

# Chapter 1 Part B: Routine maintenance and servicing – diesel models

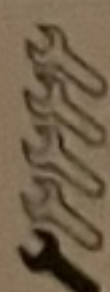
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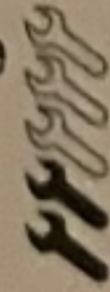


## Degrees of difficulty

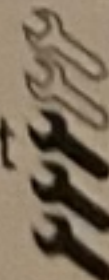
**Easy**, suitable for  
novice with little  
experience



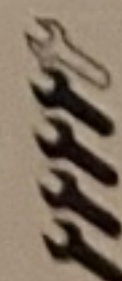
**Fairly easy**, suitable  
for beginner with  
some experience



**Fairly difficult**,  
suitable for competent  
DIY mechanic



**Difficult**, suitable  
for experienced DIY  
mechanic



**Very difficult**,  
suitable for expert  
DIY or professional



# 1B•2 Servicing specifications – diesel engines

## Lubricants and fluids

See end of *Weekly checks* on page 0•16

### Capacities

<b>Engine oil</b>	4.3 litres
Drain and refill, with filter change	1.0 litres
Between dipstick MAX and MIN markings	8.0 litres
<b>Cooling system</b>	
<b>Transmission</b>	
Manual:	1.5 litres
Drain and refill	1.9 litres
Total from dry	
Automatic:	3.5 litres
Drain and refill	7.0 litres
Total from dry (including torque converter and cooler)	
<b>Braking system</b>	0.9 litres
System capacity	
<b>Power-assisted steering</b>	1.3 litres
System capacity	
<b>Fuel tank</b>	72.0 litres (15.8 gallons)

### Cooling system

Antifreeze mixture:\*

50% antifreeze	Protection down to -37°C
55% antifreeze	Protection down to -45°C

\* **Note:** Coolant from Saab dealers is premixed with water at the correct ratio.

### Brakes

Brake pad friction material minimum thickness	4.0 mm at time of service (acoustic warning at 3.0 mm)
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### Tyre pressures

Refer to the end of *Weekly checks* on page 0•16

### Torque wrench settings

	Nm	lbf ft
Automatic transmission drain plug	40	30
Engine oil filter cover	25	18
Engine oil sump drain plug	25	18
Fuel filter	20	15
Manual transmission level/filler plug	50	37
Wheel bolts	110	81



# Maintenance schedule – diesel engines 1B•3

The maintenance intervals in this manual are provided with the assumption that you will be carrying out the work yourself. These are the minimum maintenance intervals recommended by the manufacturer 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 dealer service department (or other workshop recognised by the vehicle manufacturer as providing the same standard of service) in order to preserve the warranty. The vehicle manufacturer may reject warranty claims if you are unable to prove that servicing has been carried out as and when specified,

using only original equipment parts or parts certified to be of equivalent quality.

All Saab models are equipped with a service interval display (or Saab Information Display – SID) on the fascia, which will indicate TIME FOR SERVICE when a service is due. However, Saab point out that, 'due to the relationship between time and mileage, some operating conditions will make annual service more suitable'.

## Every 250 miles or weekly

- ☐ Refer to Weekly checks

## Every 9000 miles

- ☐ Engine oil and filter – renewal (Section 3)

**Note:** Frequent oil and filter changes are good for the engine. We recommend changing the oil at the mileage specified here, or at least annually if the mileage covered is less.

## Every 18 000 miles

- ☐ Service indicator – resetting (Section 4)
- ☐ Hoses and fluids – leak check (Section 5)
- ☐ Steering and suspension components – check (Section 6)
- ☐ Handbrake – check and adjustment (Section 7)
- ☐ Seat belt condition – check (Section 8)
- ☐ Airbag system – check (Section 9)
- ☐ Headlight beam alignment – check (Section 10)
- ☐ Power steering fluid level – check (Section 11)
- ☐ Road test (Section 12)
- ☐ Coolant antifreeze concentration – check (Section 13)
- ☐ Automatic transmission fluid level – check (Section 14)
- ☐ Driveshaft joints and gaiters – check (Section 15)
- ☐ Exhaust system – check (Section 16)
- ☐ Brake pad wear – check (Section 17)
- ☐ Hinges and locks – lubrication (Section 18)
- ☐ Pollen air filter – renewal (Section 19)
- ☐ Air conditioning drain hoses – check (Section 20)
- ☐ Auxiliary drivebelt condition – check (Section 21)
- ☐ Fuel filter – renewal (Section 22)

## Every 36 000 miles

- ☐ Air filter element – renewal (Section 23)
- ☐ Manual transmission fluid level – check (Section 24)

## Every 72 000 miles

- ☐ Timing belt – renewal (Section 25)

**Note:** Saab recommend that the interval for timing belt renewal is 72 000 miles or 6 years. However, if the vehicle is used mainly for short journeys or a lot of stop-start driving it is recommended that the renewal interval is shortened. The actual belt renewal interval is very much up to the individual owner but, bearing in mind that severe engine damage will result if the belt breaks in use, we recommend you err on the side of caution.

- ☐ Automatic transmission fluid – renewal (Section 26)
- ☐ Auxiliary drivebelt – renewal (Section 27)

## Every 3 years

- ☐ Coolant – renewal (Section 28)

**Note:** This work is not included in the Saab schedule, and should not be required if the recommended Saab antifreeze/inhibitor is used.

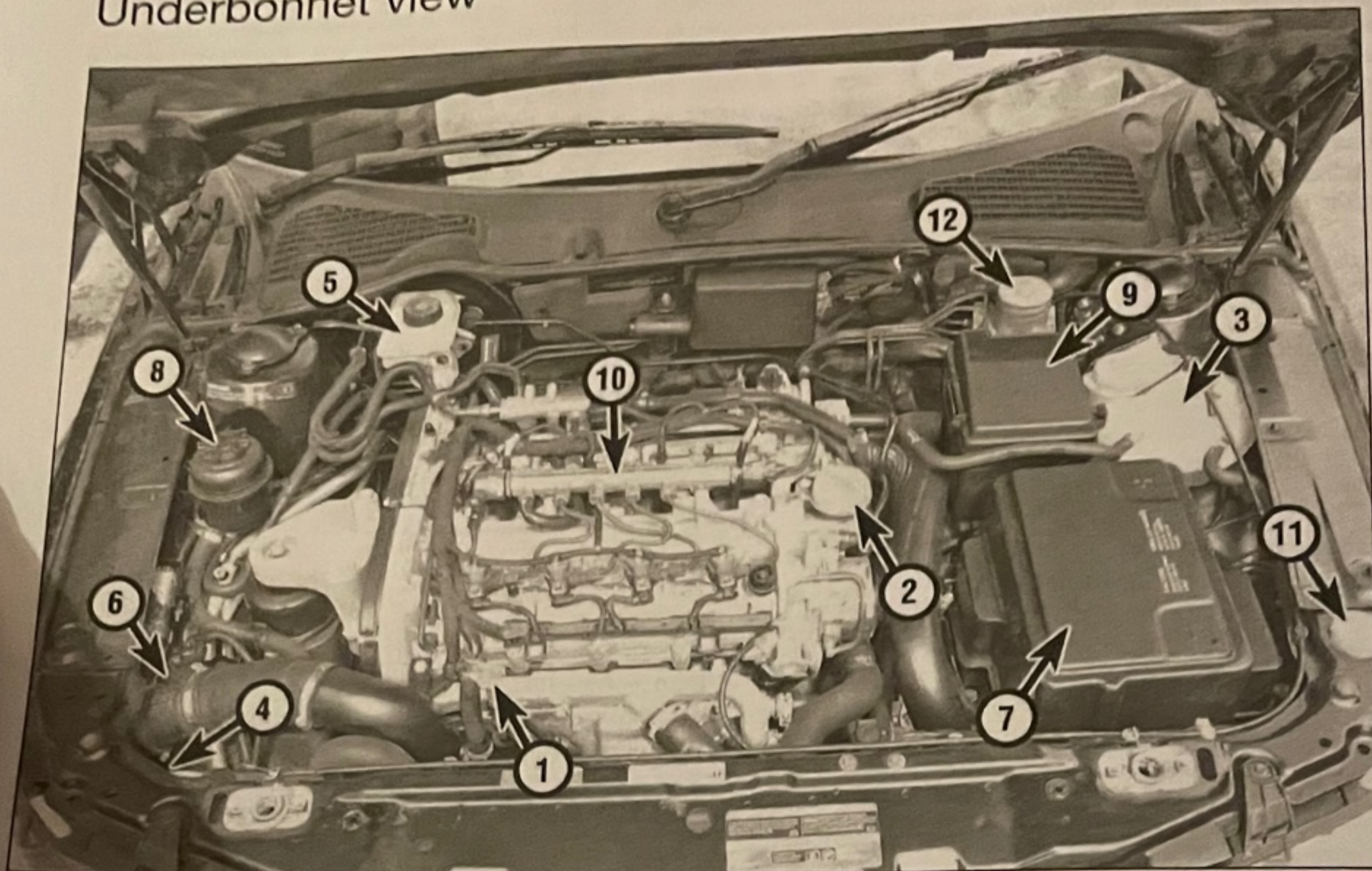
## Every 4 years

- ☐ Brake fluid – renewal (Section 29)



## 1B•4 Component locations – diesel engines

Underbonnet view



- 1 Engine oil level dipstick
- 2 Engine oil filler cap
- 3 Coolant expansion tank
- 4 Air cleaner assembly
- 5 Brake (and clutch) fluid reservoir
- 6 Mass airflow meter
- 7 Battery
- 8 Power steering fluid
- 9 Fusebox
- 10 Common (fuel) rail
- 11 Windscreen washer fluid
- 12 ABS unit

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- 2 Rear
- 3 Rear
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- 4 Brak
- hose
- 5 Han
- 6 Fue
- 7 Rea
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Front underbody view



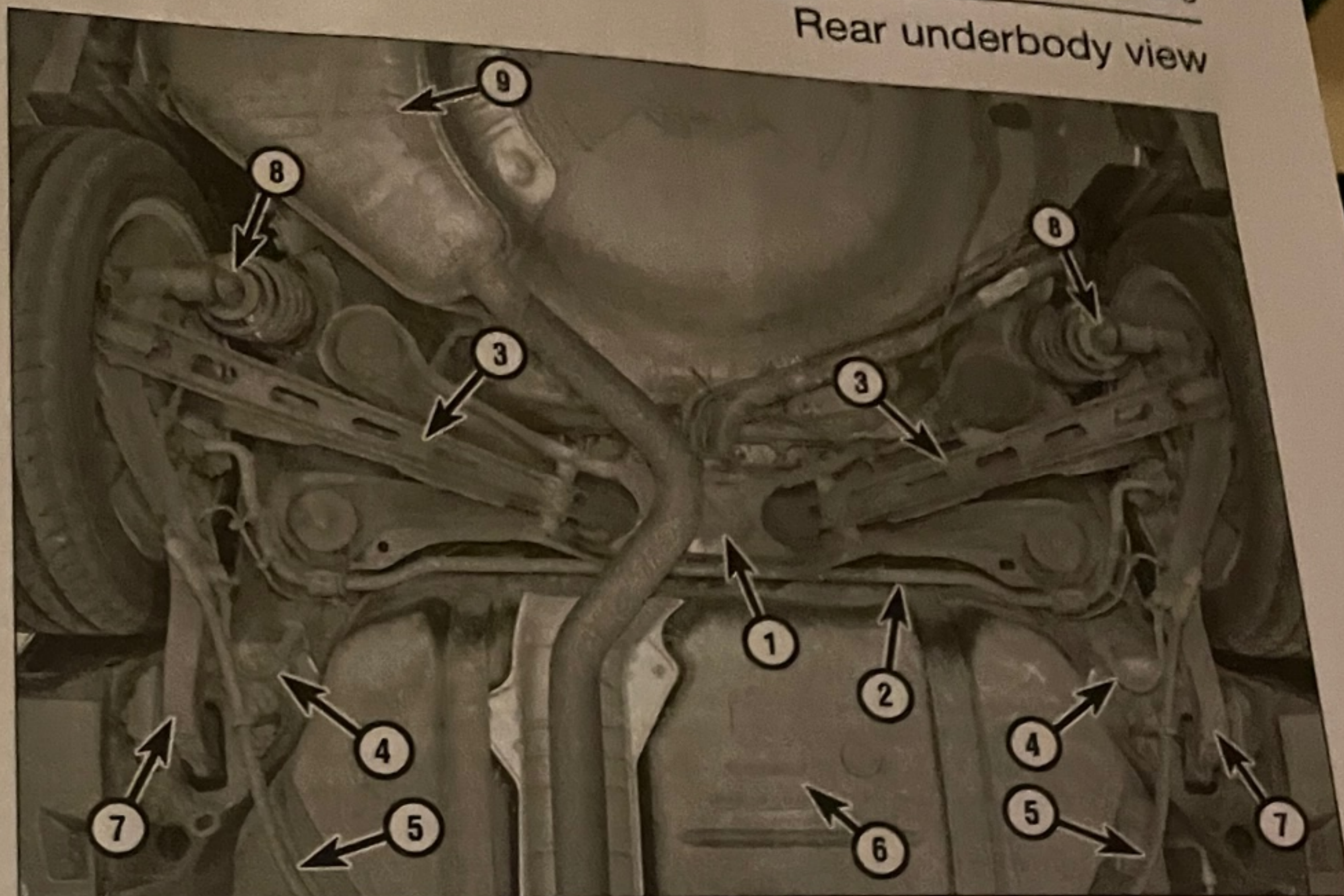
- 1 Engine oil sump drain plug
- 2 Engine oil filter
- 3 Exhaust front pipe
- 4 Front suspension/engine subframe
- 5 Exhaust mounting rubbers
- 6 Front lower arm
- 7 Steering track rod ends
- 8 Front brake caliper
- 9 Air filter housing
- 10 Windscreen washer fluid reservoir
- 11 Air conditioning compressor
- 12 Intermediate driveshaft



## Component locations – diesel engines 1B•5

Rear underbody view

- 1 Rear suspension crossmember
- 2 Rear anti-roll bar
- 3 Rear suspension lower transverse link
- 4 Brake hydraulic flexible hoses
- 5 Handbrake cables
- 6 Fuel tank
- 7 Rear suspension trailing arms
- 8 Rear suspension strut/shock absorbers
- 9 Exhaust rear silencer and tailpipe



## Maintenance procedures

### 1 General information

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

2 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.

3 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.

4 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 close proximity of two otherwise-unrelated components to one another. For example, if the vehicle is raised for any reason, the exhaust system could be

inspected at the same time as the suspension and steering components.

5 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 together all the parts and tools required. If a problem is encountered, seek advice from a parts specialist, or a dealer service department.

### 2 Regular maintenance

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

2 It is possible that there will be times when the engine is running poorly due to 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 2B) 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 (Chapter 2C) 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

- a) Clean, inspect and test the battery ('Weekly checks' and Chapter 5A)
- b) Check all the engine-related fluids ('Weekly checks').
- c) Check the condition and tension of the auxiliary drivebelt (Section 21).
- d) Check the condition of the air filter element and renew if necessary (Section 23).
- e) Renew the fuel filter (Section 22).
- f) Check the condition of all hoses, and check for fluid leaks (Section 5).

