Part 5

BRAKES

CONTENTS

GENERAL

TOOLS

The following special tools are used for repair work on the brake system.

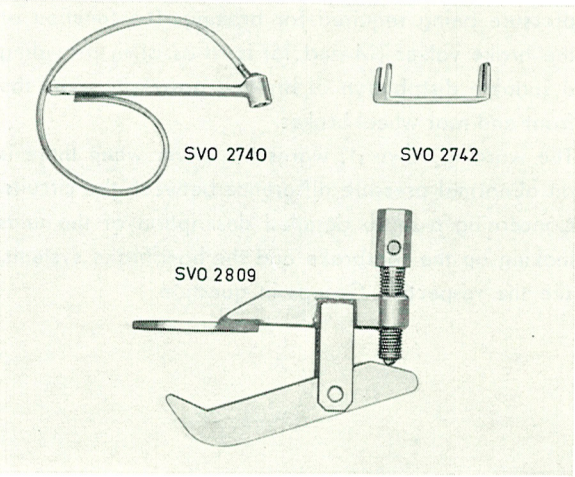

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Fig. 5-1. Special tools

SVO 2740 Venting Tool SVO 2742 Holder for cable spring
SVO 2809 Tool for pressing in piston

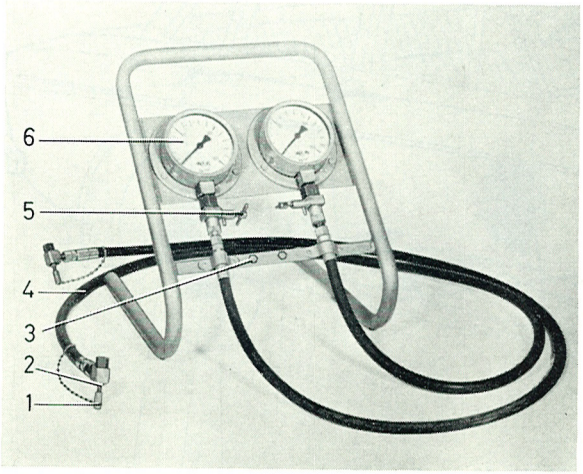

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Fig. 5-2. Testing device SVO 2741

1. Protection cover
2. Connection nipple
3. Enlarging nipple
4. Hose
5. Venting device
6. Pressure gauge

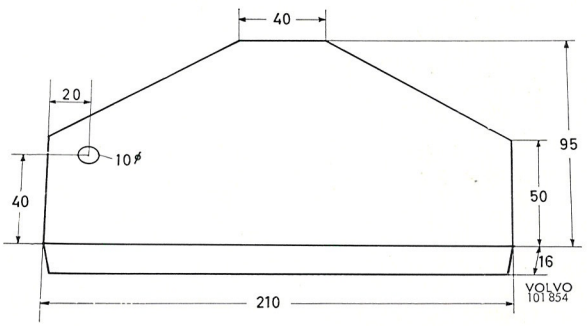

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Fig. 5-3. Wooden insert for front brake calipers

The testing device (Fig. 5-2) is used, for example, to trace faults in the brake system.

Removal of the pistons in the front brake caliper is made easier with the help of wooden inserts according to Fig. 5-3.

A venting connection, such as shown in Fig. 5-4, is required for removing the pistons in the rear brake calipers.

A venting unit, of the type shown in Fig. 5-5, is required for maintaining the hydraulic system under constant pressure. Also required is a connection cover for the brake fluid container, see Fig. 5-60.

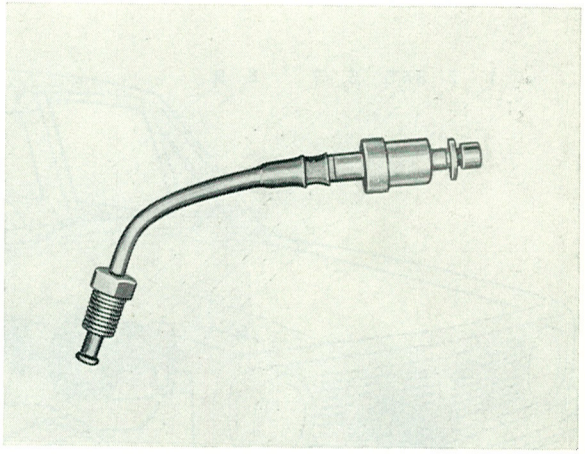

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Fig. 5-4. Venting connection

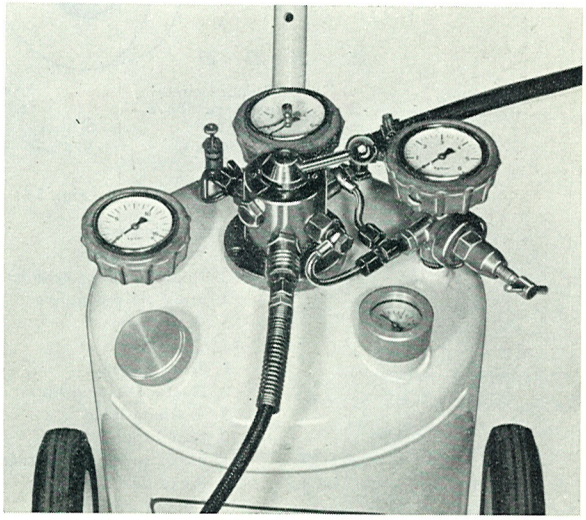


Fig. 5-5. Type of venting unit

DESCRIPTION

The P 140 is fitted with two brake systems with are independent of each other. One of these, the foot-brake system, is controlled by a brake pedal and operates on all four wheels through a hydraulic system. The other brake system, the handbrake, functions by means of a brake lever and operates both the rear wheels mechanically.

Fig. 5-6 shows the arrangement of the footbrake system which has disc brakes all round.

The hydraulic part has two separate circuits, this due to the fact that the master cylinder (3) is of the tandem-type and that each front brake caliper (20) has two pairs of cylinders which are entirely separated from each other. One of the circuits serves the lower cylinders of the front wheel brake units and the right rear wheel, while the other circuit takes care of the upper cylinders of the front wheel brake units and the left rear wheel. With such an arrangement, braking effect is ensured, should one of the brake lines fail.

The servo brake cylinder (19) is directly influenced by the brake pedal and with the help of vacuum from the engine induction manifold results in less pedal pressure being required for braking. The function of the brake valves (14 and 15) is to assist in providing a suitable distribution of braking power between the front and rear wheel brakes.

The warning valve (1) warns the driver when there is an abnormal pressure difference between the circuits.

Concerning a more detailed description of the units making up the footbrake and the handbrake systems, see the respective Groups in question.

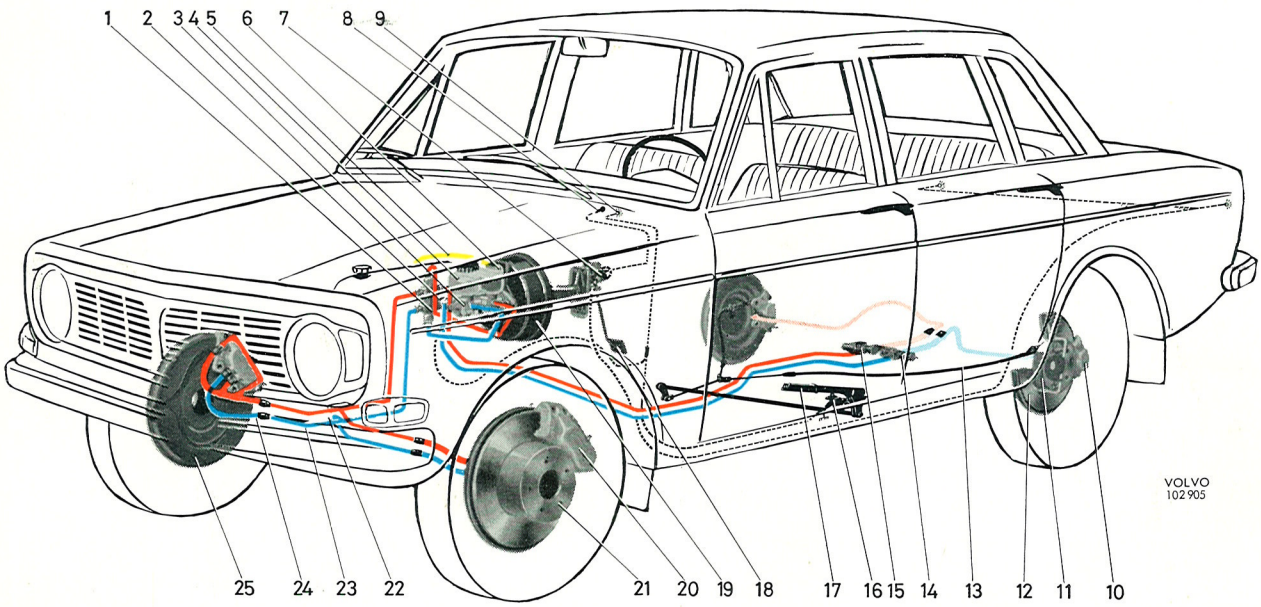


Fig. 5-6. Footbrake system

1. Warning valve
2. Warning switch
3. Tandem master cylinder
4. Brake fluid container
5. Vacuum line
6. Check valve
7. Brake switch
8. Electrical connection
9. Warning lamp
10. Rear brake caliper
11. Brake shoes, handbrake
12. Brake disc with drum
13. Handbrake cable
14. Brake valve, secondary circuit
15. Brake valve, primary circuit
16. Warning switch
17. Handbrake
18. Brake pedal
19. Servo brake cylinder
20. Front brake caliper
21. Brake disc
22. 6-branch union, (double 3-branch union)
23. Brake pipe
24. Brake hose
25. Cover plate

CLEANING

The components of the hydraulic brake system should be cleaned in clean brake fluid or denatured alcohol, which does not contain benzene (benzol).

Of the existing kinds of denatured alcohol being sold in general, only methylated spirit is free from benzene. Brake fluid is an excellent but expensive cleaning agent. From most viewpoints, **methylated spirit** is therefore the most suitable.

Petrol, white spirit, trichloroethylene or alcohol with benzene must not be used for cleaning as, like the slightest trace of mineral oil, they attack the rubber seals and cause them to swell out. For this reason, hands should be washed with soap and water before the internal parts are touched. The mechanic working with the hydraulic components should preferably be provided with rubber gloves.

Final rinsing should take place in the cleaning agent free from impurities after which the parts can be dried in the open air. To precipitate the drying and complete the cleaning process, filtered, compressed air free from moisture can be used. It is of the utmost importance that no alcoholic residue is left in the system when filled with brake fluid. Traces of alcohol in the brake fluid reduces its boiling point and can result in the formation of vapour which can affect brake functioning.

After being cleaned and dried, the parts should be moistened with brake fluid, assembled and then the complete unit filled with brake fluid as soon as possible in order to prevent corrosion attacks from the moisture in the air. This applies to parts which should be fitted immediately in the vehicle. To counteract corrosion on brake parts which are stored, or for any other reason are not covered by brake fluid, the plungers, cylinders and seals should be coated with a thin layer of lubricant called brake paste intended for this purpose. Under no condition whatsoever must other types of grease or rustproofing oil be used.

BRAKE FLUID

Only first-class brake fluid, which is guaranteed by a well-known manufacturer to fulfil the requirements according to the standard SAE 70 R 3, should be used for the brake system. Fluids which only fulfil the requirements according to SAE 70 R 1, for example HD-quality and FS-VV-H 910 A, should not be used. Mixing of brake fluids produced by different firms should be avoided.

When the container of the master cylinder is being filled, likewise with all work concerning connections, etc. the greatest cleanliness should be observed in order to prevent dirt from getting into the system. Only clean, unused brake fluid should be filled. Brake fluid which is expelled during, for example, venting, may not be put back into the system.

After use over a long period, it is normal that even first-class brake fluid gradually deteriorates through the absorption of moisture and small impurities. Thus, deteriorated brake fluid can be recognized by the fact that, compared with new brake fluid, it is darker or has changed its colour, is relatively odourless and watery, i.e., when felt between the fingers it lacks the normal feeling of a light lubricating film. Such brake fluid should be replaced by new fluid, and this should also be done when the master cylinder and wheel brake units are being overhauled.

FAULT TRACING

The following fault tracing procedure can be used, for example, after the discovery, following upon some kind of brake testing, that the capacity of the footbrake system is not what it should be. Fault tracing can also be carried out with a view to preventing faults arising.

1. Check that the level of the brake fluid reaches up to the "Max" mark on the container. Top up, if necessary. See under the heading "Brake Fluid".
2. Remove both the inside venting nipples at one of the front brake calipers and connect up the testing device SVO 2741 shown in Fig. 5-2.
3. Depress the brake pedal several times to even out any partial vacuum in the servo brake cylinder and in this way disconnect it. Check that when the brake pedal is free it is about level with the clutch pedal.
4. Apply and release the footbrake while reading off the pressure gauges of the testing device. The pressure in both the circuits should be observed. At 100 kg/cm² (1422 lb/sq.in.), there must not be a difference in pressure of more than 3 kg/cm² (42.7 lb/sq.in.).
5. Apply the footbrake with the help of a pedal jack to a hydraulic brake pressure of about 100 kg/cm² (1422 lb/sq.in.). Check the lines and parts for damage and leakage. The pressure should remain unchanged for at least 15 seconds.
6. Remove the pedal jack. Depress the brake pedal and maintain this pressure. Start the engine. Here a considerable lowering of the pedal should be felt when the servo cylinder starts to operate.
7. Stop the engine after it has run for at least 1 minute. With the help of the pedal jack apply a hydraulic pressure of 25 kg/cm² (356 lb/sq.in.).

Wait a couple of minutes. The hydraulic pressure should not drop more than 5 kg/cm² (71 lb/sq.in.).

8. Check the warning valve (Fig. 5-37). Connect a hose to one of the venting nipples of the testing device and open the device. Switch on the ignition switch and check that the warning lamp lights when the parking brake is applied. Release the parking brake. With a pedal jack apply the footbrake slowly. When the warning lamp lights, check the pressure on the pressure gauge. The lamp should light at a pressure difference of 5—15 kg/cm² (71—213 lb/sq.in.) between the circuits.

   After the test, shut off the venting nipple and remove the pedal jack. Disconnect the electrical cable and unscrew the warning valve switch so that the warning valve returns to its normal position. Screw in the warning switch to a tightening torque of 1.4—2.0 kpm (10—14 lb.ft.). Connect the electrical cable.

9. Check the brake valve of one circuit. Connect the testing devices to the venting nipple on the left rear wheel brake unit and to the upper nipple on one of the front wheel brake units. Apply the footbrake with the pedal jack to the incoming pressure according to the table in the adjacent column. Read off the incoming pressure on the pressure gauge for the front wheel brake unit. Read off the outgoing pressure on the gauge which is connected to the rear wheel brake unit. From the point of view of leakage, the brake valve is not defective if the pressure remains unaltered for at least 15 seconds.

Modell	Incoming pressure kg/cm² (lb/sq.in.)	Outgoing pressure kg/cm² (lb/sq.in.)
142—144	30 (427)	30 (427)
	50 (711)	36—42 (512—597)
	100 (1422)	50—59 (711—839)
145	45 (640)	45 (640)
	65 (924)	52—57 (739—810)
	100 (1422)	62—69 (882—981)

10. Check the other brake valve in the same way by connecting it to right rear wheel brake unit and the inner, lower nipple of the front wheel brake unit.
11. Lift up the vehicle so that the wheels rotate freely. Apply and release the brake during which a check is made to see if the wheels can be rotated. The wheels should be free for half a second after the pedal has been released. The test should be carried out with and without a partial vacuum in the servo brake cylinder.

FAULT TRACING SCHEME

Test operation	Fault	Cause	Remedy
3	Pedal too low or too high	Faulty adjustment	Adjust, see page 5:21
4	Fading pressure	Damaged brake line	Replace the damaged line
		Blocked hose	Replace hose
	Difference between circuits greater than 3 kg/cm² (42.7 lb/sq.in.)	Blockage in one of the circuits	See points 5
		Faulty master cylinder	Recondition master cylinder
5	The pressure drops	External leakage	Tighten connections and place line or recondition leaking part
		Leaking brake valve	Recondition or replace brake valve
		Leaking seal in wheel unit cylinder	Recondition wheel unit cylinder
		Leaking seal in master cylinder	Recondition master cylinder

Test-operation	Fault	Cause	Remedy
6	The pedal does not go down	Leaking vacuum line	Replace vacuum line
		Blocked air filter or leaking seal for front pressure plunger in servo cylinder	Replace filter or seal
		Faulty servo cylinder	Replace servo cylinder completely
7	The pressure drops more than 5 kg/cm² (71 lb/sq.in.)	Leaking check valve	Remove and blow clean the valve and replace the seal ring If insufficient, replace check valve
		Leaking seal for front pressure plunger in servo cylinder	Remove master cylinder and replace seal
		Internal fault in servo cylinder	Replace servo cylinder completely
8	The parking brake warning lamp does not light	Wrongly adjusted switch	Adjust the switch
		Faulty electrical parts	Replace faulty parts
	Footbrake warning lamp does not light	Faulty switch	Replace switch
	Warning lamp does not go out when pistons have returned to normal position	Pistons seize	Replace warning valve
	Warning when pressure difference is other than 5—15 kg/cm² (71—213 lb/sq.in.)	Faulty warning valve	Replace valve
9—10	Faulty outgoing pressure	Leaking valve	Recondition or replace brake valve
		Faultily set valve	Adjust if reconditioned valve tested, see page 5 : 23
11	All wheel brakes fade	Faultily adjusted front pressure plunger in servo cylinder	Adjust the pressure plunger
	A circuit fades	Blocked equalizing hole in master cylinder	Recondition the master cylinder
	The rear wheel brakes fade	Handbrake cable chafes	Replace the cable
		Faultily adjusted handbrake	Adjust the handbrake
		Faulty brake valve	Recondition or replace brake valve
	A wheel brake fades	Damaged brake line	Replace line
		Blocked hose	Replace hose
		Worn sealing ring	Recondition wheel brake unit

From the point of view of traffic safety, the condition of the brakes is an extremely important factor. It is of importance, therefore, that any work carried out on the system should be done by qualified mechanics with the greatest care, likewise that a regular check is made according to the instructions given below.

CHECKING THE BRAKE FLUID LEVEL

When filling the tank with fuel, check to make sure that the fluel level in the master cylinder container is not below the "Min" mark. This can be done without removing the cap. Every 10 000 km (6 000 miles) top-up, if necessary, to the "Max" container mark.

A first-class brake fluid which meets the requirements according to SAE 70 R 3 should be used for topping-up. Before removal, clean the cap of the container and observe maximum cleanliness when filling with fluid. Avoid spilling the brake fluid onto the paintwork as this can damage it. Check to make sure that the vent-hole in the cap is not blocked.

CHECKING THE BRAKE PADS

Every 10 000 km (6 000 miles) check the wear on the linings. The brake pads should be replaced when the linings are worn down to a thickness of about 3 mm (1/8"). Under no circumstances must the linings be worn down below 1.5 mm (1/16"). For replacement of the pads, see page 5 : 12.

FUNCTION CHECK

In addition to the regulator check on the brakes carried out by the driver as result of the driving done, the brakes should be checked every 10 000 km (6 000 miles) by a workshop mechanic. The footbrake should also be checked then to make sure that it functions satisfactorily; if necessary, check with the help of proper testing equipment (see "Fault Tracing"). A check should also be made that there is no leakage and that the brake lines are not exposed to such damage that resulting leakage can be expected. The handbrake should provide full braking power at the 3rd—4th ratchet segment. If it does not do so, adjust the handbrake according to the instructions given on page 5 : 39.

REPLACING THE AIR FILTER FOR SERVO BRAKE CYLINDER

Normally this air filter should be replaced every 40 000 km (25 000 miles), see page 5 : 35. Where driving conditions are for the most part dusty, replacement should take place more often.

