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DESCRIPTION

This Service Manual is concerned with the B 16 B engine and should be used as a complement to the Service Manual PV, Part 1, B 16 A Engine.

This book treats the carburetors in detail but also includes a brief description of other differences between the engines in question.

GENERAL

The B 16 B engine is a four-cylinder overhead-valve engine with twin horizontal carburetors. Capacity 1.6 litres (97.6 cu in.), bore 3.125", stroke 3.15", compression ratio 8.2:1.

This engine develops 85 b.h.p. (SAE) 76 b.h.p. (DIN) at 5500 r.p.m. and has a maximum torque of 87 lb. ft. (SAE) at 3500 r.p.m. or 83 lb.ft. (DIN) at 3300 r.p.m.

The engine is shown in figs. 1 and 2. See also the illustration at the end of this book.

CYLINDER HEAD

The cylinder head is of cast-iron. The distance

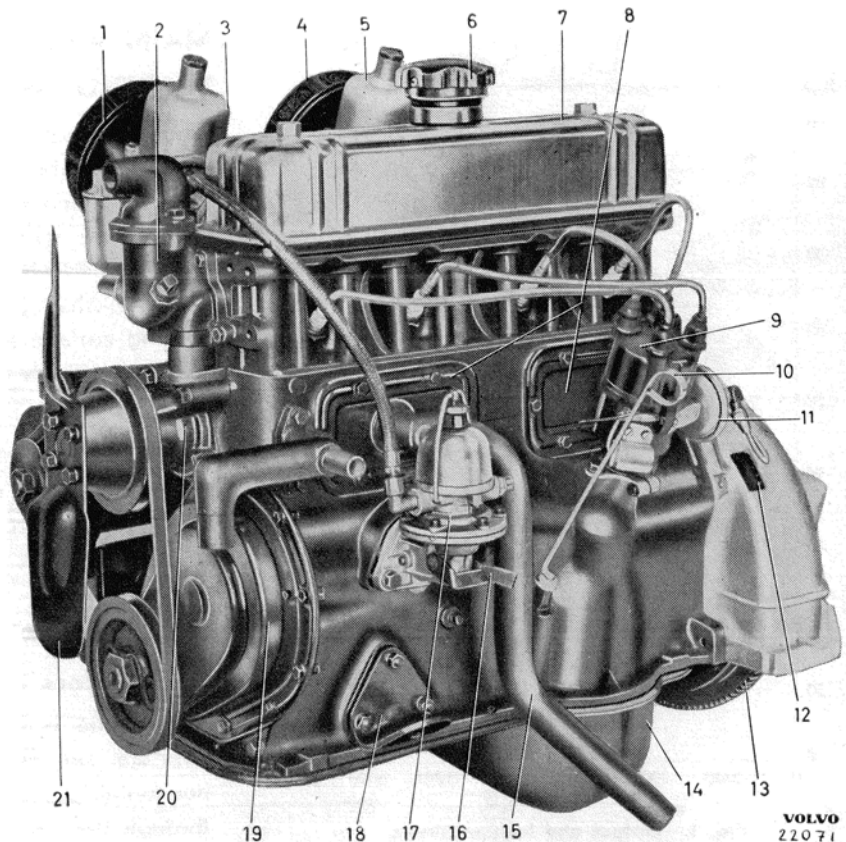
from the contact face with the block to the cylinder head nut level is 3.839".

CRANKSHAFT

The crankshaft is made of drop-forged steel which has been precision ground and surface hardened on the bearing journals. It is statically and dynamically balanced and is carried in three main bearings in the upper part of the crankcase. The main bearings consist of replaceable precision inserts. Undersize bearing shell inserts are also available to ensure the correct bearing clearance after the journals have been ground.

Fig. 1. B 16 B engine (distributor side).

1. Front air cleaner
2. Thermostat housing
3. Front carburetor
4. Rear air cleaner
5. Rear carburetor
6. Oil filler cap
7. Rocker arm cover
8. Inspection cover
9. Distributor
10. Oil dipstick
11. Engine serial number (plate on right-hand side on early production)
12. Inspection hole
13. Flywheel
14. Oil pan
15. Crankcase breather
16. Hand primer pump
17. Fuel pump
18. Engine mounting
19. Timing gear casing
20. Water pump
21. Fan



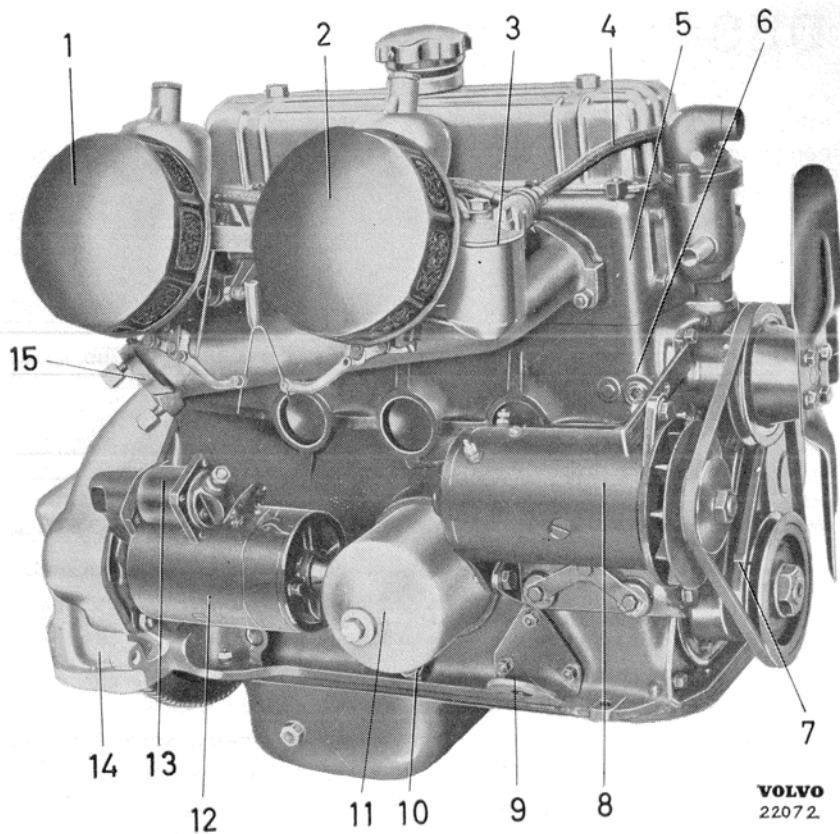


Fig. 2. B 16 B engine (carburetor side).

1. Rear air cleaner
2. Front air cleaner
3. Float chamber
4. Fuel line
5. Cylinder head
6. Cylinder block
7. Ignition setting mark (T.D.C.)
8. Generator
9. Engine mounting
10. Oil pressure relief valve
11. Oil filter
12. Starter motor
13. Solenoid
14. Flywheel housing
15. Exhaust manifold

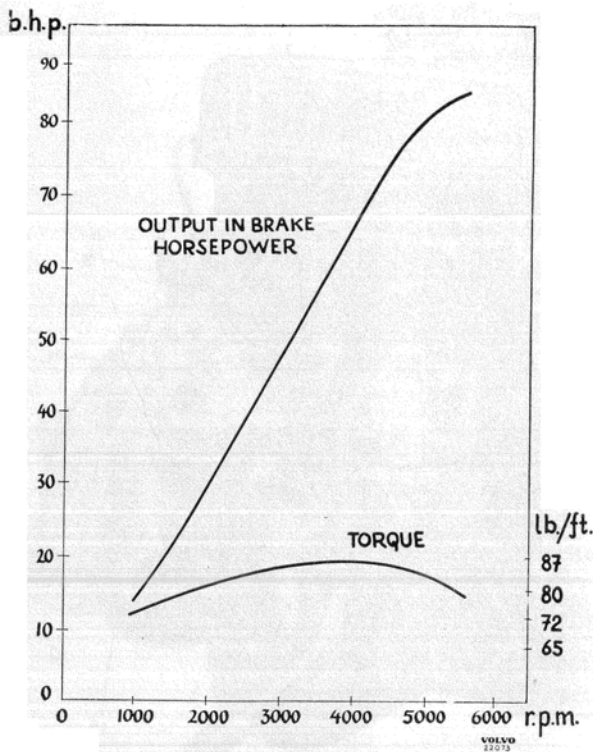


Fig. 3. Output and torque curves.

MAIN AND CONNECTING ROD BEARING SHELLS

The main and connecting rod bearing shells are of the tri-metal type designed for the hardened crankshaft and consist of steel bodies lined with lead-bronze alloy. This alloy is coated with a thin layer of lead-indium.

The crankshaft guide bearing, which has a larger bearing surface than the other main bearings, is covered with bearing metal-babbit.

CAMSHAFT

The camshaft is made of special cast-iron with hardened and ground cams and bearing journals. The cams give a relatively high lift.

FUEL SYSTEM

Carburetors

The engine is fitted with two coupled SU carburetors, see Fig. 4. The carburetors are of the horizontal type so that the fuel-air mixture passes through the carburetors in a horizontal direction.

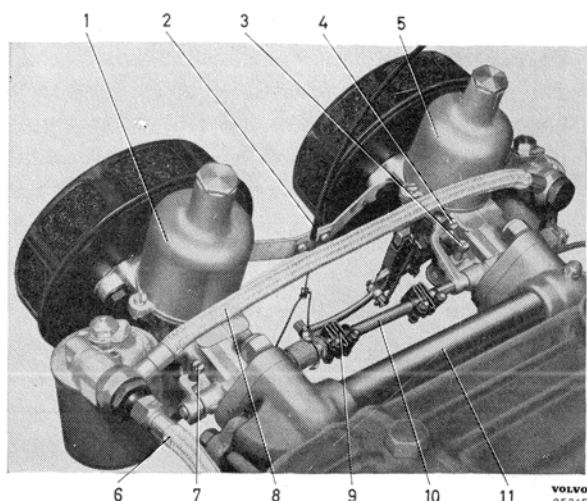


Fig. 4. Carburetors.

1. Forward carburetor
2. Controls
3. Idling adjuster screw
4. Rapid idling adjuster screw
5. Rear carburetor
6. Fuel pipe from pump
7. Idling adjuster screw
8. Fuel pipe between carburetors
9. Couplings
10. Coupling shaft
11. Equalizer tube

In this case the carburetors are, however, fitted at a slight angle to the horizontal.

The rear carburetor is fitted with a rapid idling device. The forward carburetor does not have this device but obtains the same impulse through the shaft which couples the two carburetors.

