CONTENTS

JACKING

The following instructions must be carried out before raising the vehicle off the ground.

1. Use a solid level ground surface.
2. Apply parking brake.
3. Select 1st gear in main gearbox.
4. Select Low range in transfer gearbox.

CAUTION: To avoid damage occurring to the under body components of the vehicle the following jacking procedures must be adhered to.

DO NOT POSITION JACKS OR AXLE STANDS UNDER THE FOLLOWING COMPONENTS.

Body structure
Bumpers
Fuel lines
Brake lines
Front radius arms
Panhard rod
Steering linkage
Rear Trailing links
Fuel tank
Engine sump
Gearbox bell housing

Jack or support vehicle by axles only.

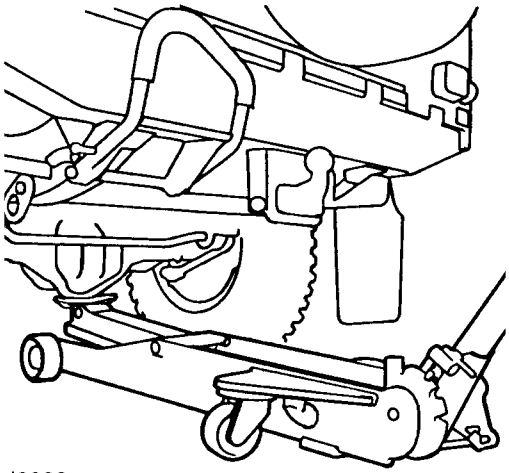
Vehicle jack

The jack provided with the vehicle is only intended to be used in an emergency, for changing a tyre. Do **NOT** use the jack for any other purpose. Refer to Owner's Manual for vehicle jack location points and procedure. Never work under a vehicle supported by the vehicle jack.

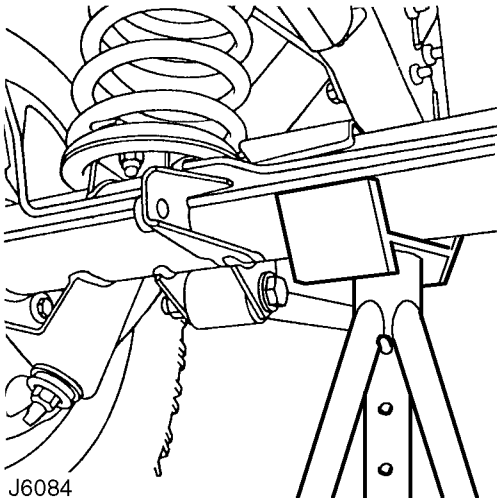
Hydraulic jack

A hydraulic jack with a minimum 1500 kg, 3,300 lbs load capacity must be used, see illustration J6083.

CAUTION: Do not commence work on the underside of the vehicle until suitable axle stands have been positioned under the axle, see J6084.



J6083



J6084

Raise the front of the vehicle

1. Position cup of hydraulic arm under differential casing.

NOTE: The differential casing is not central to the axle. Care should be taken when raising the front road wheels off the ground as the rear axle has less sway stiffness.

2. Raise front road wheels to enable an axle stand to be installed under left hand axle tube.

SHOCK ABSORBERS

Type	Telescopic, double-acting non-adjustable
Bore diameter	35.47mm

BRAKES

Front brake

Caliper	AP Lockheed, four opposed pistons
Operation	Hydraulic, self adjusting
Disc	90 - Solid, outboard, 110/130 - Ventilated, outboard
Disc diameter	298 mm (11.73 in)
Disc thickness	90 - 14,1 mm (0.56in), 110/130 - 24mm (0.95 in)
Wear limit	1 mm (0.04in) per side of disc
Disc run-out maximum	0,15mm (0.006 in)
Pad area	58 cm^2 (9.0 in^2)
Total swept area	801,3 cm^2 (124.2 in^2)
Pad material	Ferodo 3440 non asbestos
Pad minimum thickness	3 mm (0.12in)

Rear brake

Caliper	AP Lockheed opposed piston
Operation	Hydraulic, self adjusting
Disc	Solid, outboard
Disc diameter	90 - 290 mm (11.42 in), 110/130 - 298 mm (11.73)
Disc thickness	90 - 12,5 mm (0.49 in), 110/130 - 14,1 mm (0.56 in)
Wear limit	90 - 0,38 mm (0.015 in), 110/130 - 1,0 mm (0.04 in) per side of disc
Disc run-out maximum	0,15 mm (0.006 in)
Pad area	90 - 30,5 cm^2 (4.37 in^2), 110/130 - 36,2 cm^2 (5.61 in^2)
Total swept area	90 - 694 cm^2 (106.98 in^2)
Pad material	Ferodo 3440 non asbestos
Pad minimum thickness	UP TO 02MY - 3 mm (0.12 in)
Pad minimum thickness	From 02MY - 2 mm (0.08 in)

Parking brake

Type	Mechanical, cable operated drum brake on the rear of the transfer gearbox output shaft
Drum internal diameter	254 mm (10.0 in)
Width	70 mm (2.75 in)
Pad material	Ferodo 3611 non asbestos

