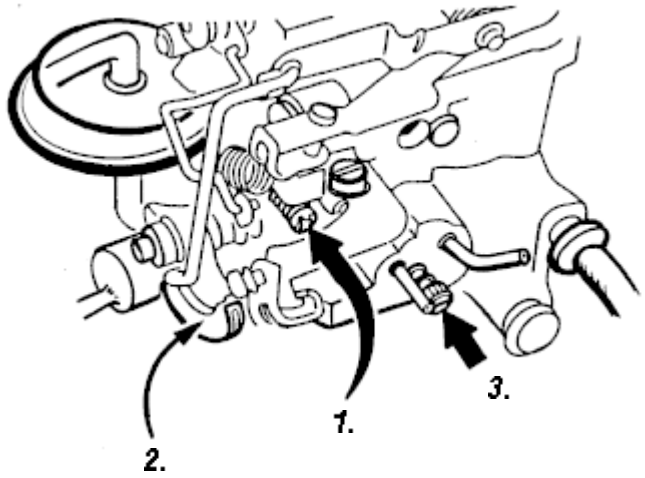
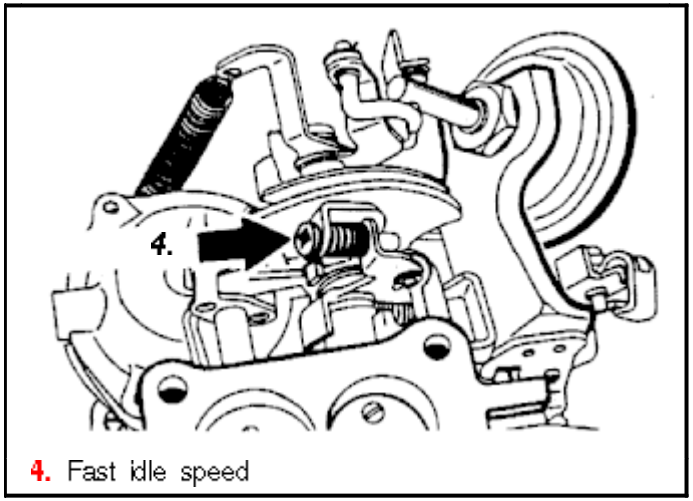
Adjustment data

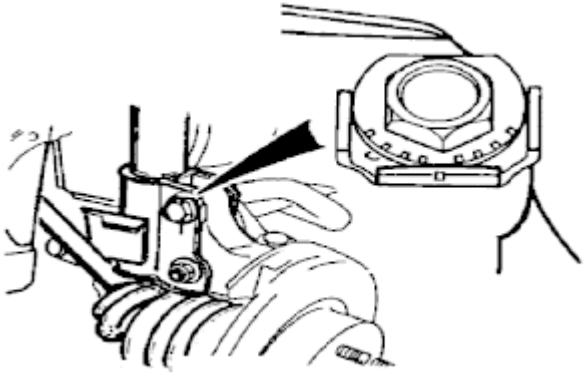
– Sunny 1.0 and 1.3 (E10S and E13S engines)

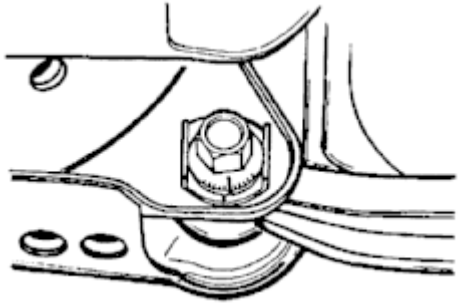


1. Idle speed adjustment screw
2. Throttle lever
3. CO adjustment screw



4. Fast idle speed





Front wheel camber and rear wheel tracking

	Sunny 1.0 3 door	Sunny 1.3, 3 door van, 5 door station wagon
General		
		Versions with live rear axle
Build years	9/'86-1990	
Version	manual transaxle	
Engine lay-out	E 10S	E 13S
Engine type	L4 / OHC	

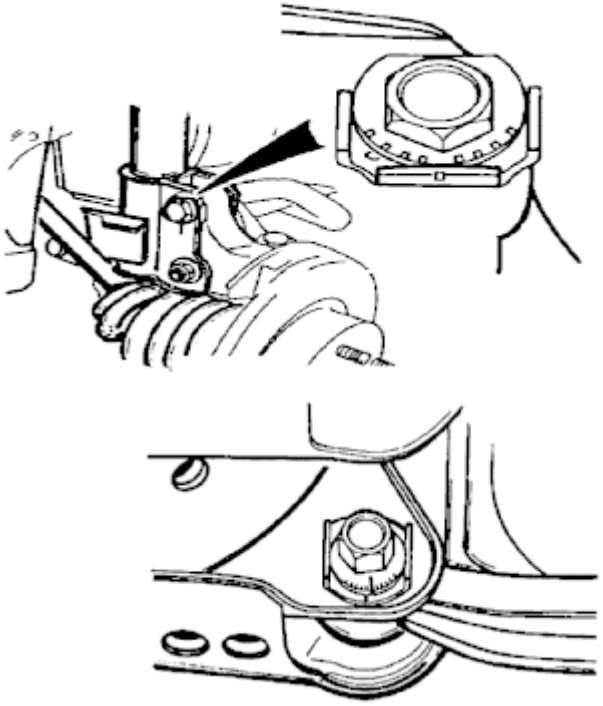
		Sunny 1.0 3 door	Sunny 1.3, 3 door van, 5 door station wagon
General			
Cubic capacity	cc	988	1270
compression tolerance between cylinders, max.	bar	1,0	
Valves			
Engine condition for adjustments		hot	
Inlet valve clearance	mm	0,28; Cold, inlet and exhaust provisional setting: 0,22	
Exhaust valve clearance	mm	0,28; Cold, inlet and exhaust provisional setting: 0,22	
Ignition			
Type		transistorized	
Spark plugs, make		NGK	
Spark plugs, type		BPR5ES	
Spark plugs - spark plug gap	mm	0,8-0,9	
Strobosc. ignition timing	°/1/min	2±2/900±50; Vacuum hose disconnected and blanked off. Value with vacuum hose connected: 15±5/900±50.	2±2/800±50; Vacuum hose disconnected and blanked off. Value with vacuum hose connected: 12±5/800±50.
Centrifugal advance - start	°/1/min	0/1100	0/1360
Centrifugal advance - test	°/1/min	-	12/2800
Centrifugal advance - end	°/1/min	20/3200	25/5400
Vacuum advance - start	°/mm Hg (x 1,33 =1 mbar)	0/120	0/110
Vacuum advance - test	°/mm Hg (x 1,33 =1 mbar)	12°12'/260	8°30'/230

	Sunny 1.0 3 door	Sunny 1.3, 3 door van, 5 door station wagon
Ignition		
vacuum advance - end °/mm Hg (x 1,33 = 1 mbar)	19/370	15/350
Fuel system		
Carburettor(s)/Injection type	21 7260-90	21 7260-88
Fuel pump pressure/injection pressure bar	0,20-0,27/-	
Fast idle speed 1/min	2200±200	2400±200
Idle speed 1/min	900±50	800±50
CO at idle speed %	1,5±0,5	
Clutch		
Version	mechanical	
Self-adjusting	no	
Pedal / release arm free play / pedal working stroke mm	12,5-17,5/2,5-3,5/; Pedal height: 162-172 mm; see illustration under MAINTENANCE.	
Wheels and tyres		
Rim size	5Jx13	
Tyre size	155SR13	
Tyre pressure, front/rear bar	1,8/1,8; Under full load and/or at high speeds: 2,1/2,1.	
Wheel alignment		
Vehicle ballast	Tank full	
Front wheel alignment	toe-in	
Front wheels - tracking mm/°	-0,3 to 0,9/-3' to 9'	3 - 5/20' - 30'
Front wheels - camber °	-50' to 40'	-25' to 1°05'

		Sunny 1.0 3 door	Sunny 1.3, 3 door van, 5 door station wagon
Wheel alignment			
Front wheels - castor	°	35'-2°05'; Non adjustable.	45'-2°15
Front wheels - KPI	°	13°05'-14°35'; Non adjustable.	12°10'-13°40'; Non adjustable.
Pos/neg Ackermann, 20° wheel-angle	°	*1°36'; Non adjustable.	2°30'; 20° outer wheel-angle
Rear wheel alignment		toe-out	Live axle
Rear wheels - tracking	mm/°	0-2,6/0'-25'	-
Rear wheels - camber	°	-1°45' to -15'; Non adjustable.	-
Brake system			
Construction, front/rear		disc / drum	
Front disc thickness, new / wear limit	mm	12/10	
Min. front brake pad thickness	mm	2,0	
Rear drum diameter: new / wear limit	mm	180/181	
Min. rear lining thickness	mm	1,5	
Proportioning valve, load sensitive	yes/no	no	
Test pressure, front / rear	bar	24,5/24,5; 35/21 and 45/27.	
Parking brake, free play/ working stroke	clicks	1-2/7-11; Force 200 N.	
Electrical system			
Battery, capacity	Ah	60	
Alternator power output	W	*840; At 14 V.	

		Sunny 1.0 3 door	Sunny 1.3, 3 door van, 5 door station wagon
Electrical system			
Controlled voltage at 20°C	V	14,1-14,7	
Primary coil resistance.	Ohm	1,0-1,3	
Secondary coil resistance	Ohm	8.400-12.600	
Ballast resistor	Ohm	Air gap between pickup element and rotor: 0,3-0,5 mm.	
HT leads resistance	Ohm	max. 30.000	

– Sunny 1.3 and 1.6 (E13S and E16S engines) 1986 - 1988



Front wheel camber and rear wheel tracking

	Sunny 1.3: 3, 4 and 5 door	Sunny 1.6: 3, 4 and 5 door
General		
Build years	9 / '86 - 9 / '88	
Version	manual transaxle / automatic transaxle	
Engine lay-out	E 13S	E 16S

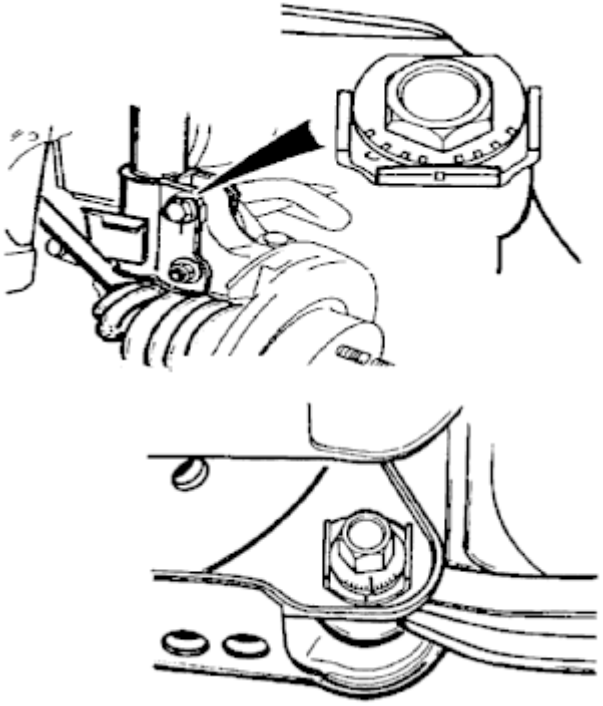
		Sunny 1.3: 3, 4 and 5 door	Sunny 1.6: 3, 4 and 5 door
General			
Engine type		L4 / OHC	
Cubic capacity	cc	1270	1597
Compression normal/wear limit	bar	12,5 / 9,8	13,4 / 10,8
tolerance between cylinders, max.	bar	1,0	
Valves			
Engine condition for adjustments		hot	
Inlet valve clearance	mm	0,28; Cold, inlet and exhaust provisional setting: 0,22	
Exhaust valve clearance	mm	0,28; Cold, inlet and exhaust provisional setting: 0,22	
Ignition			
Type		transistorized	
Spark plugs, make		NGK	
Spark plugs, type		BPR5ES	BPR6ES
Spark plugs - spark plug gap	mm	0,8 - 0,9	
Strobosc. ignition timing	°/1/min	2 ± 2/800 ± 50; Vacuum hose disconnected and blanked off. Value with vacuum hose connected: 12 ± 5/800 ± 50. With automatic transmission: Given value at 850/min or 950 ± 50/min with power steering	4 ± 2/800 ± 50; Valid for vacuum hose disconnected or connected. With automatic transmission: Given value at 850 ± 50/min or, with power steering, 950 ± 50/min.
Centrifugal advance - start	°/1/min	0/1360	
Centrifugal advance - test	°/1/min	12/2800	

		Sunny 1.3: 3, 4 and 5 door	Sunny 1.6: 3, 4 and 5 door
Ignition			
Centrifugal advance - end	°/1/min	25/5400	
Vacuum advance - start	°/mm Hg (x 1,33 = 1 mbar)	0/110	
Vacuum advance - test	°/mm Hg (x 1,33 = 1 mbar)	8° 30' / 230	4° 45' / 170
Vacuum advance - end	°/mm Hg (x 1,33 = 1 mbar)	15 / 350	10 / 250
Fuel system			
Carburettor(s)	make	Hitachi	
Injection	make	-	
Carburettor(s)/Injection	type	21 7260-88	DCZ 328 - 31
Fuel pump pressure/injection pressure	bar	0,20 - 0,27/-; On versions with automatic transmission (electric fuel pump): 0,18-0,24/-	
Fast idle speed	1/min	2400 ± 200; With automatic transmission: 2600 ± 200	2400 ± 200; With automatic transmission: 2800 ± 200.
Idle speed	1/min	800 ± 50; For automatic transmission: 950 ± 50.	
CO at idle speed	%	1,5 ± 0,5	
Clutch			
Version		mechanical	
Self-adjusting		no	
Pedal / release arm free play / pedal working stroke	mm	12,5-17,5/2,5-3,5/ Pedal height: 162-172 mm, see illustration under MAINTENANCE	
Wheels and tyres			
Rim size		5Jx13	

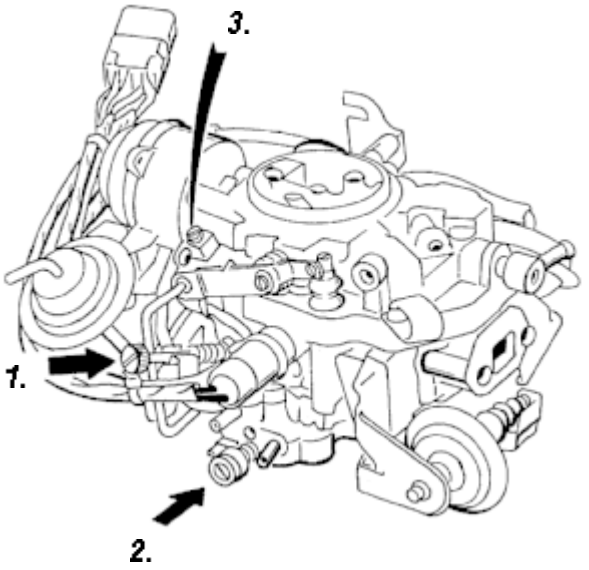
	Sunny 1.3: 3, 4 and 5 door	Sunny 1.6: 3, 4 and 5 door
Wheels and tyres		
Tyre size	155SR13; On SGX models: tyre size 175/70R13.	
Tyre pressure, front/rear bar	1,8/1,8; Under full load and/or high speeds: 2,1/2,1; 175/70R: 2,0/2,0.	
Wheel alignment		
Vehicle ballast	Tank full	
Front wheel alignment	toe-in	
Front wheels - tracking mm/°	-0,3 to 0,9/-3 to 9'	
Front wheels - camber °	-50' to 40'	
Front wheels - castor °	35'-2°05'; Non adjustable.	
Front wheels - KPI °	13°05'-14°35'; Non adjustable.	
Pos/neg Ackermann, 20° wheel-angle °	1°36'; 20° outer wheel-angle	
Rear wheel alignment	toe-out	
Rear wheels - tracking mm/°	0-2,6/0'-25'	
Rear wheels - camber °	-1°45' to -15'; Non adjustable.	
Brake system		
Construction, front/rear	disc / drum	
Front disc thickness, new / wear limit mm	12/10	12/10; With ventilated disc: 18/16.
Min. front brake pad thickness mm	2	
Rear drum diameter: new / wear limit mm	180/181	
Min. rear lining thickness mm	1,5	
Proportioning valve, load sensitive yes/no	no	

		Sunny 1.3: 3, 4 and 5 door	Sunny 1.6: 3, 4 and 5 door
Brake system			
Test pressure, front / rear	bar	24,5/24,5; 35/21 and 45/27	24,5/24,5; 35/21 and 45/27. With ventilated discs: 14,7/14,7 and 30/18 and 45/27
Parking brake, free play/ working stroke	clicks	1-2/7-11; Force 200 N	
Electrical system			
Battery capacity	Ah	60	
Alternator power output	W	840; At 14 V.	
Controlled voltage at 20°C	V	14,1 - 14,7	
Primary coil resistance.	Ohm	1,0-1,3	
Secondary coil resistance	Ohm	8.400-12.600	
Ballast resistor	Ohm	Air gap between pickup element and rotor: 0,3-0,5	
HT leads resistance	Ohm	max. 30.000	

– Sunny 1.4 (GA14S engine) 1988 - 1990



Front wheel camber and rear wheel tracking



1. Idle speed adjustment screw
2. CO adjustment screw
3. Fast idle speed

	Sunny 1.4 CAT; 3, 4 and 5 door	Sunny 1.4; 3, 4 and 5 door
General		
Build years	10/'88-1990	
Version	manual transaxle	manual transaxle / automatic transaxle
Engine type	GA 14S (CAT)	GA 14S

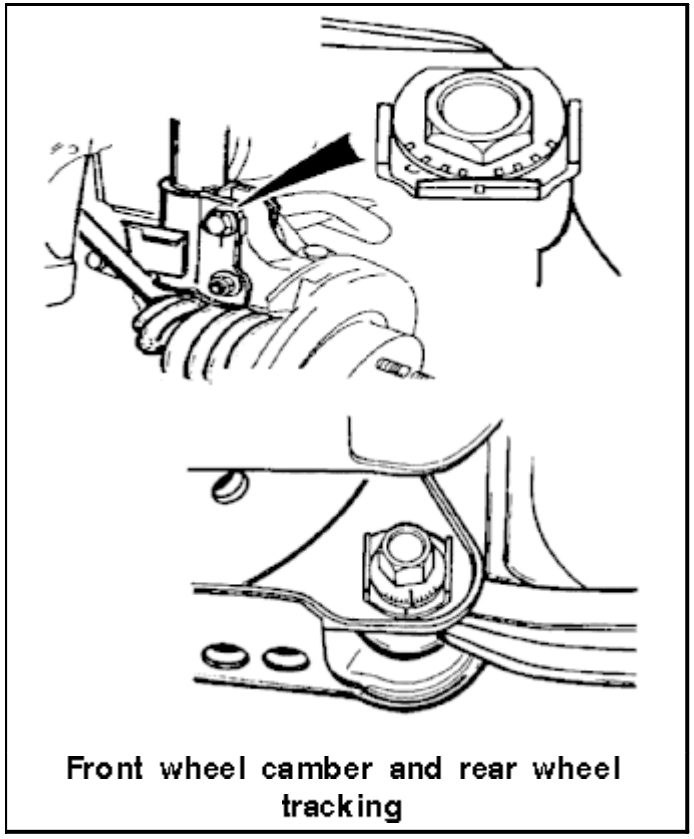
		Sunny 1.4 CAT; 3, 4 and 5 door	Sunny 1.4; 3, 4 and 5 door
General			
Engine lay-out		L4 / OHC	
Cubic capacity	cc	1392	
Compression normal/wear limit	bar	13,0/11,1	
tolerance between cylinders, max.	bar	1,0	
Valves			
Engine condition for adjustments		hot	
Inlet valve clearance	mm	0,20-0,30; Cold, provisional setting: inlet 0,15; exhaust 0,20.	
Exhaust valve clearance	mm	0,25-0,35; Cold, provisional setting: inlet 0,15; exhaust 0,20.	
Ignition			
Type		transistorized	
Spark plugs, make		NGK	
Spark plugs, type		BCPR6ES	
Spark plugs - spark plug gap	mm	0,8-0,9	
Strobosc. ignition timing	°/1/min	2±2/800±50; After TDC.; vacuum hose disconnected and blanked off. Value with vacuum hose connected: 4±5/800±50 before TDC, Automatic transmission: Given values at 850±50/min.	
Centrifugal advance - start	°/1/min	0-1/1150	
Centrifugal advance - test	°/1/min	14°36'-17,5/2850	
Centrifugal advance - end	°/1/min	28-32/5600	

		Sunny 1.4 CAT; 3, 4 and 5 door	Sunny 1.4; 3, 4 and 5 door
Ignition			
Vacuum advance - start	°/mm Hg (x 1,33 = 1 mbar)	0-1/96; At a coolant temperature of less than 20 °C is valid: 0-1/32-50 8-12/73-550	0-1/98; At a coolant temperature of less than 20 °C is valid: 0-1/32-50 8-12/73-550
Vacuum advance - test	°/mm Hg (x 1,33 = 1 mbar)	14°24'-18°24'/250; At a coolant temperature of less than 20 °C is valid: 0-1/32-50 8-12/73-550	
vacuum advance - end	°/mm Hg (x 1,33 = 1 mbar)	29-31/420; At a coolant temperature of less than 20 °C is valid: 0-1/32-50 8-12/73-550	27-29/450; At a coolant temperature of less than 20 °C is valid: 0-1/32-50 8-12/73-550
Fuel system			
Carburettor(s)/Injection	type	21 L282-07	21 L282-05; With automatic transmission: 21 L282-06.
Fuel pump pressure/injection pressure	bar	0,21-0,34/-	
Fast idle speed	1/min	2700±200	2700±200; With automatic transmission in N": 3400±200.
Idle speed	1/min	800±50	800±50; With automatic transmission in N": 850±50.
CO at idle speed	%	1,5±0,5; Measured before the catalytic converter. Pulse air system hose disconnected from the exhaust manifold and blanked off.	1,5±0,5
Clutch			
Version		mechanical	
Self-adjusting		no	

		Sunny 1.4 CAT; 3, 4 and 5 door	Sunny 1.4; 3, 4 and 5 door
Clutch			
Pedal / release arm free play / pedal working stroke	mm	12,5-17,5/2,5-3,5/ Pedal height: 162-172 mm; see illustration under MAINTENANCE.	
Wheels and tyres			
Rim size		5Jx13	
Tyre size		155SR13	
Tyre pressure, front/rear	bar	1,8/1,8; Under full load and/or high speeds: 2,1/2,1.	
Wheel alignment			
Vehicle ballast		Tank full	
Front wheel alignment		toe-in	
Front wheels - tracking	mm/°	-0,3 to 0,9/-3 to 9'	
Front wheels - camber	°	-50' to 40'	
Front wheels - castor	°	35'-2°05'; Non adjustable.	
Front wheels - KPI	°	13°05'-14°35'; Non adjustable.	
Pos/neg Ackermann, 20° wheel-angle	°	*1°36'; 20° outer wheel-angle	
Rear wheel alignment		toe-out	
Rear wheels - tracking	mm/°	0-2,6/0'-25'	
Rear wheels - camber	°	-1°45' to -15'; Non adjustable.	
Brake system			
Construction, front/rear		disc / drum	
Front disc thickness, new / wear limit	mm	12/10	
Min. front brake pad thickness	mm	2,0	

		Sunny 1.4 CAT; 3, 4 and 5 door	Sunny 1.4; 3, 4 and 5 door
Brake system			
Rear drum diameter: new / wear limit	mm	180/181	
Min. rear lining thickness	mm	1,5	
Proportioning valve, load sensitive	yes/no	no	
Test pressure, front / rear	bar	24,5/24,5; 35/21 and 45/27	
Parking brake, free play/ working stroke	clicks	1-2/7-11; Force 200 N.	
Electrical system			
Battery, capacity	Ah	60	
Alternator power output	W	910; At 14 V.	
Controlled voltage at 20°C	V	14,1-14,7	14,1-14,71
Primary coil resistance.	Ohm	1,0-1,3	
Secondary coil resistance	Ohm	8.400-12.600	
Ballast resistor	Ohm	Air gap between pickup element and rotor: 0,3-0,5 mm.	
HT leads resistance	Ohm	max. 30.000	

– Sunny 1.6 (GA16S engine) 1988 - 1990



Front wheel camber and rear wheel tracking

	Sunny 1.6; 3, 4 and 5 door	Sunny 1.6; 3 door Coupé
General		
Build years	10/'88-1990	
Version	manual transaxle / automatic transaxle	
Engine type	GA 16S	

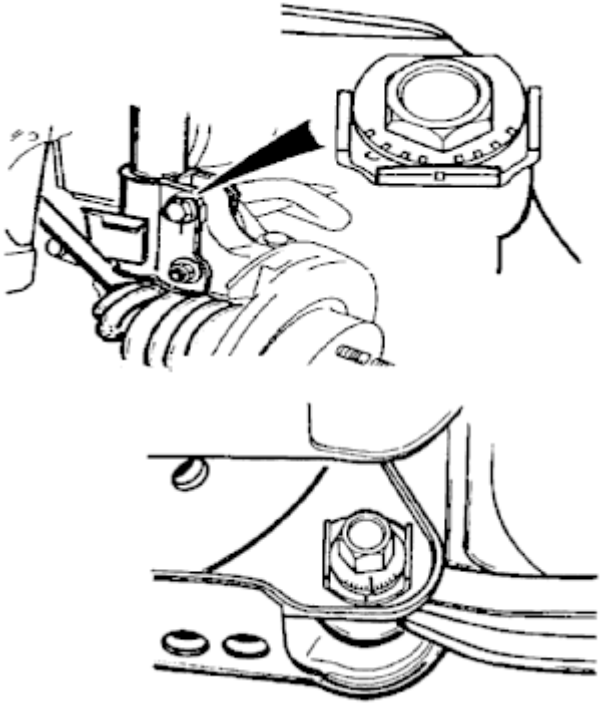
	Sunny 1.6; 3, 4 and 5 door	Sunny 1.6; 3 door Coupé
General		
Engine lay-out	L4 / OHC	
Cubic capacity cc	1597	
Compression normal/wear limit bar	13,7/11,8	
tolerance between cylinders, max. bar	1,0	
Valves		
Engine condition for adjustments	n.a. hydraulic	
Inlet valve clearance mm	0	
Exhaust valve clearance mm	0	
Ignition		
Type	transistorized	
Spark plugs, make	NGK	
Spark plugs, type	BCPR6ES	
Spark plugs - spark plug gap mm	0,8-0,9	
Strobosc. ignition timing °/1/min	0±2/850±50; Vacuum hose disconnected and blanked off. Value with vacuum hose connected: 6±5/850±50. Automatic transmission: Given values at 900/min.	
Centrifugal advance - start °/1/min	0-1/900	
Centrifugal advance - test °/1/min	20°36'-23°24'/2400	
Centrifugal advance - end °/1/min	28-32/4400	
Vacuum advance - start °/mm Hg (x 1,33 = 1 mbar)	0-1/96; At a coolant temperature of less than 20 °C is valid: 0-1/32-50, 8-12/73-550	

	Sunny 1.6; 3, 4 and 5 door	Sunny 1.6; 3 door Coupé
Ignition		
Vacuum advance - test °/mm Hg (x 1,33 = 1 mbar)	7°48'-11°48'/200; At a coolant temperature of less than 20 °C is valid: 0-1/32-50, 8-12/73-550	
vacuum advance - end °/mm Hg (x 1,33 = 1 mbar)	18-20/320; At a coolant temperature of less than 20 °C is valid: 0-1/32-50, 8-12/73-550	
Fuel system		
Carburettor(s)/Injection type	21 L304-03; With automatic transmission: 21 L304-04.	
Fuel pump pressure/injection pressure bar	0,21-0,34/-	
Fast idle speed 1/min	2700±200; With automatic transmission in N": 3100±200.	
Idle speed 1/min	850±50; With automatic transmission in N": 900±50.	
CO at idle speed %	1,5±0,5	
Clutch		
Version	mechanical	
Self-adjusting	no	
Pedal / release arm free play / pedal working stroke mm	12,5-17,5/2,5-3,5/Pedal height: 162-172 mm; see illustration under MAINTENANCE.	
Wheels and tyres		
Rim size	5Jx13	
Tyre size	155SR13; On SGX models: 175/70R13.	
Tyre pressure, front/rear bar	1,8/1,8; Under full load and/or high speeds: 2,1/2,1; 175/70R13: 2,0/2,0.	
Wheel alignment		
Vehicle ballast	Tank full	
Front wheel alignment	toe-in	
Front wheels - tracking mm/°	-0,3 to 0,9/-3' to 9'	

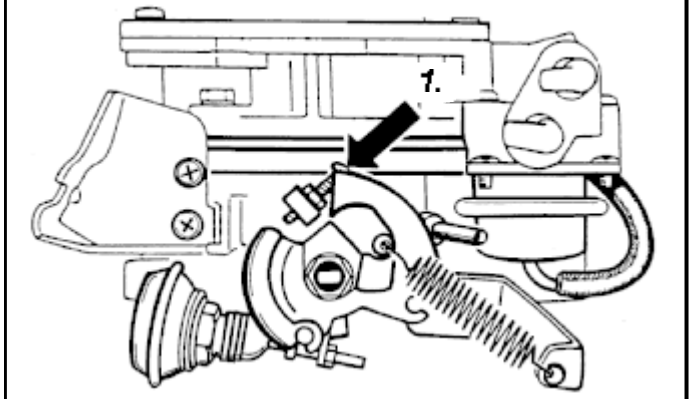
	Sunny 1.6; 3, 4 and 5 door	Sunny 1.6; 3 door Coupé
Wheel alignment		
Front wheels - camber °	-50' to 40'	-1°05' to 25'
Front wheels - castor °	35'-2°05'; Non adjustable.	45'-2°15'; Non adjustable.
Front wheels - KPI °	13°05'-14°35'; Non adjustable.	13°25'-14°55'; Non adjustable.
Pos/neg Ackermann, 20° wheel-angle °	1°36'; 20° outer wheel-angle.	
Rear wheel alignment	toe-out	
Rear wheels - tracking mm/°	0-2,6/0'-25'	-0,3 to 2,1/-3' to 21'
Rear wheels - camber °	-1°45' to -15'; Non adjustable.	*-1°55' to -25'; Non adjustable.
Brake system		
Construction, front/rear	disc / drum	
Front disc thickness, new / wear limit mm	12/10; With ventilated discs: 18/16	
Min. front brake pad thickness mm	2,0	
Rear drum diameter: new / wear limit mm	180/181	
Min. rear lining thickness mm	1,5	
Proportioning valve, load sensitive yes/no	no	
Test pressure, front / rear bar	34,3/34,3; 45/36 and 60/48. With ventilated discs: 14,7/14,7 and 30/18 and 45/27	
Parking brake, free play/ working stroke clicks	1-2/7-11; Force 200 N.	
Electrical system		
Battery, capacity Ah	60	

		Sunny 1.6; 3, 4 and 5 door	Sunny 1.6; 3 door Coupé
Electrical system			
Alternator power output	W	910; At 14 V.	
Controlled voltage at 20°C	V	14,1-14,7	
Primary coil resistance.	Ohm	1,0-1,3	
Secondary coil resistance	Ohm	8.400-12.600	
Ballast resistor	Ohm	Air gap between pickup element and rotor: 0,3-0,5 mm.	
HT leads resistance	Ohm	max. 3.0000	

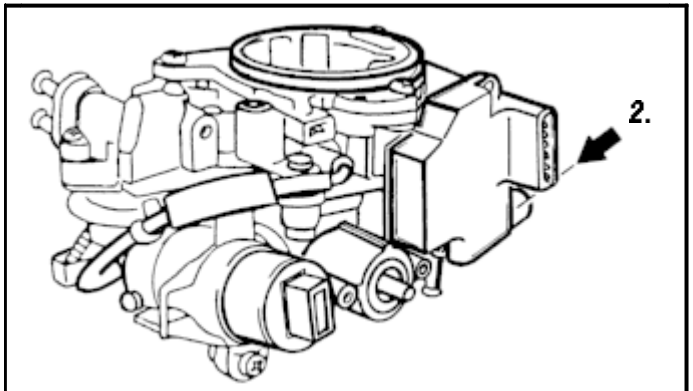
– Sunny 1.6 (E16i engine) 1986 - 1988



Front wheel camber and rear wheel tracking



1. Idle speed adjustment screw



2. CO adjustment screw

	Sunny 1.6; 3, 4 and 5 door (E16i engine)	Sunny 1.6; 3 door coupé (E16i engine)
General		
Build years	9/'86-9/'88	
Version	manual transaxle	

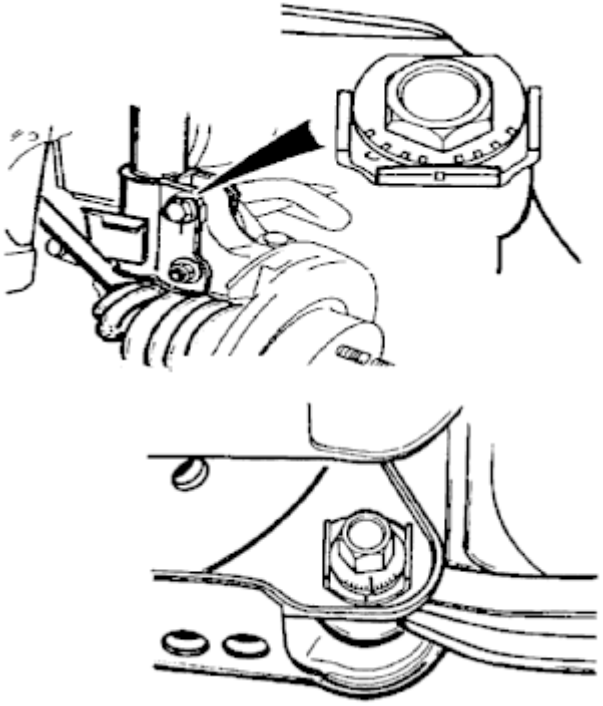
		Sunny 1.6; 3, 4 and 5 door (E16i engine)	Sunny 1.6; 3 door coupé (E16i engine)
General			
Engine type		E 16i (CAT)	
Engine lay-out		L4 / OHC	
Cubic capacity	cc	1597	
Compression normal/wear limit	bar	12,5/9,8	
tolerance between cylinders, max.	bar	1,0	
Valves			
Engine condition for adjustments		hot	
Inlet valve clearance	mm	0,28; Cold, provisional setting: Inlet and exhaust 0,22.	
Exhaust valve clearance	mm	0,28; Cold, provisional setting: Inlet and exhaust 0,22.	
Ignition			
Type		engine management	
Spark plugs, make		NGK	
Spark plugs, type		BPR5ES-11	
Spark plugs - spark plug gap	mm	1,0-1,1	
Strobosc. ignition timing	°/1/min	7/800 ± 100; Throttle valve position sensor disconnected (red, white and black wires). Value with connector connected: 7±5/800±100.	
Centrifugal advance - start	°/1/min	computer controlled	
Centrifugal advance - test	°/1/min	computer controlled	
Centrifugal advance - end	°/1/min	computer controlled	

	Sunny 1.6; 3, 4 and 5 door (E16i engine)	Sunny 1.6; 3 door coupé (E16i engine)
Ignition		
Vacuum advance - start °/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum advance - test °/mm Hg (x 1,33 = 1 mbar)	computer controlled	
vacuum advance - end °/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum retard - start °/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum retard - end °/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Fuel system		
Carburettor(s)/Injection type	E.C.C.S.	
Fuel pump pressure/injection pressure bar	0,98/0,98	
Fast idle speed 1/min	2400 ± 200	
Idle speed 1/min	800 ± 100; 750/min with throttle valve position sensor disconnected	
CO at idle speed %	3,0-10,0; Oxygen sensor connector and air induction solenoid valve connector disconnected; air induction hose disconnected and blanked off; a 2500 Ohm resistance connected instead of the coolant temperature sensor. CO test using the electronic control unit self diagnostic system, see TECHNICAL under Engine management system E16i".	
Clutch		
Version	mechanical	
Self-adjusting	no	

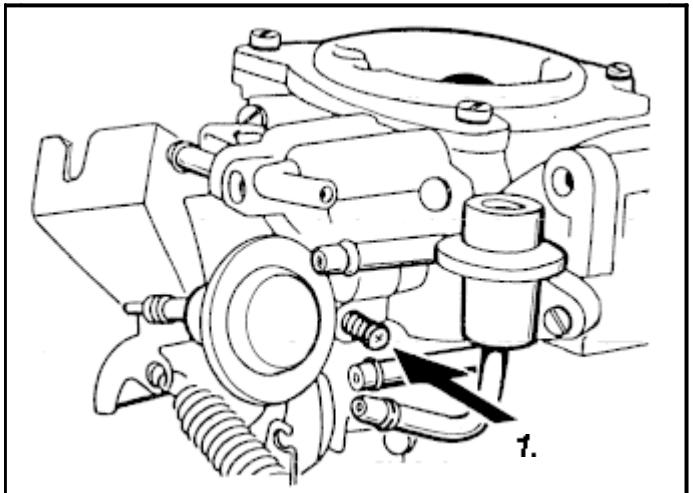
	Sunny 1.6; 3, 4 and 5 door (E16i engine)	Sunny 1.6; 3 door coupé (E16i engine)
Clutch		
Pedal / release arm free play / pedal working stroke mm	12,5-17,5/2,5-3,5/Pedal height: 162-172 mm; see illustration under MAINTENANCE.	
Wheels and tyres		
Rim size	5Jx13	
Tyre size	155SR13	
Tyre pressure, front/rear bar	1,8/1,8; Under full load and/or high speeds: 2,1/2,1.	
Wheel alignment		
Vehicle ballast	Tank full	
Front wheel alignment	toe-in	
Front wheels - tracking mm/°	-0,3 to 0,9/-3 to 9'	
Front wheels - camber °	-50' to 40'	-1°05 to 25'
Front wheels - castor °	35'-2°05'; Non adjustable.	45'-2°15'; Non adjustable.
Front wheels - KPI °	13°05'-14°35'; Non adjustable.	13°25'-14°55'; Non adjustable.
Pos/neg Ackermann, 20° wheel-angle °	1°36'; 20° outer wheel-angle.	
Rear wheel alignment	toe-out	
Rear wheels - tracking mm/°	0-2,6/0'-25'	-0,3 to 2,1/-3' to 21'
Rear wheels - camber °	-1°45' to -15'; Non adjustable.	-1°55' to -25'; Non adjustable.
Brake system		
Construction, front/rear	disc / drum	
Front disc thickness, new / wear limit mm	12/10; With ventilated discs: 18/16	

		Sunny 1.6; 3, 4 and 5 door (E16i engine)	Sunny 1.6; 3 door coupé (E16i engine)
Brake system			
Min. front brake pad thickness	mm	2,0	
Rear drum diameter: new / wear limit	mm	180/181	
Min. rear lining thickness	mm	1,5	
Proportioning valve, load sensitive	yes/no	no	
Test pressure, front / rear	bar	34,3/34,3; 45/36 and 60/48. With ventilated discs: 14,7/14,7 and 30/18 and 45/27.	
Parking brake, free play/ working stroke	clicks	1-2/7-11; Force 200 N.	
Electrical system			
Battery, capacity	Ah	60	
Alternator power output	W	840; At 14 V.	
Controlled voltage at 20°C	V	14,1-14,7	
Primary coil resistance.	Ohm	0,8-1,0	
Secondary coil resistance	Ohm	7600-11400	
HT leads resistance	Ohm	max. 30000	

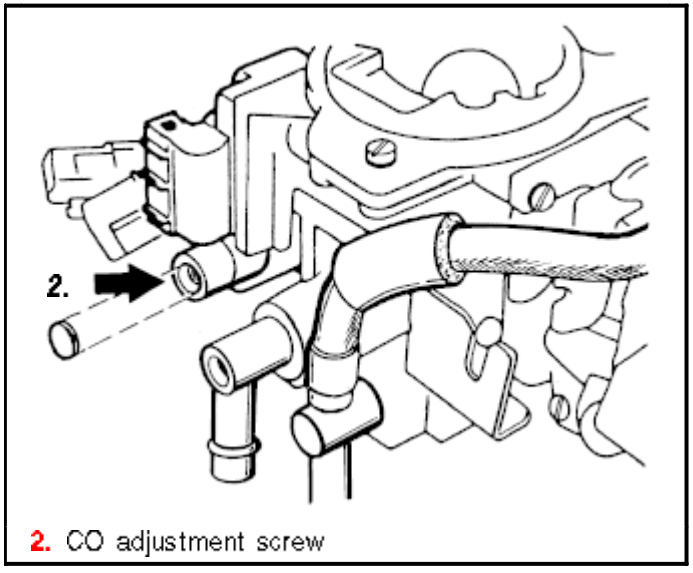
– Sunny 1.6 (GA16i engine) 1988 – 1990



Front wheel camber and rear wheel tracking



1. Idle speed adjustment screw



2. CO adjustment screw

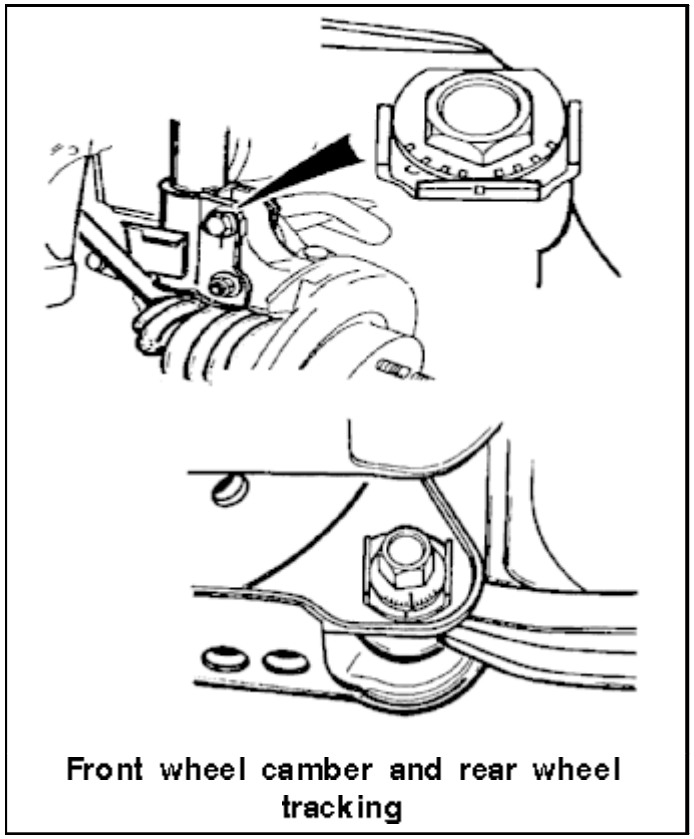
		Sunny 1.6; 3, 4 and 5 door (GA16i engine)	Sunny 1.6; 3 door coupé (GA16i engine)
General			
Build years		10/'88-1990	
Version		manual transaxle / automatic transaxle	manual
Engine type		GA 16i (CAT)	
Engine type		L4 / OHC	
Cubic capacity	cc	1597	
Compression normal/wear limit	bar	13,0/11,1	
tolerance between cylinders, max.	bar	1,0	
Valves			
Engine condition for adjustments		n.a. hydraulic	
Inlet valve clearance	mm	0	
Exhaust valve clearance	mm	0	
Ignition			
Type		engine management	
Spark plugs, make		NGK	
Spark plugs, type		BCPR6ES-11	
Spark plugs - spark plug gap	mm	1,0-1,1	
Strobosc. ignition timing	°/1/min	7/850±100; With all ancillaries switched off and with throttle valve position sensor disconnected (1x black, 2x white wire). Value with connector connected: 7±5/850±100. Automatic transmission: Given values at 900/min.	

