SERVICE MANUAL

VOLVO 164 1971

GROUP 23

FUEL SYSTEM

DESCRIPTION

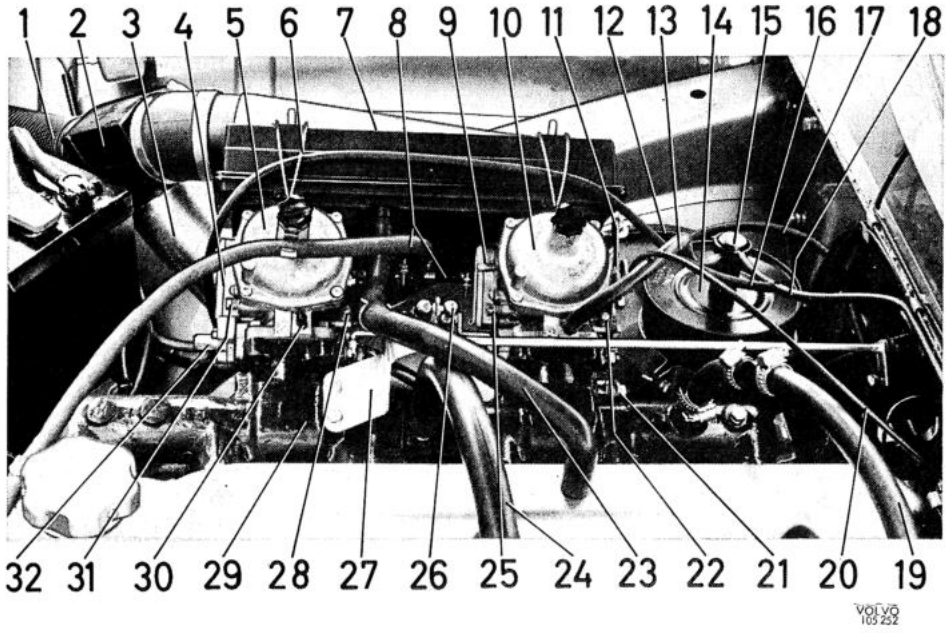


Fig. 2-48. Carburettors, B 30 A engine

1. Cold air hose
2. Constant temperature device flap
3. Warm air hose
4. Temperature compensator
5. Front carburettor
6. Clasp for air cleaner cover
7. Air cleaner
8. Fuel hoses
9. Temperature compensator
10. Rear carburettor
11. Hot start valve
12. Hose between hot start valve and venting filter
13. Hose for fuel fumes to carburettors
14. Venting filter
15. Air valve
16. Vacuum hose for vacuum for air valve and distributor
17. Hose between fuel tank and venting filter
18. Vacuum hose for distributor (negative vacuum setting)
19. Vacuum hose for brake servo
20. Choke wire
21. Secondary throttle
22. Throttle stop screw
23. Air hose for crankcase gases
24. Hose for crankcase gases
25. Idle trimming screw
26. Throttle control
27. Bracket
28. Throttle stop screw
29. Manifold with preheating chamber
30. Vacuum connection
31. Idle trimming screw
32. Throttle by-pass valve

The B 30 A engine is fitted with two horizontal carburettors of type Stromberg 175 CD-2SE (Fig. 2-48), the construction of which is shown in Figs. 2-49, 2-50, 2-52 and 2-53. This type of carburettor has been designed with a view to the exhaust emission control system. It is provided with a fixed jet, pressed into the carburettor housing, the fuel flow orifice area of which is varied by means of a movable tapered needle. The position of the needle is determined by the carburettor housing vacuum operating an air valve in which the needle is fitted in a spring-loaded suspension. The spring force always presses the needle against the same side of the jet, and this ensures an accurately controlled fuel flow through the jet.

The carburettor consists of three main parts of light-alloy, the middle part of which comprises the carburettor housing. The lower section is made up of a floatchamber, which encloses the jet and the float.

The upper section consists of a suction chamber cover, which forms a suction chamber together with a diaphragm fixed in the air valve. The suction chamber regulates the air valve lift and thereby the location of the needle in the jet.

By means of channels in the valve, the suction chamber is linked to the space between the carburettor throttle and valve.

Both carburettors are fitted with a temperature compensator (8, Fig. 2-50 and 2, Fig. 2-53). This is con-

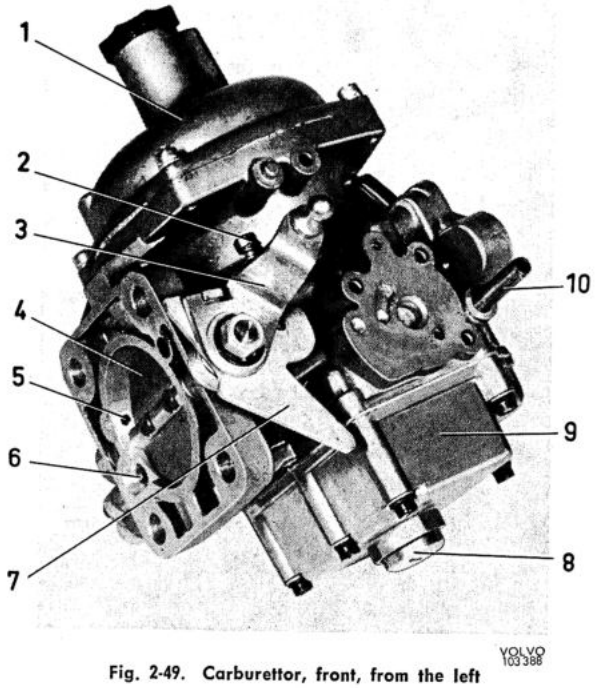


Fig. 2-49. Carburettor, front, from the left

1. Suction chamber
2. Throttle stop screw
3. Lever
4. Primary throttle
5. Drilling to vacuum side of by-pass valve
6. Drilling for fuel-air mixture from by-pass valve
7. Throttle spindle cam (for regulating secondary throttle)
8. Floatchamber plug
9. Floatchamber
10. Fuel inlet

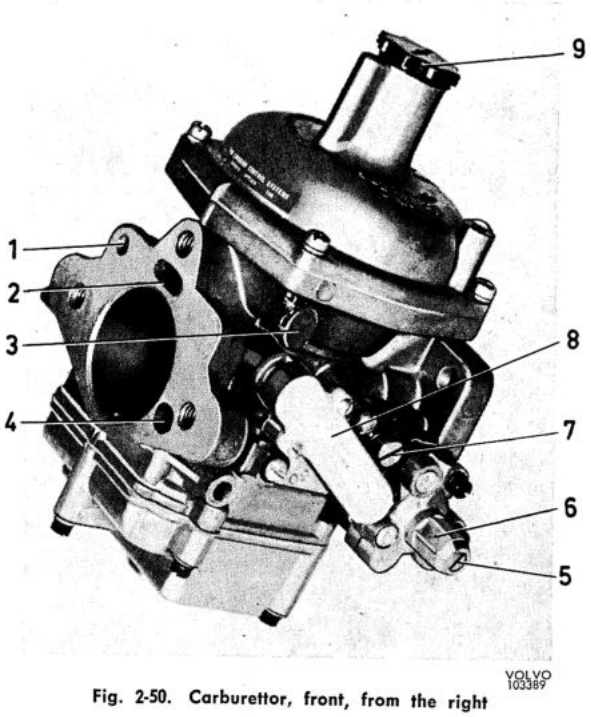


Fig. 2-50. Carburettor, front, from the right

1. Venting channel from floatchamber
2. Drilling for air supply under diaphragm
3. Sealed plug
4. Drilling for air supply to temp. comp. and idle trimming screw
5. Stop screw for by-pass valve
6. By-pass valve
7. Idle trimming screw
8. Temperature compensator
9. Hydraulic damper

structed as an air valve regulated by the carburettor temperature and maintains the fuel-air mixture constant irrespective of the fuel temperature.

The front carburettor is provided with a throttle by-pass valve (6, Fig. 2-50 and Fig. 2-58), the purpose of which is to direct a regulated flow of fuel-air mixture past the carburettor throttle when this is closed at high speeds.

This reduces powerfully the volume of noxious exhaust gases produced.

The throttle spindles are provided with seals to reduce the wear on the spindles and bushes and also to eliminate air leakage.

The hot-start valve (12 Fig. 2-48) is described on page 2 : 28.

The positive vacuum connection for the ignition distributor is located on the rear carburettor.

FLOAT SYSTEM

Fuel flows into the floatchamber via the float valve (4, Fig. 2-51). The float (1), which is made up of twin expanded rubber floats, is carried on a bridge on the lower side of the carburettor housing. As the fuel level rises, the float lifts and, by means of the float arm (2) and tag, closes the needle on its seating when the correct level has been attained.

The fuel goes through four holes in the floatchamber plug and to the inside of the jet, where the level is the same as in the floatchamber. Sealing between floatchamber plug and chamber is provided by an O-ring.

