BRAKE FLUID RESERVOIRS

Checking the brake fluid level

To get at the brake fluid reservoirs remove the cover, see Fig. 52–29. The left-hand reservoir is for the primary circuit. The reservoirs should be almost full. If necessary top up with brake fluid according to the standard SAE J 1703, that is, Brake Fluid 430 or corresponding.

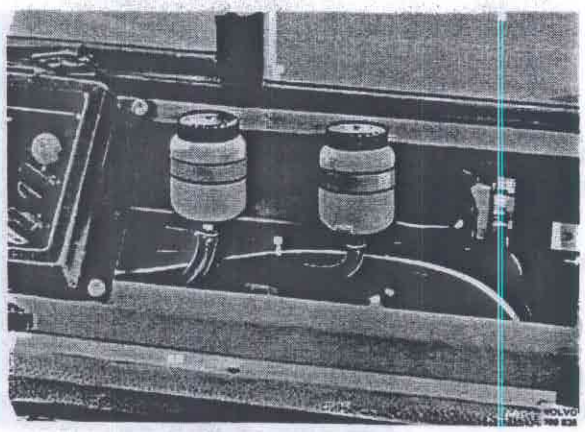

Fig. 52–29. Brake fluid reservoirs

BRAKE PEDAL

Adjusting the pedal position

The free travel, see Fig. 52–30, is the pedal travel from the rest position to the point where its piston in the master cylinder starts operating. If the free travel is too small, the equalizing holes in the master cylinder can be blocked by the piston seals so that the brake shoes are prevented from going back to their rest positions. The free travel is adjusted by means of the stop bolt and should be 5–10 mm (1/4") measured at the footplate. After adjusting tighten the lock nut and check the adjustment for the brake light contact.

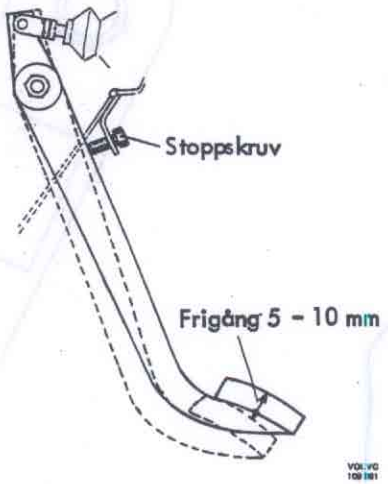

Fig. 52–30. Free travel

PEDAL JOURNALLING

Removing the pedal cover

1. Disconnect the battery positive cable.
2. Remove the retaining screws for the pedal cover.
3. Remove the bolts securing the master cylinder to the casing.
4. Remove the clutch pedal stop and disconnect the wire from the pedal. Remove the wire from the casing.
5. Disconnect the electric cables from the contact for the stop lights and the contact for the brake travel.
6. Lift forwards the pedal cover and pedals.

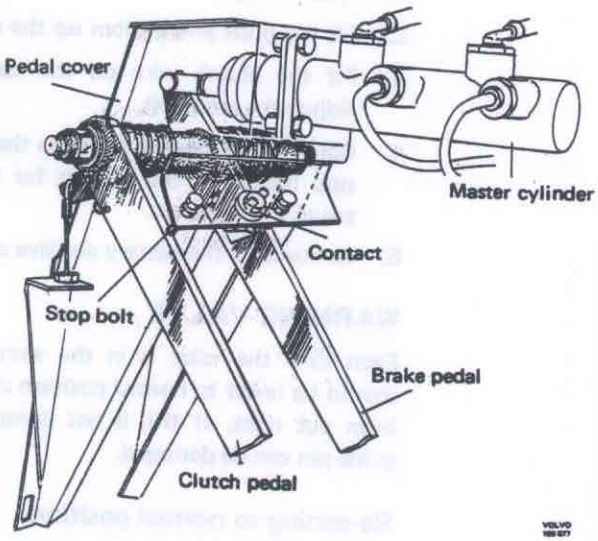

Fig. 52–31. Pedal journalling

Replacing pedal or bushings (loose casing)

1. Unhook the return springs.
2. Remove the nut and washer for the clutch pedal. Remove the pedal and spring.
3. Remove the nut and washer on the corresponding side and drive out the shaft. Lift forward the pedal and spring. REmove the bushing.
4. Clean the parts.
5. Fit new bushing and lubricate them with a light layer of universal grease.
6. Fit the spring on the brake pedal. Place the pedal in the casing and fit the shaft. Fit the washer and nut.
7. Place the clutch pedal spring in the casing. Fit the pedal and washer and tighten up the nut.
8. Hook the springs on the pedals.