		Sunny 1.6; 3, 4 and 5 door (GA16i engine)	Sunny 1.6; 3 door coupé (GA16i engine)
Ignition			
Centrifugal advance - start	°/1/min	computer controlled	
Centrifugal advance - test	°/1/min	computer controlled	
Centrifugal advance - end	°/1/min	computer controlled	
Vacuum advance - start	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum advance - test	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
vacuum advance - end	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum retard - start	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum retard - end	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Fuel system			
Carburettor(s)/Injection	type	E.C.C.S.	
Fuel pump pressure/injection pressure	bar	2,35/2,35	
Fast idle speed	1/min	1500; Coolant temperature less than -10 °C. With automatic transmission in N": 1800, with a coolant temperature of less than 0 °C.	
Idle speed	1/min	850±100; With automatic transmission in N": 900±100.	850±100

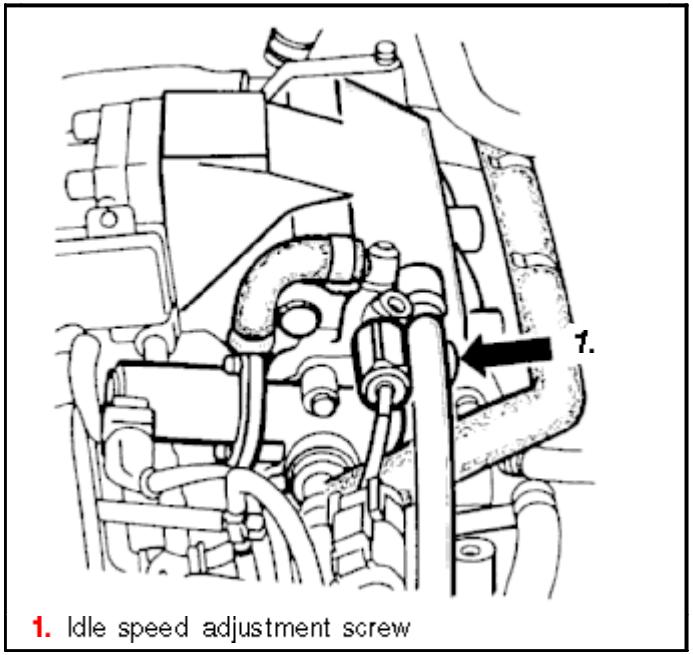
	Sunny 1.6; 3, 4 and 5 door (GA16i engine)	Sunny 1.6; 3 door coupé (GA16i engine)
Fuel system		
CO at idle speed %	3,0-10,0; Throttle switch connector and oxygen sensor disconnected and a 2500 Ohm resistance connected instead of the coolant temperature sensor. CO test using the electronic control unit self diagnostic system, see TECHNICAL under engine management system GA 16i".	
Clutch		
Version	mechanical	
Self-adjusting	no	
Pedal / release arm free play / pedal working stroke mm	12,5-17,5/2,5-3,5/Pedal height: 162-172 mm; see illustration under MAINTENANCE.	
Wheels and tyres		
Rim size	5Jx13	5Jx13
Tyre size	155SR13; On SGX models: 175/70R13.	
Tyre pressure, front/rear bar	1,8/1,8; Under full load and/or high speeds: 2,1/2,1; 175/70R13: 2,0/2,0.	
Wheel alignment		
Vehicle ballast	Tank full	
Front wheel alignment	toe-in	
Front wheels - tracking mm/°	-0,3 to 0,9/-3 to 9'	
Front wheels - camber °	-50' to 40'	-1°05' to 25'
Front wheels - castor °	35'-2°05'; Non adjustable.	45'-2°15'; Non adjustable.
Front wheels - KPI °	13°05'-14°35'; Non adjustable.	13°25'-14°55'; Non adjustable.
Pos/neg Ackermann, 20° wheel-angle °	1°36'; 20° outer wheel-angle.	
Rear wheel alignment	toe-out	

		Sunny 1.6; 3, 4 and 5 door (GA16i engine)	Sunny 1.6; 3 door coupé (GA16i engine)
Wheel alignment			
Rear wheels - tracking	mm/°	0-2,6/0'-25'	-0,3 to 2,1/-3' to 21'
Rear wheels - camber	°	-1°45' to -15'; Non adjustable.	-1°55' to -25'; Non adjustable.
Brake system			
Construction, front/rear		disc / drum	
Front disc thickness, new / wear limit	mm	12/10; With ventilated discs: 18/16	
Min. front brake pad thickness	mm	2,0	
Rear drum diameter: new / wear limit	mm	180/181	
Min. rear lining thickness	mm	1,5	
Proportioning valve, load sensitive	yes/no	no	
Test pressure, front / rear	bar	34,3/34,3; 45/36 and 60/48. With ventilated discs: 14,7/14,7 and 30/18 and 45/27.	
Parking brake, free play/ working stroke	clicks	1-2/*7-11; Force 200 N	
Electrical system			
Battery, capacity	Ah	60	
Alternator power output	W	910; At 14 V.	
Controlled voltage at 20°C	V	14,1-14,7	
Primary coil resistance.	Ohm	0,81-0,99	
Secondary coil resistance	Ohm	8.200-1.2400	
HT leads resistance	Ohm	max. 30.000	

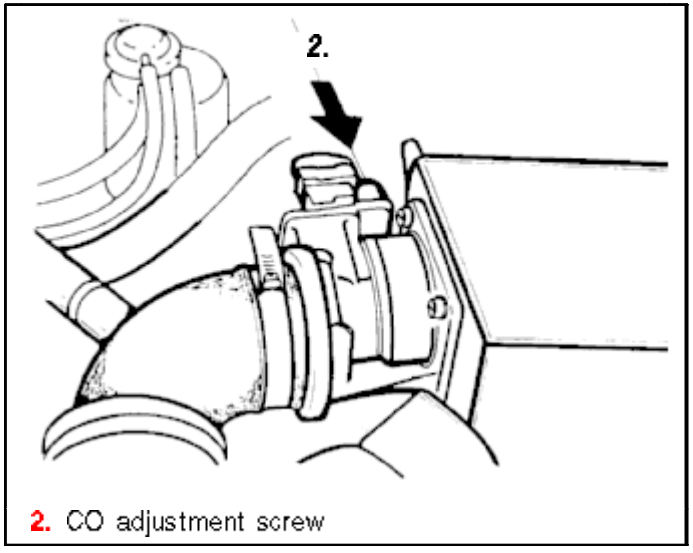
– Sunny 1.6 GTi 16V 1987 – 1988



Front wheel camber and rear wheel tracking



1. Idle speed adjustment screw



2. CO adjustment screw

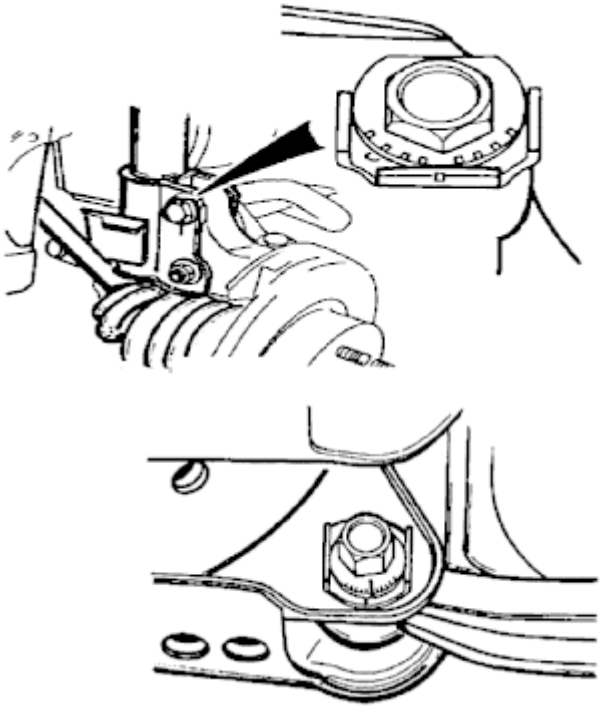
		1.6 GTi 16V; 3 door. hatchback	1.6 GTi 16V; 3 door. coupé
General			
Build years		1987-9/'88	
Version		manual transaxle	
Engine type		CA 16DE	
Engine lay-out		L4/DOHC	
Cubic capacity	cc	1598	
Compression normal/wear limit	bar	13,7/11,7	
tolerance between cylinders, max.	bar	1,0	
Valves			
Engine condition for adjustments		n.a. hydraulic	
Inlet valve clearance	mm	0	
Exhaust valve clearance	mm	0	
Ignition			
Type		engine management	
Spark plugs, make		NGK	
Spark plugs, type		BCPR6ES-11	
Spark plugs - spark plug gap	mm	1,0-1,1	
Strobosc. ignition timing	°/1/min	15 ± 2/800±50; Adjust by turning the crankshaft position sensor, located on the front of the RH camshaft.	
Centrifugal advance - start	°/1/min	computer controlled	
Centrifugal advance - test	°/1/min	computer controlled	

		1.6 GTi 16V; 3 door. hatchback	1.6 GTi 16V; 3 door. coupé
Ignition			
Centrifugal advance - end	°/1/min	computer controlled	
Vacuum advance - start	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum advance - test	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
vacuum advance - end	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum retard - start	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Vacuum retard - end	°/mm Hg (x 1,33 = 1 mbar)	computer controlled	
Fuel system			
Carburettor(s)/Injection	type	E.C.C.S.	
Fuel pump pressure/injection pressure	bar	2,50/2,50	
Idle speed	1/min	800 ± 50	
CO at idle speed	%	2,0	
Clutch			
Version		mechanical	
Self-adjusting		no	
Pedal / release arm free play / pedal working stroke	mm	12,5-17,5/2,5-3,5/Pedal height: 162 - 172 mm; see illustration under MAINTENANCE	
Wheels and tyres			
Rim size		5,5JJx14	

		1.6 GTi 16V; 3 door. hatchback	1.6 GTi 16V; 3 door. coupé
Wheels and tyres			
Tyre size		185/60R14 82H	
Tyre pressure, front/rear	bar	1,9/1,9; Under full load and/or high speeds: 2,2/2,2.	
Wheel alignment			
Vehicle ballast		Tank full	
Front wheel alignment		toe-in	
Front wheels - tracking	mm/°	-0,35 to 1,0/-3' to 9'	-0,35 to 1,0/-3' to 9'
Front wheels - camber	°	-1°05 to 25'	
Front wheels - castor	°	55'-2°25'; Non adjustable.	
Front wheels - KPI	°	13°05'-14°35'; Non adjustable.	
Pos/neg Ackermann, 20° wheel-angle	°	2°24'; 40/32 and 60/48.	
Rear wheel alignment		toe-out	
Rear wheels - tracking	mm/°	0-2,8/0'-25'	-0,45 - 2,25/-4' - 20'
Rear wheels - camber	°	-1°45' to -15'; Non adjustable.	-1°55' to -25'; Non adjustable.
Brake system			
Construction, front/rear		disc / disc	disc / drum
Front disc thickness, new / wear limit	mm	18/16	
Min. front brake pad thickness	mm	2	
Rear disc thickness, new / wear limit	mm	10/9	
Min. rear brake pad thickness	mm	2	

		1.6 GTi 16V; 3 door. hatchback	1.6 GTi 16V; 3 door. coupé
Brake system			
Proportioning valve, load sensitive	yes/no	no	
Test pressure, front / rear	bar	29,4/29,4; Force 200 N.	
Parking brake, free play/ working stroke	clicks	1-2/*7-11	
Electrical system			
Battery, capacity	Ah	60	
Alternator power output	W	980; At 14 V.	
Controlled voltage at 20°C	V	14,1-14,7	
Primary coil resistance.	Ohm	approx. 0,7	
Secondary coil resistance	Ohm	approx. 2200	
HT leads resistance	Ohm	Direct ignition with separate ignition coil above each spark plug.	

– Sunny 1.8 GTi 16V 1988 - 1990



Front wheel camber and rear wheel tracking

	1.8 GTi 16V CAT; 3, 4 and 5 door	1.8 GTi 16V; 3, 4 and 5 door	1.8 GTi 16V; 3 door Coupé
General			
Build years	10/'88-1990		
Version	manual transaxle		
Engine type	CA 18DE(CAT)	CA 18DE	

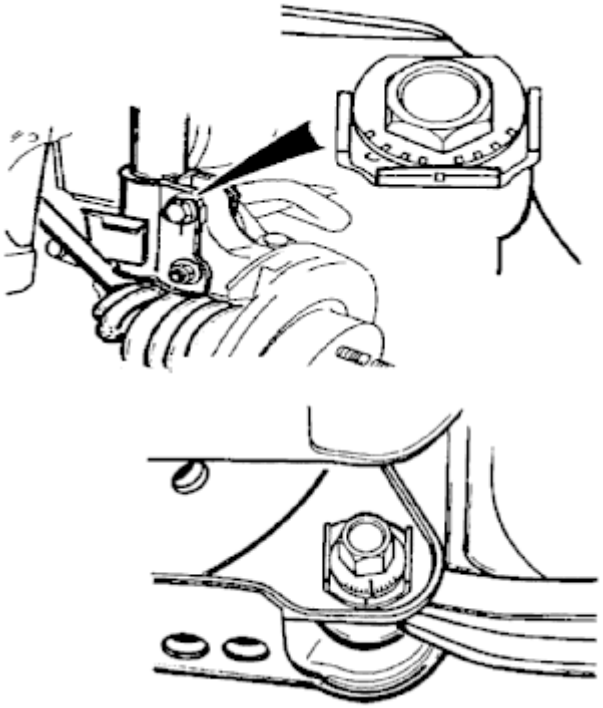
		1.8 GTi 16V CAT; 3, 4 and 5 door	1.8 GTi 16V; 3, 4 and 5 door	1.8 GTi 16V; 3 door Coupé
General				
Engine lay-out		L4/DOHC		
Cubic capacity	cc	1809		
Compression normal/wear limit	bar	14,7/10,8		
tolerance between cylinders, max.	bar	1,0		
Valves				
Engine condition for adjustments		n.a. hydraulic		
Inlet valve clearance	mm	0		
Exhaust valve clearance	mm	0		
Ignition				
Type		engine management		
Spark plugs, make		NGK		
Spark plugs, type		PFR6A-11; With platinum electrode.	PCPR6ES-11	
Spark plugs - spark plug gap	mm	1,0-1,1		
Strobosc. ignition timing	°/1/min	15±2/800±50		
Centrifugal advance - start	°/1/min	computer controlled		
Centrifugal advance - test	°/1/min	computer controlled		
Centrifugal advance - end	°/1/min	computer controlled		

		1.8 GTi 16V CAT; 3, 4 and 5 door	1.8 GTi 16V; 3, 4 and 5 door	1.8 GTi 16V; 3 door Coupé
Ignition				
Vacuum advance - start	°/mm Hg (x 1,33 = 1 mbar)	computer controlled		
Vacuum advance - test	°/mm Hg (x 1,33 = 1 mbar)	computer controlled		
vacuum advance - end	°/mm Hg (x 1,33 = 1 mbar)	computer controlled		
Vacuum retard - start	°/mm Hg (x 1,33 = 1 mbar)	computer controlled		
Vacuum retard - end	°/mm Hg (x 1,33 = 1 mbar)	computer controlled		
Fuel system				
Carburettor(s)/Injection	type	E.C.C.S.		
Fuel pump pressure/injection pressure	bar	2,5/2,5		
Idle speed	1/min	800±50		
CO at idle speed	%	max. 0,1; Measured in the exhaust tail pipe. CO is 8% or less with oxygen sensor and throttle valve switch disconnected and a 2500 Ohm resistance instead of the coolant temperature sensor.	max. 2,0	
Clutch				
Version		hydraulic		

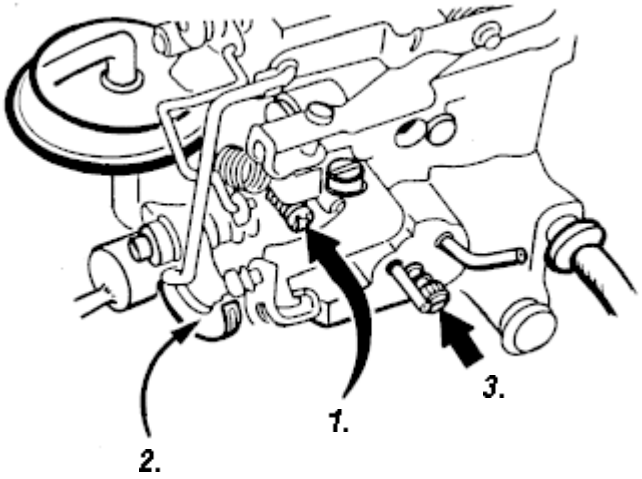
	1.8 GTi 16V CAT; 3, 4 and 5 door	1.8 GTi 16V; 3, 4 and 5 door	1.8 GTi 16V; 3 door Coupé
Clutch			
Self-adjusting	no		
Pedal / release arm free play / pedal working stroke mm	-/-/-; Pedal clearance at bottom: 1,0-3,0 mm; pedal height: 162-172 mm; see illustration under MAINTENANCE.		
Wheels and tyres			
Rim size	5,5JJx14		
Tyre size	185/60R14 82H		
Tyre pressure, front/rear bar	1,9/1,9; Under full load and/or high speeds: 2,2/2,2.		
Wheel alignment			
Vehicle ballast	Tank full		
Front wheel alignment	toe-in		
Front wheels - tracking mm/°	-0,35 to 1,0/-3 to 9'		
Front wheels - camber °	-50' to 40'		-1°05' to 25'
Front wheels - castor °	35'-2°05'; Non adjustable.		45'-2°15'; Non adjustable.
Front wheels - KPI °	13°05'-14°35'; Non adjustable.		13°25'-14°55'; Non adjustable.
Pos/neg Ackermann, 20° wheel-angle °	1°36'; 20° outer wheel-angle.		
Rear wheel alignment	toe-out		
Rear wheels - tracking mm/°	0-2,8/0'-25'		-0,35 - 2,35/-3' - 21'
Rear wheels - camber °	-1°45' to -15'; Non adjustable.		-1°55' to -25'; Non adjustable.

		1.8 GTi 16V CAT; 3, 4 and 5 door	1.8 GTi 16V; 3, 4 and 5 door	1.8 GTi 16V; 3 door Coupé
Brake system				
Construction, front/rear		disc / disc		
Front disc thickness, new / wear limit	mm	20/18		
Min. front brake pad thickness	mm	2,0		
Rear disc thickness, new / wear limit	mm	10/–		
Min. rear brake pad thickness	mm	1,5		
Proportioning valve, load sensitive	yes/no	no		
Test pressure, front / rear	bar	29,4/29,4; 40/32 and 60/48.		
parking brake, free play/ working stroke	clicks	1-2/7-11; Force 200 N.		
Electrical system				
Battery, capacity	Ah	60		
Alternator power output	W	980; At 14 V.		
Controlled voltage at 20°C	V	14,1-14,7		
Primary coil resistance.	Ohm	approx. 0,7		
Secondary coil resistance	Ohm	approx. 2200		
HT leads resistance	Ohm	Direct ignition with separate ignition coil above each spark plug.		

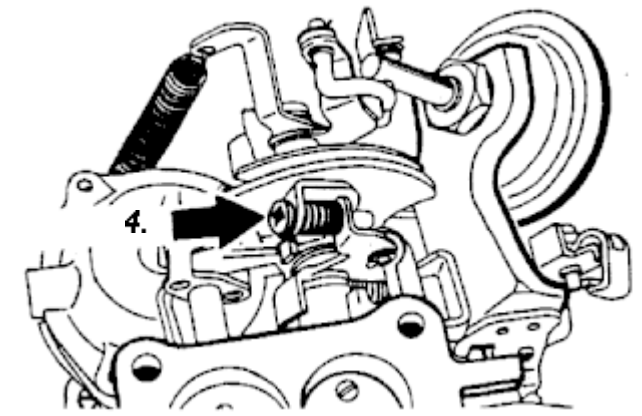
– Sunny 1.6 4WD 1987 – 1988



Front wheel camber and rear wheel tracking



1. idle speed adjustment screw
2. Throttle lever
3. CO adjustment screw



4. Fast idle speed

		Sunny 1.6; 4 door, 4WD
General		
Build years		1987-9/'88
Version		manual transaxle
Engine type		E16S
Engine lay-out		L4 / OHC
Cubic capacity	cc	1597
Compression normal/wear limit	bar	13,4/10,8
tolerance between cylinders, max.	bar	1,0
Valves		
Engine condition for adjustments		hot
Inlet valve clearance	mm	0,28; Cold, inlet and exhaust provisional setting: 0,22.
Exhaust valve clearance	mm	0,28; Cold, inlet and exhaust provisional setting: 0,22.
Ignition		
Type		transistorized
Spark plugs, make		NGK
Spark plugs, type		BPR6ES
Spark plugs - spark plug gap	mm	0,8-0,9
Strobosc. ignition timing	°/1/min	4±2/800 ± 50; Valid for vacuum hose connected and disconnected.
Centrifugal advance - start	°/1/min	0/1360
Centrifugal advance - test	°/1/min	12/2800
Centrifugal advance - end	°/1/min	25/5400

		Sunny 1.6; 4 door, 4WD
Ignition		
Vacuum advance - start	°/mm Hg (x 1,33 = 1 mbar)	0/110
Vacuum advance - test	°/mm Hg (x 1,33 = 1 mbar)	4°45'/170
vacuum advance - end	°/mm Hg (x 1,33 = 1 mbar)	10/250
Fuel system		
Carburettor(s)	make	Hitachi
Injection	make	-
Carburettor(s)/Injection	type	DCZ 328-31
Fuel pump pressure/injection pressure	bar	0,20-0,27/-
Fast idle speed	1/min	2400 ± 200
Idle speed	1/min	800 ± 50
CO at idle speed	%	1,5 ± 0,5
Clutch		
Version		mechanical
Self-adjusting		no
Pedal / release arm free play / pedal working stroke	mm	12,5-17,5/2,5-3,5/Pedal height: 162-172 mm, see illustration under MAINTENANCE.
Wheels and tyres		
Rim size		5Jx13
Tyre size		175/70SR13
Tyre pressure, front/rear	bar	1,8/1,8; Under full load and/or high speeds: 2.0/2,0.

	Sunny 1.6; 4 door, 4WD
Wheel alignment	
Vehicle ballast	Tank full
Front wheel alignment	toe-in
Front wheels - tracking mm/°	-0,3 to 0,9/-3' to 9'
Front wheels - camber °	-50' to 40'
Front wheels - castor °	10'-1°40'; Non adjustable.
Front wheels - KPI °	12°50'-14°20'; Non adjustable.
Pos/neg Ackermann, 20° wheel-angle °	*2°12'
Rear wheel alignment	toe-out
Rear wheels - tracking mm/°	0-2,5/0'-24'
Rear wheels - camber °	-55' to 35'; Non adjustable.
Brake system	
Construction, front/rear	disc / drum
Front disc thickness, new / wear limit mm	18/16
Min. front brake pad thickness mm	2
Rear drum diameter: new / wear limit mm	228,6/230,0
Min. rear lining thickness mm	1,5
Proportioning valve, load sensitive yes/no	no
Test pressure, front / rear bar	34,3/34,3; 45/36 and 60/48.
Parking brake, free play/ working stroke clicks	1-2/8-11; Force 200 N.

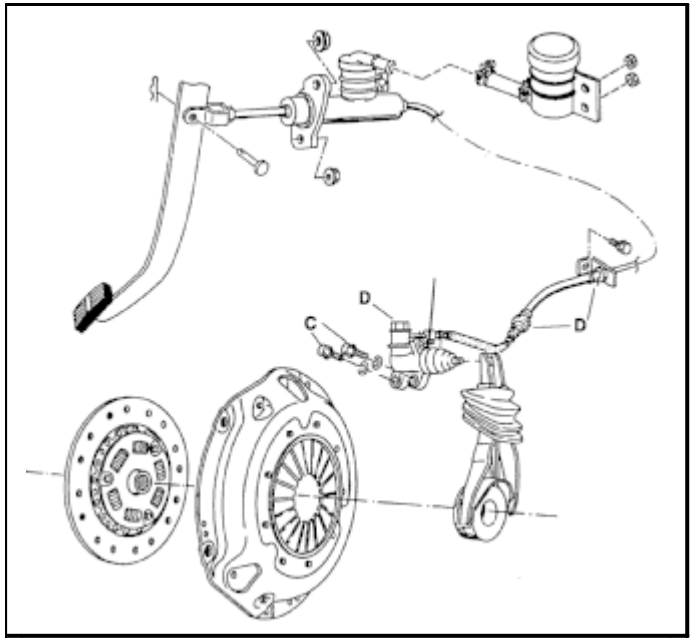
		Sunny 1.6; 4 door, 4WD
Electrical system		
Battery, capacity	Ah	60
Alternator power output	W	40; At 14 V.
Controlled voltage at 20°C	V	14,1-14,7
Primary coil resistance.	Ohm	1,0-1,3
Secondary coil resistance	Ohm	8.400-12.600
Ballast resistor	Ohm	Air gap between pickup element and rotor: 0,3-0,5 mm.
HT leads resistance	Ohm	max. 30.000

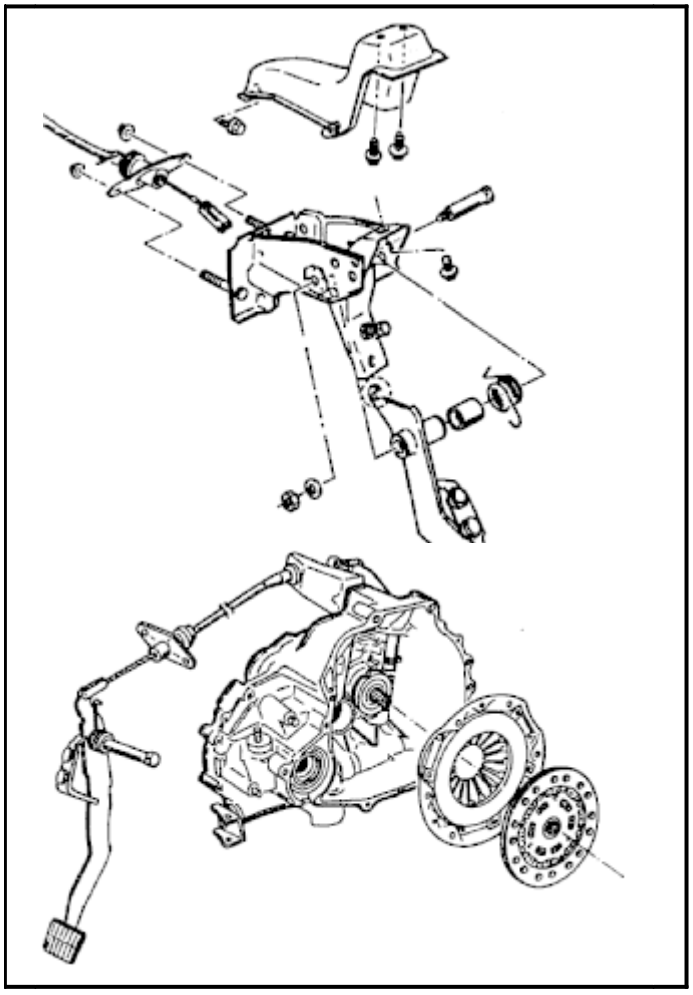
Driveline

Clutch

Removal and installation

See the illustrations. To remove the clutch, first take out the transmission. See transaxle removal and installation.





torque settings, in Nm	
A, bolt	16 - 22
A, selector	12 - 15
B	16 - 22
C	30 - 40
D	17 - 20

Transaxle

Removal and installation

The transaxle is removed downwards separated from the engine. Proceed as follows:

Drain the transmission oil. Remove the battery and battery holder. Remove the front wheel hub nuts and calipers. Undo the track rod ball joint nuts. Carefully tap the drive shafts out of the stub axles. Remove the drive shafts by prising the drive shaft out of the differential housing with a screwdriver. Place a support under the engine sump. Place an hydraulic jack under the gearbox. Remove the securing bolts. Lower the gearbox.

Refit the components in reverse order of removal. Before the drive shafts can be refitted, new oil seals must be put in place. Use fitting tool KV38105500 to protect the oil seals when fitting the drive shafts, if necessary.

torque settings, in Nm	
Wheel hub nut	196 - 275
Wheel nuts	98 - 118
Brake caliper	54 - 64
Track rod ball joint	29 - 39
Drain plug (except CA 18DE)	25 - 34
Drain plug, CA 18DE engine	20 - 29
Filler plug	25 - 34
Securing gearbox half sections	16 - 21

Fitting gearbox to engine block, see illustration

– E 10S, E 13S:

A, bolt length 70 mm: 16 - 21

B, bolt length 40 mm: 20 - 29

C, bolt length 25 mm: 16 - 21

D, bolt length 20 mm: 20 - 29

– E 16S, E 16i:

A, bolt length 70 mm: 23 - 27

B, bolt length 40 mm: 20 - 29

C, bolt length 25 mm: 16 - 21

D, bolt length 20 mm: 20 - 29

– GA engine:

A, bolt length 70 mm: 30 - 40

B, bolt length 30 mm: 30 - 40

C, bolt length 25 mm: 16 - 21

D, bolt length 25 mm: 16 - 21

– CA 16DE:

A, bolt length 90 mm: 30 - 40

B, bolt length 55 mm: 30 - 40

C, bolt length 40 mm: 16 - 21

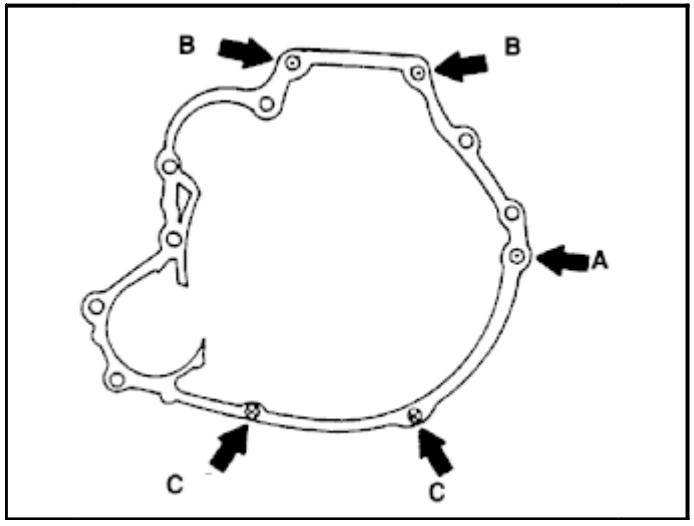
D, bolt length 25 mm: 16 - 21

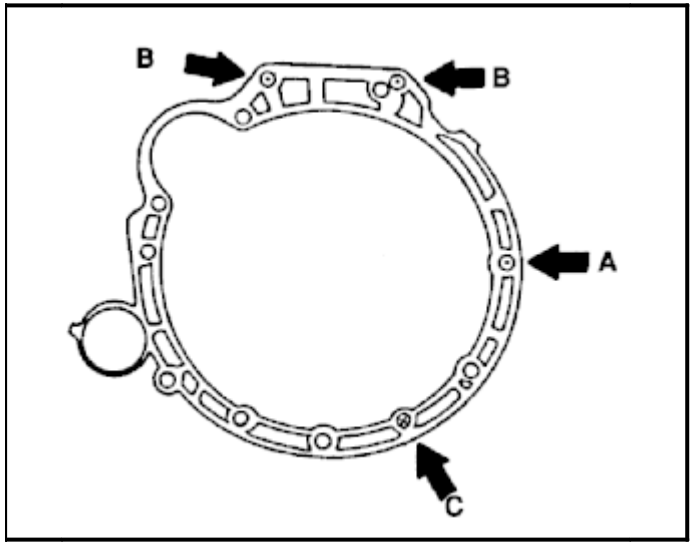
– CA 18DE:

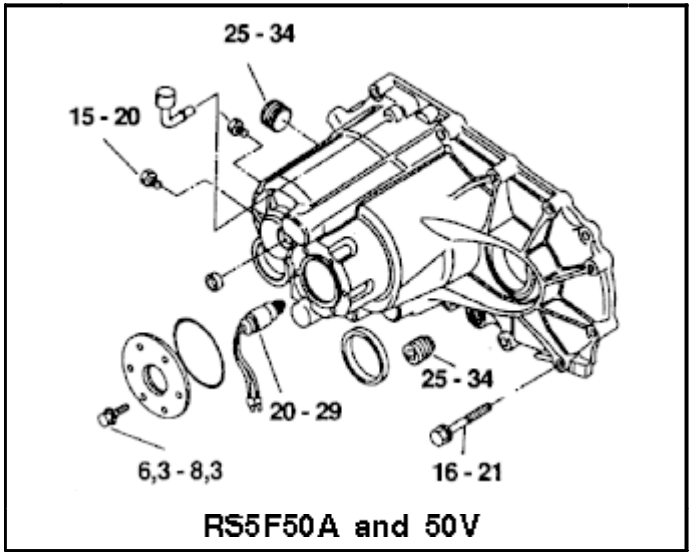
A, bolt length 125 mm: 43 - 58

B, bolt length 65 mm: 43 - 58

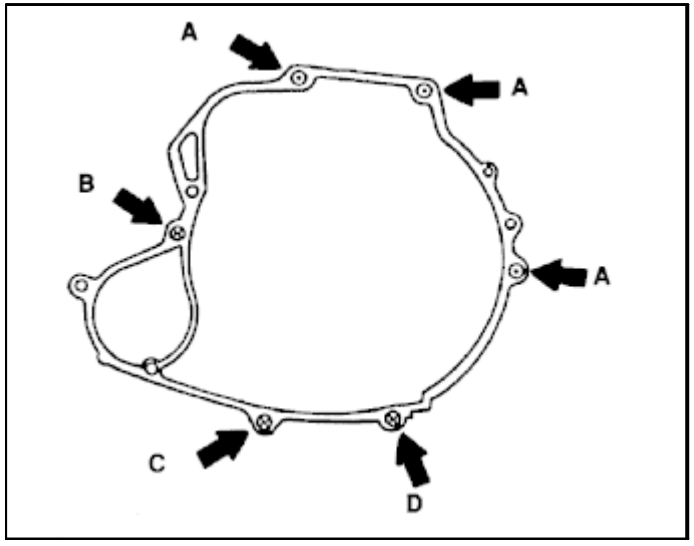
C, bolt length 45 mm: 30 - 40

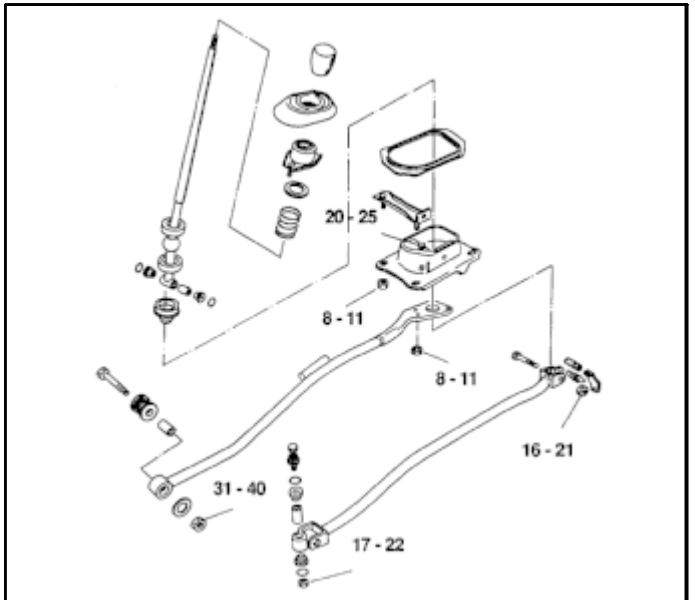




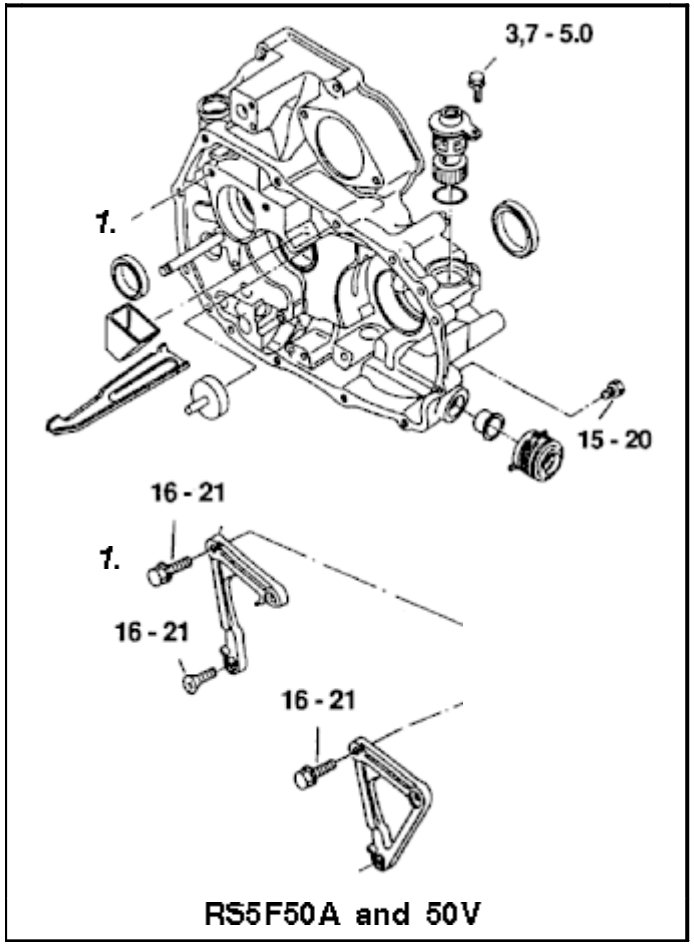


RS5F50A and 50V





RS5F50A and 50V



RS5F50A and 50V

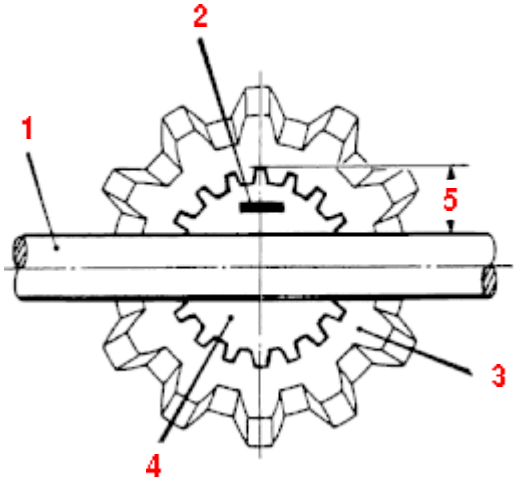
Automatic transaxle

Drain the transmission oil. Disconnect all connections and joints. Remove the front wheel hub nuts and calipers. Undo the track rod ball joint nuts. Carefully tap the drive shafts out of the stub axles. Remove the RH drive shaft by prising the joint out of the differential housing with a screwdriver.

