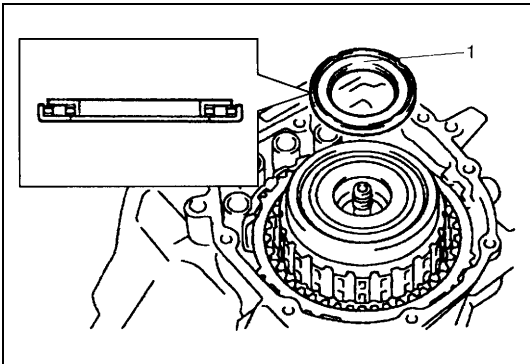
31) Remove governor apply No.2 gasket (1).



32) Remove fluid reservoir LH plate (1).



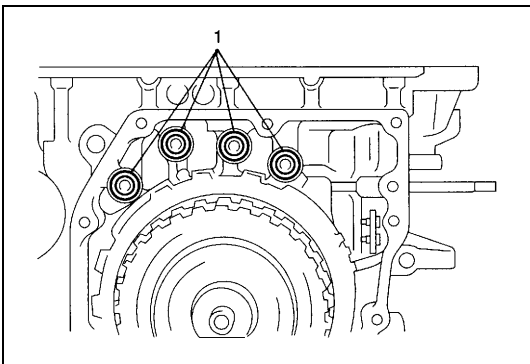
33) Turn over transaxle and remove rear cover assembly (1).



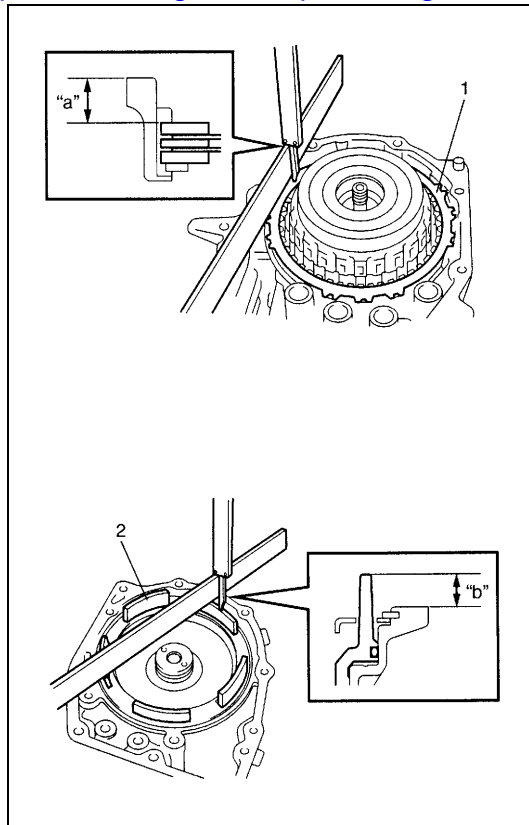
34) Remove reverse clutch drum thrust bearing (1).

NOTE:

If reverse clutch drum thrust bearing is not found, it may have been taken out with rear cover assembly.



35) Remove 2nd brake gasket (1).



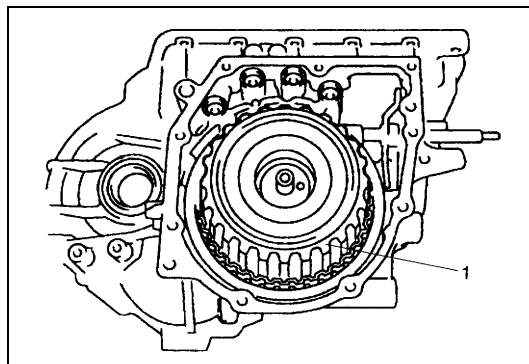
36) Measure O/D and 2nd coast brake piston stroke.

- Measure dimension "a" from mating surface of transaxle case to O/D and 2nd coast brake rear plate (1) using straightedge and micrometer caliper.
- Measure dimension "b" from O/D and 2nd coast brake piston (2) to rear cover assembly mating surface using straightedge and micrometer caliper.
- Calculate piston stroke from measured value of dimensions "a" and "b".
- Piston stroke = "a" – "b"

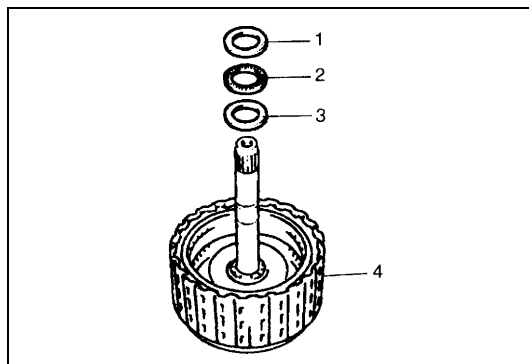
O/D and 2nd coast brake piston stroke

Standard: 0.65 – 1.05 mm (0.026 – 0.041 in.)

If piston stroke exceeds specification above, inspect and replace plates and discs.



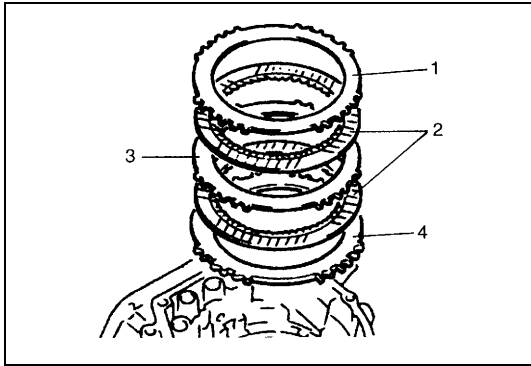
37) Remove forward and reverse clutch assembly (1).



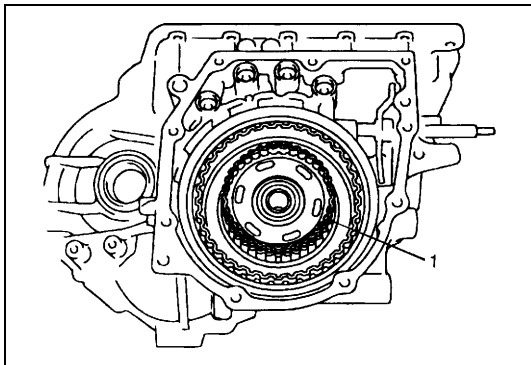
38) Remove intermediate shaft thrust bearing front race (1), thrust bearing (2) and rear race (3) from forward and reverse clutch assembly (4).

NOTE:

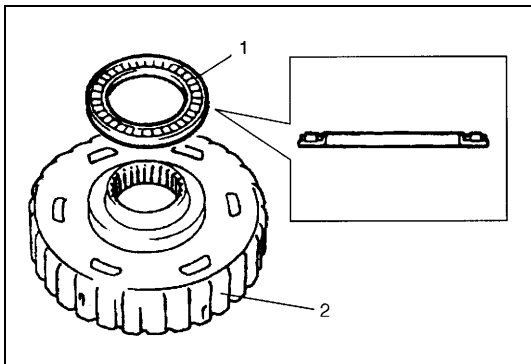
If intermediate shaft thrust bearing and/or races are not found on forward and reverse clutch assembly, they may have been left in transaxle.



- 39) Remove O/D and 2nd coast brake rear plate (1), discs (2), separator plate (3) and retaining plate (4).



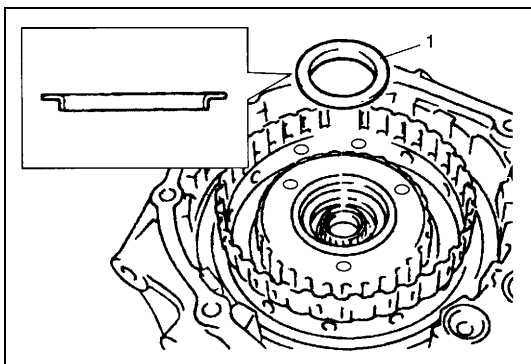
- 40) Remove forward clutch hub (1).



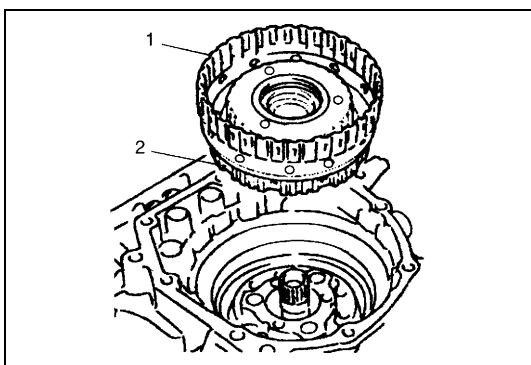
- 41) Remove rear sun gear thrust bearing (1) from forward clutch hub (2).

NOTE:

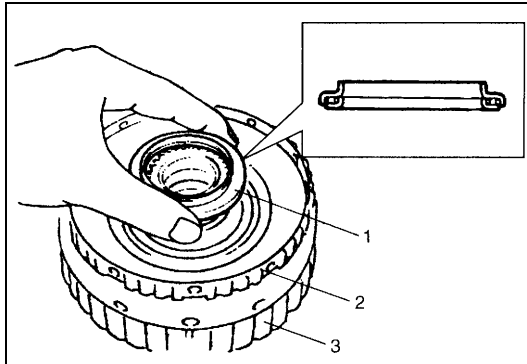
If rear sun gear thrust bearing is not found on forward clutch hub, it may have been left in transaxle.



- 42) Remove rear sun gear thrust bearing race (1).



- 43) Remove rear planetary sun gear subassembly (1) and one-way clutch No.1 assembly (2).

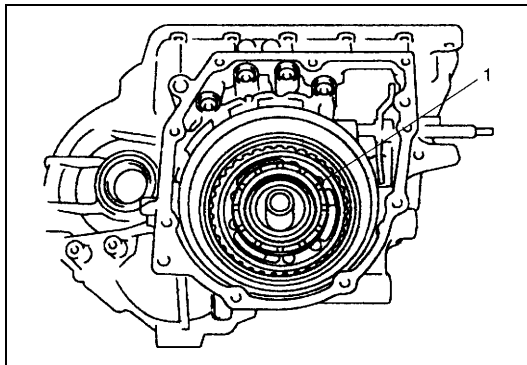


44) Remove planetary gear thrust bearing (1).

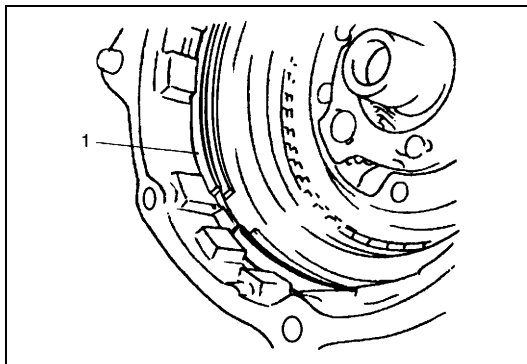
NOTE:

If planetary gear thrust bearing is not found on one-way clutch No.1 assembly, it may have been left in trasaxle.

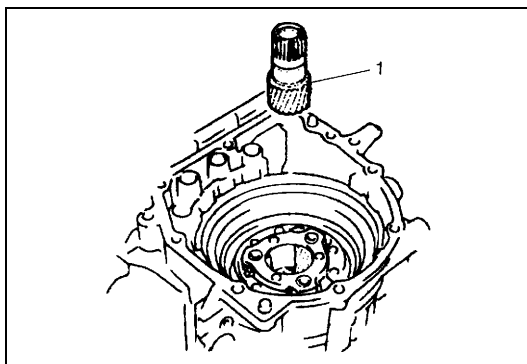
45) Remove one-way clutch No.1 assembly (2) from rear planetary sun gear subassembly (3).



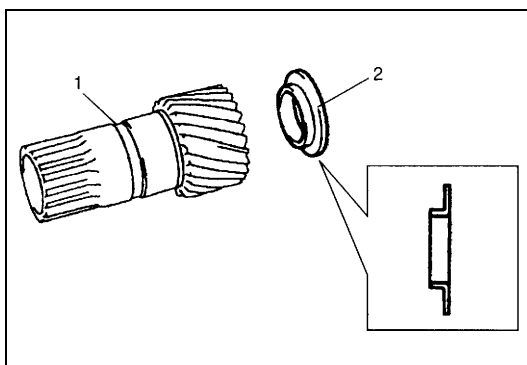
46) Remove planetary carrier thrust washer (1).



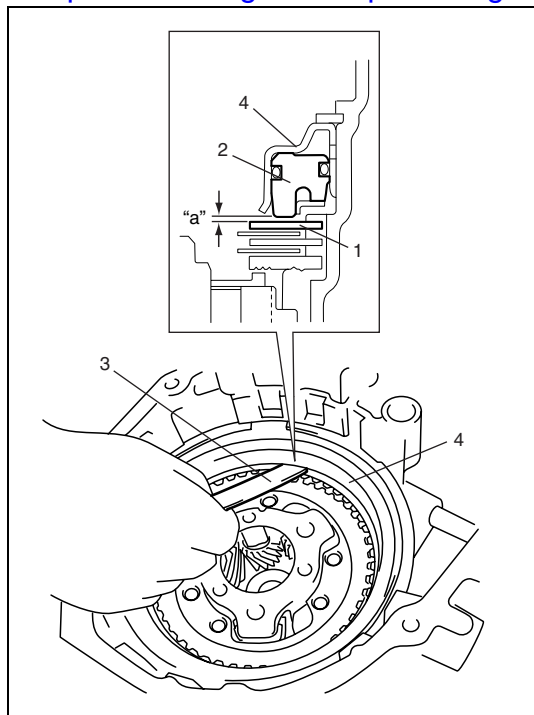
47) Remove O/D and 2nd coast brake retaining plate snap ring (1).



48) Remove front planetary sun gear (1).



49) Remove front sun gear thrust bearing race (2) from front planetary sun gear (1).

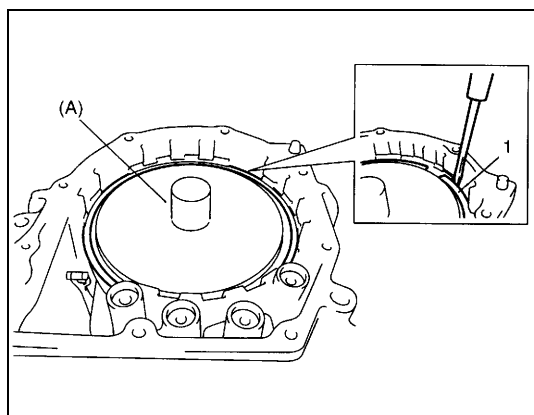


- 50) Before disassembling 2nd brake piston assembly (4), check 2nd brake piston stroke by measuring clearance between 2nd brake separator plate (1) and piston (2) with feeler gauge (3).

If clearance (piston stroke) is out of specification, replace brake discs and plates with new ones.

2nd brake piston stroke

"a": 0.40 – 1.25 mm (0.016 – 0.049 in.)



- 51) Using special tool and hydraulic press, remove 2nd brake piston snap ring (1).

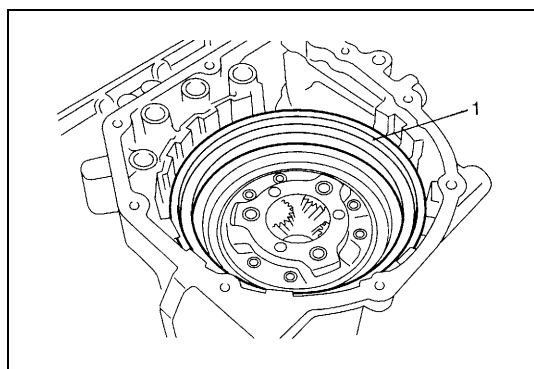
CAUTION:

Do not press 2nd brake piston assembly in over 0.4 mm (0.016 in.).

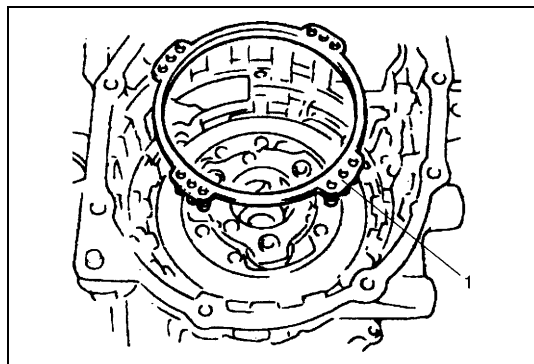
Excessive compression may cause damage to piston assembly, return spring, plates and/or discs.

Special tool

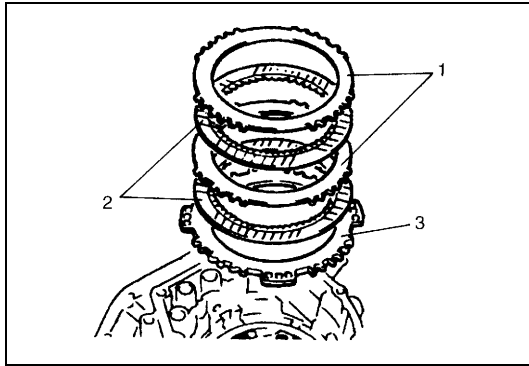
(A): 09926-96050



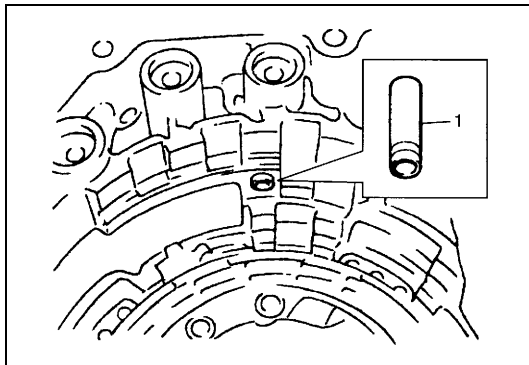
- 52) Remove 2nd brake piston assembly (1).



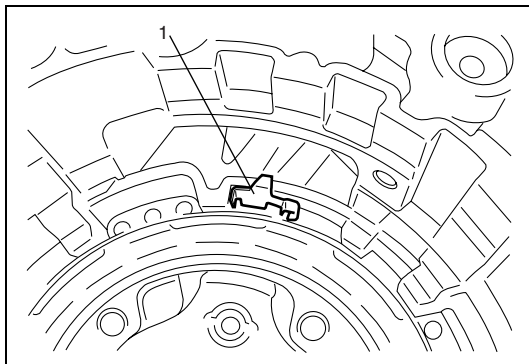
- 53) Remove 2nd brake return spring subassembly (1).



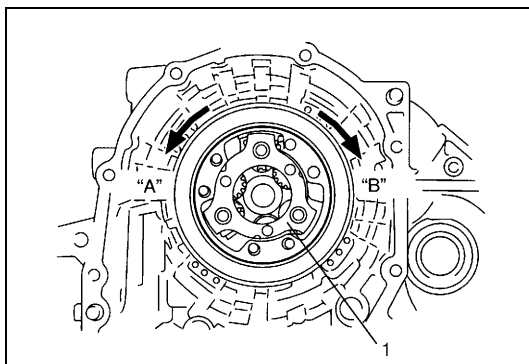
54) Remove 2nd brake separator plates (1) discs (2) and retaining plate (3).



55) Remove brake drum gasket (1).

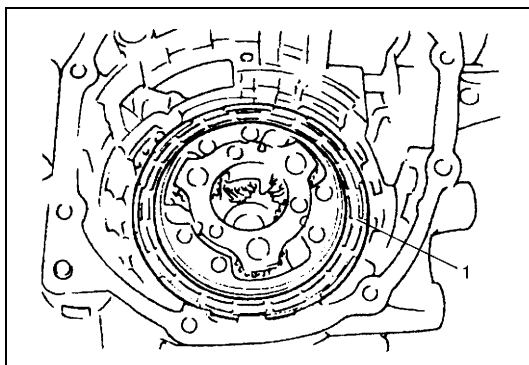


56) Remove one-way clutch outer race retainer (1).

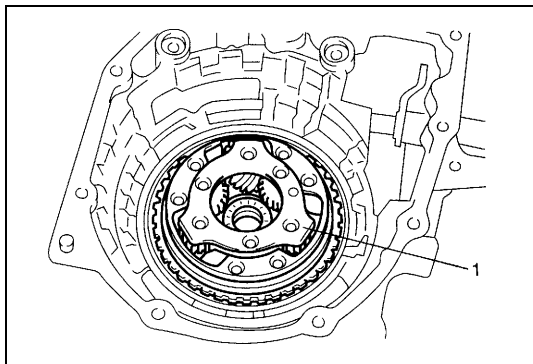


57) Check one-way clutch No.2 as follows.

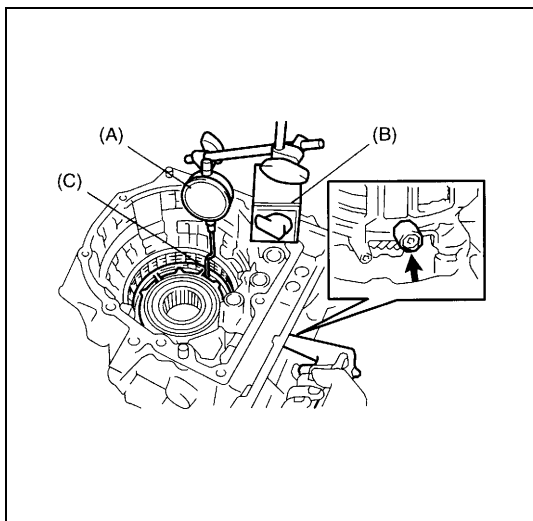
- Ensure planetary carrier (1) rotates only in counterclockwise direction "A", never in clockwise direction "B".
- If the planetary carrier rotates both ways or does not rotate either way, one-way clutch No.2 assembly will need to be replaced with new one-way clutch No.2 assembly.



58) Remove one-way clutch No.2 assembly (1).



59) Remove planetary gear assembly (1).



60) Measure 1st and reverse brake piston stroke

- Using special tool, measure 1st and reserve brake piston stroke when compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) is blown through oil hole.

Special tool

(A): 09900-20607

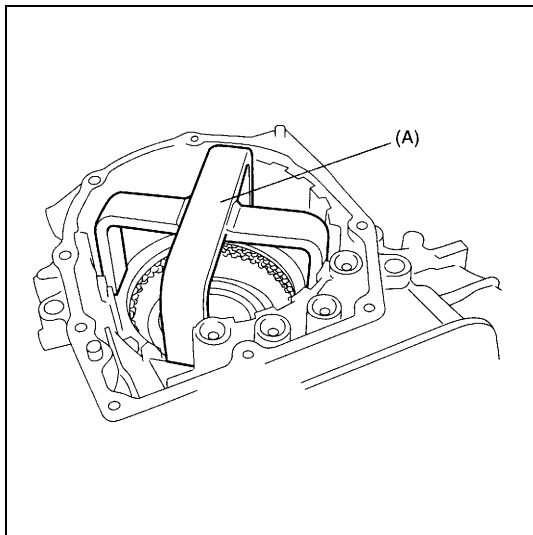
(B): 09900-20701

(C): 09952-06020

1st and reverse brake piston stroke

Standard: 0.79 – 1.49 mm (0.031 – 0.059 in.)

If piston stroke exceeds specified value, disassemble, inspect and replace discs and plates.



61) Remove snap ring while the 1st and reverse brake piston return springs are compressed using special tool and hydraulic press.

CAUTION:

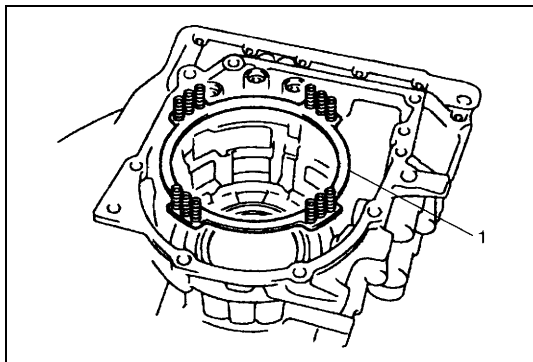
Do not press 1st and reverse brake return spring subassembly in over 0.8 mm (0.031 in.).

Excessive compression may cause damage to return spring subassembly, discs, plates and/or piston.

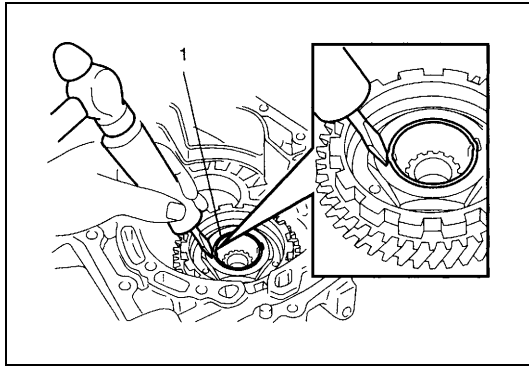
Special tool

(A): 09926-97620

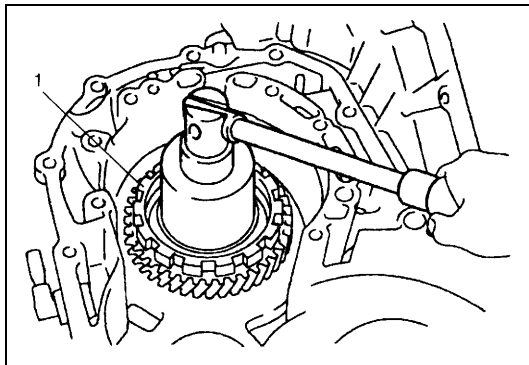
62) Remove 1st and reverse brake retaining plate, discs and separator plates.



63) Remove 1st and reverse brake return spring subassembly (1).



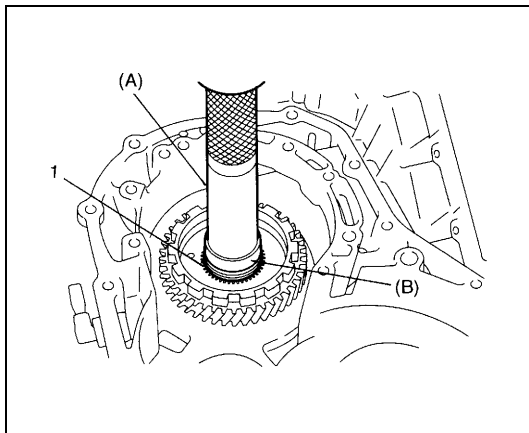
64) Turn over transaxle and uncaulk reduction drive gear nut (1).



65) Secure reduction drive gear (1) with parking lock pawl, then remove reduction drive gear nut.

CAUTION:

- It is recommended that this operation should be carried out on rubber mat to prevent damaging transaxle case.
- Never reuse removed nut.



66) Using special tools and hydraulic press, remove planetary ring gear subassembly (1).

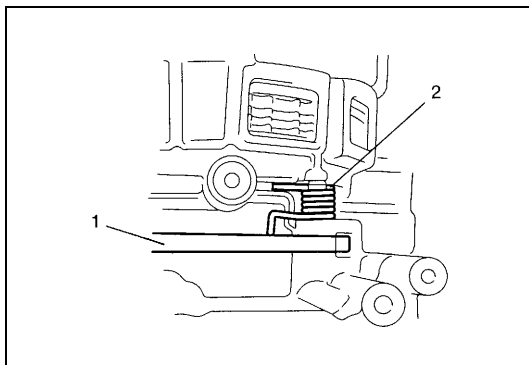
Special tool

(A): 09913-84510

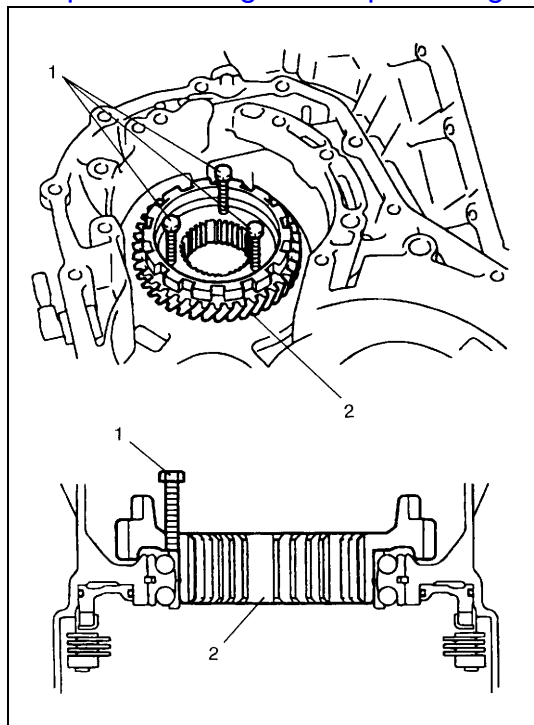
(B): 09923-78210

CAUTION:

Do not reuse planetary ring gear subassembly. Otherwise it may cause damage to planetary gear unit and/or reduction gears.



67) Remove parking lock pawl shaft, then spring (2) and parking lock pawl (1).

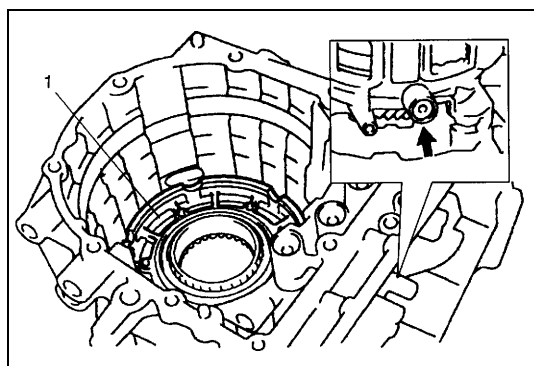


68) Screwing 3 bolts (1), remove reduction drive gear (2).

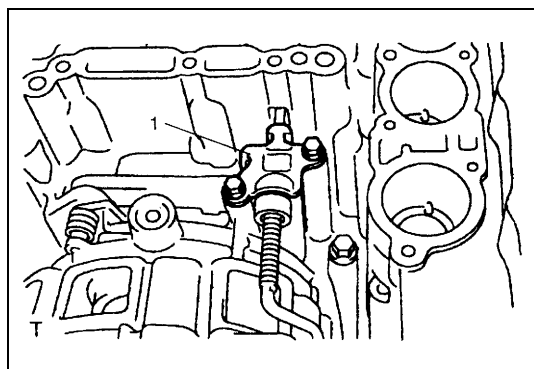
Bolt	Length
1	30 mm (1.20 in.)

CAUTION:

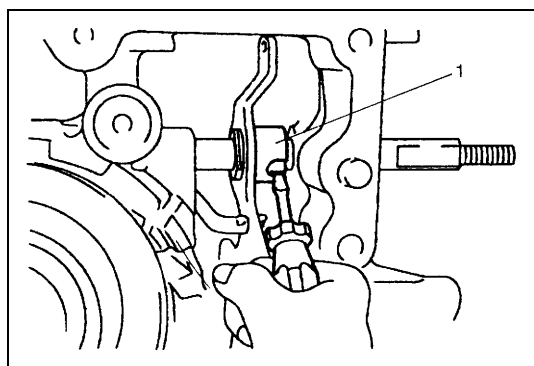
Screw 3 bolts into reduction drive gear uniformly, or reduction drive gear, bearing and transaxle case may be damaged.



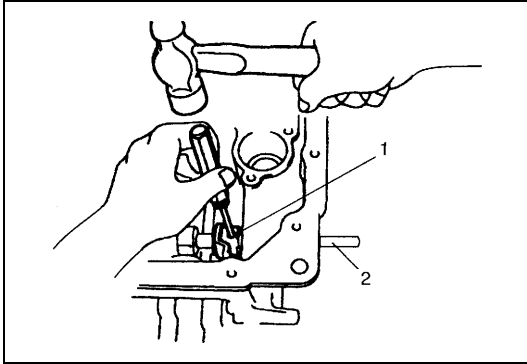
69) Blowing compressed air from oil hole of oil pump, remove 1st and reverse brake piston (1).



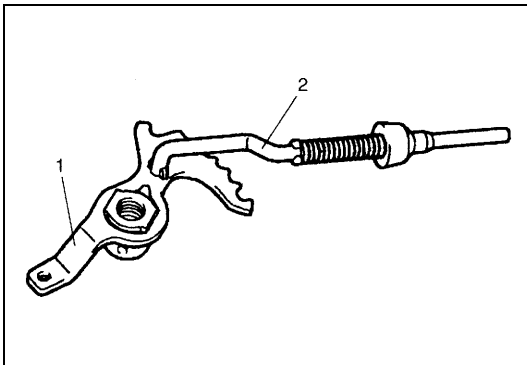
70) Remove parking lock pawl bracket (1).



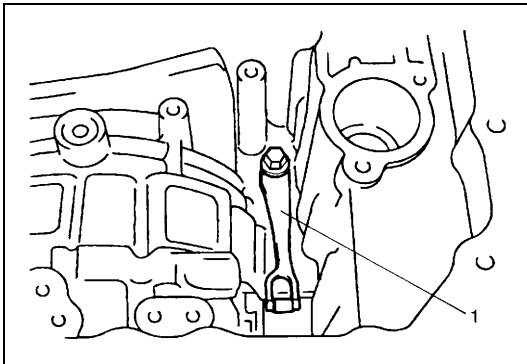
71) With slotted screw driver, cut and unfold manual valve lever spacer (1) and proceed to remove manual valve lever spacer.



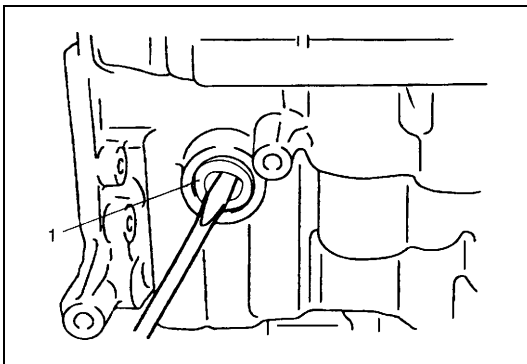
- 72) Using spring pin remover with 3 mm (0.12 in.) in diameter and hammer, drive out manual valve lever pin (1).
- 73) Remove manual shift shaft (2).



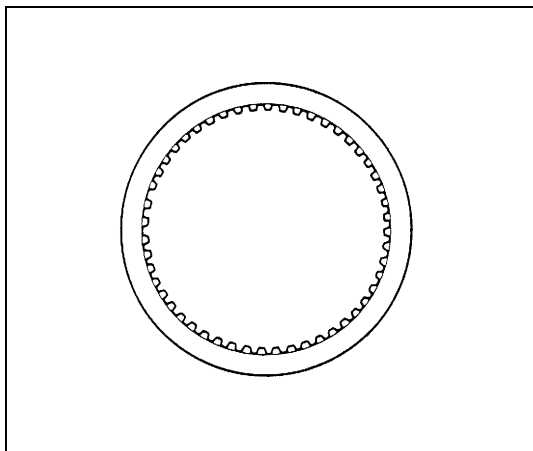
- 74) Remove parking lock pawl rod (2) from manual valve lever (1).



- 75) Remove manual detent spring (1).



- 76) Remove manual shift shaft oil seal (1).

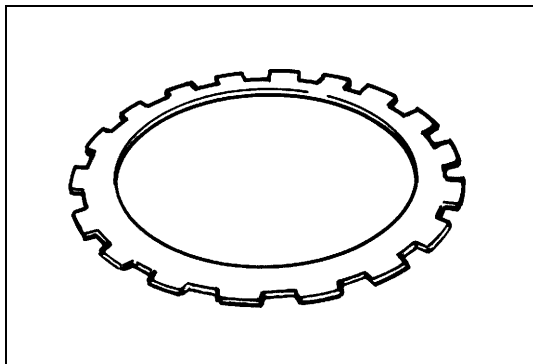
Inspection**Brake Discs**

Dry and inspect them for pitting, burn flaking, significant wear, glazing, cracking, charring and chips or metal particles imbedded in lining.

If discs show any of the above conditions, replacement is required.

NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.

Brake Separator Plates and Retaining Plates

Dry plates and check for discoloration. If plate surface is smooth and even color smear is indicated, plate should be reused. If severe heat spot discoloration or surface scuffing is indicated, plate must be replaced.

Brake Return Spring Subassembly

Measure brake return springs.

Free length of 1st & reverse brake return spring

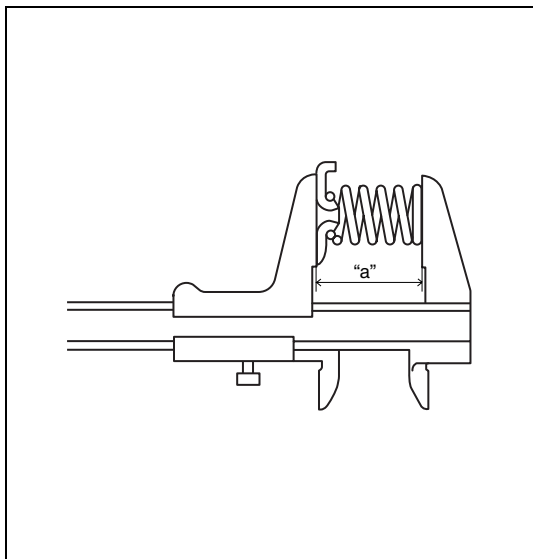
“a”: 21.71 mm (0.855 in.)

Free length of 2nd brake return spring

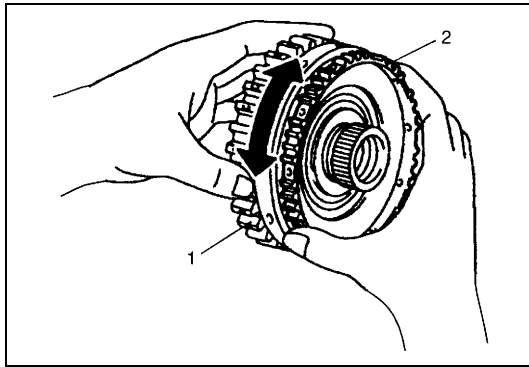
“a”: 15.85 mm (0.624 in.)

NOTE:

- Do not apply excessive force when measuring spring free length
- Perform measurement at several points.



Evidence of extreme heat or burning in the area of clutch may have caused springs to take heat set and would require their replacement.

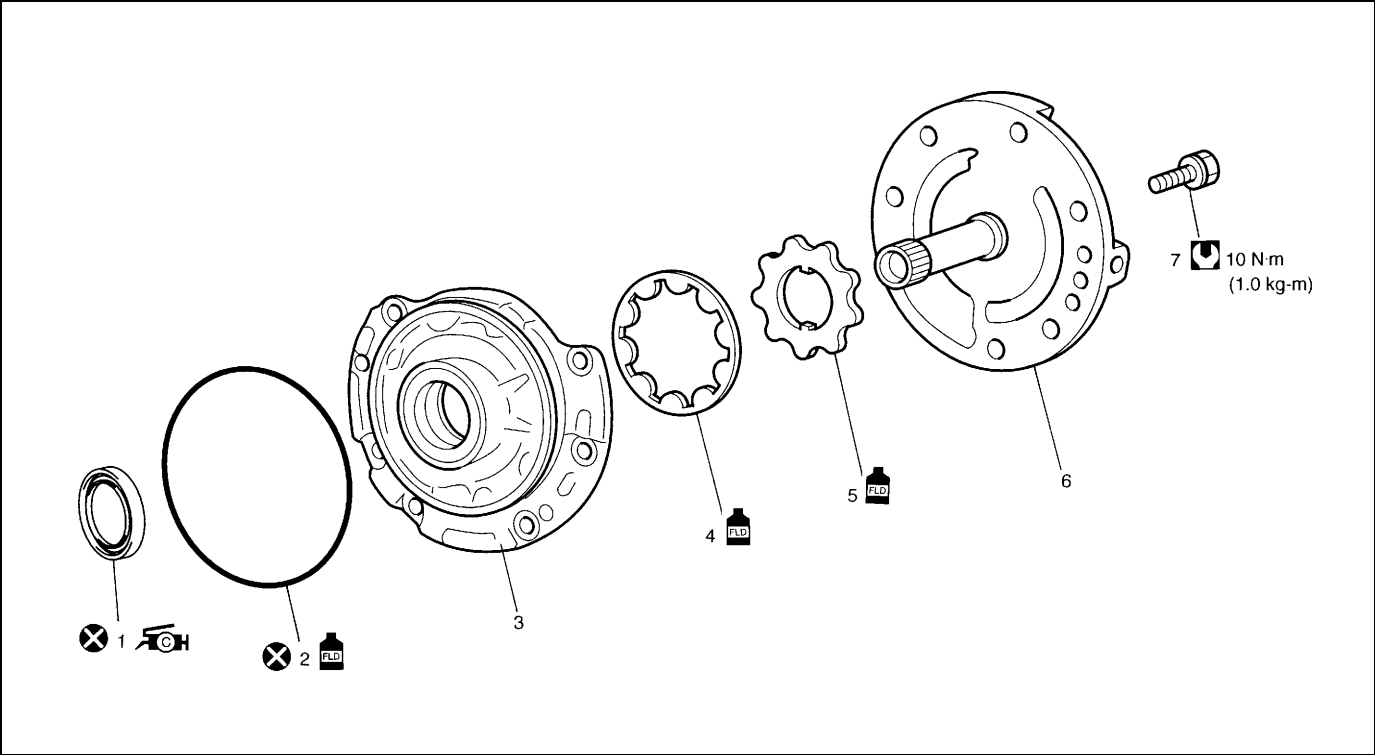
One-way Clutch No.1 Assembly





- 1) Install one-way clutch No.1 assembly (2) to rear planetary sun gear subassembly (1).
- 2) Securing rear planetary sun gear subassembly, ensure that one-way clutch No.1 assembly rotates only in one direction. If the one-way clutch rotates in both directions or it does not rotate in either direction, replace it with new one.

Disassembly/Assembly of Subassembly**CAUTION:**

- Keep component parts in group for each subassembly and avoid mixing them up.
- Clean all parts with cleaning solvent thoroughly and air dry them.
- Use kerosene or automatic transaxle fluid as cleaning solvent.
- Do not use wiping cloths or rags to clean or dry parts.
- All oil passages should be blown out and checked to make sure that they are not obstructed.
- Keep face and eyes away from solvent spray while air blowing parts.
- Check mating surface for irregularities and remove them, if any, and clean it again.
- Soak new clutch discs and brake discs in transaxle fluid for at least 2 hours before assembly.
- Replace all gaskets and O-ring with new ones.
- Apply automatic transaxle fluid to all O-rings.
- When installing seal ring, be careful so that it is not expanded excessively, extruded or caught.
- Replace oil seals that are removed and apply grease to their lips.
- Before installing, be sure to apply automatic transaxle fluid to sliding, rolling and thrusting surface of all component part. Also after installation, make sure to check each part for proper operation.
- Always use torque wrench when tightening bolts.

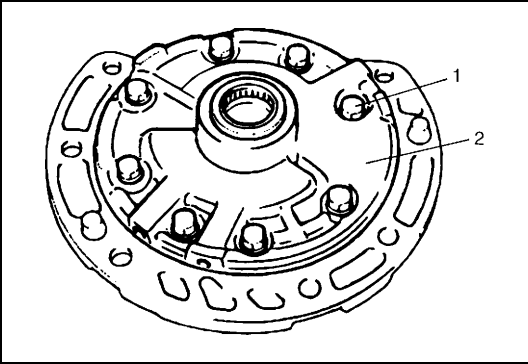
Oil pump assembly

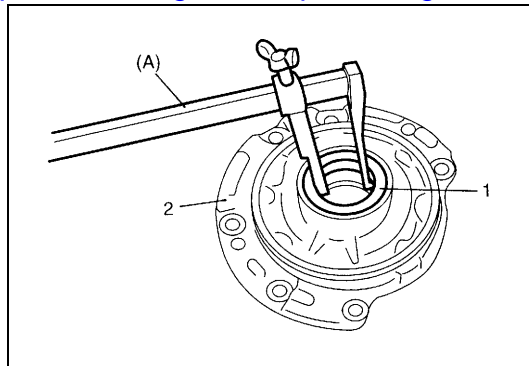


	1. Oil seal : Apply grease 99000-25030 to oil seal lip.	7. Oil pump subassembly bolts
	2. O-ring	 Apply automatic transaxle fluid.
	3. Oil pump body	 Tightening torque
	4. Oil pump driven gear	 Do not reuse.
	5. Oil pump drive gear	
	6. Stator shaft assembly	

Disassembly

- 1) Remove O-ring from pump body.
- 2) Remove 8 oil pump subassembly bolts (1) and stator shaft assembly (2).





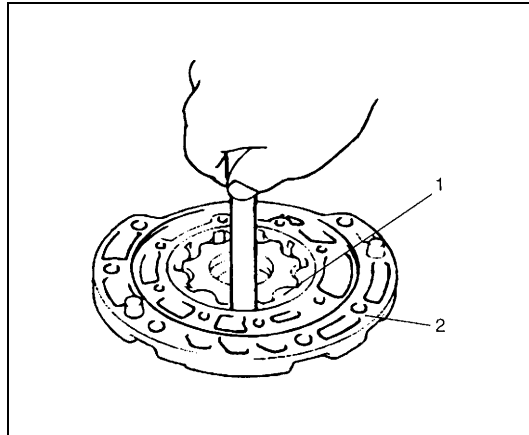
3) Remove oil seal (1) using special tool.

Special tool

(A): 09913-50121

2. Oil pump body

Inspection



1) Check body clearance of driven gear.

Push driven gear to one side of body Using feeler gauge, measure clearance between driven gear and body.

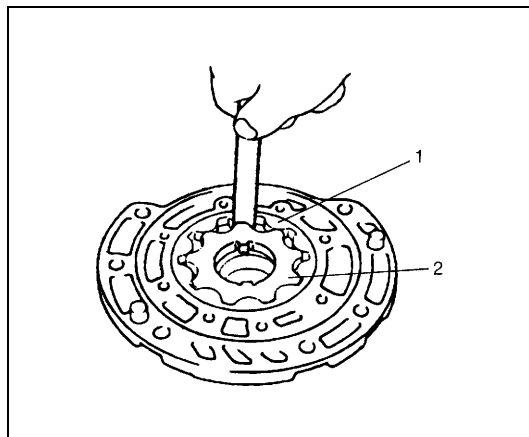
If clearance exceeds its standard value, replace oil pump assembly.

Clearance between oil pump driven gear and oil pump body

Standard: 0.1 – 0.17 mm (0.0039 – 0.0067 in.)

1. Oil pump driven gear

2. Oil pump body



2) Check tip clearance between drive and driven gear.

Using a feeler gauge, measure clearance between drive and driven gear tips.

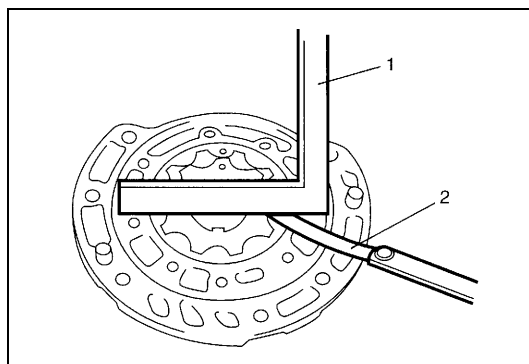
If clearance exceeds its standard value, replace oil pump assembly.

Tip clearance between oil pump drive gear and oil pump driven gear

Standard: 0.07 – 0.15 mm (0.0028 – 0.0059 in.)

1. Oil pump driven gear

2. Oil pump drive gear



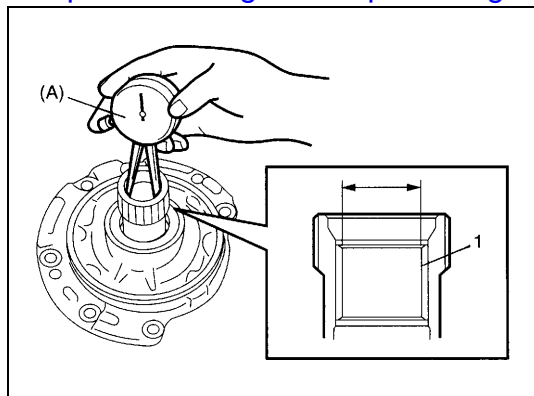
3) Check side clearance of both gears.

Using straightedge (1) and feeler gauge (2), measure side clearance between gears and pump body.

If clearance exceeds its standard value, replace oil pump assembly.

Side clearance between gears and oil pump body

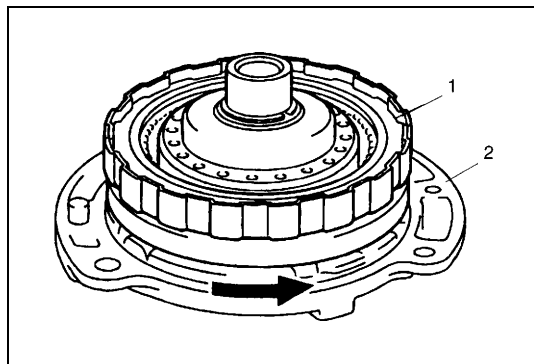
Standard: 0.02 – 0.05 mm (0.0008 – 0.0019 in.)



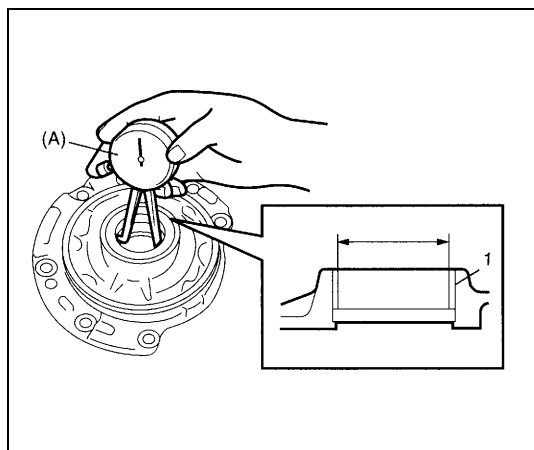
- 4) Using special tool, measure stator shaft bush bore.
If measured stator shaft bush bore is out of specifications, replace oil pump assembly with new one.

Special tool**(A): 09900-20605****Stator shaft bush bore****Standard: 18.424 – 18.450 mm (0.7254 – 0.7264 in.)**

1. Stator shaft bush



- 5) Install direct clutch assembly (1) to stator shaft assembly (2), then ensure that direct clutch assembly turns smoothly.
If unsmooth rotation or noise are found in oil pump assembly, replace oil pump assembly with new one. This check should also be done to input shaft assembly and replace input shaft assembly if necessary.

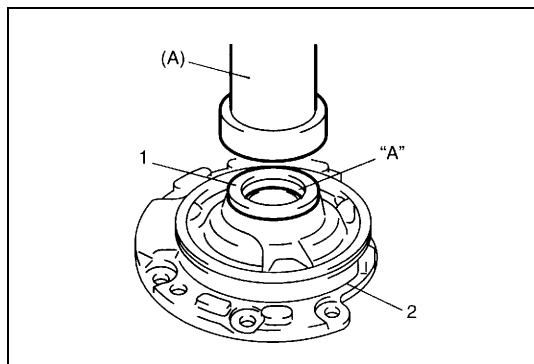


- 6) Using special tool, measure oil pump body bush bore.

Special tool**(A): 09900-20605****Oil pump body bush bore****Standard: 38.113 – 38.138 mm (1.5005 – 1.5015 in.)**

If measured oil pump body bush bore is out of specifications, replace oil pump assembly with new one. Torque converter also needs to be checked. Replace torque converter, if necessary.

1. Oil pump body bush

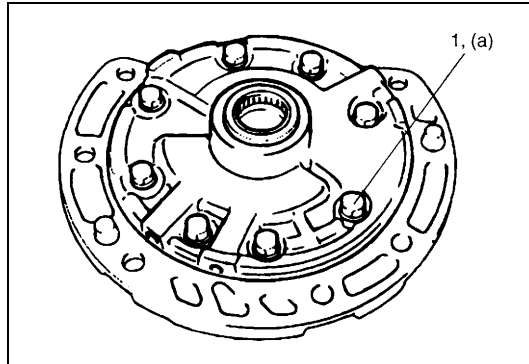
Assembly

- 1) Install new oil pump body oil seal (1).
Use special tool and hammer to install it, and then apply grease to its lip.

Special tool**(A): 09913-85210****“A”: Grease 99000-25030**

1. Oil pump body

- 2) Install driven gear and drive gear to oil pump body after applying A/T fluid.

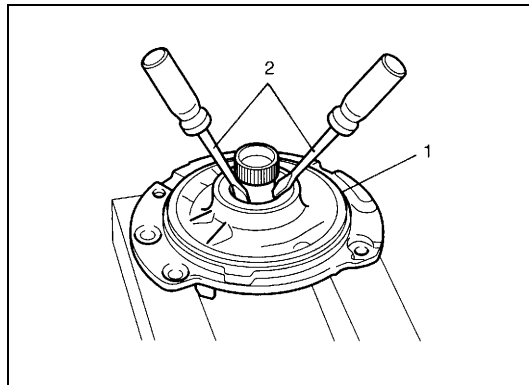


- 3) Install stator shaft assembly to oil pump body and tighten 8 pump subassembly bolts (1) to specification.

Tightening torque

Oil pump subassembly bolt

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 4) After applying A/T fluid to new O-ring, install it to oil pump body.

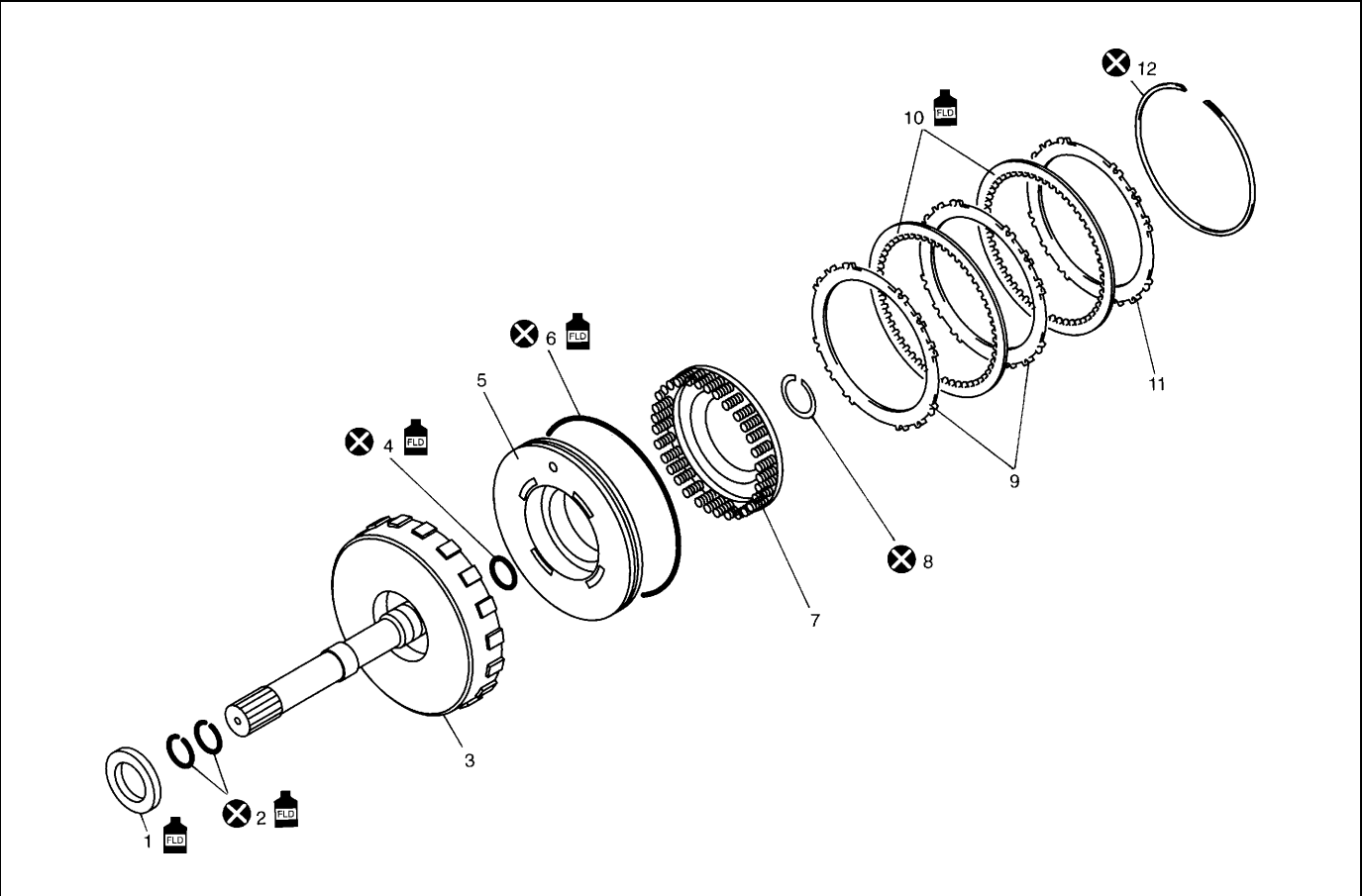
CAUTION:



Do not damage oil seal with slotted screw driver.

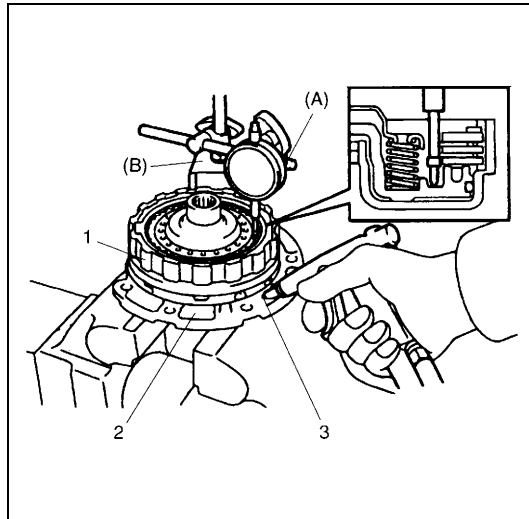
- 5) Check drive gear for smooth rotation by using slotted screw driver.

- | |
|-------------------------|
| 1. Oil pump assembly |
| 2. Slotted screw driver |

Direct clutch assembly



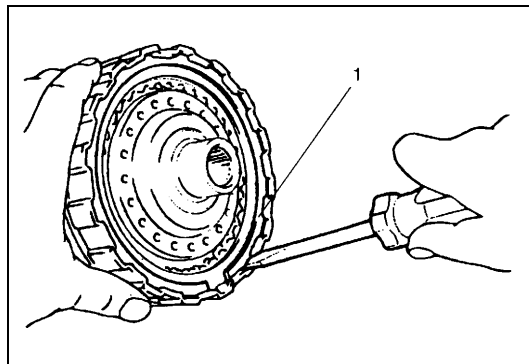
1. Input shaft front thrust bearing	8. Shaft snap ring
2. Input shaft seal ring	9. Direct clutch separator plate
3. Input shaft subassembly	10. Direct clutch disc
4. Inner O-ring	11. Direct clutch retaining plate
5. Direct clutch piston	12. Plate snap ring
6. Outer O-ring	 Apply automatic transaxle fluid.
7. Direct clutch return spring subassembly	 Do not reuse.

Preliminary Check

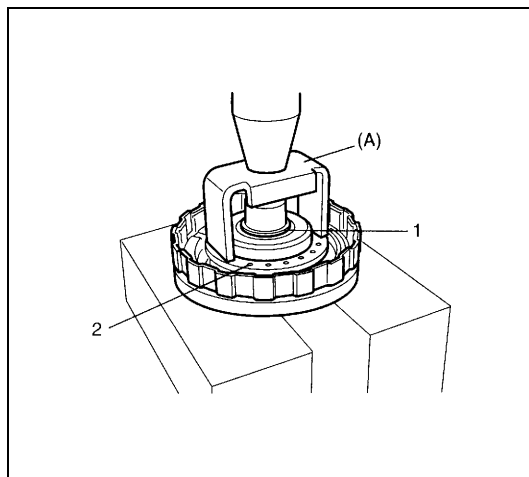
- 1) Install direct clutch assembly (1) to oil pump assembly (2), blow in air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) through oil hole (3) of oil pump assembly with special tool attached on upper surface of direct clutch piston, and measure piston stroke of direct clutch.

Special tool**(A): 09900-20607****(B): 09900-20701****Direct clutch piston stroke: 0.4 – 0.7 mm (0.016 – 0.027 in.)**

If piston stroke exceeds specified value, disassemble, inspect and replace inner parts.

Disassembly

- 1) Remove plate snap ring (1), then remove direct clutch retaining plate, discs and separator plates.



- 2) Using special tool and hydraulic press, remove shaft snap ring (1).

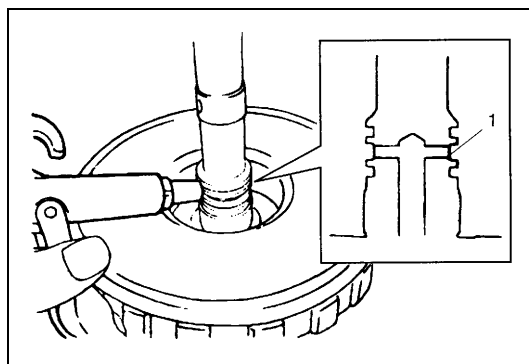
CAUTION:

Do not press direct clutch return spring subassembly in over 0.7 mm (0.027 in.).

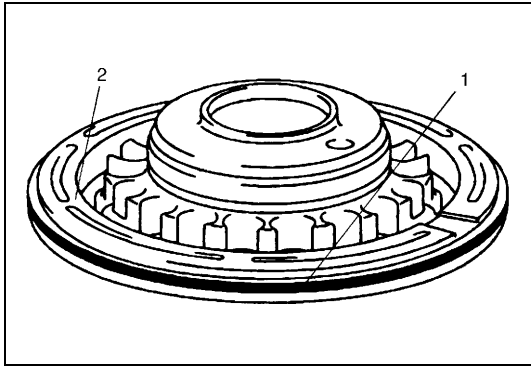
Excessive compression may cause damage to direct clutch return spring subassembly and/or piston.

Special tool**(A): 09926-98310**

- 3) Remove direct clutch return spring assembly (2).

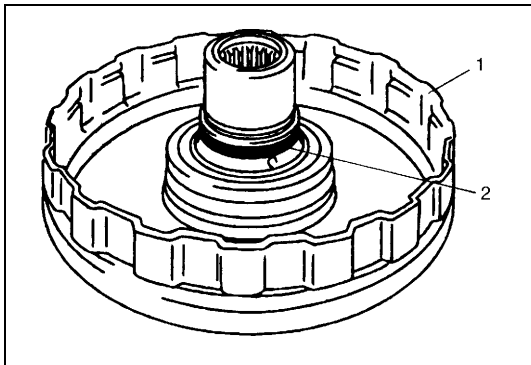


- 4) Using a finger to block oil hole (1), apply compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) to opposite hole, which will assist in removal of the clutch piston.



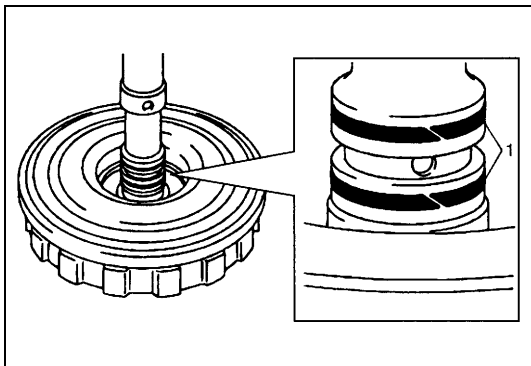
5) Remove outer O-ring (1).

2. Direct clutch piston



6) Remove inner O-ring (2).

1. Input shaft subassembly



7) Remove input shaft seal rings (1).

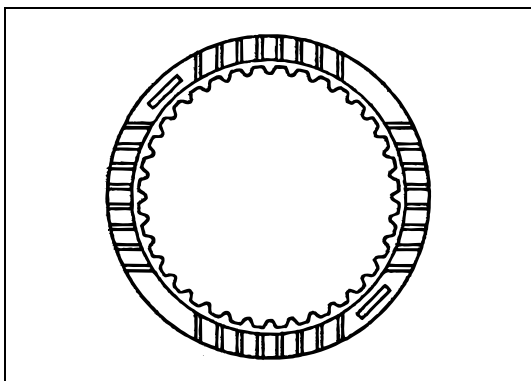
Inspection

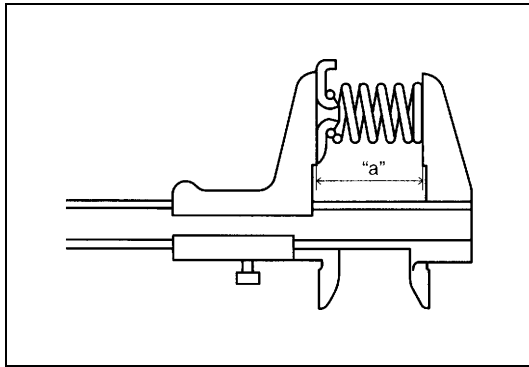
Clutch Discs, Plates and Retaining Plate

Check that sliding surfaces of discs, separator plates and retaining plate are not worn hard or burnt. If necessary, replace.

NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.



Direct Clutch Return Spring Subassembly

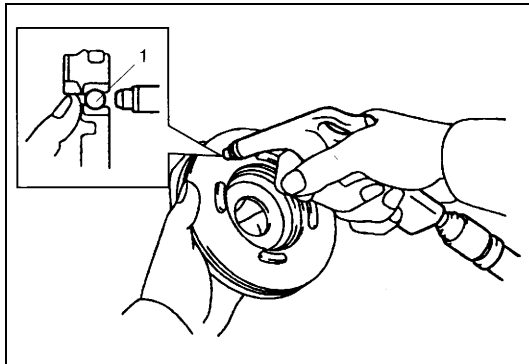
Measure free length of direct clutch return spring.

Free length of direct clutch return spring

"a": 36.04 mm (1.419 in.)

NOTE:

- Do not apply excessive force when measuring spring free length.
- Perform measurement at several points.

Direct Clutch Piston

Shake direct clutch piston lightly and check that check ball (1) is not stuck. Blow in low-pressure air (Max 100 kPa, 1 kg/cm², 15 psi) to check ball to check that there is no air leakage.

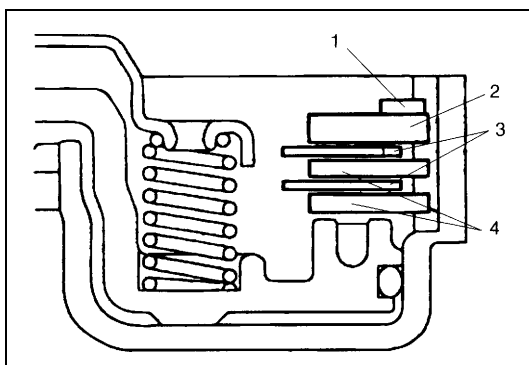
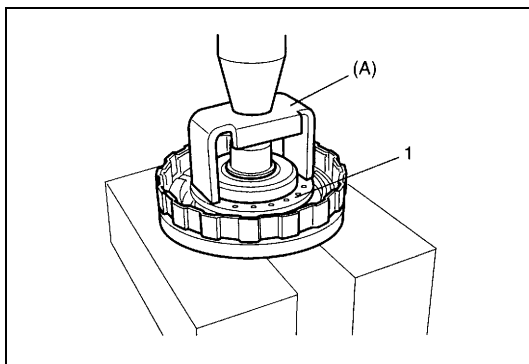
Assembly

Reverse disassembly procedure for assembly, noting the following points.

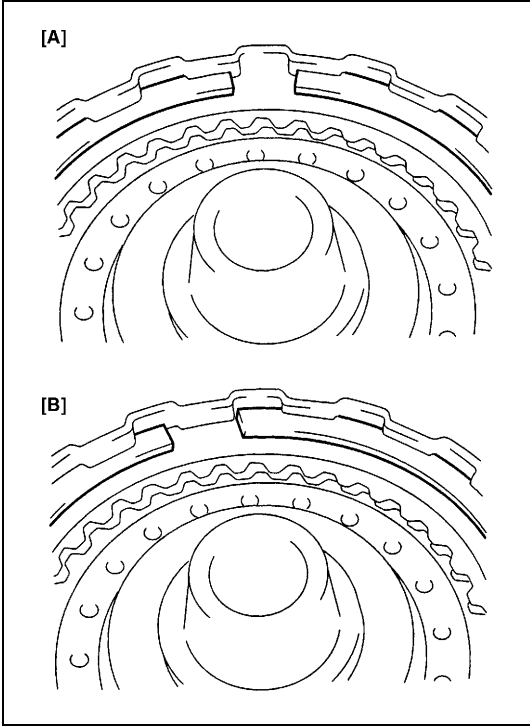
- Use new seal ring and O-ring. Apply A/T fluid before installation.
- Do not damage direct clutch return spring subassembly (1) and piston by pressing in direct clutch return spring subassembly passing through its original installing position over 0.7 mm (0.027 in.).

Special tool

(A): 09926-98310

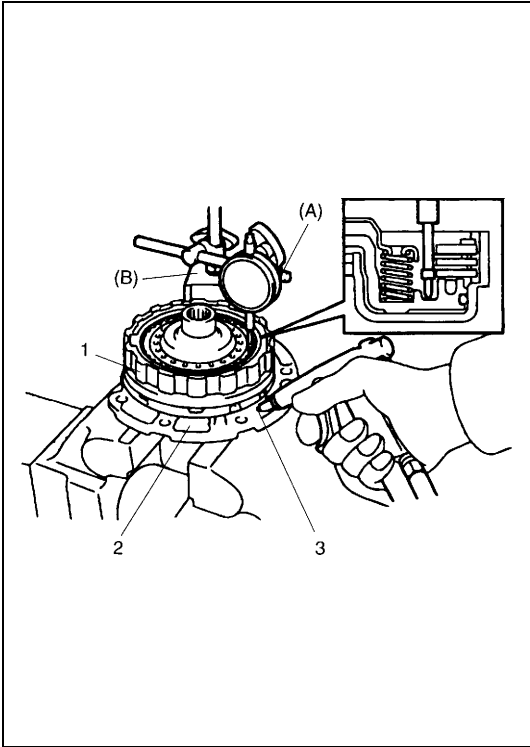


- Apply A/T fluid to direct clutch separator plates (4), discs (3) and retaining plate (2).
- Install direct clutch separator plates (4) discs (3) retaining plate (2) and snap ring (1) to input shaft subassembly.



- Install plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A] Correct
[B] Incorrect



- After assembly, measure direct clutch piston stroke.

Special tool

(A): 09900-20607

(B): 09900-20701

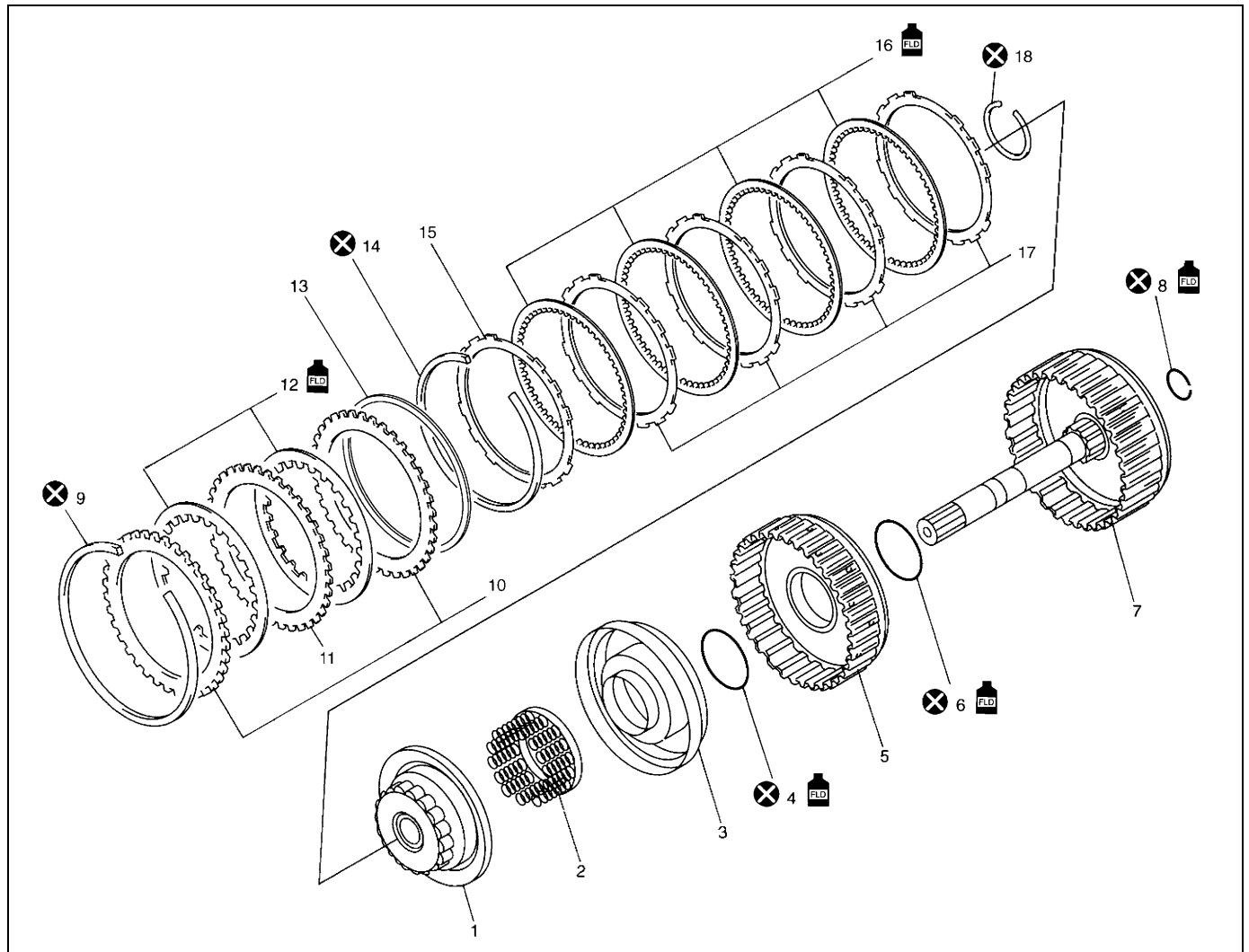
Direct clutch piston stroke: 0.4 – 0.7 mm (0.016 – 0.027 in.)



When piston strike is out of specification, select direct clutch retaining plate with suitable thickness from among the list below and replace it.

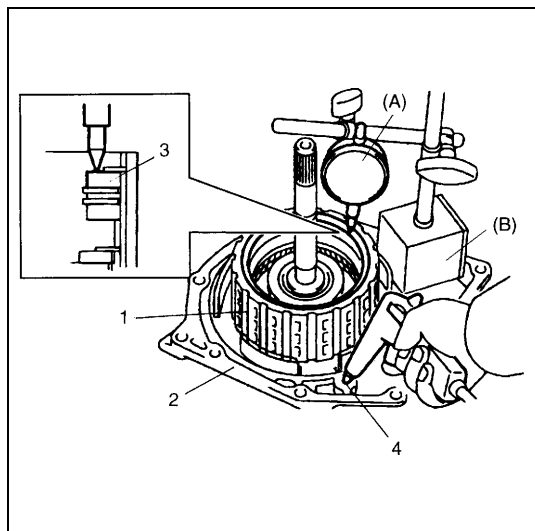
Available direct clutch retaining plate thickness

Thickness	Identification mark
2.8 mm	4
3.0 mm (0.118 in.)	1
3.2 mm (0.126 in.)	2
3.4 mm (0.134 in.)	3

1. Direct clutch assembly
2. Oil pump assembly
3. Oil hole

Forward and reverse clutch assembly

1. Forward clutch balancer	11. Reverse clutch separator plate
2. Forward clutch return spring subassembly	12. Reverse clutch disc
3. Forward clutch piston	13. Reverse clutch cushion plate
4. Forward clutch piston O-ring	14. Forward clutch plate snap ring
5. Forward clutch drum	15. Forward clutch retaining plate
6. Forward clutch drum O-ring	16. Forward clutch disc
7. Intermediate shaft subassembly	17. Forward clutch separator plate
8. Intermediate shaft seal ring	18. Balancer snap ring
9. Reverse clutch plate snap ring	 Apply automatic transaxle fluid.
10. Reverse clutch retaining plate	 Do not reuse.

Preliminary Check

- 1) Install forward and reverse clutch assembly (1) to transaxle rear cover (2), blow in compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) through oil hole (4) of transaxle rear cover with the special tool attached on the upper surface of reverse clutch retaining plate (3), and measure reverse clutch piston stroke.

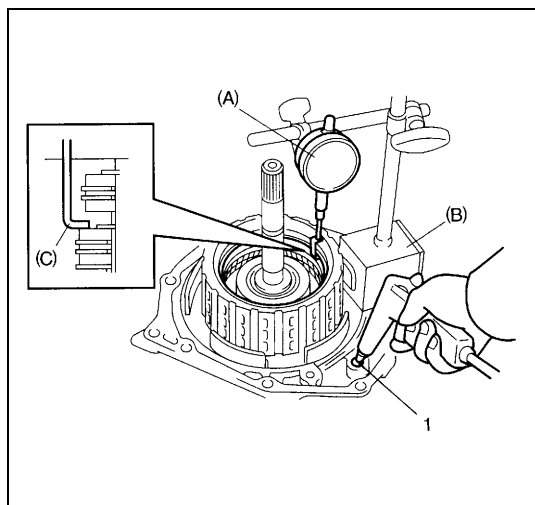
If piston stroke exceeds specified value, disassemble, inspect and replace inner parts.

Special tool

(A): 09900-20607

(B): 09900-20701

Reverse clutch piston stroke: 1.20 – 1.60 mm (0.047 – 0.063 in.)



- 2) Blow compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) through oil hole (1) of transaxle rear cover with the special tool attached on the upper surface of forward clutch retaining plate, and measure forward clutch piston stroke.

If piston stroke exceeds specified value, disassemble, inspect and replace inner parts.

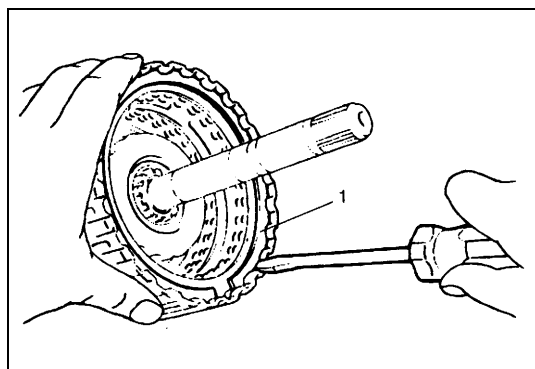
Special tool

(A): 09900-20607

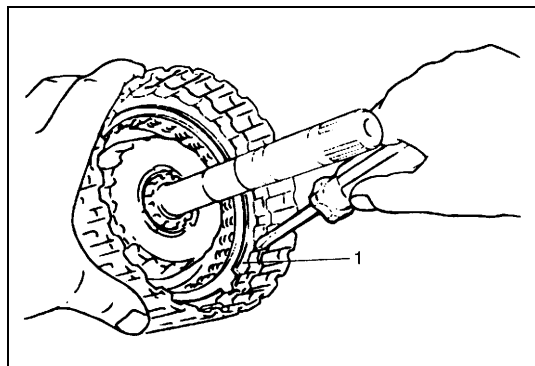
(B): 09900-20701

(C): 09952-06020

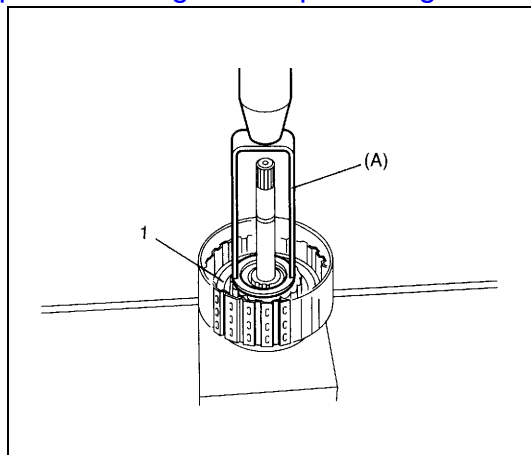
Forward clutch piston stroke: 1.30 – 1.50 mm (0.051 – 0.059 in.)

Disassembly

- 1) Remove reverse clutch plate snap ring (1) and take out reverse clutch retaining plate, discs, separator plates and reverse clutch cushion plate from intermediate shaft sub-assembly.



- 2) Remove forward clutch plate snap ring (1) and take out forward clutch retaining plate, discs and separator plates from forward clutch drum.



- 3) Remove balancer snap ring by using special tool and hydraulic press.

CAUTION:

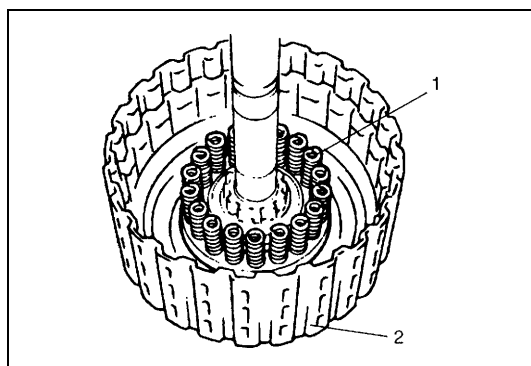
Do not press forward clutch return spring subassembly in over 1.5 mm (0.059 in.).

Excessive compression may cause damage to return spring subassembly and/or balancer.

Special tool

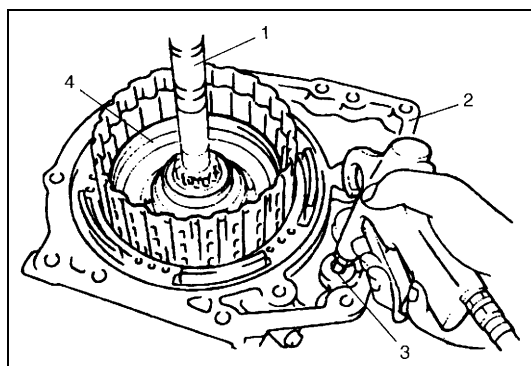
(A): 09926-97610

- 4) Remove forward clutch balancer (1).

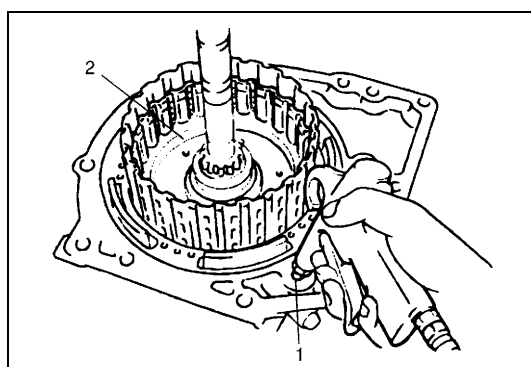


- 5) Remove forward clutch return spring subassembly (1).

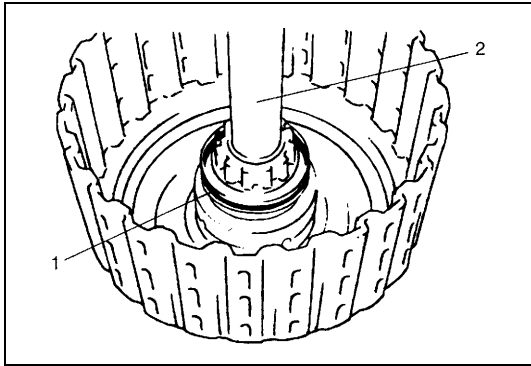
2. Intermediate shaft subassembly



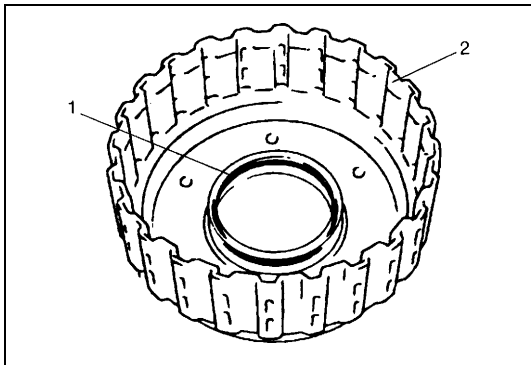
- 6) Install intermediate shaft subassembly (1) to transaxle rear cover (2). Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) to oil hole (3) of transaxle rear cover to remove forward clutch piston (4).



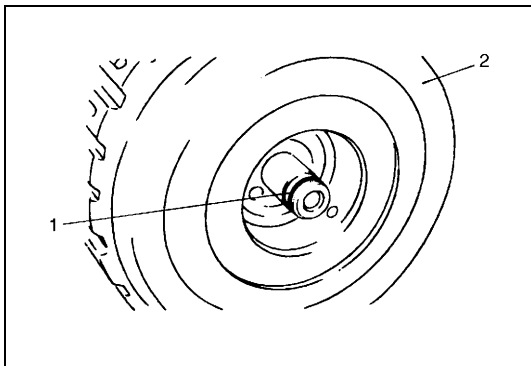
- 7) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) to oil hole (1) of transaxle rear cover to remove forward clutch drum (2).



- 8) Remove forward clutch piston O-ring (1) from intermediate shaft subassembly (2).



- 9) Remove forward clutch drum O-ring (1) from forward clutch drum (2).



- 10) Remove intermediate shaft seal ring (1) from intermediate shaft subassembly (2).

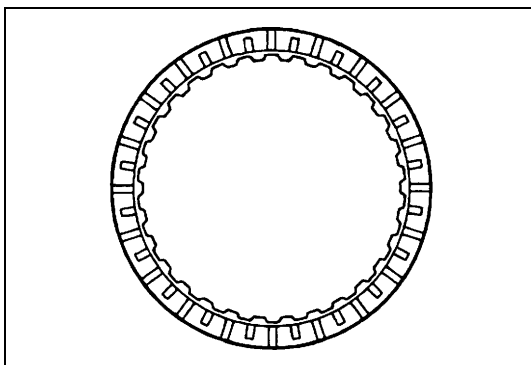
Inspection

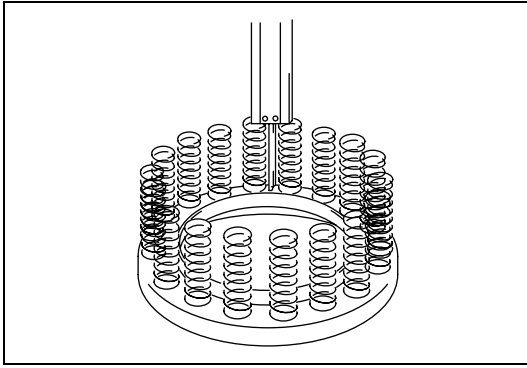
Clutch Discs, Separator Plates and Retaining Plate

Check that sliding surfaces of discs, separator plates and retaining plate are not worn hard or burnt. If necessary, replace.

NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.



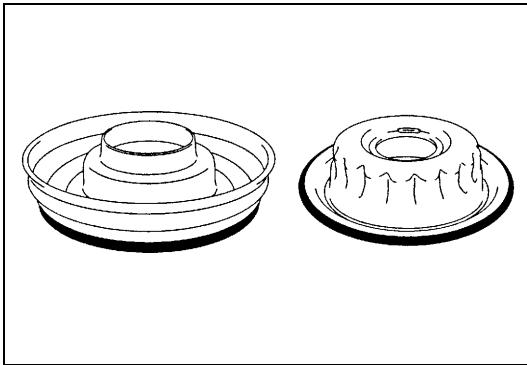
Forward Clutch Return Spring Subassembly

Measure free length of forward clutch return spring.

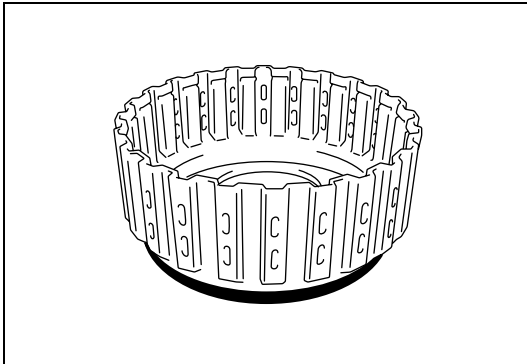
**Free length of forward clutch return spring:
24.04 mm (0.946 in.)**

NOTE:

- Do not apply excessive force when measuring spring free length.
- Perform measurement at several points.

Forward Clutch Piston Lip and Forward Clutch Balancer Lip

Check each lip for wear, deformation, cut, and/or hardening. If necessary, replace.

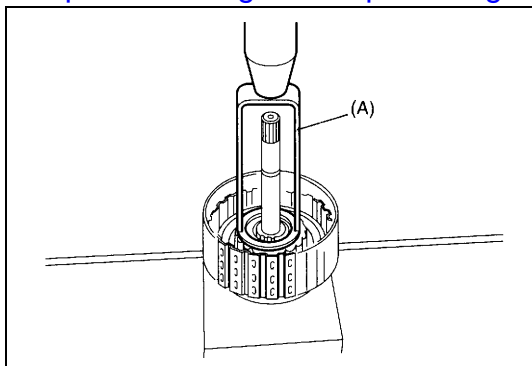
Forward Clutch Drum Lip

Check each lip for wear, deformation, cut, and/or hardening. If necessary, replace.

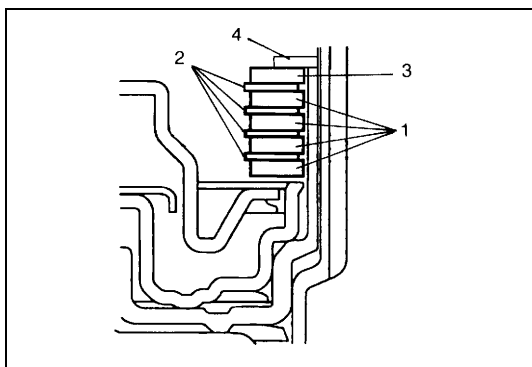
Assembly

Reverse disassembly procedure for assembly, noting the following points.

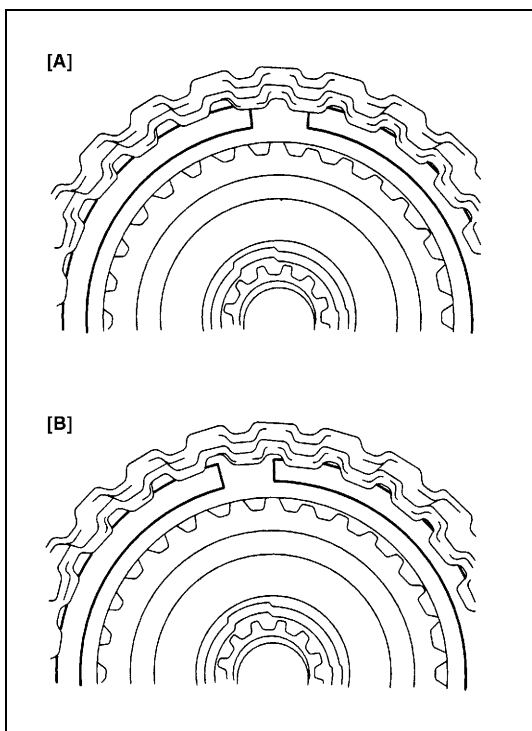
- Before assembling, apply automatic transaxle fluid to component parts.
- Replace O-rings and seal ring with new ones.



- Do not damage forward clutch return spring subassembly and balancer by pressing in forward clutch return spring subassembly passing through its original installing position over 1.5 mm (0.059 in.).

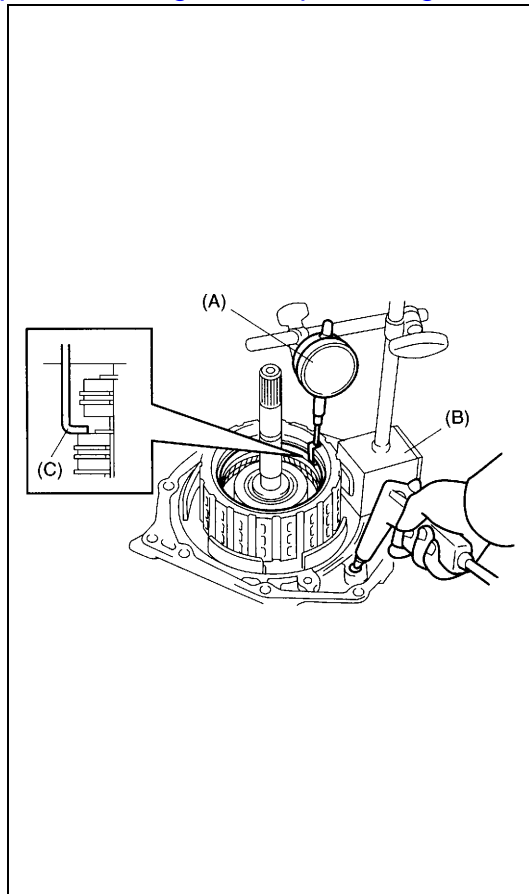
Special tool**(A): 09926-97610**

- Apply A/T fluid to forward clutch separator plates (1), discs (2) and retaining plate (3).
- Install forward clutch separator plates (1), discs (2) and retaining plate (3), then snap ring (4) to forward clutch drum.



- Install forward clutch plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A]	Correct
[B]	Incorrect



- Measure forward clutch piston stroke in the same manner as “Preliminary Check”.

Special tool

(A): 09900-20607

(B): 09900-20701

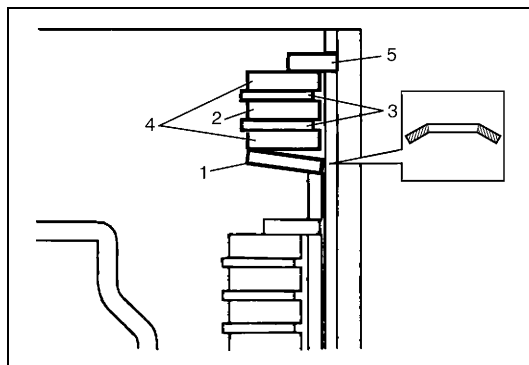
(C): 09952-06020

Forward clutch piston stroke: 1.30 – 1.50 mm (0.051 – 0.059 in.)

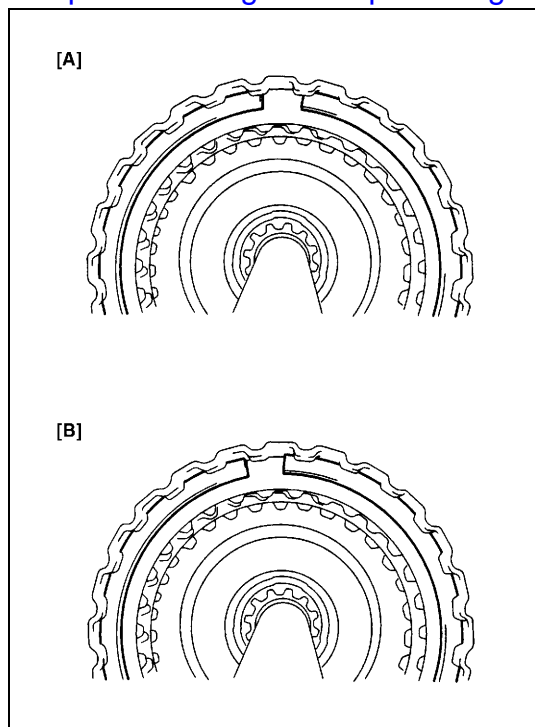
When piston stroke is out of specification, select forward clutch retaining plate with proper thickness from among the list below and replace it.

Available forward clutch retaining plate thickness

Thickness	Identification mark
3.0 mm (0.118 in.)	1
3.1 mm (0.122 in.)	5
3.2 mm (0.126 in.)	2
3.3 mm (0.130 in.)	6
3.4 mm (0.134 in.)	3
3.5 mm (0.138 in.)	7
3.6 mm (0.142 in.)	4

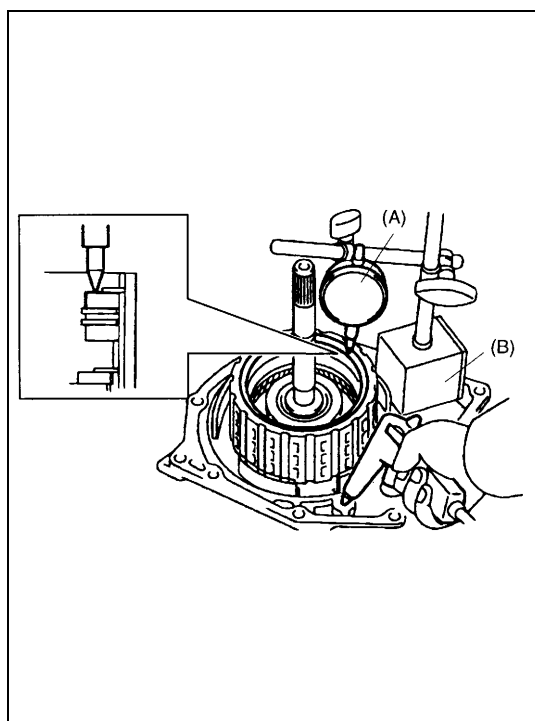


- Install reverse clutch cushion plate (1) in correct direction as shown in figure.
- Apply A/T fluid to reverse clutch cushion plate (1) reverse clutch separator plate (2) discs (3) and retaining plate (4).
- Install reverse clutch cushion plate (1) reverse clutch separator plate (2) discs (3) retaining plate (4) and then snap ring (5) to intermediate shaft subassembly.



- Install reverse clutch plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A]:	Correct
[B]:	Incorrect



- Measure reverse clutch piston stroke in the same manner as "Preliminary Check".

Special tool

(A): 09900-20607

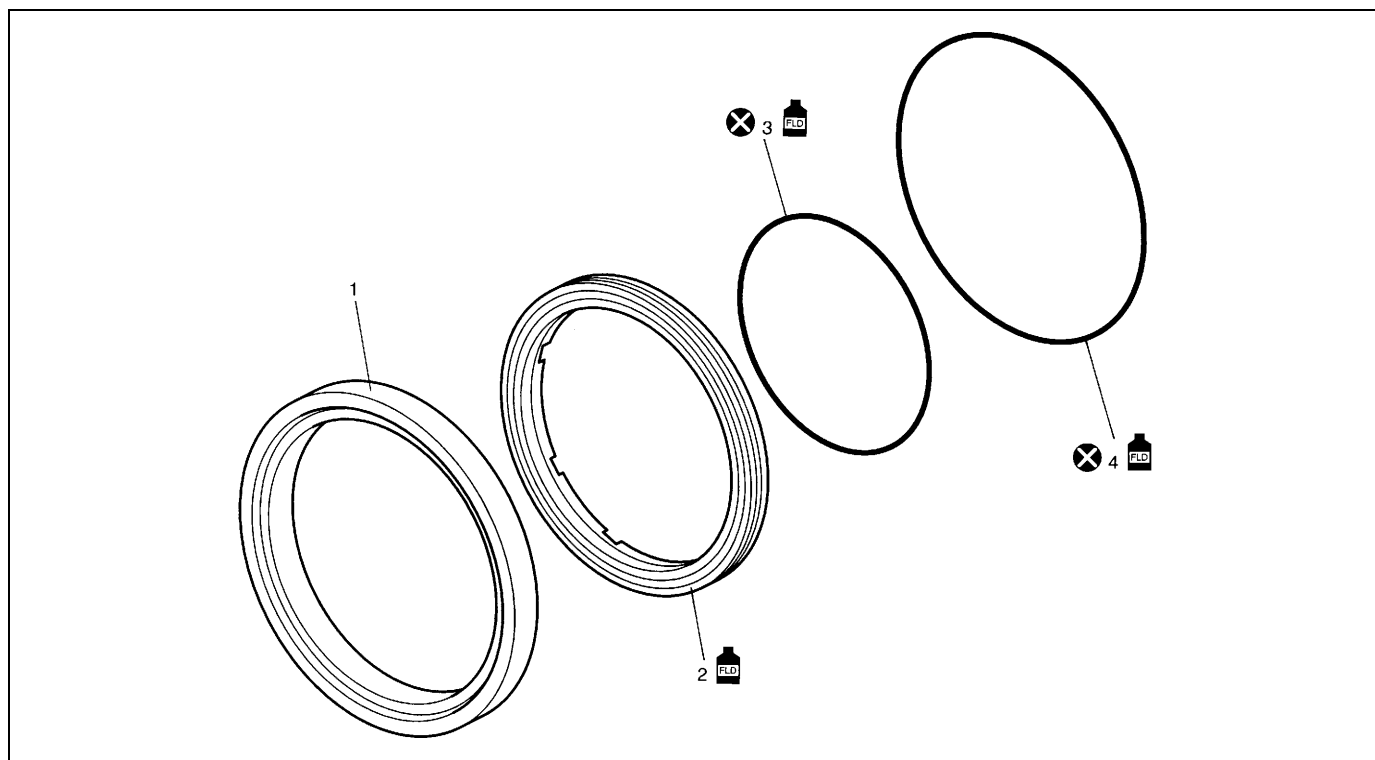
(B): 09900-20701



Reverse clutch piston stroke: 1.20 – 1.60 mm (0.047 – 0.063 in.)

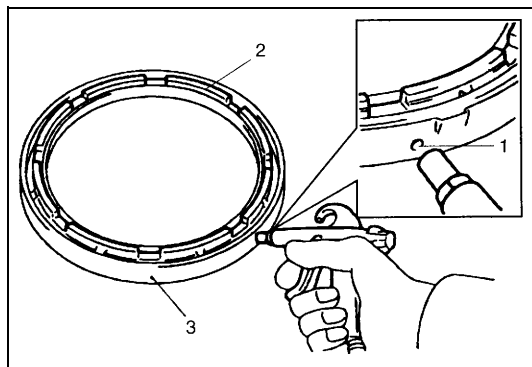
When piston stroke is out of specification, select reverse clutch retaining plate with proper thickness from among the list below and replace it.

Available reverse clutch retaining plate thickness

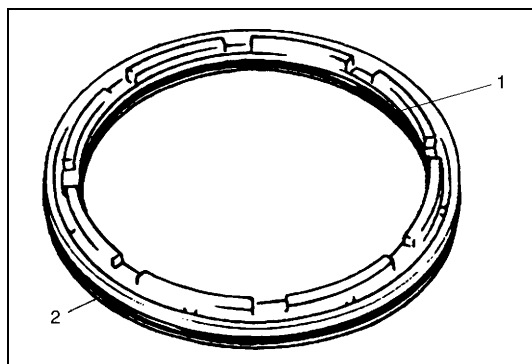
Thickness	Identification mark
3.0 mm (0.118 in.)	1
3.2 mm (0.126 in.)	2
3.4 mm (0.134 in.)	3
3.6 mm (0.142 in.)	4

2nd brake piston assembly

1. 2nd brake cylinder	4. Outer O-ring
2. 2nd brake piston	 Apply automatic transaxle fluid.
3. Inner O-ring	 Do not reuse.

Disassembly

- 1) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) to oil hole (1) of 2nd brake cylinder (3) to remove 2nd brake piston (2).

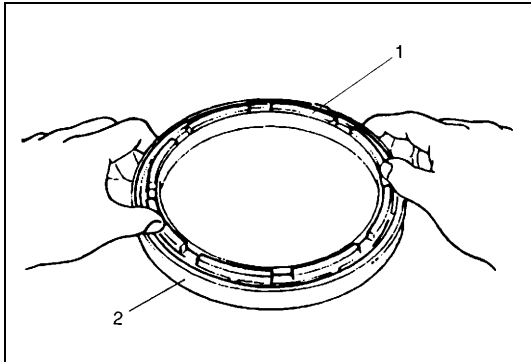


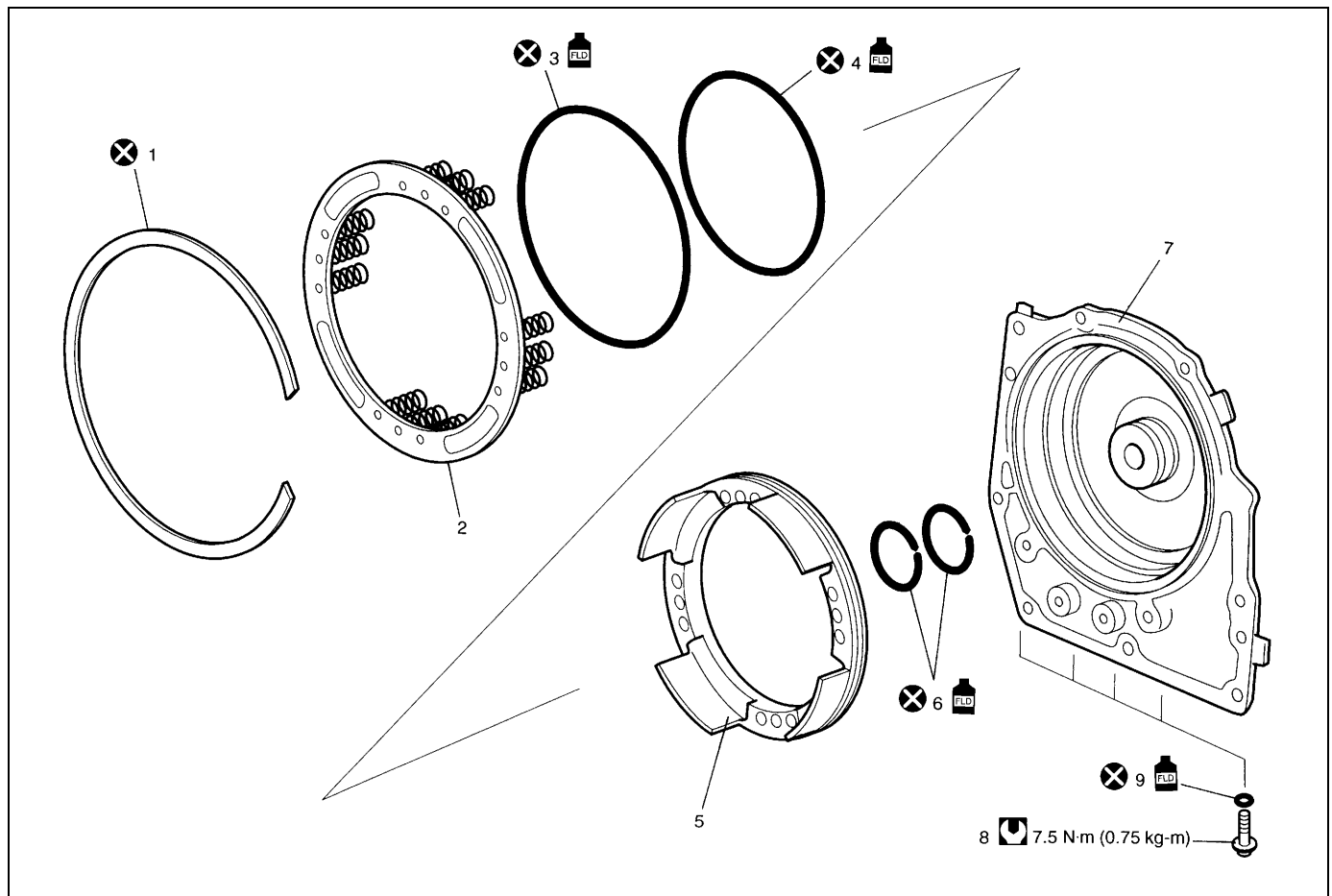
- 2) Remove inner O-ring (1) and outer O-ring (2).

Assembly

Reverse disassembly procedure for assembly, noting the following points.

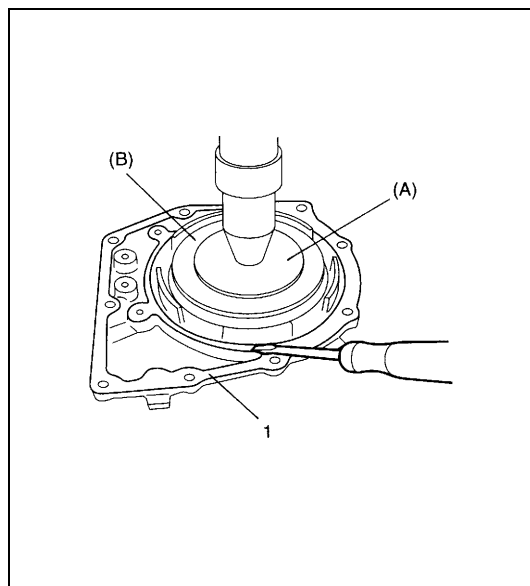
- Use new O-rings. Apply A/T fluid to the O-rings, before installation.
- Install 2nd brake piston (1) to which A/T fluid is applied to 2nd brake cylinder (2).
Do not damage O-ring when installing 2nd brake piston.





1. Snap ring	7. Transaxle rear cover
2. O/D and 2nd coast brake return spring subassembly	8. Rear cover plug
3. O/D and 2nd coast brake piston front O-ring	9. Rear cover plug O-ring
4. O/D and 2nd coast brake piston rear O-ring	Apply automatic transaxle fluid.
5. O/D and 2nd coast brake piston	Do not reuse.
6. Rear cover seal ring	Tightening torque

Disassembly



- 1) Remove snap ring by using special tools and hydraulic press.

CAUTION:

Do not press O/D and 2nd coast brake return spring sub-assembly in over 1.0 mm (0.039 in.). Excessive compression may cause damage to O/D and 2nd coast brake return spring subassembly and/or piston.

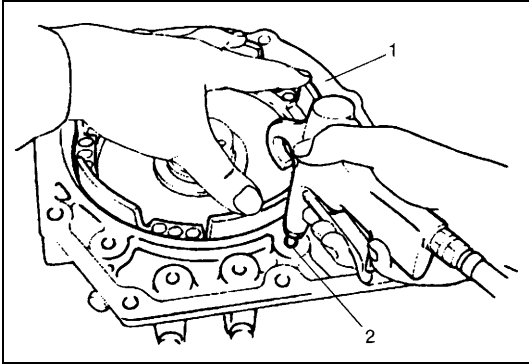
Special tool

(A): 09926-96030

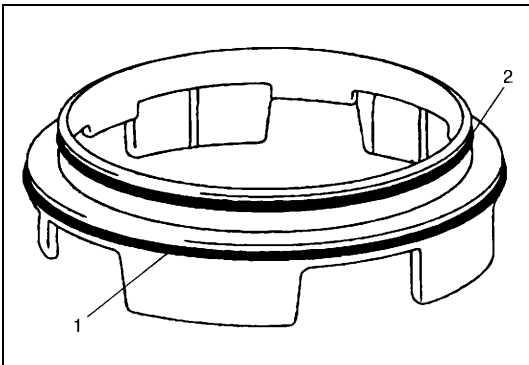
(B): 09946-06710

- 2) Remove O/D and 2nd coast brake return spring assembly.

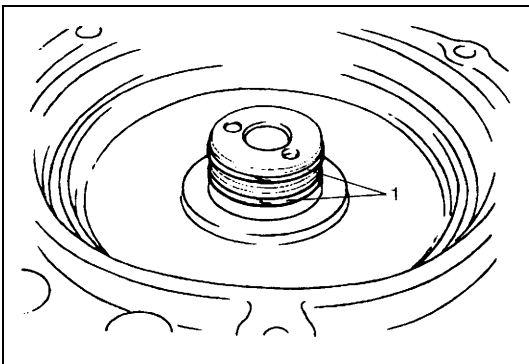
1. Transaxle rear cover



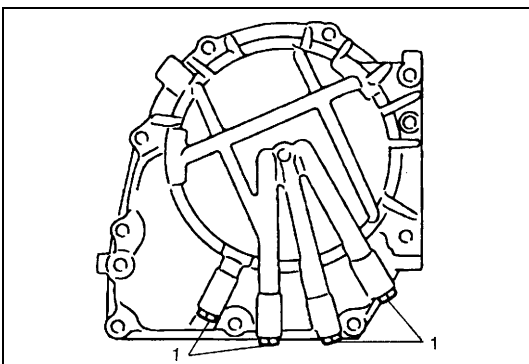
- 3) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) to oil hole (2) of transaxle rear cover (1) to remove O/D and 2nd coast brake piston.



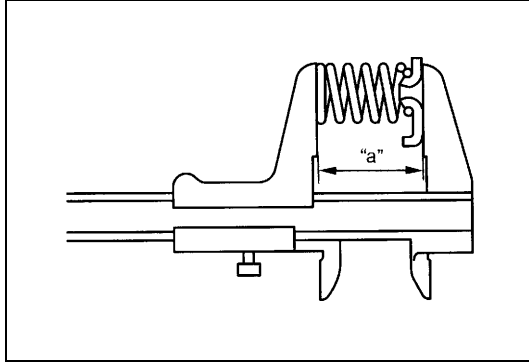
- 4) Remove O/D and 2nd coast brake piston front O-ring (1) and rear O-ring (2).



- 5) Remove rear cover seal rings (1).



- 6) Remove rear cover plugs (1).

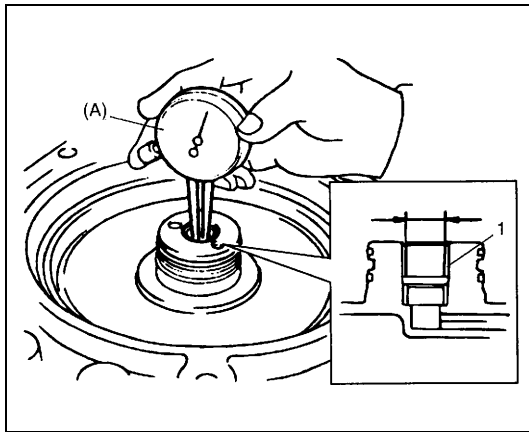
Inspection**O/D and 2nd Coast Blake Return Spring Subassembly**

Measure free length of O/D and 2nd coast Blake return spring.

Free length of O/D and 2nd coast Blake return spring
"a": 18.99 mm (0.748 in.)

NOTE:

- Do not apply excessive force when measuring spring free length.
- Perform measurement at several points.

Transaxle Rear Cover Bush

- 7) Measure transaxle rear cover bush bore by using special tool.

Special tool

(A): 09900-20605

Transaxle rear cover bush bore

Standard: 13.94 – 14.00 mm (0.549 – 0.551 in.)

If measured transaxle rear cover bush bore is out of specifications, replace transaxle rear cover with new one. In replacement, intermediate shaft subassembly also needs to be checked. Replace intermediate shaft subassembly, if necessary.

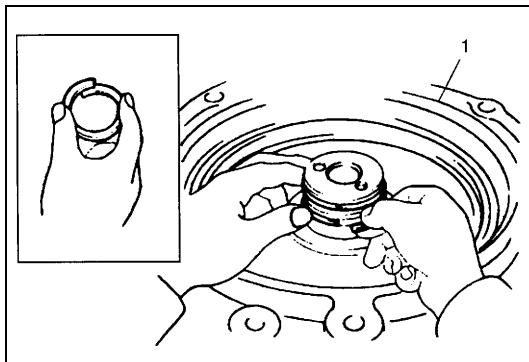
Assembly

Reverse disassembly procedure for assembly, noting the following points.

- Use new seal rings and O-rings. Apply A/T fluid to seal rings and O-rings before installation.
- Tighten rear cover plugs to specified torque.

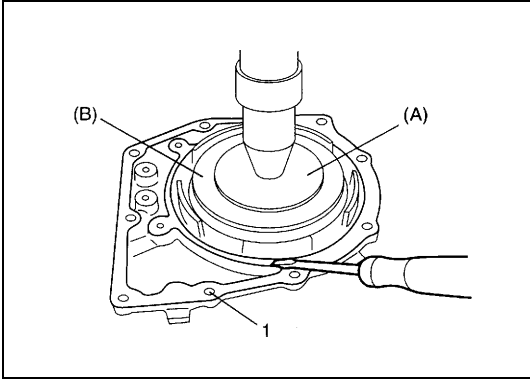
Tightening torque

Rear cover plug: 7.5 N·m (0.75 kg·m, 5.5 lb·ft)



- Before installing rear cover seal ring, apply A/T fluid to ring. First, tighten seal ring to 5 mm (0.197 in.), then install seal ring.
- Do not open rear cover seal ring too wide to attach.

1. Transaxle rear cover



- Do not damage O/D and 2nd coast brake return spring sub-assembly and piston by pressing in O/D and 2nd coast brake return spring subassembly passing through its original installing position over 1.0 mm (0.039 in.).

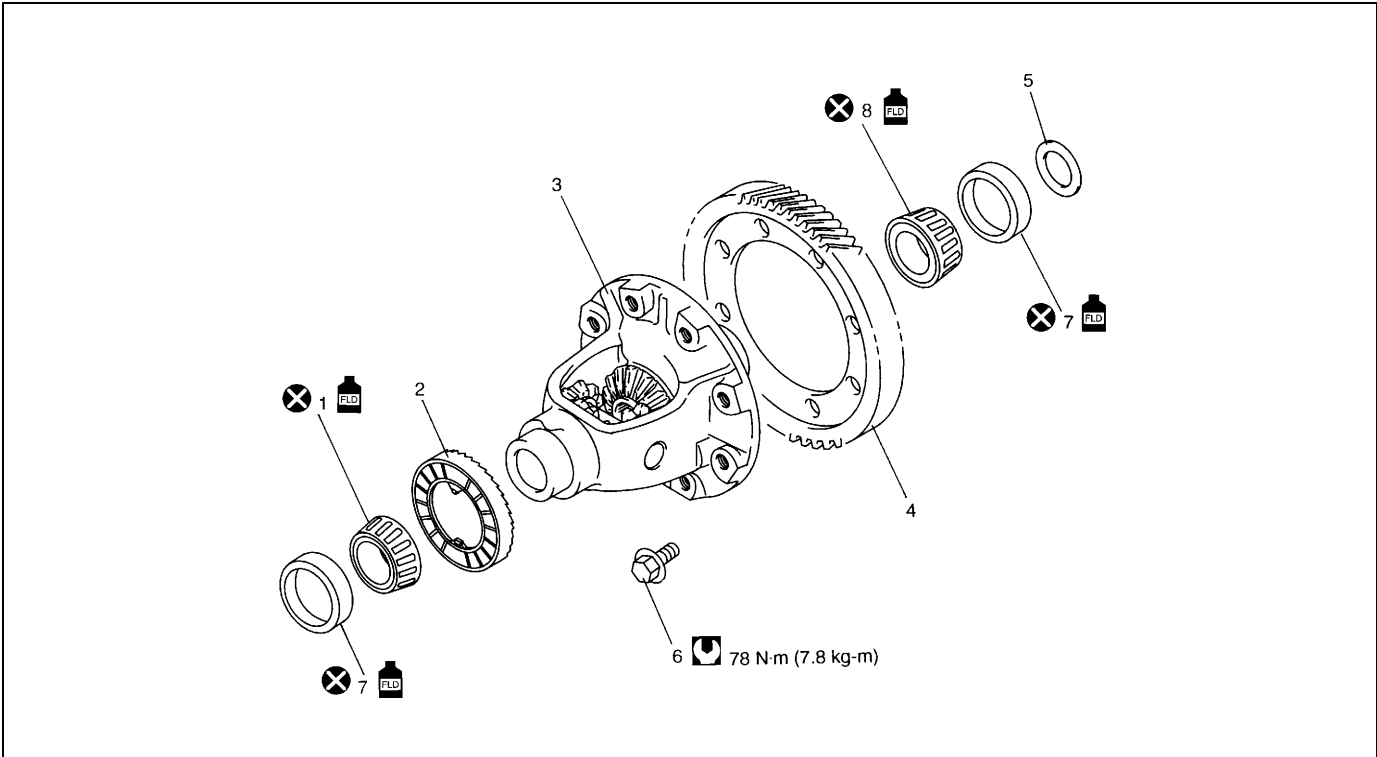
Special tool




(A): 09926-96030

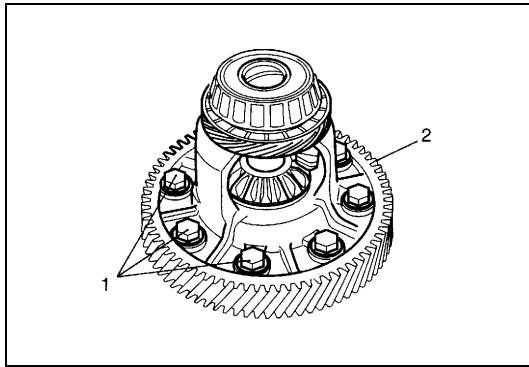
(B): 09946-06710

1. Transaxle rear cover

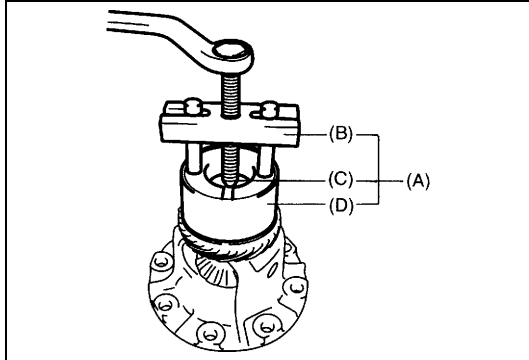
Differential Assembly



1. Differential side RH bearing	7. Side bearing cup
2. Output shaft speed sensor (VSS) drive gear	8. Differential side LH bearing
3. Differential case subassembly	 Apply automatic transaxle fluid.
4. Final gear	 Tightening torque
5. Side bearing shim	 Do not reuse.
6. Final gear bolt	

Disassembly

- 1) Remove final gear bolts (1), and then final gear (2).



- 2) Remove differential side RH bearing by using special tools.

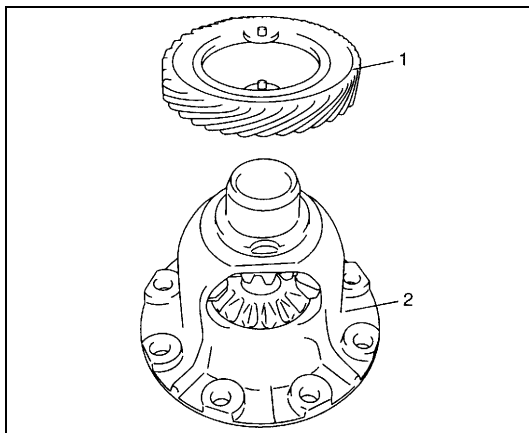
Special tool

(A): 09926-37610

(B): 09926-37610-001

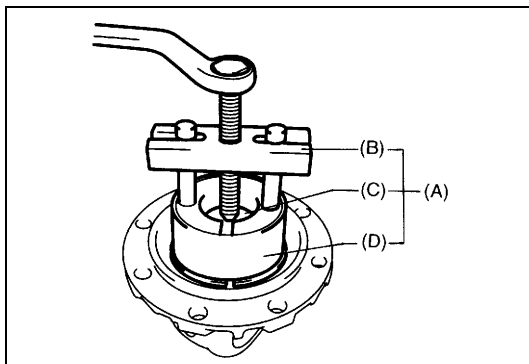
(C): 09926-37610-003

(D): 09926-47610-002



- 3) Remove output shaft speed sensor (VSS) drive gear (1).

2. Differential case subassembly



- 4) Remove differential side LH bearing by using special tools.

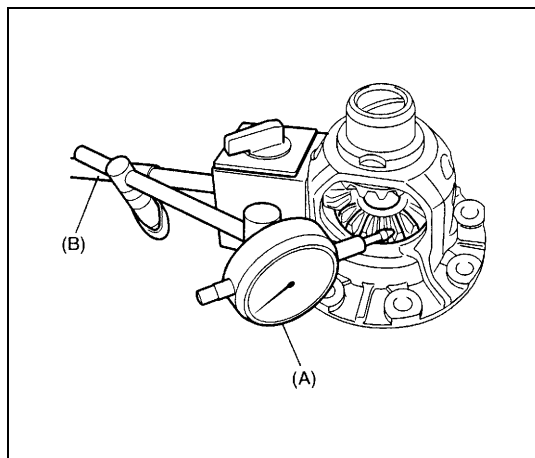
Special tool

(A): 09926-37610

(B): 09926-37610-001

(C): 09926-37610-003

(D): 09926-37610-002

Inspection

- 1) Hold differential case subassembly with soft jawed vice and set special tools as shown.

Special tool

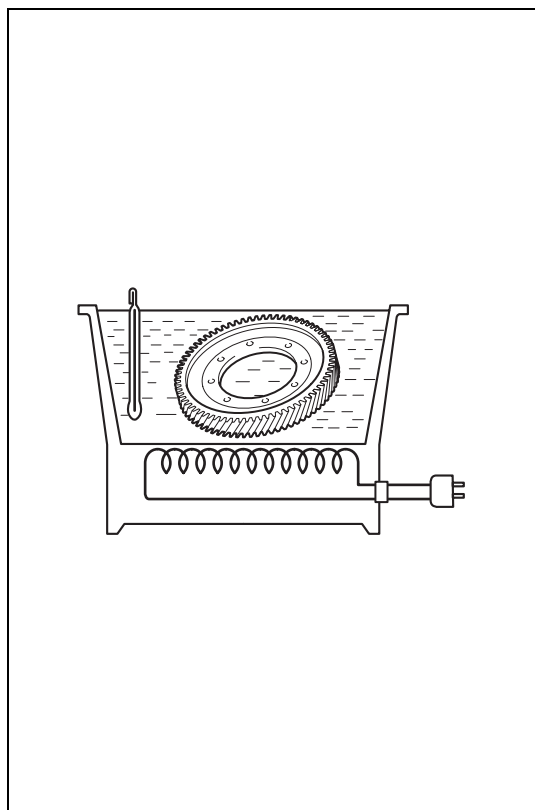
(A): 09900-20607

(B): 09900-20701

- 2) Measure differential gear thrust play.

Differential gear thrust play:**0.05 – 0.20 mm (0.002 – 0.008 in.)**

- 3) If thrust play is out of specification, replace differential case subassembly.

Assembly**WARNING:**

- When taking warmed final driven gear out of vessel, use tongs or the like. Taking out it with bare hand will cause severe burn.
- While installing warmed final driven gear, use oven glove such as leather glove. Picking up it with bare hand may cause burn.

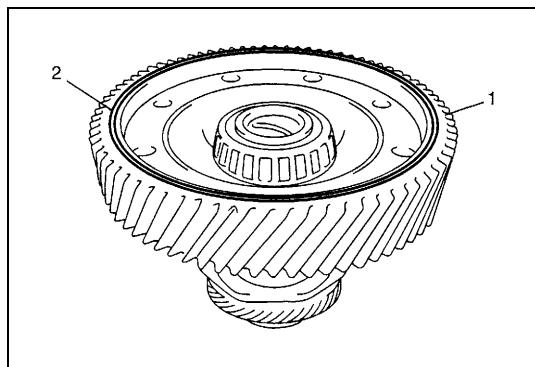
CAUTION:

Do not leave final driven gear in boiling water for longer than 5 min. Overheating the gear may cause strength reduction of gear.

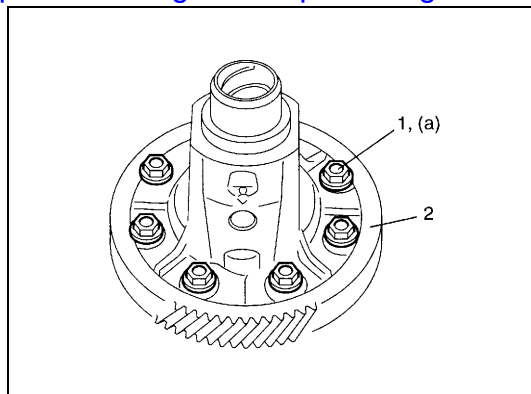
- 1) Put final driven gear in water vessel, heat and remove when it boils, then remove moisture.

NOTE:

After removing moisture on final driven gear, install final driven gear to differential case as quickly as possible.



- 2) As shown in figure, facing groove (2) side upward, install final driven gear (1) to differential case.



3) Tighten final gear bolts (1) to specified torque.

Tightening torque

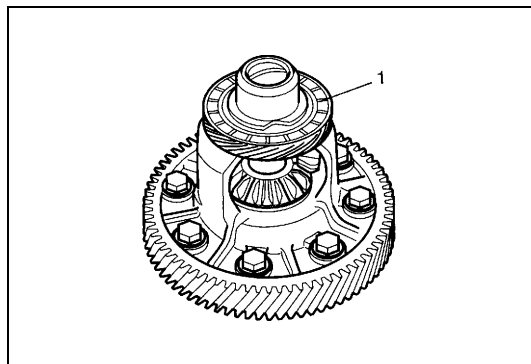
Final gear bolt

(a): 78 N·m (7.8 kg-m, 56.5 lb-ft)

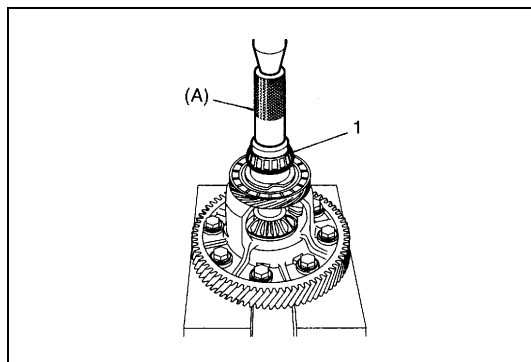
2. Final driven gear

NOTE:

- To avoid rust, apply A/T fluid to final driven gear after installation.



4) After applying A/T fluid to output shaft speed sensor (VSS) drive gear (1), install output shaft speed sensor drive gear.



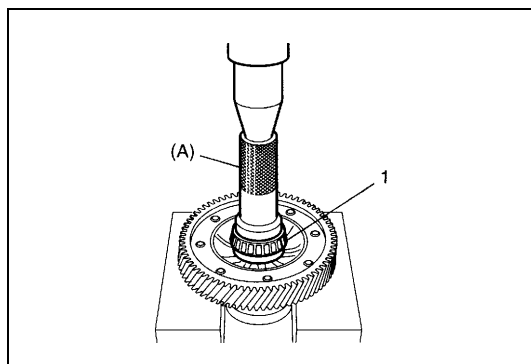
5) Install new differential side RH bearing (1) by using special tool and hydraulic press.

Special tool

(A): 09913-70123

NOTE:

Replace differential side RH bearing together with bearing cup as a set.



6) Install new differential side LH bearing (1) by using special tool and hydraulic press.

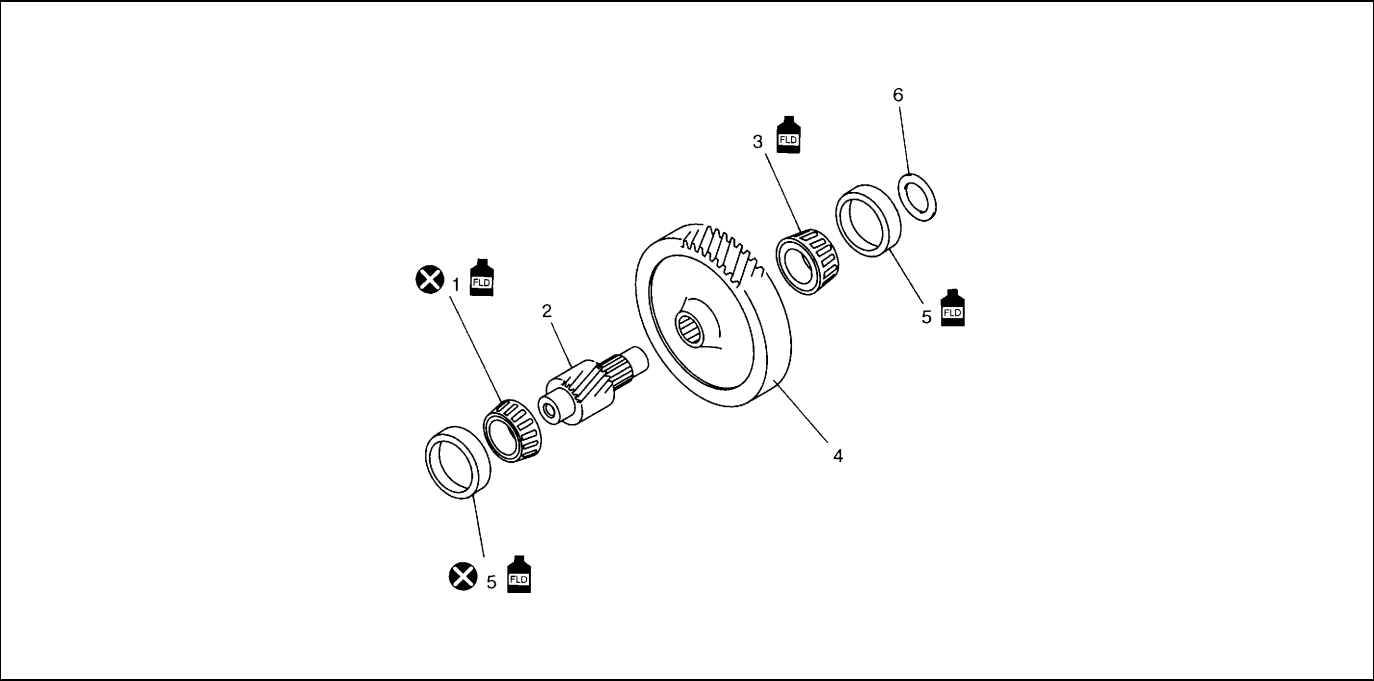
Special tool



(A): 09913-70123

NOTE:

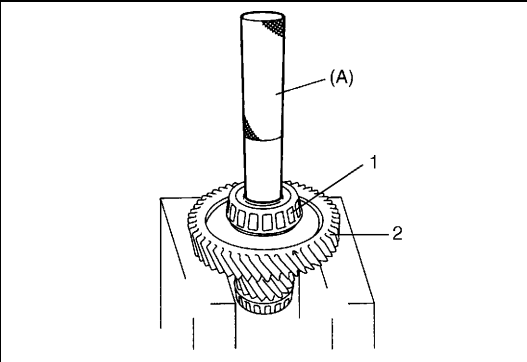
Replace differential side LH bearing together with bearing cup as a set.

Countershaft assembly



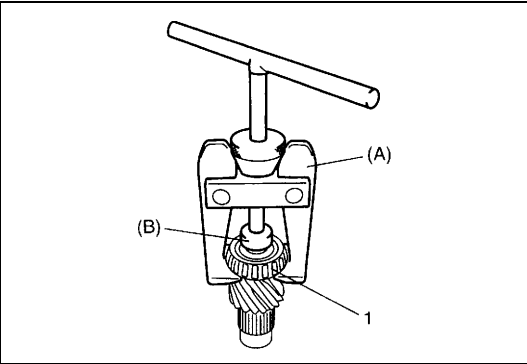
1. Countershaft RH bearing	5. Bearing cap
2. Countershaft	6. Countershaft bearing shim
3. Countershaft LH bearing	 Apply automatic transaxle fluid.
4. Reduction driven gear	 Do not reuse.

Disassembly



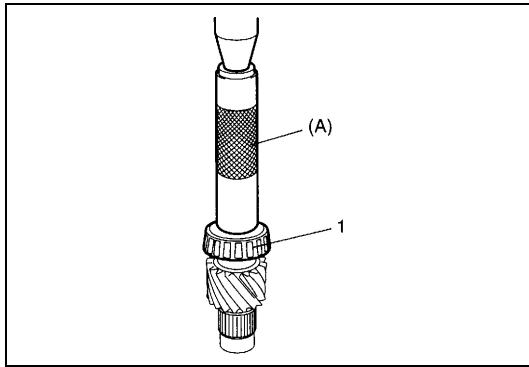
- 1) Remove countershaft LH bearing (1) and reduction driven gear (2) at once by using special tool and hydraulic press.

Special tool
(A): 09925-98221



- 2) Remove countershaft RH bearing (1) by using special tools.

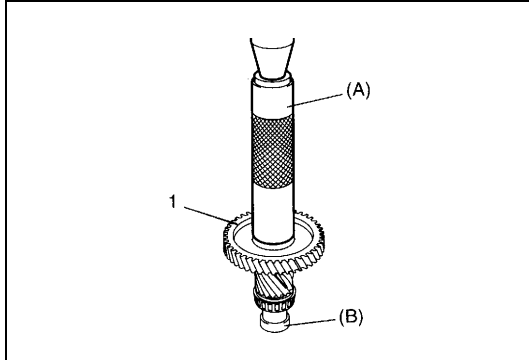
Special tool
(A): 09913-61510
(B): 09926-58010

Assembly

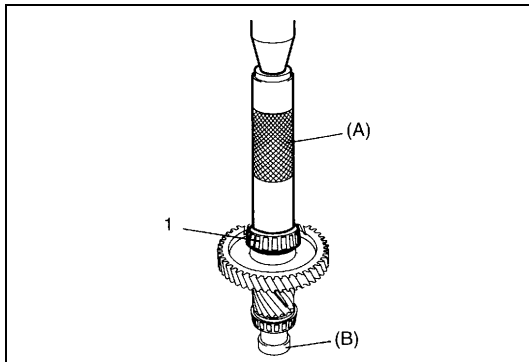
- 1) Install new countershaft RH bearing (1) by using special tool and hydraulic press.

Special tool**(A): 09913-84510****NOTE:**

Replace countershaft RH bearing together with bearing cup as a set.



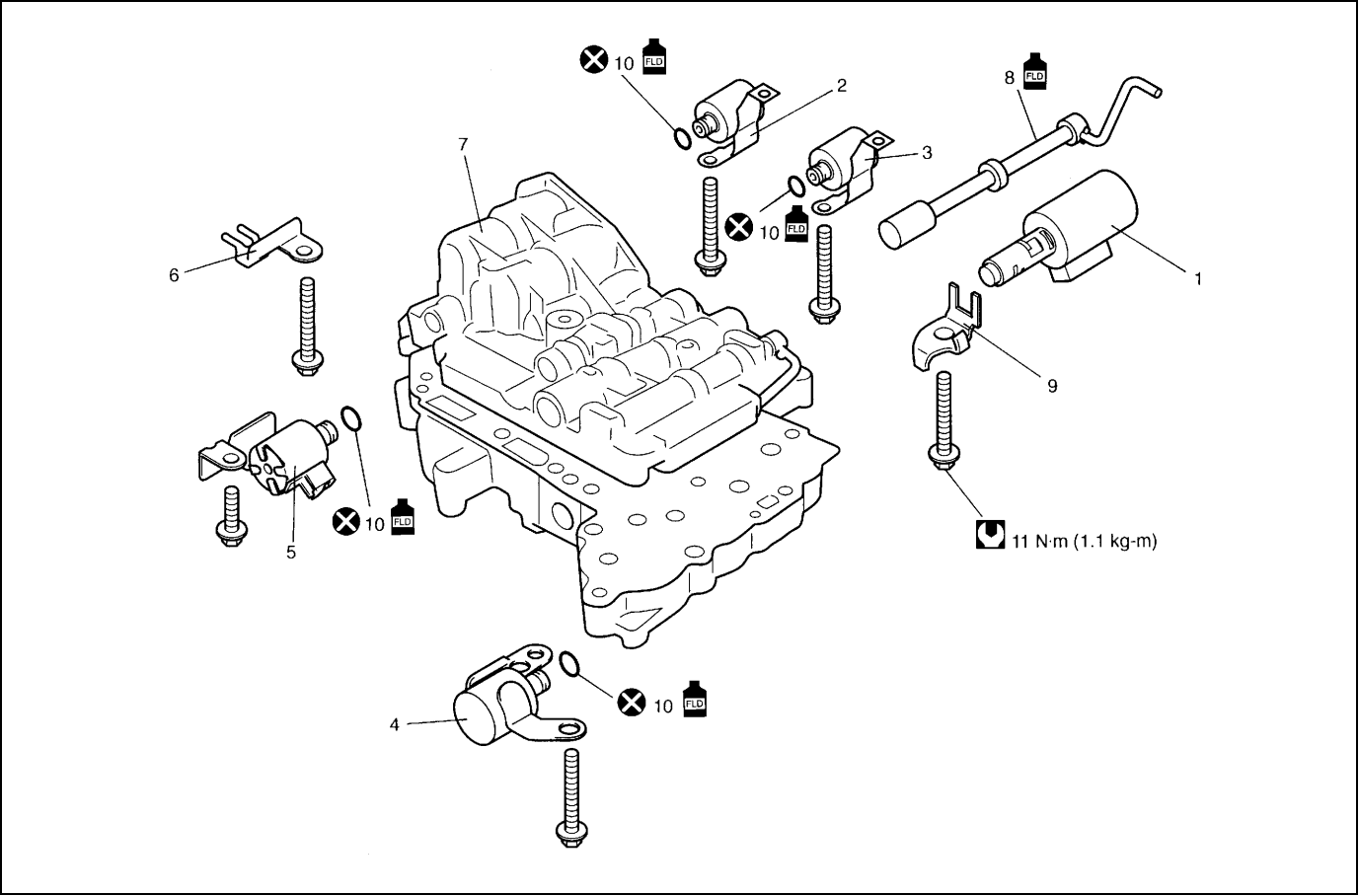
- 2) Install reduction driven gear (1) with special tools and hydraulic press.




Special tool**(A): 09913-84510****(B): 09925-88210**

- 3) Install countershaft LH bearing (1) with special tools and hydraulic press.

Special tool**(A): 09913-84510****(B): 09925-88210**

Valve body assembly

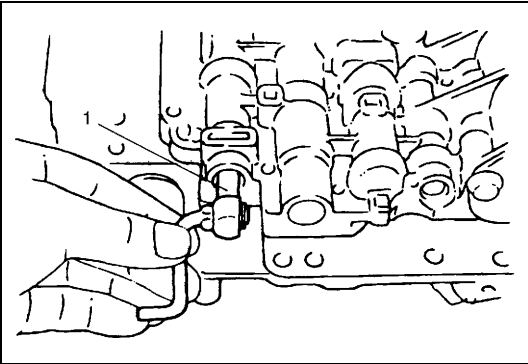


1. Pressure control solenoid valve	8. Manual valve
2. Shift solenoid valve-A (No.1)	9. Solenoid lock plate
3. Shift solenoid valve-B (No.2)	10. O-ring
4. TCC (Lock-up) solenoid valve	 Apply automatic transaxle fluid.
5. Timing solenoid valve	 Tightening torque
6. Temperature sensor clamp	 Do not reuse.
7. Valve body assembly	

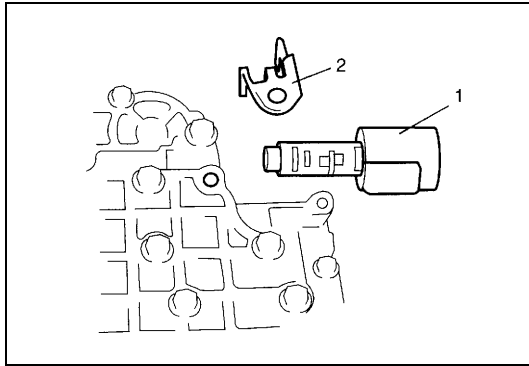
CAUTION:

When replacing pressure control solenoid valve, it is strictly required to replace it together with vale body assembly as a set. Replacing pressure control solenoid independently may cause excessive shift shock.

Disassembly

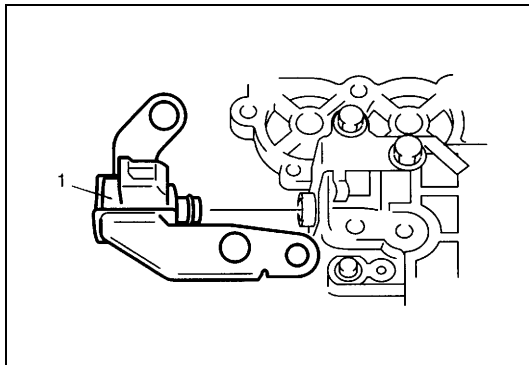


1) Pull out manual valve (1).

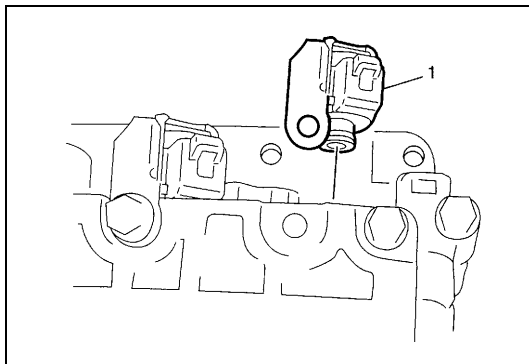


2) Remove pressure control solenoid valve (1).

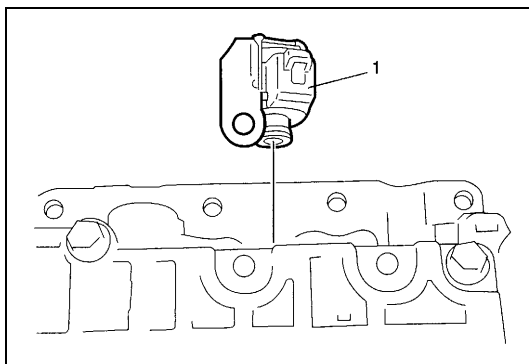
2. Solenoid lock plate



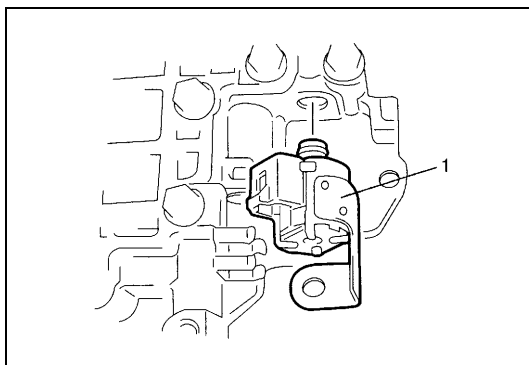
3) Remove TCC (Lock-up) solenoid valve (1).



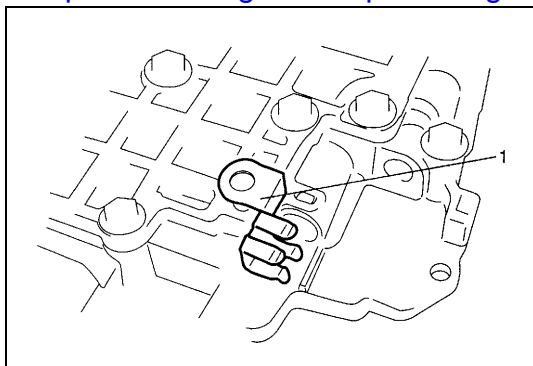
4) Remove shift solenoid valve-A (1).



5) Remove shift solenoid valve-B (1).



6) Remove timing solenoid valve (1).



7) Remove temperature sensor clamp (1).

Assembly

Reverse disassembly procedure for assembly, noting following points.

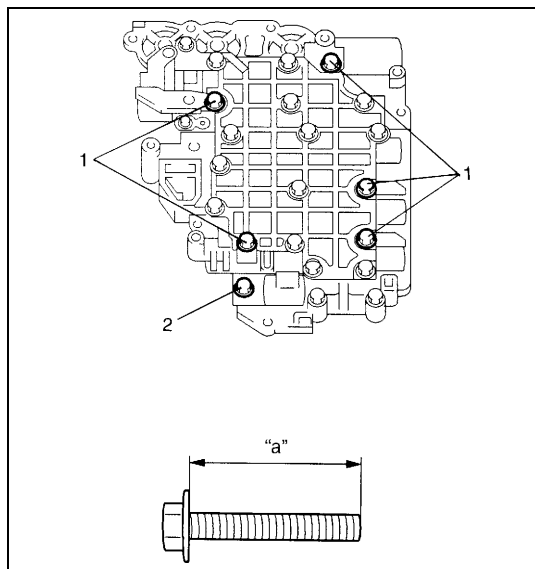
- Shift solenoid valve-A and -B are identical
- After applying A/T fluid to new O-rings, fit them to solenoid valves, then install solenoid valves to valve body.
- Tighten solenoid valve bolts to specified torque

Tightening torque

Solenoid valve bolt

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

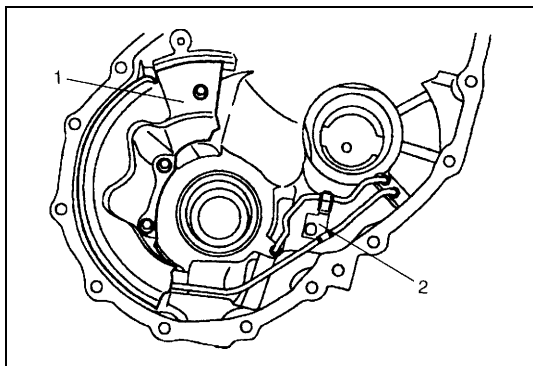
Bolt	Length "a"	Pieces
A (1)	49 mm (1.93 in.)	5
B (2)	20 mm (0.79 in.)	1

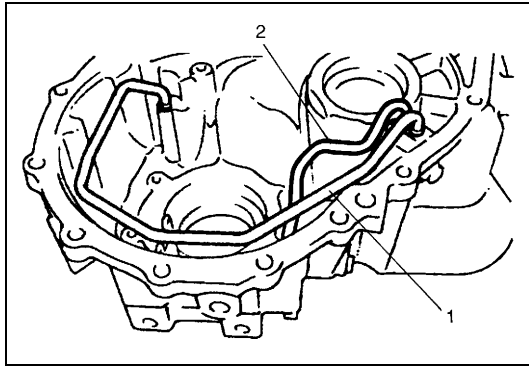


Torque converter housing

Disassembly

- 1) Remove fluid reservoir RH plate (1) and lubrication tube clamp (2).

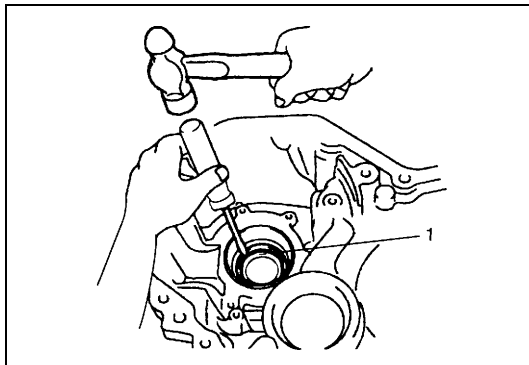




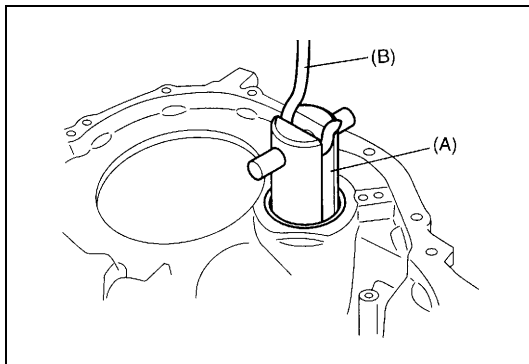
2) Remove lubrication LH tube (1) and RH tube (2).

NOTE:

Do not bend lubrication tube with excessive force.



3) Remove differential side oil seal (1).

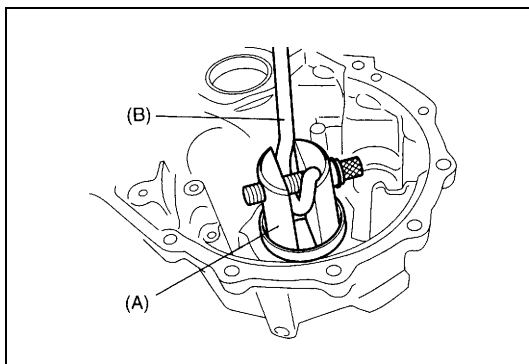


4) Remove countershaft RH bearing cup by using special tools.

Special tool

(A): 09944-96011

(B): 09942-15511

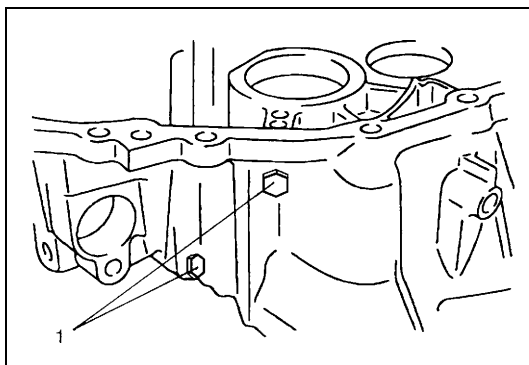


5) Remove differential side RH bearing cup by using special tools.

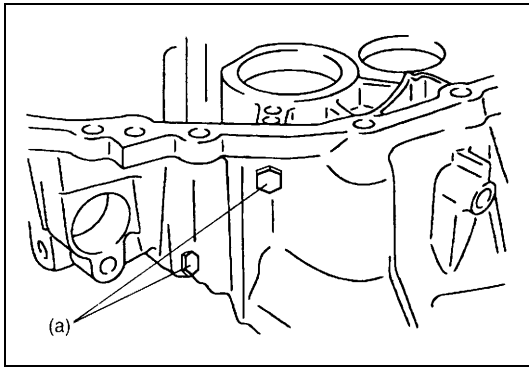
Special tool

(A): 09944-96011

(B): 09942-15511



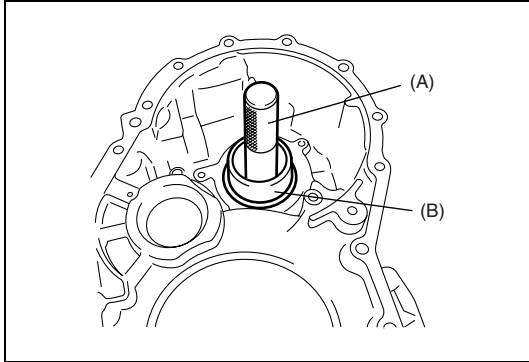
6) Remove torque converter case plugs (1).

Assembly

- 1) After applying A/T fluid to new O-rings, fit them to housing plugs. Finally install plugs to torque converter housing.

Tightening torque**Torque converter housing plug**

(a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

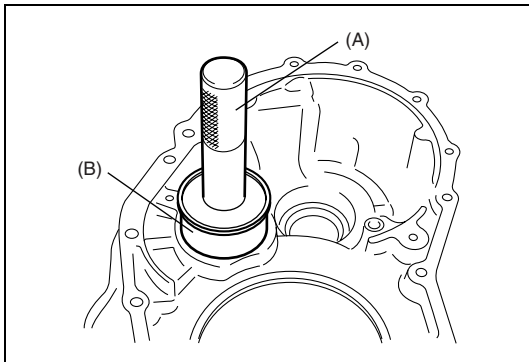


- 2) Using special tools, assemble differential side RH bearing cup.

Special tool

(A): 09924-74510

(B): 09944-88220

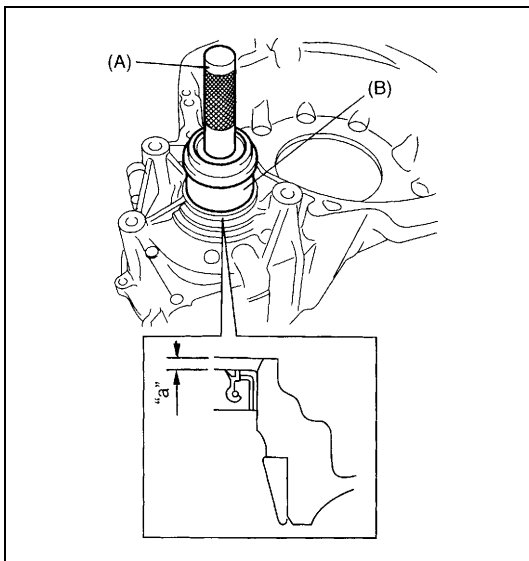


- 3) Using special tool, install countershaft RH bearing cup.

Special tool

(A): 09924-74510

(B): 09944-88220



- a) Using special tools, install new differential side oil seal to torque converter housing.

Special tool

(A): 09924-74510

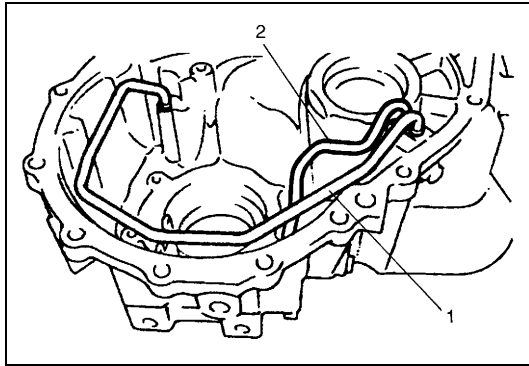
(B): 09944-88220

Differential side oil seal installing depth

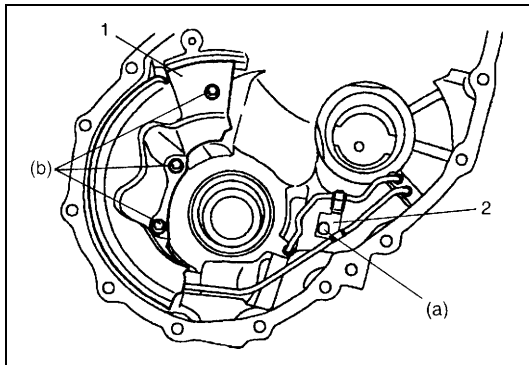
“a”: 2.6 – 3.6 mm (0.10 – 0.14 in.)

- 4) Apply grease to oil seal lip.

Grease 99000-25030



5) Install lubrication LH tube (1) and RH tube (2).



6) Install fluid reservoir RH plate (1) and lubrication tube clamp (2).

Tightening torque

Lubrication tube clamp bolt

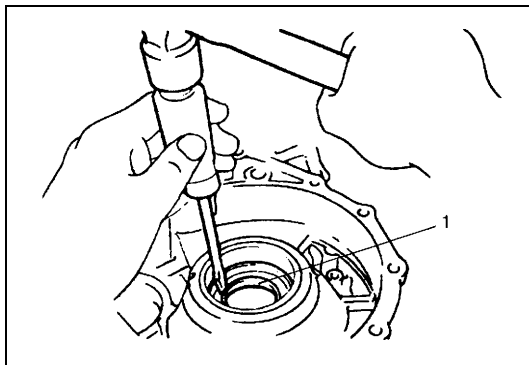
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

Fluid reservoir RH plate bolt

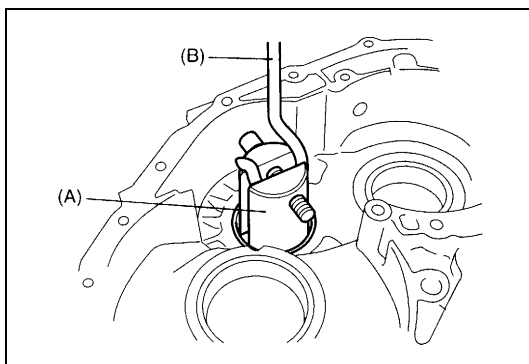
(b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

Transaxle case

Disassembly



1) Remove differential side oil seal (1).

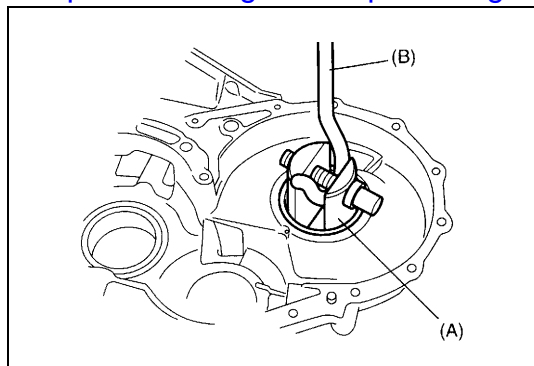


2) Remove countershaft LH bearing cup and shim with special tools.

Special tool

(A): 09944-96011

(B): 09942-15511



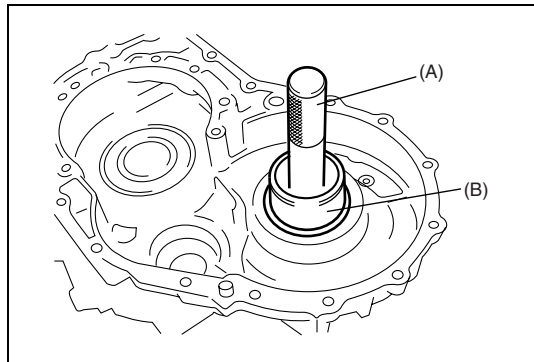
- 3) Remove differential side LH bearing cup and shim with special tools.

Special tool

(A): 09944-96011

(B): 09942-15511

Assembly



- 1) Using special tools, assemble shim and differential side LH bearing cup.

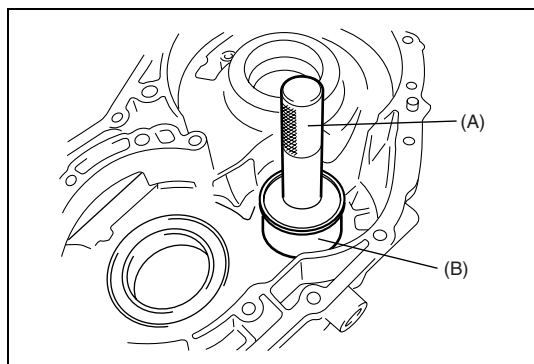
Special tool

(A): 09924-74510

(B): 09944-88220

NOTE:

Use shim with same thickness as the removed one.



- 2) Using special tools, assemble shim and countershaft LH bearing cup.

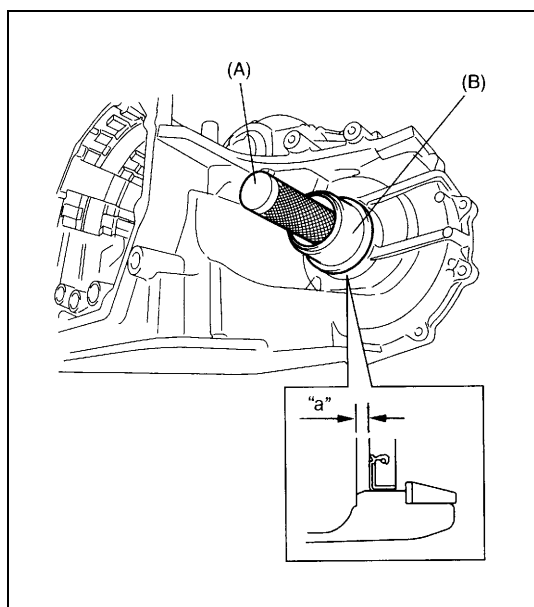
Special tool

(A): 09924-74510

(B): 09944-88220

NOTE:

Use shim with same thickness as the removed one.



- 3) Install new differential side oil seal to transaxle case by using special tools.

Special tool

(A): 09924-74510

(B): 09944-88220

Differential side oil seal installing depth

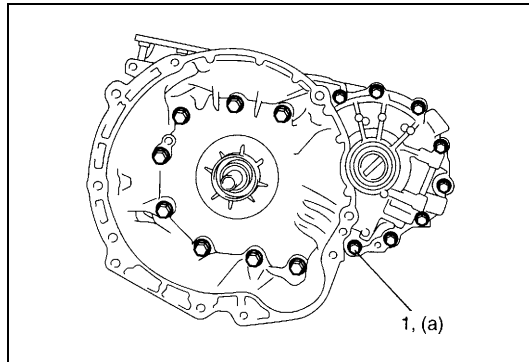
"a": 3.8 – 4.8 mm (0.15 – 0.19 in.)

- 4) Apply grease to oil seal lip.

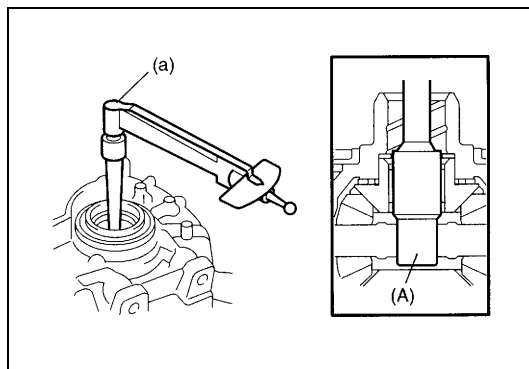
Grease 99000-25030

Adjustment before unit assembly**Differential Side Bearing Preload**

- 1) After applying A/T fluid to differential assembly, fit it to transaxle case.
- 2) Install torque converter housing to transaxle case, then tighten bolts (1) to specified torque.

**Tightening torque****Torque converter housing bolt**

(a): 33 N·m (3.3 kg-m, 24.0 lb-ft)



- 3) Measure bearing preload (a) by using a special tool.

Special tool

(A): 09928-06050

Differential side bearing preload (starting torque)**In the case of new bearing**

(a): 0.8 – 1.4 N·m (8.0 – 14.0 kg-cm, 0.58 – 1.01 lb-ft)

In the case of reused bearing

(a): 0.4 – 0.7 N·m (4.0 – 7.0 kg-cm, 0.29 – 0.51 lb-ft)

- 4) If bearing preload is out of specification, select shim with suitable thickness from among the list below and replace it. Then adjust differential side bearing preload within specification.

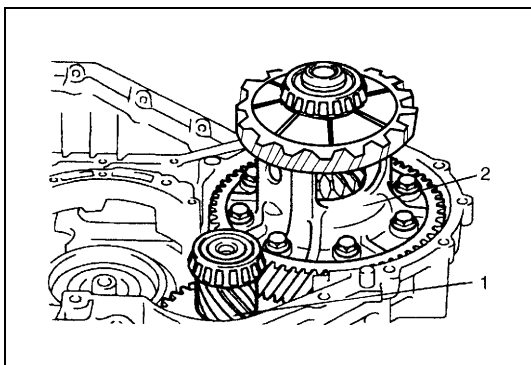
Available shim thickness

Thickness	Identification mark
1.80 mm (0.070 in.)	A
1.85 mm (0.072 in.)	B
1.90 mm (0.074 in.)	C
1.95 mm (0.076 in.)	D
2.00 mm (0.078 in.)	E
2.05 mm (0.080 in.)	F
2.08 mm (0.081 in.)	G
2.11 mm (0.083 in.)	H
2.14 mm (0.084 in.)	J
2.17 mm (0.085 in.)	K
2.20 mm (0.087 in.)	L
2.23 mm (0.088 in.)	M
2.26 mm (0.089 in.)	N
2.29 mm (0.090 in.)	P
2.32 mm (0.091 in.)	Q
2.35 mm (0.092 in.)	R
2.40 mm (0.094 in.)	S
2.45 mm (0.096 in.)	T
2.50 mm (0.098 in.)	U
2.55 mm (0.100 in.)	V
2.60 mm (0.102 in.)	W
2.65 mm (0.104 in.)	X
2.70 mm (0.106 in.)	Y

NOTE:

Record measured differential side bearing preload, because it is necessary to adjust counter shaft bearing preload.

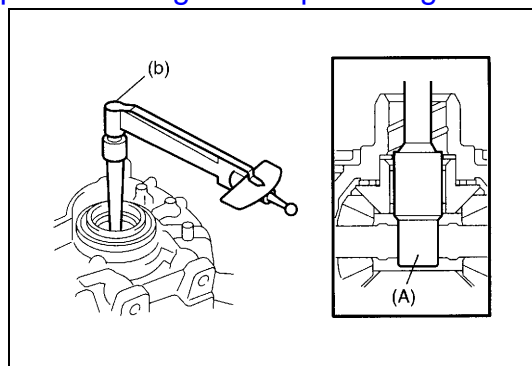
- 5) Remove differential assembly.

Counter Shaft Bearing Preload

- 1) After applying A/T fluid to countershaft assembly (1) and differential assembly (2), fit them.
- 2) Install torque converter housing to transaxle case, then tighten bolts to specified torque.

Tightening torque

Torque converter housing bolt: 33 N·m (3.3 kg-m, 24 lb-ft)



3) Measure bearing preload (b) by using special tool.

Special tool

(A): 09928-06050

Counter shaft bearing preload = (b) – Differential side bearing preload (a)

Counter shaft bearing preload (Starting torque)

In the case of new bearing

0.33 – 0.76 N·m (3.3 – 7.6 kg-cm, 0.24 – 0.55 lb-ft)

In the case of reused bearing

0.17 – 0.38 N·m (1.7 – 3.8 kg-cm, 0.12 – 0.28 lb-ft)

4) If bearing preload is out of specification, select shim with suitable thickness from among the list below and replace it. Then adjust countershaft bearing preload within specification.

Available shim thickness

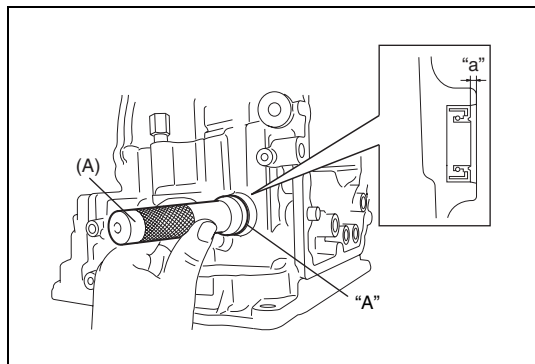
Thickness	Identification mark
1.70 (0.066 in.)	1
1.75 (0.068 in.)	2
1.80 (0.070 in.)	3
1.85 (0.072 in.)	4
1.90 (0.074 in.)	5
1.93 (0.075 in.)	6
1.96 (0.077 in.)	7
1.99 (0.078 in.)	A
2.02 (0.079 in.)	B
2.05 (0.080 in.)	C
2.08 (0.081 in.)	D
2.11 (0.083 in.)	E
2.14 (0.084 in.)	F
2.17 (0.085 in.)	G
2.20 (0.086 in.)	H
2.25 (0.088 in.)	K
2.30 (0.090 in.)	L
2.35 (0.092 in.)	M
2.40 (0.094 in.)	N
2.45 (0.096 in.)	P
2.50 (0.098 in.)	Q
2.55 (0.100 in.)	R
2.60 (0.102 in.)	S
2.65 (0.104 in.)	U
2.70 (0.106 in.)	W

5) Remove differential assembly and counter shaft assembly.

Unit Assembly

CAUTION:

- Automatic transaxle consists of highly precise parts. As even flaw in small part may cause oil leakage or decrease in function, check each part carefully before installation.
- Clean all parts with compressed air. Never use wiping cloths or rags.
- Before assembling new clutch or brake discs, soak them in automatic transaxle fluid for at least 2 hours.
- Be sure to use new gaskets and O-rings.
- Lubricate O-rings with automatic transaxle fluid.
- Apply automatic transaxle fluid on sliding or rotating surfaces of the parts before assembly.
- Use Suzuki Super Grease "C" to retain parts in place.
- Be sure to install thrust bearings and races in correct direction and position.
- Make sure that snap ring ends are not aligned with one of cutouts and are installed in groove correctly.
- Do not use adhesive cements on gaskets and similar parts.
- Be sure to torque each bolt and nut to specification.



- 1) Install new manual shift shaft oil seal to transaxle case.
Use special tool and hammer to install it, and then apply grease to its lip.

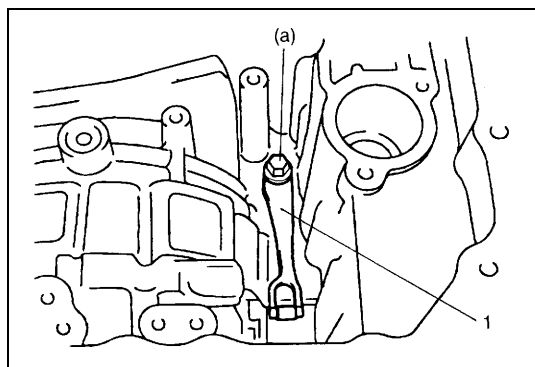
Special tool

(A): 09925-98210

"A": Grease 99000-25030

Manual shift shaft oil seal installing depth

"a": 0.75 – 1.25 mm (0.03 – 0.05 in.)

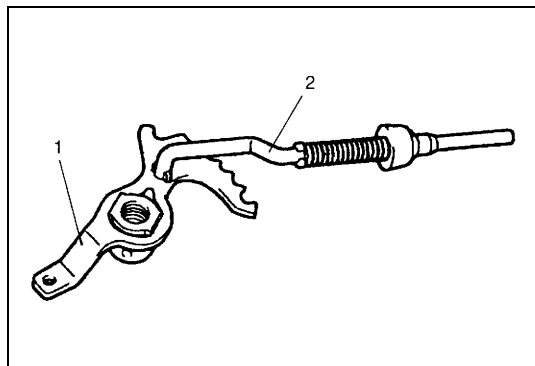


- 2) Install manual detent spring (1) to transaxle case and tighten manual detent spring bolt to specified torque.

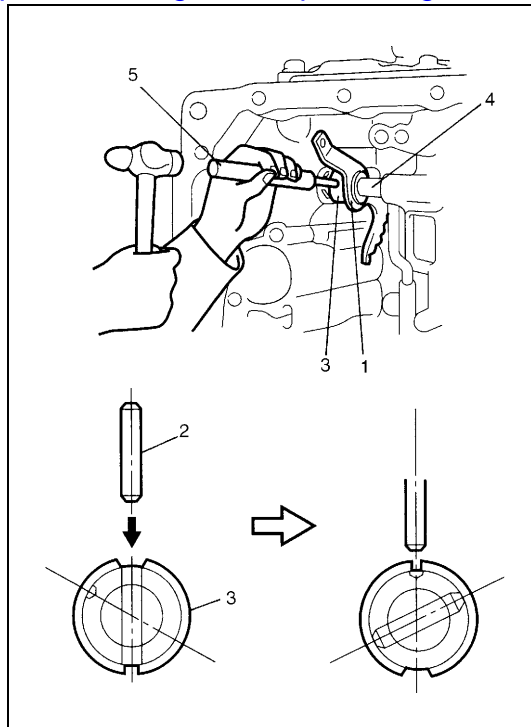
Tightening torque

Manual detent spring bolt

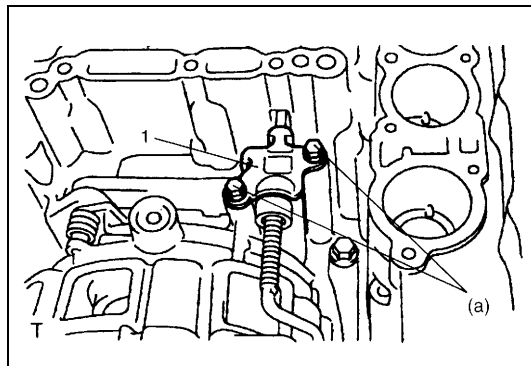
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 3) Install parking lock pawl rod (2) to manual valve lever (1).



- 4) After applying A/T fluid to new manual valve lever (1), install new manual shift shaft (4), new spacer (3) and manual valve lever to transaxle case.
- 5) After installing manual valve lever pin (2) by using spring pin remover with 3 mm (0.12 in.) in diameter (5) and hammer, turn spacer to set the position as shown in the figure. Then calk spacer with a punch.

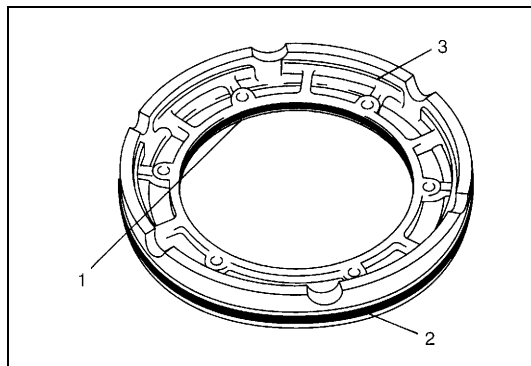


- 6) Install parking lock pawl bracket (1) to transaxle case.

Tightening torque

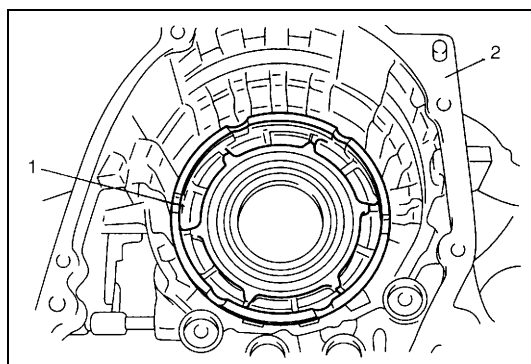
Parking lock pawl bracket bolt

(a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)



- 7) After applying A/T fluid to new O-rings, install them to 1st and reverse brake piston (3).

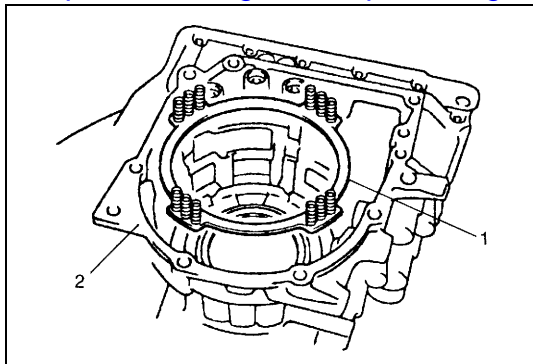
- | |
|-----------------|
| 1. Inner O-ring |
| 2. Outer O-ring |



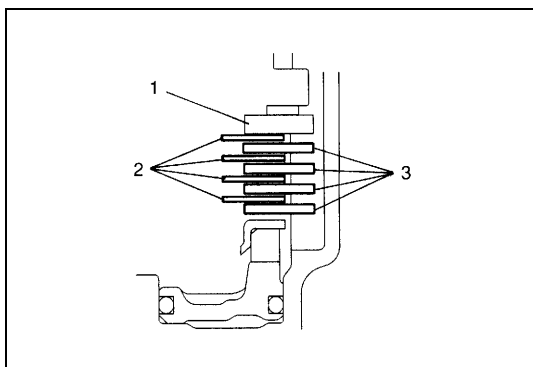
- 8) Install 1st and reverse brake piston (1) to transaxle case (2).

NOTE:

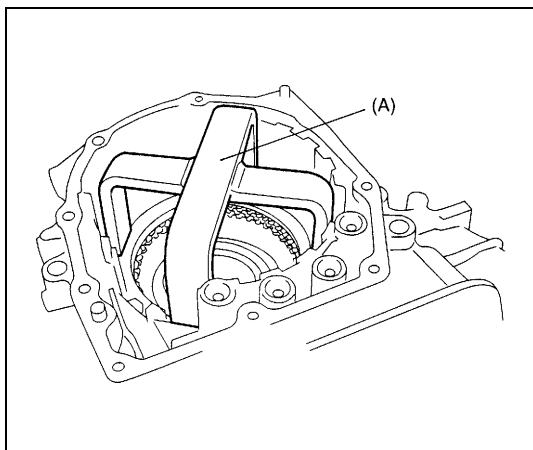
Be careful not to damage O-ring when installing 1st and reverse brake piston.



- 9) Install 1st and reverse brake return spring subassembly (1) to transaxle case (2).



- 10) Apply A/T fluid to 1st and reverse brake discs (2) separator plates (3) and retaining plate (1), then install them to transaxle case.

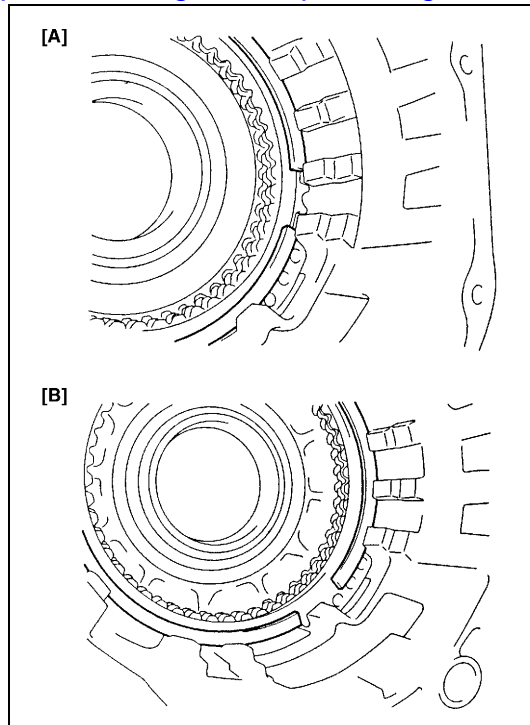


- 11) Compress 1st and reverse brake return spring using special tool and hydraulic press, then attach snap ring.

CAUTION:

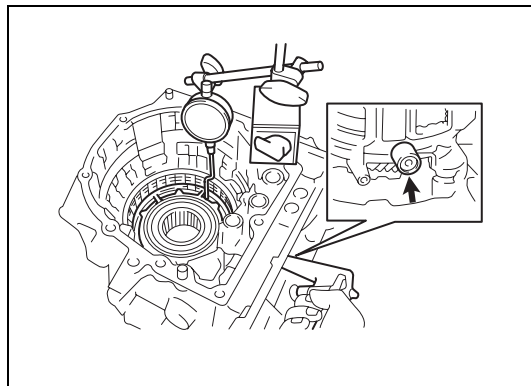
Do not damage 1st and reverse brake return spring subassembly discs, plates and piston by pressing in 1st and reverse brake return spring subassembly passing through its original installing position over 0.8 mm (0.031 in.)

**Special tool
(A): 09926-97620**



- 12) Install 1st and reverse brake plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A]	Correct
[B]	Incorrect



- 13) Using special tools, measure 1st and reverse brake piston stroke when compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) is blown through oil hole.

Special tool

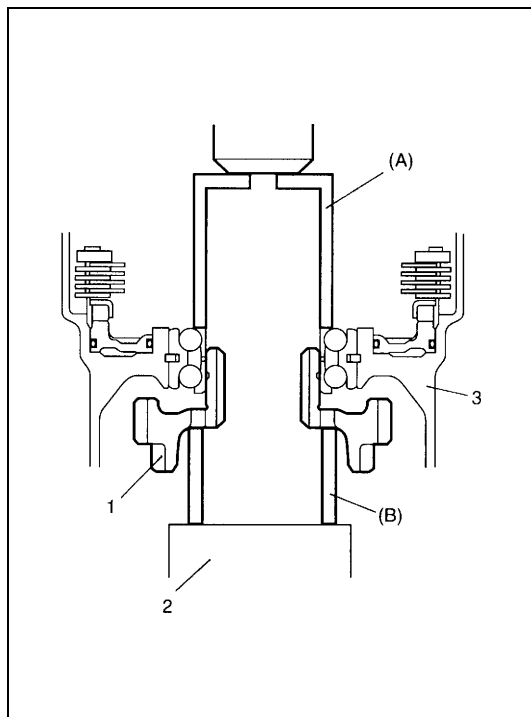
(A) 09900-20607

(B) 09900-20701

(C) 09952-06020

1st and reverse brake piston stroke

Standard: 0.791 – 1.489 mm (0.0311 – 0.0586 in.)



- 14) Install reduction drive gear (1) to transaxle case (3) by using special tools and hydraulic press.

CAUTION:

- Do not use transaxle case as groundwork to press fit reduction drive gear.
- Do not give load more than 20 kN (2,000 kg, 4410 lb) with hydraulic press. Otherwise, it may result in damaging reduction drive gear bearing.

Special tool

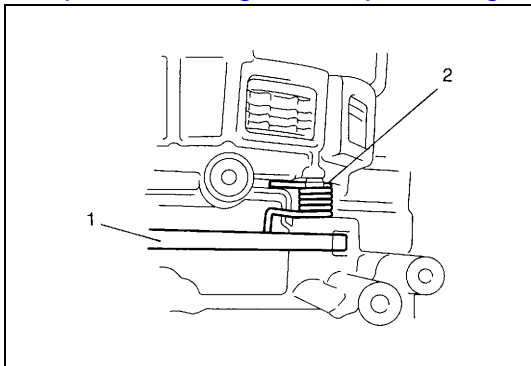
(A): 09951-18210

(B): 09944-78210

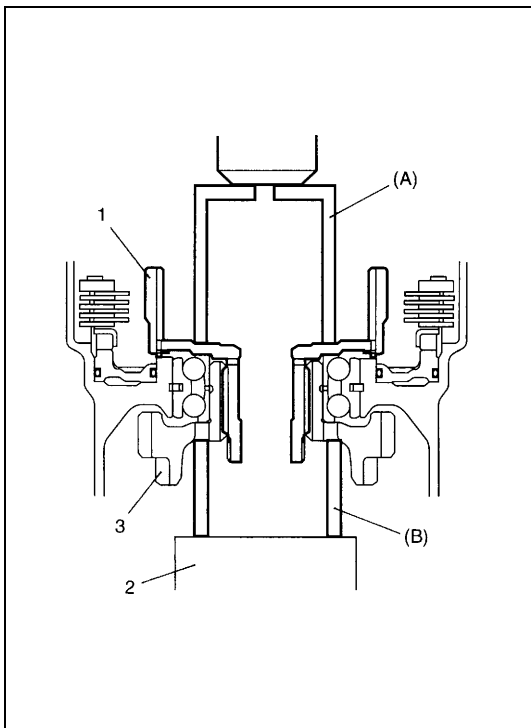
2. Stand that can slightly lift transaxle case.

NOTE:

When replacing reduction drive gear, replace it together with reduction driven gear as a set.



- 15) Install parking lock pawl (1) and spring (2). Apply A/T fluid to parking lock pawl shaft, then insert it into transaxle case.



- 16) Install new planetary ring gear subassembly (1) to reduction drive gear (3) by using special tools and hydraulic press.

CAUTION:

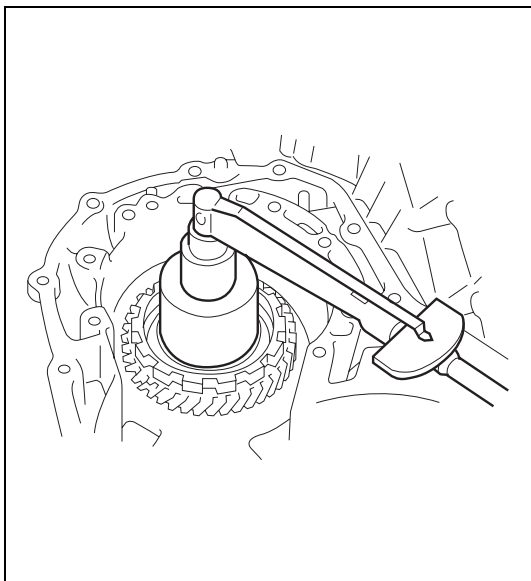
- Do not reuse planetary ring gear subassembly. Otherwise it may cause damage to planetary gear unit and/or reduction gears.
- Do not use transaxle case as groundwork to press fit planetary ring gear subassembly.
- Do not give load more than 20 kN (2,000 kg, 4410 lb) with hydraulic press. Otherwise, it may result in damaging reduction drive gear bearing.

Special tool

(A): 09951-18210

(B): 09944-78210

2. Stand that can slightly lift transaxle case.



- 17) Tighten new reduction drive gear nut to planetary ring gear subassembly little by little until reduction drive gear bearing preload is within specification.

CAUTION:

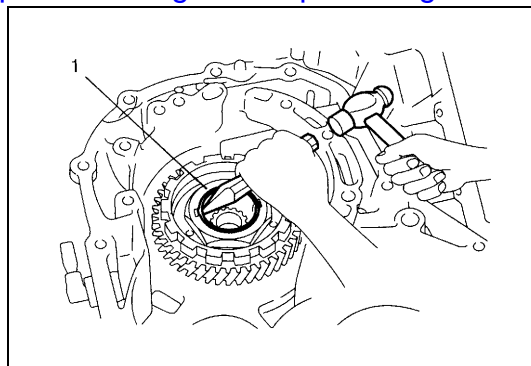
- Do not tighten nut over the specifications so that reduction drive gear nut would not be broken.
- Carry out this procedure on rubber mat in order not to damage transaxle case.

Tightening torque

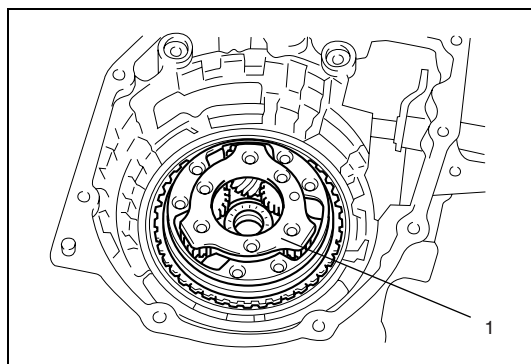
Reference: 100 N·m (10.0 kg-m, 72.5 lb-ft)

Reduction drive gear bearing preload (turning torque)

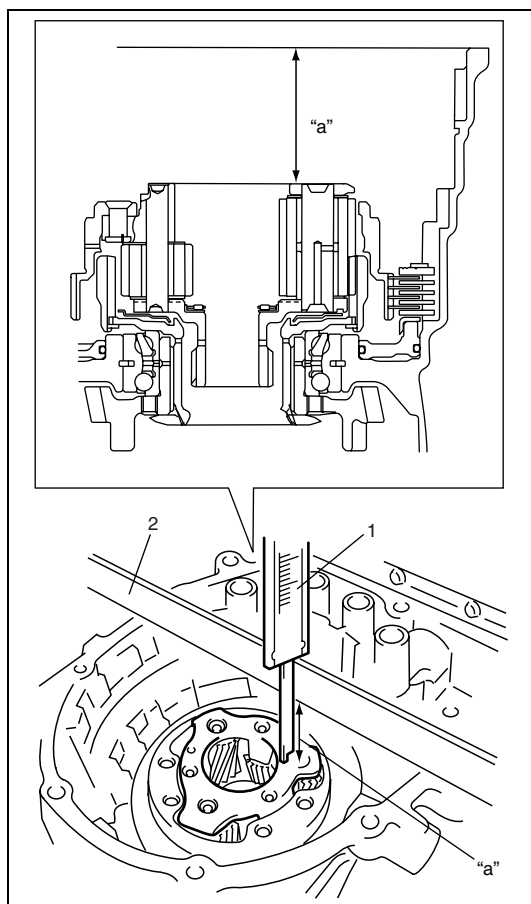
Standard: 0.05 – 0.35 N·m (0.5 – 3.5 kg-cm, 0.036 – 0.253 lb-ft)



18) Caulk reduction drive gear nut (1).



19) Apply A/T fluid to planetary gear assembly (1), then fit it to planetary ring gear assembly.

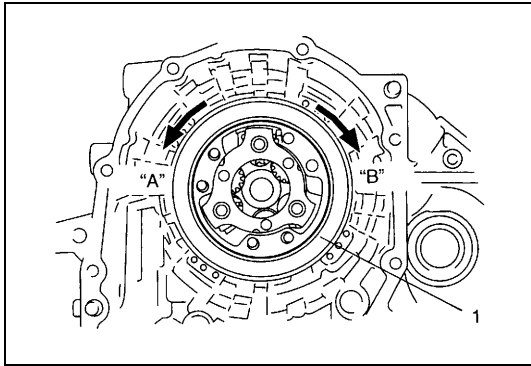


20) Check for correct installation of planetary gear assembly as follows.

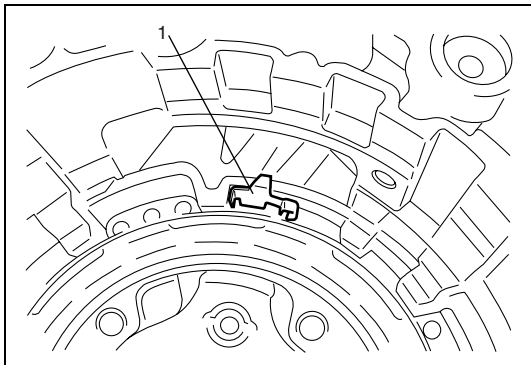
Measure the distance "a" by using micrometer caliper (1) and straightedge (2). If measured value is out of specification, remove planetary gear assembly and reinstall it properly.

Distance between planetary gear assembly and mating surface of transaxle case

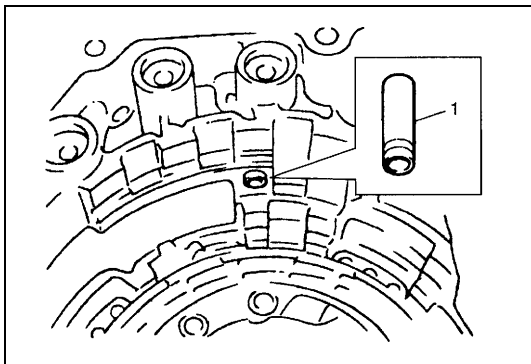
"a": 51.3 – 52.0 mm (2.020 – 2.047 in.)



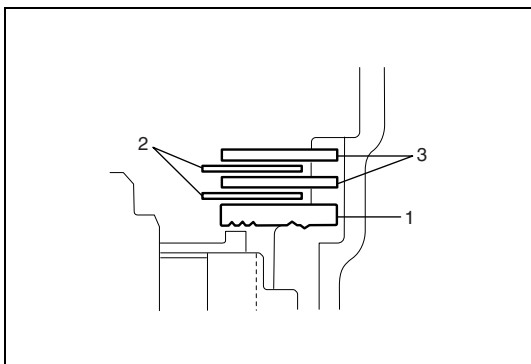
- 21) Apply A/T fluid to one-way clutch No.2 assembly (1), then install it to planetary gear assembly. After that, ensure that planetary carrier rotates only in counterclockwise direction "A", not in clockwise direction "B".



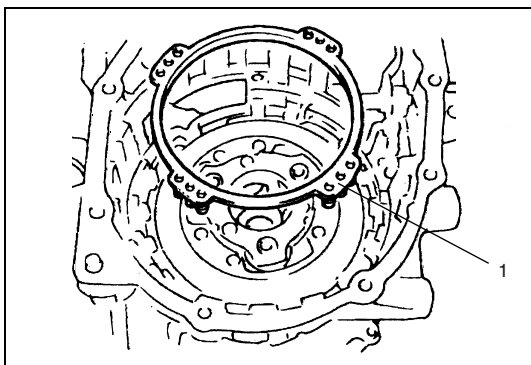
- 22) Install one-way clutch outer race retainer (1).



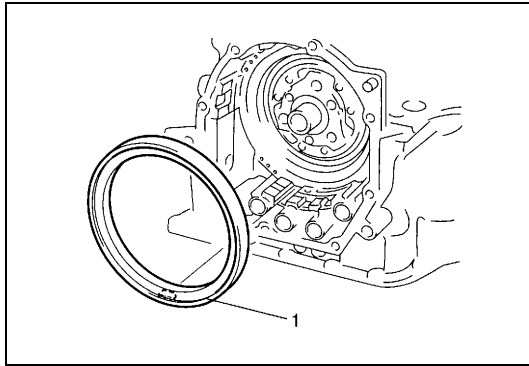
- 23) Apply A/T fluid to new brake drum gasket (1), then install it to transaxle case.



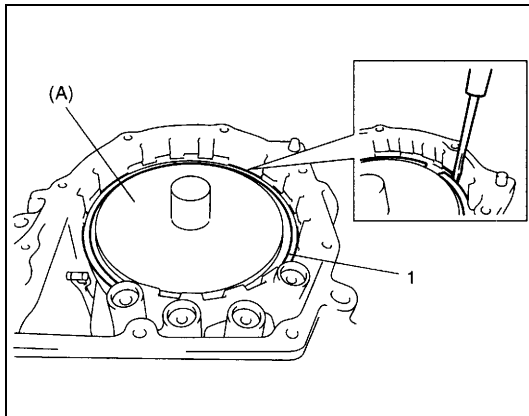
- 24) Apply A/T fluid to 2nd brake retaining plate (1), discs (2) and separator plates (3), then install them to transaxle case.



- 25) Install 2nd brake return spring subassembly (1) to transaxle case.



- 26) Apply A/T fluid to 2nd brake piston assembly (1), and align the projection of 2nd brake piston assembly with the groove of transaxle case, then put together.



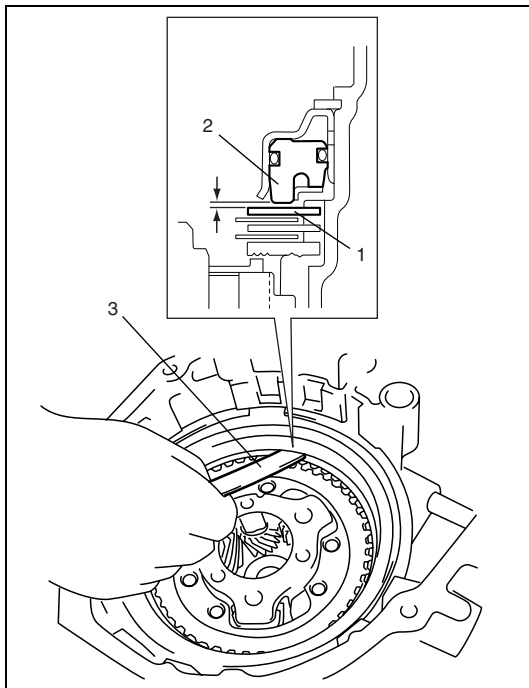
- 27) Install 2nd brake piston snap ring (1) by using special tool and hydraulic press.

CAUTION:

Do not damage 2nd brake piston assembly, return spring subassembly, plates and discs by pressing in 2nd brake assembly passing through its original installing position over 0.4 mm (0.016 in.).

Special tool

(A): 09926-96050

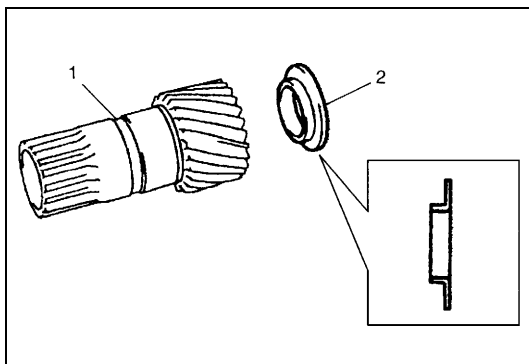


- 28) Check 2nd brake piston stroke by measuring clearance between 2nd brake separator plate (1) and piston (2) with feeler gauge (3).

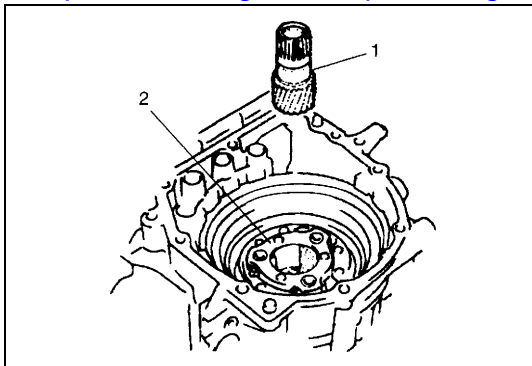
If clearance (piston stroke) is out of specification replace clutch discs and plates with new ones.

2nd brake piston stroke

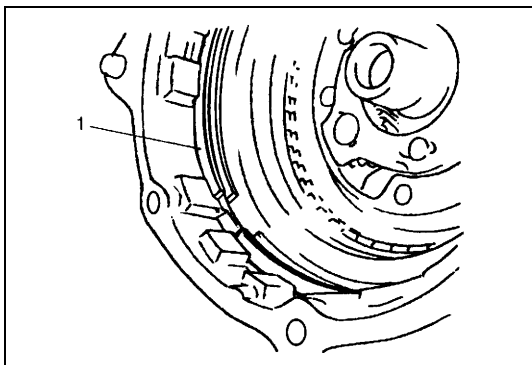
Standard: 0.40 – 1.25 mm (0.016 – 0.049 in.)



