

PART 5

BRAKES

C3-series

SERVICE MANUAL

CONTENTS

Group 50 General

Data	1
Tools	2
Description	3
Service Procedures	3
Cleaning	3
Brake fluid	3
Testing brakes with roller tester	4
Hydraulic test with testing device	4
Fault-tracing scheme (for brake test)	6
Brake test without aids	7

Group 51 Brake shoes, drums and linings

Description	1
Service Procedures	1
Adjusting the wheel brakes	1
Servicing the front wheel brakes	2
Servicing the rear wheel brakes	3

Group 52 Hydraulic service brakes

Description	1
Master cylinder	2
Wheel cylinders	3
Warning valve	4
Brake pedal	5
Brake system warning devices	5
Service procedures	6
Master cylinder	6
Wheel cylinders	9
Brake lines	10
Brake fluid reservoirs	11
Brake pedal	11
Pedal journalling	11
Warning valve	12
Contact for stop lights	12
Contact for brake pedal travel	13
Hydraulic system (bleeding)	13

Group 54 Auxiliary brakes

Description	1
Service Procedures	4
Servo unit	4
One-way valve	5
Air cleaner	5

Group 55 Parking brake

Description	1
Service Procedures	2
Adjusting the parking brake	2
Propeller shaft brake	2
Parking brake mechanism	3
Parking brake wire	3

GROUP 50 GENERAL

Data

SERVICE BRAKES

Wheel brakes

Type	Drum brakes
Brake drum:	
Diameter, nominal	279.4 mm (11")
max.	282.4 mm (11.12")
Radial throw, max.	0.1 mm (0.004")
Brake linings:	
Type	Mintex, bonded
Effective area per front wheel	414 cm ² (64 in ²)
per rear wheel	256 cm ² (40 in ²)
total	1340 cm ² (208 in ²)

Wheel cylinder, front wheels:

Nominal diameter	28.57 mm (1.125")
Bore, max.	28.68 mm (1.129")
Piston diameter, min.	28.42 mm (1.120")
Clearance, piston — cylinder, max.	0.26 mm (0.01")

Wheel cylinder, rear wheels:

Nominal diameter	31.75 mm (1.250")	25.40 mm (1.000")
Bore, max.	31.84 mm (1.254")	25.51 mm (1.004")
Piston diameter, min.	31.58 mm (1.243")	25.25 mm (0.994")
Clearance, piston — cylinder, max.	0.26 mm (0.01")	0.26 mm (0.01")

Master cylinder

Type	Tandem cylinder
Nominal diameter	28.57 mm (1.125")
Bore, max.	28.68 mm (1.129")
Piston diameter, min.	28.42 mm (1.120")
Clearance, piston — cylinder, max.	0.26 mm (0.01")

Brake lines

Outer diameter	3/16"
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Warning valve

Pressure difference for warning function	0.5–1.5 MPa (5–15 kp/cm ² = 71–213 lbf/in ²)
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Servo unit

Designation	Lockheed type 7
Control piston, diameter	9.5 mm (3/8")
Min. hydraulic pressure for servo operation (cut-out point)	0.32 MPa (3.2 kp/cm ² = 45 lbf/in ²)
Reduction	approx. 1:4

PARKING BRAKE

Brake drum

Diameter, nominal	250 mm (9.84")
max.	253 mm (10.0")
Radial throw, max.	0.1 mm (0.004")
Imbalance, max.	4 mNm (40 gcm)

Brake linings:

Type	Jurid, bonded
Effective area	176 cm ² (27 in ²)

Return spring:

Outer diameter, upper spring	11.2 mm (0.44")
lower spring	8 mm (0.32")
Pulling power for 1 cm (0.39") extension,	
upper spring	180 N (18 kp = 40 lbf)
lower spring	50 N (5 kp = 11 lbf)

Tools

The special tools shown in Figs. 50-1 and 50-2 are used for repairs on the brake system.

