



CARS

Part 5
BRAKES
(drum brakes)
P 120

SERVICE MANUAL

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ATTENTION

This Service Manual deals with wheel brake units of early and late production. In this connection, late production concerns wheel brake units of the Duo-servo type fitted at the factory on 4-door P 120 with drum brakes with effect from chassis number 15239 and on chassis numbers 14986—14987, 15069—15072, 15075—15081, 15084, 15097—15105 and 15178—15185. On 2-door P 120 with drum brakes, only the late production type occurs.

DESCRIPTION

The P 120 is equipped with two brake systems which are completely independent of each other. One of these, the footbrake, is controlled by a brake pedal and operates on all four wheels through a hydraulic system. The other system, the handbrake, is controlled by a brake lever and operates mechanically on both the rear wheels.

Footbrakes

If the footbrake is of the drum type, it is arranged as shown in Fig. 1.

When the brake pedal (6) is depressed, it actuates the plunger in the master cylinder (4) by means of a push rod (5). The hydraulic pressure in the master cylinder then rises and this is transmitted through the brake fluid in the lines (2) to the wheel unit cylinders. The plungers in these are then pressed outwards and apply the brakes.

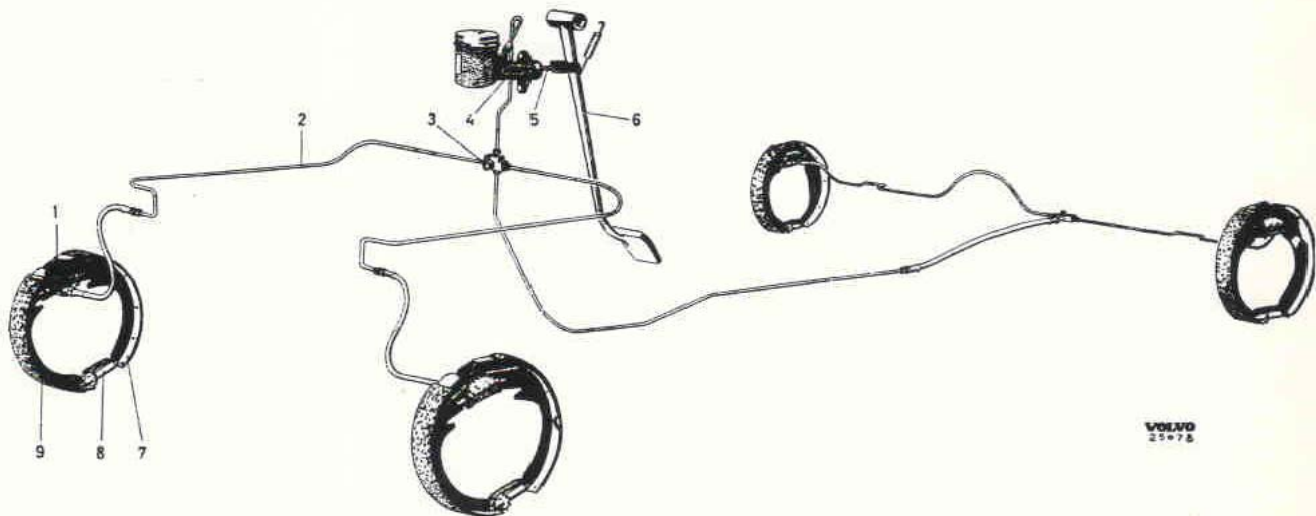


Fig. 1. Footbrake system, drum brakes.

- | | | |
|------------------------|--------------------|---------------------|
| 1. Wheel unit cylinder | 4. Master cylinder | 7. Rear brake shoe |
| 2. Brake line | 5. Push rod | 8. Adjusting device |
| 3. Brake contact | 6. Brake pedal | 9. Front brake shoe |

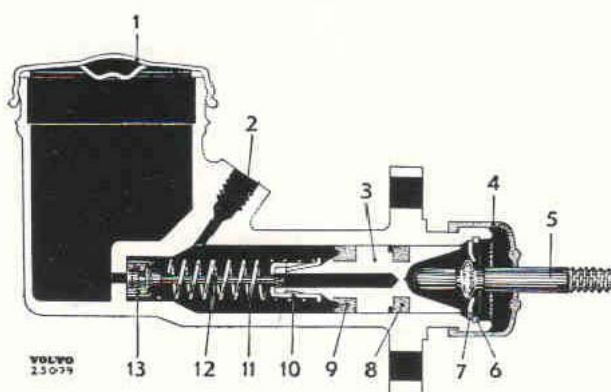


Fig. 2. Master cylinder, early production.

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|------------------------------|
| 1. Cap |
| 2. Connection for brake line |
| 3. Plunger |
| 4. Rubber cover |
| 5. Push rod |
| 6. Circlip |
| 7. Washer |
| 8. Plunger seal |
| 9. Plunger seal |
| 10. Spring retainer |
| 11. Spring |
| 12. Valve rod |
| 13. Valve |

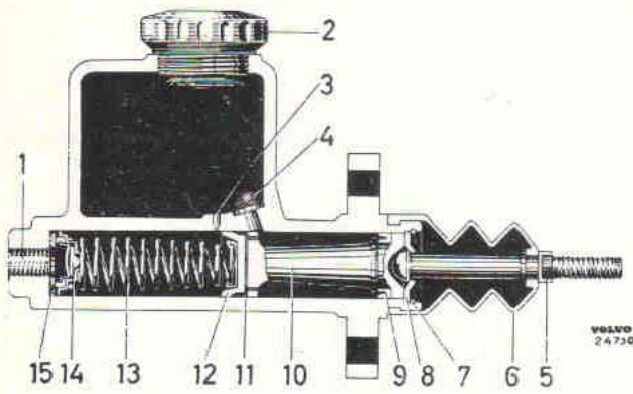


Fig. 3. Master cylinder, late production.

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|---------------------------------|-----------------|------------------|
| 1. Connection for
brake line | 5. Push rod | 10. Plunger |
| 2. Filling plug | 6. Rubber cover | 11. Washer |
| 3. Equalizing hole | 7. Circlip | 12. Plunger seal |
| 4. Strainer | 8. Stop washer | 13. Spring |
| | 9. Plunger seal | 14. Valve |
| | | 15. Washer |

Master cylinder

The construction of the master cylinder is shown in Figs. 2 and 3.

Wheel brake unit, early production

The early production of the front wheel brakes (Figs. 4 and 5) are of the "Two leading-shoe" type, i.e. each wheel has two brake cylinders with one plunger in each. By means of this arrangement both the shoes function as primary shoes. Each shoe has a self-adjusting device.

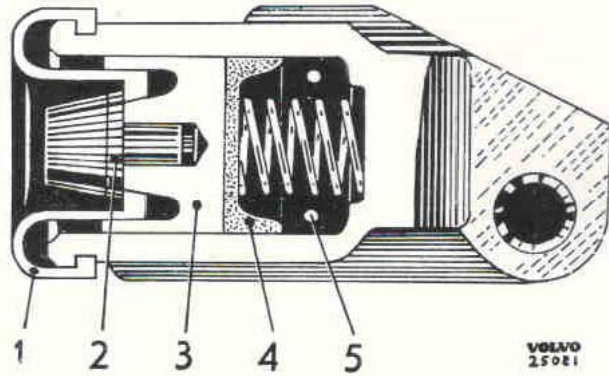


Fig. 5. Wheel unit cylinder, front wheel.

- | | |
|-----------------|---------------------------------|
| 1. Rubber cover | 4. Plunger seal |
| 2. Plunger rod | 5. Connection for
brake line |
| 3. Plunger | |

The rear wheel brake units (Figs. 6 and 7) have one wheel unit cylinder with two plungers. At the bottom the shoes rest against a support attached to the brake backing plate. The front shoe is provided with a self-adjusting device and the rear shoe has a shorter lining.

Since the shoes can be displaced radially, they are self-centring. The clearance between the brake lining and drum can be adjusted by means of an eccentric which can be turned.

The self-adjusting device (Fig. 8) functions as follows: The lower end of the lever (7, Fig. 8) is mounted in the brake shoe (1). The lever is provided with a notched lip (9) and the brake shoe with a guide lip (8).

A key (11) is fitted between the lips. The position of the lever in relation to the brake shoe depends on how far the key is pressed in. A spring (2) presses the lips towards each other and retains the key.

With the brakes in the rest position, the upper end of the lever rests against the cam (6) fitted in the brake backing plate. At a certain adjustment of the cam, therefore, the return movement of the brake shoe is determined by the position of the key.

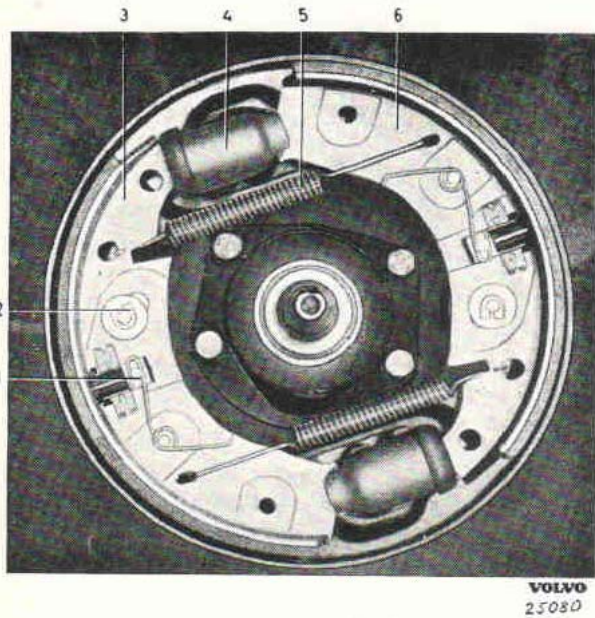


Fig. 4. Wheel brake unit, early production, left-hand front wheel.

- | | |
|--------------------------|------------------------|
| 1. Self-adjusting device | 4. Wheel unit cylinder |
| 2. Locking washer | 5. Return spring |
| 3. Front brake shoe | 6. Rear brake shoe |

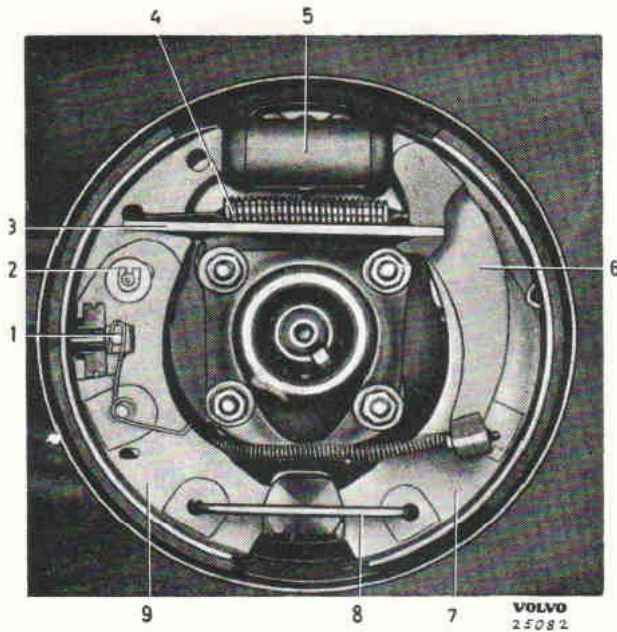


Fig. 6. Wheel brake unit, early production, left-hand rear wheel.

- | | |
|--------------------------|---------------------|
| 1. Self-adjusting device | 6. Lever |
| 2. Locking washer | 7. Rear brake shoe |
| 3. Handbrake link | 8. Spring |
| 4. Return spring | 9. Front brake shoe |
| 5. Wheel unit cylinder | |

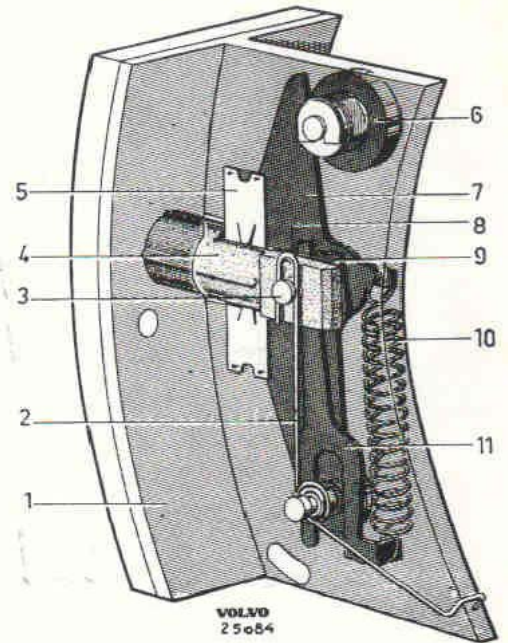


Fig. 8. Self-adjusting device.