- 29) After applying A/T fluid to front sun gear thrust bearing race (2), install it to front planetary sun gear (1).



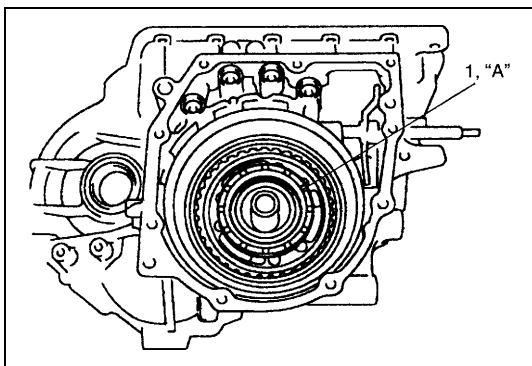
- 30) Apply A/T fluid to front planetary sun gear (1) and install it to planetary gear assembly (2).



- 31) Install O/D and 2nd coast brake retaining plate snap ring (1).

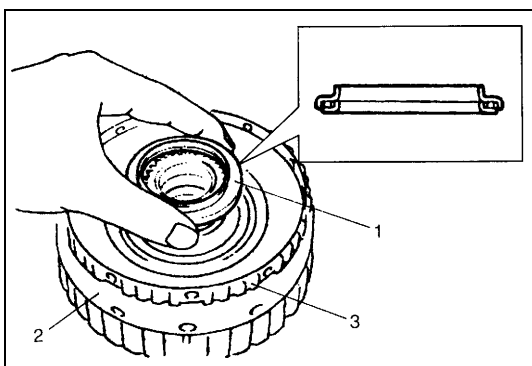
CAUTION:

Be sure to install O/D and 2nd coast brake retaining plate snap ring correctly in groove of transaxle case.



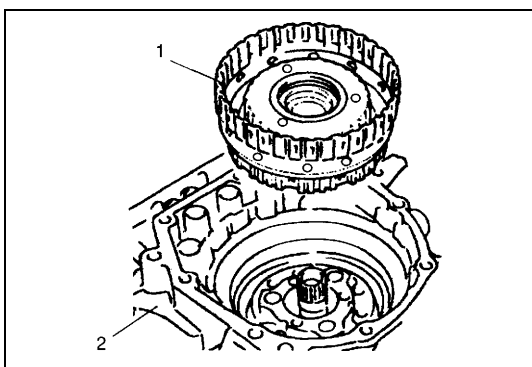
- 32) After applying grease to slide contact face of planetary carrier thrust washer (1), install it to planetary gear assembly.

"A": Grease 99000-25030

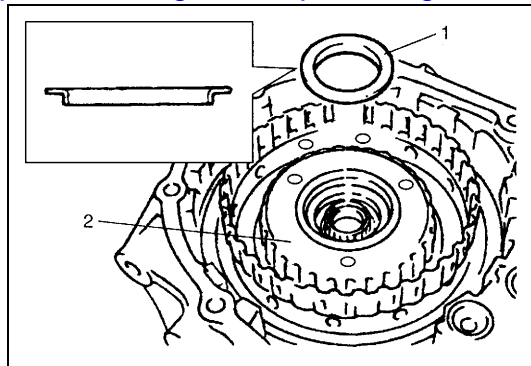


- 33) Apply A/T fluid to one-way clutch No.1 assembly (3) and install one-way clutch No.1 assembly (3) to rear planetary sun gear subassembly (2).

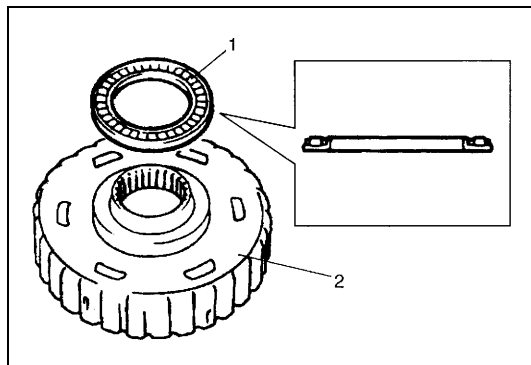
- 34) Apply A/T fluid to planetary gear thrust bearing (1), then install it to one-way clutch No.1 assembly (3).



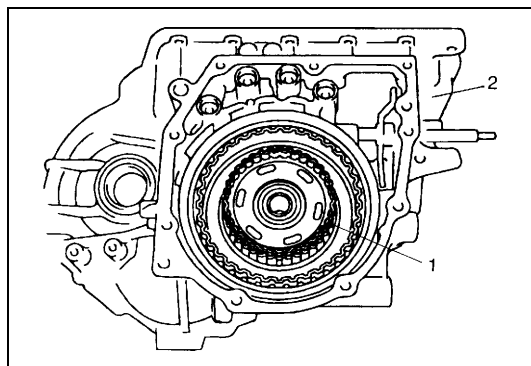
- 35) After applying A/T fluid to rear planetary sun gear subassembly and one-way clutch No.1 assembly (1), install them in transaxle case (2).



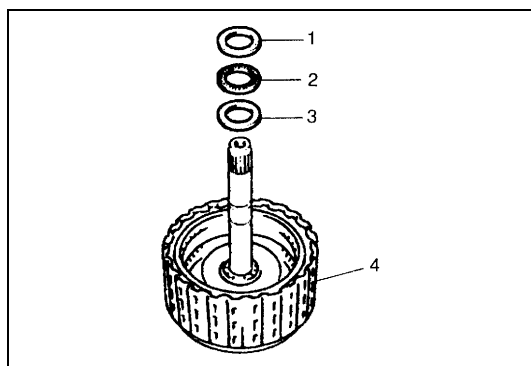
- 36) After applying A/T fluid to rear sun gear thrust bearing race (1), install it to rear planetary sun gear (2).



- 37) After applying A/T fluid to rear sun gear thrust bearing (1), install it to forward clutch hub (2).



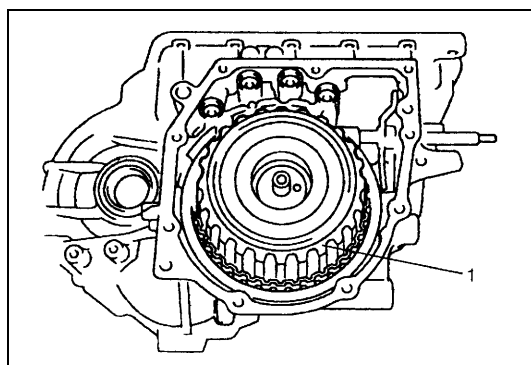
- 38) After applying A/T fluid to forward clutch hub (1), install it in transaxle case (2).



- 39) After applying A/T fluid to intermediate shaft thrust bearing rear race (3), thrust bearing (2) and front race (1), install them to forward and reverse clutch assembly (4).

Bearing race dimension

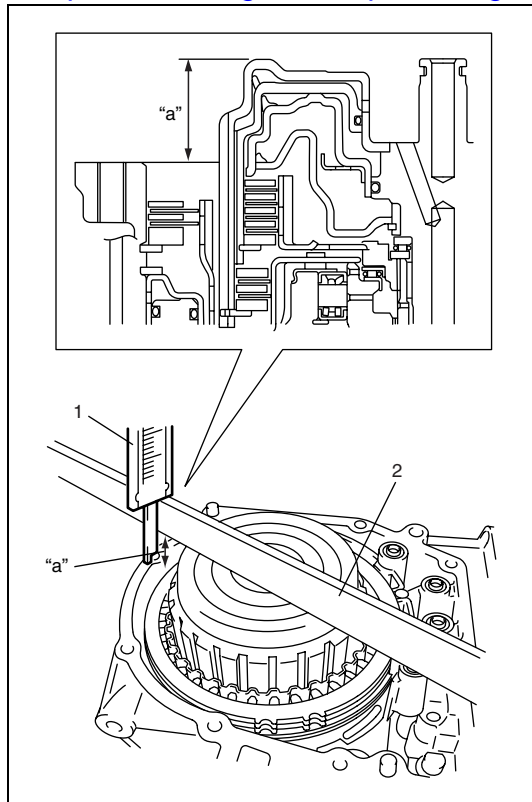
	Front race	Rear race
Outside diameter	30.6 mm (1.20 in.)	28.2 mm (1.11 in.)
Thickness	2.0 mm (0.08 in.)	2.0 mm (0.08 in.)



- 40) Apply A/T fluid to forward and reverse clutch assembly (1). Install forward and reverse clutch assembly while rotating clockwise and counter clockwise frequently to fit clutch discs to mating hubs.

NOTE:

Before installation, align teeth of forward and reverse clutch discs to facilitate installation.

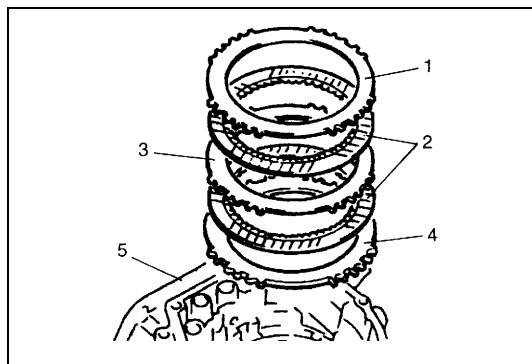


- 41) Check for correct installation of forward and reverse clutch assembly as follows.

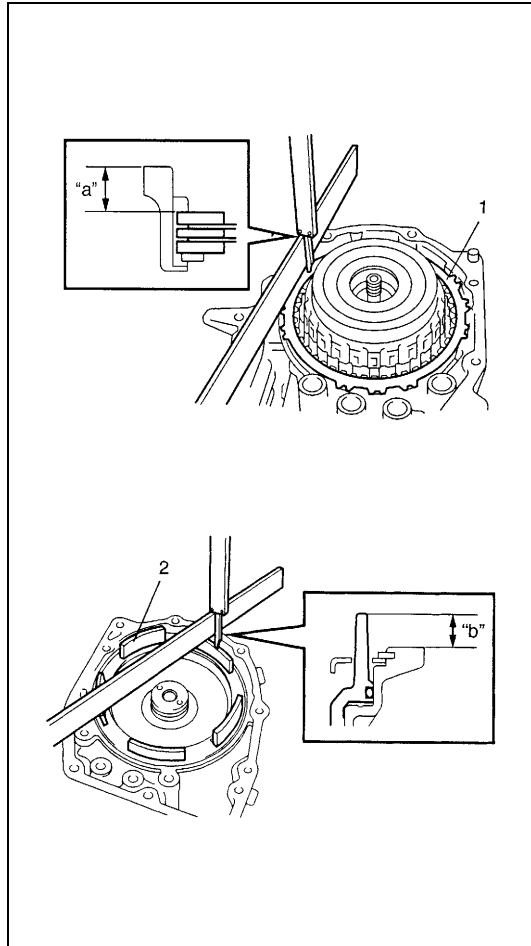
Measure distance "a" by using micrometer caliper (1) and straightedge (2). If out of specification, remove forward and reverse clutch assembly, forward clutch hub, rear planetary sun gear subassembly and one-way clutch No.1 assembly, and reinstall them properly.

Distance between forward and reverse clutch assembly and mating surface of transaxle case

"a": 27.1 – 29.4 mm (1.067 – 1.157 in.)



- 42) After applying A/T fluid to O/D and 2nd coast brake retaining plate (4), separator plate (3), discs (2) and rear plate (1), install them to transaxle case (5).



43) Measure O/D and 2nd coast brake piston stroke.

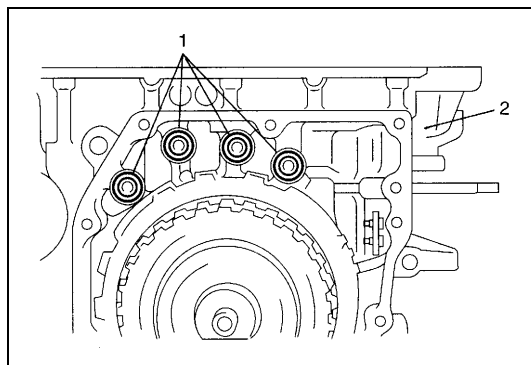
- Measure dimension "a" from end face of transaxle case to O/D and 2nd coast brake rear plate (1) using straightedge and micrometer caliper.
- Measure dimension "b" from O/D and 2nd coast brake piston (2) to rear cover assembly mating surface using straightedge and micrometer caliper.
- Calculate piston stroke from measured value of dimensions "a" and "b".
- Piston stroke = "a" – "b"

O/D and 2nd coast brake piston stroke
standard: 0.65 – 1.05 mm (0.026 – 0.041 in.)

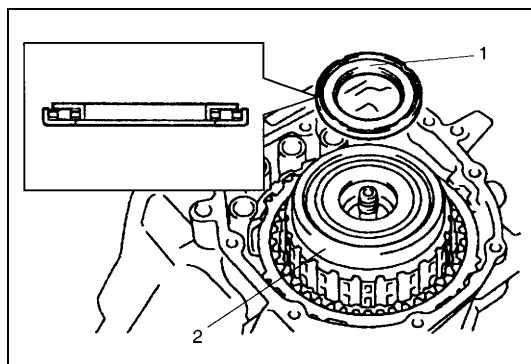
When piston stroke is out of specification, select O/D and 2nd coast brake rear plate with proper thickness from among the list below and replace it.

Available O/D and 2nd coast brake rear plate thickness

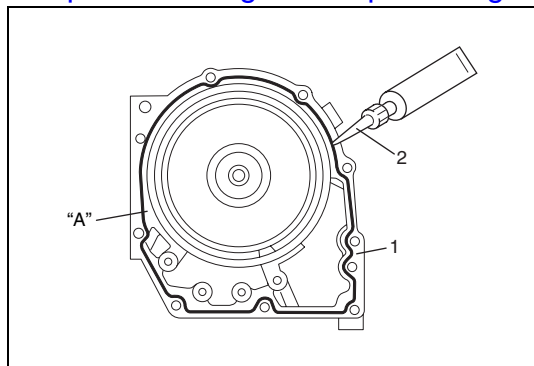
Thickness	Identification mark
1.8 mm (0.071 in.)	1
2.0 mm (0.079 in.)	2
2.2 mm (0.087 in.)	3
2.4 mm (0.094 in.)	4
2.6 mm (0.102 in.)	5
5.0 mm	



44) After applying A/T fluid to new 2nd brake gaskets (1), install them to transaxle case (2).



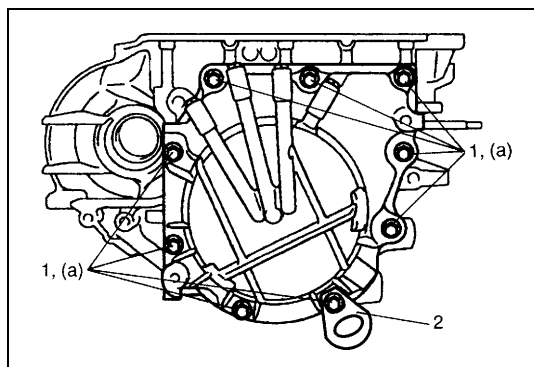
45) After applying A/T fluid to reverse clutch drum thrust bearing (1), install it to forward and reverse clutch assembly (2).



- 46) Remove sealant attached to mating surface of transaxle rear cover (1) completely.
- 47) Apply sealant to mating surface of transaxle rear cover (1) by using a nozzle (2) as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter.

“A”: Sealant 99000-31230

- 48) Install transaxle rear cover assembly on transaxle case.



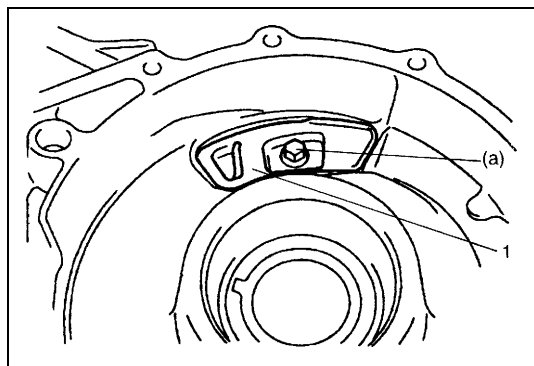
- 49) Install hook (2) to location shown in figure.

Tightening torque

Rear cover bolt

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

- 50) Tighten rear cover bolts (1).

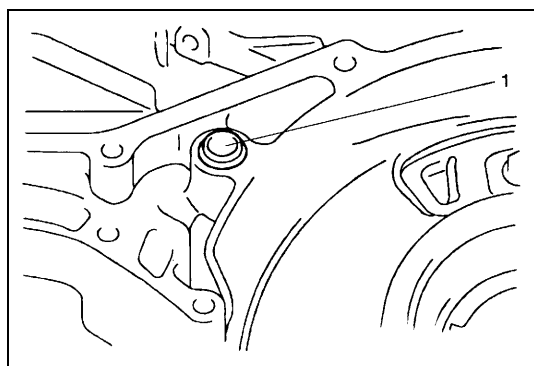


- 51) Install fluid reservoir LH plate (1).

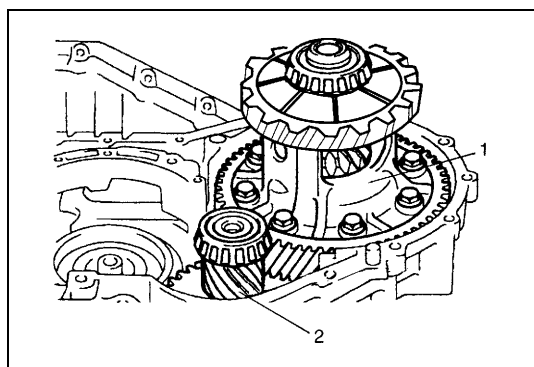
Tightening torque

Fluid reservoir LH plate bolt

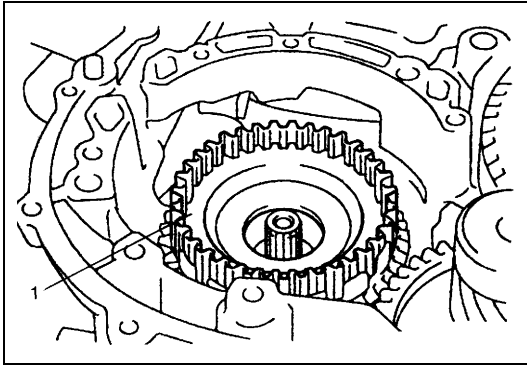
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



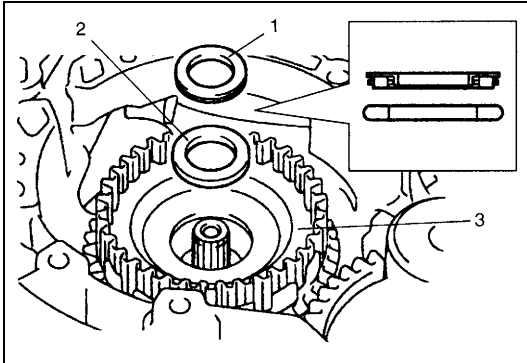
- 52) After applying A/T fluid to new governor apply No.2 gasket (1), install it to transaxle case.



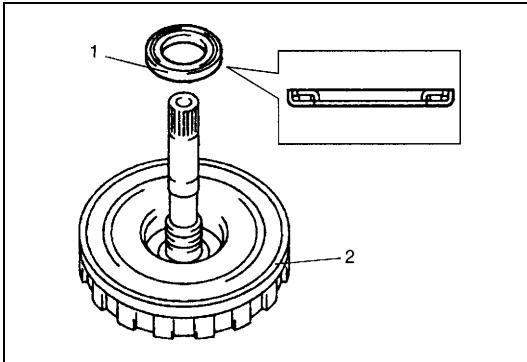
- 53) After applying A/T fluid to differential assembly (1) and countershaft assembly (2), install them to transaxle case.



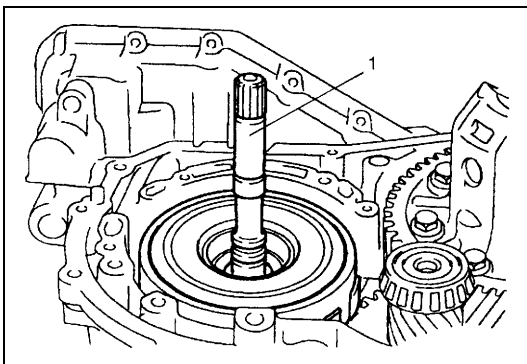
- 54) After applying A/T fluid to direct clutch hub (1), install it to planetary gear assembly.



- 55) After applying A/T fluid to input shaft rear thrust bearing (1) and thrust bearing race (2), install them into direct clutch hub (3).



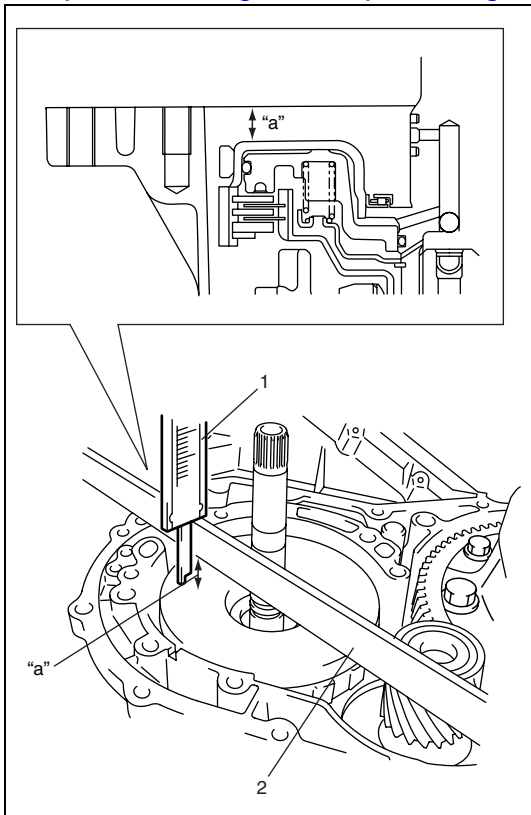
- 56) After applying A/T fluid to input shaft front thrust bearing (1), install it to direct clutch assembly (2).



- 57) Apply A/T fluid to direct clutch assembly (1).
Install direct clutch assembly while rotating clockwise and counter clockwise frequently to fit clutch discs to mating hub.

NOTE:

Before installation, align teeth of direct clutch discs to facilitate installation.

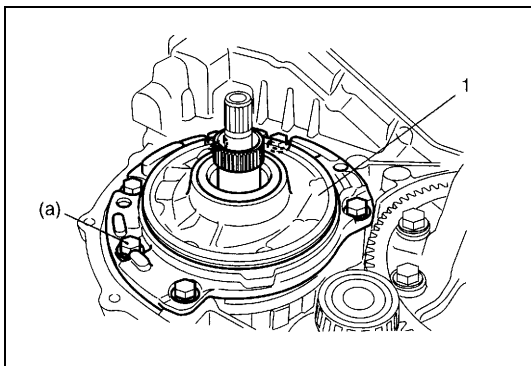


- 58) Check for correct installation of direct clutch assembly as follows.

Measure distance "a" by using micrometer caliper (1) and straightedge (2). If out of specification, remove direct clutch assembly, direct clutch hub and reinstall them properly.

Distance between direct clutch assembly and mating surface of transaxle case

"a": 10.5 – 11.3 mm (0.413 – 0.445 in.)

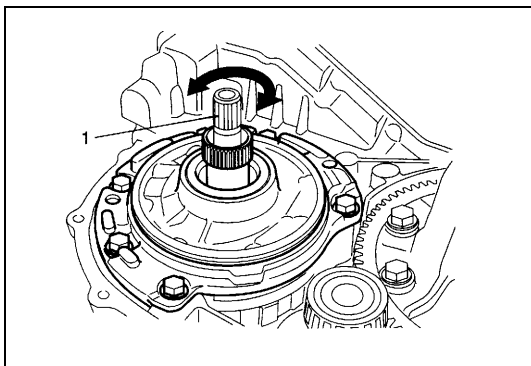


- 59) Install oil pump assembly (1) to transaxle case.

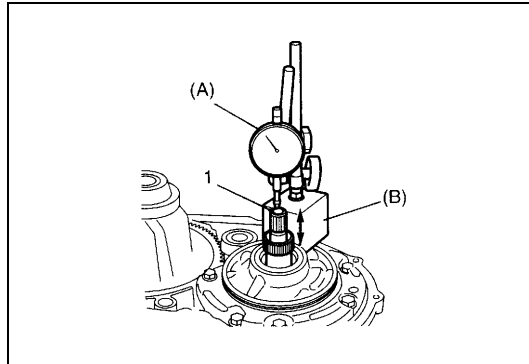
Tightening torque

Oil pump assembly bolt

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)



- 60) Make sure that input shaft (1) turns smoothly.



61) Measure input shaft thrust play.

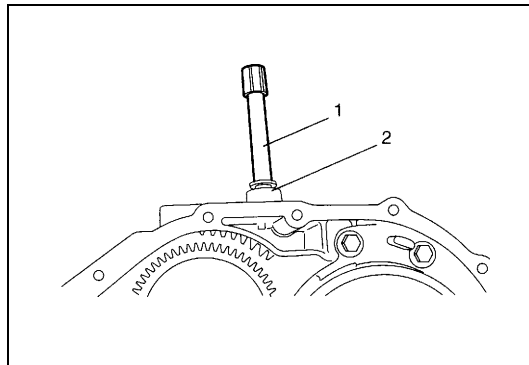
Apply dial gauge onto input shaft end (1) and measure thrust play of input shaft.

Special tool

(A): 09900-20607

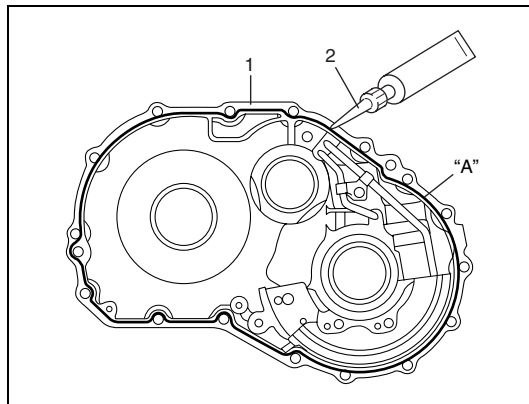
(B): 09900-20701

Input shaft thrust play: 0.3 – 0.9 mm (0.012 – 0.035 in.)



62) After applying A/T fluid to new O-ring, fit it to breather union (2). Then install breather union to transaxle case.

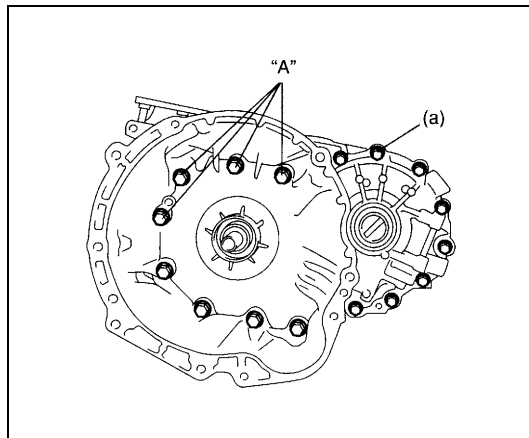
63) Install breather hose (1).



64) Wipe off and clean mating surface between transaxle case (1) and torque converter housing.

65) Apply sealant to torque converter housing (1) by using a nozzle (2) as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter.

“A”: Sealant 99000-31230



66) Install torque converter housing to transaxle case, tighten bolts to specified torque.

CAUTION:

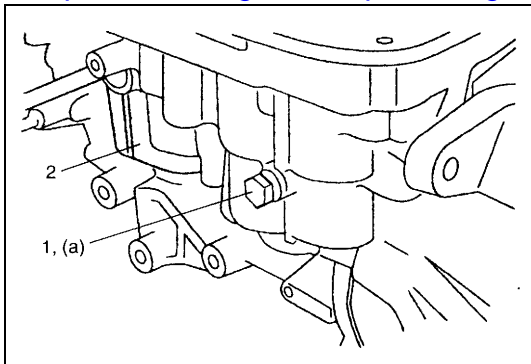
Apply sealant to threads of four bolts shown in figure before tightening.

“A”: Sealant 99000-31230

Tightening torque

Torque converter housing bolt

(a): 33 N·m (3.3 kg·m, 24.0 lb·ft)

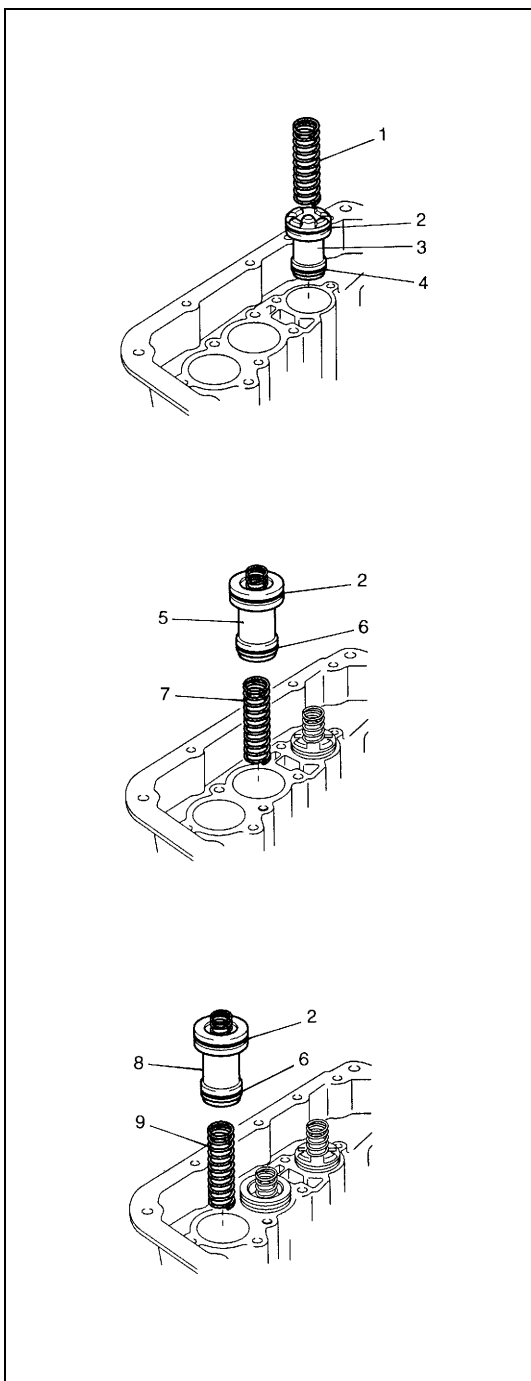


- 67) After applying A/T fluid to new O-ring, fit it to transaxle case plug (1). Then install the transaxle case plug to transaxle case (2).

Tightening torque

Transaxle case plug

(a): 7.5 N·m (0.75 kg·m, 5.5 lb·ft)



- 68) Install new O-rings to each accumulator piston and apply A/T fluid to them.

Accumulator O-ring dimension

O-ring name	Inside diameter	Section diameter
B1 accumulator O-ring (Large) (2)		
C1 accumulator O-ring (Large) (2)	29.4 mm	2.6 mm
C2 accumulator O-ring (Large) (2)	(1.16 in.)	(0.10 in.)
(Above three O-rings are same.)		
B1 accumulator O-ring (Small) (4)	19.7 mm	2.6 mm
	(0.78 in.)	(0.10 in.)
C1 accumulator O-ring (Small) (6)	21.8 mm	2.6 mm
C2 accumulator O-ring (Small) (6)	(0.86 in.)	(0.10 in.)
(Above two O-rings are same.)		

NOTE:

Make sure that O-rings are not twisted or caught when installing.

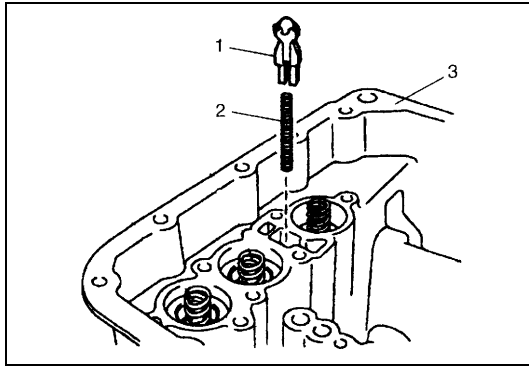
- 69) Install B1, C1, C2 accumulator pistons and springs.

Accumulator piston identification

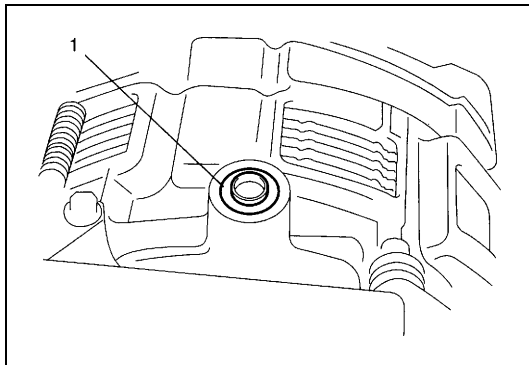
Piston name	Identification (Embossed letters on piston)
B1 accumulator piston (3)	SB-1
C1 accumulator piston (5)	S2C-1
C2 accumulator piston (8)	S2C-2

Accumulator spring identification

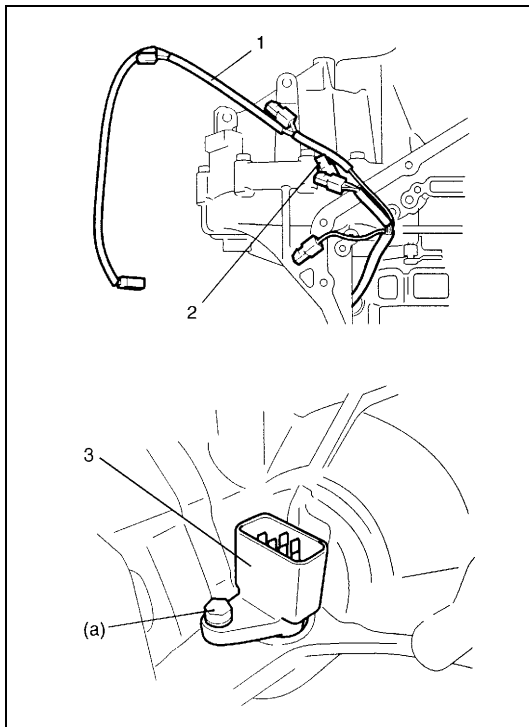
Spring name	Color of identification paint
B1 accumulator No.2 spring (1)	Pink
C1 accumulator No.2 spring (7)	Light Blue
C2 accumulator No.2 spring (9)	Yellow



70) After applying A/T fluid to cooler check valve (1) and spring (2), install them to transaxle case (3).



71) After applying A/T fluid to new governor apply No.1 gasket (1), install it to transaxle case.



72) After applying A/T fluid to new O-ring, fit it to valve body harness connector (3), then install valve body harness to transaxle case.

CAUTION:

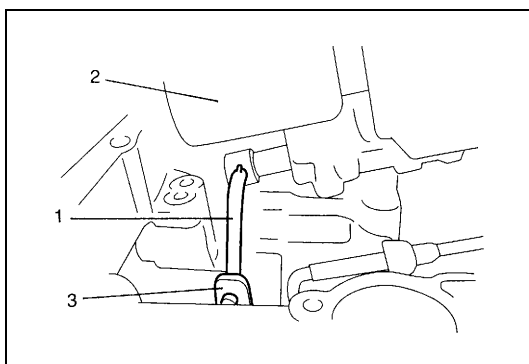
When put valve body harness (1) into transaxle case, take care not to damage transmission fluid temperature sensor (2) at narrow entrance of case.

Careless sensor treatment might cause sensor malfunction.

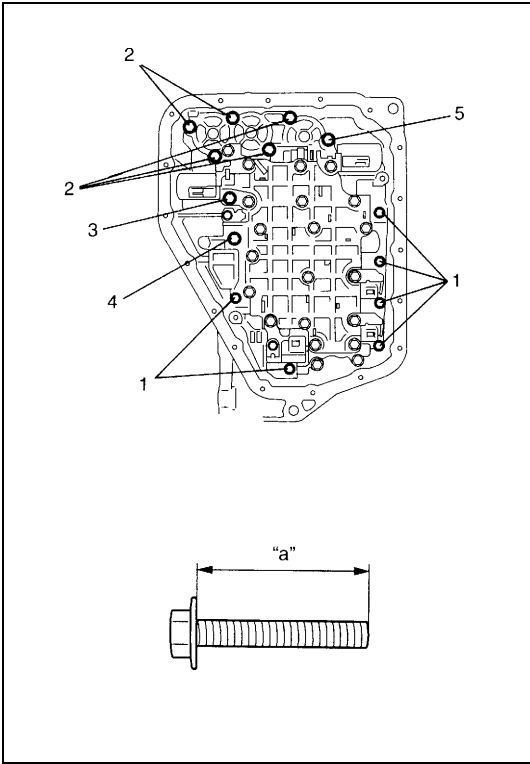
Tightening torque

Valve body harness connector bolt

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



73) Install manual valve rod (1) to manual valve lever (3) and then install valve body assembly (2) to transaxle case.



74) Tighten valve body bolts to specified torque.

Tightening torque

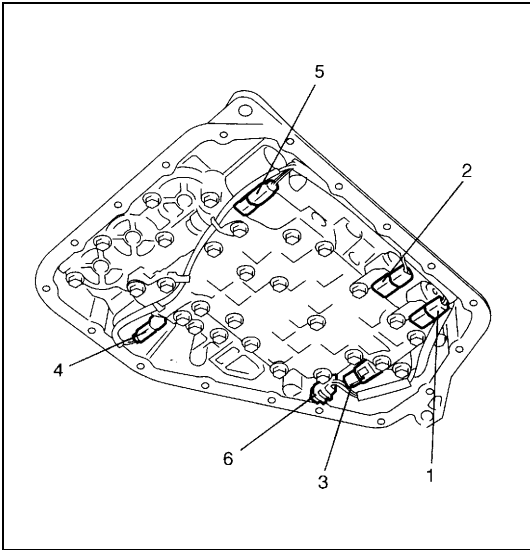
Valve body bolt

11 N·m (1.1 kg·m, 8.0 lb·ft)

Valve body bolt length

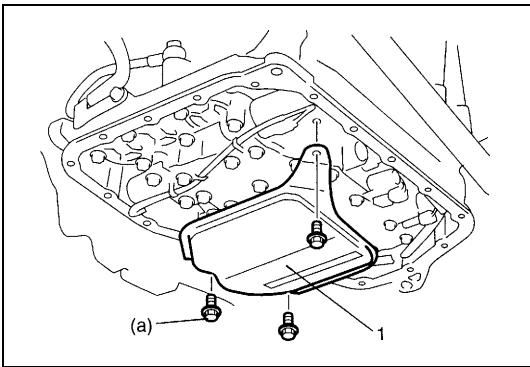
Bolt	Length “a”	Pieces
A	20 mm (0.79 in.)	6
B	28 mm (1.10 in.)	5
C	49 mm (1.93 in.)	1
D	36 mm (1.42 in.)	1
E	40 mm (1.58 in.)	1

1. Bolt A
2. Bolt B
3. Bolt C
4. Bolt D
5. Bolt E



75) Connect solenoid connectors to solenoid valves identifying their installing positions by wire colors, and install transmission fluid temperature sensor to its clamp.

Solenoid valve coupler	Wire Color
Shift solenoid valve-A (1)	White
Shift solenoid valve-B (2)	Black
Timing solenoid valve (3)	Yellow
TCC (Lock-up) solenoid valve (4)	Light Green
Pressure control solenoid valve (5)	Gray + Green
Transmission fluid temperature sensor (6)	Orange

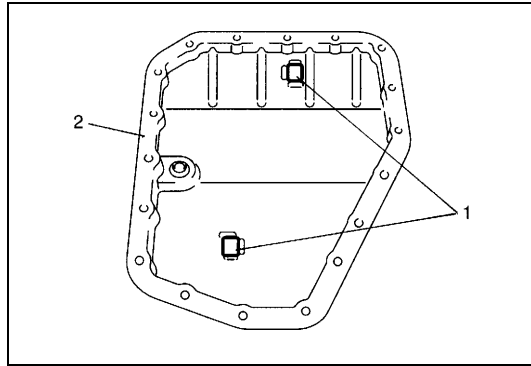


76) Install oil strainer assembly (1).

Tightening torque

Oil strainer bolt

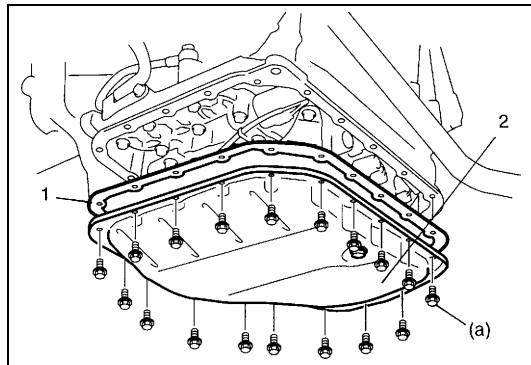
(a): 10 N·m (1.0 kg·m, 7.5 lb·ft)



77) Install oil cleaner magnets (1) in oil pan (2).

NOTE:

If metal particles are attached to the magnets, clean them before installing.

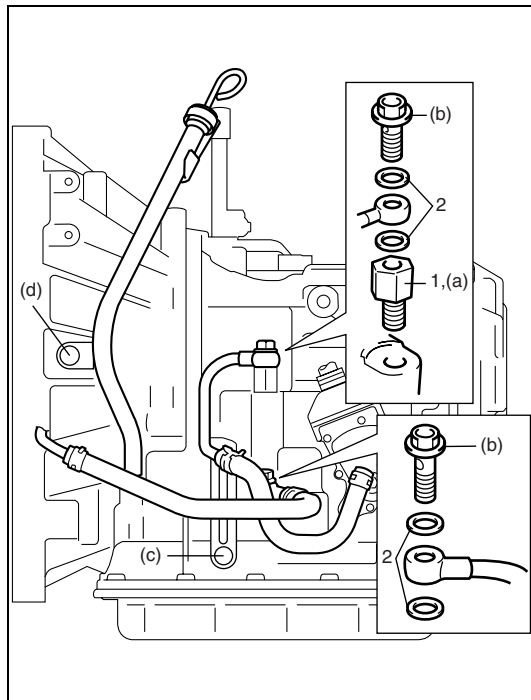


78) Install new oil pan gasket (1) between transaxle case and oil pan (2).

Tightening torque

Oil pan bolt

(a): 7.0 N·m (0.7 kg-m, 5.0 lb-ft)



79) After applying A/T fluid to new O-ring, fit it to fluid inlet union (1). Then install fluid outlet union to transaxle case.

Tightening torque

Fluid outlet union

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

80) Install new gasket (2) and then install fluid cooler pipes.

Tightening torque

Fluid cooler pipe bolt

(b): 22 N·m (2.2 kg-m, 16.0 lb-ft)

Fluid cooler pipe bracket bolt

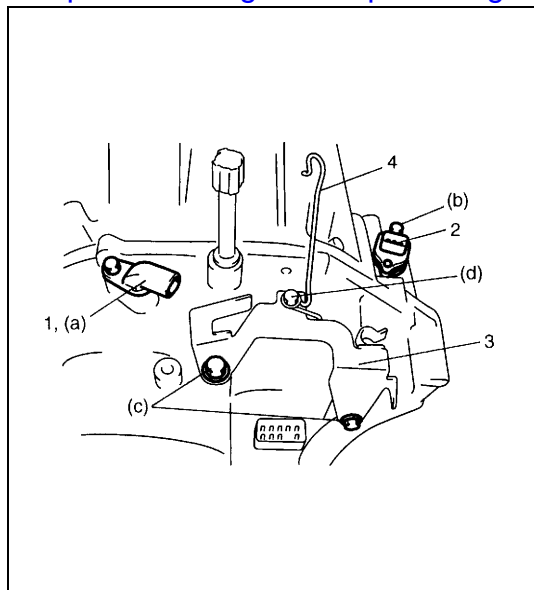
(c): 10 N·m (1.0 kg-m, 7.5 lb-ft)

81) After applying A/T fluid to new O-ring, fit it to fluid filler tube. Then install fluid filler tube to transaxle case.

Tightening torque

Fluid filler tube bolt

(d): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 82) Apply A/T fluid to O-rings of each sensor and install input shaft speed sensor (1) and output shaft speed sensor (VSS) (2).

Tightening torque

Input shaft speed sensor bolt

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

Output shaft speed sensor (VSS) bolt

(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)

- 83) Install harness bracket (3) and select cable clamp (4).

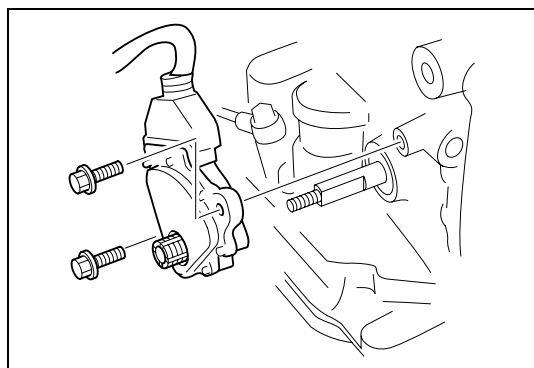
Tightening torque

Harness bracket bolt

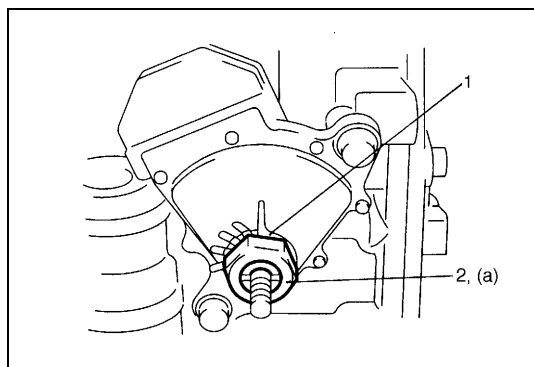
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

Select cable clamp bolt

(d): 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 84) Install transmission range sensor to transaxle case, tighten bolts temporarily at this step.

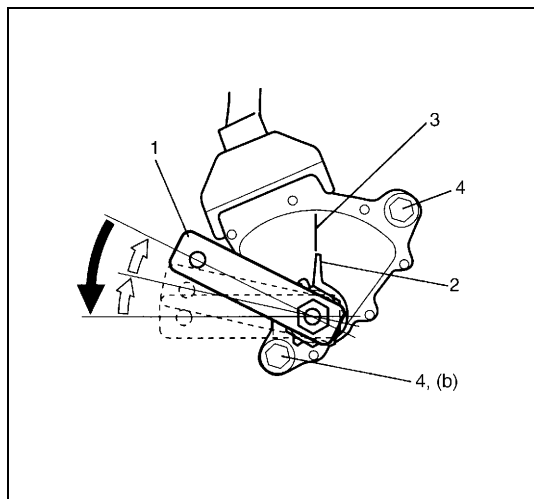


- 85) Install lock washer (1) and tighten lock nut (2) to specified torque.

Tightening torque

Transmission range sensor lock nut

(a): 7 N·m (0.7 kg-m, 5.0 lb-ft)

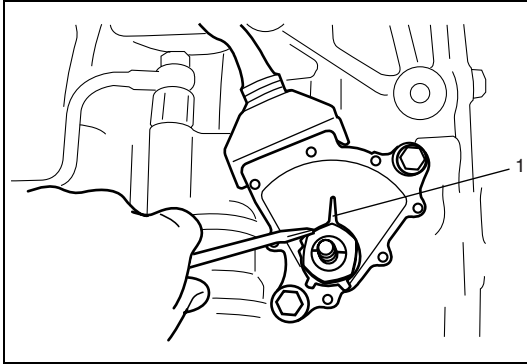


- 86) Install manual select lever (1) temporarily at this step.
 87) After shifting manual select lever counterclockwise fully, select "N" range position by bringing it back 2 notches clockwise.
 88) Remove manual select lever (1) at this step.
 89) Loosen sensor bolts (4) and align needle direction shaped on lock washer (2) with "N" reference line (3) on transmission range sensor by moving sensor in rotative direction.
 90) Tighten sensor bolts (4) to specified torque.

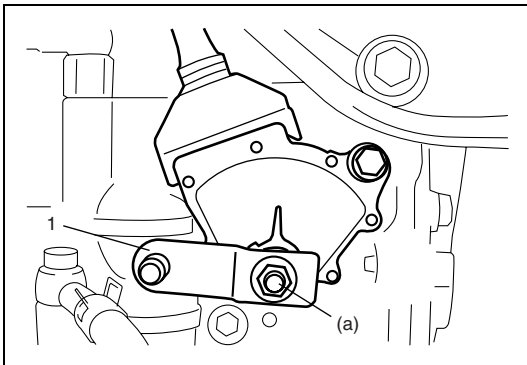
Tightening torque

Transmission range sensor bolt

(b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



- 91) Bend dents of lock washer (1) in order to prevent displacement of lock washer.

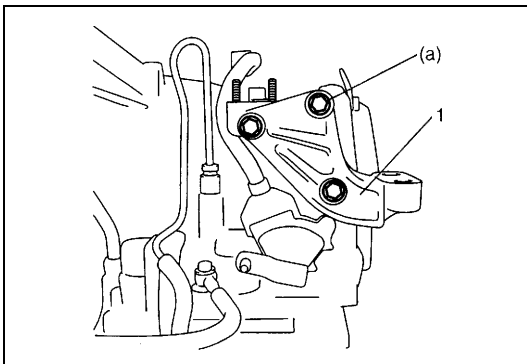


- 92) Install manual select lever (1).

Tightening torque

Manual select lever nut

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

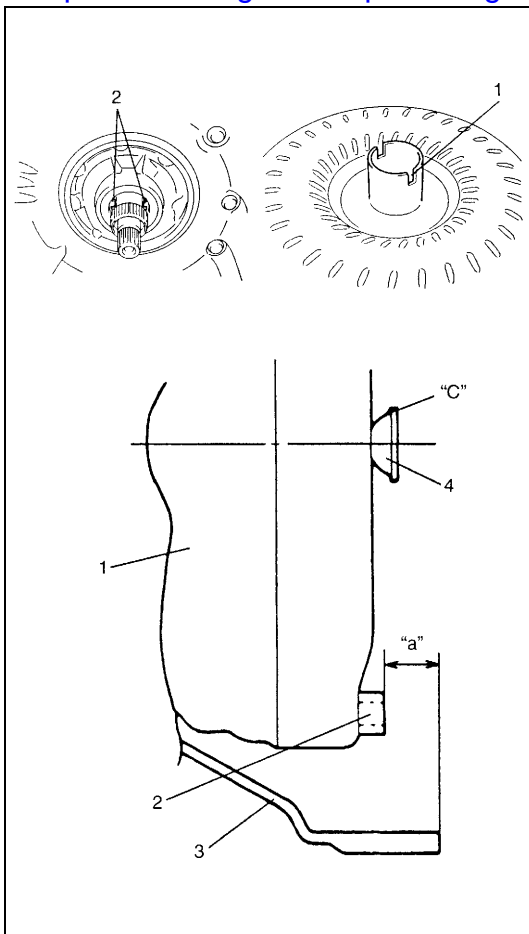


- 93) Install engine mounting LH bracket (1).

Tightening torque

Engine mounting LH bracket bolt

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

**CAUTION:**

- Before installing converter, make sure that its pump hub portion is free from nicks, burrs or damage which may cause oil seal to leak.
- Be very careful not to drop converter on oil pump gear. Damage in gear, should it occur, may cause a critical trouble.

- Install torque converter aligning grooves (1) of torque converter and projection (2) of oil pump drive gear.
- Install torque converter, using care not to damage oil seal of oil pump.
- After installing torque converter, check that distance "a" is within specification.

Torque converter installing position

"a": More than 19.9 mm (0.783 in.)

- Check torque converter for smooth rotation.
- Apply grease around cup at the center of torque converter.

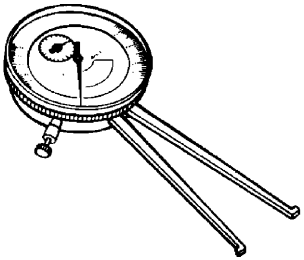
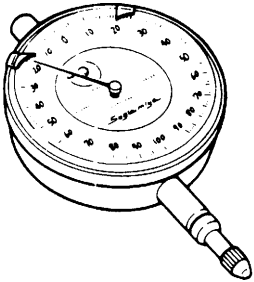
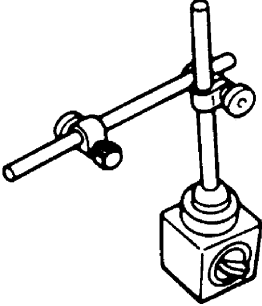
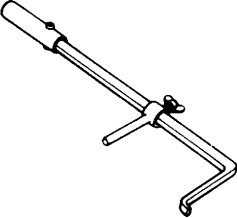
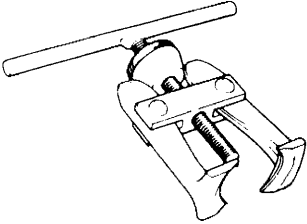
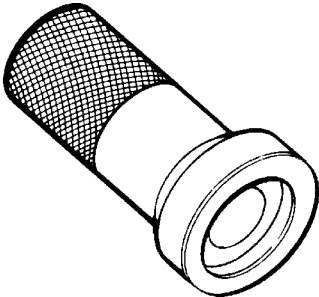
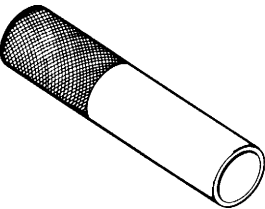
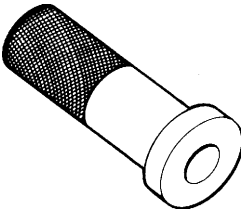
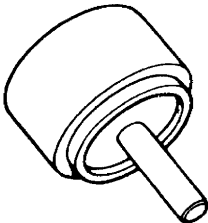
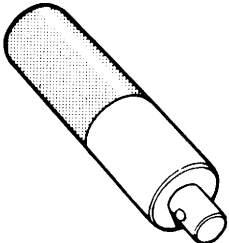
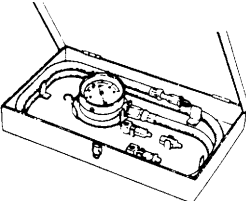
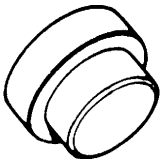
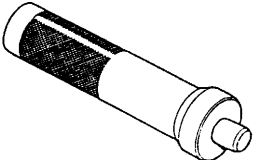
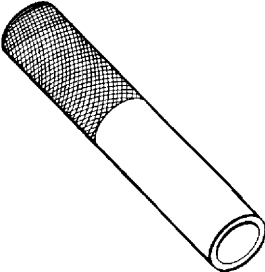
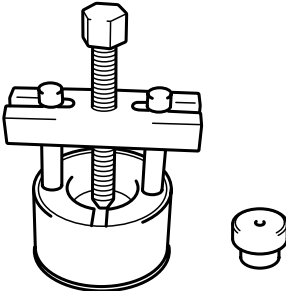
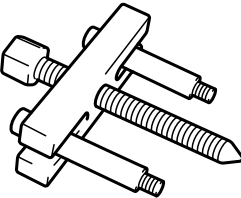
"C": Grease 99000-25010

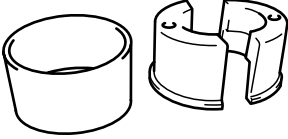


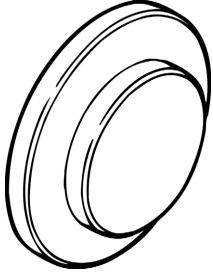
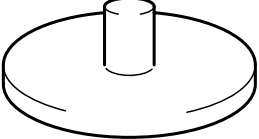
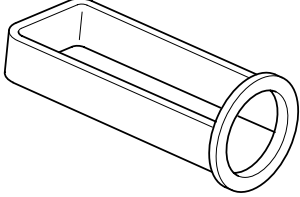
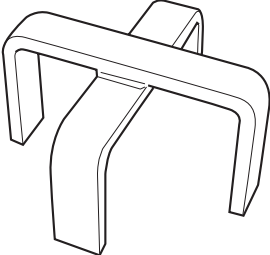
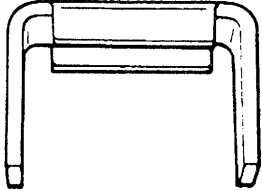
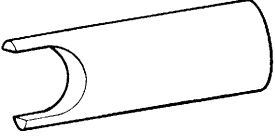
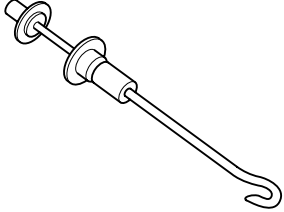
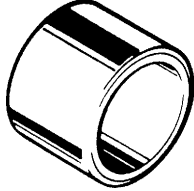
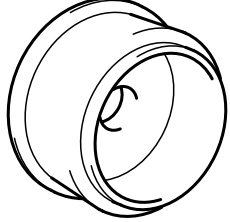
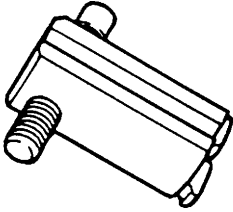
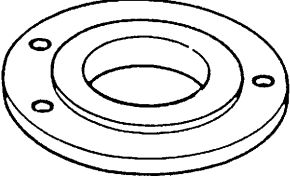
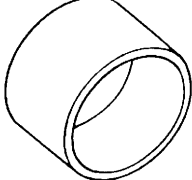
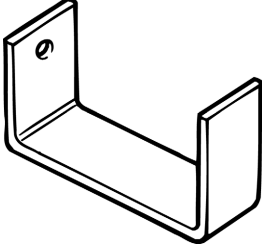
1. Torque converter
2. Flange nut
3. Torque converter housing
4. Cup

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
A/T fluid drain plug	17	1.7	12.5
Output shaft speed sensor bolt	13	1.3	9.5
Input shaft speed sensor bolt	5.5	0.55	4.0
Transaxle case plug	7.5	0.75	5.5
Solenoid valve bolt	11	1.1	8.0
Rear cover plug	7.5	0.75	5.5
Transaxle and engine fastening bolt and nut	85	8.5	61.5
Drive plate to torque converter bolt	19	1.9	14.0
Lower stiffener bolt	55	5.5	40.0
Starter motor bolt and nut	50	5.0	36.5
Oil pump subassembly bolt	10	1.0	7.5
Valve body bolt	11	1.1	8.0
Final gear bolt	78	7.8	56.5
Reduction drive gear nut (Reference)	100	10.0	72.5
Rear cover bolt	25	2.5	18.0
Fluid reservoir LH plate bolt	10	1.0	7.5
Manual detent spring bolt	10	1.0	7.5
Parking lock pawl bracket bolt	7.5	0.75	5.5
Oil pump assembly bolt	25	2.5	18.0
Torque converter housing bolt	33	3.3	24.0
Torque converter housing plug	7.5	0.75	5.5
Lubrication tube clamp bolt	5.5	0.55	4.0
Fluid reservoir RH plate bolt	5.5	0.55	4.0
Valve body harness connector bolt	5.5	0.55	4.0
Oil pan bolt	7.0	0.7	5.0
Oil strainer bolt	10	1.0	7.5
Fluid outlet union	25	2.5	18.0
Fluid cooler pipe flare nut	35	3.5	25.5
Fluid cooler pipe bolt	22	2.2	16.0
Fluid cooler pipe bracket bolt	10	1.0	7.5
Fluid filler tube bolt	10	1.0	7.5
Transmission range sensor lock nut	7	0.7	5.0
Transmission range sensor bolt	5.5	0.55	4.0
Manual select lever nut	13	1.3	9.5
Engine mounting LH bracket bolt	55	5.5	40.0
Harness bracket bolt	23	2.3	17.0
Select cable clamp bolt	10	1.0	7.5

Special Tool

 <p>09900-20605 Dial caliper gauge</p>	 <p>09900-20607 Dial gauge</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09913-50121 Oil seal remover</p>
 <p>09913-61510 Bearing puller</p>	 <p>09913-70123 Bearing installer</p>	 <p>09913-84510 Bearing installer</p>	 <p>09913-85210 Bearing installer</p>
 <p>09923-78210 Bearing installer</p>	 <p>09924-74510 Bearing installer handle</p>	 <p>09925-37811-001 Oil pressure gauge</p>	 <p>09925-88210 Bearing puller attachment</p>
 <p>09925-98210 Bearing installer</p>	 <p>09925-98221 Bearing installer</p>	 <p>09926-37610 Bearing remover See NOTE 1.</p>	 <p>09926-37610-001 Bearing puller See NOTE 2.</p>

 <p>09926-37610-002 Bearing puller attachment See NOTE 2.</p>	 <p>09926-37610-003 Bearing remover attachment See NOTE 2.</p>	 <p>09926-58010 Bearing remover attachment</p>	 <p>09926-96030 Clutch spring compressor</p>
 <p>09926-96050 Brake piston compressor</p>	 <p>09926-97610 Spring compressor</p>	 <p>09926-97620 Spring compressor</p>	 <p>09926-98310 Clutch spring compressor</p>
 <p>09928-06050 Differential preload adapter</p>	 <p>09942-15511 Sliding hammer</p>	 <p>09944-78210 Bearing installer support</p>	 <p>09944-88220 Oil seal installer</p>
 <p>09944-96011 Bearing outer race remover</p>	 <p>09946-06710 Bearing retainer dummy</p>	 <p>09951-18210 Oil seal installer</p>	 <p>09952-06020 Dial gauge plate No.2</p>

NOTE:

- “1”: This tool consists of Bearing Puller with 09926-37610-001, Bearing Puller Attachment with 09926-37610-002 and Bearing Remover Attachment with 09926-37610-003.
- “2”: This tool is constituent of Bearing Remover with 09926-37610.

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Automatic transmission fluid	An equivalent of DEXRON®-III	<ul style="list-style-type: none"> • Automatic transaxle • Parts lubrication when installing • O-rings
Sealant	SUZUKI BOND No. 1216B (99000-31230)	<ul style="list-style-type: none"> • Mating surface of torque converter housing • Mating surface of rear cover assembly • Torque converter housing bolts • Drive plate bolts
Lithium grease	SUZUKI SUPER GREASE C (99000-25030)	<ul style="list-style-type: none"> • Oil seal lips • Planetary carrier thrust washer
	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> • Cable ends • Converter center cup

SECTION 7C

CLUTCH

(G10/M13 ENGINE MODELS)

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

7C**NOTE:**

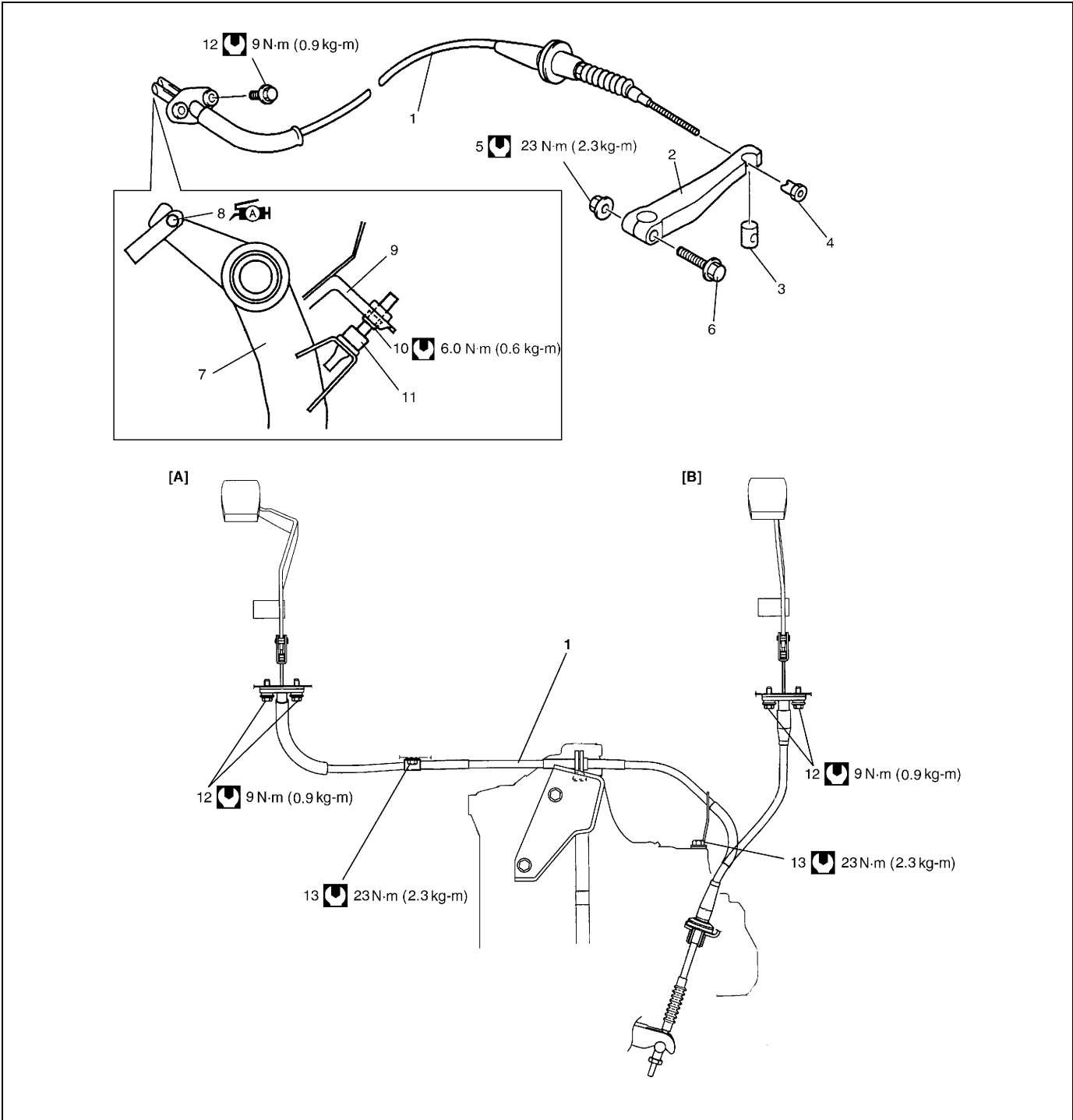
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

CONTENTS

On-Vehicle Service.....	7C-2	Clutch Release Bearing / Shaft / Bush /	
Clutch Cable.....	7C-2	Lever	7C-9
Clutch Pedal and Clutch Pedal Bracket	7C-5	Tightening Torque Specification	7C-12
Clutch Cover, Clutch Disc and Flywheel	7C-6	Required Service Material	7C-12
		Special Tool.....	7C-13

On-Vehicle Service

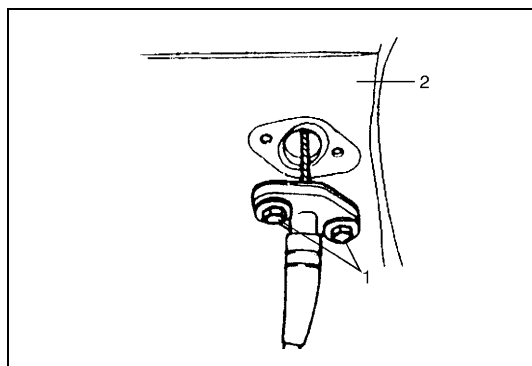
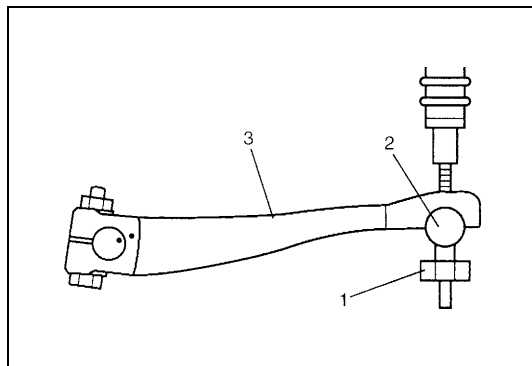
Clutch Cable



[A]: For RH vehicle	5. Clutch release lever nut	11. Adjust bolt
[B]: For LH vehicle	6. Clutch release lever bolt	12. Clutch cable outer bolt
1. Clutch cable	7. Clutch pedal	13. Clamp bolt
2. Clutch release lever	8. Clutch cable hook : Apply grease 99000-25010 to cable hook.	Tightening torque
3. Clutch cable joint pin : Apply grease 99000-25010 to joint pin.	9. Pedal bracket	
4. Clutch cable joint nut	10. Lock nut	

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove clutch cable joint nut (1).
- 3) Remove joint pin (2) from clutch release lever (3).

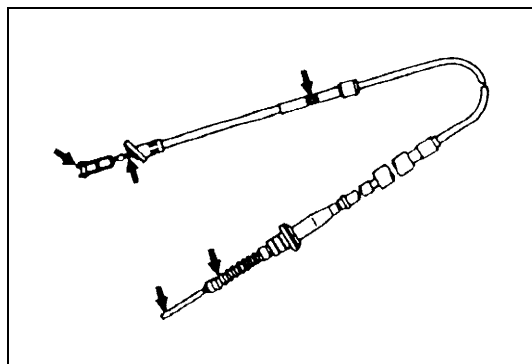


- 4) Remove clutch cable outer bolts (1) from dash panel (2) in engine room.
- 5) Disconnect cable hook from clutch pedal, then take off cable.

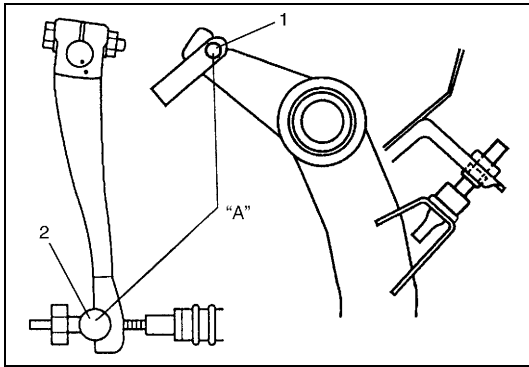
INSPECTION

Inspect clutch cable and replace it for any of the following conditions.

- Excessive cable friction
- Frayed cable
- Bent or kinked cable
- Broken boots
- Worn end



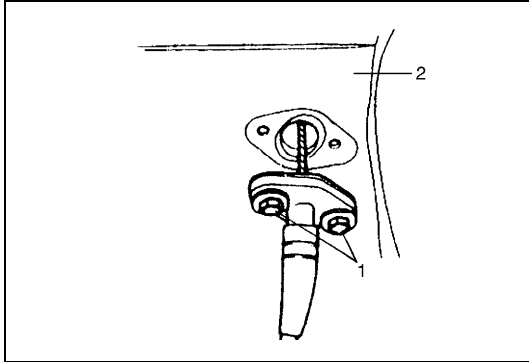
INSTALLATION



- 1) Apply grease to cable end hook (1) and also joint pin (2) before installing cable.

"A": Grease 99000-25010

- 2) Hook cable end with pedal using screwdriver or long nose pliers from cabin inside, then join inner cable joint pin in release lever.



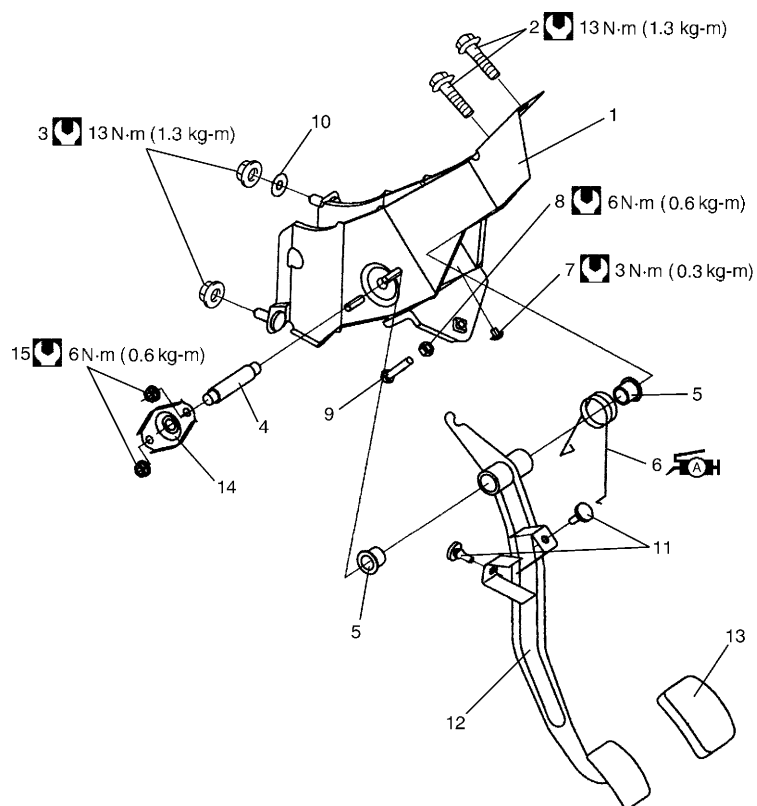
- 3) Fasten cable with clutch cable outer bolts (1) to dash panel (2).



Tightening torque

Clutch cable outer bolt (a): 9 N·m (0.9 kg-m, 6.0 lb-ft)

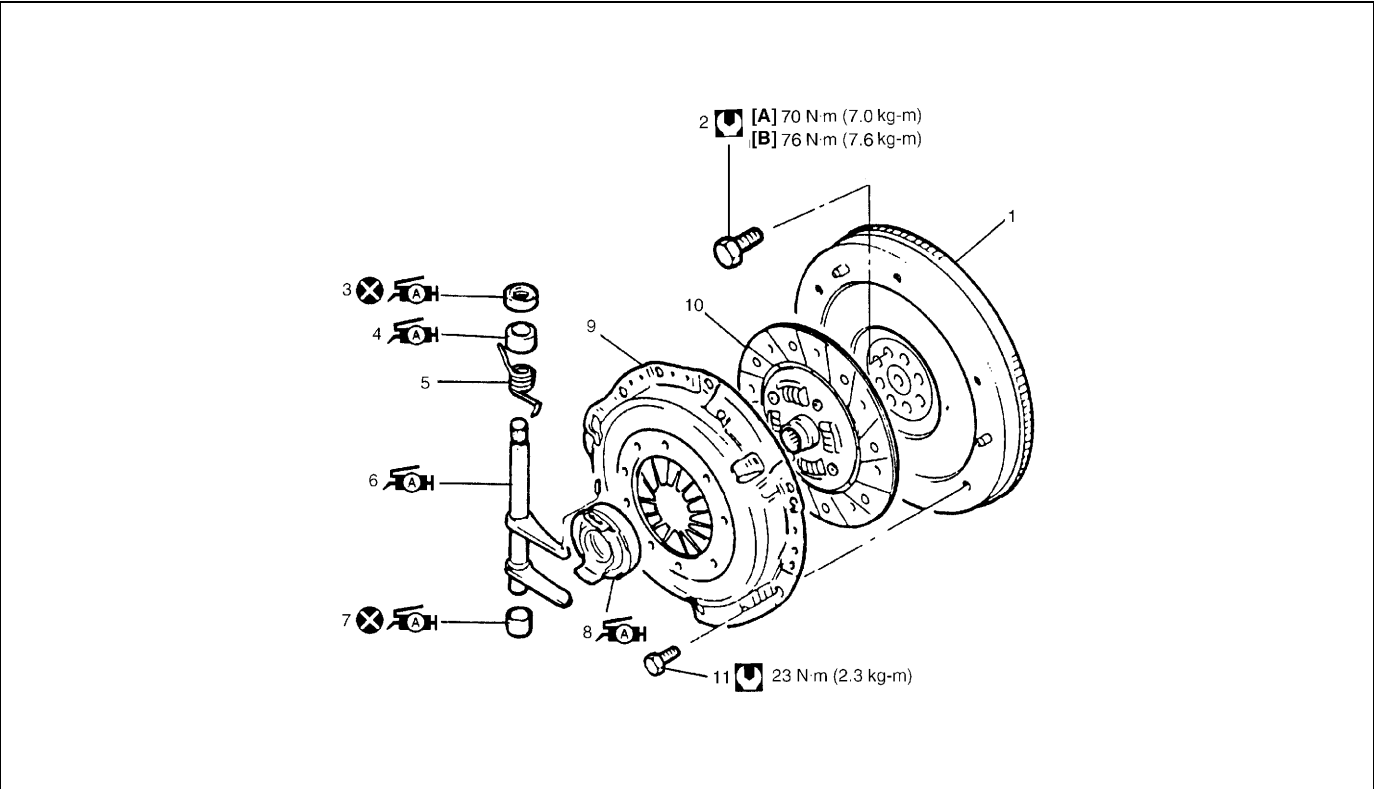
- 4) Screw in joint nut and adjust clutch pedal free travel referring to "DIAGNOSIS" in Section 7C of the Service Manual mentioned in the "FOREWORD" of this manual.








Clutch Pedal and Clutch Pedal Bracket



1. Clutch pedal bracket	9. Adjust bolt
2. Pedal bracket bolt	10. Packing (in cabin)
3. Pedal bracket nut	11. Pedal return cushion
4. Pedal shaft	12. Clutch pedal
5. Pedal bush	13. Pedal pad
 6. Pedal spring : Apply grease 99000-25010 to inside surface of spring.	14. Pedal shaft bracket
7. Pedal bracket screw	15. Pedal shaft bracket nut
8. Lock nut	 Tightening torque

Clutch Cover, Clutch Disc and Flywheel

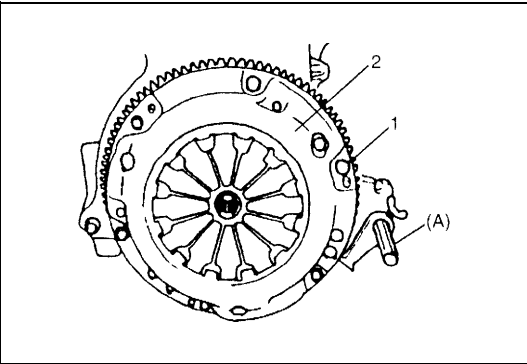


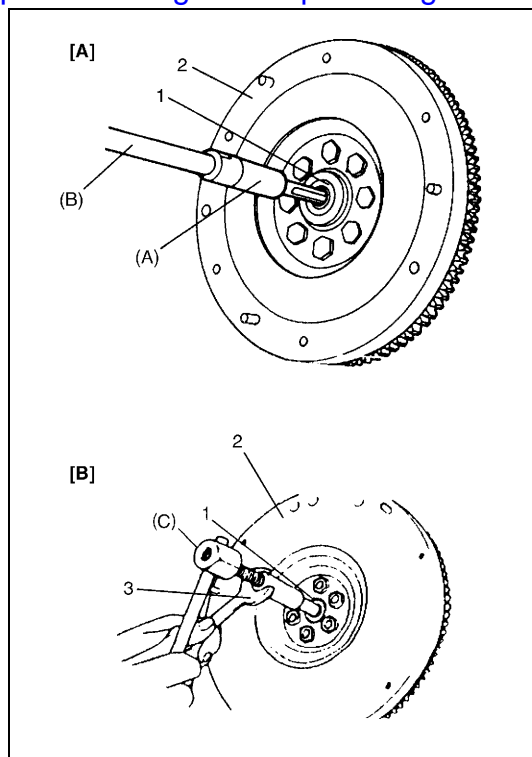
[A]: M13 engine	 7. Clutch release shaft No.1 bush : Apply grease 99000-25010 to bush inside. (0.3 g (0.01 oz))
[B]: G10 engine	 8. Release bearing : Apply grease 99000-25010 to joint of bearing and release shaft and also bearing inside. (0.3 g (0.01 oz))
1. Flywheel	9. Clutch cover
2. Flywheel bolt	10. Clutch disc
 3. Clutch release shaft seal : Apply grease 99000-25010 to seal lip. (0.3 g (0.01 oz))	11. Clutch cover bolt
 4. Clutch release shaft No.2 bush : Apply grease 99000-25010 to bush inside. (0.3 g (0.01 oz))	 Tightening torque
5. Return spring	 Do not reuse.
 6. Clutch release shaft Apply grease 99000-25010 to the end of release shaft arm. (0.3 g (0.01 oz))	

REMOVAL

- 1) Dismount transaxle assembly referring to “Transaxle unit Dismounting and Remounting” in Section 7A.
- 2) Hold flywheel with special tool and loosen clutch cover bolts (1). Remove clutch cover (2) and clutch disc.

Special tool
(A): 09924-17810





- 3) Pull out input shaft bearing (1) using the special tools, if bearing removal is necessary.

Special tool

(A): 09921-26020

(B): 09930-30104

(C): 09917-58010

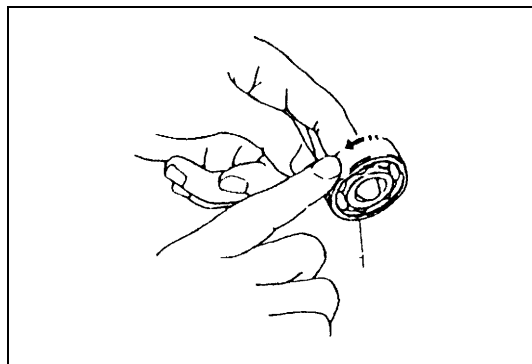
[A]: M13 engine	2. Flywheel
[B]: G10 engine	3. Wrench

- 4) Loosen flywheel bolt while holding flywheel with special tool and removal flywheel from crank shaft.

INSPECTION

Input shaft bearing

Check bearing (1) for smooth rotation and replace it if abnormality is found.



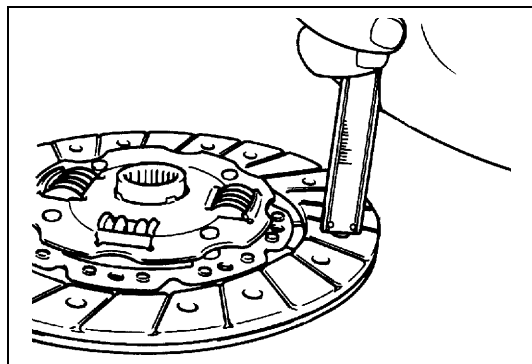
Clutch disc

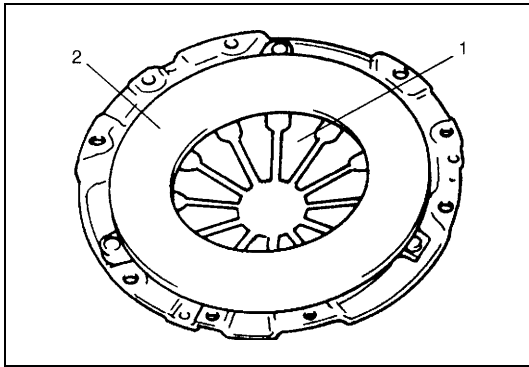
Measure depth of rivet head depression, i.e. distance between rivet head and facing surface. If depression is found to have reached service limit at any of holes, replace disc assembly.

Rivet head depth

Standard: 1.65 – 2.25 mm (0.06 – 0.09 in.)

Service limit: 0.5 mm (0.02 in.)



Clutch cover

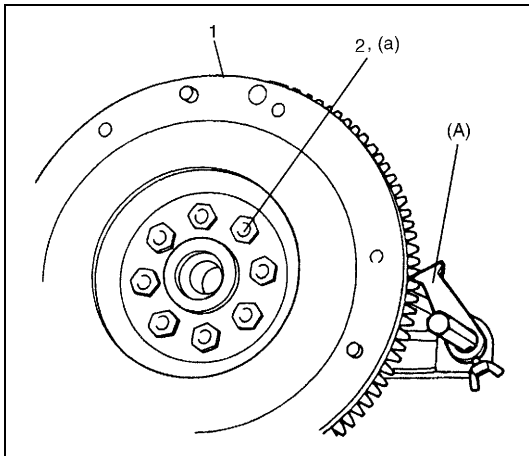
- 1) Check diaphragm spring (1) for abnormal wear or damage.
- 2) Inspect pressure plate (2) for wear or heat spots.
- 3) If abnormality is found, replace clutch cover. Do not disassemble it into diaphragm spring and pressure plate.

Flywheel

Check surface contacting clutch disc for abnormal wear or heat spots. Replace or repair as required.

INSTALLATION**NOTE:**

Before assembling, make sure that flywheel surface and pressure plate surface have been cleaned and dried thoroughly.



- 1) Install flywheel (1) to crankshaft and tighten bolts (2) to specified torque.

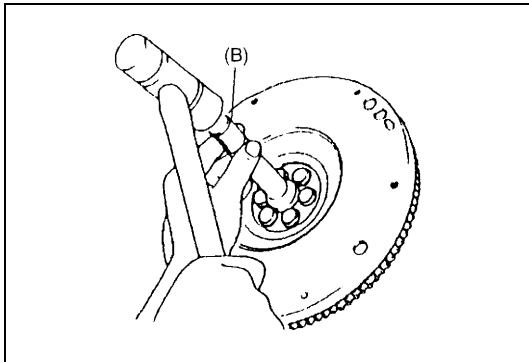
Special tool

(A): 09924-17810

Tightening torque

Flywheel bolt (M13 engine) (a): 70 N·m (7.0 kg-m, 50.5 lb-ft)

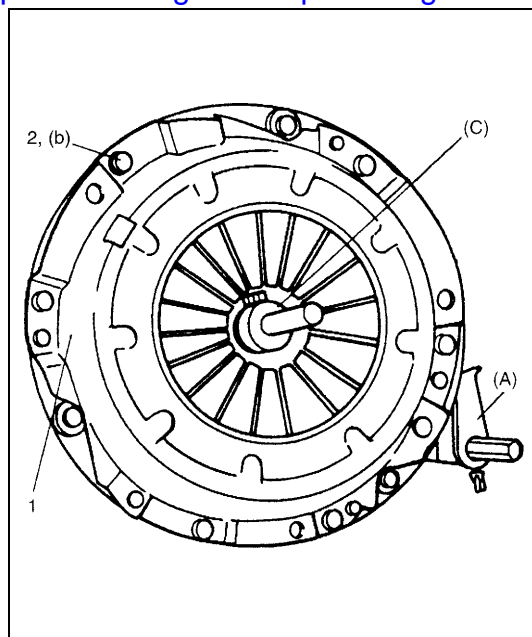
Flywheel bolt (G10 engine) (a): 76 N·m (7.6 kg-m, 54.5 lb-ft)



- 2) Using special tool, install input shaft bearing to flywheel.

Special tool

(B): 09925-98210



- 3) Aligning clutch disc to flywheel center using special tool, install clutch cover (1) and bolts (2). Then tighten bolts to specification.

NOTE:

- While tightening clutch cover bolts, compress clutch disc with special tool (C) by hand so that disc centered.
- Tighten cover bolts little by little evenly in diagonal order.

Special tool

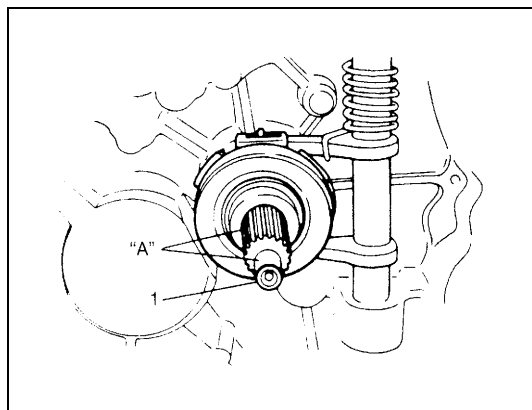
(A): 09924-17810

(C): 09923-36320 (M13 engine)

(C): 09923-36330 (G10 engine)

Tightening torque

Clutch cover bolt (b): 23 N·m (2.3 kg-m, 16.5 lb-ft)



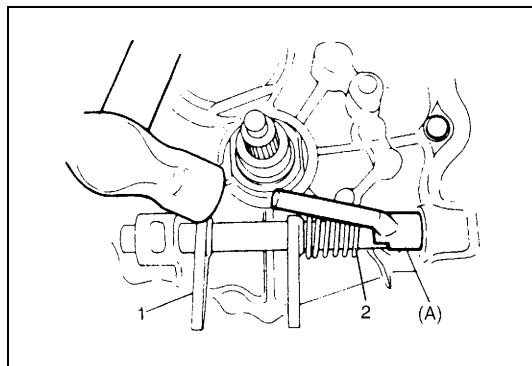
- 4) Slightly apply grease to input shaft (1), then join transaxle assembly with engine referring to "Unit Repair Overhaul" in Section 7A of the service manual mentioned in the FOREWORD of this manual or "Transaxle Unit Dismounting and Remounting" in Section 7A2.

"A": Grease 99000-25210

NOTE:

When inserting transaxle input shaft to clutch disc, turn crankshaft little by little to match splines.

Clutch Release Bearing / Shaft / Bush / Lever REMOVAL

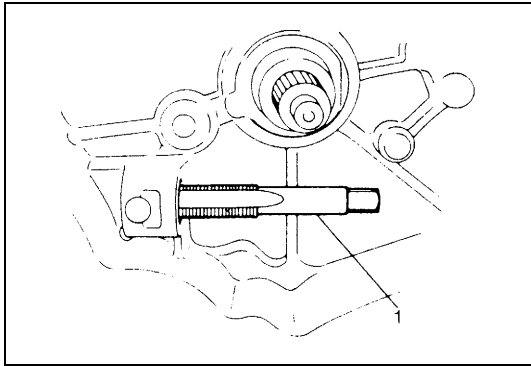


- 1) Remove release lever by loosening its bolt.
- 2) Take out release bearing by turning release shaft (1).
- 3) Unhook return spring (2) using pliers.
- 4) Drive out No.2 bush using special tool and hammer.
Release shaft seal will also be pushed out.

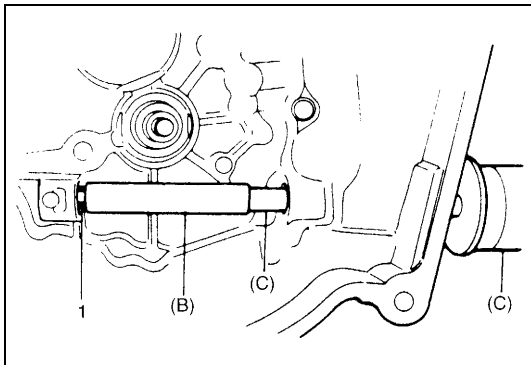
Special tool

(A): 09922-46010

- 5) Remove release shaft (1) and return spring (2).



6) Install tap (M16 X 1.5) (1) to clutch release shaft No.1 bush.



7) Pull out No.1 bush using tap (1) and special tools.

Special tool

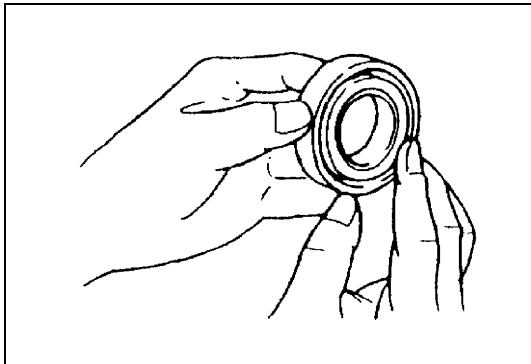
(B): 09923-46020

(C): 09930-30104

INSPECTION

Clutch release bearing

Check clutch release bearing for smooth rotation.
If abnormality is found, replace it.

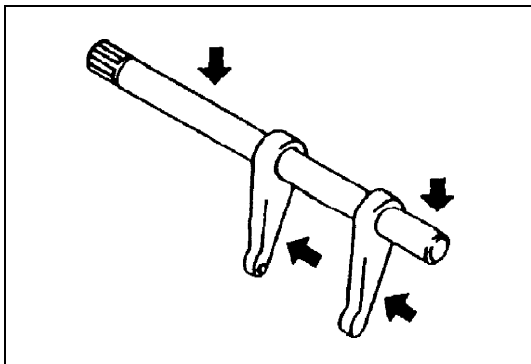


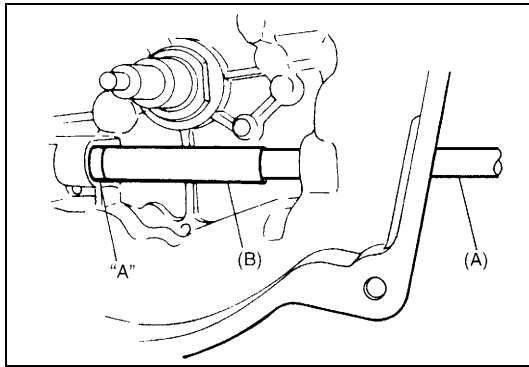
CAUTION:

Do not wash release bearing. Washing may cause grease leakage and consequential bearing damage.

Clutch release shaft

Check clutch release shaft and its pin for deflection or damage.
If abnormality is found, replace it.

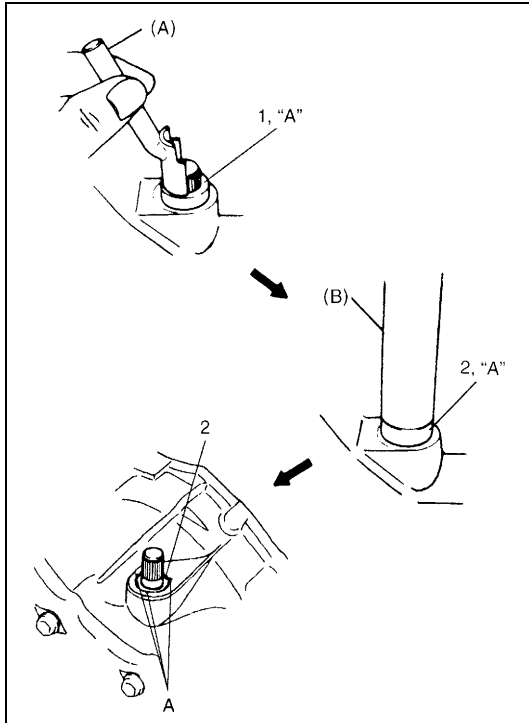


INSTALLATION

- 1) Drive in a new No.1 bush using special tools, and then apply grease to bush inside.

Special tool**(A): 09930-30104****(B): 09923-46030****“A”: Grease 99000-25010**

- 2) Install release shaft with return spring.



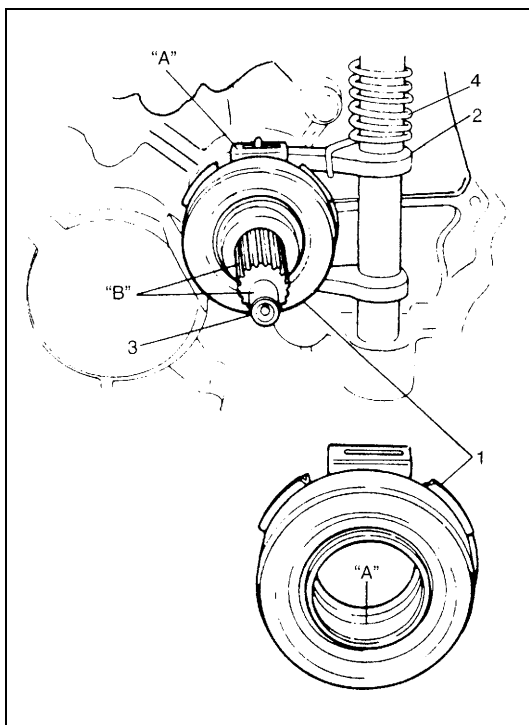
- 3) Apply grease to No.2 bush (1) inside and press-fit it using the same special tool as in removal.

“A”: Grease 99000-25010**Special tool****(A): 09922-46010**

- 4) Coat grease to shaft seal (2) lip and then install it till it is flush with case surface. Use special tool for this installation and face seal lip downward (inside).

“A”: Grease 99000-25010**Special tool****(B): 09925-98221**

- 5) Caulk seal at A using caulking tool and hammer.



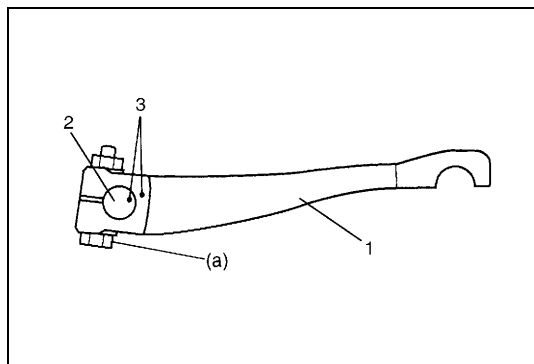
- 6) Hook return spring (4).

- 7) Apply grease to release bearing (1) inside and release shaft arm (2), then set release bearing.

“A”: Grease 99000-25010

- 8) Apply small amount of grease to input shaft (3) spline (0.3 g) (0.01 oz) and front end (0.15 g) (0.005 oz) as well.

“B”: Grease 99000-25210



- 9) Set release lever (1) to release shaft (2) aligning their punch marks (3), then tighten nut.

Tightening torque

Clutch release lever nut (a): 23 N·m (2.3 kg-m, 16.5 lb-ft)

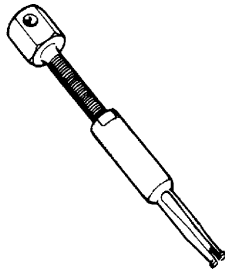
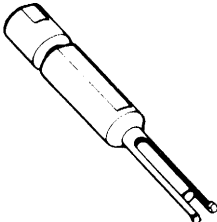
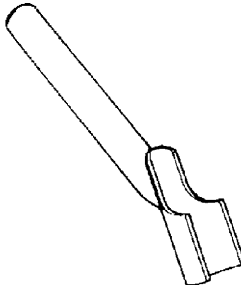
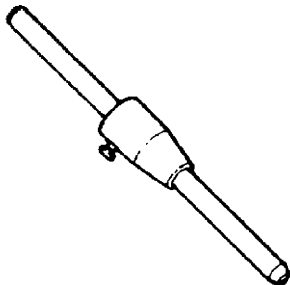
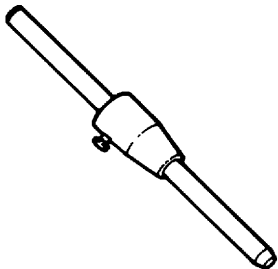
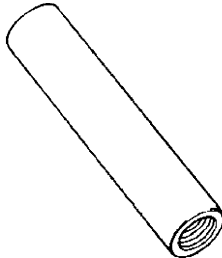
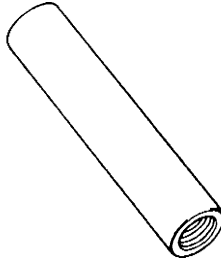
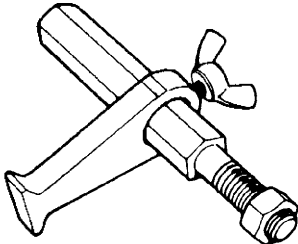
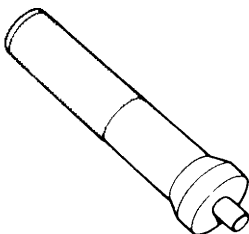
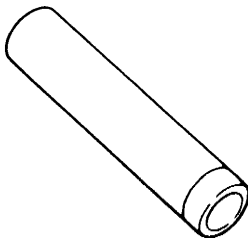
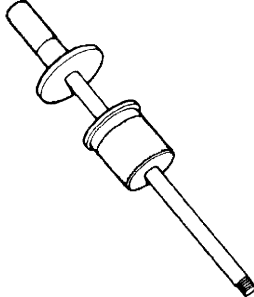
Tightening Torque Specification

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Flywheel bolt (M13 engine model)	70	7.0	50.5
Flywheel bolt (G10 engine model)	76	7.6	54.5
Clutch cover bolt	23	2.3	16.5
Clutch release lever nut	23	2.3	16.5
Pedal bracket bolt	13	1.3	9.5
Pedal bracket nut	13	1.3	9.5
Clutch cable clamp bolt	50	5.0	36.5
Lock nut	6.0	0.6	4.5
Clutch cable outer bolt	9.0	0.9	6.5
Pedal bracket screw	3	0.3	2.0
Pedal shaft bracket nut	6	0.6	4.5
Clump bolt	23	2.3	16.5

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> • Cable end hook and joint pin. • Release shaft bushes and seal. • Release shaft. • Release bearing inside. • Pedal spring.
	SUZUKI SUPER GREASE I (99000-25210)	Input shaft spline and front end.

Special Tool

 <p>09917-58010 Bearing remover</p>	 <p>09921-26020 Bearing remover</p>	 <p>09922-46010 Bush remover</p>	 <p>09923-36320 Clutch center guide</p>
 <p>09923-36330 Clutch center guide</p>	 <p>09923-46020 Joint pipe</p>	 <p>09923-46030 Joint pipe</p>	 <p>09924-17810 Flywheel holder</p>
 <p>09925-98210 Input shaft bearing installer</p>	 <p>09925-98221 Bearing installer</p>	 <p>09930-30104 Sliding shaft</p>	

SECTION 7D

TRANSFER

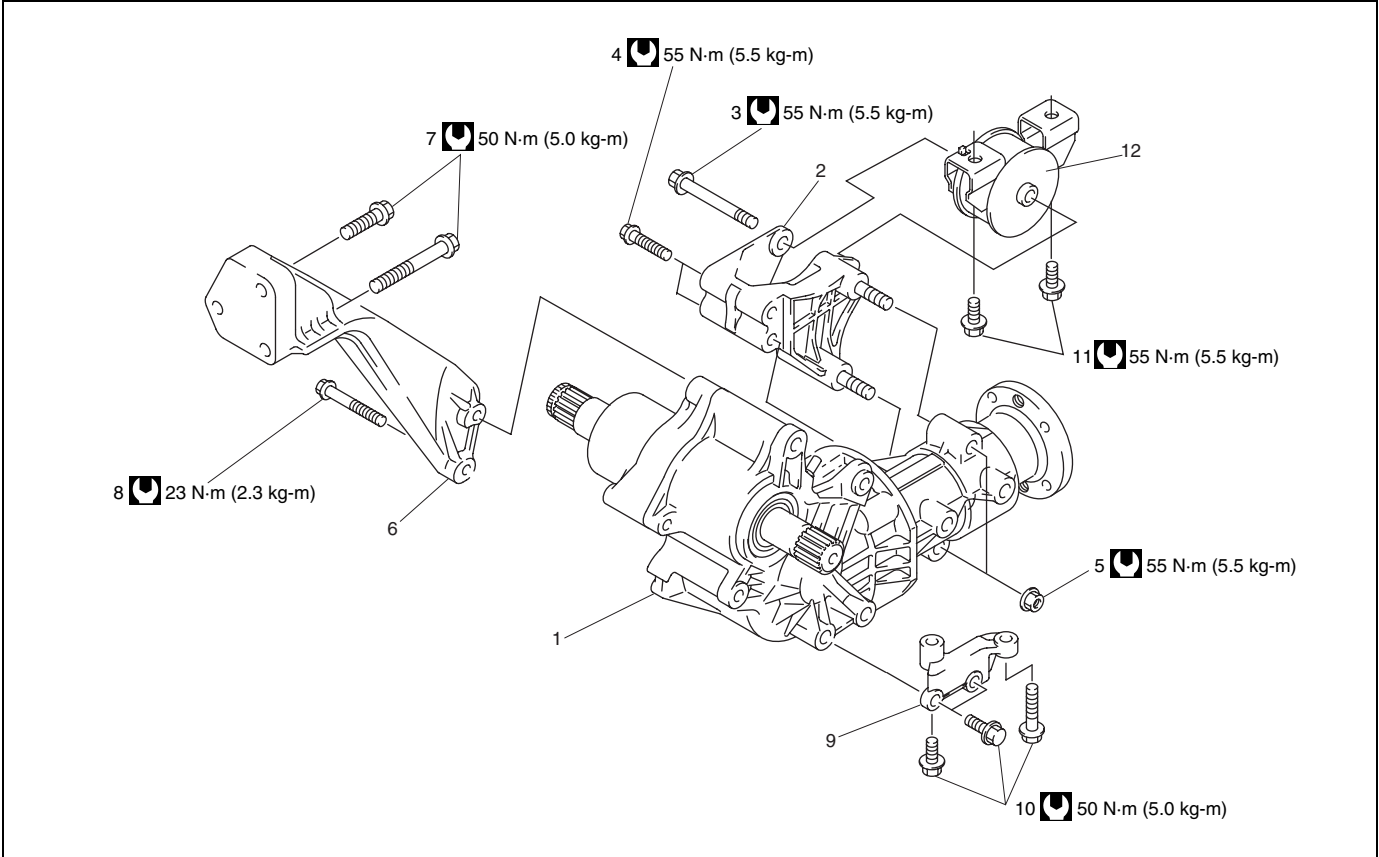
NOTE:


- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.
- The sealant SUZUKI BOND NO.1215B (99000-31110) is changed to SUZUKI BOND NO.1217G (99000-31260). In the service manual mentioned in “FOREWORD” of this manual, it is instructed that the sealant SUZUKI BOND No.1215B (99000-31110) should be used for the servicing of transfer. Please apply sealant SUZUKI BOND NO.1217G (99000-31260) instead of the sealant SUZUKI BOND No.1215B (99000-31110).

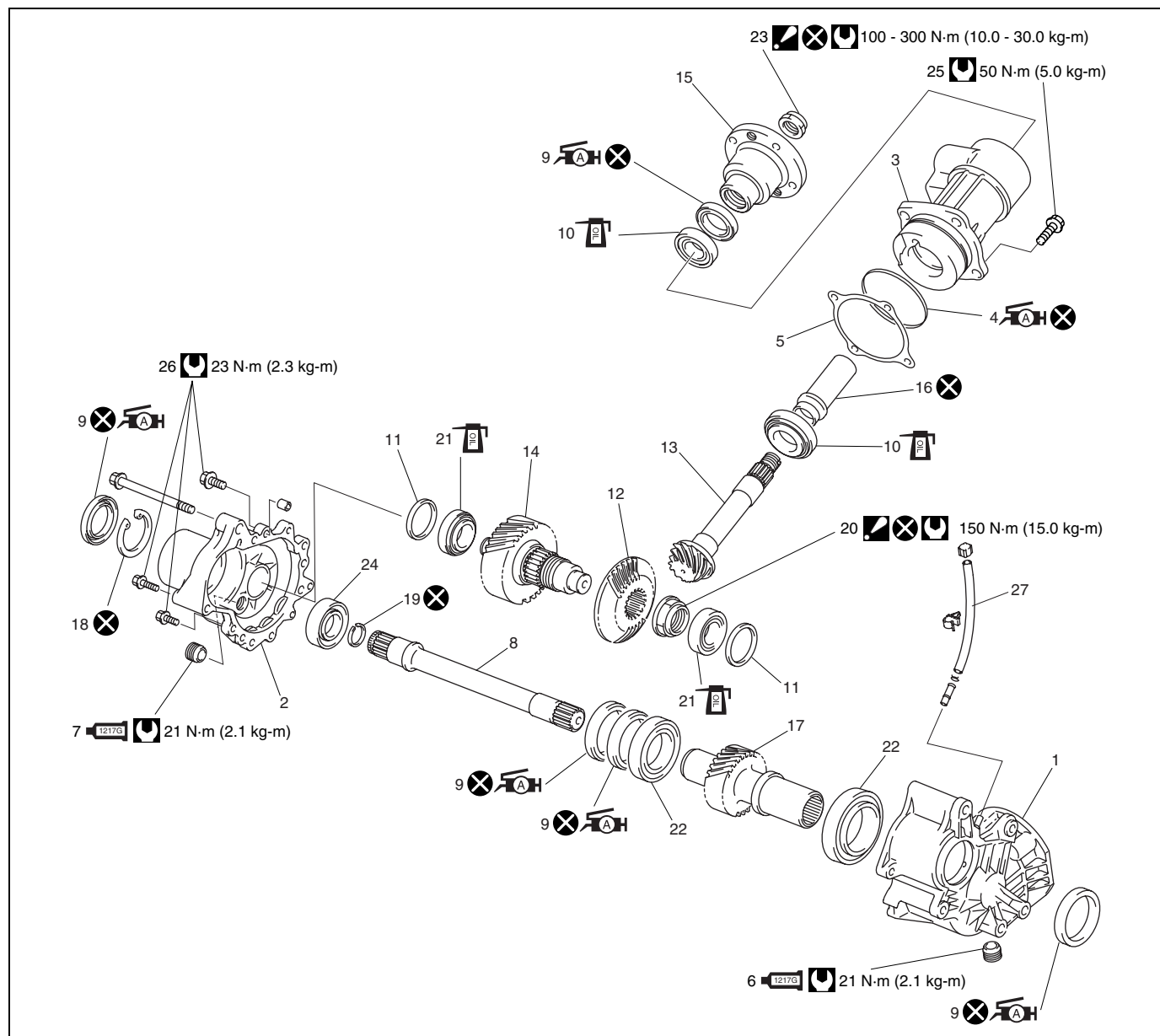
CONTENTS

Unit Repair Overhaul7D-2	Required Service Material7D-7
Tightening Torque Specification7D-6	

Unit Repair Overhaul



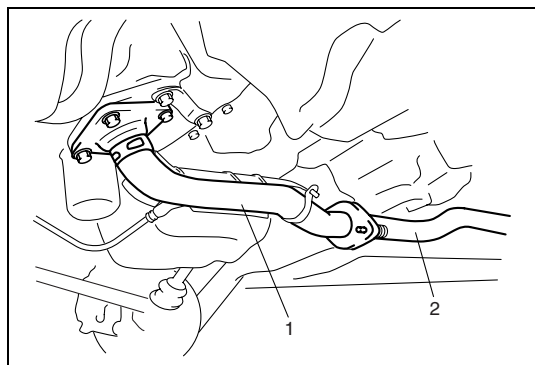
1. Transfer assy	6. Transfer to engine stiffener	11. Transfer rear mounting bracket bolts
2. Transfer rear mounting bracket	7. Transfer to engine stiffener No.1 bolts	12. Transfer rear mounting
3. Transfer mounting bolt	8. Transfer to engine stiffener No.2 bolts	 Tightening torque
4. Transfer rear mounting bracket No.2 bolts	9. Transfer to transaxle stiffener	
5. Transfer rear mounting bracket nuts	10. Transfer to transaxle stiffener bolts	



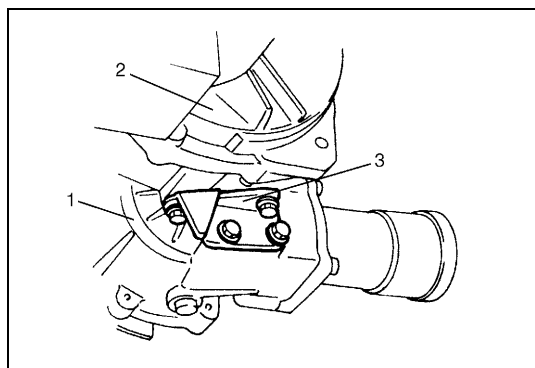
1. Transfer left case	11. Bevel gear shim	21. Driven gear bearing
2. Transfer right case	12. Bevel gear (Hypoid gear)	22. Reduction drive gear bearing
3. Transfer output retainer	13. Bevel pinion shaft (Hypoid gear)	23. Flange nut : After tightening nut so as rotation torque of bevel pinion shaft to be in specified value, caulk nut securely.
4. O-ring : Apply grease 99000-25010 to all around surface.	14. Reduction driven gear	24. Intermediate right bearing
5. Bevel pinion shim	15. Flange	25. Transfer output retainer bolts
6. Transfer oil drain plug : Apply sealant 99000-31260 to all around thread part of drain plug.	16. Pinion shaft spacer	26. Transfer case bolt
7. Transfer oil level/Filler plug : Apply sealant 99000-31260 to all around thread part of level plug.	17. Reduction drive gear	27. Breather hose
8. Intermediate shaft	18. Snap ring	Do not reuse.
9. Reduction drive gear oil seal : Apply SUZUKI SUPER GREASE A 99000-25010 to oil seal lip.	19. Circlip	Tightening torque
10. Pinion shaft bearing	20. Bevel gear nut : After tightening nut to specified torque, caulk nut securely.	Apply transfer oil.

DISMOUNTING

- 1) Disconnect negative cable at battery.
- 2) Hoist vehicle and remove wheels.
- 3) Drain transaxle oil referring to "Manual Transaxle Oil Change" in Section 7A2.
- 4) Drain transfer oil referring to "Oil Change" in Section 7D of the Service Manual mentioned in the "FOREWORD" of this manual.
- 5) Remove exhaust No.1 pipe (1).
- 6) Remove propeller shaft referring to "Propeller Shaft Removal and Installation" in Section 4B.
- 7) Remove right side drive shaft referring to "Front Drive Shaft Assembly Removal and Installation" in Section 4A.

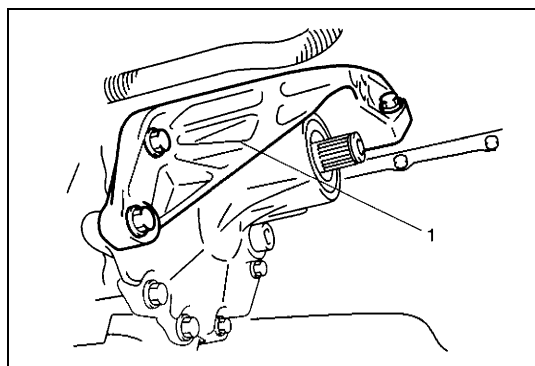


2. Exhaust No.2 pipe

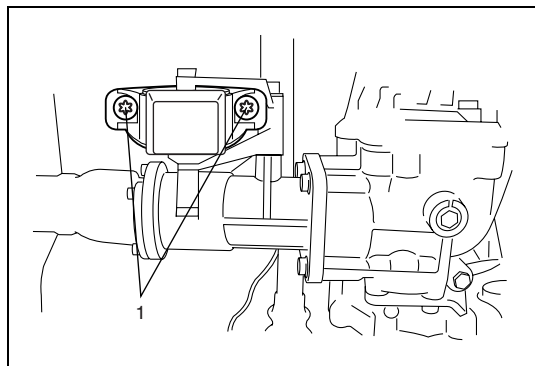


- 8) Remove transfer to transaxle stiffener (3).

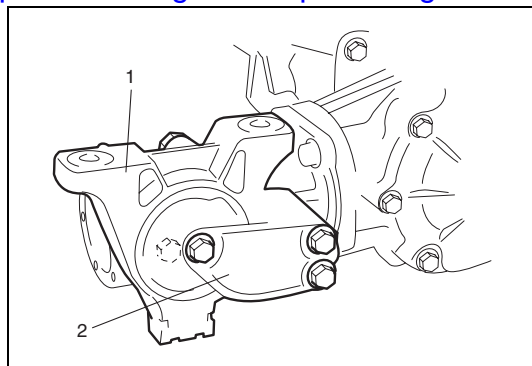
1. Transfer
2. Transaxle



- 9) Remove transfer to engine stiffener (1).



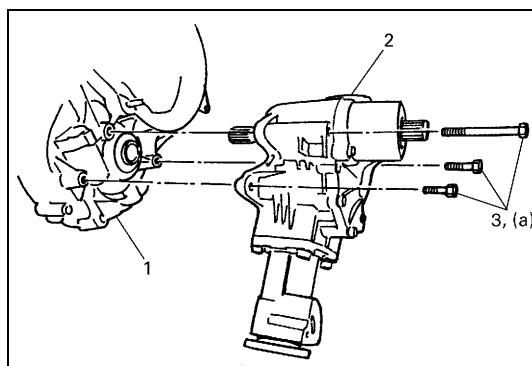
- 10) With transaxle assembly held on jack, remove rear mounting bracket bolts (1).
- 11) Remove transfer to transaxle bolts and draw out transfer assembly from transaxle assembly.



- 12) Remove transfer rear mounting bracket (2) with transfer rear mounting (1) from transfer assembly.

MOUNTING

Reverse dismounting procedure for installation noting the following.

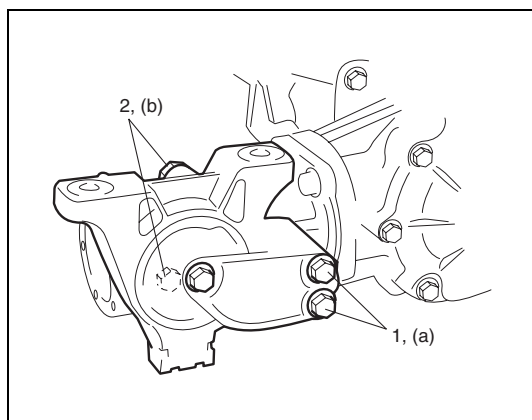


- 1) Tighten transfer mounting bolts (3) to specified torque.

Tightening torque

Transfer mounting bolt (a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

1. Transaxle
2. Transfer assembly



- 2) Tighten transfer rear mounting bracket No.2 bolts (1) and transfer rear mounting bracket nuts (2) to specified torque.

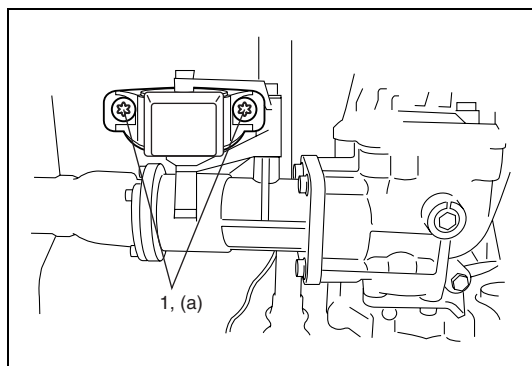
Tightening torque

Transfer rear mounting bracket No.2 bolt

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

Transfer rear mounting bracket nut

(b): 55 N·m (5.5 kg-m, 40.0 lb-ft)

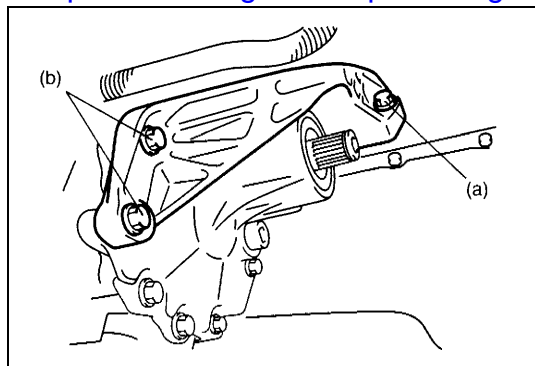


- 3) Tighten transfer rear mounting bracket bolts (1) to specified torque.

Tightening torque

Transfer rear mounting bracket bolt

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)



- 4) Tighten transfer to engine stiffener bolts to specified torque.

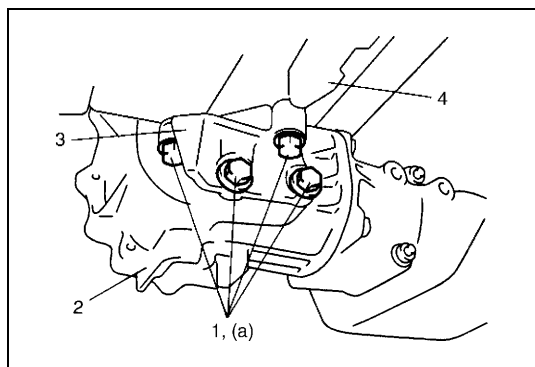
Tightening torque

Transfer to engine stiffener No.1 bolt

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

Transfer to engine stiffener No.2 bolt

(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 5) Tighten transfer to transaxle stiffener bolts (1) to specified torque.

Tightening torque

Transfer to transaxle stiffener bolt

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

2. Transfer
3. Stiffener
4. Transaxle

- Install exhaust No.1 pipe referring to “Exhaust System Components” in Section 6K2.
- Install right side drive shaft referring to “Drive Shaft Removal and Installation” in Section 4A.
- Install propeller shaft referring to “Propeller Shaft Removal and Installation” in Section 4B.
- Fill transfer with transfer oil referring to “Oil Change” in Section 7D of the Service Manual mentioned in the “FOREWORD” of this manual.
- Fill transaxle with transaxle oil referring to “Manual Transaxle Oil Change” in Section 7A2.

Tightening Torque Specification

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Transfer oil level/filler and drain plug	21	2.1	15.5
Flange nut	100 – 300	10.0 – 30.0	72.5 – 217.0
Transfer case bolt	23	2.3	17.0
Transfer output retainer bolt	50	5.0	36.5
Transfer rear mounting bracket bolt	55	5.5	40.0
Transfer rear mounting bracket nut	55	5.5	40.0
Transfer mounting bolt	55	5.5	40.0
Transfer rear mounting bracket No.2 bolt	55	5.5	40.0
Transfer to engine stiffener No.1 bolt	50	5.0	36.5
Transfer to engine stiffener No.2 bolt	23	2.3	17.0
Bevel gear nut	150	15.0	108.5
Transfer to transaxle stiffener bolt	50	5.0	36.5

Required Service Material

Material	Recommended SUZUKI products (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none">• Oil seal lips• O-ring
Sealant	SUZUKI BOND NO. 1217G (99000-31260)	<ul style="list-style-type: none">• Oil drain plug• Oil level plug• Mating surface of transfer case

SECTION 7F

REAR DIFFERENTIAL

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

CONTENTS

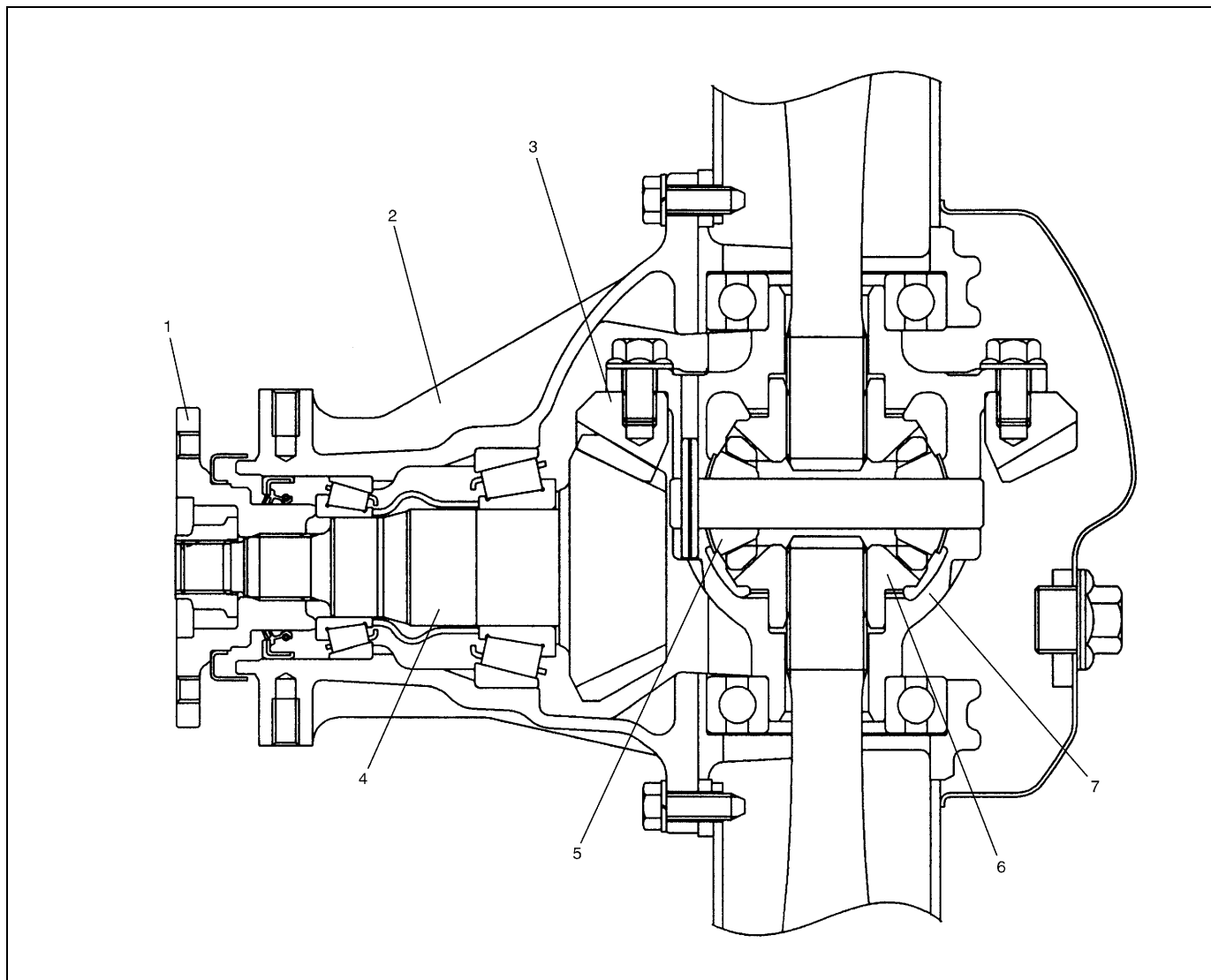
General Description	7F-2	Differential carrier and drive bevel	
Differential Unit.....	7F-2	pinion.....	7F-11
Unit Repair Overhaul	7F-5	Tightening Torque Specification	7F-18
Drive bevel pinion bearing outer race.....	7F-9	Required Service Material	7F-18
Differential case assembly	7F-9	Special Tool.....	7F-19

General Description

The rear differential assembly for 4WD model uses a hypoid bevel pinion and gear.

The differential assembly is decisive in that the drive power is concentrated there. Therefore, use of genuine parts and specified torque is compulsory. Further, because of sliding tooth meshing with high pressure between bevel pinion and gear, it is mandatory to lubricate them by hypoid gear oil.

The hypoid gears have an advantage of preventing gear noise, at the same time, they require accurate adjustment of tooth contact and backlash.

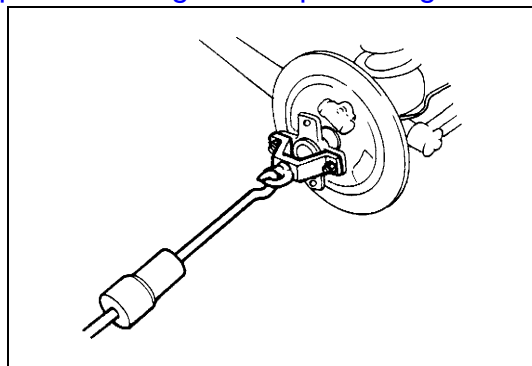


1. Companion flange	5. Differential pinion
2. Differential carrier	6. Differential side gear
3. Drive bevel gear (hypoid gear)	7. Differential case
4. Drive bevel pinion (hypoid gear)	

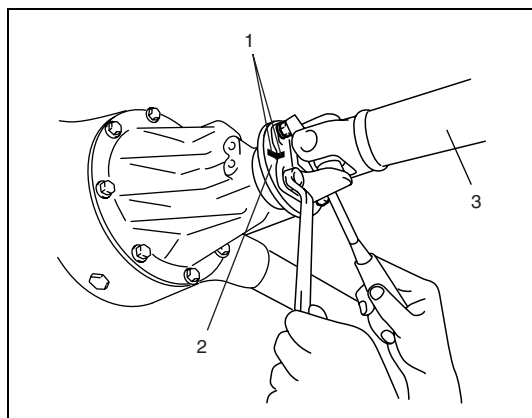
Differential Unit

DISMOUNTING

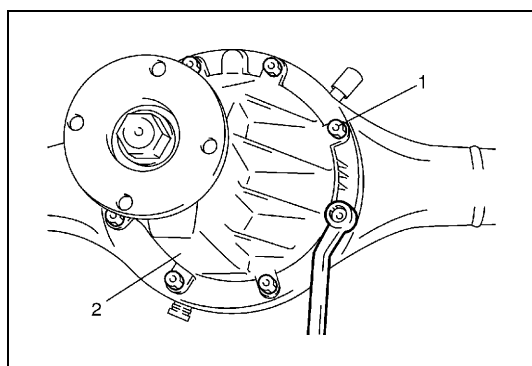
- 1) Hoist vehicle and remove wheels.
- 2) Drain differential oil referring to "Rear Differential Gear Oil Change" in this section.



- 3) Remove brake drum and disconnect parking brake cable from brake back plate referring to "Parking Brake Lever Cable Removal and Installation" in Section 5C.
- 4) Remove axle shafts referring to "Rear Axle Shaft and Wheel Bearing Remove and Installation (for 4WD Model)" in Section 3E.



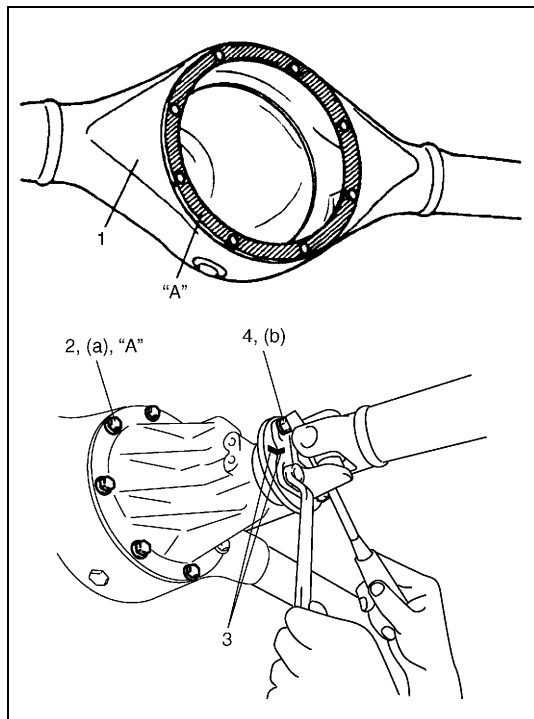
- 5) Before removing propeller shaft, give match marks (1) on companion flange (2) and propeller shaft (3) as shown.



- 6) Remove differential carrier bolts (1) and differential assembly (2).

REMOUNTING

Reverse removal procedure for installation, noting the following.



- Clean mating surfaces of axle housing (1) and differential carrier and apply sealant to housing side.

“A”: Sealant 99000-31260

- Apply sealant to carrier bolts (2) and tighten carrier bolts to specified torque.

“A”: Sealant 99000-31260

Tightening torque**Differential carrier bolt**

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

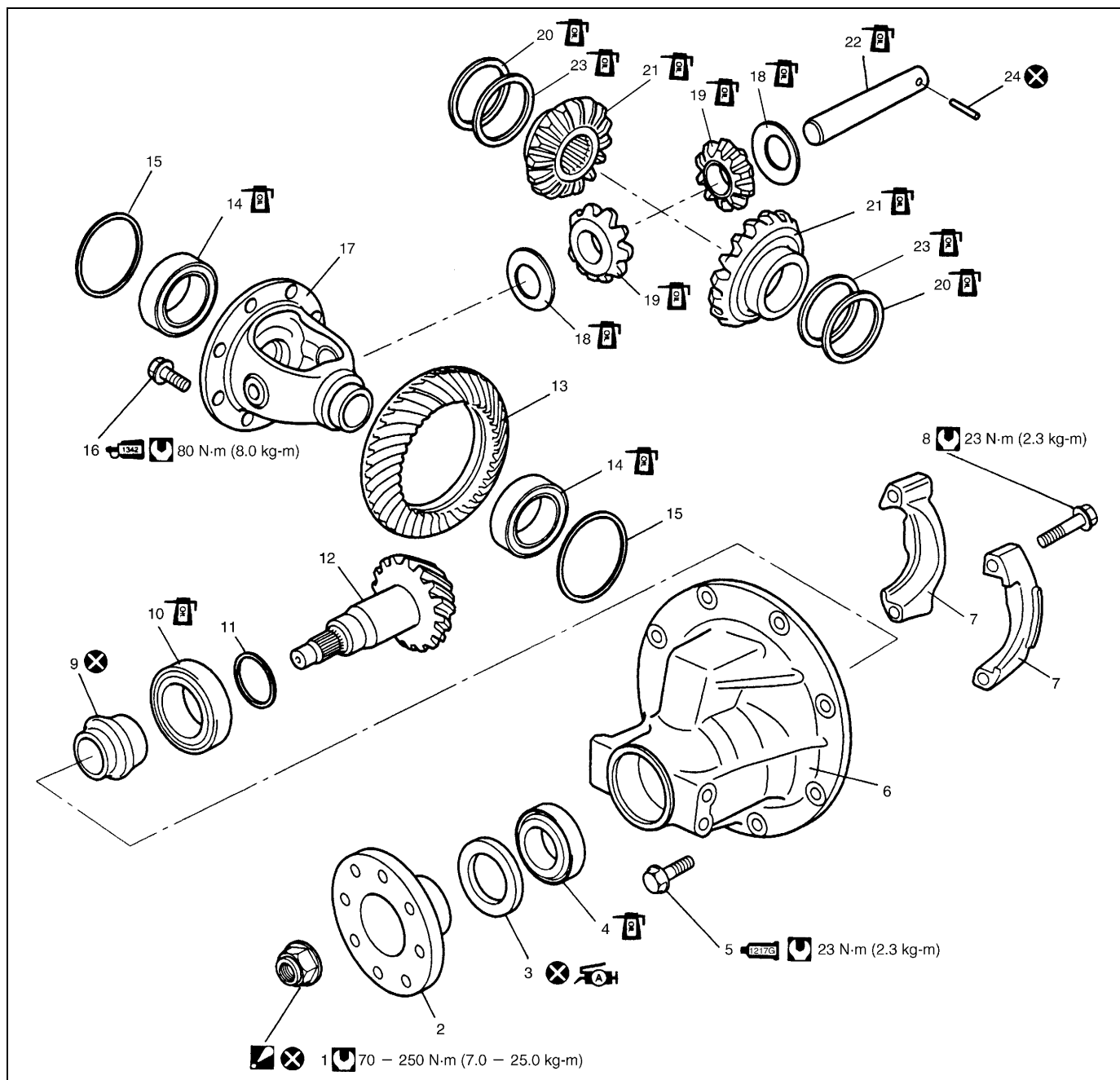
- Install propeller shaft to companion flange aligning match marks (3) and tighten propeller shaft bolts (4) to specified torque.








Tightening torque**Propeller shaft bolt**

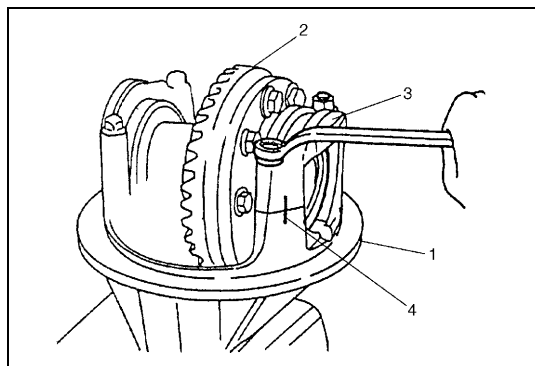
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- For installation of rear axle shaft, refer to “Rear Axle Shaft and Wheel Bearing Removal and Installation (for 4WD Model)” in Section 3E.
- For installation of rear brake drum, refer to “Brake Drum Removal and Installation (for 4WD Model)” in Section 5C.
- Refill differential housing with new specified oil referring to “Rear Differential Gear Oil Change” in this section for refill.
- Make sure to purge air out of brake circuit referring to “Bleeding Brakes” in Section 5. Then, ensure that joint seam of pipe is free from oil leak.

Unit Repair Overhaul



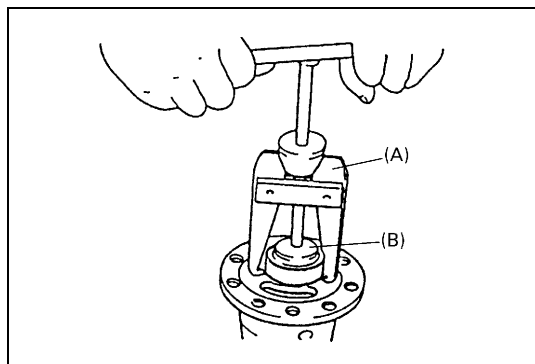
	1. Drive bevel pinion nut : After tightening nut so as rotational torque of drive bevel pinion to be in specified torque, caulk nut securely.	10. Drive bevel pinion rear taper roller bearing	19. Differential pinion
	2. Companion flange	11. Bevel pinion shim	20. Differential side gear washer
	3. Oil seal : Apply grease 99000-25010 to oil seal lip.	12. Drive bevel pinion (hypoid gear)	21. Differential side gear
	4. Drive bevel pinion front taper roller bearing	13. Drive bevel gear (hypoid gear)	22. Differential pinion shaft
	5. Differential carrier bolt : Apply sealant 99000-31260 to thread part.	14. Differential side bearing	23. Differential side gear spring washer
	6. Differential carrier	15. Differential side bearing shim	24. Differential pinion shaft pin
	7. Differential side bearing cap		 Do not reuse.
	8. Differential side bearing cap bolt	17. Differential case	 Tightening torque
	9. Spacer	18. Differential pinion washer	 Apply differential oil.

DISASSEMBLY

- 1) Put match marks (4) on differential side bearing caps (3) and differential carrier (1).
- 2) Take off differential side bearing caps by removing their bolts and remove differential gear assembly (2) with shims.

NOTE:

Check number of shims and thickness of each shim in advance.

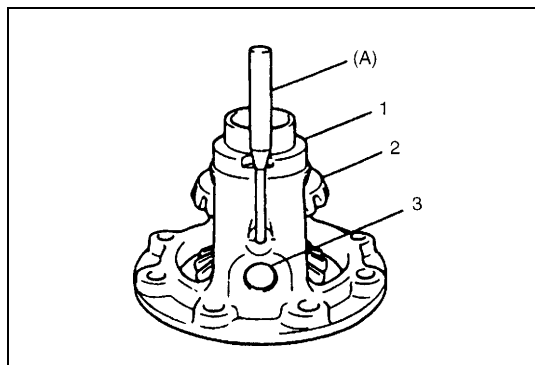


- 3) With aluminum plates placed on vise first, grip differential case with it and remove drive bevel gear by removing its bolts.
- 4) Using special tools, pull out differential side bearings.

Special tool

(A): 09913-60910

(B): 09925-88210

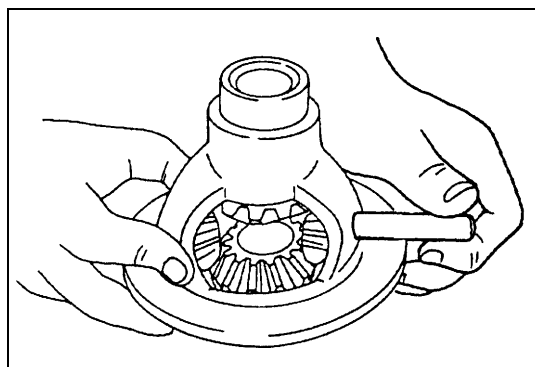


- 5) Drive out differential pinion shaft pin with special tool.

Special tool

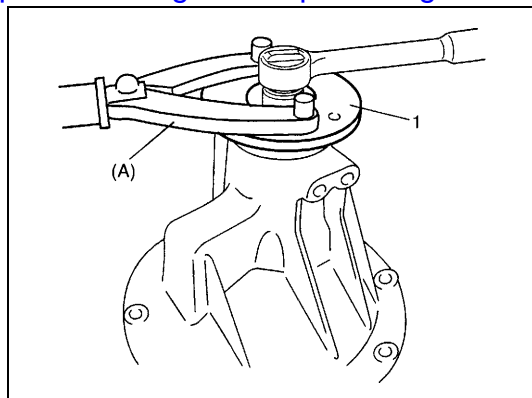
(A): 09922-85811

1.	Differential case
2.	Differential side gear
3.	Differential pinion shaft



- 6) Remove differential pinion shaft.
- 7) Remove differential side gears, pinions and washers.

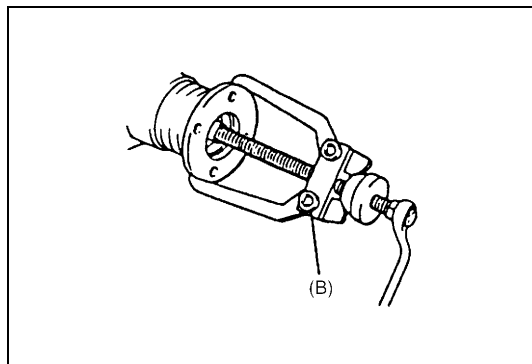
- 8) Uncaulk drive bevel pinion nut.



- 9) Hold companion flange (1) with special tool and then remove drive bevel pinion nut.

Special tool

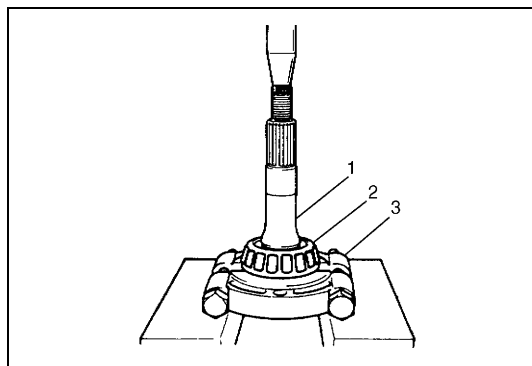
(A): 09930-40113



- 10) Remove companion flange from drive bevel pinion.
Use special tool if it is hard to remove.

Special tool

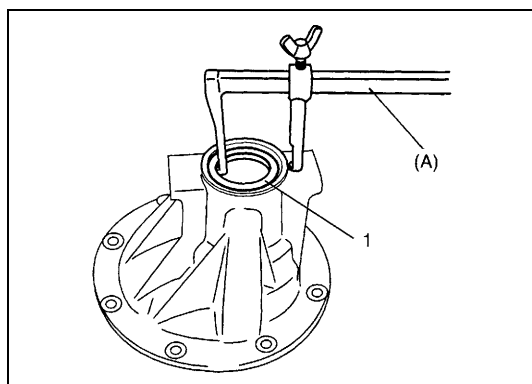
(B): 09913-65135



- 11) Remove drive bevel pinion with rear bearing, and spacer from differential carrier.

- 12) Remove drive bevel pinion rear bearing (2) by using bearing puller (3) and hydraulic press.

1. Drive bevel pinion

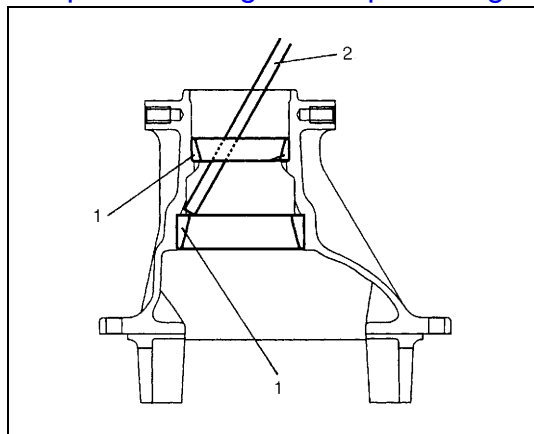


- 13) Remove oil seal (1) from differential carrier by using special tool.

Special tool

(A): 09913-50121

- 14) Remove drive bevel pinion front bearing.



- 15) Drive out drive bevel pinion bearing outer races (1) by using metallic stick (2).

INSPECTION

- Check companion flange for wear or damage.
- Check bearings for wear or discoloration.
- Check differential carrier for cracks.
- Check drive bevel pinion and bevel gear for wear or cracks.
- Check side gears, pinion gears and pinion shaft for wear or damage.
- Check side gear spline for wear or damage.

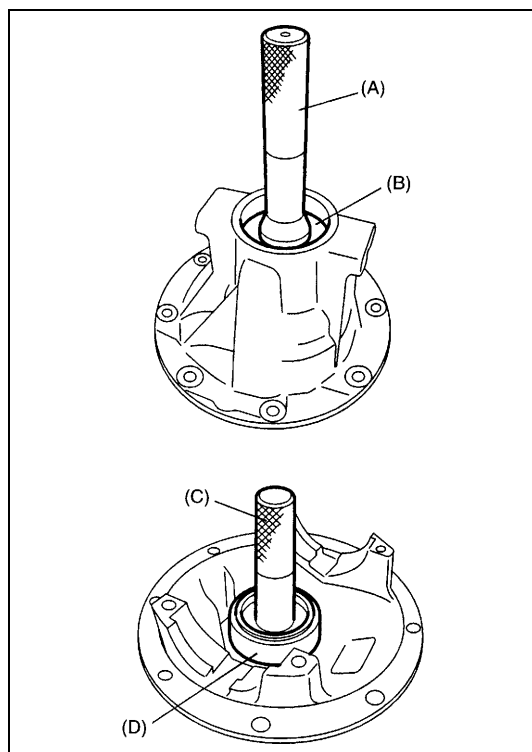
ADJUSTMENT AND ASSEMBLY

Judging from faulty conditions noted before disassembly and what is found through visual check of bearing and gear tooth etc. after disassembly, prepare replacing parts and proceed to reassembly according to procedures as described below. Make sure that all parts are clean.

CAUTION:

- Drive bevel gear and pinion must be replaced as a set when either replacement becomes necessary.
- When replacing taper roller bearing, replace as inner race & outer race assembly.

Drive bevel pinion bearing outer race



For press-fitting bevel pinion bearing outer races, use special tools as shown.

CAUTION:

Perform press-fitting carefully so as not to tilt outer race.

Special tool

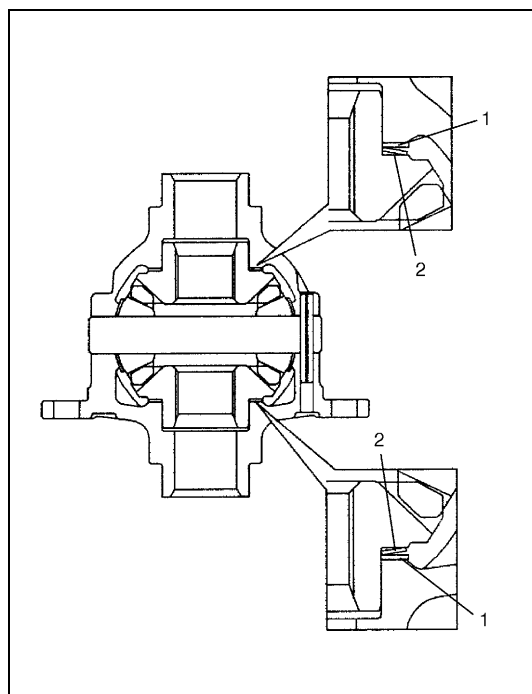
(A): 09925-98210

(B): 09941-34513-004

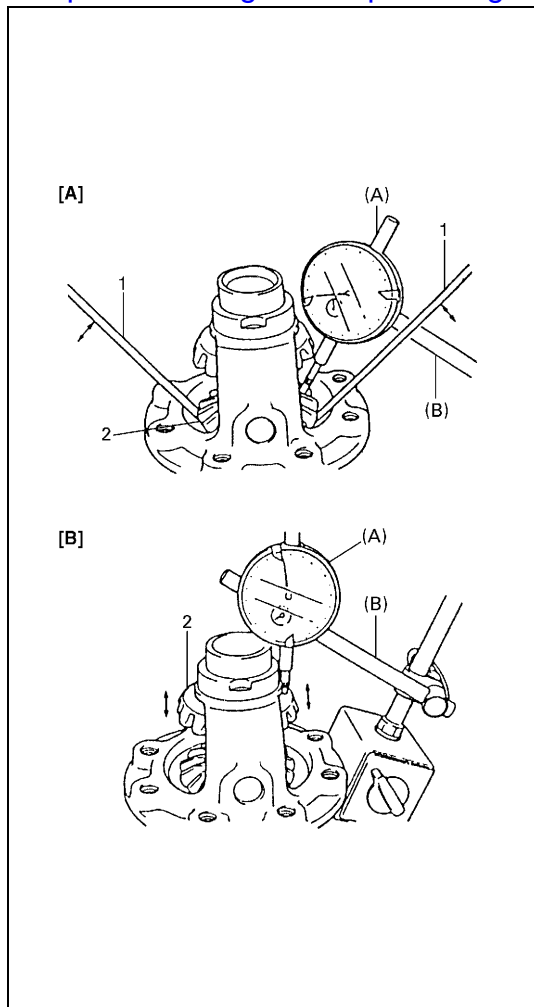
(C): 09924-74510

(D): 09951-16090

Differential case assembly



- 1) Assemble differential case assembly noting installing position and direction of differential side gear washer (1) and spring washer (2).



2) Measure thrust play of differential gear (2) as follows.

Special tool

(A): 09900-20607

(B): 09900-20701

Differential gear thrust play

0 – 0.37 mm (0 – 0.014 in.)

[A]: Right side
[B]: Left side

Right side

- Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear (2).
- Using 2 screwdrivers (1), move gear (2) up and down and read movement of dial gauge pointer.

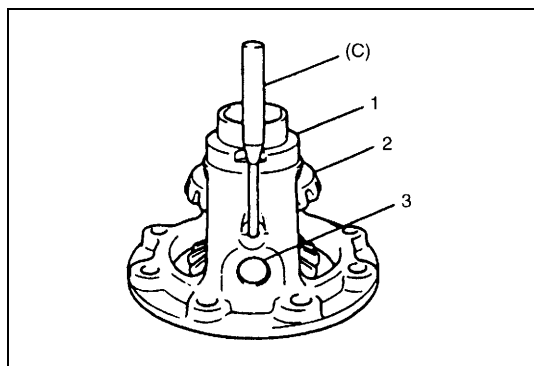
Left side

- Using similar procedure to the above, set dial gauge tip to gear shoulder.
- Move gear (2) up and down by hand and read dial gauge.

3) If thrust play is out of specification, select suitable side washer from among the following available size, install it and check again that specified gear thrust play is obtained.

Available side washer thickness

0.10, 0.30, 0.50 and 0.70 mm (0.0039, 0.0118, 0.0196 and 0.0275 in.)

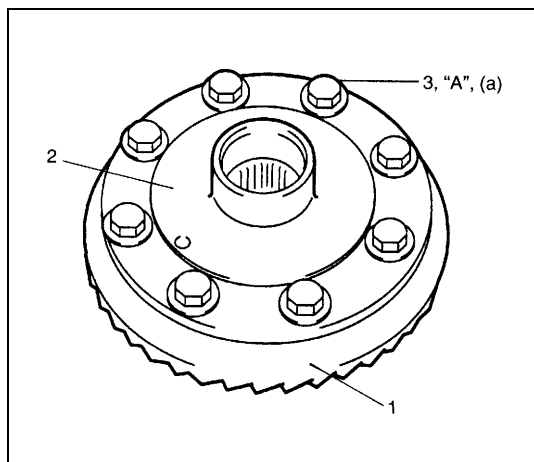


4) Drive in new differential pinion shaft pin for differential side pinion shaft till it is flush with differential case surface.

Special tool

(C): 09922-85811

1. Differential case
2. Differential gear
3. Differential pinion shaft



5) Put drive bevel gear (1) on differential case (2).

6) Apply thread lock cement to drive bevel gear bolts (3) and fasten drive bevel gear (1) on differential case (2) by tightening bolts to specified torque.

CAUTION:

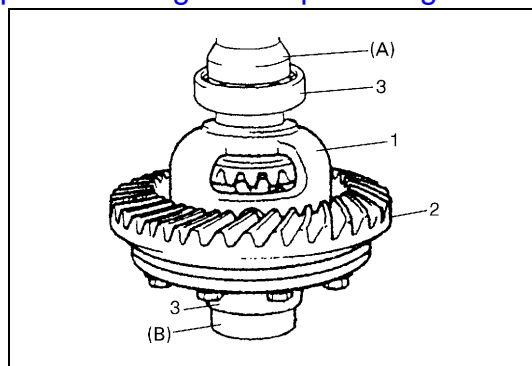
Use of any other bolts than that specified is prohibited.

“A”: Cement 99000-32110

Tightening torque

Drive bevel gear bolt

(a): 80 N·m (8.0 kg-m, 58.0 lb-ft)



7) Press-fit differential side bearings (3) to differential case (1) by using special tools.

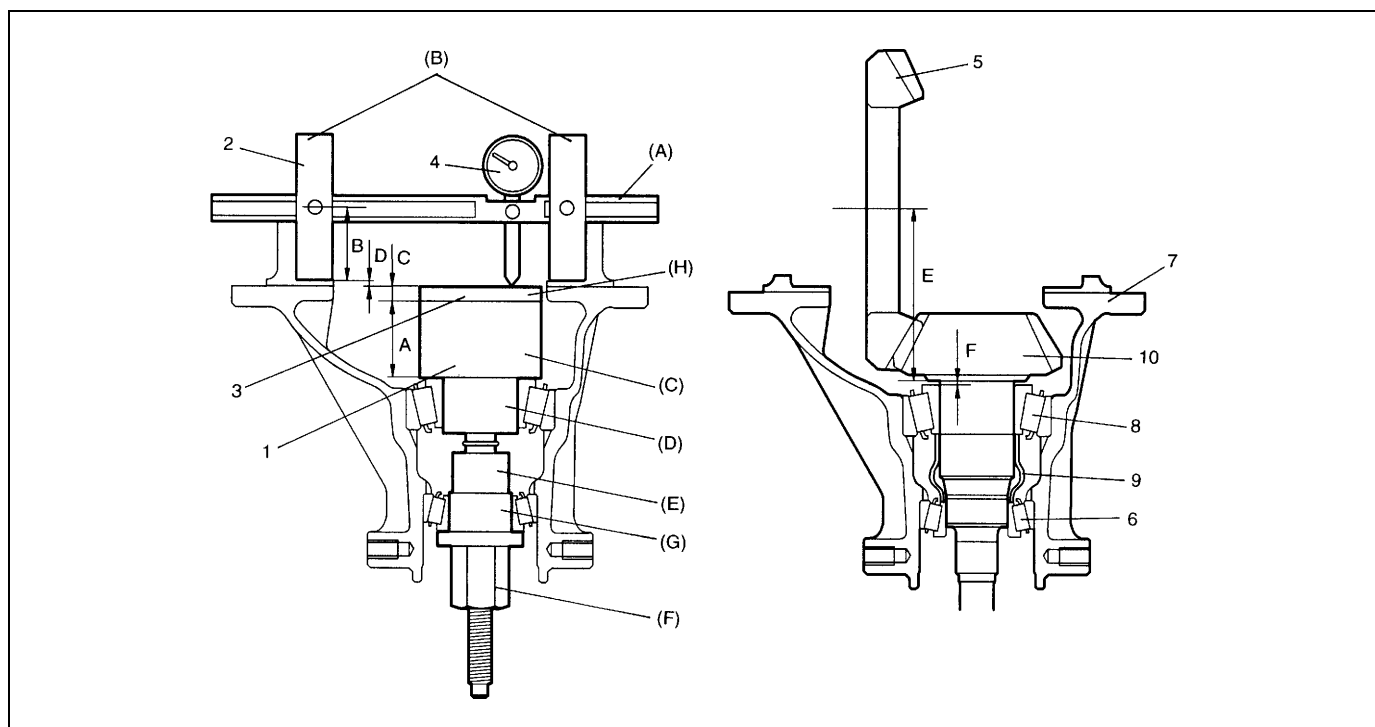
Special tool

(A): 09951-76010

(B): 09951-16060

2. Drive bevel gear

Differential carrier and drive bevel pinion



A: Dummy height of pinion form dummy (= 40 mm/1.575 in.)	F: Shim thickness for mounting distance adjustment (= D)	6. Front bearing
B: Radius of bearing form dummy with dummy shaft (= 36 mm/1.417 in.)	1. Pinion form dummy	7. Differential carrier
C: Block dummy thickness (= 4 mm/0.1575 in.)	2. Bearing form dummy with dummy shaft	8. Rear bearing
A + B + C: Mounting distance adjusting dummy total size (= 80 mm/3.150 in.)	3. Block dummy	9. Spacer
D: Measured dimension	4. Dial gauge	10. Drive bevel pinion
E: Drive bevel pinion mounting distance (= 80 mm/3.150 in.)	5. Drive bevel gear	

Special tool

(A): 09922-76120

(B): 09922-76230

(C): 09922-76140

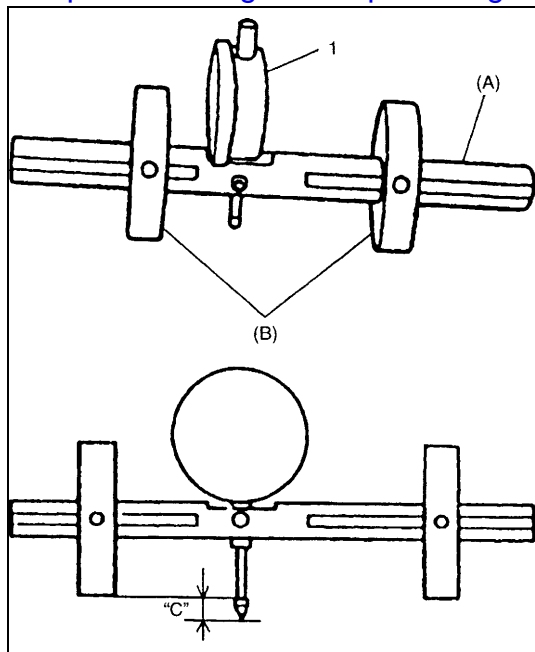
(D): 09922-76410

(E): 09922-76340

(F): 09922-76150

(G): 09922-76320

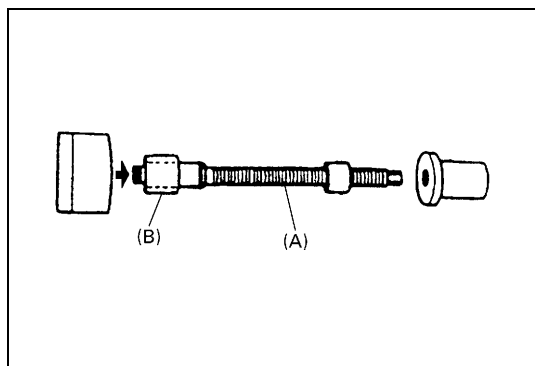
(H): 09922-76510



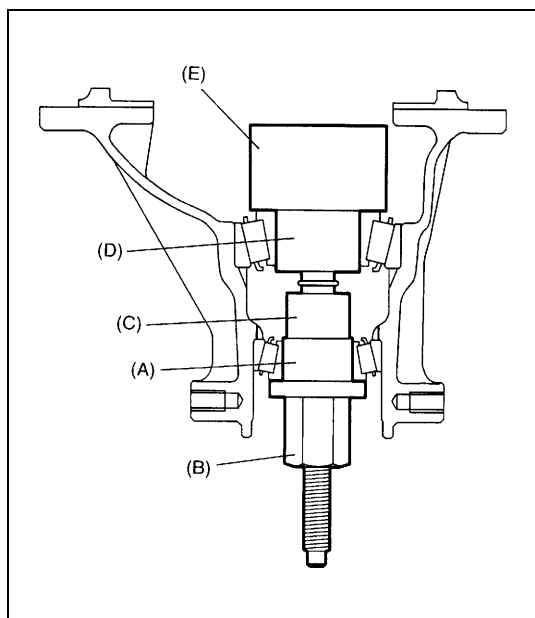
- 1) Assemble bearing form dummy with dummy shaft using special tools.

Special tool**(A): 09922-76120****(B): 09922-76230**

- 2) Install dial gauge (1) to bearing form dummy with dummy shaft as shown in figure.

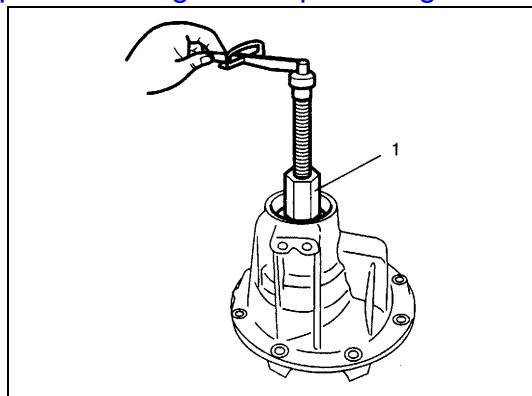
Special tool set distance (reference)**"c": 2 – 3 mm (0.079 – 0.118 in.)**

- 3) Assemble pinion form dummy using special tools.

Special tool**(A): 09922-76140****(B): 09922-76410**

- 4) Apply gear oil to drive bevel pinion rear bearing, install rear bearing to pinion form dummy and then install pinion form dummy to differential carrier.
- 5) Apply gear oil to drive bevel pinion front bearing and install bearing to pinion form dummy with other special tools as shown in figure.

NOTE:**This installation requires no spacer or oil seal.****Special tool****(A): 09922-76320****(B): 09922-76150****(C): 09922-76340****(D): 09922-76410****(E): 09922-76140**

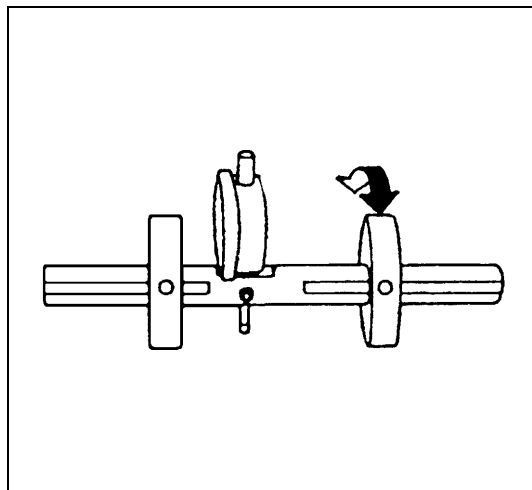


- 6) Tighten bevel pinion nut (special tool) (1) so that specified bearing preload is obtained.

NOTE:

Before taking measurement, check for rotation by hand more than 15 revolutions.

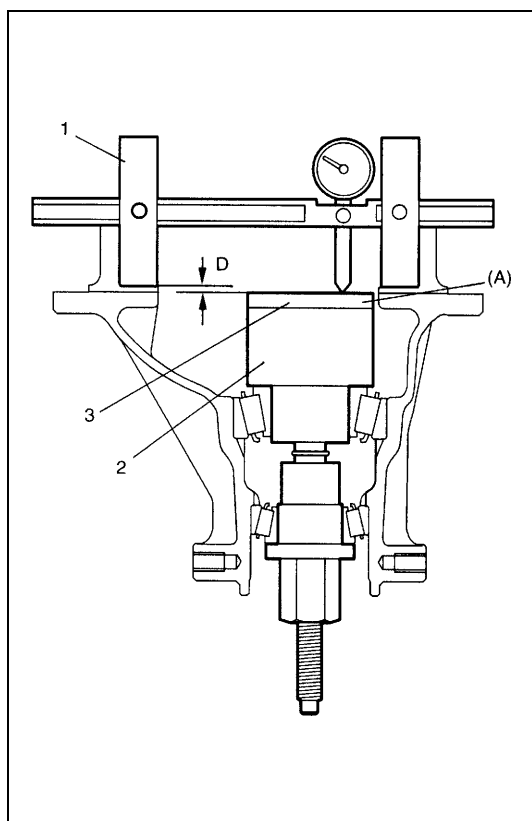
Drive bevel pinion bearing preload (at 50 rpm)
0.5 – 1.3 N·m (5.0 – 13.0 kg·cm, 0.35 – 0.90 lb·ft)



- 7) Set dial gauge to bearing form dummy with dummy shaft and make 0 (zero) adjustment on surface plate.

NOTE:

- When setting dial gauge to bearing form dummy with dummy shaft, tighten screw lightly. Be careful not to overtighten it, which will cause damage to dial gauge.
- With dial gauge set, turn dummy back and forth by hand a couple of times and attain accurate 0 (zero) adjustment.
- It is desirable that short pointer indicates beyond 2 mm when long one is at 0 (zero).



- 8) Put block dummy (3) on pinion form dummy (2).

Special tool

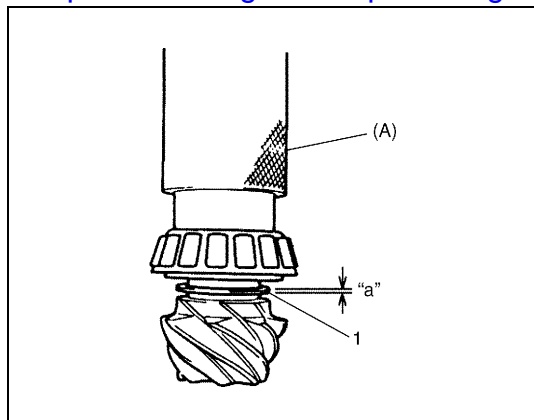
(A): 09922-76510

NOTE:

- Repeat turning back and forth of dummy and measure distance as far as top surface of block dummy accurately.
- When dial gauge measuring tip extends from 0 (zero) position, pointer turns counterclockwise.
- Measured value may exceed 1 mm. Therefore, it is also necessary to know reading of short pointer.

- 9) Place zero-adjusted bearing form dummy with dummy shaft (1) and dial gauge set on block dummy (3) and take measurement between zero position and extended dial gauge measuring tip.
- 10) Obtain adjusting shim thickness by using measured value by dial gauge in the following equation.

$$\boxed{\text{Necessary shim thickness}} = \boxed{\text{Dial gauge measured value D}}$$



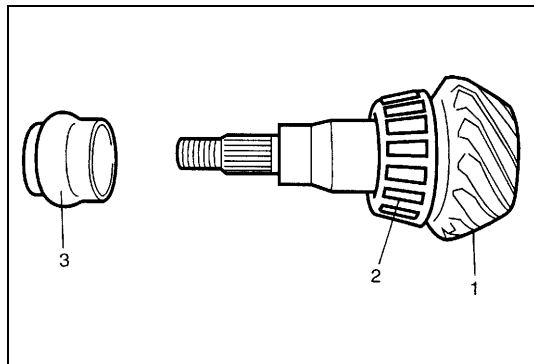
- 11) Select adjusting shim(s) (1) closest to calculated value from among following available sizes and put it in place and then press-fit rear bearing.

Special tool

(A): 09940-51710

Available shim thickness

"a": 0.30, 1.00, 1.03, 1.06, 1.09, 1.12, 1.15, 1.18, 1.21, 1.24, 1.27, and 1.30 mm (0.012, 0.039, 0.041, 0.042, 0.043, 0.044, 0.045, 0.046, 0.048, 0.049, 0.050 and 0.051 in.)

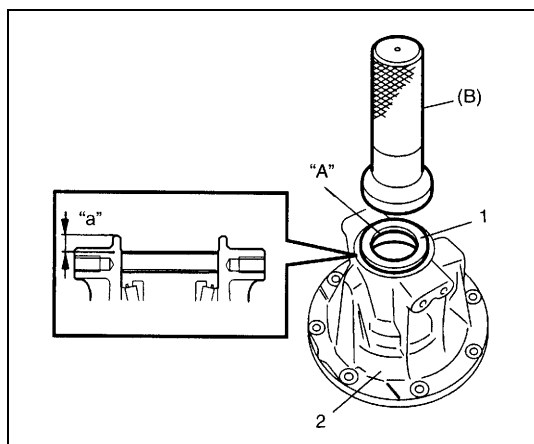


- 12) With new pinion spacer (3) inserted as shown, install front bearing to differential carrier.

NOTE:

- **Make sure to use new spacer (3) for reinstallation.**
- **Apply differential oil to bearings.**

1.	Drive bevel pinion
2.	Rear bearing



- 13) Install new oil seal (1) into differential carrier (2) by using special tool and hammer.

Special tool

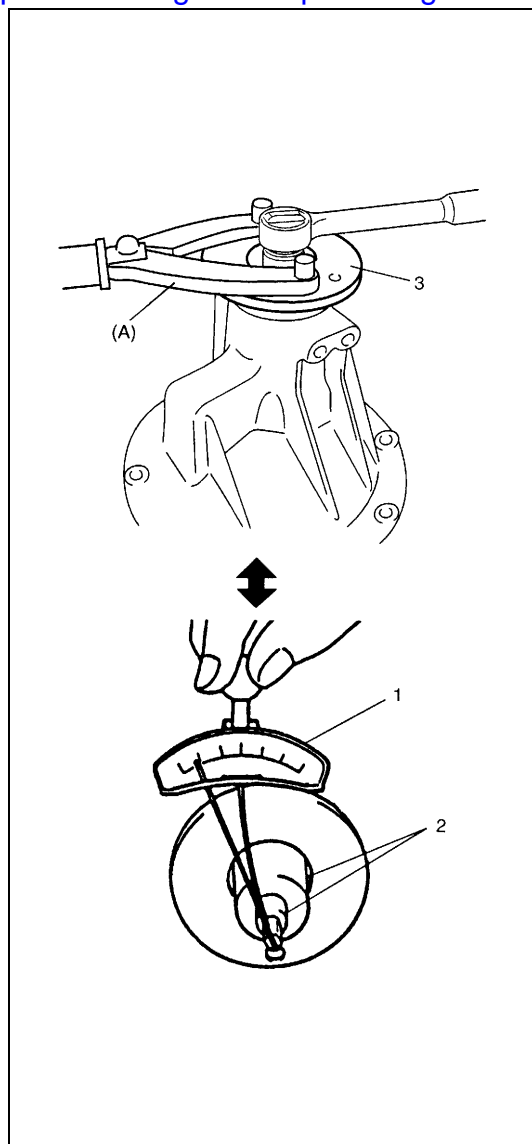
(B): 09913-75810

Differential carrier oil seal installing depth

"a": 7.5 – 8.5 mm (0.295 – 0.335 in.)

- 14) Apply grease to new oil seal lip.

"A": Grease 99000-25010



- 15) Install companion flange (3) to drive bevel pinion and tighten drive bevel pinion nut gradually with special tool, set preload of bearing to specification.

NOTE:

- Before taking measurement, check for smooth rotation by hand.
- Drive bevel pinion bearing preload is adjusted by tightening drive bevel pinion nut to deform spacer. Therefore, be sure to use a new spacer for adjustment and tighten drive bevel pinion nut step by step and check for starting torque (preload) as often as tightening to prevent over crushing of spacer. If exceeds specification given below during adjustment, replace spacer and repeat preload adjustment procedure. Attempt to decrease starting torque (preload) by loosening drive bevel pinion nut will not do.
- For measuring drive bevel pinion bearing preload, turning drive bevel pinion at about 50 rpm is required.

Tightening torque

Drive bevel pinion nut (reference)

70 – 250 N·m (7.0 – 25.0 kg·m, 51.0 – 181.0 lb·ft)

Drive bevel pinion bearing preload

0.5 – 1.3 N·m (5.0 – 13.0 kg·cm, 0.35 – 0.90 lb·ft)

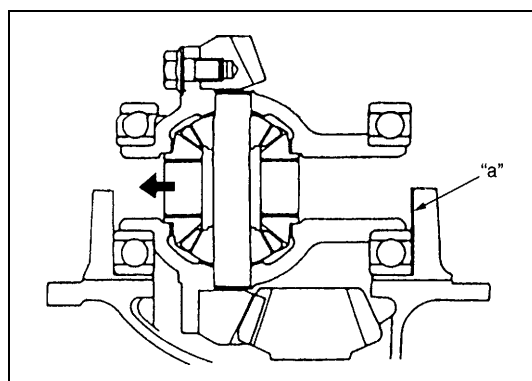
Special tool

(A): 09930-40113

1. Torque wrench
2. Socket with adapter

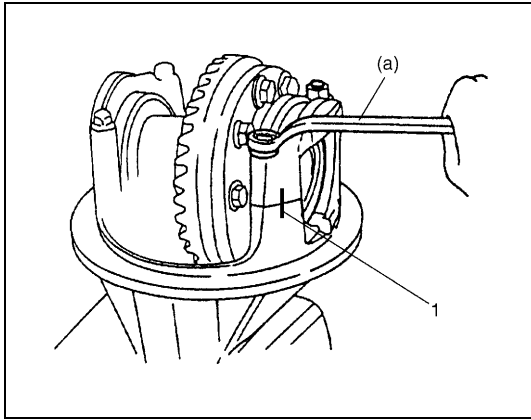
Differential assembly

- 1) Place differential gear case assembly to differential carrier, push differential case to left side as shown in figure. Then measure clearance “a” between side bearing and differential carrier by using thickness gauge. Select shims closest to measured value.



Available shim thickness

0.1, 0.3, 0.5 and 0.7 mm (0.0039, 0.0117, 0.0197 and 0.0276 in.)



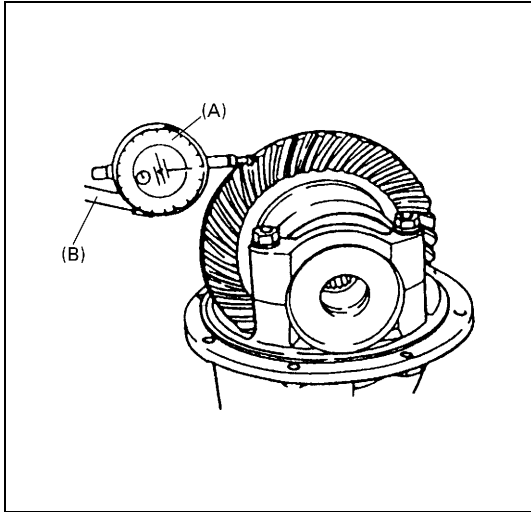
- 2) Divide selected shim(s) between both sides (right and left) and install them to differential carrier. Then install differential side bearing caps.

NOTE:

- Align match marks (1) on caps and carrier.
- Apply differential gear oil to bearings.

Tightening torque**Differential side bearing cap bolt**

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



- 3) Measure backlash by using dial gauge.
If backlash is out of specification, change division of shims so that backlash is within specification.

NOTE:

Be sure to apply measuring tip of dial gauge at right angles to convex side (drive side) of tooth.

Drive bevel gear backlash

0.10 – 0.20 mm (0.0039 – 0.0078 in.)

Special tool

(A): 09900-20607

(B): 09900-20701

- 4) Check gear tooth contact as follows.

CAUTION:

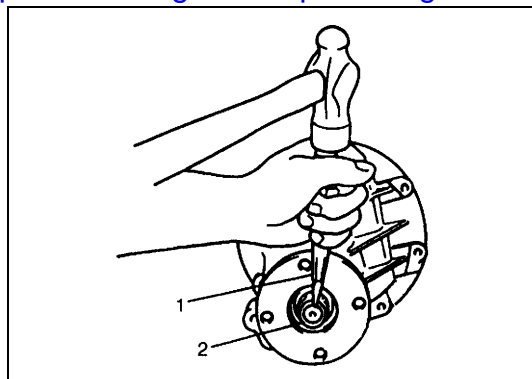
When applying red lead paste to teeth, be sure to paint tooth surfaces uniformly. The paste must not be too dry or too fluid.

- a) After cleaning tooth surface of drive bevel gear, paint teeth with gear marking compound evenly by using brush or sponge etc.
- b) Turn gear to bring its painted part in mesh with bevel pinion and turn it back and forth by hand to repeat their contact.

NOTE:

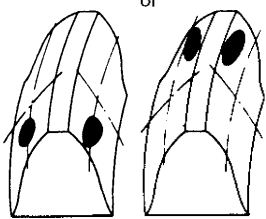
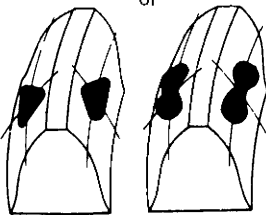
Be careful not to turn bevel gear more than one full revolution, or it will hinder accurate check.

- c) Bring painted part up and check contact pattern, referring to the following chart. If contact pattern is not normal, readjust or replace as necessary according to instruction in chart.



- 5) After completing of gear tooth contact check, caulk drive bevel pinion nut (2) with caulking tool (1) and hammer.

Tooth Contact Pattern	Diagnosis and Remedy
	<p>NORMAL</p>
	<p>HIGH CONTACT Pinion is positioned too far from the center of drive bevel gear.</p> <ol style="list-style-type: none"> 1) Increase thickness of pinion height adjusting shim and position pinion closer to gear center. 2) Adjust drive bevel gear backlash to specification.
	<p>LOW CONTACT Pinion is positioned too close to the center of drive bevel gear.</p> <ol style="list-style-type: none"> 1) Decrease thickness of pinion height adjusting shim and position pinion farther from gear center. 2) Adjust drive bevel gear backlash to specification.
	<p>These contact patterns indicate that the "offset" of differential is too much or too little. The remedy is to replace the carrier with a new one.</p>

Tooth Contact Pattern	Diagnosis and Remedy
	<p>These contact patterns, located on toe or heel on both drive and coast sides, mean that 1) both pinion and gear are defective, 2) carrier is not true and square, or 3) gear is not properly seated on differential case. The remedy is to replace the defective member.</p>
	<p>Irregular patterns: If the pattern is not oval, it means that bevel gear is defective. High or low spots on tooth surfaces or on the seat of bevel gear are the cause of irregular patterns appearing on some teeth. The remedy is to replace the pinion and-gear set and, if the seat is defective, so is transfer case.</p>

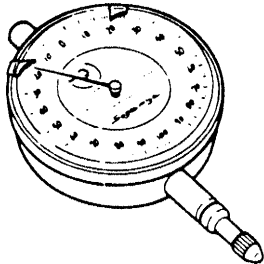
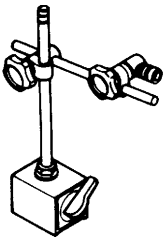
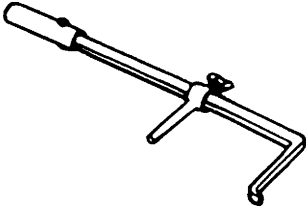
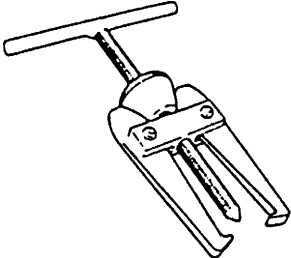
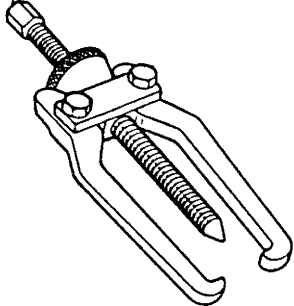
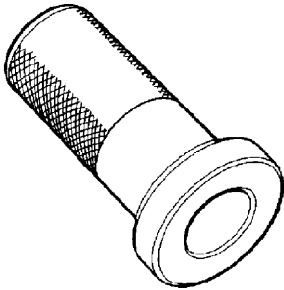
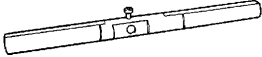
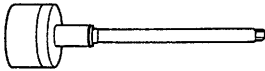
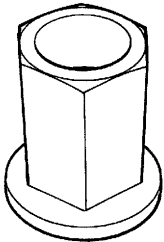
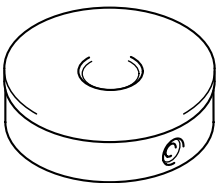
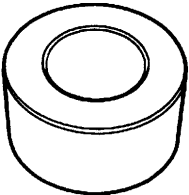
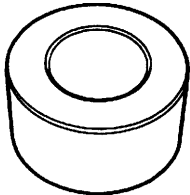
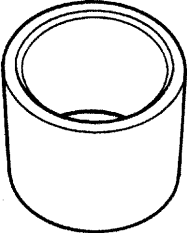
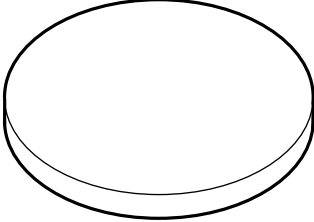
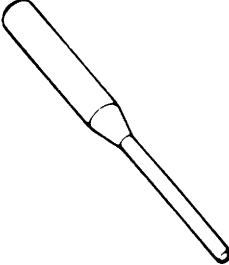
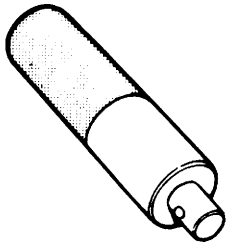
Tightening Torque Specification

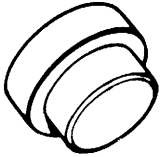
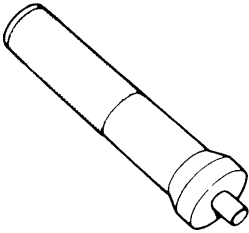
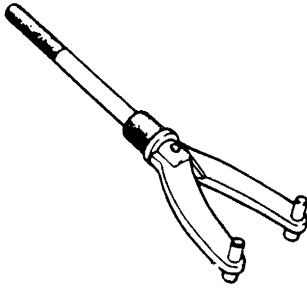
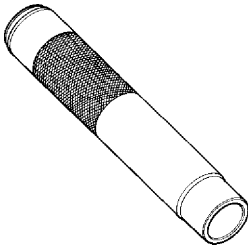
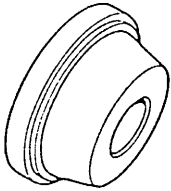
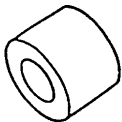
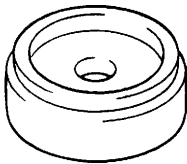
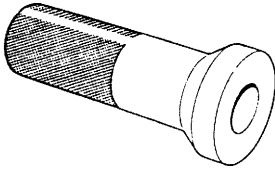
Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Rear differential oil drain plug	55	5.5	40.0
Rear differential oil level/filler plug	50	5.0	36.5
Drive bevel pinion nut (reference)	70 – 250	7.0 – 25.0	51.0 – 181.0
Drive bevel gear bolt	80	8.0	58.0
Differential side bearing cap bolt	23	2.3	17.0
Differential carrier bolt	23	2.3	17.0
Propeller shaft bolt	23	2.3	17.0

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Thread lock cement	THREAD LOCK CEMENT 1322 (99000-32110)	Drive bevel gear bolts
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lips
Sealant	SUZUKI BOND NO. 1217G (99000-31260)	<ul style="list-style-type: none"> • Thread part of differential carrier bolt • Mating surface of differential carrier • Mating surface of rear axle housing

Special Tool

 <p>09900-20607 Dial gauge</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09913-50121 Oil seal remover</p>	 <p>09913-60910 Bearing puller</p>
 <p>09913-65135 Bearing puller</p>	 <p>09913-75810 Bearing installer</p>	 <p>09922-76120 Dummy shaft</p>	 <p>09922-76140 Bevel pinion shaft</p>
 <p>09922-76150 Bevel pinion nut</p>	 <p>09922-76230 Bevel gear dummy</p>	 <p>09922-76320 Rear collar</p>	 <p>09922-76340 Rear collar</p>
 <p>09922-76410 Front collar</p>	 <p>09922-76510 Gauge block</p>	 <p>09922-85811 Spring pin remover</p>	 <p>09924-74510 Bearing installer handle</p>

 09925-88210 Bearing puller attachment	 09925-98210 Bearing installer	 09930-40113 Flange holder	 09940-51710 Bearing installer
 09941-34513-004 Bearing installer	 09951-16060 Lower arm bush remover	 09951-16090 Oil seal installer	 09951-76010 Bearing installer

SECTION 8B**LIGHTING SYSTEM****WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

Diagnosis	8B-2	Rear Fog Light	8B-3
Rear Fog Light	8B-2	Rear fog light circuit	8B-3
On-Vehicle Service	8B-3		

Diagnosis

Rear Fog Light

Condition	Possible Cause	Correction
Rear fog light does not come on when headlights and front fog lights (if equipped) come on	• Main fuse and/or fuses blown	Replace main fuse and/or fuses to check for short
	• Rear fog light switch faulty	Check switch
	• Wiring or grounding faulty	Repair as necessary
	• Bulb burnt out	Replace
	• Rear fog light controller faulty	Replace controller
[If front fog lights are equipped] Rear fog light does not come on when only headlights come on although it comes on when front fog lights come on	• Rear fog light controller harness "RED/BLU" faulty	Repair
[If front fog lights are equipped] Rear fog light does not come on when only front fog lights come on although it comes on when headlights come on	• Rear fog light controller harness "PPL/WHT" faulty	Repair

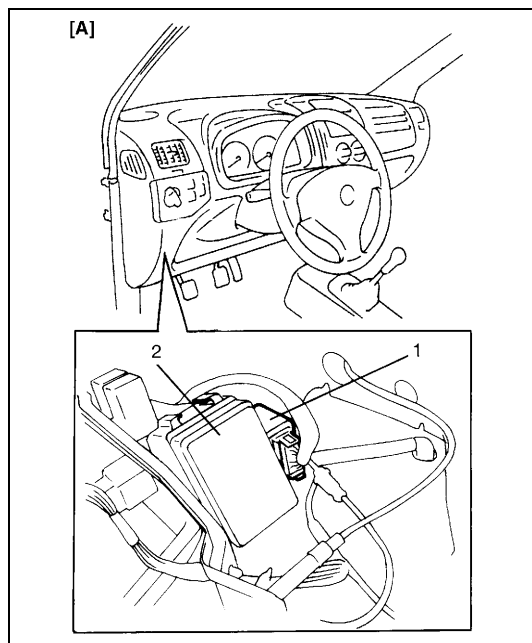
On-Vehicle Service

Rear Fog Light

Rear fog light circuit

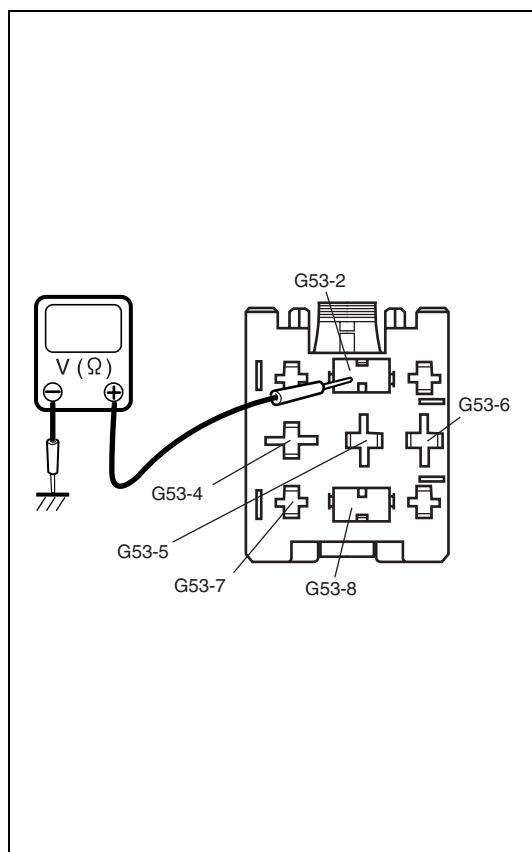
Inspection

- 1) Check headlights and front fog lights (if equipped) come on.
If headlight and/or fog light does not come on, check for light controller circuit as follows.
- 2) Disconnect negative cable at battery.
- 3) Disconnect rear fog controller (1) coupler and connect negative cable at battery.



[A]: The illustration shows LH steering vehicle.
And RH steering vehicle is symmetrical.

2. Fuse box



- 4) Check that the voltage and resistance between following terminals are specifications.

Terminals	Condition	Specification
G53-2 and ground	—	Continuity
G53-4 and ground	—	10 – 15 V
G53-5 and ground	When front fog lights come on	10 – 15 V
	When front fog lights do not come on	0 V
G53-6 and ground	—	Continuity
	When rear fog light bulb is removed	No continuity
G53-7 and ground	When rear fog light switch is pushed	10 – 15 V
	When rear fog light switch is free	0 V
G53-8 and ground	When headlight switch is in OFF	10 – 15 V
	When headlight switch is in ON	0 V

If check result is not satisfactory, repair.

SECTION 8C

INSTRUMENTATION/DRIVER INFORMATION

WARNING:

For vehicles equipped with Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

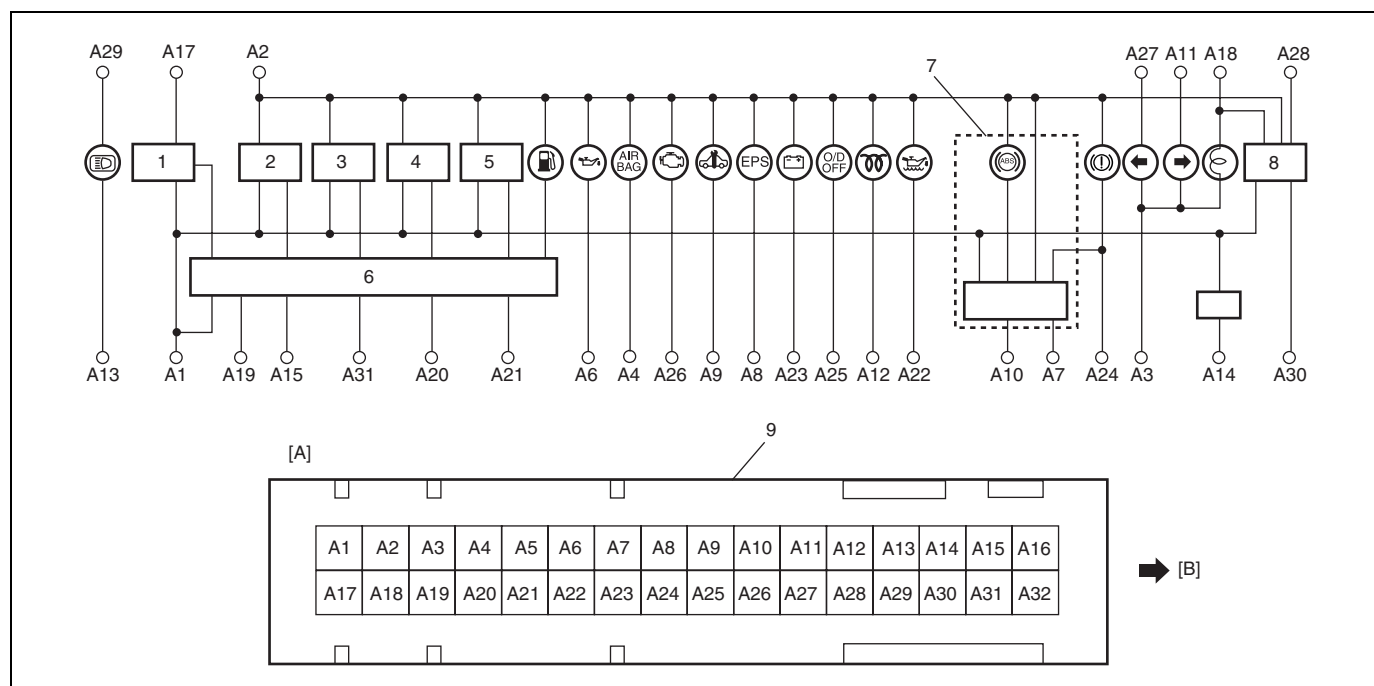
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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Combination Meter	8C-2	Low Fuel Warning System	8C-4
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Low Engine Oil Level Warning Light		(If Equipped)	8C-5
Symptom Diagnosis for Z13DT Engine			
(If equipped)	8C-3		

General Description

Combination Meter



[A]: Terminal arrangement of coupler viewed from harness side	3. Tachometer (if equipped)	7. ABS/EBD circuit (if equipped)
[B]: The upper side of combination meter	4. Fuel meter	8. Buzzer
1. Voltage regulator	5. Temp. meter	9. Connector A
2. Speedometer	6. Interface circuit	

Terminal A					
A1	To ground	BLK	A17	To positive terminal at battery	WHT/BLU
A2	To ignition switch	BLK/RED	A18	To tail light relay	RED/YEL
A3	To ground	BLK	A19	To ground	BRN
A4	To SDM	BLU	A20	To fuel level gauge	YEL/RED
A5	—	—	A21	To ECM	WHT/GRN
A6	To oil pressure switch	YEL/BLK	A22	To ECM (Z13DT engine)	PNK
A7	To ABS control module	ORN	A23	To generator	WHT/RED
A8	To EPS control module	GRY	A24	To brake fluid level switch and parking brake switch	YEL/GRN
A9	To ECM (Z13DT engine)	GRY/RED	A25	To A/T control module (M13 engine)	BLU/YEL
A10	To ABS control module	BLU/BLK	A26	To ECM	PPL/WHT
A11	To turn and hazard switch	GRN/YEL	A27	To turn and hazard switch	GRN/RED
A12	To ECM (Z13DT engine)	GRN/YEL	A28	To ignition switch	YEL/BLK
A13	To dimmer switch	RED	A29	To positive terminal at battery	WHT/BLU
A14	—	—	A30	To door switch	BLK/ORN
A15	To speed sensor or ECM	PPL	A31	To ECM	BRN/YEL
A16	—	—	A32	—	—

Diagnosis

Low Engine Oil Level Warning Light Symptom Diagnosis for Z13DT Engine (If equipped)

NOTE:

There are three types of vehicle below. Refer to corresponding table for symptom diagnosis.

- Vehicle with wire harness ("G25-27" wire harness) for low engine oil level warning light.
- Vehicle without wire harness ("G25-27" wire harness) for low engine oil level warning light.
- Vehicle whose wire harness ("G25-27" wire harness) for low engine oil level warning light is cut.

Vehicle with Wire Harness for Low Engine Oil Level Warning Light

Condition	Possible Cause	Correction
Low engine oil level warning light does not light up when low engine oil level	Fuse blown	Replace fuse to circuit for short.
	Wiring or grounding faulty	Repair circuit.
	Engine oil level switch faulty	Check engine oil level switch referring to "Engine Oil Level Switch" in Section 6E3.
	Combination meter faulty	Check combination meter circuit referring to "Combination Meter" in this section.
	ECM faulty	Check ECM referring to "Inspection of ECM and Its Circuits" in Section 6-3.
Low engine oil level warning light stays ON	Low engine oil	Refill engine oil referring to "Engine Oil and Oil Filter Replacement" in Section 0B.
	Wiring or grounding faulty	Repair circuit.
	Engine oil level switch faulty	Check engine oil level switch referring to "Engine Oil Level Switch" in Section 6E3.
	Combination meter faulty	Check combination meter circuit referring to "Combination Meter" in this section.
	ECM faulty	Check ECM referring to "Inspection of ECM and Its Circuits" in Section 6-3.

Vehicle without Wire Harness for Low Engine Oil Level Warning Light and Vehicle whose Wire Harness for Low Engine Oil Level Warning Light

Condition	Possible Cause	Correction
Low engine oil level warning light stays on	Wiring or grounding faulty	Repair wiring harness
	Combination meter faulty	Replace combination meter

On-Vehicle Service

Low Fuel Warning System

Operation

This light comes ON for 4 seconds after ignition switch is turned to ON position, and goes out.

However, in insufficient fuel level, this light indicates low fuel level by the following operation.

Low fuel warning light operation

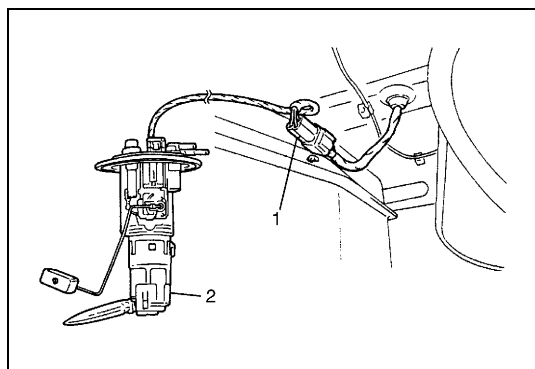
Low fuel warning light operation	Fuel level in fuel tank
OFF	6.0 litre (1.32 gal/Imp) or more
ON	2.9 – 6.0 litre (0.64 – 1.32 gal/Imp)
Flashing	0 – 2.9 litre (0 – 0.64 gal/Imp)

NOTE:

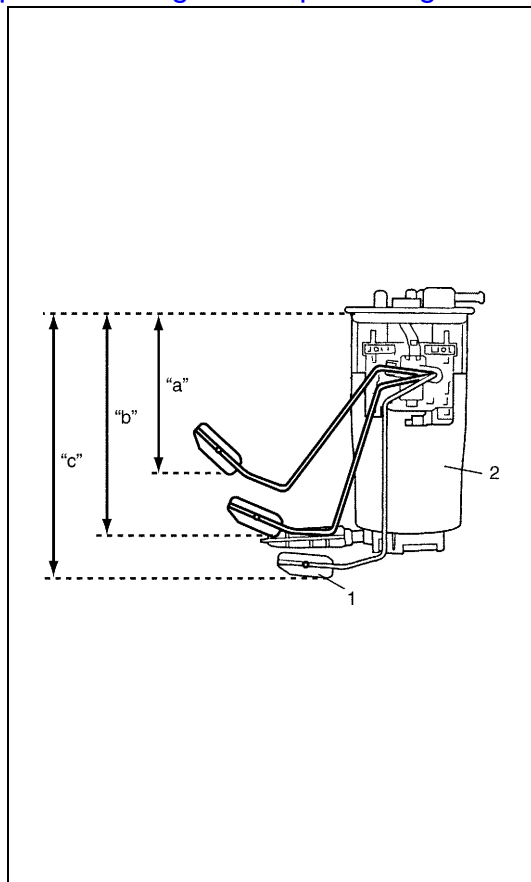
Lighting low fuel warning light will go off when fuel is refilled up to 10 litre (2.2 gal/Imp) fuel level.

System Inspection

- 1) Confirm that low fuel warning light comes ON for 4 seconds after ignition switch turned to ON position, and goes out.
- 2) Remove fuel pump assembly referring to “Fuel Pump Assembly (With Fuel Filter, Fuel Level Gauge, Fuel Pressure Regulator and Fuel Cut Valve)” in Section 6C.
- 3) Check fuel sender gauge referring to “Fuel Sender Gauge” in this section.
- 4) Connect fuel pump connector (1) to fuel pump (2).



- 5) Connect negative (–) cable to battery.
- 6) Turn ignition switch to ON position.



- 7) After 4 seconds, check for low fuel warning lamp operation under the following each float position (1) of fuel pump (2). If faulty condition is found, replace combination meter.

Low fuel warning light operation for G10/M13 engine

Float position		Low fuel warning light operation
"a"	188.5 – 191.3 mm (7.43 – 7.53 in.)	OFF
"b"	200.9 mm (7.91 in.) or more	ON
"c"	205.2 mm (8.08 in.) or more	Flashing

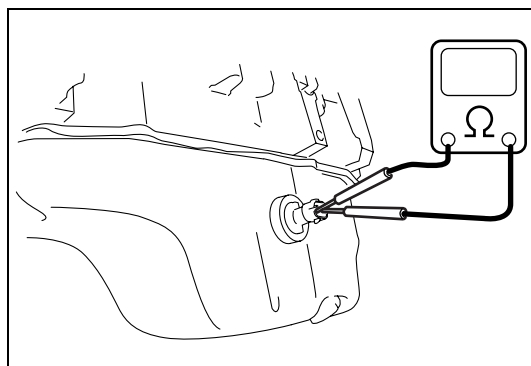
Low fuel warning light operation for Z13DT engine

Float position		Low fuel warning light operation
"a"	Above "b" position	OFF
"b"	184.0 mm (7.24 in.) or more	ON
"c"	194.3 mm (7.65 in.) or more	Flashing

Engine Oil Level Switch for Z13DT Engine (If Equipped)

Inspection

Check engine oil level switch referring to "Engine Oil Level Switch" in Section 6E3.