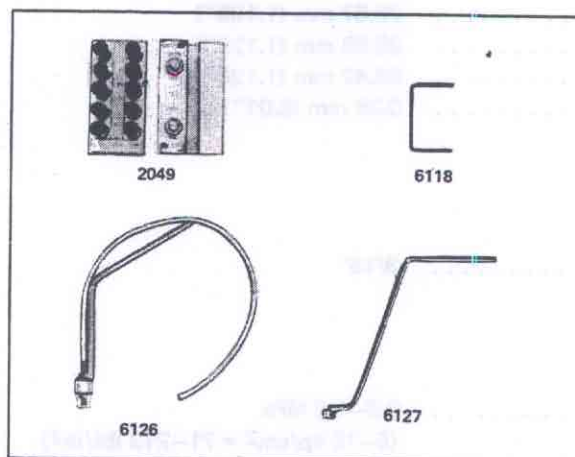


Fig. 50-1 Special tool

2049 Flanging tool

6118 Protective bracket for wheel cylinder, rear wheels

6126 Bleeder tool

6127 Spanner for adjusting rear wheel brakes

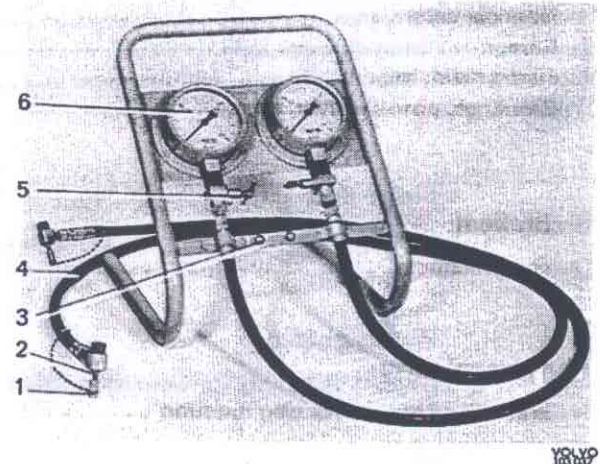


Fig. 50-2. Test device, 2741

1. Protective cap
2. Connection nipple
3. Expansion nipple

4. Hose
5. Bleeding device
6. Pressure gauge

For tightening up loose brake lines, use cap nut 945752 for the external thread and 945753 for the internal thread. In both cases the cap nuts are supplemented with rubber buffer 1210673, Fig. 50-3.

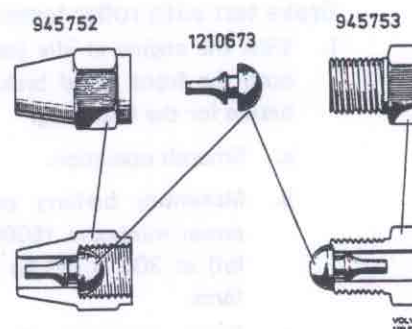


Fig. 50-3. Sealing nipples

Description

The vehicle has two brake systems independent of each other, the service brakes and parking brake.

The service brakes are vacuum-hydraulic drum brakes. The hydraulic part of these brakes as well as the control and operating devices are dealt with under

Group 52. The vacuum section is dealt with under Group 54, and the brake shoes and brake drums under Group 51.

The parking brake is mechanical and operates on the propeller shaft. It is dealt with under Group 55.

Service Procedures

Cleaning

The components of the hydraulic brake system must be cleaned in clean brake fluid or denaturalized spirit which does not contain benzene (benzole).

Petrol, white spirit, trichloroethylene or spirit with benzene must not be used for the cleaning since these as well as the slightest drop of mineral oil will attack the rubber seals and cause them to swell out. For this reason, wash your hands with soap and water before touching the internal parts of the system. The mechanic appointed to work on the hydraulic components should be provided with natural rubber gloves.

