






Chapter 1 Part A: Routine maintenance & servicing - petrol models

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Degrees of difficulty

<p>Easy, suitable for novice with little experience</p> 	<p>Fairly easy, suitable for beginner with some experience</p> 	<p>Fairly difficult, suitable for competent DIY mechanic</p> 	<p>Difficult, suitable for experienced DIY mechanic</p> 	<p>Very difficult, suitable for expert DIY or professional</p> 
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1A•2 Servicing specifications - petrol models

Lubricants and fluids

Refer to end of *Weekly checks* on page 0•17

Capacities

Engine oil:

Sump capacity (drain and refill, including oil filter):

3.5 litre engine	5.7 litres
3.9 litre engine	6.7 litres

Cooling system:

Manual transmission models	11.3 litres
Automatic transmission models	11.7 litres

Manual transmission	2.7 litres
Automatic transmission	9.8 litres

Transfer gearbox:

Up to suffix D	2.3 litres
From suffix E	2.8 litres

Front axle	1.7 litres
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Rear axle	1.7 litres
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Steering box and power steering reservoir:

Right-hand-drive models	3.4 litres
Left-hand-drive models	2.9 litres

Swivel pin housing oil (each)	0.35 litre
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Fuel tank:

Models built up to March 1993	81.8 litres
Models built from April 1993	89.0 litres

Washer fluid reservoir	7.0 litres
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Cooling system

Antifreeze mixture:

Minimum strength	25% antifreeze, 75% water
Maximum strength	60% antifreeze, 40% water
Protection to -36°C	50% antifreeze, 50% water

Fuel system

Idle speed:

Carburettor engines	700 ± 50 rpm
Fuel injection engines (non-adjustable)	665 to 735 rpm

Mixture/CO level:

Carburettor engines	1.0 to 2.0 %
Fuel injection engines (non-adjustable)	0.5 to 1.0 %

Ignition system

Ignition timing (UK market):

Carburettor models	6 ± 1° BTDC at 750 ± 50 rpm
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3.5 litre fuel injection models:

Low-compression engine	6 ± 1° BTDC at idle
High-compression engine	TDC (0° BTDC) ± 1° at idle

3.9 litre fuel injection models:

Low-compression engine, non-catalyst	2 ± 1° BTDC at idle
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High-compression engine:

Non-catalyst	4 ± 1° BTDC at idle
With catalyst	5 ± 1° BTDC at idle

Ignition timing (Australian market):

3.5 litre fuel injection models	3 ± 2° BTDC at idle
3.9 litre fuel injection models	2 ± 1° BTDC at idle

Firing order	1-8-4-3-6-5-7-2
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Location of No 1 cylinder	Pulley end left (left as seen from driver's seat - odd numbers on left bank, evens on right)
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Spark plugs:

3.5 litre models	Type Bosch WR 7 D+	Electrode gap 0.8 mm
3.9 litre models	Bosch WR 9 D+	0.8 mm

Brakes

Minimum front brake disc pad thickness	3.0 mm
Minimum rear brake disc pad thickness	3.0 mm

Tyre pressures

Refer to end of *Weekly checks* on page 0•18

Alternator drivebelt

Tension figures - 1994 to 1995 model year:	
New belt	470 to 500 N (106 to 113 lbf)
Used belt	400 to 420 N (90 to 95 lbf)

Torque wrench settings

	Nm	lbf ft
Distributor clamp nut	20	15
Engine sump drain plug:		
3.5 litre engine	30	22
3.9 litre engine	40	30
Fuel filter pipe unions	30	22
Propeller shaft and rubber coupling securing bolts	47	35
Roadwheel nuts	129	95
Spark plugs	20	15
Transfer gearbox oil drain plug	30	22
Transfer gearbox oil filler/level plug	30	22

Maintenance schedule

The maintenance intervals in this manual are provided with the assumption that you, not the dealer, will be carrying out the work. These are the minimum intervals recommended for vehicles driven daily. If you wish

to keep your vehicle in peak condition at all times, you may wish to perform some of these procedures more often. We encourage frequent maintenance, since it enhances the efficiency, performance and resale value of

your vehicle.

When the vehicle is new, it should be serviced by a dealer service department, in order to preserve the factory warranty.

Every 250 miles (400 km) or weekly

Refer to *Weekly checks*

Every 6000 miles (10 000 km) or 6 months, whichever comes first

- Renew the engine oil and filter (Section 3)
- Check the battery electrolyte level, where possible (Section 4)

Continued overleaf . . .

1A•4 Maintenance schedule - petrol models

Every 12 000 miles (20 000 km) or 12 months, whichever comes first

In addition to all the items listed above, carry out the following:

- Check the clutch fluid level (Section 5)
- Check the automatic transmission fluid level (Section 6)
- Renew the spark plugs (Section 7)
- Check the condition of the ignition system components (Section 8)
- Renew the air cleaner element (Section 9)
- Check the condition of the crankcase breather system hoses (Section 10)
- Top-up the carburettor piston dampers, where applicable (Section 11)
- Check and if necessary adjust the idle speed and mixture settings (Section 12)
- Check and lubricate the accelerator mechanism (Section 13)
- Check the cooling and heater system hoses for security and leaks (Section 14)
- Check the brake vacuum servo hose for security (Section 15)
- Check the condition of the auxiliary drivebelt(s), and adjust if necessary (Section 16)
- Check and if necessary adjust the steering gear backlash (Section 17)
- Check the security of the jack and tools (Section 18)
- Renew the manual transmission fluid (Section 19)
- Check the transfer gearbox oil level (Section 20)
- Check the front and rear axle oil levels (Section 21)
- Check the swivel pin housing oil level (Section 22)
- Lubricate the propeller shaft universal joints and sliding joints (Section 23)
- Lubricate the handbrake linkage (Section 24)
- Check all underbody brake, fuel and clutch pipes and hoses for leaks and condition (Section 25)
- Check the exhaust system for security and condition (Section 26)
- Check the steering and suspension components, including all hydraulic pipes and hoses, for leaks and condition (Section 27)
- Check the tightness of the propeller shaft coupling bolts (Section 28)
- Check the front and rear axle breathers for obstructions (Section 29)
- Drain the flywheel housing, where applicable (Section 30)
- Check the security of the fuel tank (Section 31)
- Check the security of the towing bracket (Section 32)
- Check the handbrake adjustment (Section 33)
- Carry out a road test (Section 34)
- Check and if necessary adjust the headlight and auxiliary light adjustment (Section 35)
- Check the operation of the sunroofs, and clear sunroof drain tubes (Section 36)
- Check the front wheel alignment (Section 37)

Every 12 000 miles (20 000 km) or 12 months, whichever comes first (continued)

- Check the condition of the brake pads and discs (Section 38)
- Check the condition of the spare wheel (Section 39)
- Check and lubricate all door, bonnet and tailgate locks (Section 40)
- Check the condition and operation of all seat belts (Section 41)

Every 24 000 miles (40 000 km) or 2 years, whichever comes first

In addition to all the items listed above, carry out the following:

- Check the ignition timing and adjust if necessary (Section 42)
- Renew the transfer gearbox oil (Section 43)
- Renew the front and rear axle oil (Section 44)
- Renew the swivel pin housing oil (Section 45)
- Renew the automatic transmission fluid and oil screen (Section 46)
- Clean the plenum chamber ventilation duct (Section 47)

Every 2 years, regardless of mileage

- Renew the brake fluid (Section 48)
- Renew the coolant (Section 49)

Every 36 000 miles (60 000 km) or 3 years, whichever comes first

In addition to all the items listed above, carry out the following:

- Check all shock absorbers for condition and operation (Section 50)
- Renew all braking system hydraulic fluid seals, the vacuum servo filter, and all flexible brake fluid hoses (Section 51)

Every 48 000 miles (80 000 km) or 4 years, whichever comes first

- Check the fuel evaporative emission control system for leaks (Section 52)
- Renew the fuel filter on fuel injected engines (Section 53)

Every 96 000 miles (154 000 km)

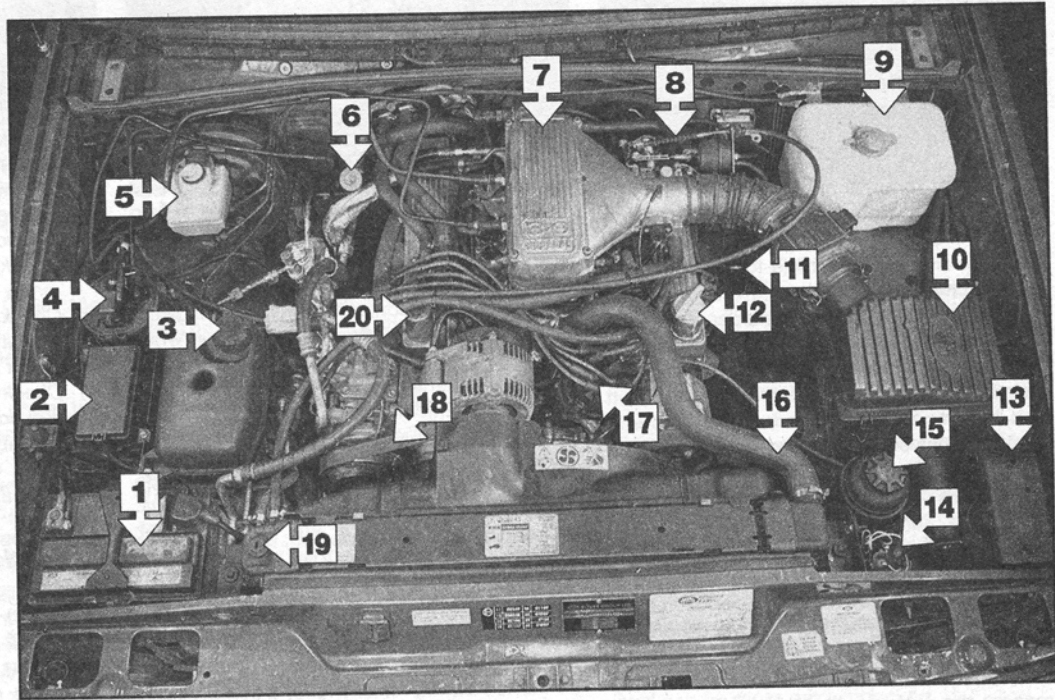
- Renew the emission control components, where applicable (Section 54)

Every 10 years

- Renew the airbag module, where applicable (Section 55)

Underbonnet view of a fuel injection model

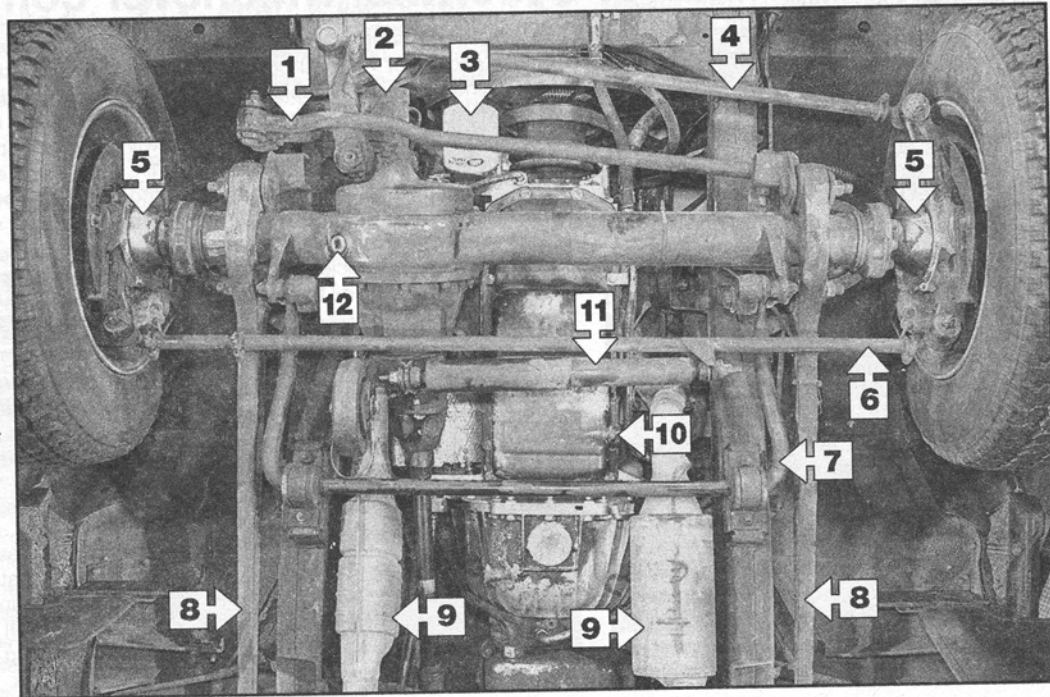
- 1 Battery
- 2 Fusebox
- 3 Coolant expansion tank
- 4 Charcoal canister (catalyst models)
- 5 Brake fluid reservoir
- 6 Automatic transmission fluid dipstick
- 7 Plenum chamber
- 8 Accelerator cable
- 9 Washer fluid reservoir
- 10 Air cleaner casing
- 11 Engine oil level dipstick
- 12 Engine oil filler cap
- 13 Wheel chock and jack
- 14 Ignition coil
- 15 Power steering fluid reservoir
- 16 Radiator top hose
- 17 Distributor cap
- 18 Auxilliary drivebelt
- 19 Radiator filler cap
- 20 Engine breather filter



Front underbody view

- 1 Panhard rod
- 2 Steering box
- 3 Oil filter
- 4 Drag link
- 5 Swivel pin housing
- 6 Track rod
- 7 Anti-roll bar
- 8 Radius arm
- 9 Exhaust (catalytic converters)
- 10 Engine oil drain plug
- 11 Steering damper
- 12 Front axle drain plug

Note: For centre and rear underbody views, see Chapter 1B



1 Introduction

This Chapter is designed to help the home mechanic maintain his/her vehicle for safety, economy, long life and peak performance.

The Chapter contains a master maintenance schedule, followed by Sections dealing specifically with each task in the schedule. Visual checks, adjustments, component renewal and other helpful items are included. Refer to the accompanying illustrations of the engine compartment and the underside of the vehicle for the locations of the various components.

Servicing your vehicle in accordance with the mileage/time maintenance schedule and the following Sections will provide a planned maintenance programme, which should result in a long and reliable service life. This is a comprehensive plan, so maintaining some items but not others at the specified service intervals will not produce the same results.

As you service your vehicle, you will discover that many of the procedures can - and should - be grouped together, because of the particular procedure being performed, or because of the proximity of two otherwise unrelated components to one another. For example, if the vehicle is raised for any reason, the exhaust can be inspected at the same time as the suspension and steering components.

The first step in this maintenance programme is to prepare yourself before the actual work begins. Read through all the

Sections relevant to the work to be carried out, then make a list and gather all the parts and tools required. If a problem is encountered, seek advice from a parts specialist, or a dealer service department.

2 Regular maintenance

1 If, from the time the vehicle is new, the routine maintenance schedule is followed closely, and frequent checks are made of fluid levels and high-wear items, as suggested throughout this manual, the engine will be kept in relatively good running condition, and the need for additional work will be minimised.

2 It is possible that there will be times when the engine is running poorly due to lack of regular maintenance. This is even more likely if a used vehicle, which has not received regular and frequent maintenance checks, is purchased. In such cases, additional work may need to be carried out, outside of the regular maintenance intervals.

3 If engine wear is suspected, a compression test (refer to the relevant Part of Chapter 2) will provide valuable information regarding the overall performance of the main internal components. Such a test can be used as a basis to decide on the extent of the work to be carried out. If, for example, a compression test indicates serious internal engine wear, conventional maintenance as described in this Chapter will not greatly improve the performance of the engine, and may prove a waste of time and money, unless extensive overhaul work is carried out first.

4 The following series of operations are those most often required to improve the performance of a generally poor-running engine:

Primary operations

- Clean, inspect and test the battery (See *Weekly checks* and Section 4, where applicable).
- Check all the engine-related fluids (See *Weekly checks*).
- Check the condition and tension of the auxiliary drivebelt (Section 16).
- Renew the spark plugs (Section 7).
- Inspect the distributor cap and rotor arm (Section 8).
- Check the condition of the air filter, and renew if necessary (Section 9).
- Check the fuel filter (Section 53).
- Check the condition of all hoses, and check for fluid leaks (Sections 10 and 14).
- Check the exhaust gas emissions (Section 12).

5 If the above operations do not prove fully effective, carry out the following secondary operations:

Secondary operations

All items listed under *Primary operations*, plus the following:

- Check the charging system (see Chapter 5A).
- Check the ignition system (see Chapter 5B).
- Check the fuel system (see relevant part of Chapter 4).
- Renew the distributor cap and rotor arm (see Chapter 5B).
- Renew the ignition HT leads (see Chapter 5B).

Every 6000 miles or 6 months, whichever comes first

3 Engine oil and filter renewal

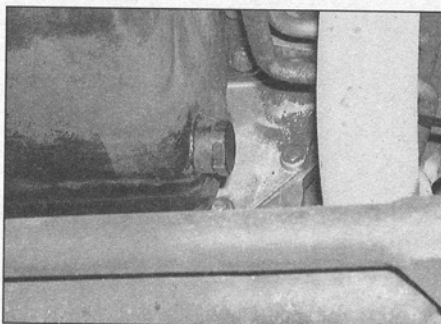


HAYNES
HINT Frequent oil and filter changes are the most important preventative maintenance procedures that can be undertaken by the DIY owner. As engine oil ages, it becomes diluted and contaminated, which leads to premature engine wear.

1 Before starting this procedure, gather together all the necessary tools and materials. Also make sure that you have plenty of clean rags and newspapers handy, to mop up any spills. Ideally, the engine oil should be warm, as it will drain better and more built-up sludge will be removed with it. Take care, however, not to touch the exhaust or any other hot parts of the engine when working under the vehicle. To avoid any possibility of scalding,

and to protect yourself from possible skin irritants and other harmful contaminants in used engine oils, it is advisable to wear rubber gloves when carrying out this work.

2 Access to the underside of the vehicle will be greatly improved if it can be raised on a lift, driven onto ramps, or jacked up and supported on axle stands (see *Jacking and vehicle support*). Whichever method is chosen, make sure that the vehicle remains as level as possible, to enable the oil to drain fully.



3.4 Sump drain plug location

3 Remove the oil filler cap from the top of the engine, then position a suitable container beneath the sump.

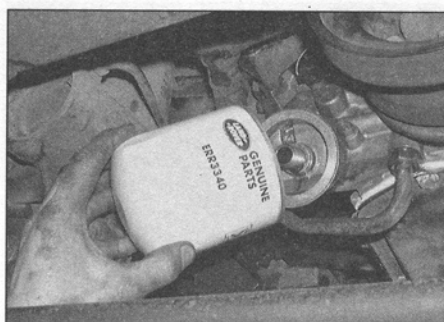
4 Taking care to avoid the hot exhaust, clean the drain plug (located at the bottom left-hand side of the sump) and the area around it (see **illustration**). Slacken the plug using a suitable socket or spanner, and remove it.

HAYNES
HINT If possible, try to keep the plug pressed into the sump while unscrewing it by hand the last couple of turns. As the plug releases from the threads, move it away sharply, so that the stream of oil issuing from the sump runs into the container, not up your sleeve.

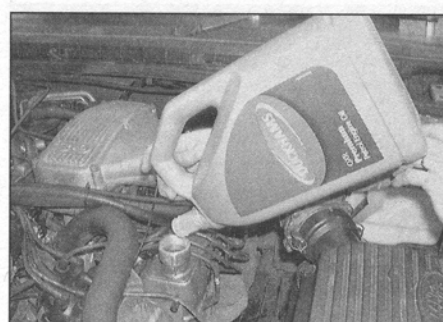
5 Allow some time for the old oil to drain, noting that it may be necessary to reposition the container as the oil flow slows to a trickle.
6 After all the oil has drained, wipe off the drain plug with a clean rag, and check the condition of the copper sealing washer.



3.8 Slackening the oil filter using a strap wrench



3.12 Fitting the new oil filter



3.14 Filling the engine with oil

Renew the washer if necessary. Clean the area around the drain plug opening, then refit and tighten the plug to the specified torque setting.

7 Move the container into position under the oil filter, screwed onto the adapter on the front of the engine.

Caution: On this engine, when the oil filter is removed, there is a danger that the oil pump will drain down too far to self-prime when the fresh oil is added to the sump. The likelihood of this happening during a routine oil change is remote, but work quickly, and always fill the new filter with fresh oil before fitting, as stated in paragraph 11.