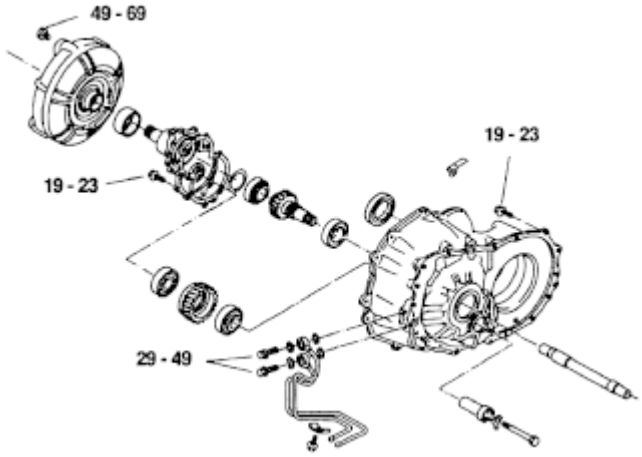
Remove the LH drive shaft. With a screwdriver tap the end of the LH shaft via the RH shaft opening in the differential housing; prevent damaging the satellite gear shaft and gear, see the illustration. Remove the torque converter to drive plate bolts via a circular opening in the bottom of the rear engine plate. Apply markings, so that the torque converter can be replaced in the same position. Place a support under the engine sump. Place an hydraulic jack under the transmission housing. Remove the securing bolts. Lower the transmission.

Refit the components in reverse order of removal. Before the transmission is secured to the engine block, measure the distance from one of the torque converter faces to the transmission housing mounting face; this dimension must be at least 21,1 mm, see the illustration. Fit the transmission to the engine block. Ensure that the torque converter is located correctly against the drive plate with help from the markings. Tighten the transmission housing bolts to 16 - 22 Nm. Coat the torque convertor securing bolts thread with locking compound. Tighten to 49 - 69 Nm. Rotate the crankshaft a few times: check that the transmission is running freely. Before fitting the drive shafts new oil seals must be put in place. Use fitting tool KV38105500 to protect the oil seals when fitting the drive shafts, if necessary.

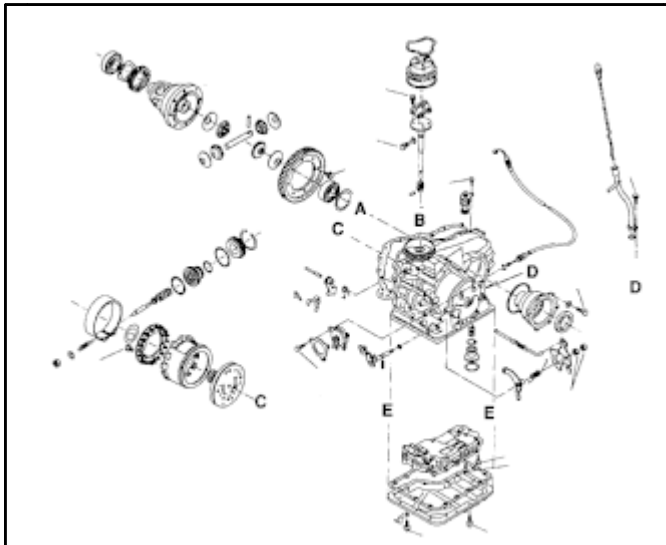
torque settings, in Nm	
Wheel hub nut	196 - 275
Wheel nuts	98 - 118
Brake caliper	54 - 64
Track rod ball joint	29 - 39
Securing transmission housing sections	19 - 23
Torque converter securing bolts (with sealant)	49 - 69
Fitting transmission housing to engine block	16 - 22



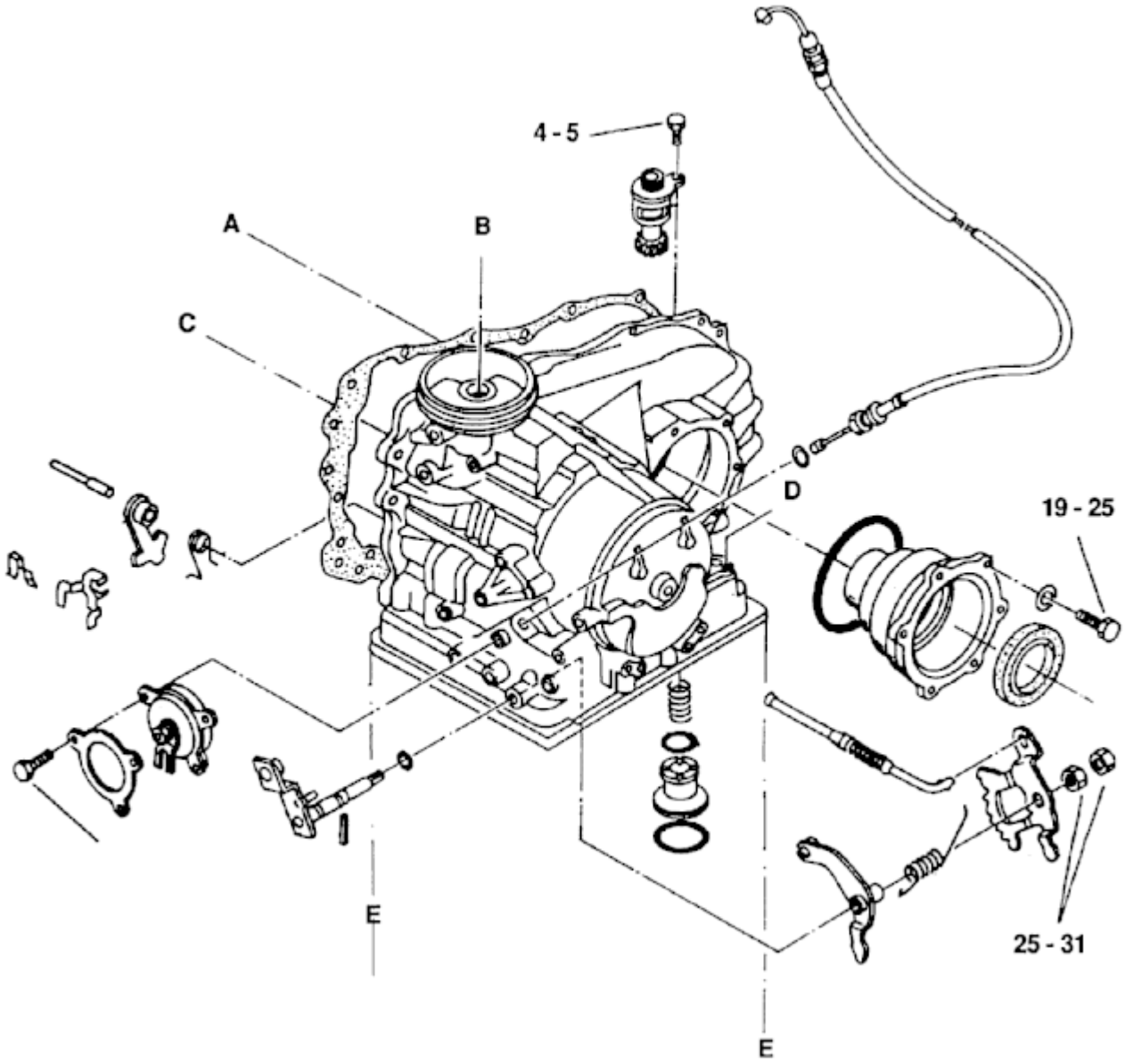
1. Satellite gear shaft
2. Screwdriver contact point
3. Satellite gear
4. Drive shaft
5. 5 mm



Automatic transaxle front half overview drawing

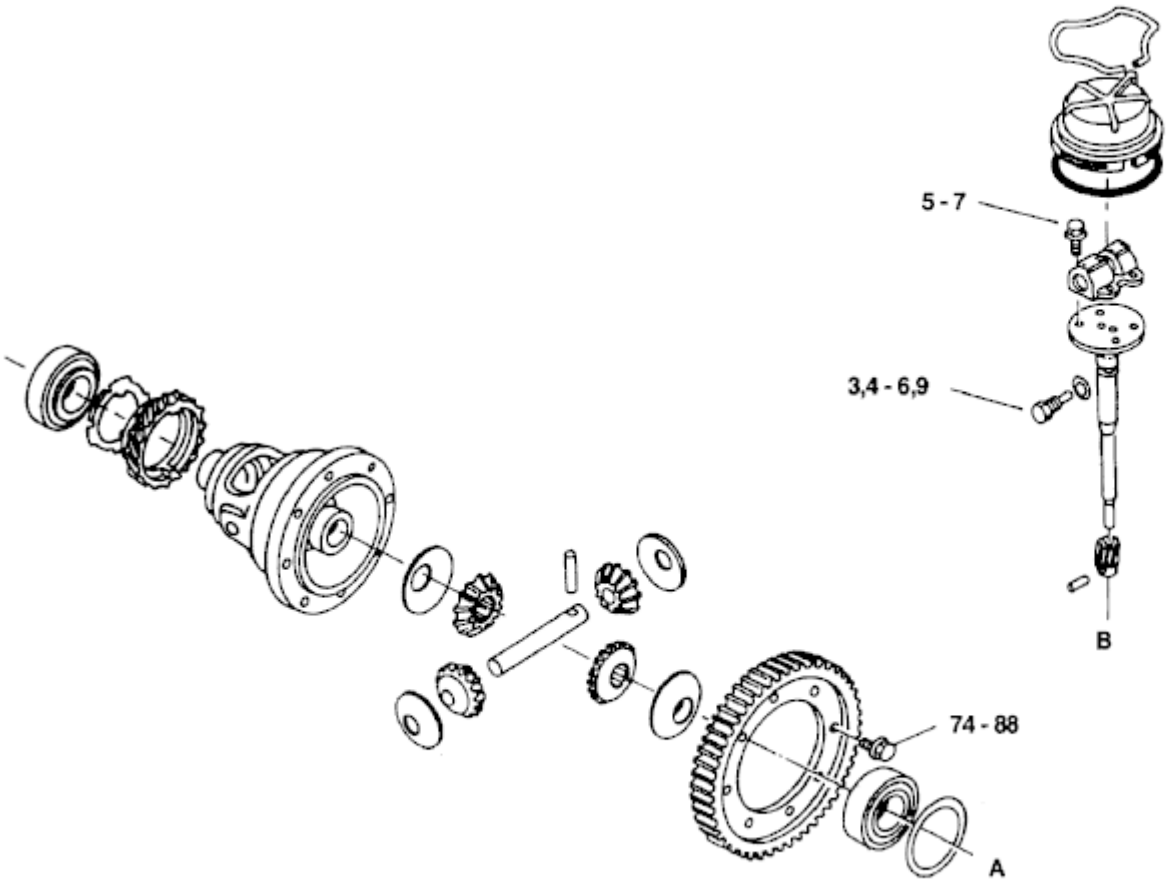


Automatic transaxle rear half overview drawing



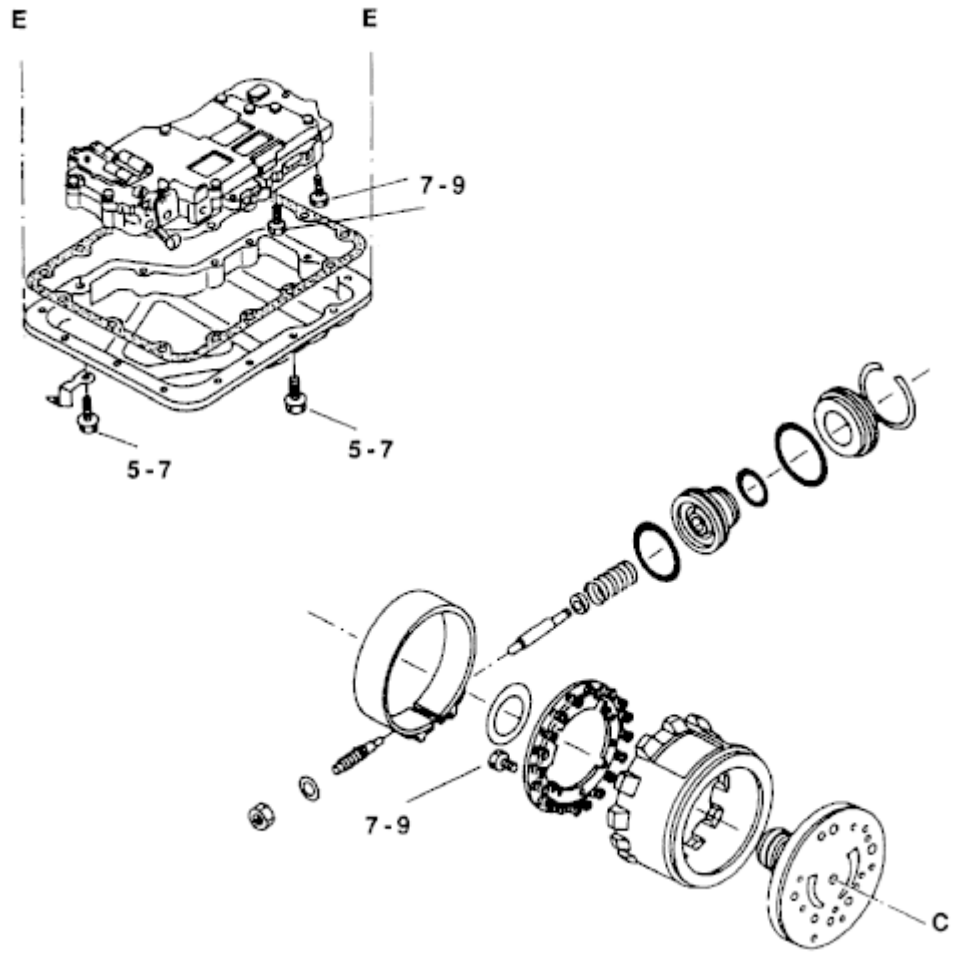
Part I, automatic transaxle

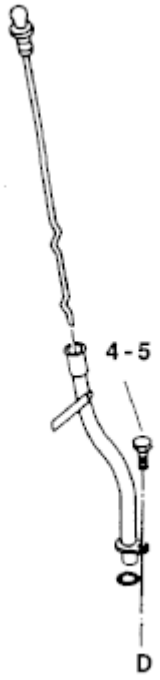
Torque settings in Nm



Part II, automatic transaxle

Torque settings in Nm





Part III, automatic transaxle
Torque settings in Nm

Ignition/Fuel system

Carburettor

– E10S, E13S, W16S and GA engines

Components

Float level

Check the float level using the sight glass in the float chamber. With the engine at idle speed the level must be half way up the sight glass. If necessary, set the float level, measured to the mating face without gasket, as follows:

Remove the carburettor top cover and hold it upside down so that the float rests on the seat. Tilt the float up and allow it to gently rest on the seat. Check the float level L1, see the illustration:

E10S and E13S engines:	14,5 - 15,5 mm
E16S engine:	16,5 - 17,5 mm
GA engine:	8,5 - 9,5 mm

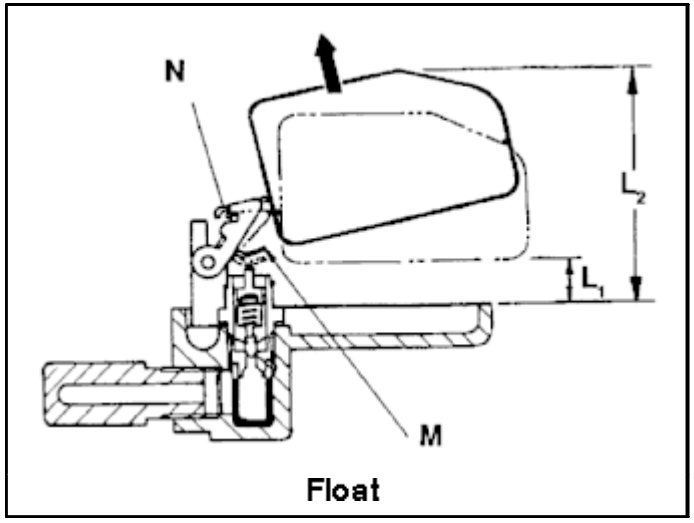
If necessary, bend the seat lip M.

Tilt the float up so that the float rim touches the carburettor top cover wall. Measure float level L2, see the illustration:

E10S and E13S engines:	44,5 - 45,5 mm
E16S engine:	46,5 - 47,5 mm
GA engine:	46,5 - 47,5 mm

If necessary, bend the float rim N.

Note: Always fit a new gasket.



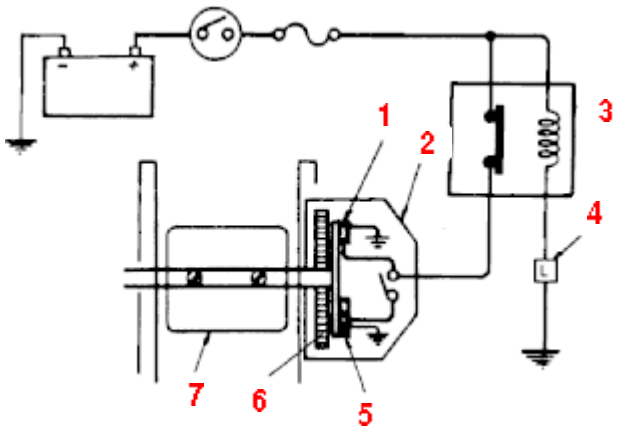
Float

Checking the automatic choke

The choke valve is operated through a bi-metal switch, controlled by P.T.C. resistances, see choke control wiring diagram. With engine cold, check if the choke valve closes when the throttle valve is opened fully.

The markings (grooves) on the choke cover flange and the choke housing must align. Start the engine. Bring to operating temperature. The choke valve must now be fully open. If necessary, check the components shown in the illustration.

The choke relay is located in the centre of the relay block in the engine compartment in front of the RH suspension strut tower.



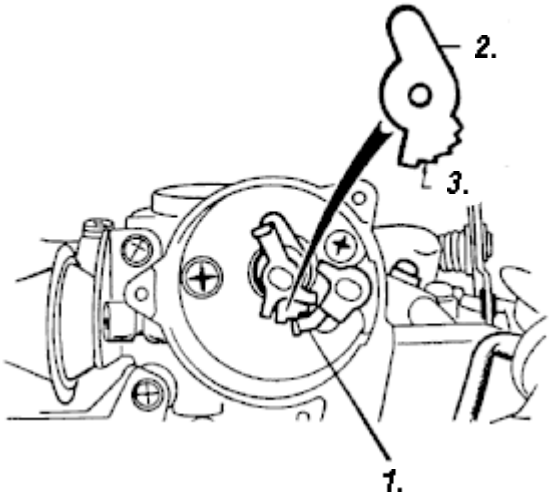
1.P.T.C. heater resistance
2.Choke cover
3.Choke relay
4.Alternator output 'L'
5.P.T.C. heater resistance
6.Bi-metal switch
7.choke valve

Setting fast idle speed

Bring the engine to operating temperature Remove the choke cover. All basic engine settings must be correct. Place the control arm on the second step of the control cam, see the illustration.

Check the engine speed:

E 10S:	2200±200/min
E 13S:	2400±200/min (manual gearbox) 2600±200/min (automatic transmission)
E 16S:	2400±200/min (manual gearbox) 2800±200/min (automatic transmission)
GA 14S:	2700±200/min (manual gearbox) 3400±200/min (automatic transmission)
GA 16S:	2700±200/min (manual gearbox) 3100±200/min (automatic transmission)



1.Control arm
2.Operating cam
3.Second stage

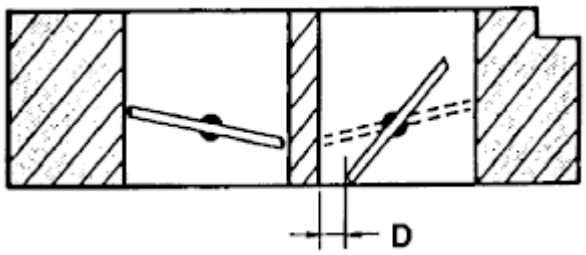
If necessary, set the fast idle speed as follows:

Remove carburettor. With the control arm placed on the second step of the operating cam the primary throttle valve air gap D opposite the inner wall must be set with the fast idle speed screw.

Air gap D, see the illustration, is:

E 10S:	0,47±0,07 mm
E 13S:	0,62±0,07 mm (manual gearbox) 0,69±0,07 mm (automatic transmission)
E 16S:	0,68±0,10 mm (manual gearbox) 0,86±0,10 mm (automatic transmission)
GA 14S:	0,75±0,07 mm (manual gearbox) 0,93±0,07 mm (automatic transmission)
GA 16S:	0,71±0,07 mm (manual gearbox) 0,89±0,07 mm (automatic transmission)

Fit the carburettor. Check the fast idle speed again.



Primary throttle valve air gap

Choke damper mechanism

With the engine cold, check that the choke valve is fully closed. Apply a vacuum of 400 mmHg to the diaphragm housing that is located to the left of the choke housing at the side of the secondary venturi.

Method for E engines:

Carefully withdraw the actuating rod from the diaphragm housing until a resistance can be felt. Measure the choke valve air gap B, see the illustration:

E 10S and E 13S:	1,31 ± 0,14 mm
E 16S:	1,40 ± 0,20 mm

Push the actuating rod carefully into the diaphragm housing until a resistance can be felt. Again measure the choke valve air gap B, see the illustration:

E 10S and E 13S:	1,84 ± 0,32 mm
E 16S:	2,19 ± 0,20 mm

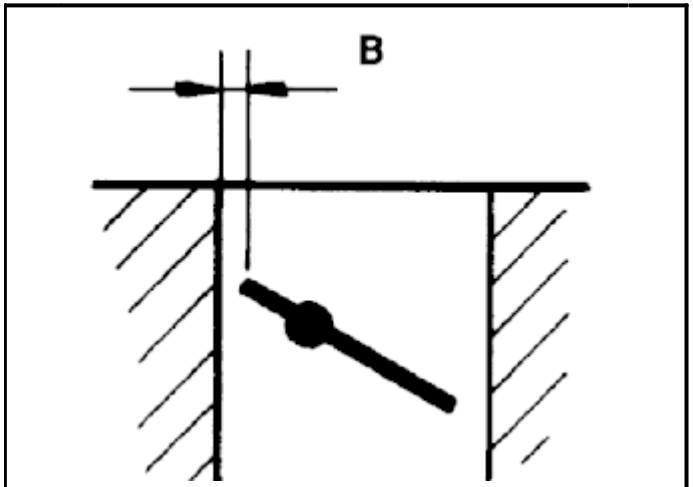
If necessary, bend the choke lever flange to reset gap B.

Method for GA engines:

Measure the choke valve air gap B at two different temperatures, see illustration:

	below 5 °C	above 16,5 °C
GA 14S, For The Netherlands with manual gearbox	1,37±0,14 mm	2,50±0,15 mm
GA 14S, For The Netherlands with automatic transmission and for Belgium	1,37±0,14 mm	2,18±0,32 mm
GA 16S	1,37±0,14 mm	2,18±0,32 mm

If necessary, bend the choke lever flange to reset gap B.



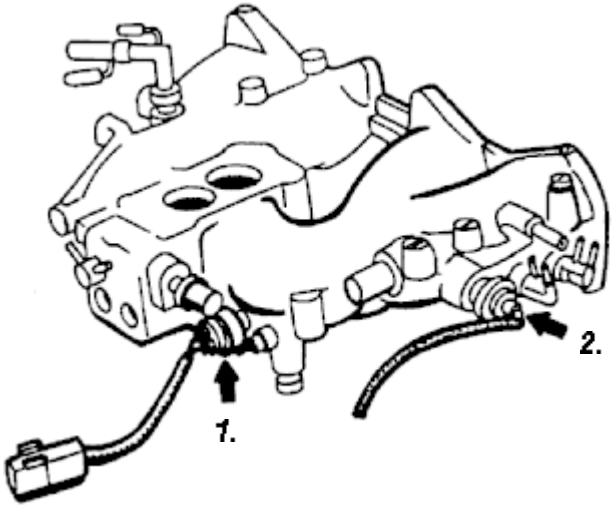
choke valve

Temperature controlled acceleration pump

– **GA engines**

The quantity of fuel injected depends upon the coolant temperature. The solenoid valve which determines the fuel quantity, is located below the acceleration pump lever pivot. At a coolant temperature less than 70 °C the solenoid valve must

be activated and the quantity of fuel injected must be high. See the illustration for the location of the coolant temperature switch.



1.Coolant temperature switch for acceleration pump
2.Coolant temperature switch for Idle speed control

Coolant temperature switches location

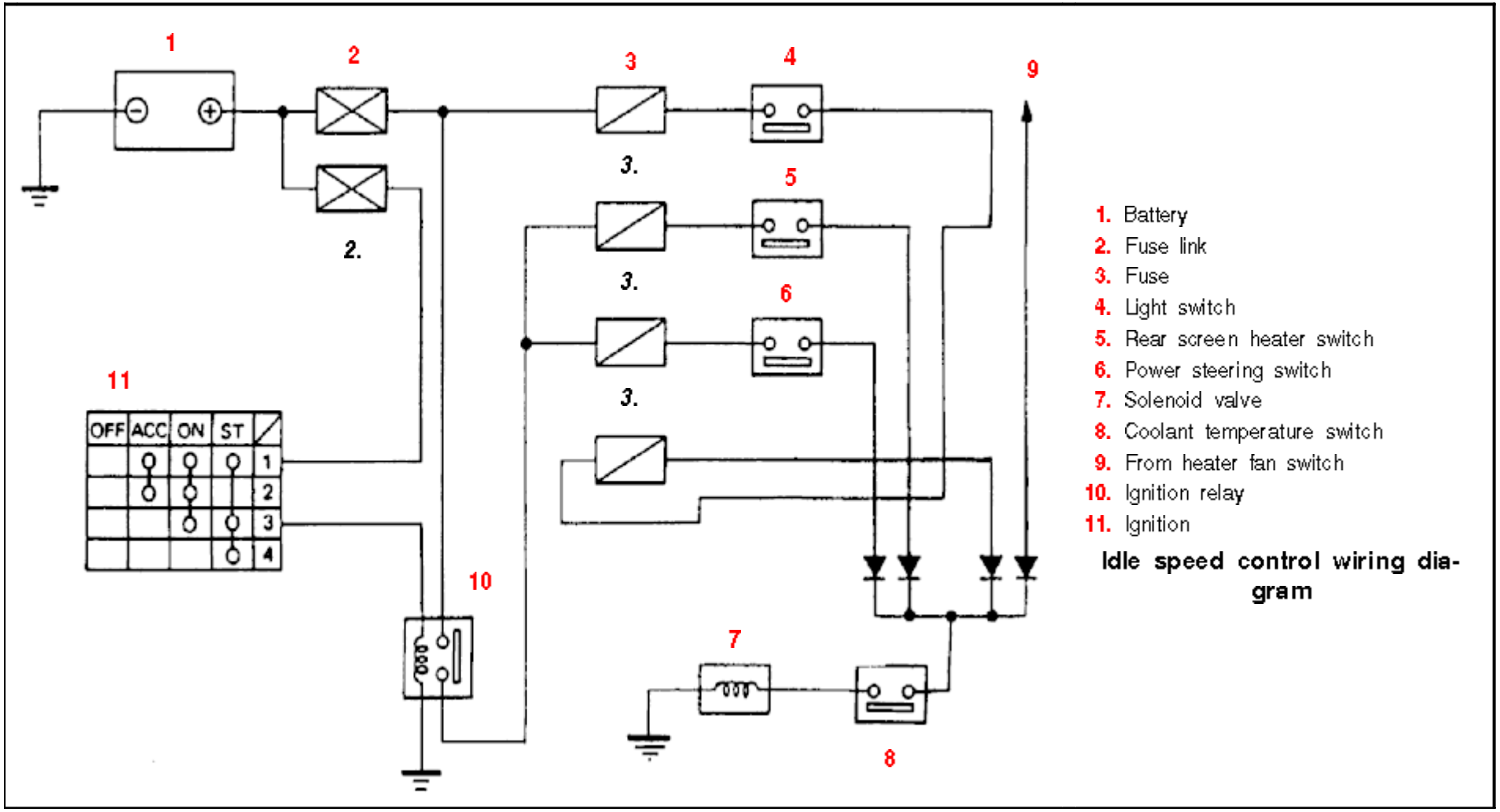
Idle speed control

– GA engines

This system raises the idle speed with engine warm, when one or more of the following consumers is switched on, see the wiring diagram:

– Headlamps
– Rear screen heater
– Heater fan motor
– Power steering pump

A solenoid valve located at the height of the secondary throttle valve provides richer mixture with a coolant temperature exceeding 42 °C. See the illustration for the coolant temperature switch location.



1. Battery
2. Fuse link
3. Fuse
4. Light switch
5. Rear screen heater switch
6. Power steering switch
7. Solenoid valve
8. Coolant temperature switch
9. From heater fan switch
10. Ignition relay
11. Ignition

Idle speed control wiring diagram

Dashpot

– E engine

Bring the engine up to operating temperature. Run at idle speed. Idle speed and CO must be correctly set.
Turn the throttle lever by hand. Check that the dashpot rod does just touches the throttle lever at:

1900±200/min	on E 10S and E 13S engines
2000±200/min	on E 16S engines

If not according to specification, the air gap can be set between the primary throttle valve and the carburettor wall, see illustration under setting fast idle speed, by turning the dashpot; the carburettor must be removed. At the moment that the dashpot rod just touches the throttle lever the air gap must be as follows:

0,47±0,1 mm	on E 10S and E 13S engines
0,56±0,1 mm	on E 16S engines

– GA engines

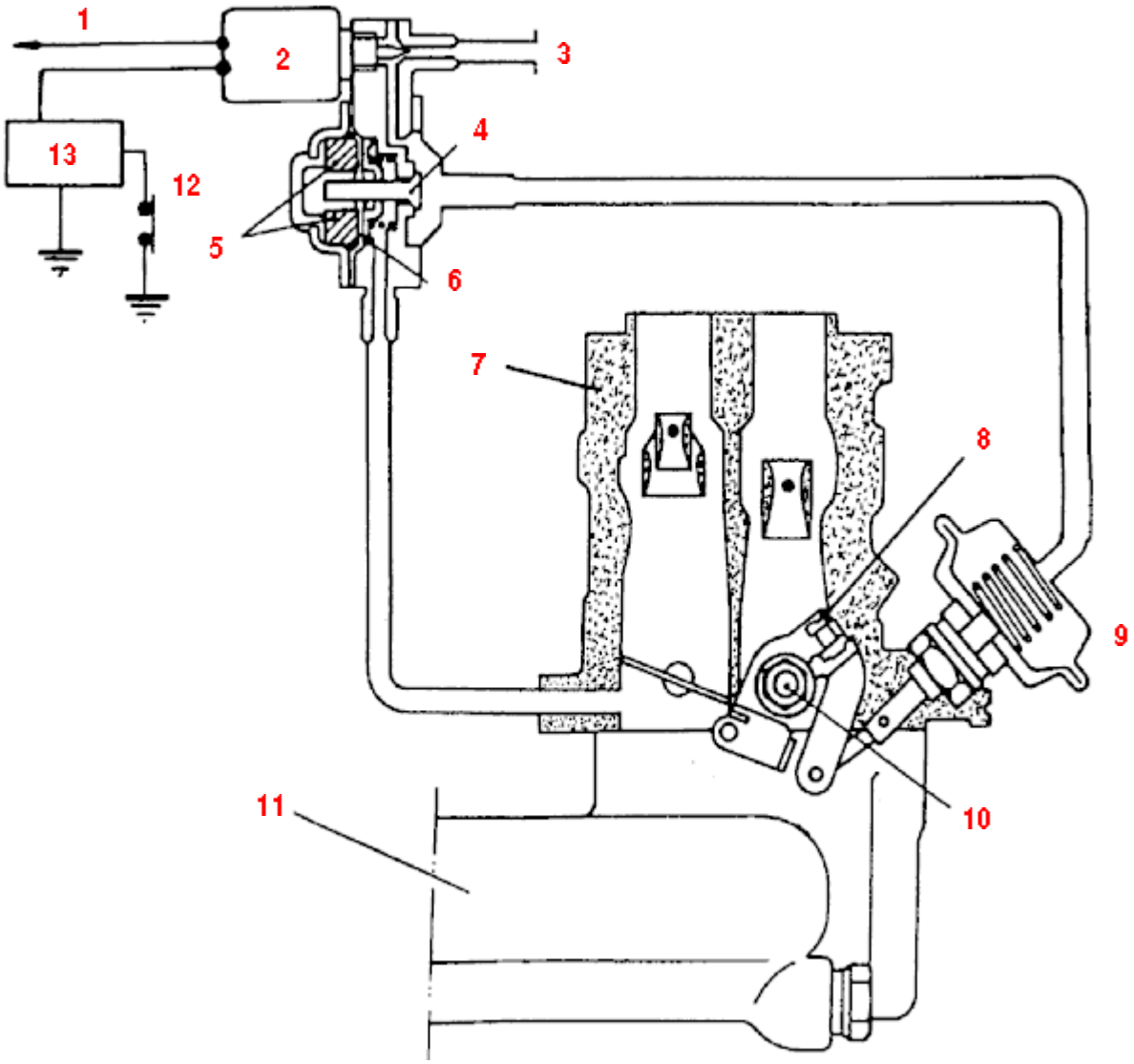
The dashpot is located at an angle below the sight glass. Bring the engine to operating temperature. Run at idle speed. Idle speed and CO must be set correctly. Turn the throttle lever by hand. Check that the dashpot rod does just touches the lever at 2800±200/min. If necessary, turn the adjustment bolt on the lever and then check if the engine speed drops evenly in approx. 3 seconds from 2000 to 1000/min.

Throttle valve opener

This is only fitted on versions for The Netherlands with a GA 14S engines and manual gearbox.