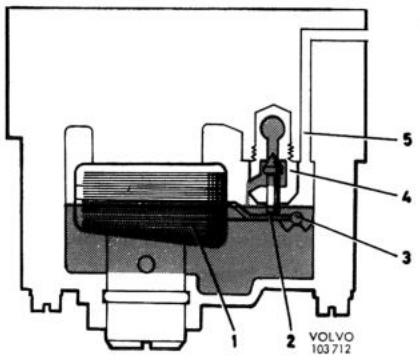


Fig. 2-51. Float system

1. Float
2. Float arm
3. Float shaft
4. Float valve
5. Venting channel from floatchamber to air cleaner

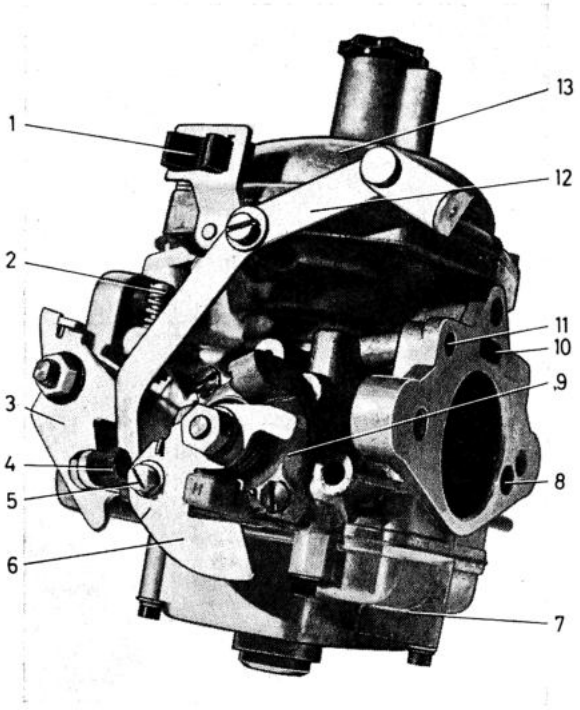


Fig. 2-52. Carburettor, rear, from the left

1. Attaching sleeve for choke control
2. Throttle stop screw
3. Throttle spindle cam
4. Fast idle stop screw
5. Connection for choke control
6. Cam disc for fast idle
7. Floatchamber
8. Drilling for air supply to temp. comp. and idle trimming screw
9. Cold start device
10. Drilling for air supply under diaphragm
11. Venting channel from floatchamber
12. Hot start valve control
13. Suction chamber

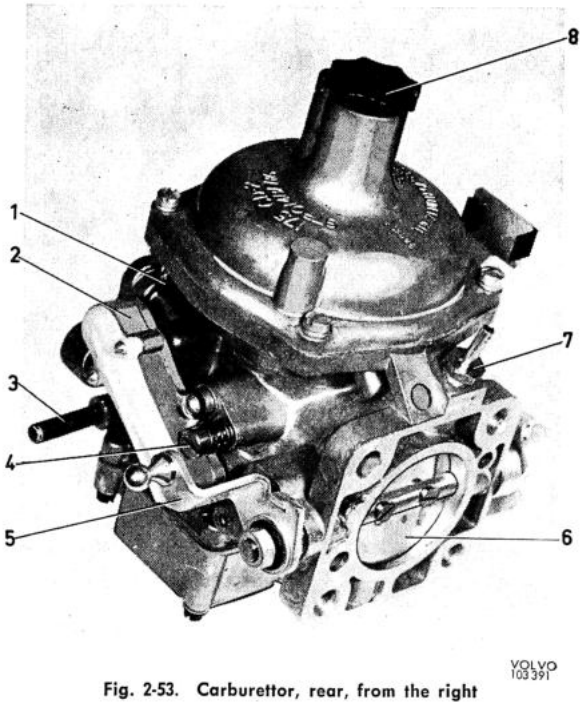


Fig. 2-53. Carburettor, rear, from the right

1. Sealed plug
2. Temperature compensator
3. Fuel inlet
4. Idle trimming screw
5. Lever
6. Primary throttle
7. Connection for vacuum hose
8. Hydraulic damper

COLD START DEVICE AND FAST IDLE

To facilitate starting during cold weather, the rear carburettor is fitted with a cold start device (Figs. 2-52 2-54 and 2-55).

The cold start device consists of a valve disc (3, Fig. 2-54) which is provided with four calibrated holes and an elongated opening as well as a disc (4) mounted on a spindle which is operated by the choke control. On the same spindle, outside the cover (5), there is a cam disc (6, Fig. 2-52) with connection for the choke control pull wire. When the cold start device is engaged, the valve disc turns and this links up the channel (1, Fig. 2-54) from the floatchamber via one or several of the calibrated holes to the channel behind the valve disc and then the opening to the channel (2), which terminates in the venturi between the vacuum plunger and choke flap. Through this link-up, the engine receives extra fuel (a richer mixture), to facilitate cold starting. At the same time, less air is supplied by means of the choke device. When the choke control is pushed in, the valve disc

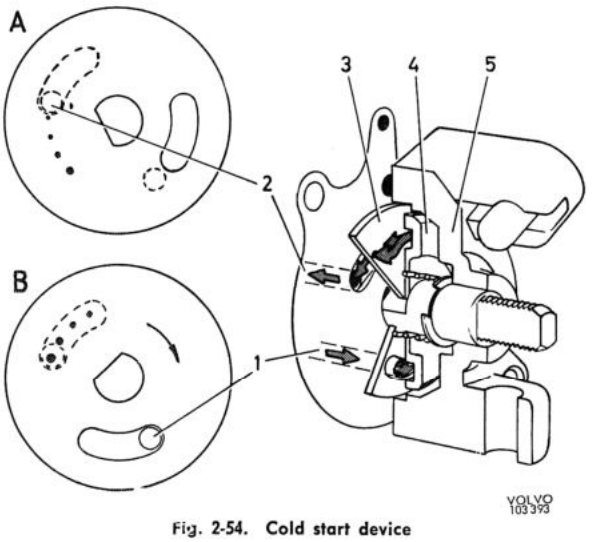


Fig. 2-54. Cold start device

A. Cold start device, disengaged B. Cold start device, engaged

1. From floatchamber
2. To venturi
3. Choke lever
4. "Channel Disc"
5. Housing

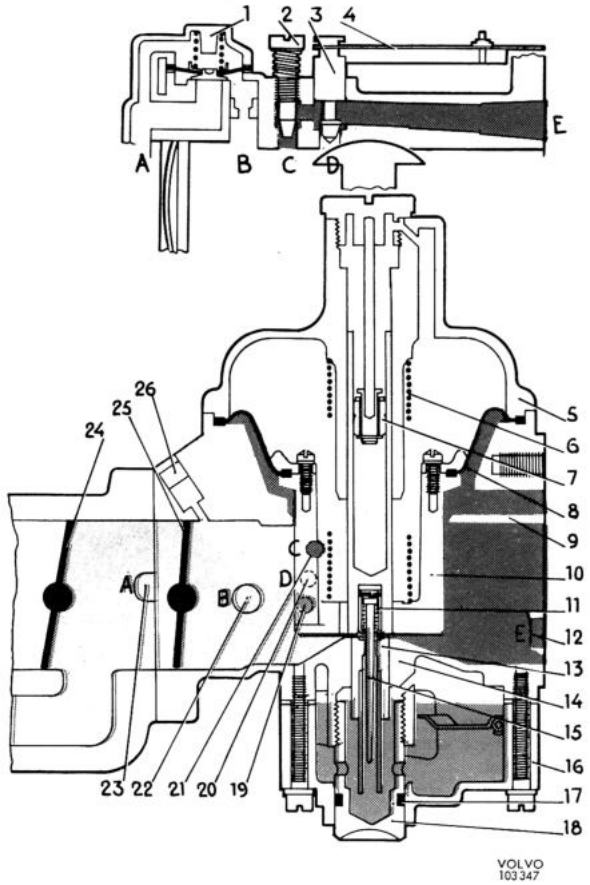


Fig. 2-55. Cold starting, principle

1. By-pass valve
2. Idle trimming screw
3. Valve for temperature compensator
4. Bi-metal spring for temperature compensator
5. Suction chamber
6. Spring
7. Damper piston
8. Diaphragm
9. Drilling for air supply under diaphragm
10. Air valve
11. Metering needle suspension
12. Drilling for air supply to temp. comp. and idle trimming screw
13. Fuel jet
14. Carburettor housing (middle section)
15. Metering needle
16. Floatchamber
17. Rubber ring
18. Floatchamber plug
19. Drilling for cold start fuel (located in carb. opposite wall)
20. Drilling for extra air through temperature compensator
21. Drilling for extra air through idle trimming screw
22. Inlet channel for fuel mixing through by-pass valve
23. Outlet channel for fuel mixing through by-pass valve
24. Secondary throttle
25. Primary throttle
26. Vacuum outlet for ignition distributor

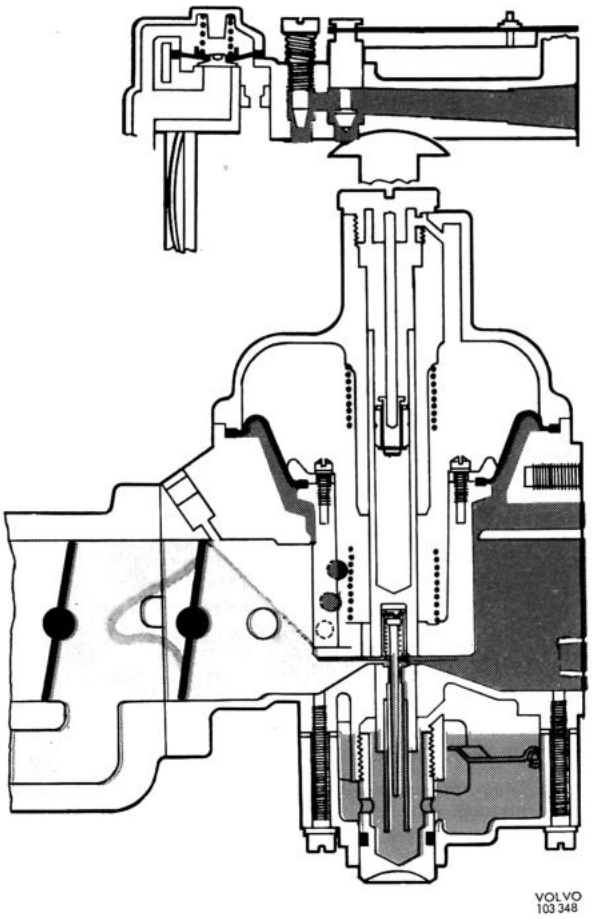


Fig. 2-56. Idling, warm engine

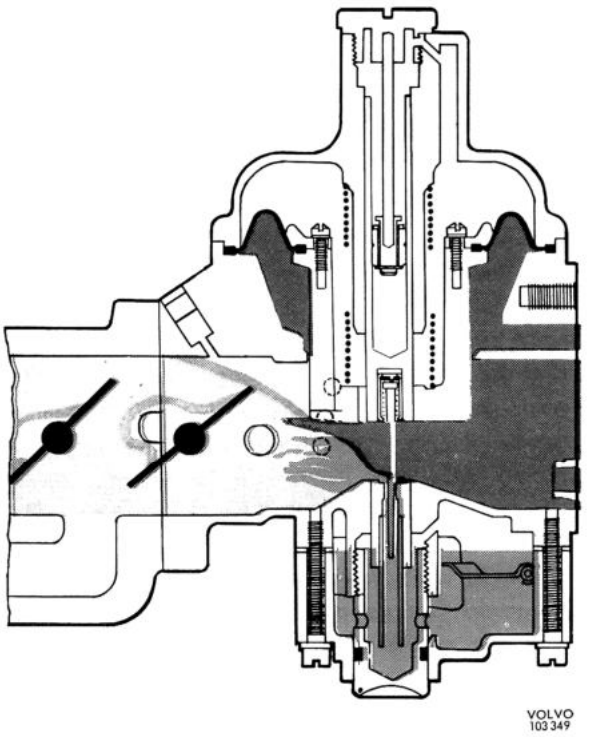


Fig. 2-57. Normal running, with open secondery throttle

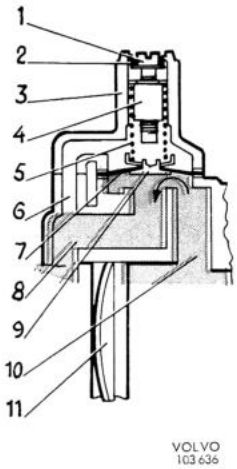


Fig. 2 58. By-pass valve

1. Adjusting screw
2. Rubber ring
3. Cover
4. Nut
5. Spring
6. Drilling to underside of diaphragm
7. Diaphragm
8. Outlet channel for fuel/air mixing
9. Valve
10. Inlet channel for fuel/air mixing
11. Primary throttle