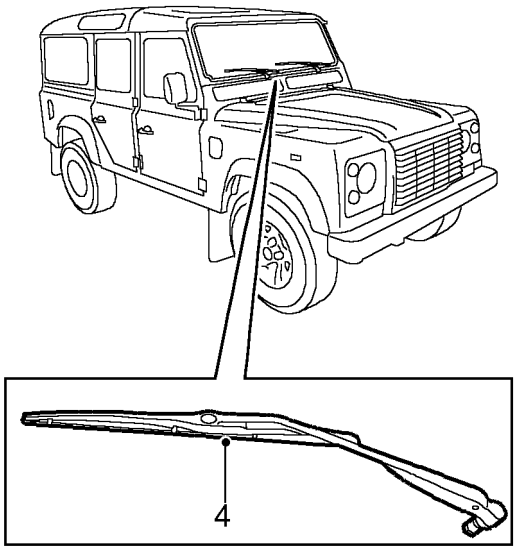
Servo/master cylinder

Manufacturer	Lucas
Servo type	LSC 80
Master cylinder type	25,4 mm (1.0 in) diameter, tandem
Pressure reducing valve, failure conscious	Cut-in pressure, 90 - 24 bar (360 lbf/in^2) ratio 4.0:1, 110 - 43 bar (645 lbf/in^2) ratio 2.9:1*

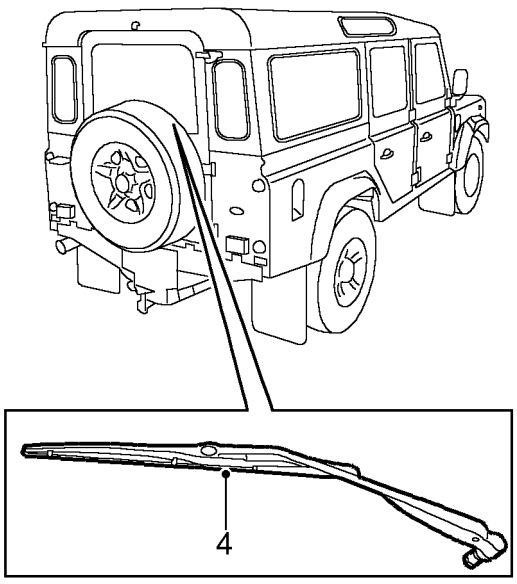
NOTE: * Pressure reducing valves are not fitted to all 110 specifications.

WIPERS AND WASHERS

1. Operate screen washer and switch on wipers. Check washer jets are correctly aimed and check for smooth smearless operation across screen of wiper blades at all speeds, including intermittent.
2. Repeat operation for rear screen wipers/washers.
3. Check all wiper blades for condition and signs of splits or damage.



M10 0634



M10 0633

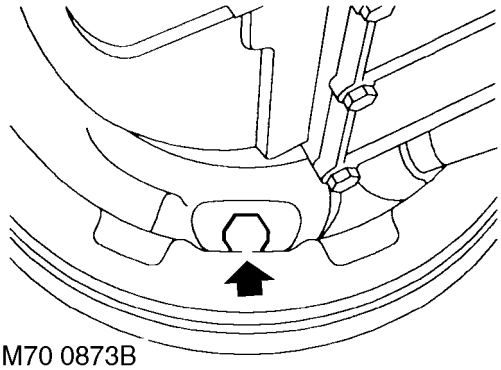
4. Check security of wiper arms.

HANDBRAKE

1. With the vehicle stationary, apply handbrake and check for correct operation. ***See BRAKES, Adjustment.***
2. Release handbrake and check for correct operation.

NOTE: Any adjustment required as a result of the checking process will be subject to additional labour and/or material cost and should not be carried out without the authorisation of the customer.