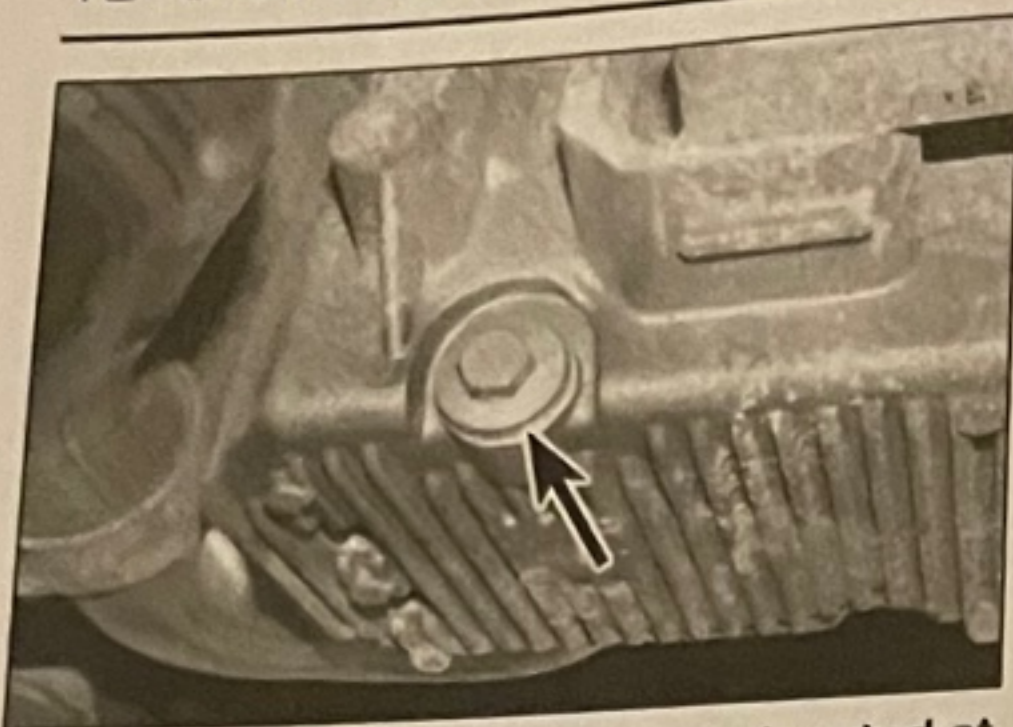
#### Secondary operations

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

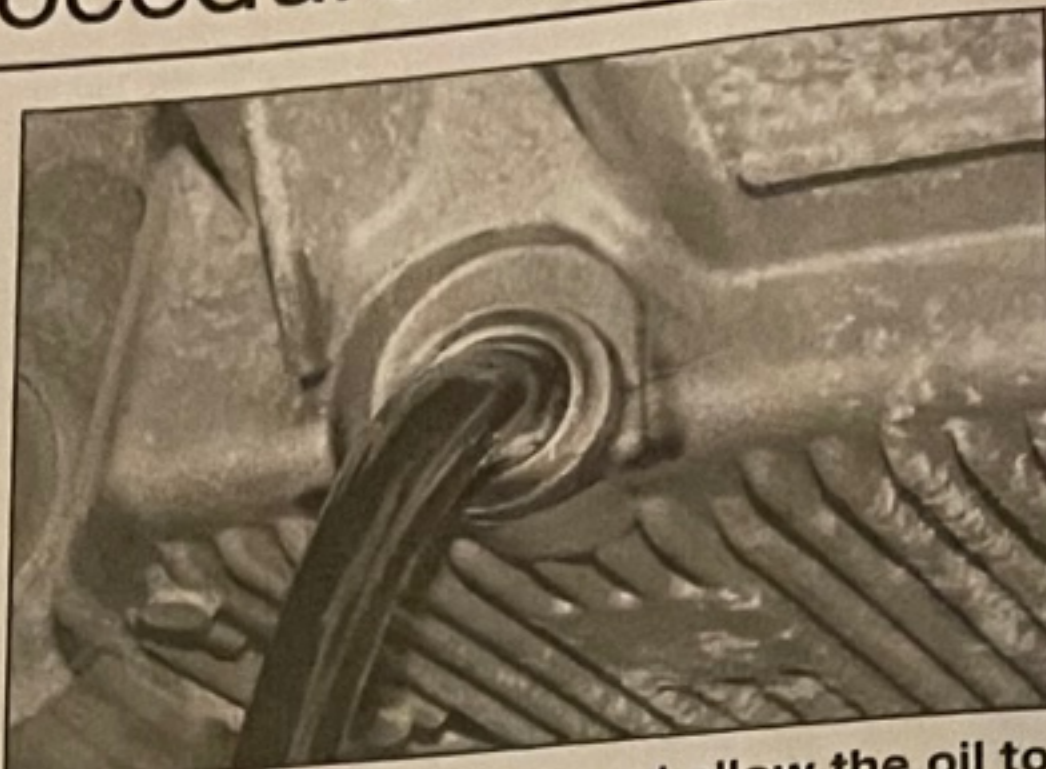
- a) Check the charging system (Chapter 5)
- b) Check the fuel system (Chapter 4B).



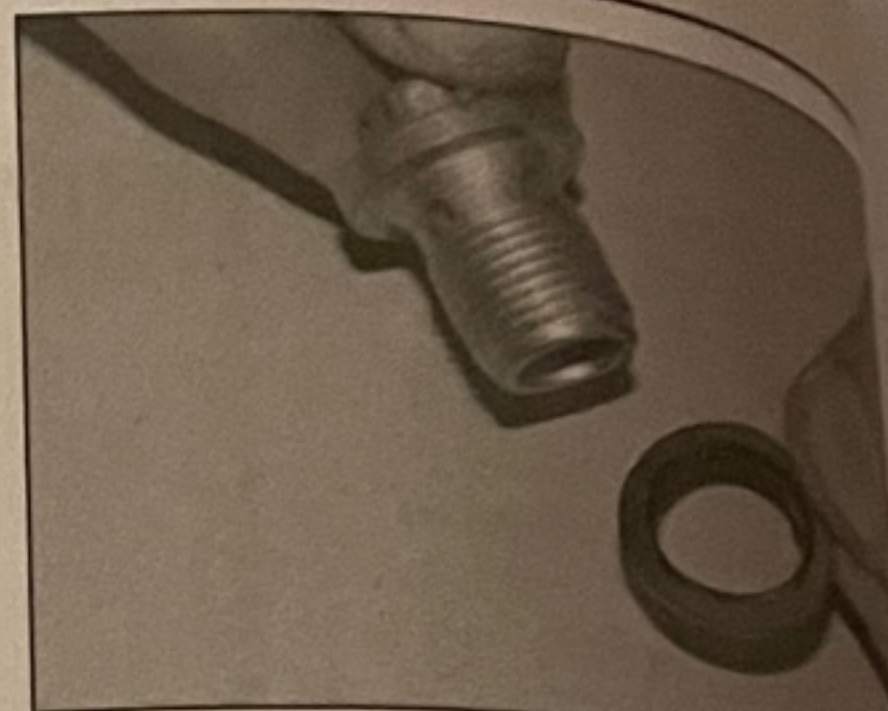
## 1B•6 Maintenance procedures – diesel engines



3.5a The engine oil drain plug is located at the rear of the sump (arrowed)



3.5b Unscrew the plug and allow the oil to drain



3.7 Refit the drain plug with a new washer

### Every 9000 miles

#### 3 Engine oil and filter – renewal

1 Frequent oil changes are the most important preventative maintenance the DIY home mechanic can give the engine, because ageing oil becomes diluted and contaminated, which leads to premature engine wear.

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

parts of the engine when working under the vehicle. To avoid any possibility of scalding, and to protect yourself from possible skin irritants and other harmful contaminants in used engine oils, it is advisable to wear gloves when carrying out this work.

3 Apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*).

4 Where applicable, undo the fasteners and remove the engine undershield.

5 The engine oil drain plug is located on the rear of the sump; slacken the plug about half a turn. Position the draining container under the drain plug, then remove the plug completely – recover the sealing washer (see *illustrations*).

6 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.

7 After all the oil has drained, wipe off the drain plug with a clean rag. Clean the area around the drain plug opening, and refit the plug with a new O-ring seal. Tighten it to the specified torque (see *illustration*).

8 Position the container under the oil filter housing, then slacken the filter housing cover a few turns, using a 32 mm socket, and allow the oil to drain into the container. On some models, to prevent the oil contacting the exhaust system, the filter housing has a drain tube on the side. Attach a length of hose to the drain tube on the filter housing (see *illustrations*).

9 When the oil has finished draining, completely unscrew and remove the oil filter cover along with the filter element. Discard the cover O-ring seals, new ones must be fitted.

10 Use a clean rag to remove all oil, dirt and sludge from the filter housing and cover.

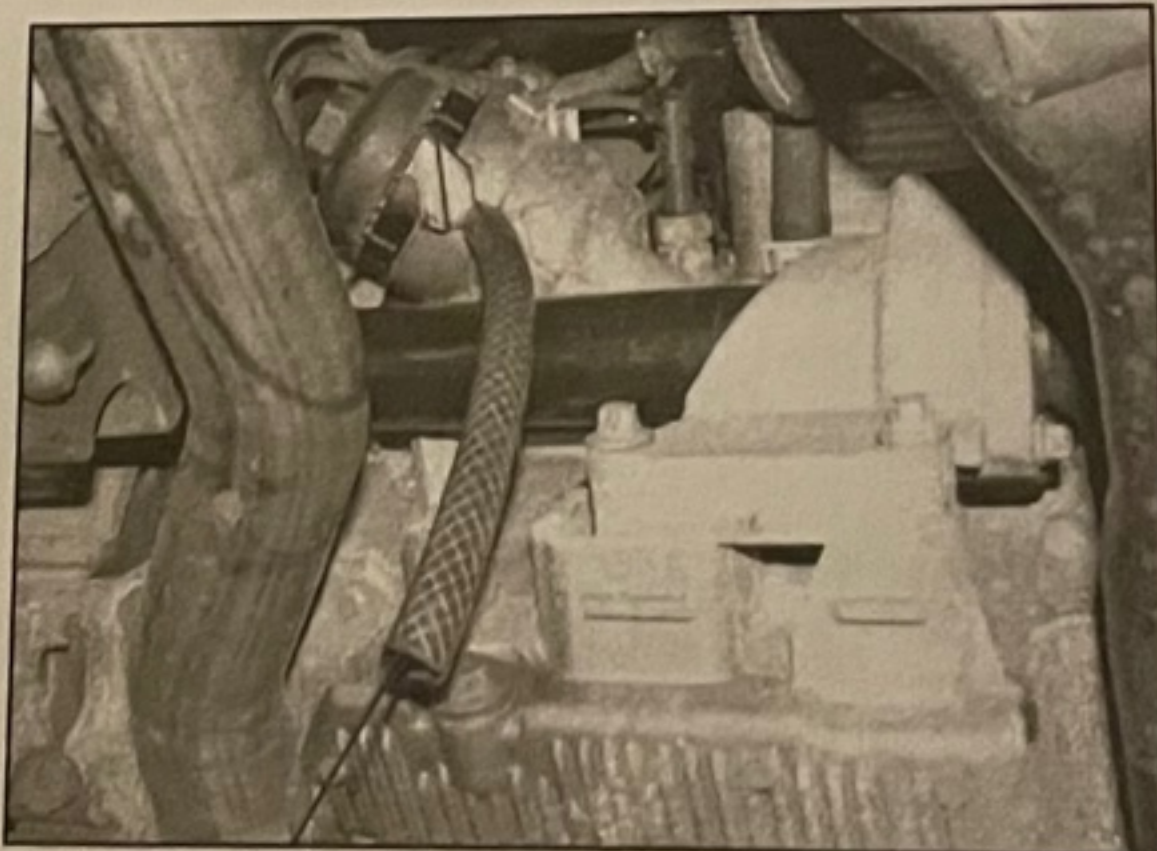
11 Fit the new filter element to the filter housing, and the O-ring seals to the filter cover (see *illustrations*).

12 Apply a light coating of clean engine oil to the O-ring seal on the filter cover, then fit the element and cover into the housing, and tighten it to the specified torque (see *illustration*). Lower the vehicle to the ground.

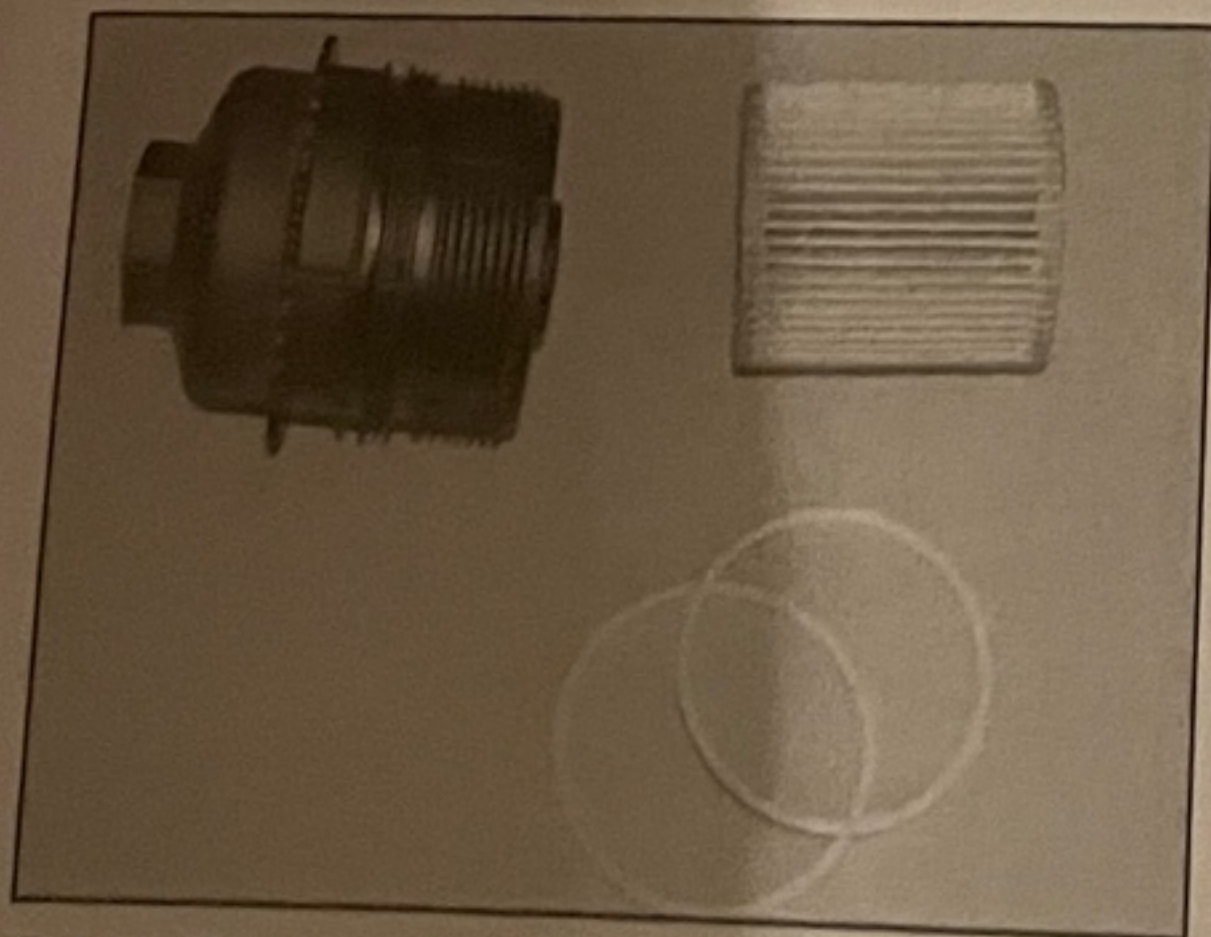
13 Remove the oil filler cap and withdraw the level dipstick from the tube. Fill the engine using the correct oil (see *Lubricants and fluids*). An oil can spout or funnel may help to reduce



3.8a Unscrew the housing cap (arrowed) a few turns with a 32 mm socket . . .



3.8b . . . and allow the oil to drain through the hose before removing the cap



3.11a The new oil filter should be supplied with new O-ring seals



3.11b Fit the new filter into the housing . . .



3.11c . . . and the new O-rings seals to the housing cap

### Every

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## Every 9000 miles – diesel engines 1B•7

spillage. Pour in half the specified quantity of oil first, and then wait a few minutes for the oil to run to the sump. Continue adding oil a small quantity at a time until the level is up to the lower mark on the dipstick. Adding a further 1.0 litre will bring the level up to the upper mark on the dipstick. Insert the dipstick, and refit the filler cap (see illustration).

**14** Start the engine and run it for a few minutes; check for leaks around the oil filter seal and the sump drain plug. Note that there may be a delay of a few seconds before the oil pressure warning light goes out when the engine is first started, as the oil circulates through the engine oil galleries and the new oil filter, before the pressure builds-up.

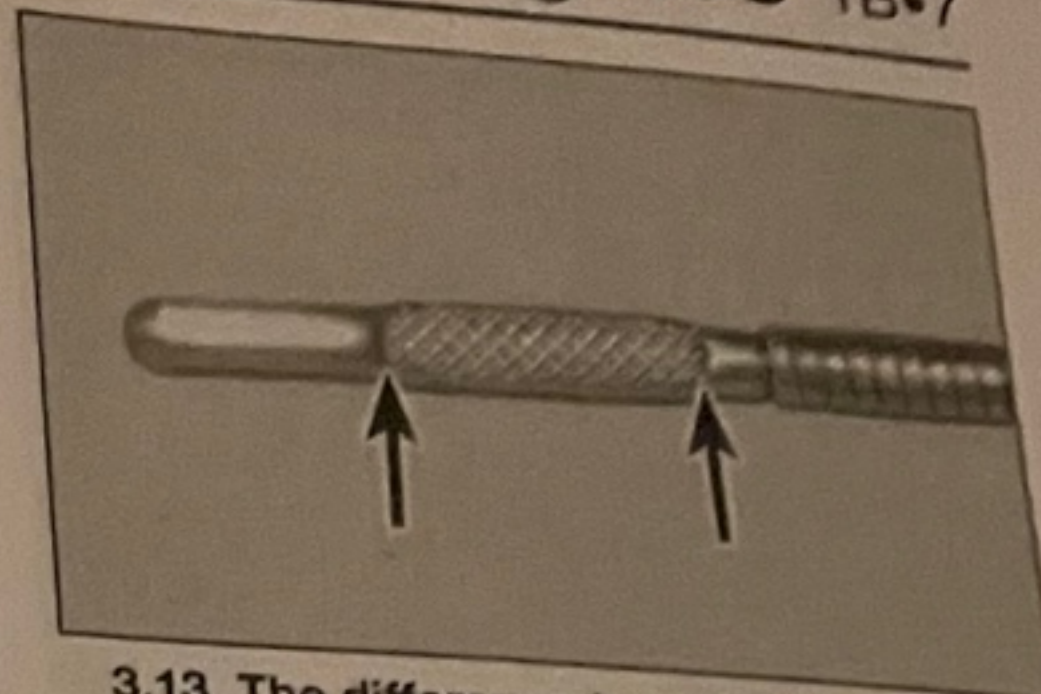
**15** Switch off the engine, and wait a few minutes for the oil to settle in the sump once more. With the new oil circulated and the



**3.12** Fit the cap with the O-rings to the housing

filter completely full, recheck the level on the dipstick, and add more oil as necessary.

**16** If removed, refit the engine undershield.

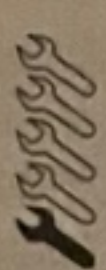


**3.13** The difference between the upper and lower marks on the dipstick is approximately 1.0 litre

**17** Dispose of the used engine oil safely, in accordance with the guidance given in *General repair procedures*.

## Every 18 000 miles

### 4 Service indicator – resetting

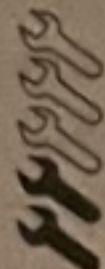


**1** The facia-mounted SID (Saab Information Display) system incorporates a service interval indicator. When the distance covered between services approaches the next service, a visual message is displayed, 'Time for service. Contact service'. The service indicator is then manually reset to zero by the technician, after the vehicle has been serviced. **Note:** The indicator is automatically reset after the message has been displayed 20 times.