turns and closes the inlet to the channel. At the same time as the cam disc is operated, the throttle flap opening is also influenced in such a way that turning the cam disc opens the throttle through the fast idle stop screw (4, Fig. 2-52) and the lever, before any of the calibrated holes open the connection to the fuel drilling. With this arrangement, the idling speed can if necessary be raised by the driver of the vehicle during the warming-up period of the engine.

IDLING

When the engine is idling, the vacuum in the carburettor suction chamber is low and the column between the air valve and the bridge will be small (see Fig. 2-56). At this stage, the thicker section of the metering needle is in the jet and thus only a small quantity of fuel, corresponding to idling requirements, is sucked into the engine. The temperature compensator (Fig. 2-55) is regulated by a bi-metal spring (4) which influences a valves (3). When the engine is hot and the temperature in the carburettor rises, the valve opens and air is supplied to the carburettor venturi to compensate for the increase in the fuel flow, which is obtained due to the alteration in the fuel's viscosity, see Fig. 2-56. Fine adjustment of the engine idling speed can be carried out with the idle trimming screw (2, Fig. 2-55).

NORMAL RUNNING

With the opening of the throttle flap, engine induction manifold depression is transferred via the channels in the plunger to the suction chamber which is sealed from the main body of the carburettor by the diaphragm. The pressure difference between the underside of the air valve, where there is pressure in the carburettor inlet port, and the upper side of the valve, where there is vacuum, causes the valve to lift from the bridge. This also lifts the tapered metering needle (15, Fig. 2-55), which is attached to the plunger, out of the jet. The effective choke area widens and increases the fuel flow. See Fig. 2-57.

As the vacuum in the engine induction manifold is dependent upon the engine speed and load, a correct fuel flow is obtained under all operating conditions.

Because of the variable choke area between the bridge and the valve, the air velocity and pressure drop across the jet orifice will always remain approximately constant, thus ensuring good fuel atomization at all speeds.

ACCELERATION

To provide at any point in the throttle range a temporarily richer mixture at the moment the throttle is suddenly opened, a hydraulic damper is arranged inside the valve rod. The hydraulic damper consists of a plunger mounted on a rod. The plunger operates in oil. When the throttle is suddenly opened, the vacuum in the suction chamber increases rapidly.

When the air valve (10, Fig. 2-55) lifts, the damper piston (7) is forced against its seat and oil is prevented from flowing past from the upper side the lower side of the damper plunger, this retarding the movement of the valve (10). This temporarily results in a more powerful vacuum above the jet so that the fuel-air mixture becomes for the moment richer.

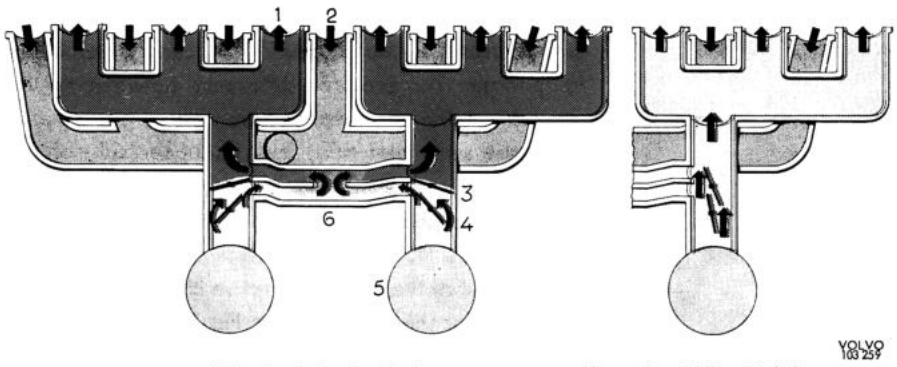
The downward stroke of the air valve is assisted by the spring (6). The rod in the valve should be filled to approximately within a 1/4" from the upper edge with oil which is approved as "Automatic Transmission Fluid, Type A".

EXHAUST EMISSION CONTROL SYSTEM

The engine is equipped with an exhaust emission control system in accordance with the principle of a more complete combustion which reduces the contents of carbon monoxide and hydrocarbons in the exhaust gases to an acceptable level. This is achieved mainly by a modified induction system that enables a more exact and leaner mixture ratio between fuel and air to be used.

How the system works is illustrated in Fig. 2-59.

The intake manifold is fitted with a secondary throttle



Light load (preheating) Heavy load (direct inlet)

Fig. 2-59. Exhaust emission control system, principle of operation

1. Intake manifold
2. Exhaust manifold
3. Secondary throttle
5. Carburettor
4. Primary throttle
6. Preheating chamber

(3) at each carburettor. For normal driving (with low power output the throttles (3) are closed thus forcing the mixture of fuel and air from the carburettors to a central preheating chamber (6) where the intake charge is heated and thoroughly mixed, whereby a completely evaporated and homogenous mixture is obtained.

When higher output is required, that is the primary throttles (4) are opened wider, the secondary throttles (3) also open up and the mixture of fuel and air passes from the carburettors directly to the cylinders without going through the preheating chamber.

No particularly accurate synchronizing of the carburettors is required since they are linked to each other through the intake manifold.

EVAPORATIVE CONTROL SYSTEM AND HOT START VALVE

Vehicles for the USA market are fitted with an evaporative control system which prevents fuel fumes from being released out into the atmosphere. Its function is outlined in Fig. 2-60.

Fuel fumes formed in the fuel tank, especially during warm weather, are led to the expansion tank (2) and from there to the venting filter (3) where they are absorbed by active carbon. The expansion tank is located behind the protective wallboard in the luggage compartment, se Fig. 2-64.

The venting filter (Fig. 2-62) is located in the engine compartment on the right-hand side, see Fig. 2-67.

Fuel fumes from the floatchamber (10, Fig. 2-60) are led via the valve (6) to the venting filter when the engine has been switched on or during idling. Throttling shuts off the connection between the venting filter and the float chamber so that the fumes travel via the valve to the air cleaner (Fig. 2-61).

The air valve (Fig. 2-63) controls the connection between the venting filter and the carburettor venturi. The space above the diaphragm (1) is connected by a line to the carburettor venturi on the side of the throttle facing the induction manifold, see Fig. 2-60. The vacuum in the induction manifold depends on the engine load and speed.

At high vacuum, the vacuum valve is kept closed (Fig. 2-60). When the vacuum drops the valve opens and air is drawn through the venting filter and vacuum valve to the carburettor venturi. Fuel fumes stored in

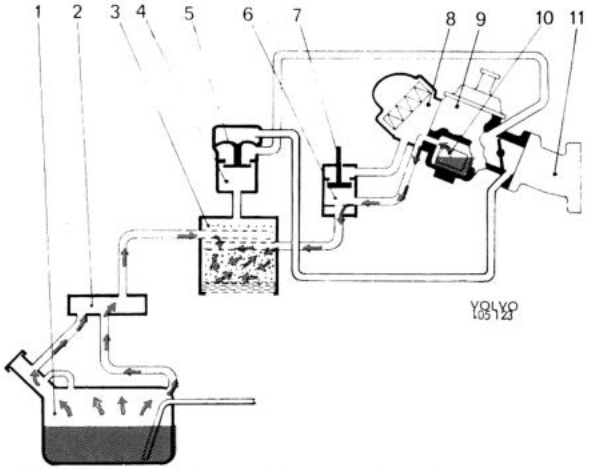


Fig. 2-60. Evaporative control system with control rod (7) at idle

1. Fuel tank
2. Expansion tank
3. Venting filter
4. Air valve
5. Diaphragm
6. Valve (hot start valve)
7. Control rod (connected to throttle)
8. Air cleaner
9. Carburettor
10. Floatchamber
11. Intake manifold

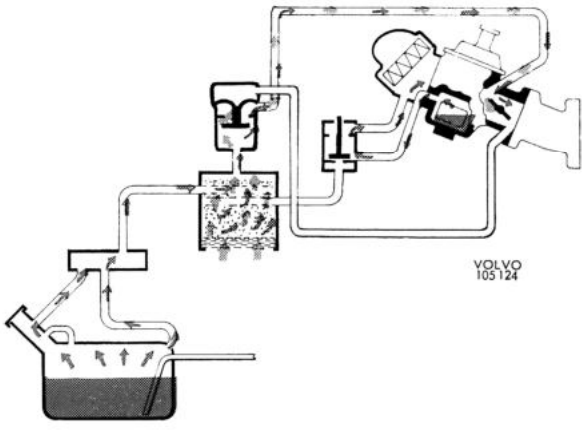


Fig. 2-61. Evaporative control system with control rod at running

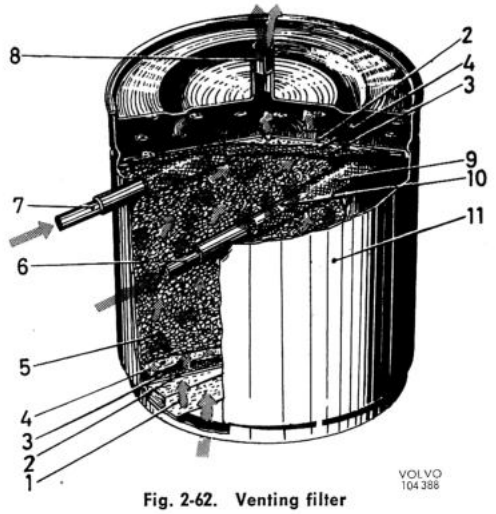


Fig. 2-62. Venting filter

1. Foam plastic filter (replace every 40 000 km =25 000 miles)
2. Plate (perforated)
3. Wire net (gauze)
4. Felt
5. Active carbon
6. Hose connection from expansion container
7. Hose connection from hot start valve
8. Connection to Air valve
9. Wire net stocking
10. Perforated pipe
11. Cannister