SECTION 8G

IMMOBILIZER CONTROL SYSTEM
(G10/M13 ENGINE MODELS)

WARNING:

For vehicles equipped with the Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in Section 10B in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-vehicle Service” in Section 10B before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative.
Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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Diagnosis	8G-4	DTC B3043 W-line CKT Malf (Short to Battery) for M13 Engine Model	8G-9
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Inspection of Immobilizer Control Module and Its Circuits for M13 Engine Model	8G-6		

General Description

Components

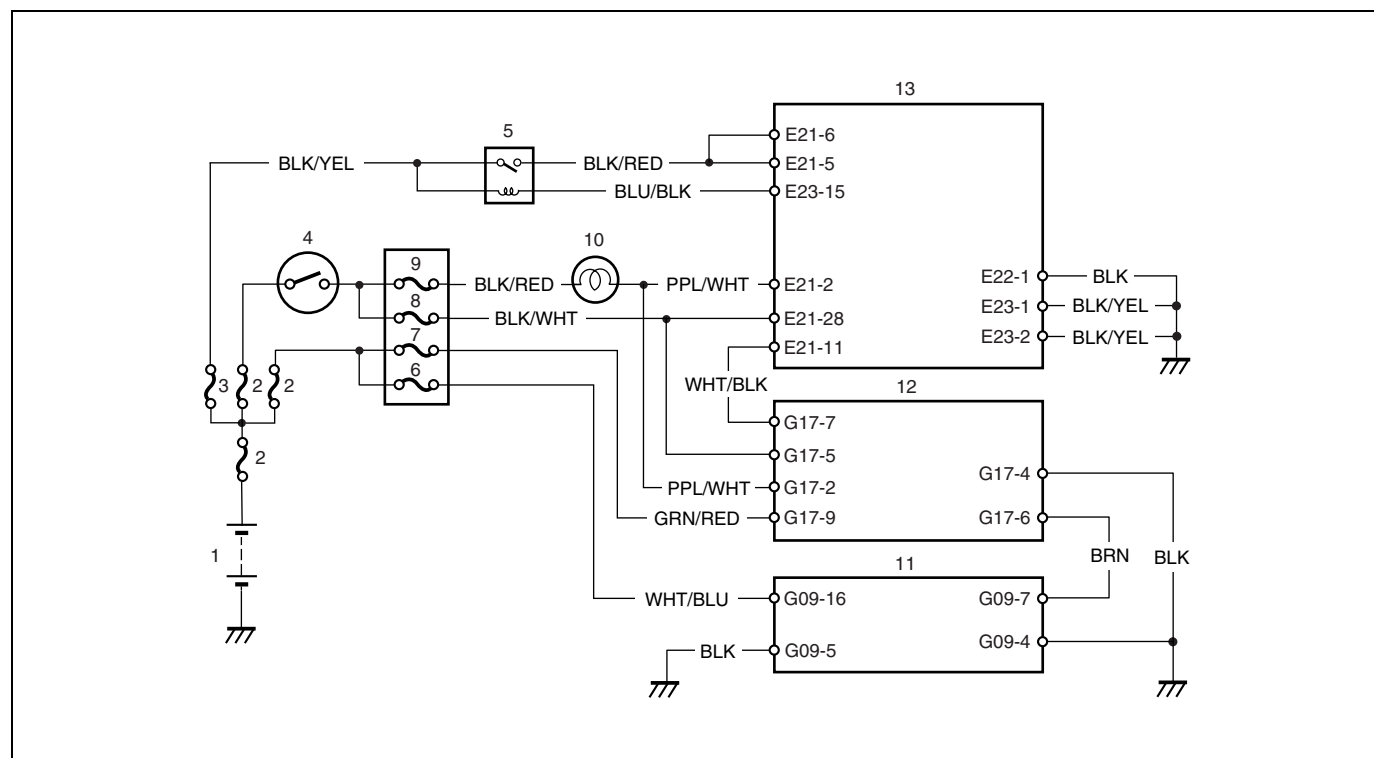
The immobilizer control system designed to prevent vehicle burglar and it consists of following components.

- Engine control module (ECM)
- Immobilizer control module (with coil antenna)
- Ignition key (with built-in transponder)

Operations

- 1) Each ignition key has its own FIX CODE (FC) stored in memory. When the ignition switch is turned to ON (II) position, immobilizer control module reads the FC through its coil antenna from ignition key.
- 2) Immobilizer control module compares FC read in step 1 and that registered in immobilizer control module and checks if they match.
- 3) ECM sends variable (generated randomly) to transponder via immobilizer control module, and then ECM calculates it with SECRET KEY (SKC) stored in its memory according to specified algorithm. On the other hand, transponder also calculates received variable with SKC stored in memory by means of same algorithm and sends back to ECM.
- 4) Only when ECM/transponder calculated values match, ECM keeps running engine. If two calculated values do not match, ECM stops operation of injectors and ignitor to stop engine after about 1.8 seconds at the first time. After the second time, ECM does not let engine start. And, so it does when FIX CODEs in step 2 do not match.

Wiring Circuit for M13 Engine Model



1. Battery	6. DOME RADIO fuse (15 A)	11. Data link connector (DLC)
2. Fuse	7. STOP fuse (15 A)	12. Immobilizer Control Module
3. FI fuse (20 A)	8. IG COIL fuse (15 A)	13. ECM
4. Ignition switch	9. METER fuse (10 A)	
5. Main relay	10. Immobilizer indicator lamp	

On-board Diagnostic System for M13 Engine Model

ECM and immobilizer control module diagnose troubles which may occur in the area including the following parts when the ignition switch is turned to ON position.

Immobilizer control module

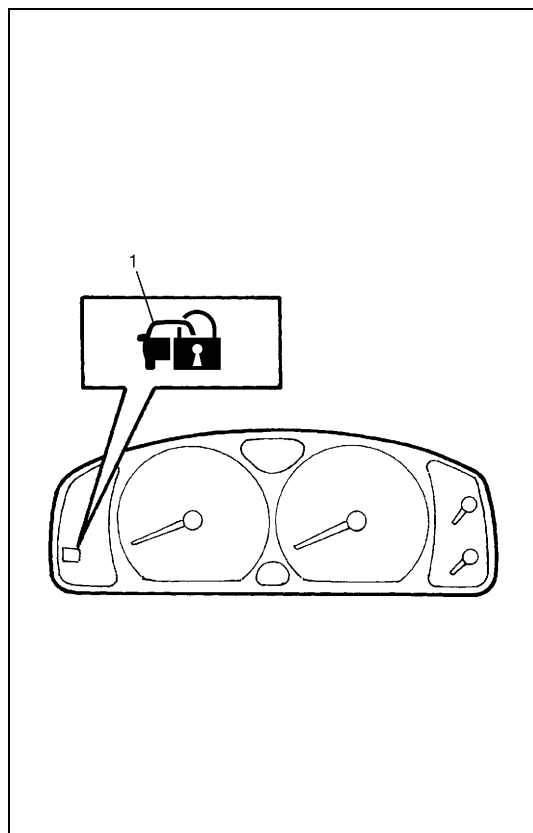
- Immobilizer control module
- W-line (Communication line between ECM and immobilizer control module)
- Password
- MIL circuit
- Transponder (ignition key)
- Fix code

ECM

- ECM
- Secret key
- Password

When a trouble exists in the immobilizer control system (when immobilizer control module or ECM detects a diagnostic trouble code (DTC)), ECM stops operation of the injector and igniter.

With the ignition switch turned ON (but the engine at stop) regardless of the condition of the engine and emission control system, ECM indicates whether a trouble has occurred in the immobilizer control system or not by flashing or turning ON the immobilizer indicator lamp (1).



Immobilizer indicator lamp ON:

No trouble exists in the immobilizer control system.

Immobilizer indicator lamp flashing ON and OFF:

ECM or immobilizer control module has detected some trouble in the immobilizer control system.

NOTE:

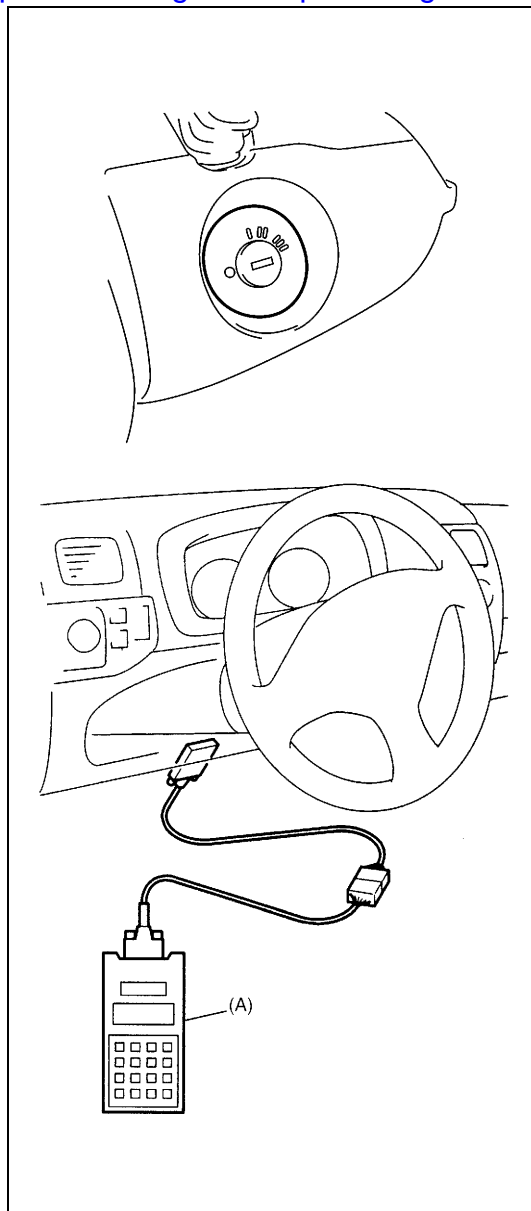
As soon as the ignition switch is turned to ON position, ECM and immobilizer control module diagnose if a trouble has occurred in the immobilizer control system in about 5 seconds at maximum.

While the diagnosis is being made, the MIL (malfunction indicator lamp) stays on and diagnosis result is abnormal, it immediately changes to flashing but if the result is normal, it remains on.

Diagnosis

Diagnostic Flow Table for M13 Engine Model

Step	Action	Yes	No
1	Turn ignition switch to start engine. Does engine run?	Go to step 5.	Go to step 2.
2	W-line circuit check Measure terminal voltage of immobilizer control module connector G17-7. Is it 10 – 14 V with ignition switch at ON position, 0 – 1 V with ignition switch at OFF position?	W-line circuit is in good condition. Go to step 3.	W-line circuit open or short Check and repair. Then, go to step 3.
3	Check for DTC referring to “Diagnostic Trouble Code (DTC) Check” in Section 6-2. Is there any DTC(s)?	Go to step 4.	Go to step 5.
4	Check, repair and/or perform necessary registration procedure according to flow table corresponding to DTC(s). Is there other DTC(s)?	Repeat step 4 until no DTC is indicated.	Go to step 5.
5	Check for DTC referring to “Diagnostic Trouble Code (DTC) Check” in this section. Is there any DTC(s)?	Go to step 6.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed to “Engine and Emission Control System Check” in Section 6-2.
6	Check and repair according to flow table corresponding to DTC(s). Is there other DTC(s)?	Repeat step 6 until no DTC is indicated.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed to “Engine and Emission Control System Check” in Section 6-2.



Diagnostic Trouble Code (DTC) Check for M13 Engine Model

Immobilizer Control Module

- 1) Prepare SUZUKI scan tool.
- 2) With ignition switch OFF position (●), connect SUZUKI scan tool to data link connector (DLC) located under instrument panel at driver's seat side.

Special tool

(A): SUZUKI scan tool (Tech-1A or Tech-2)

- 3) Turn ignition switch to ON position (II), and then read DTC according to instructions displayed on SUZUKI scan tool. If communication between scan tool and immobilizer control module can not be established, check if SUZUKI scan tool is communicable by connecting it to immobilizer control system another vehicle. If communication is possible in this case, SUZUKI scan tool is in good condition. Then, check data link connector and serial data line (circuit) in the vehicle with which communication can not be established.

NOTE:

DTC No. B3040, B3042 and B3043 can not be confirmed by SUZUKI scan tool unless W-line circuit is repaired.

- 4) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.

ECM

Refer to "Diagnostic Trouble Code (DTC) Check" in Section 6-2.

Diagnostic Trouble Code (DTC) Clearance for M13 Engine Model

Immobilizer Control Module

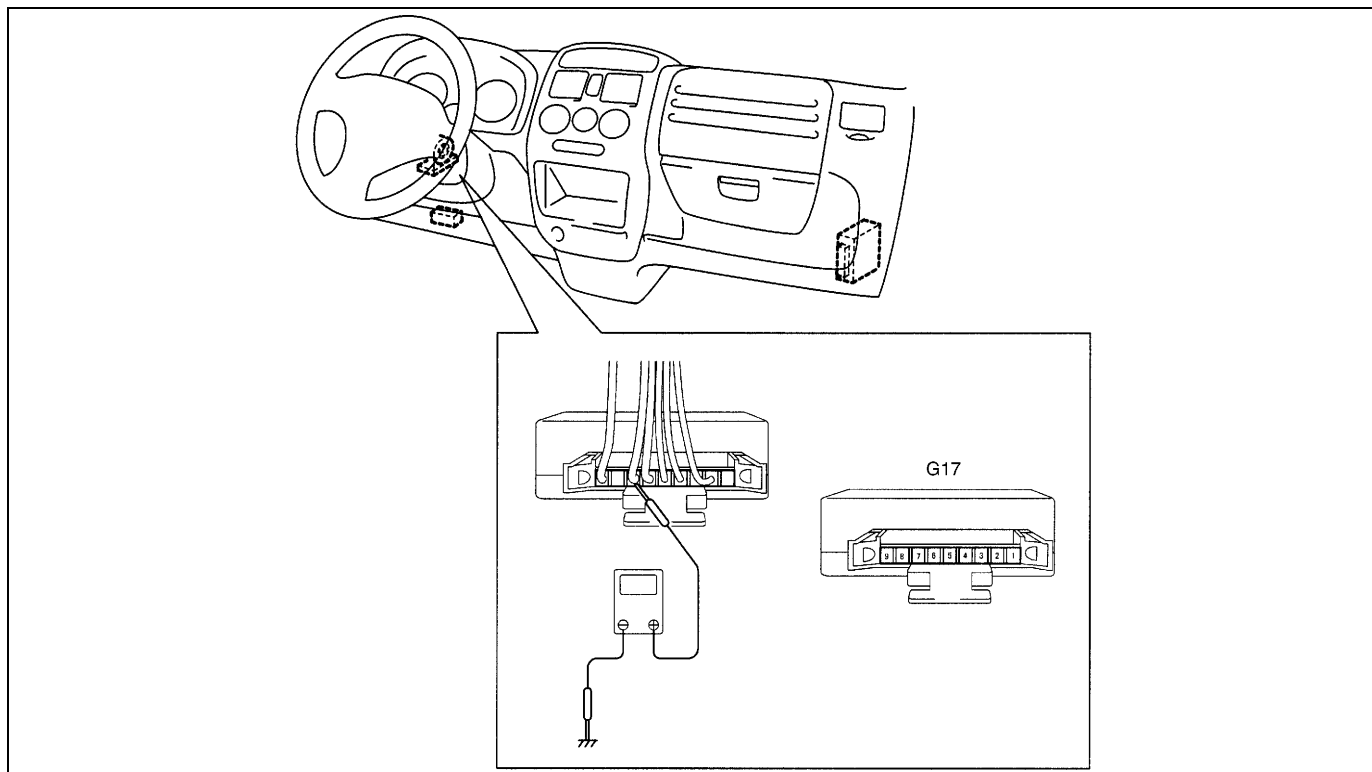
- 1) Connect SUZUKI scan tool to data link connector located under instrument panel at driver's seat side.
- 2) Turn ignition switch to ON position (II).
- 3) Erase DTC according to instructions displayed on SUZUKI scan tool. Refer to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.

ECM

Refer to "Diagnostic Trouble code (DTC) check" in Section 6-2.

Inspection of Immobilizer Control Module and Its Circuits for M13 Engine Model

Voltage Inspection



Immobilizer control module can be checked at wiring connectors by measuring voltage.

CAUTION:

Immobilizer control module can not be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to immobilizer control module with coupler disconnected from it.

NOTE:

As the battery voltage affects each terminal voltage, confirm that it is 11 V or more when ignition switch is turned to ON position.

Connector	Terminal	Circuit	Normal Voltage	Condition
G17	1	—	—	—
	2	PPL/WHT	0 – 1 V	MIL lights on.
	3	—	—	—
	4	BLK	0 – 1 V	Anytime
	5	BLK/WHT	10 – 14 V	Ignition switch at ON position
			0 – 1 V	Ignition switch at OFF position
	6	WHT/RED (Serial data line)	10 – 14 V	Scan tool connected
			0 – 1 V	Scan tool disconnected
	7	WHT/BLK	10 – 14 V	Scan tool connected or ignition switch at ON position
			0 – 1 V	Scan tool disconnected and ignition switch at OFF position
	8	—	—	—
	9	GRN/RED	10 – 14 V	Anytime

DTC B3040 W-line Communication Fail for M13 Engine Model**Wiring Circuit**

Refer to "Wiring Circuit for M13 Engine Model" on page 8G-2.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
No response from ECM while immobilizer control module requests signal	W-line circuit ECM power circuit

Troubleshooting

Step	Action	Yes	No
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at E22-11 terminal. Is it in good condition?	Go to step 2.	Repair or replace.
2	1) Ignition switch at OFF position. 2) Disconnect connector from immobilizer control module. 3) Check for proper connection to immobilizer control module at G17-7 terminal. Is it in good condition?	Go to step 3.	Repair or replace.
3	With connectors connected, measure voltage between terminal G17-7 and ground with ignition switch at ON position. Is it 10 – 14 V?	Go to step 4.	W-line (WHT/BLK) circuit open
4	With ignition switch at ON position, measure voltage between E21-5 or E21-6 terminal and ground. Are they 10 – 14 V?	Substitute a known-good ECM according to "Procedure After ECM Replacement" under "Registration Procedure of Immobilizer System Components", and recheck.	ECM power supply (BLK/WHT) circuit open

DTC B3042 W-line CKT Malf (Short to Ground) for M13 Engine Model**Wiring Circuit**

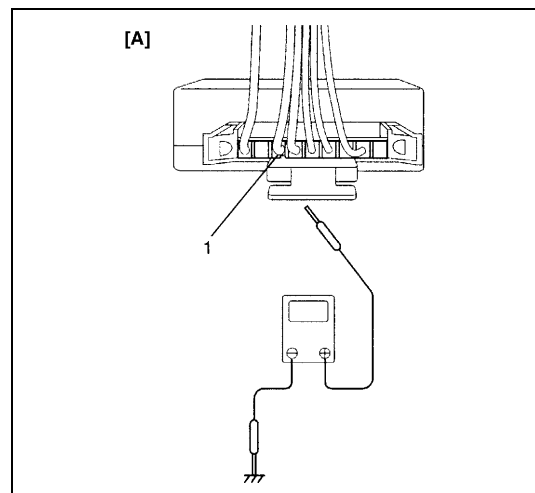
Refer to "Wiring Circuit for M13 Engine Model" on page 8G-2.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
W-line circuit voltage is low.	W-line circuit is shorted to ground.

Troubleshooting

Step	Action	Yes	No
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at E21-11 terminal. Is it in good condition?	Go to step 2.	Repair or replace.
2	1) Connect connector to ECM. 2) Measure voltage between G17-7 terminal of immobilizer control module and body ground with ignition switch at ON position. Is it 10 – 14 V?	Substitute a known-good ECM according to "Procedure After ECM Replacement" under "Registration Procedure of Immobilizer System Components", and recheck.	W-line (WHT/BLK) is shorted to ground. Repair and recheck.



1. G17-7 terminal

[A]: Fig. for step 2

DTC B3043 W-line CKT Malf (Short to Battery) for M13 Engine Model**Wiring Circuit**

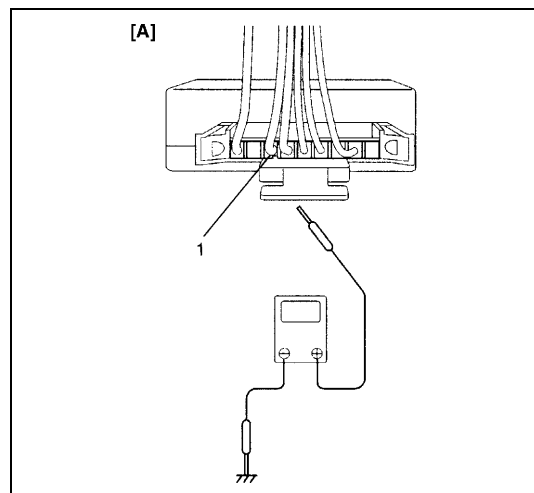
Refer to "Wiring Circuit for M13 Engine Model" on page 8G-2.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
W-line circuit voltage is high.	W-line circuit is shorted to power supply circuit.

Troubleshooting

Step	Action	Yes	No
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at E21-11. Is it in good condition?	Go to step 2.	Repair or replace.
2	1) Connect connector to ECM. 2) Measure voltage between G17-7 terminal of immobilizer control module and body ground with ignition switch at OFF position and scan tool disconnected. Is it 0 – 1 V?	Substitute a known-good ECM according to "Procedure after ECM Replacement" under "Registration Procedure of Immobilizer System Components", and recheck.	W-line (WHT/BLK) is shorted to power supply circuit. Repair and recheck.



1. G17-7 terminal

[A]: Fig. for step 2

DTC B3059 No Request from ECM for M13 Engine Model**Wiring Circuit**

Refer to "Wiring Circuit for M13 Engine Model" on page 8G-2.

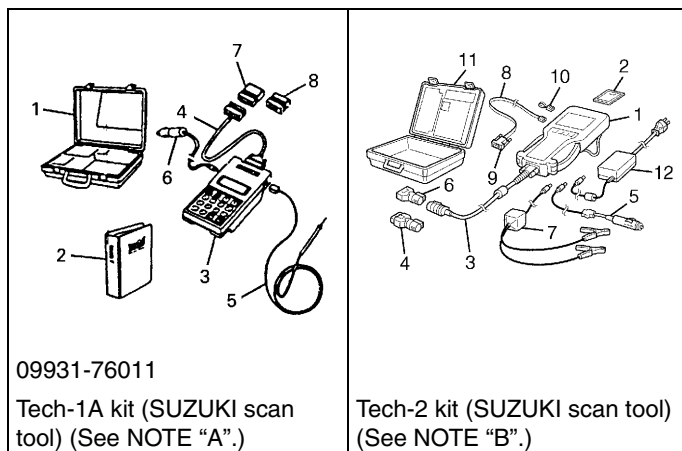
DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
No request from ECM via MIL circuit Ignition switch is not reset correctly.	MIL circuit faulty Communication between ECM and immobilizer control module

Troubleshooting

Step	Action	Yes	No
1	Turn ignition switch to (I) position or (●) position for more than 5 seconds, then turn ignition switch to ON (II) position. Recheck DTC. Is DTC B3059 current?	Go to step 2.	Communication between ECM and immobilizer control module was not finished correctly.
2	1) Check for proper connection to ECM at E21-1 terminal. Is it in good condition?	Go to step 3.	Repair or replace.
3	1) Check for proper connection to immobilizer control module at G17-2 terminal. Is it in good condition?	Go to step 4.	Repair or replace.
4	1) Check PPL/WHT line for open or short. Is it in good condition?	Substitute a known-good ECM according to "Procedure after ECM Replacement" under "Registration Procedure of Immobilizer System Components", and recheck.	Repair or replace.

Special Tools



NOTE:

- "A": This kit includes the following items.
1. Storage case, 2. Operator's manual, 3. Tech-1A, 4. DLC cable, 5. Test lead/probe, 6. Power source cable, 7. DLC cable adapter, 8. Self-test adapter
- "B": This kit includes the following items and substitutes for the Tech-1A kit.
1. Tech 2. PCMCIA card, 3. DLC cable, 4. SAE 16-19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 8G3

IMMOBILIZER CONTROL SYSTEM (Z13DT ENGINE MODEL)

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section, refer to section 8G of the Service Manual mentioned in FOREWORD of this manual.

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General Description

Components

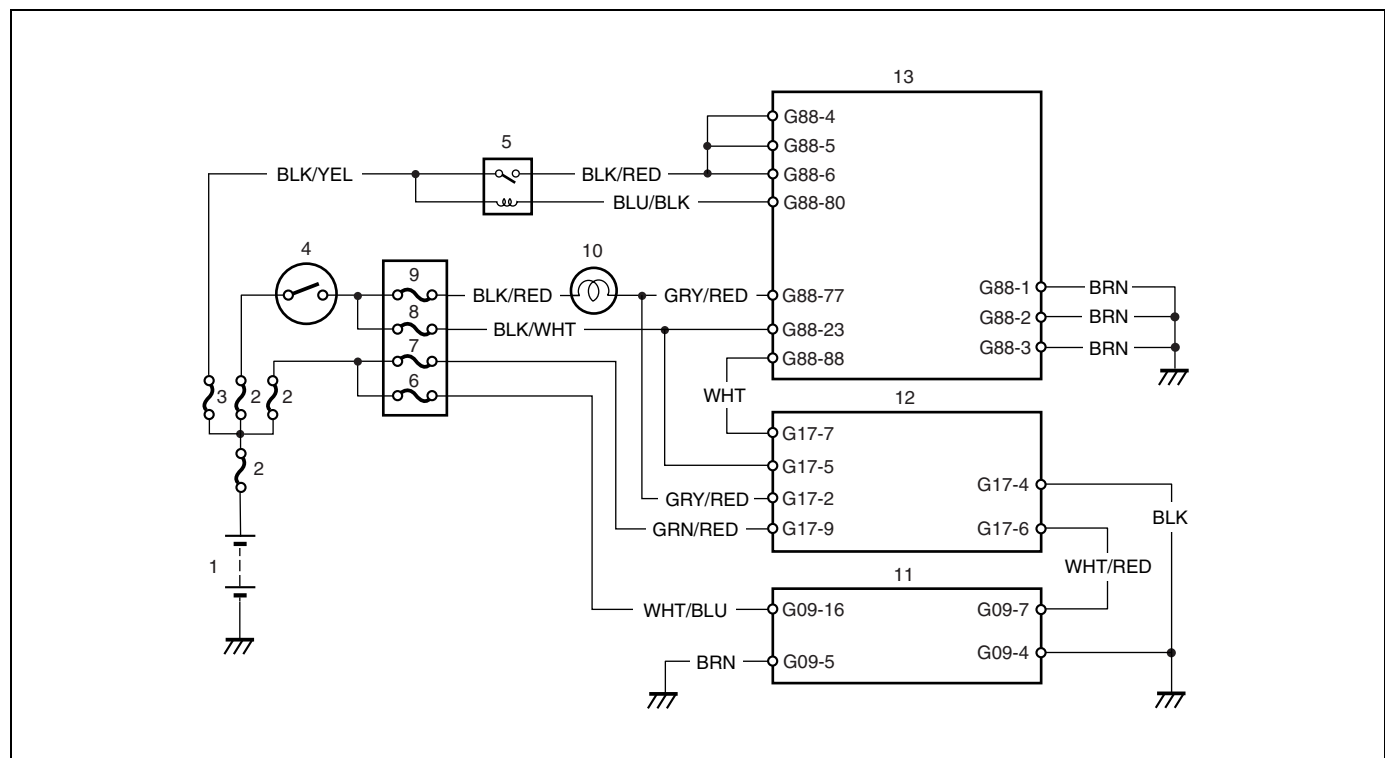
The immobilizer control system designed to prevent vehicle burglar and it consists of following components.

- Engine Control Module (ECM)
- Immobilizer Control Module (with coil antenna)
- Ignition key (with built-in transponder)

Operations

- 1) Each ignition key has its own FIX CODE (FC) stored in memory. When the ignition switch is turned to ON (II) position, Immobilizer Control Module reads the FC through this coil antenna from ignition key switch.
- 2) Immobilizer Control Module compares FC read in Step 1 and that registered in Immobilizer Control Module. Then, it checks if they match.
- 3) ECM sends variable (generated randomly) to transponder via Immobilizer Control Module and calculates it with SECRET KEY CODE (SKC) stored in its memory according to specified algorithm.
On the other hand, transponder also calculates received variable with SKC stored in its memory by means of same algorithm and sends back to ECM.
- 4) Only when ECM/transponder calculated values match, ECM keeps running engine.
If two calculated values do not match, ECM stops operation of injectors and ignitor to stop engine after about 1.8 seconds at the first time. After the second time, ECM does not let engine start. And, so it does when FIX CODEs in Step 2 do not match.

Wiring Circuit



1. Battery	6. DOME RADIO fuse (15 A)	11. Data link connector (DLC)
2. Fuse	7. STOP fuse (15 A)	12. Immobilizer Control Module
3. FI fuse (20 A)	8. IG COIL fuse (15 A)	13. ECM
4. Ignition switch	9. METER fuse (10 A)	
5. Main relay	10. Service vehicle soon (SVS) lamp	

ON-Board Diagnostic System

ECM and Immobilizer Control Module diagnose troubles which may occur in the area including the following parts when the ignition switch is turned to ON position.

Immobilizer Control Module

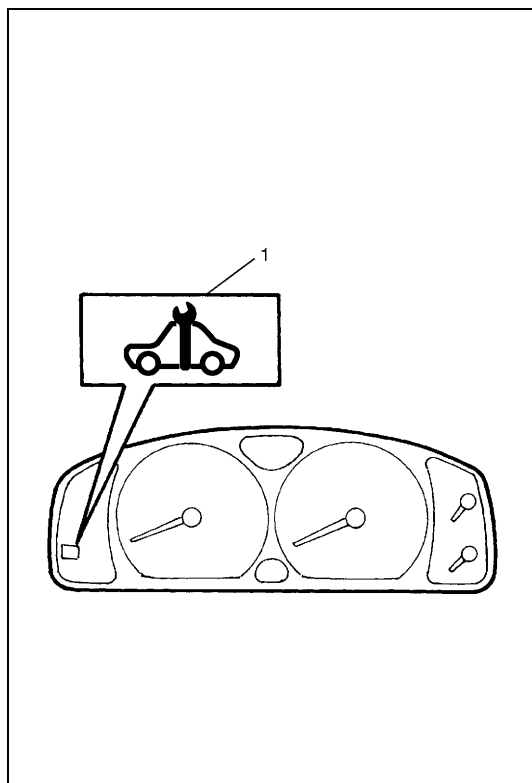
- W-line (communication line between ECM and Immobilizer Control Module)
- Password (PWD)
- MIL circuit
- Transponder (ignition key)
- FIX CODE (FC)

ECM

- SECRET KEY CODE (SKC)
- PWD

When a trouble exists in the immobilizer control system (when Immobilizer Control Module or ECM detects a diagnostic trouble code (DTC)), ECM stops operation of the injector and igniter.

With the ignition switch at ON (but the engine at stop) regardless of the condition of the engine and emission control system, ECM indicates whether some trouble has occurred in the immobilizer control system or not by turning ON or flashing ON and OFF the SVS lamp (1).



SVS lamp is ON, and then OFF after 3 seconds:

No trouble exists in the immobilizer control system.

SVS lamp flashes ON and OFF at 0.25-sec. intervals:

ECM or Immobilizer Control Module has detected some trouble in the immobilizer control system.

NOTE:

As soon as the ignition switch is turned to ON position, ECM and Immobilizer Control Module diagnose if a trouble has occurred in the immobilizer control system in about 3 seconds at maximum.

While the diagnosis is being made, the SVS lamp stays on and diagnosis result is abnormal, it immediately starts flashing but if the result is normal, it remains on.

Diagnosis

ECM and Immobilizer Control Module have on-board diagnostic system. Investigate where the trouble is by referring to "Diagnostic Flow Table" and "Diagnostic Trouble Code (DTC) Table" in this section.

Precautions in Diagnosing Troubles

- Before confirming diagnostic trouble code, do not disconnect connector from ECM, battery cable from battery, ground wire harness or main fuse.
Such disconnection will erase memorized information in ECM.
- Diagnostic trouble code stored in Immobilizer Control Module memory can be cleared as well as checked by using SUZUKI scan tool. Before using scan tool, read its Operator's (Instruction) Manual. Carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read "Precautions for Electrical Circuit Service" in Section 0A before inspection and observe what is written there.
- There are cases where SVS lamp indicates that some trouble has occurred only temporarily and has gone. In such case, it may occur that good parts are replaced unnecessarily. To prevent such case, be sure to follow instructions given below when checking by using "Diagnostic Flow Table" in this section.
- When trouble can be identified, it is not an intermittent one: check ignition key, wires and each connector and if they are all in good condition, substitute a known-good ECM and recheck.

Diagnostic Flow Table

Step	Action	Yes	No
1	Turn ignition switch to start engine. Does engine run?	Go to Step 5.	Go to Step 2.
2	W-line circuit check Measure terminal voltage of Immobilizer Control Module connector G17-7. Is it 10 – 14 V with ignition switch at ON position, 0 – 1 V with ignition switch at OFF position?	W-line circuit is in good condition. Go to step3.	W-line circuit open or short. Check and repair. Then, go to Step 3.
3	Check for DTC referring to “Diagnostic Trouble Code (DTC) Check” in Section 6-3. Is there any DTC(s)?	Go to Step 4.	Go to Step 5.
4	Check, repair and/or perform necessary registration procedure according to flow table corresponding to DTC(s). Is there other DTC(s)?	Repeat Step 4 until no DTC is indicated.	Go to Step 5.
5	Check for DTC referring to “Diagnostic Trouble Code (DTC) Check” in this section. Is there any DTC(s)?	Go to Step 6.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed to “A, Diagnostic System Check” in Section 6-3.
6	Check and repair according to flow table corresponding to DTC(s). Is there other DTC(s)?	Repeat Step 6 until no DTC is indicated.	Immobilizer control system is in good condition. If engine does not run, electronic fuel injection system is failed. Proceed to “A, Diagnostic System Check” in Section 6-3.

Diagnostic Trouble Code (DTC) Check

Immobilizer Control Module

- 1) Prepare SUZUKI scan tool.
- 2) With ignition switch OFF position (●), connect it to data link connector (DLC) (1) located under instrument panel at driver's seat side.

Special tool

(A): SUZUKI scan tool

- 3) Turn ignition switch to ON position (II).
Read DTC according to instructions displayed on SUZUKI scan tool referring to scan tool operator's manual for further details.
If communication between scan tool and Immobilizer Control Module can not be established, check if SUZUKI scan tool is communicable by connecting it to immobilizer control system in another vehicle. If communication is possible in this case, SUZUKI scan tool is in good condition. Then, check data link connector and serial data line (circuit) in the vehicle with which communication can not be established.

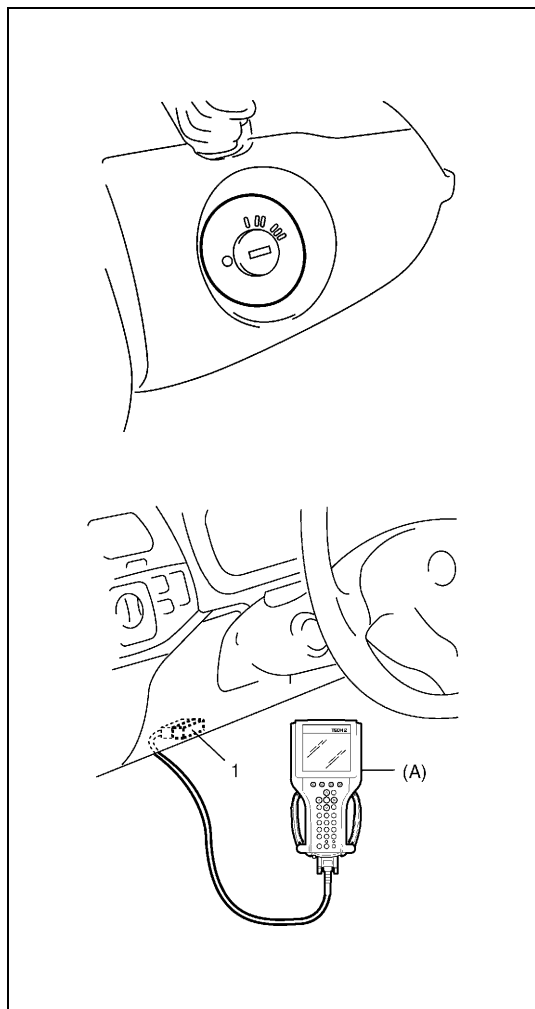
NOTE:

DTC No. B3040, B3042 and B3043 can not be confirmed by scan tool unless W-line circuit is in good condition.

- 4) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.

ECM

Refer to "Diagnostic Trouble Code (DTC) Check" in Section 6-3.



Diagnostic Trouble Code (DTC) Clearance

Immobilizer Control Module

- 1) Connect SUZUKI scan tool to data link connector (DLC) located under instrument panel at driver's seat side.
- 2) Turn ignition switch to ON position (II).
- 3) Erase DTC according to instructions displayed on SUZUKI scan tool referring to scan tool operator's manual for further details.
- 4) After completing the clearance, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.

ECM

Refer to "Diagnostic Trouble Code (DTC) Clearance" in Section 6-3.

Diagnostic Trouble Code (DTC) Table**Immobilizer Control Module**

DTC No.	Detected Item	Detecting Condition
B1000	Immobilizer Control Module internal failure	Immobilizer Control Module failure
B3040	W-line communication failure	Communication not finished correctly
B3042	W-line circuit shorted to ground	W-line circuit voltage low
B3043	W-line circuit shorted to battery	W-line circuit voltage high
B3055	No transponder	Ignition key without transponder is used.
B3056	No FIX CODE (FC) registered	FC is not registered in Immobilizer Control Module.
B3057	No password (PWD) registered	PWD is not registered in Immobilizer Control Module.
B3059	No request from ECM	ECM/Immobilizer Control Module line (SVS lamp) is open or shorted.
B3060	Incorrect transponder detected	Unregistered transponder is detected.
B3061	Transponder communication fail	Incorrect signal or no response from transponder
B3077	Read-only transponder detected	Transponder not for this system is detected.

ECM

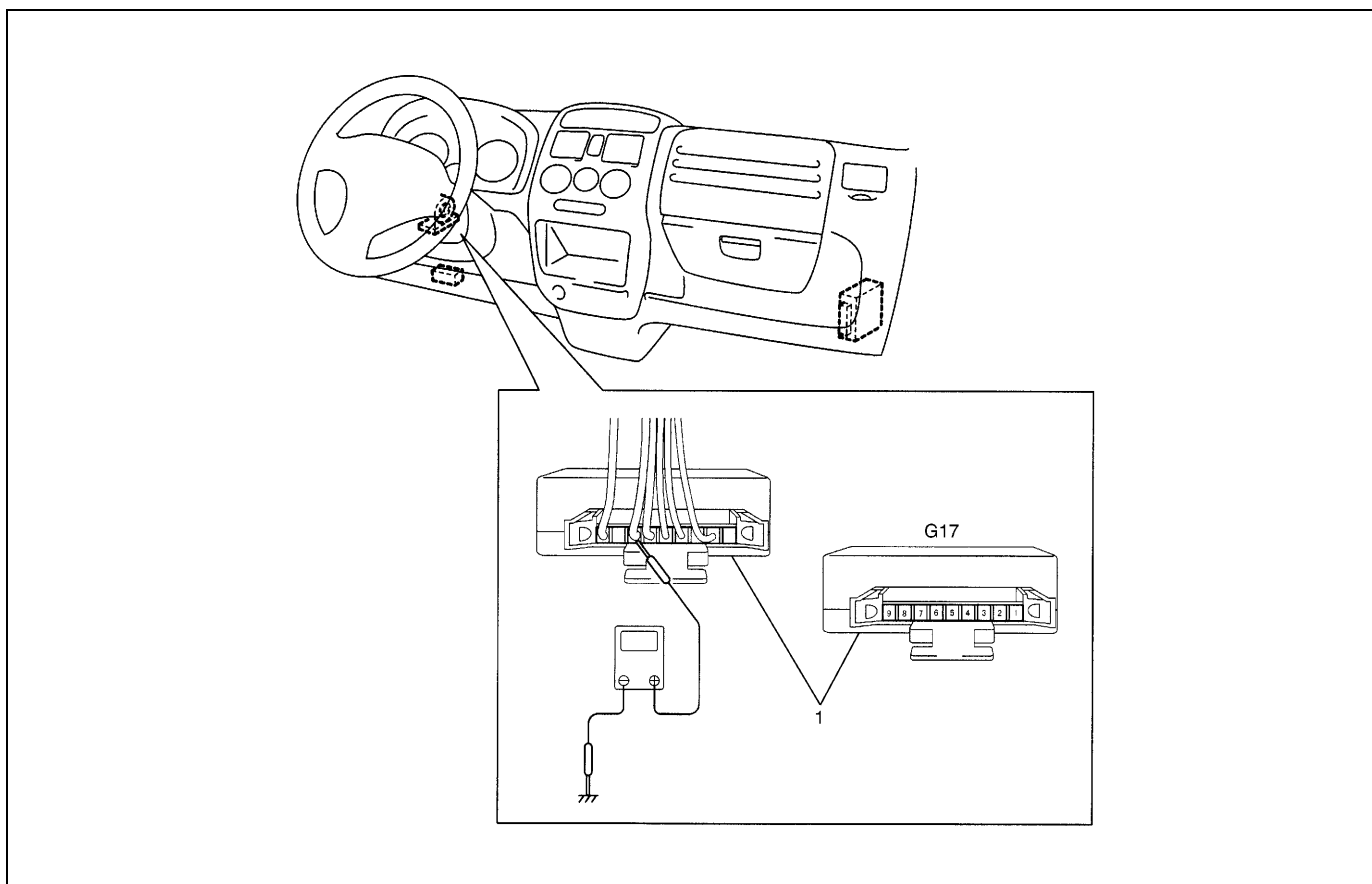
DTC No.	Detected Item	Detecting Condition
Display on Scan Tool		
P1610	SECRET KEY CODE (SKC) and password (PWD) not registered	SKC and PWD are not registered in ECM.
P1611	PWD not matched	Stored PWD is incorrect.
P1612	No signal from Immobilizer Control Module	Invalid signal from Immobilizer Control Module
P1613	No signal from Immobilizer Control Module	Invalid signal from Immobilizer Control Module
P1614	Incorrect signal from Immobilizer Control Module	Received response from transponder is incorrect.

NOTE:

- DTC B3040, B3042 and B3043 not be confirmed by scan tool unless W-line circuit is in good condition.
- DTC B3059 is detected when ignition switch is turned to ON (I) position within 5 seconds after ignition switch turned to (I) or (•) position from (II) position.

Inspection of Immobilizer Control Module and Its Circuits

Voltage Inspection



Immobilizer Control Module (1) can be checked at wiring connectors by measuring voltage.

CAUTION:

Immobilizer Control Module can not be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to Immobilizer Control Module with coupler disconnected from it.

NOTE:

As the battery voltage affects each terminal voltage, confirm that it is 11 V or more when ignition switch is turned to ON position.

Connector	Terminal		Circuit	Normal Voltage	Condition
G17	1	—	Not used	—	—
	2	GRY/RED	SVS lamp	0 – 1 V	SVS lamp lights on
	3	—	Not used	—	—
	4	BLK	Ground	0 – 1 V	Anytime
	5	BLK/WHT	Ignition switch signal	10 – 14 V	Ignition switch at ON position
				0 – 1 V	Ignition switch at OFF position
	6	WHT/RED	Data link connector (Serial data line)	10 – 14 V	SUZUKI scan tool connected
				0 – 1 V	SUZUKI scan tool disconnected
	7	WHT	W-line	10 – 14 V	SUZUKI scan tool connected or ignition switch at ON position
				0 – 1 V	SUZUKI scan tool disconnected and ignition switch at OFF position
	8	—	Not used	—	—
	9	GRN/RED	Power supply	10 – 14 V	Anytime

DTC B3040 W-Line Communication Fail**Wiring Circuit**

Refer to "Wiring Circuit" in this section.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
No response from ECM while Immobilizer Control Module requests signal	<ul style="list-style-type: none"> • W-line circuit • ECM power circuit

Troubleshooting

Step	Action	Yes	No
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at G88-88 terminal. Is it in good condition?	Go to Step 2.	Repair or replace.
2	1) Ignition switch at OFF position. 2) Disconnect connector from Immobilizer Control Module. 3) Check for proper connection to Immobilizer Control Module at G17-7 terminal. Is it in good condition?	Go to Step 3.	Repair or replace.
3	With connectors connected, measure voltage between terminal G17-7 and ground with ignition switch at ON position. Is it 10 – 14 V?	Go to Step 4.	W-line (WHT) circuit open.
4	With ignition switch at ON position, measure voltage between G88-4, G88-5, or G88-6 and ground. Are they 10 – 14 V?	Substitute a known-good ECM according to "Procedure for ECM Replacement" in this section and recheck.	ECM power supply (BLK/RED) circuit open.

DTC B3042 W-Line CKT Malf (Short to Ground)**Wiring Circuit**

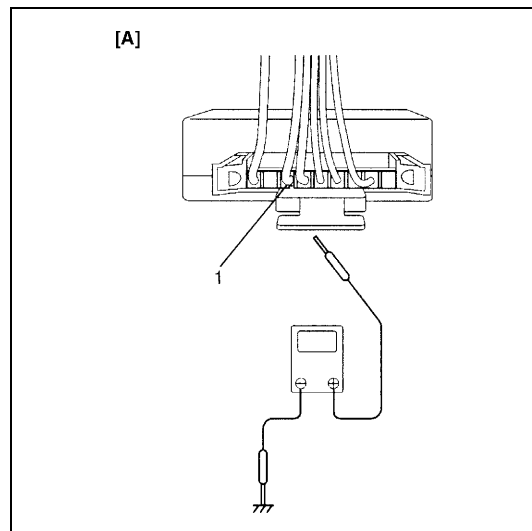
Refer to "Wiring Circuit" in this section.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
W-line circuit voltage is low.	W-line circuit

Troubleshooting

Step	Action	Yes	No
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at G88-88 terminal. Is it in good condition?	Go to Step 2.	Repair or replace.
2	1) Connect connector to ECM. 2) Measure voltage between G17-7 terminal of Immobilizer Control Module and body ground with ignition switch at ON position referring to the figure below. Is it 10 – 14 V?	Substitute a known-good ECM according to "Procedure for ECM Replacement" in this section and recheck.	W-line (WHT) is shorted to ground. Repair and recheck.



[A]: Fig. for Step 2

1. G17-7

DTC B3043 W-Line CKT Malf (Short to Battery)**Wiring Circuit**

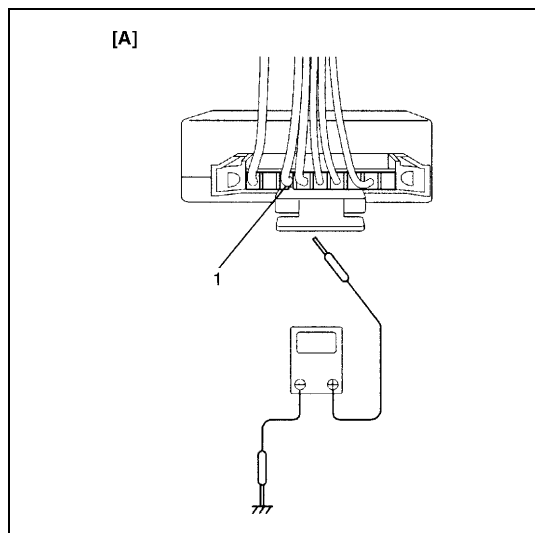
Refer to "Wiring Circuit" in this section.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
W-line circuit voltage is high.	W-line circuit

Troubleshooting

Step	Action	Yes	No
1	1) Ignition switch at OFF position. 2) Disconnect connector from ECM. 3) Check for proper connection to ECM at E88-88 terminal. Is it in good condition?	Go to Step 2.	Repair or replace.
2	1) Connect connector to ECM. 2) Measure voltage between G17-7 terminal of Immobilizer Control Module and body ground with ignition switch at OFF position and scan tool disconnected referring to the figure below. Is it 0 – 1 V?	Substitute a known-good ECM according to "Procedure for ECM Replacement" in this section and recheck.	W-line (WHT) is shorted to power supply circuit. Repair and recheck.



[A]: Fig. for Step 2

1. G17-7

DTC B3059 No Request from ECM**Wiring Circuit**

Refer to "Wiring Circuit" in this section.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
<ul style="list-style-type: none"> No request from ECM via SVS lamp circuit Ignition switch is not reset correctly. 	<ul style="list-style-type: none"> SVS lamp circuit Communication between ECM and Immobilizer Control Module

Troubleshooting

Step	Action	Yes	No
1	Turn ignition switch to (I) position or (•) position for more than 5 seconds, then turn ignition switch to ON (II) position. Recheck DTC. Is DTC B3059 current?	Go to Step 2.	Communication between ECM and Immobilizer Control Module was not finished correctly.
2	1) Check for proper connection to ECM at E23-1 terminal. Is it in good condition?	Go to Step 3.	Repair or replace.
3	1) Check for proper connection to immobilizer control module at G17-2 terminal. Is it in good condition?	Go to Step 4.	Repair or replace.
4	1) Check GRY/RED line for open or short. Is it in good condition?	Substitute a known-good ECM according to "Procedure for ECM Replacement" in this section and recheck.	Repair or replace.

On-vehicle Service

Registration Procedure of Immobilizer System Components

How to register ignition key

To register ignition key with built-in transponder, perform “Register New Ig Key (Fix Code)” mode by using SUZUKI scan tool.

For your details, refer to “SUZUKI Tech2 Operator’s Manual”.

NOTE:

Registering SECRET KEY CODE (SKC) to ignition key with built-in transponder is available only once.

Procedure after Immobilizer Control Module replacement

When Immobilizer Control Module must be replaced including when replaced because rechecking by using a known-good Immobilizer Control Module is necessary during trouble diagnosis, register FIX CODE (FC) and SECRET KEY CODE (SKC) to Immobilizer Control Module by performing the following procedure.

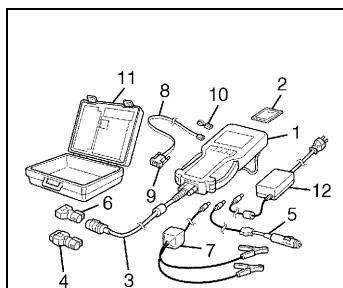
Perform “IMM Cont (Register Secret Key Code)” and “Register New Ig Key (Fix Code)” modes by using SUZUKI scan tool. For your details, refer to “SUZUKI Tech2 Operator’s Manual”.

Procedure after ECM replacement

When ECM is replaced, including when replaced because rechecking by using a known-good ECM is necessary during trouble diagnosis, register password (PWD) and SECRET KEY CODE (SKC) to ECM by performing following procedure.

Refer to “Procedure After ECM Replacement” under “ECM Registration” in Section 6E3.

Special Tools



Tech 2 kit (SUZUKI scan tool)
See NOTE below.

NOTE:

This kit includes the following items.

1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable,
6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter,
10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 9

BODY SERVICE

WARNING:

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to “Air Bag System Components and Wiring Location View” under “General Description” in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and “Service Precautions” under “On-Vehicle Service” in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the “LOCK” position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).
- When body servicing, if shock may be applied to air bag system component parts, remove those parts beforehand. (Refer to Section 10B.)

NOTE:

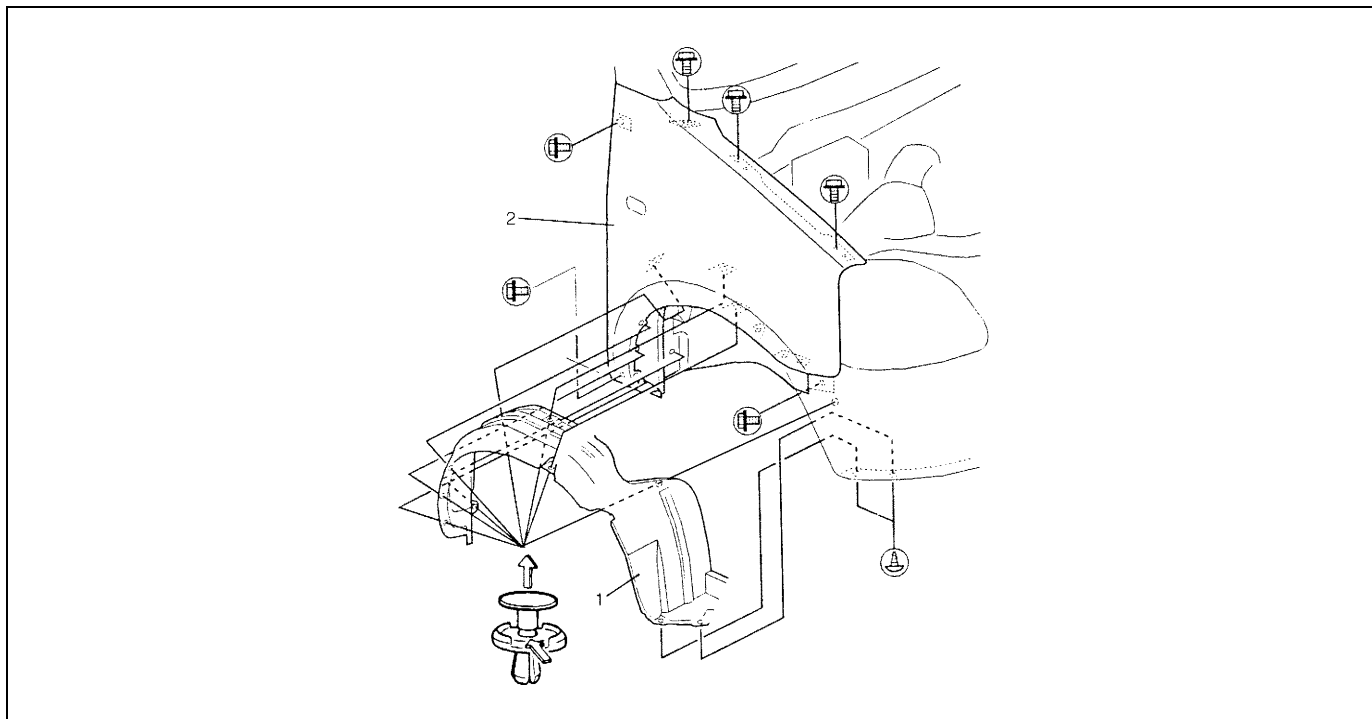
- Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.
Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.
- For the description (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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Body Structure

Front Fender



Removal

- 1) Remove front bumper.
- 2) Disconnect connector of side turn signal lamp.
- 3) Remove front fender lining (1).
- 4) Remove front fender (2).

Installation

Reverse removal procedure for installation.

NOTE:

If paint on fender bolt is peeled off, be sure to apply paint again.

Adjust panel clearance referring to "Panel Clearance" in this section.

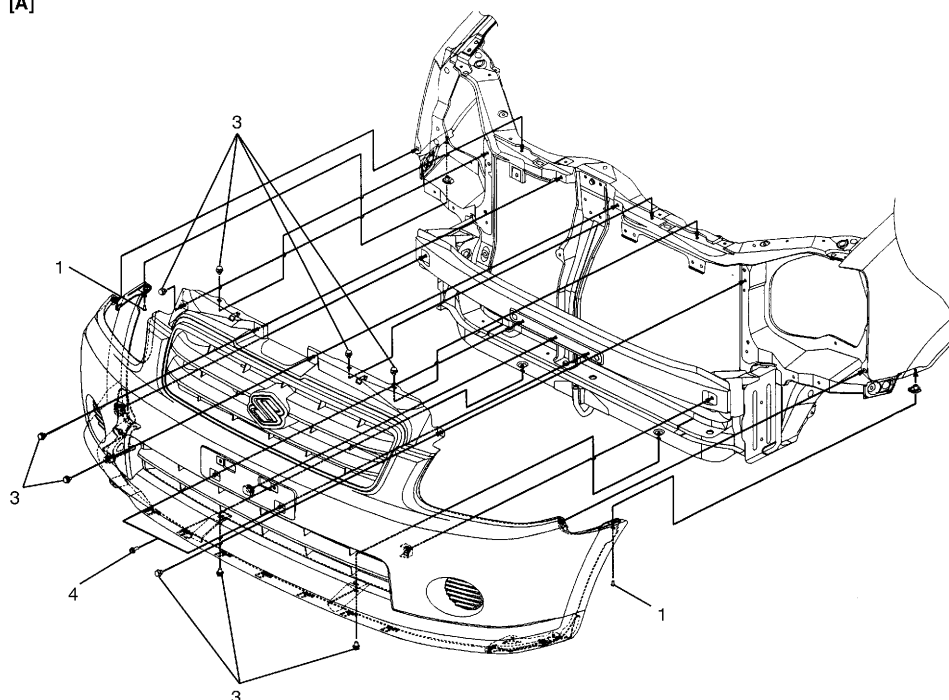
Front Bumper and Rear Bumper

NOTE:

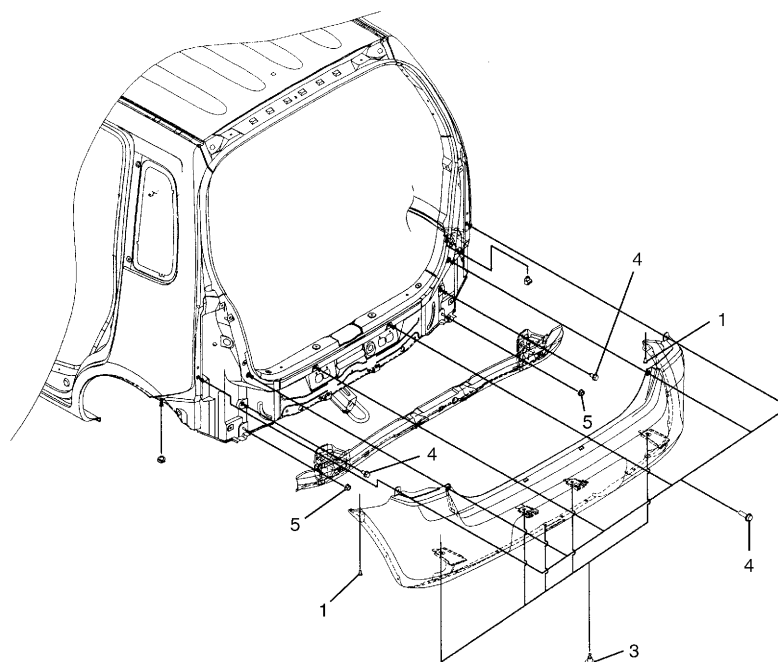
Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.

Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

[A]



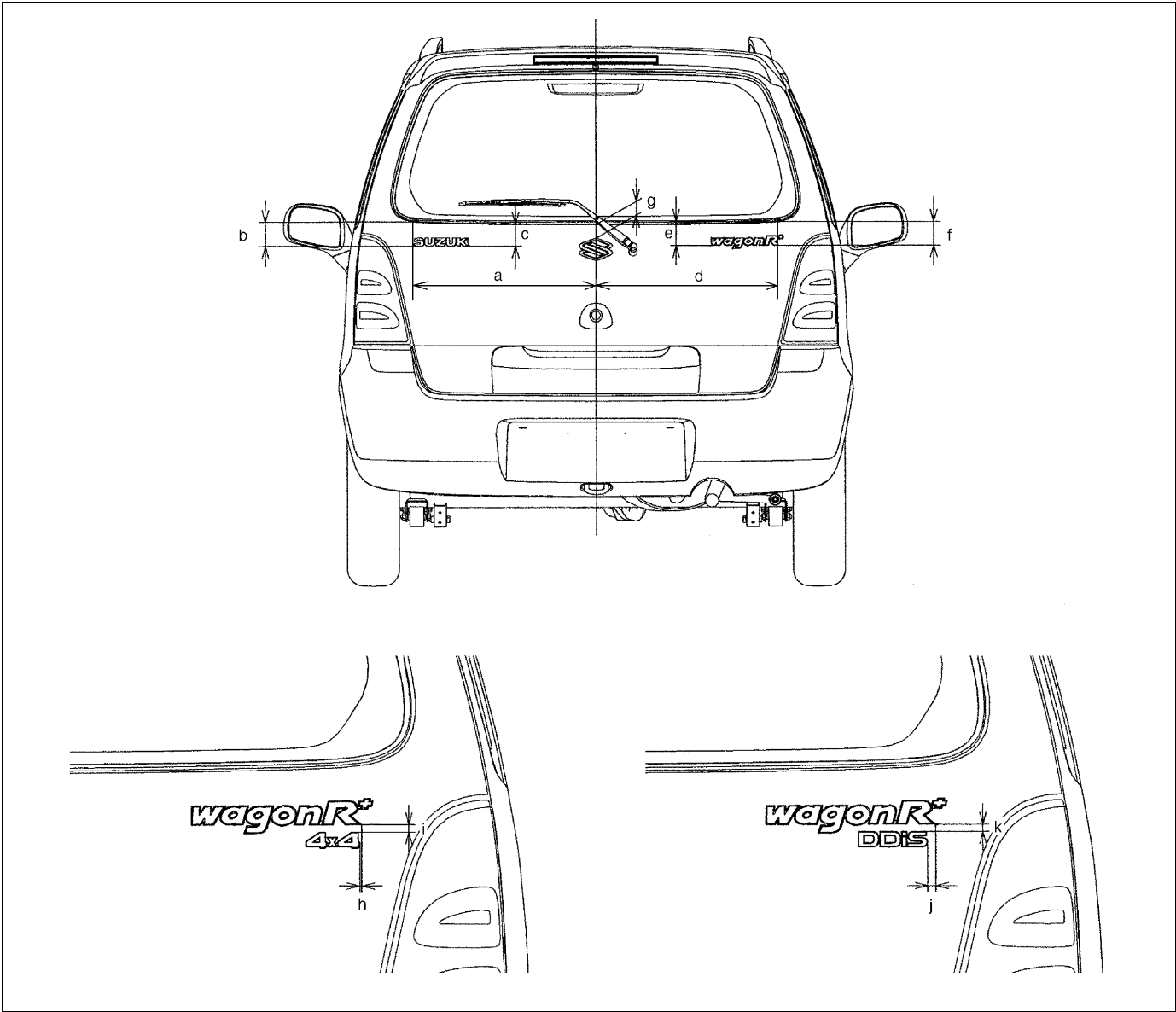
[B]



[A]: Front bumper	1. Screws	3. Clip	5. Nut
[B]: Rear bumper	2. Rear bumper member	4. Bolt	

Exterior and Interior Trim

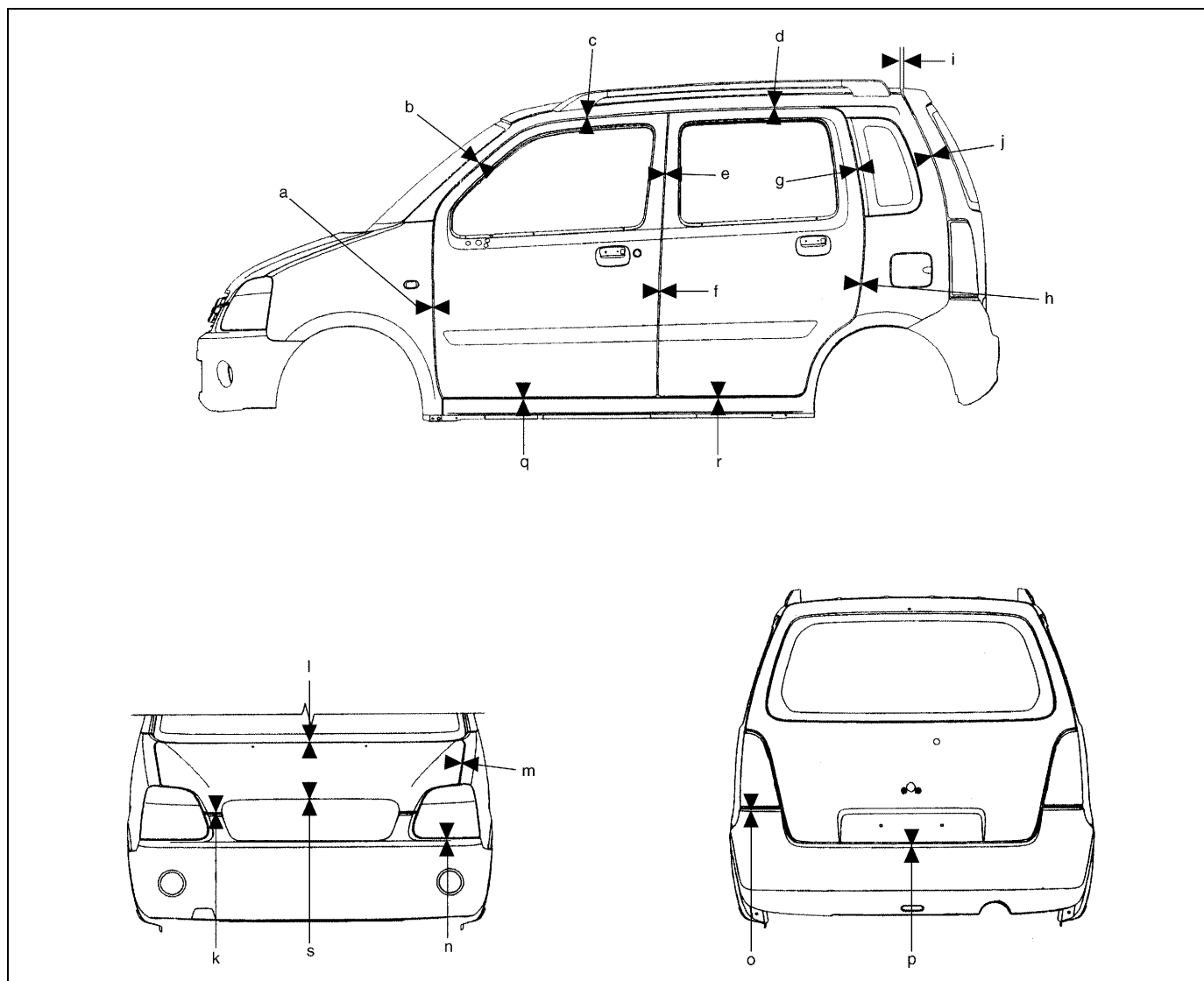
Back Door Emblem



Back door emblem dimension

Position	Dimension		Position	Dimension	
	mm	in		mm	in
a	568	22.36	g	40	1.57
b	76	2.99	h	2	0.08
c	69	2.72	i	9	0.35
d	574	22.6	j	9	0.35
e	74.5	2.93	k	9	0.35
f	74	2.91			

Panel Clearance



Panel to panel clearance

Position	Dimension		Position	Dimension	
	mm	in.		mm	in.
a	4.1 – 6.1	0.161 – 0.24	k	6 – 8	0.236 – 0.315
b	5 – 7	0.197 – 0.276	l	4.8 – 7.8	0.189 – 0.307
c	5 – 7	0.197 – 0.276	m	2.5 – 4.5	0.098 – 0.177
d	5 – 7	0.197 – 0.276	n	4.2 – 6.2	0.165 – 0.244
e	3.6 – 5.6	0.142 – 0.22	o	3.7 – 5.7	0.146 – 0.224
f	4.2 – 6.2	0.165 – 0.244	p	5.2 – 7.2	0.204 – 0.283
g	3.6 – 5.6	0.142 – 0.22	q	4.6 – 6.6	0.181 – 0.26
h	3.6 – 5.6	0.142 – 0.22	r	4.6 – 6.6	0.181 – 0.26
i	8.5 – 10.5	0.334 – 0.413	s	6.2 – 8.2	0.25 – 0.32
j	5 – 7	0.197 – 0.276			

Prepared by

MAGYAR SUZUKI CORPORATION

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910

FOREWORD

This manual has been prepared to help inspection and service works involving electric wiring of the following model be done efficiently.

Applicable model: RB310/RB413

(For VIN of applicable vehicles, refer to Applicability in page 8A-1-2 of this manual.)

In order to make a good use of this manual, it is important to have a full understanding of its first section "HOW TO USE THIS MANUAL".

All the data and information contained in this manual are based on the vehicle of certain specifications. Therefore, please note that the actual vehicle being serviced may vary somewhat because of differences in specifications or statutory regulations.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced. MAGYAR SUZUKI CORPORATION reserves the right to make changes at any time without notice.

For inspection and service works of electrical parts, following reference materials are also available for your help.

RELATED SERVICE MANUAL (S/M)

•RB310 (S/M)	99500U83E10
•RB413 (S/M)	99500-83E00
•RB413/4WD (S/S/M)	99501U83E00
•RB310/413 (S/S/M)	99501U83E10

MAGYAR SUZUKI CORPORATION

SERVICE DEPARTMENT

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VORWORT

Dieses Handbuch wurde als Hilfe für Inspektions- und Wartungsarbeiten an der Fahrzeugelektrik des folgenden Modells zusammengestellt.

Betreffendes Modell: RB310/RB413

(Hinsichtlich VIN des betreffenden Modells, siehe den Abschnitt ANWENDBARKEIT auf Seite 8A-1-4 dieser Anleitung.)

Um den größtmöglichen Nutzen aus diesem Handbuch zu ziehen, ist es wichtig, den ersten Abschnitt "VERWENDUNG DIESER ANLEITUNG" gründlich zu verstehen.

Sämtliche in diesem Handbuch enthaltenen Spezifikationen und Informationen basieren auf den technischen Daten eines bestimmten Modells. Es ist deshalb zu beachten, daß die technischen Daten und vorschriftsmäßige Ausstattung des zur Inspektion gebrachten Fahrzeugs sich eventuell leicht von den hier angegebenen Spezifikationen unterscheiden.

Alle in diesem Handbuch gegebenen Informationen, Abbildungen und Spezifikationen basieren auf den neuesten Daten, wie sie zum Zeitpunkt der Drucklegung zur Verfügung standen. Die Angaben beziehen sich größtenteils auf Fahrzeuge mit Standardspezifikationen. Sie weichen daher zuweilen von den tatsächlichen Gegebenheiten des zu wartenden Fahrzeugs ab. Das Recht zu Veränderungen, auch unangemeldet, behalten wir uns vor. Die MAGYAR SUZUKI CORPORATION behält sich das Recht auf Änderungen jederzeit und ohne vorherige Ankündigung vor.

Für Inspektions- und Wartungsarbeiten an elektrischen Bauteilen ist als zusätzliche Hilfe auch das folgende Bezugsmaterial erhältlich.

MODELLBEZOGENE WARTUNGSANLEITUNGEN

·RB310 (S/M) 99500U83E10

·RB413 (S/M) 99500-83E00

·RB413/4WD (S/S/M) 99501U83E00

·RB310/413 (S/S/M) 99501U83E10

MAGYAR SUZUKI CORPORATION

SERVICEABTEILUNG

INHALTSVERZEICHNIS

ABSCHNITT

VERWENDUNG DIESER ANLEITUNG

8A-1

STECKER-LAYOUT-DIAGRAMM

8A-3

EINBAUPOSITIONEN VON EINZELEINHEITSTEILEN

8A-4

MASSEPUNKT

8A-5

STROMVERSORGUNGSDIAGRAMM

8A-6

SYSTEMSCHALTDIAGRAMM

8A-7

LISTE DER STECKER

8A-8

AVANT-PROPOS	TABLES DES MATIÈRES	SECTION
<p>Le but de ce manuel est de permettre d'effectuer des travaux d'entretien et de réparation efficaces, en particulier sur les circuits électriques du modèle suivant.</p>	ORGANISATION DE CE MANUEL	8A-1
<p>Modèle couvert: RB310/RB413</p> <p>(Voir DÉTAILS DES APPLICATIONS à la page 8A-1-6 de ce manuel pour les numéros d'identification des véhicules concernés.)</p>	SCHÉMA DE DISPOSITION DES BLOCS RACCORD DE CÂBLAGE	8A-3
<p>Pour tirer le meilleur parti de ce manuel, il est indispensable d'avoir pris connaissance de la première partie "ORGANISATION DE CE MANUEL".</p>	POSITIONS D'INSTALLATION DES PIÈCES INDIVIDUELLES	8A-4
<p>Toutes les données et informations contenues dans ce manuel se rapportent à un véhicule précis ayant certaines spécifications. Le véhicule qui sera réparé pourra être un peu différent du fait de ses spécifications ou de la réglementation officielle.</p>	POINTS MASSE	8A-5
<p>Toutes les informations, illustrations et spécifications contenues dans ces pages sont basées sur les informations produites les plus récentes à la mise sous presse. Les descriptions principales concernent les véhicules aux spécifications standards. Veuillez donc noter que les illustrations peuvent présenter des différences par rapport aux véhicules en question. MAGYAR SUZUKI CORPORATION se réserve le droit de procéder à des modifications sans préavis.</p>	SCHÉMA DU CIRCUIT D'ALIMENTATION	8A-6
<p>Pour les travaux d'entretien et de réparation des pièces électriques, les références suivantes sont également disponibles.</p>	SCHÉMA DES SYSTÈMES ÉLECTRIQUES	8A-7
<p>MANUEL DE RÉPARATION (S/M)</p> <p>•RB310 (S/M) 99500U83E10</p> <p>•RB413 (S/M) 99500-83E00</p> <p>•RB413/4WD (S/S/M) 99501U83E00</p> <p>•RB310/413 (S/S/M) 99501U83E10</p>	LISTE DES BLOCS RACCORD DE CÂBLAGE	8A-8
<p>MAGYAR SUZUKI CORPORATION SERVICE APRÈS-VENTE</p>		

VOORWOORD

Deze handleiding is geschreven voor het efficiënt inspecteren en uitvoeren van onderhoudswerkzaamheden aangaande de elektrische bedrading van het volgende model:

Van toepassing zijnde model: RB310/RB413

(Voor de VIN van de toepasselijke voertuigen, zie Toepassing op bladzijde 8A-1-2 van deze handleiding.)

Voor een juist gebruik van deze handleiding dient u het eerste gedeelte "GEBRUIK VAN DEZE HANDLEIDING" goed te begrijpen.

Alle data en informatie in deze handleiding zijn gebaseerd op auto's met bepaalde specificaties. Het is derhalve mogelijk dat de auto waaraan u werkzaamheden uitvoert ietwat anders is vanwege verschillen in specificaties of plaatselijke vereisten.

Alle informatie, afbeeldingen en specificaties in deze uitgave zijn gebaseerd op de laatste productinformatie beschikbaar ten tijde van de goedkeuring voor deze uitgave.

In de beschrijvingen wordt het voertuigmodel met de standaard specificaties gebruikt. Daarom kunnen sommige afbeeldingen afwijken van het voertuig waaraan u moet werken. MAGYAR SUZUKI CORPORATION behoudt zich het recht voor op enig tijdstip zonder voorafgaande kennisgeving wijzigingen aan te brengen.

Voor het inspecteren en onderhouden van elektrische onderdelen zijn de volgende referenties beschikbaar om het u gemakkelijker te maken.

GERELATEERD WERKPLAATSHANDBOEK (S/M)

·RB310 (S/M) 99500U83E10
 ·RB413 (S/M) 99500-83E00
 ·RB413/4WD (S/S/M) 99501U83E00
 ·RB310/413 (S/S/M) 99501U83E10

MAGYAR SUZUKI CORPORATION
SERVICE-AFDELING

INHOUD**DEEL****GEBRUIK VAN DEZE HANDLEIDING****8A-1****SPANNINGSTOEVOER-DIAGRAM****8A-3****INSTALLATIEPOSITIE VAN ENKELE ONDERDELEN****8A-4****AARDEPUNT****8A-5****SPANNINGSTOEVOER-DIAGRAM****8A-6****SYSTEEMCIRCUITDIAGRAM****8A-7****LIJST VAN AANSLUITINGEN****8A-8**

SECTION 8A-1

HOW TO USE THIS MANUAL

8A-1

CONTENTS

- Manual Contents and Description 8A-1-2
- Applicability 8A-1-2
- Cautions in Servicing 8A-1-3
- Symbols and Marks..... 8A-1-6
- Abbreviations 8A-1-7
- Wire Color Symbols..... 8A-1-7
- How to Read Connector Layout Diagram (SECTION 8A-3) 8A-1-8
- Indication of Connectors and How to Read them 8A-1-9
- How to Read Installation Positions of Single Unit Parts (SECTION 8A-4) 8A-1-11
- How to Read Ground Point (SECTION 8A-5) 8A-1-12
- How to Read Power Supply Diagram (SECTION 8A-6) 8A-1-13
- How to Read System Circuit Diagram (SECTION 8A-7) 8A-1-14
- How to Read List of Connectors (SECTION 8A-8) 8A-1-16

MANUAL CONTENTS AND DESCRIPTION

This manual consists of diagrams showing the harness routing, connector layout, installation positions of single unit parts (fuse, relay, control unit), ground points, power circuit, system circuit and list of connectors.

SECTION		DESCRIPTION
Connector Layout Diagram	8A-3	Arrangement of connectors used in this vehicle is shown in relation with the wiring harness by using symbols in illustration.
Installation Positions of Single Unit Parts	8A-4	Positions where each fuse, relay and control unit are installed in this vehicle are shown.
Ground Point	8A-5	Points on the body where grounding is made are shown.
Power Supply Diagram	8A-6	Electric flow passage from the positive terminal of the battery to the main fuse and each fuse in the fuse box are shown and names of main systems that apply a load to each fuse are indicated.
System Circuit Diagram	8A-7	Individual circuit from the fuse to the ground of each system is shown. The circuit diagram is designed so as to show the electric flow from the top to the bottom in it.
List of Connectors	8A-8	Shapes of connectors used in this vehicle and arrangements of their pins are shown.

APPLICABILITY

This manual is applicable to the vehicles listed below.

NOTE:

Bear in mind that description in the text may vary from the actual vehicle depending on specifications.

MODEL/TYPE 1

RB310

(X)TSMMA93S00100001(X)~

RB413

(X)TSMMA53S00100001(X)~

TYPE 2

RB310/RB413

(X)TSMMA93S00180001(X)~

(X)TSMMB53S00180001(X)~

(X)TSMMA53S00180001(X)~

TYPE 3

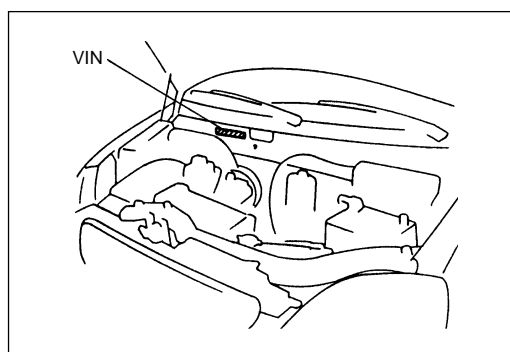
RB310/RB413

(X)TSMMA93S00210001(X)~

(X)TSMMB53S00210001(X)~

(X)TSMMA53S00210001(X)~

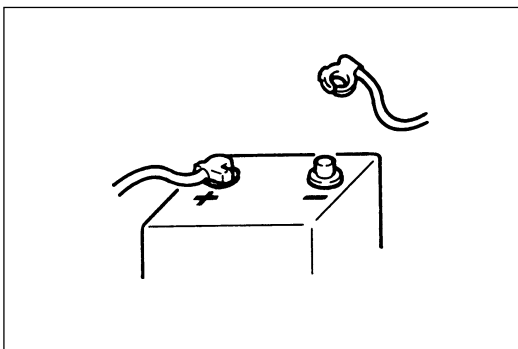
(X)TSMMA53S30210001(X)~



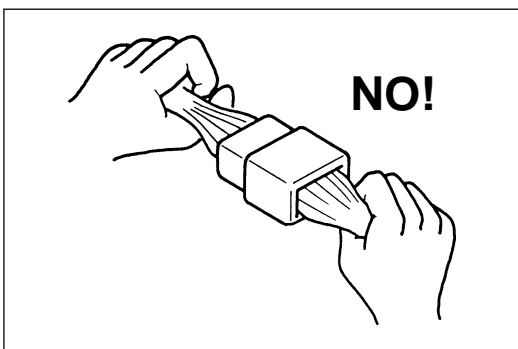
VIN: Vehicle Identification Nunumber

CAUTIONS IN SERVICING

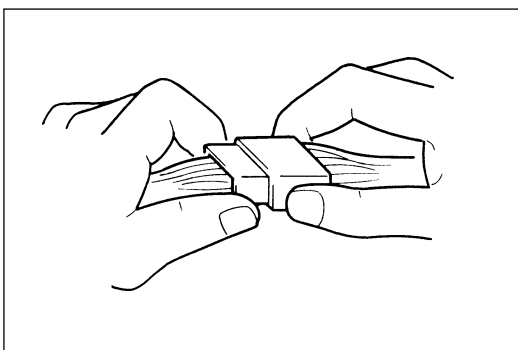
When performing works related to electric systems, observe following cautions for the purpose of protection of electrical parts and prevention of a fire from occurrence.



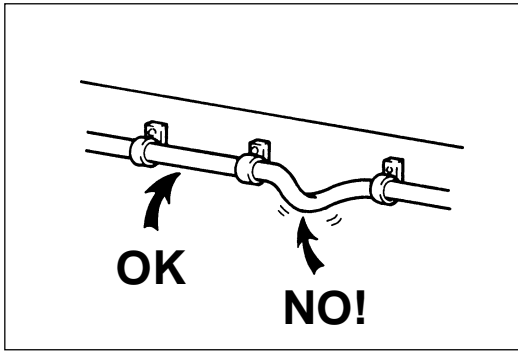
- When removing the battery from the vehicle or disconnecting the cable from the battery terminals for inspection or service works on the electric systems, always confirm first that the ignition switch and all the other switches have been turned OFF. Otherwise, the semi-conductor part may be damaged.
- When disconnecting cables from the battery, be sure to disconnect the one from the negative (–) terminal first and then the other from the positive (+) terminal.
- Reverse the above order when connecting the cables to the battery terminals.



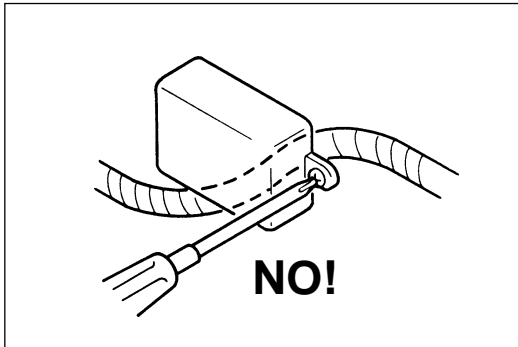
- When disconnecting connectors, never pull the wiring harnesses. Unlock the connector lock first and then pull them apart by holding connectors themselves.



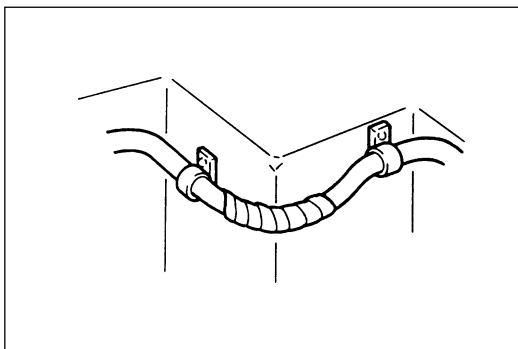
- When connecting connectors, also hold connectors and put them together until they lock securely (a click is heard).



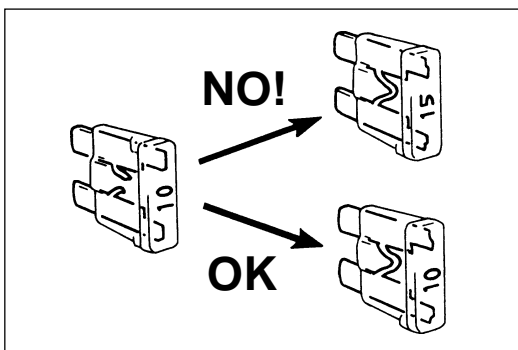
- When installing the wiring harness, fix it with clamps so that no slack is left.



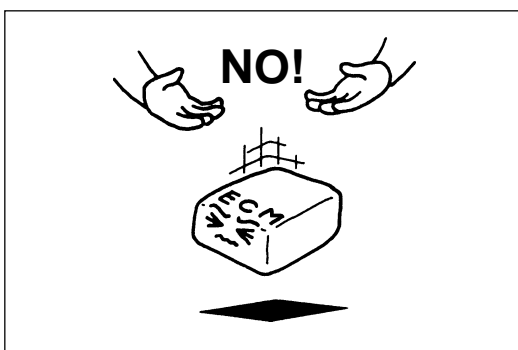
- When installing vehicle parts, be careful so that the wiring harness is not interfered with or caught by any other part.



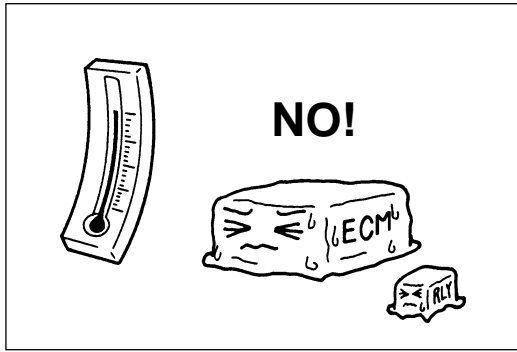
- To avoid damage to the harness, protect its part which may contact against a part forming a sharp angle by winding tape or the like around it.



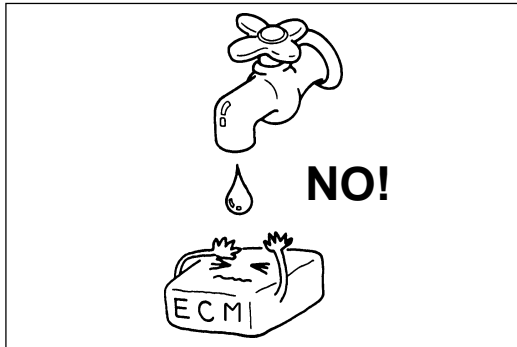
- When replacing a fuse, make sure to use a fuse of the specified capacity. Use of a fuse with a larger capacity will cause a damage to the electrical parts and a fire.



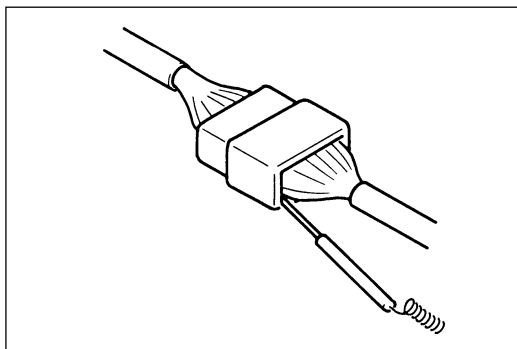
- Always be careful not to handle electrical parts (computer, relay, etc.) in a rough manner or drop them.



- When performing a work that produces a heat exceeding 80°C in the vicinity of the electrical parts, remove the heat sensitive electrical part(s) beforehand.



- Use care not to expose connectors and electrical parts to water which will be a cause of a trouble.



- When using a tester for checking continuity or measuring voltage, be sure to insert the tester probe from the wire harness side.

WARNING:

This vehicle is equipped with Supplemental Inflatable Restraint Air Bag System. Service on or around Air Bag System Components or Wiring must be performed only by an authorized Suzuki dealer. Please observe all the warnings described in "On Vehicle Service section", the Air Bag System Component and Wiring Location View in the service manual mentioned in FOREWORD of this manual before performing service on or around Air Bag System Components or Wiring. Failure to follow WARNING could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.

SYMBOLS AND MARKS

In the diagrams of this manual, each equipments are represented by the symbols and marks as shown below.

Battery	Ground		Normal Fuse	Slow blow fuse
Circuit breaker	Coil, Solenoid	Heater	Bulb	
Cigarette lighter	Motor	Pump	Horn	Speaker
Buzzer	Chime	Condenser	Thermistor	Reed switch
Resistance	Variable resistance		Transistor	
Photo transistor	Diode	Reference (zener) diode	Light emitting diode	Photo diode
Piezoelectric element	Harness		Relay	
Connector	Switch		"O" Type terminal	

ABBREVIATIONS

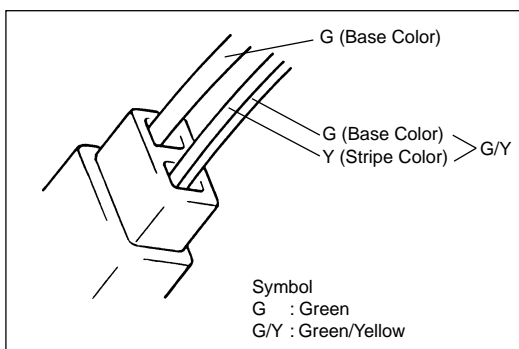
Listed below are the abbreviations as used in this manual and their full terms.

Abbreviation	Full term	Abbreviation	Full term
2WD	2 wheel drive vehicles	IND	Indicator
4WD	4 wheel drive vehicles	INT	Intermittent
A/C	Air conditioning	J/C	Joint connector
A/T	Automatic transmission	LH (D)	Left hand (drive vehicle)
ACC	Accessory	LO	Low
CKP	Crank shaft position	M/T	Manual transmission
CMP	Camshaft position	MAP	Manifold absolute pressure
DLC	Data link connector	O/D	Over drive
DRL	Daytime running light (If equipped)	P/N	Power/Normal
ECT	Engine coolant temperature	P/S	Power steering
EGR	Exhaust gas recirculation	RH (D)	Right hand (drive vehicle)
HI	High	ST	Starter
IAC	Idle air control	TCC	Torque converter clutch
IAT	Intake air temperature	TCM	Transmission control module
IG	Ignition	VSV	Vacuum switching valve
ILL	Illumination	W/S	Weld splice

Symbol	Wire core	Symbol	Wire core
B	Black	Or	Orange
Bl	Blue	R	Red
Br	Brown	W	White
G	Green	Y	Yellow
Gr	Gray	P	Pink
Lbl	Light Blue	V	Violet
Lg	Light Green		

WIRE COLOR SYMBOLS

The initial alphabet (s) of the color name is used to represent each color as listed at the left.



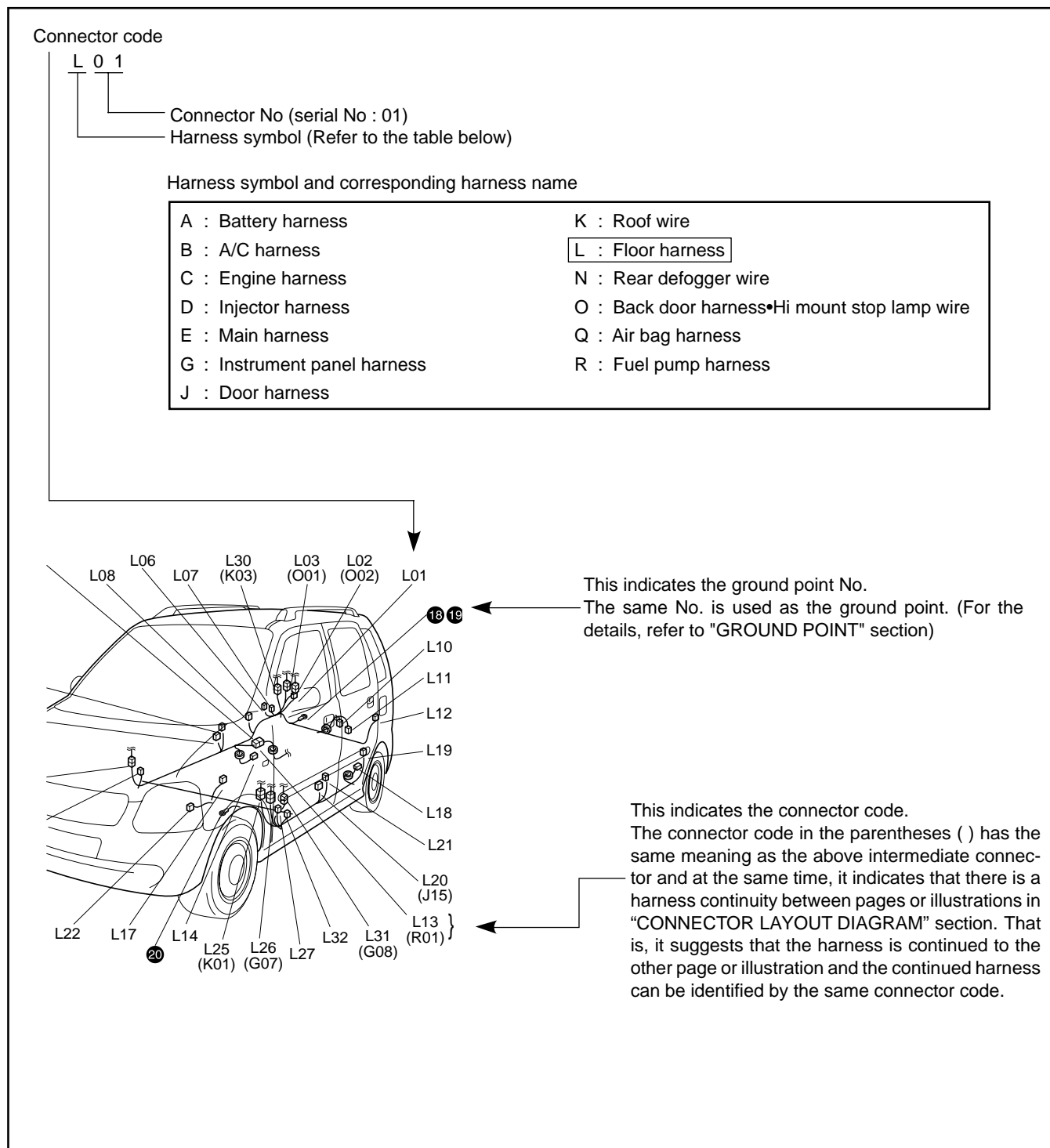
There are two types of wire color : one-color type and 2-color type (with a stripe). In case of 2-color type, the first alphabet ("G" of the example in the figure at the left) represents the basic color (color of wire insulation) and the next alphabet ("Y" of the example) represents the color of stripe.

HOW TO READ CONNECTOR LAYOUT DIAGRAM

When necessary to know the location of an electrical part or an intermediate connector, it is easily possible to retrieve it by this diagram.

First consult "SYSTEM CIRCUIT DIAGRAM" section or connector table at the right hand pages of this section for the questioned connector code. Second refer to the diagrams of this section and look for the same code.

More information on use of the code is illustrated below.



INDICATION OF CONNECTORS AND HOW TO READ THEM

The connectors are indicated as shown below in "SYSTEM CIRCUIT DIAGRAM" section. For the shape and pin arrangement of each connector used in this manual, refer to "LIST OF CONNECTORS" section. Described below are how they are indicated and how to read them.

1.

- The male terminal and female terminal are identified by a double enclosure and a single one respectively.
- The intermediate connector which connects harnesses is shown by both shapes of the male terminal and the female terminal but the connector to be connected directly to the equipment is shown by the shape of the connector on the harness side.
- The connectors described in this manual are always "harness side connectors" which are viewed from the direction as shown at the right.

Male terminal

A40

4321

8765

Female terminal

D18

1234

5678

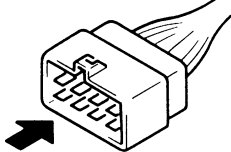
A40

D18

5

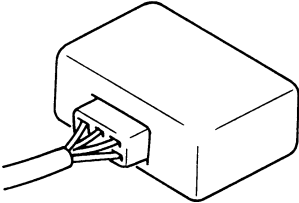
Terminal No.

Consult "LIST OF CONNECTOR" section for the pin position referring to this code (D18-5).



2.

- There are three types of connectors with respect to the way it is connected and each type is illustrated as shown below.

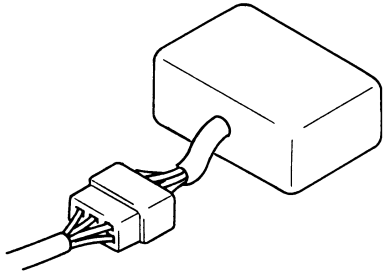


→

↑↑

↑↑

- To be inserted directly into equipment



→

B15

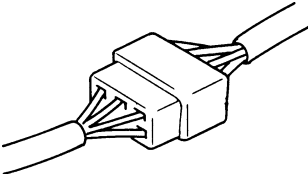
1..2

↑↑

↑↑

This indicates that they are indedntical.

- To be connected with harness connector of equipment



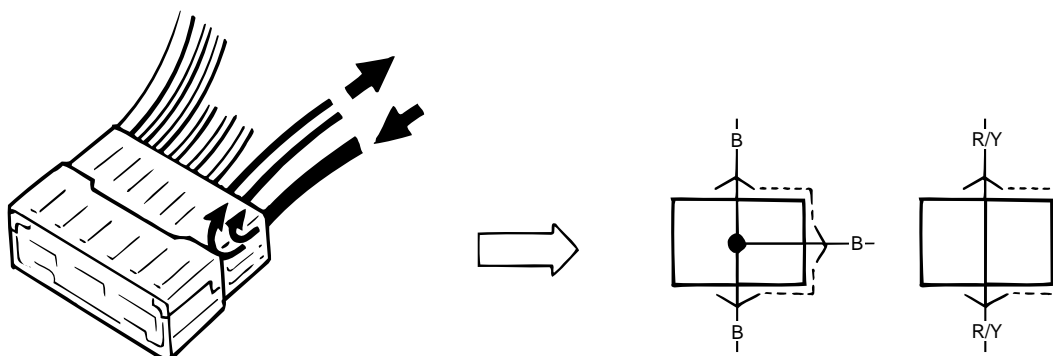
→

↑↑

↑↑

- To connect between harnesses (intermediate connector)

3. • Wiring of this vehicle uses joint connectors (J/C) which divide one wire into several different wires or combine several different wires into one wire.
- The joint connector is illustrated below.



How to Read Connector Codes and Pin Nos. (How to Use Manual) :

It is possible to retrieve the location and shape of each connector from the connector code indicated in "SYSTEM CIRCUIT DIAGRAM" section and the position of each pin from the connector pin No.

* To retrieve location of connector :

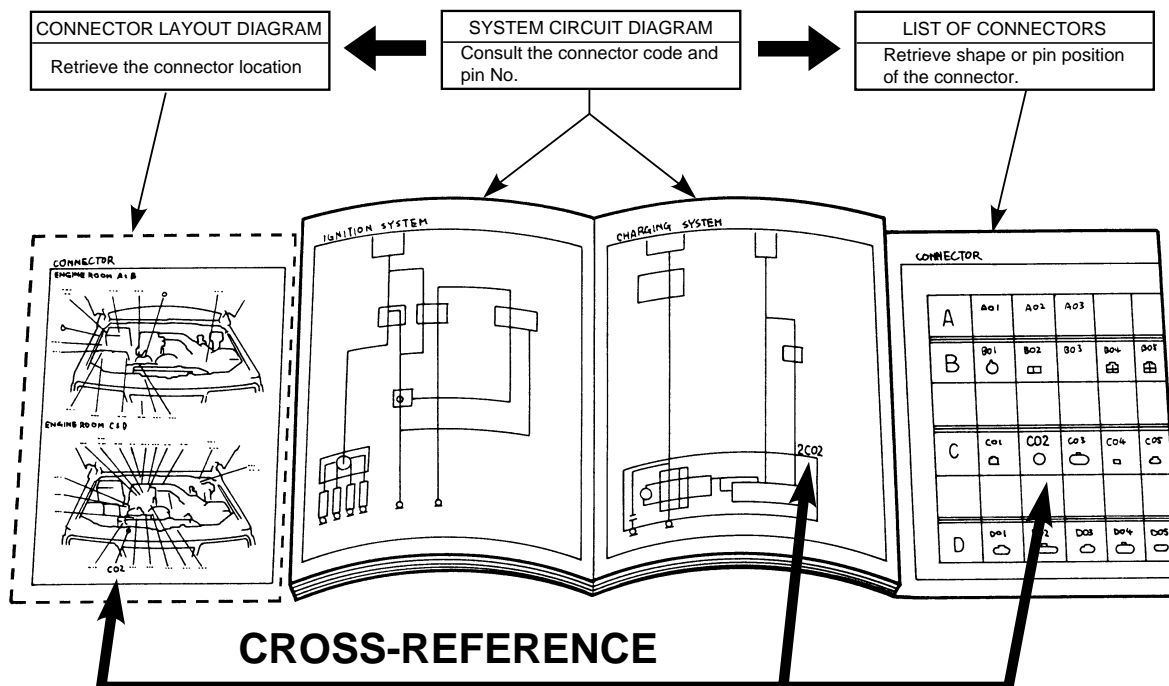
Open "SYSTEM CIRCUIT DIAGRAM" section to consult the connector code of the questioned connector. Then, refer to "CONNECTOR LAYOUT DIAGRAM" section and look for the same code as the connector code in question. The place where the code is found is the location of that connector.

* To retrieve shape or pin No.

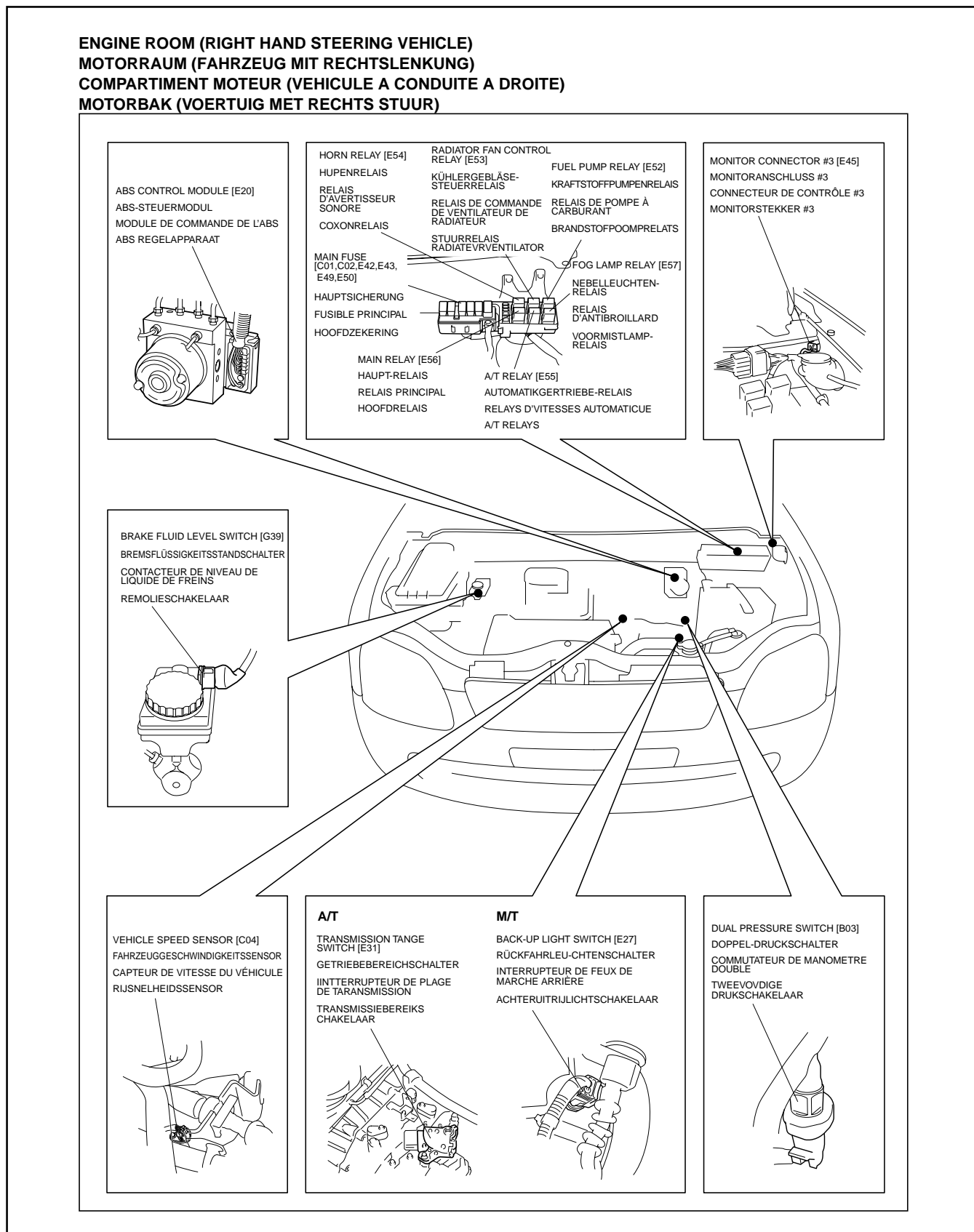
Open "SYSTEM CIRCUIT DIAGRAM" section to consult the connector code and pin No. of the questioned connector. Then, refer to "LIST OF CONNECTORS" section as shown at the right in the figure below and look for the desired connector code under which the shape of that connector is shown. This method is convenient when locating the connector in question among similar connectors. Also, by using this page, it is possible to find the position of each pin from the connector pin No. provided in "SYSTEM CIRCUIT DIAGRAM" section.

It is helpful when retrieving pin position in the connector for checking continuity between pins.

To know the location, shape or pin position of the connector, cross-refer "SYSTEM CIRCUIT DIAGRAM", "CONNECTOR LAYOUT DIAGRAM" and "LIST OF CONNECTOR" section as follows:



The diagram in "INSTALLATION POSITION OF SINGLE UNIT PARTS" section shows installation positions of fuse, relays and control units used in this vehicle. They are illustrated as shown below.



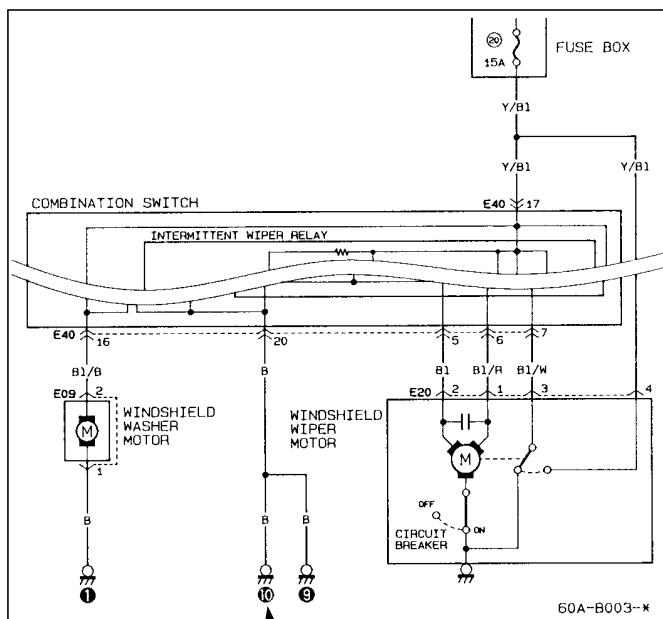
HOW TO READ GROUND POINT

Ground point means the position where the negative harness among wiring harnesses is grounded. The diagram in "GROUND POINT" section shows such ground points. In "SYSTEM CIRCUIT DIAGRAM" section, there are many ground marks followed by black circles with numerical figures in them (⑩) which mean that the end of the harness with such black circle is grounded to some part of the vehicle.

To locate the ground point (installation position), refer to "GROUND POINT" section.

"SYSTEM CIRCUIT DIAGRAM" section

■ WINDSHIELD WIPER AND WASHER



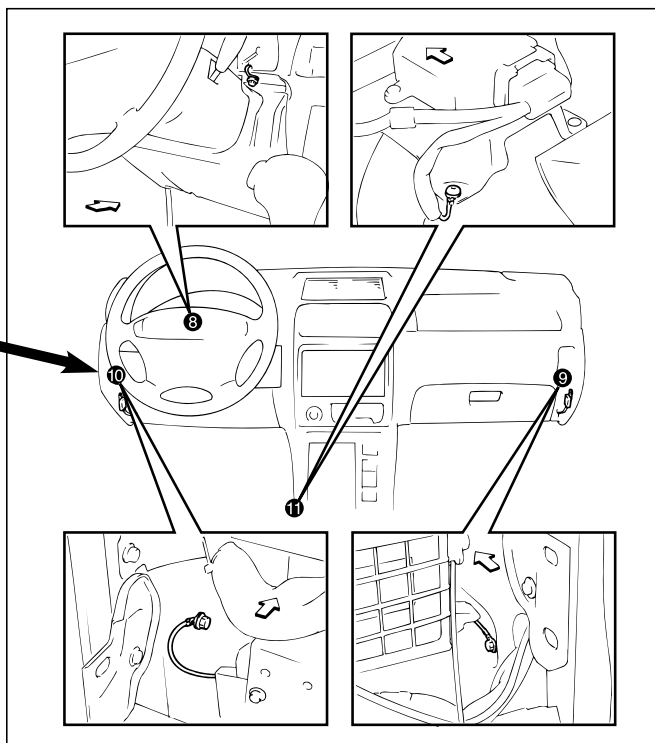
[How to locate ground point]

Look in "GROUND POINT" section for the black circle with the same numerical figure (⑩) as the described one in "SYSTEM CIRCUIT DIAGRAM" section.

NOTE:

If there is an electrical part whose ground point is not found in "GROUND POINT" section, that part itself serves as a ground.

"GROUND POINT" section

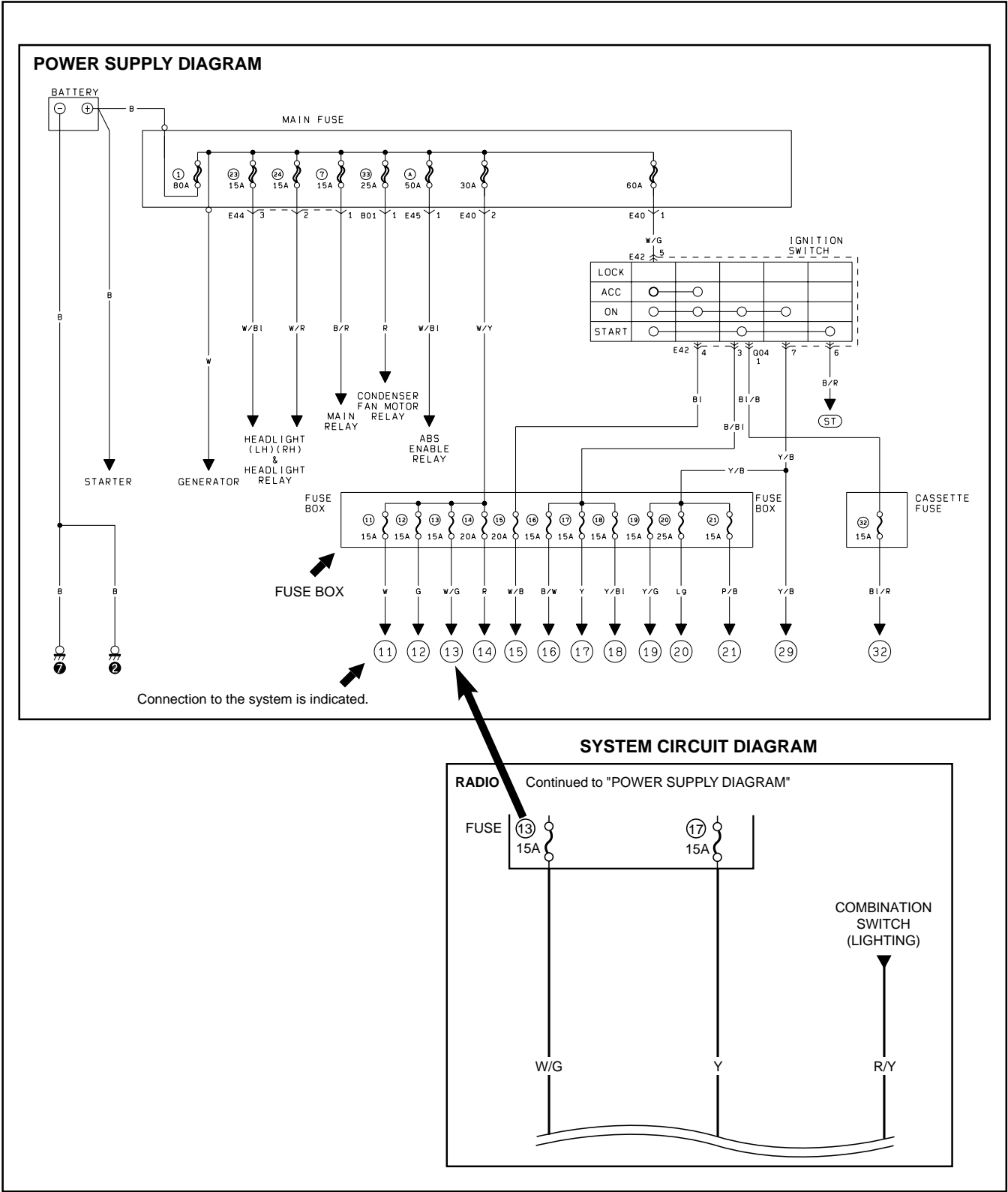


CROSS-REFERENCE

HOW TO READ POWER SUPPLY DIAGRAM

Power Supply Diagram shows the circuit from the positive terminal of the battery to each fuse in the box and where each fuse is connected (each system circuit name). In addition, the electric load value of each fuse is indicated.

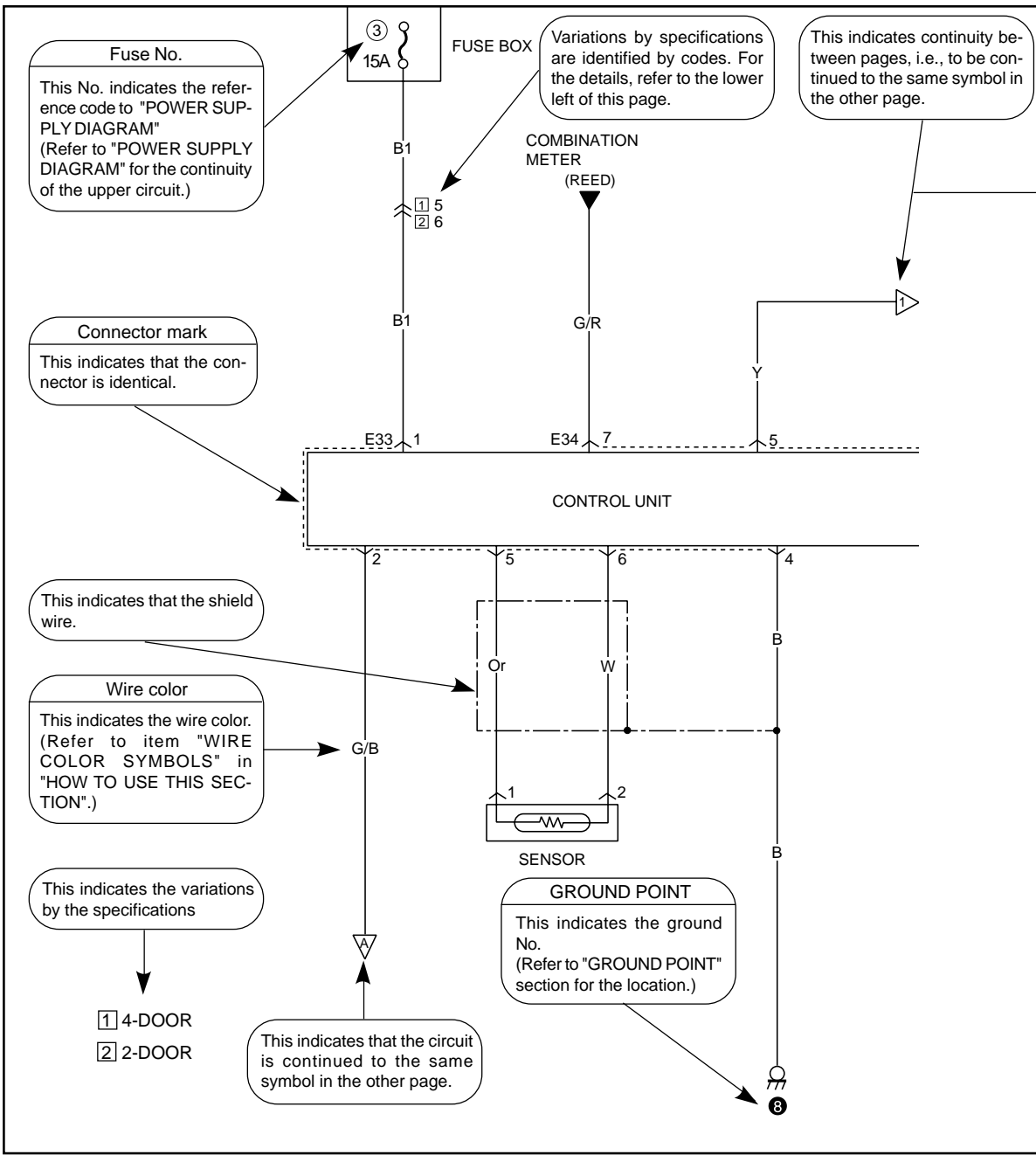
Since every "SYSTEM CIRCUIT DIAGRAM" is drawn from the circuit down the fuse, cross-refer to "POWER SUPPLY DIAGRAM" for the continuity of the upper circuit referring to Fuse No. such as ⑳.

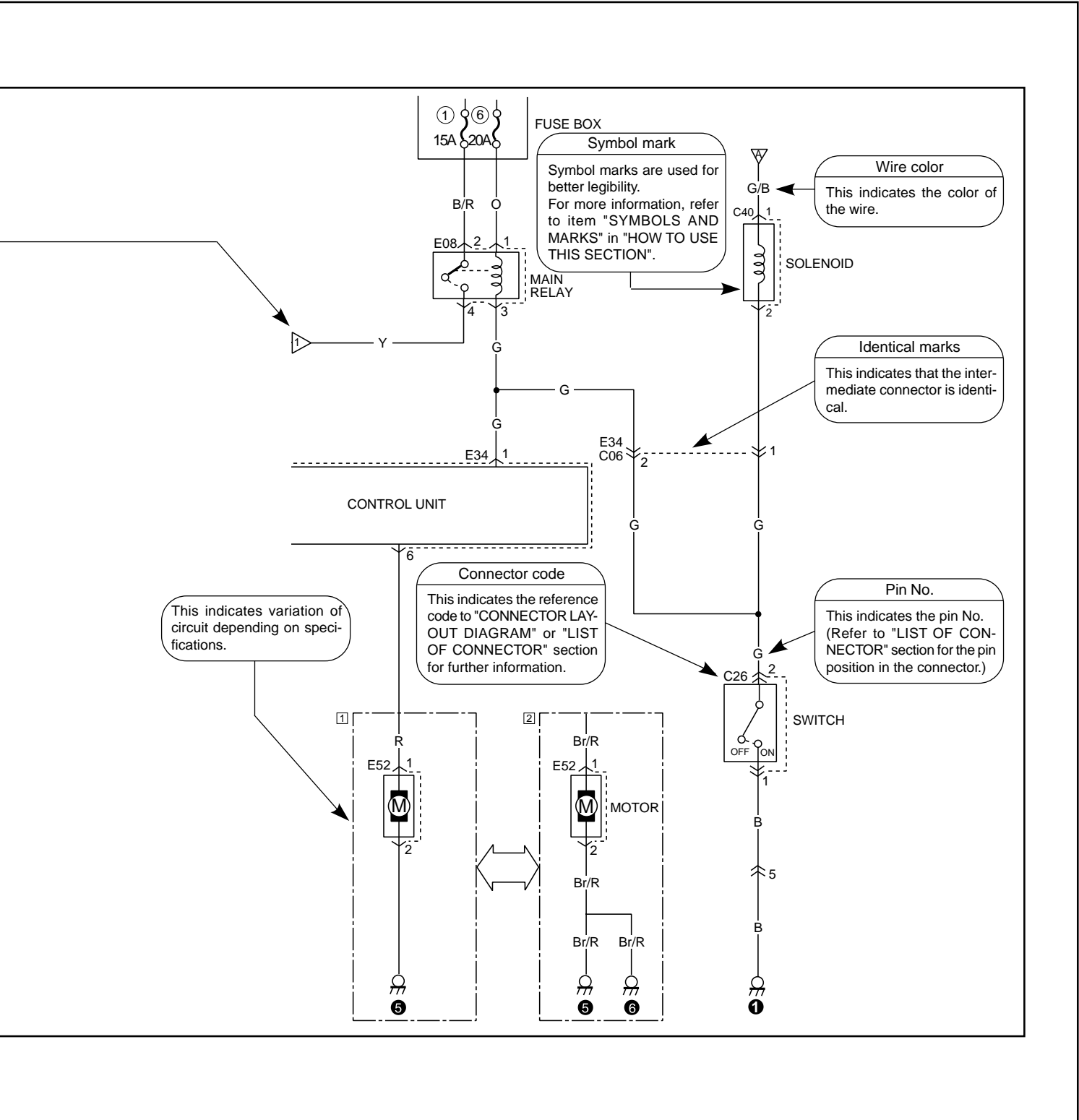


HOW TO READ SYSTEM CIRCUIT DIAGRAM

The circuit diagram of each system shows the electric circuit from the main fuse, fuse box or the ignition switch (at the top in the diagram) to the ground (at the bottom) so that the circuit can be followed easily when performing inspection and service work.

Further information on connector, ground point and fuses is provided by cross-reference of "SYSTEM CIRCUIT DIAGRAM" and the other sections as described in the preceding indications of this section. Connector code, ground No. and fuse No. are the reference code for cross-reference.





HOW TO READ LIST OF CONNECTORS

"LIST OF CONNECTORS" section is provided to help identification when looking for the connector in question out of similar ones as well as for retrieval for positions of pins in the connector when checking continuity between pins, etc. Please note that the list is drawn to symbolize the basic configurations of the connectors and some connectors in the list may be discrepant to the actual ones depending on the specifications.

How to Use List of Connectors :

It is easily possible to find the shape of the connector in question and its pin positions by locating the same connector code and the pin Nos. as those in "SYSTEM CIRCUIT DIAGRAM" section from "LIST OF CONNECTORS" section.

For further information on its use, refer to item "INDICATION OF CONNECTORS AND HOW TO READ THEM" in this section.

ABSCHNITT 8A-1

8A-1

VERWENDUNG DIESER ANLEITUNG**INHALT**

· Inhalt und Beschreibung	8A-1-18
· Anwendbarkeit	8A-1-18
· Vorsichtsmaßnahmen für die Wartung	8A-1-19
· Symbole und Markierungen	8A-1-22
· Abkürzungen	8A-1-23
· Farbcodierungssymbole der Anschlußdrähte	8A-1-23
· Wie das Stecker-Layout-Diagramm zu Lesen ist (ABSCHNITT 8A-3)	8A-1-24
· Anschlußmarkierungen und Identifizierung	8A-1-25
· Erklärung der Einbaupositionen von Einzeleinheiten (ABSCHNITT 8A-4)	8A-1-27
· Erklärung eines Massepunkts (ABSCHNITT 8A-5)	8A-1-28
· Erklärung eines Stromversorgungsdiagramms (ABSCHNITT 8A-6)	8A-1-29
· Erklärung eines Systemschaltdiagramms (ABSCHNITT 8A-7)	8A-1-30
· Wie die Liste der Stecker zu Lesen ist (ABSCHNITT 8A-8)	8A-1-32

INHALT UND BESCHREIBUNG

Diese Anleitung besteht aus Diagrammen, welche die Kabelbaumführung, das Layout der Stecker, die Einbaupositionen der unabhängigen Einheiten (Sicherung, Relais, Steuergerät), die Massepunkte, den Stromlaufplan, die Systemkreisläufe und eine Liste der Stecker zeigen.

ABSCHNITT		BESCHREIBUNG
Stecker-Layout-Diagramm	8A-3	Die Anordnung der in diesem Fahrzeug verwendeten Stecker ist im Zusammenhang mit den Kabelbäumen unter Verwendung von Symbolen in den Abbildungen dargestellt.
Einbaupositionen von Einzeleinheitsteilen	8A-4	Positionen, wo jede Sicherung, jedes Relais und jede Steuereinheit in diesem Fahrzeug gezeigt sind.
Massepunkt	8A-5	Stellen an der Karosserie, wo Massekontakt besteht, werden gezeigt.
Stromversorgungsdiagramm	8A-6	Der Plan zeigt den Stromfluß vom positiven Batteriepol bis zur Hauptsicherung und weiter zu jeder einzelnen Sicherung im Sicherungskasten sowie die Bezeichnung der mit diesen Sicherungen verbundenen Hauptsysteme.
Systemschalt-diagramm	8A-7	Einzelne Schaltkreise von der Sicherung zur Masserverbindung jedes Systems werden gezeigt. Das Schaltkreisdigramm ist so ausgelegt, daß der Stromlauf von oben nach unten daraus deutlich wird.
Liste der Stecker	8A-8	Die Formen der in diesem Fahrzeug verwendeten Stecker und deren Stiftbelegung sind dargestellt.

ANWENDBARKEIT

Dieses Handbuch bezieht sich auf die nachfolgend angegebenen Fahrzeugmodelle.

HINWEIS :

Es wird erneut darauf hingewiesen, daß der Text dieser Beschreibung mitunter leicht von den technischen Daten des zu wartenden Fahrzeugs abweicht.

MODELLE/TYP 1

RB310

(X)TSMMA93S00100001(X)~

RB413

(X)TSMMA53S00100001(X)~

TYP 2

RB413/RB310

(X)TSMMA93S00180001(X)~

(X)TSMMB53S00180001(X)~

(X)TSMMA53S00180001(X)~

TYP 3

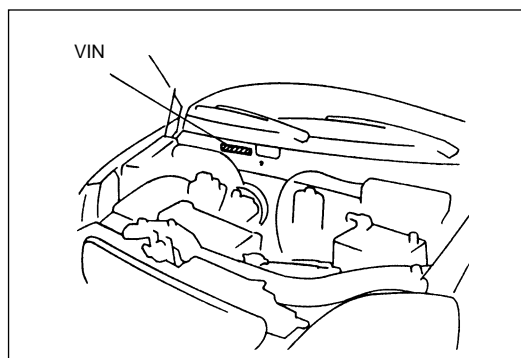
RB310/RB413

(X)TSMMA93S00210001(X)~

(X)TSMMB53S00210001(X)~

(X)TSMMA53S00210001(X)~

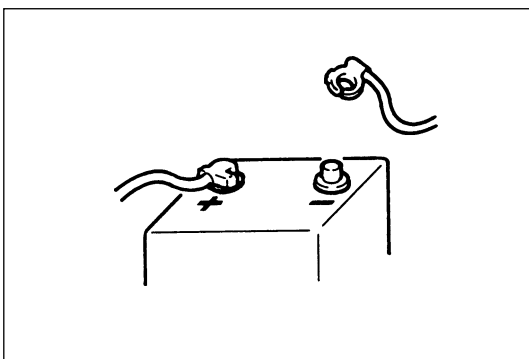
(X)TSMMA53S30210001(X)~



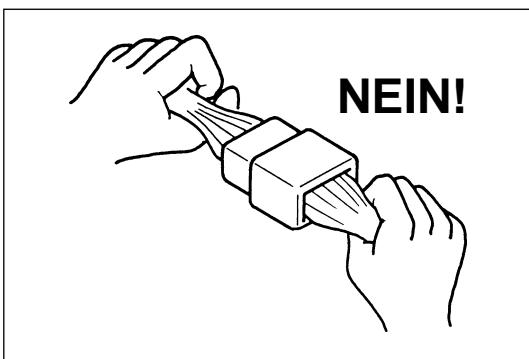
VIN: Modell-Kennnummer

VORSICHTSMASSREGELN FÜR DIE WARTUNG

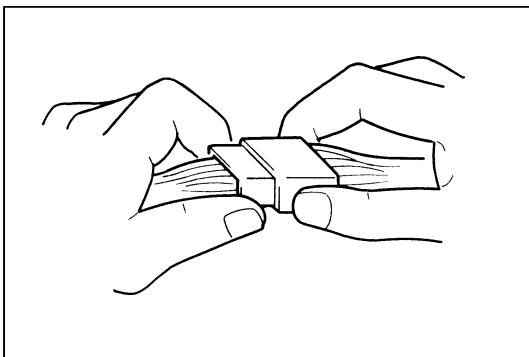
Bei Wartungsarbeiten mit Bezug auf die elektrische Anlage sind zum Schutz der Fahrzeugelektrik und zur Verhütung von Bränden die folgenden Sicherheitshinweise zu beachten.



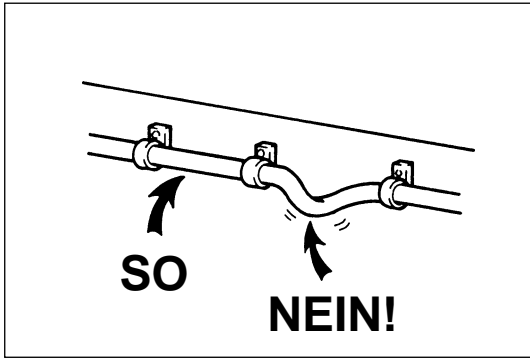
- Vor dem Ausbau der Batterie oder Trennen der Anschlußkabel von den Batteriepolen für Inspektions- oder Wartungsarbeiten am elektrischen System stets darauf achten, die Zündung auszuschalten und alle sonstigen Schalter auf OFF zu stellen, da andernfalls der Halbleiter beschädigt werden kann.
- Vor dem Trennen der Batteriekabel stets darauf achten, zuerst das Kabel am Minuspol (-) und danach das Pluspolkabel (+) zu trennen.
- Beim Wiederanschießen der Kabel an die Batterie in umgekehrter Reihenfolge vorgehen.



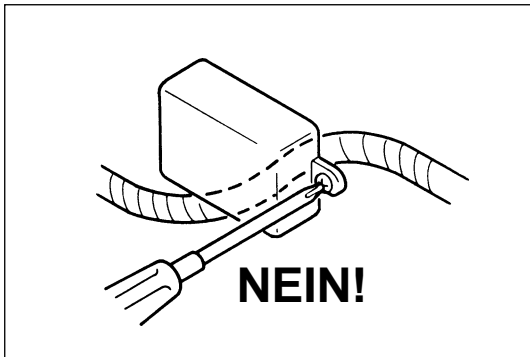
- Beim Trennen von Anschlußsteckern niemals an den Kabelsträngen ziehen, sondern den Stecker zuerst entriegeln und dann an den beiden Steckerteilen haltend abziehen.



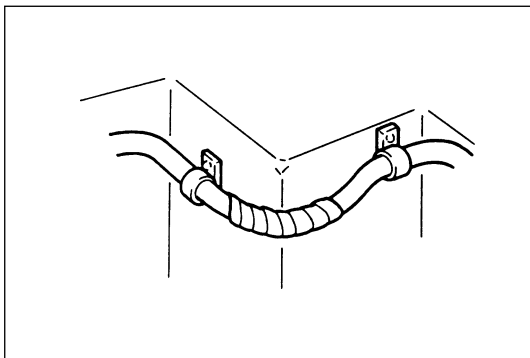
- Beim Anschließen die Stecker ebenfalls an den Steckerteilen halten und zusammenstecken, bis beide Teile hörbar einrasten.



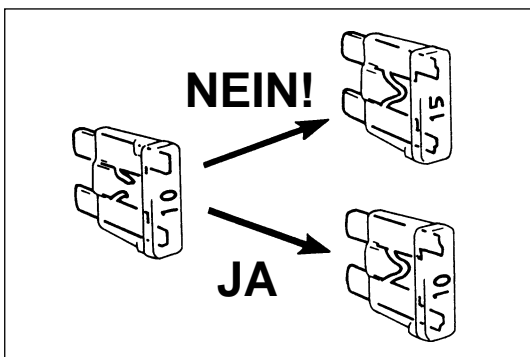
- Kabel beim Verlegen mit Kabelklemmen befestigen, so daß keine lockeren oder durchhängenden Kabelabschnitte vorhanden sind.



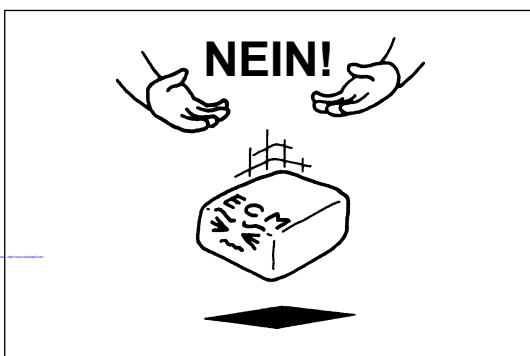
- Beim Einbauen von Fahrzeugteilen darauf achten, daß das Kabel hierdurch nicht behindert oder durch Einbauteile abgeklemt wird.



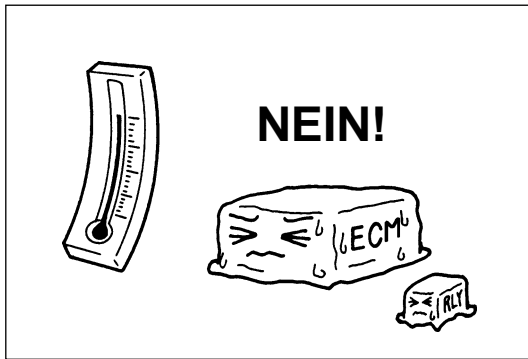
- Um eine Beschädigung des Kabels zu vermeiden, sind hervorstehende Kabelabschnitte, die eventuell andere Teile berühren, durch Umwickeln mit Klebeband zu schützen.



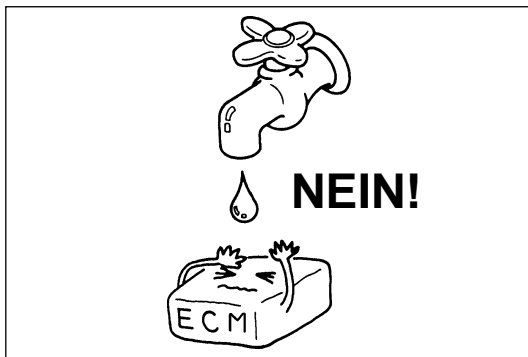
- Beim Austauschen von Sicherungen stets darauf achten, eine neue Sicherung des gleichen Typs zu verwenden. Die Verwendung einer Sicherung mit höherer Kapazität führt zu Schäden an den elektrischen Bauteilen und kann Brände verursachen.



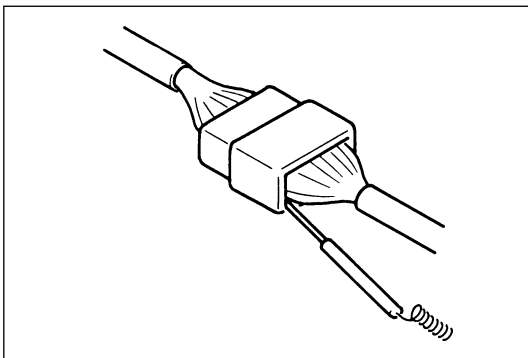
- Elektrische Teile (Computer, Relais usw.) im Umgang stets vorsichtig behandeln und niemals fallenlassen.



- Wenn Arbeiten auszuführen sind, bei denen in der Nähe elektrischer Teile Wärme von über 80°C erzeugt wird, müssen die hitzeempfindlichen elektrischen Teile vorher ausgebaut werden.



- Darauf achten, daß Stecker und elektrische Bauteile nicht mit Wasser in Berührung kommen, um durch Nässe verursachte Probleme zu vermeiden.



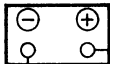





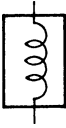


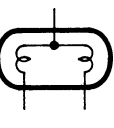
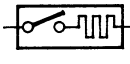



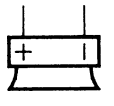










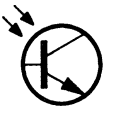


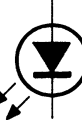

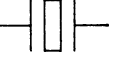


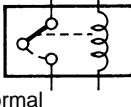
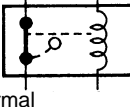
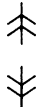
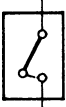
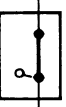
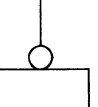
- Bei der Verwendung eines Prüfgerätes zum Prüfen des Durchgangs oder zum Messen der Spannung darauf achten, den Meßfühler des Prüfgerätes von der Kabelstrangseite her einzuführen.

WARNUNG:

Dieses Fahrzeug ist mit einem zusätzlichen Airbag-Rückhaltesystem ausgerüstet. Wartungen an den und rund um die Komponenten des Airbagsystems oder an der Verdrahtung dürfen nur von einem autorisierten SUZUKI-Vertragshändler ausgeführt werden. Bitte beachten Sie alle in dem Abschnitt "Wartungsarbeiten am Fahrzeug", sowie in den Ansichten der Komponenten und der Verdrahtung des Airbagsystems in der im VORWORT dieser Anleitung erwähnten Wartungsanleitung aufgeführten Warnungen, bevor Wartungsarbeiten an den oder rund um die Komponenten oder an der Verdrahtung des Airbagsystems ausgeführt werden. Falls diese Warnungen nicht beachtet werden, kann es zu einem ungewollten Zünden des Airbags oder zu einer Außerbetriebsetzung des Airbagsystems kommen. Jede dieser beiden Bedingungen kann zu ernsthaften Verletzungen führen.

SYMBOLS UND MARKIERUNGEN

In den Plänen dieses Handbuchs ist jedes Bauteil durch ein Symbol dargestellt oder wie unten gezeigt markiert.

Batterie	Masse		Normale Sicherung	Träge Sicherung
				
Unterbrecher	Spule, Magnet	Heizung	Birne	
				
Zigarettenanzünder	Motor	Pumpe	Hupe	Lautsprecher
				
Summer	Gong	Kondensator	Thermistor	Zungenschalter
				
Widerstand	Variabler Widerstand		Transistor	
			 NPN	 PNP
Fototransistor	Diode	Referenzdiode (Z-Diode)	LED	Fotodiode
				
Piezoelektrisches Bauelement	Kabelstrang		Relais	
	 (Angeschlossen)	 (Nicht angeschlossen)	 Normal geöffnetes Relais	 Normal geschlossenes Relais
Stecker	Schalter		"O"-Typ-Terminal	
				

ABKÜRZUNGEN

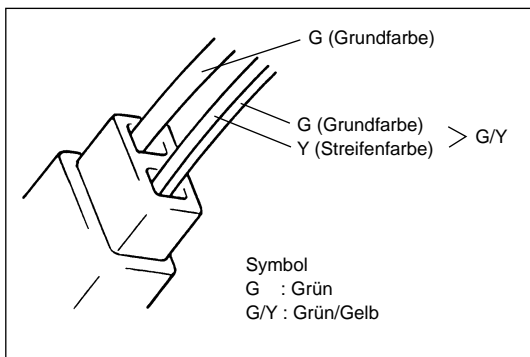
Die nachstehende Tabelle zeigt die in dieser Anleitung verwendeten Abkürzungen und deren Bedeutung.

Abkürzung	Bedeutung	Abkürzung	Bedeutung
2WD	Fahrzeuge mit Zweiradantrieb	IND	Indikator
4WD	Fahrzeuge mit Allradantrieb	INT	Unterbrochen
A/C	Klimaanlage	J/C	Verbundstecker
A/T	Automatikgetriebe	LH(D)	Fahrzeug mit Linkslenkung
ACC	Zubehör	LO	Tief
CKP	Kurbelwellenposition	M/T	Schaltgetriebe
CMP	Nockenwellenposition	MAP	Absoluter Druck im Auspuffkrümmer
DLC	Datenverbindungsstecker	O/D	Overdrive
DRL	Tagesfahrlicht (falls vorhanden)	P/N	Leistung/Normal
ECT	Motorkühlmitteltemperatur	P/S	Servolenkung
EGR	Abgasrückführung	RH(D)	Fahrzeug mit Rechtslenkung
HI	Hoch	ST	Starter
IAC	Einlaßlufttemperatur	TCC	Drehmomentwandlerkupplung
IAT	Leerlaufuftregelung	TCM	Getriebesteuermodul
IG	Zündung	VSV	Unterdruckschaltventil
ILL	Beleuchtung	W/S	Schweißspleiß

Symbol	Drahtfarbe	Symbol	Drahtfarbe
B	Schwarz	Or	Orange
Bl	Blau	R	Rot
Br	Braun	W	Weiß
G	Grün	Y	Gelb
Gr	Grau	P	Rosa
Lbl	Hellblau	V	Lila
Lg	Hellgrün		

FARBCODIERUNGSSYMBOLLE DER ANSCHLUSSDRÄHTE

Die nebenstehenden Anfangsbuchstaben der jeweiligen Farbe dienen als Symbol zur Kennzeichnung der verschiedenen Farben.



Bei den Drähten wird zwischen zwei Typen unterschieden: einfarbige und zweifarbige (mit einem Streifen). Bei den zweifarbigen Drähten stellt der erste Buchstabe ("G" im nebenstehenden Beispiel) die Grundfarbe (Farbe der Kabelisolierung) dar, während der nächste Buchstabe ("Y" im Beispiel) die Farbe des Streifens kennzeichnet.

WIE DAS STECKER-LAYOUT-DIAGRAMM ZU LESEN IST

Wenn Sie die Position eines elektrischen Teils oder eines Zwischensteckers kennen müssen, können Sie diese einfach dem vorliegenden Diagramm entnehmen.

Sehen Sie zuerst in dem "SYSTEMSCHALTDIAGRAMM" für den Steckercode des fraglichen Steckers nach, und suchen sie danach den gleichen Code in diesem Abschnitt auf.

Weitere Informationen über die Verwendung der Code sind nachfolgend aufgeführt.

Steckercode

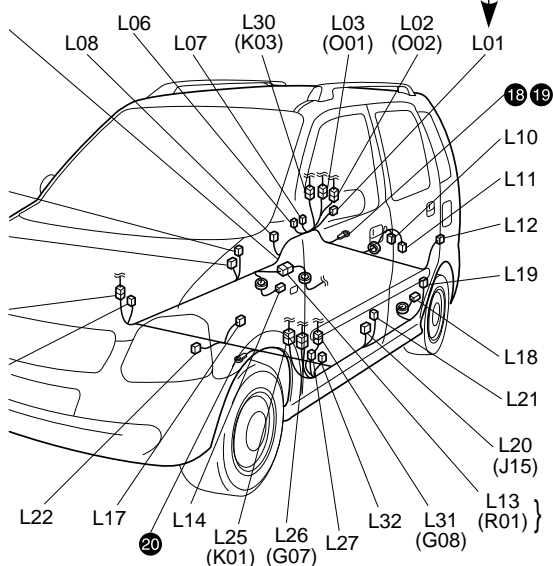
L 0 1

Stecker-Nr. (fortlaufende Nr.:01)

Kabelbaumsymbol (siehe nachfolgende Tabelle)

Kabelbaumsymbol und entsprechende Kabelbaumbezeichnung

A : Batteriekabelbaum	K : Dachleitungsdraht
B : Klimaanlage-Kabelbaum	L : Bodenkabelbaum
C : Motorkabelbaum	N : Heckscheibenheizungs-Leitungsdraht
D : Einspritzdüsen-Kabelbaum	O : Kabelbaum der hinteren tūr•Leitungsdraht für das
E : Hauptkabelbaum	obere Bremslicht
G : Armaturen Brett-Kabelbaum	Q : Air bag harness
J : Türkabelbaum	R : Kraftstoffpumpen-Kabelbaum



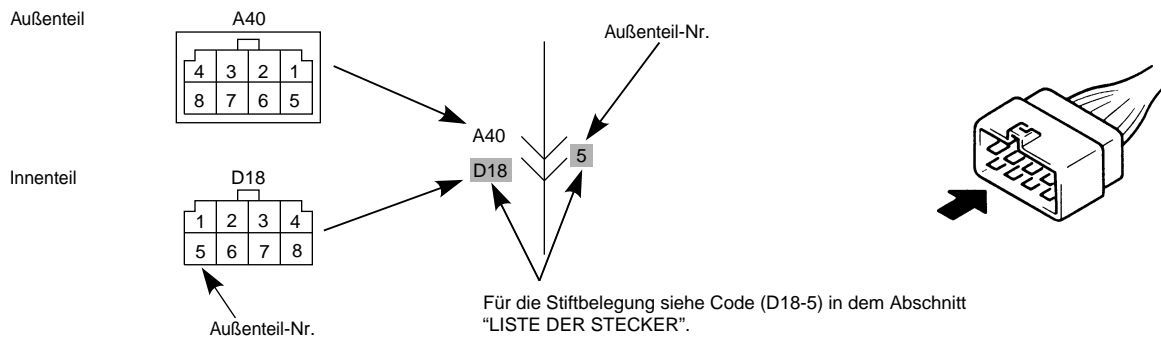
Zeigt auch die Massepunkt-Nr. an.
Die gleiche Nr. wird als Massepunkt verwendet.
(Für Einzelheiten siehe Abschnitt
"MASSEPUNKT".)

Zeigt den Steckercode an.
Der in Klammern () aufgeführte Steckercode
weist die gleiche Bedeutung wie der obige
Zwischenstecker auf und zeigt gleichzeitig an,
daß ein Kabelbaum zwischen den Seiten oder
Abbildungen im Abschnitt "STECKER-LAYOUT-
DIAGRAMM". fortgesetzt wird. Es wird also
angezeigt, daß der Kabelbaum auf der anderen
Seite oder Abbildung fortgesetzt wird und der
fortgesetzte Kabelbaum den gleichen Steckercode
aufweist.

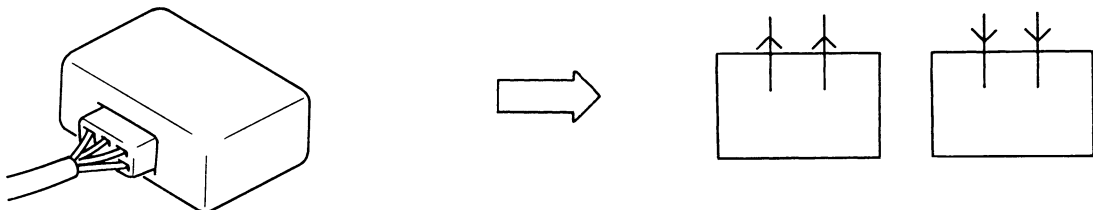
ANSCHLUSSMARKIERUNGEN UND IDENTIFIZIERUNG

Die Stecker sind bezeichnet, wie es im nachfolgenden Abschnitt "SYSTEMSCHALDIAGRAMM" dargestellt ist. Für die Form und Stiftbelegung jedes in dieser Anleitung verwendeten Steckers, siehe den Abschnitt "LISTE DER STECKER". Nachfolgend ist beschrieben, wie diese Stecker bezeichnet sind und wie diese Bezeichnungen gelesen werden können.

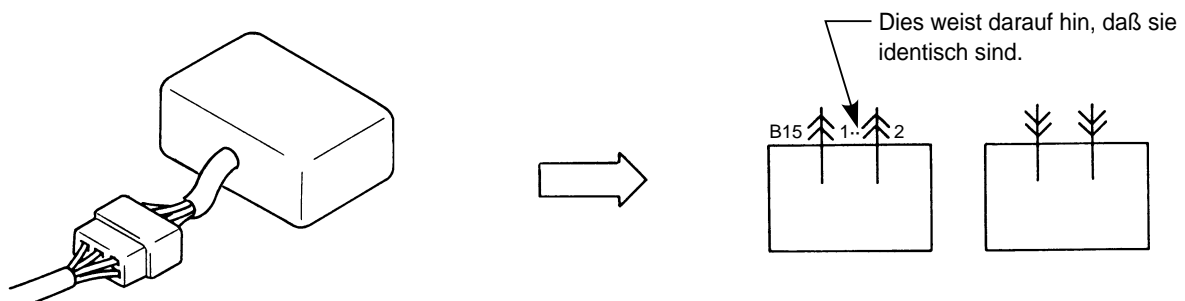
- Die Steckerklemmen und die Buchsenklemmen sind durch ein doppeltes bzw. einfaches Gehäuse dargestellt.
- Zwischenstecker, welche Kabelbäume verbinden, sind sowohl als Steckerklemmen als auch als Buchsenklemmen dargestellt, wobei jedoch der direkt an das Gerät anzuschließende Stecker durch die kabelbaumseitige Steckerform dargestellt ist.
- Bei den in dieser Anleitung beschriebenen Steckern handelt es sich immer um die "kabelbaumseitigen Stecker", die in der rechts gezeigten Richtung dargestellt sind.



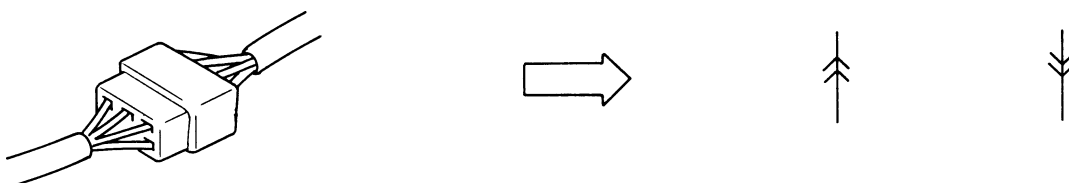
- Hinsichtlich der Anschlußart gibt drei verschiedene Steckertypen, die unten gezeigt sind.



- Ist direkt in das Gerät einzustecken.

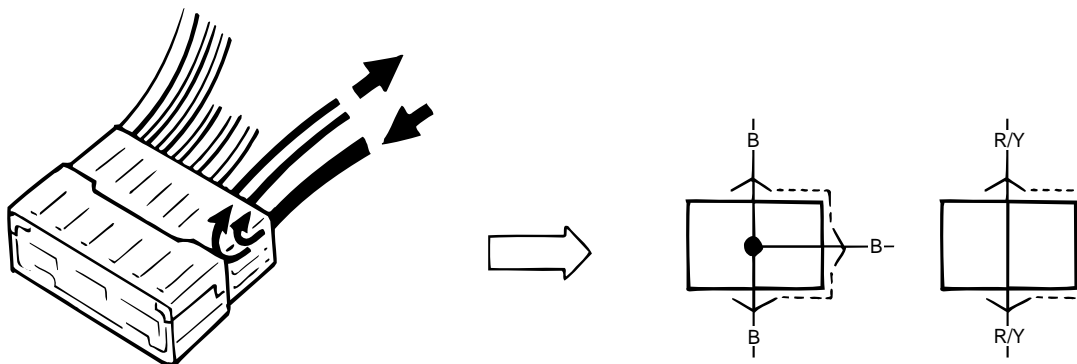


- Diese Markierung zeigt, daß die Steckerteile identisch sind.



- Zum Anschluß von Kabelsä tzen (Zwischenstecker)

3. Die Verdrahtung dieses Fahrzeuges verwendet Verbindungsstecker (J/C), die einen Draht in mehrere Drähte unterteile bzw. mehrere unterschiedliche Drähte in einen Draht kombinieren.
- Ein Verbindungsstecker ist nachfolgend dargestellt.



Ablesen des Steckercode und der Stift-Nr. (Verwendung dieser Anleitung):

Anhand des in dem Abschnitt "SYSTEMSCHALTDIAGRAMM" aufgeführten Steckercode können Einbauort und Form jedes Steckers festgestellt werden; die Steckerstift-Nr. gibt dagegen Auskunft über die Position jedes Stiftes.

*** Feststellung des Einbauorts eines Steckers:**

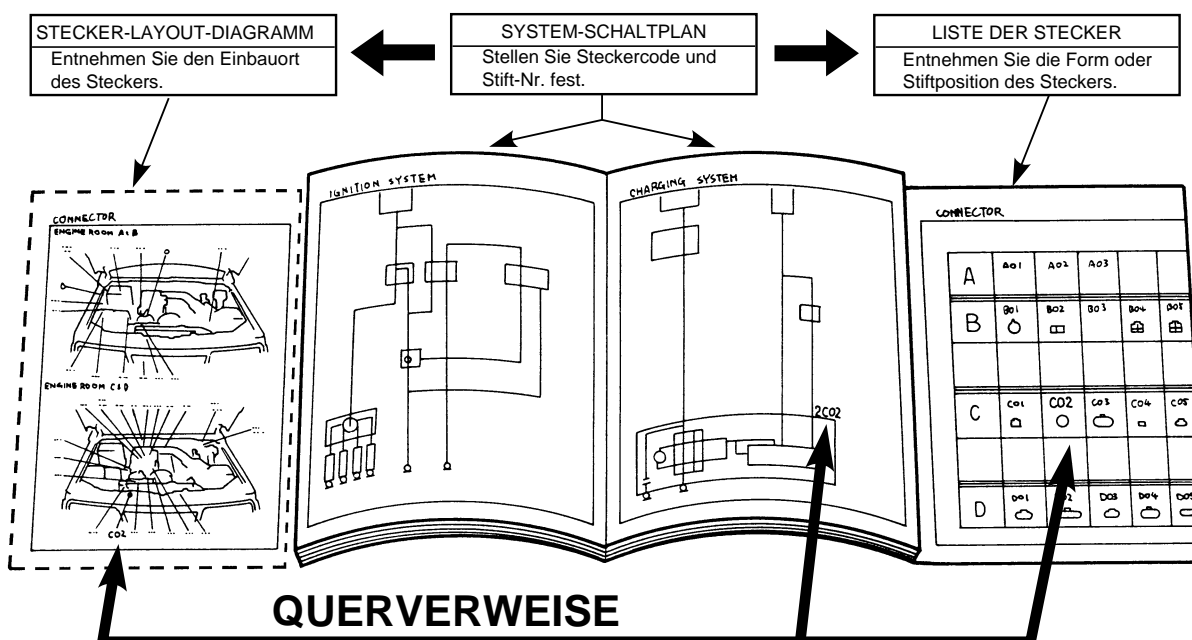
Öffnen Sie den Abschnitt "SYSTEMSCHALTDIAGRAMM", um den Steckercode des fraglichen Steckers zu entnehmen. Danach gehen Sie in das "STECKER-LAYOUT-DIAGRAMM" und suchen den gleichen Code wie den fraglichen Steckercode auf. Der Ort, an dem der Code gefunden wurde, ist der Einbauort für diesen Stecker.

*** Feststellung der Form oder Stift-Nr.:**

Öffnen Sie den Abschnitt "SYSTEMSCHALTDIAGRAMM", um den Steckercode und die Stift-Nr. des fraglichen Steckers zu entnehmen. Danach sehen Sie in dem in der unteren Abbildung rechts dargestellten Abschnitt "LISTE DER STECKER" nach, um den gewünschten Steckercode aufzufinden, unter welchem die Form dieses Steckers dargestellt ist. Dieses Verfahren ist besonders dann vorteilhaft, wenn der fragliche Stecker unter ähnlichen Steckern aufgefunden werden soll. Unter Verwendung dieser Seite können Sie auch die Position jedes Stiftes anhand der in Abschnitt "SYSTEMSCHALTDIAGRAMM" aufgeführten Steckerstift-Nr. finden.

Dieses Verfahren ist nützlich, um die Stiftposition in einem Stecker festzustellen, wenn auf Stromdurchgang zwischen bestimmten Stiften kontrolliert wird.

Um den Einbauort, die Form oder die Stiftposition eines Steckers festzustellen, beachten Sie die Querverweise in den Abschnitten "SYSTEMSCHALTDIAGRAMM", "STECKER-LAYOUT-DIAGRAMM" und "LISTE DER STECKER" wie folgt:

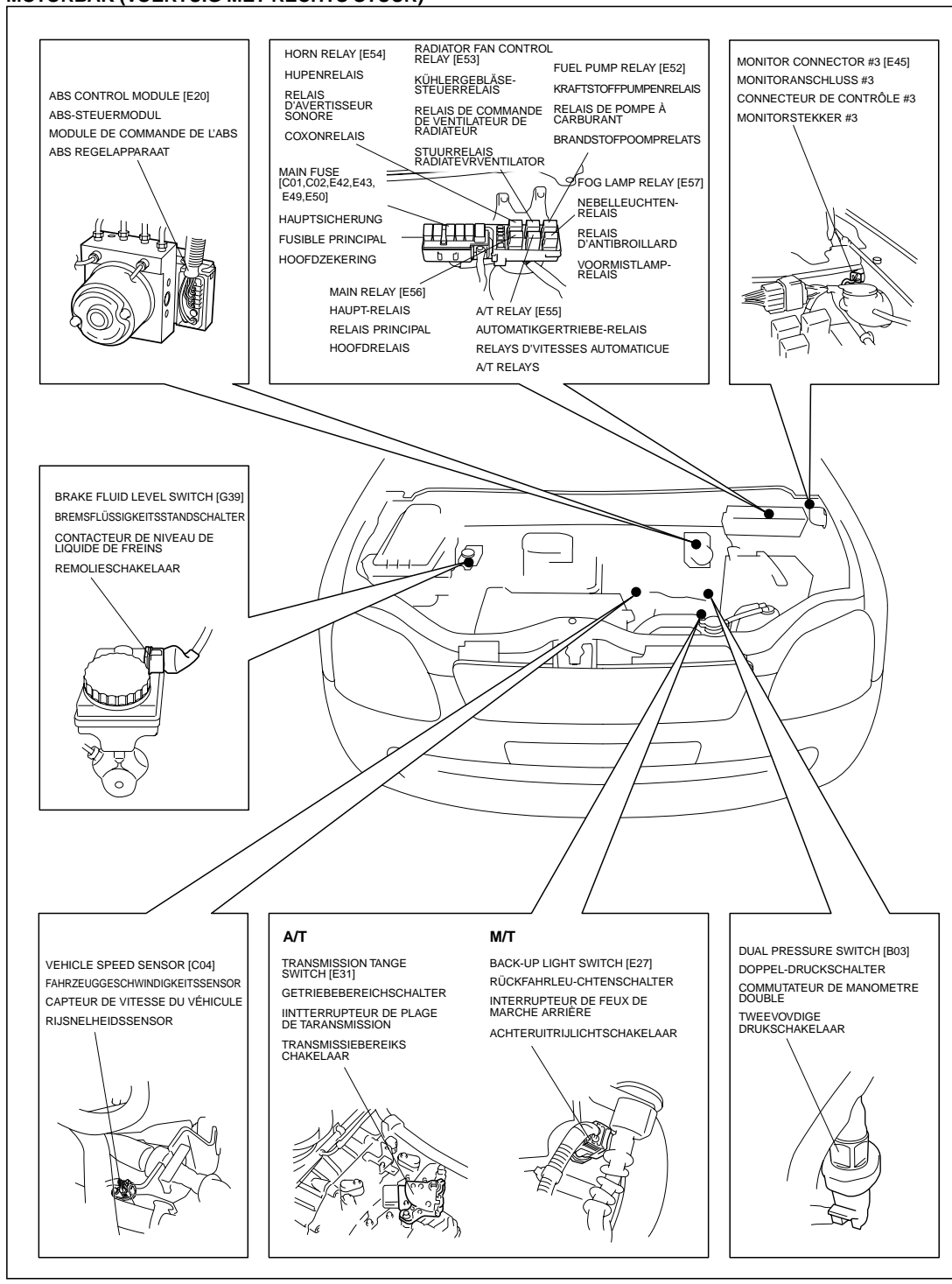


ERKLÄRUNG DER EINBAUPOSITIONEN VON EINZELLEINHEITS-TEILEN

Das Diagramm im Abschnitt "EINBAUPOSITION DER EINZELNEN TEILE DER EINHEIT" zeigt die Einbaupositionen für Sicherungen, Relais und Steuereinheiten in diesem Fahrzeug. Die Positionen sind wie unten dargestellt.

Um den Massepunkt (Einbauposition) festzustellen, siehe Abschnitt "MASSEPUNKT".

ENGINE ROOM (RIGHT HAND STEERING VEHICLE) MOTORRAUM (FAHRZEUG MIT RECHTSLENKUNG) COMPARTIMENT MOTEUR (VEHICULE A CONDUITE A DROITE) MOTORBAK (VOERTUIG MET RECHTS STUUR)

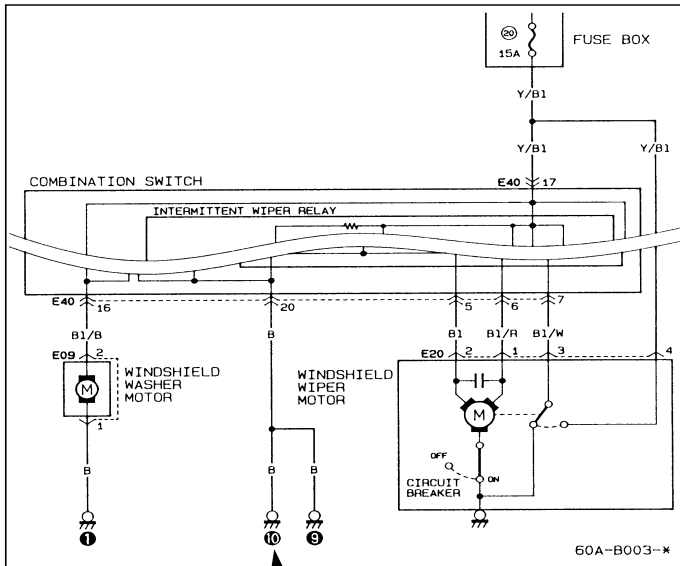


ERKLÄRUNG EINES MASSEPUNKTS

Massepunkt bedeutet die Stelle, wo die negative Leitung der Verdrahtung geerdet ist. Das Diagramm "MASSEPUNKT" zeigt solche Erdungspunkte. Im Abschnitt "SYSTEMSCHALTDIAGRAMM" gibt es viele Erdungsmarkierungen, gefolgt von schwarzen Kreisen mit Ziffern darin (10), die bedeuten, daß das Ende des Kabels mit einem derartigen schwarzen Kreis an einem Teil des Fahrzeugs geerdet ist. Um den Massenpunkt (Einbauposition) festzustellen, siehe Abschnitt "MASSEPUNKT".

Abschnitt "SYSTEMSCHALTDIAGRAMM"

■ WINDSCHUTZSCHEIBENWISCHER UND -WASCHER



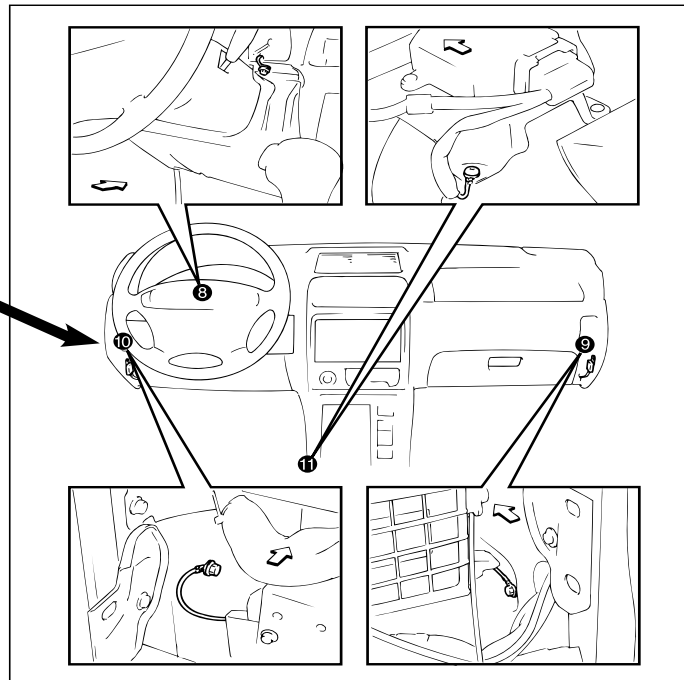
[Auffinden des Massepunkts]

Im Abschnitt "MASSEPUNKT" den schwarzen Kreis mit der Ziffer (10) als den gewünschten im Abschnitt "SYSTEMSCHALTDIAGRAMM" aufsuchen.

HINWEIS:

Wenn ein elektrisches Teil vorhanden ist, dessen Massepunkt nicht im Abschnitt "MASSEPUNKT" gefunden wird, dient dieses teil selber als Masse.

Abschnitt "MASSEPUNKT"

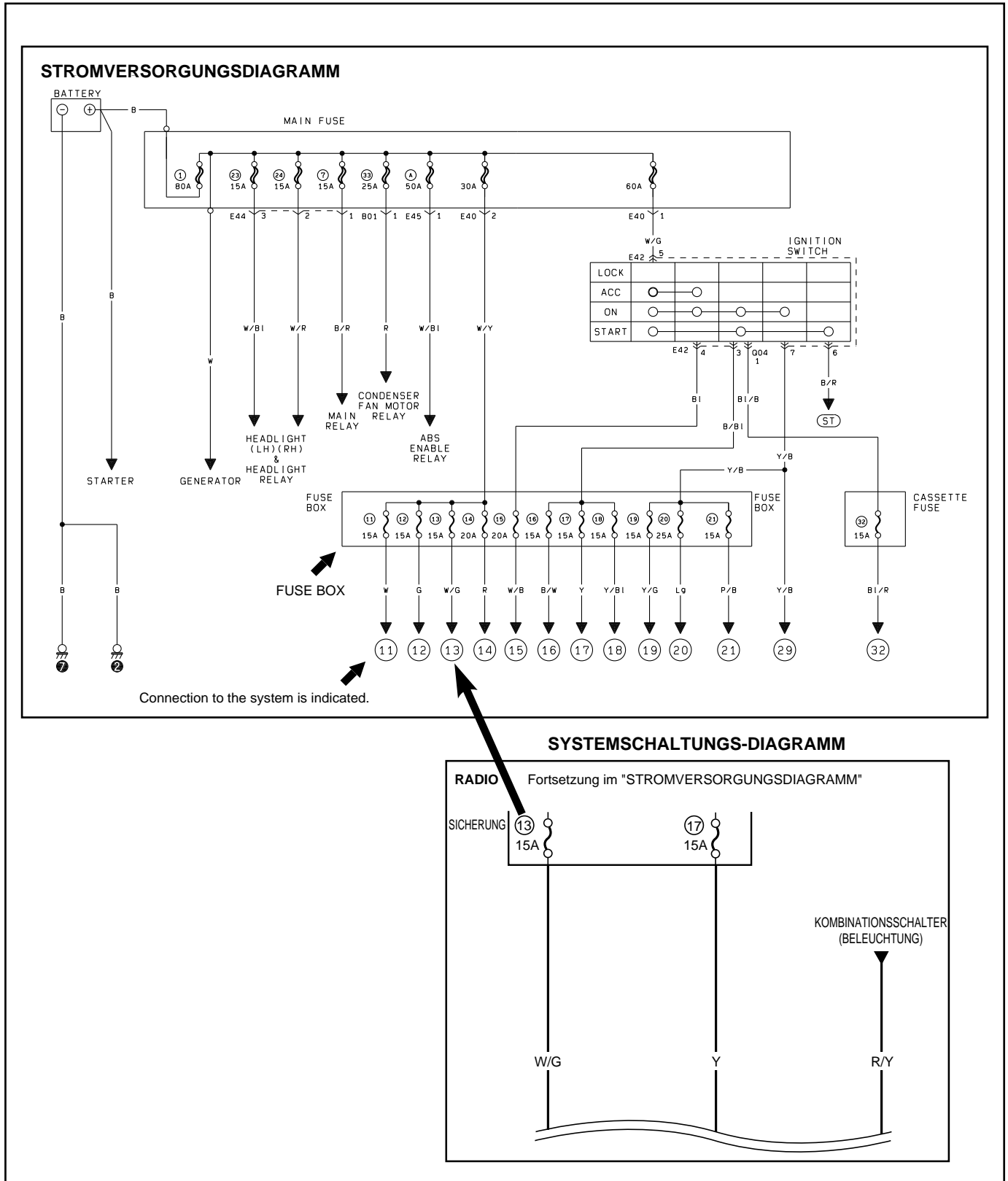


QUERVERWEISE

ERKLÄRUNG EINES STROMVERSORGUNGSDIAGRAMMS

Der Abschnitt "BETRIEBSSTROMDIAGRAMM" zeigt die Schaltung von der positiven Klemme der Batterie zu jeder Sicherung im Sicherungskasten und zeigt, wo jede Sicherung angeschlossen ist (alle Namen der Systemschaltungen). Außerdem wird die elektrische Last jeder Sicherung angezeigt.

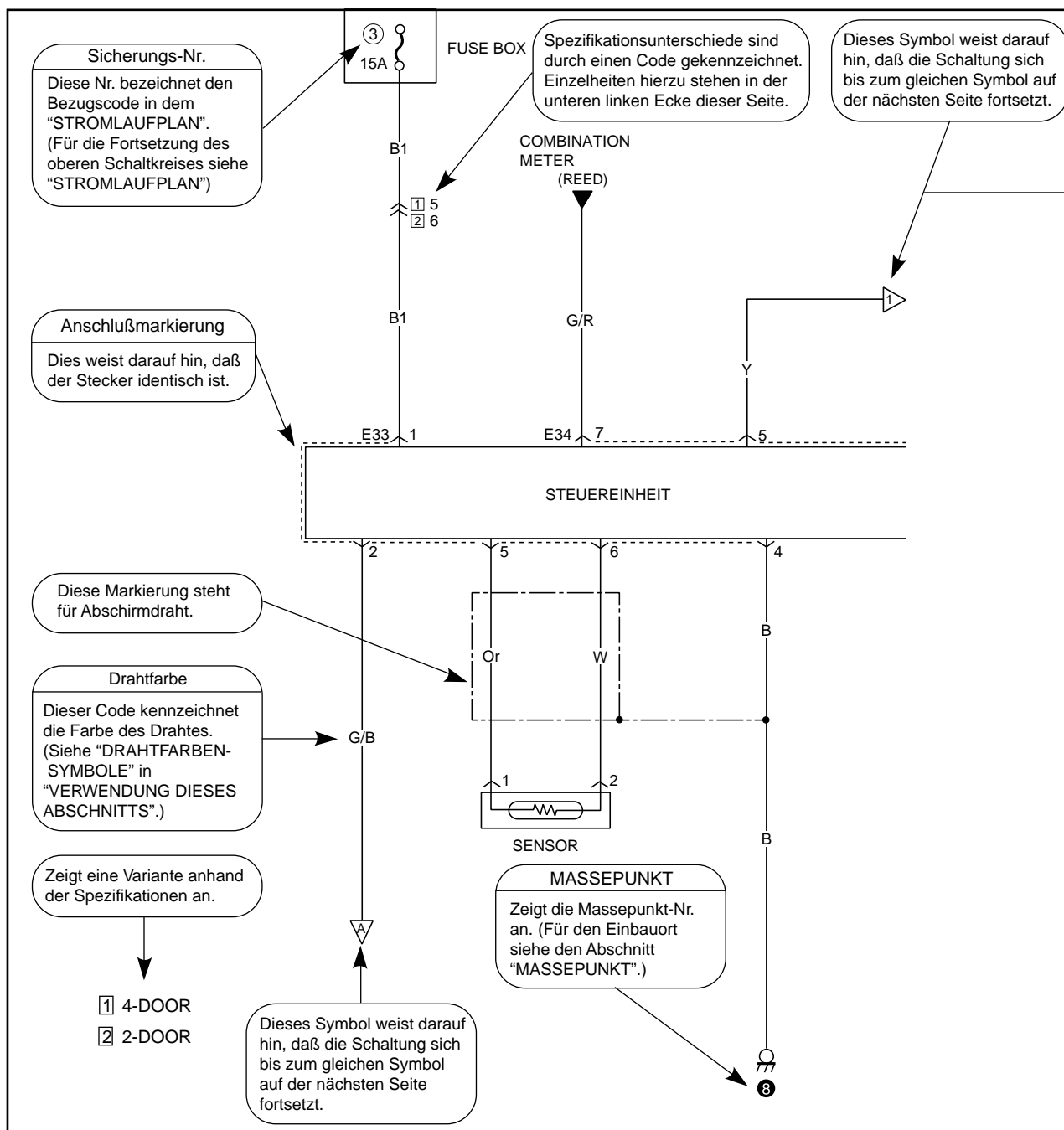
Da jedes "SYSTEMSCHALTDIAGRAMM" für den Schaltkreis ab der Sicherung gezeichnet ist, siehe auch den "STROMLAUFPLAN" für die Fortsetzung des oberen Schaltkreises gemäß Sicherungs-Nr., wie z.B. (21).

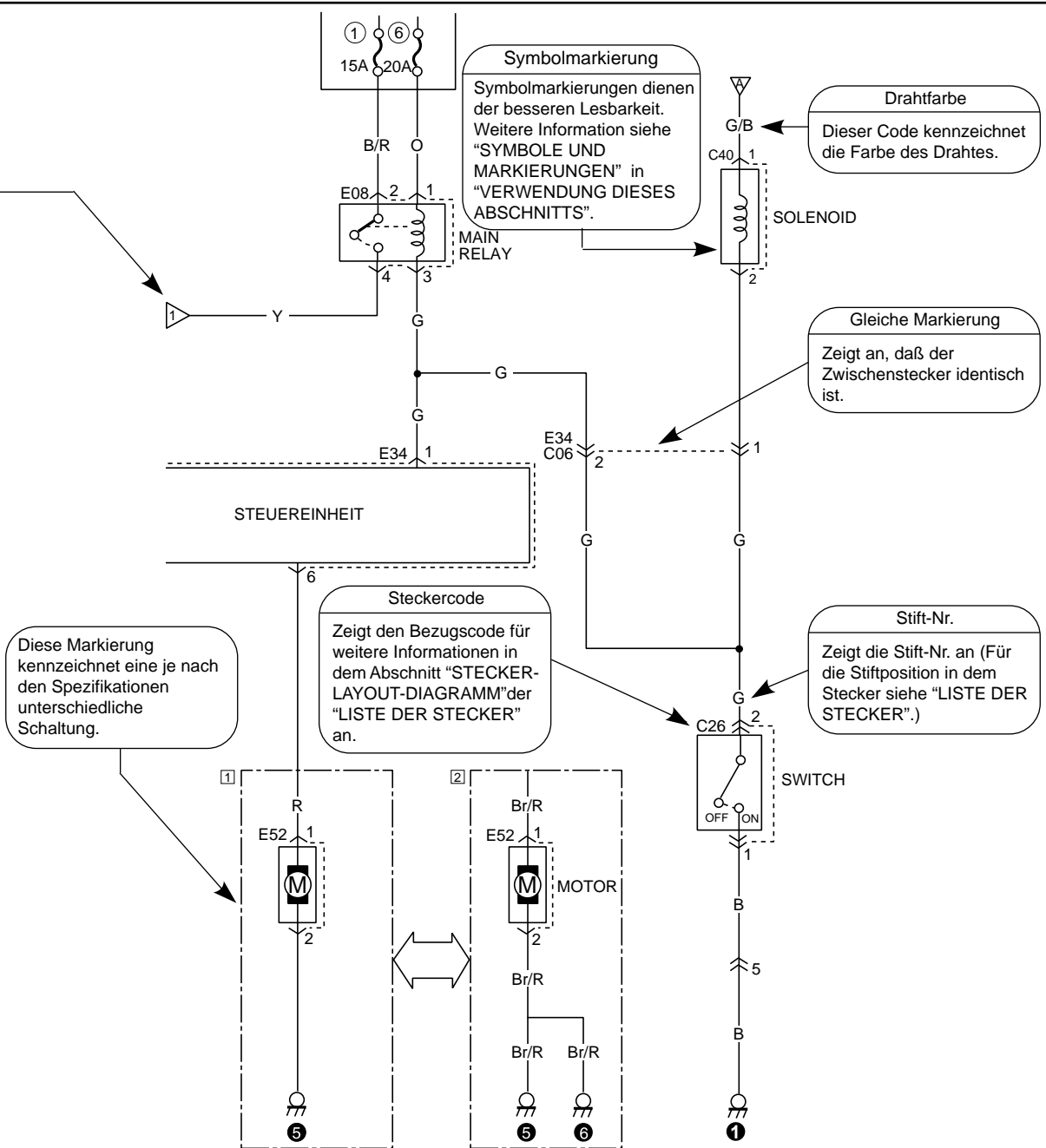


ERKLÄRUNG EINES SYSTEMSCHALTDIAGRAMM

Das Systemschalttdiagramm jedes Systems zeigt die elektrische Schaltung von der Hauptsicherung, vom Sicherungskasten oder vom Zündschalter (oben im Schaltplan) bis zur Erdung (am Boden), so daß sich die Schaltung bei der Wartung oder Inspektion leicht verfolgen läßt.

Weitere Informationen über Stecker, Massepunkt und Sicherungen finden Sie durch Querverweise mit dem "SYSTEMSCHALTDIAGRAMM" und den anderen Abschnitten für die Angaben in diesem Abschnitt. Der Steckercode, die Massepunkt-Nr. und die Sicherungs-Nr. sind die Bezugscode für die Querverweise.





WIE DIE LISTE DER STECKER ZU LESEN IST

Der Abschnitt "LISTE DER STECKER" hilft bei der Identifikation, wenn Sie nach einem fraglichen Stecker unter mehreren ähnlichen Steckern suchen; weiterhin hilft dieser Abschnitt bei der Feststellung der Stiftpositionen in einem Stecker, wenn auf Stromdurchgang zwischen Stiften usw. kontrolliert wird. Bitte beachten Sie, daß diese Liste anhand der grundlegenden Konfiguration der Stecker erstellt wurde, so daß manche Stecker in der Liste in Abhängigkeit von den Spezifikationen davon abweichen können.

Verwendung der Liste der Stecker:

Durch Auffinden des gleichen Stecker-codes und der gleichen Stift-Nr. wie in dem Abschnitt "SYSTEMSCHALTDIAGRAMM" aus dem Abschnitt "LISTE DER STECKER" können Sie einfach die Form des Steckers und seine Stiftpositionen feststellen.

Für weitere Informationen über die Verwendung dieser Liste siehe "BEZEICHNUNG DER STECKER UND WIE DIESE ZU LESEN IST" in diesem Abschnitt.

SECTION 8A-1**ORGANISATION DE CE MANUEL****8A-1****TABLE DES MATIÈRES**

· Contenu et description du manuel	8A-1-34
· Détails des applications	8A-1-34
· Précautions	8A-1-35
· Symboles et repères	8A-1-38
· Abréviations	8A-1-39
· Code de couleurs	8A-1-39
· Comment interpréter le schéma de disposition des blocs raccord de câblage (SECTION 8A-3)	8A-1-40
· Indication et légende des connecteurs.....	8A-1-41
· Légende des Positions D'installation des Pièces Individuelles (SECTION 8A-4)	8A-1-43
· Légende des Points Masse (SECTION 8A-5)	8A-1-44
· Légende des schémas du circuit d'alimentation (SECTION 8A-6)	8A-1-45
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CONTENU ET DESCRIPTION DU MANUEL

Ce manuel se compose de schémas représentant l'acheminement des faisceaux de fils électriques, la disposition des blocs raccord de câblage, les positions d'implantation des pièces indépendantes (fusible, relais, dispositif de commande), les points de mise à la masse, le circuit d'alimentation, le circuit de système et la liste des blocs raccord de câblage.

SECTION		DESCRIPTION
Schéma des positions d'implantation des blocs raccord de câblage	8A-3	L'agencement des blocs raccord de câblage utilisés dans ce véhicule est représenté par rapport aux faisceaux de fils électriques en se servant de symboles dans les illustrations.
Positions d'installation des pièces individuelles	8A-4	Indication de la position de chaque fusible, relais et bloc de commande dans le véhicule.
Point de masse	8A-5	Indication des points de mise à la masse sur la carrosserie.
Schéma du circuit d'alimentation	8A-6	Indique le passage du courant électrique de la borne positive de la batterie au fusible principal et chaque fusible du boîtier à fusibles ainsi que le noms de principaux systèmes qui appliquent une charge à chaque fusible indiqué.
Schéma des systèmes électriques	8A-7	Indication du circuit électrique de chaque système, du fusible à la masse. Le schéma est construit de manière à indiquer le sens du courant du haut en bas.
Liste des blocs raccord de câblage	8A-8	Formes des blocs raccord de câblage utilisés dans ce véhicule et agencement de leurs broches comme représenté.

DÉTAILS DES APPLICATIONS

Ce manuel couvre les modèles ci-dessous.

REMARQUE :

Les descriptions de ce manuel peuvent ne pas correspondre exactement au véhicule réparé compte tenu de certaines différences techniques.

MODELE/TYPE 1

RB310

(X)TSMMA93S00100001(X)~

RB413

(X)TSMMA53S00100001(X)~

TYPE 2

RB413/RB310

(X)TSMMA93S00180001(X)~

(X)TSMMA53S00180001(X)~

(X)TSMMA53S00180001(X)~

TYPE 3

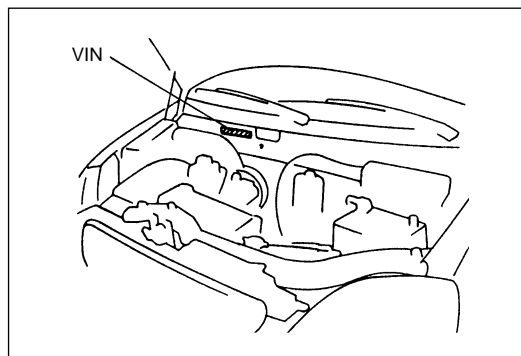
RB310/RB413

(X)TSMMA93S00210001(X)~

(X)TSMMA53S00210001(X)~

(X)TSMMA53S00210001(X)~

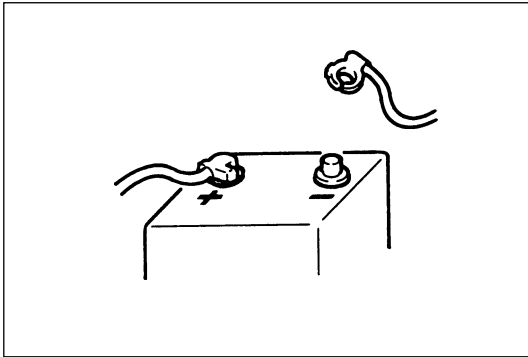
(X)TSMMA53S0210001(X)~



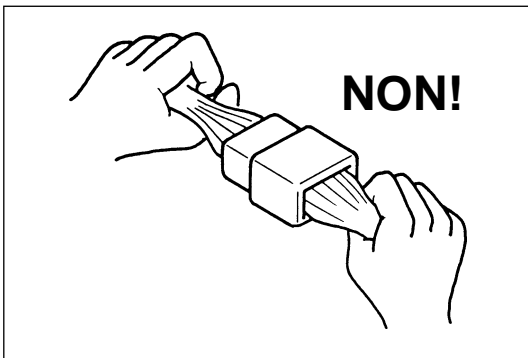
VIN: Emplacement du numéro d'identification du véhicule

PRÉCAUTIONS

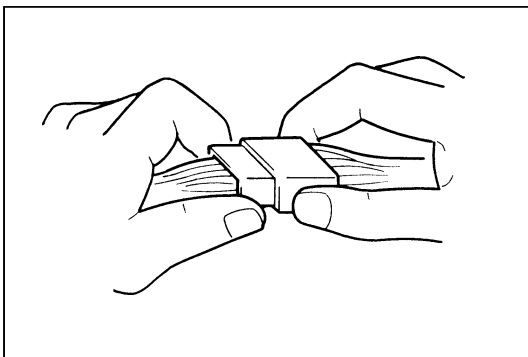
Afin de prévenir toute détérioration des circuits électriques et tout risque d'incendie, prendre les précautions suivantes lors de travaux sur les circuits électriques.



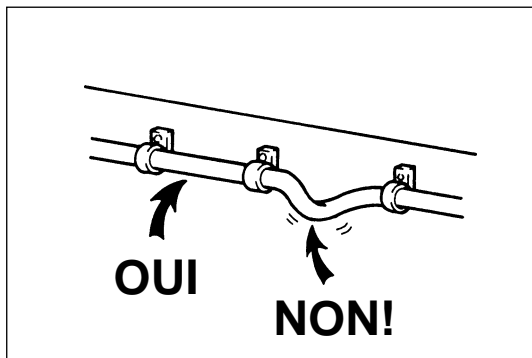
- Avant d'enlever la batterie du véhicule ou de débrancher le câble des bornes de la batterie et d'effectuer des travaux d'entretien ou de réparation sur les circuits électriques, toujours s'assurer que le contacteur d'allumage et tous les autres interrupteurs ont été mis sur Arrêt, sinon les semi-conducteurs risquent d'être endommagés.
- Toujours débrancher en premier le câble relié à la borne négative (-) de la batterie puis le câble relié à la borne positive (+).
- Procéder dans l'ordre inverse pour rebrancher les câbles sur les bornes de la batterie.



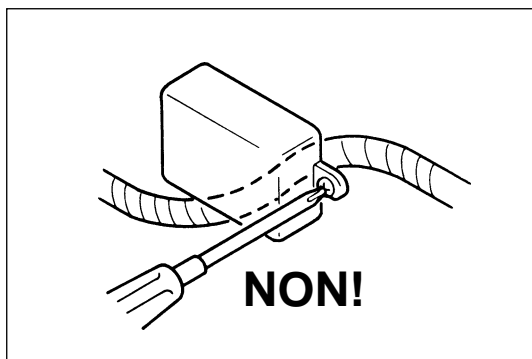
- Ne jamais tirer sur les faisceaux pour débrancher les connecteurs. Déverrouiller le connecteur puis détacher les deux parties du connecteur en tirant dessus.



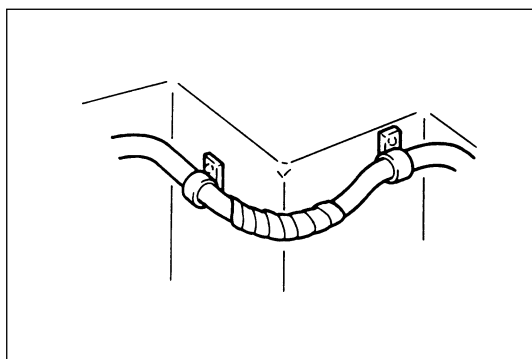
- Pour rebrancher les connecteurs, les prendre dans les mains et pousser de manière à ce qu'ils s'enclenchent (un clic doit être audible).



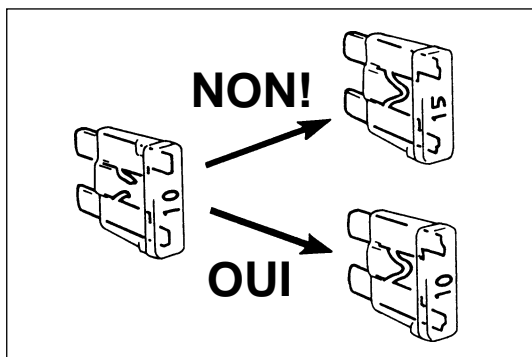
- Fixer les faisceaux électriques avec des brides de sorte qu'ils soient bien tendus.



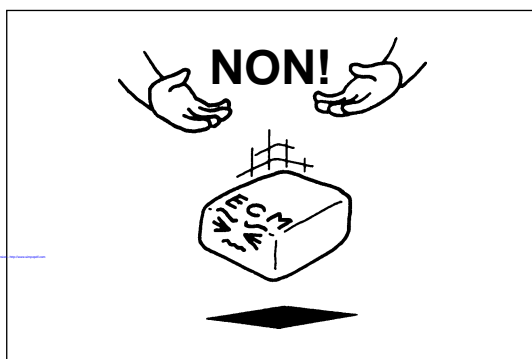
- Lors de l'installation des pièces du véhicule, veiller à ce qu'aucun faisceau électrique ne gêne ou soit pris par une autre pièce.



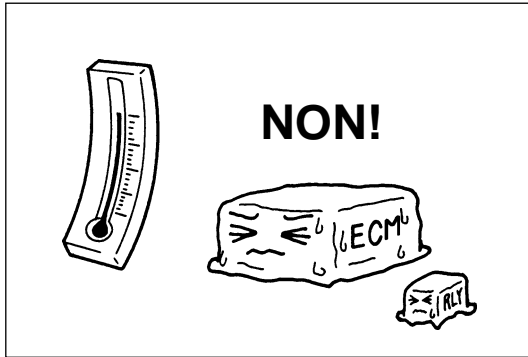
- Pour éviter que le faisceau électrique ne s'abîme, protéger les parties touchant un angle aigu avec du ruban isolant ou autre.



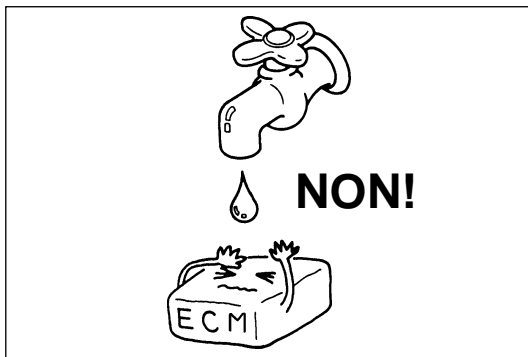
- Toujours remplacer un fusible par un fusible de même capacité. L'utilisation d'un fusible de plus grande capacité peut endommager les organes électriques et provoquer un incendie.



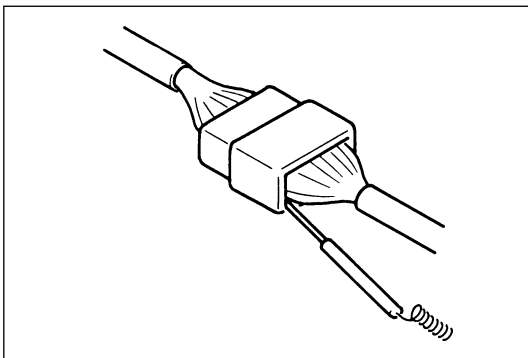
- Toujours manier avec prudence les pièces électriques (microprocesseur, relais, etc.) et ne pas les laisser tomber.



- Avant d'effectuer un travail produisant une chaleur supérieure à 80°C à proximité des pièces électriques, enlever les pièces électriques sensibles à la chaleur.



- Prendre soin de ne pas exposer les connecteurs et les pièces électriques à l'eau afin d'éviter tout problème.



- Quand un voltmètre est utilisé pour contrôler la continuité ou la tension d'un circuit, l'insérer du côté du faisceau électrique.

AVERTISSEMENT:

Ce véhicule est équipé d'un système à sac gonflable de retenue supplémentaire. Tous les travaux d'entretien sur et aux environs des organes constitutifs du système à sac gonflable ou du câblage doivent être exécutés par un concessionnaire Suzuki autorisé. Veuillez vous conformer à toutes les mises en garde décrites dans la rubrique intitulée "Section entretien exécuté sur le véhicule", consulter les schémas des organes du système à sac gonflable et d'implantation du câblage qui apparaissent dans le manuel d'entretien mentionné dans l'AVANT-PROPOS de ce manuel avant d'effectuer des travaux d'entretien sur et aux environs des organes constitutifs du système à sac gonflable ou du câblage. En effet, le fait de ne pas se conformer à AVERTISSEMENT peut se traduire par un déploiement imprévu et non intentionné du sac gonflable ou de rendre le sac gonflable inopérant. L'un ou l'autre cas pouvant engendrer de graves blessures aux techniciens.

SYMBOLES ET REPÈRES

Dans ce manuel, chaque appareil est représenté par les symboles et les repères suivants.

Batterie	Masse		Fusible ordinaire	Fusible à fusion lente
Disjoncteur	Bobine, Solénoïde	Chauffage	Ampoule	
Allume-cigares	Moteur	Pompe	Avertisseur sonore	Haut-parleur
Vibreux	Signal musical	Condensateur	Thermistance	Commutateur à tiges
Résistance	Résistance variable		Transistor	
			NPN	PNP
Phototransistor	Diode	Diode de référence (Zener)	Diode luminescente	Photodiode
Elément piézoélectrique	Faisceau		Relais	
	(Connecté)	(Non Connecté)	Relais ordinaire ouvert	Relais ordinaire fermé
Connecteur	Interrupteur		Borne de type "O"	

ABRÉVIATIONS

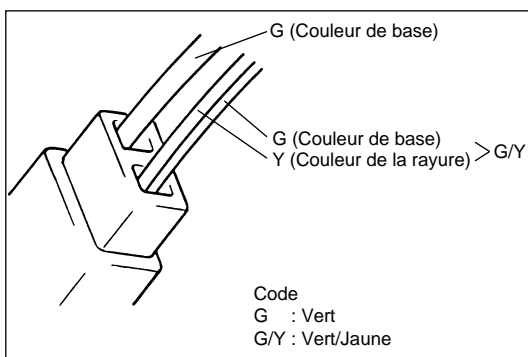
Les abréviations utilisées dans ce manuel et les termes complets correspondants sont indiqués ci-dessous.

Abréviation	Terme complet	Abréviation	Terme complet
2WD	Véhicules deux roues motrices	IND	Indicateur
4WD	Véhicules quatre roues motrices	INT	Intermittent
A/C	Climatisation	J/C	Connecteur joint
A/T	Boîte à vitesses automatique	LH (D)	Véhicule à conduite à droite
ACC	Accessoire	LO	Bas
CKP	Position du vilebrequin	M/T	Boîte à vitesses manuelle
CMP	Position de l'arbre à cames	MAP	Pression absolue du collecteur
DLC	Connecteur de transmission de données	O/D	Surmultiplicateur
DRL	Feux diurnes (si équipé)	P/N	Direction assistée/normale
ECT	Température de réfrigérant du moteur	P/S	Direction assistée
EGR	Recyclage des gaz d'échappement	RH (D)	Véhicule à conduite à gauche
HI	Haut	ST	Démarrreur
IAC	Contrôle de l'air de ralenti	TCC	Accouplement du convertisseur de couple
IAT	Température de l'air admis	TCM	Module de commande de transmission
IG	Allumage	VSV	Valve à dépression
ILL	Éclairage	W/S	Épissure de soudure

Code	Câble	Code	Câble
B	Noir	Or	Orange
Bl	Bleu	R	Rouge
Br	Marron	W	Blanc
G	Vert	Y	Jaune
Gr	Gris	P	Rose
Lbl	Bleu clair	V	Violet
Lg	Vert clair		

CODE DE COULEURS

La ou les premières lettres du nom de couleur (anglais) sont utilisées pour identifier chaque couleur, comme il apparaît dans la colonne de gauche.



Il y a deux types de câbles : les câbles à une seule couleur et les câbles bicolores (avec une rayure). Dans le cas des câbles bicolores, la première lettre ("G" dans l'exemple de gauche) représente la couleur de base (couleur de la gaine du câble) et la lettre suivante ("Y" dans cet exemple) représente la couleur de la rayure.

COMMENT INTERPRÉTER LE SCHÉMA DE DISPOSITION DES BLOCS RACCORD DE CÂBLAGE

Quand il est nécessaire de connaître l'emplacement d'un organe électrique ou d'un bloc raccord de câblage intermédiaire, il est très facile d'obtenir le renseignement à l'aide de ce schéma.

Consulter tout d'abord la section intitulée "SCHÉMA DE CIRCUIT DE SYSTÈME" pour connaître le code de bloc raccord de câblage du bloc raccord de câblage du point d'implantation concerné, puis se référer à cette section et chercher le même code.

De plus amples renseignements sur la façon d'utiliser le code sont indiqués à l'aide de l'illustration ci-dessous.

Code de bloc raccord de câblage

L

0

1

Numéro de bloc raccord de câblage (numéro de série : 01)

Symbole de faisceau de fils électriques (se référer au tableau ci-dessous)

Symbole de faisceau de fils électriques et appellation correspondante de faisceau de fils électriques

A : Faisceau de fils électriques de batterie	K : Câble de toit
B : Faisceau de fils électriques C/A	L : Faisceau de fils électriques de plancher
C : Faisceau de fils électriques de moteur	N : Câble de désembueur arrière
D : Faisceau de fils électriques de l'injecteur	O : Faisceau de porte arrière•Câble de feux de stop montés haut
E : Faisceau de fils électriques principal	Q : Faisceau de fils électriques de sac gonflable
G : Faisceau de fils électriques de planche de bord	R : Faisceau de pompe à carburant
J : Faisceau de portes	

The diagram shows a side profile of a car with numerous electrical connection points marked with circles and codes. Codes include L01 through L32, with some in parentheses (e.g., L03 (O01), L25 (K01), L26 (G07), L13 (R01)). Arrows point from the legend and explanatory text to specific points on the car.

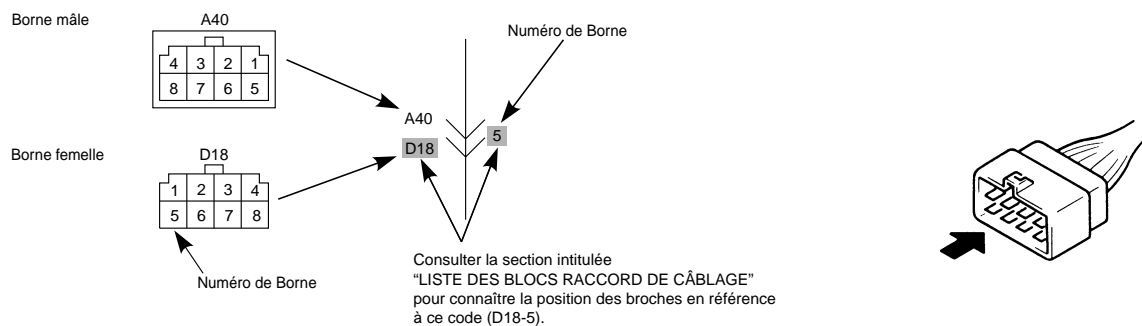
Ceci indique le numéro du point de mise à la masse. Le même numéro est utilisé comme point de mise à la masse. (Se référer à la section intitulée "POINT DE MASSE" pour obtenir de plus amples détails.)

Ceci indique le code de bloc raccord de câblage. Le code de bloc raccord de câblage qui se trouve entre parenthèses () a la même signification que le bloc raccord de câblage intermédiaire indiqué ci-dessus et il indique en même temps qu'il existe une continuité de faisceau de fils électriques entre les pages ou les illustrations de la section "SCHÉMA DE DISPOSITION DES BLOCS RACCORD DE CÂBLAGE". C'est-à-dire qu'il suggère que la description du faisceau de fils électriques se poursuit à la page ou dans l'illustration suivante de sorte que le faisceau de fils électriques peut être identifié à l'aide du même code de bloc raccord de câblage.

