

# VOLVO

## 120 & 130 Series Plus 1800 Sports

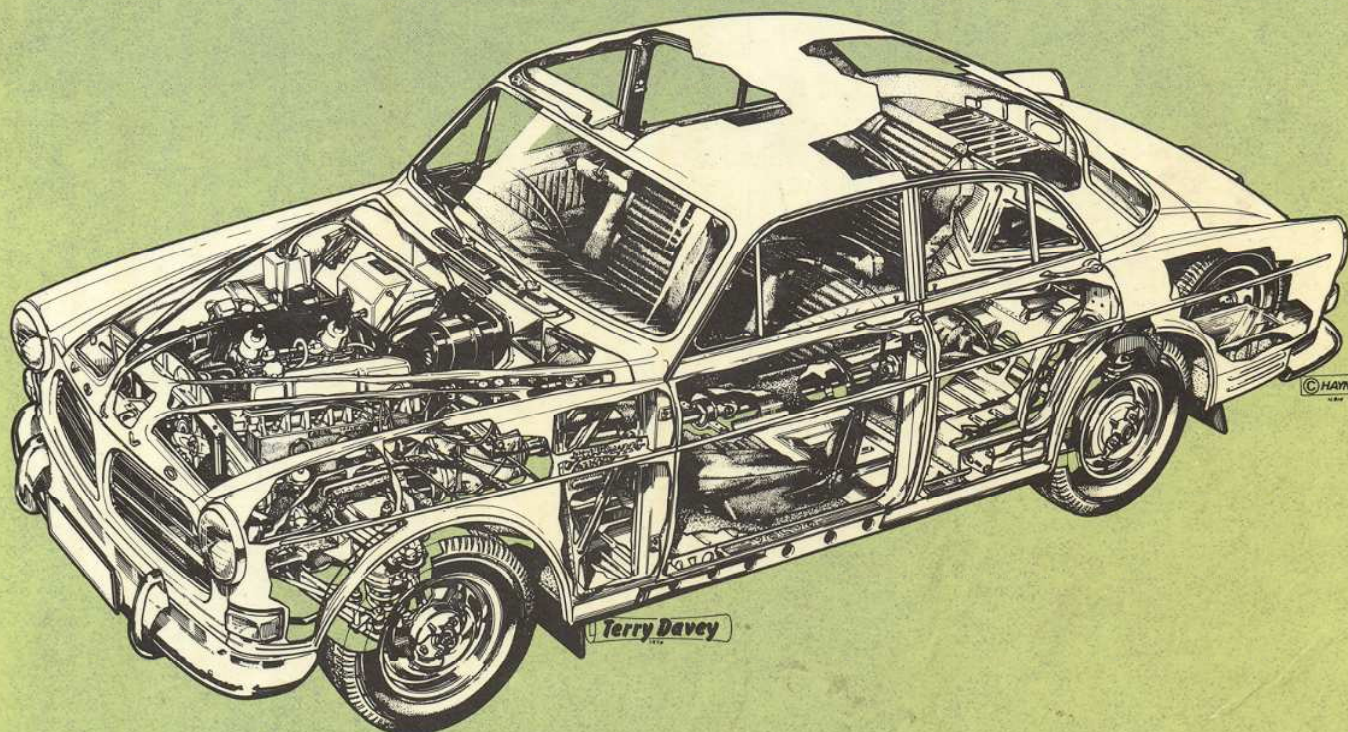
1961 to 1973

1778cc (108.5cu in) □ 1986cc (121cu in)



THE  
BOOK

# Owners Workshop Manual



# Volvo Owners Workshop Manual

by J H Haynes

Member of the Guild of Motoring Writers

and B L Chalmers - Hunt

TEng (CEI), AMIMI, AMIRTE, AMVBRA

## Models covered:

|               |   |                                                                |
|---------------|---|----------------------------------------------------------------|
| Volvo 121     | } | Saloon/Sedan<br>1778 cc (108.5 cu in) & 198 cc (121 cu in)     |
| Volvo 122     |   |                                                                |
| Volvo 123 GT  |   |                                                                |
| Volvo 131     |   |                                                                |
| Volvo 132     |   |                                                                |
| Volvo 133     | } | Estate/Wagon<br>1778 cc (108.5 cu in)<br>& 1986 cc (121 cu in) |
| Volvo 221     |   |                                                                |
| Volvo 222     |   |                                                                |
| Volvo 223     |   |                                                                |
| Volvo P1800   | } | Sports Coupe<br>1778 cc (108.5 cu in)<br>& 1986 cc (121 cu in) |
| Volvo P1800S  |   |                                                                |
| Volvo P1800E  |   |                                                                |
| Volvo P1800ES |   |                                                                |

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used in the bodywork repair section of Chapter 12.

Lastly, thanks are due to all of those people at Sparkford who helped in the production of this manual. Particularly, Brian Horsfall and Les Brazier who carried out the mechanical work and took the photographs respectively; Tim Parker who planned the layout of each page and Rod Grainger the editor.