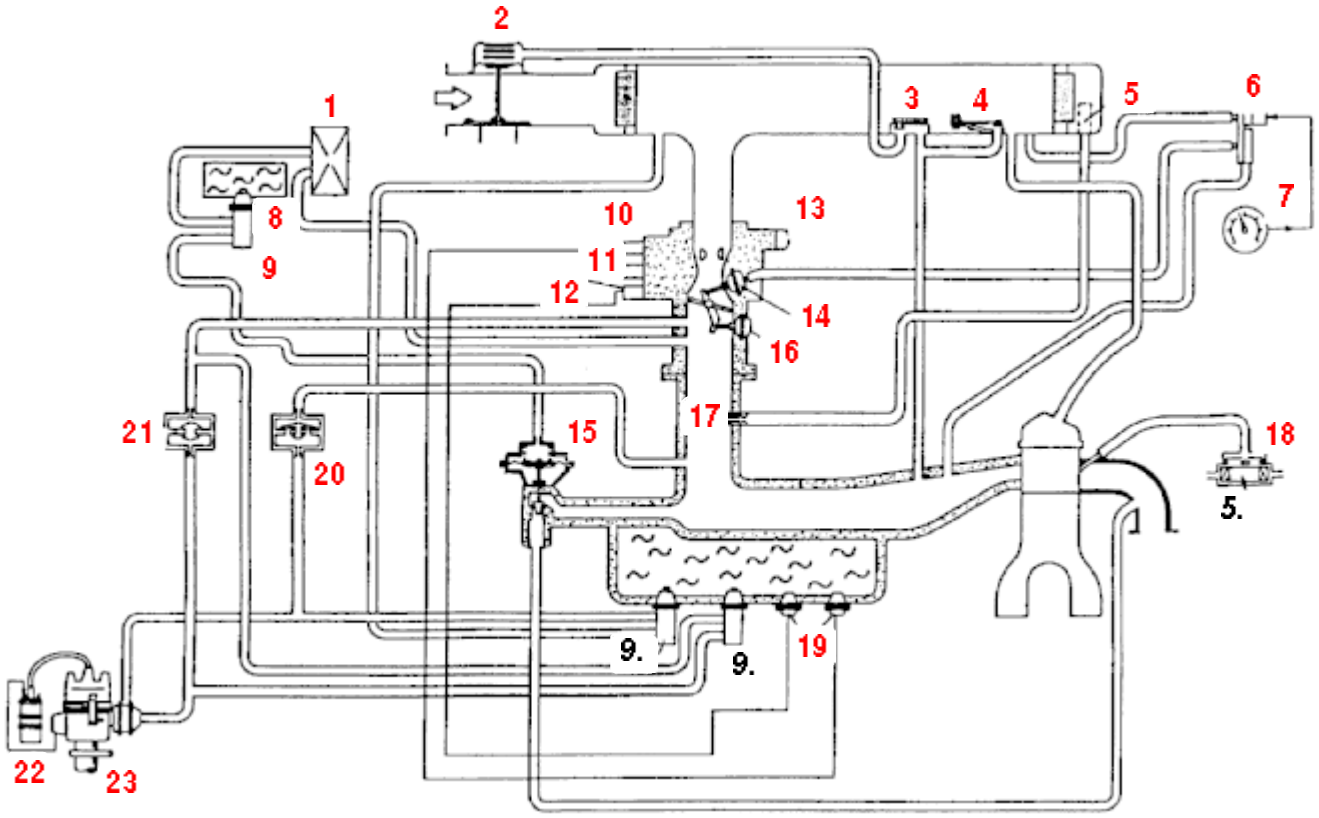
The throttle valve opener arranges that the throttle valve is just open during deceleration, so that better combustion occurs and less unburned HC is emitted. See the working diagram. Check the throttle valve opener as follows: Start the engine. Bring to operating temperature. Connect a vacuum gauge to a T piece between intake manifold and control valve. Disconnect the solenoid valve connector. Run the engine at zero load with approx. 3000/min. Abruptly release the throttle; the inlet vacuum must now be 600 mmHg or higher and then drop evenly. The throttle valve opener must operate at 560±10 mmHg; the inlet vacuum must remain constant briefly and then drop to a constant value at idle speed. If necessary, adjust using the adjustment screw behind the rubber cap on the control valve.

Check the diaphragm housing by connecting it directly to the inlet manifold. The idle speed with engine warm must be 1700 – 1900/min. If necessary, set with the adjustment screw on the lever.



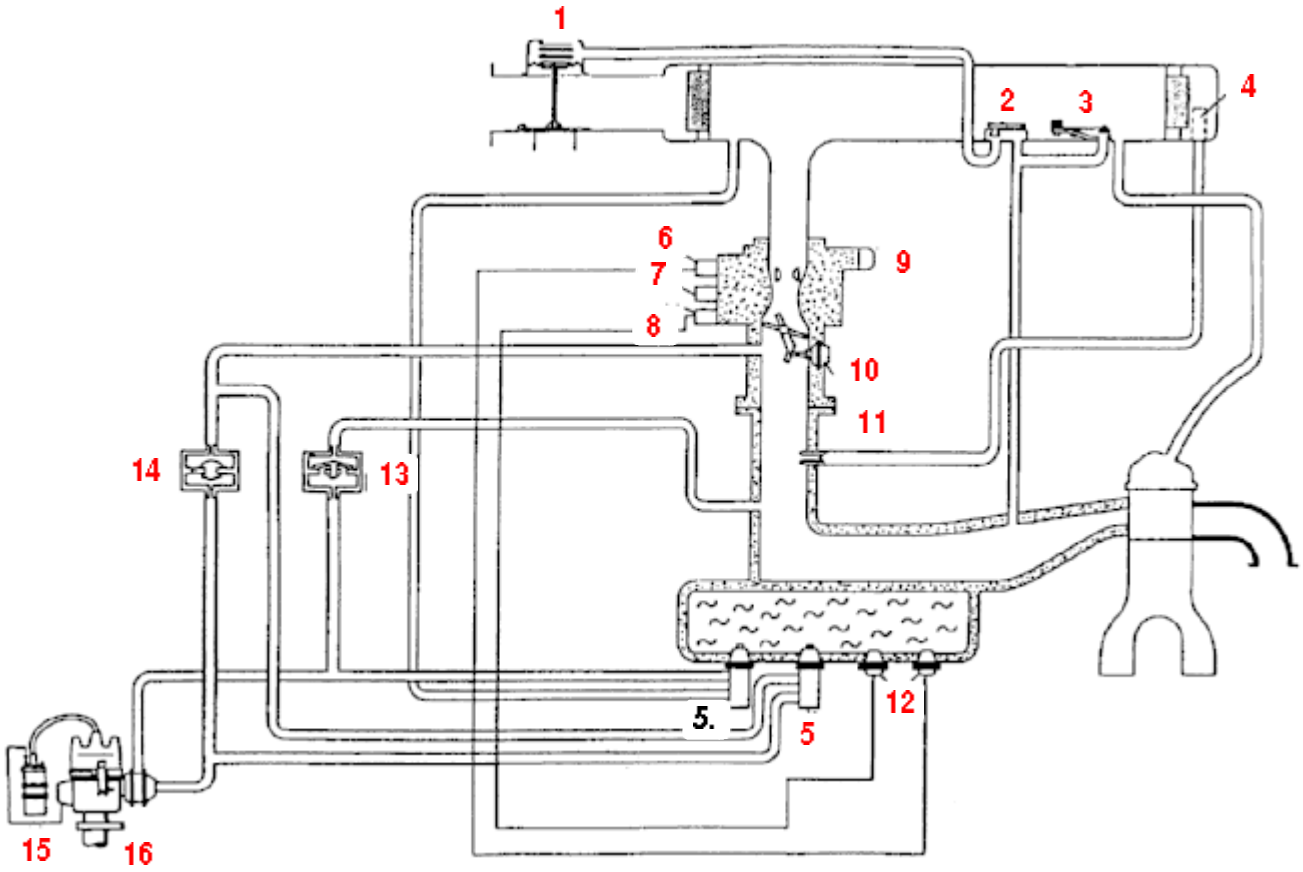
1. To battery
2. Solenoid valve
3. To air filter
4. Control valve
5. Filter
6. Diaphragm
7. Carburettor
8. Adjustment screw
9. Diaphragm housing
10. Primary throttle shaft
11. Inlet manifold
12. Vehicle speed detection switch:
    On: below 10 km/h
    Off: above 10 km/h
13. Vehicle speed detection switch amplifier

Throttle valve opener working diagram



1. Fuel vapour cut-off valve
2. Automatic intake air temperature control
3. Temperature sensor
4. Idle speed compensation valve
5. Air filter
6. Throttle valve opener control valve
7. Vehicle speed detection switch
8. Coolant overflow opening
9. Temperature controlled vacuum valve
10. Acceleration pump control solenoid valve
11. Fuel cut-off solenoid valve
12. Idle speed control solenoid valve
13. Automatic choke
14. Throttle valve opener diaphragm housing
15. EGR control valve (exhaust gas recirculation)
16. Dashpot
17. PCV valve
18. Pulse air system air induction valve
19. Coolant temperature switch
20. Check valve
21. Vacuum delay valve
22. Ignition coil
23. Distributor

Vacuum system: GA 14S engine with manual gearbox



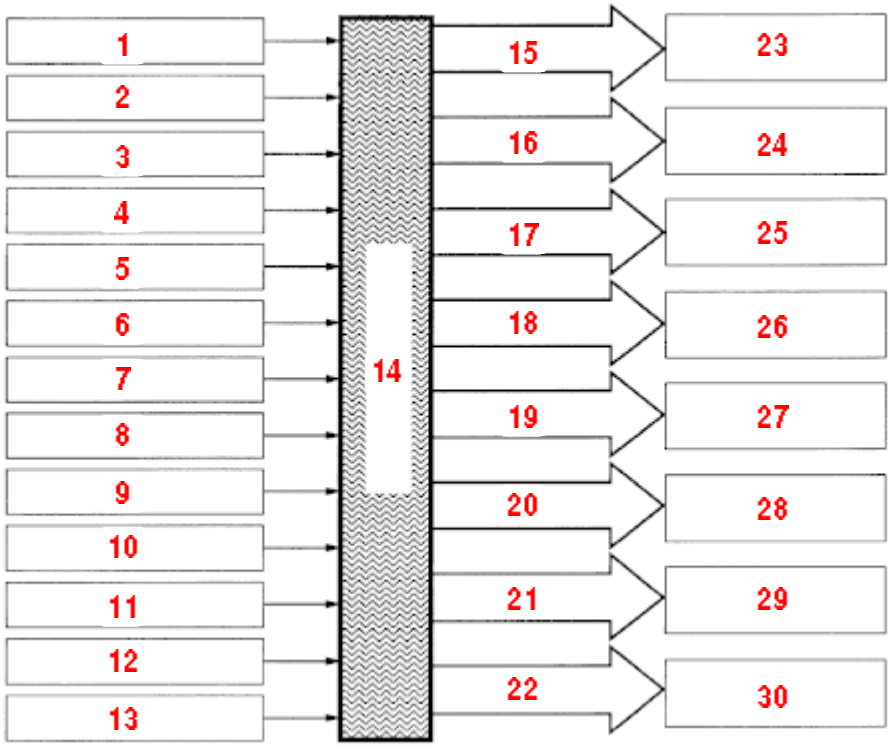
1. Intake air automatic temperature control
2. Temperature sensor
3. Idle speed compensation valve
4. Air filter
5. Temperature controlled vacuum valve
6. Acceleration pump control solenoid valve
7. Fuel cut-off solenoid valve
8. Idle speed control solenoid valve
9. Automatic choke
10. Dashpot
11. PCV valve
12. Coolant temperature switch
13. Check valve
14. Vacuum delay valve
15. Ignition coil
16. Distributor

Vacuum system: GA 14S and GA 16S engines, except GA 14S engine with manual gearbox

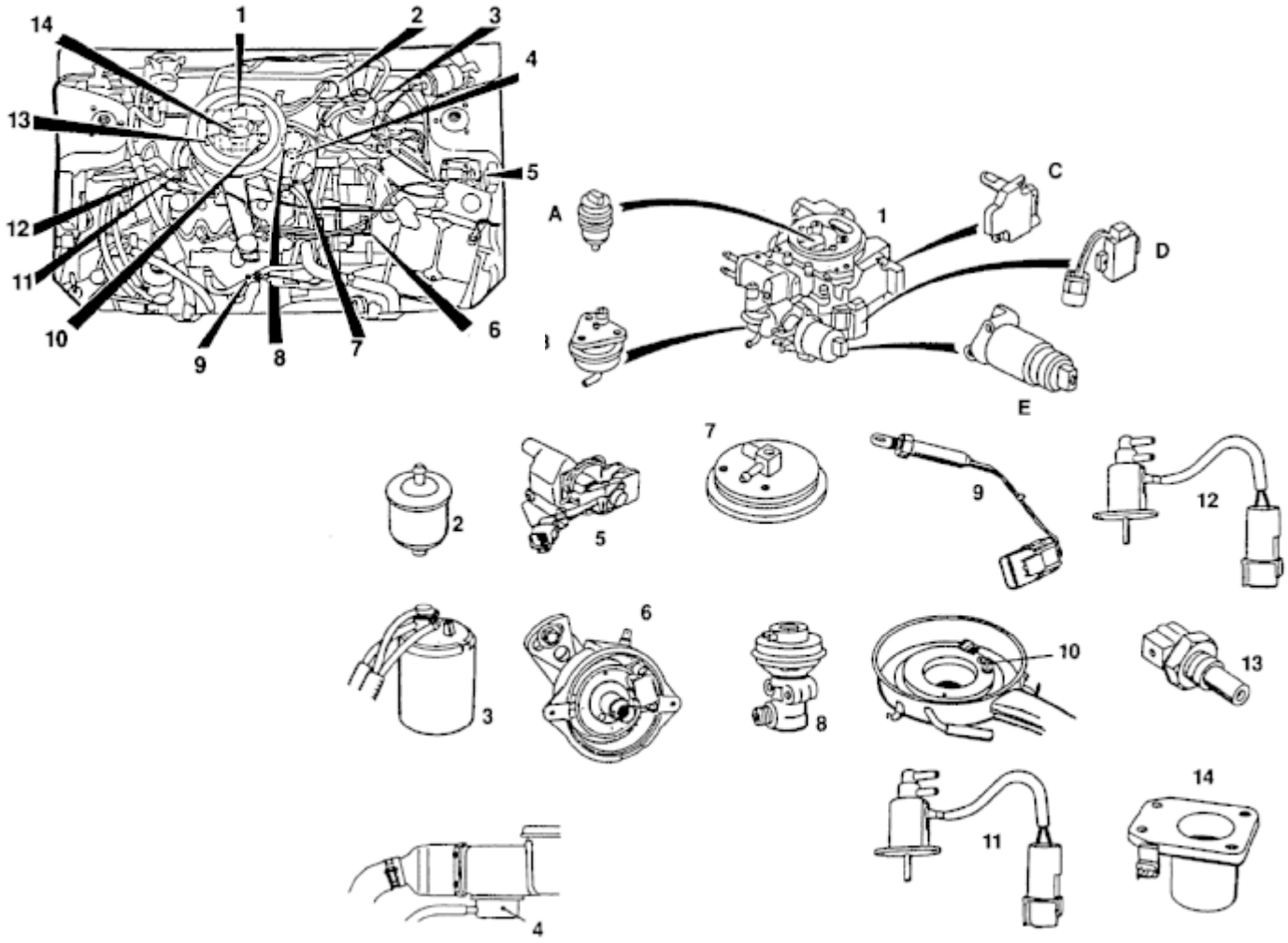
Engine management

– E16i engine

Both the fuel injection and ignition are controlled by a micro-computer via various sensors and actuators, see the wiring diagram. The electronic control unit is located beneath the RH front seat.



1. Crankshaft position sensor
2. Air mass meter
3. Coolant temperature sensor
4. Air intake temperature sensor
5. Oxygen sensor
6. Throttle switch
7. Throttle valve position sensor
8. Ignition switch
9. Start switch
10. Clutch/neutral switch
11. Vehicle speed sensor
12. Power steering switch
13. Battery
14. Electronic control unit
15. Fuel delivery and mixture composition
16. Ignition timing control
17. Idle speed control
18. Fuel pump control
19. Mixture pre-heater control
20. Air induction control
21. EGR and charcoal canister control
22. Diagnosis
23. Injector
24. Power output transistor
25. Idle speed control valve
26. Fuel pump relay
27. Mixture pre-heater relay
28. Air induction valve
29. EGR and charcoal canister solenoid valve
30. LEDs on control unit



1. Injection unit
   1A Injector
   1B Pressure regulator
   1C Air mass meter
   1D Throttle switch and sensor
   1E Idle speed control valve
2. Fuel filter
3. Charcoal canister
4. Air induction control valve
5. Ignition coil with power transistor
6. Crankshaft position sensor
7. Flap valve
8. EGR control valve*
9. Oxygen sensor
10. Air intake temperature sensor
11. EGR and charcoal canister solenoid valve*
12. Air induction solenoid valve
13. Coolant temperature sensor
14. Mixture pre-heater

*EGR= Exhaust gas recirculation

E 16i engine management system component location

Fault finding

The various diagnoses can be made by reading out the green and red LED at the top of the electronic control unit. The control unit should be removed from under the RH front seat, the connector remains connected. The diagnostic system recognizes 5 positions:

Position I and II:	Mixture composition control.
Position III:	Control unit self diagnosis.
Position IV:	Actuator checks.
Position V:	Driving test diagnosis.

The diagnostic position selection procedure is as follows:

Switch on the ignition. With a screwdriver turn the diagnostic switch fully clockwise and wait until the LEDs blink. The diagnostic switch is located at the side of the control unit, to the right of the two LEDs. The number of LED blinks indicates the diagnostic position. Turn the switch fully anti-clockwise as soon as the required blink code appears. If the ignition is switched off and then on again, the diagnostic system will always automatically revert to position I.

Fault memory erasing

The memory is erased when:

- The battery earth lead is disconnected.
- After selecting diagnostic position III, position IV is selected.

Note: If the diagnostic switch remains turned fully clockwise, it will continue blinking in sequence I, II, III, IV, V, I, etc. without the memory being erased.

Diagnostic positions I and II: Mixture composition check

- Position I

  With ignition on but engine off, both the green and red LED will light

  With engine running at 2000/min the green LED is constantly on or off and the red LED constantly off, if the oxygen sensor is still cold. If the oxygen sensor is warm, the green LED must blink approx. 9 times per 10 seconds; off is rich mixture, on is lean mixture. The red LED does not light.

- Position II

  With ignition on and engine off, the green LED will light but not the red LED

  With engine running at 2000/min both LEDs are constant on or off, if the oxygen sensor is still cold. If the oxygen sensor is warm, the green LED must blink approx. 9 times per 10 seconds; off is rich mixture, on is lean mixture. The red LED will not light if the mixture exceeds 5% too rich, blinks synchronous with the green LED if the mixture formulation is correct and lights constantly if the mixture exceeds 5% too lean.

Diagnostic Position III: Control unit self diagnosis

The control unit stores faults in the engine management system, even if these are only intermittent. Using both LEDs the faults can be read out as a blinking code. The number of blinks of the green LED indicates the units, the number of blinks of the red LED indicates the tens. Fault code 13 is thus indicated by 1 blink of the red followed by 3 blinks of the green LED.

If the engine will not start, the starter motor must be operated for at least 2 seconds, after which the self diagnostic procedure can be carried out. A fault code may be erased by switching on the starter motor 50 times after the fault code has appeared.

– Fault codes

Code 11:	Crankshaft position sensor circuit
Code 12:	Air mass meter circuit
Code 13:	Coolant temperature sensor circuit
Code 21:	No ignition signal in primary circuit
Code 22:	Idle speed control faulty
Code 42:	Throttle valve sensor circuit
Code 44:	No faults in named circuits

Not all circuits are included in the self diagnostic system. For the test values of the more important circuits, see chapter 2.: Switches, valves and sensors.

Diagnostic Position IV: Actuator checks

The following switches can be checked:

A. Throttle switch (zero load switch); on, when accelerator pedal is depressed.

B. Start switch (in ignition switch)

C. Vehicle speed sensor

A and B:

When a switch is turned on or off, the red LED must go on or off.

C.

The green LED must light when the vehicle speed exceeds 20 km/h.

Diagnostic Position V: driving test diagnosis

When driving with a fault in the following components a fault code will be generated:

– Crankshaft position sensor: 180°-signal or 1°-signal
– Ignition signal
– Air mass meter output signal
– Fuel pump

Fault codes occurring during this test are not stored in the fault memory. With the engine running and the LEDs don't blink for at least 5 minutes, no faults have been registered.

Switches, valves and sensors

In this chapter only specific checks and test values are given. For a complete diagnosis must the supply voltages, earth connections, connections and wiring be checked. Refer to the wiring diagram at the end of this chapter. Not all

components shown in the diagram are described here, because some of these circuits can be measured without further advice.

Note: Under input voltage is understood: The voltage of a signal, going to the control unit from a switch, valve or sensor.
Under output voltage is understood: The voltage of a signal, going from the control unit to a switch, valve or sensor.

Note: When measuring resistances, the connectors must always be disconnected!

Crankshaft position sensor

All connectors are connected. Start the engine. Using a voltage pulse tester check for a pulse input voltage at control unit pins 8 and 17. On pin 8 the 1°-signal, on pin 17 the 180°-signal. Check that the crankshaft position sensor wiring makes no contact with the HT leads. Check the rotor disc for damage.

Air mass meter

All connectors are connected. Start the engine. Measure the input voltage between control unit pin 31 and earth. If the accelerator pedal is depressed, the voltage must change to a value between 0 and approx. 5 V.

Coolant temperature sensor

All connectors are connected. Start the engine. Check that the input voltage when warming up between control unit pin 23 and earth when warming up changes from approx. 5 V to finally 0 V.

Measure the coolant sensor resistance on the sensor connector pins:

At 20° C	2300 - 2700 Ω
At 50° C	770 - 870 Ω
At 80° C	300 - 330 Ω

Ignition signal

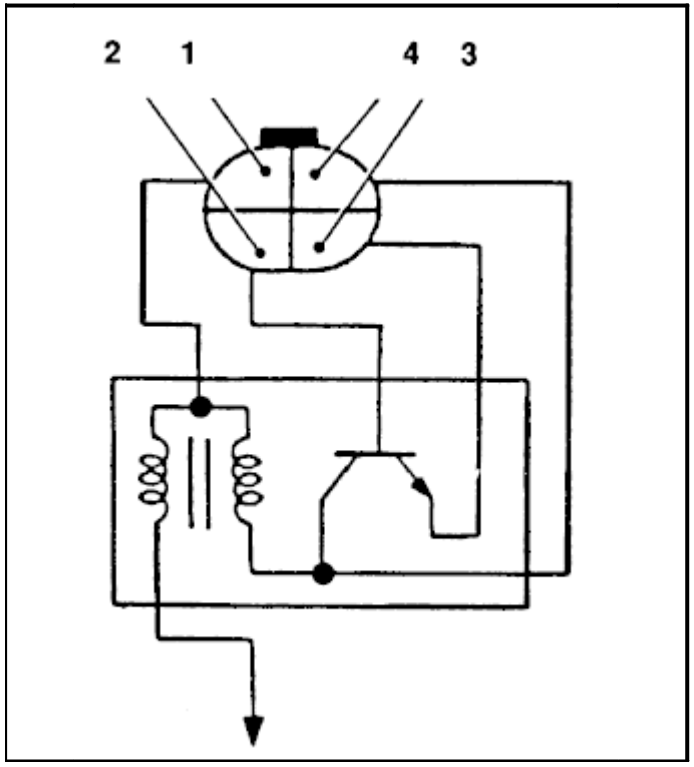
All connectors are connected. Start the engine. Check with a voltage pulse tester for a pulse input voltage between control unit pin 5 and earth.

A.

If this is not so, the power transistor must be checked, see the illustration. Disconnect the connector and measure the resistance between the terminals on the ignition coil + power transistor:

multimeter test pin polarity	pin number	continuity
+	1 or 3	no
-	2 or 4	
-	1 or 3	yes
+	2 or 4	

With any deviation the power transistor must be replaced.



B.

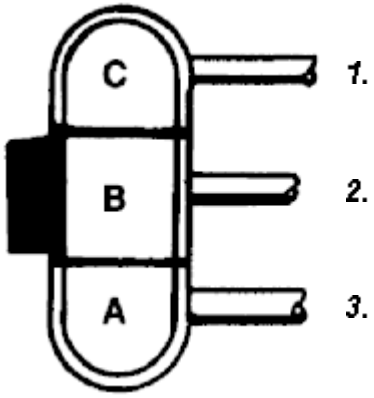
If pulse voltage is present, check the input voltage between control unit pin 3 and earth. This must be battery voltage.

Idle speed control valve

All connectors are connected. Start the engine. Check with a voltage pulse tester for pulse output voltage between both the upper and the lower control valve connector pin and earth.

Throttle valve position sensor

All connectors are connected. Switch on the ignition. Measure the throttle valve position sensor input voltage between the sensor connector pin C and earth; this should be approx. 5 V. Check, under the same conditions, if the input voltage between control unit pin 19 and earth rises from approx. 0,5 to 5 V in proportion to the accelerator pedal being depressed further.



1. Red
2. White
3. Black

Throttle valve sensor connector

Oxygen sensor

All connectors are connected. Start the engine. Bring to operating temperature. Run the engine at high speed and measure the input voltage between control unit pin 24 and earth. The voltage must fluctuate between 0 and 1,5 V.

Intake air temperature sensor

All connectors are connected. Start the engine. Check that the input voltage when warming up between control unit pin 21 and earth changes from approx. 5 V to finally 0 V. Measure the intake air temperature sensor resistance on the sensor connector pins:

At 20° C	2300 - 2700 Ω
At 50° C	770 - 870 Ω
At 80° C	300 - 330 Ω

Throttle switch

All connectors are connected. Start the engine. Check if the input voltage on the switch centre connector pin relative to earth is approx. 9 V.

Vehicle speed sensor

Disconnect the 16 pin control unit multiplug. Ensure that both front wheels are clear of the ground. Turn one of the front wheels by hand. At the same time, measure the resistance between control unit connector pin 29 and earth.

Note: Don't touch the control unit pins!
The resistance must continuously fluctuate between 0 and infinity.

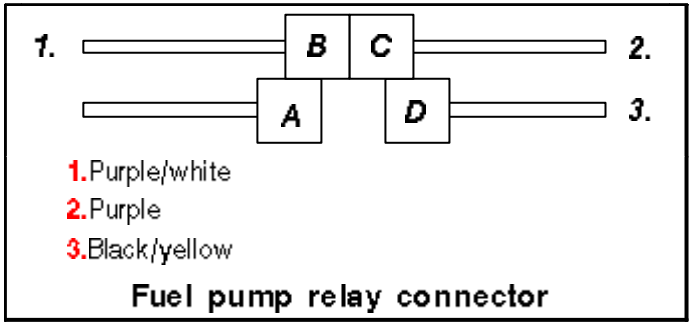
Clutch and neutral position switch

Disconnect the 20 pin control unit multiplug. Switch on the ignition. Measure the resistance between control unit connector pin 10 and earth.

Note: Don't touch the control unit pins! With a gear engaged and the clutch depressed, the resistance must be infinity. In all other cases the resistance must be 0.

Fuel pump and relay

The relay, and the fuel pump, are activated for 5 seconds after the ignition is switched on. Remove the fuel pump relay. The output voltage on relay connector pin D relative to earth must be 0 V for 5 seconds after switching on the ignition.



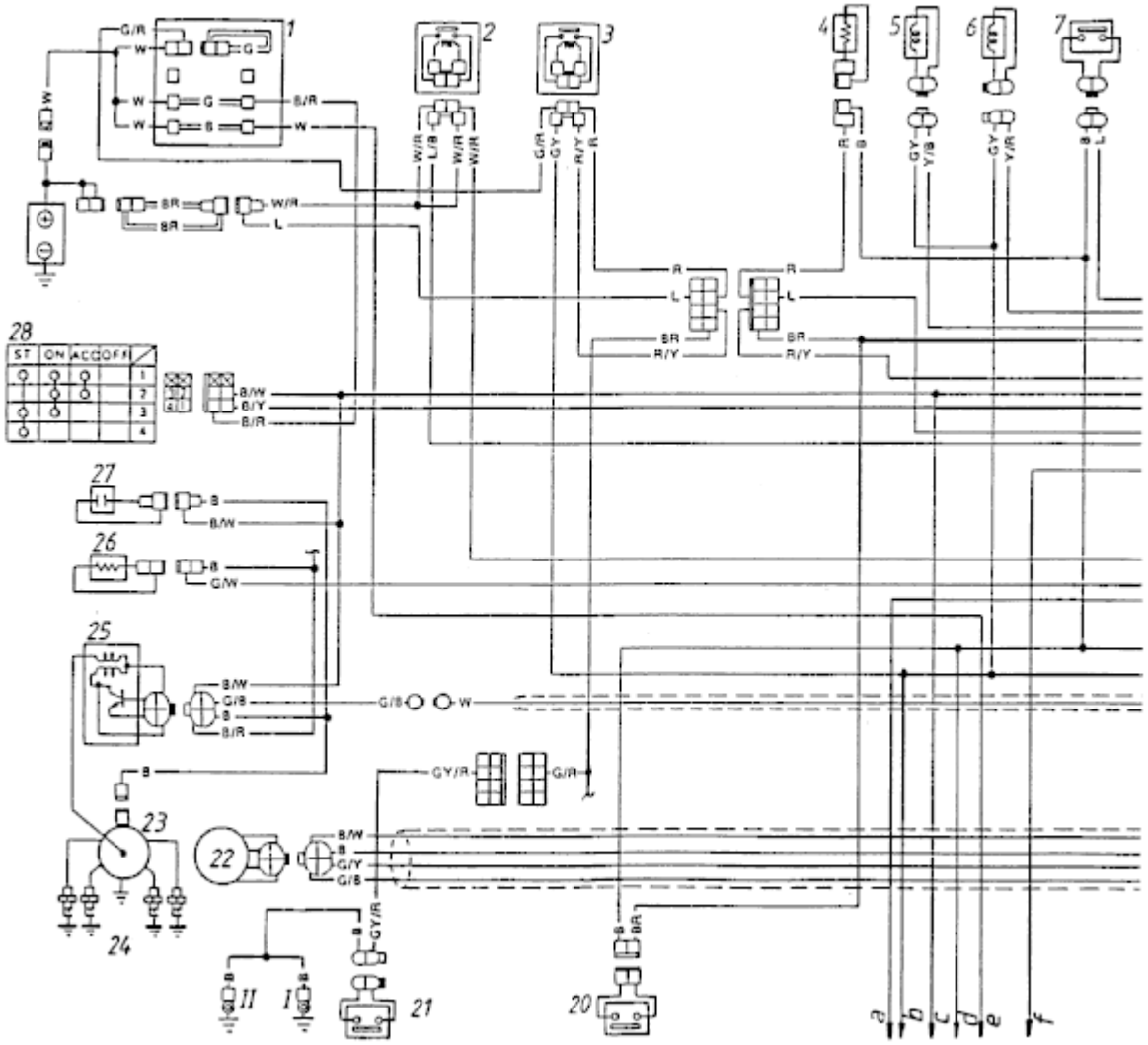
1. Purple/white
2. Purple
3. Black/yellow

Fuel pump relay connector

Control unit supply and earth circuit

All connectors are connected. Switch on the ignition. Measure the input voltage on control unit pins 27 and 35 relative to earth. This must be battery voltage.

Ignition off. Disconnect the 15 and 16 pin connectors from the control unit. Measure the resistance between pins 28, 36, 107, 112, 113 and earth. This should be 0 Ω.



1. Fuse link holder
2. Injection system main relay
3. Mixture pre-heater relay
4. Mixture pre-heater element
5. EGR and charcoal canister solenoid valve
6. Air induction solenoid valve
7. Power steering switch
20. Clutch switch
21. Neutral position switch
22. Crankshaft position sensor
23. Distributor
24. Spark plugs
25. Ignition coil and power transistor
26. Resistance 2,2 kΩ
27. Capacitor
28. Ignition switch

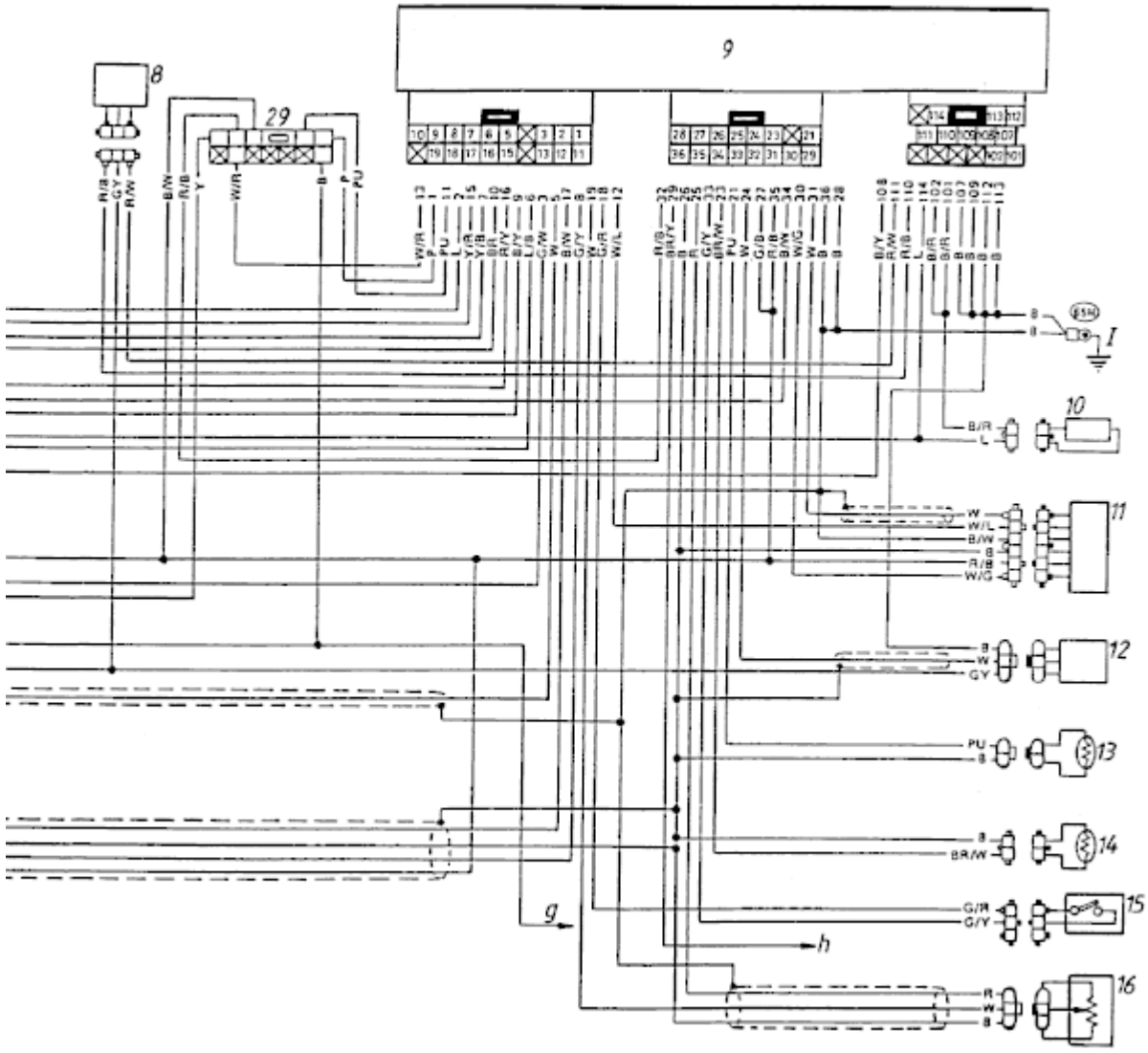
I: Earth on engine block

II: Earth on body

B = Black; BR = Brown; G = Green; GY = Grey; L = Blue; LG = Light green; OR = Orange; P = Pink; PU = Purple; R = Red; SB = Light blue; W = White; Y = Yellow

Combination: X/Y = wire coloured X, marked with a Y coloured stripe.

E 16i engine management system wiring diagram, except coupé and Florida/Station Wagon (part 1)



8. Idle speed control valve
9. Electronic control unit
10. Injector
11. Air mass meter
12. Oxygen sensor
13. Intake air temperature sensor
14. Coolant temperature sensor
15. Throttle switch
16. Throttle valve position sensor
29. Service connector

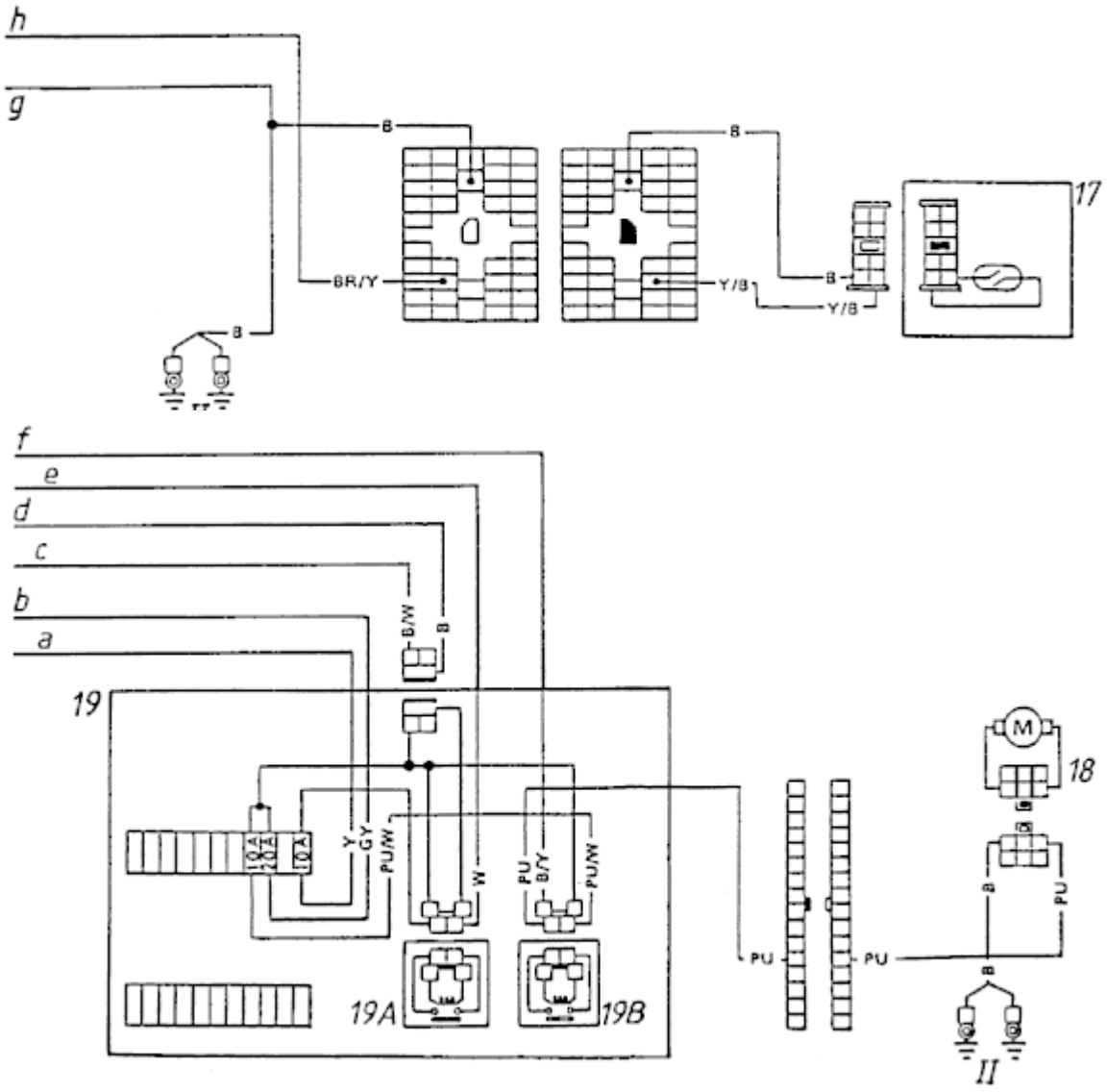
I: Earth on engine block

II: Earth on body

B = Black; BR = Brown; G = Green; GY = Grey; L = Blue; LG = Light green; OR = Orange; P = Pink; PU = Purple; R = Red; SB = Light blue; W = White; Y = Yellow

Combination: X/Y = wire coloured X, marked with a Y coloured stripe.