GROUP 51

WHEEL BRAKE UNITS

DESCRIPTION

CONSTRUCTION OF THE FRONT WHEEL BRAKE UNITS

Fig. 5-7 shows how the brake components are located at the front wheels. The disc (3) is of cast iron and is attached to the wheel hub with which it rotates. The cover plate (4) protects the disc from dirt.

Mounted on the stub axle is the front wheel brake caliper (2) which houses the wheel unit cylinders and brake pads. The front wheel brake caliper consists of a housing in two halves (6 and 14, Fig. 5-8) bolted together and located on either side of the brake disc. Each half contains two cylinders and pistons. The upper cylinder is completely separated from the lower one, but both upper and lower cylinder are each connected through channels to the corresponding cylinder in the other half. The function of the sealing rings (1) is partly to prevent brake fluid from oozing out and partly to return the pistons to the rest position after braking. Rubber dust covers (3) prevent dirt from entering. Each sealing ring has a square section and presses against the piston from the slightly oblique groove in the housing. The brake pads (10) are provided with bonded facings and are held in position by means of retaining pins (13).

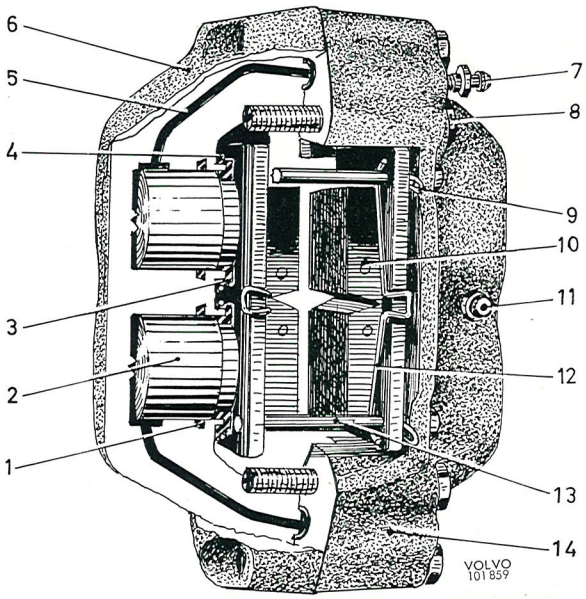


Fig. 5-8. Front wheel brake caliper

1. Sealing ring
2. Piston
3. Rubber dust cover
4. Retaining ring
5. Channel
6. Outer half
7. Upper venting nipple
8. Bolt
9. Retaining clip
10. Brake pad
11. Lower venting nipple
12. Damping spring
13. Retaining pin
14. Inner half

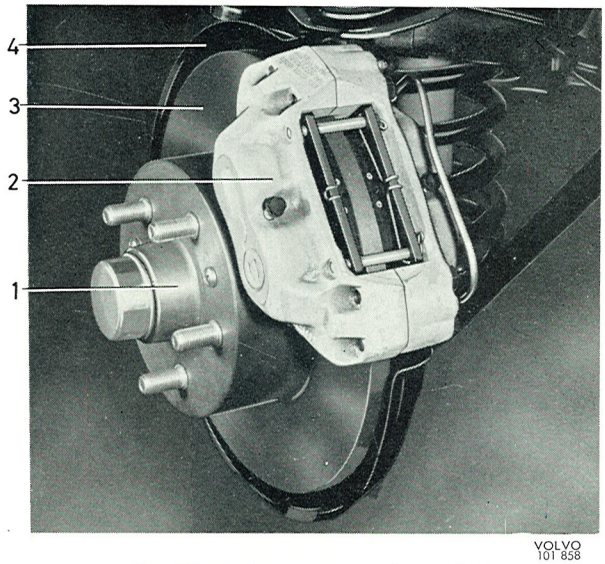


Fig. 5-7. Brake components, front wheel

1. Hub
2. Front brake caliper
3. Brake disc
4. Cover plate

CONSTRUCTION OF REAR WHEEL UNITS (FOOTBRAKE COMPONENT)

Fig. 5-9 shows the location of the brake components on the rear wheels. The brake disc (2) is of cast iron and is fixed to the drive shaft with which it rotates. The cover plate (3) prevents dirt from reaching the disc.

The rear wheel brake caliper is mounted to the rear axle casing with the help of a retainer. It houses the wheel unit cylinders and brake pads. It consists of a housing divided in two halves (9 and 14, Fig. 5-10) bolted together and located on either side of the brake disc. Each half contains a piston and a cylinder linked by means of a channel in the housing.

The caliper is provided with an A.S.B. (anti-shake back) device. The function of the A.S.B. device is to keep the pistons and the brake pads at the correct distance from the brake disc when there is considerable movement of the disc caused by lateral cast (due to the axial play of the drive shafts when driving round

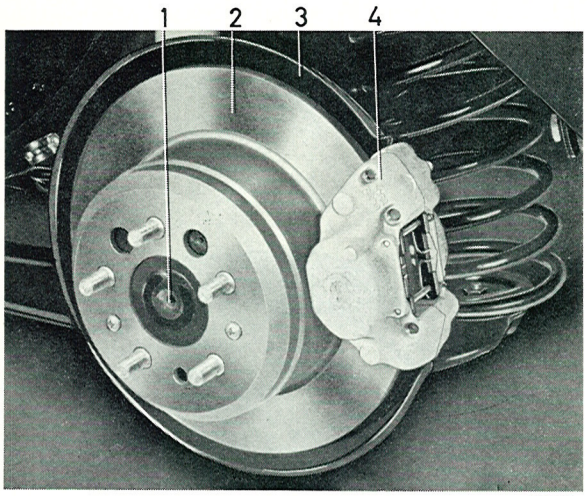


Fig. 5-9. Brake components, rear wheel

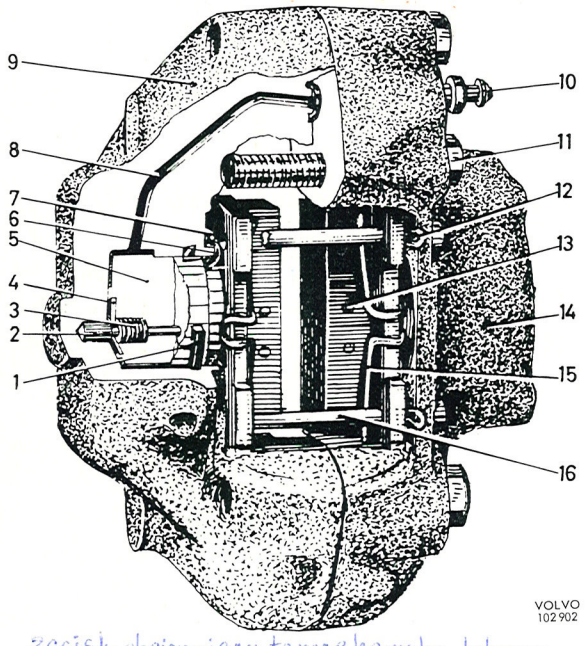
1. Drive shaft
2. Brake disc
3. Cover plate
4. Rear brake caliper

bends or on rough ground). The A.S.B. device prevents a reduction in the pedal travel (that is, distance from the pedal position at full brake application to the floor plate). The A.S.B. device consists of the following (see Fig. 5-10): A spring (3), a washer (4) which holds the spring securely on the piston, also a pin (2) which is pressed into the caliper. The spring moves on the pin with a certain amount of friction. The sealing rings (1) have a square section and press against the piston from the slightly oblique groove in the housing. The function of the sealing rings is partly to prevent brake fluid from oozing out and partly to return the pistons to the rest position after braking. The rubber dust covers (6) prevent dirt from entering. The brake pads (13) are provided with bonded facings and are held in position by means of retaining pins (16).

FUNCTION

HYDRAULIC

The lower cylinders of the front wheel brake units and the right rear wheel brake unit are connected through brake lines to the primary chamber of the master cylinder. In the same way, the upper cylinders of the front wheel brake units and the left rear wheel brake unit connected to the master cylinder through the secondary chamber. Fig. 5-11 shows the general arrangement of the connections for a left-hand steered car. Also installed are brake valves and a warning valve. For a car with right-hand steering, the connections to the master cylinder are reversed but are otherwise the same in principle.



zacisk obejmujący tarczę hamulca tylnego

Fig. 5-10. Rear brake caliper

1. Sealing ring
2. Pin
3. Spring
4. Washer
5. Piston
6. Rubber dust cover
7. Retaining ring
8. Channel
9. Outer half
10. Venting nipple
11. Bolt
12. Retaining clip
13. Brake pad
14. Inner half
15. Damping spring
16. Retaining pin

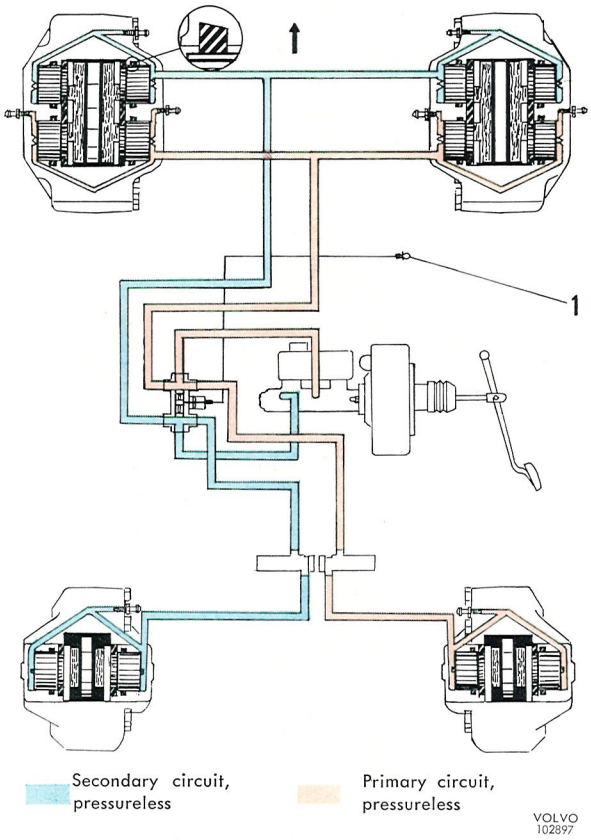


Fig. 5-11. Rest position

1 Warning lamp

When the pressure in the master cylinder rises as a result of brake application, the pistons in the brake calipers are displaced and press the pads with brake linings from both sides against the rotating friction surface of the brake disc, see Fig. 5-12. The pressure applied, and thus the brake effect, vary in proportion to the foot effort applied to the pedal. When the piston is displaced, the sealing ring is tensioned laterally. It remains in this state as long as the foot-brake is applied.

Should leakage occur in one of these circuits, full braking effect is still obtained on both the front wheels and one rear wheel if pedal pressure is increased. When there is a pressure difference in the brake circuits (about 10 kg/cm² = 142 lb/sq.in.), the piston of the warning valve is pressed over to one side where the pressure is less and the warning lamp lights. The warning lamp remains lighted until the leakage in the circuit concerned has been remedied and the warning switch returned to normal.

When the brake pedal is released, the hydraulic pressure on the pistons ceases. Since with this system there is no residual hydraulic overpressure in the lines, the tension in the sealing rings is sufficient to move the pistons back to a certain extent, see Fig. 5-11. This results in a clearance being formed between the brake linings and the brake disc. With such an arrangement, the linings will always be in the rest position at a certain distance from the brake disc, irrespective of the wear. For this reason, the brakes are self-adjusting.

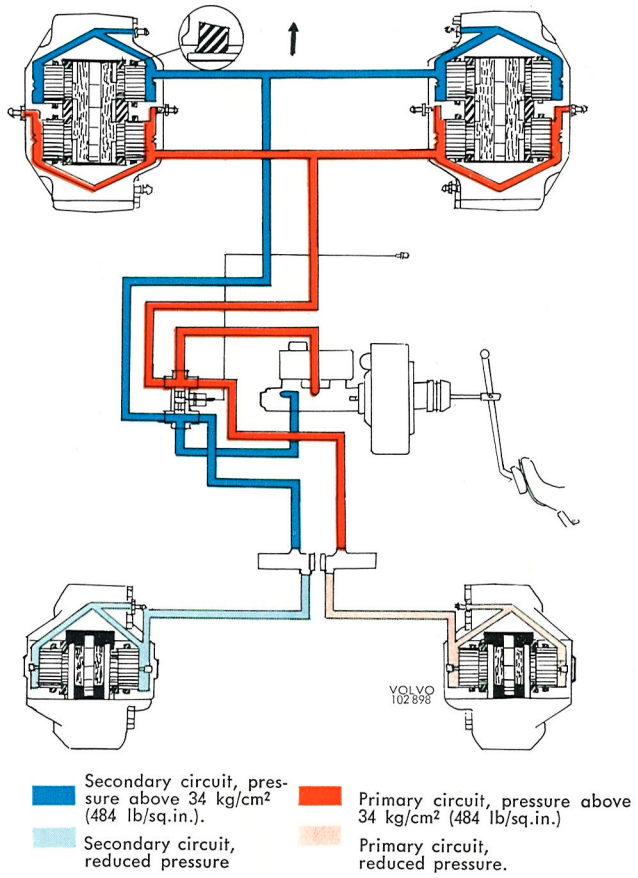


Fig. 5-12. Brake application

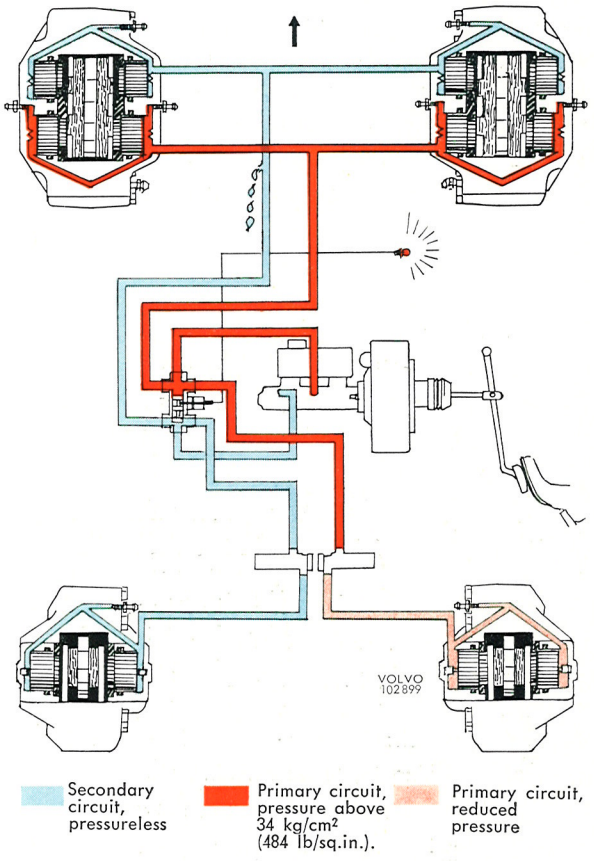


Fig. 5-13. Brake application, leakage in secondary circuit

A. S. B. DEVICE

When the brake is released, see Fig. 5-14, there is a clearance A between the brake pad and the disc and also a clearance B between the washer and the spring. With brake application, see the figure, the piston (and thus also the brake pad) is pressed against the brake disc and this removes the clearance A. If distance A is now greater than distance B, this means that the washer (1, Fig. 5-15) is pulling the spring (2) with it in the direction of the brake disc.

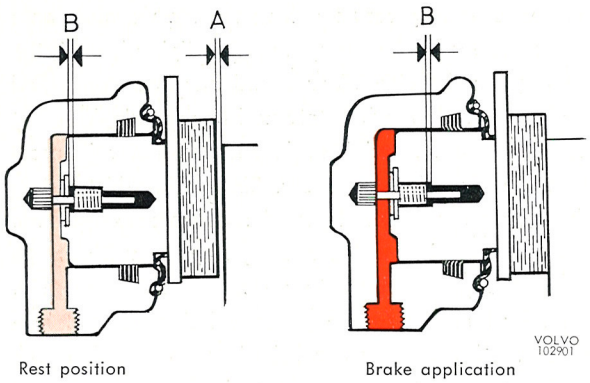


Fig. 5-14. Function of A.S.B. device

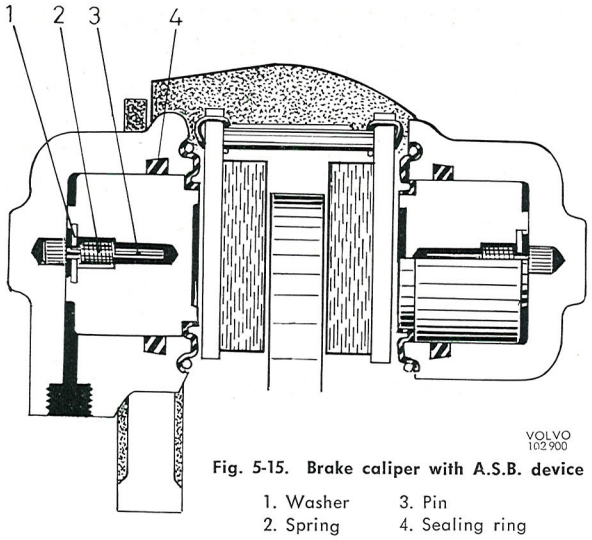


Fig. 5-15. Brake caliper with A.S.B. device

1. Washer
2. Spring
3. Pin
4. Sealing ring

When the brake pedal is released, the piston is moved backwards by the sealing ring (4) so that the clearances A and B are re-established.

If the lateral movement of the brake disc (when driving on rough ground or round bends) should now be greater than the distance A, the piston is moved backwards into the cylinder. Owing to the friction between the spring and the pin in the A.S.B. device, the lateral movement of the piston will not be greater than that of the disc.

REPAIR INSTRUCTIONS

REPLACING THE BRAKE PADS

The brake pads should be replaced when about 3 mm (1/8") of the lining thickness remains. On no account must the linings be worn down to below 1.5 (1/16").

1. Remove the hub caps and slacken the wheel nuts slightly.
2. Jack up the vehicle and place blocks under the rear axle and front jack attachments. Unscrew the wheel nuts and lift off the wheels.
3. Remove the hairpin-shaped locking clips for the guide pins. Pull out one of the lock pins while holding the damper springs in place. Remove the springs and the other lock pin. Draw out the pads, see Fig. 5-16.

FRONT BRAKE CALIPERS

1. Carefully clean out the cavity in which the pads fit. If any of the rubber dust covers are damaged, they should be replaced. If dirt has penetrated into the cylinder due to a damaged cover, the brake unit should be reconditioned. To provide room for the new brake pads, the pistons must be pressed into the cylinders. It should be noted that the brake fluid level in the master cylinder will then rise and may possibly flow over. Pressing the valves into the cylinders is facilitated by opening the venting nipple. Here make sure that the brake fluid does not touch the linings or brake disc, also do not forget to close the nipple after pressing in the pistons.

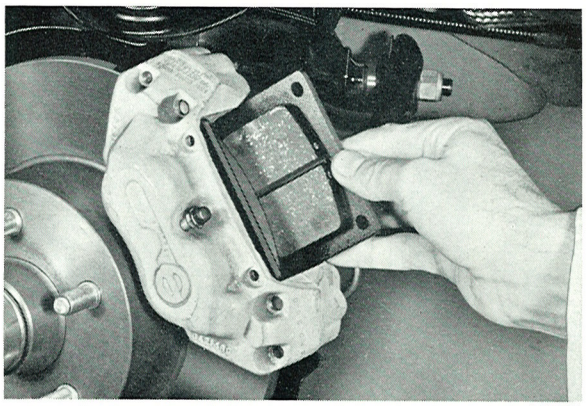


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Fig. 5-16. Removing the brake pads

2. Fit the new pads. Fit one of the retaining pins in position, then the damping springs and finally the other retaining pin. Fix the pins with the retaining clips. Check that the pads are movable.