Between the two inlet manifolds, which are very short, there is a pipe which evens out the pressure variations.

Each carburetor has only one jet. The fuel flow is varied by a tapered needle, which is guided by a plunger in the carburetor, which is impulsed by the vacuum in the carburetor barrel.

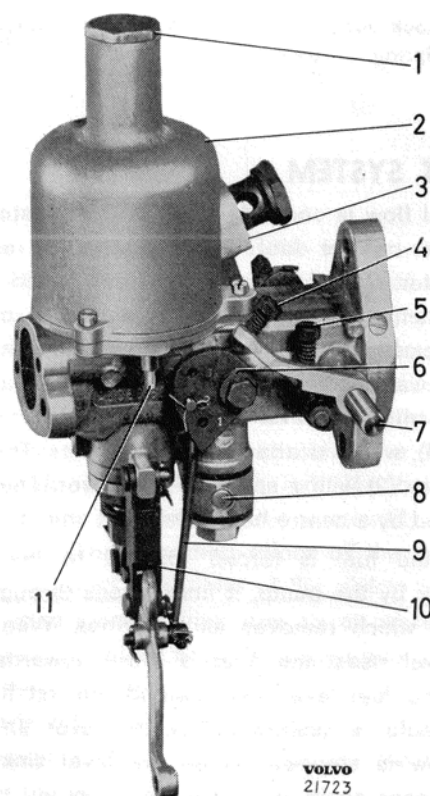
There is no choke in the normal sense of the term. Instead there is a cold start device which when engaged gives a richer fuel-air mixture by depressing the jet, whereupon the fuel flow area increases.

The function of the carburetor can be divided into the following groups:

1. Float system
2. Running
3. Cold start
4. Rapid idling
5. Idling

Fig. 5. Rear carburetor from control side.

1. Nut for damping plunger (also for oil filling)
2. Suction chamber
3. Float chamber cover
4. Rapid idling adjuster screw
5. Idling adjuster screw
6. Cam plate
7. Throttle shaft
8. Throttle shaft lever
9. Link rod
10. Link
11. Lift pin for piston



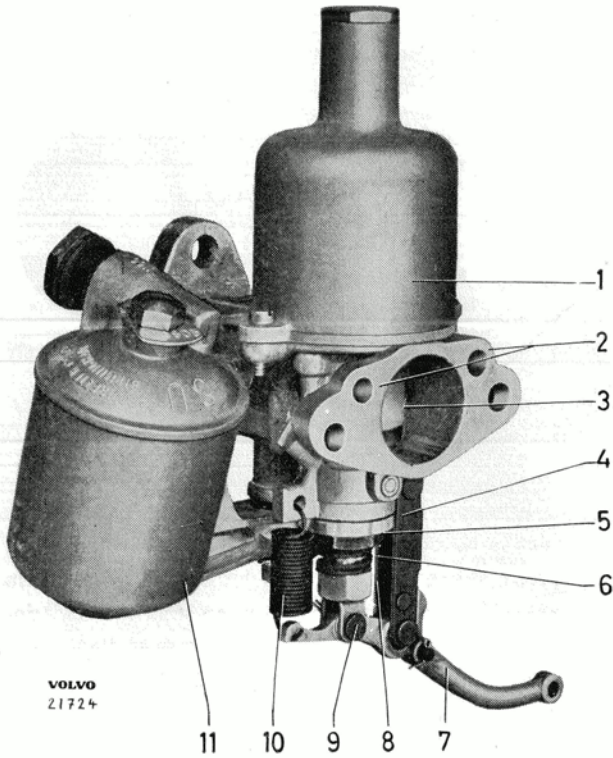


Fig. 6. Rear carburetor from float chamber side.

- | | |
|------------------------|----------------------|
| 1. Suction chamber | 7. Lever |
| 2. Ventilation channel | 8. Adjuster nut |
| 3. Piston | 9. Lower part of jet |
| 4. Seal washer | 10. Spring |
| 5. Lock nut | 11. Float chamber |
| 6. Spring | |

FLOAT SYSTEM

The fuel flow is controlled by the float system so that the correct fuel level is obtained in the carburetor. The fuel system is composed of a float chamber (6 Fig. 7) which is flexibly bolted to the carburetor housing through the medium of rubber washers, a float (5), cover (1) and the flexibly attached lever (4) as well as the needle valve (3), which is attached to the cover. There is a strainer (2) with a spring in the cover. The float is guided by a centre bolt in the float chamber.

When the fuel is forced forward to the float chamber by the pump, it first passes through the strainer which removes all impurities. When the fuel level rises, the float is lifted upwards and when the fuel level has reached the set height, the needle is pushed up by the lever and the fuel flow is stopped. When the level sinks the valve opens again and more fuel flows in.

RUNNING

The amount of fuel-air mixture, which flows to the engine, is regulated with the aid of the throttle (6 Fig. 8) in the carburetor housing (7). The housing is shaped like a channel and is also a body on which are built the various components of the carburetor.

Above the jet (10), the channel narrows due to the projection called the bridge (22) and the piston (4) which is situated above the bridge. The air flow speed increases when it passes this restriction whereupon the fuel is picked up more easily. On the top of the carburetor, there is a suction chamber (1) with the piston (4). There is a tapered needle (24) attached to the lower section of the piston.

The piston is guided by a central spindle which is mounted with a bushing fitted in the central boss of the suction chamber. The upper section of the piston fits into the suction chamber precisely. The lower section functions as a shutter and restricts the area of the main air passage in the vicinity of the fuel jet as the piston falls. The piston, under the influence of its own weight and in certain cases assisted by the spring, (2) will tend to assume its lowest position. When the

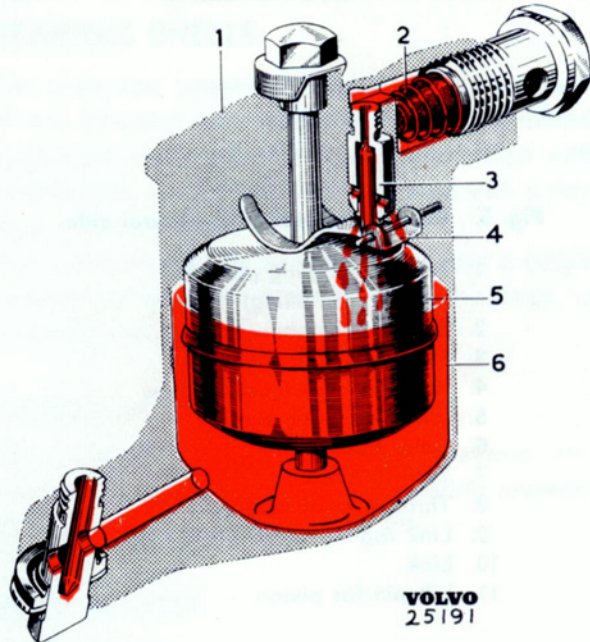
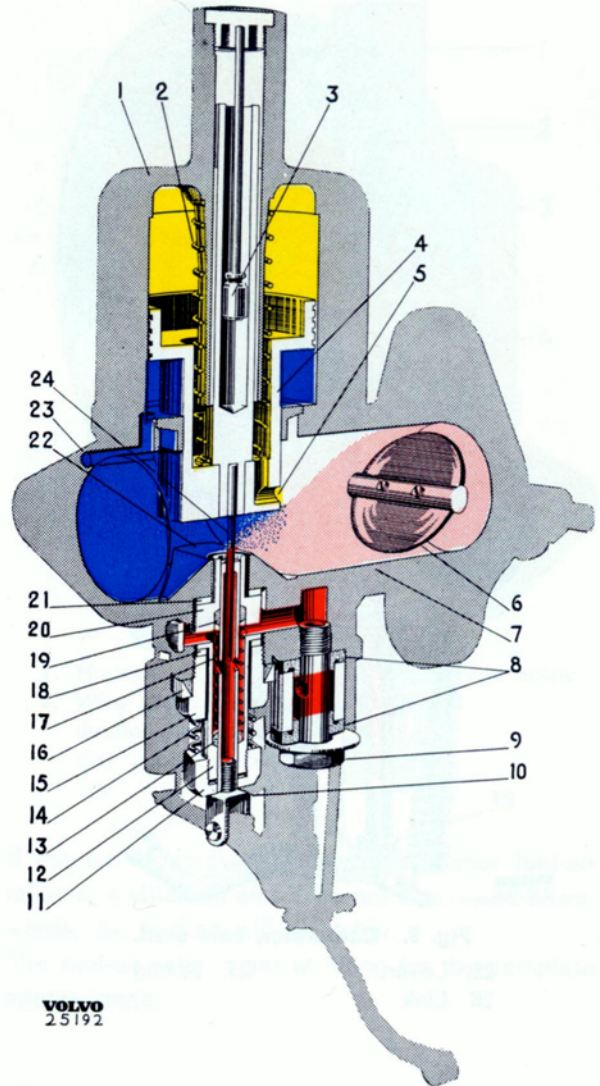


Fig. 7. Float system.

- | | |
|------------------------|------------------|
| 1. Float chamber cover | 4. Lever |
| 2. Strainer | 5. Float |
| 3. Needle valve | 6. Float chamber |

Fig. 8. Carburetor, operating position.

- | | |
|------------------------------|---------------------------|
| 1. Suction chamber | 13. Seal with washer |
| 2. Spring | 14. Spring |
| 3. Damping plunger | 15. Lock nut |
| 4. Piston in suction chamber | 16. Seal washer and gland |
| 5. Channel | 17. Spring |
| 6. Throttle | 18. Washer |
| 7. Carburetor housing | 19. Seal ring with washer |
| 8. Rubber gasket | 20. Upper jet bearing |
| 9. Bolt for float chamber | 21. Washer |
| 10. Jet | 22. Bridge |
| 11. Adjuster nut | 23. Channel |
| 12. Lower jet bearing | 24. Fuel needle |



piston is in its lowest position it rests against the bridge and a pin attached to it.

When the throttle opening increases, when running, the vacuum in the chamber between the bridge and the throttle increases and then the space above the piston is connected, through the channel (5), with the previously mentioned chamber, so that the piston rises. The area under the upper section of the piston is connected with the outer air by channels (23) and a pin attached to it.

When the piston rises, the carburetor channel cross-section above the jet is enlarged and admits an additional quantity of air. Owing to the fact that the fuel needle is attached to the piston, it rises with the piston and the effective opening between the fuel needle and the jet is enlarged. A quantity of fuel corresponding to the quantity of air is sucked in. The amount of fuel is regulated partly by the piston (fuel needle) position and partly by the air flow speed.