Adjust handbrake (First 12,000 miles/12 months only

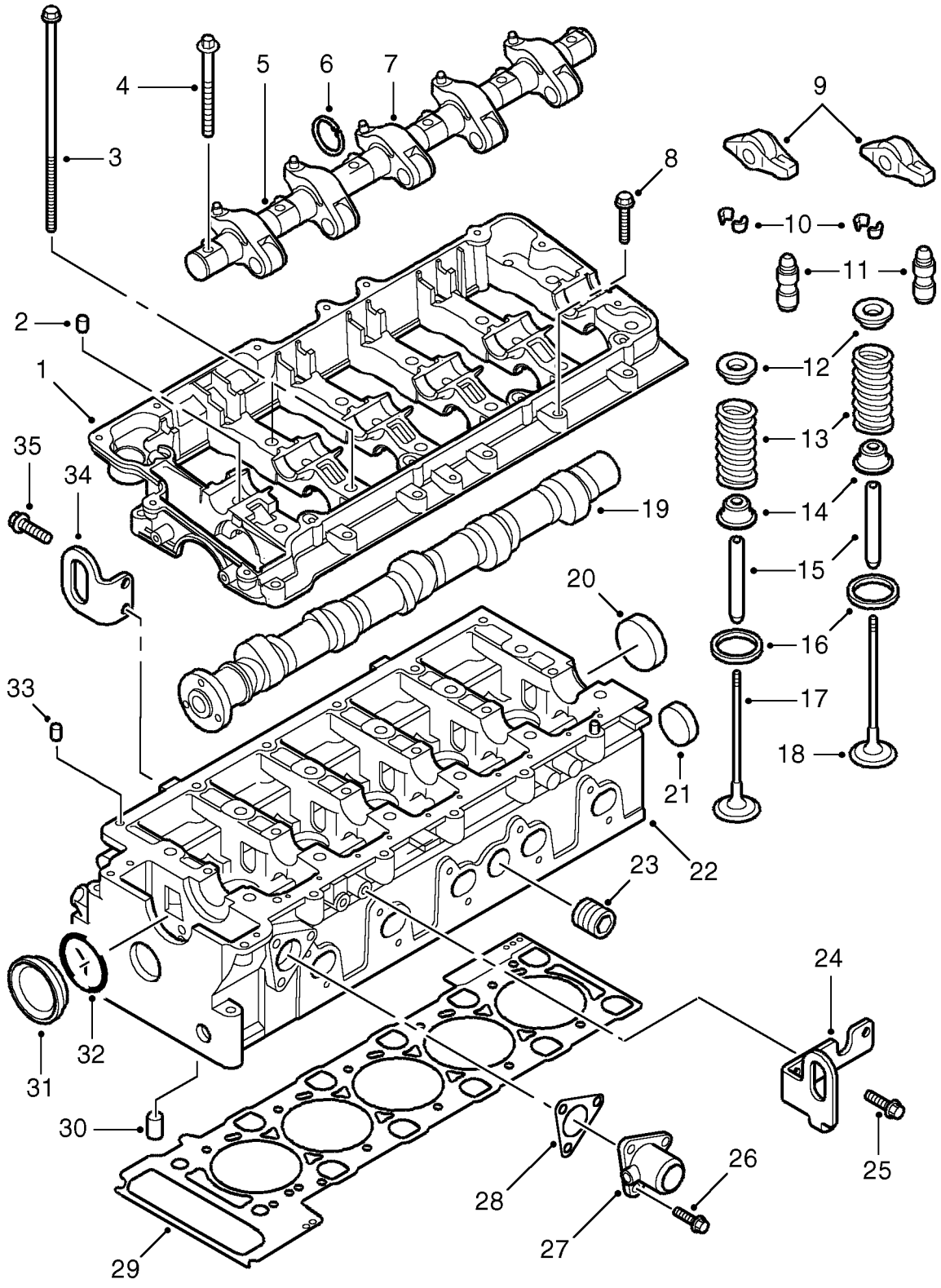


M70 0873B

1. Adjust handbrake cable. ***See BRAKES, Adjustment.***

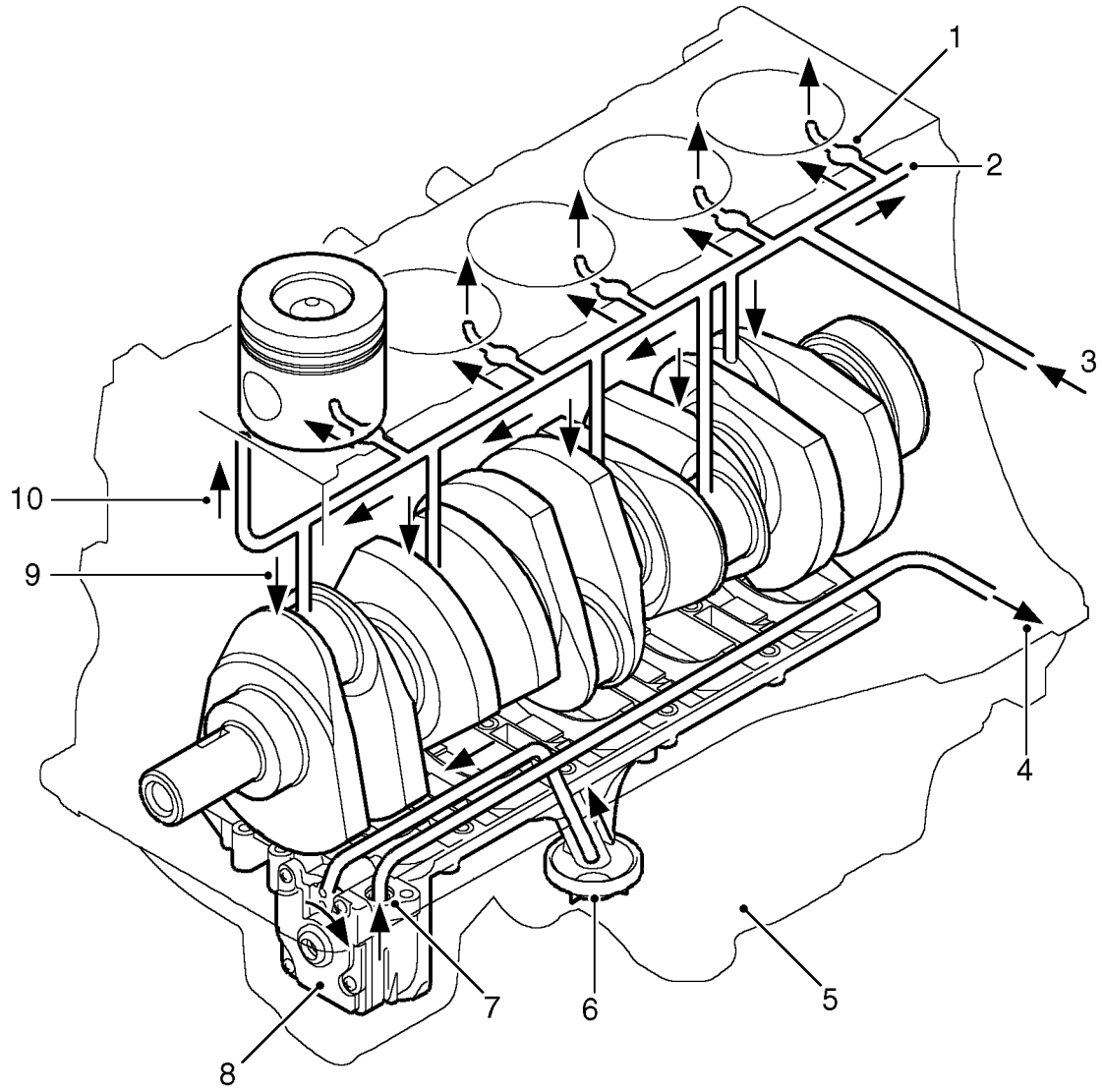
NOTE: Additional time is built into the first 12,000/12 months service time to allow for handbrake cable adjustment.

