ACCORD DIESEL
SHOP MANUAL
SUPPLEMENT 96

This Repair Manual Supplement contains information on the components and systems unique to '96 ACCORD Diesel models.

This supplement should be used in conjunction with the following manual:

Description	Code No.
HONDA ACCORD MAINTENANCE, REPAIR AND CONSTRUCTION 93	62SN700
HONDA ACCORD SUPPLEMENT 93	62SN720
HONDA ACCORD SUPPLEMENT 94	62SN721
HONDA ACCORD SUPPLEMENT 95	62SN722
HONDA ACCORD SUPPLEMENT 96	62SN723

As sections with * include SRS components; special precautions are required when servicing.

First Edition 1/96 280 pages

HONDA MOTOR CO., LTD.
Service Publication Office

: marked sections are not included in this manual.

INTRODUCTION

How to use this manual

To assist in the use of this manual the section title is given at the top and the relevant sub – section is given at the bottom each page.

Each major section starts with a contents page, listing the information contained in the four sub – sections of: Description and Operation, Adjustments, Repairs and Data, Torque & Tools. To assist filing of revised information each of the four sub – sections is numbered from page 1.

The Adjustments and Repairs sub – sections are illustrated. The individual items comprising repair operations are to be followed in the sequence in which they appear. Items numbers in the illustration are referred to in the text.

Adjustment and Repair operations include reference to Service Tool numbers and the associated illustration depicts the tool. Where usage is not obvious the tool is shown in use. Adjustment and Repair operations also include reference to wear limits, relevant data, torque figures, and specialist information and useful assembly details. In the majority of cases, each Adjustment or Repair operation is given its Repair Operation Time number for reference,

WARNINGS, CAUTIONS and Notes have the following meanings:

WARNING: Procedures which must be followed precisely to avoid the possibility of injury.

CAUTION: *Calls attention to procedures which must be followed to avoid damage to components.*

Note: *Gives helpful information.*

References

References to the LH or RH side given in this manual are made when viewing the vehicle from the rear. With the engine and gearbox assembly removed, the crankshaft pulley end of the engine is referred to as the front.

Operations covered in this manual do not include reference to testing the vehicle after repair. It is essential that work is inspected and tested after completion and if necessary a road test of the vehicle is carried out particularly where safety related items are concerned.

Dimensions

The dimensions quoted are to design engineering specification with Service limits where applicable.

During the period of running – in from new, certain adjustments may vary from the specification figures given in this manual. These will be reset by the Dealer at the After Sales Service, and thereafter should be maintained at the figures specified in this manual.

REPAIRS AND REPLACEMENTS

When replacement parts are required it is essential that only HONDA recommended parts are used.

Attention is particularly drawn to the following points concerning repairs and the fitting of replacement parts and accessories.

Safety features and corrosion prevention treatments embodied in the car may be impaired if other than Rover recommended parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the manufacturer's specification. Torque wrench setting figures given in this Manual must be used. Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed.

Owners purchasing accessories while travelling abroad should ensure that the accessory and its fitted location on the car conform to legal requirements.

The Terms of the vehicle Warranty may be invalidated by the fitting of other than HONDA recommended parts.
All HONDA recommended parts have the full backing of the vehicle Warranty.
HONDA Dealers are obliged to supply only HONDA recommended parts.

SPECIFICATION

HONDA are constantly seeking to improve the specification, design and production of their vehicles and alterations take place accordingly. While every effort has been made to ensure the accuracy of this Manual, it should not be regarded as an infallible guide to current specifications of any particular vehicle.
This Manual does not constitute an offer for sale of any particular vehicle. HONDA Dealers are not agents of HONDA and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

ABBREVIATIONS AND SYMBOLS

After Bottom Dead Centre	ABDC
After Top Dead Centre	ATDC
Air Cleaner	ACL
Air conditioning, Air conditioner	A/C
Air fuel ratio	AFR
Alternating current	ac
Alternator	ALT
Amperes	A
Anti-lock brake system	ABS
Before Bottom Dead Centre	BBDC
Before Top Dead Centre	BTDC
Bottom Dead Centre	BDC
British Standards	BS
Carbon monoxide	CO
Celcius (Centigrade)	C
Centimetre	cm
Chlorofluorocarbons	CFC's
Crankshaft position	CKP
Cubic centimetres	cm^3
Cubic inches	in^3
Degree (angle)	deg. or °
Degree (temperature)	deg. or °
Dial test indicator	DTI
Diameter	dia.
Direct current	dc
Electronic Control Unit	ECU
Exhaust gas recirculation	EGR
Electronic air control valve	EACV
Engine Control Module	ECM
Engine Coolant temperature	ECT
Fahrenheit	F
Foot	ft
Gallons (Imperial)	gal
Gramme (mass)	g
High compression	hc
Hour	h
Inches	in
Intake air temperature	IAT
Internal diameter	i.dia.
International Organization for Standardization	ISO
Kilometre	km
Kilogramme	kg
Left – hand	LH
Left – handle drive	LHD
Light emitting diode	LED
Litre	l
Low Compression	lc
Malfunction Indicator Lamp	MIL
Manifold Absolute Pressure	MAP
Mass Air Flow	MAF
Maximum	max.
Mercury	Hg
Metre	m
Miles per hour	mph
Millimetre	mm
Minimum	min
Minus (of tolerance)	–
Minute (angle)	′
Model Year	MY
Multi – function unit	MFU
Multi – point injection	MPi
Negative (electrical)	(–)
Newton metre	Nm
Number	No.
Outside diameter	o.dia.
Percentage	%
Pint	pt
Plus or minus	±
Plus (tolerance)	+
Positive (electrical)	+
Positive crankcase ventilation	PCV
Positive temperature coefficient	PTC
Pounds mass	lb
Power assisted steering	PAS
Radius	r
Ratio	:
Reference	ref.
Revolutions per minute	rev/min
Right – hand	RH
Right – handle drive	RHD
Rover Engineering Standards	RES
Second (angle)	″
Single overhead camshaft	SOHC
Specific gravity	sp.gr
Square centimetres	cm^2
Standard	std.
Supplementary Restraint System	SRS
Synchronizer synchromesh	synchro
Thousand	k
Top dead centre	TDC
United Kingdom	UK
United States	US
Vehicle identification number	VIN
Vehicle Speed Sensor	VSS
Volt	V
Watt	W

CONTENTS

ENGINE – L SERIES

Type	20 T2N – 8 valve SOHC
Cylinder arrangement	4 in line – transverse
Bore – liner	84.5 mm
Stroke	88.9 mm
Capacity	1994 cm^3 (cc)
Firing order	1 – 3 – 4 – 2
Rotation	Clockwise

Valve Timing

Inlet: Opens at	13° B.T.D.C.
Closes at	43° A.B.D.C.
Lift	8.1 mm
Exhaust: Opens at	68° B.B.D.C.
Closes at	12° A.T.D.C.
Lift	9.1 mm

Lubrication

System Type	Wet sump, crankshaft driven eccentric rotor pump.
Pressure at idle	0.7 bar (minimum) [0.7 kgf/cm^2 (minimum)]
Maximum oil pressure at 3000 rev/min (rpm)	3.8 bar (minimum) [3.9 kgf/cm^2 (minimum)]
Oil pressure warning light switch opens	0.4 – 0.7 bar [0.4 – 0.7 kgf/cm^2]
Oil filter	Full flow, renewable cartridge

COOLING SYSTEM

Pressure cap opens	110 kPa (1.1 kgf/cm^2)
Thermostat setting	82°C ± 5°C (Bottom Hose)

CLUTCH

Type	Diaphragm spring, hydraulic operation
Clutch plate diameter	228 mm

MANUAL GEARBOX

Gearbox code	PG1 S4 FTU
Gear ratios:	
Fifth	0.648 : 1
Fourth	0.848 : 1
Third	1.222 : 1
Second	1.894 : 1
First	3.250 : 1
Reverse	3.000 : 1

FINAL DRIVE

Ratio	4.200: 1	
Road speed at 1000 rev/min	km/h	mph
5th gear	41.7	25.9
4th gear	31.9	19.8
3rd gear	22.1	13.7
2nd gear	14.3	8.9
1st gear	8.3	5.2

WHEELS & TYRES

Wheel size	15 x 5 1/2 JJ - Steel and Aluminum
Tyre size	185/65 - R15

Pressures (cold):

Size	Loading Condition	bar (kgf/cm²)	lbf/in²
185/65 – R15	All conditions up to speeds of 100 mph, 160 km/h	Front 2.2 (2.2)	32
		Rear 2.2 (2.2)	32
	Speeds above 100 mph, 160 km/h	Front 2.6 (2.7)	38
		Rear 2.6 (2.7)	38

ELECTRICAL

System ..... 12 volt, negative earth

Battery

Type - Maintenance free	096
Cold crank capacity	680 amps
Reserve capacity	135 amps

Alternator	**Without Air/con**	**With Air/con**
Type (Nippondenso)	K3 AVP-80	K3 AVP-90
Maximum output	80A	90A

Starter motor

Type ..... RA 2 kW

DIMENSIONS

Overall length	4.685 m
Overall width (includes mirrors)	1.720 m
Overall height	1.380 m
Wheelbase	2.720 m
Turning circle, kerb to kerb	11.0 m
Track:	
Front	1.475 m
Rear	1.480 m

WEIGHTS

Unladen (fuel tank full, excluding options)		
TDi – LHD	1345 kg	2965 lbs
TDi – LHD with A/C	1372 kg	3025 lbs
TDi – LHD with sunroof	1363 kg	3005 lbs
TDi – LHD with A/C and leather seat	1367 kg	3014 lbs
TDi – RHD	1348 kg	2972 lbs
TDi – RHD with ABS	1363 kg	3005 lbs
TDi – RHD with ABS and A/C	1367 kg	3014 lbs
Maximum gross vehicle weight	1880 kg	4145 lbs
Maximum rear axle load	950 kg	2094 lbs
Maximum roof rack load (distributed)*	75 kg	165 lbs
Maximum towing weight with braked trailer – restart on a 12%, 1 in 8 gradient with one passenger and 95 kg (200 lb) of luggage**	1400 kg	3086 lbs
Towing hitch downward load	50 kg	110 lbs

* Load applies to HONDA approved roof racks only, and includes weight of roof rack.

** Any additional weight of luggage or additional passengers, should be deducted from the maximum towing weight quoted.

Model: ACCORD Diesel **Year: 1996 on**

Engine

Type/Capacity	20T2N/1994 cm^3 (cc)
Firing order	1 – 3 – 4 – 2
Compression ratio	19.5 : 1
Idle speed	805 ± 50 rev/min (rpm)

Electronic Diesel Control

Fuel injection pump	
Make	Bosch electronic.
Type	L 580
Injectors	
Make	Bosch 2 stage
Type	1 cylinder KBAL 70P45 2, 3, 4 cylinder KBAL 70P46
Opening pressure	20000 – 32000 kPa (0.2 – 0.3 kgf/cm^2)
Glow plugs	
Make	BERU
Type	0100226 184

CAPACITIES

Fuel tank	65 litres (Diesel fuel only)
Engine oil refill and filter change	
Service refill	5.0 litres
Overhaul Refill	6.5 litres
Manual gearbox refill	2.2 litres
Power steering refill	1.1 litres
Cooling system refill	3.2 litres
Washer reservoir	5.7 litres

FLUIDS

Brake Fluid

Use only AP New Premium Super DOT 4 brake fluid or Castrol Girling Universal DOT 4 brake/clutch fluid. DO NOT use any other type of fluid.

Anti – freeze solutions

The overall anti – freeze concentration should not fall, by volume, below 50% to ensure that the anti – corrosion properties of the coolant are maintained. Anti – freeze concentrations greater than 60% are not recommended as cooling efficiency will be impaired.

Use **Honda Anti – freeze Coolant** to protect the cooling system.

The cooling system should be drained, flushed and refilled with the correct amount of anti – freeze solution at the intervals given on the Service Maintenance Check Sheet.

***CAUTION**: No other 'universal' anti – freeze should be used with Honda Anti – freeze Coolant.*

If **Honda Anti – freeze Coolant** is not available, use an ethylene glycol based anti – freeze containing no methanol with non – phosphate corrosion inhibitors which meet specifications BS6580 and BS5117 suitable for use in mixed metal engines. To ensure the protection of the cooling system against corrosion, these anti – freezes must be renewed every 12 months.

After filling with anti – freeze solution, attach a warning label to a prominent position on the vehicle stating the type of anti – freeze contained in the cooling system to ensure that the correct type is used for topping-up.

The recommended quantities of anti – freeze for different degrees of frost protection are:

Solution	Amount of anti-freeze	Commences freezing		Frozen solid	
50%	Litres	°C	°F	°C	°F
ACCORD Diesel model	3.5	– 36	– 33	– 48	– 53

LUBRICATION

The engine and other lubricating systems are filled with high – performance lubricants giving prolonged life.

CAUTION: *You should always use a high quality oil of the correct viscosity range in the engine and gearbox during maintenance and when topping – up. The use of oil not to the correct specification can lead to high oil and fuel consumption and ultimately to damaged components.*

Oil to the correct specification contains additives which disperse the corrosive acids formed by combustion and prevent the formation of sludge which can block the oil ways. Additional oil additives should not be used.
Always adhere to the recommended servicing intervals.

Engine oil
Use oil meeting specification RES.22.OL.G4 or the requirements of CCMC G4, and having a viscosity band recommended for the temperature range of your locality. Where oils to European specifications are not available, well known brands of oils meeting API SG or SG/CD or API SH quality should be used.

Manual gearbox
Use a transmission oil of API service SG or SH viscosity SAE 10W/40 for refill or topping – up.

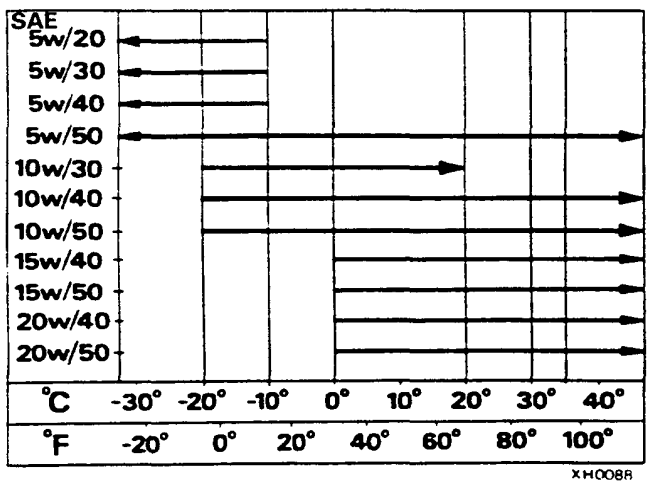
Power Steering
Use an PSF-V.

General Greasing
Use Multipurpose Lithium Base Grease N.L.G.I. consistency No. 2.

Bonnet latch
Lubricate cable and latch with oil.

Locks, Latches and Hinges
Use Door Lock and Latch Lubricant, Part No. VWN 10075.

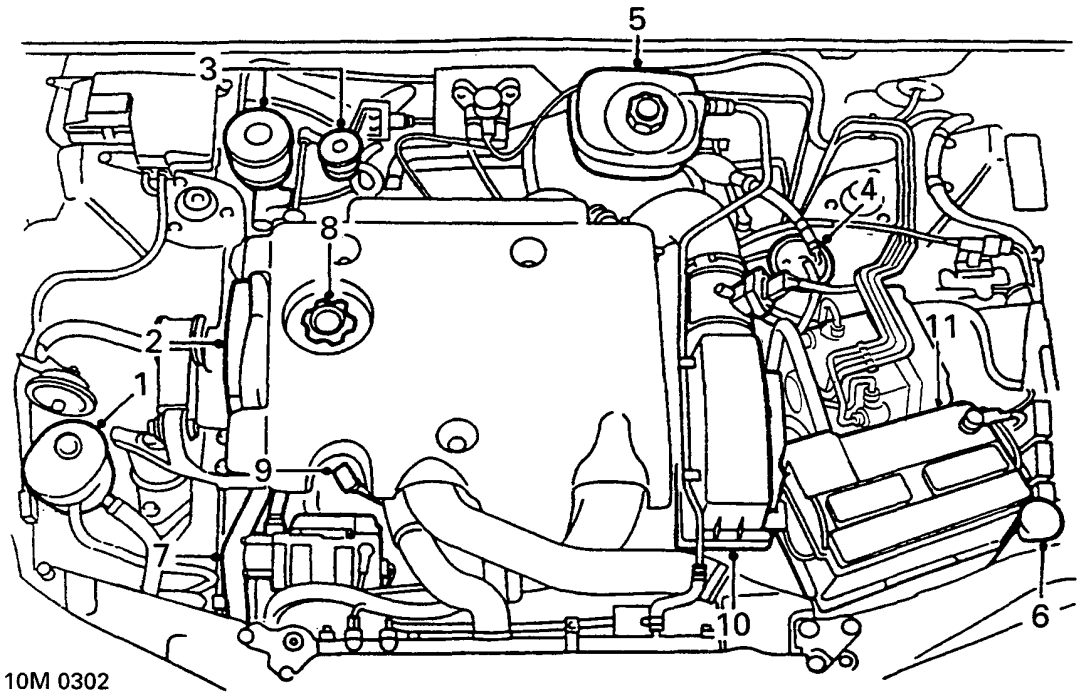
SERVICE LUBRICANTS – ALL SEASONS



ENGINE OIL VISCOSITY/ TEMPERATURE RANGES

MAINTENANCE

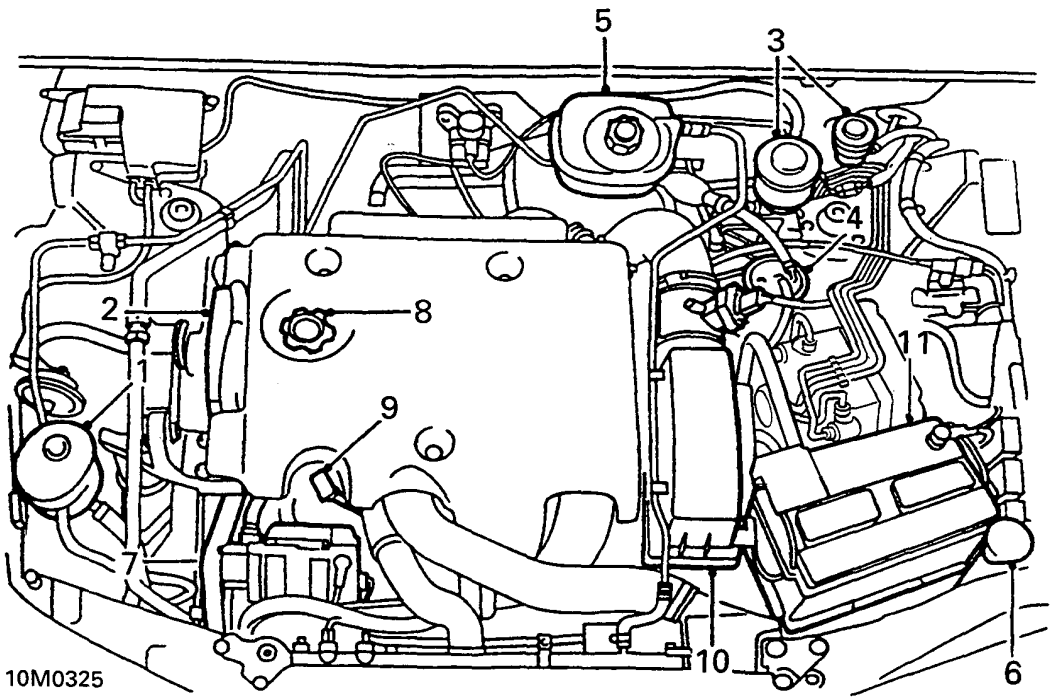
CONTENTS



10M 0302

UNDERBONNET LOCATIONS - RHD

1. Power steering reservoir
2. Camshaft drive belt
3. Brake and clutch fluid reservoirs
4. Fuel filter
5. Coolant expansion tank
6. Windscreen washer reservoir
7. Drive belt
8. Engine oil filler cap
9. Engine oil dipstick
10. Air cleaner
11. Battery



UNDERBONNET LOCATIONS - LHD

1. Power steering reservoir
2. Camshaft drive belt
3. Brake and clutch fluid reservoirs
4. Fuel filter
5. Coolant expansion tank
6. Windscreen washer reservoir
7. Drive belt
8. Engine oil filler cap
9. Engine oil dipstick
10. Air cleaner
11. Battery

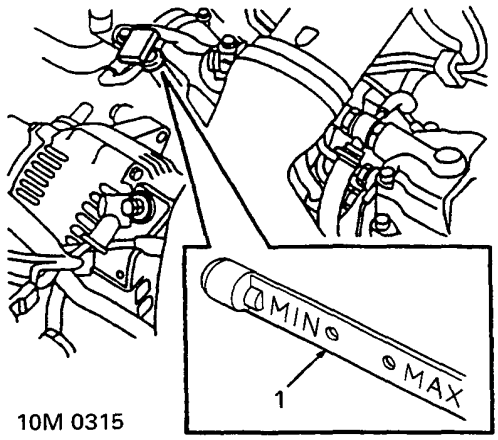
CHECK ENGINE AND TRANSMISSION

Visually inspect for oil leaks from the engine and transmission, pay particular attention to areas of gaskets and seals.

ENGINE OIL AND FILTER

Oil level check

Always check oil level and drain oil with vehicle standing on level ground and use oil of specification API SG or SG/CD or API SH quality SAE 15W/40 for topping up or refilling.



10M 0315

1. Withdraw dipstick and wipe blade. re-insert dipstick fully, withdraw it and check oil level which must be maintained between 'MIN' and 'MAX' marks on dipstick.

CAUTION: *Ensure NO oil drips onto the alternator when extracting the dipstick.*

2. If required, remove filler cap and top- up with new engine oil to specification SAE 15W/40.

CAUTION: *DO NOT raise oil level above the 'MAX' mark on dipstick.*

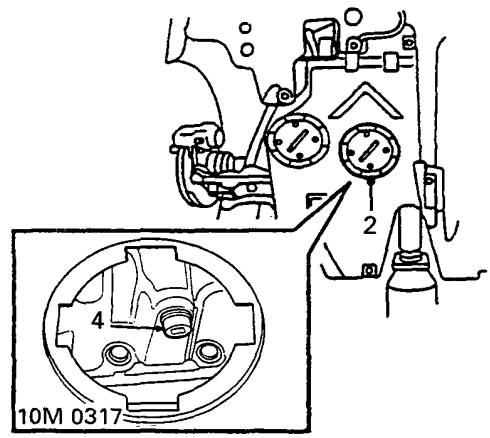
Oil drain and refill

Oil should always be drained when engine is warm.

WARNING: After engine has been run, exhaust pipes will be hot; take care when working in this area. Observe due care when draining oil as oil can be very hot.
Prolonged and repeated contact with used engine oil may cause serious skin disorders, wash hands thoroughly after contact. Keep engine oil out of reach of children.

1. Raise front of vehicle.

WARNING: Support on safety stands.



10M 0317

2. Remove oil drain plug access cover from RH under belly panel.
3. Place a container beneath sump.
4. Remove drain plug and sealing washer, allow oil to drain; discard sealing washer.
5. Clean drain plug, fit new sealing washer and refit drain plug. Tighten drain plug to 45 N·m (4.6 kgf·m, 33 lbf·ft).
6. Remove oil filler cap, refill engine with oil to specification SAE 15W/40 until oil level is correct.

CAUTION: *DO NOT raise oil level above the 'MAX' mark on dipstick.*

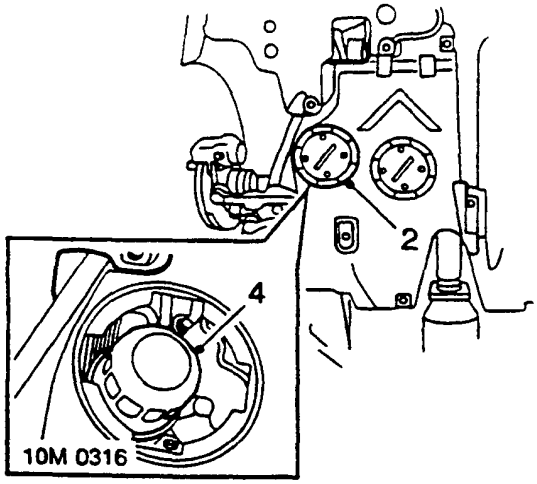
7. Fit oil filler cap.
8. Remove container from beneath sump.
9. Fit oil drain plug access cover to RH under belly panel.
10. Remove stand(s) and lower vehicle.

Oil filter renewal
Service Repair No. 12.60.04

Renew

1. Raise front of vehicle.

WARNING: Support on safety stands.



2. Remove oil filter access cover from RH under belly panel.
3. Clean area around filter head and place a container beneath engine.
4. Using a strap wrench, unscrew and discard filter.
5. Clean mating face of filter head.
6. Lubricate sealing ring of new filter with engine oil.
7. Screw filter on to filter head by hand until it seats then tighten one complete turn or 17 N·m (1.7 kgf·m, 13 lbf·ft).
8. Fit filter access cover to RH under belly panel.
9. Remove stand(s) and lower vehicle.
10. Top-up engine with engine oil to specification SAE 15W/40 until level is correct.

CAUTION: *DO NOT raise oil level above the 'MAX' mark on dipstick.*

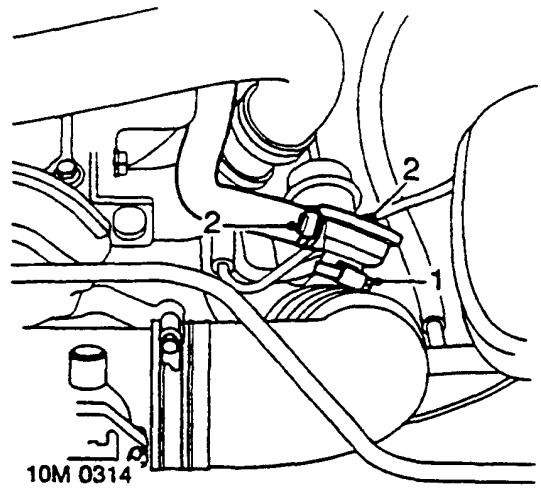
11. Start and run engine and check for oil leaks.
12. Stop engine, wait a few minutes, then check oil level and top up if necessary.

CAUTION: *Ensure NO oil drips onto the alternator when extracting the dipstick.*

CRANKCASE BREATHER VALVE

Service Repair No. 17.10.25

Remove



1. Slacken clip and release valve from air intake hose.
2. Slacken clip and remove valve from breather hose.

Refit

1. Fit valve to breather hose and tighten clip.
2. Connect valve to air intake hose and tighten clip.

DRIVE BELT

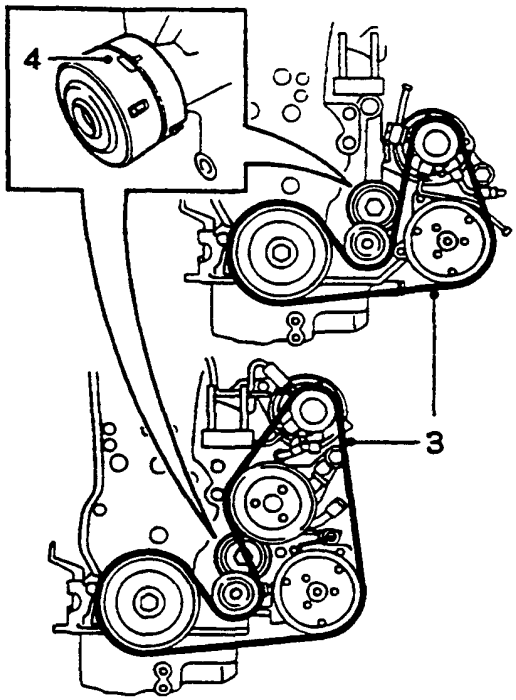
Service Repair No.
Check/adjust tension - 86.10.05
Renew - 86.10.03

Check condition

1. Raise front of vehicle.

WARNING: Support on safety stands.

2. Remove LH under tray, see **BODY - Repairs.**
3. Turn steering to RH lock.



10M 0300

4. Check condition of drive belt, renew a belt that shows signs of wear, splitting or oil contamination.
5. Check belt length, belt must be renewed before indicator reaches RH end of slot.

Renew

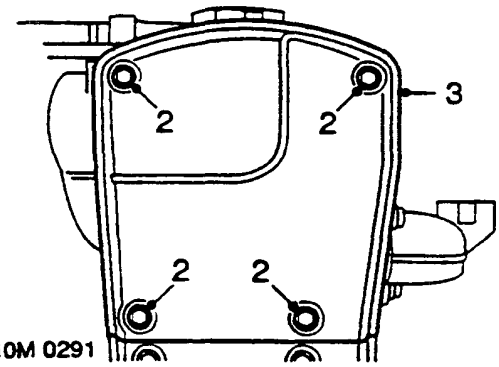
1. Using a 15 mm ring spanner on drive belt tensioner pulley bolt, rotate pulley fully clockwise and hold.
2. Using assistance, release drive belt from alternator pulley.
3. Remove drive belt from remaining pulleys and remove from vehicle.
4. Clean drive belt pulley grooves and ensure grooves are not damaged.
5. Fit new drive belt around pulleys, except alternator pulley, ensure belt is correctly aligned in pulley grooves.
6. Hold tensioner pulley fully clockwise, using assistance fit drive belt around alternator pulley.
7. Remove ring spanner from tensioner pulley bolt.
8. Refit LH under tray, see **BODY - Repairs.**
9. Remove stand(s) and lower vehicle.

CAMSHAFT TIMING BELT CHECK

Service Repair No. 12.65.17

CAUTION: *This check must be carried out at the service intervals specified in the Service maintenance Check Sheet and whenever carrying out any repair which requires the timing belt to be disturbed. Pay particular attention for signs of belt splitting at base of teeth.*

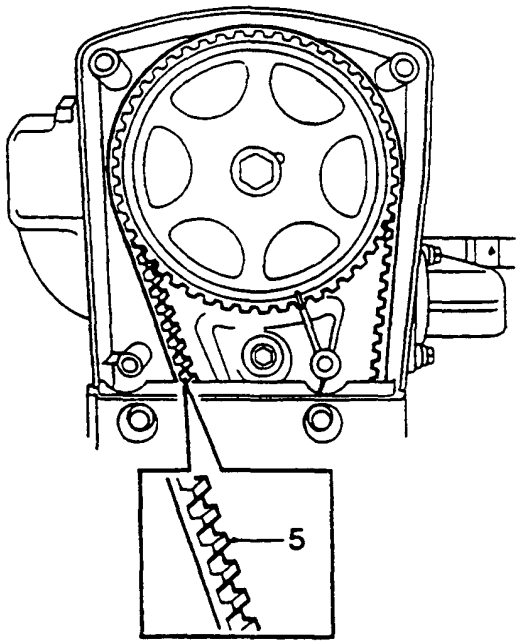
1. Disconnect battery earth lead.



10M 0291

2. Remove 4 bolts securing timing belt top cover.
3. Remove top cover.
4. Using a socket and extension bar on crankshaft pulley bolt, rotate engine a sufficient number of turns to enable timing belt to be inspected.

CAUTION: *Do not use camshaft gears or retaining bolts to rotate engine.*



10M 0292

5. Check timing belt for condition, renew any timing belt showing signs of oil contamination, cracking, fraying or splitting at base of teeth.

CAUTION: *Cause of oil contamination, if present, must be rectified.*

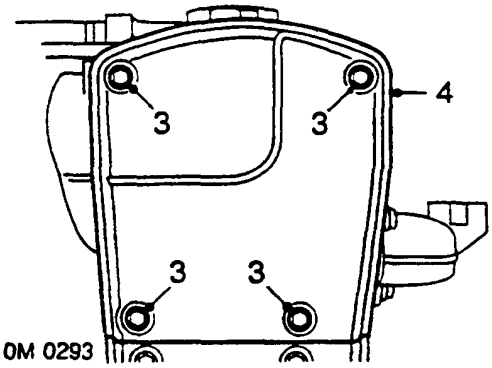
6. Clean timing belt top cover.
7. Position top cover.
8. Fit top cover securing bolts and tighten to 5 Nm.
9. Connect battery earth lead.

CAMSHAFT TIMING BELT

Service Repair No. 12.65.18

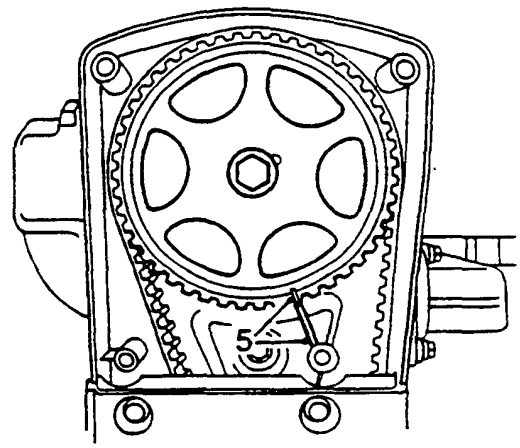
Remove

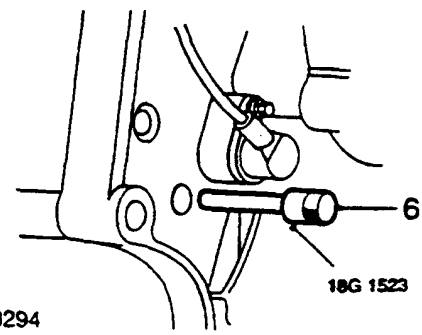
1. Disconnect battery earth lead.
2. Remove drive belt, see **Drive belt.**



10M 0293

3. Remove 4 bolts securing camshaft timing belt top cover.
4. Remove top cover.



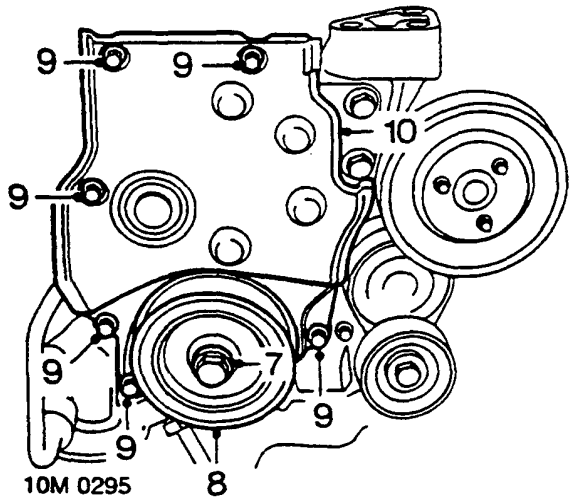


10M 0294

5. Using a socket and extension bar on the crankshaft pulley bolt, rotate crankshaft clockwise to align timing marks on camshaft pulley to back cover.

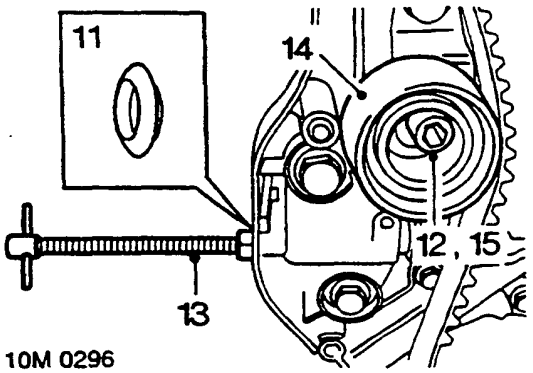
CAUTION: *Never use the camshaft gear, gear retaining bolt or timing belt to rotate the camshaft.*

6. Insert timing pin tool **18G 1523** through hole in gearbox mounting back plate and into hole in flywheel.



10M 0295

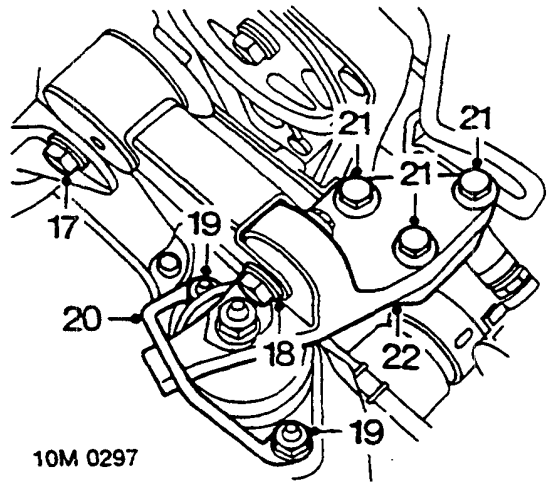
7. Remove crankshaft pulley bolt.
8. Remove crankshaft pulley.
9. Remove 6 bolts securing camshaft timing belt lower cover.
10. Remove lower cover.



10M 0296

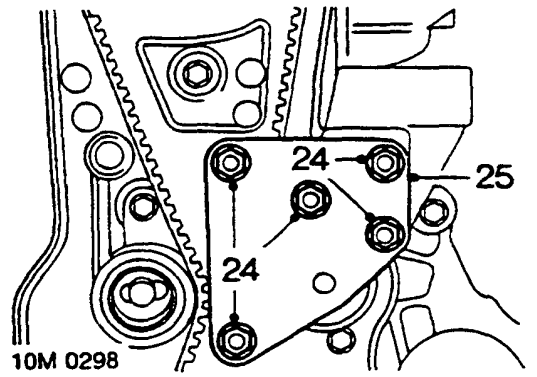
11. Remove camshaft timing belt tensioner access plug from timing belt rear cover.
12. Slacken Allen bolt securing tensioner pulley.
13. Fit tool **18G 1719** to tensioner.
14. Pull back camshaft timing belt tensioner plunger using tool **18G 1719** .
15. Tighten tensioner pulley Allen bolt.
16. Position trolley jack to support engine

CAUTION: *Use a block of wood or hard rubber pad to protect sump.*



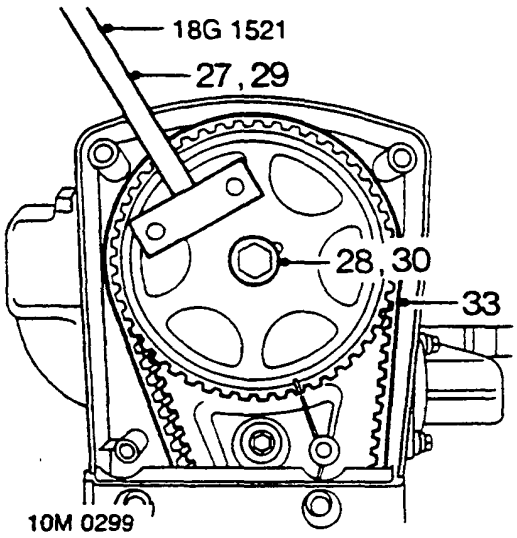
10M 0297

17. Remove bolt securing engine RH mounting tie to body bracket.
18. Slacken bolt securing engine RH mounting to tie.
19. Remove 2 nuts securing engine RH mounting restraint bar.
20. Remove mounting restraint bar.
21. Remove 3 bolts securing engine RH mounting to engine.
22. Remove engine RH mounting assembly.
23. Raise engine on jack.



10M 0298

24. Remove 5 nuts securing engine RH mounting plate.
25. Remove engine mounting plate.
26. If timing belt is to be refitted, mark direction of rotation on belt.



27. Restrain camshaft gear using tool **18G 1521.**
28. Remove camshaft gear bolt.
29. Restrain camshaft gear using tool **18G 1521.**
30. Apply clean engine oil to threads of new bolt, fit camshaft gear bolt.
31. Tighten camshaft gear bolt to 20 N·m (2.0 kgf·m, 15 lbf·ft) + 90°.
32. Remove tool **18G 1521.**
33. Remove timing belt.

CAUTION: *Ease timing belt off gears using fingers only. Metal levers may damage the belt and gears. Do not rotate engine with timing belt removed and cylinder head fitted. Timing belts must be stored and handled with care. Always store a timing belt on its edge with a bend radius greater than 50 mm. do not use a timing belt that has been twisted or bent double as this can fracture reinforcing fibres. Do not use an oil contaminated timing belt. Although the belt has a sevice life of 84,000 miles, (135,000 km), an existing belt should only be refitted if it has completed less than 42.000 miles, (65,000 Km).*

Refit

1. Clean timing belt gears and pulleys.

CAUTION: *If the sintered gears have been subjected to prolonged oil contamination, they must be soaked in a solvent bath and thoroughly washed with solvent before refitment. Because of the porous construction of sintered material, oil impregnated in the gear will emerge and contaminate a new belt.*

2. Clean crankshaft pulley.
3. Using fingers only, fit timing belt to gears. Ensure the belt run between the crankshaft gear and the camshaft gear is kept taut during the fitting procedure.

CAUTION: *If original belt is to be refitted, ensure direction of rotation is facing the correct way.*

4. Fit plate to engine mounting studs.
5. Tighten nuts using the following procedure:
   i. Tighten nuts to 30 N·m (3.1 kgf·m, 16 lbf·ft)
   ii. Turn nuts through 120 degrees.
6. Fit engine RH mounting assembly.
7. Lower engine on jack to align engine mounting assembly.
8. Fit 3 bolts securing engine mounting to engine and tighten to 85 N·m (8.7 kgf·m, 63 lbf·ft)
9. Fit mounting restraint bar to mounting, fit and tighten 2 nuts to 45 N·m (4.6 kgf·m, 33 lbf·ft)
10. Align mounting tie bar to body bracket, fit and tighten bolt to 90 N·m (9.2 kgf·m, 66 lbf·ft)
11. Tighten bolt securing mounting tie bar to mounting to 90 N·m (9.2 kgf·m, 66 lbf·ft)
12. Remove trolley jack from vehicle.
13. Position camshaft timing belt lower cover, fit 7 bolts and tighten to 5 N·m (0.5 kgf·m, 4 lbf·ft)
14. Fit crankshaft pulley, fit bolt and tighten to 63 N·m (6.4 kgf·m, 46 lbf·ft) + 90°.
15. Slacken tensioner pulley Allen bolt.
16. Release camshaft timing belt tensioner plunger using tool **18G 1719.**
17. Remove timing pin tool **18G 1523** from flywheel.
18. Fit camshaft timing belt tensioner access plug from timing belt lower cover.
19. Rotate crankshaft 2 complete revolutions and align camshaft gear timing mark.
20. Tighten tensioner pulley Allen bolt to 44 N·m (4.5 kgf·m, 32 lbf·ft)

CAUTION: *Do not exceed the specified torque figure.*

21. Position camshaft timing belt top cover, fit 4 bolts and tighten to 5 N·m (0.5 kgf·m, 4 lbf·ft)
22. Fit drive belt, see **Drive belt.**
23. Connect battery earth lead.

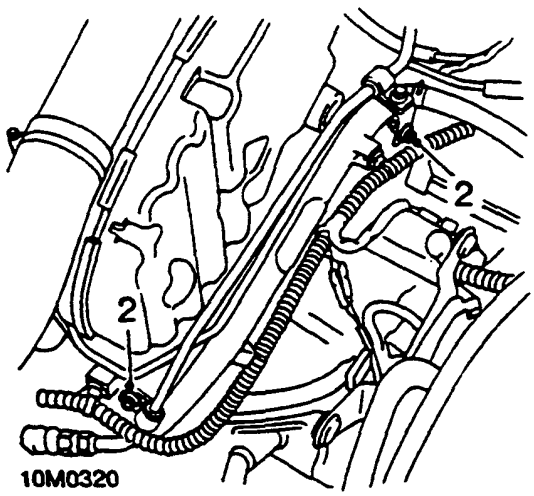
INJECTION PUMP TIMING BELT - CHECK

Service Repair No. 12.65.52

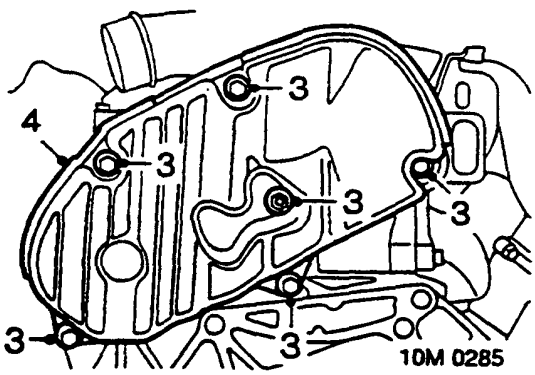
Remove

CAUTION: *This check must be carried out at the service intervals specified on the service maintenance check sheet and whenever carrying out any repair which requires the timing belt to be disturbed. Pay particular attention for signs of the belt splitting at the base of teeth.*

1. Remove air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**

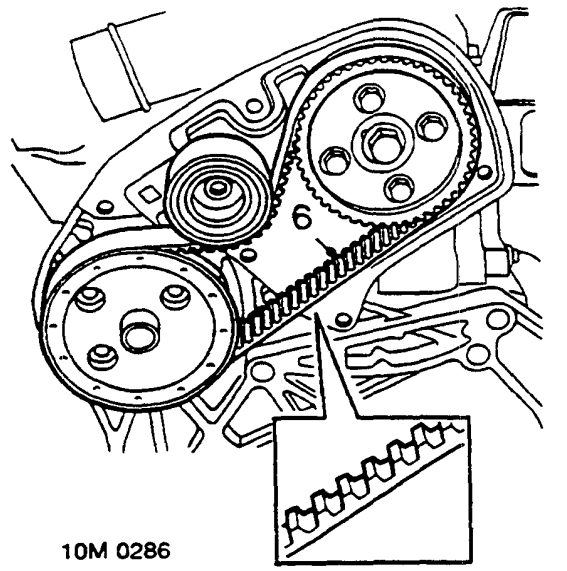


2. Remove 2 bolts securing PAS pipe to coolant rail.



3. Remove 5 bolts and nut securing injection pump timing belt cover.
4. Remove injection pump timing cover.
5. Using a socket and an extension bar on the crankshaft pulley bolt, rotate the engine to enable all of the injection pump timing belt to be inspected.

CAUTION: *Never use the camshaft gear, gear retaining bolt or timing belt to rotate the engine.*



6. Check timing belt for condition, renew any timing belt that shows signs of splits at base of teeth, fraying, oil contamination or uneven wear. Renew timing belt if it fails inspection, see **Injection pump timing belt.**

CAUTION: *Cause of oil contamination must be rectified.*

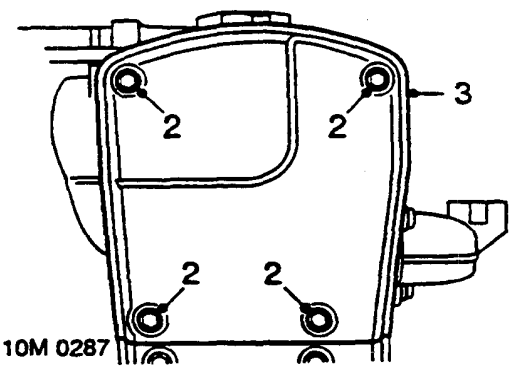
7. Clean injection pump timing belt cover.
8. Position injection pump timing belt cover, fit nut and bolts and tighten to 5 N·m (0.5 kgf·m, 4 lbf·ft)
9. Fit air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**

INJECTION PUMP TIMING BELT

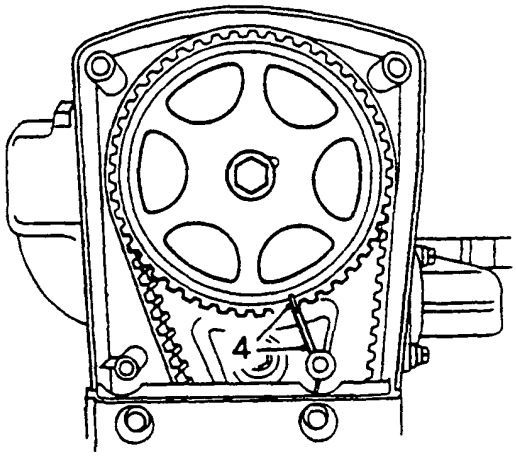
Service Repair No. 12.65.51

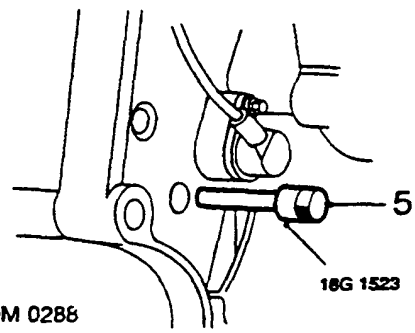
Remove

1. Remove air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**



2. Remove 4 bolts securing camshaft timing belt top cover.
3. Remove camshaft top cover.

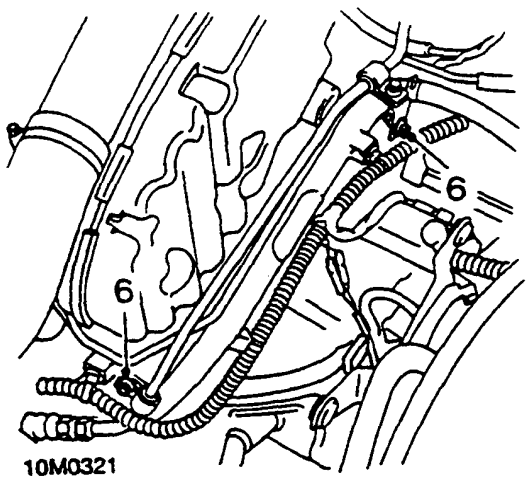




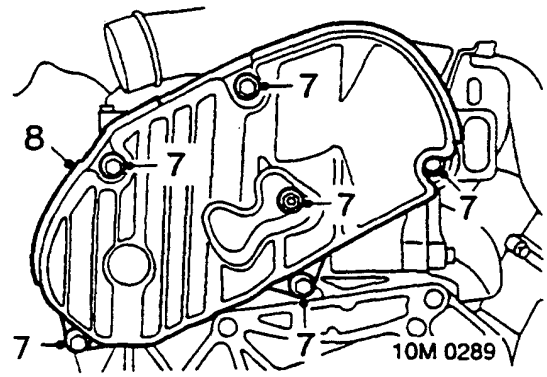
4. Using a socket and extension bar on the crankshaft pulley bolt, rotate crankshaft clockwise to align timing marks on camshaft pulley and back cover.

CAUTION: *Never use the camshaft gear, gear retaining bolt or timing belt to rotate the camshaft.*

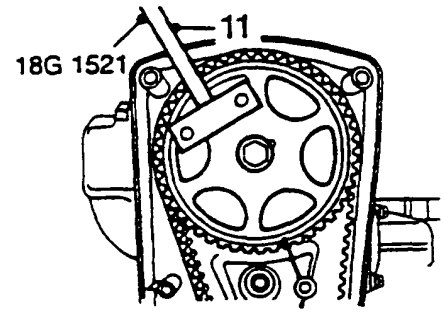
5. Insert timing pin tool **18G 1523** through hole in gearbox mounting plate and into hole in flywheel.

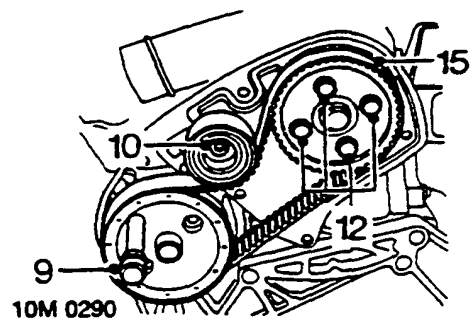


6. Remove 2 bolts securing PAS pipe to coolant rail.



7. Remove 5 bolts and nut securing injection pump timing belt cover.
8. Remove injection pump timing cover.





9. Insert locking pin tool **18G 1717** through injection pump drive gear and into hole in mounting plate.
10. Slacken Allen bolt securing tensioner pulley to mounting plate
11. Restrain front camshaft gear using tool **18G 1521.**
12. Slacken 4 bolts securing rear camshaft gear to boss.
13. If drive belt is to be refitted, mark direction of rotation on belt.
14. Move tensioner aside.
15. Remove injection pump timing belt.

CAUTION: *Ease timing belt off gears using fingers only. Metal levers may damage the belt and gears.*

Timing belts must be stored and handled with care. Always store a timing belt on its edge with a bend radius greater than 50 mm. do not use a timing belt which has been twisted or bent double

as this can fracture reinforcing fibres. Do not use an oil contaminated timing belt. Although the belt has a service life of 84,000 miles, (135,000 km), an existing belt should only be refitted if it has completed less than 42,000 miles, (65,000 km).

Refit

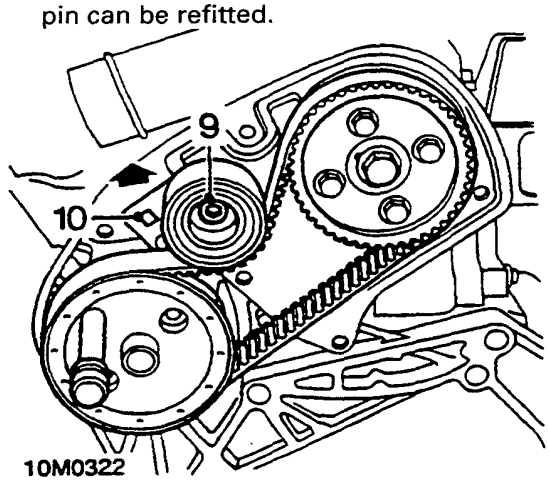
1. Clean timing belt and gears.

***CAUTION:** If the sintered gears have been subjected to prolonged oil contamination, they must be soaked in a solvent bath and thoroughly washed with solvent before refitment. Because of the porous construction of sintered material, oil impregnated in the gear will emerge and contaminate a new belt. Cause of oil contamination must be rectified.*

2. Using fingers only, fit timing belt to gears.

***CAUTION:** If the original belt is to be refitted , ensure direction of rotation is facing the correct way.*

3. Push timing belt tensioner against belt to remove all slack and tighten tensioner Allen bolt, do not torque fixing at this stage.
4. Restrain front camshaft gear using tool **18G 1521.**
5. Tighten 4 camshaft gear to boss bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft)
6. Remove tool **18G 1521.**
7. Remove injection pump gear locking pin and engine timing pin.
8. Rotate crankshaft 2 complete turns clockwise until the timing pin and locking pin can be refitted.



10M0322

9. Slacken timing belt tensioner Allen bolt.
10. Using a dial gauge torque wrench apply a force of 18 kgf (180 N) to the tensioner to tension the belt, tighten tensioner Allen bolt to 44 N·m (4.5 kgf·m, 32 lbf·ft).
11. Remove injection pump gear locking pin and engine timing pin.
12. Position injection pump timing belt cover, fit nut and bolts and tighten to 5 N·m (0.5 kgf·m, 4 lbf·ft).
13. Fit camshaft timing belt top cover, fit bolts and tighten to 5 N·m (0.5 kgf·m, 4 lbf·ft)
14. Fit and tighten bolts securing PAS pipe to coolant rail.
15. Fit air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**

FUEL SYSTEM HOSES, PIPES AND UNIONS

1. Check fuel pipes and connections for chafing and leakage.
2. Check pipes are securely clipped.
3. Check fuel tank connections for security.
4. Check fuel tank is free from leaks and corrosion.
5. Check fuel tank for security of fixings.

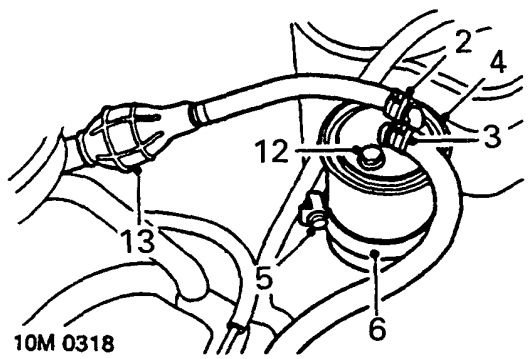
FUEL FILTER

Service Repair No. 19.25.02

Renew

1. Position absorbent cloth beneath fuel filter.

***CAUTION:** Avoid any fuel spillage onto starter motor.*



10M 0318

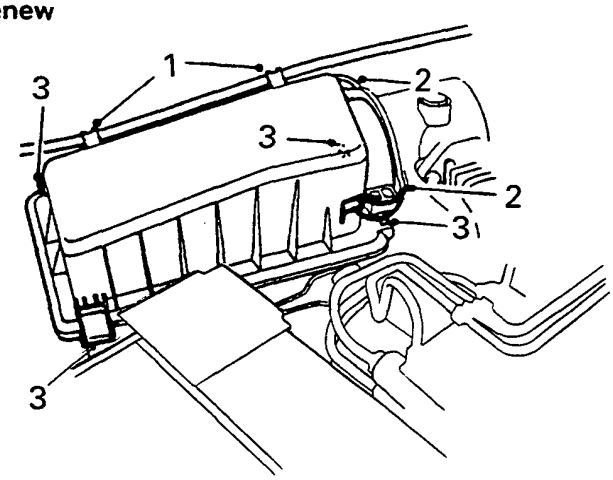
2. Release clip and disconnect fuel inlet hose from filter.
3. Release clip and disconnect fuel outlet hose from filter.
4. Remove fuel filter from body mounting bracket.
5. Slacken fuel filter bracket clamp bolt.
6. Remove fuel filter bracket.
7. Fit fuel filter bracket to new filter.
8. Tighten fuel filter bracket clamp bolt.
9. Fit fuel filter to body mounting bracket.
10. Connect fuel outlet hose to filter and secure clip.
11. Connect fuel inlet hose to filter and secure clip.
12. Slacken bleed screw.
13. Repeatedly squeeze fuel hand primer until fuel, issuing from bleed screw is free from air bubbles; tighten bleed screw.

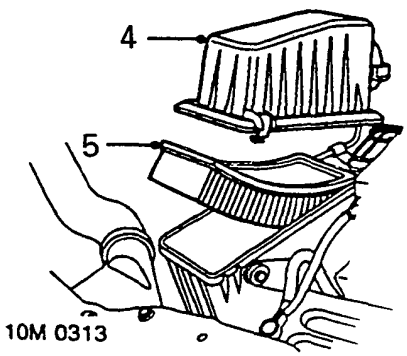
14. Continue to squeeze fuel hand primer until resistance is felt.
15. Remove absorbent cloth.

AIR CLEANER ELEMENT

Service Repair No. 19.10.10

Renew





1. Release expansion tank return pipe from 2 clips on air cleaner.
2. Release 2 clips securing air flow meter housing to air cleaner.
3. Release 4 clips retaining air cleaner cover.
4. Release and remove cover from air cleaner casing.
5. Remove and discard air cleaner element.
6. Clean inside air cleaner casing and cover.
7. Fit new air cleaner element to casing.
8. Position cover, ensure seal is located in groove and secure with clips.
9. Position air flow meter housing to air cleaner and secure with clips.
10. Secure expansion tank return pipe to clips on air cleaner.

ENGINE TUNING

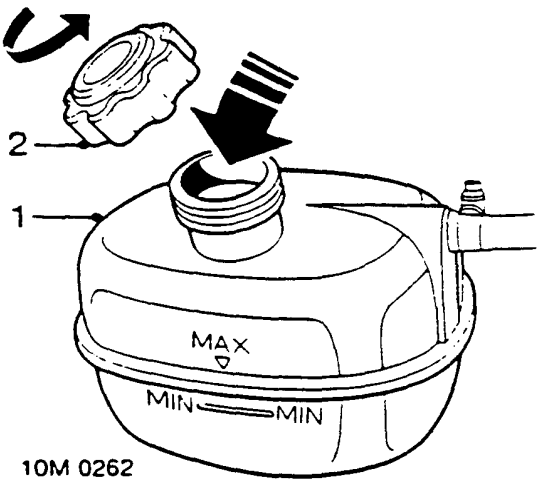
Tuning the HONDA ACCORD electronic diesel control (EDC) fuel system must be carried out using Testbook.

COOLING SYSTEM

WARNING: Since injury such as scalding could be caused by escaping steam or coolant, do not remove the pressure relief cap from the expansion tank while system is hot. Wait until system has cooled, use a cloth or gloves to protect hands from escaping steam.

Check level and top-up

CAUTION: The coolant level should only be checked when the system is cold.



10M 0262

1. Visually check that the coolant level is below flange on expansion tank. If level is appreciably low, suspect leakeage or overheating.

CAUTION: If coolant is not visible in expansion tank, the system must be refilled in accordance with the Refill procedure.

2. If required, remove coolant expansion tank cap and top-up with the correct anti- freeze mixture to just above the tank flange, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**

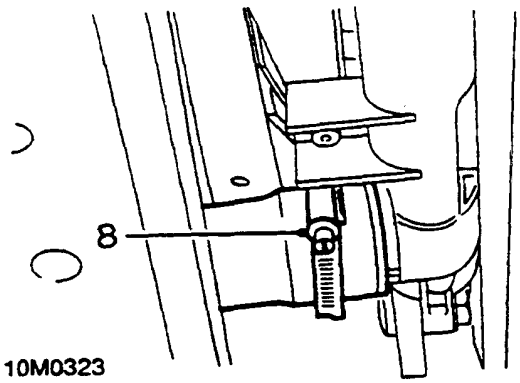
CAUTION: The coolant level must not exceed the maximum level indicator.

3. Check specific gravity of coolant. The overall anti-freeze concentration must not be less than 50% by volume.
4. Refit expansion tank cap.

Drain and refill

Service Repair No. 26.10.01

1. Visually check engine and cooling system for coolant leaks.
2. Examine hoses for signs of cracking, distortion and security of connections.
3. Move heater control to 'HOT' position.
4. Remove LH under tray, see **BODY - Repairs.**
5. Remove under belly panel, see **BODY - Repairs.**
6. Remove cap from expansion tank.
7. Position container to collect drained coolant.



10M0323

8. Slacken clip, disconnect bottom hose from radiator and allow coolant to drain
9. Flush system with water under low pressure.

CAUTION: High pressure water could damage the radiator.

10. Connect bottom hose to radiator and tighten clip.
11. Fit LH under tray, see **BODY.**
12. Fit under belly panel, see **BODY - Repairs.**
13. Fill system slowly through coolant expansion tank until the coolant reaches the 'MAX' level indicator.
14. Fit coolant expansion tank cap.
15. Start and run engine until the radiator cooling fan operates. Do not operate the air conditioning system (if fitted).
16. Switch off engine and allow to cool.
17. Check for coolant leaks and top-up coolant to 'MAX' level indicator.

EXHAUST SYSTEM

1. Check for damage and signs of leakage.
2. Check security of system.
3. Check mountings and correct alignment.
4. Check security of heat shields.

CLUTCH

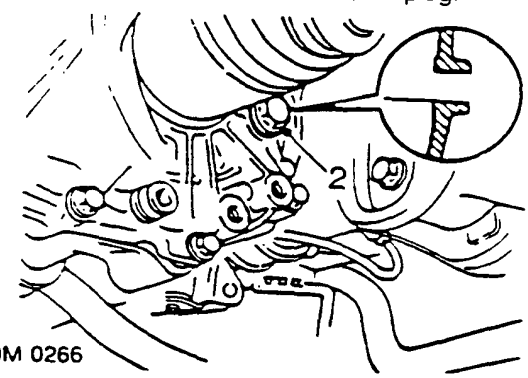
1. Check operation of clutch and free movement of pedal and release lever.
2. Check fluid level in clutch master cylinder and top-up with Brake Fluid, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**

GEARBOX

Oil level check and top-up

Ensure vehicle is standing on level surface.

1. Raise vehicle on a ramp.
2. Remove LH under belly panel, see **BODY - Repairs.**
3. Wipe clean area around filler/level plug.



10M 0266

4. Remove filler/level plug.
5. Check that oil is level with bottom of filler/level plug hole.

***CAUTION:** Oil lodged behind filler/level plug will trickle out when plug is removed and can give impression that level is correct.*

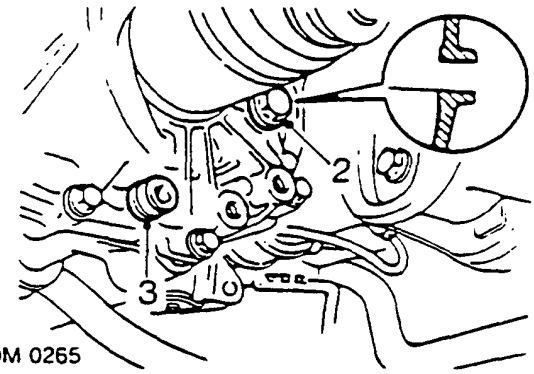
6. Top-up, if required, until oil just runs from filler/level hole. Allow sufficient time for oil to flow until it reaches a common level within gearbox.
   Use the correct specification oil, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**
7. Fit filler/level plug and tighten to 40 N·m (4.1 kgf·m, 30 lbf·ft).

Drain oil and refill

The oil should be drained when gearbox is warm.

WARNING: Observe due care when draining gearbox as the oil can be very hot.

1. Place a container beneath gearbox.



10M 0265

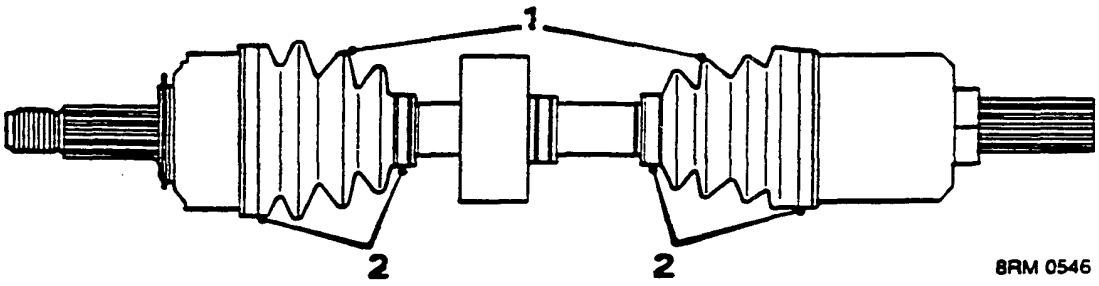
2. Remove filler/level plug.
3. Remove drain plug and discard sealing washer; allow oil to drain.
4. Clean gearbox drain plug and fit new sealing washer.
5. Fit gearbox drain plug and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
6. Fill gearbox through filler/level plug hole with the specified oil. Allow sufficient time for oil to reach a common level within gearbox.
   Use the correct specification oil, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**
7. Fit filler/level plug and tighten to 40 N·m (4.1 kgf·m, 30 lbf·ft).
8. Fit LH under belly panel, see **BODY - Repairs.**
9. Lower ramp.

DRIVE SHAFT GAITERS

1. Raise front of vehicle.

WARNING: Support on safety stands.

2. Remove LH under tray, see **BODY - Repairs.**



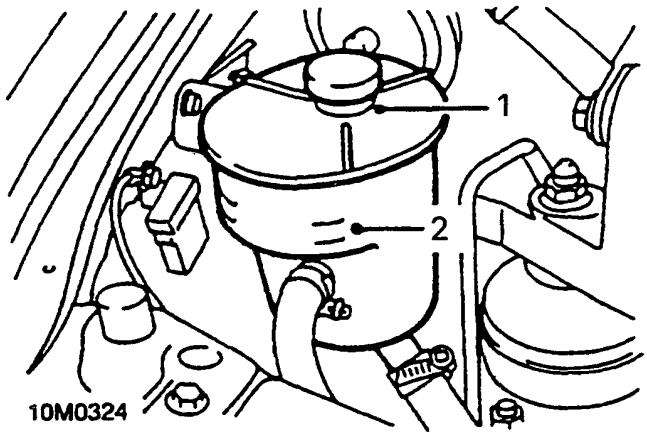
3. Check that drive shaft gaiters are not twisted, split or damaged.
4. Check clips are secure.
5. Fit LH under tray, see **BODY - Repairs.**
6. Remove stand(s) and lower vehicle.

STEERING

Check and top-up power steering fluid

Carry out fluid level check when engine is stopped and system is cold.

Note: *It is essential that the power steering system is not operated once the engine has been stopped.*

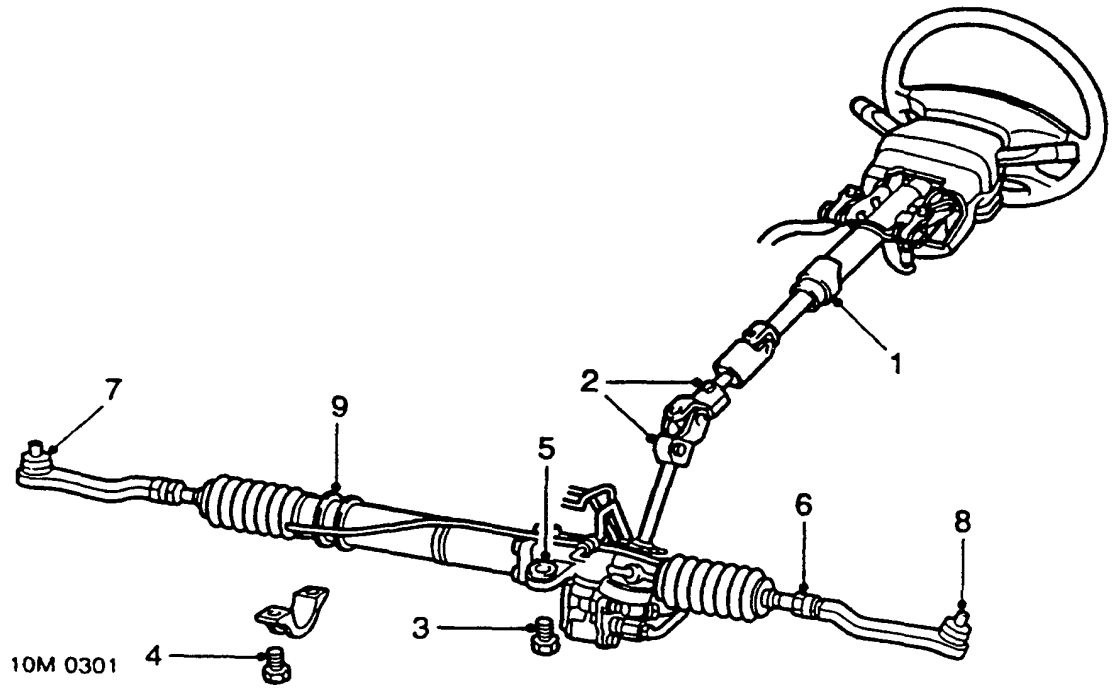


1. Clean reservoir around filler cap and level indicators.
2. Visually check fluid level is between level indicators.
3. If required, remove filler cap and top-up with Genuine Honda Power Steering Fluid V. **Do not overfill.**

CAUTION: *Ensure no dirt is allowed to enter reservoir when cap is removed.*

4. Refit filler cap.

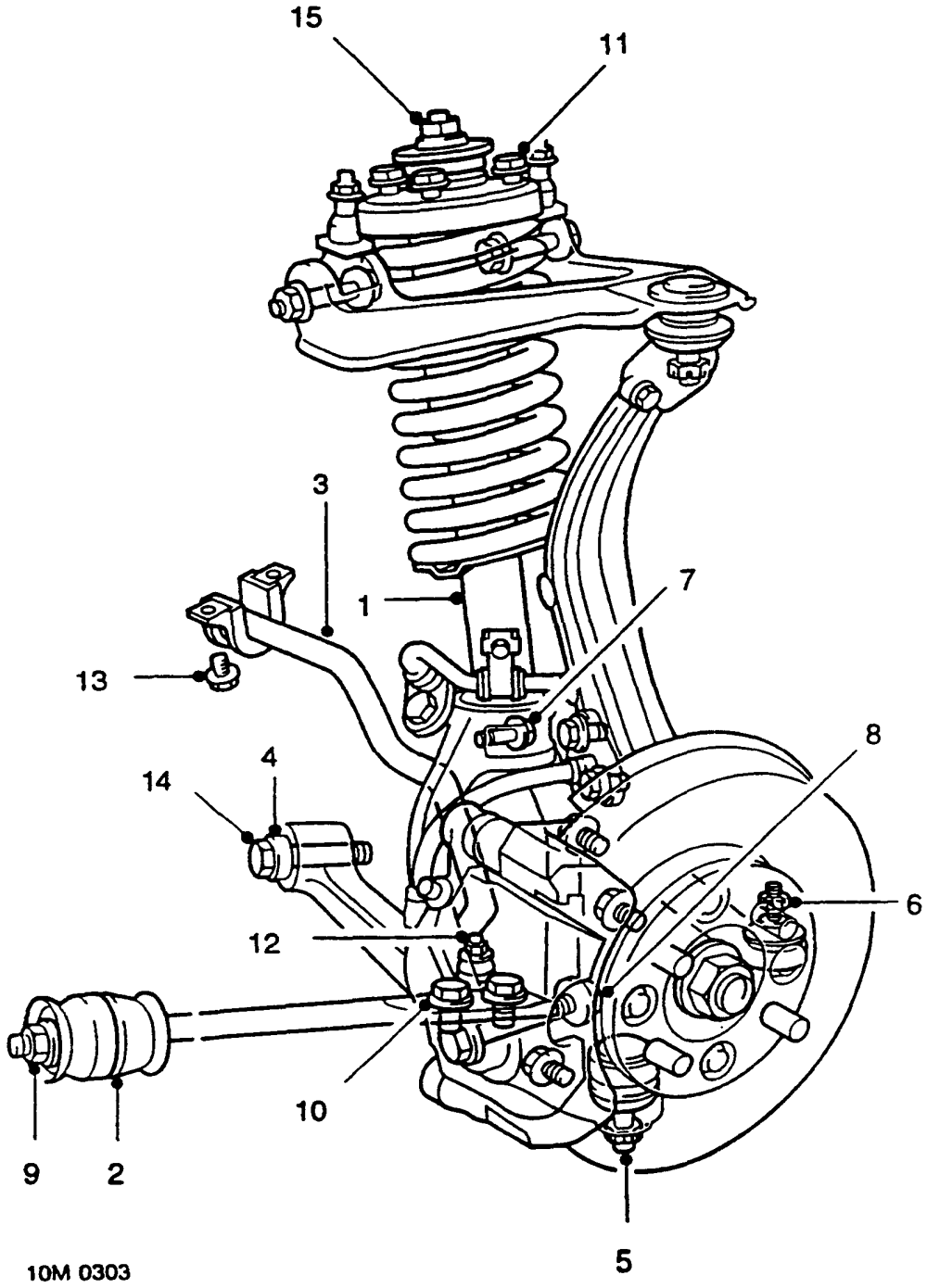
Steering column, rack, joints and gaiters



1. Check steering column to body mounting bolts are tight.
2. Check steering column universal joint bolts - 28 N·m (2.9 kgf·m, 21 lbf·ft).
3. Check steering rack to body, bolts - 50 N·m (5.1 kgf·m, 37 lbf·ft).
4. Check steering rack clamp to body, bolts - 39 N·m (4.0 kgf·m, 29 lbf·ft).
5. Inspect steering rack mounting rubbers for signs of deterioration.
6. Restrain ball joint movement and check that steering track rod locknuts are tightened to 45 N·m (4.6 kgf·m, 33 lbf·ft).
7. Check steering rack ball joint boots for signs of damage or deterioration.
8. Check that split pins are fitted to all ball joint nuts.
9. Visually check that the rack sealing gaiters are not twisted or damaged and clips are secure.
10. Check for signs of lubricant leakage.

SUSPENSION DAMPERS, BALL JOINTS, FIXINGS AND GAITERS

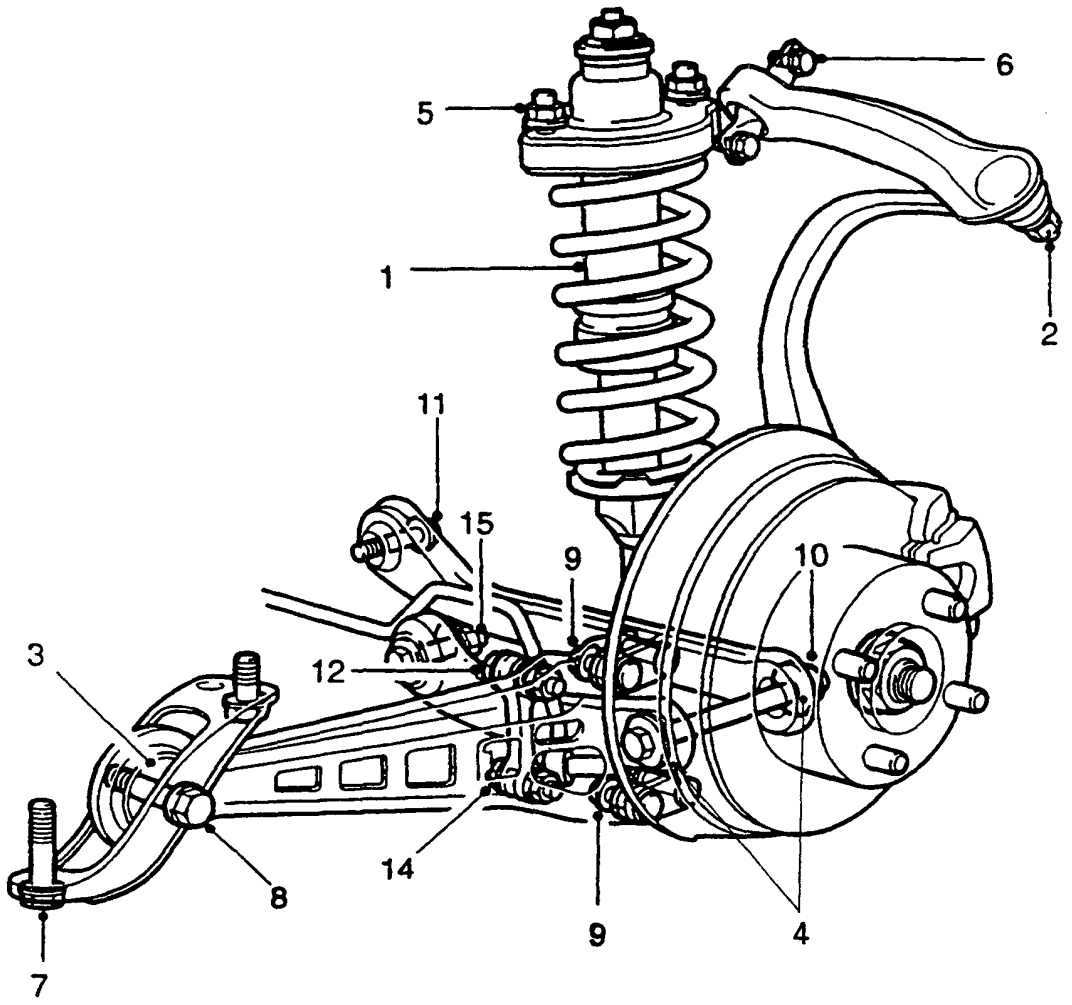
Front suspension



1. Check suspension dampers for oil leaks.
2. Check condition of radius rod bushes.
3. Check condition of stabilizer bar bushes.
4. Check condition of lower arm bushes.
5. Check that a split pin is fitted to lower arm ball joint nuts.
6. Tie-rod end ball joint nut - 45 N·m (4.6 kgf·m, 33 lbf·ft).

7. Damper fork pinch bolt - 44 N·m (4.5 kgf·m, 32 lbf·ft).
8. Damper fork to lower arm nut - 65 N·m (6.6 kgf·m, 48 lbf·ft).
9. Check radius rod front mounting nut - 68 N·m (6.9 kgf·m, 50 lbf·ft).
10. Check radius rod to lower arm bolts - 105 N·m (10.7 kgf·m, 77 lbf·ft).
11. Check damper top mounting nuts - 39 N·m (4.0 kgf·m, 29 lbf·ft).
12. Check stabilizer bar to lower arm bolt - 19 N·m (1.9 kgf·m, 14 lbf·ft).
13. Check stabilizer bar clamp bolts - 22 N·m (2.2 kgf·m, 16 lbf·ft).
14. Check lower arm to body bolt - 55 N·m (5.6 kgf·m, 41 lbf·ft).
15. Check damper top nut - 30 N·m (3.1 kgf·m, 22 lbf·ft).

Rear suspension



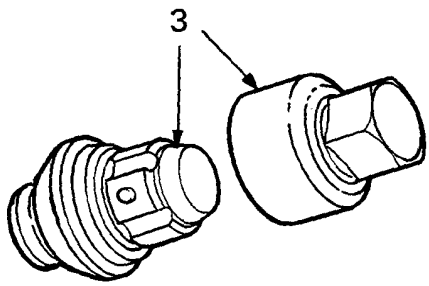
10M 0304

1. Check suspension dampers for oil leaks.
2. Check that split pin is fitted to upper arm ball joint nuts.
3. Check condition of trailing arm bush.
4. Check condition of lower arm bushes.
5. Check damper top mounting, nuts - 39 N·m (4.0 kgf·m, 29 lbf·ft).
6. Check upper arm to body, bolts - 39 N·m (4.0 kgf·m, 29 lbf·ft).
7. Check trailing arm bracket to body, bolts - 65 N·m (6.6 kgf·m, 48 lbf·ft).
8. Check trailing arm to bracket, bolt - 65 N·m (6.6 kgf·m, 48 lbf·ft).
9. Check trailing arm to knuckle, nuts - 36 N·m (3.7 kgf·m, 27 lbf·ft).
10. Check lower arms to knuckle, nut and through bolt - 65 N·m (6.6 kgf·m, 48 lbf·ft).
11. Check lower arm to body, bolt - 65 N·m (6.6 kgf·m, 48 lbf·ft).
12. Check lower arm to body, bolt - 55 N·m (5.6 kgf·m, 41 lbf·ft).
13. Check damper to knuckle, bolt - 55 N·m (5.6 kgf·m, 41 lbf·ft).
14. Check stabilizer bar to link, bolt - 13 N·m (1.3 kgf·m, 10 lbf·ft).
15. Check stabilizer bar link to lower arm, bolt - 13 N·m (1.3 kgf·m, 10 lbf·ft).

ROAD WHEELS AND FASTENINGS

1. Check condition of road wheels including spare for signs of cracking and rim damage.

Note: *Steel wheels:* Wheels are removed without disturbing wheel covers.



10M 0281

Alloy wheels

2. Push extractor tool **18G 1722** over head of nut cover and pull to remove.
3. Fit key socket over locking wheel nut, then fit wheel nut spanner over key socket and unscrew.

All wheels

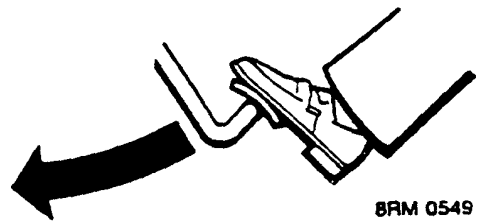
4. Working in a diagonal sequence slacken each nut 1/2 turn and then tighten to 110 N·m (11.2 kgf·m, 81 lbf·ft).

TYRE PRESSURES AND CONDITION

1. Check for signs of tyre wear indicator in tread pattern.
2. Check all tyres including spare for uneven wear, external cuts in fabric, exposure of ply or cord structure, lumps and bulges.
3. Check and adjust tyre pressures, see **INFORMATION - GENERAL DATA.**

FOOTBRAKE

Check



8RM 0549

1. Press brake pedal and check for firm resistance after short pedal movements.

HANDBRAKE

Check

1. Apply handbrake lever one notch at a time and count number of notches to apply the brakes firmly, equivalent to 196 N (20 kgf) pull applied at 50 mm from end of lever.

DATA: Handbrake lever travel = 7-11 notches.

2. Adjust handbrake cable tension if travel is outside limits.

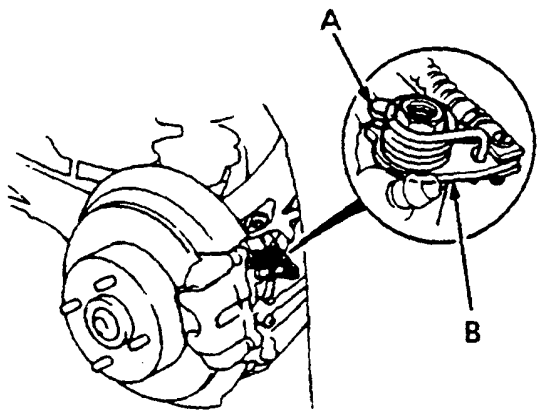
CAUTION: *Handbrake travel must not be less than 7 notches.*

Adjustment
Service Repair No. 70.35.10

Note: *After rear brake caliper servicing, loosen the handbrake adjusting nut, start the engine and depress the brake pedal several times to set the self-adjusting brake before adjusting the handbrake.*

1. Raise rear of vehicle.

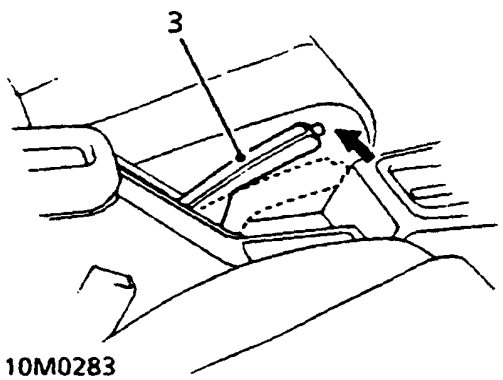
WARNING: Support on safety stands.



10M0282

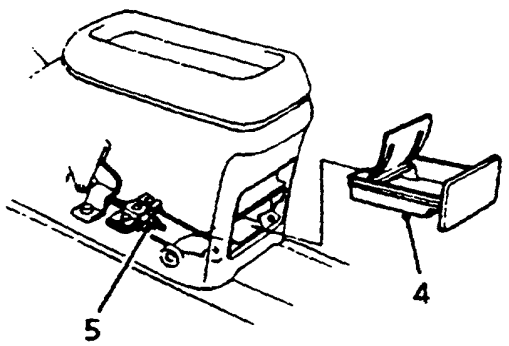
A Pin
B Lever

2. Make sure the lever of the rear brake caliper contacts the brake caliper pin.



10M0283

3. Pull the handbrake lever up one notch.



10M0284

4. Remove rear ashtray from centre console.
5. Tighten handbrake cable adjusting nut until rear wheels bind slightly when rotated.
6. Release handbrake lever fully and check that rear wheels rotate freely without binding. Readjust if necessary.
7. Apply handbrake lever one notch at a time and count the number of notches until both rear wheels lock. This should happen at a minimum of 7 notches and before the maximum of 11 notches.
8. Refit rear ashtray in centre console.
9. Remove stand(s) and lower vehicle.

BRAKE HOSES AND PIPES

1. Visually check all brake fluid pipes, hoses and connections for correct routing and security.
2. Check for signs of chafing, leakage or corrosion.

Hose Replacement

CAUTION:

- *Before reassembling, check that all parts are free of dust and other foreign particles.*
- *Replace parts with new ones whenever specified to do so.*
- *Use only clean DOT 3 or DOT 4 brake fluid.*
- *Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.*
- *Do not mix different brands of brake fluid as they may not be compatible.*
- *Do not allow brake fluid to come into contact with the paintwork as it will cause surface damage. If brake fluid is spilled on the paintwork, wash it off immediately with water.*

1. Replace the brake hose if the hose is twisted, cracked or if it leaks.

Note: *Disconnect hose at end nearest to master cylinder first.*

2. Disconnect the brake hose from the brake pipe using a 10 mm union spanner.
3. Plug end of brake pipe to prevent ingress of dirt and excess fluid loss.
4. Remove and discard brake hose clip from mounting bracket.
5. Remove banjo bolt and disconnect brake hose from caliper.
6. Remove 4 bolts securing brake hose to hub and damper, front brake only.
7. Remove and discard brake hose.
8. Remove plug from brake pipe and connect brake hose.
9. Using new sealing washers, connect brake hose to caliper.
10. Position brake hose to hub and damper and secure with bolts, front brake only.