The jet obtains the fuel, from the area in the carburetor housing at the float chamber connection, through holes in the jet walls.

The position of the piston will be stable for any given air flow through the carburetor. The degree of this air flow is determined by the degree of throttle opening and the engine speed and loading. Any tendency on the part of the piston to fall will be accompanied by a reduction of the air flow between the bridge and the lower side of the piston. There will then be an increase in the partial vacuum between the piston and the throttle which will immediately result in an increased partial

vacuum in the upper part of the suction chamber. The piston will then rise immediately until balance is once again obtained.

In order to prevent the piston from coming into any pendular motion or moving excessively rapidly, there is a damping device in the recess in the piston spindle. This device consists of a damping plunger (3) attached to the rod. The hollow interior of the spindle contains a quantity of thin engine oil. The retarding effect of the damping device on rapid movement of the piston prevents the engine from stalling due to an excessively lean fuel-air mixture when the accelerator pedal is depressed rapidly.

Opposite the throttle (rear carburetor), there is a connection for the pipe line to the vacuum regulator on the distributor.

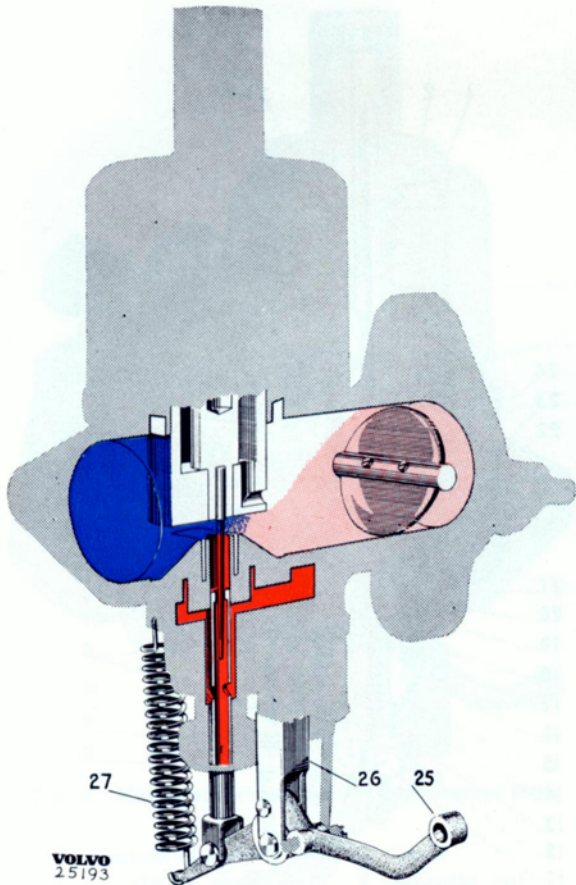


Fig. 9. Carburetor, cold start.

- 25. Lever
- 26. Link
- 27. Spring

Cold starting

In order to richen the fuel-air mixture when starting a cold engine ,there is a device on the carburetor (Fig. 9) by which the jet can be lowered. When the jet is lowered, there will be a wider passage for the fuel since the needle in the jet is tapered. There is no choke shutter on the carburetor. The jet, the lower part of which is yoke-formed, is not fitted directly into the carburetor housing but is in two bearings (12 and 20, Fig. 8) so that it can be moved up and down. When the lock nut (15) is loosened, the jet can also be moved laterally (for centralizing). The upper jet bearing has a flange which, with the aid of a washer (21), seals against a recess in the carburetor body, and the lower bearing flange seals with the help of a washer (18) against the upper surface of the lock nut. The lock nut seals against the carburetor housing by means of a washer and gland (16). Inside the bearing there is a spring (17) exerting

pressure against two washers with sealing glands (13 and 19) which prevent any leakage of fuel between the jet and the upper jet bearing. When a cold engine is being started, the outer end of the lever (25, Fig. 9) is pulled upwards by means of a control, whereby the movement is transmitted through the link (26) so that the jet, which is connected to the inner end of the lever, is pulled downwards. This movement is limited by means of a projection on the lever and return to the normal position is taken care of by the return spring (27), when the control is pushed in. At the same time as this lever is operated, the throttle is opened slightly by means of the rapid idling device described below.

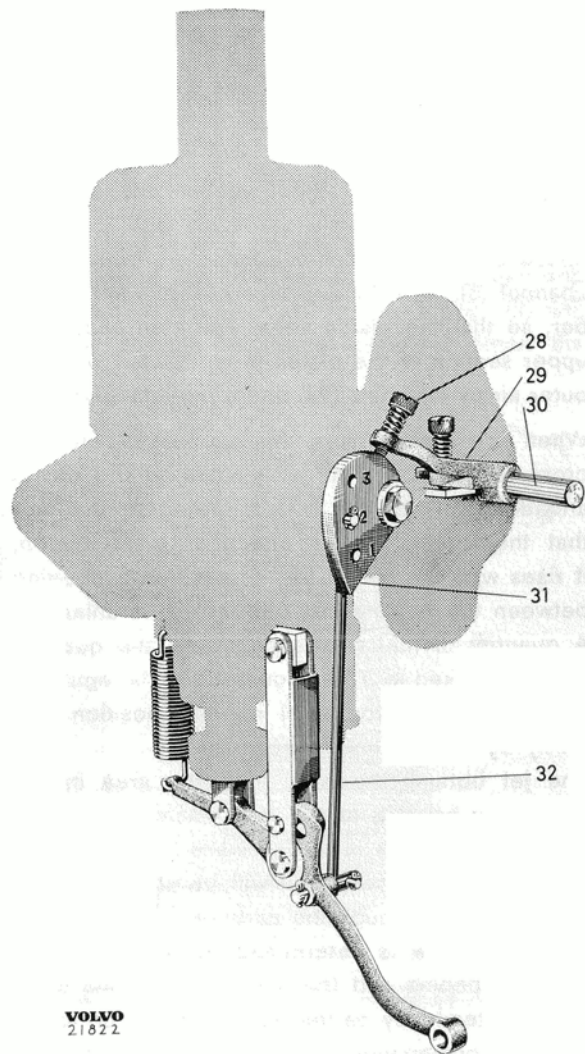


Fig. 10. Carburetor, rapid idling.

- 28. Adjuster screw
- 29. Lever
- 30. Shaft
- 31. Cam plate
- 32. Link rod

Rapid idling

When the rapid idling device is operated, a larger throttle opening is obtained than is usual during normal idling and this is used during the engine warming-up period in order to obtain a somewhat higher idling speed. See Fig. 10. When the choke knob on the instrument panel is pulled out, the rapid idling system is influenced first. If the knob is pulled further out, (more than $\frac{1}{2}$ ") increased resistance is felt depending on the fact that the jet is being influenced.

The device, which is connected to the cold starting device, consists of a link rod (32) connected to the lower lever, which influences a cam-shaped plate (31) attached to the carburetor housing. There is an adjuster screw which contacts this plate when the rapid idling device is in operation. This screw is attached to the throttle lever (29). When the lower outer end of the lever is lifted, the cam-formed plate is turned, by which the throttle is opened slightly. (The end of the lever can be lifted slightly before the jet is influenced depending upon the large clearance in the lever hole on the link).

The cam-shaped plate has three positions for the link rod. Normally the hole marked 2 is used.

Idling

When the engine is idling, the carburetor piston is in its lowest position and rests on the bridge at the jet on a pin. The small opening which remains between the bridge and the piston allows the required amount of air to pass for idling without there being a sufficiently great partial vacuum to raise the piston.

The amount of fuel required for idling is very small and the tapered needle almost entirely fills the jet opening.

The jet is pressed upwards by the spring (10, Fig. 6) for the lever (7) so that the lower part of the jet is supported against the adjuster nut (8), which is locked in position by means of another spring (6). This nut is used to set the amount of fuel passing through since the fuel needle is tapered.

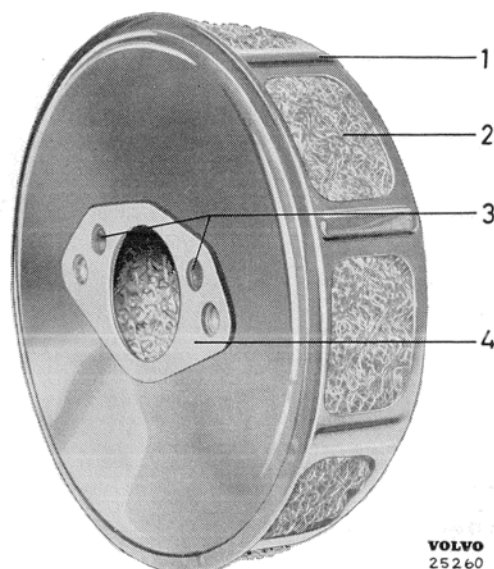


Fig. 11. Air cleaner.

- | | |
|---|----------------------|
| 1. Housing | 3. Ventilation holes |
| 2. Wire filter. Late production units have special paper cartridges | 4. Gasket |

If the nut is screwed upwards, a leaner fuel-air mixture is obtained and if the nut is screwed downwards, the mixture will be richer.

The fuel-air ratio is set at idling for the complete speed range.

AIR CLEANERS

There is one air cleaner on each carburetor. These consist of metal housings containing wire filters, see Fig. 11. The air passing into the engine is cleaned when it passes through the oil-soaked filters so that impurities are thus prevented from entering and causing damage to the engine.

Late production air cleaners have special paper cartridges. These air cleaners may not be oiled in or washed.

Ventilation air to the lower part of the carburetor suction chamber passes through the holes (3) in the cleaner so it is important to ensure that the gasket (4) is correctly fitted, otherwise the holes can be blocked.

REPAIR INSTRUCTIONS

To obtain the best engine performance, before adjusting the carburetors, make sure that the distributor dwell angle and ignition timing are correct. The ignition timing should be checked and adjusted by using a stroboscope with the engine running at rapid idling speed and the vacuum regulator disconnected.

In addition to this, the spark plugs, ignition cables and other ignition equipment should also be checked. See the correct values in the specifications. The instructions below concern only the carburetors for the B 16 B engine. The Service Manual for cars and vans, Part 1, B 16 A Engine should also be used where applicable.