REAR BRAKE CALIPERS

1. Carefully clean out the cavity in which the pads fit. If any of the rubber dust covers are damaged, replace them. If dirt has penetrated into the cylinder due to a damaged cover, the brake unit should be reconditioned. To provide room for the new brake pads, the pistons must be pushed into the cylinders. Tool SVO 2809, see Fig. 5-17, is used for pushing in the pistons. A torque wrench should also be used, see Fig. 5-17. The torque required should be between 20—80 kpcm (17—70 lb.in.). If greater torque has to be applied, recondition the caliper.

   Note that the brake fluid level in the master cylinder rises and the fluid may possibly spill over.

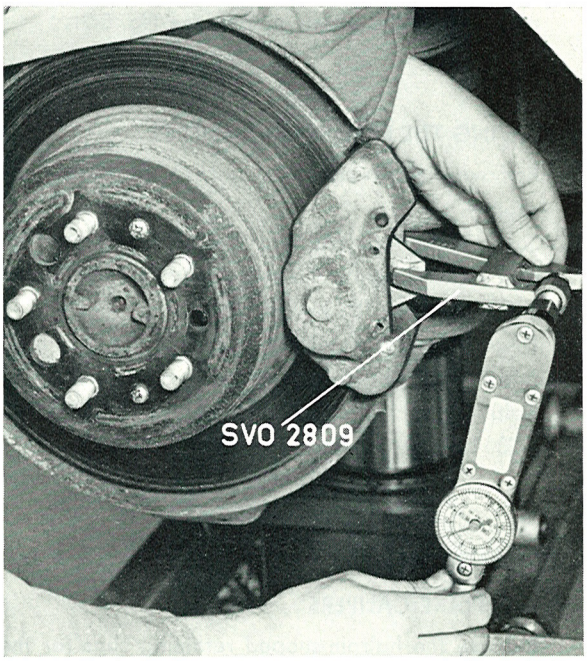

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Fig. 5-17. Pushing in the piston

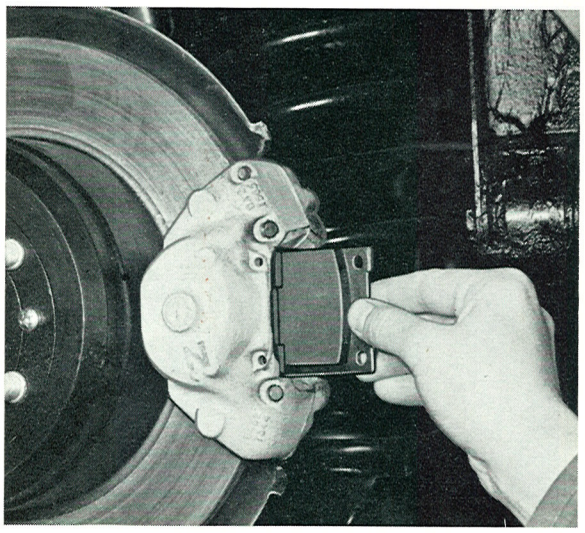

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Fig. 5-18. Fitting the brake pads

2. Fit the new pads as shown in Fig. 5-18 with the relieved edge facing downwards. Place one of the retaining pins in position and fit the damping springs and the other retaining pin. Fix the ends with the retaining clips. Check that the pads do not jam.

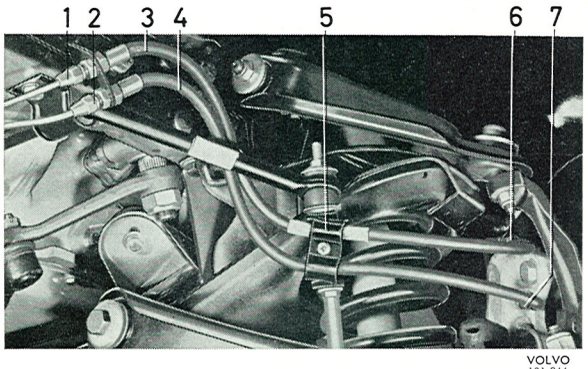

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Fig. 5-19. Fitting the front brake hoses

1. Connection for the primary circuit
2. Connection for the secondary circuit
3. Upper brake hose
4. Lower brake hose
5. Clip
6. Connection for lower wheel unit cylinder
7. Connection for upper wheel unit cylinder

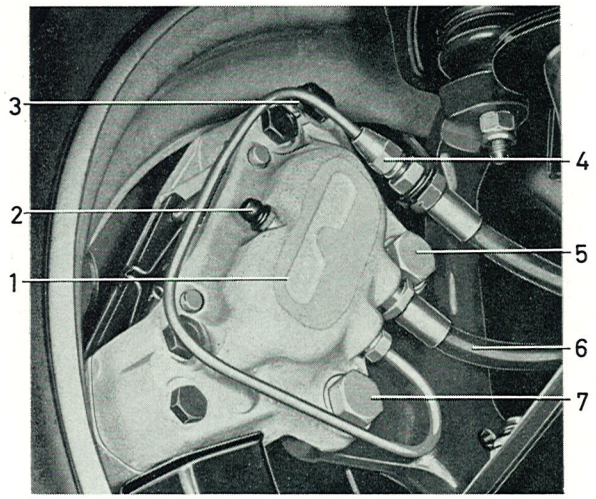

Fig. 5-20. Front wheel brake unit fitted

1. Front wheel brake caliper
2. Lower venting nipple
3. Upper venting nipple
4. Connection for lower wheel unit cylinder
5. Attaching bolt
6. Connection for upper wheel unit cylinder
7. Attaching bolt

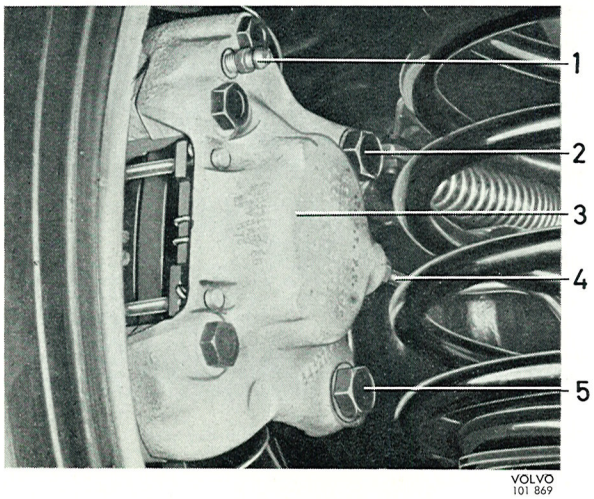

Fig. 5-22. Rear wheel brake unit fitted

1. Venting nipple
2. Attaching bolt
3. Rear wheel brake caliper
4. Brake line
5. Attaching bolt

RECONDITIONING THE WHEEL BRAKE UNITS

When working with the hydraulic system, observe the instructions under "Cleaning" and "Brake Fluid", Group 50.

REMOVING THE FRONT BRAKE CALIPERS

1. Remove the hub caps and slacken the wheel nuts a little.
2. Jack up the front end and place blocks under the front jack attachments. The linkage arms should be off-loaded so that the brake hoses can be fitted in the correct position. Unscrew the wheel nuts and lift off the wheels.
3. Remove the clip (5, Fig. 5-19). Disconnect the connection (2) and the lower hose (4) from the bracket. Place the protective casing on the brake lines to prevent unnecessary leakage. Disconnect the connection (6) for the upper hose from the brake.
4. Unscrew the attaching bolts (5 and 7, Fig. 5-20) and remove the brake caliper, see Fig. 5-21.

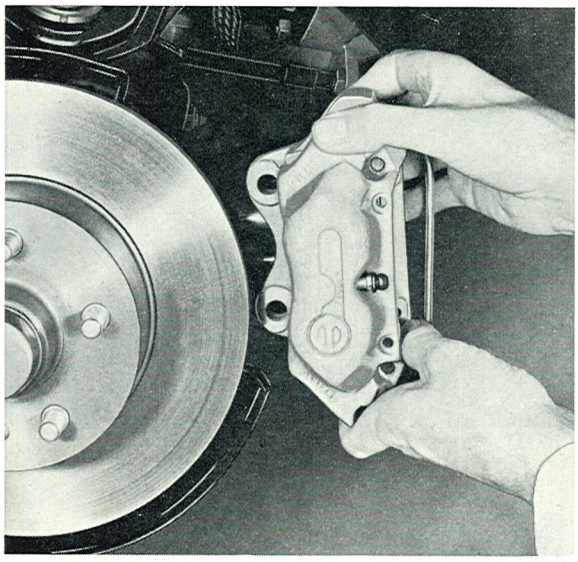

Fig. 5-21. Removing the front wheel brake caliper

REMOVING THE REAR BRAKE CALIPERS

1. Remove the hub caps and slacken the wheel nuts slightly.
2. Jack up the rear end and place blocks under the rear axle. Unscrew the wheel nuts and lift of the wheel. Release the handbrake.
3. Disconnect the brake line connection (4, Fig. 5-22) and fit the protective cover. Unscrew the attaching bolts (2 and 5). Lift off the brake caliper, see Fig. 5-23. Take care of shims if fitted.

DISMANTLING

FRONT BRAKE CALIPERS

1. Remove the hairpin-shaped retaining clips for the retaining pins. Pull out one of the retaining pins

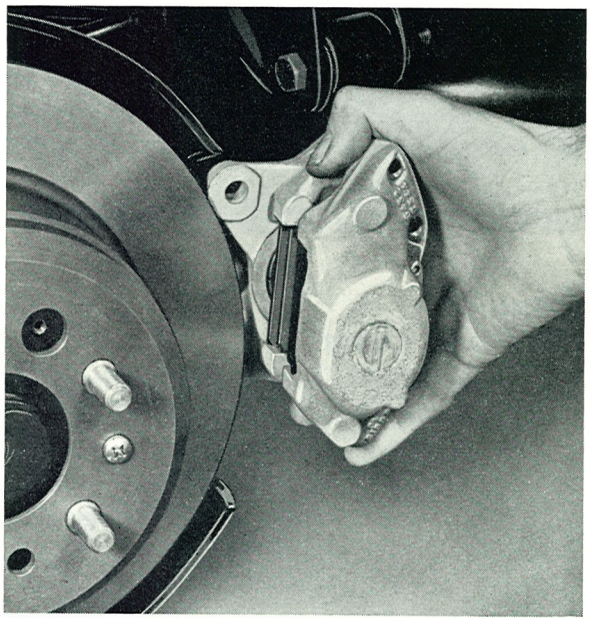

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Fig. 5-23. Removing the rear brake caliper

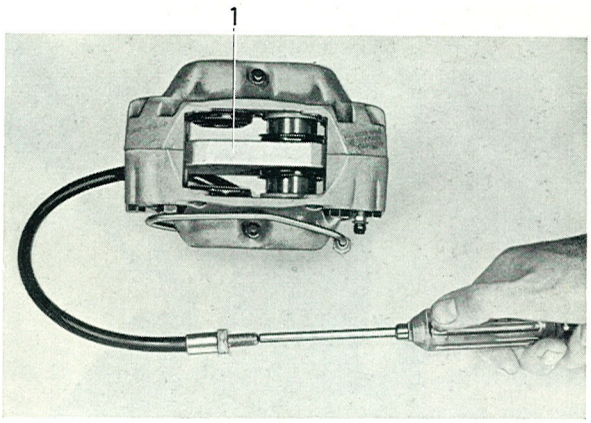

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Fig. 5-24. Removing the pistons in front brake caliper

1. Piece of wood

while holding the damping springs in position. Remove the springs and the other retaining pins. Pull out the pads, compare Fig. 5-14.

After the requisite brake pads have been replaced, depress the brake pedal repeatedly in order to check that it is functioning normally. As a rule, venting is not required after the brake pads have been replaced.

2. Remove the retaining rings for the rubber dust covers. Place a piece of wood, similar in shape to that shown in Fig. 5-3, between the pistons and press them out against the wood with the help of compressed air, see Fig. 5-24. The pistons can then be easily removed. Prise off the rubber dust covers.
3. Remove the sealing rings with the help of a blunt tool. Be careful not to damage the edge of the grooves. Unscrew the venting nipples and also the brake lines.

N.B.: Both halves of the brake caliper should not be separated. The reason for this is that the assembling requires test pressure equipment and special fluid for the bolts.

REAR BRAKE CALIPERS

1. Remove the hairpin-shaped retaining clips for the pad retaining pins. Pull out the retaining pin while keeping the damping springs in position. Remove the springs and the other pad retaining pin. Pull out the pads, see Fig. 5-18.
2. Remove the retaining rings and the rubber dust covers. Fix the caliper in a vice, see Fig. 5-25. Fit tool SVO 2809 and push one of the pistons to the bottom of the cylinder bore. Connect a suitable venting connection, see Fig. 5-4. Place a suitable length of hose in the caliper (see Fig. 5-26) and force out the piston, with an air pressure which may require to go up to about 7 kg/cm² (100 lb/sq.in.). Remove the piston.

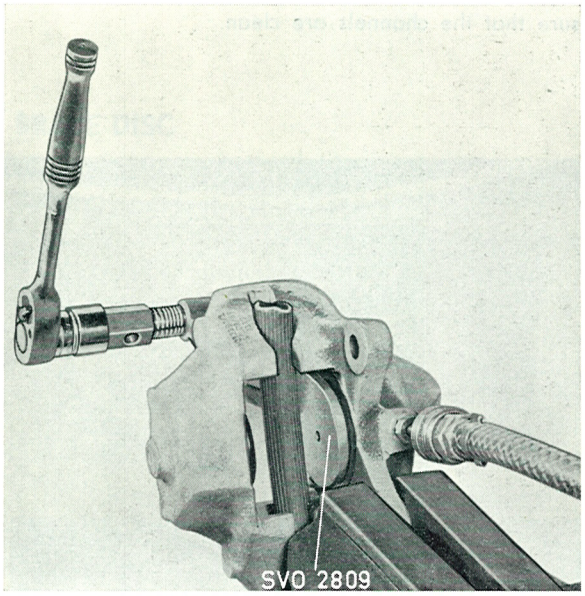

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Fig. 5-25. Compressing the piston

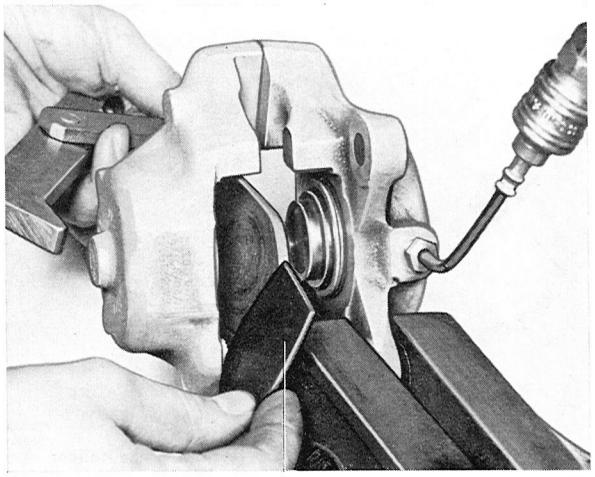

Fig. 5-26. Removing the piston
A=Rubber dust cover

3. Fit the tool with a suitable rubber seal A under the tool plate, see Fig. 5-26, for the free cylinder. Push out the piston. Remove the piston and the tool.
4. Remove the sealing rings with the help of some blunt tool. Be careful not to damage the edges of the grooves. Screw out the venting nipple. N.B. The brake caliper halves should not be separated. The reason for this is that subsequent assembling would require test pressure equipment and special fluid for the bolts.

INSPECTING

Before inspecting clean all the parts according to the instructions given under "Cleaning", Group 50. Make sure that the channels are clean.

The sealing rings and rubber dust covers should be replaced whenever reconditioning takes place. If any of the cylinders are scored or scratched, or damaged in any way, the complete cylinder housing should be replaced. Inspect the other parts and replace any that are damaged or worm.
Check also the brake disc, see under "Brake Disc".

ASSEMBLING

FRONT BRAKE CALIPERS

1. Coat the working surfaces of the pistons and cylinders with brake fluid.
2. Fit new sealing rings in the cylinders, see Fig. 5-27.
3. Fit the pistons with the large diameter end facing inwards. Make sure that the pistons are fitted in straight and are not scratched.
4. Fit the rubber covers on the piston and housing. Fit the lock rings, compare Figs. 5-28.
5. Fit the brake pads. Place one of the retaining pins in position and fit the damping springs and then the other retaining pin. Secure the pins with the hairpin-shaped retaining clips. Check that the pads are movable.
6. Fit the venting nipples and also the brake lines.

REAR BRAKE CALIPERS

1. Lubricate the working surfaces of the pistons and cylinders with brake fluid.
2. Fit the new sealing rings in the cylinders, see Fig. 5-27.
3. Push in the piston with tool SVO 2809 torque wrench, see Fig. 5-17. The torque required should be between 20—80 kpcm (17—70 lb.in.) If greater

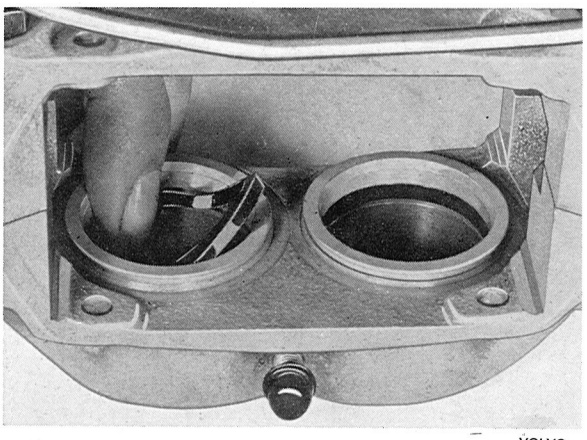

Fig. 5-27. Fitting the sealing ring

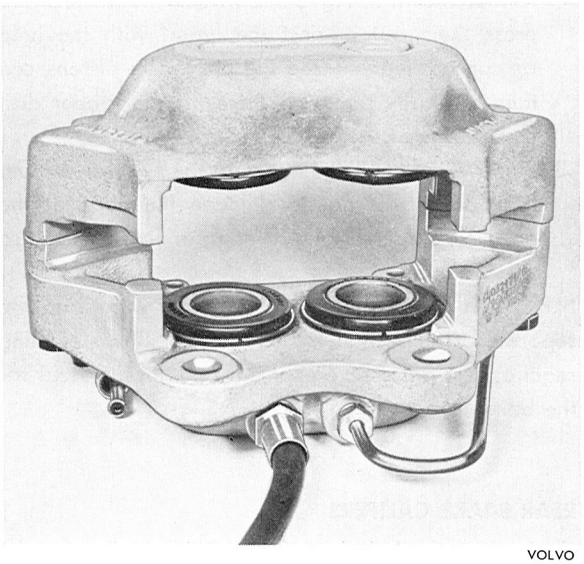

Fig. 5-28. Front brake caliper assembled

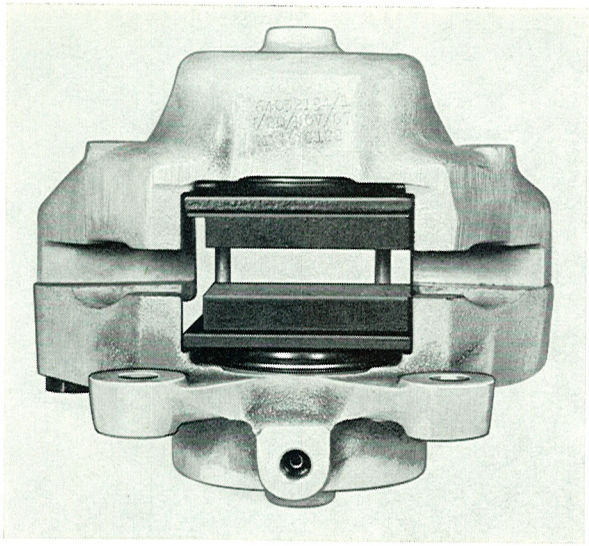

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Fig. 5-29. Rear brake caliper assembled

torque is required, the A.S.B. device must be checked. If the reason for incorrect torque is a worn pin in the caliper, the entire caliper must be replaced. The piston only should be changed if the fault lies elsewhere.