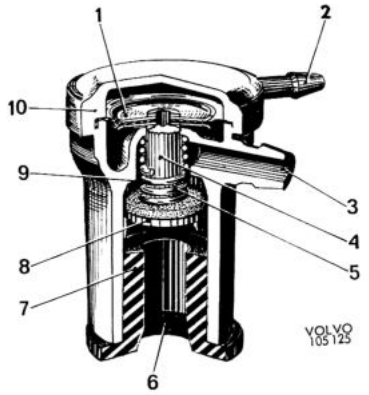


Fig. 2-63. Air valve

1. Diaphragm
2. Connection for hose to rear carburettor
3. Connection for hose to front carburettor
4. Valve rod
5. Thrust spring
6. Connection for venting filter
7. Rubber sleeve
8. Valve
9. Valve seat
10. Housing

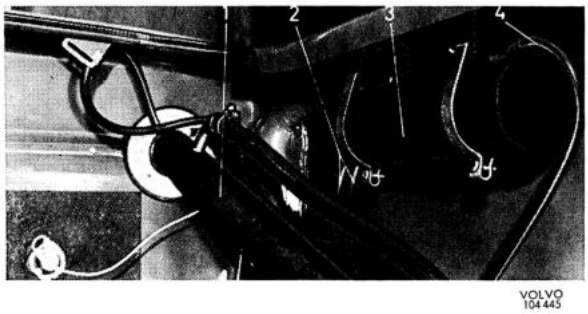


Fig. 2-64. Expansion tank

1. Fuel filling pipe
2. Hoses to fuel tank
3. Expansion tank
4. Hose to venting filter

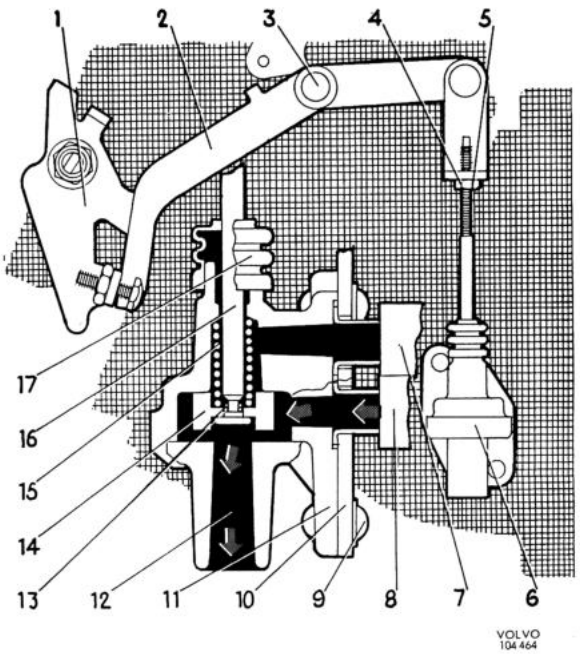


Fig. 2-65. Hot start valve, function, idling

1. Throttle lever
2. Valve control
3. Screw for valve control
4. Locknut
5. Control rod
6. Hot start valve
7. Outlet to air cleaner
8. Hose to floatchamber
9. Rivet
10. Air cleaner housing
11. Valve housing
12. Outlet to atmosphere or venting filter
13. Rubber rings
14. Piston
15. Thrust spring
16. Control rod
17. Rubber seal

the venting filter follow the air into the engine and take part in the combustion (Fig. 2-61).

The valve (6), which is known as the hot start valve, is to be found on all vehicles with twin carburettors. The difference between a valve used on a vehicle with or without an evaporative control unit is that in the latter case there is no hose connected to the

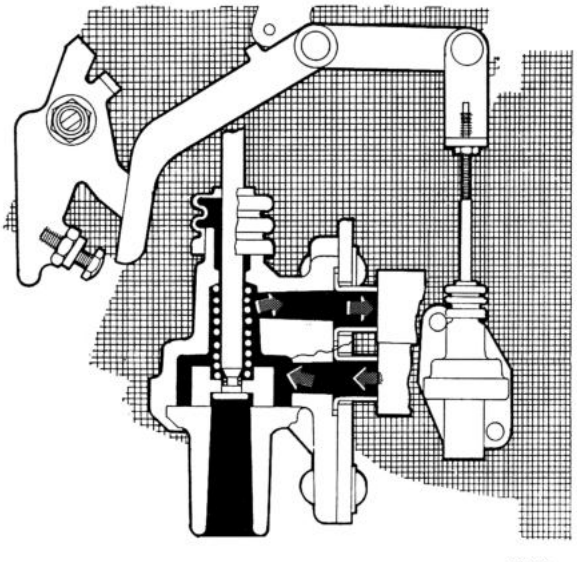


Fig. 2-66. Hot start valve, function, driving

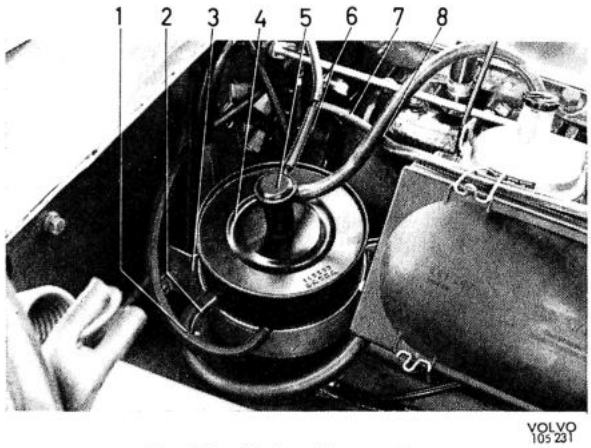


Fig. 2-67. Venting filter and hoses

1. Hose to fuel tank
2. Hose to hot start valve
3. Bracket
4. Venting filter
5. Air valve
6. Vacuum hose to air valve
7. Vacuum hose for distributor and air valve
8. Hose for fuel fumes to carburettor

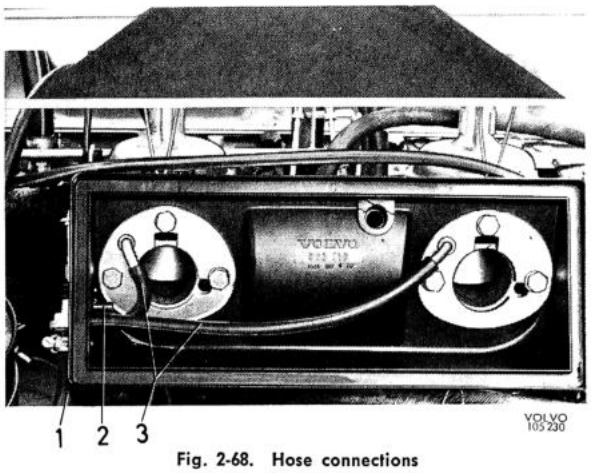


Fig. 2-68. Hose connections

1. Hose to hot start valve
2. Outlet to air cleaner
3. Hose to carburettor floatchamber

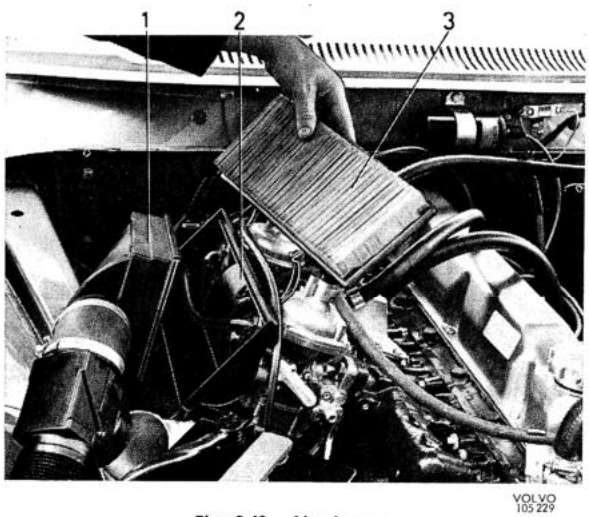


Fig. 2-69. Air cleaner

1. Air cleaner housing, upper section
2. Air cleaner housing, lower section
3. Cleaner

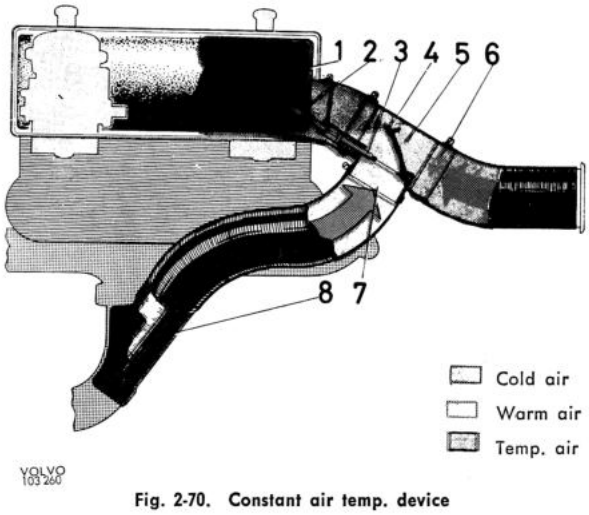


Fig. 2-70. Constant air temp. device

1. Air cleaner
2. Thermostat
3. Flap control
4. Flap
5. Flap housing
6. Cold-air intake
7. Warmair intake
8. Heater plate

outlet (12, Fig. 2-65), and the fumes are led directly out into the atmospere when the engine is switched off or idling.