FUEL SYSTEM

Carburetors

The hollow spindle on the suction chamber piston is filled with oil and functions together with the small damping plunger (3, Fig. 8) as a damper. This should be topped-up with oil at regular intervals, for example when the engine oil is changed. Screw off the nut at the top of the suction chamber, lift up the nut and the damping plunger and top-up with oil through the hole. Fill only the centre spindle so that the oil does not run over when the piston is fitted. Use SAE 20 engine oil.

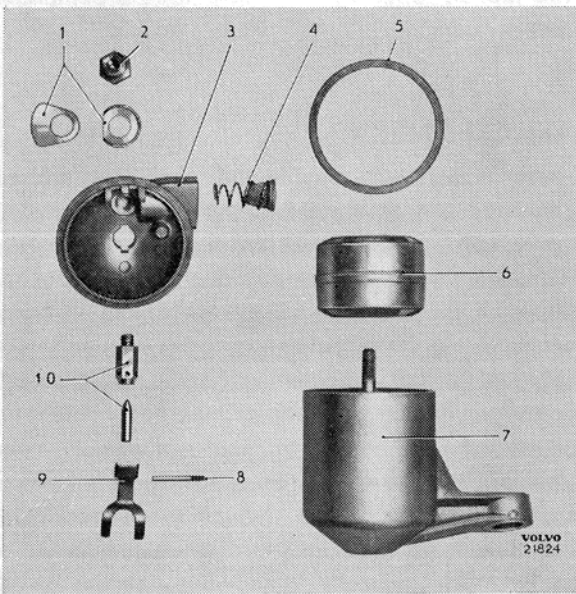


Fig. 12. Float chamber disassembled.

- | | |
|-------------------------|------------------|
| 1. Washers | 6. Float |
| 2. Nut | 7. Float chamber |
| 3. Float chamber cover | 8. Pin |
| 4. Strainer with spring | 9. Lever |
| 5. Gasket | 10. Needle valve |

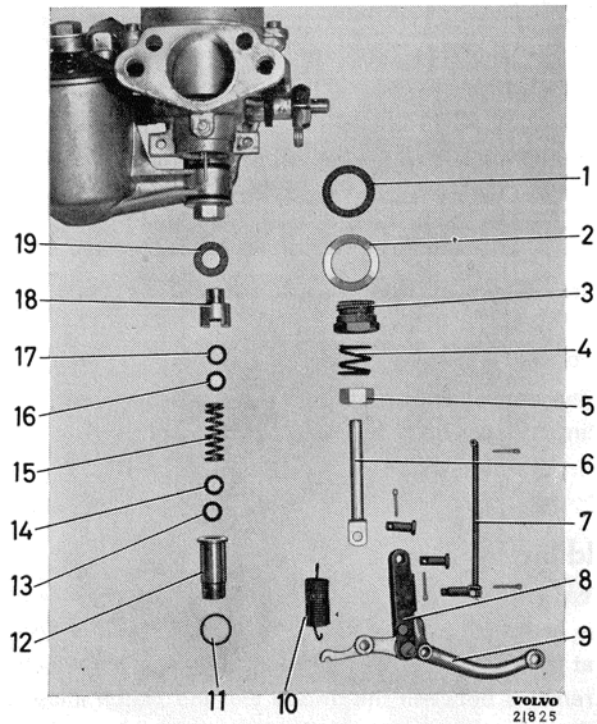


Fig. 13. Jet unit disassembled.

- | |
|-----------------------|
| 1. Washer |
| 2. Seal washer |
| 3. Lock nut |
| 4. Spring |
| 5. Adjuster nut |
| 6. Jet |
| 7. Link rod |
| 8. Link |
| 9. Lever |
| 10. Spring |
| 11. Washer |
| 12. Lower jet bearing |
| 13. Seal ring |
| 14. Washer |
| 15. Spring |
| 16. Washer |
| 17. Seal ring |
| 18. Upper jet bearing |
| 19. Washer |

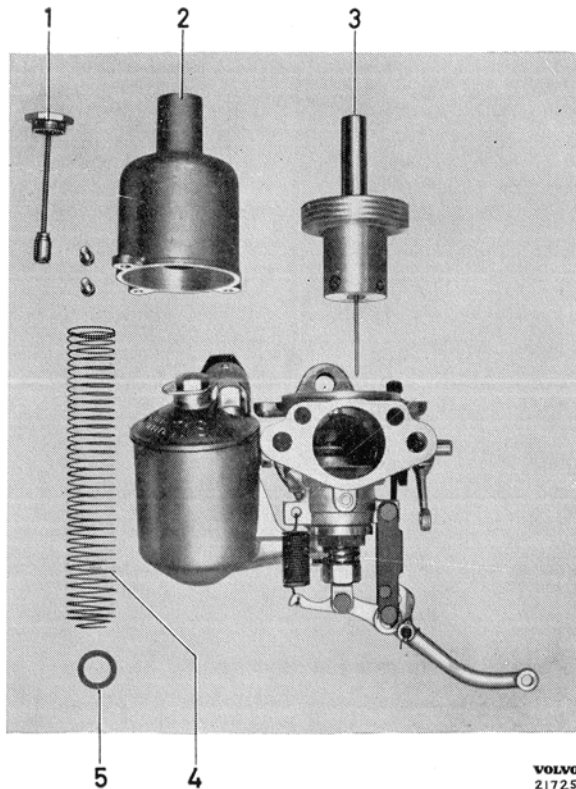


Fig. 14. Suction chamber dismantled.

- | | |
|--------------------|-----------|
| 1. Damping plunger | 4. Washer |
| 2. Suction chamber | 5. Spring |
| 3. Piston | |

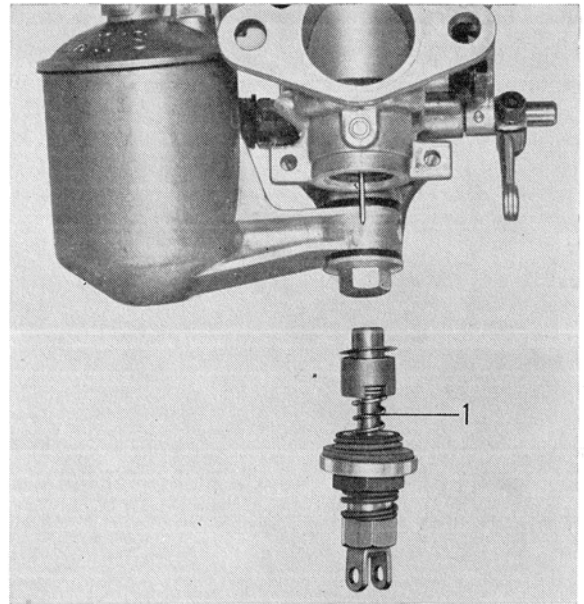
REMOVAL

1. Blow the carburetors externally.
2. Loosen and remove the air cleaners and the control retainer with the control rod between them.
3. Remove the fuel line connections and the vacuum line connections (to the distributor).
4. Loosen the nuts in the connections on the shaft between the carburetors. Move up the connections on the shaft. Loosen the throttle controls. Remove the carburetors.

Disassembly and cleaning

FLOAT CHAMBER

1. Loosen the float chamber from the carburetor housing.
2. Remove the nut on the float chamber cap. Remove the cap and lift out the float. See Fig. 12.
3. Remove the float lever by pulling out the pin upon which it pivots.
4. Loosen the needle valve in the cap and the hollow bolt and strainer.



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Fig. 15. Jet unit assembled.

1. Jet and associated parts

JET UNIT

1. Remove the return spring for the jet lever and the link rod between the lever and the cam-shaped plate.
2. Remove the bolt for the jet head and the upper bolt for the link and then remove the lever. See Fig. 13.
3. Remove the lock nut and take out the jet bearings with the spring and gland. Pull out the jet. Screw off the adjuster nut and remove its spring.

SUCTION CHAMBER WITH PISTON AND FUEL NEEDLE

The suction chamber and the piston are matched as units and if one of these is replaced then the other must be replaced at the same time. The suction chamber has three attaching screws which are staggered to ensure that it is fitted the right way.

1. Remove the damper (1 Fig. 14) from the suction chamber.
2. Loosen the screws on the suction chamber and lift it out.
3. Lift up the spring and the piston. Take care to ensure that the needle is not damaged (bent).
4. Screw out the lock screw on the fuel needle and pull it out.

CLEANING

After disassembly, all parts should be cleaned in kerosene or alcohol and then blown clean with compressed air.

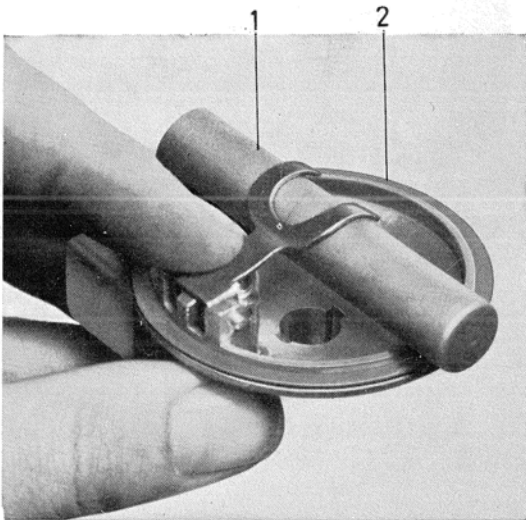


Fig. 16. Checking fuel lever.

1. Gauge SVO 2324 2. Float chamber cover

Fit of suction chamber piston

Test this fit when the carburetor is disassembled and cleaned.

1. Screw in the damping plunger but do not fill with oil.
2. Plug the hole in the lower part of the plunger at the needle.
3. Place the piston in the chamber (without spring) and turn the chamber upside down.
4. Measure the time taken by the piston to sink from the upper edge level of the large part. The time taken is normally 5–7 seconds.

ASSEMBLY AND FITTING

Assembly and refitting on the engine is carried out in the reverse order to that used when disassembling and removing.

Before assembling, check that all gaskets and sealing glands are free from damage. Replace these if necessary. Make sure that all other parts are neither damaged nor worn.

Neither the suction chamber nor the piston may be filed or rubbed with emery paper since this will change the fit and this has been very carefully calculated so that the carburetor will function properly. Any small unevenness can, however, be carefully rubbed away.