4. Push in and test the other piston as above. Fit the rubber dust covers on the pistons and housing. Install the retaining rings.
5. Fit the brake pads, with the relieved edge away from the venting nipple, i.e. towards the leading edge of the caliper in relation to the forward direction of disc rotation, see Fig. 5-29. Refit one of the retaining pins, the damping springs and the other retaining pin. Secure the pins with the hair-pin-shaped retaining clips. Check that the pads are movable.
6. Screw in the venting nipple.

INSTALLING THE FRONT BRAKE CALIPERS

1. Place the caliper in position. Check that the contact surfaces of the retainer are clean and not damaged as it is of vital importance that the caliper takes up the correct position in relation to the brake disc. Fit the attaching bolts after they have been coated with a couple of drops of Locktite, type AV. Check that the brake disc can rotate easily in the brake pads.
2. Fit the hoses and their connection as well as the guide clip as shown Fig. 5-19. It is important that the hoses are fitted in the correct way, that is without being tensioned and with the linkage arms unloaded.
3. Fit on the wheel after the contact surfaces have been cleaned of dirt, and then tighten the nuts sufficiently so that the wheel cannot be displaced on the hub. Lower the vehicle and tighten the wheel nuts. Tighten every other nut a little at a time until all are tightened to a torque of 10—14 kgm (70—100 lb.ft.). Fit the hub cap.
4. Vent the fitted brake caliper, see Group 52.

FITTING THE REAR BRAKE CALIPERS

1. Place the caliper in position. Check that the contact surfaces of the retainer are clean and not damaged as it is of vital importance that the caliper is in the correct position in relation to the brake disc. The clearance between the inner friction surface of the brake caliper should be 1.0—1.6 mm (0.040—0.064"). Any adjuster shims are refitted in their original position. Then fit the attaching bolts after coating them with a couple of drops of Locktite, type AV.
2. Connect the brake line, see Fig. 5-22.
3. Fit the wheel, see operation 3 under "Fitting the front brake calipers".
4. Vent the fitted brake caliper, see Group 52.

BRAKE DISC

The brake disc should be examined with regard to the friction surface, run-out and thickness.

Small marks on the friction surface or linings are of minor importance, but radial scratches reduce the braking effect and increase wear on the linings. The run-out must not exceed 0.1 mm (0.004") for the front

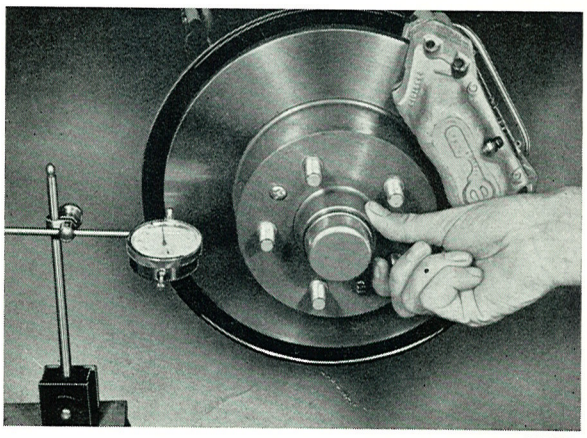

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Fig. 5-30. Checking the run-out

wheel brakes and 0.15 (0.006") for the rear wheel brakes at the outer edge of the disc and is measured, for example, according to Fig. 5-30. Check first that the wheel bearings are correctly adjusted and that the disc fits securely on the hub. The thickness is measured with, by example, a micrometer. It should not vary more than 0.03 mm (0.0012") when the disc is rotated one turn, since this can cause a vibrating brake pedal.

If a fault is discovered during the above-mentioned inspection, the brake disc should be replaced. When doing this, the brake caliper should first be removed. Then unscrew the lock bolts and lift off the brake disc, see Figs. 5-31 and 5-71. Tap on the inside of the disc with several light blows from a plastic hammer or similar tool.

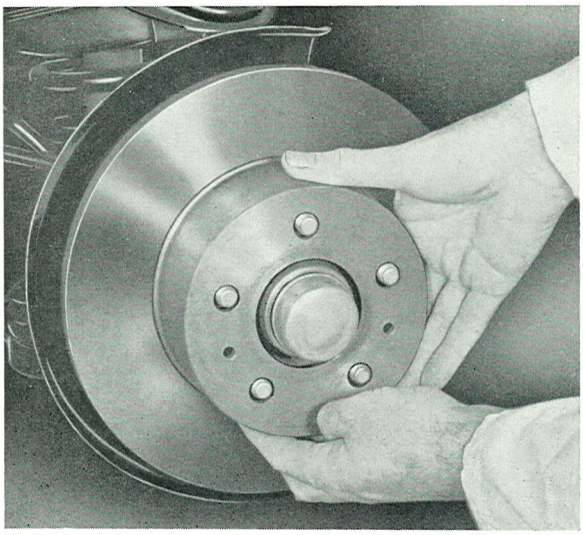

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Fig. 5-31. Removing the brake disc

GROUP 52

HYDRAULIC FOOTBRAKE SYSTEM

DESCRIPTION

MASTER CYLINDER

The master cylinder is of the tandem type. Its construction is shown in Fig. 5-32 and its function is the following:

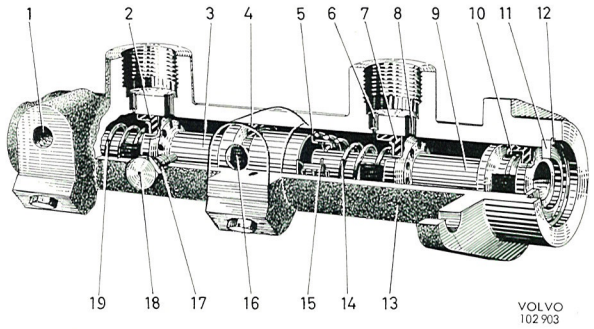


Fig. 5-32. Master cylinder

1. Connection for secondary circuit
2. Piston seal
3. Secondary piston
4. Piston seal
5. Spring guide
6. Equalizing hole
7. Piston seal
8. Overflow hole
9. Primary piston
10. Piston seal
11. Thrust washer
12. Circlip
13. Cylinder
14. Return spring for primary piston
15. Circlip
16. Connection for primary circuit
17. Sealing washer
18. Stop screw
19. Return spring for secondary piston

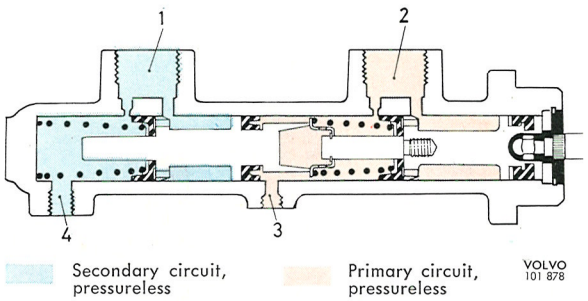


Fig. 5-33. Rest position

1 and 2. Connection for brake fluid container
3. Connection for primary circuit
4. Connection for secondary circuit

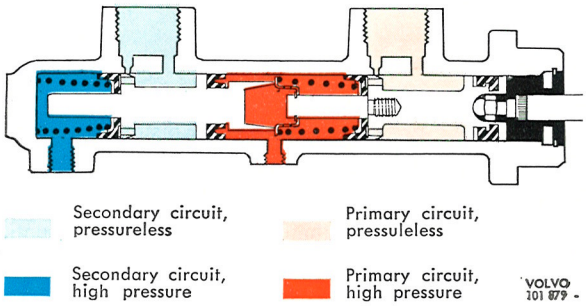


Fig. 5-34. Normal brake application

When the system is at rest (Fig. 5-33), the pistons are kept pressed back by the force of the springs. When the pistons are in this position, the connections between the fluid brake container and wheel brake units are open. At the moment braking takes place, the primary piston (to the right) is pressed in by the piston rod. This closes the connection to the container and the pressure in front of the piston rises. This pressure influences the secondary piston so that it also is moved to the left. The same overpressure arises in front of both pistons (Fig. 5-34), the brake fluid is forced out into the respective brake line and the wheel brakes are applied, providing the system is functioning properly.

If a leakage has occured in the secondary circuit, no hydraulic counterpressure builds up in front of the secondary piston. Instead, this piston is moved inwards when the brakes are applied until it is stopped by the end of the cylinder (Fig. 5-35).

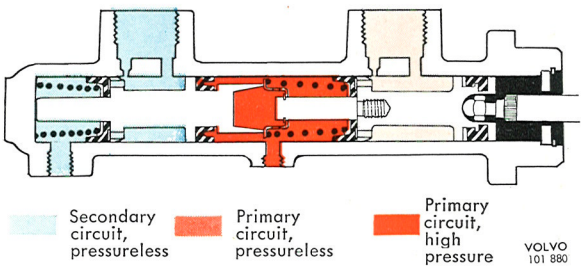


Fig. 5-35. Brake application with leakage in the secondary circuit

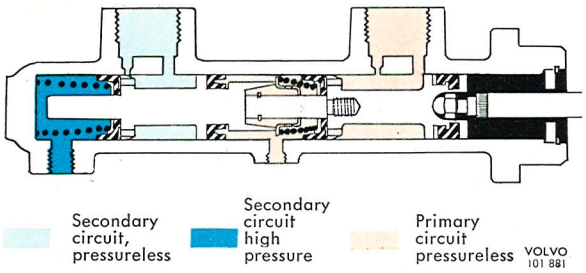


Fig. 5-36. Brake application with leakage in the primary circuit

The hydraulic pressure between the pistons can then rise and apply the brakes in the primary circuit. If leakage occurs in the primary circuit, the primary piston is moved and the brakes are applied until the primary piston makes contact with the secondary piston. Both piston are then pressed inwards, the pressure in front of the secondary plunger rises and the brakes in the secondary circuit are applied (Fig. 5-36).

WARNING VALVE

The footbrake system is fitted with a warning valve, the construction of which is shown in Fig. 5-37. Its function is to warn the driver when the pressure difference between the two brake circuits exceeds about 10 kg/cm² (142 lb/sq.in.). The valve operates as follows:

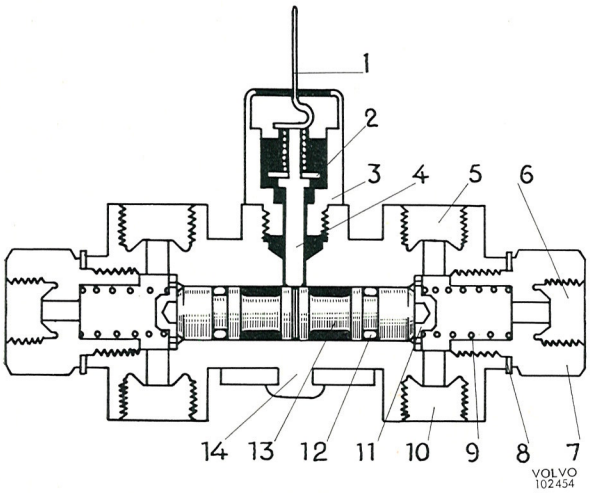


Fig. 5-37. Warning valve

1. Electrical connection
2. Switch washer
3. Switch housing
4. Guide pin
5. Connection, rear wheel brakes
6. Connection, master cylinder
7. End piece
8. Sealing washer
9. Spring
10. Connection, front wheel brakes
11. Thrust washer
12. O-ring
13. Piston
14. Housing

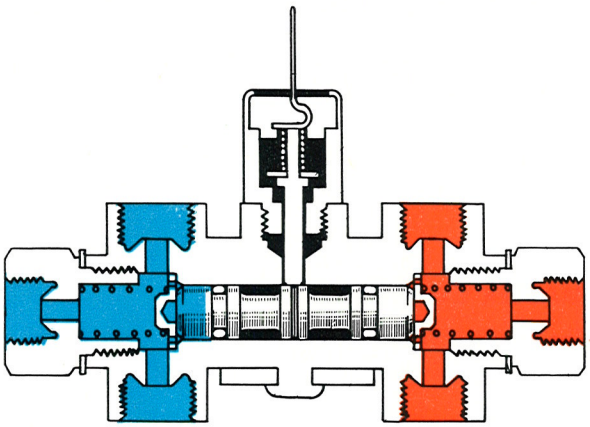


Fig. 5-38. Normal position

If there is no fault in the circuits and the brakes are applied, the hydraulic pressure on the pistons is largely the same on both sides (Fig. 5-38). But should, for example, the pressure in the secondary circuit be somewhat higher than in the primary circuit, this will try to displace the pistons to the right in the figure. This lifts the thrust washer (11) and the pressure of the spring (9) counteracts the displacement.

It is only when the pressure in the secondary circuit first exceeds that in the primary circuit by about 10 kg/cm² (142 lb/sq.in.) that the pistons are pushed so far to the right that the guide pin (4) can be pressed downwards. When this happens, the switch washer (2) reaches the housing (3) and current is cut in (Fig. 5-39). If the circuits are made pressureless, the guide pin is prevented from returning to its normal position. This can happen by screwing out the warning switch (3).

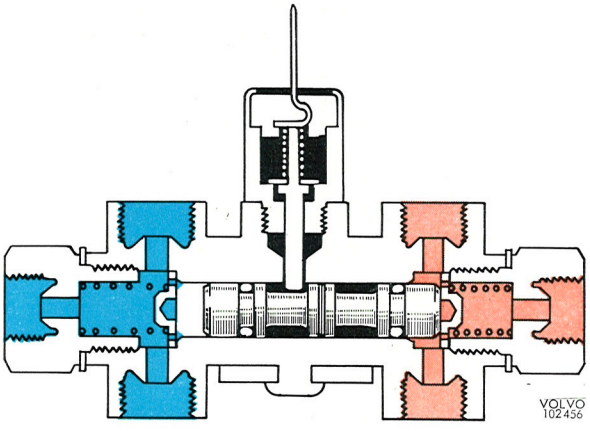


Fig. 5-39. Brake valve, construction

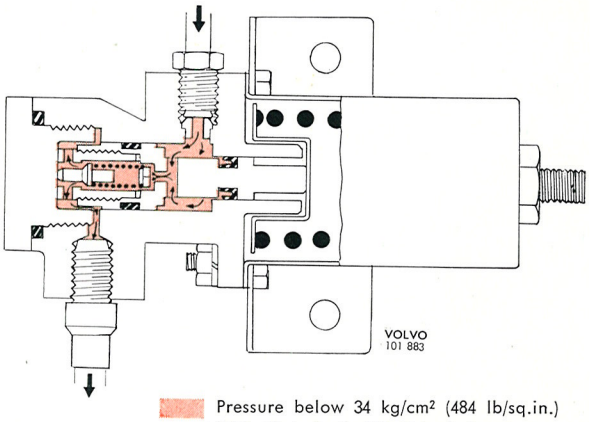
BRAKE VALVE

A brake valve is connected to each of the rear wheel brake lines, see Fig. 5-6. When the ingoing brake pressure exceeds 34 kg/cm², 484 lb/sq.in., (145, 50 kg/cm²=711 lb/sq.in.) a reduction takes place in the valve. The more powerful the pedal pressure, the greater the reduction and thereby the larger the difference between the hydraulic pressure in the front wheel and rear wheel cylinders. This results in a suitable distribution of braking force between both pairs of wheels. The construction of the brake valve is shown in Fig. 5-40 and its function is the following.

When the footbrakes are applied, the pressure from the master cylinder is transmitted via the connection (7, Fig. 5-40). The pressure then proceeds through the cylinder (6), the counterbore, past the valves (17) and (4) to cylinder (3) and then on through connection (19) to the rear wheel cylinders, see Fig. 5-41. The hydraulic pressure per unit surface is equal on the different parts of the piston (21), but since its pressure surface is larger in cylinder (3) than in cylinder (6), the force developed will move the piston to the right of the figure. However, this is counteracted by the pressure from the spring (10). When the hydraulic pressure approaches 34 kg/cm², 484 lb/sq.in. (145, 50 kg/cm²=711 lb/sq.in.) the spring pressure is overcome and the piston (21) is moved to the right. By means of pressure from the smaller spring (5), the valve (4) shuts off the connection between the two cylinders and forms two separate system, one for the front wheels and one for the rear wheel.

With continued increase in pressure in the master cylinder and front wheel cylinders, the hydraulic force in cylinder (6) moves the piston to the left so that the valve rod comes up against its stop and opens the valve, this causing the pressure in cylinder (3) to increase. Due to the larger pressure surface in this cylinder, the plunger is moved to the right again and the valve closes. In this way, the piston assumes a position of balance and the outgoing pressure from the brake valve will be lower than the ingoing pressure, see Fig. 5-42. The difference in these pressures is determined by the different areas and spring tension.

When the brake pedal is released, the pressure in the cylinder (6) falls. The piston (21) is moved to the right by the spring (10). When the pressure o nthe right-hand side of the valve (4) falls so much that the hydraulic pressure on the left-hand side enables the valves to be actuated, the connection between both the cylinders is opened again. As the pressure falls, the spring (10) presses the left piston back to its original position where the valve is held in the open position by mechanical means, see Fig. 5-41. The equalizing valve (17) is fitted with control channels which ensure an even flow of pressure through the valve.



Pressure below 34 kg/cm² (484 lb/sq.in.) (145, 50 kg/cm²=711 lb/sq.in.)

Fig. 5-41. Brake application

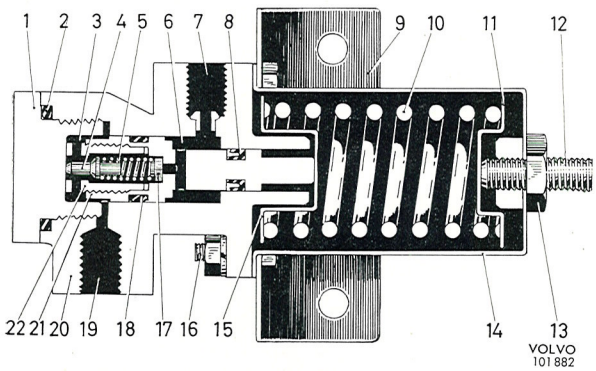
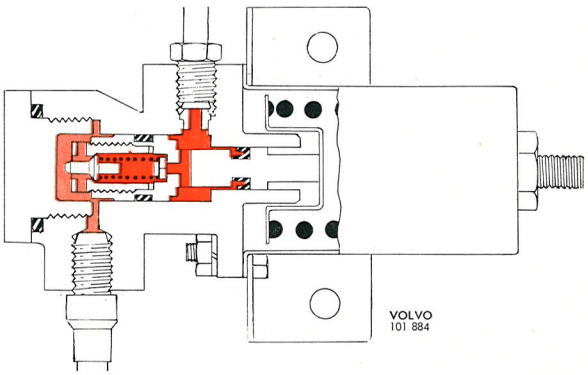


Fig. 5-40. Brake valve, construction

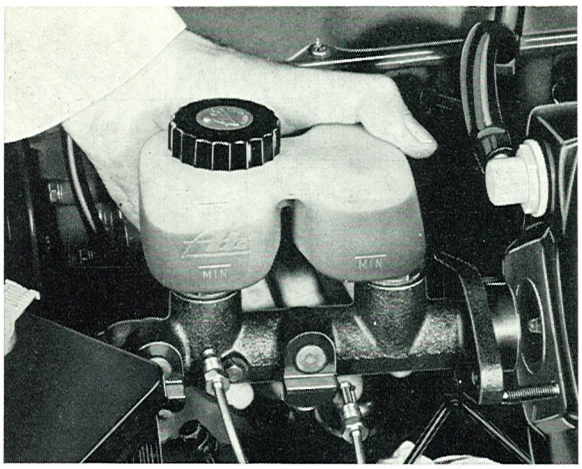
1. Plug
2. O-ring
3. Cylinder
4. Valve
5. Valve spring
6. Cylinder
7. Connection to master cylinder
8. Piston seal
9. Bracket
10. Spring
11. Retainer
12. Adjusting screw
13. Locknut
14. Spring housing
15. Retainer
16. Screw
17. Equalizing valve
18. O-ring
19. Connection to rear wheel brake cylinders
20. Housing
21. Piston
22. Valve housing



Reduced pressure

Pressure above 34 kg/cm² (484 lb/sq.in.) (145, 50 kg/cm²=711 lb/sq.in.)