## About this manual

### Introduction

This is a manual for the do-it-yourself motorist who owns a Volvo 120 series or P 1800 sports model. It shows how to maintain these cars in first class condition and how to carry out repairs when components become worn or break. By doing all maintenance and repair work themselves, owners will gain in three ways: they will know the job has been done properly; they will have had the satisfaction of doing the job themselves; and they will have saved garage labour charges. Regular and careful maintenance is essential if maximum reliability and minimum wear are to be achieved.

All the major mechanical and electrical assemblies and most of the minor ones as well have been stripped, overhauled, and rebuilt. Only through working in this way can solutions be found to the sort of problems facing private owners. Other hints and tips are also given which can only be obtained through practical experience.

The step-by-step photographic strip and rebuild sequences show how each of the major components was removed, taken apart, and rebuilt. In conjunction with the text and exploded illustrations this should make all the work quite clear - even to the novice who has never previously attempted the more complex job.

Although Volvo cars are hardwearing and robust, it is inevitable that their reliability and performance will decrease as they become older. Repairs and general reconditioning will become necessary if the car is to remain roadworthy. It is in these circumstances that the manual will prove to be of maximum help, as it is the *only* workshop manual written from practical experience especially for owners use (as opposed to service operators and garage proprietors).

Owners who intend to do their own maintenance and repairs should have a reasonably comprehensive tool kit. Some jobs require special service tools, but in many instances it is possible to get round their use with a little care and ingenuity.

Throughout this manual ingenious ways of avoiding the use of special equipment and tools are shown. In some cases the proper tool must be used. Where this is the case a description of the tool and its correct use is included, and details are given of where it can usually be borrowed or hired.

Given the time, mechanical do-it-yourself aptitude, and a reasonable collection of tools, this manual will show the enthusiastic owner how to maintain and repair his car really economically with minimum recourse to professional assistance and expensive tools and equipment.

### Its arrangement

This book is divided into 12 Chapters. Each Chapter is divided into Sections. The Sections contain serially numbered paragraphs.

All the illustrations carry a caption. When the illustration is designed as a figure the reference number consists of the Chapter number, followed by a sequence number; the sequence starting afresh for every Chapter. Photographs have a reference number in the caption - this reference number pinpoints the Section and paragraph in that Chapter to which the photograph refers.

When the left-hand side or right-hand side of a car or component is mentioned, this is to be taken as if the viewer was looking in the forward direction of travel and the component normally fitted in the car.

Note where the 120 model is mentioned this should be interpreted as meaning 120 and 130 series models when otherwise stated.

Whilst every care is taken to ensure that the information in this manual is correct, no liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from the information given.

### Getting the best from your manual

Before starting a job, read all the relevant parts of the manual - and indeed any irrelevant parts which you think might be useful. As well as providing information, it will help you to check that you have all the tools, and all the spares that you will need. The ideal time to do this is on the Friday night if you are going to do the job over the weekend - not the Friday night before you start but the previous Friday night. This will allow you a full week to get all of the materials which will be needed. Obviously this manual will be used as the actual work is carried out in order to make on the spot references. When the manual is being put to this use, it is a good idea to cover the open pages with polythene or a sheet of glass to prevent them from becoming stained with oil or grease.