When attaching the needle in the piston it is very

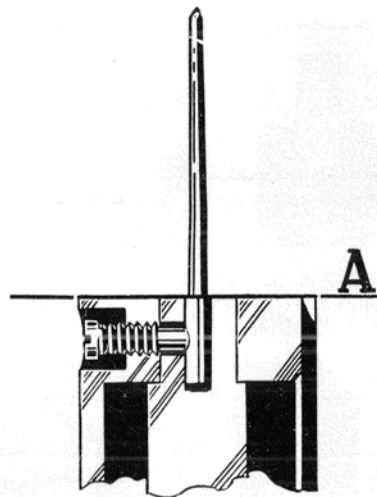


Fig. 17. Attachment of fuel needle.
A=attaching level

important to ensure that the needle assumes the right depth. See under the heading "Replacement of fuel needle".

Do not tighten the float chamber hollow screws too hard otherwise the gaskets can be damaged. The piston in the suction chamber is grooved and a guide projection in the carburetor housing fits into this groove. Lubricate the piston spindle lightly with thin engine oil before reassembling.

The jet must be centralized before it is tightened. See under the heading "Centralizing the jet".

Add oil (engine oil SAE 20) to the damping cylinders after reassembling the carburetors.

The shaft between the carburetors should be fitted so that there is a small axial clearance at both ends. Make sure that the fuel pipe between the carburetors is curved upwards when tightening the hollow bolts so that the carburetor levers are free at full throttle.

Checking the fuel level

The fuel level can be checked indirectly after removing the float chamber cap.

1. Loosen the fuel line and remove the float chamber cap.
2. Turn the float chamber cap upside down.
3. Measure the distance from the float chamber cap to the lever by means of gauge SVO 2324 as shown in Fig. 16. When the needle valve is closed, the needle valve lever should just contact the gauge.
4. If necessary, bend the lever where it joins the yoke-shape section in order to maintain the clearance mentioned in point 3 above.

Replacement of fuel needle

1. Remove the suction chamber and the piston and fuel needle.
2. Loosen the screw on the fuel needle and pull out the fuel needle.
3. Fit a new fuel needle. Check that this is marked as mentioned in the Specifications. Push the needle so far into the piston that only the tapered working section is outside it. See Fig. 17. Tighten the lock screw.
4. Fit the parts into the carburetor. Then check that the piston moves easily up and down. The piston can be lifted slightly without having to remove the air filter with the help of the pin (11, Fig. 5). When the pin is slowly released, the piston should be heard to meet the bridge with a characteristic sound.

Replacement of jet

1. Remove the jet as described under the heading "Disassembly and cleaning, jet unit". The adjuster nut does not need to be removed. If the carburetor is fitted on the engine the wire on the jet lever should be loosened.
2. Fit the new jet in the lower bearing and then fit the lower seal washer and packing, the spring, the upper seal washer with packing and the upper bearing with its copper washer. The brass washers for the upper and lower seals should be in contact with the spring.

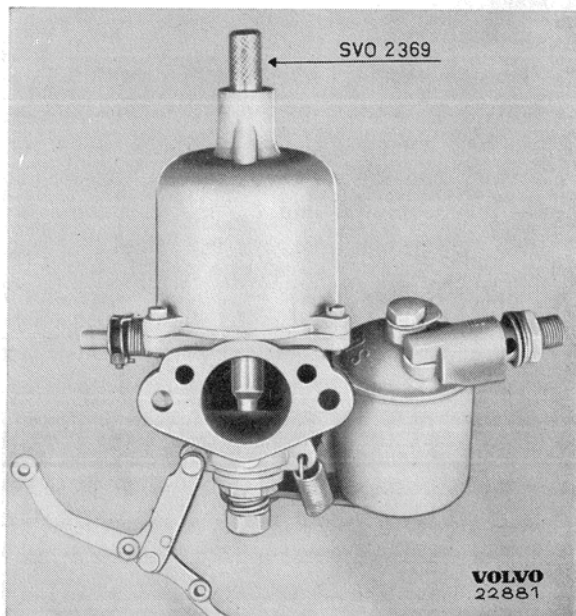


Fig. 18. Centralizing the jet.

3. Push in the jet together with the assembled parts into the carburetor housing, see Fig. 15. Screw on the lock nut loosely. Centralize the jet as shown below and then fit the lever and the other disassembled parts.

Centralizing the jet

In order to ensure that the carburetor functions in the correct way it is extremely important to make sure that the fuel needle moves easily up and down in the jet without jamming against the walls of the jet. For this reason a very careful fit (centralizing) of the jet relative to the fuel needle is necessary.

The jet bearings are attached with quite a large lateral clearance so that they can be moved laterally when adjustment is carried out.

1. Remove the air cleaner, damping plunger and suction chamber with piston. Then fit only the suction chamber.
2. Loosen lock nut for jet sleeves (5, Fig. 6). Unhook the spring at the lever and pull out necessary cotter pins and bolts so that the lever can be turned out of the way.
3. Slide the centering tool SVO 2369 into the carburetor as shown in Fig. 18. The narrow end of the tool should then press down in both jet sleeves and press out the jet.

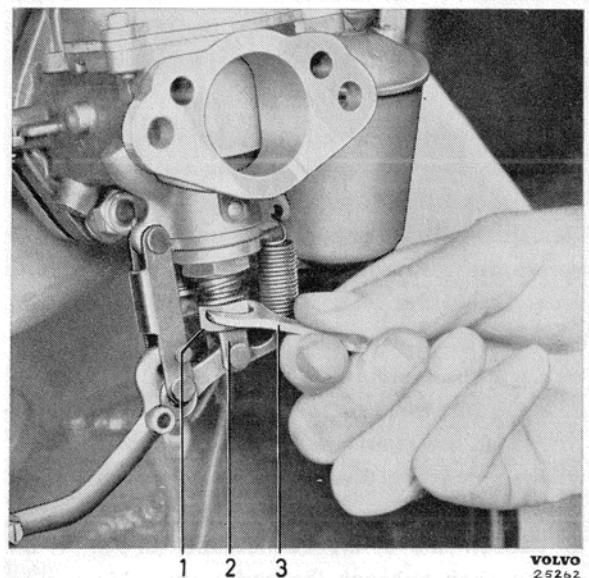


Fig. 19. Setting the adjuster nut.

1. Adjuster nut
2. Lower part of jet
3. Wrench

4. Tighten the lock nut with the tool pushed fully down and then turn the tool to see if it moves easily. It may be necessary to loosen the nut, turn the tool and tighten the nut several times in succession to obtain a good result.
5. The tool should then be pressed up by the jet. This protects the jet sleeve washers. Remove the tool. Fit the bolts for the lever and the return spring. Lift the outer end of the lever, release it and check that the jet is pushed up by the spring.
6. Fit the carburetor parts except the air cleaner. Check that the piston operates easily by lifting and releasing it. When released, it should strike the bridge with a slight bang.
7. Fit the air cleaner making sure that the gasket is turned correctly so as not to block the ventilation holes. Add oil to the damping cylinders. Set the adjuster nut as described below.

Idling settings and the coupling together of the carburetors

Idling setting is carried out partly by means of the screws (3 and 7, Fig. 4) on the throttle arms which regulate engine speed, and partly by turning the adjuster nuts on the jet heads (1, Fig. 19) whereby the richness of the fuel mixture is altered. When the nuts are screwed down, a richer fuel mixture is obtained. If the nuts are screwed up the mixture will be leaner. The richness of the mixture is set during idling to cover the whole speed range of the engine.

When the correct idling speed has been obtained and both carburetors have been adjusted to the same level, they are then connected together.

Individual settings should be carefully carried out before the carburetors are connected together in order to get the highest output from the engine.

1. Run the engine until it is thoroughly warmed up. If the jets have not been adjusted, a rough adjustment can be first carried out by screwing the adjuster nuts to their upper position and then screwing them down again one complete turn.
2. Loosen one of the connections (9, Fig. 4) on the shaft between the carburetors. Make sure that the jets on both the carburetors are pressing against the adjuster nuts and that the screw (4) for rapid idling is not in contact with the cam-shaped plate on each carburetor.

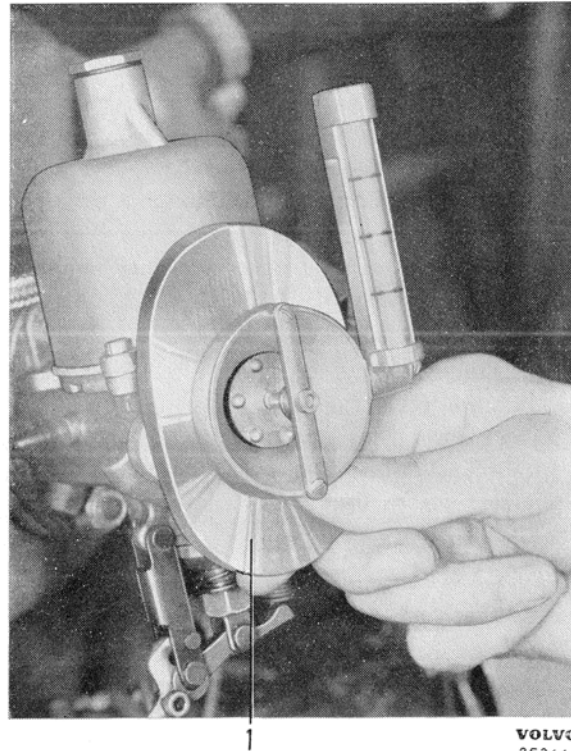


Fig. 20. Measuring air flow for identical settings on both carburetors.

1. Vacuum-meter
3. Adjust both throttles to the same position by screwing out the throttle adjuster screws (3 and 7) and then screwing them in again until contact with the stop projections is just made. Then screw down each screw exactly one turn. Make sure that the throttles work freely and independently.
4. Start the engine. Check that the throttles are open to the same extent in both carburetors by fitting a special vacuum-meter to each air cleaner contact surface. See Fig. 20. Adjust the idling screws until the meter reading on both carburetors is exactly the same.
5. Adjust the jets by turning the adjuster nuts so that the idling speed is as high as possible with unchanged throttle opening. Adjust the carburetors one at a time. First screw the adjuster nuts (1, Fig. 19) upwards (leaner mixture) until the engine runs unevenly and then in the opposite direction until the engine runs perfectly smoothly. If the idling speed is too high it can be decreased by unscrewing the idling screws on the throttle shaft levers. Then check again as specified above that the air intake is equal on both carburetors.

