GROUP 23

FUEL SYSTEM

DESCRIPTION

CARBURETTORS

The twin SU-HS6 carburettors are of the horizontal type. Movement of the accelerator pedal is transmitted to the throttle flap by means of the shaft between the carburettors which is flexibly mounted in the throttle flap spindle levers. When starting from cold, the fuel/air mixture is enriched by lowering the jets. This also operates the fast idling device. The various functions are described under the following headings.

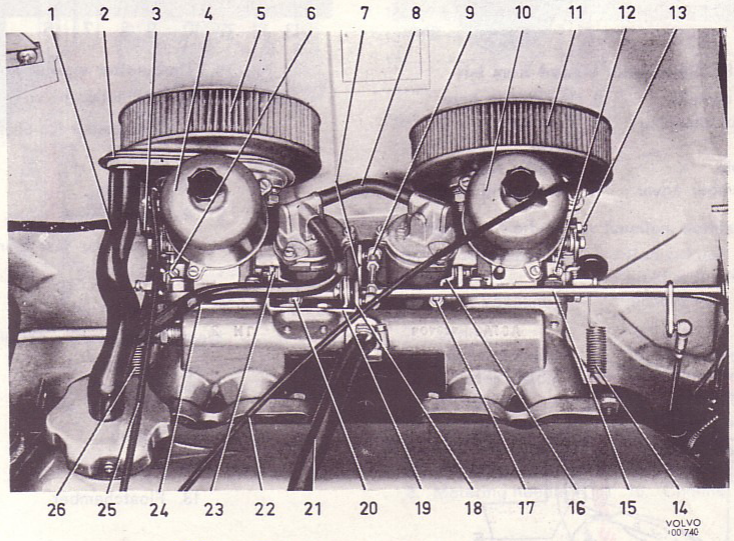


Fig. 8. Carburettor assembly (early prod.)

1. Rubber hose for crankcase ventilation (B 18 B)
2. Intermediate piece for crankcase ventilation
3. Clamping screw for choke control
4. Front carburettor
5. Front air cleaner
6. Idle adjusting screw
7. Lever
8. Fuel hose
9. Link
10. Rear carburettor
11. Rear air cleaner
12. Idle adjusting screw
13. Clamping screw for choke control
14. Return spring
15. Control shaft
16. Lever on intermediary shaft
17. Locking screw
18. Lever
19. Stop
20. Locking screw
21. Rubber hose for crankcase ventilation (B 18 B)
22. Choke control
23. Lever on intermediary shaft
24. Fuel hose
25. Choke control
26. Return spring

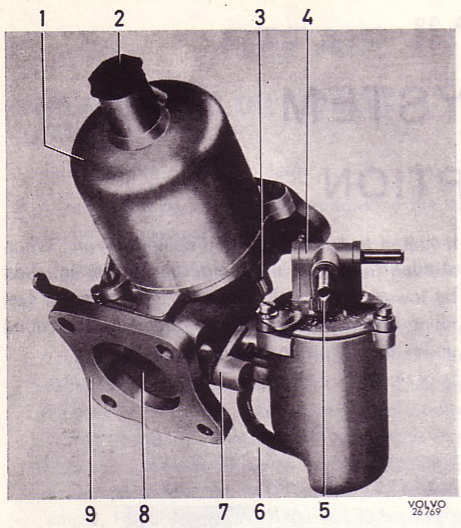


Fig. 9. Carburettor viewed from left

1. Suction chamber
2. Screw for damping piston
3. Lifting pin
4. Floatchamber cover
5. Ventilation hole
6. Fuel line
7. Lever
8. Throttle flap
9. Connecting flange

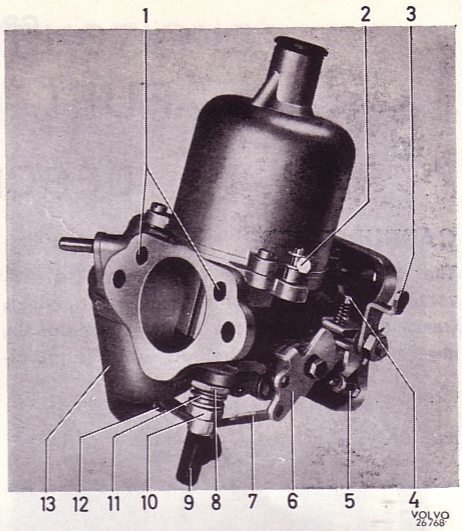


Fig. 10. Carburettor viewed from right

1. Ventilation holes
2. Attachment for choke control
3. Lever
4. Idling screw
5. Screw for fast idling
6. Lever
7. Link for jet
8. Locknut
9. Jet
10. Adjusting nut
11. Spring
12. Fuel line
13. Floatchamber

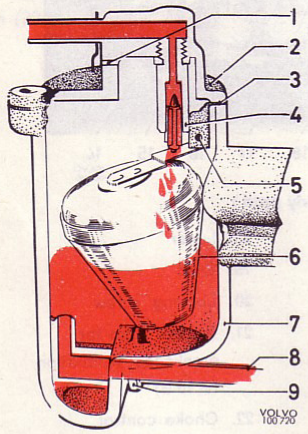


Fig. 11. Float mechanism

1. Ventilation hole with protective washer
2. Floatchamber cover
3. Gasket
4. Valve
5. Pin
6. Float
7. Floatchamber
8. Fuel line
9. Union

Float

The floatchamber is bolted onto the carburettor housing.