**2** To manually reset the service indicator, press and hold the CLEAR button on the SID panel for 8 seconds, you will hear two beeps in quick succession, and then release it. The SERVICE message will start to flash, this means the service interval is reset.

**3** The indicator can be reset at any time by a technician, using the Saab diagnostic tool.

### 5 Hoses and fluids – leak check



#### Cooling system



**Warning:** Refer to the safety information given in 'Safety first!' and Chapter 3 before disturbing any of the cooling system components.

**1** Carefully check the radiator and heater coolant hoses along their entire length. Renew any hose which is cracked, swollen or which shows signs of deterioration. Cracks will show up better if the hose is squeezed. Pay close attention to the clips that secure the hoses to the cooling system components. Hose clips that have been overtightened can pinch and

puncture hoses, resulting in cooling system leaks.

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

#### Fuel system



**Warning:** Refer to the safety information given in 'Safety first!' and Chapter 4B before disturbing any of the fuel system components.

**3** Diesel leaks can be difficult to pinpoint, unless the leakage is significant and hence easily visible. Fuel tends to evaporate once it comes into contact with air, especially in a hot engine bay. Small drips can disappear before you get a chance to identify the point of leakage. If you suspect that there is a fuel leak from the area of the engine bay, leave the vehicle overnight then start the engine from cold, with the bonnet open. Metal components tend to shrink when they are cold, and rubber seals and hoses tend to harden, so any leaks will be more apparent whilst the engine is warming-up from a cold start.

**4** Check all fuel lines at their connections to the fuel pump, common rail and fuel filter. Examine each rubber fuel hose along its length for splits or cracks. Check for leakage from the crimped joints between rubber and metal fuel lines. Examine the unions between the metal fuel lines and the fuel filter housing. Also check the area around the fuel injectors for signs of O-ring leakage.

**5** To identify fuel leaks between the fuel tank and the engine bay, the vehicle should be raised and securely supported on axle stands (see *Jacking and vehicle support*). Inspect the petrol tank and filler neck for punctures, cracks and other damage. The connection between

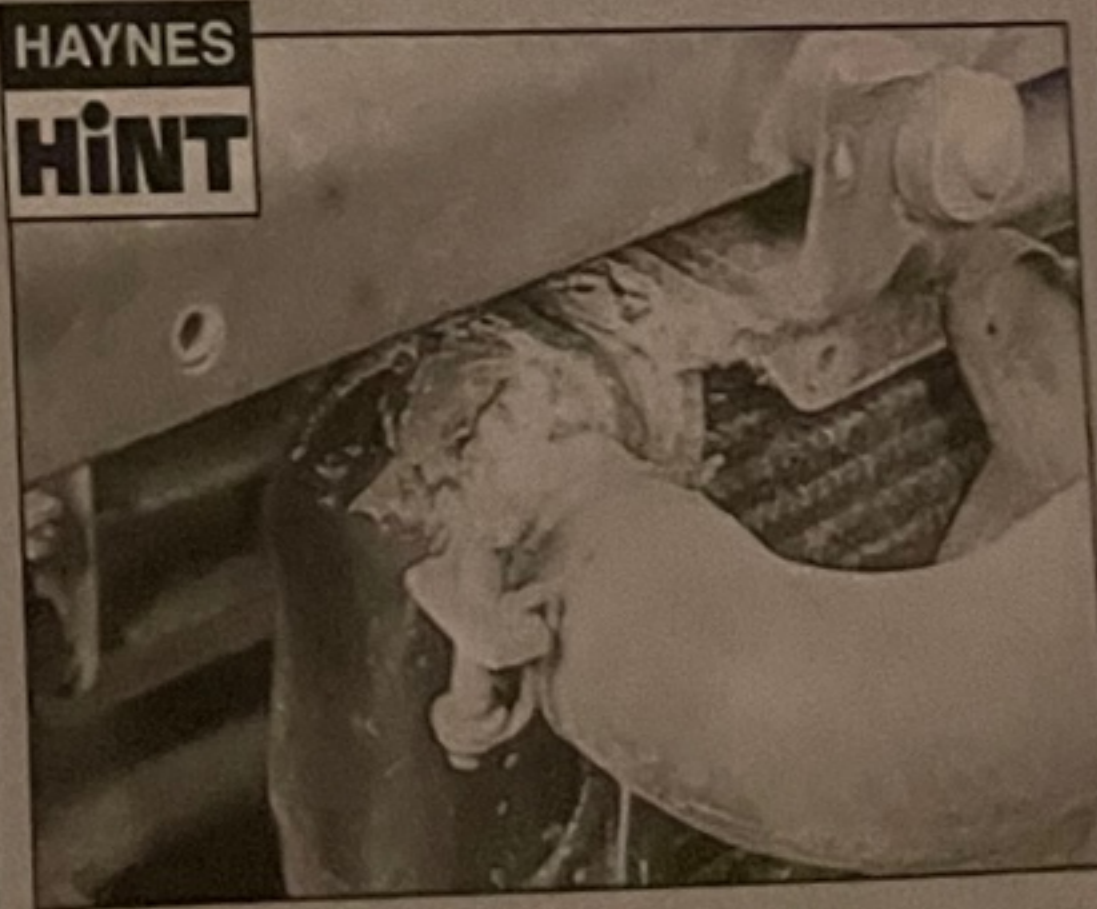
the filler neck and tank is especially critical. Sometimes a rubber filler neck or connecting hose will leak due to loose retaining clamps or deteriorated rubber.

**6** Carefully check all rubber hoses and metal fuel lines leading away from the petrol tank. Check for loose connections, deteriorated hoses, kinked 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 kinked, making tank filling difficult. Follow the fuel supply and return lines to the front of the vehicle, carefully inspecting them all the way for signs of damage or corrosion. Renew damaged sections as necessary.

#### Engine oil

**7** Inspect the area around the camshaft cover, cylinder head, oil filter and sump joint faces. Bear in mind that, over a period of time, some very slight seepage from these areas is to be expected – what you are really looking for is any indication of a serious leak

#### HAYNES HiNT



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



## 1B•8 Every 18 000 miles – diesel engines

caused by gasket failure. Engine oil seeping from the base of the timing belt cover or the transmission bellhousing may be an indication of crankshaft or transmission input shaft oil seal failure. Should a leak be found, renew the failed gasket or oil seal by referring to the appropriate Chapters in this manual.

### Automatic transmission fluid

8 Where applicable, check the hoses leading to the transmission fluid cooler at the front of the engine bay for leakage. Look for deterioration caused by corrosion and damage from grounding, or debris thrown up from the road surface. Automatic transmission fluid is thin oil and is usually red in colour.

### Power-assisted steering fluid

9 Examine the hose running between the fluid reservoir and the power steering pump, and the return hose running from the steering rack to the fluid reservoir. Also examine the high-pressure supply hose between the pump and the steering rack.

10 Check the condition of each hose carefully. Look for deterioration caused by corrosion and damage from grounding, or debris thrown up from the road surface.

11 Pay particular attention to crimped unions, and the area surrounding the hoses that are secured with adjustable worm-drive clips. Like automatic transmission fluid, PAS fluid is thin oil, and is usually red in colour.

### Air conditioning refrigerant

**Warning:** Refer to the safety information given in 'Safety first!' and Chapter 3 regarding the dangers of disturbing any of the air conditioning system components.

12 The air conditioning system is filled with a liquid refrigerant, which is retained under high pressure. If the air conditioning system is opened and depressurised without the aid of specialised equipment, the refrigerant will immediately turn into gas and escape into the atmosphere. If the liquid comes into contact with your skin, it can cause severe frostbite. In addition, the refrigerant contains substances that are environmentally damaging; for this reason, it should not be allowed to escape into the atmosphere in an uncontrolled fashion.



6.4 Check for wear in the hub bearings by grasping the wheel and trying to rock it

13 Any suspected air conditioning system leaks should be immediately referred to a Saab dealer or air conditioning specialist. Leakage will be shown up as a steady drop in the level of refrigerant in the system.

14 Note that water may drip from the condenser drain pipe, underneath the car, immediately after the air conditioning system has been in use. This is normal, and should not be cause for concern.

### Brake (and clutch) fluid

**Warning:** Refer to the safety information given in 'Safety first!' and Chapter 9 regarding the dangers of handling brake fluid.

15 With reference to Chapter 9, examine the area surrounding the brake pipe unions at the master cylinder for signs of leakage. Check the area around the base of fluid reservoir, for signs of leakage caused by seal failure. Also examine the brake pipe unions at the ABS hydraulic unit.

16 If fluid loss is evident, but the leak cannot be pinpointed in the engine bay, the brake calipers and underbody brake lines should be carefully checked with the vehicle raised and supported on axle stands (see *Jacking and vehicle support*). Leakage of fluid from the braking system is a serious fault that must be rectified immediately.

17 Brake/clutch hydraulic fluid is a toxic substance with a watery consistency. New fluid is almost colourless, but it becomes darker with age and use.

### Unidentified fluid leaks

18 If there are signs that a fluid of some description is leaking from the vehicle, but you cannot identify the type of fluid or its exact origin, park the vehicle overnight and slide a large piece of card underneath it. Providing that the card is positioned in roughly the right location, even the smallest leak will show up on the card. Not only will this help you to pinpoint the exact location of the leak, it should be easier to identify the fluid from its colour. Bear in mind, though, that the leak may only be occurring when the engine is running!

### Vacuum hoses

19 Although the braking system is hydraulically-operated, the brake servo unit amplifies the effort applied at the brake pedal by making use of the vacuum in the intake manifold generated by the engine and supplemented by the vacuum pump driven by the exhaust camshaft. Vacuum is ported to the servo by means of a large-bore hose. Any leaks that develop in this hose will reduce the effectiveness of the braking system, and may affect the running of the engine.

20 In addition, a number of the underbonnet components, particularly the emission control components, are driven by vacuum supplied from the intake manifold via narrow-bore hoses. A leak in a vacuum hose means that

air is being drawn into the hose (rather than escaping from it) and this makes it very difficult to detect. One method is to use an old length of vacuum hose as a stethoscope – hold one end close to your ear and use the other end to probe the area around the suspected leak. When the hissing sound will be heard clearly through the hose. Care must be taken to avoid contact with hot or moving components when testing in this manner, as the engine must be running. Renew any vacuum hoses that are found to be defective.

### 6 Steering and suspension components – check

#### Front suspension and steering

1 Raise the front of the vehicle, and support it on axle stands (see *Jacking and vehicle support*).

2 Visually inspect the balljoint dust cover and the steering rack-and-pinion gaiters for splits, chafing or deterioration. Any wear of these components will cause loss of lubrication together with dirt and water entry, resulting in rapid deterioration of the balljoints or steering gear.

3 Check the power steering fluid hoses for chafing or deterioration, and the hose unions for fluid leaks. Also check for signs of fluid leakage under pressure in the steering gear rubber gaiters, which may indicate failed fluid seals within the steering gear.

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 present, but if the movement is appreciable, further investigation is necessary to determine the source. Continue rocking the wheel when an assistant depresses the footbrake. If 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 also be caused by wear in the hub bearings or the steering track rod balljoints. If the outer balljoint is worn, the visual movement will be obvious. If the inner joint is suspect, it can be felt by placing a hand over the rack-and-pinion rubber gaiter and gripping the track rod. If the wheel is now rocked, movement will be felt at the inner joint if wear has taken place.

6 Using a large screwdriver or flat bar, check for wear in the suspension mounting bush by levering between the relevant suspension component and its attachment point. Some movement is to be expected, as the mountings are made of rubber, but excess

wear should be evident in the condition of the rubber, looking for splits in the rubber.

7 With the car standing on level ground, the assistant turn the front wheels forth, about an eighth of a turn. The steering should be very straight. If this is not the case, check the joints and mountings. In addition, check the pinion steering. 8 The front suspension should be checked for

#### Rear suspension

9 Check the rear of the vehicle on axle stands (see *Jacking and vehicle support*).

10 Working from the rear, check the bearings, the strut or shock absorbers (if applicable). 11 The rear suspension should be checked for

#### Shock absorbers

12 Check the shock absorbers around the vehicle for any fluid leakage. 13 The shock absorbers should be checked at the corners. 14 V

15 The shock absorbers should be checked at the corners. 16 The shock absorbers should be checked at the corners. 17 The shock absorbers should be checked at the corners. 18 The shock absorbers should be checked at the corners. 19 The shock absorbers should be checked at the corners. 20 The shock absorbers should be checked at the corners.

#### Renewal

21 The shock absorbers should be renewed if they are found to be worn. 22 The shock absorbers should be renewed if they are found to be worn. 23 The shock absorbers should be renewed if they are found to be worn. 24 The shock absorbers should be renewed if they are found to be worn. 25 The shock absorbers should be renewed if they are found to be worn.

26 The shock absorbers should be renewed if they are found to be worn. 27 The shock absorbers should be renewed if they are found to be worn. 28 The shock absorbers should be renewed if they are found to be worn. 29 The shock absorbers should be renewed if they are found to be worn. 30 The shock absorbers should be renewed if they are found to be worn.

31 The shock absorbers should be renewed if they are found to be worn. 32 The shock absorbers should be renewed if they are found to be worn. 33 The shock absorbers should be renewed if they are found to be worn. 34 The shock absorbers should be renewed if they are found to be worn. 35 The shock absorbers should be renewed if they are found to be worn.



## Every 18 000 miles – diesel engines 1B•9

wear should be obvious. Also check the condition of any visible rubber bushes, looking for splits, cracks or contamination of the rubber.

7 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. In addition, check the steering column universal joints for wear, and also check the rack-and-pinion steering gear itself.

8 The front suspension mountings should be checked for tightness.

### Rear suspension

9 Chock the front wheels, then jack up the rear of the vehicle and support securely on axle stands (see *Jacking and vehicle support*).

10 Working as described previously for the front suspension, check the rear hub bearings, the suspension bushes and the strut or shock absorber mountings (as applicable) for wear.

11 The rear suspension mountings should be checked for tightness.

### Shock absorber

12 Check for any signs of fluid leakage around the shock absorber bodies, or from the rubber gaiters around the piston rods. Should any fluid be noticed, the shock absorber is defective internally, and should be renewed.

**Note:** Shock absorbers should always be renewed in pairs on the same axle.

13 The efficiency of the shock absorber may be checked by bouncing the vehicle at each corner. Generally speaking, the body will return to its normal position and stop after being depressed. If it rises and returns on a rebound, the shock absorber is probably suspect. Also examine the shock absorber upper and lower mountings for any signs of wear.

### Removable towbar attachment

14 Where applicable, clean the coupling pin then apply a little grease to the socket. Make sure that the removable towbar attachment fits easily to its mounting and locks correctly in position.

### 7 Handbrake – check and adjustment

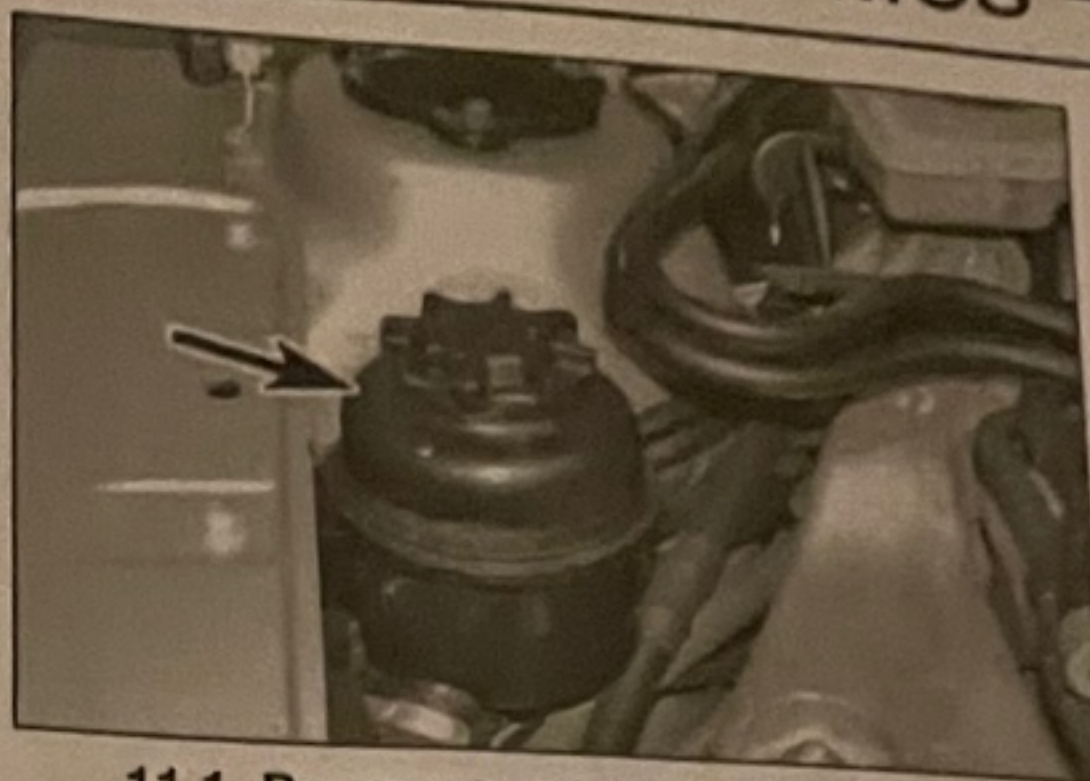
1 Chock the front wheels, then jack up the rear of the vehicle and support on axle stands (see *Jacking and vehicle support*).