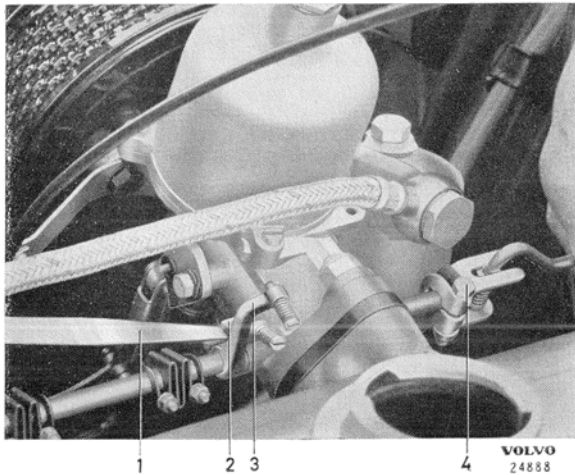


Fig. 21. Adjusting the throttle setting.

- | | |
|-------------------------|-------------|
| 1. Feeler gauge, 1.5 mm | 3. Lever |
| 2. Full throttle stop | 4. Coupling |

6. Check that the fuel-air mixture is correct on both carburetors. First lift the piston on one of the carburetors slightly by means of the pin beside the air intake. Then release the pin and carry out the same procedure on the other carburetor.

The degree of uneven running on the engine should be the same in both cases.

If the engine stalls when the piston on one of the carburetors is lifted, this usually means that the mixture on the **other** carburetor is too lean. The jet adjuster nut on the carburetor in question should be screwed carefully downwards to remedy this.

7. Connect the carburetors together by tightening the couplings on the shaft. Check that air flow is equal on both carburetors. See point 4. Adjust idling speed to 500–700 r.p.m. by using the idling adjuster screws. Adjust the rapid idling screws. This is done by screwing each screw until it is in contact with the cam plate and then screwing it back until a certain clearance is obtained.

Rapid idling and choke control mechanism

When the choke control is completely pushed in, the clearance between the adjuster screw (4, Fig. 4) and the cam plate should correspond to $\frac{1}{2}$ to 1 turn.

The clamp on the end of the choke cable should

be attached so that the jets begin to go down when the choke button on the instrument panel has been pulled out about $\frac{1}{2}$ " (rapid idling movement). Increased resistance will be felt on the choke button when the jets begin to move downwards.

When the choke control button is pulled out as far as it will go, the long lever ends should be lifted so far that the jets are completely lowered, i.e. the levers should contact the stops in the links. Make sure that both levers are influenced to the same extent through the curved cable so that both jets start to move downwards at the same time.

Throttle setting

The position of the accelerator pedal should be adjusted so that there is a clearance of 0.060" (1.5 mm) between the stop arm and full-throttle stop when the accelerator pedal is fully depressed. This will give the pedal the correct height above the floor and will also unload the control to a certain extent.

When adjusting, loosen the coupling (4, Fig. 21), place a weight on the pedal so that it is pressed down fully, adjust the clearance and then tighten the coupling.

N.B. The clearance must not exceed 0.080" (2 mm) as this will reduce the output. (On early production there is a lever in front of the carburetor instead of the coupling (4).

The shaft between the carburetors is fitted so that the end float is distributed equally at both ends. In cases where the coupling behind the rear carburetor is in the form of a ridged spring, ensure that there is clearance between the shaft ends before tightening.

Air cleaners

The air cleaners with wire wool should be disassembled for cleaning after every 3000 miles. Clean the filters in clean kerosene and blow them dry with compressed air. Then soak them in engine oil, let the excess oil run off and re-assemble them.

Air cleaners with paper cartridges must not be washed or oiled in.

They should be replaced after every 12,500 miles. If the vehicle is used in very dusty or contaminated

air, they can also be cleaned by carefully blowing through with compressed air after every 3000 miles. Blow from the inside out but do not hold the compressed air nozzle too near.

Make sure that the gaskets are fitted correctly when re-assembling. The ventilation holes (3, Fig. 11 and 2, Fig. 6) must not, under any circum-

stances, be blocked since this can prevent the carburetor in question from operating correctly.

Fuel

Since this engine has a comparatively high compression ratio, fuel with an octane rating of 93 (Research) should be used.

FAULT TRACING

Apart from the points shown below we refer you to the fault tracing table in the Service Manual for PV Part 1, B 16 A Engine where this applies. Before the carburetors are examined in detail, elementary precautions such as checking that the

fuel is reaching the carburetors, that the spark plugs are working correctly and are receiving electric current, that all the controls are functioning properly, etc., should be carried out.

FAULT	
CAUSE	REMEDY

Low oil pressure

Blocked oil filter element.
Faulty valve in oil filter.

Replace oil filter element.
Check valve and replace if necessary.

The engine will not idle properly or is difficult to start

Pistons chafing in the carburetors. The pistons are not going down until they meet the bridge.

Check the movement of the pistons with the aid of the pin on the air intake. Dismantle and clean the pistons if required.

Incorrectly centred jet hampering fuel needle movement.

Centre the jet.

The cold starting device is not taking the jet down to its lowest position.

Adjust the controls and cable attachments in the carburetor levers. See under the heading "Rapid idling and choke control mechanism".

Uneven acceleration

No oil in the carburetor damping devices, the fuel mixture obtained when the accelerator pedal is rapidly depressed being too lean.
Excessively lean fuel-air mixture.

Top-up with SAE 20 oil in the damping cylinders.

Adjust the vertical setting of the jet. See under the heading "Idling settings and coupling of carburetors".

Check the position of the fuel needle. See "Replacement of fuel needle".

Poor synchronization of carburetors.

Connect together the carburetors when the passage of air through each of them is equal. See "Idling adjustment and coupling together of carburetors".

Excessively high fuel consumption

Incorrectly fitted fuel needle.

Adjust the fitting. See "Replacement of fuel needle". Adjust the vertical position of the jet. See under the heading "Idling adjustment and coupling of carburetors".

Jet not being properly pressed up against the adjuster nut, this resulting in excessively rich fuel mixture.

Check or replace lever spring. Centralize jet. Lower jet and smear exposed part with oil.

Driving habits in many cases. Repeated fierce acceleration and braking.

More sensible driving habits.

Leakage from the lower part of the jet

Seal rings damaged.

Replace the seal rings.

The cold starting device functions stiffly

Chafing jet.

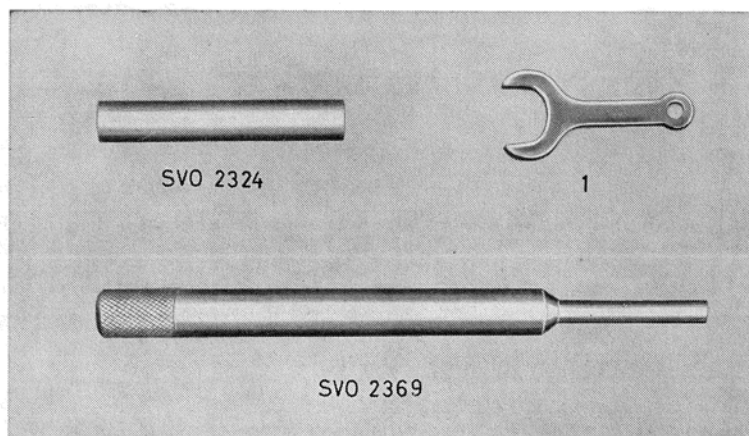
Lower the jet and lubricate the exposed portion.

Jet sleeves badly centred.

Centre sleeves, see "Centralizing the jet".

TOOLS

(Only carburetor tools. See also Service Manual for B 16 A).



VOLVO
25194

1 Wrench for adjuster nut.
SVO 2324 Gauge for float level.

SVO 2369 Centralizing tool for upper and lower jet sleeves.

SPECIFICATIONS

GENERAL

Type designation	B 16 B
Output, b.h.p./r.p.m. (SAE)	85/5500
(DIN)	76/5500
Max. torque, kgm (lb.ft)/r.p.m. (SAE)	12 (86.8)/3500
(DIN)	11.5 (83)/3300
Compression pressure (warm engine) when running on starter motor at 200 r.p.m., kg/cm ² (lb/sq.in.)	10–11 (142–156)
Compression ratio	8.2:1
Number of cylinders	4
Bore	79.37 mm (3.125")
Stroke	80 mm (3.15")
Displacement	1.58 litres (96.4 cu.in.)
Weight, including starter motor, generator, clutch, carburetors and air cleaners	approx. 150 kg (330 lb.)

CYLINDER BLOCK

Material	Special-alloy cast-iron
The cylinder bores are drilled directly in the block	
Bore, standard	3.125" (79.37 mm)
0.020" oversize	3.145" (79.88 mm)
0.030" "	3.155" (80.13 mm)
0.040" "	3.165" (80.39 mm)
0.050" "	3.175" (80.64 mm)

PISTONS

Material	Light-alloy
Weight	14.46 ± 0.18 oz. (410 ± 5 grams)
Permissible weight difference between pistons in same engine ..	0.35 oz. (10 grams)
Total height	3.390" (86 mm)
Height from piston pin centre to piston top	1.81" (46 mm)
Piston clearance	0.0012"–0.0020" (0.03–0.05 mm)
Diameter, measured at right angles to piston pin at lower edge of piston, standard	3.1230" (79.33 mm)
0.020" oversize	3.1431" (79.84 mm)
0.030" "	3.1535" (80.09 mm)
0.040" "	3.1638" (80.35 mm)
0.050" "	3.1736" (80.60 mm)

PISTON RINGS

Ring gap measured at gap opening	0.0017–0.0029" (0.25–0.50 mm)
Piston ring oversizes	0.020"
	0.030"
	0.040"
	0.050"

Compression rings

Upper ring on each piston chromed.

Number of rings on each piston	2
Height	0.078" (1.97 mm)
Piston ring clearance in groove	0.0027"—0.0031" (0.068—0.079 mm)

Both rings are beveled on the inner edge which should face upwards.

Oil rings

Number on each piston	1
Height	0.1865" (4.73 mm)
Piston ring clearance in groove	0.0017"—0.0029" (0.045—0.073 mm)

PISTON PINS

Fully floating. Circlips at both ends in piston.

