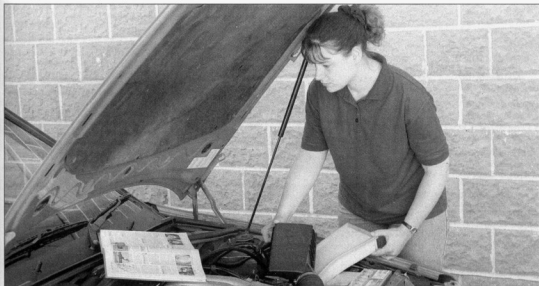


Chapter 1

Routine maintenance and servicing

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Degrees of difficulty

Easy, suitable for novice with little experience



Fairly easy, suitable for beginner with some experience



Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



1.2 Servicing specifications

Note: Many of the specifications below contain references to engine codes (eg, B18FT). The engine code is part of the engine number, which appears on a small plate on the front face of the engine block, next to the engine oil dipstick tube. A photo showing a typical engine number plate appears in Vehicle identification numbers at the end of this manual.

Lubricants and fluids See end of Weekly checks on page 0*16

Capacities

Engine oil (including oil filter)	Capacity	Dipstick MIN to MAX
All engines up to 1992	5.3 litres	1.7 litres
All engines, 1993 to 1994	5.0 litres	1.4 litres
1.6, 1.7 and 1.8 litre engines, 1994 onwards	4.8 litres	1.4 litres
2.0 litre engines, 1994 onwards	5.7 litres	2.2 litres

Cooling system

Carburettor engines	6.0 litres approx.
Fuel injection engines	7.0 litres approx.

Fuel tank

All models up to 1991	48 litres approx.
All models from 1991 onwards	60 litres approx.

Manual gearbox

All models	3.4 litres
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Automatic transmission

Total capacity	5.5 litres
Drain and refill (fluid change)	3.2 to 3.4 litres
Difference between MAX and MIN dipstick marks	0.3 litres

Power-assisted steering reservoir

All models	0.7 litres
------------	------------

Engine

Valve clearances:

Inlet:	
Checking	0.15 to 0.25 mm
Adjusting	0.20 mm
Exhaust:	
Checking (except B18FT)	0.35 to 0.45 mm
Checking (B18FT)	0.45 to 0.55 mm
Adjusting (except B18FT)	0.40 mm
Adjusting (B18FT)	0.50 mm
Oil filter type (all engines)	Champion F103

Cooling system

Antifreeze mixtures:	Antifreeze	Water
Protection down to -23°C	35%	65%
Protection down to -40°C	50%	50%

Fuel system

Idle speed (carburettor engines):

B18K, B18K(D)	800 to 900 rpm
B18KP, B18KP(D)	750 to 900 rpm

Idle mixture CO content (carburettor engines):

B18K, B18K(D)	0.5% to 2.5%
B18KP, B18KP(D)	1.0% to 2.5%

Air filter element:

Carburettor engines	Champion type not available
Fuel injection engines	Champion U634

Fuel filter:

Carburettor engines	Champion type not available
Fuel injection engines	Champion L205

Fuel octane requirement:

Models without a catalytic converter	98 RON leaded (4-star)*, 98 RON super unleaded, or 95 RON unleaded
Models with a catalytic converter	98 RON super unleaded or 95 RON unleaded only - do not use leaded 4-star

* Leaded petrol is being phased out in the UK market by January 2000 to be replaced by Lead Replacement Petrol (LRP). Cars which previously ran on leaded (4-star) petrol should run satisfactorily on LRP but, if in doubt, consult the vehicle manufacturer.

Ignition system

Firing order	1-3-4-2
Location of No 1 cylinder	Flywheel (transmission) end
Direction of crankshaft rotation	Clockwise
Direction of distributor rotor arm rotation	Anti-clockwise
Spark plugs:	
Type:	
1.6 and 1.8 litre engines	Champion RN9LCC
1.7 litre (1721 cc) engines:	
Engine codes B18E, ES, ED, FT and FTM	Champion RN7LCC
All other engine codes	Champion RN9LCC
2.0 litre engines	Champion RN7LCC
Electrode gap	0.8 mm

Note: Information on spark plug types and electrode gap is as recommended by Champion Spark Plug. Where alternative types are used, refer to their manufacturer's recommendations

Clutch

Clutch pedal height (early models):	
Non-ABS models	15.0 to 20.0 mm above the brake pedal
ABS models	25.0 to 30.0 mm above the brake pedal
Clutch pedal stroke (later models):	
Long release arm (ie with extra bracket bolted to the gearbox)	30.0 ± 1.0 mm
Short release arm	22.0 ± 1.0 mm

Braking system

Minimum front brake pad lining thickness	2.0 mm
Front brake disc minimum service thickness:	
Solid discs	10.35 mm
Ventilated discs	19.30 mm
Minimum rear brake pad lining thickness	2.0 mm
Rear brake disc minimum service thickness	8.0 mm
Minimum rear brake shoe lining thickness	1.0 mm
Rear brake drum maximum service inside diameter	204.7 mm
Handbrake adjustment	Wheels locked after 5 to 7 notches

Suspension and steering

Power steering pump drivebelt deflection	3.0 to 5.0 mm
Tyre pressures	See end of Weekly checks

Torque wrench settings

	Nm	lbf ft
Automatic transmission drain plug	15	11
Manual gearbox drain plug	15	11
Radiator drain plug	4	3
Roadwheel bolts	110	81
Spark plugs	25	18
Sump drain plug	25	18

1.4 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 maintenance intervals recommended by us 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, because it enhances the efficiency, performance and resale value of your vehicle. If the vehicle is driven in dusty areas, used to tow a trailer, or driven frequently at slow speeds (idling in traffic) or on short journeys,

more frequent maintenance intervals are recommended. When the vehicle is new, it should be serviced by a factory-authorised 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 for oil and coolant leaks (Section 4)
- ☐ Check the condition and tension of all auxiliary drivebelts (Section 5)
- ☐ Check the brake vacuum servo unit - non-ABS models (Section 6)
- ☐ Check the battery electrolyte level (Section 7)
- ☐ Check the operation of all lights, indicators, instruments and windscreen washer system(s) (Section 8)

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/adjust the front wheel alignment (Section 9)
- ☐ Check the antifreeze concentration (Section 10)
- ☐ Check exhaust manifold for leakage, and tighten nuts (Section 11)
- ☐ Check/adjust the idle speed and CO content - carburettor engines (Section 12)
- ☐ Check fuel lines for damage and leakage (Section 13)
- ☐ Check the exhaust system for condition, leakage and security (Section 14)
- ☐ Renew the spark plugs (Section 15)
- ☐ Check/adjust clutch pedal height and cable free play (Section 16)
- ☐ Check/top-up the manual gearbox oil level (Section 17)
- ☐ Check/top-up the automatic transmission fluid level (Section 18)
- ☐ Check the driveshafts and rubber gaiters for damage and leakage (Section 19)
- ☐ Check all brake lines for damage and leakage (Section 20)
- ☐ Check the front and rear brake pads/brake shoe linings for wear (Section 21)
- ☐ Adjust the handbrake (Section 22)
- ☐ Tighten all suspension nuts and bolts - at first annual service (Section 23)
- ☐ Check suspension and steering components for wear and security (Section 24)
- ☐ Visually examine the underbody, wheel arches and body panels for damage (Section 25)

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

- ☐ Check seat belts for wear and damage (Section 26)
- ☐ Lubricate all doors, bonnet and tailgate/bootlid (Section 27)
- ☐ Check and adjust the headlight beam alignment (Section 28)
- ☐ Engine management system fault code check (Section 29)
- ☐ Carry out a road test (Section 30)

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 engine cylinder compressions (Section 31)
- ☐ Clean the crankcase ventilation system hoses (Section 32)
- ☐ Renew the air filter (Section 33)
- ☐ Check air cleaner temperature control system - carburettor engines (Section 34)
- ☐ Renew the fuel filter (Section 35)
- ☐ Clean exhaust gas recirculation (EGR) system - where fitted (Section 36)
- ☐ Check automatic transmission selector and kickdown cable adjustment (Section 37)

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:

- ☐ Renew manual gearbox oil - 480 models up to 1988 only (Section 38)
- ☐ Renew automatic transmission fluid (Section 39)

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

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

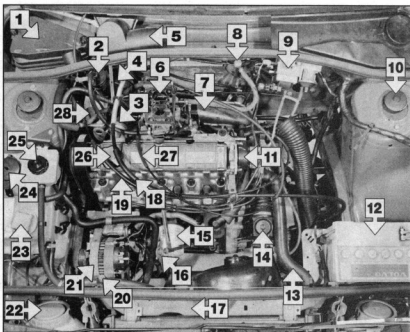
- ☐ Renew the timing belt (Section 40)
- ☐ Adjust valve clearances (Section 41)
- ☐ Renew all auxiliary drivebelts (Section 42)

Every 2 years, regardless of mileage

- ☐ Drain, flush and refill the cooling system, and renew the antifreeze (Section 43)
- ☐ Renew the brake hydraulic fluid (Section 44)

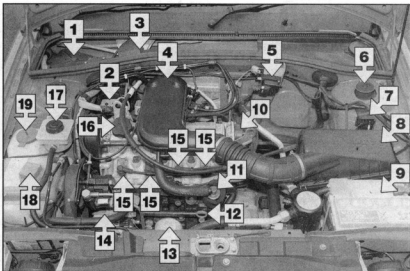
Underbonnet view of a 1.7 litre carburettor 440 model

- 1 Fusebox and relays
- 2 Fuel vapour separator
- 3 Fuel pump
- 4 Brake vacuum servo
- 5 Windscreen wiper motor
- 6 Carburettor (air cleaner removed for clarity)
- 7 Air duct for carburettor cooling
- 8 Carburettor vent valve
- 9 Ignition computer module
- 10 Front suspension strut upper mounting
- 11 Distributor cap and HT leads
- 12 Battery
- 13 Radiator top hose
- 14 Vacuum control motor for carburettor cooling system
- 15 Oil filter
- 16 Engine oil level dipstick
- 17 Radiator
- 18 Clutch cable
- 19 Accelerator cable
- 20 Cooling system vent/bleed screw
- 21 Alternator
- 22 Headlamp
- 23 Cooling system expansion tank
- 24 Windscreen washer fluid reservoir
- 25 Power steering fluid reservoir
- 26 Engine oil filler cap
- 27 Choke cable
- 28 Brake fluid reservoir

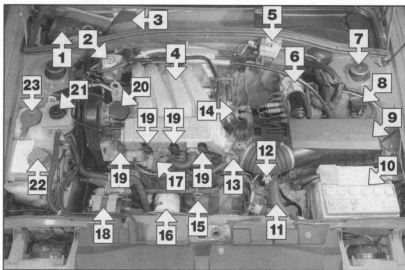


Underbonnet view of a 1.8 litre fuel injection 440 model

- 1 Relay box
- 2 Brake fluid reservoir
- 3 Windscreen wiper motor
- 4 Air inlet duct
- 5 Ignition coil
- 6 Front suspension strut upper mounting
- 7 Diagnostic socket
- 8 Air cleaner
- 9 Battery
- 10 Distributor cap and HT leads
- 11 Crankcase ventilation system oil separator
- 12 Engine oil dipstick
- 13 Oil filter
- 14 Alternator
- 15 Spark plugs
- 16 Engine oil filler cap
- 17 Power steering fluid reservoir
- 18 Cooling system expansion tank
- 19 Windscreen washer fluid reservoir