The valve (4, Fig. 11) which is opened and closed by the float, is fitted in the cover. The fuel is taken to the lower end of the jet through a flexible hose (8) from the lower part of the floatchamber.

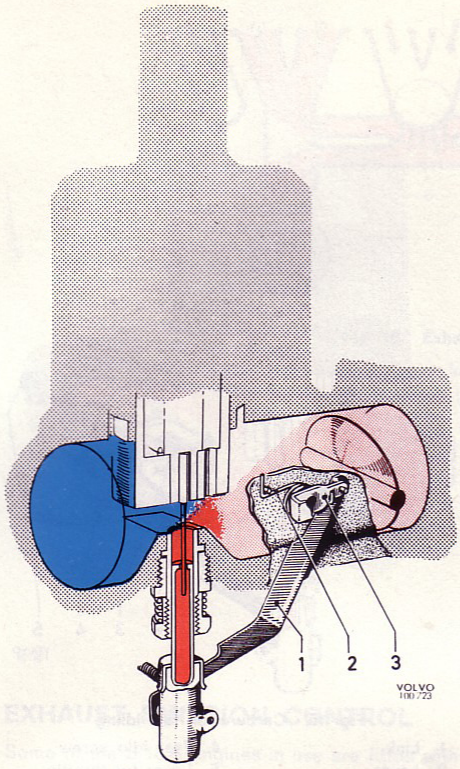


Fig. 12. Starting from cold

1. Link
2. Return spring
3. Lever

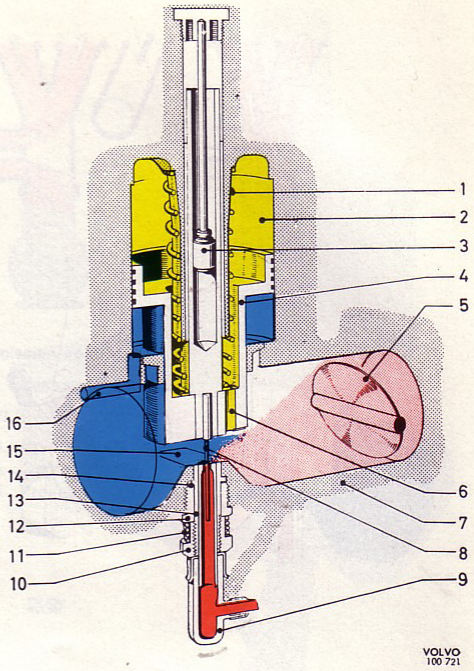


Fig. 13. Carburettor function, normal running

Blue = Atmospheric pressure
Yellow = Vacuum
Red = Fuel
Light red = Fuel/air mixture

1. Spring
2. Suction chamber
3. Damper piston
4. Air valve
5. Throttle flap
6. Channel
7. Housing
8. Metering needle
9. Jet
10. Adjusting nut
11. Locking spring
12. Lock nut
13. Jet sleeve
14. Washer
15. Bridge
16. Channel

Starting from cold

When the engine is started from cold, the fuel/air mixture can be enriched by lowering the jets, see Fig. 12, which is done through a linkage system from the choke control on the instrument panel. Since the metering needle is tapered, the cross-sectional area for the fuel flow increases when the jet is lowered.

When the choke control is pulled out, the outer end of the lever (3) is pressed downwards and influences the jet so that this is also pressed down. In addition, the fast idling screw is influenced by the cam on the lever (2, Fig. 15) and the throttle flap opens slightly.

Running

The flow of air passing through the carburettors when the engine is running increases in speed when it passes through the constriction, known here as the bridge, (15, Fig. 13). Fuel is added to the flow of air through the jet which opens out at the bridge.

The vertical position of the air valve is determined by the difference between the vacuum in the carburettor and atmospheric pressure, since the top of the valve has access to the space between the throttle flap and bridge, whereas the underside of the valve is influenced by atmospheric