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|-------------------|----------------|
| 1. Brake shoe | 7. Lever |
| 2. Spring | 8. Guide lip |
| 3. Stud | 9. Notched lip |
| 4. Contact plug | 10. Spring |
| 5. Damping spring | 11. Key |
| 6. Cam | |

The contact plug (4) is fitted in a hole in the brake shoe and connected to the lever (7) by means of a stud (3). The outer end of the plug is level with the

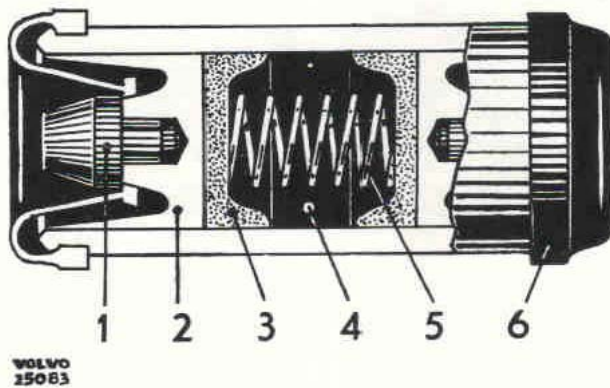


Fig. 7. Wheel unit cylinder, rear wheel.

- | |
|---------------------------------|
| 1. Pressure pin |
| 2. Plunger |
| 3. Seal |
| 4. Connection for
brake line |
| 5. Spring |
| 6. Rubber cap |

friction surface of the brake linings and during brake application comes into contact with the drum. As the brake lining becomes worn, the contact plug moves inwards and takes with it the lever (7), which has lifted from the cam (6) during brake application. During this movement the distance between the lips (8 and 9) widens and the key (11) is pulled upwards by the spring. Due to the new position of the lever (7), it reaches the cam earlier and limits the return movement. The clearance between the brake lining and drum is therefore constant regardless of wear. When the contact plug reaches the web of the brake shoe due to lining wear, the self-adjusting action ceases. With further lining wear the clearance between the lining and drum increases. If the brake pedal stroke increases, i.e. it can be pressed further down towards the floor, this means that the brake linings are worn out and need replacing.

In order to prevent vibration in the contact plug, a damping spring (5) is fitted between the brake shoe and contact plug.

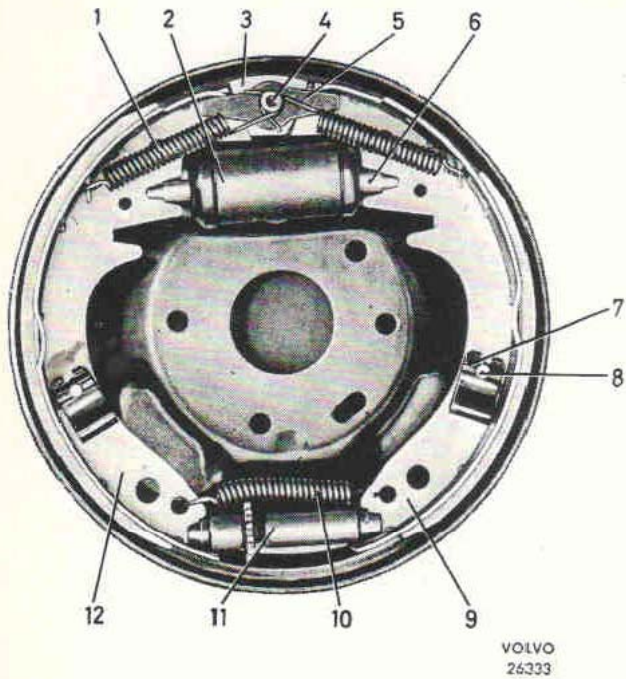


Fig. 9. Wheel brake unit, late production, right-hand front wheel.

1. Return spring
2. Wheel unit cylinder
3. Centring block
4. Anchor stud
5. Guide plate
6. Plunger rod
7. Clip
8. Guide pin
9. Front brake shoe
10. Spring
11. Adjusting device
12. Rear brake shoe

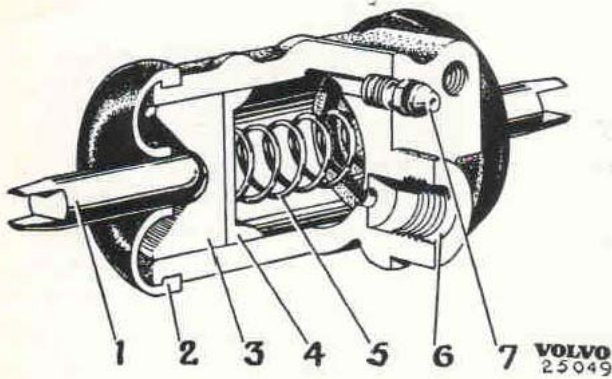


Fig. 10. Wheel unit cylinder, late production.

1. Plunger rod
2. Rubber cover
3. Plunger
4. Plunger seal
5. Return spring
6. Connection for brake line
7. Air-venting nipple

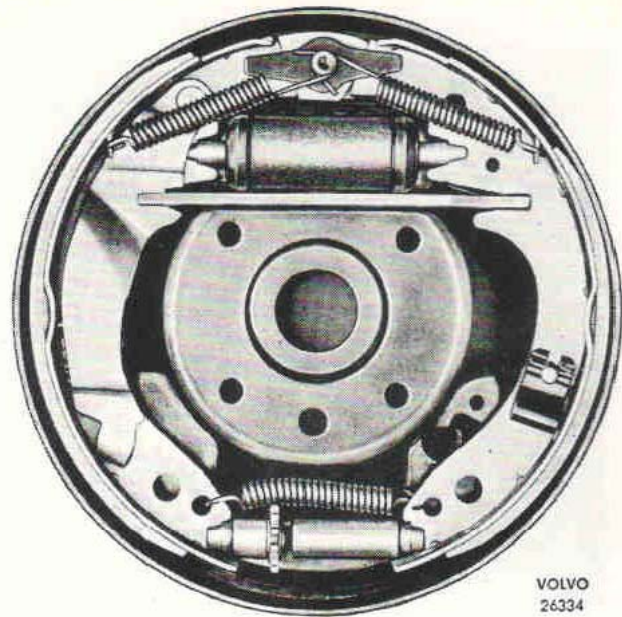


Fig. 11. Wheel brake unit, late production, right-hand rear wheel.

Wheel brake unit, late production

On late production drum brakes the brake shoes (12 and 9, Fig. 9) are movably attached to the brake backing plate by means of guide pins (8) and spring clips (7). The upper ends of the shoes are pressed against the pivoting centring block (3) by the return spring (1). The lower ends are joined by means of

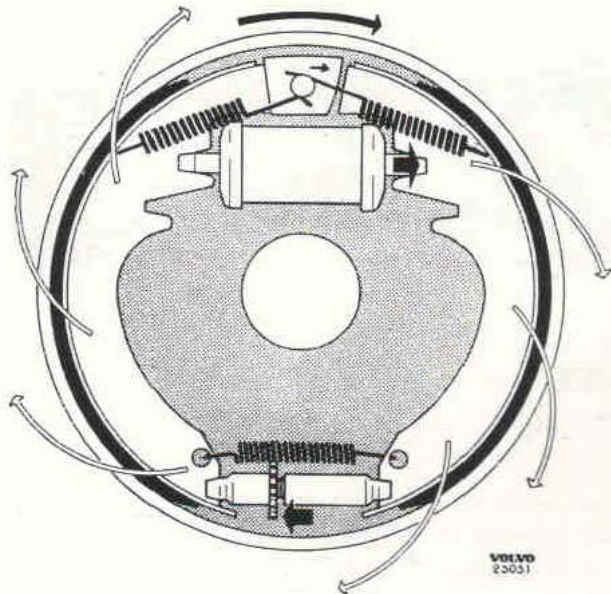


Fig. 12. Brake application.

the adjusting device (11) against which they are pressed by the spring (10), which also locks the toothed wheel of the adjusting screw. This arrangement means that the brake shoes are self-centring and both shoes partially self-applying (Duo-servo). When the brakes are applied, the wheel unit cylinder plungers press out the shoes against the brake drum by means of the plunger rods (6, Fig. 9). Due to the friction between the drum and lining, the shoes will follow round in the direction of rotation of the drum. The "floating" attachment of the shoes causes the primary shoe (9) to be pressed downwards and the secondary shoe (12) to be pressed upwards until its upper end encounters the centring block, see Fig. 12. The end of the secondary shoe is then displaced by the block so that the shoe is centred in relation to the drum. Since the pivoting centre of the secondary shoe is at the anchor stud (4, Fig. 9) and that of the primary shoe at the adjusting device, friction between the drum and lining will assist brake application, see Fig. 12. This action is also assisted by the fact that the primary shoe tends to follow round

in the direction of rotation of the drum, which assists the application of the secondary shoe.

In order to give the brake linings as long a life as possible, the rear shoes of the front wheel brake unit (secondary shoes) are provided with thicker and eccentrically ground linings.

Wheel brake units of this type were at first provided with longer linings than those shown in Figs. 9 and 11.

HANDBRAKE

The handbrake lever is floor-mounted on the outside of the driving seat. The movement of the lever is transmitted by means of a shaft, lever and pull rod to the clevis (3, Fig. 13). From there the movement is transmitted by means of cables (5) to the rear wheel brake unit levers (11). The upper end of this lever is attached to the rear brake shoe. When the lever is pulled forwards, the shoes are forced outwards by means of the links (10), causing the handbrake to be applied.

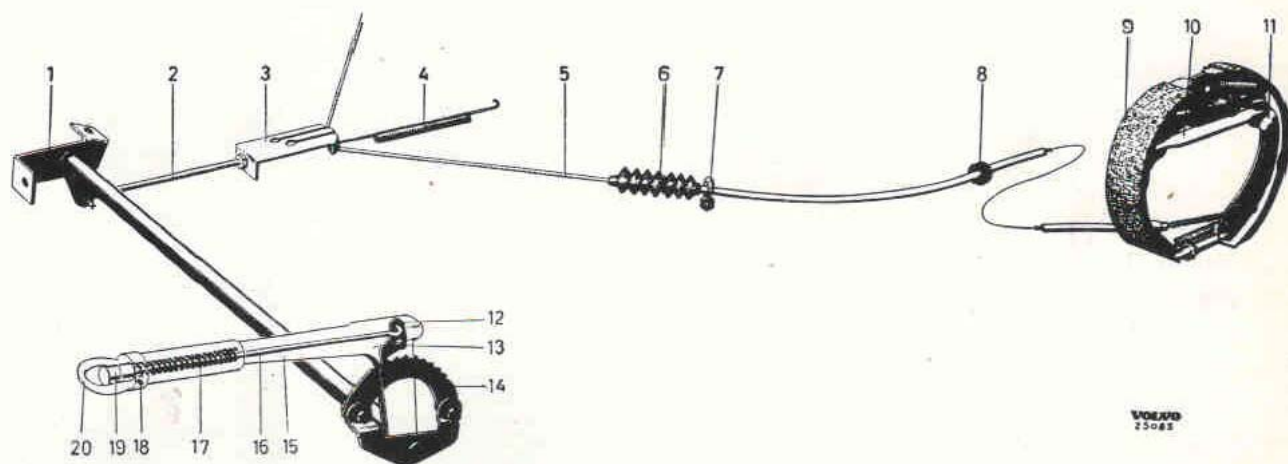


Fig. 13. Handbrake system.

- | | |
|--------------------------------|---------------------|
| 1. Mounting bracket | 11. Lever |
| 2. Pull rod | 12. Pawl |
| 3. Clevis, early production | 13. Rivet |
| 4. Spring | 14. Ratchet segment |
| 5. Handbrake cable | 15. Handbrake lever |
| 6. Rubber cover | 16. Push rod |
| 7. Attachment for outer casing | 17. Spring |
| 8. Bush | 18. Screw |
| 9. Brake shoe | 19. Button |
| 10. Link | 20. Loop |

REPAIR INSTRUCTIONS

FOOTBRAKES WHEEL BRAKE UNITS, EARLY PRODUCTION

Dismantling the front wheel brake unit

1. Remove the hub cap and slacken the wheel nuts slightly. Jack up the car and place blocks under the lower wishbone. Remove the wheel.

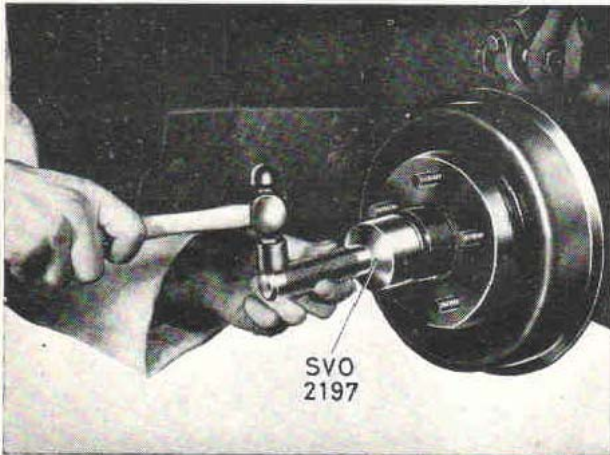


Fig. 14. Removing the grease cap.

2. Remove the grease cap with tool SVO 2197, see Fig. 14. Remove the split pin and castle nut. Pull off the hub with tool SVO 1791, see Fig. 15. If the inner bearing does not come out, pull it off the stub axle with tool SVO 1794, see Fig. 16.