E 16i engine management system wiring diagram, except coupé and Florida/Station Wagon (part 2)

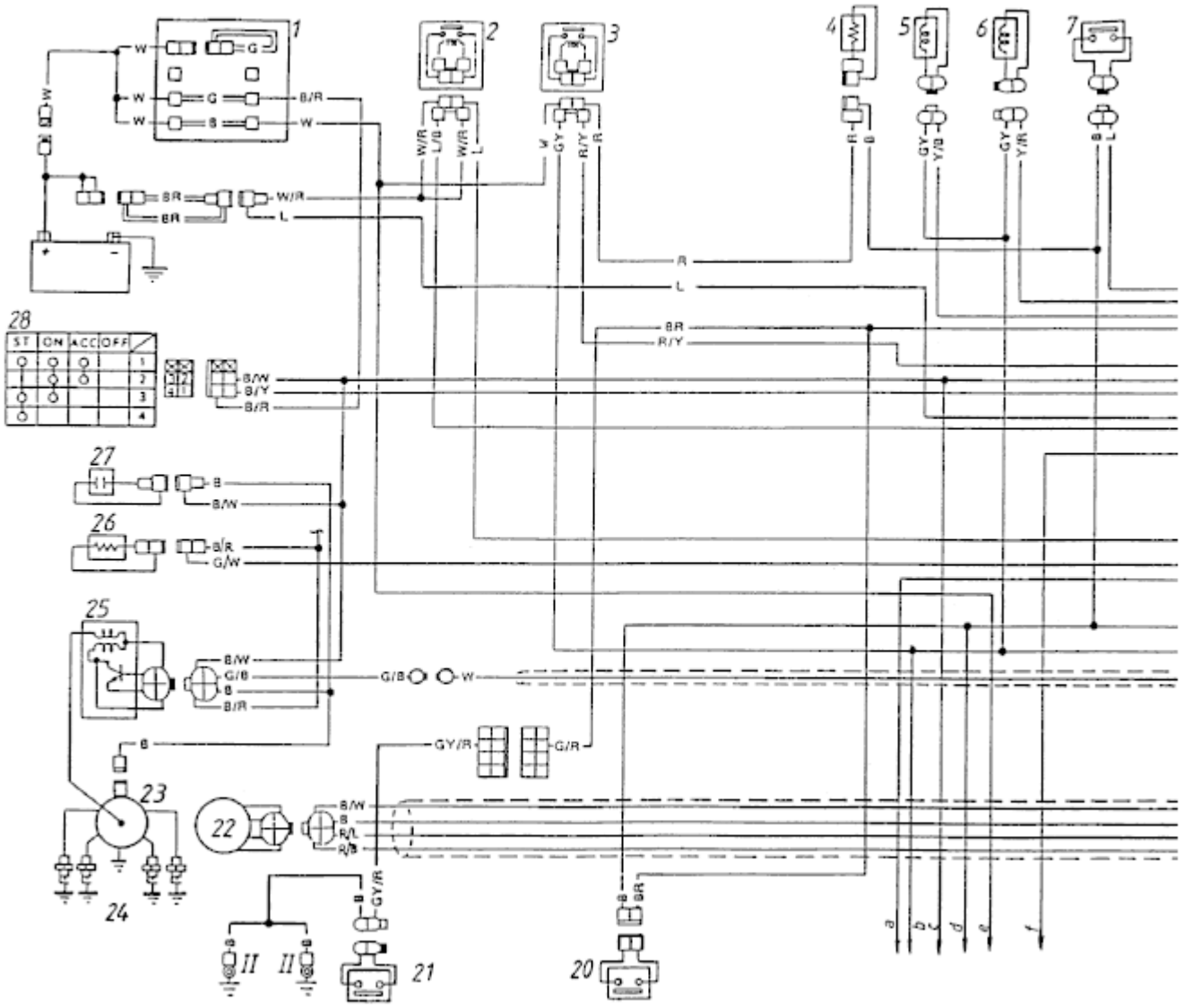


17. Fuse link holder
18. Injection system main relay
19. Mixture pre-heater relay
    19A: Ignition relay
    19B: Fuel pump relay

B = Black; BR = Brown; G = Green; GY = Grey; L = Blue; LG = Light green; OR = Orange; P = Pink; PU = Purple; R = Red; SB = Light blue; W = White; Y = Yellow

Combination: X/Y = wire coloured X, marked with a Y coloured stripe.

E 16i engine management system wiring diagram, except coupé and Florida/Station Wagon (part 3)



1. Fuse link holder
2. Injection system main relay
3. Mixture pre-heater relay
4. Mixture pre-heater heater element
5. EGR and charcoal canister solenoid valve
6. Air induction solenoid valve
7. Power steering switch
20. Clutch switch
21. Neutral position switch
22. Crankshaft position sensor
23. Distributor
24. Spark plugs
25. Ignition coil and power transistor
26. Resistance 2,2 kΩ
27. Capacitor
28. Ignition switch

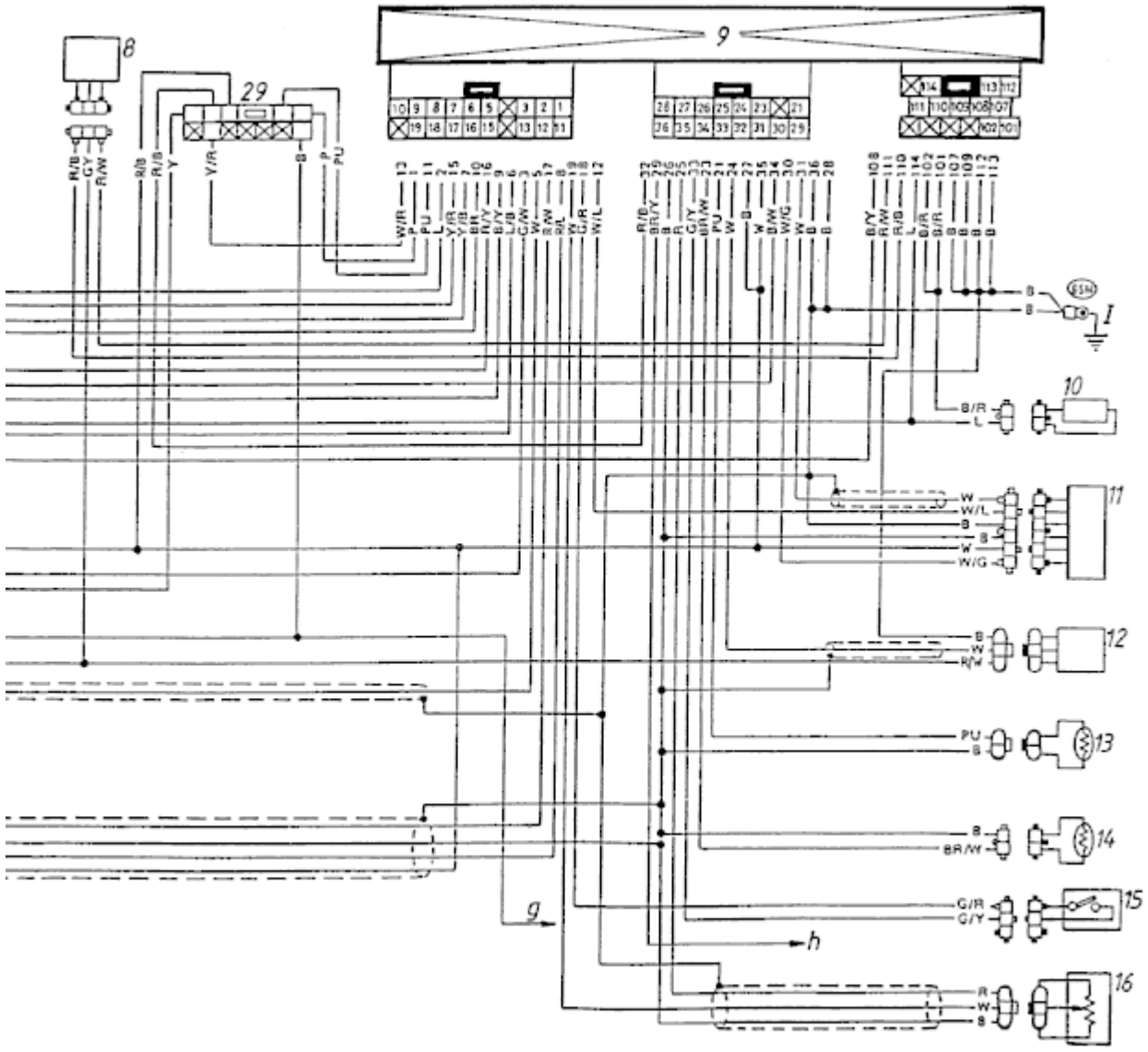
I: Earth on engine block

II: Earth on body

B = Black; BR = Brown; G = Green; GY = Grey; L = Blue; LG = Light Green; OR = Orange; P = Pink; PU = Purple; R = Red; SB = Light Blue; W = White; Y = Yellow

Combination: X/Y = wire coloured X, marked with a Y coloured stripe.

E 16i engine management system wiring diagram, for coupé and Florida/Station Wagon (part 1)



9. Electronic control unit
10. Injector
11. Air-mass meter
12. Oxygen sensor
13. Intake air temperature sensor
14. Coolant temperature sensor
15. Throttle switch
16. Throttle valve position sensor
29. Service connector

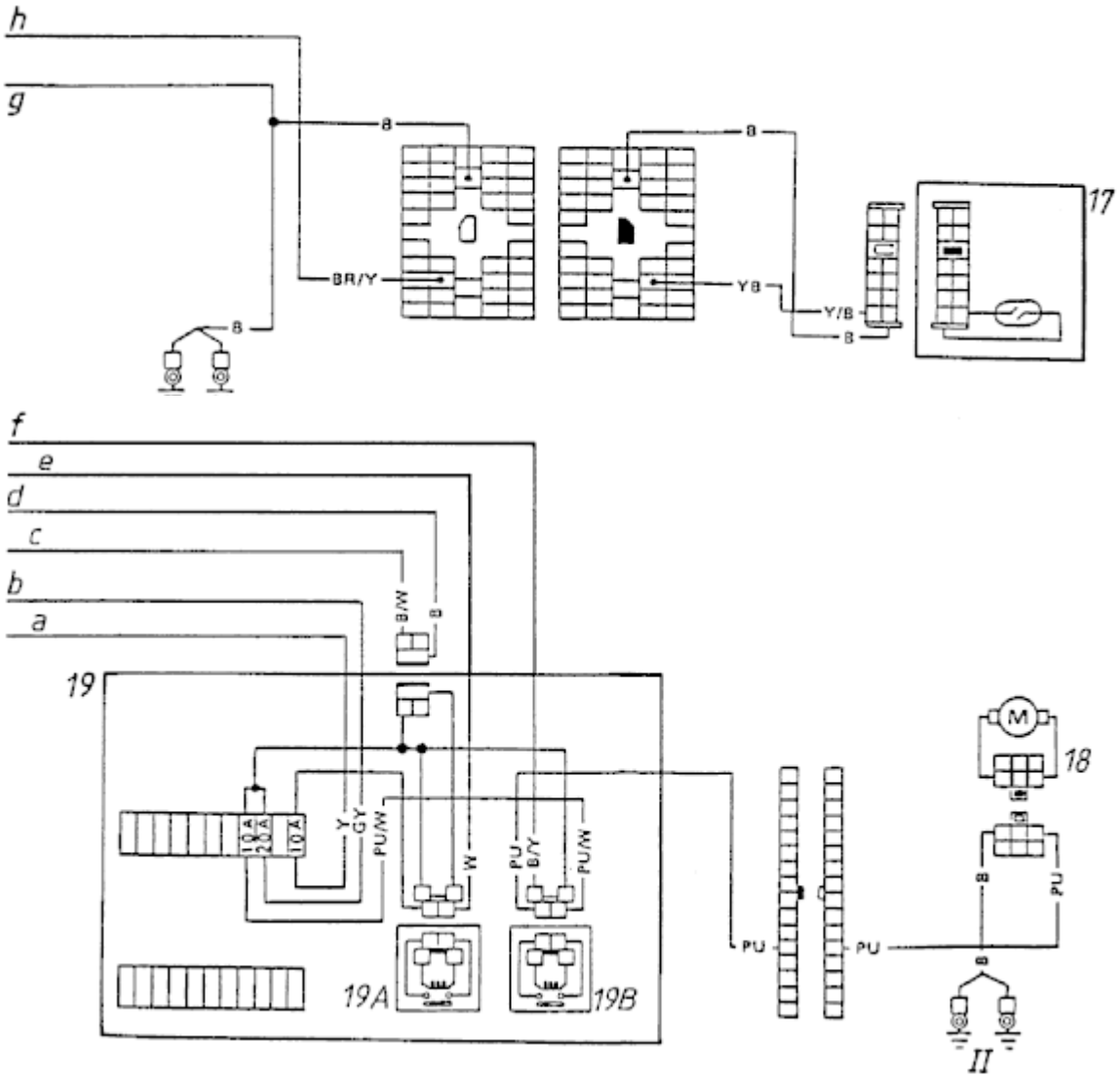
I: Earth on engine block

II: Earth on body

B = Black; BR = Brown; G = Green; GY = Grey; L = Blue; LG = Light Green; OR = Orange; P = Pink; PU = Purple; R = Red; SB = Light Blue; W = White; Y = Yellow

Combination: X/Y = wire coloured X, marked with a Y coloured stripe.

E 16i engine management system wiring diagram for coupé and Florida/Station Wagon (part 2)



17. Vehicle speed sensor

18. Fuel pump

19. Fuse box
- **19A:** Ignition relay
- **19B:** Petrol pump relay

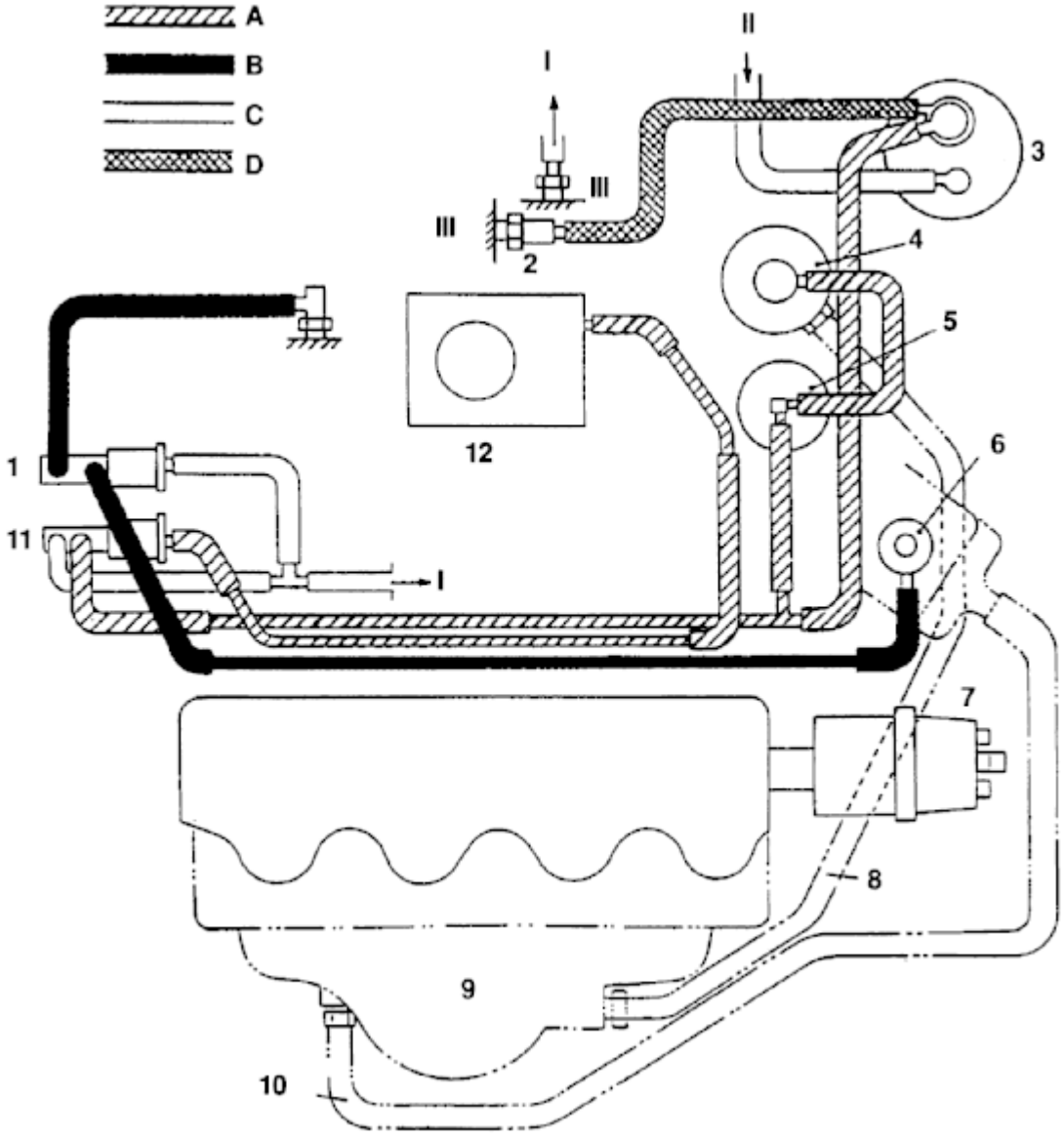
I: Earth on engine block

II: Earth on body

B = Black; BR = Brown; G = Green; GY = Grey; L = Blue; LG = Light Green; OR = Orange; P = Pink; PU = Purple; R = Red; SB = Light Blue; W = White; Y = Yellow

Combination: X/Y = wire coloured X, marked with a Y coloured stripe.

E 16i engine management system wiring diagram for coupé and Florida/Station Wagon (part 3)



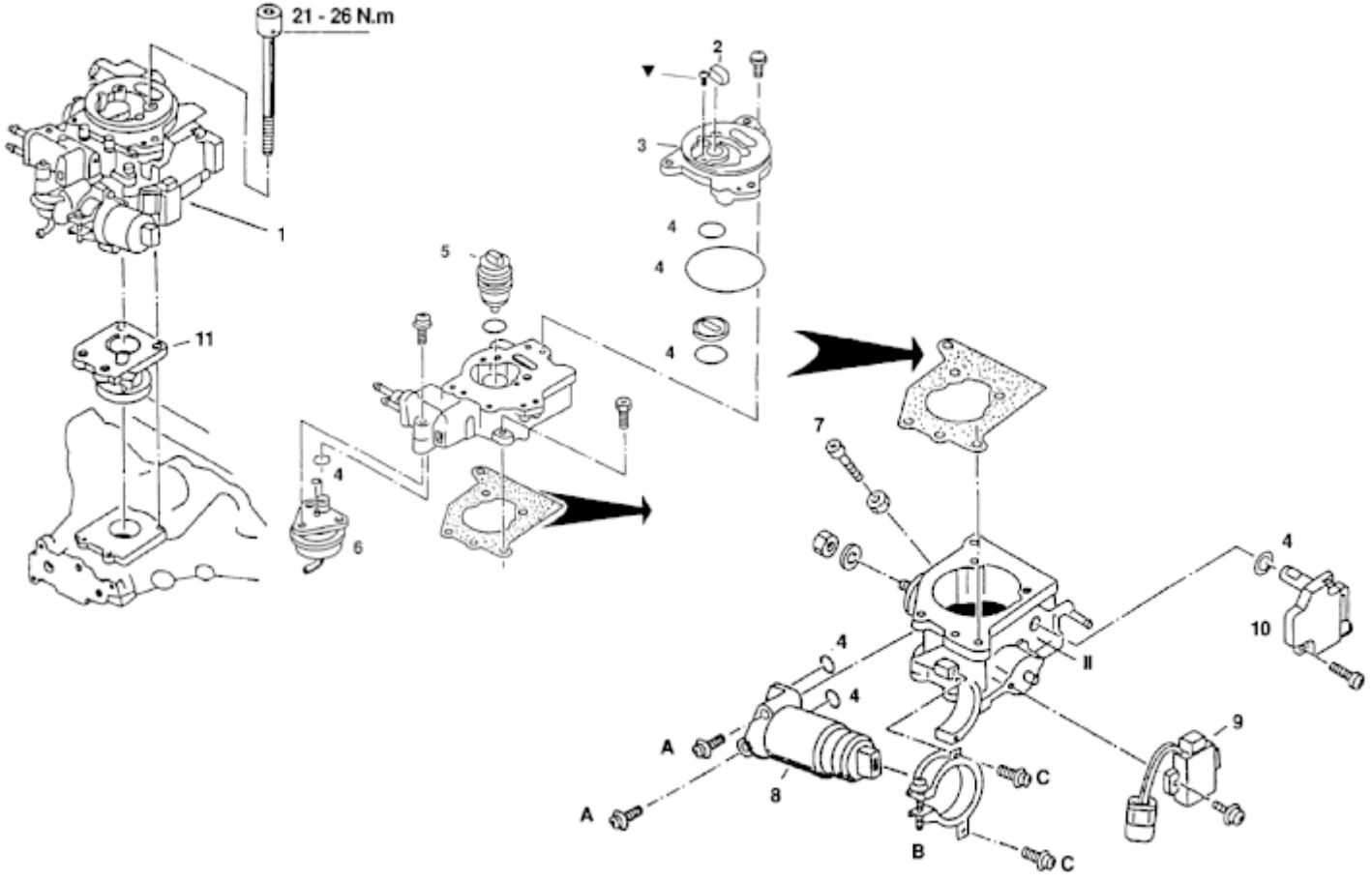
1. Air induction solenoid valve
2. Fuel vapour metering valve
3. Charcoal canister
4. EGR control valve
5. Flap valve
6. Air induction control valve
7. Distributor
8. EGR pipe
9. Exhaust manifold
10. Air induction pipe
11. EGR and charcoal canister solenoid valve
12. Injection unit

I: To air filter
II: From fuel tank
III: Inlet manifold
A: EGR and charcoal canister vacuum control
B: Engine vacuum
C: Air
D: Purge hose

E 16i engine air and vacuum systems

Mixture and exhaust emission control systems

Injection unit



1. Complete injection unit
2. Rubber cap
3. Cover plate
4. O ring; use new ring and coat lightly with engine oil
5. Injector
6. Pressure regulator
7. Volume adjustment screw
8. Idle speed control valve:

Tightening sequence: A – B – C
Torque setting: 4 – 5 Nm

9. Throttle switch and sensor
10. Air mass meter
11. Mixture pre-heater

▼:Use sealant
II: Apply silicone grease to mating face

Injection unit

Throttle switch check and adjustments

Bring the engine to operating temperature. disconnect the throttle switch connector. Check that the idle speed is 750/min. Then run the engine at 2000/min and slowly drop the engine speed. The throttle switch must close at 1050 ± 50/min; the resistance between the connector pins at that moment must be 0 Ω.. If necessary, adjust the throttle switch. To do this, slacken the securing bolts and turn the unit.

Dashpot checking and adjustment

Engine at operating temperature: Check that the idle speed is 750/min. Turn the throttle lever by hand. Check that the dashpot rod just touches the lever at 2600±400/min. If necessary, turn the adjustment screw on the lever.

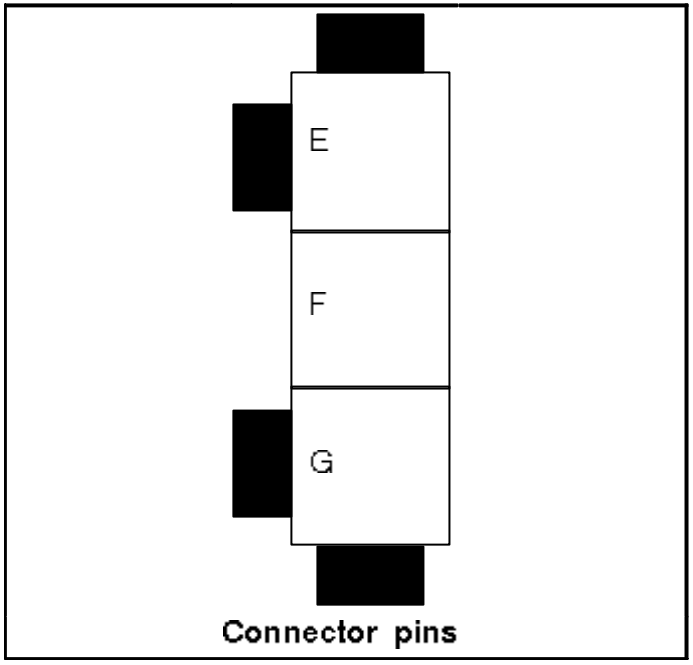
Checking idle speed control valve

Remove the control valve from the injection unit.

Note: Prevent any oil or solvent from entering the control valve. Don't knock or tap the valve. Dismantle the control valve.

Measure the resistance between the connector pins.

E and F:	8,5 - 9,5 Ω
F and G:	9,5 - 10,5 Ω

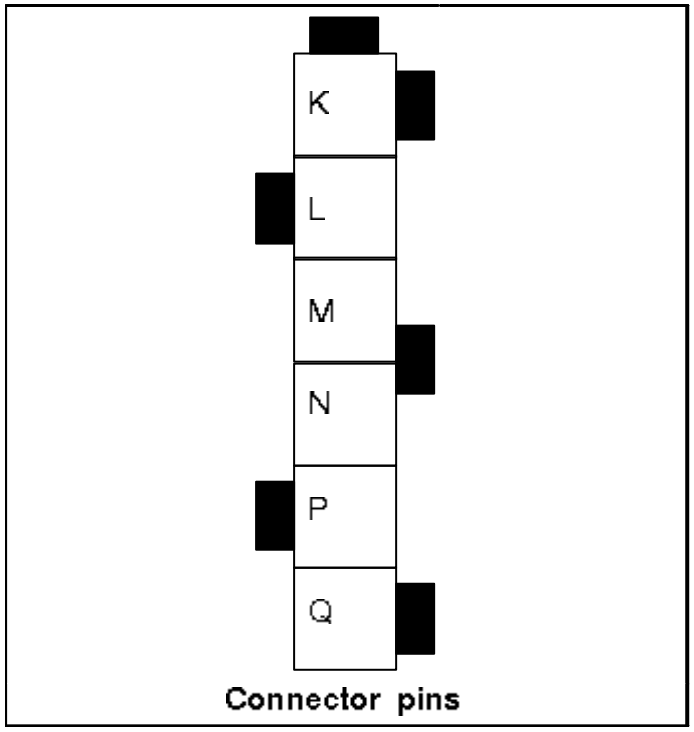


Connector pins

The resistance between the connector pins and the housing must be infinity. Apply battery voltage to pins E(-) and F(+). Check that the slide in the air exhaust port is fully closed. Apply battery voltage to pins G(-) and F(+). Check that the slide in the air exhaust port is fully open. The slide air gap must be 0 - 2 mm with no voltage on the pins.

Checking air mass meter

Note: Before removing the air mass meter, first disconnect the throttle switch from the injection unit. Hold the air mass meter vertical when removing it to prevent damage to the hot wire holder. Don't touch the hot wire.



Connector pins

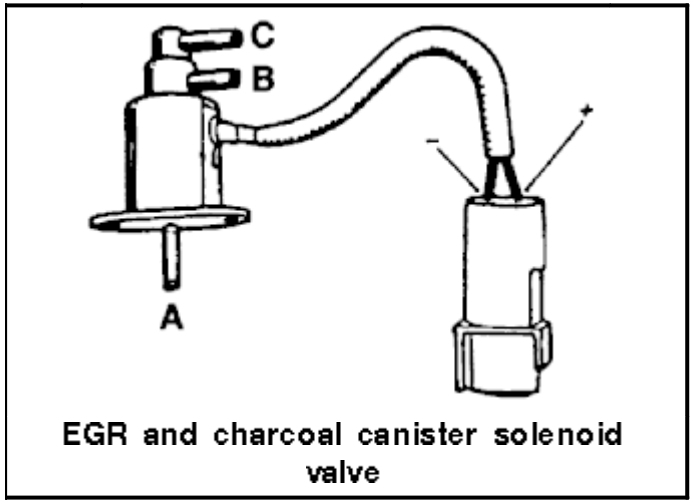
Apply battery voltage to pins M(-) and P(+). Measure the voltage between pins K and N. This should be 1,5 - 2,0 V. Again measure the voltage, with air blowing along the hot wire. The voltage should be 2,5 - 4,0 V.

Checking fuel pressure

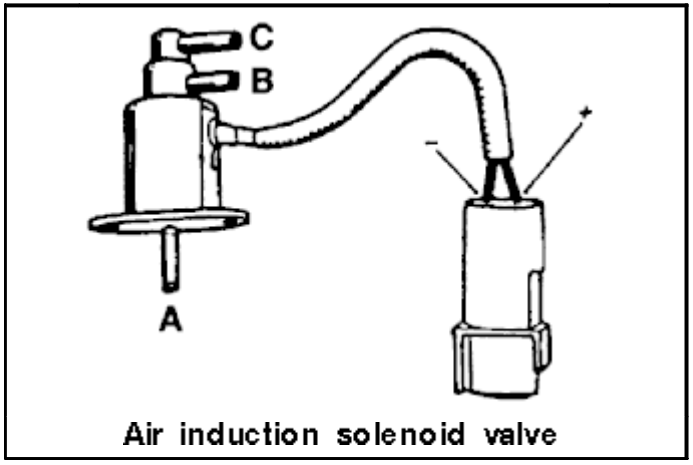
Release the fuel pressure. Remove the fuel pump fuse. This is fuse No. 8 on the top row in the fuse box, to the left below the dashboard. Start the engine. Switch the starter motor 3 times on after the engine has stalled. Switch the ignition off. Fit a manometer between the fuel supply pipe and the connection on the injection unit. Refit the fuel pump fuse. Start the engine. Check for fuel leaks.
The fuel pressure with engine at idle speed should be 0,98 bar. Release the fuel pressure. Re-connect the supply pipe to the injection unit.

EGR and charcoal canister solenoid valve

Disconnect the connector. With an Ohmmeter check for continuity between both connector pins. Disconnect all vacuum hoses from the valve. Check for connection between A,B and C, see the illustration. B and C are connected when the solenoid valve is inactive. A and B are connected with battery voltage on the connector pins (= activated solenoid valve).



EGR and charcoal canister solenoid valve



Air induction solenoid valve

EGR control valve

Apply vacuum to the vacuum diaphragm. The valve must be fully open at minimum 120 mmHg vacuum.

Inlet air temperature control vacuum diaphragm

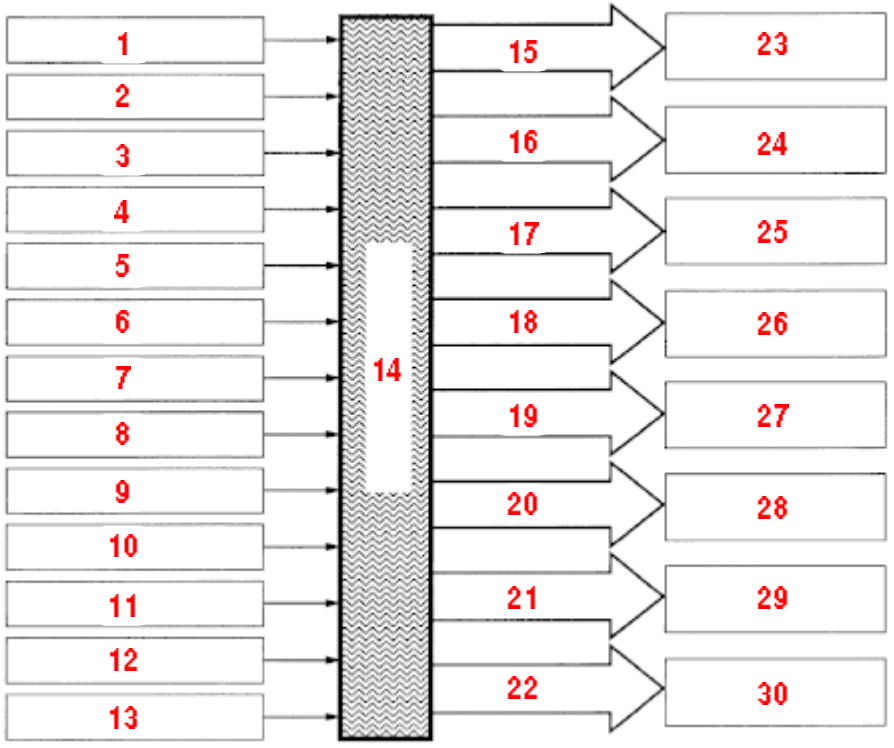
The vacuum diaphragm operates a control valve that controls the mixture of cool outside air and warm exhaust air in the air filter intake tube. The valve opens at 50 mmHg. It is fully open at 100 mmHg vacuum.

Air induction solenoid valve

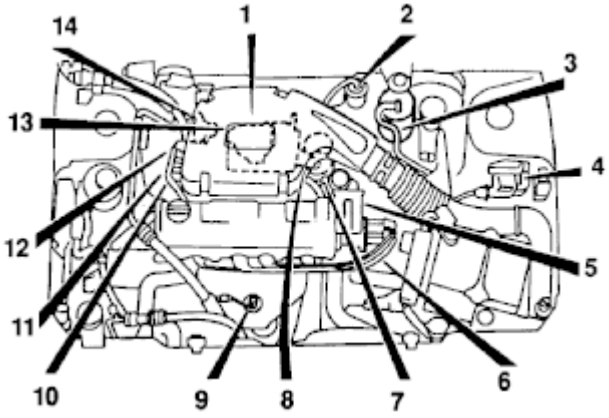
Disconnect the connector. With an Ohmmeter check for continuity between both connector pins. Disconnect all vacuum hoses from the valve. Check the connection between A,B and C, see the illustration. B and C are connected with non active solenoid valve. A and B are connected with battery voltage on the connector pins (= active solenoid valve).

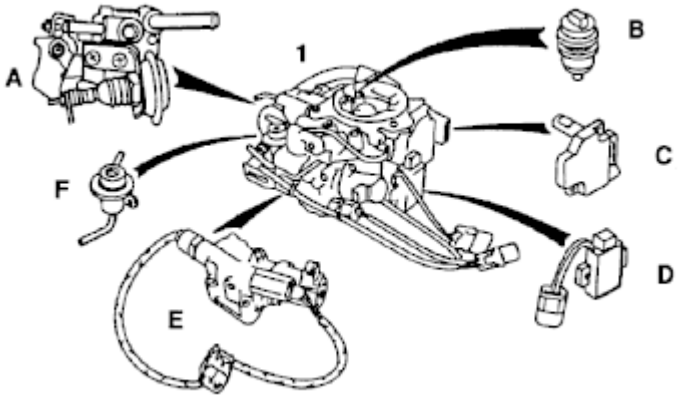
– GA 16i engine

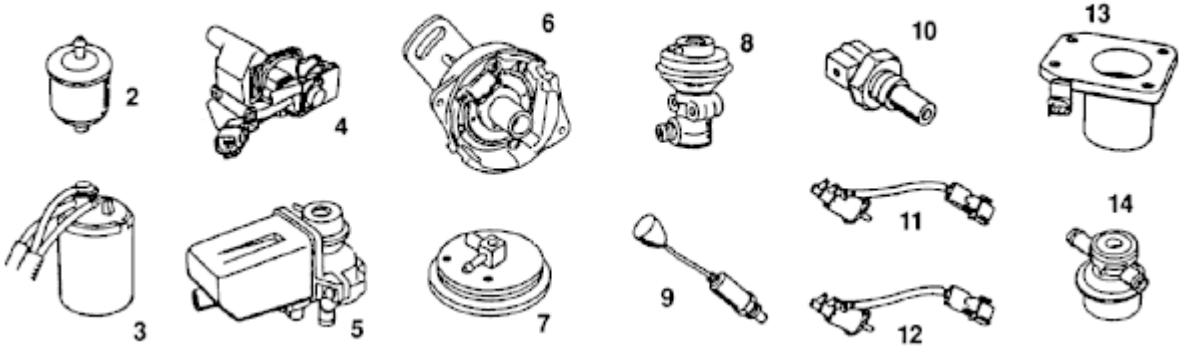
Both the fuel injection and ignition are controlled by a micro-computer which makes use of various sensors and actuators, see the wiring diagram. The electronic control unit is located under the RH front seat.



1. Crankshaft position sensor
2. Air mass meter
3. Coolant temperature sensor
4. Air intake temperature sensor
5. Oxygen sensor
6. Throttle switch
7. Throttle valve position sensor
8. Ignition switch
9. Start switch
10. Clutch/neutral position switch
11. Vehicle speed sensor
12. Power steering switch
13. Battery
14. Electronic control unit
15. Fuel delivery and mixture composition
16. Ignition timing control
17. Idle speed control
18. Fuel pump control
19. Mixture pre-heater control
20. Air induction control
21. EGR and charcoal canister control
22. Diagnosis
23. Injector
24. Power transistor
25. Idle speed control valve
26. Fuel pump relay
27. Mixture pre-heater relay
28. Air induction valve
29. EGR and charcoal canister solenoid valve
30. LEDs on control unit







1. Injection unit
   1A: Throttle valve position control
   1B: Injector
   1C: Air mass meter
   1D: Throttle switch and -sensor
   1E: Idle speed control unit: a. Idle speed fine-control solenoid valve; b. Extra idle control solenoid valve S; c. Extra idle control solenoid valve K
   1F: Pressure regulator
2. Fuel filter
3. Charcoal canister
4. Ignition coil with power transistor
5. Air induction control valve
6. Crankshaft position sensor
7. Flap valve
8. EGR control valve*
9. Oxygen sensor
10. Coolant temperature sensor
11. Air induction solenoid valve
12. EGR and charcoal canister solenoid valve*
13. Mixture pre-heater
14. Extra air valve

*EGR= Exhaust gas recirculation

GA 16i engine management system components location

Fault finding

The various diagnoses can be made by reading out the green and red LED at the top of the electronic control unit. The control unit should be removed from under the RH front seat, the connector remains connected.