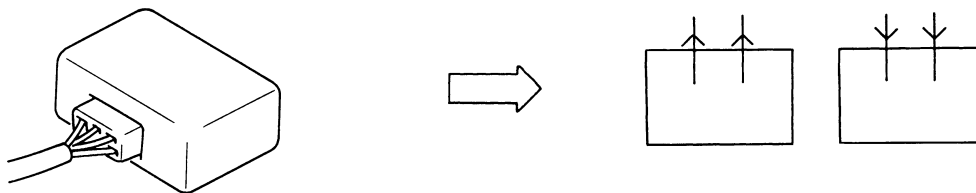
INDICATION ET LÉGENDE DES CONNECTEURS

Les blocs raccord de câblage sont indiqués comme représenté dans la section intitulée “SCHÉMA DE CIRCUIT DE SYSTÈME”. En ce qui concerne la forme et la disposition des broches de chaque bloc raccord de câblage utilisé dans ce manuel, veuillez vous référer à la section intitulée “LISTE DES BLOCS RACCORD DE CÂBLAGE”. Les descriptions qui suivent expliquent comment elles sont indiquées et la façon de les interpréter.

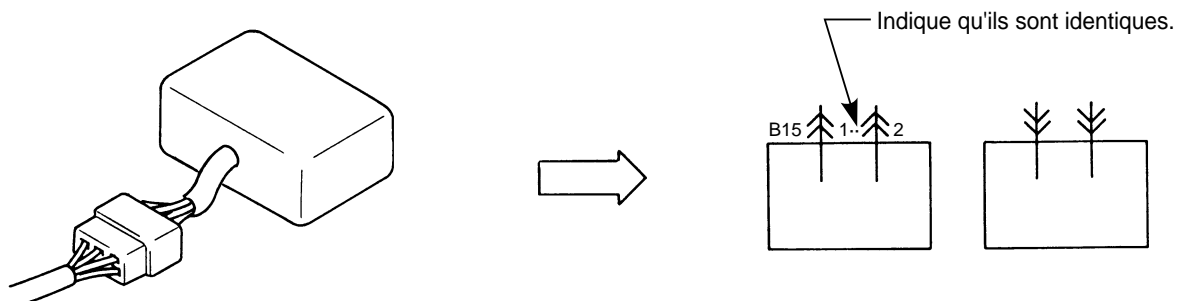
1. La borne mâle et la borne femelle sont respectivement identifiées par un encadrement double et simple.
- Le bloc raccord de câblage intermédiaire qui est relié aux faisceaux de fils électriques est représenté sous ses deux formes avec les bornes mâles et les bornes femelles, mais le bloc raccord de câblage qui doit être raccordé directement à l'équipement est représenté sous la forme du bloc raccord de câblage du côté du faisceau de fils électriques.
- Les blocs raccord de câblage décrits dans ce manuel sont toujours des “blocs raccord de câblage côté faisceau de fils électriques” et sont illustrés dans le sens représenté ci-contre, à droite.



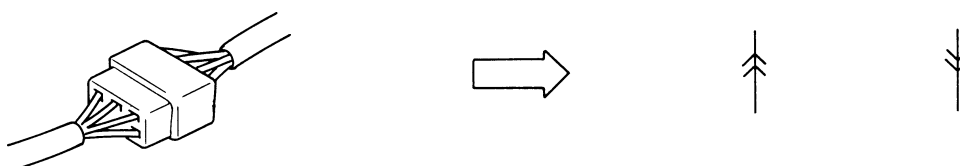
2. Il existe trois types de connecteurs d'après la façon dont ils sont raccordés. Chaque type est illustré ci-dessous.



- S'introduit directement dans l'équipement

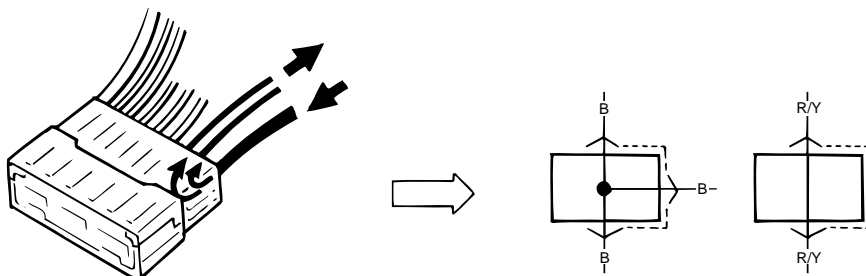


- Raccordement au connecteur de faisceau d'un appareil



- Raccordement de deux faisceaux entre eux (connecteur intermédiaire)

3. • Le câblage de ce véhicule fait usage de blocs raccord de jonction (J/C) qui permettent de diviser un fil en plusieurs fils différents ou en plusieurs fils différents combinés dans un même câble.
- Le type de bloc raccord de jonction est illustré ci-dessous.



Comment interpréter les codes de bloc raccord de câblage et les numéros de broche. (Comment se servir de ce manuel):

Il est possible de retrouver l'emplacement et la forme de chaque bloc raccord de câblage à partir du code de bloc raccord de câblage indiqué dans la section intitulée "SCHÉMA DE CIRCUIT DE SYSTÈME" et la disposition de chaque broche à partir du numéro de bloc raccord de câblage.

*** Comment retrouver l'emplacement d'un bloc raccord de câblage :**

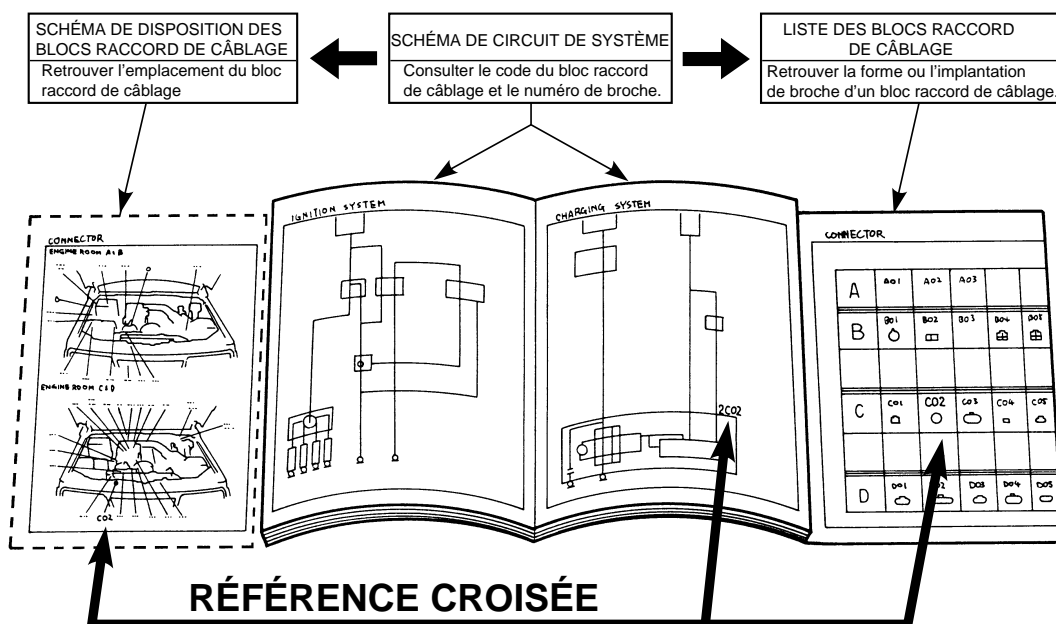
Ouvrir à la section intitulée "SCHÉMA DE CIRCUIT DE SYSTÈME" pour consulter le code du bloc raccord de câblage en question. Ensuite, se référer au "SCHÉMA DE DISPOSITION DES BLOCS RACCORD DE CÂBLAGE" pour rechercher le même code que le code de bloc raccord de câblage en question. L'emplacement où le code est trouvé correspond à l'emplacement actuel du bloc raccord de câblage.

*** Comment retrouver la forme du bloc raccord de câblage ou le numéro de broche :**

Ouvrir à la section intitulée "SCHÉMA DE CIRCUIT DE SYSTÈME" pour consulter le code de bloc raccord de câblage et le numéro de broche du bloc raccord de câblage en question. Ensuite, se référer à la liste intitulée "LISTE DES BLOCS RACCORD DE CÂBLAGE" comme représentée à droite de la figure ci-dessous, puis chercher le code du bloc raccord de câblage désiré dont la forme du bloc raccord de câblage est indiquée. Ce procédé est plus particulièrement commode pour localiser le bloc raccord de câblage en question parmi des blocs raccord de câblage de forme similaire. Par ailleurs, en utilisant cette page, il est possible de retrouver l'implantation de chaque broche à partir du numéro de bloc raccord de câblage mentionné dans la section intitulée "SCHÉMA DE CIRCUIT DE SYSTÈME".

Ceci est très utile quand il s'agit de retrouver l'implantation des broches dans un bloc raccord de câblage à des fins de vérification de continuité entre les broches.

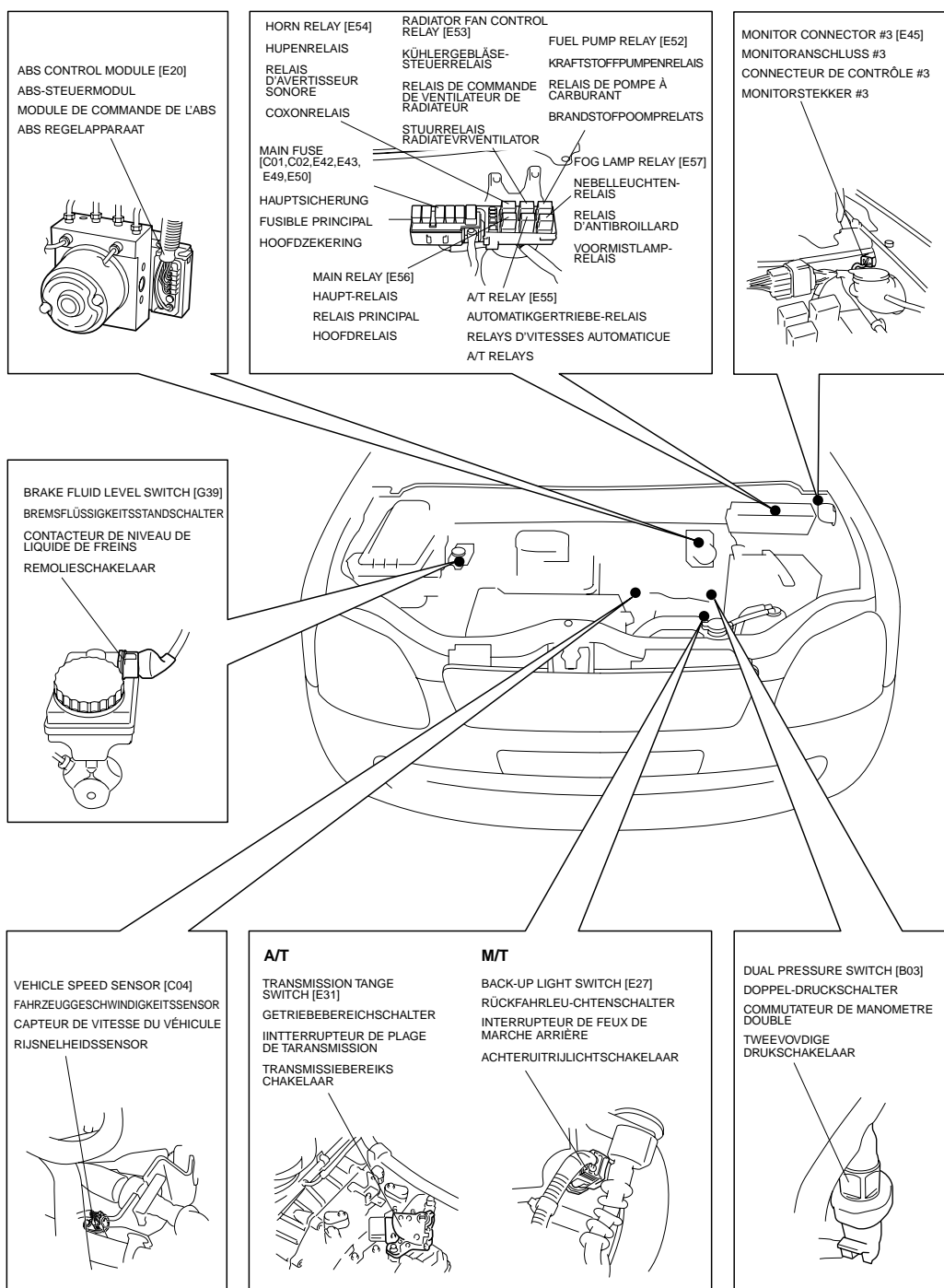
Pour connaître l'emplacement, la forme ou l'implantation des broches d'un bloc raccord de câblage, procéder à une référence croisée entre les sections intitulées "SCHÉMA DE CIRCUIT DE SYSTÈME", "SCHÉMA DE DISPOSITION DES BLOCS RACCORD DE CÂBLAGE" et "LISTE DES BLOCS RACCORD DE CÂBLAGE" comme suit:



LÉGENDE DES POSITIONS D'INSTALLATION DES PIÈCES INDIVIDUELLES

Le schéma dans la section "POSITIONS D'INSTALLATION DES PIÈCES INDIVIDUELLES" indique les positions d'installation des fusibles, relais et blocs de commande utilisés dans ce véhicule. Elles sont illustrées de la façon suivante.

ENGINE ROOM (RIGHT HAND STEERING VEHICLE) MOTORRAUM (FAHRZEUG MIT RECHTSLENKUNG) COMPARTIMENT MOTEUR (VEHICULE A CONDUITE A DROITE) MOTORBAK (VOERTUIG MET RECHTS STUUR)



LÉGENDE DES POINTS MASSE

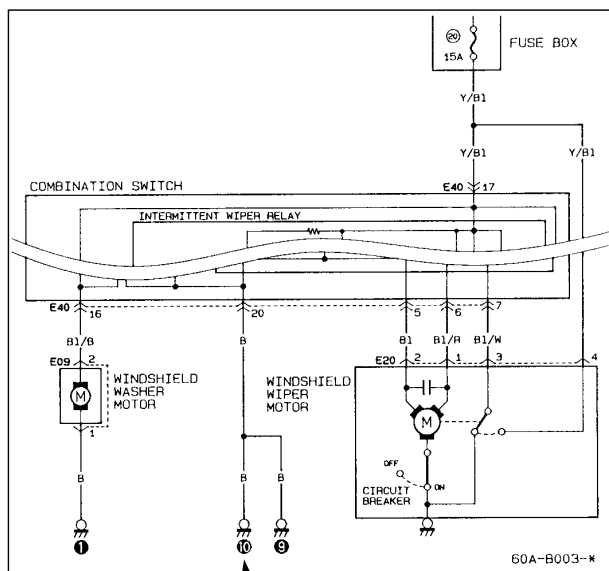
Le point de masse signifie la position où le faisceau négatif des faisceaux de câblage est mis à la masse. Le schéma dans la section "POINT MASSE" indique les divers points de masse.

Dans la section "SCHÉMA DES CIRCUITS DU SYSTÈME", de nombreux repères de masse sont suivis de cercles noirs contenant des nombres (10). Ceci signifie que l'extrémité du faisceau marqué par un cercle noir est mis quelque part à la masse sur le véhicule.

Pour localiser le point de mise à la masse (position d'installation), se référer à la section intitulée "POINT DE MASSE".

Section "SCHÉMA DES CIRCUITS DU SYSTÈME"

■ ESSUIE-GLACE ET LAVE-GLACE DE PARE-BRISE



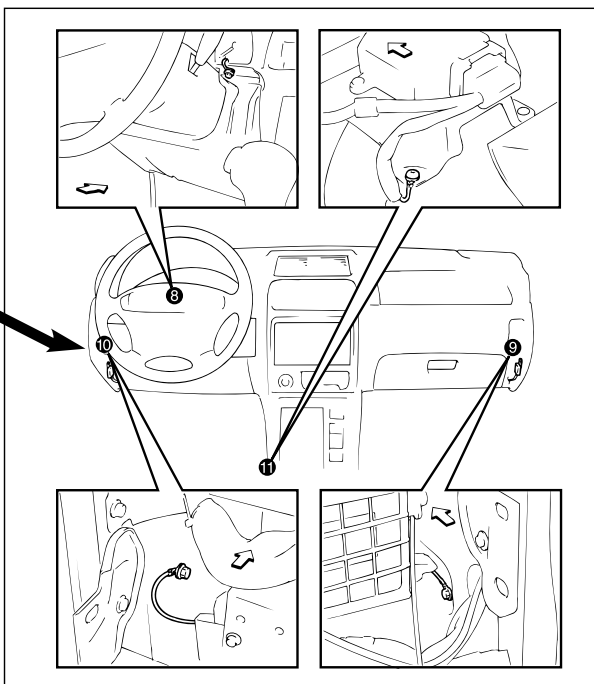
[Comment localiser un point de masse]

Rechercher dans la section "POINT MASSE" le cercle NOIR contenant le nombre (10) souhaité dans la section "SCHÉMA DES CIRCUITS DU SYSTÈME".

REMARQUE:

Si le point de masse d'une pièce électrique n'est pas trouvé dans la section "POINT MASSE", cette pièce proprement dite sert de masse.

Section "POINT MASSE"

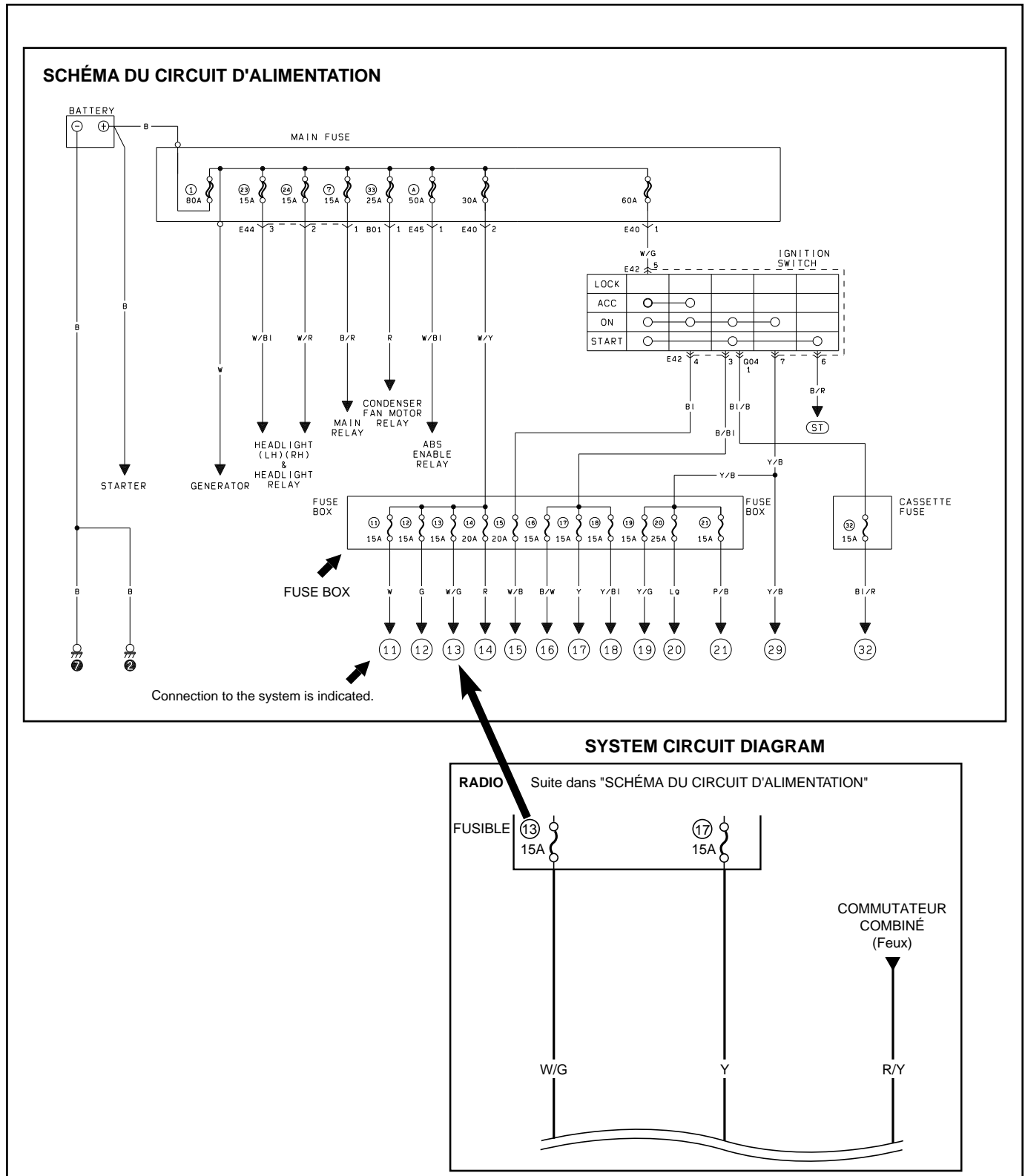


RÉFÉRENCE CROISÉE

LEGENDE DES SCHEMAS DU CIRCUIT D'ALIMENTATION

La section Schéma du Circuit D'alimentation indique le circuit à partir de la borne positive de la BATTERIE jusqu'à chaque fusible dans le boîtier à fusibles et où chaque fusible est raccordé (nom de circuit de chaque système). En outre, la valeur de la charge électrique de chaque fusible est indiquée.

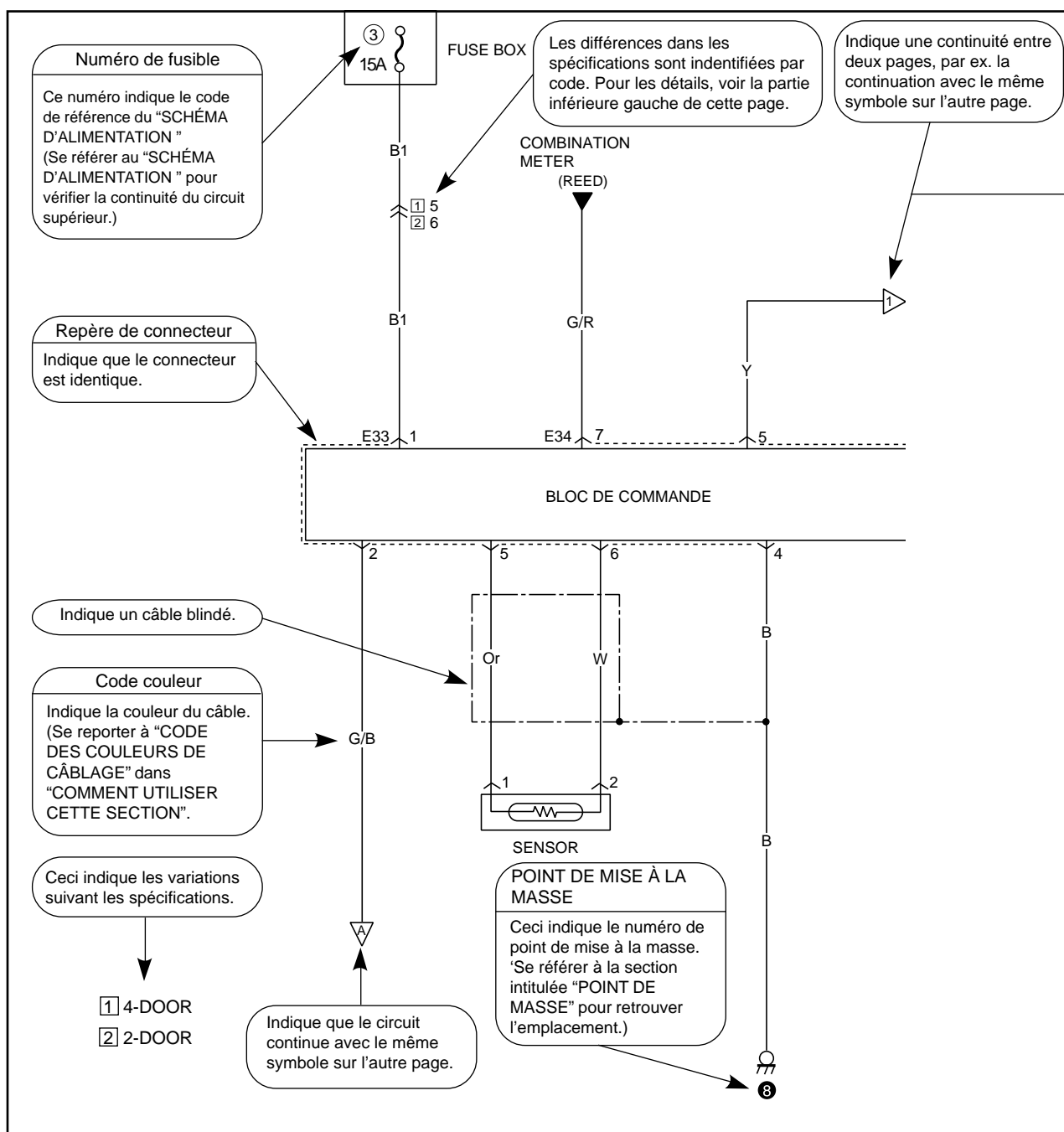
Étant donné que chaque "SCHÉMA DE CIRCUIT DE SYSTÈME" est tracé à partir du circuit placé sous le fusible, procéder à une référence croisée avec le "SCHÉMA DU CIRCUIT D'ALIMENTATION" pour vérifier la continuité tout en se référant au numéro de fusible tel que le numéro (21).

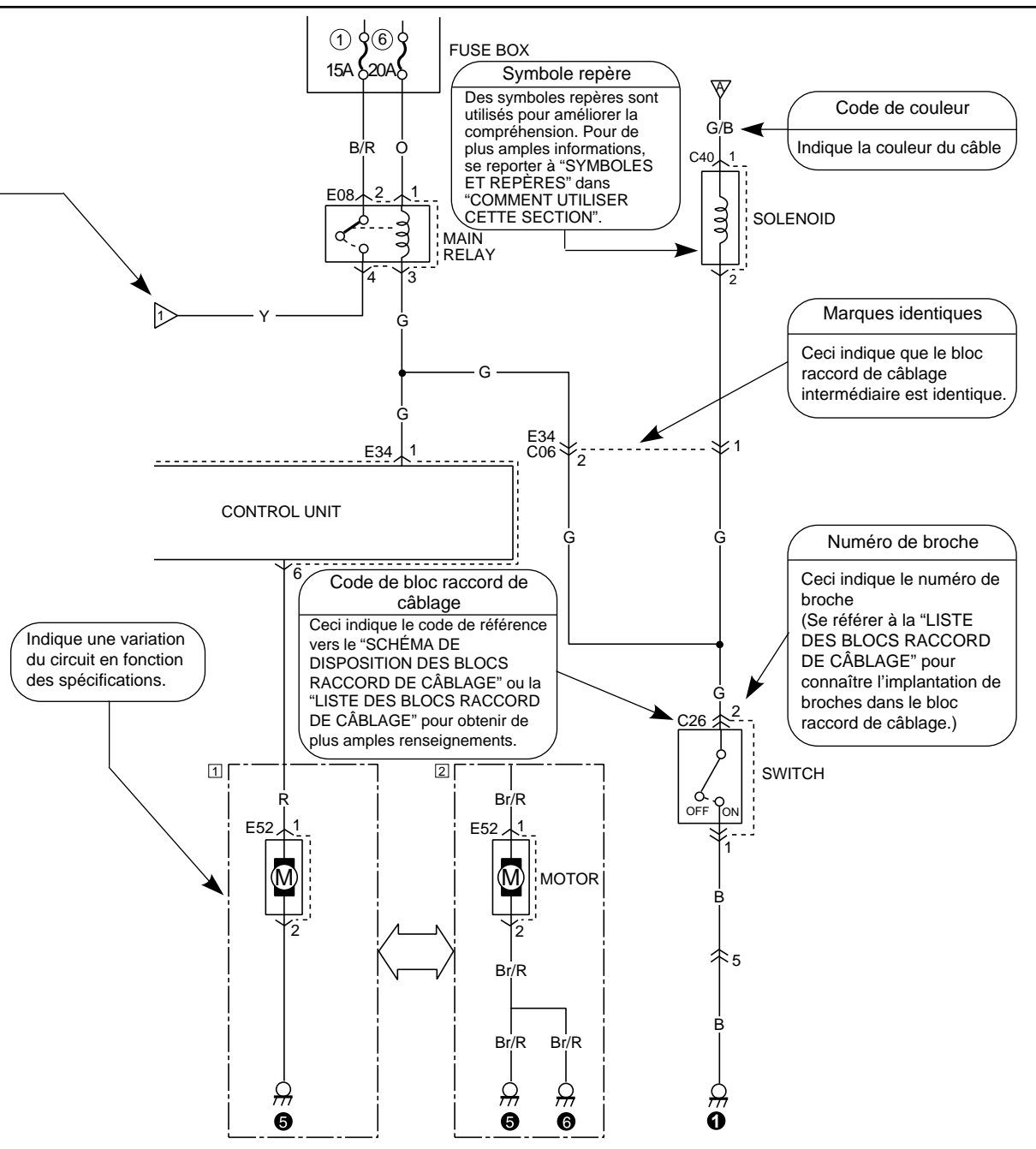


LÉGENDE DES SCHÉMAS DES CIRCUITS ÉLECTRIQUES

Le schéma du circuit électrique de chaque système montre le circuit à partir du fusible principal, du boîtier à fusibles ou du contacteur d'allumage (haut du schéma) jusqu'à la masse (bas du schéma) de sorte qu'il sera aisé de suivre tout le circuit lors des travaux d'entretien ou de réparation.

De plus amples renseignements sur les blocs raccord de câblage, les points de mise à la masse et les fusibles peuvent être obtenus en procédant à une référence croisée dans le "SCHÉMA DE CIRCUIT DE SYSTÈME" et les autres sections comme décrit dans les descriptions précédentes de la présente section. Le code de bloc raccord de câblage, le numéro de broche et le numéro de fusible constituent le code de référence de la référence croisée.





COMMENT INTERPRÉTER LA LISTE DES BLOCS RACCORD DE CÂBLAGE

La section intitulée “LISTE DES BLOCS RACCORD DE CÂBLAGE” a été compilée à des fins d’assistance à l’identification lorsque le bloc raccord de câblage en question est recherché parmi des blocs raccord de câblage similaires ainsi que pour retrouver l’implantation des broches du bloc raccord de câblage quand il s’agit de vérifier la continuité entre les broches ou d’effectuer d’autres travaux de vérification. Veuillez noter que la liste est donnée afin de symboliser les configurations de base des blocs raccord de câblage, de sorte que certains blocs raccord de câblage mentionnés dans la liste risquent de présenter une certaine différence par rapport aux blocs raccord de câblage réels suivant les spécifications.

Comment se servir de la Liste des blocs raccord de câblage:

Il est très facile de retrouver la forme du bloc raccord de câblage en question et l’implantation de ses broches en localisant le même code de bloc raccord de câblage et les numéros de broche dans la section intitulée “SCHÉMA DE CIRCUIT DE SYSTÈME” à partir de la section intitulée “LISTE DES BLOCS RACCORD DE CÂBLAGE”.

Se référer à la rubrique intitulée “INDICATION DES BLOCS RACCORD DE CÂBLAGE ET MANIÈRE DE LES INTERPRÉTER” qui apparaît dans la présente section pour obtenir de plus amples renseignements sur la façon d’utiliser le code.

DEEL 8A-1**GEBRUIK VAN DEZE HANDLEIDING****8A-1****INHOUD**

· Inhoud en beschrijving van deze handleiding	8A-1-50
· Van toepassing zijnde modellen	8A-1-50
· Wees voorzichtig wanneer u onderhoud pleegt	8A-1-51
· Symbolen en tekens	8A-1-54
· Afkortingen	8A-1-55
· Symbolen voor draadkleuren	8A-1-55
· Hoe stekker-layout diagrammen gelezen moeten worden (DEEL 8A-3)	8A-1-56
· Hoe stekkers worden aangegeven en hoe deze gelezen moeten worden	8A-1-57
· Hoe installatieposities van eenheidsonderdelen gelezen moeten worden (DEEL 8A-4)	8A-1-59
· Hoe de aardingspunten gelezen moeten worden (DEEL 8A-5)	8A-1-60
· Hoe een stroomvoorzieningsdiagram gelezen moet worden (DEEL 8A-6)	8A-1-61
· Hoe een systeemshakelingsdiagram gelezen moet worden (DEEL 8A-7)	8A-1-62
· Hoe de lijst van stekkers en aansluitingen gelezen moet worden (DEEL 8A-8)	8A-1-64

INHOUD EN BESCHRIJVING VAN DEZE HANDLEIDING

Deze handleiding bevat diagrammen voor het leiden van de bundels, plaats van aansluitingen, installatieplaats van enkele onderdelen (zekering, relais, regeleenheid), aardepunten, spanningcircuit, systeemcircuit, lijst van aansluitingen en algehele bedrading.

DEEL		BESCHRIJVING
Stekker layout diagram	8A-3	Rangschikking van stekkers en aansluitingen gebruikt in dit voertuig wordt getoond met betrekking tot de bedradingsbundel door middel van symbolen in de afbeelding.
Installatiepositie van enkele onderdelen	8A-4	De plaatsen waar elke zekering, relais en bedieningseenheid in dit voertuig zijn geïnstalleerd worden getoond.
Aardpunt	8A-5	Punten op het chassis voor de aarding worden aangegeven.
Spanningstoevoer-diagram	8A-6	Elektrische stroom van de positieve pool van de accu naar de hoofdzekering en afzonderlijke zekeringen in de zekeringbox en de namen van de hoofdsystemen die iedere zekering belasten worden aangegeven.
Systeemcircuitdiagram	8A-7	Individuele circuit van de zekering naar de aarding van ieder systeem wordt getoond. Het circuitdiagram is zodanig ontworpen dat het de elektrische stroom van boven naar onder toont.
Lijst van aansluitingen	8A-8	De vormen van de stekkers en aansluitingen gebruikt in dit voertuig en de rangschikking van de pennen daarvan worden getoond.

VAN TOEPASSING ZIJNDE MODELLEN

Deze handleiding is van toepassing op de hieronder vermelde voertuigen.

OPMERKING:

Vergeet niet dat bepaalde beschrijvingen afhankelijk van de specificaties mogelijk niet exact met de auto overeenkomen.

MODEL/TIPO 1

RB310

(X)TSMMA93S00100001(X)~

RB413

(X)TSMMA53S00100001(X)~

TIPO 2

RB413/RB310

(X)TSMMA93S00180001(X)~

(X)TSMMB53S00180001(X)~

(X)TSMMA53S00180001(X)~

TIPO 3

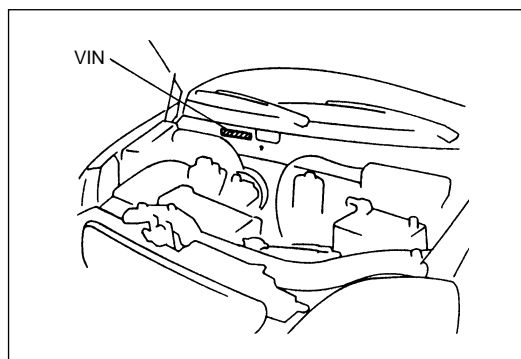
RB310/RB413

(X)TSMMA93S00210001(X)~

(X)TSMMB53S00210001(X)~

(X)TSMMA53S00210001(X)~

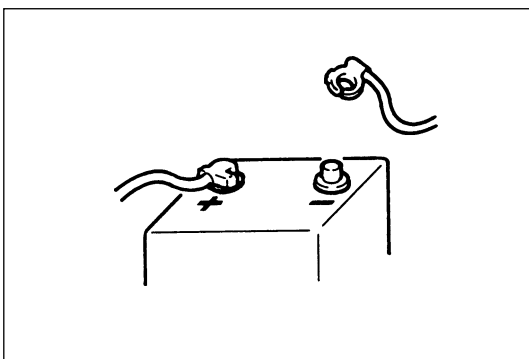
(X)TSMMA53S0210001(X)~



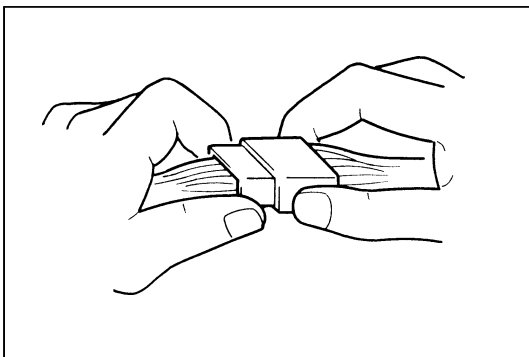
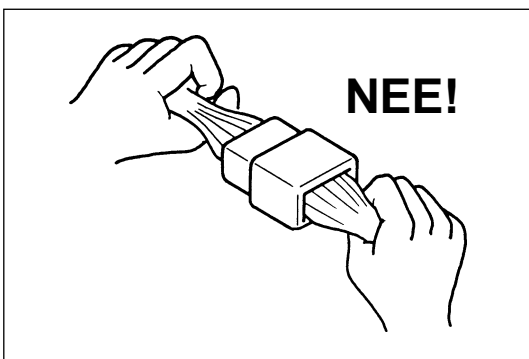
VIN: Voertuig Identificatie Nummer

WEES VOORZICHTIG WANNEER U ONDERHOUD PLEEGT

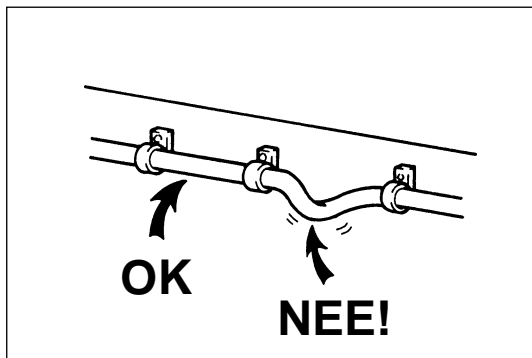
Wanneer u werk gaat uitvoeren dat te maken heeft met de elektrische systemen, dient u de volgende voorzorgen in acht te nemen om de elektrische onderdelen te beschermen en brand te voorkomen.



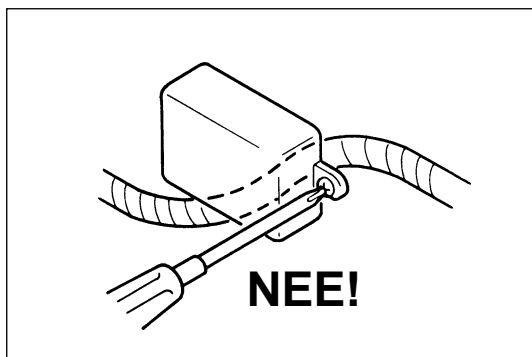
- Wanneer u de accu uit het voertuig haalt, of wanneer u de kabel loskoppelt van de accu-aansluiting voor inspectie of onderhoud van het elektrisch systeem, moet u altijd eerst controleren of het contact en alle andere schakelaars **UIT** staan. Is dat niet het geval, dan kunnen half-geleider onderdelen beschadigd raken.
- Wanneer u de kabels loskoppelt van de accu moet u er op letten dat u de negatieve (-) kabel het eerst losmaakt en dan pas de andere, positieve (+).
- Volg deze werkwijze in omgekeerde volgorde wanneer u de kabels weer op de accu gaat aansluiten.
- Wanneer u stekkers gaat losmaken, mag u nooit aan de bedrading trekken. Ontgrendel de stekker eerst en trek vervolgens aan de stekker zelf om deze los te maken.



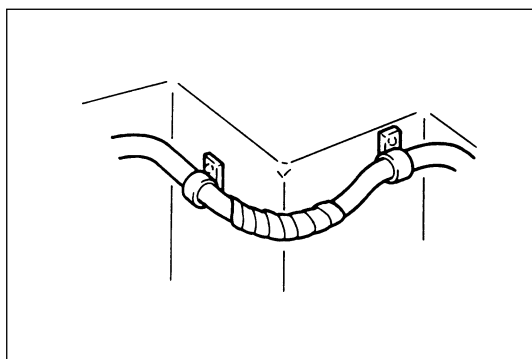
- Wanneer u stekkers vastmaakt dient u ook de stekkers zelf vast te houden en ze in elkaar te drukken totdat ze vergrendelen (u zult een klik kunnen horen).



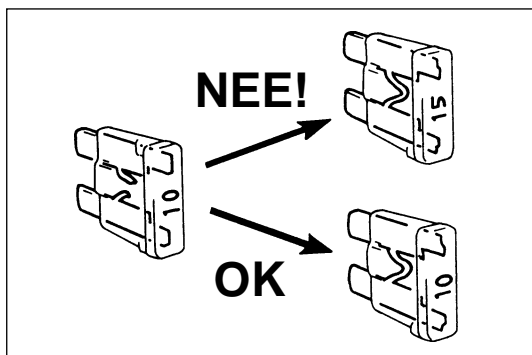
- Wanneer u de bedradingsbundel gaat installeren, dient u deze vast te zetten met klemmen zodat hij nergens los hangt.



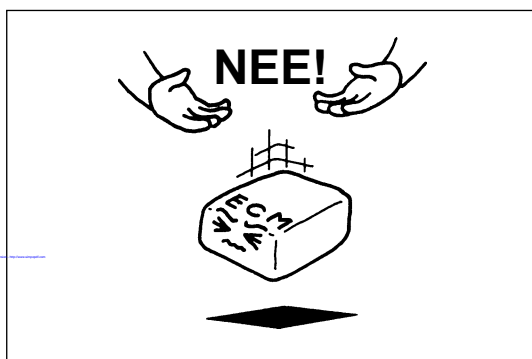
- Wanneer u onderdelen van het voertuig gaat installeren, moet u voorzichtig zijn dat u de bedradingsbundel niet hindert of door enig onderdeel afklemt.



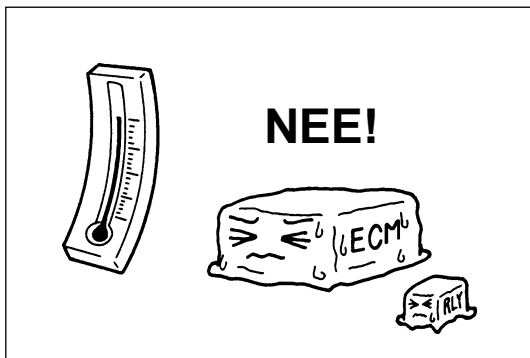
- Om beschadiging van de bedradingsbundel te voorkomen dient u delen daarvan die tegen scherpe hoeken liggen te beschermen door er isolatieband of iets dergelijks omheen te wikkelen.



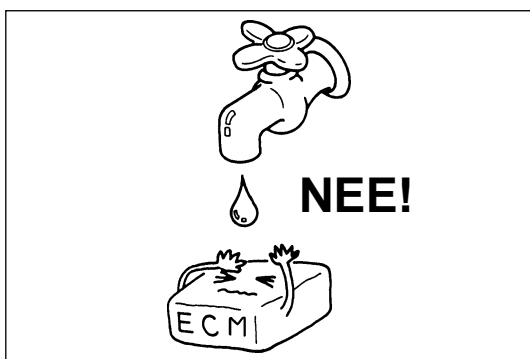
- Wanneer u eenzekering vervangt moet u een nieuwezekering met het opgegeven vermogen gebruiken. Gebruik van eenzekering met een hoger vermogen zal leiden tot schade aan de elektrische onderdelen en mogelijk tot brand.



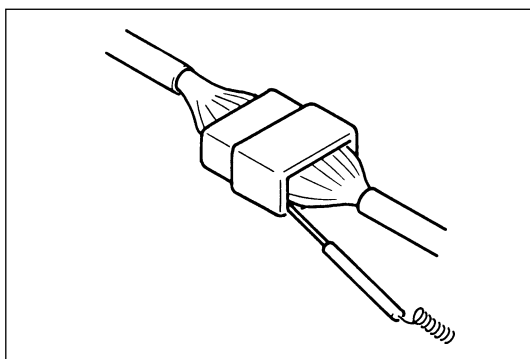
- Wees altijd voorzichtig met elektrische onderdelen (computer, relais enz.), behandel deze onderdelen niet ruw en laat ze niet vallen.



- Wanneer u werkzaamheden uitvoert waarbij de temperatuur in de buurt van elektrische onderdelen de 80°C overschrijdt, dient u van tevoren de warmtegevoelige elektrische onderdelen te verwijderen.



- Wees voorzichtig dat u stekkers en elektrische onderdelen niet blootstelt aan water aangezien dit in de toekomst tot storingen zal leiden.



- Wanneer u een tester gebruikt om de stroomdoorvoer te controleren of het voltage te meten, dient u de contactnaald van de tester van de kant van de bedradingsbundel in de stekker te steken.

WAARSCHUWING:

Dit voertuig is uitgerust met een Supplemental Inflatable Restraint Air Bag System. Onderhoud aan of bij onderdelen of bedrading van het Airbag-systeem mag alleen worden uitgevoerd door een erkende Suzuki dealer. Neemt u alstublieft alle waarschuwingen in acht die zijn beschreven in de sectie “Over onderhoud aan het voertuig”, en de Air Bag System Component en bedrading locatie aanzicht in de onderhoudshandleiding zoals vermeld in het VOORWOORD van deze handleiding, voor u onderhoud gaat verrichten aan of bij de Air Bag System componenten of bedrading. Volgt u deze WAARSCHUWINGEN niet op, dan kan de airbag onbedoeld in werking treden of juist niet meer functioneren. Beide gevallen kunnen leiden tot ernstig persoonlijk letsel.

SYMBOLLEN EN TEKENS

In de diagrammen in deze handleiding worden de gebruikte onderdelen voorgesteld door de hieronder vermelde symbolen en tekens.

Accu	Aarde		Normale zekering	Langzame zekering
Stroomonderbreker	Spoel, Solenoïde	Verwarming	Lamp	
Sigarettenaansteker	Motor	Pomp	Claxon	Luidspreker
Zoemer	Klokkenspel	Condensator	Thermistor	Reedschakelaar
Weerstand	Variabele weerstand		Transistor	
Foto-transistor	Diode	Referentie (zener-) diode	Licht emitterend	Foto-diode
Piëzo-elektrisch element	Bedradingsbundel		Relais	
	(Aangesloten)	(Niet aangesloten)	Normaal open relais	Normaal gesloten relais
Aansluitingen	Schakelaar		"O" type aansluiting	

AFKORTINGEN

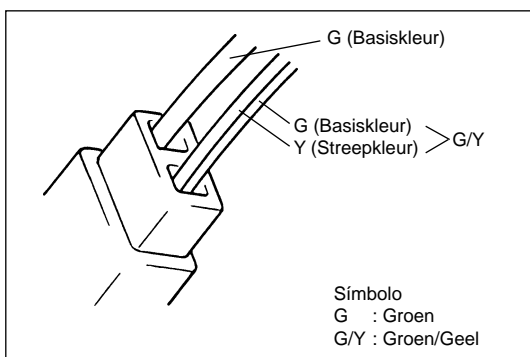
Zie de volgende lijst voor de in deze handleiding gebruikte afkortingen en hun betekenis.

Afkorting	Betekenis	Afkorting	Betekenis
2WD	auto's met 2-wielaandrijving	IND	Indicator
4WD	auto's met 4-wielaandrijving	INT	Met tussenpozen
A/C	airconditioning	J/C	Verbindingsaansluiting
A/T	Automatische transmissie	LH (D)	Stuur links (voertuig)
ACC	Accessoire	LO	Laag
CKP	Krukaspositie	M/T	Handgeschakelde transmissie
CMP	Nokkenaspositie	MAP	Spruitstuk absolute druk
DLC	Data-verbindingsaansluiting	O/D	Overdrive
DRL	Dagverlichting (indien aanwezig)	P/N	Power/Normaal
ECT	Motorkoelvoeloftemperatuur	P/S	Stuurbekrachtiging
EGR	Uitlaatgas-hercirculatie	RH (D)	Stuur rechts (voertuig)
HI	Hoog	ST	Starter
IAC	Stationair luchtregeling	TCC	Koppelconverterkoppeling
IAT	Inlaatluchttemperatuur	TCM	Transmissie bedieningsmodule
IG	Ontsteking	VSV	Vacuümschakelklep
ILL	Verlichting	W/S	Gelaste verbinding

Symbol	Draadkleur	Symbol	Draadkleur
B	Zwart	Or	Oranje
Bl	Blauw	R	Rood
Br	Bruin	W	Wit
G	Groen	Y	Geel
Gr	Grijs	P	Roze
Lbl	Lichtblauw	V	Paars
Lg	Lichtgroen		

SYMBOLEN VOOR DRAADKLEUREN

De beginletter(s) van de naam van de kleur worden gebruikt om de links vermelde kleuren aan te duiden.



Er zijn twee soorten gekleurde draden: met een enkele kleur en met twee kleuren (met een streep). Bij het soort met 2 kleuren, geeft de eerste hoofdletter ("G" in het links afgebeelde voorbeeld) de basiskleur aan en de volgende hoofdletter ("Y" in het links afgebeelde voorbeeld) de kleur van de streep.

HOE STEKKER-LAYOUT DIAGRAMMEN GELEZEN MOETEN WORDEN

Wanneer u de plaats van een elektrisch onderdeel of een tussenstekker moet opzoeken, kunt u deze gemakkelijk terugvinden met behulp van dit diagram.

Kijk eerst in de sectie "SYSTEEMCIRCUITDIAGRAM" of in de stekkertabel op de bladzijden aan de rechterkant van deze sectie voor de gezochte stekkercode. Kijk daarna in de diagrammen van deze sectie en zoek daarin dezelfde code op. Meer informatie over het gebruik van de code is hieronder afgebeeld.

Stekkercode

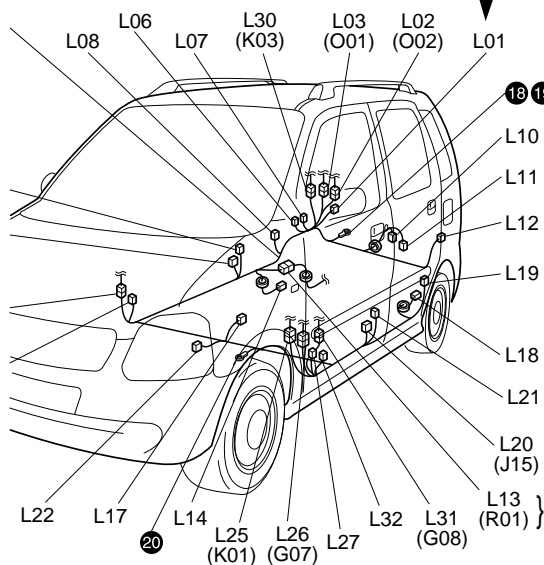
L 0 1

Stekkernummer (serienummer: 01)

Bedradingsbundel-symbool (Raadpleeg de onderstaande tabel)

Bedradingsbundel-symbool en corresponderende bedradingsbundel-naam

A : Accukabel	K : Dakkabel
B : Bedradingsbundel	L : Bedradingsbundel vloer
C : Bedradingsbundel motor	N : Bedradingsbundel achterrautver warming
D : Bedradingsbundel injector	O : Bedradingsbundel achterdeur•Kabel hooggeplaatst remlicht
E : Hoofdbedradingsbundel	Q : Bedradingsbundel airbag
G : Bedradingsbundel instrumentenpaneel	R : Bedradingsbundel brandstofpomp
J : Bedradingsbundel portier	



Dit geeft het nummer van het aardingspunt aan. Hetzelfde nummer wordt als het aardingspunt gebruikt. (Zie de sectie "AARDEPUNT" voor details.)

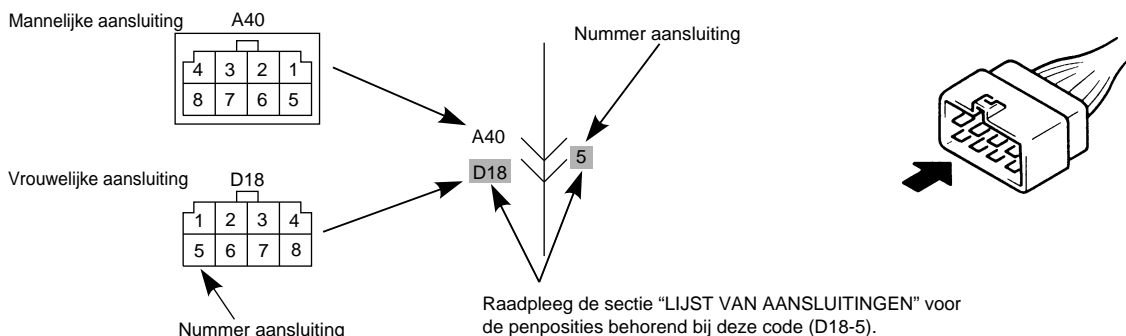
Dit geeft de stekkercode aan.

De stekkercode tussen haakjes () heeft dezelfde betekenis als de tussenstekker erboven en tegelijkertijd geeft dit aan dat er continuïteit is wat betreft de bedradingsbundel tussen de bladzijden of afbeeldingen in de sectie STEKKER LAYOUT DIAGRAM. Dat wil zeggen dat er wordt aangegeven dat de bedradingsbundel wordt vervolgd op de andere bladzijde of afbeelding en dat het vervolg van de bedradingsbundel geïdentificeerd kan worden aan dezelfde stekkercode.

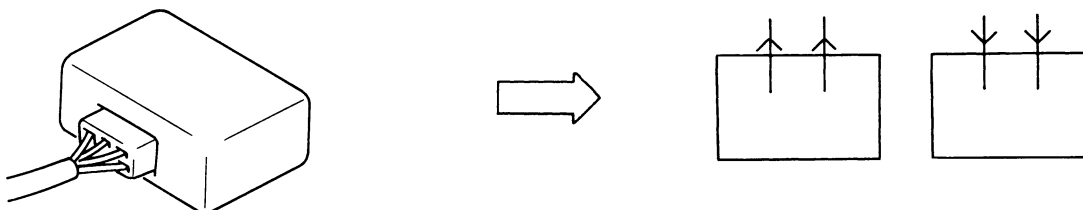
HOE STEKKERS WORDEN AANGEGEVEN EN HOE DEZE GELEZEN MOETEN WORDEN

De stekkers worden zoals hieronder afgebeeld aangeduid in de sectie "SYSTEEMCIRCUITDIAGRAM". Voor de vorm en de penposities van de diverse stekkers die in deze handleiding gebruikt worden, dient u de "LIJST VAN AANSLUITINGEN" te raadplegen. Hieronder wordt beschreven hoe ze worden aangeduid en hoe u ze moet aflezen.

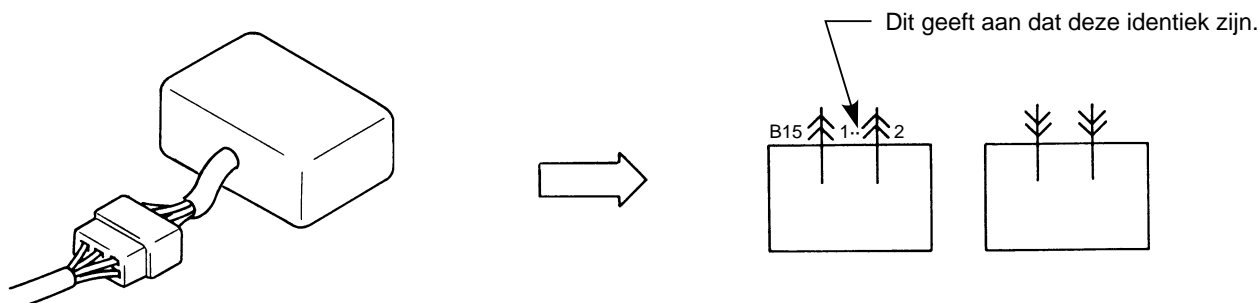
- De mannelijke aansluiting en de vrouwelijke aansluiting kunt u herkennen aan respectievelijk een dubbele en een enkele uitsparing.
 - De tussenstekker die bedradingsbundels met elkaar verbindt wordt afgebeeld met zowel de mannelijke als de vrouwelijke vorm van de aansluiting terwijl een stecker die direct op de apparatuur moet worden aangesloten alleen wordt afgebeeld met de vorm van de stekken die aan de bedradingsbundel zit.
 - De stekkers en aansluitingen die in deze handleiding worden beschreven zijn altijd "stekkers aan de bedradingsbundel", gezien uit de richting zoals hier rechts is afgebeeld.



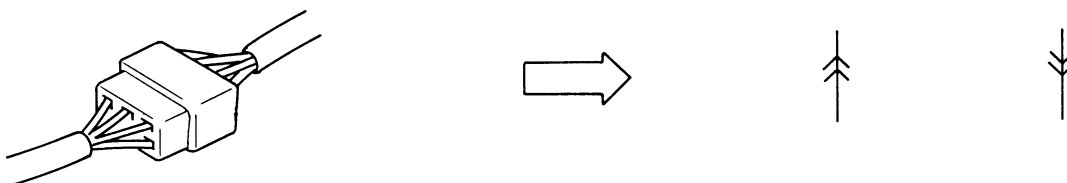
- Er zijn drie soorten stekkers, onderverdeeld naar de wijze van aansluiten, zoals voor elk type hieronder is afgebeeld.



- Om direct in de apparatuur te steken.

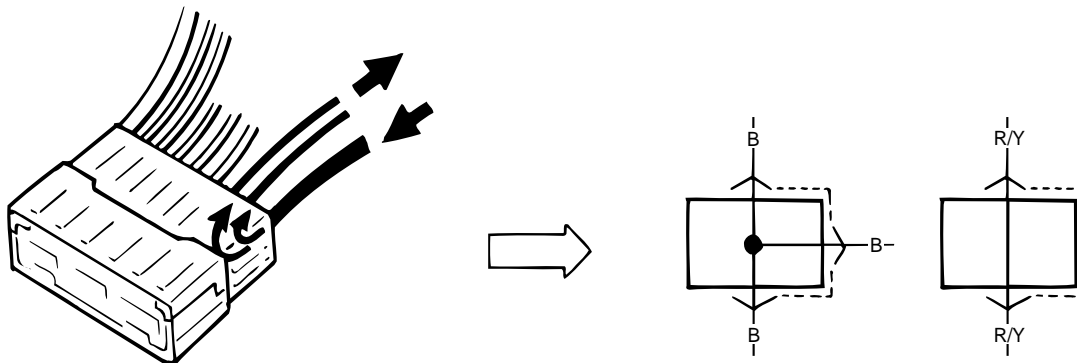


- Om aan te sluiten op de bedradingsbundel van de apparatuur.



- Om bedradingsbundels op elkaar aan te sluiten (tussenstekker).

3. • De bedrading van dit voertuig maakt gebruik van verbindingstukken die een enkele draad in verschillende draden kunnen splitsen of verschillende draden kunnen samenvoegen tot een draad.
• Een dergelijk verbindingstuk ziet u hieronder afgebeeld.



Hoe u stekkercodes en pen-nummers moet aflezen (Hoe u de handleiding moet gebruiken):

Het is mogelijk om de plaats en vorm van elke stekker terug te vinden via de stekkercode zoals die staat aangegeven in de sectie "SYSTEEMCIRCUITDIAGRAM" en de positie van elke pen via het nummer van de aansluitingspen.

* Terugvinden van de locatie van een stekker:

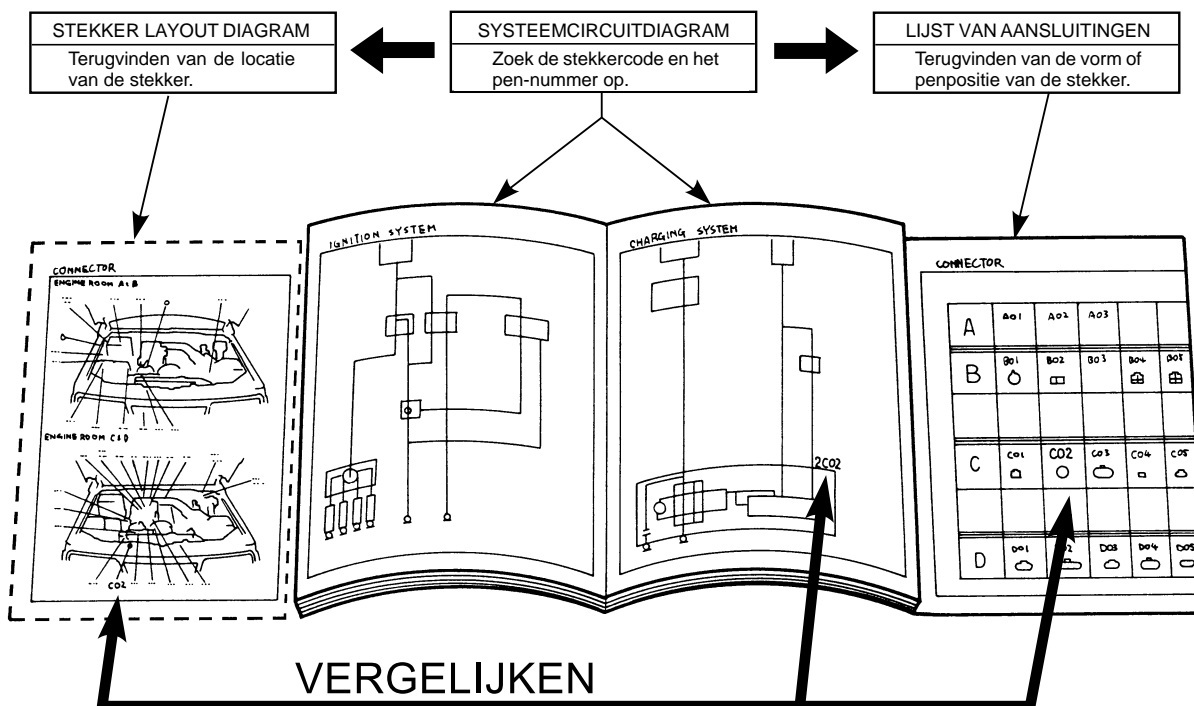
Open de sectie "SYSTEEMCIRCUITDIAGRAM" om de stekkercode van de gezochte stekker op te zoeken. Raadpleeg vervolgens de sectie "STEKKER LAYOUT DIAGRAM" en zoek de code van de gezochte stekker op. De plaats waar deze code staat is de locatie van de gezochte stekker.

* Terugvinden van de vorm of het pen-nummer

Open de sectie "SYSTEEMCIRCUITDIAGRAM" om de stekkercode en het pen-nummer van de gezochte stekker op te zoeken. Raadpleeg vervolgens de "LIJST VAN AANSLUITINGEN", zoals u hieronder aan de rechterkant van de afbeelding kunt zien en zoek de gewenste stekkercode op, waaronder de vorm van die stekker staat afgebeeld. Dit is een makkelijke werkwijze wanneer u de gezochte stekker wilt kunnen vinden van soortgelijke stekkers. Het is ook mogelijk om via deze bladzijde de positie van elke pen te vinden aan de hand van het aansluitingspen-nummer vermeld in de sectie "SYSTEEMCIRCUITDIAGRAM".

Dit kan handig zijn wanneer u de penpositie in de stekker moet opzoeken om de stroomdoorvoer tussen bepaalde pennen te controleren.

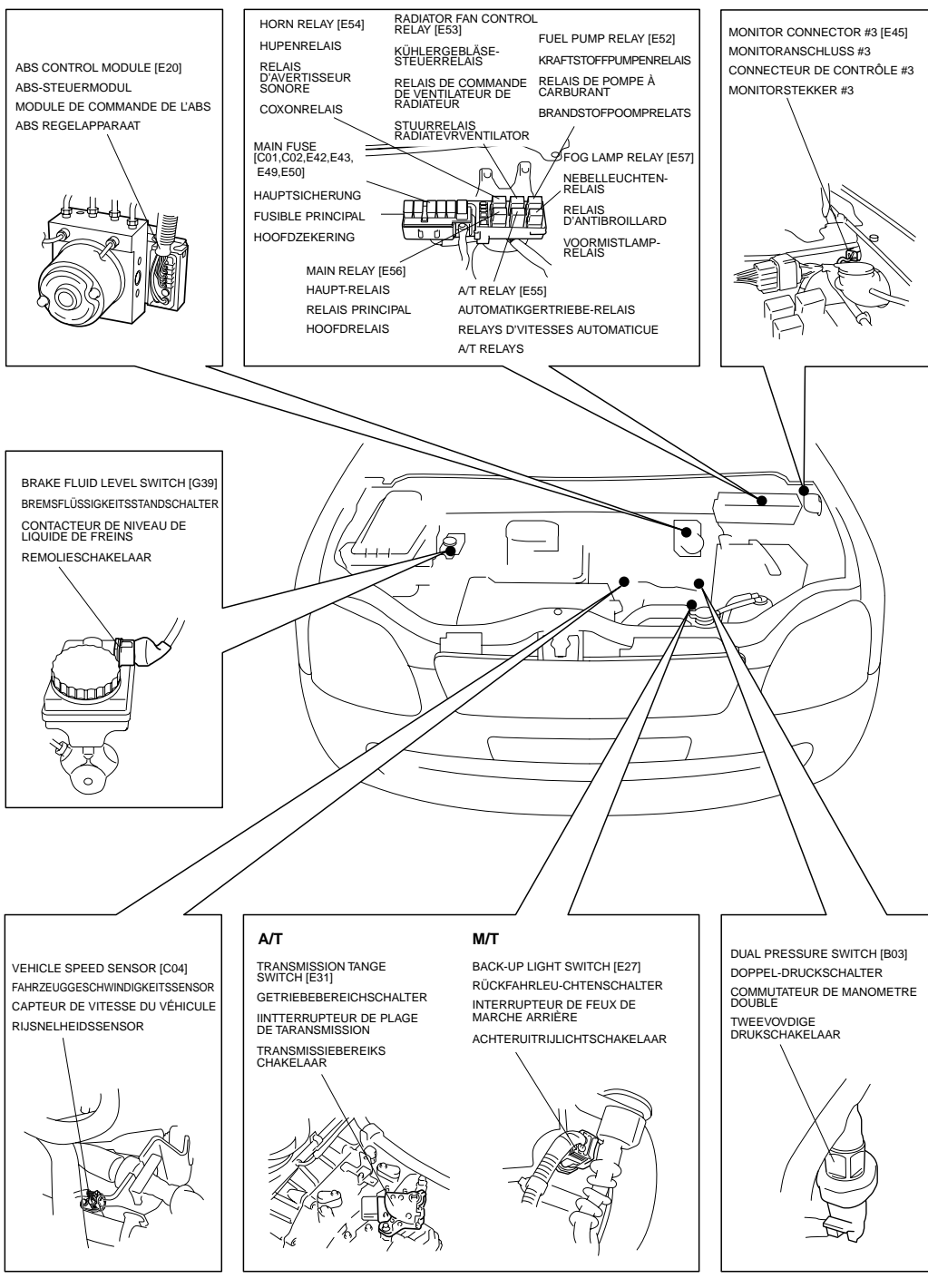
Om de locatie, de vorm of penpositie van een stekker te weten te komen, dient u het "SYSTEEMCIRCUITDIAGRAM", het "STEKKER LAYOUT DIAGRAM" en de "LIJST VAN AANSLUITINGEN" met elkaar te vergelijken op de volgende manier:



HOE INSTALLATIEPOSITIES VAN EENHEIDSONDERDELEN GELEZEN MOETEN WORDEN

Het diagram in de sectie “INSTALLATIEPOSITIES VAN EENHEIDSONDERDELEN” laat de installatieposities zien van zekeringen, relais en bedieningseenheden zoals die in dit voertuig gebruikt worden. Deze worden aangegeven zoals hieronder staat afgebeeld.

ENGINE ROOM (RIGHT HAND STEERING VEHICLE) MOTORRAUM (FAHRZEUG MIT RECHTSLENKUNG) COMPARTIMENT MOTEUR (VEHICULE A CONDUITE A DROITE) MOTORBAK (VOERTUIG MET RECHTS STUUR)

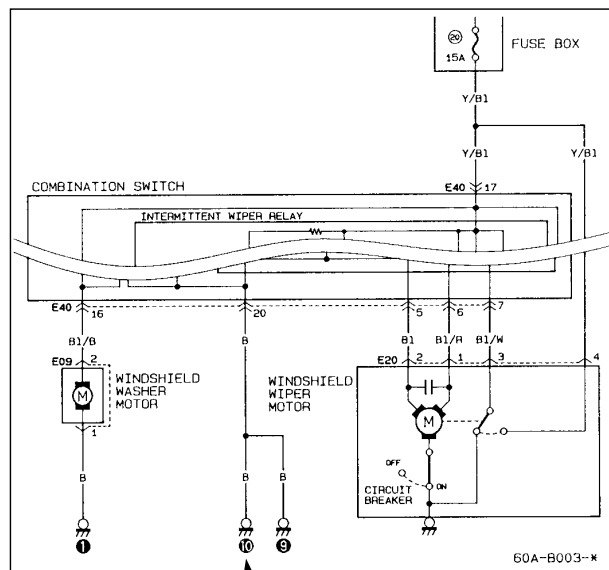


HOE DE AARDINGSPUNTEN GELEZEN MOETEN WORDEN

Een aardingspunt is een plek waar de negatieve draad van de bedradingsbundel geaard wordt. Het diagram in de sectie “AARDEPUNT” laat dergelijke aardingspunten zien. In de sectie “SYSTEEMCIRCUITDIAGRAM” staan vele aardingstekens gevolgd door zwarte cirkels met nummers (10), hetgeen betekent dat het uiteinde van de bedradingsbundel met een dergelijk zwart cirkeltje ergens aan een onderdeel van het voertuig geaard is. Om het aardingspunt terug te vinden (installatiepositie), dient u de sectie “AARDEPUNT” te raadplegen.

“SYSTEEMCIRCUITDIAGRAM” sectie

■ VOOR RUITENWISSELS/SPROEIER



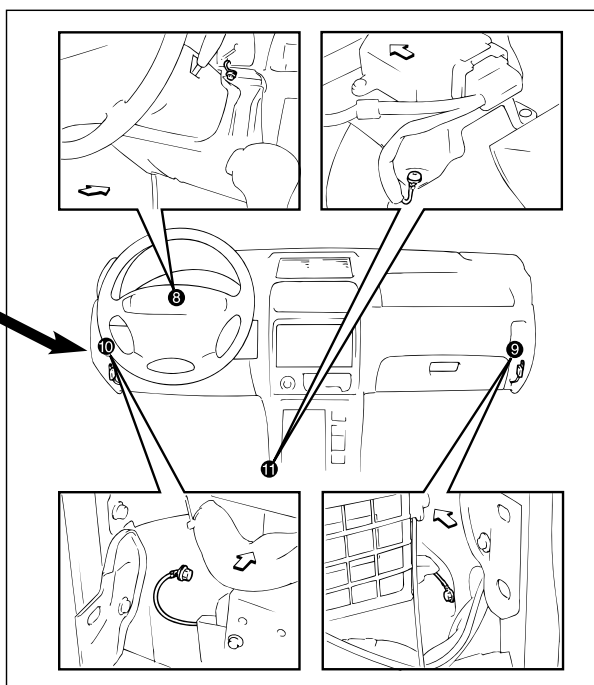
[Terugvinden aardingspunt]

Kijk in de sectie “AARDEPUNT” en zoek het zwarte cirkeltje met hetzelfde nummer (10) als beschreven in de sectie “SYSTEEMCIRCUIT-DIAGRAM”.

OPMERKING:

Als er een elektrisch onderdeel is waarvoor u het aardingspunt niet kunt vinden in de sectie “AARDEPUNT”, dan werkt dat onderdeel zelf als een aarding.

“AARDEPUNT” sectie



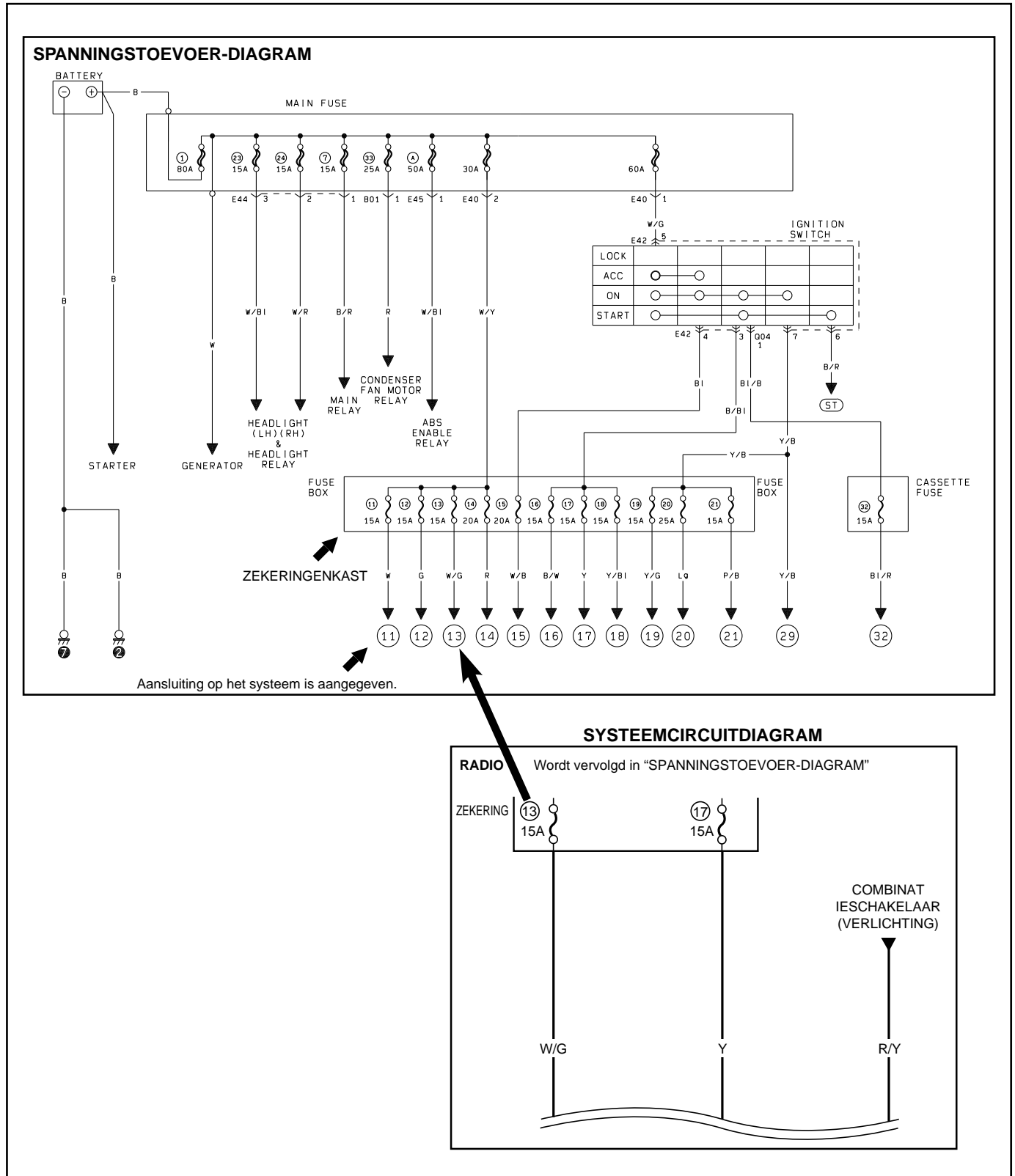
VERGELIJKEN

HOE EEN STROOMVOORZIENINGSDIAGRAM GELEZEN MOETN WORDEN

Het stroomvoorzieningsdiagram laat de schakelingen zien vanaf de positieve aansluiting van de accu naar elke zekering in de zekeringenkast en waar elke zekering is aangesloten (elke systeemschakeling-naam).

Bovendien staat de elektrische belastingswaarde van elke zekering aangegeven.

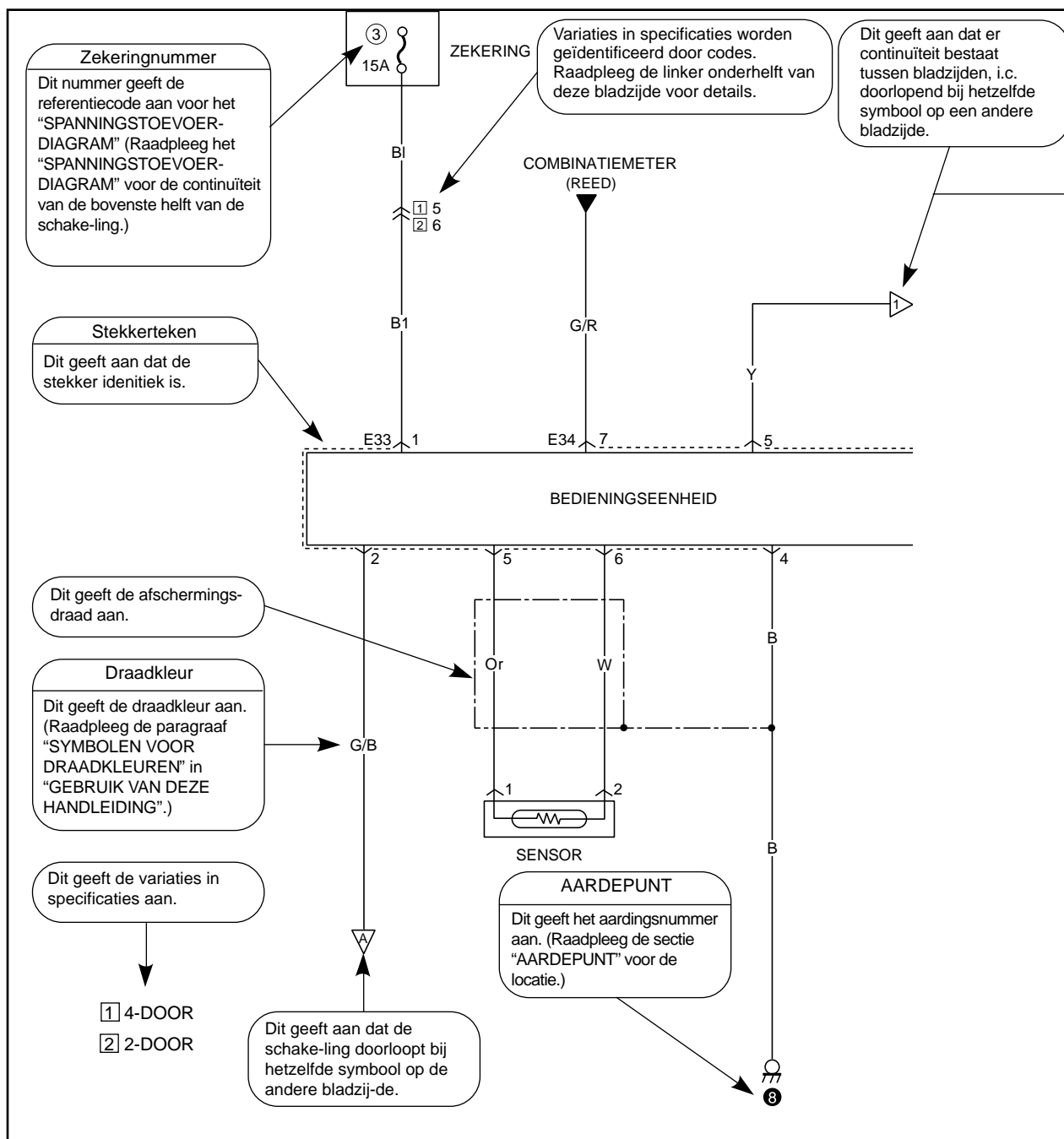
Aangezien elk "SYSTEEMCIRCUIT-DIAGRAM" getekend is voor de schakeling vanaf de zekering, dient u het "SPANNINGSTOEVOERDIAGRAM" hiermee te vergelijken aan de hand van het zekeringsnummer zoals ②1 wanneer u de continuïteit van de bovenste helft van de schakeling controleert.

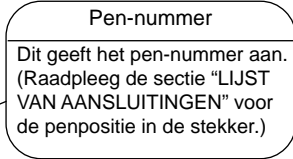


HOE EEN SYSTEEMSCHAKELINGSDIAGRAM GELEZEN MOET WORDEN

Het schakelingsdiagram van elk systeem laat de elektrische schakeling zien vanaf de hoofdzekering, de zekeringenkast of de contactschakelaar (bovenaan het diagram) naar de aarding (onderaan), zodat de schakeling gemakkelijk gevolgd kan worden wanneer u inspectie en onderhoudswerkzaamheden uit gaat voeren.

Verdere informatie over stekkers, aardingspunten en zekeringen kunt u krijgen door het "SYSTEEMCIRCUIT-DIAGRAM" te vergelijken met de andere secties zoals beschreven in de voorgaande onderdelen van deze sectie. De stekkercode, nummer van het aardingspunt en zekersnummer zijn de referentiecodes voor de vergelijking.





HOE DE LIJST VAN STEKKERS EN AANSLUITINGEN GELEZEN MOET WORDEN

De sectie “LIJST VAN AANSLUITINGEN” is bedoeld om te helpen bij de identificatie wanneer u naar een bepaalde stekker aan het zoeken bent tussen vergelijkbare stekkers, en ook wanneer u de posities van pennen moet opzoeken in de stekker wanneer u de stroomdoorvoer tussen bepaalde pennen moet controleren enz. Let u er op dat deze lijst opgesteld is om de basisconfiguraties van de stekkers te symboliseren en dat sommige stekkers uit de lijst kunnen afwijken van de daadwerkelijk aangetroffen stekkers afhankelijk van de specificaties.

Hoe u de “LIJST VAN AANSLUITINGEN” dient te gebruiken:

Het is makkelijk de vorm van de gezochte stekker en de penposities daarvan te vinden door dezelfde stekkercode en de pen-nummers op te zoeken als die in de sectie “SYSTEEMCIRCUITDIAGRAM” uit de sectie “LIJST VAN AANSLUITINGEN”.

Voor meer informatie over het gebruik hiervan dient u het onderdeel “HOE STEKKERS WORDEN AANGEGEVEN EN HOE DEZE GELEZEN MOETEN WORDEN” in deze sectie te raadplegen.

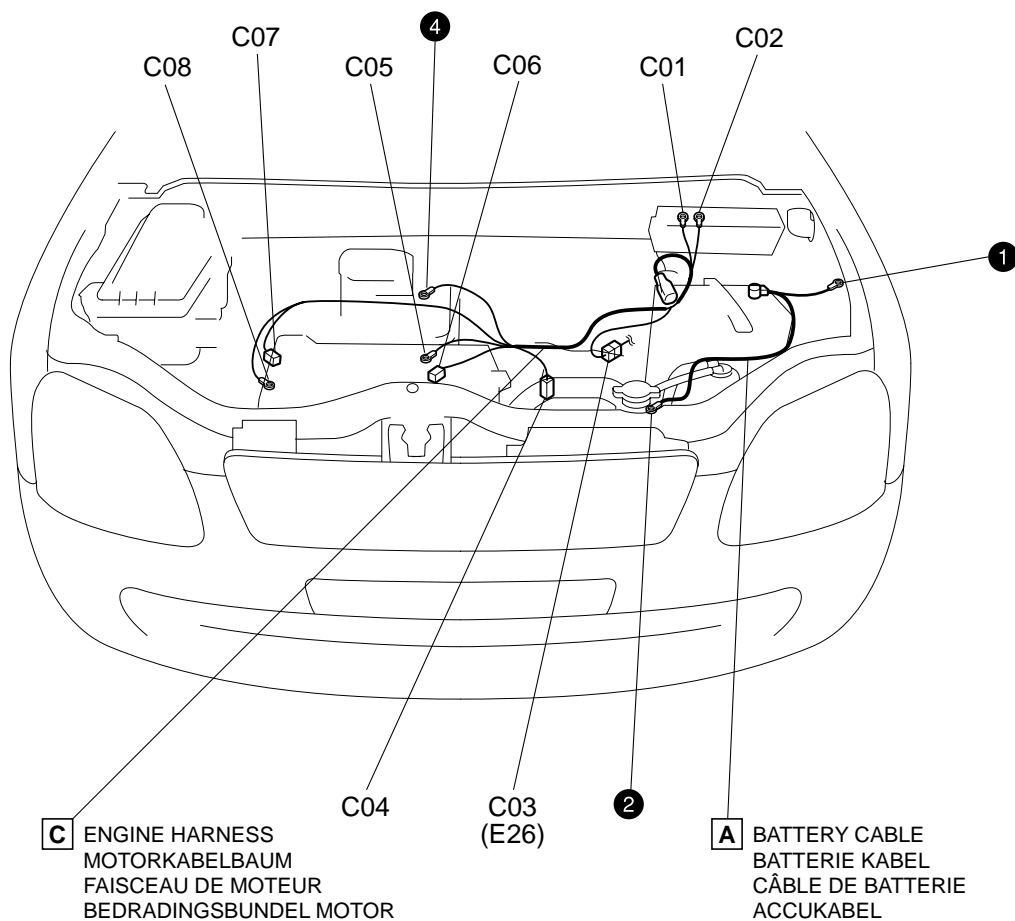
**SECTION 8A-3
ABSCHNITT 8A-3
SECTION 8A-3
DEEL 8A-3**

**CONNECTOR LAYOUT DIAGRAM
ANSCHLUSSSCHALTPLAN
SCHEMA DE DISPOSITION DES CONNECTEURS
STEKKER LAYOUT DIAGRAM**

8A-3

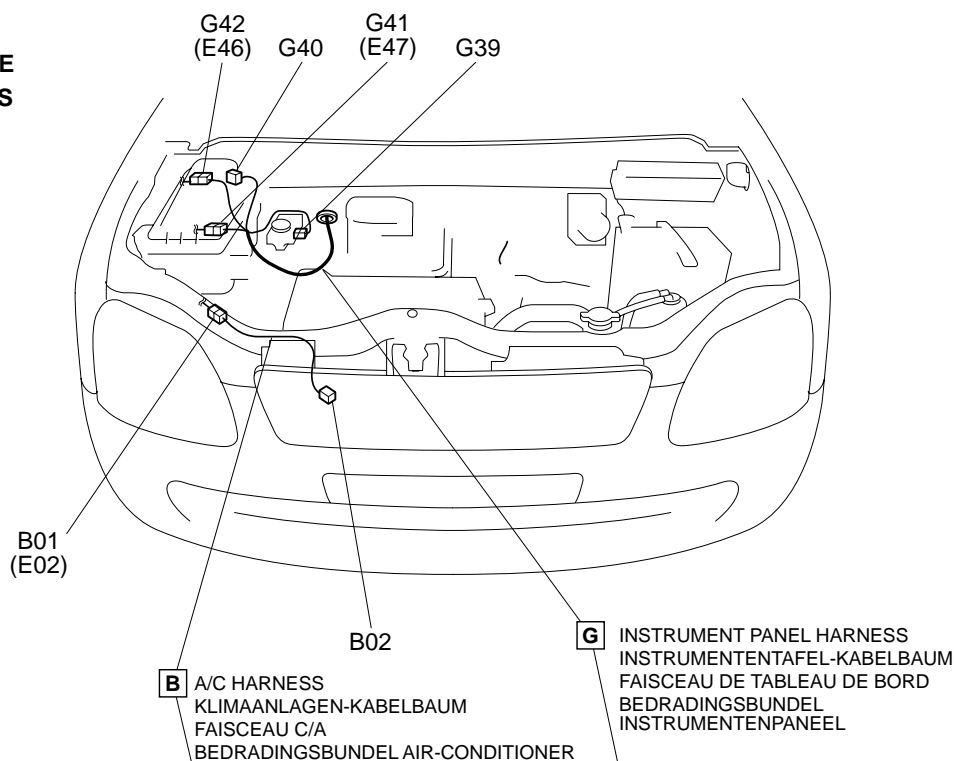
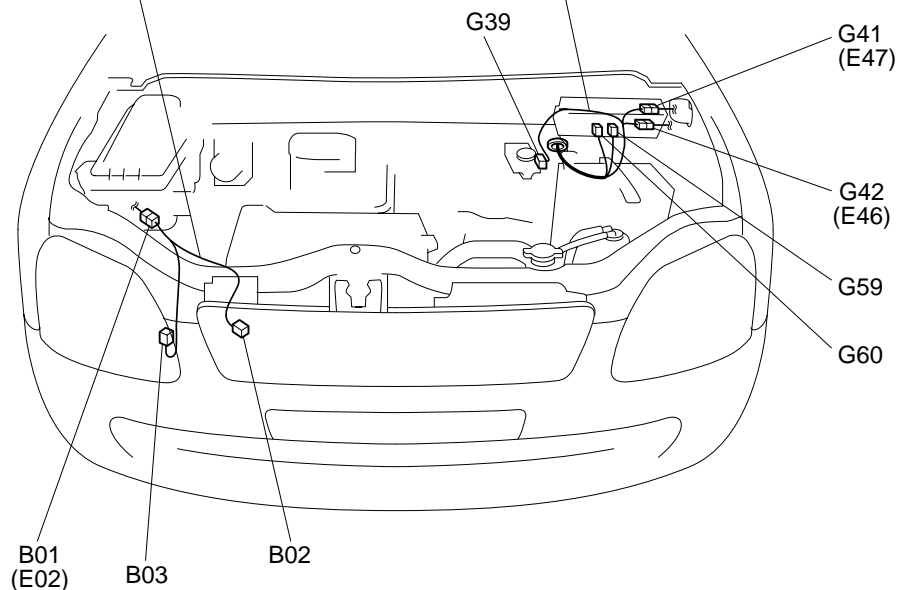
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ENGINE ROOM**MOTORRAUM****COMPARTIMENT MOTEUR****MOTORBAK****A: BATTERY CABLE****A: BATTERIEKABEL****A: CÂBLE DE BATTERIE****A: ACCUKABEL****C: ENGINE HARNESS****C: MOTORKABELBAUM****C: FAISCEAU DE MOTEUR****C: BEDRADINGSBUNDEL MOTOR****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het steekernummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

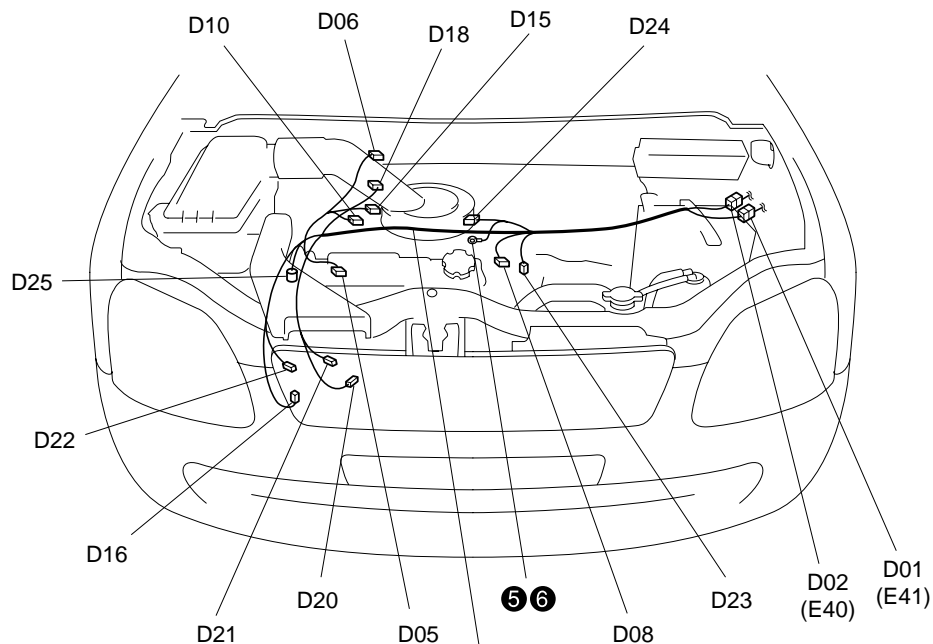
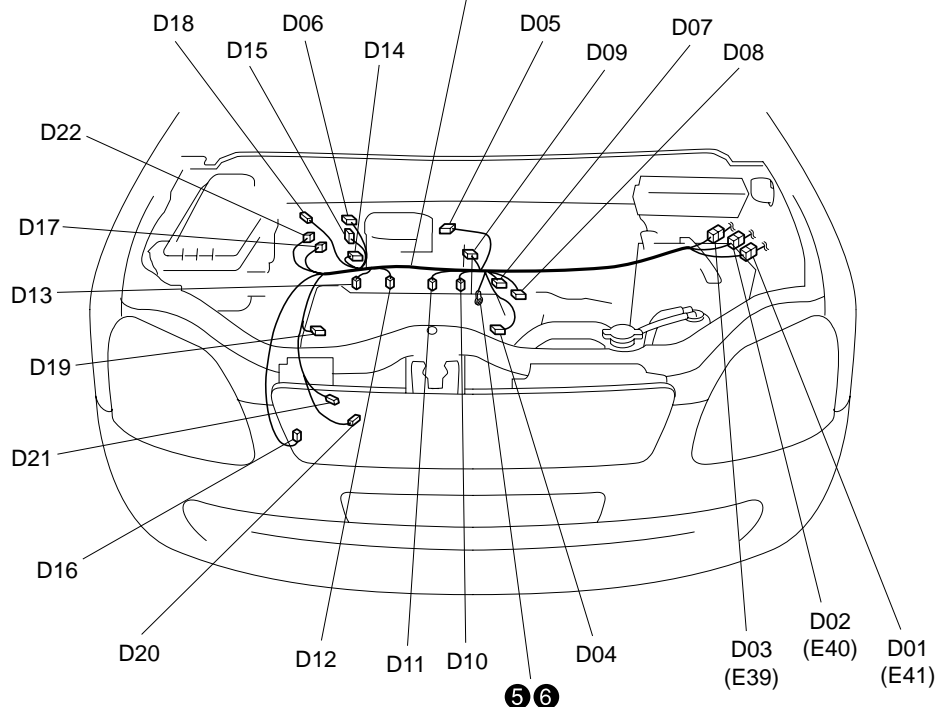
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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDER ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
A: BATTERY CABLE / A: BATTERIEKABEL A: CÂBLE DE BATTERIE / A: ACCUKABEL	
C: ENGINE HARNESS / C: MOTORKABELBAUM C: FAISCEAU DE MOTEUR / C: BEDRADINGSBUNDEL MOTOR	
C01	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
C02	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
C03	MAIN HARNESS [E26] / HAUPTKABELBAUM [E26] FAISCEAU PRINCIPAL [E26] / HOOFDBEDRADINGSBUNDEL [E26]
C04	VEHICLE SPEED SENSOR / FAHRZEUGGESCHWINDIGKEITSSENSOR CAPTEUR DE VITESSE DU VÉHICULE / RIJSNELHEIDSSENSOR
C05	STARTING MOTOR / STARTER MOTEUR DE DÉMARREUR / STARTMOTOR
C06	STARTING MOTOR / STARTER MOTEUR DE DÉMARREUR / STARTMOTOR
C07	GENERATOR / LICHTMASCHINE GÉNÉRATEUR / DYNAMO
C08	GENERATOR / LICHTMASCHINE GÉNÉRATEUR / DYNAMO

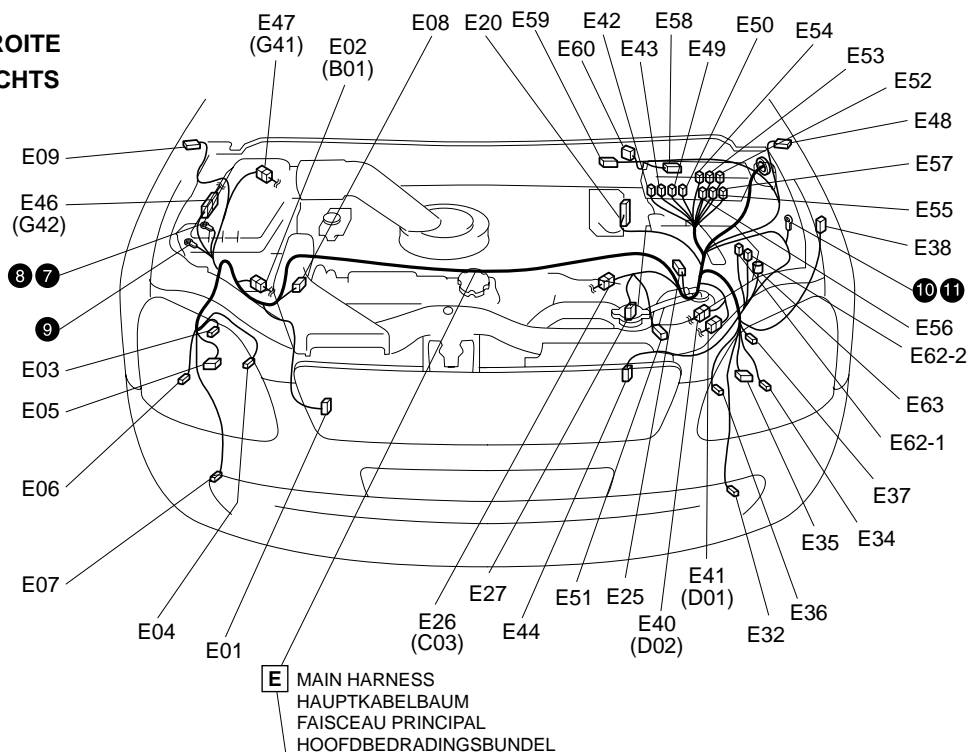
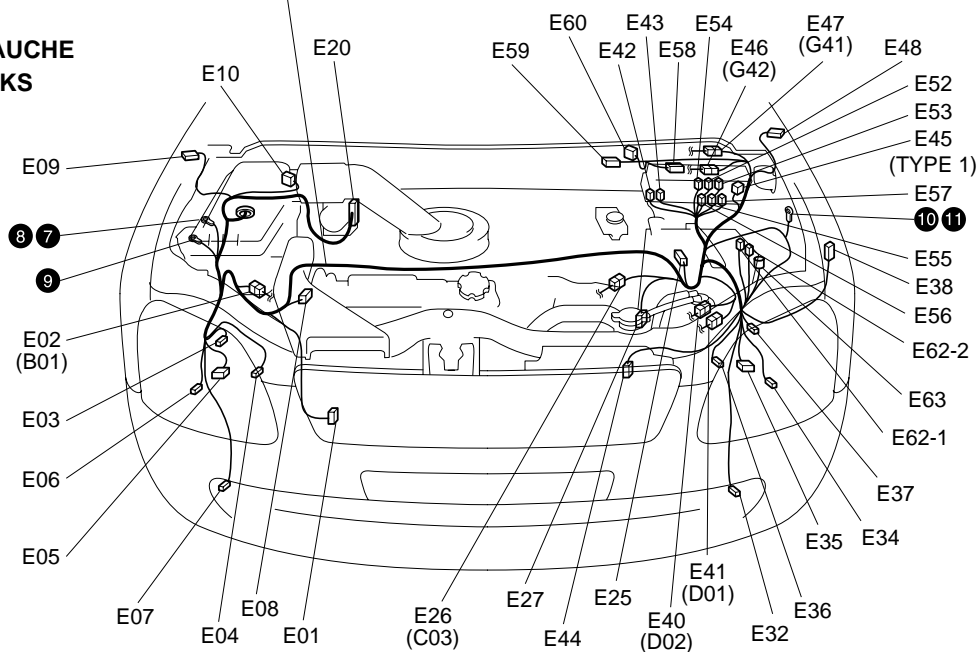
ENGINE ROOM**MOTOR ROOM****COMPARTIMENT MOTEUR****MOTORBAK****B: A/C HARNESS****B: KLIMAANLAGEN-KABELBAUM****B: FAISCEAU C/A****B: BEDRADINGSBUNDEL AIR-CONDITIONER****G: INSTRUMENT PANEL HARNESS****G: INSTRUMENTENTAFEL-KABELBAUM****G: FAISCEAU DE TABLEAU DE BORD****G: BEDRADINGSBUNDEL INSTRUMENTENPANEEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDER ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
B: A/C HARNESS / B: KLIMAANLAGEN-KABELBAUM B: FAISCEAU C/A / B: BEDRADINGSBUNDEL AIR-CONDITIONER	
B01	MAIN HARNESS [E02] / HAUPTKABELBAUM [E02] FAISCEAU PRINCIPAL [E02] / HOOFDBEDRADINGSBUNDEL [E02]
B02	A/C COMPRESSOR / KLIMAANLAGEN-KOMPRESSOR COMPRESSEUR A/C / A/C COMPRESSOR
B03	DUAL PRESSURE SWITCH / DOPPEL-DRUCKSCHALTER COMMUTATEUR DE MANOMETRE DOUBLE / TWEEVOUDIGE DRUKSCHAKELAAR
G: INSTRUMENT PANEL HARNESS / G: INSTRUMENTENTAFEL-KABELBAUM G: FAISCEAU DE TABLEAU DE BORD / G: BEDRADINGSBUNDEL INSTRUMENTENPANEEL	
G39	BRAKE FLUID LEVEL SWITCH / BREMSFLÜSSIGKEITSSTANDSCHALTER CONTACTEUR DE NIVEAU DE LIQUIDE DE FREINS / REMVLOEISTOFNIVEAUSCHAKELAAR
G40	FRONT WIPER MOTOR / FRONTSCHIEBENWISCHERMOTOR MOTEUR D'ESSUIE-GLACE AVANT / VOORRUITENWISSERMOTOR
G41	MAIN HARNESS [E47] / HAUPTKABELBAUM [E47] FAISCEAU PRINCIPAL [E47] / HOOFDBEDRADINGSBUNDEL [E47]
G42	MAIN HARNESS [E46] / HAUPTKABELBAUM [E46] FAISCEAU PRINCIPAL [E46] / HOOFDBEDRADINGSBUNDEL [E46]
G59	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
G60	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING

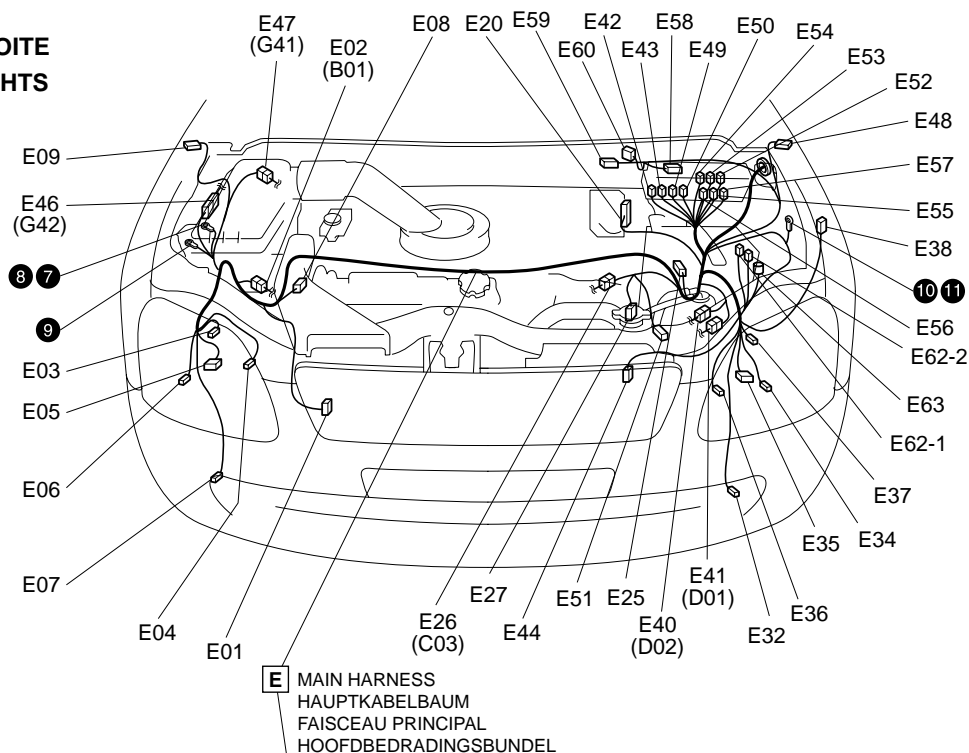
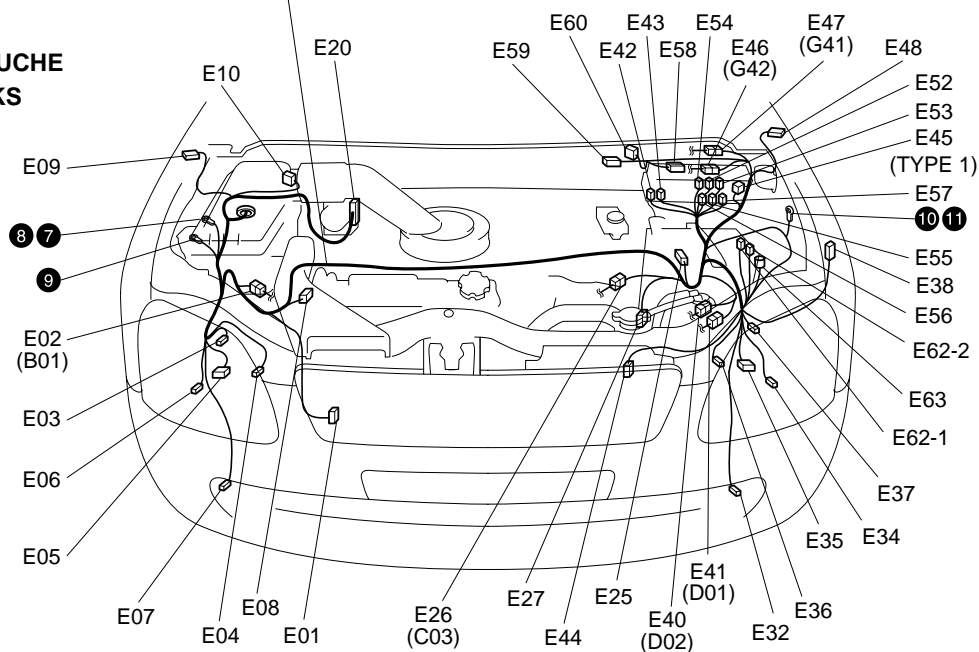
ENGINE ROOM**MOTORBAUM****COMPARTIMENT MOTEUR****MOTORBAK****D: INJECTOR HARNESS****D: EINSPRITZVORRICHTUNG-KABELBAUM****D: FAISCEAU DE FILS ÉLECTRIQUES D'INJECTEUR****D: BEDRADINGSBUNDEL INJECTOR****1.0L****1.3L****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het steekernummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDE ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
D: INJECTOR HARNESS / D: EINSPRITZVORRICHTUNG-KABELBAUM D: FAISCEAU DE FILS ÉLECTRIQUES D'INJECTEUR / D: BEDRADINGSBUNDEL INJECTOR	
D01	MAIN HARNESS [E41] / HAUPTKABELBAUM [E41] FAISCEAU PRINCIPAL [E41] / HOOFDBEDRADINGSBUNDEL [E41]
D02	MAIN HARNESS [E40] / HAUPTKABELBAUM [E40] FAISCEAU PRINCIPAL [E40] / HOOFDBEDRADINGSBUNDEL [E40]
D03	MAIN HARNESS [E39] / HAUPTKABELBAUM [E39] FAISCEAU PRINCIPAL [E39] / HOOFDBEDRADINGSBUNDEL [E39]
D04	IGNITION COIL #1 / ZÜNDSPULE #1 BOBINE D'ALLUMAGE #1 / BOBINE #1
D05	EVAP CANISTER PURGE VALVE / TROCKNE-RBEHÄLTER-ABLAßVENTIL VALVE DE PURGE DE VASE D'EVAP / AFZUIGKLEP VAN EVAP KOOLSTOFFILTER
D06	MAP SENSOR / MAP-SENSOR DÉTECTEUR MAP / MAP SENSOR
D07	CAMSHAFT POSITION SENSOR / NOCKENWELLENFÜHLER DÉTECTEUR DE POSITION DE L'ARBRE A CAMES / NOKKENASPOSITIESENSOR
D08	ECT SENSOR / ECT-SENSOR DÉTECTEUR ECT / ECT SENSOR
D09	EGR STEPPER MOTOR / EGR-SCHRITTMOTOR MOTEUR PAS-À-PAS EGR / EGR STAP MOTOR
D10	INJECTOR #4 / EINSPRITZDÜSE #4 INJECTEUR #4 / VERSTUIVER #4
D11	INJECTOR #3 / EINSPRITZDÜSE #3 INJECTEUR #3 / VERSTUIVER #3
D12	INJECTOR #2 / EINSPRITZDÜSE #2 INJECTEUR #2 / VERSTUIVER #2
D13	INJECTOR #1 / EINSPRITZDÜSE #1 INJECTEUR #1 / VERSTUIVER #1
D14	IAC VALVE / IAC-VENTIL VALVE IAC / IAC VALVE
D15	THROTTLE POSITION SENSOR / DROSSELKLAPPENÖFFNUNGSSENSOR DÉTECTEUR DE POSITION DU PAPILLON / GASKLEPPOSITIESENSOR
D16	CRANKSHAFT POSITION SENSOR / POSITIONSGEBER DÉTECTEUR DE POSITION DE VILEBREQUIN / KRUKASSTANDSENSOR
D17	KNOCK SENSOR / KLOPFSENSOR DÉTECTEUR DE DETONATION / DETONATIESENSOR
D18	IAT SENSOR / ELT-FUHLER DÉTECTEUR DE TAA / IAT SENSOR
D19	IGNITION COIL #2 / ZÜNDSPULE #2 BOBINE D'ALLUMAGE #2 / BOBINE #2
D20	OIL PRESSURE SWITCH / ÖLDRUCKSCHALTER INTERRUPTEUR DE PRESSION D'HUILE / OLIEDRUKSCHAKELAAR
D21	HEATED OXYGEN SENSOR #1 / BEHEIZTE LAMBDA-SONDE #1 CAPTEUR D'OXYGÈNE CHAUFFÉ #1 / VERWARMDE ZUURSTOFSENSOR #1
D22	HEATED OXYGEN SENSOR #2 / BEHEIZTE LAMBDA-SONDE #2 CAPTEUR D'OXYGÈNE CHAUFFÉ #2 / VERWARMDE ZUURSTOFSENSOR #2
D23	DISTRIBUTER / VERTEILER DISTRIBUTEUR / DISTRIBUIDOR
D24	IAC-VSV / IAC-VSV IAC-VSV / IAC-VSV
D25	EFE HEATER / CHAUFFE -EFE EFE HEIZUNG / EFE VERWARMING

ENGINE ROOM (1.0L)**MOTORRAUM (1,0L)****COMPARTIMENT MOTEUR (1,0L)****MOTORBAK (1,0L)****E: MAIN HARNESS****E: HAUPTKABELBAUM****E: FAISCEAU PRINCIPAL****E: HOOFDBEDRADINGSBUNDEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

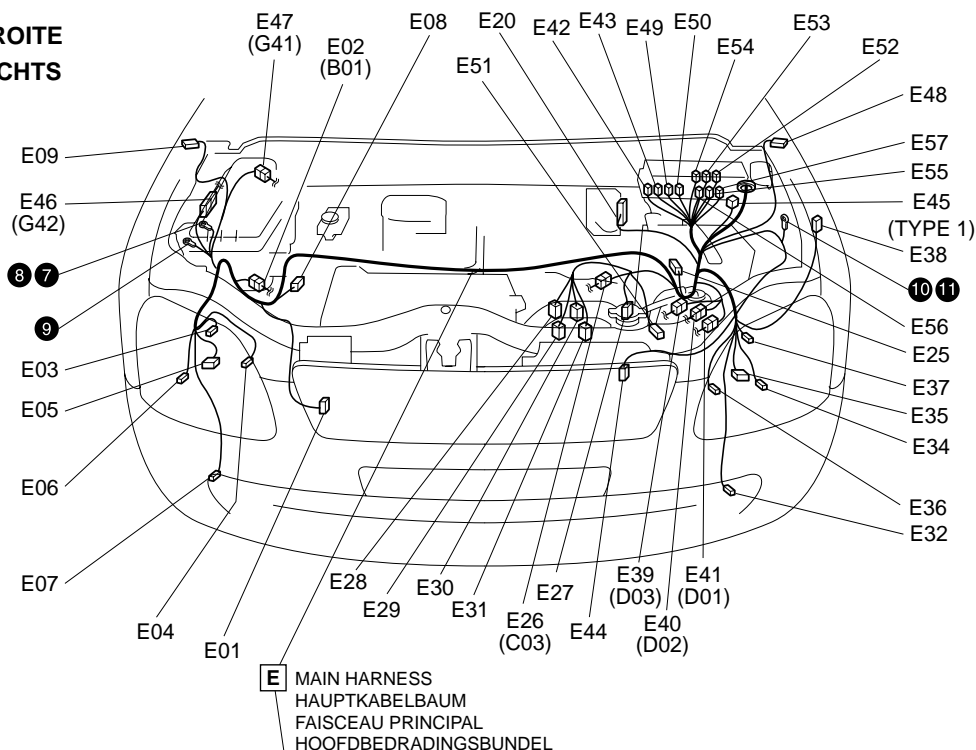
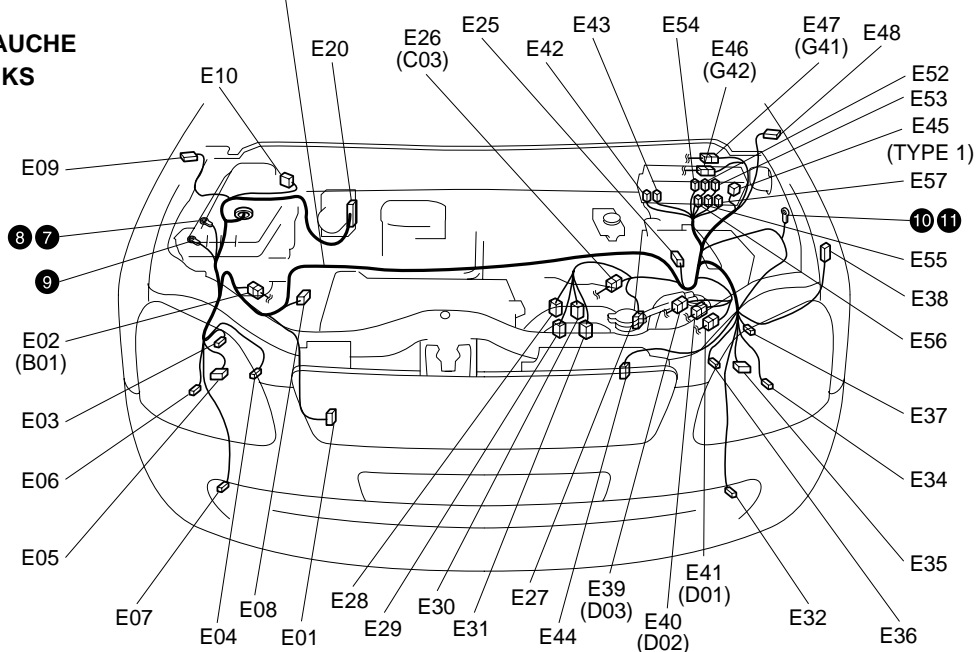
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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDE ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
E: MAIN HARNESS / E: HAUPTKABELBAUM E: FAISCEAU PRINCIPAL / E: HOOFDBEDRADINGSBUNDEL	
E01	HORN / HUPE AVERTISSEUR / CLAXON
E02	A/C HARNESS [B01] / KLIMAANLAGEN-KABELBAUM [B01] FAISCEAU C/A [B01] / BEDRADINGSBUNDEL AIR-CONDITIONER [B01]
E03	FRONT TURN SIGNAL LIGHT (R) / FRONTBLINK-LEUCHTE (R) CLIGNOTANT AVANT (D) / SEITLICHE BLINKLEUCHTE (R)
E04	FRONT POSITION LIGHT (R) / VORDERE PARKLEUC-HTE (R) FEU DE POSITION AVANT (D) / PARKEERLICHT VOOR (R)
E05	HEADLIGHT(R) / SCHEINWERFERLICHT (R) PHARE (D) / KOPLAMP (R)
E06	HEADLIGHT BEAM LEVELING ACTUATOR (R) / SCHEINWERFER-NIVELLIER-STELLGLIED (R) COMMANDE DE REGLAGE DU FAISCEAU DE PHARE (D) / KOPLICHTHOOGTE-STELMOTOR (R)
E07	FRONT FOG LIGHT (R) / NEBELSCHEINWERFER (R) ANTIBROUILLARD AVANT (D) / VOORMISTLAMP (R)
E08	FRONT WHEEL SENSOR (R) / VORDERRADSENSOR (R) DETECTEUR DE ROUE AVANT (D) / VOORWIELSENSOR (R)
E09	SIDE TURN SIGNAL LIGHT (R) / SEITENBLINKLEUCHTE (R) CLIGNOTANT LATÉRAL (D) / RICHTINGAANWIJZER ZIJKANT (R)
E10	FRONT WIPER MOTOR / FRONTSCHIEBENWISCHERMOTOR MOTEUR D'ESSUIE-GLACE AVANT / VOORRUITENWISSERMOTOR
E20	ABS CONTROL MODULE / ABS-STEUERMODUL MODULE DE COMMANDE DE L'ABS / ABS REGELAPPARAAT
E25	FRONT WHEEL SENSOR (L) / VORDERRADSENSOR (L) DETECTEUR DE ROUE AVANT (G) / VOORWIELSENSOR (L)
E26	ENGINE HARNESS [C03] / MOTORKABELBAUM [C03] FAISCEAU DE MOTEUR [C03] / BEDRADINGSBUNDEL MOTOR [C03]
E27	BACK-UP LIGHT SWITCH / RÜCKFAHRLEUCHTENSCHALTER INTERRUPTEUR DE FEUX DE MARCHE ARRIÈRE / ACHTERUITRIJLICHTSCHAKELAAR
E32	FRONT FOG LIGHT (L) / NEBELSCHEINWERFER (L) ANTIBROUILLARD AVANT (G) / VOORMISTLAMP (L)
E34	HEADLIGHT BEAM LEVELING ACTUATOR (L) / SCHEINWERFER-NIVELLIER-STELLGLIED (L) COMMANDE DE REGLAGE DU FAISCEAU DE PHARE (G) / KOPLICHTHOOGTE-STELMOTOR (L)
E35	HEADLIGHT (L) / SCHEINWERFERLICHT (L) PHARE (G) / KOPLAMP (L)
E36	FRONT POSITION LIGHT (L) / VORDERE PARKLEUC-HTE (L) FEU DE POSITION AVANT (G) / PARKEERLICHT VOOR (L)
E37	FRONT TURN SIGNAL LIGHT (L) / FRONTBLINK-LEUCHTE (L) CLIGNOTANT AVANT (G) / SEITLICHE BLINKLEUCHTE (L)
E38	FRONT & REAR WASHER MOTOR / FRONT- & HECKSCHEIBEN-WASCHPUMPENMOTOR MOTEUR DE LAVE- GLACE AVANT ET ARRIÈRE / VOOR- EN ACHTERSPROEIERMOTOR
E40	INJECTOR HARNESS [D02] / EINSPRITZVORRICHTUNG-KABELBAUM [D02] FAISCEAU DE FILS ÉLECTRIQUES D'INJECTEUR [D02] / BEDRADING SBUNDEL INJECTOR [D02]
E41	INJECTOR HARNESS [D01] / EINSPRITZVORRICHTUNG-KABELBAUM [D01] FAISCEAU DE FILS ÉLECTRIQUES D'INJECTEUR [D01] / BEDRADING SBUNDEL INJECTOR [D01]
E42	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
E43	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
E44	RADIATOR FAN MOTOR / KÜHLERGEBLÄSE-MOTOR MOTEUR DE VENTILATEUR DE RADIATEUR / MOTOR RADIATEURVENTILATOR
E45	DIAGNOSIS CONNECTOR #6 (TYPE 1) / DIAGNOSESTECKER #6 (TYP 1) CONNECTEUR DE DIAGNOSTIC #6 (TYPE 1) / DIAGNOSESTEKKER #6 (TIPO 1)
E46	INSTRUMENT PANEL HARNESS [G42] / INSTRUMENTENTAFEL-KABELBAUM [G42] FAISCEAU DE TABLEAU DE BORD [G42] / BEDRADINGSBUNDEL INSTRUMENTENPANEEL [G42]
E47	INSTRUMENT PANEL HARNESS [G41] / INSTRUMENTENTAFEL-KABELBAUM [G41] FAISCEAU DE TABLEAU DE BORD [G41] / BEDRADINGSBUNDEL INSTRUMENTENPANEEL [G41]
E48	SIDE TURN SIGNAL LIGHT (L) / SEITENBLINKLEUCHTE (L) CLIGNOTANT LATÉRAL (G) / RICHTINGAANWIJZER ZIJKANT (L)

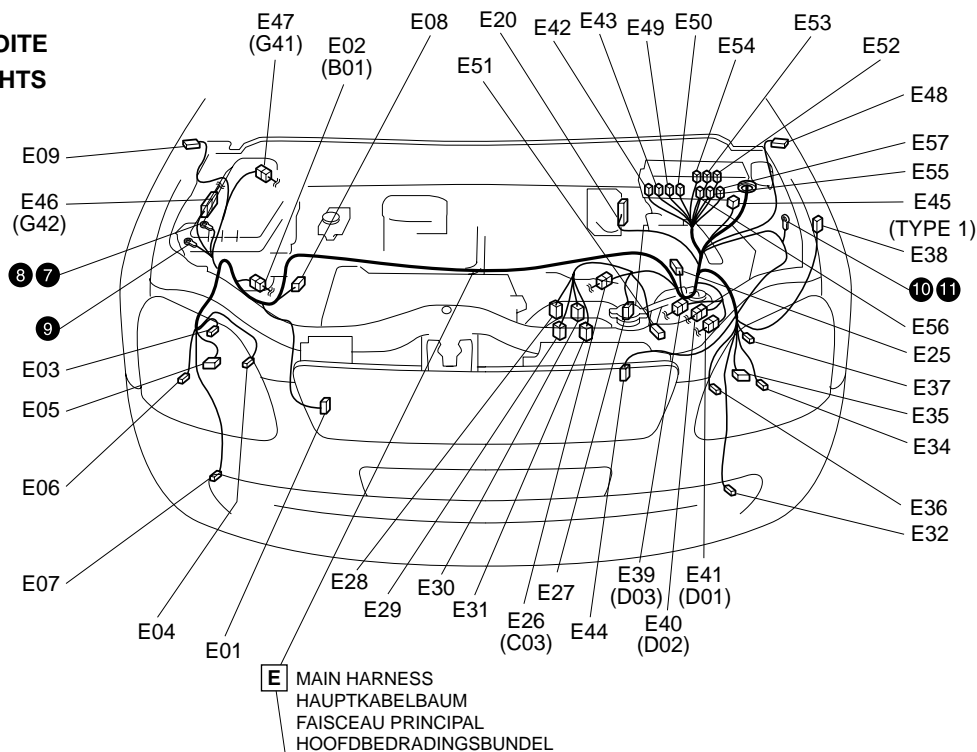
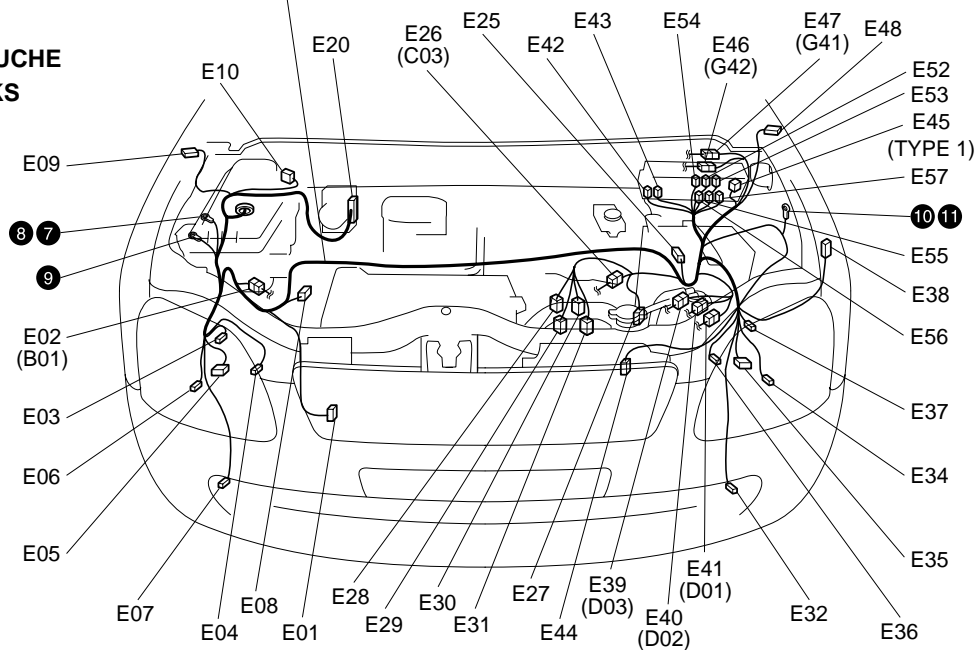
ENGINE ROOM (1.0L)**MOTORRAUM (1,0L)****COMPARTIMENT MOTEUR (1,0L)****MOTORBAK (1,0L)****E: MAIN HARNESS****E: HAUPTKABELBAUM****E: FAISCEAU PRINCIPAL****E: HOOFDBEDRADINGSBUNDEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stecker aan.

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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDER ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
E: MAIN HARNESS / E: HAUPTKABELBAUM E: FAISCEAU PRINCIPAL / E: HOOFDBEDRADINGSBUNDEL	
E49	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
E50	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
E51	DUAL PRESSURE SWITCH / DOPPEL-DRUCKSCHALTER COMMUTATEUR DE MANOMETRE DOUBLE / TWEEVOUDIGE DRUKSCHAKELAAR
E52	FUEL PUMP RELAY / KRAFTSTOFFPUMPENRELAIS RELAIS DE POMPE À CARBURANT / BRANDSTOFFPOMPRELAIS
E53	RADIATOR FAN CONTROL RELAY / KÜHLERGEBLÄSTE-STEUERRELAIS RELAIS DE COMMANDE DE VENTILATEUR DE RADIATEUR / STUURRELAIS RADIATEURVENTILATOR
E54	HORN RELAY / HUPENRELAIS RELAIS D'AVERTISSEUR SONORE / CLAXIONRELAIS
E55	ISC RELAY / ISC-RELAIS RELAYS D'ISC / RELAIS ISC
E56	MAIN RELAY / HAUPT-RELAIS RELAIS PRINCIPAL / HOOFDRELAIS
E57	FRONT FOG RELAY / NEBELSCHEINWERFER RELAIS D'ANTIBROUILLARD / VOORMISTLAMP-RELAIS
E58	NOISE SUPPRESSOR / STÖRFUNKEN-UNITERDRÜCKER SUPPRESSEUR DE BRUIT / SUPRESOR DE RUIDO
E59	IGNITION COIL / ZÜNDSPULE BOBINE D'ALLUMAGE / BOBINE
E60	IGNITER / ZÜNDGEBER IGNITEUR / ENCENDEDOR
E62-1	EFE HEATER RELAY #1 / CHAUFFE-EFE-RELAIS #1 RELAIS DE EFE HEIZUNG #1 / EFE VERWARMING RELAIS #1
E62-2	EFE HEATER RELAY #2 / CHAUFFE-EFE-RELAIS #2 RELAIS DE EFE HEIZUNG #2 / EFE VERWARMING RELAIS #2
E63	INJECTOR RESISTOR / EINSPRITZ-WIDERSTAND RÉSISTANCE D'INJECTEUR / INSPUITING WEERSTAND

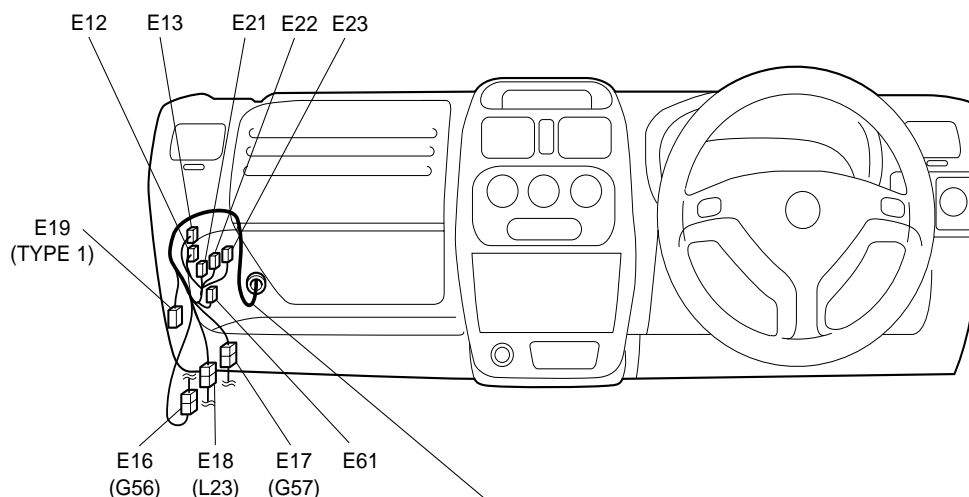
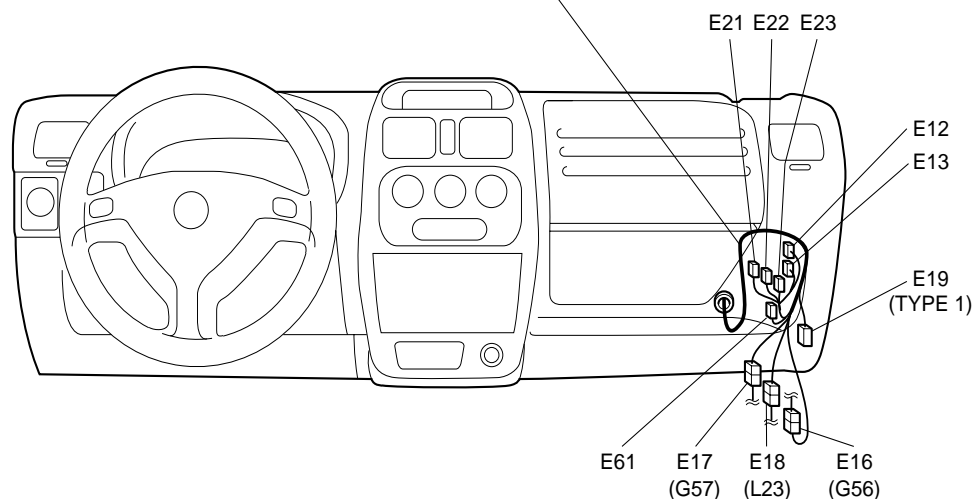
ENGINE ROOM (1,3L)**MOTORRAUM (1,3L)****COMPARTIMENT MOTEUR (1,3L)****MOTORBAK (1,3L)****E: MAIN HARNESS****E: HAUPTKABELBAUM****E: FAISCEAU PRINCIPAL****E: HOOFDBEDRADINGSBUNDEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDE ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
E: MAIN HARNESS / E: HAUPTKABELBAUM E: FAISCEAU PRINCIPAL / E: HOOFDBEDRADINGSBUNDEL	
E01	HORN / HUPE AVERTISSEUR / CLAXON
E02	A/C HARNESS [B01] / KLIMAANLAGEN-KABELBAUM [B01] FAISCEAU C/A [B01] / BEDRADINGSBUNDEL AIR-CONDITIONER [B01]
E03	FRONT TURN SIGNAL LIGHT (R) / FRONTBLINK-LEUCHTE (R) CLIGNOTANT AVANT (D) / SEITLICHE BLINKLEUCHTE (R)
E04	FRONT POSITION LIGHT (R) / VORDERE PARKLEUC-HTE (R) FEU DE POSITION AVANT (D) / PARKEERLICHT VOOR (R)
E05	HEADLIGHT (R) / SCHEINWERFERLICHT (R) PHARE (D) / KOPLAMP (R)
E06	HEADLIGHT BEAM LEVELING ACTUATOR (R) / SCHEINWERFER-NIVELLIER-STELLGLIED (R) COMMANDE DE REGLAGE DU FAISCEAU DE PHARE (D) / KOPLICHTHOOGTE-STELMOTOR (R)
E07	FRONT FOG LIGHT (R) / NEBELSCHEINWERFER (R) ANTIBROUILLARD AVANT (D) / VOORMISTLAMP (R)
E08	FRONT WHEEL SENSOR (R) / VORDERRADSENSOR (R) DETECTEUR DE ROUE AVANT (D) / VOORWIELSENSOR (R)
E09	SIDE TURN SIGNAL LIGHT (R) / SEITENBLINKLEUCHTE (R) CLIGNOTANT LATÉRAL (D) / RICHTINGAANWIJZER ZIJKANT (R)
E10	FRONT WIPER MOTOR / FRONTSCHWABENWISCHERMOTOR MOTEUR D'ESSUIE-GLACE AVANT / VOORUITENWISSERMOTOR
E20	ABS CONTROL MODULE / ABS-STEUERMODUL MODULE DE COMMANDE DE L'ABS / ABS REGELAPPARAAT
E25	FRONT WHEEL SENSOR (L) / VORDERRADSENSOR (L) DETECTEUR DE ROUE AVANT (G) / VOORWIELSENSOR (L)
E26	ENGINE HARNESS [C03] / MOTORKABELBAUM [C03] FAISCEAU DE MOTEUR [C03] / BEDRADINGSBUNDEL MOTOR [C03]
E27	BACK-UP LIGHT SWITCH / RÜCKFAHRLEUCHTENSCHALTER INTERRUPTEUR DE FEUX DE MARCHE ARRIÈRE / ACHTERUITRIJLICHTSCHAKELAAR
E28	DROPPING RESISTOR / ABFALLWIDERSTAND RESISTANCE DE CHUTE / VOORSCHAKELWEERSTAND
E29	OUTPUT SHAFT SENSOR & TURBINE INPUT SENSOR / AUSGANGSWELLEN-DREHZAHLSSENSOR & TURBINEN-EINGANGSSSENSOR CAPTEUR DE VITESSE D'ARBRE DE SORTIE & CAPTEUR D'ENTREE DE TURBINE / UITVOERAS Snelheidsensor & turbine-ingangssensor
E30	AUTOMATIC TRANSMISSION / AUTOMATIKGETRIEBE BOÎTE À VITESSES AUTOMATIQUE / AUTOMATISCHE TRANSMISSIE
E31	TRANSMISSION RANGE SENSOR / GETRIEBEBEREIC HSENSOR DETECTEUR DE PLAGE DE TRANSMISSION / TRANSMISSIEBEREIKSENSOR
E32	FRONT FOG LIGHT (L) / NEBELSCHEINWERFER (L) ANTIBROUILLARD AVANT (G) / VOORMISTLAMP (L)
E34	HEADLIGHT BEAM LEVELING ACTUATOR (L) / SCHEINWERFER-NIVELLIER-STELLGLIED (L) COMMANDE DE REGLAGE DU FAISCEAU DE PHARE (G) / KOPLICHTHOOGTE-STELMOTOR (L)
E35	HEADLIGHT (L) / SCHEINWERFERLICHT (L) PHARE (G) / KOPLAMP (L)
E36	FRONT POSITION LIGHT (L) / VORDERE PARKLEUC-HTE (L) FEU DE POSITION AVANT (G) / PARKEERLICHT VOOR (L)
E37	FRONT TURN SIGNAL LIGHT (L) / FRONTBLINK-LEUCHTE (L) CLIGNOTANT AVANT (G) / SEITLICHE BLINKLEUCHTE (L)
E38	FRONT & REAR WASHER MOTOR / FRONT- & HECKSCHEIBEN-WASCHPUMPENMOTOR MOTEUR DE LAVE- GLACE AVANT ET ARRIÈRE / VOOR- EN ACHTERSPROEIERMOTOR
E39	INJECTOR HARNESS [D03] / EINSPRITZVORRICHTUNG-KABELBAUM [D03] FAISCEAU DE FILS ÉLECTRIQUES D'INJECTEUR [D03] / BEDRADING SBUNDEL INJECTOR [D03]
E40	INJECTOR HARNESS [D02] / EINSPRITZVORRICHTUNG-KABELBAUM [D02] FAISCEAU DE FILS ÉLECTRIQUES D'INJECTEUR [D02] / BEDRADING SBUNDEL INJECTOR [D02]
E41	INJECTOR HARNESS [D01] / EINSPRITZVORRICHTUNG-KABELBAUM [D01] FAISCEAU DE FILS ÉLECTRIQUES D'INJECTEUR [D01] / BEDRADING SBUNDEL INJECTOR [D01]
E42	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
E43	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING

ENGINE ROOM (1,3L)**MOTORRAUM (1,3L)****COMPARTIMENT MOTEUR (1,3L)****MOTORBAK (1,3L)****E: MAIN HARNESS****E: HAUPTKABELBAUM****E: FAISCEAU PRINCIPAL****E: HOOFDBEDRADINGSBUNDEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

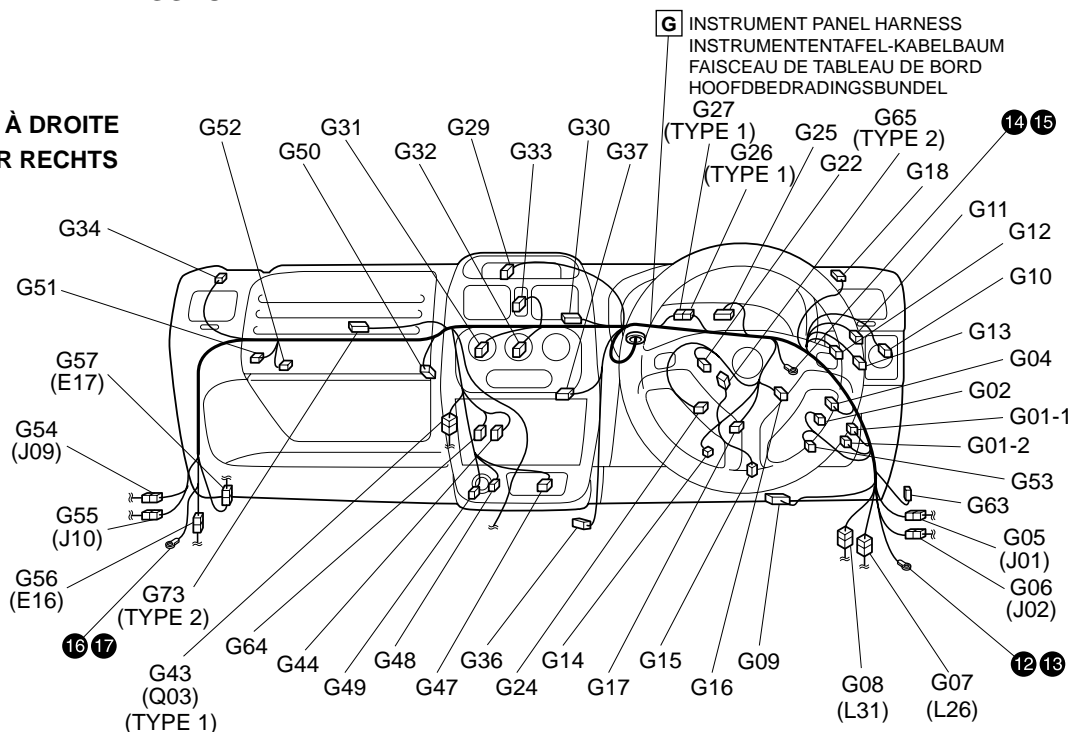
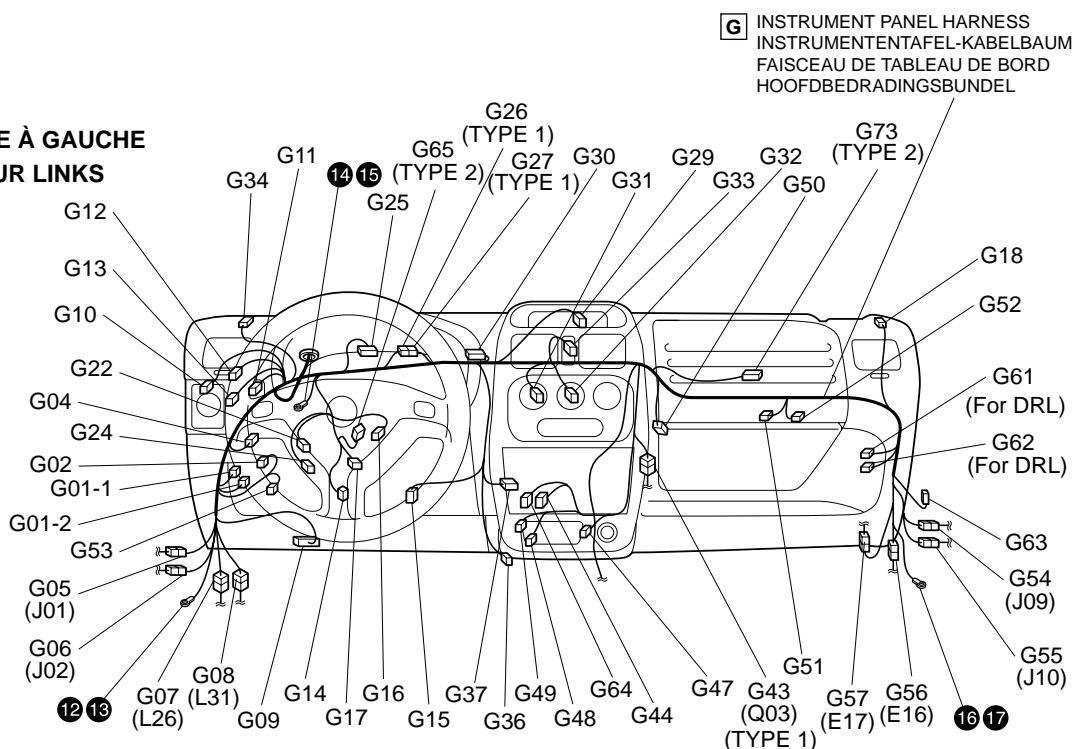
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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDER ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
E: MAIN HARNESS / E: HAUPTKABELBAUM E: FAISCEAU PRINCIPAL / E: HOOFDBEDRADINGSBUNDEL	
E44	RADIATOR FAN MOTOR / KÜHLERGEBLÄSE-MOTOR MOTEUR DE VENTILATEUR DE RADIATEUR / MOTOR RADIATEURVENTILATOR
E45	DIAGNOSIS CONNECTOR #6 (TYPE 1) / DIAGNOSESTECKER #6 (TYP 1) CONNECTEUR DE DIAGNOSTIC #6 (TYPE 1) / DIAGNOSESTEKKER #6 (TIPO 1)
E46	INSTRUMENT PANEL HARNESS [G42] / INSTRUMENTENTAFEL-KABELBAUM [G42] FAISCEAU DE TABLEAU DE BORD [G42] / BEDRADINGSBUNDEL INSTRUMENTENPANEEL [G42]
E47	INSTRUMENT PANEL HARNESS [G41] / INSTRUMENTENTAFEL-KABELBAUM [G41] FAISCEAU DE TABLEAU DE BORD [G41] / BEDRADINGSBUNDEL INSTRUMENTENPANEEL [G41]
E48	SIDE TURN SIGNAL LIGHT (L) / SEITENBLINKLEUCHTE (L) CLIGNOTANT LATÉRAL (G) / RICHTINGAANWIJZER ZIJKANT (L)
E49	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
E50	MAIN FUSE / HAUPTSICHERUNG FUSIBLE PRINCIPAL / HOOFDZEKERING
E51	DUAL PRESSURE SWITCH / DOPPEL-DRUCKSCHALTER COMMUTATEUR DE MANOMETRE DOUBLE / TWEEVOUDIGE DRUKSCHAKELAAR
E52	FUEL PUMP RELAY / KRAFTSTOFFPUMPENRELAIS RELAIS DE POMPE À CARBURANT / BRANDSTOFFPOMPRELAIS
E53	RADIATOR FAN CONTROL RELAY / KÜHLERGEBLÄSE-STEUERRELAIS RELAIS DE COMMANDE DE VENTILATEUR DE RADIATEUR / STUURRELAIS RADIATEURVENTILATOR
E54	HORN RELAY / HUPENRELAIS RELAIS D'AVERTISSEUR SONORE / CLAXIONRELAIS
E55	A/T RELAY / AUTOMATIKGERTRIEBE-RELAIS RELAYS D'VITESSES AUTOMATIQUE / RELAIS AUTOMATISCHE TRANSMISSIE
E56	MAIN RELAY / HAUPT-RELAIS RELAIS PRINCIPAL / HOOFDRELAIS
E57	FRONT FOG RELAY / NEBELSCHEINWERFER RELAIS D'ANTIBROUILLARD / VOORMISTLAMP-RELAIS

INSTRUMENT PANEL**INSTRUMENTENTAFEL****TABLEAU DE BORD****INSTRUMENTENPANEEL****E: MAIN HARNESS****E: HAUPTKABELBAUM****E: FAISCEAU PRINCIPAL****E: HOOFDBEDRADINGSBUNDEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDER ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
E: MAIN HARNESS / E: HAUPTKABELBAUM E: FAISCEAU PRINCIPAL / E: HOOFDBEDRADINGSBUNDEL	
E12	TRANSMISSION CONTROL MODULE / GETRIEBE-STEUERMODUL MODULE DE COMMANDE DE TRANSMISSION / TRANSMISSIE-REGELAPPARAAT
E13	TRANSMISSION CONTROL MODULE / GETRIEBE-STEUERMODUL MODULE DE COMMANDE DE TRANSMISSION / TRANSMISSIE-REGELAPPARAAT
E16	INSTRUMENT PANEL HARNESS [G56] / INSTRUMENTENTAFEL-KABELBAUM [G56] FAISCEAU DE TABLEAU DE BORD [G56] / BEDRADINGSBUNDEL INSTRUMENTENPANEEL [G56]
E17	INSTRUMENT PANEL HARNESS [G57] / INSTRUMENTENTAFEL-KABELBAUM [G57] FAISCEAU DE TABLEAU DE BORD [G57] / BEDRADINGSBUNDEL INSTRUMENTENPANEEL [G57]
E18	FLOOR HARNESS [L23] / BODENKABELBAUM [L23] FAISCEAU DE PLANCHER [L23] / BEDRADINGSBUNDEL VLOER [L23]
E19	DIAGNOSIS CONNECTOR #1 (TYPE 1) / DIAGNOSESTECKER #1 (TYP 1) CONNECTEUR DE DIAGNOSTIC #1 (TYPE 1) / DIAGNOSESTEKKER #1 (TIPO 1)
E21	ENGINE CONTROL MODULE / MOTORSTEUERMODUL MODULE DE COMMANDE DU MOTEUR / MOTORREGELAPPARAAT
E22	ENGINE CONTROL MODULE / MOTORSTEUERMODUL MODULE DE COMMANDE DU MOTEUR / MOTORREGELAPPARAAT
E23	ENGINE CONTROL MODULE / MOTORSTEUERMODUL MODULE DE COMMANDE DU MOTEUR / MOTORREGELAPPARAAT
E61	JOINT CONNECTOR #2 / VERBUNDSTECKER #2 CONNECTEUR JOINT #2 / VERBINDINGSAANSLUITING #2

INSTRUMENT PANEL**INSTRUMENTENTAFEL****TABLEAU DE BORD****INSTRUMENTENPANEEL****G: INSTRUMENT PANEL HARNESS****G: INSTRUMENTENTAFEL-KABELBAUM****G: FAISCEAU DE TABLEAU DE BORD****G: HOOFDBEDRADINGSBUNDEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDE ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
G: INSTRUMENT PANEL HARNESS / G: INSTRUMENTENTAFEL-KABELBAUM G: FAISCEAU DE TABLEAU DE BORD / G: HOOFDBEDRADINGSBUNDEL	
G01-1	REAR WINDOW DEFOGGER RELAY / HECKSCHEIBENHEIZUNGSRELAIS RELAIS DE DÉSEMBUEUR DE LUNETTE ARRIÈRE / ACHTERRUITVERWARMINGSRELAIS
G01-2	TAIL LIGHT RELAY / HECKLEUCHTENRELAIS RELAIS DE FEUX ARRIÈRE / ACHTELICHTRELAIS
G02	DOOR LOCK CONTROLLER / STEUEREINHEIT FÜR TÜRVERRIEGELUNG COMMANDE DE VERROUILLAGE DES PORTES / PORTIERVERGREDELING-REGELEENHEID
G04	TURN SIGNAL RELAY / BLINKERRELAIS RELAIS DE CLIGNOTANT / RICHTINGAANWIJZERRELAIS
G05	DOOR HARNESS [J01] / TÜRKABELBAUM [J01] FAISCEAU DE PORTE [J01] / PORTIERKABELBUNDEL [J01]
G06	DOOR HARNESS [J02] / TÜRKABELBAUM [J02] FAISCEAU DE PORTE [J02] / PORTIERKABELBUNDEL [J02]
G07	FLOOR HARNESS [L26] / BODENKABELBAUM [L26] FAISCEAU DE PLANCHER [L26] / BEDRADINGSBUNDEL VLOER [L26]
G08	FLOOR HARNESS [L31] / BODENKABELBAUM [L31] FAISCEAU DE PLANCHER [L31] / BEDRADINGSBUNDEL VLOER [L31]
G09	DATA LINK CONNECTOR / DATENVERBINDUNGSSTECKER CONNECTEUR DE TRANSMISSION DE DONNÉES / DATA-LINK STEKKER
G10	LIGHTING SWITCH / LICHTSCHALTER COMMUTATEUR DE FEU / LICHTSCHAKELAAR
G11	HEADLIGHT BEAM LEVELING SWICH / SCHEINWERFER-NIVELLIER-SCHALTER COMMUTATEUR DE REGLAGE DES FAISCEAUX DE PHARE / KOPLAMPSTRAAL-AFSTELSCHAKELAAR
G12	FRONT FOG LIGHT SWITCH / NEBELSCHEINWERFERSCHALTER COMMUTATEUR D'ANTBROUILLARD AVANT / MISTVOORLICHTSCHAKELAAR
G13	REAR FOG LIGHT SWITCH / HECK-NEBELLEUCHT EN-SCHALTER COMMUTATEUR D'ANTBROUILLARD ARRIERE / MISTACHTERSCHAKELAAR
G14	P/S CONTROL MODULE / SERVOLENKUNGS-STEUERMODUL MODULE DE CONTRÔLE P/S / STUURBEKRACHTIGING-REGELAPPARAAT
G15	BRAKE LIGHT SWITCH / BREMSLICHT-SCHALTER INTERRUPTEUR DE FEUX STOP / REMLICHTSCHAKELAAR
G16	WIPER & WASHER SWITCH / WISCHER U. WASCHERSCHALTER CONTACTEUR DE L'ESSUIE-GLACE ET DU LAVE-GLACE / WISSER-EN SPROEIERSCHAKELAAR
G17	IMMOBILIZER CONTROL MODULE / WEGFAHRSPERRE-STEUERMODUL MODULE DE COMMANDE D'IMMOBILISATEUR / STARTONDERBREKER-REGELMODULE
G18	FRONT SPEAKER (R) / FRONTLAUTSPRECHER (R) HAUT-PARLEUR AVANT (D) / VOORLUIDSPREKER (R)
G22	DIMMER & PASSING SWITCH / ABBLEND- U. LICHTHUPENSCHALTER CONTACTEUR D'INVERSEUR FEUX DE ROUTE ET FEUX DE CROISEMENT / DIMLICHT- EN INHAALLICHTSCHAKELAAR
G24	MAIN SWITCH / HAUPTSCHALTER COMMUTATEUR PRINCIPAL / HOOFDSCHAKELAAR
G25	COMBINATION METER / KOMBINATIONSINSTRUMENT COMPTEUR MIXTE / COMBINATIEMETER
G26	CONNECTOR #1 (FOR REAR FOG LIGHT) [G27] (TYPE 1)/ ANSCHLUSS #1 [G27](TYP 1) CONNECTEUR #1 [G27] (TYPE 1)/ STEKKER #1 [G27](TIPO 1)
G27	CONNECTOR #2 (FOR REAR FOG LIGHT) [G26] (TYPE 1)/ ANSCHLUSS #2 [G26](TYP 1) CONNECTEUR #2 [G26] (TYPE 1)/ STEKKER #2 [G26](TIPO 1)
G29	CLOCK / UHR HORLOGE / KLOK
G30	JOINT CONNECTOR #1 / VERBUNDSTECKER #1 CONNECTEUR JOINT #1 / VERBINDINGSAANSLUITING #1
G31	A/C SWITCH / KLIMAANLAGEN-SCHALTER COMMUTATEUR A/C / A/C SCHAKELAAR
G32	BLOWER FAN & REAR WINDOW DEFOGGER SWITCH / GEBLÄSE- & HECKSCHEIBENHEIZUNGSSCHALTER CONTACTEUR DE DÉSEMBUEUR DE LUNETTE ARRIÈRE ET VENTILATEUR DE SOUFFLERIE / AANJAGERVENTILATOR- EN ACHTERRUITVERWARMINGSSCHAKELAAR
G33	HAZARD SWITCH / WARNBLINKER SCHALTER COMMUTATEUR DE FEU DE DETRESSE / ALARMKNIPPERLICHTSCHAKELAAR
G34	FRONT SPEAKER (L) / VORDERER LAUTSPRECHER (L) HAUT-PARLEUR AVANT (G) / VOORLUIDSPREKER (L)

G: INSTRUMENT PANEL HARNESS
G: INSTRUMENTENTAFEL-KABELBAUM
G: FAISCEAU DE TABLEAU DE BORD
G: HOOFDBEDRADINGSBUNDEL

G INSTRUMENT PANEL HARNESS
 INSTRUMENTENTAFEL-KABELBAUM
 FAISCEAU DE TABLEAU DE BORD
 HOOFDBEDRADINGSBUNDEL

G27 (TYPE 1) G25 G65 (TYPE 2)
 G26 (TYPE 1) G22 G18
 G11 G12
 G10
 G13
 G04
 G02
 G01-1
 G01-2
 G53
 G63
 G05 (J01)
 G06 (J02)
 G07 (L26)
 G08 (L31)
 G09
 G15
 G16
 G14
 G15

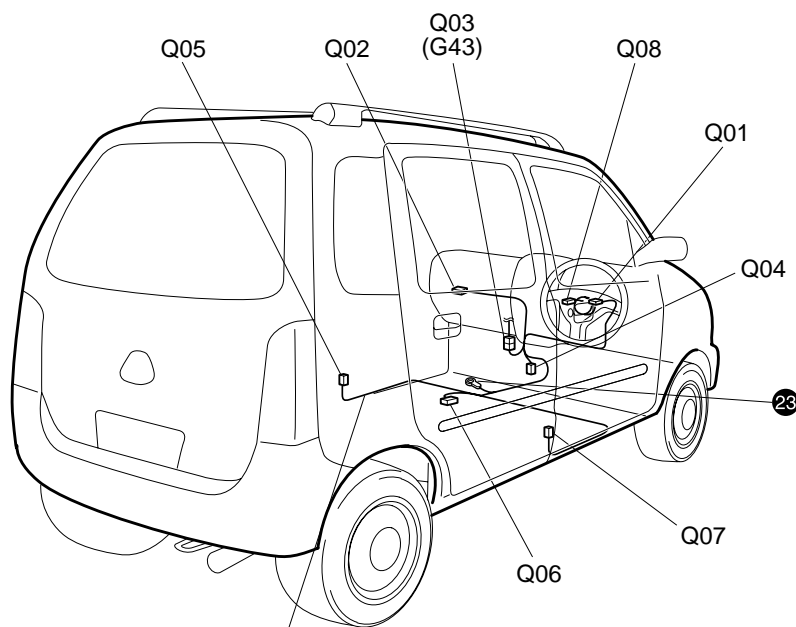
G INSTRUMENT PANEL HARNESS
INSTRUMENTENTAFEL-KABELBAUM
FAISCEAU DE TABLEAU DE BORD
HOOFDBEDRADINGSBUNDEL

G73 (TYPE 2)
G32
G50
G33
G18
G52
G61 (For DRL)
G62 (For DRL)
G63
G54 (J09)
G55 (J10)
G56 (E16)
G57 (E17)
G43 (Q03) (TYPE 1)
G51
G47
16 17

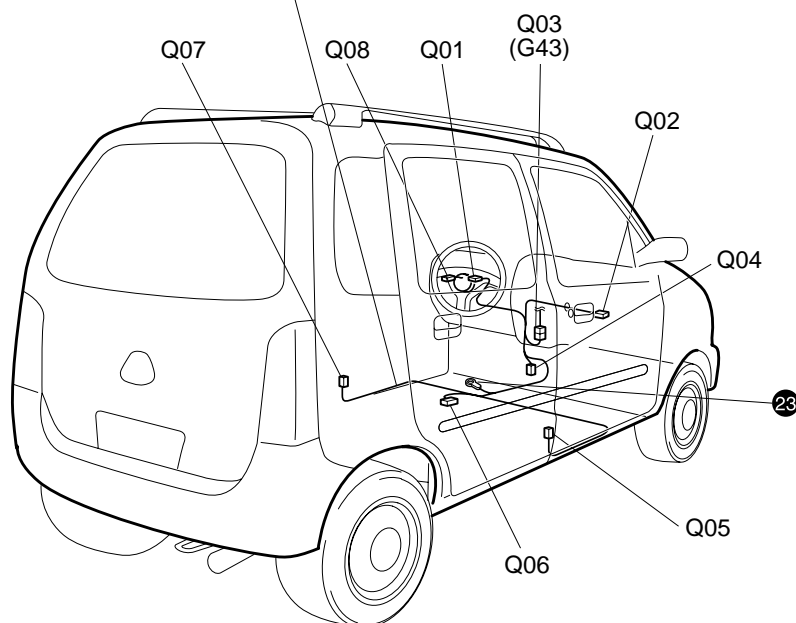
OPMERKING: Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDE ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
G: INSTRUMENT PANEL HARNESS / G: INSTRUMENTENTAFEL-KABELBAUM G: FAISCEAU DE TABLEAU DE BORD / G: HOOFDBEDRADINGSBUNDEL	
G36	HEATER RESISTOR / HEIZUNGSWIDERSTAND RESISTANCE DE CHAUFFAGE / VERWARMING-WEERSTAND
G37	BLOWER MOTOR / GEBLÄSE-MOTOR MOTEUR DE SOUFFLERIE / AANJAGERMOTOR
G43	AIR BAG HARNESS [Q03] / AIRBAG-KABELBAUM [Q03] FAISCEAU DE COUSSIN D'AIR [Q03] / BEDRADINGSBUNDEL AIR-BAG [Q03]
G44	RADIO / RADIO RADIO / RADIO
G47	ASH TRAY ILLUMINATION / ASCHENBECHERBELEUCHTUNG ÉCLAIRAGE DU CENDRIER / ASBAKVERLICHTING
G48	CIGAR LIGHTER / ZIGARETTE-NANZÜNDER ALLUME-CIGARES / SIGARETTEANSTEKER
G49	CIGAR LIGHTER / ZIGARETTE-NANZÜNDER ALLUME-CIGARES / SIGARETTEANSTEKER
G50	THERMISTOR / THERMISTOR THERMISTANCE / TERMISTOR
G51	INTERMITTENT TIMER / INTERVALLTIMER MINUTERIE INTERMITTENTE / TIJDKLOK INTERVALWISSER
G52	BLOWER FAN RELAY / GEBLÄSERELAIS RELAIS DE VENTILATEUR DE SOUFFLERIE / AANJAGERVENTILATORRELAIS
G53	REAR FOG CONTROLLER / NEBELSCHLUSSLEUCHTENREGLER RÉGULATEUR DE BROUILLARD ARRIÈRE / MISTACHTERLICHT-REGELEENHEID
G54	DOOR HARNESS [J09] / TÜRKABELBAUM [J09] FAISCEAU DE PORTE [J09] / PORTIERKABELBUNDEL [J09]
G55	DOOR HARNESS [J10] / TÜRKABELBAUM [J10] FAISCEAU DE PORTE [J10] / PORTIERKABELBUNDEL [J10]
G56	MAIN HARNESS [E16] / HAUPTKABELBAUM [E16] FAISCEAU PRINCIPAL [E16] / HOOFDBEDRADINGSBUNDEL [E16]
G57	MAIN HARNESS [E17] / HAUPTKABELBAUM [E17] FAISCEAU PRINCIPAL [E17] / HOOFDBEDRADINGSBUNDEL [E17]
G61	DRL CONTROLLER (FOR DRL) / DRL- REGLER (FÜR DRL) RÉGULATEUR DE DRL (POUR DRL) / DRL REGELAAR (PARA DRL)
G62	DRL CONTROLLER (FOR DRL) / DRL- REGLER (FÜR DRL) RÉGULATEUR DE DRL (POUR DRL) / DRL REGELAAR (PARA DRL)
G63	ANTENNA / ANTENNE ANTENNE / ANTENNE
G64	RADIO / RADIO RADIO / RADIO
G65	CONTACT COIL (TYPE 2) / KONTAKTSPULE (TYP 2) BOBINE DE CONTACT (TYPE 2) / CONTACTSPOEL (TIPO 2)
G73	PASSENGER INFLATOR (TYPE 2) / BEIFAHREINFLATOR (TYP 2) GAZOGENE PASSAGER (TYPE 2) / OPBLAASMECHANISME PASSAGIER-AIRBAG (TIPO 2)

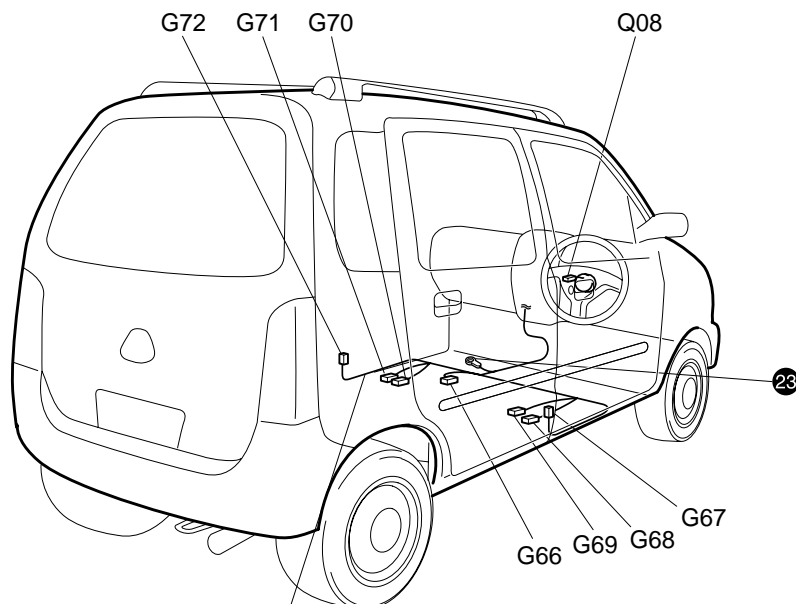
INSTRUMENT PANEL & FLOOR (TYPE 1)**INSTRUMENTENTAFEL & BODEN (TYPE 1)****TABLEAU DE BORD & PLANCHER (TYPE 1)****INSTRUMENTENPANEEL & VLOER (TIPO 1)****Q: AIR BAG HARNESS****Q: AIRBAG-KABELBAUM****Q: FAISCEAU DE COUSSIN D'AIR****Q: BEDRADINGSBUNDEL AIR-BAG****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS**

Q AIR BAG HARNESS
 AIRBAG-KABELBAUM
 FAISCEAU DE COUSSIN D'AIR
 BEDRADINGSBUNDEL AIR-BAG

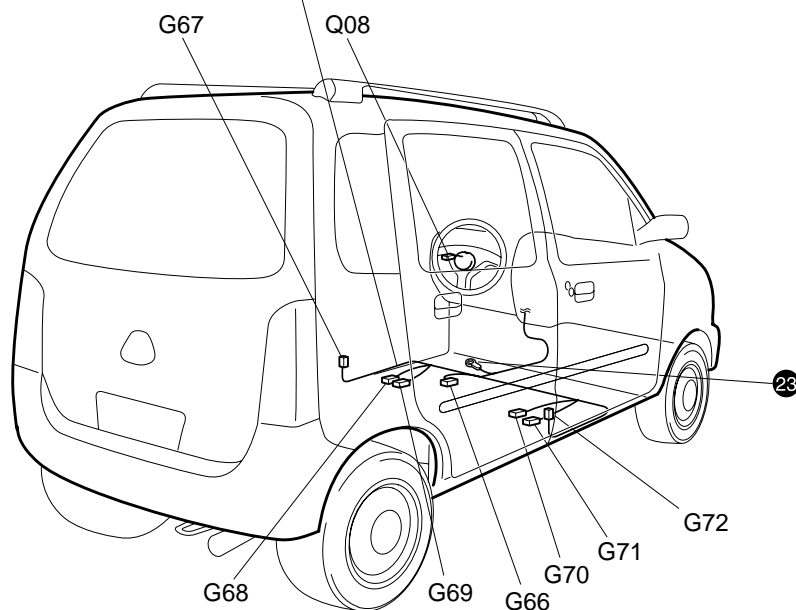
LHD**LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekkernummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

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CONNECTOR No. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDER ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
Q: AIR BAG HARNESS / Q: AIRBAG-KABELBAUM Q: FAISCEAU DE COUSSIN D'AIR / Q: BEDRADINGSBUNDEL AIR-BAG	
Q01	CONTACT COIL / KONTAKTSPULE BOBINE DE CONTACT / CONTACTSPOEL
Q02	PASSENGER INFLATOR / BEIFAHREINFLATOR GAZOGENE PASSAGER / OPBLAASMECHANISME PASSAGIER-AIRBAG
Q03	INSTRUMENT PANEL HARNESS [G43] / INSTRUMENTENTAFEL-KABELBAUM [G43] FAISCEAU DE TABLEAU DE BORD [G43] / HOOFDBEDRADINGSBUNDEL [G43]
Q04	DIAGNOSIS CONNECTOR #2 / DIAGNOSESTECKER #2 CONNECTEUR DE DIAGNOSTIC #2 / DIAGNOSESTEKKER #2
Q05	PRETENSIONER (PASSENGER SIDE) / VORSPANNER (BEIFAHRESEITE) PRETENSIONNEUR (CÔTÉ PASSAGER) / VOORSPANNER (PASSAGIERSZIJDE)
Q06	AIR BAG CONTROL MODULE / AIRBAG-STEUEMODUL MODULE DE COMMANDE DES COUSSINS D AIR / AIRBAG-REGELMODULE
Q07	PRETENSIONER (DRIVER SIDE) / VORSPANNER (FAHRESEITE) PRETENSIONNEUR (CÔTÉ CONDUCTEUR) / VOORSPANNER (BESTUURDERSZIJDE)
Q08	DRIVER INFLATOR / GASGENERATOR (FAHRESEITE) GAZOGENE CÔTÉ CONDUCTEUR / BESTUURDER-AIRBAG

INSTRUMENT PANEL & FLOOR (TYPE 2,3)**INSTRUMENTENTAFEL & BODEN (TYP 2,3)****TABLEAU DE BORD & PLANCHER (TYPE 2,3)****INSTRUMENTENPANEEL & VLOER (TIPO 2,3)****G: INSTRUMENT PANEL HARNESS****G: INSTRUMENTENTAFEL-KABELBAUM****G: FAISCEAU DE TABLEAU DE BORD****G: HOOFDBEDRADINGSBUNDEL****Q: AIR BAG HARNESS****Q: AIRBAG-KABELBAUM****Q: FAISCEAU DE COUSSIN D'AIR****Q: BEDRADINGSBUNDEL AIR-BAG****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS**

G INSTRUMENT PANEL HARNESS
 INSTRUMENTENTAFEL-KABELBAUM
 FAISCEAU DE TABLEAU DE BORD
 HOOFDBEDRADINGSBUNDEL

LHD**LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

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CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDER ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
G: INSTRUMENT PANEL HARNESS / G: INSTRUMENTENTAFEL-KABELBAUM G: FAISCEAU DE TABLEAU DE BORD / G: HOOFDBEDRADINGSBUNDEL	
G66	AIR BAG CONTROL MODULE / AIRBAG-STEUERMODUL MODULE DE COMMANDE DES COUSSINS D AIR / AIRBAG-REGELMODULE
G67	PRETENSIONER (DRIVER SIDE) / VORSPANNER (FAHRERSEITE) PRETENSIONNEUR (CÔTÉ CONDUCTEUR) / VOORSPANNER (BESTUURDERSZIJDE)
G68	SIDE AIR BAG SENSOR (DRIVER SIDE) / SEITEN AIRBAG SENSOR (FAHRERSEITE) CAPTEUR D'AIRBAG LATÉRAL (CÔTÉ CONDUCTEUR) / SENSOR DE LA BOLSA DE AIRE LATERAL (BESTUURDERSZIJDE)
G69	SIDE AIR BAG INFLATOR (DRIVER SIDE) / SEITEN-AIRBAG GASGENERATOR (FAHRERSEITE) GONFLEUR D'AIRBAG LATÉRAL (CÔTÉ CONDUCTEUR) / INFLADOR DE LA BOLSA DE AIRE LATERAL (BESTUURDERSZIJDE)
G70	SIDE AIR BAG INFLATOR (PASSENGER SIDE) / SEITEN-AIRBAG GASGENERATOR (BEIFÄHRERSEITE) GONFLEUR D'AIRBAG LATÉRAL (CÔTÉ PASSAGER) / INFLADOR DE LA BOLSA DE AIRE LATERAL (PASSAGIERSZIJDE)
G71	SIDE AIR BAG SENSOR (PASSENGER SIDE) / SEITEN AIRBAG SENSOR (BEIFÄHRERSEITE) CAPTEUR D'AIRBAG LATÉRAL (CÔTÉ PASSAGER) / SENSOR DE LA BOLSA DE AIRE LATERAL (PASSAGIERSZIJDE)
G72	PRETENSIONER (PASSENGER SIDE) / VORSPANNER (BEIFÄHRERSEITE) PRETENSIONNEUR (CÔTÉ PASSAGER) / VOORSPANNER (PASSAGIERSZIJDE)
Q: AIR BAG HARNESS / Q: AIRBAG-KABELBAUM Q: FAISCEAU DE COUSSIN D'AIR / Q: BEDRADINGSBUNDEL AIR-BAG	
Q08	DRIVER INFLATOR / GASGENERATOR (FAHRERSEITE) GAZOGÈNE CÔTÉ CONDUCTEUR / BESTUURDER-AIRBAG

K N ROOF, REAR
DACH, HECK
O R TOIT, ARRIÈRE
DAK, ACHTERKANT

K: ROOF WIRE, REAR ROOF WIRE

K: DACHDRAHT, HINTERER DACHDRAHT

K: CÂBLE DE TOIT, CÂBLE DE TOIT ARRIÈRE

K: DAKKABEL, ACHTERSTE DAKKABEL

N: REAR DEFOGGER WIRE

N: HECKSCHEIBENBEHEIZUNGSDRAHT

N: CÂBLE DE DÉSEMBUEUR ARRIÈRE

N: ACHTERRUITVERWARMINGSKABEL

O: BACK DOOR HARNESS, REAR WIPEPER WIRE, HIGH MOUNTED STOP LAMP WIRE

O: KABELBAUM DER HINTEREN TÜR, DRAHT FÜR HECKSCHEIBENWISCHER, DRAHT FÜR DRITTE BREMSLEUCHTE

O: FAISCEAU DE PORTE ARRIÈRE, CÂBLE D'ESSUIE-GLACE ARRIÈRE CÂBLE DE FEUX STOP SURÉLEVÉS

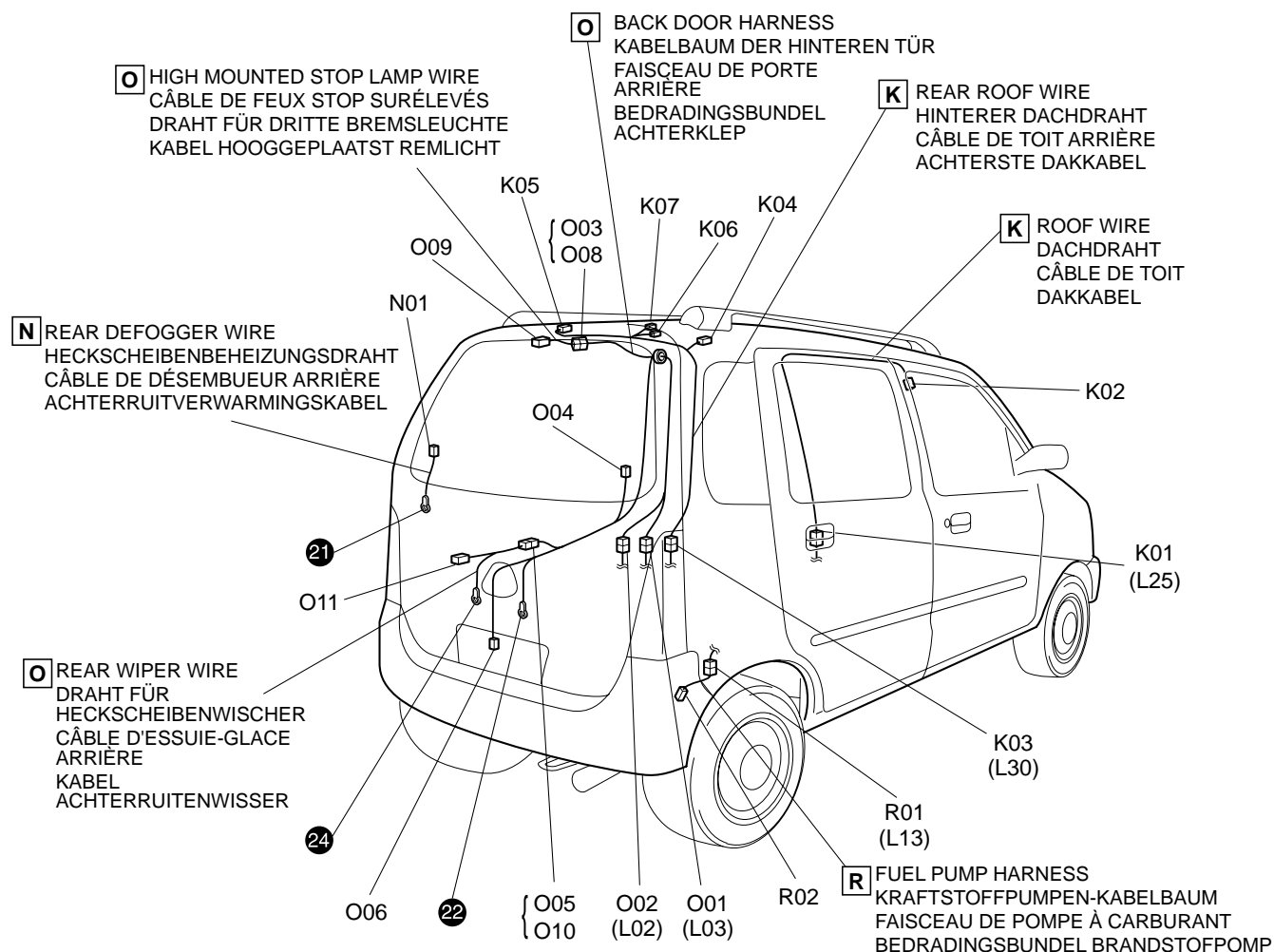
O: BEDRADINGSBUNDEL ACHTERKLEP, KABEL ACHTERRUITENWISSER KABEL HOOGGEPLAATST REMLICHT

R: FUEL PUMP HARNESS

R: KRAFTSTOFFPUMPEN-KABELBAUM

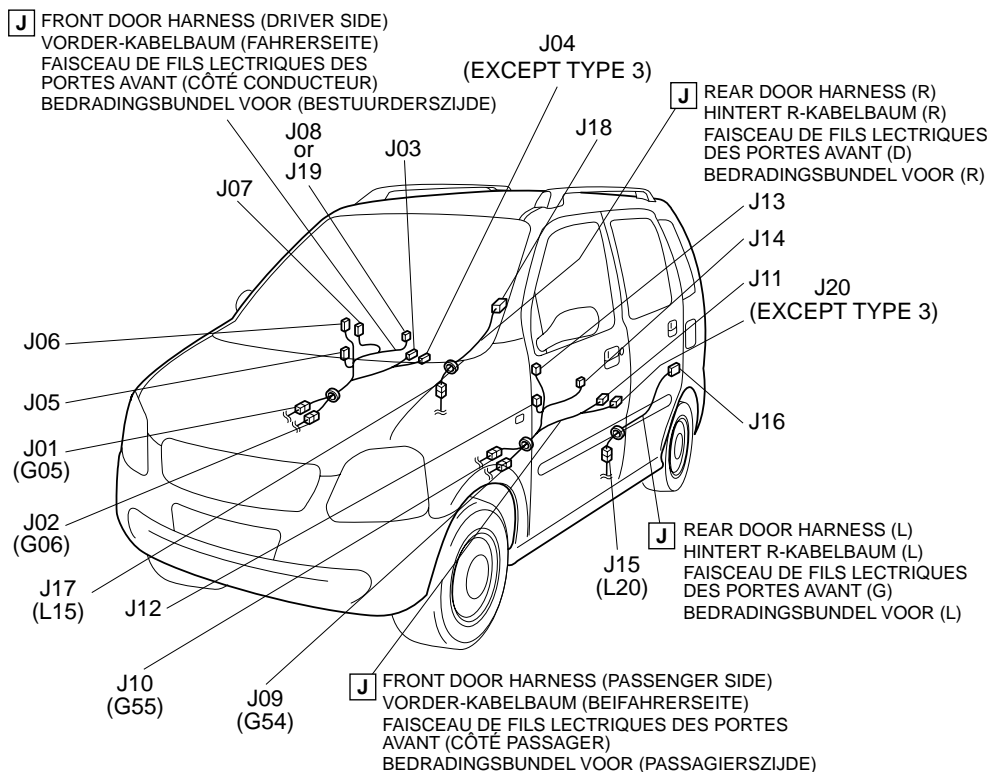
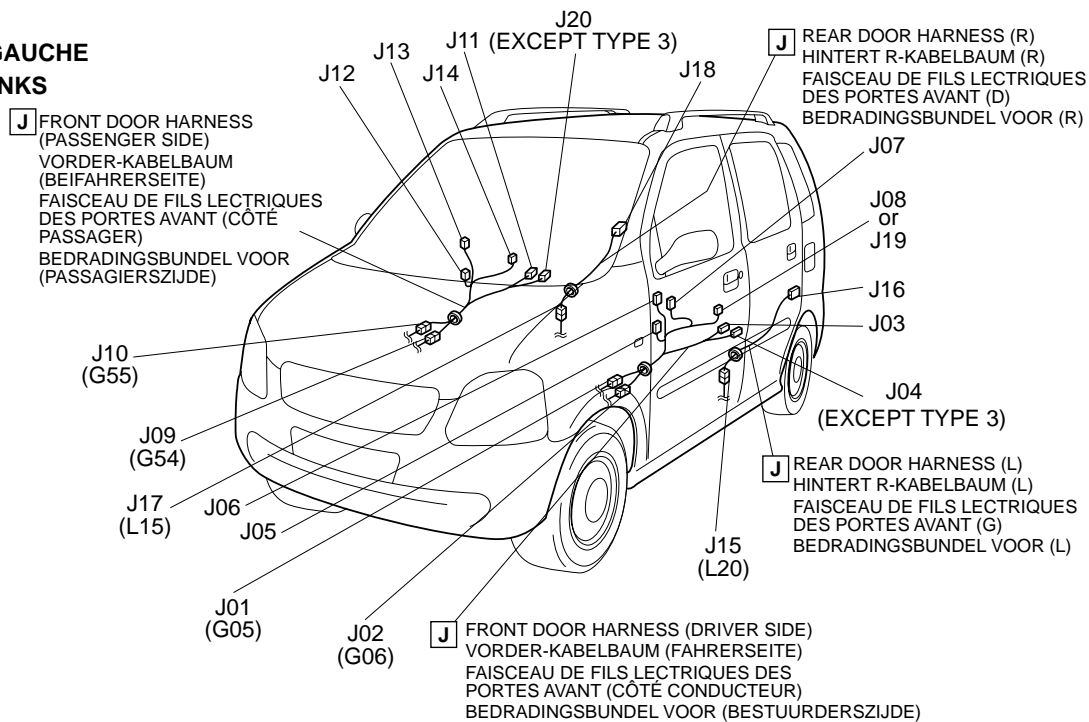
R: FAISCEAU DE POMPE À CARBURANT

R: BEDRADINGSBUNDEL BRANDSTOFFPOMP



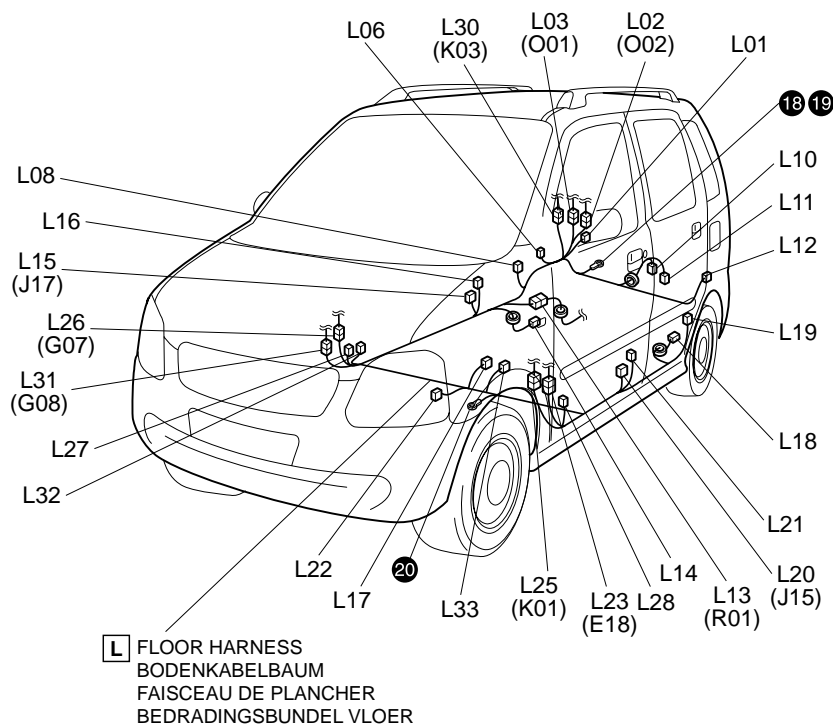
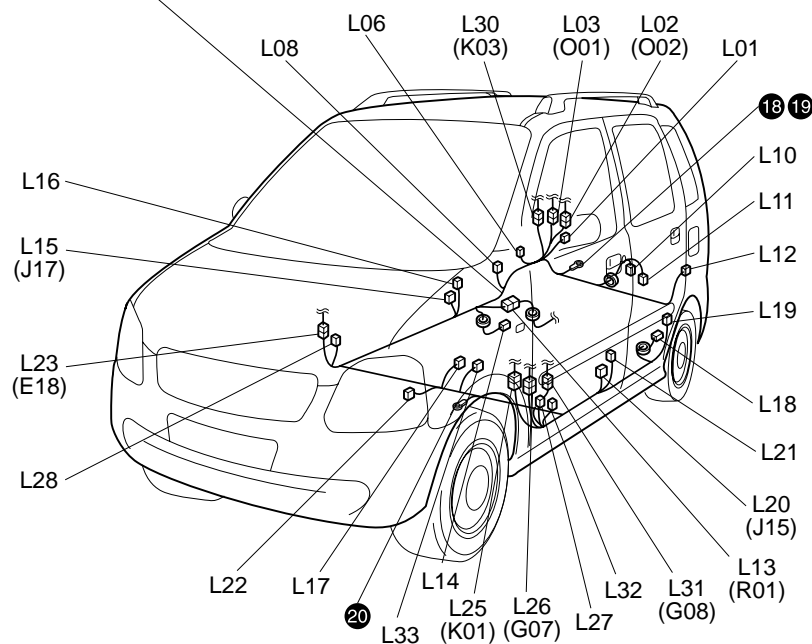
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K: ROOF WIRE / K: DACHDRAHT K: CÂBLE DE TOIT / K: DAKKABEL	
K01	FLOOR HARNESS [L25] / BODENKABELBAUM [L25] FAISCEAU DE PLANCHER [L25] / BEDRADINGSBUNDEL VLOER [L25]
K02	INTERIOR LIGHT (FRONT) / INNENLEUCHTE (VORDERER) PLAFONNIER (AVANT) / INTERIEURVERLICHTING (VOOR)
K: REAR ROOF WIRE / K: HINTERER DACHDRAHT K: CÂBLE DE TOIT ARRIÈRE / K: ACHTERSTE DAKKABEL	
K03	FLOOR HARNESS [L30] / BODENKABELBAUM [L30] FAISCEAU DE PLANCHER [L30] / BEDRADINGSBUNDEL VLOER [L30]
K04	REAR SPEAKER (R) / HINTEREN LAUTSPRECHER (R) HAUT-PARLEUR ARRIERE (D) / ACHTERLUIDSPREKER (R)
K05	REAR SPEAKER (L) / HINTEREN LAUTSPRECHER (L) HAUT-PARLEUR ARRIERE (G) / ACHTERLUIDSPREKER (L)
K06	INTERIOR LIGHT (REAR) / INNENLEUCHTE (HINTEREN) PLAFONNIER (ARRIERE) / INTERIEURVERLICHTING (ACHTER)
K07	INTERIOR LIGHT (REAR) / INNENLEUCHTE (HINTEREN) PLAFONNIER (ARRIERE) / INTERIEURVERLICHTING (ACHTER)
N: REAR DEFOGGER WIRE / N: HECKSCHEIBENBEHEIZUNGSDRAHT N: CÂBLE DE DÉSEMBUEUR ARRIÈRE / N: ACHTERRUITVERWARMINGSKABEL	
N01	REAR WINDOW DEFOGGER / HECKSCHEIBENHEIZUNG DÉSEMBUEUR DE LUNETTE ARRIÈRE / ACHTERRUITVERWARMING
O: BACK DOOR HARNESS / O: KABELBAUM DER HINTEREN TÜR O: FAISCEAU DE PORTE ARRIÈRE / O: BEDRADINGSBUNDEL ACHTERKLEP	
O01	FLOOR HARNESS [L03] / BODENKABELBAUM [L03] FAISCEAU DE PLANCHER [L03] / BEDRADINGSBUNDEL VLOER [L03]
O02	FLOOR HARNESS [L02] / BODENKABELBAUM [L02] FAISCEAU DE PLANCHER [L02] / BEDRADINGSBUNDEL VLOER [L02]
O03	HIGH MOUNTED STOP LAMP WIRE [O08] / DRAHT FÜR DRITTE BREMSLEUCHTE [O08] CÂBLE DE FEUX STOP SURÉLEVÉS [O08] / KABEL HOOGGEPLAATST REMLICHT [O08]
O04	REAR WINDOW DEFOGGER / HECKSCHEIBENHEIZUNG DÉSEMBUEUR DE LUNETTE ARRIÈRE / ACHTERRUITVERWARMING
O05	REAR WIPER WIRE [O10] / DRAHT FÜR HECKSCHEIBENWISCHER [O10] CABLE D'ESSUIE-GLACE ARRIÈRE [O10] / KABEL ACHTERRUITENWISSER [O10]
O06	BACK DOOR MOTOR & BACK DOOR SWITCH / HECKKLAPPENVERRIE-GELUNG-MOTOR & HECKKLAPPENS-CHALTER MOTEUR DE PORTE ARRIERE & COMMUTATEUR DE PORTE ARRIERE / ACHTERPORTIERVERGRENDLMOTOR & ACHTERDEURSCHAKELAAR
O: HIGH MOUNTED STOP LAMP WIRE / O: DRAHT FÜR DRITTE BREMSLEUCHTE O: CÂBLE DE FEUX STOP SURÉLEVÉS / O: KABEL HOOGGEPLAATST REMLICHT	
O08	BACK DOOR HARNESS [O03] / KABELBAUM DER HINTEREN TÜR [O03] FAISCEAU DE PORTE ARRIÈRE [O03] / BEDRADINGSBUNDEL ACHTERKLEP [O03]
O09	HIGH MOUNTED STOP LIGHT / DRITTE BREMSLEUCHTE FEUX STOP SURÉLEVÉS / HOOGGEPLAATST REMLICHT
O: REAR WIPER WIRE / O: DRAHT FÜR HECKSCHEIBENWISCHER O: CÂBLE D'ESSUIE-GLACE ARRIÈRE / O: KABEL ACHTERRUITENWISSER	
O10	BACK DOOR HARNESS [O05] / KABELBAUM DER HINTEREN TÜR [O05] FAISCEAU DE PORTE ARRIÈRE [O05] / BEDRADINGSBUNDEL ACHTERKLEP [O05]
O11	REAR WIPER MOTOR / HECKSCHEIBENWISCHERMOTOR MOTEUR D'ESSUIE-GLACE ARRIÈRE / ACHTERRUITWISSER
R: FUEL PUMP HARNESS / R: KRAFTSTOFFPUMPEN-KABELBAUM R: FAISCEAU DE POMPE À CARBURANT / R: BEDRADINGSBUNDEL BRANDSTOFFPOMP	
R01	FLOOR HANESS [L13] / BODENKABELBAUM [L13] FAISCEAU DE PLANCHER [L13] / BEDRADINGSBUNDEL VLOER [L13]
R02	FUEL PUMP & FUEL LEVEL SENSOR / KRAFTSTOFFPUMPE & KRAFTSTOFFSTANDGEBER POMPE À CARBURANT & CAPTEUR DE NIVEAU DE CARBURANT / BRANDSTOFFPOMP EN BRANDSTOFNIVEAUSENSOR

DOOR**TÜR****PORTE****PORTIER****J: DOOR HARNESS****J: TÜRKABELBAUM****J: FAISCEAU DE PORTE****J: PORTIERKABELBUNDEL****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

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J: FRONT DOOR HARNESS (DRIVER SIDE) / J: VORDER-KABELBAUM (FAHRERSEITE) J: FAISCEAU DE FILS LECTRIQUES DES PORTES AVANT (CÔTÉ CONDUCTEUR) / J: BEDRADINGSBUNDEL VOOR (BESTUURDERSZIJDE)	
J01	INSTRUMENT PANEL HARNESS [G05] / INSTRUMENTENTAFEL-KABELBAUM [G05] FAISCEAU DE TABLEAU DE BORD [G05] / HOOFDBEDRADINGSBUNDEL [G05]
J02	INSTRUMENT PANEL HARNESS [G06] / INSTRUMENTENTAFEL-KABELBAUM [G06] FAISCEAU DE TABLEAU DE BORD [G06] / HOOFDBEDRADINGSBUNDEL [G06]
J03	FRONT DOOR LOCK MOTOR (DRIVER SIDE) / VORDER TÜR-SPERRMOTOR (FAHRERSEITE) MOTEUR DE VERROUILLAGE DE PORTE AVANT (CÔTÉ CONDUCTEUR) / VOORPORTIERSLOTMOTOR (BESTUURDERSZIJDE)
J04	FRONT DOOR KEY SWITCH (DRIVER SIDE) (EXCEPT TYPE 3) / VORDERTÜR-SCHLÜSSELSCHALTER (FAHRERSEITE) (AUSGENOMMEN TYP 3) CONTACTEUR DE PORTE AVANT (CÔTÉ CONDUCTEUR) (SAUF LE TYPE 3) / SLEUTELSCHAKELAAR (BESTUURDERSZIJDE) (EXCEPTO TIPO 3)
J05	FRONT POWER WINDOW MOTOR (DRIVER SIDE) / FRONTSCHIEBENHEBEMOTOR (FAHRERSEITE) MOTEUR DE LÈVE-VITRE AVANT (CÔTÉ CONDUCTEUR) / MOTOR RUITBEDIENING VOOR (BESTUURDERSZIJDE)
J06	POWER DOOR MIRROR MOTOR (DRIVER SIDE) / TÜRSPIEGELVERSTELLMOTOR (FAHRERSEITE) MOTEUR DE RÉTROVISEUR DE PORTIÈRE MOTORISÉ (CÔTÉ CONDUCTEUR) / MOTOR ELEKTRISCH BEDIENDE BUITENSPIEGEL (BESTUURDER SZIJDE)
J07	POWER DOOR MIRROR SWITCH / TÜRSPIEGELVERSTELLSCHALTER CONTACTEUR DE RÉTROVISEUR DE PORTIÈRE MOTORISÉ / SCHAKELAAR ELEKTRISCH BEDIENDE BUITENSPIEGEL
J08	POWER WINDOW MAIN SWITCH / HAUPTSCHALTER FÜR AUTOMATISCHEN FENSTERHEBER INTERRUPTEUR PRINCIPAL DE LÈVE-VITRES / HOOFDSCHAKELAAR ELEKTRISCH BEDIENDE RUIT
J19	DOOR LOCK MAIN SWITCH / HAUPTSCHALTER DER TÜRVERRIEGELUNG COMMUTATEUR PRINCIPAL DE VERROUILLAGE DES PORTES / PORTIERSLOTSCHAKELAAR
J: FRONT DOOR HARNESS (PASSENGER SIDE) / J: VORDER-KABELBAUM (BEIFAHRESEITE) J: FAISCEAU DE FILS LECTRIQUES DES PORTES AVANT (CÔTÉ PASSAGER) / BEDRADINGSBUNDEL VOOR (PASSAGIERSZIJDE)	
J09	INSTRUMENT PANEL HARNESS [G54] / INSTRUMENTENTAFEL-KABELBAUM [G54] FAISCEAU DE TABLEAU DE BORD [G54] / HOOFDBEDRADINGSBUNDEL [G54]
J10	INSTRUMENT PANEL HARNESS [G55] / INSTRUMENTENTAFEL-KABELBAUM [G55] FAISCEAU DE TABLEAU DE BORD [G55] / HOOFDBEDRADINGSBUNDEL [G55]
J11	FRONT DOOR LOCK MOTOR (PASSENGER SIDE) / VORDER TÜR-SPERRMOTOR (BEIFAHRESEITE) MOTEUR DE VERROUILLAGE DE PORTE AVANT (CÔTÉ PASSAGER) / VOORPORTIERSLOTMOTOR (PASSAGIERSZIJDE)
J12	FRONT POWER WINDOW MOTOR (PASSENGER SIDE) / FRONTSCHIEBENHEBEMOTOR (BEIFAHRESEITE) MOTEUR DE LÈVE-VITRE AVANT (CÔTÉ PASSAGER) / MOTOR RUITBEDIENING VOOR (PASSAGIERSZIJDE)
J13	POWER DOOR MIRROR MOTOR (PASSENGER SIDE) / TÜRSPIEGELVERSTELLMOTOR (BEIFAHRESEITE) MOTEUR DE RÉTROVISEUR DE PORTIÈRE MOTORISÉ (CÔTÉ PASSAGER) / MOTOR ELEKTRISCH BEDIENDE BUITENSPIEGEL (PASSAGIERSZIJDE)
J14	POWER WINDOW SUB SWITCH (PASSENGER SIDE) / FENSTERHEBER-NEBENSCHALTER (BEIFAHRESEITE) CONTACTEUR AUXILIAIRE DE LÈVE-GLACE ÉLECTRIQUE (CÔTÉ PASSAGER) / SUBSCHAKELAAR ELEKTRISCH BEDIENDE RUIT (PASSAGIERSZIJDE)
J20	FRONT DOOR KEY SWITCH (PASSENGER SIDE) (EXCEPT TYPE 3) / VORDERTÜR-SCHLÜSSELSCHALTER (BEIFAHRESEITE) (AUSGENOMMEN TYP 3) CONTACTEUR DE PORTE AVANT (CÔTÉ PASSAGER) (SAUF LE TYPE 3) / SLEUTELSCHAKELAAR (PASSAGIERSZIJDE) (EXCEPTO TIPO 3)
J: REAR DOOR HARNESS / J: HINTER R-KABELBAUM J: FAISCEAU DE FILS LECTRIQUES DES PORTES AVANT / J: BEDRADINGSBUNDEL VOOR	
J15	FLOOR HARNESS [L20] / BODENKABELBAUM [L20] FAISCEAU DE PLANCHER [L20] / BEDRADINGSBUNDEL VLOER [L20]
J16	REAR DOOR LOCK MOTOR (L) / SPERRMOTOR FÜR HINTERE TÜR (L) MOTEUR DE VERROUILLAGE DE PORTE ARRIERE (G) / ACHTERPORTIERSLOTMOTOR (L)
J17	FLOOR HARNESS [L15] / BODENKABELBAUM [L15] FAISCEAU DE PLANCHER [L15] / BEDRADINGSBUNDEL VLOER [L15]
J18	REAR DOOR LOCK MOTOR (R) / SPERRMOTOR FÜR HINTERE TÜR (R) MOTEUR DE VERROUILLAGE DE PORTE ARRIERE (D) / ACHTERPORTIERSLOTMOTOR (R)

**FLOOR****BODEN****PLANCHER****VLOER****L: FLOOR HARNESS****L: BODENKABELBAUM****L: FAISCEAU DE PLANCHER****L: BEDRADINGSBUNDEL VLOER****RHD****RECHTS****CONDUITE À DROITE****MET STUUR RECHTS****LHD****LINKS****CONDUITE À GAUCHE****MET STUUR LINKS****NOTE:** Connector NO. in () means the mating connector NO.**HINWEIS:** Steckverbindernummer in () bedeutet passende steckverbindernummer.**REMARQUE:** Le numéro de connecteur mis entre parenthèses () indique le numéro de connecteur correspondant.**OPMERKING:** Het stekker nummer tussen haakjes () geeft het nummer van de bijbehorende stekker aan.

Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>

CONNECTOR NO. ANSCHLUSS-NR. CONNECTEUR NO. STEKKER NR.	MATING COMPONENT [MATING CONNECTOR] / ZUSAMMENPASSENDE KOMPONENTE [ZUSAMMENPASSENDE ANSCHLUSS] COMPOSANT DE CONNEXION [CONNECTEUR DE CONNEXION] / BIJPASSEND ONDERDEEL [BIJPASSEND STEKKER]
L: FLOOR HARNESS / L: BODENKABELBAUM L: FAISCEAU DE PLANCHER / L: BEDRADINGSBUNDEL VLOER	
L01	REAR COMBINATION LIGHT (R) / HECK-KOMBINATIONSLEUCHTE (R) FEU COMBINE ARRIERE (D) / COMBI-LICHT ACHTER (R)
L02	BACK DOOR HARNESS [O02] / KABELBAUM DER HINTEREN TÜR [O02] FAISCEAU DE PORTE ARRIÈRE [O02] / BEDRADINGSBUNDEL ACHTERKLEP [O02]
L03	BACK DOOR HARNESS [O01] / KABELBAUM DER HINTEREN TÜR [O01] FAISCEAU DE PORTE ARRIÈRE [O01] / BEDRADINGSBUNDEL ACHTERKLEP [O01]
L06	ACCESSORY SOCKET / ZUBEHÖRANSCHLUSS PRISE D'ACCESSOIRES / ACCESSOIRE-STROOMAANSLUITING
L08	REAR DOOR SWITCH (R) / HINTERER TÜRSCHALTER (R) COMMUTATEUR DE PORTE ARRIERE (D) / ACHTERPORTIESCHAKELAAR (R)
L10	LICENSE PLATE LIGHT / KENNZEICHENLEUCHTE ÉCLAIRAGE DE PLAQUE D'IMMATRICULATION / KENTEKENPLAATVERLICHTING
L11	LICENSE PLATE LIGHT / KENNZEICHENLEUCHTE ÉCLAIRAGE DE PLAQUE D'IMMATRICULATION / KENTEKENPLAATVERLICHTING
L12	REAR COMBINATION LIGHT (L) / HECK-KOMBINATIONSLEUCHTE (L) FEU COMBINE ARRIERE (G) / COMBI-LICHT ACHTER (L)
L13	FUEL PUMP HARNESS [R01] / KRAFTSTOFFPUMPEN-KABELBAUM [R01] FAISCEAU DE POMPE À CARBURANT [R01] / BEDRADINGSBUNDEL BRÄNDSTOFFPOMP [R01]
L14	REAR WHEEL SENSOR (R) / HINTERRADSENSOR (R) DETECTEUR DE ROUE ARRIERE (D) / ACHTERWIELSENSOR (R)
L15	REAR DOOR HARNESS [J17] / HINTERT R-KABELBAUM [J17] FAISCEAU DE FILS LECTRIQUES DES PORTES AVANT [J17] / BEDRADINGSBUNDEL VOOR [J17]
L16	FRONT DOOR SWITCH (R) / VORDERER TÜRSCHALTER (R) COMMUTATEUR DE PORTE AVANT (D) / VOORPORTIERSCHAKELAAR (R)
L17	PARKING BRAKE SWITCH / HAND BREMSSENSCHALTER INTERRUPTEUR DE FREIN DE STATIONNEMENT / PARKEERREMSCHAKELAAR
L18	REAR WHEEL SENSOR (L) / HINTERRADSENSOR (L) DETECTEUR DE ROUE ARRIERE (G) / ACHTERWIELSENSOR (L)
L19	REAR DOOR SWITCH (L) / HINTERER TURSCHALTER (L) COMMUTATEUR DE PORTE ARRIERE (G) / ACHTERPORTIESCHAKELAAR (L)
L20	REAR DOOR HARNESS [J15] / HINTERT R-KABELBAUM [J15] FAISCEAU DE FILS LECTRIQUES DES PORTES AVANT [J15] / BEDRADINGSBUNDEL VOOR [J15]
L21	FRONT DOOR SWITCH (L) / VORDERER TÜRSCHALTER (L) COMMUTATEUR DE PORTE AVANT (G) / VOORPORTIERSCHAKELAAR (L)
L22	O/D SWITCH & A/T SHIFT ILLUMINATION / O/D-SCHALTER & A/T-SCHALTBELEUCHTUNG COMMUTATEUR O/D & ÉCLAIRAGE DE SELECTION A/T / O/D SCHAKELAAR & VERLICHTING A/T SCHAKELING
L23	MAIN HARNESS [E18] / HAUPTKABELBAUM [E18] FAISCEAU PRINCIPAL [E18] / HOOFDBEDRADINGSBUNDEL [E18]
L25	ROOF WIRE [K01] / DACHDRAHT [K01] CÂBLE DE TOIT [K01] / DAKKABEL [K01]
L26	INSTRUMENT PANEL HARNESS [G07] / INSTRUMENTENTAFEL-KABELBAUM [G07] FAISCEAU DE TABLEAU DE BORD [G07] / HOOFDBEDRADINGSBUNDEL [G07]
L27	DIODE #5 / DIODE #5 DIODE #5 / DIODE #5
L28	DIODE #4 / DIODE #4 DIODE #4 / DIODE #4
L30	REAR ROOF WIRE [K03] / HINTERER DACHDRAHT [K03] CÂBLE DE TOIT ARRIÈRE [K03] / ACHTERSTE DAKKABEL [K03]
L31	INSTRUMENT PANEL HARNESS [G08] / INSTRUMENTENTAFEL-KABELBAUM [G08] FAISCEAU DE TABLEAU DE BORD [G08] / HOOFDBEDRADINGSBUNDEL [G08]
L32	DIODE #3 / DIODE #3 DIODE #3 / DIODE #3
L33	G SENSOR / G SENSOR DETECTEUR G / G SENSOR

SECTION 8A-4
ABSCHNITT 8A-4
SECTION 8A-4
DEEL 8A-4

INSTALLATION POSITIONS OF SINGLE UNIT PARTS
EINBAUPOSITIONEN VON EINZELEINHRIT-TEILEN
PASITIONS D'INSTALLATION DES PIECES INDIVIDUELLES
INSTALLATIEPOSITIE VAN ENKELE ONDERDELEN

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8A-4

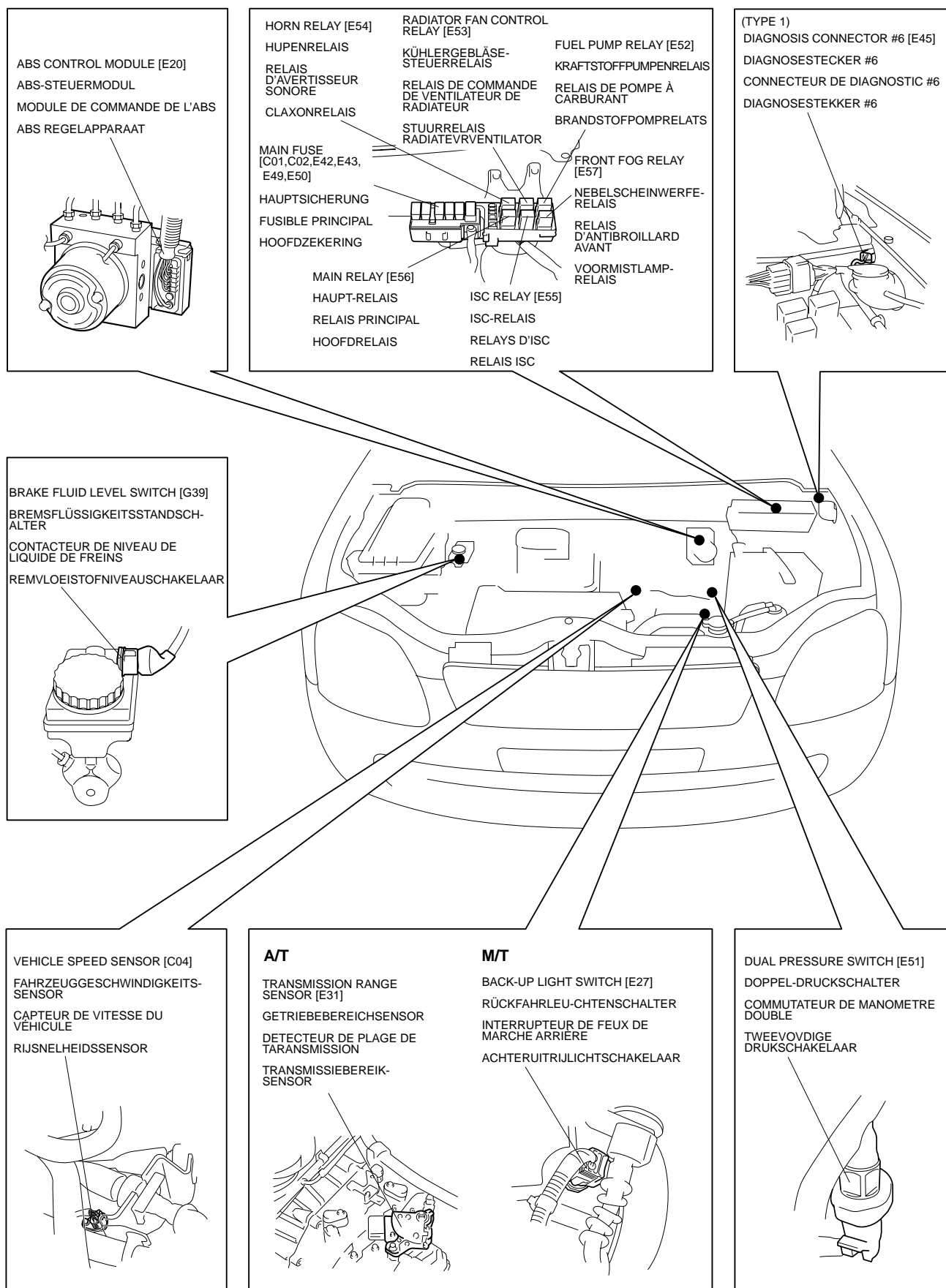
· ENGINE ROOM (RIGHT HAND STEERING VEHICLE)	8A-4-2
· ENGINE ROOM (LEFT HAND STEERING VEHICLE)	8A-4-3
· ENGINE ROOM (1,0L)	8A-4-4
· INSTRUMENT PANEL (RIGHT HAND STEERING VEHICLE)	8A-4-6
· INSTRUMENT PANEL (LEFT HAND STEERING VEHICLE)	8A-4-7
· FLOOR	8A-4-8
· MOTORRAUM (FAHRZEUG MIT RECHTSLENKUNG)	8A-4-2
· MOTORRAUM (FAHRZEUG MIT LINKSLENKUNG)	8A-4-3
· MOTORRAUM (1,0L)	8A-4-4
· INSTRUMENTENTAFEL (FAHRZEUG MIT RECHTSLENKUNG)	8A-4-6
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· COMPARTIMENT MOTEUR (VEHICULE A CONDUITE A DROITE)	8A-4-2
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· COMPARTIMENT MOTEUR (1,0L)	8A-4-4
· TABLEAU DE BORD (VEHICULE A CONDUITE A DROITE)	8A-4-6
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· PLANCHER	8A-4-8
· MOTORBAK (VOERTUIG MET RECHTS STUUR)	8A-4-2
· MOTORBAK (VOERTUIG MET LINKS STUUR)	8A-4-3
· MOTORBAK (1,0L)	8A-4-4
· INSTRUMENTENPANEEL (VOERTUIG MET RECHTS STUUR)	8A-4-6
· INSTRUMENTENPANEEL (VOERTUIG MET LINKS STUUR)	8A-4-7
· VLOER	8A-4-8

ENGINE ROOM (RIGHT HAND STEERING VEHICLE)

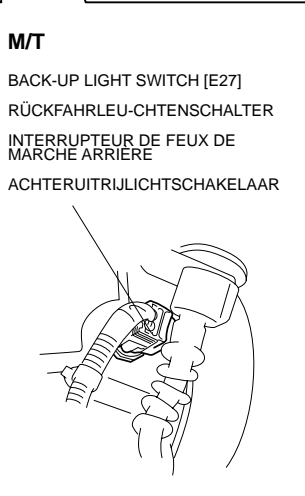
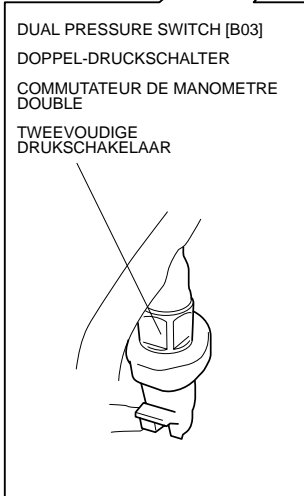
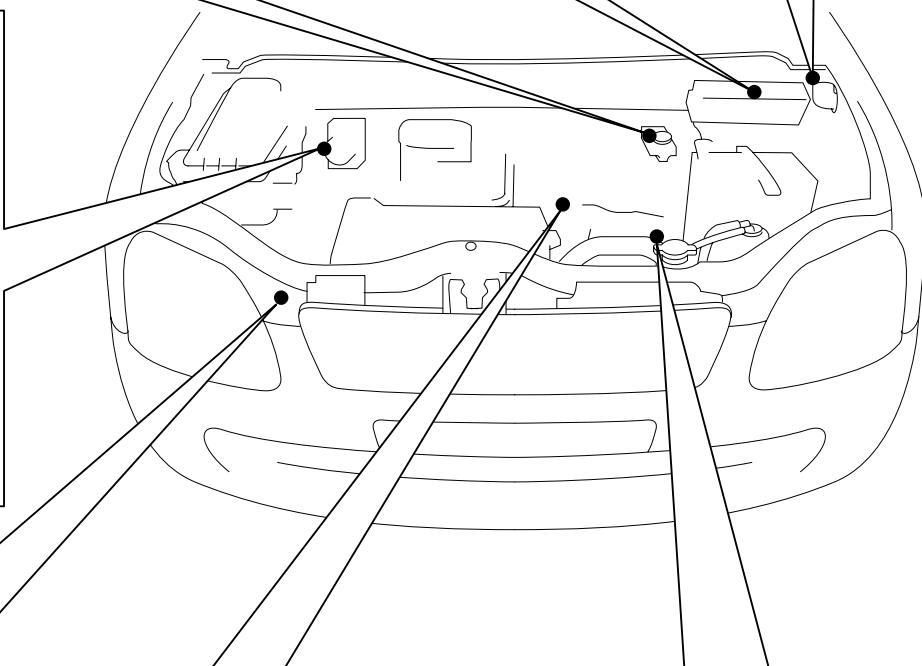
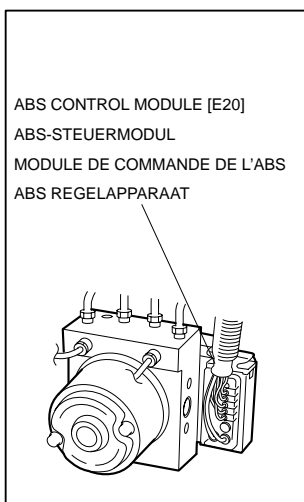
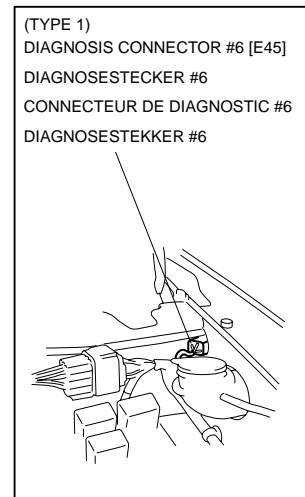
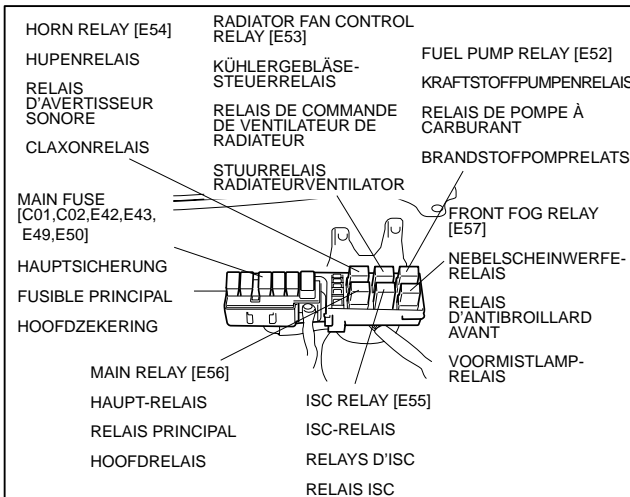
MOTORRAUM (FAHRZEUG MIT RECHTSLENKUNG)

COMPARTIMENT MOTEUR (VEHICULE A CONDUITE A DROITE)

MOTORBAK (VOERTUIG MET RECHTS STUUR)



ENGINE ROOM (LEFT HAND STEERING VEHICLE)
MOTORRAUM (FAHRZEUG MIT LINKSLENKUNG)
COMPARTIMENT MOTEUR (VEHICULE A CONDUITE A GAUCHE)
MOTORBAK (VOERTUIG MET LINKS STUUR)

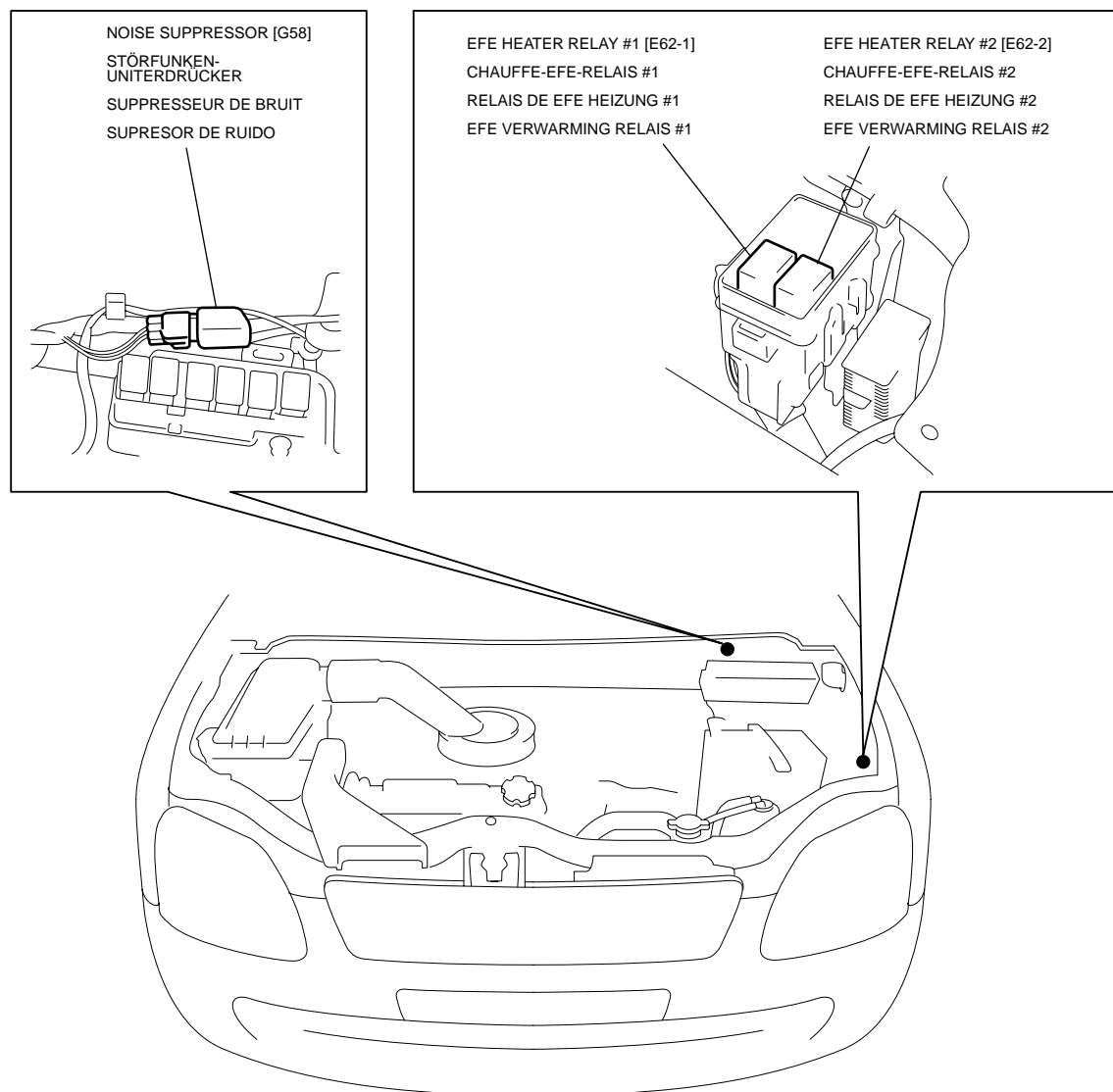


ENGINE ROOM (1.0L)

MOTORRAUM (1,0L)

COMPARTIMENT MOTEUR (1,0L)

MOTORBAK (1,0L)



MEMO

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NOTE

MEMO

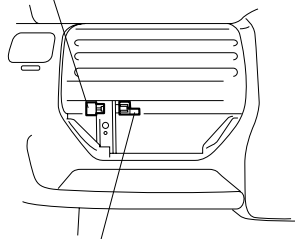
INSTRUMENT PANEL (RIGHT HAND STEERING VEHICLE)

INSTRUMENTENAFEL (FAHRZEUG MIT RECHTSLENKUNG)

TABLEAU DE BORD (VEHICULE A CONDUITE A DROITE)

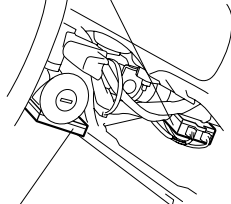
INSTRUMENTENPANEEL (VOERTUIG MET RECHTS STUUR)

INTERMITTENT TIMER [G51]
INTERVALLTIMER
MINUTERIE INTERMITTENTE
TIJDKLOK
INTERVALWISSE



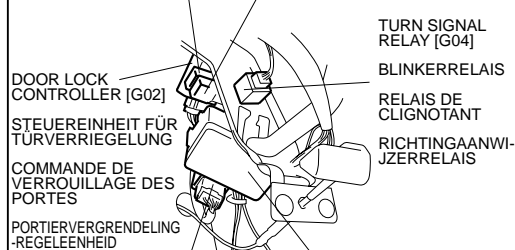
BLOWER FAN RELAY [G52]
GEBLÄSERELAIS
RELAIS DE VENTILATEUR DE
SOUFFLERIE
AANJAGERVENTILATORRELAIS

P/S CONTROL MODULE [G14]
SERVOLENKUNGS-STEUEMODUL
MODULE DE CONTRÔLE P/S
STUURBEKRACHTIGING
-REGELAPPARAAT



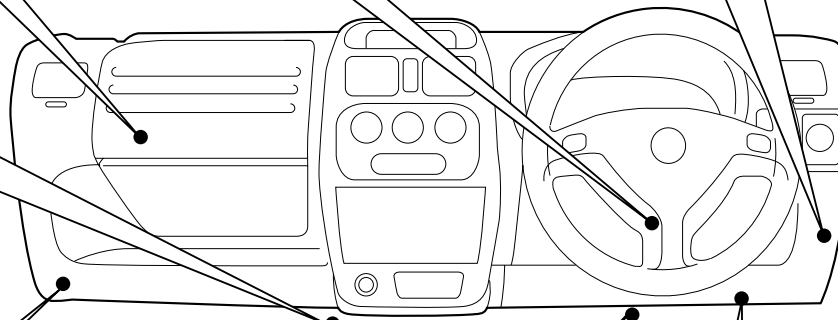
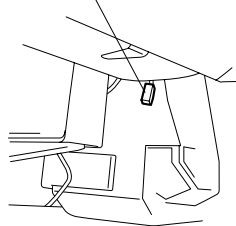
IMMOBILIZER CONTROL MODULE [G17]
WEGFAHRSPERRE-STEUEMODUL
MODULE DE COMMANDE
D'IMMOBILISATEUR
STARTONDERBREKER
-REGLMODVLE

TAIL LIGHT RELAY [G01-2] REAR WINDOW DEFOGGER RELAY [G01-1]
HECKLEUCHTENRELAIS
HECKSCHEIBENHEIZUNGS-RELAIS
RELAIS DE FEUX ARRIERE
RELAIS DE DÉSEMBUEUR DE LUNETTE ARRIERE
ACHTERLICHTRELAIS
ACHTERRUITVERWARMINGSRELAIS



DOOR LOCK CONTROLLER [G02] TURN SIGNAL RELAY [G04]
STEUEREINHEIT FÜR TÜRVERRIEGELUNG
BLINKERRELAIS
COMMANDE DE VERROUILLAGE DES PORTES
RELAIS DE CLIGNOTANT
PORTIERVERGREDELING -REGELEENHEID
RICHTINGAANWIJZERRELAIS
CIRCUIT FUSE
SCHALTKREIS-SICHERUNG
FUSIBLE DE CIRCUIT
CIRCUITZEKERING

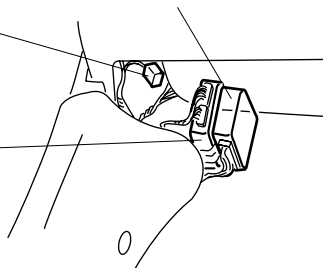
(TYPE 1)
DIAGNOSIS CONNECTOR #2 [Q04]
DIAGNOSESTECKER #2
CONNECTEUR DE DIAGNOSTIC #2
DIAGNOSESTEKKER #2



(TYPE 1)
DIAGNOSIS CONNECTOR #1 [E19]
DIAGNOSESTECKER #1
CONNECTEUR DE DIAGNOSTIC #1
DIAGNOSESTEKKER #1

TRANSMISSION CONTROL MODULE [E12,E13]
GETRIEBE-STEUEMODUL
MODULE DE COMMANDE DE TRANSMISSION
MOTORREGLAPPARAAT

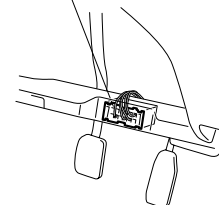
ENGINE CONTROL MODULE [E21,E22,E23]
MOTORSTEUERMODUL
MODULE DE COMMANDE DU MOTEUR
MOTORREGLAPPARAAT



BRAKE LIGHT SWITCH [G15]
BREMSLICHT-SCHALTER
INTERRUPTEUR DE FEUX STOP
REMILICHTSCHAKELAAR



DATA LINK CONNECTOR [G09]
DATENVERBINDUNGSSTECKER
CONNECTEUR DE TRANSMISSION DE DONNÉES
DATA-LINK STEKKER



INSTRUMENT PANEL (LEFT HAND STEERING VEHICLE)
INSTRUMENTENPANEEL (FAHRZEUG MIT LINKSLENKUNG)
TABLEAU DE BORD (VEHICULE A CONDUITE A GAUCHE)
INSTRUMENTENPANEEL (VOERTUIG MET LINKS STUUR)

DOOR LOCK CONTROLLER [G02]
 STEUEREINHEIT FÜR TÜRVERRIEGELUNG
 COMMANDE DE VERROUILLAGE DES PORTES
 PORTIERVERGREDELING-REGELEENHEID

REAR WINDOW DEFOGGER RELAY [G01-1]
 HECKSCHEIBENHEIZUNGS-RELAIS
 RELAIS DE DÉSEMBUEUR DE LUNETTE ARRIÈRE
 ACHTERRUITVERWARMINGS-RELAIS

TURN SIGNAL RELAY [G04]
 BLINKERRELAIS
 RELAIS DE CLIGNOTANT
 ACHTERLICHT-RELAIS

CIRCUIT FUSE
 SCHALTKREIS-SICHERUNG
 FUSIBLE DE CIRCUIT
 CIRCUITZEKERING

TAIL LIGHT RELAY [G01-2]
 HECKLEUCHTENRELAIS
 RELAIS DE FEUX ARRIÈRE
 RICHTINGAAN-WIJZERRELAIS

REAR FOG CONTROLLER [G53]
 NEBEL SCHLUSSLEUCHTENREGLER
 RÉGULATEUR DE BROUILLARD ARRIÈRE
 MISTACHTERLICHT-REGELEENHEID

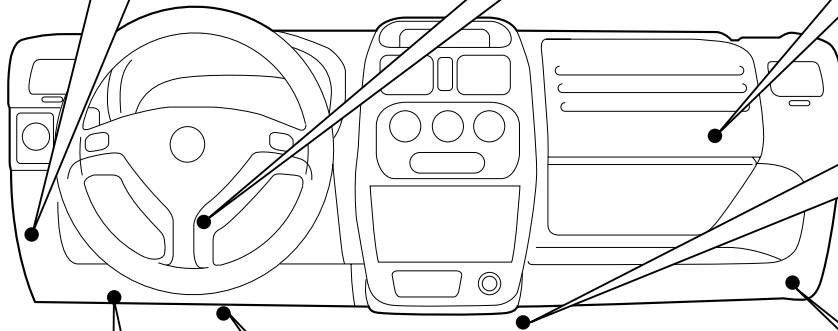
P/S CONTROL MODULE [G14]
 SERVOLENKUNGS-STEUERMODUL
 MODULE DE CONTRÔLE P/S
 STUURBEKRACHTIGING-REGELAPPARAAT

IMMOBILIZER CONTROL MODULE [G17]
 WEGFAHRSPERRE-STEUERMODUL
 MODULE DE COMMANDE D'IMMOBILISATEUR
 STARTONDERBREKER-REGELMODULE

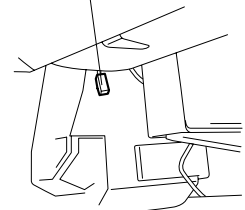
INTERMITTENT TIMER [G51]
 INTERVALLTIMER
 MINUTERIE INTERMITTENTE
 TIJDKLOK INTERVALWISSE

DRL CONTROLLER [G61,G62]
 DRL- REGLER
 REGULATEUR DE DRL
 DRL REGELAAR

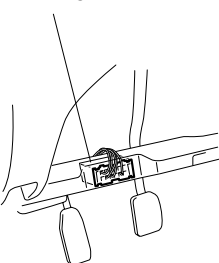
BLOWER FAN RELAY [G52]
 GEBLÄSERELAIS
 RELAIS DE VENTILATEUR DE SOUFFLERIE
 AANJAGERVENTILATORRELAIS



(TYPE 1)
 DIAGNOSIS CONNECTOR #2 [Q04]
 DIAGNOSESTECKER #2
 CONNECTEUR DE DIAGNOSTIC #2
 DIAGNOSESTECKER #2



DATA LINK CONNECTOR [G09]
 DATENVERBINDUNGSSTECKER
 CONNECTEUR DE TRANSMISSION DE DONNÉES
 DATA-LINK STEKKER



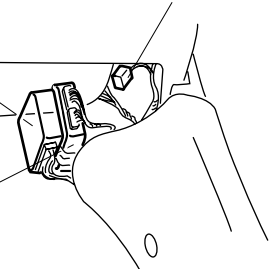
BRAKE LIGHT SWITCH [G15]
 BREMSLICHT-SCHALTER
 INTERRUPTEUR DE FEUX STOP
 REMLICHTSCHAKELAAR



TRANSMISSION CONTROL MODULE [E12,E13]
 GETRIEBE-STEUERMODUL
 MODULE DE COMMANDE DE TRANSMISSION
 MOTORREGELAPPARAAT

(TYPE 1)
 DIAGNOSIS CONNECTOR #1 [E19]
 DIAGNOSESTECKER #1
 CONNECTEUR DE DIAGNOSTIC #1
 DIAGNOSESTECKER #1

ENGINE CONTROL MODULE [E21,E22,E23]
 MOTORSTEUERMODUL
 MODULE DE COMMANDE DU MOTEUR
 MOTORREGELAPPARAAT

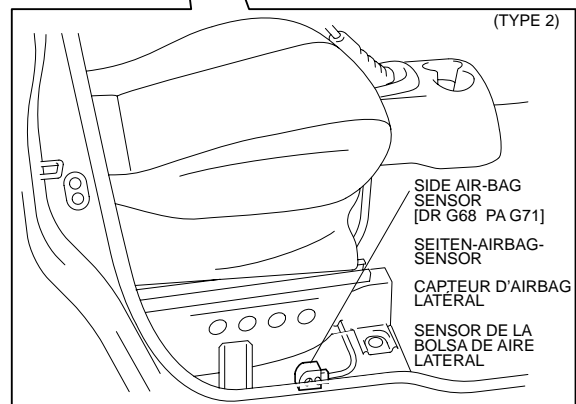
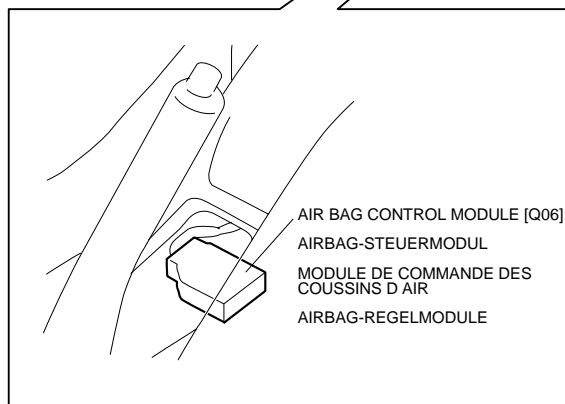
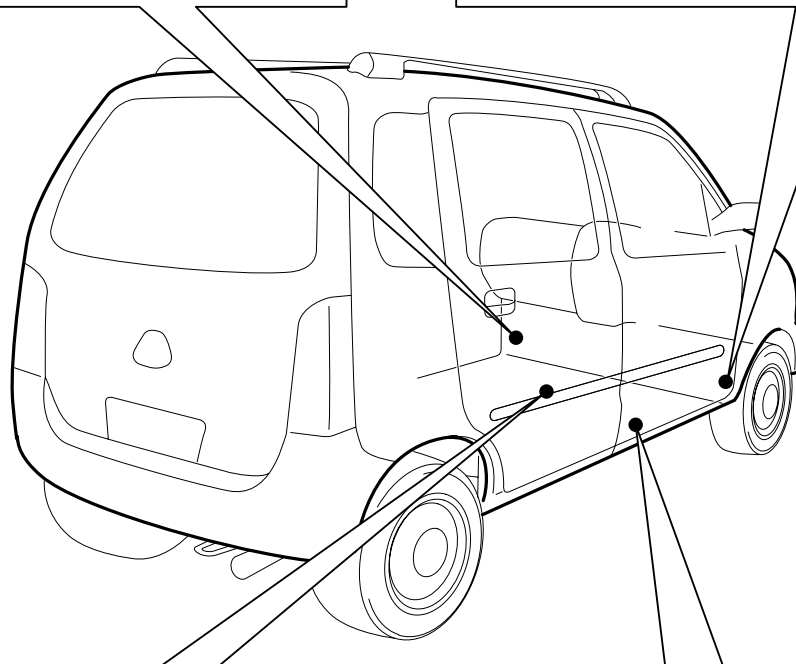
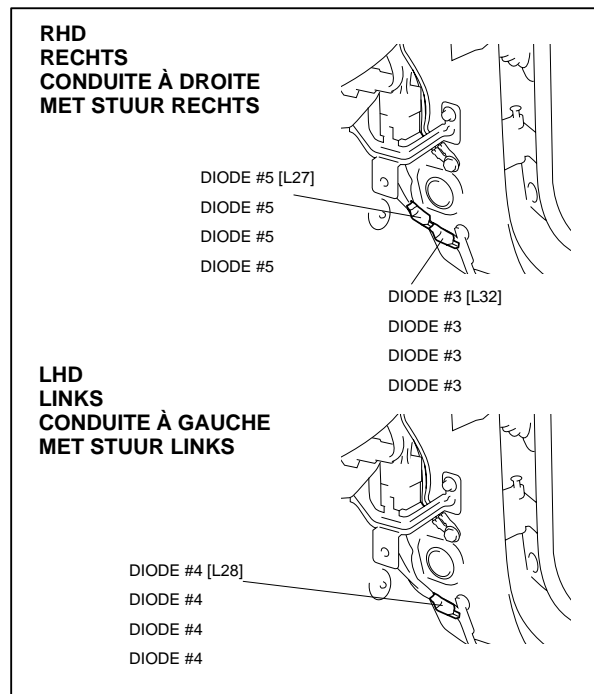
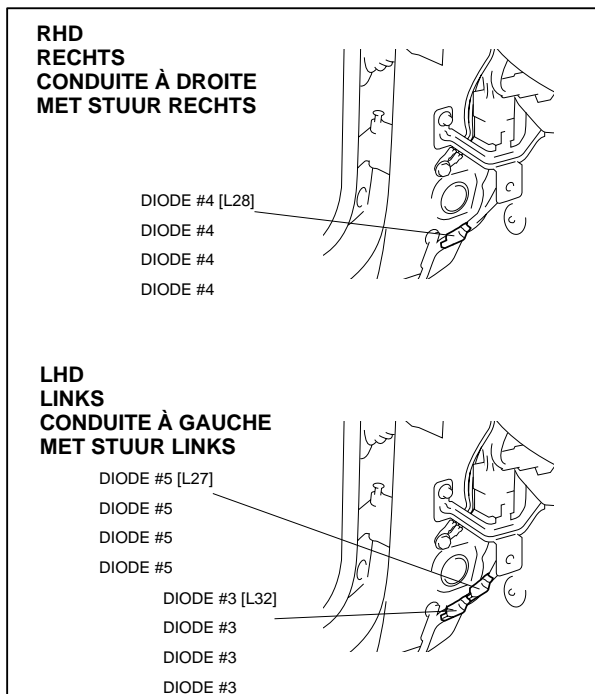


FLOOR

BODEN

PLANCHER

VLOER



SECTION 8A-5
ABSCHNITT 8A-5
SECTION 8A-5
DEEL 8A-5

GROUND POINT
MASSEPUNKT
POINTS DE MASSE
AARDEPUNT

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· MOTORRAUM	8A-5-2
· INSTRUMENTENTAFEL	8A-5-3
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· TÜR	8A-5-5
· COMPARTIMENT MOTEUR	8A-5-2
· TABLEAU DE BORD	8A-5-3
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· MOTORBAK	8A-5-2
· INSTRUMENTENPANEEL	8A-5-3
· VLOER	8A-5-4
· ACHTERKANT	8A-5-5

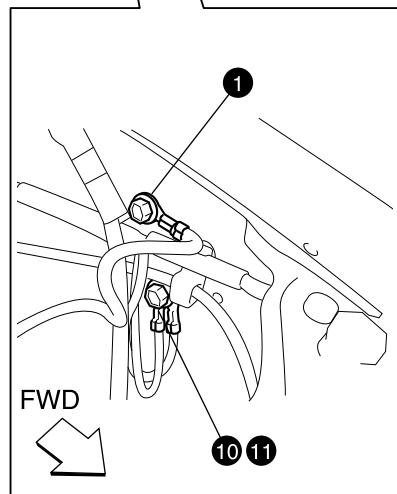
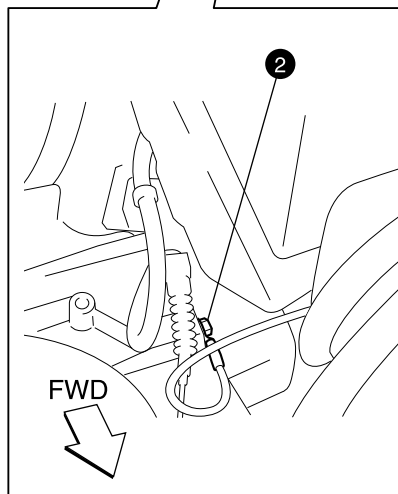
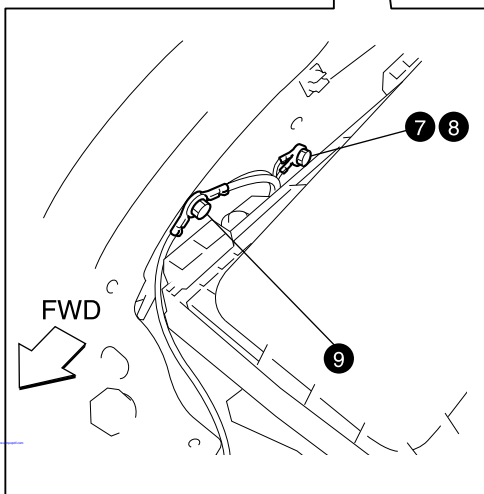
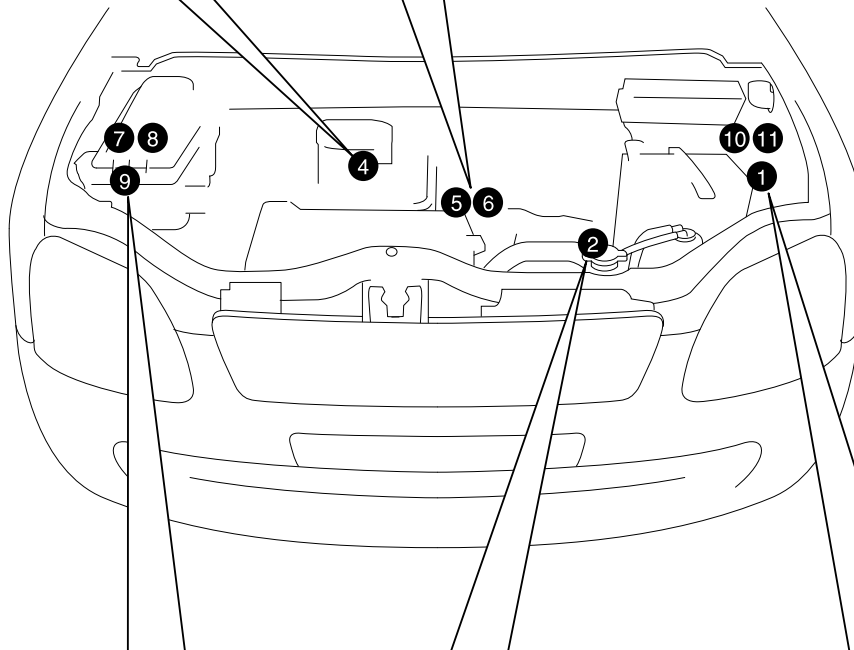
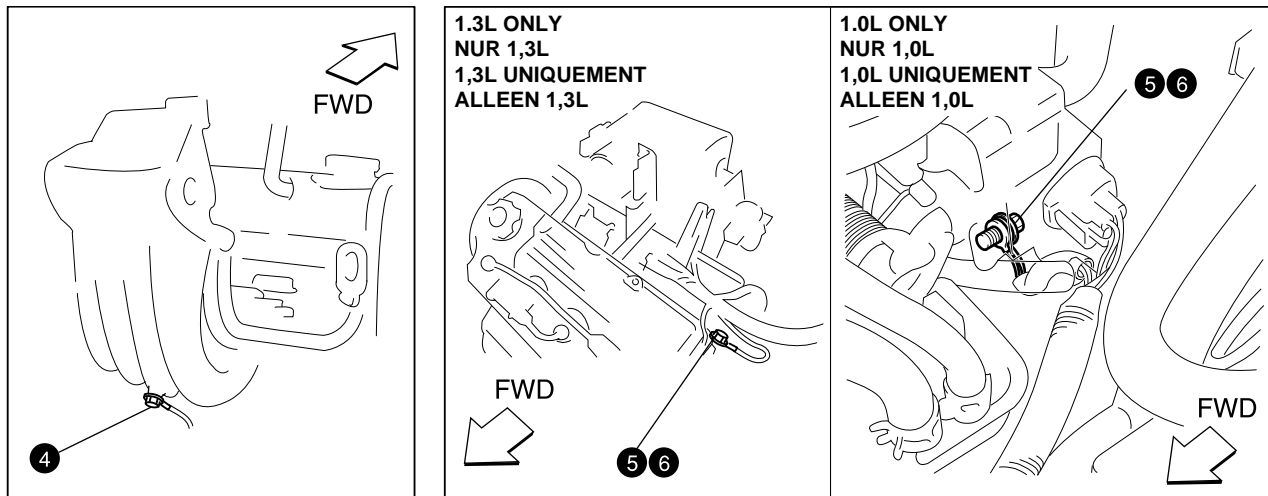
8A-5

ENGINE ROOM

MOTORRAUM

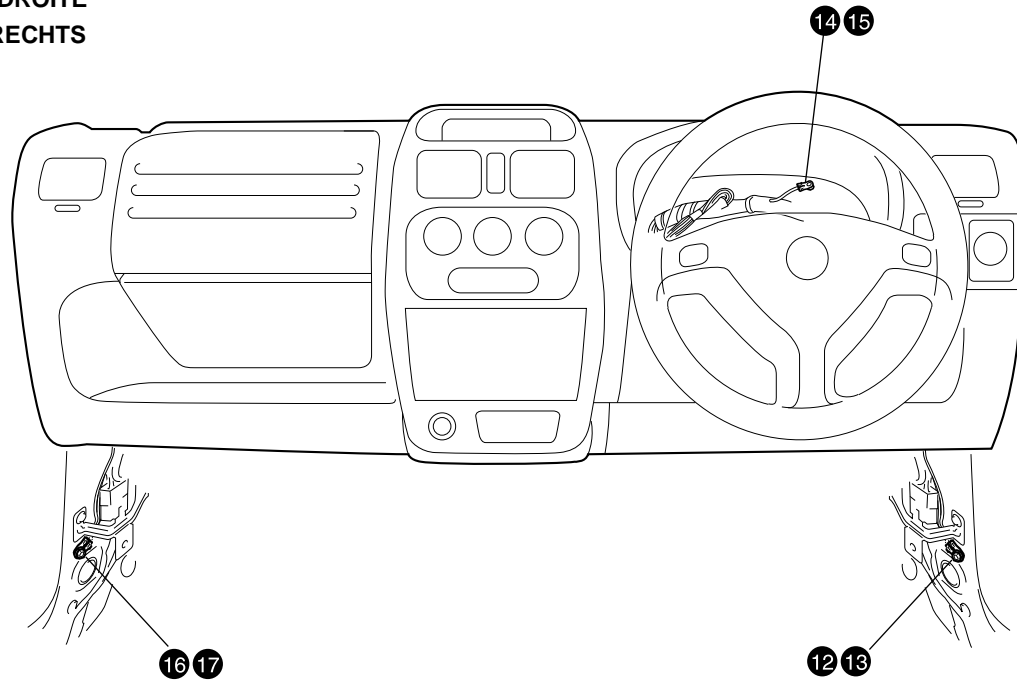
COMPARTIMENT MOTEUR

MOTORBAK

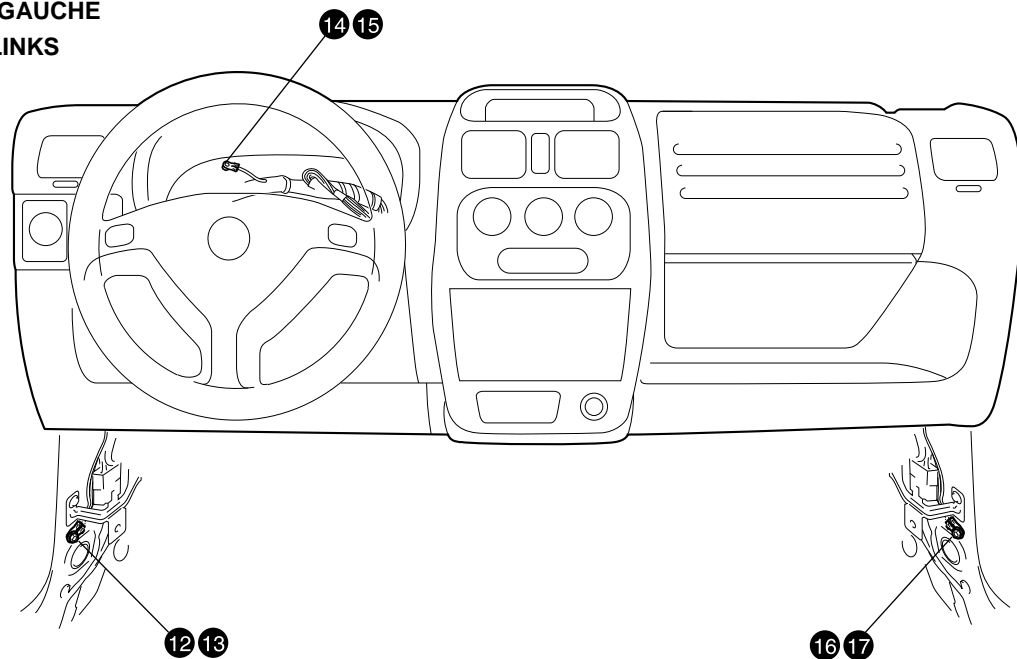


**INSTRUMENT PANEL
INSTRUMENTENTAFEL
TABLEAU DE BORD
INSTRUMENTENPANEEL**

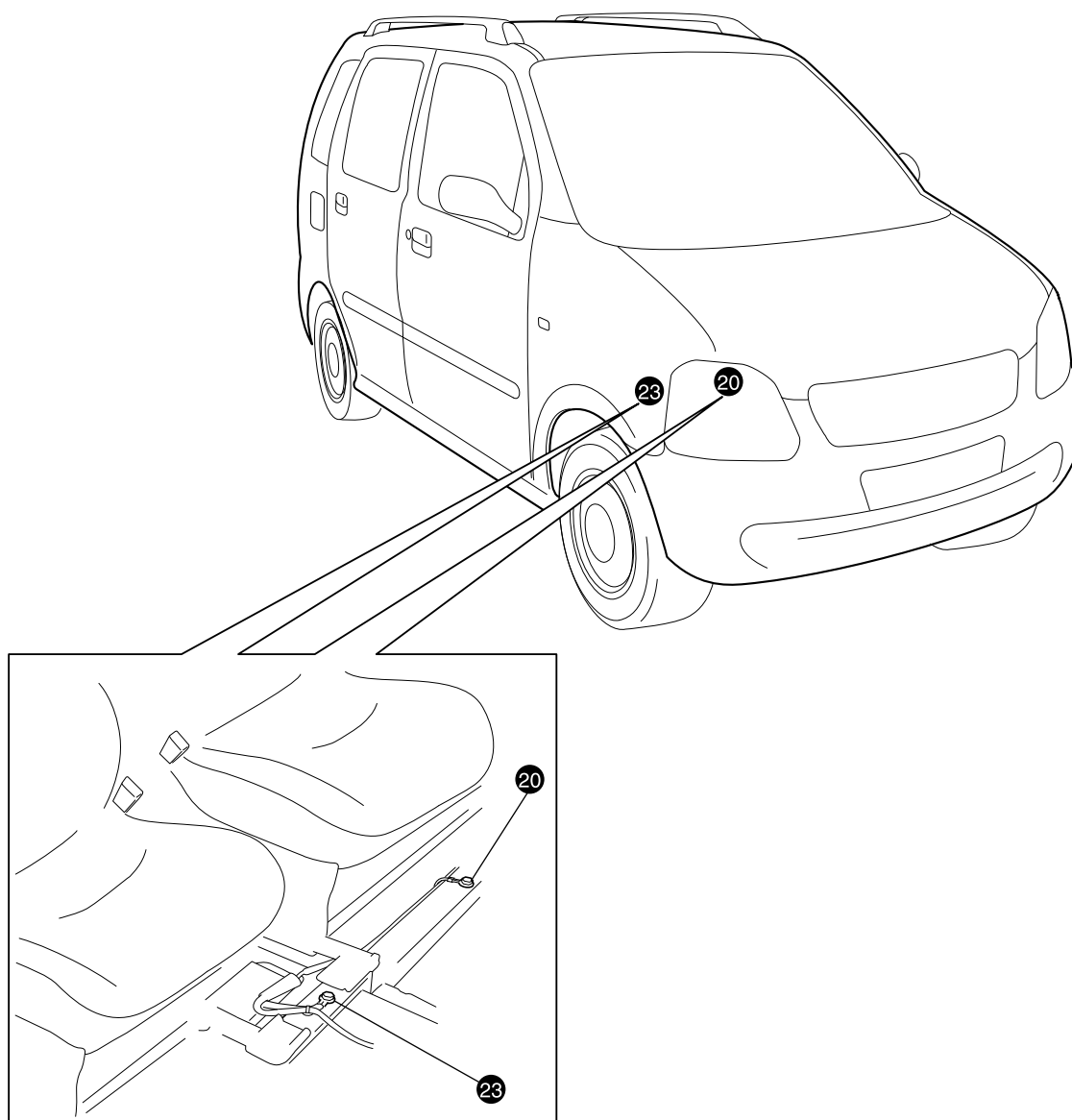
**RHD
RECHTS
CONDUITE À DROITE
MET STUUR RECHTS**



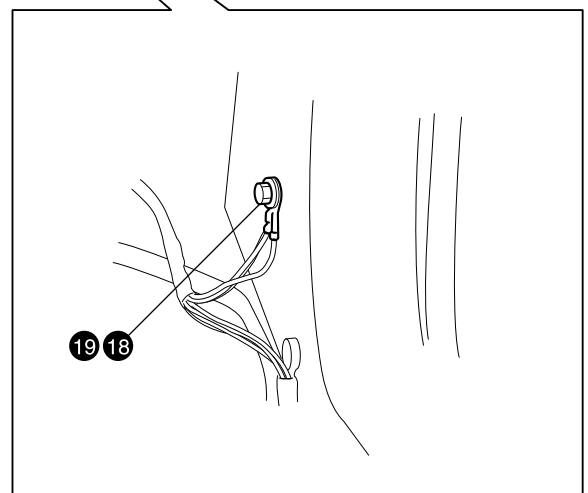
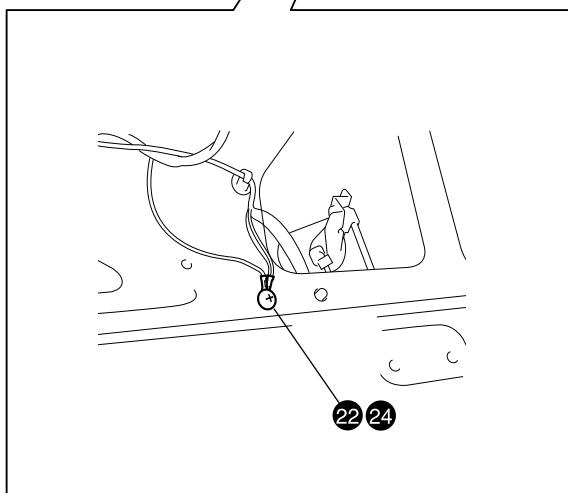
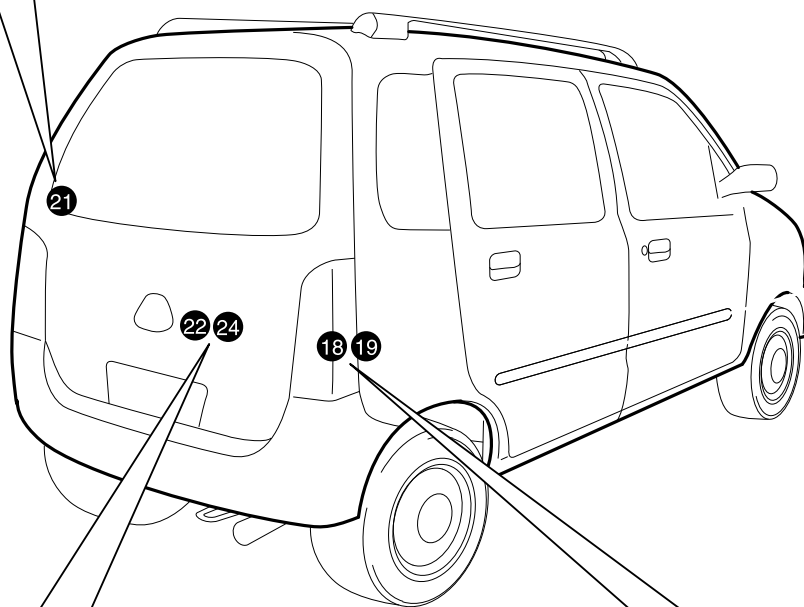
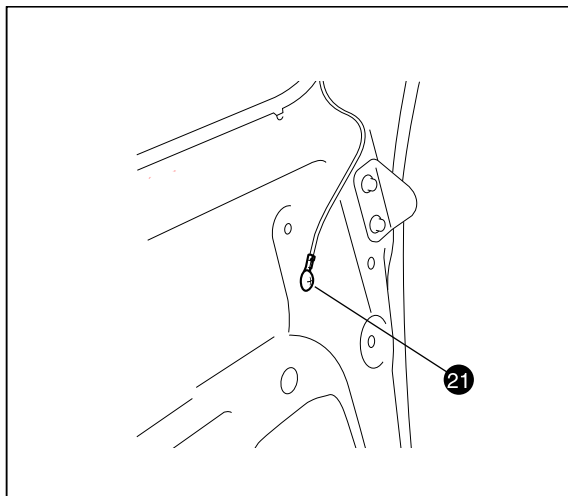
**LHD
LINKS
CONDUITE À GAUCHE
MET STUUR LINKS**



FLOOR
BODEN
PLANCHER
VLOER



REAR
TÜR
PORTE
ACHTERKANT



SECTION 8A-6
ABSCHNITT 8A-6
SECTION 8A-6
DEEL 8A-6

POWER SUPPLY DIAGRAM
STROMVERSORGUNGSDIAGRAMM
SCHÉMA DU CIRCUIT D'ALIMENTATION
SPANNINGSTOEVOER-DIAGRAM

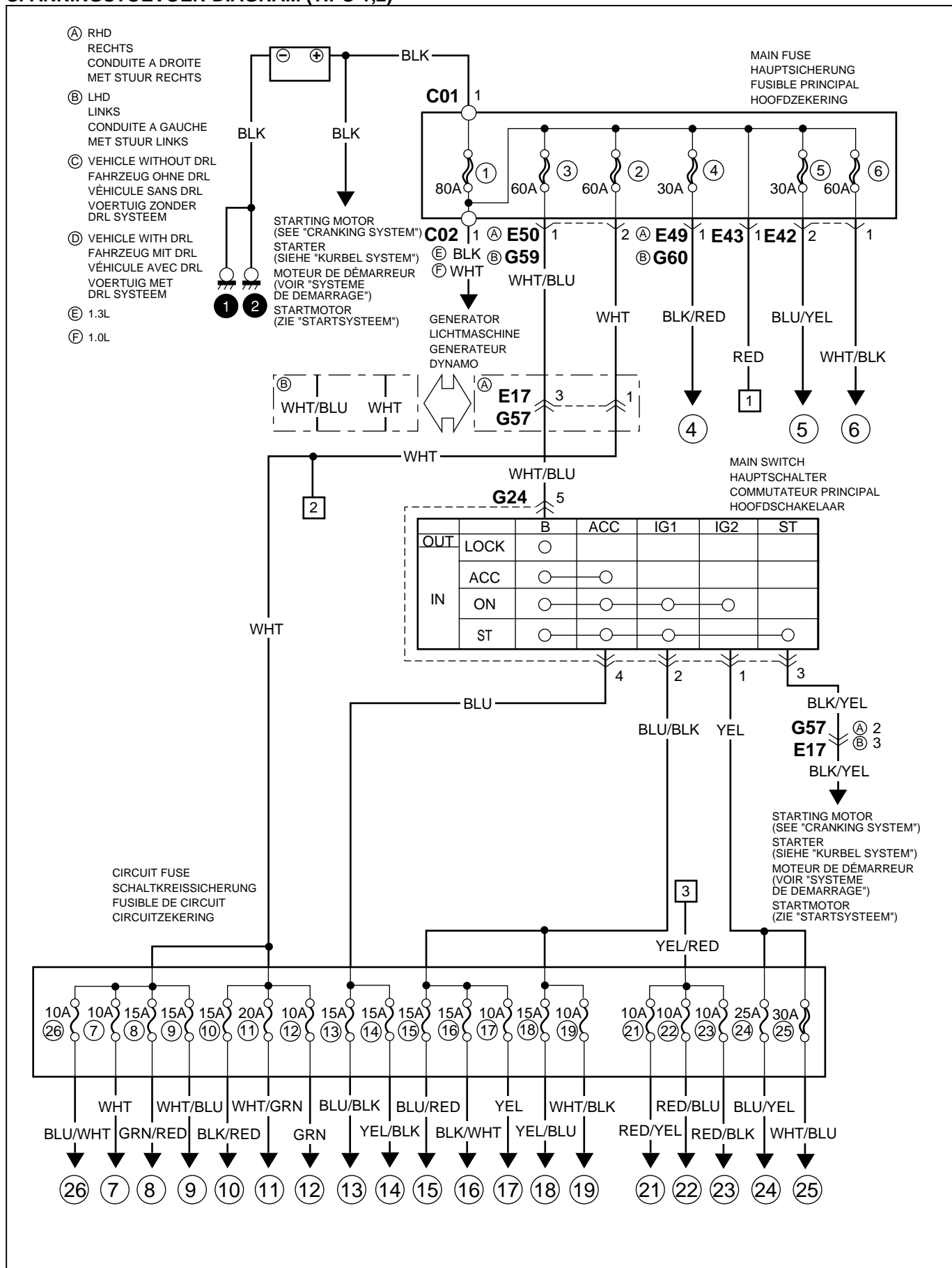
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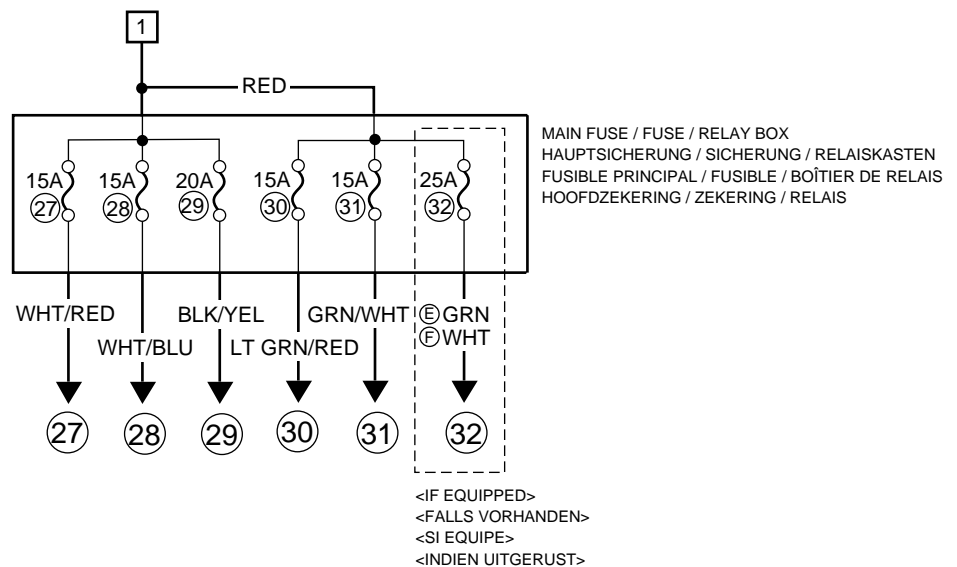
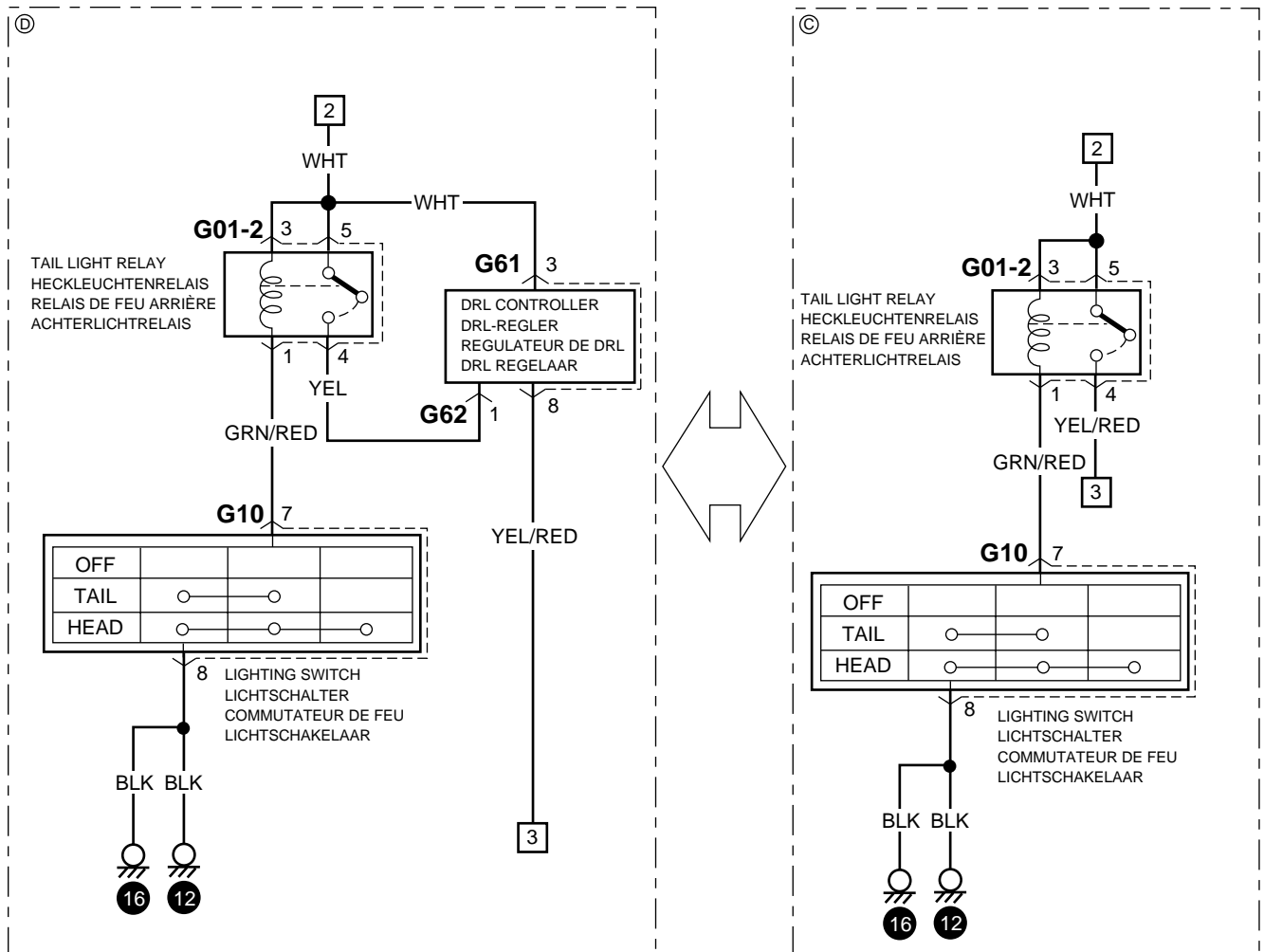
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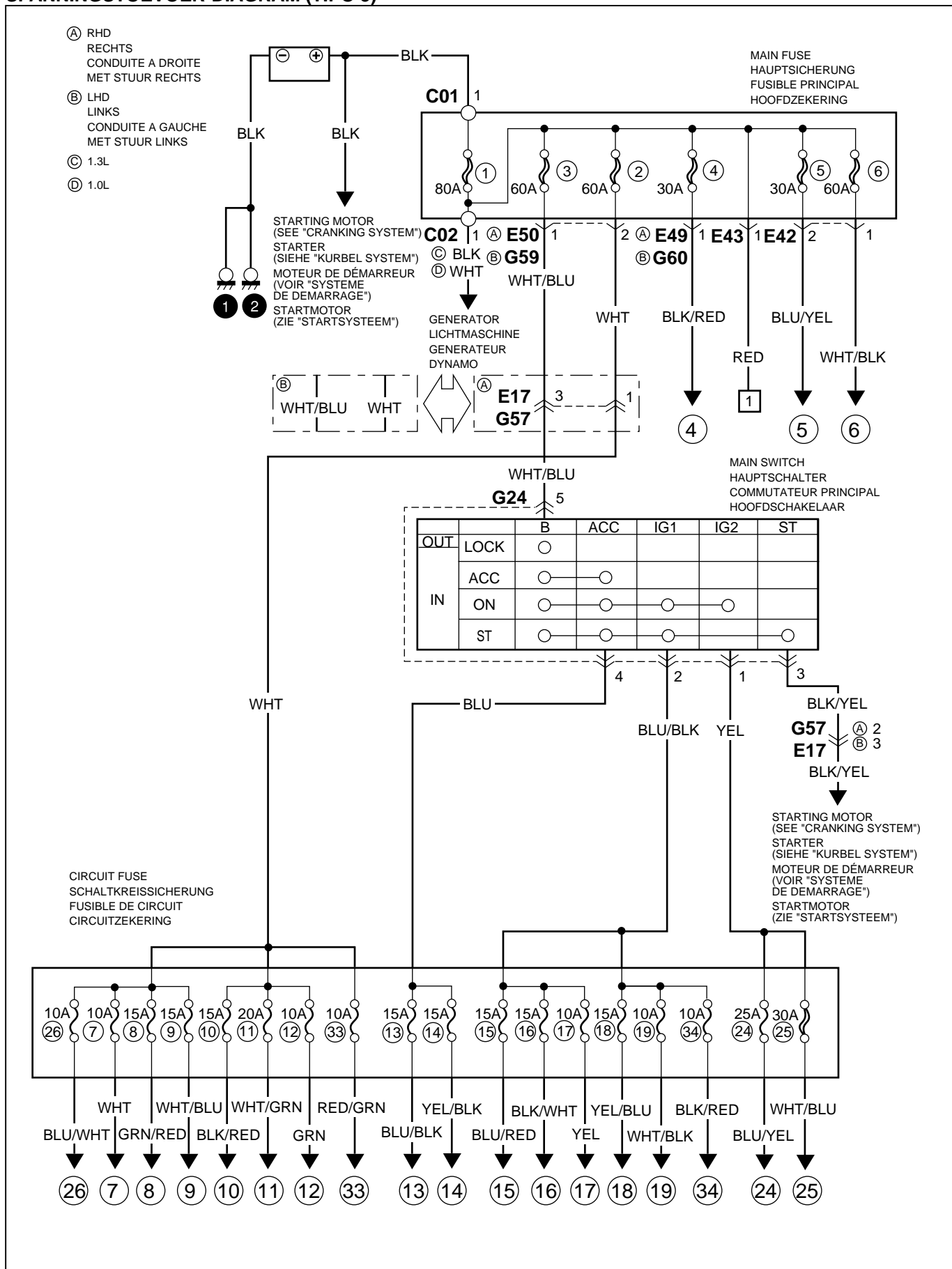
STROMVERSORGUNGS DIAGRAMM (TYPE 2)

SCHÉMA DU CIRCUIT D'ALIMENTATION (TYPE 1,2)

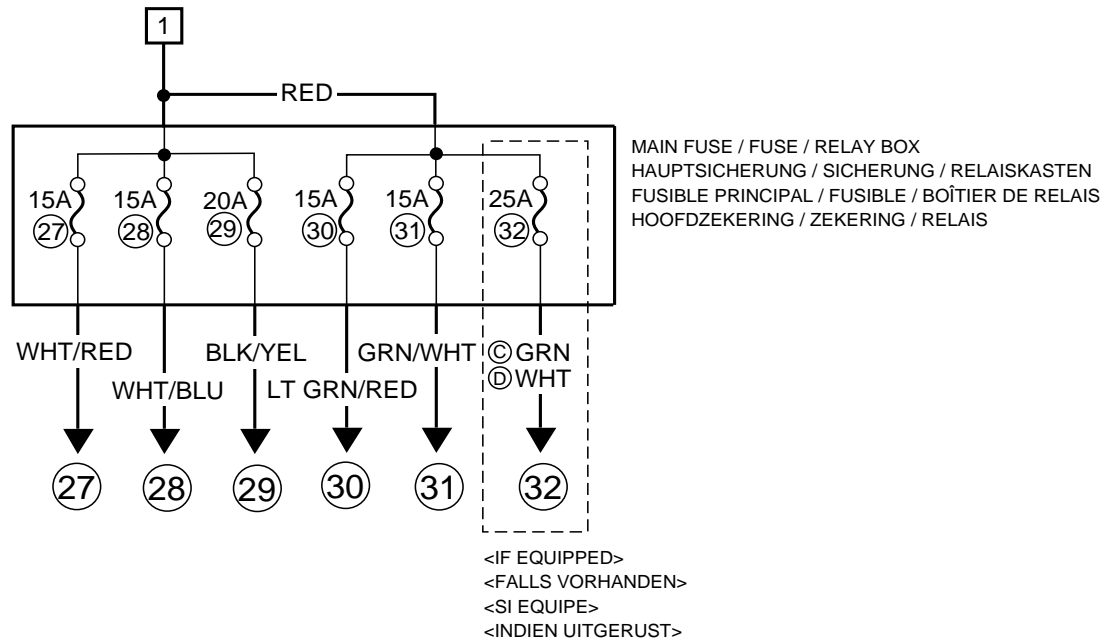
SPANNINGSTOEVOER-DIAGRAM (TIPO 1,2)



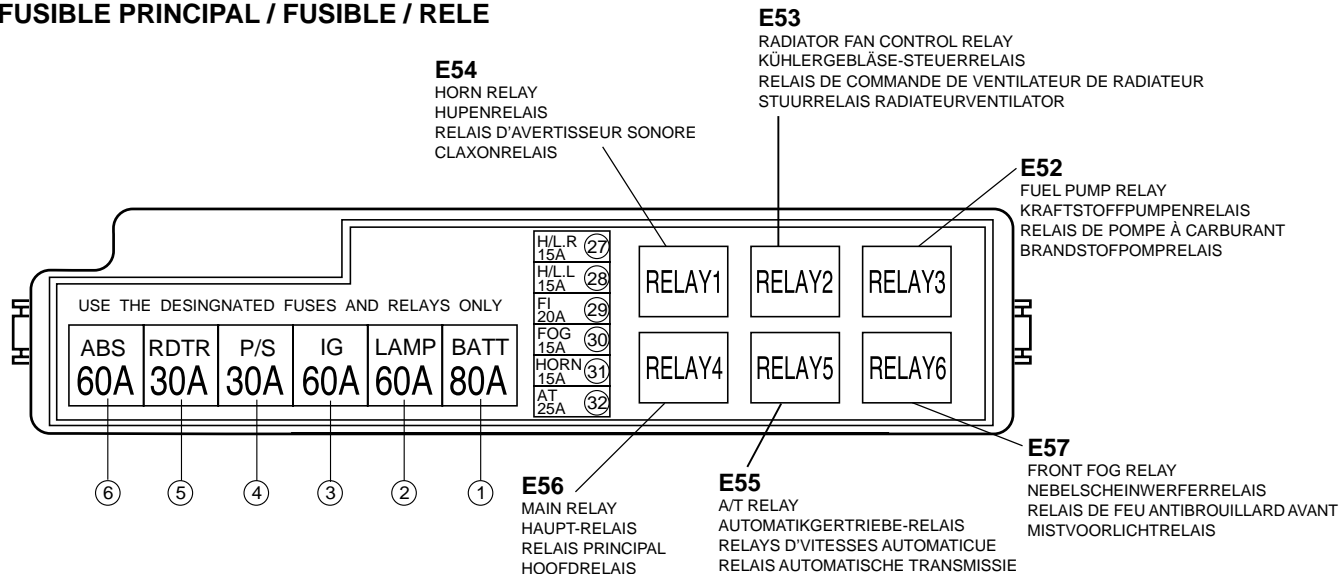


POWER SUPPLY DIAGRAM (TYPE 3)**STROMVERSORGUNGSDIAGRAMM (TYPE 3)****SCHÉMA DU CIRCUIT D'ALIMENTATION (TYPE 3)****SPANNINGSTOEVOER-DIAGRAM (TIPO 3)**

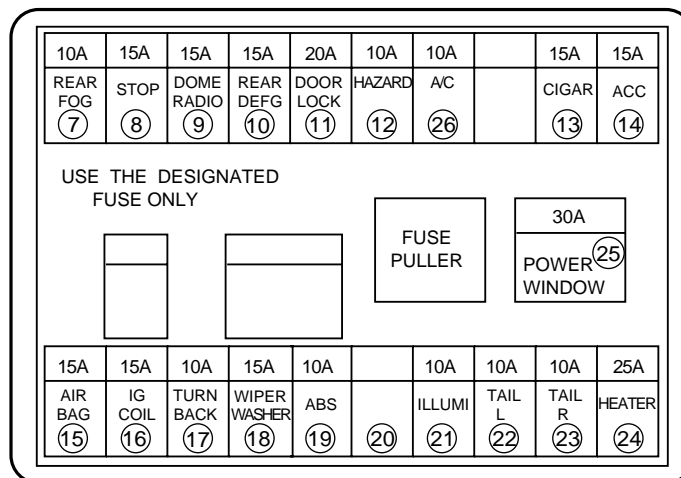
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MAIN FUSE / FUSE / RELAY
HAUPTSICHERUNG / SICHERUNG / RELAIS
FUSIBLE PRINCIPAL / FUSIBLE / RELAIS
FUSIBLE PRINCIPAL / FUSIBLE / RELE



FUSE (TYPE 1,2)
SICHERUNG (TYP 1,2)
FUSIBLE (TYPE 1,2)
ZEKERING (TIPO 1,2)

**NOTE:**

The number at each fuse corresponds to that of Power Supply Diagram (8A-6-2,3) or System Circuit Diagram (8A-7).

HINWEIS:

Die Nummer jeder Sicherung entspricht der jeweiligen Nummer auf dem Stromversorgungsdiagramm (8A-6-2,3) oder Systemschalttdiagramm (8A-7).

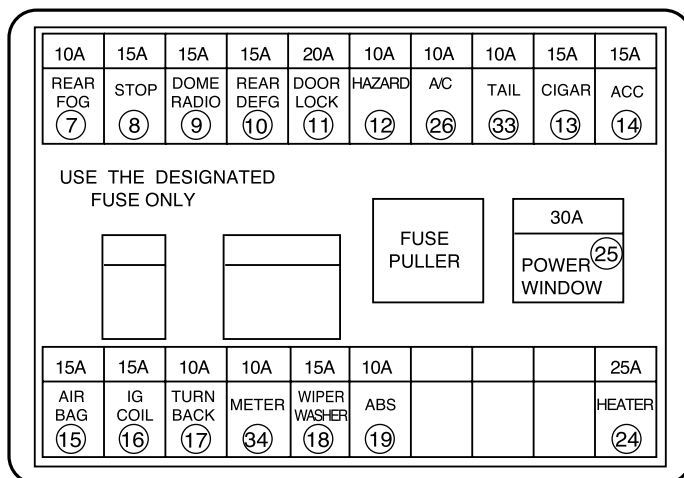
REMARQUE:

Le numéro de chaque fusible correspond à celui indiqué sur le schéma du circuit d'alimentation (8A-6-2,3) ou du schéma des circuits électriques (8A-7).

OPMERKING:

Het nummer bij iedere zekering correspondeert met het nummer in het spanningstoevoer-diagram (8A-6-2,3) of het systeemcircuitdiagram (8A-7).

FUSE (TYPE 3)
SICHERUNG (TYP 3)
FUSIBLE (TYPE 3)
ZEKERING (TIPO 3)



NOTE:

The number at each fuse corresponds to that of Power Supply Diagram (8A-6-2,3) or System Circuit Diagram (8A-7).

HINWEIS:

Die Nummer jeder Sicherung entspricht der jeweiligen Nummer auf dem Stromversorgungsdiagramm (8A-6-2,3) oder Systemschalttdiagramm (8A-7).

REMARQUE:

Le numéro de chaque fusible correspond à celui indiqué sur le schéma du circuit d'alimentation (8A-6-2,3) ou du schéma des circuits électriques (8A-7).

OPMERKING:

Het nummer bij iedere zekering correspondeert met het nummer in het spanningstoevoer-diagram (8A-6-2,3) of het systeemcircuitdiagram (8A-7).

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ABSCHNITT 8A-7

SYSTEMSCHALTDIAGRAMM

INHALT

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SECTION 8A-7

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DEEL 8A-7

SYSTEEMCIRCUITDIAGRAM

INHOUD

SYSTEEM NR. : SYSTEEM

BLADZIJDE NR.

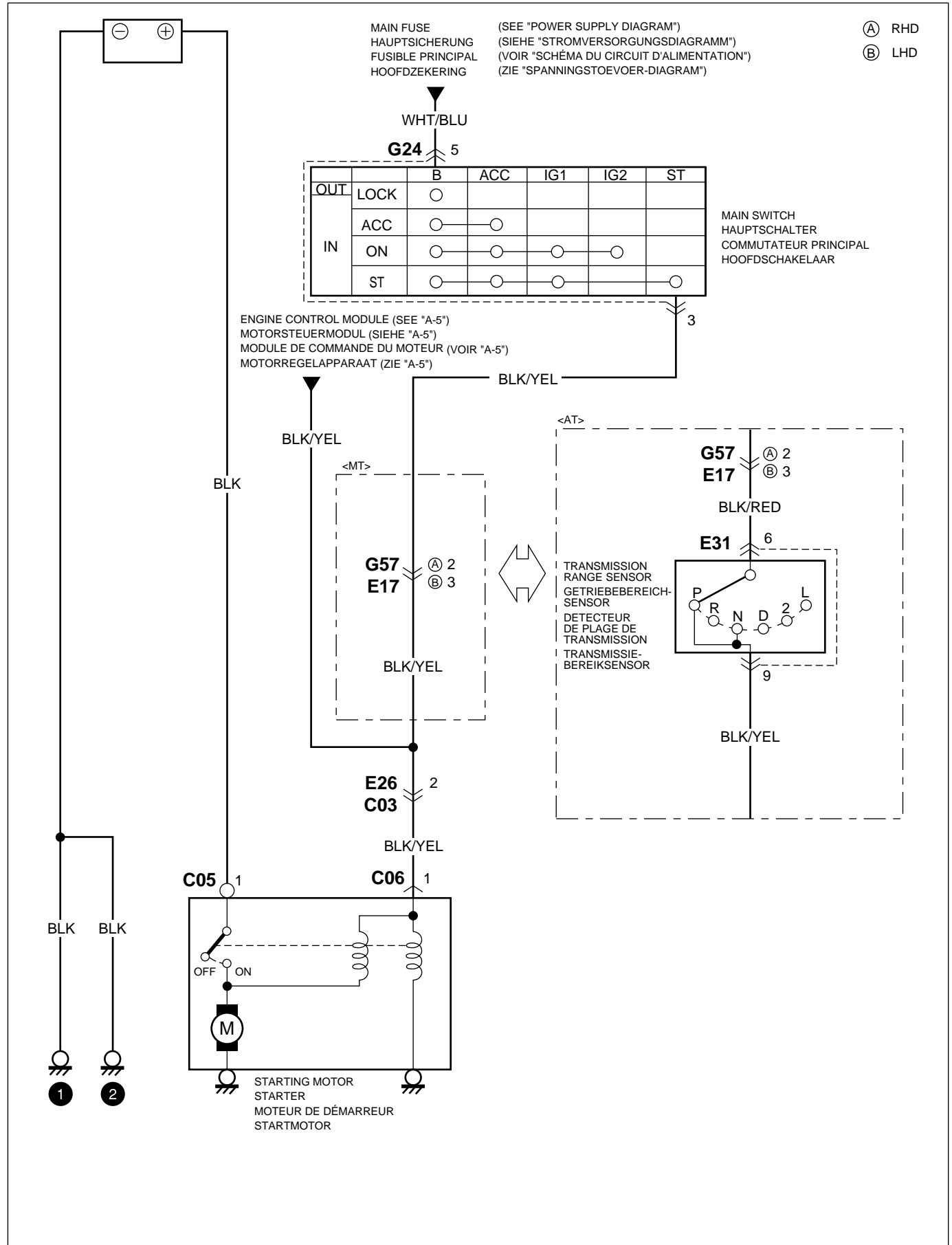
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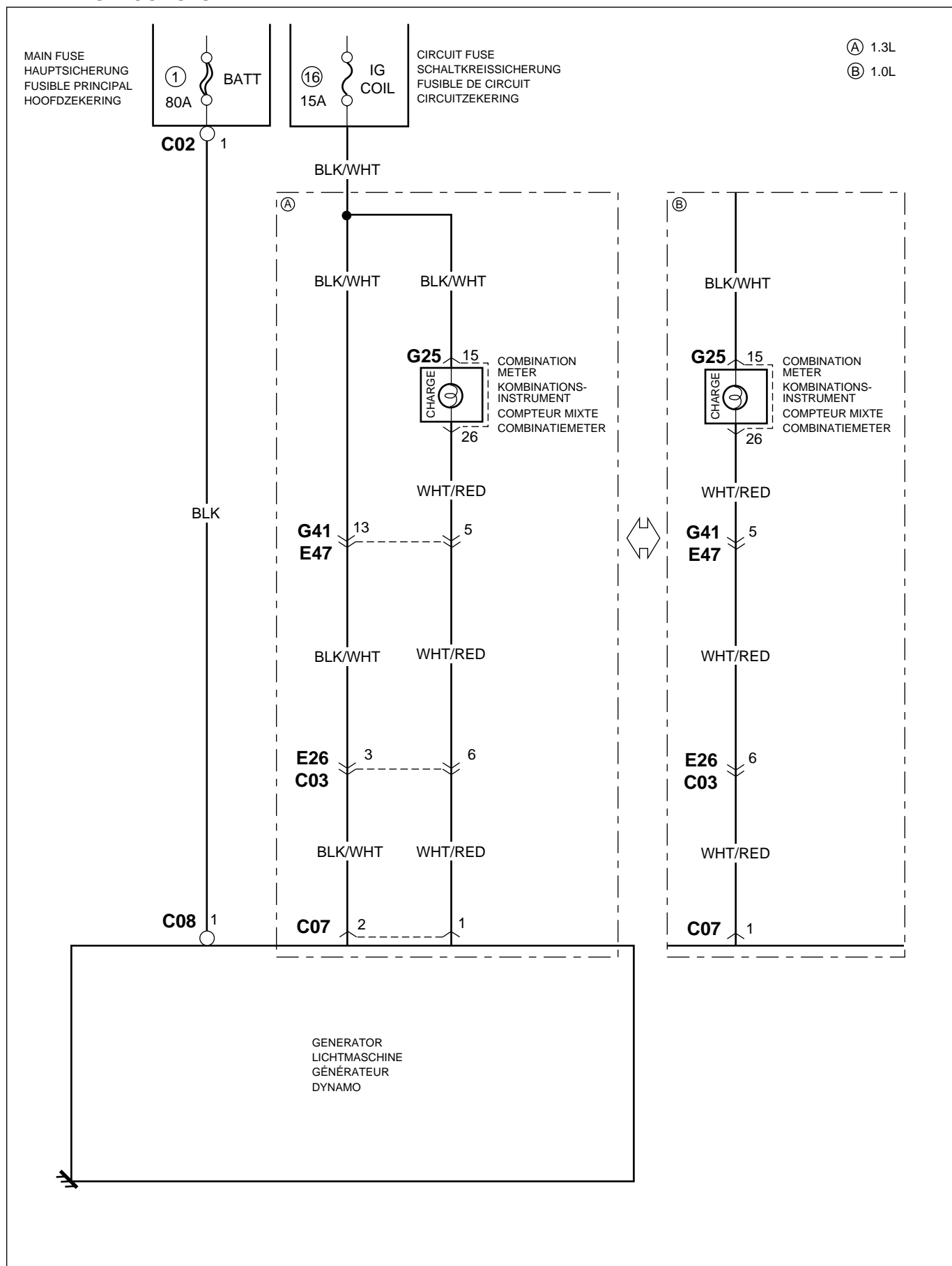
A-1:CRANKING SYSTEM

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A-1:SYSTÈME DE DÉMARRAGE

A-1:STARTSYSTEEM



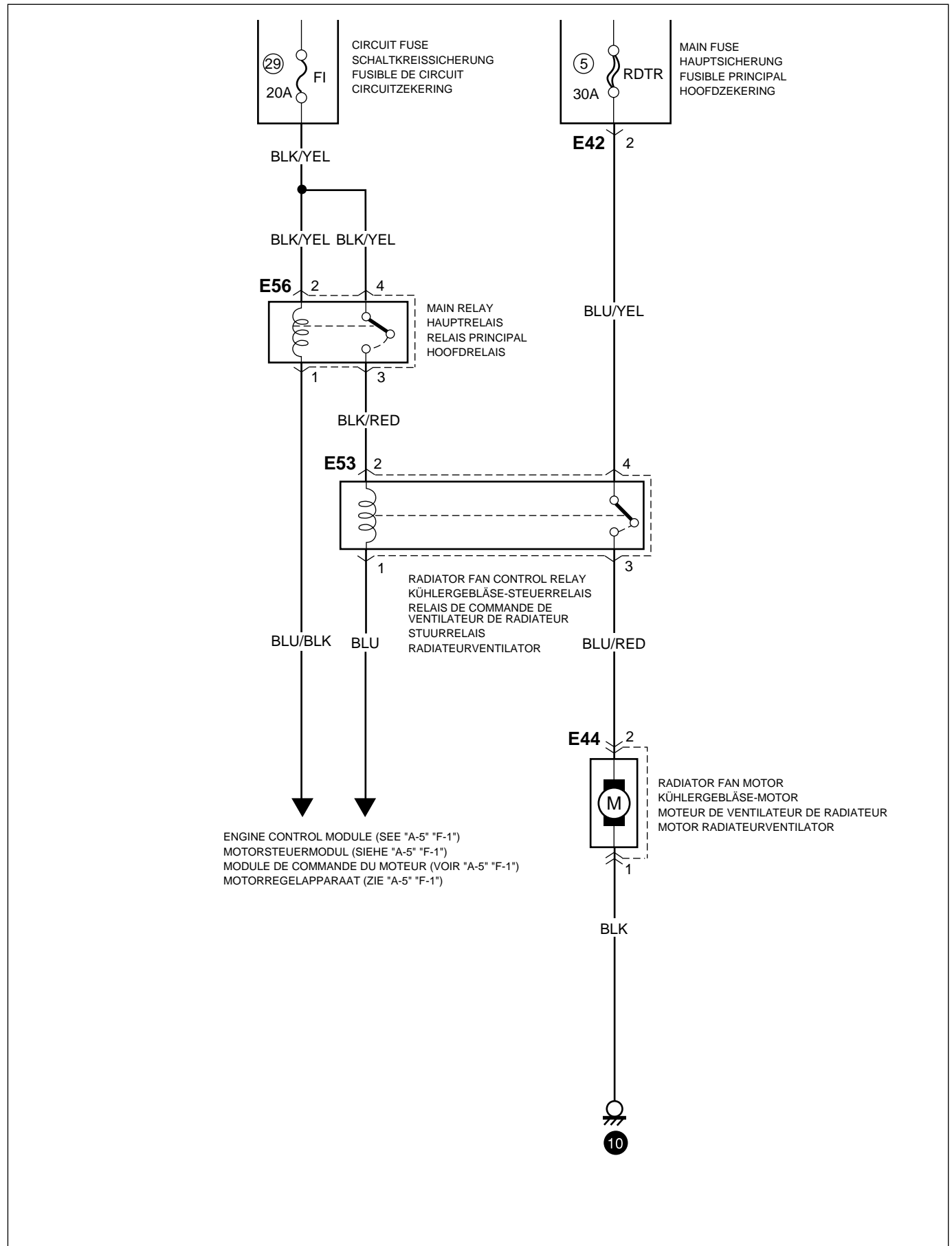
A-2:CHARGING SYSTEM**A-2:LADESYSYTEM****A-2:SYSTÈME DE CHARGE****A-2:LAADSTROOMSYSTEEM**

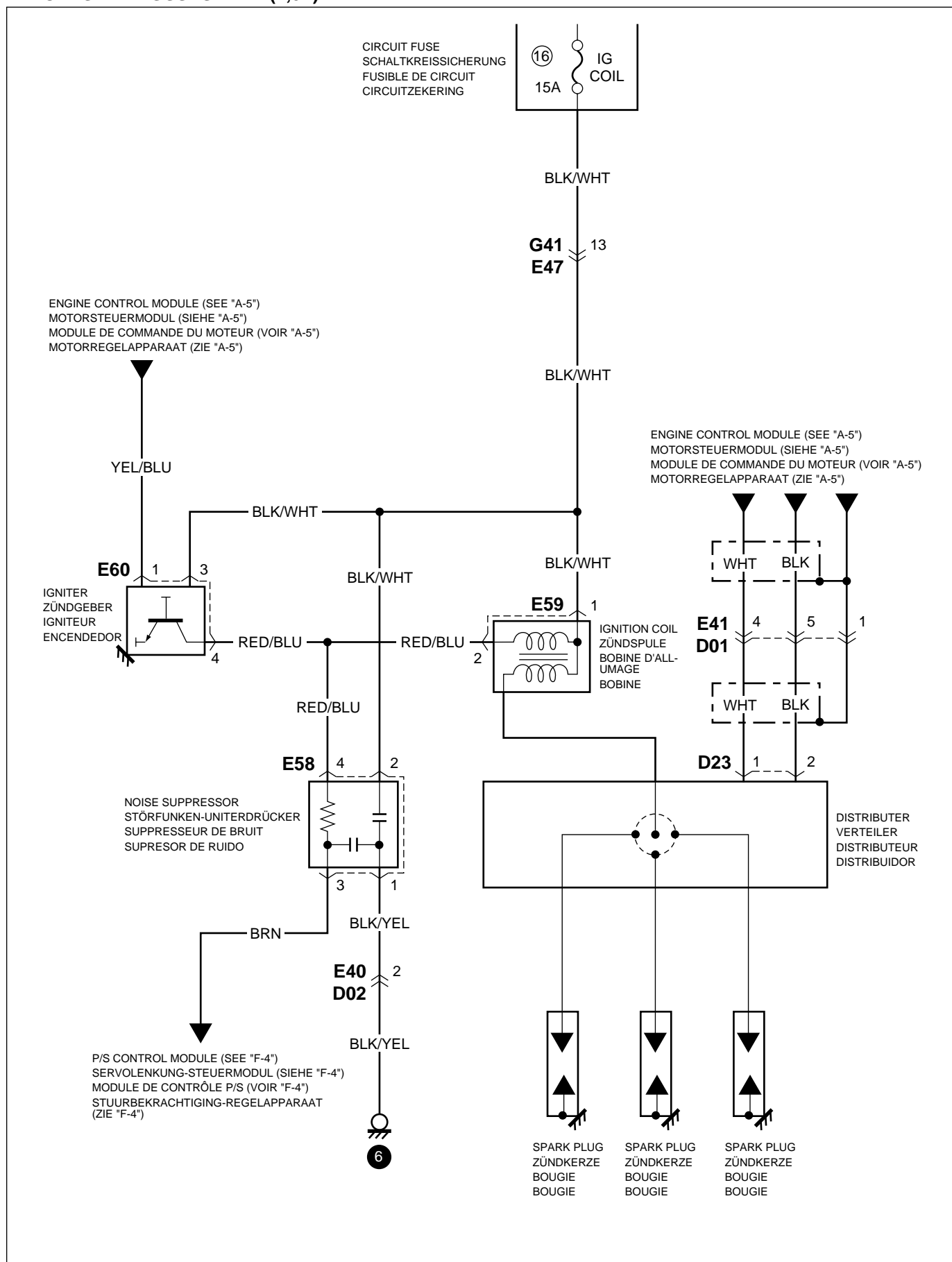
A-3:COOLING SYSTEM

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A-3:SYSTEME DE REFROIDISSEMENT

A-3:KOELSYSTEEM



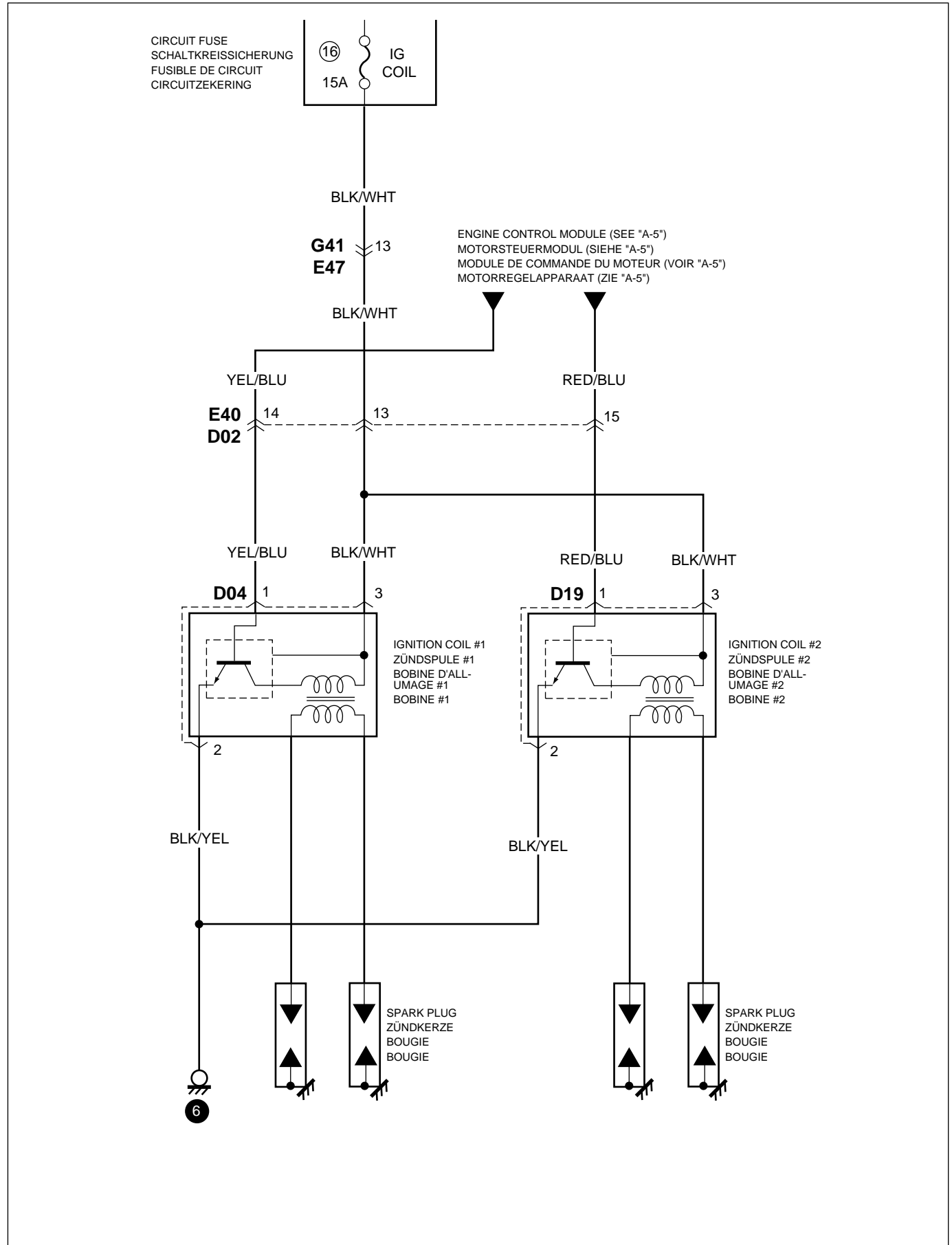
A-4:IGNITION SYSTEM (1,0L)**A-4:ZÜNDSYSTEM (1,0L)****A-4:SYSTÈM D'ALLUMAGE (1,0L)****A-4:ONTSTEKINGSSYSTEEM (1,0L)**

A-4:IGNITION SYSTEM (1.3L)

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A-4:SYSTEM D'ALLUMAGE (1,3L)

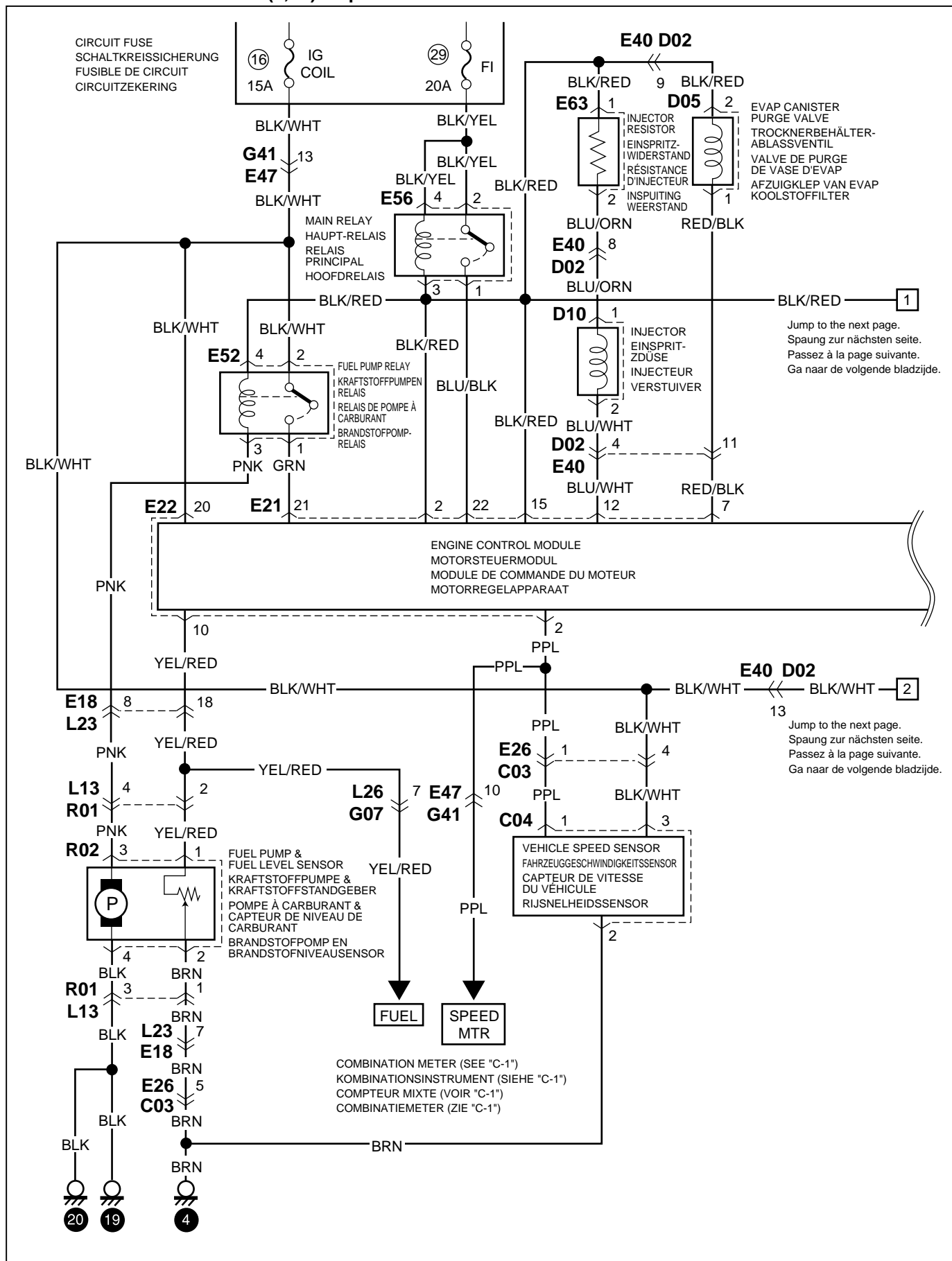
A-4:ONTSTEKINGSSYSTEEM (1,3L)

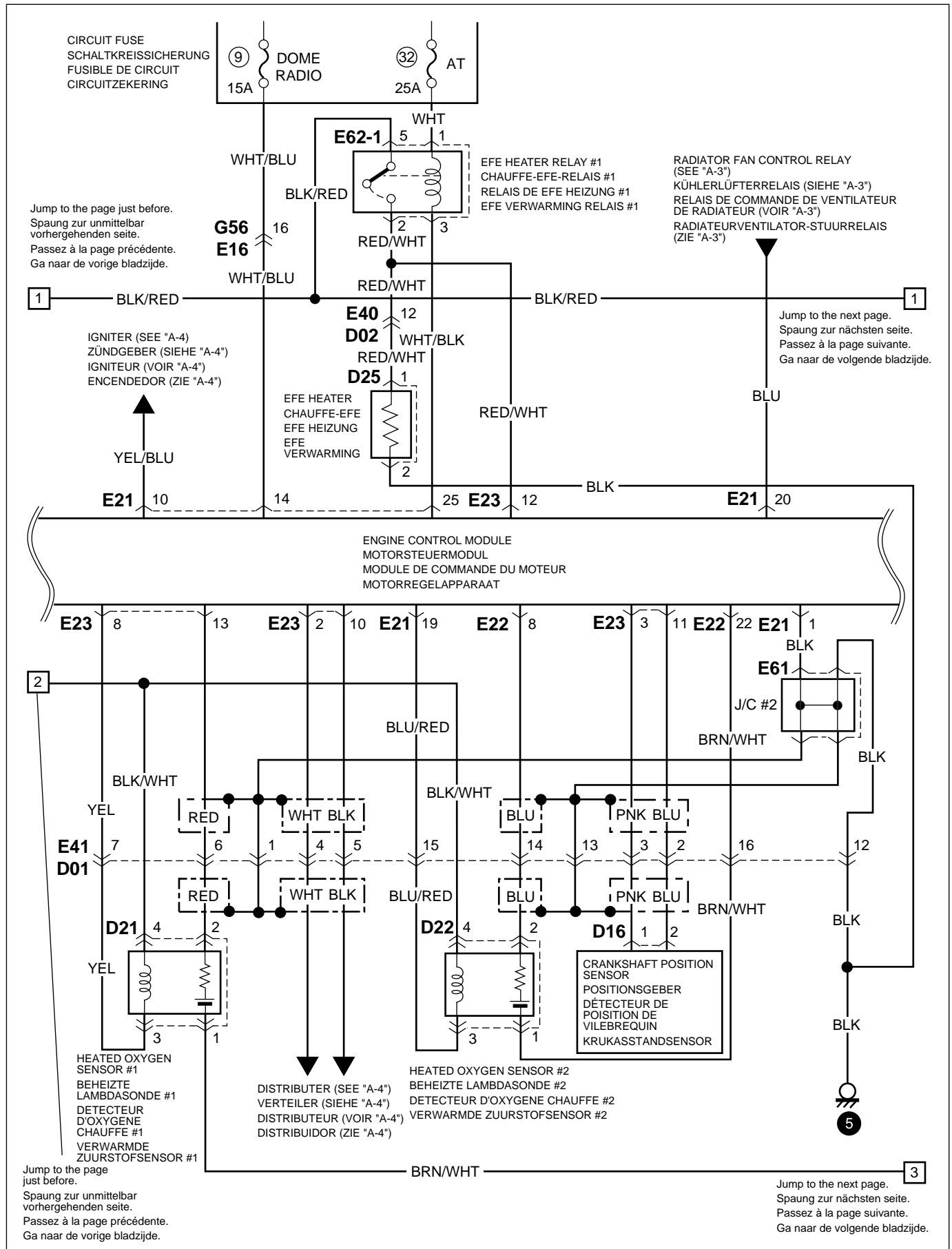


A-5: MOTORSTEUERSYSTEM 1 (1,0L) von 2

A-5:SYSTÈM DE COMMANDE DU MOTOR (1,0L) 1 de 2

A-5:MOTORREGELSYSTEEM (1,0L) 1 op 2

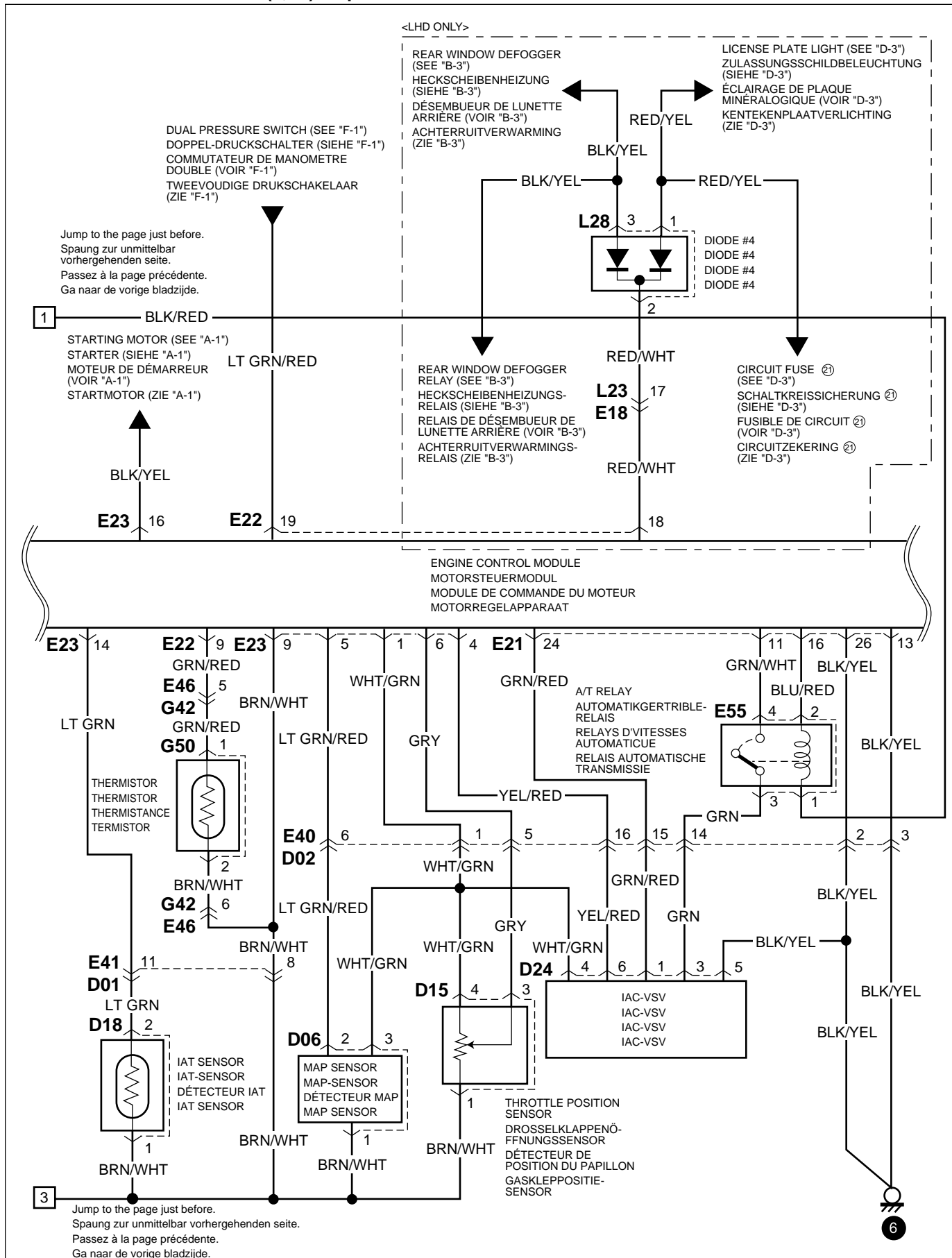


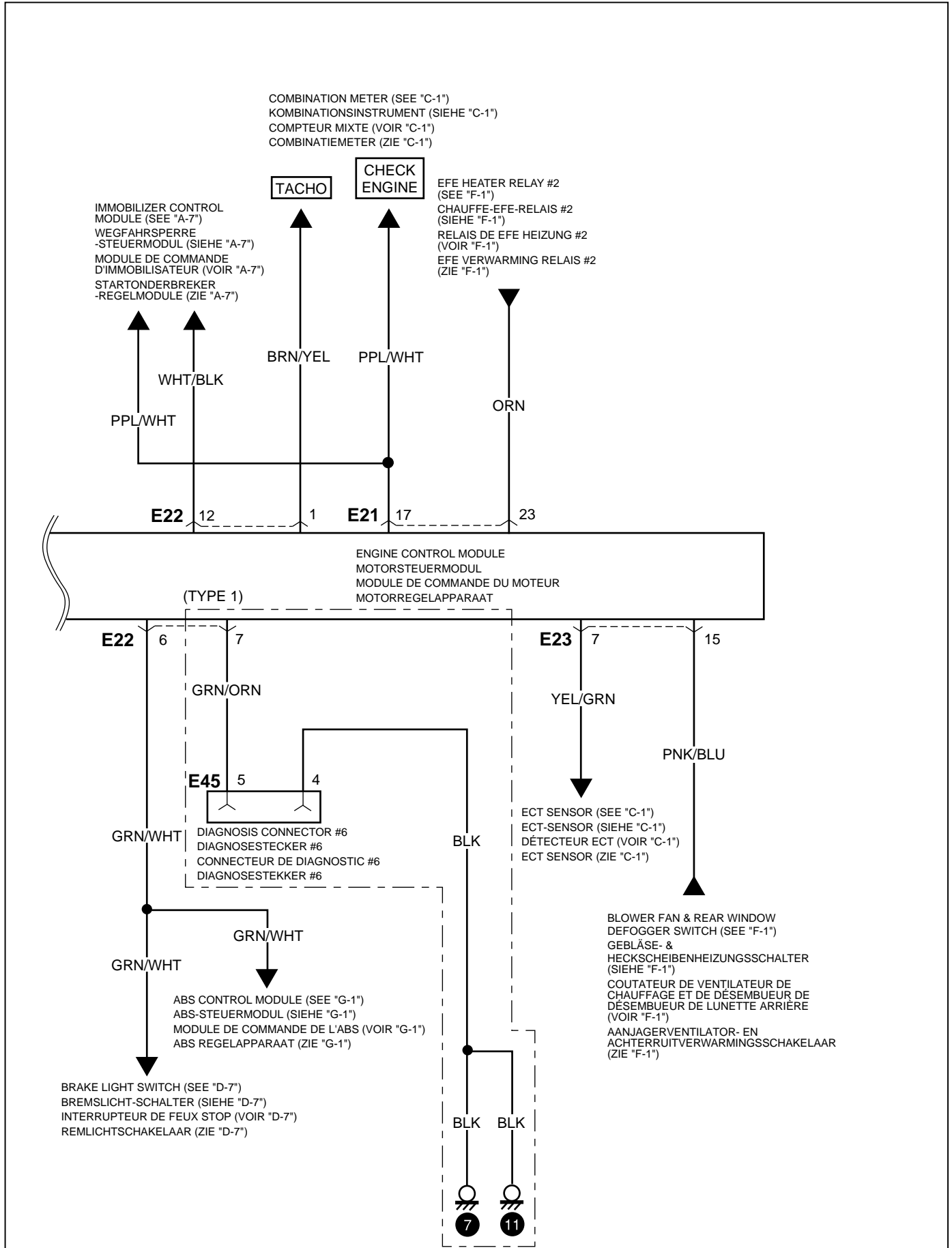


A-5: MOTORSTEUERSYSTEM (1,0) 2 von 2

A-5: MOTORSTEUERSYSTEM (1,0L) 2 von 2

A-5:MOTORREGELSYSTEEM (1,0L) 2 op 2

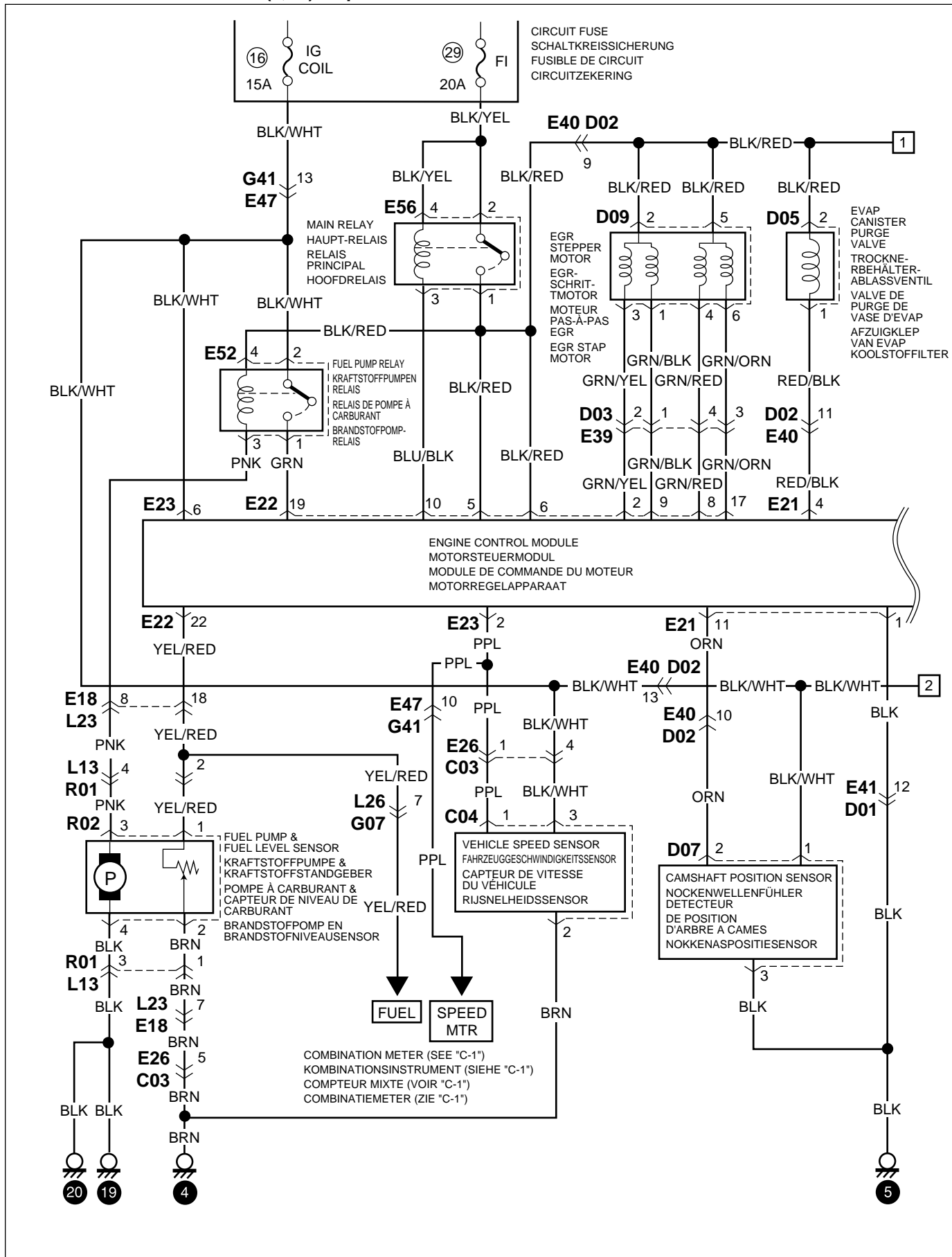


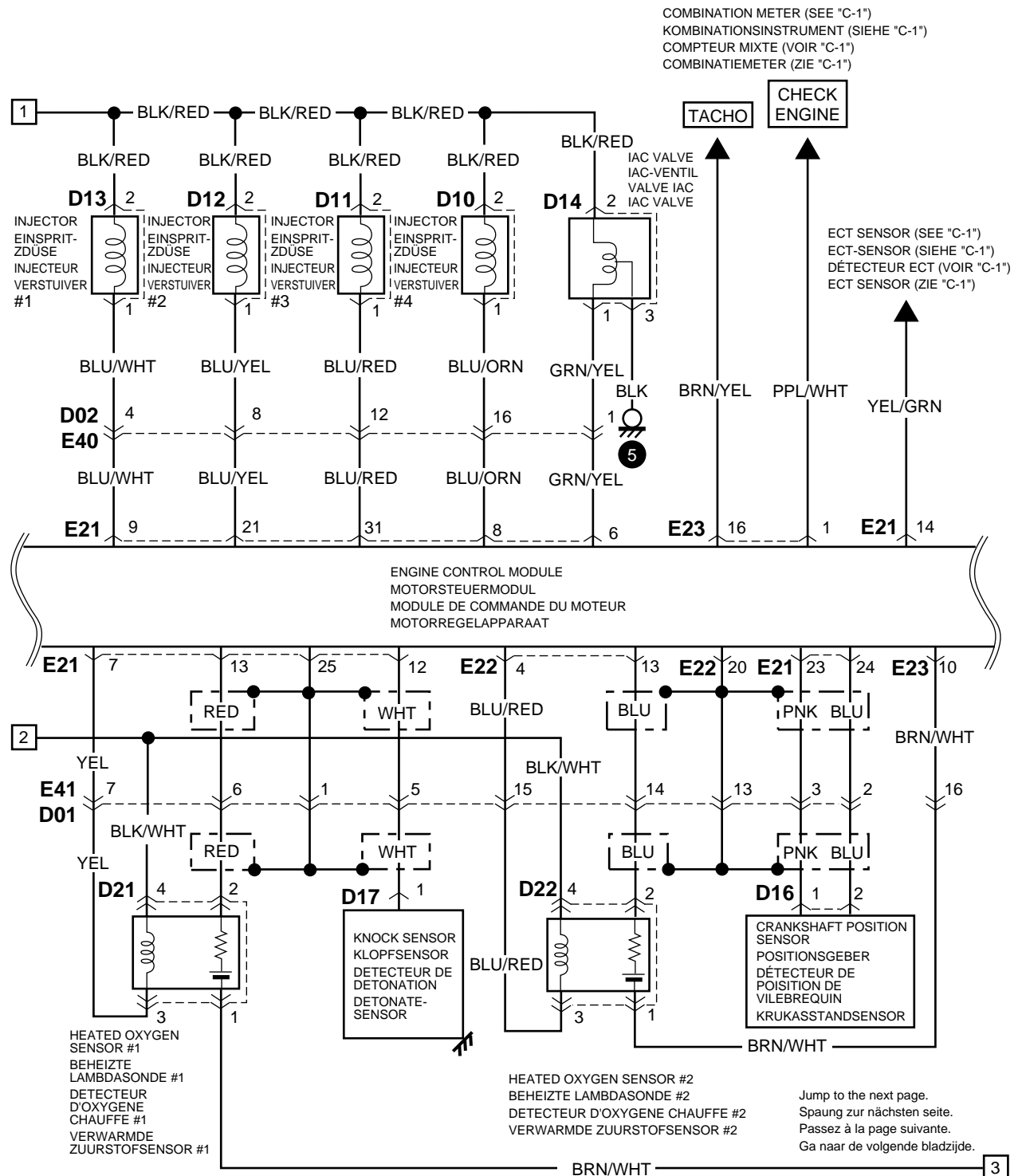


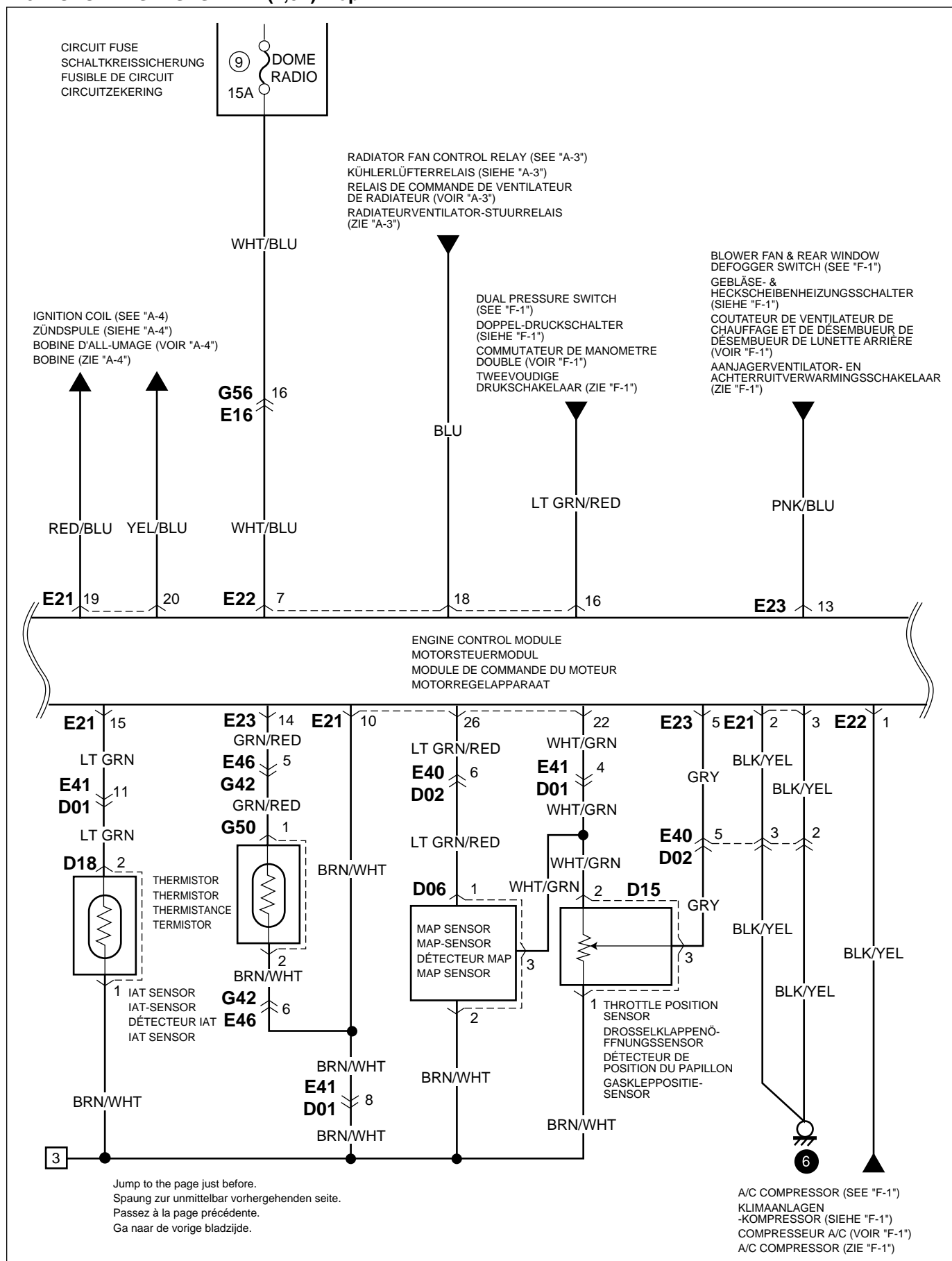
A-5: MOTORSTEUERSYSTEM (1,3) 1 von 2

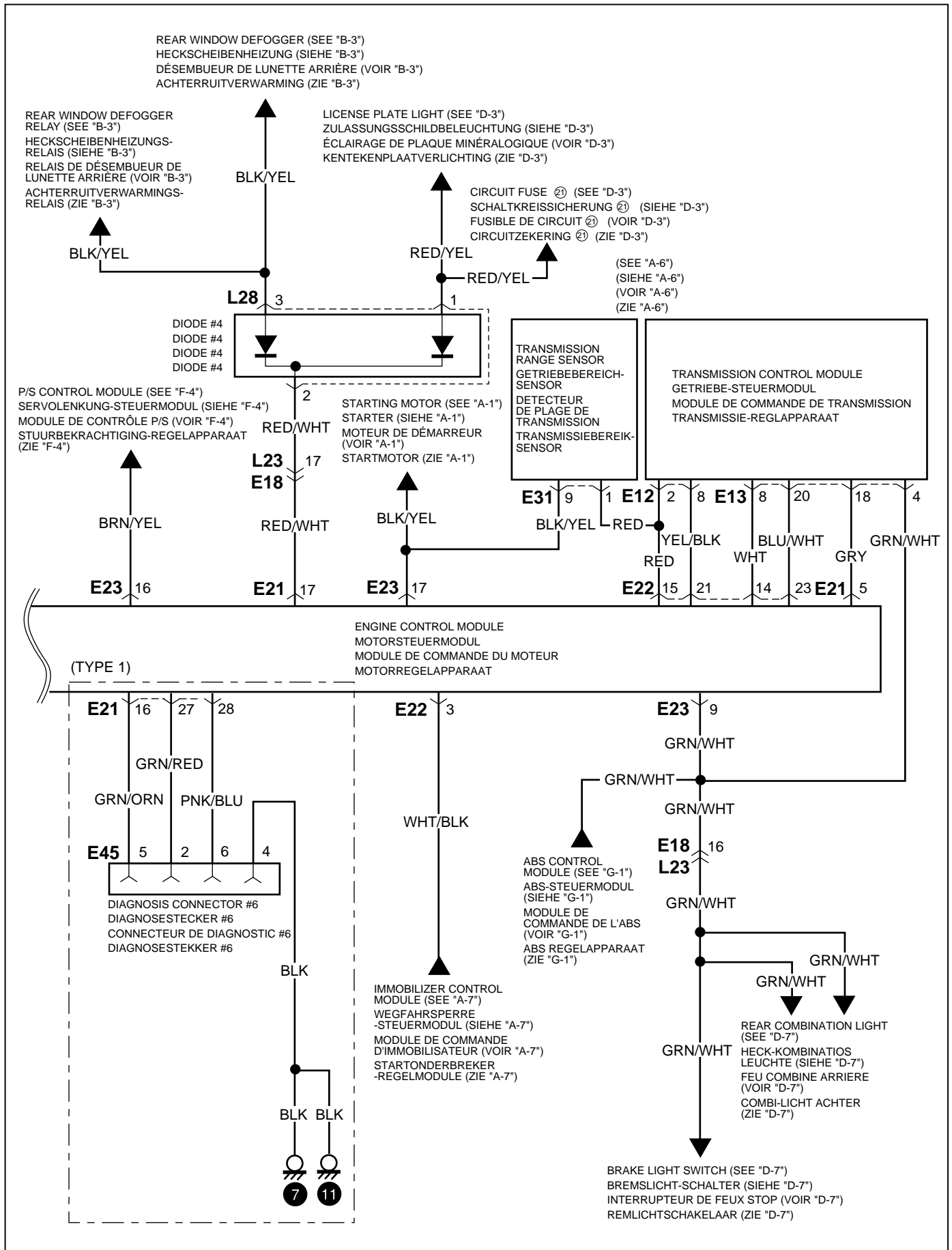
A-5-MOTORSTEUERSYSTEM (1,3) 1 von 2

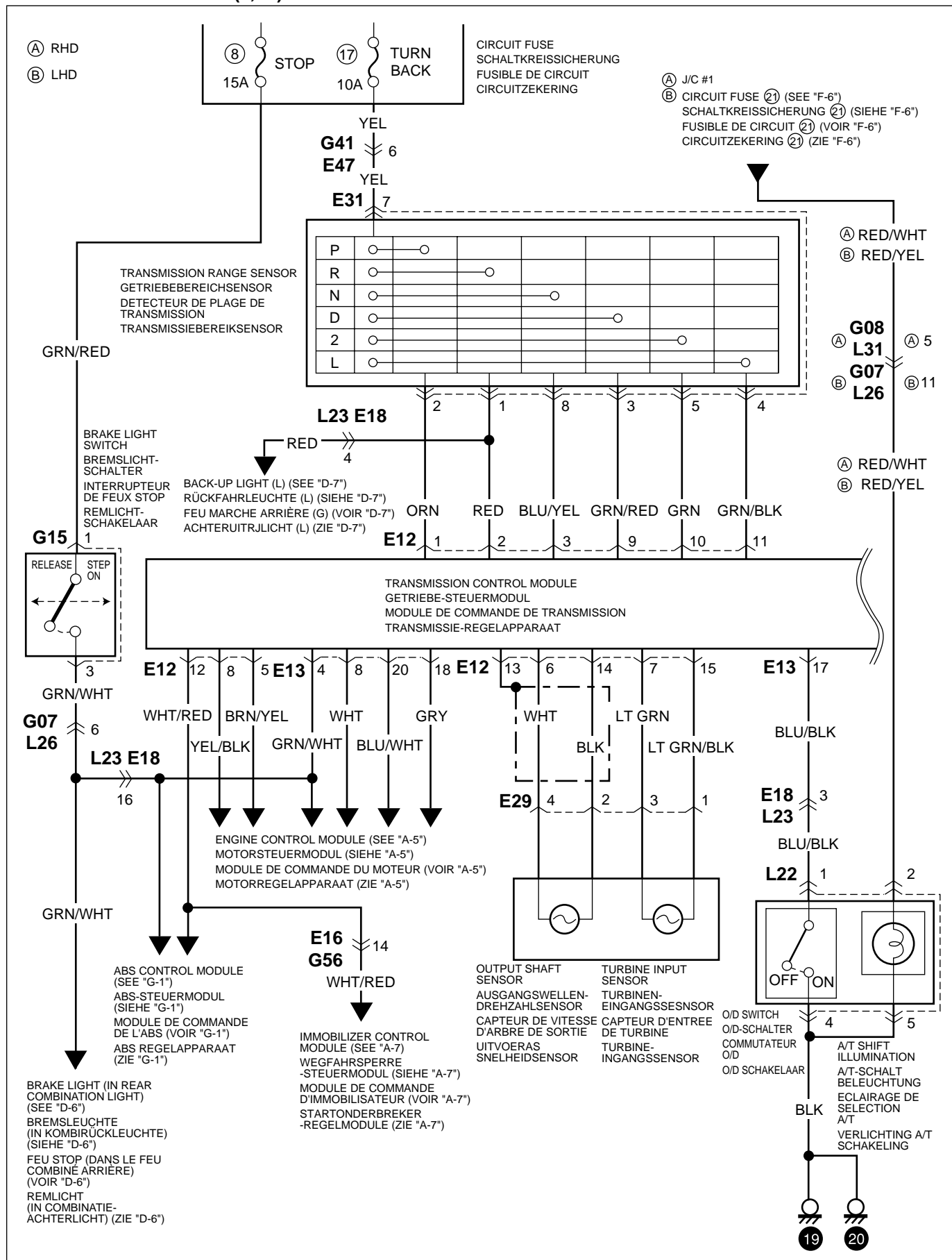
A-5:MOTORREGELSYSTEEM (1,3L) 1 op 2

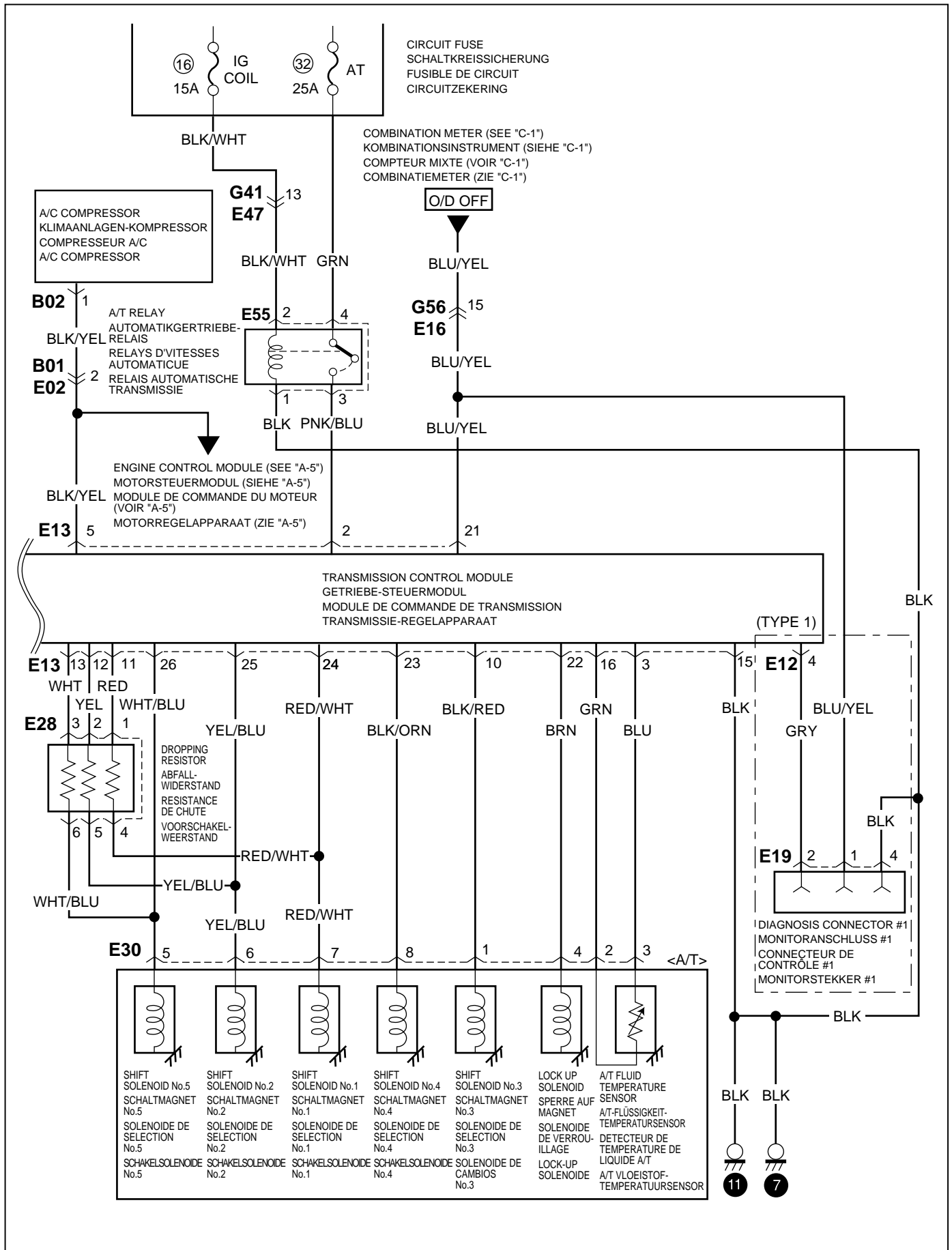


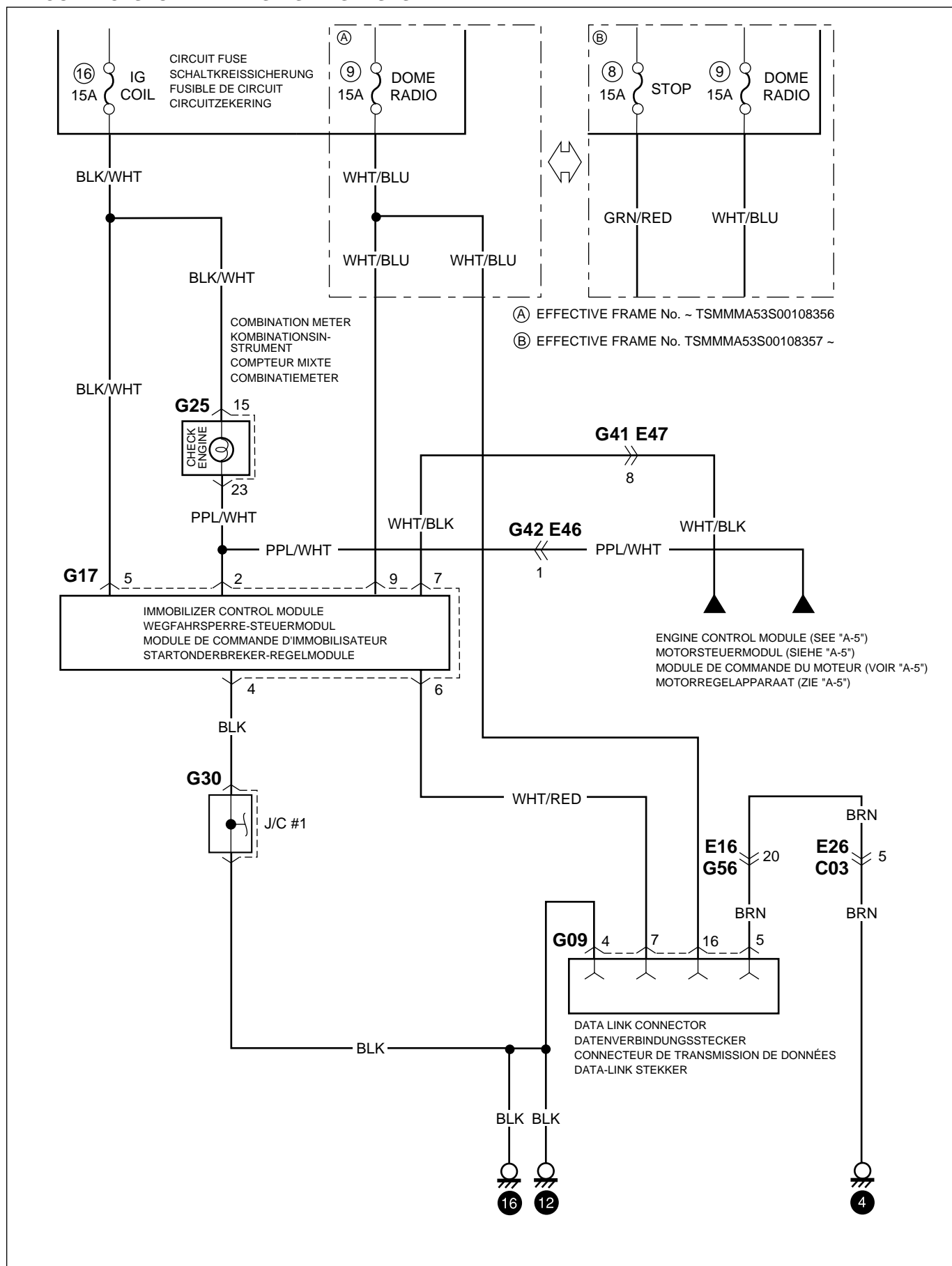


A-5:ENGINE CONTROL SYSTEM (1.3L) 2 of 2**A-5:MOTORSTEUERSYSTEM (1,3L) 2 von 2****A-5:SYSTÈME DE COMMANDE DU MOTOR (1,3L) 2 de 2****A-5:MOTORREGELSYSTEM (1,3L) 2 op 2**



A-6:A/T CONTROL SYSTEM (1,3L)**A-6:A/T REGELSYSTEM (1,3L)****A-6:SYSTÈME DE COMMANDE A/T (1,3L)****A-6:A/T REGELSYSTEM (1,3L)**



A-7:IMMOBILIZER CONTROL SYSTEM**A-7:WEGFAHRSPERRE-STEUERSYSTEM****A-7:SYSTÈME DE COMMANDE DE L'IMMOBILISATEUR****A-7:CONTACTSLOT-BEVEILIGING REGELSYSTEEM**

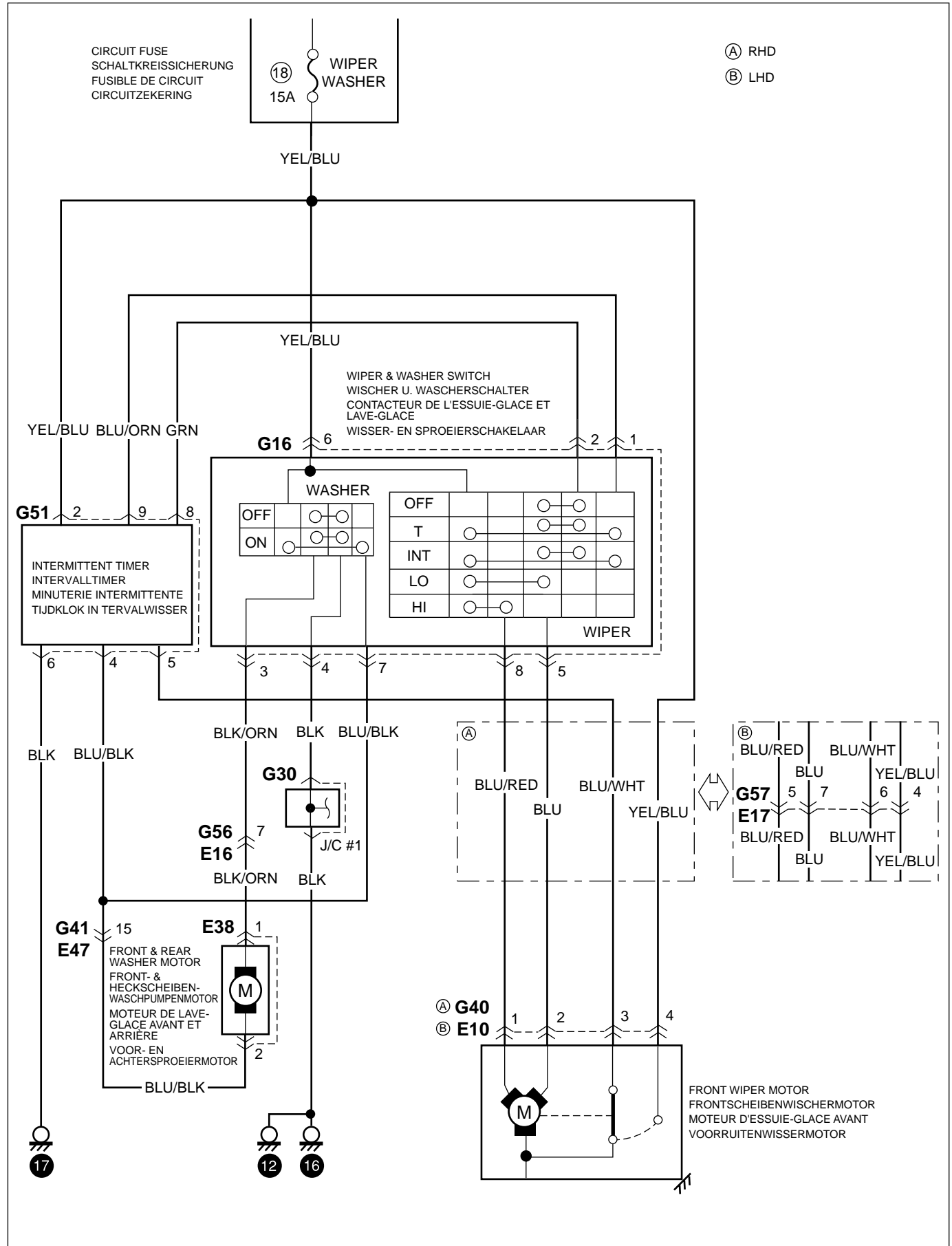
B-1: WINDSHIELD WIPER AND WASHER

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B-1: FRONTSCHEIBENWISCHER UND WASCHANLAGE

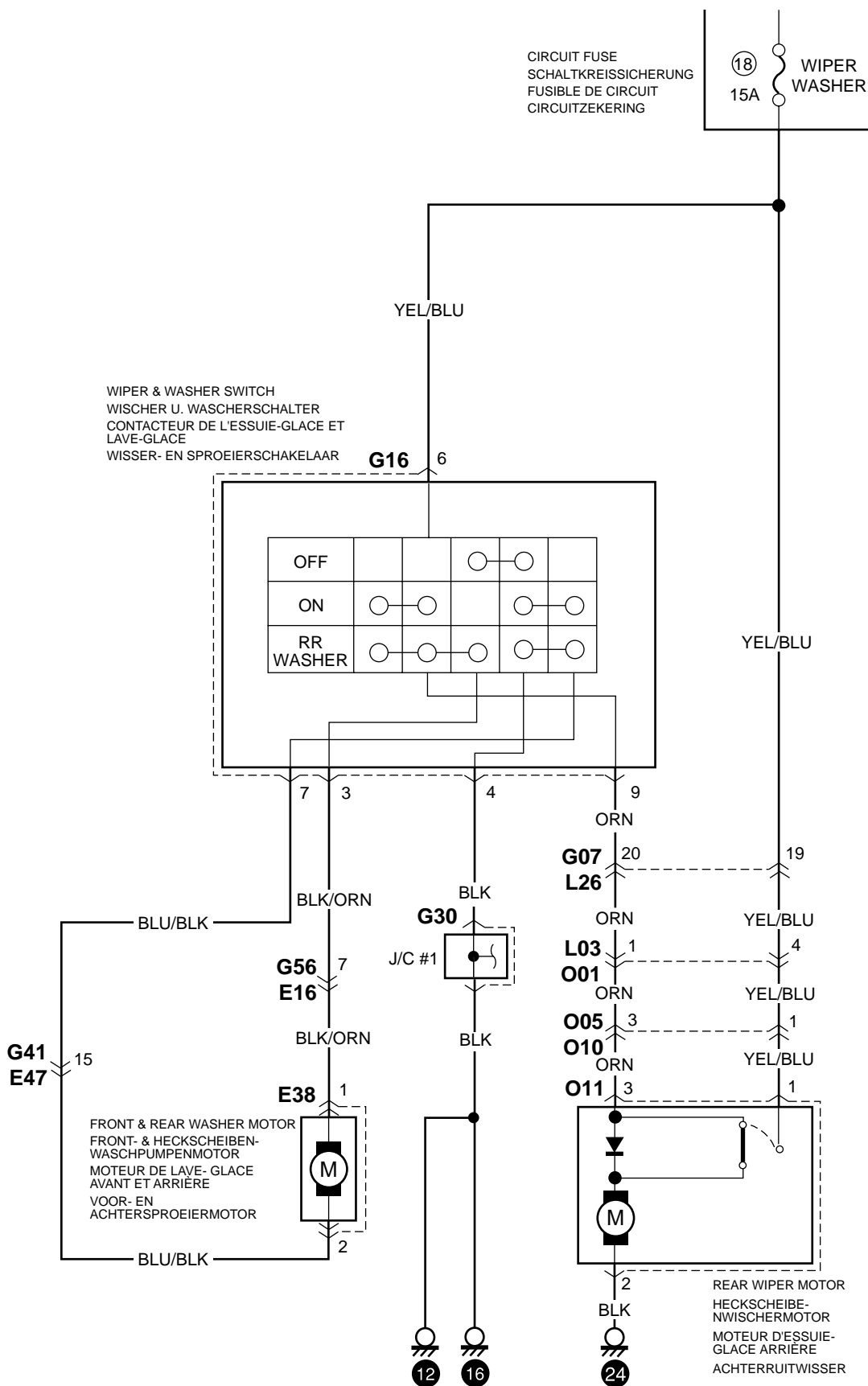
B-1: ESSUIE-GLACE ET LAVE-GLACE DE PARE-BRISE

B-1: WINDSCHUTZSCHEIBENWISCHER UND WASCHER



B-2.5 MECHANISCHE BEWEISER UND WÄSCHANLAGE

B-2: ACHTERRUITWISSER EN-SPROEIER

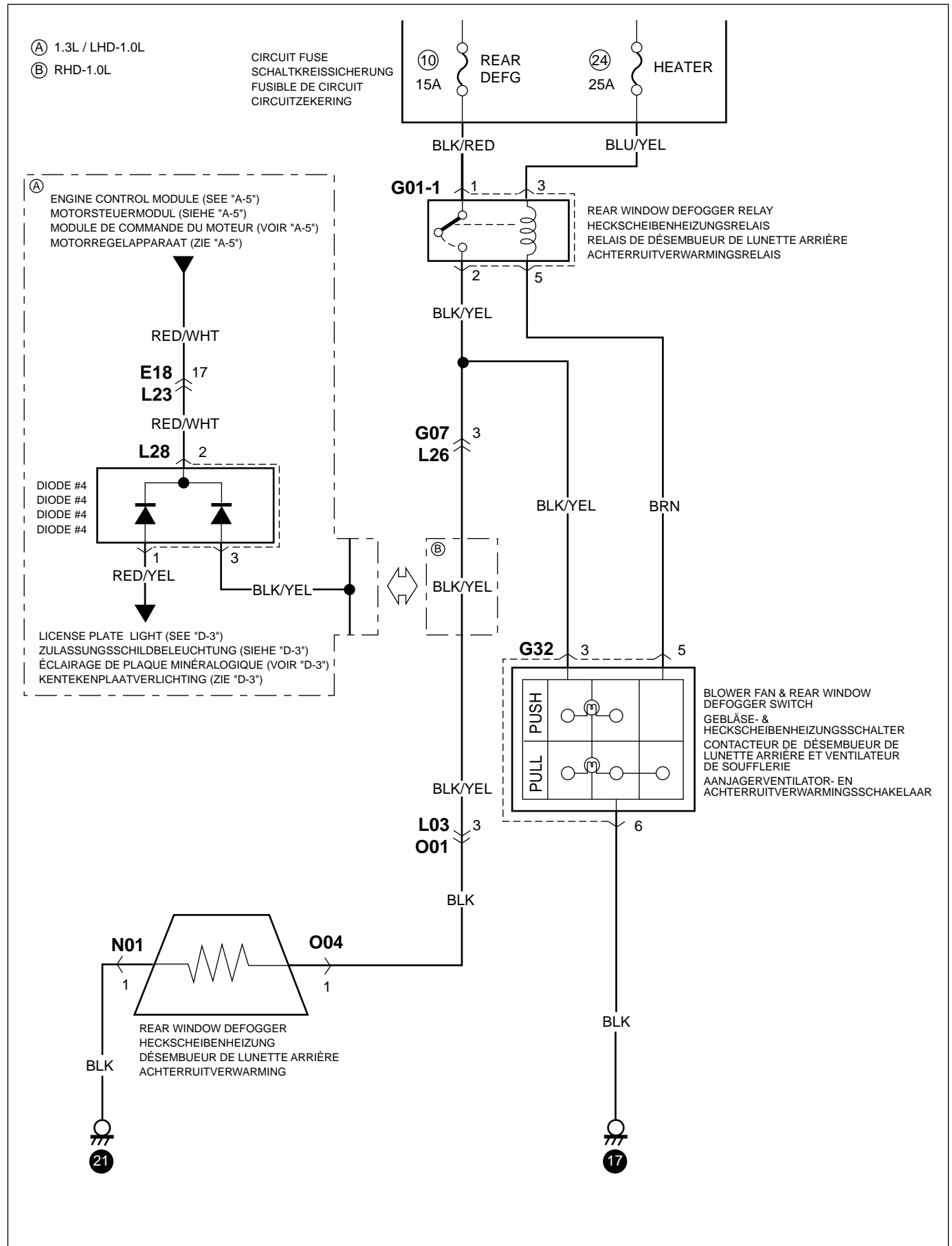


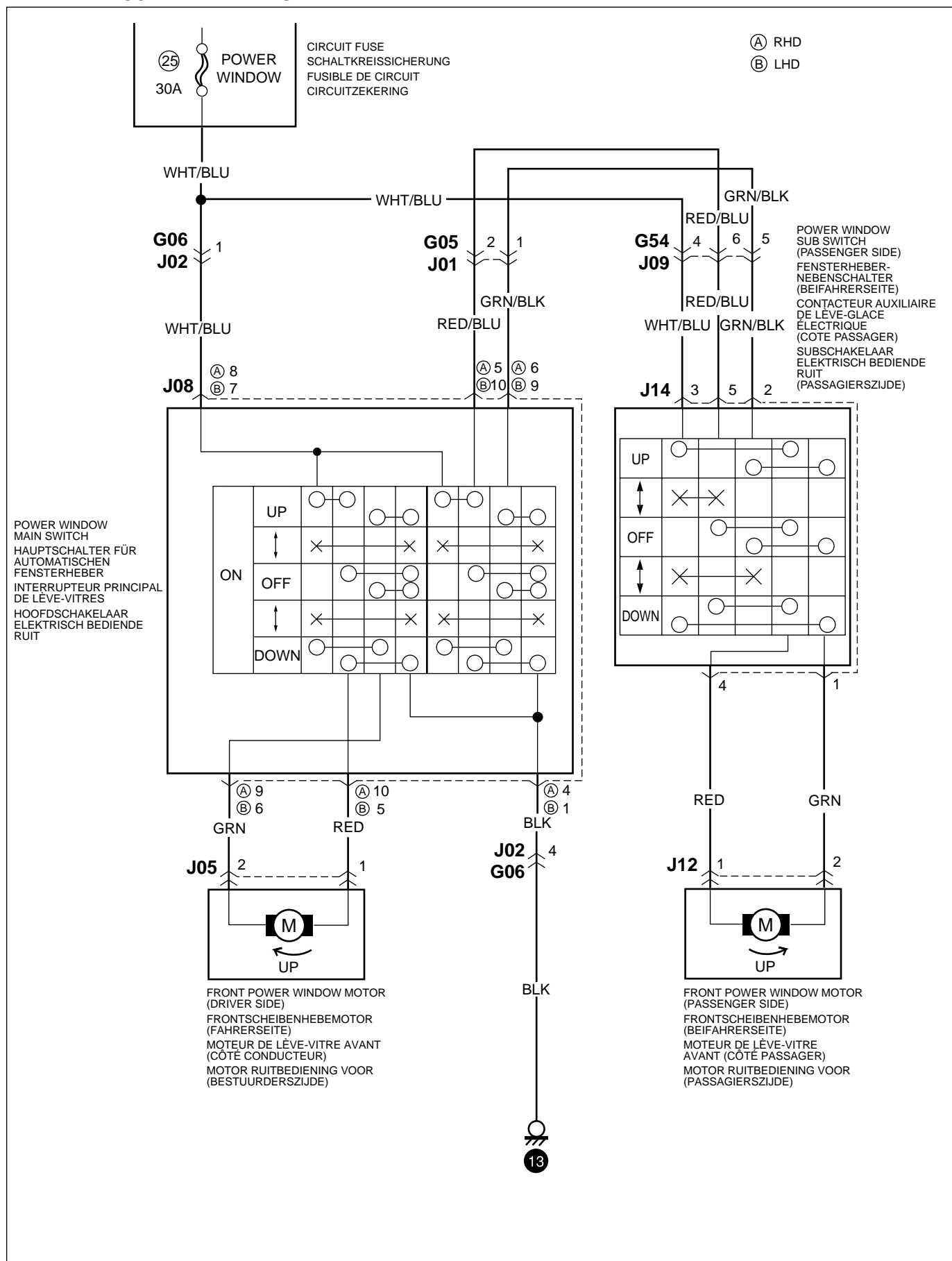
B-3:REAR WINDOW DEFOGGER

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B-3:DESEMBUEUR DE FENÊTRE ARRIÈRE

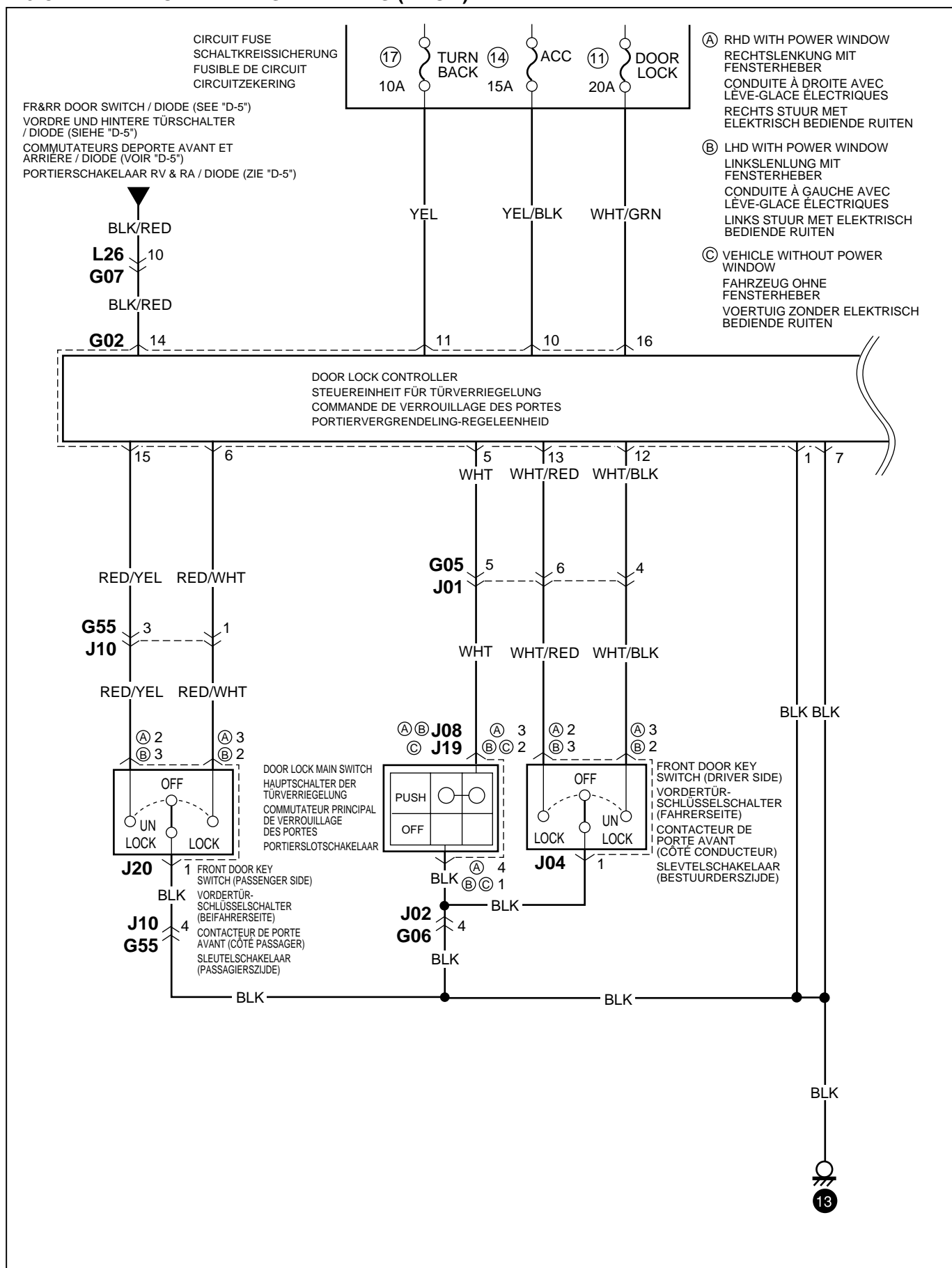
B-3:ACHTERRUITVERWARMING

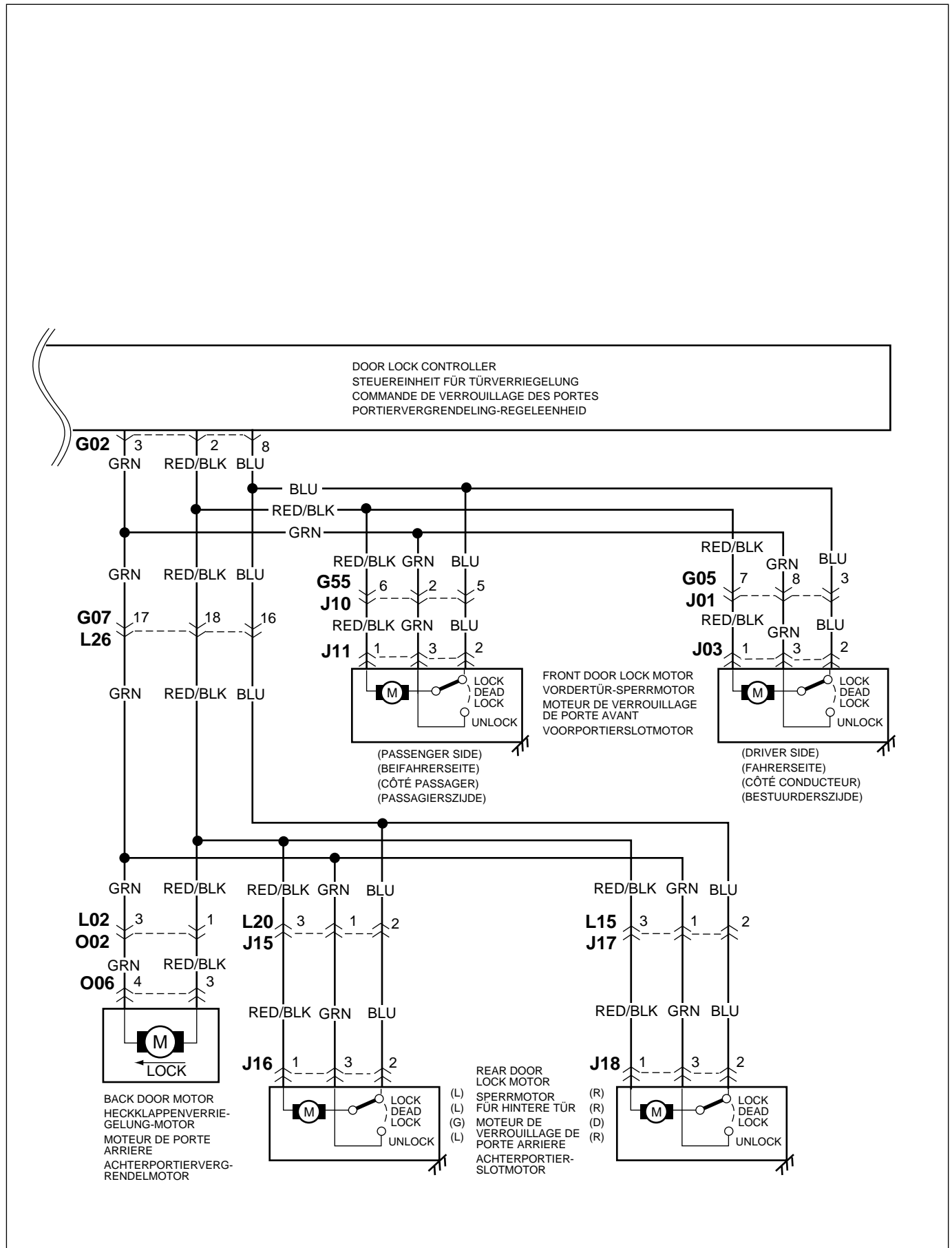


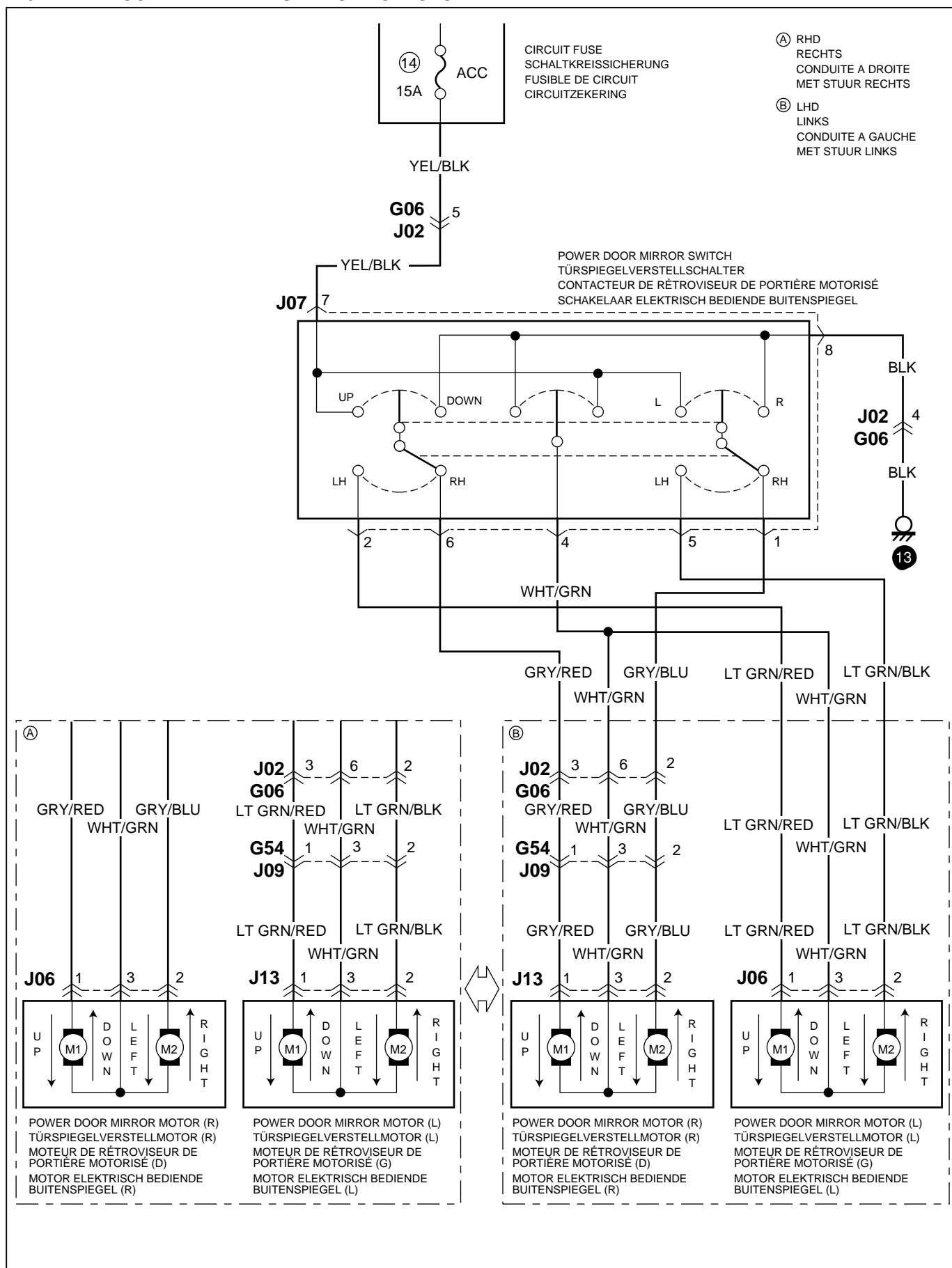
B-4: POWER WINDOW**B-4: AUTOMATISCHER FENSTERHEBER****B-4: LÈVE-VITRES ÉLECTRIQUES****B-4: ELEKTRISCH BEDIENDE RUIT**

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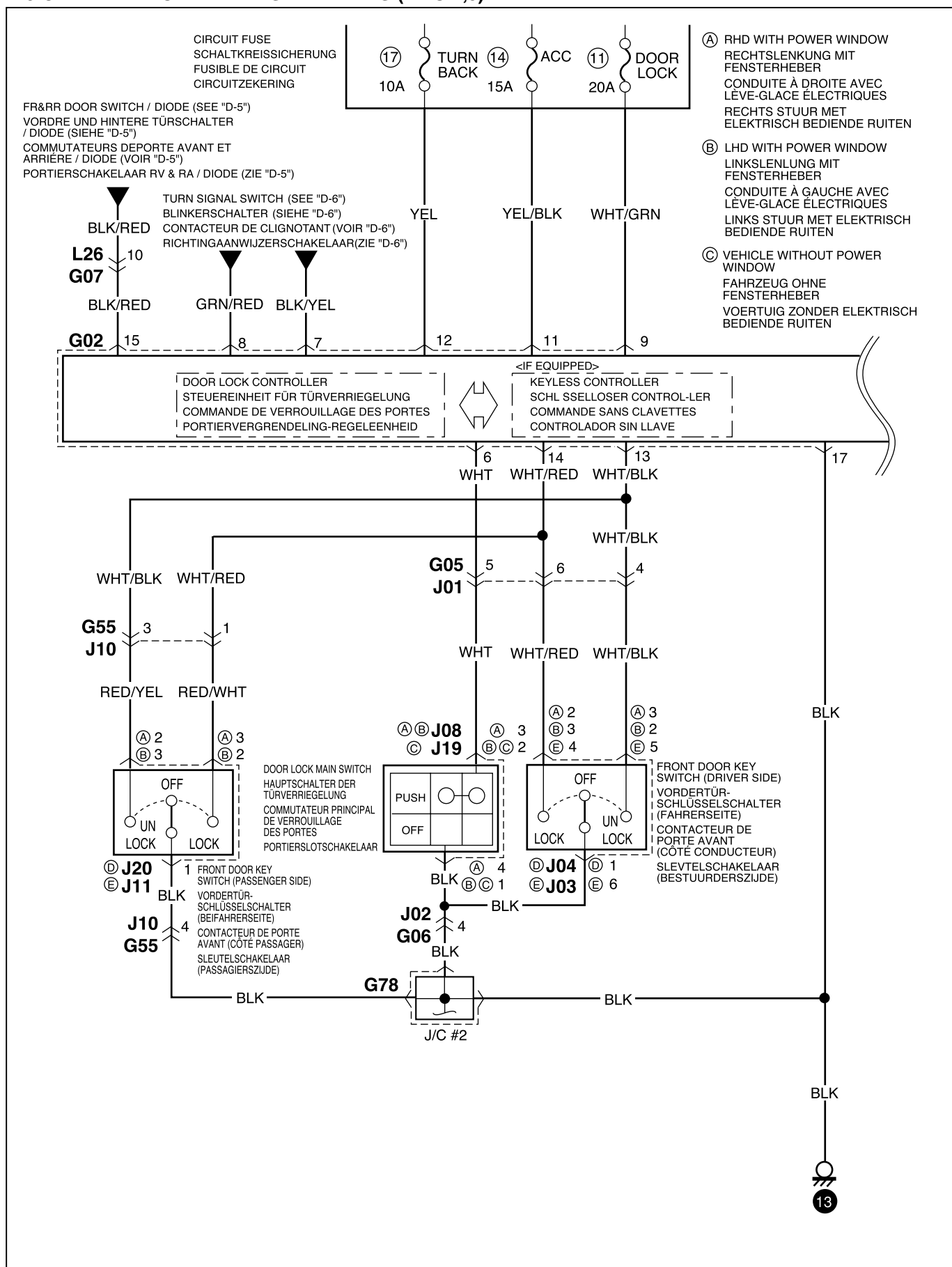
B-5: POWER DOOR LOCK SYSTEM (TYPE 1)**B-5: ZENTRALVERRIEGLUNG (TYP 1)****B-5: SYSTÈME DE VERROUILLAGE DE PORTIÈRE MOTORISÉ (TYPE 1)****B-5: CENTRALE PORTIERVERGREDELING (TIPO 1)**



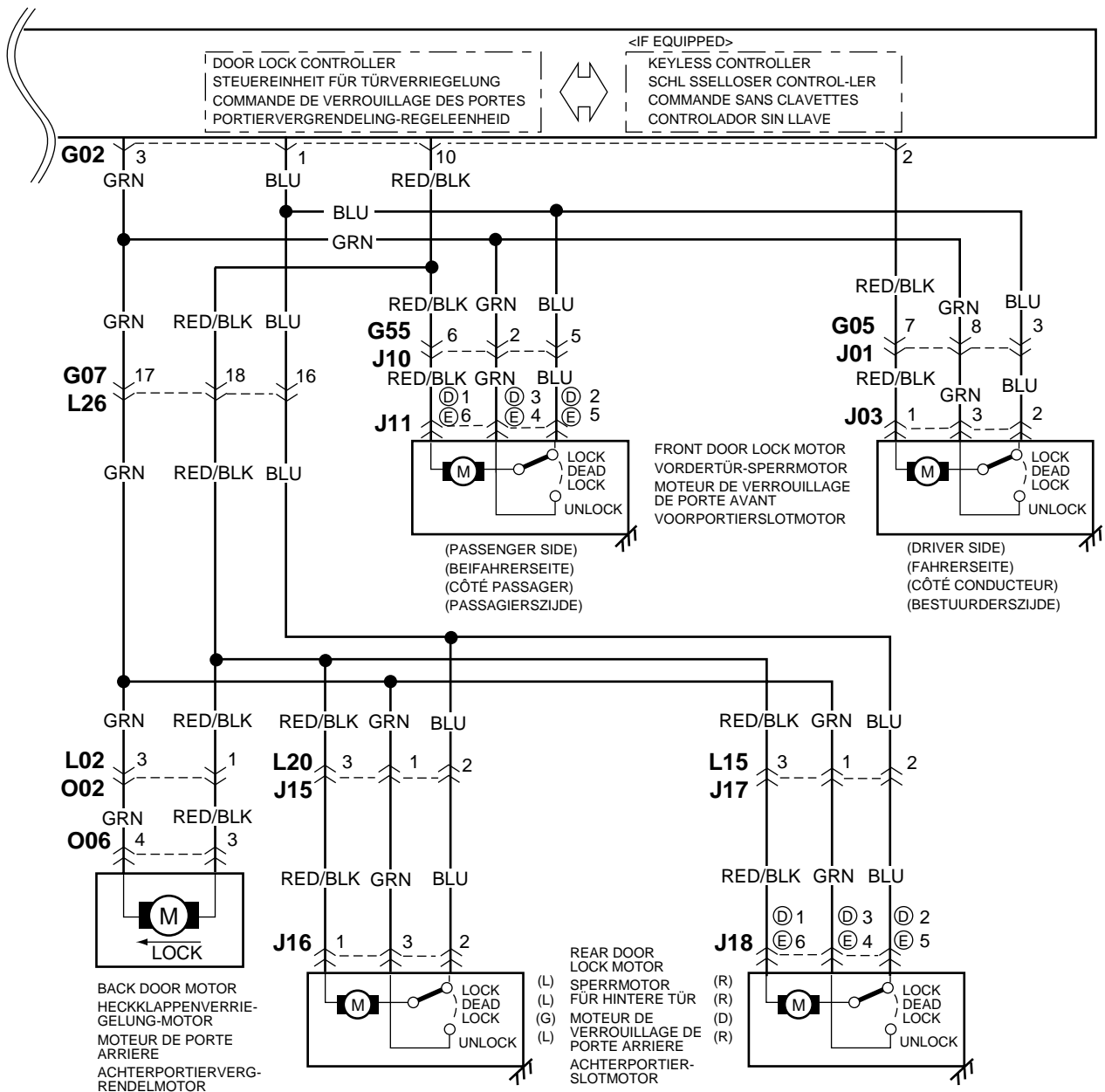
B-6: POWER DOOR MIRROR CONTROL SYSTEM**B-6: TÜRSPIEGELVERSTELLUNG****B-6: SYSTÈME DE COMMANDE RÉTROVISEUR DE PORTIÈRE MOTORISÉ****B-6: ELEKTRISCH BEDIENDE BUITENSPIEGELSYSTEEM**

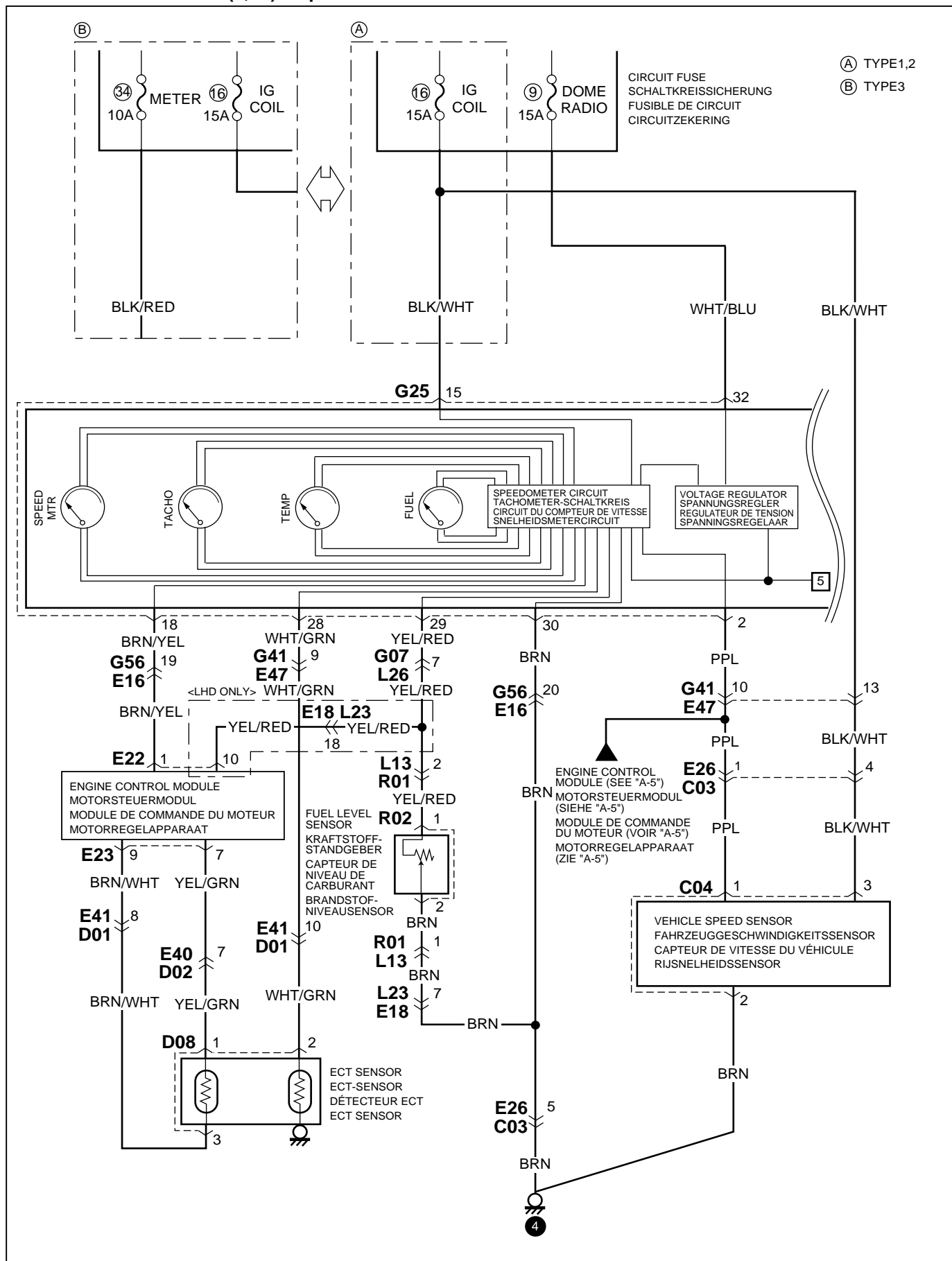
B-8: ZENTRALVERKEILUNG (TYP 2,3)

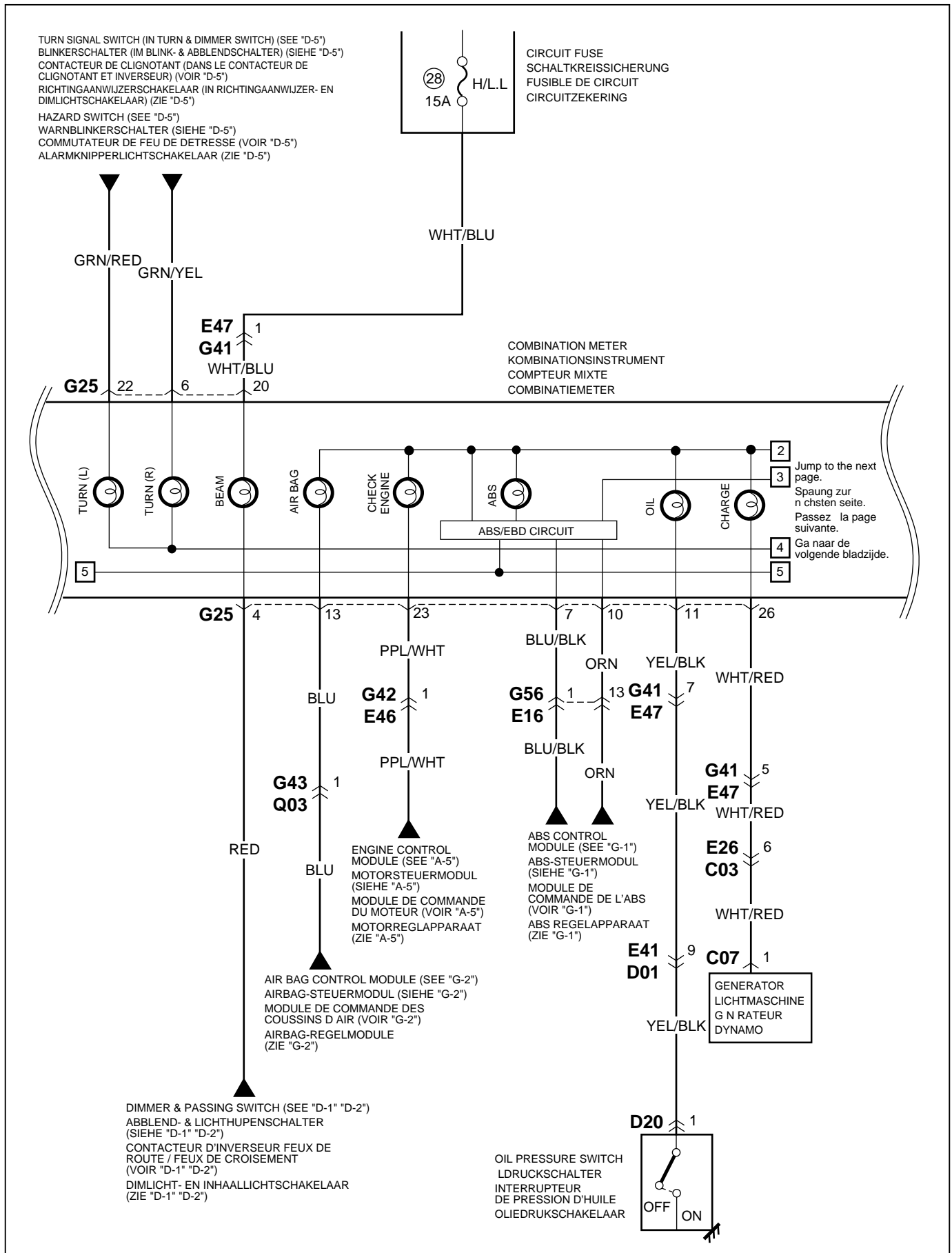
B-8:CENTRALE PORTIERVERGREDELING (TIPO 2,3)



- Ⓓ TYPE 2
 TYP 2
 TYPE 2
 TIPO2
 Ⓔ TYPE 3
 TYP 3
 TYPE 3
 TIPO 3

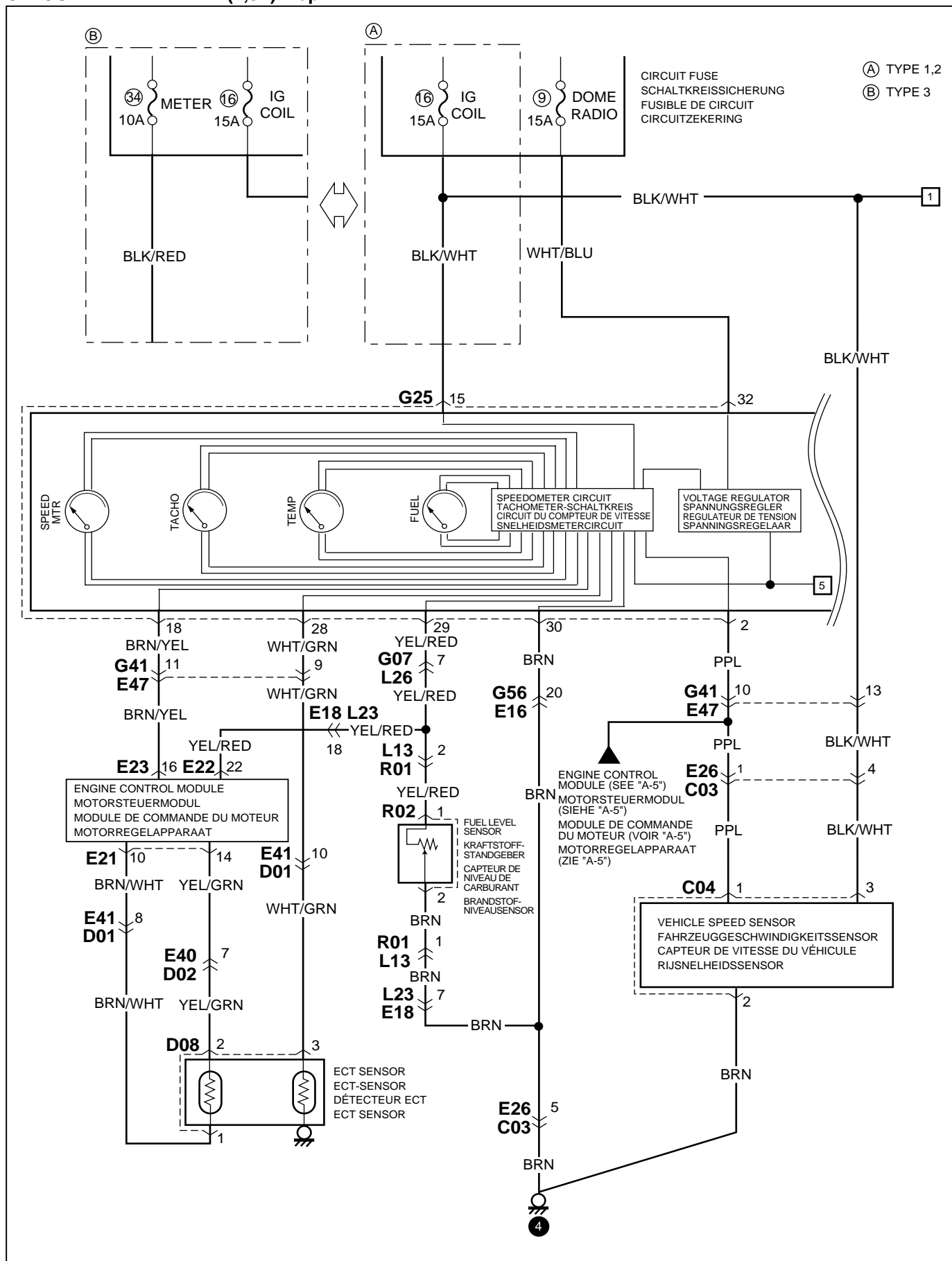


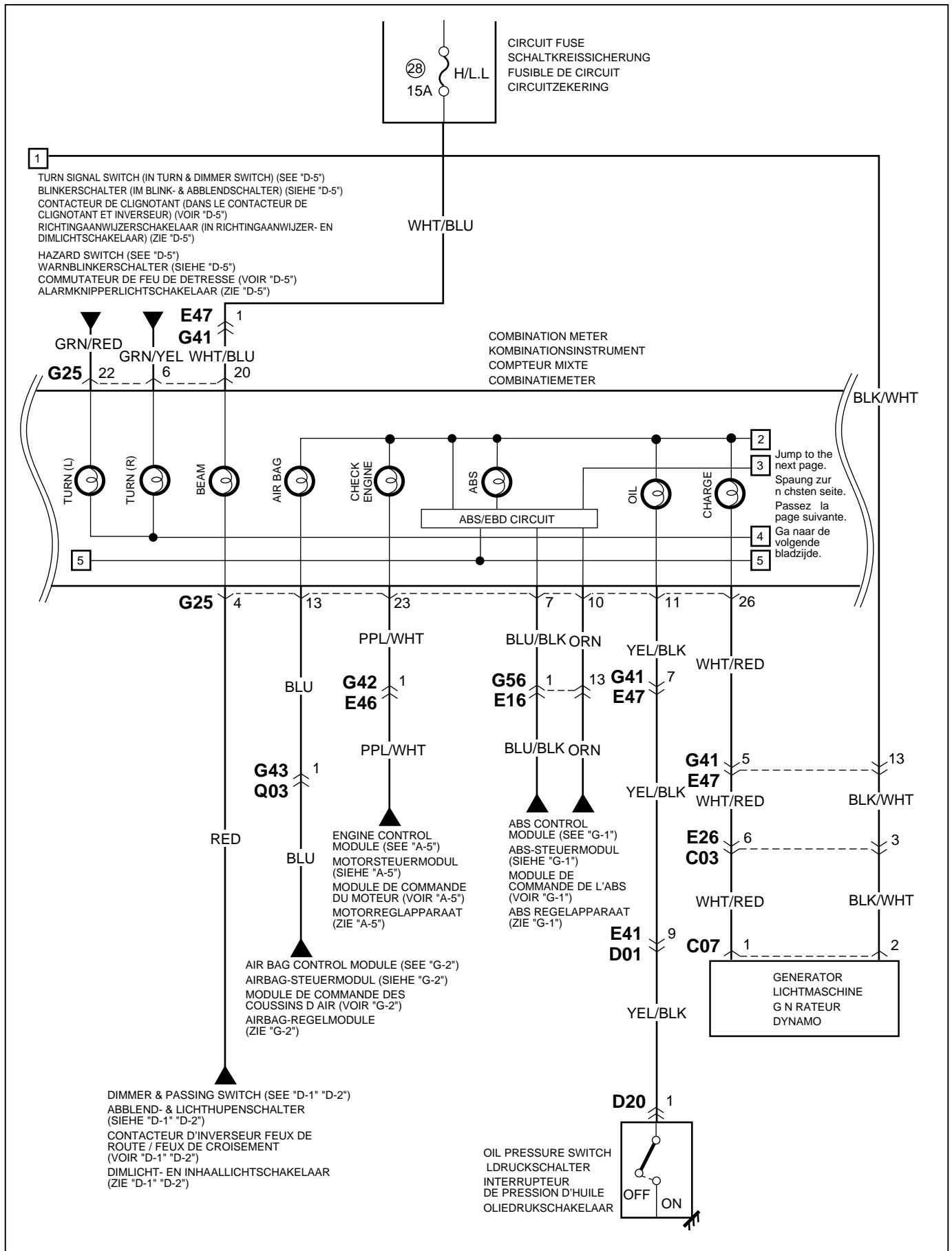
C-1: COMBINATION METER (1,0L) 1 of 2**C-1: COMBINATION INSTRUMENT (1,0L) 1 of 2****C-1: COMPTEUR MIXTE (1,0L) 1 de 2****C-1: COMBINATIEMETER (1,0L) 1 op 2**

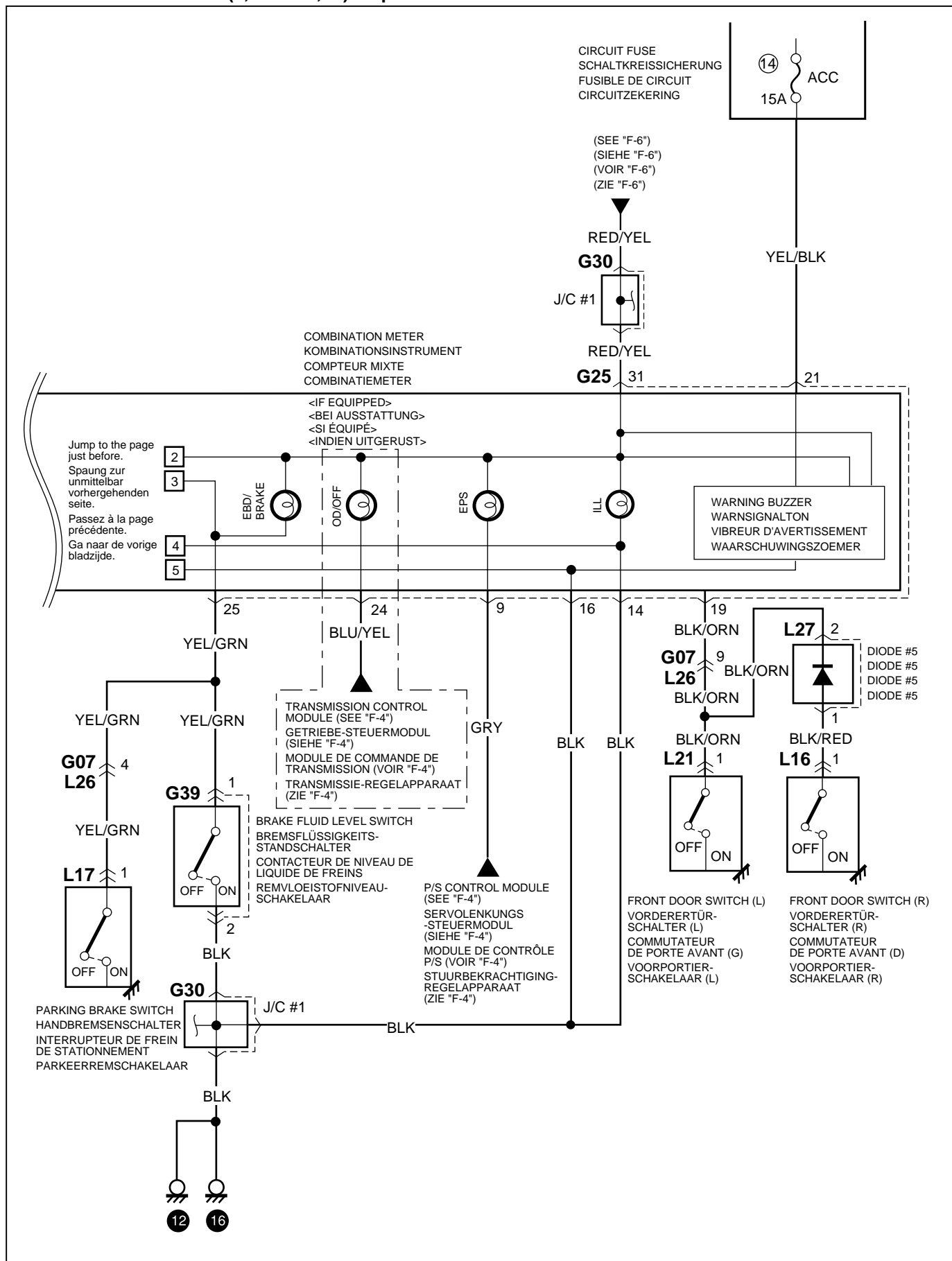


C-1: KOMBINATIONSTRUMENT (1,3L) - von 2

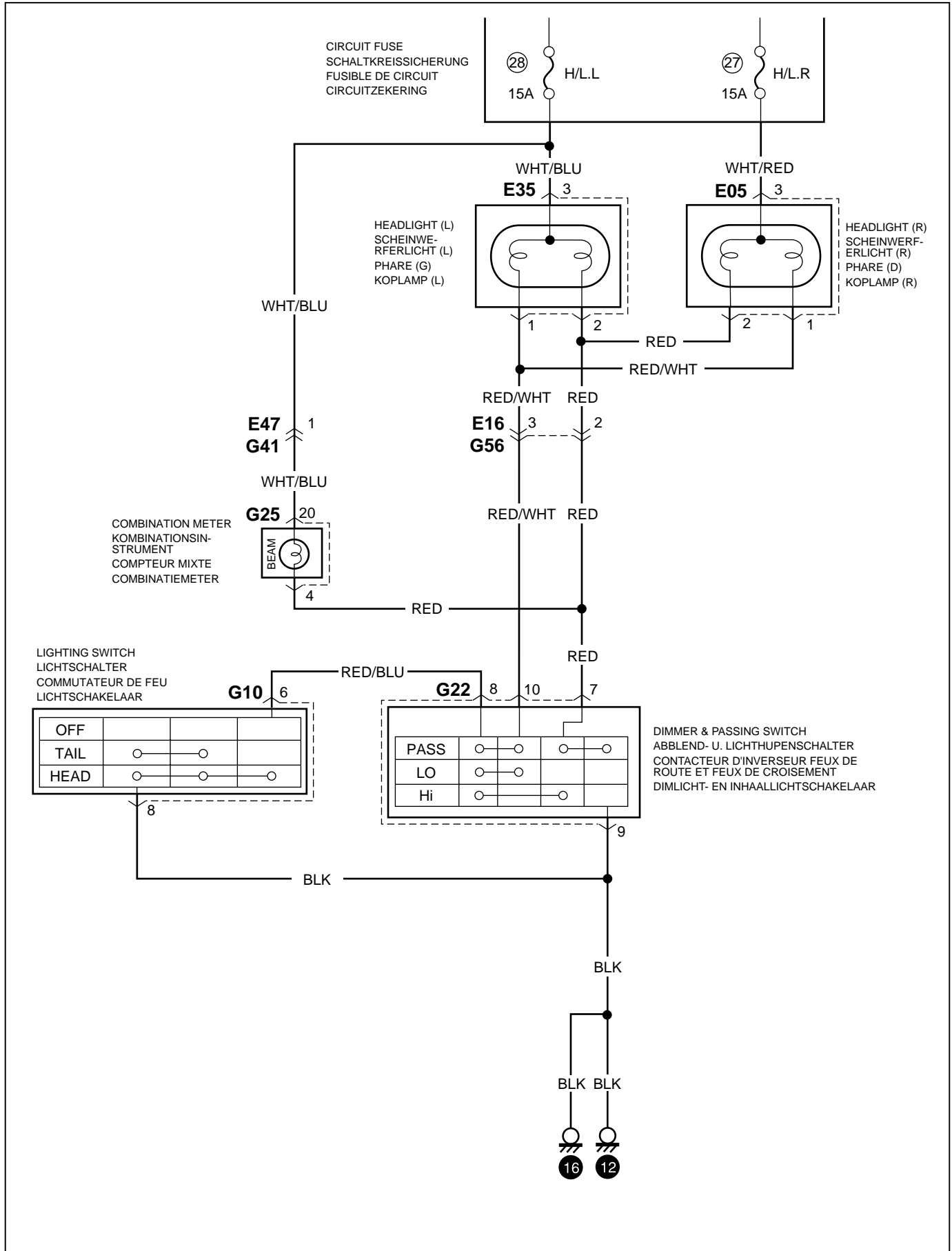
C-1:COMBINATIEMETER (1,3L) 1 op 2

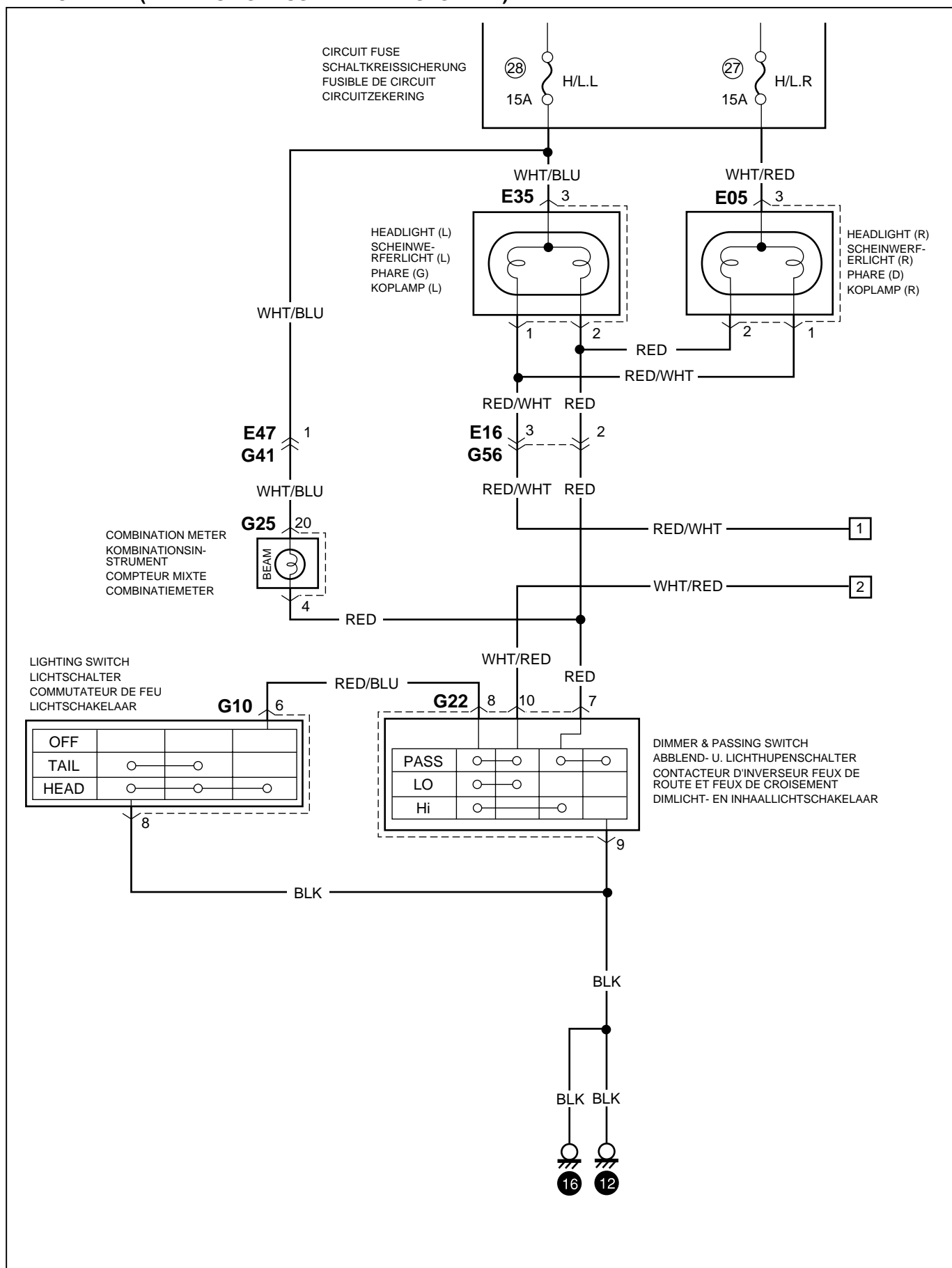


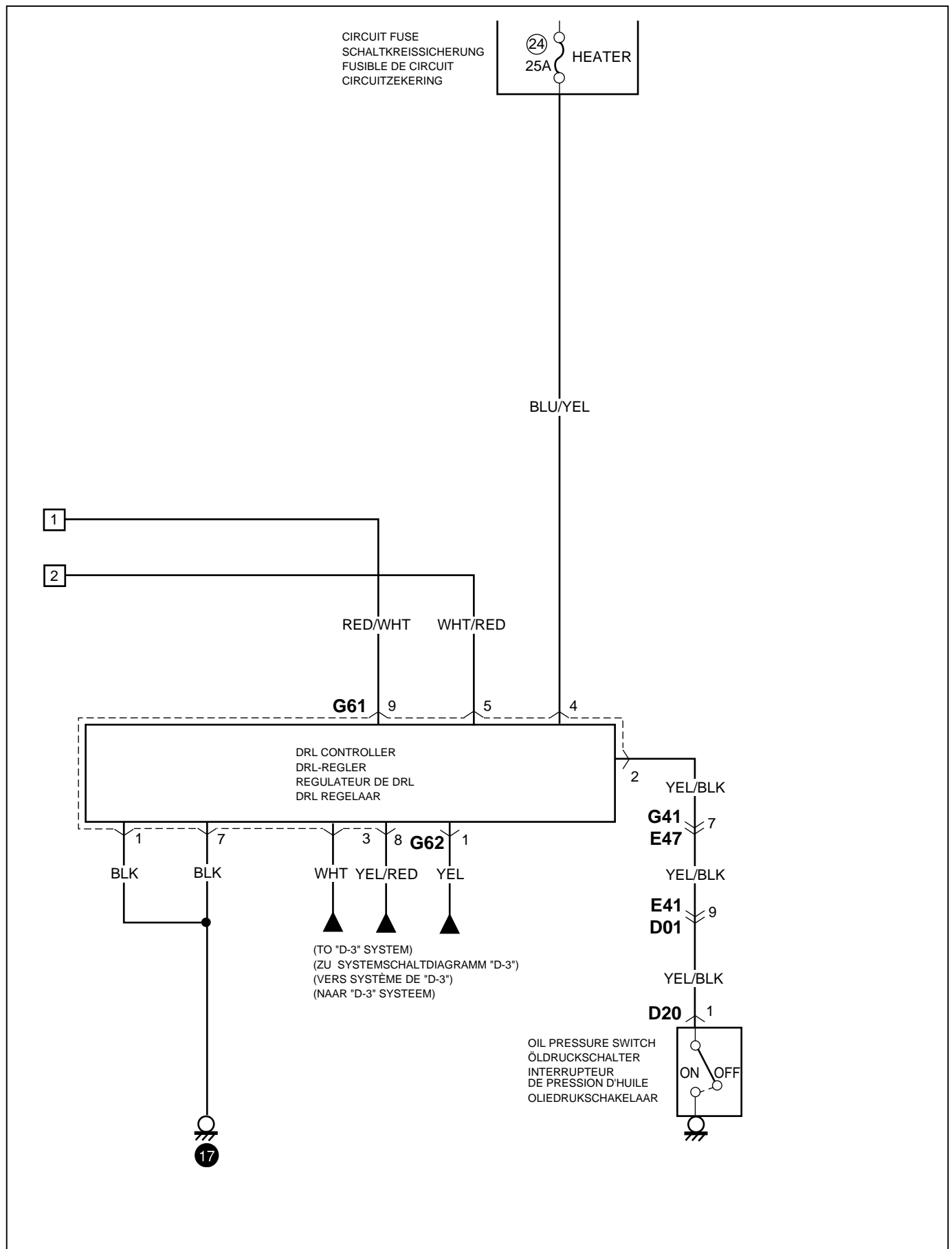


C-1: COMBINATION METER (1.0L & 1.3L) 2 of 2C-1: KOMBINATIONSTRUMENT (1,0L & 1,3L) 2 von 2 <http://www.simpodpdf.com>**C-1: COMPTEUR MIXTE (1,0L ET 1,3L) 2 de 2****C-1: COMBINATIEMETER (1,0L EN 1,3L) 2 op 2**