Fig. 5-42. Reducing action



VOLVO
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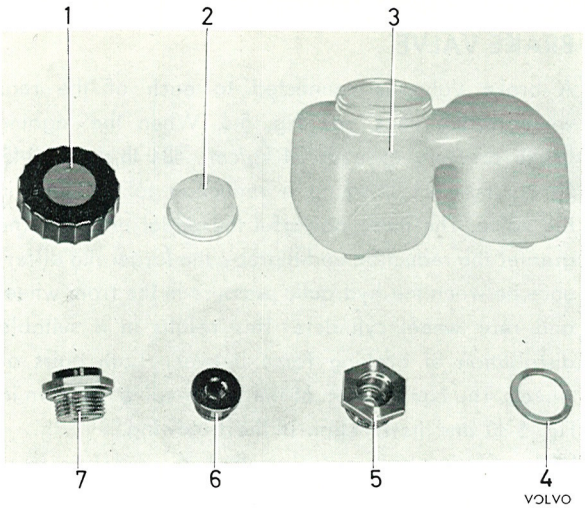
Fig. 5-43. Removing the master cylinder



VOLVO
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Fig. 5-45. Container parts

1. Filler cap
2. Strainer
3. Container
4. Sealing washer
5. Nut
6. Rubber seal
7. Nut, complete

REPAIR INSTRUCTIONS

MASTER CYLINDER

With regard to repair work on the hydraulic system, the instructions given under "Cleaning" and "Brake Fluid", Group 50, should be observed. When the master cylinder is removed, the brake pedal should not be depressed because the resulting abnormal position for the parts of the servo cylinder can cause damage.

REMOVING

1. Place a cover over the mudguard and rags under the master cylinder in order to avoid possible damage to the paintwork should the brake fluid spill over.
2. Remove the electric cables from the master cylinder and fit plastic plugs.
3. Remote the two attaching nuts for the master cylinder and lift the cylinder forwards, see Fig. 5-43. Empty out the brake fluid.

DISMANTLING

1. Fix the flange of the master cylinder firmly in a vice.
2. Place both hands under the container and pull it up from the rubber seals, see Fig. 5-44. Remove the filler cap and strainer from the container and also the nuts and rubber seals from the cylinder, see Fig. 5-45.
3. Unscrew the stop screw (Fig. 5-46). Remove the circlip from the primary piston with the help of circlip pliers. Remove the pistons. If it is not possible to shake out the secondary piston, it can

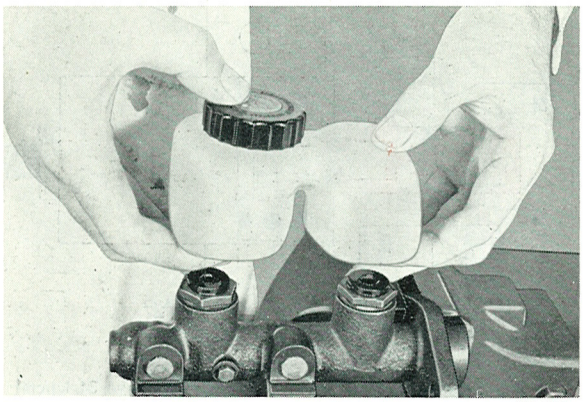

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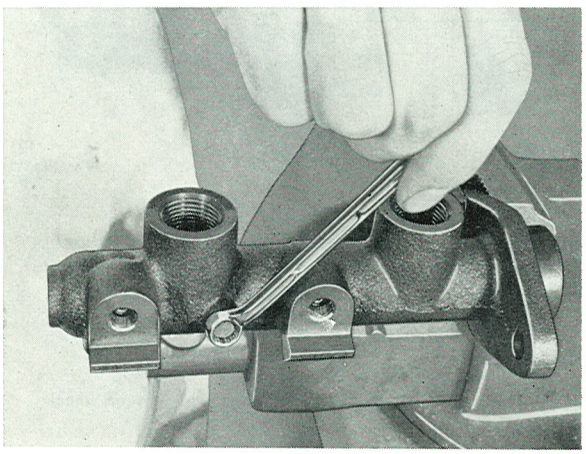
Fig. 5-44. Removing the container



VOLVO
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Fig. 5-46. Removing the stop screw

be removed by blowing air in the hole for the brake switch.

4. Remove the two seals from the secondary piston. Be careful not to damage the surfaces of the plunger. Fig. 5-47 shows the cylinder dismantled. During reconditioning, the primary piston should be replaced completely. For this reason, it does not need to be dismantled.

INSPECTING

Before inspecting, all the parts should be cleaned according to the instructions given under "Cleaning", Group 50.

Examine the inside of the cylinder carefully. If scored or scratched, the cylinder should be replaced. Rust formation and similar damage can as a rule be eliminated by honing the cylinder. The procedure for this varies with different makes of tools so that no general description can be given. Follow, therefore, the instructions of the manufacturer. Clean the cylinder carefully after honing and check that the holes are clear.

If wear on the cylinder or secondary piston is suspected, the diameter should be measured with a micrometer or indicator. The cylinder diameter may not exceed 22.40 mm (0.881"), while the diameter of the piston may not be less than 22.05 mm (0.870").

During reconditioning, the primary piston complete (9, Fig. 5-47) should be replaced likewise the secondary piston seals (2 and 4), the stop screw (18) and its washer (17), also the circlip (12). In addition, the rubber seals (Fig. 5-45) for the container should be replaced.

ASSEMBLING

1. Fit the seals on the secondary piston and make sure that they are turned correctly, see Figs. 5-32 and 5-48.

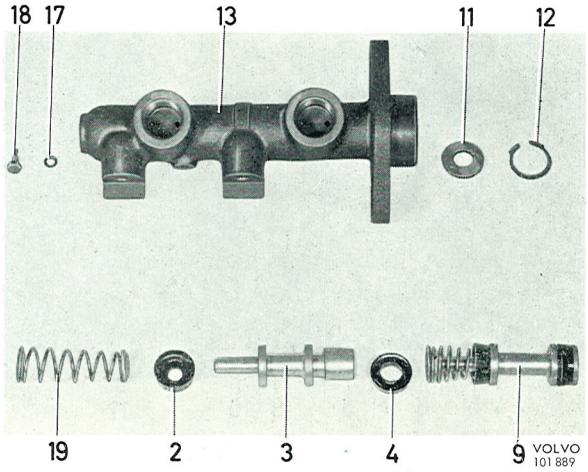


Fig. 5-47. The master cylinder dismantled

2. Piston seal
3. Secondary piston
4. Piston seal
9. Primary piston (assembled)
11. Thrust washer
12. Circlip
13. Cylinder housing
17. Sealing washer
18. Stop screw
19. Return spring

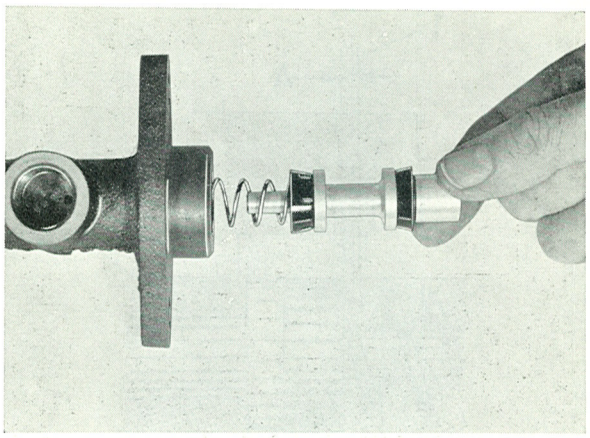


Fig. 5-48. Fitting the secondary piston

2. Coat the cylinder with brake fluid and dip the piston and seals in brake fluid before fitting. Slide the spring (19) onto the secondary piston (3) and fit the piston, see Fig. 5-48.

   Be careful when inserting the seals in the cylinder. Fit the new primary piston (Fig. 5-49). Press in the piston and fit washer (11) and circlip (12).
3. Check that the hole for the stop screw is clear and fit screw (18) and sealing washer (17). The tightening torque should be 1.3 kgm (9.5 lb.ft.)
4. Check the movement of the pistons and make sure that the through-flow holes are clear. The equalizing hole is checked by inserting a soft copper wire with diameter 0.5 mm (25 s. w. g.) through the hole, see Fig. 5-50. If the equalizing hole is not clear, then the master cylinder is generally wrongly assembled.
5. Fit nuts (5, Fig. 5-45) with washers (4) and rubber seals (6). Check that the venting hole in the cap (1) is clear and fit the strainer (2) and filler cap in position. Fit the container, compare Fig. 5-44. Fit the brake contact.

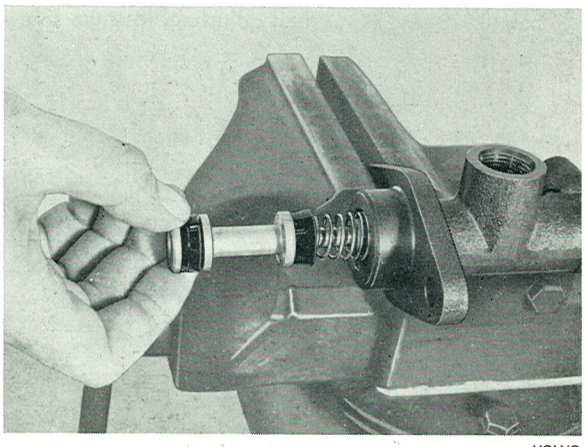


Fig. 5-49. Fitting the primary piston

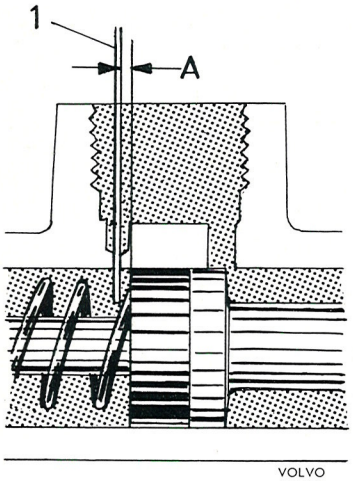


Fig. 5-50. Checking the equalizing hole

1. 0.5 mm (25 s.w.g.) soft copper wire
A = approx. 0.5 mm (0.020")

FITTING

1. For the correct function of the master cylinder, the outgoing thrust rod of the servo cylinder must not prevent the primary piston from returning to its resting position. Thus, when fitted and in the resting position, the thrust rod and primary piston should have a clearance (dimension C, Fig. 5-51) between them.

   Before fitting the master cylinder, check the clearance first by, for example, measuring with slide calipers the distance between the face of the attaching flange and the centre of the primary piston, dimension A, Fig. 5-51. Then measure how much the thrust rod (the adjuster screw) projects outside the fixed surface of the servo cylinder, dimension B. For this measurement, the thrust rod should be pressed in fully and a partial vacuum should exist in the cylinder so that the engine, if necessary, can be started.

   Dimension A reduced by dimension B will result thereby in the clearance C, and should be 0.5—1.5 mm (0.020—0.059"). When adjusting, lock the screw

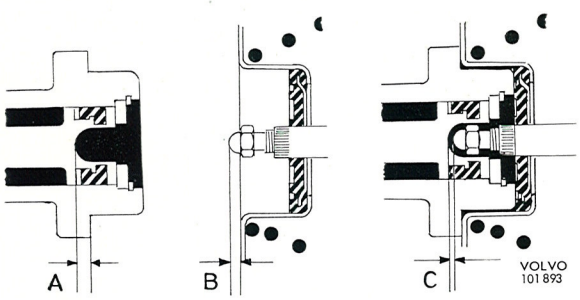


Fig. 5-51. Adjusting the thrust rod

C = Clearance 0.5—1.5 mm (0.020—0.059")

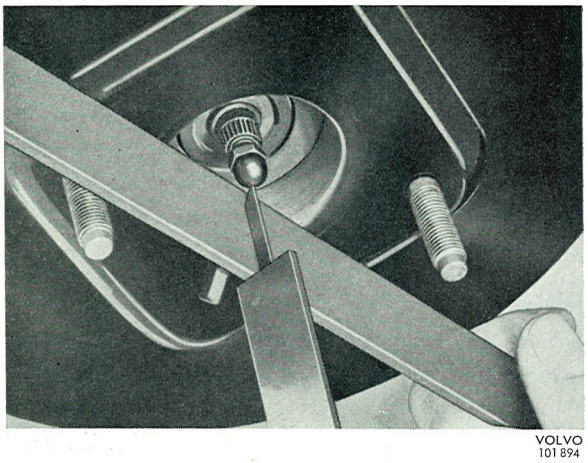


Fig. 5-52. Measuring the thrust rod

   (4, Fig. 5-68) with a couple of drops of Locktite, type B.
2. Fit the master cylinder in position and then the washers and attaching nuts. Tightening torque 2.4 kgm (17 lb.ft.).
3. Connect the lines, see Fig. 5-53.
4. Vent the entire brake system.

WARNING VALVE

Normalizing the pistons

1. Disconnect the electrical cable and screw out the warning switch (Fig. 5-54) so that the pistons return to normal position.

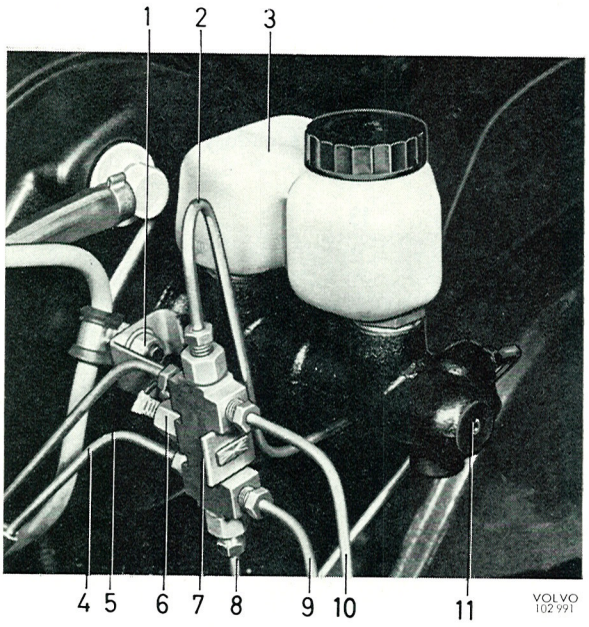
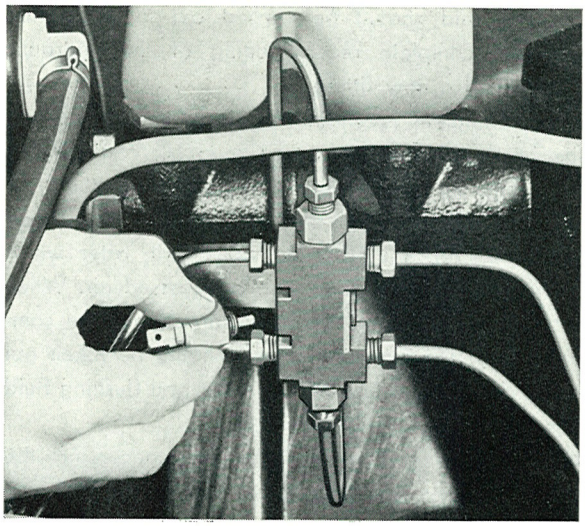


Fig. 5-53. The master cylinder fitted

1. Attaching nut
2. From primary circuit (master cylinder)
3. Brake fluid container
4. To left brake valve
5. To right brake valve
6. Warning switch
7. Warning valve
8. From secondary circuit (master cylinder)
9. To 6-branch union, lower
10. To 6-branch union, upper
11. Master cylinder



VOLVO 102992

Fig. 5-54. Removing the warning switch

Fig. 5-53 shows the different connections. Vent the brake system.

2. Repair and vent the faulty hydraulic circuit.
3. Screw in the warning switch to a torque of 1.4—2.0 kpm (10—15 lb.ft.). Connect the electrical cable.

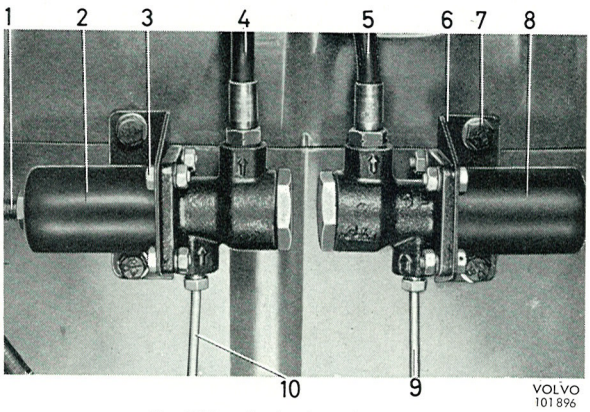
REPLACING THE WARNING VALVE

Disconnect all connections. Remove the attaching nut and then the valve. Fit in reverse order to removal.

BRAKE VALVES

REMOVING

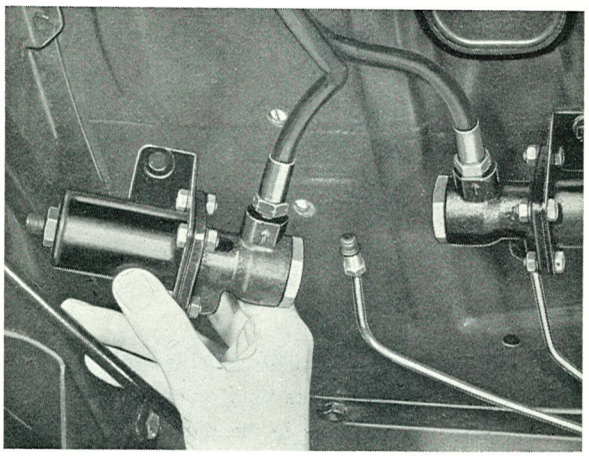
Unscrew and plug the connection (10, Fig. 5-55) of the brake pipe. Loosen the brake hose (4) a maximum 1/4 turn at the valve. Remove the attaching screws and unscrew the valve from the brake hose, see Fig. 5-56.



VOLVO 101896

Fig. 5-55. The brake valves fitted

1. Adjusting screw
2. Left brake valve (secondary circuit)
3. Screw (assembling)
4. Brake hose to left rear wheel
5. Brake hose to right rear wheel
6. Bracket
7. Attaching screw
8. Right brake valve
9. From the master cylinder primary circuit
10. From the master cylinder secondary circuit

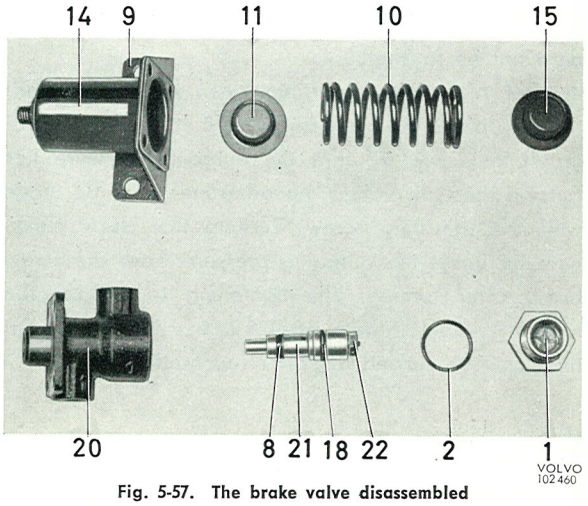


VOLVO 101897

Fig. 5-56. Removing the brake valve

RECONDITIONING

1. Separate the spring housing from the hydraulic part by removing the four screws (16, Fig. 5-40). Shake out the springs and container. **The adjusting screw must not be removed.**
2. Screw out the plug (1) and press out the complete plunger, see Fig. 5-57.
3. Clean the hydraulic part, see under the heading "Cleaning", Group 50.
4. Inspect the parts. If the cylinder surfaces are scratched or damaged by rust, the valve should be replaced complete. However, if the cylinder surfaces are not damaged, replace only plunger complete. When doing so, check that the seal is turned according to Fig. 5-58.