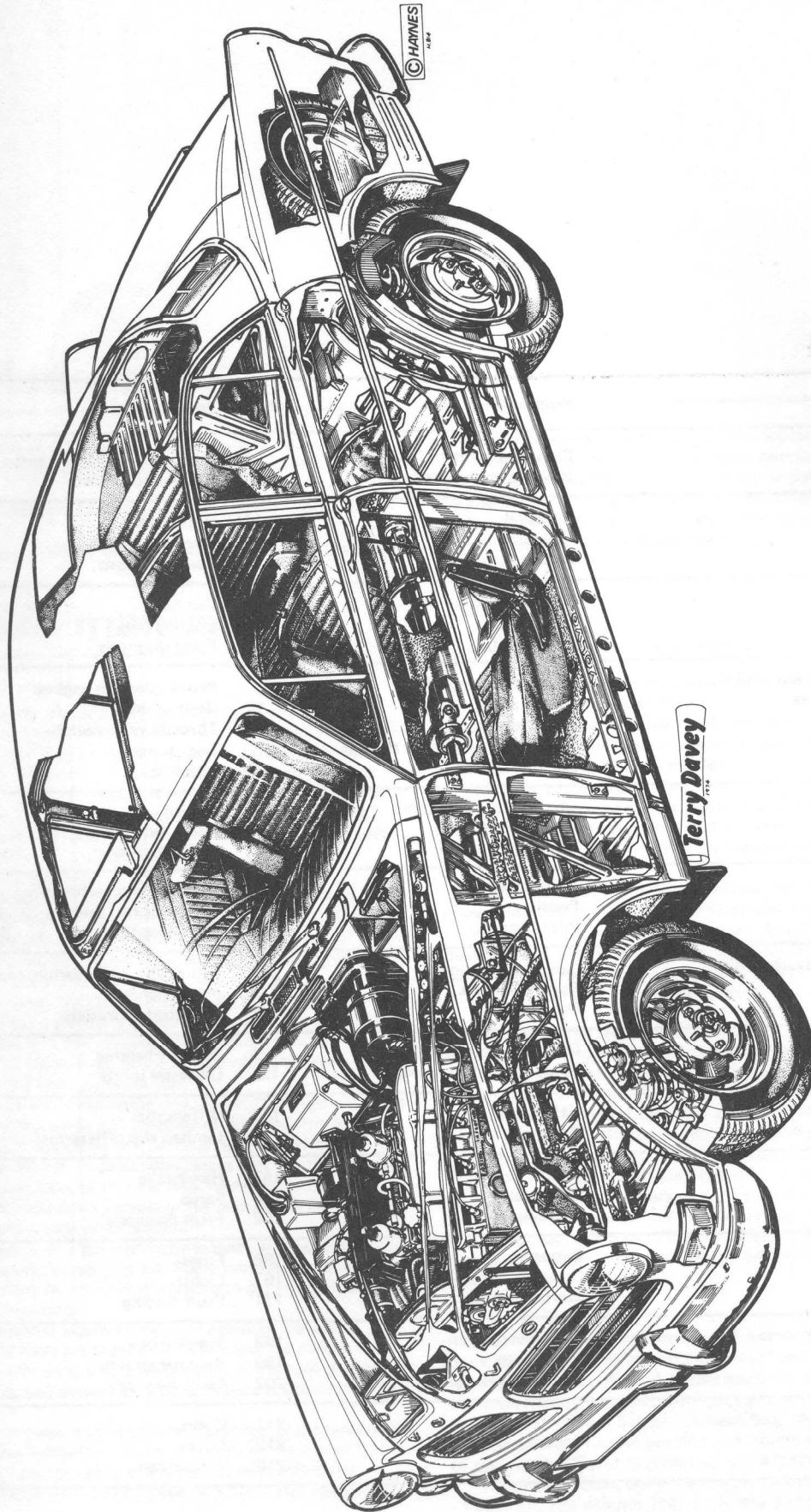
### The tools for the job

The Volvo needs millimetric A/F spanners. You will see from this book that you can do almost anything if you possess a set of open-ended spanners and a set of cranked ring spanners. If, having bought these you still have money to spend, don't buy a box full of gleaming socket heads with a ratchet holder - instead, buy yourself a hub puller, which can also be used for the gearbox and timing gear (you can see the sort of tool needed in our illustration) and a torque wrench.

Torque wrenches, pullers and other specialised tools are pricey items - therefore, you will not find them easy to borrow. However, one possible source should not be overlooked - many local car clubs lend tools to their members, and it could well be that a subscription to such a club would cost you less than buying a torque wrench.

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Cutaway view of the Volvo 122S

# Use of English

As this book has been written in England, it uses the appropriate English component names, phrases, and spelling. Some of these differ from those used in America. Normally, these cause no difficulty, but to make sure, a glossary is printed below. In ordering spare parts remember the parts list will probably use these words:

## Glossary

| English                    | American                    | English                             | American                         |
|----------------------------|-----------------------------|-------------------------------------|----------------------------------|
| Aerial                     | Antenna                     | Interior light                      | Dome lamp                        |
| Accelerator                | Gas pedal                   | Layshaft (of gearbox)               | Counter shaft                    |
| Alternator                 | Generator (AC)              | Leading shoe (of brake)             | Primary shoe                     |
| Anti-roll bar              | Stabiliser or sway bar      | Locks                               | Latches                          |
| Battery                    | Energizer                   | Motorway                            | Freeway, turnpike etc.           |
| Bodywork                   | Sheet metal                 | Number plate                        | Licence plate                    |
| Bonnet (engine cover)      | Hood                        | Paraffin                            | Kerosene                         |
| Boot lid                   | Trunk lid                   | Petrol                              | Gasoline                         |
| Boot (luggage compartment) | Trunk                       | Petrol tank                         | Gas tank                         |
| Bottom gear                | 1st gear                    | 'Pinking'                           | 'Pinging'                        |
| Bulkhead                   | Firewall                    | Quarter light                       | Quarter window                   |
| Camfollower or tappet      | Valve lifter or tappet      | Retread                             | Recap                            |
| Carburettor                | Carburetor                  | Reverse                             | Back-up                          |
| Catch                      | Latch                       | Rocker cover                        | Valve cover                      |
| Choke/venturi              | Barrel                      | Roof rack                           | Car-top carrier                  |
| Circlip                    | Snap ring                   | Saloon                              | Sedan                            |
| Clearance                  | Lash                        | Seized                              | Frozen                           |
| Crownwheel                 | Ring gear (of differential) | Side indicator lights               | Side marker lights               |
| Disc (brake)               | Rotor/disk                  | Side light                          | Parking light                    |
| Propeller shaft            | Driveshaft                  | Silencer                            | Muffler                          |
| Drop arm                   | Pitman arm                  | Spanner                             | Wrench                           |
| Drop head coupe            | Convertible                 | Sill panel (beneath doors)          | Rocker panel                     |
| Dynamo                     | Generator (DC)              | Split cotter (for valve spring cap) | Lock (for valve spring retainer) |
| Earth (electrical)         | Ground                      | Split pin                           | Cotter pin                       |
| Engineer's blue            | Prussian blue               | Steering arm                        | Spindle arm                      |
| Estate car                 | Station wagon               | Sump                                | Oil pan                          |
| Exhaust manifold           | Header                      | Tab washer                          | Tang; lock                       |
| Fast back (Coupe)          | Hard top                    | Tailgate                            | Liftgate                         |
| Fault finding/diagnosis    | Trouble shooting            | Tappet                              | Valve lifter                     |
| Float chamber              | Float bowl                  | Thrust bearing                      | Throw-out bearing                |
| Free-play                  | Lash                        | Top gear                            | High                             |
| Freewheel                  | Coast                       | Trackrod (of steering)              | Tie-rod (or connecting rod)      |
| Gudgeon pin                | Piston pin or wrist pin     | Trailing shoe (of brake)            | Secondary shoe                   |
| Gearchange                 | Shift                       | Transmission                        | Whole drive line                 |
| Gearbox                    | Transmission                | Tyre                                | Tire                             |
| Halfshaft                  | Axle-shaft                  | Van                                 | Panel wagon/van                  |
| Handbrake                  | Parking brake               | Vice                                | Vise                             |
| Hood                       | Soft top                    | Wheel nut                           | Lug nut                          |
| Hot spot                   | Heat riser                  | Windscreen                          | Windshield                       |
| Indicator                  | Turn signal                 | Wing/mudguard                       | Fender                           |
| Interior light             | Dome lamp                   |                                     |                                  |

## Miscellaneous points

An "Oil seal" is fitted to components lubricated by grease!

A "Damper" is a "Shock absorber", it damps out bouncing, and absorbs shocks of bump impact. Both names are correct, and both are used haphazardly.

Note that British drum brakes are different from the Bendix type that is common in America, so different descriptive names result. The shoe end furthest from the hydraulic wheel cylinder is on a pivot; interconnection between the shoes as on Bendix brakes is most uncommon. Therefore the phrase "Primary" or "Secondary" shoe does not apply. A shoe is said to be Leading or Trailing. A "Leading" shoe is one on which a point on the drum, as it rotates forward, reaches the shoe at the end worked by the hydraulic cylinder before the anchor end. The opposite is a trailing shoe, and this one has no self servo from the wrapping effect of the rotating drum.

# Buying spare parts and vehicle identification numbers

## Buying spare parts

Spare parts are available from many sources, for example: Volvo garages, other garages and accessory shops, and motor factors. Our advice regarding spare part sources is as follows:

**Officially appointed Volvo garages** - This is the best source of parts which are peculiar to your car and are otherwise not generally available (eg; complete cylinder heads, internal gearbox components, badges, interior trim etc). It is also the only place at which you should buy parts if your car is still under warranty - non-Volvo components may invalidate the warranty. To be sure of obtaining the correct parts it will always be necessary to give the storeman your car's engine and chassis number, and if possible, to take the 'old' part along for positive identification. Remember that many parts are available on a factory exchange scheme - any parts returned should always be clean! It obviously makes good sense to go straight to the specialists on your car for this type of part for they are best equipped to supply you.

**Other garages and accessory shops** - These are often very good places to buy materials and components needed for the maintenance of your car (eg; oil filters, spark plugs, bulbs, fan belts, oils and greases, touch-up paint, filler paste etc). They also sell general accessories, usually have convenient opening hours, charge lower prices and can often be found not far from home.

**Motor factors** - Good factors will stock all of the more important components which wear out relatively quickly (eg; clutch components, pistons, valves, exhaust systems, brake cylinders/pipes/hoses/seals/shoes and pads etc). Motor factors will often provide new or reconditioned

components on a part exchange basis - this can save a considerable amount of money.

## Vehicle identification numbers

Although many individual parts, and in some cases sub-assemblies, fit a number of different models it is dangerous to assume that just because they look the same, they are the same. Differences are not always easy to detect except by serial numbers. Make sure therefore, that the appropriate identity number for the model or sub-assembly is known and quoted when a spare part is ordered.

The *final drive* assembly has a number of its own which is carried on a plate fastened to the left-hand side of the casing. This plate gives the drive ratio, part number and serial number of the unit. The gearbox carries a similar plate on its underside giving the type designation, part number and serial number.