Cylinder head components

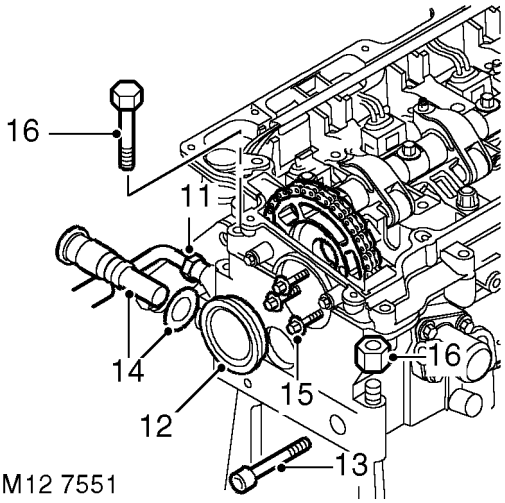


M12 4655A

CYLINDER BLOCK FLOW

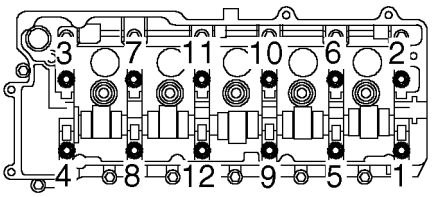


M12 4728



M12 7551

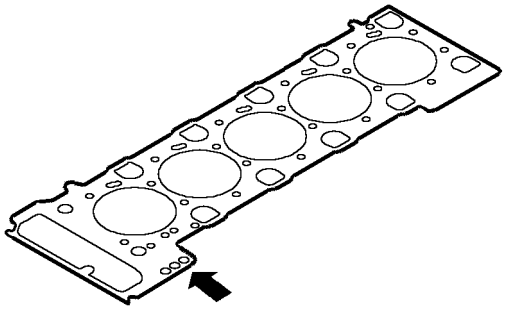
11. Disconnect alternator/vacuum pump oil feed pipe union from cylinder head, remove and discard 'O' ring.
12. Remove camshaft sprocket access plug from front of cylinder head, remove and discard 'O' ring.
13. Remove timing chain fixed guide Allen screw.
14. Remove timing chain tensioner, remove and discard sealing washer.
15. Remove and discard 3 bolts securing camshaft sprocket to camshaft; release sprocket from camshaft.
16. Remove bolt and nut securing front of cylinder head to timing chain cover.



M12 7343

17. Using sequence shown, progressively loosen then remove 12 cylinder head bolts; discard bolts together with their captive washers.
18. Using assistance, remove cylinder head and place on 2 wooden blocks.

CAUTION: Cylinder head is dowel located, do not tap it sideways to free it from cylinder block. Support both ends of cylinder head on blocks of wood. With the camshaft carrier bolted down, the injector nozzles and some of the valves will protrude from the face of the cylinder head.

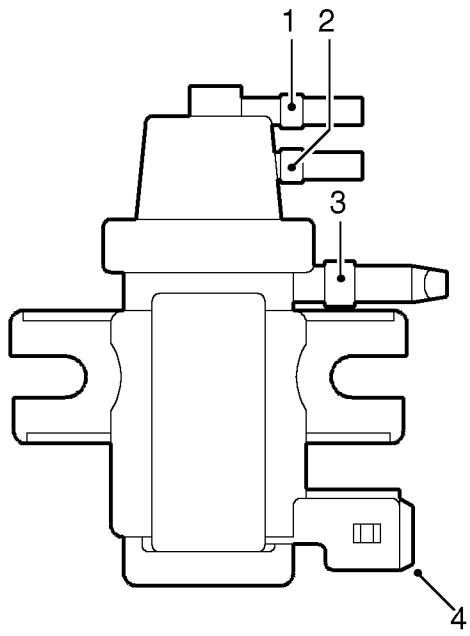

M12 7548

19. Remove the cylinder head gasket.
20. Note the gasket thickness indicator and ensure the same thickness gasket is used on refitment of the cylinder head.

CAUTION: If new pistons, connecting rods or crankshaft are fitted, it will be necessary to measure piston stand proud in order to determine thickness of gasket required. ***See this Section.***

21. Remove and discard 2 plastic locating dowels from cylinder block.
22. Carry out cylinder head overhaul procedures. ***See this Section.***

EGR MODULATOR



M17 0150

1. Port to vacuum source (white band)
2. Port to EGR valve (blue band)
3. Port to atmosphere via in-line filter (green band)
4. Harness connector

The EGR modulator is located on a plate fixed to the inner RH front wing. The modulator is attached to the plate by two studs, each with two nuts which secure the assembly to a rubber mounting, which helps reduce noise. The modulator must be mounted vertically with the two vacuum ports uppermost.