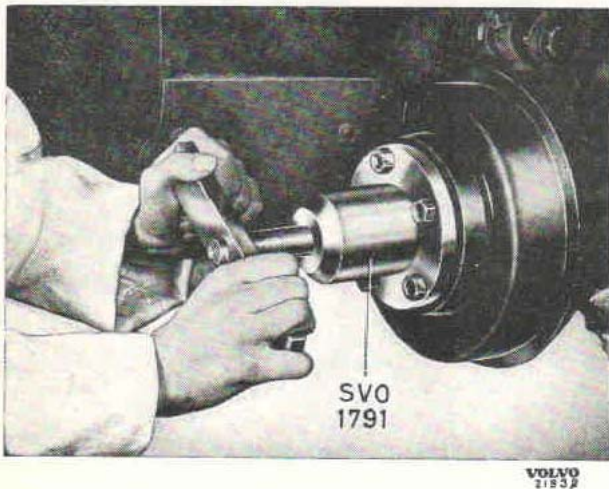


Fig. 15. Removing the hub.

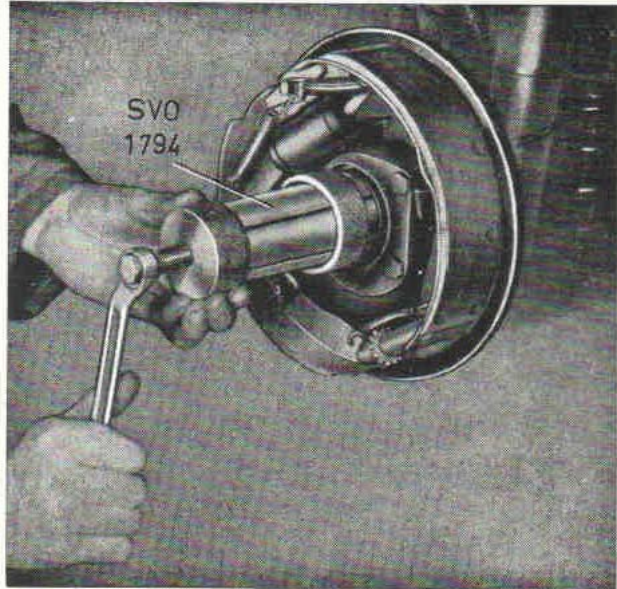


Fig. 16. Removing the inner bearing.

3. Remove the locking washer and other washers from the stud for the adjusting cam on the front brake shoe. Remove the shoe and springs as shown in Fig. 17. Remove the rear shoe in the same way.

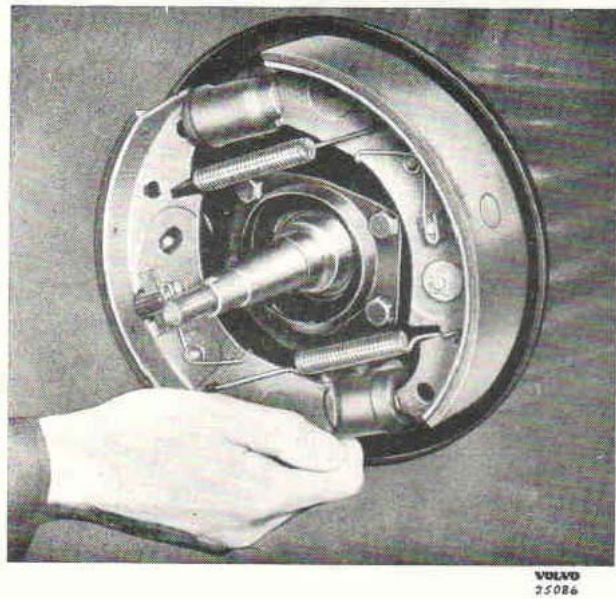


Fig. 17. Removing the brake shoe.

Dismantling the rear wheel brake unit

1. Remove the hub cap and slacken the wheel nuts slightly. Jack up the car and place blocks under the rear axle. Remove the wheel.
2. Release the handbrake. Remove the split pin and castle nut. Pull off the hub with tool SVO 1791, see Fig. 15.
3. Place the spring clip SVO 4074 on the wheel unit cylinder so that the plungers cannot be pressed outwards. Remove the lower spring with the help of pliers SVO 1221, see Fig. 18. Remove the locking washer and other washers from the front shoe. Then turn the shoe outwards so that the handbrake link can be removed. Lift off the front brake shoe and return spring. Disconnect the handbrake cable and remove the rear shoe.

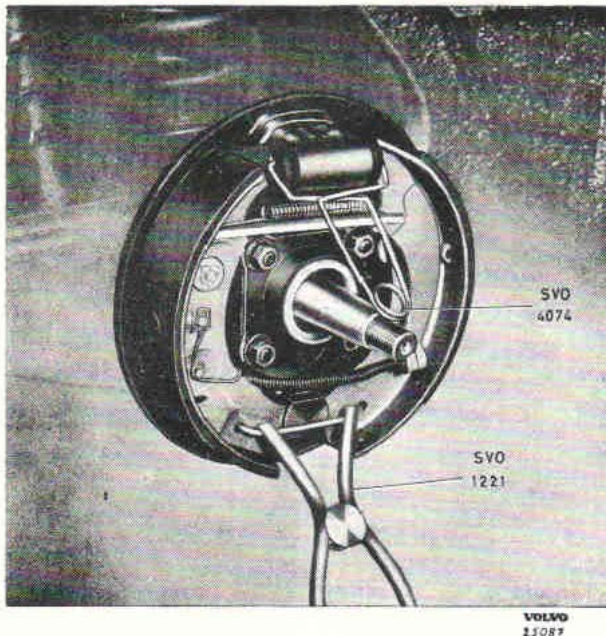


Fig. 18. Removing the lower spring.

Replacing the brake linings

Bonded linings are most easily replaced by fitting replacement shoes complete with ready-bonded linings.

If the old linings are to be removed from the shoes, this should preferably be done in a band-type grinding machine. They can also be chiselled off, after which the brake shoe should be cleaned out with emery cloth. In both cases care must be taken to ensure that the shoe is not damaged.

After cleaning up, the shoe should be washed in clean petrol (gasoline) or similar and then allowed to dry. In the case of bonded linings, the lining contact surface on the shoes must not be touched or made dirty.

The sizes of the new linings are shown in the "Specifications". When fitting, make sure that the lining does not come askew on the shoe and that the holes come opposite the contact plug. The rear lining of the rear wheel brake unit is fitted on the upper part of the shoe.

For bonding purposes use only adhesives which are specially made to withstand the high temperatures arising during prolonged braking. The procedure when bonding varies with different makes of adhesive and oven so that no general description can be given. Therefore carefully follow the instructions of the manufacturer concerned.

In the case of riveted linings, begin riveting at the middle of the lining. Use a rivet press and rivet punches corresponding to the rivet sizes. Make sure that the lining beds down properly on the shoe throughout its whole length.

Self-adjusting device

DISMANTLING

1. Press in the contact plug (4, Fig. 8) and check that the key (11) is in its lower position.
2. Disconnect the spring (10) for the key and the spring (2) for the contact plug.
3. Remove the lever (7), key (11), contact plug (4), damping spring (5) and guide lip (8).

ASSEMBLING

1. Fit the guide lip (8, Fig. 8). Replace the contact plug and fit the new one in position in the brake shoe. Place the key (11) in position with the smooth side towards the guide lip.
2. Press in the contact plug so that the hole in it comes opposite the hole in the brake shoe, and fit the lever (7) and spring (2) for the contact plug.
3. Hook on the spring (10) for the key and fit the damping spring.

TESTING

Testing is carried out as follows. While the contact plug is held pressed in, the key is moved to its outer end position, see Fig. 19, after which the pressure is taken off and the key released.

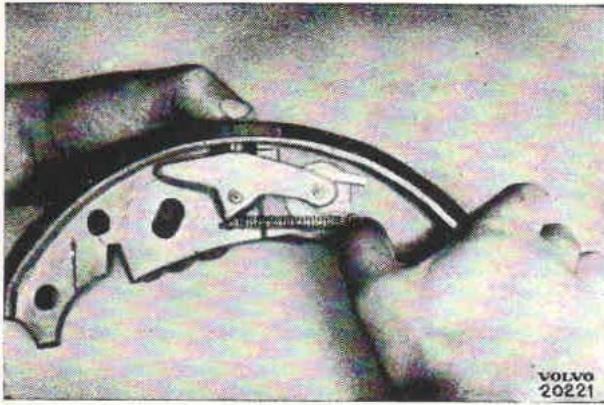


Fig. 19. Testing the self-adjusting device.

When the contact plug is pressed in, the spring should be able to pull the key inwards, see Fig. 20. While retaining the pressure, the key is moved back to its outer position and the brake shoe is now ready for adjustment of the contact plug.

ADJUSTING THE CONTACT PLUG

The contact plug is adjusted with the help of a file and adjusting jig (part number 210030).

With the contact plug in the outer position, the brake shoe is secured in a vice. The lip of the lever (2, Fig. 21) should rest against one of the jaws in order to prevent the plug from being pressed in when adjusting, thereby making the adjustment incorrect.

Place the adjusting jig (1) over the contact plug and file this off flush with the jig, see Fig. 21. The plug will then come 0.1 mm (0.04") above the surface of the brake lining.

Replacing the pin for the adjusting cam

The pin (5, Fig. 22) for the adjusting cam (4) which is fitted in the brake backing plate can be replaced by pressing out the old one and staking in a new one with the special staking tool SVO 2119.

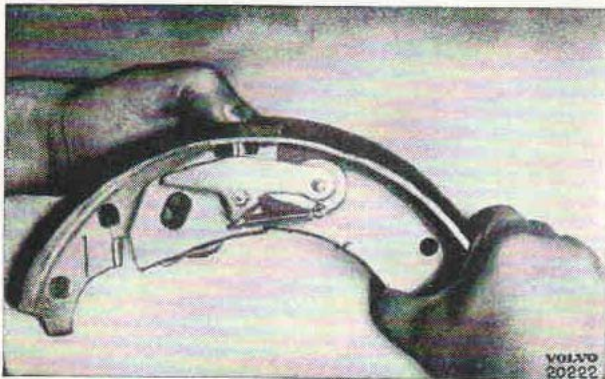


Fig. 20. Testing the self-adjusting device.

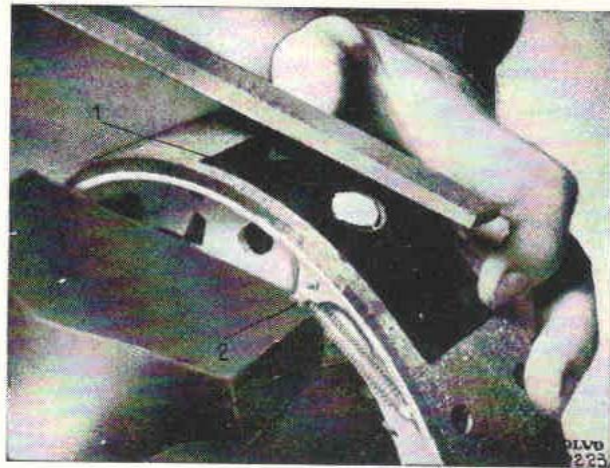


Fig. 21. Adjusting the contact plug.

- 1. Adjusting jig
- 2. Lip

The pin is replaced as follows:

1. Remove the brake backing plate. Place the cushioning sleeve belonging to the staking tool in a press as shown in Fig. 22 and press out the pin (5) with the help of a drift in the case of the rear shoe of the rear wheel brake unit. On other shoes the pin and adjusting cam are made in one piece so that a larger cushioning sleeve which goes over the cam must be used.
2. Turn the cushioning sleeve and place a new pin above it. Fit the adjusting cam (4), brake backing plate (1), spacing washer (3) and the internally toothed sprung washer (2) over the pin. Press down the washers with the help of the staking tool, see Fig. 23.

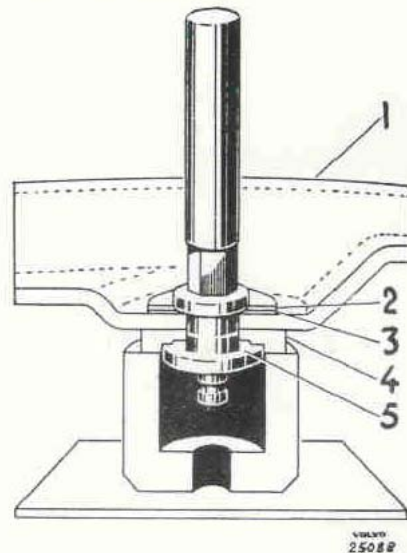


Fig. 22. Removing the pin (rear shoe of rear wheel brake unit).

- 1. Brake backing plate
- 2. Washer
- 3. Washer
- 4. Adjusting cam
- 5. Pin

3. Turn the tool round and centre it on the pin. Ensure that it is aligned with the pin. Press down the tool, see Fig. 24. Discontinue pressing at a maximum pressure of 8 tons. Twist the tool and check that the pin does not move too easily. If so, further pressure should be applied.
4. Screw in the bolt and pull the tool off the pin, see Fig. 25.

Brake drums

The friction surface and radial throw of the brake drum should be checked. The radial throw must not exceed 0.15 mm (0.006"). If the friction surface is concave, scored or cracked, the brake drum should be replaced. Rust spots and minor scratches can be polished or ground off in a machine.