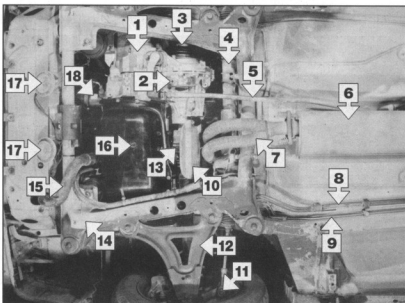


Underbonnet view of a 2.0 litre fuel injection 440 model



- 1 Relay box
- 2 Brake fluid reservoir
- 3 Windscreen wiper motor
- 4 Inlet manifold (upper section)
- 5 Ignition coil
- 6 ABS unit
- 7 Front suspension strut upper mounting
- 8 Diagnostic socket
- 9 Air cleaner
- 10 Battery
- 11 Radiator top hose
- 12 Inlet air temperature sensor
- 13 Throttle housing
- 14 Distributor cap and HT leads
- 15 Engine oil dipstick
- 16 Oil filter
- 17 Idle speed regulating valve
- 18 Alternator
- 19 Spark plugs
- 20 Engine oil filter cap
- 21 Power steering fluid reservoir
- 22 Cooling system expansion tank
- 23 Windscreen washer fluid reservoir

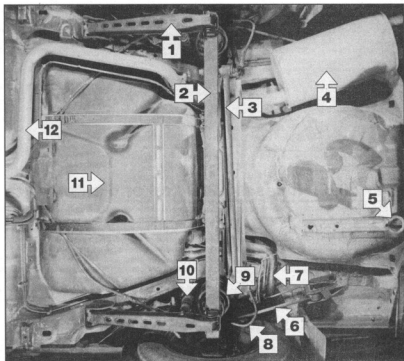
Front underbody view (1.7 litre 440 model shown, others similar)



- 1 Manual gearbox
- 2 Gearbox oil drain plug
- 3 Left-hand driveshaft
- 4 Steering gear
- 5 Gearchange linkage
- 6 Exhaust silencer
- 7 Exhaust downpipe
- 8 Fuel feed and return lines
- 9 Hydraulic brake lines
- 10 Heat shield
- 11 Tie-rod end
- 12 Front suspension lower arm
- 13 Starter motor
- 14 Subframe
- 15 Radiator bottom hose
- 16 Engine oil drain plug
- 17 Horns
- 18 Electric cooling fan

Rear underbody view (440 model shown, others similar)

- 1 Rear suspension trailing arm
- 2 Rear axle
- 3 Panhard rod
- 4 Exhaust tailpipe and silencer
- 5 Rear towing eye
- 6 Rear suspension radius arm
- 7 Fuel tank filler pipe and vent hoses
- 8 Rear brake flexible hydraulic hose
- 9 Rear coil spring
- 10 Rear shock absorber
- 11 Fuel tank
- 12 Exhaust intermediate pipe



1

Maintenance procedures

1 Introduction

This Chapter is designed to help the home mechanic maintain their 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.

Service intervals - models from 1991 onwards

From 1991 model year onwards, Volvo have changed the service intervals for the 400 series. The 6000 mile and the 12 000 mile services have been amalgamated into a single 10 000 mile/12-month main service. In view of this, high-mileage users may wish to amend their servicing intervals (on 1991-on cars **only**) from those given in this manual, but the advice of a Volvo dealer should be sought first. However, we recommend that most owners keep to the original schedule shown here. We encourage frequent maintenance, because it enhances the efficiency, performance and resale value of your vehicle. If the vehicle is driven in dusty areas, used to tow a trailer, or driven frequently at slow speeds (idling in traffic) or on short journeys, more shorter maintenance intervals are recommended. In particular, the engine will benefit greatly from more frequent oil and filter changes.

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 the 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 Chapter 2A) 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 (refer to Weekly checks).
- Check all the engine-related fluids (refer to Weekly checks).

- Check the condition and tension of the auxiliary drivebelt (Section 5).
 - Renew the spark plugs (Section 15).
 - Check the condition of the air filter, and renew if necessary (Section 33).
 - Renew the fuel filter (Section 35).
 - Check the condition of all hoses, and check for fluid leaks (Section 4).
- 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 (refer to Chapter 5A).
- Check the ignition system (refer to Chapter 5B).
- Check the fuel system (refer to Chapter 4A or 4B).

Every 6000 miles (10 000 km) or 6 months

3 Engine oil and filter renewal

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.

- Before starting this procedure, gather together all the necessary tools and materials (see illustration). Also make sure that you have plenty of clean rags and newspapers handy to mop up any spills.
- Ideally, the engine should be warm, as the oil 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 gloves when carrying out this work.
- 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. Whichever method is chosen, make sure that the car remains as level as possible, as the drain plug is located in the centre of the sump.

- If necessary, remove the access cover to the sump drain plug, then position a suitable container beneath the hole. Clean the drain plug and the area around it, then slacken it half a turn using a special drain plug key (see illustration). Remove the drain plug, and allow the oil to drain.



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 the stream of oil issuing from the sump runs into the pan, not up your sleeve.

- 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.
- After all the oil has drained, wipe off the drain plug with a clean rag, and renew the sealing washer. Clean the area around the drain plug

opening and refit the plug. Tighten the plug securely, preferably to the specified torque using a torque wrench - do not overtighten.

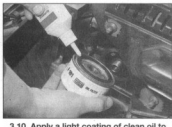
- Move the container into position under the oil filter, which is located on the front face of the cylinder block.
- Using an oil filter removal tool, slacken the filter initially, then unscrew it by hand the rest of the way. Empty the oil in the old filter into the container.
- Use a clean rag to remove 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.
- Apply a light coating of clean engine oil to the sealing ring on the new filter, then screw it 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.
- Remove the old oil and all tools from under the car, then (if applicable) lower the car to the ground.
- Remove the oil filler cap on the right-hand end of the valve cover, and fill the engine, using the correct grade and type of oil (see illustrations). Pour the oil in slowly, otherwise



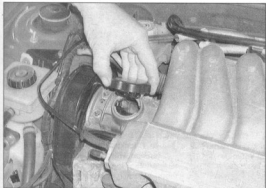
3.1 Tools necessary for the engine oil change and filter renewal



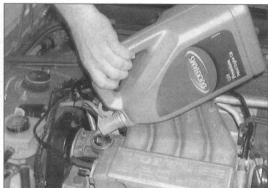
3.4 Using a special drain plug key to unscrew the drain plug from the sump



3.10 Apply a light coating of clean oil to the sealing ring before fitting the new oil filter



3.12a Remove the filler cap on the right-hand side of the valve cover ...



3.12b ... and add engine oil until the level reaches the dipstick MAX mark

it may overflow from the top of the valve cover. Check that the oil level is up to the maximum mark on the dipstick.

13 Start the engine and run it for a few minutes, while checking for leaks around the oil filter seal and the sump drain plug.

14 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 as necessary.

15 Dispose of the used engine oil safely with reference to *General repair procedures*.

4 Underbonnet hose and fluid leak check



Engine

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 valve cover, cylinder head, oil filter and sump joint faces.

2 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.

3 Should a leak be found, renew the offending gasket or oil seal by referring to the appropriate Chapters in this manual.

4 Check the security and condition of all the engine-related pipes and hoses.

5 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.

Cooling system

6 The engine should be cold for the cooling system checks, so either perform the following procedure before driving the vehicle, or after it has been shut off for at least three hours.

7 Remove the expansion tank filler cap (see above), and clean it thoroughly inside and out with a rag. Also clean the filler neck on the expansion tank. The presence of rust or corrosion in the filler neck indicates that the coolant should be changed. The coolant inside the expansion tank should be relatively clean and transparent. If it is rust-coloured, drain and flush the system, and refill with a fresh coolant mixture.

8 Carefully check the radiator hoses and heater hoses along their entire lengths. Renew any hose which is cracked, swollen or deteriorated; cracks will show up better if the hose is squeezed. Pay close attention to the hose clips which 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.

9 Inspect all the cooling system components (hoses, joint faces, etc.) for leaks (see Haynes Hint). Where any problems are found on system components, renew the component or gasket with reference to Chapter 3.

10 Clean the front of the radiator with a soft brush to remove all insects, leaves, etc. imbedded in the radiator fins. Be extremely careful not to damage the radiator fins, and take care not to cut your fingers on them.

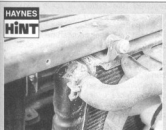
5 Auxiliary drivebelt check, adjustment, removal and refitting



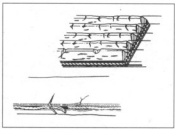
1 The water pump drivebelt arrangement varies according to the engine type, and according to whether power steering and/or air conditioning is fitted. In all cases, the water pump pulley is driven by the back (smooth side) of the drivebelt. On models fitted with both power steering and air conditioning, the alternator is driven by a small drivebelt from the air conditioning compressor pulley.

2 Since the drivebelt is located very close to the right-hand side of the engine compartment, it is possible to gain better access by raising the front of the car and removing the right-hand wheel, then removing the inner plastic cover which covers the lower part of the engine.

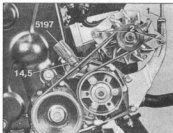
3 With the engine switched off, inspect the full length of the drivebelt for cracks and deterioration (see illustration). It will be



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



5.3 Check the multi-ribbed drivebelt for wear as shown



5.4a Checking the water pump drivebelt tension with the special Volvo tool (5197) on models without power steering or air conditioning

- 1 Adjustment nut
- 2 Alternator pivot bolt and lock-bolt

necessary to turn the engine in order to move the belt from the pulleys so that the belt can be inspected thoroughly. Twist the belt between the pulleys so that both sides can be viewed. Also check for fraying, and for glazing which gives the belt a shiny appearance. Check the pulleys for nicks, cracks, distortion and corrosion.

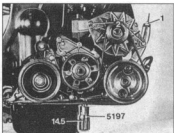
4 The tension of the drivebelt is checked by pushing on it midway between the pulleys on the longest run and checking the deflection. Volvo technicians use a special spring-tensioned tool which applies a specific force to the belt, and the tension of the belt is then adjusted to bring a mark in line on the tool. If at all possible this tool should be used; alternatively, press on the drivebelt with a finger or thumb, and check that the deflection is between 3.0 mm and 5.0 mm (see illustrations).

5 If adjustment is necessary on models without air conditioning, loosen the alternator pivot and tension lock-bolts, then turn the adjustment nut clockwise to tension the belt, or anti-clockwise to slacken the belt (see illustration). Tighten the pivot and lock-bolts after making the adjustment.

6 On models with air conditioning and power steering, loosen the power steering pivot and lock-bolts, then turn the adjustment nut clockwise to tension the belt, or anti-clockwise to slacken the belt. Tighten the pivot and lock-bolts after making the adjustment. To adjust



5.5 Adjusting the water pump drivebelt tension on models without air conditioning



5.4b Checking the water pump drivebelt tension with the special Volvo tool (5197) on models with power steering

- 1 Adjustment nut
- 2 Alternator pivot bolt and lock-bolt

the small alternator drivebelt on these models, proceed as described in the previous paragraph. It is preferable to adjust the small drivebelt before the main drivebelt.