CAUTION: *Do not twist the brake hose excessively.*

11. Tighten brake hose to caliper banjo bolt to 35 N·m (3.6 kgf·m, 26 lbf·ft).
12. Tighten brake hose to brake pipe union to 15 N·m (1.5 kgf·m, 11 lbf·ft).
13. Align brake hose to mounting bracket and secure with new clip, tap home with hide mallet.
14. Bleed brake system. see **Brake system.**
15. Check brake hose and line joints for leaks, tighten if necessary.

BRAKE FLUID

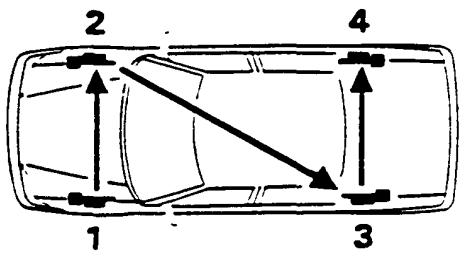
WARNING: Do not allow dirt or foreign liquids to enter reservoir when topping-up. Use only new DOT 3 or DOT 4 brake fluid from airtight containers.

CAUTION: *Do not allow brake fluid to contact paint finished surfaces as paint may be damaged. If spilled, remove fluid and clean area with clean warm water.*

Level check

1. Wipe reservoir body and filler cap clean and check level visually.
2. Remove filler cap and top-up to 'MAX' mark, if required.

Bleed sequence



8RM 2743

3. Attach a bleed tube to LH front bleed screw. Insert free end of tube into bottle containing fluid.
4. Open bleed screw and use an assistant to press brake pedal to floor and release.
5. Repeat operation until clean fluid flows from bleed screw.
6. When clear, bubble free fluid flows. Use an assistant to hold pedal to floor and tighten bleed screw to 9 N·m (0.9 kgf·m, 7 lbf·ft)

CAUTION: *Ensure that fluid level in reservoir is maintained during the complete operational sequence using NEW brake fluid.*

7. Repeat bleeding procedure at each wheel in sequence illustrated.
8. Check for a firm footbrake after complete operation.

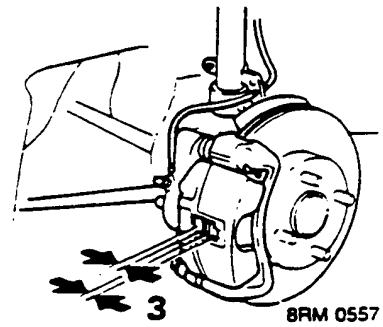
FRONT BRAKES-HYDRAULICS, PADS, DISCS AND CALIPERS

Check

1. Raise front of vehicle.

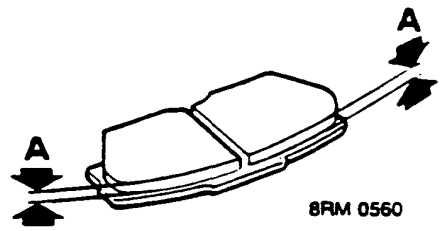
WARNING: Support on safety stands.

2. Remove both front road wheels.



8RM 0557

3. Check brake pads visually and assess lining thickness.



8RM 0560

DATA: Minimum brake pad thickness (A): 3 mm.

Note: *Measurement does not include pad backing thickness.*

If brake pads have worn to less than the recommended thickness they must be replaced, see **REPAIR MANUAL - BRAKES - Repairs.**

WARNING: Brake pads must be renewed in axle sets only. Braking efficiency may otherwise be impaired.

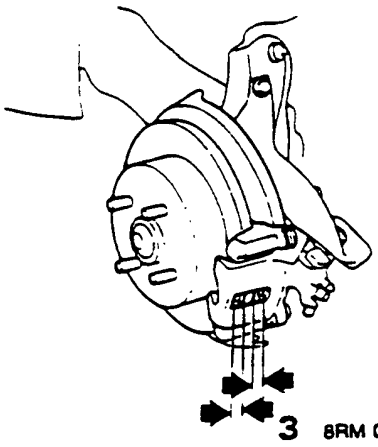
REAR DISC BRAKES

Check

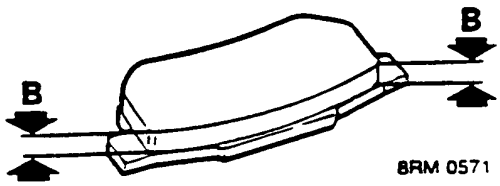
1. Raise rear of vehicle.

WARNING: Support on safety stands.

2. Remove road wheel(s).



3. Check brake pads visually and assess pad thickness.



DATA: Minimum brake pad thickness (A): 3 mm.

Note: *Measurement does not include pad backing thickness.*

If brake pads have worn to less than the recommended thickness they must be replaced, see **REPAIR MANUAL - BRAKES - Repairs.**

WARNING: Brake pads must be renewed in axle sets only. Braking efficiency may otherwise be impaired.

BODY

Locks, hinges and latch mechanism (not steering lock)

1. Functionally check operation of all locks.
2. Operate front door lock and check that electric central door locking operates.
3. Ensure that all locks, hinges and latch mechanisms are lubricated using Door Lock and Latch Lubricant.
   Inject grease sparingly into lock barrels.
   Clean off any surplus grease.
   DO NOT lubricate the steering lock.
4. Lubricate sunroof lid seal very sparingly using Non-Staining Grease BAU 5812 (Corning No. 7).

Exterior paintwork and body panels

Visually check paintwork and body panels for damage and corrosion.

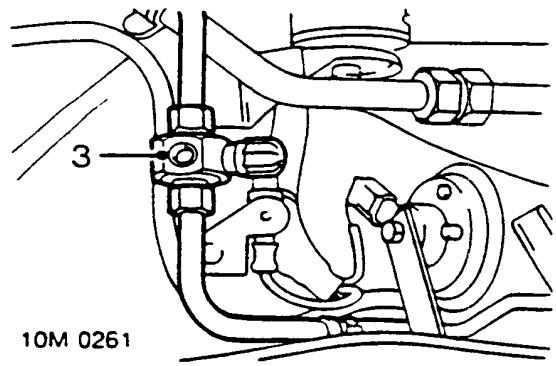
Underbody sealer

Visually check underbody sealer for damage and continuity.

AIR CONDITIONING

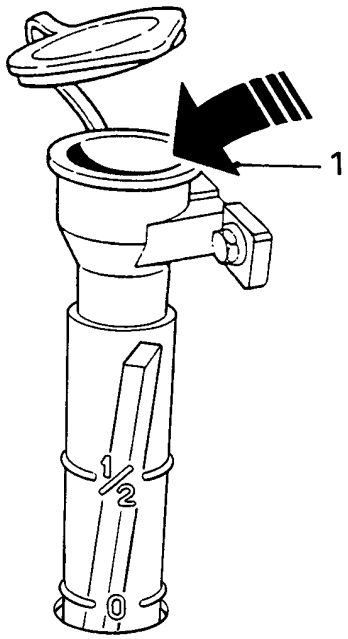
Air conditioner refrigerant sight glass - check

1. Start engine and switch on air conditioner.
2. Run engine at fast idle for a few minutes.



3. Observe sight glass. Occasional bubbles indicates normal condition. A constant stream of bubbles indicates low refrigerant. A clouded or streaky sight glass indicates a compressor fault or drier desiccant circulating.

WINDSCREEN WASHERS

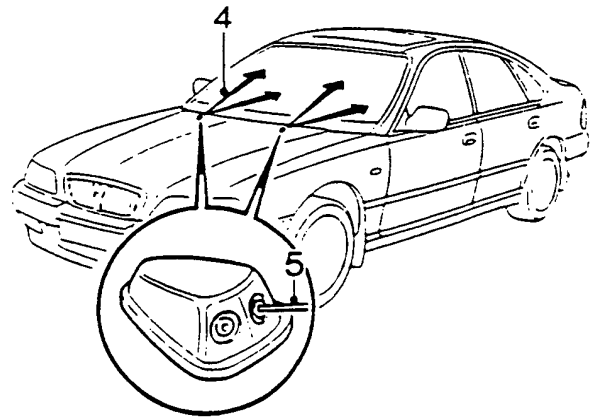


10M 0260

1. Remove filler cap, visually check mixture level in reservoir by looking at top of float position.
2. Top-up by adding a mixture of water and 'Screenwash' at required concentration.

Reservoir capacity	Temperature °C		
	-3°	-7°	-12°
5.7 litre	0.6 ltr	1.2 ltr	2.4 ltr

3. Clean windscreen washer jets using thin wire as a probe. Disconnect tube from jet and remove debris. Reconnect washer tube.



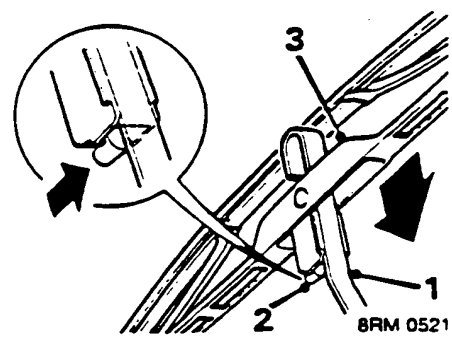
10M 0259

4. Operate windscreen washer and check that jets strike top and centre of area to be wiped.
5. Adjust jet by inserting a needle into jet hole and repositioning.
6. Check operation of programmed wash/wipe by switching on ignition and operating washer lever.
7. Observe that washer and wiper operate for as long as lever is operated and wiper operates for a further 5 seconds after lever is released.
8. After adjustments, top-up fluid level in reservoir.

SCREEN WIPERS AND BLADES

1. Operate front screen wiper.
2. Check that blades wipe screen without smearing.
3. Check that wipers park correctly.
4. Operate wiper switch in all modes.
5. Check that wipers operate at speeds selected.

Renew blade



1. Lift wiper arm.
2. Press retaining lever.
3. Slide blade down arm.
4. Withdraw blade assembly from arm.
5. Position new blade on wiper arm.

6. Push blade into engagement with arm.
7. Check that it is retained.

LAMPS, HORNS AND WARNING INDICATORS

1. Switch on sidelamps and check that sidelamps, headlamps in the dipped mode, tail lamps, rear number plate lamps, panel illumination lamps and panel sidelamp indicators illuminate.
2. Switch ON ignition.
3. Switch on headlamps and check that headlamps, tail lamps and rear number plate lamps illuminate.
4. Operate dip switch and check that headlamp dip and main beams and panel main beam indicator illuminate.
5. Operate flash switch and check that headlamps flash.
6. Operate direction warning indicator switch to right and left and check that warning indicators flash at front and rear.
7. Switch OFF ignition.
8. Open doors and luggage compartment and check that interior lights illuminate.
9. Press horn switches and check that horns operate.
10. Operate hazard warning switch and check that all warning indicators flash.

BATTERY CONNECTIONS

1. Pull back flexible terminal protector.
2. Wipe battery top clean and dry, smear terminal posts with petroleum jelly.
3. Ensure terminals are tight.
4. Replace protector.

FUSEBOX

Engine compartment fuse box

1. Release and lift off cover.
2. Check condition of fusible links and security of connections.
3. Refit cover and secure.

ROAD TEST

Engine performance and throttle operation

1. Check that throttle pedal movement is free and unrestricted.
2. Start engine and check that it starts easily and maintains idle speed.
3. Check that 'oil pressure' and 'no charge' warning lamps extinguish.
4. Check that engine is responsive to throttle movement.

Clutch and gear selection

Normal driving conditions

1. Check that clutch engages smoothly without judder, slipping or noise.
2. Check for abnormal transmission noise.
3. Check for smooth quiet gear change and that gear selected engages easily.

Steering

1. Check for noise, effort required, free play and self-centralising.

Suspension

1. Check for noise, irregularity in ride (e.g dampers) and wheel imbalance.

Footbrake

1. Check for pedal effort, travel, braking efficiency, pulling and binding.

Instruments

1. Check that all instruments operate.
2. Check speedometer for steady operation, noise and operation of distance recorder.
3. Check warning lights for bulb failure.

Body and trim

1. Check for abnormal body noise.

Seat belts

1. Check for operation of inertia reels and condition of belt webbing.

Handbrake

1. Apply handbrake firmly, check travel and ratchet hold and release.

DATA

Injection pump timing belt tension ..... 180N (18 kgf)

TORQUE SETTINGS

Gearbox drain plug	45 N·m (4.6 kgf·m, 33 lbf·ft)
Gearbox filler/level plug	40 N·m (4.1 kgf·m, 30 lbf·ft)
Engine sump plug	35 N·m (3.6 kgf·m, 26 lbf·ft)
Engine RH mounting to engine bolts	85 N·m (8.7 kgf·m, 63 lbf·ft)
Engine RH mounting restraint bar nuts	45 N·m (4.6 kgf·m, 33 lbf·ft)
Engine RH mounting tie bar bolts	90 N·m (9.2 kgf·m, 66 lbf·ft)
Timing belt upper front cover screws	5 N·m (0.5 kgf·m, 4 lbf·ft)
Timing belt lower cover screws	5 N·m (0.5 kgf·m, 4 lbf·ft)
Injection pump timing belt cover nut and bolts	5 N·m (0.5 kgf·m, 4 lbf·ft)
Camshaft gear to boss bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Camshaft gear bolt	20 N·m (2.0 kgf·m, 15 lbf·ft) + 90°
Crankshaft pulley bolt	63 N·m (6.4 kgf·m, 46 lbf·ft) + 90°
Camshaft tensioner pulley Allen bolt	44 N·m (4.5 kgf·m, 32 lbf·ft)
Engine RH mounting support plate nuts	30 N·m (3.1 kgf·m, 22 lbf·ft) + 120°
Road wheel nuts	110 N·m (11.2 kgf·m, 81 lbf·ft)
Steering column universal joint bolts	28 N·m (2.9 kgf·m, 21 lbf·ft)
Steering rack to body bolts	50 N·m (5.1 kgf·m, 37 lbf·ft)
Steering rack clamp to body bolts	39 N·m (4.0 kgf·m, 29 lbf·ft)
Track rod end locknuts	45 N·m (4.6 kgf·m, 33 lbf·ft)
Steering arm ball pin nut	45 N·m (4.6 kgf·m, 33 lbf·ft)
Damper fork pinch bolt	44 N·m (4.5 kgf·m, 32 lbf·ft)
Damper fork to lower arm nut	65 N·m (6.6 kgf·m, 48 lbf·ft)
Tie rod front mounting nut	68 N·m (6.9 kgf·m, 50 lbf·ft)
Tie rod to lower arm bolts	105 N·m (10.7 kgf·m, 77 lbf·ft)
Damper top mounting nuts	39 N·m (4.0 kgf·m, 29 lbf·ft)
Stabilizer bar to lower arm bolt	19 N·m (1.9 kgf·m, 14 lbf·ft)
Stabilizer bar clamp bolts	22 N·m (2.2 kgf·m, 16 lbf·ft)
Lower arm to body bolt	55 N·m (5.6 kgf·m, 41 lbf·ft)
Damper top nut	30 N·m (3.1 kgf·m, 22 lbf·ft)
Damper top mounting nuts	39 N·m (4.0 kgf·m, 29 lbf·ft)
Upper arm to body bolts	39 N·m (4.0 kgf·m, 29 lbf·ft)
Trailing arm bracket to body bolts	65 N·m (6.6 kgf·m, 48 lbf·ft)
Trailing arm to bracket bolt	65 N·m (6.6 kgf·m, 48 lbf·ft)
Trailing arm to knuckle nuts	36 N·m (3.7 kgf·m, 27 lbf·ft)
Lower arm to knuckle bolt	65 N·m (6.6 kgf·m, 48 lbf·ft)
Rear lower arm to body bolts:	
M10	55 N·m (5.6 kgf·m, 41 lbf·ft)
M12	65 N·m (6.6 kgf·m, 48 lbf·ft)
Damper to knuckle bolt	55 N·m (5.6 kgf·m, 41 lbf·ft)
Anti-roll bar to link bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)
Anti-roll bar link to lower arm bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)
Brake hose to caliper banjo bolt	35 N·m (3.6 kgf·m, 26 lbf·ft)
Brake hose to brake pipe union	15 N·m (1.5 kgf·m, 11 lbf·ft)
Brake caliper bleed screw	9 N·m (0.9 kgf·m, 7 lbf·ft)

TOOL NUMBERS

18G 1523	Flywheel locking/timing pin
18G 1717	Injection pump timing pin
18G 1719	Cambelt tensioner pulley retracting tool
18G 1521	Camshaft gear holding tool
18G 1722	Locking wheel nut cap extractor

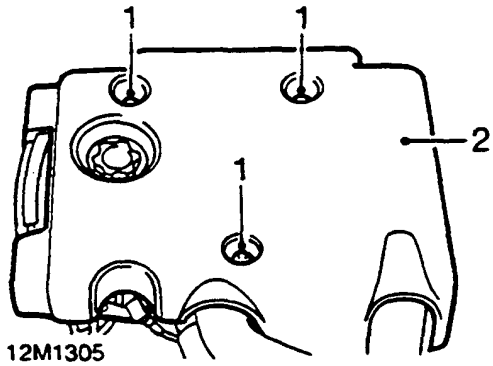
ENGINE

CONTENTS

CAMSHAFT COVER GASKET

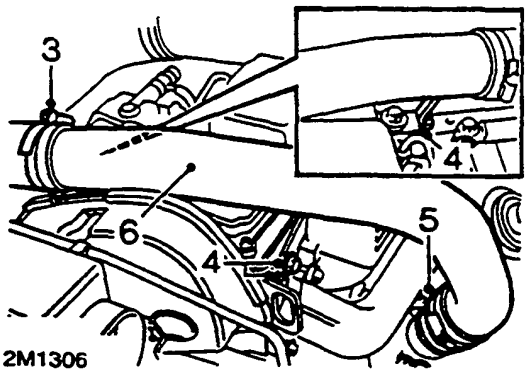
Service Repair No. 12.29.40

Remove



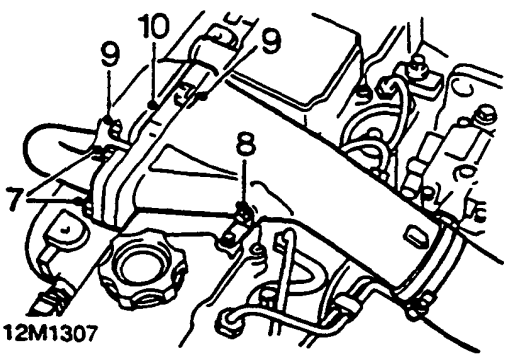
12M1305

1. Remove 3 bolts securing sound deadening pad to engine.
2. Remove sound deadening pad.



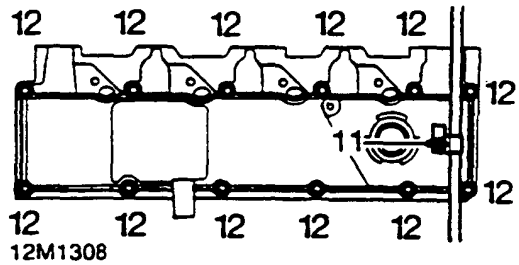
12M1306

3. Slacken clip and disconnect intercooler top hose from turbocharger pipe.
4. Remove 3 bolts securing turbocharger pipe to cylinder head, collect engine lifting bracket.
5. Slacken clip and disconnect pipe from turbocharger.
6. Remove turbocharger pipe.



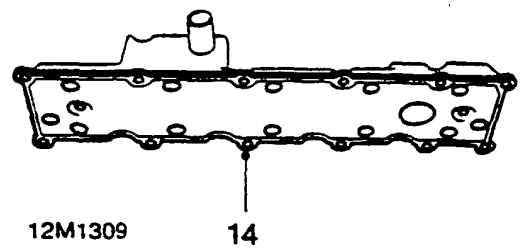
12M1307

7. Remove 2 bolts securing EGR recirculation pipe to inlet manifold intake pipe.
8. Remove bolt securing inlet manifold intake pipe to camshaft cover bracket.
9. Remove 2 bolts securing intake pipe to inlet manifold.
10. Remove inlet manifold intake pipe and discard gasket.



12M1308

11. Remove Allen screw securing brake servo vacuum pipe to camshaft cover.
12. Remove 12 bolts securing camshaft cover to cylinder head.
13. Remove camshaft cover from cylinder head.

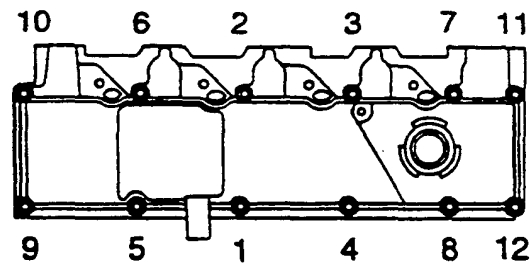


12M1309

14. Release gasket from fixings on camshaft cover and discard.

Refit

1. Clean mating faces of camshaft cover and camshaft carrier.
2. Fit new gasket to camshaft cover.
3. Fit camshaft cover to cylinder head.



12M1244

4. Working in the sequence shown, fit camshaft cover bolts and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
5. Align brake servo vacuum pipe bracket to camshaft cover and secure with Allen screw.
6. Clean mating faces of inlet manifold and intake pipe.
7. Using a new gasket, position intake pipe to inlet manifold, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
8. Position EGR recirculation pipe to inlet manifold intake pipe, fit bolts and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
9. Fit bolt securing inlet manifold intake pipe to camshaft cover bracket and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).

10. Position sound deadening pad to engine and secure with bolts.

CAMSHAFT FRONT OIL SEAL

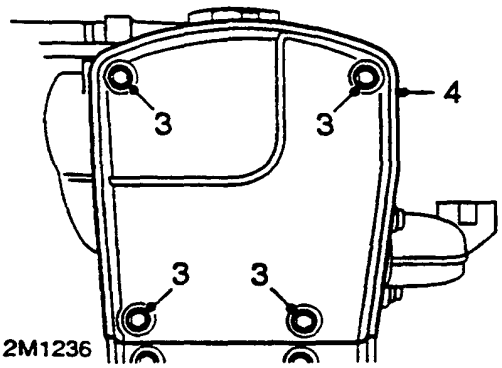
Service Repair No. 12.13.05

Remove

1. Raise front of vehicle.

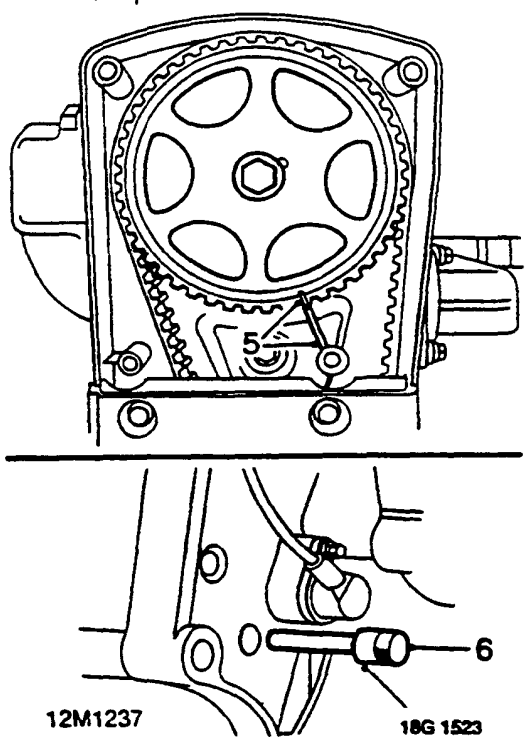
WARNING: Support on safety stands.

2. Disconnect battery earth lead.



12M1236

3. Remove 4 bolts securing camshaft timing belt top cover.
4. Remove top cover.

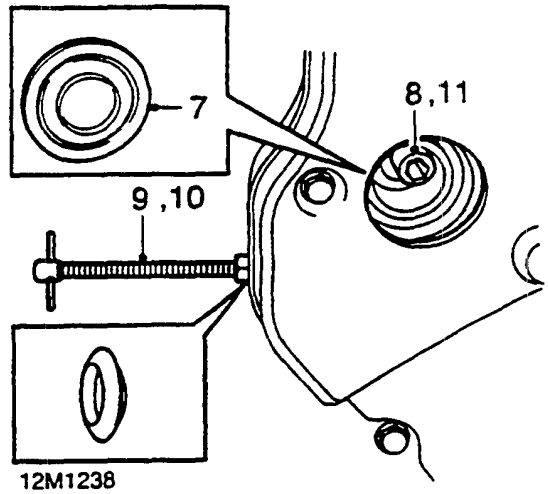


12M1237 18G 1523

5. Using a socket and extension bar on the crankshaft pulley bolt, rotate crankshaft clockwise to align timing marks on camshaft pulley to back cover.

***CAUTION:** Never use the camshaft gear, gear retaining bolt or timing belt to rotate the camshaft.*

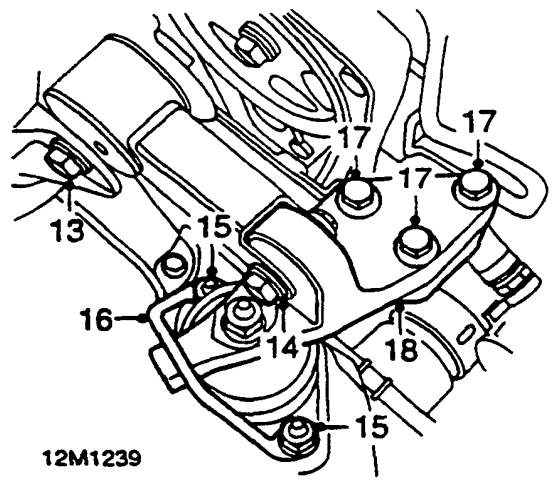
6. Insert timing pin tool **18G 1523** through hole in gearbox mounting back plate and into hole in flywheel.



12M1238

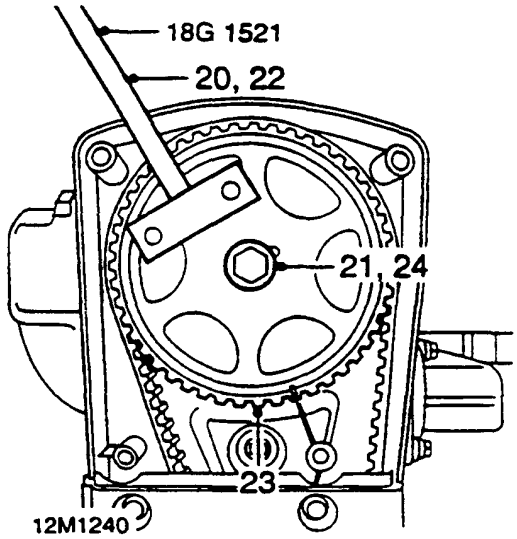
7. Remove tensioner access plug from camshaft timing belt lower cover.
8. Slacken Allen bolt securing tensioner pulley.
9. Fit tool **18G 1719** to tensioner.
10. Pull back tensioner plunger using tool **18G 1719** .
11. Tighten tensioner pulley Allen bolt.
12. Position trolley jack to support engine.

***CAUTION:** Use a block of wood or hard rubber pad to protect sump.*



12M1239

13. Remove bolt securing engine RH mounting tie to body bracket.
14. Slacken bolt securing engine RH mounting to tie.
15. Remove 2 nuts securing engine RH mounting restraint bar.
16. Remove mounting restraint bar.
17. Remove 3 bolts securing engine RH mounting to engine.
18. Remove engine RH mounting assembly.
19. Raise engine on jack.

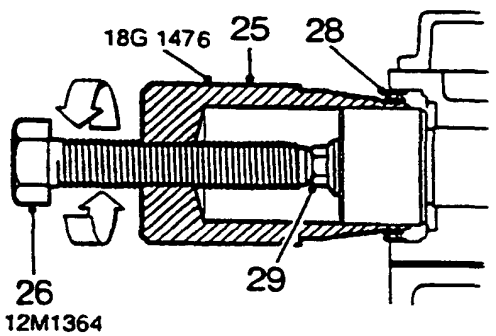


20. Restrain camshaft gear using tool **18G 1521** .
21. Remove camshaft gear retaining bolt and discard.
22. Remove tool **18G 1521** .
23. Release camshaft gear from camshaft and remove from belt.

CAUTION: *If the sintered gears have been subjected to prolonged oil contamination, they must be soaked in a solvent bath and thoroughly washed with solvent before refitment. Because of the porous construction of the sintered material, oil impregnated in the gear will emerge and contaminate a new belt.*

CAUTION: *If camshaft timing belt shows any sign of oil contamination renew camshaft timing belt,* see **MAINTENANCE.**

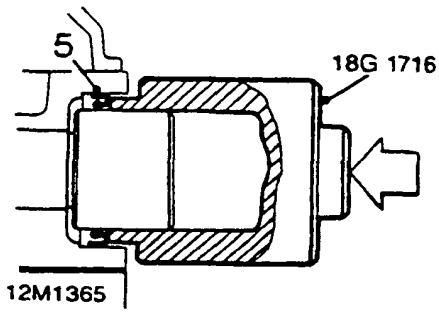
24. Fit but do not tighten the old camshaft gear retaining bolt.



25. Fit and tighten seal remover, tool **18G 1476** , to camshaft seal.
26. Tighten seal remover centre screw to remove camshaft seal.
27. Remove seal remover, tool **18G 1476** .
28. Remove and discard seal from seal remover tool.
29. Remove and discard camshaft gear retaining bolt.

Refit

1. Clean seal recess and camshaft.
2. Grease outer edge of new seal.
3. Lubricate the inner lip of the seal with clean engine oil.



4. Ensure seal fitting tool **18G 1716** is clean.
5. Locate new oil seal to seal housing, position tool **18G 1716** to seal and drift seal into housing.
6. Remove tool **18G 1716.**
7. Clean camshaft gear.
8. Fit camshaft gear to belt and position gear to camshaft.

CAUTION: *Ensure timing marks on camshaft gear and rear cover are aligned.*

9. Restrain camshaft gear using tool **18G 1521.**
10. Apply clean engine oil to threads of new bolt, fit camshaft gear bolt and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft) + 90°.
11. Remove tool **18G 1521.**
12. Fit engine RH mounting assembly.
13. Lower engine on jack to align engine mounting assembly.
14. Fit 3 bolts securing engine mounting to engine and tighten to 85 N·m (8.7 kgf·m, 63 lbf·ft).
15. Fit restraint bar to engine mounting, fit and tighten nuts to 45 N·m (4.6 kgf·m, 33 lbf·ft).
16. Fit mounting tie bar to body bracket, fit and tighten bolt to 90 N·m (9.2 kgf·m, 66 lbf·ft).
17. Tighten bolt securing mounting tie bar to mounting to 90 N·m (9.2 kgf·m, 66 lbf·ft).
18. Remove trolley jack from vehicle.
19. Slacken tensioner pulley Allen bolt.
20. Release camshaft timing belt tensioner plunger using tool **18G 1719.**
21. Remove tool **18G 1719** from camshaft timing belt tensioner.
22. Remove timing pin tool **18G 1523** from flywheel.
23. Rotate crankshaft 2 complete revolutions and align camshaft gear timing marks.

CAUTION: *Do not exceed the specified torque figure.*

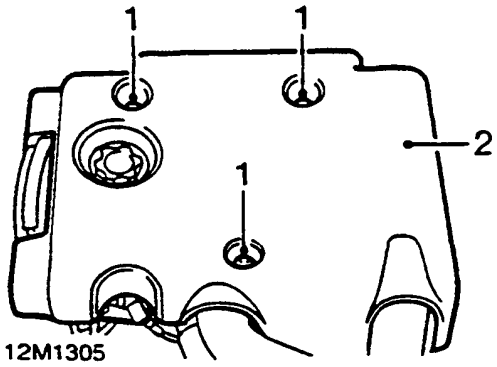
24. Position camshaft timing belt top cover, fit 4 bolts and tighten to 5 N·m (0.5 kgf·m, 4 lbf·ft).
25. Remove stand(s) and lower vehicle.

26. Connect battery earth lead.

CAMSHAFT REAR OIL SEAL

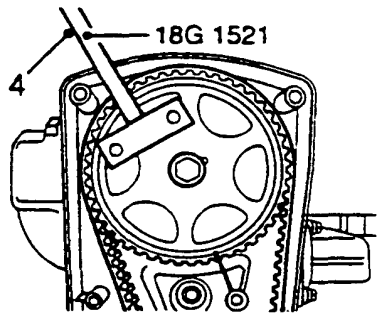
Service Repair No. 12.13.06

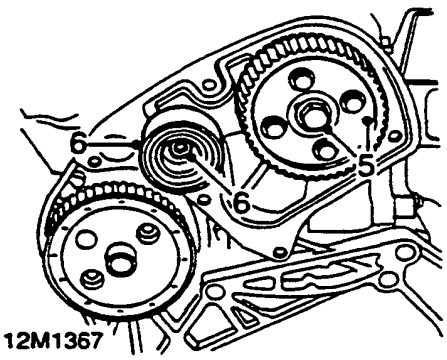
Remove



12M1305

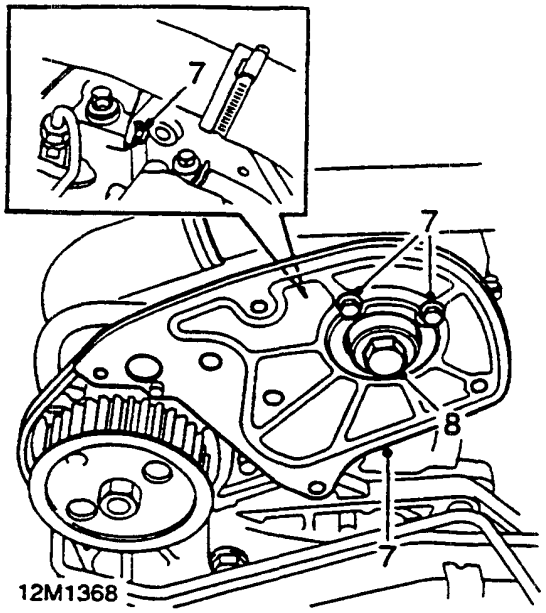
1. Remove 3 bolts securing sound deadening pad to engine.
2. Remove sound deadening pad.
3. Remove Injection pump timing belt, see **MAINTENANCE.**





12M1367

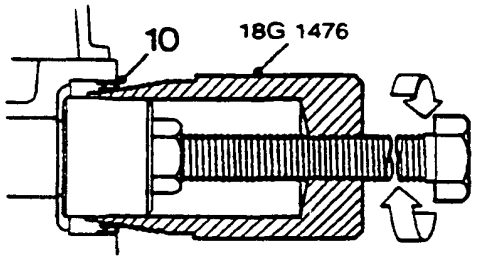
4. Restrain camshaft gear using tool **18G 1521** .
5. Remove camshaft gear bolt, remove camshaft gear.
6. Remove Allen bolt from injection pump drive belt tensioner, remove tensioner.



12M1368

7. Remove 3 bolts securing drive belt back plate, remove back plate.
8. Fit camshaft gear bolt to camshaft.

***CAUTION:** Do not tighten bolt and ensure camshaft does not turn.*



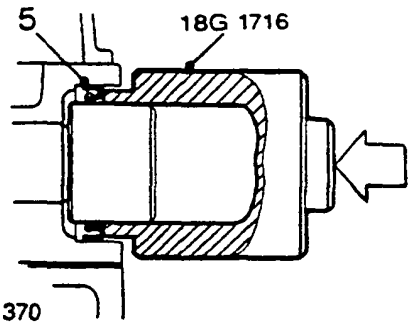
12M1369

9. Screw body of tool **18G 1476** into camshaft rear oil seal.
10. Tighten centre screw of tool **18G 1476** and extract oil seal.
11. Remove camshaft gear bolt and discard.

***CAUTION:** Ensure camshaft does not turn during this operation.*

Refit

1. Thoroughly clean the oil seal recess and running face of camshaft.
2. Smear running face of camshaft and sealing lip of oil seal with clean engine oil.
3. Apply smear of grease to periphery of oil seal recess and oil seal.



4. Ensure tool **18G 1716** is clean.

CAUTION: *Ensure that when fitted, 'open' side of oil seal faces inwards.*

5. Drift oil seal into recess using tool **18G 1716** ; ensure that seal is fully located in recess.
6. Clean drive belt back plate mating faces.
7. Fit back plate to engine, fit bolts and tighten to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
8. Clean tensioner pulley.
9. Fit tensioner pulley to gearbox mounting plate locating dowel, fit Allen bolt but do not tighten.
10. Clean rear camshaft drive gear.

CAUTION: *If the sintered gears have been subjected to prolonged oil contamination, they must be soaked in a solvent bath and thoroughly washed with solvent before refitment. Because of the porous construction of the sintered material, oil impregnated in the gear will emerge and contaminate a new belt.*

CAUTION: *If injection pump timing belt shows any signs of oil contamination,* see **MAINTENANCE.**

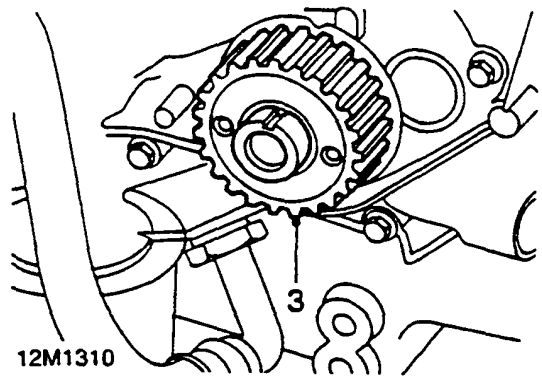
11. Locate camshaft drive gear on camshaft
12. Restrain camshaft gear using tool **18G 1521.**
13. Apply clean engine oil to threads of new rear camshaft gear retaining bolt and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft) + 90°.
14. Remove tool **18G 1521.**
15. Fit injection pump timing belt, *see* **MAINTENANCE.**
16. Position sound deadening pad to engine and secure with bolts.

CRANKSHAFT FRONT OIL SEAL

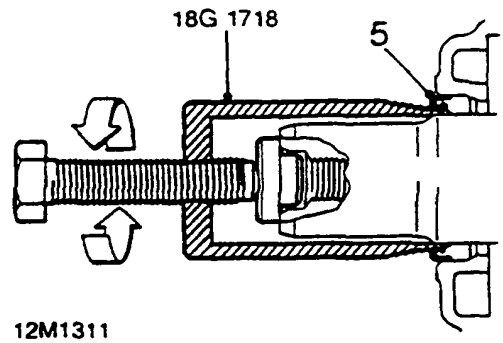
Service Repair No. 12.21.14

Remove

1. Disconnect battery earth lead.
2. Remove camshaft timing belt, *see* **MAINTENANCE.**



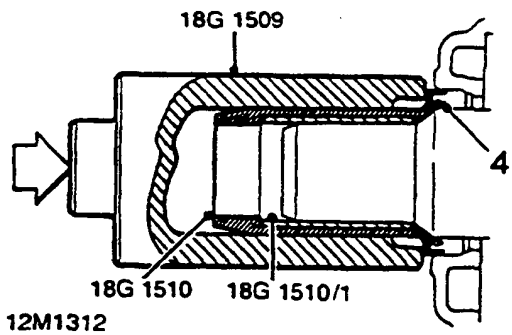
3. Remove timing gear from crankshaft.



4. Ensure bore of tool **18G 1718** is burr free, screw tool into crankshaft front oil seal.
5. Remove oil seal by tightening centre bolt of tool.

Refit

1. Use lint free cloth and thoroughly clean seal recess in oil pump and running surface on crankshaft.



2. Fit guide tools **18G 1510** and **18G 1510-1** onto crankshaft.
3. Lubricate oil pump seal recess and guide tools with clean engine oil.

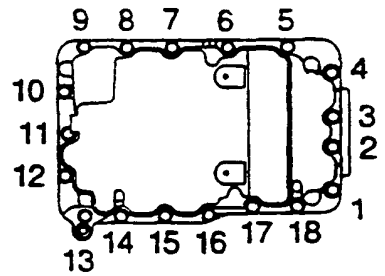
4. Using guide tools position new oil seal on crankshaft journal and against oil pump, drift into place using tool **18G 1509.**
5. Remove guide tools from crankshaft.
6. Clean crankshaft timing gear and slide onto crankshaft.
7. Fit camshaft timing belt, see **MAINTENANCE.**
8. Connect battery earth lead.

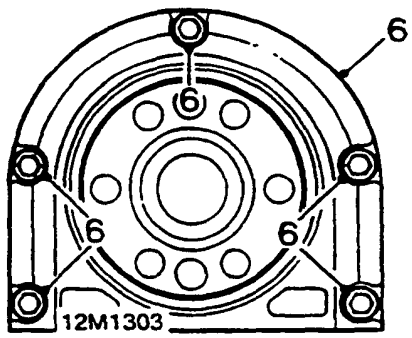
CRANKSHAFT REAR OIL SEAL

Service Repair No. 12.21.20

Remove

1. Disconnect battery earth lead.
2. Remove flywheel, see **Flywheel and starter ring gear.**
3. Drain engine oil, see **MAINTENANCE.**
4. Fit oil drain plug using new sealing washer and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).

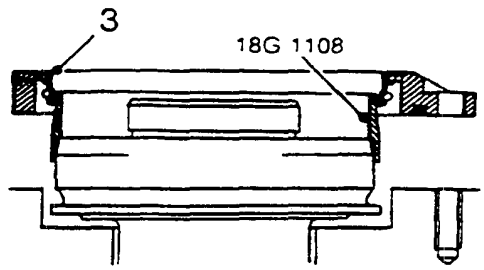


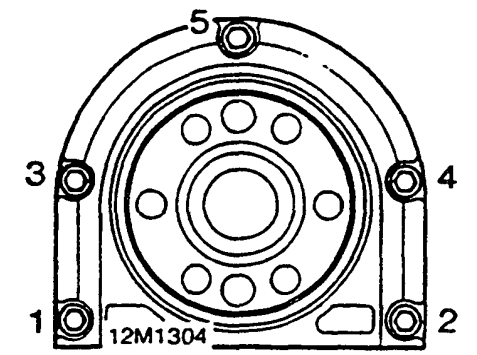


5. Slacken 18 sump bolts by approximately 3 turns, allowing sump to drop away from rear oil seal housing.
6. Remove 5 bolts securing oil seal housing and remove oil seal and housing.

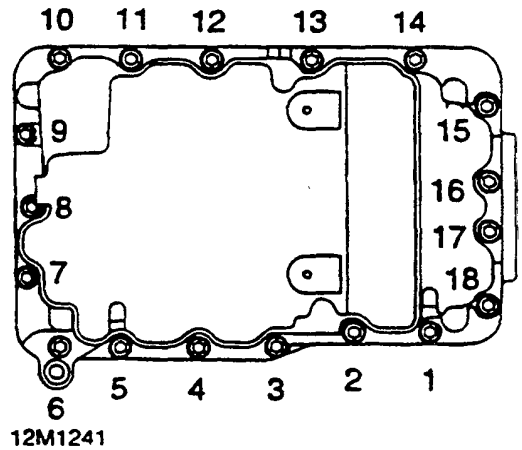
Refit

1. Clean seal seating area of block and accessible area of sump gasket. Sump gasket must be replaced if damaged.
2. Lubricate oil seal and sealing surfaces with engine oil.





3. Fit tool **18G 1108** over crankshaft boss and fit oil seal.
4. Remove tool.
5. Fit and tighten seal housing bolts to 10 N·m (1.0 kgf·m, 7.4 lbf·ft) in sequence shown.



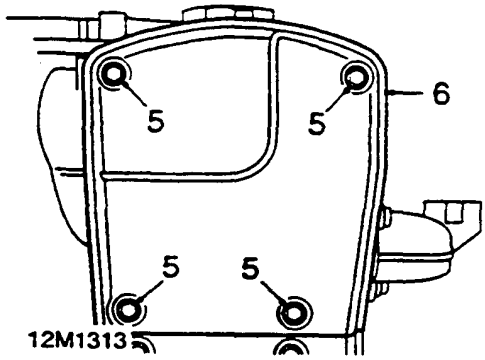
6. Tighten engine sump bolts progressively in the sequence shown to 25 N·m (2.5 kgf·m, 18 lbf·ft).
7. Fit flywheel, see **Flywheel and starter ring gear.**
8. Fill engine with oil, see **MAINTENANCE.**
9. Connect battery earth lead.
10. Start engine and run until normal operating temperature is reached.
11. Check for leaks around engine sump gasket.

CYLINDER HEAD GASKET

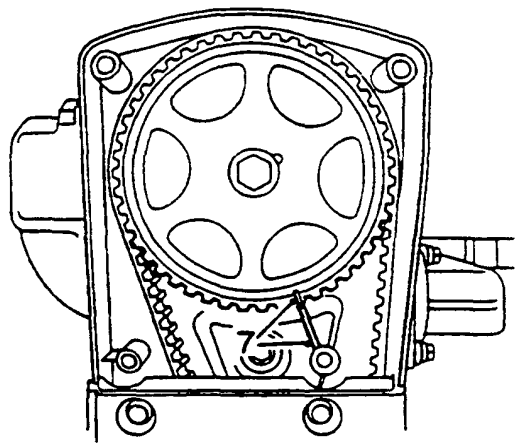
Service Repair No. 12.29.02

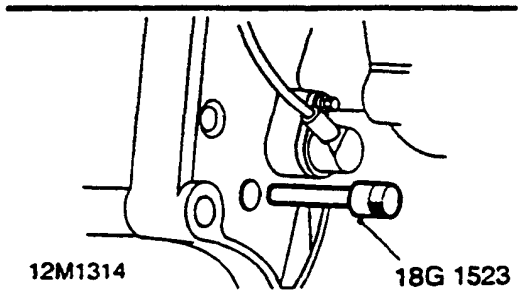
Remove

1. Remove exhaust manifold, see **MANIFOLD & EXHAUST - Repairs.**
2. Remove LH under tray, see **BODY - Repairs.**
3. Remove air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**
4. Remove drive belt, see **MAINTENANCE.**



5. Remove 4 bolts securing camshaft timing belt top cover.
6. Remove top cover.

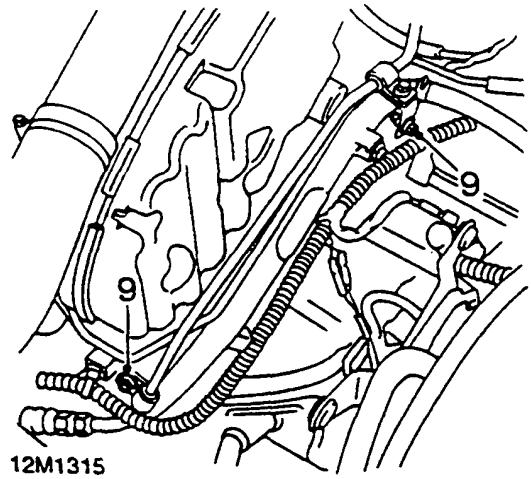




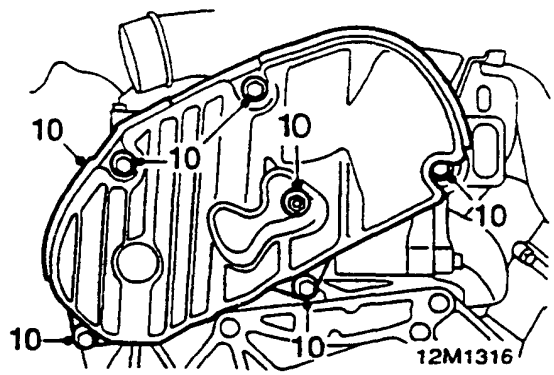
7. Using a socket and extension bar on crankshaft pulley bolt, rotate crankshaft clockwise to align timing marks on camshaft pulley to back cover.

***CAUTION:** Never use the camshaft gear, gear retaining bolt or timing belt to rotate the camshaft.*

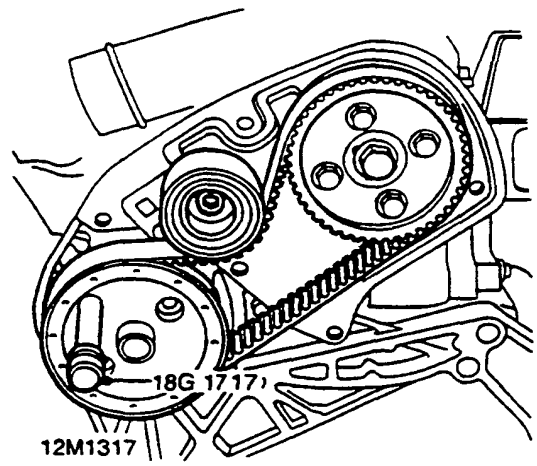
8. Insert timing pin tool **18G 1523** through hole in gearbox mounting back plate and into hole in flywheel.



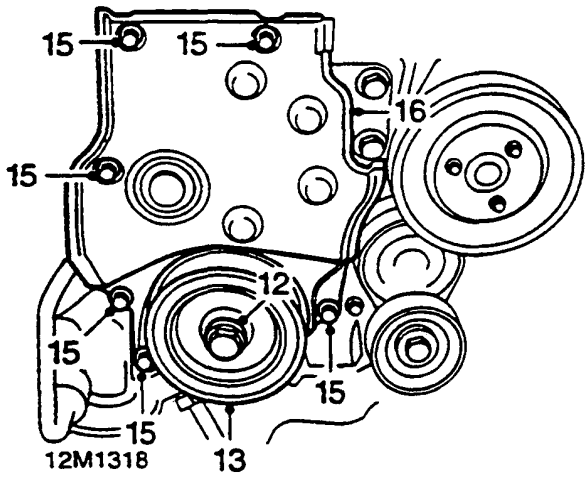
9. Remove 2 bolts securing PAS pipes to coolant rail.



10. Remove 5 bolts and nut securing injection pump timing belt cover, remove cover.



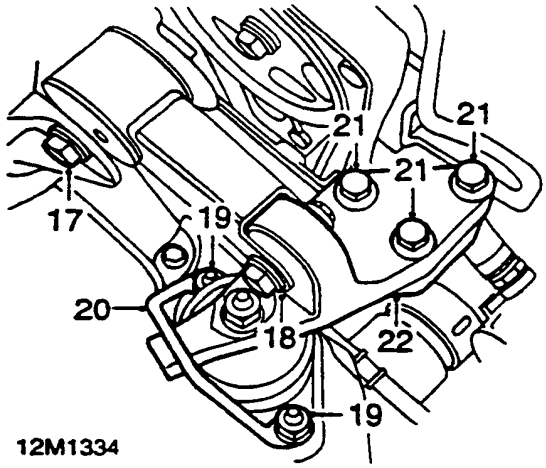
11. Insert locking pin tool **18G 1717** through injection pump drive gear and into hole in mounting plate.



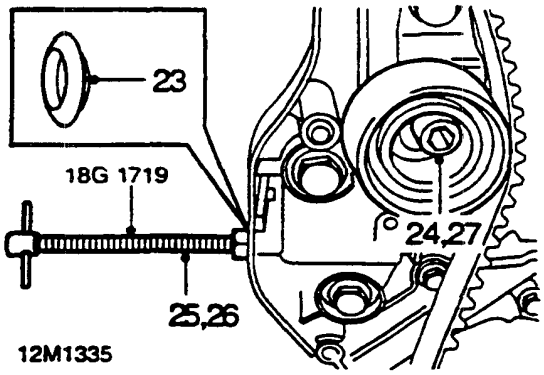
12. Remove crankshaft pulley bolt.
13. Remove crankshaft pulley from crankshaft
14. Position trolley jack to support engine.

CAUTION: *Use a block of wood or hard rubber pad to protect sump.*

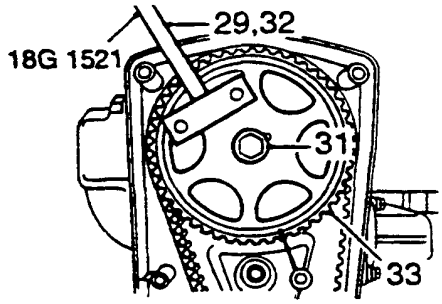
15. Noting their fitted positions remove 6 bolts securing camshaft timing belt lower cover.
16. Remove lower cover.

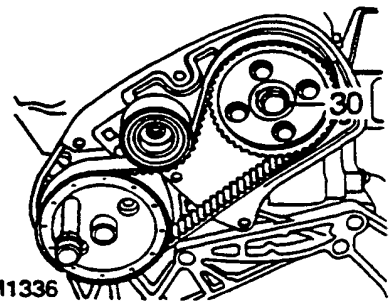


17. Remove bolt securing engine RH mounting tie to body bracket.
18. Slacken bolt securing engine RH mounting to tie.
19. Remove 2 nuts securing restraint bar to engine RH mounting.
20. Remove mounting restraint bar.
21. Remove 3 bolts securing engine RH mounting to engine.
22. Remove engine RH mounting assembly.

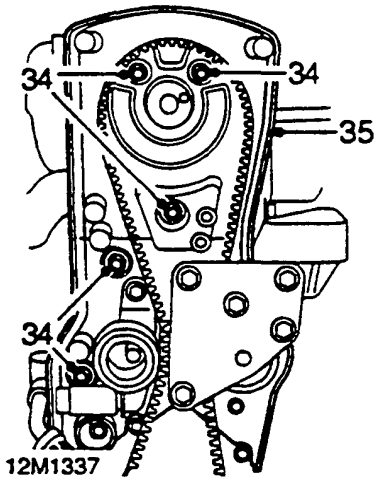


23. Remove camshaft timing belt tensioner access plug from timing belt rear cover.
24. Slacken Allen bolt securing tensioner pulley.
25. Fit tool **18G 1719** to tensioner.
26. Pull back tensioner plunger using tool **18G 1719** .
27. Tighten tensioner pulley Allen bolt.
28. Raise engine on jack.

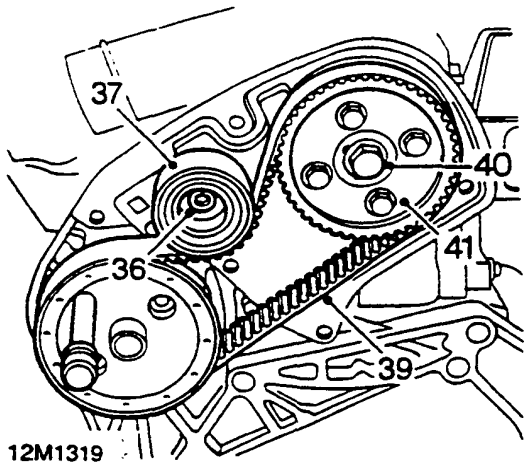




29. Restrain camshaft gear using tool **18G 1521** .
30. Slacken camshaft rear gear retaining bolt.
31. Remove and discard camshaft gear retaining bolt.
32. Remove tool **18G 1521** .
33. Release camshaft gear from camshaft and remove from belt.



34. Remove 5 bolts securing camshaft timing belt rear cover to engine.
35. Remove timing belt rear cover.

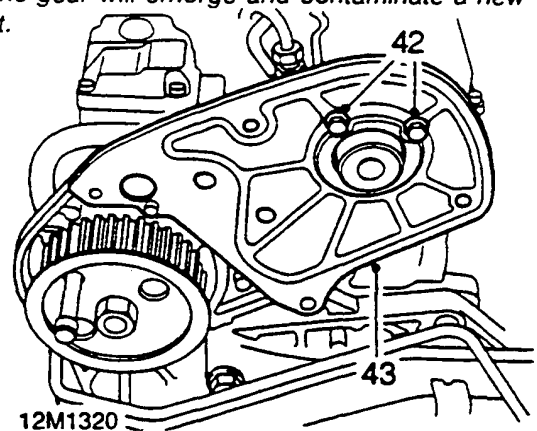


36. Remove Allen bolt securing tensioner pulley to mounting plate.
37. Remove tensioner.
38. If injection pump timing belt is to be refitted, mark direction of rotation on belt.
39. Remove injection pump timing belt.

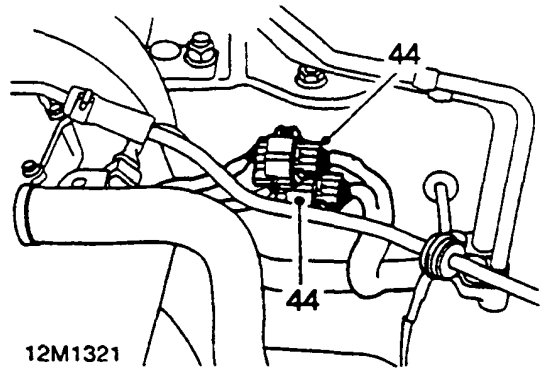
CAUTION: *Ease timing belt off gears using fingers only. Metal levers may damage the belt and gears. Do not rotate engine with timing belt removed and cylinder head fitted. Timing belts must be stored and handled with care. Always store a timing belt on its edge with a bend radius greater than 50 mm (2.0 in).*
Although the belt has a service life of 135,000 km, (84,000 miles), an existing belt should only be refitted if it has completed less than 65,000 km, (42,000 miles).

40. Remove and discard camshaft gear retaining bolt.
41. Remove camshaft gear.

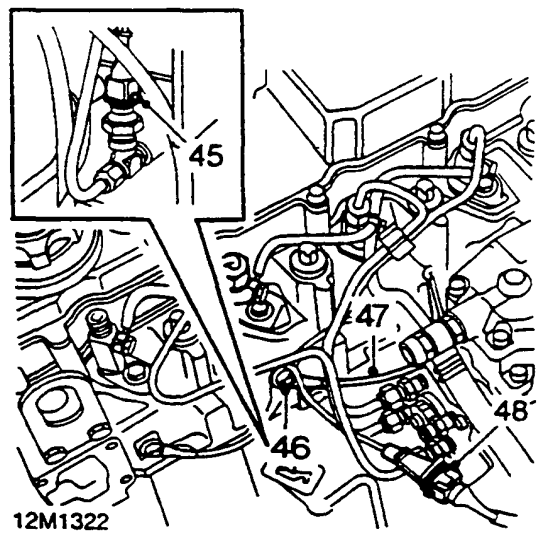
CAUTION: *If the sintered gears have subjected to prolonged oil contamination, they must be soaked in a solvent bath and thoroughly washed with solvent before refitment. Because of the porous construction of sintered material, oil impregnated in the gear will emerge and contaminate a new belt.*



42. Remove 2 bolts securing injection pump timing belt back plate to cylinder head.
43. Remove back plate.

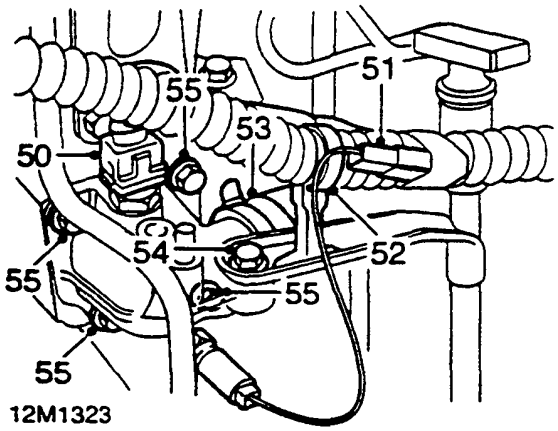


44. Disconnect 2 main harness to engine harness multiplugs.



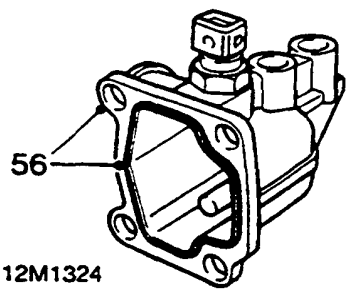
45. Disconnect multiplug from oil pressure switch.
46. Remove terminal nut securing lead to No.2 glow plug.
47. Disconnect lead from glow plug.
48. Release injector needle lift sensor multiplug from injection pump bracket and disconnect.

49. Drain cooling system, see **MAINTENANCE.**



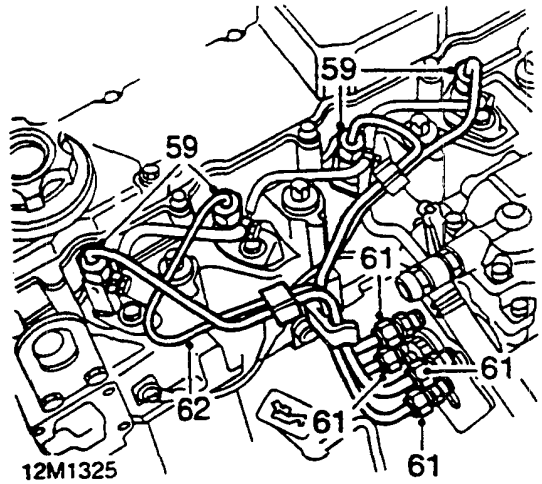
12M1323

50. Disconnect multiplug from ECT sensor.
51. Disconnect instrument pack ECT gauge sending unit connector.
52. Release harness clip from oil level dipstick bracket.
53. Slacken clip and disconnect radiator top hose from coolant outlet elbow.
54. Remove bolt securing oil level dipstick bracket to coolant outlet elbow.
55. Remove 4 bolts securing coolant outlet elbow to cylinder head.



12M1324

56. Remove coolant outlet elbow, remove and discard seal.
57. Position engine harness aside.
58. Position coolant hose aside.



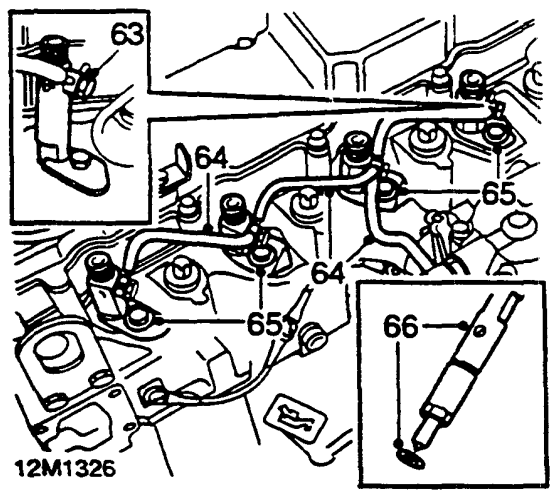
12M1325

59. Slacken 4 injector pipe unions at injectors.
60. Position absorbent cloth around fuel injection pump pipe unions to catch fuel spillage.
61. Slacken 4 injector pipe unions at injection pump.

CAUTION: *To prevent damage to fuel system pipes or components, use two spanners when loosening or tightening unions.*

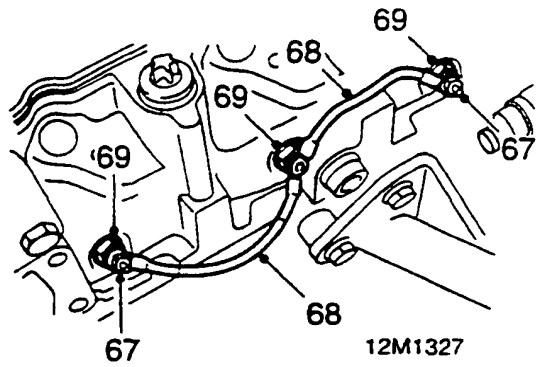
62. Disconnect injector pipe unions from fuel injection pump and injectors, remove injector pipes.

CAUTION: *Plug the connections to prevent the ingress of dirt.*

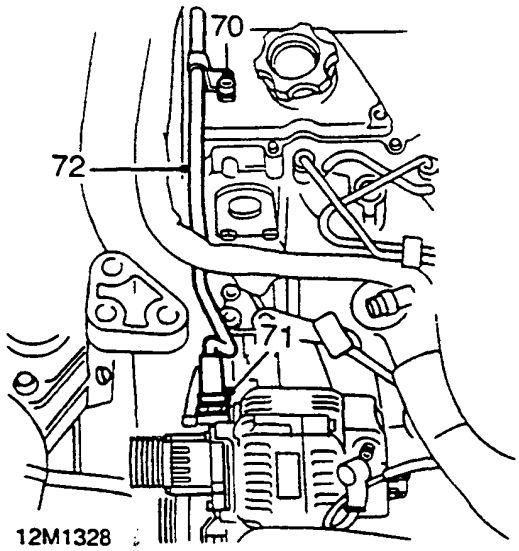


12M1326

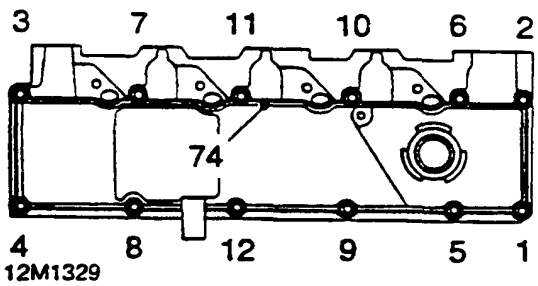
63. Remove spill return pipe banjo bolt from injector No. 4 and discard 2 sealing washers.
64. Remove 3 spill return pipes from injectors and injection pump.
65. Remove 4 bolts and collect clamp plates securing injectors to cylinder head.
66. Remove 4 injectors from cylinder head, remove and discard 4 sealing washers.



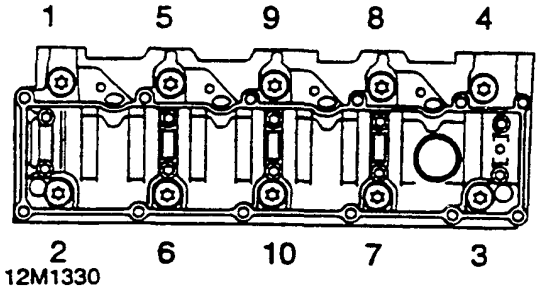
67. Remove 2 terminal nuts securing feed leads to glow plugs.
68. Disconnect and remove glow plug leads.
69. Remove 3 glow plugs.



70. Remove Allen screw securing brake servo vacuum pipe to camshaft cover.
71. Release clip and disconnect vacuum pipe from vacuum pump.
72. Position vacuum pipe aside.

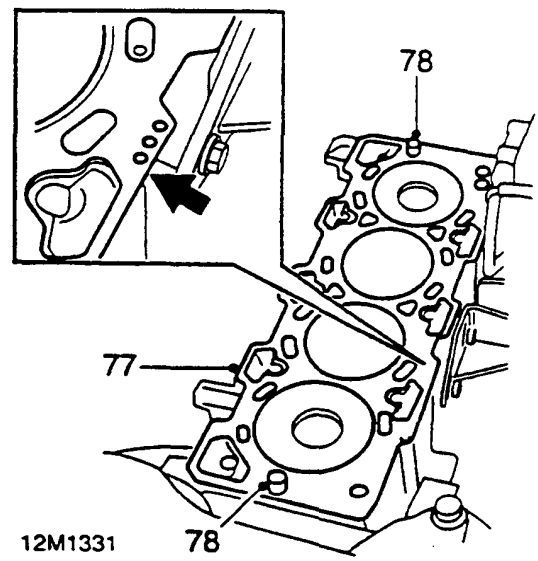


73. Remove 12 bolts securing camshaft cover to cylinder head.
74. Remove camshaft cover from cylinder head



75. Progressively slacken and remove 10 Tx14 Torx cylinder head bolts, working in the sequence shown.

Note: *Store cylinder head bolts in fitted order.*



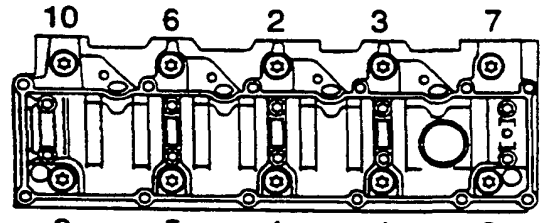
76. Remove cylinder head assembly from cylinder block, use assistance.
77. Remove cylinder head gasket from cylinder block and discard.

CAUTION: *Note the gasket thickness indicator and ensure the same thickness gasket is used on refitment of cylinder head.*

78. Remove location dowels from cylinder head.
79. Inspect cylinder head for signs of damage.

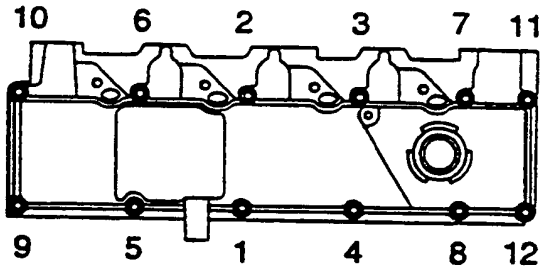
Refit

1. Clean joint surfaces on cylinder head and block.
   Clean oil and coolant passages.
   De-carbonise piston crowns and cylinder head if necessary.
2. Clean cylinder head bolt threads with a wire brush, check for damage, replace if necessary.
3. Wash cylinder head bolts and wipe dry. Apply a light film of engine oil to bolt threads and underside of bolt heads.
4. Fit location dowels to cylinder block.
5. Fit new cylinder head gasket, dry, to cylinder block.
6. Fit cylinder head onto cylinder block, carefully locating on dowels, use assistance.



12M1332

7. Tighten cylinder head bolts progressively in the sequence shown, using the following procedure:
   i. Tighten all bolts to 30 N·m (3.1 kgf·m, 22 lbf·ft).
   ii. Tighten all bolts to 65 N·m (6.6 kgf·m, 48 lbf·ft). Using a felt tip pen, mark position of radial mark on each bolt head.
   iii. Turn all bolts through 90°.
   iv. Turn all bolts through another 90°.
8. Clean camshaft cover to cylinder head mating faces.
9. Inspect camshaft cover gasket for signs of damage, replace if necessary.
10. Fit camshaft cover to cylinder head.



12M1244

11. Working in the sequence shown, fit camshaft cover bolts and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
12. Connect vacuum pipe to vacuum pump and secure with clip.
13. Align vacuum pipe bracket to camshaft cover, fit and tighten Allen screw.
14. Thoroughly clean glow plugs and glow plug seating area in cylinder head.
15. Apply a suitable anti-sieze compound to threads of glow plugs.
16. Fit glow plugs and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft).
17. Connect feed leads to glow plugs, fit and tighten terminal nuts on No. 1 and No. 3 glow plugs.
18. Clean mating faces of coolant outlet elbow and cylinder head.
19. Fit new seal to coolant outlet elbow.
20. Position coolant outlet elbow to cylinder head, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
21. Align oil level dipstick bracket to coolant outlet elbow, fit bolt and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
22. Thoroughly clean injectors and injector seats in cylinder head.
23. Fit new sealing washers to injectors and fit injectors to cylinder head.

CAUTION: *The injector incorporating the needle lift sensor must be fitted into No.1 cylinder position only.*

CAUTION: *Domed surface of sealing washer must face towards injector.*

24. Fit clamp plates to injectors, align injectors and clamp plates to bolt holes in cylinder head.
25. Fit injector clamp plate bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
26. Using new sealing washers, fit spill return pipe union to injector and tighten banjo bolt to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
27. Remove plugs from injector pipes, injection pump and injector unions.
28. Clean injector pipes, injection pump and injector unions.
29. Fit and align injector pipes to injectors and fuel injection pump.
30. Tighten injector pipes to fuel injection pump unions to 20 N·m (2.0 kgf·m, 15 lbf·ft).
31. Tighten injector pipes to injector unions to 20 N·m (2.0 kgf·m, 15 lbf·ft).

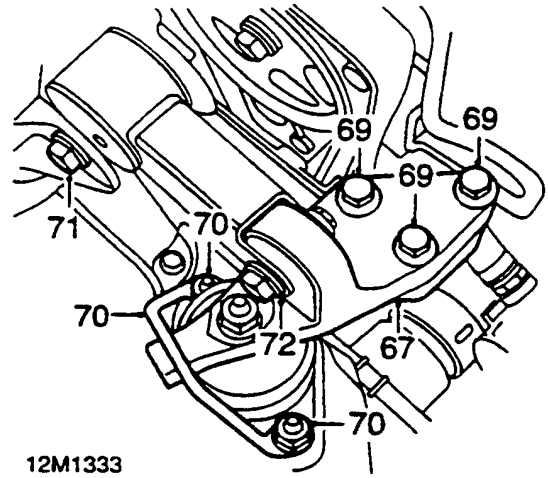
CAUTION: *To prevent damage to fuel system pipes or components, use 2 spanners when loosening or tightening unions.*

32. Connect radiator top hose to coolant outlet elbow and tighten clip.
33. Position engine harness.
34. Secure harness clip to oil level dipstick tube bracket.
35. Connect injector lift sensor multiplug and secure to injection pump bracket.
36. Connect supply lead to No.2 glow plug and tighten terminal nut.
37. Connect multiplug to oil pressure switch.
38. Connect instrument pack ECT gauge sending unit connector.
39. Connect multiplug to ECT sensor.
40. Connect main harness to engine harness multiplugs.
41. Clean injection pump timing belt back plate to cylinder head mating faces.

42. Position back plate to cylinder head, fit bolts and tighten to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
43. Clean tensioner pulley.
44. Fit tensioner pulley to gearbox mounting plate locating dowel, fit Allen bolt but do not tighten.
45. Position camshaft timing belt rear cover, fit and tighten bolts to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
46. Clean camshaft timing belt.
47. Locate camshaft front drive gear on camshaft.
48. Restrain camshaft gear using tool **18G 1521.**
49. Apply clean engine oil to threads of new camshaft gear retaining bolt and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft) then another 90°.
50. Locate camshaft rear drive gear on camshaft.
51. Restrain camshaft front gear using tool **18G 1521.**
52. Apply clean engine oil to threads of new camshaft gear retaining bolt and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft) then another 90°.
53. Remove tool **18G 1521.**

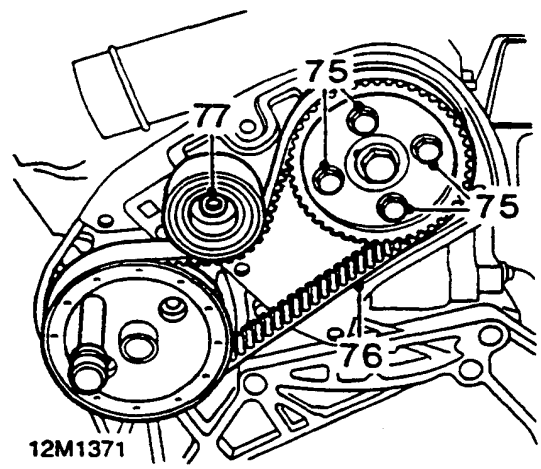
CAUTION: *Ensure timing marks on camshaft front drive gear and rear cover are aligned.*

54. Clean crankshaft pulley.
55. Using fingers only, fit timing belt to gears. Ensure the belt run between the crankshaft gear and the camshaft gear is kept taut during the fitting procedure.
56. Fit camshaft timing belt lower cover, fit bolts and tighten to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
57. Clean crankshaft pulley and crankshaft mating face.
58. Fit crankshaft pulley, fit bolt and tighten to 63 N·m (6.4 kgf·m, 46 lbf·ft) + 90°.
59. Slacken tensioner pulley Allen bolt.
60. Release camshaft timing belt tensioner plunger using tool **18G 1719** .
61. Remove timing pin tool **18G 1523** from flywheel.
62. Rotate crankshaft 2 complete revolutions and align camshaft gear timing mark.
63. Insert timing pin tool **18G 1523** through hole in gearbox mounting back plate and into hole in flywheel.
64. Remove camshaft timing belt tensioner access plug from timing belt lower cover.
65. Tighten tensioner pulley Allen bolt to 44 N·m (4.5 kgf·m, 32 lbf·ft).
66. Fit camshaft timing belt tensioner access plugs to timing belt lower cover and rear cover.



12M1333

67. Position engine RH mounting assembly
68. Lower engine on jack and align engine mounting assembly.
69. Fit 3 bolts securing engine mounting to engine and tighten to 85 N·m (8.7 kgf·m, 63 lbf·ft).
70. Fit restraint bar to engine mounting, fit and tighten nuts to 45 N·m (4.6 kgf·m, 33 lbf·ft).
71. Align tie bar to body bracket, fit through bolt and tighten to 90 N·m (9.2 kgf·m, 66 lbf·ft).
72. Tighten bolt securing tie bar to engine mounting to 90 N·m (9.2 kgf·m, 66 lbf·ft).
73. Remove trolley jack from vehicle.
74. Clean injection pump timing belt.



12M1371

75. Slacken 4 bolts securing camshaft gear to hub
76. Using fingers only, fit timing belt to gears.ensure the lower belt run between the camshaft gear and injection pump gear is kept taut during the fitting procedure.

CAUTION: *If the original belt is to be refitted, ensure direction of rotation is facing the correct way.*

77. Push timing belt tensioner against belt to remove all slack and tighten tensioner Allen bolt, do not torque fixing at this stage.
78. Restrain camshaft front gear using tool **18G 1521.**

79. Tighten camshaft gear to hub bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft).
80. Remove tool **18G 1521.**
81. Remove injection pump gear locking pin and engine timing pin.
82. Rotate crankshaft 2 complete turns clockwise until the timing pin and locking pin can be refitted.
83. Slacken timing belt tensioner Allen bolt
84. Using a dial gauge torque wrench apply a force of 177 N (18 kgf, 40 lbf) to the tensioner to tension the belt, tighten tensioner Allen bolt to 45 N·m (4.6 kgf·m, 33 lbf·ft).
85. Remove injection pump gear locking pin and engine timing pin.
86. Position injection pump timing belt cover, fit bolts and nut and tighten to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
87. Fit and tighten bolts securing PAS pipe to coolant rail.
88. Fit camshaft timing belt top cover, fit bolts and tighten to 5 N·m (0.5 kgf·m, 4 lbf·ft).
89. Fit drive belt, see **MAINTENANCE.**
90. Fit exhaust manifold, see **MANIFOLD & EXHAUST - Repairs.**
91. Fit LH under tray, see **BODY - Repairs.**
92. Refill cooling system, see **MAINTENANCE.**
93. Fit air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**
94. Check engine oil level and top-up if necessary, see **MAINTENANCE.**
95. Start engine and check for leaks.

***Note:** If tappet noise is evident, run engine for 20 minutes at 2000 to 2500 rpm (min^{-1}). Do not exceed 3000 rpm (min^{-1}) until noise ceases.*

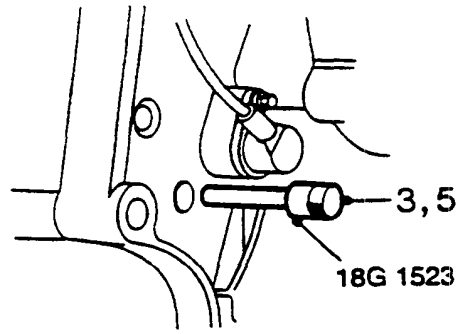
96. Stop engine and allow to cool; top-up coolant level if necessary, see **MAINTENANCE.**

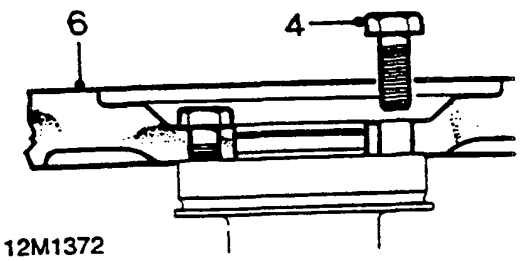
FLYWHEEL AND STARTER RING GEAR

Service Repair No.
Flywheel - 12.53.07
Starter ring gear - 12.53.19

Remove

1. Remove clutch assembly, see **CLUTCH - Repairs.**
2. Turn steering onto RH lock.





12M1372

3. Using a socket and extension bar on crankshaft pulley bolt, rotate crankshaft until flywheel locking pin **18G 1523** can be inserted through hole in gearbox mounting plate and into hole in flywheel.
4. Remove and discard 6 bolts securing flywheel to crankshaft.
5. Remove flywheel locking pin.
6. Remove flywheel from crankshaft.

Starter Ring Gear

7. Inspect starter ring gear and, if damaged, renew flywheel.

Refit

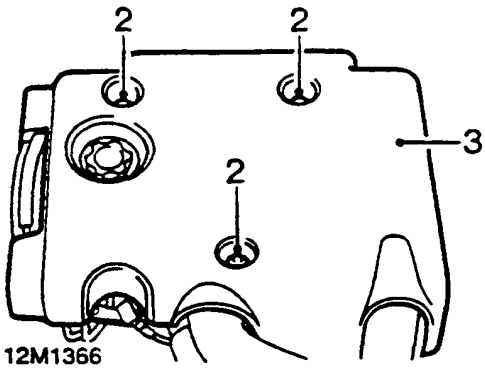
1. Clean flywheel and crankshaft face.
2. Clean adhesive from threads in crankshaft, using an old flywheel bolt with two helical hacksaw cuts made in threads. Do not use a tap.
3. Ensure location dowel is fitted to crankshaft, fit flywheel to crankshaft.
4. Insert flywheel locking pin **18G 1523** and engage in hole in flywheel.
5. Fit NEW flywheel bolts and tighten to 100 N·m (10.2 kgf·m, 73.8 lbf·ft)
6. Fit clutch assembly, see **CLUTCH - Repairs.**
7. Remove flywheel locking pin.

OIL COOLER

Service Repair No. 12.60.68

Remove

1. Disconnect battery earth lead.

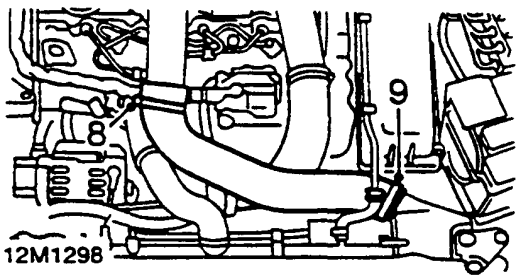


12M1366

2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.
4. Raise front of vehicle.

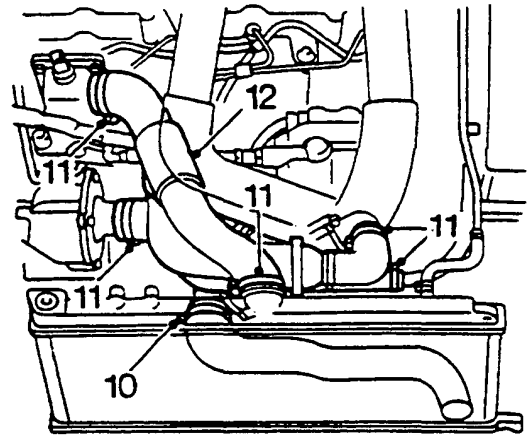
WARNING: Support on safety stands.

5. Remove LH under tray, see **BODY - Repairs.**
6. Remove under belly panel, see **BODY - Repairs.**
7. Drain cooling system, see **MAINTENANCE.**



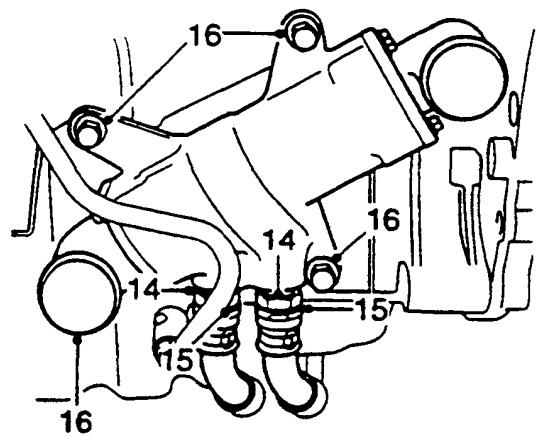
12M1298

8. Slacken clip and disconnect hose from inlet manifold intake pipe.
9. Slacken clip and remove hose from intercooler.



12M1299

10. Slacken clip and remove radiator bottom hose from oil cooler.
11. Slacken 5 clips and disconnect hoses from engine coolant outlet elbow, coolant pump, radiator outlet pipe, oil cooler and engine coolant rail.
12. Remove coolant pipe assembly from engine
13. Position container to collect any oil spillage.



12M1300

14. Using a 22 mm (0.9 in) crow foot spanner, slacken oil cooler pipe unions and release from cooler.
15. Remove and discard 'O' ring seals from oil cooler pipes.

CAUTION: Plug the connections.

16. Remove 3 bolts securing oil cooler to mounting bracket, remove cooler.

Refit

1. Fit oil cooler to mounting bracket, fit bolts and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
2. Clean oil cooler pipe connections.
3. Lubricate 'O' ring seals with clean engine oil.
4. Fit 'O' ring seals to cooler pipes, position pipes to cooler and tighten unions to 20 N·m (2.0 kgf·m, 15 lbf·ft).
5. Remove spillage container.
6. Fit coolant pipe assembly to engine.
7. Connect coolant pipes and tighten clips.

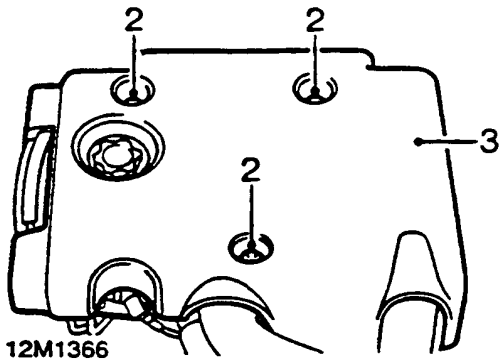
8. Connect radiator bottom hose to intercooler and tighten clip.
9. Fit intercooler hose to inlet manifold intake pipe and tighten clip
10. Connect intercooler top hose and tighten clip.
11. Refill cooling system, see **MAINTENANCE.**
12. Fit LH under tray, see **BODY - Repairs.**
13. Fit under belly panel, see **BODY - Repairs.**
14. Fit sound deadening pad and secure with bolts.
15. Connect battery earth lead.

ENGINE OIL PRESSURE SWITCH

Service Repair No. 12.60.50

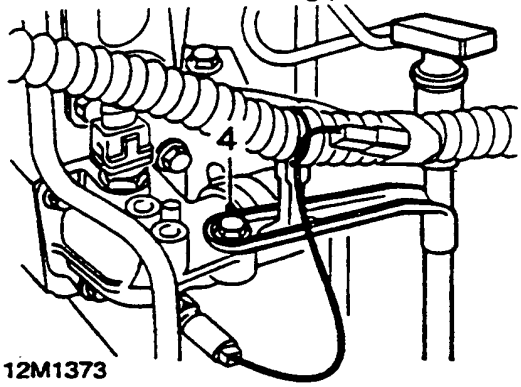
Remove

1. Disconnect battery earth lead.



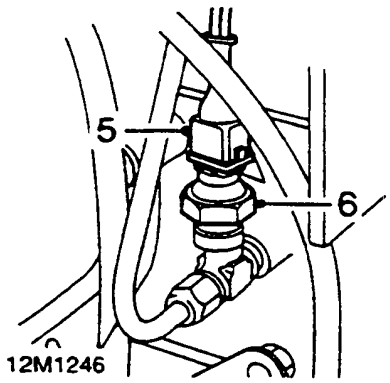
12M1366

2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.



12M1373

4. Remove bolt securing dipstick tube bracket to coolant outlet elbow.



12M1246

5. Disconnect multiplug from engine oil pressure switch.
6. Using a 24 mm (0.9 in) crow foot spanner, slacken engine oil temperature switch.
7. Remove engine oil pressure switch.

Refit

1. Clean threads of engine oil pressure switch and apply Loctite 577.
2. Fit engine oil pressure switch and tighten to 14 N·m (1.4 kgf·m, 10 lbf·ft).
3. Connect multiplug to engine oil temperature switch.
4. Align dipstick tube bracket to coolant outlet elbow, fit bolt and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
5. Position sound deadening pad to engine and secure with bolts.
6. Connect battery earth lead.