VOLVO 102460

Fig. 5-57. The brake valve disassembled

1. Plug
2. O-ring
8. Piston seal
9. Bracket
10. Spring
11. Retainer
14. Spring housing
15. Retainer
18. O-ring
20. Housing
21. Piston
22. Valve housing

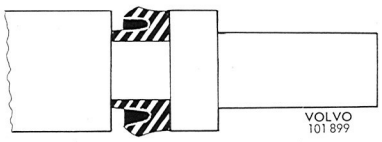


Fig. 5-58. The piston seal

5. Fit the piston (21) fully assembled after it has been coated with brake fluid or given a thin coat of brake paste. Screw in the plug (1) with O-ring (2). The tightening torque is 10—12 kgm (70—85 lb.ft.).
6. Place the container (11) in the housing (14) and turn it according to Fig. 5-40. Place the retainer (15) in the spring (10) and insert it in position in the housing. Now fit the housing on the hydraulic part with the help of screws (16), washers and nuts.

INSTALLING

Screw the brake valve onto the brake hose, compare Fig. 5-56. Place the valve in position and check that there is no tension in the hose. Fit the attaching screws and connect up the brake pipe. Tighten up the connection. Vent the brake system.

ADJUSTING

The adjusting screw (12, Fig. 5-40), is not intended for adjusting in the normal meaning of the word. Its function is to balance the variations in the manufacturing. The carefully checked adjustment made at the initial assembling is generally sufficient for the entire lifetime of the valve. **For this reason, the adjusting screw must not be touched.**

If after reconditioning it has been established with the help of testing according to "Fault Tracing", paragraph 9, Group 50, that the outgoing pressure lies outside the limit values, an adjustment can be made with the adjusting screw. Turning the screw clockwise increases the outgoing pressure. Lock the screw firmly after turning. The tightening torque for the locknut is 2.5—3.5 kgm (18—25 lb.ft.). The adjustment may only be carried out after reconditioning.

BRAKE LINES

CLEANING

The brake lines can be cleaned by flushing them with brake fluid or spirit and then by blowing them clean with moisture-free, filtered, compressed air. The purpose of this is to remove all brake fluid and dirt particles and should be carried out in connection with the complete reconditioning of the hydraulic system and a new fitting.

When complete reconditioning is being carried out, the brake service unit (see Group 50) can suitably be connected to the master cylinder and then the system emptied through the venting nipple. The system should therefore be flushed with spirit, after which it should be blown clean with compressed air. When such a reconditioning has been carried out, the components of the hydraulic system should be taken out and checked to ensure that any dirt and flushing fluid has been effectively removed.

N.B. With regard to requirements concerning the cleaning agent, see the general instructions in Group 50. Do not top up with brake fluid which has been drained off from the system.

REPLACING THE BRAKE LINES

If leakage occurs or if the brake lines have been exposed to such external damage that leakage or blockage can result, the damaged lines should be replaced according to the instructions given below. If the replacement concerns the front brake hoses, if should be carried out with no load on the front wheels.

1. To prevent unnecessary spilling of brake fluid, the existing filter cap on the master cylinder container should be temporarily replaced with one without a venting hole.
2. Clean round the connections and remove the damaged brake line.

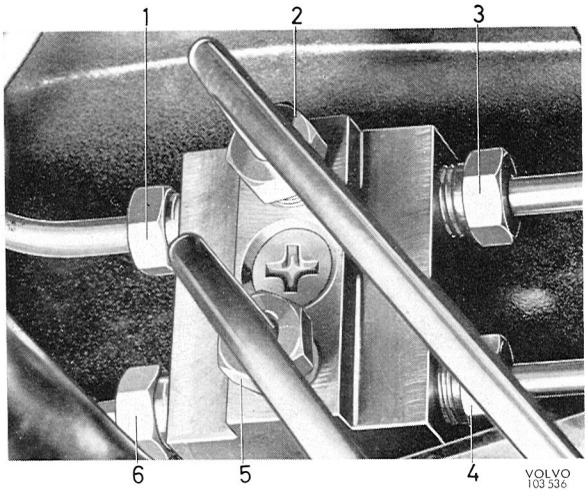


Fig. 5-59. 6-branch union connections (left-hand steering)

1. Primary circuit of the master cylinder
2. Left, lower wheel unit cylinder
3. Right, lower wheel unit cylinder
4. Right, upper wheel unit cylinder
5. Left, upper wheel unit cylinder
6. Secondary circuit of the master cylinder

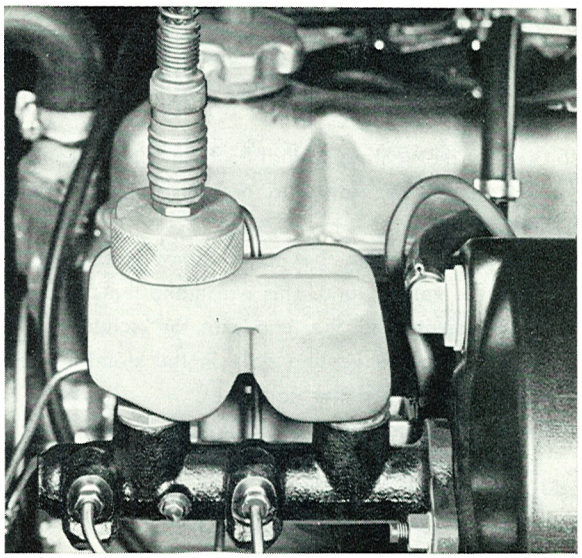


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Fig. 5-60. Connecting the venting unit

3. Take a completely new brake line, blow it clean internally with moisture-free, filtered, compressed air and fit it. Make sure that the brake line lies in such a position that it does not chafe while driving. Particularly important points are where the pipes pass the steering rod, where they must not come nearer than 10 mm (3/8"). If the pipe is not bent correctly, it should be adjusted manually before being fitted. Bending a pipe which is already connected often results in deformation at the connections. The front brake hoses must only be fitted according to Fig. 5-19 and always with the linkage arms unloaded. Do not forget the clips.
4. Vent the brake system according to the instructions given below. Then fit the filler cap with the venting hole on the container.

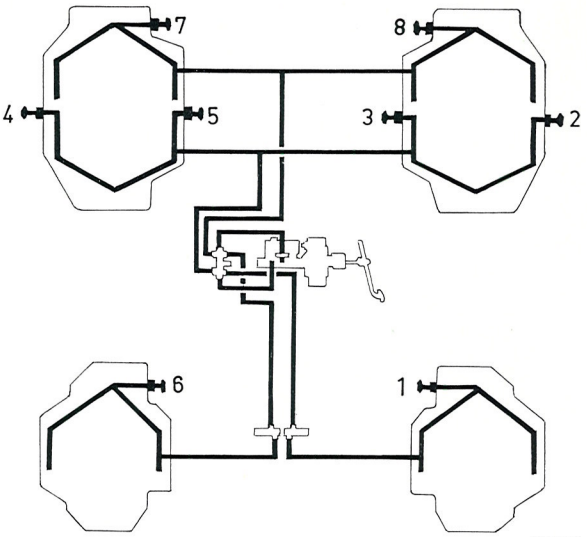

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Fig. 5-62. Venting sequence, right-hand steering

1. Right rear wheel
2. Right front wheel, outer
3. Right front wheel, inner, lower
4. Left front wheel, outer
5. Left front wheel, inner, lower
6. Left rear wheel
7. Left front wheel, inner, upper
8. Right front wheel, inner, upper

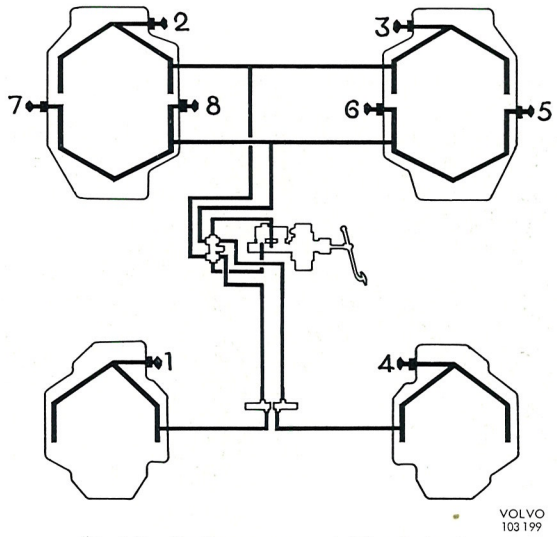

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Fig. 5-61. Venting sequence, left-hand steering

1. Left rear wheel
2. Left front wheel, upper, inner
3. Right front wheel, upper, inner
4. Right rear wheel
5. Right front wheel, outer
6. Right front wheel, lower, inner
7. Left front wheel, outer
8. Left front wheel, lower, inner

VENTING THE HYDRAULIC SYSTEM

A sign that there is air in the system is that the brake pedal can be depressed without any appreciable resistance, or if it feels spongy.

As soon as any part of the system has been removed, venting must be carried out. Air can also enter the system if there is too small a quantity of brake fluid in the container. If, for example, only a wheel brake unit has been removed, it is usually sufficient to vent this only. If, on the other hand, the master cylinder or lines from this have been removed, the entire brake system must be vented.

When venting or other similar work is being carried out, no brake fluid must be permitted to come into contact with the friction surfaces or linings. Avoid spilling any fluid on the paintwork as this can damage it.

Should the car be placed on blocks during the venting, the rear end ought to be raised higher than the front end.

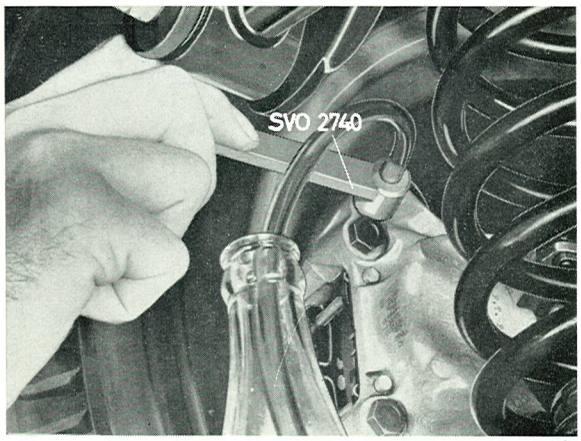

Fig. 5-63. Venting with the venting unit

When filling with oil the following should be observed: The brake fluid must fulfil the requirements according to SAE 70 R 3. Brake fluid which has been vented out of the system must under no circumstances be returned to the venting unit or the brake fluid container.

Venting of the entire brake system is as follows:

VENTING WITH THE VENTING UNIT

1. Check to make sure there is full return on the brake pedal and that neither mats or suchlike prevent full travel (about 140 mm=5½") from being utilized during the venting. Depress the brake pedal several times to even out any underpressure in the servo cylinder and in this way disconnect it.
2. Clean round the cap on the brake fluid container, also round the contact on the warning valve. Remove the warning switch, see Fig. 5-54. Fill, if necessary with brake fluid to the "Max" mark on the container.
3. Fit on the container a cap specially used when venting, see Fig. 5-60. This cap can be obtained from AB Volvo Service Department. Connect the venting unit according to the instructions of the manufacturer. The working pressure is 2 kg/cm² (28.4 lb.sq.in.). The Type of venting unit which may be used is shown in Fig. 5-5.
4. Venting should take place in the order shown in Fig. 5-61 for a left-hand steered car and Fig. 5-62 for a right-hand steered one.
   When venting, remove the protective cap and fit the venting tool SVO 2740, see Fig. 5-63. Allow the other end of the hose to hang down into a collecting vessel. Open the venting nipple maximum 1/2 a turn and have someone carefully pump with the brake pedal. Close the nipple when brake fluid free from air bubbles blows out. Make sre that there is no leakage between the nipple and tool, as this could give rise to misleading results.
5. Repeat the venting so that both circuits are vented at least twice. Refit the protective caps on the nipples.
6. After the venting has been completed, disconnect the venting unit. This will make the unit hose pressureless and the cap can be screwed off. Blow clean the venting hole in the standard cap and refit this on the container.
7. Fit the warning switch and tighten it to a torque of 1.4—2.0 kgm (10—15 lb.ft.). Connect the electric cable. Check to make sure that the warning lamp lights when the handbrake is on.

MECHANICAL VENTING

1. Check to make sure there is full return on the brake pedal and that neither carpets or suchlika prevent full travel (about 140 = 5½") can be utilized during the venting. Depress the brake pedal several times in order to even out any underpressure in the servo cylinder and in this way disconnect it.
2. Clean round the cap on the brake fluid container as well as round the switch on the warning valve. Remove the warning switch, see Fig. 5-54. If necessary, fill the container with brake fluid up to the "Max" mark. Blow the venting hole of the cap clean.
3. Required for the venting is a plastic hose which

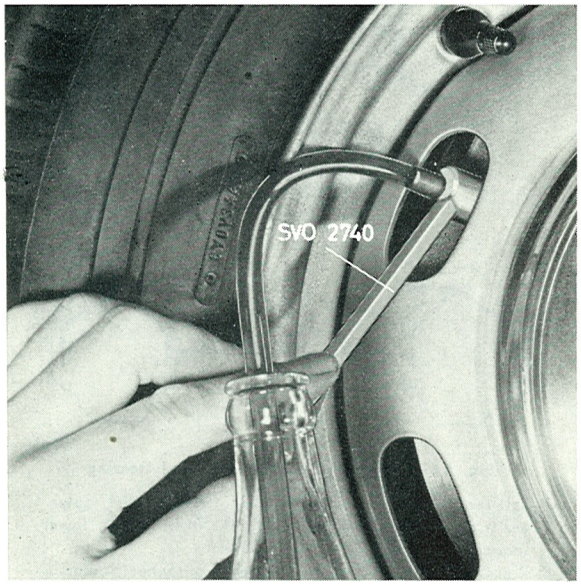

Fig. 5-64. Mechanical venting

can be pressed onto and sealed round the venting nipple. The lower end of the hose should be extended by means of a glass or plastic tube. Also required is a glass bottle filled with so much brake fluid that the opening of the pipe can be kept under the surface in order to prevent air being sucked in. To turn the nipple use a 5/16" ring spanner. New brake fluid must be available so that the container can be gradually filled. The level must not go below the "Min" mark since this would allow air to penetrate into the system via the container.

4. Venting should be carried out in the order shown in Fig. 5-61 and Fig. 5-62 respectively and as follows:
   Remove the masking cap and fit the ring spanner and plastic hose onto the venting nipple. Allow the opening of the pipe to hang down below the surface of the fluid in the glass bottle, see Fig. 5-64. Open the venting nipple at the most 1/2 a turn. Slowly press the brake pedal down to the bottom. When the pedal reaches the bottom, pause a little and the quickly release the pedal. Repeat this procedure until brake fluid free from air bubbles flows out. Then press the pedal to the bottom and close the venting nipple.
5. Repeat the venting so that both circuits are vented at least twice. Refit the masking caps on the nipples.
6. Fill the brake fluid container with brake fluid up to the "Max" mark.
7. Fit the warning switch and tighten it to a torque of 1.4—2.0 kgm (10—15 lb.ft.). Connect the electric cable. Check that the warning lamp lights only when the handbrake is applied.

BRAKE PEDAL

ADJUSTING THE PEDAL POSITION

The brake pedal should travel about 140 mm =5½" (dimension A, Fig. 5-65) before the pistons in the master cylinder are pressed to the bottom without the assistance of hydraulic pressure.

The travel can be measured only by venting both circuits simultaneously. At the bottom position, the pedal should have a distance of about 10 mm (3/8") to the floor (dimension B).

When the brake pedal is released, it should take up the same position as the clutch pedal provided, of course, that the clutch pedal is correctly adjusted.

When the master cylinder is removed, do not depress the brake pedal, otherwise the subsequent abnormal position of the parts of the servo brake cylinder can cause damage.

The position of the pedal is adjusted by loosening the locknut (8, Fig. 5-67) and removing the split pin bolt (10) and then turning the fork (9). Do not forget after adjusting to tighten the locknut and fit the split pin.

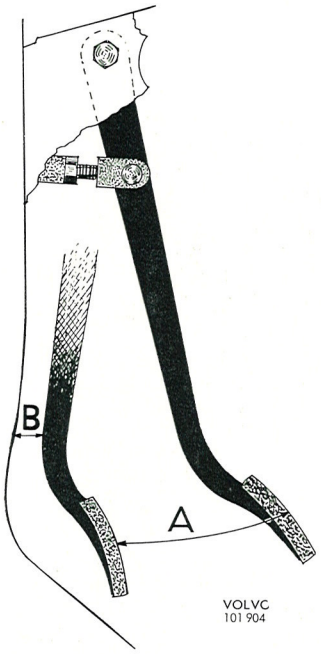

Fig. 5-65. Pedal travel

A = approx. 140 mm (5½")
B = approx. 10 mm (3/8")

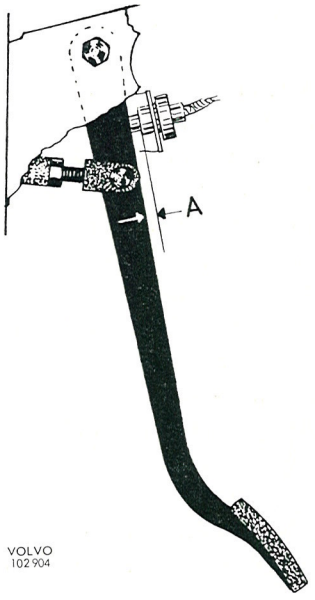

Fig. 5-66. Adjustment measurement, brake warning light switch

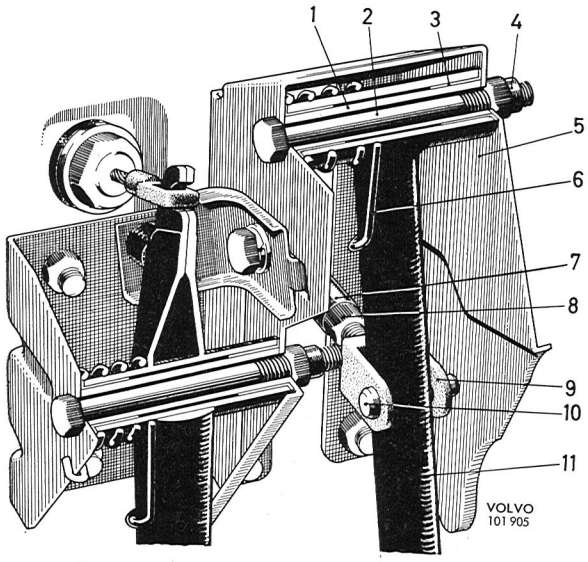

Fig. 5-67. Pedal suspension components

1. Bearing sleeve
2. Screw
3. Nylon bush
4. Nut
5. Bracket
6. Return spring
7. Thrust rod
8. Locknut
9. Fork
10. Split pin bolt
11. Brake pedal

ADJUSTING THE BRAKE SWITCH

On adjusting the switch, measure the distance between the brake pedal released and the threaded brass hub on the switch (dimension A, Fig. 5-66). This distance should be 4±2 mm (0.16±0.08"). If this is not the case, slacken the attaching screws for the bracket and move the bracket until the correct distance is obtained. Secure the attaching screws.

REPLACING THE PEDAL OR BUSHES

1. Remove the split pin bolt (10, Fig. 5-67). Prise off the return spring (6). Unscrew the nut (4) and pull out the screw (2). Lift the pedal (11) forwards.
2. Press out the bearing sleeve (1) and the bushes (3).
3. Clean the parts. If the bearing sleeve is worn, replace it.
4. Press the new bushes (3) in position in the pedal and lubricate them with a thin layer of ball bearing grease. Fit the bearing sleeve (1) and the return spring (6).
5. Place the pedal in position and fit the screw (2) and the nut (4). Fit on the return spring. Fit the split pin bolt (10) and the split pin.