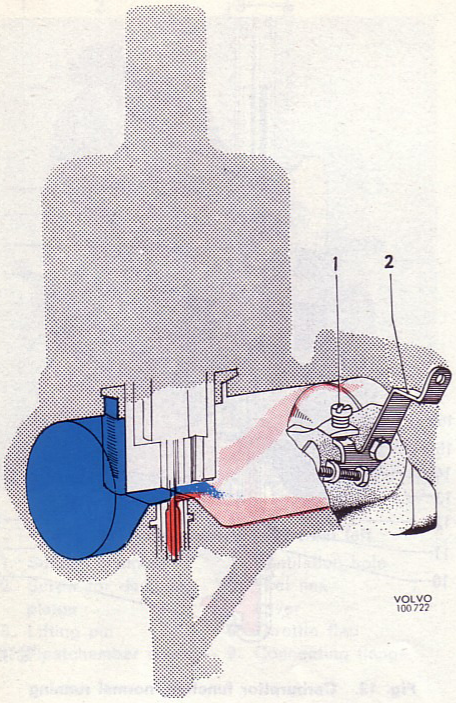


Fig. 14. Carburettor, idling

1. Idle adjusting screw
2. Lever for return spring

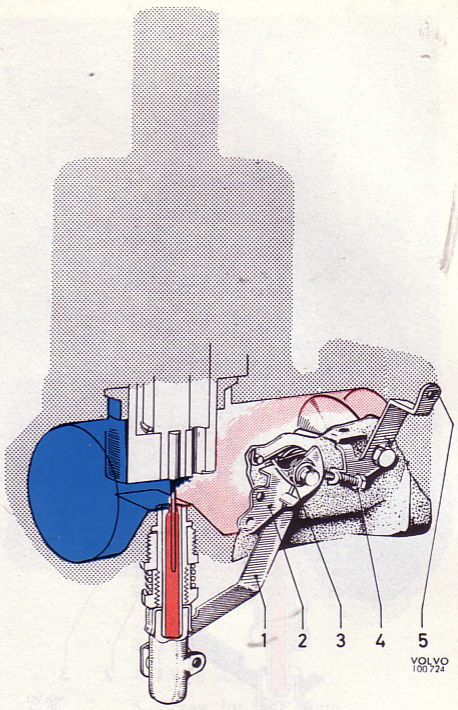


Fig. 15. Carburettor, fast idling

1. Link
2. Lever
3. Return spring
4. Fast idle screw
5. Lever for throttle flap spindle

pressure. When engine loading increases, the degree of vacuum also increases, so that the valve and tapered fuel needle rise and permit an increased amount of fuel/air mixture to flow into the cylinders.

The supply of fuel and air is thus dependent on the degree of vacuum in the carburettor venturi, and so the carburettors work in accordance with a continuously variable principle.

In order to prevent excessively rapid movements of the air valve, there is a damper piston (3) which runs in an oil-filled cylinder.

Idling

When the engine is idling, only a small amount of fuel/air mixture passes through the carburettors. The throttle flap is held slightly open by the idling screw (1, Fig. 14). Idling adjustment on each carburettor is done independently. The shaft between the carburettors, see Fig. 8, is not permanently fixed to the throttle flap spindles but is flexibly mounted in the ends of the levers.

The fuel/air mixture is adjusted with the adjusting nuts (10, Fig. 13) on the jets and the adjustment carried out at idling speed is sufficient to cover the entire speed range.

Fast idling

When the choke control is pulled out, the throttle flap is also influenced. One end of the lever (2, Fig. 15) is in the form of a cam which presses on the fast idle screw (4) whereby the throttle flap is opened.

This means that the engine runs at a faster idling speed during the time the choke control is pulled out.

REPAIR INSTRUCTIONS

CARBURETTORS

Each time the car is greased, the oil level in the carburettor damping cylinders should be checked. If required, top up with ATF oil, type A (not multigrade oil). See Fig. 19.

Do not top up with too much oil, only the centre spindle should be filled, not the area above this.

Removing the carburettors

Both the carburettors must be removed at the same time from the intake manifold since the intermediate shaft is mounted to the levers on the throttle flap spindles.

1. Remove the air cleaners, fuel pipes, vacuum hose and controls for the carburettors.
2. Unscrew all nuts which hold the carburettors to the intake manifold.
3. Pull off both carburettors at the same time from the intake manifold. Cover the induction ports with masking tape.

Dismantling the carburettors

1. Remove the damper piston and suction chamber complete with valve.
2. Unscrew the floatchamber cover and lift it up. Then remove the floatchamber.
3. Remove the screws which hold the levers for the choke and fast idling control, pull them off and remove the jet.

   Remove the adjusting nut and lock nut as well at the jet sleeve, see Fig. 28.
4. Wash all parts in white spirit and blow them dry with compressed air.

   The air cleaners must not be washed since they have paper elements.

Re-bushing of carburettor

If the throttle spindle fits loosely in the housing the housing should be re-bushed as follows:

1. Loosen the screws and remove the throttle flap. Remove the throttle spindle.
2. Place fixture 2603 in a vice and clamp the carburettor in the fixture with hooks as shown in Fig. 20. For work on SU carburettors, use the larger stud on the fixture. Ensure that the hole in the stud aligns with the throttle spindle hole.
3. Ream the hole for the throttle spindle in the housing with reamer SVO 2400, Fig. 20. Do not pull the reamer backwards out of the hole, but instead loosen the support and push the reamer through the hole in the bottom plate in the same direction as reaming was carried out. If reaming is carried out in an upright drilling machine, then the lowest speed must be used and the reaming tool must be fastened in the