8 Using an oil filter removal tool if necessary, slacken the filter initially (see illustration). Loosely wrap some rags around the oil filter, then unscrew it, and immediately position it with its open end uppermost to prevent further spillage of oil. Remove the oil filter from the engine compartment, and empty the oil into the container.

9 Use a clean rag to remove all oil, dirt and sludge from the filter sealing area on the engine. Check the old filter to make sure that the rubber sealing ring hasn't stuck to the engine. If it has, carefully remove it.

10 Apply a light coating of clean oil to the sealing ring on the new filter.

11 It is advisable to pre-fill the new oil filter with fresh oil, to avoid oil pressure problems when the engine is re-started. Holding the filter at the approximate fitted angle, pour as much clean oil into the filter as possible.

12 Screw the filter into position on the engine (see illustration). Tighten the filter firmly by hand only - do not use any tools. Wipe clean the exterior of the oil filter.

13 Remove the old oil and all tools from under the vehicle, then (if applicable) lower the vehicle to the ground.

14 Fill the engine with the specified quantity and grade of oil (see illustration). Pour the oil in slowly, otherwise it may overflow. Take particular care not to overfill the engine, particularly if the oil filter was pre-filled with oil (paragraph 11). Check that the oil level is up to the correct level on the dipstick (see *Weekly checks*), then refit and tighten the oil filler cap.

15 Start the engine without racing it, and let it idle. The oil warning light should go out after a short delay. If the light stays on, this means that the oil pump has not primed itself - switch off the engine and refer to Chapter 2A, Section 13.

16 Run the engine for a few minutes, and check that there are no leaks around the oil filter seal and the sump drain plug.

17 Switch off the engine, and wait a few minutes for the oil to settle in the sump once more. With the new oil circulated and the filter now completely full, recheck the level on the dipstick, and add more oil if necessary.

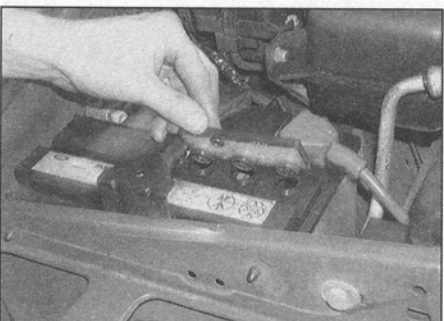
18 Dispose of the used engine oil safely with reference to *General repair procedures* in the Reference Section of this manual.

4 Battery electrolyte level check

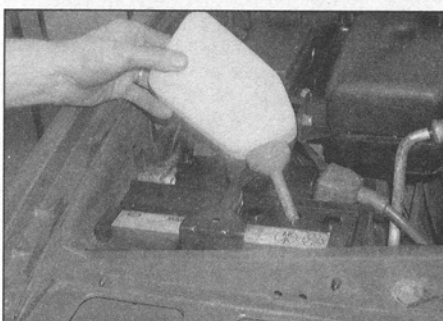


Warning: The electrolyte inside a battery is diluted acid - it is a good idea to wear suitable rubber gloves. When topping-up, don't overflow the cells so that the electrolyte overflows. In the event of any spillage, rinse the electrolyte off without delay. Refit the cell covers and rinse the battery with copious quantities of clean water. Don't attempt to siphon out any excess electrolyte.

1 The battery is located in the front right-hand



4.4 Removing the battery cell covers



4.5 Topping-up the battery electrolyte level

corner of the engine compartment. Where applicable, unclip and remove the cover from the top of the battery.

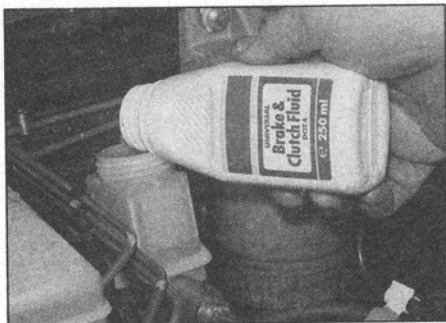
2 Some models covered by this manual will be fitted with a maintenance-free battery as standard equipment, or may have had one fitted as a replacement. If the battery in your vehicle is marked 'Freedom', 'Maintenance-Free' or similar, electrolyte level checking may not be possible (the battery is often completely sealed, preventing any topping-up).

3 Batteries which do require their electrolyte level to be checked can be recognised by the presence of removable covers over the six battery cells - the battery casing is also sometimes translucent, so that the electrolyte level can be more easily checked.

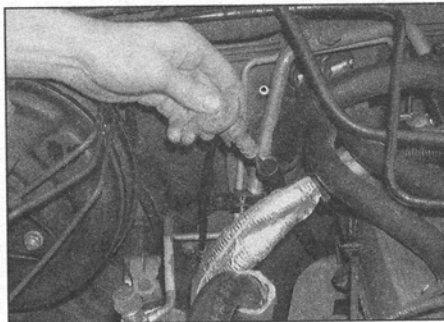
4 Remove the cell caps or covers (these either unscrew, or are prised/pulled out), and look down inside the battery to see the level webs or the separators between the cells (see illustration). The electrolyte should cover the battery plates (maximum 3 mm above the plates), and should be up to the level of the indicator webs or separators. If markings are provided on the battery casing, these can be used instead.

5 If necessary, top up a little at a time with distilled (de-ionised) water until the level in all six cells is correct - don't fill the cells up to the brim (see illustration). Wipe up any spillage, then refit the cell covers.

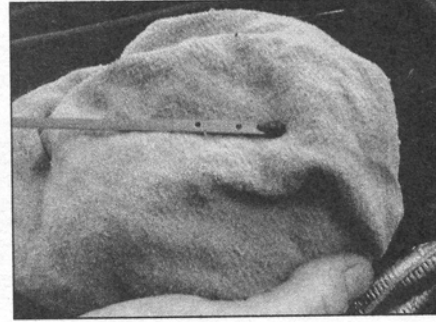
6 Further information on the battery, charging and jump starting can be found at the start of this manual and in Chapter 5A.



5.3 Topping-up the clutch fluid level



6.5a Removing the transmission fluid dipstick



6.5b Wipe the dipstick, then re-insert it and check the level

Every 12 000 miles or 12 months, whichever comes first

5 Clutch fluid level check

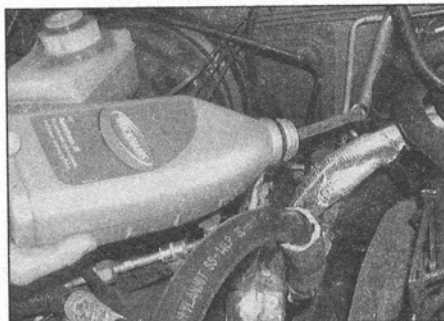


Warning: Hydraulic fluid is poisonous; wash off immediately and thoroughly in the case of skin contact, and seek immediate medical advice if any fluid is swallowed or gets into the eyes. Hydraulic fluid is also an effective paint stripper, and will attack plastics; if any is spilt, it should be washed off immediately, using copious quantities of clean water. Finally, it is hygroscopic (it absorbs moisture from the air). While this is not as important in the clutch system as it is in the braking system, old fluid may be too contaminated for further use. When topping-up or renewing the fluid, always use the recommended type, and ensure that it comes from a freshly-opened, sealed container.

- 1 The clutch fluid reservoir is attached to the master cylinder, which is located on the right-hand side of the engine compartment on right-hand-drive models, or on the left-hand side of the engine compartment on left-hand-drive models.
- 2 On models with level marks on the side of the reservoir, the fluid level should be maintained between the MAX and MIN marks. On models with no level markings, the fluid level should be up to the lower edge of the filler neck on the reservoir.
- 3 If topping-up is required, wipe round the reservoir and filler cap before unscrewing the cap - it is important not to introduce dirt into the system. Using the fluid recommended at the end of *Weekly checks*, top up to the required level (see illustration).
- 4 On completion, refit the filler cap, tightening it securely, and wipe up or wash away any fluid spillage.
- 5 There should be no significant drop in fluid level during normal operation of the clutch. Any significant loss of fluid is likely to be due to a leak in the hydraulic system, and should be investigated and corrected.

6 Automatic transmission fluid level check

- 1 The automatic transmission fluid level is checked with a dipstick which extends through a tube and into the sump at the bottom of the transmission. The dipstick is located on the right-hand side of the engine (right as seen from the driver's seat).
- 2 The fluid level should be checked with the transmission cold, as follows.
- 3 Check that the vehicle is parked on level ground.
- 4 With the handbrake fully applied, and the engine running at normal idle speed, select position P with the transmission selector lever.
- 5 Withdraw the dipstick from the tube, and wipe it clean (see illustrations).
- 6 Re-insert the dipstick to its full depth, and remove it for a second time to take a reading.
- 7 The fluid level should be maintained between the two level marks on the dipstick.
- 8 If necessary, top-up the fluid level, using the correct type of fluid (see end of *Weekly checks*) through the dipstick tube (see illustration). Do not overfill the transmission. Note that 0.25 litre of fluid will raise the level from the 'low' to the 'high' mark on the dipstick.
- 9 Ensure that the dipstick is inserted correctly after checking the level.



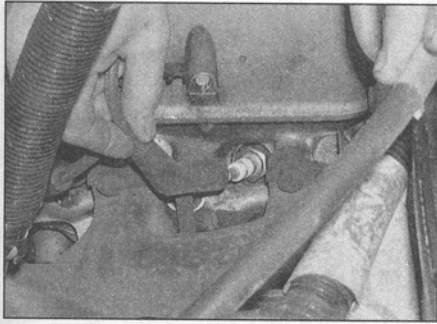
6.8 Topping-up the transmission fluid

10 Any significant loss of fluid should be investigated and corrected.

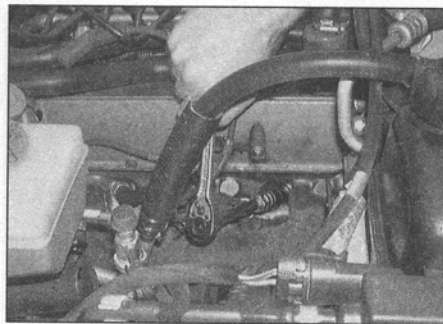
7 Spark plug renewal

Note: There is very little clearance between the body of the spark plug and the cylinder head. The best tool is the box spanner or tommy-bar usually supplied in the vehicle tool kit, as this is thin enough to fit.

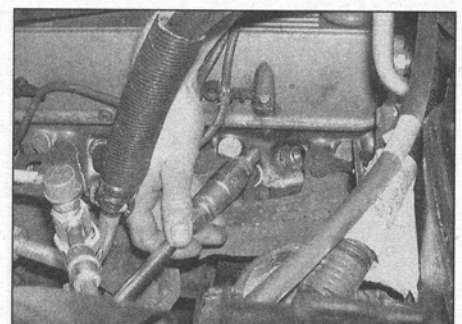
- 1 The correct functioning of the spark plugs is vital for the correct running and efficiency of the engine. It is essential that the plugs fitted are appropriate for the engine (the suitable type is specified at the beginning of this Chapter). This type is used and the engine is in good condition, the spark plugs should not need attention between scheduled replacement intervals. Spark plug cleaning is rarely necessary, and should not be attempted unless specialised equipment is available, as damage can easily be caused to the firing ends.
- 2 Before removing the spark plugs, allow engine time to cool.
- 3 If the marks on the original-equipment spark plug (HT) leads cannot be seen, mark the leads 1 to 8, according to which number cylinder the lead serves (number 1 cylinder at the front of the left-hand bank). Pull the leads from the plugs by gripping the clips, not the lead, otherwise the lead connection may be fractured. Don't detach the HT leads from their clips on the valve covers more than necessary.
- 4 It is advisable to remove the dirt from spark plug recesses using a clean brush, vacuum cleaner or compressed air before removing the plugs, to prevent dirt dropping into the cylinders.
- 5 Unscrew the plugs using either the tool supplied in the vehicle tool kit (mentioned in note above), a spark plug spanner, suitable spanner, or a deep socket and extension (see illustrations). Keep the tool aligned with the spark plug if it is forcibly moved to one side, the ceramic insulator may be broken. As each plug is removed, examine it as follows:



7.5a Pull off the HT leads ...



7.5b ... then using a suitable plug socket, unscrew ...



7.5c ... and remove the spark plugs

6 Examination of the spark plugs will give a good indication of the condition of the engine. If the insulator nose of the spark plug is clean and white, with no deposits, this is indicative of a weak mixture or too hot a plug (a hot plug transfers heat away from the electrode slowly, a cold plug transfers heat away quickly).

7 If the tip and insulator nose are covered with hard black-looking deposits, then this is indicative that the mixture is too rich. Should the plug be black and oily, then it is likely that the engine is fairly worn, as well as the mixture being too rich.

8 If the insulator nose is covered with light tan to greyish-brown deposits, then the mixture is correct and it is likely that the engine is in good condition.

9 The spark plug electrode gap is of considerable importance as, if it is too large or too small, the size of the spark and its efficiency will be seriously impaired. The gap should be set to the value specified at the start of this Chapter. **Note:** Spark plugs with multiple earth electrodes are becoming an

increasingly common fitment, especially to vehicles equipped with catalytic converters. Unless there is clear information to the contrary, no attempt should be made to adjust the plug gap on a spark plug with more than one earth electrode.

10 To set the gap, measure it with a feeler blade and then bend open, or closed, the outer plug electrode until the correct gap is achieved. The centre electrode should never be bent, as this may crack the insulator and cause plug failure, if nothing worse. If using feeler blades, the gap is correct when the appropriate-size blade is a firm sliding fit.

11 Special spark plug electrode gap adjusting tools are available from most motor accessory shops, or from some spark plug manufacturers.

12 Before fitting the spark plugs, check that the threaded connector sleeves are tight, and that the plug exterior surfaces and threads are clean. It's often difficult to screw in new spark plugs without cross-threading them - this can be avoided using a piece of rubber hose (**see Haynes Hint**).

13 Remove the rubber hose (if used), and tighten the plug to the specified torque using the spark plug socket and a torque wrench (**see illustration**). If a torque wrench is not available, tighten the plug by hand until it just seats, then tighten it by no more than a quarter of a turn further with the plug socket and handle. Refit the remaining spark plugs in the same manner.

8 Ignition system components check



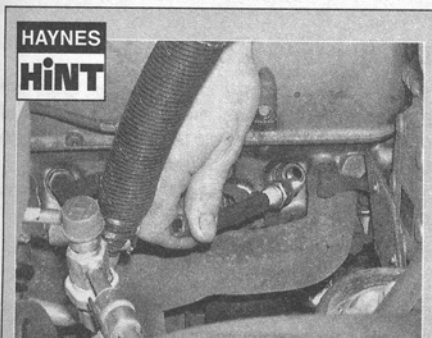
HT leads

1 The spark plug and ignition coil HT leads should be checked on a regular basis, as they are vital to the correct running of the engine. The HT leads should also be checked whenever new spark plugs are installed in the engine (Section 7).

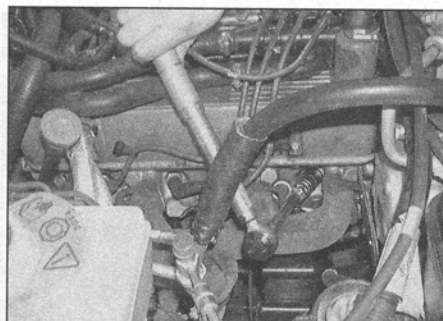
2 Before removing them, check that the HT leads are numbered for position (**see Haynes Hint**). Pull the HT leads from the plugs by gripping the end fitting, not the lead, otherwise the lead connection may be fractured.

3 Check inside the end fitting for signs of corrosion, which will look like a white crusty powder (**see illustration**).

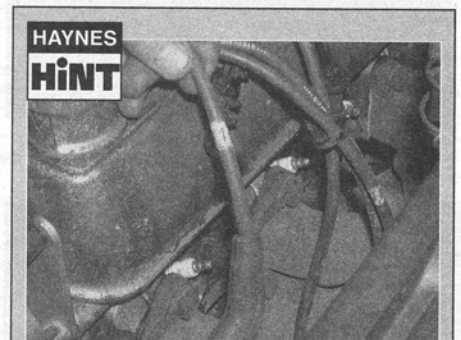
4 Push the end fitting back onto the spark plug, ensuring that it is a tight fit on the plug. If it isn't, remove the lead again and use pliers to carefully crimp the metal connector inside the end fitting until it fits securely on the end of the spark plug.



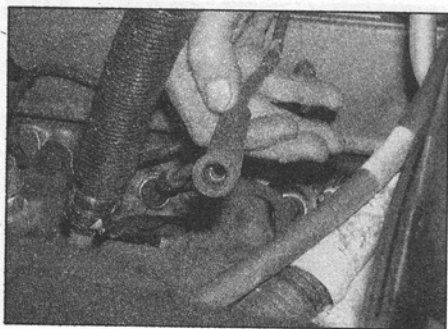
HAYNES HINT
It is very often difficult to insert spark plugs into their holes without cross-threading them. To avoid this possibility, fit a short length of 5/16 inch internal diameter rubber hose over the end of the spark plug. The flexible hose acts as a universal joint to help align the plug with the plug hole. Should the plug begin to cross-thread, the hose will slip on the spark plug, preventing thread damage to the alloy cylinder head



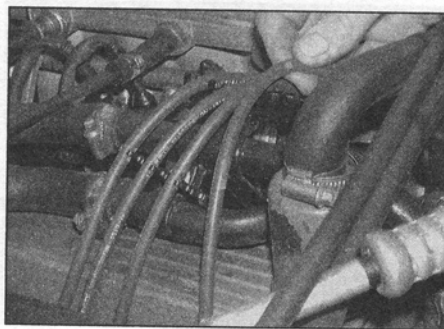
7.13 Tighten the plugs using a torque wrench, if available



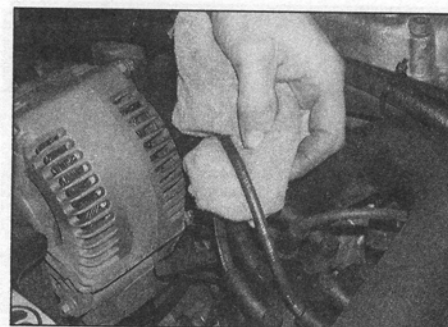
HAYNES HINT
Ensure that the leads are numbered before removing them, to avoid confusion when refitting. Number 1 plug lead is at front of the left-hand bank of the engine (left as seen from the driver's seat). Wrap numbered labels around the leads if no other markings are found



8.3 Check the HT lead end fittings at the plugs



8.5a Unclip the HT leads from the clips around the engine . . .



8.5b . . . then wipe them clean

5 Unclip each lead then, using a clean rag, wipe the entire length of the lead to remove any built-up dirt and grease (see illustrations). Once the lead is clean, check for burns, cracks and other damage. Do not bend the lead excessively or pull the lead lengthways - the conductor inside might break.

6 Disconnect the other end of the lead from the distributor cap - again, pull only on the end fitting. Check for corrosion and a tight fit in the same manner as the spark plug end. Refit the lead securely on completion.

7 Check the remaining HT leads one at a time, in the same way. Don't forget to include the HT which links the centre terminal on the distributor cap to the ignition coil (the 'king' lead) (see illustration). It is most important that the leads are routed so they cross over each other as little as possible - this reduces

the chance of the leads arcing, which would cause a misfire.

8 If new HT leads are required, purchase a set for your specific vehicle and engine.

9 Even with the ignition system in first class condition, some engines may still occasionally experience poor starting attributable to damp ignition components. To disperse moisture, a water-repelling aerosol spray can be very effective.

Distributor cap and rotor arm

10 It is preferable to remove the distributor cap with the HT leads attached, even though this makes handling the cap more awkward. If the HT leads are to be removed, make sure their locations on the cap are marked.

11 Release the clip either side, and lift the cap off the top of the distributor (see illustrations).

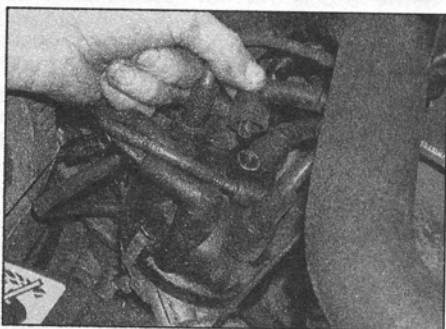
12 Wipe the cap clean and carefully inspect it inside and out for signs of cracks, carbon tracks (tracking) and worn, burned or loose contacts (see illustration).