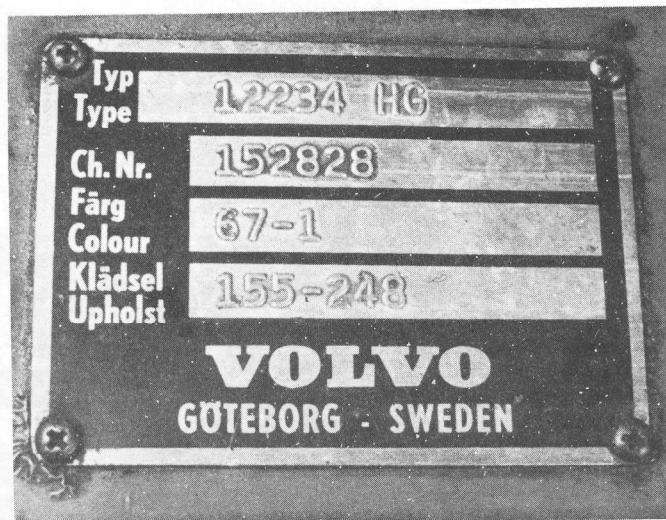
The *engine serial number* appears on the left-hand side of the engine at the top of the cylinder block just below the cylinder head, between the distributor and the crankcase breather (see photo). Just in front of this pad is another pad carrying two engraved figures. These are the last two digits of the engine part number. The first four figures of this number appear on the cylinder head casting immediately beside this pad.

The *car type designation* and *chassis number* are stamped on the cowl under the bonnet.

Stamped on a plate to the left, under the bonnet, is the *type designation* together with the code numbers for colour and upholstery.



This is the engine serial number (7327). The rest of the whole engine number will be found in the same position nearer to the front of the engine



This plate gives the vehicle type designation number and also the code numbers for paintwork and upholstery

# Routine maintenance

## Introduction

Routine maintenance is a chore - however enthusiastic an owner or ardent a car lover you may be. A better name for it is preventive maintenance. This does not make it any less of a chore, but it is one of those chores which pays off.

It does this in three ways:

- a) *It reduces wear and lengthens car life by ensuring that all parts that need it are properly lubricated.*
- b) *It ensures that all small adjustments which make so much difference to the performance of the car - and in some cases neglect of these may mean disaster - are always correct.*
- c) *Most important of all, by carrying out maintenance you give your car a thorough inspection.*

The maintenance tasks described below are in the main those recommended by Volvo, but we have added a few more to the list which practical experience has convinced us are well worth doing.

The recommended time intervals are applicable in temperate climates where the roads are reasonably dust-free and for yearly distances of 12,000 - 24,000 miles (20,000 - 40,000 kms). They may need to be modified where environmental conditions are extreme or distances driven are very much greater.

---

### 2 Weekly, before a long journey, or every 250 miles (400 kms)

---

- 1 Check the engine oil level which should be up to the 'Max' mark on the dipstick. Top-up the oil in the sump if necessary. On no account allow the oil to fall below the 'Min' mark on the dipstick.
- 2 Check the battery electrolyte level and top-up as necessary with distilled water. Make sure that the top of the battery is always kept clean and free of moisture.
- 3 Check the coolant level in the radiator or expansion tank. Top-up if necessary with the same mixture as is already in there - do not top-up antifreeze solution with water. Persistent need to top-up indicates leakage somewhere and should be investigated without delay.
- 4 Check the tyre pressures - and that includes the spare. The correct tyre pressures depend on the type of tyre that is being used and the vehicle load carried. The local Volvo garage, or indeed, any garage which deals in the make of tyre that is fitted, will be able to give this information. Keep the spare tyre at the highest pressures used as it can always be let down a little when it is fitted.
- 5 Refill the windscreen washer container with perfectly clean water. If it is necessary to add an antifreeze always use the sort specially made for windscreen washers. Check that the jets are operating correctly.
- 6 Check the windscreen wipers for correct operation and the blades for signs of deterioration. Renew the blades if their condition is suspect.
- 7 Check all the lights - notably the brake lights. When a car brakes suddenly, the car behind it needs all the warning it can get.
- 8 Check the level of the brake and clutch (when the hydraulic system is used as opposed to cable operation) hydraulic fluid reservoir/s. Top-up to the 'Max' mark if necessary.

---

### 3 Every 6,000 miles (10,000 km) or 6 months

---

- 1 Carry out the service operations in the weekly check.
- 2 Run the engine until it is hot and drain the engine oil. Refill with 5.7 Imp. pints (3.25 litres, 6.9 US pints) of fresh engine oil.
- 3 Renew the engine oil filter.
- 4 Wipe the top of the carburettor suction chamber and top-up the carburettor until the fluid is 0.25 in (6 mm) from the top. For further information see Chapter 3.
- 5 Check the carburettor adjustments, as described in Chapter 3. When fuel injection is fitted, further information will also be found in Chapter 3, but it may be as well to leave this to the local Volvo garage.
- 6 Check the cooling and heater systems for signs of leakage. Be sure

that all hose clips are tight and that none of the hoses shows signs of cracking.