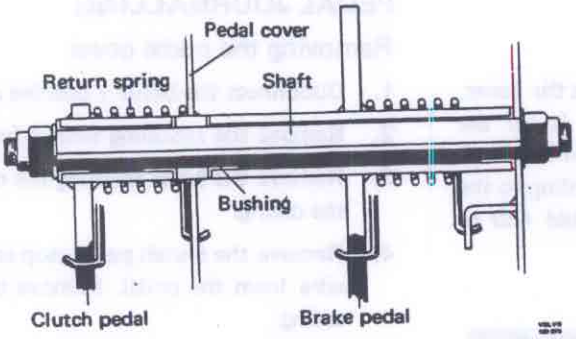

Fig. 52–32. Pedal journalling

Installing the pedal casing

1. Fit the pedal casing in position. Install the push rod in the master cylinder and tighten up the pedal casing.
2. Fit the bolts and tighten up the master cylinder.
3. Fit the clutch wire on the casing and pedal. Adjust the stop bolt.
4. Connect the electric cables to the contact for the stop lights and the contact for the brake pedal travel.
5. Connect up the battery positive cable.

WARNING VALVE

Each time the valve is in the warning position, it should be re-set to normal position after the fault has been put right. If this is not done, the piston and guide pin can be damaged.

Re-setting to normal position.

1. Disconnect the electric cable and unscrew the contact so that the pistons return to normal position, Fig. 52–33.
2. Clean and bleed the faulty hydraulic circuit.

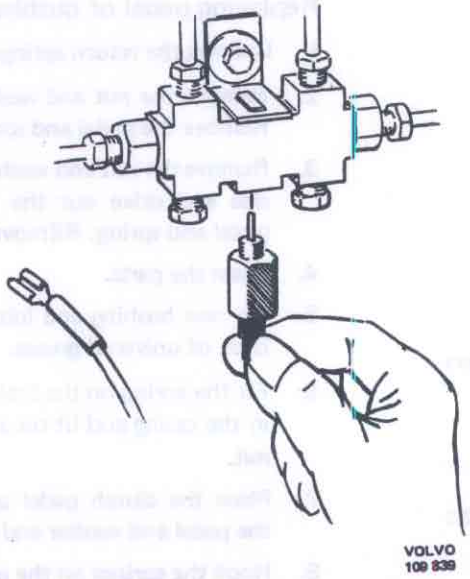

Fig. 52–33. Removing the contact

3. Carefully screw in the contact about 15 Nm (1.5 kpm = 11 lbftf). Connect up the electric cable.

Replacing the warning valve

Clean the outside of the valve. Remove the retaining bolts and the valve. Install the new valve. Fig. 52–34 shows the various connections. Bleed the brake system.

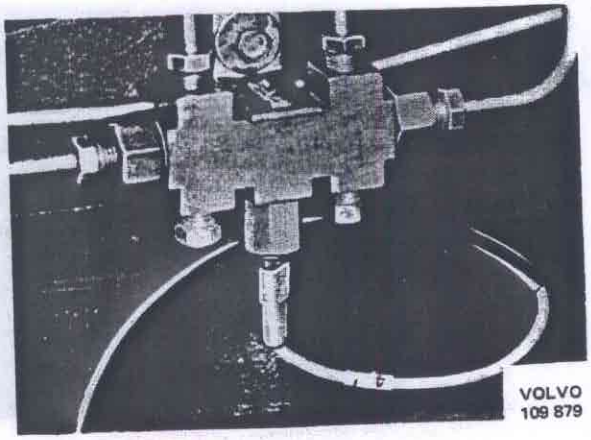

Fig. 52–34. Warning valve

CONTACT FOR STOP LIGHTS

Adjusting the position

For proper function and in order not to damage, the contact should have a certain location in relation to the pedal. The distance between the pedal in rest position and the brass sleeve on the contact should be 2–6 mm (0.08–0.24"), see Fig. 52–35. If the distance is otherwise, slacken the nuts and move the contact so that the correct gap is obtained. Then re-tighten the nuts.