ENGINE AND MANUAL GEARBOX

Service Repair No. 12.37.01

Note: *On models fitted with air conditioning :*

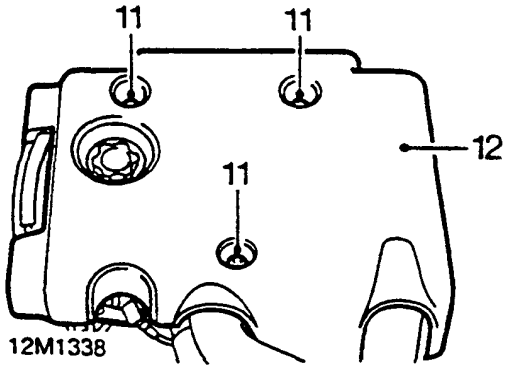
- Reclaim refrigerant, see **REPAIR MANUAL - AIR CONDITIONING - Adjustments.**

Remove

1. Tie back bonnet, protect roof panel.
2. Raise front of vehicle.

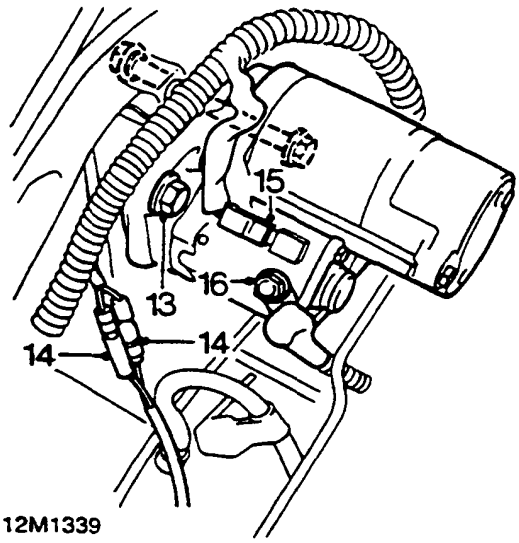
WARNING: Support on safety stands.

3. Remove road wheel(s).
4. Remove LH under tray, see **BODY - Repairs.**
5. Remove Under belly panel, see **BODY - Repairs.**
6. Drain engine oil and remove filter, see **MAINTENANCE.**
7. Drain gearbox oil, see **MAINTENANCE.**
8. Drain cooling system, see **MAINTENANCE.**
9. Disconnect battery earth lead.
10. Remove air cleaner assembly, see **ENGINE MANAGEMENT SYSTEM - Repairs.**



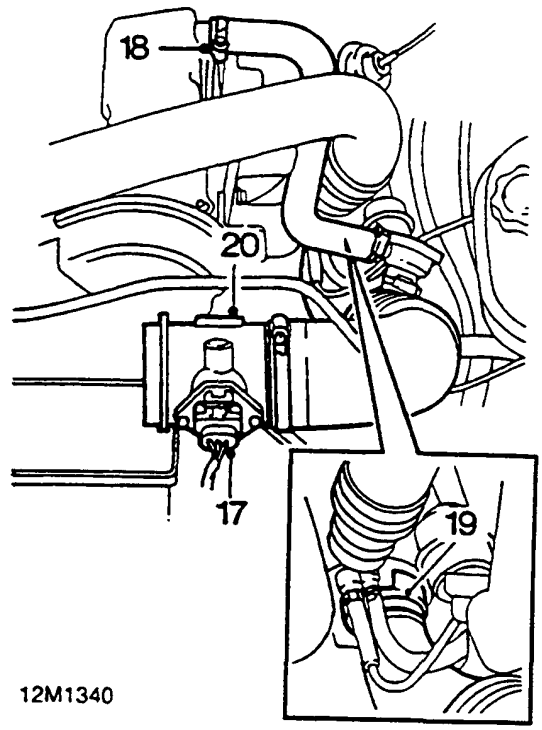
12M1338

11. Remove 3 bolts securing sound deadening pad to engine.
12. Remove sound deadening pad.



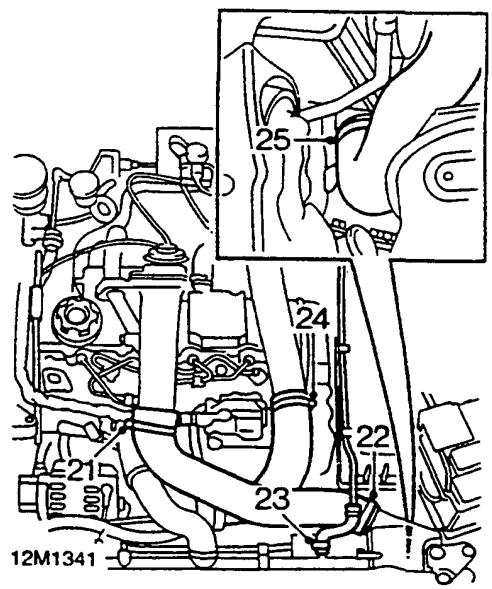
12M1339

13. Remove starter motor top retaining bolt.
14. Disconnect 2 reverse lamp switch connectors.
15. Disconnect starter solenoid connector.
16. Remove nut securing battery lead to starter motor.



12M1340

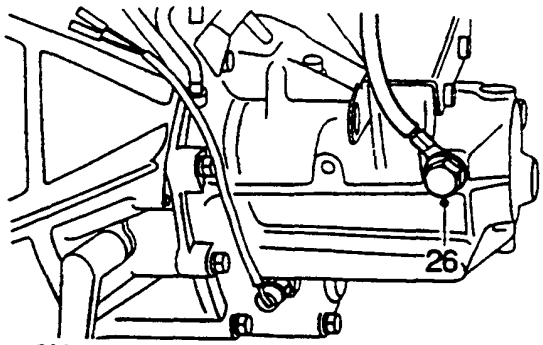
17. Disconnect Mass Air Flow (MAF) sensor multiplug.
18. Slacken clip and disconnect breather hose from camshaft cover.
19. Slacken clip and disconnect air intake hose from turbocharger.
20. Remove air intake hose assembly.



12M1341

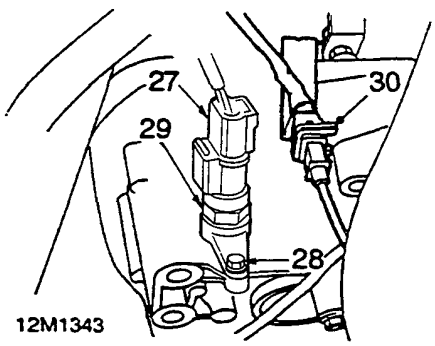
21. Slacken clip and disconnect air intake hose from inlet manifold intake pipe.
22. Slacken clip and remove air intake hose from intercooler.

23. Slacken clip and disconnect expansion tank return pipe from radiator.
24. Slacken clip and disconnect turbocharger hose from turbocharger pipe.
25. Slacken clip and remove turbocharger hose from intercooler.



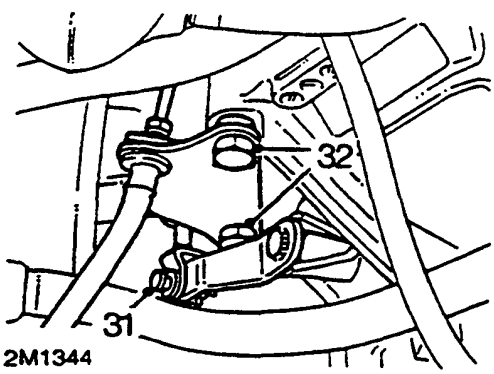
12M1342

26. Remove bolt securing earth lead to gearbox.



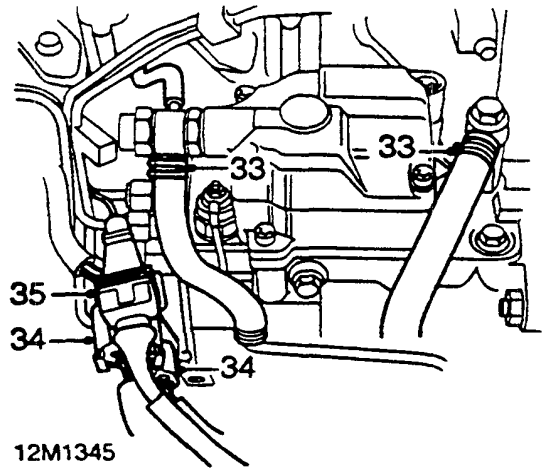
12M1343

27. Disconnect multiplug from Vehicle Speed Sensor (VSS).
28. Remove bolt securing power steering speed sensor to gearbox.
29. Release VSS from gearbox and position aside.
30. Release Crankshaft Position (CKP) sensor connector from bracket and disconnect multiplug.



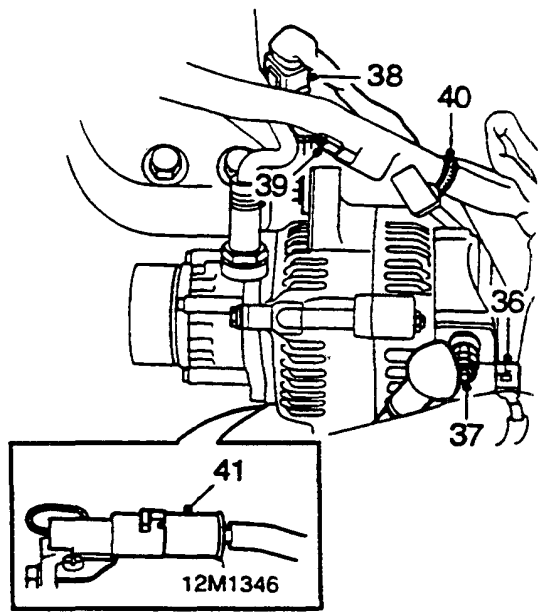
12M1344

31. Remove 'R' clip securing clutch slave cylinder push rod to release lever, remove washer, clevis pin and push rod.
32. Remove 2 bolts securing slave cylinder mounting bracket to gearbox and position aside.



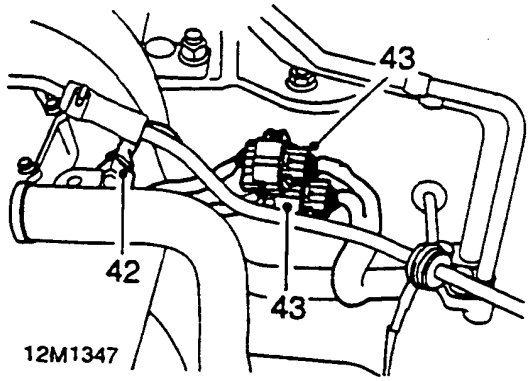
12M1345

33. Release clips and disconnect 2 fuel hoses from fuel injection pump.
34. Disconnect 2 fuel injection pump multiplugs.
35. Disconnect No.1 injector needle lift sensor multiplug.

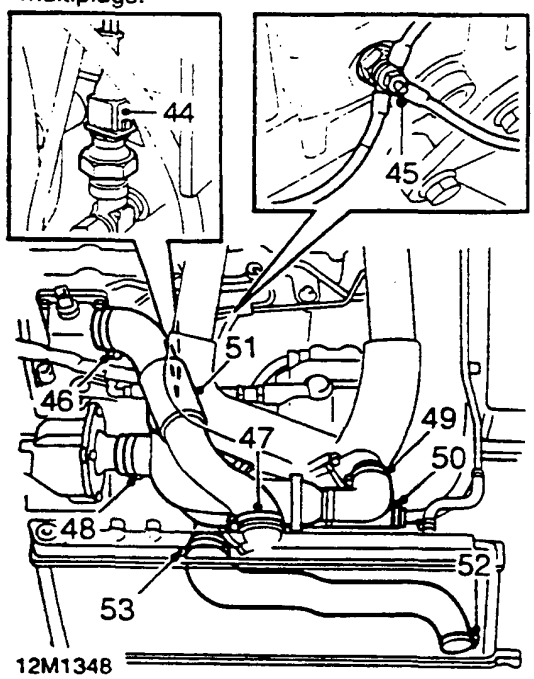


12M1346

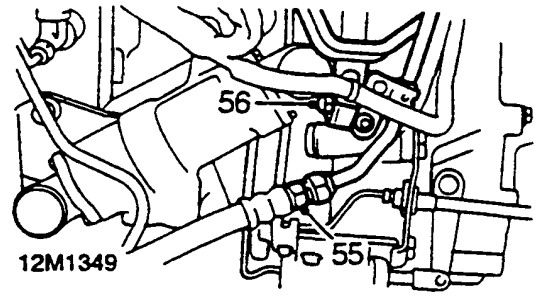
36. Disconnect alternator (ALT) multiplug.
37. Remove nut securing ALT lead.
38. Disconnect ECT sensor multiplug.
39. Disconnect ECT gauge sending unit connector.
40. Release engine harness clip from dipstick tube bracket.
41. Disconnect air conditioning compressor multiplug.



42. Disconnect intake air temperature sensor multiplug.
43. Release 2 engine harness to main harness connectors from bracket and disconnect multiplugs.



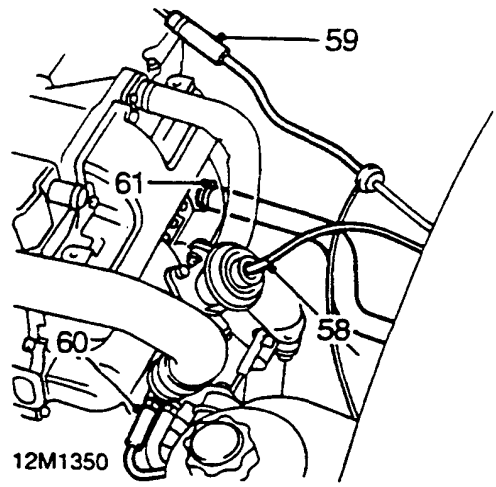
44. Disconnect oil pressure switch multiplug
45. Remove nut securing supply lead to No.2 glow plug.
46. Slacken clip and disconnect coolant hose from coolant outlet elbow.
47. Slacken clip and disconnect coolant hose from radiator inlet pipe.
48. Slacken clip and disconnect coolant hose from coolant pump.
49. Slacken clip and disconnect coolant hose from engine oil cooler inlet pipe.
50. Slacken clip and disconnect coolant hose from engine coolant rail.
51. Remove coolant hose assembly
52. Slacken clip and disconnect coolant hose from radiator outlet pipe.
53. Slacken clip and disconnect coolant hose from engine oil cooler outlet pipe.
54. Position drain tray and cloth to absorb fluid spillage.



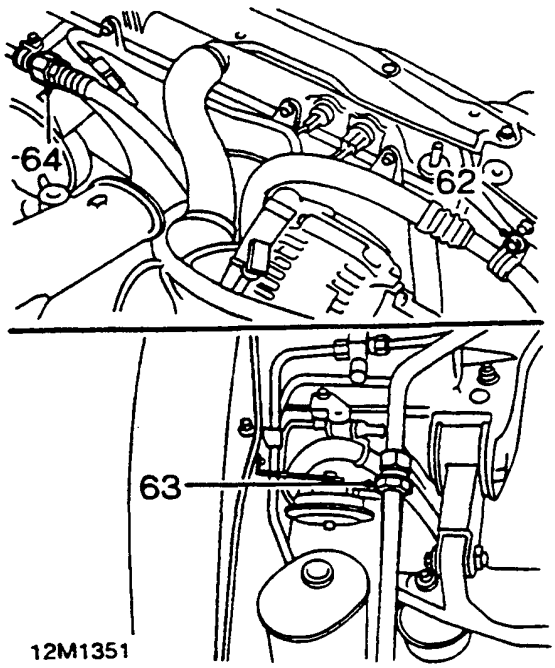
55. Slacken PAS pump pressure hose to intermediate pipe union, remove and discard 'O' ring seal.

CAUTION: *Use 2 spanners when loosening or tightening unions. Plug the connections to prevent the ingress of dirt.*

56. Slacken bolt securing coolant rail to gearbox mounting plate.
57. Release fuel filter from bracket and position aside with coolant rail and harness.



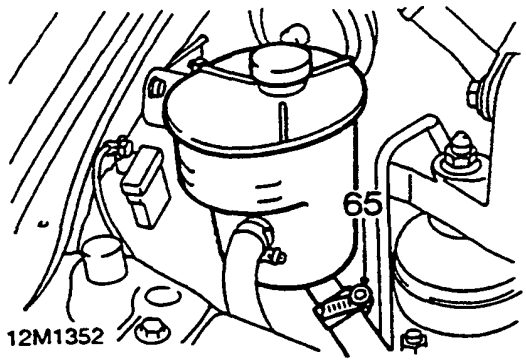
58. Disconnect vacuum hose from EGR valve.
59. Release clip and disconnect vacuum hose from vacuum pump pipe.
60. Disconnect boost pressure sensing pipe from turbocharger.
61. Slacken clip and disconnect coolant heater feed hose from engine outlet pipe.



62. Remove bolt securing air conditioning suction pipe clip to bonnet locking panel.
63. Slacken air conditioning suction pipe union, remove and discard 'O' ring seal.
64. Slacken air conditioning pressure pipe union, remove and discard 'O' ring seal.

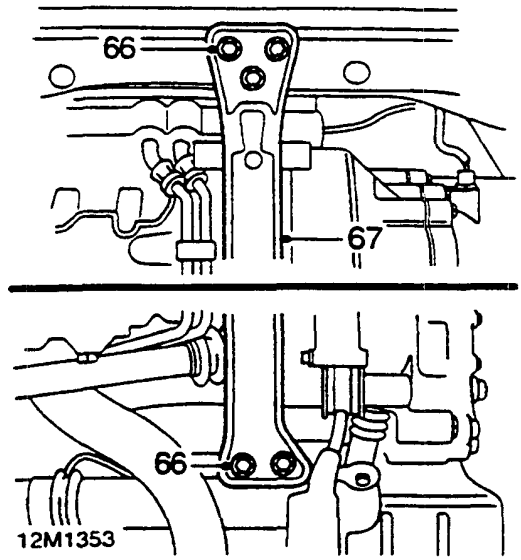
Note: *Plug or cap the lines immediately after disconnecting to avoid moisture and dust contamination into the system.*

CAUTION: *Use 2 spanners when loosening or tightening unions.*

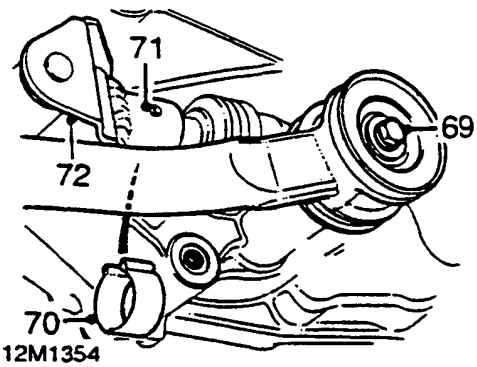


65. Slacken clip and disconnect PAS pump feed hose from PAS fluid reservoir.

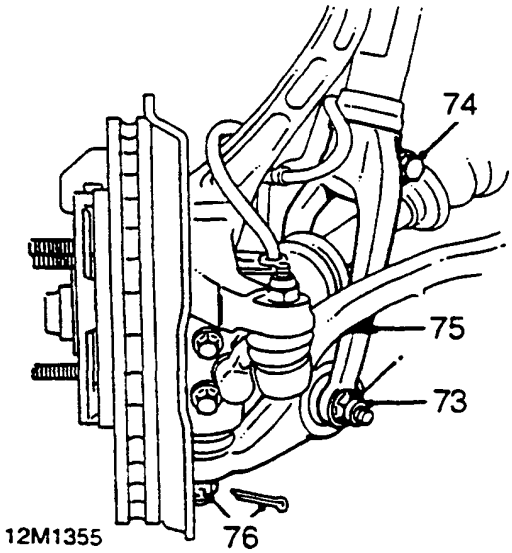
CAUTION: *Plug the connections to prevent the ingress of dirt.*



66. Remove 5 bolts securing centre beam.
67. Remove centre beam.
68. Remove exhaust front pipe, see **MANIFOLD & EXHAUST - Repairs.**

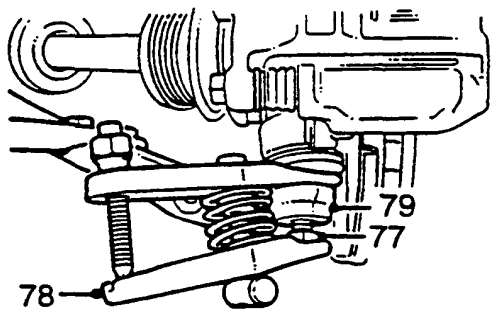


69. Remove bolt and disconnect gear change steady bar; collect 2 washers.
70. Remove clip retaining selector rod roll pin.
71. Using a suitable punch, drive out selector rod roll pin.
72. Tie selector rod and steady bar aside.



12M1355

73. Remove and discard nut and withdraw damper fork bolt from LH lower arm.
74. Remove pinch bolt from damper fork.
75. Remove LH damper fork.
76. Remove split pin from lower ball joint nut, discard split pin and remove castle nut

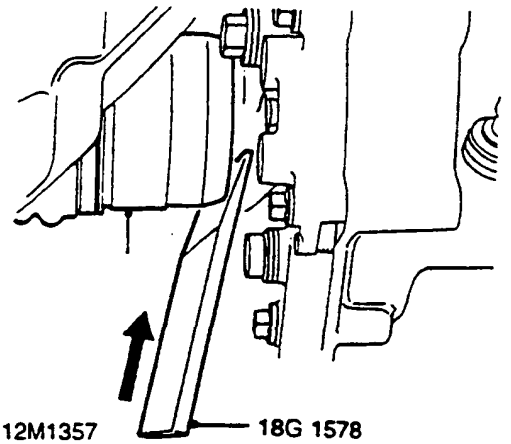


12M1356

77. Screw a 12 mm (0.5 in) nut onto ball pin end. If necessary, apply penetrating oil to joint.
78. Break taper joint using tool **18G 1707** and separate ball pin from lower arm.

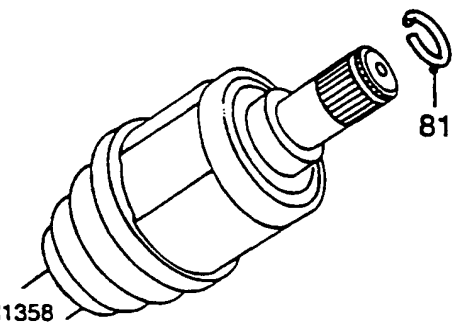
CAUTION: *Ensure cross-bar on tool is at right angles (as shown). Be careful not to damage ball joint boot.*

79. Release LH lower arm ball pin from hub.



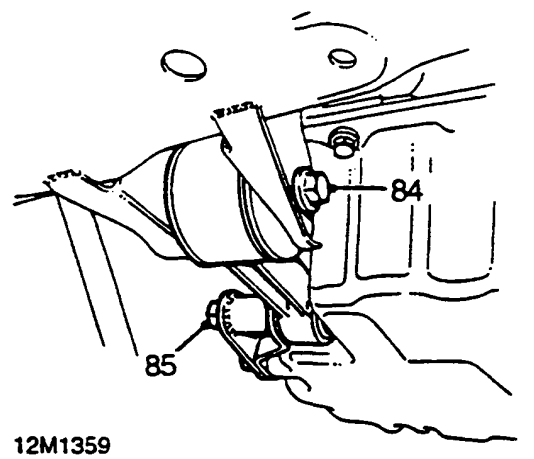
12M1357

80. Insert tool **18G 1578** between drive shaft housing and gearbox to disengage drive shaft circlip from differential by pulling on the inboard housing.



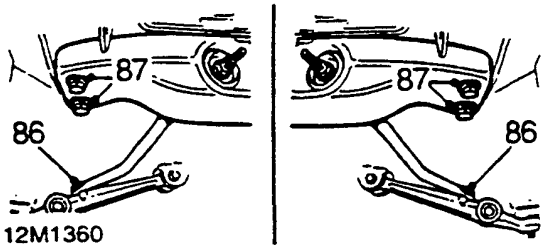
12M1358

81. Remove and discard circlip from LH drive shaft.
82. Fit plastic bag over end of drive shaft.
83. Repeat above operations and disconnect RH suspension and drive shaft.



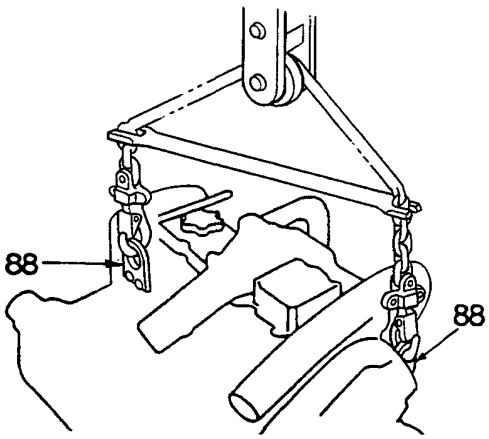
12M1359

84. Slacken bolt securing engine lower tie bar to sub-frame.
85. Remove bolt securing tie bar to sump bracket. Position tie bar away from bracket.



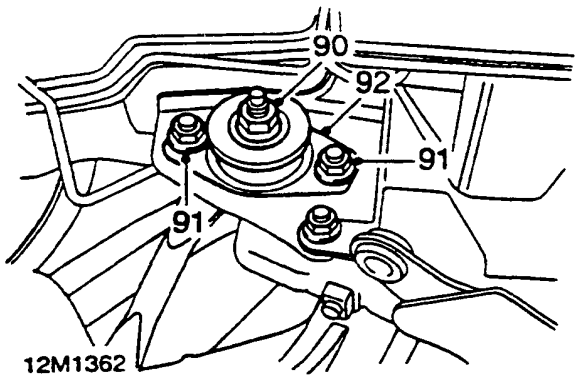
12M1360

86. Remove 2 bolts securing LH and RH radius rods to lower arms.
87. Remove 4 bolts securing front beam and remove using assistance.



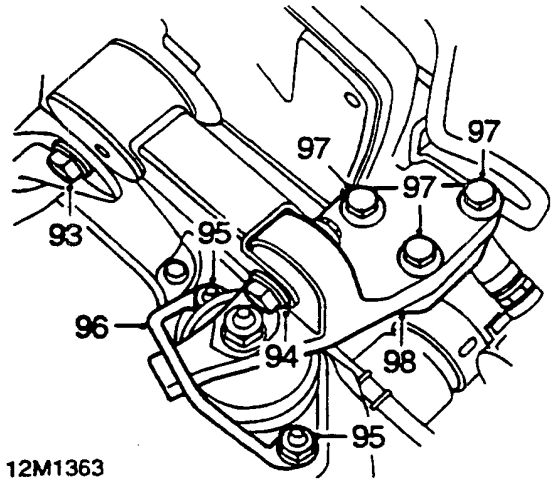
12M1361

88. Attach engine lifting tool **18G 1598**, to engine lifting eyes and connect lifting tool to hoist.
89. Raise hoist until lifting tool chains are taut.



12M1362

90. Remove nut securing engine LH mounting to gearbox bracket.
91. Remove 2 nuts securing engine LH mounting to bracket.
92. Remove engine LH mounting.



12M1363

93. Remove bolt securing engine RH mounting tie to body bracket.
94. Slacken bolt securing engine RH mounting to tie.
95. Remove 2 nuts securing engine RH mounting restraint bar.
96. Remove mounting restraint bar.
97. Remove 3 bolts securing engine RH mounting to engine.
98. Remove engine RH mounting assembly.
99. Lower engine assembly to remove.

Refit

1. Raise engine assembly into position using assistance.
2. Fit engine RH mounting assembly.
3. Align engine mounting assembly.
4. Fit 3 bolts securing engine mounting to engine and tighten to 85 N·m (8.7 kgf·m, 63 lbf·ft).
5. Fit mounting restraint bar to mounting, fit and tighten 2 nuts to 45 N·m (4.6 kgf·m, 33 lbf·ft).
6. Align mounting tie bar to body bracket, fit and tighten bolt to 90 N·m (9.2 kgf·m, 66 lbf·ft).
7. Tighten bolt securing mounting tie bar to mounting to 90 N·m (9.2 kgf·m, 66 lbf·ft).
8. Align engine LH mounting to bracket.
9. Fit engine LH mounting, tighten M10 nuts to 45 N·m (4.6 kgf·m, 33 lbf·ft) and M12 nut to 70 N·m (7.1 kgf·m, 52 lbf·ft).
10. Release lifting tool chains from engine.
11. Remove lifting tool **18G 1598**.
12. Using assistance, fit front beam to vehicle, fit bolts and tighten to 69 N·m (7.0 kgf·m, 51 lbf·ft).
13. Attach lower tie bar to sump, tighten bolts to 85 N·m (8.7 kgf·m, 63 lbf·ft).
14. Fit LH and RH radius rod to lower arm bolts and tighten to 105 N·m (10.7 kgf·m, 77.4 lbf·ft).
15. Clean splines of LH drive shaft, fit NEW circlip to end of shaft.
16. Smear differential oil seal with clean engine oil.

17. Insert drive shaft in differential and push fully home until circlip locks into differential groove. Pull on inner housing to ensure circlip is fully engaged.

CAUTION: *Keep drive shaft horizontal to avoid damaging differential oil seal.*

18. Engage swivel pin in lower arm and tighten nut to 50 N·m (5.1 kgf·m, 37 lbf·ft) tighten to align hole and fit NEW split pin.

CAUTION: *Bend split pin ends, against face of nut and along swivel pin.*

19. Engage damper fork on damper so that tab is aligned with slot in damper fork.
20. Insert lower arm bolt and pinch bolt, tighten finger tight.

CAUTION: *The bolt and nut should be tightened with the vehicle's weight on the suspension.*

21. Repeat operations to fit RH drive shaft and damper fork.
22. Position steady bar and gear selector rod.
23. Align holes in selector shaft and selector rod.
24. Fit selector rod roll pin, fit retaining clip.
25. Fit steady bar washers and bolt, tighten bolt to 60 N·m (6.1 kgf·m, 44 lbf·ft).
26. Fit exhaust front pipe, see **MANIFOLD AND EXHAUST - Repairs.**
27. Fit centre beam; fit bolts and tighten to 55 N·m (5.6 kgf·m, 41 lbf·ft).
28. Connect PAS pump feed hose to fluid reservoir and tighten clip.
29. Remove plugs from air conditioning pressure pipe union.
30. Clean union joint.
31. Lubricate NEW 'O' ring with refrigerant oil.
32. Fit 'O' ring to union.
33. Connect union and tighten to 17 N·m (1.7 kgf·m, 13 lbf·ft).

NOTE: *Use 2 spanners when tightening or loosening unions.*

34. Remove plugs from suction pipe union.
35. Clean union joint.
36. Lubricate NEW 'O' ring with refrigerant oil.
37. Fit 'O' ring to union.
38. Connect union and tighten to 17 N·m (1.7 kgf·m, 13 lbf·ft).

Note: *Use 2 spanners when tightening or loosening unions.*

39. Position suction pipe clip to bonnet locking panel, fit and tighten bolt.
40. Connect coolant heater feed hose to engine outlet pipe and tighten clip.
41. Connect boost pressure sensing pipe to turbocharger.
42. Connect vacuum pipe to vacuum pump pipe and secure clip.
43. Connect vacuum hose to EGR valve.
44. Secure fuel filter to mounting bracket and position coolant rail and engine harness
45. Position coolant rail bracket to gearbox mounting plate bolt, tighten bolt.
46. Remove plugs from PAS pump pressure hose union.
47. Clean union joint.
48. Lubricate NEW 'O' ring with PAS fluid, fit 'O' ring to union and tighten union to 25 N·m (2.5 kgf·m, 18 lbf·ft).

Note: *Use 2 spanners when tightening or loosening unions.*

49. Connect coolant hose to engine oil cooler inlet pipe and tighten clip.
50. Connect coolant hose to radiator outlet pipe and tighten clip.
51. Fit coolant hose assembly.
52. Connect coolant hose to engine coolant rail and tighten clip.
53. Connect coolant hose to engine oil cooler inlet pipe and tighten clip.
54. Connect coolant hose to coolant pump and tighten clip.
55. Connect supply lead to No.2 cylinder glow plug and tighten terminal nut.
56. Connect oil pressure switch multiplug.
57. Connect coolant hose to radiator inlet pipe and tighten clip.
58. Connect coolant hose to coolant outlet elbow and tighten clip.
59. Connect engine harness to main harness multiplugs and secure to mounting bracket.
60. Connect IAT sensor multiplug.
61. Connect air conditioning compressor multiplug.
62. Secure engine harness clip dipstick tube bracket.
63. Connect ECT gauge sending unit connector.
64. Connect coolant temperature sensor multiplug.
65. Connect ALT lead and tighten nut.
66. Connect ALT multiplug.
67. Connect No.1 injector needle lift sensor multiplug.
68. Connect fuel injection pump multiplugs.
69. Connect fuel hoses to injection pump and secure clips.
70. Position clutch slave cylinder to gearbox mounting plate, tighten bolts to 45 N·m (4.6 kgf·m, 33 lbf·ft).
71. Fit push rod to slave cylinder, attach to release lever using clevis pin, washer and 'R' clip.
72. Connect CKP sensor multiplug and secure to mounting bracket.
73. Fit PAS speed sensor to gearbox, tighten bolt to 19 N·m (1.9 kgf·m, 14 lbf·ft).
74. Connect VSS multiplug.
75. Position earth lead to gearbox, fit and tighten bolt.
76. Fit turbocharger hose to intercooler and tighten clip.

77. Connect turbocharger hose to turbocharger pipe and tighten clip.
78. Connect expansion tank return pipe to radiator and tighten clip.
79. Fit air intake hose to intercooler and tighten clip.
80. Connect air intake hose to inlet manifold intake pipe and tighten clip.
81. Fit air intake hose assembly to turbocharger and tighten clip.
82. Connect breather hose to camshaft cover and tighten clip.
83. Connect MAF sensor multiplug.
84. Connect battery lead to starter motor and tighten nut.
85. Connect starter solenoid connector.
86. Connect reverse lamp switch connectors.
87. Fit starter motor top retaining bolt and tighten to 85 N·m (8.7 kgf·m, 63 lbf·ft).
88. Fit sound deadening pad to engine and secure with bolts.
89. Fit air cleaner assembly, see **ENGINE MANAGEMENT SYSTEM - Repairs.**
90. Connect battery earth lead.
91. Fill gearbox with correct quantity and grade of oil, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**
92. Fill engine with correct quantity and grade of oil, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**
93. Fill cooling system, see **MAINTENANCE.**
94. Fill power steering system with the correct quantity and grade of fluid, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**
95. Fit under belly panel, see **BODY - Repairs.**
96. Fit LH under tray, see **BODY - Repairs.**
97. Fit road wheel and tighten nuts to 110 N·m (11.2 kgf·m, 81.1 lbf·ft).

Note: *Before installing the wheels, clean mating surface of brake disc and inside of wheel.*

98. Remove stand(s) and lower vehicle.
99. Tighten damper pinch bolt to 44 N·m (4.5 kgf·m, 32 lbf·ft) and damper fork nut to 65 N·m (6.6 kgf·m, 48 lbf·ft).
100. Support bonnet on support stay.
101. Check front wheel alignment and adjust if necessary, see **REPAIR MANUAL - FRONT SUSPENSION - Repairs.**

Note: *On models fitted with air conditioning:*

- Fit new receiver drier, see **REPAIR MANUAL - AIR CONDITIONING - Repairs.**
- Charge system, see **REPAIR MANUAL - AIR CONDITIONING - Adjustments.**

Injection pump timing belt tension ..... 177 N (18 kgf, 130 lbf)

TORQUE SETTINGS

Camshaft cover bolts	9 N·m (0.9 kgf·m, 7 lbf·ft)
Camshaft timing belt upper back plate cover, bolts	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Camshaft timing belt top cover bolts	5 N·m (0.5 kgf·m, 4 lbf·ft)
Camshaft timing belt lower cover, bolts	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Injection pump timing belt back plate bolts	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Injection pump timing belt front cover, bolts and nut	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Camshaft gear bolts	
Stage 1	65 N·m (6.6 kgf·m, 48 lbf·ft)
Stage 2	90°
Cylinder head nuts:*	
Stage 1	30 N·m (3.1 kgf·m, 22 lbf·ft)
Stage 2	65 N·m (6.6 kgf·m, 48 lbf·ft)
Stage 3	90°
Stage 4	90°
Engine oil drain plug	25 N·m (2.5 kgf·m, 18 lbf·ft)
Crankshaft rear oil seal housing, bolts*	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Engine sump bolts:*	
Stage 1; clockwise starting at 1	3 N·m (0.3 kgf·m, 2 lbf·ft)
Stage 2; anti-clockwise starting at 1	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Stage 3; tighten in sequence	25 N·m (2.5 kgf·m, 18 lbf·ft)
Flywheel bolts - NEW	100 N·m (10.2 kgf·m, 73.8 lbf·ft)
Crankshaft pulley bolt	
Stage 1	63 N·m (6.4 kgf·m, 46 lbf·ft)
Stage 2	90°
Camshaft timing belt tensioner pulley Allen bolt	44 N·m (4.5 kgf·m, 32 lbf·ft)
Injection pump timing belt tensioner pulley Allen bolt	45 N·m (4.6 kgf·m, 33 lbf·ft)
Rear camshaft gear to hub, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Injector clamp plate bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Injector spill return banjo bolts	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Injector pipes to fuel injection pump, unions	20 N·m (2.0 kgf·m, 15 lbf·ft)
Injector pipe unions to injectors	20 N·m (2.0 kgf·m, 15 lbf·ft)
Glow plugs	20 N·m (2.0 kgf·m, 15 lbf·ft)
EGR recirculation pipe to inlet manifold, bolts	9 N·m (0.9 kgf·m, 7 lbf·ft)
Intake pipe to inlet manifold, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Coolant outlet elbow to cylinder head, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Dipstick tube bracket to coolant elbow, bolt	9 N·m (0.9 kgf·m, 7 lbf·ft)
Air conditioning pipe unions	17 N·m (1.7 kgf·m, 13 lbf·ft)
Engine oil cooler to mounting bracket, bolts	45 N·m (4.6 kgf·m, 33 lbf·ft)
Oil cooler pipe unions	20 N·m (2.0 kgf·m, 15 lbf·ft)
Oil pressure switch	14 N·m (1.4 kgf·m, 10 lbf·ft)
Clutch slave cylinder to mounting bracket, bolts	45 N·m (4.6 kgf·m, 33 lbf·ft)
PAS speed sensor to gearbox, bolt	19 N·m (1.9 kgf·m, 14 lbf·ft)
Starter motor bolts	85 N·m (8.7 kgf·m, 63 lbf·ft)
Engine RH mounting bracket:	
Bolts - mounting to engine	85 N·m (8.7 kgf·m, 63 lbf·ft)
Nuts - mounting restraint bar	45 N·m (4.6 kgf·m, 33 lbf·ft)
Bolt - tie bar to body	90 N·m (9.2 kgf·m, 66 lbf·ft)
Bolt - tie bar to mounting	90 N·m (9.2 kgf·m, 66 lbf·ft)
Engine LH mounting:	
12 mm nut	70 N·m (7.1 kgf·m, 52 lbf·ft)
10 mm nuts	45 N·m (4.6 kgf·m, 33 lbf·ft)
Front beam bolts	69 N·m (7.0 kgf·m, 51 lbf·ft)
Centre beam bolts	55 N·m (5.6 kgf·m, 41 lbf·ft)
LH radius rod to lower arm, bolts	105 N·m (10.7 kgf·m, 77.4 lbf·ft)
RH radius rod to lower arm, bolts	105 N·m (10.7 kgf·m, 77.4 lbf·ft)
Lower tie rod. sump to front beam, bolts	85 N·m (8.7 kgf·m, 63 lbf·ft)

ENGINE

Gear change steady bar bolt	60 N·m (6.1 kgf·m, 44 lbf·ft)
Lower ball joint to hub, nut	50 N·m (5.1 kgf·m, 37 lbf·ft)***
Suspension damper fork pinch bolt	44 N·m (4.5 kgf·m, 32 lbf·ft)**
Suspension damper fork lower nut and bolt	65 N·m (6.6 kgf·m, 48 lbf·ft)**
Road wheel nuts	110 N·m (11.2 kgf·m, 81.1 lbf·ft)

* Tighten in sequence

** Full weight of engine must be on mounting before tightening nut

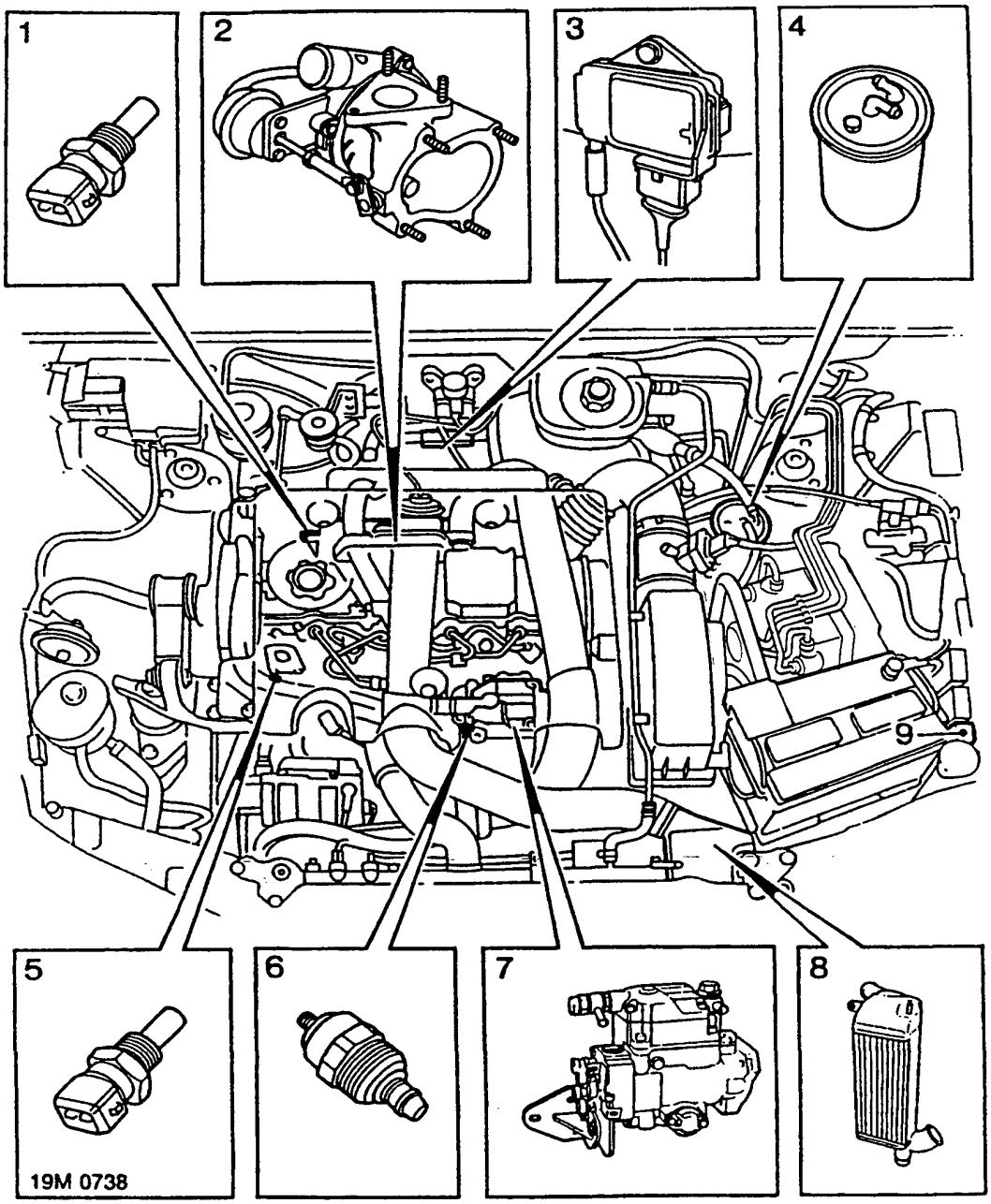
*** Align to slot in nut

TOOL NUMBERS

18G 1476	Camshaft oil seal remover
18G 1716	Camshaft oil seal replacer
18G 1521	Camshaft gear holding tool
18G 1717	Injection pump timing pin
18G 1719	Camshaft timing belt tensioner extractor
18G 1108	Crankshaft rear oil seal protective sleeve
18G 1718	Crankshaft oil seal remover
18G 1509	Crankshaft oil seal replacer
18G 1510	Crankshaft front oil seal protective sleeve
18G 1510-1	Crankshaft front oil seal protective sleeve - adaptor
18G 1523	Flywheel locking tool
18G 1707	Ball Joint Separator
18G 1578	Drive shaft seperator
18G 1598	Engine lifting tool

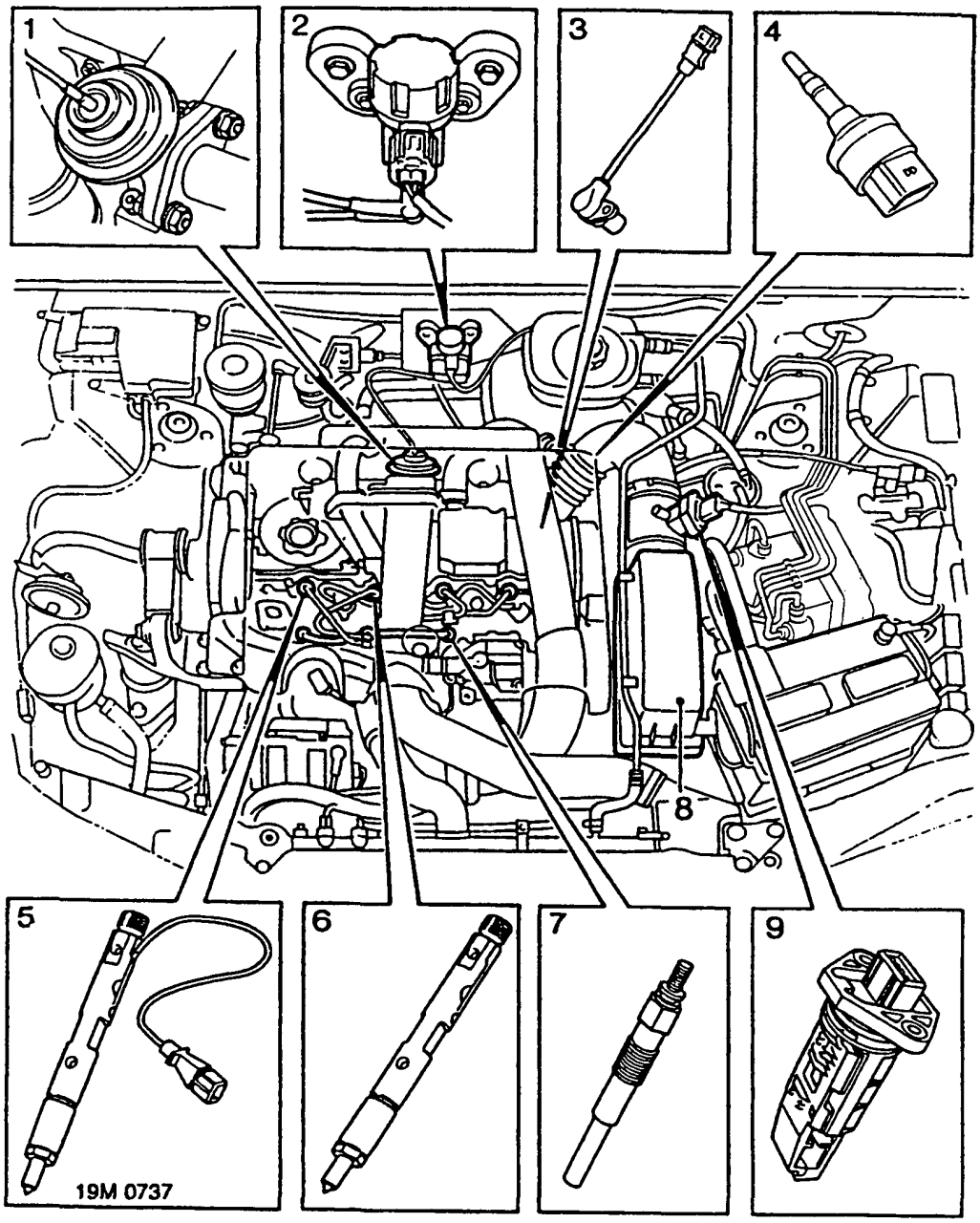
ENGINE MANAGEMENT SYSTEM

CONTENTS



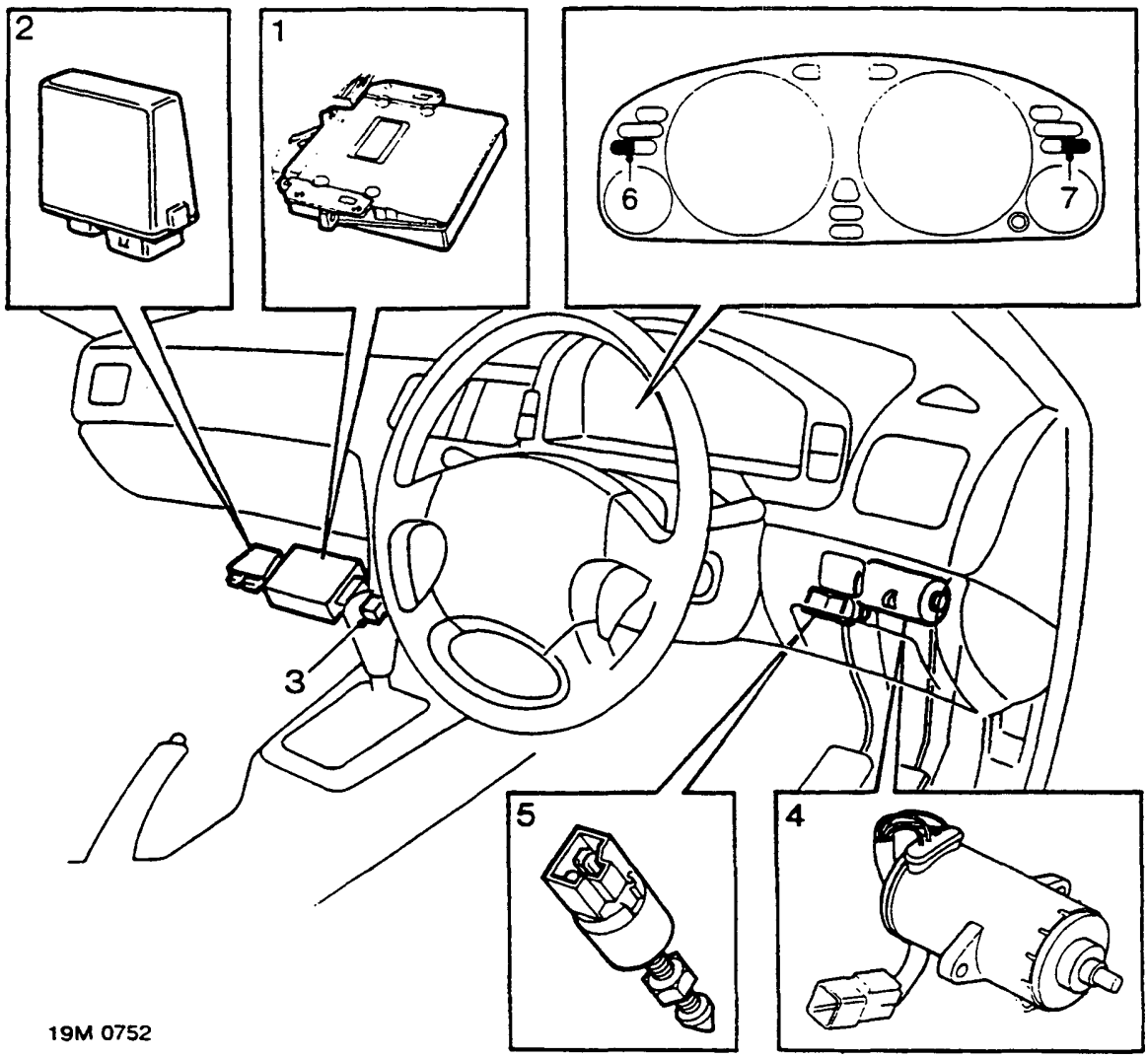
ENGINE COMPARTMENT COMPONENT LOCATIONS

1. Intake air temperature (IAT) sensor
2. Turbocharger
3. Manifold absolute pressure (MAP) sensor
4. Fuel filter
5. Engine coolant temperature (ECT) sensor
6. Fuel shut-off solenoid
7. Fuel injection pump
8. Intercooler
9. Glow plug relay



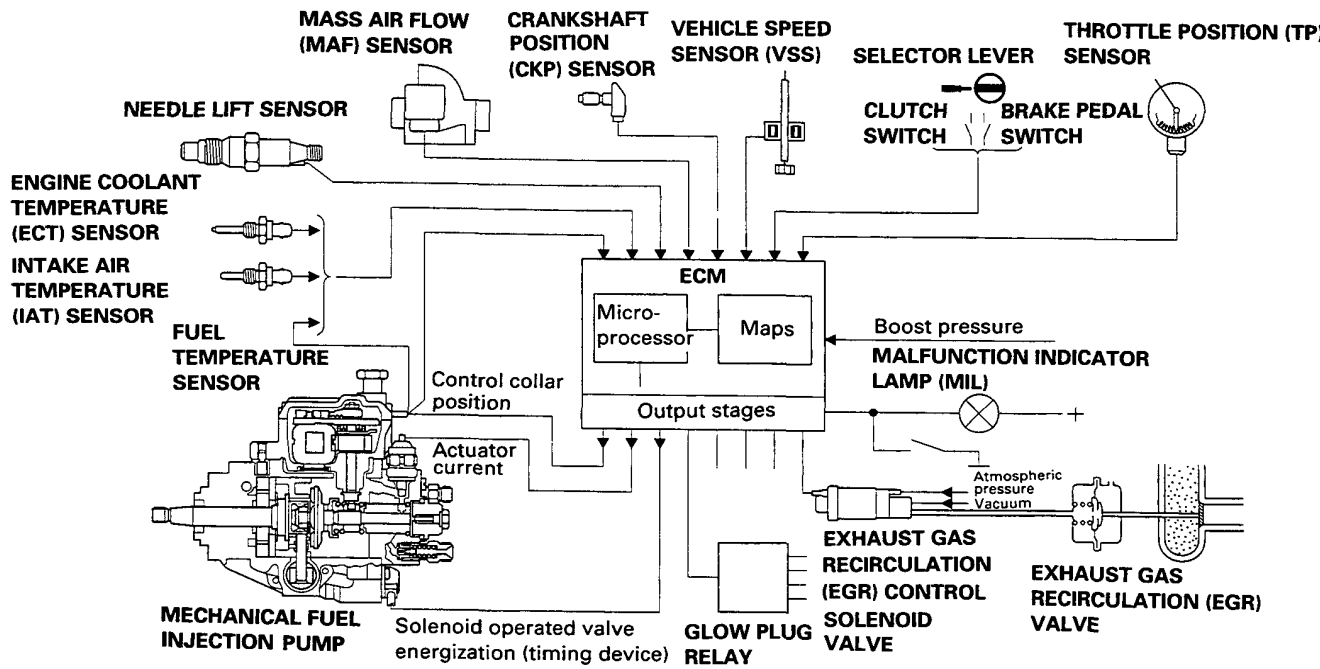
ENGINE COMPARTMENT COMPONENT LOCATIONS

1. Exhaust Gas Recirculation (EGR) valve
2. Exhaust Gas Recirculation (EGR) control solenoid valve
3. Crankshaft position (CKP) sensor
4. Vehicle speed sensor (VSS)
5. Needle lift sensor
6. Injectors
7. Glow plugs
8. Air cleaner (ACL)
9. Mass air flow (MAF) sensor



PASSENGER COMPARTMENT COMPONENT LOCATIONS

1. Engine Control Module (ECM)
2. Cooling fan relay module
3. Fuses
4. Throttle position sensor
5. Brake pedal switch
6. Malfunction Indicator Lamp (MIL)
7. Glow plug warning light


MASS AIR FLOW (MAF) SENSOR
CRANKSHAFT POSITION (CKP) SENSOR
VEHICLE SPEED SENSOR (VSS)
SELECTOR LEVER
THROTTLE POSITION (TP) SENSOR
NEEDLE LIFT SENSOR
CLUTCH SWITCH
BRAKE PEDAL SWITCH
ENGINE COOLANT TEMPERATURE (ECT) SENSOR
INTAKE AIR TEMPERATURE (IAT) SENSOR
ECM
Micro-processor
Maps
Boost pressure
MALFUNCTION INDICATOR LAMP (MIL)
FUEL TEMPERATURE SENSOR
Control collar position
Output stages
Actuator current
Atmospheric pressure
Vacuum
EXHAUST GAS RECIRCULATION (EGR) CONTROL SOLENOID VALVE
EXHAUST GAS RECIRCULATION (EGR) VALVE
MECHANICAL FUEL INJECTION PUMP
Solenoid operated valve energization (timing device)
GLOW PLUG RELAY

ELECTRONIC DIESEL CONTROL OPERATION

Diesel engines operate by compression ignition. The rapid compression of air in the cylinder during the compression cycle heats the injected fuel causing it to self ignite. During cold starting, automatically controlled glow plugs assist in raising the temperature of the compressed air to ignition point.

The Engine Control Module (ECM) monitors the conditions required for optimum combustion of fuel in the cylinder through sensors located at strategic points around the engine. From the inputs from these sensors, the engine control module can adjust the fuel quantity and timing of the fuel being delivered to the cylinder.

The main features are as follows:

- The ECM controls the fuel injection quantity and timing of the fuel delivered to the cylinder based on inputs from sensors located around the engine. The ECM incorporates short circuit protection and can store intermittent faults on certain inputs.
- The engine management system is a 'Drive by Wire' system. The throttle pedal is not physically connected to the fuel injection pump, but instead connected by a linkage to a throttle pedal position sensor which provides the ECM with a signal proportional to throttle pedal movement. The ECM then adjusts the fuel injection pump to deliver the required amount of fuel.
- In conjunction with the throttle pedal position sensor the ECM uses the speed/density method of mass air flow measurement to calculate fuel delivery. This method measures the intake air temperature and inlet manifold pressure and assumes that the engine is a calibrated vacuum pump, with its characteristics stored in the ECM, it can determine the correct amount of fuel to be injected.
- If certain system inputs fail, the ECM implements a back-up facility to enable the system to continue functioning, although at a reduced level of performance.
- Data link connector allows fault diagnosis to be carried out using Honda PGM-Tester without disconnecting the ECM harness multiplug.

Fuel injection timing

The engine control module determines the optimum fuel injection timing for the injection pump based on the signals it receives from the following sensors:

1. CKP sensor - Engine speed and crankshaft position
2. Needle lift sensor - Start of injection
3. ECT sensor - Engine temperature
4. MAP sensor - Engine load
5. IAT sensor

Basic fuel injection timing

Crankshaft sensor

The speed and position of the engine is detected by the CKP sensor which is bolted to, and projects through, the gearbox adapter plate adjacent to the flywheel.

The CKP sensor is an inductive sensor consisting of a bracket mounted body containing a coil and a permanent magnet which provides a magnetic field. The sensor is situated such that an air gap exists between it and the flywheel. Air gap distance is critical for correct operation.

The flywheel has four poles positioned equally around the crankshaft circumference at 90 degree intervals. When the flywheel rotates, as a pole passes the sensor it disturbs the magnetic field inducing a voltage pulse in the coil. This pulse is transmitted to the engine control module.

Four pulses are transmitted to the engine control module for each revolution of the flywheel. By calculating the number of pulses that occur within a given time, the engine control module can determine the engine speed. The output from this sensor when used in conjunction with that from the needle lift sensor is used for idle stabilisation and reference for injection timing.

Needle lift sensor

The needle lift sensor consists of a coil which surrounds the shaft of an extended injection needle. The coil is fed a DC supply from the control unit which produces a magnetic field.

When the needle is moved under the influence of fuel pressure, the magnetic field is disturbed which induces an ac voltage in the coil. The induced voltage is registered in the engine control module as a reference point for the start of the injection sequence.

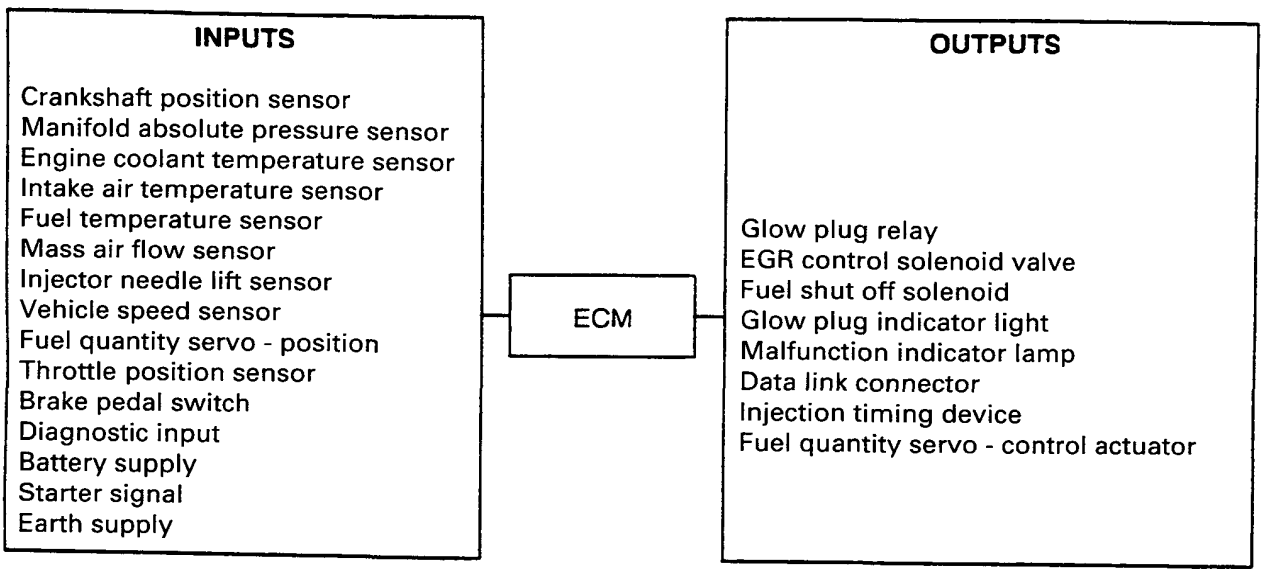
The engine control module uses the input signals from the needle lift sensor, together with signal from the CKP sensor, to detect the actual start of injection. The engine control module, using inputs from the other sensors, calculates then adjusts the injection timing of the fuel pump to achieve optimum fuelling of the engine.

Fuel injection timing compensation

Engine coolant temperature sensor

The engine coolant temperature sensor is a 'thermistor' (a temperature dependent resistor), i.e. the voltage output varies in proportion to temperature. The sensor is located in the top of the coolant outlet elbow. The engine control module constantly monitors the signal and uses the information to correct the quantity of fuel injected and the injection timing especially during cold starting. During starting, output from the sensor determines how long the glow plugs are on.

The ECM inputs and outputs are shown in the following table.



Intake air temperature sensor

The intake air temperature sensor is located in the side of the inlet manifold. This sensor is of the negative temperature coefficient (NTC) type, designed to reduce its resistance with increasing temperature. The engine control module receives a signal proportional to the temperature of the intake air. When used in conjunction with the signal from the manifold absolute pressure sensor the engine control module can calculate the volume of oxygen in the air and adjust the quantity of fuel being injected to achieve optimum fuelling of the engine.

Manifold absolute pressure sensor

The pressure of the intake air is monitored by a strain gauge type sensor located on the bulkhead and connected, via a pressure tube, to the intake side of the turbocharger. The sensor is connected electrically to the engine control module.

The sensor comprises of a plastic body containing a pressure detection chamber. The pressure detection chamber consists of four individual sensors made from glass panels with Silicon diaphragms. The Silicon diaphragms contain resistors which are bonded to the glass panels forming an enclosed vacuum.

When the intake air pressure changes, pressure in the detection chamber causes the diaphragms to deflect. The deflection of the diaphragms alters the length of each resistor, changing their resistance. This change in resistance is converted into a signal within the pressure sensor. The change in output from the pressure sensor is detected by the engine control module where it is converted into a pressure value.

Manifold absolute pressure when used in conjunction with the signal from the intake air temperature sensor allows the engine control module to accurately calculate the volume of oxygen in the air and adjust the quantity of fuel being injected to achieve optimum fuelling of the engine.

Vehicle speed sensor

The vehicle speed sensor is located on the top of the differential housing. The vehicle speed sensor is driven by a shaft from the final drive gear where it is converted into an electrical signal proportional to road speed. The output from the vehicle speed sensor is used to drive the instrument pack speedometer in addition to providing a signal to the engine control module. The engine control module uses this signal to provide active surge damping and adjust idle stabilisation and the quantity of fuel being delivered to injectors.

Throttle position sensor

The engine management system is a 'Drive by Wire' system. The throttle pedal is not physically connected to the fuel injection pump by a mechanical linkage as in a traditional injection system, but instead the amount of fuel injected is controlled by the control unit. The throttle pedal is connected by a linkage to a throttle pedal position sensor. Movements of the throttle pedal are sensed by the throttle pedal position sensor and a signal sent to the engine control module.

The throttle pedal position sensor consists of a thick film potentiometer together with a sender switch. With the throttle pedal at rest the switch is open. When the throttle pedal has been moved enough to rotate the potentiometer more than 9 degrees the switch closes. The sender switch signal from the potentiometer is used by the engine control module to check the operation of the circuit, implement idle speed control and over-run fuel shut-off.

When the potentiometer is moved the sender switch signals a logic input to the engine control module. The engine control module then checks the voltage signal from the potentiometer. This voltage is compared with a pre-programmed value to check the potentiometer is working correctly.

Throttle pedal movement causes voltage across the potentiometer to vary. The control unit calculates the rate of change of the voltage signal in positive (acceleration) or negative (deceleration) directions. From this the engine control module can determine the required engine speed, rate of acceleration or rate of deceleration and apply acceleration enrichment, deceleration fuel metering or over-run fuel cut-off.

The engine control module calculates the 'maximum allowable fuel quantity' from the input signal according to strategies such as smoke limitation, active surge damping, fuel reduction to calculate the final figure. If the signal from the throttle potentiometer is smaller than the maximum allowable quantity then the requested quantity will be injected. However, if the requested quantity is greater than the maximum allowable quantity, then the maximum allowable quantity will be injected rather than that demanded.

Brake pedal switch

The brake pedal switch informs the engine control module when the vehicle is braking and allows it to implement active surge damping and over-run fuel cut-off.

The engine control module has two brake inputs, each of opposite polarity. Comparison of the two polarity states provides the engine control module with brake sense. If both switches are the same polarity the engine control module senses a fault.

Glow Plug relay

When the starter switch is turned to position 'II' the engine control module energises the glow plug relay and illuminates the glow plug warning indicator light in the fascia. The glow plug relay supplies a current from the battery to the three glow plugs (there is no glow plug in No. 4 cylinder) to assist cold starting by raising the temperature of the compressed air in the cylinder to ignition point.

The length of time the glow plugs will remain operational is dependent upon the initial engine temperature determined by the engine control module from the engine coolant temperature sensor. Once the glow plugs have operated for their pre-determined time the control unit will remove the supply from the glow plug relay and extinguish the glow plug warning indicator light on the fascia.

If an attempt to start the engine is made before the glow plugs have finished operating the engine control module will remove the supply from the glow plug relay, switching off the glow plugs.

Mass air flow sensor

The mass air flow is determined from the cooling effect of inlet air flowing over a Hot Film sensor. This signal is fed back to the engine control module where it is used to monitor the recirculation of exhaust gases. Increase in the exhaust gas recirculation reduces the amount of intake air being drawn into the system, thereby reducing the cooling effect of Hot Film resistor.

Data link connector

The data link connector is located under the streering column. The data link is provided to enable diagnosis via Honda PGM-Tester to be carried out.

Malfunction indicator lamp

The engine control module has a built in self-diagnosis function. If a fault is detected the malfunction indicator lamp in the instrument pack will illuminate, and the engine control module will implement a back-up facility to enable the system to continue functioning, though at a reduced level of performance. If a serious fault is detected the malfunction indicator lamp will illuminate and the engine management system will shut down preventing the car from being started or driven.

The malfunction indicator lamp will remain illuminated until the starter switch is turned off. If the fault is still present when the starter switch is turned back on (II) the malfunction indicator lamp will illuminate. If the fault is not present when the starter switch is turned on (II), the malfunction indicator lamp will remain extinguished. but a fault code will be stored in the engine control modules memory.

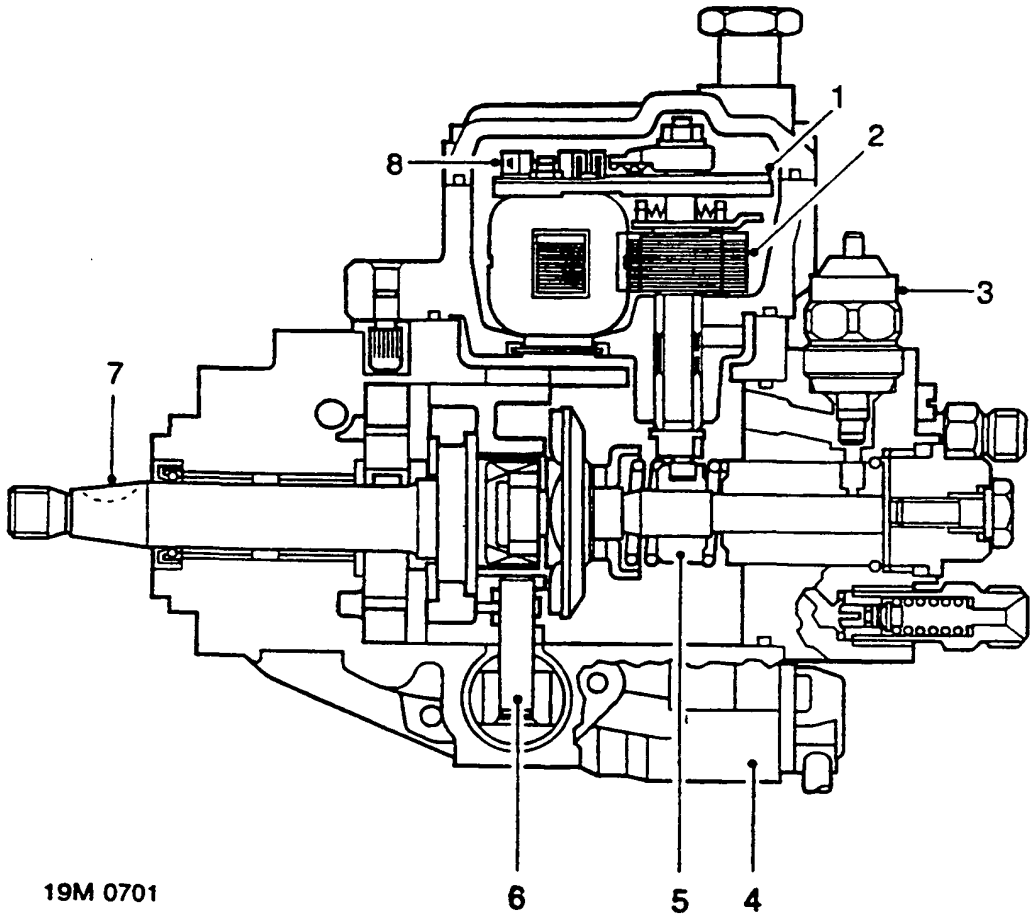
FUEL SYSTEM

Fuel is drawn from the tank by the injection pump via a filter which removes particle contamination from the fuel.

The injection pump meters a precisely timed, exact quantity of fuel to the injectors in response to throttle variations, injection timing varying with engine speed. Any excess fuel delivered to the injection pump is not injected, but passed back to the tank via the fuel return line.

Fuel is injected in a finely atomised form into a pre-combustion chamber in the cylinder head where it ignites. The burning fuel expands rapidly into the main combustion chamber, creating extreme turbulence which mixes the burning fuel thoroughly with the compressed air, providing complete combustion.

Fuel injection pump



19M 0701

1. Fuel quantity servo potentiometer
2. Fuel quantity servo control unit
3. Fuel shut off solenoid
4. Injection timing device solenoid valve
5. Control spool
6. Injection timing device
7. Injection pump drive shaft
8. Fuel temperature sensor

The fuel injection pump is a vane-type pump, which is belt driven from the rear end of the camshaft. Fuel delivery from the pump to the injectors is regulated by the movement of a control spool. Movement of the control spool increases or decreases the fuel delivery rate to meet engine operating requirements.

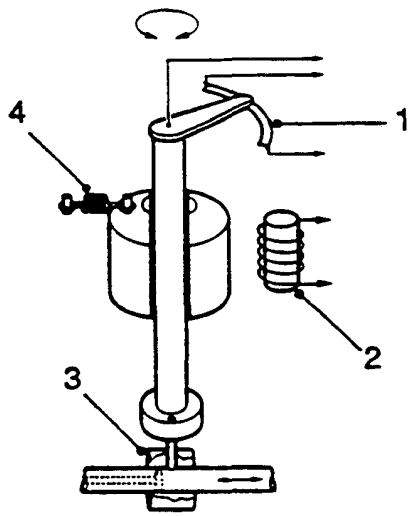
The pump houses the following components which either provide feed back to the engine control module or are controlled by the engine control module:

Fuel temperature sensor

Fuel temperature is monitored by a sensor located in the fuel injection pump. This sensor is of the negative temperature coefficient (NTC) type, designed to reduce its resistance with increasing temperature. The sensor is connected to earth and to a precision resistor inside the engine control module. A small current is fed through the precision resistor.

When the system is operating the engine control module regularly checks the sensor voltage. This is converted to a digital word that can be read by the microprocessor and converted to a temperature reading. As fuel density varies with temperature, the information received is used to calculate the correct quantity of fuel to inject.

Quantity servo control unit



19M 0708

The servo control unit is used to accurately control the amount of fuel delivered to the injectors. The unit consists of a rotary magnet mounted on an eccentric shaft; the shaft engages with the control spool (3) of the pump. The rotary magnet is fitted with a return spring (4) and moves under the influence of a control coil (2). The magnet rotates through an arc of about 60 degrees moving the control spool from the closed position to the maximum fuel delivery position. The eccentric shaft engages with the control spool at one end, while the opposite end operates a rotary potentiometer (1).

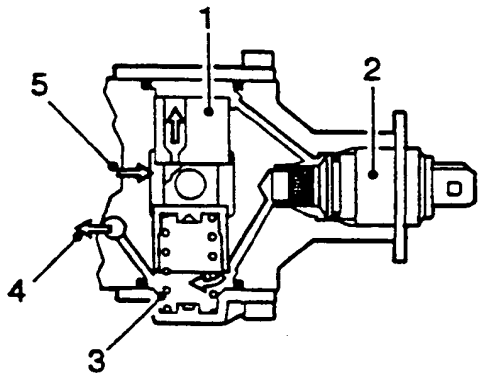
When the control coil is energised the rotary magnet and eccentric shaft move against spring pressure. Rotary movement of the eccentric shaft is converted into linear movement of the control spool. This allows more fuel to be delivered to the injectors.

When the control coil is de-energised the return spring causes the rotary magnet and eccentric shaft to resume their original position. The control spool is moved to the closed position.

Quantity servo potentiometer

Mounted at the top of the servo control unit is a rotary potentiometer. As the eccentric shaft of the servo control unit moves, the wiper of the potentiometer is moved across the resistive part of the potentiometer. The voltage output from the potentiometer is proportional to the position of the control spool. From this input the engine control module can calculate the quantity of fuel being delivered by the pump and adjust the amount of fuel being delivered by energising the control coil to move the control spool.

Injection timing device



19M 0707

1. Plunger
2. Solenoid
3. Spring
4. Pump feed pressure
5. pump internal pressure

The injection timing device consists of a spring loaded plunger and a solenoid. The spring loaded plunger acts against a cam plate driven by the injection pump shaft.The spring loaded plunger moves under the influence of pump working pressure.

The injection timing solenoid is responsible for the characteristic 'buzzing' sound when the ignition is turned on. The solenoid operates at 50 Hz and by varying the operating frequency the engine control module alters the fuel pressure on the plunger, moving it against spring tension. By moving the plunger against the spring, the height of the plunger acting against the cam plate is changed, retarding the ignition. Injection timing is fully advanced with the solenoid de-energised.

The engine control module receives a feedback signal from the needle lift sensor and will attempt to correct the injection timing accordingly by altering the signal to the solenoid. If a change does not occur or differs by a substantial amount the engine control module will assume a fault exists and reduce the amount of fuel injected.

Fuel shut-off solenoid

The fuel shut-off solenoid is located in the high pressure section of the injection pump. When the ignition is switched on (II) the engine control module sends a signal to the solenoid. The solenoid energises opening a valve allowing fuel to flow.

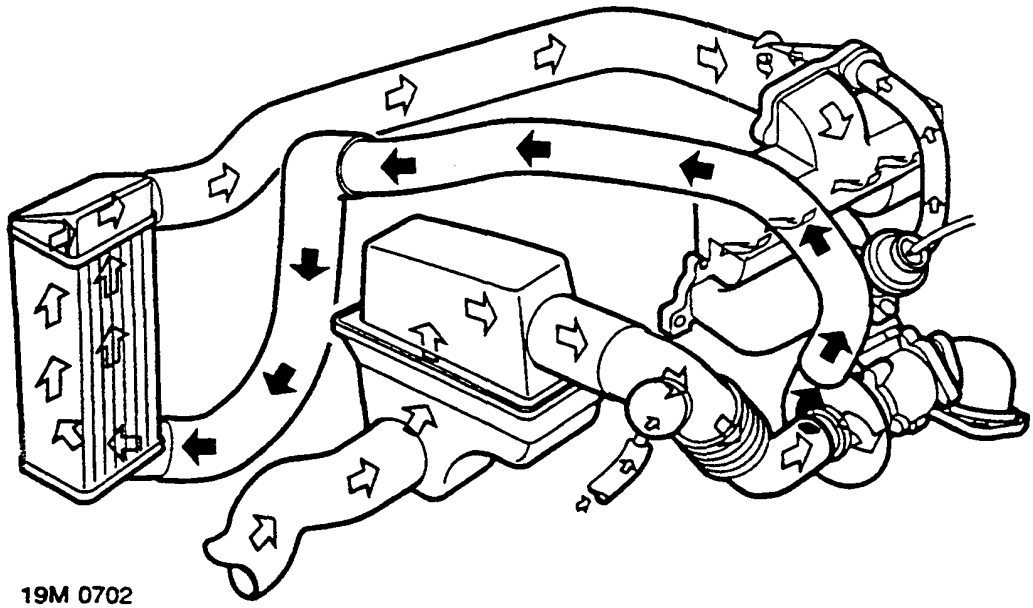
When the ignition is switched off, or in the event of a serious engine problem, the engine control unit will remove the supply to the solenoid, closing the valve and cutting off the fuel supply to the injectors.

EXHAUST GAS RECIRCULATION (EGR)

During certain running conditions the EGR system directs exhaust gases into the intake manifold to be used in the combustion process. The principal effect of this is to reduce combustion temperatures, which in turn reduces Oxides of Nitrogen (NO_x) emissions.

The EGR diaphragm valve is vacuum operated through a solenoid valve, mounted in the centre of the bulkhead. When the Engine Control Module (ECM) determines that exhaust gas recirculation should take place, the solenoid valve is modulated and vacuum, supplied by the brake servo vacuum pump, opens the EGR valve. Exhaust gases are then fed through a pipe into the exhaust manifold.

An mass air flow sensor, mounted in the air intake pipe, senses the volume of air entering the engine. Using the principle that an increase in EGR will lead to a decrease in the intake air flow, the mass air flow sensor is used by the ECM to monitor the amount of exhaust gases being recirculated. This feedback signal allows the ECM to accurately control the volume of exhaust gases being recirculated.



19M 0702

AIR INTAKE SYSTEM

The engine is supplied with pre-compressed air by a single stage turbocharger.

With the engine running, exhaust gases pass into the turbine side of the turbocharger causing the turbine to rotate, driving a compressor mounted on the turbine shaft in the intake side of the turbocharger.

Intake air is drawn through the air cleaner to the turbocharger, where it is compressed by the compressor. The compressed air is then fed into the inlet manifold via an intercooler, which reduces the temperature of the compressed air, increasing its density.

Boost control

Boost control is achieved by a pneumatic actuator operating a mechanical flap situated in the turbocharger which, when operated, allows exhaust gases to bypass the turbine side of the turbocharger, so decreasing the rotational speed of the turbine thereby reducing the pressure of the intake air.

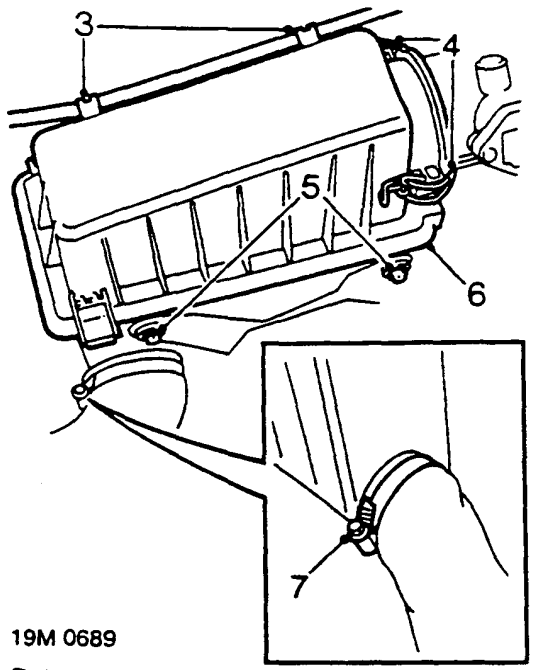
The pneumatic actuator consists of a diaphragm connected to a mechanical linkage which is opposed by an internal spring. Pressure from the compressor side of the turbocharger is applied to the pneumatic actuator via a sensing pipe. The pressure acting on the pneumatic actuator diaphragm builds up until it exceeds the opposing force of the internal spring (approx. 118 kPa (1.2 kgf/17 psi) causing the mechanical linkage to move, thereby opening the flap on the turbocharger and so reducing the boost pressure. As boost pressure is reduced the mechanical linkage will move the other way closing the flap on the turbocharger allowing the pressure to increase again. With the engine under load the pneumatic actuator will be constantly opening and closing the flap on the turbocharger.

AIR CLEANER

Service Repair No. 19.10.01

Remove

1. Remove key from starter switch and disconnect both battery leads, earth lead first.
2. Remove bolt and battery clamp; lift out battery.



19M 0689

3. Release expansion tank return pipe from 2 clips on air cleaner.
4. Release 2 clips securing air flow meter housing to air cleaner.
5. Remove 2 bolts securing air cleaner to battery tray.
6. Release and remove air cleaner.

Do not carry out further dismantling if component is removed for access only

7. Release clip securing air intake hose to air cleaner.
8. Remove air intake hose from air cleaner.
9. Fit air intake hose to new air cleaner and tighten clip.

Refit

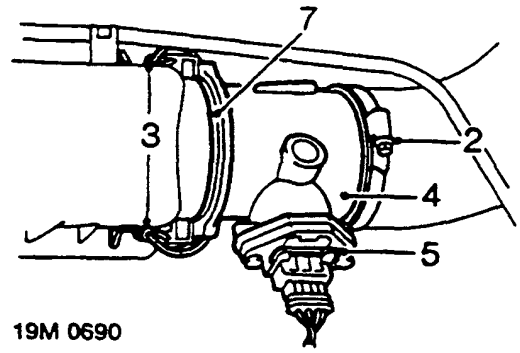
1. Fit air cleaner, ensuring spigot on mounting bracket locates into air cleaner.
2. Fit and tighten screws securing air cleaner to battery tray.
3. Connect mass air flow sensor to air cleaner and secure clips.
4. Secure expansion tank return pipe to air cleaner clips.
5. Fit battery into tray, fit clamp and tighten bolt; connect both battery leads, earth lead last.

MASS AIR FLOW SENSOR

Service Repair No. 19.22.25

Remove

1. Disconnect battery earth lead.



19M 0690

2. Slacken clip securing air intake hose to mass air flow sensor, disconnect hose.
3. Release 2 clips securing mass air flow sensor to air cleaner.
4. Release mass air flow sensor from air cleaner.
5. Release clip and disconnect multiplug.
6. Remove mass air flow sensor.
7. Remove and discard 'O' ring.

Refit

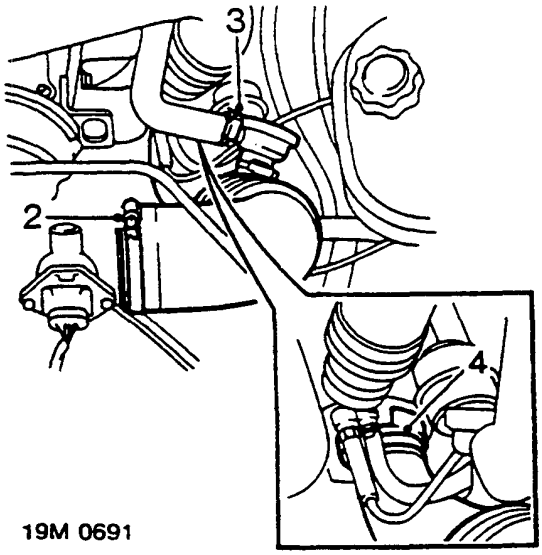
1. Fit new 'O' ring to mass air flow sensor.
2. Connect multiplug.
3. Fit mass air flow sensor to air cleaner.
4. Secure clips.
5. Connect intake hose to mass air flow sensor, tighten clip.
6. Connect battery earth lead.

AIR INTAKE HOSE

Service Repair No. 19.42.28

Remove

1. Disconnect battery earth lead.



19M 0691

2. Slacken clip and disconnect hose from mass air flow sensor.
3. Slacken clip and disconnect one-way valve from air intake hose.
4. Slacken clip securing air intake hose to turbocharger, remove air intake hose.

Refit

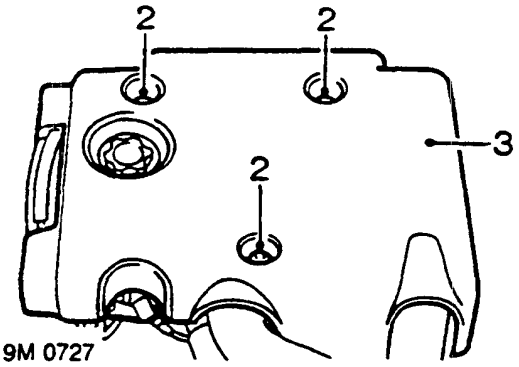
1. Connect air intake hose to turbocharger and tighten clip.
2. Connect one-way valve to intake hose and tighten clip.
3. Connect air intake hose to mass air flow sensor and tighten clip.
4. Connect battery earth lead.