The final cleaning should be done in a cleaning agent free from impurities, after which the parts can be dried with air. Filtered compressed air free from water can be used to precipitate the drying and complete the cleaning. It is important that no spirit residues are left in the system when it is filled with brake fluid. Traces of spirit in the brake fluid lowers its boiling point and can give rise to vaporization and functional disturbance.

After cleaning and drying the components, coat them with brake paste, assemble them and then fill the complete unit with brake fluid as soon as possible in order to prevent attacks from rust through moisture in the air. This applies to units which are to be immediately installed in the vehicle. To counteract corrosion on brake components which are put in

stock, pistons, cylinders and seals should be coated with a light layer of brake paste. Under no circumstances whatsoever may 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 meet the requirements according to the standard SAE J 1703 or DOT 3 may be used for the brake system.

When filling the brake fluid reservoirs, as well as with all work with connections, etc, observe the greatest cleanliness in order to prevent dirt getting into the system. The system should only be filled with clean, unused brake fluid. Any brake fluid that is expelled during bleeding may not be put back into the system.

After being in use a long time, it is normal that even first-class brake fluid gradually deteriorates due to the absorption of moisture and minor impurities. Thus, deteriorated brake fluid can be recognized by the fact that, compared with new brake fluid, it is darker or has altered its colour, it is relatively free from the smell which new brake fluid has, and when rubbed between the fingers it lacks the normal feeling of a light lubricating film. Such brake fluid should be replaced with new brake fluid. This also applies after doing any reconditioning on the master cylinder and wheel cylinders.

Brake test with roller tester

1. With the engine at idle (servo assistance), check both the front wheel brakes and the rear wheel brakes for the following:
 - a. Smooth operation.
 - b. Maximum braking power. Total braking power minimum 15000 N (1500 kp = 3300 lbf) at 300 N (30 kp = 66 lbf) brake pedal force.
 - c. Brake application time. Braking should be obtained within 1/2 second after the brake pedal has been depressed.
 - d. Brake release time. Braking power 0 within 1/2 second after brake pedal has been released.
 - e. Check that the contact for the brake pedal travel is functioning properly by switching in the circuit by hand.

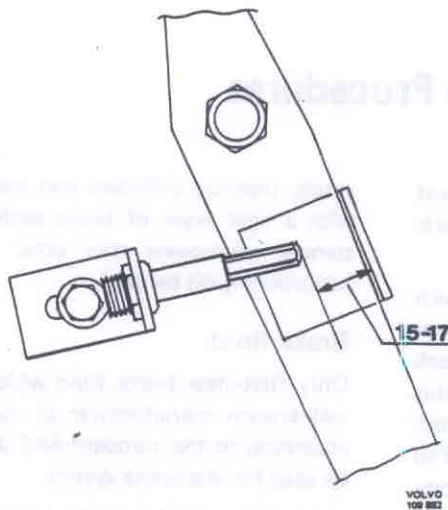


Fig. 50-4. Contact for brake pedal travel

If a fault is discovered during the test, supplementary fault tracing can be done by repeating the checks with the engine switched off (that is without servo assistance).

NOTE! Re-set the contact for the brake pedal travel by pushing the pin back to the rest position.

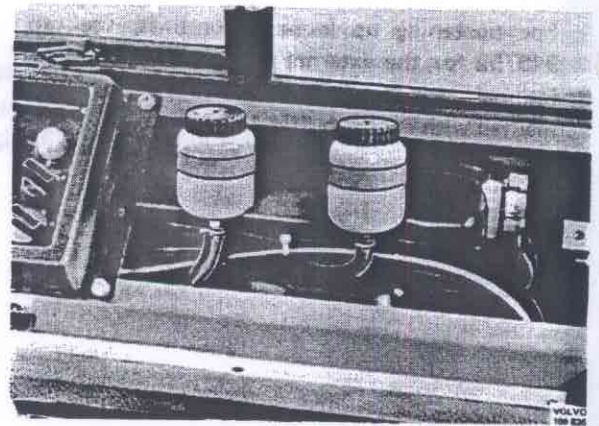


Fig. 50-5. Brake fluid reservoirs

Hydraulic test with test device

Special tool: 2741 Test device

Check to make sure that the brake fluid reservoirs are full, see Fig. 50-5.