7 *Carburettor engines only.* Clean the filter in the fuel pump. For further information, refer to Chapter 3.

8 Check the fan belt for signs of wear. If necessary set the tension, as described in Chapter 10.

9 Lubricate all throttle and engine control linkages with a little engine oil.

10 Check the adjustment of the handbrake and footbrake. Inspect the discs and pads and drums and linings for wear and signs of scoring. If it was necessary to make an appreciable adjustment to the handbrake inspect the linkage for wear. Full information will be found in Chapter 9.

11 Carefully examine all the brake hydraulic pipes, hoses and unions for signs of leakage. The flexible hoses must not rub against any part of the car when the steering is turned through both locks.

12 Lubricate all moving parts of the handbrake system.

13 Clean and adjust the spark plugs, as described in Chapter 4.

14 Check the state of charge of the battery with an hydrometer. If it is not fully charged, and there is no immediate explanation of this (as, for example a slack fan belt), have the battery checked by a local garage or preferably a specialist. If it is not in very good shape, it may be wise to consider replacement, especially in the Winter.

15 Clean the battery terminals and smear them with petroleum jelly (vaseline) to prevent corrosion.

16 Check the alignment of the headlights and adjust, if necessary, as described in Chapter 10.

17 Wipe round the filler plug on the steering box and check the oil level which should be up to the bottom of the plug hole. Top-up, if necessary, with the correct lubricant.

18 Check the tyre wear pattern as, if irregular, it can indicate that the front suspension is out of alignment. If this does appear to be the case, the remedy is obvious and expert advice sought as soon as possible.

19 Wipe around the filler plug of the final drive unit (differential) and remove the plug. Check the oil level which should come up to the filler hole. If necessary, top-up with the correct lubricant. Refit the plug.

20 Check the propeller shaft for wear, as described in Chapter 7.

Generally speaking, if wear is evident it would already have made its presence felt by causing vibration in the transmission system.

21 For cars with manual gearboxes, whether or not they are fitted with overdrive, wipe round the filler plug and check the oil level which should be up to the filler hole. If necessary, top-up with the correct lubricant.

22 *Automatic transmission.* The dipstick and filler tube is located in front of the bulkhead on the right-hand side of the engine. To check the oil level drive the car for a few miles to bring the fluid up to its normal operating temperature. With the car on a level surface move the selector to the 'P' position and allow the engine to idle for two minutes. With the engine still running, remove the dipstick, wipe clean with a non-fluffy rag, quickly insert fully and withdraw. If necessary, add fluid of the correct type to bring the level up to the 'Max' mark but take care not to overfill.

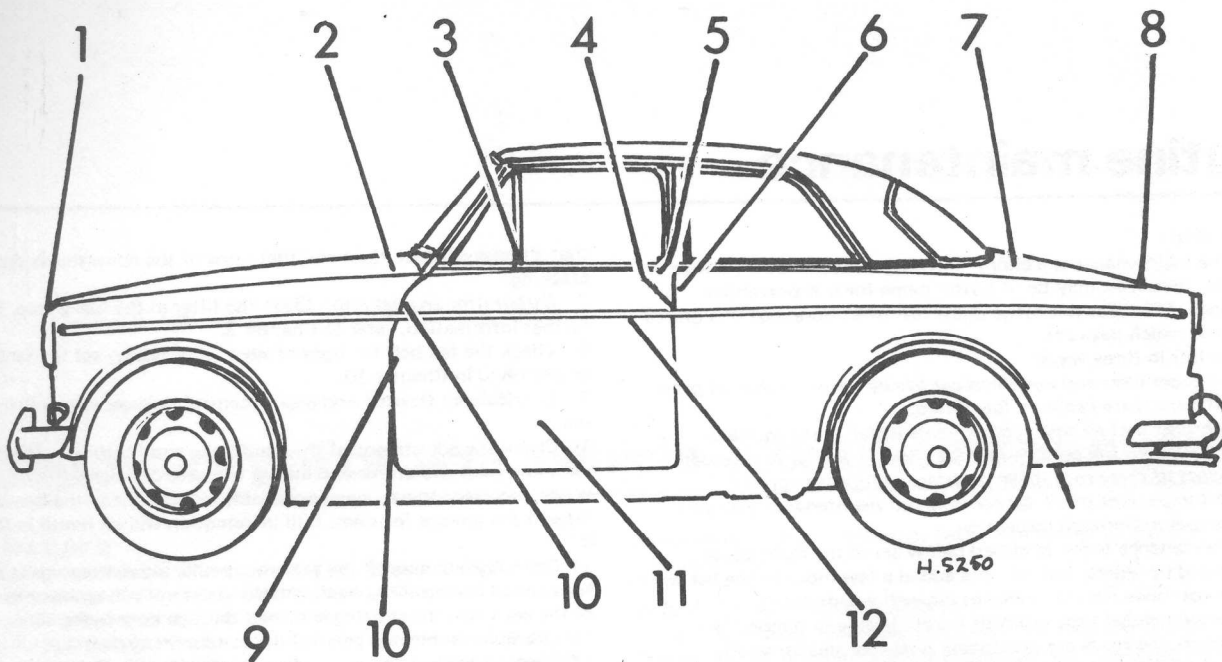
23 Check the exhaust system for leaks. If small blow holes are found, apply a little 'Holts Silencer Seal' or 'Gun-Gum' as a temporary measure. However, this is a sign that corrosion is well advanced and the pipe or system will require renewal shortly. Check all exhaust mountings for tightness.