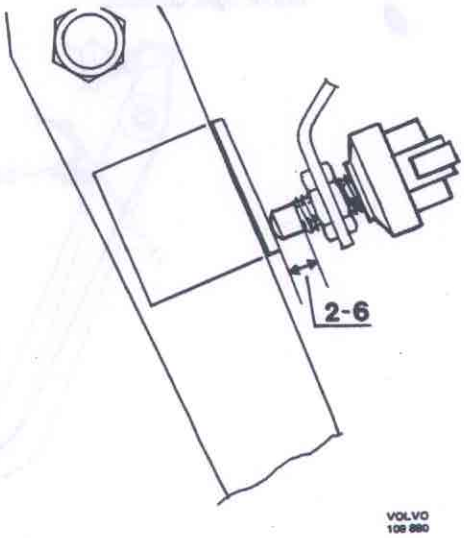

Fig. 52–35. Gap measurement

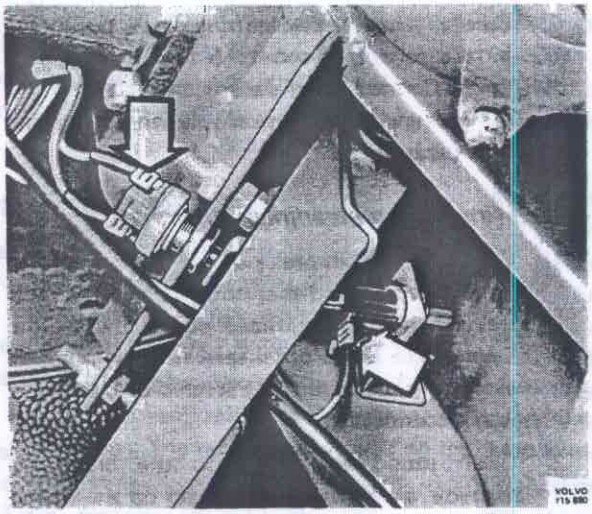

Fig. 52–36. Contact for stop lights and pedal travel

CONTACT FOR BRAKE PEDAL TRAVEL

Adjusting the position

The contact should give a warning when there remains 90–100 mm (3.5–4.0") of the pedal travel, measured at the centre of the footplate. Since this normally can be checked only when bleeding, the position of the contact can be checked instead by measuring the distance with the pedal at rest position between the pedal bracket and the contact terminal, see Fig. 52–37. This gap should be 15–17 mm (0.60–0.67"). If the gap is otherwise, slacken the nut and move the contact bracket so that the right gap is obtained. Then re-tighten the nut.

To re-set from the warning position, press back the contact terminal to the rest position.

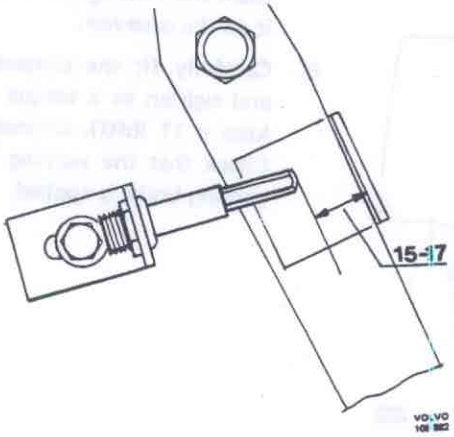

Fig. 52–37. Adjustment measurement

HYDRAULIC SYSTEM

Bleeding

Special tool: 6126 Bleeder spanner

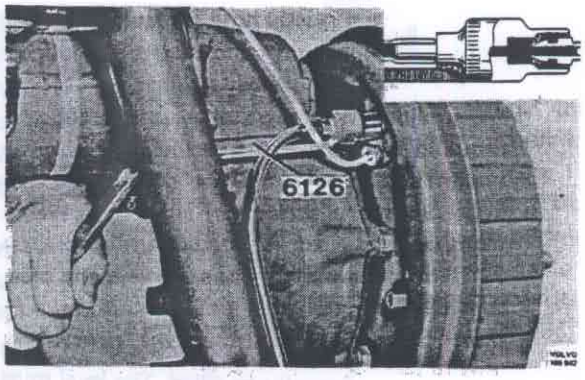

Fig. 52–38. Bleeder spanner

If no resistance is felt when depressing the brake pedal or if it feels spongy then there must be air in the system.