Assembling the front wheel brake unit

1. Check that the key in the self-adjusting device is in its outer position and that the cams on the brake backing plate are turned to their lowest position.
The self-adjusting devices must not be lubricated since this results in dust and dirt adhering to the parts, impairing the function of the device.
2. Place the rear shoe in position. Fit the flat washer, sprung washer, flat washer and locking washer on the adjusting cam pin. Squeeze up the locking washer slightly after fitting.
3. Hook on the return springs to both shoes and fit the front shoe, see Fig. 17. Fit the locking arrangement as described above.
4. Check that the return springs and locking washers are properly in position and that the linings are free from burr, grease and dirt.
5. If the inner front wheel bearing has been removed, fit it in place in the hub. If necessary, pack it with wheel bearing grease. Press in the sealing ring with the help of drift SVO 1798 and standard handle SVO 1801.
6. Fit the hub and brake drum on the stub axle. Place on the outer bearing, washer and castle nut. Adjust the bearings by first tightening the nuts to a torque of 7 kgm (50 lb. ft.). Then slacken the nut a third of a turn and lock it. Fill the grease cap with grease and fit it with drift SVO 2197.

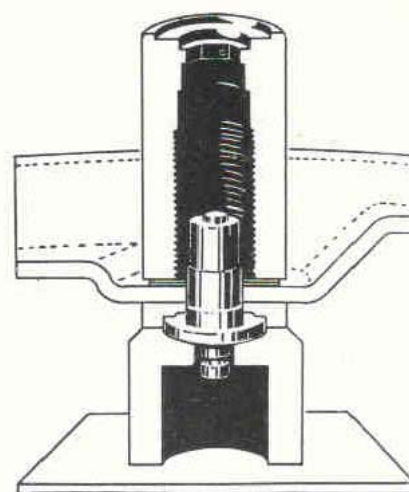


Fig. 23. Fitting the washers.

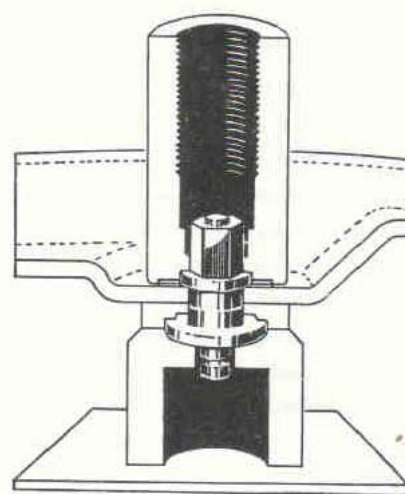


Fig. 24. Pressing together.

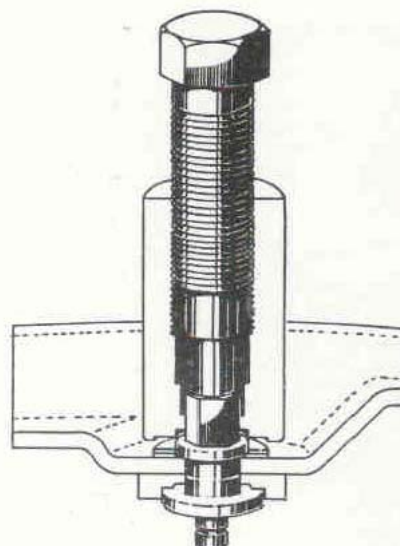


Fig. 25. Removing the tool.

7. Fit the wheel. Adjust the brakes, see under "Adjusting the front wheel brake unit". Lower the vehicle. Tighten the wheel nuts to a torque of 10—14 kgm (70—100 lb. ft.). Fit on the hub cap.

Assembling the rear wheel brake unit

1. Proceed in accordance with operations 1 and 2 under "Assembling the front wheel brake unit".
2. Hook the return spring onto the shoes, place the front shoe in position on the wheel unit cylinder, turn the shoe outwards, fit the handbrake link and place the shoe in position. Fit the locking arrangement.
3. Fit the lower spring with the help of pliers SVO 1221. Hook on the handbrake cable. Remove the clip SVO 4074.
4. Check that the springs and locking washers are properly in position and that the linings are free from burr, grease and dirt.
5. Fit the hub, brake drum, washer and castle nut. Lock with a split pin after the nut has been tightened. Fit the wheel. Adjust the brakes, see under "Adjusting the rear wheel brake unit". Lower the vehicle. Tighten the wheel nuts to a torque of 10—14 kgm (70—100 lb. ft.). Fit on the hub cap.

Adjusting the front wheel brake unit

Rotate the wheel backwards and turn the cam for the front brake shoe anti-clockwise on the right-hand wheel and clockwise on the left-hand wheel until the wheel is locked by the brake shoe. Then slacken off the cam just sufficiently so that the wheel can rotate freely. Adjust the rear brake shoe in the same way.

Adjusting the rear wheel brake unit

Check that the handbrake is released. Rotate the wheel backwards and turn the cam for the front brake shoe anti-clockwise on the right-hand wheel and clockwise on the left-hand wheel until the wheel is locked by the brake shoe. Then slacken off the cam just sufficiently so that the wheel can rotate freely. Adjust the rear wheel brake shoe by rotating the wheel forwards and applying the cam in the opposite direction to the front shoe.

WHEEL BRAKE UNITS, LATE PRODUCTION

Dismantling the front wheel brake unit

1. Remove the hub cap and slacken the wheel nuts slightly. Jack up the car and block up under the lower wishbone. Remove the wheel.
2. Remove the grease cap with tool SVO 2197, see Fig. 14. Remove the split pin and castle nut. Pull off the hub with tool SVO 1791, see Fig. 15. If the inner bearing does not come out with it, pull this off the stub axle with tool SVO 1794, see Fig. 16.
3. Place the clip SVO 4074 as shown in Fig. 27 so that the plungers in the wheel unit cylinder cannot be pressed outwards. The procedure for removing the shoes depends on which tool is used.

The two return springs are first disconnected with a brake spring tool as shown in Fig. 26, after which the retaining clips are removed and the shoes lifted off together with the adjusting device.

The locking spring is disconnected with the help of the brake spring pliers as shown in Fig. 27. Pull apart the shoes and remove the adjusting device. Hold against the guide pin on the back of the brake backing plate and remove the retaining clip. Turn the shoe outwards until the plunger rod of the wheel unit cylinder is released, see Fig. 28. Then turn the shoe inwards until the return spring can be disconnected and the shoe lifted off. Remove the other shoe in the same way.

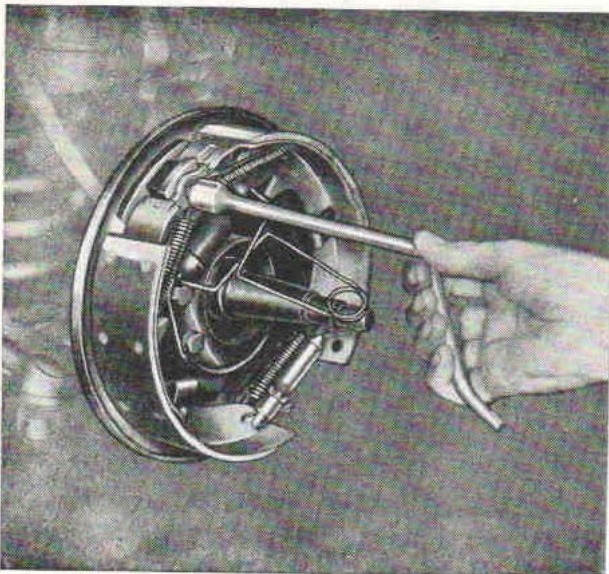


Fig. 26. Removing the return spring with brake spring tool (Snap-on BT or corresponding).

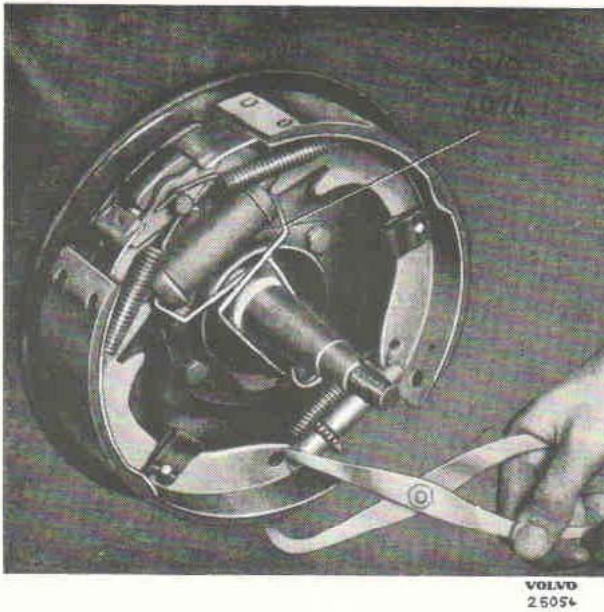


Fig. 27. Removing the locking spring.

Dismantling the rear wheel brake unit

1. Apply the handbrake. Remove the hub cap. Remove the split pin and slacken the castle nut and wheel nuts slightly. Jack up the car and block up under the rear axle. Remove the wheel.
2. Release the handbrake. Remove the split pin and castle nut. Pull off the hub with tool SVO 1791, see Fig. 15.
3. Place clip SVO 4074 over the wheel unit cylinder so that the plungers cannot be pressed outwards. Disconnect the handbrake cable from

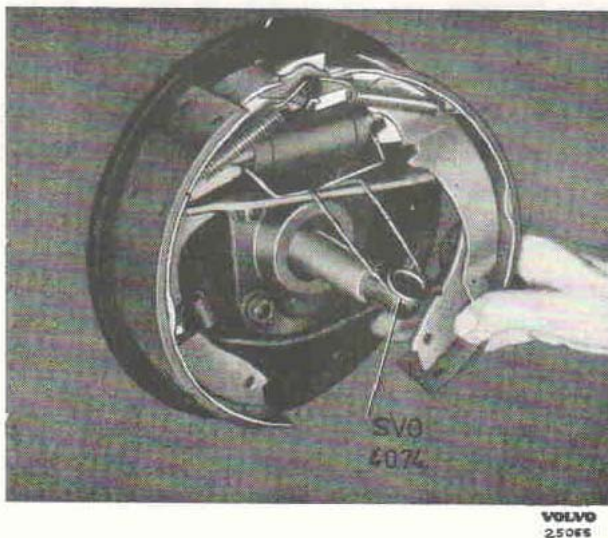


Fig. 28. Removing the brake shoe.

the lever. The procedure when removing the shoes depends on which tool is used. With a brake spring tool as shown in Fig. 26, the two return springs are first disconnected, after which the retaining clips are removed and the shoes lifted off together with the adjusting device.

With the help of brake spring pliers, the locking spring is disconnected, see Fig. 27. Pull apart the shoes and remove the adjusting device. Hold against the guide pin on the back of the brake backing plate and remove the retaining clip for the rear shoe. Turn the shoe outwards until the plunger rod of the wheel unit cylinder and handbrake link are released, see Fig. 28. Then turn the shoe inwards until the return spring can be disconnected and the shoe lifted off. Remove the other shoe in the same way.

Replacing the brake linings

The vehicle can be equipped with different types of brake linings. The linings can be riveted or bonded onto the shoes, the primary shoes can have long or short linings, and the linings can be of two different qualities. These can be distinguished since the earlier type is marked red and green and the reverse side stamped 2201—H8, whereas the later type is marked brown and green and stamped H 3142.

In order to avoid uneven braking effect, both pairs of wheels must have the same type of brake lining.

The brake linings are replaced as follows.



Fig. 29. Rear brake lining of front wheel.

RIVETED BRAKE LININGS

Remove the old linings by pressing out the rivets in a rivet press. Then wash the shoes clean and wipe them. Fit ready-made genuine Volvo linings. **When doing this, note that the eccentrically ground linings which are marked on the wearing side as shown in Fig. 29 should be fitted on the rear brake shoes (secondary shoes) of the front wheels. The thicker part (marked) should face upwards. On types with shorter primary linings, these are fitted as shown in Figs. 9 and 11 respectively.**

Use rivet sizes in accordance with those given in the specifications. Begin riveting at the middle of the lining and make sure that the lining beds down properly on the shoe throughout its whole length. Use a rivet press and rivet punches corresponding to the rivet sizes.

If riveted linings have to be ground for any reason, a machine which is adjustable for eccentric grinding is required for the rear linings of the front wheels. The eccentricity is shown in Fig. 30 and the grinding radius for all linings is equal to half the diameter of the brake drum less 0.4 mm (0.016").

BONDED BRAKE LININGS

Bonded brake linings are most easily replaced by fitting ready-made replacement shoes complete with linings bonded on.

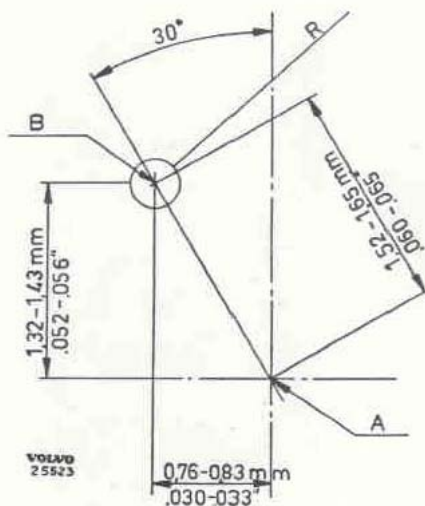


Fig. 30. Eccentricity for rear lining of front wheel, riveted type.