24 Check and, if necessary, adjust the clutch free-play. Where a cable system is used check the condition of the cable and lubricate with a little engine oil.

25 Check and adjust the distributor contact breaker points. Full information will be found in Chapter 4.

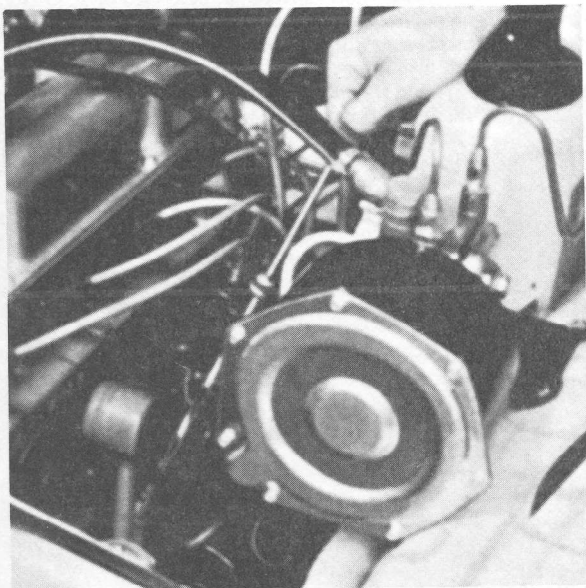
26 Check ignition timing and reset if necessary, as described in Chapter 4.

27 Ideally the front wheel alignment should be checked and reset if necessary. This is best left to the local Volvo garage. See Chapter 11 for further information.

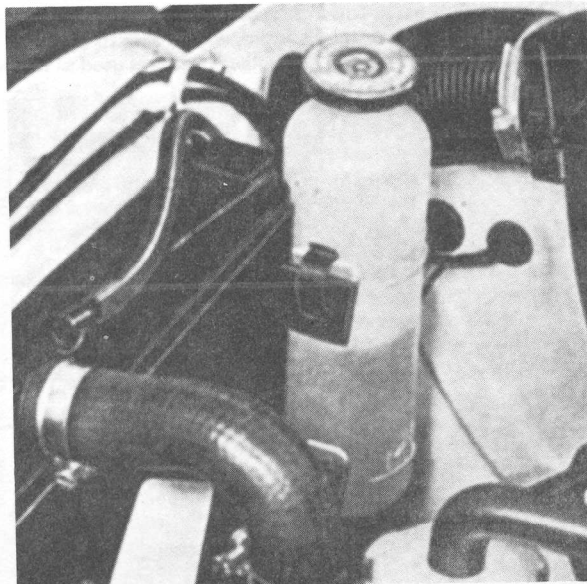


#### General lubrication points

| No. | Lubricating point                               | Lubricant            |
|-----|-------------------------------------------------|----------------------|
| 1   | Bonnet catch                                    | Paraffin wax         |
| 2   | Bonnet hinges                                   | Oil                  |
| 3   | Ventilator window catches and hinges            | Oil                  |
| 4   | Catches, door                                   | Paraffin wax         |
| 5   | Door handle lock buttons                        | Paraffin wax         |
|     | Keyholes                                        | Lock oil             |
| 6   | Door locks                                      | Lock oil             |
| 7   | Boot hinges                                     | Oil                  |
| 8   | Boot lid lock                                   | Oil                  |
|     | Keyholes                                        | Lock oil             |
| 9   | Door stops                                      | Paraffin wax         |
| 10  | Door hinges                                     | Oil                  |
| 11  | Driving seat rails and catches                  | Paraffin wax and oil |
| 12  | Window lifts                                    | Oil and grease       |
|     | Locks (accessible after removal of door panels) | Silicon grease       |



Removal of engine dipstick



Coolant expansion tank



Brake and clutch master cylinders

28 Generally, check the suspension and steering attachments for security and wear.  
 29 Check the valve clearances and reset if necessary. Full information will be found in Chapter 1.