2 Fully release the handbrake lever.

3 Apply the lever to the 4th notch position, and check that both rear wheels are locked when attempting to turn them by hand.

4 If adjustment is necessary, refer to Chapter 9.

5 Lower the vehicle to the ground.



11.1 Power steering fluid reservoir



11.3 Fluid level marks on the dipstick

### 8 Seat belt condition – check

1 Working on each seat belt in turn, carefully examine the seat belt webbing for cuts, or for any signs of serious fraying or deterioration. Pull the belt all the way out, and examine the full extent of the webbing.

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

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

4 Check the function of the seat belt reminder lamp.

### 9 Airbag system – check

1 The following work can be carried out by the home mechanic, however, if an electronic fault is apparent, it will be necessary to take the car to a Saab dealer or specialist, who will have the necessary diagnostic equipment to extract fault codes from the system.

2 Turn the ignition switch to the drive position (ignition warning lights on), and check that the SRS (Supplementary Restraint System) warning light is illuminated for 3 to 4 seconds. After this period the light should go out, indicating that the system has been checked and is functioning correctly.

3 If the warning light remains on or refuses to light, have the system checked by a Saab dealer or specialist.

4 Visually examine the steering wheel centre pad and the passenger airbag module for external damage. Also check the exterior of the front seats around the side airbag locations. If damage is evident, consult a Saab dealer or specialist.

5 In the interests of safety, make sure that there are no loose items inside the car that could be thrown onto the airbag modules in the event of an accident.

### 10 Headlight beam alignment – check

Refer to Chapter 12 for details.

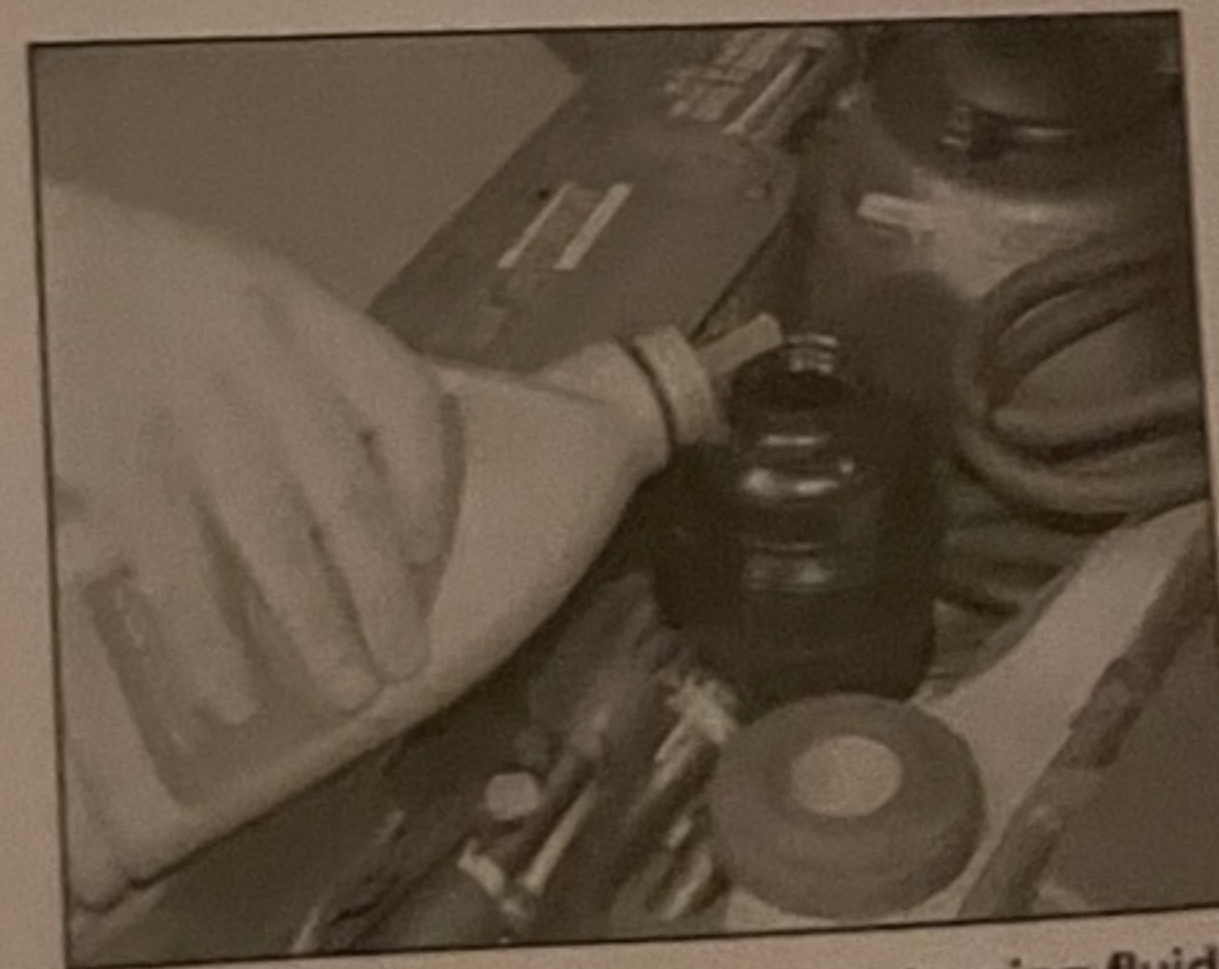
### 11 Power steering fluid level – check

1 The power steering fluid reservoir is located on the right-hand side of the engine compartment, in front of the suspension turret (see illustration). The fluid level should be checked with the engine stopped and the front wheels pointing straight-ahead.

2 First wipe the filler cap and surrounding area of the reservoir. Unscrew the cap from the top of the reservoir, and wipe all fluid from the cap dipstick with a clean rag.

3 Screw on the cap completely again, then remove it and check the fluid level on the dipstick. When the engine is cold at an ambient temperature of 20°C, the fluid level should be between the upper (MAX) and lower (MIN) marks on the dipstick, preferably near the MAX mark (see illustration). If the engine is warm, the level can be slightly higher, but the level must never be allowed to be lower than the MIN mark.

4 Top-up the fluid level using the specified type of fluid (do not overfill the reservoir) (see illustration), then refit and tighten the filler cap.



11.4 Topping-up the power steering fluid level



# 1B•10 Every 18 000 miles – diesel engines

## 12 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. Check the function of the heating, air conditioning and automatic climate control systems.

### Steering and suspension

- 3 Check for any abnormalities in the steering, suspension, handling or road 'feel'.
- 4 Drive the vehicle, and check that there are no unusual vibrations or noises.
- 5 Check that the steering feels positive, with no excessive 'sloppiness', or roughness, and check for any suspension noises when cornering, or when driving over bumps. Check that the power steering system operates correctly.

### Drivetrain

- 6 Check the performance of the engine, clutch (manual transmission), transmission and driveshafts. Check that the turbo boost pressure needle moves up to the upper limit during sharp acceleration. The needle may occasionally enter the red zone for an instant, but if this happens frequently, or for extended periods, a problem may exist within the turbo boost control mechanism (see Chapter 4B).
- 7 Listen for any unusual noises from the engine, clutch (manual transmission) and transmission.
- 8 Make sure that the engine runs smoothly when idling, and that there is no hesitation when accelerating.
- 9 On manual transmission models, check that the clutch action is smooth and progressive, that the drive is taken up smoothly, and that the pedal travel is correct. Also listen for any noises when the clutch pedal is depressed. Check that all gears can be engaged smoothly, without noise, and that the gear lever action is smooth and not abnormally vague or 'notchy'.

10 On automatic transmission models, make sure that all gearchanges occur smoothly without snatching, and without an increase in engine speed between changes. Check that all the gear positions can be selected with the vehicle at rest. If any problems are found, they should be referred to a Saab dealer.

11 Listen for a metallic clicking sound from the front of the vehicle, as the vehicle is driven slowly in a circle with the steering on full lock. Carry out this check in both directions. If a clicking noise is heard, this indicates wear in a driveshaft joint, in which case, refer to Chapter 8.

### Braking system

- 12 Make sure that the vehicle does not pull to one side when braking, and that the wheels do not lock when braking hard.
- 13 Check that there is no vibration through the steering when braking.
- 14 Check that the handbrake operates correctly, without excessive movement of the lever, and that it holds the vehicle stationary on a slope.
- 15 Test the operation of the brake servo unit as follows. With the engine off, depress the footbrake four or five times to exhaust the vacuum, and then start the engine while holding the brake pedal depressed. As the engine starts, there should be a noticeable 'give' in the brake pedal as vacuum builds-up. Allow the engine to run for at least two minutes, and then switch it off. If the brake pedal is now depressed again, it should be possible to detect a 'hiss' from the servo as the pedal is depressed. After about four or five applications, no further sound should be heard, and the pedal should feel considerably harder.

### 13 Coolant antifreeze concentration – check

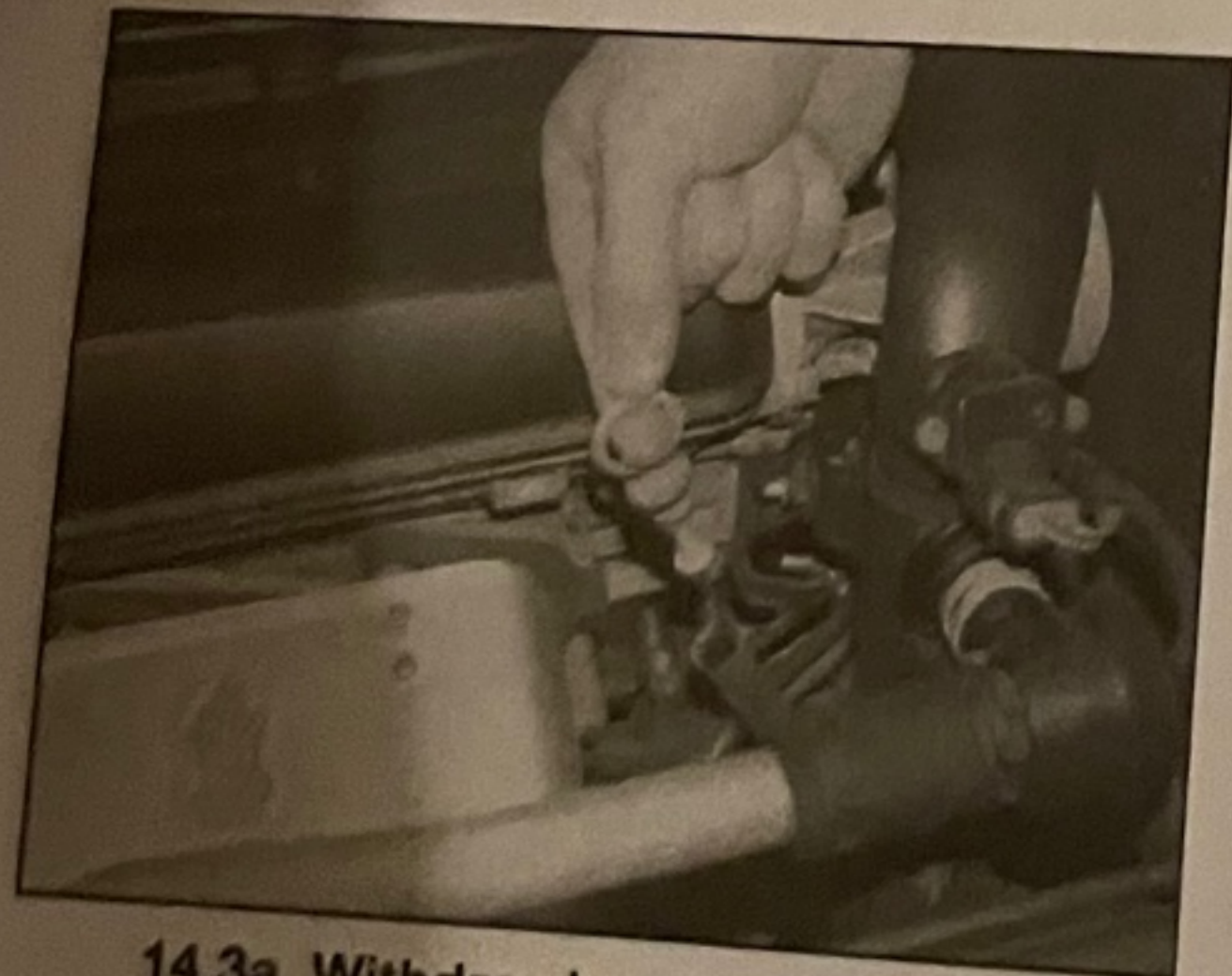
1 The cooling system should be filled with the recommended antifreeze and corrosion protection fluid. Over a period of time, the concentration of fluid may be reduced due to topping-up (this can be avoided by topping-up with the correct antifreeze mixture) or fluid

loss. If loss of coolant has been seen, it is important to make the necessary adjustments before adding fresh fluid. The exact ratio of antifreeze-to-water which you should use depends on the relative weather conditions. The mixture should contain at least 50% antifreeze, but not more than 70%. Consult the mixture ratio chart on the antifreeze container before adding coolant. Use antifreeze that meets the vehicle manufacturer's specifications. Note that antifreeze is premixed with water at the correct ratio.

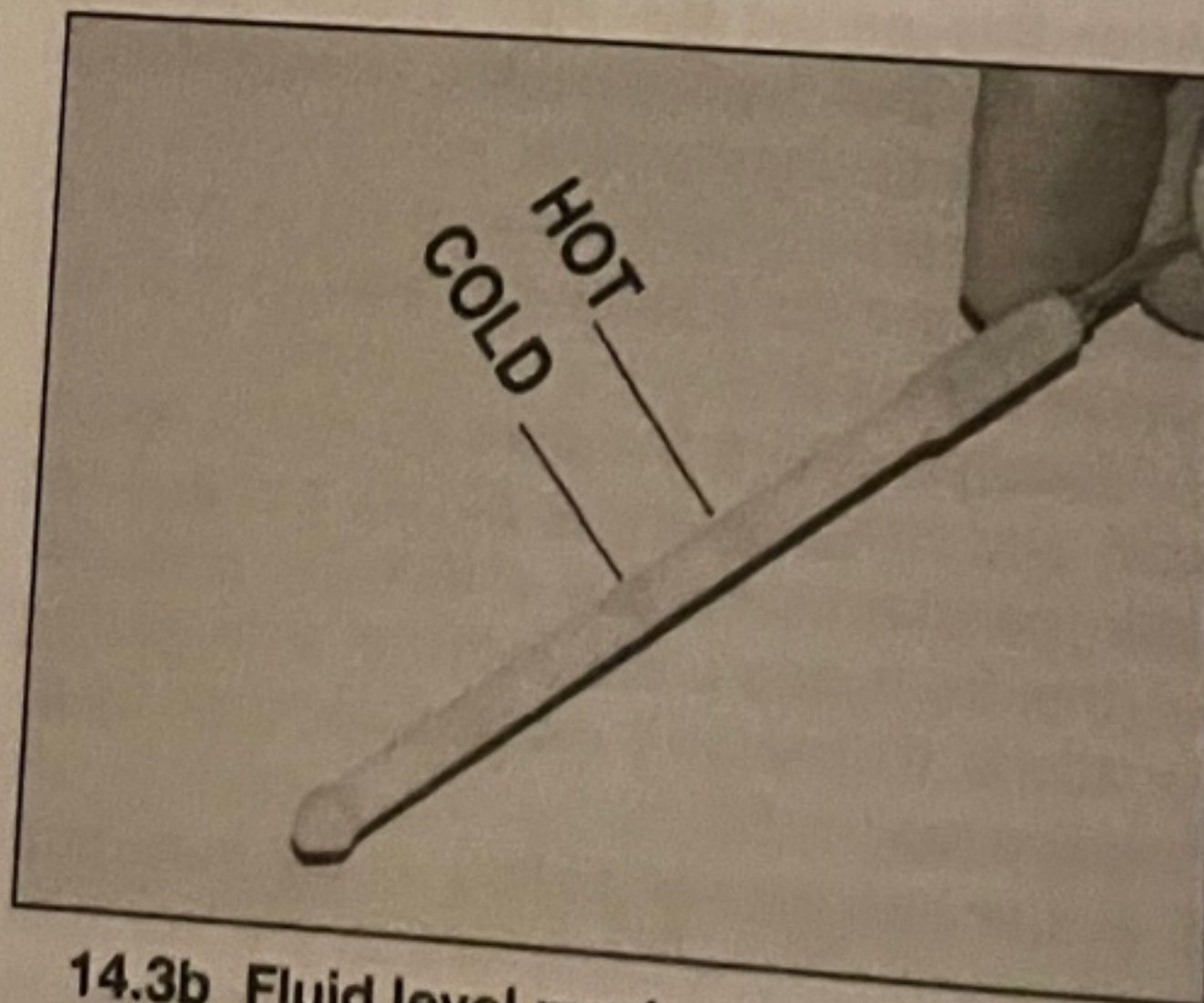
- 2 With the engine cold, carefully remove the cap from the expansion tank. If the engine is not completely cold, place a cloth rag over the cap before removing it, and remove it slowly to allow any pressure to escape.
- 3 Antifreeze checkers are available from car accessory shops. Draw some coolant from the expansion tank and observe the result. Many plastic balls are floating in the coolant. Usually, 2 or 3 balls must be floating for the correct concentration of antifreeze, but follow the manufacturer's instructions.
- 4 If the concentration is incorrect, it will be necessary to either withdraw some coolant and add antifreeze, or alternatively drain the old coolant and add fresh coolant of the correct concentration.