Unscrew the bleeder nipples at rear wheels and connect it to the test device shown on Fig. 50-2. Connect up according to Fig. 50-6. If necessary, bleed the test device.

Depress the brake pedal several times in order to even out any vacuum in the servo units and in this way disengage them.

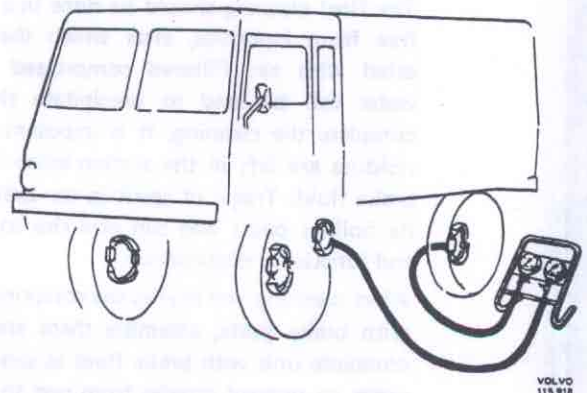


Fig. 50-6. Connecting up the test device

Leakage and pressure checks

2. With a pedal jack on the brake pedal, apply the service brakes to a hydraulic brake pressure of about 10 MPa ($100 \text{ kp/cm}^2 = 1422 \text{ lbf/in}^2$). Check lines and components for damage and leakage. The pressure should remain unchanged for at least 15 seconds.
3. Remove the brake pedal jack. Apply and release the footbrake while reading the test device gauges. The pressure in both the circuits should be similar. At 10 MPa ($100 \text{ kp/cm}^2 = 1422 \text{ lbf/in}^2$), the pressure in both the circuits may not differ more than 0.3 MPa ($3 \text{ kp/cm}^2 = 43 \text{ lbf/in}^2$). The pressure should drop to about 0.1 MPa ($1 \text{ kp/cm}^2 = 14 \text{ lbf/in}^2$) within 1/2 second after the pedal has been released.
4. Start the engine and stop it after it has been run at least 1 minute. Adjust the brake pedal jack to a hydraulic pressure of 2.5 MPa ($25 \text{ kp/cm}^2 = 355 \text{ lbf/in}^2$). Wait 2 minutes. The hydraulic pressure should not alter during this time more than 0.5 MPa ($5 \text{ kp/cm}^2 = 71 \text{ lbf/in}^2$).

Warning valve (only Swedish market)

Disconnect the electric cable from the contact for the pedal travel, see Fig. 50-7.

5. Depress the brake pedal several times in order to disengage the servo units. Connect a hose to one of the bleeder nipples on the test device and open the nipple. Turn the ignition key and check that the warning lamp goes on when the parking brake is applied.