13 Check that the cap's carbon brush is unworn, free to move against spring pressure and making good contact with the rotor arm. Similarly inspect the rotor arm. Renew these components if any defects are found.

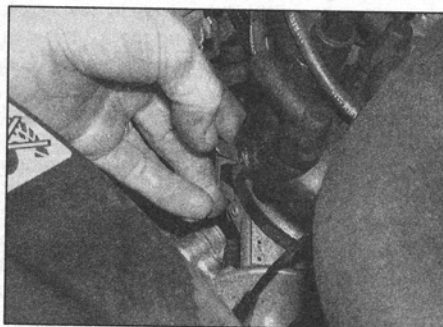
14 It is common practice to renew the cap and rotor arm whenever new HT leads are fitted. The rotor arm is simply pulled off the distributor shaft, and the notch in the shaft ensures it can only fit in one position (see illustration).



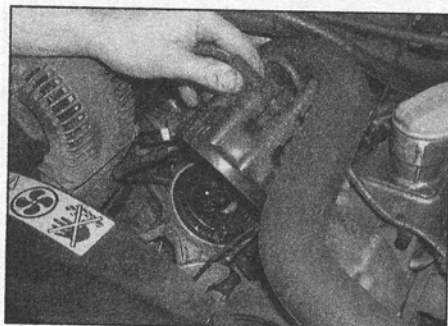
When fitting a new cap, remove the HT leads from the old cap one at a time (if not already removed) and fit them to the new cap in the exact same location - do not simultaneously remove all the leads from the old cap, or firing-order confusion may occur.



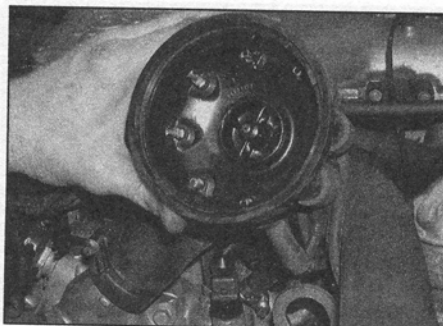
8.7 Check the king lead at the distributor cap and at the coil



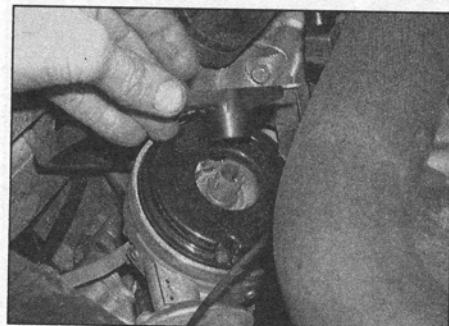
8.11a Release the clip at either side . . .



8.11b . . . and remove the distributor cap

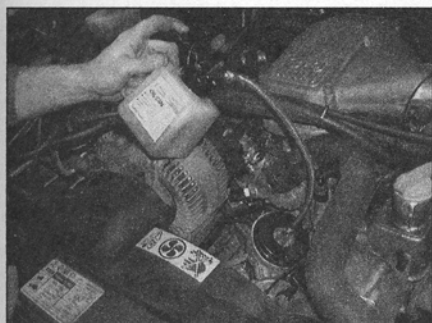


8.12 Inspect the inside of the distributor cap



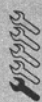
8.14 The rotor arm pulls off the spindle

10/100



8.15 Lubricate the distributor through the spindle

9 Air cleaner element renewal



Carburettor models

1 Slacken the hose clips on either end of the air cleaner, and pull the elbows from the carburettors and air cleaner assembly. Check the condition of the rubber seals fitted on the elbows, and renew if the rubber is cracked or perished.

2 Using two open-ended spanners, disconnect the one-way valve hose from the flame trap.

3 Remove the air cleaner assembly from the retaining posts by lifting it and pulling it forwards. As the assembly is withdrawn, disconnect the crankcase breather hose from its base. Note that a new breather filter should be fitted whenever the air filters are changed - see Section 10.

4 Release the clips on each end of the air cleaner canister in turn, and withdraw the end cover and air filter element from both ends.

5 Remove the wing nut and retaining plate from the inner end of each assembly, and remove the elements (see illustration).

6 Fit a new element to each assembly, and refit the retaining plate and wing nut. Check that the sealing washers on the end cover and retaining plate are in good condition, otherwise they must be renewed. Wipe clean the element housing, and check that the dump valve in the base of the housing is clear by squeezing it open (see illustration).

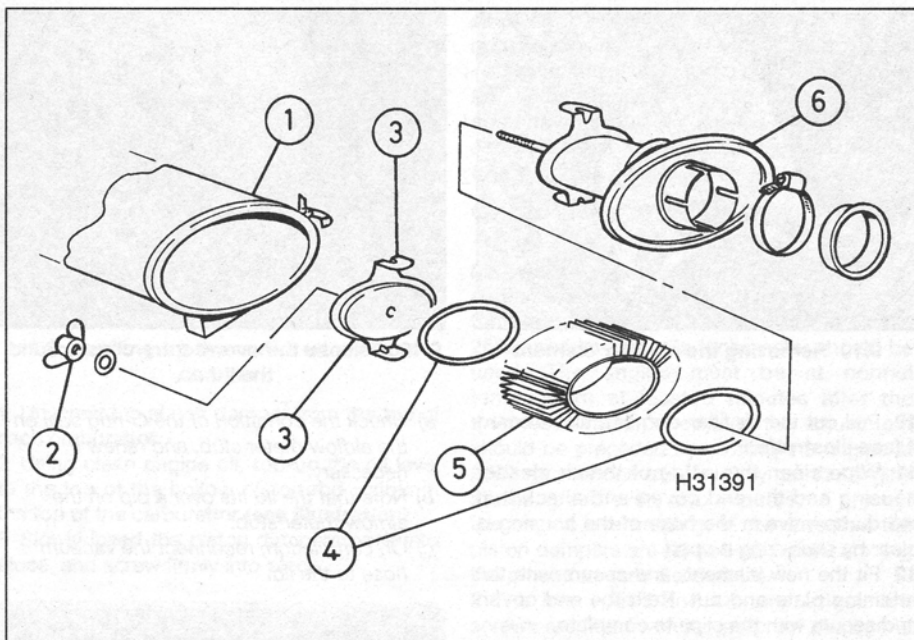
7 Refit each assembly into the end of the housing, and secure it with the spring clips. Refit the air cleaner into position, making sure that the breather hoses are reconnected. Reconnect the flame trap to the one-way valve, then refit the elbows and secure the hose clips.

Fuel injection models

Canister-type air filter (early models)

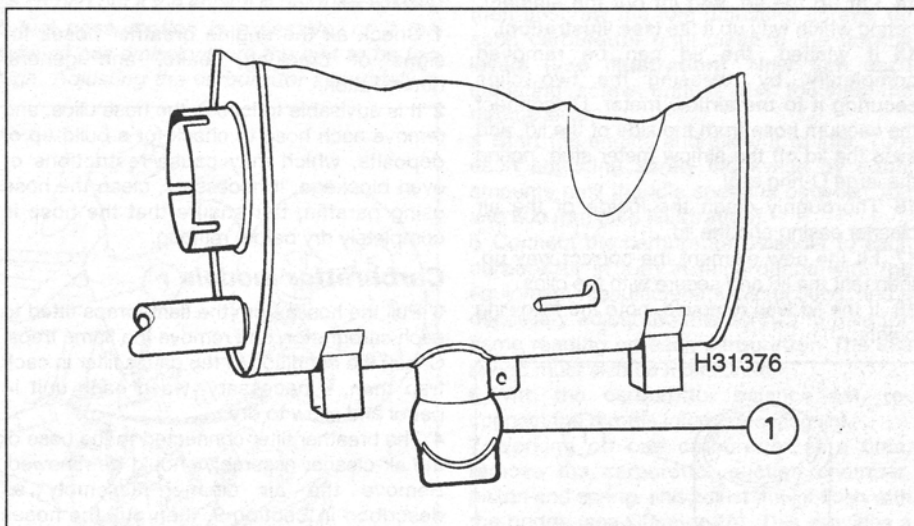
8 Release the three over-centre wire clips securing the housing end cover and air inlet spout, and remove the cover.

9 Unscrew the nut and remove the air filter element retaining plate (see illustrations).

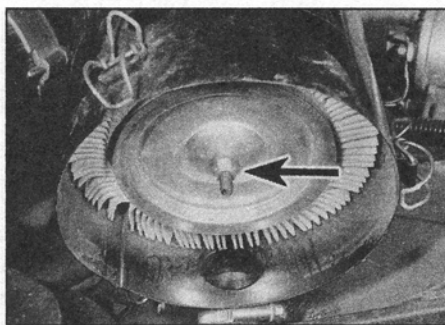


9.5 Air cleaner details - carburettor models

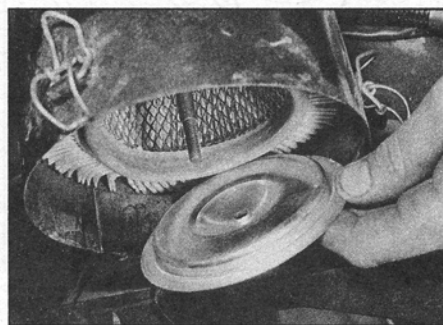
- | | | |
|------------|-------------------|------------------|
| 1 Clip | 3 Retaining plate | 5 Filter element |
| 2 Wing nut | 4 Rubber seals | 6 End cover |



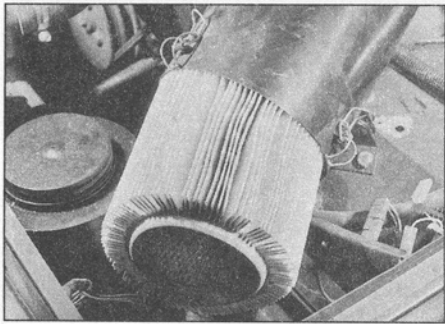
9.6 Air cleaner dump valve (1) - carburettor models



9.9a Undo the retaining nut (arrowed) ...



9.9b ... and remove the filter element retaining plate



9.10 Removing the air filter element

10 Pull out the air filter element, and discard it (see illustration).

11 Wipe clean the inside of the air cleaner housing and the end cover, and check that the dump valve in the base of the housing is clear by squeezing it open.

12 Fit the new element, and secure with the retaining plate and nut. Refit the end cover, and secure with the clips to complete.

Square-type air filter (later models)

13 Release the four over-centre wire clips securing the lid to the air cleaner assembly (see illustration).

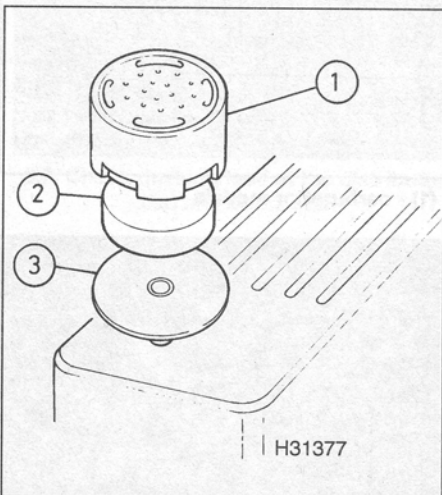
14 Lift up the lid, and lift out the element, noting which way up it fits (see illustration).

15 If wished, the lid can be removed completely, by releasing the two clips securing it to the airflow meter. Disconnect the vacuum hose from the side of the lid, and ease the lid off the airflow meter stub, noting the large O-ring seal.

16 Thoroughly clean the inside of the air cleaner casing and the lid.

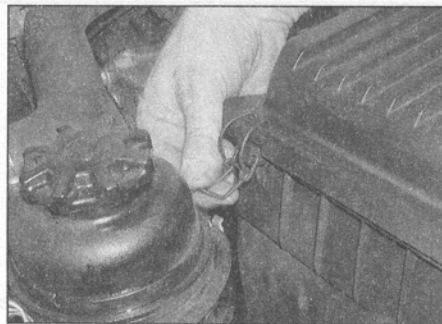
17 Fit the new element the correct way up, then refit the lid and secure with the clips.

18 If the lid was removed, note the following points:



10.6 Crankcase ventilation air inlet filter details

- 1 Filter cover
- 2 Foam filter
- 3 Mounting plate



9.13 Release the over-centre clips around the lid . . .

a) Check the condition of the O-ring seal on the airflow meter stub, and renew if necessary.

b) Note that the lid fits over a pip on the airflow meter stub.

c) On completion, reconnect the vacuum hose to the lid.

10 Crankcase breather system check

General

1 Check all the engine breather hoses for signs of cracking, leaks, and general deterioration.

2 It is advisable to loosen the hose clips, and remove each hose to check for a build-up of deposits, which may cause restrictions or even blockage. If necessary, clean the hose using paraffin, but ensure that the hose is completely dry before refitting.

Carburettor models

3 Pull the hoses from the flame traps fitted to each carburettor, and remove the flame traps. Check the condition of the gauze filter in each trap then, if necessary, wash each unit in petrol and allow to dry.

4 The breather filter connected to the base of the air cleaner assembly should be renewed. Remove the air cleaner assembly as described in Section 9, then pull the hoses from the filter and fit the new unit.



10.9 Disconnect the hose from the crankcase filter



9.14 . . . then lift up the lid and remove the filter element

Fuel injection models

Early models (up to 1994)

5 The crankcase ventilation air inlet filter is located under a round plastic cover, at the rear of the left-hand rocker cover.

6 To renew the filter, prise up the plastic filter cover and separate the foam filter from the filter body (see illustration). The filter should be discarded, and a new one fitted. If a new filter is not available, the old one could be cleaned in petrol and allowed to dry before refitting, though this is not recommended.

7 Reassemble the filter, and press it fully back down into the rocker cover to complete.

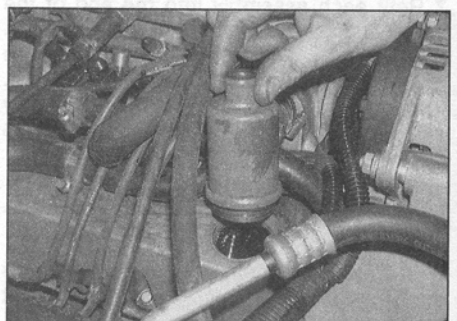
All models

8 The main crankcase filter is fitted to the front of the right-hand rocker cover, and is connected via a hose to the plenum chamber.

9 To check the rest of the system, first loosen the hose clip and disconnect the hose from the top of the filter body (see illustration). Clean the end of the hose, then try to blow through it to check for blockages. If the hose appears to be blocked, disconnect the other end from the plenum chamber (and release any cable-ties), then remove the hose completely and clean using petrol or degreasant.

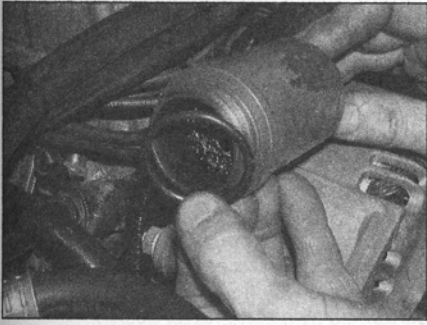
10 Unscrew the filter body from the rocker cover, and recover the sealing O-ring. If the O-ring is in poor condition, a new one must be fitted (see illustrations).

11 Wash the filter thoroughly in petrol or degreasant, then allow it to dry. Check the



10.10a Unscrew the filter from the rocker cover . . .

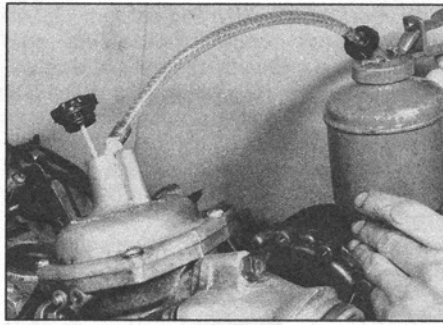
Darius



10.10b ... and check the condition of the O-ring

condition of the wire mesh inside the filter - if the mesh is in poor condition, or is still blocked, fit a new filter.

12 Refit the filter body to the rocker cover, using a new O-ring if necessary, and screw it firmly into place. Reconnect the hose, ensuring the hose clip(s) are tight.



11.2 Topping-up the carburettor piston damper

1 Unscrew the piston damper from the top of each carburettor.

2 Using clean engine oil, top-up the oil level to the top of the hollow piston rod visible in the top of the carburettor (see illustration).

3 Slowly insert the piston dampers back into place, and screw firmly into place.

11 Carburettor piston damper oil level top-up



Note: This procedure should be carried out at the specified interval, and also prior to any form of emissions testing. If symptoms of poor idle quality become apparent, low piston damper oil level could be the cause.

12 Idle speed and mixture check and adjustment



Note: Strictly speaking, this check need only be carried out if the engine is not running well, if fuel consumption is excessive, or if the exhaust gas emissions are thought to be too high. Adjusting the carburettor accurately is

an involved procedure for the DIY mechanic, requiring several items of specialist equipment - if not done accurately, it would be better left to a suitably-equipped garage. With the right equipment, the check itself is a simple task, and should not therefore be an expensive one to entrust to a garage.

Carburettor models

1 Before starting the procedure, it will be necessary to obtain a carburettor balancer and an exhaust gas analyser. The ambient air temperature should be between 15°C and 26°C, and an accurate tachometer should be used. The engine must be at normal temperature at least 5 minutes after the thermostat has opened, and the adjustment should be preceded by running the engine at 2500 rpm for one minute. Only run the engine at this speed every two minutes, to prevent the engine overheating. Make sure that the piston dampers are topped-up before starting the procedure (see Section 11).

2 The idle speed and mixture adjustment screws are fitted with tamperproof plugs, and these should be renewed after making the adjustments.

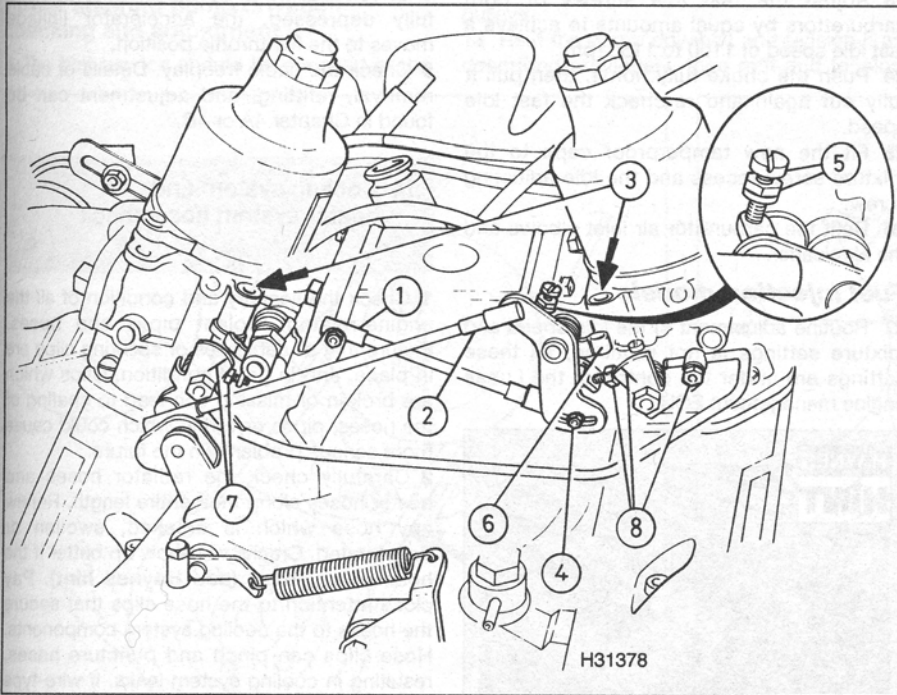
3 If necessary, remove the air cleaner for access. Disconnect the interconnecting throttle link between the two carburettors, then unscrew the idle adjusting screws on each carburettor until clear of the throttle levers (see illustration). Now turn each adjusting screw until it just touches the throttle lever.

4 Start the engine and allow it to idle. Turn each adjusting screw clockwise by equal amounts until the idle speed is between 700 and 800 rpm (see illustration).

5 Connect the carburettor balancer to each carburettor in turn in accordance with the equipment manufacturer's instructions, and if necessary adjust the idle screws to give the same reading on each carburettor. The idle speed must also be maintained.