Modulator operation is controlled by a signal from the ECM which determines the required amount of EGR needed in response to inputs relating to air flow, engine operation, and ambient conditions. The modulator has a two pin connector at its base to connect it to the ECM via the engine harness.

The modulator features three ports:

- The top port is identified by a white band and connects to a T-piece in the vacuum line via a small bore light brown plastic hose. The two other ports on the T-piece connect to the vacuum line hoses of black vinyl tubing between the vacuum pump and the brake servo assembly attached to the bulkhead. The vacuum pump end of the tubing terminates in a rubber elbow, which gives a vacuum tight seal on the suction port of the vacuum pump. The brake servo end of the tubing terminates with a non-return valve in a plastic housing which plugs into the front face of the brake servo housing.
- The middle port is identified by a blue band, and connects to the suction port on the EGR valve through a small bore blue plastic hose.
- The lower port is identified by a green band and connects to atmosphere through an in-line filter via a small bore green plastic hose.

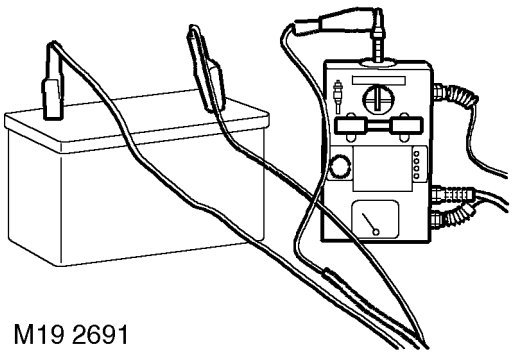
The blue and brown vacuum hoses are protected by corrugated plastic sheaths. The ends of the hoses are fitted with rubber boots to ensure vacuum tight seals at the component ports.

HEATER PLUG TEST

Service repair no - 19.90.20.01

Check

1. **Test out of engine**
2. Remove heater plug. ***See Repair.***



M19 2691

3. Using **LRT-12-511,** connect RED lead to battery '+' positive and the BLACK lead to battery '-' negative.
4. Position heater plug into tester and retain with spring loaded bar.
5. Connect YELLOW lead to heater plug terminal.
6. Press red button on tester and note ammeter reading. Keep button depressed, heater plug tip should start to glow after 5 seconds

CAUTION: The heater plug tip must glow first, if it fails to do so, replace heater plug.

7. The ammeter reading should show an initial current draw of 25 amps, which should fall to 12 amps after 20 seconds.
8. Refit heater plug. ***See Repair.***

FUEL SYSTEM - BLEED

Service repair no - 19.50.07

Fuel Purging Procedure

1. If the vehicle runs out of fuel, or the fuel level is so low that the fuel system draws air into the fuel rail, the fuel rail will need to be purged before the engine will start. This can be achieved by following a set procedure. The process does not require the use of any specialist equipment and can be performed by the driver of the vehicle.
   The process is as follows:
2. Switch off ignition and wait 15 seconds.
3. Turn ignition key to position 2 and wait 3 minutes, (this ensures that the fuel system purges all the air from the fuel rail within the cylinder head).
4. Depress the throttle pedal to more than 90% of its total travel, (to the throttle stop).
5. Crank the engine keeping the throttle pedal depressed.

NOTE: This operation is controlled by the ECM and it is important that the purging operation is not carried out on a vehicle that has not run out of fuel. If it is carried out unnecessarily it can lead to the engine flooding and failing to start.
This operation will be cancelled:

6. As soon as engine speed exceeds 600 rev/min.
7. The driver allows the throttle pedal to close to a position less than 90% of its travel.
8. The ignition key is released from the start position.

NOTE: The engine must not be cranked for more than 30 seconds in any one period.

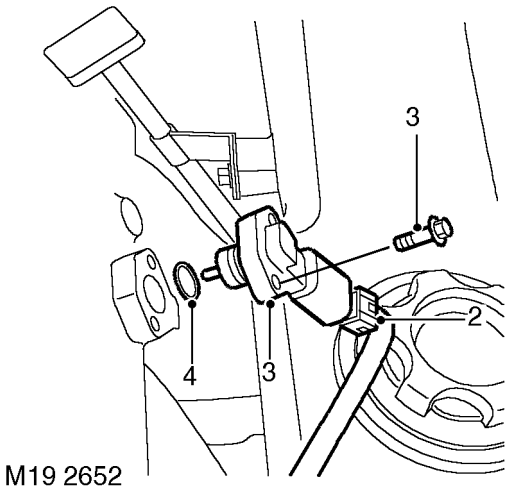
9. Repeat the above procedure if the engine fails to start.

SENSOR - COMBINED MAP AND IAT

Service repair no - 19.22.26

Remove

1. Remove 3 bolts and remove engine acoustic cover.



2. Disconnect multiplug from combined MAP and IAT sensor,
3. Remove 2 bolts securing sensor to inlet manifold.
4. Remove sensor and discard 'O' ring.