The function of the **hot start valve** is as follows:

During warm weather and when the engine is warm, a great deal of fuel fumes develop in the floatchamber. These are vented through a channel to the air cleaner and resulting the engine obtaining a somewhat "richter" fuel mixture. This makes it difficult to start the engine. To counteract this, the hot start valve is fitted to the connection between the floatchamber and air cleaner by means of hoses.

When the throttle is at idling position, the lever (1), Fig. 2-65, presses against the valve control (2). The piston (14) is thereby lifted to its upper position by the control rod (16). The connection between the floatchamber and air cleaner is closed and fuel fumes are led directly out into the atmosphere through the outlet (12). (On vehicles fitted with an anti-fume device, the fumes are led from the outlet (12) to the venting filter.) When the accelerator pedal is depressed (See Fig. 2-66), the lever (1) releases the valve control (2) and the piston (14) is pressed by the spring (15) against its lower position. The outlet (12) is shut off, the fuel fumes are led into the air cleaner, and when the engine starts running, further through the carburettor and into the engine combustion chambers.

If it is to function properly, it is important that the hot start valve is accurately adjusted so that it has proper contact with the carburettor lever.

AIR CLEANER

The air cleaner (Fig. 2-69) functions both as a cleaner for the intake air and as an intake silencer. It is fitted with a replaceable paper insert. This insert must not be washed or moistened. At the recommended inter-

val, 40 000 km (25 000 miles), it should be discarded and replaced by a new none.

The engine is fitted with a **constant air temp. device,** see Fig. 2-70. (Not, however, on vehicles with right-hand drive.) This device consists of a flap housing (5), a hose (6) for cold air and a heat-resistant hose (7) for warm air as well as a heater plate (8), which is secured to the exhaust pipe. The thermostat (2), fitted in the flap housing, is inserted in the air cleaner housing and regulates the flap (4) by means of the flap control (3). The warm air taken at the exhaust pipe and the cold air taken at the front of the vehicle are regulated by the flap, mixed. The temperature of the mixture then influences the thermostat. In this way, the air supplied to the carburettors is maintained at a constant temperature (30±5° C=87±42° F). This arrangement eliminates the occurrence of ice forming in the carburettors. Thanks to this system in conjunction with the temperature compensator, the vehicle can be driven more or less irrespective of the temperature of the atmosphere.

FUEL PUMP

The fuel pump is of the diaphragm type and is driven by a cam on the camshaft. When the rocker arm in the pump is pressed upwards by the cam, the diaphragm is pulled downwards and fuel is drawn up to the pump. When the rocker arm returns, the diaphragm is pressed upwards by a spring (15, Fig. 2-71) and fuel is fed to the floatchamber in the carburettor. When the level in the floatchamber is sufficiently high, the float valve closes and the pressure in the delivery line rises until the pressure on the upper side of the diaphragm exceeds the spring pressure and pumping action ceases. A diaphragm (8) is fitted in the upper section of the housing and its purpose is to obtain a more even flow of fuel to the floatchamber. The diaphragm compresses the air in the cap (9). When the diaphragm (14) sucks fuel, the compressed air above the diaphragm (8) maintains the pressure in the line to the floatchamber.

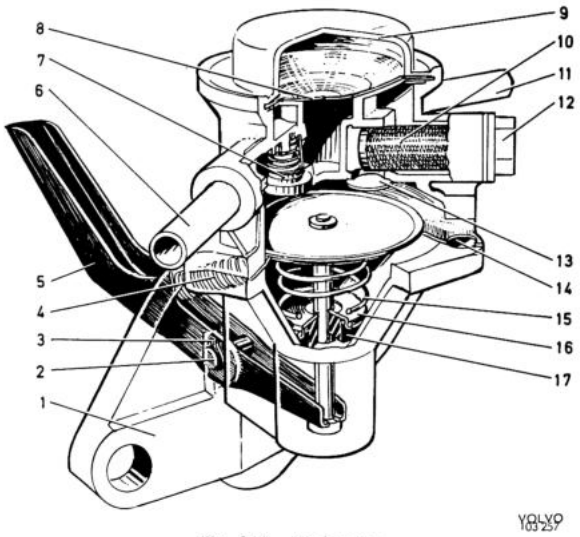


Fig. 2-71. Fuel pump

1. Lower pump housing
2. Pin
3. Circlip
4. Return spring
5. Lever
6. Outlet pipe
7. Outlet valve
8. Diaphragm
9. Cap
10. Strainer
11. Inlet pipe
12. Plug
13. Inlet valve
14. Diaphragm
15. Diaphragm spring
16. Guide
17. Rubber seal

REPAIR INSTRUCTIONS

The carburettors are specially set by the manufacturer and fine-adjusted with a CO-meter at the factory. In order not do disturb the setting of the carburettors, it is absolutely essential that the **following repair instructions are accurately followed when any work is to be done on the carburettors.**

PERIODICAL CHECK

Every 10 000 km (6 000 miles) check that there is oil in the damper cylinders (see, Fig. 2-73).

The spindle in the piston should be filled to about a 1/4" from the upper edge with oil approved as "Automatic Transmission Fluid, Type A".

Before any adjustment or repair to the carburettor is carried out, the following should be checked and, if necessary, remedied:

Valve clearance, spark plugs, compression, contact breaker (dwell angle) and ignition setting.

Also check that there is no air leakage on the intake side and that the air cleaner is not blocked. To be on the safe side, check also the flap function of the constant air temperature device. (See page 2:38.)

The function of the throttle control and throttles should be checked as well. It should be noted here that the engine drops its idling speed, after the engine speed has been raised, somewhat more slowly than with a carburettor without a by-pass valve.

SETTING THE CARBURETTOR

The best setting of the carburettor is obtained by using a CO-meter.

However, the setting can be checked without the use of this meter, but if the checking with either of these methods results in unsatisfactory running of the engine and it has been established that the fault is due to an "overrich" carburettor or "too lean" fuel mixture, the

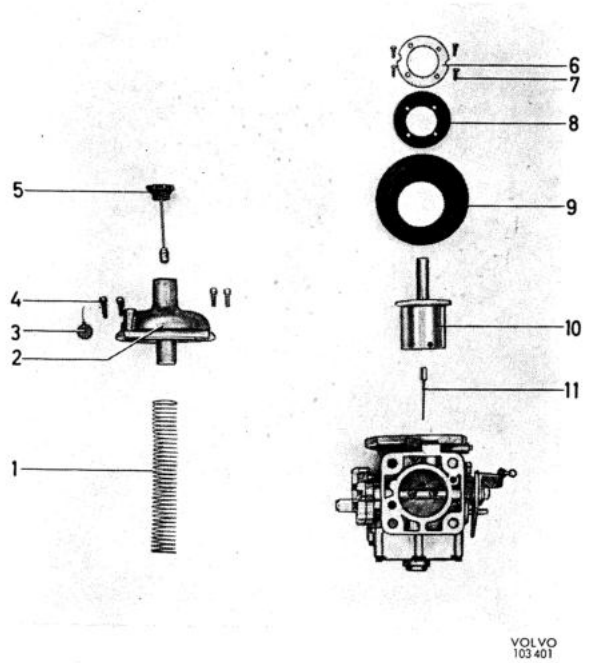


Fig. 2-72. Upper section dismantled

1. Spring
2. Suction chamber cover
3. Sealing plug
4. Screw
5. Hydraulic damper
6. Washer
7. Screw for diaphragm
8. Washer
9. Diaphragm
10. Air valve
11. Metering needle

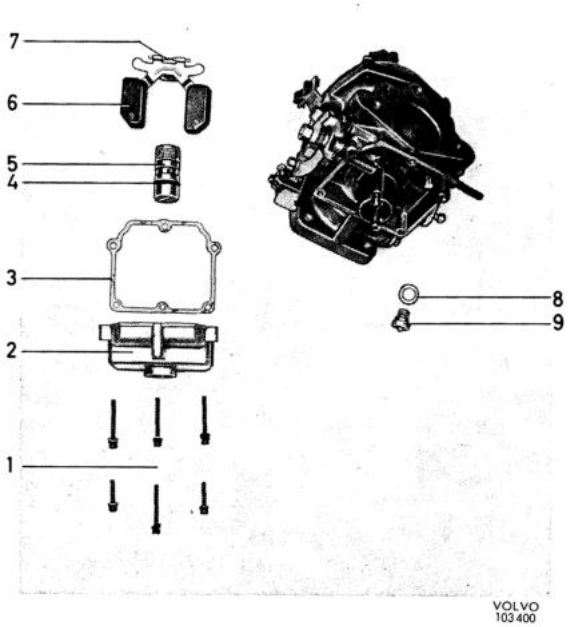


Fig. 2-74. Floatchamber dismantled

1. Screw for floatchamber
2. Floatchamber
3. Gasket
4. Rubber ring
5. Floatchamber plug
6. Float
7. Float pin
8. Washer
9. Float valve

carburettor nozzle should be adjusted with a special tool in accordance with Workshop Bulletin P-08-13.

SETTING WITHOUT CO-METER

1. Check that there is oil in the damper cylinders. See under "Periodical Check".
2. Run the engine warm. The adjustment should be carried out within about 10 minutes after the coolant thermostat has opened. (One way of finding this out is by feeling the upper radiator hose at the radiator which should start to get warm.)
3. Adjust the engine speed to 800 r.p.m. with the throttle stop screws (2, Fig. 2-49). The speed should be adjusted to 700 r.p.m. for a vehicle with automatic transmission. (If the engine does not reduce its idling speed, see under the heading "By-pass valve".)