- A = central point of brake shoe
- B = pivoting fulcrum
- R = grinding radius

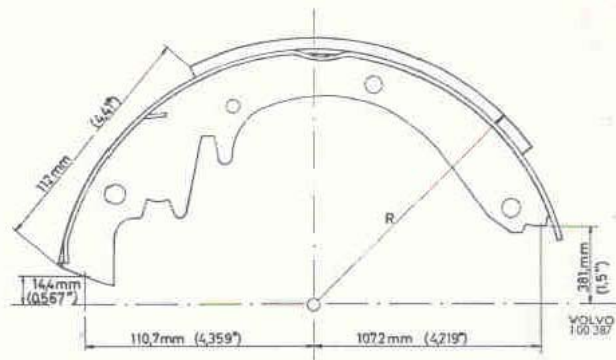


Fig. 31. Adjusting measurement for front wheel front brake shoes.

If the old linings are to be removed from the shoes, this should preferably be done in a hand-type grinding machine. They can also be chiselled off, after which the brake shoe must be cleaned up with emery cloth. In both cases care must be taken to ensure that the shoe is not damaged.

The bonding procedure varies with different makes of oven and testing apparatus so that no general description can be given. When bonding, carefully follow the recommendations of the bonding compound manufacturer concerned.

When fitting, make sure that the lining does not come askew on the shoe and that it is placed as shown in Figs. 31 to 35. 1/4" linings are fitted on the rear shoes of the front wheels (secondary shoes) and 3/16" linings on the others.

For bonding purposes, use only adhesives which are specially made to withstand the high temperatures arising during prolonged braking.

After bonding, the linings must be ground to the correct measurements.

Since the rear brake linings of the front wheels must be ground eccentrically, this requires a grinding machine which can be specially adjusted for this type of lining. There are different types of these machines so that the grinding procedure varies accordingly. Fig. 33 shows how much the pivoting fulcrum should be displaced in relation to the central point of the brake shoe when grinding an eccentric lining. For other linings, the pivoting fulcrum coincides with the central point of the brake shoe.

The grinding radius (R) is equal to half the diameter of the brake drum less 0.4 mm (0.016"). Machines which are graduated for the drum diameter should therefore be set to a value which is 0.8 mm (0.032") less than the diameter of the brake drum.

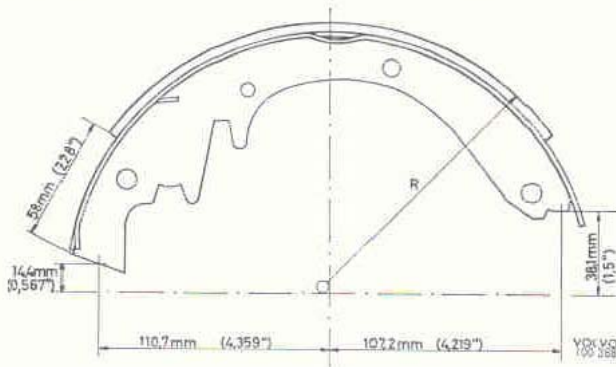


Fig. 32. Adjusting measurements for front wheel rear brake shoes.

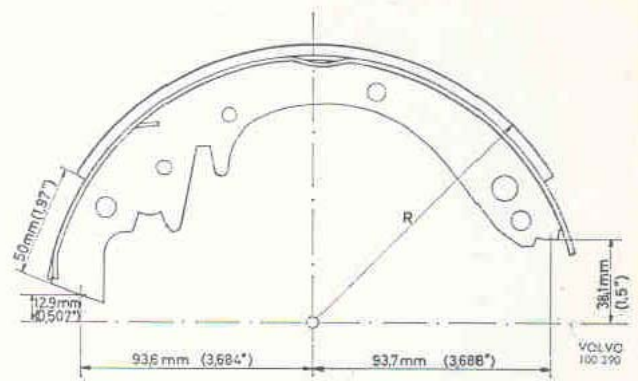


Fig. 35. Adjusting measurements for rear wheel rear brake shoes.

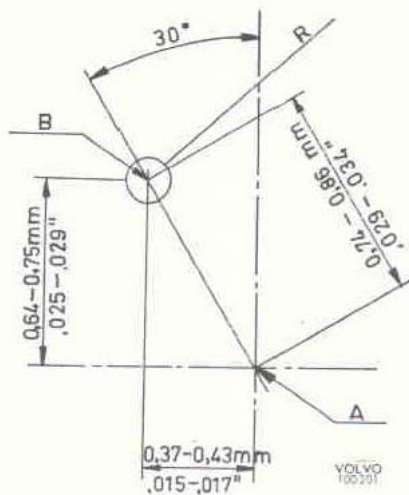


Fig. 33. Eccentricity for front wheel rear linings, bonded type.

- A = central point of brake shoe
- B = pivoting fulcrum
- R = grinding radius

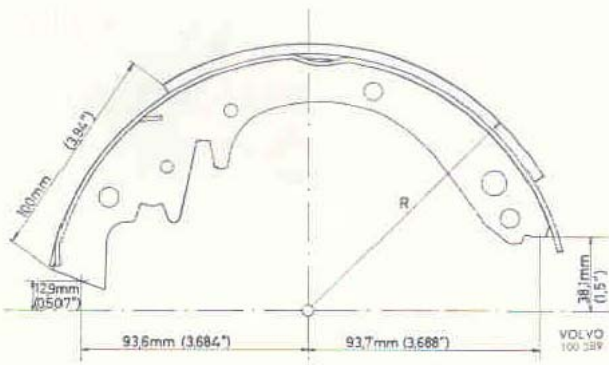


Fig. 34. Adjusting measurements for rear wheel front brake shoes.

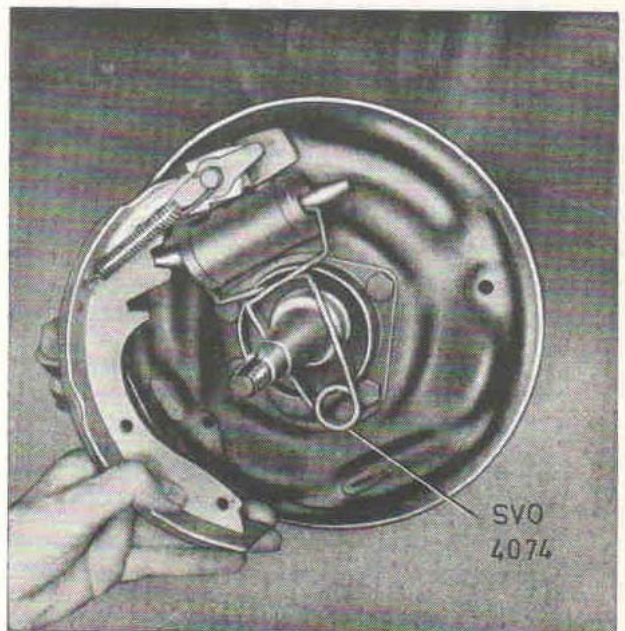


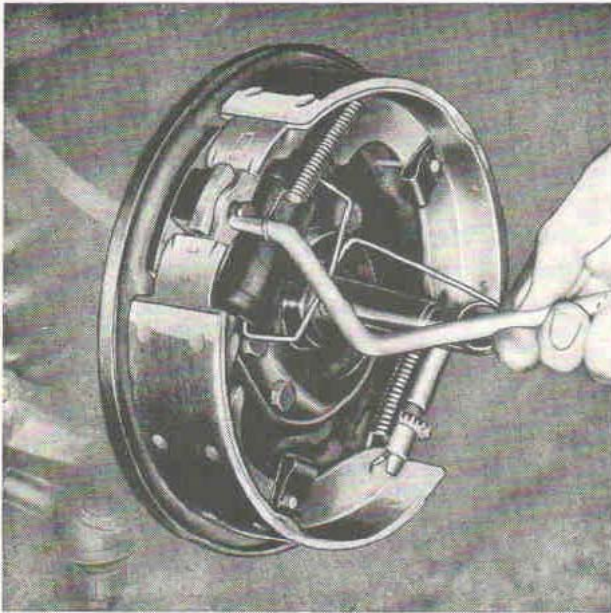
Fig. 36. Fitting a brake shoe.

Brake drums

The friction surface and radial throw of the brake drums should be checked. The radial throw must not exceed 0.15 mm (0.006"). If the friction surface is concave, scored or cracked, the brake drum must be replaced. Rust spots and minor scratches can, however, be polished or ground off in a machine.

Assembling the front wheel brake unit

1. Check, and if necessary, smooth off the surface of the lips on the brake backing plate against which the shoes and centring block slide. Clean up the sliding surfaces on the shoes and centring block. Coat the surfaces with a very thin layer of heat-resistant grease. Place the centring



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Fig. 37. Fitting the return spring with brake spring tool.

block (3, Fig. 9) in position when the **stamped arrow should point in the direction of rotation of the brake drum**. There are different types of centring block. The centring blocks on each pair of brake units must be of the same type. On the latest production type a point and an "S" are stamped on in addition to the arrow. Place on the guide plate (5).

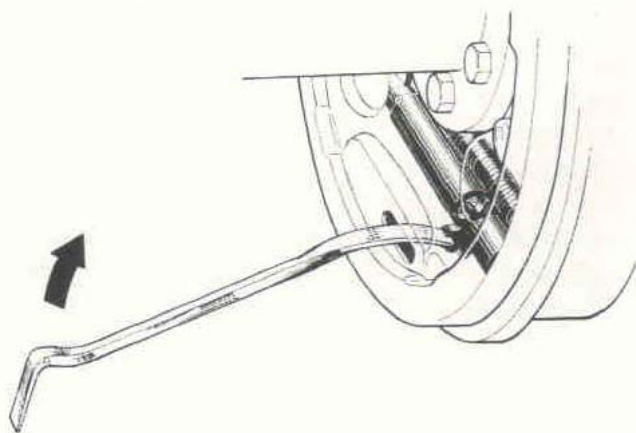
2. Hold the front shoe in place so that the return spring can be hooked on. Turn the shoe outwards so that the wheel unit cylinder plunger rod can be placed in position, see Fig. 36. Fit the guide pin (8) and retaining clip (7). Fit the rear shoe in the same way. Remove clip SVO 4074. Fit the adjusting device and its locking spring. If a brake spring tool as shown in Fig. 37 is available, it is possible to begin instead by fitting the adjusting device and locking spring, after which the shoes are placed in position. The retaining clips are then fitted and the return spring hooked on with the pointed end of the tool, see Fig. 37.
3. Check that the springs and retaining clips are located properly, that the linings are free from burr, grease and dirt and that the thicker part of the lining on the rear brake shoe faces upwards.
4. If the inner front wheel bearing has been removed, it should be placed in position in the hub. If necessary, pack with wheel bearing

grease. Press in the sealing ring with the help of drift SVO 1798 and standard handle SVO 1801.

5. Fit the hub with cleaned brake drum on the stub axle. Fit on the outer bearing, washer and castle nut. Adjust the bearings by first tightening the nut to a torque of 7 kgm (50 lb. ft.). Then slacken the nut a third of a turn and lock it. Fill the grease cap with grease and fit it with drift SVO 2197.
6. Fit the wheel. Adjust the brakes, see under "Adjusting the wheel brake units". Lower the vehicle. Tighten the wheel nuts to a torque of 10—14 kgm (70—100 lb. ft.). Fit on the hub cap.

Assembling the rear wheel brake unit

1. Proceed in accordance with operations 1 and 2 under "Assembling the front wheel brake unit". Place the handbrake link with spring in position in the front shoe before fitting the rear shoe. Connect up the handbrake cable.
2. Check that the springs and retaining clips are properly located and that the linings are free from burr, grease and dirt.
3. Fit the hub with cleaned brake drum, washer and castle nut. Fit the wheel. Adjust the brakes, see under "Adjusting the wheel brake units". Lower the vehicle. Lock the castle nut with a split pin after the nut has been tightened well. Tighten the wheel nuts to a torque of 10—14 kgm (70—100 lb. ft.). Fit on the hub cap.



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Fig. 38. Adjusting the wheel brake unit.

Testing

When test driving after replacing the brake linings, avoid repeated hard brakings from high speeds. Such action with linings which have not been worn in can cause overheating and permanent local damage to the linings. Instead, make repeated light brakings with relatively long intervals between for cooling.

Adjusting the wheel brake units

If it is suspected that the linings are worn out, remove the brake drum for checking this. The adjusting device permits of adjustment even when the linings are worn down to the rivets. Such wear can cause the rivets to damage the drums. Regular examination of the linings should be carried out every 10,000 km (6000 miles), and more frequently in the case of hard driving.

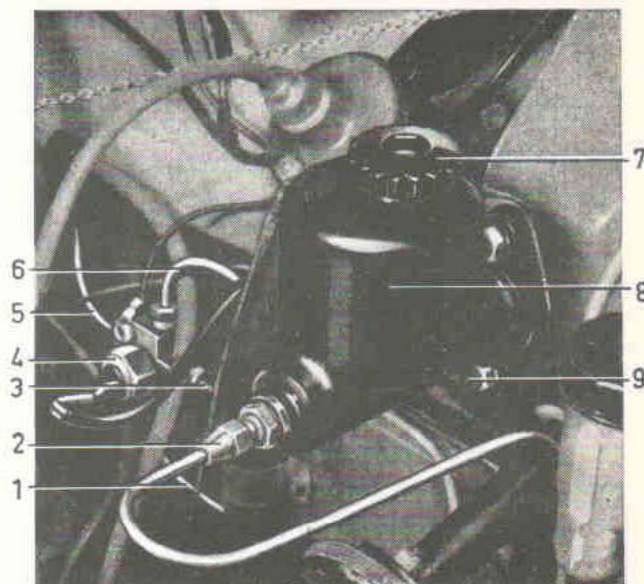
Adjusting is carried out as follows:

1. Jack up the car and place blocks under the wish-bones or rear axle respectively. Release the handbrake.
2. Remove the rubber seal. Rotate the wheel in its **normal direction of rotation** (not backwards and forwards) while applying the brake shoes against the brake drum with the help of the adjusting screw. A screwdriver or tool as shown in Fig. 38 is used for turning this. When the wheel can only just be turned by hand, stop adjusting. Then turn back the adjusting screw 12 notches. Fit the rubber seal.