7 Run the engine for about five minutes, then recheck the tension and adjust if necessary.

8 To renew the drivebelt, slacken the belt tension fully as described above, then slip the belt off the pulleys. Fit the new belt ensuring that it is routed correctly, and adjust the tension as previously described. Note that on models with air conditioning and power steering, the main drivebelt must be removed first in order to remove the small alternator drivebelt.

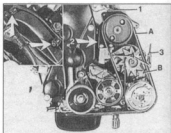
6 Vacuum servo unit check (non-ABS models)

1 To test the operation of the servo unit, depress the footbrake four or five times to exhaust the vacuum, then start the engine. As the engine starts, there should be a noticeable give in the brake pedal as vacuum builds up.

2 Allow the engine to run for at least two minutes, and then switch it off. If the brake pedal is depressed now, a hiss should be heard from the servo; after about four or five applications, no further hissing should be heard, and the pedal should feel considerably firmer.



7.3 Unscrew the cell caps, and check the electrolyte level



5.4c Checking the water pump drivebelt tension with the special Volvo tool (5197) on models with air conditioning and power steering

- 1 Power steering pump adjustment nut
- 2 Power steering pump pivot bolt and lock-bolt
- 3 Alternator adjustment nut
- A Water pump drivebelt
- B Alternator drivebelt

3 Check the condition of the vacuum hose to the brake servo, and ensure that its connection at the servo is secure.

7 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 overfill 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.

Note: Some models covered by this Manual may 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, no electrolyte level checking is required (the battery is often completely sealed, preventing any topping-up).

1 The battery is located in the front left-hand corner of the engine compartment.

2 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. One of the project vehicles seen in our workshop had a battery marked 'maintenance-free', which still had removable cell caps - in this case, check the electrolyte level as described, but consult a Volvo dealer if topping-up appears to be required.

3 Remove the cell caps or covers (see illustration), and either look down inside the



7.4 Topping-up the electrolyte level

battery to see the level web, or check the level using any markings provided on the battery casing. The electrolyte should cover the battery plates by approximately 15 mm.

4 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.

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

8 Ancillary systems check

Wiper blades

1 See Weekly checks.

Wiper arms

2 Check the wiper arms for worn hinges and weak springs, and renew as necessary.

3 If working on the windscreen wiper arm, prise out the cover for access to the retaining nut. If working on the tailgate wiper arm, lift up the hinged cover (see illustrations).

4 Make sure that the wiper is in its rest (or park) position; if necessary, switch the wiper(s) on and off in order to allow them to return to the park position. Note this position for correct refitting - stick a piece of masking tape to the glass, to indicate the wiper blade line.



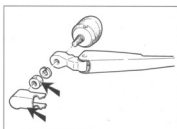
8.3a Removing the cover from the windscreen wiper arm



8.3b Lifting the hinged cover from the tailgate wiper arm



8.5a Removing the windscreen wiper arm from the splined spindle



8.5b Tailgate wiper arm components

5 Unscrew the retaining nut and pull the arm from the spindle splines (see illustrations). If necessary, use a screwdriver to prise off the arm, being careful not to damage the paintwork.

6 Fit the new arm using a reversal of the removal procedure.

Washer system

7 If topping-up the windscreen/headlight washer fluid reservoir, refer to Weekly checks.

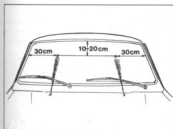
8 Check that the washer jets direct the fluid onto the upper part of the windscreen/tailgate/headlight (see illustration). If necessary, adjust the windscreen/tailgate washer jets using a 0.6 mm diameter piece of wire - not a pin or needle.

9 To adjust the headlight washer jets, make up a tool out of 2.5 mm sheet steel (see illustration). Never attempt to open the jet itself, otherwise an incorrect spray pattern will result. The headlight main beam must be switched on before the headlight washers are functional - on 480 models, the headlights must be switched on and off each time the washers are checked.

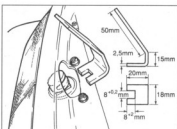
10 Adjust the headlight washer jets to a point between the top of the headlight and 5.0 mm below (see illustration).

Lights and instruments

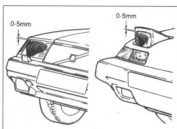
11 Check the operation of all lights, indicators and instruments; refer to Chapter 12 if any problems are discovered.



8.8 Windscreen washer jet setting diagram



8.9 Headlamp washer jet adjustment tool dimensions



8.10 Headlamp washer jet setting diagram

Every 12 000 miles (20 000 km) or 12 months

9 Front wheel alignment check



Checking the front wheel alignment requires specialist knowledge and equipment (see Chapter 10, Section 29). For most owners, this task should therefore be referred to a Volvo dealer, suitably-equipped garage, or tyre-fitting centre. Unless abnormal tyre wear has been noted, this check should not normally be strictly necessary on a regular basis.

10 Antifreeze concentration check



If the antifreeze concentration drops below the levels indicated in the Specifications at the start of this Chapter, the cooling system will be at risk from premature freezing in cold weather, and from internal corrosion. Special antifreeze testers are available from motor accessory shops - use their manufacturers instructions to check the antifreeze concentration.

However, provided that coolant renewal has been carried out at regular intervals, and any topping-up has only been done using antifreeze mixture (not plain water), there is no reason to assume the required concentration won't be present in the system. If the history of the car is not known, it may be advisable to renew the coolant as described in Section 43.

11 Exhaust manifold check



Check the exhaust manifold for any signs of leakage, and check the tightness of the

exhaust manifold nuts. On older engines, take care when tightening the nuts that the spanner or socket does not slip - if the nuts are old and rusty, it may be preferable to leave them alone, as long as there is no indication of a leak.

If there is evidence of leakage, the manifolds will have to be removed and the gasket renewed. It may be advisable to renew the manifold studs and nuts at the same time, if they are in less-than-perfect condition.

12 Idle speed and mixture check and adjustment - carburettor engines



Note: The idle speed and mixture settings on fuel injection engines should not require routine checking, and this task does not feature in the current Volvo schedules. In most cases, the idle speed cannot be adjusted, and the mixture screw should not be interfered with unless an accurate CO meter is available, particularly on models with a catalytic converter.

1 Before making any adjustments, note the following points:

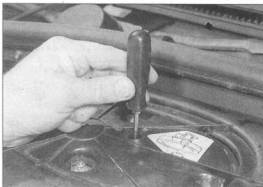
- The engine should be in good condition, with balanced compressions, correct valve clearances, plugs clean and correctly gapped, and correct ignition timing.
- The air filter element should be checked, to ensure that it is not excessively dirty.
- The accelerator and choke cables should be correctly adjusted, and all crankcase ventilation hoses should be clean.
- The engine must be at normal operating temperature (indicated by the engine cooling fan having cut in and out - but see e below).
- An exhaust gas analyser and tachometer will be required.

- Adjustments must not be made while the electric cooling fan is in operation.
- On models fitted with a catalytic converter, the CO content must be measured ahead of the catalytic converter by unscrewing the special plug and using an adaptor. Where an oxygen sensor is fitted, its wiring must be disconnected.
- On models not fitted with a catalytic converter, the CO meter probe must be inserted at least 45 cm into the end of the exhaust tailpipe.
- On automatic transmission models, select position N before adjustments are carried out.
- On models with air conditioning, make sure that the air conditioning is switched off, unless otherwise stated.

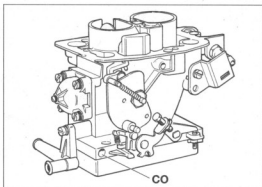
2 Connect an exhaust gas analyser and tachometer to the engine, in accordance with the equipment manufacturer's instructions.

3 Check that the idle speed is as given in the Specifications. If the speed is not within the specified range, turn the adjustment screw using a screwdriver inserted through the special hole in the top of the air cleaner (see illustration). Turning it clockwise increases the speed, and turning it anti-clockwise decreases the speed.

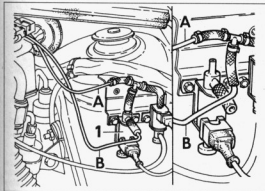
4 With the engine idling, check that the CO content is within the limits given in the Specifications. If adjustment is necessary, remove the tamperproof plug (where fitted) covering the mixture adjustment screw, using a scriber or small screwdriver (see illustration). Turn the adjustment screw by about a half-turn, then wait a few seconds for the gases to reach the exhaust gas analyser before noting the CO reading. Increase the engine speed to 2000 rpm for 30 seconds once every 3 minutes, to ensure that any excess fuel is cleared from the inlet manifold.



12.3 Adjusting the idle speed on the carburettor engine



12.4 CO adjustment screw location on the Solex CISAC carburettor



12.9 Idle speed compensation system on carburettor models fitted with air conditioning

1 Three-way valve
inset shows method of connecting hoses A and B together

5 If the mixture is adjusted, it will be necessary to check and if necessary adjust the idle speed again. Repeat the two adjustments until both are correct.

6 On completion, switch off the engine and fit a new tamperproof plug. Remove the exhaust gas analyser and tachometer.

Models with air conditioning

7 The idle speed and mixture are adjusted as described in paragraphs 2 to 6 above. On models with air conditioning, an idle speed compensation system is fitted, and this should be checked and if necessary adjusted after carrying out the previous work.

8 The headlight dipped beams should be switched on, and the air conditioning disengaged.

9 Refer to the accompanying illustration and disconnect hoses A and B from the three-way valve, then connect the hoses to each other - do not detach any other connections (see illustration).

10 Run the engine for approximately 10 seconds, then check that the engine speed is between 1375 rpm and 1425 rpm. If this is not the case, the idle speed should be adjusted to 1400 rpm as follows. Remove the rubber plug in the plenum chamber below the windscreen, then turn the adjusting screw on the vacuum diaphragm unit as required (see illustration).

11 After making the adjustment, refit the rubber plug and reconnect the hoses.

13 Fuel system checks

Warning: Certain procedures in this Section require the removal of fuel lines and connections which may result in some fuel spillage. Before carrying out any operation on the

fuel system, refer to the precautions given in Safety first! at the beginning of this manual, and follow them implicitly. Petrol is a highly dangerous and volatile liquid, and the precautions necessary when handling it cannot be overstressed.

1 The fuel system is most easily checked with the vehicle raised on a hoist, or suitably supported on axle stands, so that the components underneath are readily visible and accessible.

2 If the smell of petrol is noticed while driving or after the vehicle has been parked in the sun, the system should be thoroughly inspected immediately.

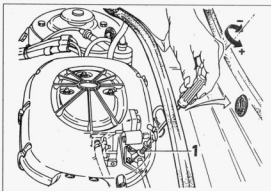
3 Remove the petrol tank filler cap, and check for damage, corrosion and an unbroken sealing imprint on the gasket. Renew the cap if necessary.

4 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.

5 Carefully check all rubber hoses and metal fuel lines leading away from the fuel 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 (see illustration). Renew damaged sections as necessary.