As soon as any part in the system has been removed, the system must be bled. Air can also get into the system due to the fact that too little brake fluid is in the reservoir. If, for example, only one wheel cylinder has been removed and an insignificant amount of brake fluid ran out, it is generally necessary to bleed only the cylinder. Otherwise the entire system must be bled.

With bleeding or similar work, brake fluid must not be allowed to run onto the friction surfaces or linings. Do not allow the brake fluid to spill onto the paintwork since this can damage the paintwork.

When topping up with brake fluid the following should be observed. The brake fluid must meet the requirements according to the standard SAE J 1703, for example, Brake Fluid 430.

Any brake fluid that has been bled from the system must not be put back into the bleeder unit or reservoir.

The entire brake system is bled as follows:

Mechanical bleeding

1. Check that the brake pedal returns fully to the rest position and that nothing prevents its full travel when using it for bleeding. Depress the brake pedal several times in order to even out any vacuum in the servo unit and in this way disconnect it.

2. Clean round the cap on the brake reservoir and round the contact on the warning valve. Remove the contact, see Fig. 52–34. If necessary top up with brake fluid. Blow clean the cap venting hole.
3. For bleeding a plastic hose is required which can be pressed onto and connected tight round the bleeder nipple. The lower end of the hose should be provided with a glass or plastic tube. Also required is a glass bottle provided with so much brake fluid that the opening of the tube can be kept under the surface in order to prevent air from being sucked in. To turn the nipple, use a 7/16" ring spanner for the servo unit and bleeder tool 6126 for the other points. New brake fluid must be available so that the reservoir can gradually be filled. The level must not be too low otherwise air can penetrate into the system via the reservoir.
4. Bleeding should be done in the order shown in Fig. 52–39 and as follows:

   Remove the protective cap and fit the ring spanner and plastic hose on the bleeder nipple. Allow the pipe opening to hang down under the surface of the fluid in the glass bottle. Open the bleeder nipple a maximum half turn. Slowly depress the brake pedal to the floor. When the pedal has reached the floor, wait for a brief moment and then quickly release the brake pedal. Repeat this procedure until brake fluid free from air bubbles flows out. Then depress the brake pedal to the floor and close the bleeder nipple. Re-fit the protective caps on the nipples.
5. Generally it is sifficient to bleed each circuit once. If the pedal can be depressed without any resistance worth mentioning or if it still feels spongy, repeat the bleeding.
6. Fill with brake fluid until the reservoirs are full.

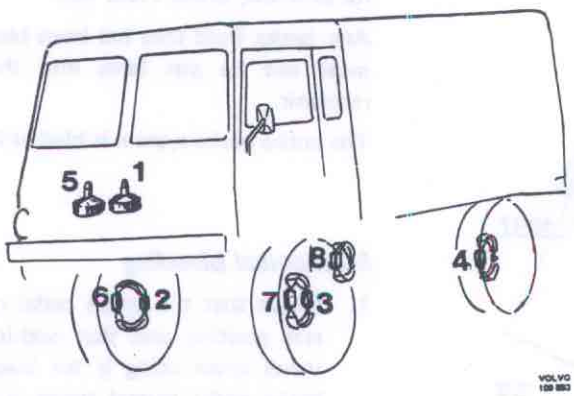

Fig. 52–39. Bleeding sequence

7. Carefully install the warning contact, tightening it to a torque of about 15 Nm (1.5 kpm = 11 lbftf). Connect up the electric cable. Check that the warning lamp goes on only when the parking brake is applied.