HYDRAULIC SYSTEM

Observe the utmost cleanliness when working on the hydraulic system. Wash the hands with soap and water before cleaning the internal parts. These should be cleaned with methylated spirits. Petrol (gasoline), paraffin (kerosene), trichlorethylene or any other spirit containing benzol must not be used.

Use only first-class brake fluid which fulfils the requirements of SAE 70 R 3. Avoid spilling brake fluid on the paintwork as this can cause damage.



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Fig. 39. Brake components.

- | | |
|----------------------------------|-------------------------------------|
| 1. Brake line, rear wheel | 6. Brake line, master cylinder |
| 2. Connection | 7. Filling plug |
| 3. Brake line, left front wheel | 8. Master cylinder, late production |
| 4. Brake contact | 9. Attaching bolt |
| 5. Brake line, right front wheel | |

Master cylinder, early production

REMOVING

1. Remove the split pin and stud for the brake pedal. Disconnect the return spring. Remove the rubber cover.
2. Loosen the connection for the brake line (2, Fig. 39). Collect up the brake fluid which runs out. Remove the two attaching bolts (9) for the master cylinder. Take out the master cylinder carefully. Avoid spilling brake fluid onto the paintwork since this can cause damage.

DISMANTLING

1. Remove the plug and empty out the brake fluid.
2. Bend back the rubber cover (4, Fig. 2) and remove the circlip (6), washer and push rod (5). Shake out the parts from the cylinder.
3. Prise up the circlip on the spring retainer (10) on the plunger (3) and separate the parts. Remember that the spring (11) is under tension.

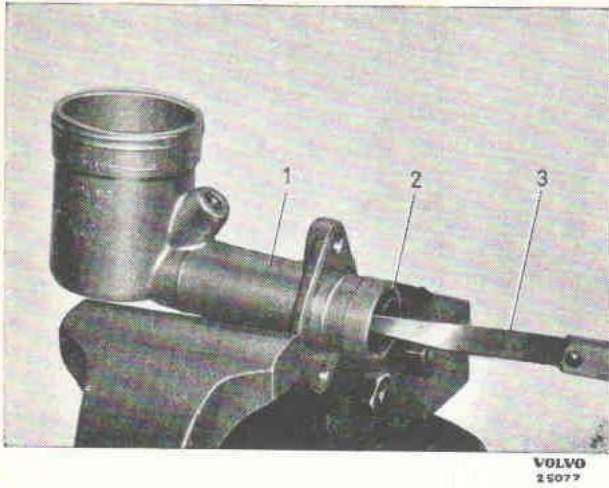


Fig. 40. Checking the clearance.

1. Master cylinder
2. Plunger
3. Feeler gauge

INSPECTING

Before inspecting, all the the parts of the master cylinder should be washed in methylated spirits. The cylinder should be inspected thoroughly internally. There must be no scoring, scratches or rust spots on the polished surface.

The clearance between the plunger and cylinder must not exceed 0.15 mm (0.006") and can be measured as shown in Fig. 40. If the clearance exceeds this value, test with a new plunger. If this does not help, the master cylinder must be replaced. When reconditioning, all the seals should be replaced. There are different types, see under "Assembling". Otherwise any damaged or worn parts should be replaced.

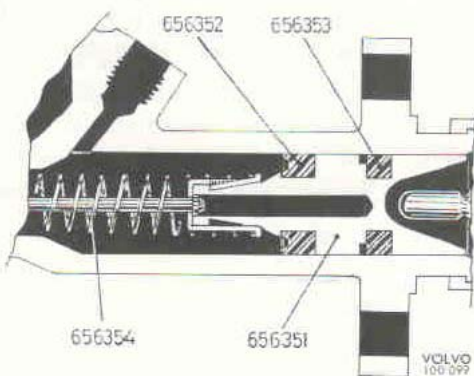


Fig. 41. Plunger seal, type 1.

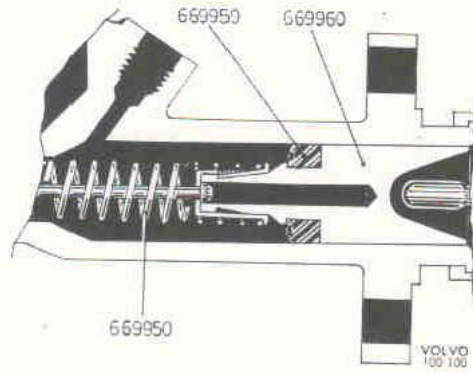


Fig. 42. Plunger seal, type 2.

ASSEMBLING

There are two types of plunger, seal and spring. Figs. 41 and 42 show the difference as well as the Volvo part number. In the case of type 2 (Fig. 42), the stronger spring (669950) must always be fitted with the inner plunger seal (669959) and the above-mentioned seal must always be fitted together with the stronger spring. These two parts can be fitted to type 1 plungers providing that the outer seal (656353) is removed. The inner plunger seal (656352) of type 1 must always be combined with an outer seal (656353).

1. Fit the seal on the plunger and valve rod. The flat side of the valve seal (13, Fig. 2) faces towards the flange of the rod.
2. Fit the sprung washer on the valve rod with the convex side first. Fit the valve guide.
3. Fit the spring and the spring retainer (3, Fig. 43) on the valve rod (4) and assemble these parts with the plunger, see Fig. 43. Then press down the circlip (2) onto the spring retainer so that the parts are held securely.
4. Dip the seal and plunger in brake fluid and fit them into the cylinder. Fit the push rod (5, Fig. 2), washer (7) and circlip (6). Fill the cover (4) with special rubber grease and fit it in position.

INSTALLING

Installing is done in the reverse order to removing. Do not forget the split pin in the pedal stud. Fill up with brake fluid and air-vent the system in accordance with the instructions under "Air-venting the hydraulic system".

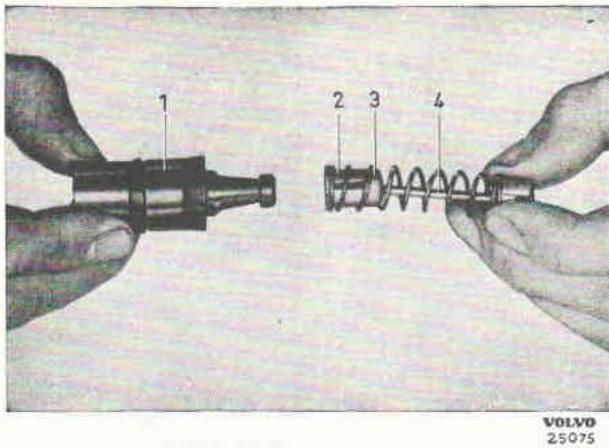


Fig. 43. Assembling the plunger.

- | | |
|------------|--------------------|
| 1. Plunger | 3. Spring retainer |
| 2. Circlip | 4. Valve rod |

Master cylinder, late production

REMOVING

See under "Master cylinder, early production".

DISMANTLING

1. Screw out the plug (2, Figs. 3 and 44) and empty out the brake fluid.
2. Bend back the rubber cover (6) and remove the circlip (7), washer (8) and push rod (5). Shake all the parts out of the cylinder, see Fig. 44.

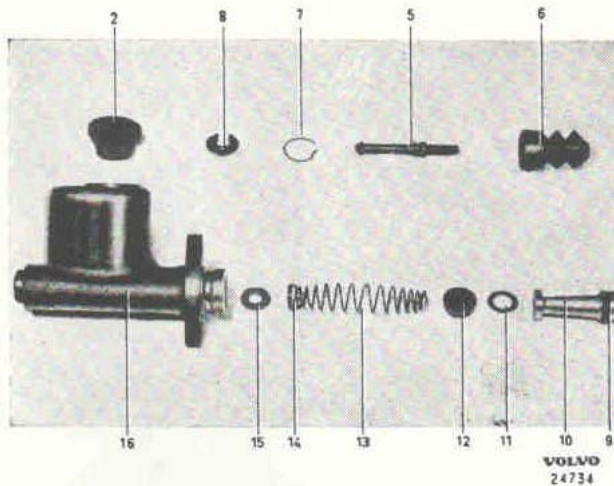


Fig. 44. Master cylinder, late production.

- | | |
|-----------------|-------------------|
| 2. Plug | 11. Washer |
| 5. Push rod | 12. Seal |
| 6. Rubber cover | 13. Spring |
| 7. Circlip | 14. Valve |
| 8. Stop washer | 15. Washer |
| 9. Seal | 16. Cylinder body |
| 10. Plunger | |

INSPECTING

Before inspecting, all the master cylinder parts should be washed in methylated spirits.

The cylinder must be examined thoroughly internally. There must be no scoring, scratches or rust spots on the polished surface. Such damage can as a rule be eliminated by honing the cylinder. The procedure for this varies with different machines so that no general description can be given. Therefore follow the manufacturer's instructions. Clean the cylinder thoroughly after honing and check that the holes are clear.

The clearance between the plunger and cylinder must not exceed 0.20 mm (0.008"), which can be measured with a feeler gauge as shown Fig. 40. If the clearance exceeds this value, test with a new plunger. If this does not help, the master cylinder must be replaced. Replace both the plunger seals. Otherwise any damaged or worn parts should be replaced.

ASSEMBLING

1. Fit the washer (15, Fig. 44) in the bottom of the cylinder.

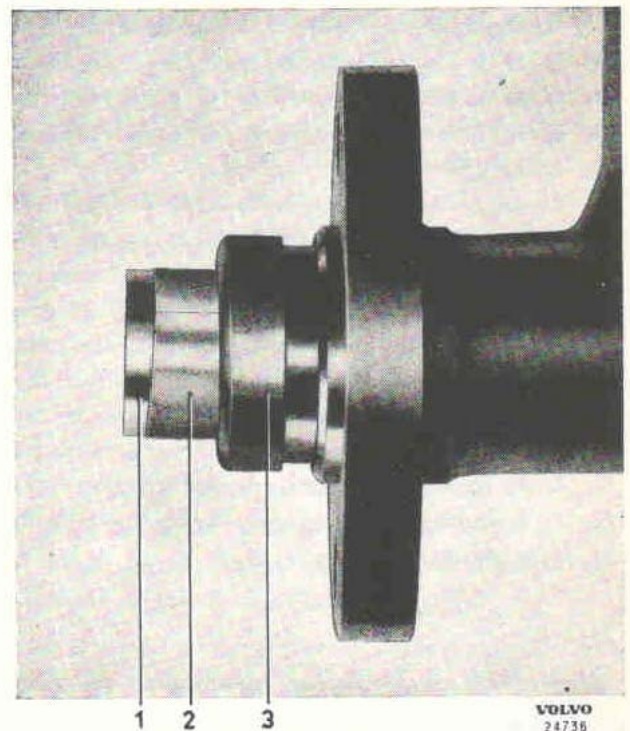
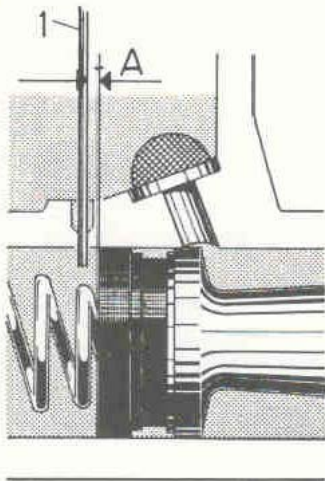


Fig. 45. Fitting the plunger.

- | |
|--------------------|
| 1. Plunger |
| 2. Brass foil |
| 3. Master cylinder |



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Fig. 46. Checking the equalizing hole.

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

Wheel unit cylinders

REMOVING, EARLY PRODUCTION

1. Remove the hub and brake shoes, see under "Dismantling the front wheel brake unit".
2. Disconnect the brake line and unscrew the wheel unit cylinder attaching screws. Lift off the cylinder.

REMOVING, LATE PRODUCTION

1. Remove the hub, see under "Dismantling the front wheel brake unit", page 10.
2. Place clip SVO 4047 over the wheel unit cylinder. Move the brake shoes to one side with the help of a screwdriver in order to release the plunger rods from the shoes, see Fig. 47.
3. Disconnect the brake line and unscrew the wheel unit cylinder attaching screws. Lift off the cylinder but make sure that no brake fluid gets onto the linings.

RECONDITIONING

Remove the clip, pull off the rubber seal and take out the plungers, seals and springs. Wash all parts in methylated spirits.



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Fig. 47. Removing the wheel unit cylinder.