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

7 Check the operation of the throttle linkage, and lubricate the linkage components with a few drops of light oil.



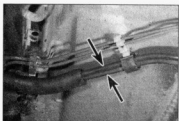
12.10 Adjusting the idle speed compensation system screw (1) on the vacuum diaphragm unit

14 Exhaust system check

1 With the engine cold, check the complete exhaust system from the engine to the end of the tailpipe. Ideally the inspection should be carried out with the vehicle on a hoist, to permit unrestricted access. If a hoist is not available, raise and support the vehicle on axle stands.

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 that the securing nuts and bolts are 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. Try to move the pipes and silencers: if the components can come into contact with the body or suspension parts, either secure the system with new mountings or if possible, separate the joints and twist the pipes as necessary to provide additional clearance.



13.5 Fuel feed and return lines (arrowed) on the underbody



15.2 Pull the HT lead from the first spark plug



15.4a Using a suitable socket and extension bar ...



15.4b ... unscrew and remove the spark plugs from the cylinder head

15 Ignition system checks

Spark plugs



Warning: Voltages produced by an electronic ignition system (such as that fitted to the Volvo 400 series) are considerably higher than those produced by conventional systems. Extreme care must be taken when working on the system with the ignition switched on. Persons with surgically-implanted cardiac pacemaker devices should keep well clear of the ignition circuits, components and test equipment.

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, and the suitable type is specified at the beginning of this Chapter. If 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 To remove the plugs, first open the bonnet and mark the HT leads for position. Wrap a piece of tape round each lead, and number them one to four, to correspond to the cylinder the lead serves (number one cylinder is at the left-hand, flywheel/transmission, end

of the engine). Pull the HT leads from the plugs by gripping the end fitting, not the lead, otherwise the lead connection may be fractured (see illustration).

3 It is advisable to remove the dirt from the spark plug recesses using a clean brush, vacuum cleaner or compressed air before removing the plugs, to prevent any dirt dropping into the cylinders.

4 Unscrew the plugs using a spark plug spanner, suitable box spanner, or a deep socket and extension bar (see illustrations). Keep the socket in alignment on the spark plugs - if it is forcibly moved to either side, the porcelain top of the spark plug may be broken off. As each plug is removed, examine it as follows.

5 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).

6 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.

7 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.

8 The spark plug gap is of considerable importance - if it is too large or too small, the size of the spark and its efficiency will be

seriously impaired. For the best results, the spark plug gap should be set in accordance with the Specifications at the beginning of this Chapter.

9 To set the plug gap, measure the gap with a feeler gauge, and then bend the outer plug electrode until the correct gap is achieved (see illustrations). The centre electrode should never be bent, as this may crack the insulation and cause plug failure, if nothing worse.

10 Special spark plug electrode gap adjusting tools are available from most motor accessory shops (see illustration).

11 Before fitting the spark plugs, check that the threaded connector sleeves are tight, and that the plug exterior surfaces and threads are clean. To make removal of the plugs easier next time, apply a smear of copper-based brake grease to the plug threads.

12 Screw in the spark plugs by hand where possible, then tighten them to the specified torque. Take extra care to enter the plug threads correctly, as the cylinder head is of aluminium alloy (see Tool Tip). Refit the remaining spark plugs in the same manner.

13 Reconnect the HT leads in their correct order.

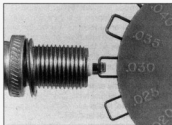
HT leads, distributor cap and rotor arm

14 The spark plug HT leads should be checked whenever new spark plugs are installed in the engine.

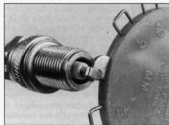
15 Ensure that the leads are numbered before removing them, to avoid confusion when refitting (refer to paragraph 2 above).



15.9a Measuring the spark plug electrode gap with a feeler gauge



15.9b Measuring the spark plug electrode gap with a wire gauge



15.10 Adjusting the spark plug electrode gap with the adjuster on the wire gauge

**TOOL
TIP**

To prevent cross-threading, fit a short length of rubber hose over the end of each spark plug before inserting it. 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 aluminium cylinder head. Remove the rubber hose and tighten the plug to the specified torque using the spark plug socket and a torque wrench

Pull the HT leads from the plugs by gripping the end fitting, not the lead, otherwise the lead connection may be fractured.

16 Check inside the end fitting for signs of corrosion, which will look like a white crusty powder. 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.

17 Using a clean rag, wipe the entire length of the lead to remove any built-up dirt and grease. 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.

18 Disconnect the other end of the lead from the distributor cap. Again, pull only on the end fitting. Unless you mark the distributor cap for lead position, do not remove all the leads from the cap at once. Check for corrosion and a tight fit in the same manner as the spark plug end. If an ohmmeter is available, check the resistance of the HT lead by connecting the meter between the spark plug end of the lead and the segment inside the distributor cap (see illustration). Refit the lead securely on completion.

19 Check the remaining HT leads one at a time, in the same way.

20 Refer to Chapter 5B and remove the distributor cap. Wipe it clean and carefully inspect it inside and out for signs of cracks, carbon tracks (tracking) and worn, burned or loose contacts. Similarly inspect the rotor arm. Renew these components if any defects are found. It is common practice to renew the cap and rotor arm whenever new HT leads are fitted.

**HAYNES
HINT**

When fitting a new distributor cap, remove the HT leads from the old cap one at a time, 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.

21 Even with the ignition system in first class condition, some engines may still occasionally experience poor starting, attributable to damp ignition components. The application at regular intervals of a water-dispersant spray can be an excellent preventative measure.

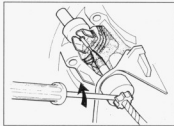
22 Particularly if running problems have been experienced, check carefully all earth connections around the engine compartment (see illustration). Even if they appear to be sound, it is worthwhile dismantling the connection, cleaning it thoroughly, and applying a coat of water-dispersant aerosol, or a suitable grease. A Volvo dealer may be able to recommend a product which will ensure a continued good earth connection.

16 Clutch pedal adjustment**Early models**

1 As the linings on the clutch friction disc wear, the clutch pedal height will rise, so it is necessary to check the adjustment at the specified intervals.

2 If adjustment is necessary, open the bonnet and locate the clutch cable mounting on the gearbox.

3 Insert a screwdriver between the adjustment nut on the outer cable and the plastic casing (see illustration). Turn the screwdriver as required so that the adjustment nut turns, and continue to do this until the correct pedal height is achieved. Turning the screwdriver anti-clockwise will raise the pedal, and turning it clockwise will lower the pedal.



16.3 Clutch pedal height adjustment - early models

Turning nut anti-clockwise will raise the clutch pedal



15.18 Checking the resistance of the spark plug HT leads using a digital ohmmeter



15.22 Typical engine compartment earth connection (arrowed) - also check those around the battery, etc

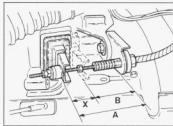
4 After each adjustment, operate the clutch pedal several times and recheck the setting.

Later models

5 On later models, the clutch cable is adjusted with a nut on the end of the inner cable. Some models are fitted with a short release arm, and some with a longer arm. The models with the longer arm can be recognised by an additional mounting bracket bolted to the gearbox housing to locate the cable in line with the release arm.

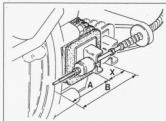
Models with the longer release arm

6 Measure the distance A between the release fork and the special bracket, without depressing the clutch pedal (see illustration).



16.6 Clutch pedal stroke adjustment dimensions on later models with longer type release fork

$A - B = 30.0 \pm 1.0 \text{ mm (X)}$



16.11 Clutch pedal stroke adjustment dimensions on later models with the shorter type release fork

$B - A = 22.0 \pm 1.0 \text{ mm (X)}$

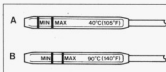
- 7 Have an assistant depress the clutch pedal fully, and measure between the same points on the release arm and bracket. If necessary, a length of wood can be used against the front seat to hold the clutch pedal fully depressed.
- 8 The difference between the two dimensions is the clutch pedal stroke, and this should be as specified.
- 9 If the stroke is incorrect, loosen the locknut and turn the adjustment nut as required until the difference is correct. When correct, tighten the locknut.

Models with the shorter release arm

- 10 First remove the pedal stop screw (if fitted) below the pedal on the bracket inside the car. Also remove the floor mat under the pedal.



18.5a Automatic transmission fluid level dipstick location



18.5b Markings on each side of the automatic transmission fluid level dipstick

- A Markings for checking when cold
B Markings for checking when hot

- 11 Measure the distance A between the release fork and the engine-to-gearbox joint surface, without depressing the clutch pedal (see illustration).

- 12 Now have an assistant fully depress the clutch pedal, measure between the same points and record dimension B. If necessary, a length of wood can be used against the front seat to hold the clutch pedal fully depressed.

- 13 The difference between the two dimensions (A - B) represents the clutch pedal stroke, and should be as specified.

- 14 If the stroke is incorrect, loosen the locknut and turn the adjustment nut as required. Tighten the locknut on completion.

17 Manual gearbox oil level check

- 1 Position the car over an inspection pit, on car ramps, or jack it up, but make sure that it is level.
- 2 Remove the engine splash guard.
- 3 Using a suitable square key, unscrew the filler/level plug from the front-facing side of the gearbox (see illustration).
- 4 Check that the level of the oil is up to the bottom edge of the plug hole. If necessary, use a screwdriver or length of wire to confirm this, but don't drop anything into the hole!
- 5 Where necessary, top-up the level using the correct grade of oil. If too much oil is added, and oil begins to come out, wait for the level to stabilise before refitting the filler plug.
- 6 Check and if necessary renew the sealing washer, then refit and tighten the filler plug.
- 7 If the gearbox requires frequent topping-up, check it for leakage, especially around the driveshaft oil seal/rubber boot, and repair as necessary.
- 8 Refit the engine splash guard.
- 9 Lower the car to the ground.

18 Automatic transmission fluid level check

- 1 Ideally, this check should be carried out with the engine and transmission at normal operating temperature, such as immediately after a journey of at least 5 miles. If necessary, the check can also be performed with the engine cold, but the result will not be as accurate an indication.
- 2 Position the car on level ground, then firmly apply the handbrake and select P with the selector lever. Start the engine, and allow it to idle.
- 3 Move the selector lever between all the positions, stopping in each position for 2 to 3 seconds.
- 4 Select position P, and allow the engine to idle for further 2 minutes.
- 5 With the engine still idling, withdraw the dipstick from the front of the transmission



17.3 Removing the manual gearbox filler/level plug

housing, and wipe it on a clean cloth. Note that there are level marks on both sides of the dipstick - the marks on one side are for checking when the transmission is cold, and the higher marks on the other side are for the (more accurate) hot check (see illustrations).

- 6 Insert the dipstick again, making sure that the applicable side (according to the transmission temperature) is facing towards the transmission. Wait at least four seconds, then withdraw the dipstick once more and read off the level. Ideally, the level should be up to the MAX mark.

- 7 If the level is too low, check the transmission for leakage. Also note that a low reading may result if the ambient temperature is below 5°C, and in this case, the level should be checked again when the temperature is higher.

- 8 If the level is too high, check for water in the fluid, which will produce a milky colour. In this case, the fluid should be drained and the fluid cooler renewed, then the transmission filled with new fluid. Note also that heavy loading or driving at excessive speeds may overheat the fluid, resulting in a reading which is too high. Wait until the transmission has cooled down before checking the level again.