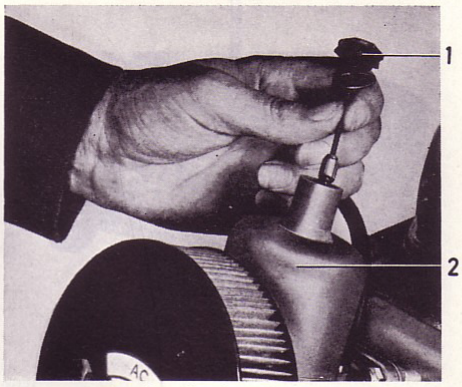


Fig. 19. Checking the oil level
1. Nut 2. Suction chamber

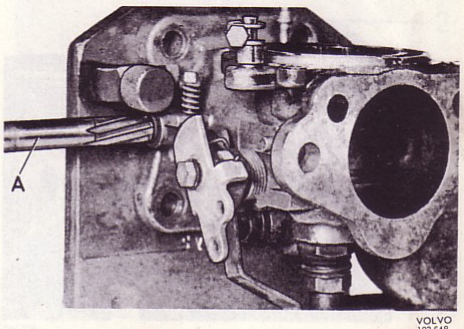


Fig. 20. Reaming the bush seat
A = SVO 2400

chuck with great care so that it does not throw. If the reamer does throw, the hole will be too large, the bush will loosen and the housing will then have to be scrapped.

NOTE!

During re-bushing of the carburettor housing for SU carburettors, it may happen that the reamer seizes in the housing. This is probably the result of a piece of the old bushing having loosened from the housing and fastened to the reamer. Should this be the case, withdraw the reamer, remove the old bushing and then continue reaming.

4. After reaming has been carried out, turn the fixture stud through 90° so that it forms a stop inside the carburettor housing for the bush which can then be driven into position with drift SVO 2402, Fig. 21.
5. Turn the fixture stud a further 90° and ream the newly fitted bush with reamer SVO 2401, Fig. 22.
6. Re-fit the throttle flap and a new throttle spindle. Twist or rivet the throttle flap screws.
7. Replace the carrier yoke as shown in Fig. 24 (throttle fully closed, idling screw screwed out). Ensure that a clearance of 1.5 mm (0.06″) is obtained between the carrier yoke and the throttle housing. Drill with the carrier in position as shown in Fig. 23 and using a 3.0 mm (0.12″) drill, the hole for the locking pin is drilled through the throttle spindle, (the hole must be drilled at right angles to the carburettor length axis when the throttle is closed). Remove all drillings, fit the carrier yoke and locking pin.
8. Fit the float housing.

Checking and assembling the carburettors

Before assembling, check that all parts are undamaged. The fit of the air valve in the chamber is of a particularly close tolerance and its character must not be altered by filing or scraping. Minor unevenness can be removed by careful polishing with fine emery cloth.

1. Fit the metering needle as shown in Fig. 24. Only the tapered part of the needle should project outside the piston.

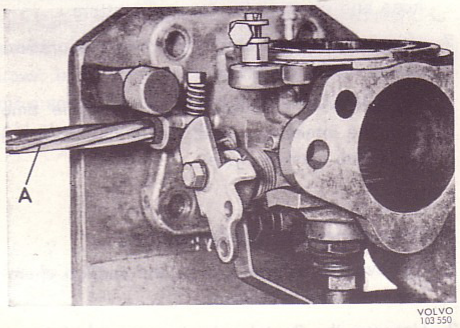


Fig. 22. Reaming of bush
A = SVO 2401

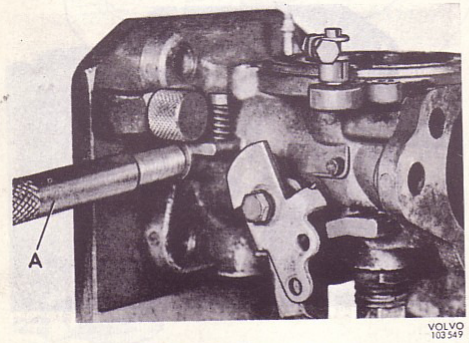


Fig. 21. Driving in of bush
A = SVO 2402

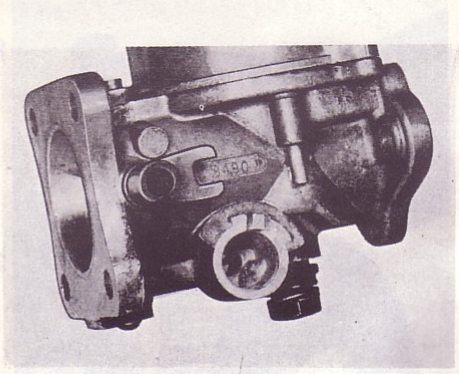


Fig. 23. Carrier yoke position

2. Fit the spring, washer and piston in the suction chamber and bolt this to the carburettor housing.
3. Fit the jet sleeve and lock nut, see Fig. 28. Push in the jet and centre it, see "Centering the jet".
4. Fit the spring for the adjuster nut and jet, see Fig. 28.
5. Check and attach the float valve (see Fig. 27). Fit the float and cover. Fit the floatchamber and connect the fuel line to the jet.