Bleeding with a bleeding apparatus

1. Check that the brake pedal goes back fully when released and that nothing prevents its full travel from being utilized during the bleeding. Depress the brake pedal several times in order to even out any vacuum in the servo unit and in this way disconnect it.
2. Clean round the cover on the brake fluid reservoir and round the contact on the warning valve. Remove the contact, see Fig. 52–33. If necessary fill with brake fluid.
3. Connect the bleeder apparatus, to the right reservoir, according to the instructions of the manufacturer. Working pressure is 0.2 MPa (2 kp/cm^2 = 30 lbf/in^2).
4. Fit the plastic hose on the upper servo unit nipple and allow the other end of the hose to hang down in a collecting vessel. Open the bleeder nipple with a 7/16" ring spanner but a maximum half turn. Pump several times with th brake pedal. Close the nipple when brake flu free from air bubbles flows out. Continue the bleeding with tool 6126 at wheel cylinders 2, 3 and 4, see Fig. 52–39.
5. Transfer the bleeder apparatus to the left reservoir and repeat the bleeding as above through nipples 5, 6, 7 and 8, see Fig. 52–39.
6. Generally it is sufficient to bleed each circuit once. If the brake pedal can still be depressed without any resistance worth mentioning or if it feels spongy repeat the bleeding.
7. After the bleeding has been completed, make the apparatus pressureless and unscrew the cap. Blow clean the venting hole in the standard cap and fit it on the reservoir.
8. Carefully fit the contact on the warning valve and tighten to a torque of approx. 15 Nm (1.5 kpm = 11 lbftf). Connect up the electric cable. Check that the warning lamp goes on when the parking brake is applied.

GROUP 54 AUXILIARY BRAKE

Description

SERVO UNITS

The function of the servo units is to boost the brake pressure so that less brake pedal force is required when braking. They function as follows:

When the brake system is at rest position (see Fig. 54–1), the vent valve for the control units is closed by a spring. The vaccum valve fixed on the same shaft has a certain position at this time. Another spring presses down the diaphragm with the vacuum valve seat and the control piston. The vacuum valve is, therefore, open and the space to the left of the vacuum piston is connected via the control unit to the space on the right-hand side of the piston. In other words, the same vacuum, is on both sides of the vacuum piston, which the return spring holds pressed to the right, see Fig. below. The pressure piston centre is off-load so that there is an open connection between the master cylinder and wheel cylinder.