### 14 Automatic transmission fluid level – check

- 1 The fluid level is checked using the dipstick located on the front of the transmission, on the left-hand side of the engine compartment beneath the battery location.
- 2 With the engine idling, select D and wait approximately 15 seconds, then engage P and wait a further 15 seconds. Do this again, position P, and leave the engine idling.
- 3 Withdraw the dipstick from the tube, wipe all the fluid from its end with a clean cloth or paper towel. Insert the clean dipstick into the tube as far as it will go, then withdraw it once more. Note the fluid level on the dipstick – there are level marks for cold and hot fluid conditions (see illustration). Use the hot marks if the engine has reached normal operating temperature.
- 4 If topping-up is necessary, add fluid through the dipstick tube. Never overfill the transmission so that the fluid level is above the upper mark. Use a funnel with a fine mesh gauze, to avoid spillage and to ensure that no foreign matter enters the transmission. Note that the quantity of fluid between the MIN and MAX marks is 0.4 litres.
- 5 After topping-up, take the car on a short drive to distribute the fresh fluid, and then recheck the level again, topping-up if necessary.
- 6 Always maintain the fluid at the correct level. If the level is allowed to fall below the lower mark, fluid starvation may result, which could lead to severe transmission damage.



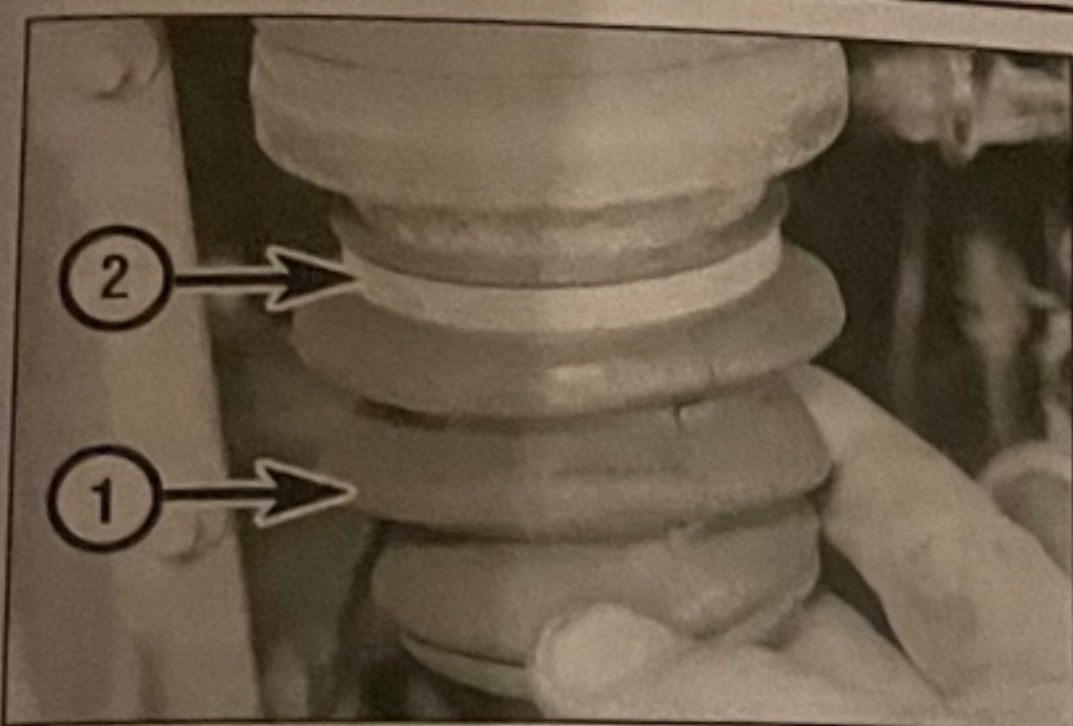
14.3a Withdrawing the automatic transmission fluid level dipstick



14.3b Fluid level marks on the dipstick



## Every 18 000 miles – diesel engines 1B•11



15.2 Check the condition of the driveshaft gaiters (1) and the retaining clips (2)

### 15 Driveshaft joints and gaiters – check

1 The driveshaft rubber gaiters are very important, because they prevent dirt, water and foreign material from entering and damaging the constant velocity (CV) joints. External contamination can cause the gaiter material to deteriorate prematurely, so it's a good idea to wash the gaiters with soap and water occasionally.

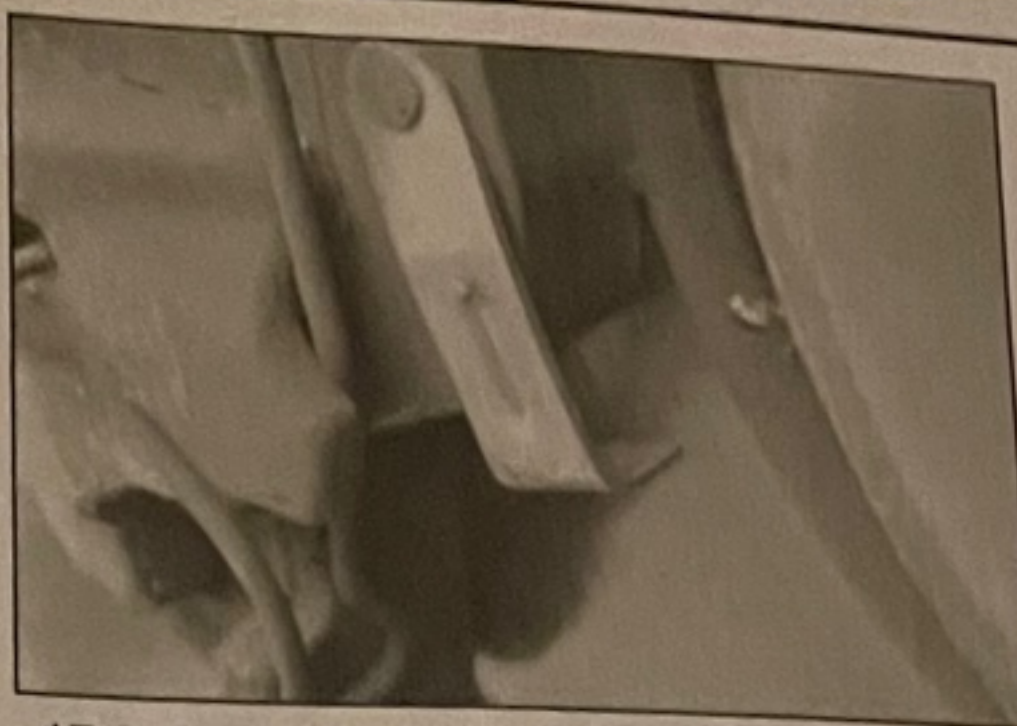
2 With the front of the vehicle raised and securely supported on stands, turn the steering onto full lock then slowly rotate the roadwheel. Inspect the condition of the outer constant velocity (CV) joint rubber gaiters while squeezing the gaiters to open out the folds (**see illustration**). Check for 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 gaiters should be renewed as described in Chapter 8.

3 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.

4 Any appreciable movement in the CV joint indicates wear in the joint, wear in the driveshaft splines, or a loose driveshaft retaining nut.

### 16 Exhaust system – check

1 With the engine cold, check the complete exhaust system from its starting point at the engine to the end of the tailpipe. If necessary, raise the front and rear of the vehicle and support it on axle stands (**see Jacking and vehicle support**). Remove any engine undershields as necessary for full access to the exhaust system.



17.0 Acoustic wear warning device fitted to the outer front brake pad

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 all relevant 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 rubber mountings. Try to move the pipes and silencers. If the components are able to come into contact with the body or suspension parts, secure the system with new mountings. Otherwise separate the joints (if possible) and twist the pipes as necessary to provide additional clearance.

### 17 Brake pad wear – check

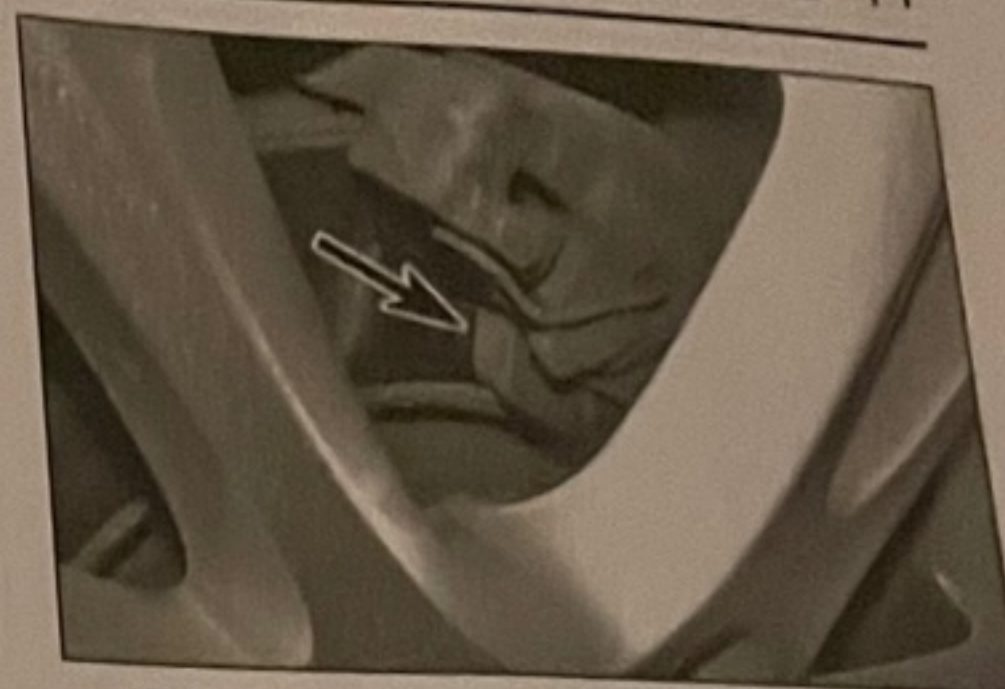
**Note:** An acoustic wear warning device is fitted to the outer pad, consisting of a metal strip, which contacts the brake disc when the thickness of the friction material is less than 3.0 mm. This device causes a scraping noise that warns the driver that the pads are worn excessively (**see illustration**).

1 To check the brake pads, firmly apply the handbrake, and then jack up the front or rear of the vehicle (depending on brakes to be checked) and support it securely on axle stands (**see Jacking and vehicle support**).

2 For a quick check, the pad thickness can be checked through the gaps in the alloy wheels (**see illustration**). Measure the thickness of the pad lining excluding the backing plate. This must not be less than that indicated in the Specifications.

3 The view through the wheel gives an indication of the **outer** brake pad wear only. For a comprehensive check, remove the wheels, and then the brake pads should be removed and cleaned. The operation of the caliper can then also be checked, and the condition of the brake disc itself can be fully examined on both sides.

4 If any pad's friction material is worn to the specified thickness or less; **all four pads must be renewed as a set**. Refer to Chapter 9 for details.



17.2 The outer brake pad wear can be checked through the aperture in the wheel

5 On completion, refit the roadwheels and lower the vehicle to the ground.

### 18 Hinges and locks – lubrication

1 Work around the vehicle and lubricate the hinges of the bonnet, doors and boot lid or tailgate with a light machine oil.

2 Lightly lubricate the two bonnet release locks with a smear of grease.

3 Check carefully the security and operation of all hinges, latches and locks. Check that the central locking system operates correctly.

4 Check the condition and operation of the bonnet and boot lid/tailgate struts, renewing them if either is leaking or no longer able to support the bonnet/boot lid/tailgate.

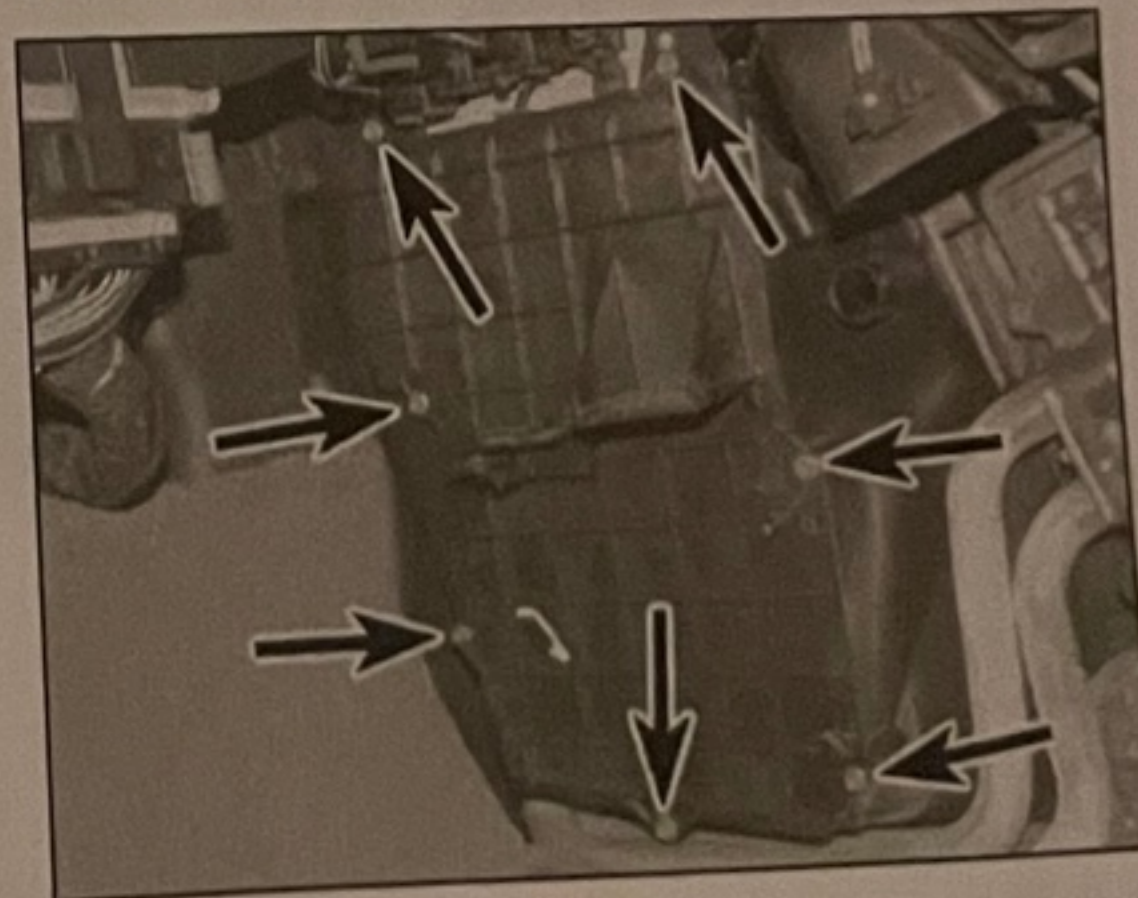
### 19 Pollen filter – renewal

1 Remove the glovebox as described in Chapter 11.

2 Remove the side trim/carpet from the centre console with reference to Chapter 11. At the same time, cut the plastic ties holding the wiring harness to the cover, and the cooler hose to the glovebox.

3 Undo the screws and remove the cover from over the pollen filter (**see illustrations**).

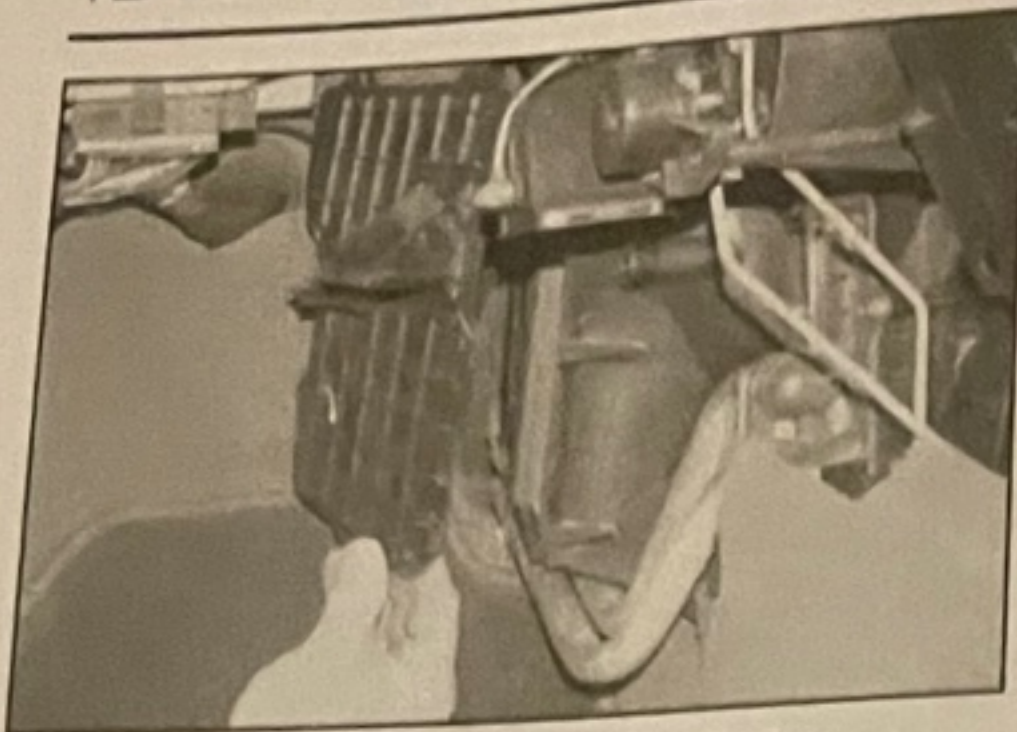
4 Slide the pollen filter from the housing (**see**



19.3a Undo the screws...