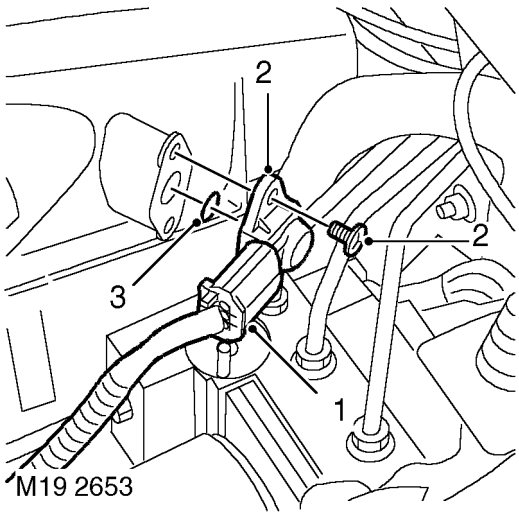
Refit

5. Clean sensor and mating face.
6. Fit new 'O' ring and position sensor to manifold.
7. Fit and tighten MAF and IAT sensor bolts to ***9 Nm (7 lbf.ft)***
8. Fit engine acoustic cover and secure with bolts.

SENSOR - AMBIENT AIR PRESSURE (AAP)

Service repair no - 19.22.27

Remove



1. Disconnect multiplug from AAP sensor.
2. Remove 2 screws and remove sensor.
3. Remove and discard 'O' ring.

Refit

4. Clean sensor and air cleaner cover.
5. Fit new 'O' ring, fit sensor and tighten screws.
6. Connect multiplug to AAP sensor.

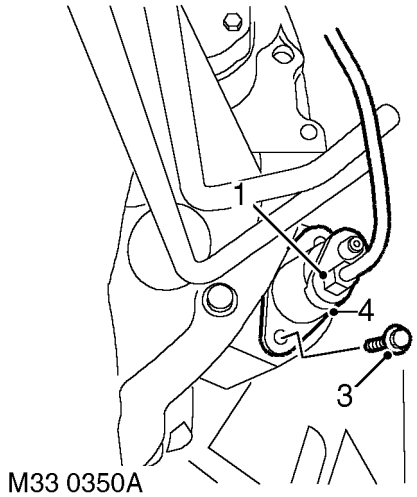
Clutch pedal setting

1. Loosen both locknuts on master cylinder push rod.
2. Check distance from lower edge of clutch pedal to floor. Correct measurement is 140 mm (5.50 in) without floor mat.
3. Adjust pedal stop to obtain correct setting.
4. Adjust master cylinder push rod to obtain approximately 1.5 mm (0.06 in) free play between push rod and master cylinder piston.
5. Tighten push rod locknuts.
6. Check operation of clutch pedal and ensure that there is minimum of 6 mm (0.25in) of free play before pressure is felt.
7. Fit pedal box top cover and multiplug bracket using a new gasket and secure with screws.
8. Connect multiplug and harness clip to pedal bracket.
9. Bleed clutch hydraulic system. ***See Adjustment.***

CYLINDER - CLUTCH SLAVE

Service repair no - 33.35.01

Remove



M33 0350A

1. Disconnect pipe from slave cylinder.

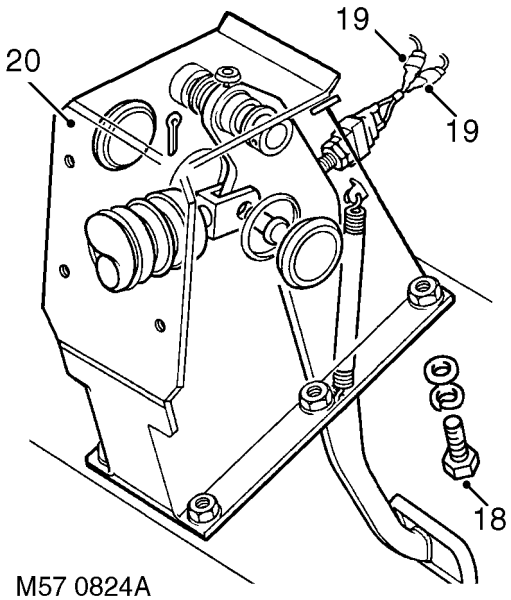
CAUTION: Plug the connections.

2. Position container to catch spillage.
3. Remove 2 bolts securing slave cylinder to bell housing.
4. Withdraw slave cylinder from bell housing and push rod.

Refit

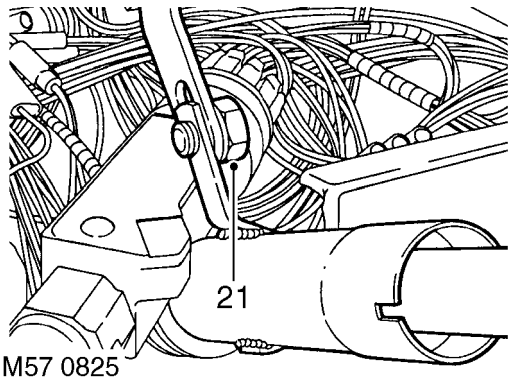
5. Clean ends of pipes, bell housing and slave cylinder mating faces.
6. Lubricate end of push rod with Molybdenum disulphide gease.
7. Locate slave cylinder to push rod and bell housing.
8. Fit bolts and tighten to ***25 Nm (18 lbf.ft).***
9. Connect clutch pipe to slave clyinder.
10. Bleed clutch system. ***See Adjustment.***

15. Remove brake servo. ***See BRAKES, Repair.***
16. Release ABS modulator multiplug from side of brake pedal box.
17. Release mat from underside of fascia to gain access to brake pedal box mounting bolts.