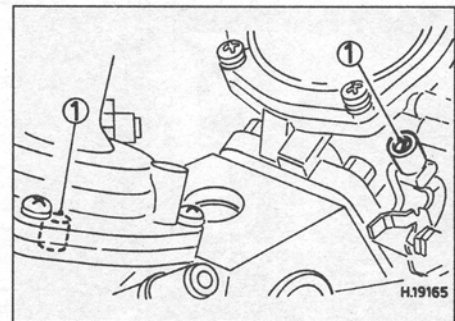
6 With the carburettor balance set, re-connect the throttle interconnecting link.

7 Working on one carburettor at a time, remove the carburettor suction chamber, piston and spring, and adjust the jet flush with the bridge (see Chapter 4A). This provides a datum position for adjusting the mixture. Refit



12.3 Carburettor adjustment details (seen from rear of engine)

- 1 Inboard interconnecting link
- 2 Outboard interconnecting link
- 3 Idle speed screws
- 4 Interconnecting link ball nut
- 5 Lost motion screw and locknut
- 6 Right-hand throttle lever
- 7 Left-hand fast idle cam and screw
- 8 Right-hand fast idle cam and screw, and link rod screw



12.4 Idle speed screws (1)

Toniw

the suction chambers to the carburettors and make sure that the dampers are topped-up with engine oil to the top of the hollow piston rod.

8 Turn each mixture adjustment screw 3 1/2 turns clockwise (see illustration).

9 Insert the exhaust gas analyser probe into the end of the exhaust pipe as far as possible, then start the engine and allow it to stabilise for approximately 2 minutes.

10 With the engine idling, check the CO reading, and if necessary adjust each mixture adjustment screw by equal amounts to achieve the specified CO reading. If the reading is not satisfactory after two minutes, run the engine at 2000 to 2500 rpm for a minute before proceeding.

11 Loosen the nut at the left-hand carburettor securing the interconnecting link ball to the throttle cam lever.

12 Disconnect the interconnecting link between the carburettors at the left-hand carburettor.

13 Working on the right-hand carburettor, unscrew the locknut and loosen the lost-motion adjustment screw until it is well clear of the spring-loaded pad.

14 With the engine idling, adjust the idle screw so that the specified idle speed is maintained, then re-check the CO reading and adjust if necessary.

15 Re-connect the interconnecting link to the left-hand carburettor.

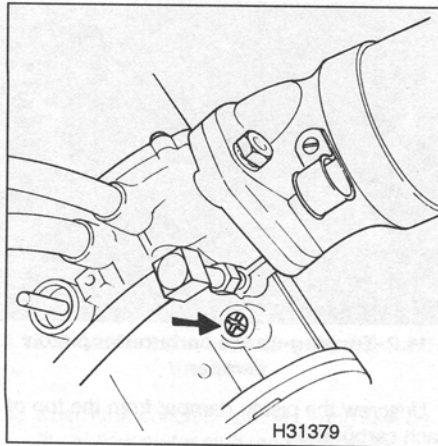
16 While holding the right-hand throttle lever against the idle screw stop, adjust the lost-motion screw until contact is made with the spring-loaded pad, then tighten the locknut.

17 Check the idle speed and balance, and adjust the lost-motion screw if necessary to maintain balance.

18 Ensure that the roller is firmly seated in the lower corner of the cam lever, then tighten the nut securing the interconnecting link ball to the cam lever.

19 Switch off the engine and carry out the fast idle adjustment as follows.

20 First pull out the choke control until the scribed line on the left-hand fast idle cam is aligned with the centre of the fast idle screw. Check that the scribed line on the right-hand fast idle cam is also aligned with the fast idle screw. If not, loosen the fast idle cam link rod



12.8 Mixture screw (arrowed)

screw at the right-hand carburettor and move the cam until the scribed line is aligned with the centre of the screw. Tighten the cam rod screw.

21 Turn each fast idle screw clockwise until just clear of the cam.

22 With the engine idling, turn the fast idle screw of the leading (left-hand) carburettor clockwise until a slight change in engine speed is noted. Working on the right-hand carburettor, turn the fast idle screw down until a further slight change of engine speed is noted.

23 Adjust the fast idle screws of both carburettors by equal amounts to achieve a fast idle speed of 1100 to 1150 rpm.

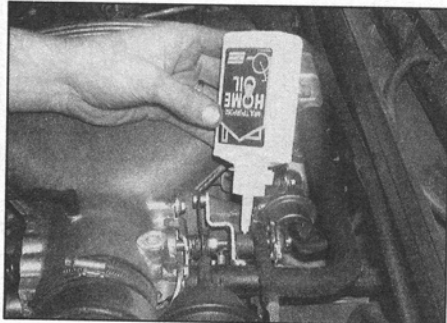
24 Push the choke fully home, then pull it fully out again and re-check the fast idle speed.

25 Fit the new tamperproof caps to the mixture screw recess and the idle adjusting screw.

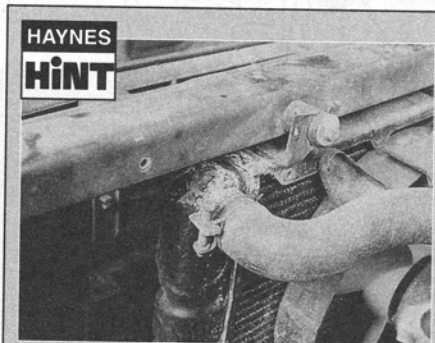
26 Refit the carburettor air inlet elbows and the air cleaner.

Fuel injection models

27 Routine adjustment of the idle speed and mixture settings is not required, as these settings are under the control of the Lucas engine management ECU.



13.3 Lubricating the throttle linkage



A leak in the cooling system will usually show up as white or rust-coloured deposits on the area adjoining the leak

28 Experienced home mechanics equipped with an accurate tachometer and a carefully calibrated exhaust gas analyser may be able to check the exhaust gas CO content and the engine idle speed. If these are found to be out of specification, then the vehicle must be taken to a suitably-equipped Land Rover dealer for assessment - incorrect test results indicate a fault within the fuel injection system. Apart from the base idle speed adjustment described in Chapter 4B, any adjustments which may be required must be performed by a Land Rover dealer.

13 Accelerator mechanism checking and lubrication

1 Check the operation of the accelerator pedal. Make sure that the pedal pivots freely and if necessary, lightly lubricate the pivot bushes using a little light oil.

2 Check the condition of the accelerator cable. Make sure that the cable is routed correctly free from kinks, and clear of surrounding components. Check the cable for signs of chafing and fraying, particularly at the injection pump end, and renew the cable if necessary.

3 Lubricate the accelerator (and cruise control/kickdown cable, where fitted) linkages and pivots using a little light oil (see illustration).

4 Check that when the accelerator pedal is fully depressed, the accelerator linkage moves to the full-throttle position.

5 Check the cable freeplay. Details of cable removal, refitting, and adjustment can be found in Chapter 4A or 4B.

14 Cooling system and heater system hose check

1 Check the security and condition of all the engine-related coolant pipes and hoses. Ensure that all cable-ties or securing clips are in place, and in good condition. Clips which are broken or missing can lead to chafing of the hoses, pipes or wiring which could cause more serious problems in the future.

2 Carefully check the radiator hoses and heater hoses along their entire length. Renew any hose which is cracked, swollen or deteriorated. Cracks will show up better if the hose is squeezed (see Haynes hint). Pay close attention to the hose clips that secure the hoses to the cooling system components. Hose clips can pinch and puncture hoses, resulting in cooling system leaks. If wire-type hose clips are used, it may be a good idea to replace them with screw-type clips.

3 Inspect all the cooling system components (hoses, joint face, etc.) for leaks. Where any problems of this nature are found on system components, renew the component or gasket with reference to Chapter 3.

Acron

15 Brake vacuum servo hose check



1 Working from the servo unit, examine the vacuum hose for signs of damage or deterioration; at the same time, also check the servo unit check valve rubber grommet. If necessary, renew the hose/grommet, referring to the information given in Chapter 10.

16 Auxiliary drivebelt checking and renewal



1 Correct tensioning of each drivebelt will ensure that it has a long life. Beware, however, of overtightening, as this can cause excessive wear in the ancillary components.

2 To improve access, remove the viscous cooling fan and coupling as described in Chapter 3.

3 The belt should be inspected along its entire length, and if it is found to be worn, frayed or cracked, it should be renewed as a precaution against breakage in service. It is advisable to carry a spare drivebelt of the correct type in the vehicle at all times.

Up to 1995 model year (four drivebelts)

Power steering pump drivebelt checking and adjustment

4 The belt tension should be checked at the

mid-point of the belt run between the pulleys (see illustration). Under normal finger pressure, the belt should deflect by 4 to 6 mm.

5 If adjustment is required, first slacken the alternator mounting and adjuster bolts as described later in this Section.

6 Loosen the pump front and rear mounting bolts, and the clamp bolt on the adjustment slide.

7 Pivot the pump as necessary to achieve the correct tension, but do not lever against the pump casing itself, as this could lead to fluid leakage.

8 When the correct tension is achieved, tighten the adjuster clamp bolt and the pump mounting bolts.

9 Re-check the tension, and adjust if necessary. Do not be tempted to run the belt too tight, as this will damage the pump bearings.

10 If a new drivebelt has been fitted, start the engine and run it for five minutes at a fast idle, then re-check the tension and adjust if necessary.

11 Where applicable, refit the viscous fan and coupling as described in Chapter 3.

Power steering pump drivebelt removal and refitting

12 To remove the belt, first remove the alternator and water pump drivebelts as described later in this Section. Loosen the pump mounting and adjuster bolts, and pivot the pump sufficiently to slip the belt from the pulleys.

13 Refit the pump drivebelt and tension it as described previously, then refit and tension

the alternator and water pump belts removed for access, as described later in this Section.

Alternator drivebelt checking and adjustment - up to 1994 model year

14 Prior to checking the alternator belt tension, check and if necessary adjust the power steering pump drivebelt tension as described previously.

15 The alternator belt tension should be checked at the mid-point of the belt run between the pulleys (see illustration). Under normal finger pressure, the belt should deflect by 4 to 6 mm.

16 If adjustment is required, slacken the alternator lower mounting bolt, and the alternator adjuster link mounting bolt below the distributor cap.

17 Slacken the clamp bolt securing the alternator to the adjuster link.

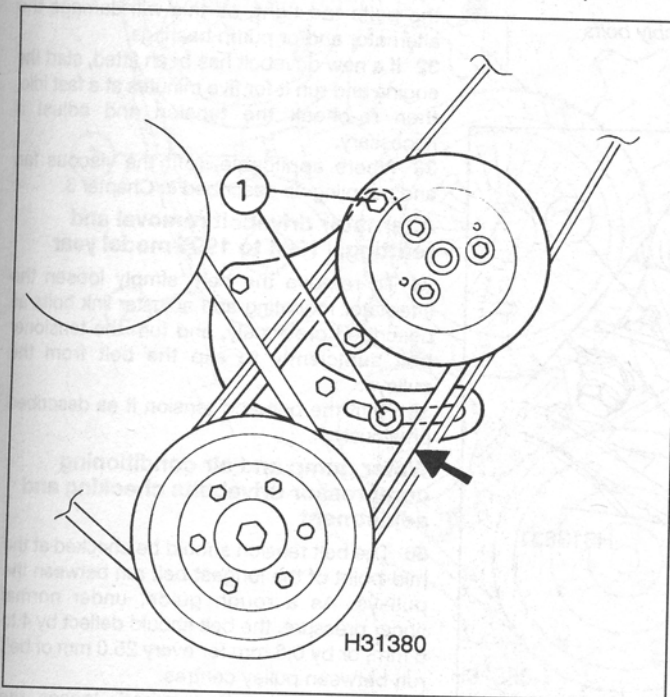
18 Pivot the alternator as necessary to achieve the correct belt tension, taking care not to lever directly against the alternator body, or near the distributor cap.

19 When the correct tension is achieved, tighten the adjuster link clamp bolt and the remaining two bolts.

20 Re-check the tension, and adjust if necessary. Do not be tempted to run the belt too tight, as this will damage the alternator bearings.

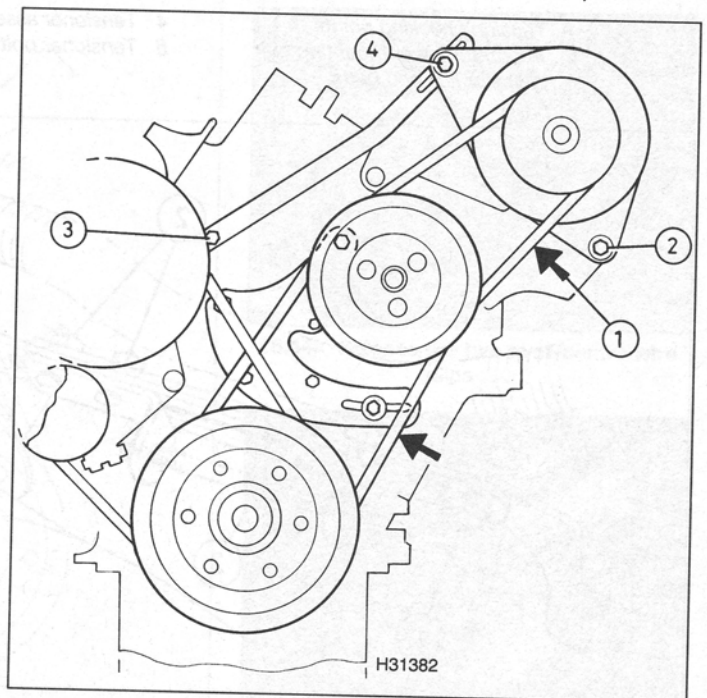
21 If a new drivebelt has been fitted, start the engine and run it for five minutes at a fast idle, then re-check the tension and adjust if necessary.

22 Where applicable, refit the viscous fan and coupling as described in Chapter 3.



16.4 Power steering pump drivebelt checking (1994 model shown)

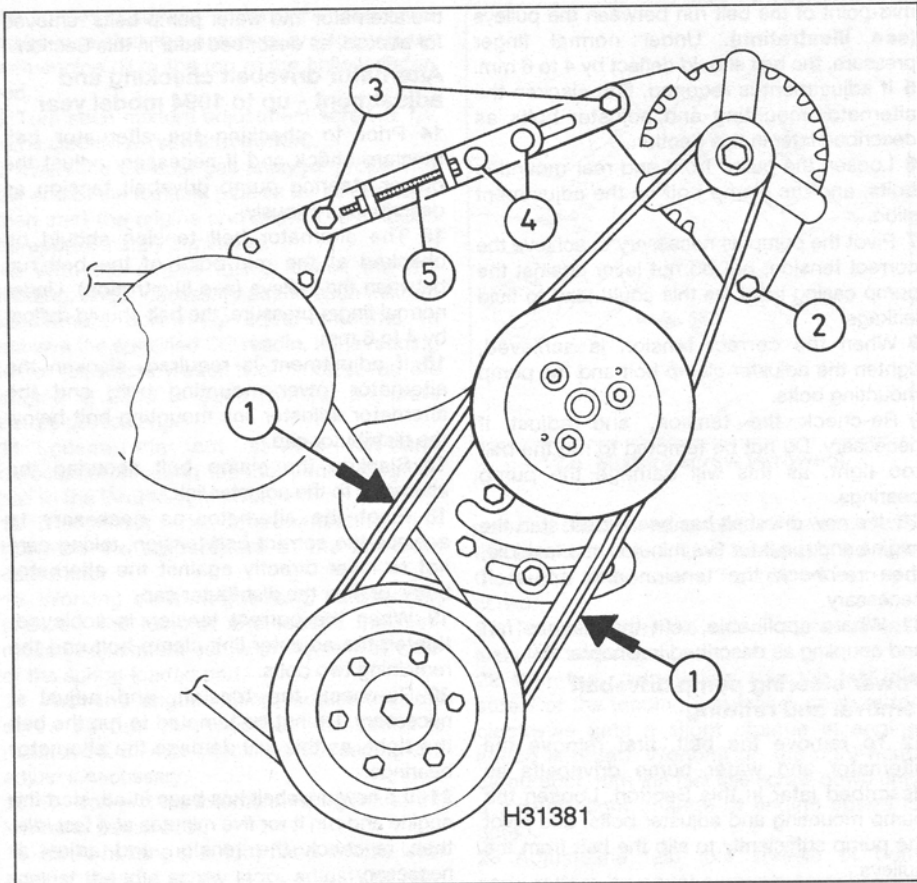
Arrow indicates tension checking point
1 Pump mounting bolts



16.15 Alternator drivebelt details - up to 1994 model year

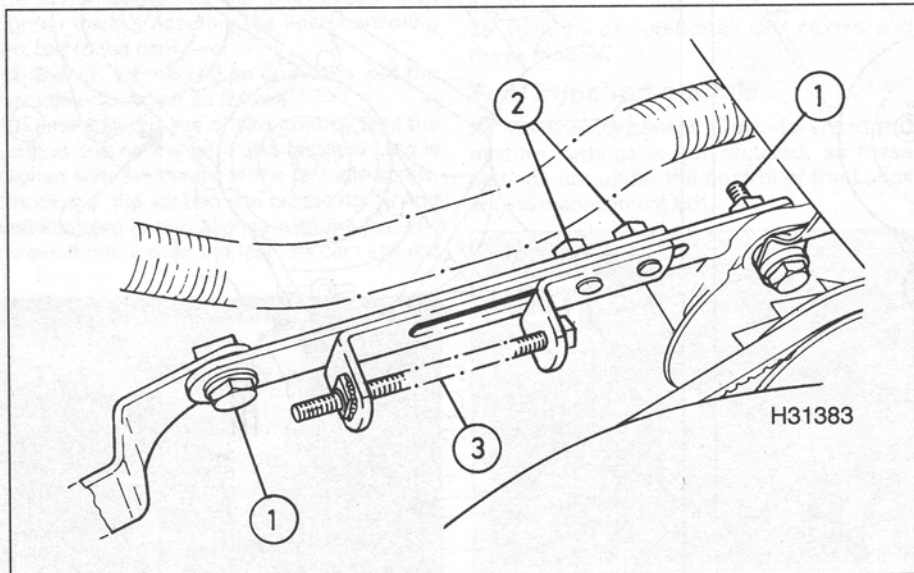
1 Tension checking point
2 Alternator lower mounting bolt
3 Adjusting link lower mounting bolt
4 Adjusting link clamp bolt

Vertical



16.26a Alternator drivebelt details - 1994 to 1995 model year

- | | |
|----------------------------------|----------------------------|
| 1 Tension checking points | 4 Tensioner assembly bolts |
| 2 Alternator lower mounting bolt | 5 Tensioner bolt |
| 3 Adjuster link end bolts | |



16.26b Alternator tensioner details - 1994 to 1995 model year

- | | | |
|---------------------------|----------------------------|------------------|
| 1 Adjuster link end bolts | 2 Tensioner assembly bolts | 3 Tensioner bolt |
|---------------------------|----------------------------|------------------|

Alternator drivebelt removal and refitting - up to 1994 model year

23 To remove the belt, simply loosen the alternator mounting and adjuster link bolts as described previously, and pivot the alternator sufficiently to slip the belt from the pulleys.

24 Refit the belt and tension it as described previously.

Alternator drivebelt checking and adjustment - 1994 to 1995 model year

25 Measure the length of the belt run between the centres of the pulleys. As a rough guide, under normal finger pressure, the belt should deflect by 0.5 mm for every 25.0 mm of belt run between pulley centres. Otherwise Land Rover only publish tension figures for use with a special belt tension gauges - if one is available, the tension figures are given in the Specifications.

26 If adjustment is required, slacken the alternator lower mounting bolt, the bolt at either end of the adjuster link, and the two bolts securing the tensioner assembly to the adjuster link (see illustrations).

27 Slacken the power steering pump mounting and adjuster bolts as described previously.

28 Turn the alternator tensioner bolt as necessary to achieve the correct belt tension.

29 Tension the power steering pump belt as described previously in this Section.

30 When the correct tension is achieved on both belts, securely tighten all mounting, adjuster and adjuster link bolts.

31 Re-check the tension of both belts, and adjust if necessary. Do not be tempted to run the belts too tight, as this will damage the alternator and/or pump bearings.

32 If a new drivebelt has been fitted, start the engine and run it for five minutes at a fast idle, then re-check the tension and adjust if necessary.

33 Where applicable, refit the viscous fan and coupling as described in Chapter 3.

Alternator drivebelt removal and refitting - 1994 to 1995 model year

34 To remove the belt, simply loosen the alternator mounting and adjuster link bolts as described previously, and turn the tensioner bolt sufficiently to slip the belt from the pulleys.