- 9 If topping-up is necessary, slowly add a quantity of the specified fluid (refer to the end of Weekly checks) to the transmission through the dipstick tube, with the engine still running. Use a funnel with a fine-mesh screen, to avoid spillage and to ensure that any foreign matter is trapped (see illustration). The difference between the MIN and MAX marks is 0.3 litres. Do not overfill the transmission, otherwise there is a risk of overheating. After adding



18.9 Topping-up the automatic transmission fluid level

fluid, allow the engine to idle for several minutes before rechecking the level.

10 If the level is too high, drain a quantity of fluid from the transmission by unscrewing the drain plug.

Warning: Take precautions to prevent scalding, as the fluid may be very hot.

11 If the fluid is discoloured or has a burnt smell, the advice of a Volvo dealer or an automatic transmission specialist should be sought.

12 Re-insert the dipstick, and switch off the engine.

19 Driveshaft rubber boot and CV joint check

1 With the vehicle raised and securely supported on axle stands, turn the steering onto full-lock then slowly rotate the roadwheel. Inspect the condition of the outer constant velocity (CV) joint rubber boots, squeezing the boots to open out the folds. Check for signs of cracking, splits or deterioration of the rubber, which may allow the grease to escape and lead to water and grit entry into the joint. Also check the security and condition of the retaining clips. Repeat these checks on the inner CV joints. If any damage or deterioration is found, the boots should be renewed as described in Chapter 8.

2 At the same time, check the general condition of the CV joints themselves by first holding the driveshaft and attempting to rotate the wheel. Repeat this check by holding the inner joint and attempting to rotate the driveshaft. Any appreciable movement indicates wear in the joints, wear in the driveshaft splines, or a loose driveshaft retaining nut.

20 Brake pipes and hoses check

1 Either position the car over an inspection pit, or alternatively jack it up and support on axle stands.

2 Check all brake hoses and hydraulic pipes/lines for leakage and damage. Check that the brake hoses are positioned well clear of suspension and underbody components, which may chafe them when the car is in motion.

3 Examine the brake hoses closely for cracking and deterioration.

21 Brake pads and shoes check

Front pads and discs

1 Loosen the front wheel bolts. Apply the handbrake, then jack up the front of the car and support on axle stands. Remove the front wheels.

2 Looking through the aperture on the front of the caliper, check that each front brake pad has at least a 2.0 mm thickness of friction material or lining left (do not confuse the lining with the pad backing plate).

3 If any one pad thickness is less than the minimum amount, renew all the front pads with reference to Chapter 9.

4 Check the front brake discs for excessive wear and scoring. Slight scoring is permissible, but if it is excessive, both front discs should be renewed.

5 Using a micrometer if possible, check that the disc thickness is not less than the minimum amount given in the Specifications. It is normal to find a lip of rust around the outer edge of the disc, which can build up sufficiently to disguise the true thickness of the disc. Remove the lip with a file if necessary, but take care not to damage the disc friction surface.

Rear pads and discs

6 Loosen the rear wheel bolts. Check the front wheels, then jack up the rear of the car and support on axle stands. Remove the rear wheels.

7 Looking through the aperture on the rear of the caliper, check that each rear brake pad has at least a 2.0 mm thickness of friction material or lining left (do not confuse the lining with the pad backing plate).

8 If any one pad thickness is less than the minimum amount, renew all the rear pads with reference to Chapter 9.

9 Check the rear brake discs as described in paragraphs 4 and 5.

Rear shoes and drums

10 Loosen the rear wheel bolts. Check the front wheels, then jack up the rear of the car and support it on axle stands. Remove the rear wheels.

11 Remove both rear brake drums, with reference to Chapter 9.

12 Clean away the accumulated dust from the shoes and backplates.

Warning: The dust may contain asbestos, which is a health hazard. Do not inhale the dust; clean it away using brake cleaner or methylated spirit only.

13 Check that each brake shoe lining has at least a 1.0 mm thickness of friction material or lining left (do not confuse the lining with the shoe backing plate).

14 If the lining on any one shoe is less than the minimum amount, renew all the rear brake shoes with reference to Chapter 9.

15 Check the wheel cylinders for signs of leakage, and repair as necessary.

16 Clean the brake drums, and examine them for excessive wear and scoring. Check that the inside diameter of the drum does not exceed the maximum amount given in the Specifications. Slight scoring of the drums is permissible, but if it is excessive, both rear brake drums should be renewed.

22 Handbrake check and adjustment

1 Check the front wheels, then jack up the rear of the car and support on axle stands.

2 Apply the handbrake lever by 5 to 7 notches, and check that both rear wheels are locked. To check this, try to turn each rear wheel by hand.

3 If adjustment is required, unbolt and remove the exhaust system heat shield from the underbody, for access to the handbrake compensator and adjuster (see illustration).

4 With the handbrake applied by 6 notches, first back off the adjuster nut until the rear wheels can be turned, then tighten the adjuster nut until both rear wheels are locked.

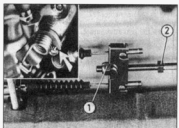
5 Fully release the handbrake, and check that the rear wheels can be turned freely. If not, check for seized handbrake cables and/or faulty rear brake shoe/disc pad operation.

6 On models with rear disc brakes, check that, with the handbrake fully released, the levers on the rear calipers are just contacting the stops (refer to illustration 22.3). The help of an assistant will be needed to do this - have the assistant apply and release the handbrake, and tell you when it is fully off.

7 Lower the car to the ground on completion.

23 Suspension fastener tightness check

This task is included in the Volvo schedule, and need only be carried out at the first annual service. With reference to the torque wrench settings in Chapter 10, the tightness of all front and rear suspension nuts and bolts should be checked. It may be of value to carry out this check even after the first service, especially at higher mileages, or if the car's history is not known.



22.3 Handbrake adjustment

1 Locknut

2 Adjuster bolt

Inset shows caliper stop and lever on models with rear disc brakes



24.2 Checking the condition of the steering rack rubber bellows



24.4 Checking for wear in the front suspension and hub bearings

24 Suspension and steering check

Front

- 1 Raise the front of the vehicle, and securely support it on axle stands.
- 2 Visually inspect the balljoint dust covers and the steering rack rubber bellows for splits, chafing or deterioration (see illustration). Any wear of these components will cause loss of lubricant, and will permit dirt and water entry, resulting in rapid deterioration of the balljoints or steering gear.
- 3 On vehicles with power steering, check the 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 gear rubber bellows, which would indicate failed fluid seals within the steering gear. To pressurise the system, simply turn the steering towards full-lock, but do not hold it on full-lock for more than a few seconds, as this strains the pump.
- 4 Grasp the roadwheel at the 12 o'clock and 6 o'clock positions, and try to rock it (see illustration). Very slight free play 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 free play 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 balljoints. If the outer ball-joint is worn, the visual movement will be obvious - wear in the steering track rod ends can be checked by attempting to compress the balljoints as shown (see illustration). If the inner joint is suspect, it can be felt by placing a hand over the rack-and-pinion rubber bellows and gripping the track-rod. If the wheel is now rocked, movement will be felt at the inner joint if wear has taken place. The maximum play allowed is 0.5 mm in the steering rack, and 0.5 mm in each of the track-rod balljoints.

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 (see illustration). Check the anti-roll bar mountings in the same way. 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.

7 Check all of the front suspension mounting bolts for security and tightness.

8 With the car standing on its wheels, have an

assistant turn the steering wheel back and forth about an eighth of a turn each way. 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, and also check the rack-and-pinion steering gear itself.

Rear

9 Check the front wheels, then raise the rear of the vehicle and securely support it on axle stands.

10 Using a large screwdriver or flat bar, check for wear in the rear suspension trailing arm and radius arm bushes. There will be some movement as the mountings are made of rubber, but excessive wear should be obvious.

11 Similarly check the anti-roll bar and link mounting bushes, and also the Panhard rod mounting bushes.

12 Check the rear axle beam for signs of damage.

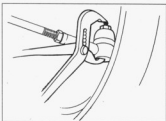
13 Check all of the rear suspension mounting bolts for security and tightness.

Strut/shock absorber check

14 Check for any signs of fluid leakage around the suspension strut/shock absorber body, or from the seal around the piston rod.

Note: Suspension struts/shock absorbers should always be renewed in pairs on the same axle.

15 The efficiency of the suspension strut/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 suspension strut/shock absorber is probably suspect. Also examine the suspension strut/shock absorber upper and lower mountings for any signs of wear.



24.5 Using adjustable grips to check the steering track rod end balljoints for wear



24.6 Using a lever to check for wear in the anti-roll bar mountings

25 Bodywork check

Body paintwork and underseal

1 Check all of the body paintwork for damage from stones and scratching. Treat bare metal with rust inhibitor, and touch-up chipped paintwork.

2 With the car raised and supported on axle stands, check for damage to the underbody, and renew any underseal as necessary.

Rubber door seal protection

3 Before Winter, dust all door and tailgate/boot lid rubber weatherstrips with talcum powder (or silicone spray), to keep them in good condition and to prevent them sticking to the body.

26 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 The seat belts are designed to lock up during a sudden stop or impact, yet allow free movement during normal driving. Fasten and unfasten the belt, ensuring that the locking mechanism holds securely and releases properly when intended. Check also that the retracting mechanism operates correctly when the belt is released.

27 Hinge and lock lubrication

1 Lightly lubricate all door, boot lid/tailgate and bonnet hinges with a little oil (see illustration).

2 Lubricate all catches with a little grease.

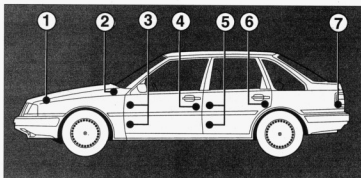
3 Apply a little petroleum jelly to the door and boot lid strikers, and to the bonnet safety catch.

28 Headlight beam alignment check

Have the headlight beam alignment accurately adjusted by a Volvo dealer or suitably-equipped garage. It is not possible to accurately adjust the alignment without precision equipment, and as this is tested during the MOT test, accurate setting is vital.

**29 Engine management system fault code check -
Fenix fuel injection models**

1 This check is part of the manufacturer's maintenance schedule, and involves 'interrogating' the engine management control unit using special dedicated test equipment. Such testing will allow the test equipment to read any fault codes stored in the electronic control unit memory.

**27.1 Body lubricating points**

- 1 Engine bonnet catch
- 2 Bonnet hinges
- 3 Front door hinges

- 4 Front door locks
- 5 Rear door hinges
- 6 Rear door locks

- 7 Tailgate/boot lid hinges, locks and striker

2 Unless a fault is suspected, this test is not essential, although it should be noted that it is recommended by the manufacturers.

3 It is possible for quite serious faults to occur in the engine management system without the owner being aware of it. Certain engine management system faults will cause the system to enter an emergency back-up mode, which is often so sophisticated that engine performance is not apparently much affected. If a problem has caused the system to enter its back-up mode, this will usually be most apparent when starting and running from cold.

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, transmission and driveshafts.

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 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.

10 Check that all gears can be engaged smoothly without noise, and that the gear lever action is not abnormally vague or notchy.

30 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.

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.

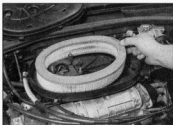
12 Check that there is no vibration through the steering when braking.