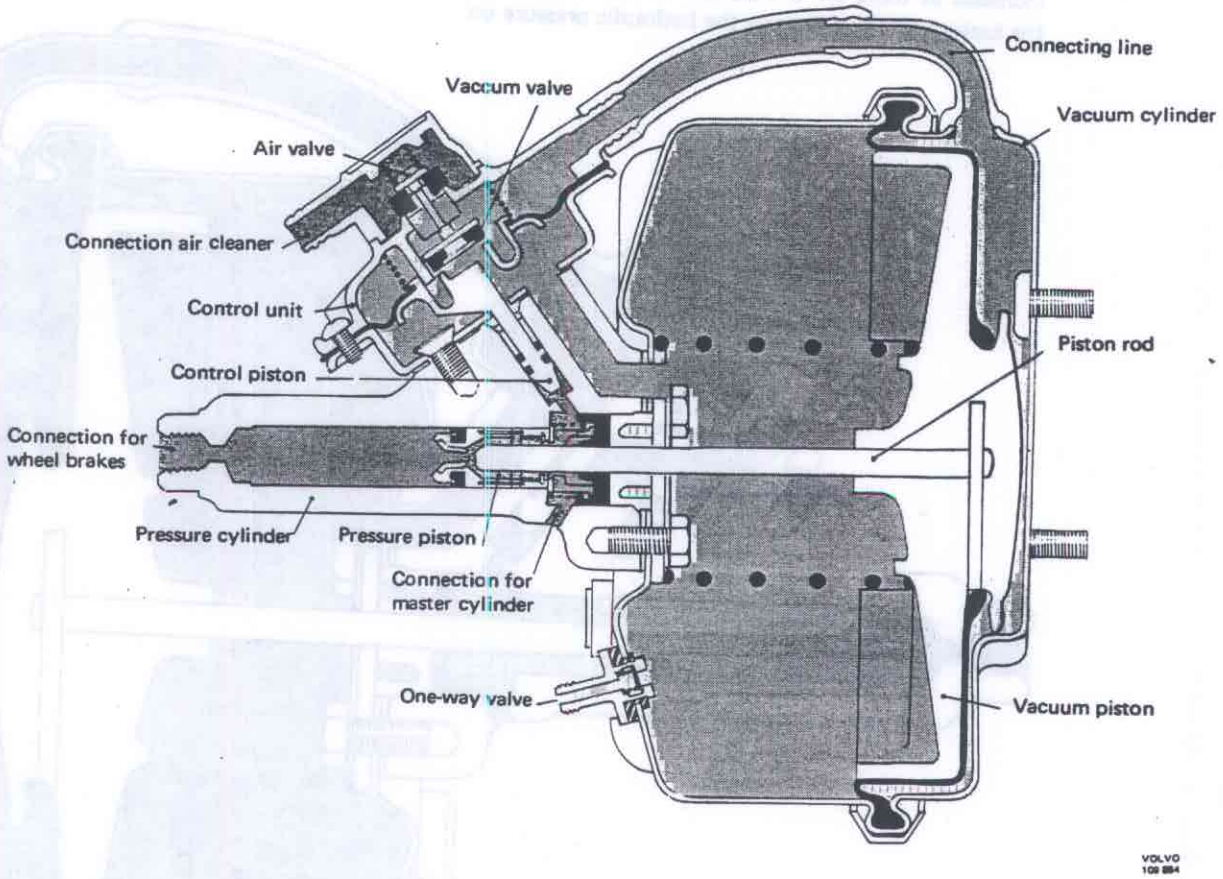

Fig. 54–1. Servo unit, rest position

When the brake pedal is depressed, the brake fluid is forced under pressure from the master cylinder through the servo unit discharge piston to the wheel cylinders and the brake is applied. When the hydraulic pressure rises under the control piston, the piston and the vaccum valve seat are pressed upwards. This closes the vacuum valve, and with the continued movement upwards the inner, minor section of the vent valve opens first and then the outer, larger section. Atmospheric pressure air flows past the air valve through the connection line to the space to the right of the vacuum piston. Since there is a vaccum on the left-hand side of the piston, the piston is pressed to the left and the piston rod pushes on the thrust piston. At the same time the piston rod closes the connection through the pressure piston centre. In this way, the outgoing hydraulic pressure for the wheel cylinders will be greater than the input pressure for the servo unit, compare Fig. 54-2.

In the control unit the pressure above the diaphragm increases as more air is supplied. If the pressure on the brake pedal and thereby the hydraulic pressure on the control piston is unchanged, this is finally overcome so that the diaphragm is pressed downwards and the air valve closes. The pressure to the right of the vacuum piston remains unchanged and is unable to overcome the pressure in the pressure cylinder. The moving parts of the servo unit remains therefore in this position and the braking remains constant as long as the same force is exerted on the brake pedal; compare Fig. 54–3.

If the brake pedal is released, the inlet pressure on the control piston reduces and the diaphragm is pressed downwards so that the vacuum valve is exposed. This results in the spaces on both sides of the vacuum piston coming into contact with each other so that the pressure reaches an equilibrium and the piston is pushed to the right. The piston in the pressure cylinder is pushed back to the initial position. Since the piston rod is pulled back further by the vacuum piston, this exposes the centre of the pressure piston so that the brakes are released and all parts return to rest position.