2. Place the seal (12) on the spring guide. Dip the seal in brake fluid and fit it together with the spring and valve. Place the washer (11) in the cylinder.
3. Pull the seal (9) onto the plunger and turn it as shown in the figure. Dip the plunger in brake fluid and fit it. Be careful that the seal (9) is not damaged or bent over. It is advisable to use a piece of brass foil formed into a ring to act as a guide for the seal, see Fig. 45. Compress the spring and fit the push rod (5), washer (8) and circlip (7).
4. Check that the equalizing hole is clear by inserting a piece of 0.5 mm (25 s.w.g.) wire through the hole, see Fig. 46. It should then be possible to press the plunger in about 0.5 mm (0.020") before the wire is gripped. Take care not to damage the seal. Also check that the push rod (5) has a clearance between the plunger and washer. The clearance is about 1 mm (0.04") and is not adjustable.
5. Fit the rubber cover (6) after having filled it with special rubber grease.

INSTALLING

Installing is done in the reverse order to removing. Do not forget the split pin in the pedal stud. Fill up with brake fluid and air-vent in accordance with the instructions under "Air-venting the hydraulic system".

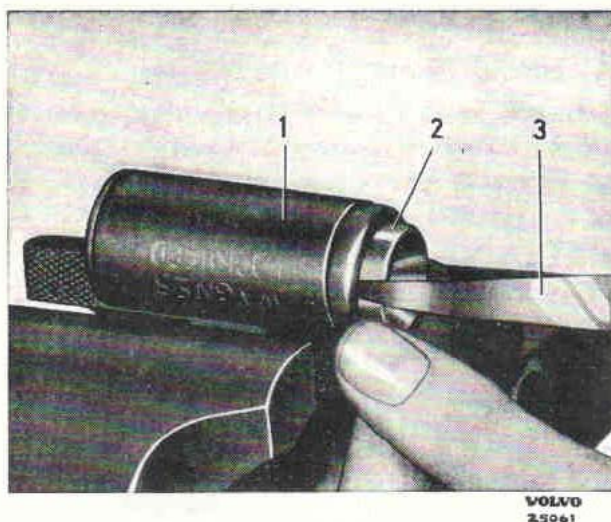


Fig. 48. Checking the clearance.

1. Wheel unit cylinder
2. Plunger
3. Feeler gauge

The cylinder must be examined thoroughly internally. There must be no scoring, scratches or rust spots on the polished surface. Such damage can as a rule be eliminated by honing the cylinder. Since the procedure for this varies with different machines, follow the instructions of the manufacturer concerned. Clean the cylinder thoroughly after honing, when the air-venting nipple should be removed.

The clearance between the plunger and cylinder must not exceed 0.25 mm (0.010"), which is measured as shown in Fig. 48. If the clearance exceeds this value, test with a new plunger. If this does not help, the wheel unit cylinder must be replaced.

Every time reconditioning is carried out, the seals and rubber covers should be replaced with new ones. Otherwise any damaged or worn parts should be replaced.

Assemble the parts in the reverse order to dismantling. Dip the plungers and seals in brake fluid.

INSTALLING

Installing is done in the reverse order to removing. When working on both front and rear wheel unit cylinders of late production, remember that these differ, see "Specifications". Air-vent the wheel unit cylinder.

Brake lines

The brake lines should be flushed through in connection with full reconditioning of the hydraulic system.

The lines are disconnected at the wheel unit cylinders one by one and flushed through with brake fluid or spirit. Flushing is preferably done by filling the master cylinder and then carrying out repeated braking movements with the pedal.

After having been flushed through with spirit, all the lines must be blown clean with moisture-free, filtered, compressed air, since the spirit can cause gas bubbles in the system, giving rise to a "spongy" pedal. In the event of leakage, or where the lines have been subjected to damage so that leakage is suspected, the damaged lines should be replaced. This is preferably done as follows:

1. Remove the damaged brake line.
2. Take a new genuine Volvo brake line, blow it clean internally with moisture-free, filtered, compressed air, and fit it. Make sure that the brake line is in such a position that it does not chafe during driving. Particularly important points to watch are those where the pipes pass the rear spring attachments on the rear axle, where they must not be closer than 10 mm ($\frac{3}{8}$ "), and where they pass the support arms. If the pipe is not bent correctly, it should be adjusted by hand before fitting. If bending is done after the pipe has been fitted, this often results in deformation at the connections.
3. Air-vent the hydraulic system.

Air-venting the hydraulic system

An indication that there is air in the system is that the brake pedal can be depressed with very little resistance or that it feels "spongy".

After any part of the system has been removed for repair, air-venting must be carried out. Air can also enter the system if there is insufficient brake fluid in the container. If, for example, only one wheel unit cylinder has been removed, it is usually sufficient just to air-vent this. If, on the other hand, the master cylinder or lines from this have been removed, then the whole system must be air-vented.

Air-venting the whole brake system is carried out as follows:

1. Clean round the filling plug on the master cylinder. Unscrew the plug and if necessary fill up with first-class brake fluid, i.e. that which fulfils the requirements according to SAE 70 R3.
2. Clean the air-venting nipple. Connect a hose on to the air-venting nipple and allow the other end of the hose to hang down in the fluid in a collecting vessel. If an air-venting key with hose is used, make sure that there is no leakage between the nipple and tool, as this can give misleading results. For early production front wheel brakes, key SVO 2280 is used, and for other brakes, SVO 1431.
3. Open the nipple and have someone depress the brake pedal slowly. Close the nipple before the pedal is released, otherwise air can be sucked in since there is no check valve between the master cylinder and lines. Repeat this procedure as long as there are air bubbles in the fluid running out.
4. Air-vent the other wheels in the same way. Check between every wheel that there is sufficient brake fluid in the container.

A special air-venting apparatus can also be used which maintains the fluid in the system under a certain pressure. In this case it is not necessary for the brake pedal to be operated, so that one man can carry out air-venting.

Leakage test

Once or twice a year, and when any hydraulic part has been removed, it is advisable to check the system for leaks. This can be done by placing the system under pressure by means of a pedal jack, after which all the hydraulic parts can be examined for leakage. It is even better if the test is done with a special pressure tester. This is connected to the hydraulic system and the pressure raised to a maximum of 100 kg/cm² (1420 lb/sq. in.). After 10 minutes, the pressure set on the gauge must not fall more than 10 % of the first reading, and should then remain constant. If there is the slightest leakage in the system, the pressure will drop.

If any leakage is discovered, the fault must be remedied before the car is taken into use.

BRAKE PEDAL

Adjusting the pedal position

The brake pedal should have a travel of about 140 mm (5 1/2") before reaching the floor. The travel can be measured, for example, when air-venting or by comparing with the clutch pedal. When the brake pedal is released, it should take up the same position as the clutch pedal, providing that this is correctly adjusted. The position is adjusted by slackening the locknut and turning the push rod for the master cylinder. Do not forget to tighten up the locknut again.

Replacing the pedal and bushes

See under "Reconditioning the pedal shaft", Service Manual, Part 4.

HANDBRAKE

Replacing the handbrake cable

REMOVING

1. Apply the handbrake, remove the hub cap, slacken the wheel nuts and castle nut.
2. Jack up the rear end, place blocks under the rear axle and remove the wheel. Release the handbrake.
3. Pull off the brake drum and hub with puller SVO 1791, see Fig. 15. Disconnect the cable from the brake shoe lever.
4. Remove the bolts for the cable outer casing attachment on the brake backing plate or the locking spring in the case of early production brakes. Remove the cable outer casing front attachment and the rubber support sleeve. Disconnect the cable from the clevis and pull out the cable. In the case of older type cables (up to chassis number 534), this is first pulled backwards so that the locking washer can be removed. If the guide sleeve and locking washer do not come out with the cable, knock the guide sleeve backwards with a narrow drift.

INSTALLING

1. Fit the rubber support sleeve on the cable outer casing and connect the cable to the clevis.
2. Thread the sealing ring over the cable spring (does not apply to cables with locking springs). Insert the cable through the brake backing plate. On older type cables, the guide sleeve and locking washer are then fitted. Connect the cable to the brake shoe lever.

3. Fit on the locking spring or tighten the bolts, whichever the case may be. Fit the cable outer casing attachment and make sure that the clamp enters the groove on the sleeve. If necessary, slacken the adjusting nuts. Fit the rubber support sleeve in its bracket.
4. Fit on the hub with brake drum and wheel. Tighten the castle nut and wheel nuts sufficiently for the drum and wheel to come into the correct position.
5. Adjust the handbrake. Lower the vehicle and tighten the wheel nuts to a torque of 10—14 kgm (70—100 lb. ft.). Tighten and lock the castle nut. Fit on the hub cap.

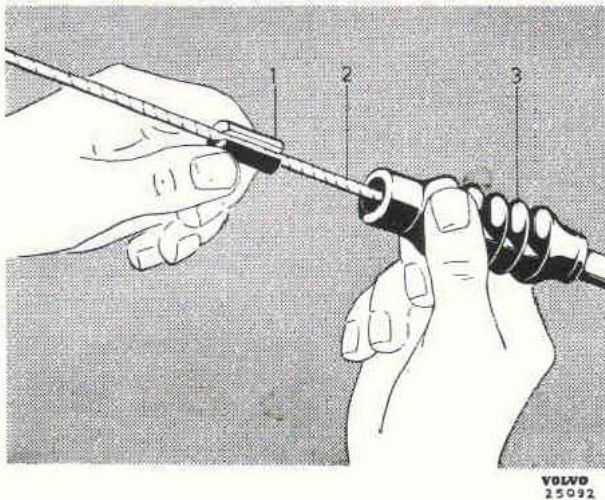


Fig. 49. Fitting the rubber cover.

1. Sealing plug
2. Cable
3. Rubber cover

Replacing the rubber cover

If the handbrake cable rubber cover has been damaged for any reason, it must be replaced, otherwise water and dirt can penetrate, causing rusting. For this purpose there is special rubber cover with sealing plug (part numbers 86850 and 86851 respectively). When replacing, the pull rod is removed from the lever and the cable disconnected from the clevis. Cut off the old cover and fit on the new one. Connect the cable to the clevis and refit the pull rod. Push the slotted sealing plug (1, Fig. 49) onto the cable (2) and then press it into the rubber cover (3).

Replacing the handbrake lever or ratchet parts

1. Jack up the rear end and place blocks under the rear axle.

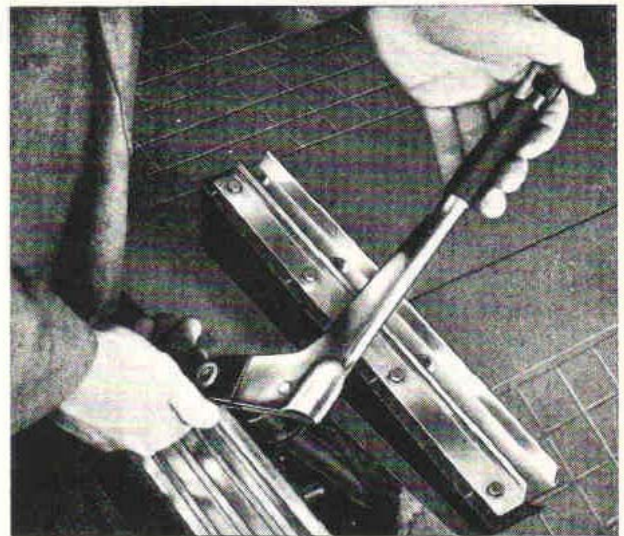


Fig. 50. Removing the handbrake lever.

2. Remove the split pin and pull the cable so that the pull rod (11, Fig. 51) can be disconnected from the lever. Remove the bracket (13).
3. Turn back the floor mat and remove the rubber cover over the ratchet segment. Remove the ratchet segment.
4. Move the handbrake lever towards the centre of the vehicle until it releases at the outer support. Remove the rubber seal and take out the lever complete with shaft, see Fig. 50.

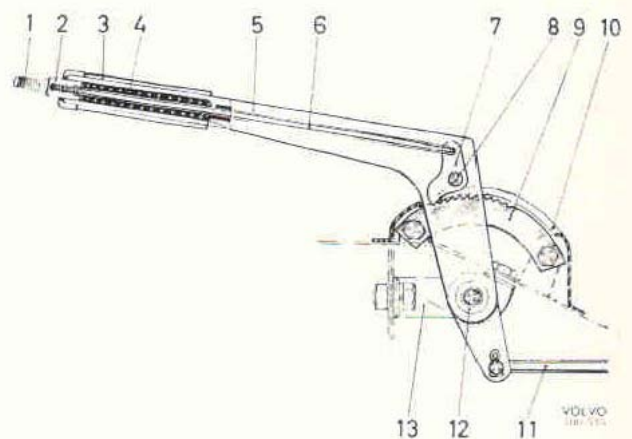


Fig. 51. Handbrake parts.

- | | |
|-------------|--------------------|
| 1. Loop | 8. Rivet |
| 2. Button | 9. Ratchet segment |
| 3. Handle | 10. Rubber cover |
| 4. Spring | 11. Pull rod |
| 5. Lever | 12. Bush |
| 6. Push rod | 13. Bracket |
| 7. Pawl | |

5. Screw out the locking screw and remove the loop (1, Fig. 51) and button (2). Take the spring (4) out of the lever. Remove the rivet (8) and take out the push rod (6) and pawl (7).
6. Fit the new parts in the reverse order, see Fig. 51. Make sure that the rivet is properly secured without the movement of the pawl being affected. Lubricate the bush with a thin coating of ball bearing grease. Do not forget to lock the pull rod and ensure that the rubber cover on the shaft seals properly.