# 1B•12 Every 18 000 miles – diesel engines



19.3b ... and remove the cover ...

illustration). Note the arrows indicating the direction of airflow through the filter.

5 Check that a seal is fitted to the top of the filter; if not, obtain and fit one. On models which have had air conditioning fitted after original manufacture, break off the plastic lugs from the top of the filter.

6 Loosen the clips and disconnect the two drain hoses from each side of the heater unit. Ideally, blow compressed air through the hoses to clear any accumulated debris, alternatively, clear the hoses with a suitable brush. Also, clear the spigots on the heater unit.

7 Refit the drain hoses and tighten the clips, then fit the new pollen filter using a reversal of the removal procedure.



19.4 ... then slide the pollen filter from the housing

## 20 Air conditioning drain hoses – check

- 1 Working beneath the glovebox, remove the side trim from the filter housing.
- 2 Remove the sound insulation from both sides of the heater unit.
- 3 Fold down the carpet from both sides of the centre console, and remove the insulation from the passenger's side.
- 4 Loosen the clips and remove both drain hoses from the side of the heater unit.
- 5 Ideally, blow compressed air through the drain hoses to clear them, alternatively use a cloth rag. Also clear the spigots on the heater unit.
- 6 Refit the hoses using a reversal of the removal procedure.

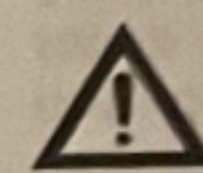
## 21 Auxiliary drivebelt condition – check

- 1 On all engines, a single, multi-grooved auxiliary drivebelt is used to transmit drive from the crankshaft pulley to the alternator, power steering pump and the refrigerant compressor (see illustration). The drivebelt is tensioned automatically by a spring-loaded tensioner pulley.

- 2 For better access to the drivebelt, remove the handbrake then jack up the front of the car and support it on axle stands (see illustration and vehicle support). Remove the front roadwheel, and then remove the plastic liner from under the right-hand arch to expose the crankshaft pulley (see illustration).

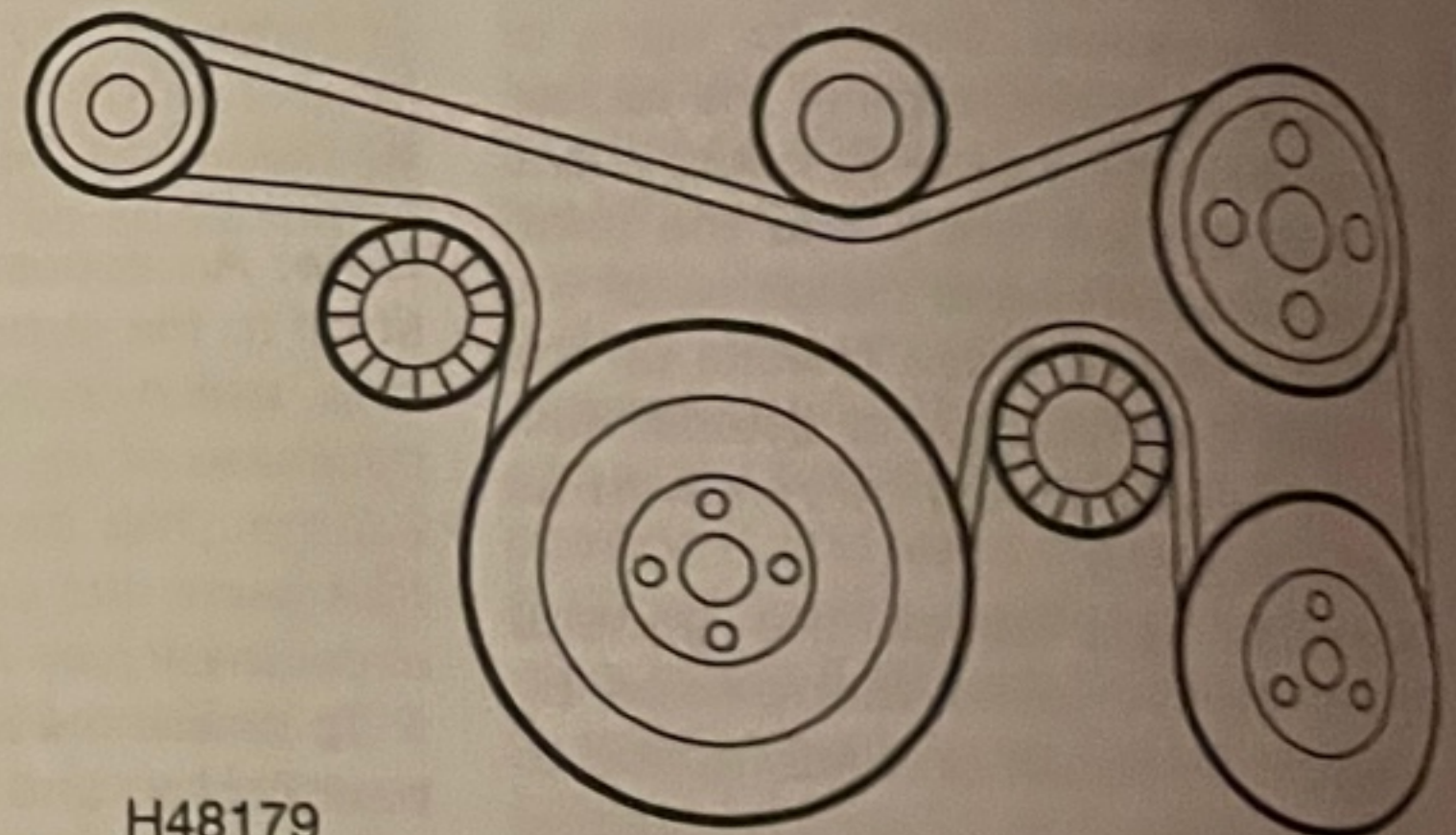
- 3 Using a suitable socket and extension, fitted to the crankshaft pulley bolt, rotate the crankshaft so that the entire length of the drivebelt can be examined. Examine the drivebelt for cracks, spitting, fraying, or patches and for separation of the belt plies. Renew the belt if worn or damaged.

## 22 Fuel filter – renewal

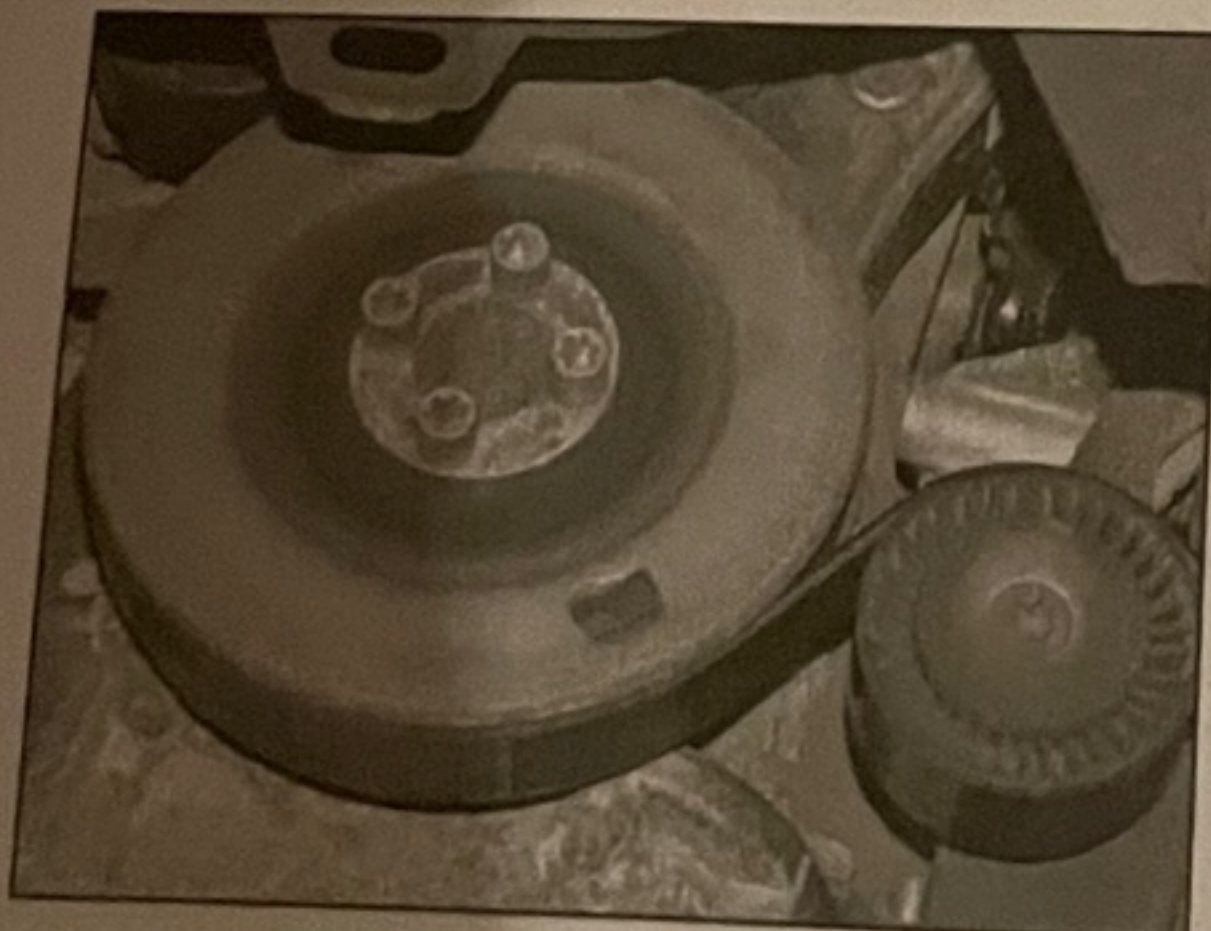


**Warning:** Absolute cleanliness must be observed during the procedure. Even the smallest particle of dirt could cause extensive damage to the fuel system.

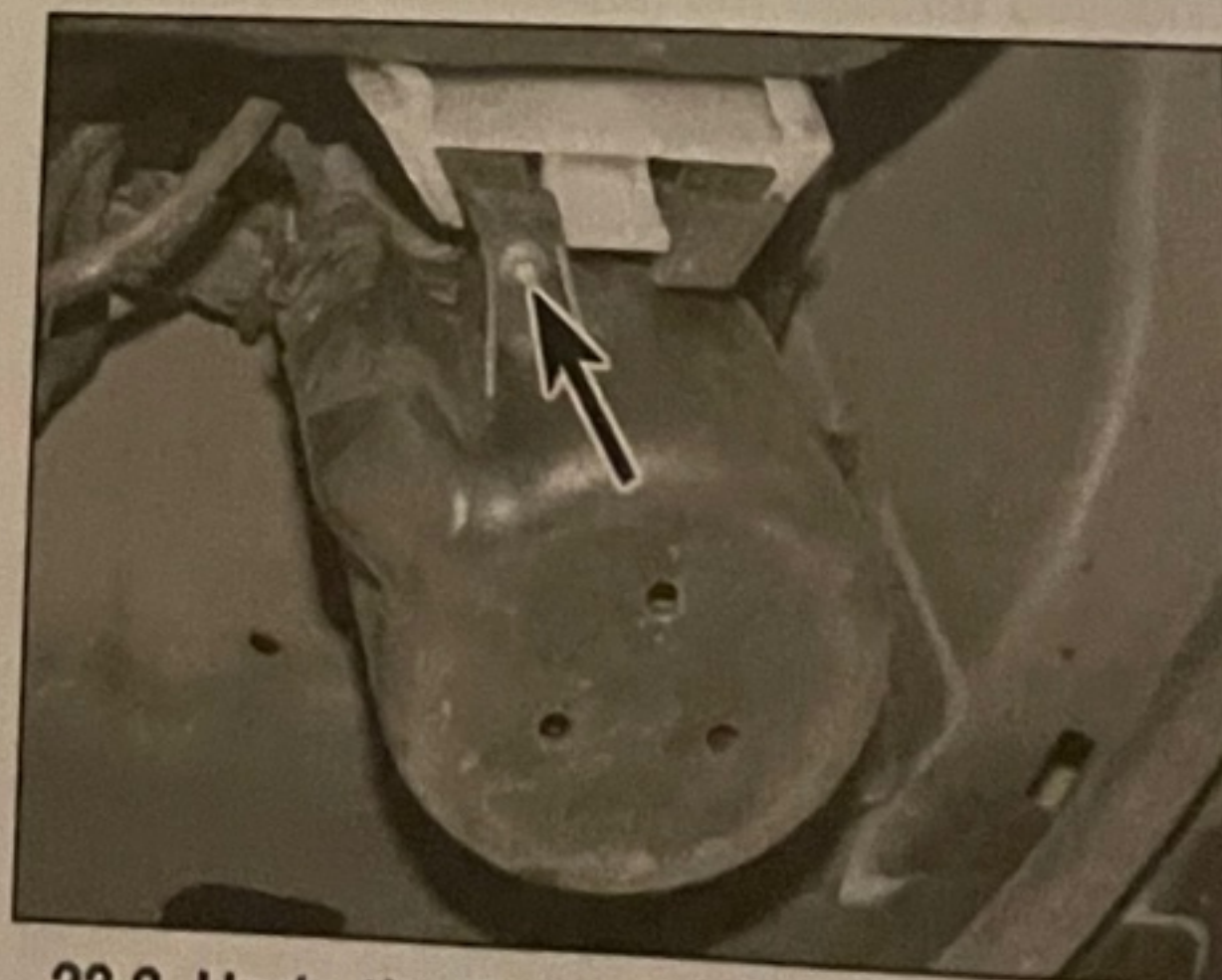
- 1 The fuel filter is attached to the side of the fuel tank under the vehicle.
- 2 Undo the Torx screw and pull down the protective cover on the base of the filter (see illustration).



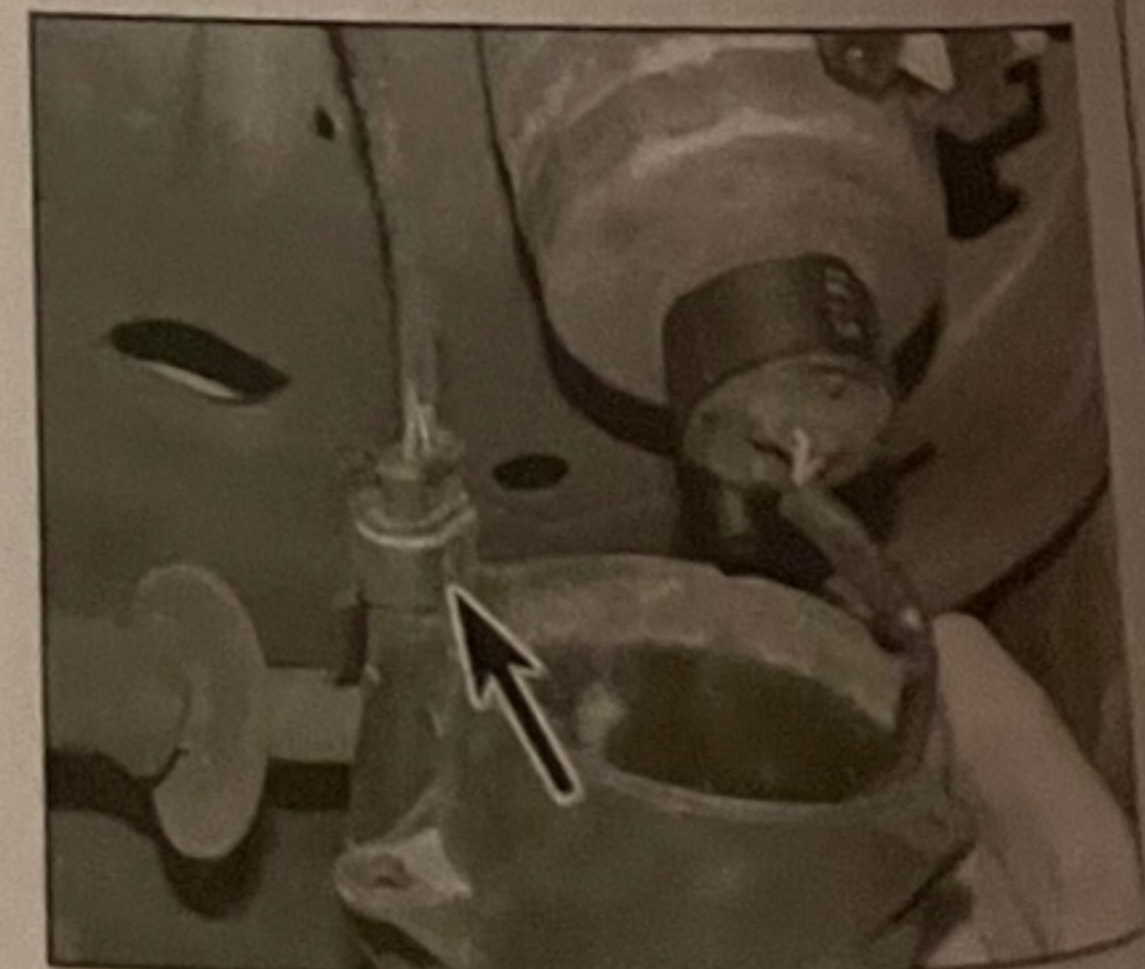
21.1 Auxiliary drivebelt correctly routed



21.2 Remove the wheel arch liner to expose the crankshaft pulley and auxiliary belt



22.2 Undo the Torx screw (arrowed) and lower the plastic cover



22.3a Disconnect the sensor wiring plug (arrowed) ...