Fit in connecting rod	Close running fit
Fit in piston	Slide fit
Diameter, standard	0.748" (19)
0.05 mm oversize	0.750" (19.05 mm)
0.10 mm "	0.752" (19.10 mm)
0.20 mm "	0.754" (19.20 mm)

CYLINDER HEAD

Height measured from cylinder head contact surface to cylinder head nut flats	3.84" (97.5 mm)
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CRANKSHAFT

(Replaceable bearing shells for main and connecting rod bearings)

Crankshaft end play	0.0004"—0.0040" (0.01—0.10 mm)
Main bearings, radial play, flange bearing	0.0005"—0.0025" (0.014—0.064 mm)
Main bearings, radial play, others	0.0020"—0.0039" (0.051—0.100 mm)
Connecting rod bearings, radial play	0.0020"—0.0034" (0.051—0.087 mm)

MAIN BEARINGS

Main bearing journals

Journal diameter, standard	2.1240"—2.1244" (53.950—53.960 mm)
0.010" undersize	2.1140"—2.1144" (53.696—53.706 mm)
0.020" "	2.1040"—2.1044" (53.442—53.452 mm)
0.030" "	2.0940"—2.0944" (53.188—53.198 mm)
0.040" "	2.0840"—2.0844" (52.934—52.944 mm)
Journal width, flange bearing, standard	1.5329"—1.5344" (38.935—38.975 mm)
0.1 mm oversize (for 0.010" undersize shell)	1.5369"—1.5384" (39.035—39.075 mm)
0.2 mm " (" 0.020" " ")	1.5407"—1.5423" (39.135—39.175 mm)
0.3 mm " (" 0.030" " ")	1.5447"—1.5463" (39.235—39.275 mm)
0.4 mm " (" 0.040" " ")	1.5486"—1.5502" (39.335—39.375 mm)

Main bearing shells

Flange bearing shells

Thickness, standard	0.0752"–0.0755" (1.911–1.918 mm)
0.010" undersize	0.0802"–0.0805" (2.038–2.045 mm)
0.020" "	0.0852"–0.0855" (2.165–2.172 mm)
0.030" "	0.0902"–0.0905" (2.292–2.299 mm)
0.040" "	0.0952"–0.0955" (2.419–2.426 mm)

Other main bearing shells

Thickness, standard	0.0746"–0.0748" (1.894–1.900 mm)
0.010" undersize	0.0796"–0.0798" (2.021–2.027 mm)
0.020" "	0.0845"–0.0848" (2.148–2.154 mm)
0.030" "	0.0895"–0.0898" (2.275–2.281 mm)
0.040" "	0.0946"–0.0948" (2.402–2.408 mm)

Connecting rod bearings

Connecting rod bearing journals.

Bearing seat width	1.2953"–1.2992" (32.900–33.000 mm)
Journal diameter, standard	1.8736"–1.8740" (47.589–47.600 mm)
0.010" undersize	1.8635"–1.8640" (47.335–47.347 mm)
0.020" "	1.8536"–1.8540" (47.081–47.092 mm)
0.030" "	1.8436"–1.8440" (46.827–46.838 mm)
0.040" "	1.8336"–1.8520" (46.573–46.584 mm)

Connecting rod bearing shells.

Thickness, standard	0.0615"–0.0617" (1.562–1.568 mm)
0.010" undersize	0.0665"–0.0667" (1.689–1.695 mm)
0.020" "	0.0715"–0.0717" (1.816–1.822 mm)
0.030" "	0.0765"–0.0767" (1.943–1.949 mm)
0.040" "	0.0815"–0.0817" (2.070–2.076 mm)

Connecting rods

Marked 1–4 on side away from camshaft. Classified A–D showing weight classification. Only connecting rods with same weight classification may be used in the same engine. Axial play at crankshaft

Length, centre–centre	0.0060"–0.0140" (0.15–0.35 mm)
Weight, Class A	5.905 ± 0.004" (150 ± 0.1 mm)
B	20.39–21.44 oz. (578–608 grams)
C	21.44–22.50 oz. (608–638 grams)
D	22.50–23.56 oz. (638–668 grams)
	23.56–24.62 oz. (668–698 grams)

FLYWHEEL

Permissible axial play	0.008" (0.20 mm)
Ring gear (chamfer facing inwards)	116 teeth

Flywheel housing

Permissible axial play for rear surface	0.0016" (0.08 mm)
Max. radial play for rear guide	0.0060" (0.15 mm)

CAMSHAFT

Drive	Fiber gear on camshaft
Number of bearings	3
Forward bearing journal, diameter	1.8494"—1.8504" (46.975—47.000 mm)
Centre bearing journal, diameter	1.6919"—1.6929" (42.975—43.000 mm)
Rear bearing journal, diameter	1.4557"—1.4567" (36.975—37.000 mm)
Radial clearance	0.0010"—0.0029" (0.025—0.075 mm)
Valve clearance for check of camshaft setting (cold engine)	0.043" (1.15 mm)
Inlet valves should then open at	0° (T.D.C.)

CAMSHAFT BEARINGS

Forward bearing, diameter	1.8514"—1.8524" (47.025—47.050 mm)
Centre bearing, diameter	1.6939"—1.6949" (43.025—43.050 mm)
Rear bearing, diameter	1.4577"—1.4587" (37.025—37.050 mm)

TIMING GEARS

Crankshaft gear	20 teeth
Camshaft gear	40 teeth
Backlash	0.0004"—0.0016" (0.01—0.04 mm)

VALVE SYSTEM**Valves****Inlet**

Disc diameter	1.46" (37 mm)
Stem diameter	0.3094"—0.3100" (7.859—7.874 mm)
Valve seat angle	44.5°
Cylinder head seat angle	45°
Seat width in cylinder head	0.060" (1.5 mm)
Clearance, warm engine	0.020" 0.50 mm)

Exhaust**Disc resistant to ethyl fuel**

Disc diameter	1.34" (34 mm)
Stem diameter	0.3082"—0.3089" (7.830—7.845 mm)
Valve seat angle	44.5°
Cylinder head seat angle	45°
Seat width in cylinder head	0.060" (1.5 mm)
Clearance, warm engine	0.020" 0.50 mm)

VALVE GUIDES

Length	2.44" (62 mm)
Inner diameter	0.311"—0.312" (7.905—7.920 mm)
Length above cylinder head upper surface	0.83" (21 mm)
Clearance valve stem-valve guide, inlet valves	0.0012"—0.0024" (0.031—0.061 mm)
Clearance valve stem-valve guide, exhaust valves	0.0024"—0.0035" (0.061—0.090 mm)

P

VALVE SPRINGS

Springs close-wound at one end. This end should be turned downwards.

Length, unloaded	1.77" (45 mm)
in./loading, lb.	1.54/56 ± 4 ¹ / ₂
mm/loading, kg.	39/25.5 ± 2
in./loading, lb.	1.20/145 ± 8
mm/loading, kg.	30.5/66 ± 3.5

LUBRICATING SYSTEM

Oil capacity of crankcase	4 ⁷ / ₈ Imp. pints = 5 ³ / ₄ US pints (2.75 litres)
Oil capacity, incl. oil cleaner	6 ¹ / ₄ Imp. pints = 7 ¹ / ₂ US pints (3.5 litres)
Oil pressure, warm engine (2000 r.p.m. = 30 m.p.h. 50 km.p.h. in top gear)	36–50 lb./sq.in. (2.5–3.5 kg/cm ²)
Lubricant	Engine oil (For Service MM, MS)
viscosity, throughout the year	Multigrade oil 10 W–30
below 32° F (0° C)	SAE 10 W
from 32° F (0° C) to 90° F (30° C)	SAE 20
above 90° F (30° C)	SAE 30

Oil pump

Type	Gear pump
Number of teeth	10
Axial clearance	0.0008"–0.004" (0.020–0.10 mm)
Radial clearance	0"–0.004" (0.00–0.10 mm)
Backlash	0.006"–0.014" (0.15–0.35 mm)

Oil cleaner

Type	Full-flow
Make and designation	AC Mann or Fram
Element, designation including gasket	AC 1531572 Mann H 10.18 + Di 105–02 Fram CH847 PL

Relief valve spring

Length unloaded	1.575" ± 0.002" (40 ± 0.5 mm)
loaded with 5 ¹ / ₂ ± 1 ¹ / ₂ lb. (2.5 ± 0.2 kg)	1.340" (34 mm)
7 ³ / ₄ ± 1 ¹ / ₂ lb. (3.5 ± 0.2 kg)	1.240" (31.5 mm)

FUEL SYSTEM

Fuel pump, make and type	AC diaphragm pump
Fuel pressure	Min. 2 lb./sq.in. (0.14 kg/cm ²) Max. 3.5 lb./sq.in. (0.25 kg/cm ²)
Capacity at idling speed	7 ⁷ / ₈ Imp. pint/min. = 1 US pint/min. (0.5 litres/min.)
Fuel gauge, type	Electric

Carburetors

Type	Horizontal
Make and designation	SU H4
Number of carburetors	2
Size (air intake diameter)	1½" (38.1 mm)
Fuel control jet, designation	AUC 2112
Fuel needle, designation	GT
Rapid idling, setting of rod in cam-shaped lever	Position 2
Idling speed	500–700 r.p.m.
Oil for damping cylinders	SAE 20

Ignition system

Voltage	6 V
Order of firing	1–3–4–2
Ignition setting basic, (97 octane Research Method)	6–8° before T.D.C.
Ignition setting, stroboscope setting 1500 engine r.p.m. with vacuum regulator disconnected (97 octane Research Method) ..	23–25° before T.D.C.
Spark plugs, normal driving	Champion J 6
	Bosch W 175–225 T3
hard driving	Champion J 6
	Bosch W 225–240 T3
Spark plug gap	0.028" (0.7 mm)
tightening torque (copper washer)	25 lb.ft. (3.5 kgm)
(steel washer)	29 lb.ft. (4 kgm)

Distributor

Make and designation	Bosch VJU 4 BR 20
Contact breaker gap	0.016"–0.020" (0.4–0.5 mm)
Breaker arm tension	14–18 oz. (0.4–0.5 kg)
Dwell angle	50±3°

COOLING SYSTEM

Type	Pressure
Filler cap valve opens at	3.2–4.2 lb./sq.in. (0.23–0.30 kg/cm²)
Capacity	approx. 2 Imp. gallons= 2¼ US gallons (8.5 litres)

Thermostat

Balanced thermostat. Does not open under influence of water pump pressure	
Thermostat marked	170
Starts to open at	167°–172° F (75°–78° C)
Fully open at	194° F (90° C)
Fan belt, designation	HC .380"×33"

WEAR TOLERANCES

Cylinders

Rebore when worn (if oil consumption abnormal)	0.010" (0.25 mm)
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P

Crankshaft

Maximum main bearing journal out-of-round	0.0020" (0.05 mm)
Maximum connecting rod journal out-of-round	0.0028" (0.07 mm)
Maximum crankshaft end play	0.0060" (0.15 mm)