The diagnostic system recognizes 5 positions:

Positions I and II:	Mixture composition control.
Position III:	Control unit self diagnosis.
Position IV:	Actuator checks.
Position V:	Drive test diagnosis.

The diagnosis position selection procedure is as follows:

Switch on the ignition. With a screwdriver turn the diagnostic switch fully clockwise and wait until the LEDs blink. The diagnostic switch is located at the side of the control unit, to the right of the two LEDs. The number of LED blinks indicates the diagnostic position. Turn the switch fully anti-clockwise as soon as the required blink code appears.

If the ignition is switched off and then on again, the diagnostic system will always automatically revert to position I.

Fault memory erasing

The memory is erased when:

- The battery earth lead is disconnected.
- After selecting diagnostic position III, position IV is selected.

Note: If the diagnostic switch remains turned fully clockwise, it will continue blinking in sequence I, II, III, IV, V, I, etc. without the memory being erased.

Diagnostic positions I and II: Mixture composition check

Position I.

With ignition on but engine off, both the green and red LED will light

With engine running at 2000 min the green LED is constantly on or off and the red LED constantly off, if the oxygen sensor is still cold. If the oxygen sensor is warm, the green LED must blink approx. 9 times per 10 seconds; off is rich mixture, on is lean mixture. The red LED does not light.

Position II.

With ignition on and engine off, the green LED will light but not the red LED

With engine running at 2000/min both LEDs are constantly on or off, if the oxygen sensor is still cold.
If the oxygen sensor is warm, the green LED must blink approx. 9 times per 10 seconds; off is rich mixture, on is lean mixture. The red LED will not light if the mixture exceeds 5% too rich, blinks synchronous with the green LED if the mixture formulation is correct and lights constantly if the mixture exceeds 5% too lean.

Diagnostic position III: Control unit self diagnosis

The control unit stores faults in the engine management system even if these are only intermittent. Using both LEDs the faults can be read out as a blinking code. The number of blinks of the green LED indicates the units, the number of blinks of the red LED indicates the tens. Fault code 13 is thus indicated by 1 blink of the red followed by 3 blinks of the green LED

If the engine will not start, the starter motor must be operated for at least 2 seconds, after which the self diagnostic procedure can be carried out.
A fault code may be erased by switching on the starter motor 50 times after the fault code has appeared.

Fault codes

- Code 11: Crankshaft position sensor circuit
- Code 12: Air mass meter circuit
- Code 13: Coolant temperature sensor circuit
- Code 14: Vehicle speed sensor circuit
- Code 21: No ignition signal in primary circuit
- Code 23: Throttle switch circuit
- Code 25: Fine idle speed control circuit
- Code 31: Electronic control unit
- Code 33: Oxygen sensor circuit
- Code 43: Throttle valve position sensor circuit
- Code 55: No fault in named circuits.

Not all circuits are included in the self diagnostic system. For the test values of the more important circuits, see chapter 2: Switches, valves and sensors.

Diagnostic position IV: Actuator checks

The following actuators may be checked:

A. Throttle switch (zero load switch); on, when the accelerator pedal is depressed.

B. Start switch (in ignition switch)

C. Vehicle speed sensor

A and B:

When a switch is turned on or off, the red LED must go on or off.

C.

The green LED must light when the vehicle speed exceeds 20 km/h.

Diagnostic position V: Driving test diagnosis

When driving with a fault in the following components a fault code will be generated:

- Crankshaft position sensor: 180°-signal or 1°-signal
- Ignition signal
- Air mass meter output signal

Fault codes occurring during this test are not stored in the fault memory.

With the engine running and the LEDs don't blink for at least 5 minutes, no faults have been registered.

Switches, valves and sensors

In this chapter only specific checks and test values are given. For a complete diagnosis must the supply voltages, earth connections, connections and wiring must all be checked.

Refer to the wiring diagram appended at the end of this chapter.

Not all components shown in the diagram are described here, because some of these circuits can be measured without further advice.

Note: Under input voltage is understood: The voltage of a signal going to the control unit from a switch, valve or sensor. Under output voltage is understood: The voltage of a signal, going from the control unit to a switch, valve or sensor.

Note: When measuring resistances, the connectors must always be disconnected!

Crankshaft position sensor

All connectors are connected. Start the engine. Using a voltage pulse tester, check for a pulse input voltage at control unit pins 22, 32 and 21, 31. On pins 22 and 32 the 1°-signal, on pins 21 and 31 the 180°-signal.

Check that the crankshaft position sensor wiring makes no contact with the HT leads. Check the rotor disc for damage.

Air mass meter

All connectors are connected. Start engine and idle. Measure the input voltage between control unit pin 15 and earth. This should be approx.1,0 V.

Coolant temperature sensor

Measure the resistance of the coolant temperature sensor on the sensor connector pins:

At 20° C: approx. 2500 Ω

At 80° C: approx. 330 Ω

Vehicle speed sensor

Disconnect the 16 pin control unit multiplug. Ensure that both front wheels are clear of the ground. Turn one of the front wheels by hand. At the same time measure the resistance between control unit connector pin 33 and earth.

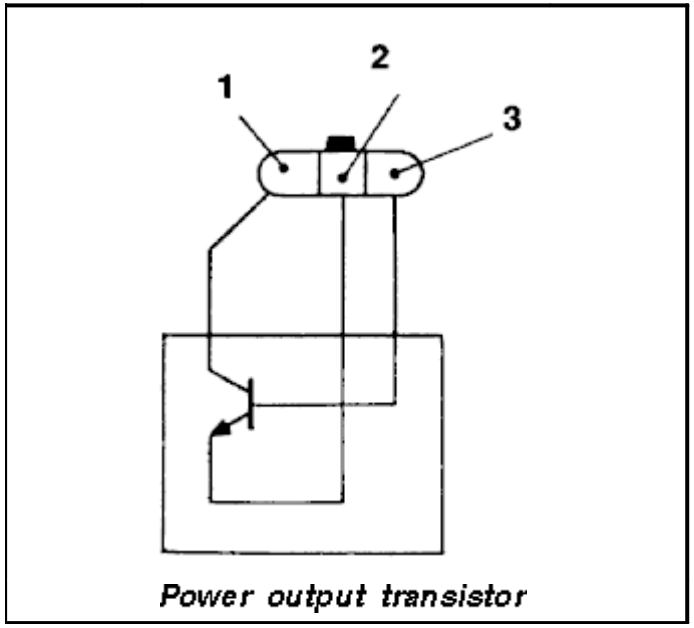
Note: Don't touch the control unit pins!
The resistance must continuously fluctuate between 0 and infinity.

Ignition signal

All connectors are connected. Start the engine. Using a pulse voltage tester check for a pulse input voltage between control unit pin 1 and earth.

A.

If this is not the case, check the power transistor, see the illustration. Disconnect the connector. Measure the resistance between the power transistor pins:



Power output transistor

multimeter test pin polarity	pin number	continuity
+	1	no
-	2 or 3	
-	1	yes
+	2 or 3	

With any deviation, replace the power transistor.

B.

If pulse voltage is present, check the input voltage between control unit pin 3 and earth. This must be battery voltage

Throttle switch

Disconnect the throttle switch connector. Start the engine. Check that the supply voltage on the centre connector pin relative to earth is approx. 9 V.

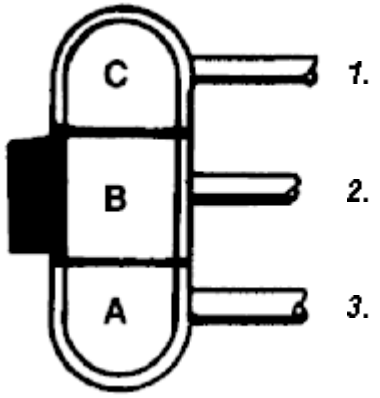
Idle speed fine-control solenoid valve

Disconnect the connector from the solenoid valve. Measure the resistance between the pins; this should be approx. 10 Ω. Re-connect the connector. Start the engine. Bring to operating temperature. Check if the output voltage between control unit pin 114 and earth is approx. 4 - 8 V at idle speed.

Throttle valve position sensor

All connectors are connected. Switch on the ignition. Measure the feed voltage of the throttle valve position sensor between sensor connector pin C and earth; this must be approx. 5 V.

Check, under similar conditions, if the input voltage between control unit pin 19 and earth changes between approx. 0,4 to 4 V, if the accelerator pedal is depressed



1.Red
2.White
3.Black

Throttle valve position sensor connector

Start inhibitor and neutral position switch

The start inhibitor switch is on when the shift lever is in position N" or P". The neutral position switch is on when the gear lever is in neutral".

Fuel pump

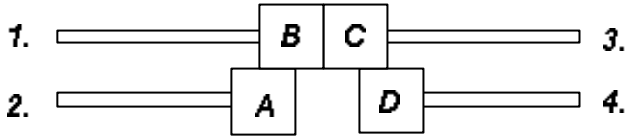
Disconnect the fuel pump connector beneath the rear seat. Switch on the ignition. Check for battery voltage between the connector pin and earth, for 5 seconds after switching the ignition on.

Injector

Check the resistance between the injector connector pins; This should be approx. 1 - 2 Ω.

Mixture pre-heater and relay

The mixture pre-heater only runs when the engine is cold. Remove the relay and start the (cold) engine. Check if the output voltage between pin D and earth is approx. 0,7.



1.White
2.Green/Yellow
3.White/Brown*
4.Green/Blue**

* coupé and Florida/Station Wagon: blue/white
** coupé and Florida/Station Wagon: red/yellow

Fuel pump relay connector

Extra idle speed control solenoid valve K (on versions with air-conditioning)

Start the engine. Bring to operating temperature. Check that the Idle speed rises when the air-conditioning is switched on.

Extra idle speed control solenoid valve S (on versions with power steering)

Start the engine. Bring to operating temperature. Measure the output voltage between control unit connector pin 111 and earth: Approx. 0,9 V with power steering switch on and battery voltage with power steering switch off.

Air induction solenoid valve

Start the engine. Bring to operating temperature. Measure the output voltage between control unit connector pin 102 and earth: Approx. 0,8 V with accelerator pedal released and battery voltage with accelerator pedal depressed.

EGR and charcoal canister solenoid valve

Start the engine. Bring to operating temperature. Measure the output voltage between control unit connector pin 102 and earth: Approx. 0,6 - 0,9 V at idle speed and battery voltage with accelerator pedal depressed.

Octane selector (if fitted)

Remove the switch from the LH side of the dashboard. Disconnect the connector. With the switch in position SUPER", there should be a current flow between the switch connector pins.

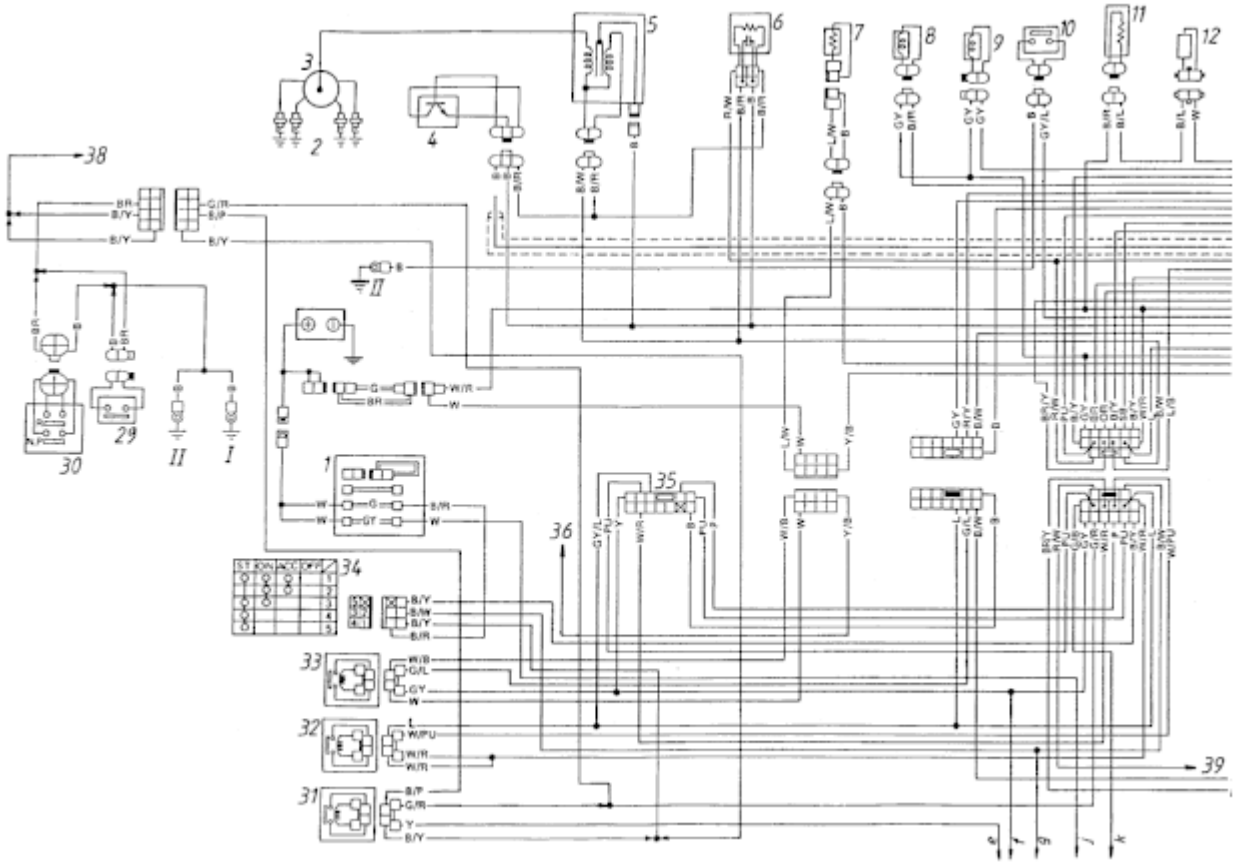
Switch on the ignition. Measure the voltage between the connector pin on the blue/red wire and earth; this should be 7 - 9 V.

Cranking signal

Start the engine. At the same time, measure the input voltage between control unit connector pin 35 and earth. The voltage must be 8 - 12 V.

Control unit feed and earth circuits

All connectors are connected. Switch on the ignition. Measure the feed voltage to control unit pins 39, 47 and 109 relative to earth. This must be battery voltage. Switch ignition off. Disconnect the 12 and 16 pin connectors from the control unit. Measure the resistance between pins 6, 12, 107, 108, 116 and earth. This should be 0 Ω.

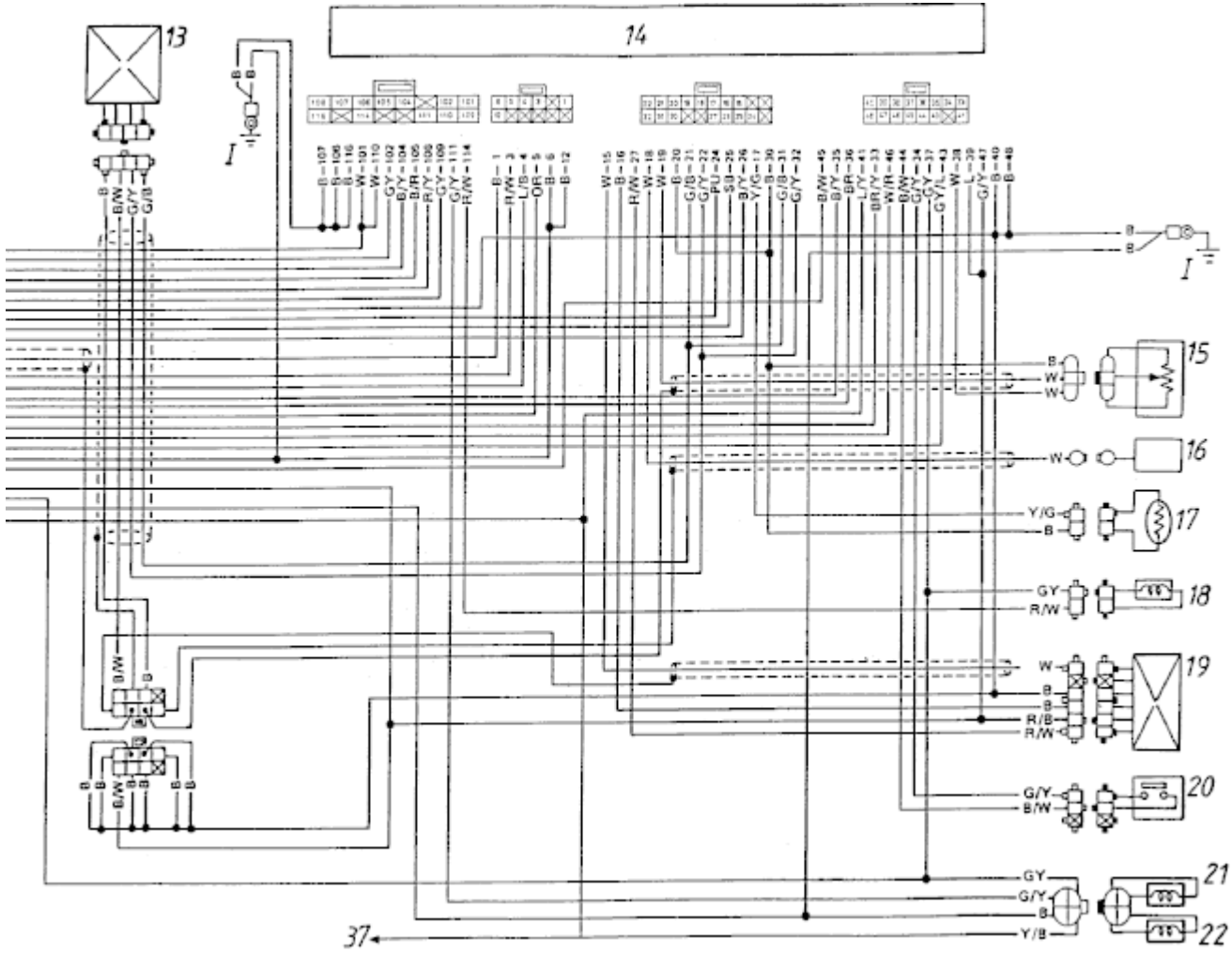


1. Fuse link holder
2. Spark plugs
3. Distributor
4. Power transistor
5. Ignition coil
6. Resistance 2200 Ω and capacitor
7. Mixture pre-heater element
8. EGR and charcoal canister solenoid valve
9. Air induction solenoid valve
10. Power steering switch
11. Ballast resistor
12. Injector
29. Neutral position switch on manual gearbox
30. Start inhibitor switch on automatic transmission
31. Start inhibitor relay on automatic transmission
32. Injection system main relay
33. Mixture pre-heater relay
34. Ignition switch
35. Service connector
36. To air conditioning compressor, if fitted
37. —
38. To starter motor
39. To rev. counter, if fitted

I: Earth on engine block; II: Earth on body

B= Black; BR=Brown; G= Green; GY=Grey; L= Blue; LG= Light green; OR=Orange; P= Pink; PU=Purple; R= Red; SB=Light Blue; W= White; Y= Yellow

GA 16i engine management wiring diagram, not for coupé and Florida/Station Wagon (part 1).



5. Crankshaft position sensor
6. Electronic control unit
7. Throttle valve position sensor
8. Oxygen sensor
9. Coolant temperature sensor
10. Idle speed fine-control solenoid valve
11. Air mass meter
12. Throttle switch
13. Extra idle speed control solenoid valve S (on versions with power steering)
14. Extra idle speed control solenoid valve K (on versions with air-conditioning)

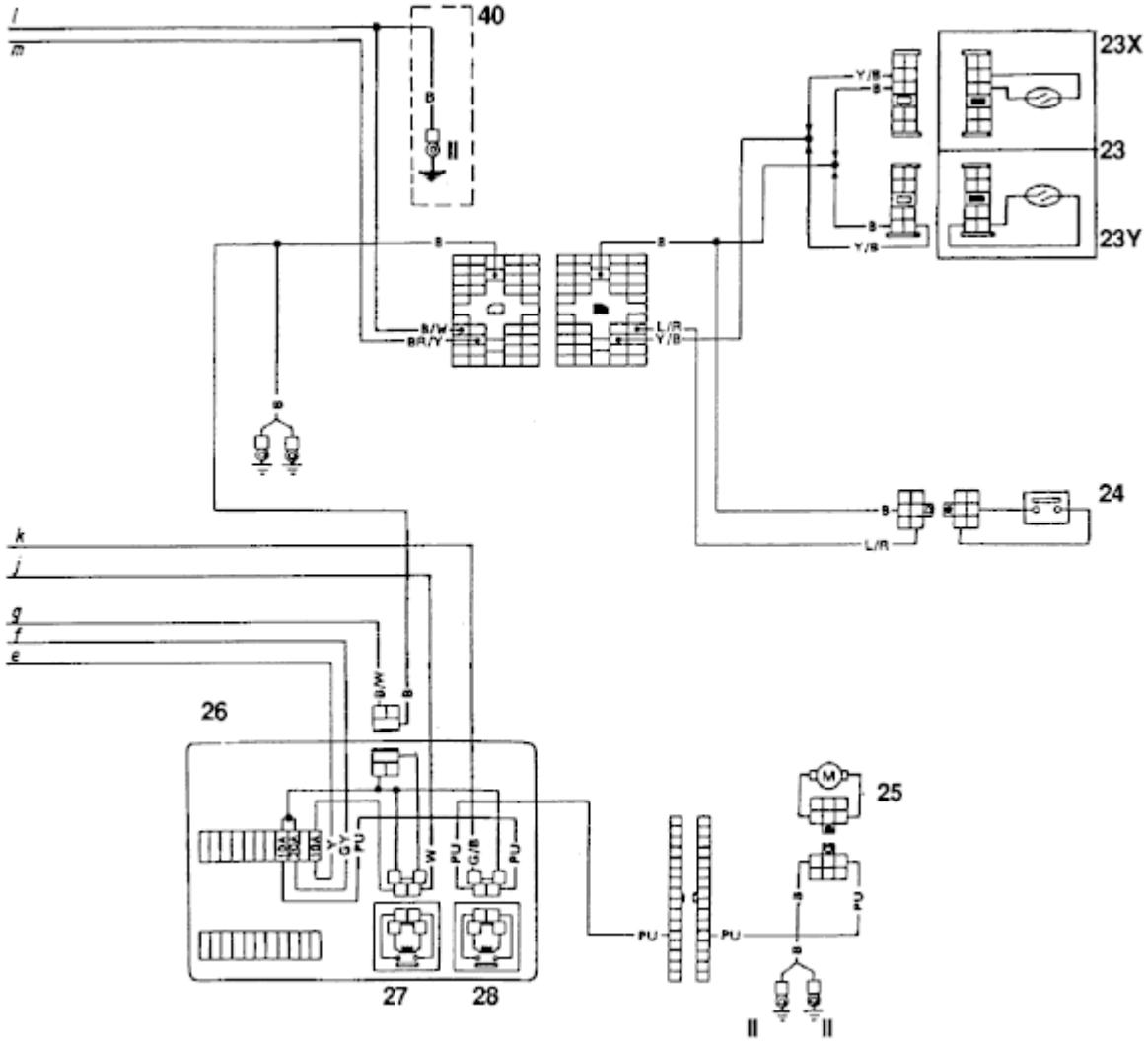
37. To air-conditioning, if fitted

I: Earth on engine block

II: Earth on body

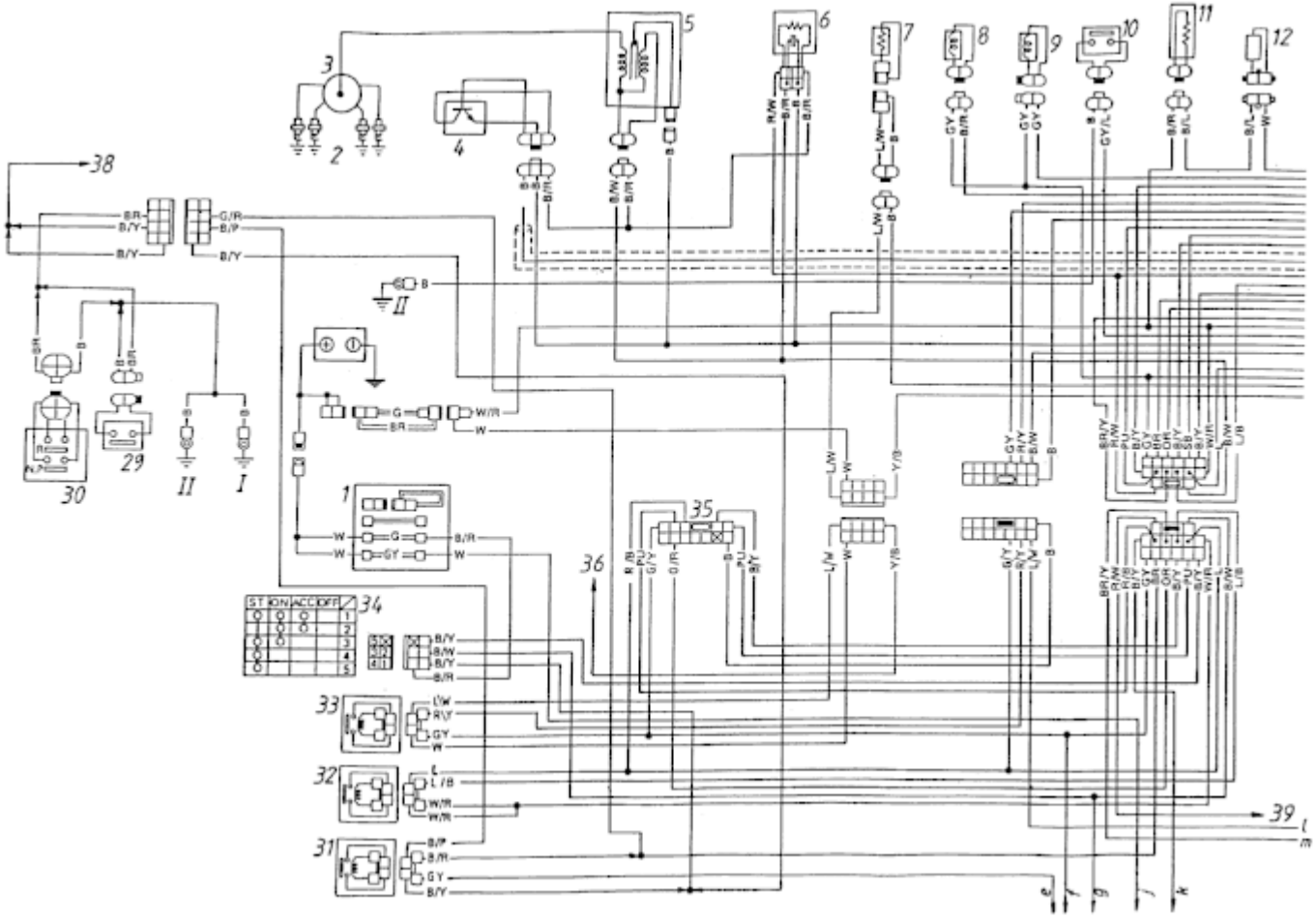
B= Black; BR=Brown; G= Green; GY=Grey; L= Blue; LG= Light green; OR=Orange; P= Pink; PU=Purple; R= Red; SB=Light Blue; W= White; Y= Yellow

GA 16i engine management wiring diagram, not for coupé and Florida/Station Wagon (part 2).



15. Instrument cluster on dashboard
X. Vehicle speed sensor (version without rev. counter)
Y. Vehicle speed sensor (version with rev. counter)
16. Octane selector, switch LH side of dashboard (if fitted)
17. Fuel pump
18. Fuse box
19. Ignition relay
20. Fuel pump relay
40. Version with headlamp washer or wiper
I: Earth on engine block
II: Earth on body
B= Black; BR=Brown; G= Green; GY=Grey; L= Blue; LG= Light green; OR=Orange; P= Pink; PU=Purple; R= Red; SB=Light Blue; W= White; Y= Yellow

GA 16i engine management wiring diagram, not for coupé and Florida/Station Wagon (part 3).

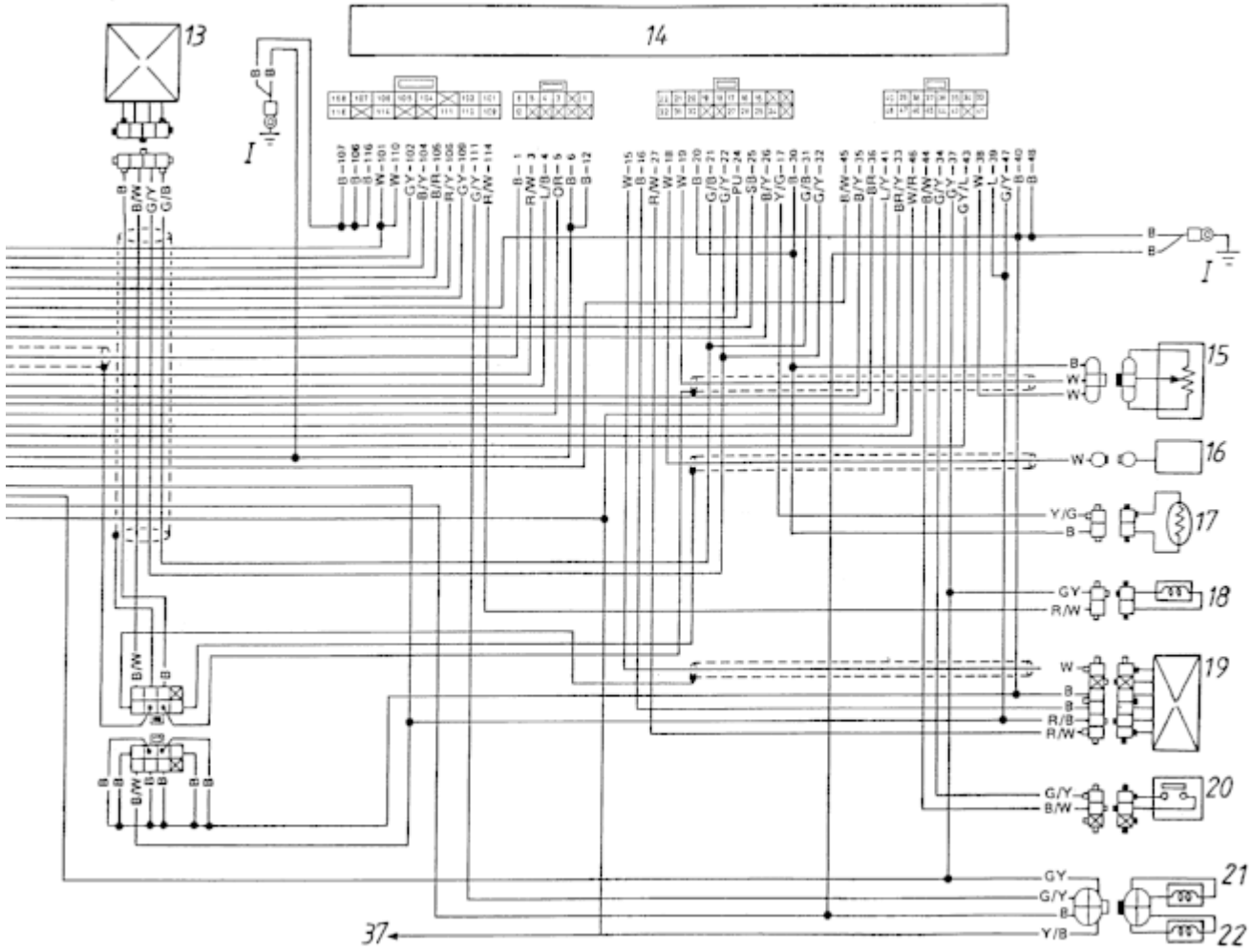


1. Fuse link holder
2. Spark plugs
3. Distributor
4. Power transistor
5. Ignition coil
6. Resistance 2200 Ω and capacitor
7. Mixture pre-heater element
8. EGR and charcoal canister solenoid valve
9. Air induction solenoid valve
10. Power steering switch
11. Ballast resistor
12. Injector
29. Neutral position switch on manual gearbox
30. Start inhibitor switch on automatic transmission
31. Start inhibitor relay on automatic transmission
32. Injection system main relay
33. Mixture pre-heater relay
34. Ignition switch
35. Service connector
36. To air-conditioning compressor, if fitted
37. —
38. To starter motor
39. To rev. counter, if fitted

I: Earth on engine block

II: Earth on body

GA 16i engine management wiring diagram for coupé and Florida/Station Wagon (part 1).



13. Crankshaft position sensor
14. Electronic control unit
15. Throttle valve position sensor
16. Oxygen sensor
17. Coolant temperature sensor
18. Idle speed fine-control solenoid valve
19. Air mass meter
20. Throttle switch
21. Extra idle speed control solenoid valve S (on versions with power steering)
22. Extra idle speed control valve K (on versions with air-conditioning)

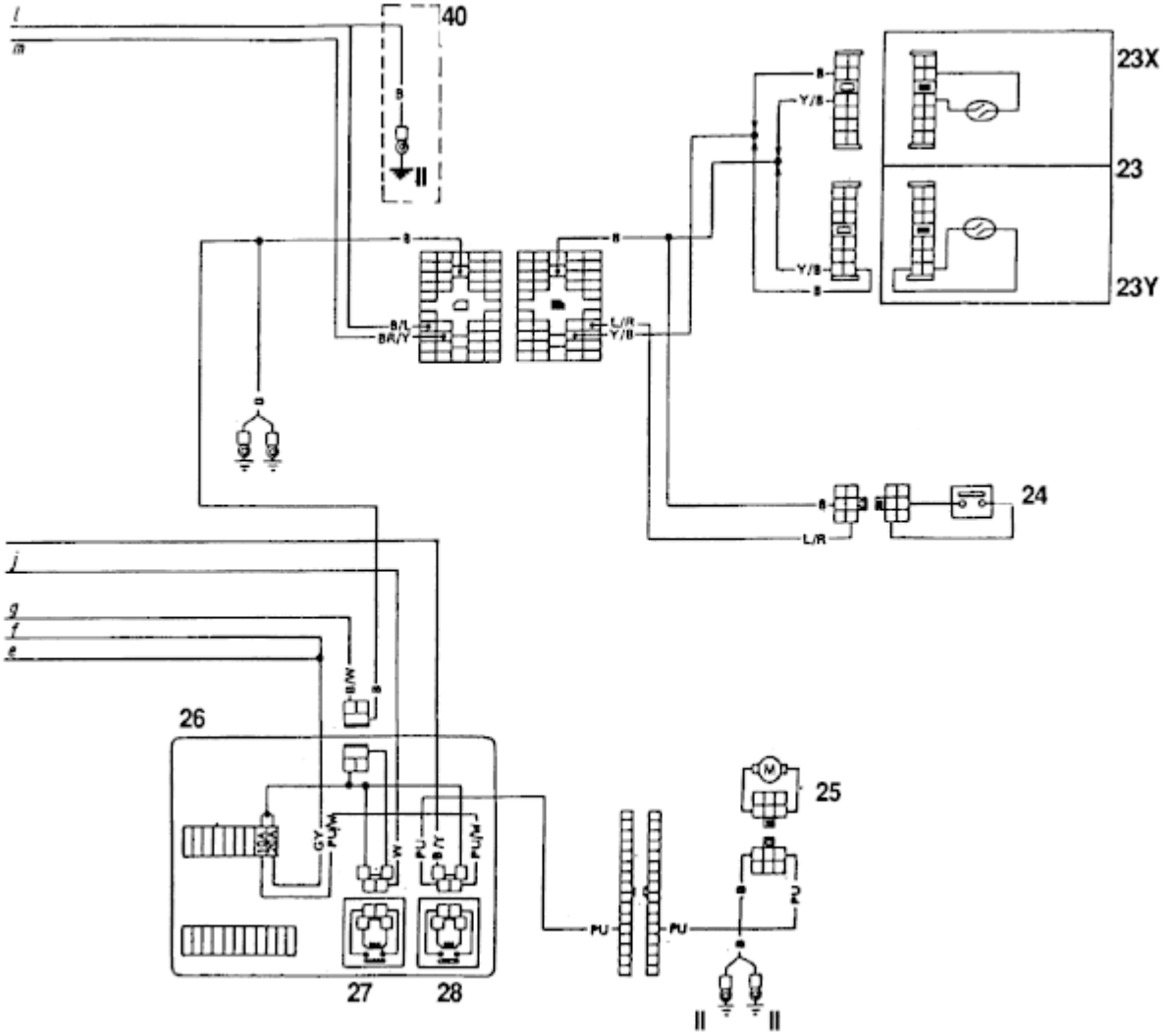
37. To air-conditioning, if fitted

I: Earth on engine block

II: Earth on body

B= Black; BR=Brown; G= Green; GY=Grey; L= Blue; LG= Light green; OR=Orange; P= Pink; PU=Purple; R= Red; SB=Light Blue; W= White; Y= Yellow

GA 16i engine management wiring diagram for coupé and Florida/Station Wagon (part 2).