## Every

## 23 Air

- 1 The right-hand side of the air filter is behind the...



## Every 18 000 miles – diesel engines 1B•13

3 Disconnect the water sensor wiring plug then unscrew the sensor from the base of the filter (see illustrations). Be prepared for fuel spillage – position a container under the filter to catch the fuel.

4 Unscrew the filter cartridge from the housing, using a strap wrench or filter removal tool (see illustration).

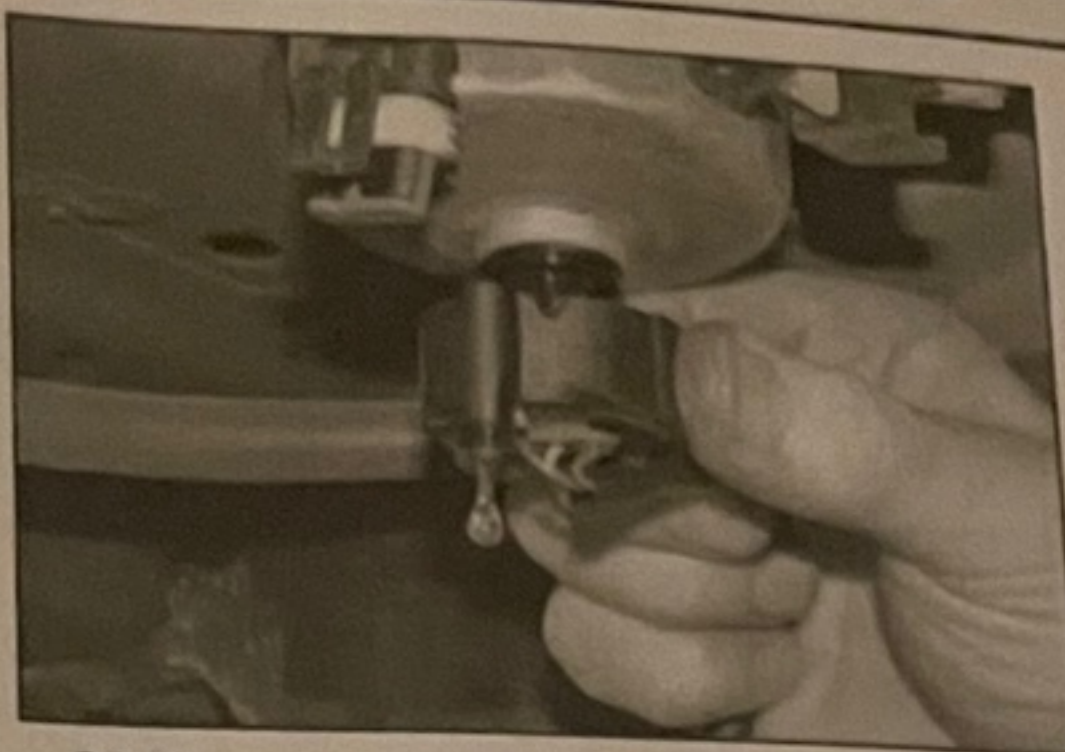
5 Lubricate the new filter seal with a little clean diesel fuel, and then screw the new filter into position (see illustrations). Tighten the filter to the specified torque.

6 Screw the water sensor into the base of the new filter, ensuring the rubber seal is fitted.

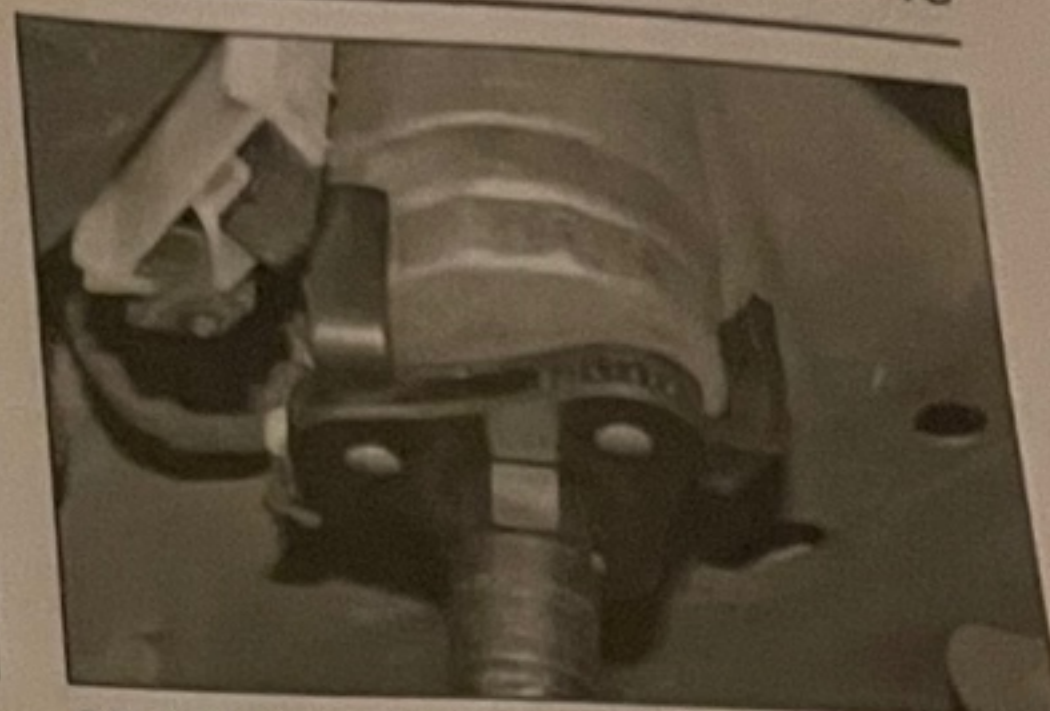
7 Reconnect the water sensor wiring plug, refit the cover and tighten the retaining screw.

8 Start the engine, and check the filter for leaks.

9 The old filter should be disposed of safely.



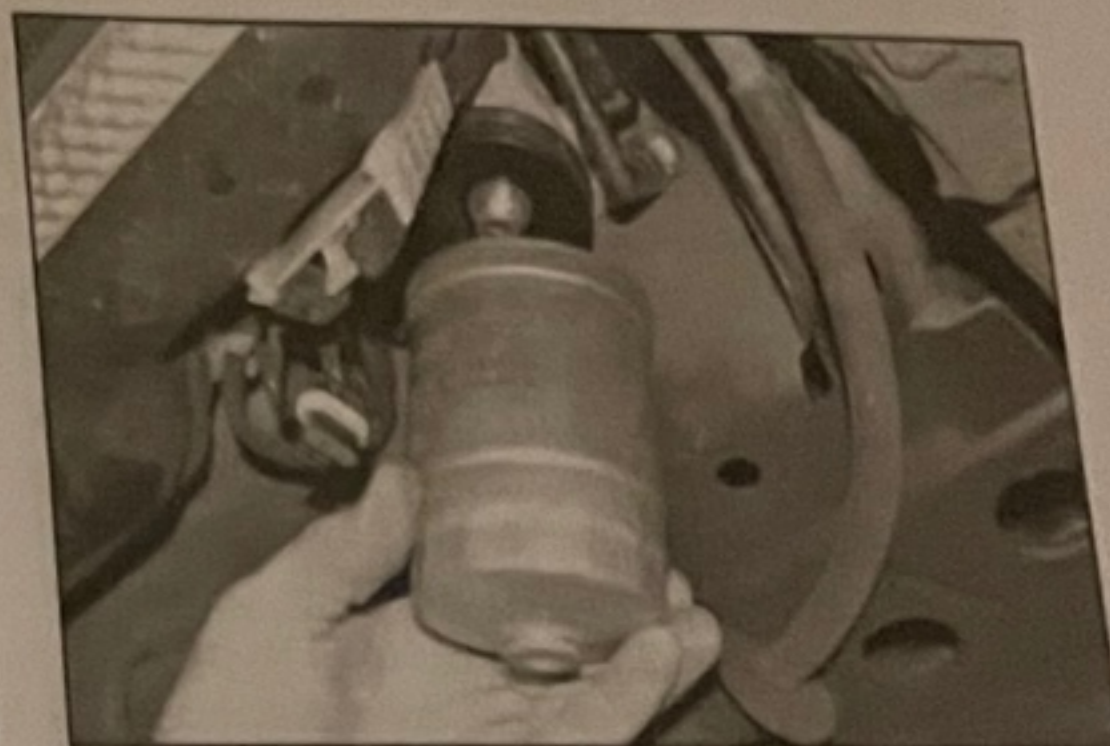
22.3b ... then unscrew the sensor and allow the filter to drain



22.4 Using a filter removal tool to unscrew the filter



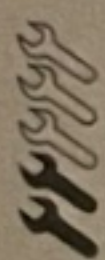
22.5a Lubricate the filter seal with clean fuel ...



22.5b ... and screw it into position

## Every 36 000 miles

### 23 Air filter element – renewal



1 The air cleaner is located beneath the front right-hand wing, behind the front bumper, and the air inlet is taken from the front of the car behind the radiator grille area. For improved

access to the filter, apply the handbrake, then jack up the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*), then undo the single screw and pull aside the front bumper/spoiler.

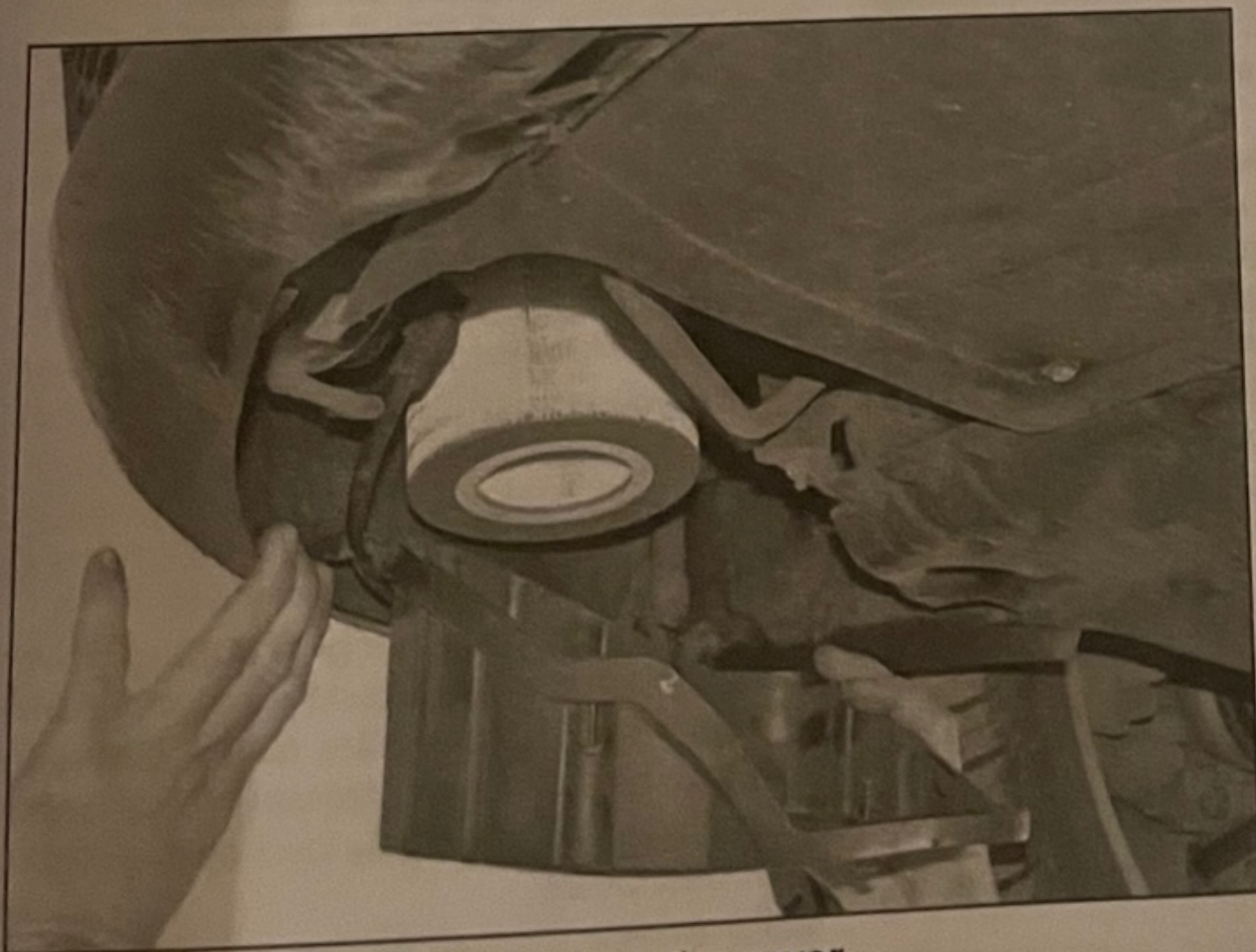
2 Undo the screws and remove the cover together with filter element from the bottom of the air filter housing (see illustrations). Recover the O-ring seal.

3 Note how the element is fitted, then remove it from the cover.

4 Wipe clean the inner surfaces of the cover and main housing.

5 Locate the new element on the cover, and then fit the cover complete with O-ring seal to the bottom of the housing. Insert and tighten the screws.

6 Lower the vehicle to the ground.



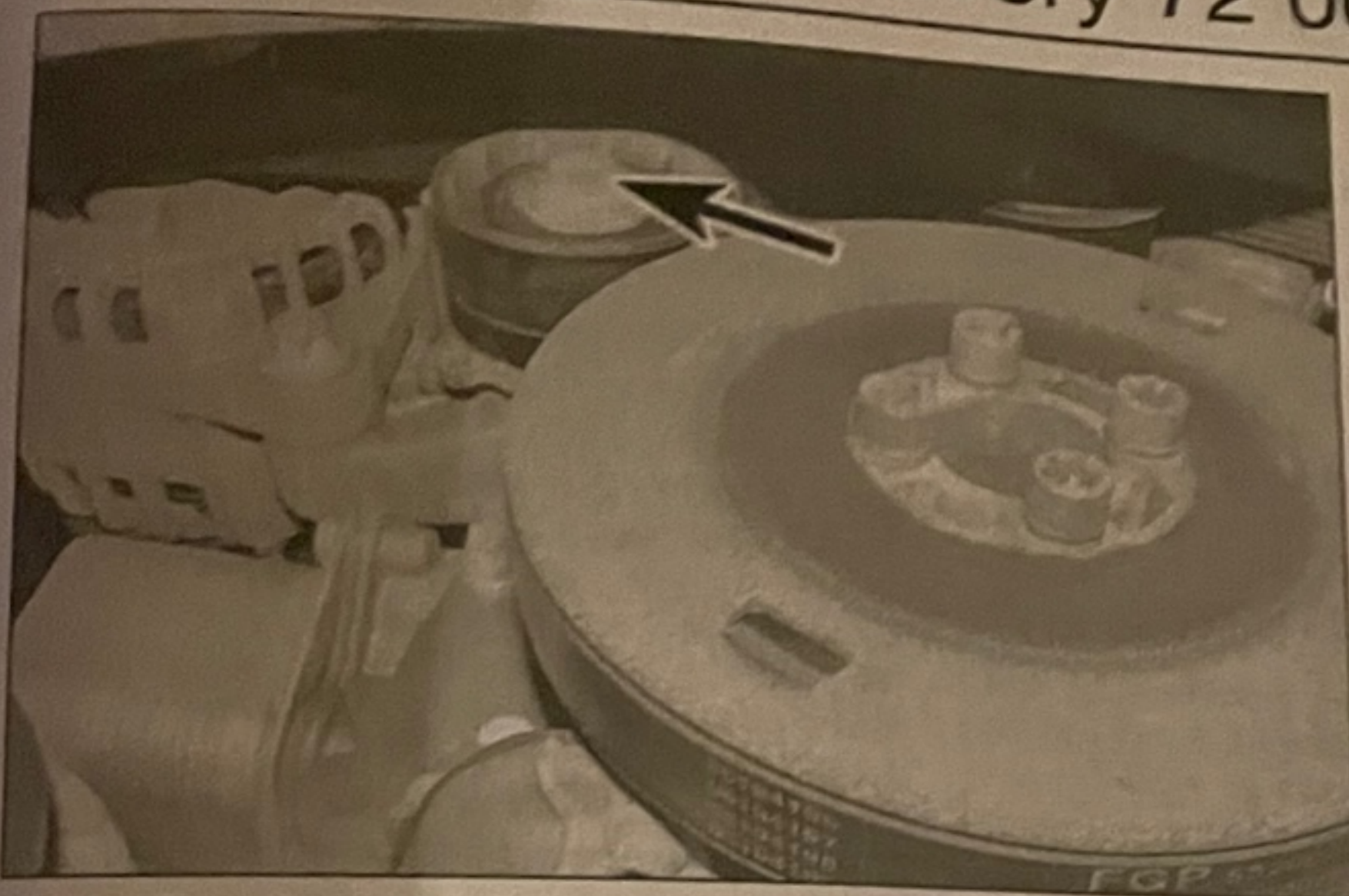
23.2a Remove the cover ...