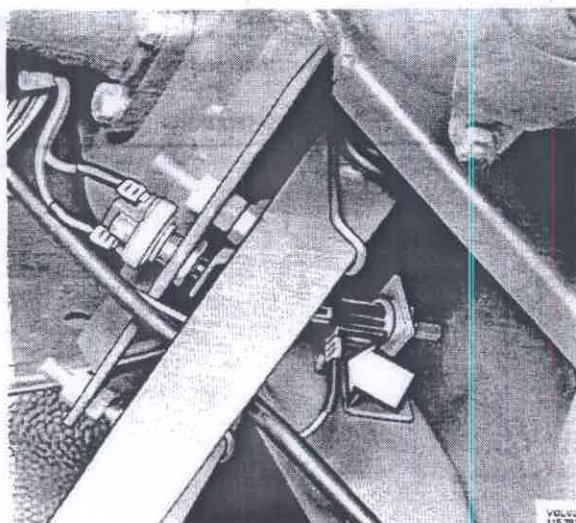


Fig. 50-7. Contact for pedal travel

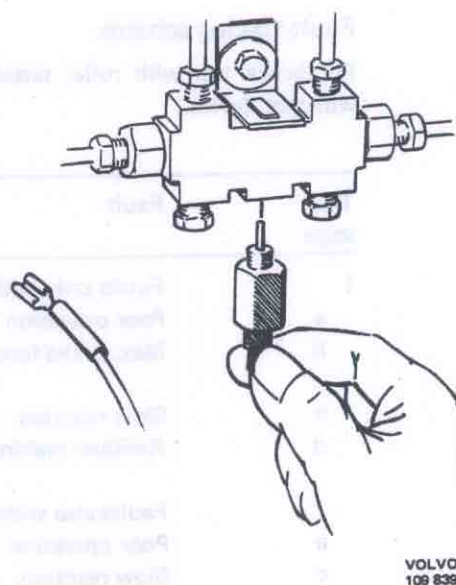


Fig. 50-8. Removing the contact

Release the parking brake. Carefully apply the service brakes with a brake pedal jack. When the warning lamp goes on, check the pressure on the gauge. The lamp should light at a pressure difference of 0.5–1.5 MPa ($5\text{--}15 \text{ kp/cm}^2 = 71\text{--}108 \text{ lbf/in}^2$) between the circuits.

After the test, close the bleeder nipple and remove the brake pedal jack. Connect the contact for the pedal travel. NOTE: Disconnect the electric cable and screw out the contact, Fig. 50-8, so that the warning valve returns to normal position. Screw in the warning contact carefully (approx. 15 Nm = 1.5 kpm = 11 lbf·ft). Reconnect the electric cable.

Servo units

6. Depress the brake pedal several times to disengage the servo units. Apply the service brakes with a brake pedal gauge to a hydraulic pressure of 2 MPa ($20 \text{ kp/cm}^2 = 284 \text{ lbf/in}^2$). Read off the brake pedal gauge. Start the engine and apply the brakes until the brake pedal gauge gives the same reading as before. Read off the hydraulic gauge, which will then indicate the servo pressure. At maximum servo effect, the pressure should be 8 MPa ($80 \text{ kp/cm}^2 = 1138 \text{ lbf/in}^2$), that is a reduction of 1:4.

Fault-tracing scheme

For brake test with roller tester and hydraulic test with test device.

Test stage	Fault	Reason
1	Faults only with servo assistance	
a	Poor operation	Servo units
b	Max. brake force too low,	one wheel Wheel brake both wheels Servo units
c	Slow reaction	Servo units
d	Residual braking	Servo units
	Faults also without servo assistance	
a	Poor operation	Wheel brakes
c	Slow reaction,	one wheel Wheel brake both wheels Master cylinder or wheel brakes
d	Residual braking,	one wheel Wheel brake both wheels Master cylinder or wheel brakes
2	Pressure drops	Leaking brake line Wheel cylinder Master cylinder
3	Lagging pressure Brake-release period greater than 1/2 second	Pinched brake line Wheel cylinders Master cylinder
4	Pressure drops more than 0.5 MPa (5 kp/cm ² = 71 lbf/in ²) Pressure increases more than 0.5 MPa (5 kp/cm ² = 71 lbf/in ²)	One-way valve Servo units Servo units
5	Parking brake warning lamp does not go on Service brakes warning lamp does not go on Warning at pressure difference other than 0.5–1.5 MPa (5–15 kp/cm ² = 71–213 lbf/in ²) Warning lamp does not go out after being re-set	Electrical components Contact on warning valve Warning valve Warning valve
6	Faulty servo pressure	Servo units