35 Refit the belt and tension it as described previously.

Water pump and air conditioning compressor drivebelts checking and adjustment

36 The belt tension should be checked at the mid-point of the longest belt run between the pulleys. As a rough guide, under normal finger pressure, the belt should deflect by 4 to 6 mm, or by 0.5 mm for every 25.0 mm of belt run between pulley centres.

37 If adjustment is required, loosen the clamp bolt on the jockey wheel midway between the main pulleys (see illustration). Turn the jockey wheel as necessary.

Trium

achieve the correct tension, then tighten the clamp bolt securely.

38 If a new drivebelt has been fitted, start the engine and run it for five minutes at a fast idle, then re-check the tension and adjust if necessary.

39 Where applicable, refit the viscous fan and coupling as described in Chapter 3.

Water pump and air conditioning compressor drivebelts removal and refitting

40 To remove the water pump belt, simply loosen the jockey wheel clamp bolt as described previously, and turn the wheel sufficiently to slip the belt from the pulleys.

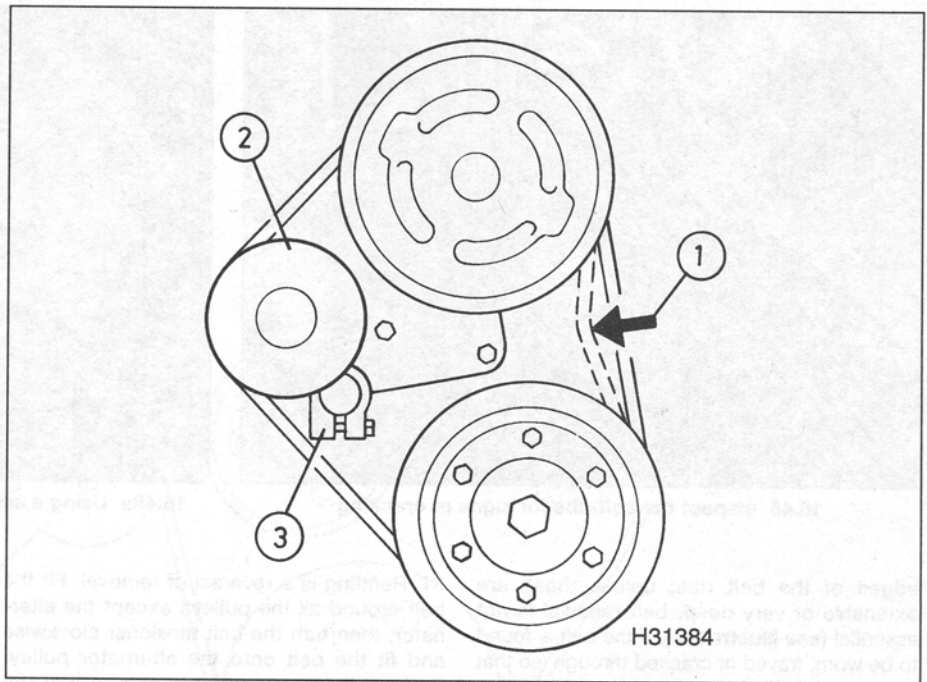
41 The procedure for removing the air conditioning belt is identical to that for the water pump belt described above, but the water pump belt must be removed first.

42 Refit each belt as applicable and tension it as described previously.

1995 model year onwards (one drivebelt)

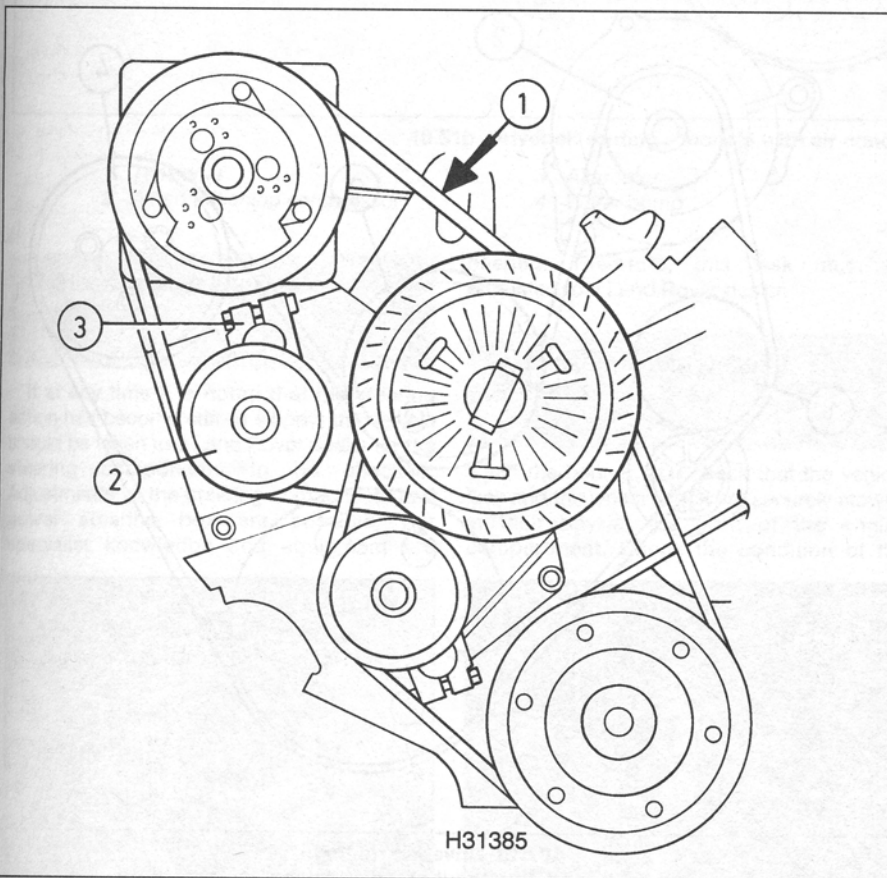
Checking and adjustment

43 An automatic drivebelt tensioner is fitted, and no checking of the tension is necessary, however the belt should be inspected for wear or damage at the recommended intervals.



16.37a Water pump drivebelt details - up to 1995 model year

- 1 Tension checking point
- 2 Jockey wheel
- 3 Clamp bolt

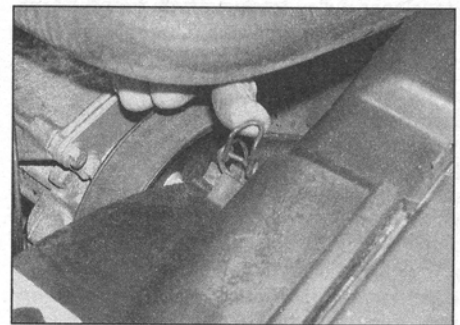


16.37b Air conditioning compressor drivebelt details - up to 1995 model year

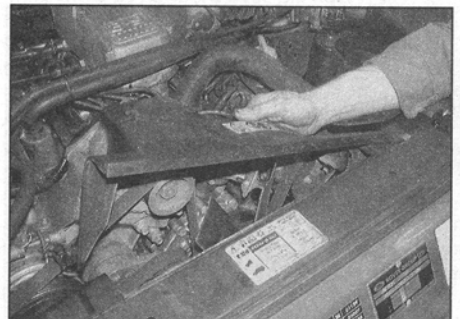
- 1 Tension checking point
- 2 Jockey wheel
- 3 Clamp bolt

fan upper cowl by releasing the two over-centre clips (see illustrations).

45 The belt should be inspected along its entire length. Note that it is not unusual for a ribbed belt to exhibit small cracks in the edges of the belt ribs; unless these are

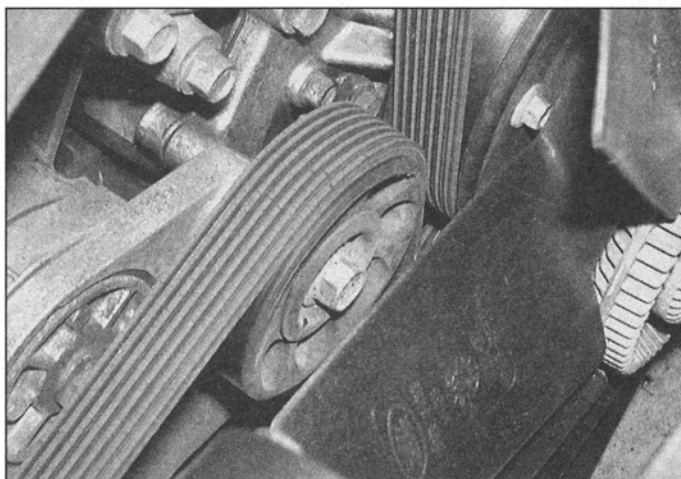


16.44a Release the two over-centre wire clips ...

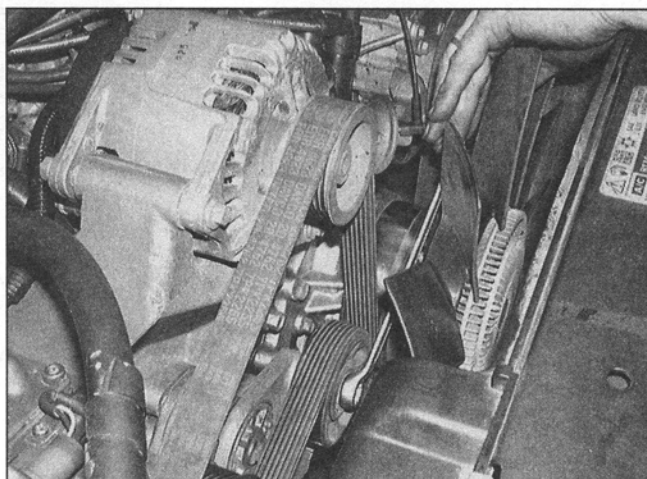


16.44b ... and lift out the cooling fan upper cowl

Twin



16.45 Inspect the belt ribs for signs of cracking



16.48a Using a spanner on the tensioner bolt, release the belt tension . . .

edges of the belt ribs; unless these are extensive or very deep, belt renewal is not essential (see illustration). If the belt is found to be worn, frayed or cracked through (so that cracks are visible in the flat side of the belt), it should be renewed as a precaution against breakage in service.

46 Refit the upper cooling fan cowl on completion.

Removal and refitting

47 Remove the upper cooling fan cowl by releasing the two over-centre clips.

48 Using a suitable ring spanner on the belt tensioner pulley retaining bolt, turn the tensioner clockwise and relieve the tension in the belt. Slide the belt from the alternator pulley, then release the tensioner (see illustrations).

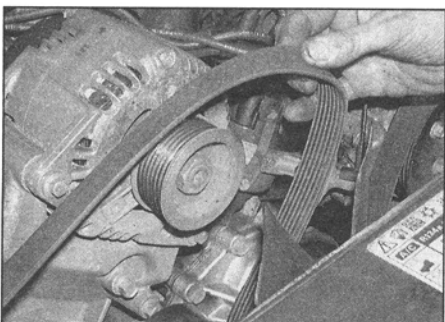
49 If the original belt is to be refitted, mark the running direction to ensure correct refitting.

50 Remove the belt from the remaining pulleys, then if the fan was not removed, manipulate the belt over the viscous fan blades, and remove it.

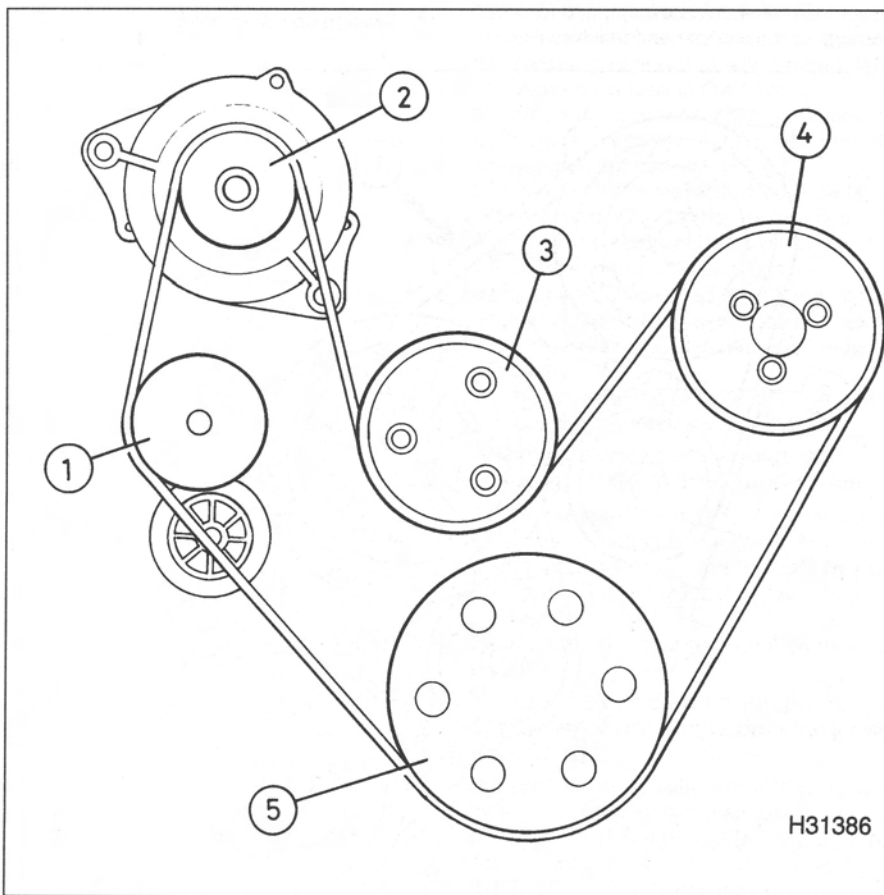
51 Refitting is a reversal of removal. Fit the belt around all the pulleys except the alternator, then turn the belt tensioner clockwise and fit the belt onto the alternator pulley. Release the tensioner, and ensure that the

belt is correctly seated on the pulleys (see illustrations).

52 On completion, refit the upper cooling cowl.



16.48b . . . and slip the drivebelt off the alternator pulley



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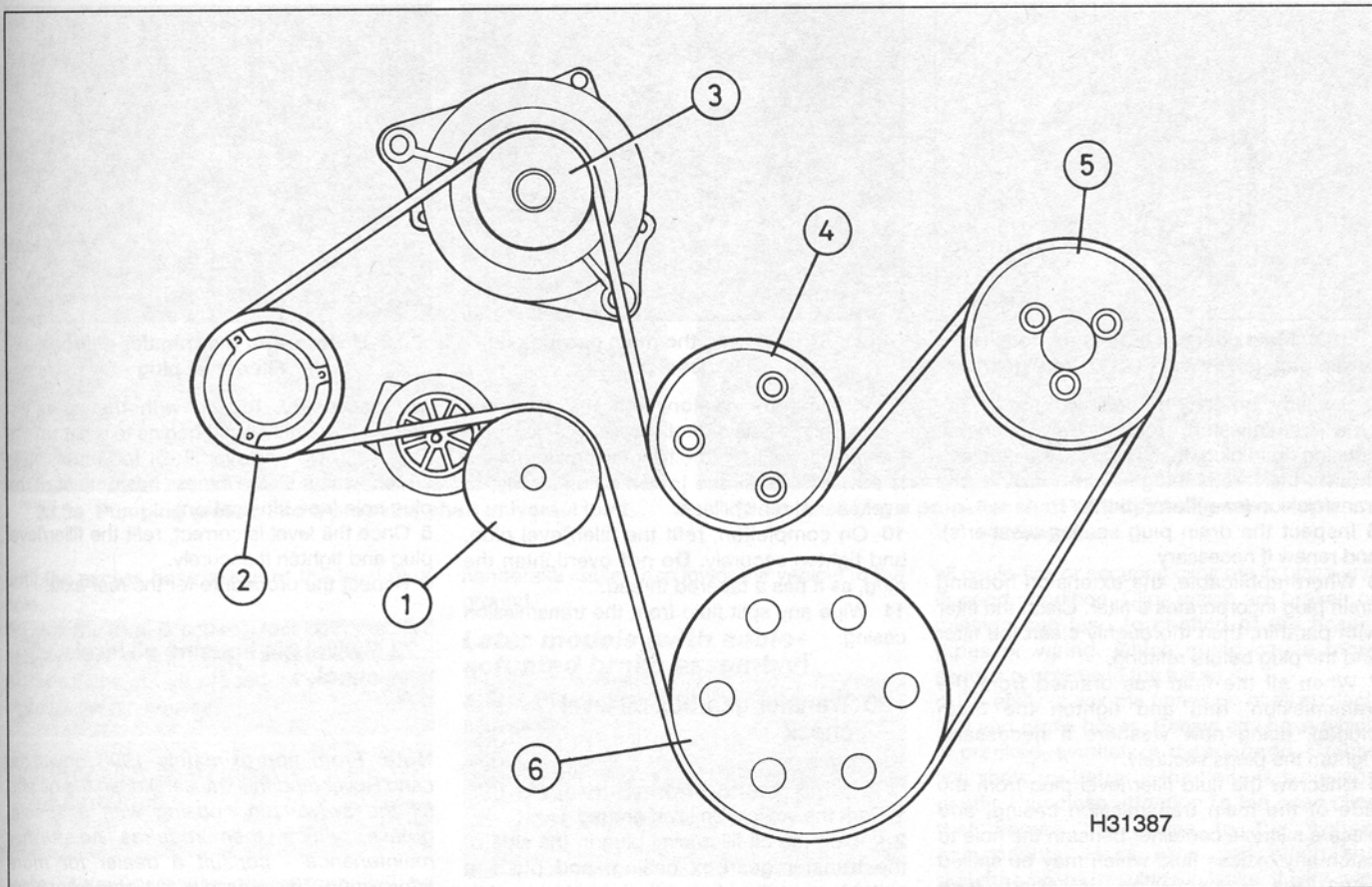
16.51a Drivebelt routing - models without air conditioning

- 1 Tensioner
- 2 Alternator

- 3 Water pump
- 4 Power steering pump

- 5 Crankshaft pulley

Vertical



H31387

16.51b Drivebelt routing - models with air conditioning

- 1 Tensioner
- 2 Air conditioning compressor

- 3 Alternator
- 4 Water pump

- 5 Power steering pump
- 6 Crankshaft pulley

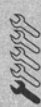
17 Steering gear backlash check



If at any time it is noted that the steering action has become stiff or sloppy, the vehicle should be taken to a Land Rover dealer for the steering components to be checked. Adjustments to the steering components and power steering box are possible, but specialist knowledge and equipment are

needed. Therefore, this task must be entrusted to a Land Rover dealer.

18 Jack and tools security check

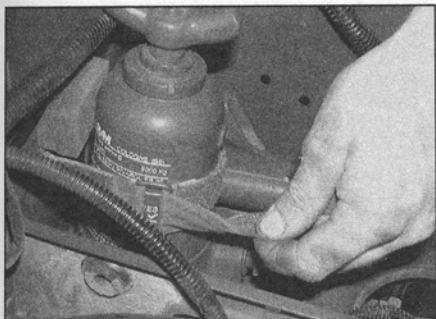


1 Lift the bonnet, and check that the vehicle jack and the wheel chock are securely stowed in their bay at the front of the engine compartment. Check the condition of the

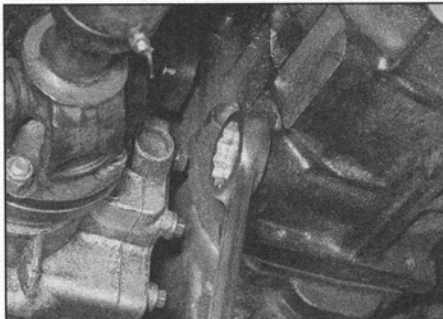
strap securing the jack, and check that the wing nut or turn-clip securing the wheel chock is tight (see illustration).

2 Similarly, check the security of the jack handle and the wheel nut wrench, which are located in a bag under the rear seats. Tilt the rear seat cushions forwards for access.

3 If the car has alloy wheels, one of the roadwheel nuts on each wheel may be of locking type. If so, check that the removal key or removal tools are present. Standard-equipment locking wheel nuts may have an indented cover fitted over the nut.

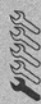


18.1 Checking the jack retaining strap



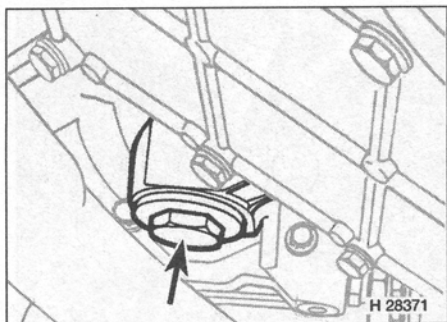
19.3 Unscrewing the main gearbox drain plug

19 Manual transmission fluid renewal



- 1 Park the vehicle on level ground.
- 2 Working under the vehicle, locate the main transmission casing drain plug, and place a suitable container beneath the plugs to catch the escaping fluid.
- 3 Unscrew the drain plug, and allow the fluid to drain. Allow at least ten minutes for all the fluid to drain (see illustration).