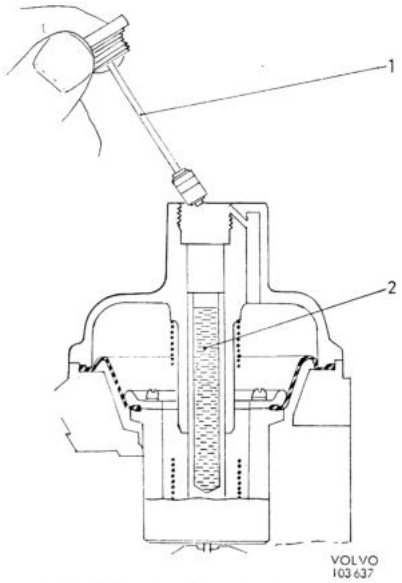


Fig. 2-73. Checking the damper oil

1. Damper piston
2. Oil approved as "Automatic Transmission Fluid, Type A"

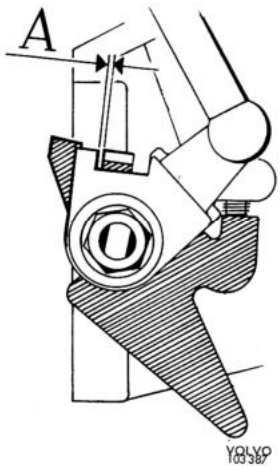


Fig. 2-75. Setting the control

A=0.1 mm (0.004")

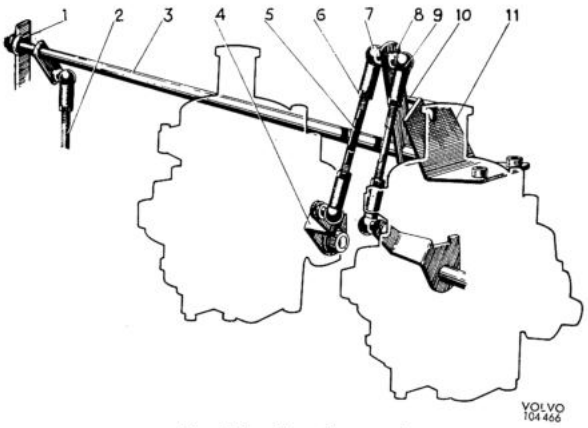


Fig. 2-76. Throttle control

1. Bush
2. Link rod for pedal
3. Control shaft
4. Lever
5. Link rod
6. Locknut
7. Ball joint
8. Lever
9. Lock wire
10. Stop for lever
11. Bracket

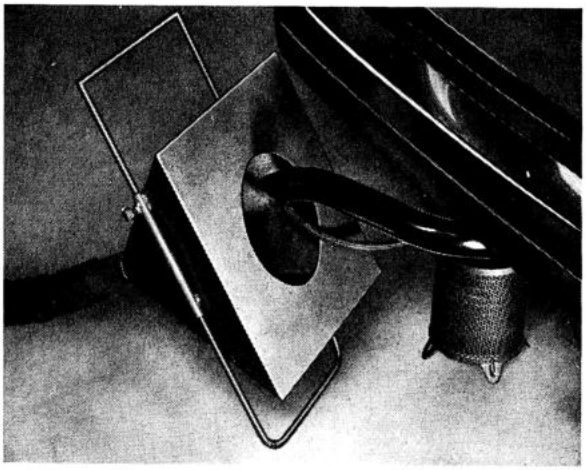


Fig. 2-77. Funnel for exhaust evacuation

N.B. Screw equally for both carburettors. Check to make sure that both carburettors have the same air valve lift. This is checked easily by simply making sure that the distance visually between the bridge of the carburettor housing and the air valve is the same for both carburettors. A more accurate synchronization is not required.

4. Adjust with the idle trimming screws 7, Fig. 2-50 from the basic setting, which is 2 screwed-out turns of the screw so that the best idling speed is obtained. Screw equally for both carburettors.
5. Adjust the link rods. With the control against its stop on the manifold bracket, the link rods should be adjusted so that there is a clearance of about 0.1 mm (0.004") between the lever and the primary throttle spindle flange. See Fig. 2-75.
6. Adjust so that the valve control of the hot start valve is against the carburettor lever with the valve piston in the upper position and the throttle control at idle. (See Figs. 2-65 and 2-66.)
   Lubricate the contact surface with Molykote and check that the engine returns to idling speed after briefly revving-up several times.
7. Setting the fast idle: Pull out the choke control 23—25 mm (almost 1") so that the mark on the rapid idle cam comes opposite the centerline of the rapid idle screw.
   Then adjust the rapid idle screw to give an engine speed of 1100—1300 r.p.m.

SETTING WITH CO-METER

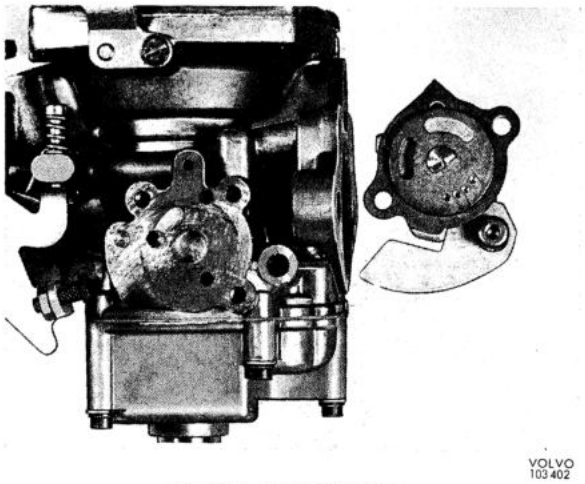
The setting should be made at a temperature of 60—80° F and must be made within 8 minutes after the coolant thermostat has opened. Warming-up should be done with a completely cold engine.

When measuring with a CO-meter, it is important that the **carburettor temperature** is the correct one. When the engine is idling, the floatchamber is exposed to heat radiation from the exhaust manifold while the flow of cold fuel through the floatchamber is small. The resultant rise in temperature causes an increase in the fuel flow through the jet due to the alteration in the viscosity and the increase in the CO-value. Racing the engine speed cools the carburettor to a certain extent due to the step up in the fuel flow. The temperature can be checked to make sure that it is not excessive by feeling the floatchamber with the hand. It should "feel cold", that is, it more or less should not exceed room temperature.

Before reading off the CO-meter, briefly revv up the engine so that the air valve is in the proper position. In order to be certain that the measured CO-value is correct, **measuring should be carried out within the time period mentioned above.**

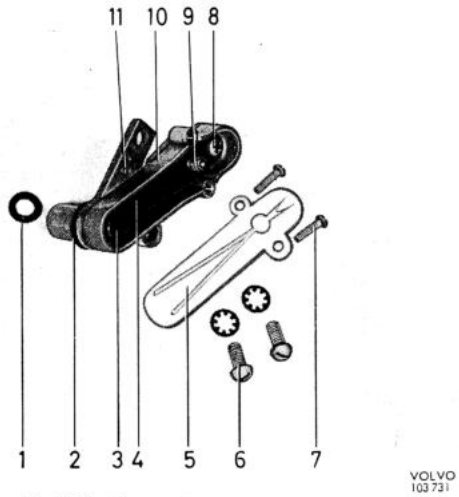
There are a number of different types of CO-meters available which function with acceptable accuracy. The instructions on their use accompany each meter. Note that when connecting the hose for evacuating the exhaust gases, the hose must not be placed so that the exhaust gases are completely evacuated from the CO-meter connection to the exhaust manifold. A funnel, see Fig. 2-77 could suitably be used here. With the funnel installed, the suction at the connection would not be so great as to upset the measuring but sufficient to suck up the exhaust gases so that they do not fill the workshop.

When doing any measuring with the CO-meter, it is important that the exhaust pipe and silencer are in good condition, that is, they do not leak.



VOLVO 103402

Fig. 2-78. Cold-start device



VOLVO 103731

Fig. 2-79. Temperature compensator

1. Rubber seal
2. Rubber seal
3. Valve
4. Bi-metal spring
5. Cover
6. Screws for temperature compensator
7. Screw for cover
8. Cross-slotted screw
9. Adjusting nut
10. Housing
11. Marking

1. Check that there is oil in the damper cylinders. See under "Periodical Check".
2. Connect a tachometer and run the engine warm at 1500 r.p.m. until the coolant thermostat opens. (One way of finding this out is by feeling the upper radiator hose at the radiator which should start to get warm.)
3. Adjust the engine speed to 800 r.p.m. with the throttle stop screws (2, Fig. 2-49). The speed should be adjusted to 700 r.p.m. for a vehicle with automatic transmission. (If the engine does not reduce its idling speed, see under "By-pass valve".)
   N.B. Screw equally for both carburettors. Check that both carburettors have the same air valve lift. This is easily checked by measuring with the eye the distance between the carburettor house bridge and the air valve. The distance should be the same for both carburettors. More accurate synchronization is not required.
4. Connect a CO-meter and check that the CO-content is within the limits 2.5—3.5 %. With the help of the idle trimming screws (7, Fig. 2-50) the CO-content can be adjusted within small deviations. (If the CO-content is too high, check first the temperature compensator, see under "Temperature Compensator".)
5. Adjust the link rods. With the control against its stop on the manifold bracket, the link rods should be adjusted so that there is a clearance of about 0.1 mm (0.004") between the lever and the flange of the primary throttle spindle. See Fig. 2-75.
6. Adjust so that the valve control of the hot-start valve is against the carburettor lever with the valve piston in the upper position and the throttle control at idle. (See Figs. 2-65 and 2-66).
   Lubricate the contact surface with Molykote and check that the engine returns to idling speed after briefly revving-up several times.
7. Setting the fast idle: Pull out the choke control 23—25 mm (almost 1") so that the mark on the rapid idle cam comes opposite the centerline of the rapid idle screw.
   Then adjust the rapid idle screw to give an engine speed of 1100—1300 r.p.m.

FAULTY CARBURETTOR FUNCTION

1. Check to make sure that the reason for the fault in the function is not due to wrong damper oil or oil level, impurities in the floatchamber or a faulty float valve and float. See the respective headings.
2. Remove the air cleaner and check that the suction valve(s) operate easily and without jamming. (The damper piston(s) removed.) If this is not the case, remove the suction chamber cover and clean the pistons. At the same time, check to make sure the diaphragm is in good condition. Plug-seal after fitting.
   N.B. If the metering needle must be released or moved, it should be adjusted, see under the heading "Replacing the metering needle". A CO-meter is recommended for this purpose.