AUXILIARY BRAKE SYSTEM

DESCRIPTION

SERVO CYLINDER

This is a mechanical servo device located between the brake pedal and the master cylinder, see Fig. 5-6. Due to the servo cylinder, which is assisted by vacuum from the engine induction manifold, less pedal pressure is required when braking. The construction as well as the designation and location of the parts are shown in Fig. 5-68. The servo cylinder functions as follows.

When the system is at rest, the parts of the servo cylinder are in the position shown in Fig. 5-69. The thrust rod spring holds the thrust rod and the valve piston flexibly connected to it pressed to the right. Movement is limited by the stop plate. In this position, the valve plunger keeps the valve lifted from the seat in the guide housing, and this closes the air channel and opens the vacuum channel. Thus an equivalent vacuum exists on both sides of the diaphragm which, together with the guide housing, is held pressed to the right end position of the diaphragm spring.

When the brake pedal is depressed, the rear thrust rod and valve piston are moved to the left (forwards). The valve spring causes the valve plate to move also until it reaches the seat in the guide housing. Here the connection between the front and rear side of the diaphragm is closed. When the piston continues moving, its movements are transferred via the reaction disc and front thrust rod to the master cylinder.

When the seat of the valve piston leaves the valve plate, the connection between the rear side and the

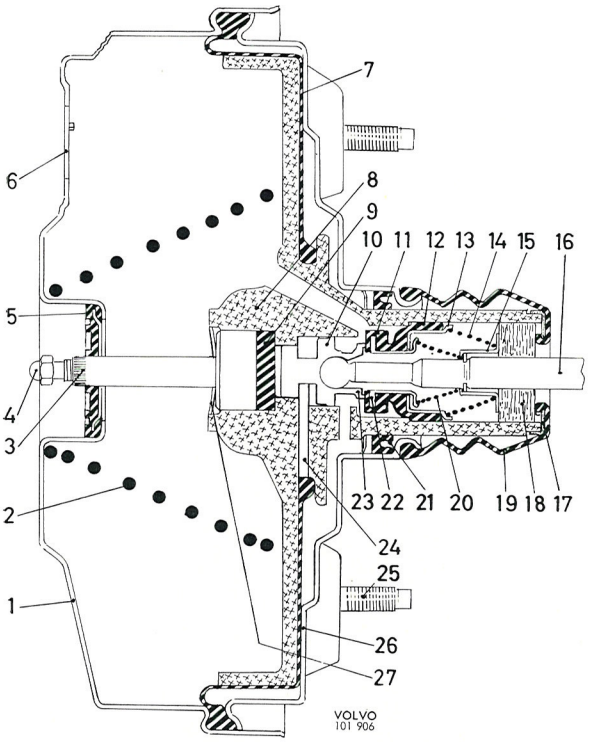

Fig. 5-68. Servo cylinder

1. Cylinder
2. Return spring
3. Front thrust rod
4. Adjusting screw
5. Sealing ring
6. Vacuum inlet
7. Diaphragm
8. Guide housing
9. Reaction disc
10. Valve piston
11. Valve plate
12. Seal
13. Guide
14. Return spring
15. Retainer with lock ring
16. Rear thrust rod
17. Washer
18. Air filter
19. Rubber cover
20. Valve spring
21. Sealing ring
22. Valve guide
23. Valve piston reat
24. Stop washer
25. Attaching screw
26. End
27. Resilient washer

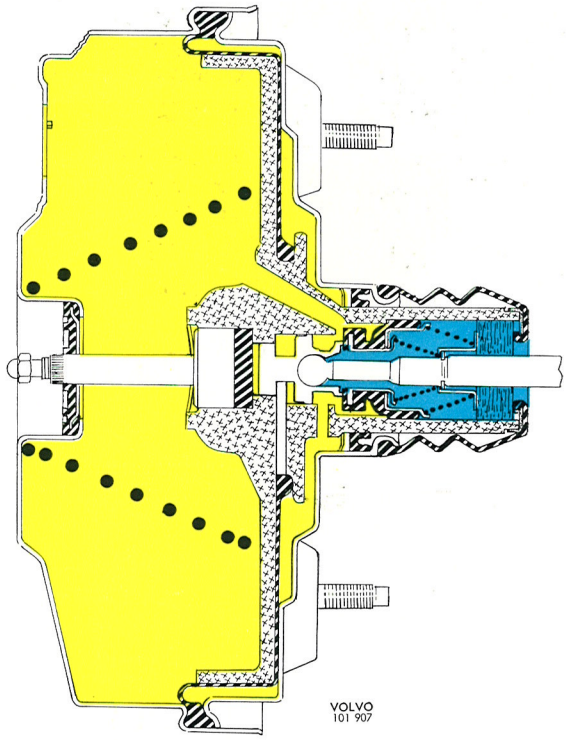

Fig. 5-69. Rest position

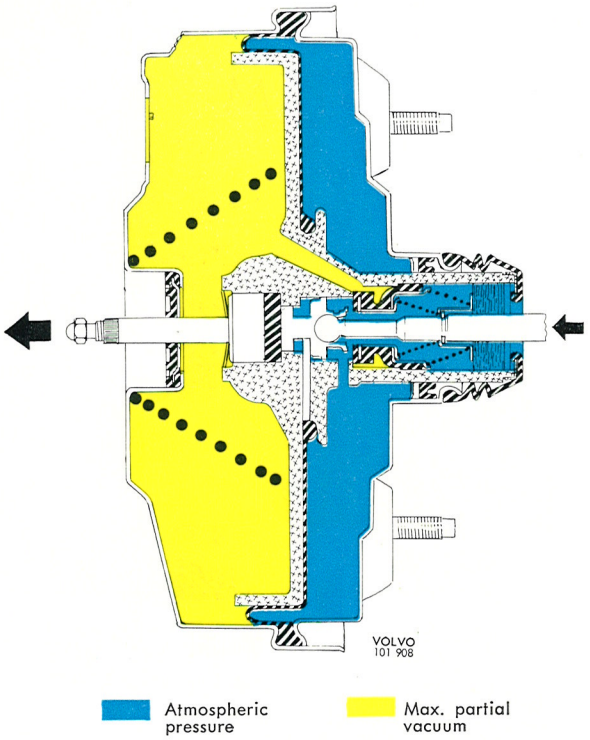

Fig. 5-70. Full brake application

centre of the valve section is opened. Air from atmospheric pressure can then flow in behind the diaphragm. When there is vacuum on the front side of the diaphragm, it is moved, and likewise the guide housing, forwards. In this way, the force applied to the front thrust rod is increased. The parts of the servo cylinder are in the position shown in Fig. 5-70 when the pedal pressure provides maximum servo effect.

If the pedal pressure is less than that mentioned above, the same procedure takes place in the beginning. During brake application, the hydraulic pressure in the master cylinder increases and also the counter-pressure on the front thrust rod. The pressure of the guide housing is transmitted to the thrust rod through the outer part of the reaction disc. Because the disc is made of rubber, its periphery contracts while its centre tends to expand, see Fig. 5-71. This causes the guide housing to be moved further forwards than the valve piston and results in the seat of the piston reaching the valve and shutting off the air supply. The pressure behind the diaphragm remains constant and is thus unable to overcome the hydraulic counter-pressure in the master cylinder. The movable parts of the servo cylinder, therefore, remain in this position, and constant braking is obtained as long as the same pressure is maintained on the brake pedal.

If pressure on the pedal is increased, the pressure of the valve piston on the reaction disc centre will be greater, this causing a certain displacement forwards of the piston. When this happens, the valve leaves the seat of the piston, more air can flow in and greater brake application is obtained until the new equalizing position is attained.

If the pressure on the pedal is reduced, the reaction disc centre can be thrust out still further, and this causes the valve piston to lift the valve from the seat in the guide housing. The spaces on both sides of the diaphragm are thereby connected with each other, equal pressure arises, the guide housing is moved backwards by the spring pressure and there is a reduction in the brake application. This procedure also reduces the contraction of the reaction disc periphery, so that the valve piston can return to the position shown in Fig. 5-71 and the new equalizing position is reached. If the brake pedal is released fully, all the parts of the servo cylinder are returned to the rest position and the brakes are released.

Should any fault occur with the vacuum supply, brake application can still take place due to the fact that the servo cylinder functions as an extended thrust rod. As no servo effect is then obtained, greater pressure on the pedal is of course required.

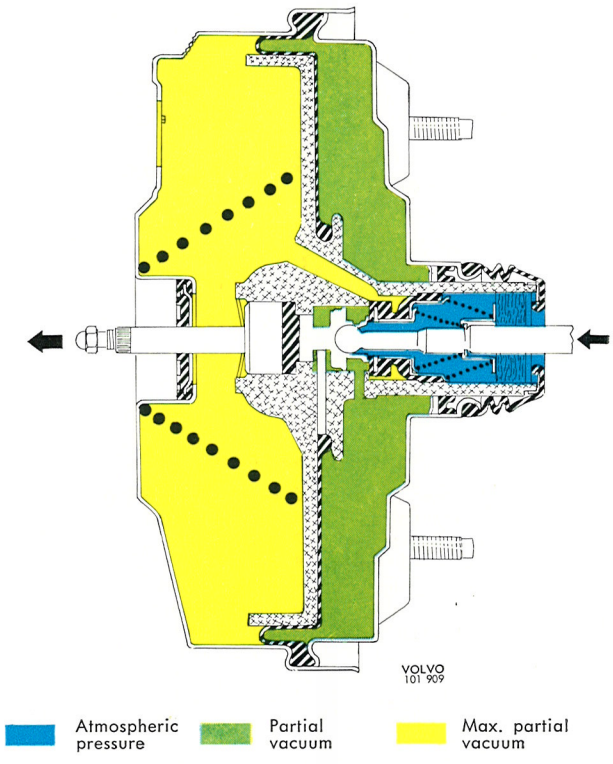

Fig. 5-71. Partial brake application

CHECK VALVE

The check valve (Fig. 5-72) is placed on the line between the engine intake manifold and the servo brake cylinder. Its purpose is to prevent air from flowing back to the servo brake cylinder. The valve only opens when there is a larger degree of vacuum at connection 3 than at connection 5.

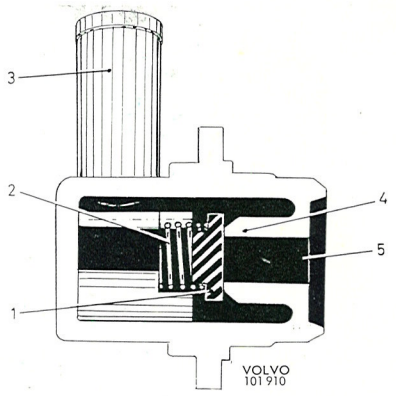

Fig. 5-72. Check valve

1. Valve
2. Spring
3. Connection for intake manifold
4. Valve seat
5. Connection for servo cylinder

REPAIR INSTRUCTIONS

REPLACING THE AIR FILTER FOR THE SERVO CYLINDER

1. Remove the master cylinder, see page 5 : 20.
2. Loosen the fork from the brake pedal by removing its split pin bolt.
3. Unscrew the 4 nuts which attach the servo cylinder to the bracket.
4. Pull the servo cylinder forwards until the rubber cover is released. Do not pull it too far as this might result in the rubber cover being damaged by the fork at the cowl.
5. Pry off the rubber cover, place to the one side the plastic washer and pull the filter forwards. Clip up and remove the filter.
6. Also clip up the new filter and insert it in position, see Fig. 5-73. Fit the plastic washer and rubber cover.
7. Put the servo cylinder on the bracket and screw on the attaching nuts.
8. Fit the fork on the brake pedal.
9. Fit the master cylinder, see page 5:22. Vent the brake system.

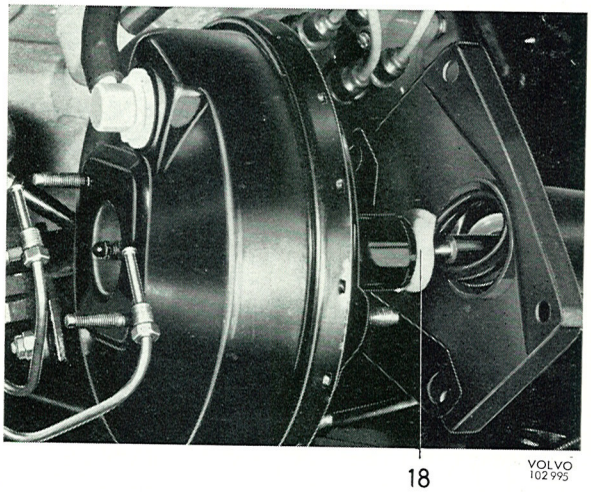

Fig. 5-73. Fitting the air filter

18. Air filter

REPLACING THE CHECK VALVE

Remove the vacuum hose from the check valve. Turn the valve with the help of a 28 mm (1/32") spanner and lift the valve forwards. Follow this procedure in reverse when fitting the check valve. Make sure that the O-ring (2, Fig. 5-74) is in the correct position. The highest point of the vacuum hose should be its attachment to the check valve.

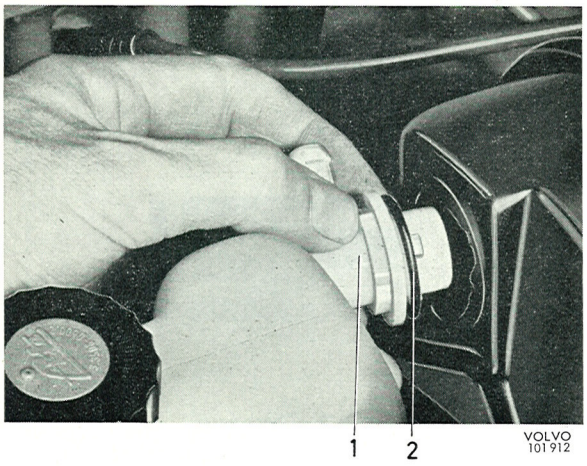

Fig. 5-74. Fitting the check valve
1. Check valve 2. O-ring

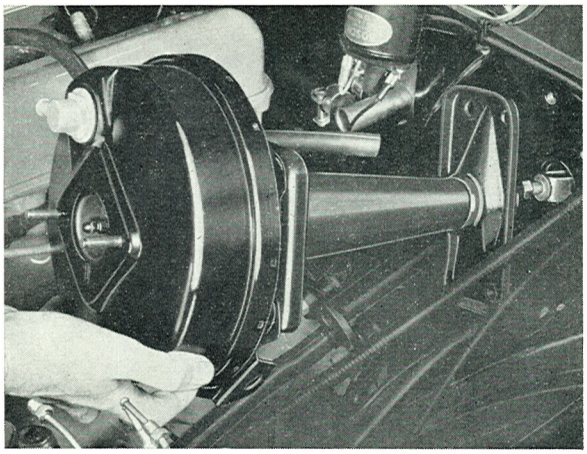

Fig. 5-76. Removing the servo cylinder

REPLACING THE SERVO CYLINDER

REMOVING

1. Remove the master cylinder, see page 5:20.
2. Loosen the fork from the brake pedal by removing its split pin bolt.
3. Prise off the vacuum hose from the check valve. Remove the clamp for the coupling cable and attaching screws for the support bracket.
4. Remove the attaching screws for the bracket and lift the servo cylinder forwards, see Fig. 5-76.
5. Loosen the locknut (2, Fig. 5-77) and unscrew the fork (1). Remove the rubber cover (4) and the bracket (5). Unscrew the thrust rod (3) from the rear thrust rod of the cylinder.

INSTALLING

1. After lubricating the thrust rod (3, Fig. 5-77) with a couple of drops of Locktite, type B, screw it into the rear thrust rod of the servo cylinder as far it can go.
2. Fit the brackets on the servo cylinder, see Fig. 5-78. The attaching nuts should not be tightened until the brackets have been fitted in the vehicle.
3. Fit the rubber cover (4, Fig. 5-77) in position. Screw on locknut (2) and fork (1). The distance between the centre of the fork hole and the end of the thrust rod (dimension A) should be approximately 45 mm (1.77").

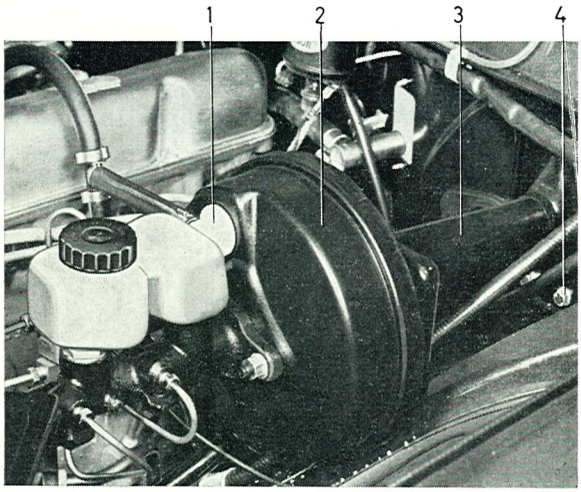

Fig. 5-75. The servo cylinder fitted
1. Check valve 3. Bracket
2. Servo cylinder 4. Attaching screw

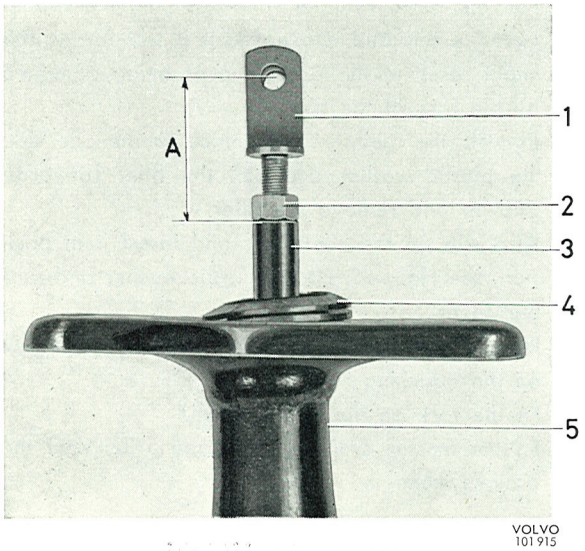

Fig. 5-77. Fitting the fork
1. Fork 4. Rubber cover
2. Locknut 5. Bracket
3. Thrust rod A=approx. 45 mm (1.77")

4. Fit the servo cylinder, the upper attaching screws for the bracket and the attaching screws for the support bracket in position in the vehicle. Then fit the lower attaching screws for the bracket and tighten all the screws and nuts on the brackets.
5. Fit the clamp for the coupling cable and connect the vacuum hose to the check valve. Make sure that the highest point of the vacuum hose is at the connection.
6. Connect the fork to the brake pedal and secure with the split pin. Check and if necessary adjust the piston of the pedal, see page 5 : 27.
7. Check the thrust rod clearance and fit the master cylinder, see page 5:22. Vent the entire brake system.

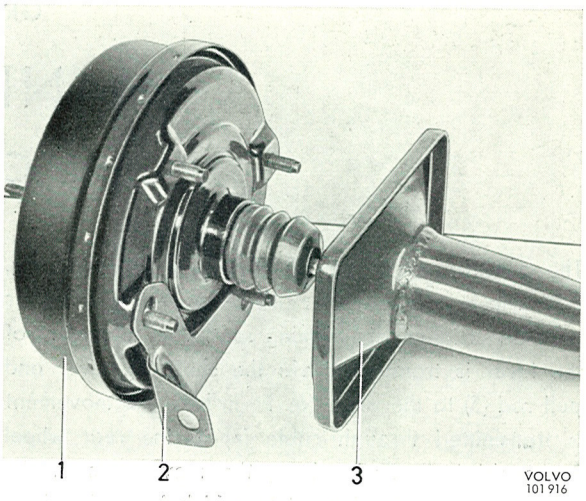

Fig. 5-78. Fitting the brackets
1. Servo cylinder 2. Support bracket 3. Bracket

GROUP 55

HANDBRAKE

DESCRIPTION

The construction of the handbrake is shown in Fig. 5-79. The handbrake lever (28) is mounted on the floor on the outside of the driving seat. The movement of the lever is transmitted via the shaft (4), lever and pull rod (5) to the block (6). From here the movement is transmitted through cable (7) to the rear wheel brake units. At each wheel, the movements of the cable influence the lever (15), which is carried in a movable rod (20) on the brake shoes. The upper ends of the brake shoes are held pressed against the anchor bolt (14) by the upper spring. The lower ends are joined through the adjusting device (17) to which they are held pressed by the spring (18), which also locks the small serrated wheel of the adjusting screw. Due to this type of suspension, the brake shoes are self-centring and both the shoes are partly self-applying (Duo-Servo). The brake drum is fitted on the drive shaft and so designed that it also serves as a brake disc for the footbrake.