Vertical



19.4 Main gearbox extension housing drain plug (arrowed) - LT 77-type gearbox

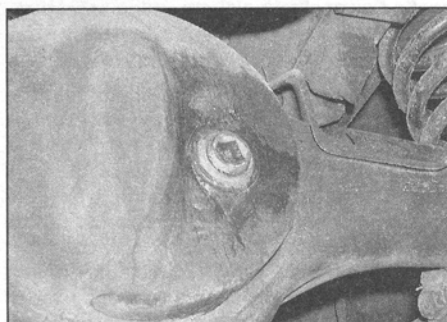
4 Similarly, on early models with the LT 77-type transmission, locate the extension housing drain plug, then unscrew the plug and drain the remaining fluid from the transmission (see illustration).

5 Inspect the drain plug sealing washer(s), and renew if necessary.

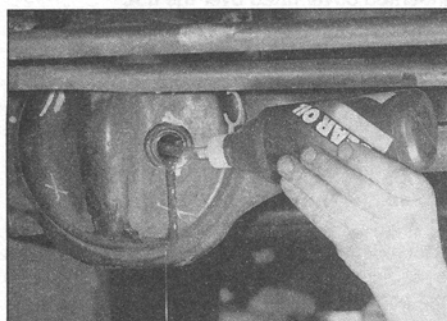
6 Where applicable, the extension housing drain plug incorporates a filter. Clean the filter with paraffin, then thoroughly clean the filter and the plug before refitting.

7 When all the fluid has drained from the transmission, refit and tighten the drain plug(s), using new washers if necessary. Tighten the plugs securely.

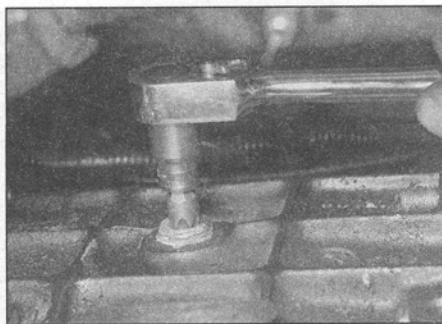
8 Unscrew the fluid filler/level plug from the side of the main transmission casing, and place a suitable container beneath the hole to catch any excess fluid which may be spilled when the transmission is filled (see illustration).



21.2 Axle oil filler/level plug



21.4 Topping-up the axle oil level



19.8 Unscrewing the main gearbox oil filler/level plug

9 Fill the transmission with the specified grade of fluid (see end of *Weekly checks*), until the fluid flows from the filler/level plug hole. It is advisable to fill the transmission slowly, to avoid a sudden spillage.

10 On completion, refit the filler/level plug, and tighten securely. Do not overtighten the plug, as it has a tapered thread.

11 Wipe any split fluid from the transmission casing.

20 Transfer gearbox oil level check

1 Park the vehicle on level ground.
2 Locate the oil filler/level plug in the side of the transfer gearbox casing, and place a suitable container beneath the hole to catch any escaping oil.

3 Unscrew the filler/level plug, and check the oil level. The level should be up to the lower edge of the filler/level plug hole (see illustration).

4 If necessary, add oil of the specified type (see end of *Weekly checks*) until the oil overflows from the filler/level hole.

5 Clean and refit the filler/level plug, and tighten to the specified torque. Do not overtighten the plug, as it has tapered threads.

6 Wipe any split oil from the gearbox casing.

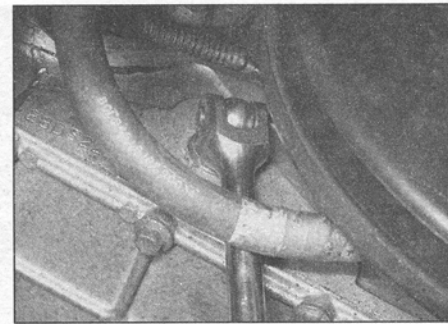
21 Axle oil level check

Note: A 13 mm square-section wrench will be required to undo the axle filler/level plug. These wrenches can be obtained from most motor factors or your Land Rover dealer. It may be possible to use the square fitting of a half-inch-drive socket handle as a substitute.

1 Ensure that the vehicle is standing on level ground, and that the handbrake is applied.

2 Working underneath the vehicle, unscrew the front axle oil filler/level plug, which is located in the differential housing (see illustration).

3 The oil level should be up to the lower edge of the filler/level plug hole.



20.3 Unscrewing the transfer gearbox oil filler/level plug

4 If necessary, top-up with the specified grade of oil, until oil just begins to run from the plug hole. Do not overfill - if too much oil is added, wait until the excess has run out of the plug hole (see illustration).

5 Once the level is correct, refit the filler/level plug and tighten it securely.

6 Repeat the procedure for the rear axle.

22 Swivel pin housing oil level check

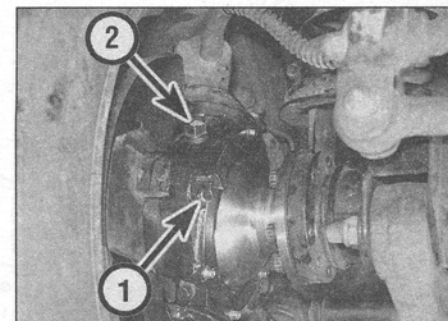
Note: From approximately 1998 onwards, Land Rover (and their dealers) drain the oil and fill the swivel pin housing with a special grease, which then requires no further maintenance - consult a dealer for more information. This grease is available from Land Rover dealers, under part number FTC3435.

1 Ensure that the vehicle is standing on level ground, and that the handbrake is applied.

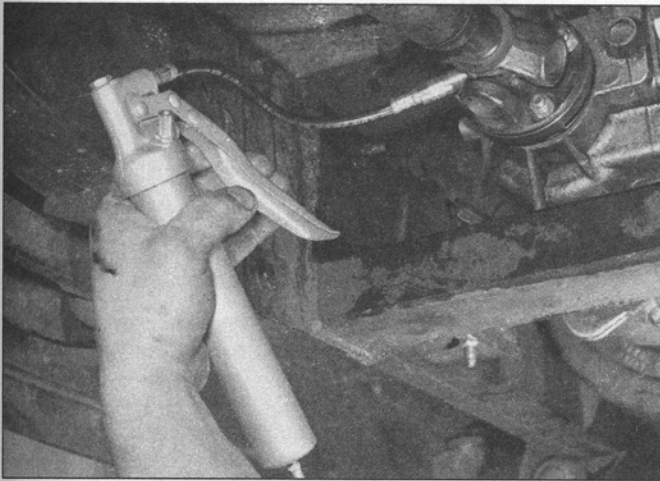
2 Working underneath the vehicle, unscrew the left-hand swivel pin housing level plug. The level plug has a square-section head, and is situated approximately halfway up the housing (see illustration).

3 The oil level should be up to the lower edge of the level plug hole.

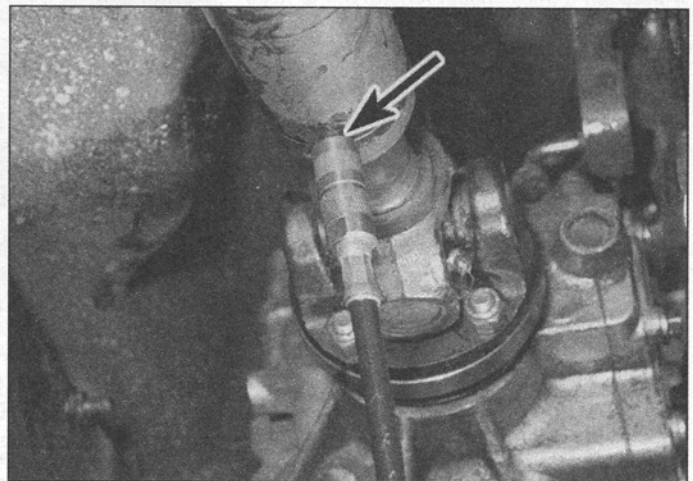
4 If topping-up is necessary, unscrew the filler plug from the top of the swivel pin housing; the filler plug also has a square-section head. Top-up the housing via the filler plug hole using the specified grade of oil, until oil just begins to run from the level plug hole. Do not overfill - if too much oil is added, wait



22.2 Swivel pin housing level plug (1) and filler plug (2)



23.3a Pumping grease into a propeller shaft universal joint



23.3b Greasing a propeller shaft sliding joint (grease nipple arrowed)

until the excess has run out of the level plug hole.

5 Once the level is correct, refit both the filler and level plugs, and tighten them securely.

6 Repeat the above procedure on the right-hand swivel pin housing.

23 Propeller shaft joint lubrication



Note: A low-pressure grease gun will be required for this operation.

1 Working under the vehicle, locate the grease nipples on the front and rear propeller shafts universal joint spiders, and the shaft sliding joints.

2 Thoroughly clean the around each nipple. This is essential - if the area is not clean, the grease will either not go in, or will take in dirt with it.

3 Fill a suitable grease gun with the recommended type of grease (see end of *Weekly checks*), then apply the grease gun to each of the nipples in turn, and pump grease into the joints (see illustrations). Apply grease until it emerges from the end of the nipple, then wipe away the excess.

24 Handbrake linkage lubrication



Early models (with rod-actuated brake assembly)

1 To improve access, firmly apply the handbrake, then jack up the front of the vehicle and support it on axle stands.

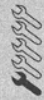
2 Thoroughly degrease the handbrake rod linkage assembly, which is mounted onto the side of the transfer box. Apply fresh high-melting point grease to all the linkage pivot points and to the exposed end of the

handbrake cable, then lower the vehicle to the ground.

Later models (with cable-actuated brake assembly)

3 On these models, no lubrication is necessary.

25 Underbody component, pipe, hose and wiring check



1 Visually inspect the engine joint faces, gaskets and seals for any signs of water or oil leaks. Pay particular attention to the areas around the rocker covers, cylinder heads, oil filter and sump joint faces. Bear in mind that over a period of time some very slight seepage from these areas is to be expected - what you are really looking for is any indication of a serious leak. Should a leak be found, renew the offending gasket or oil seal by referring to the appropriate Chapter(s) in this manual.

2 Similarly, check the transmission components for oil leaks, and investigate and rectify any problems found.

3 Check the security and condition of all the engine-related pipes and hoses. Ensure that

all cable-ties or securing clips are in place and in good condition. Clips which are broken or missing can lead to chafing of the hoses, pipes or wiring, which could cause more serious problems in the future.

4 Carefully check the condition of all coolant, fuel and brake hoses. Renew any hose which is cracked, swollen or deteriorated. Cracks will show up better if the hose is squeezed gently. Pay close attention to the hose clips that secure the hoses to the system components. Hose clips can pinch and puncture hoses, resulting in leaks. If wire-type hose clips are used, it may be a good idea to replace them with screw-type clips.

5 With the vehicle raised, inspect the fuel tank and filler neck for punctures, cracks and other damage. The connection between the filler neck and tank is especially critical. Sometimes, a rubber filler neck or connecting hose will leak due to loose retaining clamps or deteriorated rubber.

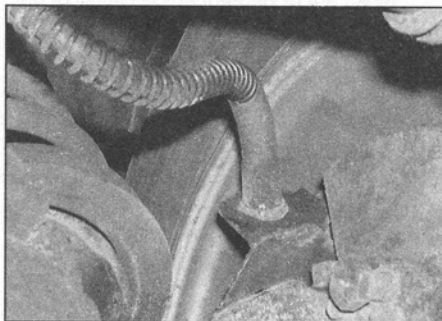
6 Similarly, inspect all brake hoses and metal pipes (see illustration). If any damage or deterioration is discovered, do not drive the vehicle until the necessary repair work has been carried out. Renew any damaged sections of hose or pipe.

7 Carefully check all rubber hoses and metal fuel lines leading away from the petrol tank. Check for loose connections, deteriorated hoses, crimped lines and other damage. Pay particular attention to the vent pipes and hoses, which often loop up around the filler neck and can become blocked or crimped. Follow the lines to the front of the vehicle carefully inspecting them all the way. Renew damaged sections as necessary.

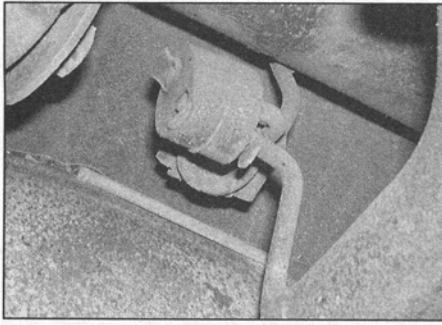
8 From within the engine compartment, check the security of all fuel hose attachments and pipe unions, and inspect the fuel hoses and vacuum hoses for kinks, chafing and deterioration.

9 Check the condition of the oil cooler hoses and pipes.

10 Check the condition of the power steering



25.6 Check all brake pipes and hoses

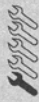


26.3 Exhaust mounting rubber

fluid hoses and pipes and, where applicable, check the condition of the automatic transmission fluid hoses and pipes.

11 Check the condition of all exposed wiring harnesses, paying particular attention to the ABS wheel sensor wiring harnesses, where applicable.

26 Exhaust system check

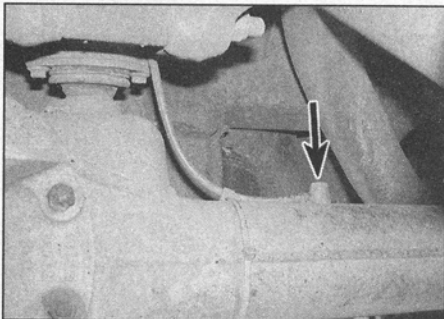


1 With the engine cold (at least an hour after the vehicle has been driven), check the complete exhaust system from the engine to the end of the tailpipes. Ideally the inspection should be carried out with the vehicle raised (see *Jacking and vehicle support*).

2 Check the exhaust pipes and connections for evidence of leaks, severe corrosion and damage. Make sure that all brackets and mountings are in good condition and tight. Leakage at any of the joints or in other parts of the system will usually show up as a black sooty stain in the vicinity of the leak.

3 Rattles and other noises can often be traced to the exhaust system, especially the brackets and mountings (see *illustration*). Try to move the pipes and silencers. If the components can come into contact with the body or suspension parts, secure the system with new mountings; if possible, separate the joints, and twist the pipes as necessary to provide additional clearance.

4 Run the engine at idle speed, then temporarily place a cloth rag over the rear end of



29.2a Rear axle breather at the axle end ...

the exhaust pipes, and listen for any escape of exhaust gases that would indicate a leak.

5 On completion, where applicable, lower the vehicle to the ground.

27 Steering and suspension component check



1 Apply the handbrake, then raise the front of the vehicle and securely support it on axle stands.

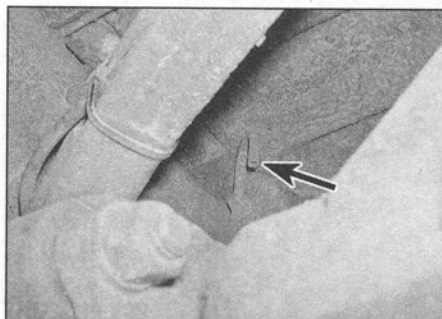
2 Visually inspect the balljoint dust covers for splits, chafing or deterioration. Any damage will cause loss of lubricant, together with dirt and water entry, resulting in rapid deterioration of the balljoints.

3 Check the power steering fluid hoses for chafing or deterioration, and the pipe and hose unions for fluid leaks. Also check for signs of fluid leakage under pressure from the steering box, which would indicate failed fluid seals within the steering box assembly.

4 Grasp the roadwheel at the 12 o'clock and 6 o'clock positions, and try to rock it. Very slight freeplay may be felt, but if the movement is appreciable, further investigation is necessary to determine the source. Continue rocking the wheel while an assistant depresses the footbrake. If the movement is now eliminated or significantly reduced, it is likely that the hub bearings are at fault. If the freeplay is still evident with the footbrake depressed, then there is wear in the suspension joints or mountings.

5 Now grasp the wheel at the 9 o'clock and 3 o'clock positions, and try to rock it as before. Any movement felt now may again be caused by wear in the hub bearings or the steering track rod and drag link balljoints. If a balljoint is worn, the visual movement will be obvious.

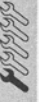
6 Using a large screwdriver or flat bar, check for wear in the suspension mounting bushes by levering between the relevant suspension component and its attachment point. Some movement is to be expected as the mountings are made of rubber, but excessive wear should be obvious. Also check the condition of any visible rubber bushes, looking for splits, cracks or contamination of the rubber.



29.2b ... and showing the hose end (arrowed)

7 With the vehicle standing on its wheels, have an assistant turn the steering wheel back and forth. There should be very little, if any, lost movement between the steering wheel and roadwheels. If this is not the case, closely observe the joints and mountings previously described, but in addition, check the steering column universal joints for wear. The steering box backlash is adjustable, but adjustment should be entrusted to a Land Rover dealer (see Section 17).

28 Propeller shaft securing bolt check



1 Working under the vehicle, use a torque wrench to check the tightness of the bolts securing the propeller shafts to the transfer gearbox and axle drive flanges.

2 Also check the bolts securing the rear propeller shaft rubber coupling, where applicable.

29 Axle breather check

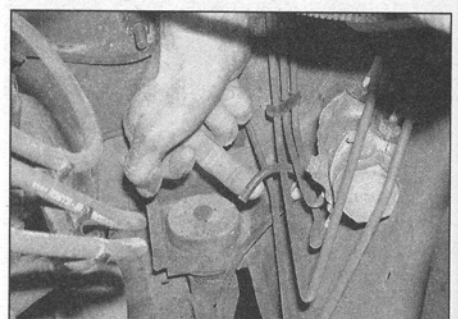


1 Ensure that the vehicle is standing on level ground, and that the handbrake is applied. To access the rear axle breather, jack up the rear of the car and support on axle stands under the chassis. The front axle breather is routed into the engine compartment, at the base of the left-hand inner wing.

2 Check that both the front and rear axle breather tubes are securely retained by all the relevant retaining clips, and show no signs of damage or deterioration (see *illustrations*).

3 If renewal is necessary, unscrew the union bolt securing the breather hose to the top of the axle, and recover the sealing washers from the hose union. Free the hose from its retaining clips, and remove it from the vehicle.

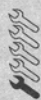
4 Position a new sealing washer on each side of the hose union, and refit the union bolt. Ensure that the hose is correctly routed and retained by all the necessary clips, then securely tighten the union bolt.



29.2c Front axle breather is routed into the engine compartment

Tom

30 Flywheel housing draining

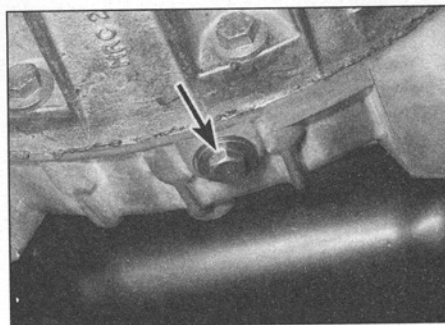


1 In production, the flywheel housing plug is not normally fitted. The plug can be fitted to the oil drain hole in the housing, to seal the housing if the vehicle is likely to be used off-road in very muddy conditions, or under severe wading conditions. A suitable plug can be obtained from a Land Rover dealer (see illustration).

2 If the vehicle is regularly used in adverse conditions, the plug should be fitted permanently, but if the vehicle is normally used on the road, the plug should be removed.

3 If the plug is permanently fitted, it should be removed at the recommended intervals to allow any accumulated oil to drain from the housing.

4 Clean the plug before refitting.



30.1 Flywheel housing drain plug location (arrowed)

assembly clockwise until both shoes are fully expanded against the drum.

5 With the shoes in full contact with the drum, remove all but a slight amount of freeplay from the handbrake cable, using the adjuster nut. Hold the adjuster nut in this position, and securely tighten the cable locknut.

6 Rotate the handbrake drum adjuster in an anti-clockwise direction, until the drum is free to rotate easily.

7 Applying normal, moderate pressure, pull the handbrake lever to the fully-applied position whilst counting the number of clicks emitted from the handbrake ratchet mechanism. The handbrake should be fully-applied on the second or third click of the ratchet mechanism. If necessary, adjust by rotating the drum adjuster in the relevant direction.