Temperature compensator

3. Should there be a powerful drop in the idling speed during idling for a lengthy period, especially when the weather is warm, check the function of the temperature compensator by removing the

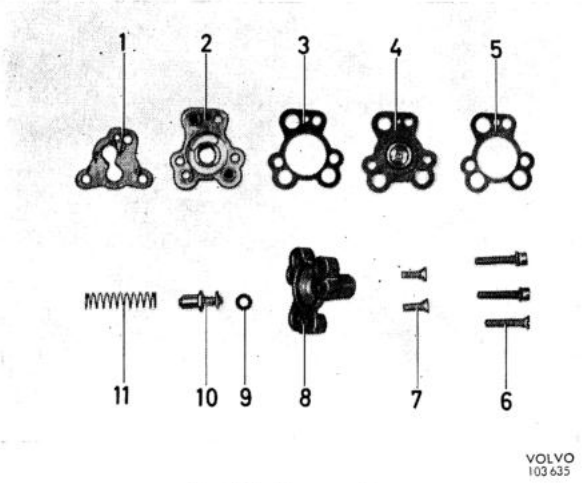


Fig. 2-80. By-pass valve

1. Gasket
2. Housing
3. Gasket
4. Diaphragm
5. Gasket
6. Screws for by-pass valve
7. Screw for cover
8. Cover
9. Rubber ring
10. Adjusting screw
11. Spring

plastic cover and pressing in the valve (3, Fig. 2-79). This should move under very light pressure and return to its position without sticking. This applies at a temperature above 80° F. The valve starts opening at 70°—77° F.

Pressing the valve inwards deteriorates the quality of the idle. If the valve has a tendency to be stiff in operation or if the compensator is incorrectly adjusted, the latter should be replaced complete. See under "Replacing the temperature compensator".

For adjusting slacken one of the cross-slotted screws (8), for the bi-metal spring and center the valve so that its function will be as above. If necessary adjust as follows:

At 70—77° F the valve should just start to open. In other words, the valve should be loose in its seat at this temperature.

When checking the setting, remove the temperature compensator from the carburettor and store it at a temperature of 70—77° F until it has reached this temperature. Adjust with the nut (9) for the bi-metal spring.

By-pass valve (front carburettor)

4. With faulty function of the by-pass valve, or if the engine does not reduce speed at idle (first check that the throttle control is correctly adjusted) or if the valve does not open, then adjust as follows:

A **Engine does not reduce speed at idle:**
Turn the adjusting screw (5, Fig. 2-50) to the left until the engine reduces idling speed.

Check the function by running the engine briefly up to about 2 000 r.p.m. The engine should then return to idling speed. (Note that the engine will return to idle somewhat slower than is the case with a carburettor without a by-pass valve.) When correct function is obtained (that is, even the function according to B), turn the screw a further 1/2 turn to the left.

B **The valve does not open:**
Normally the air valve of the front carburettor should go down to the bridge a little after that of the rear carburettor on racing the engine speed. Turn the adjusting screw to the right until normal function is obtained. If this not possible, replace the by-pass valve complete, see under "Replacing the by-pass valve".

N.B. When adjusting, do not press the adjusting screw inwards since the rubber ring (9, Fig. 2-80) sealing between the screw and cover can drop out of position. Check for air leakage by e.g. placing a finger over the rubber ring hole.

REMOVING THE CARBURETTORS

Remove the valve control for the hot-start valve and the air cleaner. Remove the link rod ball joints from the carburettors. Take off the fuel hoses, vacuum hose and choke wire.

Remove the nuts for the carburettors and take off the carburettors. Remove the protection plates and gaskets. Mask over the intake holes with tape.

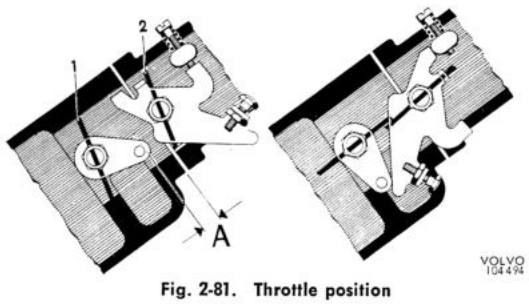
FITTING THE CARBURETTORS

Clean the gasket surface. Fit the protection plates, new gaskets and then the carburettors. Connect the ball joints, fuel hoses, vacuum hose and choke wire. Make sure that the choke control on the dashboard is pushed in. Then secure the pull wire in the clamping screw of the rapid idle cam. After this clip on the outer sleeve of the pull wire.

Fit the air cleaner and connect the hose for the crankcase ventilation. Fit the valve control for the hotstart valve. Adjust the carburettors, see under "Setting the carburettors".

Checking the secondary throttles

Check to make sure that the secondary throttles are centered and can be turned without jamming. Check the location ("A", Fig. 2-81) of the levers. When the secondary throttle is closed, the distance "A" between the lever pin and the intake manifold flange should be 2.7—4.3 mm (0.11—0.17").

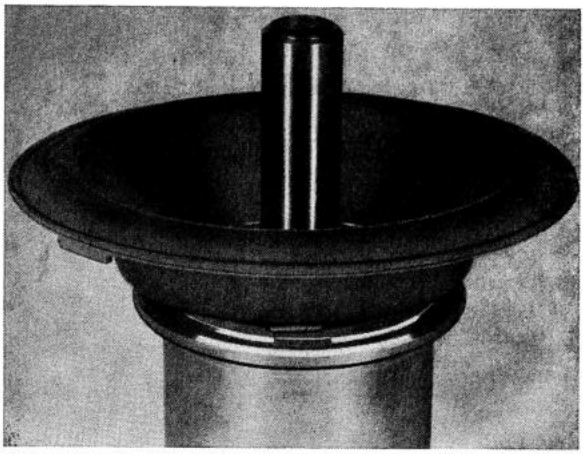


VOLVO 104494

Fig. 2-81. Throttle position

Throttle position at low output — Fully open throttle

1. Secondary throttle 2. Primary throttle
"A"=2.7—4.3 mm (0.11—0.17")



VOLVO 101 963

Fig. 2-83. Diaphragm in air valve

CLEANING THE FLOATCHAMBER

The floatchamber is removed by unscrewing the floatchamber plug (5, Fig. 2-74 and the screws (1). Clean the gasket surface and fit a new rubber ring (4). Fit the floatchamber with a new gasket.

N.B. Fit the floatchamber plug before tightening the floatchamber screws.

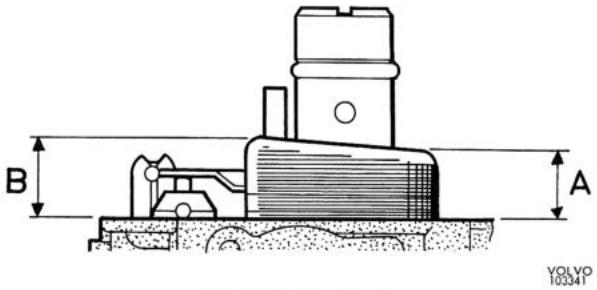
FLOAT LEVEL

Before checking the float level, remove the carburettor, invert it and take out the floatchamber.

The float is removed by carefully breaking the float spindle from the bridge. The float is fitted with the sloping side facing away from the carburettor housing.

At the correct float level, the top point on the float should lie 15—17 mm (0.59—0.67") and the rear edge 9—13 mm (0.35—0.51") above the sealing surface (see Fig. 2-82). If the level is incorrect, adjust by bending the tag at the float valve.

N.B. Do not bend the arm between the float and the pin.



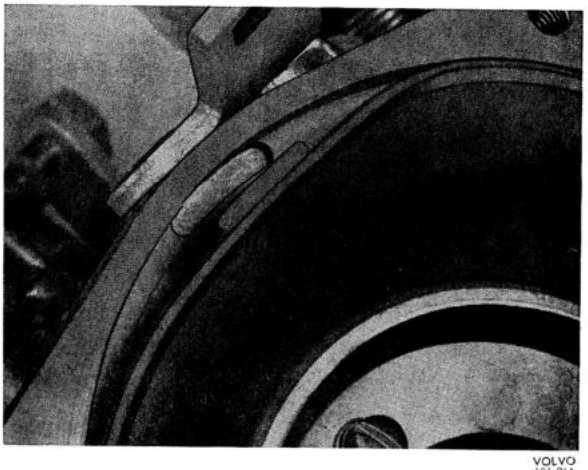
VOLVO 103341

Fig. 2-82. Float level

A= 9—13 mm (0.35—0.51")
B =15—17 mm (0.59—0.67")

REPLACING THE DIAPHRAGM

1. Screw out the damper piston. Make line-up marks on the suction chamber cover and carburettor housing. Remove the seal plug, release the screws and take off the suction chamber cover. Remove the spring.
2. Pull up the air valve with diaphragm. Remove the diaphragm by unscrewing the four screws. Clean the air valve.
   N.B. Observe due care that the metering needle is not bent or moved from its position.
3. Fit the new diaphragm, see Fig. 2-83. The rubber register should fit into the valve groove.
4. Move the air valve down and fit in the rubber register as shown in Fig. 2-84. Fit the cover and fill with damper oil.
5. Plug-seal the suction chamber cover.



VOLVO 101 964

Fig. 2-84. Diaphragm in carburettor housing

REPLACING THE BY-PASS VALVE

The by-pass valve is replaced complete. The valve is removed from the carburettor by screwing out the three screws (6, Fig. 2-80). Clean the gasket surface and fit the new valve with gasket (1). Carry out a function test. Note that the by-pass valve is marked y on the cover.

REPLACING THE TEMPERATURE COMPENSATOR

The temperature compensator is replaced complete. It is removed from the carburettor by unscrewing the screws (6, Fig. 2-79). Take out the old seal (1) from the carburettor and fit a new one. Place a new seal (2) on the temperature compensator and fit the compensator. The temperature compensator is marked "60" (see 11, Fig. 2-79).

REPLACING THE METERING NEEDLE

After replacing the metering needle, the following check with a CO-meter is recommended.