Fit of air valve

The fit can be checked by plugging the air holes in the valve with, for example, small corks, placing them in the suction chamber and holding the parts upside down. The damper piston should be fitted but not filled with oil. The air valve spring should not be fitted. The valve should normally sink to the bottom from the position shown in Fig. 26, within 5—7 seconds.

Replacing the float valve

1. Remove the floatchamber cover and turn it upside down.
2. Remove the pin for the float lever. Remove the float.
3. Screw out the valve and fit a new valve. Replace the float.
4. Check that the cover gasket is in good condition and then fit and tighten the cover.

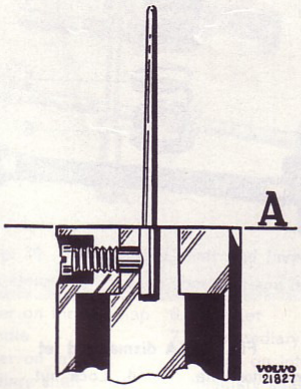


Fig. 24. Attachment of metering needle
A = Fixing level

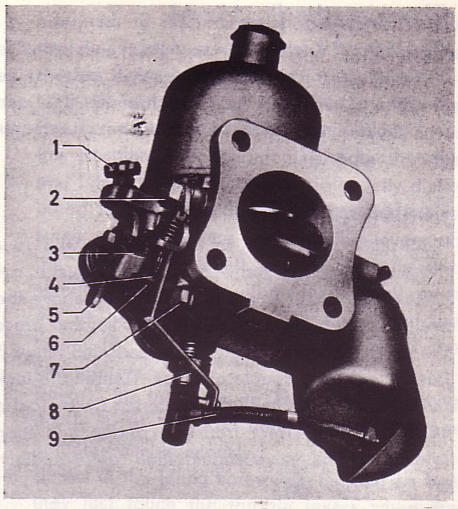


Fig. 25. Levers and springs

1. Attachment for choke control outer casing
2. Throttle flap spindle
3. Return spring
4. Return spring
5. Lever for fast idling, etc.
6. Lever for lowering jet
7. Bolt for floatchamber
8. Link for lowering jet
9. Fuel line

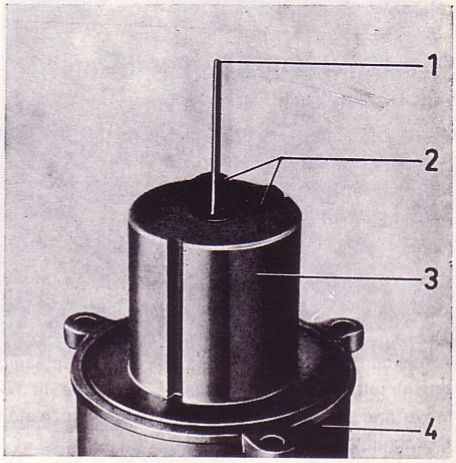


Fig. 26. Fit of air valve

1. Metering needle
2. Rubber or cork plugs
3. Air valve
4. Suction chamber

Checking the float level

This type of carburettor is relatively insensitive to variations in the float level. As a guide value for the correct level, the position of the float can be checked in accordance with the measurements shown in Fig. 27.

Centering the jet

Place the carburettor with the flange with four holes downwards. Screw up the jet adjuster nut so that upper end of the jet reaches up above the bridge. Loosen the lock nut (4, Fig. 28) and press the air valve against the bridge and also move it back and forth a couple of times. Tighten the lock nut carefully and check the centering by lifting the valve 5–6 mm (1/4″) from the bridge and then release it. The valve should then, quite audibly, hit the bridge (jet).

Fitting the carburettors

1. Remove the masking tape from the induction ports. Fit new gaskets.
2. Fit the intermediate shaft in position between the carburettors, see Fig. 30. Make sure that the protective plate is in good condition and that the sealing surfaces are clean.
3. Fit both the carburettors, with intermediate shaft, at the same time. Tighten the nuts and connect up the controls and lines.
4. Carry out necessary carburettor setting adjustments see "Carburettor settings after fitting".

Carburettor settings after fitting (synchronizing)

In order to enable the carburettor settings to be carried out correctly, the following points must be first checked and adjusted if necessary:

Valve clearance, sparking plugs, compression, dwell angle of contact breakers, ignition timing.

If these adjustments are carried out carefully, subsequent re-adjustment is very seldom necessary.

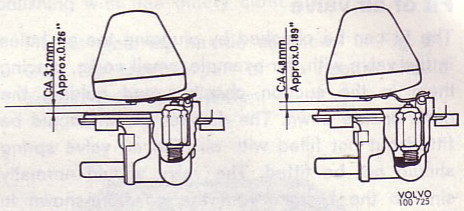
At certain intervals, for example, when replacing the air cleaners, it is, however, advisable to remove and clean the vacuum chamber and piston thoroughly.