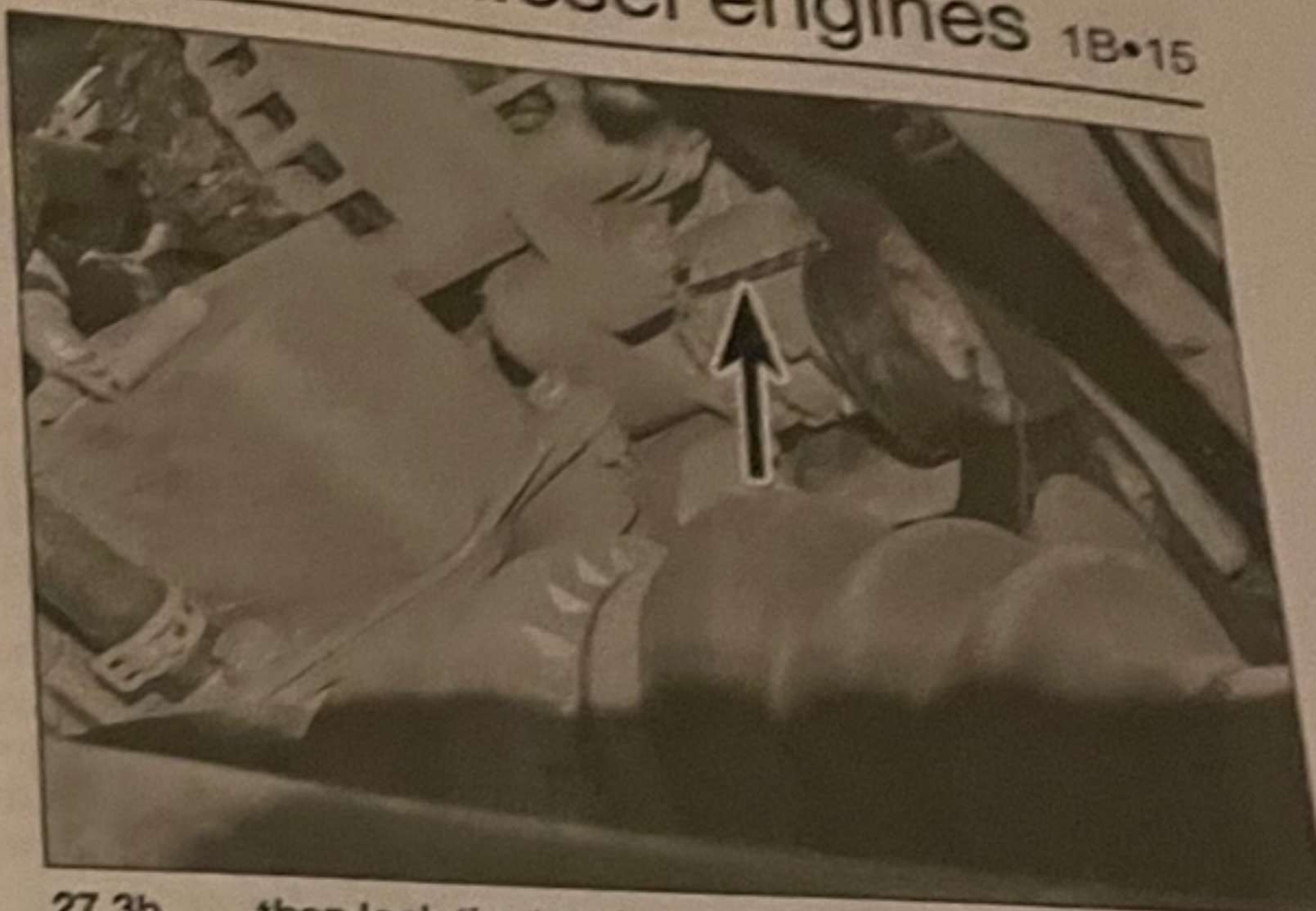
23.2b ... and remove the filter element



## Every 72 000 miles – diesel engines 1B•15



27.3a Turn the drivebelt tensioner clockwise using a spanner on the pulley centre bolt (arrowed) . . .



27.3b . . . then lock the tensioner by inserting a locking pin or drill bit (arrowed) through the special hole

and vehicle support). Remove the right-hand front roadwheel, and then remove the plastic liner from under the right-hand wheel arch to expose the crankshaft pulley.

3 The tensioner pulley spring must now be compressed and locked in position. Using a spanner or socket and bar, rotate the tensioner clockwise, then insert a locking pin/5 mm drill bit once the holes in the arm and body align, to lock the tensioner in place (see illustrations).

4 Slip the drivebelt from the pulleys, then

remove it from the engine compartment from the right-hand wheel arch. If the belt is to be re-used, mark its direction of rotation.

5 Locate the drivebelt over all the pulleys, making sure that the multi-grooved side is correctly engaged with the grooves on the pulleys (see illustration 21.1).

6 Compress the tensioner spring and withdrawn the locking pin/drill bit. Slowly release the tensioner, allowing it to apply pressure to the rear surface of drivebelt.

7 Ensure that the belt is correctly seated on all the pulleys, then start the engine and allow it to idle for a few minutes. This will allow the tensioner to settle in position and distribute the tension evenly throughout the belt. Stop the engine and check once again that the belt is correctly seated on all the pulleys.

8 On completion, refit the plastic wheel arch liner and roadwheel, and then lower the car to the ground.

## Every 3 years

### 28 Coolant – renewal



**Note:** This work is not included in the Saab schedule, and should not be required if the recommended Saab antifreeze/inhibitor is used.

**Warning:** Do not allow antifreeze to come in contact with your skin or painted surfaces of the vehicle. Flush contaminated areas immediately with plenty of water. Don't store new coolant, or leave old coolant lying around, where it's accessible to children or pets – they're attracted by its sweet smell. Ingestion of even a small amount of coolant can be fatal. Wipe up garage-floor and drip-pan spills immediately. Keep antifreeze containers covered, and repair cooling system leaks as soon as they're noticed.

**Warning:** Never remove the expansion tank filler cap when the engine is running, or has just been switched off, as the cooling system will be hot, and the consequent escaping steam and scalding coolant could cause serious injury.

**Warning:** Wait until the engine is cold before starting these procedures.

### Cooling system draining

1 With the engine completely cold, remove the expansion tank filler cap. Turn the cap anti-clockwise, wait until any pressure remaining in the system is released, then unscrew it and lift it off.

2 Raise the front of the vehicle and support it on axle stands (see *Jacking and vehicle support*).

3 Where applicable, remove the engine undershield, and then position a suitable container beneath the left-hand side of the radiator.

4 Loosen the drain plug located on the left-hand lower mounting stub (see illustration), and allow the coolant to drain into the container. If necessary, attach a hose to the drain plug to direct the coolant into the container.

5 When the flow of coolant stops, tighten the drain plug and where necessary refit the undershield.

6 If the coolant has been drained for a reason other than renewal, then provided it is clean and less than two years old, it can be re-used, though this is not recommended.

### Cooling system flushing

7 If coolant renewal has been neglected, or if the antifreeze mixture has become diluted, then in time the cooling system may gradually

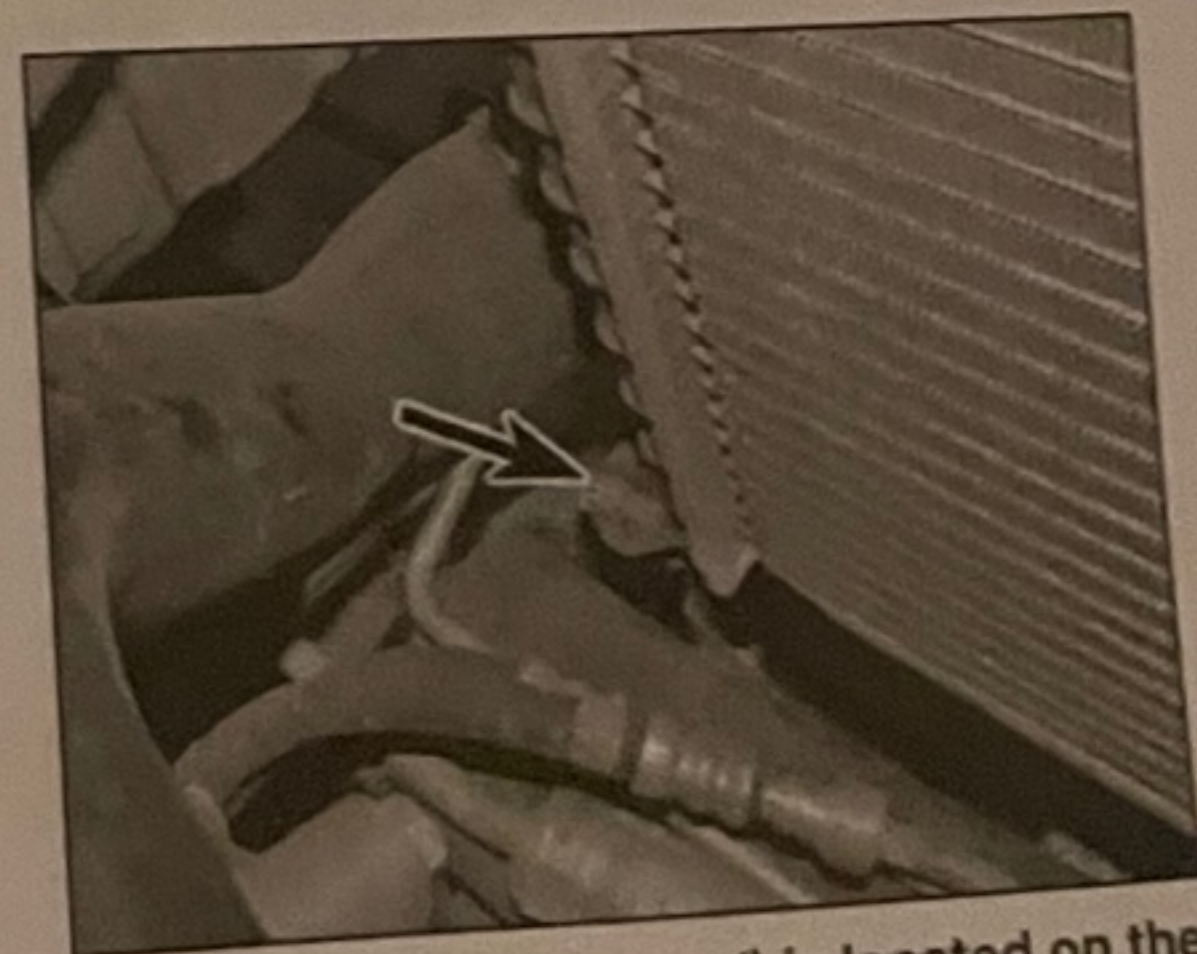
lose efficiency, as the coolant passages become restricted due to rust, scale deposits and other sediment. The cooling system efficiency can be restored by flushing the system clean.

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

### Radiator flushing

9 Disconnect the top and bottom hoses and any other relevant hoses from the radiator, with reference to Chapter 3.

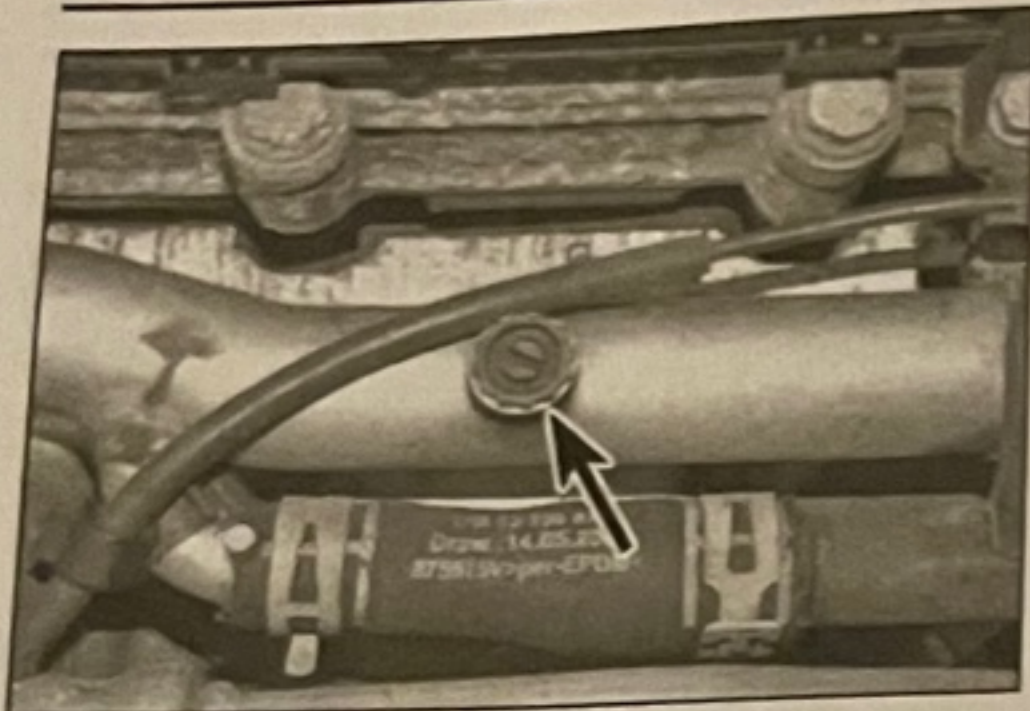
10 Insert a garden hose into the radiator top inlet. Direct a flow of clean water through the radiator, and continue flushing until clean



28.4 Drain plug (arrowed) is located on the left-hand end of the radiator



## 1B•16 Every 3 years – diesel engines



**28.18** The bleed screw (arrowed) is located in the metal coolant pipe at the front of the engine

water emerges from the radiator bottom outlet.

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

### Engine flushing

**12** Remove the thermostat housing as described in Chapter 3. If the radiator top hose has been disconnected, temporarily reconnect the hose.

**13** With the top and bottom hoses disconnected from the radiator, insert a garden hose into the radiator top hose. Direct

a clean flow of water through the engine, and continue flushing until clean water emerges from the radiator bottom hose.

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

### Cooling system filling

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

**16** Make sure that the air conditioning (A/C) or automatic climate control (ACC) is switched off. This is to prevent the air conditioning system starting the radiator cooling fan before the engine is at normal temperature when refilling the system.

**17** Remove the expansion tank filler cap and slowly fill the system until the coolant level reaches 30 mm above the MAX mark on the side of the expansion tank.

**18** Undo the bleed screw in the coolant pipe at the front of the engine (see illustration). Allow any trapped air to escape, and close the bleed screw once bubble-free coolant emerges from the pipe.

**19** Check the coolant level, top-up if necessary, then refit and tighten the expansion tank filler cap.

**20** Start the engine and set the heater to hot, and then run the engine until it reaches normal operating temperature (until the cooling fan cuts

in and out). Running the engine at varying speeds will allow the engine to warm-up quickly.

**21** Stop the engine, and allow it to cool, then recheck the coolant level with reference to *Weekly checks*. Top-up the level if necessary and refit the expansion tank filler cap.

### Antifreeze mixture

**22** The antifreeze should always be replaced at the specified intervals. This is necessary only to maintain the antifreeze properties, also to prevent corrosion that would otherwise occur as the corrosion inhibitors become progressively less effective.

**23** 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 given in the Specifications.

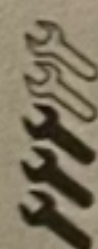
**24** Before adding antifreeze, the cooling system should be completely drained, preferably flushed, and all hoses checked for condition and security.

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

**Caution:** Do not use engine antifreeze in the windscreen/tailgate washer system as it will cause damage to the vehicle paintwork. A screenwash additive should be added to the washer system in the quantities stated on the bottle.

## Every 4 years

### 29 Brake fluid – renewal



**Warning:** Brake hydraulic 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. Excess moisture can cause a dangerous loss of braking effectiveness.

**1** The procedure is similar to that for the bleeding of the hydraulic system as described in Chapter 9.

**2** Working as described in Chapter 9, open the first bleed screw in the sequence, and pump the brake pedal gently until nearly all the old fluid has been emptied from the master cylinder reservoir. Top-up to the MAX level with new fluid, and continue pumping until only the new fluid remains in the reservoir, and new fluid can be seen emerging from the bleed screw. Tighten the screw, and top the reservoir level up to the MAX level line.

**3** Work through all the remaining bleed screws in the sequence until new fluid can be seen at all of them. Be careful to keep the master cylinder reservoir topped-up to above the MAX level at all times, or air may enter the system and greatly increase the length of the task.

**4** When the operation is complete, check that all bleed screws are securely tightened, and that their dust caps are refitted. Wash off traces of spilt fluid, and recheck the master cylinder reservoir fluid level.

**5** Check the operation of the brakes before taking the car on the road.

## Chapter 3 Petrol engines

## Contents

Camshafts and hydraulic lifters refitting .....  
Compression test .....  
Crankshaft oil seal replacement .....  
Cylinder head – removal and refitting .....  
Cylinder head cover refitting .....  
Engine/transmission oil change

## Degree of difficulty

Easy, suitable for novice with little experience

## Specifications

### General

Designation: 1985 cc engine, 2290 cc engine

Bore: 76.2 mm (3.0 in)

Stroke: 86.3 mm (3.39 in)

1985 cc engine

2290 cc engine

Direction of rotation: clockwise

No. 1 cylinder: front, left-hand

Compression ratio: 10.5:1

B205: 10.5:1

B235: 10.5:1

Maximum engine speed: 5500 rev/min

B205E: 5500 rev/min

B205E: 5500 rev/min

B235E: 5500 rev/min

B235R: 5500 rev/min

### Camshaft

Drive: belt

Number of lobes: 16

Camshaft rotation: clockwise

Cam lift: 10.5 mm

Endfloat: 0.15 mm

### Lubrication

Oil pump: gear

Minimum oil level: 3.5 litres

Oil pressure: 3.5 bar

Clearance: 0.15 mm

Pressure: 3.5 bar

Oil consumption: 0.15 litres/100 km