1. Remove the air valve from the carburettor and clean it.
2. Remove the needle by unscrewing the lock screw and pull the needle out with the spring suspension.
3. Before fitting the new needle, check that the
3. needle designation is B1 BE.
   The designation is punched on the needle and can be read by pulling the needle out of the spring suspension far enough to reveal the designation.
4. Fit the needle with the spring suspension so that the flat surface faces the lock screw. The needle should incline from the holes in the air valve, i.e. in towards the air cleaner flange.
   The needle should be inserted so far that the plastic washer lies flush with the valve, see Fig. 2-83. Tighten the lock screw.
5. Fit the air valve in the carburettor. Plug-seal the suction chamber cover.

DAMPER DEVICE

If the engine does not react properly during acceleration, the reason may be a faulty clearance on the damper plunger, the axial clearance of which (see A, Fig. 2-86) should be 1.1—1.9 mm (0.04"—0.07") early prod. 0.05—1.1 (0.02"—0.04"). The diameter on the plunger should be 9.32—9.35 mm (0.36—0.37").

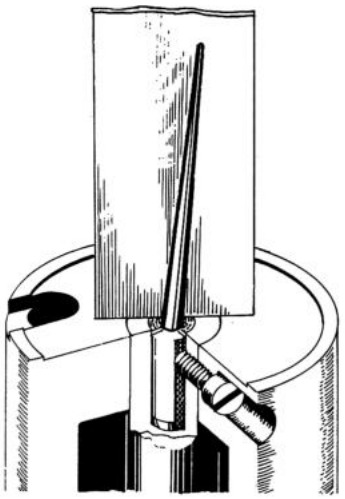


Fig. 2-85. Fitting the metering needle

With any fault in the damper plunger change it complete.

If the damper device is to function correctly, then the level of the damper oil must be correct (see Fig. 2-73). The interval prescribed for the periodical check is 10 000 km (6 000 miles).

ADJUSTING THE ACCELERATOR PEDAL

The length of the long, vertical link for the pedal is adapted so that there is a clearance of 1 mm (0.039") between the throttle lever lug and the full throttle stop on the carburettors, when the accelerator pedal is fully depressed. With a fully depressed pedal, the force of the driver's foot is taken up by the toe-plate without imposing unnecessary loading on the throttle control.

Fig. 8-86. Damper plunger clearance

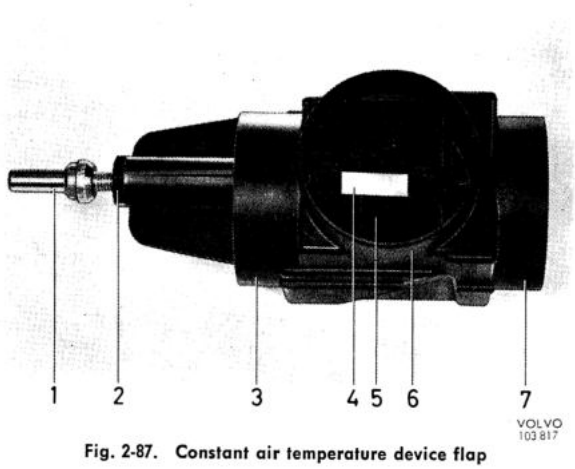


Fig. 2-87. Constant air temperature device flap

1. Thermostat
2. Lock
3. Air cleaner connection
4. Flap control
5. Flap
6. Hot air intake
7. Cold air intake

FLAP HOUSING FOR CONSTANT AIR TEMPERATURE DEVICE

If the flap (5, Fig. 2-87) does not open, there will be too high a temperature for the intake air and this will have a negative effect on the engine.

The flap should be closed for cold air at a temperature of 70—77° F and for warm air at 95—105° F. If correct function is not obtained, replace the flap housing with the thermostat complete.

The flap location can be checked with the flap housing fitted in position. A small tab on the flap spindle projects from both sides of the housing (see 3, Fig. 2-88). The longitudinal pin for these tabs coincides with that of the spindle and turns parallel with the spindle. In other words, the location of the flap can be seen at different temperatures by comparing the angle of a tab in relation to the stops outside the housing.

The thermostat can be checked in lukewarm water. The flap should be closed for cold air at 70—80° F and closed for hot air at 95—105° F. If correct function is not obtained, change the flap housing with thermostat complete.

When fitting the flap housing, observe that the thermostat is located in the centre of the air flow and the tightening screw for the hose clamp is on the upper side of the flap housing.

AIR CLEANER

The insert should be replaced with a new one every 40 000 km (25 000 miles), if the vehicle is driven in areas with moderate air pollution. With driving in very dusty areas, replacement may have to be done more often.

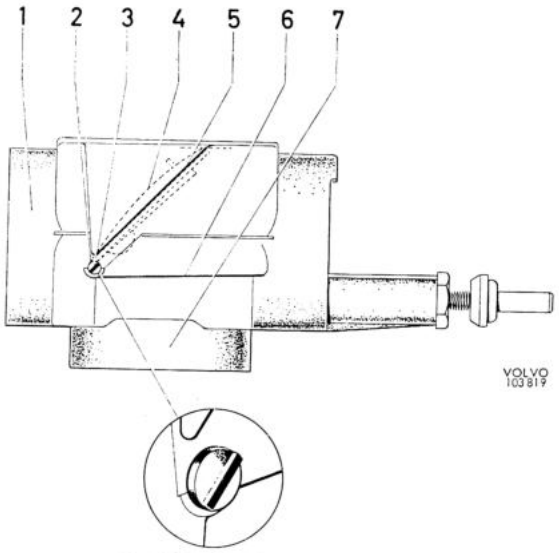


Fig. 2-88. Checking the flap function

1. Cold air intake
2. Flap spindle
3. Tab
4. Flap
5. Stop for marking flap position at temp. below 58—77° F
6. Stop for markring flap position at temp. above 95—104° F
7. Hot air intake

No cleaning of any type should be carried out between the replacements. The insert must on no condition be moistened or oiled.

Increased fuel consumption is a sign of a blocked air cleaner.

FUEL PUMP

Cleaning the strainer

When cleaning the fuel strainer, unscrew the plug (12, Fig. 2-71).

Checking condition of fuel pump

Before removing the fuel pump, check its condition with a fuel pressure gauge. Connect a pressure gauge and run the engine until the pressure no longer rises. Stop the engine, check the pressure and compare with the values given in "Specifications". Check also the pressure drop after the engine has stopped. If the pressure drops, this is a sign that the valves leak.

Removing

Disconnect the connections for the fuel lines and screw off the pump.

Dismantling

1. Screw out the plug (3, Fig. 2-89) with strainer.

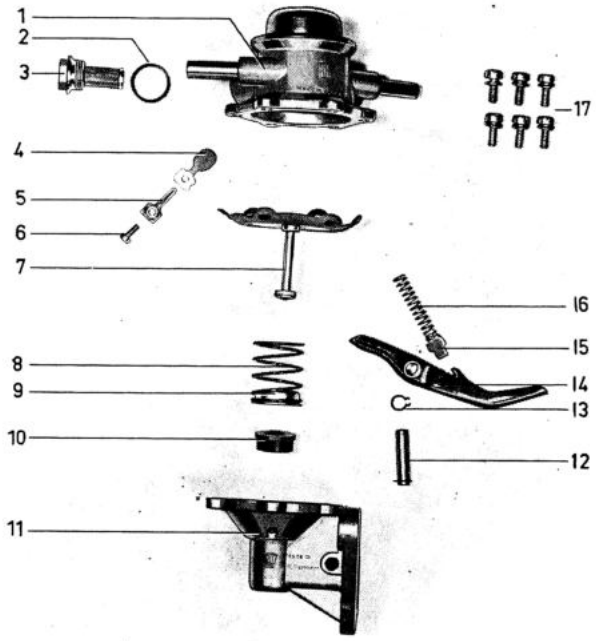


Fig. 2-89. Fuel pump, dismantled

1. Upper pump housing
2. Sealing washer
3. Plug with strainer
4. Inlet valve
5. Stop arm
6. Screw
7. Diaphragm
8. Spring
9. Spring guide
10. Rubber seal
11. Lower pump housing
12. Lever pin
13. Circlip
14. Lever
15. Spring retainer
16. Return spring
17. Screw

2. Make line-up marks on the upper section and lower section. Screw loose the upper part from the lower part.
3. Remove a circlip (13) from the lever pin 12). Press out the pin. Pull out the lever (14) and the spring (16).
4. Remove the diaphragm with spring (8), guide (9) and rubber seal (10). Lever the rubber seal over the nylon washer and then remove the spring.
5. Screw loose the underside from the upper section, remove the stop arm and the inlet valve (4). The outlet valve cannot be removed.

Inspecting

Check the diaphragm and gasket for leakage and the moving parts for wear. Replace damaged or worn parts.

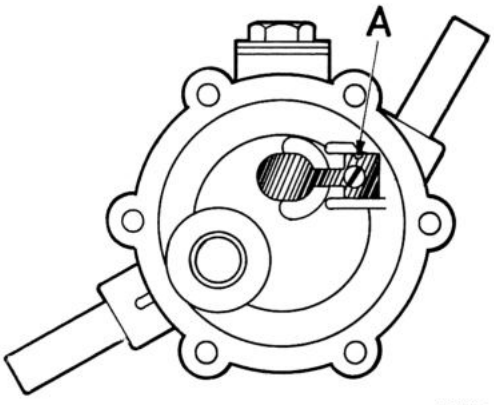


Fig. 2-90. Location of inlet valve

Assembling

1. Fit the inlet valve, see Fig. 2-90, and the stop arm. Tighten the screw, but only sufficiently so that the spring lies well against the pump body.
2. Fit the spring (8) and guide (9), see Fig. 2-89. Lever on the rubber seal (10 with the flange facing inwards towards the guide.
3. Fit the diaphragm unit in the upper section of the pump. Press downwards so that the rubber seal comes into its correct position.
4. Press down the diaphragm, move in the lever (14) make sure that it locates correctly in relation to the diaphragm rod. Fit the pin (12), circlip (13), spring retainer (15) and spring (16).
5. Fit the upper section observing the line-up marks and secure it.
6. Fit the strainer and plug.

Test the pump. When installing, make sure that the lever locates correctly above its cam.

VENTING FILTER

The foam plastic filter (1, Fig. 2-62) should be changed every 40 000 km (25 000 miles). This is done by slackening the bracket screws, lifting up the venting filter and drawing out the foam plastic filter. Fitting is in reverse order.