8 When adjustment is correct, release the handbrake lever, and check that the drum is free to rotate easily.

9 Apply a smear of high-melting point grease to all the linkage pivot points and to the exposed end of the handbrake cable, then lower the vehicle to the ground.

Later models (with cable-actuated brake)

10 Release the handbrake lever gaiter from the console, and remove the switch panel cover plate. Undo the retaining screws, then withdraw the switch panel and disconnect its wiring connectors. Access can then be gained to the handbrake cable knurled adjuster nut (see illustration).

11 Slacken the cable knurled cable adjuster ring to obtain some freeplay in the cable.

12 From underneath the vehicle, using a suitable spanner, rotate the adjuster on the rear of the handbrake assembly clockwise until both shoes are fully expanded against the drum.

13 With the shoes in full contact with the drum, rotate the handbrake adjuster in an anti-clockwise direction until the handbrake drum is free to rotate easily.

14 Applying normal, moderate pressure, pull the handbrake lever to the fully-applied position, counting the number of clicks emitted from the handbrake ratchet mechanism. The handbrake should be fully-applied on the third

click of the ratchet mechanism. If necessary, adjust the cable setting using the adjuster nut.

15 When adjustment is correct, release the handbrake lever, and check that the drum is free to rotate easily. If all is well, lower the vehicle to the ground.

16 Reconnect the wiring connectors to the centre console switch panel, and refit the panel to the console. Securely tighten the panel retaining screws, and clip the cover plate and handbrake lever gaiter back into position.

34 Road test



Instruments and electrical equipment

1 Check the operation of all instruments and electrical equipment.

2 Make sure that all instruments read correctly, and switch on all electrical equipment in turn to check that it functions properly.

Steering and suspension

3 Check for any abnormalities in the steering, suspension, handling or road 'feel'.

4 Drive the vehicle, and check that there are no unusual vibrations or noises.

5 Check that the steering feels positive, with no excessive sloppiness, or roughness, and check for any suspension noises when cornering and driving over bumps.

Drivetrain

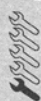
6 Check the performance of the engine, clutch (where applicable), transmission and propeller shafts.

7 Listen for any unusual noises from the engine, clutch and transmission.

8 Make sure that the engine runs smoothly when idling, and that there is no hesitation when accelerating.

9 Where applicable, check that the clutch action is smooth and progressive, that the drive is taken up smoothly, and that the pedal travel is not excessive. Also listen for any noises when the clutch pedal is depressed.

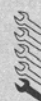
31 Fuel tank security check



1 Working under the vehicle, check the fuel tank for any signs of damage or corrosion.

2 If there is any sign of significant damage or corrosion, remove the fuel tank (see the relevant part of Chapter 4) and take it to a professional for repair. Do not under any circumstances attempt to weld or solder a fuel tank.

32 Towing bracket check



1 Where applicable, check the security of the towbar bracket mountings. Also check that all wiring is intact, and that the trailer electrical systems function correctly.

33 Handbrake adjustment



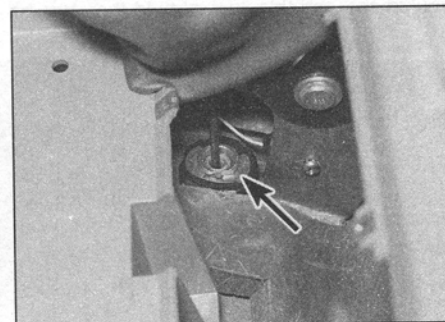
1 The handbrake mechanism is mounted onto the rear of the transfer box assembly. Place the transmission in gear (manual) or P (automatic), then release the handbrake lever and chock the front wheels.

2 Jack up the rear of the vehicle, and support it on axle stands so the wheels are clear of the ground.

Early models (with rod-actuated brake)

3 From underneath the vehicle, slacken the cable locknut, then loosen the adjuster nut to obtain plenty of freeplay in the cable.

4 Using a suitable spanner, rotate the adjuster on the rear of the handbrake



33.10 On later models, access to the handbrake cable adjuster nut (arrowed) can be gained once the switch panel has been removed from the centre console

Vertical

10 Check that all gears can be engaged smoothly without noise, and that the gear lever action is not abnormally vague or 'notchy'. This check applies to both the manual/automatic transmission and the transfer gearbox.

Braking system

11 Make sure that the vehicle does not pull to one side when braking, and that the wheels do not lock prematurely when braking hard.

12 Check that there is no vibration through the steering when braking.

13 Check that the handbrake operates correctly without excessive movement of the lever, and that it holds the vehicle stationary on a slope.

14 Test the operation of the brake servo unit as follows. With the engine switched off, depress the footbrake four or five times to exhaust the vacuum, then start the engine, keeping the pedal depressed. As the engine starts, there should be a noticeable 'give' in the brake pedal as vacuum builds up. Allow the engine to run for at least two minutes, and then switch it off. If the brake pedal is now depressed, it should be possible to detect a hiss from the servo as the pedal is depressed. After about four or five applications, no further hissing should be heard, and the pedal should feel considerably harder.

carried out by a Land Rover dealer or service station with the necessary facilities.

5 Basic adjustments can be carried out in an emergency, and further details are given in Chapter 13.

6 On models with an electrically-operated headlight levelling system, check the operation of both headlight motors. Refer to the appropriate Sections of Chapter 13 if any of the circuits are found to be inoperative.

3 For a comprehensive check, the brake pads should be removed and cleaned. This will allow the operation of the caliper to be checked, and the condition of the brake disc itself to be fully examined on both sides (see Chapter 10).

35 Headlight and auxiliary light adjustment check

1 Check the operation of all the electrical equipment, ie lights, direction indicators, horn, etc. Refer to the appropriate Sections of Chapter 13 for details if any of the circuits are found to be inoperative.

2 Note that stop-light switch adjustment is described in Chapter 10.

3 Visually check all accessible wiring connectors, harnesses and retaining clips for security, and for signs of chafing or damage. Rectify any faults found.

4 Accurate adjustment of the headlight beam is only possible using optical beam-setting equipment, and this work should therefore be

36 Sunroof maintenance

1 Check the operation of each sunroof (on cars so equipped). If the action is at all stiff, clean and lubricate the sunroof guide rails and slides with a little multi-purpose grease.

2 With the sunroof open, check that the sunroof drain tubes at the corners of the sunroof aperture are clear. Carefully pour a little water into the drain channel, and have an assistant watch for the water emerging under the car. Beware of probing the drain tubes with wire, as this may damage the tubes. If available, an air line should be used to clear any blockages.

37 Front wheel alignment check

Check the front wheel alignment as described in Chapter 11.

38 Brake pad and disc check

1 Jack up the vehicle, support securely on axle stands, then remove the roadwheels (see *Jacking and vehicle support*).

2 For a quick check, the thickness of friction material remaining on each pad can be measured through the slot in the caliper body (**see illustration**). If any pad is worn to the specified minimum thickness or less, all four pads must be renewed (see Chapter 10).

39 Spare wheel check

Refer to *Weekly checks* and Section 18.

40 Hinge and lock check and lubrication

1 Lubricate the hinges of the bonnet, doors and tailgate with a light general-purpose oil. Similarly, lubricate all latches, locks and lock strikers (**see illustration**). At the same time, check the security and operation of all the locks, adjusting them if necessary (see Chapter 12).

2 Lightly lubricate the bonnet release mechanism and cable with a suitable grease.

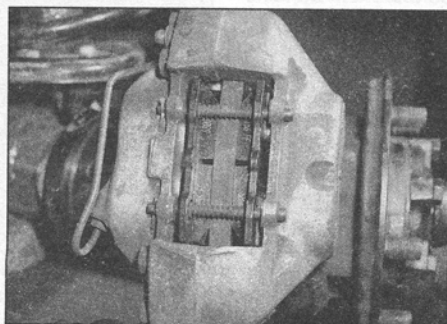
41 Seat belt check

1 Carefully examine the seat belt webbing for cuts, or any signs of serious fraying or deterioration. If the seat belt is of the retractable type, pull the belt all the way out, and examine the full extent of the webbing.

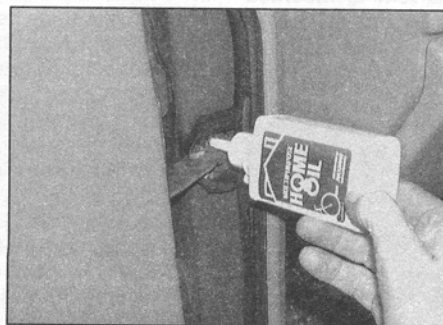
2 Fasten and unfasten the belt, ensuring that the locking mechanism holds securely, and releases properly when intended. If the belt is of the retractable type, check also that the retracting mechanism operates correctly when the belt is released.

3 Check the security of all seat belt mountings and attachments which are accessible, without removing any trim or other components, from inside the vehicle.

4 Renew any worn components as described in Chapter 12.

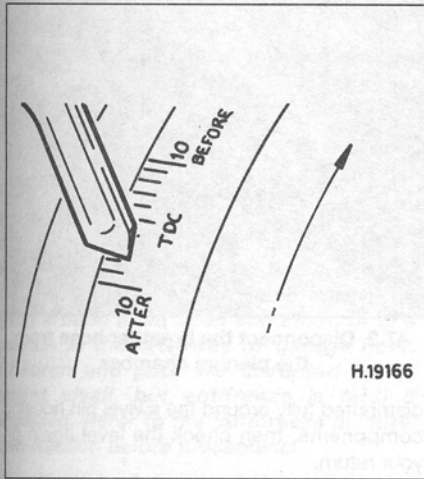


38.2 Brake pad friction material thickness can be checked with the caliper in position

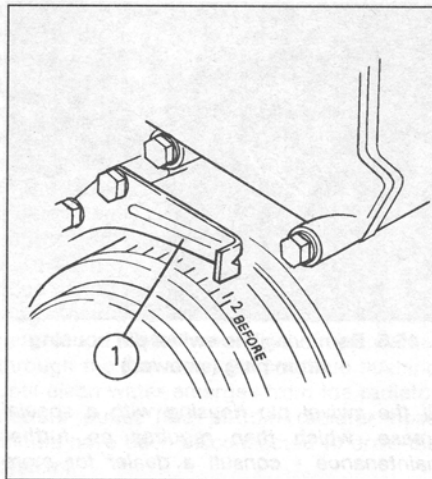


40.1 Lubricating a front door check strap pivot

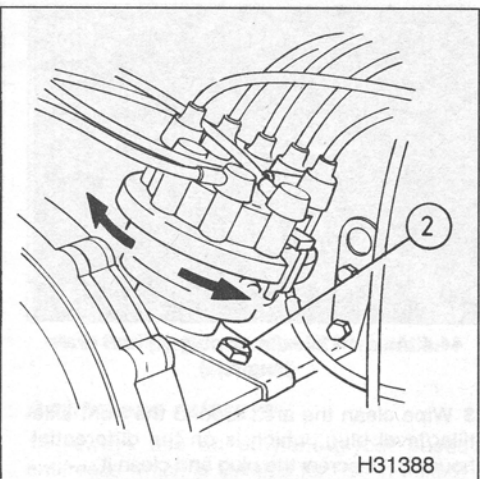
Tom



42.5 Ignition timing pointer and scale



42.6 Ignition timing pointer (1) and distributor clamp bolt (2)



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Every 24 000 miles or 2 years, whichever comes first

42 Ignition timing check and adjustment



1 Correct ignition timing is vital for the proper running of the engine. If the ignition is over-advanced, pre-ignition (pinking), and possible piston damage, will result; if the ignition is retarded, there will be loss of power, overheating and high fuel consumption.

2 The engine must be at normal operating temperature. Disconnect the distributor vacuum hose - the idle speed should not rise above 800 rpm when this is done.

3 Connect a timing light (strobe) into the ignition system in accordance with the equipment manufacturer's instructions - usually to the No 1 HT lead. Some lights also require a connection to be made to the battery or to a mains power supply.

4 Depending on the brightness of the timing light and the ambient light level, it may be necessary to highlight the specified timing mark (on the scale on the pulley) and the pointer with quick-drying white paint. Typist's correcting fluid is ideal.

5 Start the engine and allow it to idle. Point the timing light at the timing marks and pointer. The timing marks will appear stationary, and if the timing is correct, the specified mark on the scale will be aligned with the pointer (see illustration). Take care not to let the light or its leads come into contact with moving parts of the engine.

6 If the timing is incorrect, stop the engine, slacken the distributor clamp bolt and move the distributor in the required direction (clockwise to retard, anti-clockwise to advance) to correct the timing (see illustration). Access to the clamp bolt is not easy, and is best achieved from under the power steering pump, using a long extension

handle. Tighten the clamp bolt and recheck the timing.

7 Note that if the engine idle speed is too high, it will be impossible to set the timing correctly since the centrifugal advance mechanism in the distributor will have started to operate. Connect a tachometer to the engine if in doubt.

8 With the ignition timing set, check the operation of the centrifugal advance mechanism by slowly increasing the engine speed. As the engine speed is increased, the timing scale will appear to drift relative to the pointer in the advanced (BTDC) direction. Accurate checking is difficult without special equipment, but any jerkiness or sticking in the advancement should be regarded with suspicion.

9 The vacuum advance system can be checked in a similar way, once the distributor vacuum hose is reconnected.

10 On completion, disconnect the timing light, and make sure (if not already done) that the distributor vacuum hose is reconnected.

43 Transfer gearbox oil renewal



1 Park the vehicle on level ground.

2 Locate the filler/level plug in the side of the transfer gearbox casing, the unscrew the plug (see Section 20).

3 Place a suitable container beneath the drain plug in the bottom of the gearbox casing, then unscrew the drain plug and allow the oil to drain (see illustration). Recover the sealing washer.

4 When the oil has finished draining, refit and tighten the drain plug, using a new sealing washer if necessary.

5 Refill the gearbox with oil of the specified

type (see end of *Weekly checks*) through the filler/level hole, until the oil level reaches the lower edge of the hole (place a container beneath the hole to catch any escaping oil).

6 Clean and refit the filler/level plug, and tighten to the specified torque. **Do not** overtighten the plug, as it has tapered threads.

7 Wipe any split oil from the gearbox casing.

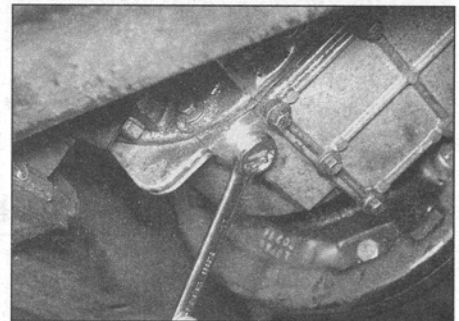
44 Axle oil renewal



Note: A 13 mm square-section wrench will be required to undo the axle filler/level plug. These wrenches can be obtained from most motor factors or your Land Rover dealer. It may be possible to use the square fitting of a half-inch-drive socket handle as a substitute.

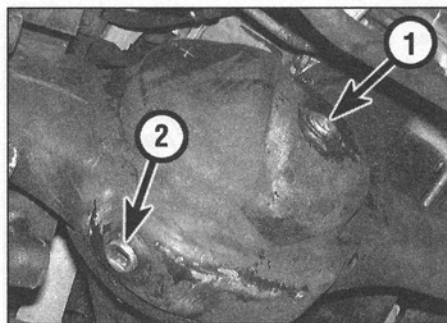
1 This operation is much quicker and more efficient if the car is first taken on a journey of sufficient length to warm the axle oil up to normal operating temperature.

2 Park the car on level ground, switch off the ignition and apply the handbrake firmly.



43.3 Unscrewing the transfer gearbox oil drain plug

Trium



44.4 Axle oil filler/level plug (1) and drain plug (2)

3 Wipe clean the area around the front axle filler/level plug, which is on the differential housing. Unscrew the plug and clean it.

4 Position a suitable container under the drain plug situated on the base of the differential housing (see illustration).

5 Unscrew the drain plug, and allow the oil to drain completely into the container. If the oil is hot, take precautions against scalding. Examine the sealing washer for signs of damage, renewing it if necessary, and clean both the filler/level and the drain plugs.

6 When the oil has finished draining, clean the drain plug threads and those of the differential casing, then refit the drain plug and washer, tightening it securely.

7 Refilling the axle is an extremely awkward operation. Above all, allow plenty of time for the oil level to settle properly before checking it. Note that the car must be parked on flat level ground when checking the oil level.

8 Refill the axle with the exact amount of the specified type of oil, then check the oil level as described in Section 21. If the correct amount was poured into the housing, and a large amount flows out on checking the level, refit the filler/level plug, and take the car on a short journey so that the new oil is distributed fully around the axle components, then check the level again on your return.

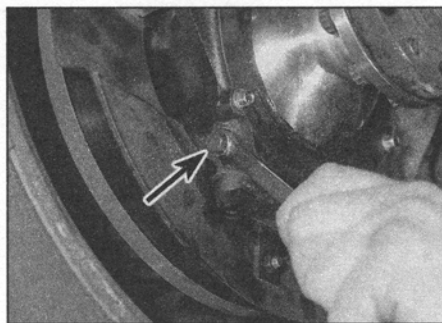
9 When the level is correct, refit the filler/level plug, tightening it securely, and wash off any spilt oil.

10 Repeat the procedure for the rear axle.

45 Swivel pin housing oil renewal



Note: From approximately 1998 onwards, Land Rover (and their dealers) drain the oil and



45.5 Removing the swivel pin housing drain plug (arrowed)

fill the swivel pin housing with a special grease, which then requires no further maintenance - consult a dealer for more information. This grease is available from Land Rover dealers, under part number FTC3435.

1 This operation is much quicker and more efficient if the car is first taken on a journey of sufficient length to warm the swivel pin housing oil up to normal operating temperature.

2 Park the car on level ground, switch off the ignition and apply the handbrake firmly.

3 Working underneath the vehicle, unscrew the left-hand swivel pin housing level plug and filler. Both plugs can be identified by their square-section heads (see Section 22).

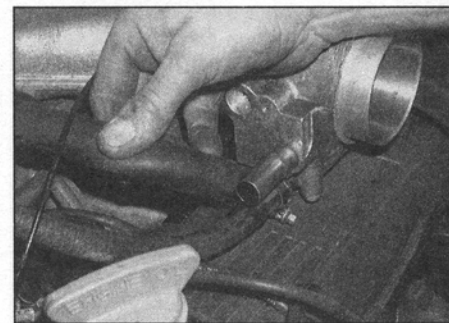
4 Position a suitable container under the drain plug situated on the base of the swivel pin housing.

5 Unscrew the drain plug, and allow the oil to drain completely into the container (see illustration). If the oil is hot, take precautions against scalding. Examine the sealing washer for signs of damage, renewing it if necessary, and clean the threads of all removed plugs.

6 When the oil has finished draining, clean the drain plug threads and those of the housing, then refit the drain plug and washer, tightening it securely.

7 Refilling the housing is an extremely awkward operation. Above all, allow plenty of time for the oil level to settle properly before checking it. Note that the car must be parked on flat level ground when checking the oil level.

8 Refill the housing with the exact amount of the specified type of oil, then check the oil level as described in Section 22. If the correct amount was poured into the housing, and a large amount flows out on checking the level, refit the filler and level plugs, and take the car on a short journey so that the new oil is



47.2 Disconnect the breather hose from the plenum chamber

distributed fully around the swivel pin housing components, then check the level again on your return.

9 When the level is correct, refit the filler and level plugs, tightening them securely, and wash off any spilt oil.

10 Repeat the above operation on the right-hand swivel pin housing.

46 Automatic transmission fluid and oil screen renewal



This is an involved operation, and is best entrusted to a Land Rover dealer.

47 Plenum chamber ventilation duct cleaning



1 Loosen the hose clamp and remove the large air inlet hose from the plenum chamber.

2 Disconnect the crankcase breather hose from the front of the plenum chamber (see illustration), and also disconnect the T-piece further down the same hose.

3 To prevent any debris being drawn into the inlet manifold, stuff a clean piece of rag down into the plenum chamber main air inlet, making sure that it can easily be retrieved.

4 Using an air line or a soft piece of wire, clean the crankcase breather duct at the front of the plenum chamber. Using the breather hose, blow through the duct to ensure that it is clear.

5 Similarly, check and clean the T-piece removed previously.

6 Remove the rag from the plenum chamber, then refit all disconnected hoses to complete.

Every 2 years, regardless of mileage

48 Brake fluid renewal



The procedure is similar to that for the bleeding of the hydraulic system as described in Chapter 10, except that the brake fluid reservoir should be emptied by siphoning, using a (clean) old battery hydrometer or

similar before starting, and allowance should be made for the old fluid to be expelled from the circuit when bleeding each section of the circuit.