The floatchambers should also be cleaned at the same time. This can easily be done after the floatchamber covers have been removed.

BASIC ADJUSTMENT (O-SETTING) OF CARBURETTORS

The basic adjustment should always be the starting point for synchronization.

1. Place a 0.5 mm feeler gauge at "A" Fig. 30 between the lever and its abutment. Screw out the fast idling and idling screws (2, Fig. 31) so that the throttle flap is fully closed.



Early production Late production

Fig. 27. Checking the float level

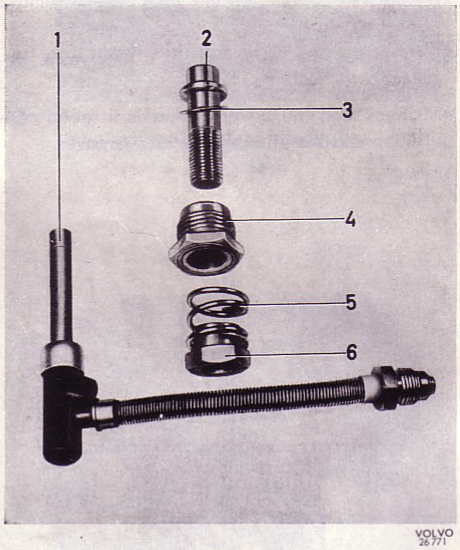


Fig. 28. A dismantled jet

1. Jet with fuel line, complete
2. Jet sleeve
3. Washer
4. Lock nut
5. Spring
6. Adjusting nut

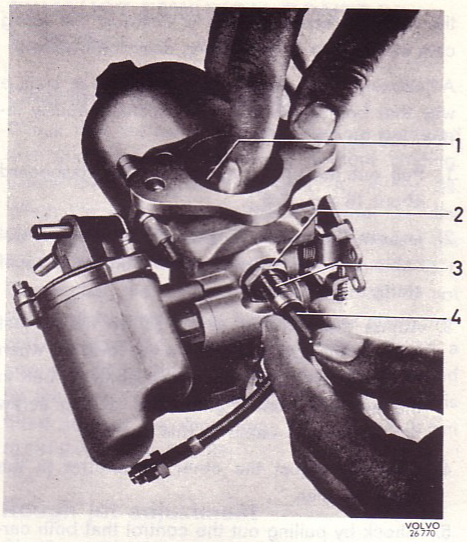


Fig. 29. Centering the jet

1. Lower part of air valve
2. Lock nut
3. Jet sleeve
4. Jet

2. Loosen the lock nuts (3 and 9, Fig. 30) and press the outer end of the levers (2, 8) on the intermediate shaft carefully downwards so that the pins just touch the lower tooth on the throttle flap spindle levers (1, 10).

   N.B. Do not press so hard that the throttle flap is influenced. Tighten the nuts (3, 9) in this position. When tightening, note that the end float of the shaft should be equally distributed in both directions and that there is a small axial clearance between the levers on the intermediate shaft and the throttle flap spindle levers. The intermediate shaft must not be held, for instance, as a result of the levers (2, 8) being fitted too close to the carburettors.
3. Remove the feeler gauge. Then check by lifting the lever at "A" that both throttle flaps are actuated simultaneously.
4. Screw in the idling screws (2, Fig. 31) so that they just touch the throttle levers when the throttles are closed.

   Then screw the idling screws in a further 1/2 turn.
5. Roughly adjust the jet height position by first screwing up the adjuster nut to the upper stop position and then screw it down again 1 1/2 turns. Adjust both carburettors in the same manner.

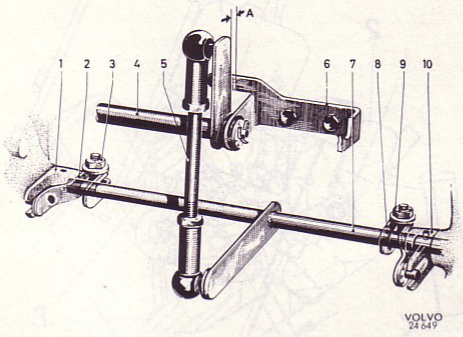


Fig. 30. Intermediate shaft and levers

A = clearance between abutment and lever

1. Lever on throttle flap spindle
2. Lever on intermediary shaft
3. Lock nut
4. Control shaft
5. Link
6. Bracket
7. Intermediary shaft
8. Lever on intermediary shaft
9. Lock nut
10. Lever on throttle flap spindle

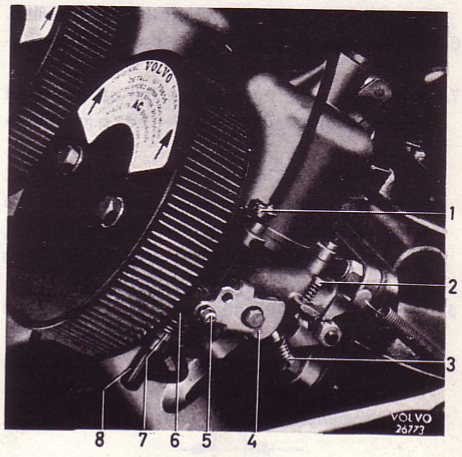


Fig. 31. Controls

1. Attachment for choke control outer casing
2. Idle adjusting screw
3. Fast idle adjusting screw
4. Lever
5. Locking screw for choke control
6. Lock nut
7. Adjusting nut
8. Jet

6. Fill the carburettor damping cylinders with oil. Use hydraulic oil ATF, type A. Fill only the centre spindle of the air valve, not the part above it.