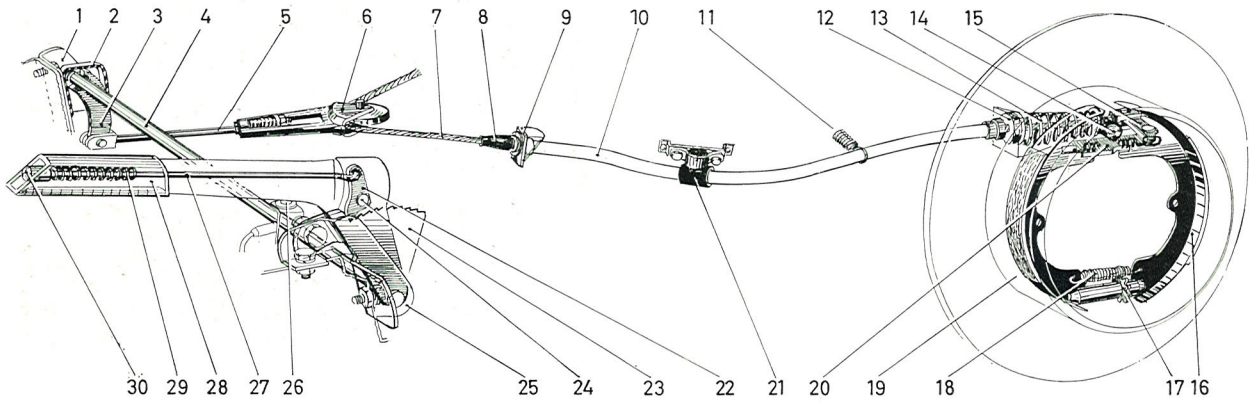

Fig. 5-79. Handbrake system

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1. Inside support attachment
2. Rubber cover
3. Lever
4. Shaft
5. Pull rod
6. Block
7. Cable
8. Rubber cover
9. Front attachment
10. Cable sleeve
11. Attachment
12. Rear attachment
13. Return spring
14. Anchor bolt
15. Lever
16. Brake shoe (secondary shoe)
17. Adjusting device
18. Return spring
19. Brake drum
20. Rod
21. Rubber cable guide
22. Pawl
23. Ratchet segment
24. Rivet
25. Outside support attachment
26. Warning valve switch
27. Push rod
28. Handbrake lever
29. Spring
30. Push button

When the handbrake is applied, the lever and rod press the shoes against the brake drum. When the wheels or drive shaft attemps to turn the drum, the shoes accompany the rotation because of the friction between lining and drum. Due to the "floating" suspension of the shoes, the primary shoe is thus pressed downwards and the secondary shoe upwards until the latter's upper end moves towards the anchor bolt, see Fig 5-80. Due to the fact that the turning centre of the secondary shoe lies in the anchor bolt and that of the primary shoe in the adjusting device, the friction between the drum and the linings will assist in brake application. Also contributing to this is the retarding effect on the secondary shoe because of the primary shoe's endeavour to accompany the direction of rotation of the drum.

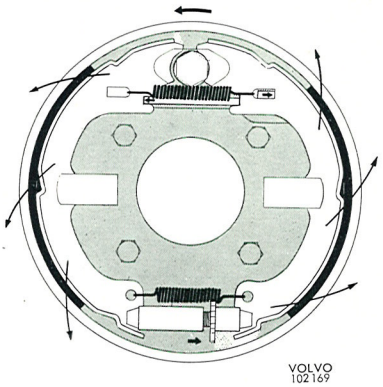

Fig. 5-80. Duo-servo principle

REPAIR INSTRUCTIONS

ADJUSTING THE HANDBRAKE

The handbrake should give full effect at the third-fourth notch. If it does not do so, adjustment should be carried out. Here the wheel brake units are first adjusted and, if necessary, the cable.

1. Apply the handbrake, remove the hub caps of the rear wheels and loosen the wheel nuts.
2. Jack up the rear end, place blocks under the rear axle, remove the nuts and take off the wheels. Release the handbrake.
3. Check that the brake pads are not stuck to the brake disc. To prevent the lever when adjusting from influencing the shoes and thus give misleading results, the spring tension acting on the lever should be reduced. This can be done by fitting holder SVO 2742 (Fig. 5-83) or by disconnecting the cable from the lever.
4. Set the drum so that its hole coincides with the serrations on the adjusting screw and apply the shoes by moving the screwdriver handle upwards, see Fig. 5-81. When the drum can be rotated easily, discontinue applying the shoes. Then turn the adjusting screw back 4—5 serrations. Check that the shoes do not "drag" by rotating the drum in its normal direction of rotation. Very little dragging may be permitted. If, however, the dragging is more pronounced, the adjusting screw should be released a further 2—3 serrations. Connect the cable to the lever and remove the holder SVO 2742.
5. Repeat the adjusting procedure with the other rear wheel.

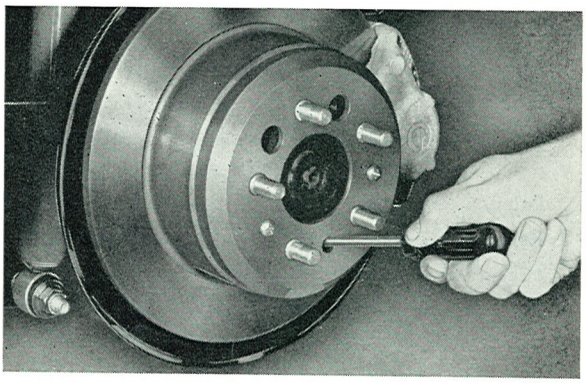

Fig. 5-81. Adjusting the handbrake, rear wheel

6. Apply the handbrake lever and check that full braking effect is obtained on the 3rd—4th notch. If the handbrake can be applied still further, the cable should be tensioned. This is done by loosening the locknuts and screwing in the block (6, Fig. 5-82) on the pull rod. After adjusting, tighten the locknuts. Check that there is approximately the same braking effect on both rear wheels.
7. Mount the wheels after having cleaned any dirt from the contact surfaces, and tighten the wheel nuts sufficiently so that the wheel cannot be moved. Lower the vehicle and tighten the nuts. Tighten every other nut a little at a time until all are tightened to a torque of 10—14 kgm (70—100 lb.ft.). Fit the hub caps.

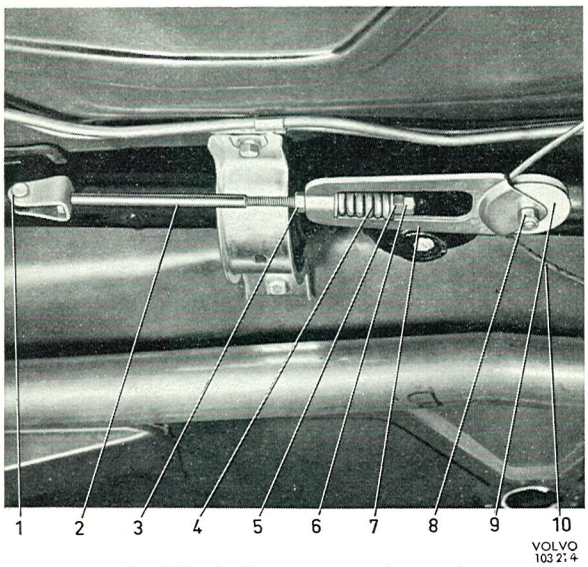

Fig. 5-82. Brake components, late prod.

1. Split pin bolt
2. Pull rod
3. Stop nut
4. Spring
5. Adjusting nut
6. Lock nut
7. Block
8. Nut
9. Pulley
10. Cable

REPLACING THE CABLE

REMOVING

1. Apply the handbrake, remove the hub caps of the rear wheels and loosen the wheel nuts.
2. Jack up the rear end, place blocks under the rear axle, remove the nuts and take off the wheels. Release the handbrake.
3. Remove the nut (8, Fig. 5-82) and take off the pulley (9) from the block (7).
4. Remove the rubber cover (8, Fig. 5-79) from the cable sleeve front attachment and remove the nut. Remove the attachment of the rubber suspension in the frame member. Remove the cable from the other side's attachment in the same way.

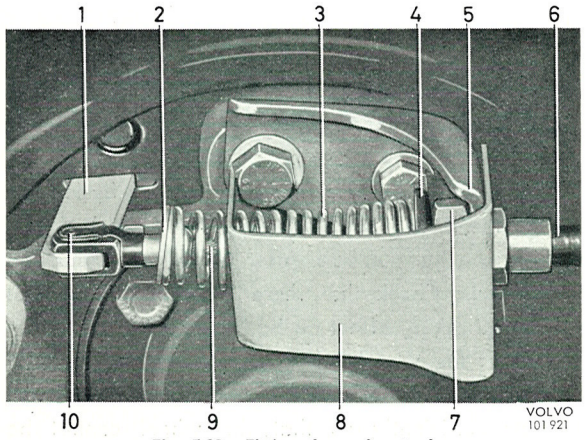

Fig. 5-83. Fitting the spring tool

1. Lever
2. Washer
3. Return spring
4. Washer
5. Cable attachment
6. Cable sleeve
7. Nut
8. Holder SVO 2742
9. Cable
10. Lock pin

5. Place holder SVO 2742 so that the return spring is held in position according to Fig. 5-83. Bend up the lock and remove the lock pin so that the cable releases from the lever.
6. Remove the return spring with washers. Loosen the nut for the rear attachment of the cable sleeve. Lift the cable forwards after having loosened both sides of the attachments.

INSTALLING

1. Adjust the brake shoes of the rear wheels. Check here that the brake pads do not stick to the brake disc and adjust the drums so that its hole coincides with the serrations of the adjusting screw. Place a screwdriver between the serrations of the adjusting screw and apply the shoes by moving the screwdriver handle upwards, see Fig. 5-81. When the drum can be turned easily, discontinue applying the shoes. Then turn the adjusting screw 4—5 serrations back.
2. Fit on new rubber cable guides for the cable suspension. Place the cable in position in the rear attachment and tighten the nut. Fit the washers and return spring. Compress the spring with the help of the holder tool, see Fig. 5-83. Oil the lock pin and fit it together with the cable on the lever. Fit the attachment and rubber cable guide on the frame member.
3. Fit the cable in the same way as above on the other side of the vehicle.
4. Place the cable sleeve in position in the front attachments and fit the lock washers.
5. Lubricate the bolt and fit the block on the pull rod. Adjust so that the handbrake gives full effect at the 3rd—4th notch.
6. Fit the wheels, see operation 7 headed "Adjusting the handbrake".

REPLACING THE HANDBRAKE LEVER OR RATCHET PARTS

1. Jack up the rear end and place blocks under the rear axle.
2. Remove the split pin and stretch the cable so that the pull rod (5, Fig. 5-79) can be removed from the lever.
3. Loosen the three attachments for the frame of the seat slide rails and life the whole seat forwards.
4. Remove the rubber covers, the ratchet segment and the bearing. Pull the handbrake lever with shaft and lever forwards.
5. Unscrew the button (30, Fig. 5-79) and remove the spring (29) from the handbrake lever. Remove the rivet (24) and take out the push rod (27) and the pawl (22).

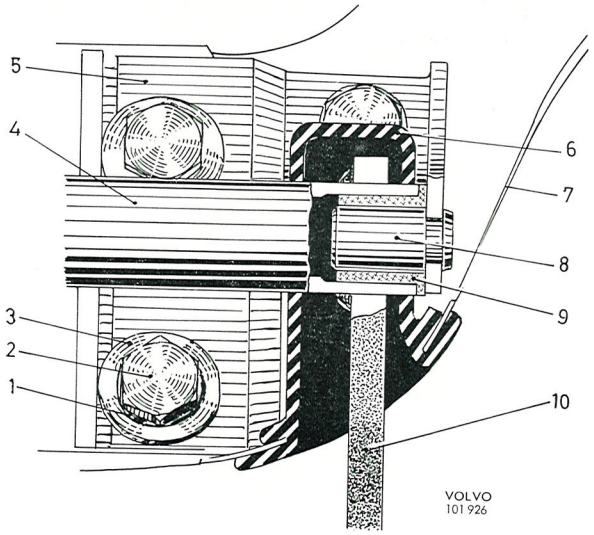

Fig. 5-84. Inner shaft support

1. Spring washer
2. Attachment bolt
3. Flat washer
4. Shaft
5. Inner support attachment
6. Rubber cover
7. Floor
8. Support pin
9. Bush
10. Lever

6. Fit the new parts in the reverse order, see Fig. 5-79. Make sure that the rivet is firmly fixed but does not obstruct the movement of the pawl. Lubricate the bushes with a thin coat of ball bearing grease. Do not forget to lock the pull rod and make sure that the rubber covers seal well.

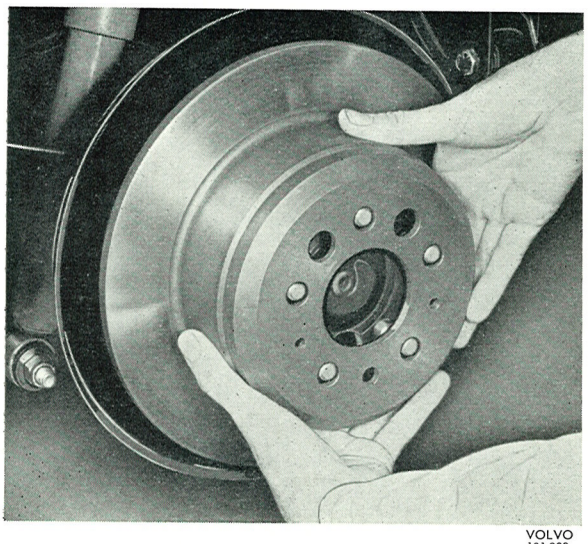

Fig. 5-85. Removing the brake drum

REAR WHEEL BRAKE UNIT (HANDBRAKE COMPONENT)

DISMANTLING

1. Apply the handbrake, remove the hub caps of the rear wheels and loosen the wheel nuts.
2. Jack up the rear end, place blocks under the rear axle, remove the nuts and take off the wheels. Release the handbrake.
3. Screw loose the brake line (4, Fig. 5-22) from the rear brake caliper and plug the connection. Brake fluid must not spill onto the disc or brake pads. Remove the attaching bolts (2 and 5). Lift out the caliper, see Fig. 5-23.
4. Remove the attaching bolts for the brake drum and lift off the drum, see Fig. 5-85.
5. Pry off the upper return spring with the help of brake spring pliers. Lift the shoes forward, see Fig. 5-86.

INSPECTING

First check that there is no oil leakage. If there is oil leakage, replace the sealing ring, see Group 46. Clean all the parts except the brake linings. Check that the lever joint does not chafe and replace parts which are damaged or worn.

If the brake linings are oily or worn down to the rivets, replace the shoes completely. The brake drum should be replaced if its friction surface is concave, or if its out-of-round exceeds 0.2 mm (0.008"). Rust spots can, however, be polished off. Wipe the contact surfaces on the backing plate.

ASSEMBLING

1. If new linings or drums are to be fitted, slacken the lock nut (6, Fig. 5-82) to remove tension in the cable.
2. Coat the 6 guide lips on the backing plate as

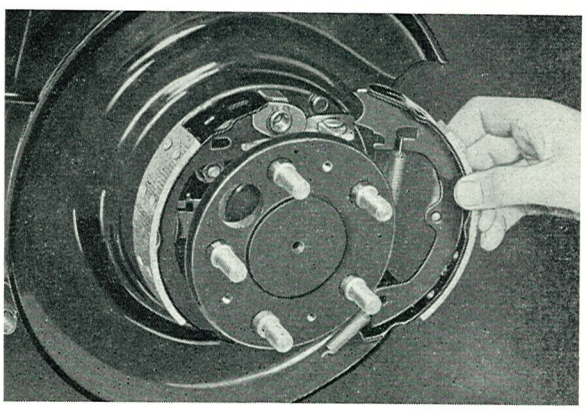

Fig. 5-86. Removing the brake shoe

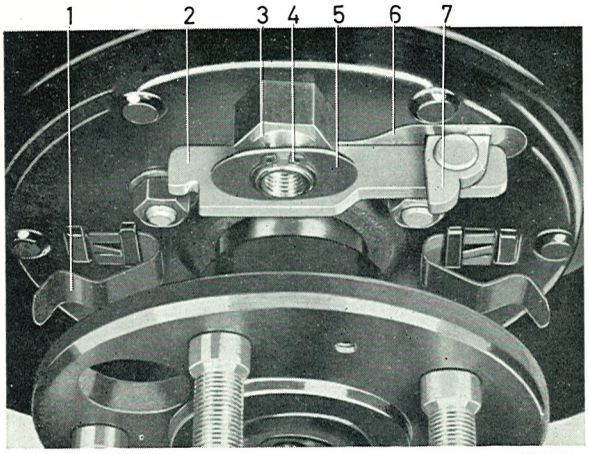

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Fig. 5-87. Brake parts

1. Brake shoe retainer
2. Link
3. Anchor bolt (early prod.)
4. Lock ring (early prod.)
5. Washer
6. Cover plate
7. Lever

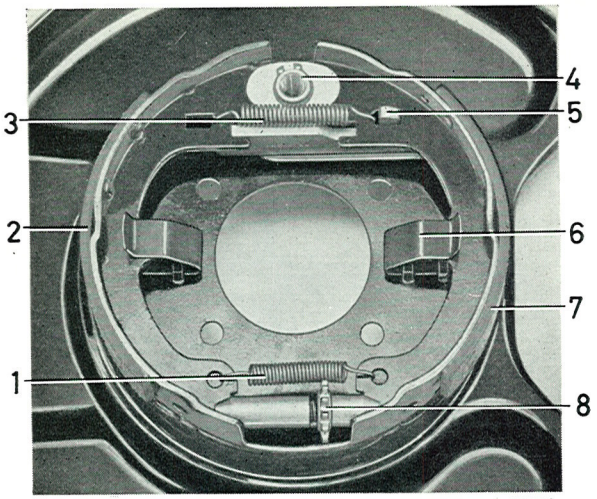

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Fig. 5-88. Handbrake

1. Lower return spring
2. Front brake shoe (primary shoe)
3. Upper return spring
4. Anchor bolt (early prod.)
6. Retainer for brake shoe
7. Rear brake shoe (secondary shoe)
8. Adjusting device

well as the lever joint and adjusting screw with heat-resistant graphite grease intended for this purpose. Check that the lever and anchor bolt parts are correctly fitted, see Fig. 5-87.

3. Fit the adjusting device. The shorter sleeve should be turned forwards on the right-hand side and backwards on the left-hand side, see Fig. 5-88.
4. Fit the brake drum with attaching bolts.
5. Place the brake caliper in position. Fit any shims and attaching bolts (2 and 5, Fig. 5-22) after smearing the bolts with a couple of drops of Loctite, type AV.
6. Check that the brake pads move freely from the brake disc and adjust the handbrake, see operation 4—6 under "Adjusting the handbrake".
7. Vent the fitted brake caliper, see Group 52.
8. Fit the wheel, see operation 7 under "Adjusting the handbrake".