Adjusting the handbrake

The handbrake should give full effect at the 4th—5th ratchet notch. If not, the handbrake should be adjusted. Before adjusting, make sure that the fault is not in the wheel brake units. On vehicles with late production wheel brake units (without self-adjusting), the rear wheel brakes should therefore be adjusted first.

The handbrake is adjusted by moving the clevis on the pull rod, see Fig. 52. Tighten the nuts well after adjusting.

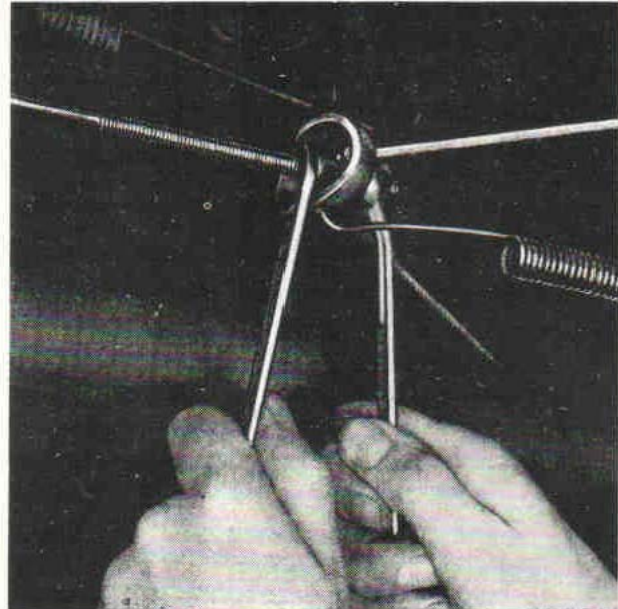


Fig. 52. Adjusting the handbrake (late production).

FAULT TRACING

FAULT	
REASON	REMEDY

NO OR POOR BRAKING EFFECT

Insufficient brake fluid in the system.
 Air in the hydraulic system.
 Leakage in the hydraulic system.
 Defective master cylinder.
 Incorrectly adjusted brakes.
 Unsuitable brake linings.
 Grease or oil on the brake linings.

Top up with brake fluid. Check for leakage. Air-vent.
 Air-vent the system.
 Check and repair the leakage. Air-vent.
 Re-condition the master cylinder.
 Adjust the brakes.
 Change over to genuine Volvo brake linings.
 Replace the brake linings. Check the oil seal.

THE CAR PULLS TO ONE SIDE WHEN BRAKING

Grease or oil on one of the brake linings.
 Different types of brake lining.
 Brakes unevenly adjusted.
 Out-of-round or uneven brake drum.
 Defective wheel unit cylinder.
 Excessive play in wheel bearings or faulty wheel alignment.
 Uneven tyre pressure.
 Tyres unevenly worn.

Replace the brake lining. Check the oil seal.
 Replace with the same type.
 Adjust the brakes.
 Replace the brake drum.
 Recondition the wheel unit cylinder.
 Adjust the front end.

 Adjust the tyre pressure.
 See Part 7.

THE BRAKES GRAB

Brakes badly adjusted.
 Moisture on the brake linings.

 Excessive play in wheel bearings.
 Brake linings worn out.
 Brake linings glazed.
 Damaged or loose brake linings.
 Loose brake backing plate.
 Out-of-round brake drum.
 Broken return spring.
 Wheel brake unit centring block damaged.
 Uneven sliding surfaces on the brake shoes and centring block.

Adjust the brakes.
 Apply the brakes several times, after which the trouble will disappear.
 Adjust the bearings.
 Replace the linings.
 Replace the linings and repair the leakage.
 Replace the linings.
 Tighten the brake backing plate.
 Replace the brake drum.
 Replace the spring.
 Replace the centring block.
 Clean up the sliding surfaces.

THE BRAKES BIND ON ONE OF THE WHEELS

Brakes incorrectly adjusted.
 Broken return spring.
 Handbrake cable binds.
 Brake line to the wheel blocked or damaged.
 Excessive play in wheel bearings.

Adjust the brakes.
 Replace the spring.
 Lubricate or replace the cable.
 Clean or replace the line.
 Adjust the bearings.

THE BRAKES BIND ON ALL WHEELS

Brakes incorrectly adjusted.
 During very cold weather: poor quality brake fluid.
 Equalizing hole in late production master cylinder blocked up.

Adjust the brakes.
 Change the brake fluid.
 Recondition the master cylinder.

THE BRAKES SQUEAL

Brake linings worn out.
 Dirt in the brake drums.
 Vibrating brake drums.

Replace the linings.
 Clean the drums and the linings.
 Fit damping springs on the outside of the drums.

TOOLS

The following special tools are required for repairs to the brake system.

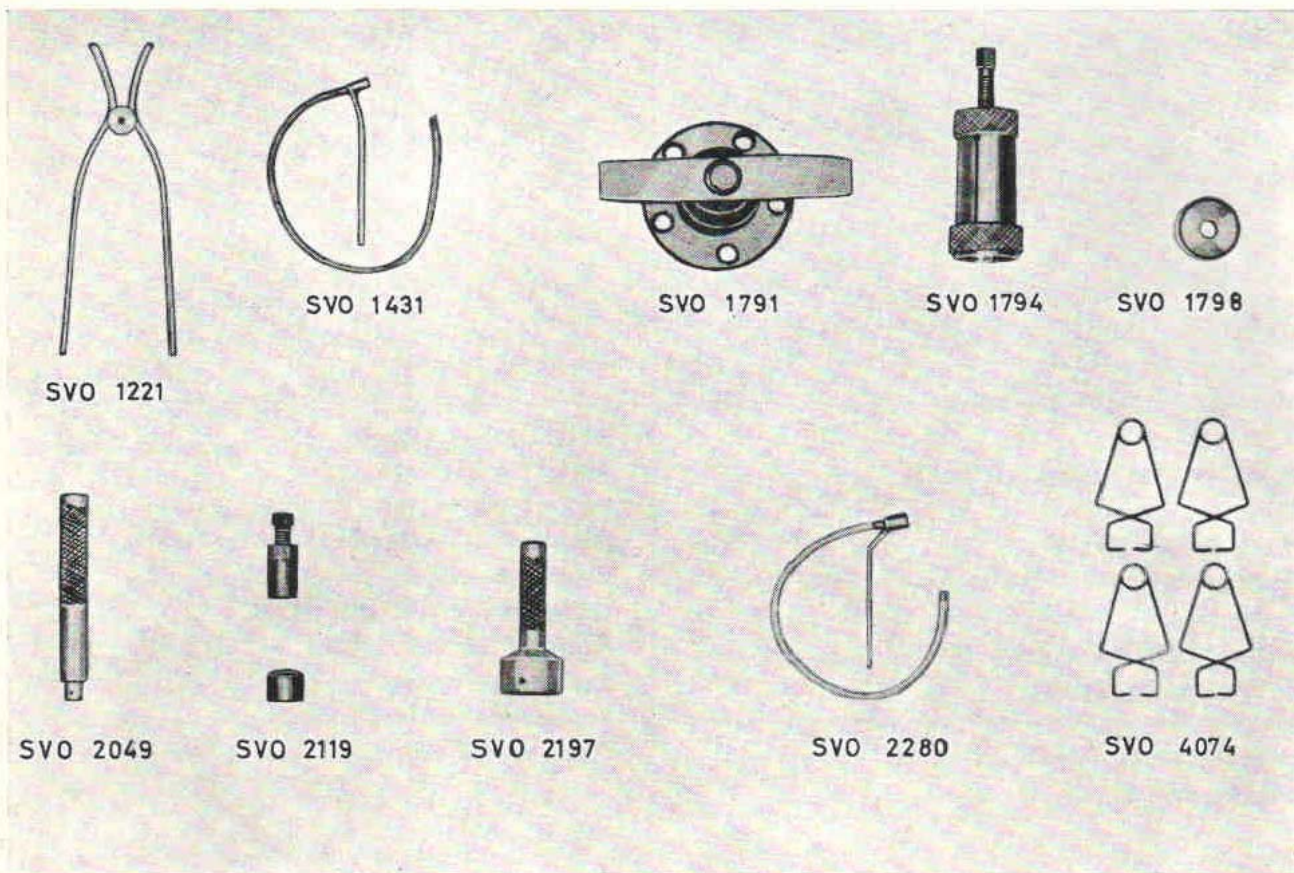


Fig. 53. Special tools.

VOLVO
100 587

- | | | | |
|----------|---|----------|---|
| SVO 1221 | Pliers for lower spring, rear wheel brakes, early production. | SVO 2119 | Staking tool for cam pin, early production. |
| SVO 1431 | Key for air-venting nipple. | SVO 2197 | Drift for removing and fitting grease cap for front wheel hub. |
| SVO 1791 | Puller for hub with brake drum. | SVO 2280 | Key for air-venting nipple, front wheel brakes, early production. |
| SVO 1794 | Puller for inner bearing on stub axle. | SVO 4074 | Spring clips for wheel unit cylinder. |
| SVO 1798 | Drift for fitting oil seal in front wheel hub. | | |
| SVO 1801 | Standard handle. | | |

SPECIFICATIONS

Wheel brake units

EARLY PRODUCTION

Brake drum, diameter	9" (228.6 mm)
radial throw, max.	0.15 mm (0.006")
Brake linings:	
Width	2"
Thickness	$\frac{3}{16}$ "
Length, front wheels	260 mm (10 $\frac{1}{4}$ ")
rear wheels, front shoe	260 mm (10 $\frac{1}{4}$ ")
rear shoe	200 mm (7 $\frac{7}{8}$ ")
Effective area, front wheels	520 cm ² (80.6 sq. in.)
rear wheels	465 cm ² (72.1 sq. in.)
total	985 cm ² (152.7 sq. in.)
Return spring for brake shoe:	
Necessary pull for a total length of:	
154 mm (6 $\frac{1}{16}$ "), front wheels	13.5—20.5 kg (29.7—45.1 lb.)
rear wheels	15.5—20.5 kg (34.1—45.1 lb.)
Clearance between the brake lining and drum	0.1 mm (0.004")
Rivets for brake linings, size	$\frac{9}{64} \times \frac{5}{16}$ " (3.5 × 8 mm)

LATE PRODUCTION

Brake drum, diameter, front wheels	10" (254 mm)
rear wheels	9" (228.6 mm)
radial throw, max.	0.15 mm (0.006")
Brake linings, riveted, type I:	
Width	2"
Thickness, rear lining, front wheels	$\frac{1}{4} \times \frac{3}{16}$ " (ground)
others	$\frac{3}{16}$ "
Length, front wheels, front shoes	275 mm (10 $\frac{53}{64}$ ")
rear shoes	275 mm (10 $\frac{53}{64}$ ")
rear wheels, front shoes	250 mm (9 $\frac{27}{32}$ ")
rear shoes	250 mm (9 $\frac{27}{32}$ ")
Effective area, front wheels	560 cm ² (86.8 sq. in.)
rear wheels	508 cm ² (78.7 sq. in.)
total	1068 cm ² (165.5 sq. in.)
Brake linings, riveted, type II:	
Width	2"
Thickness, rear linings, front wheels	$\frac{1}{4} \times \frac{3}{16}$ " (ground)
others	$\frac{3}{16}$ "
Length, front wheels, front shoes	192 mm (7 $\frac{9}{16}$ ")
rear shoes	250 mm (9 $\frac{27}{32}$ ")
rear wheels, front shoes	212 mm (8 $\frac{11}{32}$ ")
rear shoes	250 mm (9 $\frac{27}{32}$ ")
Effective area, front wheels	497 cm ² (77 sq. in.)
rear wheels	451 cm ² (70 sq. in.)
total	948 cm ² (147 sq. in.)
Rivets for brake linings, size	$\frac{9}{64} \times \frac{5}{16}$ " (3.5 × 8 mm)

Brake linings, bonded type:

Width	2"
Thickness, rear linings, front wheels	$\frac{1}{4} \times \frac{3}{16}$ " (ground)
others	$\frac{3}{16}$ "
Length, front wheels, front shoes	190 mm ($7 \frac{31}{64}$ ")
rear shoes	245 mm ($9 \frac{41}{64}$ ")
rear wheels, front shoes	165 mm ($6 \frac{1}{2}$ ")
rear shoes	220 mm ($8 \frac{21}{32}$ ")
Effective area, front wheels	441 cm ² (68.4 sq. in.)
rear wheels	398 cm ² (61.7 sq. in.)
total	839 cm ² (130.1 sq. in.)

Hydraulic system

MASTER CYLINDER

Bore, early production	$\frac{7}{8}$ " (22.23 mm)
late production	$\frac{7}{8}$ " (22.23 mm)
Clearance between plunger and cylinder,	
early production	max. 0.15 mm (0.006")
late production	max. 0.20 mm (0.008")
Tightening torque for adjusting nuts for master cylinder	
push rod	1.1—1.2 kgm (8—9 lb. ft.)

WHEEL UNIT CYLINDERS

Bore, front wheels, early production	$\frac{7}{8}$ " (22.23 mm)
late production	1" (25.4 mm)
rear wheels, early production	$\frac{7}{8}$ " (22.23 mm)
late production, type I	$\frac{13}{16}$ " (20.64 mm)
type II	$\frac{7}{8}$ " (22.23 mm)
Clearance between plunger and cylinder	max. 0.25 mm (0.010")

BRAKE LINES

External diameter	$\frac{3}{16}$ "
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