D-1: HEADLIGHT (IF NOT EQUIPPED WITH DRL SYSTEM)
 D-1: SCHEINWERFER (BEI AUSSTATTUNG OHNE DRL-SYSTEM)
 D-1: PHARE (SI PAS ÉQUIPÉ DU SYSTÈME DRL)
 D-1: KOPLAMP (INDIEN NIET UITGERUST MET DRL SYSTEEM)



D-2: HEADLIGHT (IF EQUIPPED WITH DRL SYSTEM)Simpo PDF Merge and Split Unregistered Version, <http://www.simpopdf.com>**D-2: SCHEINWERFER (BEFAUSSTATTUNG MIT DRL-SYSTEM)****D-2: PHARE (SI ÉQUIPÉ DU SYSTÈME DRL)****D-2: KOPLAMP (INDIEN UITGERUST MET DRL SYSTEEM)**

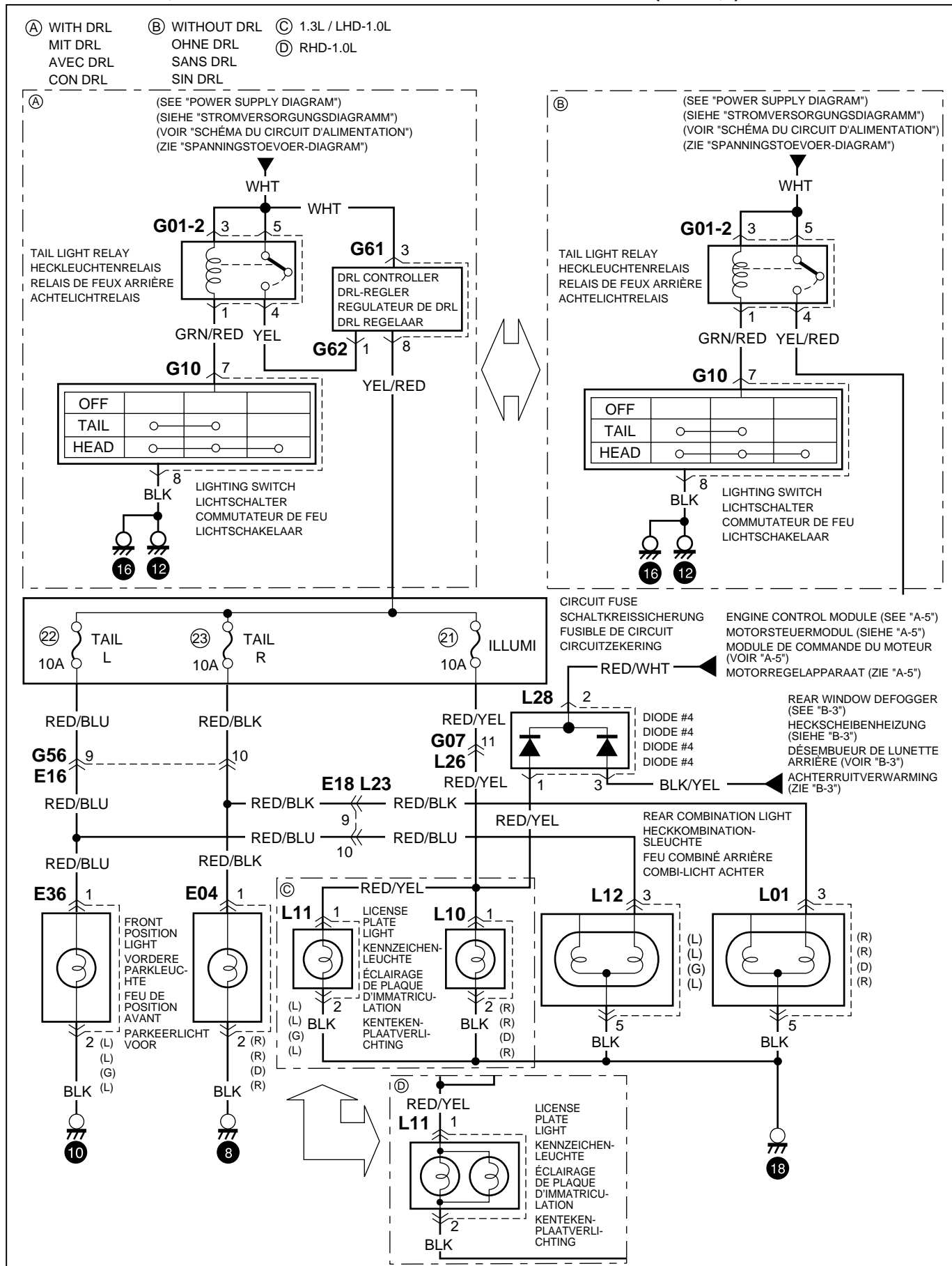


D-3: POSITION, TAIL AND LICENSE PLATE LIGHT (TYPE 1,2)

D-3: PARKLEUCHTEN, HECKLEUCHTEN UND NUMMERSCHILDELEUCHTEN (TYP 1,2)

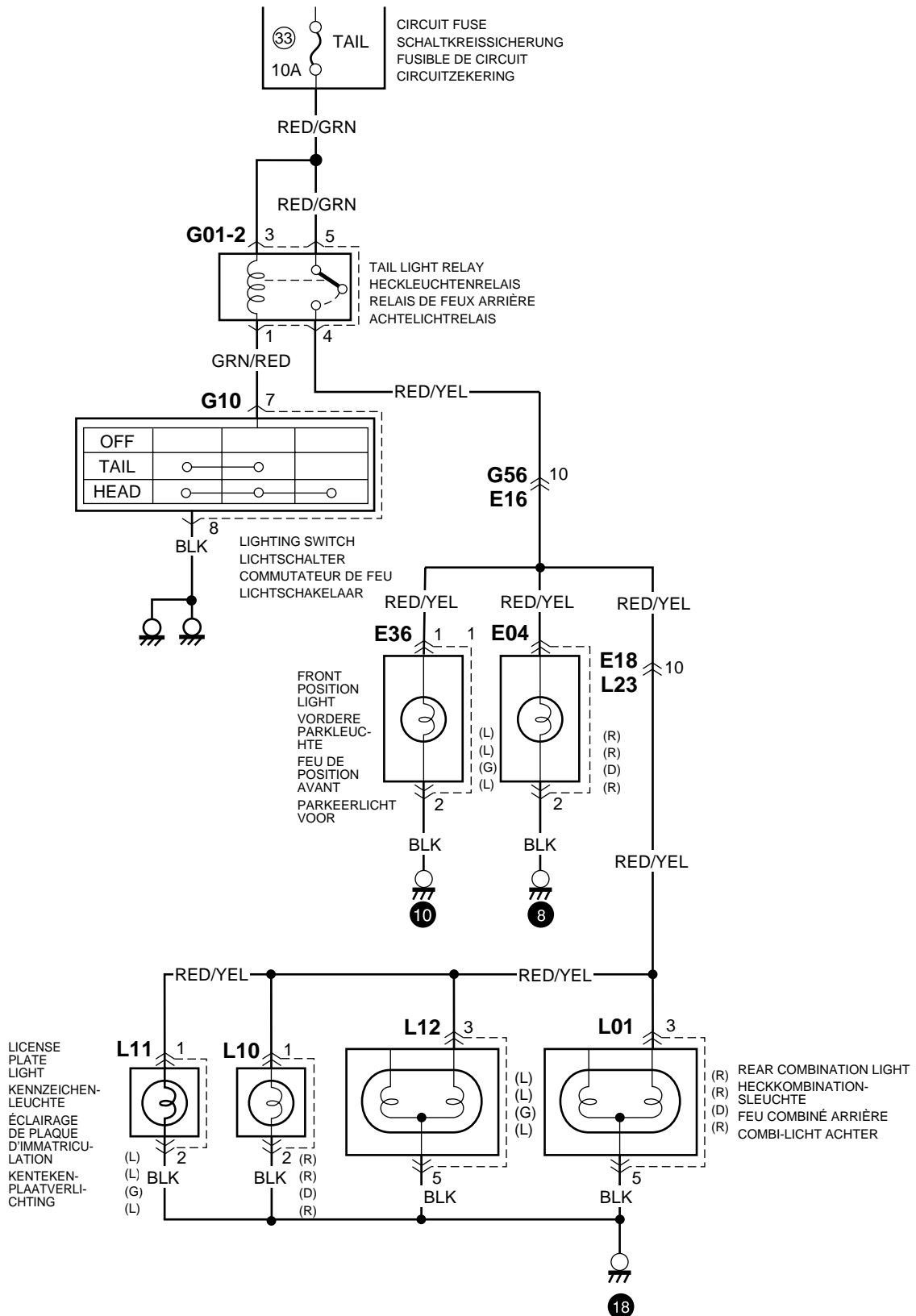
D-3: FEUX DE POSITION, ARRIÈRE ET DE PLAQUE D'IMMATRICULATION (TYPE 1,2)

D-3: POSITIELICHT, ACHTERLICHT EN KENTEKEKENPLAATVERLICHTING (TIPO 1,2)



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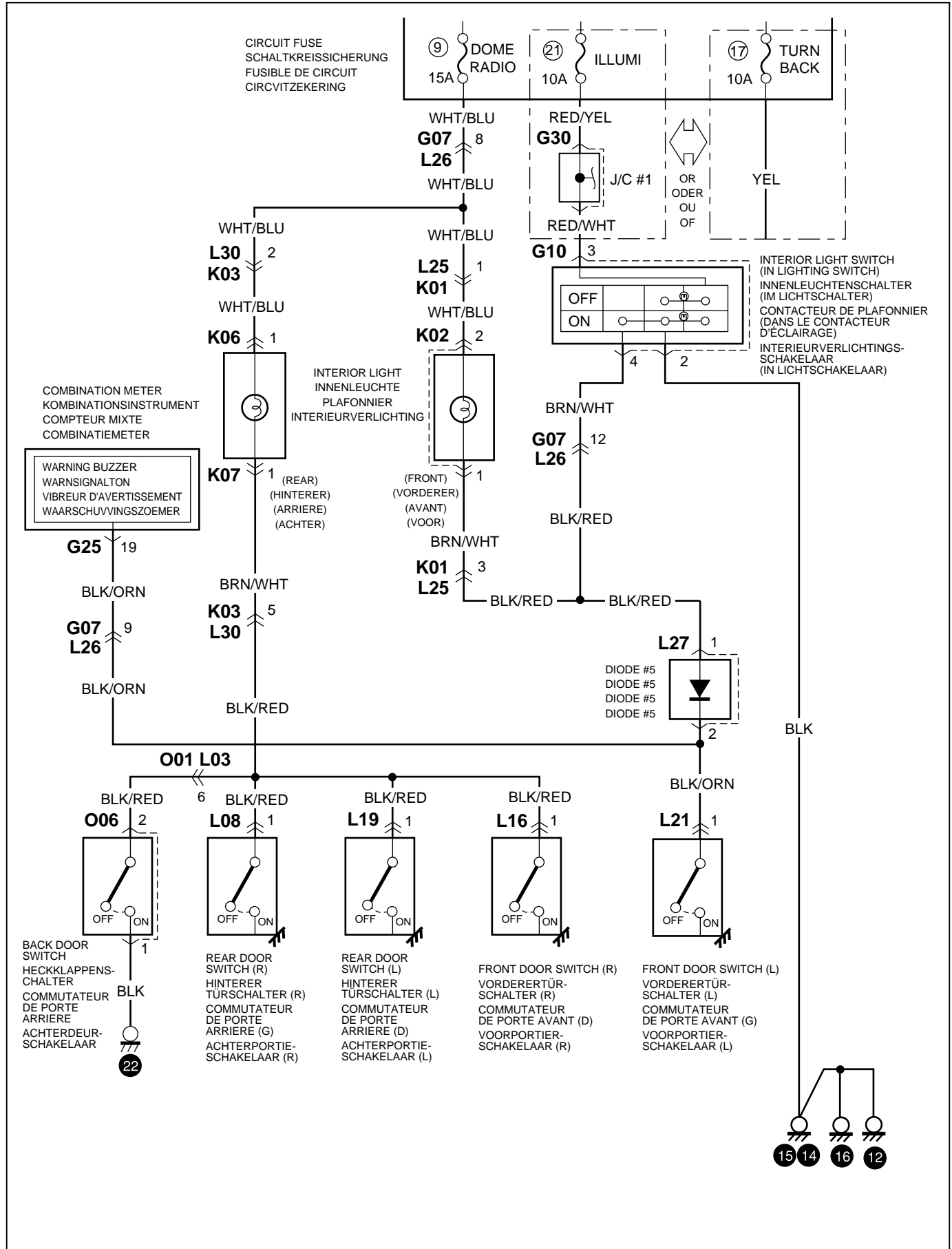
D-3: POSITION, TAIL AND LICENSE PLATE LIGHT (TYPE 3)Simple PDF Merge and Split - Unregistered Version - <http://www.simplepdf.com>**D-3: FEUX DE POSITION, ARRIÈRE ET DE PLAQUE D'IMMATRICULATION (TYPE 3)****D-3: POSITIELICHT, ACHTERLICHT EN KENTEKEKENPLAATVERLICHTING (TIPO 3)**

D-4: INTERIOR LIGHT (WITHOUT POWER DOOR LOCK SYSTEM)

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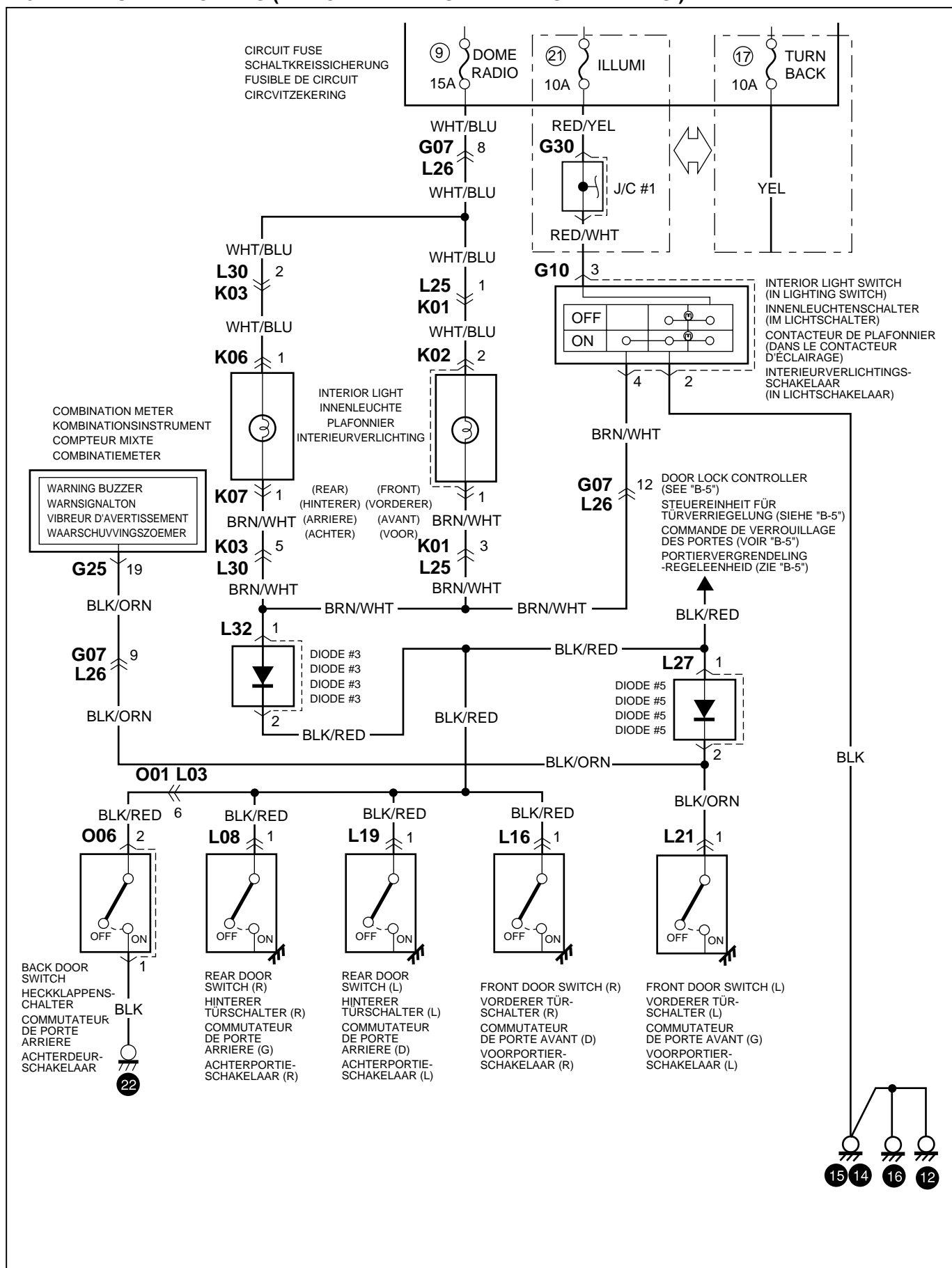
D-4: PLAFONNIER (SANS SYSTÈME DE VERROUILLAGE DE PORTIÈRE MOTORISÉ)

D-4: INTERIEURVERLICHTING (ZONDER CENTRALE PORTIERVERGREDELING)

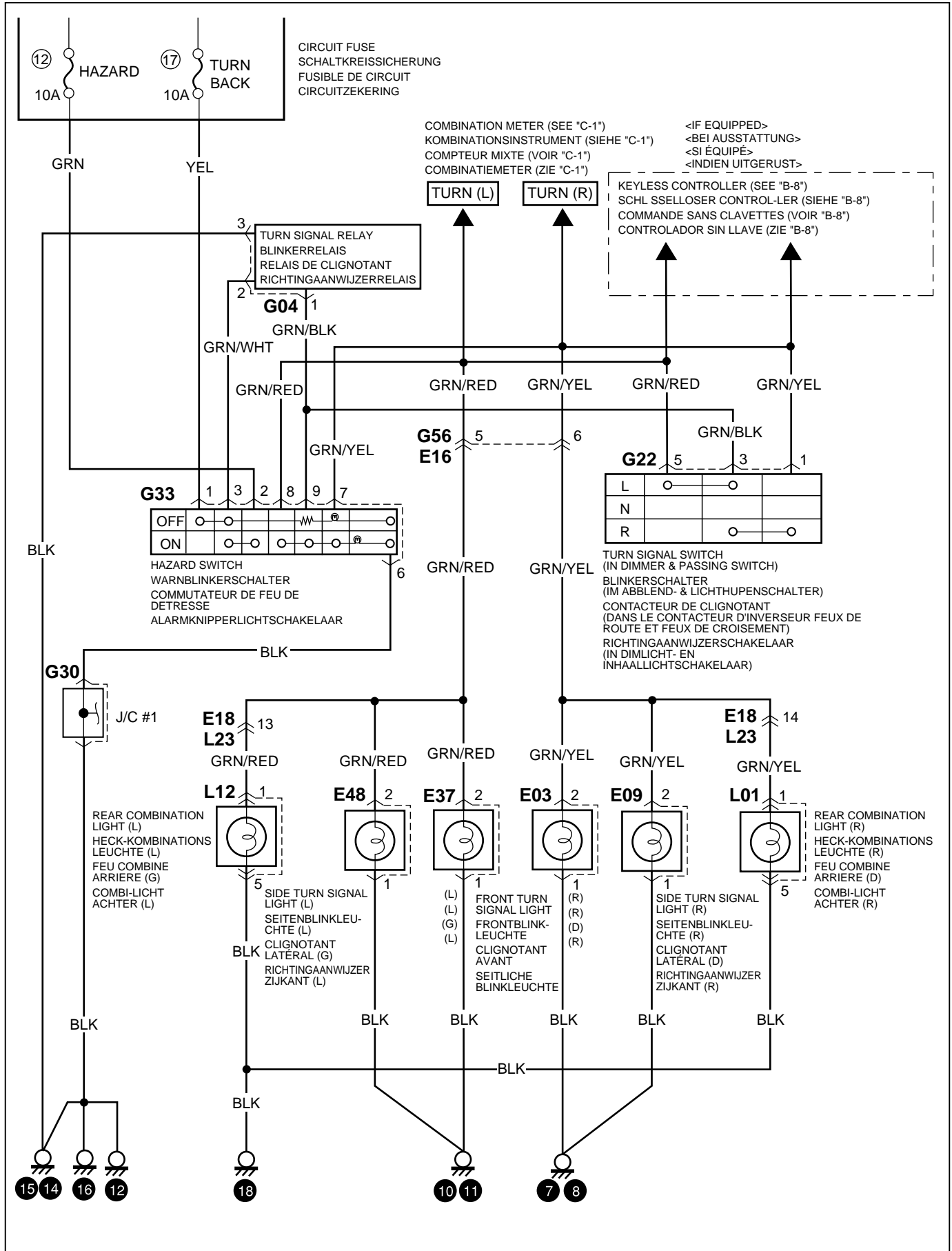


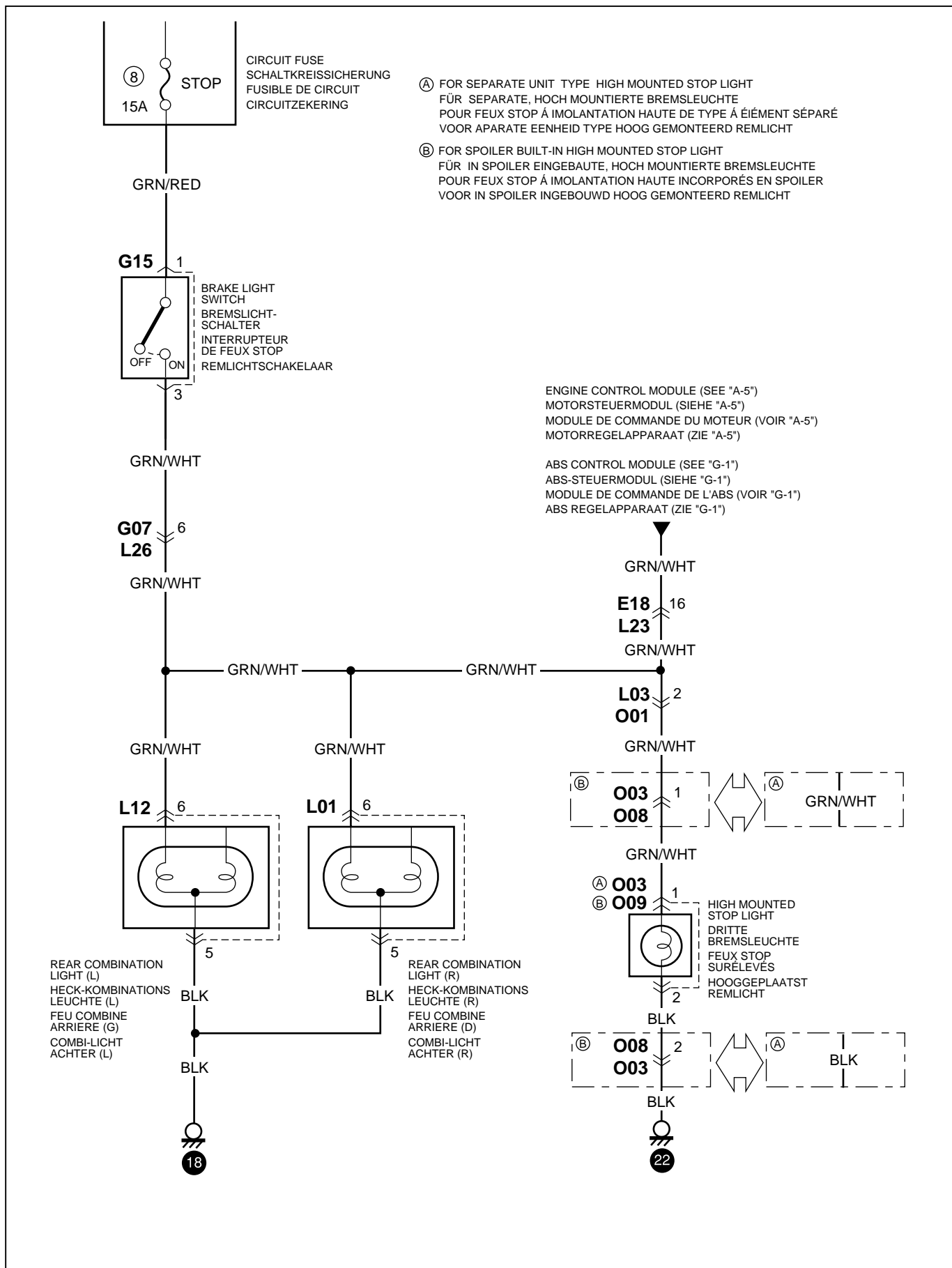
D-5: INNENLEUCHTUNG (MIT ZENTRALVERRIEGELUNG)

D-5:INTERIEURVERLICHTING (MET CENTRALE PORTIERVERGREDELING)

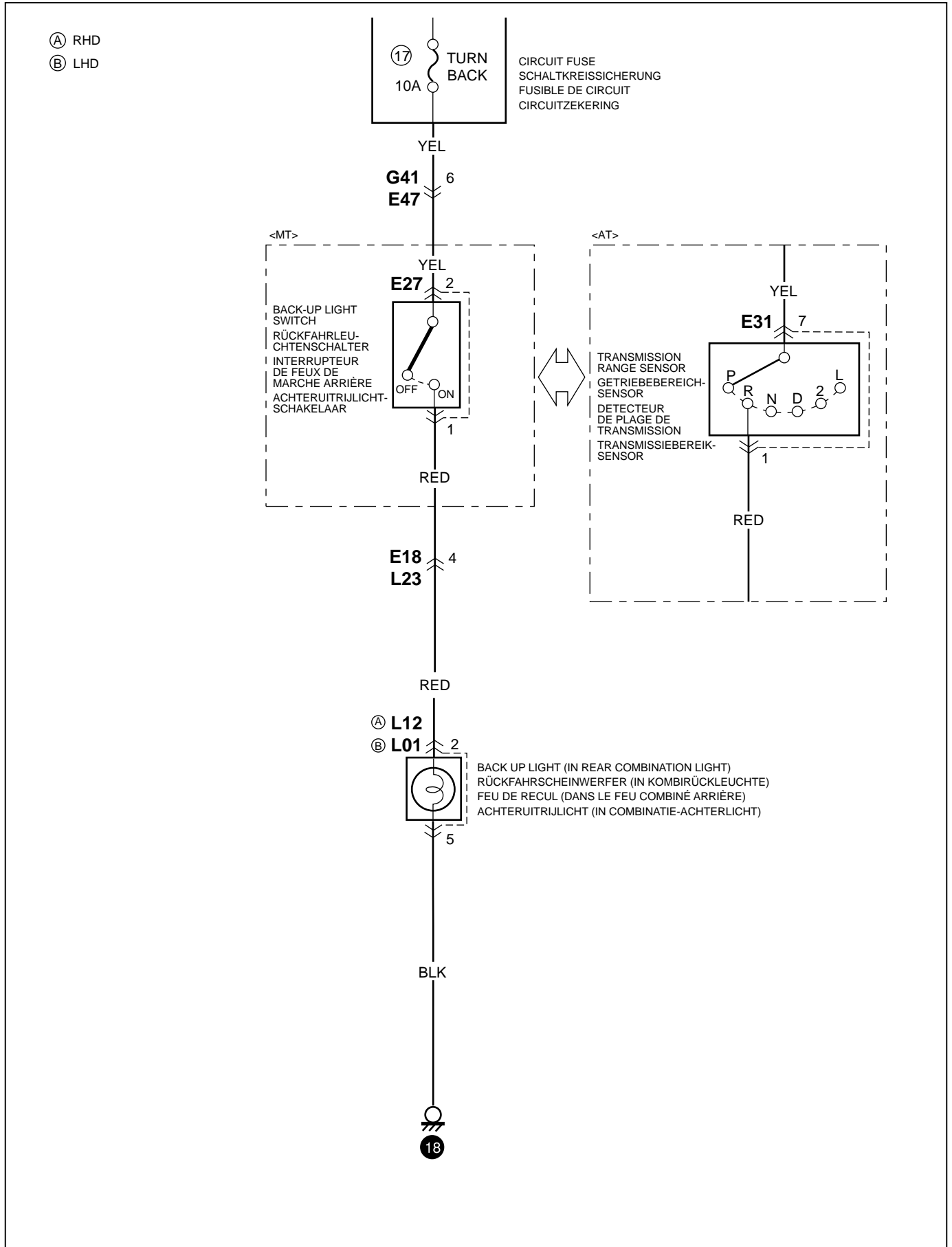


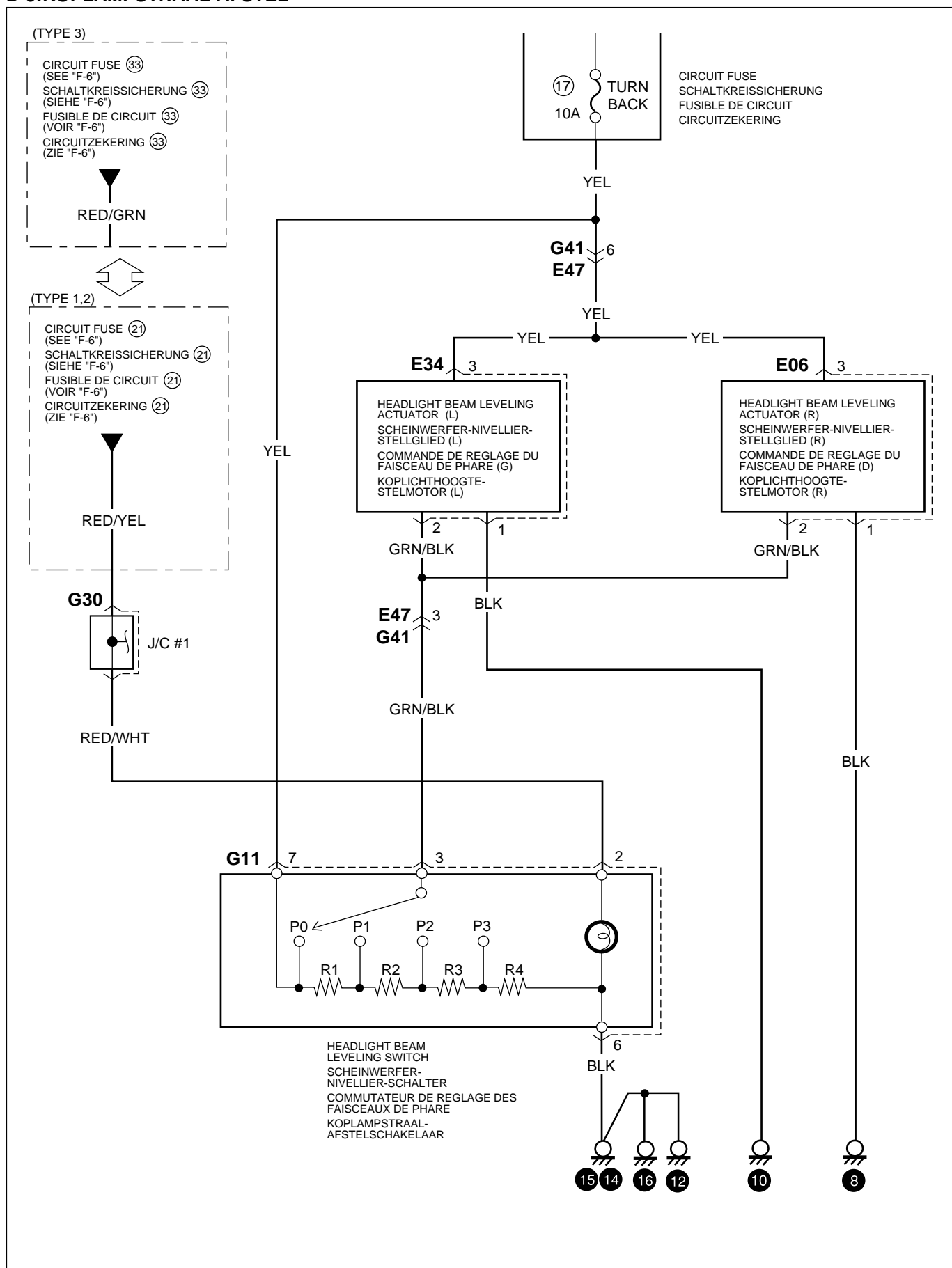
D-6: TURN SIGNAL AND HAZARD WARNING LIGHT
D-6: BLINKLICHT UND WARNLEUCHTE
D-6: FEUX CLIGNOTANTS ET FEUX DE DÉTRESSE
D-6: RICHTINGAANWIJZER-EN ALARMKNIPPERLICHT



D-7: BRAKE LIGHT**D-7: BREMSLEUCHTE****D-7: FEUX STOP****D-7: REMLICHT**

D-8:BACK-UP LIGHT
D-8:RÜCKFAHRLICHT
D-8:FEUX DE MARCHE ARRIÈRE
D-8:ACHTERUITRIJLICHT



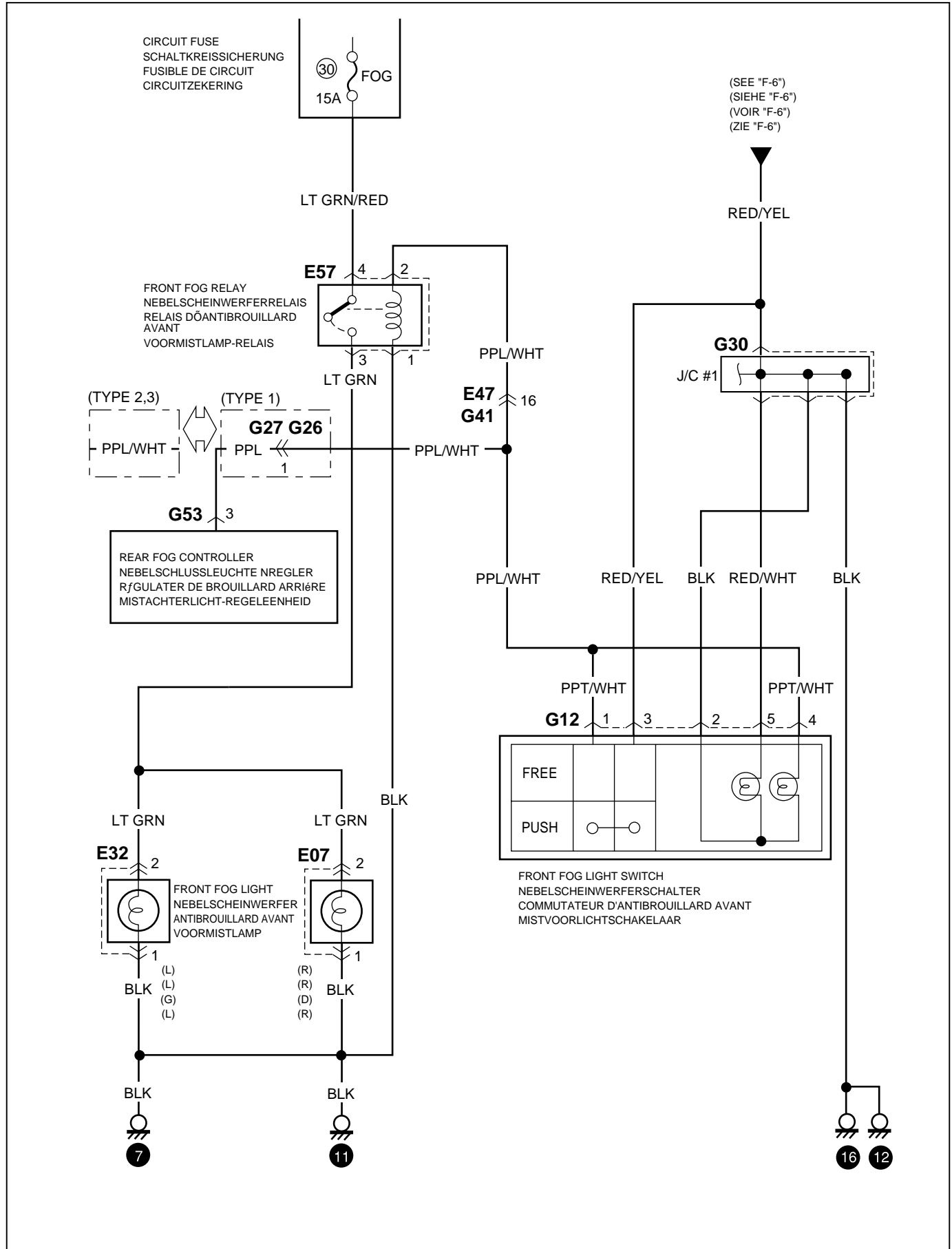
D-9: HEADLIGHT LEVELING**D-9: SCHEINWERFER-NIVELLIERUNG****D-9: REGLAGE DES PHARES****D-9: KOPLAMPSTRAAL-AFSTEL**

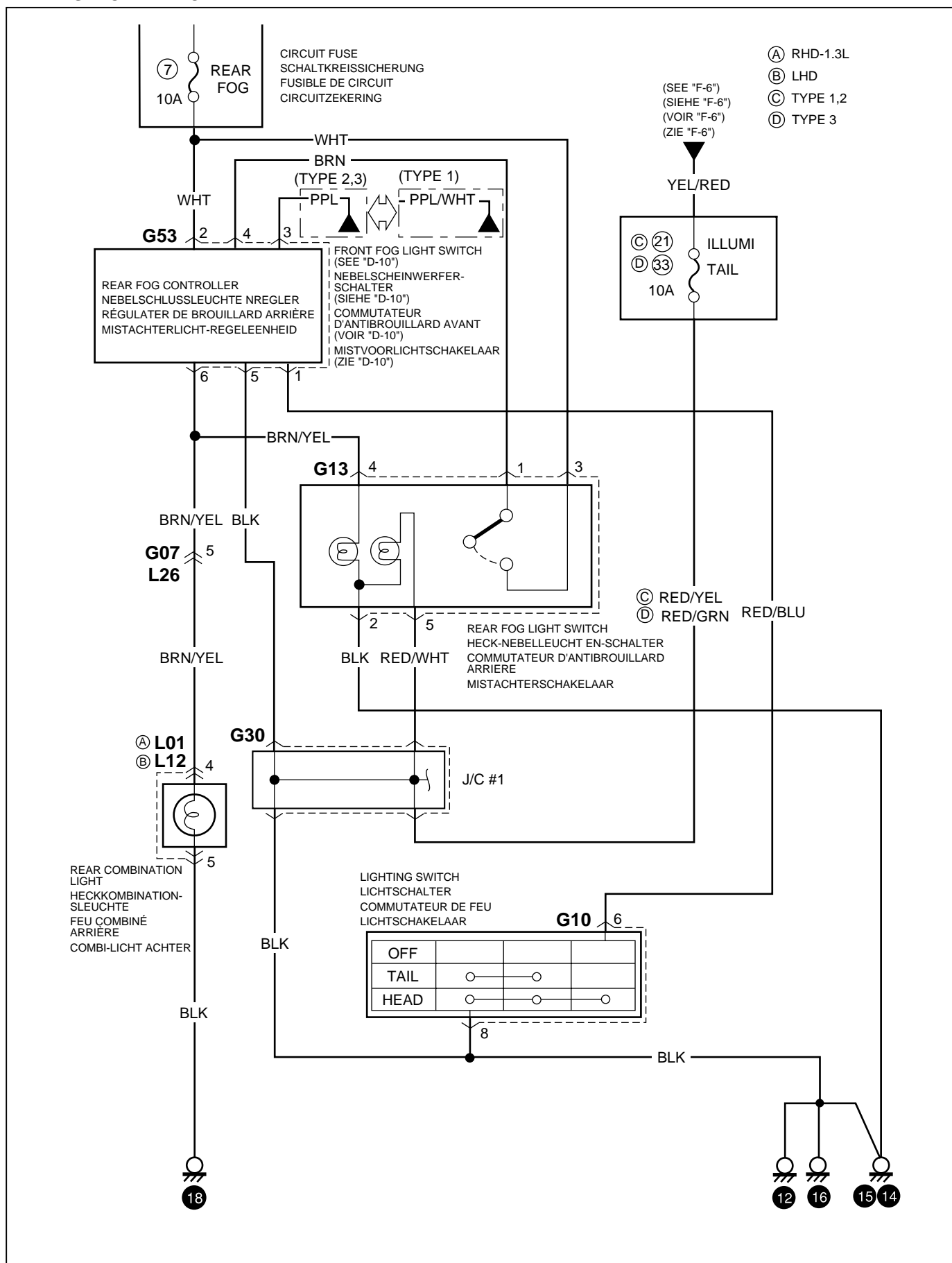
D-10:FRONT FOG LIGHT (IF EQUIPPED)

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D-10:ANTIBROUILLARD AVANT (SI ÉQUIPÉ)

D-10:VOORMISTLAMP (INDIEN UITGERUST)



D-11: REAR FOG LIGHT**D-11: NEBELSCHLUSSLEUCHTE****D-11: ANTIBROUILLARD ARRIERE****D-11: MISTACHTERLICHT**

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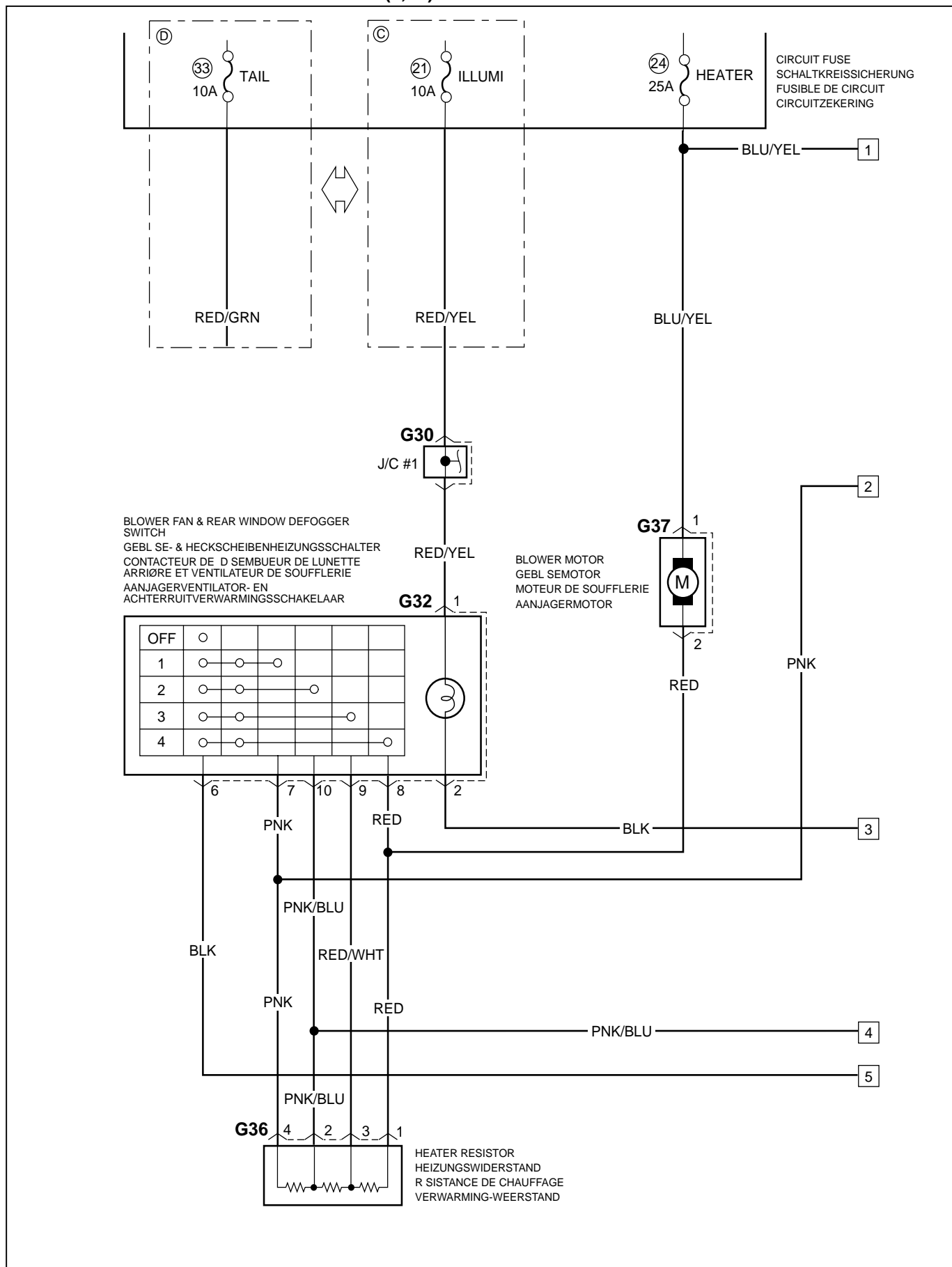
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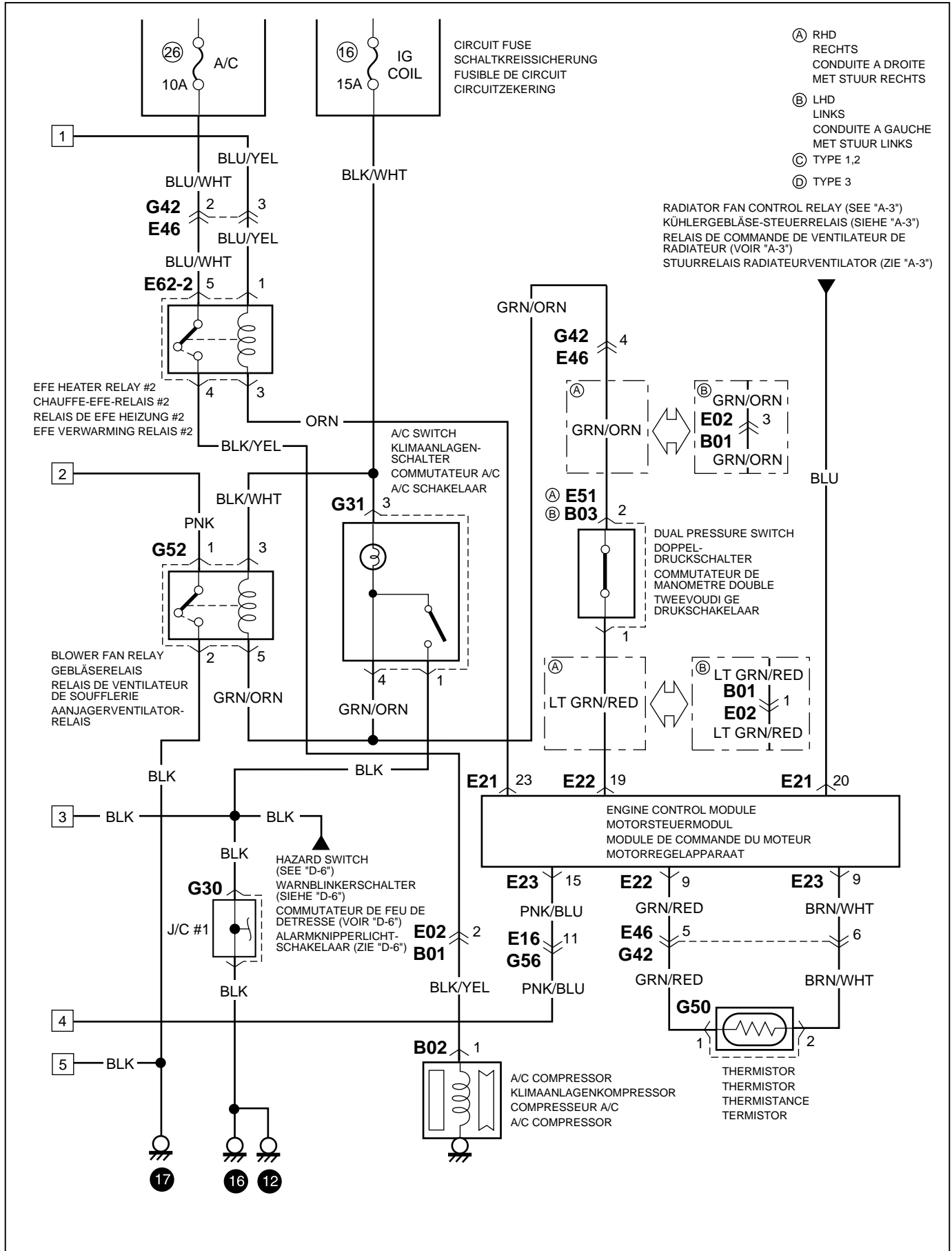
F-1: HEATER AND AIR CONDITIONER (1,0L)

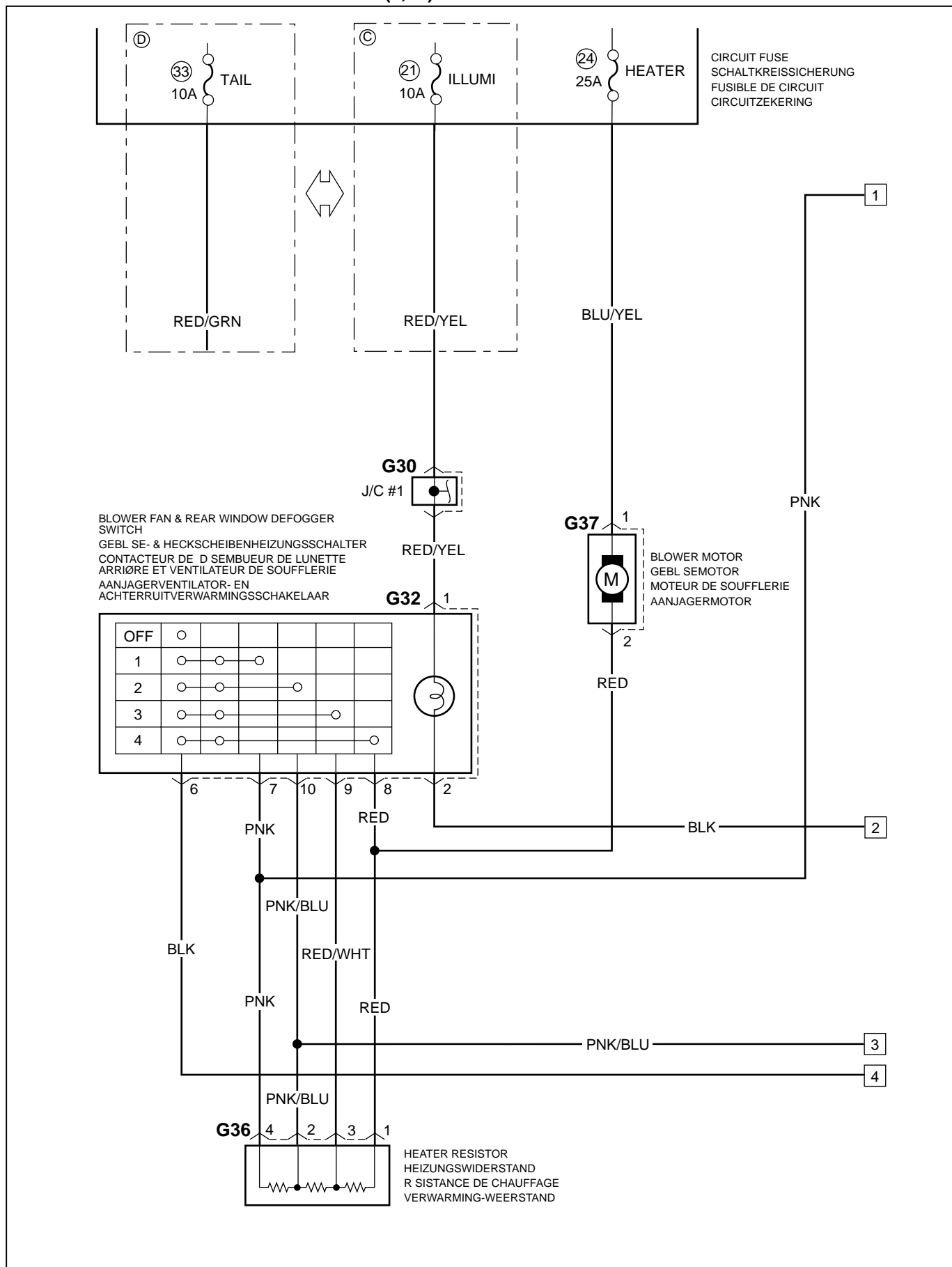
F-1: HEIZUNG UND KLIMAANLAGE (1,0L)

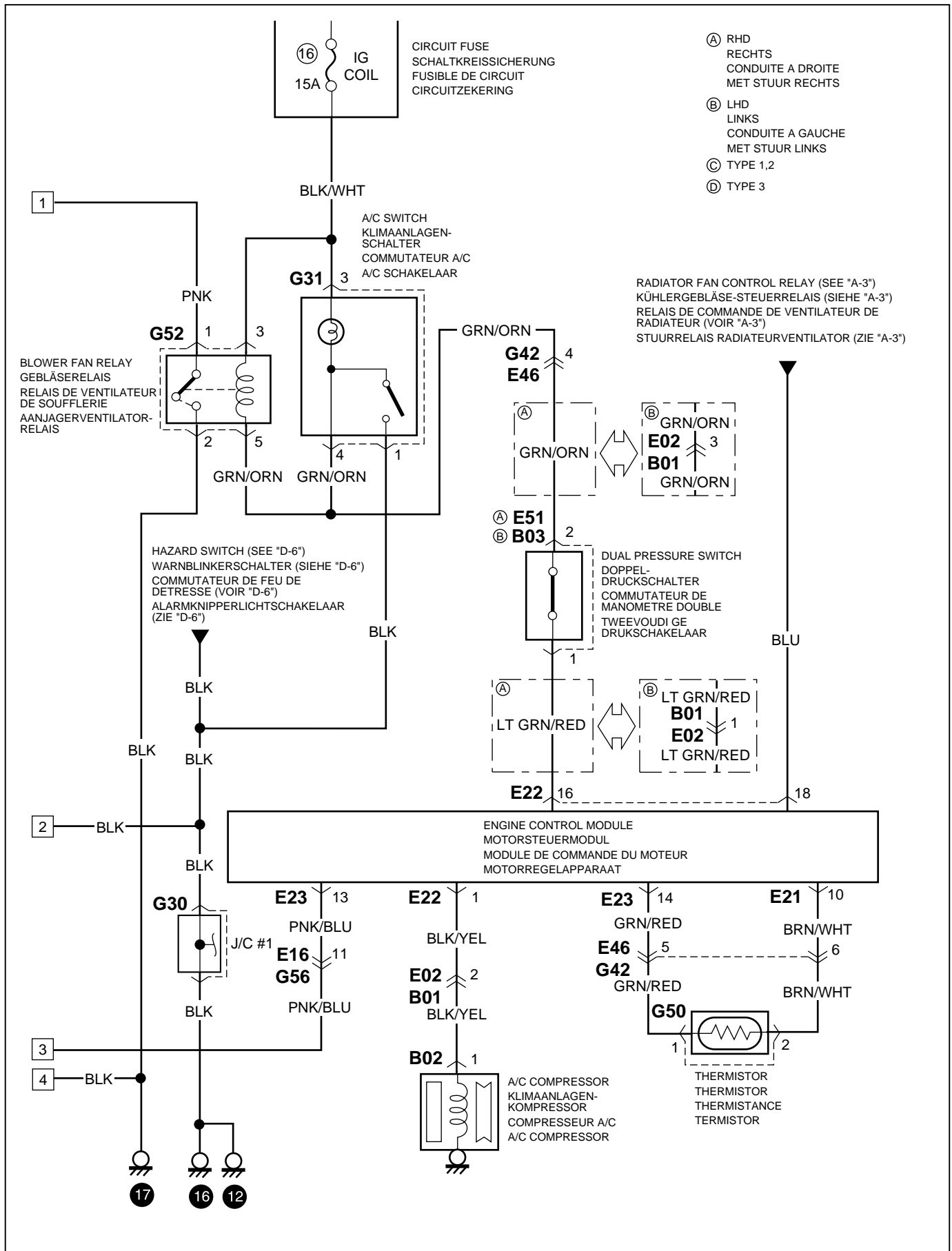
F-1: CHAUFFAGE ET CLIMATISATION (1,0L)

F-1: VERWARMING EN AIR CONDITIONING (1,0L)





F-1:HEATER AND AIR CONDITIONER (1.3L)F-1:SEIZING AND CLIMATE (1.3L) <http://www.simpopdf.com>**F-1:CHAUFFAGE ET CLIMATISATION (1,3L)****F-1:VERWARMING EN AIR CONDITIONING (1,3L)**

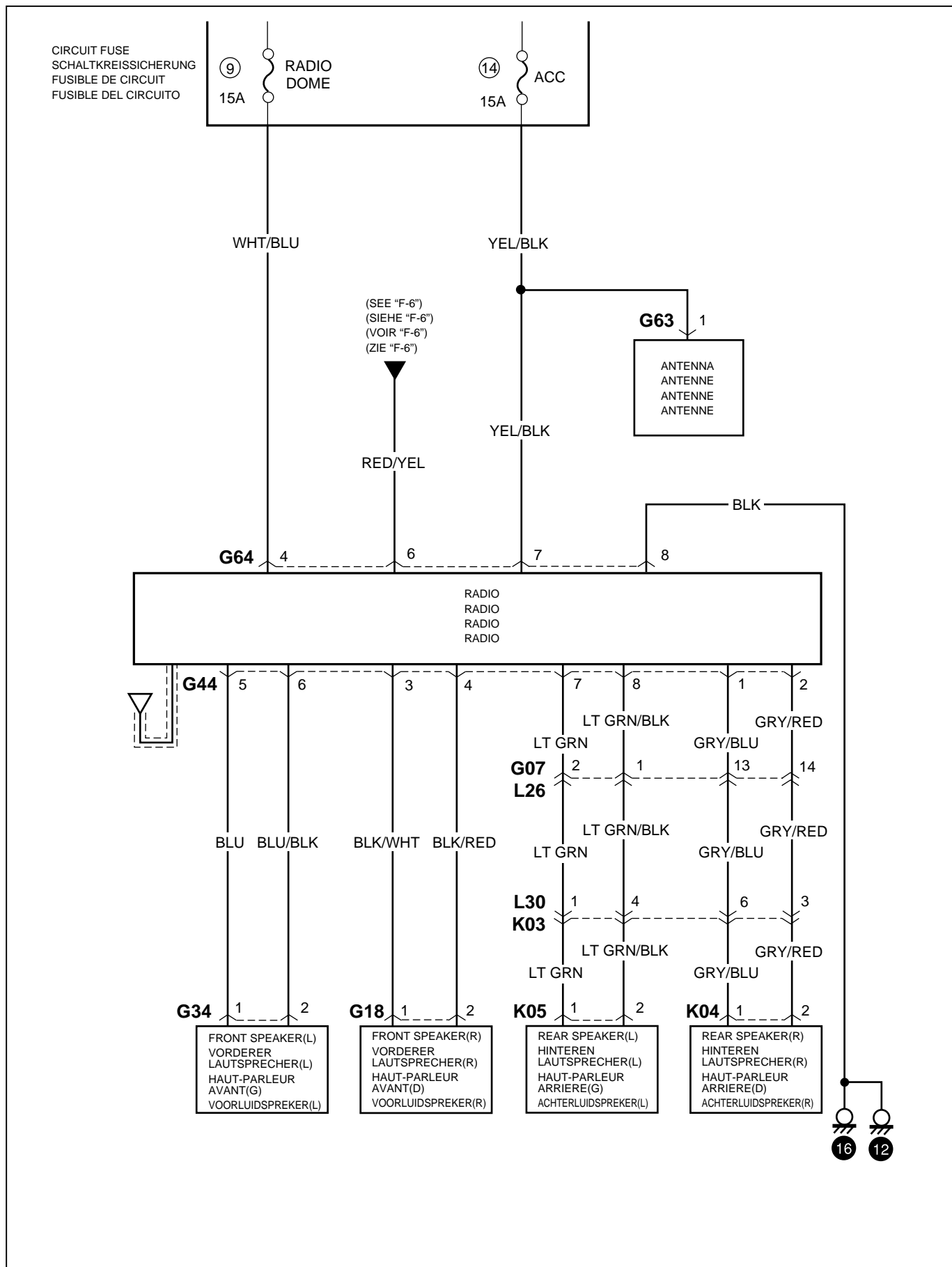


F-2:RADIO

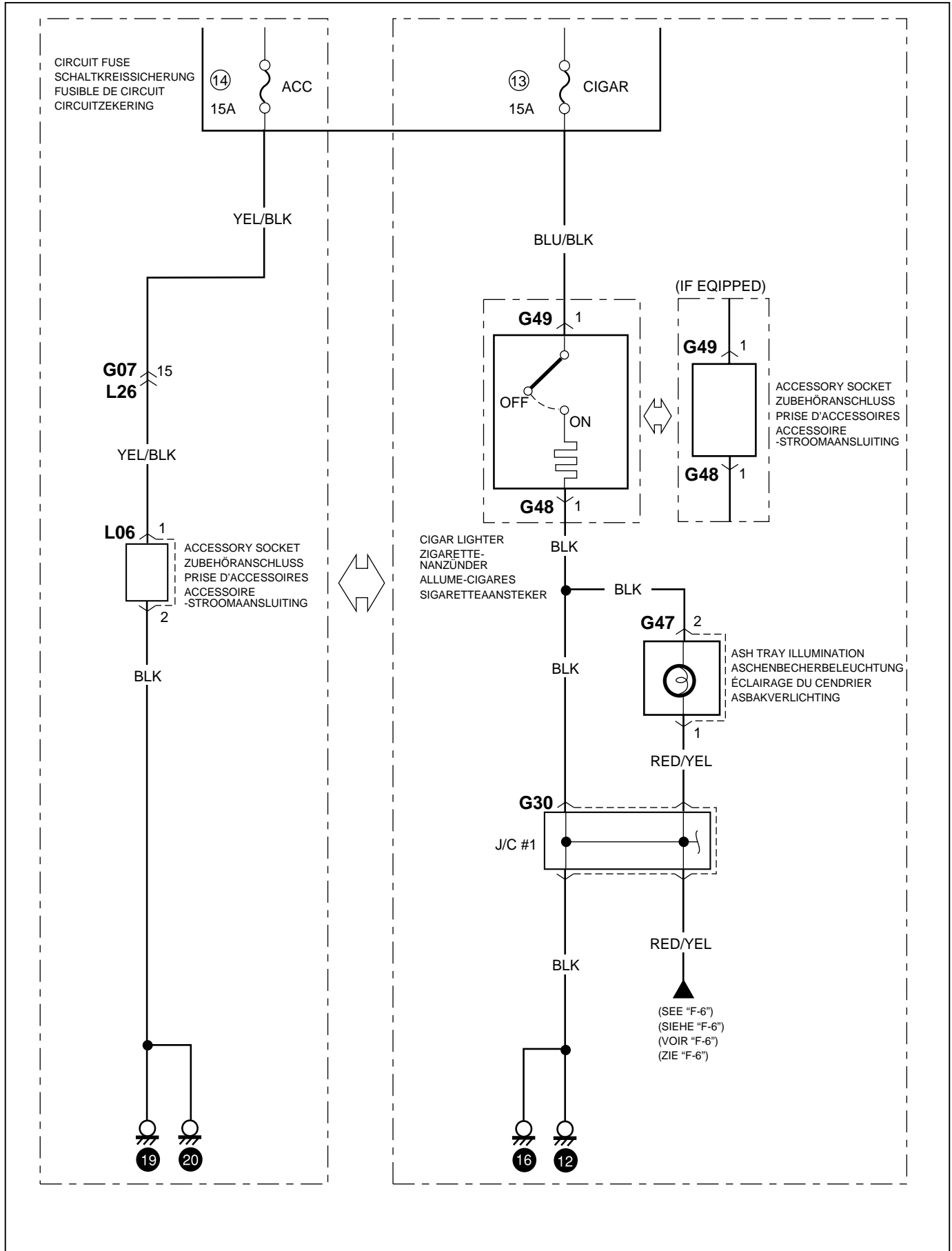
F-2:RADIO

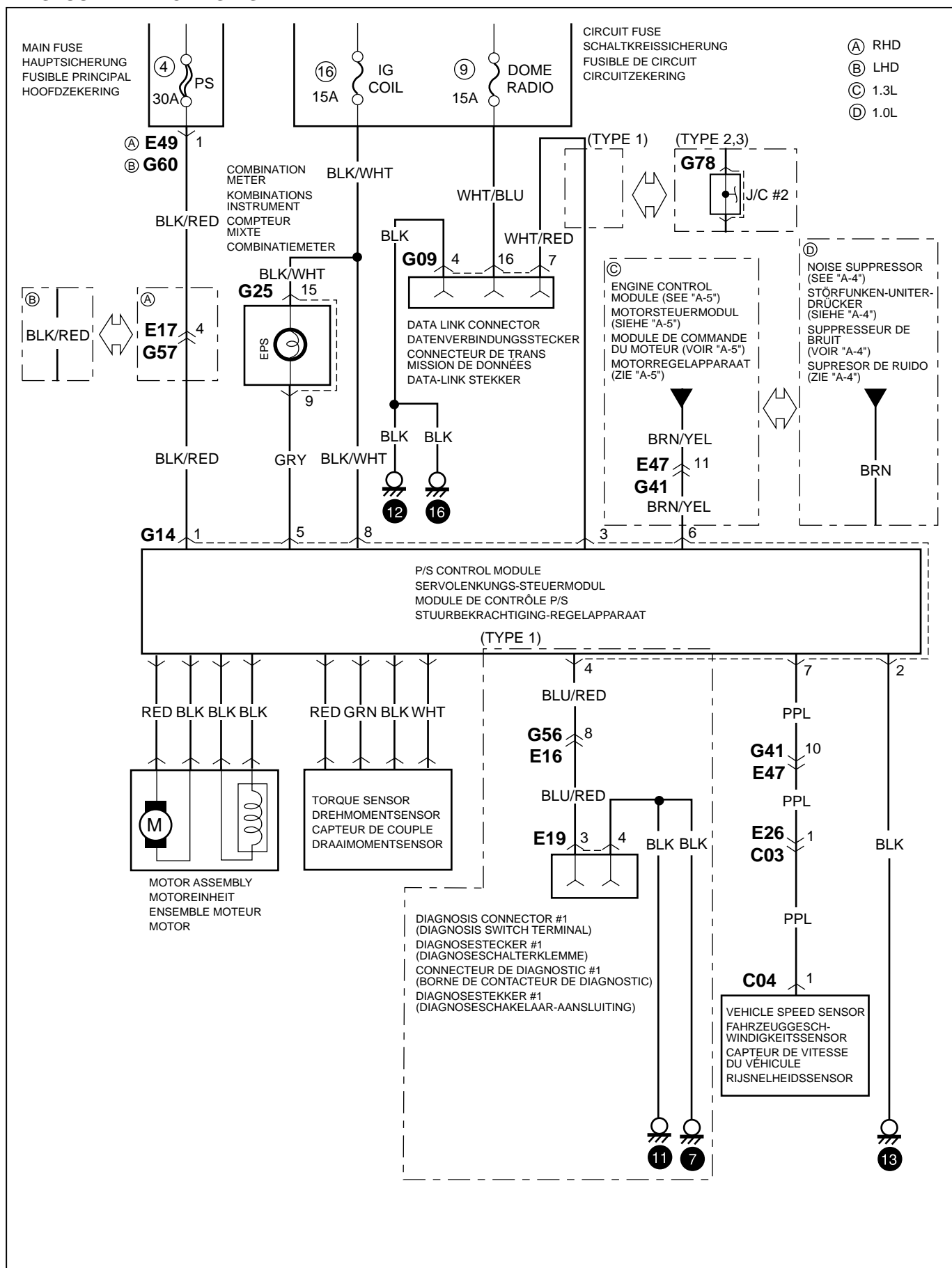
F-2:RADIO

F-2:RADIO

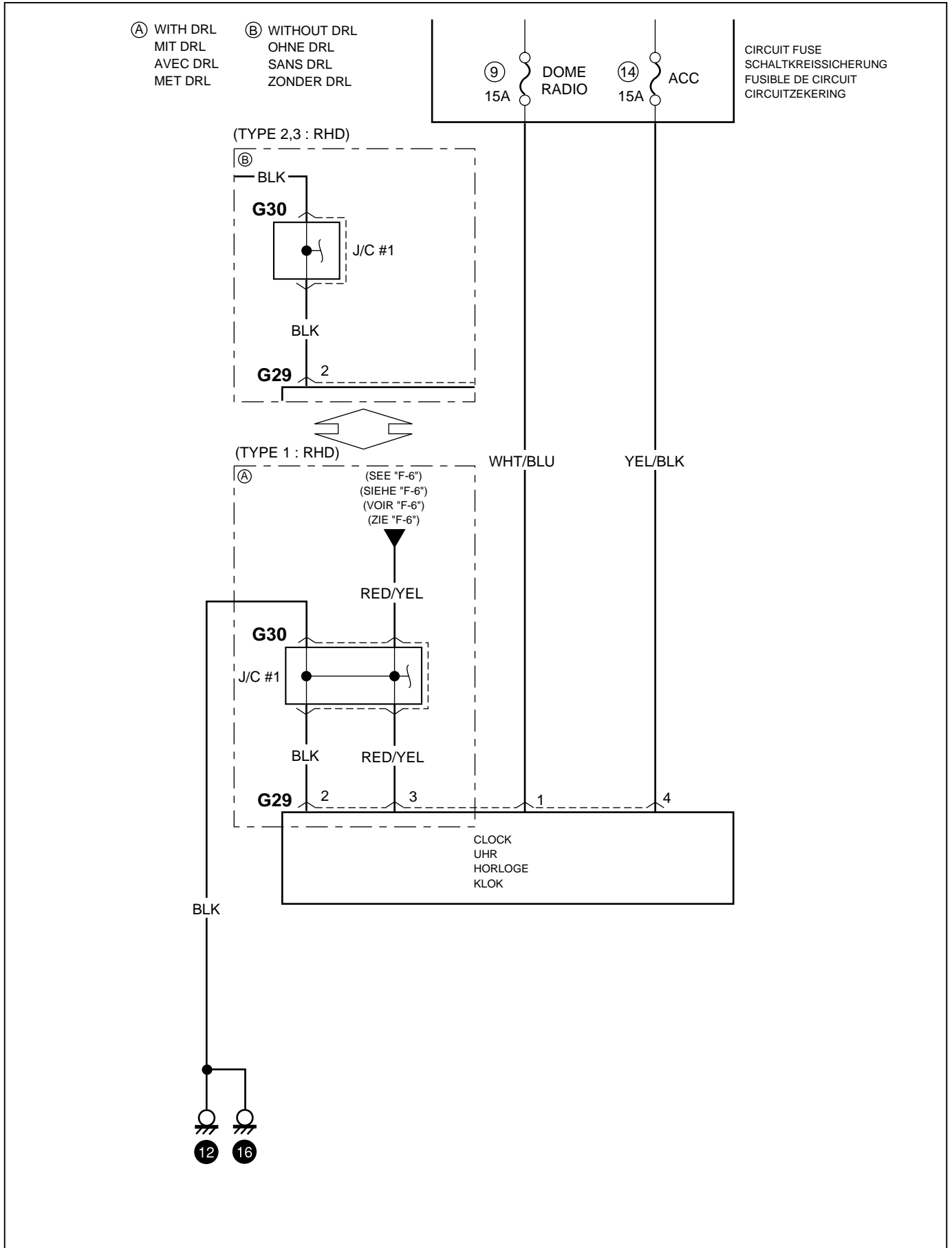


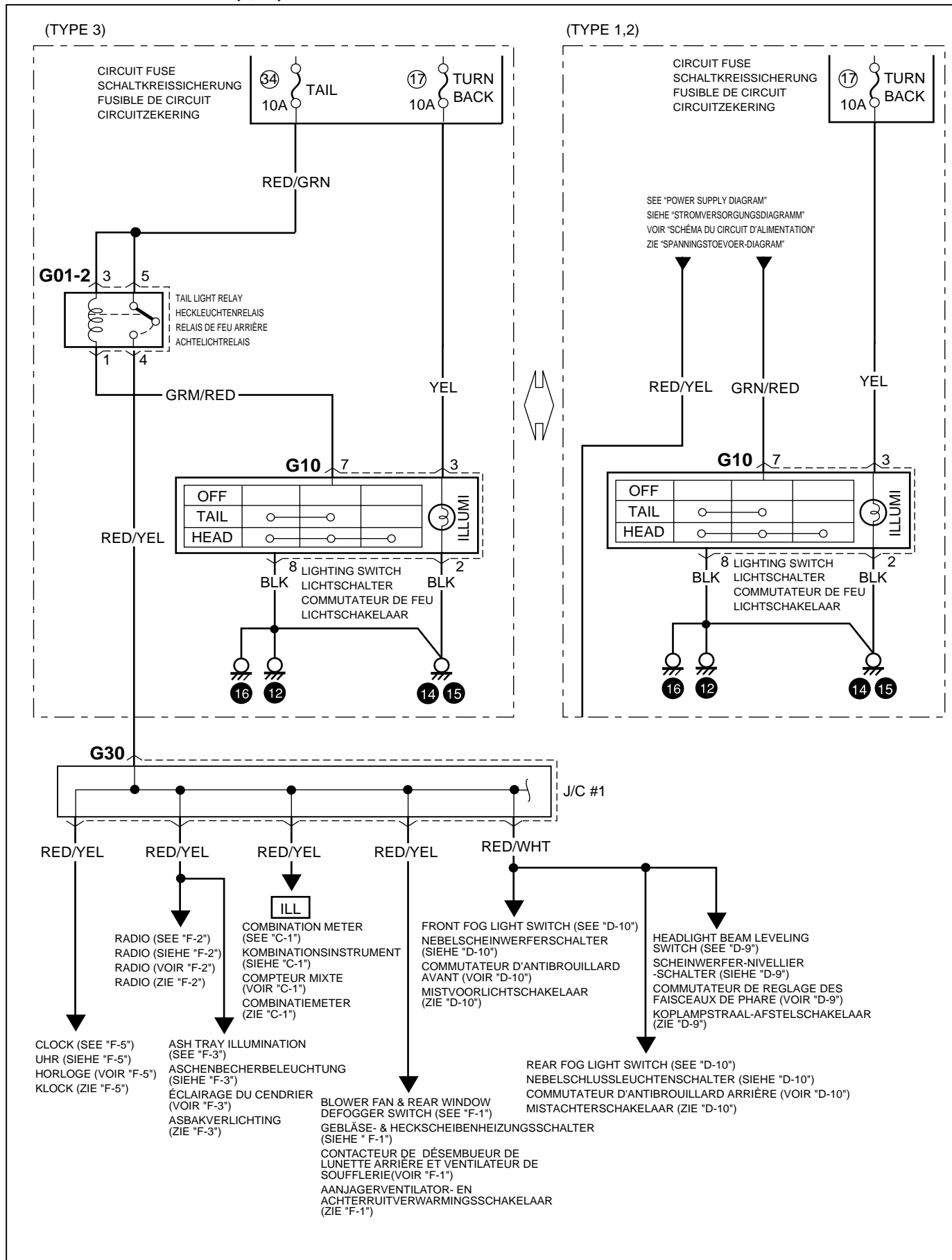
F-3: CIGAR LIGHTER / ACCESSORY SOCKET / ASH TRAY ILLUMINATION
F-3: ZIGARETTENANZÜNDER / ZUBEHÖRANSCHLUSS / ASCHENBECHERBELEUCHTUNG
F-3: ALLUME-CIGARES / PRISE D'ACCESSOIRES / ÉCLAIRAGE DU CENDRIER
F-3: SIGARETTEAANSTEKER / ACCESOIRE-STROOMAANSLUITING / ASBAKVERLICHTING



F-4:POWER STEERINGF-4: Servolenkung <http://www.simpopdf.com>**F-4:DIRECTION ASSISTEE****F-4:STUURBEKRACHTIGING**

F-5:CLOCK
F-5:UHR
F-5:HORLOGE
F-5:KLOK



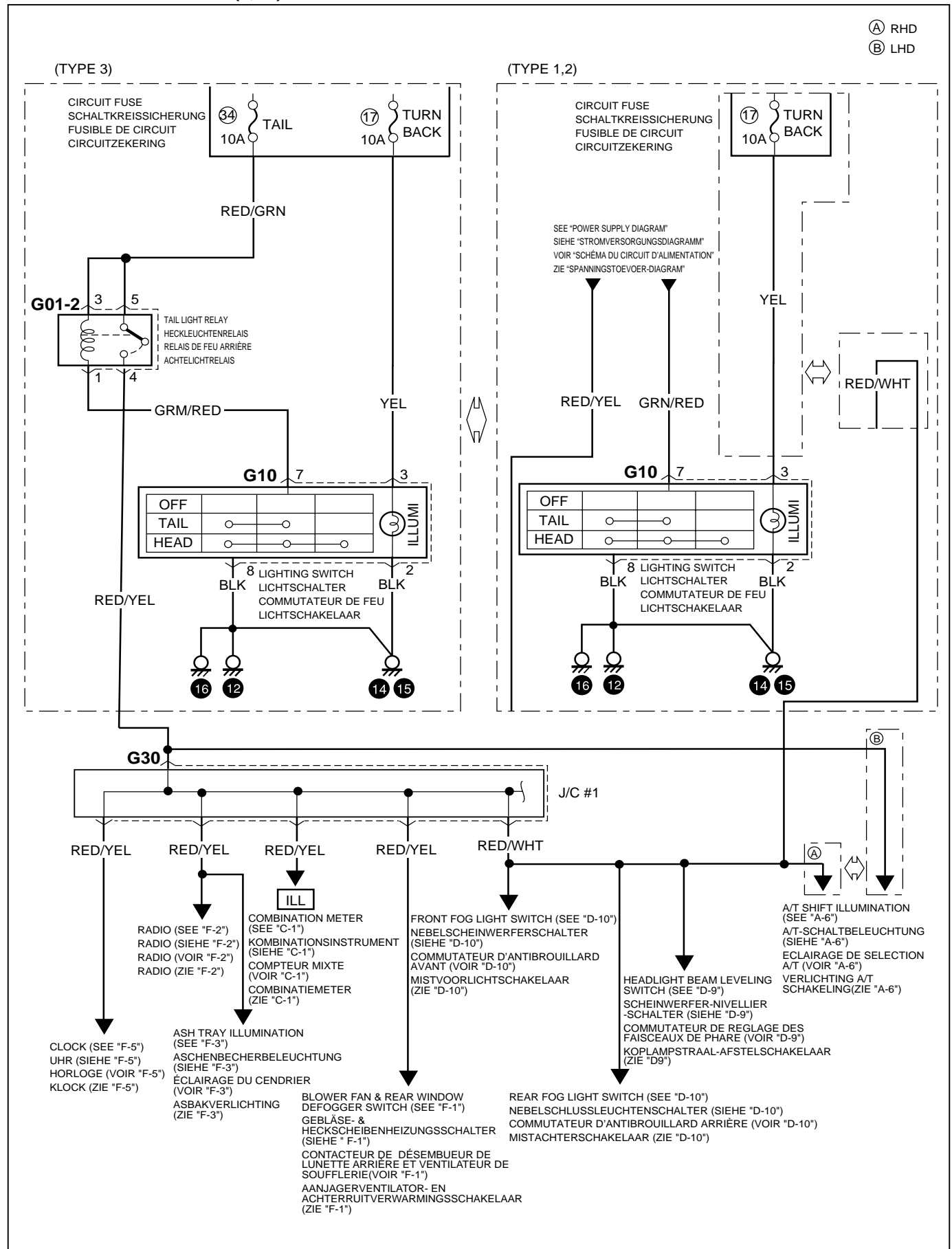
F-6: ILLUMINATION LIGHT (1.0L)**F-6: BELEUCHTUNG (1.0L)****F-6: FEUX D'ÉCLAIRAGE (1.0L)****F-6: VERLICHTINGSLAMP (1.0L)**

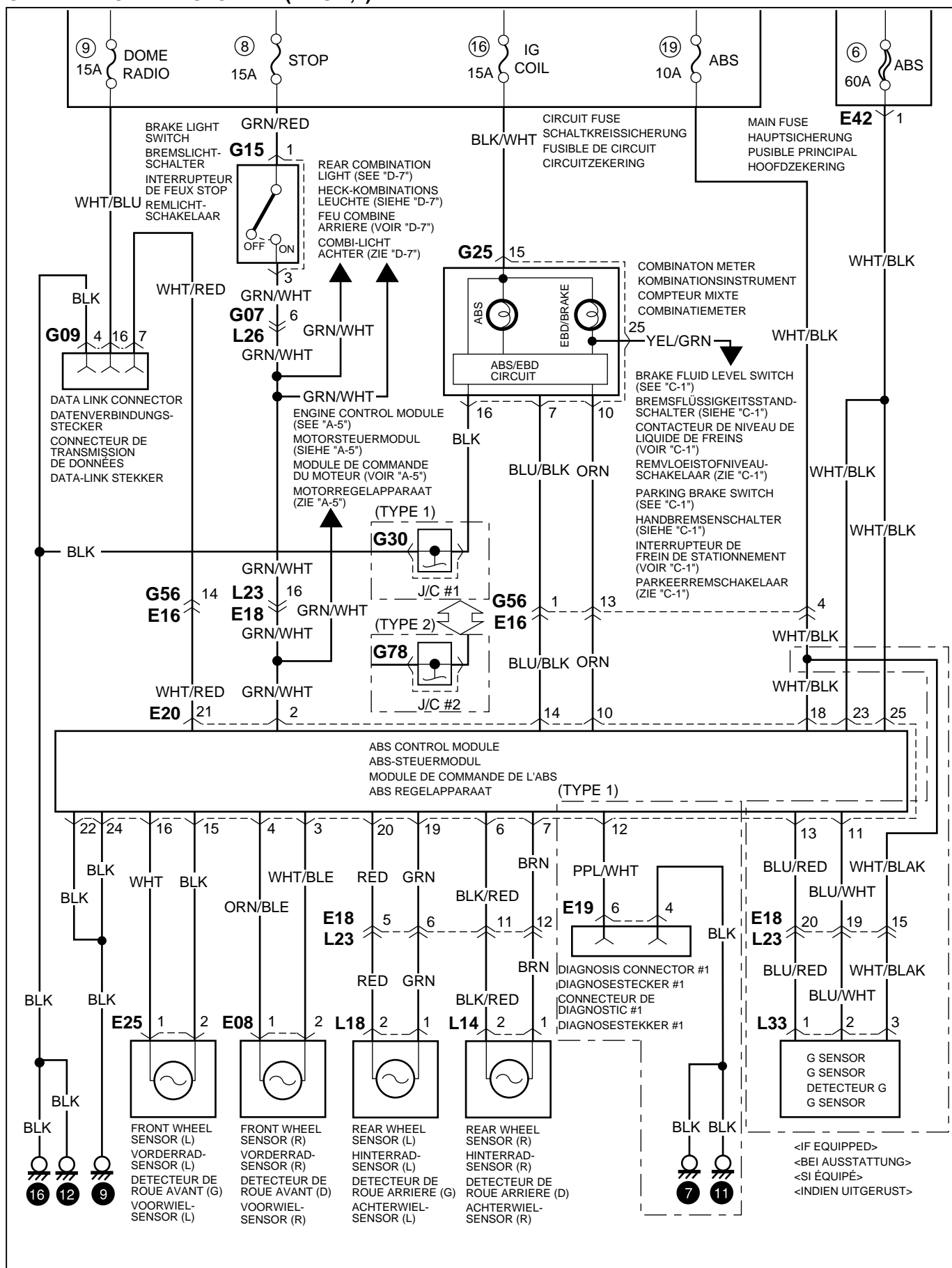
F-6: ILLUMINATION LIGHT (1,3L)

F-6: BELEUCHTUNG (1,3L)

F-6: VERLICHTINGSLAMP (1,3L)

(A) RHD
(B) LHD



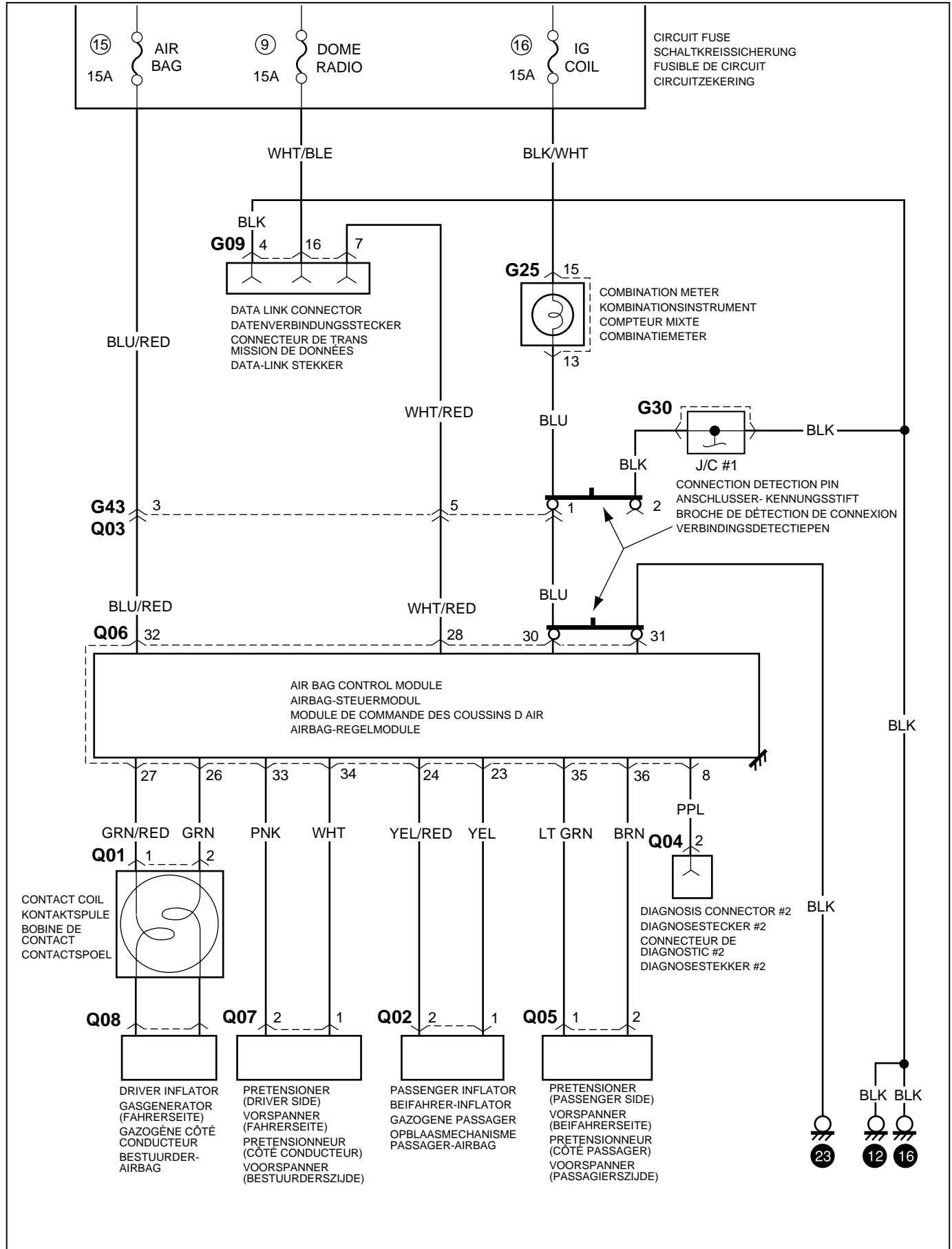
G-1:ANTI-LOCK BRAKE SYSTEM (TYPE 1,2)Simpopdf.com Registered Version - <http://www.simpopdf.com>**G-1:SYSTÈME D'ANTIBLOCAGE (TYPE 1,2)****G-1:ANTIBLOKKEERSYSTEEM (TIPO 1,2)**

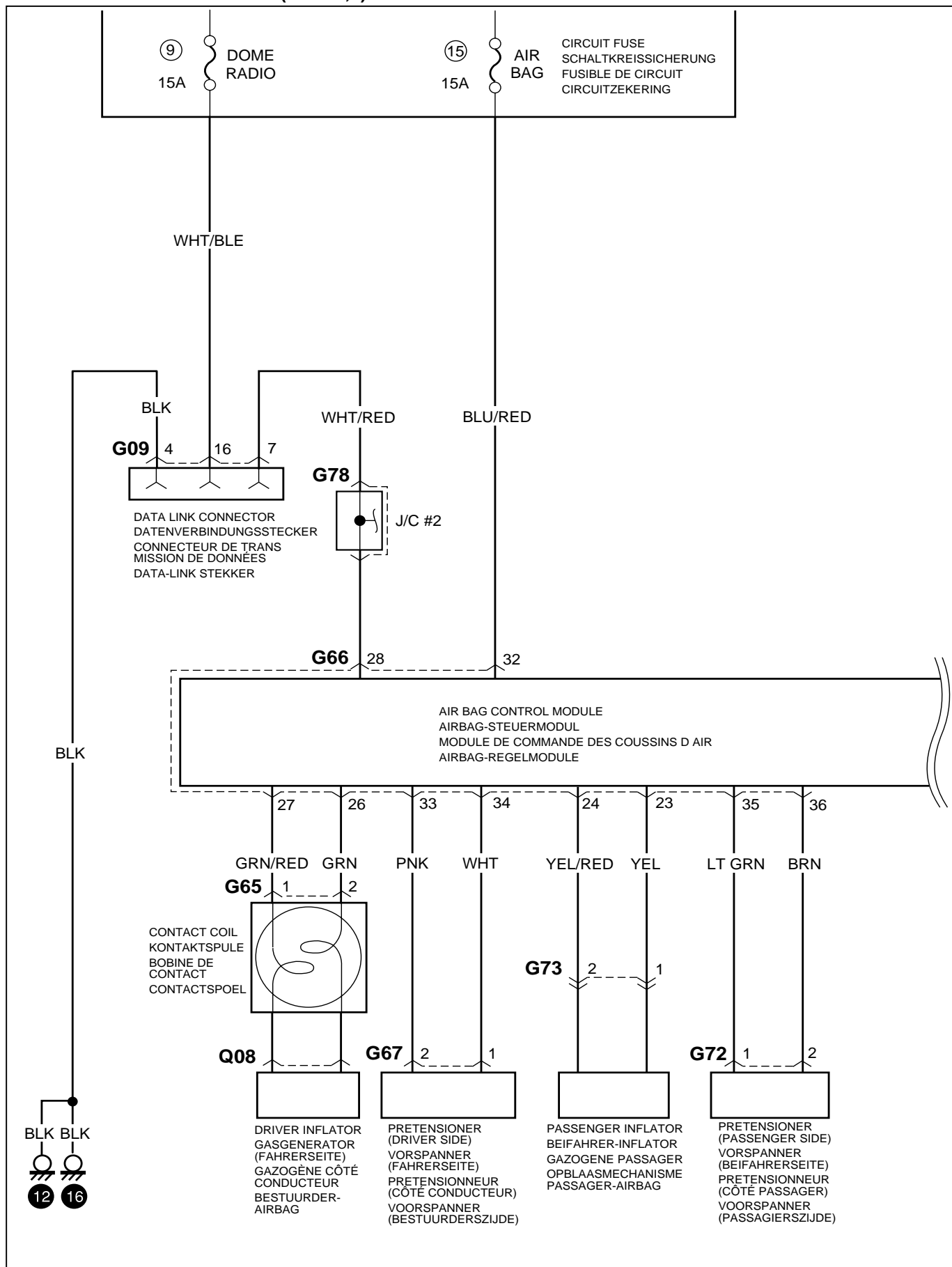
G-2: AIR BAG CONTROL SYSTEM (TYPE 1,2)

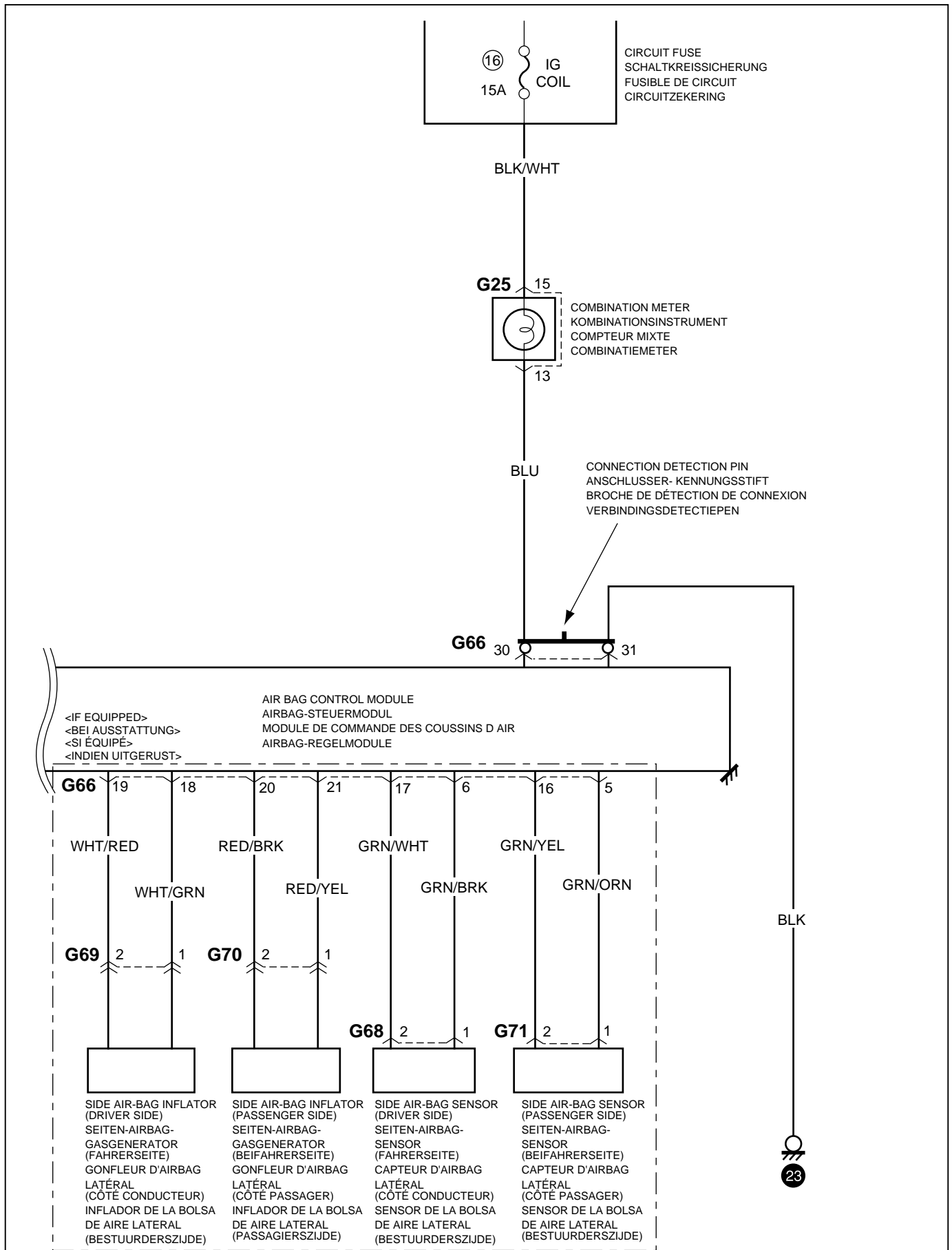
Simple PDF Manager Registered Version - <http://www.simpopdf.com>

G-2: SYSTEME DE COMMANDE DES COUSSINS D'AIR (TYPE 1,2)

G-2: AIRBAG-REGELSYSTEM (TIPO 1,2)



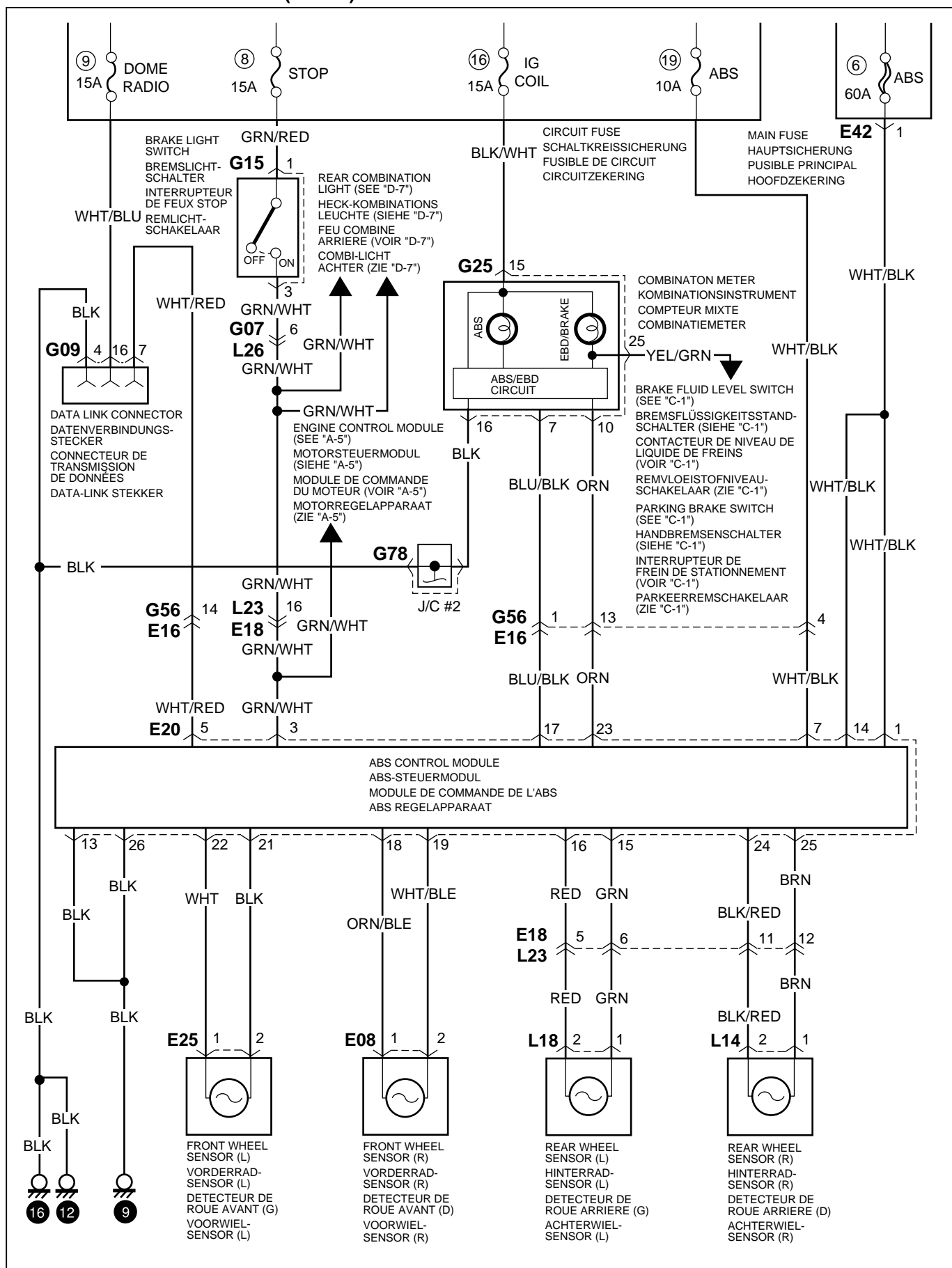
G-3: AIR BAG CONTROL SYSTEM (TYPE 2,3)**G-3: AIRBAG-STEUERUNG (TYP 2,3)****G-3: SYSTEME DE COMMANDE DES COUSSINS D'AIR (TYPE 2,3)****G-3: AIRBAG-REGELSYSTEME (TIPO 2,3)**



G-4: ANTIBLOCKIEREMISSYSTEM (TYP 3)

G-4:SYSTÈME D'ANTIBLOPAGE (TYPE 3)

G-4: ANTIBLOKKEERSYSTEEM (TIPO 3)



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SECTION 8A-8
ABSCHNITT 8A-8
SECTION 8A-8
DEEL 8A-8

LIST OF CONNECTORS
LISTE DER STECKVERBINDER
LISTE DES CONNECTEURS
LIJST VAN AANSLUITINGEN


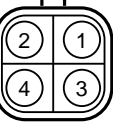











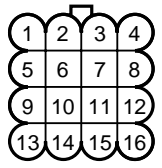
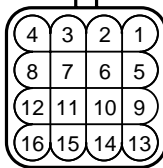
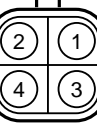



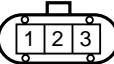
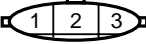


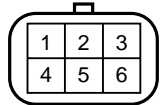






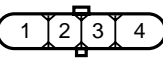
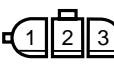








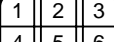



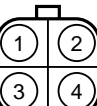









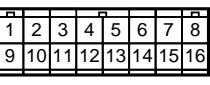
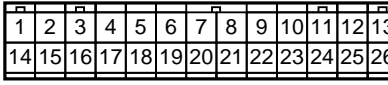
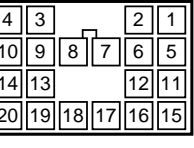
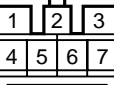
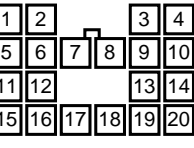

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LIST OF CONNECTORS
LISTE DER STECKVERBINDER
LISTE DES CONNECTEURS
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NOTE : The illustration below shows the harness side connectors, but not the component side connectors.
HINWEIS : Die nachstehende Abbildung zeigt die Steckverbinder der Kabelbaumseite, aber nicht die Steckverbinder auf der Komponentenseite.
REMARQUE : L'illustration ci-dessous montre les connecteurs du faisceau de câbles, mais pas les connecteurs des composants.
OPMERKING: De onderstaande afbeelding toont de stekkers aan de bedradingsbundelzijde, maar niet de stekkers aan de componentzijde.

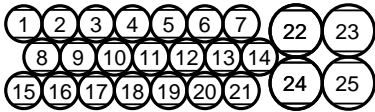
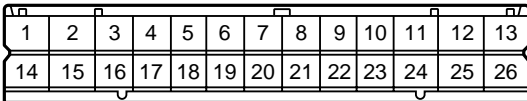
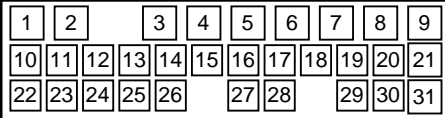
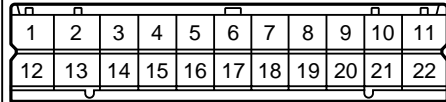
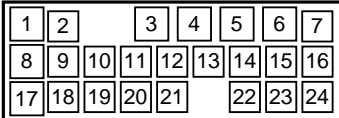
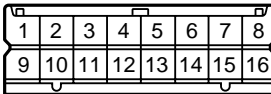
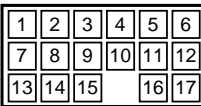

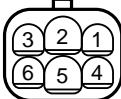

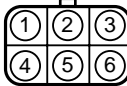
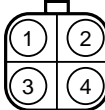
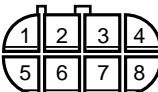
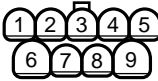



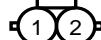



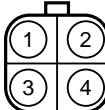
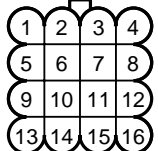
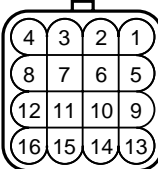



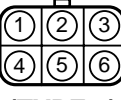
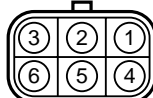
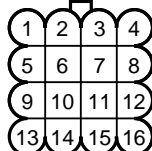










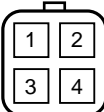
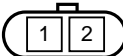
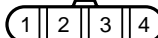
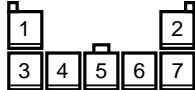
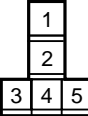


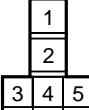
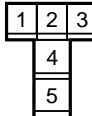
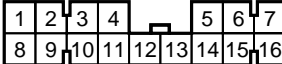
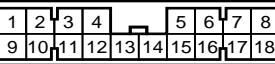

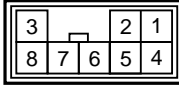
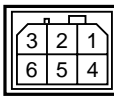
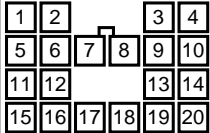
B C D E

B	B01(E02) (RHD) 	(LHD) 	B02 	B03 (LHD) 						
	C01 	C02 	C03(E26) 	C04 	C05 	C06 	C07 (1.0L) 	(1.3L) 	C08 	
D	D01(E41) 	D02(E40) 	D03(E39) 	D04 	D05 	D06 (1.0L) 	(1.3L) 	D07 	D08 (1.0L) 	(1.3L) 
	D09 	D10 (1.0L) 	(1.3L) 	D11 	D12 	D13 	D14 	D15 (1.0L) 	(1.3L) 	D16 
	D17 	D18 	D19 	D20 	D21 	D22 	D23 	D24 	D25 	
	E01 	E02(B01) (RHD) 	(LHD) 	E03 (1.0L) 	(1.3L) 	E04 	E05 	E06 	E07 	E08 
	E09 	E10 (LHD) 	E12 	E13 	E16(G56) 	E17(G57) 	E18(L23) 	E19 	(TYPE 1)	

NOTE : Connector Nos in () indicate mating connector Nos.
HINWEIS : Die in () angegebenen Nummern kennzeichnen die passenden Steckverbinder.
REMARQUE : Les Nos. de connecteurs entre parenthèses indiquent le No. des connecteurs correspondants.
OPMERKING: De stekker nummers tussen haakjes () zijn de nummers van de bijbehorende stekkers.

NOTE : The illustration below shows the harness side connectors, but not the component side connectors.
HINWEIS : Die nachstehende Abbildung zeigt die Steckverbinder der Kabelbaumseite, aber nicht die Steckverbinder auf der Komponentenseite.
REMARQUE : L'illustration ci-dessous montre les connecteurs du faisceau de câbles, mais pas les connecteurs des composants.
OPMERKING: De onderstaande afbeelding toont de stekkers aan de bedradingsbundelzijde, maar niet de stekkers aan de componentzijde.

E G

E	E20  (TYPE 1,2)		E21 (1.0L)  (1.3L) 							
	E22 (1.0L)  (1.3L) 		E23 (1.0L)  (1.3L) 		E25 	E26(C03) 	E27 			
	E28 	E29 	E30 	E31 	E32 	E34 	E35 	E36 	E37 (1.0L)  OR (1.3L) 	
	E38 	E39(D03) 	E40(D02) 	E41(D01) 	E42 	E43 	E44 	E45 (TYPE 1) 	E46(G42) 	E47(G41) 
	E48 	E49 (RHD) 	E50 (RHD) 	E51 (RHD) 	E52 	E53 	E54 	E55 	E56 	E57 
	E58 	E59 	E60 	E61 	E62-1 	E62-2 	E63 			
G	G01-1 	G01-2 	G02 	<IF EQUIPPED> 		G04 	G05(J01) 	G06(J02) 	G07(L26) 	

NOTE : Connector Nos in () indicate mating connector Nos.
HINWEIS : Die in () angegebenen Nummern kennzeichnen die passenden Steckverbinder.
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REMARQUE : L'illustration ci-dessous montre les connecteurs du faisceau de câbles, mais pas les connecteurs des composants.
OPMERKING: De onderstaande afbeelding toont de stekkers aan de bedradingsbundelzijde, maar niet de stekkers aan de componentzijde.

G

<div>G</div>	G08(L31) 	G09 	G10 	G11 	G12 	G13 	G14 	G15 	G16
	G17 	G18 	<IF EQUIPPED> 	G22 	G24 	G25 			G26(G27) <IF EQUIPPED>
	G27(G26) <IF EQUIPPED> 	G29 	G30 	G31 	G32 	G33 	G34 	<IF EQUIPPED> 	G36
	G39 	<IF EQUIPPED> 	G40 (RHD) 	G41(E47) 	G42(E46) 	G43(Q03) (TYPE 1) 	G44 	G47 	G48
	G50 	G51 	G52 	G53 	G54(J09) 	G55(J10) 	G56(E16) 	G57(E17) 	G59 (LHD)
	G61 <IF EQUIPPED> (LHD) 	G62 <IF EQUIPPED> (LHD) 	G63 	G64 	G65 	G66 			
	G67 (TYPE 2) 	G68 (TYPE 2) 	G69 (TYPE 2) 	G70 (TYPE 2) 	G71 (TYPE 2) 	G72 (TYPE 2) 	G73 (TYPE 2) 	G78 (TYPE 2) 	

NOTE : Connector Nos in () indicate mating connector Nos.
HINWEIS : Die in () angegebenen Nummern kennzeichnen die passenden Steckverbinder.
REMARQUE : Les Nos. de connecteurs entre parenthèses indiquent le No. des connecteurs correspondants.
OPMERKING: De stekker nummers tussen haakjes () zijn de nummers van de bijbehorende stekkers.

NOTE : The illustration below shows the harness side connectors, but not the component side connectors.
HINWEIS : Die nachstehende Abbildung zeigt die Steckverbinder der Kabelbaumseite, aber nicht die Steckverbinder auf der Komponentenseite.
REMARQUE : L'illustration ci-dessous montre les connecteurs du faisceau de câbles, mais pas les connecteurs des composants.
OPMERKING: De onderstaande afbeelding toont de stekkers aan de bedradingsbundelzijde, maar niet de stekkers aan de componentzijde.



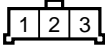


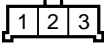



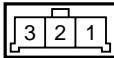

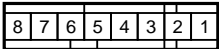
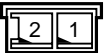
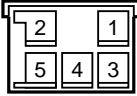

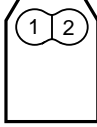

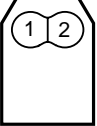
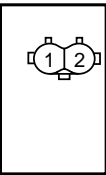
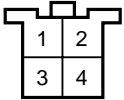
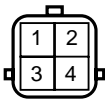
J K L N

J	J01(G05) 	J02(G06) 	J03 (TYPE 1,2)	 (TYPE 3)	J04 (TYPE 1,2)	J05 	J06 	J07 	J08 	J09(G54)
	J10(G55) 	J11 (TYPE 1,2)	 (TYPE 3)	J12 	J13 	J14 	J15(L20) 	J16 	J17(L15) 	J18
	J19 	J20 (TYPE 1,2)								
K	K01(L25) 	K02 	K03(L30) 	K04 	K05 	K06 	K07 			
	L01 	L02(O02) 	L03(O01) 	L06 	L08 	L10 	L11 	L12 	L13(R01) 	L14
L	L15(J17) 	L16 	L17 	L18 	L19 	L20(J15) 	L21 	L22 	L23(E18) 	L25(K01)
	L26(G07) 	L27 (→←)	L28 (→←→←)	L30(K03) 	L31(G08) 	L32 (→←)	L33 OR			

NOTE : Connector Nos in () indicate mating connector Nos.
HINWEIS : Die in () angegebenen Nummern kennzeichnen die passenden Steckverbinder.
REMARQUE : Les Nos. de connecteurs entre parenthèses indiquent le No. des connecteurs correspondants.
OPMERKING: De stekkersnummers tussen haakjes () zijn de nummers van de bijbehorende stekkers.

NOTE : The illustration below shows the harness side connectors, but not the component side connectors.
HINWEIS : Die nachstehende Abbildung zeigt die Steckverbinder der Kabelbaumseite, aber nicht die Steckverbinder auf der Komponentenseite.
REMARQUE : L'illustration ci-dessous montre les connecteurs du faisceau de câbles, mais pas les connecteurs des composants.
OPMERKING: De onderstaande afbeelding toont de stekkers aan de bedradingsbundelzijde, maar niet de stekkers aan de componentzijde.

O Q R

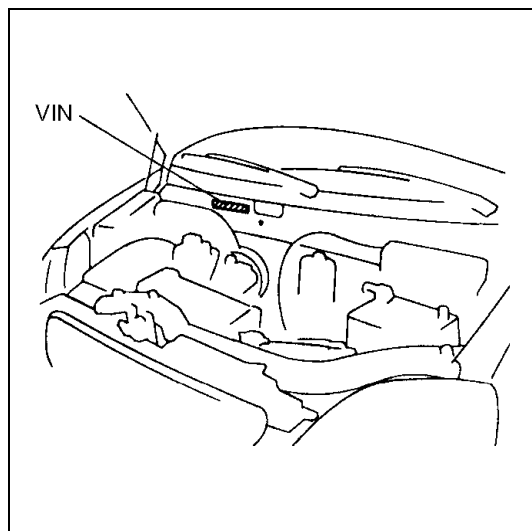
N	N01									
										
O	O01(L03)	O02(L02)	O03(O08)	O04	O05(O10)	O06	O08(O03)	O09	O10(O05)	O11
										
Q	Q01		Q02	Q03(G43)	Q04	Q05	Q06			
	 (TYPE 1)		 (TYPE 1)	 (TYPE 1)	 (TYPE 1)	 (TYPE 1)	 (TYPE 1)			
	Q07	Q08								
	 (TYPE 1)									
R	R01(L13)	R02								
										

NOTE : Connector Nos in () indicate mating connector Nos.
HINWEIS : Die in () angegebenen Nummern kennzeichnen die passenden Steckverbinder.
REMARQUE : Les Nos. de connecteurs entre parenthèses indiquent le No. des connecteurs correspondants.
OPMERKING: De stekker nummers tussen haakjes () zijn de nummers van de bijbehorende stekkers.

Foreword

This manual contains SECTION 8A "Wiring Diagram" which is a part of the ELECTRICAL SYSTEM section of the service manual.

Applicable model: TYPE4, RB310/RB413/RB413D



(X) TSMMMA93S00280001 (X) ~
 (X) TSMMMB33S00280001 (X) ~
 (X) TSMMMA33S00280001 (X) ~
 (X) TSMMMA33S40280001 (X) ~
 (X) TSMMMA43S00280001 (X) ~

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. The descriptions in this manual are based on standard or base model specifications. Therefore, please note that the actual vehicle being serviced may differ from the manual. MAGYAR SUZUKI CORPORATION reserves the right to make changes at any time without notice.

Please note that this manual contains references to equipment that may not be marketed in all countries.

For inspection and service work, refer to the service manual(s) listed below.

NOTE:

This manual shows the circuits for all the possible variations in production specifications. However, depending on the specifications of the vehicle you are handling, its wiring harness may not include some of the circuits or wiring shown in this manual.

Related Manual

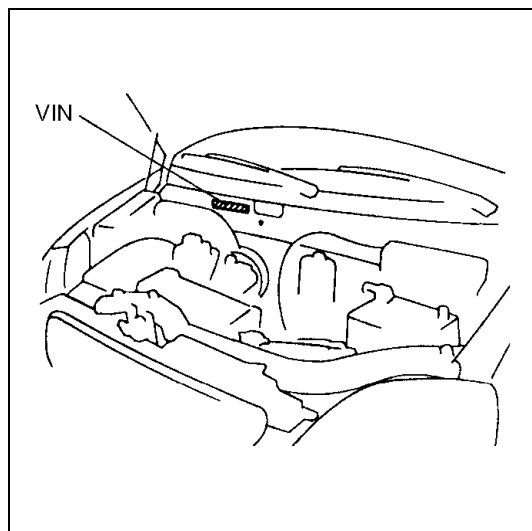
Manual Name	Part Number
RB310 (S/M)	99500U83E10-01E
RB413 (S/M)	99500-83E00-01E
RB413 4WD (S/S/M)	99501U83E00-01E
RB310/413 (S/S/M)	99501U83E10-01E
RB310/413 (S/S/M)	99501U83E20-01E
RB310/413 (S/S/M)	99501U83E30-01E
RM413D/RB413D (S/S/M)	99501U86G20-01E

MAGYAR SUZUKI CORPORATION

Vorwort

Dieses Handbuch enthält ABSCHNITT 8A "VERDRAHTUNGSSCHEMA", der zum Abschnitt ELEKTRISCHE ANLAGE des Werkstatt-Handbuchs gehört.

Zu verwenden für Modell: TYPE4, RB310/RB413/RB413D



(X) TSMMMA93S00280001 (X) ~
 (X) TSMMMB33S00280001 (X) ~
 (X) TSMMMA33S00280001 (X) ~
 (X) TSMMMA33S40280001 (X) ~
 (X) TSMMMA43S00280001 (X) ~

Alle hier angebotenen Informationen, Abbildungen und Spezifikationen basieren auf den neuesten Daten, wie sie zum Zeitpunkt der Drucklegung zur Verfügung standen. Die Erläuterungen der vorliegenden Anleitung basieren auf den technischen Daten des Standardmodells oder Basismodells. Sie weichen daher zuweilen von den tatsächlichen Gegebenheiten des zu wartenden Fahrzeugs ab. MAGYAR SUZUKI CORPORATION behält sich das Recht zu Veränderungen ohne Ankündigung vor.

Wir bitten zu beachten, daß diese Anleitung auch Informationen zu Ausrüstungen enthält, die eventuell nicht in allen Ländern zur Fahrzeugausstattung gehören.

Angaben zur Überprüfung und Wartung finden Sie in den nachstehenden Handbüchern.

ZUR BEACHTUNG:

Diese Anleitung zeigt die Schaltkreise für alle möglichen Variationen der technischen Produktionsdaten. Je nach Spezifikation des gewarteten Fahrzeugs kann es allerdings vorkommen, daß zur Verkabelung nicht alle hier dargestellten Schaltkreise und Leitungen gehören.

Handbücher zur weiteren Bezugnahme

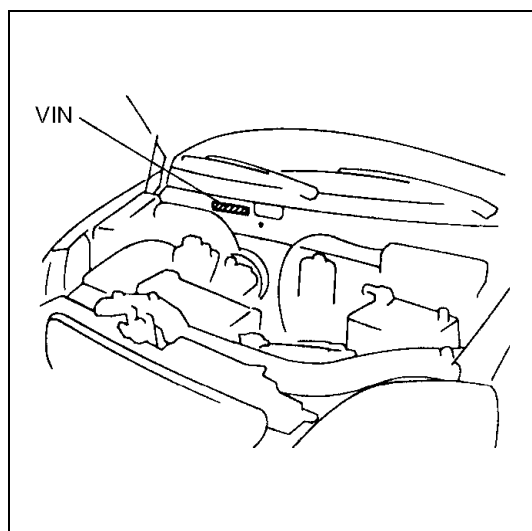
Name des Handbuchs	Einzelteilnummer
RB310 (S/M)	99500U83E10-01G
RB413 (S/M)	99500-83E00-01G
RB413 4WD (S/S/M)	99501U83E00-01G
RB310/413 (S/S/M)	99501U83E10-01G
RB310/413 (S/S/M)	99501U83E20-01G
RB310/413 (S/S/M)	99501U83E30-01G
RM413D/RB413D (S/S/M)	99501U86G20-01G

MAGYAR SUZUKI CORPORATION

Avant-propos

Ce manuel est la SECTION 8A "Schéma de câblage" qui fait partie de la section SYSTEME ELECTRIQUE du manuel d'entretien.

Modèle concerné: TYPE4, RB310/RB413/RB413D



(X) TSMMMA93S00280001 (X) ~
 (X) TSMMMB33S00280001 (X) ~
 (X) TSMMMA33S00280001 (X) ~
 (X) TSMMMA33S40280001 (X) ~
 (X) TSMMMA43S00280001 (X) ~

Toutes les informations, illustrations et spécifications contenues par ces pages sont basées sur les données produit les plus récentes disponibles au moment de la mise sous presse. Les descriptions faites dans ce manuel sont basées sur les spécifications du modèle de série ou de base. Par conséquent, noter que le véhicule soumis à entretien peut être différent du manuel. MAGYAR SUZUKI CORPORATION se réserve le droit de procéder sans préavis et à tout moment à des changements.

Noter que ce manuel contient des références à des équipements qui ne sont pas nécessairement commercialisés dans tous les pays.

Pour les contrôles et les travaux d'entretien, voir le(s) manuel(s) d'entretien énumérés ci-dessous.

REMARQUE :

Ce manuel inclut les circuits pour toutes les variations possibles des spécifications de production. Toutefois, selon les spécifications du véhicule soumis à entretien, son faisceau de câbles peut ne pas inclure certains des circuits ou des câbles indiqués dans ce manuel.

Manuel concerné

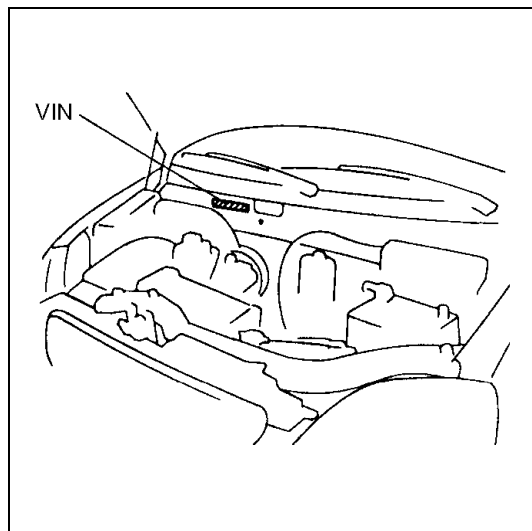
Nom du manuel	Numéro de pièce
RB310 (S/M)	99500U83E10-01F
RB413 (S/M)	99500-83E00-01F
RB413 4WD (S/S/M)	99501U83E00-01F
RB310/413 (S/S/M)	99501U83E10-01F
RB310/413 (S/S/M)	99501U83E20-01F
RB310/413 (S/S/M)	99501U83E30-01F
RM413D/RB413D (S/S/M)	99501U86G20-01F

MAGYAR SUZUKI CORPORATION

Voorwoord

Dit handboek bevat HOOFDSTUK 8A “Elektrisch schema”, dat deel uitmaakt van het hoofdstuk ELEKTRISCH SYSTEEM van het werkplaatshandboek.

Van toepassing op model: TYPE4, RB310/RB413/RB413D



(X) TSMMMA93S00280001 (X) ~
 (X) TSMMMB33S00280001 (X) ~
 (X) TSMMMA33S00280001 (X) ~
 (X) TSMMMA33S40280001 (X) ~
 (X) TSMMMA43S00280001 (X) ~

Alle informatie, afbeeldingen en technische gegevens die in dit handboek worden verschaft, zijn gebaseerd op de laatst beschikbare informatie ten tijde van het ter perse gaan. De beschrijvingen in dit handboek zijn gebaseerd op de technische gegevens van het standaard- of basismodel. Dit betekent dat het voertuig waaraan gewerkt wordt enigszins kan verschillen van de beschrijvingen in het handboek. MAGYAR SUZUKI CORPORATION behoudt zich het recht voor om zonder voorafgaande kennisgeving te allen tijde wijzigingen aan te brengen.

Gelieve er rekening mee te houden dat dit handboek verwijzingen bevat naar uitrusting die mogelijk niet in alle landen op de markt wordt gebracht.

Raadpleeg het (de) hieronder vermelde werkplaatshandboek(en) voor inspectie- en onderhoudswerkzaamheden.

OPMERKING:

Dit handboek bevat de schema's voor alle mogelijke variaties van technische productiegegevens. Afhankelijk van de technische gegevens van het voertuig waaraan gewerkt wordt, is het echter mogelijk dat de bedradingsbundels bepaalde circuits of draden die in dit handboek worden vermeld niet bevatten.

Verband houdend werkplaatshandboek

Naam van het werkplaatshandboek	Onderdeelnummer
RB310 (S/M)	99500U83E10-01D
RB413 (S/M)	99500-83E00-01D
RB413 4WD (S/S/M)	99501U83E00-01D
RB310/413 (S/S/M)	99501U83E10-01D
RB310/413 (S/S/M)	99501U83E20-01D
RB310/413 (S/S/M)	99501U83E30-01D
RM413D/RB413D (S/S/M)	99501U86G20-01D

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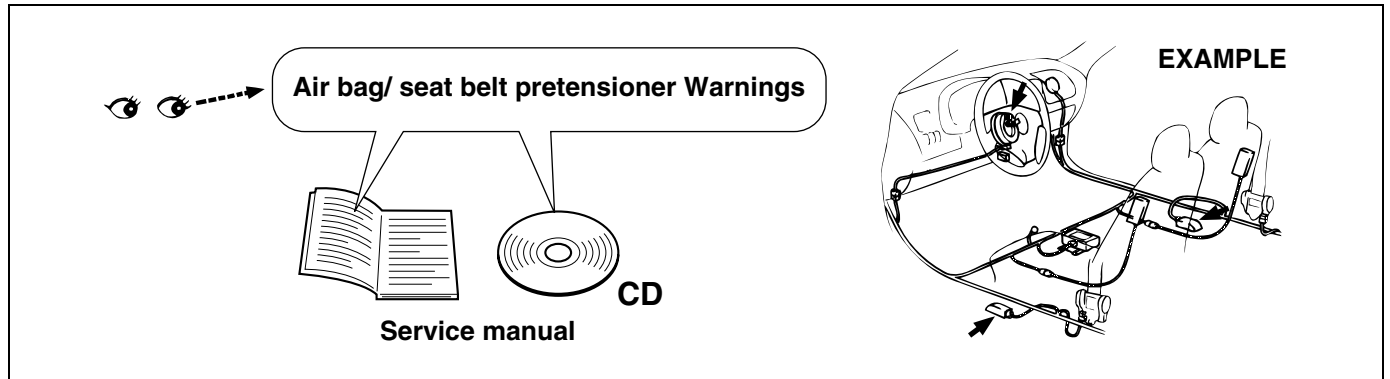
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Precautions



WARNING:

(For the vehicles with the Supplemental Restraint System (Air Bags) and/or the Seat Belt Pretensioner System)

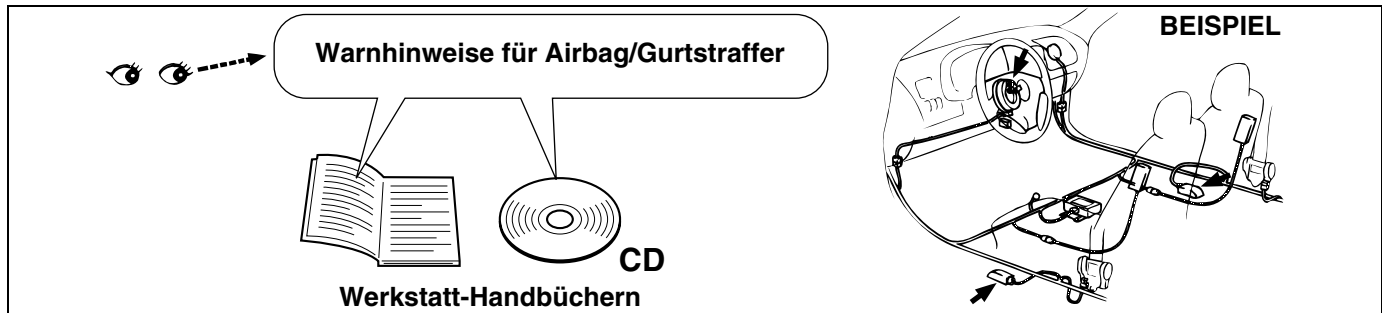
Service on or around the air bag system / Seat belt pretensioner system components or their wiring must be performed only by an authorized SUZUKI dealer. Observe all the warnings in the service manual and disable the systems before servicing on or around the components and the wiring of the systems. The service manual(s) is (are) mentioned in the FOREWORD of this manual. Failure to follow the warnings could result in unintended activation of the systems or could render the systems inoperative. Either of these two conditions may result in severe injury.

CAUTION:

To prevent damage to the electrical/ electronic parts (especially computers or semi-conductors) or to prevent fire.

- When disconnecting the battery terminals, be sure to (1) turn off the ignition switch and all other switches, (2) disconnect the negative (-) terminal wire and then (3) disconnect the positive (+) terminal wire. Connect the wires in the reverse order of disconnecting.
- When disconnecting the connectors, be sure to unlock the connector lock (if equipped) and then pull the connector shells to detach them. Do not pull the wires.
- Connect the connectors by holding the connector shells. Make sure they are securely locked.
- Install the wiring harness securely without any slack.
- When installing parts, make sure the wiring harness is not interfered with or pinched by them.
- Avoid routing the wiring harness near or around a sharp corner or edge of the vehicle body or parts as much as possible. If necessary, protect the wiring harness by winding tape or the like around on it.
- When replacing a fuse, make sure to use the specified capacity fuse. Using a fuse with a larger capacity can cause damage to the electrical parts or a fire.
- Do not handle electrical/ electronic parts (computer, relay, etc.) roughly or drop them.
- Do not expose electrical/ electronic parts to high temperature (Approximately 80 °C (176 °F) or higher) or water.
- For open back connectors, be sure to insert the tester probe into the back side (wiring harness side) of the connector for inspection. For sealed back connectors, apply the tester probe to the terminal as gently as possible not to damage or deform the terminal.

Vorsichtsmaßnahmen



WARNUNG:

(Für Fahrzeuge, die mit einem aufblasbaren Zusatzrückhaltesystem (Airbag) und/oder Sicherheitsgurtstrammersystem ausgerüstet sind)

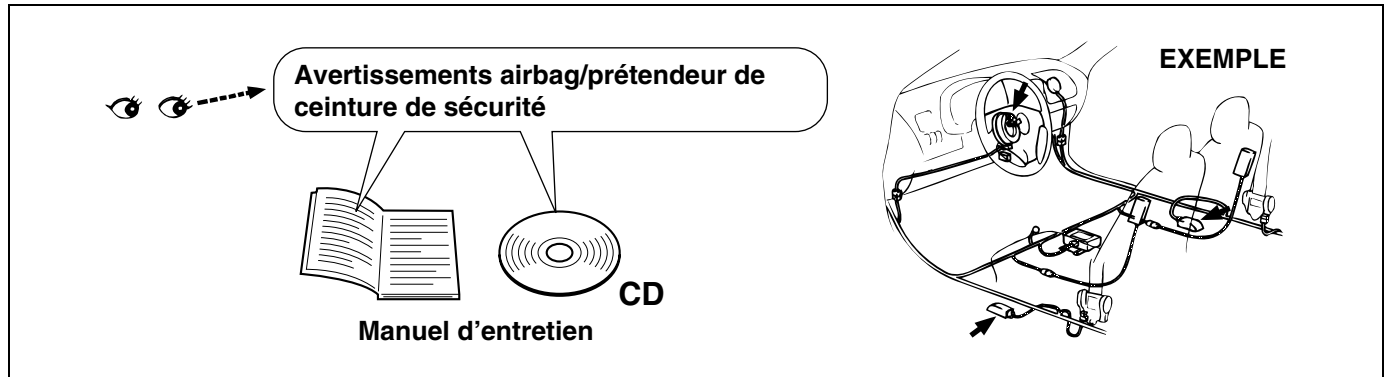
Wartungsarbeiten an Komponenten oder Verdrahtung des Airbag-Systems bzw. Gurtstrammersystems oder in dessen Bereich dürfen nur von einem autorisierten SUZUKI-Fachhändler ausgeführt werden. Bitte beachten Sie jegliche Warnungshinweise in den Werkstatt-Handbüchern, und deaktivieren Sie die Systeme, bevor Sie mit irgendwelchen Arbeiten an den Systemkomponenten oder deren Verdrahtung beginnen. Das Werkstatt-Handbuch bzw. die Werkstatt-Handbücher sind im VORWORT dieser Anleitung aufgeführt. Eine nichtbeachtete Warnung könnte eine unbeabsichtigte Auslösung eines Systems zur Folge haben oder ein System außer Funktion setzen. Jede dieser Bedingungen könnte zu schweren Verletzungen führen.

VORSICHT:

Gewährleisten Sie den Schutz vor Beschädigung elektrischer bzw. elektronischer Teile (besonders von Computern oder Halbleitern) sowie den Brandschutz wie nachstehend.

- Vor dem Abklemmen der Kabel von den Batteripolen immer (1) den Zündschalter und alle anderen Schalter ausschalten, (2) das Minuskabel (–) abziehen und dann (3) das Pluskabel (+) abziehen. Die Kabel sind umgekehrt zur Reihenfolge des Abnehmens wieder anzuschließen.
- Beim Abklemmen der Stecker zuerst die Steckerverriegelung (falls vorhanden) entriegeln und dann durch Erfassen der Stecker auseinanderziehen. Niemals an der Leitung selbst ziehen.
- Beim Anschließen wiederum die Steckerverriegelungen erfassen und zusammenschieben. Darauf achten, daß sie eindeutig einrasten.
- Die Kabelbäume so befestigen, daß sie keinen Durchhang aufweisen.
- Achten Sie beim Montieren der Komponenten darauf, daß die Kabelbäume nicht davon behindert oder eingeklemmt werden.
- Den Kabelbaum nicht über scharfe Kanten oder andere Teile verlegen, die Beschädigungen verursachen können. Falls nötig den Kabelbaum durch Umwickeln von Isolierband o.ä. schützen.
- Beim Auswechseln der Sicherungen immer darauf achten, daß die Sicherung die vorgeschriebene Kapazität aufweist. Verwendung einer Sicherung mit größerer Kapazität könnte Schäden an der elektrischen Anlage oder einen Brand verursachen.
- Elektrische Teile (Computer, Relais usw.) müssen grundsätzlich vorsichtig behandelt werden; nicht fallen lassen.
- Elektrische und elektronische Komponenten dürfen keinen hohen Temperaturen (über 80°) oder Wasser ausgesetzt werden.
- Im Falle von Steckverbindungen mit offener Rückseite muß bei der Überprüfung die Prüfspitze unbedingt von der Rückseite (Kabelbaumseite) des Steckers her eingesteckt werden. Im Falle von Steckverbindungen mit versiegelter Rückseite muß die Prüfspitze so vorsichtig wie möglich eingesteckt werden, damit die Klemme nicht beschädigt oder verformt wird.

Précautions



AVERTISSEMENT :

(Véhicules avec système de retenue supplémentaire (airbags) et/ou système de ceintures de sécurité à prétendeur)

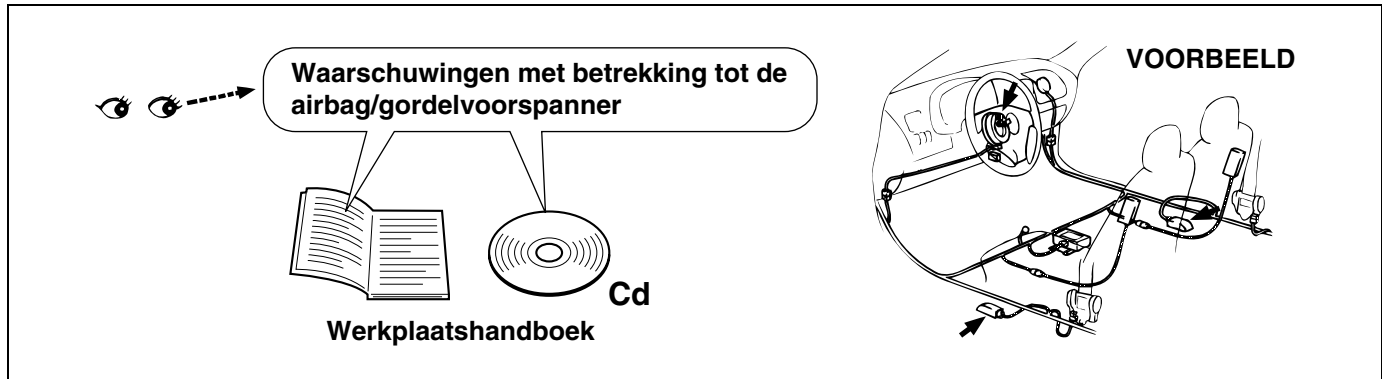
Les opérations d'entretien sur ou autour des composants du système à airbags / système de ceintures de sécurité à prétendeur ou de leur câblage doivent être exclusivement effectuées par un concessionnaire SUZUKI agréé. Bien se conformer à tous les avertissements donnés dans le manuel d'entretien et mettre les systèmes hors service avant de procéder aux opérations d'entretien sur ou autour des composants et du câblage des systèmes. Le(s) manuel(s) d'entretien est (sont) mentionné(s) en AVANT-PROPOS de ce manuel. Le non respect des consignes données dans les avertissements peut résulter dans le brusque déploiement des systèmes ou mettre ceux-ci hors d'usage et résulter dans les deux cas en accident grave.

ATTENTION :

pour éviter toute détérioration des parties électriques/électroniques (en particulier les ordinateurs ou les semi-conducteurs) ou pour éviter tout risque d'incendie.

- Pour débrancher les plots de la batterie, (1) mettre le contacteur d'allumage et toutes les commandes hors circuit, (2) débrancher le câble du plot négatif (-) et (3) débrancher le câble du plot positif (+). Raccorder les câbles en procédant en ordre inverse de la dépose.
- Pour déconnecter les connecteurs, les déverrouiller (le cas échéant) et tirer sur le corps du connecteur. Ne pas tirer sur les câbles.
- Raccorder les connecteurs en les saisissant par leur corps. Vérifier qu'ils sont bien verrouillés en place.
- Implanter soigneusement les faisceaux de câbles sans laisser de mou dans les câbles.
- A l'installation des pièces, vérifier que le faisceau de câbles ne se trouve pas sur l'emplacement de ces pièces et qu'il ne risque pas d'être coincé à leur installation.
- Éviter dans toute la mesure du possible de disposer le faisceau de câbles près ou autour d'arêtes vives de la caisse ou de pièces du véhicule. Si nécessaire, protéger le faisceau de câbles à l'aide de bande adhésive ou autre.
- Toujours utiliser des fusibles de rechange de capacité appropriée. Ne pas utiliser des fusibles de capacité supérieure sous peine de détérioration des systèmes électriques ou d'incendie.
- Traiter les pièces électriques/électroniques (ordinateur, relais etc..) avec soin et ne pas les faire tomber.
- Ne pas exposer les pièces électriques/électroniques à des températures excessives (environ 80 ° C ou plus) ou à l'eau.
- Pour le contrôle des connecteurs à dos ouvert, insérer la pointe du testeur dans le dos du connecteur (côté faisceau de câbles). Pour les connecteurs à dos scellé, appliquer la pointe du testeur sur le contact le plus légèrement possible de sorte à ne pas détériorer ou déformer ce contact.

Voorzorgsmaatregelen



WAARSCHUWING:

(Voor voertuigen uitgerust met het SRS-airbagsysteem en/of het veiligheidsgordelspannersysteem)
Onderhoud aan of rondom de onderdelen of bedrading van het airbagsysteem/veiligheidsgordelspannersysteem mag uitsluitend door een officiële SUZUKI-dealer worden uitgevoerd. Volg alle waarschuwingen in het werkplaatshandboek op en schakel de systemen uit alvorens onderhoud aan of rondom de onderdelen of bedrading van de systemen uit te voeren. Het (de) werkplaatshandboek(en) staat (staan) vermeld in het VOORWOORD van dit handboek. Indien de waarschuwingen niet worden opgevolgd, zouden de systemen onvoorzien in werking kunnen treden of de systemen defect kunnen raken. Beide omstandigheden kunnen tot ernstig letsel leiden.

LET OP:

Om beschadiging van de elektrische/elektronische onderdelen (in het bijzonder computers of halfgeleiders) of brand te voorkomen.

- Ga bij het losmaken van de accupolen als volgt te werk: (1) zet het contactslot en alle andere schakelaars uit, (2) maak de negatieve accukabel (-) los en (3) maak de positieve (+) accukabel los. Sluit de kabels aan in de omgekeerde volgorde van het losmaken.
- Bij het losmaken van stekkers ontgrendelt u eerst de stekkervergrendeling (indien uitgerust) en trekt u vervolgens aan de stekkerbehuizingen om de stekkers los te maken. Trek niet aan de kabels.
- Neem bij het aansluiten van stekkers de stekkerbehuizing vast. Controleer of de stekkers stevig zijn vergrendeld.
- Zet bedradingsbundels stevig vast, zodat de draad niet loshangt.
- Zorg er bij het monteren van onderdelen voor dat de onderdelen de bedradingsbundel niet belemmeren of pletten.
- Bedradingsbundels moeten voor zover mogelijk uit in de buurt van scherpe hoeken of randen van de carrosserie of voertuigonderdelen worden geplaatst. Bescherm de bedradingsbundel indien nodig door er tape of iets dergelijks rond te wikkelen.
- Gebruik voor het vernieuwen van zekeringen uitsluitend zekeringen die de voorgeschreven stroomsterkte hebben. Het gebruik van een zekering met een hogere stroomsterkte kan resulteren in schade aan de elektrische onderdelen of brand.
- Behandel elektrische/elektronische onderdelen (computer, relais, enz.) niet met geweld en laat ze niet vallen.
- Stel elektrische/elektronische onderdelen niet bloot aan hoge temperatuur (ongeveer 80 °C of hoger) of water.
- Bij stekkers met een open achterkant moet de testpen aan de achterkant (zijde van de bedradingsbundel) van de stekker naar binnen worden gestoken voor controle. Bij stekkers met een gesloten achterkant houdt u de testpen zo voorzichtig mogelijk tegen de aansluiting, om te voorkomen dat de aansluiting wordt beschadigd of vervormd.

General information

Allgemeine Informationen

Informations générales

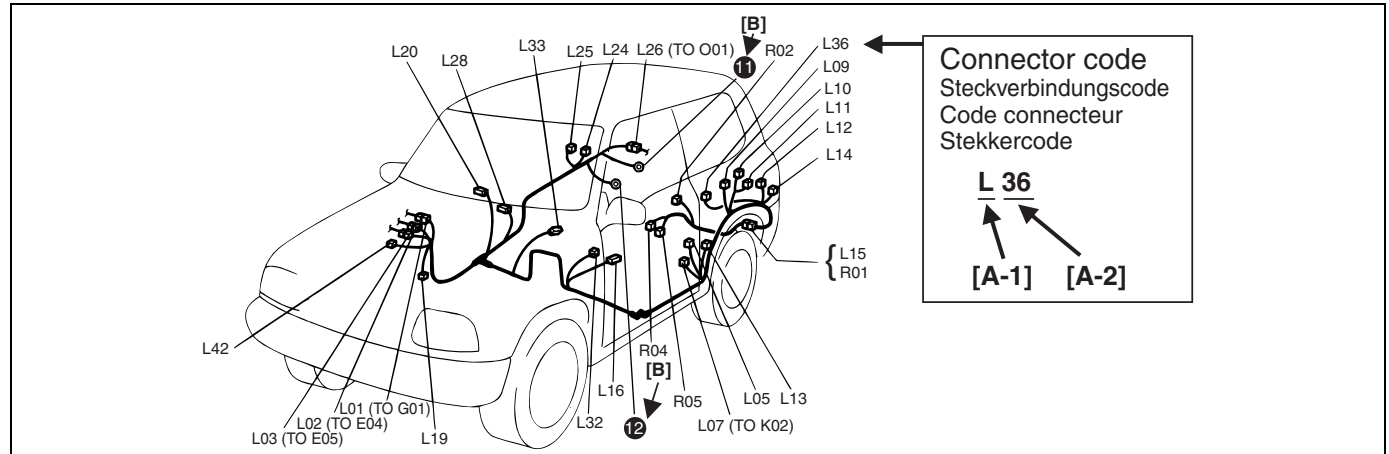
Algemene informatie

How to read connector layout diagram

Bezeichnungen des Steckverbindungsplans

Comment lire le schéma de disposition des connecteurs

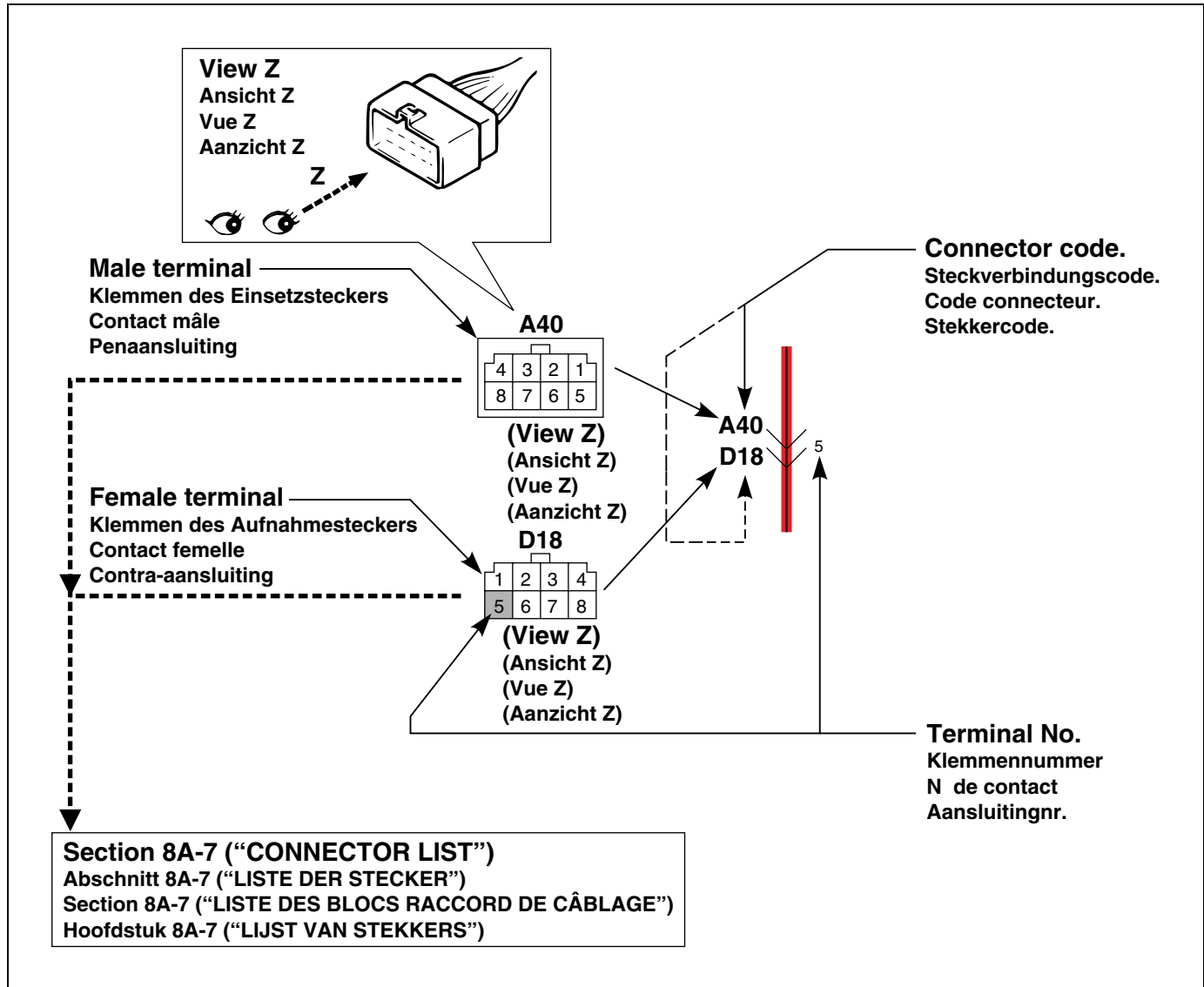
Lezen van een stekkerschema



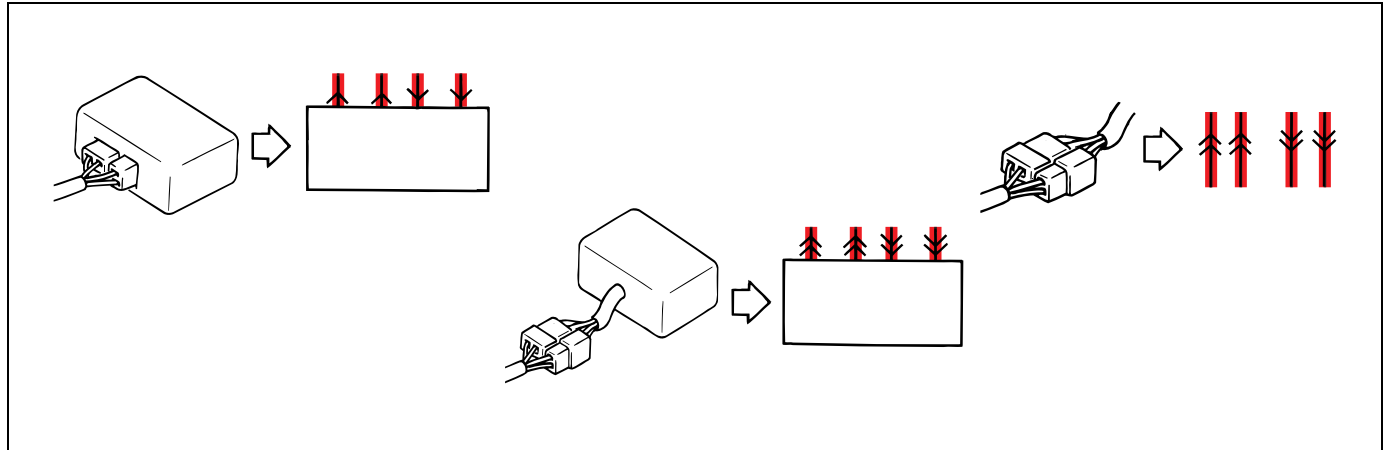
[A-1]		Harness classification	Kabelbaumklassifizierung	Classification du faisceau de fils	Classificatie van bedradingsbundel
[A-1]	A	Battery harness	Batterie-Kabelbaum	Faisceau de câbles de la batterie	Accubedradingsbundel
	B	A/C harness	Klimaanlagen-Kabelbaum	Faisceau de câbles d'A/C	A/C-bedradingsbundel
	C	Engine harness	Motor-Kabelbaum	Faisceau de câbles du moteur	Motorbedradingsbundel
	D	Injector harness	Einspritzventil-Kabelbaum	Faisceau de câbles de l'injecteur	Verstuiverbedradingsbundel
	E	Main harness, Oil pressure switch wire, Console wire	Haupt-Kabelbaum, Draht für öldruckschalter, Konsolensignalleitung	Faisceau de câbles principal, Câble de manocontact de pression d'huile, Câble de la console	Hoofdbedradingsbundel, draad van oliedruckschakelaar, consoledraad
	G	Instrument panel harness	Instrumententafel-Kabelbaum	Faisceau de câbles du panneau des instruments	Instrumentenpaneelbedradingsbundel
	J	Side door wire (Power window)	Seitentür-Kabelbaum (elektrische Fensterheber)	Câble de portière latérale (vitre électrique), Câble de haut-parleur arrière, Câble de toit ouvrant	Zijportierdraad (elektrische ruitbediening)
	K	Interior light harness, Rear speaker wire, Roof wire	Innenraumleuchten-Kabelbaum, Leitung für hintere Lautsprecher, Dachleitung	Faisceau de fils électriques de plafonnier, Cable de haut-parleur arrière, Fil de toit	Bedradingsbundel van interieurverlichting, achterluidsprekerdraad, dakdraad
	L	Floor harness, G sensor wire (Fuel pump harness)	Boden-Kabelbaum, G-Sensor-Signalleitung (Kraftstoffpumpen-Kabelbaum)	Faisceau de câbles de plancher, Câble de capteur de G (Faisceau de câbles de pompe à essence)	Vloerbedradingsbundel, G-sensordraad (brandstofpompbedradingsbundel)
	M	Rear bumper harness	eckstoßdämpfer-Kabelbaum	Faisceau de câbles de pare-choc arrière	Achterbumperbedradingsbundel
	O	Rearend door harness	Hecktür-Kabelbaum	Faisceau de câbles de hayon arrière	Kofferdekselbedradingsbundel
	Q	Air bag / Pretensioner harness	Airbag / Gurtstrammer-Kabelbaum	Faisceau de câbles d'airbag / prétendeur	Airbag-/gordelvoorspannerbedradingsbundel
R	(Fuel pump wire)	(Kraftstoffpumpen-Signalleitung)	(Câble de pompe à essence)	(Brandstofpompdraad)	
[A-2]		Connector Number	Steckverbindungsnummer	Numéro du connecteur	Stekkernummer
[B]		Ground (earth) point No.	Massepunkt Nr.	N° de point de mise à la masse	Massapuntnummer

How to read connector codes and terminal nos.
Ablesen der Steckverbindungs-codes und Klemmennummern.
Comment lire les codes connecteur et identifier les n° des contacts.
Lezen van steekercodes en aansluitingnummers

Connector code / Terminal No. / Terminal layout
Steckverbindungscode / Klemmennummer / Klemmenbelegung
Code connecteur / N° de contact / Disposition des contacts
Stekkercode/Aansluitingnr./Aansluitingschema



Connector type
 Steckertyp
 Type de connecteur
 Stekkertype

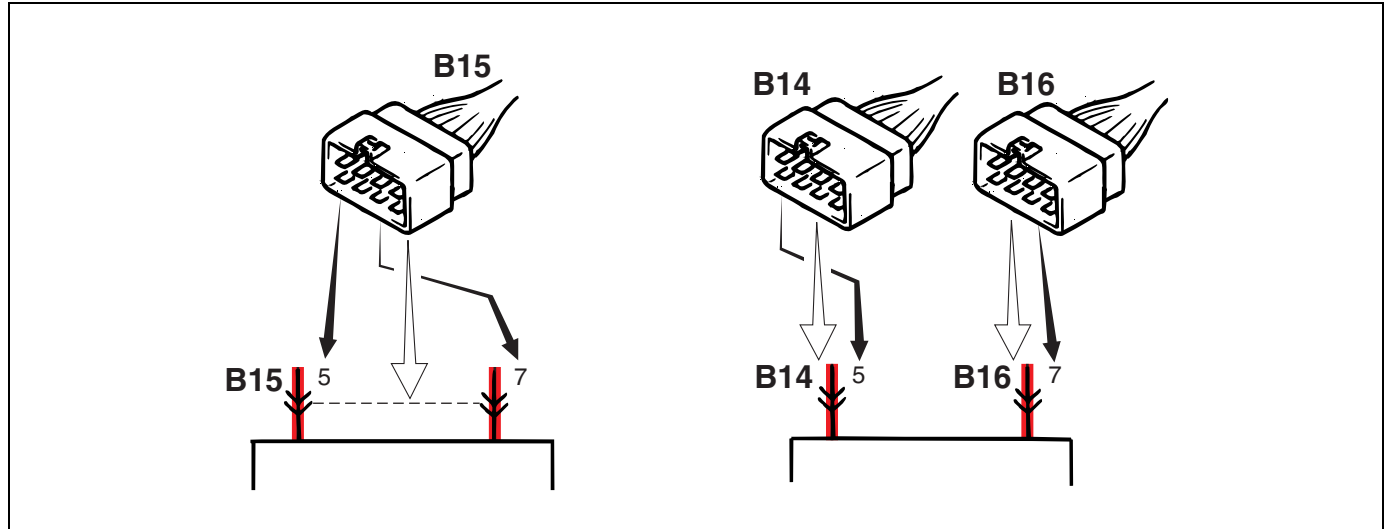


Terminals in one connector (Broken line) (B15) / Terminals in different connectors (B14, B16)

Klemmen eines Steckers (gestrichelte Linie) (B15) / Klemmen anderer Stecker (B14, B16)

Contacts dans un connecteur (pointillé) (B15) / Contacts dans des connecteurs différents (B14, B16)

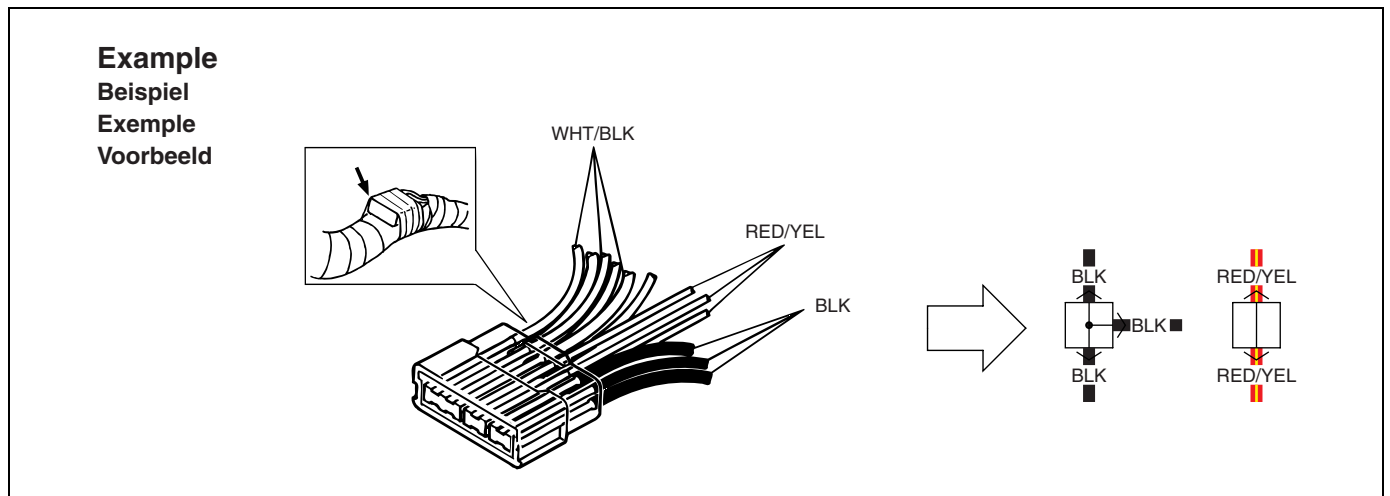
Aansluitingen in één stecker (stippellijn) (B15) / Aansluitingen in verschillende steckkers (B14, B16)

**Joint connector (J/C)**

Verbindungsstecker (J/C)

Connecteur commun (J/C)

Knooppuntstekker (J/C)

**NOTE:**

The joint connector (J/C) connects several different wires with the same wire color at one place instead of connecting them by welding or caulking one by one. It is not an ordinary connector but a part of the continuous wire in the harness.

ZUR BEACHTUNG:

Der Verbindungsstecker (J/C) bringt verschiedene Leitungsdrähte derselben Farbe an einer Stelle zusammen, anstatt daß sie durch Lötten oder Verstemmen einzeln angeschlossen werden. Diese Art von Stecker ist also nicht eine normale Steckverbindung, sonder Teil einer ununterbrochenen Leitung im Kabelbaum.

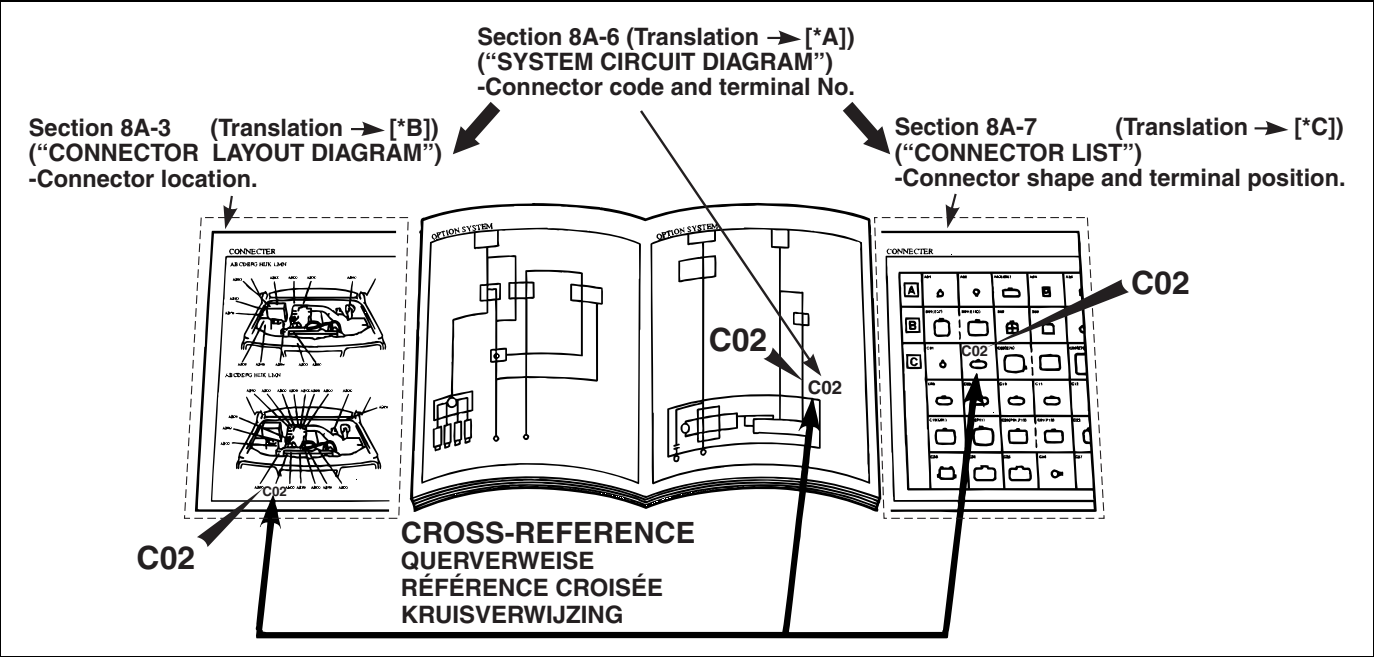
NOTE:

Un connecteur commun (J/C) assure le raccordement de plusieurs câbles de même couleur en un même endroit en évitant leur soudage ou leur jonction de manière individuelle. Ce n'est pas un connecteur ordinaire mais une partie d'un câble continu dans un faisceau.

OPMERKING:

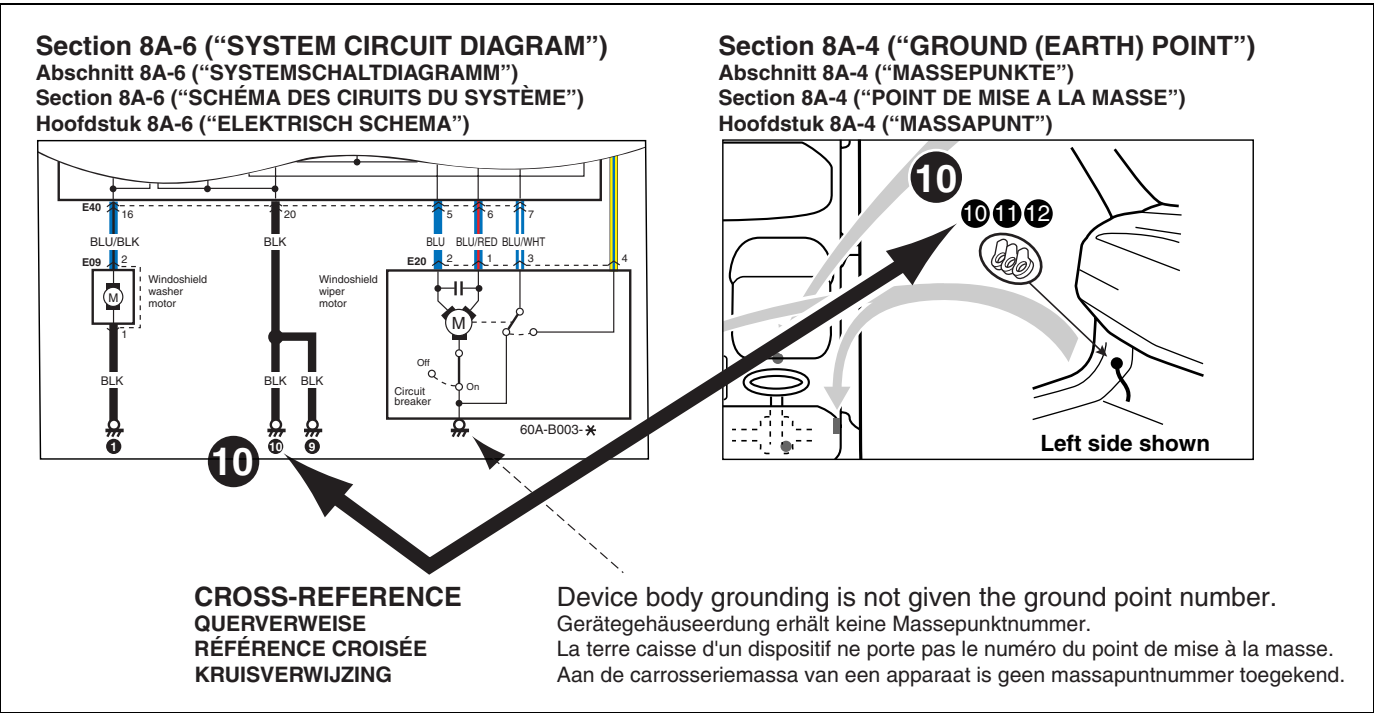
De knooppuntstekker (J/C) verbindt verschillende draden met dezelfde kleur op één plaats in plaats van afzonderlijke gelaste of gestuikte draadaansluitingen. Het is geen gewone stecker, maar een deel van de ononderbroken draad in de bedradingsbundel.

Connector location, shape and terminal No.
Der Position, Form und Klemmennummer des Steckers
L'emplacement, la forme ou le n° de contact d'un connecteur.
Plaats van stekker, vorm en aansluitingnr.



*A	Abschnitt 8A-6 ("SYSTEMSCHALTDIAGRAMM") - Steckercode und Klemmennummer.	Section 8A-6 ("SCHÉMA DE CIRCUIT DE SYSTÈME") -Code connecteur et n° de fiche.	Hoofdstuk 8A-6 ("ELEKTRISCH SCHEMA")-Stekkercode en aanslui- tingnr.
*B	Abschnitt 8A-3 ("STECKER-LAYOUT- DIAGRAMM") -Position der Stecker.	Section 8A-3 ("SCHÉMA DE DISPOSI- TION DES BLOCS RACCORD DE CÂBLAGE") -emplacement du connecteur.	Hoofdstuk 8A-3 ("STEKKERSCHHEMA")-Plaats van stekker.
*C	Abschnitt 8A-7 (Steckverbindungsli- ste) -Stekkerform und Klemmenanord- nung.	Section 8A-7 (Liste des connecteurs) -pro- fil du connecteur et emplacement du con- tact.	Hoofdstuk 8A-7 ("LIJST VAN STEK- KERS")-Stekkervorm en plaats van aansluiting.

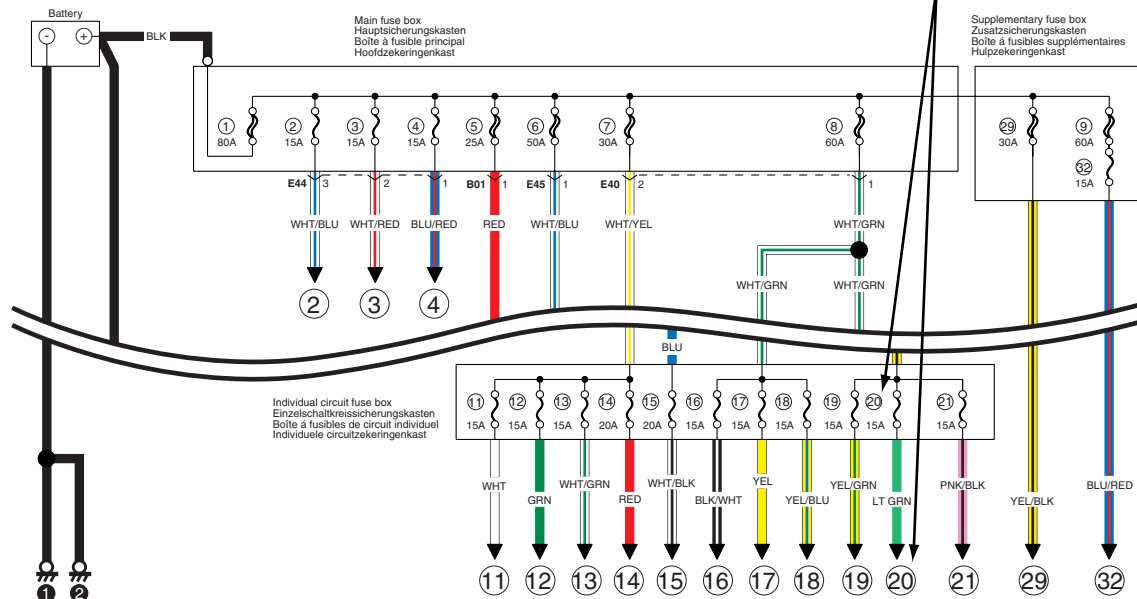
How to read ground (Earth) point
Ermittlung des Massepunkts
Comment lire les points de mise à la masse
Lezen van een massapunt



How to read power supply diagram
Erklärung eines Stromversorgungsdiagramm
Légende des schémas du circuit d'alimentation
Lezen van een voedingsschema

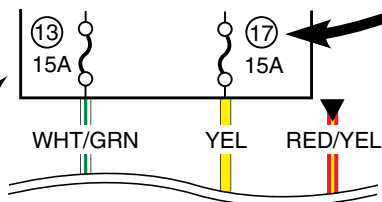
Section 8A-5 ("POWER SUPPLY DIAGRAM")
Abschnitt 8A-5 ("STROMVERSORGUNGSDIAGRAMM")
Section 8A-5 ("SCHÉMA DU CIRCUIT D'ALIMENTATION")
Hoofdstuk 8A-5 ("VOEDINGSSHEMA")

Fuse number
Sicherungsnummer
N°de fusible
Zekeringnummer



Section 8A-6 ("SYSTEM CIRCUIT DIAGRAM")
Abschnitt 8A-6 ("SYSTEMSCHALTDIAGRAMM")
Section 8A-6 ("SCHÉMA DE CIRCUIT DE SYSTÈME")
Hoofdstuk 8A-6 ("ELEKTRISCH SCHEMA")

Fuse
Sicherung
Fusible
Zekering



Connection to the system indicated.

Anschluß an das Syetem ist angezeigt.

Le raccordement au système est indiqué.

Aansluiting op het aangeduide systeem.

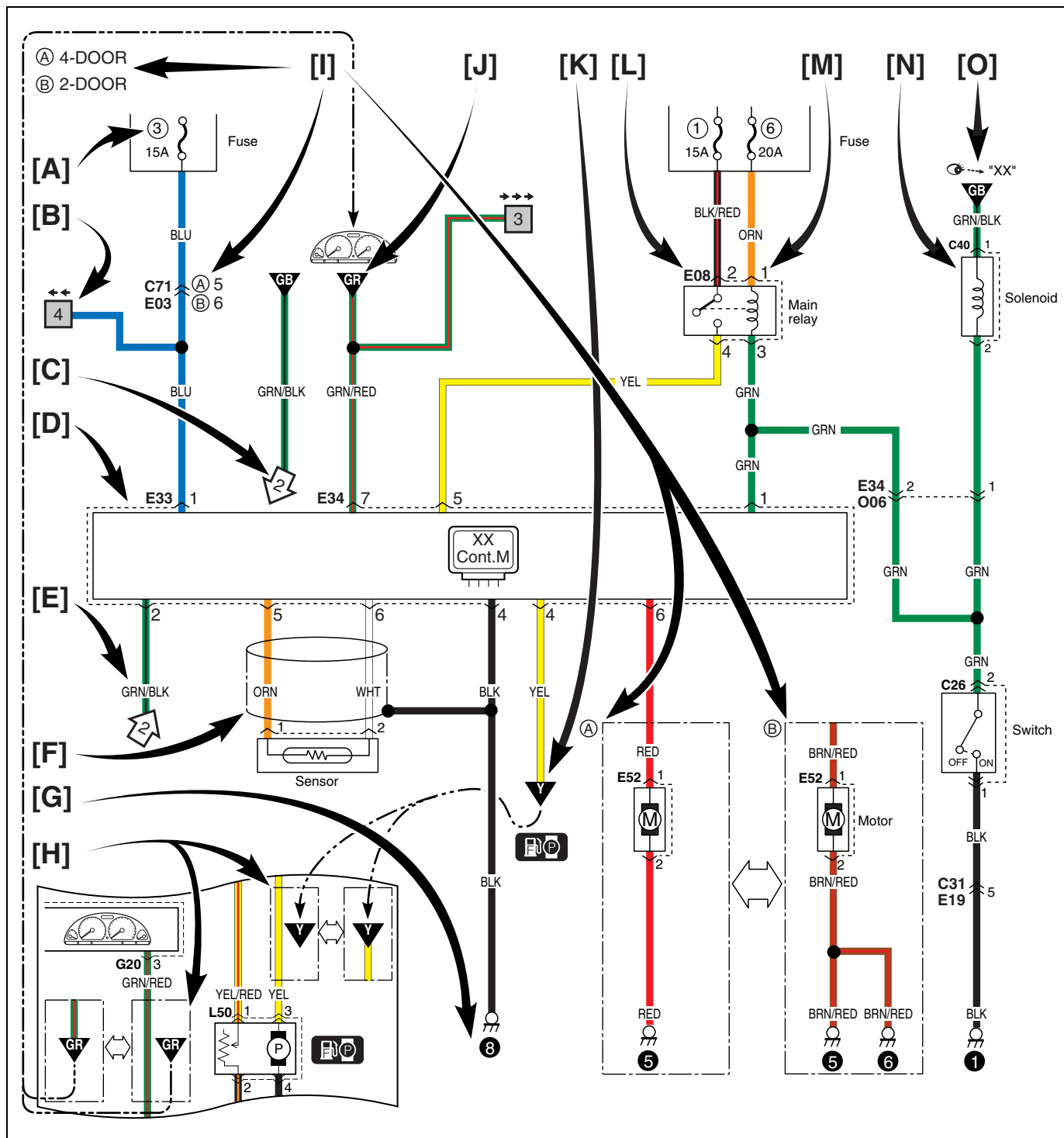
How to read system circuit diagram
Erklärung eines systemschaltendiagramms
Légende des schémas des circuits électriques
Lezen van een elektrisch schema

The circuit diagram is designed so the current flows from the top of the diagram (power source) to the bottom of the diagram (ground (earth)) as if giving an image of water flow.

Das Verdrahtungsschema zeigt den Stromfluß vom Schema oben (Stromversorgung) zum Schema unten (Masse (Erde)) im Sinne eines Wasserverlaufs.

Le schéma du circuit est dessiné de telle sorte que le courant circule depuis le haut du schéma (source d'alimentation électrique) vers le bas (masse(terre)) comme le ferait un écoulement d'eau.


In een elektrisch schema loopt de elektrische stroom vanaf de bovenkant van het schema (stroombron) naar de onderkant van het schema (massa), net zoals een waterstroom.