TURBOCHARGER

Service Repair No. 19.42.01

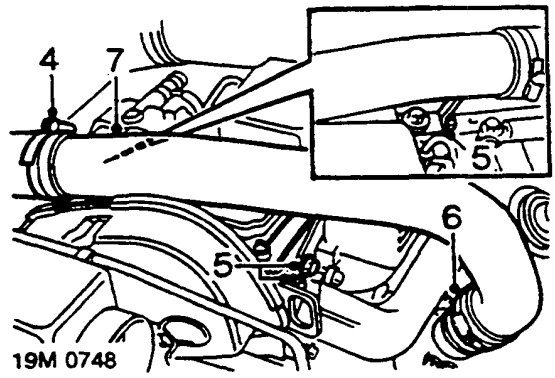
Remove

1. Disconnect battery earth lead.



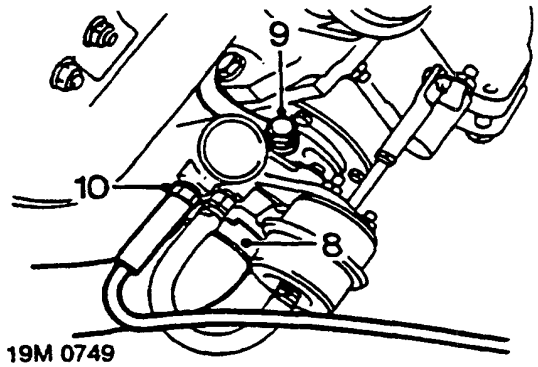
19M 0727

2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.



19M 0748

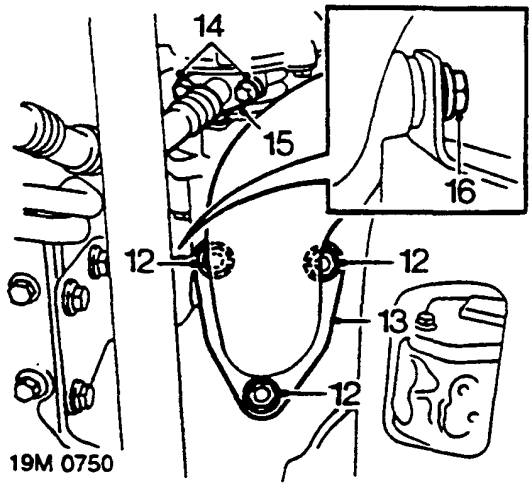
4. Slacken clip and disconnect intercooler hose from turbocharger pipe.
5. Remove 3 bolts securing turbocharger pipe to cylinder head, collect engine lifting bracket.
6. Slacken clip and disconnect pipe from turbocharger.
7. Remove turbocharger pipe.



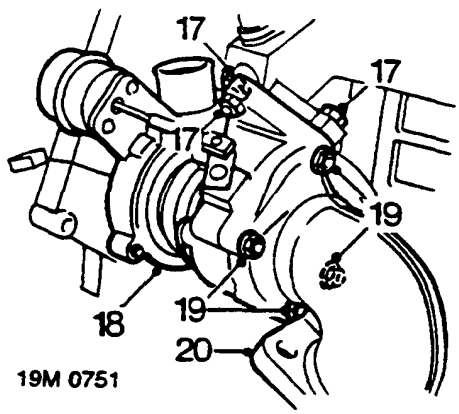
19M 0749

8. Slacken clip and disconnect air intake hose from turbocharger.
9. Remove banjo bolt securing oil feed pipe to turbocharger, collect 2 sealing washers and discard.

10. Disconnect boost pressure sensing pipe from turbocharger.
11. Remove RH under tray, see **BODY - Repairs.**



12. Remove 3 nuts securing exhaust front pipe to exhaust manifold.
13. Release exhaust front pipe from exhaust manifold, remove and discard manifold flange gasket.
14. Remove 2 bolts securing oil drain pipe flange to turbocharger.
15. Remove and discard gasket.
16. Remove bolt securing exhaust manifold to mounting bracket.



17. Remove 3 nuts securing turbocharger to exhaust manifold.
18. Release and remove turbocarger.

Do not carry out further dismantling if component is removed for access only

19. Remove 4 nuts securing exhaust elbow to turbocharger.
20. Remove exhaust elbow.
21. Clean mating faces of turbocharger and exhaust elbow.
22. Fit exhaust manifold elbow to turbocharger, fit nuts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).

Refit

1. Clean mating faces of turbocharger and exhaust manifold.
2. Fit turbocharger to exhaust manifold, fit nuts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
3. Fit RH under tray, see **BODY - Repairs.**
4. Fit bolt securing exhaust manifold to mounting bracket and tighten.
5. Clean mating faces of oil drail pipe and turbocharger.
6. Fit new gasket to turbocharger, fit bolts and tighten to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
7. Fit new manifold flange gasket.
8. Align exhaust front pipe to exhaust manifold, fit nuts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
9. Remove stand(s) and lower vehicle.
10. Connect boost pressure sensing pipe to turbocharger.
11. Clean turbocharger oil feed pipe union and banjo bolt.
12. Fit new sealing washers to banjo bolt, connect oil feed pipe to turbocharger and tighten union to 20 N·m (2.0 kgf·m, 15 lbf·ft).
13. Connect air intake pipe to turbocharger and tighten clip.
14. Position turbocharger pipe and connect to turbocharger, tighten clip to secure.
15. Position engine lifting bracket and align turbocharger pipe to cylinder head.
16. Fit 2 bolts securing turbocharger pipe to cylinder head and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
17. Fit bolt securing turbocharger pipe to front of cylinder head and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
18. Connect intercooler top hose to turbocharger pipe and tighten clip.
19. Position sound deadening pad to engine and secure with bolts.
20. Connect battery earth lead.

INTERCOOLER - NON AIR CONDITIONING MODELS

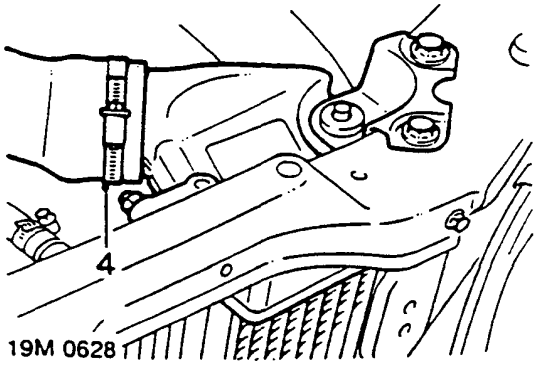
Service Repair No. 19.42.15

Remove

1. Disconnect battery earth lead.
2. Raise front of vehicle.

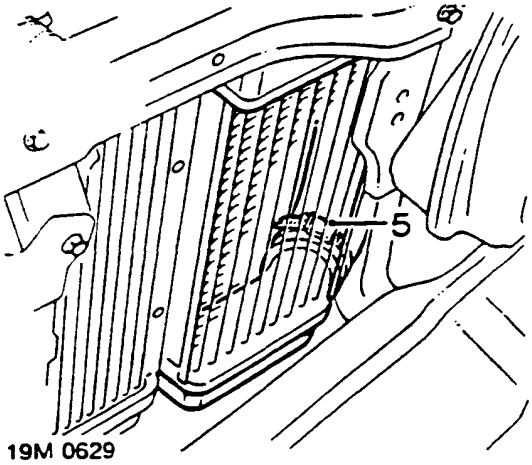
WARNING: Support on safety stands.

3. Remove under belly panel, see **BODY - Repairs.**



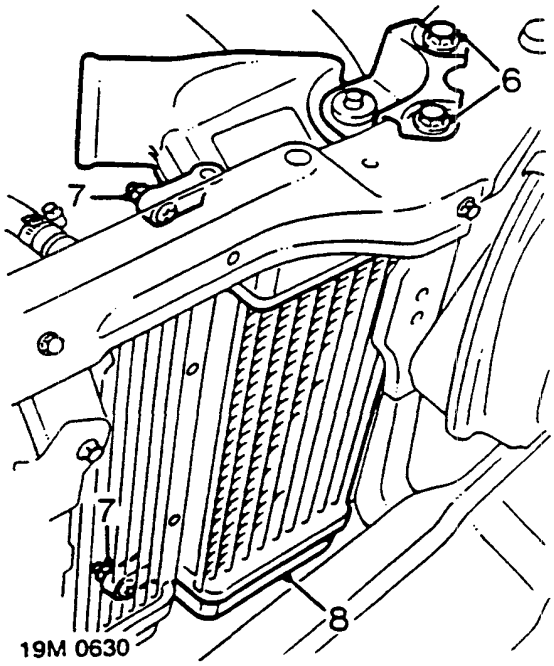
19M 0628

4. Slacken hose clip and release hose from top of intercooler.



19M 0629

5. Slacken clip and release air hose from bottom of intercooler.



19M 0630

6. Remove 2 bolts securing intercooler support bracket to bonnet lock plateform.
7. Remove 2 Tx40 Torx bolts and nuts securing intercooler to radiator.
8. Release and remove intercooler.
9. Retain rubber mounting.

Refit

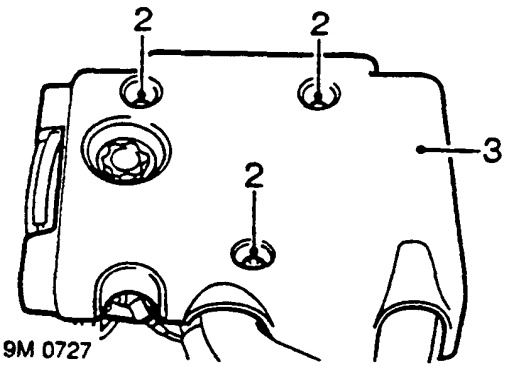
1. Ensure rubber mounting is fitted correctly.
2. Fit and tighten nuts and Torx bolts securing intercooler and radiator.
3. Fit intercooler into position.
4. Fit intercooler support bracket to bonnet lock plateform, fit bolts and tighten bolts to 9 N·m (0.9 kgf·m, 7 lbf·ft).
5. Fit hoses to top and bottom of intercooler and and secure with clips.
6. Fit under belly panel, see **BODY - Repairs.**
7. Remove stand(s) and lower vehicle.
8. Connect battery earth lead.

INTERCOOLER - AIR CONDITIONING MODELS

Service Repair No. 19.42.15/20

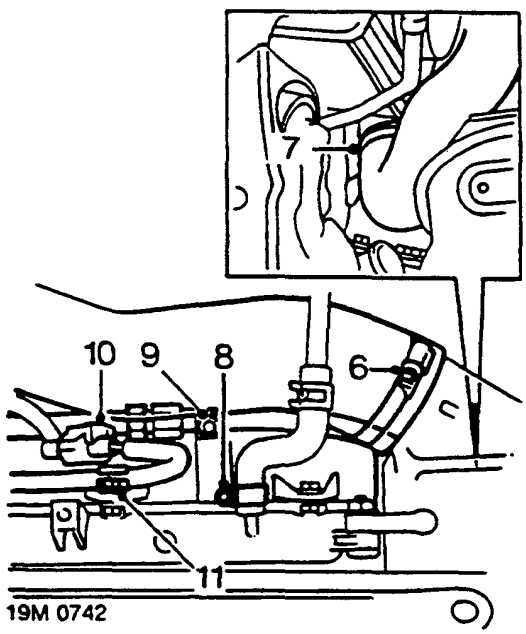
Remove

1. Remove air cleaner assembly, see **Air cleaner.**



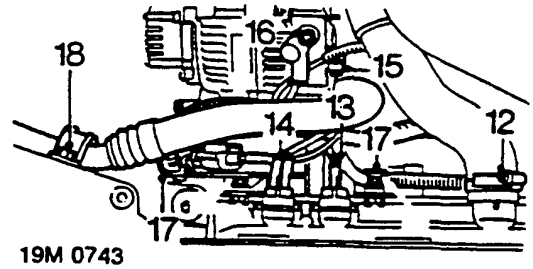
19M 0727

2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.
4. Remove under belly panel, see **BODY - Repairs.**
5. Drain cooling system, see **MAINTENANCE.**



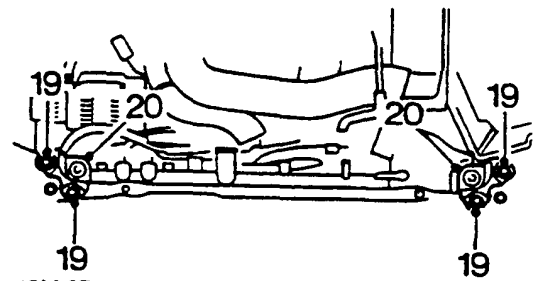
19M 0742

6. Slacken clip and disconnect top hose from intercooler.
7. Slacken clip and disconnect bottom hose from intercooler.
8. Slacken clip and disconnect expansion tank return pipe from radiator.
9. Remove bolt securing air conditioning pipe to LH cooling fan cowl.
10. Disconnect LH cooling fan motor multiplug.
11. Release harness from clip on LH cooling fan cowl.



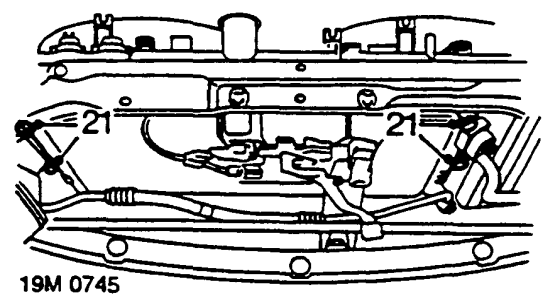
19M 0743

12. Slacken clip and disconnect coolant hose from radiator inlet pipe.
13. Disconnect radiator high temperature sensor multiplug.
14. Disconnect 2 lucars from radiator low temperature sensor.
15. Disconnect multiplug from alternator.
16. Release cover and remove nut securing lead to alternator.
17. Release harness from 2 clips on RH cooling fan cowl.
18. Remove bolt securing air conditioning pipe to bonnet lock platform.



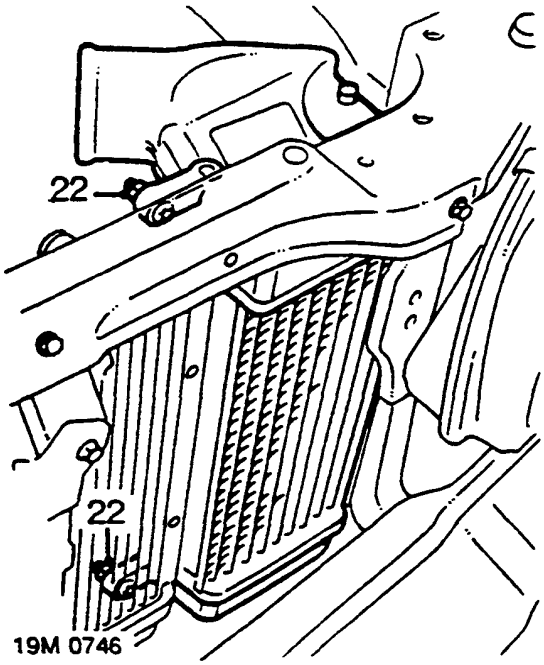
19M 0744

19. Remove 4 bolts securing radiator top mounting brackets to bonnet platform.
20. Remove 2 mounting brackets.



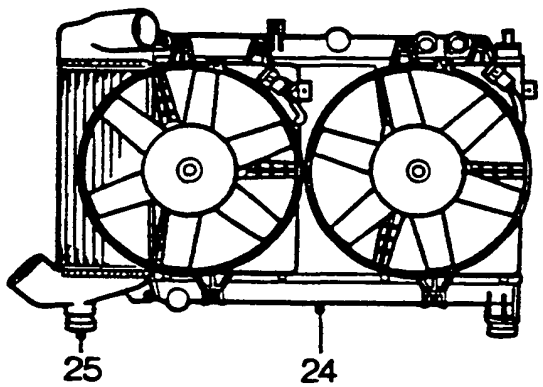
19M 0745

21. Remove 4 bolts securing condenser to radiator.



19M 0746

22. Remove 2 Tx40 Torx bolts and nuts securing intercooler to radiator.
23. Using assistance, manoeuvre radiator and intercooler from engine compartment.



19M 0747

24. Remove radiator and intercooler.

Do not carry out further dismantling if component is removed for access only

25. Remove lower mounting rubber from intercooler.
26. Fit lower mounting rubber to new intercooler.

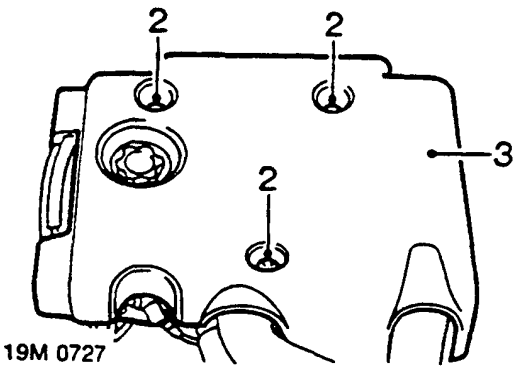
Refit

1. Using assistance, manoeuvre radiator and intercooler into position and locate into lower mountings.
2. Align intercooler to radiator, fit and tighten nuts and Torx bolts.
3. Align condenser to radiator, fit and tighten bolts.
4. Fit radiator top mounting brackets, fit and tighten bolts to 9 N·m (0.9 kgf·m, 7 lbf·ft).
5. Align air conditioning pipe bracket to bonnet platform, fit and tighten bolt to 9 N·m (0.9 kgf·m, 7 lbf·ft).
6. Secure harness to clips on RH fan cowl.
7. Connect battery cable to alternator stud, tighten nut to 4 N·m (0.4 kgf·m, 3 lbf·ft) and position cover.
8. Connect multiplug to alternator.
9. Connect lucars to radiator temperature sensor.
10. Connect multiplug to radiator temperature sensor.
11. Secure harness to clip on LH fan cowl.
12. Connect multiplug to LH cooling fan.
13. Align air conditioning pipe bracket to LH fan cowl, fit bolt and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
14. Connect bottom hose to intercooler and tighten clip.
15. Connect top hose to intercooler and tighten clip.
16. Connect coolant hose to radiator inlet pipe and tighten clip.
17. Connect expansion tank return pipe to radiator and tighten clip.
18. Fit sound deadening pad to engine and secure with bolts.
19. Refill cooling system, see **MAINTENANCE**.
20. Fit under belly panel, see **BODY - Repairs**.
21. Fit air cleaner assembly, see **Air cleaner**.

GLOW PLUGS

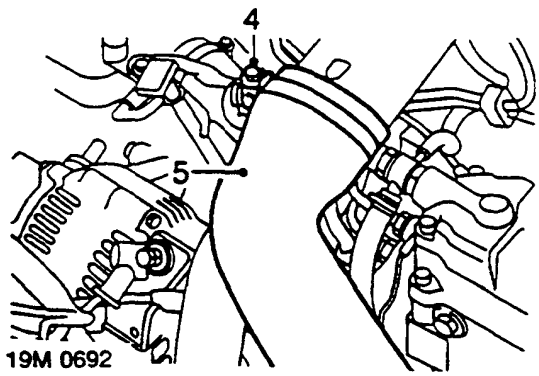
Remove

1. Disconnect battery earth lead.



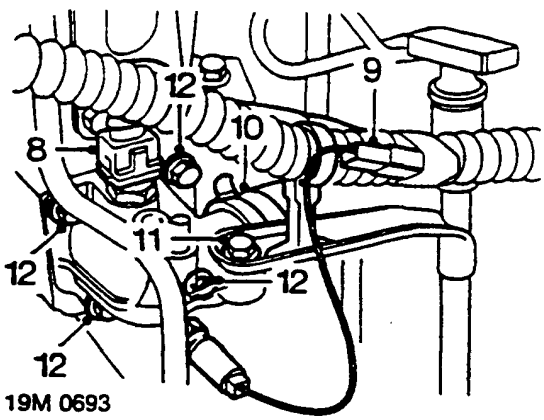
19M 0727

2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.



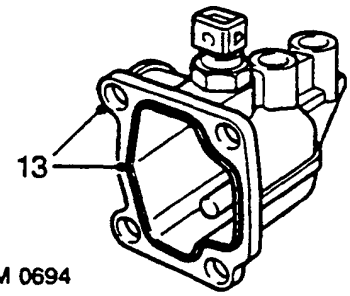
19M 0692

4. Slacken clip and disconnect intercooler top hose from inlet manifold.
5. Position intercooler top hose aside.
6. *Models with air conditioning fitted:* Remove alternator, see **ELECTRICAL - Repairs.**
7. Drain cooling system, see **MAINTENANCE.**



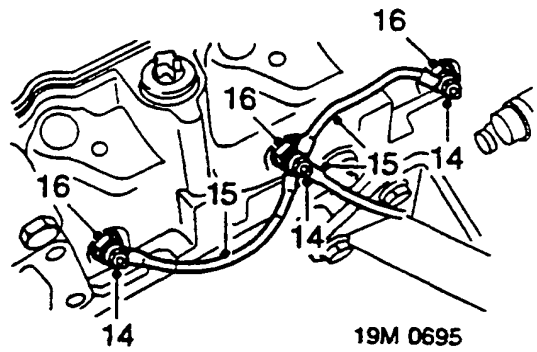
19M 0693

8. Disconnect multiplug from engine coolant temperature sensor.
9. Disconnect ECT gauge sending unit Lucar from harness.
10. Slacken clip and disconnect radiator top hose from coolant outlet elbow.
11. Remove bolt securing dipstick tube bracket to coolant outlet elbow.
12. Remove 4 bolts securing coolant outlet elbow to cylinder head.



19M 0694

13. Remove coolant outlet elbow, remove and discard seal.



19M 0695

14. Remove 3 terminal nuts securing feed leads to glow plugs.
15. Disconnect and remove glow plug leads.
16. Remove 3 glow plugs.

Refit

1. Thoroughly clean glow plugs and glow plug seating area in cylinder head.
2. Apply a suitable anti-sieze compound to threads of glow plugs.
3. Fit glow plugs and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft).
4. Connect feed leads to glow plugs, fit and tighten terminal nuts.

Note: *Harness feed lead must be connected to glow plug No. 2.*

5. Clean mating faces of coolant outlet elbow and cylinder head.
6. Fit new seal to coolant outlet elbow.
7. Position coolant outlet elbow to cylinder head, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
8. Align dipstick tube bracket to coolant outlet elbow and secure with bolt.
9. Connect ECT gauge sending unit Lucar to harness.
10. Connect multiplug to engine coolant temperature sensor.
11. Connect radiator top hose to coolant outlet elbow and tighten clip.
12. *Models with air conditioning fitted:* Fit alternator, see **ELECTRICAL - Repairs.**
13. Connect intercooler top hose to inlet manifold and tighten clip.
14. Position sound deadening pad and secure with bolts.
15. Connect battery earth lead.
16. Refill cooling system, see **MAINTENANCE.**

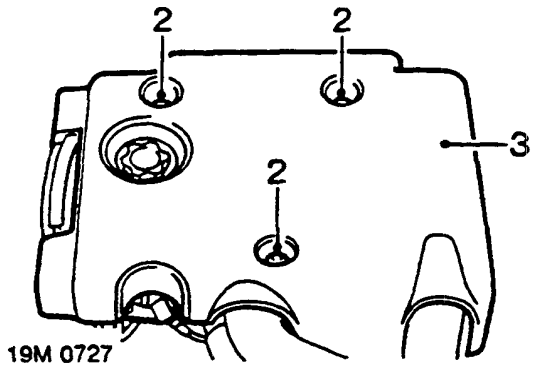
INJECTOR NEEDLE LIFT SENSOR

Service Repair No. 18.30.72

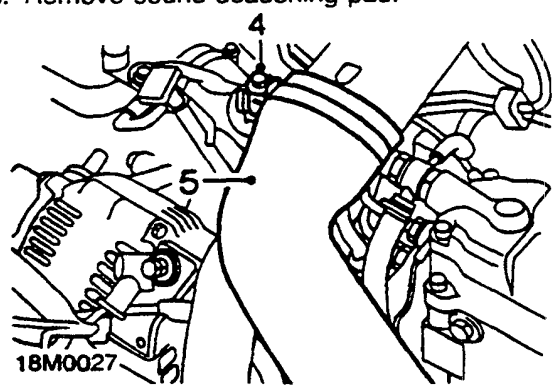
Note: *The injector needle lift sensor is an integral part of No. 1 injector and cannot be replaced seperately.*

Remove

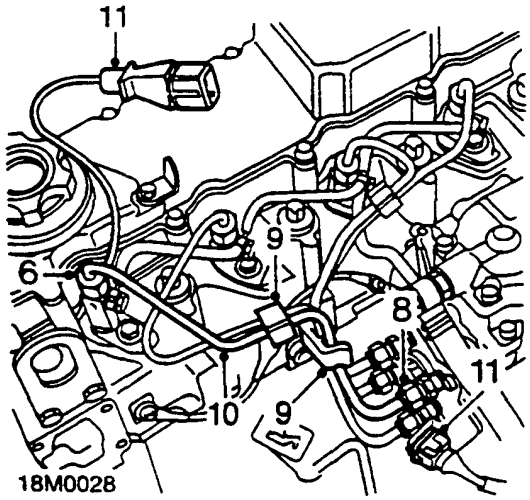
1. Disconnect battery earth lead.



2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.



4. Slacken clip and disconnect intercooler top hose from inlet manifold.
5. Position hose aside.



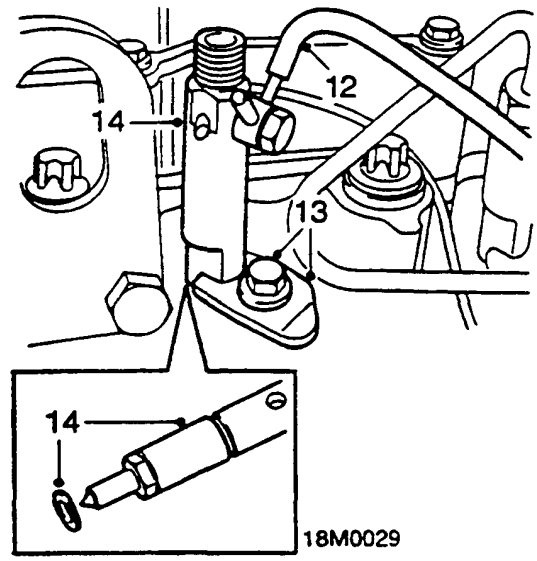
6. Slacken injector pipe union at injector.
7. Position absorbent cloth around fuel injection pump connection to catch fuel spillage.
8. Slacken injector pipe union at injection pump.

CAUTION: *To prevent damage to fuel system pipes or components, use 2 spanners when loosening or tightening unions.*

9. Release 2 clips securing injector pipes together.
10. Disconnect injector pipe unions from fuel injection pump and injector, remove injector pipe.

CAUTION: *Plug the connections to prevent the ingress of dirt.*

11. Disconnect injector needle lift sensor multiplug from harness.



12. Disconnect spill return pipe from injector.
13. Remove bolt and collect clamp plate securing injector to cylinder head.
14. Remove injector from cylinder head, remove and discard sealing washer.

Do not carry out further dismantling if component is removed for access only

15. Remove spill return pipe banjo bolt and discard 2 sealing washer.
16. Using new sealing washers, fit spill return pipe to new injector and tighten banjo bolt.

Refit

1. Thoroughly clean injector and injector seat in cylinder head.
2. Fit new sealing washer to injector and fit injector to cylinder head.

CAUTION: *Domed surface of sealing washer must face towards injector.*

3. Fit clamp plate to injector, align injector and clamp plate to bolt hole in cylinder head
4. Fit injector clamp plate bolt and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
5. Connect spill return pipe to injector.
6. Connect needle lift sensor multiplug to harness.
7. Remove plugs from injector pipe, injection pump and injector unions.
8. Clean injector pipe, injection pump and injector unions.
9. Position injector pipe to injection pump and injector, connect unions.
10. Align injector pipe to other injector pipes, fit and secure retaining clips.
11. Tighten injector pipe to injector union to 20 N·m (2.0 kgf·m, 15 lbf·ft).
12. Tighten injector pipe to injection pump union to 20 N·m (2.0 kgf·m, 15 lbf·ft).

CAUTION: *To prevent damage to fuel system pipes or components, use 2 spanners when loosening or tightening unions.*

13. Connect intercooler top hose to inlet manifold and tighten clip.
14. Position sound deadening pad and secure with bolts.
15. Connect battery earth lead.

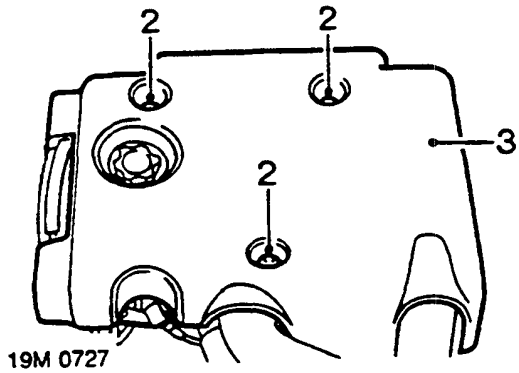
INJECTORS

Service Repair No. 19.60.10

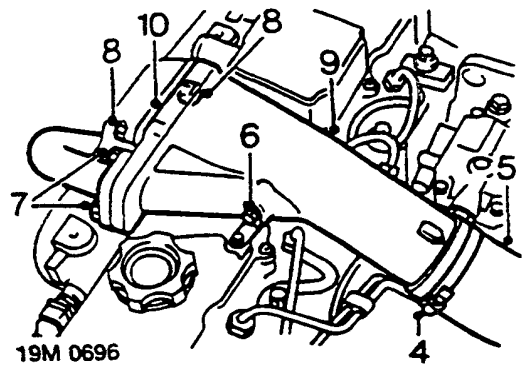
Note: *No. 1 injector incorporates the needle lift sensor and is covered in a seperate procedure, see* **Needle lift sensor.**

Remove

1. Disconnect battery earth lead.



2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.

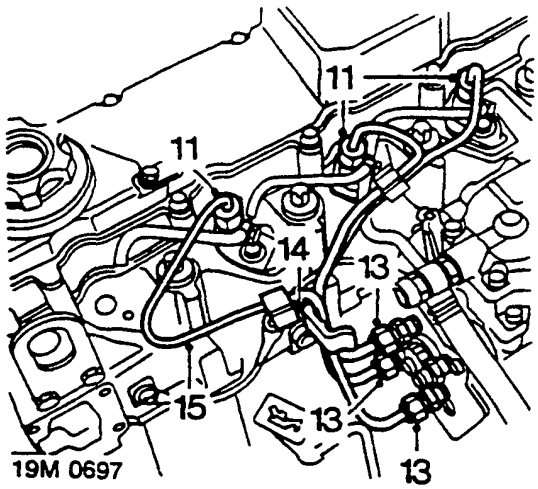


4. Slacken clip and disconnect intercooler top hose from inlet manifold.
5. Position hose aside.

No. 2 injector only

6. Remove bolt securing inlet manifold intake pipe to camshaft cover bracket.
7. Remove 2 bolts securing EGR recirculation pipe to inlet manifold intake pipe.
8. Remove 2 bolts securing intake pipe to inlet manifold.
9. Remove inlet manifold intake pipe.
10. Remove and discard gasket.

All injectors

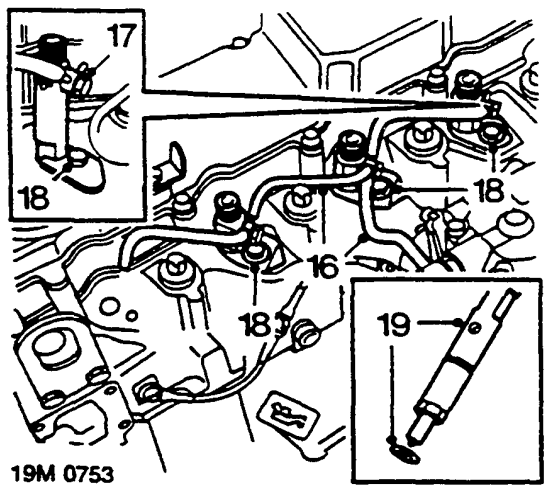


11. Slacken injector pipe union at injector.
12. Position absorbent cloth around fuel injection pump connection to catch fuel spillage.
13. Slacken injector pipe union at injection pump.

CAUTION: *To prevent damage to fuel system pipes or components, use 2 spanners when loosening or tightening unions.*

14. Release 2 clips securing injector pipes together.
15. Disconnect injector pipe unions from fuel injection pump and injector, remove injector pipe.

CAUTION: *Plug the connections to prevent the ingress of dirt.*



16. *Injectors 2 &3:* Disconnect spill return pipe from injector.
17. *Injector 4:* Remove spill return pipe banjo bolt and discard 2 sealing washers.
18. Remove bolt and collect clamp plate securing injector to cylinder head.
19. Remove injector from cylinder head, remove and discard sealing washer.

Do not carry out further dismantling if component is removed for access only

Injectors 2 & 3 only

20. Remove spill return pipe banjo bolt and discard 2 sealing washer.
21. Using new sealing washers, fit spill return pipe to new injector and tighten banjo bolt.

Refit

1. Thoroughly clean injector and injector seat in cylinder head.
2. Fit new sealing washer to injector and fit injector to cylinder head.

CAUTION: *Domed surface of sealing washer must face towards injector.*

3. Fit clamp plate to injector, align injector and clamp plate to bolt hole in cylinder head
4. Fit injector clamp plate bolt and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
5. *Injector 4:* Using new sealing washers, fit spill return pipe to injector and tighten banjo bolt.
6. *Injectors 2 & 3:* Connect spill return pipe to injector.
7. Remove plugs from injector pipe, injection pump and injector unions.
8. Clean injector pipe, injection pump and injector unions.
9. Position injector pipe to injection pump and injector, connect unions.
10. Align injector pipe to other injector pipes, fit and secure retaining clips.
11. Tighten injector pipe to injector union to 20 N·m (2.0 kgf·m, 15 lbf·ft).
12. Tighten injector pipe to injection pump union to 20 N·m (2.0 kgf·m, 15 lbf·ft).

CAUTION: *To prevent damage to fuel system pipes or components, use 2 spanners when loosening or tightening unions.*

No 2. injector only

13. Clean mating faces of EGR recirculation pipe, inlet manifold and inlet manifold intake pipe.
14. Using new gasket, fit inlet manifold intake pipe and tighten bolts to 20 N·m (2.0 kgf·m, 15 lbf·ft).
15. Align EGR recirculation pipe to inlet manifold, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
16. Fit bolt securing inlet manifold intake pipe to camshaft cover and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).

All injectors

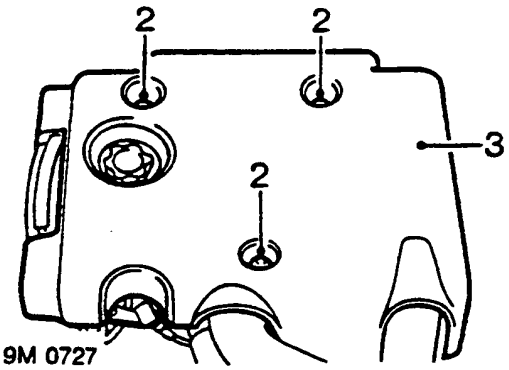
17. Connect intercooler top hose to inlet manifold and tighten clip.
18. Position sound deadening pad and secure with bolts.
19. Connect battery earth lead.

INJECTION PUMP

Service Repair No. 19.30.07

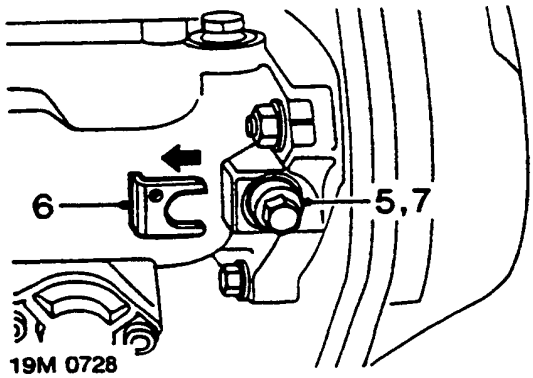
Remove

1. Disconnect battery earth lead.



19M 0727

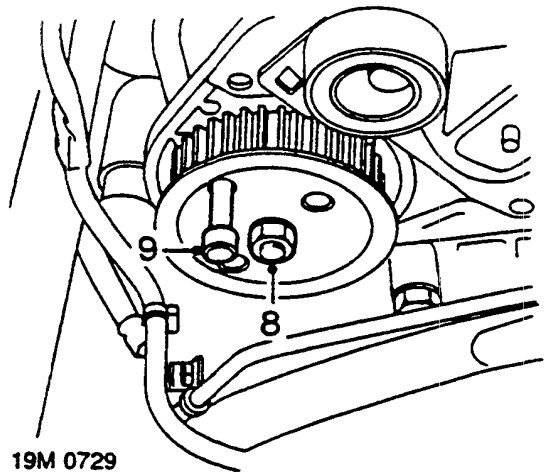
2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.
4. Remove injector pump timing belt, see **MAINTENANCE.**



19M 0728

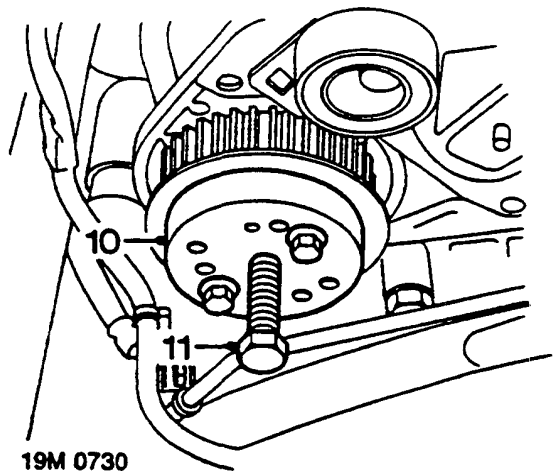
5. Slacken injection pump shaft clamp bolt.
6. Remove spacer from clamp bolt.
7. Tighten clamp bolt to 31 N·m (3.2 kgf·m, 23 lbf·ft).

CAUTION: *DO NOT exceed specified torque. damage to the injection pump shaft will render the pump inoperable.*



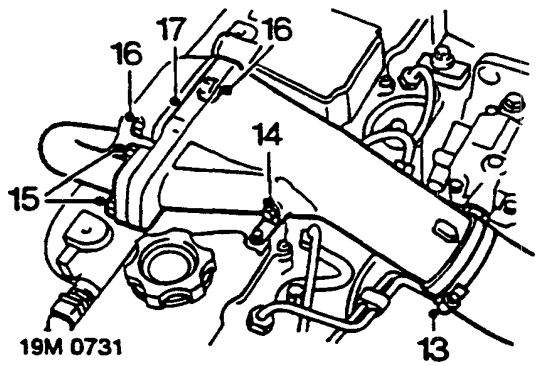
19M 0729

8. Remove injection pump drive gear retaining nut.
9. Remove locking pin tool **18G 1717** from injection pump drive gear.



19M 0730

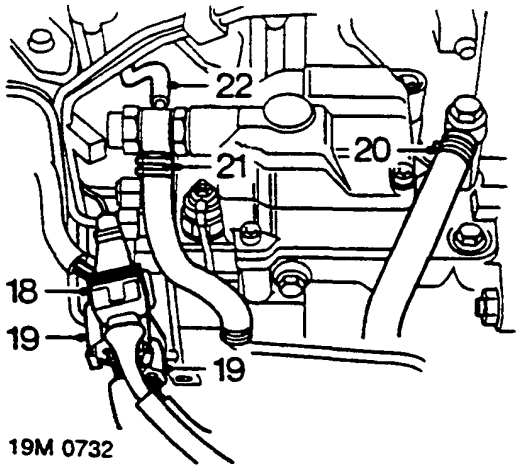
10. Fit tool **18G 1512** to injection pump drive gear.
11. Rotate tool **18G 1512** centre bolt clockwise to break injection pump drive gear from taper.
12. Remove tool **18G 1512** from drive gear.



19M 0731

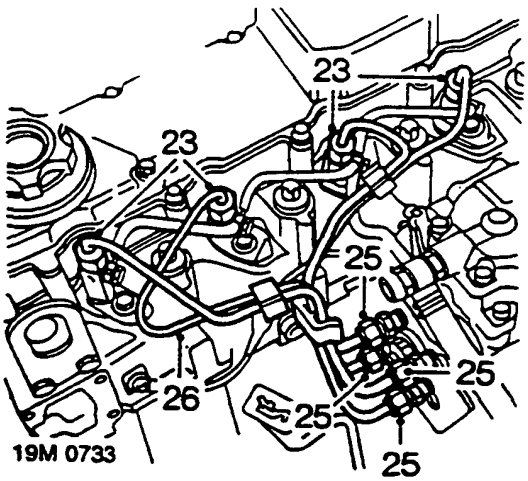
13. Slacken clip and disconnect intercooler hose from inlet manifold intake pipe.
14. Remove bolt securing support bracket to inlet manifold intake pipe.

15. Remove 2 bolts securing EGR recirculation pipe to inlet manifold intake pipe.
16. Remove 2 bolts securing inlet manifold intake pipe to manifold chamber.
17. Remove and discard gasket.



18. Release injector needle lift sensor multiplug from injection pump bracket.
19. Release and disconnect 2 injection pump multiplugs.
20. Release clip and disconnect fuel feed hose from injection pump banjo.
21. Release clip and disconnect fuel return hose from injection pump banjo.
22. Disconnect spill return hose from injection pump banjo.

CAUTION: *Plug the connections.*

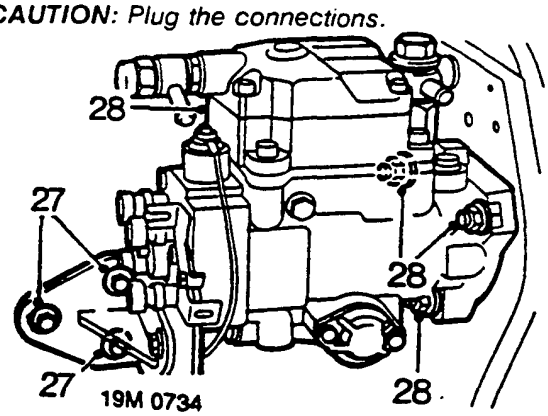


23. Slacken injector pipe unions at injectors.
24. Position absorbent cloth around fuel injection pump pipe connections to catch fuel spillage.
25. Slacken injector pipe unions from fuel injection pump.

CAUTION: *To prevent damage to fuel injection pipes or components use 2 spanners when loosening unions.*

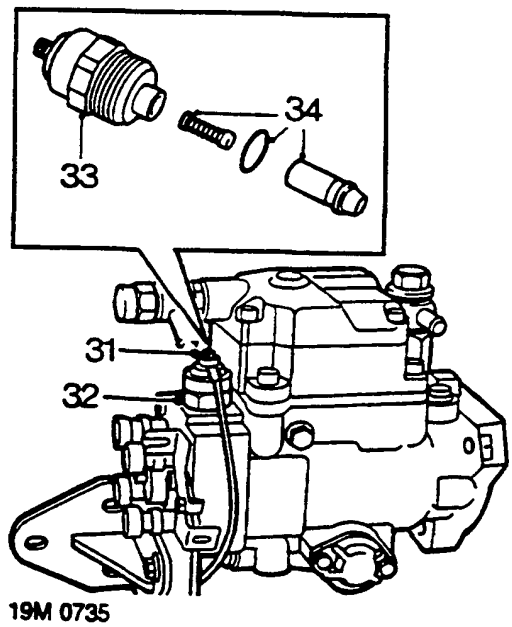
26. Disconnect injector pipe unions from fuel injection pump and injectors, remove injector pipe assembly.

CAUTION: *Plug the connections.*



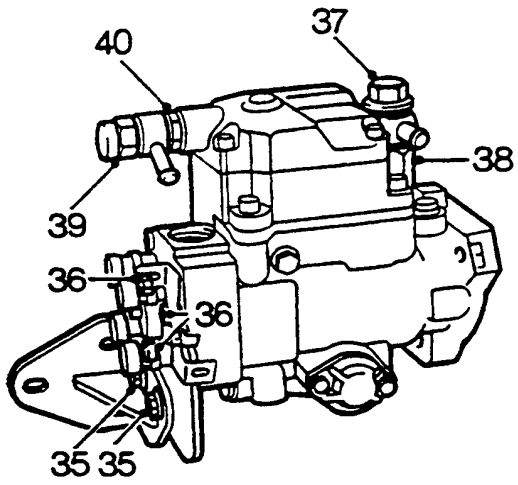
27. Remove 3 bolts securing injection pump support bracket to engine.
28. Remove 3 nuts securing injection pump to to gearbox mounting plate, remove injection pump.

Do not carry out further dismantling if component is removed for access only



29. Clean top of fuel injection pump around fuel shut-off solenoid.
30. Position absorbent cloth around fuel shut-off solenoid.
31. Remove nut and disconnect cable from fuel shut-off solenoid.
32. Using a 24 mm (0.9 in) spanner slacken fuel shut-off solenoid from injection pump.
33. Unscrew and remove fuel shut-off solenoid
34. Collect fuel shut-off solenoid plunger, spring and 'O' ring.

CAUTION: *Plug fuel shut-off solenoid housing.*



19M 0736

35. Remove 2 nuts and bolts securing injection pump support bracket to abutment bracket, remove bracket.
36. Remove 3 Allen screws securing abutment bracket to injection pump, remove bracket.
37. Remove fuel feed banjo bolt from injection pump, discard 2 sealing washers.
38. Remove fuel feed banjo adaptor from injection pump, discard sealing washer.
39. Remove fuel return banjo from injection pump, discard 2 sealing washers.
40. Remove fuel return banjo adaptor from injection pump, discard sealing washer.

CAUTION: Plug the connections.

41. Fit fuel return banjo adaptor to injection pump, use new sealing washer and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
42. Fit fuel return banjo to injection pump, use new sealing washers and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
43. Fit fuel feed banjo adaptor to injection pump, use new sealing washers and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
44. Fit fuel feed banjo to injection pump, use new sealing washers and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
45. Fit abutment bracket to injection pump, fit Allen screws and tighten to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
46. Fit injection pump support bracket to abutment bracket, align multiplug mounting bracket, fit but do not tighten nuts and bolts.
47. Lubricate and fit new 'O' ring to fuel shut-off solenoid.
48. Clean fuel shut-off solenoid plunger.
49. Fit plunger and spring to fuel shut-off solenoid.
50. Fit fuel shut-off solenoid to fuel injection pump and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft).
51. Connect cable to fuel shut-off solenoid, fit and tighten terminal nut.

Refit

1. Clean injection pump and gearbox mounting plate mating faces.
2. Fit injection pump to gearbox mounting plate studs, align multiplug mounting bracket, fit nuts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
3. Align injection pump support bracket to engine, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
4. Tighten nuts and bolts securing injection pump abutment bracket to support bracket to 25 N·m (2.5kgf·m, 18 lbf·ft).
5. Position injector pipes to fuel injection pump and injectors, tighten unions to 20 N·m (2.0 kgf·m, 15 lbf·ft).

***CAUTION:** To prevent damage to fuel system pipes or components use 2 spanners when tightening unions.*

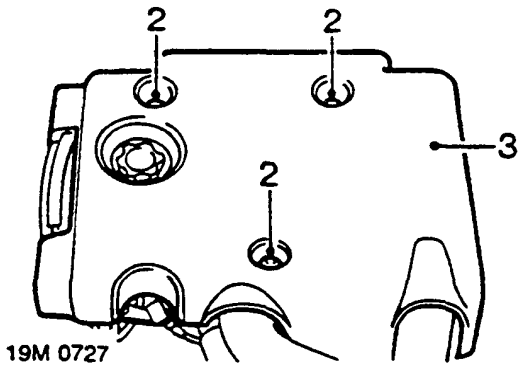
6. Connect spill return hose to injector pump banjo.
7. Connect fuel return hose to injection pump banjo and secure clip.
8. Connect fuel feed hose to injection pump banjo and secure clip.
9. Connect injection pump multiplugs and secure to bracket.
10. Secure injector needle lift sensor multiplug to injection pump bracket.
11. Clean inlet manifold intake pipe and EGR recirculation pipe to manifold chamber mating faces.
12. Fit new gasket to manifold chamber, position inlet manifold intake pipe, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
13. Align EGR recirculation pipe to inlet manifold intake pipe, fit bolts and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
14. Fit and tighten bolt securing support bracket to inlet manifold intake pipe.
15. Connect intercooler hose to inlet manifold intake pipe and tighten clip.
16. Clean injection pump drive gear and shaft.
17. Fit drive gear to injection pump.
18. Fit locking pin tool **18G 1717** to injection pump drive gear and engage into gearbox mounting plate.
19. Fit spring washer and nut to injection pump shaft and tighten to 60 N·m (6.1 kgf·m, 44 lbf·ft).
20. Slacken injector pump shaft clamp bolt.
21. Position spacer beneath clamp bolt.
22. Tighten clamp bolt to 10 N·m (10 kgf·m, 7.4 lbf·ft).
23. Fit injection pump drive belt, see **MAINTENANCE**.
24. Position sound deadening pad and secure with bolts.
25. Connect battery earth lead.

FUEL SHUT-OFF SOLENOID

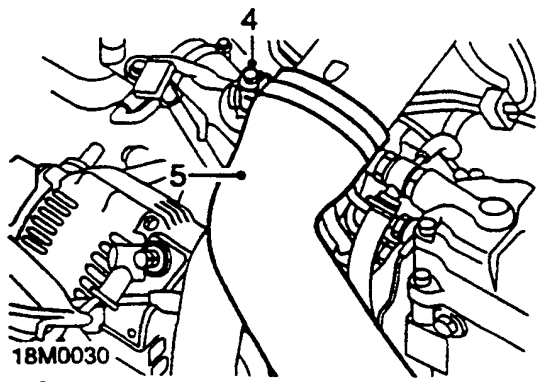
Service Repair No. 18.30.07

Remove

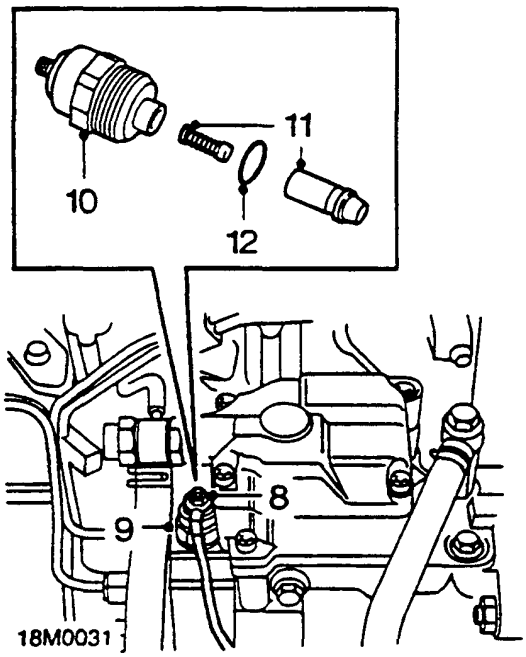
1. Disconnect battery earth lead.



2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.



4. Slacken clip and disconnect intercooler top hose from inlet manifold.
5. Position hose aside.



6. Clean top of injection pump around fuel around fuel shut-off solenoid.
7. Position absorbent cloth around fuel shut-off valve to catch fuel spillage.
8. Remove nut and disconnect lead from fuel shut-off valve.
9. Using a 24 mm (0.9 in) spanner, slacken fuel shut-off solenoid from injection pump.
10. Unscrew and remove fuel shut-off solenoid.
11. Collect fuel shut-off solenoid plunger and spring.
12. Remove and discard 'O' ring seal from fuel shut-off solenoid.

Refit

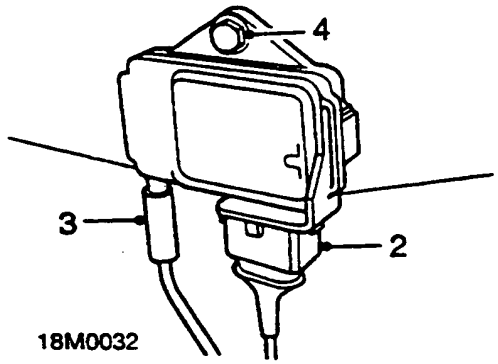
1. Lubricate and fit new 'O' ring seal to fuel shut-off solenoid.
2. Clean fuel shut-off solenoid plunger.
3. Fit spring and plunger to fuel shut-off solenoid.
4. Fit fuel shut-off solenoid to injection pump and tighten to 20 N·m (2.0 kgf·m, 15 lbf·ft).
5. Remove absorbent cloth.
6. Connect intercooler top hose to inlet manifold and tighten clip.
7. Position sound deadening pad and secure with bolts.
8. Connect battery earth lead.

MANIFOLD ABSOLUTE PRESSURE SENSOR

Service Repair No. 18.30.56

Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from boost pressure sensor.
3. Disconnect boost pressure sensing pipe from boost pressure sensor.
4. Remove nut and bolt securing boost pressure sensor to mounting bracket.
5. Remove boost pressure sensor.

Refit

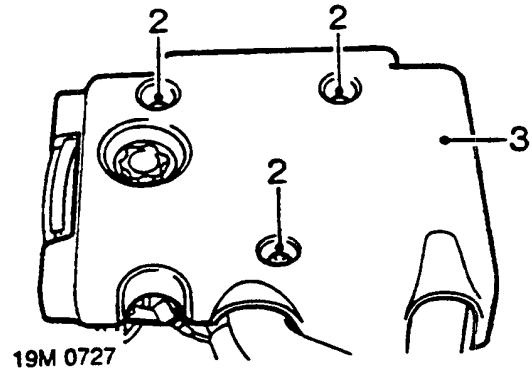
1. Align boost pressure sensor to mounting bracket, fit nut and bolt and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
2. Connect boost pressure sensing pipe to boost pressure sensor.
3. Connect multiplug to boost pressure sensor.
4. Connect battery earth lead.

INTAKE AIR TEMPERATURE SENSOR

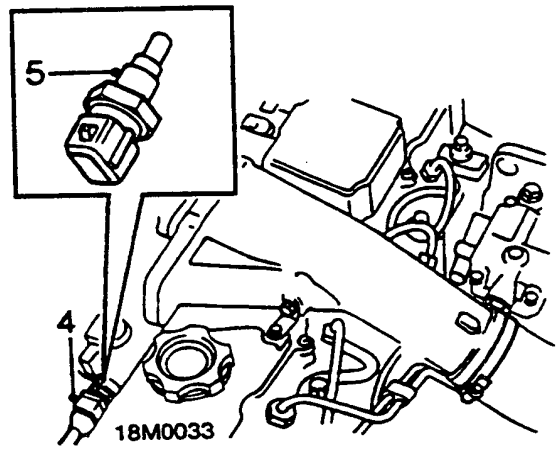
Service Repair No. 18.30.09

Remove

1. Disconnect battery earth lead.



2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.



4. Disconnect multiplug from intake air temperature sensor.
5. Remove intake air temperature sensor.

Refit

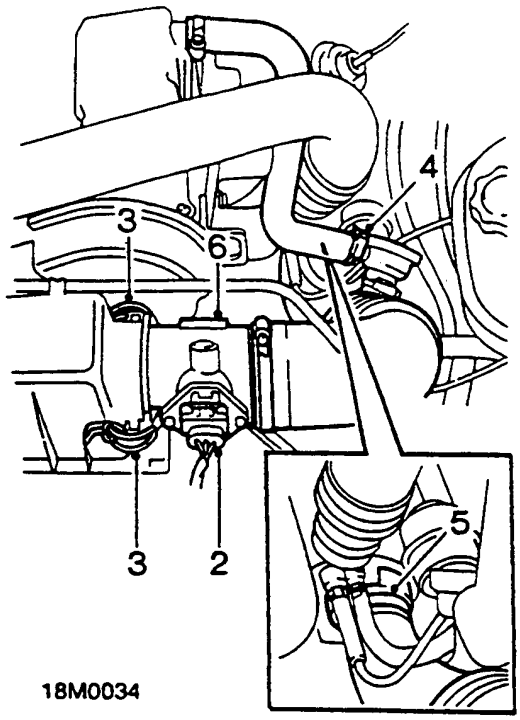
1. Clean threads of intake air temperature sensor and apply Loctite 577 or similarity.
2. Fit sensor to inlet manifold and tighten to 12 N·m (1.2 kgf·m, 8.9 lbf·ft).
3. Connect multiplug to intake air temperature sensor.
4. Position sound deadening pad to engine and secure with bolts.
5. Connect battery earth lead.

CRANKSHAFT POSITION SENSOR

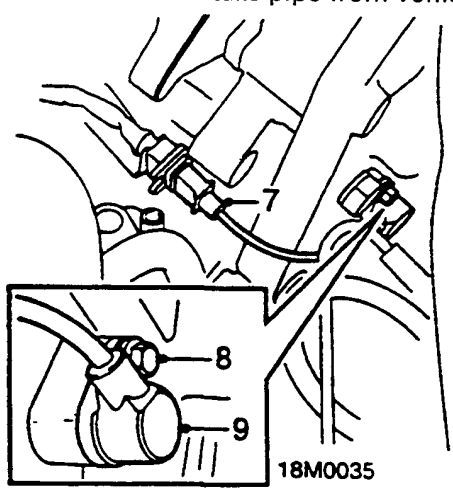
Service Repair No. 18.30.12

Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from mass air flow sensor.
3. Release 2 clips securing mass air flow sensor housing to air filter.
4. Slacken clip and disconnect one way valve from air intake pipe.
5. Slacken clip and disconnect air intake hose from turbocharger.
6. Remove air intake pipe from vehicle.



7. Disconnect multiplug from crankshaft position sensor.
8. Remove bolt securing crankshaft position sensor to gearbox mounting plate.
9. Remove crankshaft position sensor.

Refit

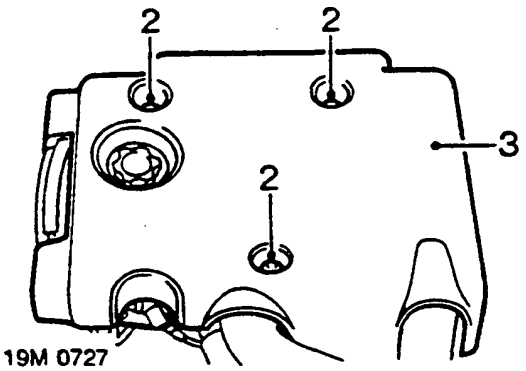
1. Clean crankshaft position sensor and mating face of gearbox mounting plate.
2. Fit crankshaft position sensor, fit bolt and tighten to 6 N·m (0.6 kgf·m, 4 lbf·ft).
3. Connect multiplug to crankshaft position sensor.
4. Position air intake hose in engine compartment.
5. Connect air intake hose to turbocharger and tighten clip.
6. Connect one way valve to air intake hose and tighten clip.
7. Connect mass air flow sensor housing to air filter and secure clips.
8. Connect multiplug to air flow sensor.
9. Connect battery earth lead.

ENGINE COOLANT TEMPERATURE SENSOR

Service Repair No. 18.30.59

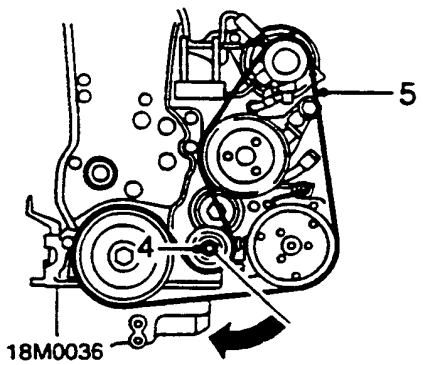
Remove

1. Disconnect battery earth lead.

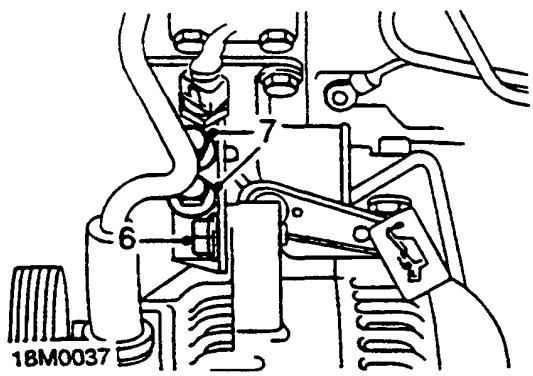


2. Remove 2 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.

Models with air conditioning

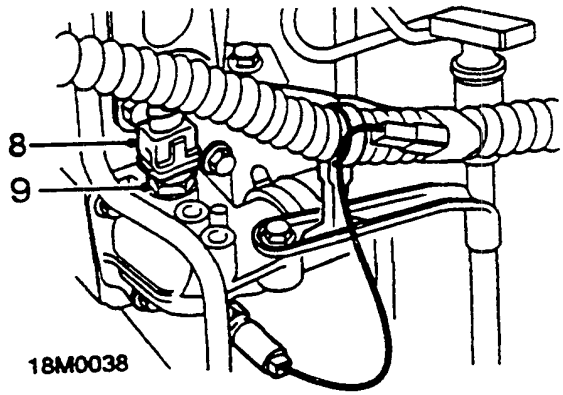


4. Using a 15 mm (0.6 in) ring spanner on drive belt tensioner pulley bolt, rotate pully fully clockwise and hold.
5. Using assistance, release drive belt from alternator pulley.



6. Remove bolt securing alternator to top mounting bracket.
7. Remove 2 bolts securing alternator top mounting bracket to coolant outlet elbow and remove bracket.

All models



8. Disconnect multiplug from engine coolant temperature sensor.
9. Remove engine coolant temperature sensor.

Refit

1. Clean threads of engine coolant temperature sensor and apply Loctite 577 or similarity.
2. Connect multiplug to engine coolant temperature sensor.

Models with air conditioning

3. Position alternator top mounting bracket to coolant outlet elbow, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
4. Check condition of alternator drive belt. see **MAINTENANCE.**
5. Hold tensioner pulley fully clockwise, using assistance fit drive belt around alternator pulley, ensure belt is correctly aligned in pulley grooves.
6. Remove 15 mm (0.6 in) ring spanner from tensioner pulley bolt.

All models

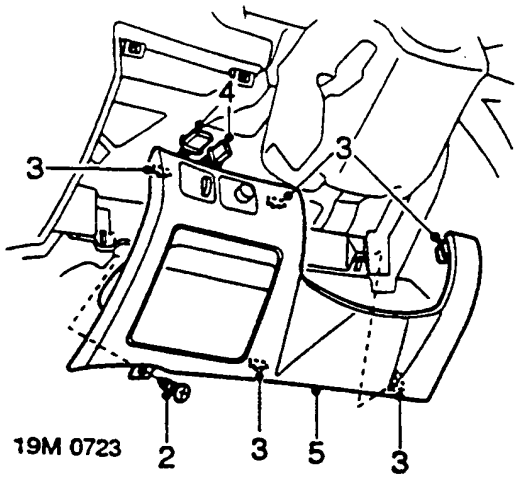
7. Position sound deadening pad to engine and secure with bolts.
8. Connect battery earth lead.

THROTTLE PEDAL POSITION SENSOR

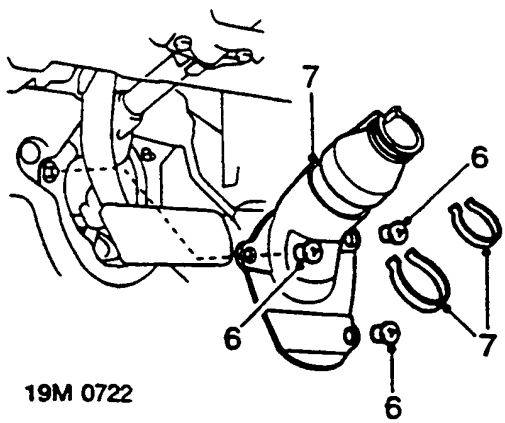
Service Repair No. 19.22.49

Remove

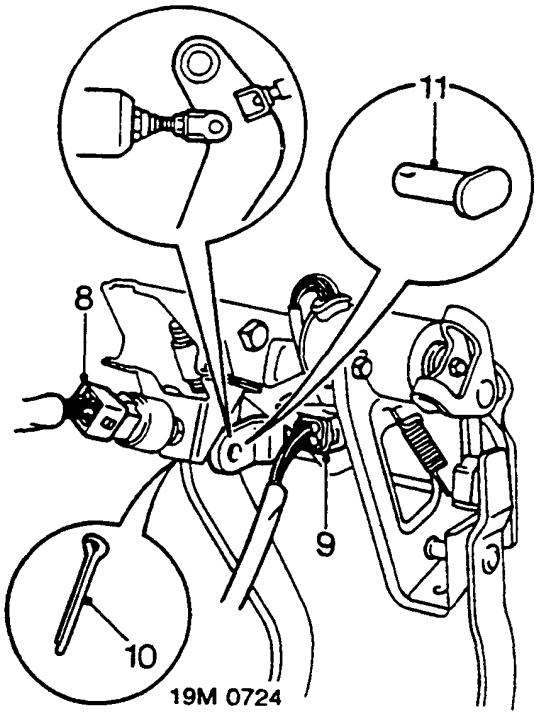
1. Disconnect battery earth lead.



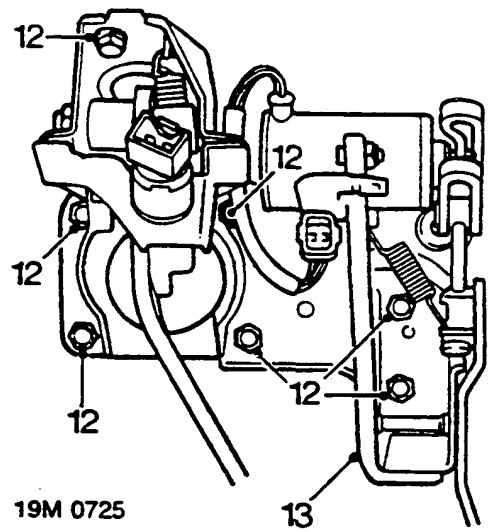
2. Remove screw securing lower fascia closing panel to fascia.
3. Release 5 clips securing lower fascia closing panel to fascia.
4. Disconnect multiplug from instrument panel dash Lights brightness controller. *Models fitted with headlight adjuster:* Disconnect multiplug from headlight adjuster switch.
5. Remove lower fascia closing panel.



6. Remove 3 trim fasteners securing universal joint cover to bulkhead.
7. Release 2 clips securing universal joint cover to steering column and remove cover.

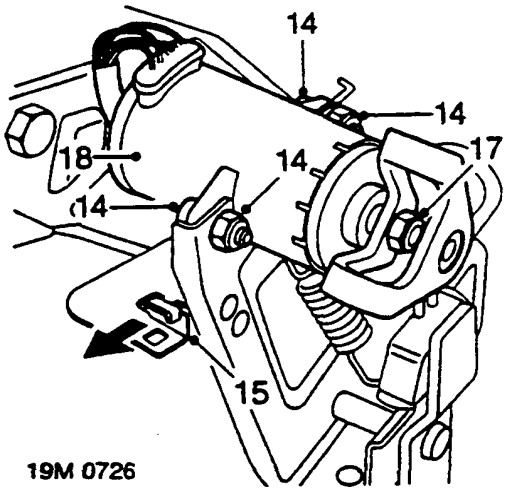


8. Disconnect multiplug from brake pedal switch.
9. Disconnect multiplug from throttle pedal position sensor.
10. Remove and discard split pin from servo push rod clevis pin.
11. Remove servo push rod clevis pin.



12. Remove bolt and 6 nuts securing pedal box assembly to bulkhead and underside of fascia.
13. Release pedal box assembly from studs on bulkhead and manoeuvre from beneath fascia.

CAUTION: *Do not damage brake pedal switch.*



19M 0726

14. Remove 2 nuts and bolts securing throttle pedal position sensor to pedal box. discard nuts.
15. Release throttle pedal position sensor multiplug from mounting bracket.
16. Remove throttle pedal position sensor and linkage.
17. Remove and discard nut securing linkage to throttle pedal position sensor.
18. Remove throttle pedal position sensor.

Refit

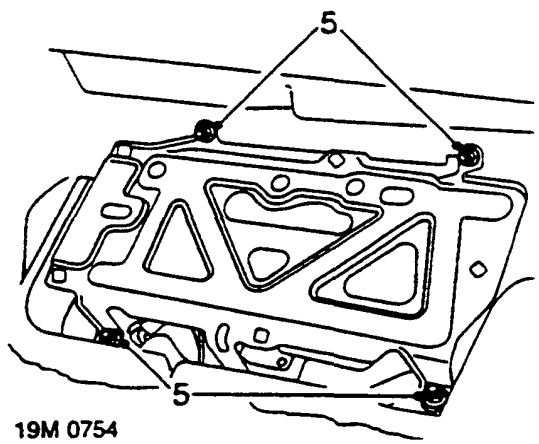
1. Fit linkage to throttle pedal position sensor, fit new nut but do not tighten.
2. Engage throttle pedal position sensor linkage with throttle pedal.
3. Align throttle pedal position sensor to pedal box. Fit and tighten bolts and new nuts.
4. Ensure throttle pedal is firmly against it's stop and tighten nut securing linkage to throttle pedal position sensor.
5. Carefully manoeuvre pedal box assembly into position under fascia and engage on studs on bulkhead.
6. Fit nuts securing pedal box assembly to bulkhead and tighten to 13 N·m (1.3 kgf·m, 9.6 lbf·ft).
7. Fit bolt securing pedal box assembly to underside of fascia and tighten to 13 N·m (1.3 kgf·m, 9.6 lbf·ft).
8. Align servo push rod to brake pedal.
9. Fit servo push rod clevis pin and secure with new split pin.
10. Connect multiplug to brake pedal switch.
11. Connect multiplug to throttle pedal position sensor and secure to mounting bracket.
12. Fit universal joint cover to steering column and secure to bulkhead with 3 trim fasteners.
13. Position lower fascia closing panel and connect multiplug to instrument panel dash light brightness controller.
    Models fitted with headlamp levelling:
    Connect multiplug to headlight adjuster switch.
14. Align lower fascia closing panel to fascia and press to secure retaining clips.
15. Fit screw securing lower fascia closing panel to fascia.
16. Connect battery earth lead.

ENGINE CONTROL MODULE

Service Repair No. 18.30.01

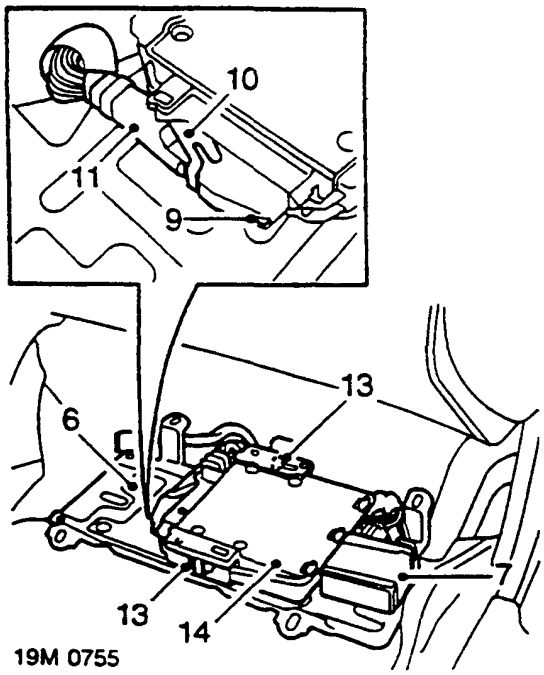
Remove

1. Disconnect both battery leads, earth lead first.
2. Remove trim fastener securing passenger's footwell carpet to centre console.
3. Release passenger's footwell carpet from base of 'A' post, bulkhead and rear of centre console.
4. Fold back passenger's footwell carpet.



19M 0754

5. Remove 4 nuts securing ECM mounting bracket to bulkhead.



19M 0755

6. Release mounting bracket from studs.
7. Release clip and disconnect cooling fan relay module from mounting bracket.
8. Manoeuvre mounting bracket to gain access to ECM multiplug.
9. Remove screw securing multiplug to ECM.
10. Release metal clip securing multiplug to ECM.
11. Disconnect multiplug from ECM.

***Note:** Take care when disconnecting multiplug from ECM as it is possible to break the bridging piece which secures the multiplug to ECM.*

12. Remove ECM and mounting bracket.
13. Remove 2 nuts securing ECM to mounting bracket.
14. Remove ECM.

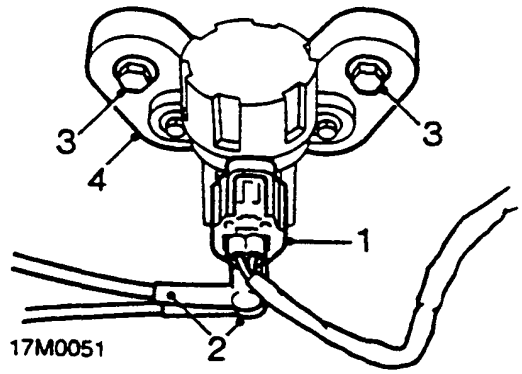
Refit

1. Position ECM to mounting bracket, fit nuts and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
2. Connect multiplug to ECM and engage metal clip.
3. Fit and tighten ECM multiplug retaining screw.
4. Manoeuvre ECM mounting bracket into position in passenger's footwell.
5. Secure cooling fan relay module to clip on mounting bracket.
6. Fit ECM mounting bracket to studs on bulkhead, fit nuts and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
7. Position passenger's footwell carpet and fit to base of 'A' post, bulkhead and rear of centre console.
8. Fit trim fastener securing carpet to centre console.
9. Connect both battery leads, earth lead last.

EGR SOLENOID VALVE

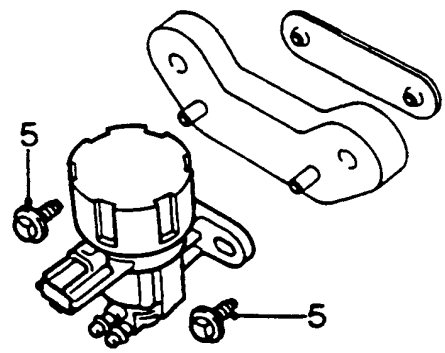
Service Repair No. 17.45.04

Remove



17M0051

1. Disconnect multiplug from EGR solenoid valve.
2. Disconnect 2 vacuum hoses from solenoid valve.
3. Remove 2 nuts and bolts securing solenoid mounting rubber to mounting bracket.
4. Remove solenoid valve and mounting rubber.



17M0052

5. Remove 2 screws securing solenoid valve to mounting rubber.
6. Remove EGR solenoid valve.

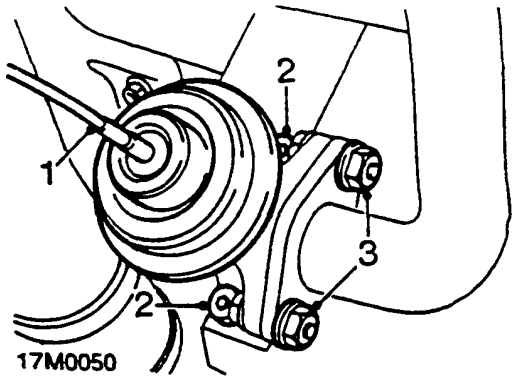
Remove

1. Align EGR solenoid valve to mounting rubber, fit and tighten bolts
2. Position solenoid valve to mounting bracket, fit and tighten nuts and bolts.
3. Connect vacuum pipes to solenoid valve.
4. Connect multiplug to EGR solenoid valve.

EGR VALVE

Service Repair No. 17.45.01

Remove



1. Disconnect vacuum pipe from EGR valve.
2. Remove 2 Allen screws securing EGR valve to exhaust manifold.
3. Remove 2 nuts and bolts securing recirculation pipe to EGR valve.
4. Remove EGR valve.
5. Remove and discard 2 gaskets.

Refit

1. Clean mating faces of EGR valve. exhaust manifold and recirculation pipe.
2. Fit new gasket to EGR valve.
3. Align EGR valve to exhaust manifold, fit allen screws and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
4. Align recirculation pipe to EGR valve, fit nuts and bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
5. Connect vacuum pipe from EGR solenoid to EGR valve.

TORQUE SETTINGS

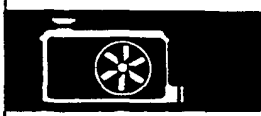
Exhaust manifold elbow to turbocharger, nuts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Turbocharger to exhaust manifold, nuts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Oil drain pipe to turbocharger, bolts	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Exhaust front pipe to manifold, nuts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Oil feed pipe to turbocharger, banjo bolt	20 N·m (2.0 kgf·m, 15 lbf·ft)
Turbocharger pipe to rear of cylinder head, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Turbocharger pipe to front of cylinder head, bolt	9 N·m (0.9 kgf·m, 7 lbf·ft)
Radiator top mounting bracket, bolts	9 N·m (0.9 kgf·m, 7 lbf·ft)
Air conditioning pipe bracket to bonnet locking platform, bolt	9 N·m (0.9 kgf·m, 7 lbf·ft)
Air conditioning pipe bracket to LH fan cowl, bolt	9 N·m (0.9 kgf·m, 7 lbf·ft)
Alternator terminal nut	4 N·m (0.4 kgf·m, 3 lbf·ft)
Glow plugs	20 N·m (2.0 kgf·m, 15 lbf·ft)
Coolant outlet elbow to cylinder head, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Injector clamp plate bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Injector pipe unions to injection pump	20 N·m (2.0 kgf·m, 15 lbf·ft)
Injector pipe unions to injectors	20 N·m (2.0 kgf·m, 15 lbf·ft)
Intake pipe to inlet manifold, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
EGR recirculation pipe to inlet manifold, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Intake pipe to support bracket, bolt	9 N·m (0.9 kgf·m, 7 lbf·ft)
Injection pump shaft clamp bolt (spacer fitted)	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Injection pump shaft clamp bolt (spacer removed)	31 N·m (3.2 kgf·m, 23 lbf·ft)
Fuel return to injection pump banjo bolt adaptor	25 N·m (2.5 kgf·m, 18 lbf·ft)
Fuel return to injection pump, banjo bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)
Fuel inlet to injection pump banjo bolt adaptor	25 N·m (2.5 kgf·m, 18 lbf·ft)
Fuel inlet to injection pump, banjo bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)
Abutment bracket to injection pump, Allen bolts	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Fuel shut-off solenoid	20 N·m (2.0 kgf·m, 15 lbf·ft)
Injection pump mounting nuts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Injection pump support bracket to engine, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Injection pump abutment bracket to support bracket, nuts and bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Injection pump gear nut	60 N·m (6.1 kgf·m, 44 lbf·ft)
Manifold absolute pressure sensor to bracket, bolts	9 N·m (0.9 kgf·m, 7 lbf·ft)
Intake air temperature sensor	12 N·m (1.2 kgf·m, 8.9 lbf·ft)
Crankshaft position sensor bolt	6 N·m (0.6 kgf·m, 4 lbf·ft)
Alternator top mounting bolt(s)	25 N·m (2.5 kgf·m, 18 lbf·ft)
Engine coolant temperature sensor	5 N·m (0.5 kgf·m, 4 lbf·ft)
Pedal box to bulkhead, nuts	13 N·m (1.3 kgf·m, 9.6 lbf·ft)
Pedal box to fascia, bolt	13 N·m (1.3 kgf·m, 9.6 lbf·ft)
ECM to mounting bracket, nuts	9 N·m (0.9 kgf·m, 7 lbf·ft)
ECM mounting bracket to body, nuts	9 N·m (0.9 kgf·m, 7 lbf·ft)
EGR solenoid valve to bracket, bolts	9 N·m (0.9 kgf·m, 7 lbf·ft)
EGR valve to exhaust manifold, Allen bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Recirculation pipe to EGR valve, nuts and bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)

TOOL NUMBERS

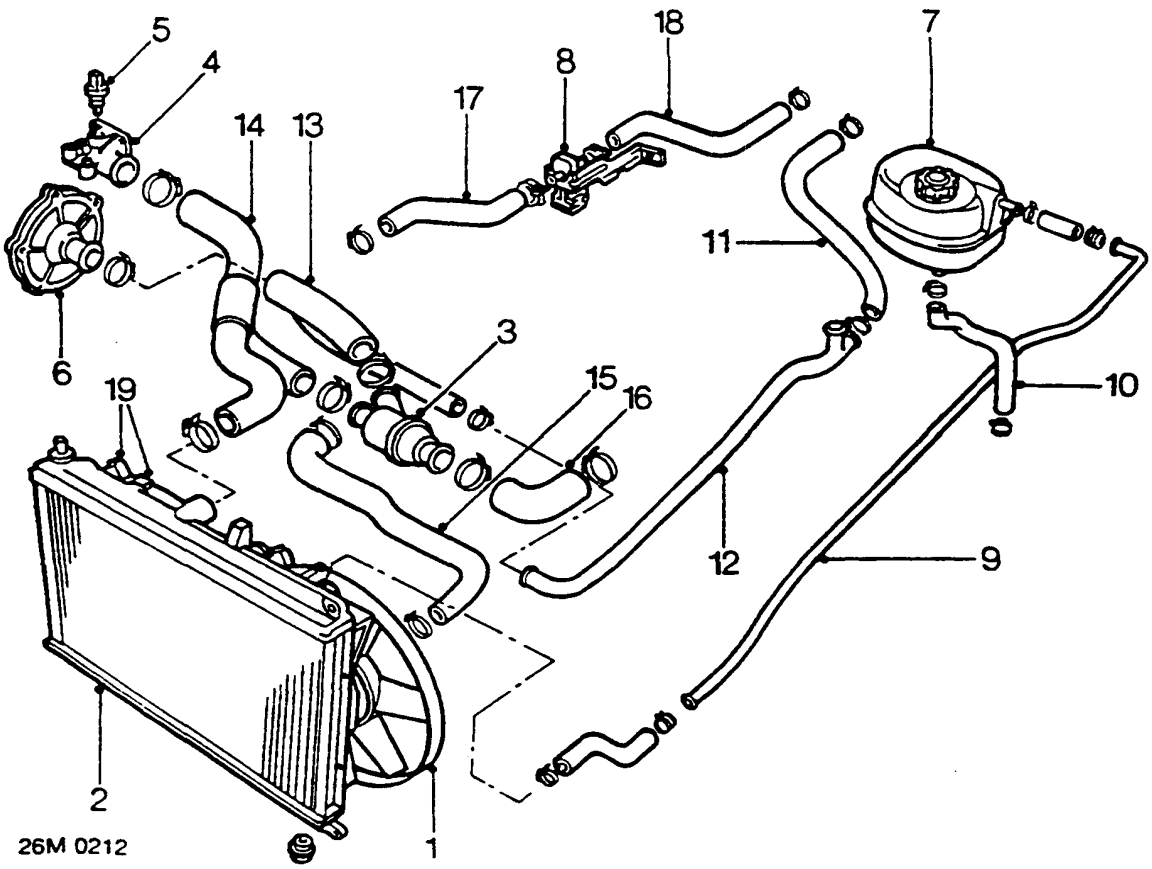
18G 1717	Injection pump timing pin
18G 1512	Injection pump gear remover

COOLING SYSTEM

CONTENTS

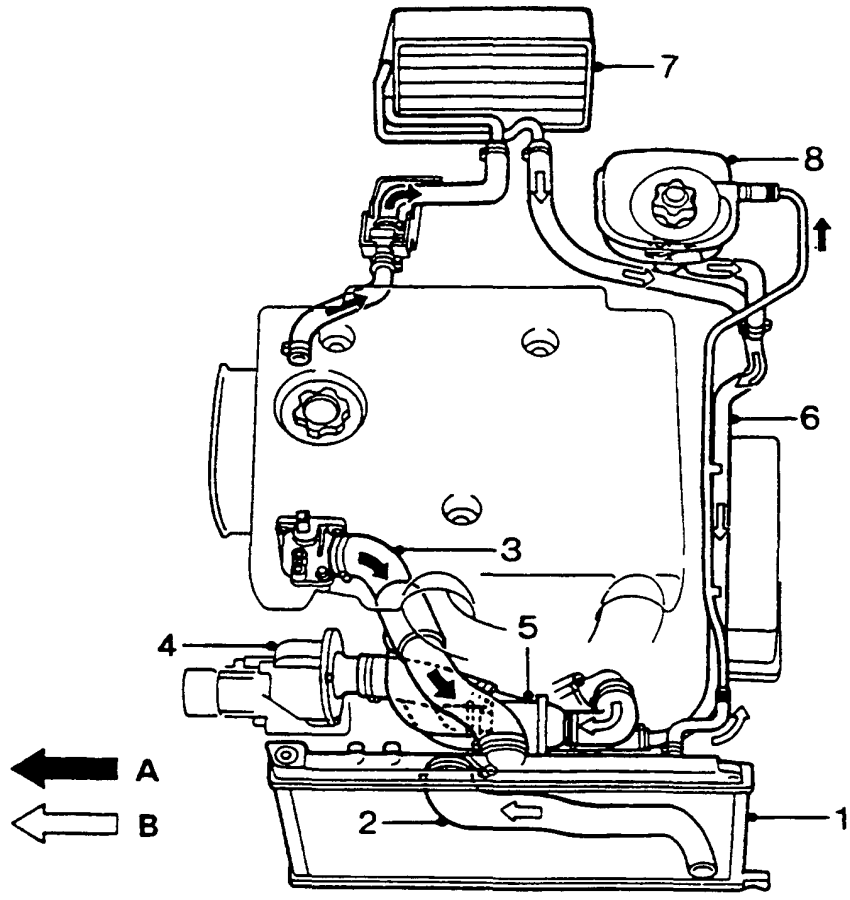


COOLING SYSTEM COMPONENTS



1. Cooling fan & cowl
2. Radiator
3. Thermostat
4. Coolant outlet elbow
5. 'O' ring seal
6. Coolant pump
7. Coolant expansion tank
8. Heater valve
9. Coolant expansion pipe
10. Hose - Expansion tank to coolant rail
11. Hose - Heater to coolant rail
12. Coolant rail
13. Hose - Coolant pump to thermostat housing
14. Top hose
15. Hose - Radiator to oil cooler
16. Hose - Oil cooler to thermostat housing
17. Hose - Engine to heater valve
18. Hose - Heater valve to heater
19. Thermostatic switch - 2 off
20. Sealing ring - 2 off
21. Locking ring - 2 off

COOLING SYSTEM OPERATION



26M 0213

A = HOT **B** = COLD

1. Radiator
2. Bottom hose
3. Top hose
4. Coolant pump
5. Thermostat
6. Coolant rail
7. Heater matrix
8. Expansion tank

The cooling system employed is the by-pass type, allowing coolant to circulate around the engine while the thermostat is closed.

When cold the thermostat closes off the coolant feed from the radiator bottom hose, which is fed via an engine oil cooler. Coolant is drawn via the heater matrix from the rear of the cylinder block (No.1 cylinder); this allows some heat transfer to the radiator via the top hose by convection while retaining the majority of the heat within the cylinder block.

As temperature increases the thermostat gradually opens, bleeding cool fluid into the cylinder block and allowing hot coolant to flow to the radiator via the top hose, balancing the flow of hot and cold fluid to maintain temperature. As the thermostat opens further so the full flow of coolant is drawn through the radiator.

The radiator is a copper/brass cross-flow type with moulded plastic tanks top and bottom which incorporate 2 sensor mountings. The radiator is mounted in rubber bushes directly into the front body member. The top of the radiator is mounted by means of mounting brackets bolted to the

bonnet locking platform. For additional air flow, at times when the vehicle is stationary, an electric cooling fan is fitted. This is triggered by a thermostatic switch mounted in the radiator inlet tank .

The coolant pump is a rotor type *drawing coolant* directly from the thermostat and is driven directly from the power steering pump.

The engine has additional cooling provided by an oil cooler, coolant from the radiator cools the oil before it enters the oil filter which is fed via an oil stat.