23. Dashboard instrument cluster
23X: Vehicle speed sensor (version without rev.counter)
23Y: Vehicle speed sensor (version with rev. counter)
24. Octane selector, switch on LH side of dash-board (if fitted)
25. Fuel pump
26. Fuse box
27. Ignition relay
28. Fuel pump relay
40. Version with headlamp washer or wiper

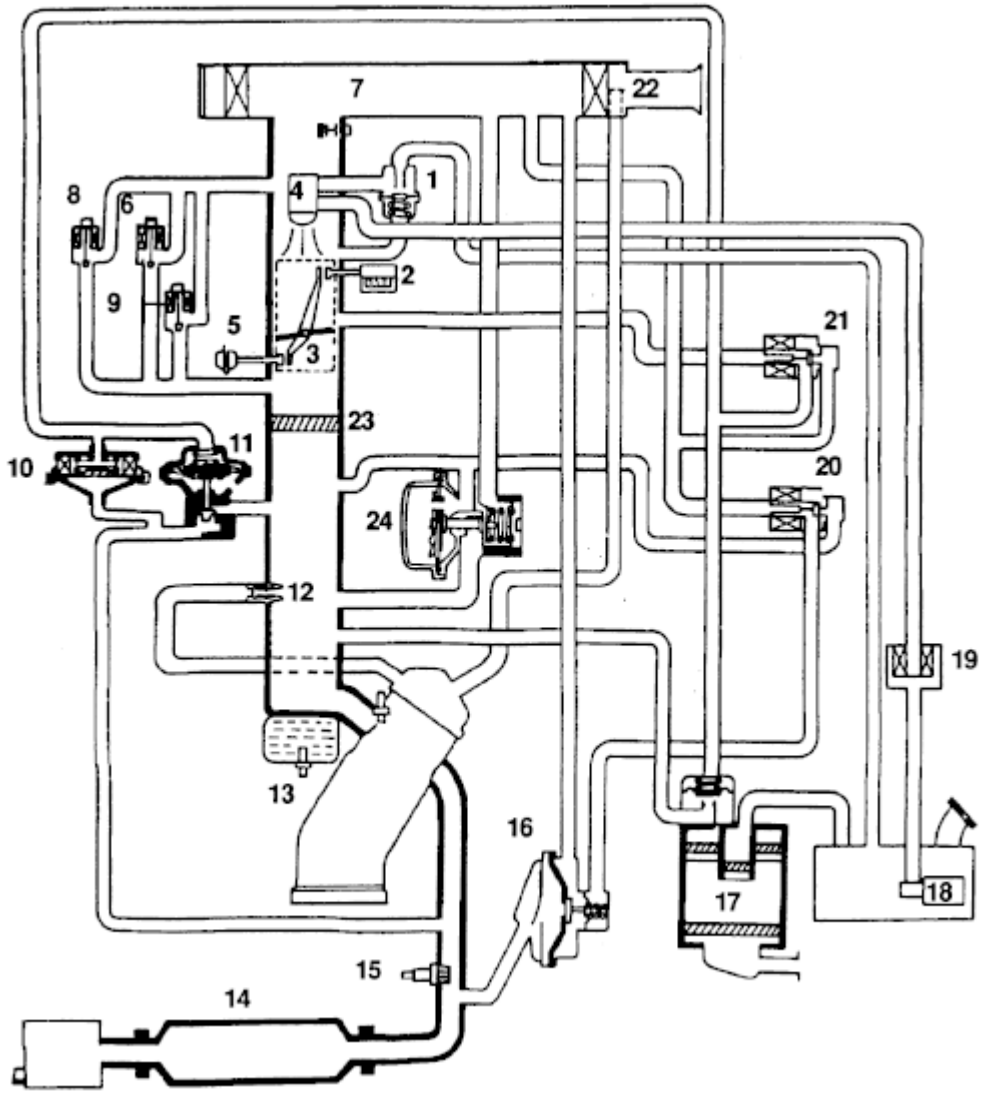
I: Earth to engine block

II: Earth to body

B= Black; BR=Brown; G= Green; GY=Grey; L= Blue; LG= Light green; OR=Orange; P= Pink; PU=Purple; R= Red; SB=Light Blue; W= White; Y= Yellow

Combination: X/Y = wire coloured X, marked with a Y coloured stripe.

GA 16i engine management wiring diagram for coupé and Florida/Station Wagon (part 3).

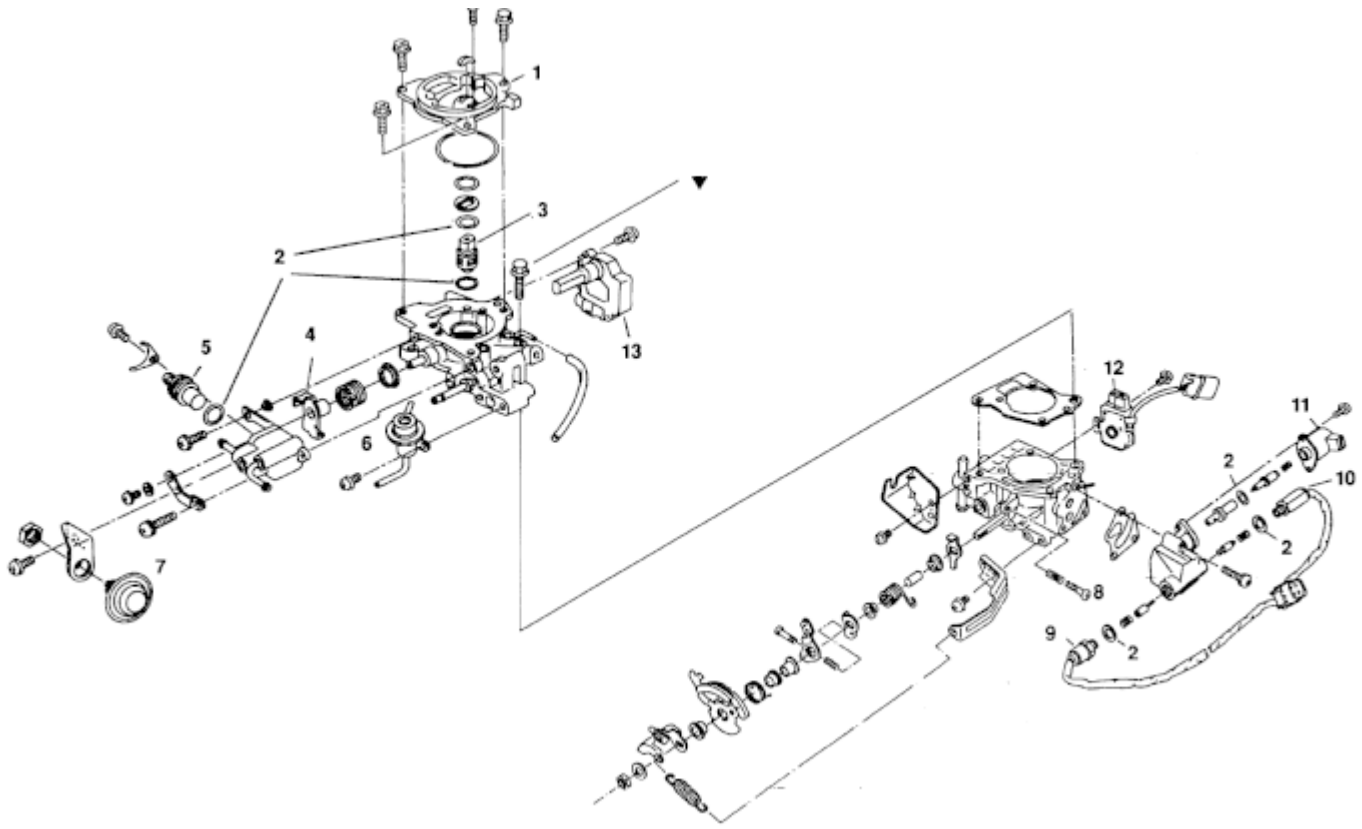


1. Fuel pressure regulator
2. Fast idle speed thermal element and control lever
3. Throttle switch and sensor
4. Injector
5. Dashpot
6. Extra idle speed control solenoid valve K
7. Air mass meter
8. Extra idle speed control solenoid valve S
9. Fine idle speed control
10. Flap valve
11. EGR control valve
12. PCV valve
13. Coolant temperature sensor
14. Catalytic converter
15. Oxygen sensor
16. Air induction control valve
17. Charcoal canister
18. Fuel pump
19. Fuel filter
20. Air induction solenoid valve
21. EGR and charcoal canister solenoid valve
22. Filter
23. Mixture pre-heater
24. Extra-air valve

GA 16i engine, air and vacuum system

Mixture and exhaust emission control systems

Injection unit



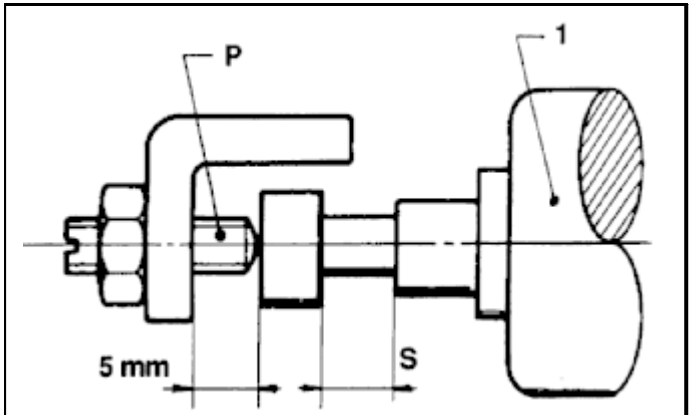
1. Cover plate
2. O ring; use new ring and coat lightly with engine oil
3. Injector
4. Fast idle speed control lever
5. Fast idle speed thermal element
6. Pressure regulator
7. Dashpot
8. Volume adjustment screw
9. Extra idle speed control solenoid valve S
10. Extra idle speed control solenoid valve K
11. Idle speed fine-control solenoid valve
12. Throttle switch and sensor
13. Air mass meter

▼: Use sealant

injection unit

Checking and setting fast idle speed

Run the engine warm until the radiator fan switches on. Measure the thermal element piston travel S, see the illustration.



Thermal element piston

S < 8,2 mm or S > 12,5 mm: Replace the thermal element. Turn adjustment screw P with reference to the drawing. Re-measure S.

S = 8,2 - 8,9 mm or S = 11,8 - 12,5 mm: See A. and B.
S = 8,9 - 11,8 mm: See B.

A.

Adjust the actuator lever to the following formula:

N = (S-10,40)/0,5

S in mm.

N is the number of anti-clockwise turns of adjustment screw P.
Example: If N = -2,5 then P must be given 2,5 clockwise turns.

B.

Run the engine warm until the radiator fan switches on. With a feeler gauge measure the clearance K between the control cam and follower lever roller, see the illustration.

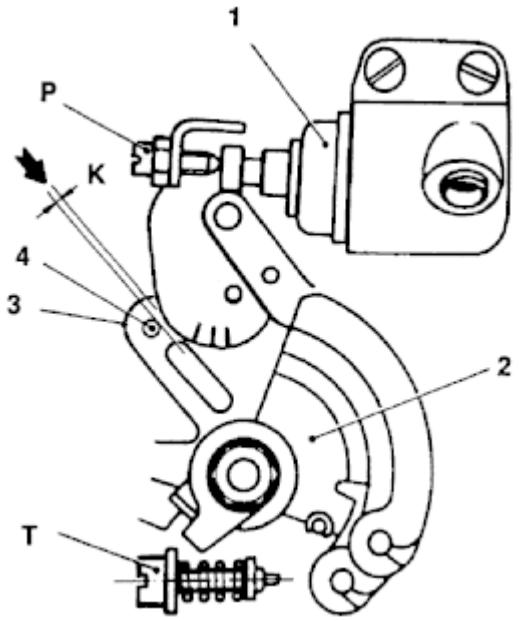
K = 1,8 - 4,9 mm on versions with manual gearbox.

K = 1,9 - 5,4 mm on versions with automatic transmission.

If K is not within the limits, turn adjustment screw T until the following values are obtained:

K = 2,1 - 4,1 mm on versions with manual gearbox.

K = 2,4 - 4,9 mm on versions with automatic transmission.



1. Thermal element
2. Throttle lever
3. Follower lever
4. Roller

Fast idle speed control mechanism

Checking and adjusting Dashpot

Engine at operating temperature: Check that the idle speed is correct. Turn the throttle lever by hand. Check that the dashpot rod just touches the lever at 2000±200/min on versions with manual gearbox and 2400± 400/min on versions with automatic transmission. If necessary, turn the lever adjustment screw.

Checking fuel pressure

Release the fuel pressure. Remove the fuel pump fuse. This is fuse No. 8 of the top row in the fuse box, at the left below the dashboard. Start the engine. Switch the starter motor 3 times on after the engine has stalled. Switch off the ignition.

Fit a manometer between the fuel supply hose and the injection unit connection. Replace the fuel pump fuse. Start the engine. Check for fuel leaks.

The fuel pressure with engine at idle speed should be 0,98 bar.

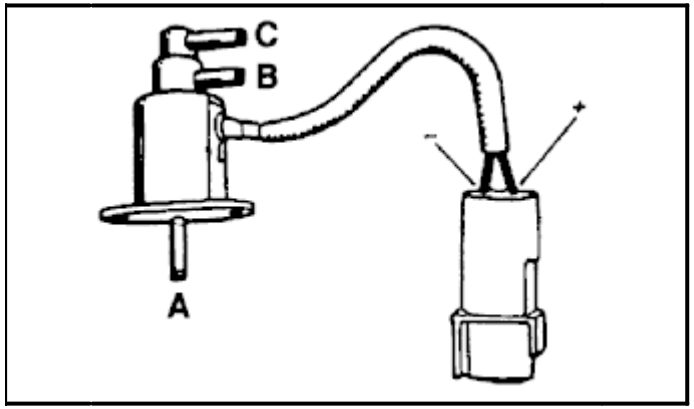
Release the fuel pressure. Re-connect the supply pipe to the injection unit.

EGR and charcoal canister solenoid valve

Disconnect the connector. With an Ohmmeter check for continuity between both connector pins.

Disconnect all vacuum hoses from the valve. Check the connection between A, B and C, see the illustration.

B and C are connected with non activated solenoid valve. A and B are connected with battery voltage on the connector pins (= activated solenoid valve).

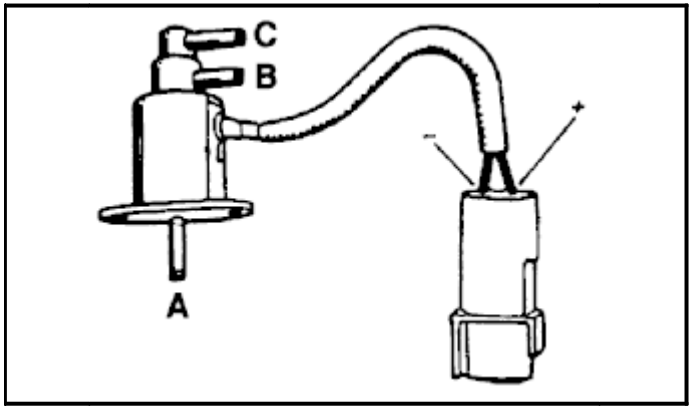


EGR control valve

Apply vacuum to the vacuum diaphragm. The valve must be fully open at minimum 120 mmHg vacuum.

Air induction solenoid valve

Disconnect the connector. With an Ohmmeter check for a continuity between both connector pins. Disconnect all vacuum hoses from the valve. Check the connection between A, B and C, see the illustration. B and C are connected with non activated solenoid valve. A and B are connected with battery voltage on the connector pins (= activated solenoid valve).



– **CA16DE and 18DE engines: no data available**

Lubricants and fluids

Engine sump, including oil filter	
	Level check: Regularly
	Change: Every 10.000 km or every 6 months
Capacity:	E and GA engines: 3,2 litre
	oil filter: 0,4 litre
	CA engines: 3,8 litres
	oil filter: 0,4 litre
Oil type:	Complying with API specifications SE, SF or SG
Viscosity:	above -20 °C: SAE 10W30 (for preference) 10W40, 10W50, 15W40, 15W50
	above -10° C: SAE 20W20, 20W40, 20W50
	for long periods below -10 °C: SAE 5W20
	Drain plug: 29-39 Nm

Transaxle		
Change: Only under severe operating conditions, every 40.000 km or every 2 years		
Capacity:	RN4F30A, 4 speed box: to 10/'88: 2,3 litres; from 10/'88 onwards: 2,4 litres	Filler plug: 25-34 Nm
		Drain plug:
		30A gearbox: 25-34 Nm
	RN4F31A, 4 speed box: to 10/'88: 2,6 litres; from 10/'88 onwards: 2,7 litres	31A gearbox: 25-34 Nm
		50A gearbox: 20-29 Nm
	RS5F30A or 31A, 5 speed gearbox: to 10/'88: 2,7 litres; from 10/'88 onwards: 2,8 litres	50V gearbox: 20-29 Nm
	RS5F50A or V: 4,7 litres	
Oil type:	Hypoid transmission oil complying with API GL-4	
Viscosity:	SAE 80W90 (for preference) or 75W90	

Automatic transaxle		
Level check: Weekly		
Change: Only under severe operating conditions, every 40.000 km or every 2 years		
Capacity, total:	6,3 litres	
Fluid type:	Autom. transmission fluid: Dexron	

Transfer box (4WD)		
Level check: Every 10.000 km or every 6 months		
Change: Only under severe operating conditions, every 40.000 km or every 2 years		
Capacity:	1,1 litres	
Oil type:	Hypoid transmission oil complying with API GL-5	
Viscosity:	As for manual gearbox	Filler plug: 18-25 Nm Drain plug: 20-29 Nm

Rear differential, (4WD)		
Level check: Every 10.000 km or every 6 months		
Change: Only under severe operating conditions, every 40.000 km or every 2 years		
Capacity:	1,0 litre	
Oil type:	Hypoid transmission oil complying with API GL-5	
Viscosity:	As for manual gearboxes	Filler plug: 59-98 Nm Drain plug: 59-98 Nm

Cooling system		
	Level check	Regularly
	Change	Every 40.000 km or every 2 years
Capacity, without header tank:	E engines:	
	light alloy radiator: 4,3 litres	
	copper radiator: 4,9 litres	
	GA engine:	
	manual transaxle: 5,0 litres	
	autom. transaxle: 5,4 litres	
	CA 16DE: 4,6 litres	
	CA 18DE: 5,2 litres	
	Header tank to "max." level: 0,6 litre	
Fluid type:	Coolant on ethylene glycol base	
	Drain plug:	
	GA engine: 34-44 Nm	
	CA engines: 54-74 Nm	

Brake system		
	Level check	Regularly
	Change	Every 40.000 km or every 2 years
Capacity:	No data available	
Fluid type:	Brake fluid to specification FMVSS 116 DOT 3	

Power steering		
	Level check	Every 10.000 km or every 6 months
	Change	Only top up
Capacity:	0,9 litre	
Fluid type:	Autom. transmission fluid: Dexron	

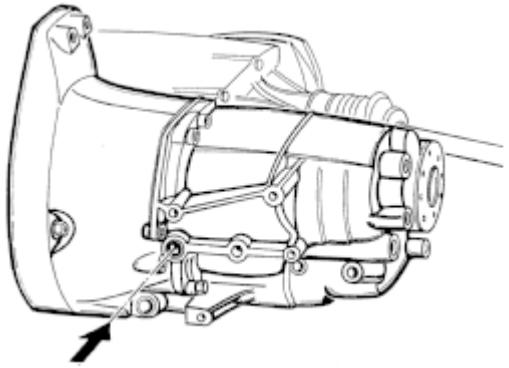
Fuel tank		
	Level check	
Capacity:	coupé: 52 litres	
	Florida/Station Wagon: 52 litres	
	4WD: 47 litres	
	other versions: 50 litres	

Fuel type:		
E 10S and E 13S	Leaded or unleaded 90 RON	
E 16S	Leaded or unleaded 97 RON	
E 16i catalytic converter	Unleaded 90 RON	
GA 14S	Leaded or unleaded 91 RON	
GA 14S catalytic converter	Unleaded 91 RON	
GA 16S	Leaded or unleaded 95 RON	
GA 16i catalytic converter	Unleaded 95 RON	
CA 16DE	Leaded or unleaded 97 RON	
CA 18DE	Leaded or unleaded 95 RON	
CA 18DE catalytic converter	Unleaded 95 RON	

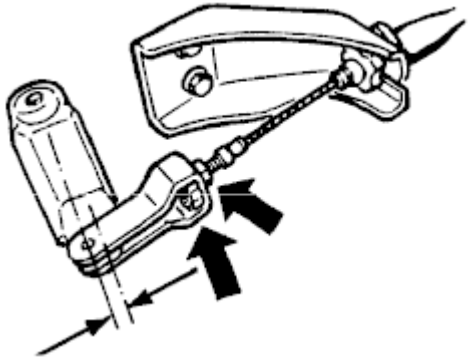
Note: Versions with octane selector:
"Super" is for 95 RON.
"Normal" is for 91 RON, only in emergencies; fill up first three times with 95 RON before changing selector back to "Super".

Maintenance

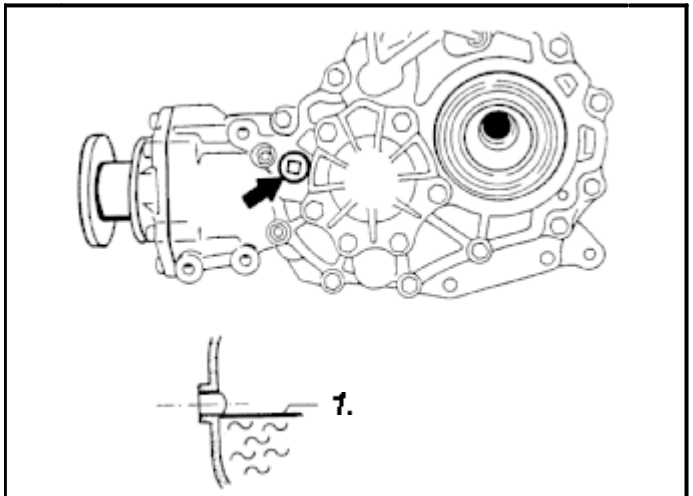
– Versions without catalytic converter or with unregulated catalytic converter



Transaxle filler plug

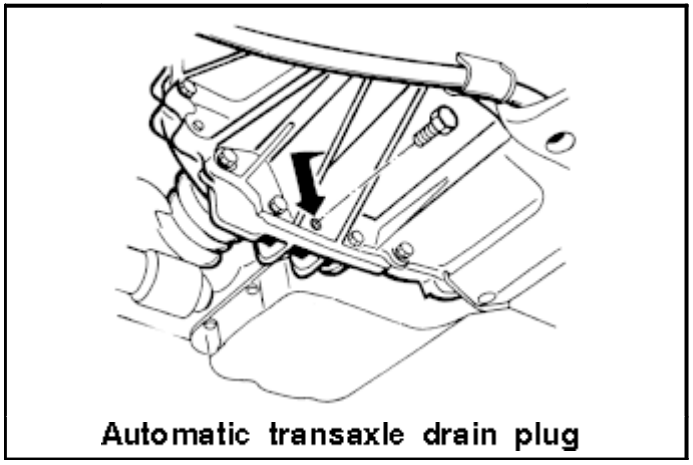


Clutch free play

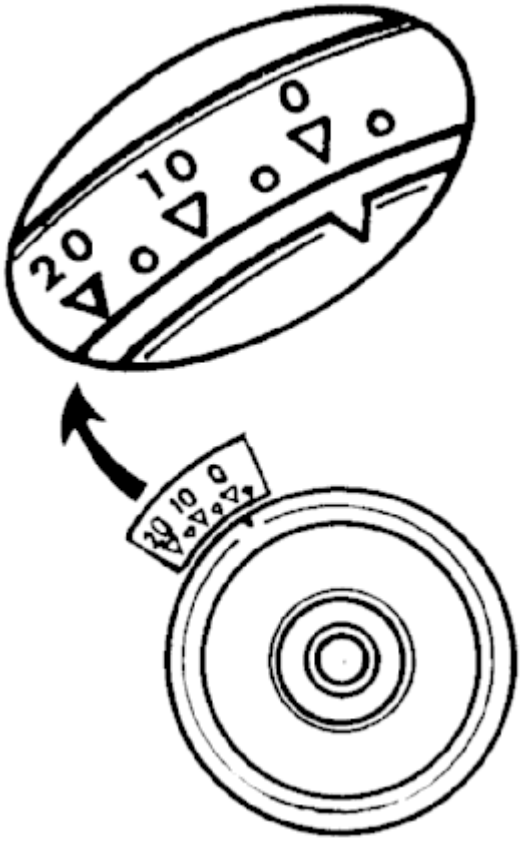


1. Level

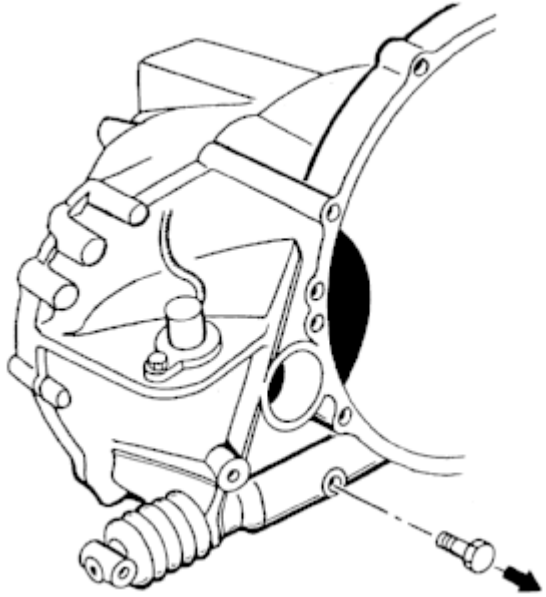
Transfer box filler plug



Automatic transaxle drain plug

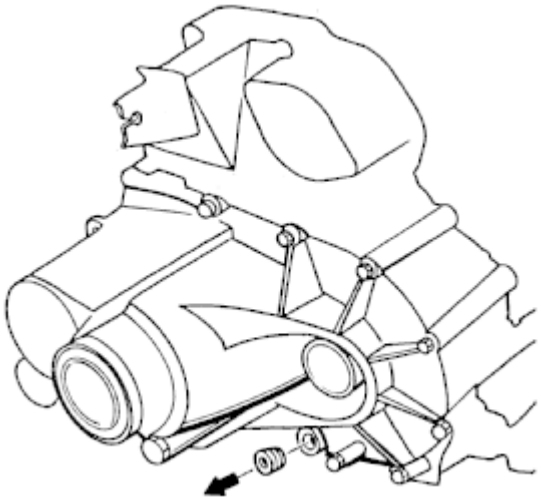


Ignition timing markings



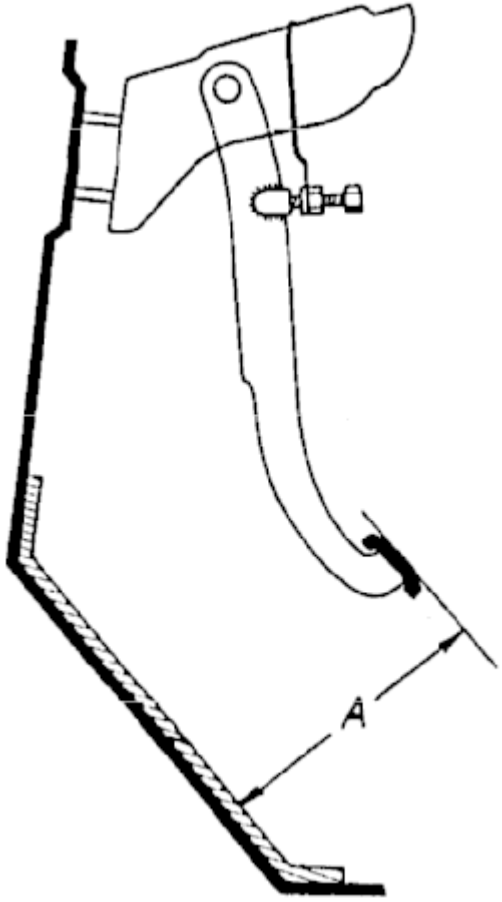
RS5F50A
RS5F50V

Transaxle: oil change

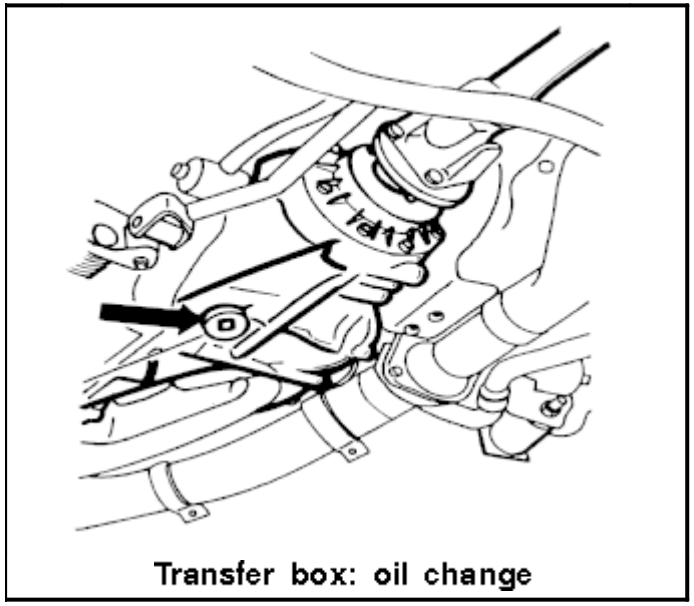


RN4F31A
RN4F30A
RS5F31A
RS5F30A

Transaxle: oil change



Clutch pedal height



Transfer box: oil change

Every 10.000 km / 6 months

- ❑ Engine sump: drain
- ❑ Oil filter: renew
- ❑ Transaxle: inspect for leaks
- ❑ Automatic transaxle: inspect for leaks
- ❑ Transfer box: inspect for leaks (4WD)
- ❑ Rear differential: check for leaks (4WD)
- ❑ Check condition of: suspension, shock absorbers, steering, exhaust, anticorrosion protection, etc. (leaks, wear, damage)
- ❑ Inspect the whole of the vehicle underside condition
- ❑ Front brake pads: clean, check, renew
- ❑ Tyres, including spare tyre: check condition, pressure and tread depth
- ❑ Wheel bolts/nuts: check, tighten (100–120 Nm)

- ❑ Engine sump: refill
- ❑ Power steering reservoir: check level, top-up if necessary
- ❑ Brake and clutch fluid reservoirs: check level, top-up if necessary
- ❑ Brake fluid level / parking brake warning lamp: check
- ❑ Poly-V-belt(s): inspect
- ❑ V-belt(s): inspect, renew, adjust
- ❑ Air filter: clean element and housing
- ❑ Cooling system: check, top-up, check anti freeze
- ❑ Battery: inspect mounting, top-up, clean terminals
- ❑ Windscreen wipers, washers: inspect, top-up reservoir(s)
- ❑ Lights/fuses/electrical system: check operation, renew if necessary
- ❑ Headlamp setting: check, adjust
- ❑ Safety belts and anchoring points: inspect
- ❑ Spark plugs: clean, set
- ❑ Idle speed: check, adjust
- ❑ Exhaust gas: check CO content

- ❑ GENERAL: after every service clean: steering wheel, control elements, door handles, windows; check rear view mirrors

Every 20.000 km / 1 year

- ❑ Engine sump: drain
- ❑ Oil filter: renew
- ❑ Transaxle: inspect for leaks
- ❑ Transaxle: top-up
- ❑ Automatic transaxle: inspect for leaks
- ❑ Transfer box: top-up (4WD)
- ❑ Rear differential: top-up
- ❑ Linkages/pivots: lubricate
- ❑ Check condition of: suspension, shock absorbers, steering, exhaust, anticorrosion protection, etc. (leaks, wear, damage)
- ❑ Inspect the whole of the vehicle underside condition
- ❑ Brake system/parking brake: check, adjust
- ❑ Brake servo: check
- ❑ Pads and linings: clean, check, renew
- ❑ Wheel bearings: check
- ❑ Tyres, including spare tyre: check condition, pressure and tread depth
- ❑ Wheel bolts/nuts: check, tighten (100–120 Nm)
- ❑ Wheel alignment: check, adjust if necessary (see ADJUSTMENT DATA: Wheel alignment)
- ❑ Engine sump: refill
- ❑ Automatic transaxle: check level, top-up if necessary
- ❑ Power steering reservoir: check level, top-up if necessary
- ❑ Brake and clutch fluid reservoirs: check level, top-up if necessary
- ❑ Brake fluid level / parking brake warning lamp: check
- ❑ Poly-V-belt(s): inspect
- ❑ V belt(s): inspect, renew, adjust
- ❑ Air filter: renew element, clean housing
- ❑ Pre-heater valve: check operation (warm/cold)
- ❑ Crankcase breather: check, service + check EGR system
- ❑ Fuel system: inspect and check choke operation
- ❑ Fuel filter: clean
- ❑ Cooling system: check, top-up, check anti freeze
- ❑ battery: inspect mounting, top-up, clean terminals
- ❑ Windscreen wiper, washers: inspect, top-up reservoir(s)
- ❑ Linkages/pivots: lubricate
- ❑ Hinges/locks/door catches: lubricate
- ❑ Lights/fuses/electrical system: check operation, renew if necessary
- ❑ Headlamp setting: check, adjust
- ❑ Safety belts and anchoring points: inspect
- ❑ Fuel/oil/water: inspect for leaks
- ❑ Valve clearance: check, adjust, except GA 16S and CA engines.
- ❑ Spark plugs: renew, set; check compression

- ❑ Ignition: check ignition timing, advance
- ❑ Idle speed: check, adjust
- ❑ Exhaust gas: check CO level
- ❑ Clutch, free play: check, adjust
- ❑ Clutch, pedal height: check, adjust
- ❑ Check on rolling road/road test
- ❑ GENERAL: after every service clean: steering wheel, control elements, door handles, windows; check rear view mirrors

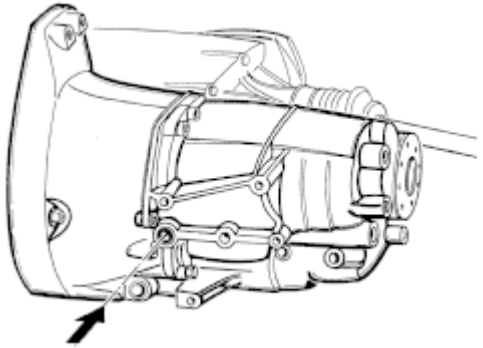
Every 40.000 km / 2 years

- ❑ Transaxle: change, only under severe operating conditions
- ❑ Automatic transaxle: drain, only under severe operating conditions
- ❑ Transfer box: change, only under severe operating conditions (4WD)
- ❑ Rear differential: change, only under severe operating conditions (4WD)
- ❑ Linkages/pivots: lubricate
- ❑ Brake fluid: change (every 2 years)
- ❑ Wheel bearings: check; end float max. 0,05 mm
- ❑ Automatic transaxle: refill
- ❑ Fuel filter: renew
- ❑ Cooling system: drain, flush, refill (every 2 years)
- ❑ Autom. transmission, brake bands: check, adjust; turn adjustment bolt to 4-5 Nm and then 2,5 turns back

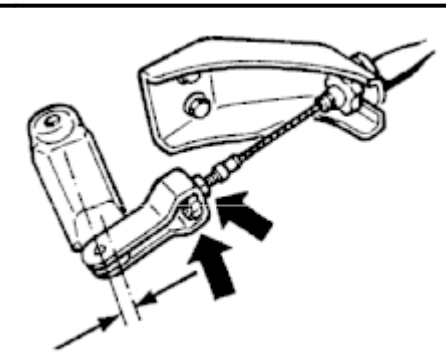
Every 90.000 km / 3 years

- ❑ Timing belt: renew; not on GA engines

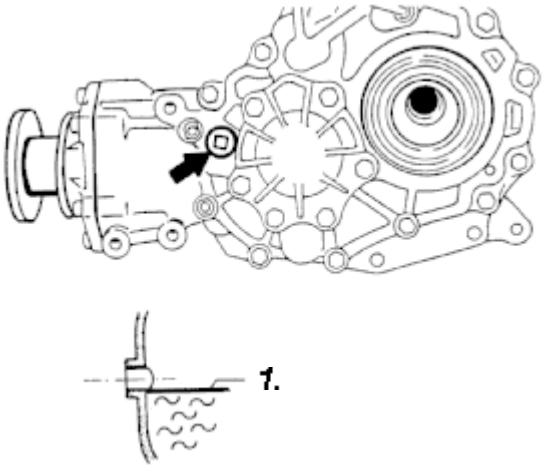
– Versions with controlled catalytic converter