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

14 On models without ABS, test the operation of the brake servo unit as described in Section 6.



33.1 Release the over-centre wire clips securing the air cleaner top cover



33.4a Removing the air cleaner element on a carburettor engine ...



33.4b ... and on a fuel injection engine

Every 24 000 miles (40 000 km) or 2 years

31 Compression test

Refer to Chapter 2A and carry out a check of all cylinder compressions. This is part of the Volvo schedule, and is not absolutely essential if the engine is running well, but can give valuable diagnostic clues if the engine has been running poorly.

32 Crankcase ventilation hoses - cleaning

- 1 Disconnect the crankcase ventilation system hoses, and clean them out thoroughly; refer to Chapter 4C if necessary. Where applicable, clean any calibrated orifices.
- 2 Reconnect the hoses after cleaning them.

33 Air cleaner filter element renewal

- 1 Release the spring clips securing the air cleaner cover to the main body (see illustration).
- 2 On carburettor models, unscrew the central screw and if necessary unscrew the nuts securing the main body to the carburettor.
- 3 Separate the cover from the main body, and move it to one side.
- 4 Remove the air cleaner element from inside the main body, noting which way round it is fitted (see illustrations).
- 5 Wipe clean the inside of the main body and cover.
- 6 Locate a new filter element in the main body. On fuel injection models, make sure that the seal is upmost.
- 7 Refit the cover, and secure with the clips and screws as applicable.

34 Air cleaner temperature control system check - carburettor engines

- 1 Disconnect the inlet air hose and exhaust manifold warm air hose from the air cleaner temperature control unit.
- 2 Pull the temperature control unit from the air cleaner body.
- 3 An accurate thermometer, and a hot air blower such as a hairdryer, will be required for the following check. Heat the thermostat capsule, and check that the valve flap closes at a temperature above 35°C. Now cool the thermostat, and check that the valve flap opens at a temperature below 20°C.
- 4 To renew the thermostat, press back the tabs at the sides and front, and separate the two halves of the housing. Press the thermostat out of the housing. Refitting is a reversal of the removal procedure, but check its operation as described previously.

35 Fuel filter renewal



Warning: Procedures in this Section require the removal of fuel lines and connections which may result in some fuel spillage. Before carrying out any operation on the fuel system, refer to the precautions given in Safety first! at the beginning of this manual, and follow them implicitly. Petrol is a highly dangerous and volatile liquid, and the precautions necessary when handling it cannot be overstressed.

- 1 Wait until the engine is completely cold before starting this procedure. Anticipate some fuel spillage, and have some clean rag to hand to mop up any spills quickly.

Carburettor engines

- 2 A gauze filter is fitted in the fuel delivery union on the side of the carburettor. To remove it, unscrew the plug and pull out the filter.
- 3 Clean the filter in fuel, then insert it in the

union. Check the washer, and renew it if necessary before refitting and tightening the plug.

Fuel injection engines

- 4 Depressure the fuel system as described in Chapter 4B. This is essential, both to reduce the amount of fuel lost in changing the filter, and to ensure that it does not spray out uncontrollably.
- 5 The fuel filter is located on the right-hand side of the fuel tank, beneath the rear underbody. First chock the front wheels, then jack up the rear of the car and support on axle stands.
- 6 Before removing the filter, note the orientation of the direction-of-flow arrow on the filter body. Loosen the clips, then disconnect the hoses and remove the fuel filter.
- 7 Check the condition of the clips and hoses, and if necessary renew them. Check particularly for signs of cracking on the hose ends - remember, the system operates at high pressure, so renew any hose which is at all suspect.
- 8 Fit the new filter using a reversal of the removal procedure, making sure that the fuel flow direction arrow on the filter points away from the fuel tank. Tighten the clips securely.

36 Exhaust gas recirculation (EGR) system cleaning

- 1 Disconnect the EGR pipes and valve, and clean them thoroughly. Tap the components to remove internal carbon deposits.
- 2 After reconnecting the components, check that the valve operates correctly with reference to Chapter 4C. The valve should only operate when the engine is at its normal operating temperature, and at engine speeds above idle.

37 Automatic transmission selector and kickdown cables - adjustment

Refer to Chapter 7B.

Every 36 000 miles (60 000 km) or 3 years

38 Manual gearbox oil renewal

- 1 Gearbox oil renewal is best carried out shortly after a run of five miles or more, when the gearbox oil is hot.
- 2 Position the car over an inspection pit, on car ramps, or jack it up, but make sure that it is level.
- 3 Remove the engine splash guard.
- 4 Position a suitable container beneath the drain plug on the bottom of the gearbox.
- 5 Using a suitable square key, unscrew both the filler/level plug and the drain plug, and allow the oil to drain for several minutes.
- 6 Check and if necessary renew the plug sealing washers, then refit and tighten the drain plug.
- 7 Fill the gearbox with the correct quantity and grade of oil through the filler/level plug hole, and check that the level is up to the bottom edge of the hole (see Section 17).

- 8 Refit and tighten the filler/level plug.
- 9 Refit the engine splash guard.
- 10 Lower the car to the ground.

39 Automatic transmission fluid renewal

- 1 To avoid any chance of scalding, renew the fluid when the transmission is cold or only warm. Position the car over an inspection pit, on car ramps, or jack it up and support on axle stands.
- 2 Place a suitable container beneath the transmission drain plugs located on the right-hand side of the oil pan and differential casing (see illustration).
- 3 Unscrew and remove the plugs, and allow the fluid to drain for several minutes. Check and if necessary renew the sealing washers on the plugs. On completion, refit and tighten the plugs.
- 4 Measure out the specified quantity of fluid



39.2 Automatic transmission fluid drain plugs

necessary to refill the transmission, then pour it slowly through the dipstick tube using a funnel with a fine-mesh screen, to avoid spillage and to ensure that any foreign matter is trapped.

- 5 With the car level, check and if necessary top-up the fluid level with reference to Section 18.

Every 48 000 miles (80 000 km) or 4 years

40 Timing belt renewal

The timing belt must be renewed at the specified interval, following the procedure described in Chapter 2A. Failure to do this may result in the belt breaking in service, with consequent serious damage to the engine. If the history of the car is not known, timing belt renewal must be regarded as a high priority.

41 Valve clearance adjustment

- 1 On carburettor models, remove the air cleaner assembly with reference to Chapter 4A.
- 2 On fuel injection models, remove the upper section of the inlet manifold with reference to Chapter 4B.
- 3 Unscrew the nuts and remove the valve cover from the top of the cylinder head (see illustration). Remove the gasket.
- 4 Remove the spark plugs with reference to Section 15, in order to make turning the engine easier.
- 5 Draw the valve positions on a piece of paper, numbering them 1 to 8 from the flywheel end of the engine. Identify them as inlet or exhaust (ie 1E, 2I, 3E, 4I, 5I, 6E, 7I, 8E).
- 6 Using a socket or spanner on the crankshaft pulley bolt, turn the engine until the valves of No 1 cylinder (flywheel end) are rocking; the

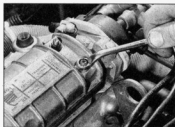
exhaust valve will be closing, and the inlet valve will be opening. The piston of No 4 cylinder will be at the top of its compression stroke, both valves will be fully closed, and the valve clearances for both valves of No 4 cylinder may be checked at the same time.

- 7 Insert a feeler blade of the correct thickness between the cam lobe and the shim on the top of the tappet bucket, and check that it is a firm sliding fit (see illustration). If it is not, use other feeler blades to ascertain the clearance present, and record this in order to calculate the new shim thickness required. Note that the inlet and exhaust valve clearances are different - refer to the Specifications.
- 8 With No 4 cylinder valve clearances checked, turn the engine through half a turn so that No 3 valves are rocking, then check the valve clearances of No 2 cylinder in the same way. Similarly check the remaining valve

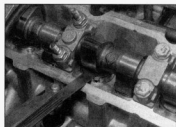
clearances in the following sequence:

Valves rocking in cylinder	Check clearances in cylinder
1	4
3	2
4	1
2	3

- 9 Where a valve clearance differs from the specified value, the shim for that valve must be replaced with a thinner or thicker shim accordingly. The size of shim required can be calculated as follows.
- 10 If the measured clearance is less than specified, subtract the measured clearance from the specified clearance and deduct the result from the thickness of the existing shim.
- 11 If the measured clearance is more than specified, subtract the specified clearance from the measured clearance and add the result to the thickness of the existing shim.



41.3 Removing the valve cover



41.7 Measuring the valve clearances



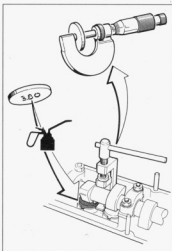
41.12 Shim thickness engraved on the underside

12 The shim size is stamped on the bottom face of the shim but its thickness should be checked with a micrometer (see illustration).

13 The shims can be removed from their locations on top of the tappet buckets without removing the camshaft, if the Volvo tool shown in the accompanying illustration can be borrowed, or a suitable alternative fabricated (see illustration). On carburettor models, the fuel pump must also be removed if the tool is being used on No 4 cylinder valves.

14 To remove the shim, the tappet bucket has to be pressed down against valve spring pressure just far enough to allow the shim to be slid out. This can be done by levering against the camshaft between the cam lobes with a suitable pad or screwdriver to push the buckets down, but if at all possible, the Volvo tool should be used. **Note:** The engine should not be at TDC, otherwise the valves may strike the tops of the pistons as the buckets are pressed down - turn the engine a quarter-turn past the TDC position.

15 With the tappet bucket levered down, the valve will be open, and it will be possible to remove the shim using a small screwdriver to prise it up (see illustration). Make sure that



41.13 Valve tappet shim removal and checking

the relevant cam lobe peaks are uppermost when doing this, and rotate the buckets so that the notches are at right angles to the camshaft centreline, to make removal of the shims easier. When refitting the shims, ensure that the size markings face the tappet buckets (ie face downwards), and lubricate them generously with engine oil.

16 If difficulty is experienced in removing the shims, the alternative method is to remove the camshaft complete, with reference to Chapter 2A. Direct access to each of the shims will then be much easier.

17 Remove the socket or spanner from the crankshaft pulley bolt.



41.15 Using a screwdriver to depress the tappet buckets, and a smaller screwdriver to prise up the shim

18 Refit the spark plugs with reference to Chapter 1, Section 15, then refit the valve cover together with a new gasket where necessary. On fuel injection models, refit the inlet manifold; on carburettor models, refit the air cleaner.

42 Auxiliary drivebelt renewal

This is part of the Volvo schedule. Arguably, if a regular check is made of drivebelt condition (as described in Section 5), signs of premature wear should be noticed in time to prevent a drivebelt failing in service. However, if a high mileage has been completed, or if the history of the car is not known, it would be prudent to renew the drivebelt(s), if only for peace of mind. Drivebelt failure could lead to engine damage through overheating - the water pump would stop working. On power steering models, belt failure would cause a sudden loss of power assistance, which could be highly dangerous.

Every 2 years, regardless of mileage

43 Coolant renewal



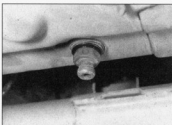
Warning: Wait until the engine is cold before starting this procedure. Do not allow antifreeze to come in contact with your skin, or with the painted surfaces of the vehicle. Rinse off spills immediately with plenty of water.