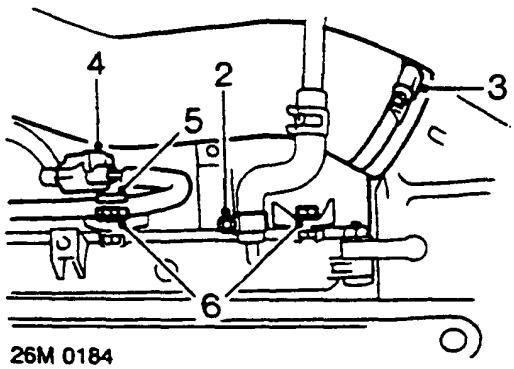
As engine oil temperature increases the oil stat gradually opens, bleeding hot engine oil through oil cooler allowing the cold coolant from the radiator to cool the engine oil which returns in a cool state to the oil pump via the filter element.

LH COOLING FAN

Service Repair No. 26.25.23

Remove

1. Remove air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**



26M 0184

2. Slacken clip and disconnect expansion tank return pipe from radiator.
3. Slacken clip and disconnect top hose from intercooler.
4. Disconnect cooling fan multiplug.
5. Release harness from clip on fan cowl.
6. Remove 2 bolts securing fan cowl to radiator, collect harness clip.
7. Release and remove radiator fan cowl assembly.

Refit

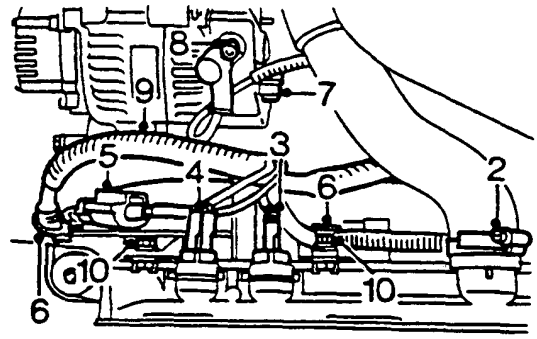
1. Position radiator and fan cowl assembly, engage lug in mounting bracket hole.
2. Align fan cowl and harness clip to radiator, fit and tighten securing bolts.
3. Connect cooling fan multiplug.
4. Secure harness to clip on fan cowl.
5. Connect top hose to intercooler and tighten clip.
6. Connect expansion tank return pipe to radiator and tighten clip.
7. Fit air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**

RH COOLING FAN

Service Repair No. 26.25.34

Remove

1. Disconnect battery earth lead.



26M 0185

2. Slacken clip and disconnect top hose from radiator.
3. Disconnect multiplug from radiator temperature sensor.
4. Disconnect 2 Lucars from radiator temperature sensor.
5. Disconnect cooling fan multiplug.
6. Release harness from 2 clips on fan cowl
7. Disconnect multiplug from alternator.
8. Release cover and remove nut securing cable to alternator.
9. Position harness aside.
10. Remove 2 bolts securing fan cowl to radiator, collect harness clip.
11. Release and remove radiator fan cowl assembly.

Refit

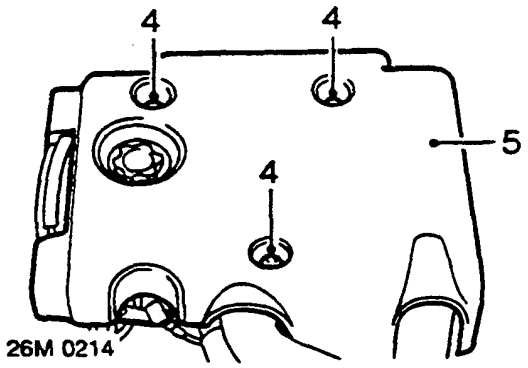
1. Position radiator fan cowl assembly, engage lug in mounting bracket hole.
2. Align fan cowl and harness clip to radiator, fit and tighten securing bolts.
3. Connect battery cable to alternator stud, tighten nut to 4 N·m (0.4 kgf·m, 3 lbf·ft) and position cover.
4. Connect multiplug to alternator.
5. Secure harness to clips on fan cowl.
6. Connect multiplug to radiator temperature sensor.
7. Connect Lucars to radiator temperature sensor.
8. Connect top hose to radiator and tighten clip.
9. Connect battery earth lead.

RADIATOR

Service Repair No. 26.40.04

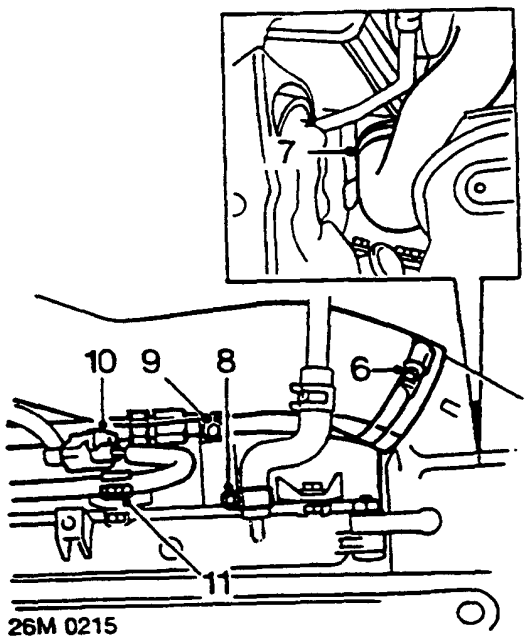
Remove

1. Remove air cleaner assembly, see **ENGINE MANAGEMENT SYSTEM - Repairs.**
2. Remove under belly panel, see **BODY - Repairs.**
3. Drain cooling system, see **MAINTENANCE.**



26M 0214

4. Remove 3 bolts securing sound deadening pad to engine.
5. Remove sound deadening pad.



26M 0215

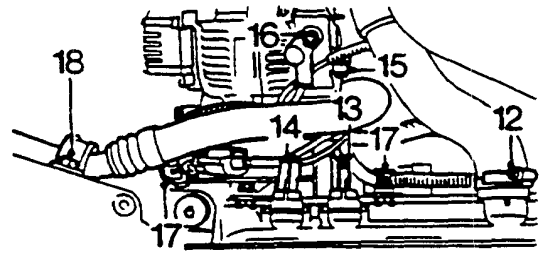
6. Slacken clip and disconnect air intake hose from intercooler.
7. Slacken clip and disconnect turbocharger hose from intercooler.
8. Slacken clip and disconnect expansion tank return pipe from radiator.

Air conditioning

9. Remove bolt securing air conditioning pipe to LH cooling fan cowl.

All models

10. Disconnect LH cooling fan motor multiplug.
11. Release harness from LH cowl clip.

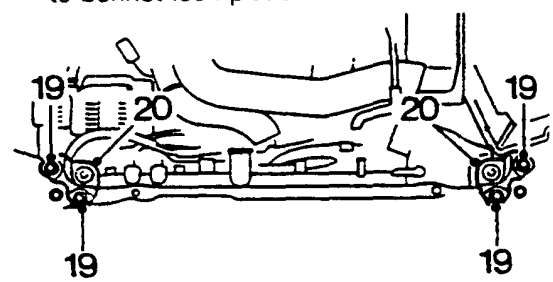


26M 0216

12. Slacken clip and disconnect coolant hose from radiator inlet pipe.
13. Disconnect radiator high temperature sensor multiplug.
14. Disconnect 2 lucars from radiator low temperature sensor.
15. Disconnect multiplug from alternator.
16. Release cover and remove nut securing lead to alternator.
17. Release harness from 2 RH cowl clips.

Air conditioning

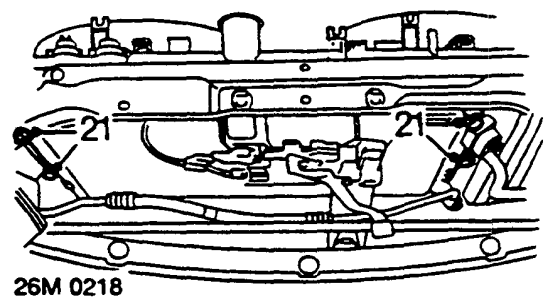
18. Remove bolt securing air conditioning pipe to bonnet lock platform.



26M 0217

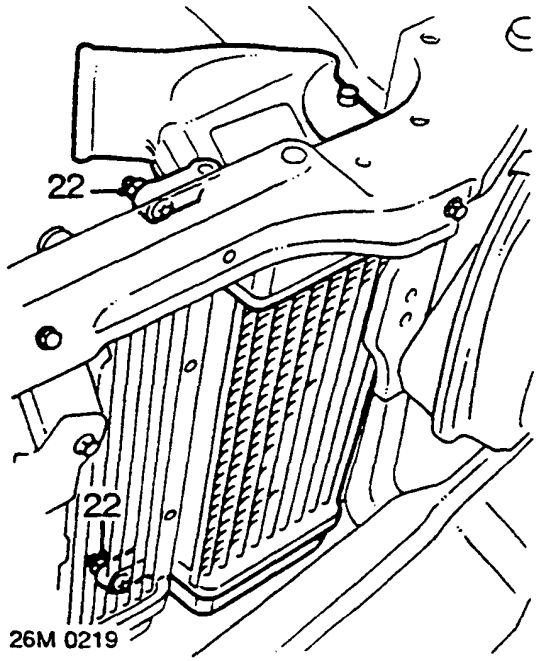
All models

19. Remove 4 bolts securing 2 radiator mounting brackets to bonnet lock platform.
20. Remove 2 radiator mounting brackets.



26M 0218

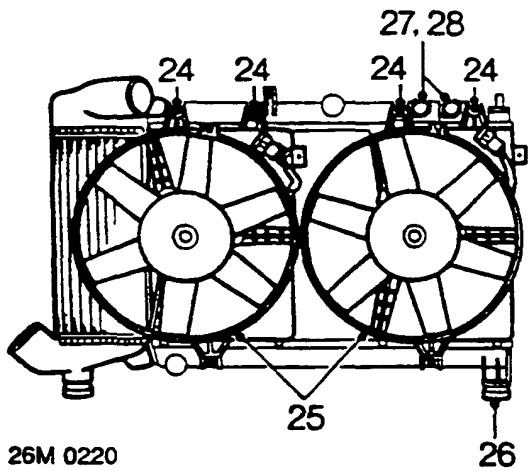
21. Remove 4 bolts securing condenser to radiator.



26M 0219

22. Remove 2 Tx40 Torx bolts and nuts securing intercooler to radiator.
23. Manoeuvre radiator and intercooler from engine compartment using assistance, remove radiator and intercooler.

Do not carry out further dismantling if component is removed for access only



26M 0220

24. Remove 4 screws securing fan cowls to radiator.
25. Remove 2 fan cowl assemblies and collect 2 harness clips.
26. Remove lower mounting rubber from radiator.
27. Remove 2 locking rings securing temperature sensors to radiator.
28. Noting their fitted position remove temperature sensors.
29. Fit temperature sensors to radiator and secure with locking rings.
30. Fit lower mounting rubber to radiator.
31. Position fan cowl assemblies and harness clips to radiator and secure with bolts.

Refit

1. Manoeuvre radiator and intercooler into position using assistance and locate in lower fixings.
2. Align intercooler to radiator, fit and tighten nuts and bolts.
3. Align condenser to radiator, fit and tighten bolts.
4. Fit radiator top mounting brackets, fit and tighten bolts to 9 N·m (0.9 kgf·m, 7 lbf·ft).

Air conditioning

5. Align air conditioning pipe bracket to bonnet lock platform, fit and tighten bolt.

All models

6. Secure harness to RH cowl clips.
7. Position alternator lead, fit and tighten nut to 4 N·m (0.4 kgf·m, 3 lbf·ft) and secure cover.
8. Connect multiplug to alternator.
9. Connect lucars to radiator temperature sensor.
10. Connect radiator temperature sensor multiplug.
11. Secure harness to LH cowl clip.
12. Connect LH cooling fan multiplug.

Air conditioning

13. Align air conditioning pipe bracket to LH cowl, fit and tighten bolt.

All models

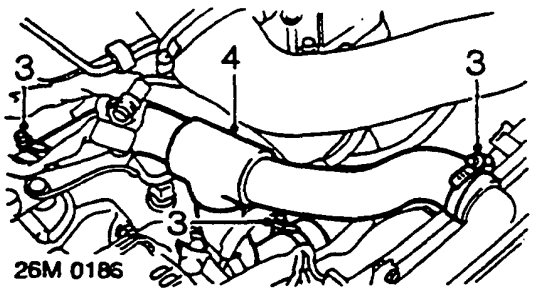
14. Connect turbocharger hose to intercooler and tighten clip.
15. Connect coolant hose to radiator inlet pipe and tighten clip.
16. Connect air intake hose to intercooler and tighten clip.
17. Connect expansion tank return pipe to radiator and tighten clip.
18. Fit sound deadening pad to engine and secure with bolts.
19. Refill cooling system, see **MAINTENANCE.**
20. Fit under belly panel, see **BODY - Repairs.**
21. Fit air cleaner assembly, see **ENGINE MANAGEMENT SYSTEM - Repairs.**

COOLANT PUMP - NON AIR CONDITIONING

Service Repair No. 26.50.01

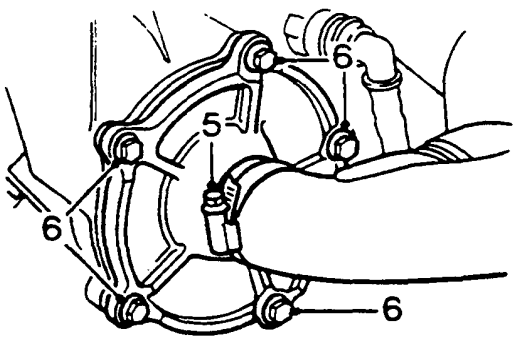
Remove

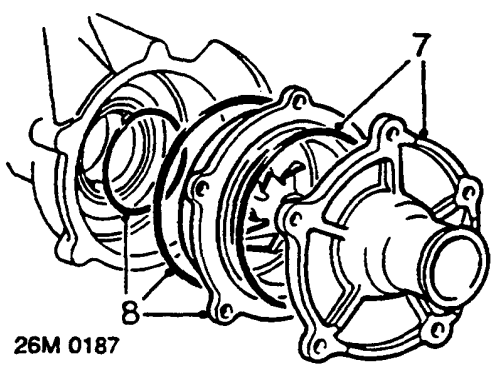
1. Remove underbelly panel, see **BODY - Repairs.**
2. Drain cooling system, see **MAINTENANCE.**



26M 0186

3. Slacken clips and release radiator top hose from engine, radiator and thermostat housing.
4. Remove radiator top hose from engine.





26M 0187

5. Slacken clip and release coolant hose from pump housing.
6. Remove 5 bolts securing cover to coolant pump.
7. Remove cover and discard 'O' ring.
8. Remove coolant pump from housing and discard 'O' rings.

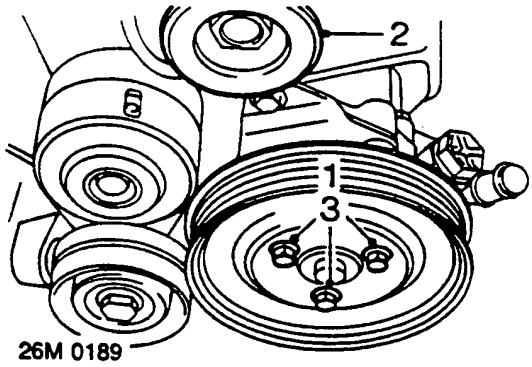
Refit

1. Clean coolant pump housing and mating faces.
2. Lubricate new 'O' rings with Loctite 405 or similarity and fit to coolant pump and coolant pump cover.
3. Fit coolant pump and cover, position power steering pipe bracket, fit 5 bolts and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft) connect hose to coolant pump housing and tighten clip.
4. Fit radiator top hose to engine and tighten clip.
5. Connect radiator top hose to radiator and thermostat housing and tighten clips.
6. Refit underbelly panel, see **BODY - Repairs.**
7. Refill cooling system, see **MAINTENANCE.**

COOLANT PUMP HOUSING

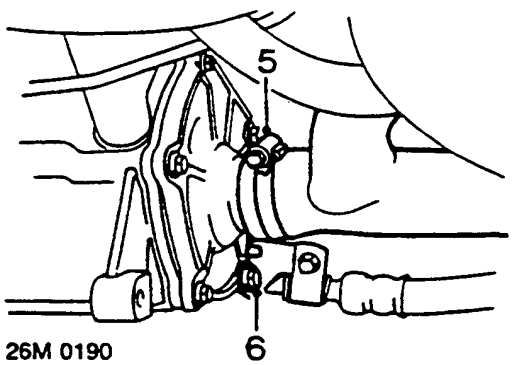
Service Repair No. 26.50.03

Remove



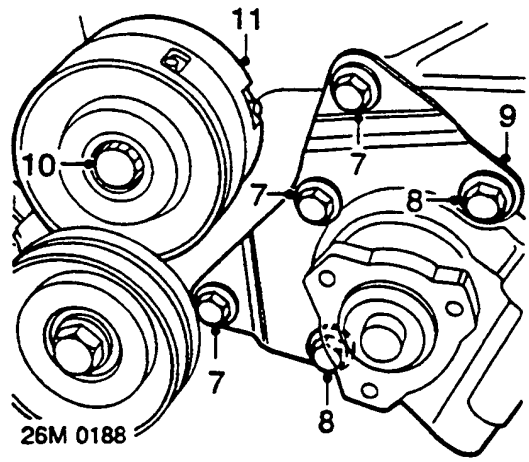
26M 0189

1. Slacken 3 bolts securing pulley to power steering pump.
2. Remove alternator, see **ELECTRICAL - Repairs.**
3. Remove 3 bolts securing pulley to power steering pump.
4. Drain cooling system, see **MAINTENANCE.**



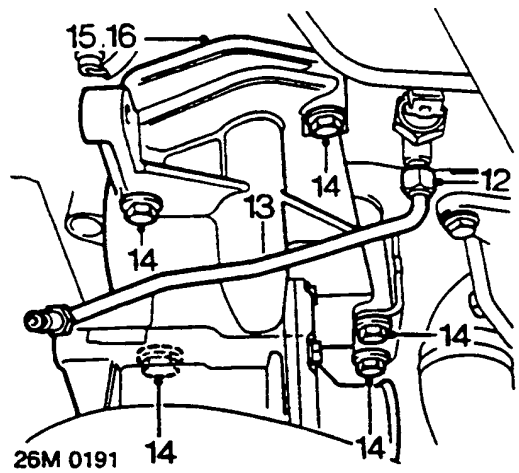
26M 0190

5. Slacken clip and disconnect hose from coolant pump housing.
6. Remove bolt securing power steering pipe bracket to coolant pump housing.



26M 0188

7. Noting their fitted position, remove 3 bolts securing support bracket to power steering pump and coolant pump housing.
8. Remove 2 long bolts securing steering pump to coolant pump housing
9. Release steering pump from coolant pump housing and position aside.
10. Remove bolt securing drive belt tensioner to coolant pump housing.
11. Remove drive belt tensioner assembly.



26M 0191

12. Slacken union securing vacuum pump oil feed pipe to oil pressure sensor.
13. Disconnect and remove oil feed pipe.
14. Remove 5 bolts securing coolant pump housing to cylinder block.
15. Release and remove coolant pump housing.
16. Remove and discard 'O' ring seal from rear of coolant pump housing.

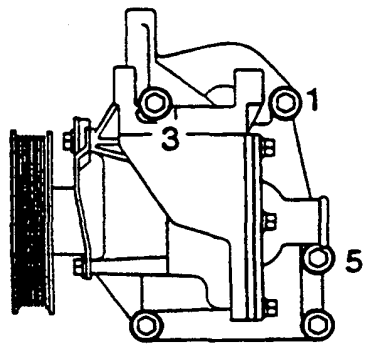
Do not carry out further dismantling if component is removed for access only

17. Remove 4 bolts securing coolant pump cover to housing and remove cover.
18. Remove coolant pump from housing.
19. Remove and discard 3 'O' ring seals from coolant pump.
20. Clean mating faces of coolant pump, coolant pump cover and coolant pump housing.

21. Clean 'O' ring seal grooves and bolt holes in coolant pump housing.
22. Apply Loctite 405 or similarity to 'O' ring seal grooves and fit new 'O' ring seals.
23. Fit coolant pump and cover to coolant pump housing.
24. *Fit 4 bolts and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).*

Refit

1. Clean mating faces of coolant pump housing and cylinder block
2. Apply Loctite 405 or similarity to 'O' ring seal groove and fit new 'O' ring seal.



26M 0193

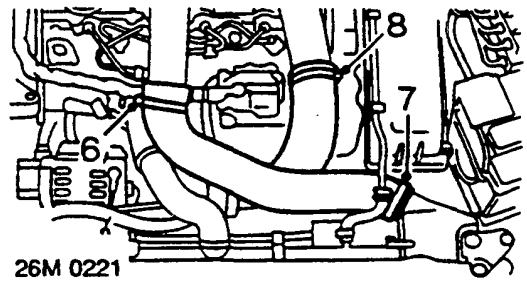
3. Align coolant pump housing to cylinder block and in sequence shown fit bolts and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
4. Connect vacuum pump oil feed pipe to oil pressure switch and tighten union.
5. Clean drive belt tensioner assembly.
6. Position drive belt tensioner to coolant pump housing and engage lug.
7. Fit bolt securing tensioner to housing and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
8. Position steering pump and support bracket to coolant pump housing.
9. Fit 2 long bolts securing steering pump to coolant pump housing, but do not tighten.
10. Fit 3 short bolts securing steering pump to coolant pump housing.
11. Tighten steering pump to coolant pump housing bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft).
12. Align power steering pipe bracket to coolant pump cover. Fit bolt and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
13. Connect hose to coolant pump housing and tighten clip.
14. Fit pulley to power steering pump and secure with bolts.
15. Fit alternator, see **ELECTRICAL - Repairs.**
16. Tighten power steering pump pulley bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft).
17. Fit under belly panel, see **BODY - Repairs.**
18. Refill cooling system, see **MAINTENANCE.**

THERMOSTAT

Service Repair No. 26.45.09

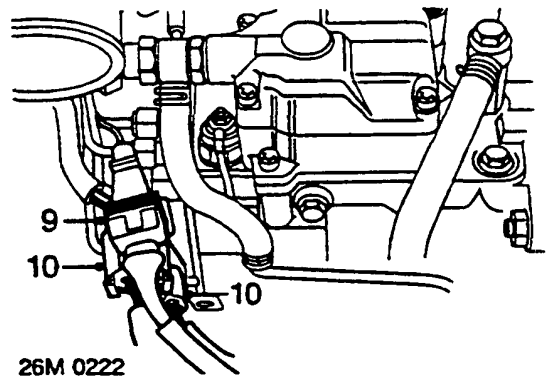
Remove

1. Remove under belly panel, see **BODY - Repairs.**
2. Remove air cleaner assembly, see **ENGINE MANAGEMENT SYSTEM - Repairs.**
3. Remove 3 bolts securing sound deadening pad to engine.
4. Remove sound deadening pad.
5. Drain cooling system, see **MAINTENANCE.**



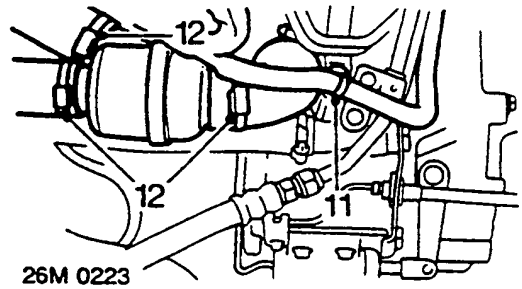
26M 0221

6. Slacken clip and disconnect air intake hose from inlet manifold intake pipe.
7. Slacken clip and remove air intake hose from intercooler.
8. Slacken clip and disconnect turbocharger hose from turbocharger pipe.



26M 0222

9. Release injector needle lift sensor multiplug from bracket.
10. Disconnect 2 fuel injection pump multiplugs.
11. Release engine harness clip from coolant rail bracket, position harness aside.



26M 0223

12. Slacken 3 clips and disconnect hoses from thermostat housing, remove thermostat housing.

Refit

1. Fit thermostat housing, connect hoses and tighten clips.
2. Secure engine harness clip to coolant rail bracket.
3. Connect 2 fuel injection pump multiplugs.
4. Secure injector needle lift sensor multiplug to bracket.
5. Connect turbocharger hose to turbocharger pipe and tighten clip.
6. Fit air intake hose to intercooler and tighten clip.
7. Connect air intake hose to inlet manifold intake pipe and tighten clip.
8. Fit air cleaner assembly, see **ENGINE MANAGEMENT SYSTEM - Repairs.**
9. Fit sound deadening pad to engine and secure with bolts.
10. Fit under belly panel, see **BODY - Repairs.**
11. Refill cooling system, see **MAINTENANCE.**

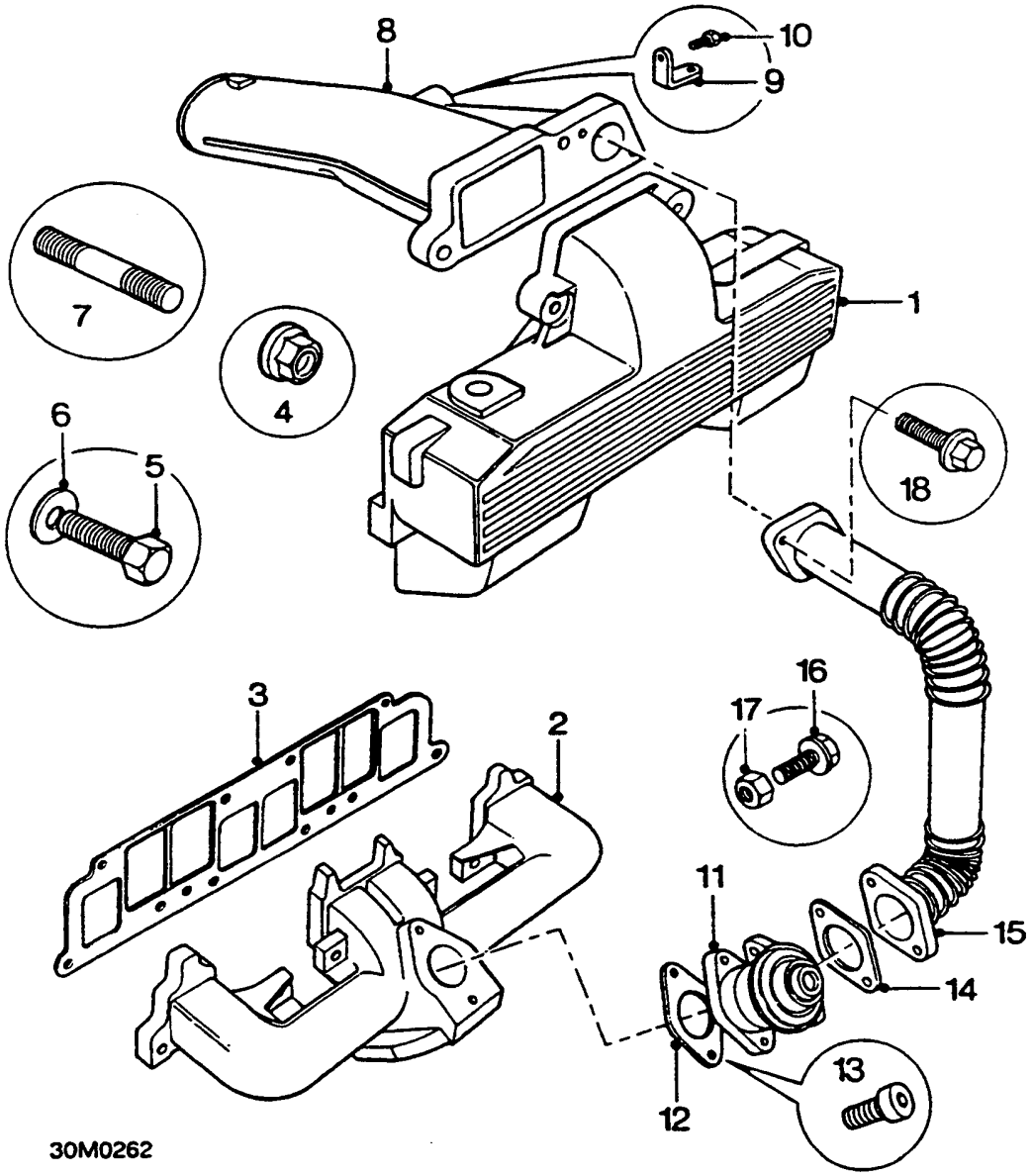
TORQUE SETTINGS

Alternator terminal nut	4 N·m (0.4 kgf·m, 3 lbf·ft)
Radiator top mounting bracket, bolts	9 N·m (0.9 kgf·m, 7 lbf·ft)
Coolant pump housing bolts	45 N·m (4.6 kgf·m, 33 lbf·ft)
Coolant pump housing to block, bolts	45 N·m (4.6 kgf·m, 33 lbf·ft)
Drive belt tensioner to coolant pump housing, bolt	45 N·m (4.6 kgf·m, 33 lbf·ft)
Steering pump to coolant pump housing, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Power steering pipe bracket to coolant pump, bolt	45 N·m (4.6 kgf·m, 33 lbf·ft)
Power steering pump pulley bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Fan cowl securing bolts	10 N·m (1.0 kgf·m, 7 lbf·ft)
Intercooler to radiator, bolts	11 N·m (1.1 kgf·m, 8.1 lbf·ft)

MANIFOLD & EXHAUST

CONTENTS

MANIFOLD & EXHAUST SYSTEM COMPONENTS



30M0262

1. Inlet manifold
2. Exhaust manifold
3. Gasket - Inlet/exhaust manifold
4. Nut - inlet/exhaust manifold to cylinder head
5. Bolt - inlet/exhaust manifold to cylinder head
6. Washer - inlet/exhaust manifold to cylinder head bolt
7. Stud - inlet/exhaust manifold to cylinder head
8. Inlet manifold intake pipe
9. Bracket - intake pipe to cam cover
10. Bolt - intake pipe bracket
11. EGR valve
12. Gasket - EGR valve to exhaust manifold
13. Allen bolt - EGR valve to exhaust manifold
14. Gasket - EGR recirculation pipe to EGR valve
15. EGR recirculation pipe
16. Bolt - EGR recirculation pipe to EGR valve
17. Nut - EGR recirculation pipe to EGR valve
18. Bolt - EGR recirculation pipe to inlet manifold

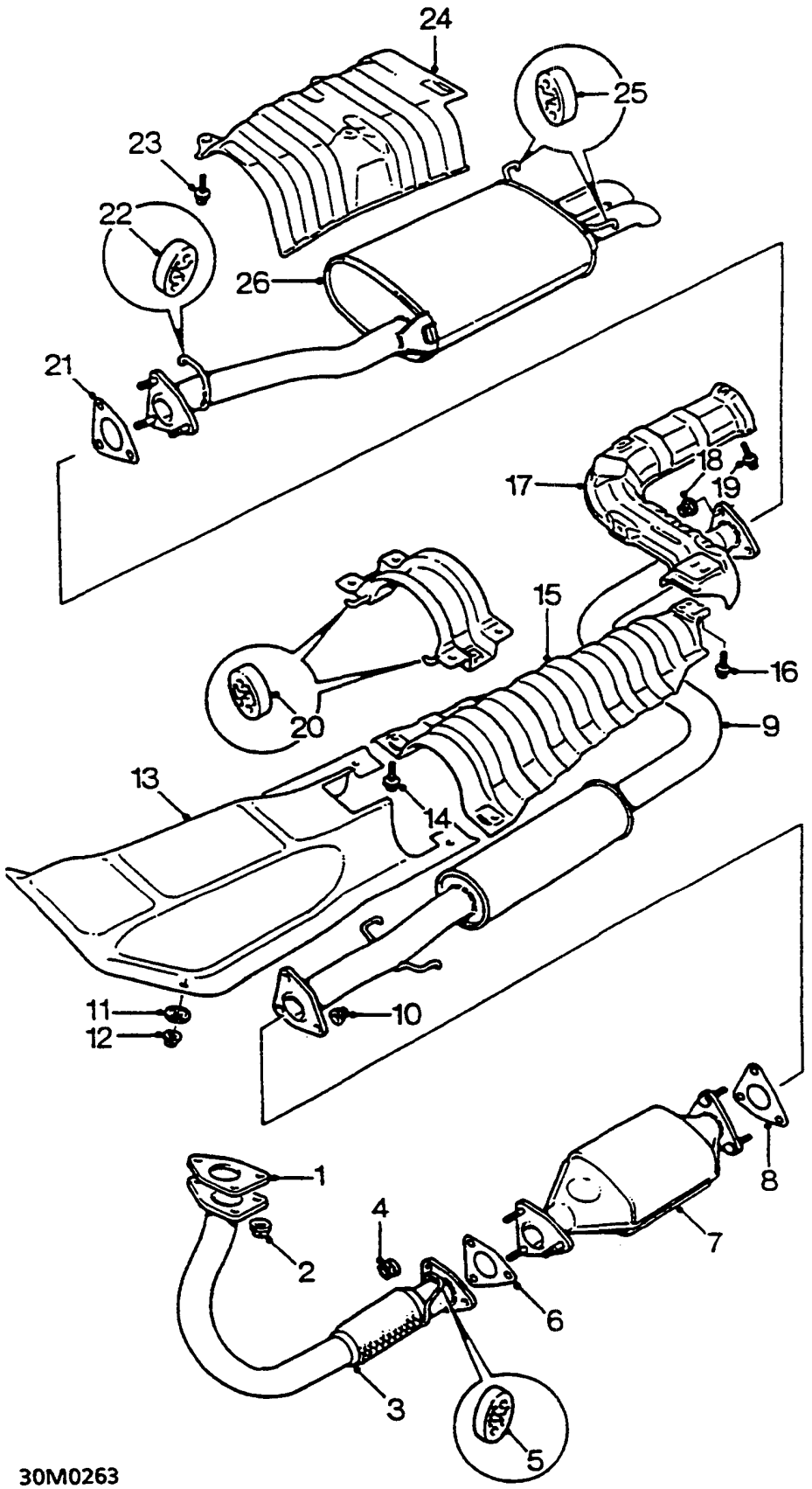
INLET MANIFOLD

The inlet manifold is a fabricated aluminium alloy manifold, secured by 4 bolts and 2 nuts and incorperates a twin terminal sensor, at the timing belt end, to measure the temperature of the boosted air supply to the combustion chambers. The gasket is a multi-leaf type and also seals the exhaust manifold to the cylinder head.

EXHAUST MANIFOLD

The cast iron manifold, secured by 6 bolts and 4 nuts, carries an EGR valve and a variable wastegate Garrett turbocharger with a maximum boost pressure of 118 kPa (1.2 kgf/cm^2, 17 psi).

Note: *Gaskets are NOT fitted to the manifold to turbocharger joint or on the turbocharger to exhaust outlet pipe joint.*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30M0263

EXHAUST SYSTEM

1. Gasket
2. Nut - 3 off
3. Front pipe
4. Nut - 3 off
5. Mounting rubber
6. Gasket
7. Catalytic converter (Oxidation)
8. Gasket
9. Intermediate pipe
10. Nut - 3 off
11. Washer - 2 off
12. Nut - 2 off
13. Heat shield
14. Bolt - 2 off
15. Heat shield
16. Bolt - 2 off
17. Heat shield
18. Nut - 3 off
19. Bolt - 2 off
20. Mounting rubber
21. Gasket
22. Mounting rubber
23. Bolt - 3 off
24. Heatshield
25. Mounting rubber
26. Tail pipe and silencer

EXHAUST SYSTEM

All the silencers contain a series of expansion chambers, resonators and baffles designed to give an improved exhaust system, eliminate condensation and give a longer life to the system.

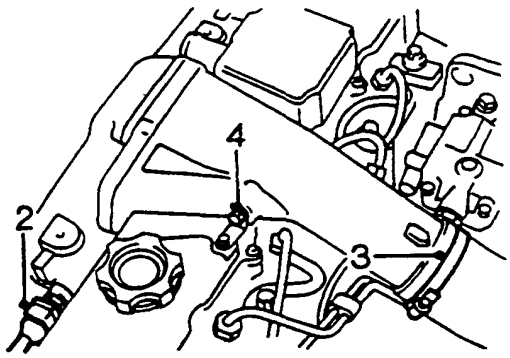
The exhaust system consists of a single front pipe which terminates at a catalytic coverter, an intermediate pipe which incorperates a silencer and tailpipe which incorporates a second silencer.

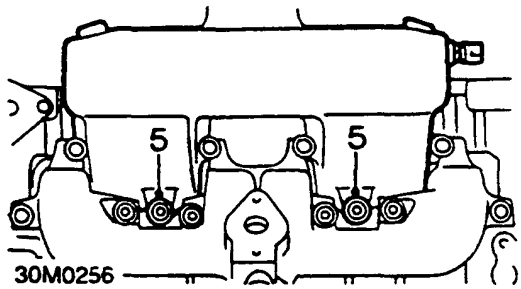
INLET MANIFOLD

Service Repair No. 30.15.08

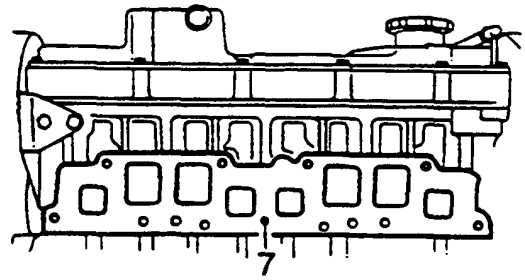
Remove

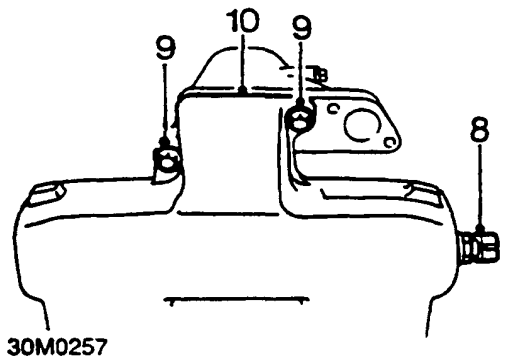
1. Remove exhaust manifold, see **Exhaust manifold.**





2. Disconnect multiplug from intake air temperature sensor.
3. Slacken clip and disconnect intercooler top hose from intake pipe.
4. Remove bolt securing intake pipe to camshaft cover bracket.
5. Remove 2 nuts securing inlet manifold to cylinder head.
6. Remove inlet manifold.





7. Remove and discard manifold gasket

Do not carry out further dismantling if component is removed for access only

8. Remove intake air temperature sensor.
9. Remove 2 bolts securing intake pipe to inlet manifold.
10. Remove and discard gasket.
11. Clean mating faces of inlet manifold and intake pipe.
12. Fit new gasket and align intake pipe to inlet manifold, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
13. Clean threads of intake air temperature sensor and apply Loctite 577 or similarity.
14. Fit sensor to inlet manifold and tighten to 12 N·m (1.2 kgf·m, 8.9 lbf·ft).

Refit

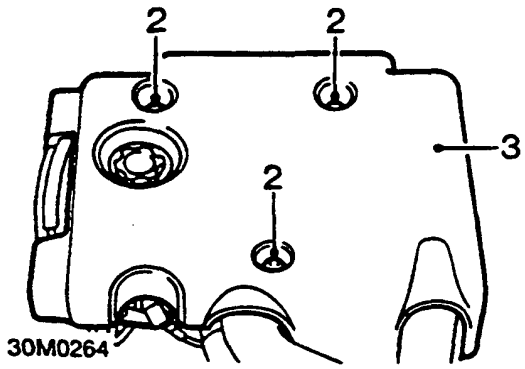
1. Clean mating faces of inlet manifold and cylinder head.
2. Fit new manifold gasket.
3. Position inlet manifold to cylinder head, fit nuts but do not fully tighten.
4. Align intake pipe to bracket on camshaft cover, fit bolt and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
5. Connect intercooler top hose to intake pipe and tighten clip.
6. Connect multiplug to intake air temperature sensor.
7. Fit exhaust manifold, see **Exhaust manifold.**

EXHAUST MANIFOLD

Service Repair No. 30.15.12

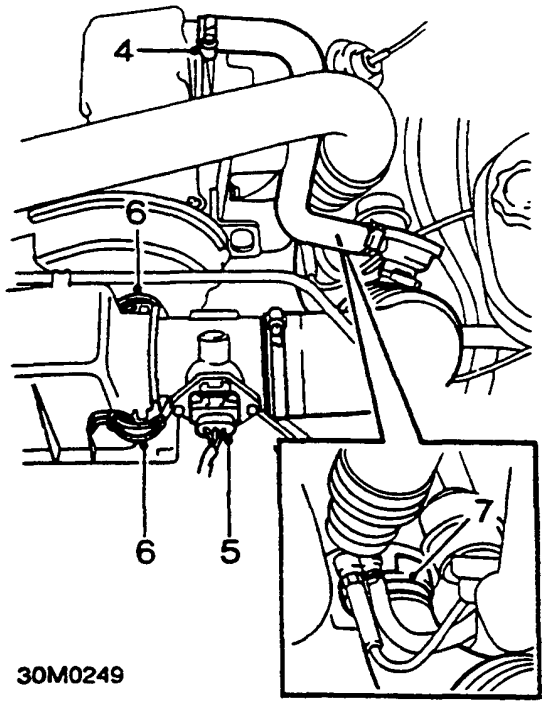
Remove

1. Disconnect battery earth lead.



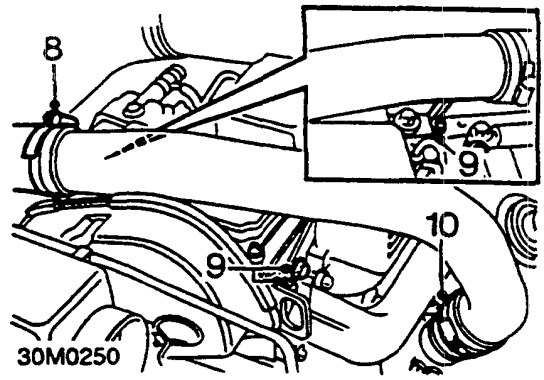
30M0264

2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.



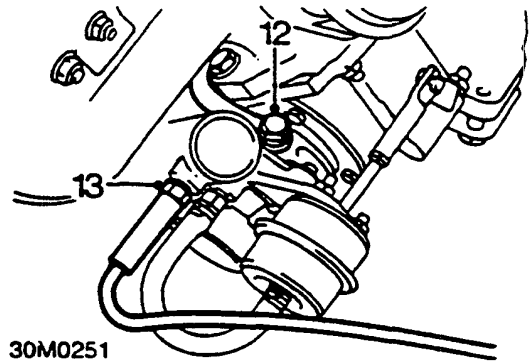
30M0249

4. Slacken clip and disconnect breather hose from camshaft cover.
5. Disconnect multiplug from mass air flow sensor.
6. Release 2 clips securing mass air flow sensor housing to air filter.
7. Slacken clip and disconnect air intake hose from turbocharger.



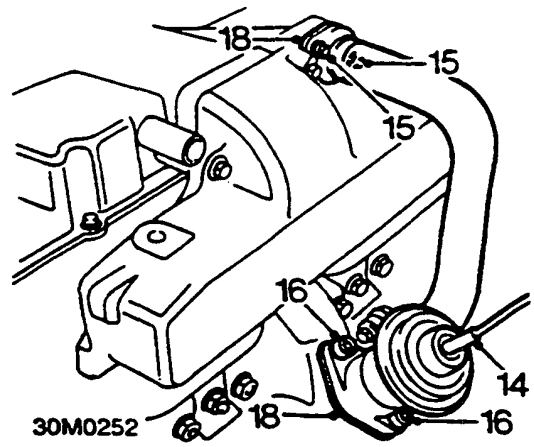
30M0250

8. Slacken clip and disconnect intercooler hose from turbocharger pipe.
9. Remove 3 bolts securing turbocharger pipe to cylinder head, collect engine lifting bracket.
10. Slacken clip and disconnect pipe from turbocharger.
11. Remove turbocharger pipe.



30M0251

12. Remove banjo bolt securing oil feed pipe to turbocharger, collect 2 sealing washers.
13. Disconnect boost pressure sensing pipe from turbocharger.



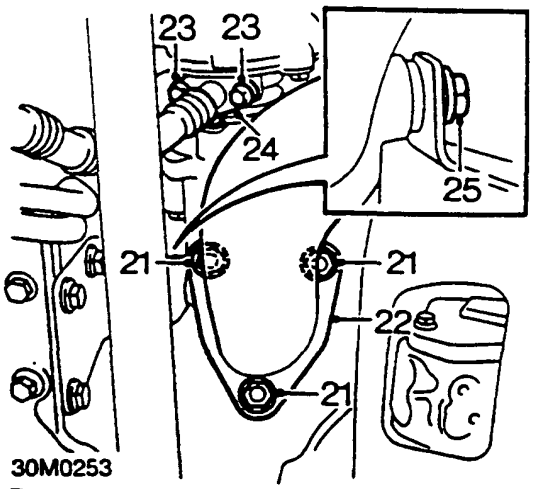
30M0252

14. Disconnect vacuum pipe from EGR valve.
15. Remove 2 bolts securing recirculation pipe to inlet manifold
16. Remove 2 Allen screws securing EGR valve to exhaust manifold.
17. Release and remove EGR valve.
18. Remove and discard gasket.

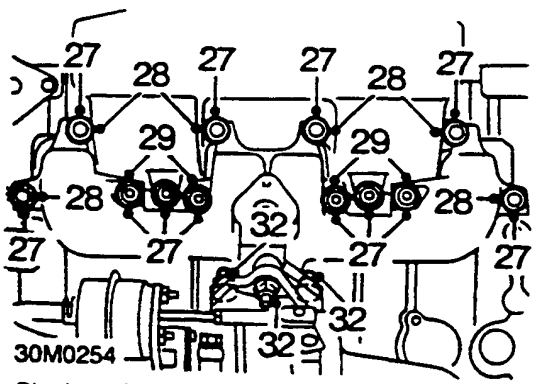
19. Raise front of vehicle.

WARNING: Support on safety stands.

20. Remove LH under tray, see **BODY - Repairs.**



21. Remove 3 nuts securing exhaust front pipe to exhaust manifold.
22. Release exhaust front pipe from exhaust manifold, remove and discard manifold flange gasket.
23. Remove 2 bolts securing oil drain pipe flange to turbocharger.
24. Remove and discard gasket.
25. Remove bolt securing exhaust manifold to mounting bracket.
26. Remove stand(s) and lower vehicle.



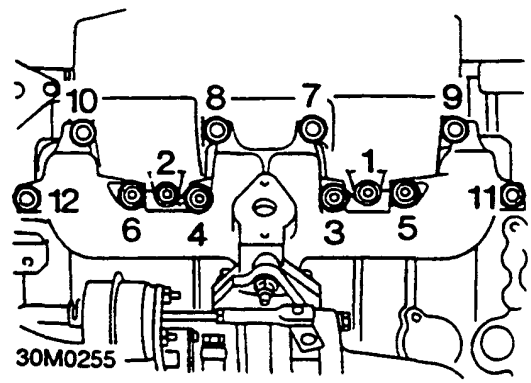
27. Slacken the 6 bolts and 6 nuts securing inlet manifold and the exhaust manifold to cylinder head.
28. Remove 6 bolts securing exhaust manifold to cylinder head, collect 4 washers.
29. Remove 4 nuts securing exhaust manifold to cylinder head.
30. Release and remove exhaust manifold and turbocharger assembly.
31. Remove inlet manifold, see **Inlet manifold.**

Do not carry out further dismantling if component is removed for access only

32. Remove 3 nuts securing turbocharger to exhaust manifold.
33. Remove exhaust manifold.
34. Clean mating faces of turbocharger and exhaust manifold.
35. Fit turbocharger to exhaust manifold, fit nuts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).

Refit

1. Clean mating faces of exhaust manifold and cylinder head.
2. Clean mating faces of exhaust manifold and exhaust front pipe.
3. Fit inlet manifold, see **Inlet manifold.**
4. Manouvre exhaust manifold and turbocharger assembly into position and align to cylinder head.



5. Fit nuts, bolts and washers securing exhaust manifold to cylinder head. Working in the sequence illustrated tighten exhaust manifold nuts and bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft).
6. Raise front of vehicle.

WARNING: Support on safety stands.

7. Fit and tighten bolt securing exhaust manifold to mounting bracket.
8. Clean mating faces of oil drain pipe and turbocharger.
9. Fit new gasket to turbocharger oil drain pipe. Align pipe to turbocharger, fit bolts and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
10. Fit new exhaust manifold flange gasket.
11. Align exhaust front pipe to exhaust manifold. Fit nuts and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
12. Fit LH under tray, see **BODY - Repairs.**
13. Remove stand(s) and lower vehicle.
14. Clean mating faces of EGR valve, inlet manifold and exhaust manifold.
15. Fit new gaskets to EGR valve and recirculation pipe. Align EGR valve to inlet manifold and exhaust manifold.
16. Fit Allen screws securing EGR valve to exhaust manifold and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
17. Fit 2 bolts securing EGR recirculation to inlet manifold and tighten to 9 N·m (0.9 kgf·m, 7 lbf·ft).
18. Connect vacuum pipe from EGR solenoid to EGR valve.
19. Connect boost pressure sensing pipe to turbocharger.
20. Clean turbocharger oil feed pipe union and banjo bolt.

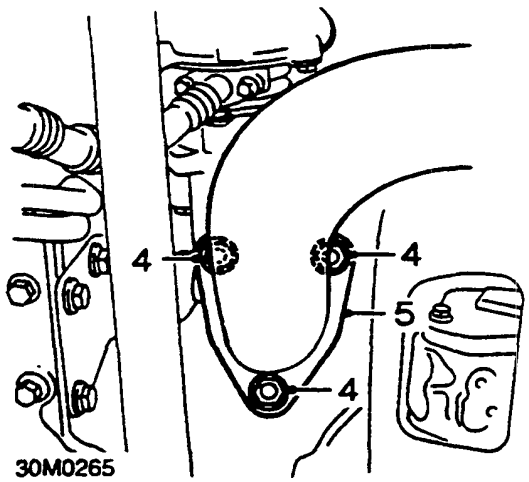
21. Fit new sealing washers to banjo bolt. Conenct oil feed pipe to turbocharger and tighten union to 20 N·m (2.0 kgf·m, 15 lbf·ft).
22. Position turbocharger pipe and connect to turbocharger, tigten clip to secure.
23. Position engine lifting bracket and align turbocharger pipe to cylinder head. Fit 3 bolts securing turbocharger pipe to cylinder head.
24. Connect intercooler top hose to turbocharger pipe and tighten clip.
25. Position air intake pipe and connect to turbocharger, tighten clip.
26. Connect air intake pipe to air filter and secure clips.
27. Connect breather hose to cylinder head and tighten clip.
28. Connect multiplug to mass air flow sensor.
29. Position sound deadening pad to engine and secure with bolts.
30. Connect battery earth lead.

FRONT PIPE AND FLANGE GASKET

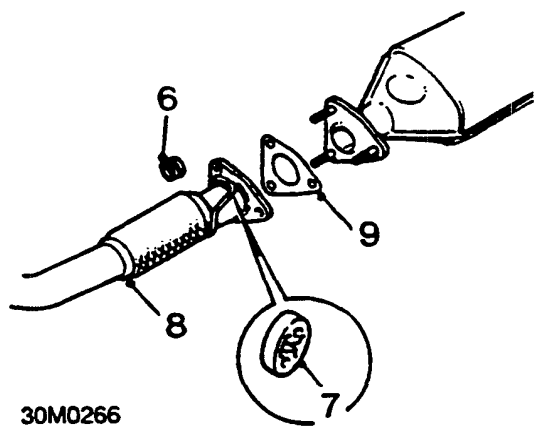
Service Repair No.
Front pipe - 30.10.09
Flange gasket - 30.10.26

Remove

1. Disconnect battery earth lead.
2. Raise vehicle on a ramp.
3. Remove LH under tray, see **BODY - Repairs.**



4. Remove 3 nuts from flange joint.
5. Remove and discard gasket from flange.



6. Remove 3 nuts securing front pipe to catalytic converter.
7. Disconnect rubber mounting from front pipe.
8. Remove front pipe from vehicle.
9. Remove and discard gasket, front pipe to catalytic converter.

Refit

1. Clean all mating faces.
2. Position a new flange gasket and fit front pipe to manifold, tighten nuts to 45 N·m (4.6 kgf·m, 33 lbf·ft).
3. Position a new gasket and fit front pipe to catalytic converter; fit nuts and tighten to 34 N·m (3.5 kgf·m, 25 lbf·ft).
4. Connect rubber mounting to front pipe.
5. Lower ramp.
6. Fit LH under tray, see **BODY - Repairs**.
7. Connect battery earth lead.

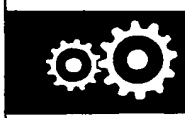
TORQUE SETTINGS

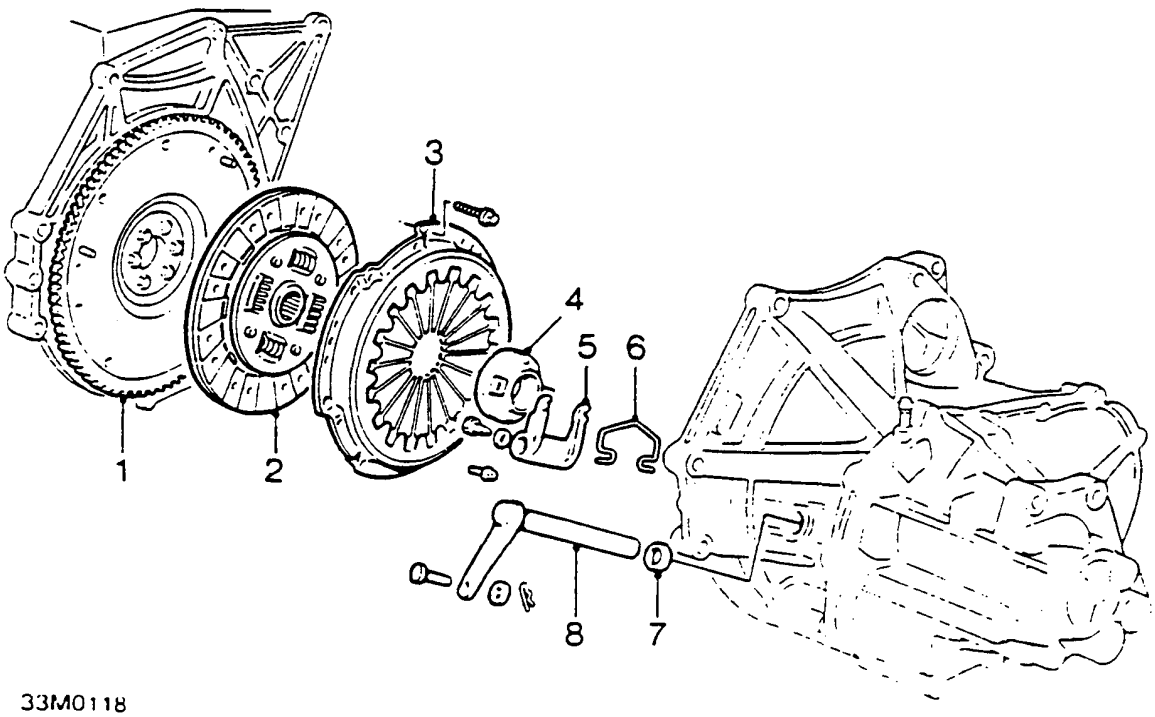
Intake air temperature sensor	12 N·m (1.2 kgf·m, 8.9 lbf·ft)
Intake pipe to inlet manifold, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Intake pipe support bracket to camshaft cover, bolt	9 N·m (0.9 kgf·m, 7 lbf·ft)
Turbocharger to exhaust manifold, nuts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Exhaust and inlet manifold to cylinder head, nuts and bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)*
Oil drain pipe to turbocharger, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Exhaust front pipe to manifold, nuts	45 N·m (4.6 kgf·m, 33 lbf·ft)
EGR valve to exhaust manifold, Allen bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
EGR recirculation pipe to inlet manifold, bolts	9 N·m (0.9 kgf·m, 7 lbf·ft)
Oil feed pipe to turbocharger, banjo bolt	20 N·m (2.0 kgf·m, 15 lbf·ft)
Front pipe to catalytic converter, nuts	34 N·m (3.5 kgf·m, 25 lbf·ft)
Catalytic converter to intermediate pipe, nuts	34 N·m (3.5 kgf·m, 25 lbf·ft)
Intermediate pipe to tail pipe, nuts	15 N·m (1.5 kgf·m, 11 lbf·ft)

* Tighten in sequence

CLUTCH

CONTENTS





33M0118

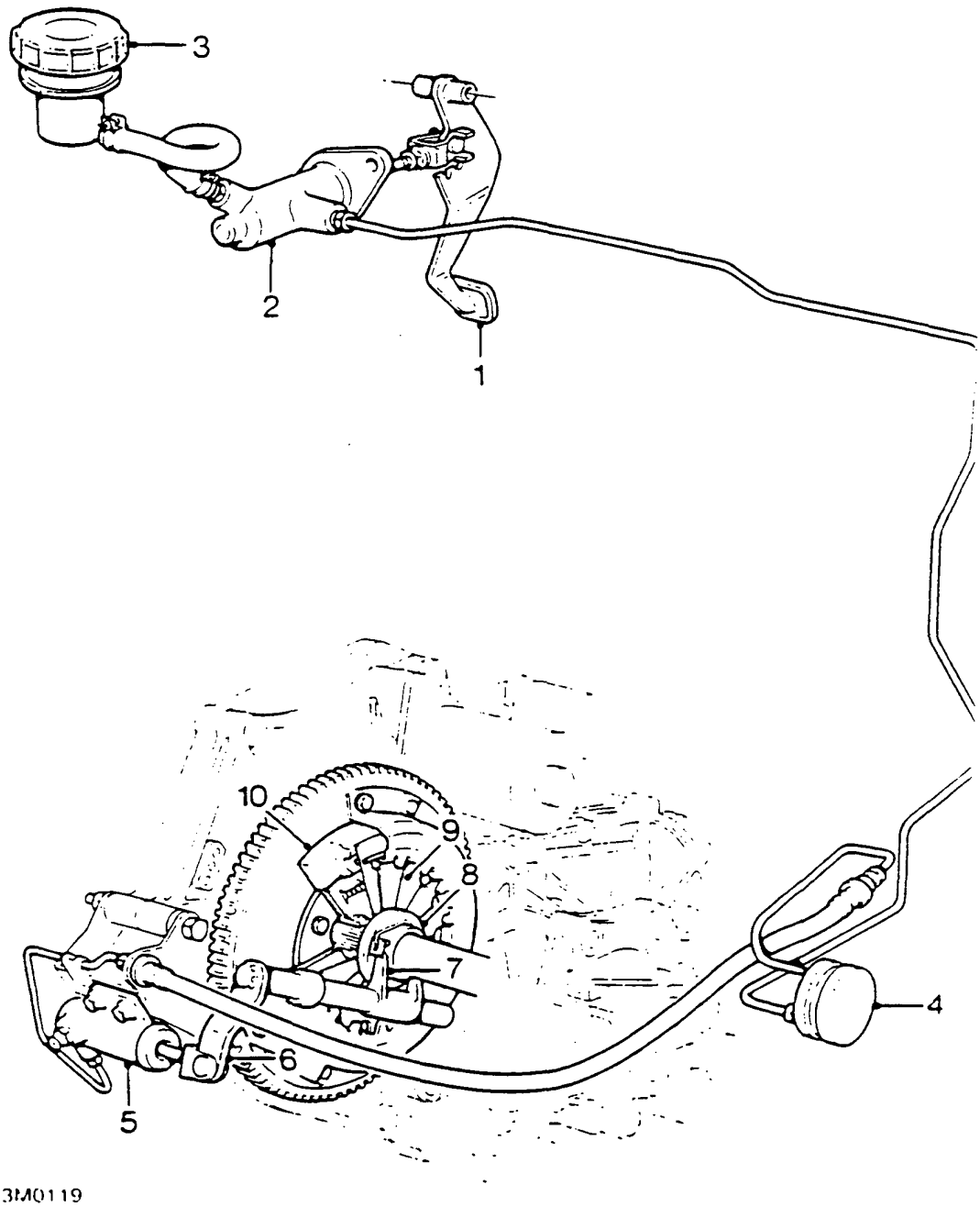
CLUTCH COMPONENTS

1. Flywheel
2. Clutch plate
3. Pressure plate
4. Release bearing
5. Release fork
6. Release fork spring
7. Release shaft oil seal
8. Release shaft

OPERATION

When the clutch pedal is depressed, fluid is pumped from the master cylinder under pressure to the slave cylinder piston which applies pressure directly to the release arm. The release shaft rotates and moves the release fork which presses the release bearing against the cluch diaphragm fingers which deflect, removing pressure from the clutch plate to disengage the clutch.

When pressure is released from the clutch pedal, the diaphragm fingers push the release bearing back and force the clutch plate under spring pressure against the flywheel.



33M0119

1. Clutch pedal
2. Master cylinder
3. Master cylinder reservoir - remote
4. Hydraulic damper
5. Slave cylinder
6. Release arm
7. Release fork
8. Release bearing
9. Diaphragm fingers
10. Clutch plate

HYDRAULIC SYSTEM BLEED

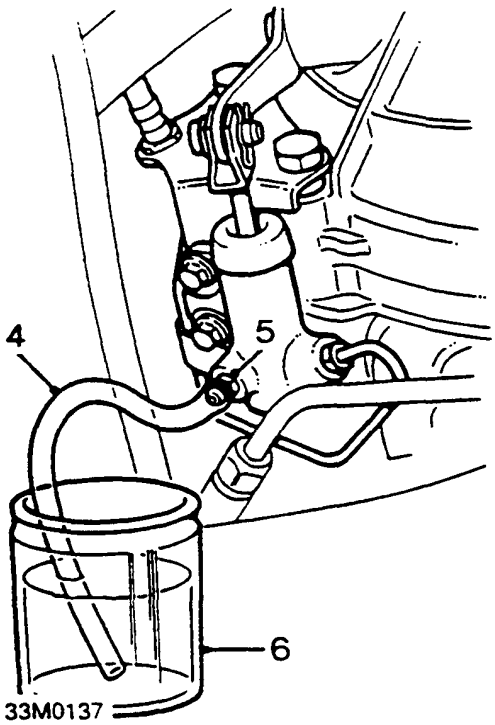
Service Repair No. 33.15.01

Remove

1. Raise front of vehicle.

WARNING: Support on safety stands.

2. Remove LH under tray, see **BODY - Repairs.**
3. Top up clutch reservoir, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**



4. Connect clear bleed tube to bleed screw on slave cylinder. Locate end of tube in a container containing fluid.
5. Slacken bleed screw ½ turn.
6. Press clutch pedal slowly to the floor. Repeat until bubble free fluid enters the container

***CAUTION:** Ensure that fluid level in reservoir is maintained during the complete operational sequence using new fluid.*

7. Tighten bleed screw to 9 N·m (0.9 kgf·m, 6.6 lbf·ft).
8. Check clutch pedal and release lever action.
9. Fit LH under tray, see BODY - Repairs.
10. Remove stand(s) and lower vehicle.

SLAVE CYLINDER

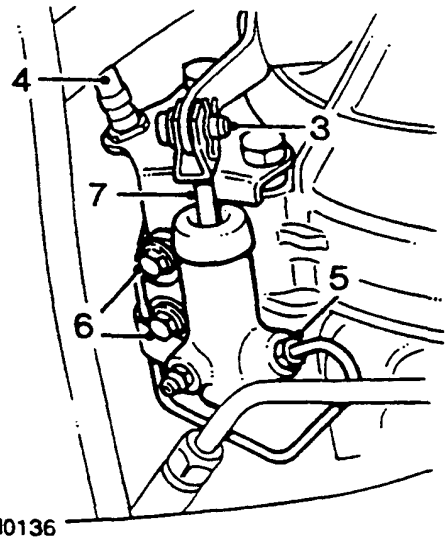
Service Repair No. 33.35.01

Remove

1. Raise front of vehicle.

WARNING: Support on safety stands.

2. Remove LH under tray, see **BODY - Repairs.**



33M0136

3. Remove 'R' clip and washer and withdraw clevis pin from push rod and release lever.
4. Fit hose clamp to slave cylinder hose.
5. Unscrew pipe union from slave cylinder.
6. Remove 2 bolts securing slave cylinder to gearbox.
7. Release from push rod and remove slave cylinder.

Refit

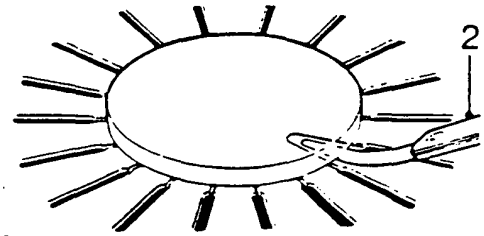
1. Position slave cylinder and engage push rod on release lever.
2. Attach slave cylinder to gearbox, tighten bolts to 22 N·m (2.2 kgf·m, 16.2 lbf·ft).
3. Connect pipe union and remove hose clamp.
4. Fit clevis pin to push rod and release lever, retain with washer and 'R' clip.
5. Fit LH under tray, see **BODY - Repairs.**
6. Remove stand(s) and lower vehicle.
7. Bleed clutch system, see **Adjustments.**

DRIVE PLATE AND RELEASE BEARING

Service Repair No. 33.10.02 Drive plate
Service Repair No. 33.25.12 Release bearing

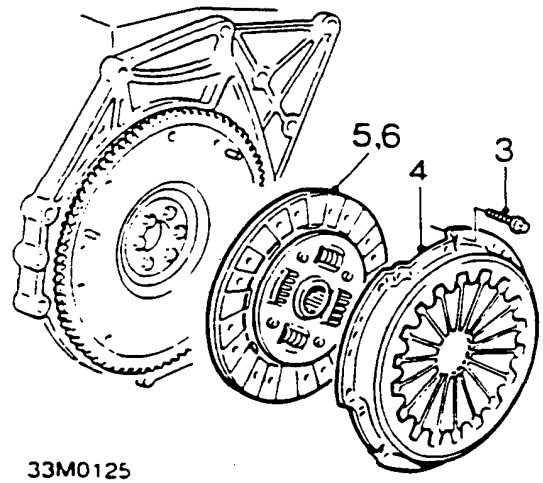
Remove

1. Remove gearbox assembly, see **MANUAL GEARBOX - Repairs**



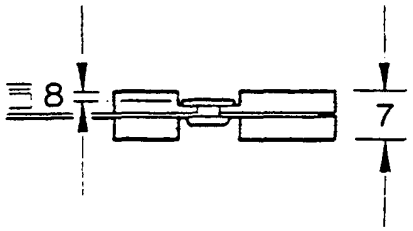
33M0124

2. Place a circular piece of flat plate across diaphragm fingers and insert feeler gauges between plate and fingers; measure finger clearance.
   DATA: Diaphragm finger clearance - service limit = 1.0 mm (0.04 in)
   Renew pressure plate if clearance obtained is outside service limits.



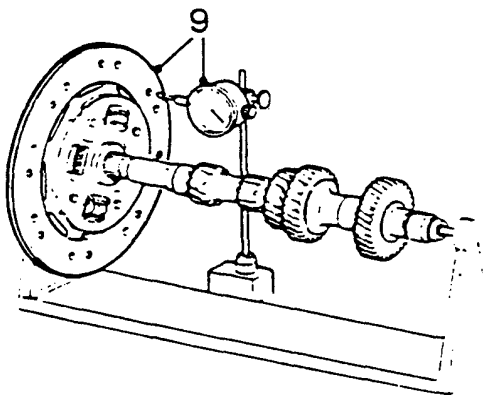
33M0125

3. Progressively slacken then remove 6 bolts securing pressure plate to flywheel.
4. Remove pressure plate.
5. Remove clutch plate.
6. Inspect clutch linings for signs of wear or oil contamination. Check for broken or weak springs and signs of spring apertures cracking; renew components as necessary.



33M0126

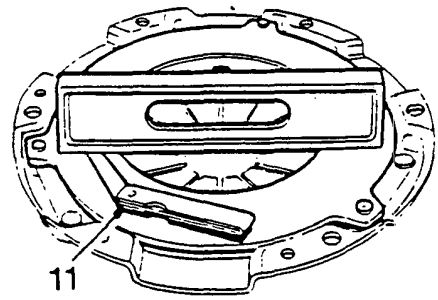
7. Measure clutch plate thickness, renew plate if less than service limit.
   DATA: Clutch plate thickness
   - new clutch plate = 7.1 – 7.5 mm (0.28 – 0.30 in)
   - service limit = 5.8 mm (0.23 in)
8. Measure rivet depth, renew plate if less than service limit.
   DATA: Rivet depth
   - new clutch plate = 1.0 mm (0.04 in)
   - service limit = 0.2 mm (0.08 in)



33M0127

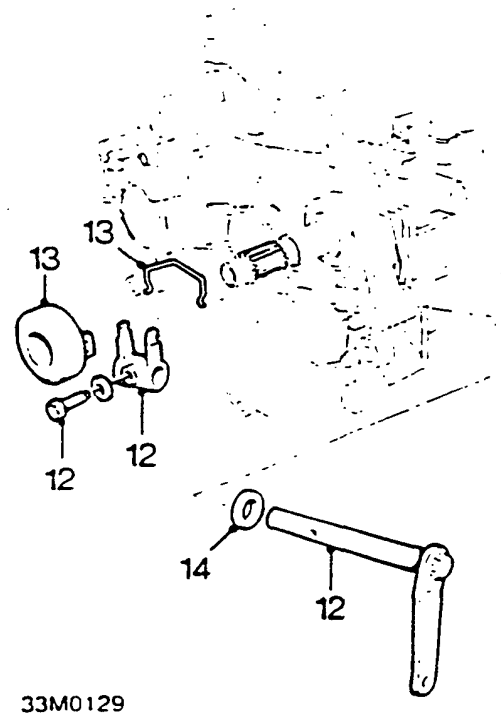
9. Measure clutch plate run-out using a dial gauge and a gearbox mainshaft; renew plate if outside service limit.
   DATA: Clutch plate run-out
   - new clutch plate = 0.8 mm (0.03 in)
   - service limit = 1.0 mm (0.04 in)
10. Check clutch plate for signs of wear or damage. Check for signs of overheating on drive straps (deep straw to blue colour); renew pressure plate if necessary.

***CAUTION:** Renew a pressure plate which has been accidentally dropped.*



33M0128

11. Using a straight edge and feeler gauges, check surface of pressure plate for warping at 4 separate points, renew plate if warping exceeds service limited.
    DATA: Pressure plate warping
    - service limit = 0.18 mm (0.007 in)



33M0129

Release bearing

12. Remove bolt securing release fork to shaft, withdraw shaft; recover fork.
13. Release spring securing release bearing, remove bearing.
14. Remove shaft oil seal from housing; discard seal.
15. Examine release bearing for signs of wear or damage, renew if necessary.

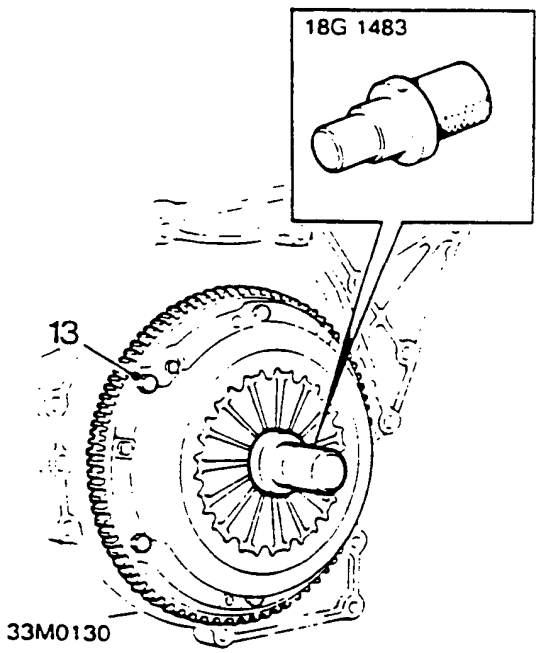
Refit

Release bearing

1. Clean all components, ensure gearbox input shaft is clean.
2. Smear a new shaft oil seal with engine oil; fit seal in housing.
3. Position release bearing to release fork, fit spring.
4. Position release fork in housing and insert shaft.
5. Align bolt holes in release fork and shaft, fit bolt and tighten to 15 N·m (1.5 kgf·m, 11.1 lbf·ft).

Clutch assembly

6. Clean all components.
7. Clean flywheel.
8. Ensure locating dowels are inserted in flywheel.
9. Smear clutch plate splines with molybdenum disulphide grease.
10. Position clutch plate to flywheel with 'FLYWHEEL SIDE' marking towards flywheel.
11. Position pressure plate to flywheel ensuring it is located on dowels.



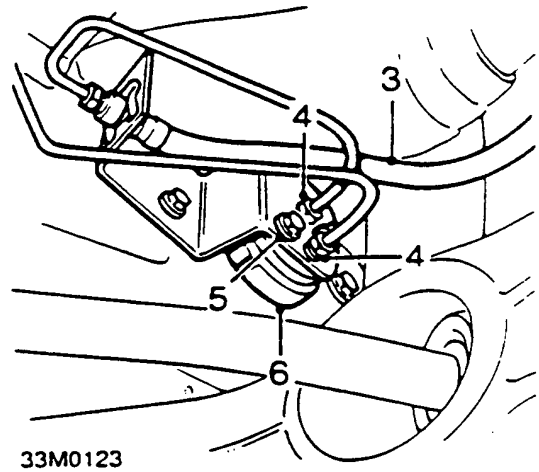
12. Fit alignment tool **18G 1483.**
13. Fit pressure plate bolts finger tight.
14. Working by diagonal selection, progressively tighten pressure plate bolts to 26 N·m (2.7 kgf·m, 19.2 lbf·ft).
15. Remove tool **18G 1483.**
16. Fit gearbox assembly, see **MANUAL GEARBOX - Repairs**

HYDRAULIC DAMPER

Service Repair No. 33.15.05

Remove

1. Remove LH under tray, see **BODY - Repairs.**
2. Remove under belly panel, see **BODY - Repairs.**



3. Fit hose clamp to master cylinder hose.
4. Unscrew 2 pipe unions and disconnect pipes from damper.

***CAUTION:** Plug the connections.*

5. Remove 2 bolts securing damper to bracket.
6. Withdraw damper from bracket.

Refit

1. Position damper in bracket, tighten bolts to 10 N·m (1.0 kgf·m, 7.4 lbf·ft).
2. Engage and tighten pipe unions to damper.
3. Remove hose clamp.
4. Bleed clutch system, see **Hydraulic system bleed.**
5. Fit under belly panel, see **BODY - Repairs.**
6. Fit LH under tray, see **BODY - Repairs.**

DATA

Diaphragm finger clearance	
- service limit	1.0 mm (0.04 in)
Lining thickness	
- new clutch plate	7.1 – 7.5 mm (0.28 – 0.30 in)
- service limit	5.8 mm (0.23 in)
Rivet depth	
- new clutch plate	1.0 mm (0.04 in)
- service limit	0.2 mm (0.08 in)
Clutch plate run-out	
- new clutch plate	0.8 mm (0.03 in)
- service limit	1.0 mm (0.04 in)
Pressure plate warping	
- service limit	0.18 mm (0.007 in)

TORQUE SETTINGS

Slave cylinder bleed screw	9 N·m (0.9 kgf·m, 6.6 lbf·ft)
Slave cylinder to gearbox mounting plate, bolts	22 N·m (2.2 kgf·m, 16.2 lbf·ft)
Damper to mounting bracket, bolts	10 N·m (1.0 kgf·m, 7.4 lbf·ft)
Pressure plate bolts	26 N·m (2.7 kgf·m, 19.2 lbf·ft)*
Release fork bolt	15 N·m (1.5 kgf·m, 11.1 lbf·ft)

* Tighten in a diagonal sequence

TOOL NUMBERS

18G 1483	Clutch Plate Centralizer

MANUAL GEARBOX

CONTENTS

GEAR LEVER ADJUSTMENT

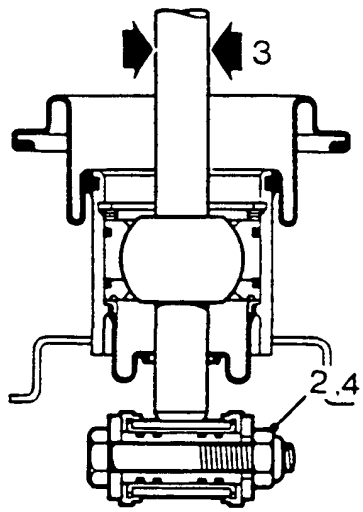
Service Repair No. 37.16.21

Adjust

Note: *Whenever the gear lever is reconnected to the selector rod, the gear lever must be set in the vertical position.*

1. Raise front of vehicle.

WARNING: Support on safety stands.



37M0679

2. Slacken locknut securing gear lever to selector rod.
3. Using assistance, hold gear lever vertically and tighten locknut to 25 N·m (2.5 kgf·m, 18.4 lbf·ft).
4. Check that the gear lever can travel across gate without contacting the centre console.
5. Remove stand(s) and lower vehicle.

DIFFERENTIAL OIL SEAL

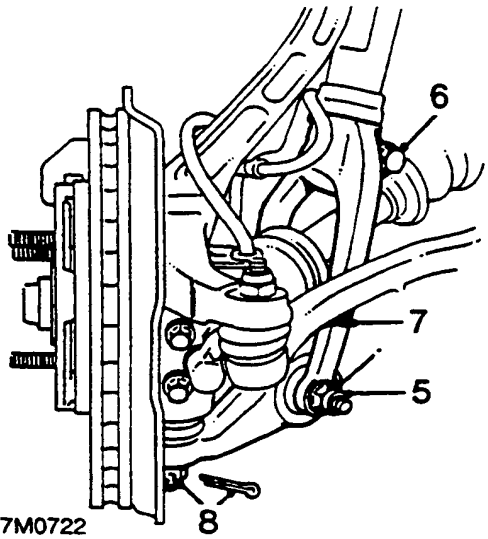
Service Repair No. LH seal - 54.10.18
Service Repair No. RH seal - 54.10.19

Remove

1. Raise front of vehicle.

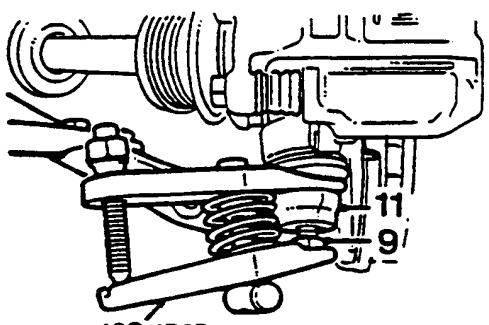
WARNING: Support on safety stands.

2. Remove LH under tray, see **BODY - Repairs.**
3. Remove road wheel.
4. Position drain tray to collect oil spillage from gearbox.



37M0722

5. Remove and discard nut and withdraw damper fork bolt from lower arm.
6. Remove pinch bolt from damper fork.
7. Remove damper fork.
8. Extract split pin and remove castle nut from lower ball pin; discard split pin.

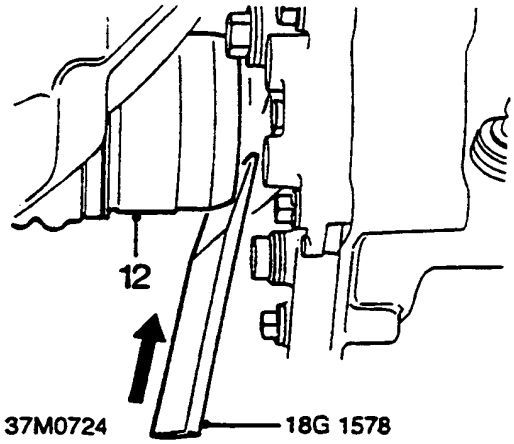


37M0723

9. Screw a 12 mm nut onto ball pin until flush with ball pin end. If necessary, apply penetrating oil to joint.
10. Break taper joint using tool **18G 1707.**

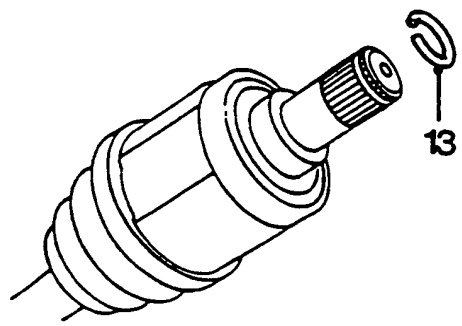
***CAUTION:** Ensure cross-bar on tool is at right angles (as shown).*
Be careful not to damage ball joint boot.

11. Release lower arm from hub.



37M0724

12. Insert **18G 1578** between drive shaft housing and gearbox to disengage drive shaft circlip from differential. Withdraw drive shaft from differential by pulling on inboard joint housing.

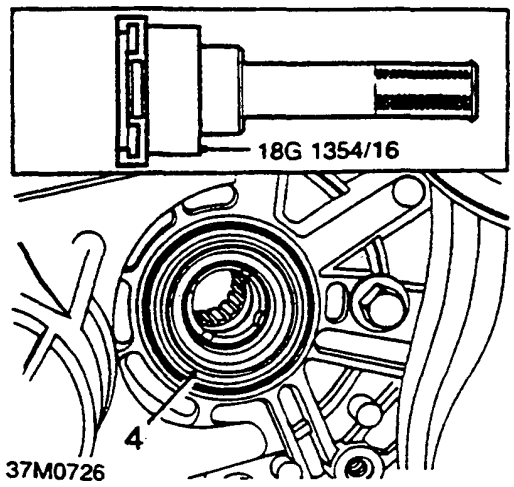


37M0725

13. Remove and discard circlip from drive shaft.
14. Retain drive shaft clear of gearbox to give access to oil seal.
15. Carefully prise oil seal out of differential housing; discard oil seal.

Refit

1. Thoroughly clean oil seal recess and splines of drive shaft.
2. Lubricate new oil seal with gearbox oil, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**



3. Locate seal on tool **18G 1354-16** with lip of seal towards differential housing.
4. Carefully drift seal into differential housing until it is fully seated in recess.
5. Remove tool **18G 1354-16.**
6. Fit new circlip to drive shaft.
7. Engage drive shaft in differential and push fully home.

CAUTION: *Keep drive shaft horizontal to avoid damaging oil seal.*

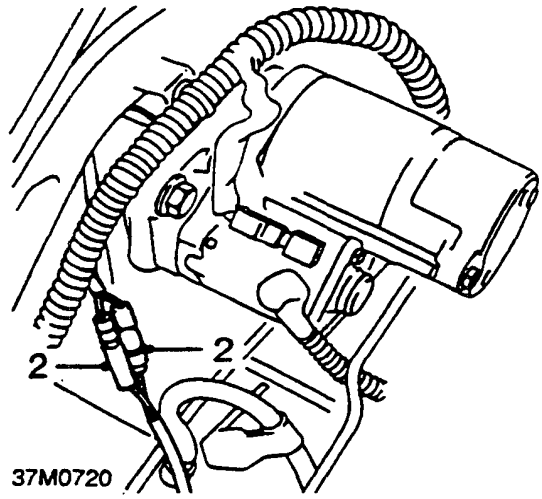
8. Pull on drive shaft joint to ensure circlip is fully engaged and retains shaft.
9. Engage hub ball joint pin in lower arm.
10. Fit castle nut to lower ball pin, tighten to 50 N·m (5.1 kgf·m, 36.9 lbf·ft) and align split pin hole. Fit NEW split pin and bend ends over, against face of nut and ball pin.
11. Engage damper fork on damper so that alignment tab is aligned with slot in damper fork, insert lower arm bolt and fit NEW nut, fit pinch bolt. Tighten fixings when weight of vehicle is on suspension.
12. Fit road wheel and tighten nuts to 110 N·m (11.2 kgf·m, 81.1 lbf·ft).
13. Fit LH under tray, see **BODY - Repairs.**
14. Remove stand(s) and lower vehicle.
15. Tighten damper fork pinch bolt to 44 N·m (4.5 kgf·m, 32.5 lbf·ft) and lower arm nut to 65 N·m (6.6 kgf·m, 47.9 lbf·ft).
16. Top-up gearbox oil, see **MAINTENANCE.**

REVERSE LAMP SWITCH

Service Repair No. 37.27.01

Remove

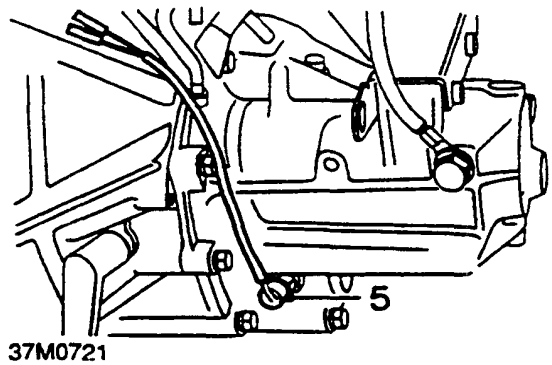
1. Remove air cleaner, see **ENGINE MANAGEMENT SYSTEM - Repairs.**



2. Disconnect 2 reverse lamp switch leads from engine harness.
3. Raise front of vehicle.

WARNING: Support on safety stands.

4. Remove LH under tray, see **BODY - Repairs.**



5. Remove reverse lamp switch and discard sealing washer.

Refit

1. Clean reverse lamp switch and fit new sealing washer.
2. Fit and tighten reverse lamp switch.
3. Fit LH under tray, see **BODY - Repairs.**
4. Remove stand(s) and lower vehicle.
5. Connect 2 reverse lamp switch leads to engine harness
6. Fit air cleaner, see **ENGINE MANAGEMENT SYSTEM.**

GEARBOX

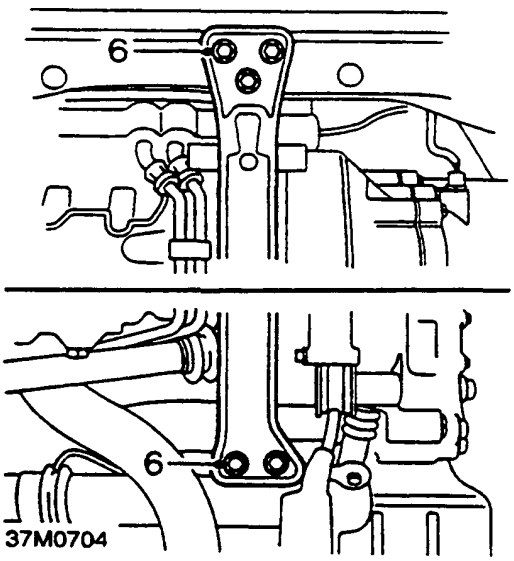
Service Repair No. 37.20.02

Remove

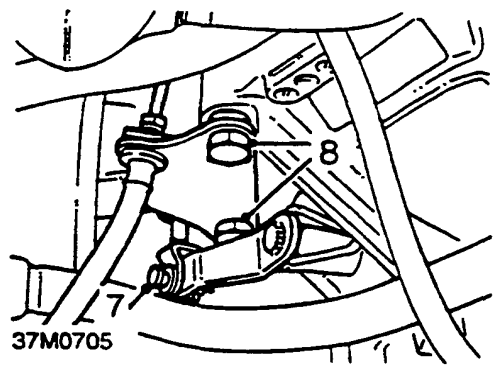
1. Disconnect battery earth lead.
2. Raise front of vehicle.