#### 4 Every 12,000 miles (20,000 km) or 12 months

Carry out the service items for the 6,000 mile service, as applicable, plus:

- 1 Renew spark plugs. Full information will be found in Chapter 4.
- 2 Generally lubricate all locks, catches and hinges.
- 3 Service the crankcase ventilation system, as described in Chapter 3.
- 4 Change the discharge line fuel filter (fuel injection engines), as described in Chapter 3.
- 5 Check the engine compression pressures. This is best carried out by a Volvo garage using specialised equipment.
- 6 Adjust the throttle valve switch (fuel injection engines), as described in Chapter 3.
- 7 Thoroughly examine all electrical connections and fuel lines for signs of deterioration and damage.
- 8 Renew air cleaner elements, as described in Chapter 3.
- 9 Where the engine air cleaner is fitted with a plastic sleeve, remove and clean, or renew, this sleeve. See also Chapter 3.
- 10 *Fuel injection engines.* Check and adjust the trigger contacts. Further information will be found in Chapter 4.

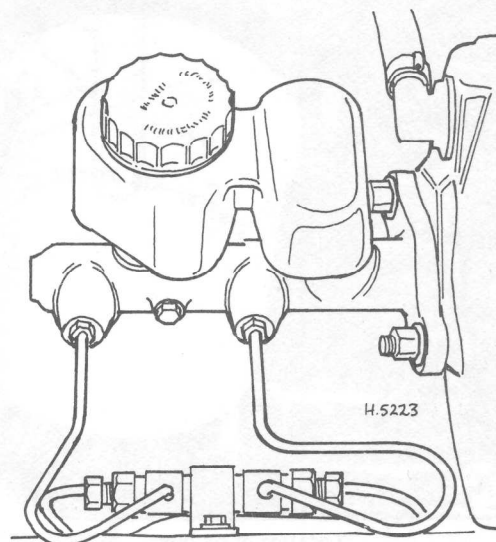
#### 5 Every 24,000 miles (40,000 km) or 18 months

Carry out the service items for the 6,000 mile service, until the exceptions of items 19, 21 and 22 which are replaced by oil changes, plus:

- 1 Having driven the car until the oil in the transmission and final drive is thoroughly warm, drain and refill both these systems. Capacities are as follows:

|                               |                                             |
|-------------------------------|---------------------------------------------|
| Manual gearbox                | 1.3 Imp. pints (0.75 litres, 1.6 US pints)  |
| Manual gearbox plus overdrive | 2.8 Imp. pints (1.6 litres, 3.4 US pints)   |
| Automatic transmission        | 11.3 Imp. pints (6.4 litres, 13.5 US pints) |

- 2 Change coolant and pressure test the cooling system. (See Section 7).
- 3 Examine the hub bearings for wear and renew as necessary. For full



Brake master cylinder reservoir (Tandem)

information refer to Chapter 11.

- 4 Remove the starter motor, examine the brushes and renew as necessary. Clean the commutator and starter drive. Full information will be found in Chapter 10.

- 5 Discuss with the local Volvo garage changing the hydraulic fluid and seals in the braking system.

#### 6 Every 36,000 miles (60,000 km) or 3 years

Carry out the 12,000 mile service, plus:

- 1 Replace the seals and air filter element in the brake servo unit. Full information will be found in Chapter 9.

#### 7 Pressure testing the cooling system

- 1 It is a simple matter to pressure test the cooling system provided that a tyre pressure gauge which is accurate at pressures of 10 lb/in<sup>2</sup> (0.7 kg/cm<sup>2</sup>) above atmospheric pressure is available. All that is needed is a spare radiator cap which fits the filler hole on the radiator or a cap which fits the expansion tank when this is fitted.
- 2 Drain the cooling system and pump it up with a tyre pump to a pressure of just under 10 lb/in<sup>2</sup> (0.7 kg/cm<sup>2</sup>) on the B20 engines or 4 lb/in<sup>2</sup> (0.28 kg/cm<sup>2</sup>) on B18 engines.
- 3 The system should be able to hold this pressure for at least 30 seconds without noticeable drop. If it does not, examine for leakage.

#### 8 EGR system - maintenance

- 1 The exhaust gas recirculation system comprises a valve worked by a vacuum which connects the exhaust manifold to the inlet manifold under conditions of high vacuum, thus ensuring that a considerable part of the exhaust gases are sucked back into the engine when the throttle is set fairly low.
- 2 A diagram illustrating its situation and section is given.
- 3 To test the system, with the engine idling, connect the distributor vacuum line to the vacuum connection of the EGR valve. The engine should now stop or begin to run rough. If this does not happen, check all hoses and pipes for clogging. If no clogging is found, replace the EGR valve and retest.
- 4 The maintenance procedure is to clean all hoses and pipes in the system every 12,000 miles (20,000 kms) and replace the EGR valve every 24,000 miles (40,000 kms).