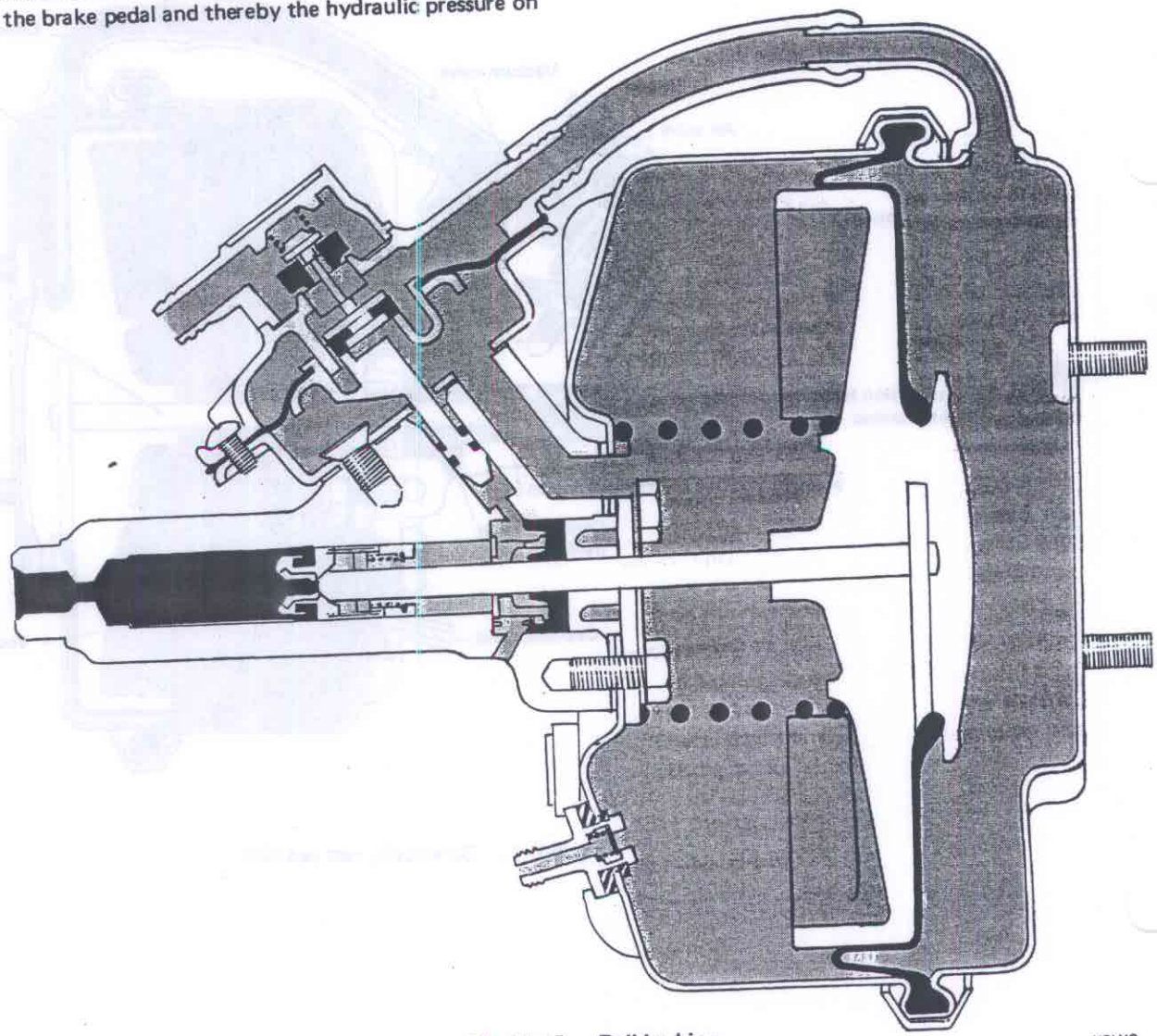

Fig. 54–2. Full braking

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109 885

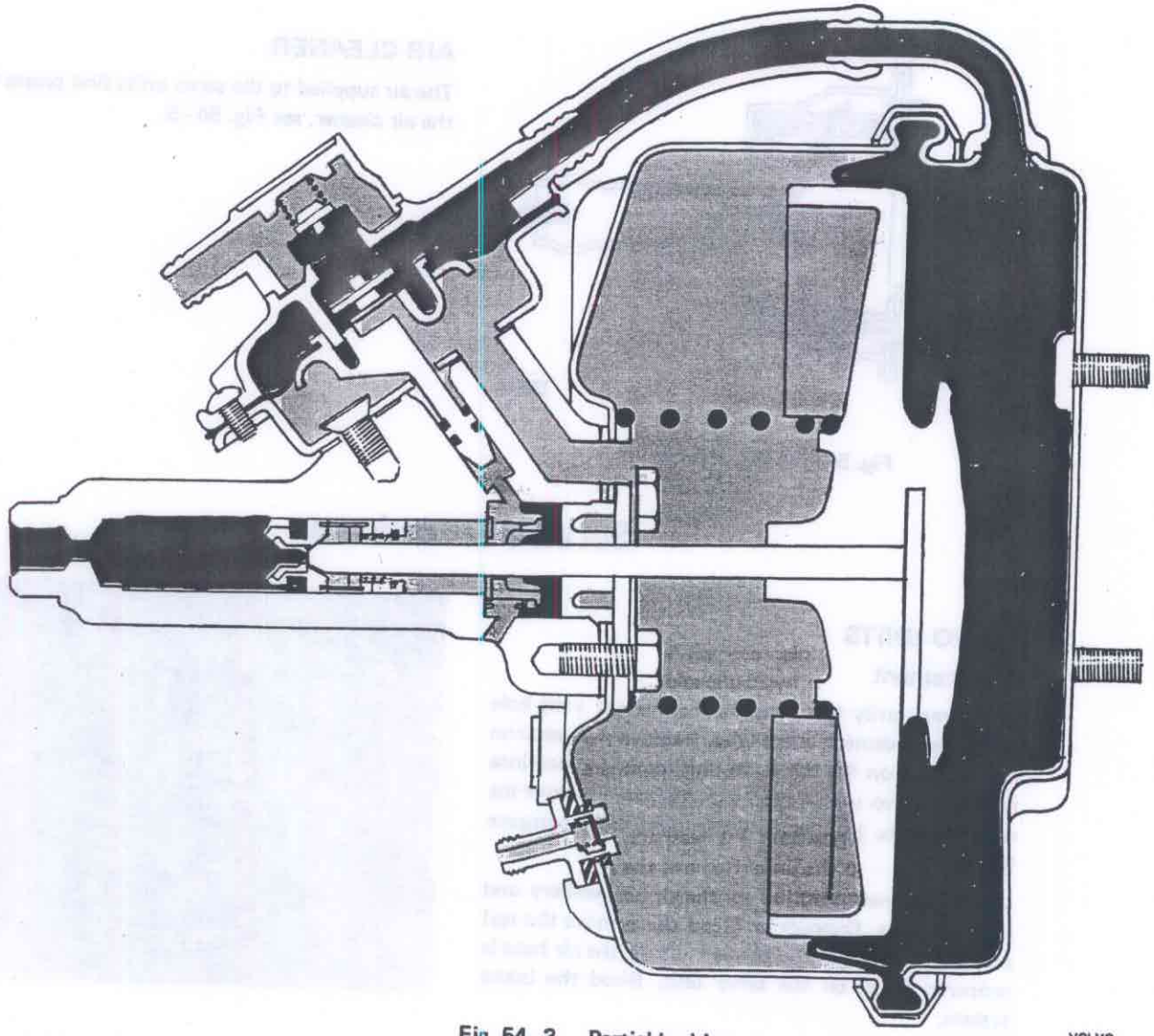

Fig. 54–3. Partial braking

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ONE-WAY VALVE

The one-way valves are placed on the servo units and are connected to the lines from the engine intake manifold. Their function is to prevent air flowing back to the servo units. The valve opens only when the vacuum in the intake manifold is greater than that in a servo unit.

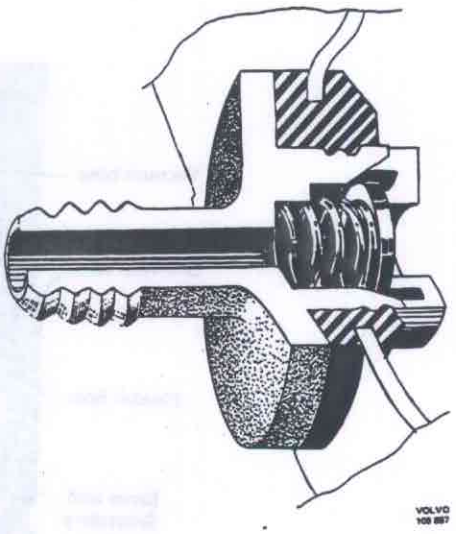

Fig. 54–4. One-way valve on servo unit