SYNCHRONIZING

Connect a revolution counter. Start and run the engine warm.

1. Adjust idling speed on B 18 B to between 600—800 r.p.m. and for B 18 D 500—700 r.p.m. with both idling screws. Check with a synchro test that the stream of induction air to both carburettors is the same. Make sure that the synchro test is fitted so that its opening corresponds with the throats of the carburettors. Turn the synchro test throttling washer until a suitable register for its piston is achieved.
2. Adjust the idling screws until the synchro test shows the same register for both carburettors (adjust both screws so that the idling speed is withheld).
3. Screw the adjuster nut for the fuel jet slowly downwards until the highest r.p.m. is reached as per the revolution counter. Then screw the nut a further hex flat downwards.
4. Repeat the procedure with the other carburettor.
5. Lift the air valve for the other carburettor with the pin and check the fall off in engine speed.
6. Repeat the procedure with the other carburettor.
7. If adjustment is correct, the fall off in speed should be approximately 100—150 r.p.m. in both cases.
   If the speed falls off too much when lifting, for example, the **rear** carburettor valve, adjust the **front** carburettor to a somewhat richer mixture, which is achieved by screwing the adjusting nut downwards.
8. Check and adjust if necessary the idling speed with the aid of the synchro test as per point 2.
9. Fit the air cleaners and test run the car. During test running, carry out a new "pin test" and any adjustment necessary.

Adjustment of choke control and fast idling

The fast idling adjustment described below is a normal setting. The setting can also be varied to suit different requirements and temperatures. In very cold weather it may be advisable to adjust the fast idle screw so that it contacts the idling cam earlier than in the setting described below.

Adjustment must always be carried out in such a way that both carburettors are simultaneously influenced by the control.

1. Pull out the choke control on the dashboard about 15 mm (5/8″).
2. Loosen the screw (5, Fig. 31) for the control cable. Lift the lever so much that the jet just starts to go down.
3. Adjust the fast idle screw (3) so that it just touches the fast idle cam on the lever (4) when the jet starts to be influenced as described in the previous item. Tighten the locking screw for the control cable in this position.
4. Carefully adjust the other carburettor in the same manner.
5. Check by pulling out the control that both carburettors are simultaneously influenced. This is most easily carried out by pulling out the control about 20 mm (13/16″) and then carefully watching the jets go down.
   Adjust the setting if the jets do not go down equally.

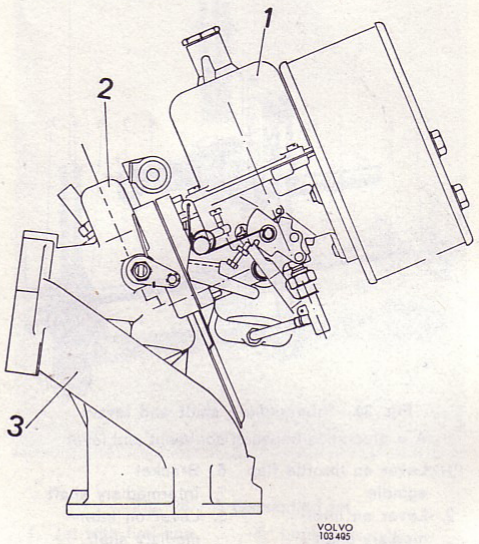


Fig. 32. Carburettor, exhaust emission control

1. Carburettor
2. Induction manifold
3. Exhaust manifold

EXHAUST EMISSION CONTROL SYSTEM

Checking the carburettors

Check that the secondary throttles are centered and that they can be turned without chafing. Check the position of the levers "A" in Fig. 33. When the secondary throttle is closed, the distance open "A" between the lever spindle and the inlet manifold flange should be 3.5 mm (0.15″). Check that the rubber seal (8, Fig. 35) is not damaged to ensure that its inner edge seals properly against the inlet manifold. When fitting a new seal, make sure that the seal is not damaged by the sharp edges of the spindle and that it is fitted so that the dimension "B" is 4.5–5.0 mm (0.18–0.20″) (see Fig. 35).

Rough jet adjustment

Starting with the top position of the jet (as described above), screw it down so far **that it just contacts the suction chamber when this is resting against the bridge.** From this position screw the adjuster nut down 16 hex flats.

Checking the suction chamber valve stroke

With the carburettor in the same position as when "centering the jet" as described above, move the suction chamber piston to its upper position. It should be possible to move the valve easily without jamming. When the valve is released, it should return at an even speed and strike against the bridge with a clearly audible noise.