Transaxle filler plug

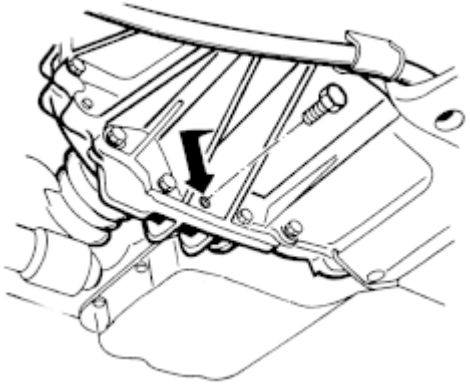


Clutch free play

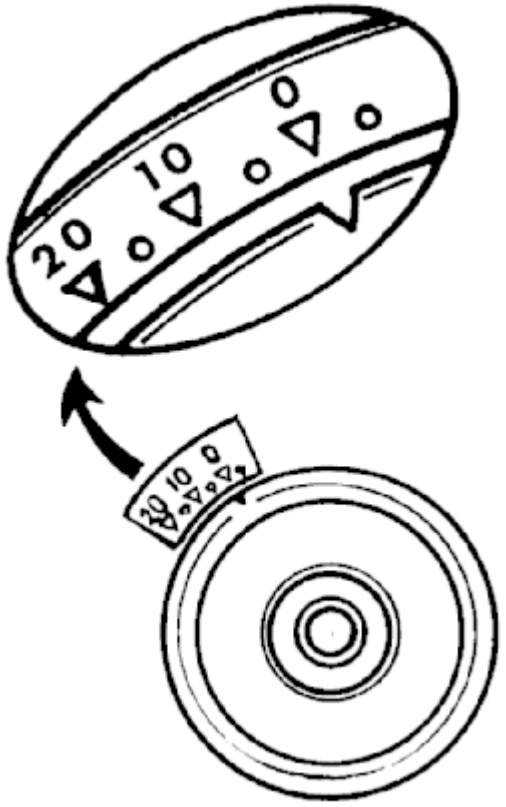


1.Level

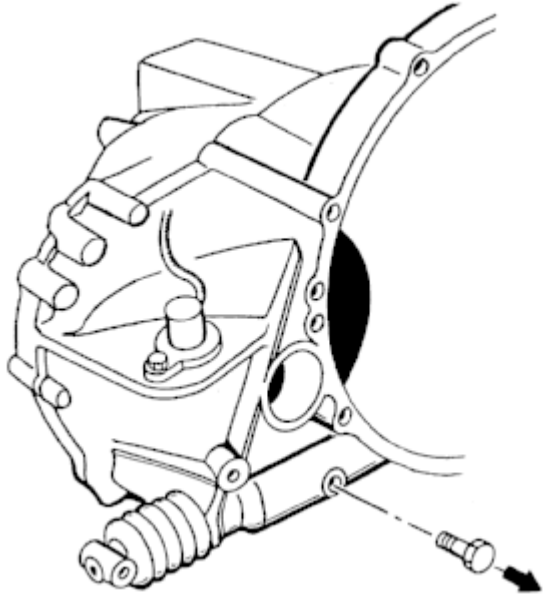
Transfer box filler plug



Automatic transaxle drain plug

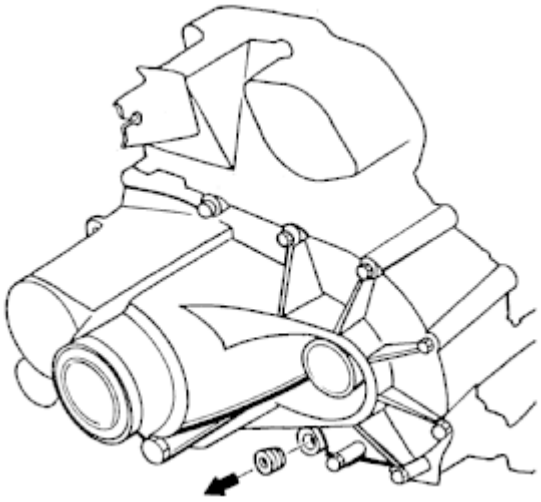


Ignition timing markings



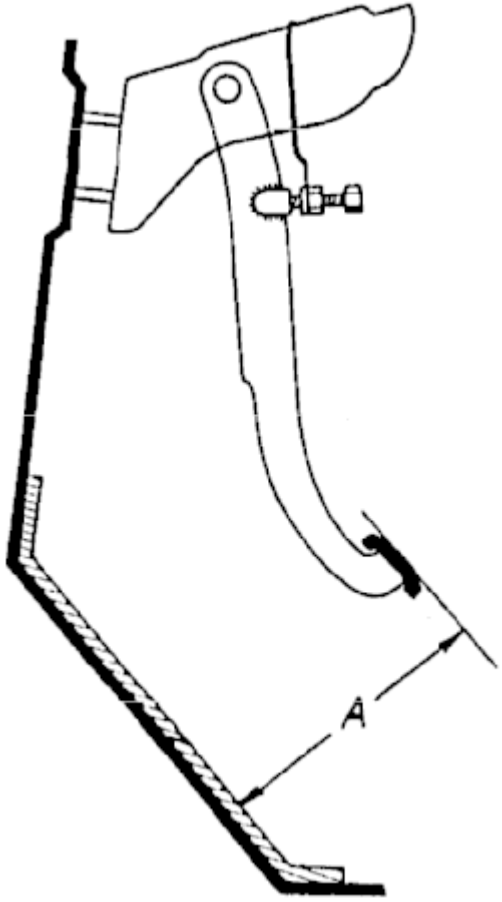
RS5F50A
RS5F50V

Transaxle: oil change

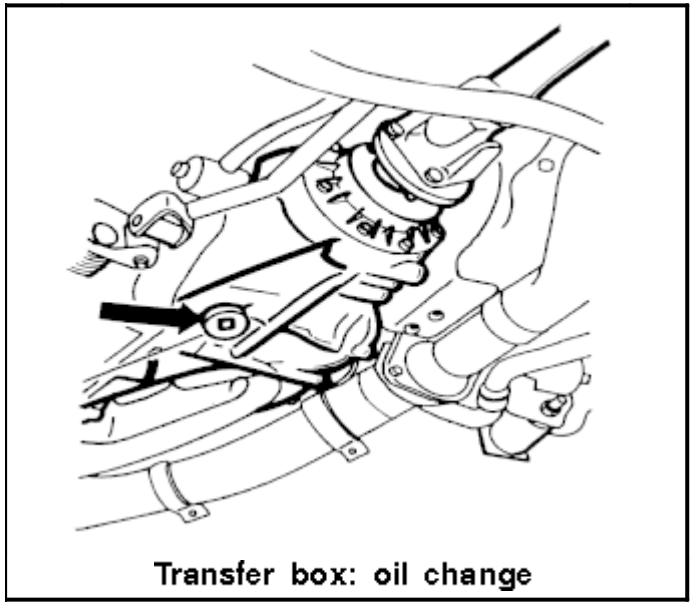


RN4F31A
RN4F30A
RS5F31A
RS5F30A

Transaxle: oil change



Clutch pedal height



Transfer box: oil change

Every 10.000 km / 6 months

- ❑ Engine sump: drain
- ❑ Oil filter: renew
- ❑ Transaxle: inspect for leaks
- ❑ Automatic transaxle: inspect for leaks
- ❑ Check condition of: suspension, shock absorbers, steering, exhaust, anticorrosion protection, etc. (leaks, wear, damage)
- ❑ Inspect the whole of the vehicle underside condition
- ❑ Front brake pads: clean, check, renew
- ❑ Tyres, including spare tyre: check condition, pressure and tread depth
- ❑ Wheel bolts/nuts: check, tighten (100–120 Nm)
- ❑ Engine sump: refill
- ❑ Power steering reservoir: check level, top-up if necessary
- ❑ Brake and clutch fluid reservoirs: check level, top-up if necessary
- ❑ Brake fluid level / parking brake warning lamp: check
- ❑ Poly-V-belt(s): inspect
- ❑ V belts(s): inspect, renew, adjust
- ❑ Air filter: clean element and housing
- ❑ Cooling system: check, top-up, check anti freeze
- ❑ Battery: inspect mounting, top-up, clean terminals
- ❑ Windscreen wipers, washers: inspect, top-up reservoir(s)
- ❑ Lights/fuses/electrical system: check operation, renew if necessary
- ❑ Headlamp setting: check, adjust
- ❑ Safety belts and anchoring points: inspect
- ❑ Exhaust gas: check CO level
- ❑ GENERAL: after every service clean: steering wheel, control elements, door handles, windows; check rear view mirrors

Every 20.000 km / 1 year

- ❑ Engine sump: drain
- ❑ Oil filter: renew
- ❑ Transaxle: inspect for leaks

- ❑ Transaxle: top-up
- ❑ Automatic transaxle: inspect for leaks
- ❑ Linkages/pivots: lubricate
- ❑ Check condition of: suspension, shock absorbers, steering, exhaust, anticorrosion protection, etc. (leaks, wear, damage)
- ❑ Inspect the whole of the vehicle underside condition
- ❑ Parking brake: check, adjust
- ❑ Brake servo: check
- ❑ Pads and linings: clean, check, renew
- ❑ Wheel bearings: check
- ❑ Tyres, including spare tyre: check condition, pressure and tread depth
- ❑ Wheel bolts/nuts: check, tighten (100–120 Nm)
- ❑ Wheel alignment: check, adjust if necessary (see ADJUSTMENT DATA: Wheel alignment)
- ❑ Engine sump: refill
- ❑ Automatic transaxle: check level, top-up if necessary
- ❑ Power steering reservoir: check level, top-up if necessary
- ❑ Brake and clutch fluid reservoirs: check level, top-up if necessary
- ❑ Brake fluid level / parking brake warning lamp: check
- ❑ Poly-V-belt(s): inspect
- ❑ V-belt(s): inspect, renew, adjust
- ❑ Air filter: renew element, clean housing
- ❑ Pre-heater valve: check operation (warm/cold)
- ❑ Engine oil and coolant level warning lamp: check operation
- ❑ Cooling system: inspect, top-up, check anti freeze
- ❑ Battery: inspect mounting, top-up, clean terminals
- ❑ Windscreen wipers, washers: inspect, top-up reservoir(s)
- ❑ Linkages/pivots: lubricate
- ❑ Hinges/locks/door catches: lubricate
- ❑ Lights/fuses/electrical system: check operation, renew if necessary
- ❑ Headlamp setting: check, adjust
- ❑ Safety belts and anchoring points: inspect
- ❑ Fuel/oil/water: inspect for leaks
- ❑ Spark plugs: renew, set; check compression
- ❑ Electronic ignition: check vacuum hose and sensors if necessary
- ❑ Ignition: check ignition timing, advance
- ❑ Idle speed: check, adjust
- ❑ Exhaust gas: check CO level
- ❑ Clutch, free play: check, adjust
- ❑ Clutch, pedal height: check, adjust
- ❑ Check on rolling road/road test
- ❑ GENERAL: after every service clean: steering wheel, control elements, door handles, windows; check rear view mirrors

Every 40.000 km / 2 years

- ❑ Transaxle: change, only under severe operating conditions
- ❑ Automatic transaxle: drain, only under severe operating conditions
- ❑ Transfer box: change, only under severe operating conditions (4WD)
- ❑ Linkages/pivots: lubricate
- ❑ Brake fluid: change (every 2 years)
- ❑ Wheel bearings: check; end float max. 0,05 mm

- ❑ Automatic transaxle: refill
- ❑ Crankcase breather: check, service: filter: renew
- ❑ Fuel system: Check oxygen sensor
- ❑ Fuel filter: renew. On injection engine, remove fuel pump fuse. Start engine. After stalling, start again 2 to 3 times to release pressure
- ❑ Cooling system: drain, flush, refill (every 2 years)

- ❑ Spark plugs: renew, set; check compression
- ❑ Autom. transmission, brake bands: check, adjust; turn adjustment bolt to 4-5 Nm and then 2,5 turns back

Every 90.000 km / 3 years

- ❑ Timing belt: renew; not on GA engines

Chassis

Steering

(Not for vans and station wagons with live rear axle)

torque settings, in Nm	
Steering wheel nut	29 - 39
Steering column	13 - 18
U-joint	24 - 29
Track rod ball joint	29 - 39
Track rod lock nut	37 - 46
Rack and pinion steering box housing to firewall	73 - 97

Without power assisted steering

torque settings, in Nm	
Steering box sealing ring to steering shaft	64 - 74
Sealing ring lock nut	49 - 69
Type R22N:	
Lock plate sealing nut	39 - 59
Lock plate lock nut	10 - 15
Type R22S and R24S:	
Lock plate lock nut	39 - 59

With power assisted steering

torque settings, in Nm	
Self locking nut on steering shaft end	19 - 25
Steering box plug	49 - 69
Oil pipes	20 - 26
Lock plate sealing plate	16 - 21
Lock plate lock nut	10 - 15

Brake system

(Not for vans and station wagons with live rear axle)

Front disc brake

torque settings, in Nm	
Stub axle carrier to stub axle	54 - 64
Brake caliper to stub axle carrier:	
Florida/Station Wagon and 4WD	31 - 41
Except Florida/Station Wagon and 4WD	22 - 31
Hose to brake cylinder housing	17 - 20
Bleed nipple	7 - 9

Rear disc brake

torque settings, in Nm	
Stub axle carrier to stub axle	38 - 52
Brake caliper to mounting	37 - 49
Hose to brake cylinder housing	17 - 20
Bleed nipple	7 - 9
Handbrake cable connection nut	37 - 49

Drum brake

torque settings, in Nm	
Backing plate to stub axle	33 - 39
Brake cylinder housing	6 - 8
Bleed nipple	7 - 9

Suspension

Front suspension

(Not for vans and station wagons with live rear axle)

torque settings	
Hub nut	196 - 275 Nm

Note: The torque setting of nuts and bolts securing rubber components applies to empty vehicles with wheels on the ground and tank full.

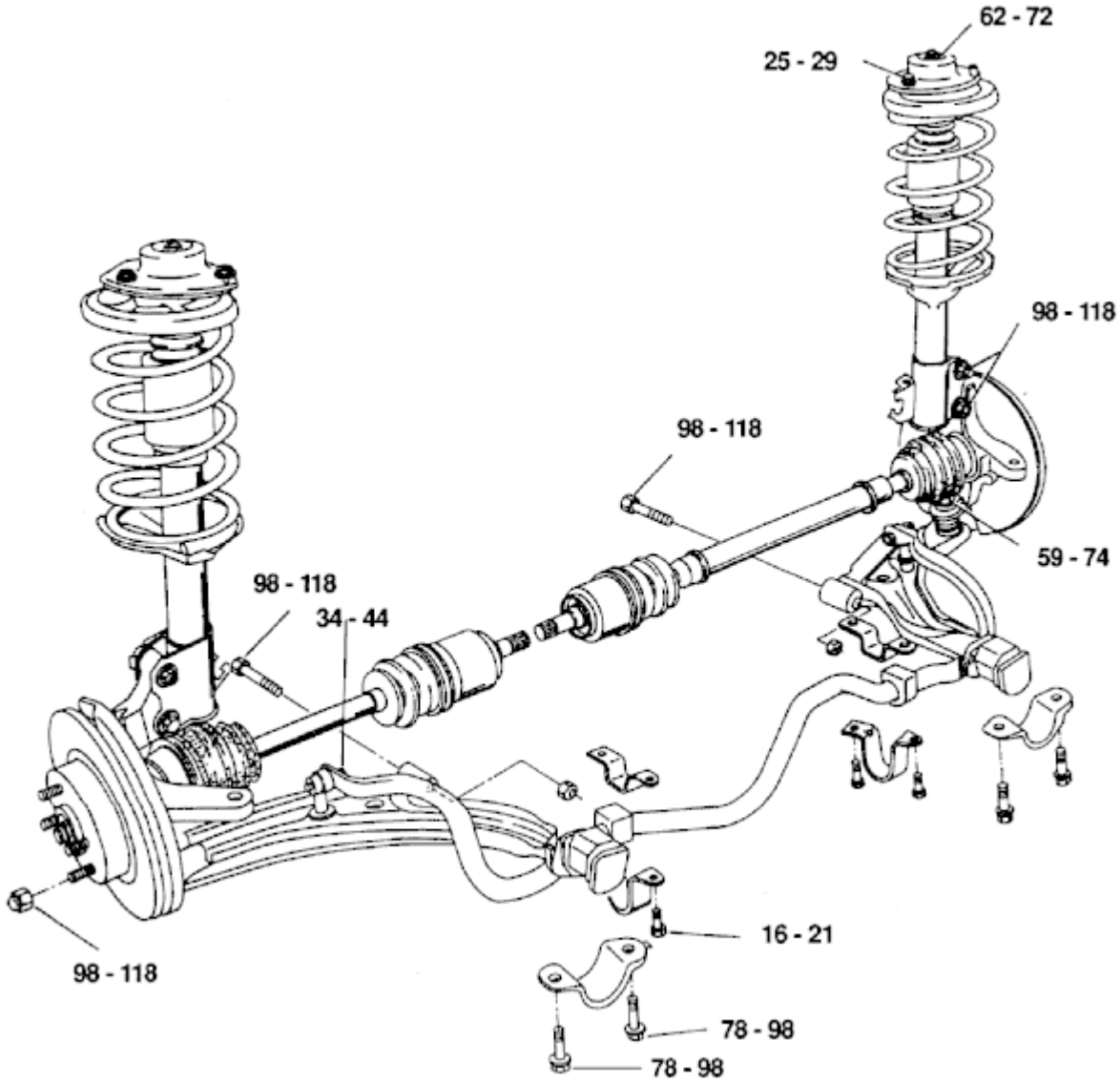
See also the next page

Rear suspension

(Not for vans and station wagons with live rear axle)

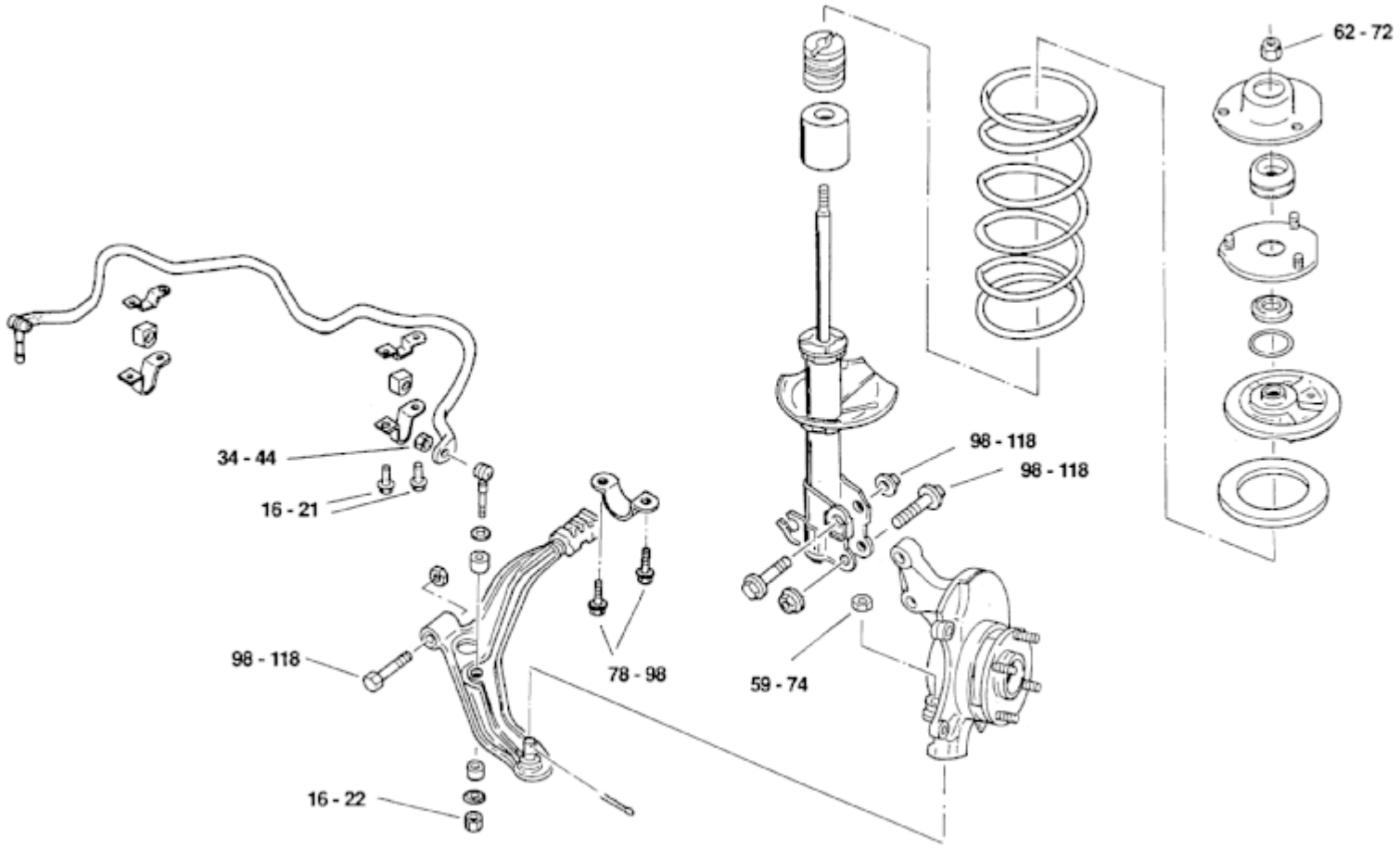
torque settings	
Hub nut	186 - 255 Nm
Wheel nuts	98 - 118 Nm

Note: The torque setting of nuts and bolts securing rubber components applies to empty vehicles with wheels on the ground and tank full.



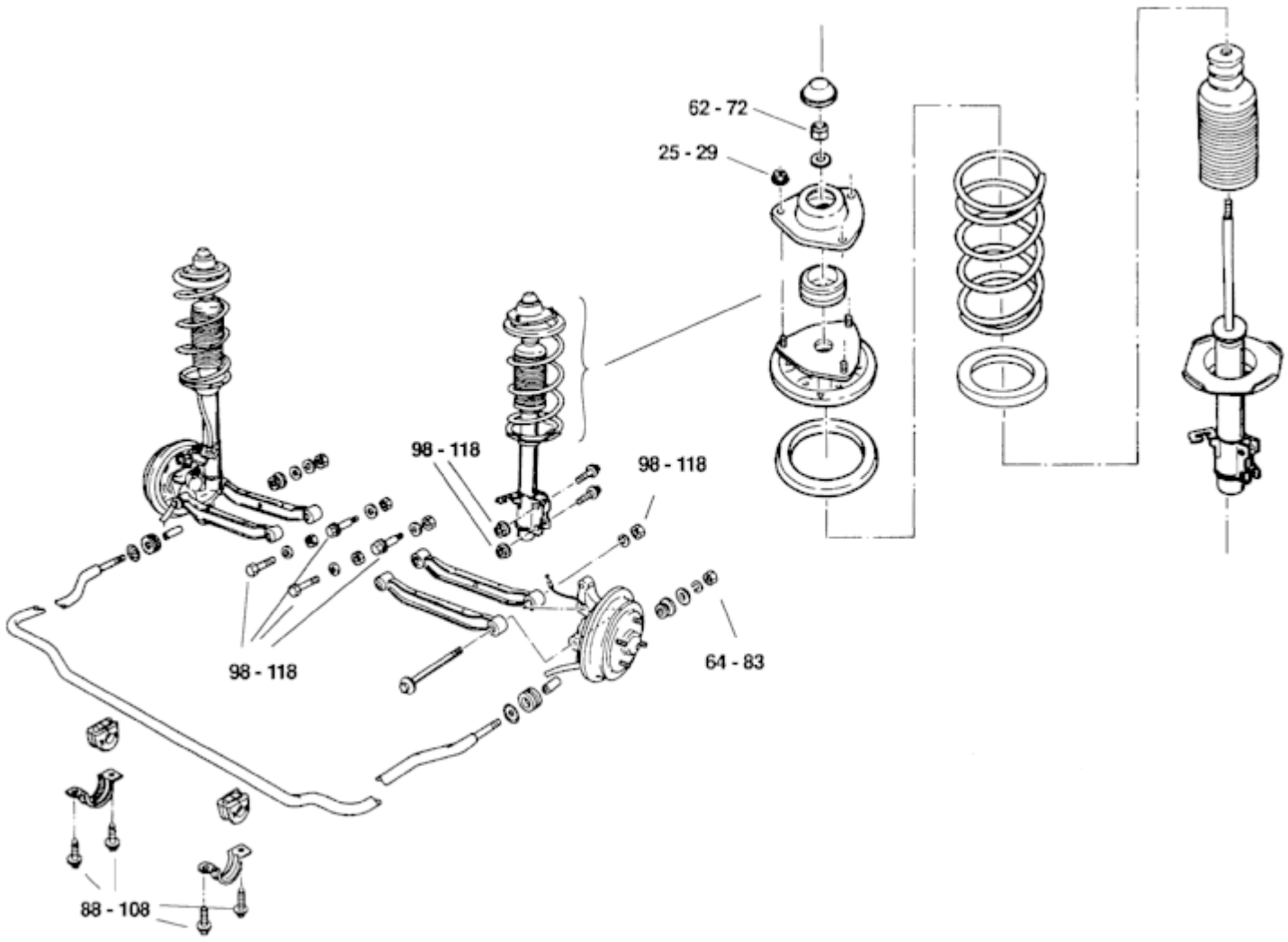
Front suspension

Torque settings in Nm



Front suspension

Torque settings in Nm



Rear suspension

Torque settings in Nm

Timing

Timing belt

E engines

Checking and renewing

The camshaft is driven by a toothed belt with an eccentric, spring loaded tensioner pulley.

Renew timing belt: every 90.000 km / 3 years.

The ancillary gear, to the right above the crankshaft gear, drives a shaft with helical gears to provide a right angled oil pump drive; this is fitted to the engine block. To renew the timing belt proceed as follows:

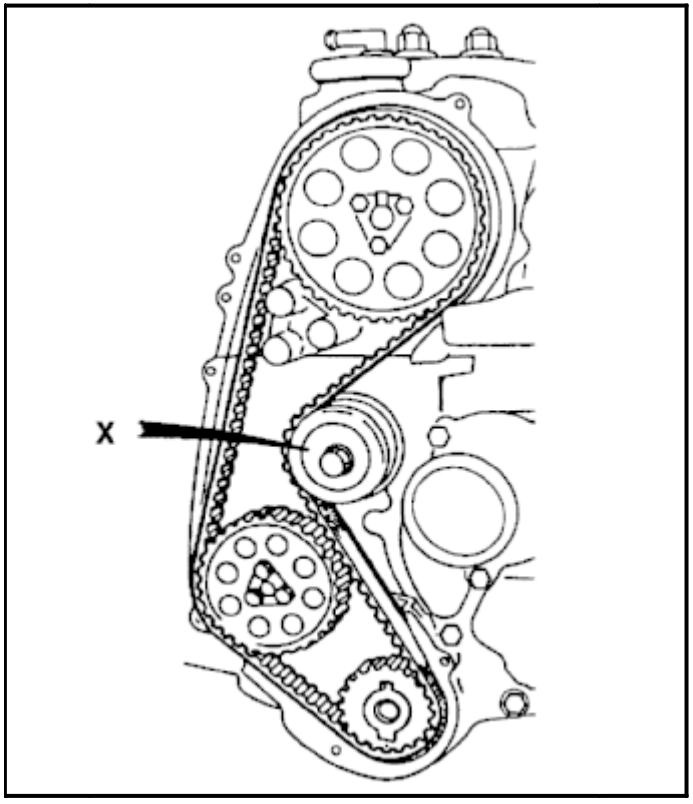
Remove both side plates; the spark plugs and the V belt(s). Place the crankshaft in TDC with piston No. 1 at the end of the compression stroke. Remove the water pump and crankshaft pulleys. Support the engine. Disconnect the RH engine mounting bracket. Both timing cover sections may now be removed. Use a Torx wrench.

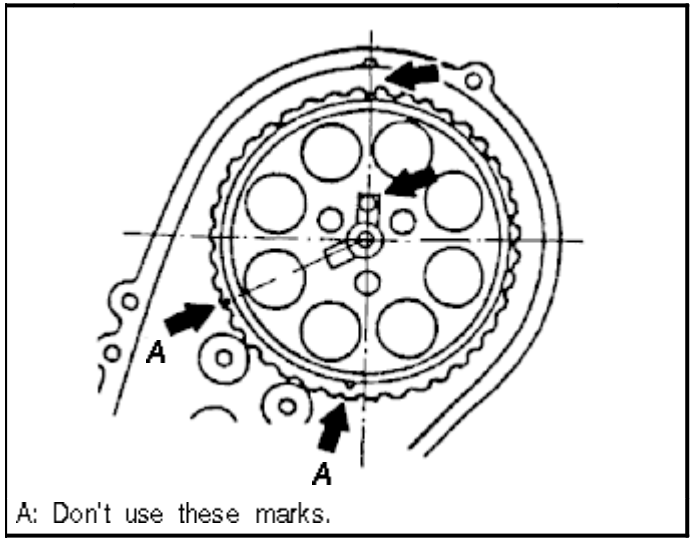
Note: Refer to the illustration for the correct camshaft location marks; there are also markings which should not be used.

Insert a screwdriver into the tensioner pulley slot and slacken the tensioner pulley nut. Turn the screwdriver against the spring pressure to release the belt. Hand tighten the nut.

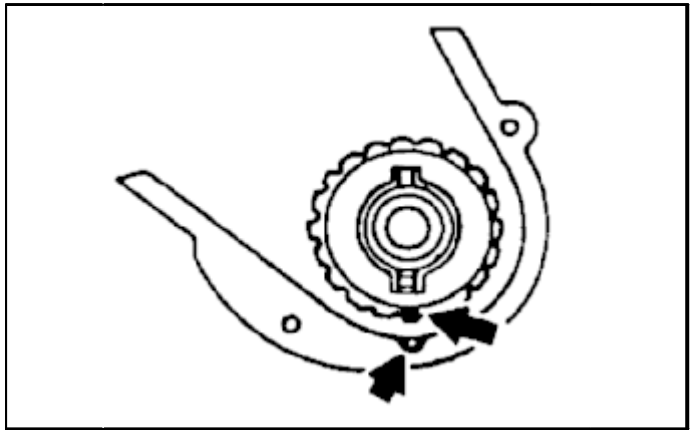
Apply a marking to show the direction of rotation. Remove the toothed belt. Check all components for further use, Renew any worn or damaged parts. Refit the timing belt as follows:

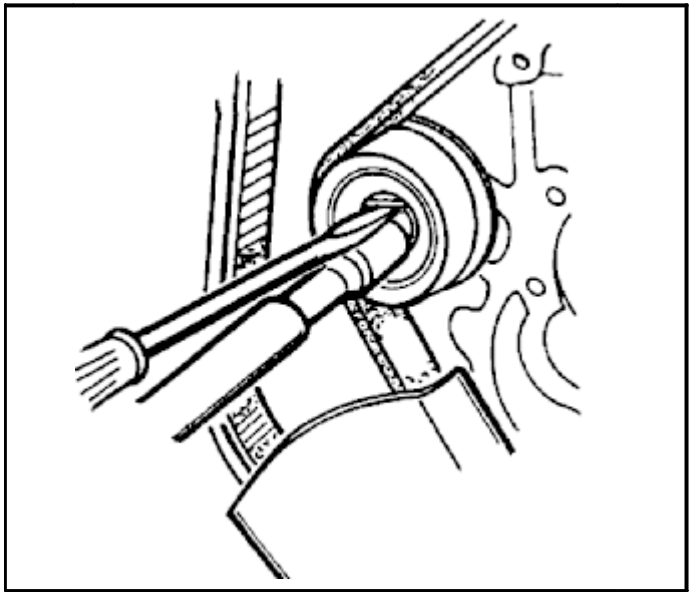
Place the camshaft and crankshaft in the position shown in the illustration. Turn the tensioner pulley 70 - 80° clockwise. Tighten the nut provisionally. Fit the belt, paying heed to the direction of rotation mark. Slacken the tensioner pulley nut until the tensioner pulley exerts pressure on the belt. Turn the camshaft approx. 20° (two teeth) clockwise. Tighten the tensioner pulley nut to 16 - 21 Nm whilst preventing the tensioner pulley from moving. Complete the engine assembly.





A: Don't use these marks.





Torque settings: in Nm	
Valve cover	4 - 6
Timing cover	5,1 - 6,5
Water pump pulley	8,4 - 0,8
Crankshaft pulley	108 -127
Water pump	5,1 - 6,5
Tensioner pulley nut	16 - 21
Spark plugs	20 - 29
Engine mounting bracket	21 - 26

GA engines

Checking and renewing

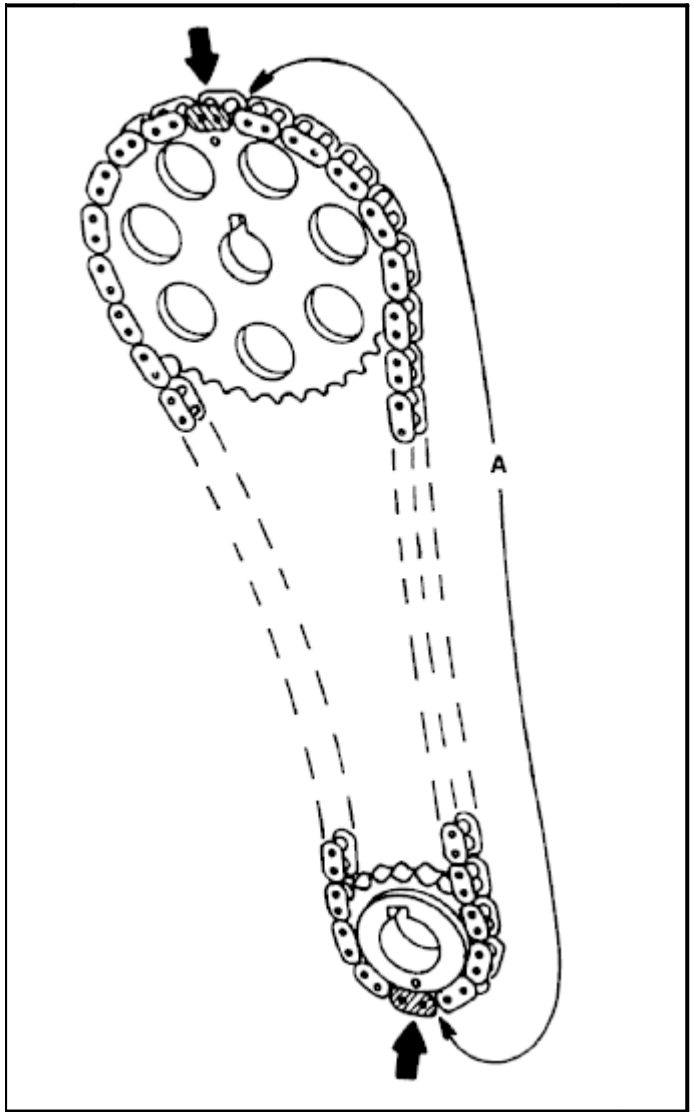
A chain drives the camshaft via two chain guides, and is kept taut through a chain tensioner on the LH guide. Remove and refit the timing chain as follows:

Drain the Cooling system. Remove the engine sump. Remove in sequence: the poly-V-belt(s); the power steering pump mounting, if fitted; the air filter; the RH engine mounting bracket; the water pump; the chain tensioner from the side of the timing cover; the valve cover and spark plugs. Rotate the crankshaft until cylinder No. 1 is in TDC at the end of the compression stroke; check this using the distributor rotor position. Remove: the crankshaft pulley; the timing cover and the camshaft chain gear bolt.

Remove the chain guides and the chain with chain gears. Check the chain for wear and damage. Check that cylinder No. 1 is in TDC at the end of the compression stroke. Lay the chain over the chain gears. Ensure that the markings on chain gears and chain are aligned, see the illustration. The chain markings consist of two silver coloured links separated by an equal distance 'A'.

Fit the chain with the chain gears. Tighten the camshaft gear to 98 - 127 Nm. Note that the washer must be fitted with the chamfered side outwards. Fit the chain guides. Complete engine assembly. Apply liquid gasket to the timing cover mating faces.

Torque settings: in Nm	
Valve cover	2 - 4
Water pump pulley	6,3 - 8,3
Crankshaft pulley	132 - 152
Water pump	6,3 - 8,3
Chain tensioner	13 - 19
Timing cover	16 - 21
Camshaft gear	98 - 127
Chain guides	13 - 19



CA engines

Checking and renewing

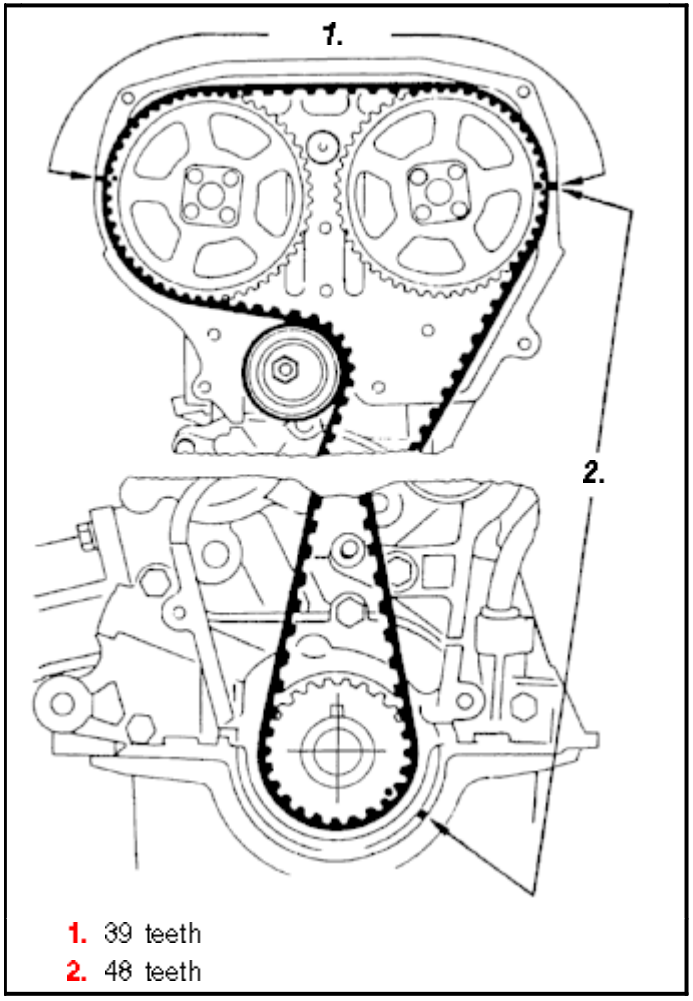
The 16 valve engine with two overhead camshafts (DOHC) has a toothed timing belt with a spring loaded tensioner pulley and an idler pulley. The crankshaft position sensor is mounted with three bolts to the upper timing cover. The oil pump is mounted on the crankshaft, in a housing behind the distribution.

Renew timing belt: Every 90.000 km / 3 years.

Drain the cooling system. Remove the top water hose; the lower RH oil baffle plate; the V belt(s) and the water pump pulley. Remove the crankshaft position sensor from the timing cover. Carefully mark its position. Support the engine. Remove the engine mounting bracket on the side. Remove the upper cover section so that the camshaft gear markings are visible. Align the markings (see illustration). Remove the crankshaft pulley; this is accessible via the inspection cover in the RH inner wing panel. Remove the lower cover section. Apply markings to the belt and note the direction of rotation, if the belt is suitable for further use. Unscrew the tensioner pulley nut. Move the tensioner pulley clockwise with an Allen key against the spring pressure to release the belt. Remove the timing belt. Check all components for further use. Renew any parts which are worn or damaged. Refit the timing belt as follows:

Check the camshafts and crankshaft positions. See illustration. Fit the belt ensuring that the belt markings are aligned, or check the number of teeth between the crankshaft gear and camshaft gear and between the two camshaft gears; see illustration.

Slacken the tensioner pulley nut to tension the belt. Secure the lower cover section. Fit the crankshaft pulley and tighten the pulley bolt to 142 - 152 Nm. Rotate the crankshaft two full turns clockwise. Tighten the tensioner pulley bolt without moving the tensioner pulley to 22 - 29 Nm. Secure the upper cover section noting that the bolt lengths vary. Both outer bolts at the top of the cover are the shortest; the extra long bolt is in the centre, second from the top. Place the crankshaft position sensor in the marked position. Tighten to 7 - 8 Nm. Tighten the engine mounting bracket to 39 - 54 Nm. Complete engine assembly.



1. 39 teeth
2. 48 teeth

Torque settings: in Nm	
Lower timing cover	3 - 5
Upper timing cover	7 - 8
Crankshaft pulley	142 - 152
Idler pulley nut	31 - 42
Tensioner pulley nut	22 - 29
Crankshaft position sensor	7 - 8
Spark plugs	20 - 29
Engine mounting bracket	39 - 54

Valves, rocker arms and tappets

Valve clearance

Checks and adjustments

The valve clearance is checked and adjusted with the engine warm. The tappets have the usual adjustment bolts. Adjust the valves in the following sequence:

Piston No. 1 in TDC at the end of the compression stroke.

Cylinder No. 1:	inlet and exhaust
Cylinder No. 2:	inlet
Cylinder No. 3:	exhaust

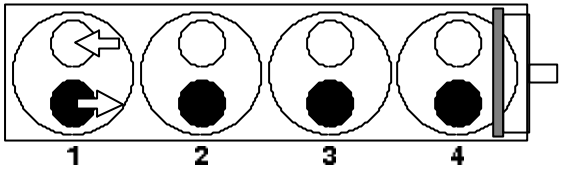
Piston No. 4 in TDC ditto:

Cylinder No. 2:	exhaust
Cylinder No. 3:	inlet
Cylinder No. 4:	inlet and exhaust

The adjustment values are as follows:

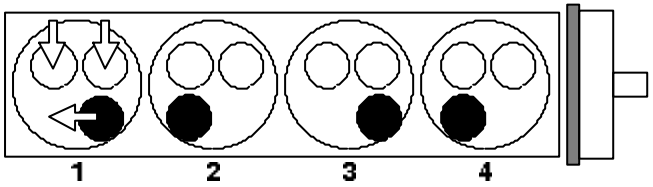
E engines:	
All valves	0,28 mm
GA 14S:	
Inlet	0,20 - 0,30 mm
Exhaust	0,25 - 0,35 mm

torque settings	
lock nut	
E engines:	16 - 21 Nm
GA 14S:	7,4 - 11,3 Nm



Firing order: 1-3-4-2

E engines



Firing order: 1-3-4-2

GA 14S engines