Draining

- 1 With the engine cold, unscrew the pressure cap from the top of the expansion tank.
- 2 On 440 and 460 models, unscrew the screws and pull down the front section of the engine splash guard for access to the radiator drain tap.
- 3 On 480 models, unscrew the self-tapping

screws from the front skirt, and pull it down for access to the radiator drain tap.

4 Position a suitable container beneath the radiator. If necessary, a length of tubing may be fitted over the drain plug to prevent coolant



43.5 Radiator drain plug

spillage. Bear in mind that antifreeze is poisonous, and it has a sweet smell which may attract children or animals - always try to reduce the risk of spillage.

5 Loosen the drain plug and allow the coolant to drain into the container (see illustration). On completion, remove the tubing and tighten the plug.

6 If it is required to drain the cylinder block as well, move the container beneath the right-hand end of the engine, and unscrew the cylinder block drain plug located below the inlet manifold near the oil pressure switch. Allow the coolant to drain.

7 If the system needs to be flushed after draining, refer to the following paragraphs; otherwise refit and tighten the drain plug.

Flushing

8 With time (and particularly if regular coolant changes are neglected), the cooling system

may gradually lose its efficiency as the radiator matrix becomes choked with rust and scale deposits. If this condition is suspected, the system must be flushed as follows.

9 First drain the coolant as already described. Loosen the clips and disconnect the top and bottom hoses from the radiator. Insert a garden hose in the radiator top hose connection stub, and allow the water to circulate through the radiator until it runs clear from the bottom outlet.

10 To flush the engine and the remainder of the system, remove the thermostat as described in Chapter 3, then insert the garden hose in the thermostat opening in the cylinder head, and allow the water to circulate through the engine until it runs clear from the bottom hose and cylinder block drain plug opening.

11 In severe cases of contamination, the radiator should be reverse-flushed. To do this, first remove it from the car, as described in Chapter 3, invert it and insert a hose in the bottom outlet. Continue flushing until clear water runs from the top hose outlet.

12 If, after a reasonable period, the water still does not run clear, the radiator should be flushed with a good proprietary cleaning system. The regular renewal of corrosion-inhibiting antifreeze should prevent such severe contamination of the system.

Filling

13 Refit and tighten the cylinder block drain plug. If the system has just been flushed, also refit the radiator top and bottom hoses, and any other hoses which were removed.

14 Loosen the bleed screw, which, depending on model, is located in the hose near the thermostat housing (B18U engine), on the T-piece into the cylinder head (B18EP/FP and B20F engines), or on the expansion tank-to-radiator supply hose (see illustrations).



43.14b ... B18EP/F and B20F engines ...

15 Pour the appropriate mixture of water and antifreeze into the expansion tank, and close the bleed screw as soon as a continuous flow of bubble-free coolant can be seen flowing from it. Continue to fill the expansion tank until the coolant is at the maximum level.

16 Start the engine and run it at a fast idle speed for three or four minutes. Keep the expansion tank topped-up to the maximum level during this period.

17 Refit and tighten the expansion tank cap, then run the engine at a fast idle speed until it reaches its normal operating temperature (indicated by the electric cooling fan cutting in). During this period, the coolant will circulate around the engine, and any remaining air will be purged to the expansion tank.

18 Switch off the engine and allow it to cool, then check the coolant level as described earlier and top-up if necessary.

Antifreeze

19 The antifreeze should always be renewed at the specified intervals. This is necessary not only to maintain the antifreeze properties, but also to prevent corrosion which would otherwise occur as the corrosion inhibitors in a good-quality antifreeze become progressively less effective.

20 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.

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

22 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



43.14c ... and bleed screw located on the expansion tank-to-radiator supply hose



43.14a Bleed screw location on B18U engine ...

subsequent topping-up should be made with the same type and concentration of antifreeze (see illustration).

23 Do not use engine antifreeze in the windscreen or tailgate washer system, as it will cause damage to the vehicle paintwork. A screen wash should be added to the washer system in the screen wash manufacturer's recommended quantities.

44 Brake fluid renewal

1

The procedure is similar to that for the bleeding of the hydraulic system described in Chapter 9, except that the brake fluid reservoir should be emptied by syphoning, using a clean poultry baster or similar before starting, and allowance should be made for the old fluid to be removed from the circuit when bleeding each section of the circuit.



43.22 Topping-up the cooling system with antifreeze

Introduction

There are some very simple checks which need only take a few minutes to carry out, but which could save you a lot of inconvenience and expense.

These Weekly checks require no great skill or special tools, and the small amount of time they take to perform could prove to be very well spent, for example;

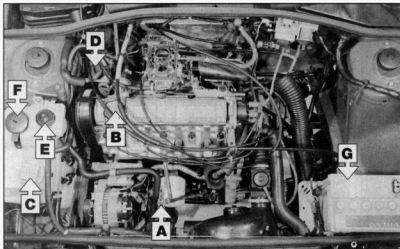
☐ Keeping an eye on tyre condition and pressures, will not only help to stop them wearing out prematurely, but could also save your life.

☐ Many breakdowns are caused by electrical problems. Battery-related faults are particularly common, and a quick check on a regular basis will often prevent the majority of these.

☐ If your car develops a brake fluid leak, the first time you might know about it is when your brakes don't work properly. Checking the level regularly will give advance warning of this kind of problem.

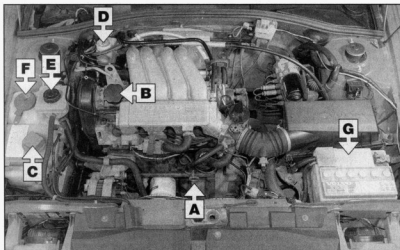
☐ If the oil or coolant levels run low, the cost of repairing any engine damage will be far greater than fixing the leak, for example.

Underbonnet check points



◀ 1.7 litre carburettor engine

- A** Engine oil level dipstick
- B** Engine oil filler cap
- C** Coolant expansion tank
- D** Brake fluid reservoir
- E** Power steering fluid reservoir
- F** Screen washer fluid reservoir
- G** Battery



◀ 2.0 litre fuel injection engine

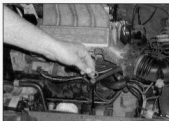
- A** Engine oil level dipstick
- B** Engine oil filler cap
- C** Coolant expansion tank
- D** Brake fluid reservoir
- E** Power steering fluid reservoir
- F** Screen washer fluid reservoir
- G** Battery

Engine oil level

Before you start

- ✓ Make sure that your car is on level ground.
- ✓ Check the oil level before the car is driven, or at least 5 minutes after the engine has been switched off.

HAYNES
HiNT If the oil is checked immediately after driving the vehicle, some of the oil will remain in the upper engine components, resulting in an inaccurate reading on the dipstick.



- 1 The engine oil level is checked with a dipstick located at the front of the engine. Withdraw the dipstick.



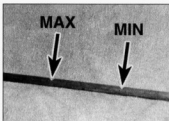
- 2 Using a clean rag or paper towel remove all oil from the dipstick. Insert the clean dipstick into the tube as far as it will go, then withdraw it again.

The correct oil

Modern engines place great demands on their oil. It is very important that the correct oil for your car is used (See Lubricants and fluids) on page G•16).

Car Care

- If you have to add oil frequently, you should check whether you have any oil leaks. Place some clean paper under the car overnight, and check for stains in the morning. If there are no leaks, the engine may be burning oil (see Fault Finding).
- Always maintain the level between the upper and lower dipstick marks (see photo 3). If the level is too low severe engine damage may occur. Oil seal failure may result if the engine is overfilled by adding too much oil.
- On models equipped with an information centre display, don't be tempted to rely on the automatic check alone - verify the level using the dipstick on a regular basis. Equally, don't ignore the display if it warns of low oil level.



- 3 Note the oil level on the end of the dipstick, which should be between the MAX and MIN marks. If the oil level is only just above, or below, the MIN mark, topping-up is required.



- 4 Oil is added through the filler cap. Unscrew the cap and top-up the level; a funnel may be useful in reducing spillage. Add the oil slowly, checking the level on the dipstick often, and allowing time for the oil to run to the sump. Add oil until the level is just up to the MAX mark on the dipstick - don't overfill (see Car care).

Coolant level



Warning: DO NOT attempt to remove the expansion tank pressure cap when the engine is hot, as there is a very great risk of scalding. Do not leave open containers of coolant about, as it is poisonous.



- 1 The coolant level varies with engine temperature - the level will always be higher when the engine is hot. The level can be seen through the reservoir, and should be above the MIN mark at all times.

Car Care

- With a sealed-type cooling system, adding coolant should not be necessary on a regular basis. If frequent topping-up is required, it is likely there is a leak. Check the radiator, all hoses and joint faces for signs of staining or wetness, and rectify as necessary.



- 2 If topping up is necessary, wait until the engine is cold. Slowly unscrew the expansion tank cap, to release any pressure present in the cooling system, and remove it.



- 3 Add a mixture of water and antifreeze to the expansion tank until the coolant level is between the MAX and MIN marks. Refit the cap and tighten it securely.

Brake fluid level



Warning:

● **Brake fluid can harm your eyes and damage painted surfaces, so use extreme caution when handling and pouring it.**



● **Do not use fluid that has been standing open for some time, as it absorbs moisture from the air, which can cause a dangerous loss of braking effectiveness.**



* **The fluid level in the reservoir will drop slightly as the brake pads wear down, but the fluid level must never be allowed to drop below the MIN mark.**

Before you start

✓ Make sure that your car is on level ground.

Safety First!

● If the reservoir requires repeated topping-up this is an indication of a fluid leak somewhere in the system, which should be investigated immediately.

● If a leak is suspected, the car should not be driven until the braking system has been checked. Never take any risks where brakes are concerned.



1 The brake fluid reservoir is located at the rear of the engine compartment, next to the suspension strut top mounting. On models without ABS, the reservoir is on the right-hand side; models with ABS may have the reservoir on the opposite side.



2 The MAX and MIN marks are indicated on the side or front of the reservoir, depending on whether or not ABS is fitted. The fluid level must be kept between the marks at all times.



3 Where necessary, unplug the level switch wiring connector, then unscrew the reservoir cap and carefully lift it out of position. Place the cap on a piece of clean rag. Inspect the reservoir; if the fluid is dirty, the hydraulic system should be drained and refilled (see Chapter 1).



4 Carefully add fluid, taking care not to spill it onto the surrounding components. Use only the specified fluid; mixing different types can cause damage to the system. After topping-up to the correct level, securely refit the cap (reconnect the wiring plug, where applicable) and wipe off any spilled fluid.

Power steering fluid level

Before you start

- ✓ Park the vehicle on level ground.
- ✓ Set the steering wheel straight-ahead.
- ✓ Ensure that the ignition is switched off.



For the check to be accurate, the steering must not be turned once the engine has been stopped.

Safety First!

● The need for frequent topping-up indicates a leak, which should be investigated immediately.



1 The reservoir is located at the right-hand side of the engine compartment, next to and above the screenwash reservoir.



2 When the system is cold, the level should be above the MIN mark. With the system at operating temperature (after a run), the level should be between the MAX and MIN marks. If topping-up is required, wipe clean the area around the reservoir filler neck and unscrew the filler cap from the reservoir.