[A]	Fuse No.	Sicherungsnummer	N° de fusible	Zekeringnr.
[B]	Circuit jumping page / direction	Drahtüberbrückungsseite / Richtung	Page de saute des fils / direction	Verwijzingspagina/-richting
[C]	Circuit jumping point / direction	Drahtüberbrückungspunkt / Richtung	Point de saute des fils / direction	Verwijzingspunt/-richting
[D]	Terminals-in-one-connector mark	Klemmen-in-einem-Stecker Symbol	Repère des connecteurs multi-contacts	Symbool voor aansluitingen in één stekker
[E]	Wire color	Kabelfarbkennung	Code couleur	Draadkleur
[F]	Shield wire	Abschirmungsdraht	Fil gainé	Afschermingsdraad
[G]	Ground (earth) point	Massepunkt	Point de mise à la masse	Massapunt
[H]	"From" or "To"	"Von" oder "Zu"	"Depuis" ou "Depuis"	"Vanaf" of "naar"
[I]	Specification variation	Spezifikationsvariation	Variation des spécifications	Variatie in technische gegevens
[J]	"From" (With ID letter(s))	"Von" (Mit Kennbuchst)	"Depuis" (Avec lettre(s) d' ID)	"Vanaf" (met kenletter(s))
[K]	"To" (With ID letter(s))	"Zu" (Mit Kennbuchst)	"Vers" (Avec lettre(s) d' ID)	"Naar" (met kenletter(s))
[L]	Connector code	Steckercode	Code connecteur	Stekkercode
[M]	Terminal No.	Klemmennummer	N° de contact	Aansluitingnr.
[N]	Symbol mark	Symbolmarkierungen	Repère de symbole	Symbool
[O]	"SEE" mark	"SIEHE" Markierung	Repère "VOIR"	"SEE"-symbool
[B]	<p>Circuit jumping page / direction This means "Jump to the page directed with the arrow(s) by their number. (For example: "Two arrows directing left" means "Jump to two pages before".) You will find the same symbol with the arrows directing opposite in the referenced page. The circuit continues between the symbols.</p> <p>Drahtüberbrückungsseite / Richtung Bedeutet "Weiter zur durch Anzahl von Pfeilen bezeichneten Seite. (Zum Beispiel: "Zwei Pfeile nach links weisend" bedeutet "Weiter zur vorvorigen Seite".) Auf der jeweiligen Bezugsseite finden Sie dann dasselbe Symbol mit den Pfeilen in der umgekehrten Richtung. Der Schaltkreis wird zwischen den Symbolen fortgesetzt.</p> <p>Page de saute des fils / direction Ceci signifie "Passer à la page repérée par le nombre correspondant de flèches. (Par exemple: "Deux flèches orientées vers la gauche" signifie "Revenir deux page en arrière".) Le même symbole se retrouve sur la page de renvoi avec les flèches pointant dans la direction opposée. Le circuit se poursuit entre les symboles.</p> <p>Verwijzingspagina/-richting Dit betekent "Ga naar de pagina die wordt aangegeven door het aantal en de richting van de pijlen. (Bijvoorbeeld: "Twee pijlen naar links" betekent "Ga twee pagina's terug".) U treft hetzelfde symbool aan, maar met de pijlen in de andere richting, op de pagina waarnaar wordt verwezen. Het circuit gaat voort tussen de symbolen.</p>			
[C]	<p>Circuit jumping point / direction The circuit continues to the same symbol with opposite direction within the page. You will find the other symbol in the direction of the arrow.</p> <p>Drahtüberbrückungspunkt / Richtung Der Schaltkreis läuft zum gleichen Symbol mit entgegengesetzter Ausrichtung auf diesem Blatt weiter. Das andere Symbole ist in der Pfeilrichtung aufzufinden.</p> <p>Point de saute des fils / direction Le circuit se poursuit en direction du même synbole dans le sens opposé sur la même page. L'autre symbole est sur la page repérée par la flèche.</p> <p>Verwijzingspunt/-richting Het circuit gaat voort naar hetzelfde symbool met tegengestelde richting op dezelfde pagina. U treft het andere symbool aan in de richting van de pijl.</p>			
[I]	<p>The white arrow between A and B means "or". Der weiße Pfeil zwischen A und B bedeutet "oder". La flèche blanche entre A et B signifie "ou" De witte pijl tussen A en B betekent "of".</p>			

Symbols and marks
Symbole und markierungen
Symboles et repères
Symbolen en merktekens

	Battery	Batterie		Ground (Earth)	Masse
	Batterie	Accu		Masse	Massa
	fuse	Sicherung		Coil, Solenoid	Spule, Magnet
	Fusible	zekering		Bobine, Solénoïde	Spoel, solenoïde
	Heater	Heizung		Bulb	Birne
	Chauffage	Verwarming		Ampoule	Gloeilamp
	Cigarette lighter	Zigarettenanzünder		Motor	Motor
	Allume-cigares	Sigarettenaansteker		Moteur	Motor
	Pump	Pumpe		Horn	Hupe
	Pompe	Pomp		Avertisseur sonore	Claxon
	Speaker	Lautsprecher		Buzzer	Summer
	Haut-parleur	Luidspreker		Vibreux	Zoemer
	Condenser	Kondensator		Thermistor	Thermistor
	Condensateur	Condensor		Thermistance	Thermistor
	Reed switch	Zungen-Schalter		Resistance	Widerstand
	Commutateur à tiges	Reed-schakelaar		Résistance	Weerstand
	Variable resistance	Variabler Widerstand		Transistor	Transistor
	Résistance variable	Variabele weerstand		Transistor	Transistor
	Diode	Diode		Piezoelectric element	Piezoelektrisches Bauelement
	Diode	Diode		Élément piézoélectrique	Piëzo-elektrisch element
	Harness (Connected)	Kabelstrang		Harness (Not connected)	Kabelstrang (Angeschlossen)
	Faisceau (onnecté)	Bedradingsbundel (aangesloten)		Faisceau (Non Connecté)	Bedradingsbundel (niet aangesloten)
	Ring terminal	Ringklemme		Relay (Normal open)	Relais (Normal Geöffnetes)
	Contact en anneau	Ringaansluiting		Relais (Ordinaire ouvert)	Relais (normaal open)
	Relay (Normal closed)	Relais (Normal Geschlossenes)		Open switch	Offener Schalter
	Relais (Ordinaire fermé)	Relais (normaal gesloten)		Contact ouvert	Open schakelaar
	Closed switch	Geschlossener Schalter		LED	LED
	Contact fermé	Gesloten schakelaar		LED	LED

	Ignition switch	Zundschalter		Keyless entry	Schlüsselloser Einstieg
	Contacteur d'allumage	Contactslot		Ouverture sans clé	Afstandsbediening voor de portieren
	Immobilizer system	Wegfahrsperrensysteem		Combination meter	Kombinationsinstrument
	Système immobilisateur	Startblokkeersysteem		Compteur mixte	Combinatiemeter
	Lighting switch	Lichtschalter		Headlight leveling	Scheinwerfer-Höhen-einstellung
	Commutateur de feu	Lichtschakelaar		Réglage de niveau des projecteurs	Koplamphoogteverstelling
	Hazard warning light	Warnblinkleuchte		Front fog light	Vordere nebelleuchten
	Témoin de détresse	Alarmknipperlicht		Feu de d'antibrouillard	Voormistlicht
	Rear fog light	Hecknebeleuchte		Spark plug	Zündkerze
	Antibrouillard arrière	Achtermistlicht		Bougie	Bougie
	Radiator fan	Kühlerlüfter		Fuel pump	Kraftstoffpumpen
	Ventilateur de radiateur	Koelventilator		Pompe à carburant	Brandstofpomp
	Injector	Einspritzdüse		XX control module	XX Steuermodul
	Injecteur	Verstuiver		Module de commande XX	XX-regelapparaat
	Windshield wiper	Windschutzscheibenwischer		Windshield washer	Windschutzscheibenwaschanlage
	Essuie-glace de pare-brise	Voorruitwischer		Lave-glace de pare-brise	Voorruitsproeier
	Rear wiper	Heckscheibenwischer		Rear washer	Heckscheibenwaschanlage
	Essuie-glace arrière	Achtermistwischer		Lave-glace arrière	Achtermistsproeier
	Rear defogger	Heckscheibenentfeuchter		Power window	Elektrische Fensterheber
	Désembueur arrière	Achtermistverwarming		Vitre électrique	Elektrische ruitbediening
	Power door lock	Elektrische Türverriegelung		Power mirror	Elektrisch verstellbarer Spiegel
	Verrouillage électrique de portière	Centrale portiervergrendeling		Rétroviseur électrique	Elektrisch verstelbare spiegel
	A/B	A/B		Pretensioner	Pretensionneur
	A/B	A/B		Vorspanner	Gordelvoorspanner
	Passenger side	Beifahrerseite		Driver side	Fahrerseite
	Côté passager	Passagierszijde		Côté conducteur	Bestuurderszijde
	Seat heater	Sitzheizung		A/C	A/C
	Chauffage de siège	Stoelverwarming		A/C	A/C

	Side air-bag (R)	Seiten Air-bag (R)		Side air-bag (L)	Seiten Air-bag (L)
	Airbag latéral (D)	Zij-airbag (R)		Airbag latéral (G)	Zij-airbag (L)
	Power steering	Servolenkung		Glow plug	Glühkerze
	Direction assistée	Stuurbekrachtiging		Bougie de prechauffage	Gloeibougie

Abbreviations

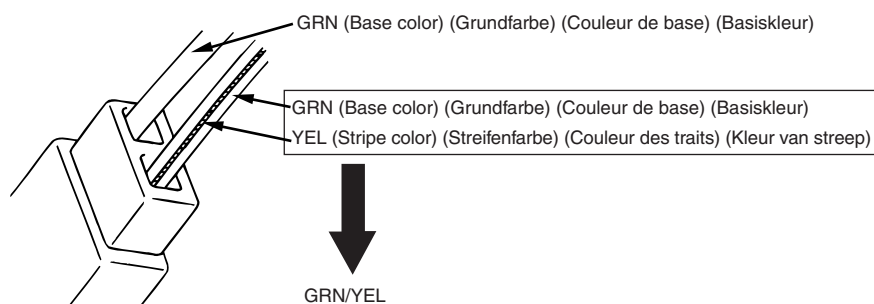
Abkürzungen
Abréviations
Afkortingen

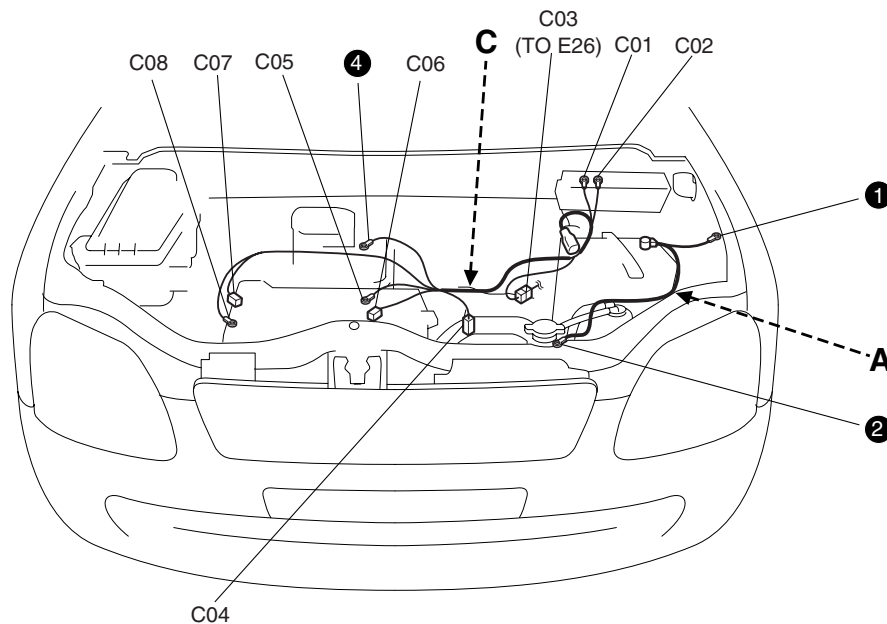
Abbreviation	Full term	Bedeutung	Terme complet	Volledige term
2WD	2 wheel drive vehicles	Fahrzeuge mit Zweiradantrieb	Véhicules deux roues motrices	Voertuigen met tweewiel aandrijving
4WD	4 wheel drive vehicles	Fahrzeuge mit Allradantrieb	Véhicules quatre roues motrices	Voertuigen met vierwiel aandrijving
A/B	Air bag	Airbag	Airbag	Airbag
A/C	Air conditioning	Klimaanlage	Climatisation	Airconditioning
A/T	Automatic transaxle	Automatikgetriebe	Boîte à vitesses automatique	Automatische transmissie
ACC	Accessory	Zubehör	Accessoire	Accessoire
CAN	Controller area network	Controller-Netzwerk	Réseau de multiplexage CAN	Controller Area Network (serieel communicatieprotocol)
CKP	Crank shaft position	Kurbelwellenposition	Position du vilebrequin	Krukaspositie
CMP	Cam shaft position	Nockenwellenposition	Position de l'arbre à cames	Nokkenaspositie
COMB	Combination	Kombination	Combinaison	Combinatie
DLC	Data link connector	Datenverbindungsstecker	Connecteur de transmission de données	Data-link-stekker
DRL	Daytime running light	Tagesfahrlicht (falls vorhanden)	Feux diurnes	Daglichtlampen
DSL	Diesel engine	Dieselmotor	Moteur diesel	Dieselmotor
ECM	Engine control module	Motorsteuermodul	Module de commande du moteur	Motorregelapparaat
ECT	Engine coolant temperature	Motorkühlmitteltemperatur	Température de réfrigérant du moteur	Motorkoelvloeistoftemperatuur
EGR	Exhaust gas recirculation	Abgasrückführung	Recyclage des gaz d'échappement	Uitlaatgasrecirculatie
EVAP	Evaporative	Kraftstoffverdampfung	Evaporatif	Benzinedampafzuiging
F/A motor	Free axle motor	Freiachs motor	Moteur d'axe libre	Vrije-asmotor
FWD	Forward	Stürmer	Avant	Vooruit
HI	High	Hoch	Haut	Hoog
IAC	Idle air control	Einlaßlufttemperatur	Contrôle de l'air de ralenti	Stationaire luchtregeling
IAT	Intake air temperature	Leerlaufuftregelung	Température de l'air admission	Inlaatluchttemperatuur
Imb CM	Immobilizer control module	Wegfahrsperr-Steuermodule	Module de commande d'immobilisateur	Regelapparaat startblokkeersysteem
IF EQPD	If equipped	Falls vorhanden	Si équipé	Indien uitgerust
IG	Ignition	Zündung	Allumage	Ontsteking
IG COIL	Ignition coil	Zündspule	Bobine d'allumage	Bobine
ILL	Illumination	Beleuchtung	Eclairage	Verlichting
IND	Indicator	Indikator	Indicateur	Indicator
INT	Intermittent	Unterbrochen	Intermittent	Intermitterend
ISC	Idle speed control	Leerlaufsteuerung	Contrôle de vitesse de ralenti	Regelinrichting voor stationair toerental
J/B	Junction fuse block	Abzweig-Sicherungskasten	Bloque de fusibles de union	Aftakblok

J/C	Joint connector	Verbindungsstecker	onnecteur commun	Knooppuntstekker
L	Left	Links	Gauche	Links
LED	Light emitting diode	Leuchtdiode	Diode à lueurs	Licht uitstralende diode
LHD	Left hand drive vehicle	Fahrzeug mit Linkslenkung	Véhicule à conduite à droite	Voertuig met links stuur
LO	Low	Tief	Bas	Laag
MAP	Manifold absolute pressure	Absoluter Druck im Auspuffkrümmer	Pression absolue du collecteur	Absolute spruitstukdruk
M/T	Manual transaxle	Schaltgetriebe	Boîte à vitesses manuelle	Handgeschakelde versnellingsbak
O/D	Over drive	Overdrive	Surmultiplicateur	Over drive
P/N	Power / Normal	Leistung / Normal	Direction / normale	Power / Normal
P/S	Power steering	Servolenkung	Direction assistée	Stuurbekrachtiging
PSP	Power steering pressure	Servolenkungsdruck	Pression de direction assistée	Stuurbekrachtigingsdruk
R	Right	Rechts	Droite	Rechts
RHD	Right hand drive vehicle	Fahrzeug mit Rechtslenkung	Véhicule à conduite à gauche	Voertuig met rechts stuur
SDM	Sensing and diagnostic module	Sensor-und Diagnosemodul	Module de diagnostic et de detection	Sensor/diagnosemodule
ST	Starter	Starter	Démarrreur	Startmotor
TCC	Torque converter clutch	Drehmomentwandlerkupplung	Accouplement du convertisseur de couple	Blokkeerkoppeling in koppelomvormer
TCM	Transmission control module	Getriebe-steuermodule	Module de commande de transmission	Transmissie-regelapparaat
VIV	Variable inhalation valve	Variables Einlassventil	Soupape d'aspiration variable	Variabele inhalatieklep
VSS	Vehicle speed sensor	Fahrzeuggeschwindigkeit-Sensor	Détecteur de vitesse du véhicule	Rijsnelheidssensor
VSV	Vacuum switching valve	Unterdruckschaltventil	Valve à dépression	Vacuümschakelklep
VVT	Variable valve timing	Variable Ventilsteuerung	Distribution à programme variable	Variabele kleptiming

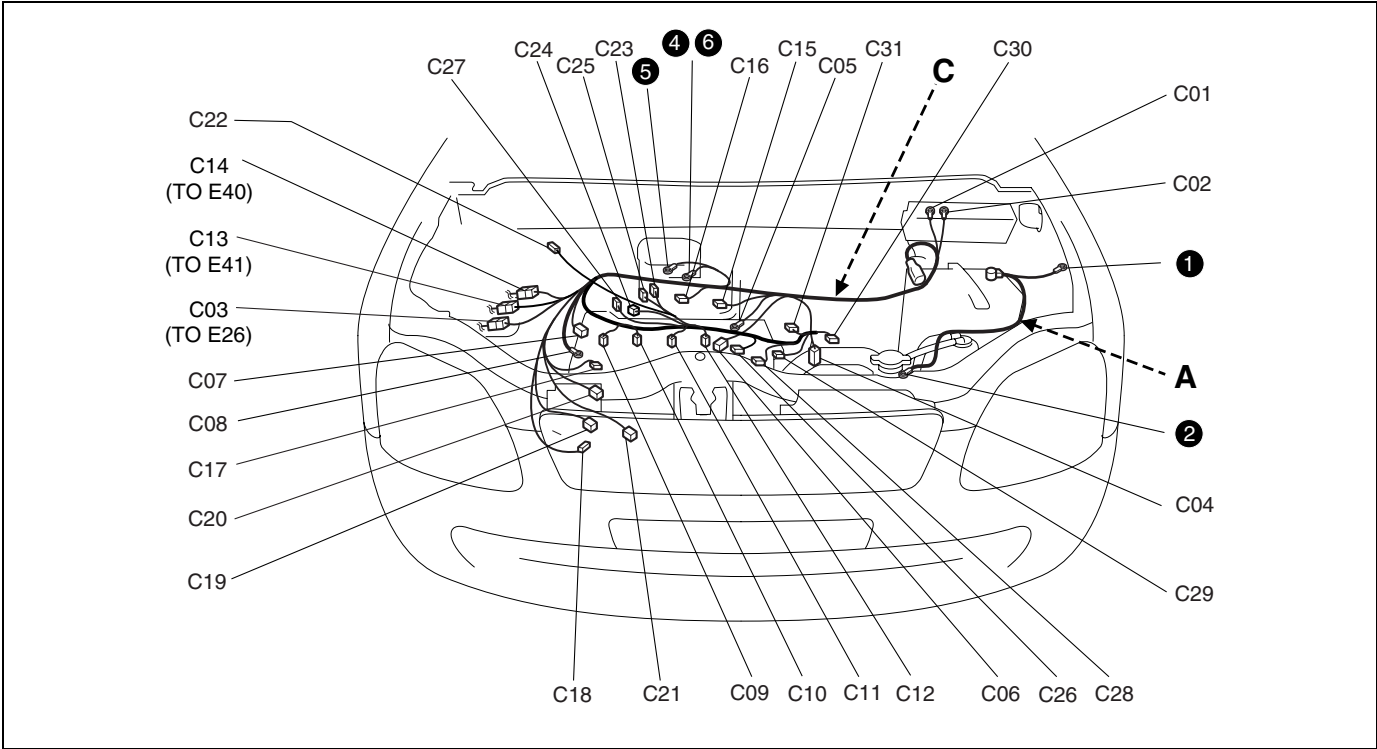
Wire / connector color symbols
Symbole der Kabel und Steckerfarben
Symboles des codes couleur câbles / connecteurs
Kleurcodes voor draden/stekkers

Symbol	Wire / Connector Color	Kabel und Steckerfarben	Couleur câbles / connecteurs	Kleur van draad/stekker
BLK	Black	Schwarz	Noir	Zwart
BLU	Blue	Blau	Bleu	Blauw
BRN	Brown	Braun	Marron	Bruin
GRN	Green	Grün	Vert	Groen
GRY	Gray	Grau	Gris	Grijs
LT BLU	Light blue	Hellblau	Bleu clair	Lichtblauw
LT GRN	Light green	Hellgrün	Vert clair	Lichtgroen
ORN	Orange	Orange	Orange	Oranje
RED	Red	Rot	Rouge	Rood
WHT	White	Weiß	Blanc	Wit
YEL	Yellow	Gelb	Jaune	Geel
PNK	Pink	Rosa	Rose	Roze
PPL	Purple	Lila	Violet	Paars
N	Natural	Natürlich	Naturel	Natuurkleur

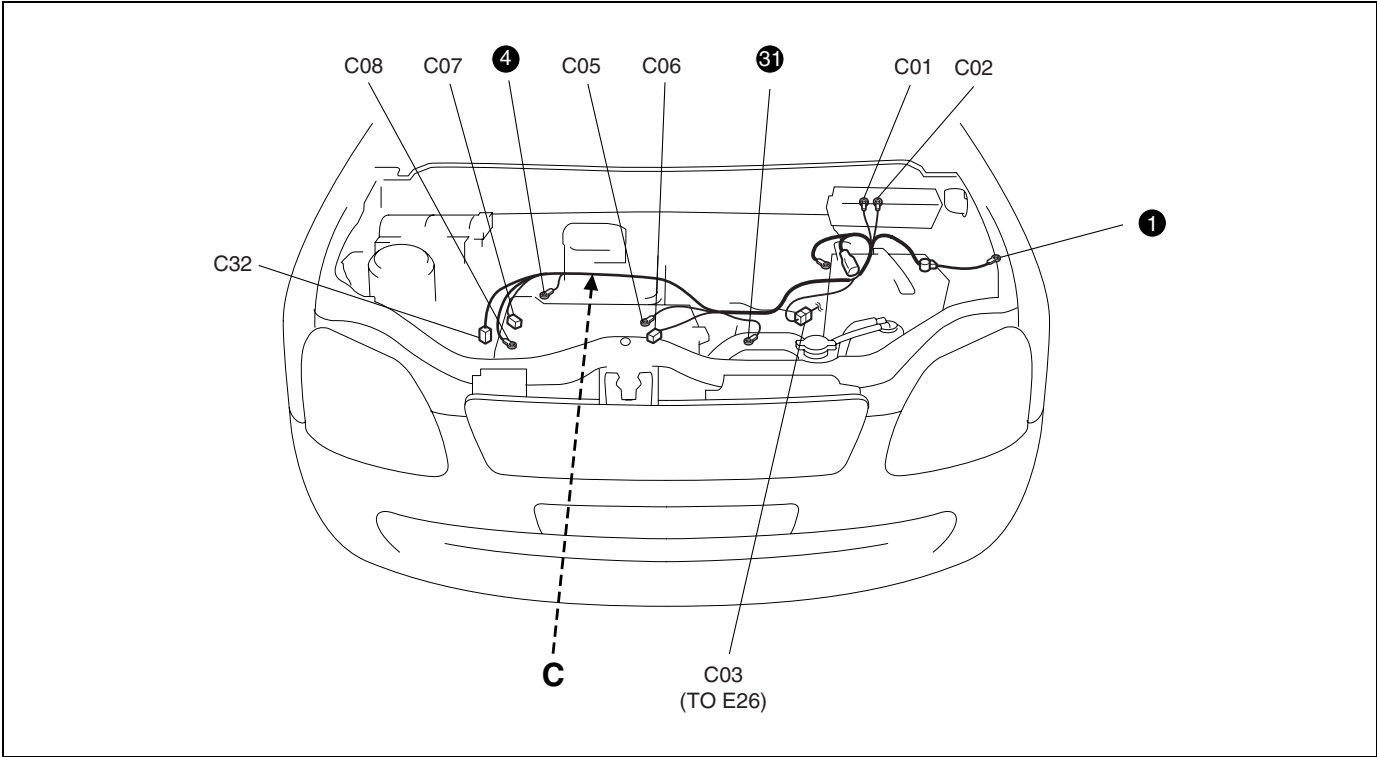


Connector layout diagram**Stecker-layout-diagramm****Schéma de disposition des blocs raccord de câblage****Stekkerschema****Engine compartment****Motorraum****Compartment moteur****Motorruimte****A: Battery harness****A: Batterie-Kabelbaum****A: Faisceau de câbles de la batterie****A: Accubedradingsbundel****C: Engine harness****C: Motor-Kabelbaum****C: Faisceau de câbles du moteur****C: Motorbedradingsbundel****G10****8A-3**

M13A



DSL



No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Engine harness	Motor-Kabelbaum	Faisceau de câbles du moteur	Motorbedradingsbundel
C01/N	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
C02/N	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
C03/GRY	Main harness (To E26)	Haupt-Kabelbaum (ZUM E26)	Faisceau de câbles principal (AU E26)	Hoofdbedradingsbundel (naar E26)
C04/GRY(A/T)	Vehicle speed sensor	Fahrzeuggeschwindigkeit sensor	Capteur de vitesse	Rijksnelheidssensor
C04/BLK(M/T)				

No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Engine harness	Motor-Kabelbaum	Faisceau de câbles du moteur	Motorbedradingsbundel
C05/-	Starting motor	Anlasser	Moteur de depart	Startmotor
C06/BLK (G10 / M13A)	Starting motor	Anlasser	Moteur de depart	Startmotor
C06/- (DSL)				
C07/GRY (G10 / M13A)	Generator	Lichtmaschine	Générateur	Dynamo
C07/- (DSL)				
C08/-	Generator	Lichtmaschine	Générateur	Dynamo
C09/GRY(M13A)	Injector #1	Einspritzdüse #1	Injecteur #1	Verstuiver 1
C10/GRY(M13A)	Injector #2	Einspritzdüse #2	Injecteur #2	Verstuiver 2
C11/GRY(M13A)	Injector #3	Einspritzdüse #3	Injecteur #3	Verstuiver 3
C12/GRY(M13A)	Injector #4	Einspritzdüse #4	Injecteur #4	Verstuiver 4
C13/GRY (M13A)	Main harness (To E41)	Haupt-Kabelbaum (ZUM E41)	Faisceau de câbles principal (AU E41)	Hoofdbedradingsbundel (naar E41)
C14/BLK (M13A)	Main harness (To E40)	Haupt-Kabelbaum (ZUM E40)	Faisceau de câbles principal (AU E40)	Hoofdbedradingsbundel (naar E40)
C15/GRY(M13A)	Knock sensor	Klopfsensor	Détecteur de detonation	Detonatiesensor
C16/GRY(M13A)	CKP sensor	CKP-sensor	Détecteur CKP	CKP-sensor
C17/BLU(M13A)	VVT solenoid	VVT-Magnet	Solénoïde de distribution à programme variable	VVT-solenoïde
C18/N(M13A)	Oil pressure switch	Öldruckschalter	Interrupteur de pression d'huile	Oliedrukschakelaar
C19/GRY(M13A)	Heated oxygen sensor #1	Reheizte lambdas-onde #1	Capteur d'oxygène chauffé #1	Verwarmde zuurstofsensor 1
C20/GRN(M13A)	Heated oxygen sensor #2	Reheizte lambdas-onde #2	Capteur d'oxygène chauffé #2	Verwarmde zuurstofsensor 2
C21/BLK(M13A)	Compressor	Kompressor	Compresseur	Compressor
C22/BLK(M13A)	IAT sensor	IAT-sensor	Détecteur IAT	IAT-sensor
C23/BLK(M13A)	MAP sensor	MAP-sensor	Détecteur MAP	MAP-sensor
C24/BLK(M13A)	EVAP canister purge valve	EVAP spülluft ventil	Clapet de purge cartouche d'EVAP	Afzuigklep van EVAP-koolstoffilter
C25/BLK(M13A)	Throttle position sensor	Drosselklappenöffnungs-sensor	Détecteur de position du papillon	Gaskleppositie-sensor
C26/BLK(M13A)	CMP sensor	CMP-sensor	Détecteur CMP	CMP-sensor
C27/GRY(M13A)	IAC valve	IAC-ventil	Soupape IAC	IAC-klep
C28/GRY(M13A)	IG COIL #1			
C29/GRY(M13A)	IG COIL #2			
C30/GRY(M13A)	ECT sensor	ECT-sensor	Détecteur ECT	ECT-sensor
C31/GRY(M13A)	EGR valve	EGR-ventil	Soupape EGR	EGR-klep
C32/BLK(DSL)	Oil level switch	Ölpegelschalter	Contacteur de niveau d'huile	Oliepeilschakelaar

B: A/C harness

B: Klimaanlage-Kabelbaum

B: Faisceau de câbles d'A/C

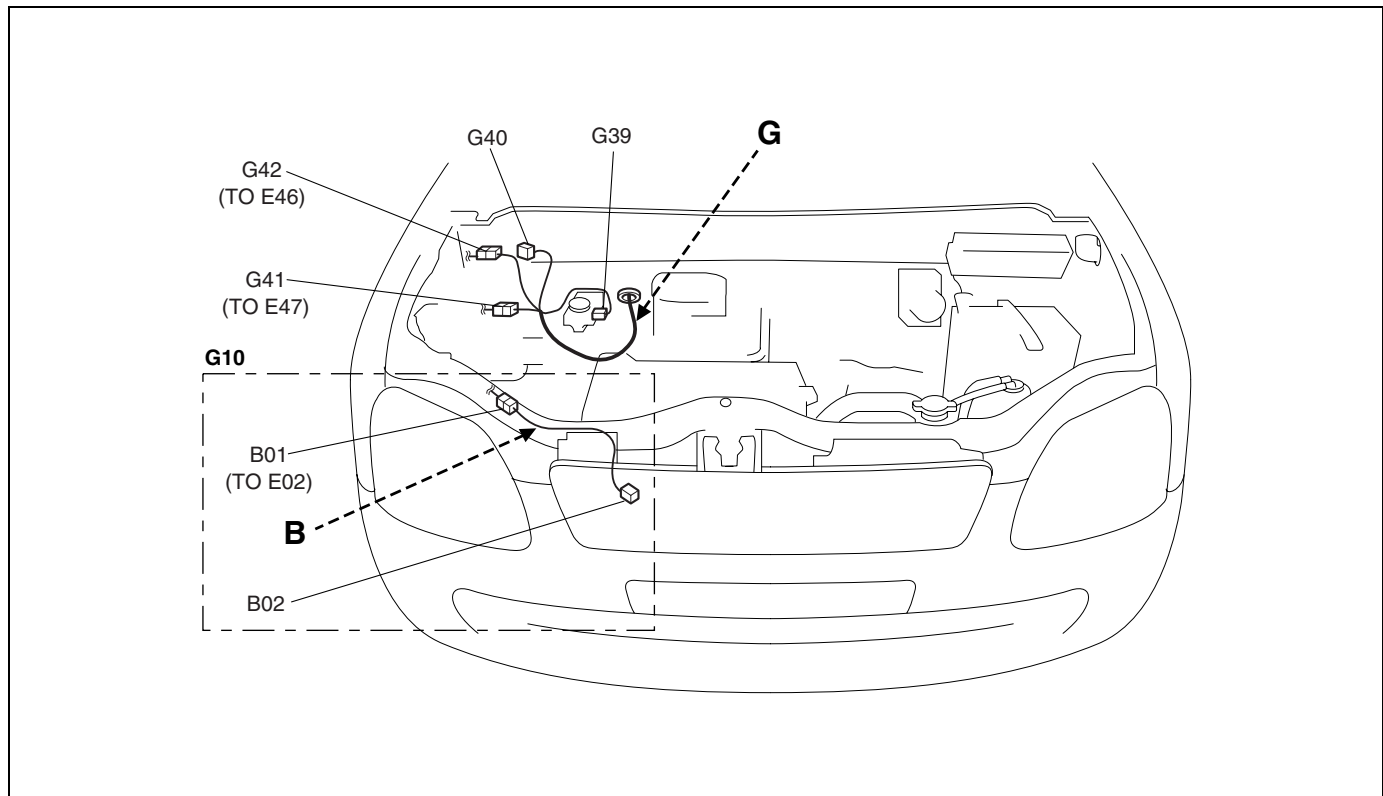
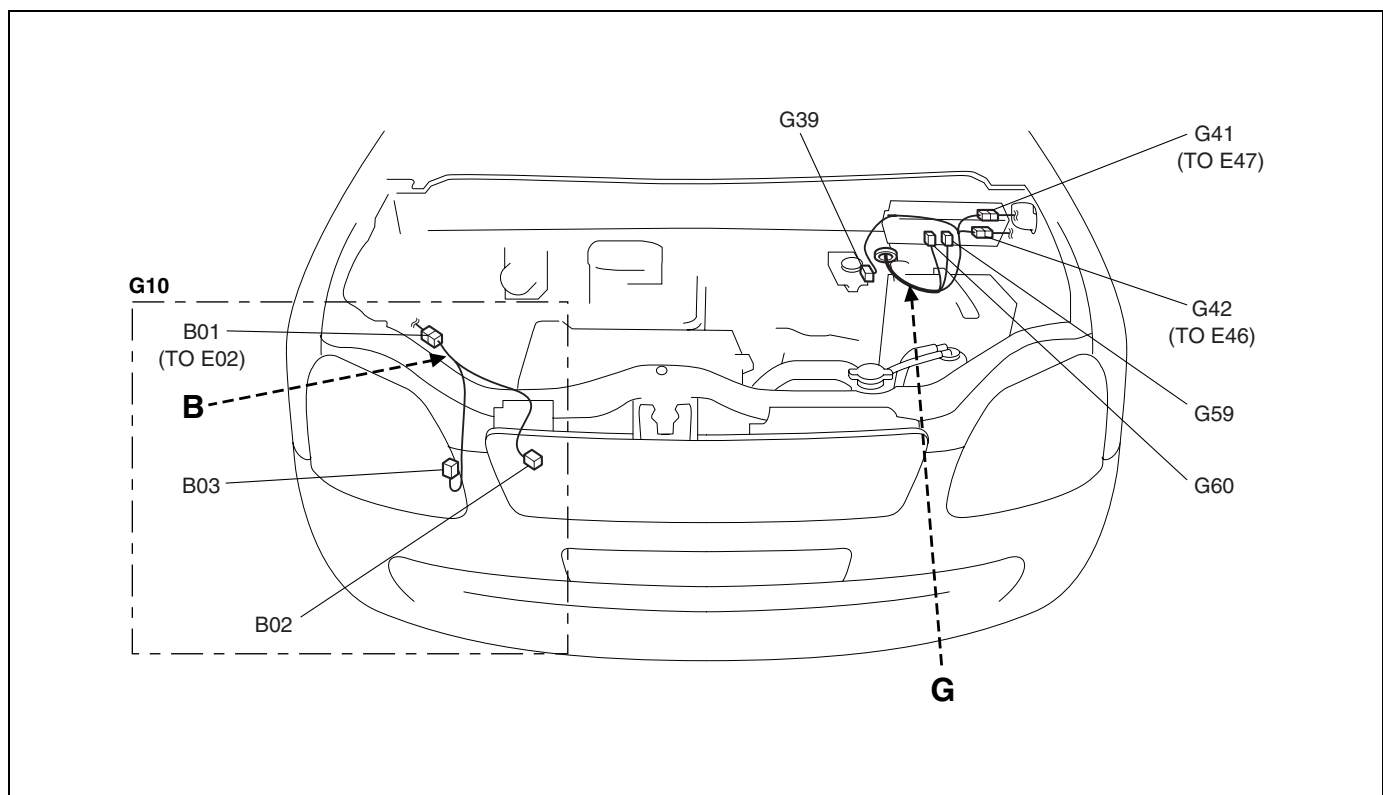
B: A/C-bedradingsbundel

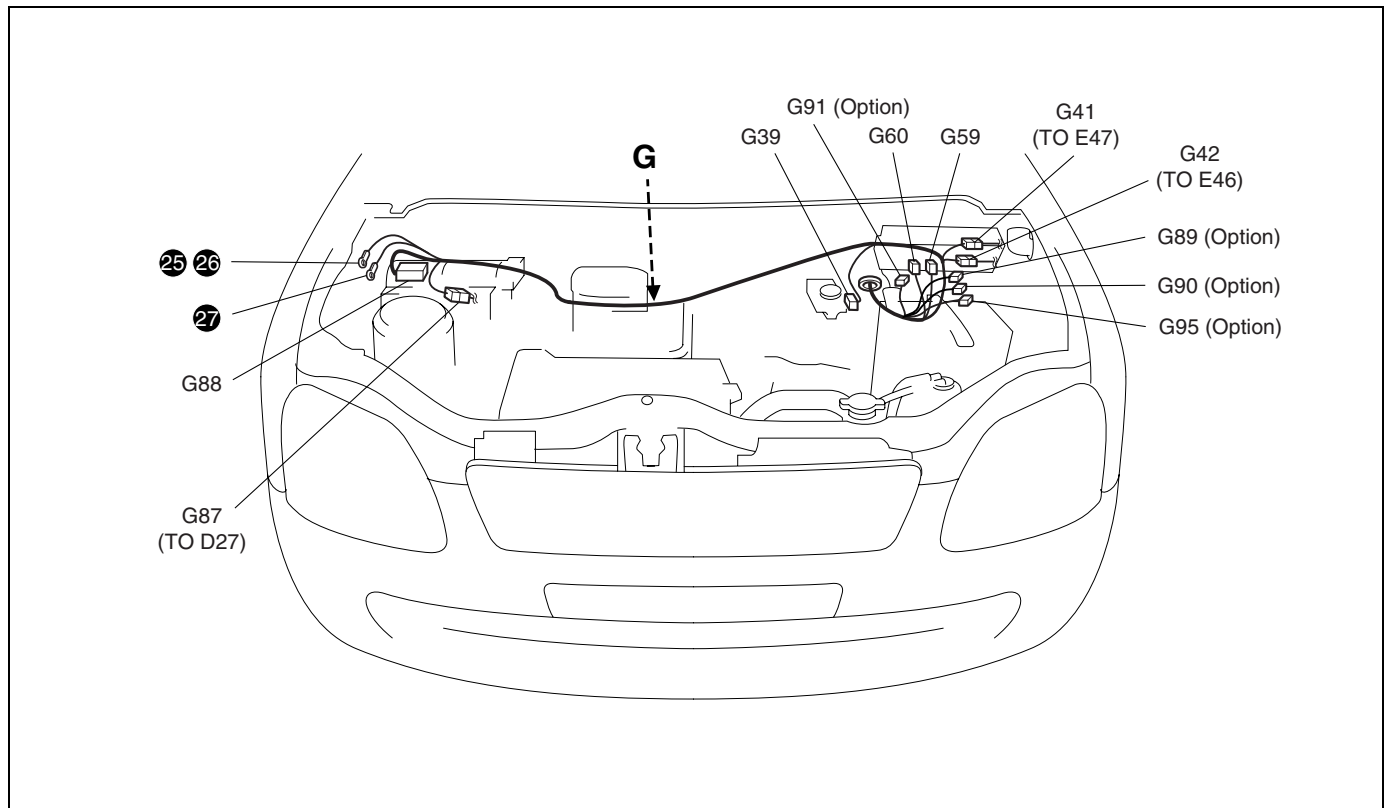
G: Instrument panel harness

G: Instrumententafel-Kabelbaum

G: Faisceau de câbles du panneau des instruments

G: Instrumentenpaneelbedradingsbundel

RHD (G10 / M13A)**LHD (G10 / M13A)**



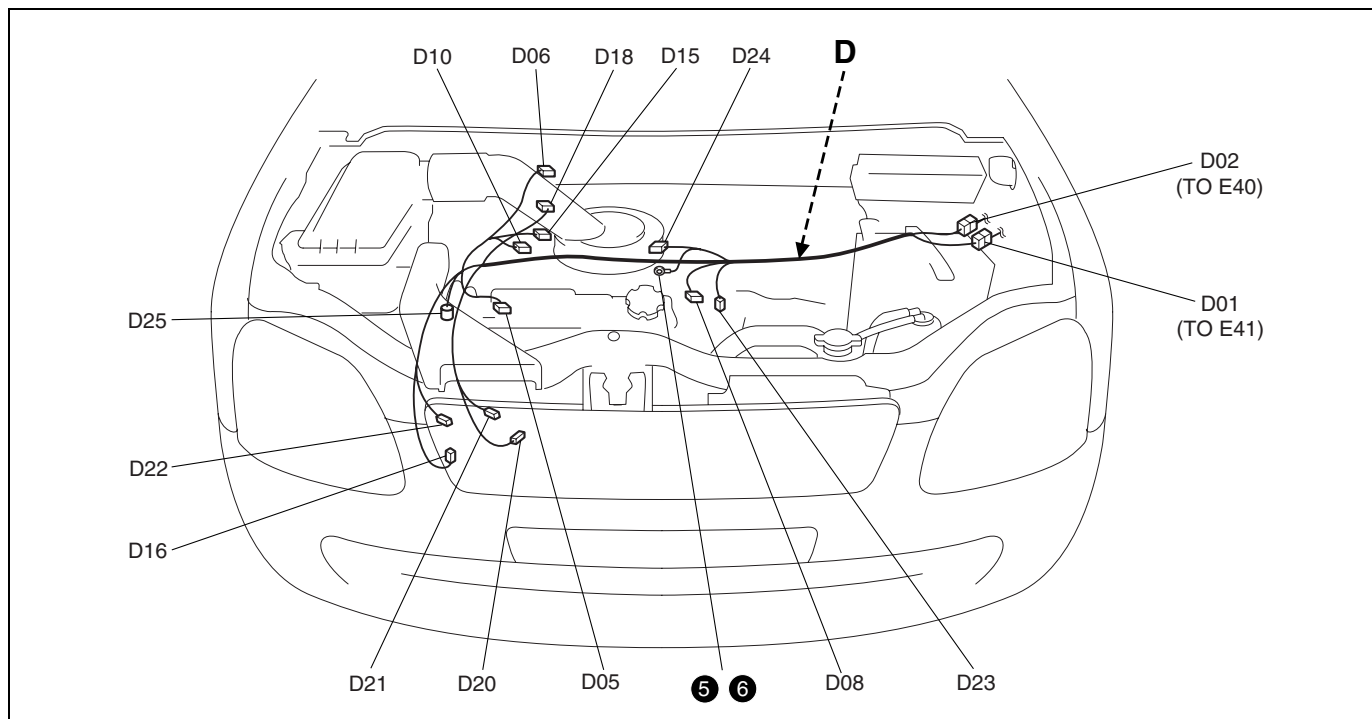
No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	A/C harness	Klimaanlagen-Kabelbaum	Faisceau de câbles d'A/C	A/C-bedradingsbundel
B01/N(G10)	Main harness (To E02)	Haupt-Kabelbaum (ZUM E02)	Faisceau de câbles principal (AU E02)	Hoofdbedradingsbundel (naar E02)
B02/BLK(G10)	Compressor	Kompressor	Compresseur	Compressor
B03/GRY (G10, LHD)	Dual pressure switch	Doppel-druckschalter	Commutateur de manometre double	Dubbele drukschakelaar
	Instrument panel harness	Instrumententafel-Kabelbaum	Faisceau de câbles du panneau des instruments	Instrumentenpaneelbedradingsbundel
G39/BRN	Brake fluid level switch	Bremsflüssigkeitsstandschalter	Contacteur de niveau de liquide de frein	Remvloeistofpeilschakelaar
G40/BLK(RHD)	Windshield wiper motor	Windschutzscheiben-Wischermotor	Moteur d'essuie-glace de parebrise	Ruitenwissermotor
G41/GRY	Main harness (To E47)	Haupt-Kabelbaum (ZUM E47)	Faisceau de câbles principal (AU E47)	Hoofdbedradingsbundel (naar E47)
G42/N	Main harness (To E46)	Haupt-Kabelbaum (ZUM E46)	Faisceau de câbles principal (AU E46)	Hoofdbedradingsbundel (naar E46)
G42/GRY(DSL)	Main harness (To E46)	Haupt-Kabelbaum (ZUM E46)	Faisceau de câbles principal (AU E46)	Hoofdbedradingsbundel (naar E46)
G59/BLK(LHD)	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
G60/BLK(LHD)	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
G87/BLK(DSL)	Injector harness (To D27)	Einspritzventil-Kabelbaum (ZUM D27)	Faisceau de câbles de l'injecteur (AU D27)	Verstuiverbedradingsbundel (naar D27)
G88/BLK(DSL)	ECM			
G89/N(DSL)	PTC heater relay #1	PTC-Heizungsrelais #1	Relais de réchauffeur de PTC #1	PTC-verwarmingsrelais #1
G90/N(DSL)	PTC heater relay #2	PTC-Heizungsrelais #2	Relais de réchauffeur de PTC #2	PTC-verwarmingsrelais #2
G91/N(DSL)	PTC fusible link box	PTC-Schmelzsicherungsgehäuse	Boîte de liaison fusible de PTC	PTC-smeltverbindingskastje
G95/N(DSL)	PTC heater relay #3	PTC-Heizungsrelais #3	Relais de réchauffeur de PTC #3	PTC-verwarmingsrelais #3

D: Injector harness (G10)

D:Einspritzventil-Kabelbaum (G10)

D:Faisceau de câbles de l'injecteur (G10)

D: Verstuiverbedradingsbundel (G10)



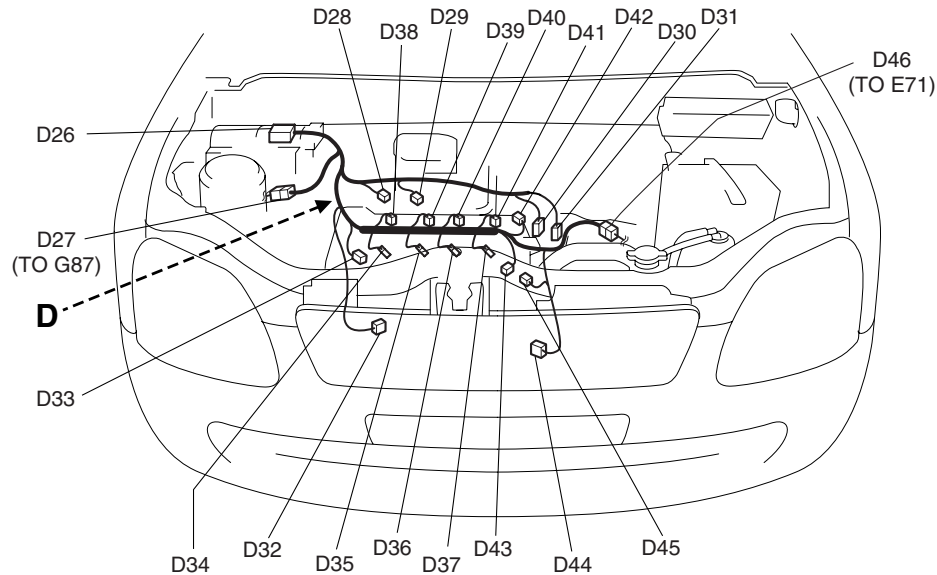
No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Injector harness	Einspritzventil-Kabelbaum	Faisceau de câbles de l'injecteur	Verstuiverbedradingsbundel
D01/GRY	Main harness (To E41)	Haupt-Kabelbaum (ZUM E41)	Faisceau de câbles principal (AU E41)	Hoofdbedradingsbundel (naar E41)
D02/GRY	Main harness (To E40)	Haupt-Kabelbaum (ZUM E40)	Faisceau de câbles principal (AU E40)	Hoofdbedradingsbundel (naar E40)
D05/BLK	EVAP canister purge valve	EVAP spülluft ventil	Clapet de purge cartouche d'EVAP	Afzuigklep van EVAP-koolstoffilter
D06/BLK	MAP sensor	MAP-sensor	Détecteur MAP	MAP-sensor
D08/BLK	ECT sensor	ECT-sensor	Détecteur ECT	ECT-sensor
D10/BLK	Injector	Einspritzdüse	Injecteur	Verstuiver
D15/BLK	Throttle position sensor	Drosselklappenöffnungs-sensor	Détecteur de position du papillon	Gaskleppositiesensor
D16/GRY	CKP sensor	CKP-sensor	Détecteur CKP	CKP-sensor
D18/BLK	IAT sensor	IAT-sensor	Détecteur IAT	IAT-sensor
D20/N	Oil pressure switch	Öldruckschalter	Interrupteur de pression d'huile	Oliedrukschakelaar
D21/N	Heated oxygen sensor #1	Reheizte lambdasonde #1	Capteur d'oxygène chauffé #1	Verwarmde zuurstofsensor 1
D22/N	Heated oxygen sensor #2	Reheizte lambdasonde #2	Capteur d'oxygène chauffé #2	Verwarmde zuurstofsensor 2
D23/N	Distributor	Verteiler	Distributeur	Verdeler
D24/GRY	IAC-VSV			
D25/N	PTC heater	Chauffe-PTC	PTC heating	PTC-verwarming

D: Injector harness (DSL)

D:Einspritzventil-Kabelbaum (DSL)

D:Faisceau de câbles de l'injecteur (DSL)

D: Verstuiverbedradingsbundel (DSL)



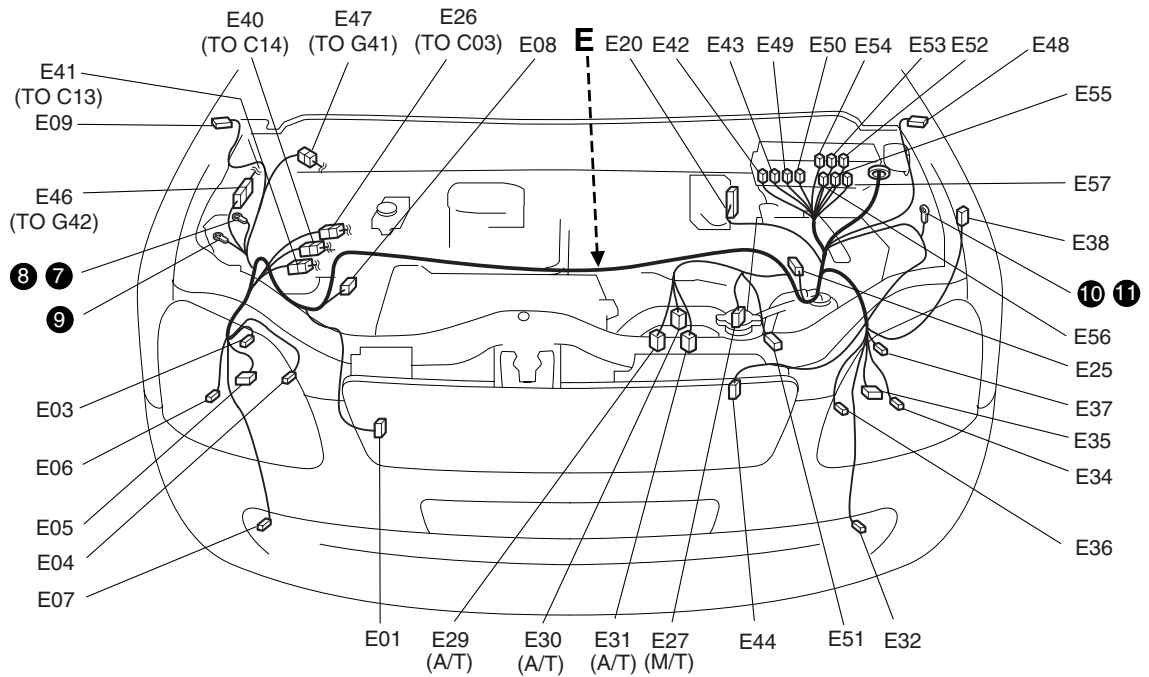
No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Injector harness	Einspritzventil-Kabelbaum	Faisceau de câbles de l'injecteur	Verstuiverbedradingsbundel
D26	ECM			
D27	Injector harness (To G87)	Einspritzventil-Kabelbaum (ZUM G87)	Faisceau de câbles de l'injecteur (AU G87)	Verstuiverbedradingsbundel (naar G87)
D28	Fuel pressure sensor	Kraftstoffdrucksensor	Capteur de pression de carburant	Brandstofdruksensor
D29	Boost pressure sensor	Ladedrucksensor	Capteur de surpression	Laaddruksensor
D30	Fuel pressure regulator	Kraftstoffdruckregler	Régulateur de pression du carburant	Brandstofdrukregelaar
D31	EGR valve	EGR-ventil	Soupape EGR	EGR-klep
D32	Compressor	Kompressor	Compresseur	Compressor
D33	CMP sensor	CMP-sensor	Détecteur CMP	CMP-sensor
D34	Glow plug #1	Glühkerze #1	Bougie de prechauffage #1	Gloeibougie 1
D35	Glow plug #2	Glühkerze #2	Bougie de prechauffage #2	Gloeibougie 2
D36	Glow plug #3	Glühkerze #3	Bougie de prechauffage #3	Gloeibougie 3
D37	Glow plug #4	Glühkerze #4	Bougie de prechauffage #4	Gloeibougie 4
D38	Injector #1	Einspritzdüse #1	Injecteur #1	Verstuiver 1
D39	Injector #2	Einspritzdüse #2	Injecteur #2	Verstuiver 2
D40	Injector #3	Einspritzdüse #3	Injecteur #3	Verstuiver 3
D41	Injector #4	Einspritzdüse #4	Injecteur #4	Verstuiver 4
D42	Air flow meter	Lufimassenmesser	Debitmètre d'air	Luchtstroommeter
D43	Oil pressure switch	Öldruckschalter	Interrupteur de pression d'huile	Oliedrukschakelaar
D44	ECT sensor	ECT-sensor	Détecteur ECT	ECT-sensor
D45	CKP sensor	CKP-sensor	Détecteur CKP	CKP-sensor
D46	Main harness (To E71)	Haupt-Kabelbaum (ZUM E71)	Faisceau de câbles principal (AU E71)	Hoofdbedradingsbundel (naar E71)

E: Hoofdbedradingsbundel (G10)

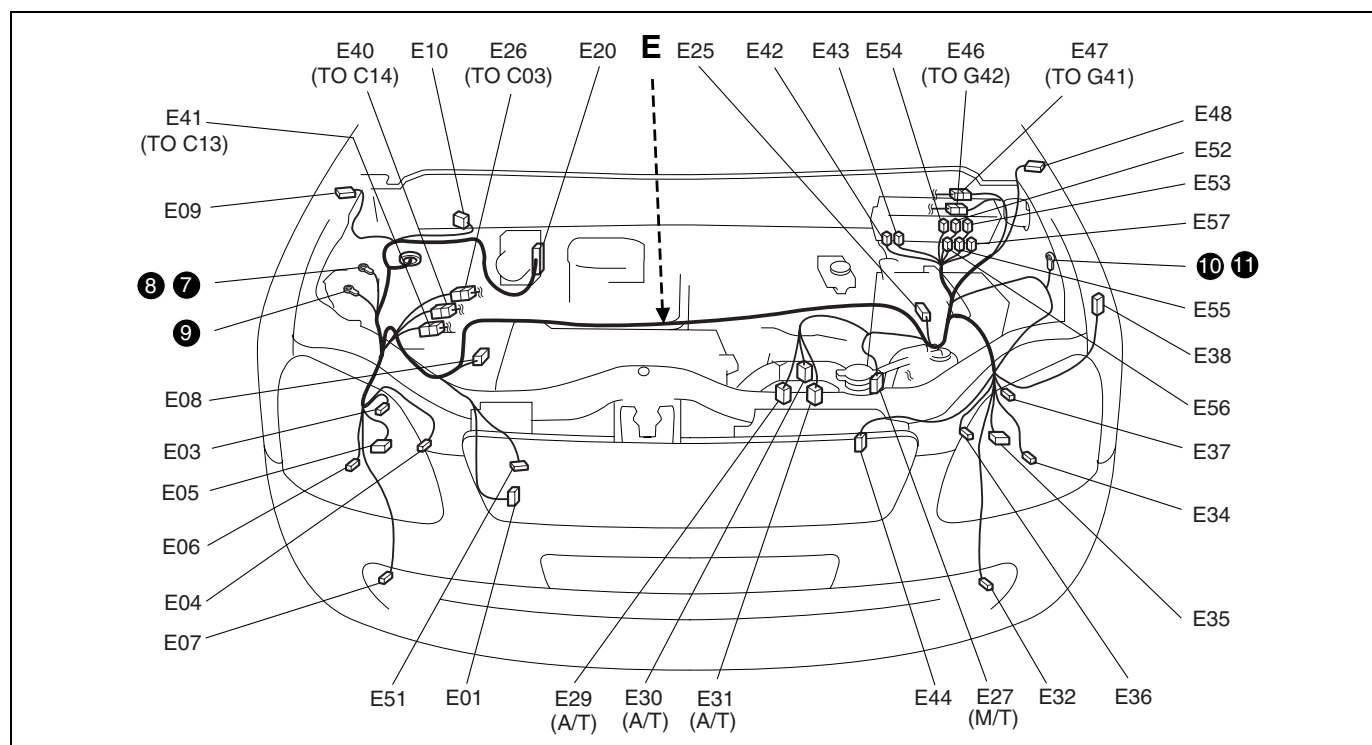
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No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Main harness	Haupt-Kabelbaum	Faisceau de câbles principal	Hoofdbedradingsbundel
E01/BLK	Horn	Hupe	Avertisseur sonore	Claxon
E02/N	A/C harness (To B01)	Klimaanlagen-kabelbaum (ZUM B01)	Faisceau de câbles d'A/C (AU B01)	A/C-bedradingsbundel (naar B01)
E03/BLK	Front turn signal light (R)	Frontblinkleuchte (R)	Clignotant avant (D)	Richtingaanwijzer voor (R)
E04/BLK	Front position light (R)	Vordere parkleuchte (R)	Feu de position avant (D)	Parkeerlicht voor (R)
E05/BLK	Headlight (R)	Scheinwerfer-erlicht (R)	Phare (D)	Koplamp (R)
E06/BLK	Headlight beam leveling actuator (R)	Scheinwerferstrahl-nivellierstellglied (R)	Commande de réglage du faisceau de phare (D)	Actuator van koplamp-hoogteverstelling (R)
E07/N	Front fog light (R)	Vordere nebelleuchten (R)	Feu de d'antibrouillard (D)	Voormistlicht (R)
E08/N	Front wheel speed sensor (R)	Raddrehzahlsensor (R)	Capteur de vitesse de la roue (D)	Voorwieltoerentalsensor (R)
E09/N	Side turn signal light (R)	Seitenblinkleuchte (R)	Eclairage de clignotant (D)	Richtingaanwijzer zijkant (R)
E10/BLK(LHD)	Windshield wiper motor	Windschutzscheiben-Wischermotor	Moteur d'essuie-glace de parebrise	Ruitenwissermotor
E20/BLU	ABS control module	ABS-steuermodul	Module de commande de l'ABS	ABS-regelapparaat
E25/N	Front wheel speed sensor (L)	Raddrehzahlsensor (L)	Capteur de vitesse de la roue (G)	Voorwieltoerentalsensor (L)
E26/GRY	Engine harness (To C03)	Motor-Kabelbaum (ZUM C03)	Faisceau de câbles du moteur (AU C03)	Motorbedradingsbundel (naar C03)
E27/BLK	Back-up light switch	Rückfahrleuchtenschalter	Interrupteur de feux de marche arrière	Achteruitrijlichtschakelaar
E32/N	Front fog light (L)	Vordere nebelleuchten (L)	Feu de d'antibrouillard (G)	Voormistlicht (L)
E34/BLK	Headlight beam leveling actuator (L)	Scheinwerferstrahl-nivellierstellglied (L)	Commande de réglage du faisceau de phare (G)	Actuator van koplamp-hoogteverstelling (L)
E35/BLK	Headlight (L)	Scheinwerfer-erlicht (L)	Phare (G)	Koplamp (L)
E36/BLK	Front position light (L)	Vordere parkleuchte (L)	Feu de position avant (G)	Parkeerlicht voor (L)
E37/BLK	Front turn signal light (L)	Frontblinkleuchte (L)	Clignotant avant (G)	Richtingaanwijzer voor (L)
E38/BLK	Front and rear washer motor	Waschanlagenmotor Front-Heck	Moteur de lave-glace avant et arrière	Voorruit- en achteruitsproei-motor
E40/GRY	Injector harness (To D02)	Einspritzventil-Kabelbaum (ZUM D02)	Faisceau de câbles de l'injecteur (AU D02)	Verstuiverbedradingsbundel (naar D02)
E41/GRY	Injector harness (To D01)	Einspritzventil-Kabelbaum (ZUM D01)	Faisceau de câbles de l'injecteur (AU D01)	Verstuiverbedradingsbundel (naar D01)
E42/BLK	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E43/BLK	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E44/BLK	Radiator fan motor	Kühlergebläse-motor	Moteur de ventilateur de radiateur	Koelventilatormotor
E46/N	Instrument panel harness (To G42)	Instrumententafel-Kabelbaum (ZUM G42)	Faisceau de câbles du panneau des instruments (AU G42)	Instrumentenpaneelbedradingsbundel (naar G42)
E47/GRY	Instrument panel harness (To G41)	Instrumententafel-Kabelbaum (ZUM G41)	Faisceau de câbles du panneau des instruments (AU G41)	Instrumentenpaneelbedradingsbundel (naar G41)
E48/N	Side turn signal light (L)	Seitenblinkleuchte (L)	Eclairage de clignotant (G)	Richtingaanwijzer zijkant (L)
E49/BLK(RHD)	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E50/BLK(RHD)	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E51/GRY(RHD)	Dual pressure switch	Doppel-druckschalter	Commutateur de manomètre double	Dubbele drukschakelaar
	Main harness	Haupt-Kabelbaum	Faisceau de câbles principal	Hoofdbedradingsbundel
E52/BLK	Fuel pump relay	Kraftstoff pumpenrelais	Relais de pompe à carburant	Brandstofpomprelais

No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
E53/BLK	Radiator fan control relay	Kühlergebläsesteuerrelais	Relais de commande de ventilateur de radiateur	Stuurrelais van radiator-ventilator
E54/BLK	Horn relay	Hupenrelais	Relais d'avertisseur sonore	Claxonrelais
E55/BLK	ISC relay	ISC-relais	Relais d'ISC	ISC-relais
E56/BLK	Main relay	Hauptrelais	Relais principal	Hoofdrelais
E57/BLK	Front fog light relay	Nebelleuchten relais	Relais d'antibroillard avant	Voormistlichtrelais
E58/BLK	Noise suppressor	Störfunkenunterdrücker	Suppresseur de bruit	Storingsonderdrukker
E59/BLK	IG COIL			
E60/GRY	Igniter	Zündgeber	Igniteur	Ontsteker
E62-1/BLK	PTC heater relay	Chauffe-PTC-relais	Relais de PTC heizung	PTC-verwarmingsrelais
E62-2/BLK	Compressor relay	Kompressorrelais	Relais de compresseur	Compressorrelais
E63/YEL	Injector resistor	Einspritz-widerstand	Résistance d'injecteur	Brandstofverstuiverweerstand

E: Main harness (M13A)**E: Haupt-Kabelbaum (M13A)****E: Faisceau de câbles principal (M13A)****E: Hoofdbedradingsbundel (M13A)****RHD**

LHD



No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Main harness	Haupt-Kabelbaum	Faisceau de câbles principal	Hoofdbedradingsbundel
E01/BLK	Horn	Hupe	Avertisseur	Claxon
E03/BLK	Front turn signal light (R)	Frontblinkleuchte (R)	Clignotant avant (D)	Richtingaanwijzer voor (R)
E04/BLK	Front position light (R)	Vordere parkleuchte (R)	Feu de position avant (D)	Parkeerlicht voor (R)
E05/BLK	Headlight (R)	Scheinwerferlicht (R)	Phare (D)	Koplamp (R)
E06/BLK	Headlight beam leveling actuator (R)	Scheinwerferstrahl-nivellierstellglied (R)	Commande de réglage du faisceau de phare (D)	Actuator van koplamp-hoogteverstelling (R)
E07/N	Front fog light (R)	Vordere nebeleuchten (R)	Feu de d'antibrouillard (D)	Voormistlicht (R)
E08/N	Front wheel speed sensor (R)	Raddrehzahlsensor (R)	Capteur de vitesse de la roue (D)	Voorwieltoerentalsensor (R)
E09/N	Side turn signal light (R)	Seitenblinkleuchte (R)	Eclairage de clignotant (D)	Richtingaanwijzer zijkant (R)
E10/BLK(LHD)	Windshield wiper motor	Windschutzscheiben-Wischermotor	Moteur d'essuie-glace de parebrise	Ruitenwissermotor
E20/BLU	ABS control module	ABS-steuermodule	Module de commande de l'ABS	ABS-regelapparaat
E25/N	Front wheel speed sensor (L)	Raddrehzahlsensor (L)	Capteur de vitesse de la roue (G)	Voorwieltoerentalsensor (L)
E26/GRY	Engine harness (To C03)	Motor-Kabelbaum (ZUM C03)	Faisceau de câbles du moteur (AU C03)	Motorbedradingsbundel (naar C03)
E27/BLK(M/T)	Back-up light switch	Rückfahrleuchtenschalter	Interrupteur de feux de marche arrière	Achteruitrijlichtschakelaar
E29/BLU(A/T)	Input sensor	Eingabesensor	Capteur d'entrée	Ingangssensor
E30/GRY(A/T)	Shift solenoid	Schaltmagnet	Solénoïde de sélection de vitesse	Schakelsolenoïde
E31/GRY(A/T)	Transaxle range sensor	Fahrbereichssensor	Decteur de gamme de transmission	Transmissiebereiksensor
E32/N	Front fog light (L)	Vordere nebeleuchten (L)	Feu de d'antibrouillard (G)	Voormistlicht (L)
	Main harness	Haupt-Kabelbaum	Faisceau de câbles principal	Hoofdbedradingsbundel

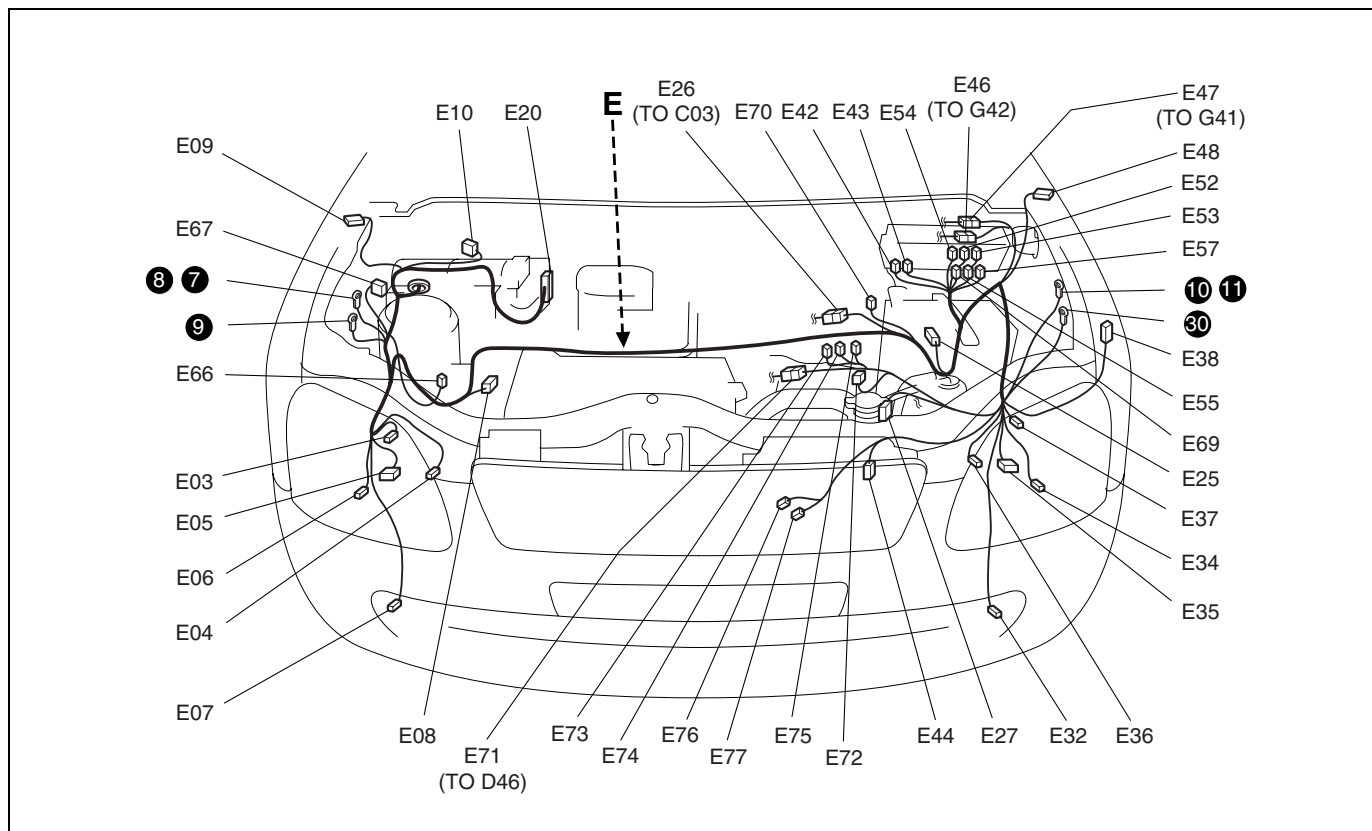
No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
E34/BLK	Headlight beam leveling actuator (L)	Scheinwerferstrahlnivel- lierstellglied (L)	Commande de réglage du faisceau de phare (G)	Actuator van koplamp- hoogteverstelling (L)
E35/BLK	Headlight (L)	Scheinwerf-erlicht (L)	Phare (G)	Koplamp (L)
E36/BLK	Front position light (L)	Vordere parkleuchte (L)	Feu de position avant (G)	Parkeerlicht voor (L)
E37/BLK	Front turn signal light (L)	Frontblinkleuchte (L)	Clignotant avant (G)	Richtingaanwijzer voor (L)
E38/BLK	Front and rear washer motor	Waschanlagenmotor Front-Heck	Moteur de lave-glace avant et arrière	Voorruit- en achterraut- sproeiermotor
E40/BLK	Engine harness (To C14)	Motor-Kabelbaum (ZUM C14)	Faisceau de câbles du moteur (AU C14)	Motorbedradingsbundel (naar C14)
E41/GRY	Engine harness (To C13)	Motor-Kabelbaum (ZUM C13)	Faisceau de câbles du moteur (AU C13)	Motorbedradingsbundel (naar C13)
E42/BLK	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E43/BLK	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E44/BLK	Radiator fan motor	Kühlergebläse-motor	Moteur de ventilateur de radiateur	Koelventilatormotor
E46/N	Instrument panel harness (To G42)	Armaturenbrett-kabel- baum (ZUM G42)	Faisceau de fils électri- ques de planche de bord (AU G42)	Instrumentenpaneelbe- dradingsbundel (naar G42)
E47/GRY	Instrument panel harness (To G41)	Armaturenbrett-kabel- baum (ZUM G41)	Faisceau de fils électri- ques de planche de bord (AU G41)	Instrumentenpaneelbe- dradingsbundel (naar G41)
E48/N	Side turn signal light (L)	Seitenblinkleuchte (L)	Eclairage de clignotant (G)	Richtingaanwijzer zijkant (L)
E49/BLK(RHD)	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E50/BLK(RHD)	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E51/GRY	Dual pressure switch	Doppel-druckschalter	Commutateur de mano- mètre double	Dubbele drukschakelaar
E52/BLK	Fuel pump relay	Kraftstoff pumpenrelais	Relais de pompe à car- burant	Brandstofpomprelais
E53/BLK	Radiator fan control relay #1	Kühlergebläsesteuerre- lais #1	Relais de commande de ventilateur de radiateur #1	Stuurrelais 1 van radia- teurventilator
E54/BLK	Horn relay	Hupenrelais	Relais d'avertisseur sonore	Claxonrelais
E55/BLK	Compressor relay	Kompressorrelais	Relais de compresseur	Compressorrelais
E56/BLK	Main relay	Hauptrelais	Relais principal	Hoofdrelais
E57/BLK	Front fog light relay	Nebelleuchten relais	Relais d'antibrouillard avant	Voormistlichtrelais

E: Main harness (DSL)

E: Haupt-Kabelbaum (DSL)

E: Faisceau de câbles principal (DSL)

E: Hoofdbedradingsbundel (DSL)



No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Main harness	Haupt-Kabelbaum	Faisceau de câbles principal	Hoofdbedradingsbundel
E01/BLK	Horn	Hupe	Avertisseur	Claxon
E03/BLK	Front turn signal light (R)	Frontblinkeuchte (R)	Clignotant avant (D)	Richtingaanwijzer voor (R)
E04/BLK	Front position light (R)	Vordere parkleuchte (R)	Feu de position avant (D)	Parkeerlicht voor (R)
E05/BLK	Headlight (R)	Scheinwerferlicht (R)	Phare (D)	Koplamp (R)
E06/BLK	Headlight beam leveling actuator (R)	Scheinwerferstrahl-nivellierstellglied (R)	Commande de réglage du faisceau de phare (D)	Actuator van koplamp-hoogteverstelling (R)
E07/N	Front fog light (R)	Vordere Nebelleuchten (R)	Feu de d'antibrouillard (D)	Voormistlicht (R)
E08/N	Front wheel speed sensor (R)	Raddrehzahlsensor (R)	Capteur de vitesse de la roue (D)	Voorwieltoerentalsensor (R)
E09/N	Side turn signal light (R)	Seitenblinkeuchte (R)	Eclairage de clignotant (D)	Richtingaanwijzer zijkant (R)
E10/BLK	Windshield wiper motor	Windschutzscheiben-Wischermotor	Moteur d'essuie-glace de pare-brise	Ruitenwissermotor
E20/BLU	ABS control module	ABS-steuermodul	Module de commande de l'ABS	ABS-regelapparaat
E25/N	Front wheel speed sensor (L)	Raddrehzahlsensor (L)	Capteur de vitesse de la roue (G)	Voorwieltoerentalsensor (L)
E26/BLK	Engine harness (To C03)	Motor-Kabelbaum (ZUM C03)	Faisceau de câbles du moteur (AU C03)	Motorbedradingsbundel (naar C03)
E27/BLK	Back-up light switch	Rückfahrleuchtenschalter	Interrupteur de feux de marche arrière	Achteruitrijlichtschakelaar
E32/N	Front fog light (L)	Vordere Nebelleuchten (L)	Feu de d'antibrouillard (G)	Voormistlicht (L)

No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Main harness	Haupt-Kabelbaum	Faisceau de câbles principal	Hoofdbedradingsbundel
E34/BLK	Headlight beam leveling actuator (L)	Scheinwerferstrahlnivellierstellglied (L)	Commande de réglage du faisceau de phare (G)	Actuator van koplamp-hoogteverstelling (L)
E35/BLK	Headlight (L)	Scheinwerferlicht (L)	Phare (G)	Koplamp (L)
E36/BLK	Front position light (L)	Vordere parkleuchte (L)	Feu de position avant (G)	Parkeerlicht voor (L)
E37/BLK	Front turn signal light (L)	Frontblinkleuchte (L)	Clignotant avant (G)	Richtingaanwijzer voor (L)
E38/BLK	Front and rear washer motor	Waschanlagenmotor Front-Heck	Moteur de lave-glace avant et arrière	Voorruit- en achterrautspoeiermotor
E42/BLK	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E43/BLK	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E44/GRY	Radiator fan motor	Kühlergebläse-motor	Moteur de ventilateur de radiateur	Koelventilatormotor
E46/GRY	Instrument panel harness (To G42)	Armaturenblett-kabelbaum (ZUM G42)	Faisceau de fils électriques de planche de bord (AU G42)	Instrumentenpaneelbedradingsbundel (naar G42)
E47/GRY	Instrument panel harness (To G41)	Armaturenblett-kabelbaum (ZUM G41)	Faisceau de fils électriques de planche de bord (AU G41)	Instrumentenpaneelbedradingsbundel (naar G41)
E48/N	Side turn signal light (L)	Seitenblinkleuchte (L)	Eclairage de clignotant (G)	Richtingaanwijzer zijkant (L)
E52/BLK	Fuel pump relay	Kraftstoff pumpenrelais	Relais de pompe à carburant	Brandstofpomprelais
E53/BLK	Radiator fan control relay #1	Kühlergebläsesteuerrelais #1	Relais de commande de ventilateur de radiateur #1	Stuurrelais 1 van radiatorventilator
E54/BLK	Horn relay	Hupenrelais	Relais d'avertisseur sonore	Claxonrelais
E55/BLK	Compressor relay	Kompressorrelais	Relais de compresseur	Compressorrelais
E57/BLK	Front fog light relay	Nebelleuchten relais	Relais d'antibrouillard avant	Voormistlichtrelais
E66/BLK	A/C Pressure sensor	Klimaanlagendrucksensor	Capteur de pression d'A/C	A/C-druksensor
E67/ORN	Fuel temperature sensor	Kraftstofftemperatur sensor	Capteur de température du carburant	Brandstoftemperatuursensor
E69/BLK	Radiator fan control relay #2	Kühlergebläsesteuerrelais #2	Relais de commande de ventilateur de radiateur #2	Stuurrelais 2 van radiatorventilator
E70/BLK	Main fuse	Hauptsicherung	Fusible principal	Hoofdzekering
E71/BLK	Injector harness (To D46)	Einspritzventil-Kabelbaum (ZUM D46)	Faisceau de câbles de l'injecteur (AU D46)	Verstuiverbedradingsbundel (naar D46)
E72/BLK	Glow controller	Flammwächter	Régulateur de préchauffage	Voorgloeiregelapparaat
E73/N	Radiator fan control relay #3	Kühlergebläsesteuerrelais #3	Relais de commande de ventilateur de radiateur #3	Stuurrelais 3 van radiatorventilator
E74/BLK	Fuel heating relay	Kraftstoffheizungsrelais	Relais de chauffage du carburant	Brandstofverwarmingsrelais
E75/BLU	Main relay	Hauptrelais	Relais principal	Hoofdrelais
E76/N	Horn (+)	Hupe (+)	Avertisseur (+)	Claxon (+)
E77/N	Horn (-)	Hupe (-)	Avertisseur (-)	Claxon (-)

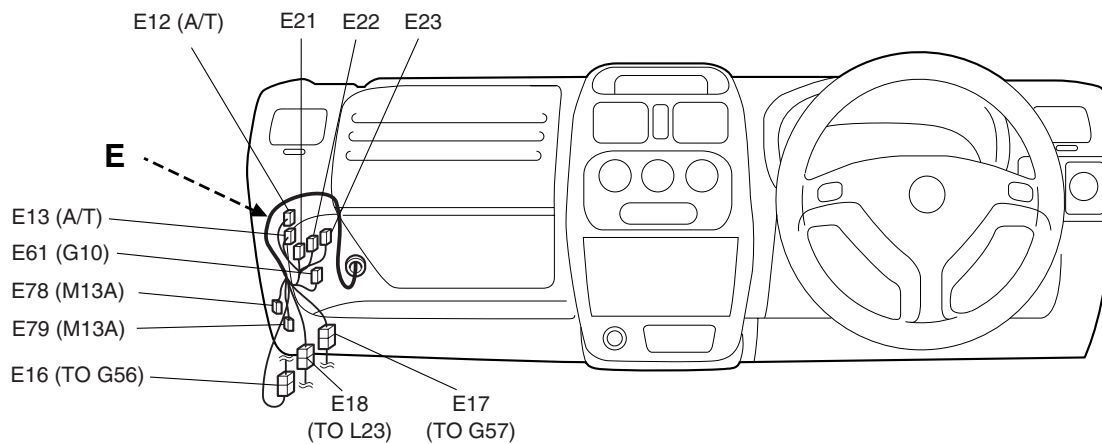
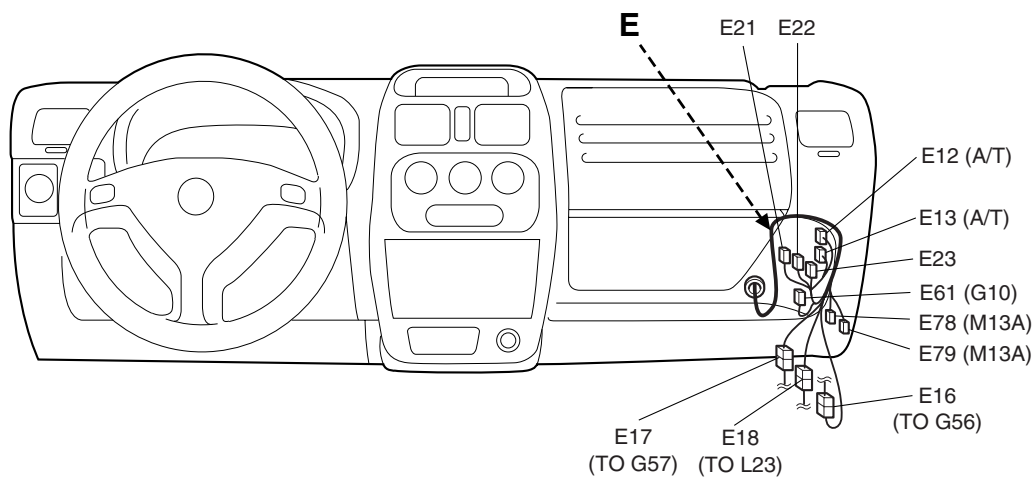
Instrument panel
Armaturenbrett
Panneau d'instruments
Instrumentenpaneel

E: Main harness

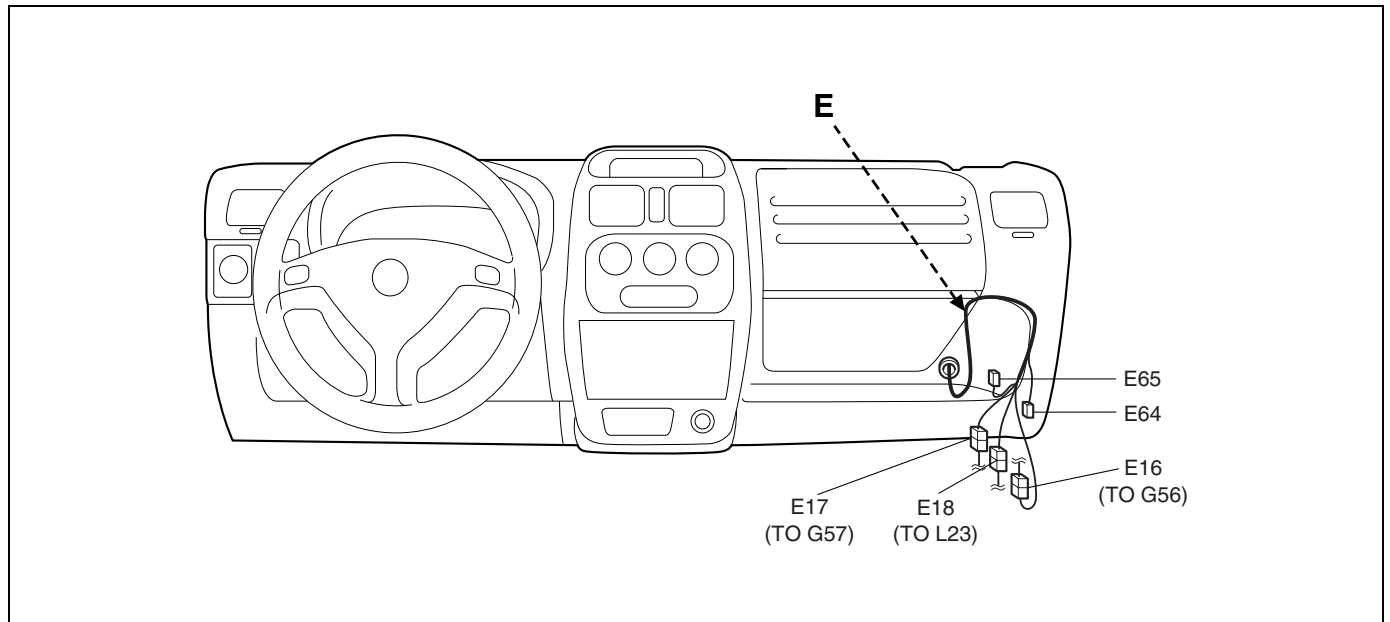
E: Haupt-Kabelbaum

E: Faisceau de câbles principal

E: Hoofdbedradingsbundel

RHD (G10 / M13A)**LHD (G10 / M13A)**

LHD (DSL)

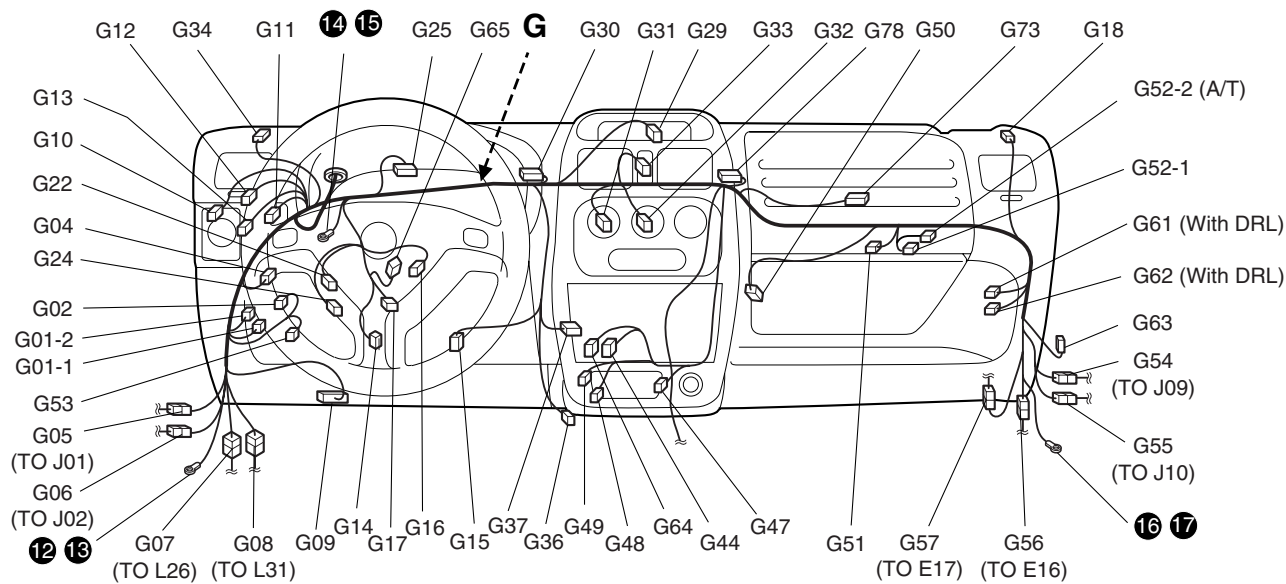


No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Main harness	Haupt-Kabelbaum	Faisceau de câbles principal	Hoofdbedradingsbundel
E12/N(A/T)	TCM			
E13/N(A/T)	TCM			
E16/N	Instrument panel harness (To G56)	Armaturenbrett-kabelbaum (ZUM G56)	Faisceau de fils électriques de planche de bord (AU G56)	Instrumentenpaneelbedradingsbundel (naar G56)
E17/BRN	Instrument panel harness (To G57)	Armaturenbrett-kabelbaum (ZUM G57)	Faisceau de fils électriques de planche de bord (AU G57)	Instrumentenpaneelbedradingsbundel (naar G57)
E18/BLK	Floor harness (To L23)	Boden-Kabelbaum (ZUM L23)	Faisceau de câbles de plancher (AU L23)	Vloerbedradingsbundel (naar L23)
E21/GRY(G10)	ECM			
E21/N(M13A)				
E22/GRY(G10)	ECM			
E22/N(M13A)				
E23/GRY(G10)	ECM			
E23/N(M13A)				
E61/N(G10)	J/C #3			
E64/BLU(DSL)	Diagnosis connector	Diagnosestecker	Connecteur de diagnostic	Diagnosestekker
E65/BLK(DSL)	Speed sensor relay	Geschwindigkeitssensorrelais	Relais de capteur de vitesse	Rijsnelheidssensorrelais
E78/N(M13A)	J/C #4			
E79/N(M13A)	J/C #5			

G: Instrumentenpaneelbedradingsbundel

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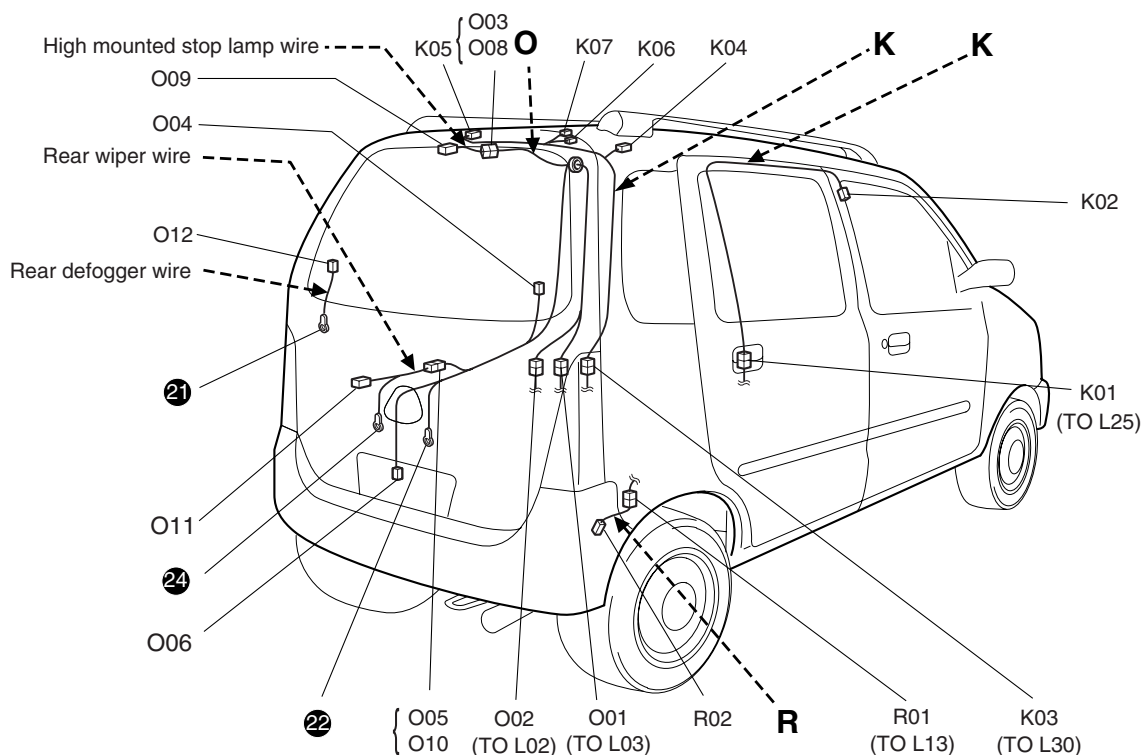
LHD (M13A)



No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Instrument panel harness	Instrumententafel-Kabelbaum	Faisceau de câbles du panneau des instruments	Instrumentenpaneelbedradingsbundel
G01-1/BLK	Rear defogger relay	Relais der Heckscheibenheizung	Relais de degivreur arrière	Achterrautverwarmingsrelais
G01-2/BLK	Tail light relay	Heckleuchtenrelais	Relais de feux arrière	Achterlichtrelais
G02/N	Door lock controller	Steuereinheit für türverriegelung	Commande de verrouillage des portes	Portierslotregeleenheid
G04/BLK	Turn signal relay	Blinkerrelais	Relais de clignotant	Richtingaanwijzerrelais
G05/N	Front door wire (To J01)	Fronttüraabel (ZUM J01)	Fil de portier avant (AU J01)	Voorportierdraad (naar J01)
G06/N	Front door wire (To J02)	Fronttüraabel (ZUM J02)	Fil de portier avant (AU J02)	Voorportierdraad (naar J02)
G07/N	Floor harness (To L26)	Boden-Kabelbaum (ZUM L26)	Faisceau de câbles de plancher (AU L26)	Vloerbedradingsbundel (naar L26)
G08/N	Floor harness (To L31)	Boden-Kabelbaum (ZUM L31)	Faisceau de câbles de plancher (AU L31)	Vloerbedradingsbundel (naar L31)
G09/BLK	DLC			
G10/BLK	Lighting switch	Lichtschalter	Commutateur de feu	Lichtschakelaar
G11/BLK	Headlight leveling switch	Scheinwerfer-justierschalter	Commutateur de reglage de phare	Schakelaar van koplamphoogteverstelling

No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Instrument panel harness	Instrumententafel-Kabelbaum	Faisceau de câbles du panneau des instruments	Instrumentenpaneelbedradingsbundel
G12/BLK	Front fog light switch	Nebelscheinwerferschalter	Interrupteur d'anti-brouillard avant	Voormistlichtschakelaar
G13/GRN	Rear fog light switch	Schalter für hecknebel-leuchte	Interrupteur d'anti-brouillard arrière	Achtermistlichtschakelaar
G14/N	P/S control module	P/S-steuermodule	Module de commande du P/S	P/S-regelapparaat
G15/N	Brake light switch	Bremslicht-schalter	Interrupteur de feux stop	Remlichtschakelaar
G16/BLK	Wiper and washer switch	Wischer und wascher-schalter	Contacteur de l'essuie-glace et du lave-glace	Wisser- en sproeierschakelaar
G17/GRY	Imb CM			
G18/BLK	Front speaker (R)	Frontlautsprecher (R)	Haut-parleur avant (D)	Voorluidspreker (R)
G22/BLK	Dimmer & passing switch	Abblend- u. 1ichthupen-schalter	Contacteur d'inverseur feux de route et feux de croisement	Dimlicht- en passeersignaal-schakelaar
G24/BLK	Ignition switch	Zündschalter	Contacteur d'allumage	Contacts1ot
G25/GRY	Combination meter	Kombinationsinstrument	Compteur mixte	Combinatiemeter
G29/N	Clock	Uhr	Horloge	Klok
G30/ORN	J/C #1			
G31/N	A/C switch	Klimaanlagen-schalter	Commutateur A/C	A/C-schakelaar
G32/N	Blower fan & rear window defogger switch	Gebläse- & heckscheibenheizungsschalter	Contacteur de désembueur de lunette arrière et ventilateur de soufflerie	Aanjager- en achterrui-verwarmingsschakelaar
G33/BLK	Hazard light switch	Warnblinkerschalter	Commutateur de feude de tresse	Alarmknipperlichtenschakelaar
G34/BLK	Front speaker (L)	Frontlautsprecher (L)	Haut-parleur avant (G)	Voorluidspreker (L)
G36/N	Heater resistor	Heizungswiderstand	Resistance de chauffage	Verwarmingssweerstand
G37/N	Blower fan motor	Gebläsemotor	Moteur de ventilateur soufflant	Aanjagermotor
G44/BRN	Radio			
G47/N	Ashtray ILL	Aschenbecherbeleuchtung	Tmoin de cendrier	Asbakverlichting
G48/N	Cigarette lighter (-)	Zigarettenanzünder (-)	Allume-cigares (-)	Sigarettenaansteker (-)
G49/N	Cigarette lighter (+)	Zigarettenanzünder (+)	Allume-cigares (+)	Sigarettenaansteker (+)
G50/N	EVAP thermistor	Verdampfungsthermistor	Thermistance d'EVAP	EVAP-thermistor
G51/BLK	Intermittent timer	Intervalltimer	Minuterie intermittente	Intervaltimer
G52/BLK (G10 / DSL)	Blower motor relay	Heizungsrelais	Relais de chauffage	Aanjagermotorrelais
G52-1/BLK(M13A)	Blower motor relay	Heizungsrelais	Relais de chauffage	Aanjagermotorrelais
G52-2/BLK(A/T)	A/T relay	Automatikgetrieberelais	Relays d'vitesses automatique	A/T-relais
G53/N	Rear fog light controller	Nebelschlußleuchten-Steuergerät	Commande d'anti-brouillard arrière	Achtermistlichtregeleenheid
G54/N	Front door wire (To J09)	Fronttüraabel (ZUM J09)	Fil de portier avant (AU J09)	Voorportierdraad (naar J09)
G55/N	Front door wire (To J10)	Fronttüraabel (ZUM J10)	Fil de portier avant (AU J10)	Voorportierdraad (naar J10)
G56/N	Main harness (To E16)	Haupt-Kabelbaum (ZUM E16)	Faisceau de câbles principal (AU E16)	Hoofdbedradingsbundel (naar E16)
G57/BRN	Main harness (To E17)	Haupt-Kabelbaum (ZUM E17)	Faisceau de câbles principal (AU E17)	Hoofdbedradingsbundel (naar E17)
G61/N(LHD)	DRL controller	DRL-regler	Regulateur de DRL	DRL-regeleenheid
G62/N(LHD)	DRL controller	DRL-regler	Regulateur de DRL	DRL-regeleenheid
G63/N	Antenna amplifier	Antennenverstärker	Amplificateur d'antenne	Antenneversterker
G64/GRY	Radio			

No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Instrument panel harness	Instrumententafel-Kabelbaum	Faisceau de câbles du panneau des instruments	Instrumentenpaneelbedradingsbundel
G65/BLK	Driver inflator	Gasgenerator (Fahrerseite)	Gazogène côté conducteur	Opblaaseenheid bestuurdersairbag
G73/YEL	Passenger inflator	Gasgenerator (Beifahrerseite)	Gazogène côté passager	Opblaaseenheid passagiersairbag
G74/GRY(DSL) (IF EQPD)	Diode	Diode	Diode	Diodo
G78/ORN	J/C #2			
G82/BLK(DSL)	Acceleration pedal sensor	Fahrpedalsensor	Capteur de pédale d'accélérateur	Gaspedaalsensor
G85/BRN(DSL)	Clutch switch	Kupplungsschalter	Contacteur d'embrayage	Koppelingsschakelaar
G92/N(DSL)	PTC control module	PTC-steuermodul	Module de commande PTC	PTC-regelapparaat
G93/N(DSL)	PTC heater #1	PTC-Heizung #1	Réchauffeur de PTC #1	PTC-verwarming #1
G94/N(DSL)	PTC heater #2	PTC-Heizung #2	Réchauffeur de PTC #2	PTC-verwarming #2

Roof, rear**Dach, heck****Toit, Arrière****Dak, achter****K:Roof wire, Rear roof wire, High mounted stop light wire, Rear wiper wire, Rear defogger wire****K:** Dachleitung, Hinterer dachdraht, Kabel für oberes Bremslicht, Draht für Heckscheibenwischer, Heckscheibenbeheizungsdraht**K:** Fil de toit, Câble de toit arrière, Fil de feu stop en position élevée, Câble d'essuie-glace arrière, Achterruitverwarmingskabel**K:** Dakdraad, achterdakdraad, draad van hooggemonteerd remlicht, achterruitwisserdraad, achterruitverwarmingsdraad**O: Rearend door harness****O:** Hecktür-Kabelbaum**O:** Faisceau de câbles de hayon arrière**O:** Kofferdekselbedradingsbundel**R: Fuel pump wire****R:** Kraftstoffpumpen-Signalleitung**R:** Câble de pompe à essence**R:** Brandstofpompdraad

No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Roof wire	Dachleitung	Fil de toit	Dakdraad
K01/N	Floor harness (To L25)	Boden-Kabelbaum (ZUM L25)	Faisceau de câbles de plancher (AU L25)	Vloerbedradingsbundel (naar L25)
K02/GRY	Interior light	Innenraumleuchte	Plafonnier	Interieurverlichting
	Rear roof wire	Hinterer dachdraht	Câble de toit arrière	Achterdakdraad
K03/N	Floor harness (To L30)	Boden-Kabelbaum (ZUM L30)	Faisceau de câbles de plancher (AU L30)	Vloerbedradingsbundel (naar L30)
K04/BLK	Rear speaker (R)	Hecklautsprecher (R)	Haut-parleur arrière (D)	Achterluidspreker (R)
K05/BLK	Rear speaker (L)	Hecklautsprecher (L)	Haut-parleur arrière (G)	Achterluidspreker (L)
K06/BLK	Interior light (+) (Rear)	Innenraumleuchte (+) (Hinteren)	Plafonnier (+) (Arrière)	Interieurverlichting (+) (achter)
K07/BLK	Interior light (-) (Rear)	Innenraumleuchte (-) (Hinteren)	Plafonnier (-) (Arrière)	Interieurverlichting (-) (achter)

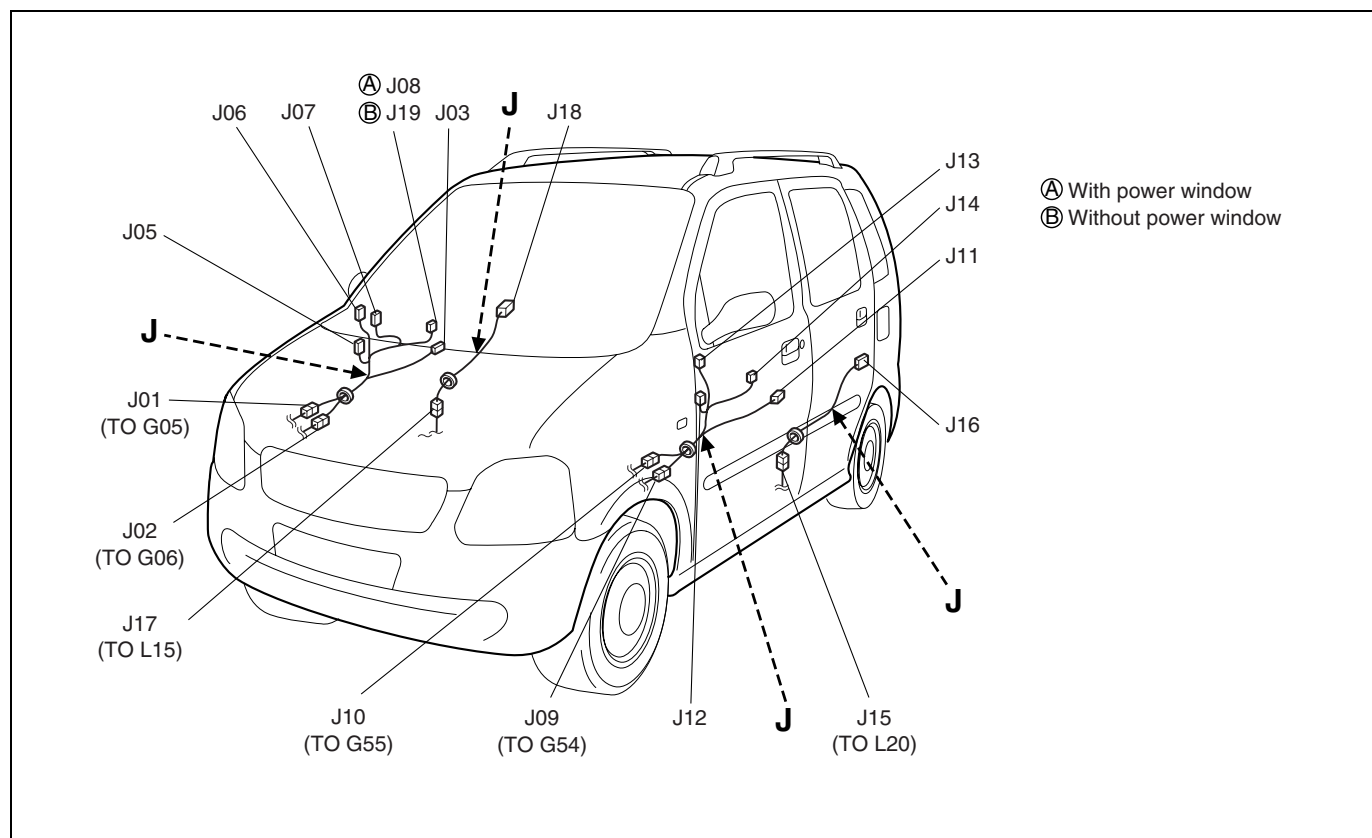
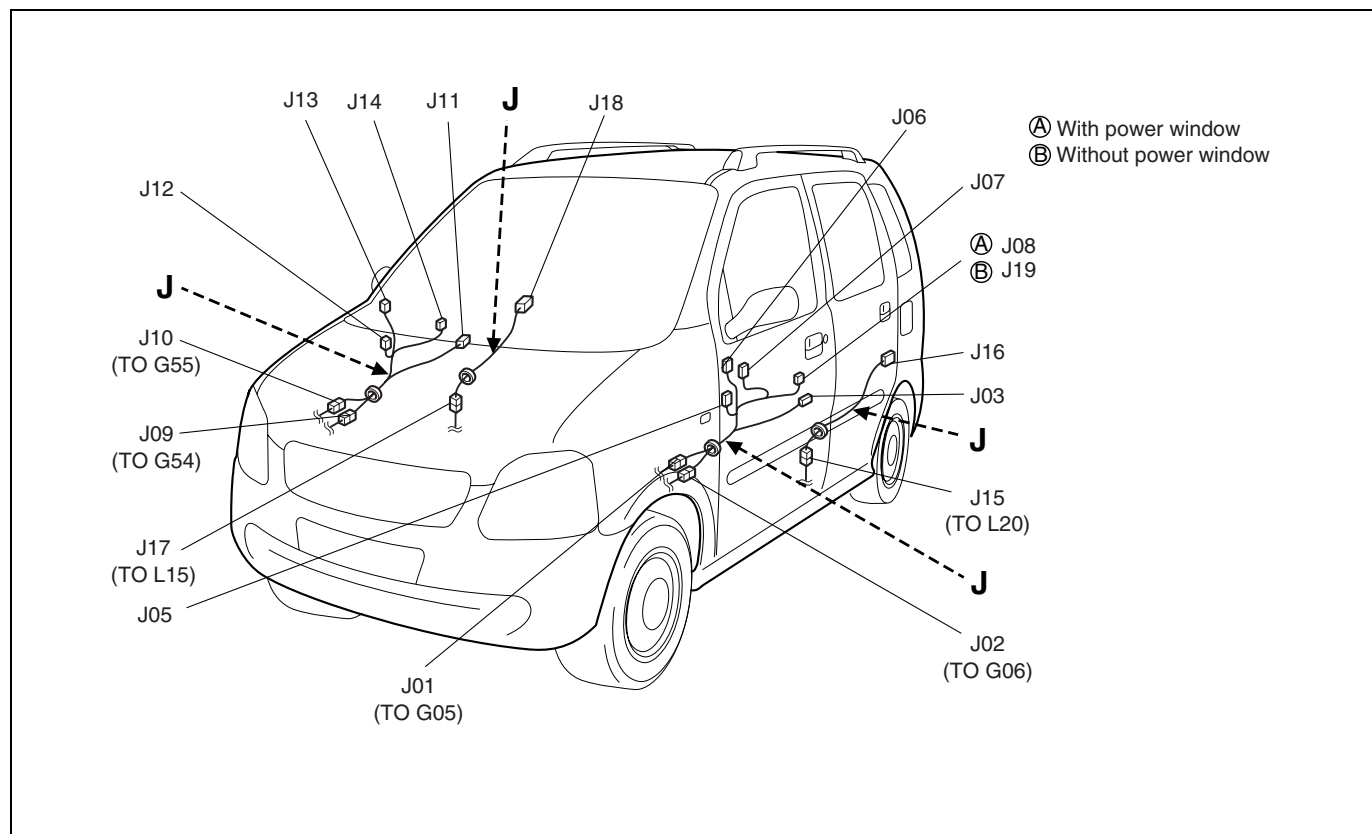
No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Rearend door harness	Hecktür-Kabelbaum	Faisceau de câbles de hayon arrière	Kofferdekselbedradingsbundel
O01/N	Floor harness (To L03)	Boden-Kabelbaum (ZUM L03)	Faisceau de câbles de plancher (AU L03)	Vloerbedradingsbundel (naar L03)
O02/N	Floor harness (To L02)	Boden-Kabelbaum (ZUM L02)	Faisceau de câbles de plancher (AU L02)	Vloerbedradingsbundel (naar L02)
O03/N	High mounted stop light wire (To O08)	Kabel für oberes bremslicht (ZUM O08)	Fil de feu stop en position élevée (AU O08)	Draad van hooggemonteerd remlicht (naar O08)
O04/BLK	Rear defogger (+)	Heckscheibenentfeuchter (+)	Désembueur arrière (+)	Achterrautverwarming (+)
O05/N	Rear wiper wire (To O10)	Draht für heckscheibenwischer (ZUM O10)	Câble d'essuie-glace arrière (AU O10)	Achterrautwisserdraad (naar O10)
O06/N	Rearend door lock motor & lock switch	Motor und Schalter der Hecktüverriegelung	Moteur de verrouillage de portière arrière et contacteur de verrouillage	Kofferdekselslotmotor en -slotschakelaar
	High mounted stop light wire	Kabel für oberes bremslicht	Fil de feu stop en position élevée	Draad van hooggemonteerd remlicht
O08/N	Rearend door harness (To O03)	Hecktür-Kabelbaum (ZUM O03)	Faisceau de câbles de hayon arrière (AU O03)	Kofferdekselbedradingsbundel (naar O03)
O09/N	High mounted stop light	Dritte bremsleuchte	Feux stop surélevés	Hooggemonteerd remlicht
	Rear wiper wire	Draht für heckscheibenwischer	Câble d'essuie-glace arrière	Achterrautwisserdraad
O10/N	Rearend door harness (To O05)	Hecktür-Kabelbaum (ZUM O05)	Faisceau de câbles de hayon arrière (AU O05)	Kofferdekselbedradingsbundel (naar O05)
O11/BLK	Rear wiper motor	Heckscheibenwischermotor	Moteur d'essuie-glace arrière	Achterrautwissermotor
	Rear defogger wire	Heckscheibenbeheizungsdraht	Câble de désembueur arrière	Achterrautverwarmingsdraad
O12/BLK	Rear defogger (-)	Heckscheibenentfeuchter (-)	Désembueur arrière (-)	Achterrautverwarming (-)
	Fuel pump wire	Kraftstoffpumpen-Signalleitung	Câble de pompe à essence	Brandstofpompdraad
R01/N	Floor harness (To L13)	Bodenwannen-kabelbaum (ZUM L13)	Faisceau de fils électriques de plancher (AU L13)	Vloerbedradingsbundel (naar L13)
R02/GRY	Fuel pump and gauge	Kraftstoffpumpe und -anzeige	Pompe a carburant et jauge	Brandstofpomp en -meter

J: Front door wire, Rear door wire

J: Fronttürkabel, Hecktürkable

J: Fil de portière avant, Fil de portière arrière

J: Voorportierdraad, achterportierdraad

RHD**LHD**

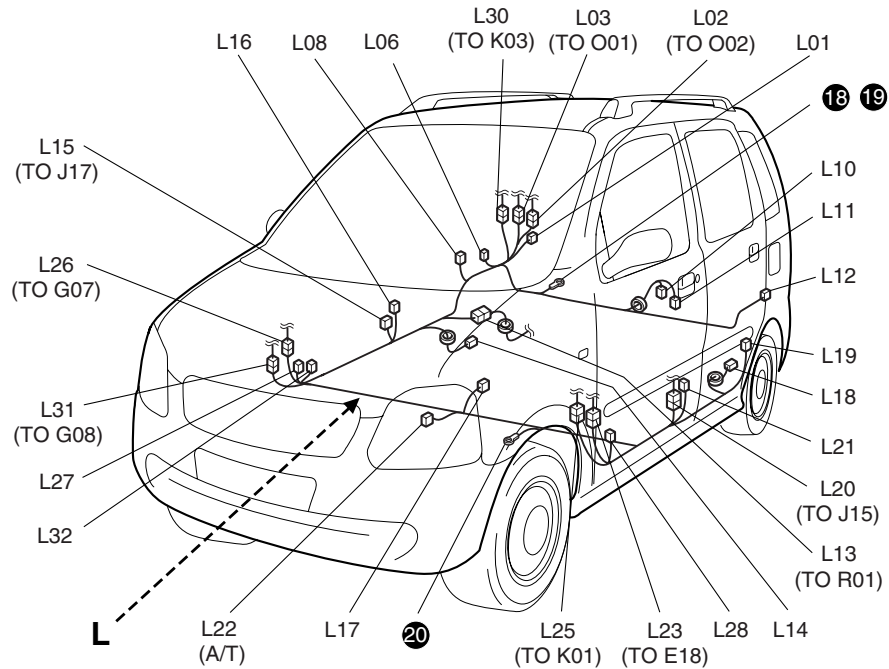
No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Front door wire (Driver side)	Fronttüraabel (Fahrerseite)	Fil de portier avant (Côté conducteur)	Voorportierdraad (bestuurderszijde)
J01/N	Instrument panel harness (To G05)	Armaturen Brett-kabelbaum (ZUM G05)	Faisceau de fils électriques de planche de bord (AU G05)	Instrumentenpaneelbedradingsbundel (naar G05)
J02/N	Instrument panel harness (To G06)	Armaturen Brett-kabelbaum (ZUM G06)	Faisceau de fils électriques de planche de bord (AU G06)	Instrumentenpaneelbedradingsbundel (naar G06)
J03/GRY	Front door lock motor (Driver side)	Vordertür-Sperrmotor (Fahrerseite)	Moteur de verrouillage de porte avant (Côté conducteur)	Voorportierslotmotor (bestuurderszijde)
J05/N	Front power window motor (Driver side)	Frontchibenhebemotor (Fahrerseite)	Moteur de lève-vitre avant (Côté conducteur)	Voorportierruitmotor (bestuurderszijde)
J06/N	Power mirror motor (Driver side)	Spiegelmotor (Fahrerseite)	Moteur de retro viseur (Côté conducteur)	Motor van elektrisch verstelbare spiegel (bestuurderszijde)
J07/N	Power mirror switch	Spiegelschalter	Interrupteur de rétroviseurs	Schakelaar van elektrisch verstelbare spiegel
J08/N	Power window main switch	Hauptschalter für automatischen Fensterheber	Interrupteur principal de lève-vitres	Hoofdschakelaar van elektrische ruitbediening
J19/N	Door lock main switch	Türsperren-Hauptschalter	Interrupteur principal de verrouillage des portes	Hoofdschakelaar van centrale portiervergrendeling
	Front door wire (Passenger side)	Fronttüraabel (Beifahrerseite)	Fil de portier avant (Côté conducteur)	Voorportierdraad (passagierszijde)
J09/N	Instrument panel harness (To G54)	Armaturen Brett-kabelbaum (ZUM G54)	Faisceau de fils électriques de planche de bord (AU G54)	Instrumentenpaneelbedradingsbundel (naar G54)
J10/N	Instrument panel harness (To G55)	Armaturen Brett-kabelbaum (ZUM G55)	Faisceau de fils électriques de planche de bord (AU G55)	Instrumentenpaneelbedradingsbundel (naar G55)
J11/GRY	Front door lock motor (Passenger side)	Vordertür-Sperrmotor (Beifahrerseite)	Moteur de verrouillage de porte avant (Côté passager)	Voorportierslotmotor (passagierszijde)
J12/N	Front power window motor (Passenger side)	Frontchibenbebermotor (Beifahrerseite)	Moteur de lève-vitre avant (Côté conducteur)	Voorportierruitmotor (passagierszijde)
J13/N	Power mirror motor (Passenger side)	Spiegelmotor (Beifahrerseite)	Moteur de retro viseur (Côté conducteur)	Motor van elektrisch verstelbare spiegel (passagierszijde)
J14/N	Front power window sub switch	Hilfsschalter für vorderen elektrischen Fensterheber	Commutateur secondaire de lève-glace électrique avant	Hulpschakelaar elektrisch bediende voorruit
	Rear door wire	Hecktürkabel	Fil de portière arrière	Achterportierdraad
J15/N	Floor harness (To L20)	Boden-Kabelbaum (ZUM L20)	Faisceau de câbles de plancher (AU L20)	Vloerbedradingsbundel (naar L20)
J16/GRY	Rear door lock motor (L)	Motor für Türverriegelung hinten (L)	Moteur de verrouillage des portes arrière (G)	Achterportierslotmotor (L)
J17/N	Floor harness (To L15)	Boden-Kabelbaum (ZUM L15)	Faisceau de câbles de plancher (AU L15)	Vloerbedradingsbundel (naar L15)
J18/GRY	Rear door lock motor (R)	Motor für Türverriegelung hinten (R)	Moteur de verrouillage des portes arrière (D)	Achterportierslotmotor (R)

Floor
Boden
Plancher
Vloer

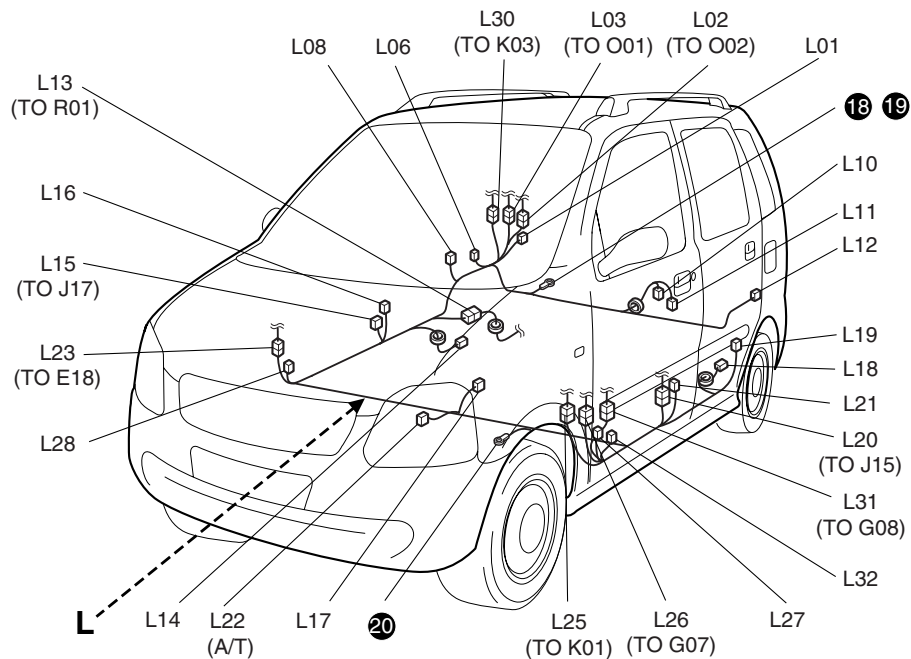
L: Floor harness

L: Boden-Kabelbaum
 L: Faisceau de câbles de plancher
 L: Vloerbedradingsbundel

RHD



LHD



No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Floor harness	Boden-Kabelbaum	Faisceau de câbles de plancher	Vloerbedradingsbundel
L01/N	Rear combination light (R)	Heckkombinations leuchte (R)	Feu combiné arrière (D)	Combinatielicht achter (R)
L02/N	Rearend door harness (To O02)	Hecktür-Kabelbaum (ZUM O02)	Faisceau de câbles de hayon arrière (AU O02)	Kofferdekselbedradingsbundel (naar O02)
L03/N	Rearend door harness (To O01)	Hecktür-Kabelbaum (ZUM O01)	Faisceau de câbles de hayon arrière (AU O01)	Kofferdekselbedradingsbundel (naar O01)
L06/N	Accessory socket	Zubehörbunchse	Douille pour accessoire	Accessoire-aansluiting
L08/N	Rear door switch (R)	Hintere Türschalter (R)	Commutateur de porte arrière (D)	Achterportierschakelaar (R)
L10/N	License plate light (R)	Kennzeichenleuchte (R)	Feu de plaque d'immatriculation (D)	Kentekenplaatverlichting (R)
L11/N	License plate light (L)	Kennzeichenleuchte (L)	Feu de plaque d'immatriculation (G)	Kentekenplaatverlichting (L)
L12/N	Rear combination light (L)	Heckkombinations leuchte (L)	Feu combiné arrière (G)	Combinatielicht achter (L)
L13/N	Fuel pump wire (To R01)	Kraftstoffpumpen-Signalleitung (ZUM R01)	Câble de pompe à essence (AU R01)	Brandstofpomppdraad (naar R01)
L14/N	Wheel speed sensor (RR)	Raddrehzahlsensor (RR)	Capteur de vitesse de la roue (ARG)	Wieltoerentalsensor (RA)
L15/N	Rear door wire (To J17)	Hecktürkabel (ZUM J17)	Fil de portière arrière (AU J17)	Achterportierdraad (naar J17)
L16/N	Front door switch (R)	Vorderer Türschalter (R)	Commutateur de porte avant (D)	Voorportierschakelaar (R)
L17/N	Parking brake switch	Handbremsenschalter	Interrupteur de ceinture	Parkeerremschakelaar
L18/N	Wheel speed sensor (RL)	Raddrehzahlsensor (RL)	Capteur de vitesse de la roue (ARD)	Wieltoerentalsensor (LA)
L19/N	Rear door switch (L)	Hintere Türschalter (L)	Commutateur de porte arrière (G)	Achterportierschakelaar (L)
L20/N	Rear door wire (To J15)	Hecktürkabel (ZUM J15)	Fil de portière arrière (AU J15)	Achterportierdraad (naar J15)
L21/N	Front door switch (L)	Vorderer Türschalter (L)	Commutateur de porte avant (G)	Voorportierschakelaar (L)
L22/N(A/T)	A/T shift lever	Automatikgetriebewählhebel	Lévier de changement de vitesses A/T	A/T-keuzehendel
L23/BLK	Main harness (To E18)	Haupt-Kabelbaum (ZUM E18)	Faisceau de câbles principal (AU E18)	Hoofdbedradingsbundel (naar E18)
L25/N	Roof wire (To K01)	Dachleitung (ZUM K01)	Fil de toit (AU K01)	Dakdraad (naar K01)
L26/N	Instrument panel harness (To G07)	Armaturenbrett-kabelbaum (ZUM G07)	Faisceau de fils électriques de planche de bord (AU G07)	Instrumentenpaneelbedradingsbundel (naar G07)
L27/GRY	Diode #5	Diode #5	Diode #5	Diode 5
L28/ORN	Diode #4	Diode #4	Diode #4	Diode 4
L30/N	Rear roof wire (To K03)	Hintere dachdraht (ZUM K03)	Câble de toit arrière (AU K03)	Achterdakdraad (naar K03)
L31/N	Instrument panel harness (To G08)	Armaturenbrett-kabelbaum (ZUM G08)	Faisceau de fils électriques de planche de bord (AU G08)	Instrumentenpaneelbedradingsbundel (naar G08)
L32/GRY	Diode #3	Diode #3	Diode #3	Diode 3

G: Instrument panel harness

G: Instrumententafel-Kabelbaum

G: Faisceau de câbles du panneau des instruments

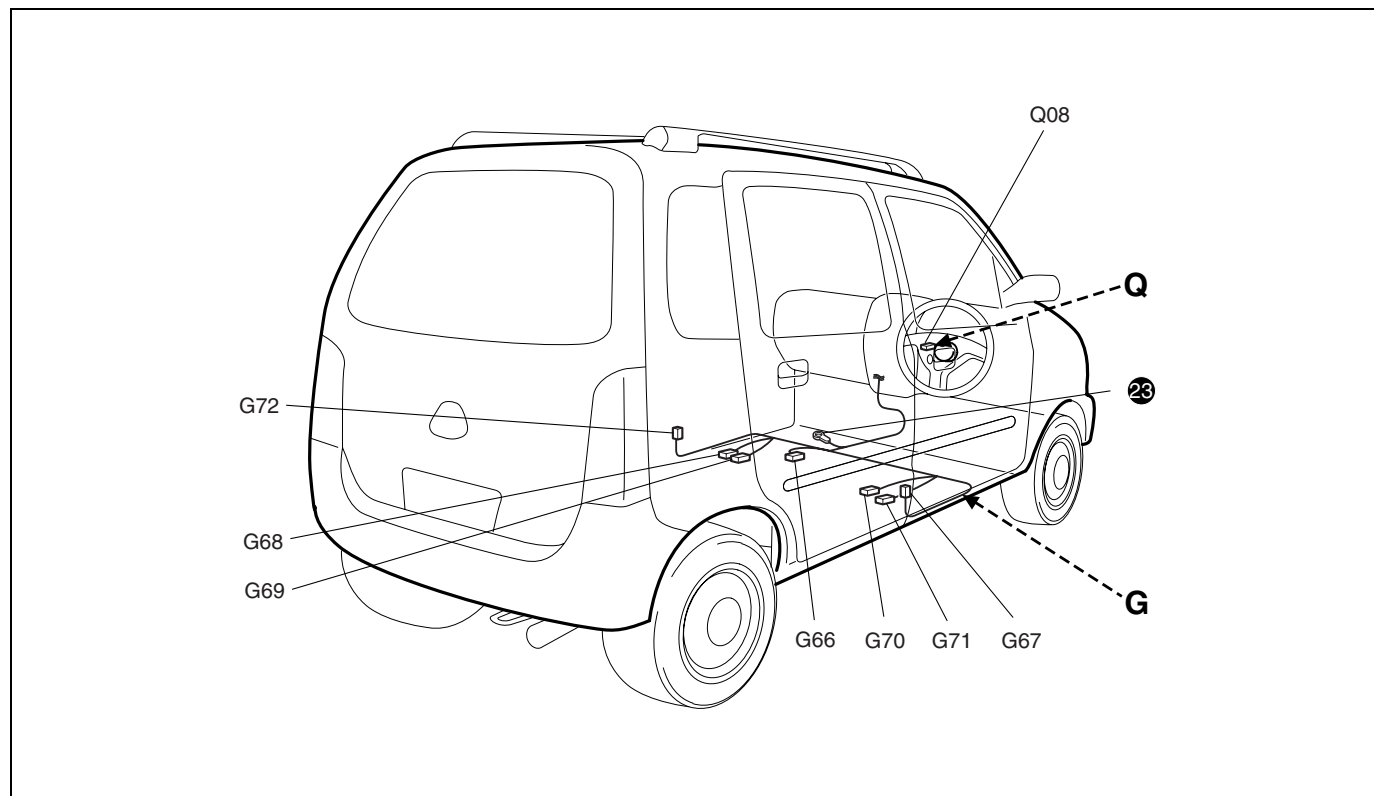
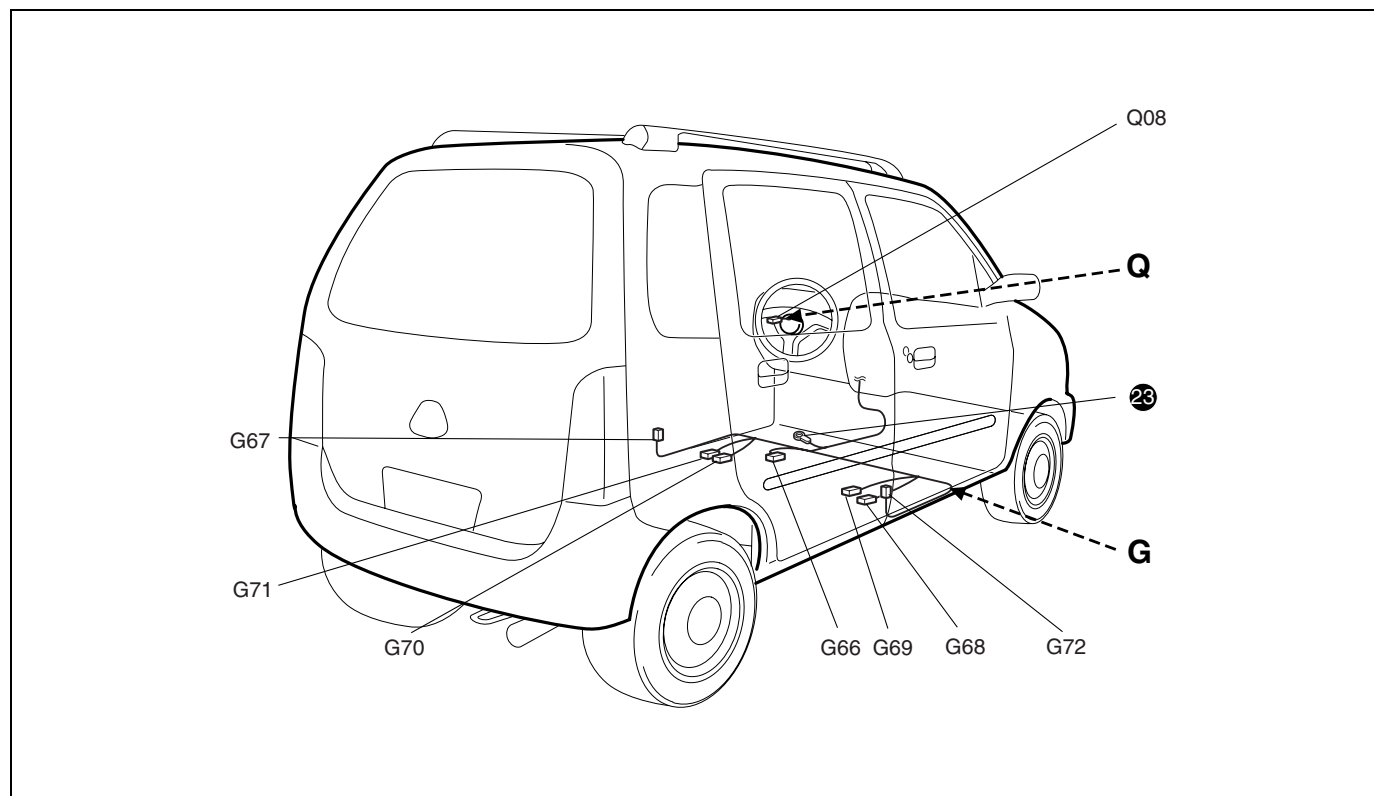
G: Instrumentenpaneelbedradingsbundel

Q: Pretensioner wire

Q: Gurtstraffer kabel

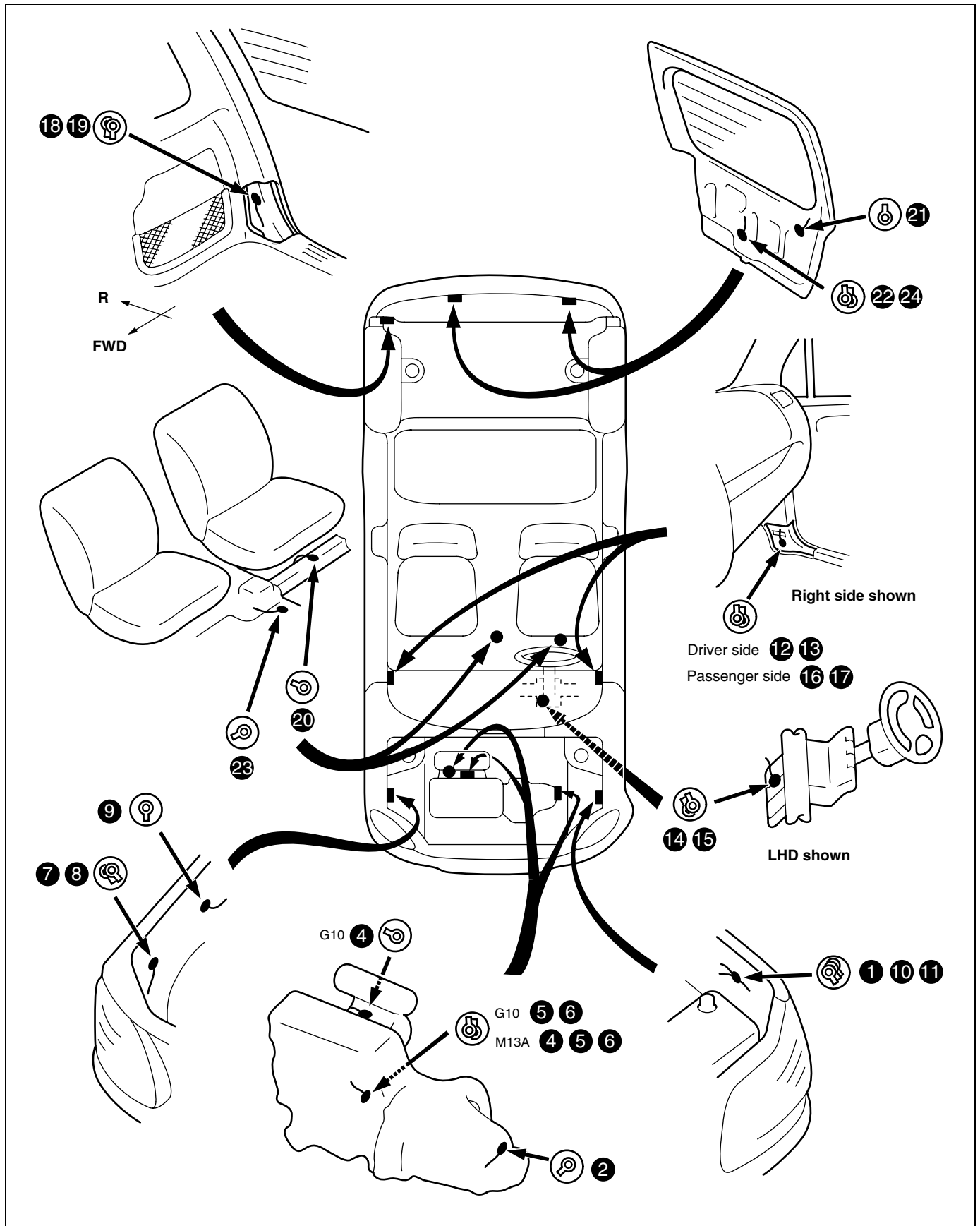
Q: Fil de prétendeur

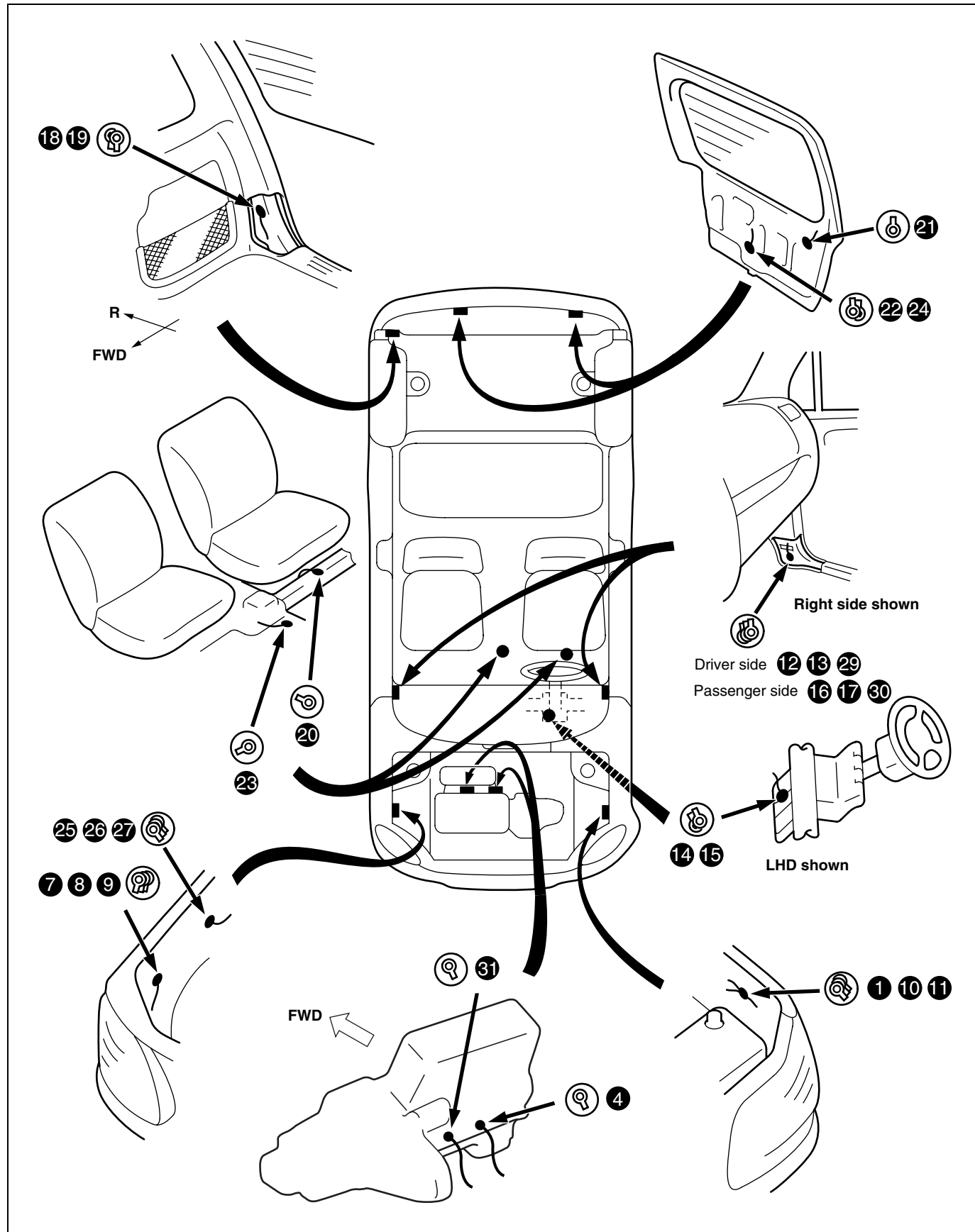
Q: Gordelvoorspannerdraad

RHD**LHD**

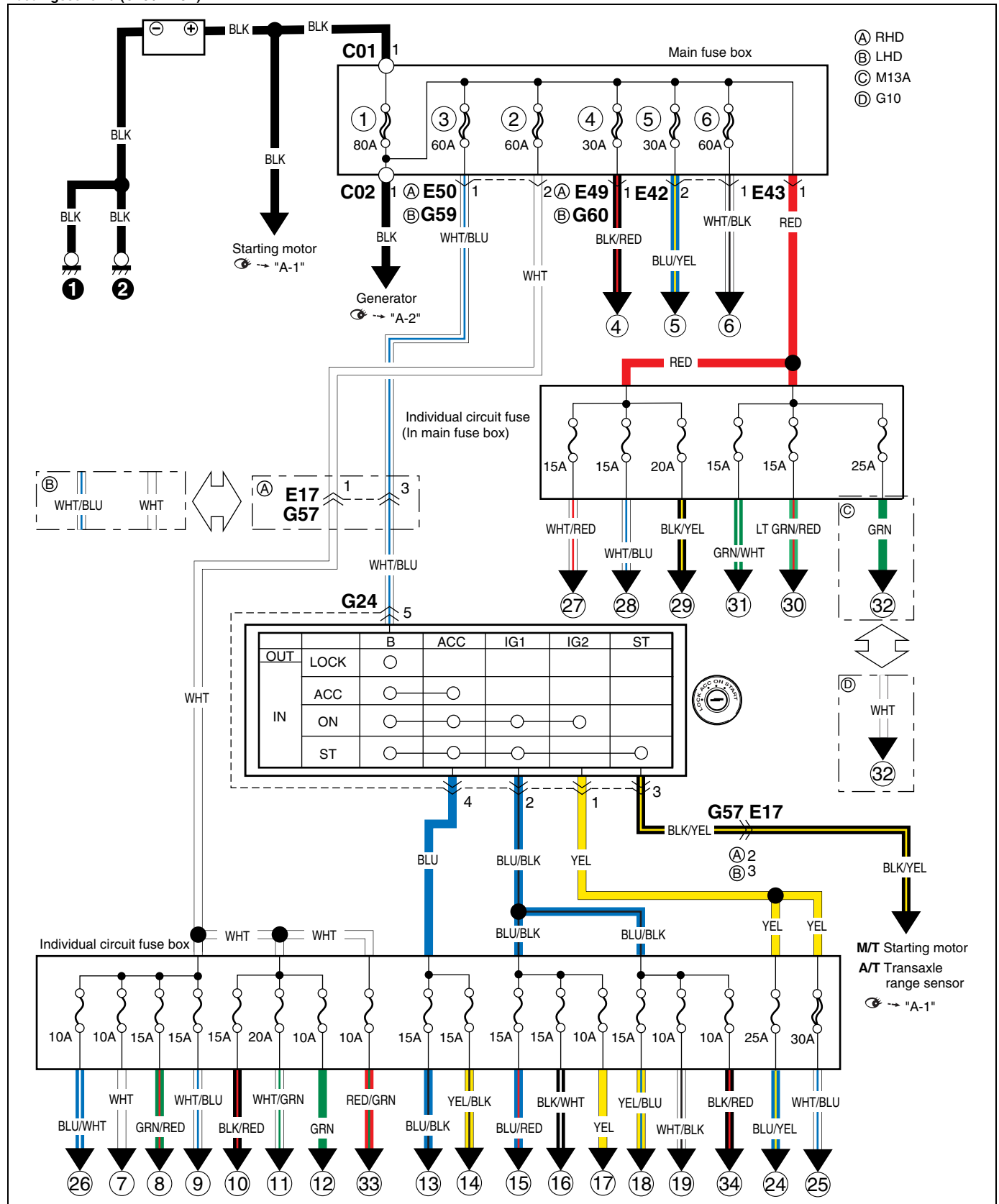
No./Color	Connective position	Anschlussposition	Position de connexion	Aansluitpositie
	Instrument panel harness	Armaturen Brett-kabelbaum	Faisceau de fils électriques de planche de bord	Instrumentenpaneelbedradingsbundel
G66/YEL	A/B SDM			
G67/YEL	Pretensioner (Driver side)	Pretensionneur (Fahrerseite)	Vorspanner (Côté conducteur)	Gordelvoorspanner (bestuurderszijde)
G68/ORN	Side air-bag sensor (Passenger side)	Seiten-Airbag-Sensor (Beifahrerseite)	Capteur d'airbag latéral (Côté passager)	Zij-airbagsensor (passagierszijde)
G69/YEL	Side air-bag inflator (Passenger side)	Seiten-Airbag gasgenerator (Beifahrerseite)	Gonfleur d'airbag latéral (Côté passager)	Zij-airbagopblaaseenheid (passagierszijde)
G70/YEL	Side air-bag inflator (Driver side)	Seiten-Airbag gasgenerator (Fahrerseite)	Gonfleur d'airbag latéral (Côté conducteur)	Zij-airbagopblaaseenheid (bestuurderszijde)
G71/ORN	Side air-bag sensor (Driver side)	Seiten-Airbag-Sensor (Fahrerseite)	Capteur d'airbag latéral (Côté conducteur)	Zij-airbagsensor (bestuurderszijde)
G72/YEL	Pretensioner (Passenger side)	Pretensionneur (Beifahrerseite)	Vorspanner (Côté passager)	Gordelvoorspanner (passagierszijde)
	Pretensioner wire	Gurtstraffer kabe	Fil de prétendeur	Gordelvoorspanner draad
Q08/YEL	Driver inflator	Gasgenerator (Fahrerseite)	Gazogène côté conducteur	Opblaaseenheid bestuurdersairbag

Memo
Notizen
Note
Memo

Ground (earth) point (G10 / M13A)**Massepunkt (G10 / M13A)****Points de masse (G10 / M13A)****Massapunt (G10 / M13A)**

Ground (earth) point (DSL)**Massepunkt (DSL)****Points de masse (DSL)****Massapunkt (DSL)**

Power supply diagram (G10 / M13A)
Stromversorgungsdiagramm (G10 / M13A)
Schéma du circuit d'alimentation (G10 / M13A)
Voedingsschema (G10 / M13A)

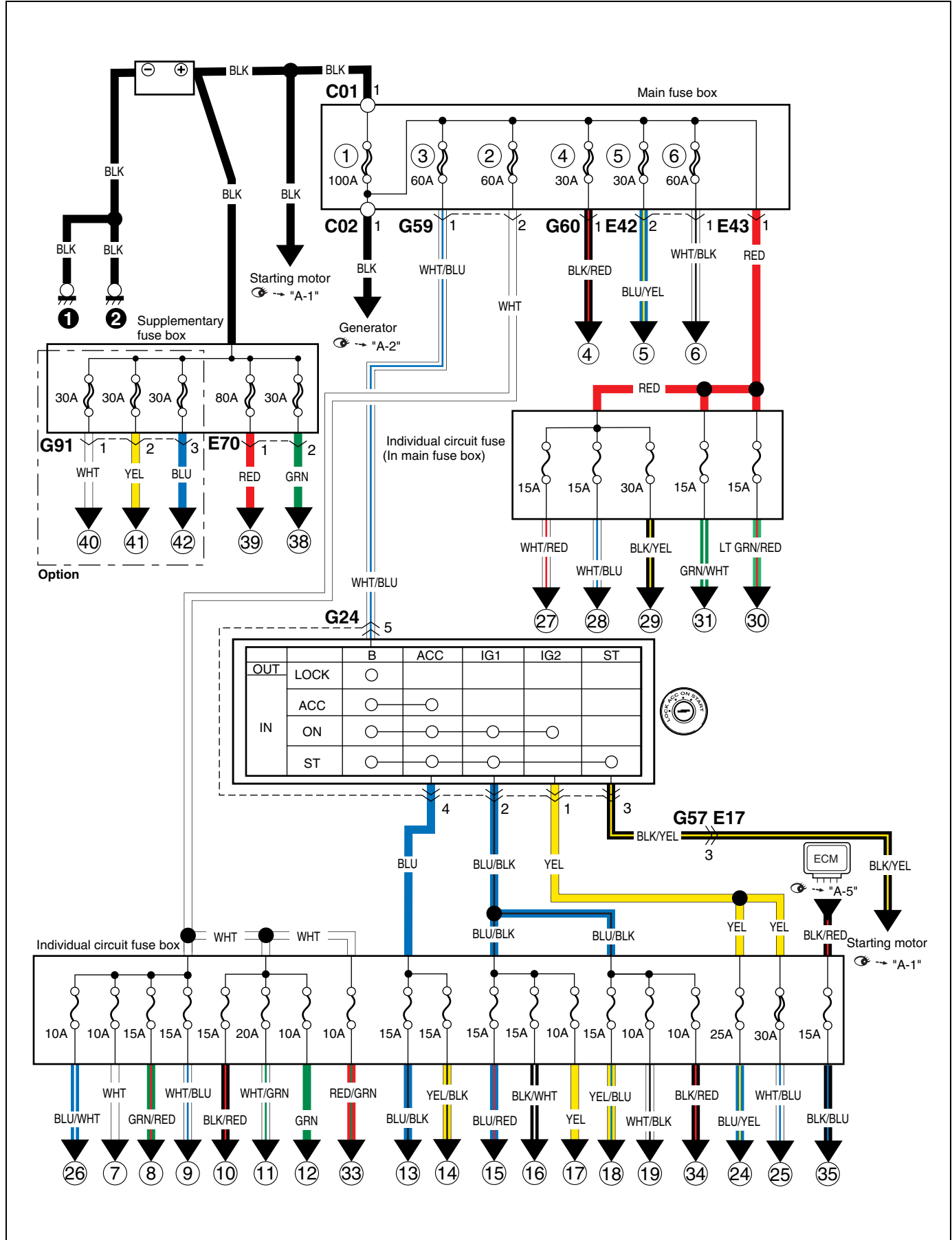


Power supply diagram (DSL)

Stromversorgungsdiagramm (DSL)

Schéma du circuit d'alimentation (DSL)

Voedingsschema (DSL)



Fuses and the protected parts

Sicherungen und geschützte teile

Fusibles et pièces protégées

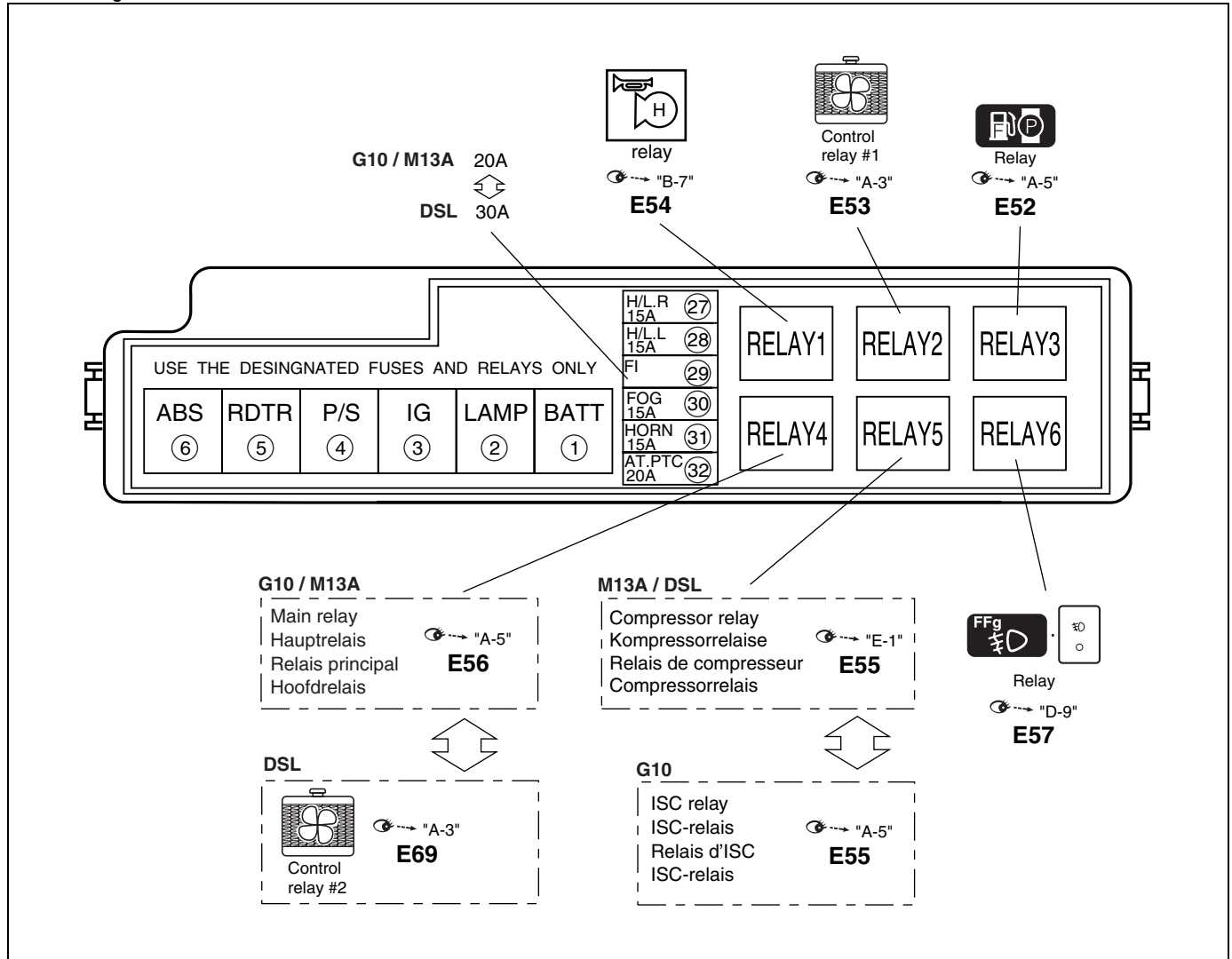
Zekeringen en beschermde onderdelen

Main fuse box

Hauptsicherungskasten

Boîte à fusibles principale

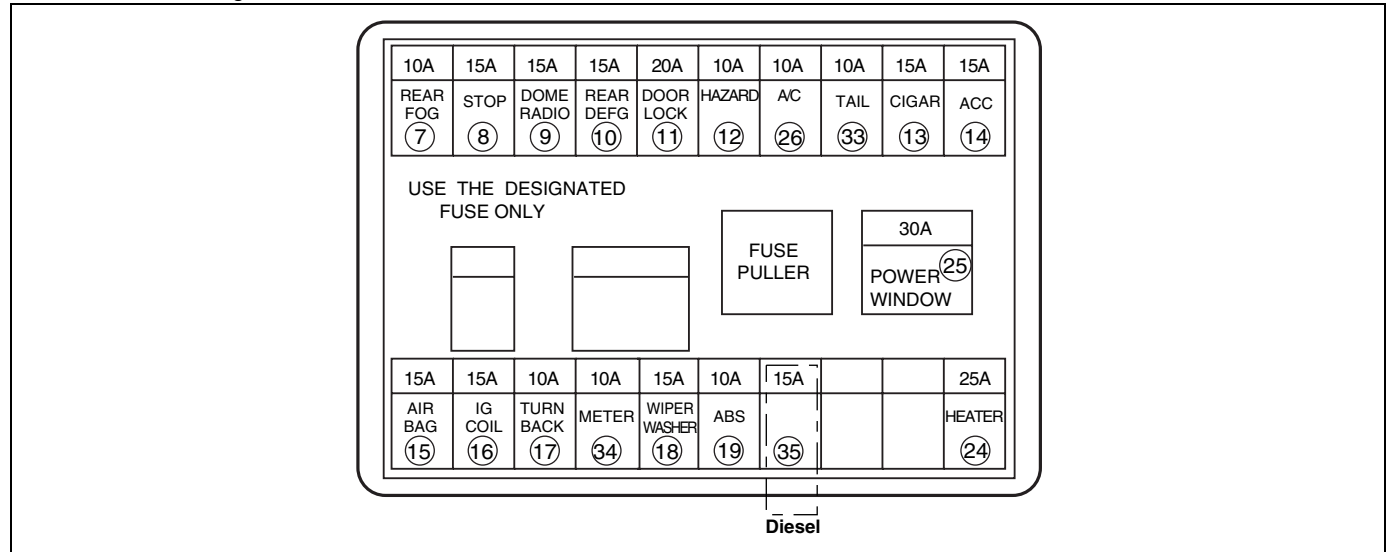
Hoofdzekeringenkast



No. Nr. No. Nr.	Fuse Sicherung Fusible Zekering	Protected circuit	Schutzschaltung	Circuit protege	Beschermde circuit
①	80A (G10 / M13A) 100A (DSL)	Battery	Batterie	Batterie	Accu
		Generator	Lichtmaschine	Generateur	Dynamo
		All electric circuit	Alle elektrischen schaltkreise	Tout circuit électrique	Alle elektrischen circuits
②	60A	Circuit fuse box	Schaltkreis-sicherungskasten	Boîte à fusibles de circuit	Circuitzekeringenkast
		Fuse box (Engine room)	Sicherungskasten (Motorraum)	Boîtier à fusibles (Compartiment moteur)	Zekeringenkast (motorruimte)
③	60A	Ignition switch	Zündschalter	Contacteur d'allumage	Contactsnot
④	30A	P/S control module	P/S-steuermodule	Module de commande du P/S	P/S-regelapparaat

No. Nr. No. Nr.	Fuse Sicherung Fusible Zekering	Protected circuit	Schutzschaltung	Circuit protege	Beschermd circuit
⑤	30A	Radiator fan control relay #1	Kühlergebläsesteuerrelais #1	Relais de commande de ventilateur de radiateur #1	Stuurrelais 1 van radiatorventilator
		Radiator fan control relay #2 (DSL)	Kühlergebläsesteuerrelais #2 (DSL)	Relais de commande de ventilateur de radiateur #2 (DSL)	Stuurrelais 2 van radiatorventilator (DSL)
⑥	60A	ABS control module	ABS-steuermodule	Module de commande de l'ABS	ABS-regelapparaat
②⑦	15A	Head light (R)	Scheinwerferlicht (R)	Phare (D)	Koplamp (R)
②⑧	15A	Combination meter	Kombination mter	Commodo	Combinatiemeter
		Head light (L)	Scheinwerferlicht (L)	Phare (G)	Koplamp (L)
②⑨	20A (G10 / M13A) 30A (DSL)	Fuel pump relay	Kraftstoff pumpenrelais	Relais de pompe à carburant	Brandstofpomprelais
		Main relay	Hauptrelais	Relais principal	Hoofdrelais
		Radiator fan control relay #1 (DSL)	Kühlergebläsesteuerrelais #1 (DSL)	Relais de commande de ventilateur de radiateur #1 (DSL)	Stuurrelais 1 van radiatorventilator (DSL)
		Radiator fan control relay #2 (DSL)	Kühlergebläsesteuerrelais #2 (DSL)	Relais de commande de ventilateur de radiateur #2 (DSL)	Stuurrelais 2 van radiatorventilator (DSL)
		Radiator fan control relay #3 (DSL)	Kühlergebläsesteuerrelais #3 (DSL)	Relais de commande de ventilateur de radiateur #3 (DSL)	Stuurrelais 3 van radiatorventilator (DSL)
③⑩	15A	Front fog light relay	Nebelleuchten relais-hte	Relais d'antibrouillard avant	Voormistlichtrelais
③①	15A	Horn relay	Hupenrelais	Relais d'avertisseur sonore	Claxonrelais
③②	25A (M13A)	A/T relay	Automatikgertrieberelais	Relays d'vitesses automatique	A/T-relais
	25A (G10)	PTC heater relay	Chauffe-PTC-relais	Relais de PTC heizung	PTC-verwarmingsrelais

Individual circuit fuse box
Einzelschaltkreissicherungskasten
Boîte à fusibles de circuit individuel
Individuele circuitzekeringkast



No. Nr. No. Nr.	Fuse Sicherung Fusible Zekering	Protected circuit	Schutzschaltung	Circuit protege	Beschermd circuit
(7)	10A REAR FOG	Rear fog light controller	Nebelschlußleuchten- Steuergerät	Commande d'anti- brouillard arrière	Achtermistlichtregeleen- heid
		Rear fog light switch	Schalter für hecknebel- leuchte	Interrupteur d'anti- brouillard arrière	Achtermistlichtschakelaar
(8)	15A STOP	Brake light switch	Bremslicht-schalter	Interrupteur de feux stop	Remlichtschakelaar
		Imb CM			
(9)	15A DOME RADIO	Clock	Uhr	Horloge	Klok
		Combination meter	Kombination mterr	Commodo	Combinatiemeter
		DLC			
		Interior light (front)	Innerraumleuchte (Vorde- rer)	Plafonnier (Avant)	Interieurverlichting (voor)
		Interior light (Rear)	Innerraumleuchte (Hinte- ren)	Plafonnier (Arrière)	Interieurverlichting (ach- ter)
		ECM			
		Radio			
		TCM			
(10)	15A REAR DFOG	Rear defogger relay	Relais der Heckscheiben- heizung	Relais de degivreur arrière	Achterruietverwarmingsre- lais
(11)	20A DOOR ROCK	Door lock controller	Steuereinheit für türver- riegelung	Commande de ver- rouillage des portes	Portierslotregeleenheid
(12)	10A HAZARD	Hazard warning light switch	Warnblinkerschalter	Commutateur de feu de détresse	Alarmknipperlichtenscha- kelaar
(13)	15A CIGER	Cigarette lighter	Zigarettenanzünder	Allume-cigares	Sigarettenaansteker
(14)	15A ACC	Antenna amplifier	Antennenverstärker	Amplificateur d'antenne	Antenneversterker
		Accessory socket	Zubehörbuchse	Douille pour accessoire	Accessoire-aansluiting
		Combination meter	Kombination mterr	Commodo	Combinatiemeter
		Clock	Uhr	Horloge	Klok
		Door lock controller	Steuereinheit für türver- riegelung	Commande de ver- rouillage des portes	Portierslotregeleenheid

No. Nr. No. Nr.	Fuse Sicherung Fusible Zekering	Protected circuit	Schutzschaltung	Circuit protege	Beschermd circuit
⑭	15A ACC	Power mirror switch Radio	Spiegelschalter	Interrupteur de rétrovi- seurs	Schakelaar van elek- trisch verstelbare spiegel
⑮	15A AIR BAG	A/B SDM			
⑯	15A IG COIL	A/C switch	Klimaanlagen-schalter	Relais de chauffage	A/C-schakelaar
		Air flow meter (DSL)	Lufimassenmesser (DSL)	Debitmetre d'air (DSL)	Luchtstroommeter (DSL)
		A/T relay (M13A)	Automatikgertriberelais (M13A)	Relays d'vitesses auto- maticue (M13A)	A/T-relais (M13A)
		Blower motor relay (G10 / M13A)	Heizungsrelais (G10 / M13A)	Relais de chauffage (G10 / M13A)	Aanjagermotorrelais (G10 / M13A)
		Combination meter	Kombination mterr	Commodo	Combinatiemeter
		Compressor relay	Kompressorrelais	Relais de compresseur	Compressorrelais
		Clutch switch (DSL)	Kupplungsschalter (DSL)	Contacteur d'embrayage (DSL)	Koppelingsschakelaar (DSL)
		ECM			
		Fuel heating relay (DSL)	Kraftstoffheizungsrelais (DSL)	Relais de chauffage du carburant (DSL)	Brandstofverwarmingsre- lais (DSL)
		Fuel pump relay	Kraftstoff pumpenrelais	Relais de pompe à carbu- rant	Brandstofpomprelais
		Generator	Lichtmaschine	Generateur	Dynamo
		Glow controller (DSL)	Flammwächter (DSL)	Régulateur de préchauf- fage (DSL)	Voorgloeiregeleenheid (DSL)
		Heated oxygen sensor #1	Reheizte lambdasonde #1	Capteur d'oxygène chauffé #1	Verwarmde zuurstofsens- sor 1
		Heated oxygen sensor #2	Reheizte lambdasonde #2	Capteur d'oxygène chauffé #2	Verwarmde zuurstofsens- sor 2
		IG COIL #1			
		IG COIL #2			
		Igniter	Zündgeber	Igniteur	Ontsteker
		Imb CM			
		Noise suppressor	Störfunkenunterdrücker	Suppresseur de bruit	Storingsonderdrukker
		P/S control module	P/S-steuermodule	Module de commande du P/S	P/S-regelapparaat
		Speed sensor relay (DSL)	Geschwindigkeitssensor- relais (DSL)	Relais de capteur de vitesse (DSL)	Rijsnelheidssensorrelais (DSL)
		Vehicle speed sensor (G10)	Fahrzeuggeschwindigkeit sensor (G10)	Capteur de vitesse (G10)	Rijsnelheidssensor (G10)
⑰	10A TURN BACK	Back-up light switch	Rückfahrleuchtschalter	Interrupteur de feux de marche arrière	Achteruitrijlichtschakelaar
		Door lock controller	Steureinheit für türverrie- gelung	Commande de ver- rouillage des portes	Portierslotregeleenheid
		Hazard warning light switch	Warnblinkerschalter	Commutateur de feude de tresse	Alarmknipperlichtenscha- kelaar
		Back-up light switch	Rückfahrleuchtschalter	Interrupteur de feux de marche arrière	Achteruitrijlichtschakelaar
		Door lock controller	Steureinheit für türverrie- gelung	Commande de ver- rouillage des portes	Portierslotregeleenheid
		Hazard warning light switch	Warnblinkerschalter	Commutateur de feude de tresse	Alarmknipperlichtenscha- kelaar

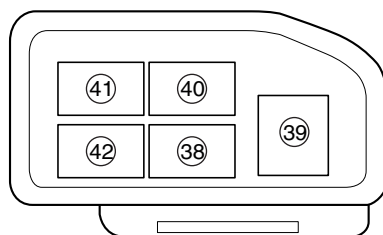
No. Nr. No. Nr.	Fuse Sicherung Fusible Zekering	Protected circuit	Schutzschaltung	Circuit protege	Beschermd circuit
(17)	10A TURN BACK	Headlight beam leveling actuator (L)	Scheinwerferstrahl-nivel- lierstellglied (L)	Commande de réglage du faisceau de phare (G)	Actuator van koplamp- hoogteverstelling (L)
		Back-up light switch	Rückfahrleuchtschalter	Interrupteur de feux de marche arrière	Achteruitrijlichtschakelaar
		Door lock controller	Steureinheit für türverrie- gelung	Commande de ver- rouillage des portes	Portierslotregeleenheid
		Hazard warning light switch	Warnblinkerschalter	Commutateur de feude de tresse	Alarmknipperlichtenscha- kelaar
		Headlight beam leveling actuator (L)	Scheinwerferstrahl-nivel- lierstellglied (L)	Commande de réglage du faisceau de phare (G)	Actuator van koplamp- hoogteverstelling (L)
		Headlight beam leveling actuator (R)	Scheinwerferstrahl-nivel- lierstellglied (R)	Commande de réglage du faisceau de phare (D)	Actuator van koplamp- hoogteverstelling (R)
		Headlight leveling switch	Scheinwerfer-justierschal- ter	Commutateur de reglage de phare	Schakelaar van koplamp- hoogteverstelling
		Lighting switch	Lichtschalter	Commutateur de feu	Lichtschakelaar
		Transaxle range sensor	Fahrbereichssensor	Detecteur de gamme de transmission	Transmissiebereiksensor
(18)	15A WIPER WASHER	Intermittent timer	Intervalltimer	Minuterie intermittente	Intervalltimer
		Rear wiper motor	Heckscheibenwischermo- tor	Moteur d'essuie-glace arrière	Achterrautwissermotor
		Windshield wiper motor	Windschutzscheiben- Wischermotor	Moteur d'essuie-glace de parebrise	Voorruitwissermotor
		Wiper and washer switch	Wischer und wascher- schalter	Contacteur de l'essuie- glace et du lave-glace	Wisser- en sproeierschakelaar
(19)	10A ABS	ABS control module	ABS-steuermodule	Module de commande de l'ABS	ABS-regelapparaat
(24)	25A HEATER	Blower fan motor	Gebäsemotor	Moteur de ventilateur soufflant	Aanjagermotor
		Compressor relay	Kompressorrelais	Compresseur relé del	Compressorrelais
		DRL controller (IF EQPD)	DRL-regler (IF EQPD)	Regulateur de DRL (IF EQPD)	DRL-regeleenheid (IF EQPD)
		Rear defogger relay	Relais der Heckscheiben- heizung	Relais de degivreur arrière	Achterrautverwarmingsre- lais
		PTC control module	PTC-steuermodule	Module de commande PTC	PTC-regelapparaat
		PTC heater relay #1	PTC-Heizungsrelais #1	Relais de réchauffeur de PTC #1	PTC-verwarmingsrelais #1
		PTC heater relay #2	PTC-Heizungsrelais #2	Relais de réchauffeur de PTC #2	PTC-verwarmingsrelais #2
(25)	30A POWER WINDOW	Power window main switch	Hauptschalter für automa- tischen Fensterheber	Interrupteur principal de lève-vitres	Hoofdschakelaar van elektrische ruitbediening
		Front power window sub switch	Hilfsschalter für vorderen elektrischen Fensterheber	Commutateur secondaire de lève-glace électrique avant	Hulpschakelaar elek- trisch bediende voorruit
(26)	10A A/C	Compressor relay	Kompressorrelais	Relais de compresseur	Compressorrelais
(33)	10A TAIL	DRL controller (IF EQPD)	DRL-regler (IF EQPD)	Regulateur de DRL (IF EQPD)	DRL-regeleenheid (IF EQPD)
		Tail light relay	Heckleuchtenrelais	Relais de feux arrière	Achterlichtrelais
(34)	10A METER	Combination meter	Kombination mterr	Commodo	Combinatiemeter
		Generator	Lichtmaschine	Generateur	Dynamo
(35)	15A (DSL)	ECM			
		EGR valve	EGR-ventil	Soupape EGR	EGR-klep

Supplementary fuse box (DSL)

Zusatzsicherungskasten (DSL)

Boîte à fusibles supplémentaires (DSL)

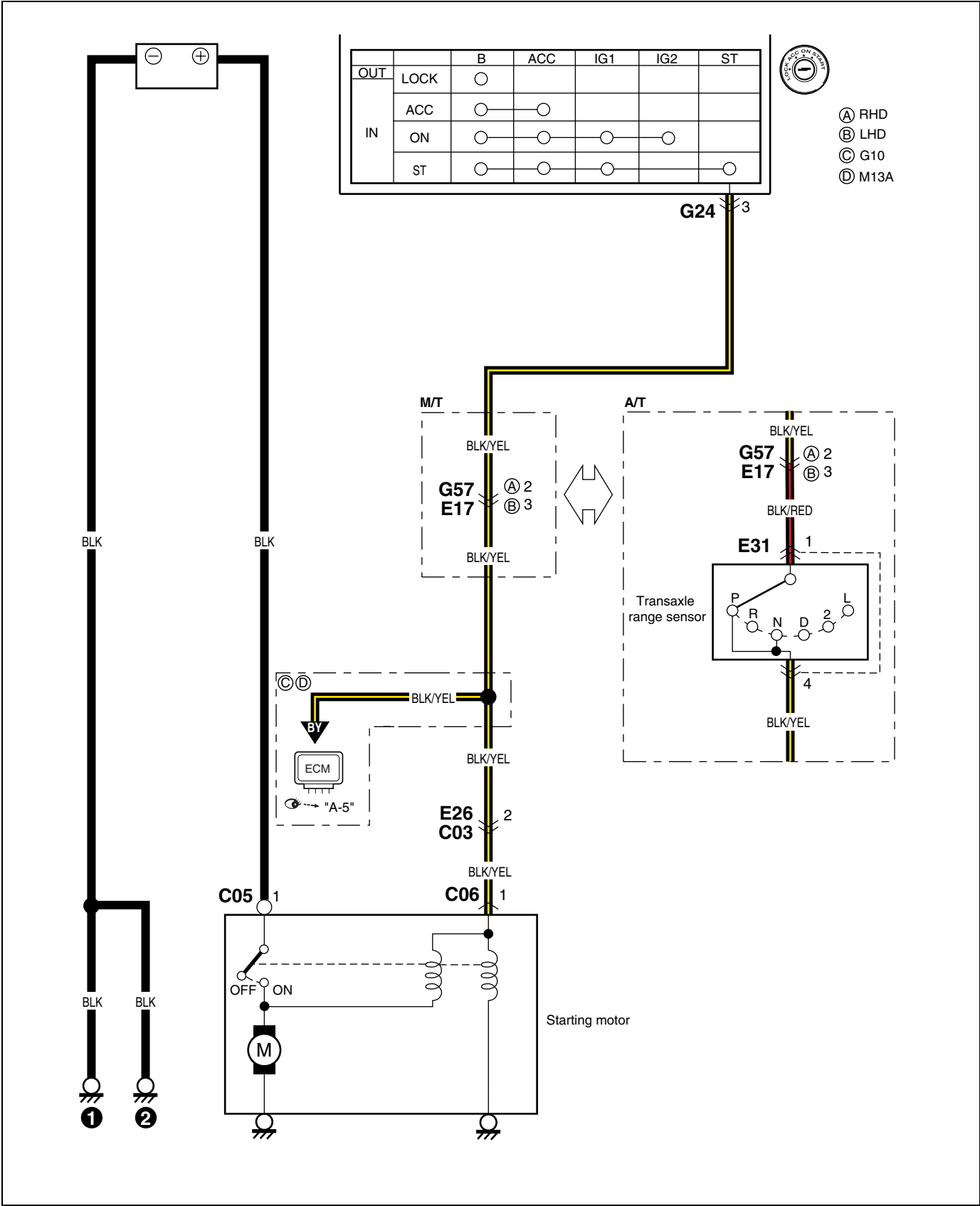
Hulpzekeringenkast (DSL)



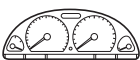
No. Nr. No. Nr.	Fuse Sicherung Fusible Zekering	Protected circuit	Schutzschaltung	Circuit protege	Beschermd circuit
③⑧	30A	Fuel heating relay	Kraftstoffheizungsrelais	Relais de chauffage du carburant	Brandstofverwarmingsrelais
③⑨	80A	Glow controller	Flammwächter	Régulateur de préchauffage	Voorgloeiregeleenheid
④①	30A (Option)	PTC heater relay #1	PTC-Heizungsrelais #1	Relais de réchauffeur de PTC #1	PTC-verwarmingsrelais #1
④②	30A (Option)	PTC heater relay #3	PTC-Heizungsrelais #3	Relais de réchauffeur de PTC #3	PTC-verwarmingsrelais #3
④③	30A (Option)	PTC heater relay #2	PTC-Heizungsrelais #2	Relais de réchauffeur de PTC #2	PTC-verwarmingsrelais #2

System circuit diagram
Systemschalt diagramm
Schéma des circuits électriques
Elektrisch schema

A-1 Cranking system
A-1 Kurbelsystem
A-1 Système de démarrage
A-1 Startsystem



A-2 Laadsysteem

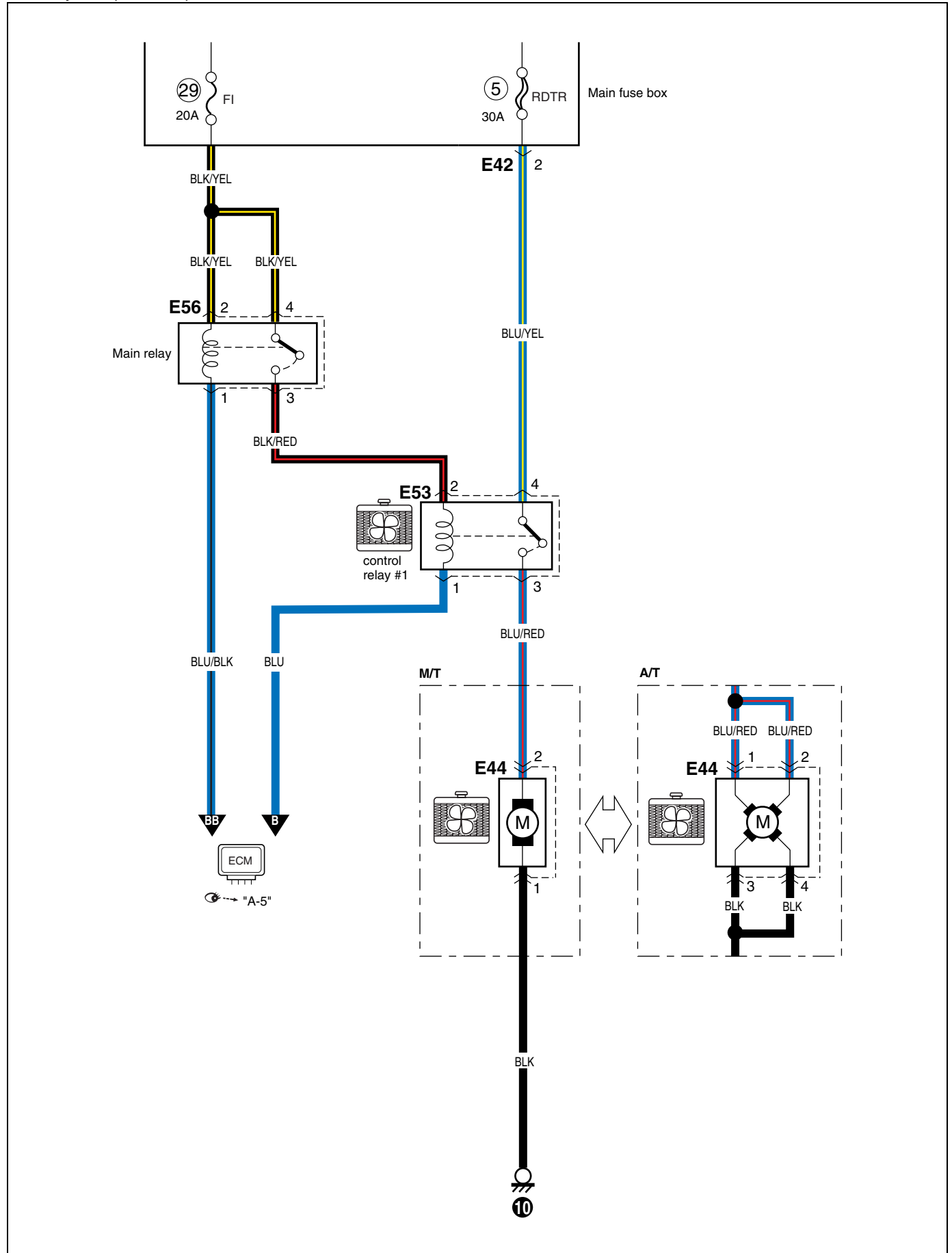


A-3 Cooling system (G10 / M13A)

A-3 Kühlsystem (G10 / M13A)

A-3 Système de refroidissement (G10 / M13A)

A-3 Koelsysteem (G10 / M13A)

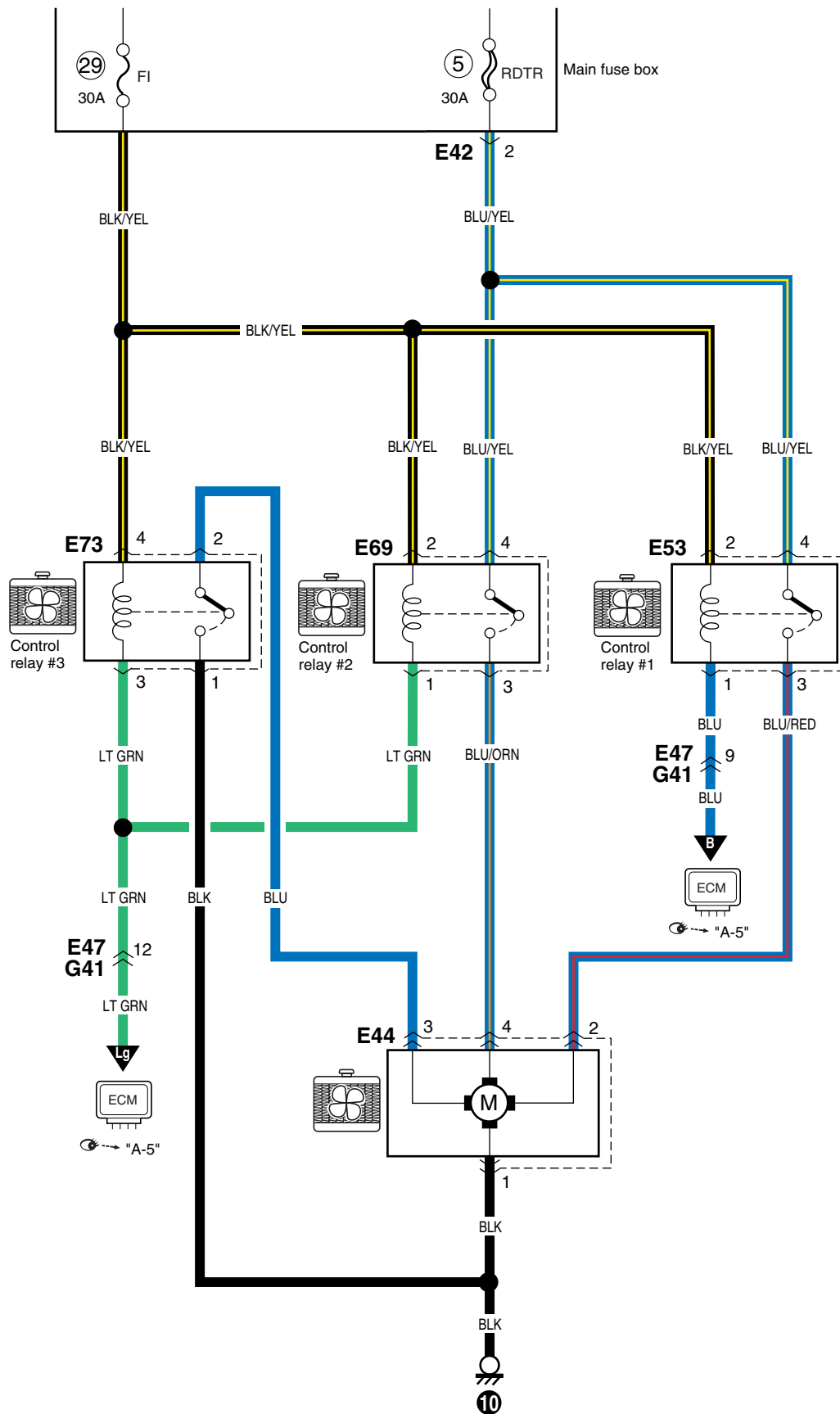


A-3 Cooling system (DSL)

A-3 Kühlsystem (DSL)

A-3 Système de refroidissement (DSL)

A-3 Koelsysteem (DSL)

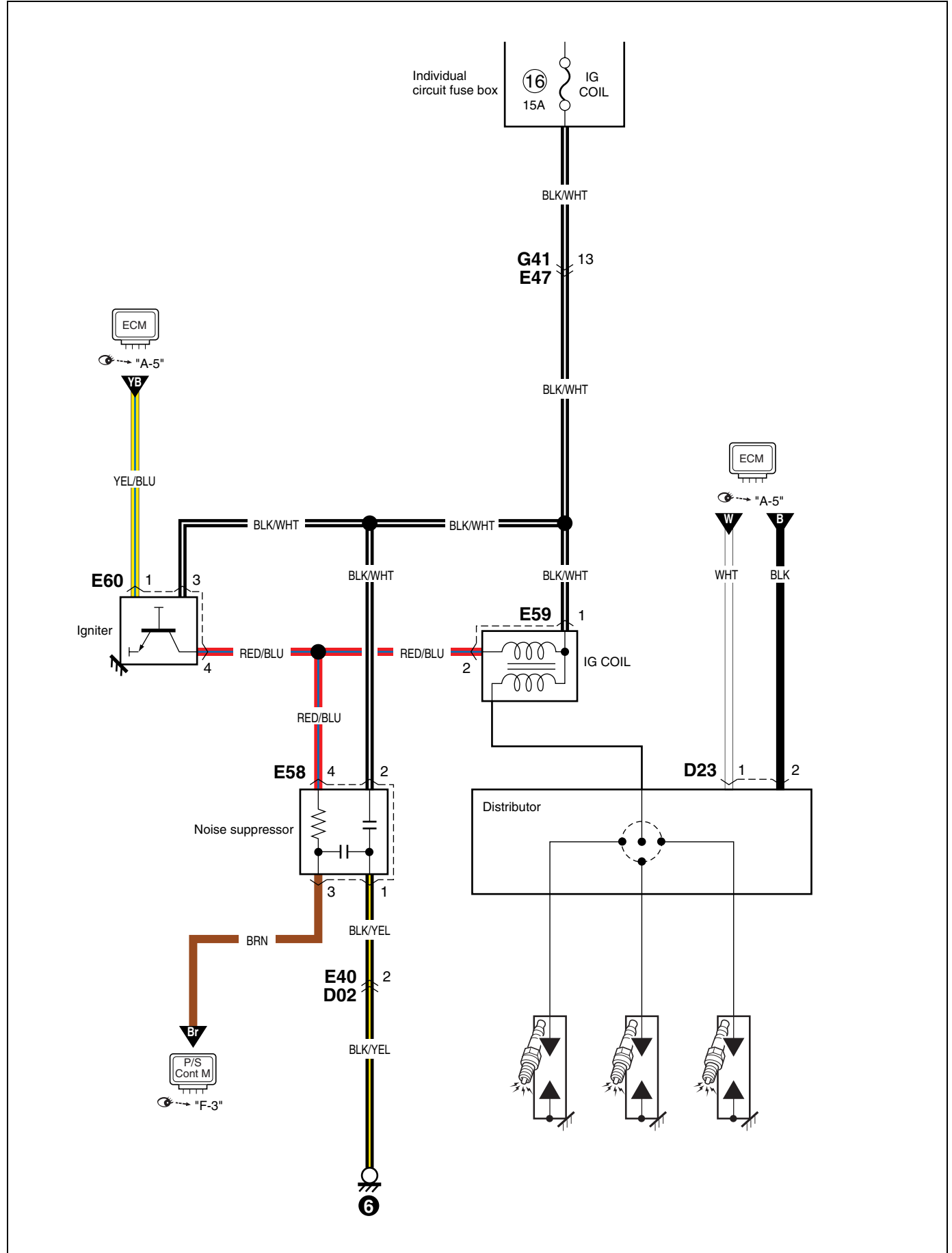


A-4 Ignition system (G10)

A-4 Zündanlage (G10)

A-4 Système d'allumage (G10)

A-4 Ontstekingsysteem (G10)

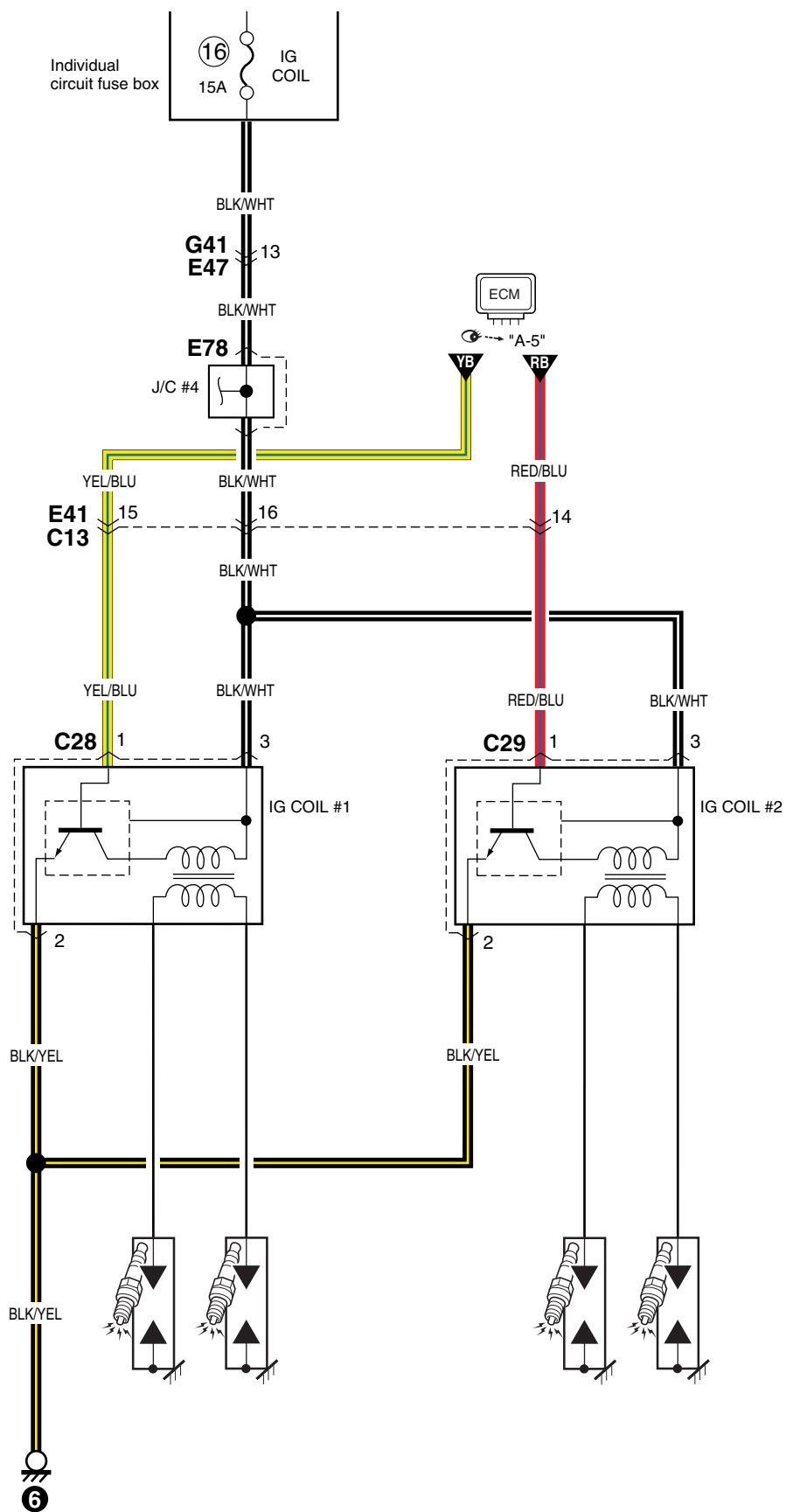


A-4 Ignition system (M13A)

A-4 Zündanlage (M13A)

A-4 Système d'allumage (M13A)

A-4 Ontstekingsysteem (M13A)



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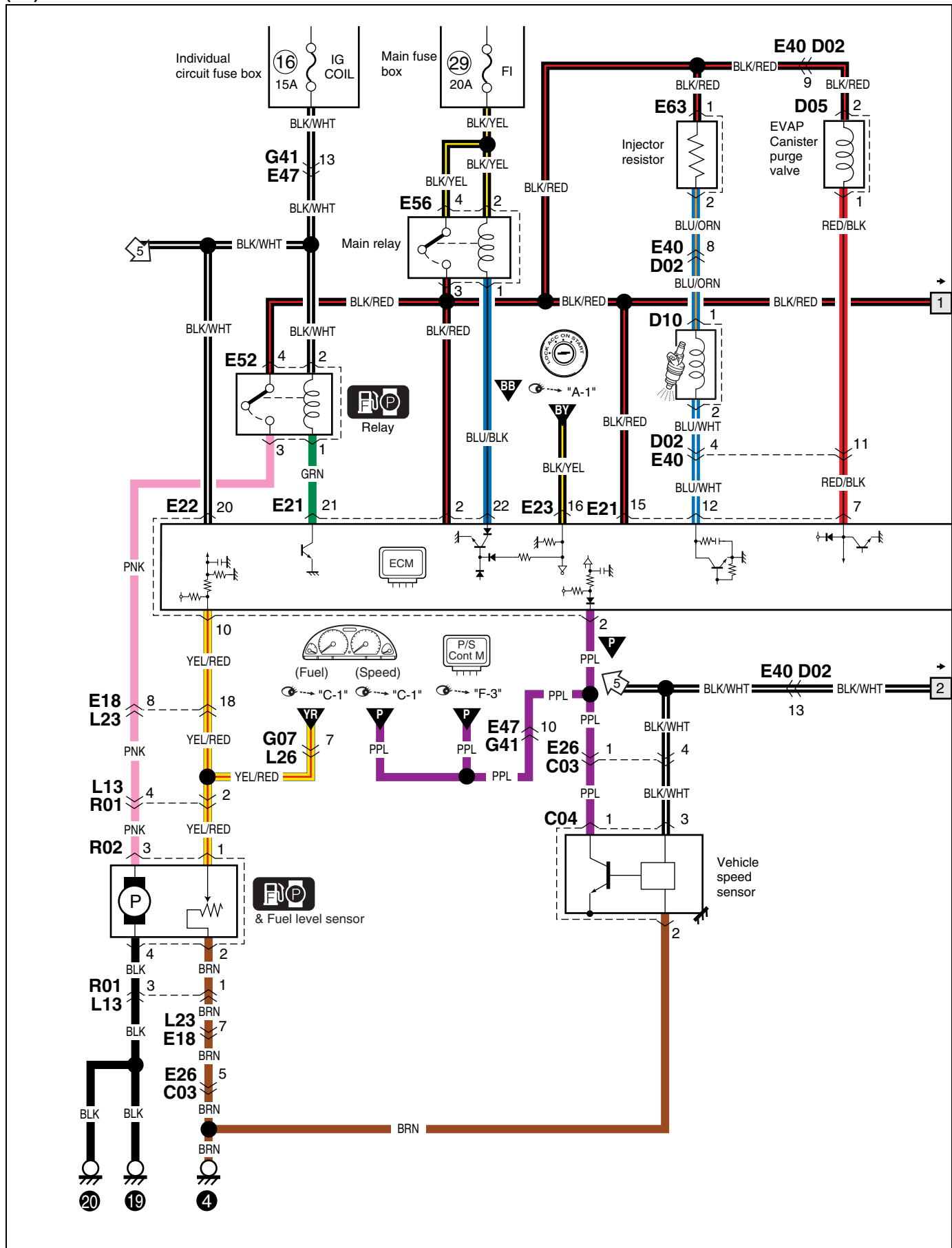
A-5 Engine & A/C control System (G10)

A-5 Motor- und klimaanlagen-steuersystem (G10)

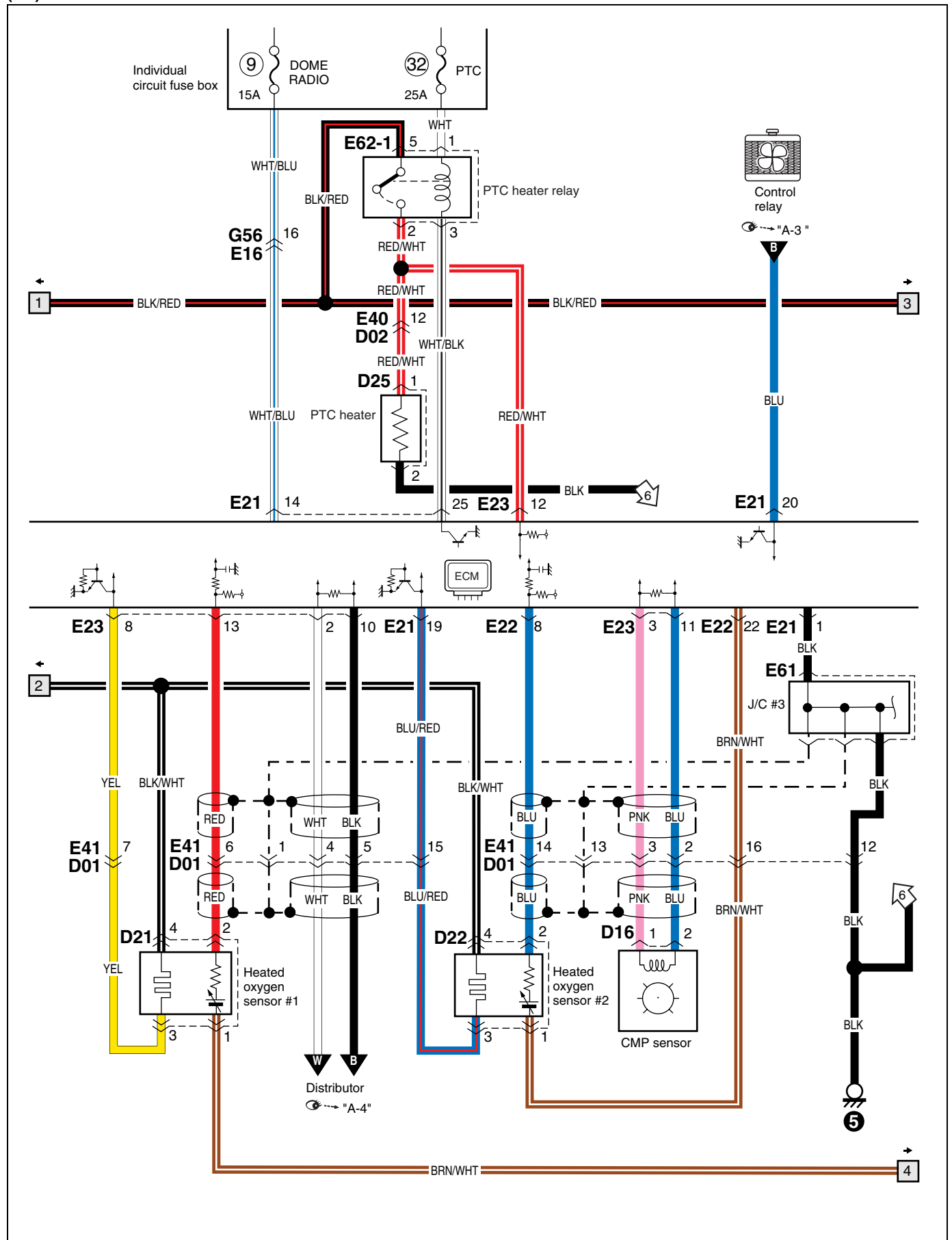
A-5 Moteur & système de commande du climatiseur (G10)

A-5 Motor- en A/C-regelsysteem (G10)

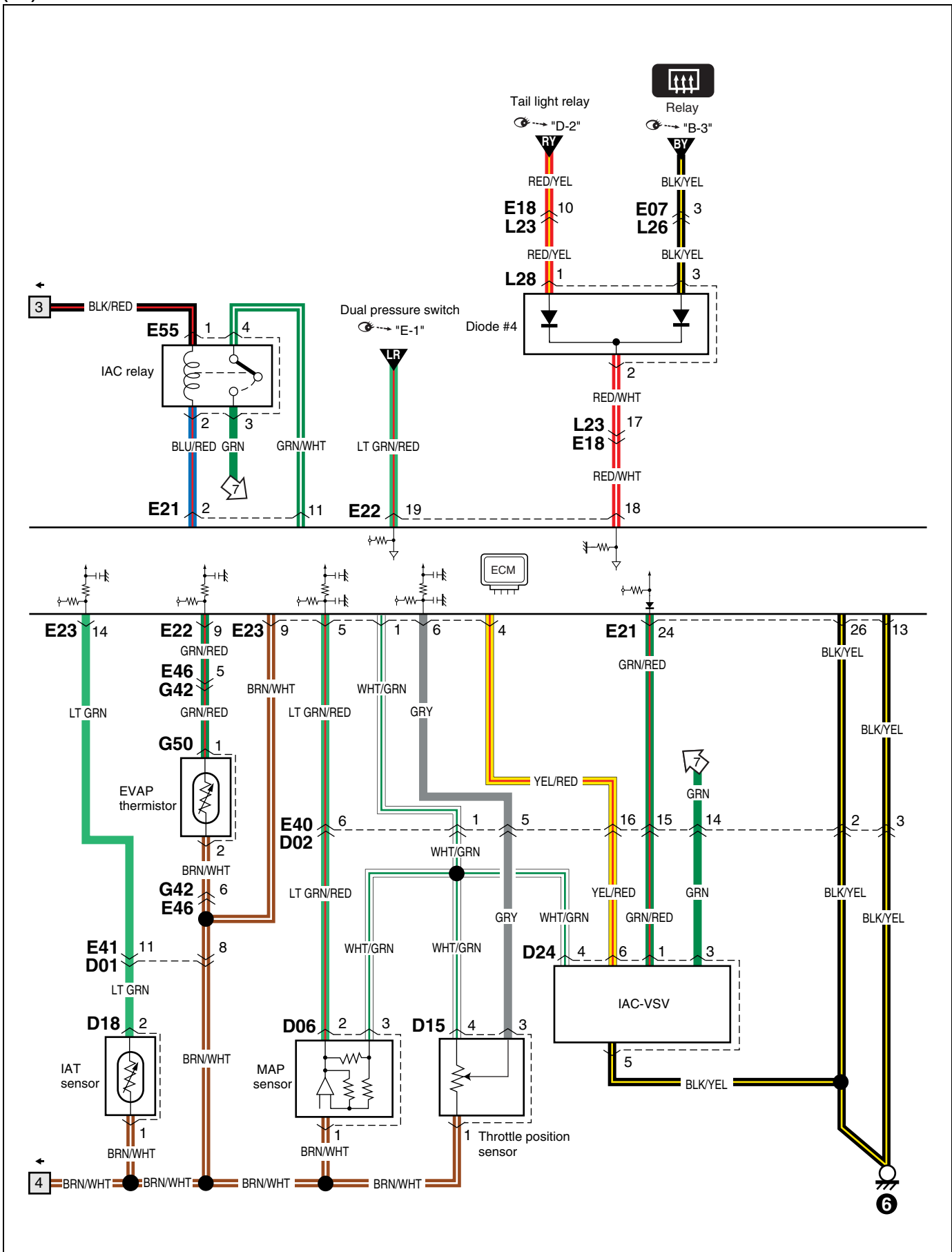
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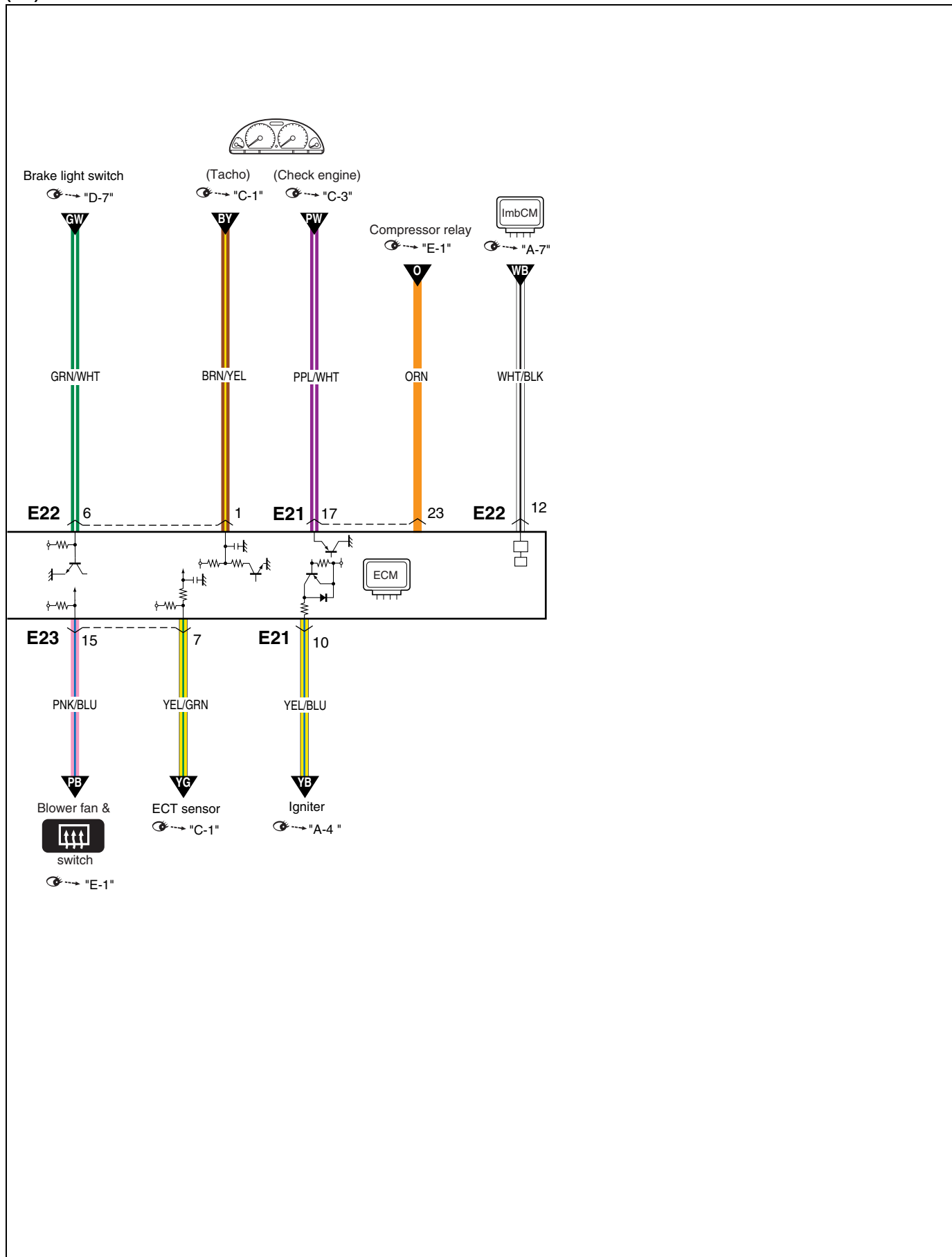
(2/4)



(3/4)



(4/4)



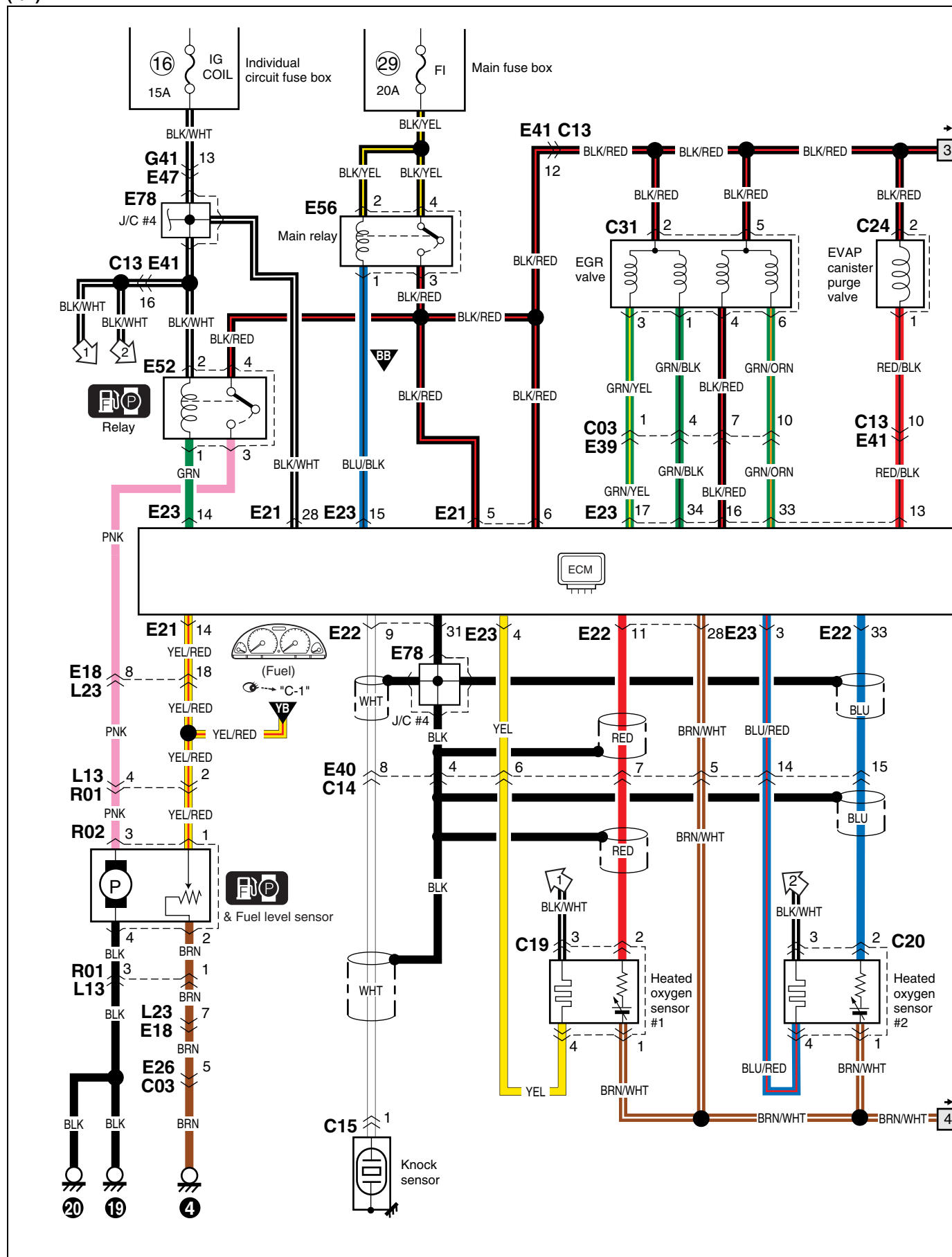
A-5 Engine & A/C control System (M13A)

A-5 Motor- und klimaanlagen-steuersystem (M13A)

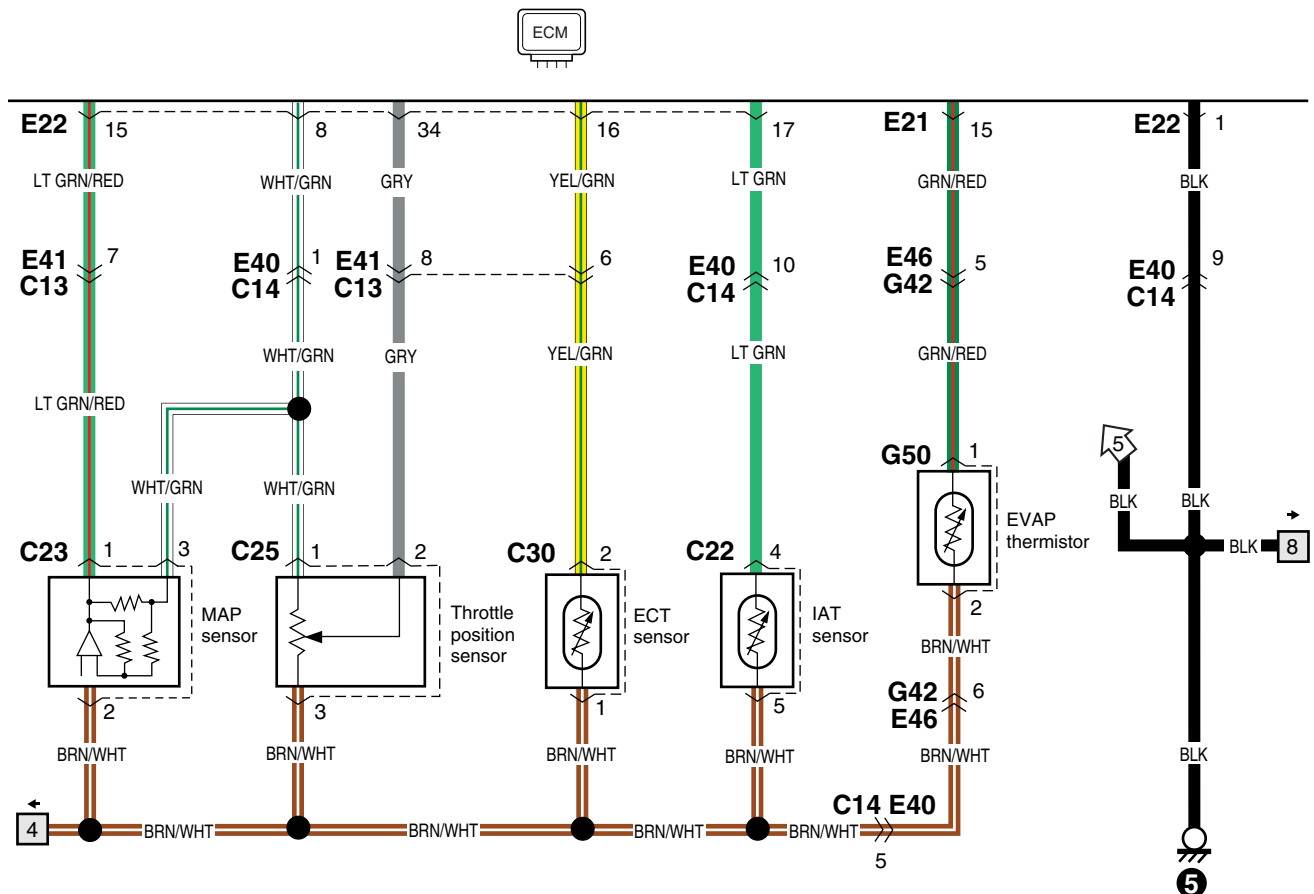
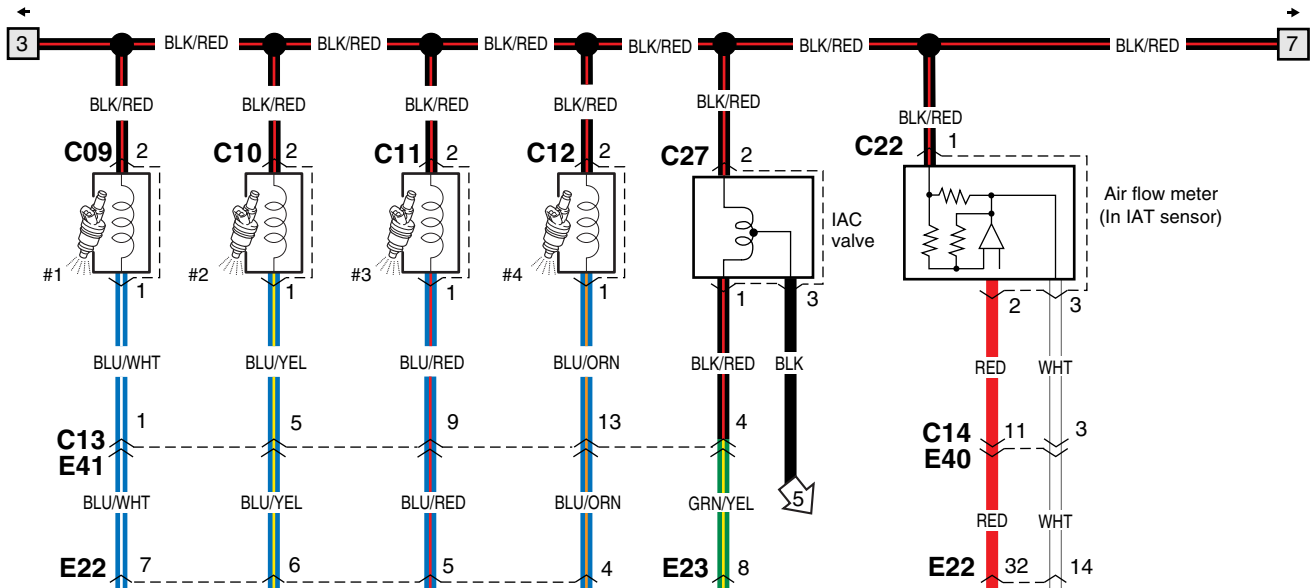
A-5 Moteur & système de commande du climatiseur (M13A)

A-5 Motor- en A/C-regelsysteem (M13A)

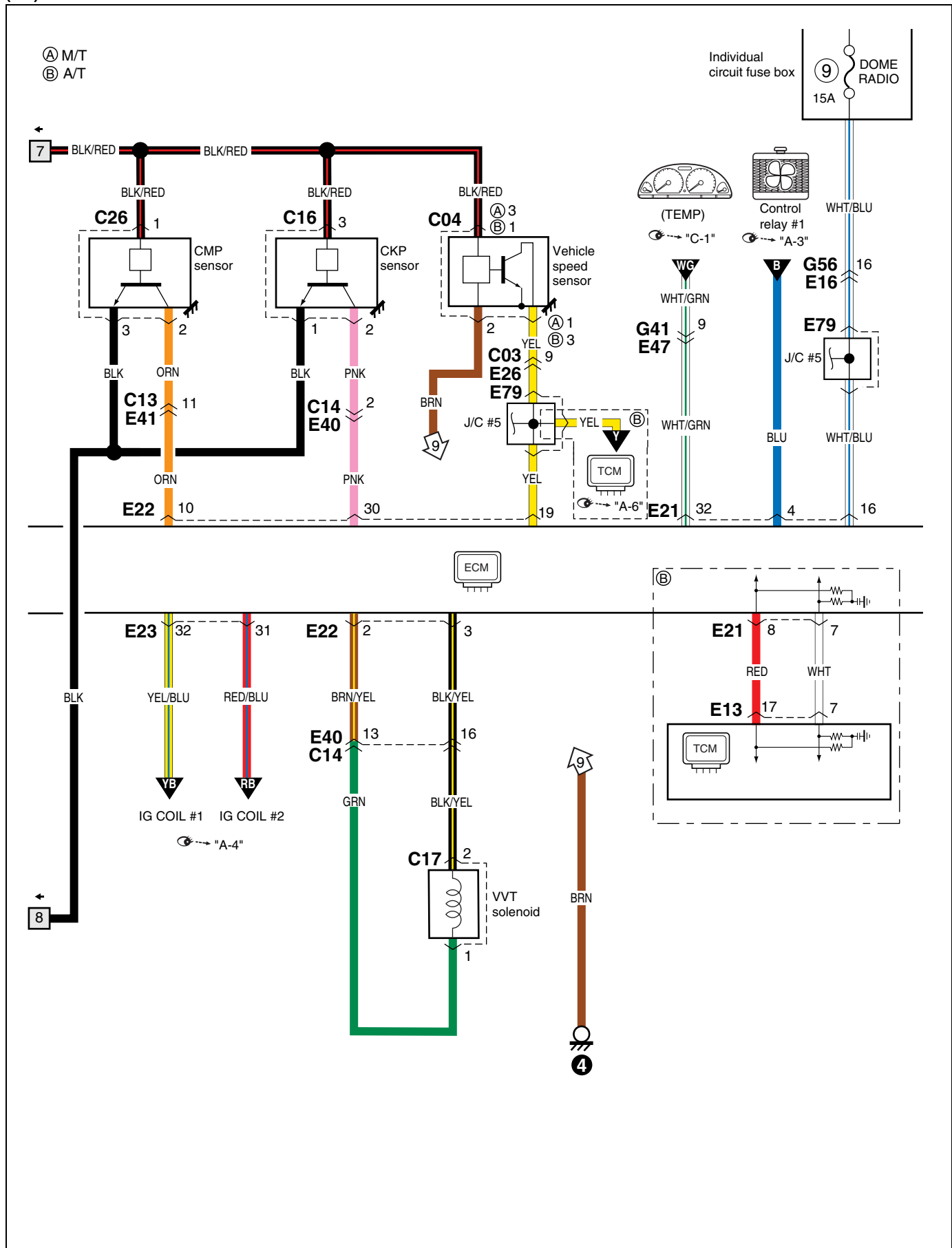
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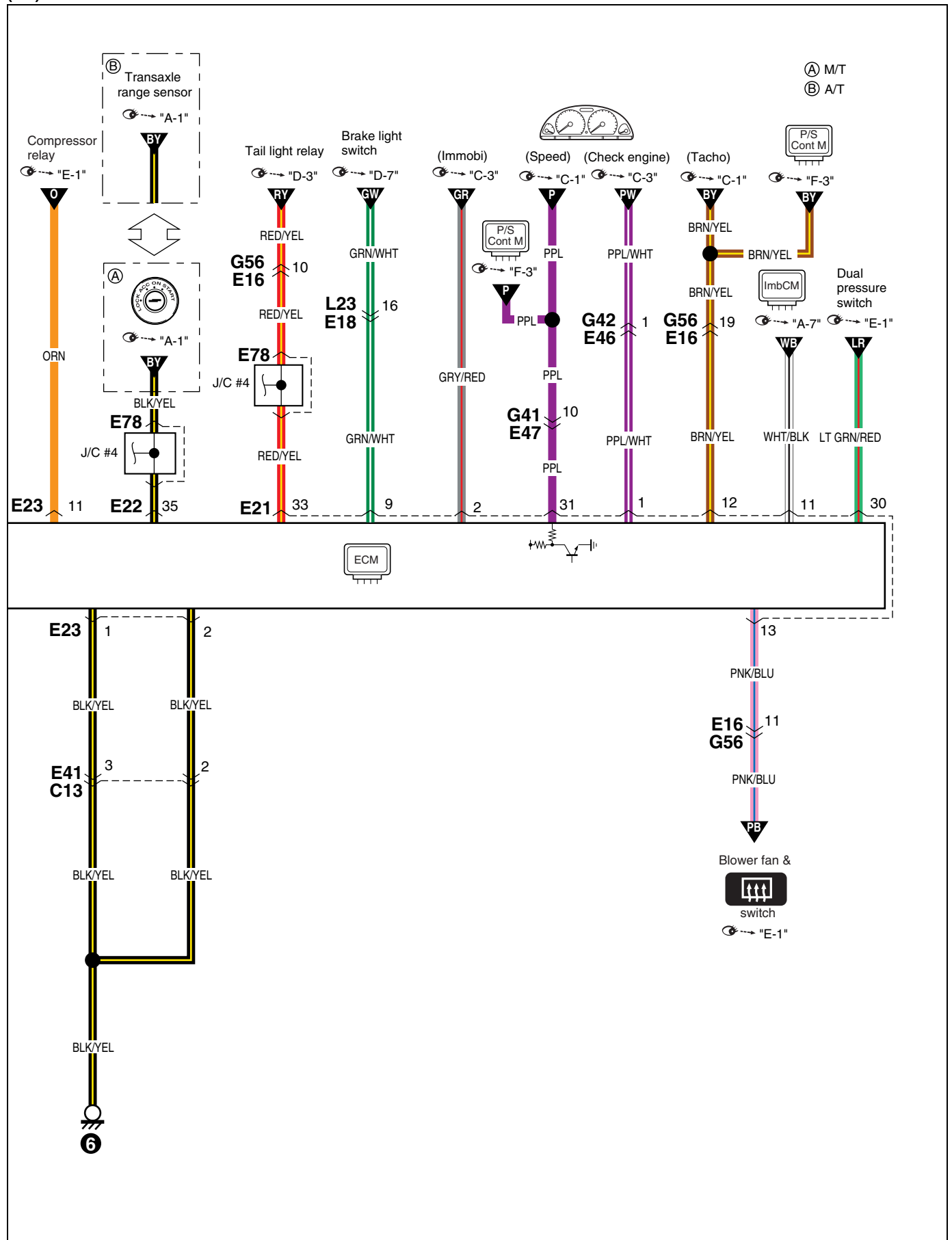
(2/4)



(3/4)



(4/4)



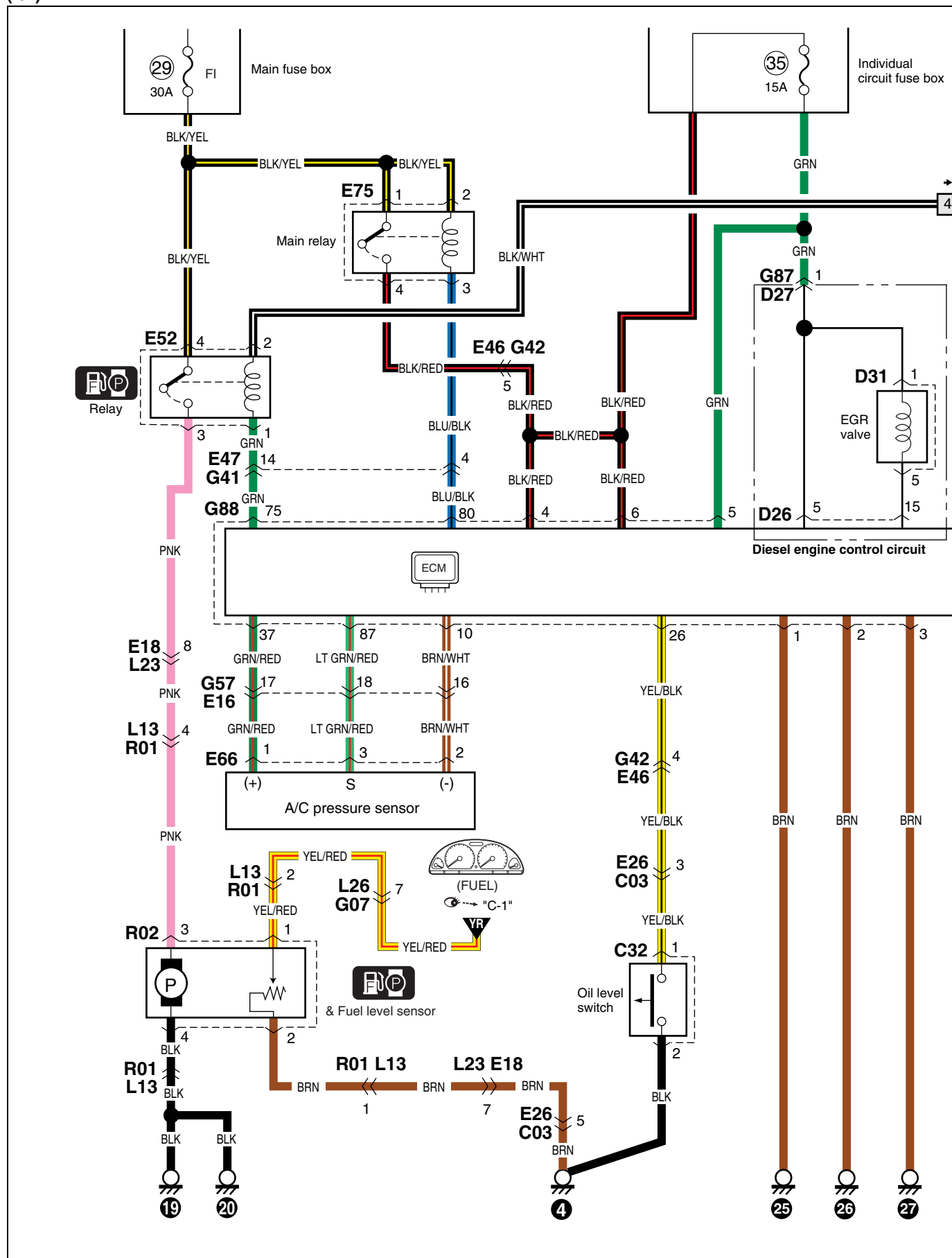
A-5 Engine & A/C control System (DSL)

A-5 Motor- und klimaanlagen-steuersystem (DSL)

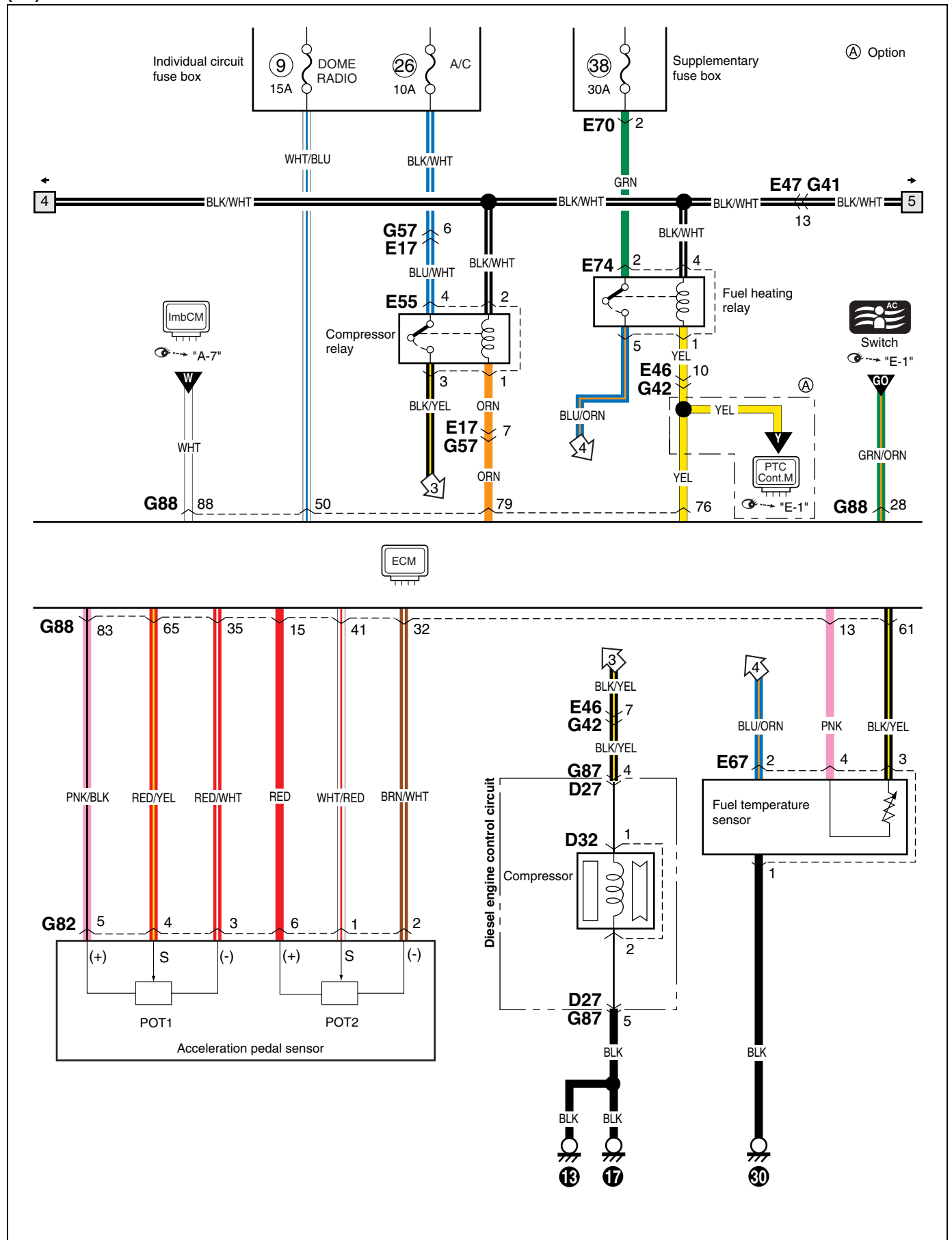
A-5 Moteur & système de commande du climatiseur (DSL)

A-5 Motor- en A/C-regelsysteem (DSL)

(1/4)



(2/4)



[illegible]

Front wheel speed sensor (R)

① With ABS
② Without ABS

Speed sensor relay

Control relay #1

Control relay #2

Control relay #3

ECM

Diesel engine control circuit

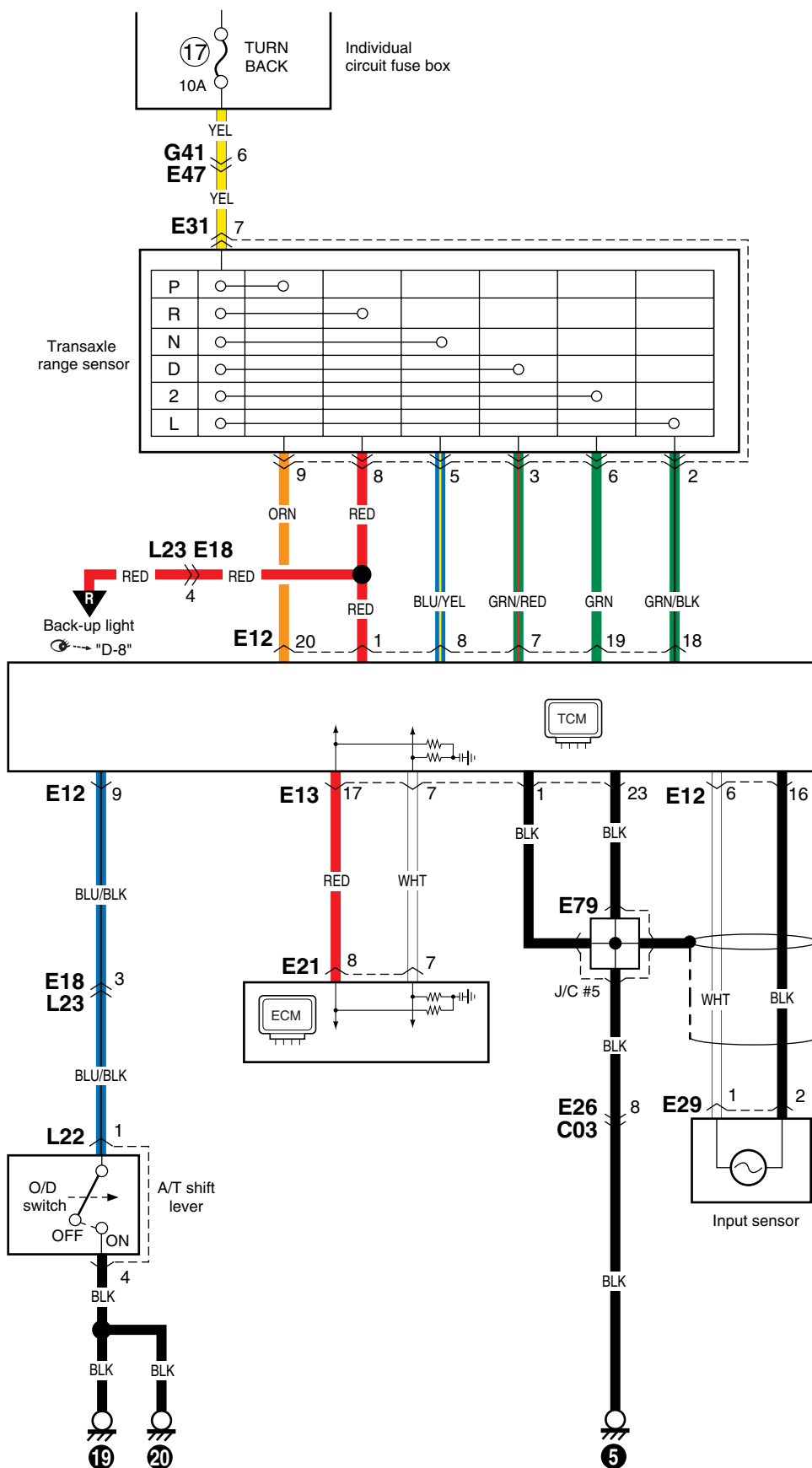
Sensors:

- ECT sensor (D44)
- Fuel pressure regulator (D30)
- Fuel pressure sensor (D28)
- Boost pressure sensor (D29)
- CKP sensor (D45)
- CMP sensor (D33)

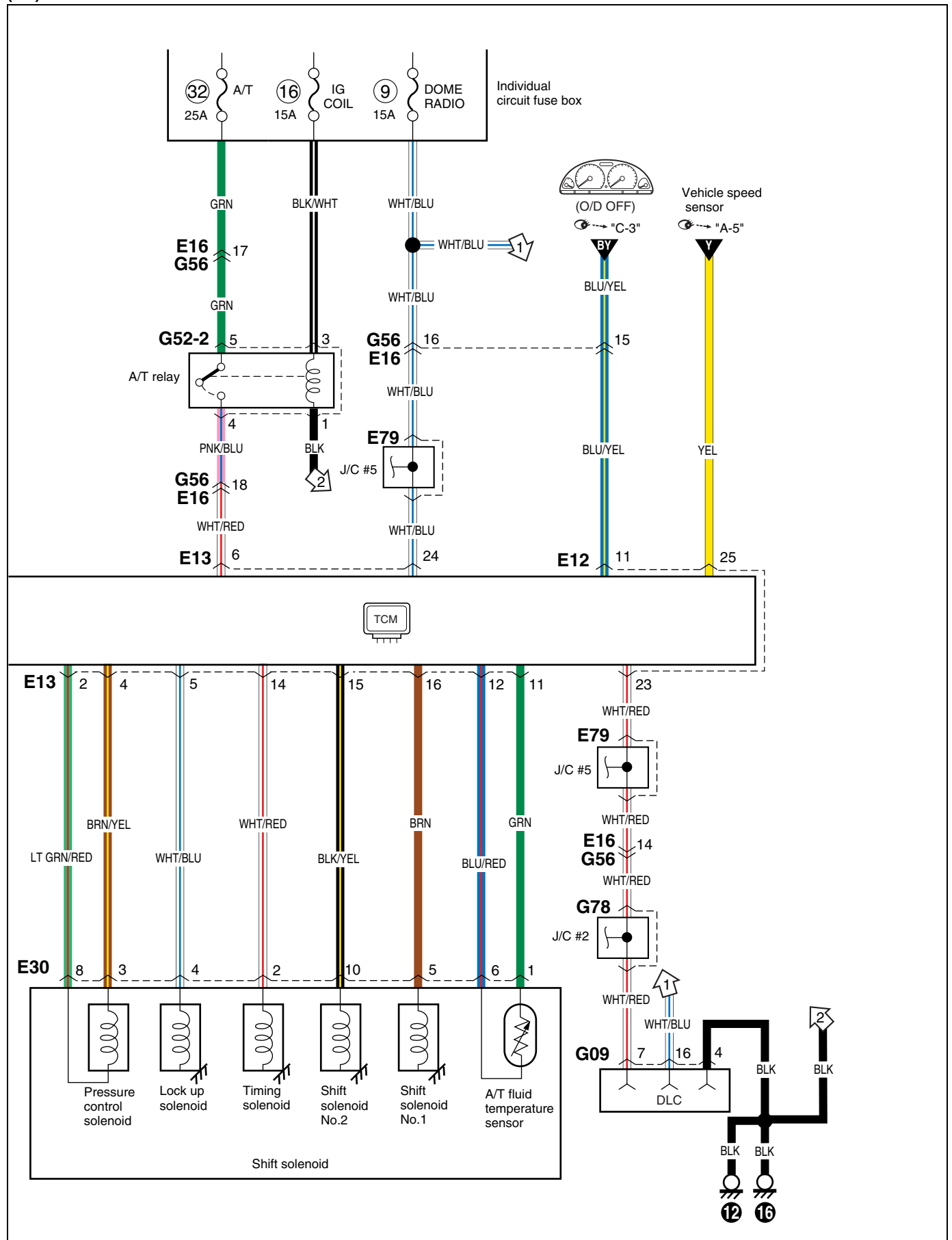
Wiring Details:

- Front wheel speed sensor (R):** ORN/BLU (1), WHT/BLU (2), BLK/WHT (13). IG COIL (16) 15A.
- Speed sensor relay:** BLK (8), PPL (4).
- Control relay #1:** BLU (9), BLU (7).
- Control relay #2:** LT GRN (12), LT GRN (8).
- Control relay #3:** LT GRN (12), LT GRN (8).
- ECM:** 54, 29, 4, 34, 8, 6, 38, 23, 41, 24, 43, 59, 25, 56, 21.
- Sensors:**
 - ECT sensor (D44): 1, 2.
 - Fuel pressure regulator (D30): 1, 2.
 - Fuel pressure sensor (D28): 3, 1, 2.
 - Boost pressure sensor (D29): 1, 3, 2.
 - CKP sensor (D45): 1, 2.
 - CMP sensor (D33): 3, 2, 1.