WARNING: Support on safety stands.

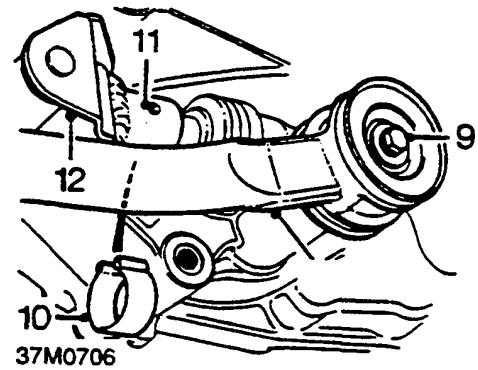
3. Remove road wheel(s).
4. Remove LH under tray, see **BODY - Repairs.**
5. Remove under belly panel, see **BODY - Repairs.**



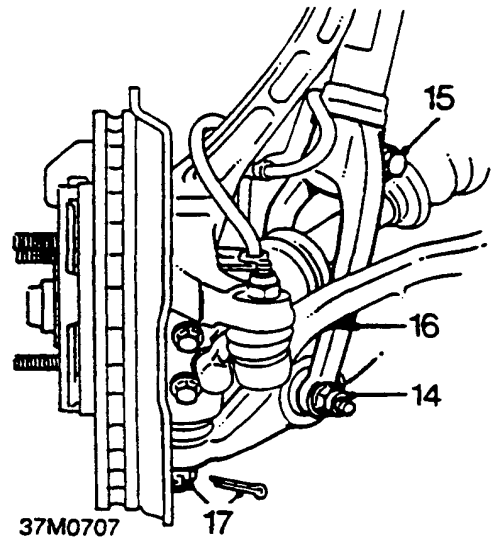
6. Remove 5 bolts securing centre beam, remove centre beam.



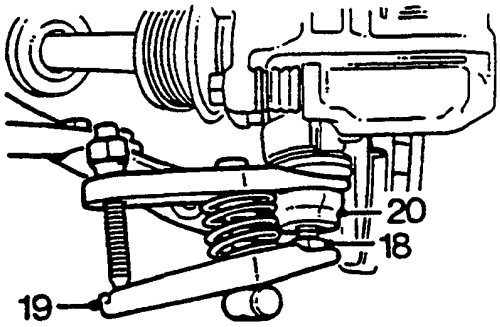
7. Remove 'R' clip and withdraw clevis pin from push rod and release lever, remove push rod and collect washer.
8. Remove 2 bolts and nut securing slave cylinder bracket to gearbox and position aside.



9. Remove bolt and disconnect gear change steady bar; collect 2 washers.
10. Remove clip retaining selector rod roll pin.
11. Using a suitable punch, drive out selector rod roll pin.
12. Tie selector rod and steady bar aside.
13. Drain gearbox oil, see **MAINTENANCE.**



14. Remove and discard nut and withdraw damper fork bolt from LH lower arm.
15. Remove pinch bolt from damper fork.
16. Remove LH damper fork.
17. Remove split pin from lower ball joint nut, discard split pin and remove castle nut.

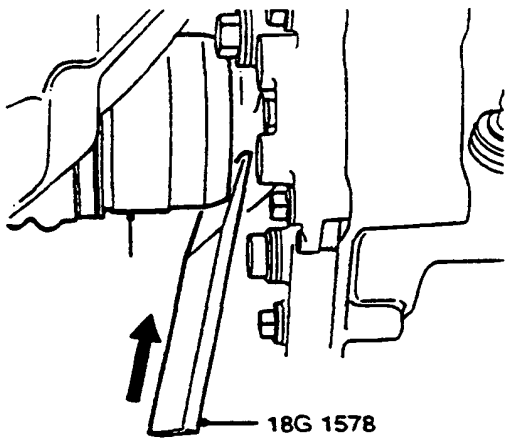


37M0708

18. Screw a 12 mm nut onto ball pin end. If necessary, apply penetrating oil to joint.
19. Break taper joint using tool **18G 1707** and separate ball pin from lower arm.

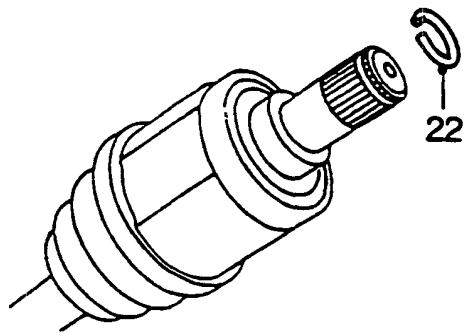
CAUTION: *Ensure cross-bar on tool is at right angles (as shown). Be careful not to damage ball joint boot.*

20. Release LH lower arm ball pin from hub.



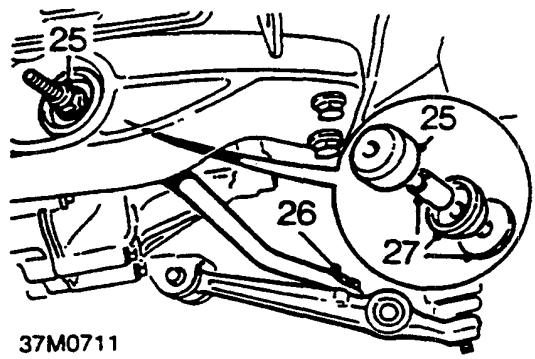
37M0709

21. Insert **18G 1578** between drive shaft housing and gearbox to disengage drive shaft circlip from differential by pulling on the inboard housing.



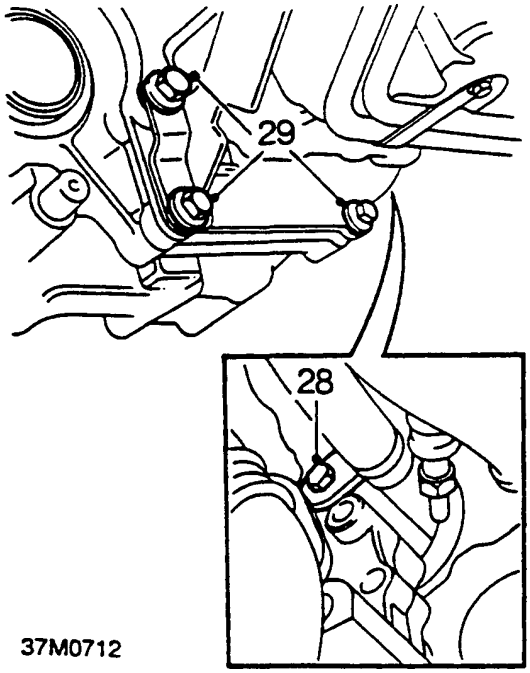
37M0710

22. Remove and discard circlip from LH drive shaft.
23. Fit plastic bag over end of drive shaft.
24. Repeat above operations and disconnect RH suspension and drive shaft.



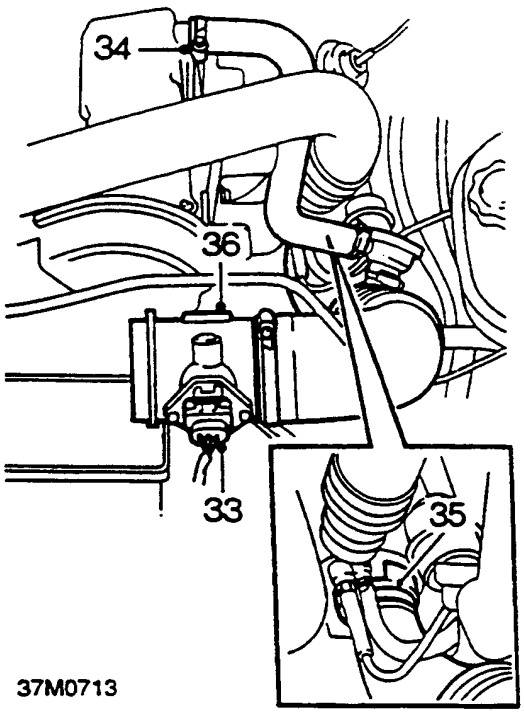
37M0711

25. Remove nut, special washer and rubber bushing A from LH radius rod.
26. Remove 2 bolts securing radius rod to lower arm.
27. Remove radius rod and withdraw rubber bushing B, spacer, special washer and adjusting shims.



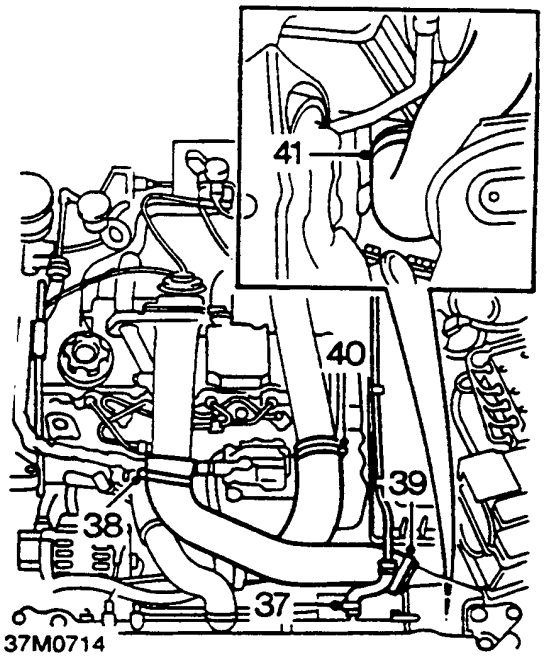
37M0712

28. Slacken bolt securing coolant rail bracket to gearbox mounting plate.
29. Remove 3 lower gearbox retaining bolts.
30. Remove starter motor, see **ELECTRICAL - Repairs.**
31. Remove 3 bolts securing sound deadening pad to engine.
32. Remove sound deadening pad.



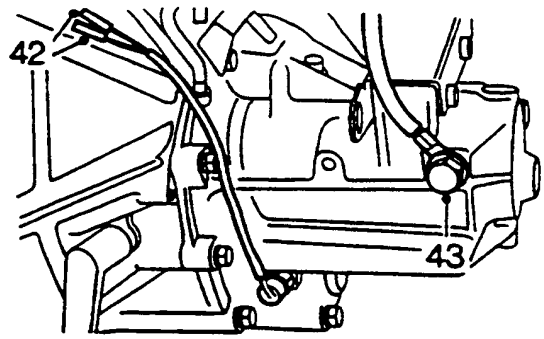
37M0713

33. Disconnect air flow meter multiplug.
34. Slacken clip and disconnect breather valve hose from camshaft cover.
35. Slacken clip and disconnect air intake hose from turbocharger.
36. Remove air intake hose assembly.



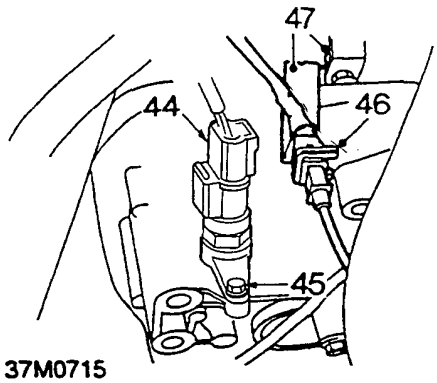
37M0714

37. Slacken clip and disconnect expansion tank return pipe from radiator.
38. Slacken clip and disconnect air intake hose from inlet manifold intake pipe.
39. Slacken clip and remove air intake hose from intercooler.
40. Slacken clip and release turbocharger hose from turbocharger pipe.
41. Slacken clip and remove turbocharger hose from intercooler.



37M0718

42. Disconnect 2 reverse light switch connectors.
43. Remove bolt securing earth lead to gearbox.

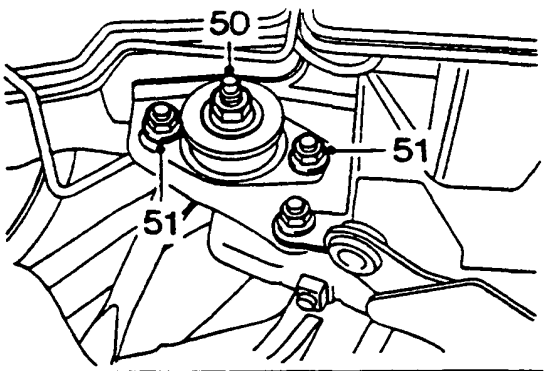


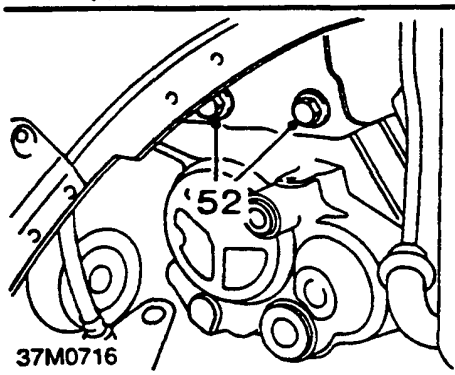
37M0715

44. Disconnect speed sensor multiplug.
45. Remove bolt securing speed sensor, release sensor and position aside.
46. Release crank sensor multiplug from bracket and disconnect multiplug.
47. Remove nut securing crank sensor bracket to gearbox, remove bracket.
48. Position trolley jack to support engine.

CAUTION: *Use a block of wood or hard rubber pad to protect sump.*

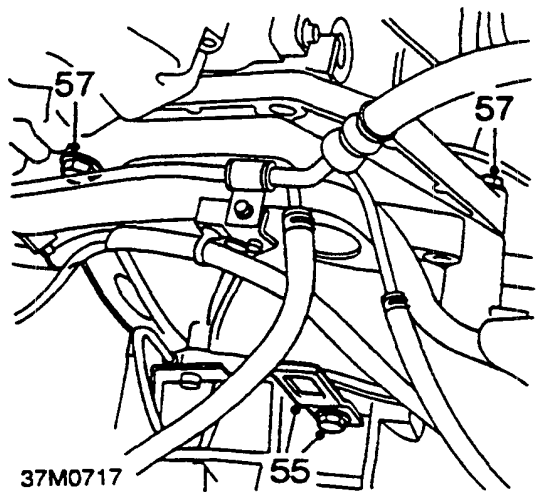
49. Release fuel filter from mounting bracket and position aside.





37M0716

50. Remove nut securing LH engine mounting to gearbox bracket.
51. Remove 2 nuts securing LH engine mounting to bracket.
52. Remove LH engine mounting.
53. Lower gearbox slightly.
54. Remove 2 bolts securing mounting bracket to gearbox and remove mounting bracket.



37M0717

55. Remove bolt securing gear case to differential housing, position suitable lifting eye, fit and tighten bolt.
56. Attach hook of crane to lifting eye and support weight of gearbox.
57. Remove remaining 2 bolts securing top of gearbox to engine.
58. Release gearbox from locating dowels.
59. Using assistance, manoeuvre gearbox away from engine.
60. Lower gearbox, disconnect lifting hook and remove gearbox from beneath vehicle.

Refit

1. Clean mating faces of gearbox and gearbox adapter plate; ensure locating dowels are fitted.
2. Using assistance, raise gearbox until it is aligned with engine and then locate on dowels.
3. Fit 2 top gearbox to engine retaining bolts and tighten to 70 N·m (7.1 kgf·m, 51.6 lbf·ft).
4. Disconnect lifting chain from gearbox.
5. Remove gearbox lifting eye bolt, remove eye and refit bolt and tighten to 25 N·m (2.5 kgf·m, 18.4 lbf·ft).
6. Position LH mounting to gearbox, fit bolts and tighten to 45 N·m (4.6 kgf·m, 33.2 lbf·ft).
7. Raise engine and align engine mounting bracket.
8. Fit LH engine mounting, tighten M10 nuts to 45 N·m (4.6 kgf·m, 33.2 lbf·ft) and M12 nut to 70 N·m (7.1 kgf·m, 51.6 lbf·ft).
9. Fit crank sensor bracket to gearbox and tighten nut to 25 N·m (2.5 kgf·m, 18.4 lbf·ft).
10. Secure fuel filter to mounting bracket.
11. Remove trolley jack.
12. Clean speed sensor and differential mating faces.
13. Fit speed sensor to gearbox, tighten bolt to 19 N·m (1.9 kgf·m, 14.0 lbf·ft).
14. Connect speed sensor multiplug.

15. Connect crankshaft sensor multiplug and secure to bracket.
16. Connect reverse light switch connectors.
17. Fit turbocharger hose to intercooler and tighten clip.
18. Connect turbocharger hose to turbocharger intake pipe and tighten clip.
19. Fit air intake hose to intercooler and tighten clip.
20. Connect air intake hose to inlet manifold intake pipe and tighten clip.
21. Connect expansion tank return pipe to radiator and tighten clip.
22. Fit air intake hose assembly to turbocharger and tighten clip.
23. Connect breather hose to camshaft cover and tighten clip.
24. Position sound deadening pad to engine and secure with bolts.
25. Connect air flow meter multiplug.
26. Refit starter motor, see **ELECTRICAL - Repairs**.
27. Fit earth lead to gearbox; tighten bolt.
28. Fit lower gearbox retaining bolts and tighten to 70 N·m (7.1 kgf·m, 51.6 lbf·ft).
29. Position coolant rail bracket to gearbox mounting plate and tighten bolt.
30. Fit shim, special washer and inner rubber bush B to suspension tie-rod.
31. Enter tie-rod in cross-member and connect tie-rod to lower arm, tighten bolts to 105 N·m (10.7 kgf·m, 77.4 lbf·ft).
32. Fit outer rubber bush A and special washer to suspension tie-rod, fit nut and tighten to 68 N·m (6.9 kgf·m, 50.2 lbf·ft).
33. Clean LH drive shaft end and differential oil seal.
34. Fit NEW circlip to groove in drive shaft
35. Lubricate oil seal running surfaces.
36. Insert drive shaft into differential and push fully home until circlip locks in differential groove. Pull on inner housing to ensure circlip is fully engaged.

CAUTION: *Keep drive shaft horizontal to avoid damaging differential oil seal.*

37. Engage swivel pin in lower arm and tighten nut to 50 N·m (5.1 kgf·m, 36.9 lbf·ft), tighten to align hole. fit a NEW split pin, bend ends over against face of nut and ball pin.

CAUTION: *Be careful not to damage the ball joint boot.*

Tighten nut only far enough to align slot with pin hole. **Do not align the nut by loosening.**

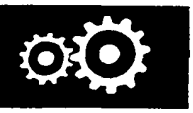
38. Position damper fork over drive shaft and lower arm. Insert damper into fork so alignment tab is aligned with slot in damper fork.
39. Loosely install the damper pinch bolt, damper fork bolt and NEW nut.

CAUTION: *The bolts and nut should be tightened with the vehicle's weight on the damper.*

40. Repeat above operations and fit RH drive shaft.
41. Position steady bar and selector rod, align holes.
42. Fit selector rod roll pin; fit retaining clip.
43. Insert steady bar washers, fit bolt and tighten to 60 N·m (6.1 kgf·m, 44.3 lbf·ft).
44. Position slave cylinder to gearbox; fit bolts and tighten to 22 N·m (2.2 kgf·m, 16.2 lbf·ft).
45. Clean push rod and fit to slave cylinder.
46. Lubricate clevis pin and fit to push rod and release lever, retain with washer and 'R' clip.
47. Fit centre beam; tighten bolts to 50 N·m (5.1 kgf·m, 36.9 lbf·ft).
48. Fill gearbox with correct quantity and grade of oil, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS**.
49. Fit front under belly panel, tighten bolts.
50. Fit front under belly panel scrivet fixings.
51. Fit LH under tray, see **BODY - Repairs**.
52. Fit road wheel and tighten nuts to 110 N·m (11.2 kgf·m, 81.1 lbf·ft).

Note: *Before installing the wheels, clean mating surface of brake disc and inside of wheel.*

53. Remove stand(s) and lower vehicle.
54. Tighten damper pinch bolt to 44 N·m (4.5 kgf·m, 32.5 lbf·ft) and damper fork nut to 65 N·m (6.6 kgf·m, 47.9 lbf·ft).
55. Connect battery earth lead.
56. Check front wheel alignment, adjust if necessary, see **REPAIR MANUAL - FRONT SUSPENSION - Repairs**.



TORQUE SETTINGS

Gear lever to slector shaft nut	25 N·m (2.5 kgf·m, 18.4 lbf·ft)
Lower suspension arm ball joint castle nut	50 N·m (5.1 kgf·m, 36.9 lbf·ft)*
Damper fork pinch bolt	44 N·m (4.5 kgf·m, 32.5 lbf·ft)**
Damper fork to lower arm nut	65 N·m (6.6 kgf·m, 47.9 lbf·ft)
Gearcase to differential housing, bolt	25 N·m (2.5 kgf·m, 18.4 lbf·ft)
Gearbox to adaptor plate, bolts	70 N·m (7.1 kgf·m, 51.6 lbf·ft)
Engine mounting bracket to gearbox, bolts	45 N·m (4.6 kgf·m, 33.2 lbf·ft)
LH engine mounting:	
M10 nuts	45 N·m (4.6 kgf·m, 33.2 lbf·ft)
M12 nut	70 N·m (7.1 kgf·m, 51.6 lbf·ft)
Centre beam bolts	50 N·m (5.1 kgf·m, 36.9 lbf·ft)
Speed sensor bolt	19 N·m (1.9 kgf·m, 14.0 lbf·ft)
Slave cylinder bolts	22 N·m (2.2 kgf·m, 16.2 lbf·ft)
LH radius rod to lower arm bolts	105 N·m (10.7 kgf·m, 77.4 lbf·ft)
RH radius rod to lower arm bolts	105 N·m (10.7 kgf·m, 77.4 lbf·ft)
Radius rod to front beam, nuts	68 N·m (6.9 kgf·m, 50.2 lbf·ft)
Gear change steady bar bolt	60 N·m (6.1 kgf·m, 44.3 lbf·ft)
Road wheel nuts	110 N·m (11.2 kgf·m, 81.1 lbf·ft)

* Align to slot in nut - **Do Not slacken**

** Full weight of engine must be on mounting before tightening nut

TOOL NUMBERS

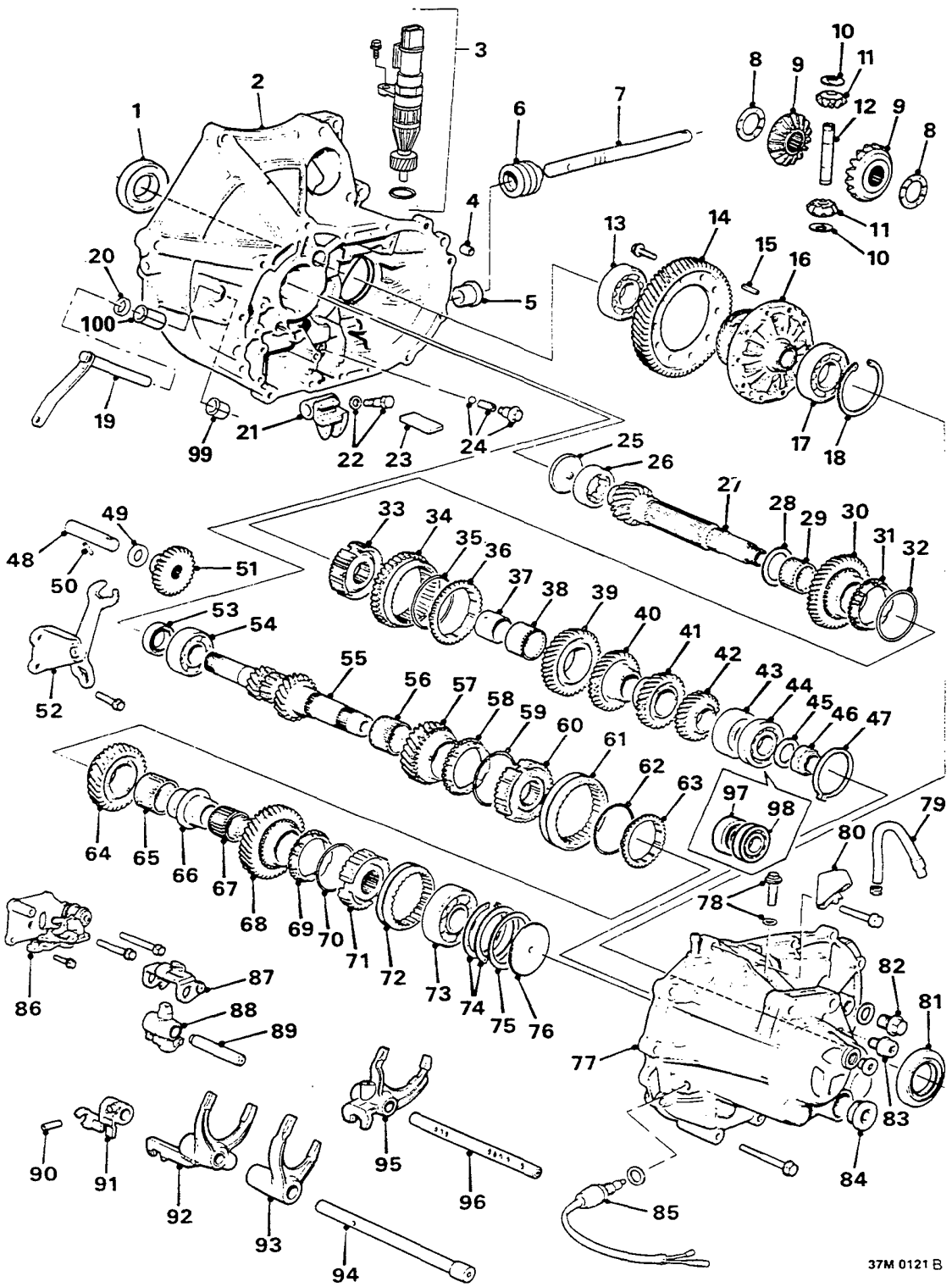
18G 1707	Ball Joint Seperator
18G 1578	Drive Shaft Seperator
18G 1354-16	Differential Oil Seal Replacer

MANUAL GEARBOX

CONTENTS

Overhaul

Data, Torque & Tools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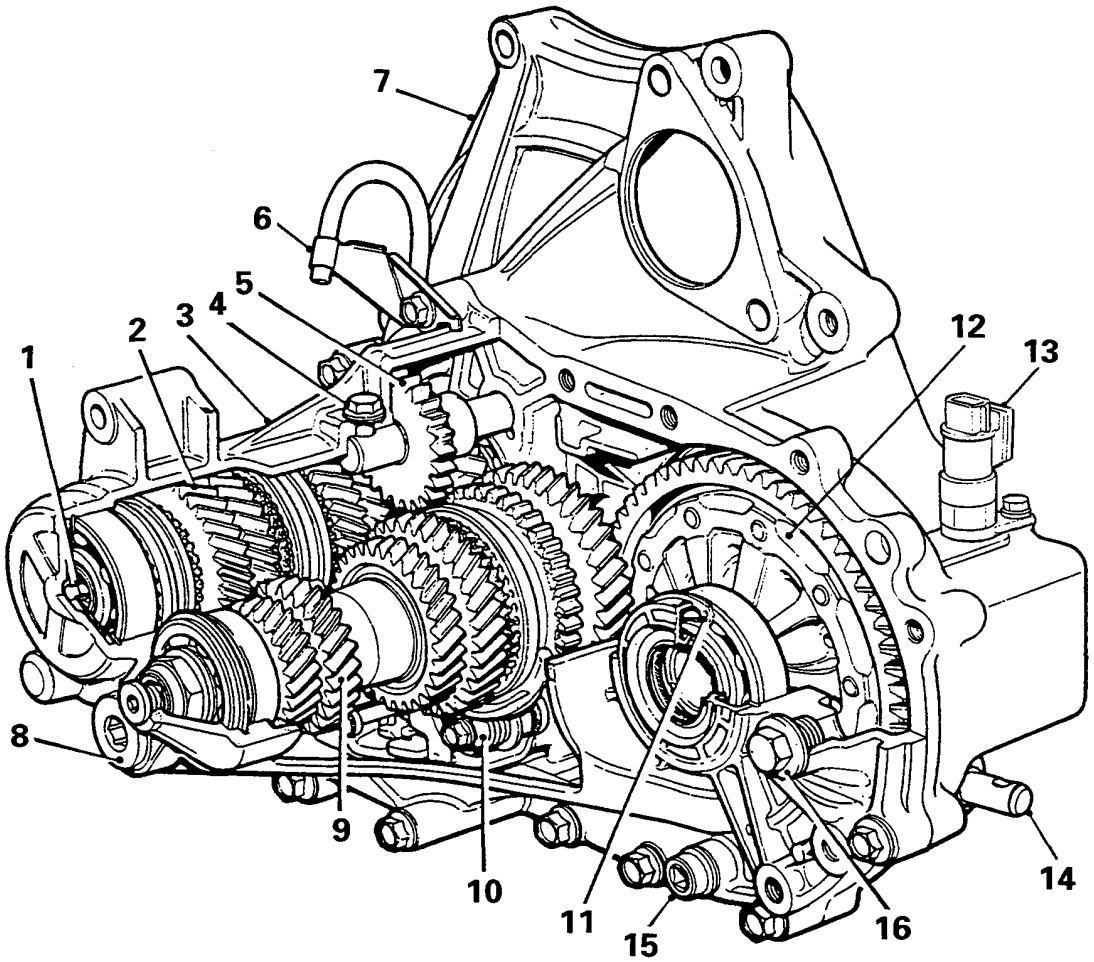
GEARBOX COMPONENTS

1. Oil seal – differential
2. Differential housing
3. Speed sensor
4. Dowel
5. Oil seal – selector shaft
6. Boot
7. Selector shaft
8. Thrust washer – sun gear
9. Sun gear
10. Thrust washer – planet gear
11. Planet gear
12. Pinion shaft
13. Ball bearing – differential
14. Final drive gear
15. Roll pin – differential pinion shaft
16. Differential casing
17. Ball bearing – differential
18. Selective shim
19. Clutch release shaft
20. Oil seal – clutch release shaft
21. Selector shaft guide
22. Dowel bolt and washer
23. Magnet
24. Detent cap bolt, ball and spring – selector shaft
25. Oil guide plate
26. Parallel roller bearing – output shaft
27. Output shaft
28. Selective thrust washer – 1st gear end float
29. Needle roller bearing – 1st gear
30. 1st gear
31. Synchro ring – 1st gear
32. Synchro spring
33. Synchro hub – 1st/2nd gear
34. Synchro sleeve – 1st/2nd gear
35. Synchro spring
36. Synchro ring – 2nd gear
37. Selective collar – 2nd gear end float
38. Needle roller bearing – 2nd gear
39. 2nd gear
40. 3rd gear
41. 4th gear
42. 5th gear
43. Ball bearing – output shaft*
44. Ball bearing – output shaft*
45. Tongued washer
46. Output shaft nut – L.H. thread
47. Circlip
48. Reverse idler shaft
49. Thrust washer – reverse idler gear
50. Roll pin – reverse idler shaft
51. Reverse idler gear
52. Reverse selector fork
53. Oil seal – input shaft
54. Ball bearing – input shaft
55. Input shaft
56. Needle roller bearing – 3rd gear
57. 3rd gear
58. Synchro ring – 3rd gear
59. Synchro spring
60. Synchro hub – 3rd/4th gears
61. Synchro sleeve – 3rd/4th gears
62. Synchro spring
63. Synchro ring – 4th gear
64. 4th gear
65. Needle roller bearing – 4th gear
66. Distance collar – 4th/5th gears
67. Needle bearing – 5th gear
68. 5th gear
69. Synchro ring – 5th gear
70. Synchro spring – 5th gear
71. Synchro hub – 5th gear
72. Synchro sleeve – 5th gear
73. Ball bearing – input shaft
74. Selective snap rings – input shaft end thrust
75. Belleville washer – input shaft end thrust
76. Oil guide plate
77. Gearbox casing
78. Reverse idler shaft bolt and washer
79. Breather pipe
80. Breather pipe bracket
81. Oil seal – differential
82. Filler/level plug
83. Drain plug
84. Access plug – output shaft bearing circlip
85. Reverse light switch
86. Interlock assembly
87. Gearshift holder
88. Gearshift arm guide
89. Shift shaft
90. Roll pin – 5th/reverse gear selector
91. Gear selector – 5th/reverse gears
92. Selector fork – 3rd/4th gears
93. Selector fork – 5th gear
94. Selector shaft – 5th/reverse gears
95. Selector fork – 1st/2nd gears
96. Selector shaft – 1st/2nd gears
97. Bearing – roller *
98. Bearing – ball *
99. Clutch release shaft bush – inner
100. Clutch release shaft bush – outer

* Depending on application



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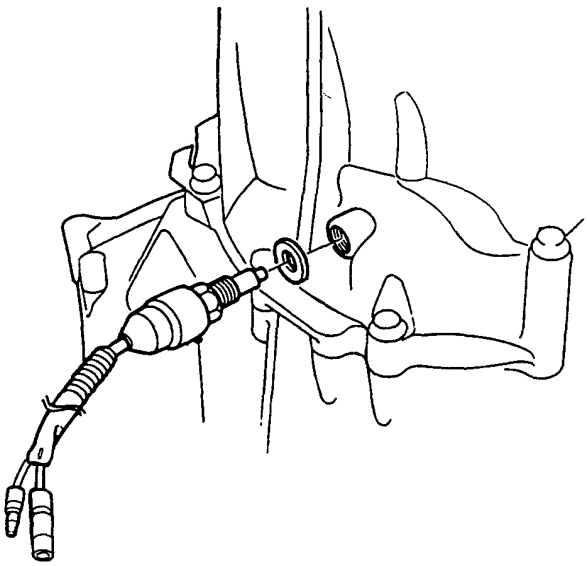
SECTIONED VIEW OF GEARBOX

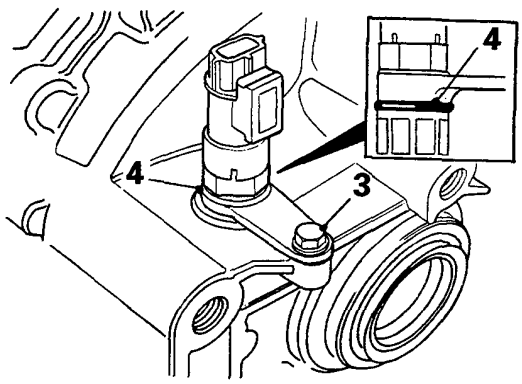
1. Oil guide plate
2. Input shaft assembly
3. Gear case
4. Reverse idler shaft bolt
5. Reverse idler gear
6. Breather pipe and bracket
7. Differential housing
8. Access plug – output shaft bearing circlip
9. Output shaft assembly
10. Shift arm assembly and interlock
11. Selective shim
12. Final drive assembly
13. Speed sensor
14. Selector shaft
15. Oil drain plug
16. Oil filler/level plug

GEARBOX DISMANTLING

1. Thoroughly clean exterior of gearbox.

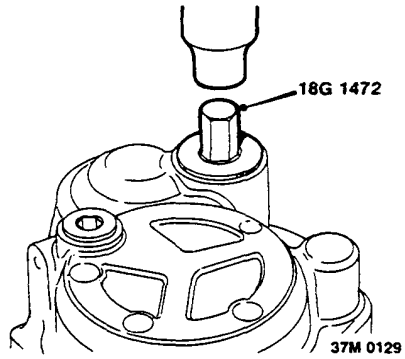


2. Remove reverse light switch; discard washer.



37M 0127

3. Remove bolt securing speedometer drive pinion and housing.
4. Remove speedometer drive pinion and housing, discard 'O' ring.



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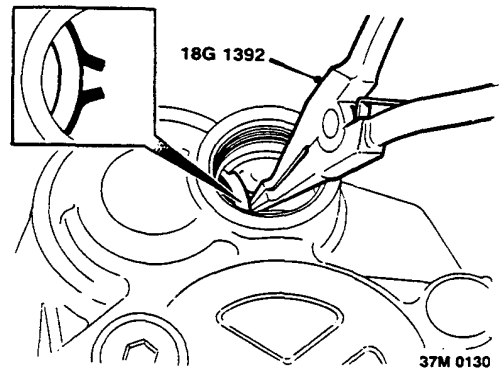
5. Remove access plug using tool **18G 1472.**



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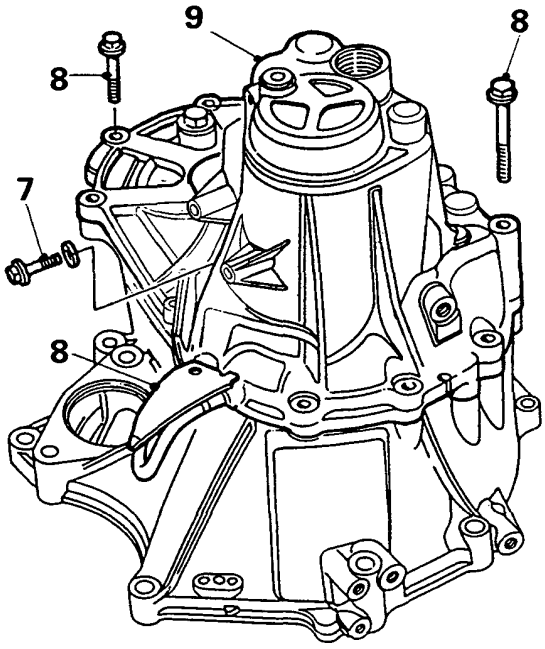
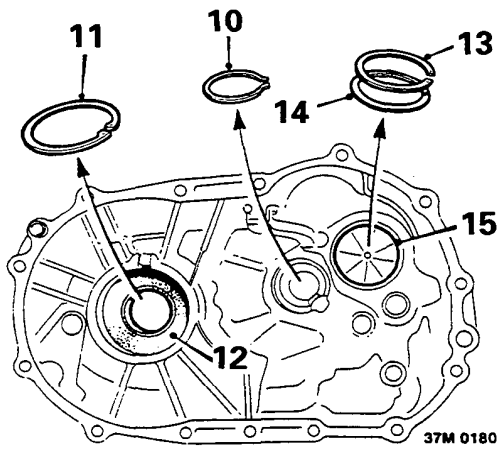
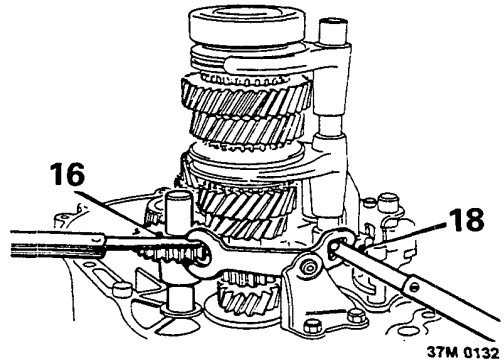
6. Using tool **18G 1392**, release circlip retaining output shaft bearing.



7. Remove bolt retaining reverse idler shaft, discard washer.
8. Noting their fitted position, remove 14 bolts securing gear case to differential housing; release breather pipe bracket.
9. Using a soft-faced mallet, release gear case from differential housing; remove gear case.

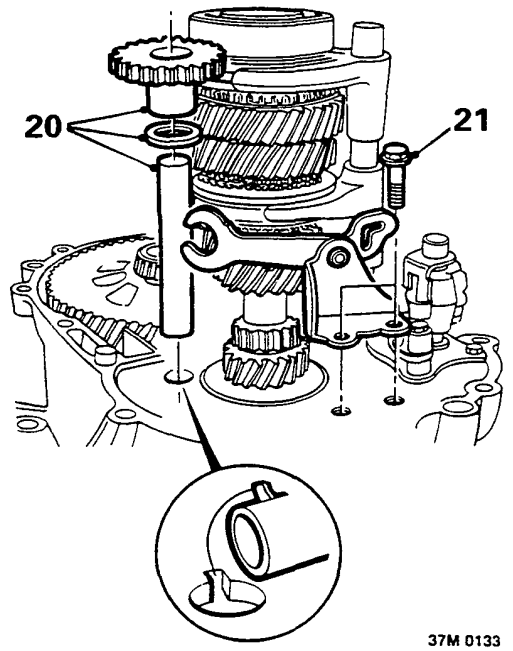


10. Remove and discard output shaft bearing circlip from gear case.
11. Remove selective circlip from differential bearing recess in gear case; retain circlip.
12. Remove and discard differential oil seal.
13. Remove selective circlip(s).
14. Remove and discard Belleville washer.
15. Remove input shaft oil guide plate.

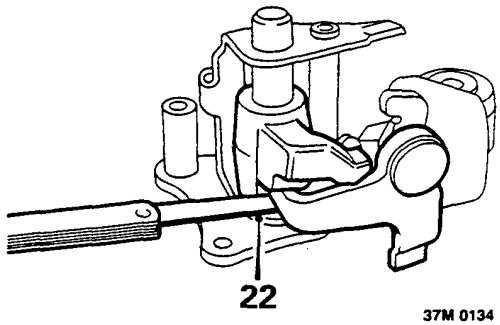


16. Using feeler gauges, measure clearance between reverse idler gear and selector fork.
    Clearance = 0.5 to 1.1 mm (0.02 – 0.04 in)
17. If clearance obtained exceeds above figure, measure width across prongs of selector fork.
    Prong width = 13.0 to 13.3 mm (0.51 – 0.52 in)
18. Using feeler gauges, measure clearance between pin and selector fork groove.
    Standard = 0.05 to 0.35 mm (0.002 – 0.014 in)
    Service limit = 0.5 mm (0.02 in)
19. If clearance obtained exceeds service limit, measure width of selector fork groove.
    Groove width = 7.05 to 7.25 mm (0.278 – 0.285 in)

CAUTION: *If dimensions obtained exceed figures given, selector fork must be replaced.*

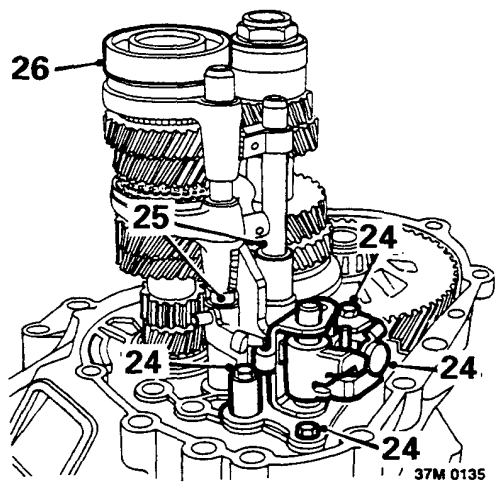


20. Remove reverse idler gear, thrust washer and idler shaft.
21. Remove 2 bolts securing reverse selector fork bracket; remove bracket and fork.

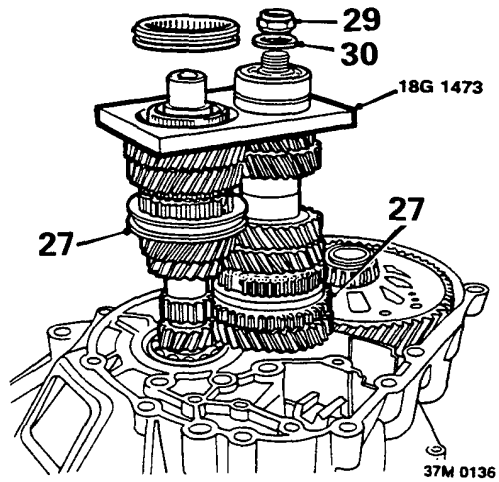


22. Using feeler gauges, measure clearance between interlock shift arm and guide.
Standard = 0.2 to 0.3 mm (0.008 – 0.012 in)
Service limit = 0.55 mm (0.022 in)
23. If clearance obtained exceeds service limit, measure width of groove in guide.
Groove width = 8.1 to 8.2 mm
(0.319 – 0.323 in)

CAUTION: *If dimensions obtained exceed figures given, interlock assembly must be replaced.*



24. Noting their fitted position, remove 2 plain bolts and shoulder bolt retaining interlock assembly; remove assembly.
25. Raise both input and output shafts slightly, remove selector forks and rails.
26. Using 2 suitable levers, remove input shaft bearing.



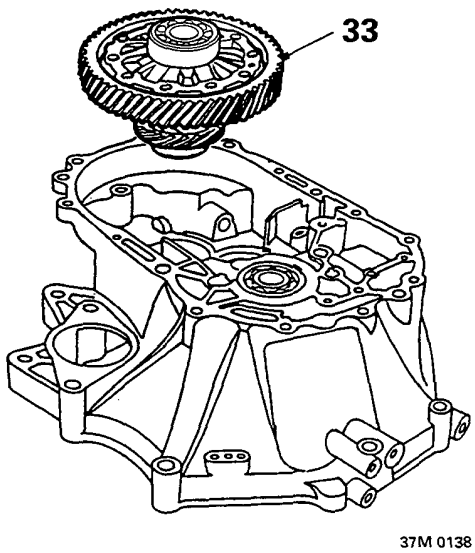
27. Move synchro sleeve to engage 1st and 4th gears.

CAUTION: *Damage to components will result if gears other than 1st and 4th are engaged.*

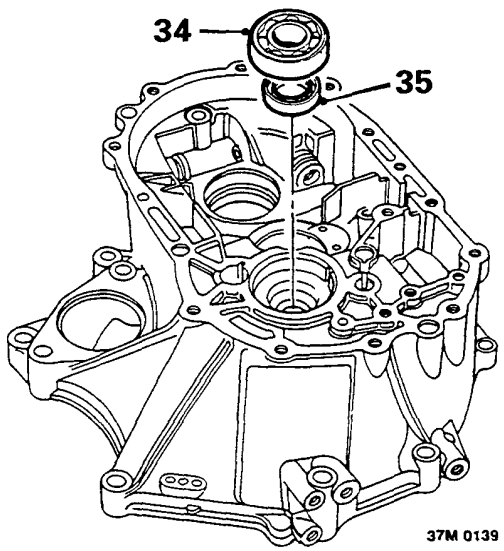
28. Position tool **18G 1473** on input shaft and around output shaft bearing.
29. Release staking, remove and discard nut from output shaft.

Note: *Nut has a L.H. thread.*

30. Remove and discard tongued washer.
31. Remove tool **18G 1473**.
32. Remove input and output shafts from differential housing.

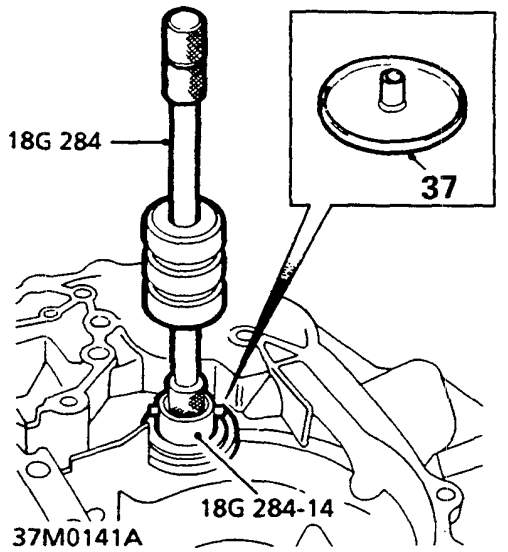


33. Lift differential assembly out of housing.



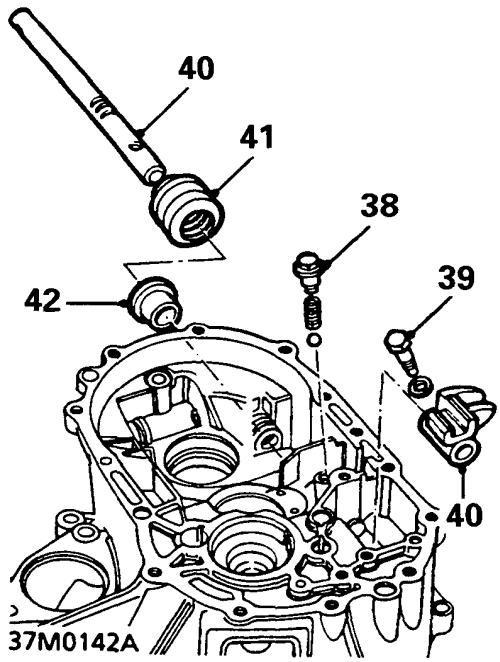
34. Using a soft metal drift, remove input shaft bearing from differential housing; discard bearing.

35. Remove and discard input shaft oil seal.



36. Remove output shaft bearing using tools **18G 284, and 18G 284 – 14** discard bearing.

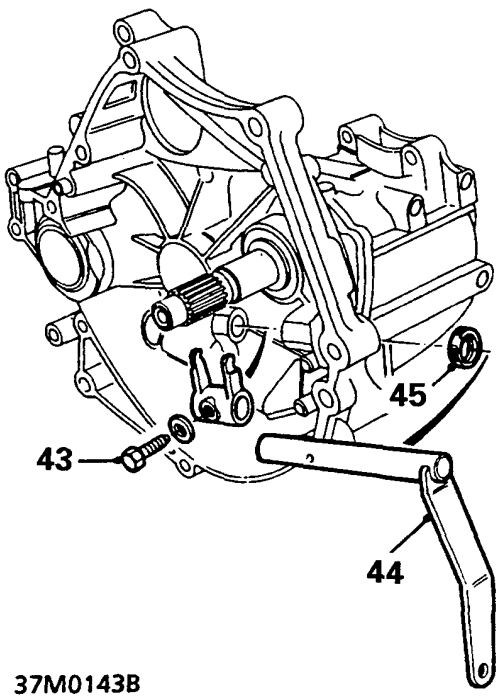
37. Remove output shaft oil guide plate.



38. Remove detent cap bolt and washer, recover detent spring and ball.

Note: *Use a stick magnet to recover ball.*

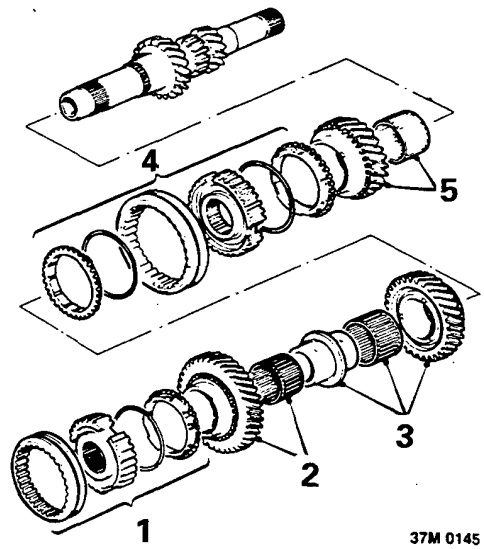
39. Remove bolt and washer securing selector shaft guide to shaft.
40. Withdraw selector shaft; remove selector shaft guide.
41. Remove gaiter from shaft.
42. Remove and discard oil seal.



43. Remove bolt and washer securing clutch release fork to release shaft.
44. Withdraw release shaft.
45. Remove and discard release shaft oil seal.

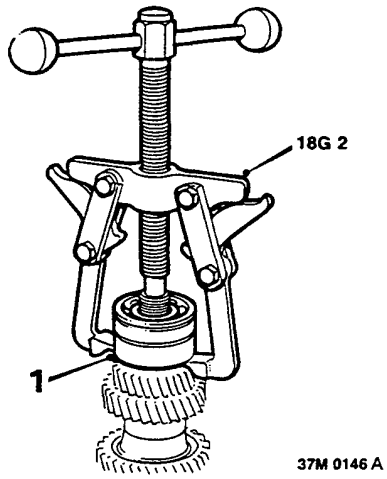
Input Shaft - Dismantling

CAUTION: *Keep component parts of each synchro assembly together.*

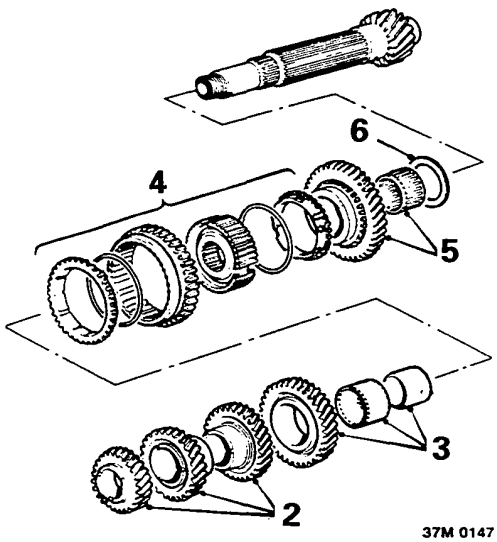


1. Remove 5th gear synchro assembly.
2. Remove 5th gear and needle bearing.
3. Remove 4th gear together with collar and needle bearing.
4. Remove 3rd/4th synchro assembly.
5. Remove 3rd gear and needle bearing.

Output Shaft



1. Remove bearings using tool **18G 2**, note type of bearing fitted; discard bearings.

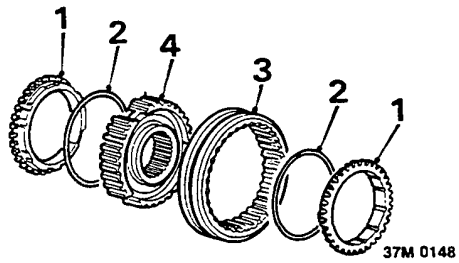


2. Remove 5th, 4th and 3rd gears.
3. Remove 2nd gear, needle bearing and collar.
4. Remove 1st/2nd synchro assembly.

CAUTION: *Keep component parts of synchro assembly together.*

5. Remove 1st gear and needle bearing.
6. Remove and retain selective thrust washer.

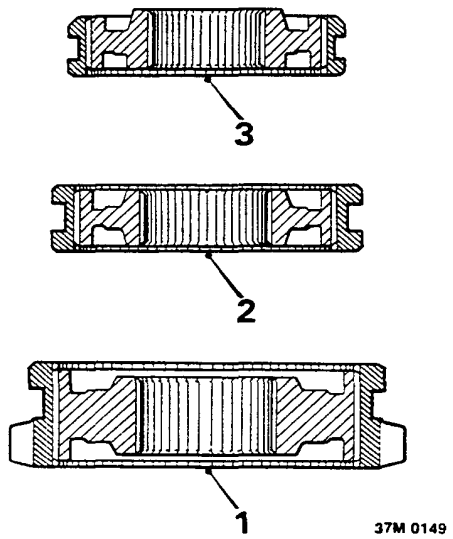
Synchro Assemblies



Synchro Assembly Components

1. Synchro ring
2. Spring spring ring
3. Synchro sleeve
4. Synchro hub

Note: *Only one synchro ring and spring ring are fitted to 5th speed synchro assembly.*

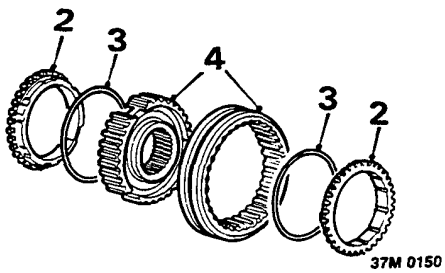


Synchro Assembly Identification

1. 1st/2nd synchro
2. 3rd/4th synchro
3. 5th synchro

CAUTION: *Keep component parts of each synchro assembly together.*

1. Suitably mark relative position of each synchro hub to its respective sleeve.



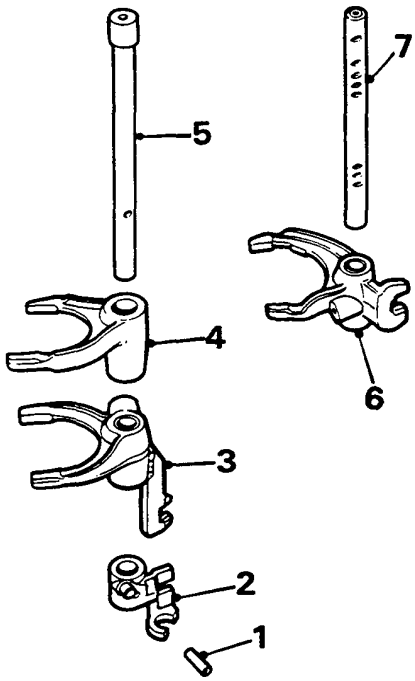
37M 0150

2. Remove 2 synchro rings.
3. Remove 2 spring rings.

Note: *Only one synchro ring and spring ring are fitted to 5th synchro.*

4. Remove synchro hub from sleeve.

Selector Shafts



37M 0151

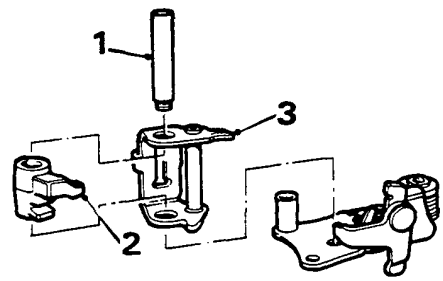
Selector Shaft Components

1. Roll pin
2. 5th/reverse gear selector
3. 3rd/4th gear selector fork
4. 5th gear selector fork
5. 5th/reverse selector shaft
6. 1st/2nd gear selector fork
7. 1st/2nd selector shaft

CAUTION: *Suitably identify each selector fork and its fitted position to the relevant selector shaft.*

1. Slide 1st/2nd gear selector fork off 1st/2nd selector shaft.
2. Slide 1st/2nd selector shaft out of 5th/reverse gear selector.
3. Using a suitable punch, remove roll pin securing 5th/reverse gear selector; discard roll pin.
4. Slide 5th/reverse gear selector off 5th/reverse selector shaft.
5. Slide 3rd/4th and 5th selector forks off 5th/reverse selector shaft.

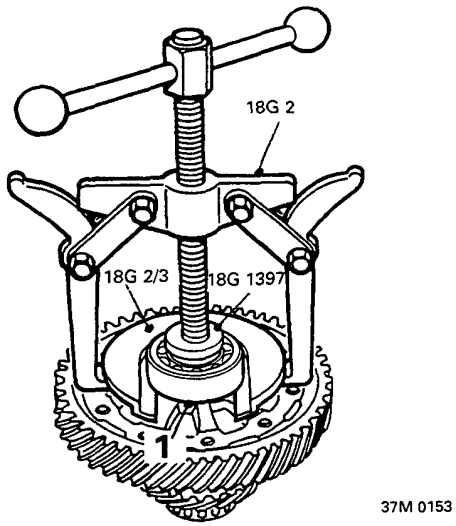
Interlock Assembly - Dismantling



37M 0152

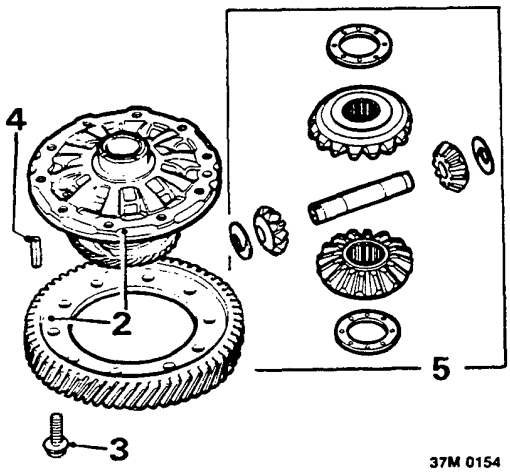
1. Withdraw shift shaft from gearshift holder and arm guide.
2. Release lug on arm guide from slot in interlock.
3. Slide gearshift holder off arm guide.

Differential Assembly - Dismantling



37M 0153

1. Remove bearings using tools **18G 2, 18G 2/3** and **18G 1397**; discard bearings.



37M 0154

2. Suitably mark fitted position of final drive gear to carrier.
3. Progressively slacken, then remove 10 bolts securing final drive gear to carrier; remove gear.
4. Using a suitable punch, remove roll pin securing pinion shaft; discard pin.
5. Remove pinion shaft, sun gears, planet gears and thrust washers; retain thrust washers – if fitted.

Note: *Selective thrust washers are fitted to planet gears, non – selective washers are fitted to sun gears.*

INSPECTING COMPONENTS

1. Clean all components ensuring all traces of RTV sealant are removed from gear case, differential housing and access plug. Ensure oil drillings in input and output shafts and oil guide plates are clear. Ensure gearbox breather is unobstructed.

Input and Output Shaft Assemblies

1. Check gears for worn or chipped teeth, cracks or uneven wear.
2. Check coning surfaces of gears for wear.
3. Check needle bearings for wear and overheating (blueing).

CAUTION: *Where any of the above are evident, all bearings on the shaft must be replaced.*

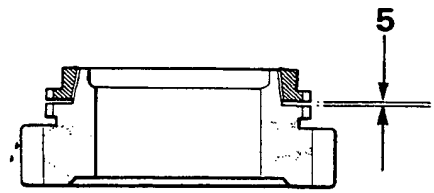
4. Check shaft splines for wear and threads of output shaft for damage.
5. Check bearing collars for wear and damage.

Reverse Idler Shaft and Gear

1. Check idler shaft for wear.
2. Check gear for wear, chipping or cracking of teeth.
3. Check needle bearings for wear, replace gear and bearings as an assembly if wear is evident.

Synchro Assemblies

1. Check component parts of each synchro assembly for wear or damage, ensure teeth on hubs and sleeves are not chipped or rounded off.
2. Ensure teeth on synchro rings are not chipped or damaged, check inner surfaces of rings for wear.
3. Ensure each hub moves freely in its respective sleeve.
4. Place a synchro ring on its respective gear cone and rotate it until it stops (approximately 10° to 20°).



37M 0155

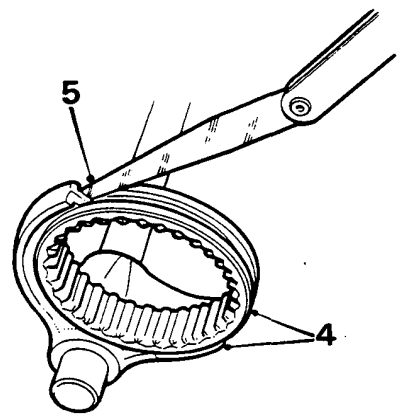
5. Measure clearance between synchro ring and gear.
   Ring to gear clearance:
   Standard = 0.85 to 1.1 mm
   (0.033 – 0.043 in)
   Service limit = 0.4 mm (0.02 in)
6. Repeat for remaining rings and gears.

CAUTION: *If any ring to gear clearance is less than above service limit, synchro assembly must be replaced.*

Selector Shafts and Forks

1. Check shafts for wear and alignment.
2. Check forks for wear, cracks or damage.
3. Check the retained detent balls and springs, there must be no visible 'flats' on the balls and springs must keep balls in contact with the staked portion of the fork.

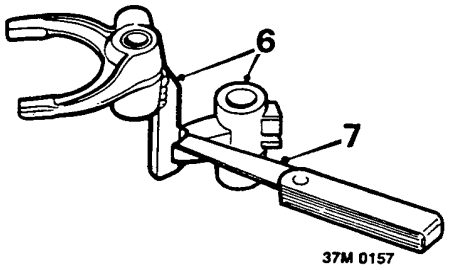
CAUTION: *It is not possible to replace balls or springs, fork must be replaced.*



37M 0156

4. Assemble each fork to its respective synchro sleeve.
5. Check clearance of fork in synchro sleeve groove.
   Fork to groove clearance:
   Standard = 0.45 to 0.65 mm
   (0.018 – 0.026 in)
   Service limit = 1.0 mm (0.04 in)

CAUTION: *If clearance is found to exceed service limit, fork must be replaced.*

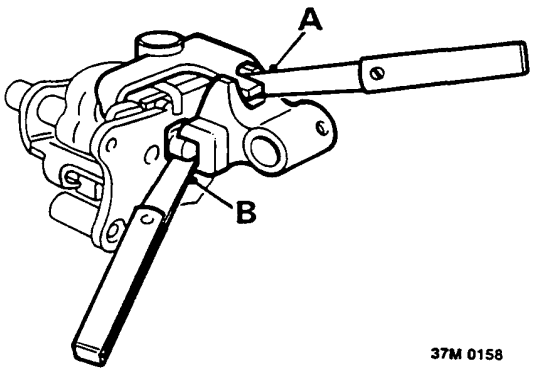


6. Assemble 5th/reverse gear selector to 3rd/4th selector fork.
7. Using feeler gauges, measure clearance between selector and fork.
   Standard = 0.2 to 0.5 mm (0.01 – 0.02 in)
   Service limit = 0.8 mm (0.03 in)
8. If clearance obtained exceeds service limit, measure width of tongue on selector.
   Standard = 11.9 to 12.0 mm (0.469 – 0.472 in)

CAUTION: *If width of tongue is within limits, selector fork must be replaced, if width of tongue is less than quoted, selector must be replaced.*

Interlock Assembly

1. Check components for wear or damage, replace assembly if necessary.



2. Assemble gearshift arm guide to interlock assembly.
3. Using feeler gauges, measure clearance **A**.
   Clearance **A**:
   Standard = 0.05 to 0.35 mm (0.002–0.014 in)
   Service limit = 0.6 mm (0.02 in)
4. If clearance exceeds service limit, check width of groove in gearshift arm guide.
   Groove width = 13.05 to 13.25 mm (0.514 – 0.522 in)

CAUTION: *If width of groove exceeds above dimension, gearshift arm guide must be replaced. If width of groove is within service limit, replace interlock assembly.*

5. Using feeler gauges, measure clearance **B** between interlock ball and gearshift arm guide.
   Clearance **B**:
   Standard = 0.05 to 0.25 mm (0.002 – 0.010 in)
   Service limit = 0.5 mm (0.02 in)
6. If clearance exceeds service limit, measure outside diameter of interlock ball.
   Interlock ball outside diameter = 12.05 to 12.15 mm (0.474 – 0.478 in)

CAUTION: *If diameter of ball is within limits, replace gearshift arm guide, if diameter of ball is less than 12.05 mm (0.474 in), replace interlock assembly.*

Differential Assembly

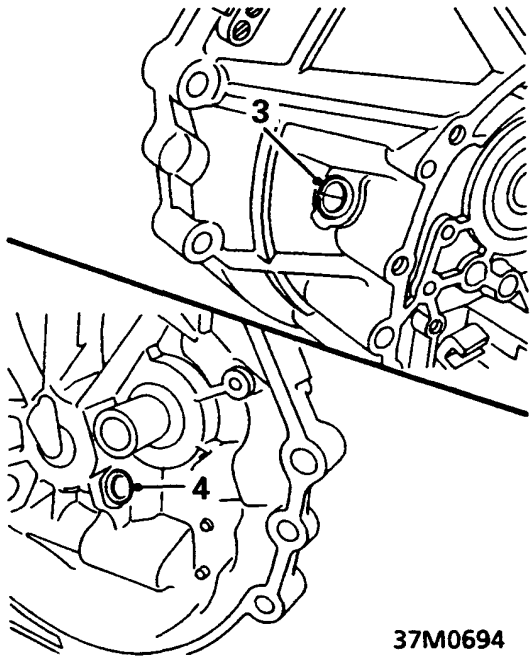
1. Check gear teeth for wear, chipping and signs of overheating.
2. Check pinion shaft for wear.

Differential Housing

1. Check housing for damage, check that locating dowels are fitted.

2. Check clutch release shaft bushes for damage or wear and that shaft is free to turn; replace if necessary using the following procedure.

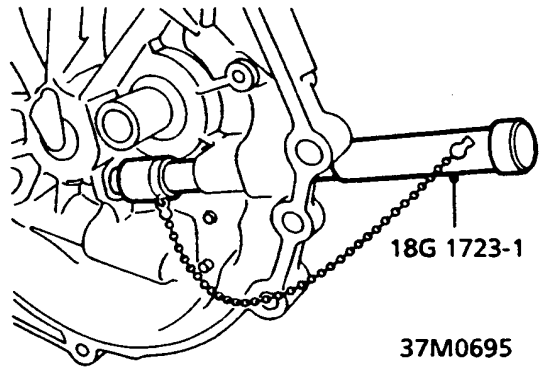
Remove



37M0694

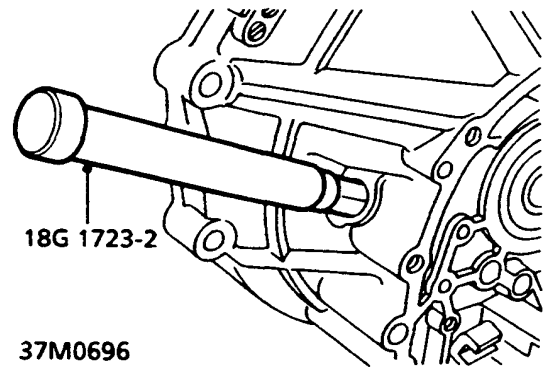
3. *Outer bush:* Using a hacksaw blade, carefully cut a longitudinal slot opposite the split in the bush; prise bush out of differential housing.
4. *Inner bush:* Carefully prise inner bush out of differential housing.

Refit



37M0695

5. *Inner bush:* Using tool **18G 1723–1**, drift inner bush into differential housing.



37M0696

6. *Outer bush:* Using tool **18G 1723–2**, drift outer bush into differential housing.

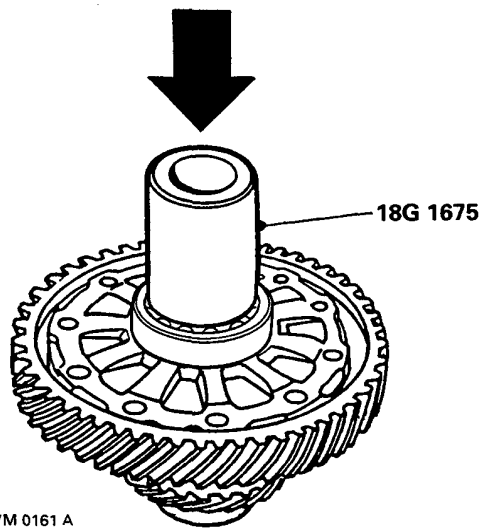
CAUTION: *Ensure end of tool **18G 1723–2** is located in inner bush.*

GEARBOX ASSEMBLY

Differential - Reassembling

1. Assemble planet gears and original thrust washers.
2. Fit sun gears and original thrust washers – if fitted.
3. Rotate gears and thrust washers to align drillings in carrier.

CAUTION: *Do not fit roll pin or final drive gear at this stage.*



4. Fit new ball bearings to carrier using tool **18G 1675**.

Note: *Larger of the two bearings is fitted on speedometer drive gear side.*

Synchro Assemblies - Reassembling

1. Assemble each synchro hub to its respective sleeve ensuring that raised teeth on sleeve are aligned with grooves in hub.
2. Fit spring rings to retain hub.

Note: *Only one spring ring is fitted on 5th speed synchro.*

3. Assemble synchro rings to their respective sleeves.

Selector Shafts - Reassembling

1. Slide 5th and 3rd/4th selector forks on to 5th/reverse selector shaft.

CAUTION: *Ensure that longest portion of selector fork lugs face away from shoulder of shaft.*

2. Slide 5th/reverse selector on to 5th/reverse selector shaft; secure selector with a new roll pin.
3. Slide 1st/2nd gear selector fork on to 1st/2nd selector shaft.
4. Locate 1st/2nd selector shaft in 5th/reverse gear selector.
5. Locate lug on shift arm guide in gearshift holder.
6. Position gearshift holder to interlock; fit shaft.

Reverse Idler Gear and Shaft - Reassembling

1. Fit a new thrust washer.
2. Smear needle bearing rollers with petroleum jelly and fit in idler gear.
3. Fit reverse idler gear to shaft.

Note: *Boss on gear must face towards thrust washer.*

Input Shaft - Reassembling

Note: *Smear needle bearing rollers with petroleum jelly prior to assembly.*

1. Fit needle bearing rollers in third gear.
2. Fit 3rd gear on shaft.
3. Fit 3rd/4th synchro assembly.
4. Fit needle bearing rollers in 4th gear, position gear on collar and fit assembly on shaft.
5. Fit needle bearing rollers in 5th gear, position gear on collar.

Note: *Boss on 5th gear must face away from 4th gear.*

6. Fit 5th synchro assembly.

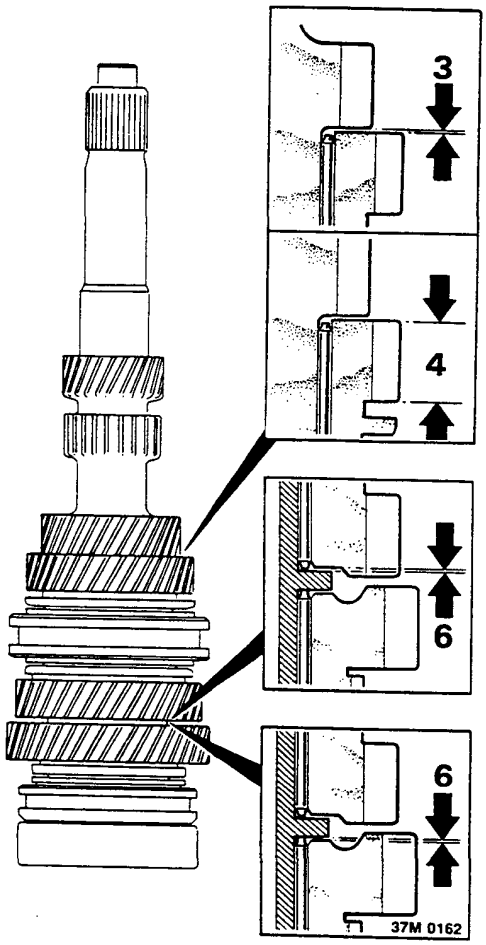
Note: *Machined groove in synchro hub must face towards 5th gear and large chamfer on synchro sleeve must face away from 5th gear.*

7. Fit a new input shaft bearing.

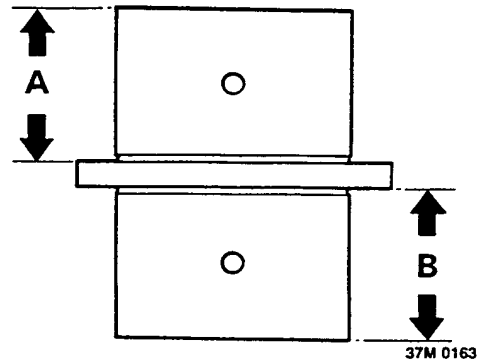
Input Shaft Gear End – float – Check

1. Position input shaft on bed of a hand press with bearing located on a suitable socket.
2. Apply downward pressure to input shaft.

Note; *Maintain pressure whilst checks are carried out.*



3. Using feeler gauges, measure clearance between 2nd and 3rd gears.
   3rd gear clearance:
   Standard = 0.06 to 0.21 mm
   (0.002 – 0.008 in)
   Service limit = 0.3 mm (0.01 in)
4. If clearance exceeds service limit, measure thickness of 3rd gear.
   3rd gear thickness:
   Standard = 35.42 to 35.47 mm
   (1.394 – 1.396 in)
   Service limit = 35.30 mm (1.390 in)
5. If 3rd gear thickness is greater than service limit, replace 3rd gear synchro assembly; if thickness is less than service limit, replace 3rd gear.
6. Using feeler gauges, measure clearance between the spacer collar and 4th gear and spacer collar and 5th gear.
   4th and 5th gear clearance:
   Standard = 0.06 to 0.21 mm
   (0.002 – 0.008 in)
   Service limit = 0.3 mm (0.01 in)



7. If clearance of either gear exceeds service limit measure length of appropriate side of spacer collar **A** or **B**.
   Length A = 4th gear side
   Length B = 5th gear side
   Spacer collar length **A** or **B**:
   Standard = 26.03 to 26.08 mm
   (1.025 – 1.027 in)
   Service limit = 26.01 mm (1.024 in)
8. If length **A** exceeds service limit, measure thickness of 4th gear.
   4th gear thickness:
   Standard = 30.92 to 30.97 mm
   (1.217 – 1.219 in)
   Service limit = 30.80 mm (1.213 in)
9. If thickness of 4th gear exceeds service limit, replace 3rd/4th synchro assembly; if thickness of gear is less than service limit, replace gear.
10. If length **B** exceeds service limit, measure thickness of 5th gear.
    5th gear thickness:
    Standard = 30.42 to 30.47 mm
    (1.198 – 1.200 in)
    Service limit = 30.30 mm (1.193 in)
11. If thickness of 5th gear exceeds service limit, replace 5th synchro assembly; if thickness of gear is less than service limit, replace gear.

Output Shaft - Reassembling

Note: Smear needle bearing rollers with petroleum jelly prior to assembly.

1. Measure and record thickness of original thrust washer.
2. Fit original thrust washer on shaft.
3. Fit needle bearing rollers in 1st gear.
4. Fit 1st gear on shaft.
5. Fit 1st/2nd synchro assembly.

CAUTION: Ensure reverse gear on synchro sleeve is adjacent to 1st gear.

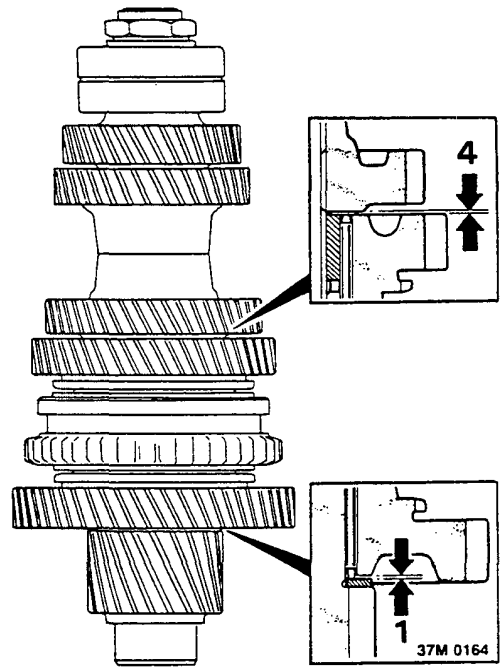
6. Measure and record length of 2nd gear collar.
7. Fit 2nd gear collar on shaft ensuring lubrication groove is towards 1st/2nd synchro assembly.
8. Fit needle bearing rollers in 2nd gear.
9. Fit 2nd gear on shaft.
10. Fit 3rd and 4th gears ensuring that bosses on gears are adjacent to each other.
11. Fit 5th gear ensuring that large boss on gear is towards threaded portion of shaft.
12. Fit new output shaft bearings ensuring that snap ring groove in ball race is towards threaded portion of shaft.

CAUTION: Ensure that replacement bearings are the same as originally fitted. Where a roller bearing and single ballrace is to be fitted, the single ballrace must be adjacent to threaded portion of shaft.

13. Fit a new tongued washer with dished side of washer towards bearing.
14. Secure final drive pinion of shaft in a soft-jawed vice.
15. Fit a new nut and tighten to 110 Nm (11.2 kgf·m, 81.1 lbf·ft).

Note: Nut has a L.H. thread; do not stake nut at this stage.

Output Shaft Gear End - float - Check



1. Using feeler gauges measure clearance between 1st gear and thrust washer.
   Standard = 0.03 to 0.08 mm (0.001 – 0.003 in)
   Service limit = 0.18 mm (0.007 in)
2. From clearance obtained, calculate thickness of thrust washer required to give correct clearance. If clearance obtained exceeds service limit, fit a thicker thrust washer; if it is less than 0.03 mm (0.001 in), fit a thinner thrust washer.

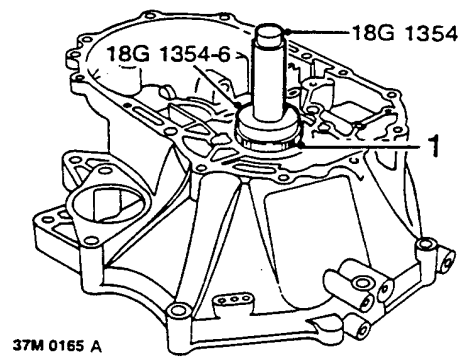
Note: Thrust washers are available as follows: 1.96 to 2.08 mm (0.077 – 0.082 in) thick in increments of 0.03 mm (0.001 in).

3. Select a thrust washer of the required thickness to bring end-float within limits.
4. Using feeler gauges measure clearance between 2nd and 3rd gears.
   2nd/3rd gear clearance = 0.03 to 0.10 mm (0.001 – 0.004 in)
5. If clearance exceeds figure given, it will be necessary to fit a shorter 2nd gear collar; if clearance is less than figure given, it will be necessary to fit a longer collar.
6. Compare length of original collar and select a collar which will provide specified clearance. Collars are available in the following lengths:
   28.99 mm (1.141 in) and 29.04 mm (1.143 in)

7. Having determined thickness of selective thrust washer and length of 2nd gear collar required, fit thrust washer and collar.
8. Secure output shaft nut by staking.

INPUT SHAFT END - THRUST

Input Shaft End-thrust - Check and Adjust



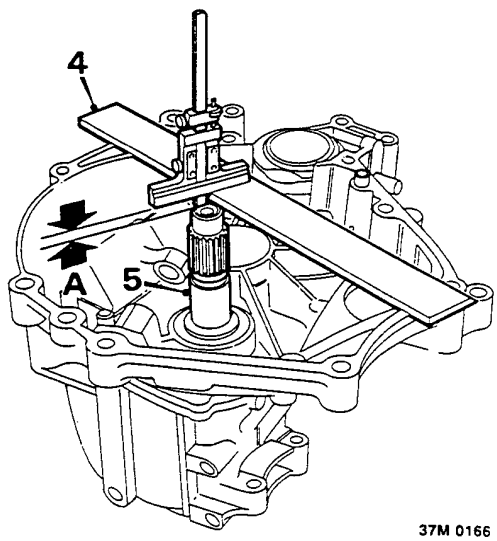
1. Fit a new input shaft bearing in differential housing using tools **18G 1354** and **18G 1354 - 6.**

CAUTION: Do not fit oil seal at this stage.

2. Position input shaft assembly in differential housing ensuring it is fully inserted in bearing.

***Note:** Position housing so that end of shaft is clear of bench.*

3. Fit gear case, fit and tighten bolts to 45 Nm (4.6 kgf·m, 33.2 lbf·ft).



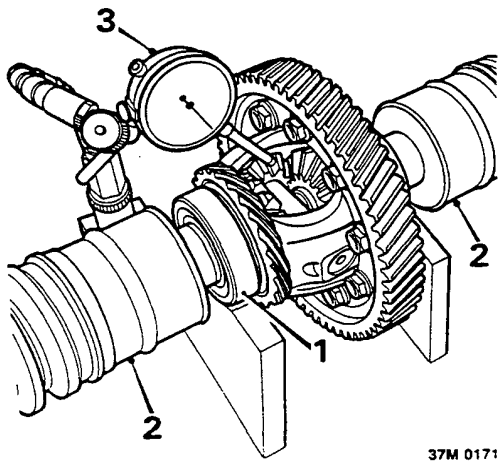
4. Position a straight edge and depth gauge across face of differential housing.
5. Pull input shaft into differential housing and position end of depth gauge on end of shaft; record measurement shown on gauge.
6. Push input shaft towards gear case, record measurement shown on gauge.
7. Subtract thickness of straight edge from above readings.
8. Subtract first measurement from second measurement; record figure obtained. Call the resultant figure **A.**
9. Calculate thickness of circlip(s) required by subtracting 0.97 mm (0.038 in) from dimension **A.**
   Input shaft end thrust = 0.14 to 0.21 mm (0.006 - 0.008 in)
10. Select circlip(s) from sizes available which equal thickness required. Fourteen circlips are available ranging from 0.5 mm to 1.15 mm (0.020 - 0.045 in) thick in increments of 0.05 mm (0.002 in).

***CAUTION:** No more than two circlips may be fitted. It may not always be possible to select the exact thickness of circlips required; where this occurs, always fit a slightly thinner pack to avoid pre - loading bearings.*

11. Remove bolts securing gear case; remove gear case.
12. Remove input shaft assembly.

DIFFERENTIAL ASSEMBLY - ADJUST

Pinion Gear Backlash - Check and Adjust



1. Position differential assembly with bearings located in V blocks.
2. Fit both inboard drive shaft joints to align gears.
3. Assemble a D.T.I. gauge with stylus of gauge contacting one of the planet gears; zero the gauge.
4. Measure and record planet gear backlash.
5. Repeat procedure for other planet gear.
6. Compare backlash figures obtained with the following:
   Planet gear backlash = 0.05 to 0.15 mm (0.002 – 0.006 in)
7. If backlash is not as specified, remove planet gears, measure thickness of original thrust washers and from figures obtained, calculate thickness of thrust washers required to give correct backlash.

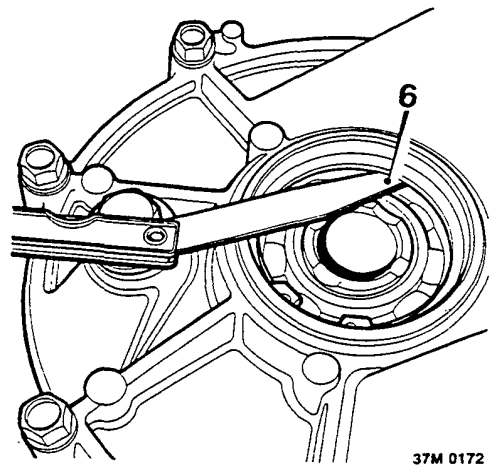
Note: *Thrust washers are available from 0.70 to 0.90 mm (0.028 – 0.035 in) thick in increments of 0.20 mm (0.008 in).*

CAUTION: *Thrust washers selected must be of equal thickness.*

8. Fit selected thrust washers, secure pinion shaft with a new pin.
9. Fit final drive gear to carrier ensuring reference marks are aligned.
10. Fit 10 bolts and tighten progressively to 110 Nm (11.2 kgf·m, 81.1 lbf·ft).

Differential Bearing Pre–load – Check and Adjust

1. Position original selective circlip in gear case.
2. Position differential assembly in differential housing.
3. Fit gear case, fit and tighten bolts to 45 Nm (4.6 kgf·m, 33.2 lbf·ft).
4. Lightly drive differential assembly into gear case to seat circlip.
5. Lightly drive differential into differential housing to settle bearing.



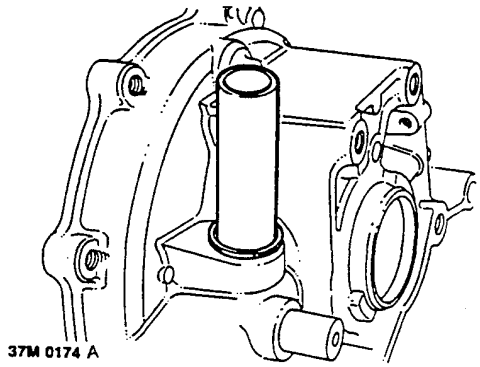
6. Using feeler gauges measure and record clearance between circlip and bearing outer face.
   Correct clearance = 0.15 mm (0.006 in) maximum
7. If clearance is not as specified, select the appropriate circlip from the range available.

Note: *Circlips are available from 2.50 to 3.00 mm (0.098 – 0.118 in) thick in increments of 0.10 mm (0.004 in).*

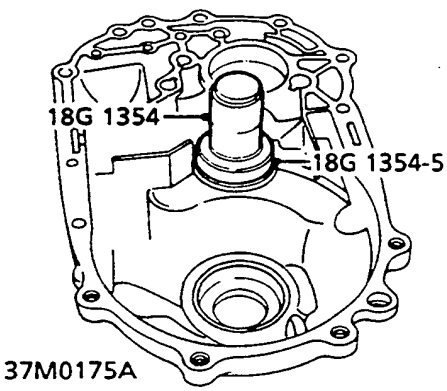
8. Remove original circlip through oil seal aperture using tool **18G 1392.**
9. Fit selected circlip using tool **18G 1392.**
10. Re – check bearing pre – load using above procedure.
11. Remove differential assembly, retain selected circlip.