Trium

49 Coolant renewal



Warning: Wait until the engine is cold before starting this procedure. Do not allow antifreeze to come in contact with your skin, or with the painted surfaces of the vehicle. Rinse off spills immediately with plenty of water. Never leave antifreeze lying around in an open container, or in a puddle in the driveway or garage floor. Children and pets are attracted by its sweet smell, but antifreeze is fatal if ingested. Refer to the 'Antifreeze mixture' sub-Section before proceeding.

Cooling system draining

1 To drain the cooling system, first cover the expansion tank cap with a wad of rag, and slowly turn the cap anti-clockwise to relieve the pressure in the cooling system (a hissing sound will normally be heard). Wait until any pressure remaining in the system is released, then continue to turn the cap until it can be removed.

2 To assist draining, unscrew and remove the radiator filler plug fitted to the top right-hand side of the radiator, and recover the O-ring.

3 Position a suitable container beneath the radiator bottom hose connection, then slacken the hose clip and ease the hose from the radiator stub (see illustration). If the hose joint has not been disturbed for some time, it will be necessary to manipulate the hose to break the joint. Allow the coolant to drain into the container.

4 To fully drain the system, also slacken and remove the square-headed coolant drain plug fitted to each side of the cylinder block, below the exhaust manifold, and allow any residual coolant to drain from the block (see illustration).



In the absence of a proper tool, the left-hand block drain plug can be removed using a short 3/8-inch extension bar as a 'socket', with a 10 mm open-ended spanner fitted to the square end fitting. Lack of access prevents this method on the right-hand side, but a 10 mm spanner alone can be used.

5 When the flow of coolant has stopped, wipe clean the threads of the drain plugs and block. Apply a smear of suitable sealant to the drain plug threads, then refit the drain plugs to the block, and tighten securely.

6 If the coolant has been drained for a reason other than renewal, then provided it is clean and less than two years old, it can be re-used.

Cooling system flushing

7 If coolant renewal has been neglected, or if

the antifreeze mixture has become diluted, then in time, the cooling system may gradually lose efficiency, as the coolant passages become restricted due to rust, scale deposits, and other sediment. The cooling system efficiency can be restored by flushing the system clean.

8 The radiator should be flushed independently of the engine, to avoid unnecessary contamination.

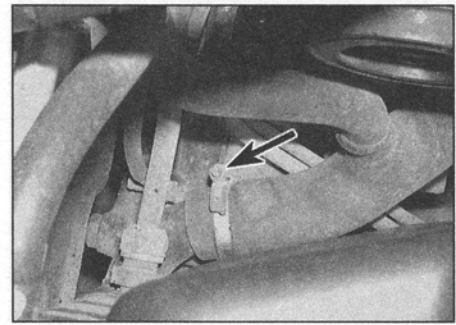
9 To flush the radiator, disconnect the top hose at the radiator, disconnect the radiator filler plug, then insert a garden hose into the radiator top inlet. Direct a flow of clean water through the radiator, and continue flushing until clean water emerges from the radiator bottom outlet (the bottom radiator hose should have been disconnected to drain the system).

10 If after a reasonable period, the water still does not run clear, the radiator can be flushed with a good proprietary cleaning agent. It is important that the cleaning agent manufacturer's instructions are followed carefully. If the contamination is particularly bad, insert the hose in the radiator bottom outlet, and flush the radiator in reverse ('reverse-flushing').

11 Remove the thermostat as described in Chapter 3, then temporarily refit the thermostat cover.

12 With the radiator top and bottom hoses disconnected from the radiator, insert a hose into the radiator bottom hose. Direct a clean flow of water through the engine, and continue flushing until clean water emerges from the radiator top hose.

13 On completion of flushing, refit the thermostat with reference to Chapter 3, and reconnect the hoses.



49.3 Radiator bottom hose connection (arrowed)

Antifreeze mixture

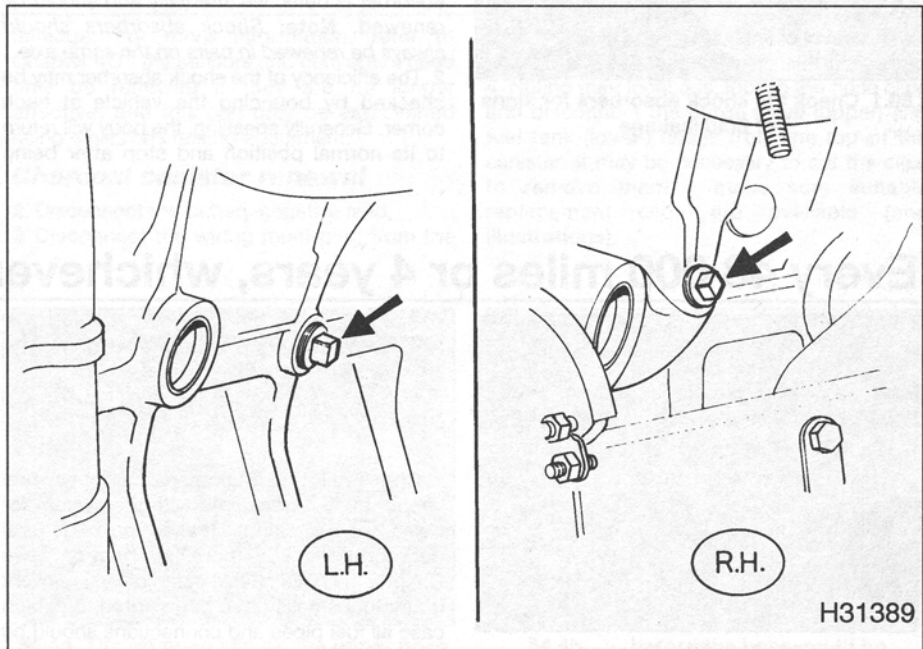
14 Always use an ethylene-glycol based antifreeze which is suitable for use in mixed-metal cooling systems. The quantity of antifreeze and levels of protection are indicated in the Specifications.

15 Before adding antifreeze, the cooling system should be completely drained, preferably flushed, and all hoses and clips checked for condition and security.

16 After filling with antifreeze, a label should be attached to the radiator or expansion tank, stating the type and concentration of antifreeze used, and the date installed. Any subsequent topping-up should be made with the same type and concentration of antifreeze.

Cooling system filling

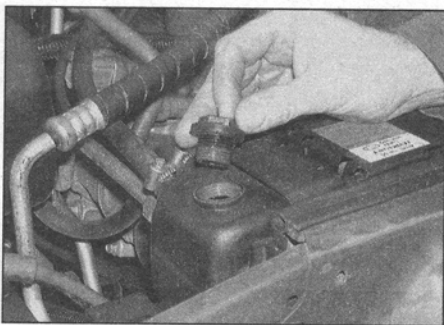
17 Before attempting to fill the cooling system, make sure that all hoses and clips are in good condition, and that the clips are tight. Note that an antifreeze mixture must be used all year round, to prevent corrosion of the alloy engine components.



49.4 Engine block drain plugs (arrowed)

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49.18 Removing the radiator filler cap

18 Remove the expansion tank cap, and (if not already done) unscrew the filler cap from the top of the radiator (see illustration). In both cases, check the cap sealing ring (where fitted), and renew it if it shows signs of damage or deterioration.

19 Fill the system slowly to prevent airlocks from forming. Pour the coolant mixture into the expansion tank until coolant free of air bubbles emerges from the radiator filler. Refit

the radiator filler cap, tightening it securely, and add more coolant until the level in the expansion tank is correct. Refit and tighten the expansion tank cap.

20 Start the engine and run it until it reaches normal operating temperature, then stop the engine and allow it to cool for several hours (preferably overnight).

21 Check for leaks, particularly around disturbed components.

22 Check the coolant level in the expansion tank, and top-up if necessary. Note that the system must be cold before an accurate level is indicated in the expansion tank.

Airlocks

23 If, after draining and refilling the system, symptoms of overheating are found which did not occur previously, then the fault is almost certainly due to trapped air at some point in the system, causing an airlock and restricting the flow of coolant; usually, the air is trapped because the system was refilled too quickly.

24 If an airlock is suspected, first try gently squeezing all visible coolant hoses. A coolant

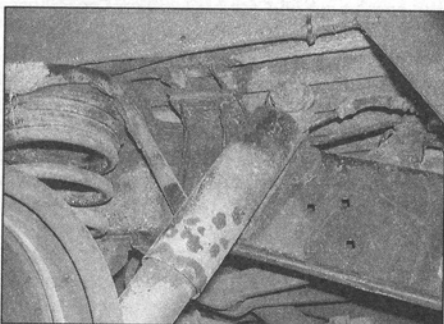
hose which is full of air feels quite different to one full of coolant, when squeezed. After refilling the system, most airlocks will clear once the system has cooled, and been topped-up.

25 While the engine is running at operating temperature, switch on the heater and heater fan, and check for heat output. Provided there is sufficient coolant in the system, lack of heat output could be due to an airlock in the system.

26 Airlocks can have more serious effects than simply reducing heater output - a severe airlock could reduce coolant flow around the engine. Check that the radiator top hose is hot when the engine is at operating temperature - a top hose which stays cold could be the result of an airlock (or a non-opening thermostat).

27 If the problem persists, stop the engine and allow it to cool down **completely**, before unscrewing the expansion tank filler cap or partially disconnecting hoses to bleed out the trapped air. In the worst case, the system will have to be at least partially drained (this time, the coolant can be saved for re-use) and flushed to clear the problem.

Every 36 000 miles or 3 years, whichever comes first



50.1 Check the shock absorbers for signs of fluid leakage

50 Shock absorber check

1 Check for any signs of fluid leakage around the shock absorber body, or from the rubber gaiter around the piston rod (see illustration). Should any fluid be noticed, the shock absorber is defective internally and should be renewed. **Note:** Shock absorbers should always be renewed in pairs on the same axle.

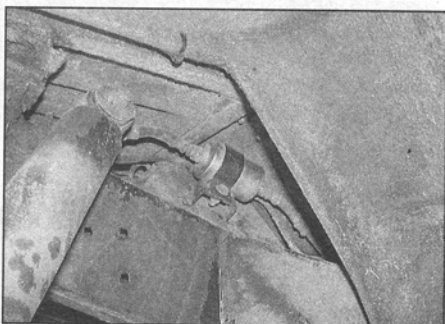
2 The efficiency of the shock absorber may be checked by bouncing the vehicle at each corner. Generally speaking, the body will return to its normal position and stop after being

depressed. If it rises and returns on a rebound, the shock absorber is probably suspect. Examine also the shock absorber upper and lower mountings for any signs of wear.

51 Braking system seal, vacuum servo filter and hose renewal

Land Rover recommend that all the braking system and rubber hoses are renewed, and the hydraulic system filled with fresh fluid. At the same time, the vacuum servo unit filter should also be renewed. Refer to the relevant Sections of Chapter 10 for renewal information.

Every 48 000 miles or 4 years, whichever comes first



53.3 Fuel filter location

52 Evaporative emission control system check

Check all the engine vacuum and fuel vapour hoses associated with the system for signs of cracking, leaks, and general deterioration. For more information, see Chapter 4D. This check is particularly relevant if any fuel smells have been noted, in which case all fuel pipes and connections should be closely inspected.

53 Fuel filter renewal



Warning: Ensure that this operation is carried out in a well-ventilated area.

1 Depressurise the fuel system as described in Chapter 4B.

2 Disconnect the battery negative terminal.

3 The fuel filter is accessed through the right-hand rear wheel arch (see illustration). Loosen the right-hand rear wheel nuts, then

Verion

jack up the rear of the vehicle and support it on stands (see *Jacking and vehicle support*). Remove the right-hand rear roadwheel.

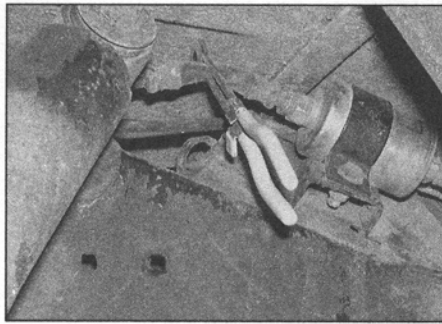
4 Using pipe clamps, clamp the inlet and outlet hoses at the fuel filter. If only one clamp is available, clamp the inlet hose (see illustration).

5 Slacken the fuel pipe unions and disconnect the inlet and outlet pipes (see illustration). Plug the pipe ends after removal to prevent dirt ingress.

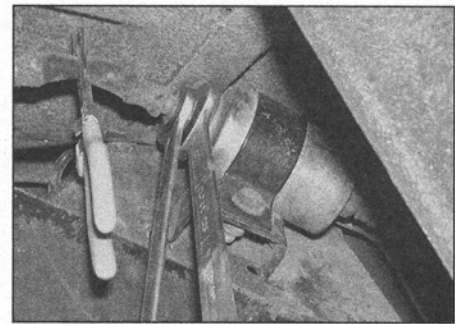
6 Unscrew the filter clamp bolt and remove the filter from the clamp. Note the fitted position of the direction-of-flow arrow on the filter body, and ensure that the new filter is fitted with the arrow pointing the same way (see illustration).

7 Refitting is the reversal of removal, noting the following points:

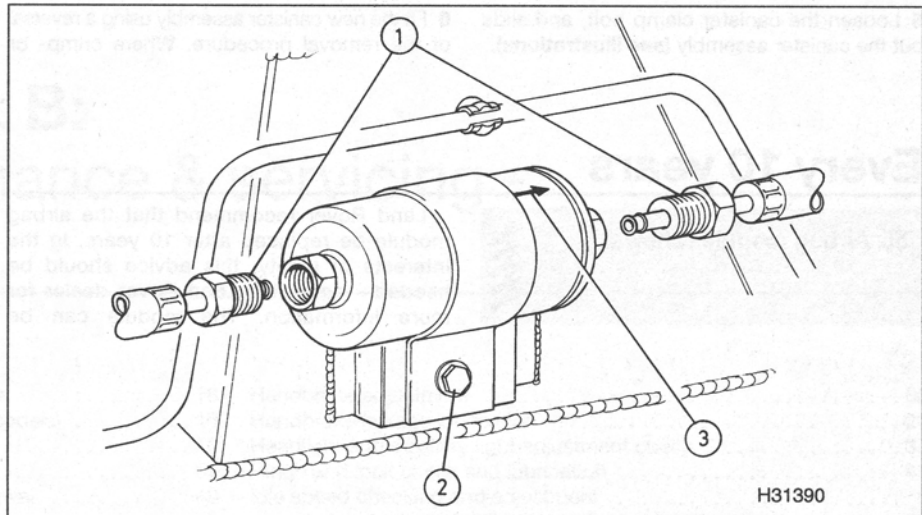
- a) Tighten the fuel pipe unions to the specified torque, then remove the hose clamps.
- b) Before lowering the vehicle, reconnect the battery and switch on the ignition without starting the engine. This will pressurise the fuel system (the fuel pump should briefly run). With the system pressurised, check carefully around the disturbed connections for signs of leakage.
- c) On completion, refit the rear wheel and lower the vehicle to the ground. Tighten the wheel nuts to the specified torque.
- d) If, after renewing the filter, any petrol smell is noted, trace and rectify the cause without delay.



53.4 Clamp the fuel inlet hose before disconnecting



53.5 Slacken the fuel unions as shown



53.6 Fuel filter removal details

1 Fuel unions

2 Filter clamp bolt

3 Fuel direction-of-flow arrow

Every 96 000 miles

54 Emission control component renewal



1 Land Rover recommend that the charcoal canister, exhaust gas oxygen sensors, and catalytic converters be renewed at this

mileage. For more information, refer to Chapter 4D - the sensors and converters need only be renewed if they are no longer effective, and this can only be established using emissions testing equipment.

Charcoal canister renewal

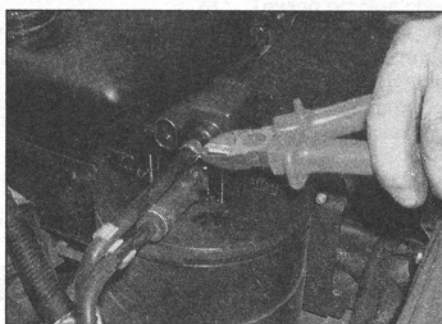
- 2 Disconnect the battery negative lead.
- 3 Disconnect the wiring multi-plug from the

purge valve on top of the canister (see illustration).

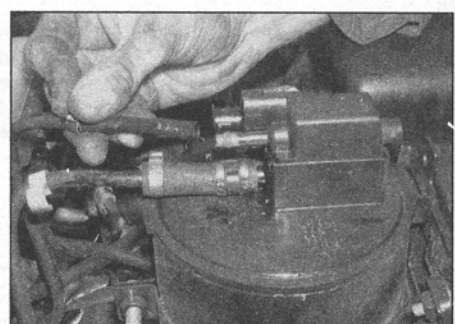
4 Noting their locations, loosen the hose clips and disconnect the purge valve (upper) and fuel tank (lower) hoses from the top of the canister. It may be necessary to cut the clips to remove them - make sure suitable replacement clips are available (see illustrations).



54.3 Disconnect the wiring plug from the purge valve

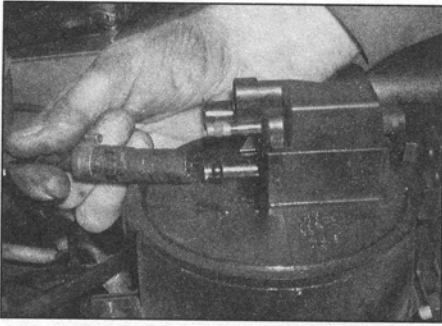


54.4a The crimped clip on the upper hose had to be cut ...

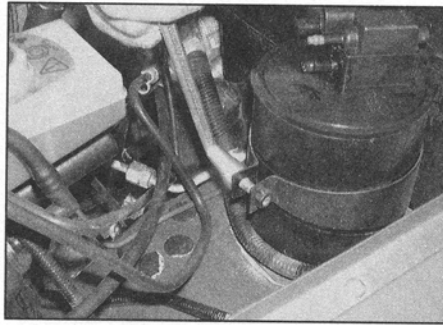


54.4b ... before the hose could be disconnected

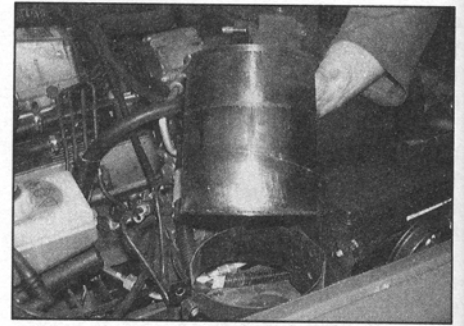
Torus



54.4c Disconnecting the fuel tank hose from the charcoal canister



54.5a Loosen the canister clamp bolt . . .



54.5b . . . then withdraw the canister from the engine compartment

5 Loosen the canister clamp bolt, and slide out the canister assembly (see illustrations).

6 Fit the new canister assembly using a reversal of the removal procedure. Where crimp- or

spring-type clips were used, replace these with screw-type fuel pipe clips when reassembling.

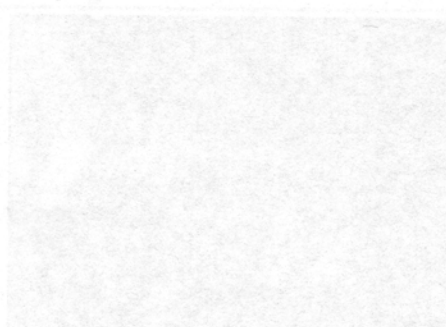
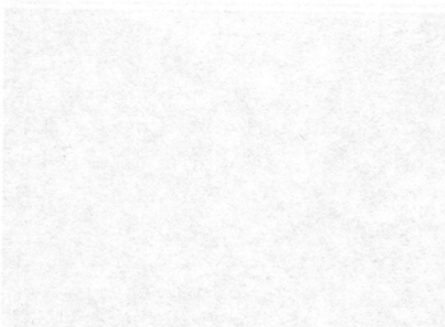
Every 10 years

55 Airbag module renewal



Land Rover recommend that the airbag module be replaced after 10 years. In the interests of safety, this advice should be heeded - consult a Land Rover dealer for more information. The module can be

removed and refitted as described in Chapter 13, but on completion, its operation should be checked by a Land Rover dealer.



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