A-6 A/T control system
 A-6 A/T-steuersystem
 A-6 Système de commande A/T
 A-6 A/T-regelsysteem
 (1/2)



(2/2)

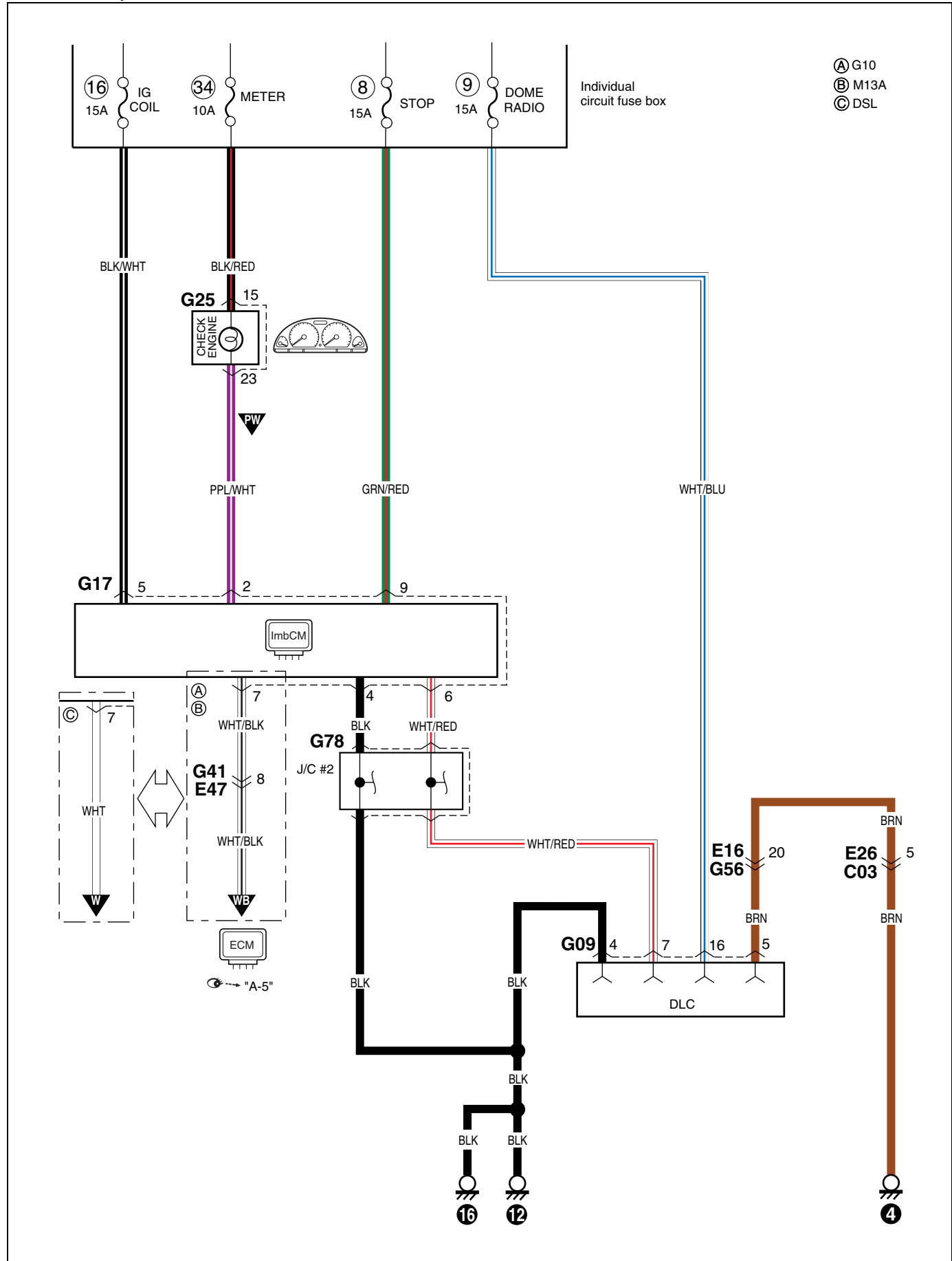


A-7 Immobilizer system

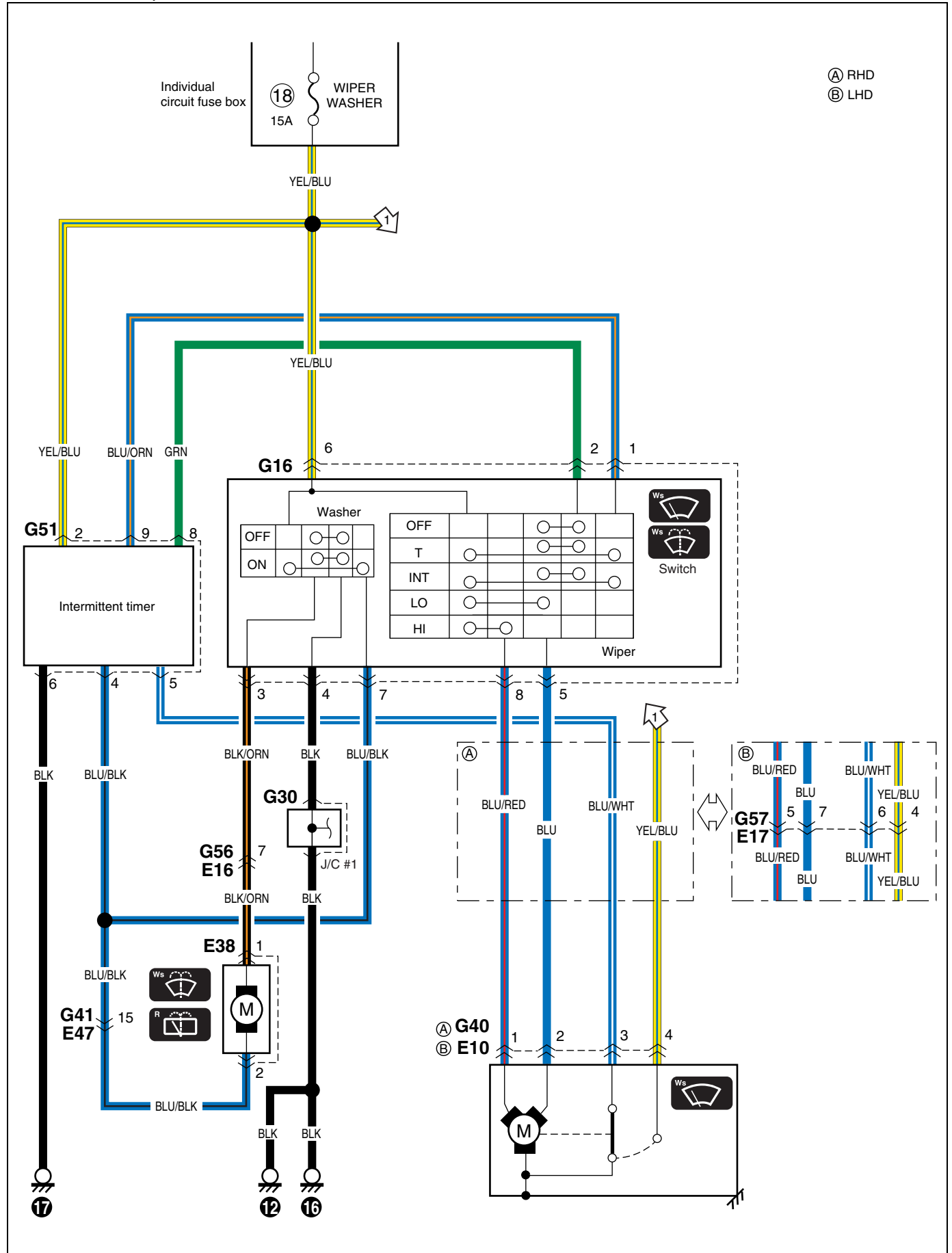
A-7 Wegfahrsperrsystem

A-7 Système immobilisateur

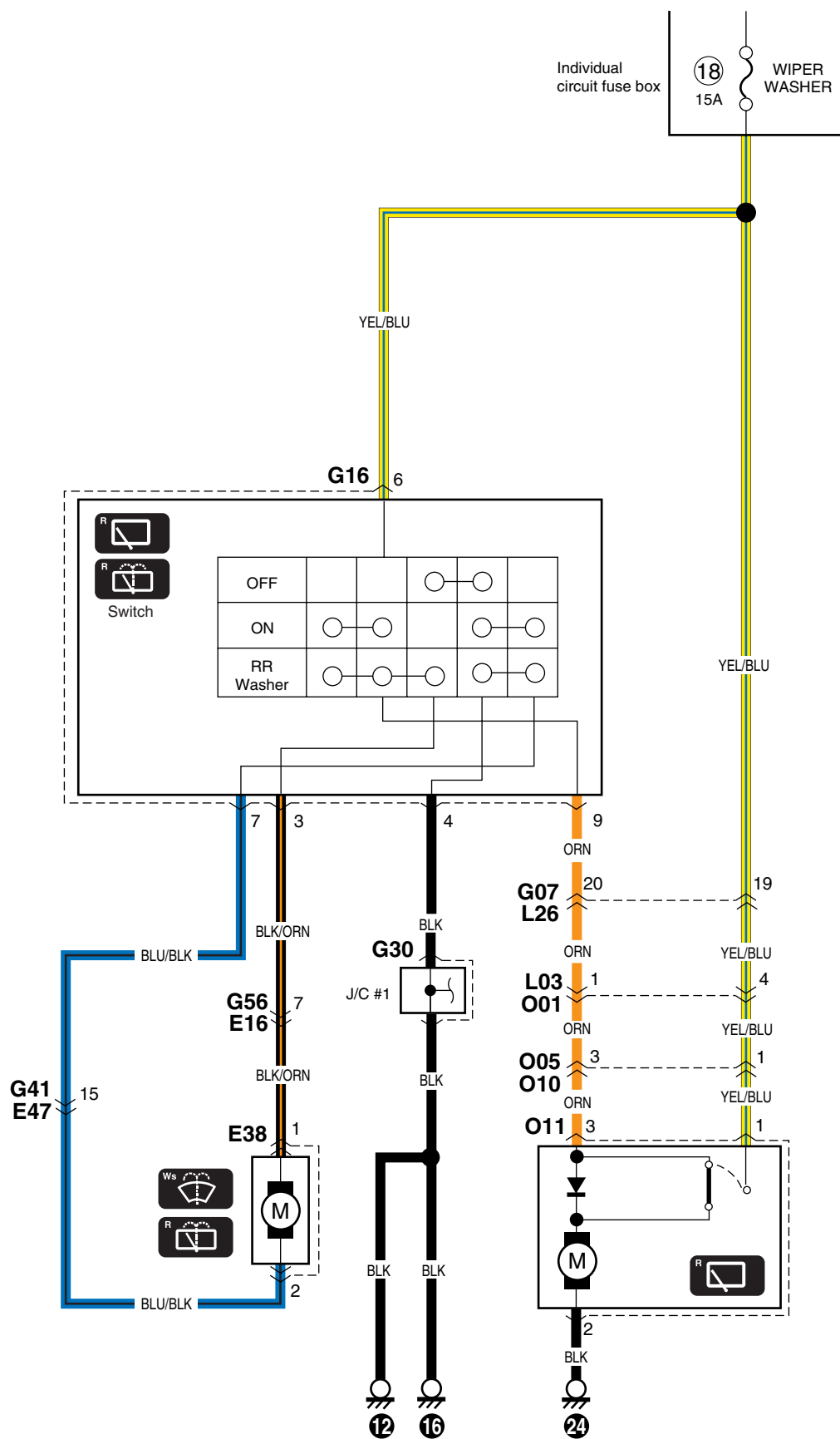
A-7 Startblokkeersysteem



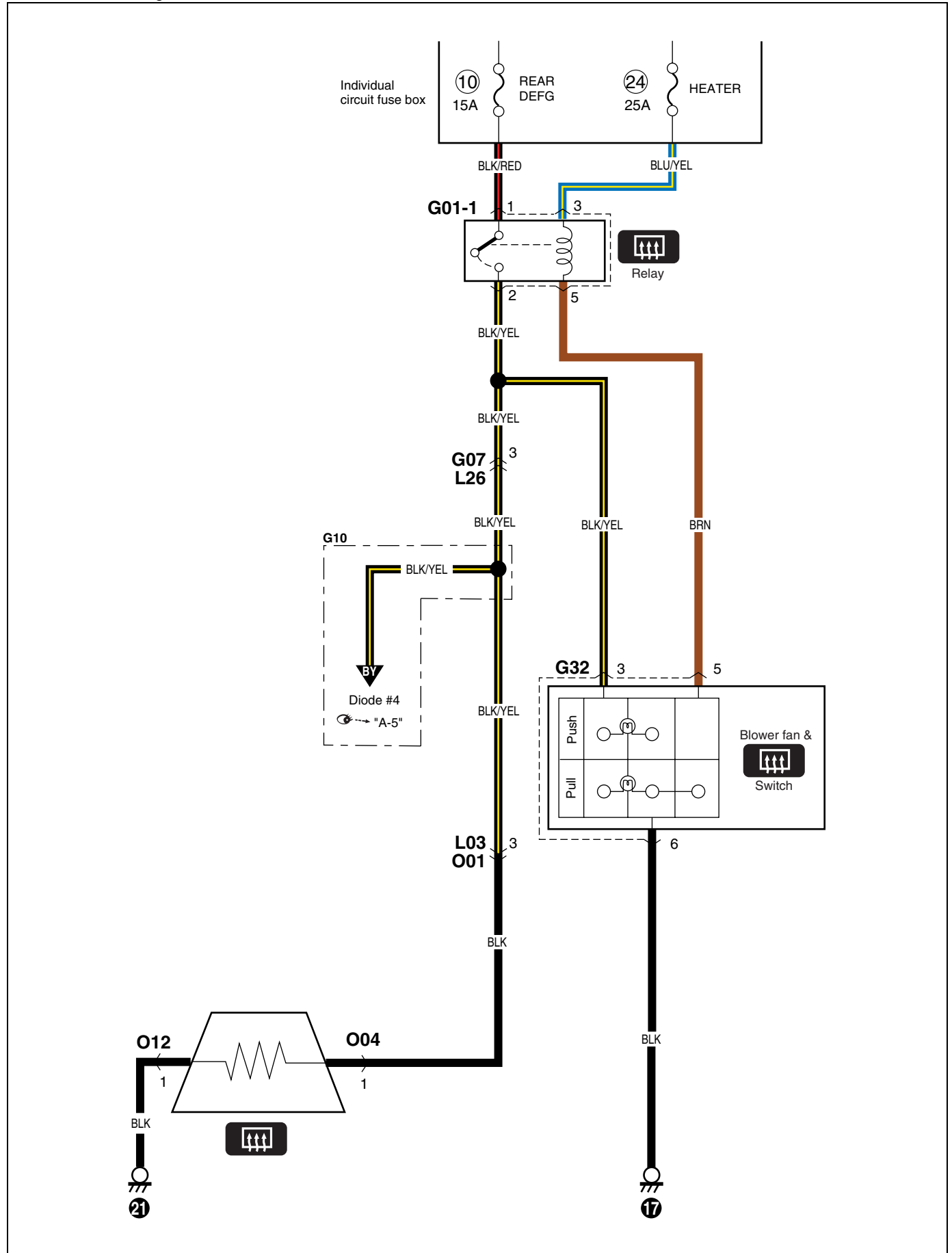
B-1 Windshield wiper and washer
 B-1 Frontscheibwischer und waschanlage
 B-1 Essuie-glace et lave-glace de pare-brise
 B-1 Voorruitwisser en -sproeier



B-2 Achterruitwisser en -sproeier



B-3 Rear defogger
 B-3 Heckscheibenentfeuchter
 B-3 Désembueur arrière
 B-3 Achterruitverwarming

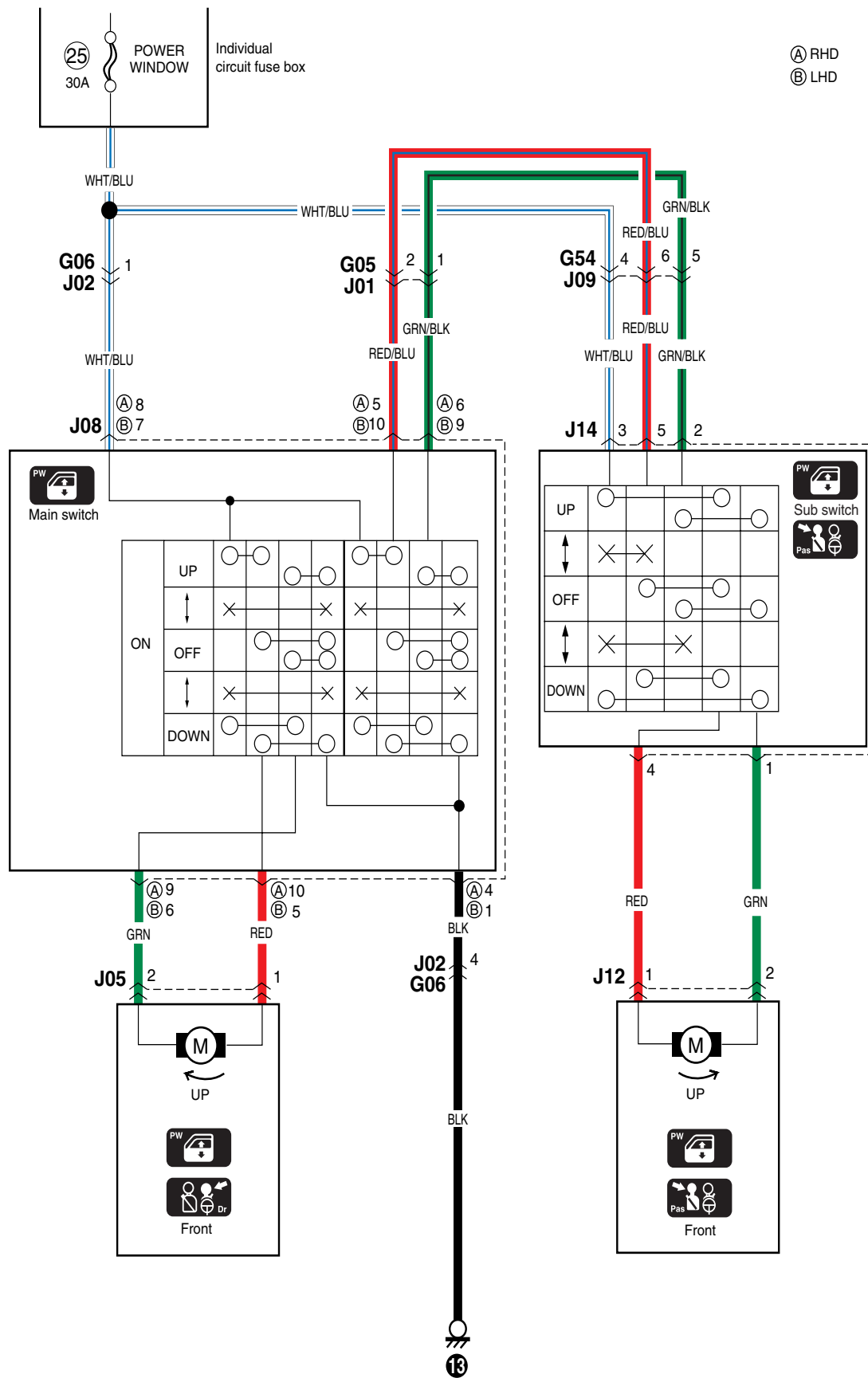


B-4 Power window

B-4 Elektrische fensterheber

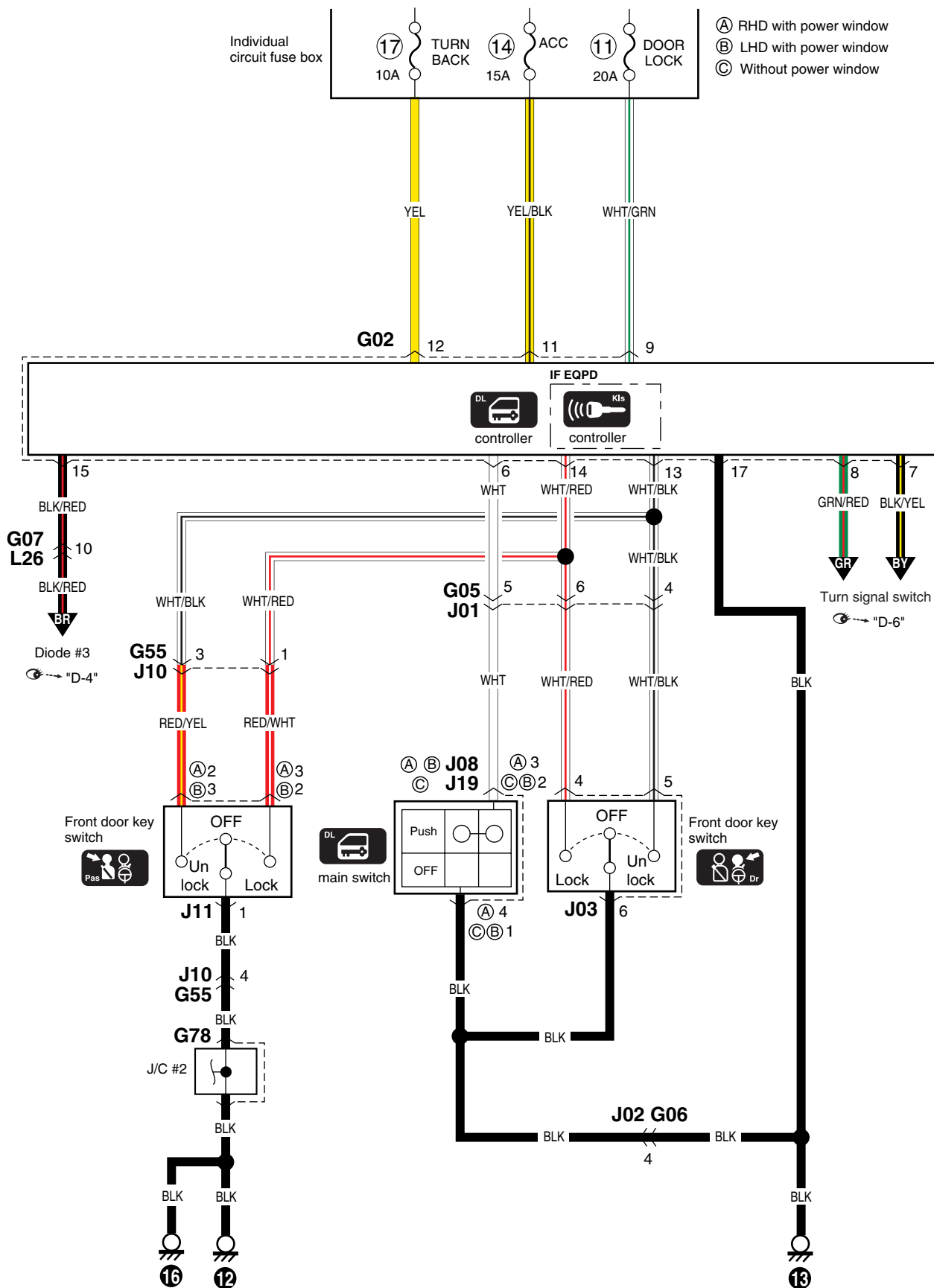
B-4 Vitre électrique

B-4 Elektrische ruitbediening

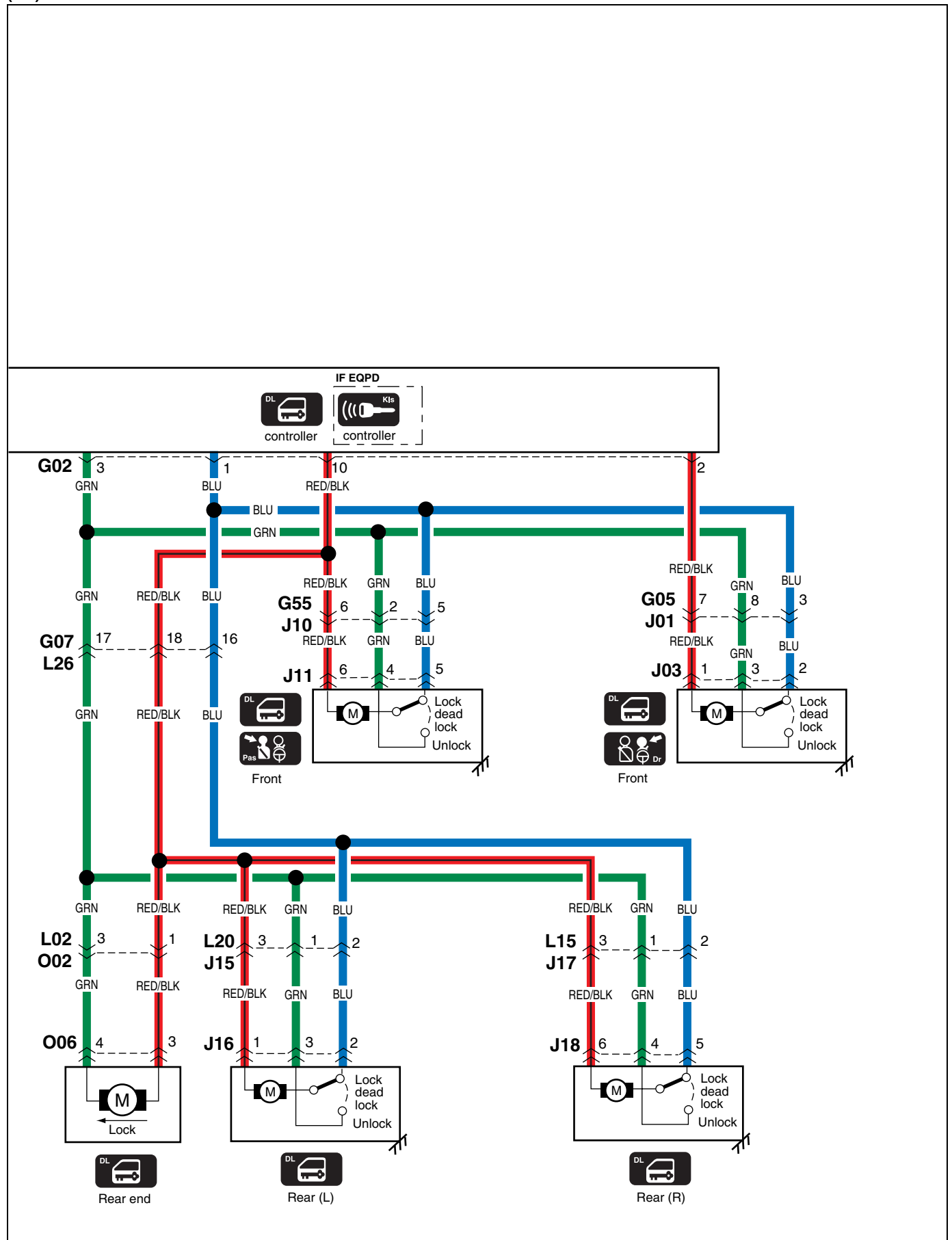


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B-5 Elektrische türverriegelung
B-5 Verrouillage centralisé des portes
B-5 Centrale portiervergrendeling
(1/2)



(2/2)

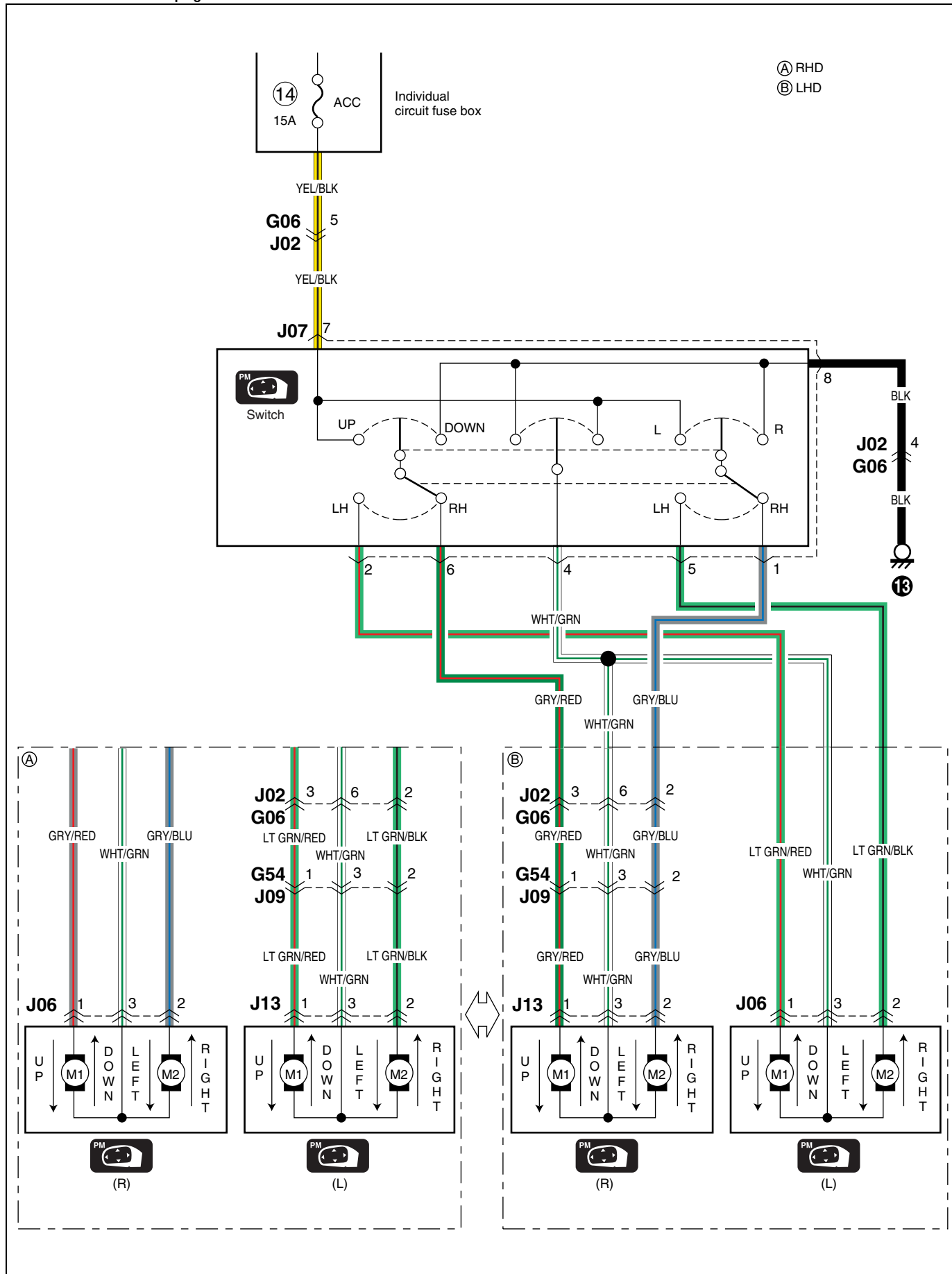


B-6 Power mirror

B-6 Elektrisch verstellbarer Spiegel

B-6 Rétroviseur électrique

B-6 Elektrisch verstellbare spiegel

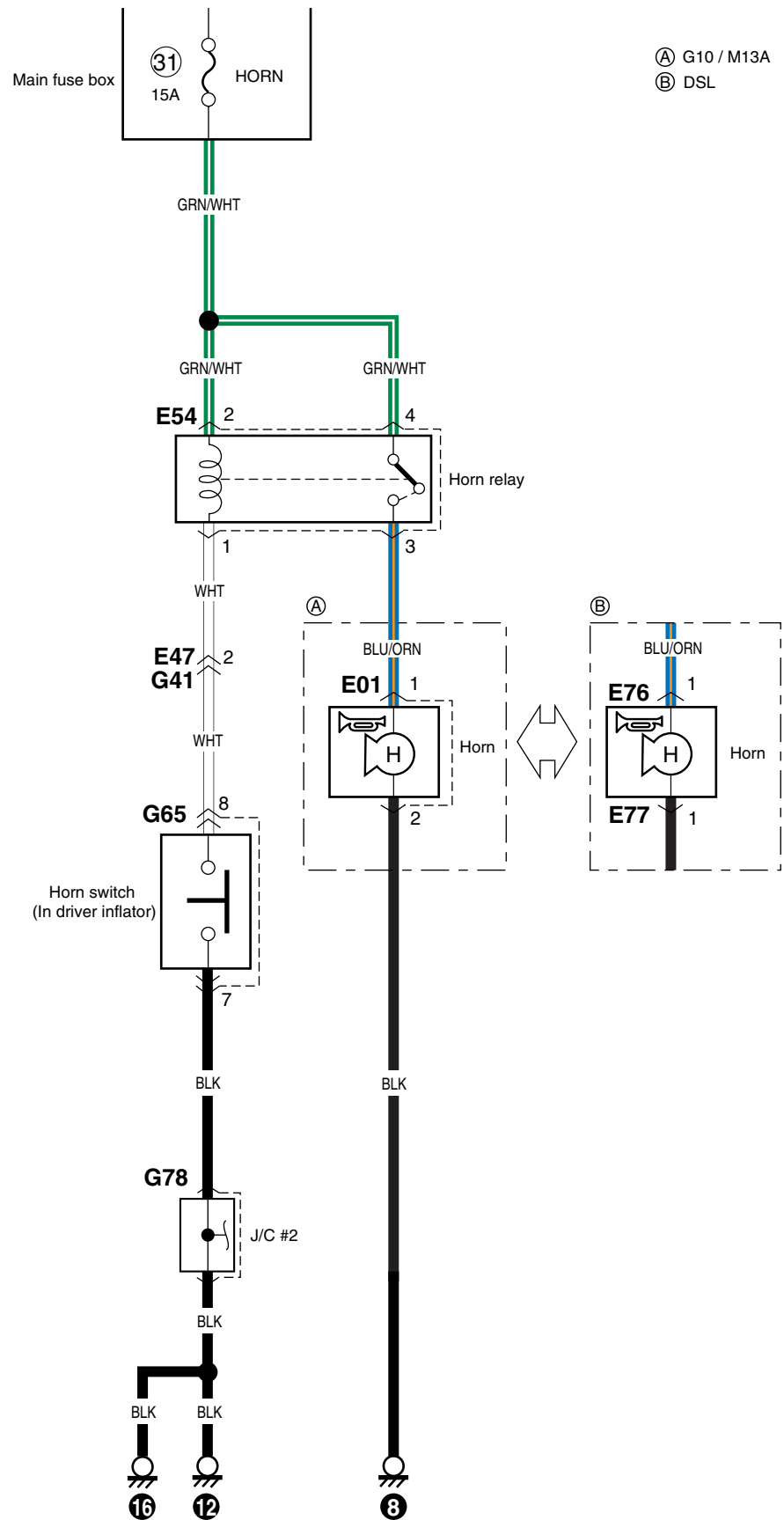


B-7 Horn

B-7 Hupe

B-7 Avertisseur sonore

B-7 Claxon

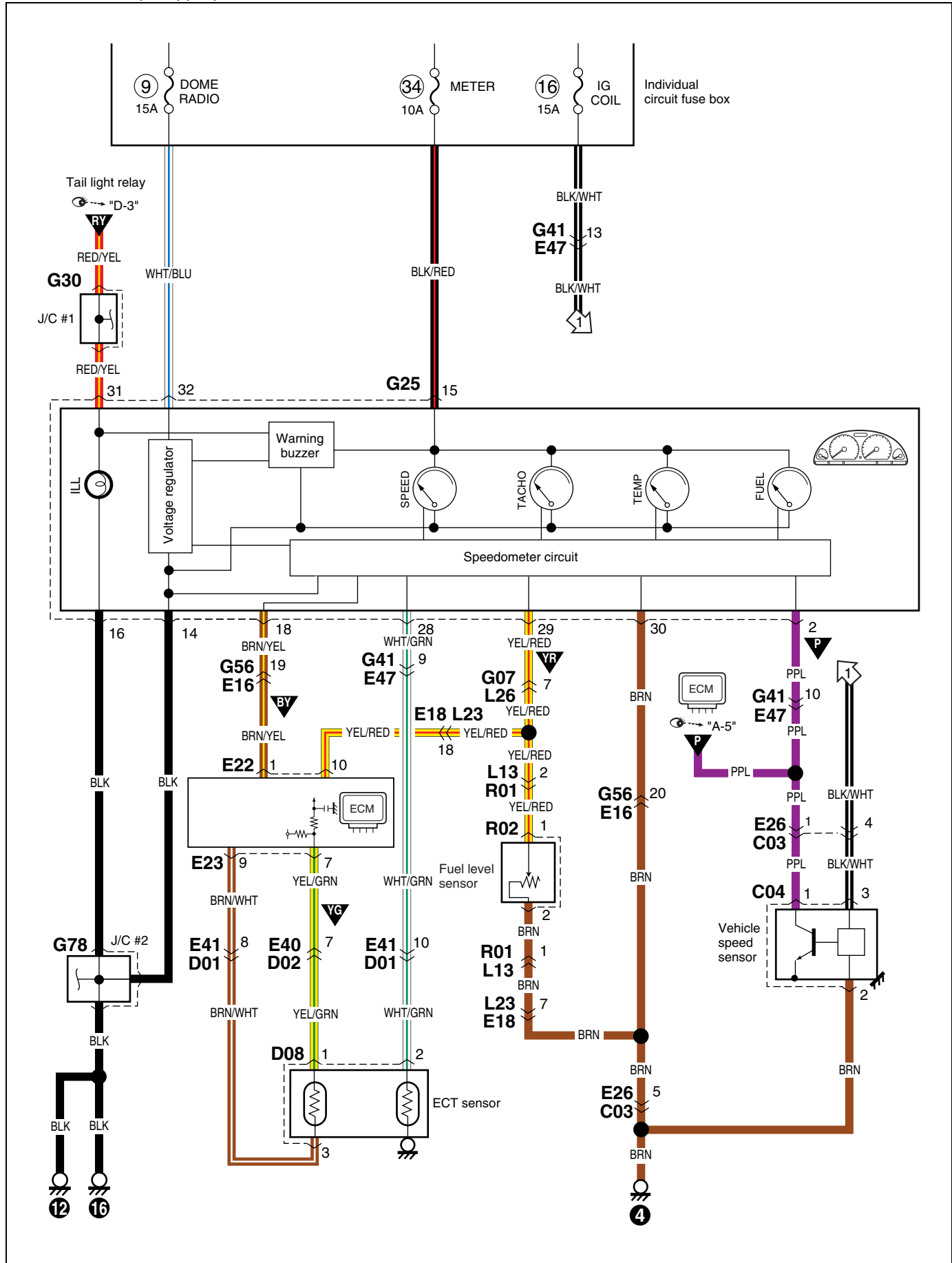


C-1 Combination meter (Meter) (G10)

C-1 Kombinationsinstrument (Meter) (G10)

C-1 Compteur mixte (Compteur) (G10)

C-1 Combinatiemeter (meter) (G10)

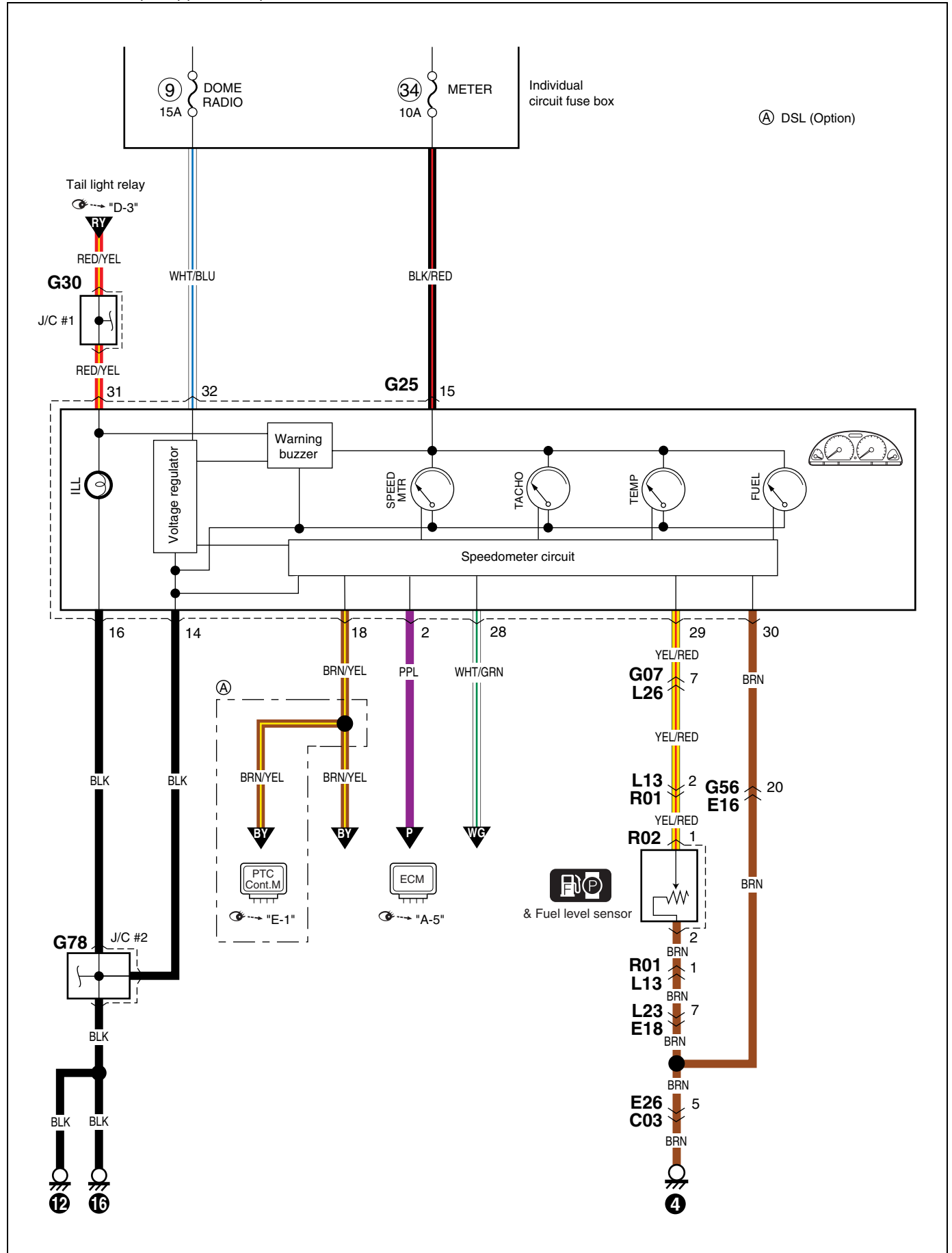


C-1 Combination meter (Meter) (M13A / DSL)

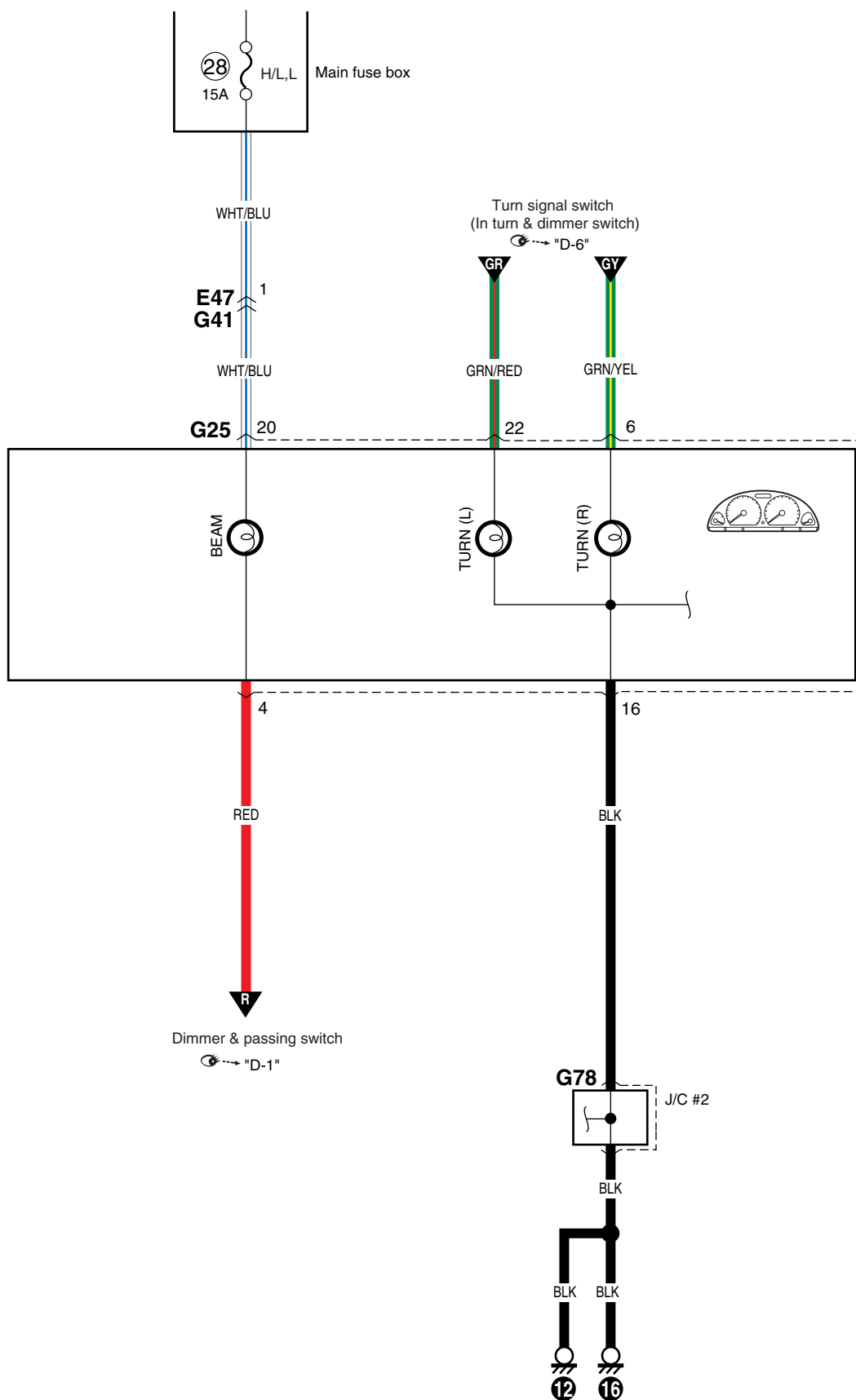
C-1 Kombinationsinstrument (Meter) (M13A / DSL)

C-1 Compteur mixte (Compteur) (M13A / DSL)

C-1 Combinatiemeter (meter) (M13A / DSL)



C-2 Combinatiemeter (indicator)



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C-3 Combination meter (Warning light)

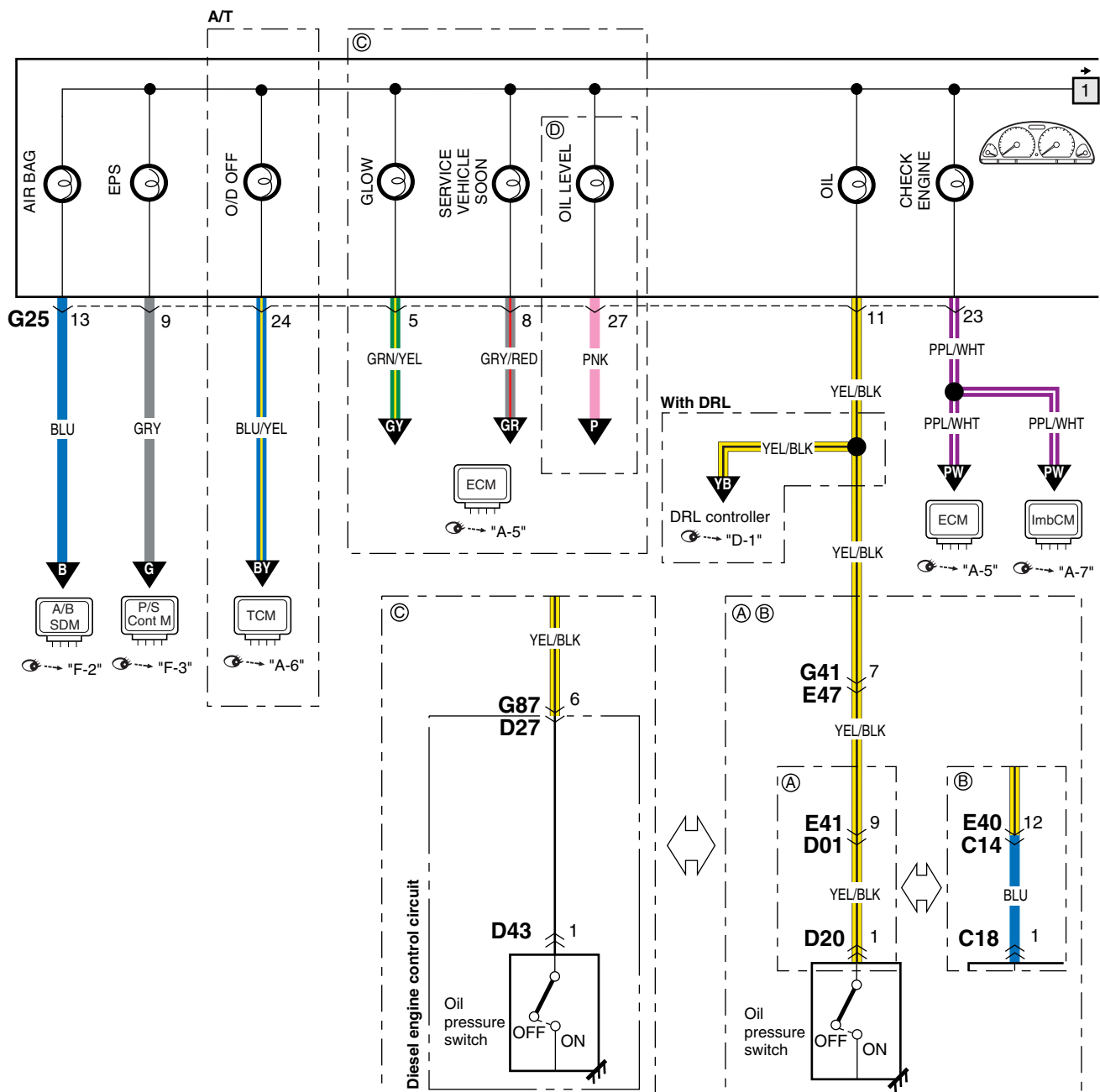
C-3 Kombinationsinstrument (Wrrnleuchte)

C-3 Compteur mixte (Témoins d'avertissement)

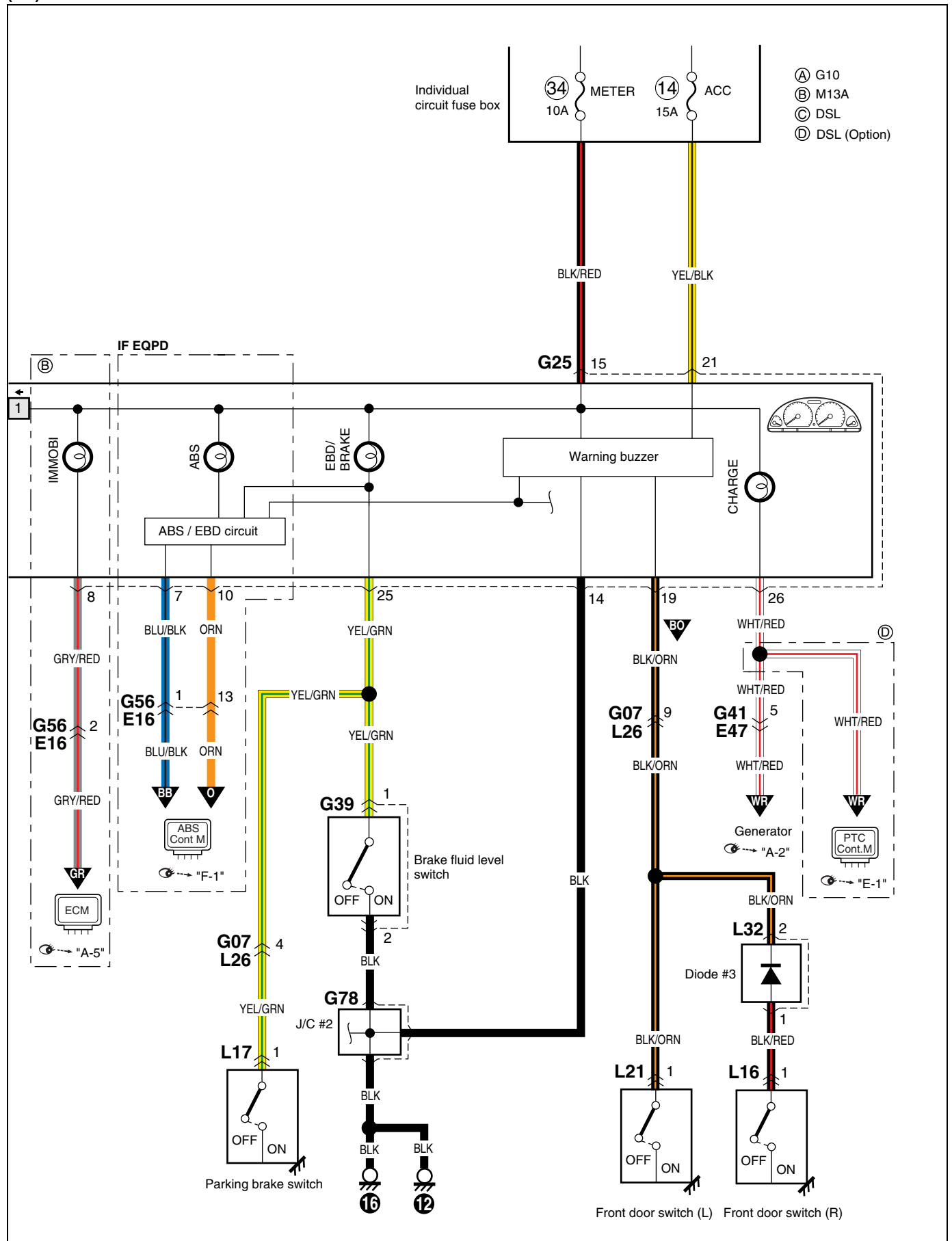
C-3 Combinatiemeter (waarschuwingslampje)

(1/2)

- (A) G10
 (B) M13A
 (C) DSL
 (D) Early DSL only



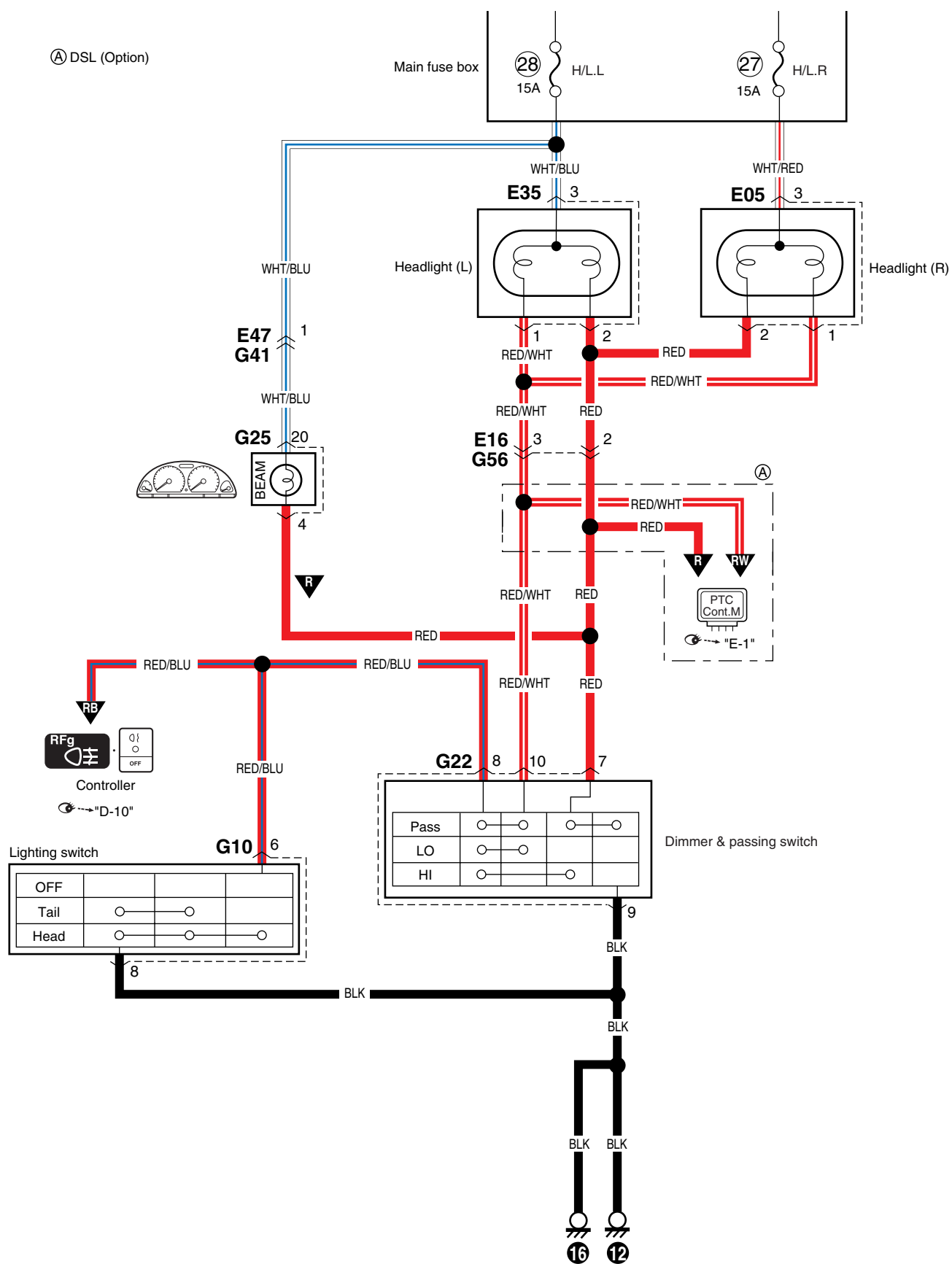
(2/2)



D-1 Scheinwerferanlage (Ohne DRL-system)

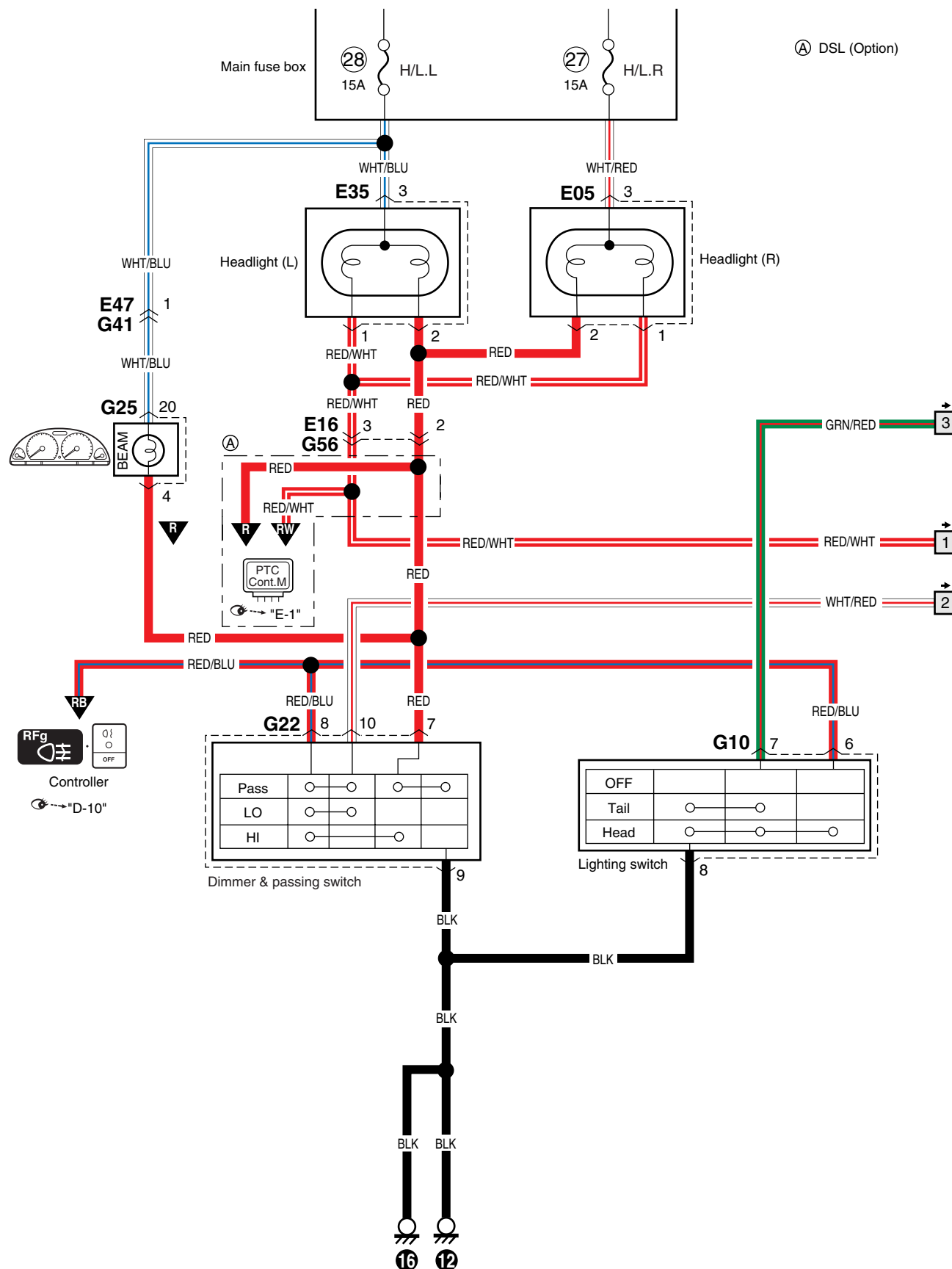
D-1 Système des phares (Sans le système DRL)

D-1 Koplampsysteem (zonder DRL-systeem)

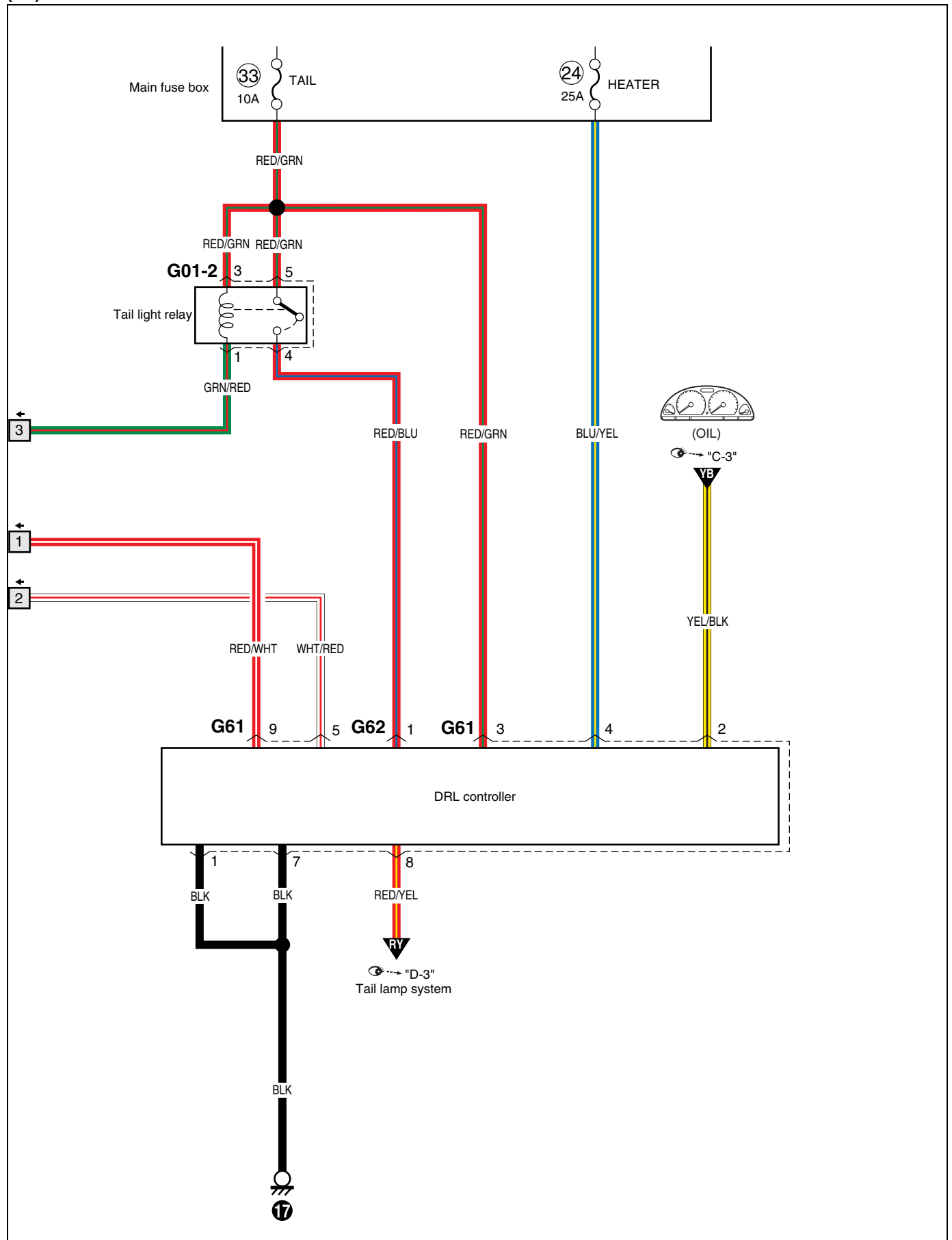


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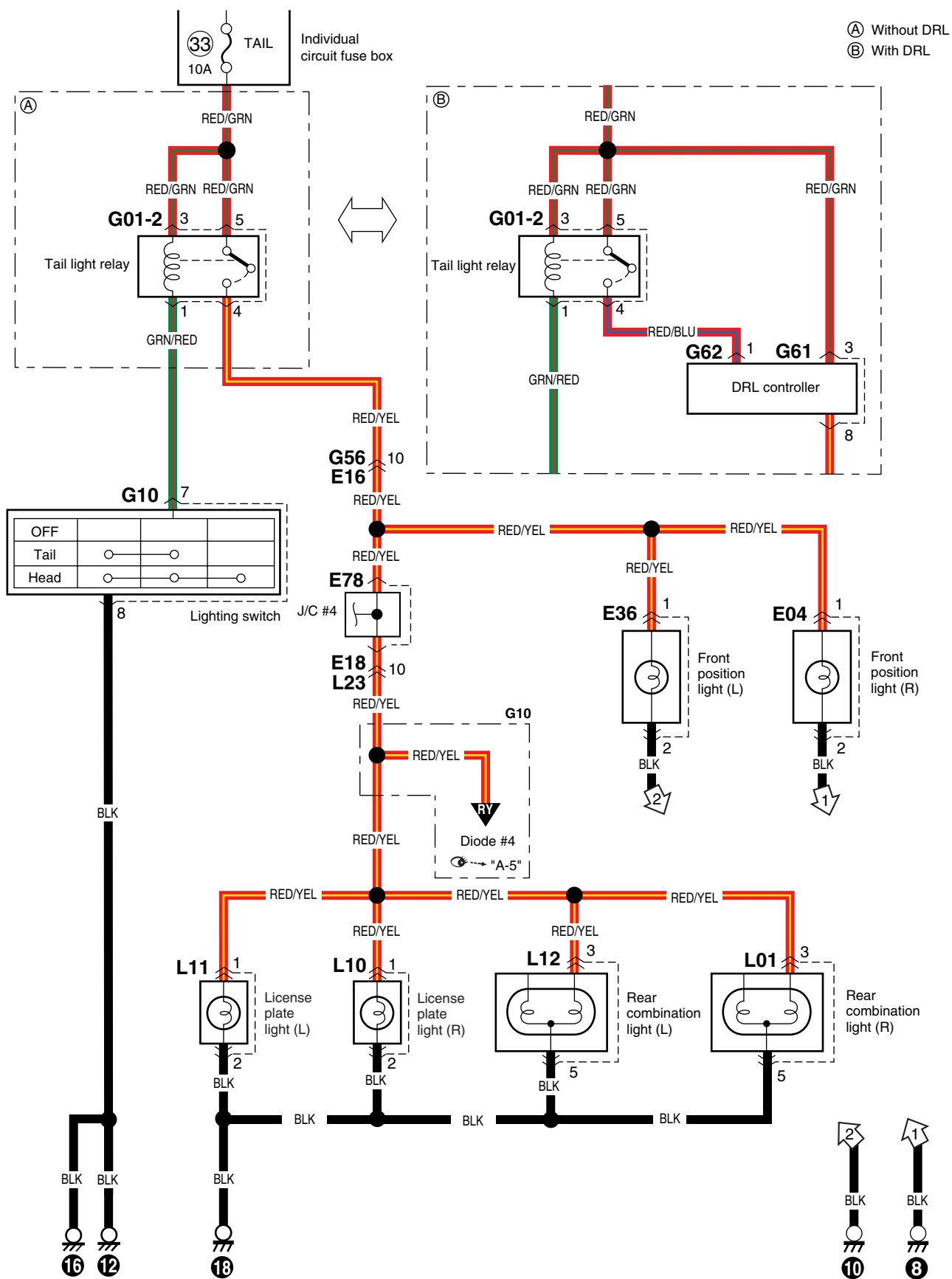
(1/2)



(2/2)



D-2 Begrenzungs-, heck- und kennzeichenleuchte
D-2 Feux de gabarit, arrière et de plaque d'immatriculation
D-2 Parkeerlicht, achterlicht en kentekenplaatverlichting



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Note
Memo

D-3 Illumination light

D-3 Beleuchtungslampe

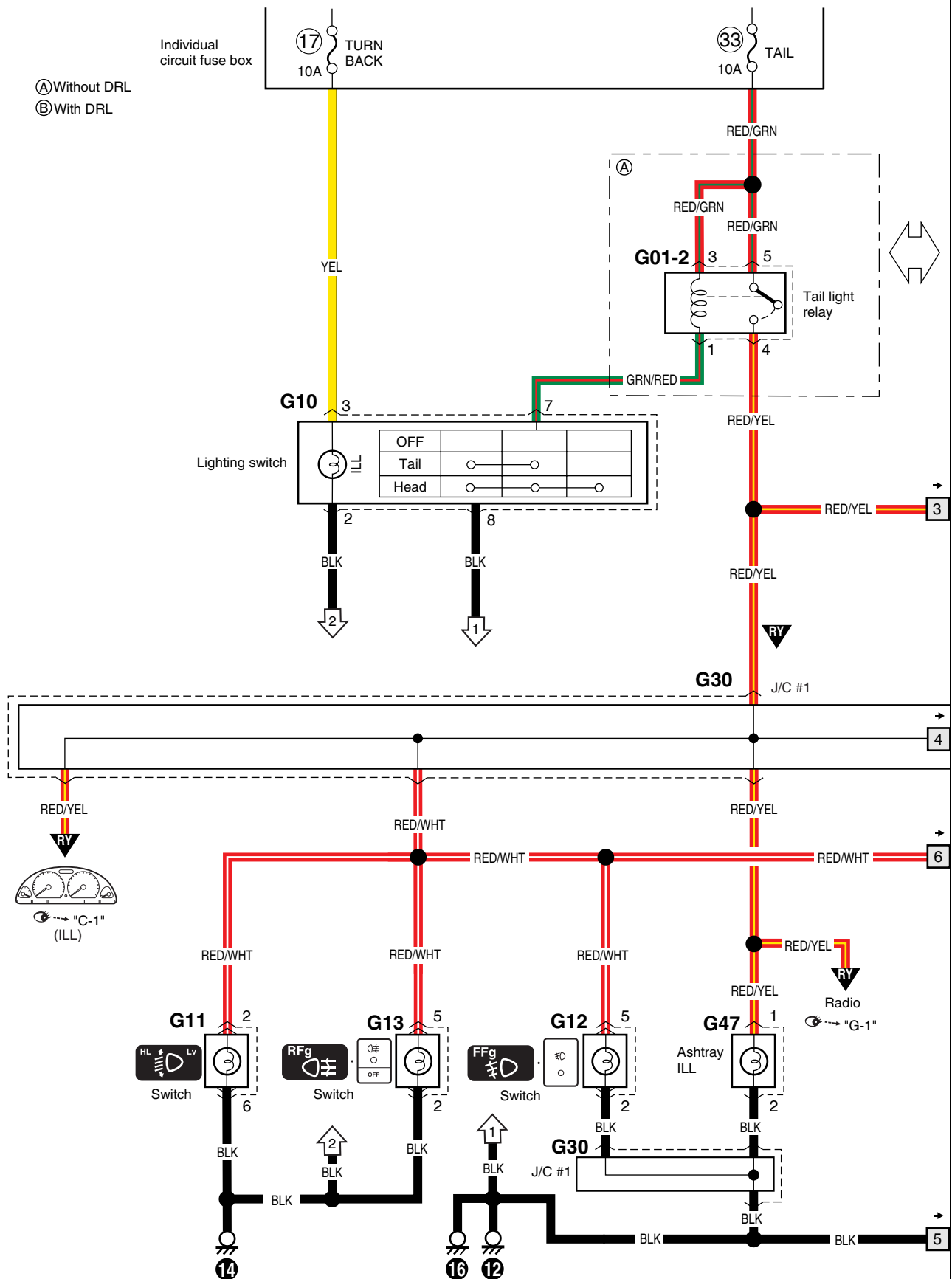
D-3 Dispositif d'éclairage

D-3 Verlichting

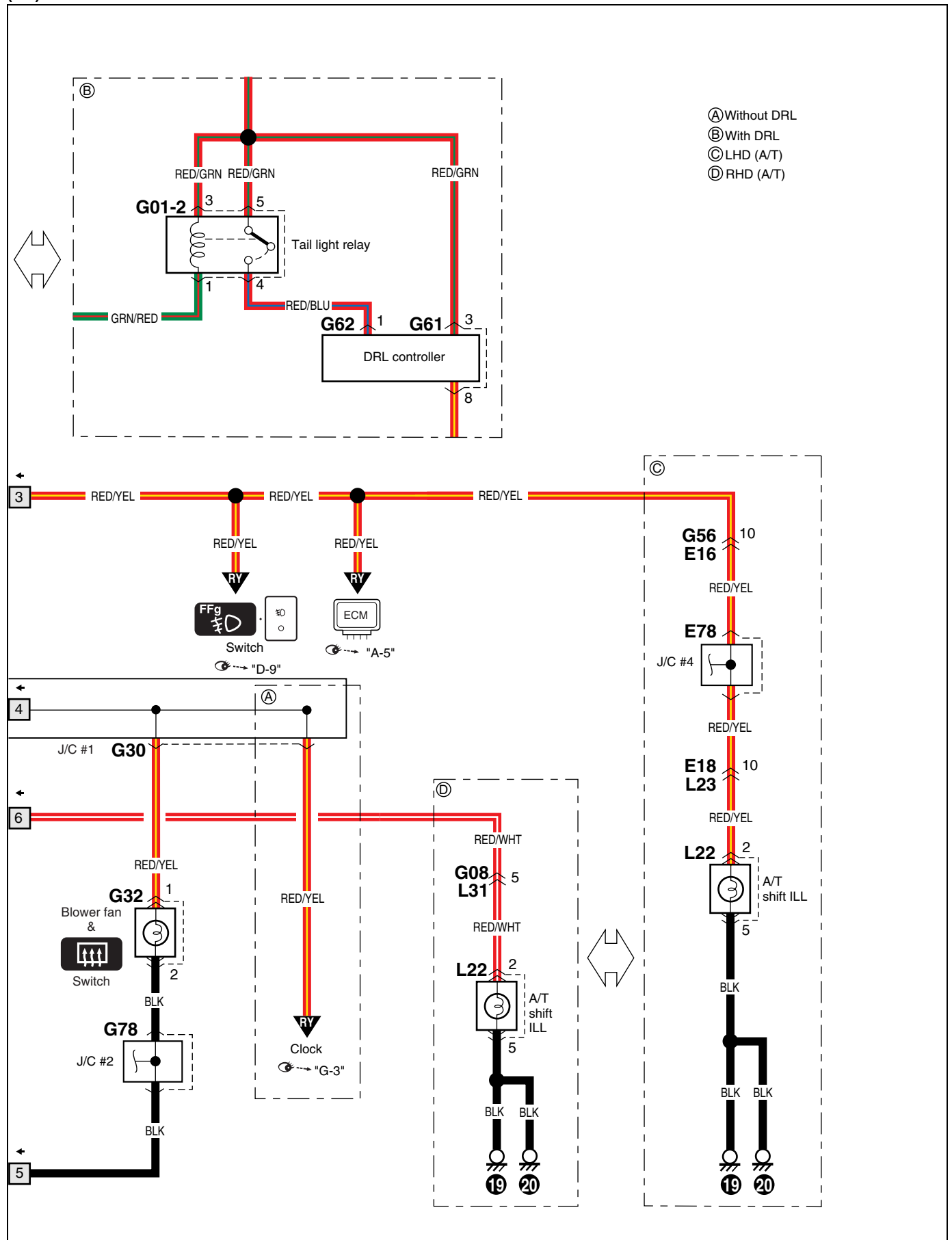
(1/2)

(A) Without DRL

(B) With DRL



(2/2)

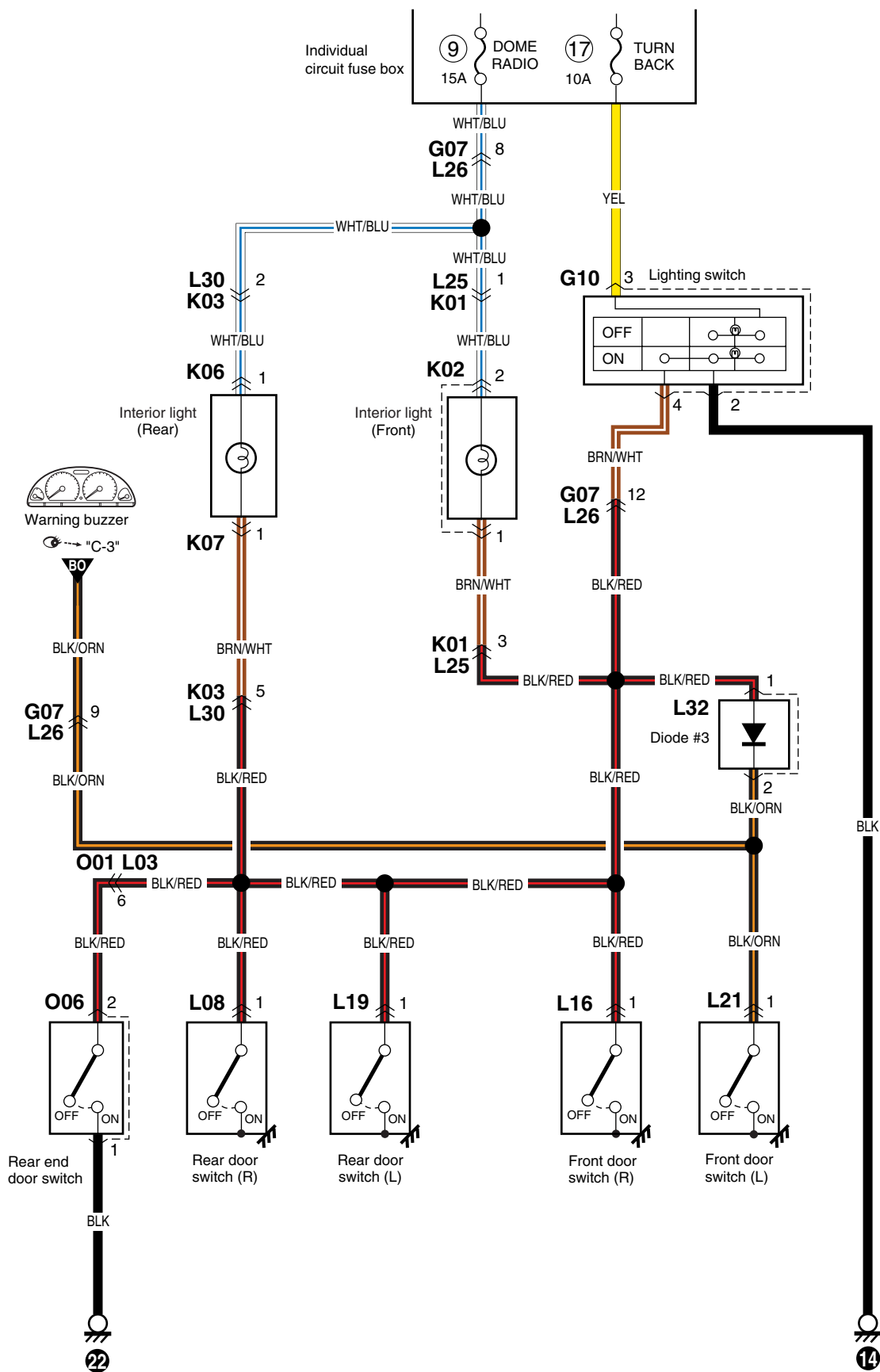


D-4 Interior light (Without power door lock system)

D-4 Innenbeleuchtung (Ohne zentralverriegelung)

D-4 Plafonterior (Sans système de verrouillage de portière motorisé)

D-4 Interieurverlichting (zonder centrale portiervergrendeling)

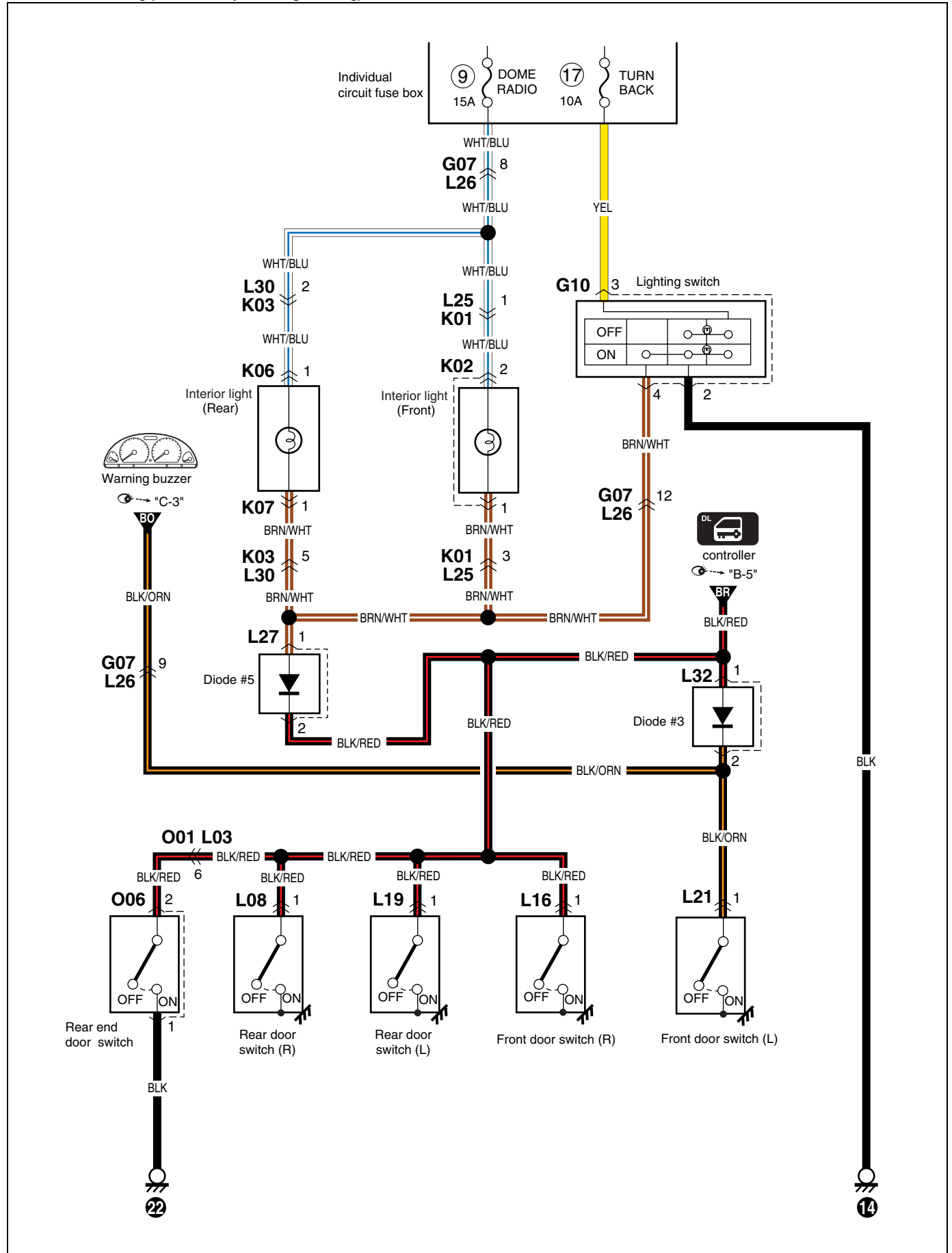


D-4 Interior light (With power door lock system)

D-4 Innenbeleuchtung (Mit Zentralverriegelung)

D-4 Plafontérieur (Avec système de verrouillage de portière motorisé)

D-4 Interieurverlichting (met centrale portierverrendeling)

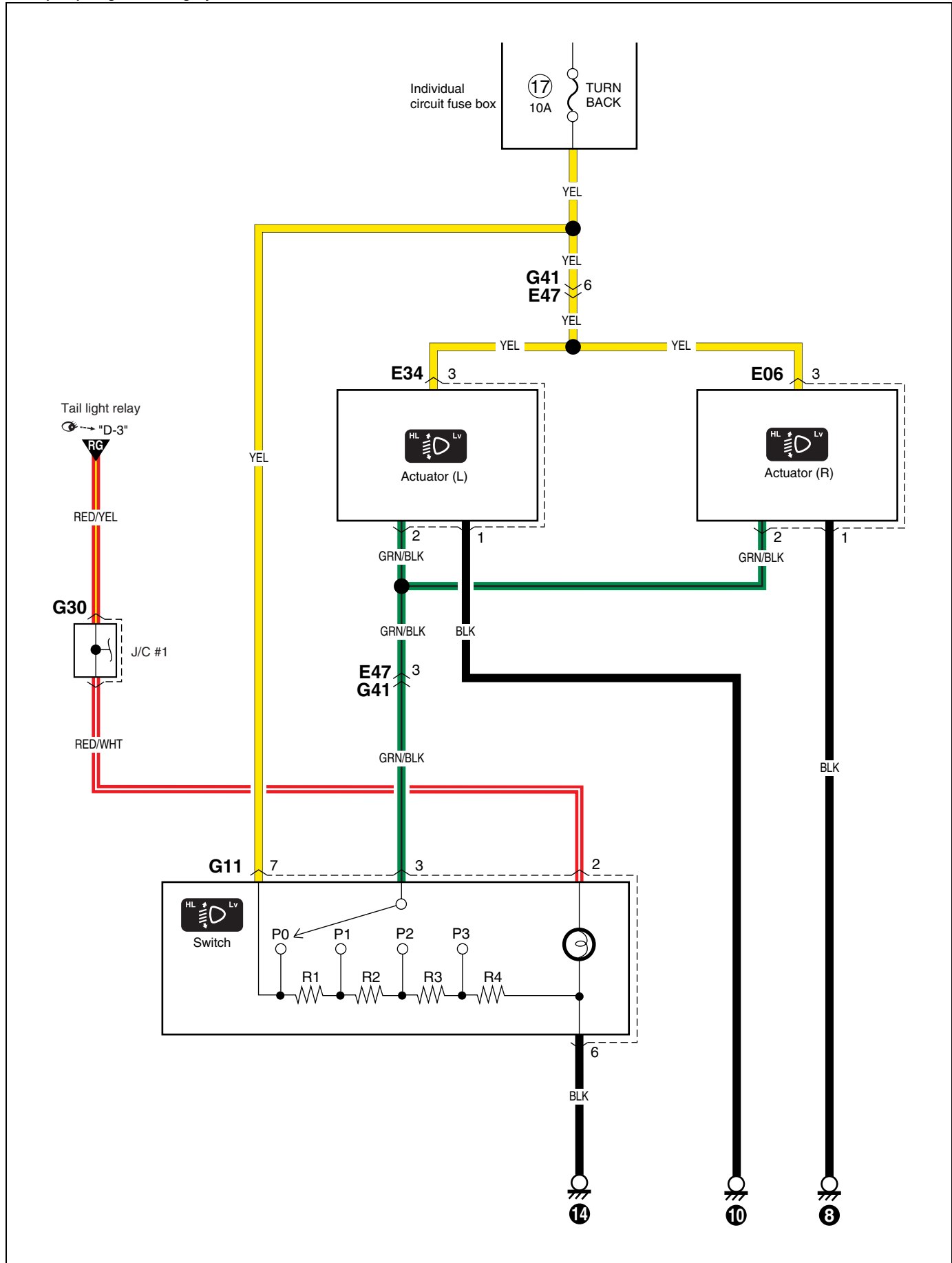


D-5 Headlight beam leveling system

D-5 Scheinwerfer-nivelliersystem

D-5 Système de réglage des faisceaux de phares

D-5 Koplamphoogteverstellingssysteem

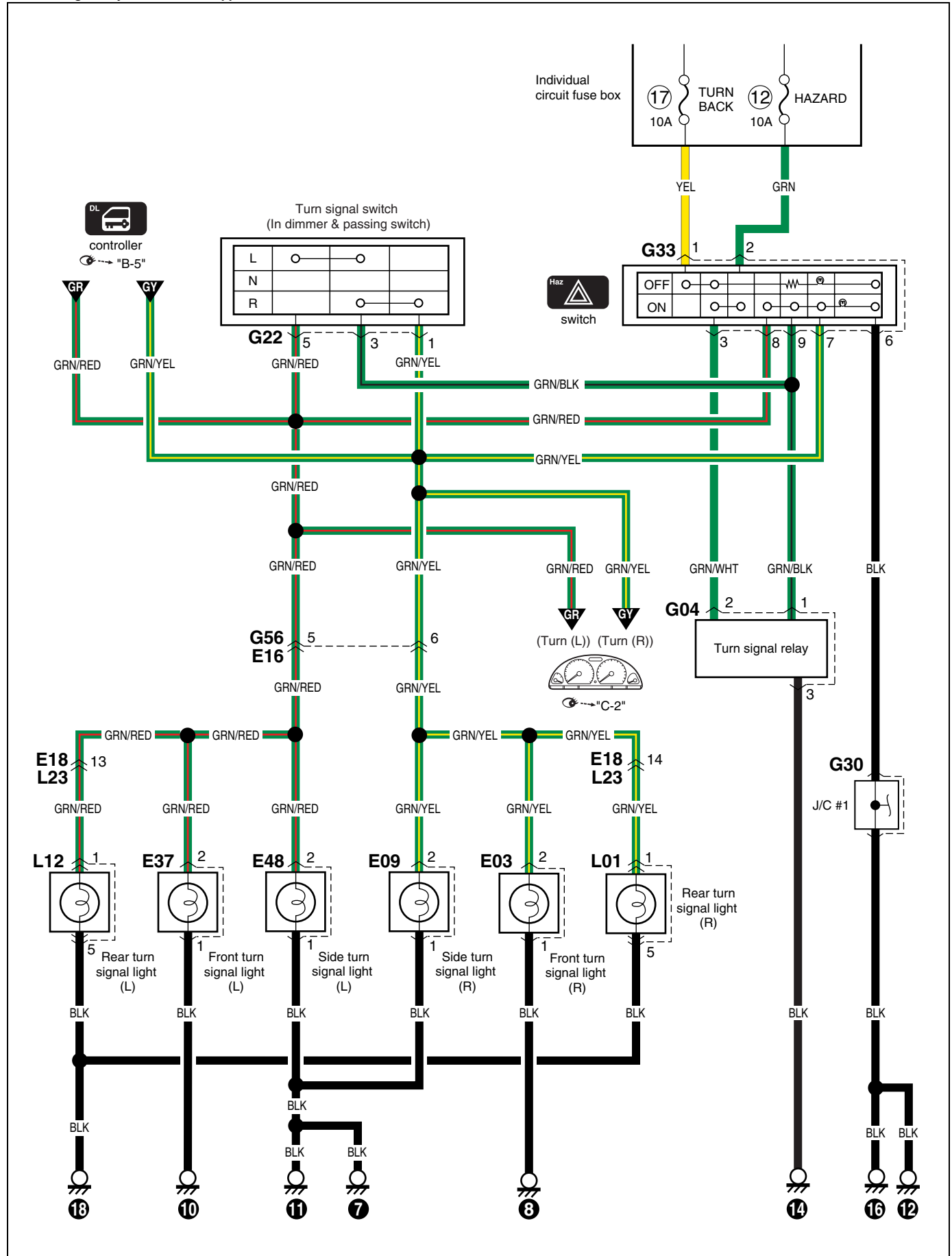


D-6 Turn signal and hazard warning light

D-6 Blinklicht und warnleuchte

D-6 Feux clignotants et feux de détresse

D-6 Richtingaanwijzers en alarmknipperlicht

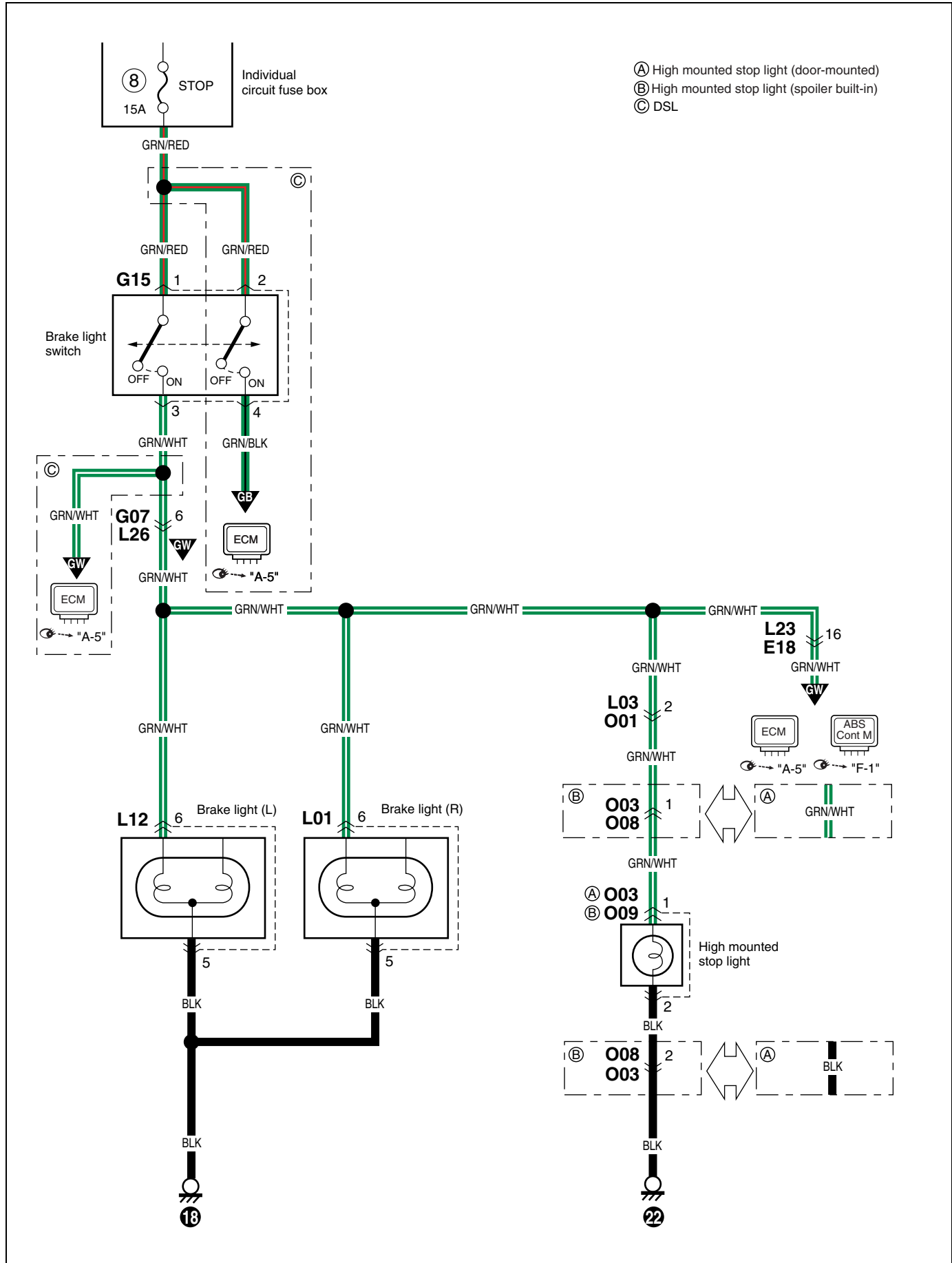


D-7 Brake light

D-7 Bremsleuchte

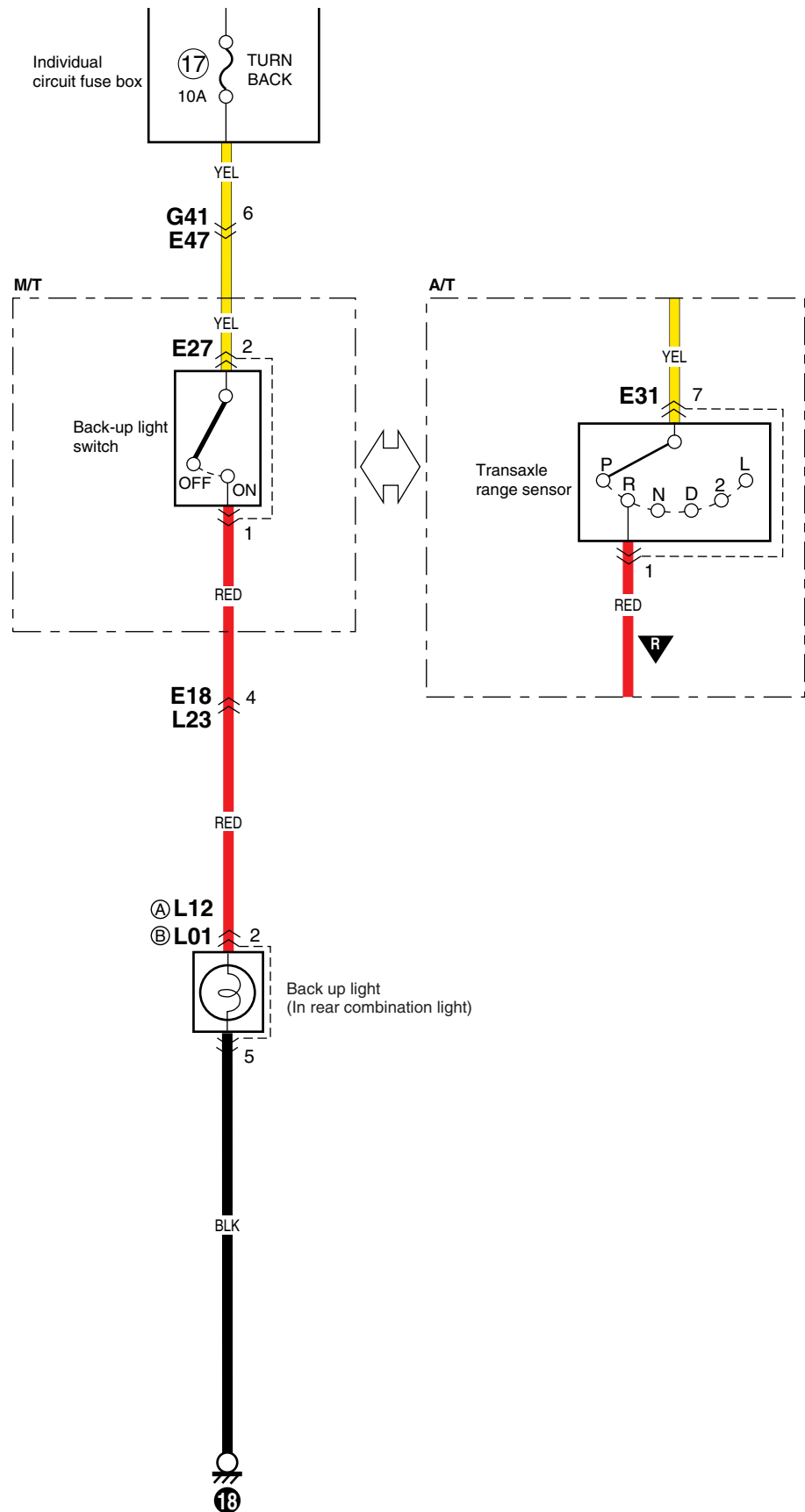
D-7 Feux stop

D-7 Remlicht



D-8 Back-up light
 D-8 Rückfahrleuchte
 D-8 Feux de marche arrière
 D-8 Achteruitrijlicht

Ⓐ RHD
 Ⓑ LHD

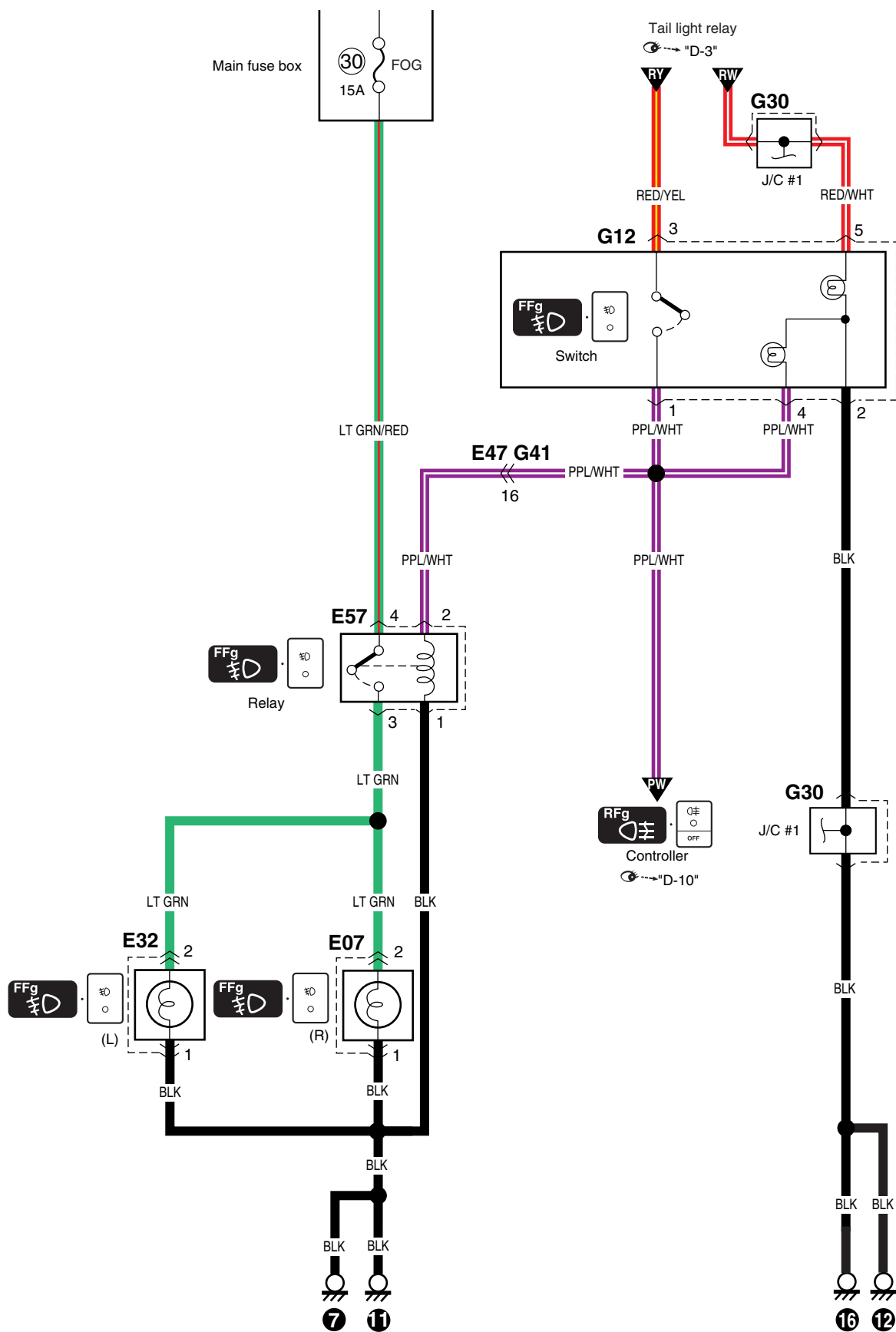


D-9 Front fog light

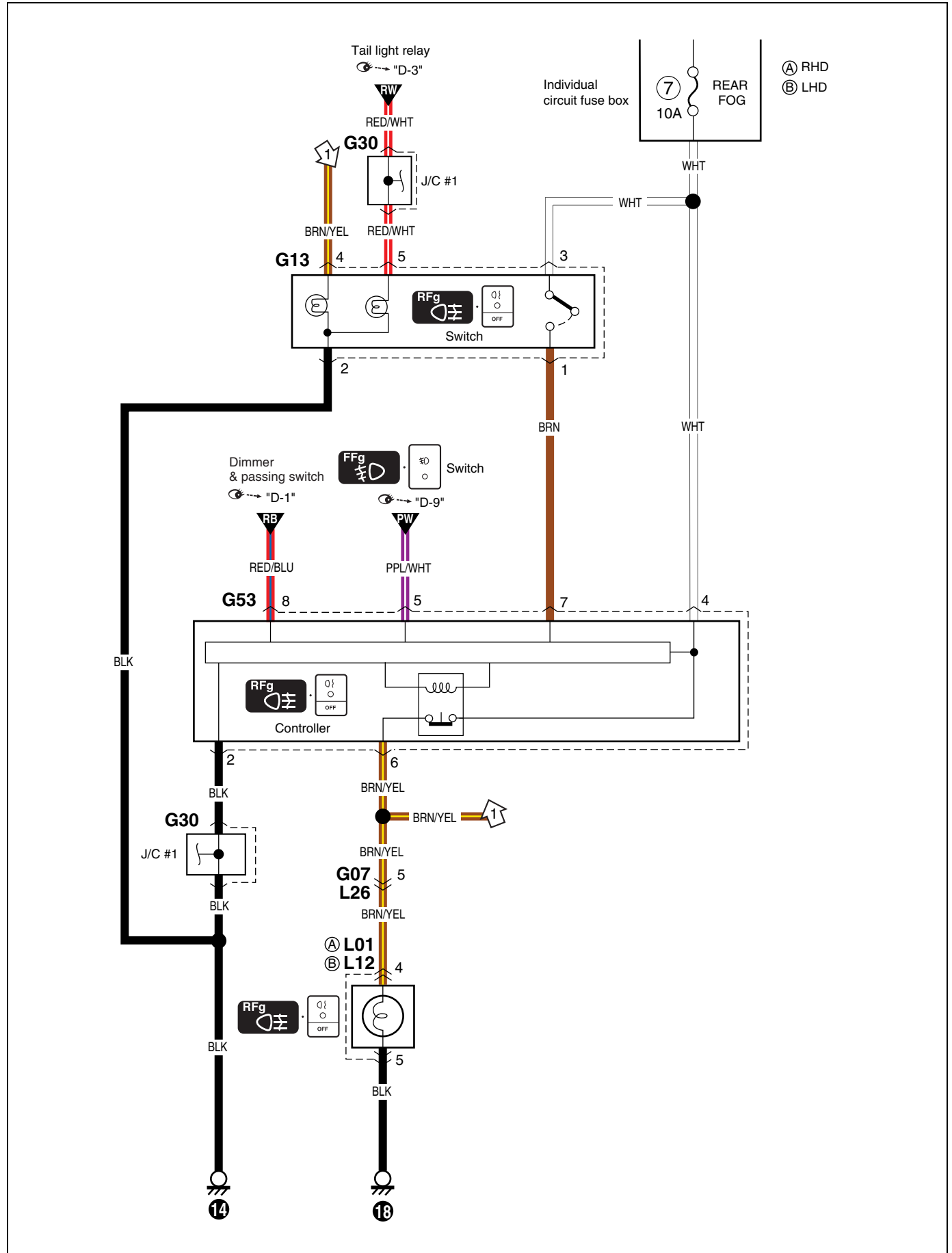
D-9 Vordere nebelleuchten

D-9 Antibrouillard avant

D-9 Voormistlicht



D-10 Rear fog light
 D-10 Hecknebeleuchte
 D-10 Antibrouillard arrière
 D-10 Achtermistlicht

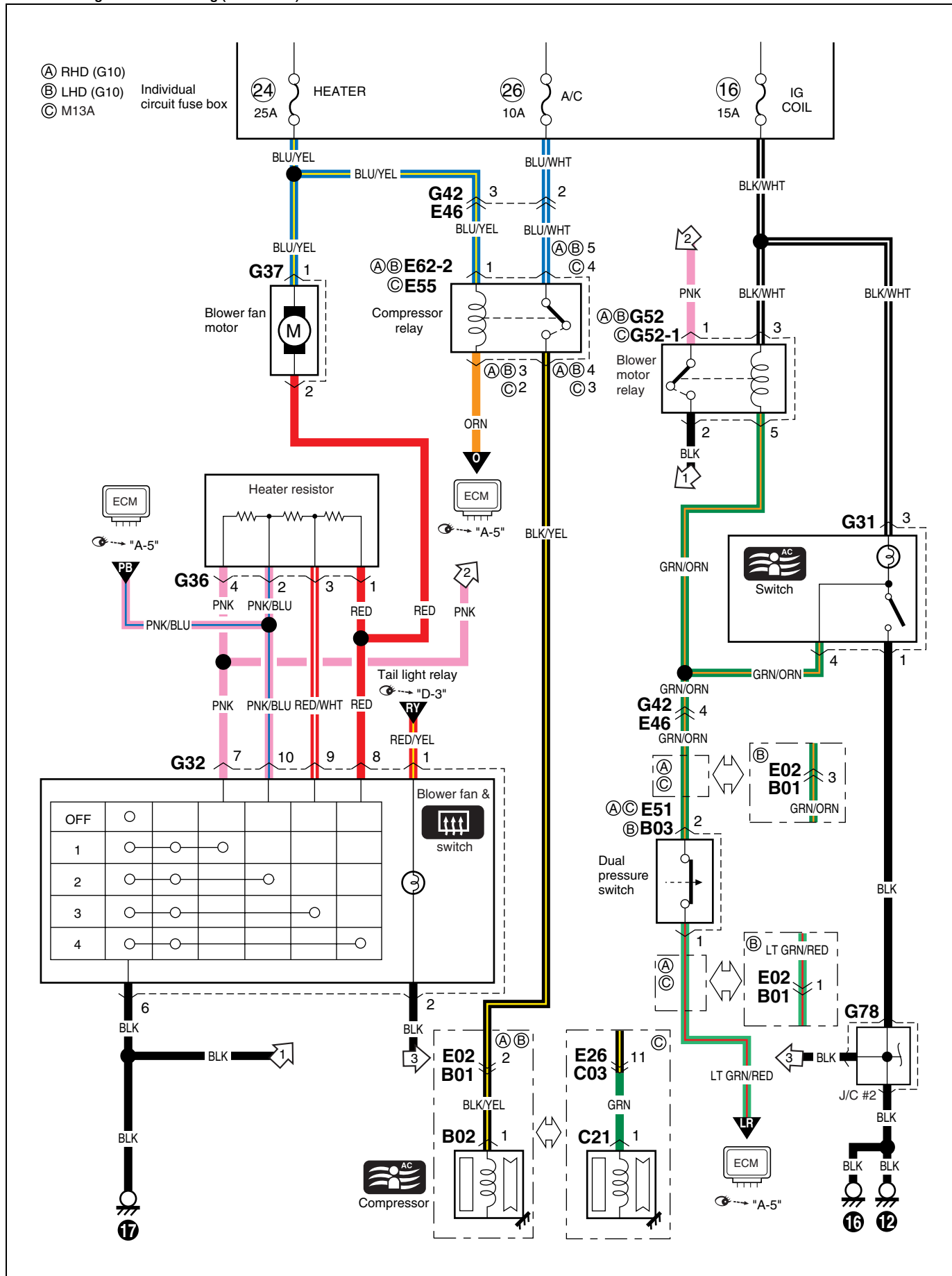


E-1 Heater and air conditioner (G10 / M13A)

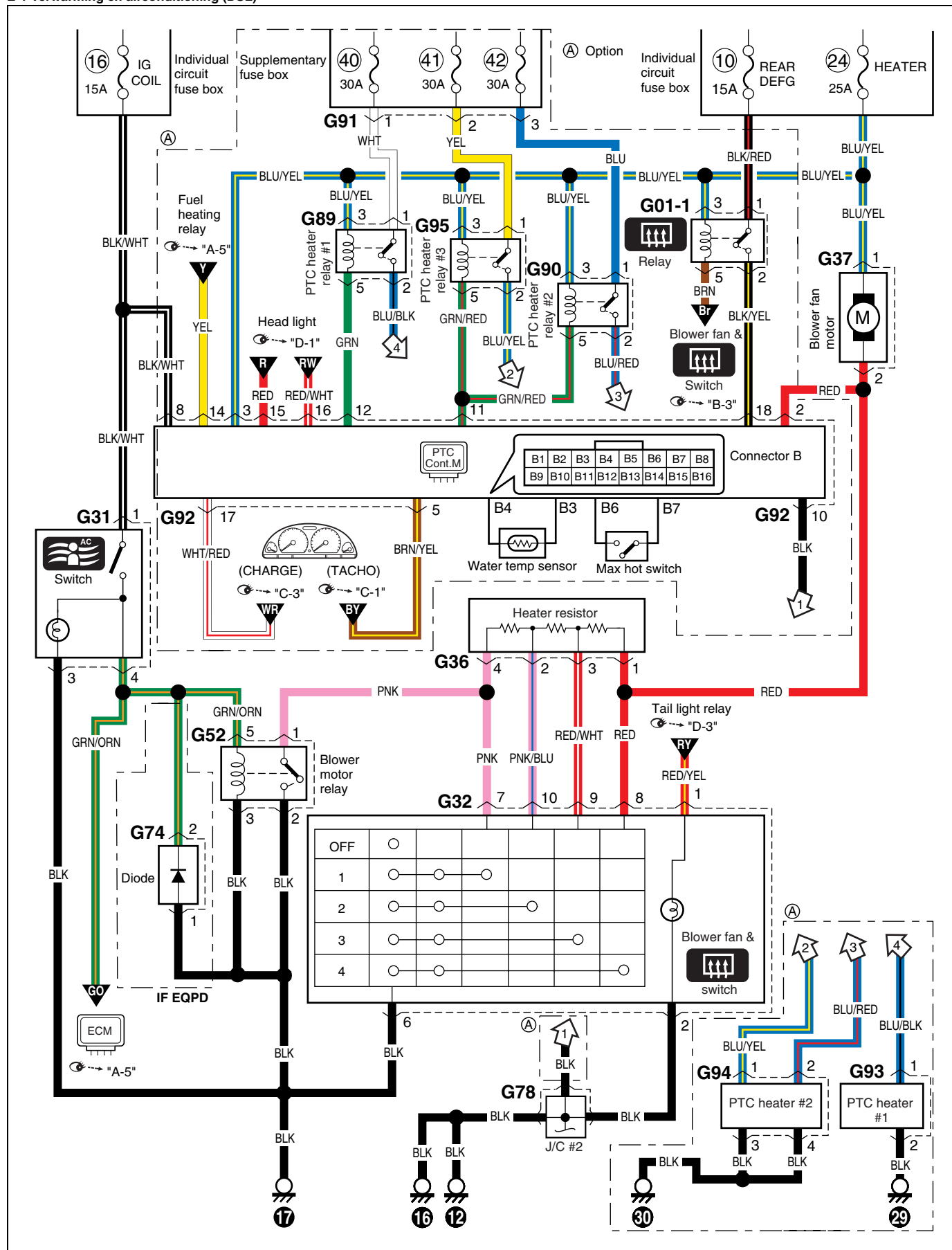
E-1 Heizung und Klimaanlage (G10 / M13A)

E-1 Chauffage et climatisation (G10 / M13A)

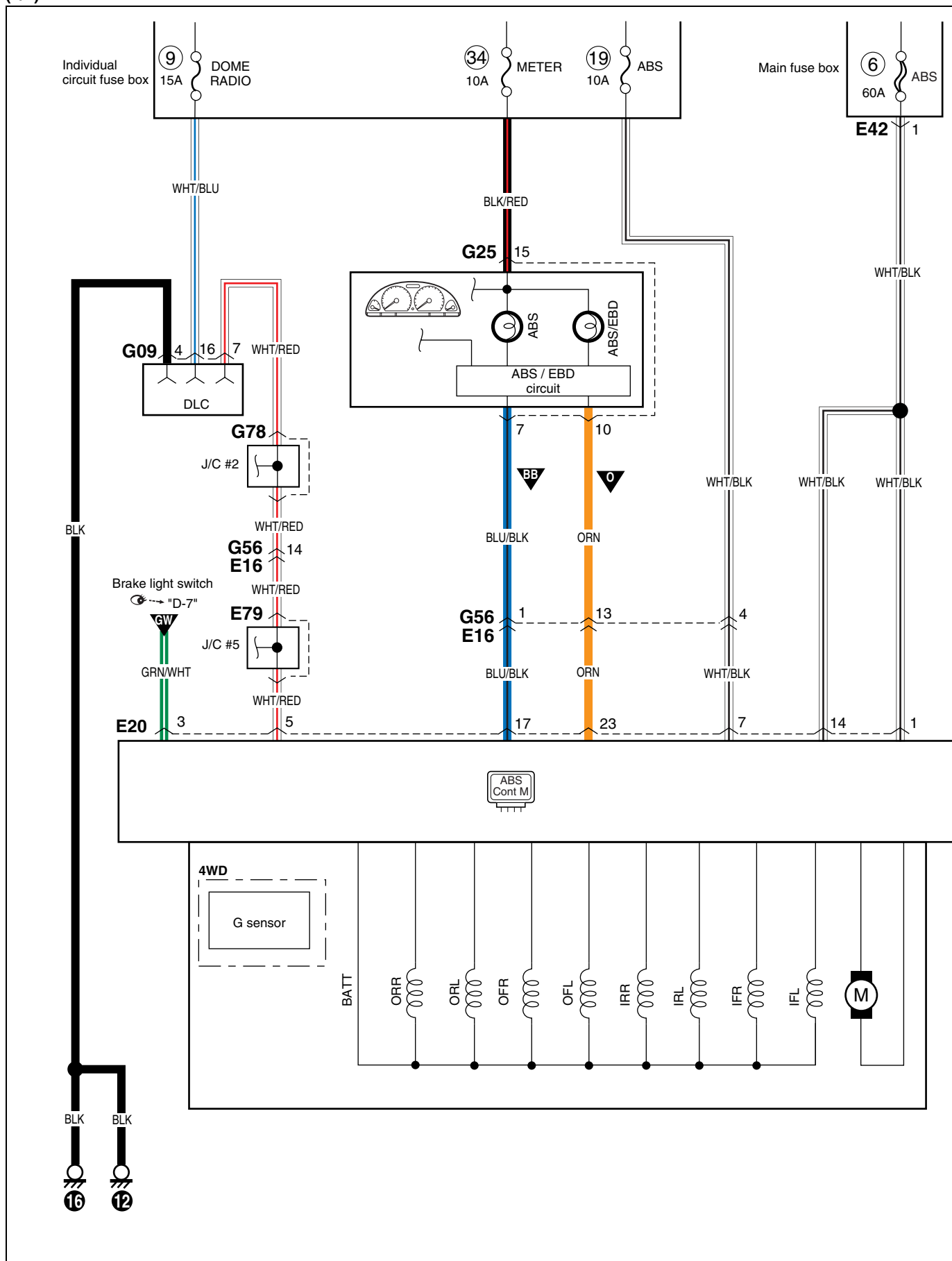
E-1 Verwarming en airconditioning (G10 / M13A)



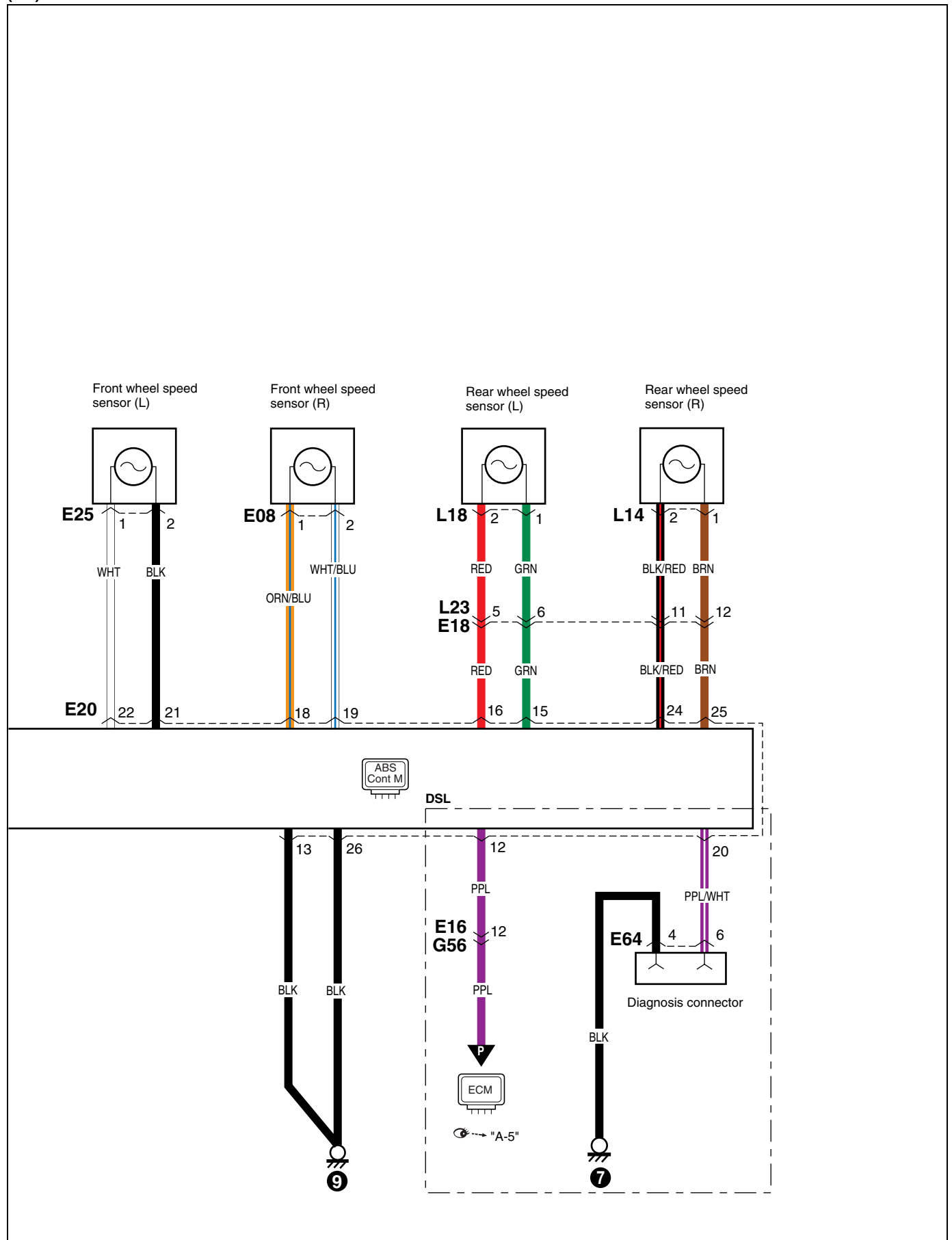
E-1 Verwarming en airconditioning (DSL)



F-1 Antiblockiersystem
F-1 Système d'antiblocage des freins
F-1 Antiblokkeersysteem
(1/2)



(2/2)



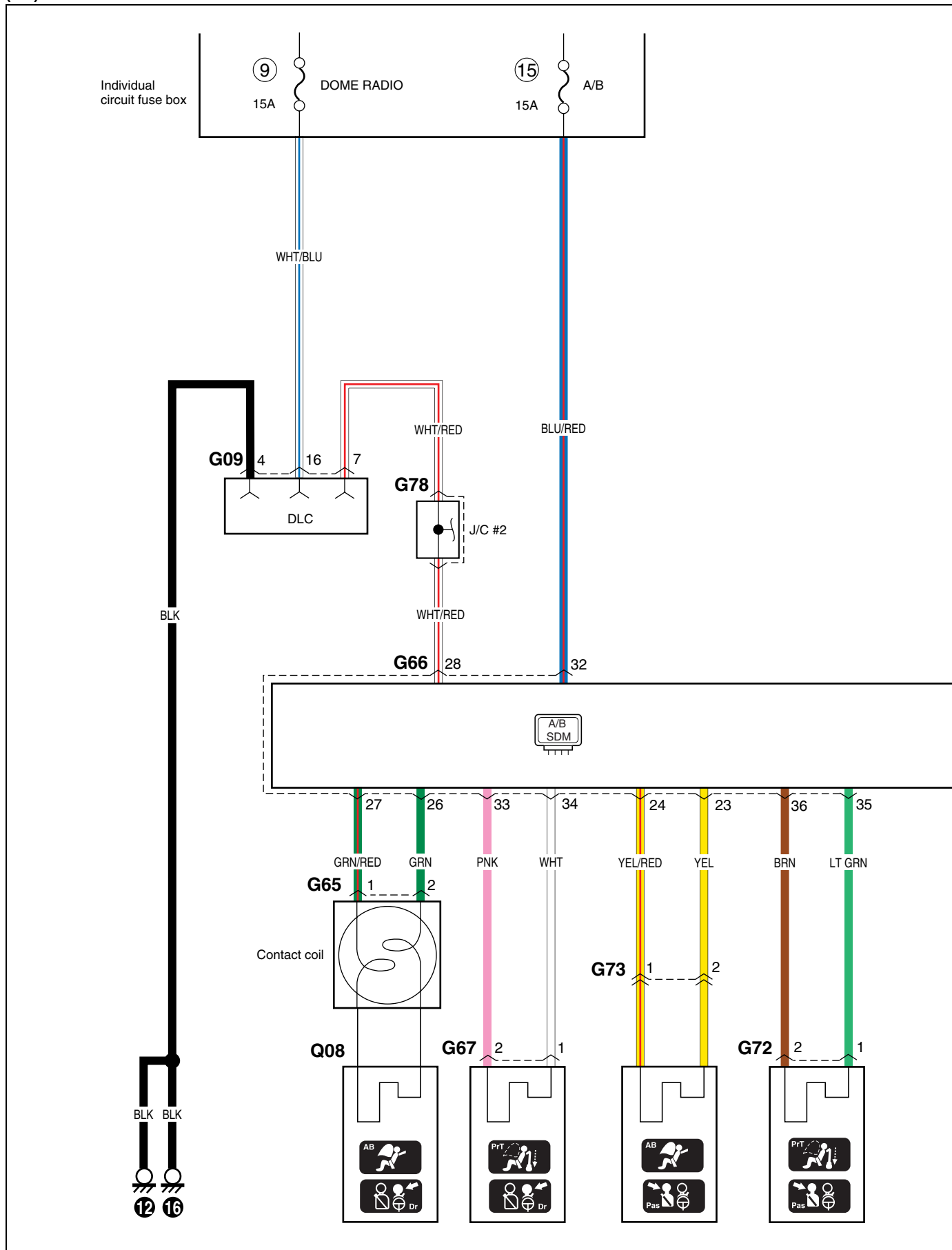
F-2 Air-bag control system

F-2 Airbag-steuersystem

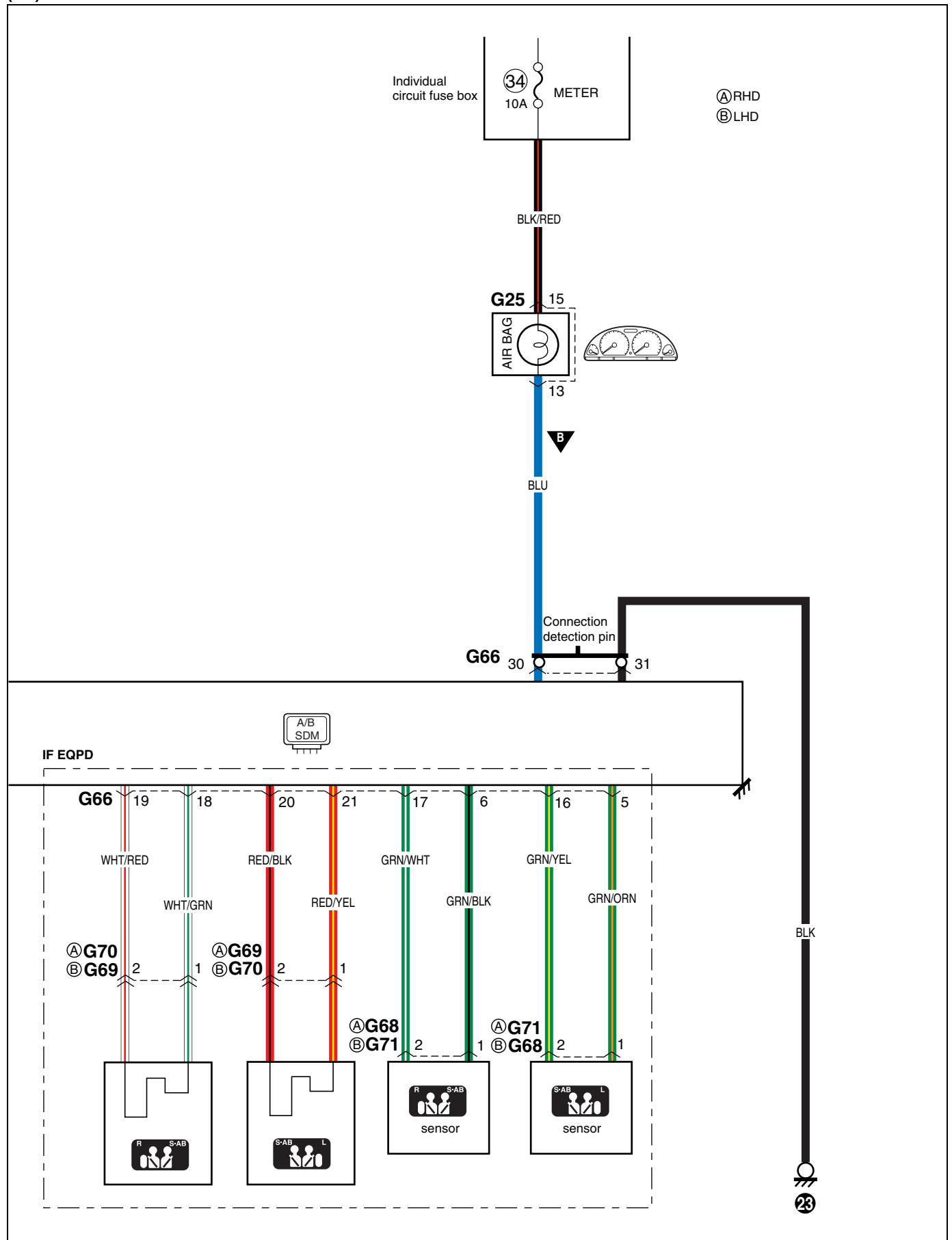
F-2 Système de commande des airbags

F-2 Airbagregelsysteem

(1/2)



(2/2)



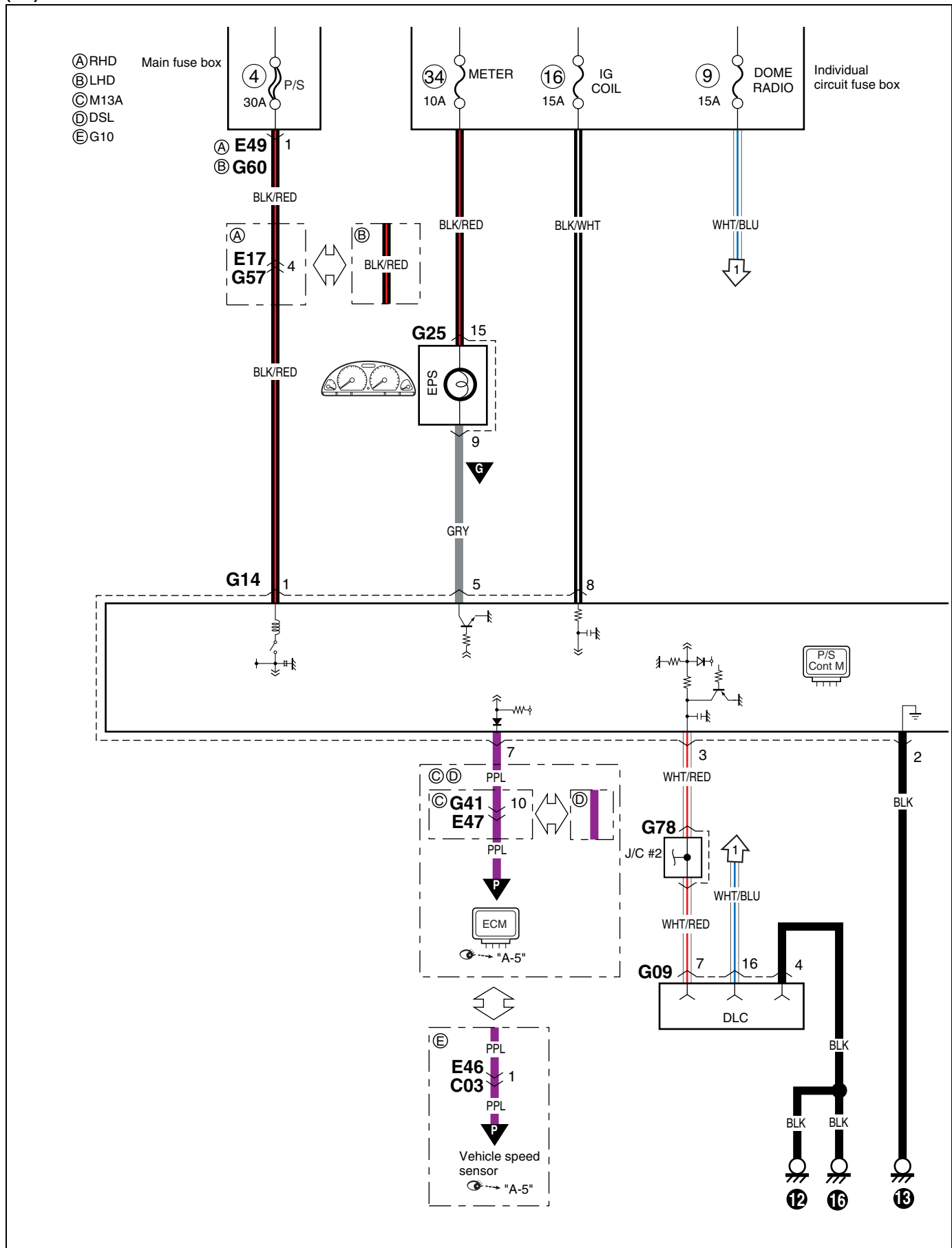
F-3 Power steering

F-3 Servolenkung

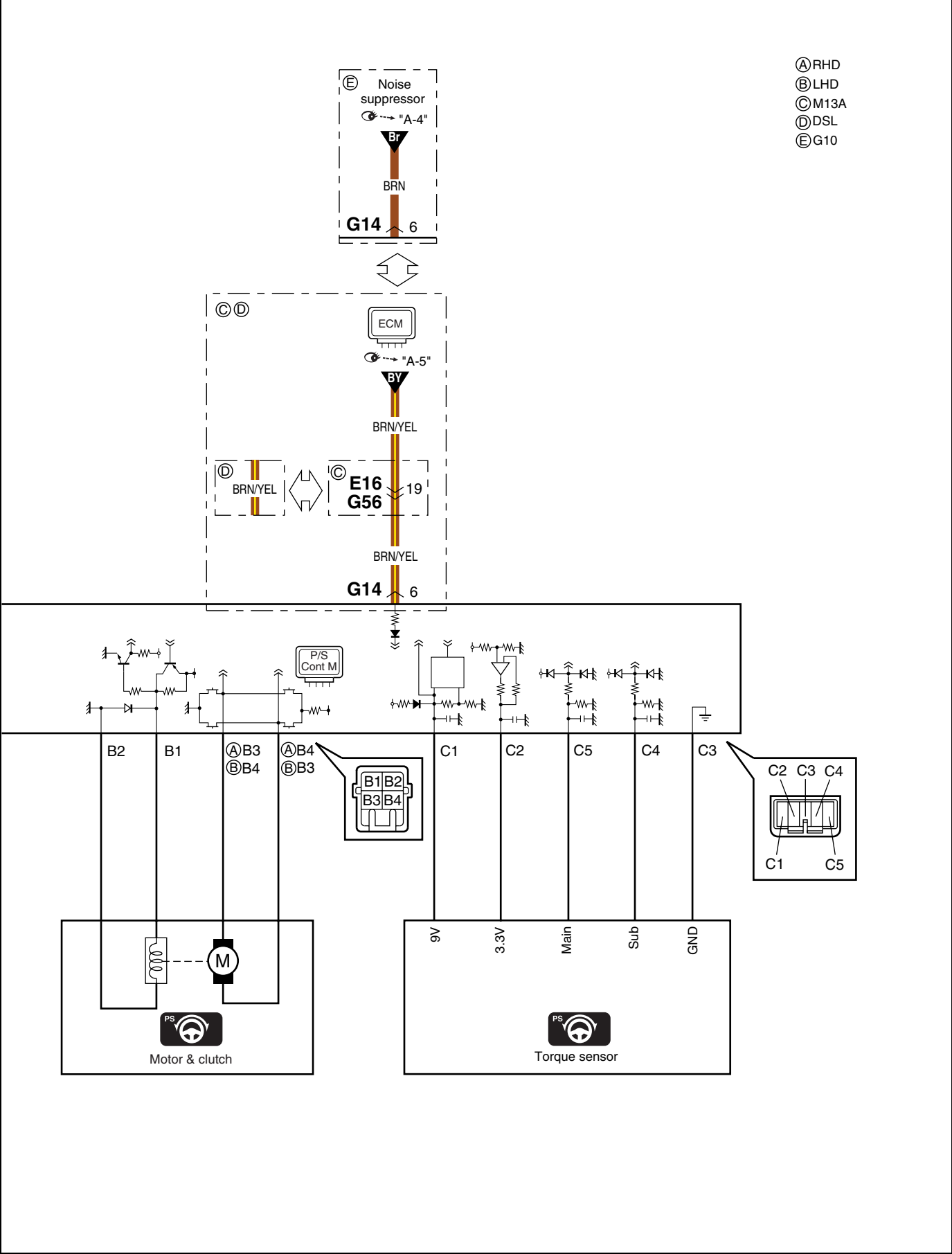
F-3 Direction assistée

F-3 Stuurbevestigingssysteem

(1/2)



(2/2)

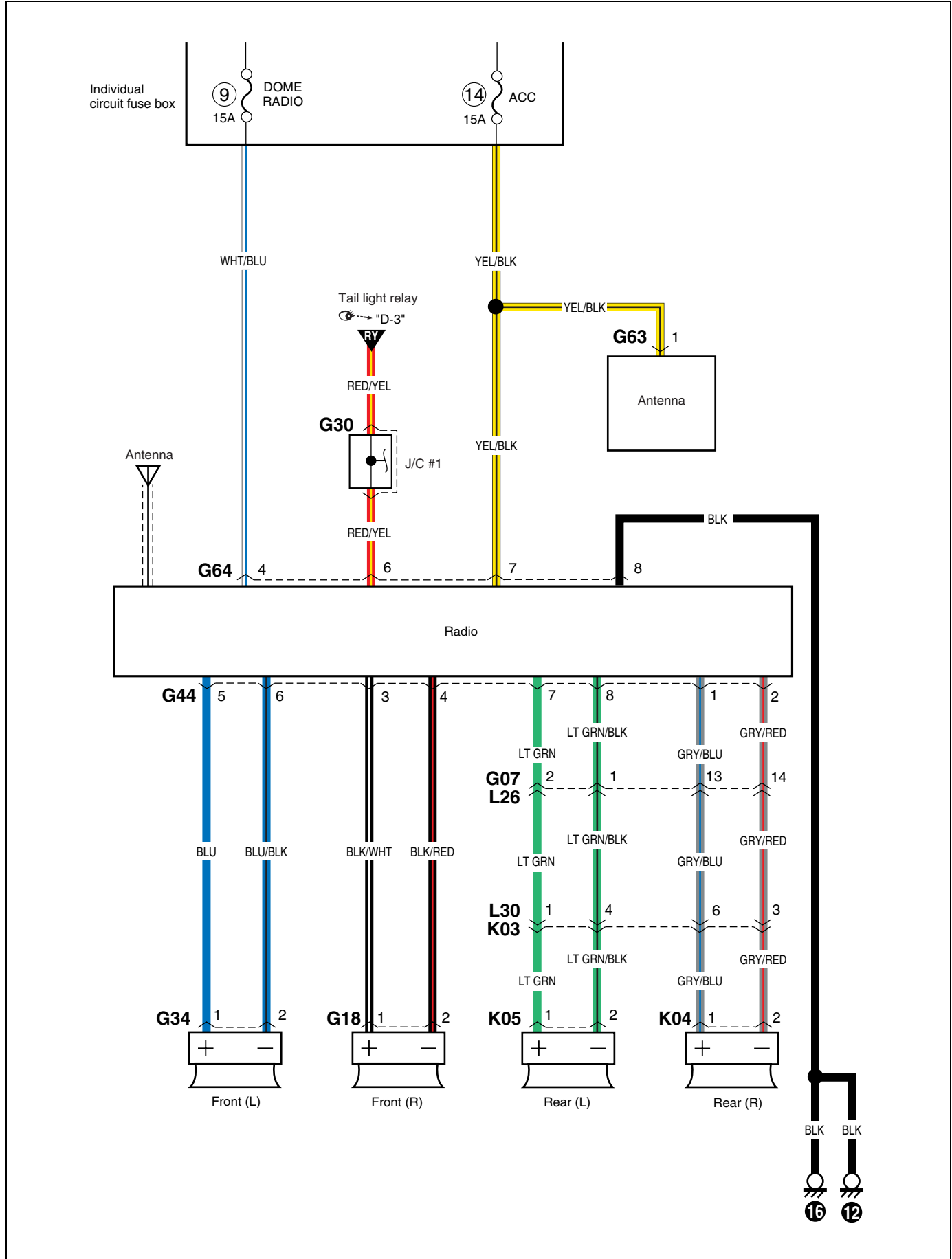


G-1 Radio

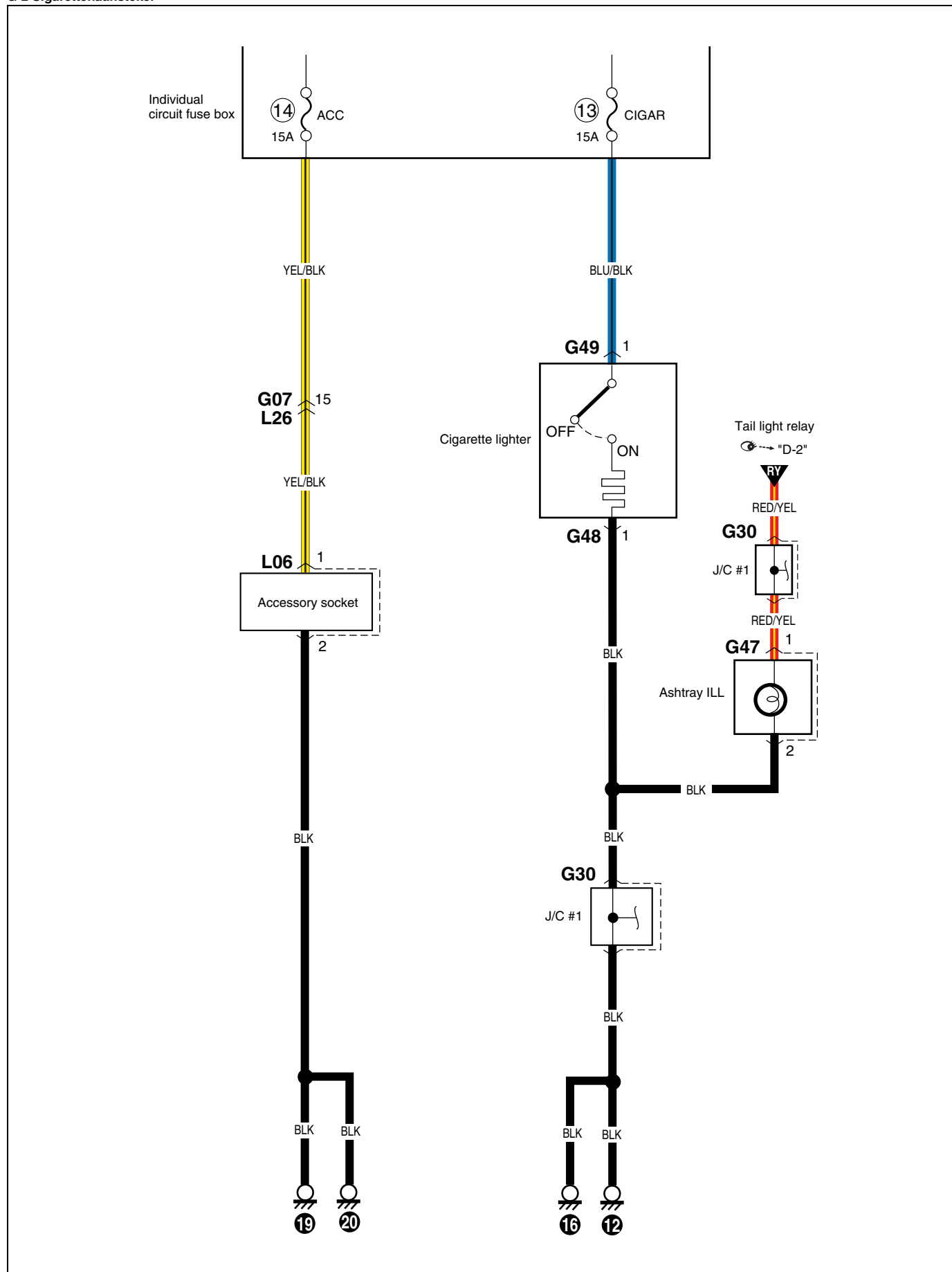
G-1 Radio

G-1 Radio

G-1 Radio



G-2 Sigarettenaansteker

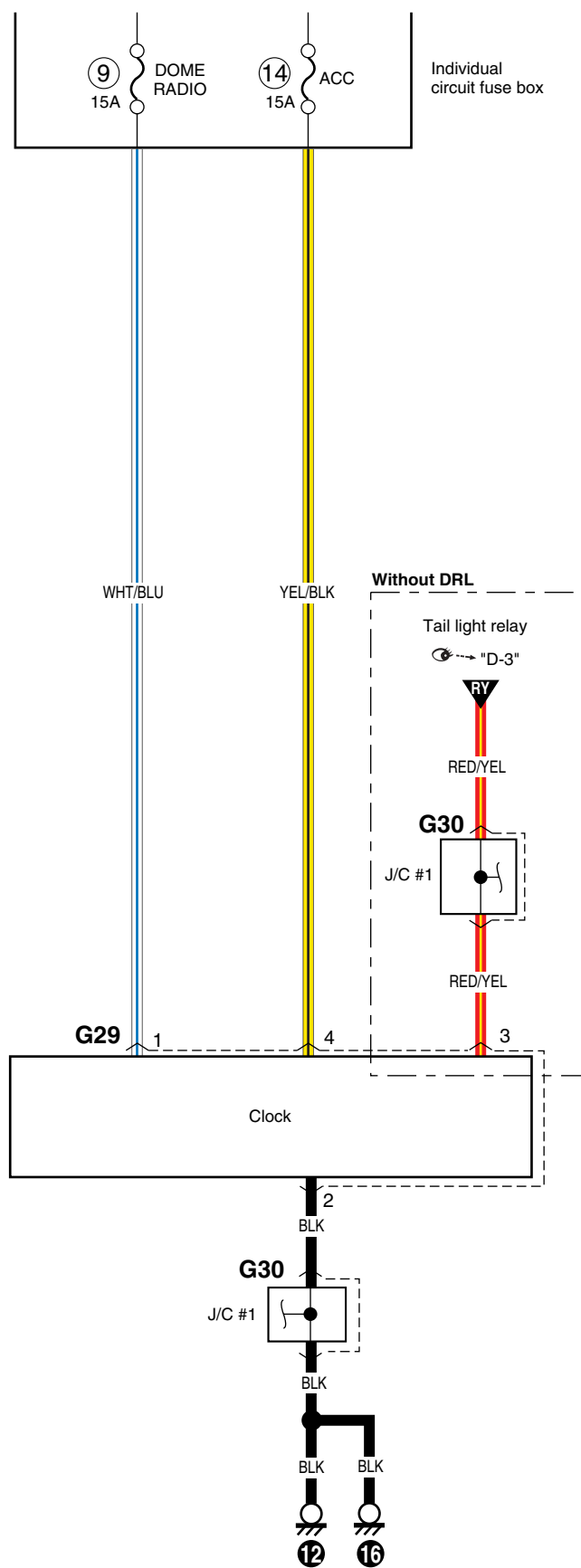


G-3 Clock

G-3 Uhr


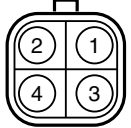


G-3 Horloge

G-3 Klok



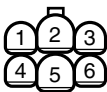

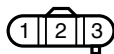
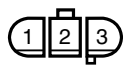

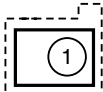





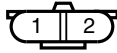
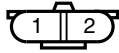
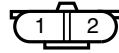
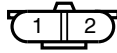
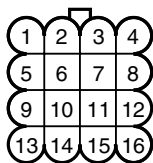
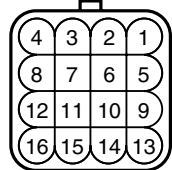

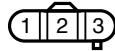






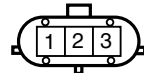
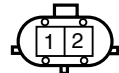



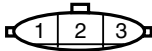
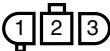
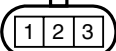
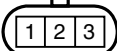

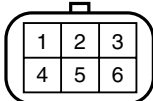

Connector list
Liste der stecker
Liste des connecteurs
Lijst van stekkers

B

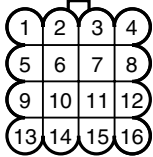
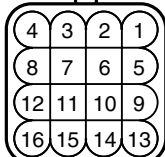

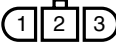
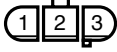

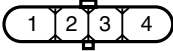





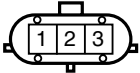
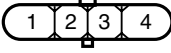

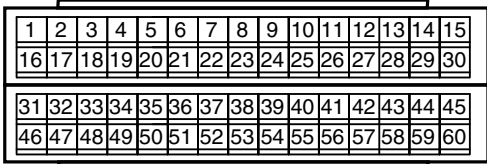
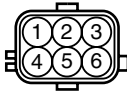
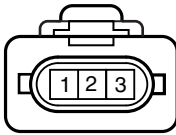
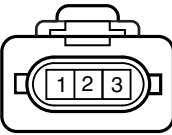

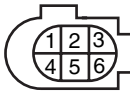
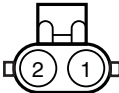
B01 (TO E02)	B01 (TO E02)	B02	B03
			
RHD	LHD		

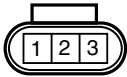








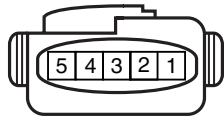



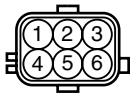
C

C01	C02	C03 (TO E26)	C03 (TO E26)	C04	C04
					
		G10, DSL	M13A	A/T	M/T
C05	C05	C06	C06	C07	C07
					
G10, M13A	DSL	G10, M13A	DSL	G10, DSL	M13A
C08	C09	C10	C11	C12	C13 (TO E41)
					
C14 (TO E40)	C15	C16	C17	C18	C19
					
C20	C21	C22	C23	C24	
					

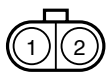
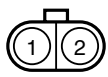
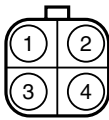



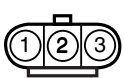
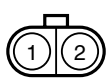



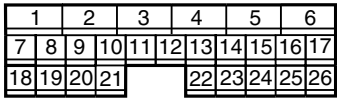
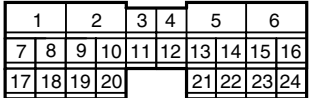
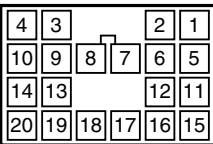
C25 	C26 	C27 	C28 	C29 	C30 
C31 	C32 				

D

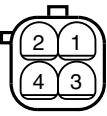


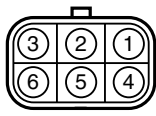
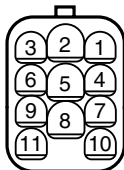
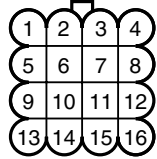




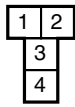

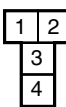
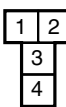
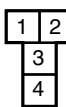
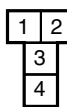
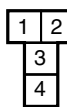
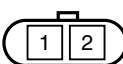
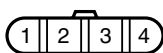
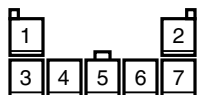
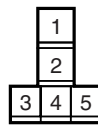
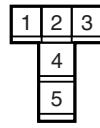

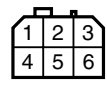
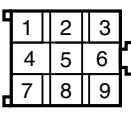
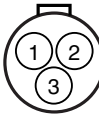
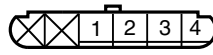
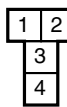

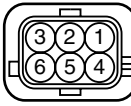

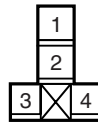
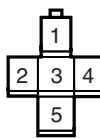
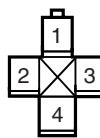


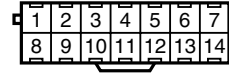
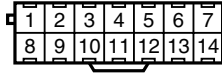
D01 (TO E41) 	D02 (TO E40) 	D05 	D06 	D08 	D10 
D15 	D16 	D18 	D20 	D21 	D22 
D23 	D24 	D25 	D26 		
D27 (TO G87) 	D28 	D29 	D30 	D31 	D32 

D33 	D34 	D35 	D36 	D37 	D38 
D39 	D40 	D41 	D42 		D43 
D44 	D45 	D46 (TO E71) 			

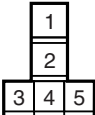
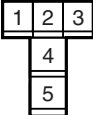
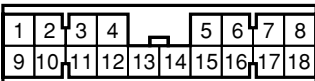

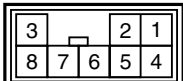
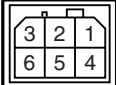
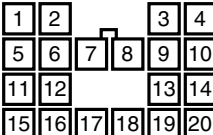
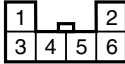
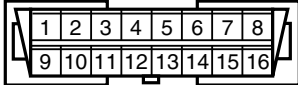
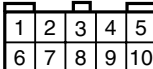
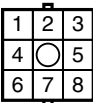
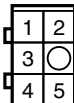
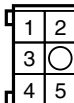
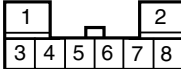

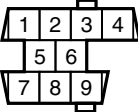
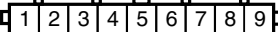

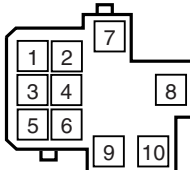
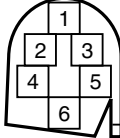
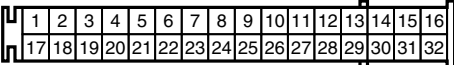
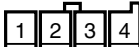
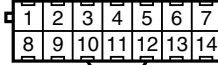
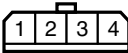
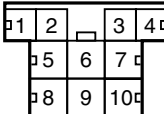






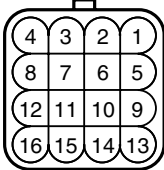
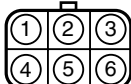


E






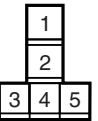
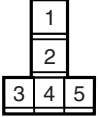
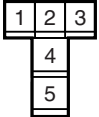
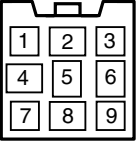
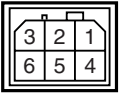
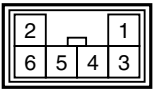
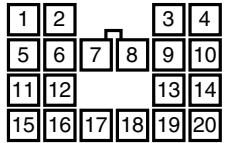
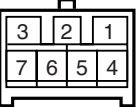


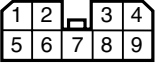



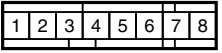

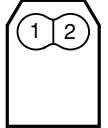
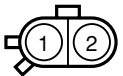
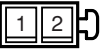
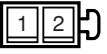
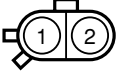
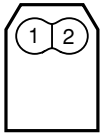



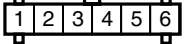
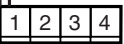
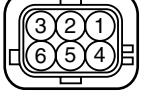
E01 	E02 (TO B01)  RHD	E02 (TO B01)  LHD	E03 	E04 	E05 
E06 	E07 	E08 	E09 	E10  LHD	
E12  A/T	E13  A/T		E16 (TO G56) 		

E17 (TO G57)	E18 (TO L23)	E20			
E21	E21				
G10	M13A				
E22	E22				
G10	M13A				
E23	E23	E25	E26 (TO C03)		
G10	M13A		G10, DSL		
E26 (TO C03)	E27	E29	E30	E31	
M13A		A/T	A/T	A/T	
E32	E34	E35	E36	E37	E38
E40 (TO D02)	E40 (TO C14)	E41 (TO D01)	E41 (TO C13)	E42	E43
G10	M13A	G10	M13A		

E44  A/T	E44  M/T	E44  DSL	E46 (TO G42)  G10, M13A	E46 (TO G42)  DSL	E47 (TO G41)  E47 (TO G41)
E48  E48	E49  RHD	E50  RHD	E51  RHD	E52  E52	E53  E53
E53  E53	E53  E53	E53  E53	E53  E53	E53  E53	E59  E59
E60  E60	E61  E61	E62-1  E62-1	E62-2  E62-2	E63  E63	E64  E64
E65  IF EQPD	E66  E66	E67  E67		E69  E69	E70  E70
E71 (TO D46)  E71 (TO D46)	E72  E72	E73  E73	E74  E74	E75  E75	E76  E76
E77  E77	E78  E78		E79  E79		

G

G01-1 	G01-2 	G02 		G04 	G05 (TO J01) 
G06 (TO J02) 	G07 (TO L26) 		G08 (TO L31) 	G09 	
G10 	G11 	G12 	G13 	G14 	G15 
G16 	G17 		G18 	G22 	G24 
G25 			G29 		G30 
G31 	G32 	G33 	G34 	G36 	G37 
G39 	G40  RHD	G41 (TO E47) 	G42 (TO E46)  G10, M13A	G42 (TO E46)  DSL	G44 

G47 	G48 	G49 	G50 	G51 	G52  G10,DSL
G52-1 	G52-2 	G53 	G54 (TO J09) 	G55 (TO J10) 	
G56 (TO E16) 	G57 (TO E17) 	G59  LHD	G60  LHD	G61 (IF EQPD)  LHD	
G62 (IF EQPD)  LHD	G63 	G64 	G65 		
G66 	G67 	G68 			
G69 	G70 	G71 	G72 	G73 	G74  IF EQPD
G78 	G82 	G85 	G87 (TO D27) 		

G88 			G89 Option	G90 Option
G91 Option	G92 Option	G93 Option	G94 Option	G95 Option

J

J01 (TO G05) 	J02 (TO G06) 	J03 		J05 	J06
J07 	J08 (IF EQPD) 	J09 (TO G54) 	J10 (TO G55) 	J11 	
J12 	J13 	J14 	J15 (TO L20) 	J16 	J17 (TO L15)
J18 	J19 (IF EQPD) 				

K


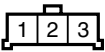


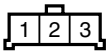



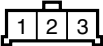


K01 (TO L25) 	K02 	K03 (TO L30) 	K04 	K05 	K06
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K07

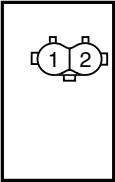


L

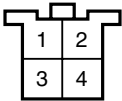
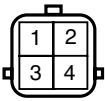
L01 	L02 (TO O02) 	L03 (TO O01) 	L06 	L08 	L10
L11 	L12 	L13 (TO R01) 	L14 	L15 (TO J17) 	L16
L17 	L18 	L19 	L20 (TO J15) 	L21 	L22 A/T
L23 (TO E18) 	L25 (TO K01) 	L26 (TO G07) 	L27 		
L28 	L30 (TO K03) 	L31 (TO G08) 	L32 		

O01 (TO L03) 	O02 (TO L02) 	O03 (TO O08) 	O04 	O05 (TO O10) 	O06 
O08 (TO O03) 	O09 	O10 (TO O05) 	O11 	O12 	

Q

Q08 

R

R01 (TO L13) 	R02 
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Glossary
Fachbegriffe
Glossaire
Verklarende woordenlijst

English	Deutsch	Français	Nederlands
A/C amplifier	Klimaanlagenverstärker	Amplificateur d'A/C	A/C-versterker
A/C mode actuator	Klimaanlage-Betriebsart-Stell- element	Actuateur de mode A/C	A/C-standactuator
A/C Pressure sensor	Klimaanlagendrucksensor	Capteur de pression d'A/C	A/C-druksensor
A/C & Rear defogger switch	Klimaanlagen- und Heckschei- benheizungsschalter	Commande d'A/C et désém- bueur arrière	A/C- en achterrautverwar- mingsschakelaar
A/T fluid	Automatikgetriebeflüssigkeit	Liquide d'A/T	A/T-koelvloeistof
A/T mode switch	Automatikgetriebe-Betriebsart- schalter	Contacteur de mode A/T	A/T-standsckelaar
A/T shift illumination	Fahrstufenbeleuchtung	Eclairage du changement de vitesses d'A/T	A/T-schakelverlichting
A/T shift lock solenoid	Automatikgetriebe-Schaltsperr- en-Magnetventil	Solénoïde de verrouillage du changement de vitesses d'A/T	A/T-schakelvergrendelingsso- lenoïde
ABS control actuator	ABS-Reglerstellelement	Actuateur de commande d'ABS	ABS-regelactuator
Acceleration pedal sensor	Fahrpedalsensor	Capteur de pédale d'accéléra- teur	Gaspedaalsensor
Actuator	Stellelement	Actuateur	Actuator
Air flow meter	Lufimassenmesser	Debitmètre d'air	Luchtstroommeter
Ambient temperature sensor	AuBentemperaturesonde	Capteur de température exté- rieure	Buitemperatuursensor
Back-up light switch wire	Rückfahrlichtschalter-Zulei- tung	Câble de contacteur de feu de recul	Achterrautrijlichtschakelaar- draad
Boost pressure sensor	Ladedrucksensor	Capteur de surpression	Laaddruksensor
Circuit breaker	Leistungsschalter	Coupe-circuit	Stroomonderbreker
Clutch pedal position switch	Kupplungspedal-Positions- schalter	Contacteur de position de pédale d'embrayage	Koppelingspedaalstandscha- elaar
Clutch switch	Kupplungsschalter	Contacteur d'embrayage	Koppelingsschakelaar
CO adjusting resistor	CO-Stellwiderstand	Résisteur de réglage du CO	CO-instelweerstand
Coil antenna	Rahmenantenne	Cadre fixe	Spoelantenne
Combination switch	Kombischalter	Commutateur commodo	Combinatieschakelaar
Condenser fan	Kondensatorgebläse	Ventilateur de condensateur	Condensorventilator
Contact coil	Kontaktspule	Bobine de contact	Contactspoel
Cruise actuator	Tempomat-Stellantrieb	Ensemble d'actionneur de régulation de vitesse	Kruissnelheidsactuator
Data link connector	Datenübertragungsanschluß	Contacteur de liaison des don- nées	Data-link-stekker
Dual cut switch	Gasdruckschalter	Interrupteur de coupure à dou- ble action	Dubbele afsluitschakelaar
Dual pressure switch	Doppeldruckschalter	Double pressostat	Dubbele drukschakelaar
EGR stepper motor	EGR-Schrittschaltmotor	Moteur pas-à-pas d'EGR	EGR-stappenmotor
EVAP canister purge valve	EVAP-Spülluftventil	Soupape de purge de cartou- che d'EVAP	Afzuigklep van EVAP-koolstof- filter
EVAP canister vent valve	EVAP-Entlüftungsventil	Clapet d'évent de cartouche d'EVAP	Ventilatieklep van EVAP-kool- stoffilter
Exhaust gas recirculation	Abgasrückführung	Re circulation des gaz d'échappement	Uitlaatgasrecirculatie
Forward clutch cylinder revolu- tion sensor	Vorwärtskupplung-Zylinder- drehzahlsensor	Capteur de rotation du cylindre d'embrayage avant	Omwentelingssensor voor vooruitkoppelingscilinder
Front clearance light	Vordere Begrenzungsleuchte	Feu de gabarit avant	Contourlicht voor
Front combination light	Vordere Kombileuchte	Feu commodo arrière	Combinatielicht voor
Fuel injection	Kraftstoffeinspritzung	Injection de carburant	Brandstofinspuiting

English	Deutsch	Français	Nederlands
Front intermittent timer relay	Vorderes Intervallwischer-Timerrelais	Relais de minuterie essuie-glace intermittent avant	Intervaltimerrelais voor
Fuel heating relay	Kraftstoffheizungsrelais	Relais de chauffage du carburant	Brandstofverwarmingsrelais
Fuel level gauge	Kraftstoffstandgeber	Jauge de niveau de carburant	Brandstofpeilmeter
Fuel pressure sensor	Kraftstoffdrucksensor	Capteur de pression de carburant	Brandstofdruksensor
G sensor	G-Sensor	Capteur de G	G-sensor
Gas generator	Gasgenerator	Générateur de gaz	Gasgenerator
Generator	Generator	Dynamo	Dynamo
Glow controller	Flammwächter	Régulateur de préchauffage	Voorgloeiregeleenheid
Hazard warning light	Warnblinker	Feu de détresse	Alarmknipperlicht
Headlight beam leveling actuator	Scheinwerfer-Niveau-Stellelement	Actuateur de réglage des projecteurs	Actuator van koplamphoogteverstelling
Headlight leveling motor	Scheinwerfer-Niveau-Einstellmotor	Moteur de réglage des projecteurs	Koplamphoogteverstellingsmotor
Heated oxygen sensor	Beheizte Lambdasonde	Capteur d'oxygène chauffé	Verwarmde zuurstofsensoren
Heater blower motor	Heizgebläsemotor	Moteur de soufflante de chauffage	Aanjagermotor
Heater resistor	Heizungswiderstand	Résisteur de chauffage	Verwarmingsweerstand
High mounted stop light	Dritte Bremsleuchte	Feu de stop supplémentaire	Hooggemonteerd remlicht
Ignition coil	Zündspule	Bobine d'allumage	Bobine
Ignition timing resistor	Zündverstellungswiderstand	Résisteur de calage d'allumage	Ontstekingsafstellingsweerstand
Igniter	Schaltgerät	Allumeur	Ontsteker
Illumination controller	Beleuchtungsregler	Régulateur d'éclairage	Verlichtingsregeleenheid
Input sensor	Eingabesensor	Capteur d'entrée	Ingangssensor
Interior (dome) light	Innenbeleuchtung (Dachhimmelleuchte)	Eclairage intérieur (plafonnier)	Interieurverlichting (plafond)
Knock sensor	Klofsensor	Capteur de cognement	Detonatiesensor
License plate light	Kennzeichenbeleuchtung	Éclairage de plaque d'immatriculation	Kentekenplaatverlichting
Light emitting diode	Leuchtdiode	Diode à lueurs	Licht uitstralende diode
lighting controller	Beleuchtungsregler	Commande d'éclairage	lichtregeleenheid
Limit switch	Grenzschalter	Limiteur	Eindschakelaar
Lock up solenoid	Überbrückungsmagnetventil	Solénoïde de verrouillage	Vergrendelings-solenoïde
Meter illumination control	Instrumentenbeleuchtungsregelung	Commande d'éclairage des instruments	Meterverlichtingsregelaar
Mode actuator	Fahrstufen-Stellelement	Actuateur de mode	Standactuator
Mode control switch	Fahrstufenstellschalter	Contacteur de commande de mode	Standregelschakelaar
Mode select switch	Fahrstufenwählschalter	Sélecteur de mode	Standkeuzeschakelaar
Noise suppressor	Störschutz	Anti-parasites	Storingsonderdrukker
O/D cut switch	O/D-trennschalter	Interrupteur O/D	O/D-annuleerschakelaar
Oil control valve	Öldruckregelventil	Vanne de régulation d'huile	Olieregelsklep
Oil level switch	Ölpegelschalter	Contacteur de niveau d'huile	Oliepeilschakelaar
Oil pressure switch	Öldruckschalter	Pressostat d'huile	Oliedrukschakelaar
Output diagnosis coupler	Ausgangsdiagnosestecker	Coupleur de diagnostic de sortie	Uitvoerdiagnosestekker
Output shaft speed sensor	Ausgangswellen-drehzahlsensor	Capteur de vitesse d'arbre de sortie	Toerentalsensor van uitgaande as
Parking brake switch	Handbremschalter	Contacteur de frein à main	Parkeerremschakelaar

English	Deutsch	Français	Nederlands
Photo diode	Photodiode	Photo-diode	Fotodiode
Photo transistor	Phototransistor	Photo-transistor	Fototransistor
Piezoelectric element	Piezoelement	Élément piézoélectrique	Piëzo-elektrisch element
Position light	Positionsleuchte	Feu de position	Parkeerlicht
Pressure regulator	Druckregler	Régulateur de pression	Drukregelaar
Pressure switch	Druckschalter	Contacteur de pression	Drukschakelaar
Rear intermittent timer relay	Hinteres Intervallwischer-Timerrelais	Relais de minuterie essuie-glace intermittent arrière	Intervaltimerrelais achter
Reed switch	Reed-Schalter	Contacteur à lame	Reed-schakelaar
Reference (zener) diode	Bezugsdiode (Zenerdiode)	Diode (de Zener) de référence	Referentiediode (zener-diode)
Seat belt switch	Sicherheitsgurtschalter	Contacteur de ceinture de sécurité	Veiligheidsgordelschakelaar
Shift illumination	Schalt-beleuchtung	Témoin de sélection de vitesse	Schakelverlichting
Shift lock relay	Schaltsperrrelais	Relais de verrouillage de changement de vitesses	Schakelvergrendelingsrelais
Shift lock solenoid	Schaltsperrmagnet	Solénoïde de verrouillage de changement de vitesses	Schakelvergrendelingssolenoïde
Side air-bag inflator	Seiten-Airbag-Gasgenerator	Gonfleur d'airbag latéral	Opblaaseenheid van zij-airbag
Slide switch	Schiebeschalter	Contacteur de toit ouvrant	Schuifschakelaar
Sliding roof	Schiebedach	Toit ouvrant	Schuifdak
Solenoid valve	Magnetventil	Electrovanne	Solenoïdeklep
Starting motor	Starter	Moteur de démarrage	Startmotor
Tail light	Heckleuchte	Feu arrière	Achterlicht
Throttle position sensor	Drosselfühler	Capteur de position de papillon	Gaskleppositiesensor
Tilt switch	Neigungsschalter	Contacteur de basculage	Tuimelschakelaar
Torque sensor	Drehmomentsensor	Capteur de couple	Koppelsensor
Transmission control module	Automatikgetriebe-Steuergerät	Module de commande de transmission	Transmissie-regelapparaat
Transaxle range switch	Fahrbereichsschalter	Contacteur de gamme de transmission	Transmissiebereikschakelaar
Triple pressure switch	Dreifachdruckschalter	Triple pressostat	Driedvoudige drukschakelaar
Turn signal light	Fahrtrichtungsanzeiger	Clignotant	Richtingaanwijzer
Tweeter (L)	Hochtöner (L)	HP aigus (G)	Hogetonenluidspreker (L)
Tweeter (R)	Hochtöner (R)	HP aigus (D)	Hogetonenluidspreker (R)
Variable resistance	Regelwiderstand	Résistance variable	Variabele weerstand
Vehicle speed sensor	Fahrtgeschwindigkeitsfühler	Capteur de vitesse du véhicule	Rijnsnelheidssensor
Warning controller	Warnungsregler	Régulateur d'alarme	Waarschuwingseleenheid
Water-in-fuel sensor	Wasser-im-Kraftstoff-Sensor	Capteur de présence d'eau dans le carburant	Water-in-brandstofsensor
With	Mit	Avec	Met
Without	Ohne	Sans	Zonder

Memo
Notizen
Note
Memo

Prepared by
MAGYAR SUZUKI CORPORATION

1st Ed. January, 2004

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HOW TO FIND APPLICABLE MANUALS

1. Identify the model category which contains the VIN of the vehicle under repair.

Refer to the “VIN TABLE”

2. Refer to the corresponding service manuals in the Applicable Manual Group column.

The numbers shown in the column show manual group in the “MANUAL LIST”.

3. Search necessary information in the reverse order of manual group number.

Model Category	Language	Applicable Manual Group (NO. : (1) - (8))	
		Service Manual	Wiring Diagram Manual
Model A 2000 – 2001 WagonR+ (RB413)	E, F, G, D	(1)	(7)
Model B 2001 – WagonR+ (RB310)	E, F, G, D	(1), (2)	(7)
Model C 2001 – WagonR+ (RB413 4WD)	E, F, G, D	(1), (3)	(7)
Model D 2002.1 – WagonR+ (RB310/RB413)	E, F, G, D	(1), (2), (3), (4)	(7)
Model E 2002.8 – WagonR+ (RB310/RB413)	E, F, G, D	(1), (2), (3), (4), (5)	(7)
Model F 2003.8 – WagonR+ (RB310/RB413)	E, F, G, D	(1), (2), (3), (4), (5), (6)	(8)
Model G 2003.8 – WagonR+ (RB413D)	E, F, G, D	(1), (2), (3), (4), (5), (6)	(8)

[English](#)[French](#)[German](#)[Dutch](#)

MANUAL LIST

Manual Group	Manual Part Name	Language	Manual Part Number
(1)	RB413 Service Manual	E	99500-83E00-01E
		G	99500-83E00-01G
		F	99500-83E00-01F
		D	99500-83E00-01D
(2)	RB310 Service Manual	E	99500U83E10-01E
		G	99500U83E10-01G
		F	99500U83E10-01F
		D	99500U83E10-01D
(3)	RB413 Supplementary Service Manual (4WD)	E	99501U83E00-01E
		G	99501U83E00-01G
		F	99501U83E00-01F
(4)	RB310/413 Supplementary Service Manual	E	99501U83E10-01E
		G	99501U83E10-01G
		F	99501U83E10-01F
		D	99501U83E10-01D
(5)	RB310/413 Supplementary Service Manual	E	99501U83E20-01E
		G	99501U83E20-01G
		F	99501U83E20-01F
		D	99501U83E20-01D
(6)	RB310/413/413D Supplementary Service Manual	E	99501U83E30-01E
		G	99501U83E30-01G
		F	99501U83E30-01F
		D	99501U83E30-01D
(7)	RB310/RB413 Wiring Diagram Manual	E, G, F, D	99512U83E30-669
(8)	Wagon R+ (RB310/RB413/RB413D) Wiring Diagram Manual	E, G, F, D	99512U83E40-669

E English
 G German
 F French
 D Dutch

HOW TO FIND APPLICABLE MANUALS

VIN TABLE

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Simpopdf Merge and Split Unregistered Version - <http://www.simpopdf.com>

Model A:

The VIN within the range shown in the table are categorized as “model A”

ⓧ TSMMA53S00100001 ⓧ ~ ⓧ TSMMA53S00180000 ⓧ

Model B:

The VIN within the range shown in the table are categorized as “model B”

ⓧ TSMMA93S00100001 ⓧ ~ ⓧ TSMMA93S00180000 ⓧ

Model C:

The VIN within the range shown in the table are categorized as “model C”

ⓧ TSMMB53S00100001 ⓧ ~ ⓧ TSMMB53S00180000 ⓧ

Model D:

The VIN within the range shown in the table are categorized as “model D”

ⓧ TSMMA53S00180001 ⓧ ~ ⓧ TSMMA53S00210000 ⓧ
ⓧ TSMMA93S00180001 ⓧ ~ ⓧ TSMMA93S00210000 ⓧ
ⓧ TSMMB53S00180001 ⓧ ~ ⓧ TSMMB53S00210000
ⓧ TSMMB53S20180001 ⓧ ~

Model E:

The VIN within the range shown in the table are categorized as “model E”

ⓧ TSMMA93S00210001 ⓧ ~ ⓧ TSMMA93S00280000 ⓧ
ⓧ TSMMB53S00210001 ⓧ
ⓧ TSMMA53S00210001 ⓧ
ⓧ TSMMA53S30210001 ⓧ

Model F:

The VIN within the range shown in the table are categorized as “model F”

ⓧ TSMMA93S00280001 ⓧ ~
ⓧ TSMMA33S00280001 ⓧ ~
ⓧ TSMMB33S00280001 ⓧ ~
ⓧ TSMMA33S40280001 ⓧ ~

Model G:

The VIN within the range shown in the table are categorized as “model G”

ⓧ TSMMA43S00280001 ⓧ ~