GEARBOX REASSEMBLING

1. Lightly lubricate all components with gearbox oil.

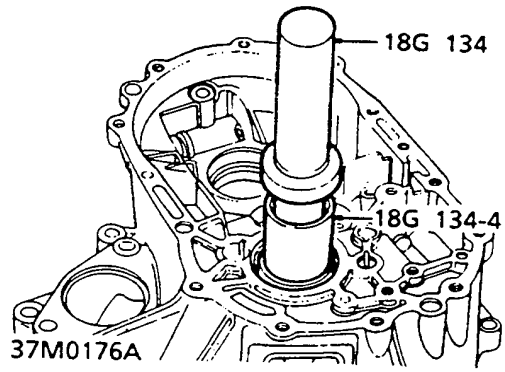


2. Using a suitable piece of tubing, fit a new selector shaft oil seal.
3. Fit output shaft oil guide plate in differential housing.

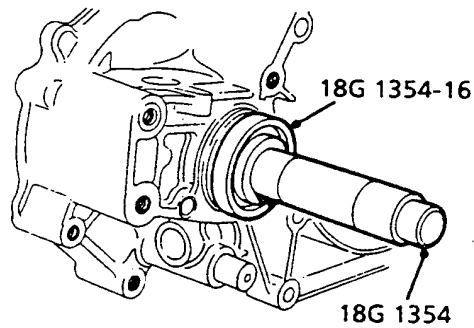


4. Fit a new output shaft bearing in differential housing using tools **18G 1354** and **18G 1354 – 5.**

Note: *Oil holes in bearing must face towards output shaft.*



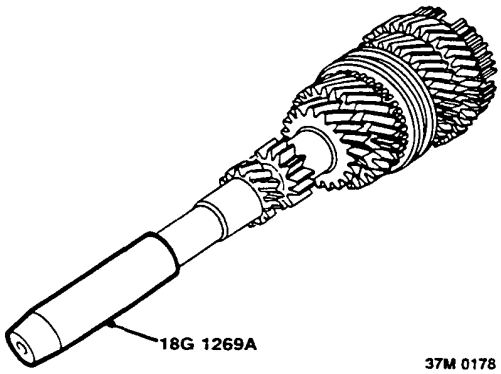
5. Fit a new input shaft oil seal in differential housing using tools **18G 134** and **18G 134 – 4.**



6. Fit a new differential oil seal in differential housing using tools **18G 1354** and **18G 1354 – 16.**
7. Fit output shaft bearing retaining plate.

CAUTION: *Ensure side marked TOP is facing towards output shaft.*

8. Fit selector shaft and selector shaft guide.
9. Fit and tighten dowel bolt to 28 Nm (2.9 kgf·m, 20.7 lbf·ft).
10. Fit detent ball, spring and cap bolt, tighten bolt to 22 Nm (2.2 kgf·m, 16.2 lbf·ft).
11. Position differential assembly into housing.



12. Fit seal protector, tool **18G 1269A** to input shaft.
13. Place input and output shafts together and fit assembly in differential housing.

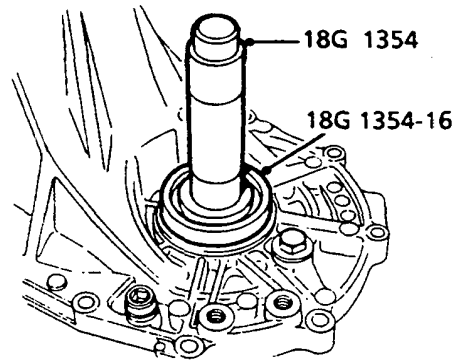
Note: *Position housing so that when fitted, end of input shaft is clear of bench.*

14. Remove tool **18G 1269A.**
15. Ensure output shaft nut is staked.
16. Position gears in neutral.
17. Raise both shafts slightly and fit selector forks assembly ensuring forks are located in grooves in synchro sleeves.
18. Fit reverse idler gear, thrust washer and shaft.

Note: *Large boss on idler gear must be towards differential housing.*

19. Fit reverse selector fork and bracket.
20. Fit and tighten retaining bolts.
21. Fit interlock assembly ensuring base of interlock locates in slot at lower end of 1st/2nd selector shaft.
22. Fit and tighten interlock retaining bolts.

CAUTION: *Ensure shoulder bolt is fitted in its correct location.*



23. Fit new differential oil seal in gear case using tools **18G 1354** and **18G 1354 – 16.**
24. Fit input shaft oil guide plate in gear case.
25. Fit a new Belleville washer and selected circlip(s).
26. Fit new output shaft circlip in gear case.
27. Fit selected circlip in differential bearing recess in gear case.
28. Apply a bead of RTV silicone sealant to mating face of gear case.
29. Position gear case over differential housing keeping gear case square to housing.
30. Lower gear case into position and at the same time, expand output shaft bearing circlip using tool **18G 1392.**
31. Push gear case fully down on to differential housing.
32. Ensure circlip is fully seated in groove in output shaft bearing, raise output shaft and a click will be heard as circlip enters groove.
33. Fit and progressively tighten gear case bolts to 45 Nm (4.6 kgf·m, 33.2 lbf·ft).
34. Fit reverse idler shaft bolt and tighten to 67 Nm (6.8 kgf·m, 49.4 lbf·ft). Use a new washer.
35. Apply thread sealant to access plug, fit and tighten plug using tool **18G 1472.**
36. Fit reverse light switch and new washer.
37. Fit speedometer drive pinion and housing, use a new 'O' ring: tighten bolt to 15 Nm (1.5 kgf·m, 11.1 lbf·ft).
38. Fit new clutch release shaft oil seal.
39. Fit clutch release shaft and fork.
40. Fit and tighten bolt to 29 Nm (3.0 kgf·m, 21.4 lbf·ft).

DATA

Reverse idler gear to selector fork clearance	0.5 to 1.1 mm (0.02 – 0.04 in)
Selector fork prong width	13.0 to 13.3 m (0.51 – 0.52 in)
Selector fork groove to pin clearance:	
Standard	0.05 to 0.35 mm (0.002 – 0.014 in)
Service limit	0.5 mm (0.02 in)
Selector fork groove width	7.05 to 7.25 mm (0.278 – 0.285 in)
Interlock shift arm to guide clearance:	
Standard	0.2 to 0.3 mm (0.008 – 0.012 in)
Service limit	0.55 mm (0.022 in)
Interlock shift guide groove width	8.1 to 8.2 mm (0.319 – 0.323 in)
Synchro ring to gear clearance:	
Standard	0.85 to 1.1 mm (0.033 – 0.043 in)
Service limit (minimum clearance)	0.4 mm (0.02 in)
Selector shaft forks in synchro sleeve grooves clearance:	
Standard	0.45 to 0.65 mm (0.018 – 0.026 in)
Service limit	1.0 mm (0.04 in)
Selector to fork clearance:	
Standard	0.2 to 0.5 m (0.01 – 0.02 in)
Service limit	0.8 mm (0.03 in)
Selector tongue width	11.9 to 12.0 mm (0.469 – 0.472 in)
Gearshift arm guide to interlock assembly clearance:	
Standard	0.05 to 0.35 mm (0.002 – 0.014 in)
Service limit	0.6 mm (0.02 in)
Gearshift arm guide groove width	13.05 to 13.25 mm (0.514 – 0.522 in)
Interlock ball to gearshift arm guide clearance:	
Standard	0.05 to 0.25 mm (0.002 – 0.010 in)
Service limit	0.5 mm (0.02 in)
Interlock ball outside diameter	12.05 to 12.15 mm (0.474 – 0.478 in)
2nd to 3rd gear clearance:	
Standard	0.06 to 0.21 mm (0.002 – 0.008 in)
Service limit	0.3 mm (0.01 in)
3rd gear thickness:	
Standard	35.42 to 35.47 mm (1.394 – 1.396 in)
Service limit	35.30 mm (1.390 in)
4th to 5th gear clearance:	
Standard	0.06 to 0.21 mm (0.002 – 0.008 in)
Service limit	0.3 mm (0.01 in)
Spacer collar length:	
Standard	26.03 to 26.08 m (1.025 – 1.027 in)
Service limit	26.01 mm (1.024 in)
4th gear thickness:	
Standard	30.92 to 30.97 mm (1.217 – 1.219 in)
Service limit	30.80 mm (1.213 in)
5th gear thickness	
Standard	30.42 to 30.47 mm (1.198 – 1.200 in)
Service limit	30.30 mm (1.193 in)
1st gear to thrust washer clearance:	
Standard	0.03 to 0.08 mm (0.001 – 0.003 in)
Service limit	0.18 mm (0.007 in)
2nd to 3rd gear clearance	0.03 to 0.10 mm (0.001 – 0.004 in)

Input shaft end thrust	0.14 to 0.21 mm (0.006–0.008 in)
Planet gear backlash	0.05 to 0.15 mm (0.002–0.006 in)
Differential bearing to circlip clearance	0.15 mm (0.006 in) maximum

TORQUE SETTINGS

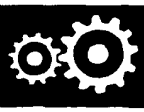
Final drive pinion nut	110 Nm (11.2 kgf·m, 81.1 lbf·ft)
Differential housing to gearcase bolts	45 Nm (4.6 kgf·m, 33.2 lbf·ft)
Selector shaft guide to selector shaft bolt	28 Nm (2.9 kgf·m, 20.7 lbf·ft)
Cap bolts – detent balls and springs	22 Nm (2.2 kgf·m, 16.2 lbf·ft)
Reverse idler shaft bolt	67 Nm (6.8 kgf·m, 49.4 lbf·ft)
Speedometer drive pinion, retaining plate bolt	15 Nm (1.5 kgf·m, 11.1 lbf·ft)
Clutch release shaft pivot bolt	29 Nm (3.0 kgf·m, 21.4 lbf·ft)
Final drive gear to carrier bolts	110 Nm (11.2 kgf·m, 81.1 lbf·ft)
Output shaft bearing retainer bolts – if fitted	8 Nm (0.8 kgf·m, 5.9 lbf·ft)

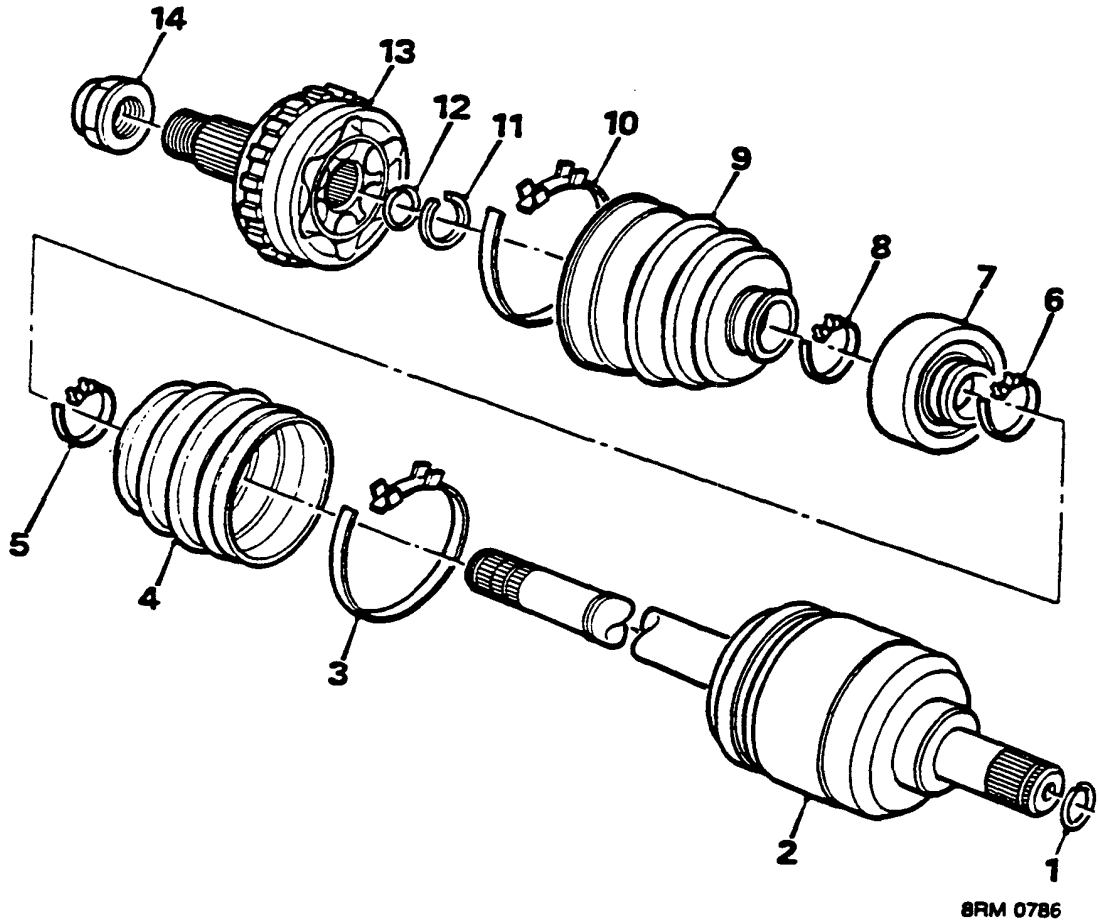
TOOL NUMBERS

18G 2	General purpose puller
18G 2/3	Adapter – Differential bearing remover
18G 134	Driver handle (main tool)
18G 134–4	Input shaft oil seal replacer
18G 191–6	Adapter plate – Differential and float
18G 284	Slide hammer
18G 284–17	Adapter – Slide hammer
18G 1269A	Oil seal protector sleeve
18G 1354	Driver handle (main tool)
18G 1354–5	Bearing replacer
18G 1354–6	Adapter – Input shaft differential bearing
18G 1354–16	Adapter – Differential oil seal replacer
18G 1392	Circlip pliers
18G 1397	Bearing puller thrust pad
18G 1472	14 mm Hex key access plug
18G 1473	Anti–spread plate
18G 1527	Turning tool – Differential bearing pre–load
18G 1528	Dial gauge base
18G 1675	Differential bearing replacer
MS 103	Pre–load gauge
18G 1723–1	Clutch release shaft inner bush replacer
18G 1723–2	Clutch release shaft outer bush replacer

DRIVE SHAFTS

CONTENTS





DRIVE SHAFT COMPONENTS

1. Circlip
2. Inner joint and shaft
3. Large clip - inner joint gaiter
4. Gaiter
5. Small clip - inner joint gaiter
6. Damper clip
7. Dynamic damper
8. Small clip - outer joint gaiter
9. Gaiter
10. Large clip - outer joint gaiter
11. Stopper ring
12. Circlip
13. Outer joint
14. Drive shaft nut

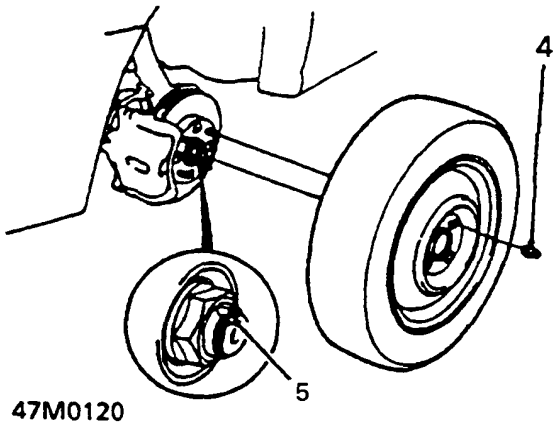
OPERATION

Drive from the power unit is transmitted to the front wheels by unequal length drive shafts. The RH drive shaft is longer than the LH and both are fitted with a dynamic damper to reduce harmonic vibration.

The inner joint is of the tripode type with spherical bushing to reduce sliding resistance. The inner joint and shaft are serviced as an assembly. The outer joint is of the ball and socket type and can be serviced independantly. Both joints are pre-packed with a special grease and sealed by a gaiter.

DRIVE SHAFT

Remove

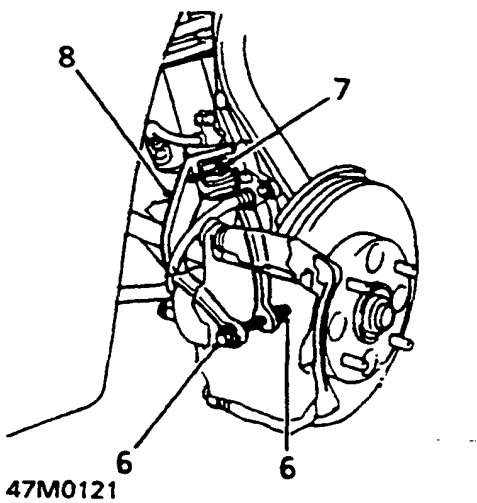


47M0120

1. Slacken wheel nuts slightly.
2. Raise front of vehicle.

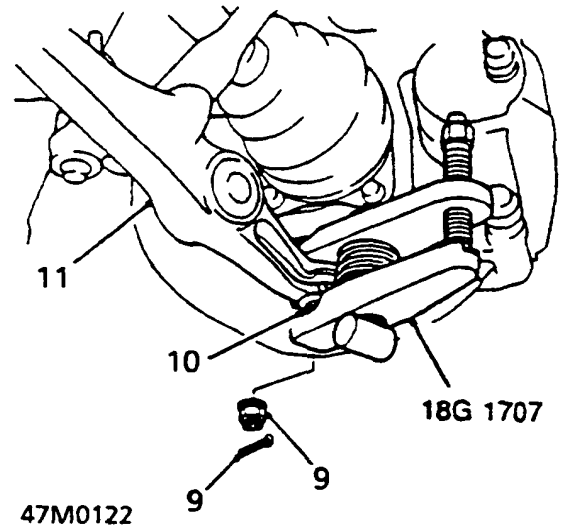
WARNING: Support on safety stands.

3. Remove LH under tray, see **BODY - Repairs.**
4. Remove wheel nuts and front wheel.
5. Raise locking tab on drive shaft nut, then remove and discard nut.



47M0121

6. Remove damper fork nut and bolt and discard nut.
7. Remove damper pinch bolt.
8. Remove damper fork and check for damage.

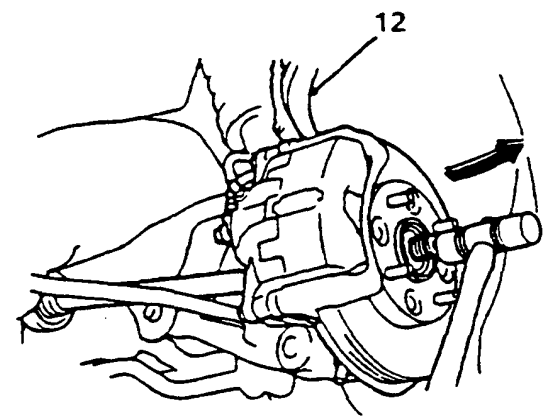


47M0122

9. Remove split pin and castle nut from lower arm ball joint. Discard split pin.
10. Fit a 12 mm hex nut on the ball joint and flush with the ball joint pin end, to protect ball joint thread.
11. Use ball joint remover **18G 1707** to separate ball joint and lower arm.

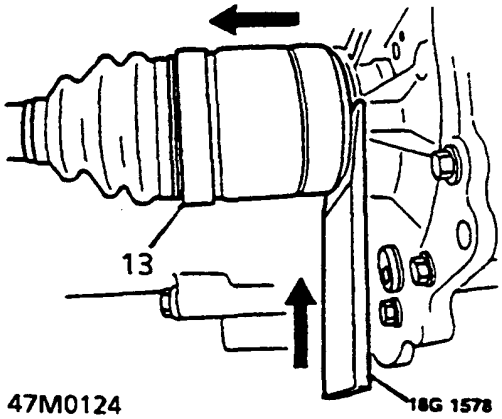
CAUTION: *Be careful not to damage ball joint boot. Ensure bar on tool is at right angles as shown.*

Note: *If necessary, apply penetrating type lubricant to loosen the ball joint.*



47M0123

12. Pull knuckle outward and release the drive shaft outboard joint from the front wheel hub using a mallet.

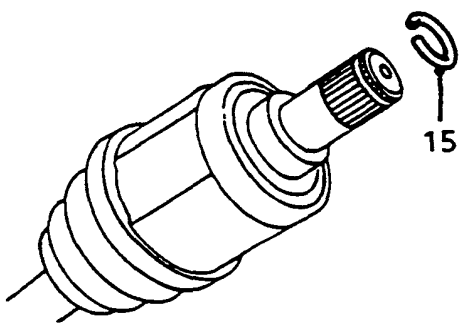


47M0124

13. Using tool **18G 1578**, release drive shaft from differential.

CAUTION: *Withdraw drive shaft joint horizontally to avoid damage to differential oil seal.*

14. Remove drive shaft.

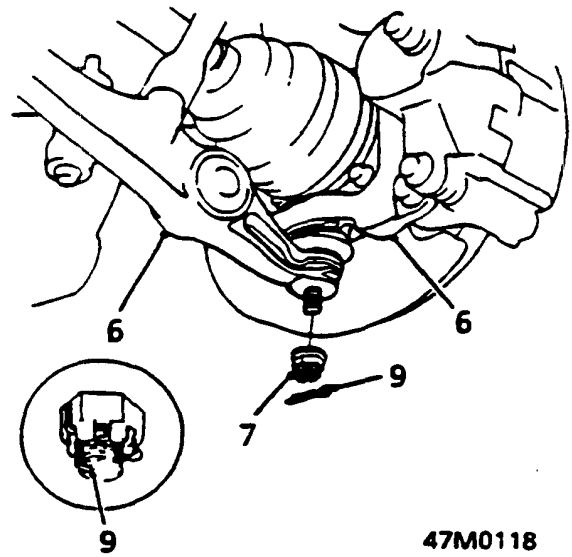


47M0125

15. Remove and discard circlip from groove in drive shaft.
16. Secure plastic bag over each joint to prevent damage and contamination.

Refit

1. Clean drive shaft ends, hub and differential oil seal.
2. Fit NEW circlip to groove in drive shaft.
3. Lubricate oil seal running surfaces.
4. Install outboard joint in knuckle, fit but do not tighten NEW driveshaft nut.
5. Insert inboard end of drive shaft into differential and push fully home until circlip locks in differential groove.

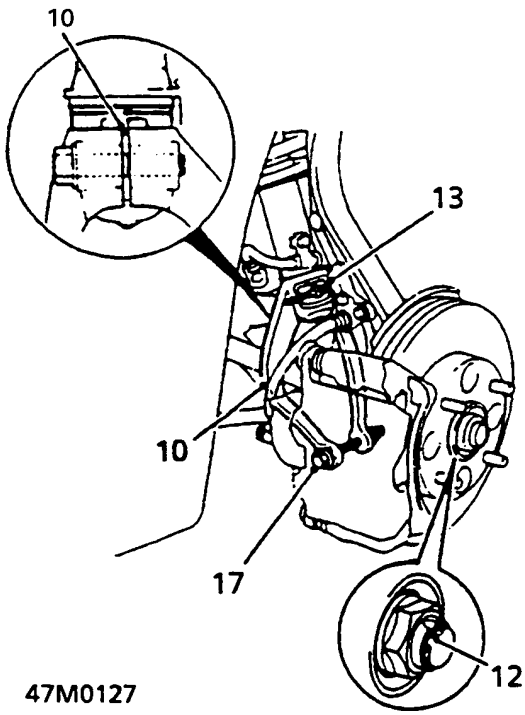


47M0118

6. Connect lower arm to front knuckle.

CAUTION: *Be careful not to damage ball joint boot.*

7. Fit castle nut to ball joint and tighten to 50 N·m (5.1 kgf·m, 36.9 lbf·ft).
8. Tighten castle nut to align slot with split pin hole. Do not align nut by loosening.
9. Fit new split pin and bend to secure as shown.



47M0127

10. Position damper fork over drive shaft and onto lower arm. Insert damper in damper fork so aligning tab is aligned with slot in the damper fork.
11. Fit damper pinch bolt, damper fork bolt and NEW nut, but do not tighten.

CAUTION: *The bolts and nut should be tightened with the vehicle's weight on the damper.*

12. Apply foot brake to prevent rotation of hub, fit and tighten NEW driver shaft nut to 250 N·m (25.5 kgf·m, 184.4 lbf·ft). Stake nut to shaft.
13. Tighten damper pinch bolt to 44 N·m (4.5 kgf·m, 32.5 lbf·ft).
14. Fit road wheel and tighten nuts to 110 N·m (11.2 kgf·m, 81.1 lbf·ft).
15. Fit LH under tray, see **BODY - Repairs**.
16. Remove stand(s) and lower vehicle.
17. Tighten damper fork nut and bolt to 65 N·m (6.6 kgf·m, 47.9 lbf·ft).
18. Refill the gearbox with recommended oil, see **MAINTENANCE**.
19. Check front wheel alignment and adjust if necessary, Refer to **REPAIR MANUAL**, see **SUSPENSION**.

OUTER JOINT, GAITER AND DAMPER

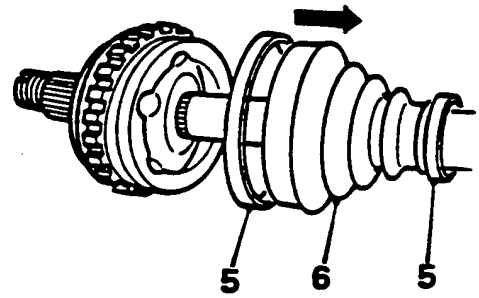
Service Repair No.
Outer joint - 47.10.04
Gaiter - 47.10.03
Damper - 47.10.33

Remove

1. Raise front of vehicle, one side.

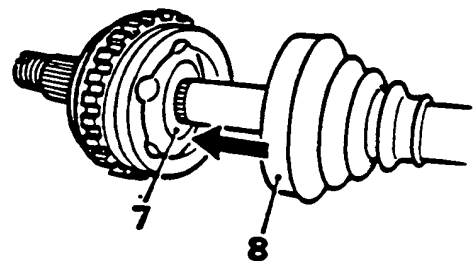
WARNING: Support on safety stands.

2. Remove road wheel(s).
3. Remove drive shaft, see **Drive shaft**.
4. Place drive shaft in a vice.



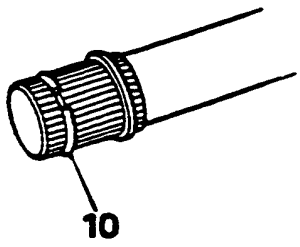
8RM 0798

5. Release both gaiter clips and discard.
6. Slide gaiter along shaft to gain access to outer joint.



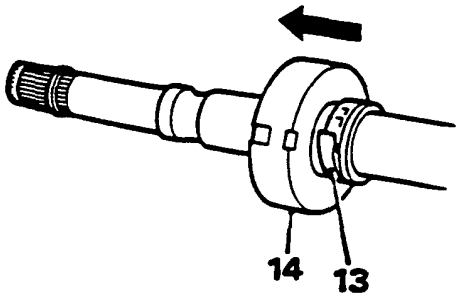
8RM 0799

7. Bend joint and, using a suitable drift against the inner part of joint, remove joint from shaft.
8. Slide gaiter from shaft.
9. Inspect gaiter for signs of damage and renew if necessary.



8RM 0800

10. Remove and discard circlip from drive shaft.
11. Clean shaft with emery cloth to remove rust.
12. Lubricate shaft with liquid soap to aid damper removal.

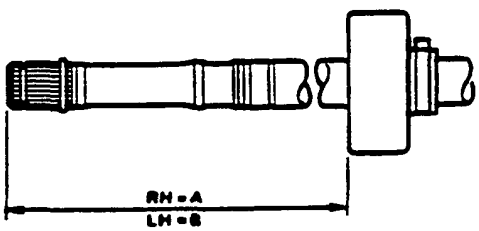


8RM 0801

Damper

13. Release damper securing clip and discard it.
14. Slide damper from shaft.
15. Clean joint and shaft end.

Refit



8RM 0802

1. Measure along shaft for fitting of damper.
   RH shaft '**A**' = 264 – 270 mm (10.4 – 10.6 in)
   LH shaft '**B**' = 221 – 227 mm (8.7 – 8.9 in)
2. Mark the shaft for fitting position.
3. Lubricate shaft to aid fitting of damper.
4. Position new clip on shaft.
5. Fit damper to shaft with flange facing inner joint.

Note: *Dampers for LH and RH shafts are not interchangeable.*

6. Fit clip around damper flange.
7. Secure damper with clip.
8. Clean lubricant from shaft.
9. Fit new circlip to shaft.
10. Fit gaiter to shaft.
11. Position outer joint to shaft, use a screwdriver to press circlip into its groove and push joint fully onto shaft.
12. Smear grease from the sachet around joint.
13. Position gaiter to joint and use a Band-it thriftool to secure the 2 new clips.
14. Fit drive shaft, see **Drive shaft.**
15. Fit road wheel and tighten nuts to 110 N·m (11.2 kgf·m, 81.1 lbf·ft).
16. Remove stand(s) and lower vehicle.

DRIVE SHAFT AND INNER JOINT AND GAITER

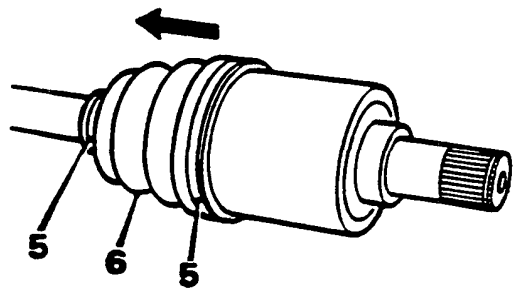
Service Repair No.
Drive shaft and inner joint - 47.10.25
Gaiter - 47.10.16

Remove

1. Raise front of vehicle, one side.

WARNING: Support on safety stands.

2. Remove road wheel(s).
3. Remove drive shaft, see **Drive shaft.**
4. Place drive shaft in a vice and remove outer joint, gaiter and damper.



8RM 0804

5. Release both inner joint gaiter clips and discard.
6. Slide gaiter from shaft.
7. Inspect gaiter for signs of damage and renew if necessary.
8. Clean shaft and joint.

Refit

1. Fit gaiter to shaft.
2. Smear grease from sachet around joint.
3. Position gaiter to joint and use a Band-it thriftool to secure 2 new clips.
4. Fit damper, gaiter and outer joint.
5. Fit drive shaft, see **Drive shaft.**
6. Remove stand(s) and lower vehicle.
7. Fit road wheel and tighten nuts to 110 N·m (11.2 kgf·m, 81.1 lbf·ft).

TORQUE SETTINGS

Front lower ball joint castle nut	50 N·m (5.1 kgf·m, 36.9 lbf·ft)*
Damper fork pinch bolt	44 N·m (4.5 kgf·m, 32.5 lbf·ft)
Damper fork bolt to lower arm nut	65 N·m (6.6 kgf·m, 47.9 lbf·ft)
Drive shaft nut	250 N·m (25.5 kgf·m, 184.4 lbf·ft)
Road wheel nuts	110 N·m (11.2 kgf·m, 81.1 lbf·ft)

* Align to next pin hole.

TOOL NUMBERS

18G 1578	Drive shaft remover
18G 1707	Ball Joint Separator

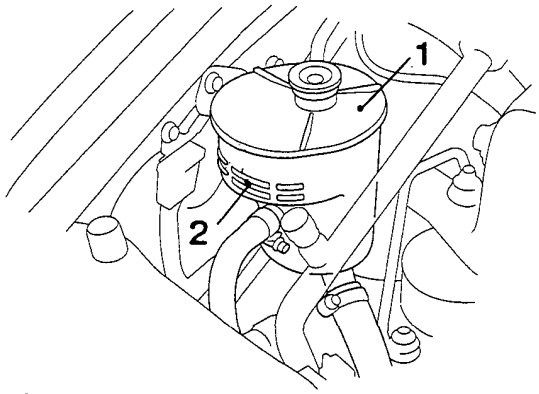
*STEERING

CONTENTS

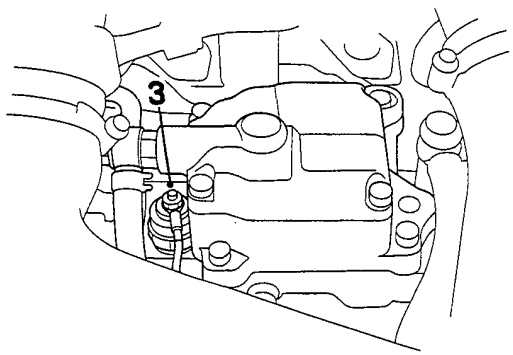
POWER STEERING SYSTEM - BLEED

Service Repair No. 57.15.02

Bleed



1. Clean reservoir around filler cap and fluid level indicators.
2. Visually check fluid level is between level indicators, top up if necessary with Genuine Honda Power Steering Fluid-V.



3. Remove nut and disconnect fuel shut – off solenoid lead from injector pump.
4. Crank engine for 5 seconds to prime steering pump.
5. Top up reservoir.
6. Turn steering to RH lock, crank engine for 5 seconds.
7. Top up reservoir.
8. Turn steering to LH lock, crank engine for 5 seconds.
9. Top up reservoir.
10. Connect fuel shut – off solenoid lead to injector pump and secure with nut.
11. Start and run engine for 2 minutes, then turn steering to full LH and RH lock.

CAUTION: *Do not hold steering at full lock for more than 10 seconds.*

12. Switch off engine.
13. Check steering fluid, if aerated, wait until fluid is free from bubbles, then top up reservoir.
14. Start and run engine for 2 minutes, then turn steering to LH and RH full lock.

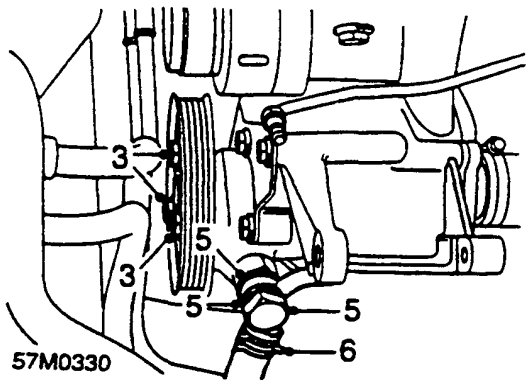
CAUTION: *Do not hold steering at full lock for longer than 10 seconds.*

15. Switch off engine.
16. Check and if necessary, top up reservoir to upper mark.
17. Refit filler cap.

POWER STEERING PUMP

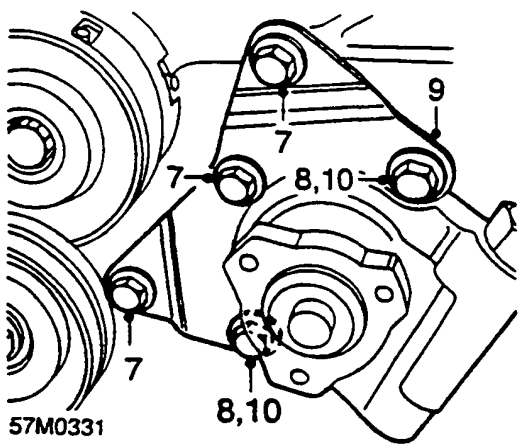
Service Repair No. 57.20.14

Remove



1. Slacken 3 bolts securing pulley to power steering pump.
2. Remove alternator, see **ELECTRICAL - Repairs.**
3. Remove 3 bolts securing pulley to power steering pump, remove pulley.
4. Position container beneath power steering pump to collect oil spillage.
5. Remove banjo bolt securing high pressure hose to steering pump, remove and discard 2 sealing washers.
6. Release clip and disconnect feed hose from steering pump.

CAUTION: Plug the connections.



7. Noting their fitted positions, remove 3 short bolts securing support bracket to steering pump and coolant pump housing
8. Slacken 2 long bolts securing steering pump and support bracket to coolant pump housing.
9. Release steering pump and support bracket from coolant pump housing.
10. Remove bolts and support bracket.
11. Remove power steering pump.

Refit

1. Clean mating faces of steering pump and coolant pump.
2. Position steering pump and support bracket to coolant pump housing.
3. Align steering pump to coolant pump drive lugs.
4. Fit but do not tighten 2 long bolts securing steering pump to coolant pump housing.
5. Fit 3 bolts securing steering pump to coolant pump housing.
6. Tighten steering pump to coolant pump housing bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft).
7. Connect feed hose to steering pump and tighten clip.
8. Connect high pressure hose to steering pump, use new sealing washers.
9. Tighten high pressure hose banjo bolt to 38 N·m (3.9 kgf·m, 28 lbf·ft).
10. Position pulley to steering pump, fit and tighten bolts.
11. Fit alternator, see **ELECTRICAL - Repairs.**
12. Tighten pulley to steering pump bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft).
13. Refill power steering reservoir and bleed system, see **Power steering system - bleed.**

TORQUE SETTINGS

Steering pump to coolant pump, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Steering pump banjo bolt	38 N·m (3.9 kgf·m, 28 lbf·ft)
PAS pump pulley bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)

BRAKES

CONTENTS

BRAKE SYSTEM - BLEED

Service Repair No.
Complete system - 70.25.02
Primary system - 70.25.04
Secondary system - 70.25.05

The following procedure covers bleeding the complete hydraulic system but where only the primary or secondary circuit has been disturbed in isolation, it should only be necessary to bleed that system. Partial bleeding of the hydraulic system is only permissable if a brake pipe or hose has been disconnected with only a minor loss of fluid.

CAUTION: *Never re-use fluid which has been bled from the brake system. Do not allow the fluid level in the master cylinder to fall so low that air can enter the system during bleeding. Check reservoir fluid level during bleeding and top-up as required. Do not fill above the MAX mark.*

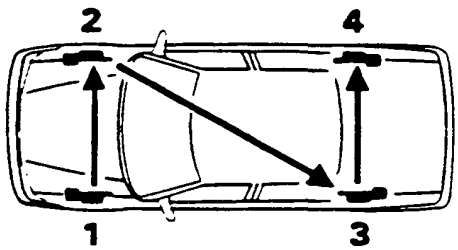
CAUTION: *Do not allow brake fluid to contact paint finished surfaces as paint may be damaged. If spilled, remove fluid and clean area with clean warm water.*

Bleed

1. Raise front and rear of vehicle.

WARNING: Support on safety stands.

2. Check that all pipe and hose connections are tight and that there are no leaks in the system.
3. Top-up brake fluid reservoir, see **INFORMATION - CAPACITIES, FLUIDS AND LUBRICANTS.**



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4. Bleed sequence for ABS brake system:
   LH front to RH front.
   LH rear to RH rear.
5. Attach bleed tube to LH front brake caliper bleed screw:
6. Submerge free end of bleed tube in brake fluid held in a transparent container.
7. Open bleed screw 1/4 - 1/2 turn anti-clockwise.
8. Depress brake pedal steadily; allow pedal to return unassisted. Repeat procedure until flow of clean air-free fluid is purged to container then, whilst maintaining pedal at end of downward stroke, tighten bleed screw.
9. Check fluid level in reservoir; top up if necessary.
10. Repeat procedure at each wheel in the sequence shown.

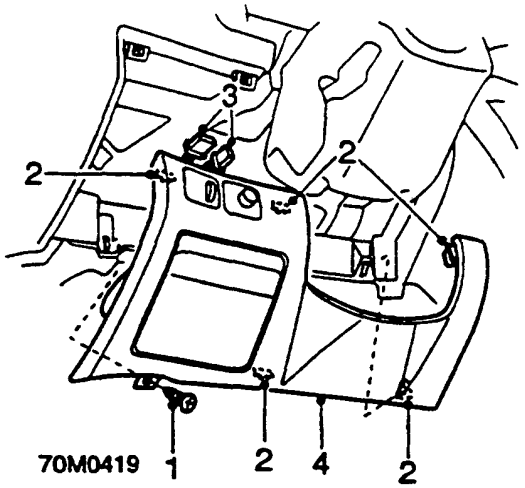
Note: *The braking efficiency of the vehicle may be seriously impaired if the wrong bleed sequence is used.*

11. Switch on ignition then apply steady pressure to brake pedal several times; check that brake fluid warning light does not illuminate.
12. Check system for leaks.
13. Remove stand(s) and lower vehicle.
14. Road test vehicle and test brake operation is short and feels firm.

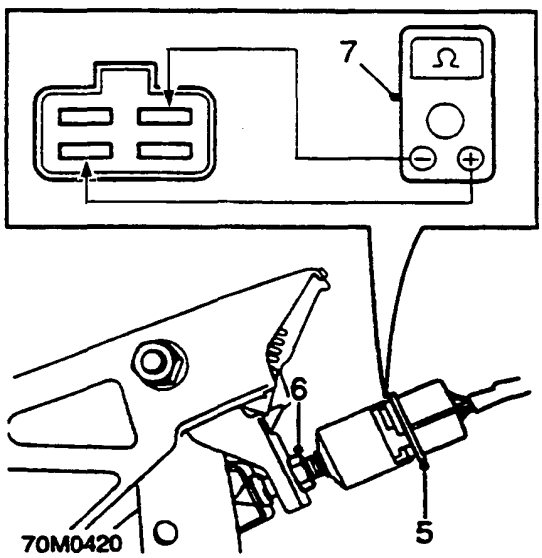
BRAKE LIGHT SWITCH ADJUSTMENT

Service Repair No. 70.35.41

Adjust



1. Remove screw securing lower fascia closing panel to fascia.
2. Release 5 clips securing lower fascia closing panel to fascia.
3. Disconnect intrument illumination dimmer switch multiplug. *Models fitted with headlamp levelling:* Disconnect multiplug from headlamp levelling switch.
4. Remove lower fascia closing panel.



5. Disconnect multiplug from brake light switch.
6. Slacken brake light switch locknut.
7. Connect an Ohmmeter across the WHITE/YELLOW (WHT/YEL) and GREEN/WHITE (GRN/WHT) terminals of brake light switch.
8. Screw brake light switch into mounting bracket until an open circuit condition exists across the switch with the brake pedal released and a continuous circuit exists as soon as the pedal is depressed.
9. Tighten brake light switch locknut.

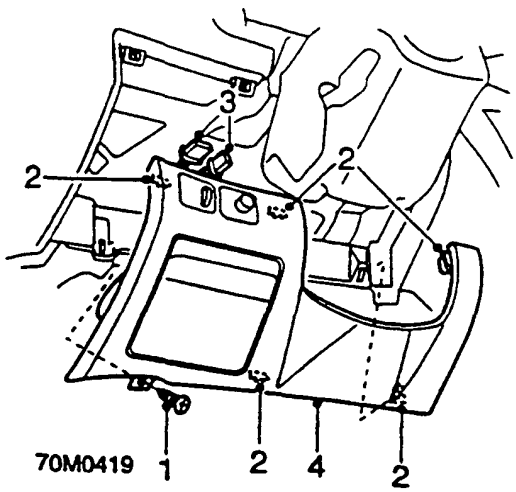
***CAUTION:** Ensure the brake light switch does not prevent the brake pedal returning fully to its stop.*

10. Disconnect Ohmmeter and connect multiplug to brake light switch.
11. *Models fitted with headlamp levelling:* Position lower fascia closing panel and connect multiplug to headlamp levelling switch.
12. Align lower fascia closing panel to fascia and press to secure retaining clips.
13. Fit screw securing lower fascia closing panel to fascia.

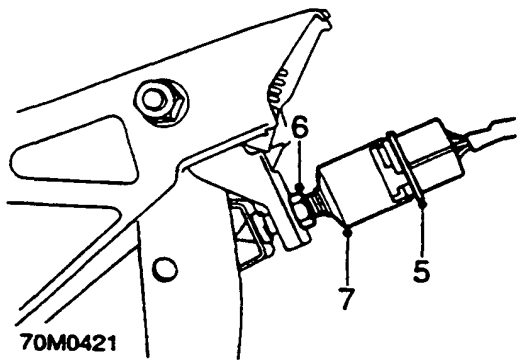
BRAKE LIGHT SWITCH

Service Repair No. 70.35.42

Remove



1. Remove screw securing lower fascia closing panel to fascia.
2. Release 5 clips securing lower fascia closing panel to fascia.
3. *Models fitted with headlamp levelling:* Disconnect multiplug from headlamp levelling switch.
4. Remove lower fascia closing panel.



5. Disconnect multiplug from brake light switch.
6. Slacken brake light switch locknut
7. Unscrew and remove brake light switch from mounting bracket.

Refit

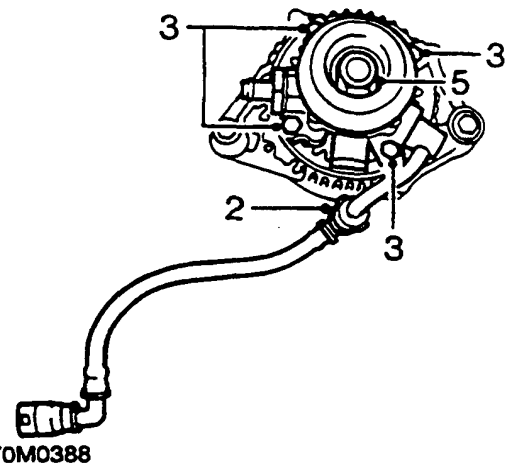
1. Screw brake light switch into mounting bracket until switch plunger contacts brake pedal.
2. Connect multiplug to brake light switch.
3. Adjust brake light switch, see **Adjustments.**
4. *Models fitted with headlamp levelling:* Position lower fascia closing panel and connect multiplug to headlamp levelling switch.
5. Align lower fascia closing panel to fascia and press to secure retaining clips.
6. Fit screw securing lower fascia closing panel to fascia.

BRAKE SERVO VACUUM PUMP

Service Repair No. 70.50.19

Remove

1. Remove alternator, see **ELECTRICAL - Repairs.**



2. Disconnect oil return pipe from vacuum pump.
3. Remove 4 bolts securing vacuum pump to alternator.
4. Remove vacuum pump from alternator.
5. Holding vacuum pump pulley in the soft jaws of a vice, remove pulley nut and remove pulley.

Refit

1. Clean vacuum pump and alternator mating faces.
2. Fit vacuum pump to alternator, fit and tighten bolts to 8 N·m (0.8 kgf·m, 6 lbf·ft).
3. Fit alternator, see **ELECTRICAL - Repairs.**

TWIN PRESSURE CONSCIOUS REDUCING VALVE

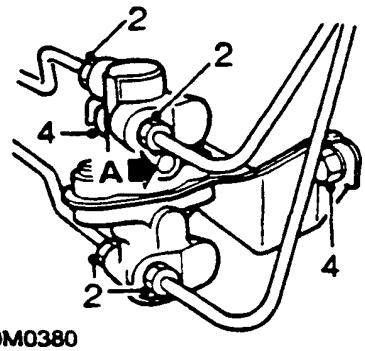
Service Repair No. 70.25.15

Note: *The valve is designed so that in the event of an internal failure, brake fluid will seep from the plug* **'A'** *as a tell – tale.*

Remove

1. Position a cloth below valve to collect spilled fluid.

CAUTION: *Do not allow brake fluid to contact paint finished surfaces as paint may be damaged. If spilled, remove fluid and clean area with clean warm water.*



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2. Unscrew 4 unions securing brake pipes to valve.
3. Release 4 pipes from valve.

CAUTION: *Plug exposed pipe and valve orifices.*

4. Remove 2 bolts, valve bracket to body.
5. Remove valve complete with bracket assembly.

Refit

1. Position valve and bracket assembly. Fit bolts loosely.
2. Remove plugs from pipes and valve orifices.
3. Align pipes to valve and engage unions.
4. Tighten bolts, valve bracket to body.
5. Tighten pipe unions to 19 N·m (1.9 kgf·m, 14 lbf·ft).
6. Bleed brake system, *see* **Adjustments**.

TORQUE SETTINGS

Vacuum pump to alternator, bolts	8 N·m (0.8 kgf·m, 6 lbf·ft)
Twin pressure conscious reducing valve mounting bolts	15 N·m (1.5 kgf·m, 11 lbf·ft)
Twin pressure conscious reducing valve brake pipe unions	19 N·m (1.9 kgf·m, 14 lbf·ft)
Hydraulic modulator to mounting bracket, nuts	6 N·m (0.6 kgf·m, 4.3 lbf·ft)

*BODY

CONTENTS

Repairs Page

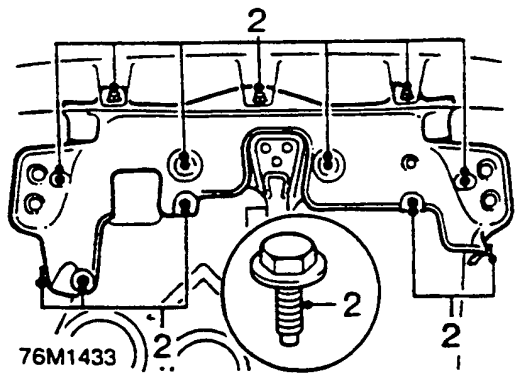
UNDER BELLY PANEL

Service Repair No. 76.10.50

Remove

1. Raise front of vehicle.

WARNING: Support on safety stands.



2. Remove 12 bolts securing under belly panel to underside of vehicle
3. Release and remove under belly panel from beneath vehicle.

Refit

1. Position under belly panel to underside of front panel.
2. Fit and tighten under belly panel retaining bolts.
3. Remove stand(s) and lower vehicle.

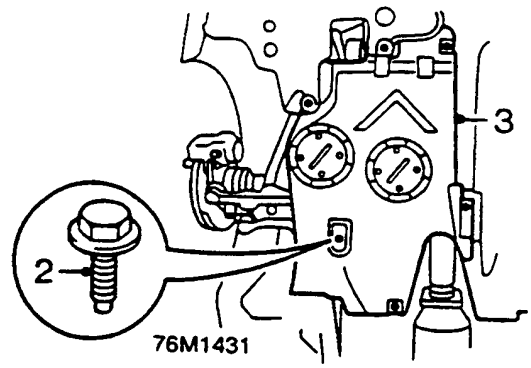
UNDER TRAY - RH

Service Repair No. 76.10.43

Remove

1. Raise front of vehicle.

WARNING: Support on safety stands.



2. Remove 6 bolts securing RH under tray.
3. Remove RH under tray.

Refit

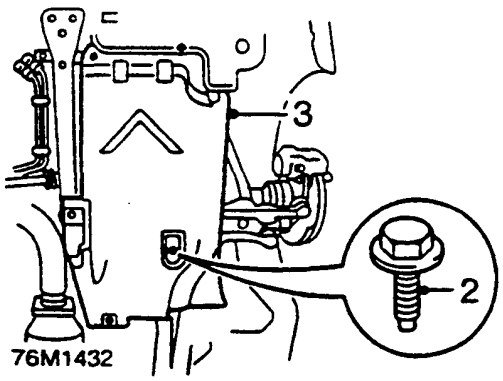
1. Fit under tray.
2. Fit and tighten bolts securing under tray.

UNDER TRAY - LH

Service Repair No. 76.10.42

Remove

1. Remove RH under tray, see **Under tray - RH** .



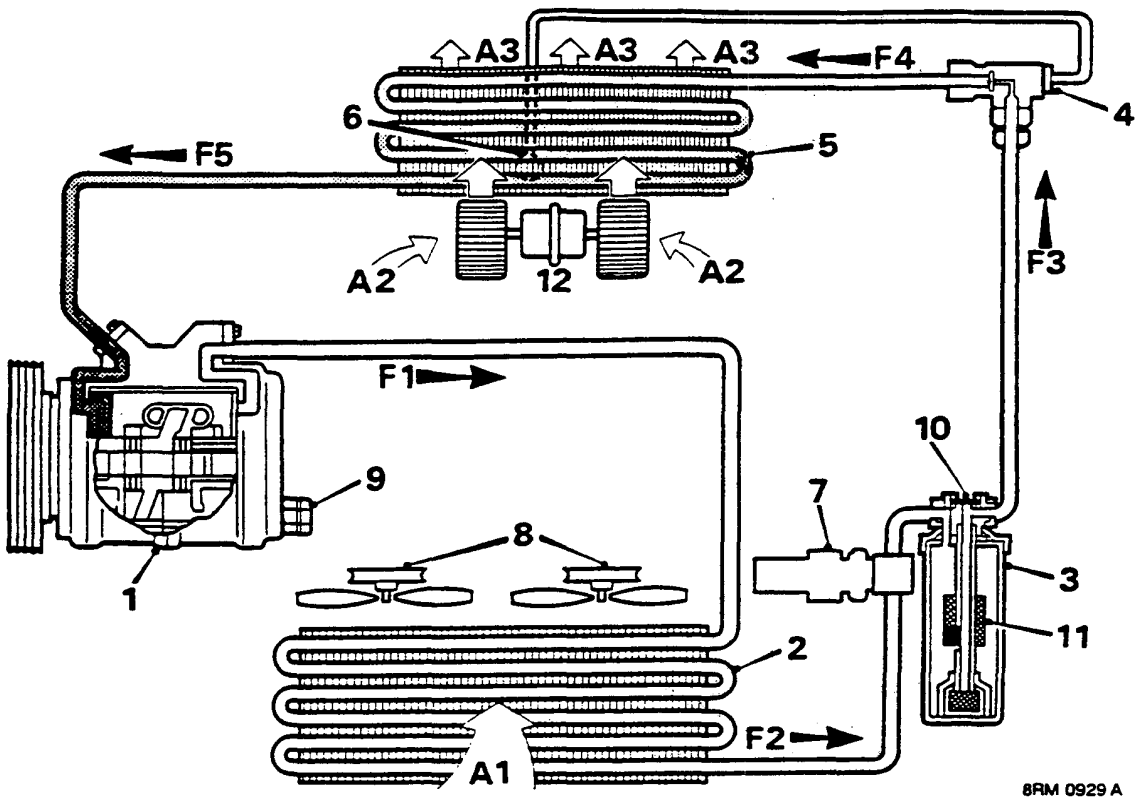
2. Remove 4 bolts securing LH under tray.
3. Remove LH under tray.

Refit

1. Fit LH under tray.
2. Fit and tighten bolts securing LH under tray.
3. Fit RH under tray, see **Under tray - RH** .

*AIR CONDITIONING

CONTENTS



SCHEMATIC LAYOUT OF THE AIR CONDITIONING SYSTEM

1. Compressor
2. Condenser
3. Receiver/drier
4. Thermostatic expansion valve
5. Evaporator
6. Capillary tube
7. Trinary pressure switch
8. Cooling fans to increase air flow
9. Compressor high pressure relief valve
10. Sight glass - receiver/drier
11. Drying agent - receiver/drier
12. Blower motors

A1. Ambient air flow through condenser
A2. Ambient air flow through fan and evaporator
A3. Cooled air flow to vehicle interior
F1. High pressure high temperature refrigerant vapour
F2. High pressure slightly subcooled refrigerant liquid
F3. High pressure slightly subcooled refrigerant liquid with moisture, vapour bubbles and foreign matter removed
F4. Low pressure low temperature mixed liquid and valour
F5. Low pressure slightly supperheated refrigerant vapour

AIR CONDITIONING SYSTEM OPERATION

The air conditioning system provides the means of supplying cooled and dehumidified air into the interior of the vehicle. The cooling effect is obtained by drawing air, from the interior of the vehicle, through the matrix of an evaporator unit. The cooled and dehumidified air is then emitted from the centre vents of the fascia and a vent in the rear of the glove box.

Sealed refrigerant

A sealed system, charged with Refrigerant R134a, together with a blower unit and control system combine to achieve the cooled air condition.

The sealed system comprises the following main components:

1. Compressor
2. Condenser
3. Receiver/drier
4. Thermostatic expansion valve
5. Evaporator

Refrigeration cycle

The compressor (1), belt driven from the crankshaft pulley, pressurises and circulates the refrigerant through the system. Mounted on the compressor, an electro-mechanical clutch maintains the correct temperature and pressure by engaging or disengaging to support the system's requirements. The clutch action is controlled by the MEMS ECU which recieves a temperature signal from a thermistor located on the exterior fins of the evaporator (5). The compressor is of the swashplate type having variable displacement.

Should the temperature at the evaporator (5) fall low enough for ice to begin to form on the fins, the thermistor signals the ECU which disengages the compressor clutch and also isolates the cooling fan relays. When the temperature at the evaporator (5) rises to above its threshold, the system is reactivated.

Should the system pressure become excessive or drop sufficiently to cause damage to the compressor (1) a trinary (triple) pressure switch (7), located in the high pressure line at the receiver drier, signals the ECU to disengage the compressor clutch.

When the air conditioning is switched off, the cooling fans are controlled by two thermostatic switches mounted in the top of the radiator. When the air conditioning is switched on, the cooling fans are also controlled by the trinary pressure switch. The cooling fans have two operating speeds, the higher speed being engaged if engine temperature rises excessively or if the air conditioning system pressure rises sufficiently to close the medium pressure switch of the trinary pressure switch.

From the compressor high pressure vaporised refrigerant (F1) passes to the condenser (2), which is mounted on the RH inner wing.

A cooling fan mounted on the exterior of the condenser operates continuously when the air conditioning is operating. The cooling fan cools the refrigerant vapour in the condenser sufficiently to form a high pressure slightly subcooled liquid (F2).

This liquid then passes to a receiver/drier (3) which performs three functions. It acts as a reservoir, moisture extractor (11) and by means of a sight glass (10) provides a method of determining the state of the refrigerant without breaking into the system.

From the receiver/drier (3) the moisture free refrigerant liquid (F3) passes through a thermostatic expansion valve (4). This valve, converts the liquid refrigerant to a low temperature, low pressure liquid vapour mixture (F4).

To prevent liquid passing through to the compressor, a capillary tube (6), attached to the outlet pipe of the evaporator (5) and connected to the thermostatic expansion valve (4), controls the amount that the valve opens and closes in relation to the temperature of the refrigerant vapour (F4) at the outlet.

The atomised refrigerant then passes through the evaporator (5). Fan assisted air (A2) passes through the matrix (A3) of the evaporator and is cooled by absorption due to the low temperature refrigerant extracting the heat from the air.

From the evaporator, low pressure slightly heated refrigerant (F5) passes to the compressor to complete the cycle.

AIR CONDITIONING CONTROL SYSTEM

The air conditioning control system comprises of relays, thermistor, dual pressure switch, and a control panel. Together these controls, in conjunction with the cooling fan, compressor clutch, and blower maintain the required environment inside the vehicle.

When air conditioning is not selected, air is supplied from the normal fresh air ventilators by ram effect. Heated air is circulated by the blower motor to the areas selected by the controls.

Selecting air conditioning provides the added facility of cooled air available to be mixed as before. When required, a fully cold condition can be selected by pushing the temperature control to cold, which automatically closes the heated coolant access to the heater matrix. Mixtures of cooled, fresh, and ambient air can be selected to give the required interior environmental conditions.

Trinary pressure switch

This switch, located in the high pressure line within the receiver drier, monitors refrigerant pressure and by means of the MEMS ECU controls the following system functions:

1. Refrigerant pressure drops below 206 kPa (2.1 kgf/cm^2, 29.5 psi) (due to possible leakage), the compressor electro-mechanical clutch is disengaged.

When pressure rises above 206 kPa (2.1 kgf/cm^2, 29.5 psi) the compressor clutch is engaged.

2. Refrigerant pressure rises above 3138 kPa (32 kgf/cm^2, 455 psi) (due to possible blockage), even with maximum cooling fan operation, compressor electro-mechanical clutch is disengaged.

3. Refrigerant pressure exceeds 1510 kPa (15.4 kgf/cm^2, 220 psi), the cooling fan speed is increased by the Engine Control Module switching the cooling fan relays to provide a direct feed to each fan motor.

Condenser cooling fans

The condenser cooling fans operate automatically whenever the air conditioning system is switched on, providing the system pressure is correct.

The cooling fans are controlled by low and high temperature switches mounted in the top of the radiator. The cooling fans operate at slow speed providing the coolant temperature is normal. If the coolant temperature exceeds 114°C (237°F), the cooling fans will operate at high speed.

Blower control

The blower can be operated at any one of five speeds by rotating the blower switch to the required position. When the blower is switched off the air conditioning system will not operate.

The fresh air/recirculation flap has two positions and is operated by pressing the required button on the heater control panel. In recirculation position, air is drawn into the heater from the vehicle by closing the exterior air inlet and opening the interior air inlet. In the fresh air position, air is drawn into the heater from outside the vehicle by opening the exterior air inlet and closing the interior inlet.

Heater distribution and blend unit control

Air from the blower unit is passed through the evaporator into the heater blend unit to be heated, if required. It is then directed into the vehicle interior according to the position of the flaps selected on the heater control unit. A heater flap controls the amount of air flowing through the heater matrix. This flap is moved by the temperature control.

A cable connected to the bleed flap linkage moves the coolant valve, allowing engine coolant to flow through the heater matrix back to the engine when the control is moved towards the hot position. The temperature of the heated air flow into the vehicle interior is controlled by the blend flap.

The distribution control moves the flaps which control the direction of the air flow into the interior of the vehicle.

GENERAL PRECAUTIONS

The refrigerant used in the air conditioning system is HFC (Hydrofluorocarbon) R134a.

WARNING:

- **R134a is a hazardous liquid and when handled incorrectly can cause serious injury. Suitable protective clothing must be worn when carrying out service operations on the air conditioning system.**
- Do not allow a refrigerant container to be heated by direct flame or to be placed near any heating appliance. A refrigerant container must not be heated above 50°C (122°F).
- **Do not leave a container of refrigerant without its cap fitted. Do not transport a container of refrigerant that is unrestrained, especially in boot of a car.**
- **R134a is odourless and colourless. Do not handle or discharge in an enclosed area, or any area where the vapour and liquid can come in contact with a naked flame or hot metal. R134a is not flammable but can cause a highly toxic gas.**
- **Do not smoke or weld in areas where R134a is in use. inhalation of concentrations of vapour can cause dizziness, disorientation, incoordination, narcosis, nausea or vomiting.**
- **Do not allow fluids other than R134a or compressor lubricant to enter the air conditioning system. Spontaneous combustion may occur.**
- **R134a splashed on any part of the body will cause immediate freezing of that area. Also refrigerant cylinders and replenishment trolleys when discharging will freeze skin to them if contact is made.**
- **The refrigerant used in an air conditioning system must be reclaimed in accordance with the recommendations given by a Refrigerant Recovery Recycling Recharging Station.**

Note: *Suitable protective clothing comprises: Wrap round safety glasses or helmet, heatproof gloves, rubber apron, or waterproof overalls and rubber boots.*

REMEDIAL ACTIONS

1. If liquid R134a strikes the eye, do not rub it. Gently run large quantities of eye wash off it to raise the temperature. If eye wash is not available, cool, clean water may be used. Cover eye with a clean pad and seek immediate medical attention.
2. If liquid R134a is splashed on the skin run large quantities of water over the area as soon as possible to raise the temperature. Carry out the same action if the skin comes in contact with discharging cylinders. Wrap effected parts in blankets or similar material and seek immediate medical attention.
3. If suspected of being overcome by inhalation of R134a vapour seek fresh air. If unconscious move to fresh air. Apply artificial respiration and/or oxygen and seek immediate medical attention.

Note: *Due to its low evaporating temperature of – 30°C (86°F), R134a should be handled with care.*

SERVICE PRECAUTIONS

Care should be taken when handling the components in the refrigeration system. Units must not be lifted by their hoses, pipes or capillary lines. Hoses and lines must not be subjected to any twist or stress. Ensure that hoses are positioned in their correct run before tightening couplings, and ensure that all clips and supports are used. Torque wrenches of the correct type must be used when tightening refrigerant connections to the stated value. An additional spanner must be used to hold the union to prevent twisting of the pipe.

Before connecting any hose or pipe ensure that refrigerant oil is applied to the seat of the new 'O' ring but not to the threads.

Check the oil trap for the amount of oil lost.

All protective plugs must be left in place until immediately prior to connection.

The receiver/drier contains desiccant which absorbs moisture. It must be positively sealed at all times.

CAUTION: *Whenever the refrigerant system is opened, the receiver/drier must be renewed immediately before evacuating and recharging the system.*

Use alcohol and a clean cloth to clean dirty connections.

Ensure that all new parts fitted are marked for use with **R134a.**

Refrigerant oil

Use an approved refrigerant lubricating oil:

UNIDAP 7
Unipart SP - 10

CAUTION: *Do not use any other type of refrigerant oil.*

Refrigerant oil easily absorbs water and must not be stored for long periods. Do not pour unused oil back into the container.

When renewing system components, add the following quantities of refrigerant oil:

Condenser 30 mℓ (1 fl·oz, 1.0 Imp·oz)
Evaporator 30 mℓ (1 fl·oz, 1.0 Imp·oz)
Pipe or hose 10 mℓ (1/3 fl·oz, 0.4 Imp·oz)
Receiver drier 30 mℓ (1 fl·oz, 1.0 Imp·oz)

Total amount of oil in the system: 135 mℓ (4 1/2 fl·oz, 4.8 Imp·oz)

A new compressor is sealed and pressurised with Nitrogen gas, slowly release the sealing cap, gas pressure should be heard to release as the seal is broken.

Note: *A new compressor should always have its sealing cap in place and must not be removed until immediately prior to fitting.*

Fitting a new compressor

A new compressor is supplied with an oil fill (Q) of 135 mℓ (4 1/2 fl·oz, 4.8 Imp·oz)

A calculated quantity of oil must be drained from a new compressor before fitting.

To calculate the quantity to be drained:

1. Remove the drain plug from the OLD compressor.
2. Invert the compressor and gravity drain the oil in a calibrated measuring cylinder. Rotating the compressor clutch plate will assist complete draining.
3. Note the quantity of oil drained (Y).
4. Calculate the quantity of oil to be drained from the NEW compressor using the following formula:

Q - (Y + 20) = X mℓ (fl·oz, Imp·oz)

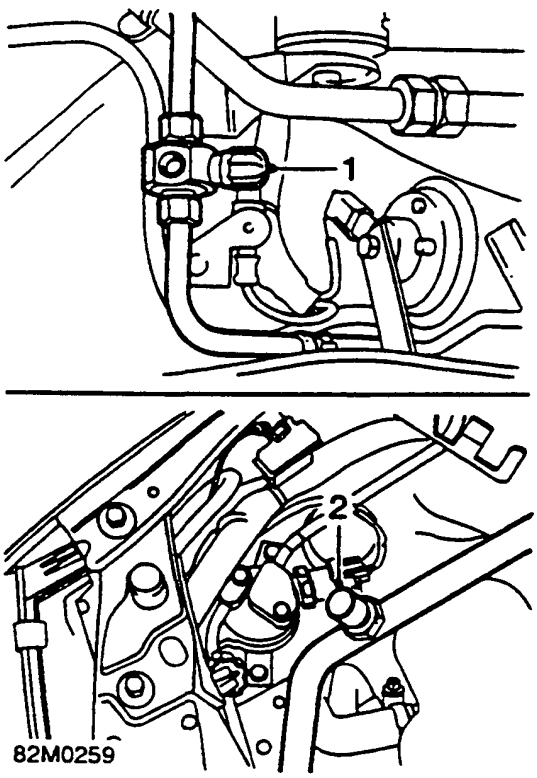
Rapid refrigerant discharge

If the air conditioning system is involved in accident damage and the circuit is punctured, the refrigerant will discharge rapidly. The rapid discharge of refrigerant will also result in the loss of most of the oil from the system. The compressor must be removed and all the remaining oil in the compressor drained and refilled as follows:

1. Remove the drain plug and gravity drain all the oil, assisted by rotating the clutch plate(not the pulley).
2. Refit the compressor with the following amount of new refrigerant oil: 100 mℓ (3 1/3 fl·oz, 3.5 Imp·oz)
3. Refit the drain plug and plug the inlet and outlet port.

REFRIGERANT RECOVERY RECYCLING RECHARGING

An air conditioning portable Refrigerant Recovery Recycling Recharging Station for use with R134a refrigerant incorporates all the features necessary to recover refrigerant R134a from the A/C system, to filter and remove moisture, to evacuate and recharge with reclaimed refrigerant. The unit can also be used for performance testing and air conditioning system analysis.



Service connections

1. High pressure service connection
2. Low pressure service connection

Recovery and recycling

1. Connect a refrigerant station to high and low pressure servicing connections.
2. Operate the refrigerant recovery system in accordance to the manufacturers instructions.

WARNING: Refrigerant must always be recycled before re-use, to ensure that the purity of the refrigerant is high enough for safe use in the air conditioning system.

Recycling should always be carried out with equipment which is design certified by Underwriter Laboratory Inc. for compliance with SAE - J1991. Other equipment may not recycle refrigerant to the required level of purity.

A R134a Refrigerant Recovery Recycling Recharging Station must not be used with any other type of refrigerant.

Refrigerant R134a from domestic and commercial sourses must not be used in motor vehicle air conditioning systems.

Evacuation and recharging

1. Add calculated refrigerant oil to the compressor as necessary.
2. Renew receiver/drier.
3. Connect a Refrigerant Station to the high and low pressure servicing connections.

CAUTION: *Whenever the refrigerant system is opened, the receiver/drier must be renewed immediately before evacuating and recharging the system.*

4. Operate the refrigerant evacuation system according to the manufacturers instructions.

Note: *If the vacuum reading is below 700 mm/Hg after 15 minutes, suspect a leak in the system. Partially recharge the system and check for leaks using an electronic leak tester.*

CAUTION: *The system must be evacuated immediately before recharging commences. Delay between evacuation and recharging is not permitted.*

5. Operate the refrigerant recharging system according to the manufacturers instructions.

Refrigerant required to charge system is:

LHD vehicles – 0.65 kg (23 oz)
RHD vehicles – 0.70 kg (25 oz)

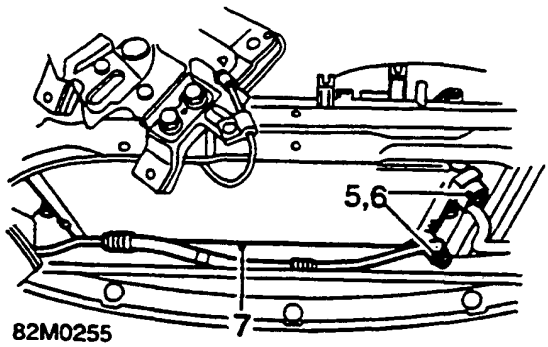
6. If the full charge has not been accepted by the system, start the engine and run it at 1500 rev/min.
7. Switch on the air conditioning system, open the car windows, set the temperature control to cold and switch the blower to maximum speed.
8. Consult the Refrigerant Station Manual for the correct procedure to complete the charge.
9. Carry out the air conditioning system performance test.

COMPRESSOR

Service Repair No. 82.10.20

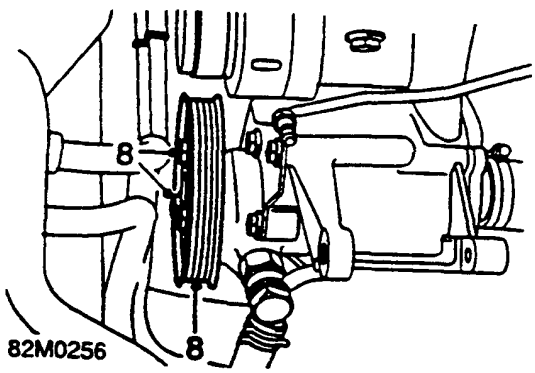
Remove

1. Recover refrigerant from air conditioning system, see **Adjustments.**
2. Remove RH under belly panel, see **BODY - Repairs.**
3. Remove radiator, see **COOLING SYSTEM - Repairs.**
4. Remove drive belt, see **MAINTENANCE.**



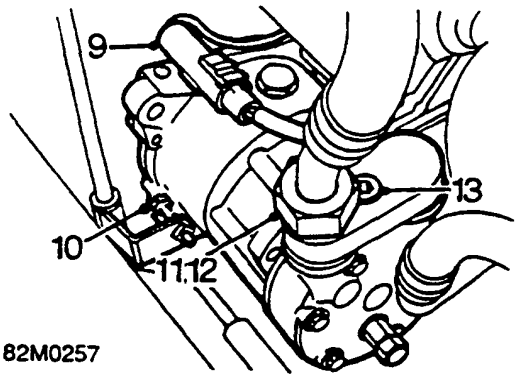
82M0255

5. Remove 2 bolts securing air conditioning pipes to condenser.
6. Remove 'O' rings from pipes.
7. Remove condenser.



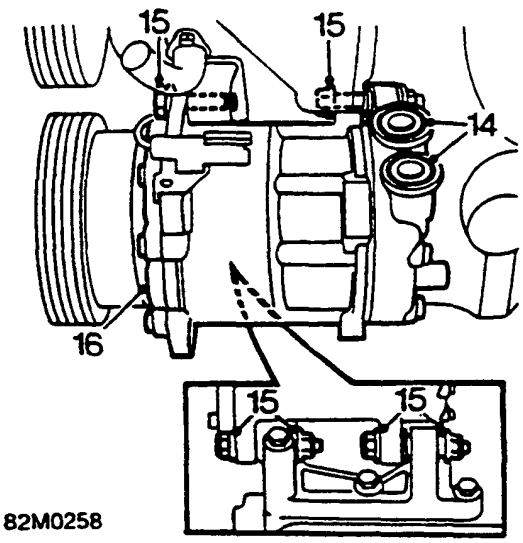
82M0256

8. Remove 3 bolts securing PAS pump pulley, remove pulley.



82M0257

9. Disconnect compressor multiplug.
10. Remove bolt securing PAS pipe bracket to compressor.
11. Unscrew condenser pipe union from compressor.
12. Remove 'O' ring from pipe.
13. Remove Allen bolt securing pressure pipe to compressor.



82M0258

14. Remove 'O' rings from compressor.

***CAUTION:** Immediately cap pipes, condenser and compressor to keep moisture and dirt out of system.*

15. Remove 4 bolts and 3 nuts securing compressor to mounting bracket.
16. Manoeuvre compressor from mounting bracket, remove compressor.

Refit

1. Fit compressor and manoeuvre into bracket.
2. Fit nuts and bolts securing compressor to mounting bracket and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
3. Remove caps from compressor and pipes.
4. Clean pipes and joints on compressor.
5. Lubricate 'O' rings with refrigerant oil and fit to compressor.
6. Position pressure pipe to compressor, fit and tighten Allen bolt to 17 N·m (1.7 kgf·m, 12 lbf·ft).

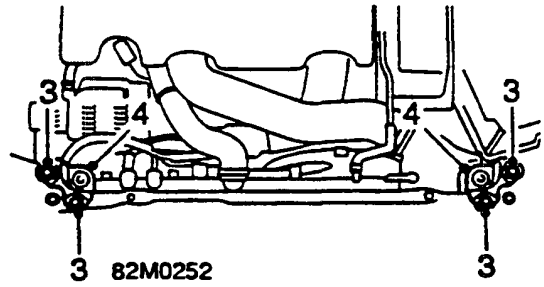
7. Lubricate 'O' rings with refrigerant oil and fit to condenser pipe.
8. Position condenser pipe union to compressor and tighten to 17 N·m (1.7 kgf·m, 12 lbf·ft).
9. Fit PAS pulley to pump, fit and tighten bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft).
10. Align PAS pipe to compressor, fit and tighten bolt.
11. Remove caps from pipes and condenser.
12. Clean pipes and joints on condenser.
13. Lubricate 'O' rings with refrigerant oil and fit to pipes.
14. Position pipes to condenser, fit bolts and tighten to 17 N·m (1.7 kgf·m, 12 lbf·ft).
15. Connect compressor multiplug.
16. Fit drive belt, see **MAINTENANCE.**
17. Fit radiator, see **COOLING SYSTEM - Repairs.**
18. Fit RH under tray, see **BODY - Repairs.**
19. Fit NEW receiver drier, see **Receiver drier.**
20. Recharge air conditioning system, see **Adjustments** .

CONDENSER

Service Repair No. 82.15.07

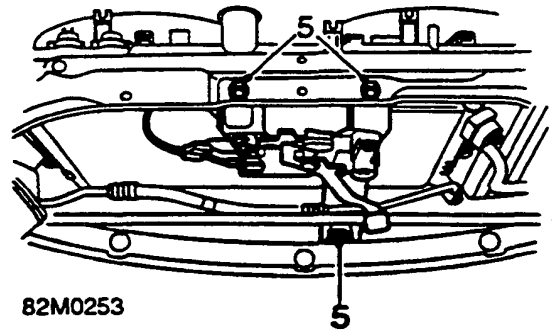
Remove

1. Disconnect both battery leads, earth lead first.
2. Recover refrigerant from air conditioning system, see **Adjustments.**



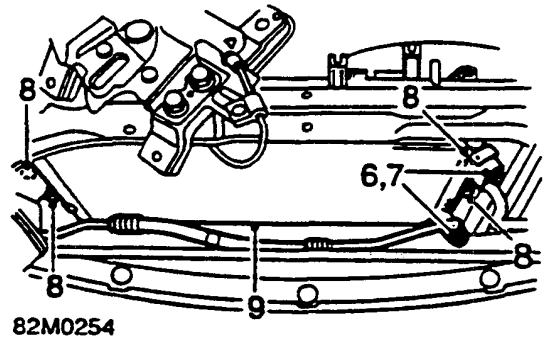
82M0252

3. Remove 4 bolts securing 2 radiator mounting brackets to bonnet lock platform.
4. Remove radiator mounting brackets.



82M0253

5. Remove 3 bolts securing bonnet lock platform support and position aside .



82M0254

6. Remove 2 bolts securing condenser pipes.
7. Remove 'O' rings from pipes.

CAUTION: *Immediately cap all joints to keep moisture and dirt out of system.*

8. Remove 4 bolts securing condenser to radiator.
9. Remove condenser.

Refit

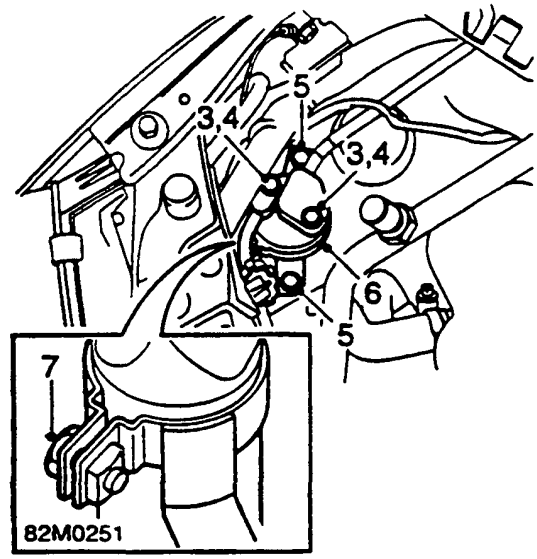
1. Fit condenser to radiator, fit and tighten bolts.

2. Remove caps from condenser and pipes.
3. Lubricate 'O' rings with refrigerant oil and fit to pipes.
4. Position pipes to condenser, fit bolts and tighten to 17 N·m (1.7 kgf·m, 12 lbf·ft).
5. Position bonnet lock platform support and secure with bolts.
6. Fit NEW receiver drier, see **Receiver drier.**
7. Recharge air conditioning system, see **Adjustments** .
8. Reconnect both battery leads, earth lead last.

RECEIVER DRIER

Service Repair No. 82.17.03

1. Release power steering fluid reservoir from mounting bracket.
2. Recover refrigerant from air conditioning system, see **Adjustments.**



3. Remove 2 bolts securing air conditioning pipes to receiver drier.
4. Remove and discard 'O' rings from pipes.

CAUTION: *Immediately cap all pipe joints to keep moisture and dirt out of system.*

5. Remove 2 bolts securing receiver drier clamp bracket to inner wing valance.
6. Remove receiver drier assembly.
7. Slacken receiver drier clamp bracket bolt, remove bracket.

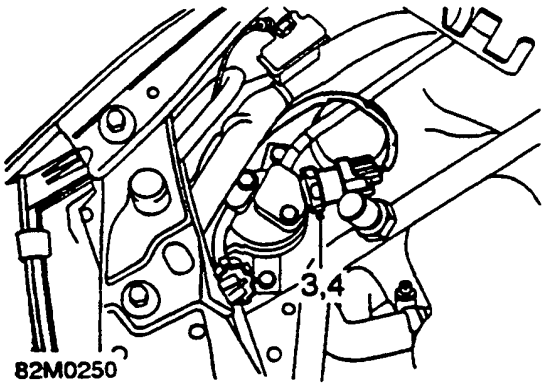
Refit

1. Fit clamp bracket to receiver drier and tighten bolt.
2. Fit receiver drier to inner wing valance and secure with bolts.
3. Remove caps from pipes and receiver drier.
4. Clean pipes and joints.
5. Lubricate NEW 'O' rings with refrigerant oil and fit to pipes.
6. Position pipes to receiver drier, fit and tighten bolts to 5 N·m (0.5 kgf·m, 3.6 lbf·ft).
7. Secure power steering fluid reservoir to mounting bracket.
8. Recharge air conditioning system, see **Adjustments** .

TRINARY PRESSURE SWITCH

Service Repair No. 82.20.19

1. Release power steering fluid reservoir from mounting bracket.
2. Recover refrigerant from air conditioning system, see **Adjustments.**



3. Remove trinary pressure switch.
4. Remove and discard 'O' ring from switch.

CAUTION: *Immediately cap switch housing to keep moisture and dirt out of system.*

Refit

1. Remove cap from switch housing.
2. Clean switch and housing.
3. Lubricate NEW 'O' ring with refrigerant oil and fit to switch.
4. Fit switch and tighten to 12 N·m (1.2 kgf·m, 8.8 lbf·ft).
5. Secure power steering fluid reservoir to mounting bracket.
6. Recharge air conditioning system, see **Adjustments** .

TORQUE SETTINGS

Trinary pressure switch	12 N·m (1.2 kgf·m, 8.8 lbf·ft)
Compressor to mounting bracket, nut	45 N·m (4.6 kgf·m, 33 lbf·ft)
Condenser mounting bolts	5 N·m (0.5 kgf·m, 3.6 lbf·ft)
Air conditioning pipe to compressor, Allen bolt	17 N·m (1.7 kgf·m, 12 lbf·ft)
Air conditioning pipe union to compressor	17 N·m (1.7 kgf·m, 12 lbf·ft)
Air conditioning pipes to condenser, bolts	17 N·m (1.7 kgf·m, 12 lbf·ft)
Air conditioning pipes to receiver drier, bolts	5 N·m (0.5 kgf·m, 3.6 lbf·ft)
PAS pulley to pump, bolts	25 N·m (2.5 kgf·m, 18 lbf·ft)
Cooling fan cowl bolts	10 N·m (1.0 kgf·m, 7.2 lbf·ft)
Bonnet lock support platform bolts	10 N·m (1.0 kgf·m, 7.2 lbf·ft)
Battery tray bolts	9 N·m (0.9 kgf·m, 6.5 lbf·ft)

ELECTRICAL

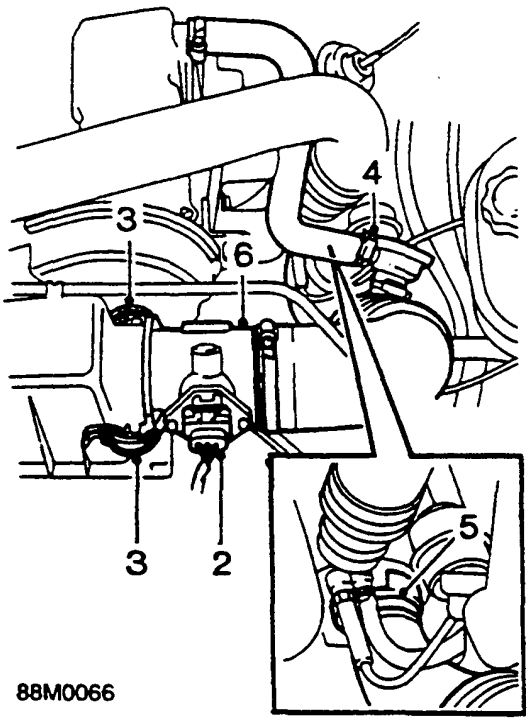
CONTENTS

VEHICLE SPEED SENSOR

Service Repair No. 88.30.14

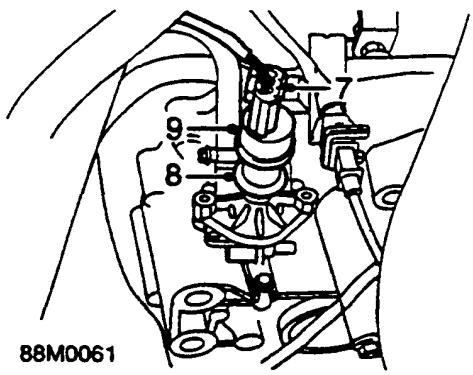
Remove

1. Disconnect battery earth lead.



88M0066

2. Disconnect multiplug from air flow sensor.
3. Release 2 clips securing air flow sensor housing to air filter.
4. Slacken clip and disconnect breather hose to one way valve.
5. Slacken clip and disconnect air intake hose from turbocharger.
6. Remove air intake pipe from vehicle.



88M0061

7. Disconnect multiplug from vehicle speed sensor.
8. Turn gaiter 90 degrees to disengage clip securing vehicle speed sensor to gearbox.
9. Remove vehicle speed sensor.

Refit

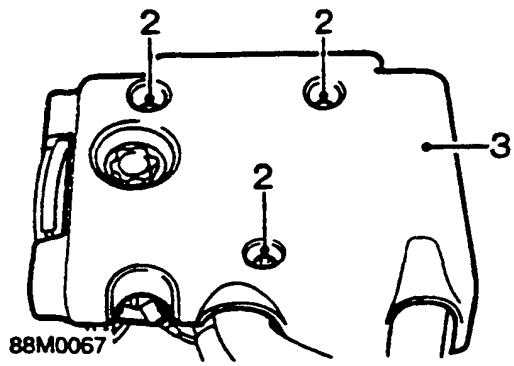
1. Fit vehicle speed sensor to gearbox. rotate gaiter to engage retaining clip in slot on speed sensor.
2. Connect multiplug to vehicle speed sensor.
3. Position air intake hose in engine compartment.
4. Connect air intake hose to turbocharger and tighten clip.
5. Connect breather hose to one way valve and tighten clip.
6. *Secure air flow sensor housing to air filter* with clips.
7. Connect multiplug to air flow sensor.
8. Connect both battery leads, earth lead last.

ENGINE COOLANT TEMPERATURE GAUGE SENSOR

Service Repair No. 88.25.20

Remove

1. Disconnect battery earth lead.



88M0067

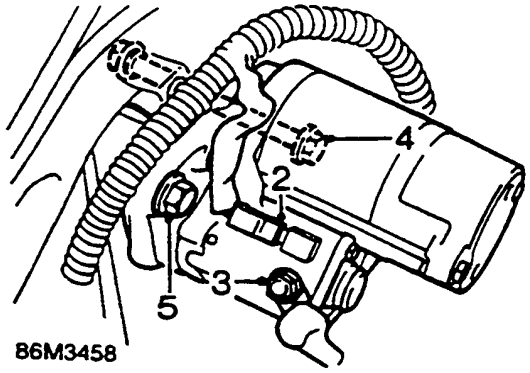
2. Remove 3 bolts securing sound deadening pad to engine.
3. Remove sound deadening pad.
4. *Models with air conditioning:* Remove alternator, see **ELECTRICAL - Repairs.**

STARTER MOTOR

Service Repair No. 86.60.01

Remove

1. Remove air cleaner, see **ENGINE MANAGEMENT SYSTEM.**



86M3458

2. Disconnect lucar from starter solenoid.
3. Remove nut securing battery cable to starter solenoid; release lead from stud.
4. Remove lower nut and bolt securing starter motor to gearbox.
5. Remove upper bolt securing starter motor to gearbox.
6. Remove starter motor.