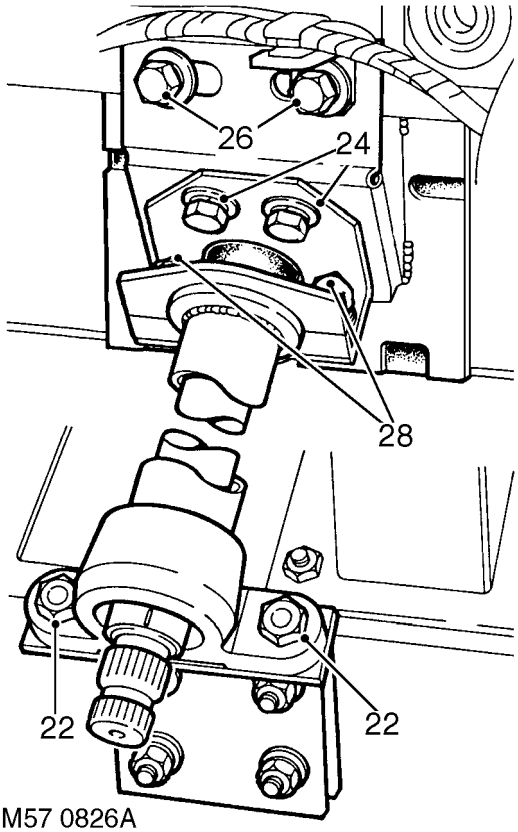
M57 0824A

18. Remove 6 bolts securing brake pedal box to bulkhead.
19. Disconnect 2 brake pedal switch Lucars.
20. Carefully remove brake pedal box assembly and collect gasket.



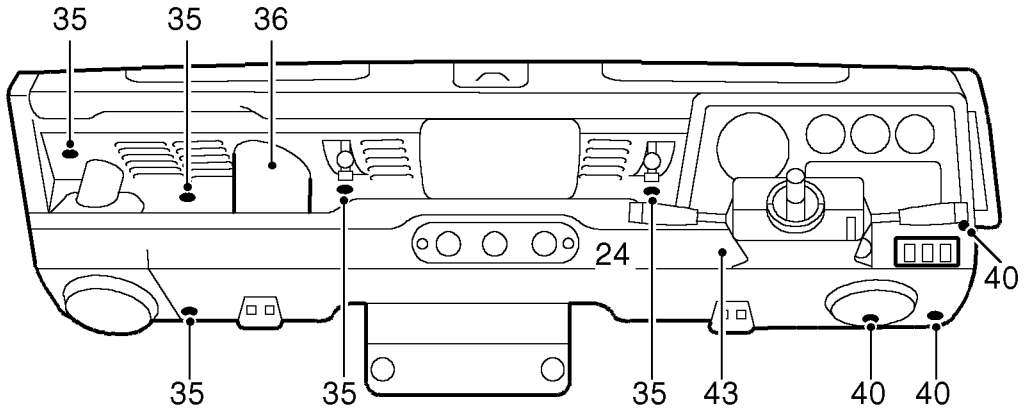
M57 0825

21. Remove bolt securing column upper tie bar to column.



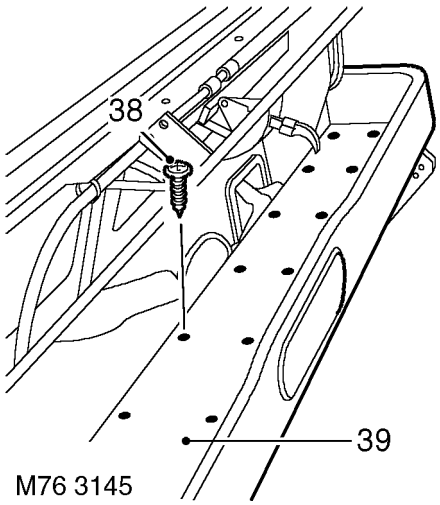
M57 0826A

22. Remove 2 bolts securing upper column to lower mounting bracket.
23. Remove 2 bolts securing 2 halves of column upper clamp.
24. Remove 2 bolts securing column upper clamp to mounting bracket.
25. Remove column upper clamp and collect rubber packing.
26. Remove 2 bolts securing column upper mounting bracket to bulkhead.
27. Release upper column from lower column and manouvre mounting bracket and upper column assembly from vehicle.
28. Remove mounting bracket from column.



M76 3188

35. Remove 7 trim clips securing trim upper fascia trim casing to bulkhead.
36. Carefully fold back trim casing over fresh air vent operating levers and remove.



M76 3145

37. Release demist hose from parcel shelf.
38. Remove 18 screws securing parcel shelf to lower fascia panel.
39. Remove parcel shelf.
40. Remove 7 screws securing bottom edge of lower fascia panel to bulkhead.
41. Remove both retaining plates and lower footwell covers.
42. Remove 2 bolts securing top of lower fascia to bulkhead.
43. With assistance, remove lower fascia.