Rough setting of idling screw

Check that the end of the screw is free from burrs. Screw in the idling screw until it just contacts the lever. Then screw it in a further 1 1/2 turns.

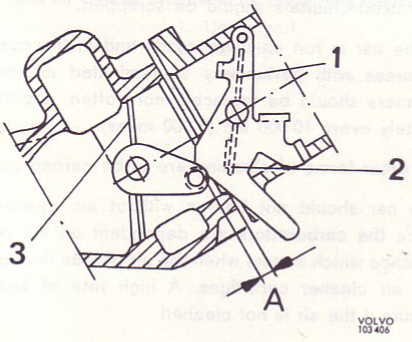


Fig. 33. Throttle position at low output, secondary throttle closed

"A" = 3.5 mm (0.15″)
1. Primary throttle
2. Valve
3. Secondary throttle

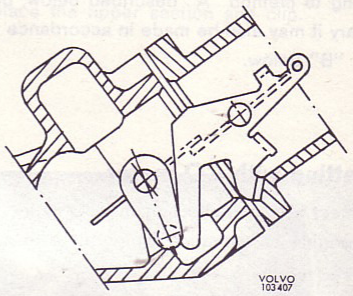


Fig. 34. Throttle fully open (high output)

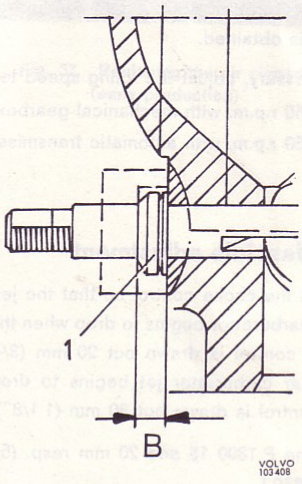


Fig. 35. Checking the seal

"B" = 4.5–5.0 mm (0.18–0.20″)
1. Rubber seal

Setting the fuel/air mixture and idling speed

First check the oil level in the damper cylinder. This should be filled to 1/4″ from the upper edge with ATF Type A oil. Also check to make sure that the engine is in general correctly adjusted (valve clearance, timing, etc.). **The mixture setting must be made at room temperature (20° C: 68° F) at approximately 1—3 minutes after the engine has reached its normal operating temperature (by running at idling speed).**

The setting should be made with a CO-meter according to method "A" described below, but if necessary it may also be made in accordance with method "B" below.

A. Setting with CO-meter

1. Connect a tachometer and the CO-meter. Run the engine to operating temperature at idling speed.
2. Set the idling speed to 850 r.p.m. so that both carburettors have the same intake noise.
3. From the basic setting (16 flats down on each carburettor) adjust the fluid air mixture on the **rear** carburettor until a CO-content of 3.0—3.5 % is obtained.
4. If necessary, adjust the idling speed to:
   800—850 r.p.m. with mechanical gearbox.
   700—750 r.p.m. with automatic transmission.

Choke-fast idle adjustment

1. Adjust the choke control so that the jet of the front carburettor begins to drop when the dashboard control is drawn out 20 mm (3/4″) and the rear carburettor jet begins to drop when the control is drawn out 30 mm (1 1/8″).

   (For the P 1800 15 and 20 mm resp. (5/8″ and 3/4″ resp.).
2. The fast idle speed adjusting screws are adjusted with the choke control fully pushed in so that the distance between the screw and the cam is 0.1—0.3 mm (0.004—0.012″) for the front carburettor and for the rear carburettor 0.3—0.0 (0.012—0.020″).

After adjustment has been carried out, the car should be test-driven and a further check on the fuel/air mixture ("the pin test") be made **outdoors.** This is particularly important during wintertime with a view to the low temperature outside. The wide variations in temperature (warm workshop — minus temperature outside) have an influence on the fuel/air mixture.

Adjusting the accelerator pedal

The length of the long vertical thrust rod from the control on the body is adapted so that there is a clearance of 1 mm (0.04″) between the throttle lever tab and the full throttle stop on the carburettors, when the accelerator pedal is fully depressed. At full depression of the pedal, the force from the driver's foot will be absorbed by the toeplate without unnecessary loading of the accelerator pedal.

AIR CLEANERS

Replacement of air cleaners

The only servicing procedure necessary under normal conditions is to replace both air cleaners by new units after every 20 000 km (12 000 miles). The used cleaners should be scrapped.

If the car is run on dusty roads and in the case of areas with particularly contaminated air, the cleaners should be replaced more often, approximately every 10 000 km (6 000 miles).

No other forms of cleaning are to be carried out.

The car should not be run without air cleaners since the carburettors are dependent on the resistance which occurs when the air passes through the air cleaner cartridges. A high rate of wear occurs if the air is not cleaned.

1. Remove the air cleaners by unscrewing the attaching screws.
2. Make sure that the gaskets are turned the right way and then fit the new air cleaners. If the gaskets are turned the wrong way, they block

Rest omitted as it discusses the replacement of air filters.