Refit

1. Clean mating faces of starter motor and differential housing.
2. Manoeuvre starter motor into position; fit lower nut & bolt, but do not tighten.
3. Fit upper retaining bolt, tighten to 85 N·m (8.7 kgf·m, 63 lbf·ft).
4. Tighten lower retaining bolt to 85 N·m (8.7 kgf·m, 63 lbf·ft).
5. Connect battery cable to starter solenoid, fit nut and tighten to 4 N·m (0.4 kgf·m, 3 lbf·ft).
6. Connect lucar to starter solenoid.
7. Fit air cleaner, see **ENGINE MANAGEMENT SYSTEM.**

TORQUE SETTINGS

Alternator lower mounting bolt	45 N·m (4.6 kgf·m, 33 lbf·ft)
Alternator upper mounting bolt(s)	25 N·m (2.5 kgf·m, 18 lbf·ft)
Alternator terminal nut	4 N·m (0.4 kgf·m, 3 lbf·ft)
Starter motor bolts	85 N·m (8.7 kgf·m, 63 lbf·ft)

INSTRUMENTS

CONTENTS

ALTERNATOR

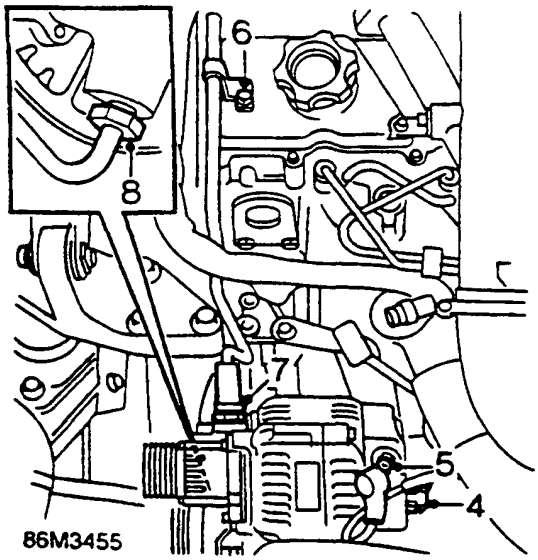
Service Repair No. 86.10.02

Remove

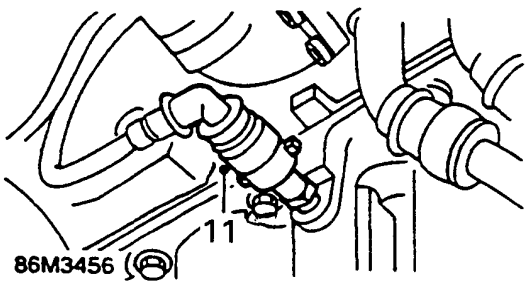
1. Disconnect battery earth lead.
2. Raise front of vehicle.

WARNING: Support on safety stands.

3. Remove alternator drive belt, see **MAINTENANCE.**

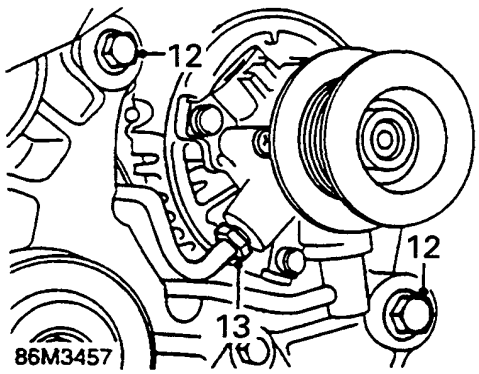


4. Disconnect multiplug from alternator
5. Release cover and remove nut securing cable to alternator.
6. Remove bolt securing vacuum pipe to camshaft cover.
7. Slacken clip and release vacuum pipe from vacuum pump.
8. Slacken oil feed pipe union on vacuum pump.



9. Remove LH under tray, see **BODY - Repairs.**
10. Position drain tin to collect oil spillage from sump.
11. Release oil return pipe from sump.

***CAUTION:** Plug the connections.*



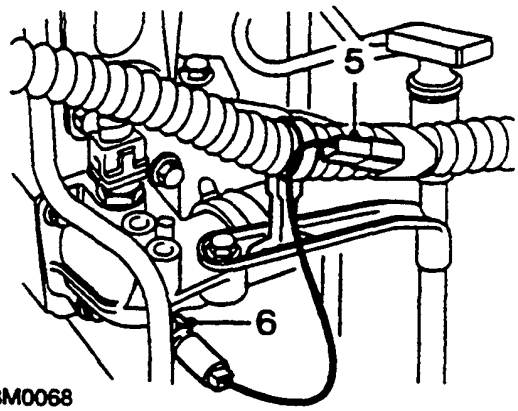
12. Remove 2 bolts securing alternator to mounting bracket.
13. Disconnect oil feed pipe from vacuum pump.
14. Remove alternator from vehicle.

Do not carry out further dismantling if component is removed for access only

15. Remove vacuum pump from alternator, see **BRAKES - Repairs.**

Refit

1. Refit vacuum pump to alternator (if removed), see **BRAKES - Repairs.**
2. Position alternator to mounting bracket.
3. Connect oil feed pipe to vacuum pump.
4. Align alternator to mounting bracket, fit lower bolt and tighten to 45 N·m (4.6 kgf·m, 33 lbf·ft).
5. Fit top alternator bolt(s) and tighten to 25 N·m (2.5 kgf·m, 18 lbf·ft).
6. Tighten oil feed pipe union to vacuum pump.
7. Connect vacuum pipe to vacuum pump and tighten clip.
8. Align vacuum pipe bracket to camshaft cover, fit and tighten bolts.
9. Remove plugs from oil return pipe and sump.
10. Connect oil return pipe to sump.
11. Remove drain tin from beneath vehicle.
12. Fit LH under tray, see **BODY - Repairs.**
13. Remove stand(s) and lower vehicle.
14. Connect battery cable to alternator stud tighten nut to 4 N·m (0.4 kgf·m, 3 lbf·ft) and position cover.
15. Connect multiplug to alternator.
16. Refit alternator drive belt, see **MAINTENANCE.**
17. Connect battery earth lead.



88M0068

5. Disconnect Lucar from engine coolant temperature gauge sensor.
6. Remove engine coolant temperature gauge sensor.

Refit

1. Clean threads of engine coolant temperature gauge sensor, apply Loctite 577 to threads.
2. Fit engine coolant temperature gauge sensor and tighten to 15 N·m (1.5 kgf·m, 11 lbf·ft).
3. Connect Lucar to engine coolant temperature gauge sensor.
4. *Models with air conditioning:* Fit alternator, see **ELECTRICAL – Repairs.**
5. Position sound deadening pad to engine and secure with bolts.
6. Connect battery earth lead.

TORQUE SETTINGS

Coolant temperature gauge sensor	15 N·m (1.5 kgf·m, 11 lbf·ft)

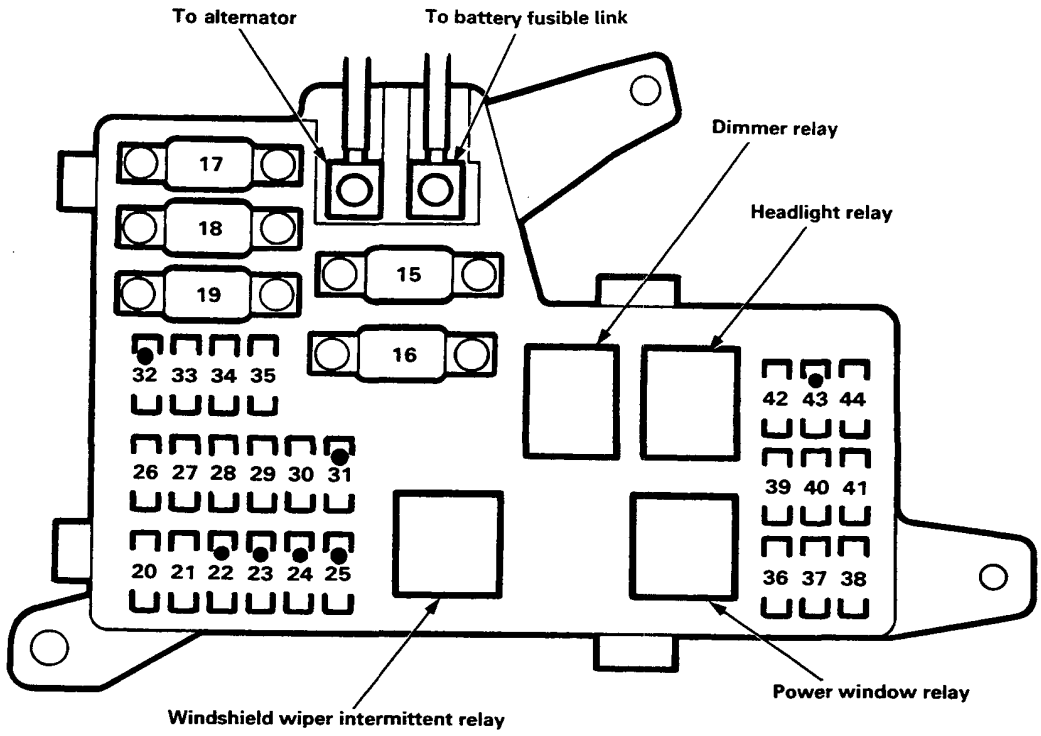
*Electrical (WIRING DIAGRAMS)

NOTE: "Immobi." in this manual means "Immobilizer (Immobiliser)

Fuses

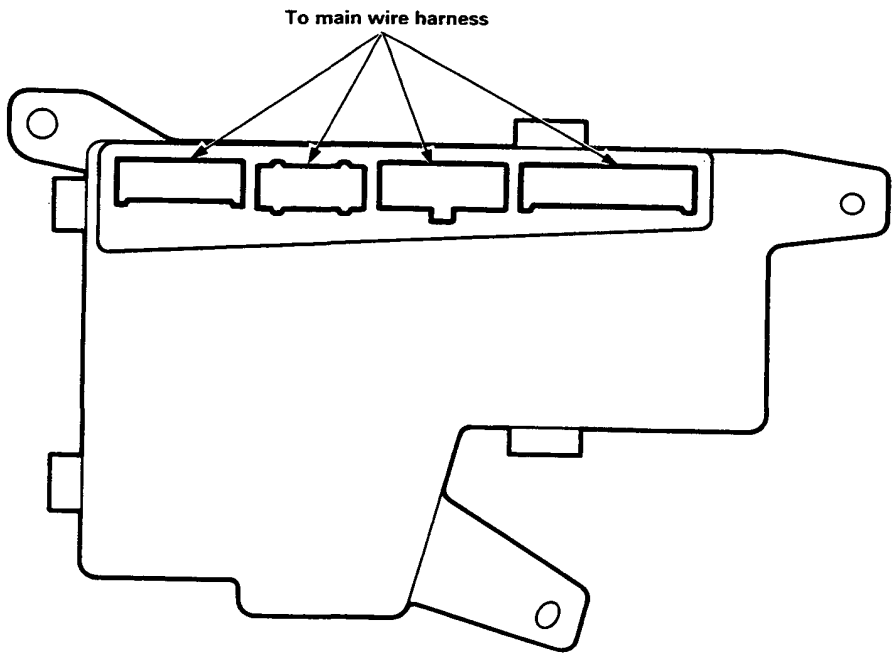
Under-hood Fuse/Relay Box

Front View:



●: Not used

Back View:



Fuse Number	Amps	Wire Color	Circuit(s) and Component(s) Protected
15	80 A	———	Main fuse (battery), power distribution
16	50 A	BRN/PNK	Main fuse (ignition switch, fan controls)
17	40 A	BLK/GRN	Main fuse (rear window defogger relay)
18	30 A	WHT	Main fuse (blower motor relay)
19	30 A	LT BLU/GRN	Immobi. control unit, glow plug relay, engine control module (ECM), cooling fan relay module, EGR control solenoid valve, mass air flow (MAF) sensor, injection timing device solenoid valve, Fuel quantity servo control actuator, glow plug warning light.
20	10 A	RED/GRN	Lighting system (small lights)
21	20 A	WHT/BLU	Power door lock control unit, keyless entry and security alarm system, security horn
22	———	———	Not used
23	———	———	Not used
24	———	———	Not used
25	———	———	Not used
26	30 A	GRN	Sunroof
27	10 A	BLU/RED	Lighting system
28	30 A	BRN/GRN	Cooling fan motors (right and left)
29	15 A	WHT/BLU	Ceiling (interior) lights, cigarette lighter, trunk light, ABS data link connector
30	7.5 A	WHT	ECM data link connector
31	———	———	Not used
32	———	———	Not used
33	30 A	BRN/BLU	Cooling fan motor (left)
34	15 A	WHT	Front fog light (option)
35	7.5 A	WHT/YEL	Clock (+B), stereo sound system
36	20 A	GRN/BLK	Left rear power window
37	20 A	YEL/BLK	Right rear power window
38	20 A	WHT/YEL	Driver's power window
39	20 A	BLU/BLK	Front passenger's power window
40	20 A	RED/GRN	Right headlight, high beam indicator
41	20 A	WHT/YEL	Horns, brake lights, brake light signal
42	20 A	RED/YEL	Left headlight
43	———	———	Not used
44	10 A	WHT/GRN	Hazard warning lights

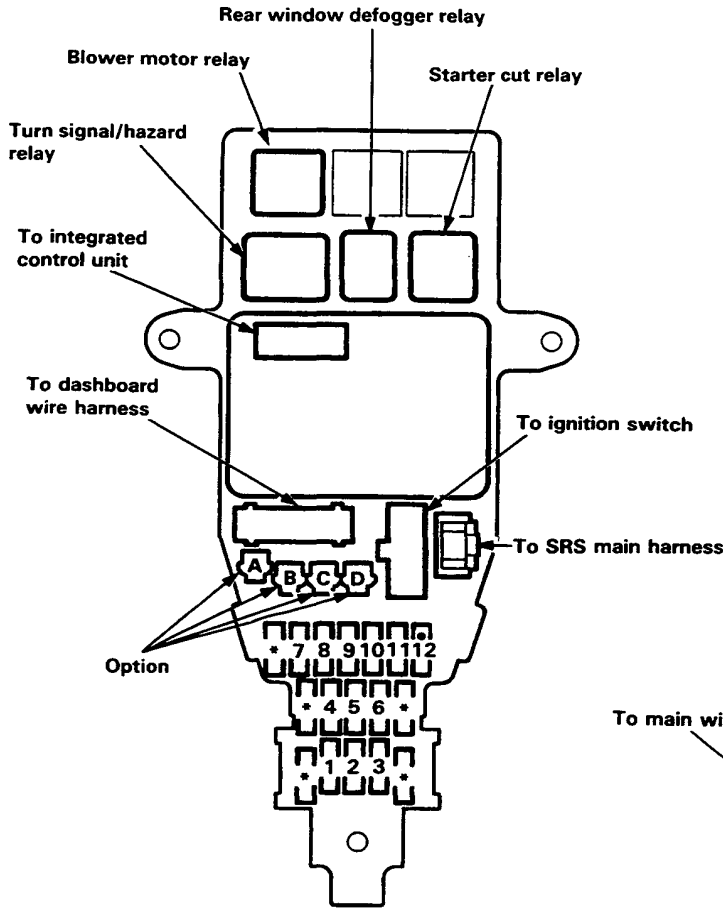
Battery/ABS Fusible Link (Located left side of engine compartment)

Fusible link	Amps	Wire Color	Circuit(s) and Component(s) Protected
Battery	80 A	BRN	Power distribution (under-hood fuse/relay box)
ABS	60 A	BRN/PNK	ABS modulator assembly

Fuses

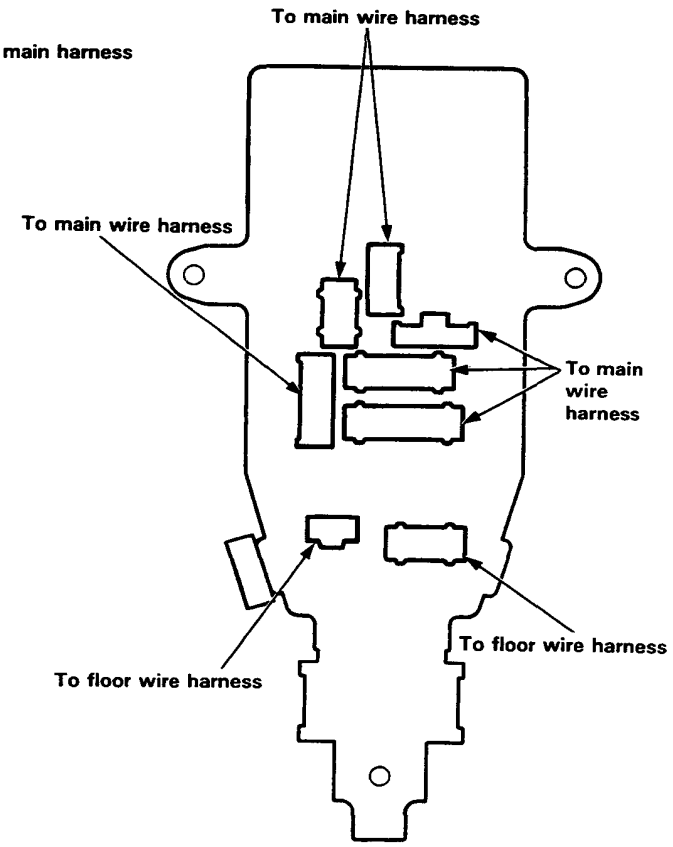
Under-dash Fuse/Relay Box

Front View:



*: Spare fuse
•: Not used

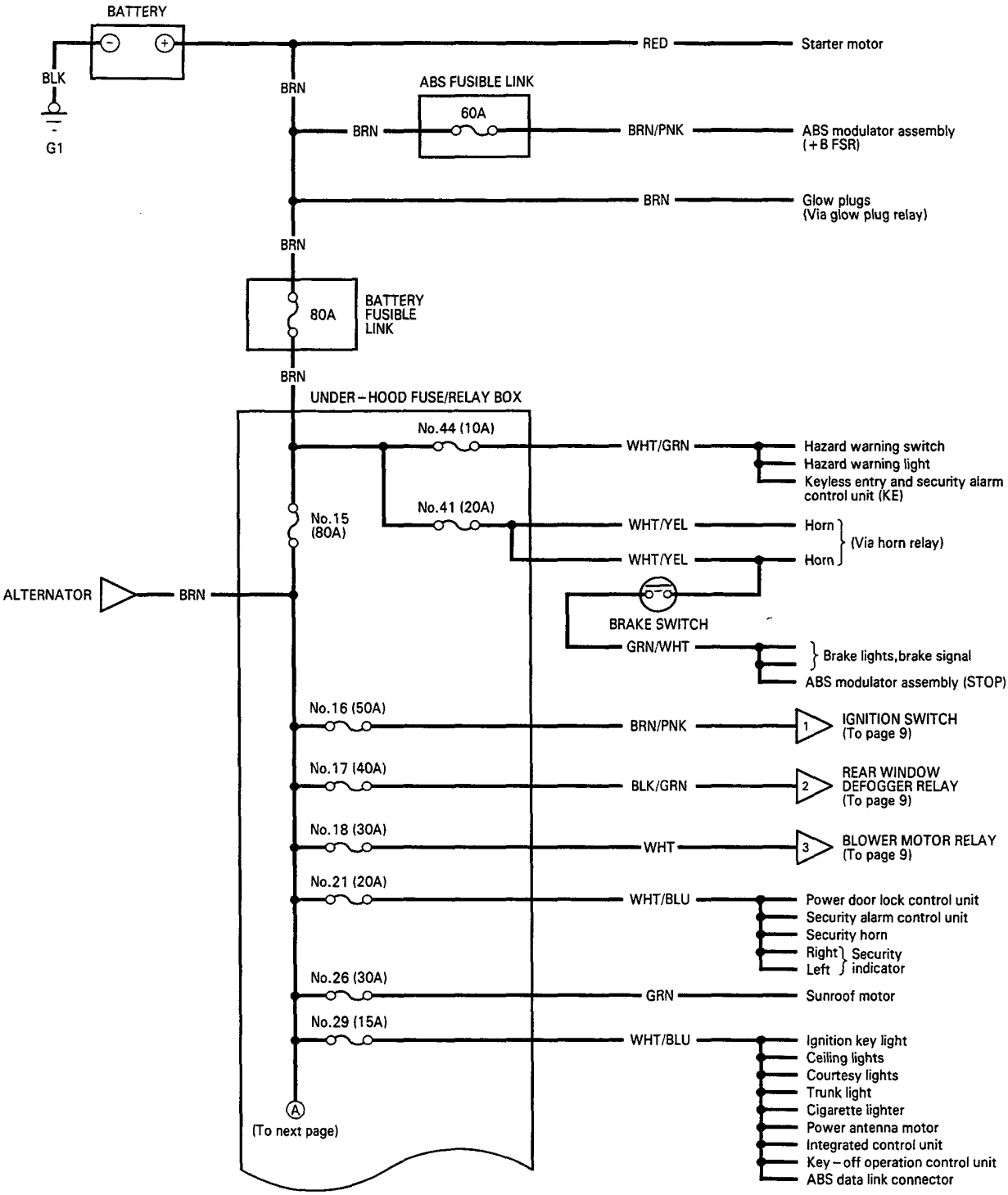
Back View:

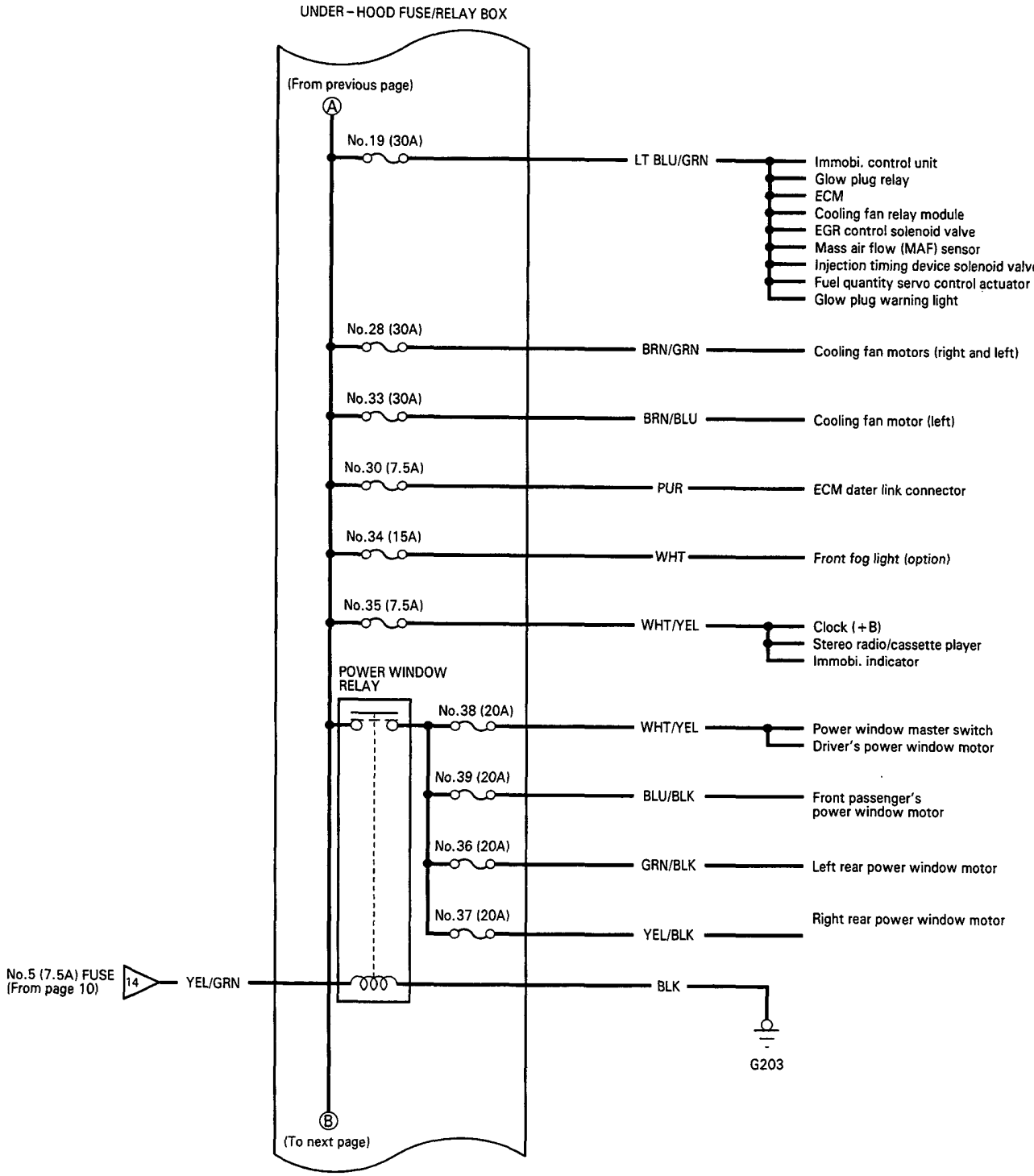


Fuse Number	Amps	Wire Color	Circuit(s) and Component(s) Protected
1	7.5 A	YEL/WHT	Keyless entry and security alarm system
2	15 A	BLK/YEL	Main relay, Immobi. control unit, engine control module (ECM), charging system (IG1)
		GRY (or RED)	SRS unit (VA)
3	10 A	GRY (or PNK)	SRS unit (VB)
4	10 A	BLK/YEL	Charging system light
5	7.5 A	YEL/GRN	Headlight adjuster unit, power mirrors, sunroof, power window
6	30 A	GRN/BLK	Wiper/washer system
7	7.5 A	YEL/BLK	Heater control panel, rear window defogger relay
8	10 A	YEL	Back-up lights, clock, warning/indicator lights
		BLK/YEL	Vehicle speed sensor (VSS)
9	7.5 A	———	Optional connector B
10	10 A	GRN/PNK	ABS modulator assembly
11	15 A	YEL/RED	Stereo sound system (radio motor antenna), cigarette lighter
12	———	———	Not used

Power Distribution

Circuit Identification

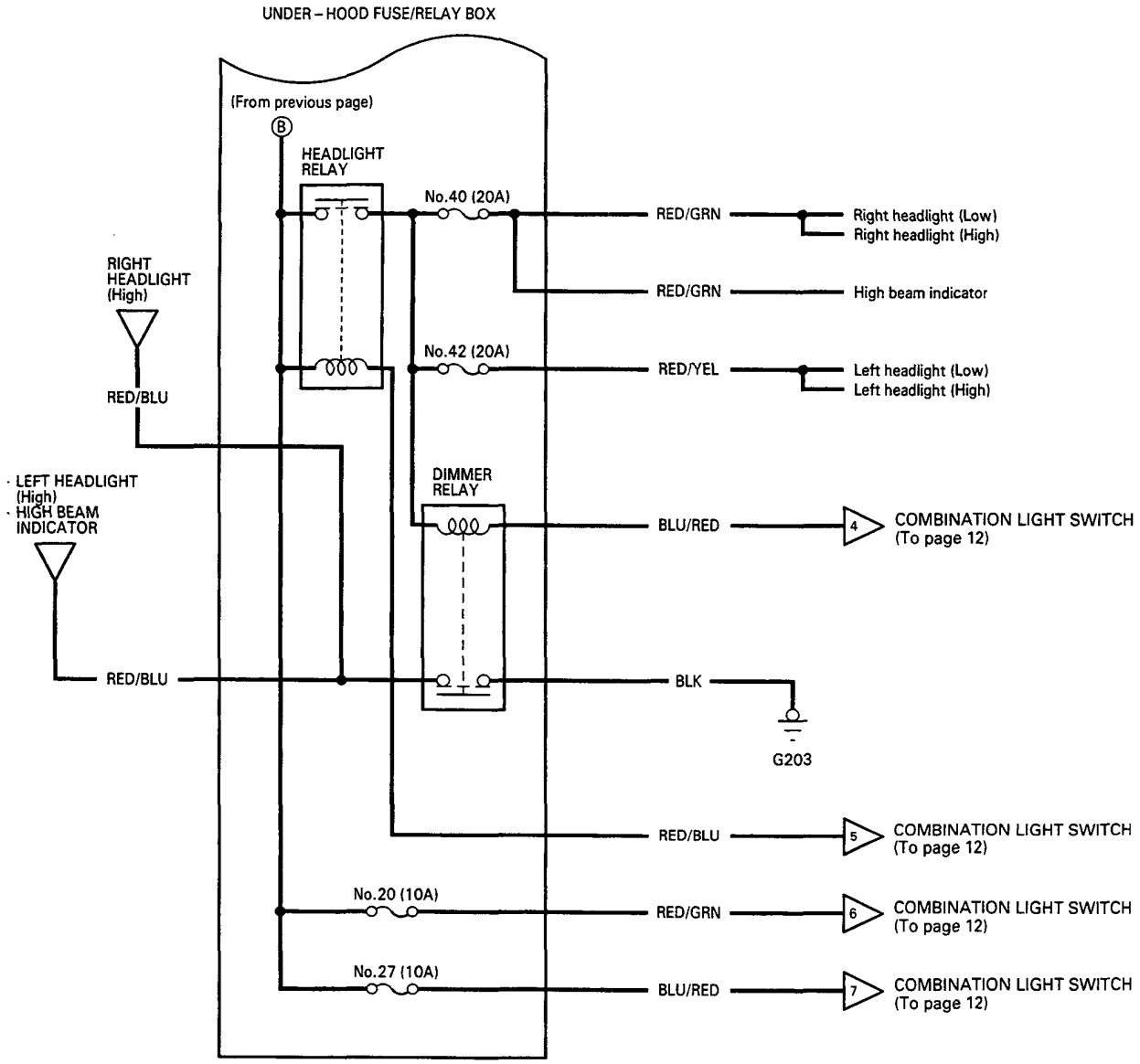


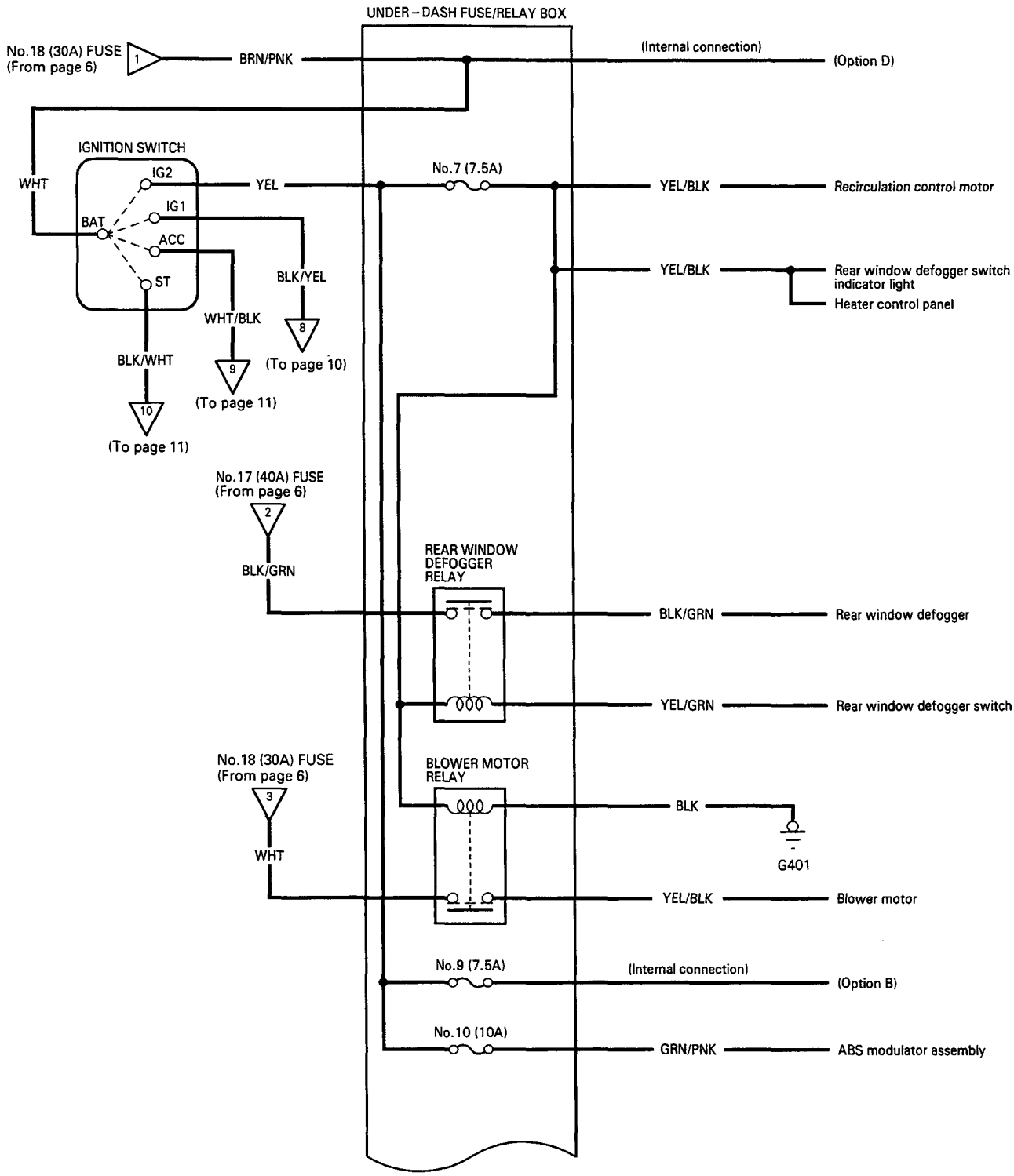

UNDER-HOOD FUSE/RELAY BOX
(From previous page)
Ⓐ
No.19 (30A)
LT BLU/GRN
Immobi. control unit
Glow plug relay
ECM
Cooling fan relay module
EGR control solenoid valve
Mass air flow (MAF) sensor
Injection timing device solenoid valve
Fuel quantity servo control actuator
Glow plug warning light
No.28 (30A)
BRN/GRN
Cooling fan motors (right and left)
No.33 (30A)
BRN/BLU
Cooling fan motor (left)
No.30 (7.5A)
PUR
ECM dater link connector
No.34 (15A)
WHT
Front fog light (option)
No.35 (7.5A)
WHT/YEL
Clock (+B)
Stereo radio/cassette player
Immobi. indicator
POWER WINDOW RELAY
No.38 (20A)
WHT/YEL
Power window master switch
Driver's power window motor
No.39 (20A)
BLU/BLK
Front passenger's power window motor
No.36 (20A)
GRN/BLK
Left rear power window motor
No.37 (20A)
YEL/BLK
Right rear power window motor
No.5 (7.5A) FUSE
(From page 10)
14
YEL/GRN
BLK
G203
Ⓑ
(To next page)

(cont'd)

Power Distribution

Circuit Identification (cont'd)

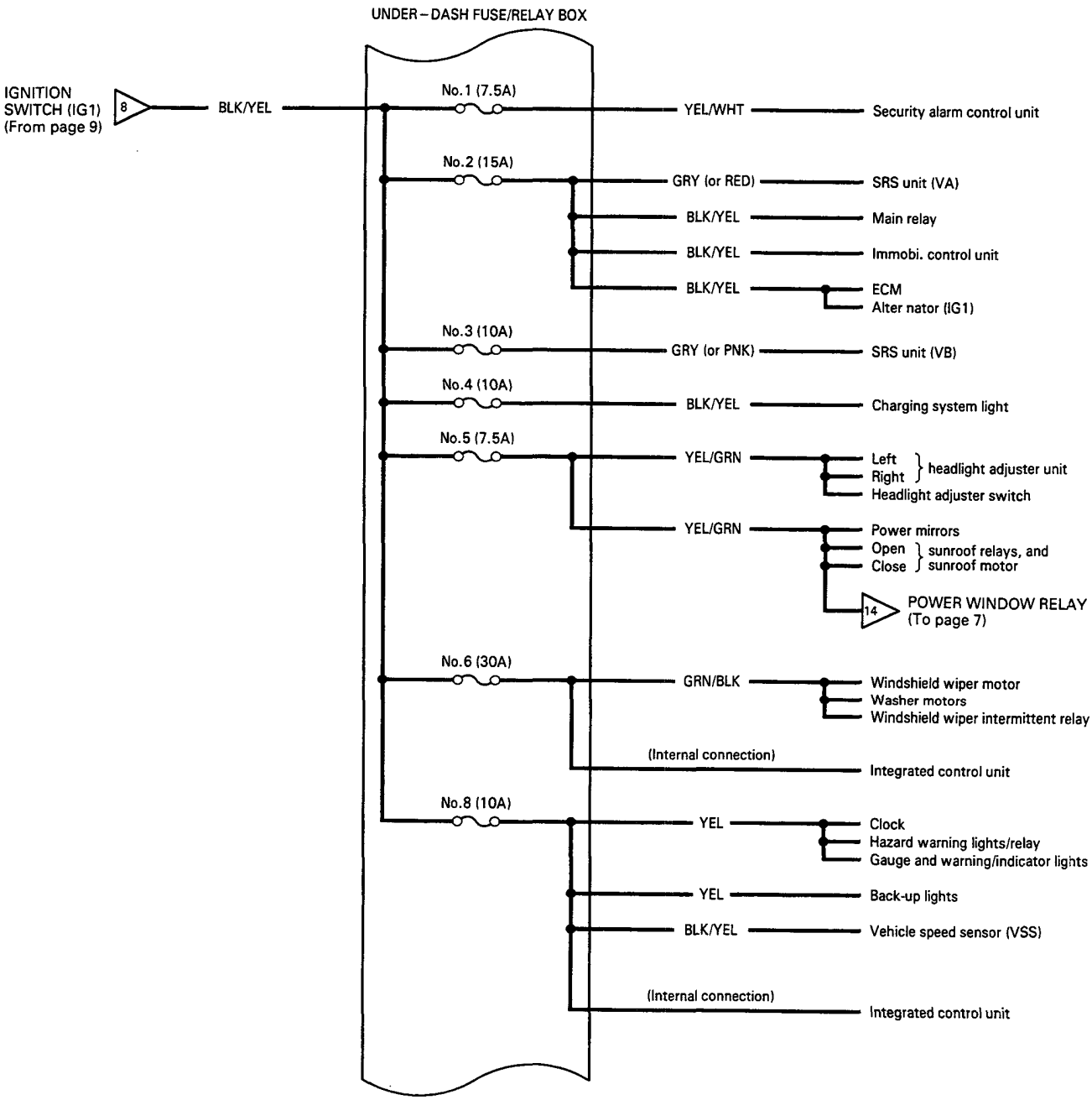


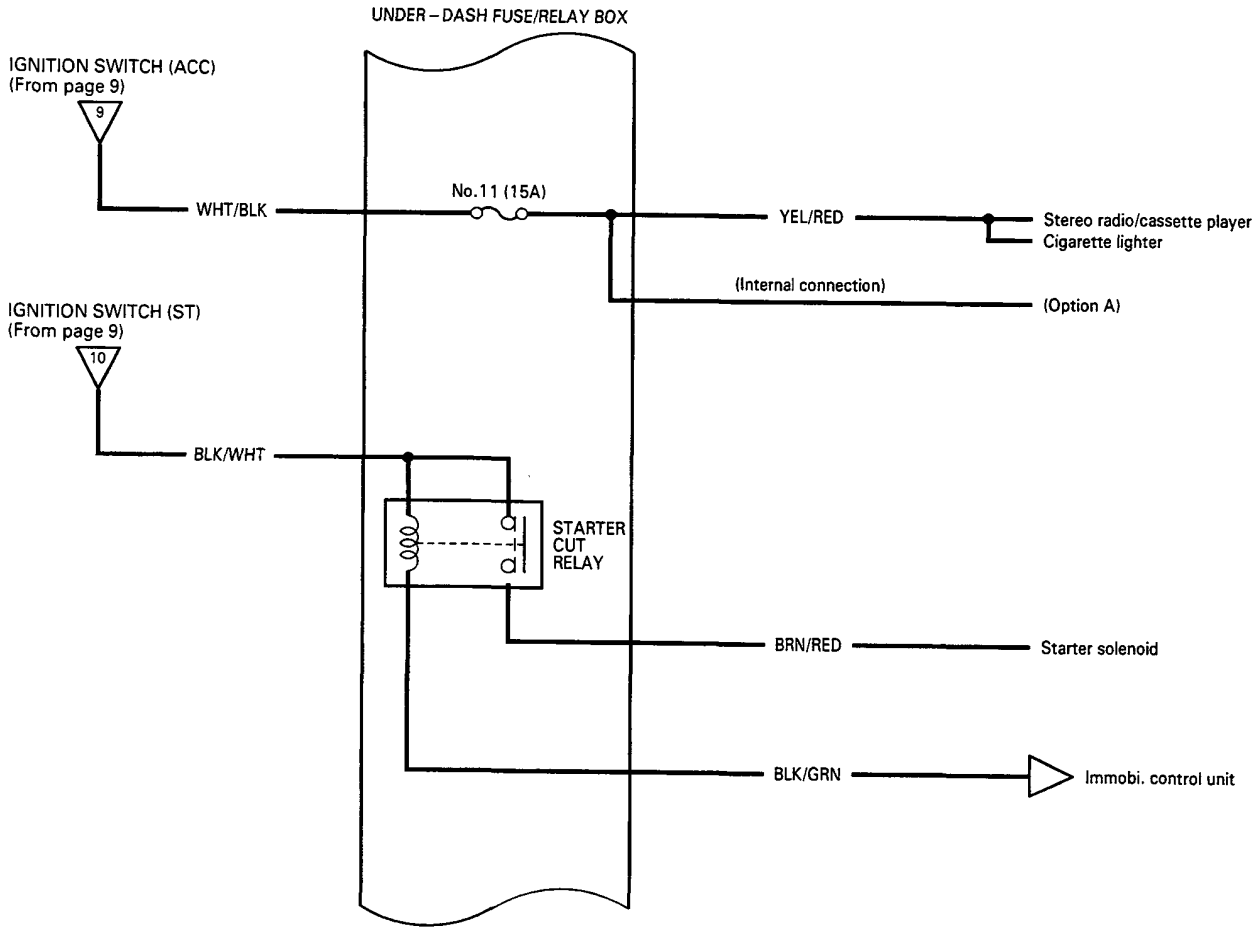

UNDER – DASH FUSE/RELAY BOX
No.18 (30A) FUSE
(From page 6)
1
BRN/PNK
(Internal connection)
(Option D)
IGNITION SWITCH
WHT
IG2
YEL
No.7 (7.5A)
YEL/BLK
Recirculation control motor
IG1
BAT
ACC
ST
YEL/BLK
Rear window defogger switch indicator light
Heater control panel
BLK/YEL
8
WHT/BLK
9
(To page 10)
BLK/WHT
(To page 11)
10
(To page 11)
No.17 (40A) FUSE
(From page 6)
2
BLK/GRN
REAR WINDOW DEFOGGER RELAY
BLK/GRN
Rear window defogger
YEL/GRN
Rear window defogger switch
No.18 (30A) FUSE
(From page 6)
3
WHT
BLOWER MOTOR RELAY
BLK
G401
YEL/BLK
Blower motor
No.9 (7.5A)
(Internal connection)
(Option B)
No.10 (10A)
GRN/PNK
ABS modulator assembly

(cont'd)

Power Distribution

Circuit Identification (cont'd)

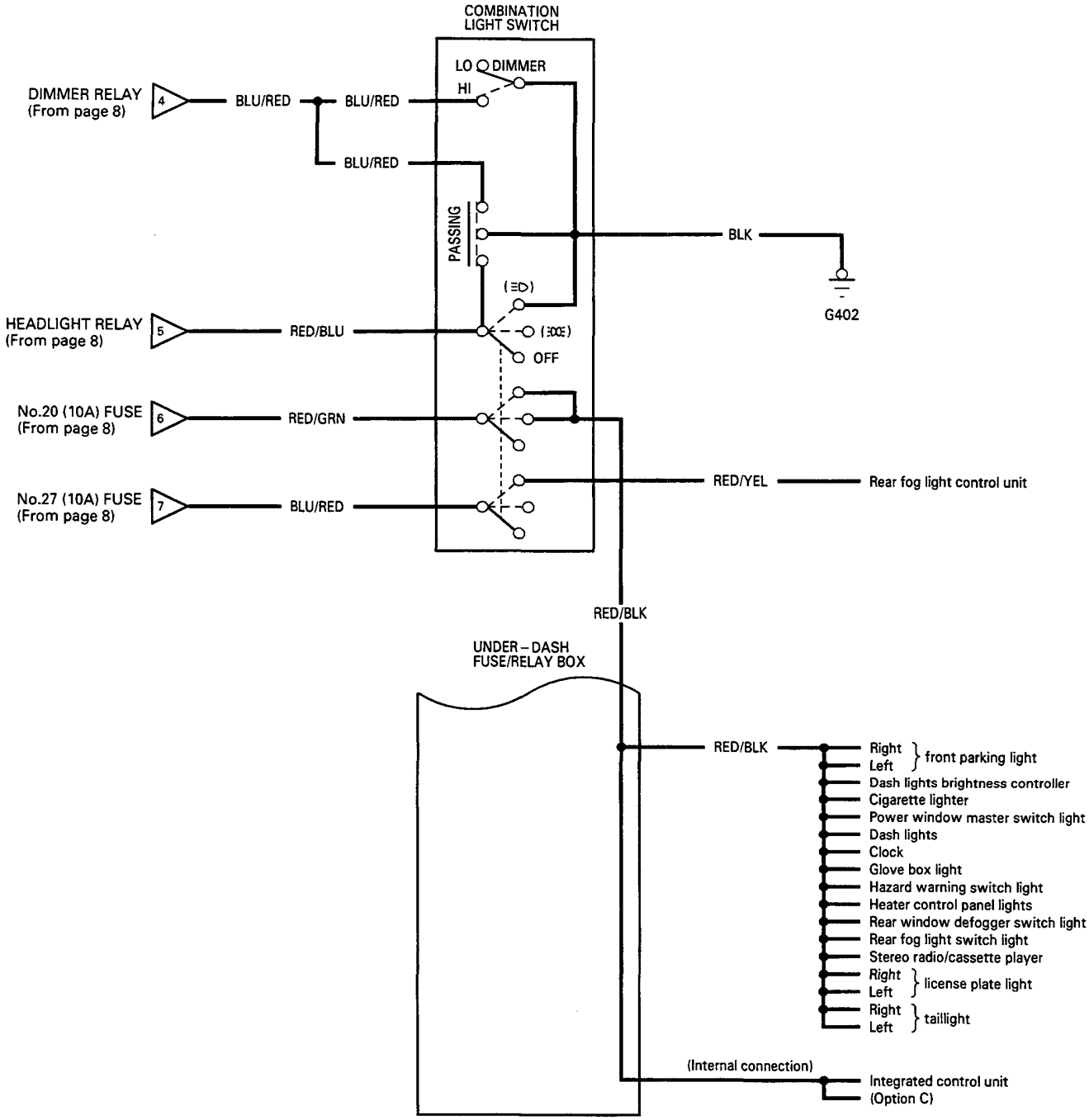



UNDER – DASH FUSE/RELAY BOX
IGNITION SWITCH (ACC)
(From page 9)
9
WHT/BLK
No.11 (15A)
YEL/RED
Stereo radio/cassette player
Cigarette lighter
(Internal connection)
(Option A)
IGNITION SWITCH (ST)
(From page 9)
10
BLK/WHT
STARTER
CUT
RELAY
BRN/RED
Starter solenoid
BLK/GRN
Immobi. control unit

(cont'd)

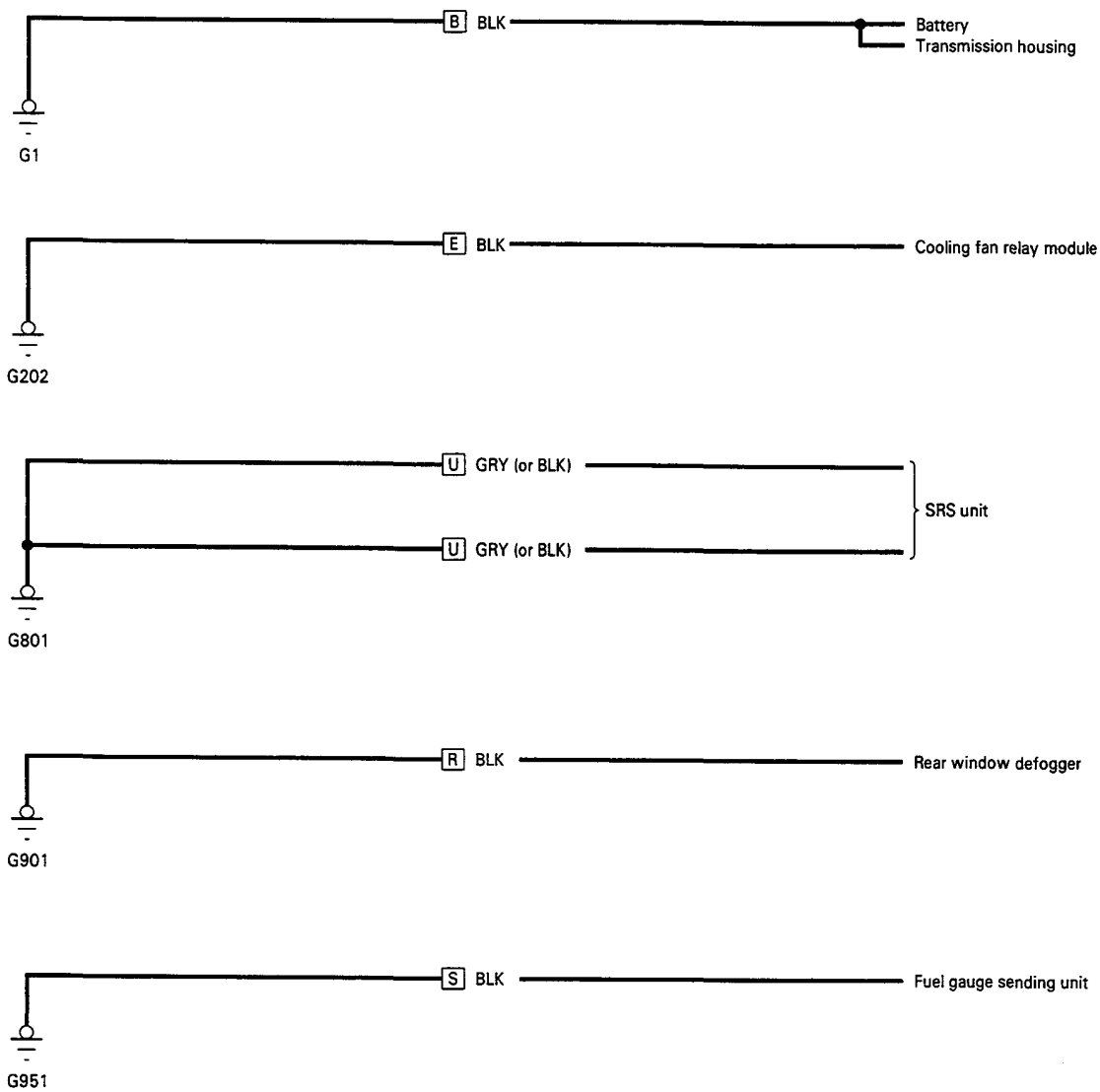
Power Distribution

Circuit Identification (cont'd)



Ground Distribution

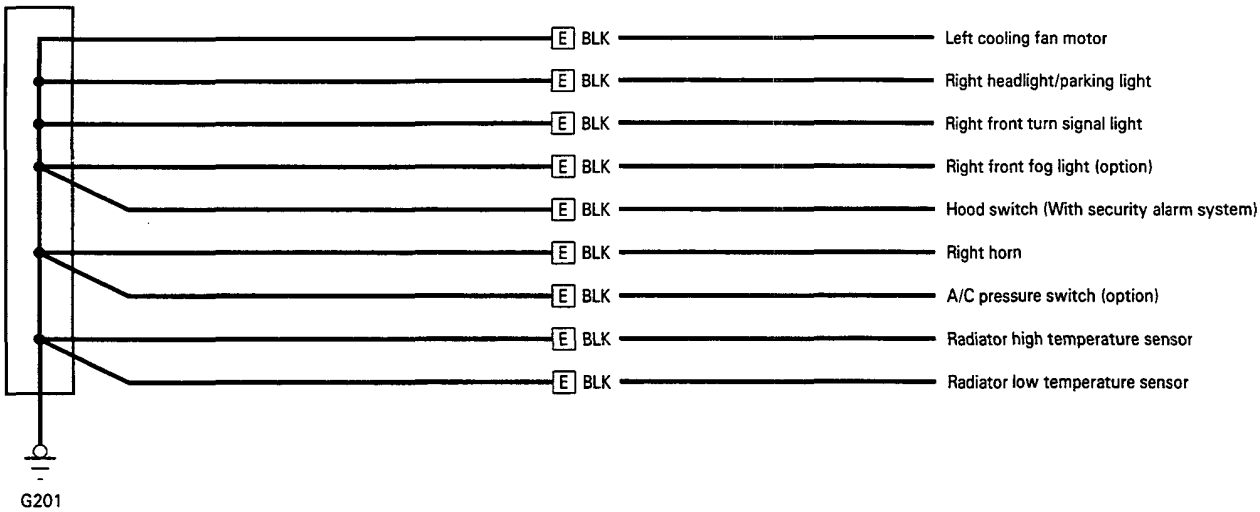
Circuit Identification

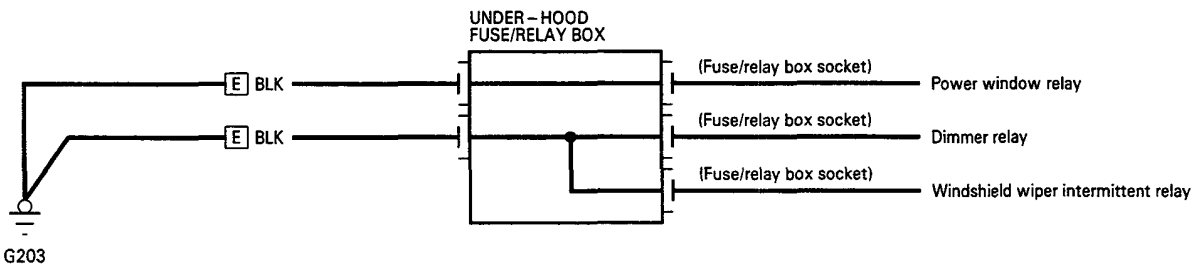


B : Battery ground cables
E : Main wire harness
R : Rear window defogger ground wire
S : Fuel unit wire harness
U : SRS main harness
X : ABS pump motor ground cable

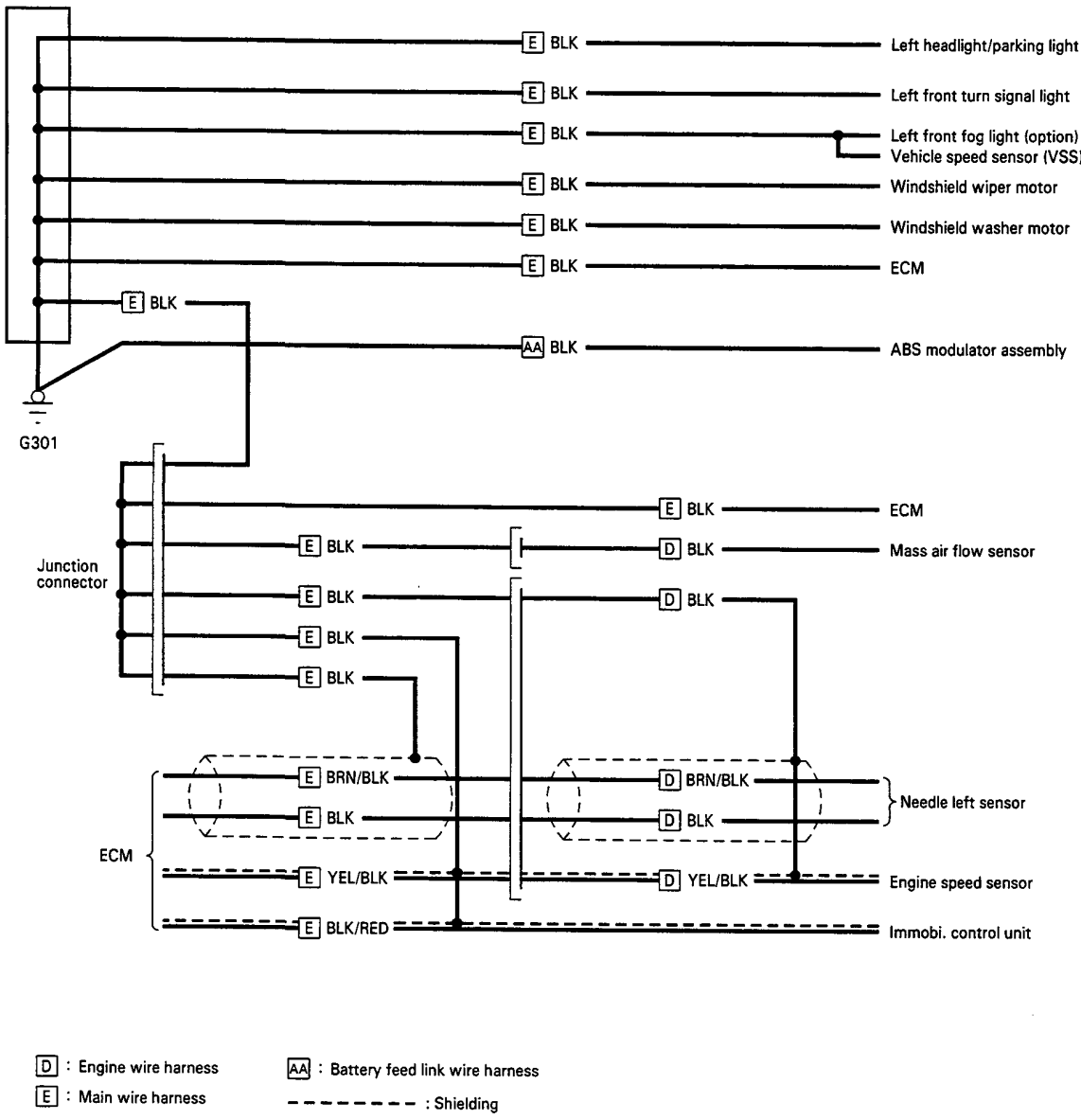
Ground Distribution

Circuit Identification (LHD)





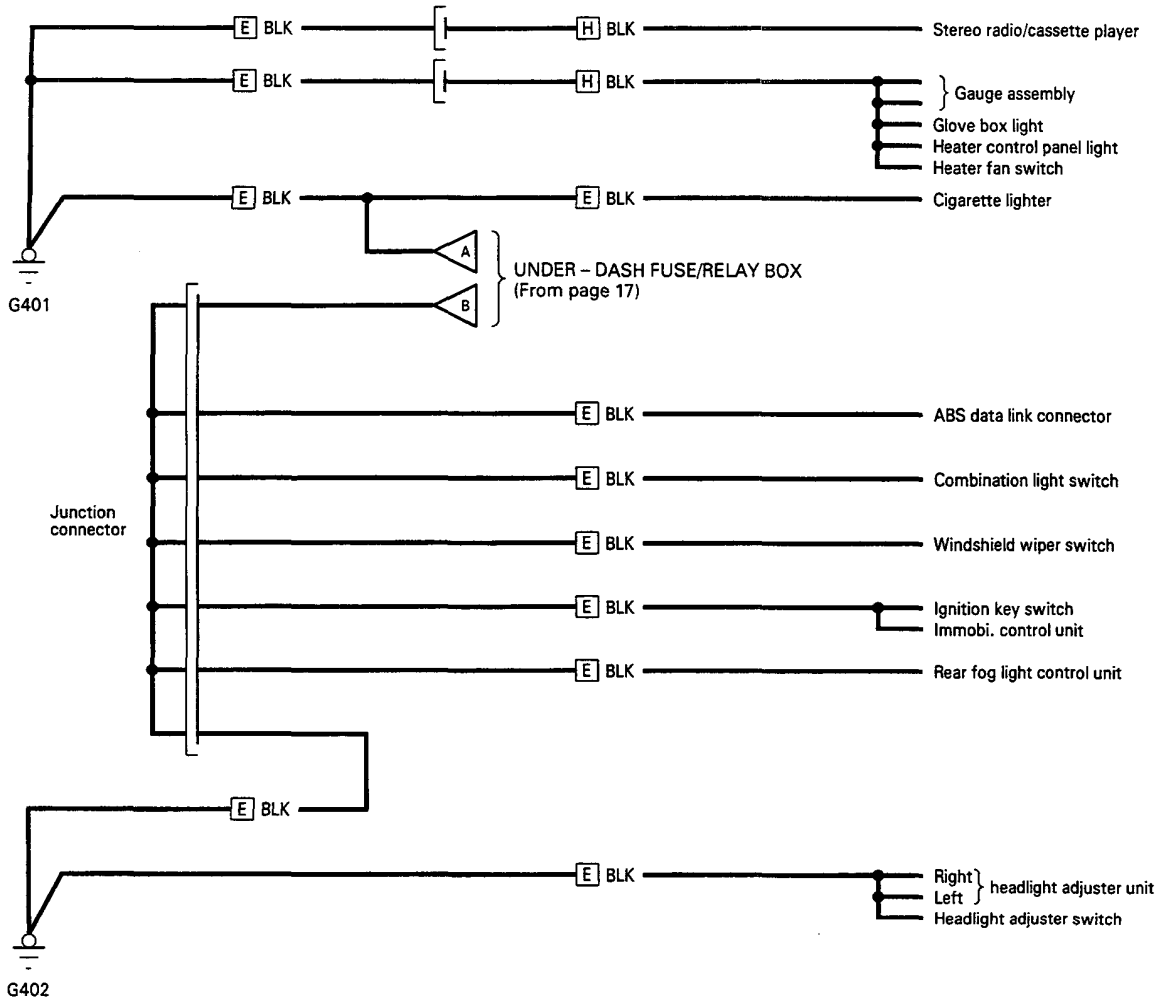
E : Main wire harness


E BLK
Left headlight/parking light
E BLK
Left front turn signal light
E BLK
Left front fog light (option)
Vehicle speed sensor (VSS)
E BLK
Windshield wiper motor
E BLK
Windshield washer motor
E BLK
ECM
E BLK
AA BLK
ABS modulator assembly
G301
E BLK
ECM
Junction connector
E BLK
D BLK
Mass air flow sensor
E BLK
D BLK
E BLK
E BLK
E BRN/BLK
D BRN/BLK
Needle left sensor
E BLK
D BLK
ECM
E YEL/BLK
D YEL/BLK
Engine speed sensor
E BLK/RED
Immobi. control unit
D : Engine wire harness
E : Main wire harness
AA : Battery feed link wire harness
: Shielding

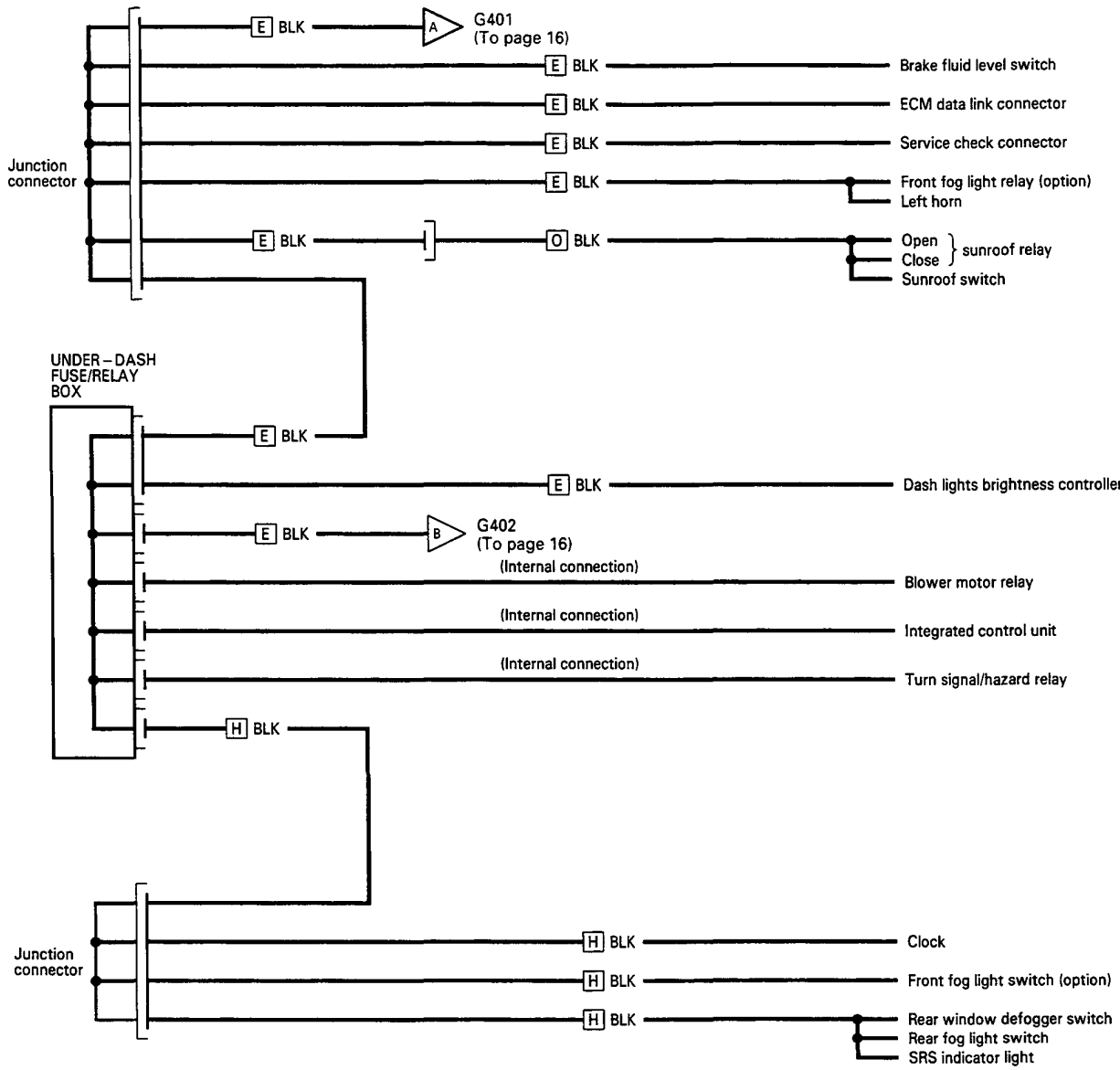
(cont'd)

Ground Distribution

Circuit Identification (LHD) (cont'd)



E : Main wire harness
H : Dashboard wire harness

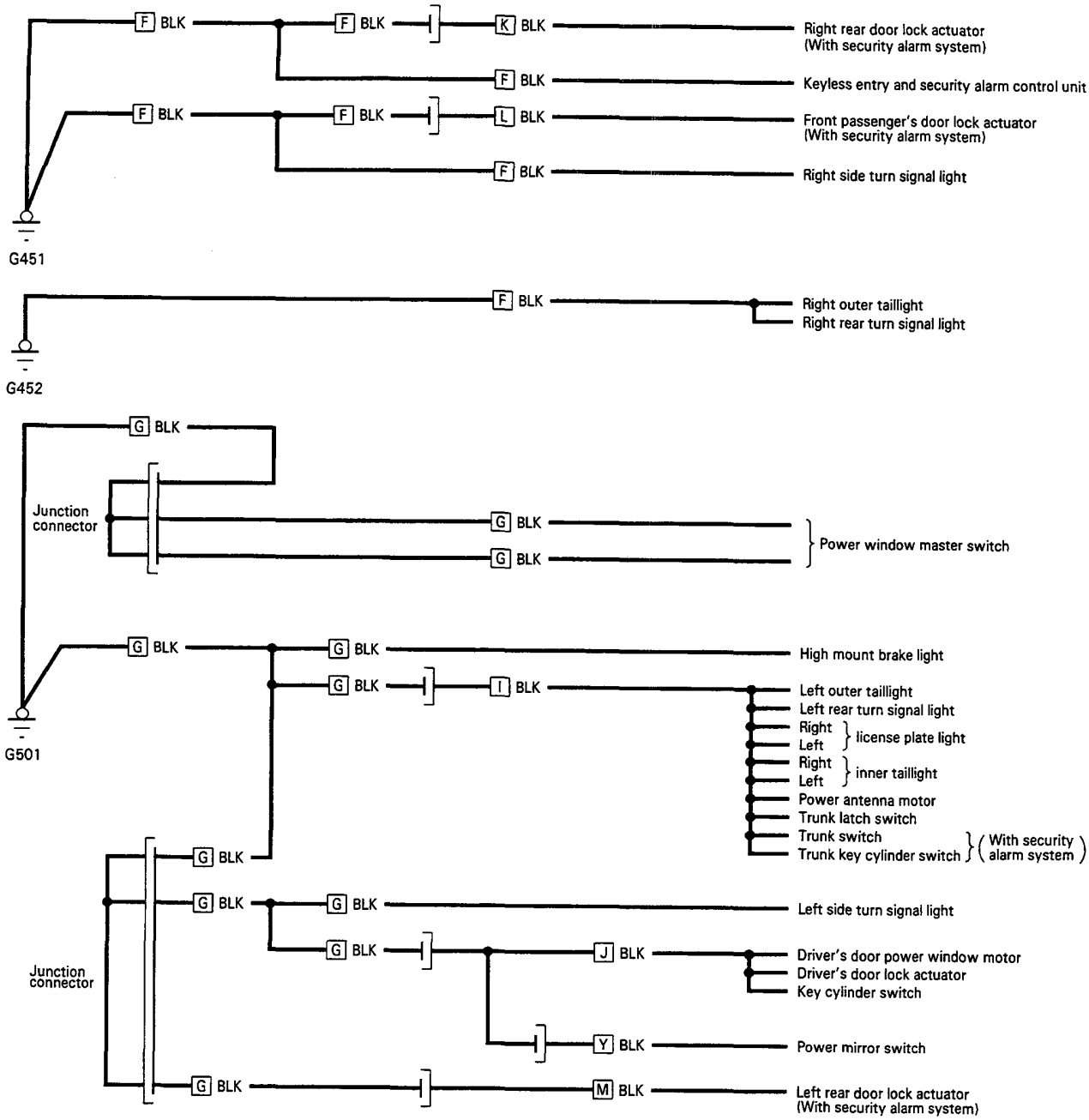


E : Main wire harness
O : Roof wire harness
H : Dashboard wire harness

(cont'd)

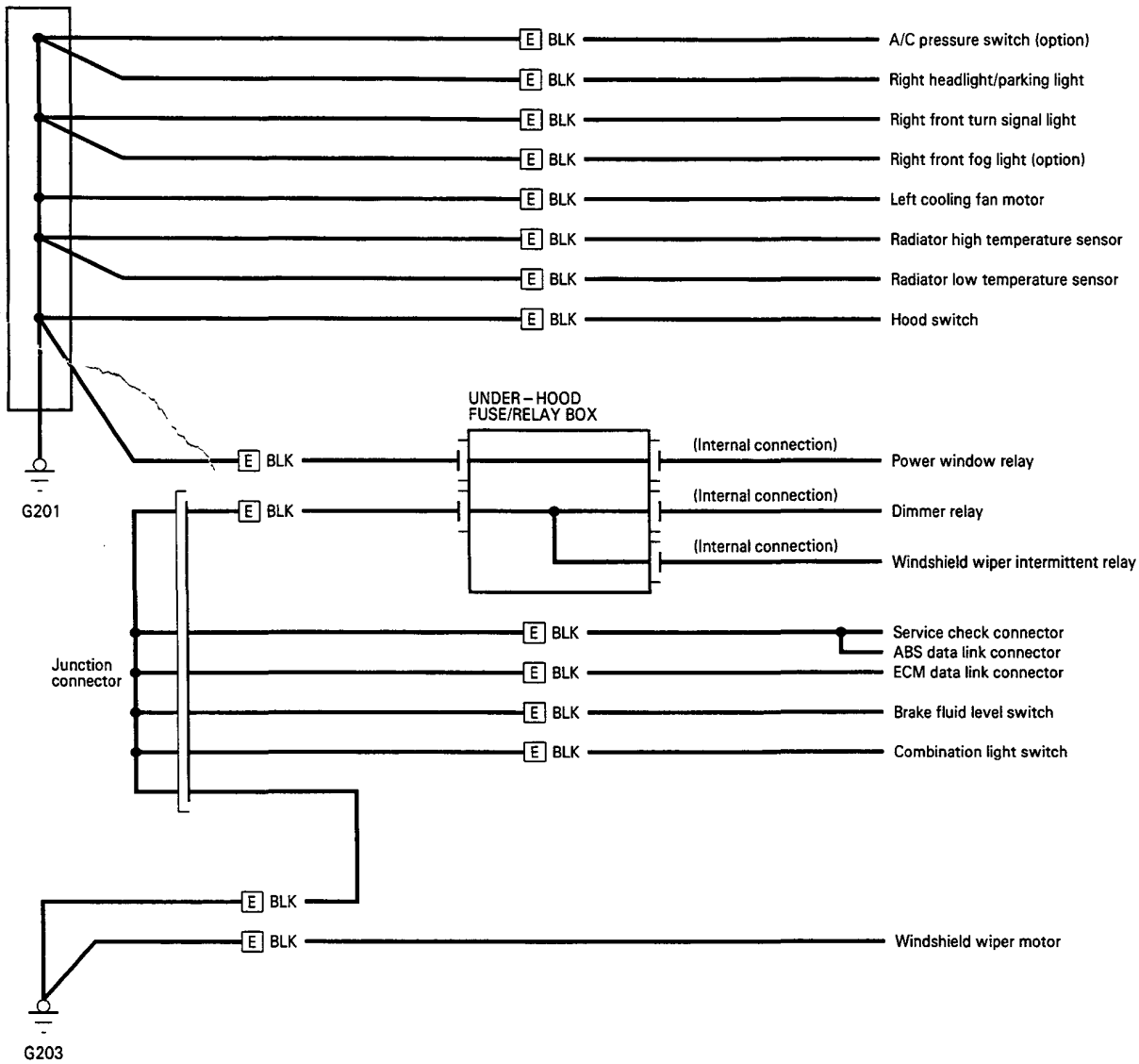
Ground Distribution

Circuit Identification (LHD) (cont'd)



F : Side wire harness
G : Floor wire harness
I : Rear wire harness
J : Driver's door wire harness
K : Right rear door wire harness
L : Front passenger's door wire harness
M : Left rear door wire harness
Y : Power mirror switch sub-harness

Circuit Identification (RHD)

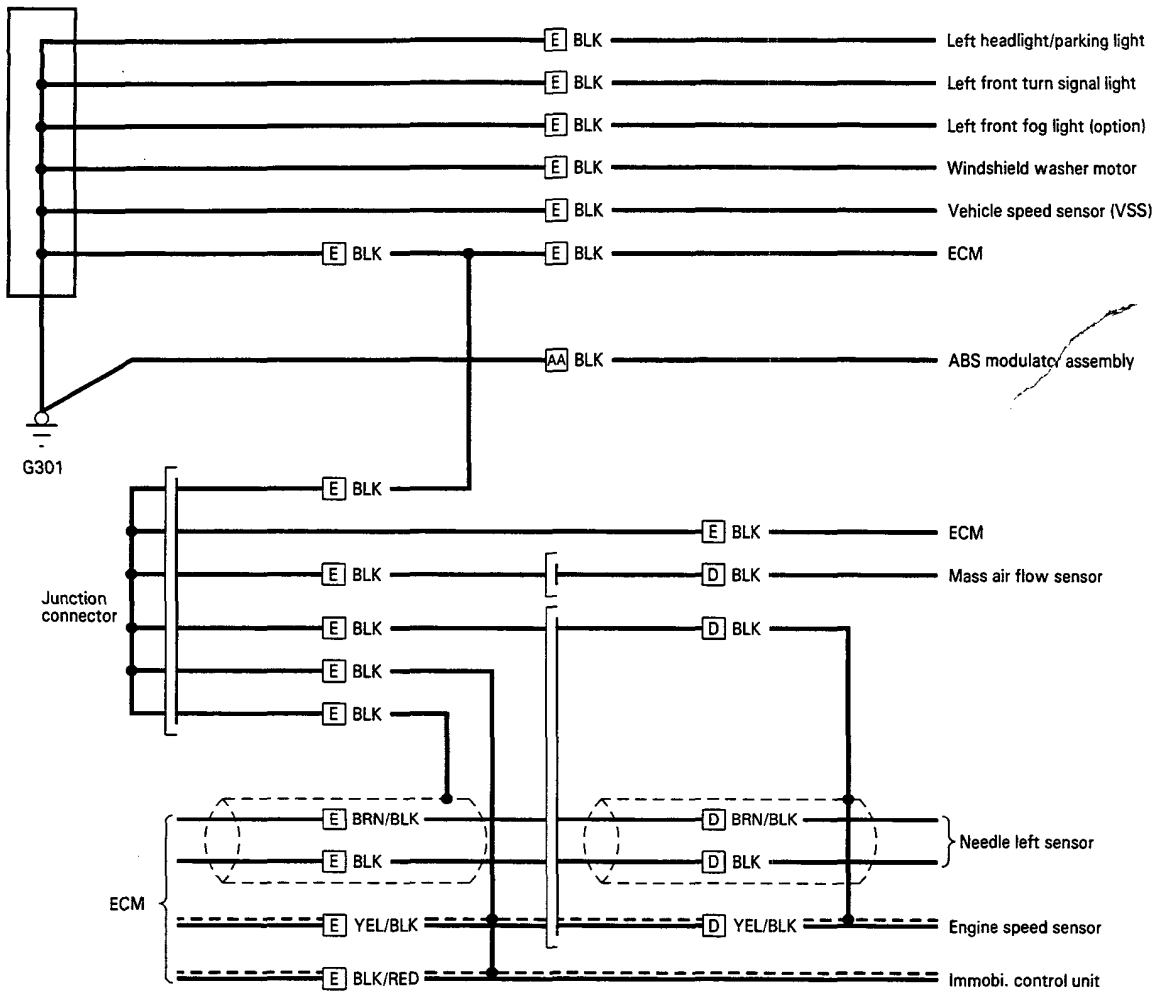


E : Main wire harness

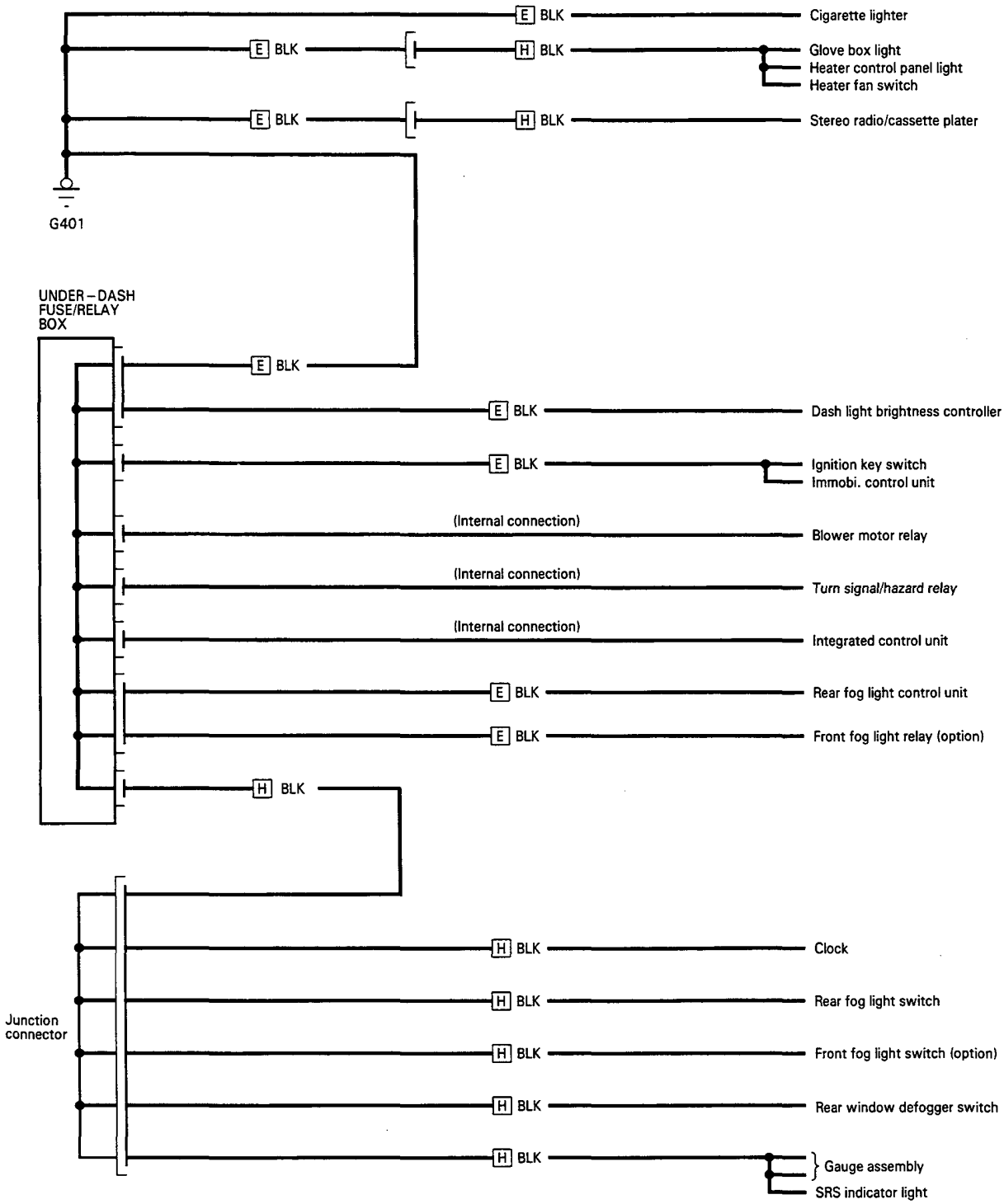
(cont'd)

Ground Distribution

Circuit Identification (RHD) (cont'd)



D : Engine wire harness
E : Main wire harness
AA : Battery feed link wire harness
- - - - - - - - : Shielding

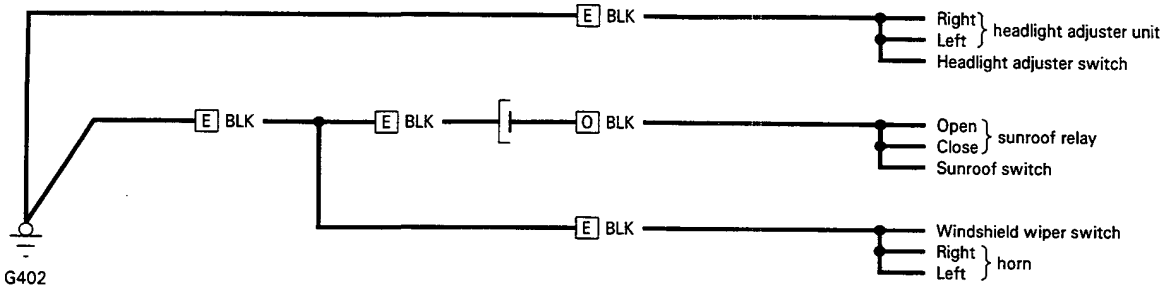


E : Main wire harness
H : Dashboard wire harness

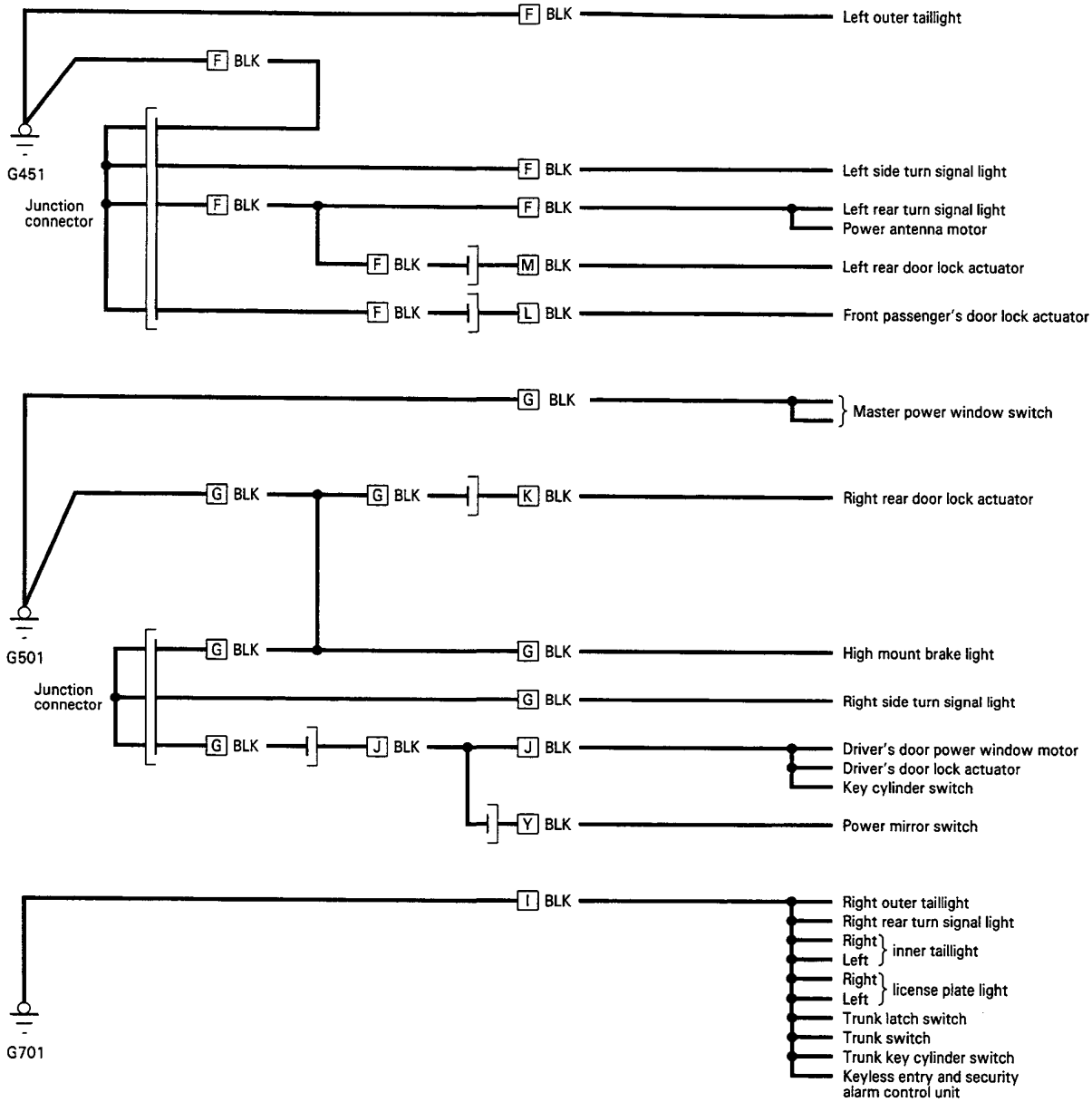
(cont'd)

Ground Distribution

Circuit Identification (RHD) (cont'd)



E : Main wire harness
O : Roof wire harness



F : Side wire harness
G : Floor wire harness
I : Rear wire harness
J : Driver's door wire harness
K : Right rear door wire harness
L : Front passenger's door wire harness
M : Left rear door wire harness
Y : Power mirror switch sub – harness