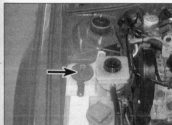
3 When topping-up, use the specified type of fluid, and do not overfill the reservoir. When the level is correct, securely refit the cap.

Screen washer fluid level

Note: On models with a headlight washer system, the screen wash is also used to clean the headlights. The underbonnet reservoir also serves the tailgate washer.

Screenwash additives not only keep the windscreen clean during foul weather, they also prevent the washer system freezing in cold weather - which is when you are likely to need it most. Don't top up using plain water as the

screenwash will become too diluted, and will freeze during cold weather. **On no account use coolant antifreeze in the washer system - this could discolour or damage paintwork.**



- 1** The screen washer fluid reservoir is located on the right-hand side of the engine compartment.



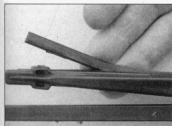
- 2** The screen washer level can be seen through the reservoir body, but if necessary, remove the filler cap, and look inside.



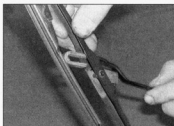
- 3** When topping-up the reservoir, add a screenwash additive in the quantities recommended on the additive bottle. The exact level is not critical - add fluid slowly until the reservoir is almost full. Refit the filler cap securely on completion.

Wiper blades

Note: Fitting details for wiper blades vary according to model, and according to whether genuine Volvo wiper blades have been fitted. Use the procedures and illustrations shown as a guide for your car.



- 1** Check the condition of the wiper blades; if they are cracked or show any signs of deterioration, or if the glass swept area is smeared, renew them. Wiper blades should be renewed annually, regardless of their apparent condition.



- 2** To remove a windscreen wiper blade, lift the arm away from the screen until it locks. Depress the locking tab, and slide the blade down, around and out of the arm's hooked end.



- 3** Don't forget to check the tailgate wiper blade as well, where applicable. On models with a rear spoiler, operate the wiper to its halfway point, then switch off the ignition, to position the arm so that the blade can be lifted. The blade is removed in the same way as the windscreen wipers.

**HAYNES
HINT**

If smearing is still a problem despite fitting new wiper blades, try cleaning the windscreen with neat screenwash additive or methylated spirit.

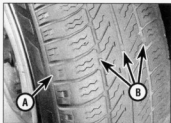
Tyre condition and pressure

It is very important that tyres are in good condition, and at the correct pressure - having a tyre failure at any speed is highly dangerous. Tyre wear is influenced by driving style - harsh braking and acceleration, or fast cornering, will all produce more rapid tyre wear. As a general rule, the front tyres wear out faster than the rears. Interchanging the tyres from front to rear ("rotating" the tyres) may result in more even wear. However, if this is completely effective, you may have the expense of replacing all four tyres at once! Remove any nails or stones embedded in the tread before they penetrate the tyre to cause deflation. If removal of a nail does reveal that

the tyre has been punctured, refit the nail so that its point of penetration is marked. Then immediately change the wheel, and have the tyre repaired by a tyre dealer.

Regularly check the tyres for damage in the form of cuts or bulges, especially in the sidewalls. Periodically remove the wheels, and clean any dirt or mud from the inside and outside surfaces. Examine the wheel rims for signs of rusting, corrosion or other damage. Light alloy wheels are easily damaged by "kerbing" whilst parking; steel wheels may also become dented or buckled. A new wheel is very often the only way to overcome severe damage.

New tyres should be balanced when they are fitted, but it may become necessary to re-balance them as they wear, or if the balance weights fitted to the wheel rim should fall off. Unbalanced tyres will wear more quickly, as will the steering and suspension components. Wheel imbalance is normally signified by vibration, particularly at a certain speed (typically around 50 mph). If this vibration is felt only through the steering, then it is likely that just the front wheels need balancing. If, however, the vibration is felt through the whole car, the rear wheels could be out of balance. Wheel balancing should be carried out by a tyre dealer or garage.



1 Tread Depth - visual check

The original tyres have tread wear safety bands (B), which will appear when the tread depth reaches approximately 1.6 mm. The band positions are indicated by a triangular mark on the tyre sidewall (A).



2 Tread Depth - manual check

Alternatively, tread wear can be monitored with a simple, inexpensive device known as a tread depth indicator gauge.



3 Tyre Pressure Check

Check the tyre pressures regularly with the tyres cold. Do not adjust the tyre pressures immediately after the vehicle has been used, or an inaccurate setting will result. Tyre pressures are shown on page 0•16.

Tyre tread wear patterns



Shoulder Wear

Underinflation (wear on both sides)

Under-inflation will cause overheating of the tyre, because the tyre will flex too much, and the tread will not sit correctly on the road surface. This will cause a loss of grip and excessive wear, not to mention the danger of sudden tyre failure due to heat build-up. Check and adjust pressures.

Incorrect wheel camber (wear on one side)

Repair or renew suspension parts

Hard cornering

Reduce speed!



Centre Wear

Overinflation

Over-inflation will cause rapid wear of the centre part of the tyre tread, coupled with reduced grip, harsher ride, and the danger of shock damage occurring in the tyre casing. Check and adjust pressures.

If you sometimes have to inflate your car's tyres to the higher pressures specified for maximum load or sustained high speed, don't forget to reduce the pressures to normal afterwards.



Uneven Wear

Front tyres may wear unevenly as a result of wheel misalignment. Most tyre dealers and garages can check and adjust the wheel alignment (or "tracking") for a modest charge.

Incorrect camber or caster

Repair or renew suspension parts

Malfunctioning suspension

Repair or renew suspension parts

Unbalanced wheel

Balance tyres

Incorrect toe setting

Adjust front wheel alignment

Note: The feathered edge of the tread which typifies toe wear is best checked by feel.

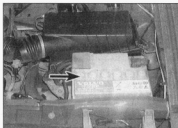
Battery

Caution: Before carrying out any work on the vehicle battery, read the precautions given in *Safety* first at the start of this manual.

✓ Make sure that the battery tray is in good condition, and that the clamp is tight. Corrosion on the tray, retaining clamp and the battery itself can be removed with a solution of water and baking soda. Thoroughly rinse all cleaned areas with water. Any metal parts damaged by corrosion should be covered with a zinc-based primer, then painted.

✓ Periodically (approximately every three months), check the charge condition of the battery as described in Chapter 5A.

✓ If the battery is flat, and you need to jump start your vehicle, see *Roadside Repairs*.



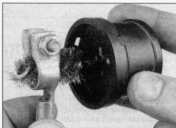
1 The battery is located on the left-hand side of the engine compartment. The exterior of the battery should be inspected periodically for damage such as a cracked case or cover.



2 Check the tightness of battery clamps to ensure good electrical connections. You should not be able to move them. Also check each cable for cracks and frayed conductors.



3 If corrosion (white, fluffy deposits) is evident, remove the cables from the battery terminals, clean them with a small wire brush, then refit them. Automotive stores sell a tool for cleaning the battery post...



4 ... as well as the battery cable clamps



Battery corrosion can be kept to a minimum by applying a layer of petroleum jelly to the clamps and terminals after they are reconnected.

Electrical system

✓ Check all external lights and the horn. Refer to the appropriate Sections of Chapter 12 for details if any of the circuits are found to be inoperative.

✓ Visually check all accessible wiring connectors, harnesses and retaining clips for security, and for signs of chafing or damage.

**HAYNES
HiNT**

If you need to check your brake lights and indicators unaided, back up to a wall or garage door and operate the lights. The reflected light should show if they are working properly.



1 If a single indicator light, stop-light or headlight has failed, it is likely that a bulb has blown and will need to be replaced. Refer to Chapter 12 for details. If both stop-lights have failed, it is possible that the switch on the brake pedal has failed (see Chapter 9).



2 If more than one indicator light or tail light has failed, it is likely that either a fuse has blown or that there is a fault in the circuit (see Chapter 12). The main fuses are located in a triangular box at the rear of the engine compartment, or behind a cover under the driver's side of the fascia, depending on model. Certain additional fuses may be located behind the glovebox.



3 To replace a blown fuse, simply pull it out using the tweezers tool provided, and fit a new fuse of the correct rating (see Chapter 12). If the fuse blows again, it is important that you find out why.

Lubricants and fluids

Engine	Multigrade engine oil, viscosity SAE 10W/30, 10W/40 or 15W/40, API SG or SH (Duckhams QXR Premium Petrol Engine Oil, or Duckhams Hypergrade Petrol Engine Oil)
Cooling system	Ethylene glycol-based antifreeze with corrosion inhibitor (Duckhams Antifreeze and Summer Coolant)
Manual gearbox Up to 1988	Gear oil, viscosity SAE 80W (Duckhams Hypoid Gear Oil 80W GL-4)
1989 onwards	Volvo special oil - part number 3343922-5
Automatic transmission	Volvo special oil - Dexron II type ATF
Brake hydraulic system	Hydraulic fluid to FMVSS 116 DOT 4 (Duckhams Universal Brake & Clutch Fluid)
Power steering	Dexron type ATF (Duckhams ATF Autotrans III)

Choosing your engine oil

Engines need oil, not only to lubricate moving parts and minimise wear, but also to maximise power output and to improve fuel economy. By introducing a simplified and improved range of engine oils, Duckhams has taken away the confusion and made it easier for you to choose the right oil for your engine.

HOW ENGINE OIL WORKS

• Beating friction

Without oil, the moving surfaces inside your engine will rub together, heat up and melt, quickly causing the engine to seize. Engine oil creates a film which separates these moving parts, preventing wear and heat build-up.

• Cooling hot-spots

Temperatures inside the engine can exceed 1000° C. The engine oil circulates and acts as a coolant, transferring heat from the hot-spots to the sump.

• Cleaning the engine internally

Good quality engine oils clean the inside of your engine, collecting and dispersing combustion deposits and controlling them until they are trapped by the oil filter or flushed out at oil change.

OIL CARE - FOLLOW THE CODE

To handle and dispose of used engine oil safely, always:

- Avoid skin contact with used engine oil. Repeated or prolonged contact can be harmful.
- Dispose of used oil and empty packs in a responsible manner in an authorised disposal site. Call 0800 663366 to find the one nearest to you. Never tip oil down drains or onto the ground.



DUCKHAM'S ENGINE OILS

For the driver who demands a premium quality oil for complete reassurance, we recommend synthetic formula **Duckhams QXR Premium Engine Oils**.

For the driver who requires a straightforward quality engine oil, we recommend **Duckhams Hypergrade Engine Oils**.

For further information and advice, call the Duckhams UK Helpline on 0800 212988.



Tyre pressures

Tyre pressures (cold):

	Front	Rear
Up to 4 passengers:		
All models	2.1 bars (30 psi)	1.9 bars (28 psi)
4 passengers and luggage:		
440 and 460 models	2.3 bars (33 psi)	2.1 bars (30 psi)
480 models	2.2 bars (32 psi)	2.0 bars (29 psi)
Space-saver spare wheel (where applicable)	4.1 bars (60 psi)	4.1 bars (60 psi)

Note 1: Tyre pressure information may be given on a decal below the driver's door lock. If the information shown there differs from that given above, consult a Volvo dealer for advice.

Note 2: Pressures apply to original-equipment tyres, and may vary if any other make of tyre is fitted; check with the tyre manufacturer or supplier for the correct pressures if necessary.