Refit

44. With assistance, fit lower fascia.
45. Fit 2 bolts securing top of lower fascia to bulkhead.
46. Fit both retaining plates and footwell covers to lower fascia.
47. Fit 7 screws securing bottom edge of lower fascia to bulkhead.
48. Fit parcel shelf to lower fascia and secure with screws.
49. Fit demist hose to parcel shelf.
50. Carefully manoeuvre upper fascia trim casing over fresh air vents and fit to fascia.
51. Fit trim clips securing trim casing to bulkhead.
52. Fit finisher rail to lower fascia and secure with screws.
53. Fit wiper motor cover and secure with screws.
54. Fit both door check strap covers and secure with screws.
55. Fit both footwell vents to lower fascia and secure with screws.
56. Fit interior fuse box cover.
57. Fit auxilliary switch panel cover.
58. Fit auxilliary switch panel. ***See this Section.***

CAVITY WAX

Cavity Wax Injection
Box sections treated with cavity wax are shown in this section. Repairs affecting these areas must include re-treatment with an approved cavity wax, using the access points illustrated. In addition, all interior surfaces which have been disturbed during repairs must be wax injected whether they have been treated in production or not. This includes all box members, cavities, door interiors etc. It is permissible to drill extra holes for access where necessary, provided these are not positioned in load-bearing members. Ensure that such holes are treated with a suitable zinc rich primer, brushed with wax and then sealed with a rubber grommet.

Prior to wax injection, ensure that the cavity to be treated is free from any contamination or foreign matter. Where necessary, clear out any debris using a compressed air supply.

Carry out wax injection after final paint operations. During application, ensure that the wax covers all flange and seam areas and that it is applied to all repaired areas of both new and existing panels.

NOTE: Apply cavity wax AFTER the final paint process and BEFORE refitting of any trim components.

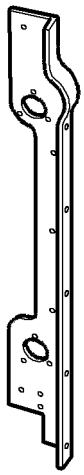
It should also be noted that new panel assemblies and body shells are supplied without wax injection treatment which must be carried out after repairs.

Effective cavity wax protection is vital. Always observe the following points:

- Complete all finish paint operations before wax application.
- Clean body panel areas and blow-clean cavities if necessary, before treatment.
- Maintain a temperature of 18°C (64°F) during application and drying.
- Check the spray pattern of injection equipment.
- Mask off all areas not to be wax coated and which could be contaminated by wax overspray.
- Remove body fixings, such as seat belt retractors, if contamination is at all likely.
- Move door glasses to fully closed position before treating door interiors.
- Treat body areas normally covered by trim before refitting items.
- Check that body and door drain holes are clear after the protective wax has dried.
- Keep all equipment clean, especially wax injection nozzles.

CORNER CAPPING

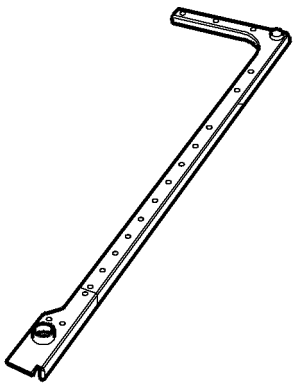
The Corner Capping is not replaced as a single panel. It is replaced in conjunction with either the Body Side Lower Panel or Body Side Assembly. The procedure to replace the Corner Capping is shown in the Body Side Lower Panel procedure.



M77 2102A

BODY SIDE CAPPING

The Body Side Capping is not replaced as a single panel. It is replaced in conjunction with either the Body Side Lower Panel or Body Side Assembly. The procedure to replace the Body Side Capping is shown in the Body Side Lower Panel procedure.

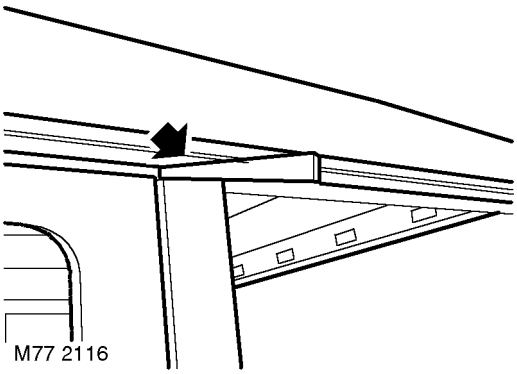


M77 2101A

BODY SIDE REAR - UPPER

Remove

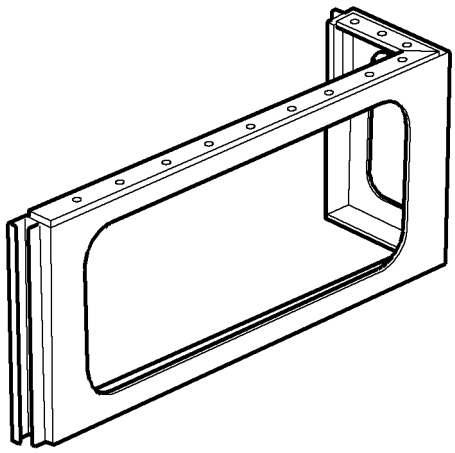
1. Disconnect both battery leads, negative lead first.
2. Remove front, centre and rear sections of headlining.
3. Release upper edge of front door aperture seal.
4. Release upper edge of rear door aperture seal.
5. Remove fixings from front edge of roof, and along side being replaced.
6. Release sealant securing front edge of roof.



M77 2116

7. Insert wedges into top of both 'B/C' posts. This will allow access for removal of body side.
8. **RH side:** Remove tail door. ***See CHASSIS AND BODY, Repair.***
9. Remove side window.
10. Remove rear sixth light.
11. Remove all bolts securing upper body side.

Refit



M77 2117

12. Prepare and clean panel joint faces.
13. Reverse removal procedure.

NOTE: When refitting, ensure body side upper is correctly fitted onto location pins.