Valves

Maximum valve stem to valve guide clearance	0.0060" (0.15 mm)
Maximum valve stem wear	0.0008" (0.02 mm)

Camshaft

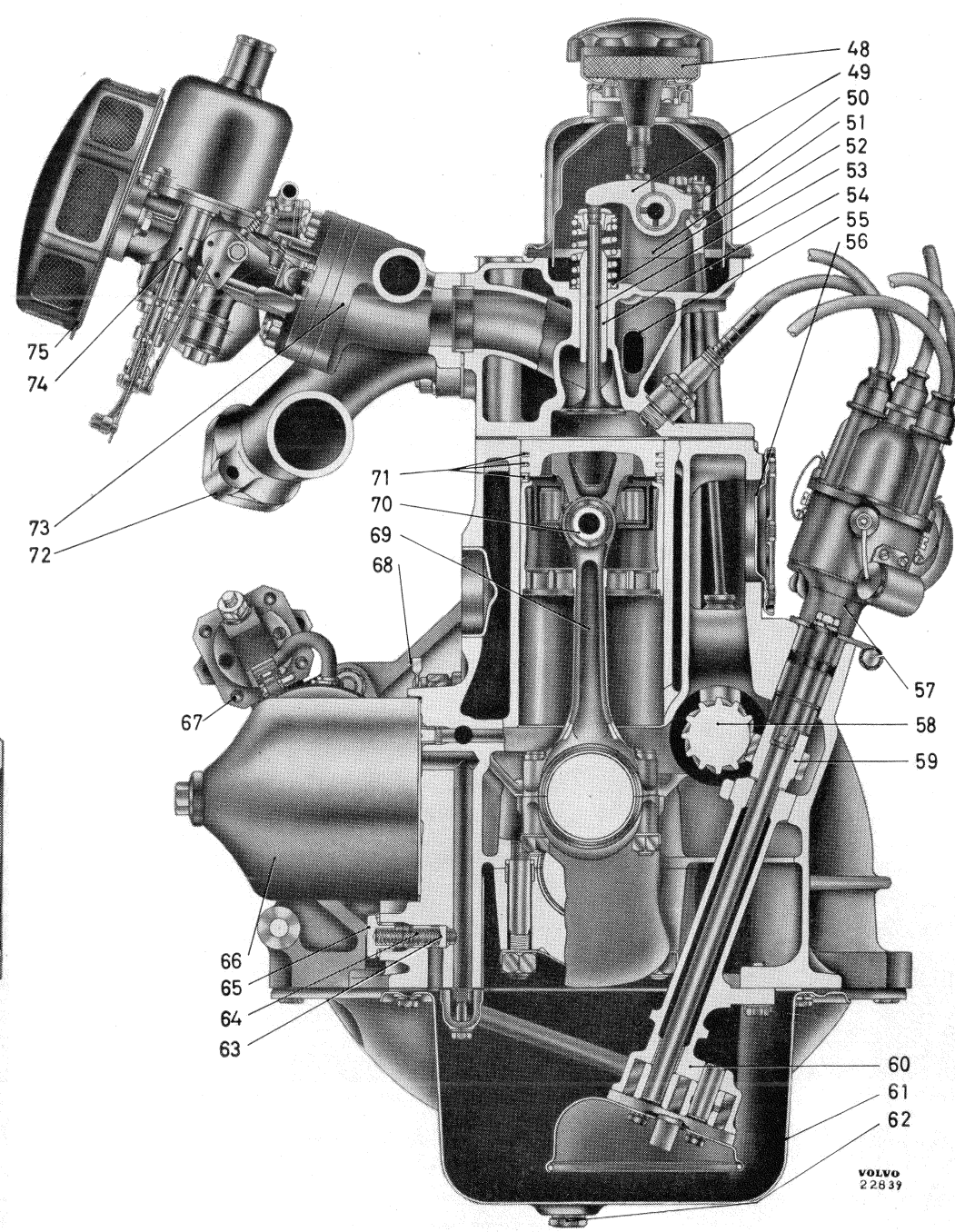
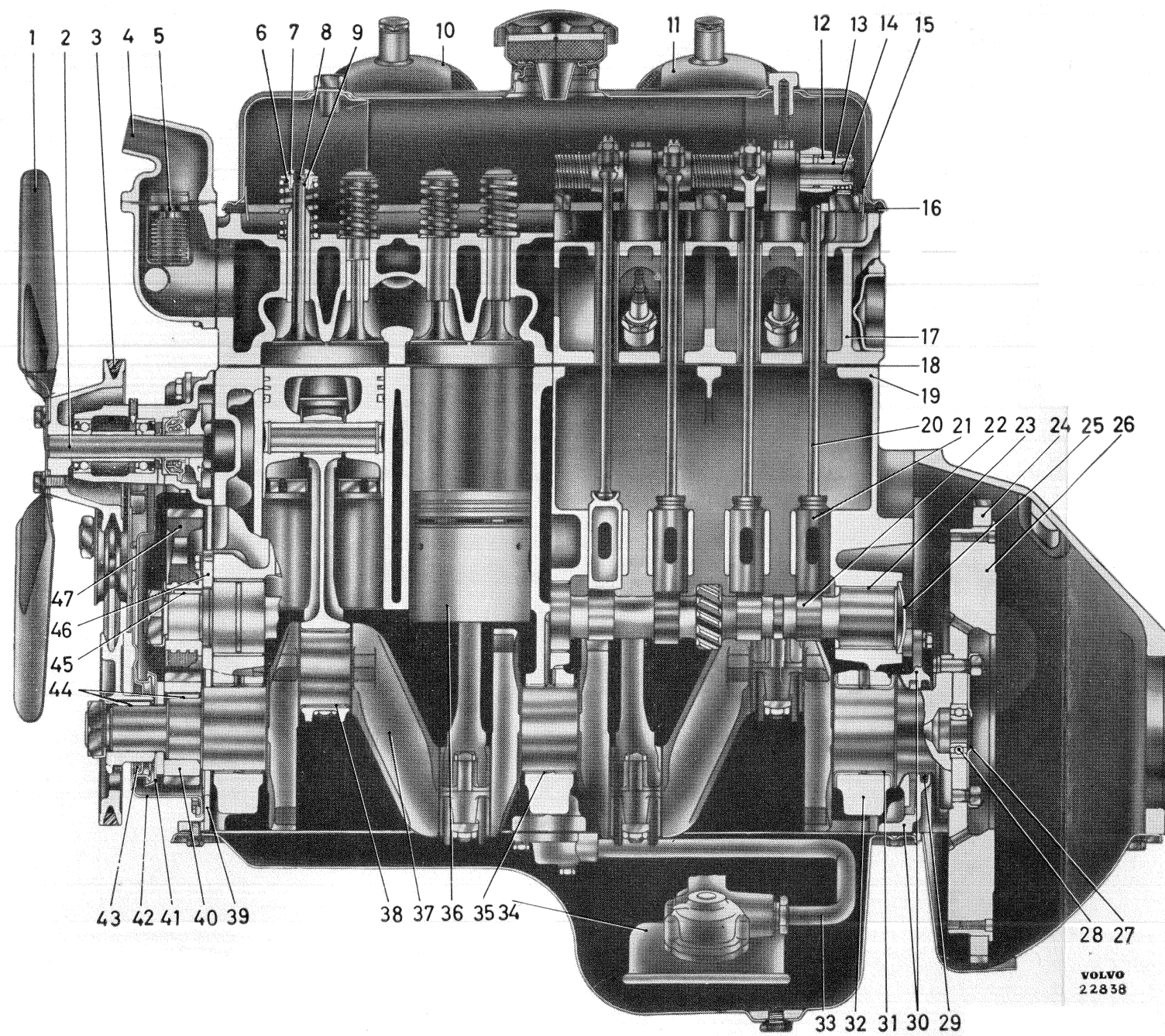
Maximum out-of-round (with new bearings)	0.0030" (0.075 mm)
Maximum bearing wear	0.0008" (0.02 mm)

Timing gears

Largest permissible backlash	0.0050" (0.12 mm)
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TIGHTENING TORQUES

	Lb.ft.	Kgm.
Cylinder head	50-60	7-8
Main bearings	60-70	8-10
Connecting rod bearings	30-35	4-5
Flywheel	17-20	2.3-2.7
Generator bolts ($\frac{3}{8}$ "-16)	27	4
Oil cleaner center bolt	36	5
Spark plugs, copper washer	25	3.5
steel washer	29	4



Longitudinal and cross-sections of B 16 B engine.

- | | | | | |
|-----------------------------------|--------------------------------------|---|--|-------------------------------------|
| 1. Fan | 16. Gasket | 31. Main bearing shell (flange bearing) | 46. Guide flange | 61. Oil pan |
| 2. Water pump | 17. Cylinder head | 32. Bearing cap | 47. Camshaft gear | 62. Drain plug |
| 3. Fan belt | 18. Cylinder head gasket | 33. Oil pipe | 48. Filler cap (right-hand illustration) | 63. Relief valve plunger |
| 4. Thermostat housing, upper part | 19. Cylinder block | 34. Oil pump | 49. Rocker arm | 64. Relief valve spring |
| 5. Thermostat | 20. Push rod | 35. Main bearing shell | 50. Setscrew | 65. Nut and washer for relief valve |
| 6. Valve spring seat | 21. Valve lifter | 36. Piston | 51. Bearing bracket | 66. Oil cleaner |
| 7. Rubber ring | 22. Camshaft | 37. Crankshaft | 52. Valve spring | 67. Starter motor solenoid |
| 8. Valve | 23. Bushing | 38. Connecting rod bearing shell | 53. Valve | 68. Water drain cock |
| 9. Valve retainer | 24. Ring gear | 39. Seal plate | 54. Valve guide | 69. Connecting rod |
| 1. Forward carburetor | 25. Seal washer | 40. Crankshaft gear | 55. Water distribution pipe | 70. Piston pin |
| 11. Rear carburetor | 26. Flywheel | 41. Oil slinger ring | 56. Inspection cover | 71. Piston rings |
| 12. Bushing | 27. Retainer | 42. Timing gear casing | 57. Distributor | 72. Exhaust manifold |
| 13. Rocker arm shaft | 28. Ball bearing | 43. Felt seal | 58. Camshaft gear | 73. Intake manifold |
| 14. Seal washer | 29. Felt seal | 44. Key | 59. Pump gear | 74. Carburetor (rear) |
| 15. Rocker cover | 30. Sealing flanges, upper and lower | 45. Key | 60. Oil pump | 75. Air cleaner |