VOLVO SERVICE

PART 5

BRAKES

C3-series

SERVICE MANUAL

CONTENTS

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"

Warning valve

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

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.

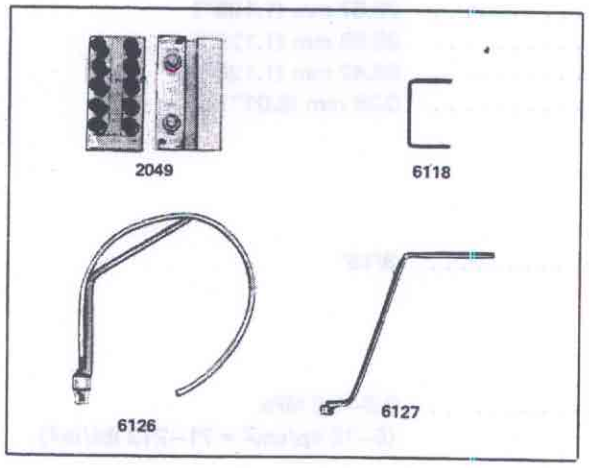

Fig. 50–1 Special tool

2049 Flanging tool
6118 Protective bracket for wheel cylinder, rear wheels
6126 Bleeder tool
6127 Spanner for adjusting rear wheel brakes

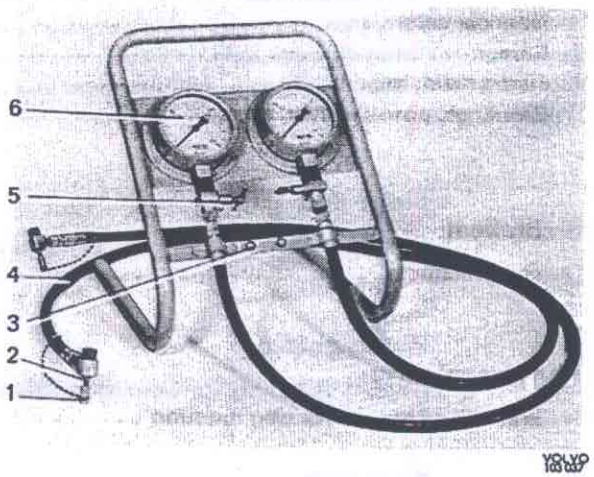

Fig. 50–2. Test device, 2741

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.

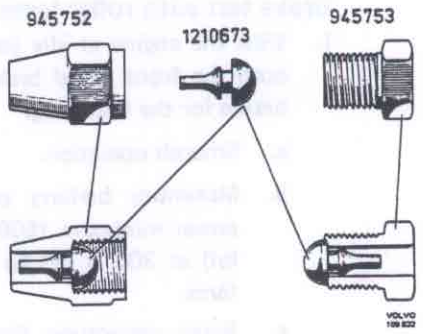

Fig. 50–3. Sealing nipples

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 benzane (benzole).

Petrol, white spirit, trichloroethylene or spirit with benzane 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 inpurities, 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 impotant 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 vapourization 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.

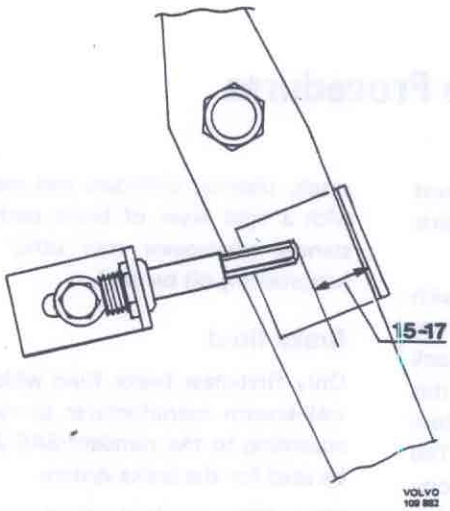

Fig. 50—4. Contact for brake pedal travel

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.

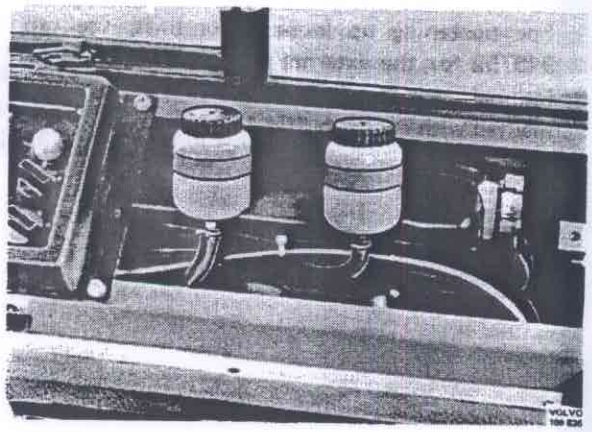

Fig. 50—5. Brake fluid reservoirs

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 vaccum in the servo units and in this way disengage them.

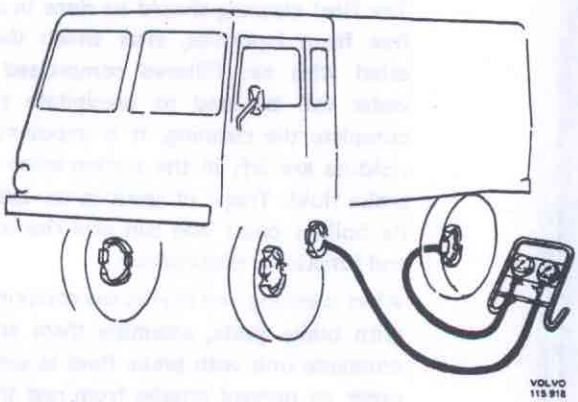

Fig. 50—6. Connecting up the test device

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 kp/cm^2 = 1422 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 kp/cm^2 = 1422 lbf/in^2), the pressure in both the circuits may not differ more than 0.3 MPa (3 kp/cm^2 = 43 lbf/in^2). The pressure should drop to about 0.1 MPa (1 kp/cm^2 = 14 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 kp/cm^2 = 355 lbf/in^2). Wait 2 minutes. The hydraulic pressure should not alter during this time more than 0.5 MPa (5 kp/cm^2 = 71 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.

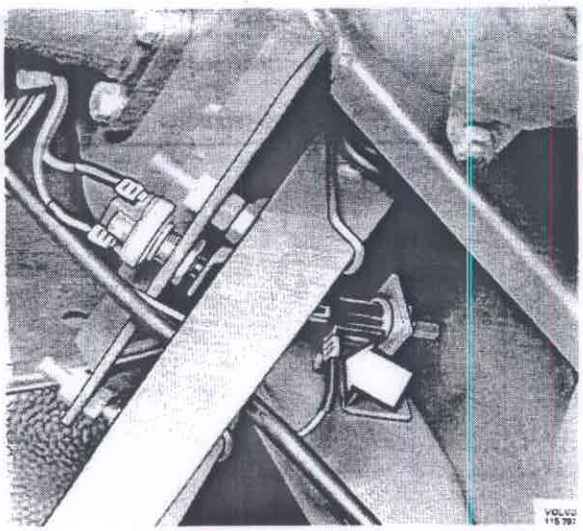

Fig. 50–7. Contact for pedal travel

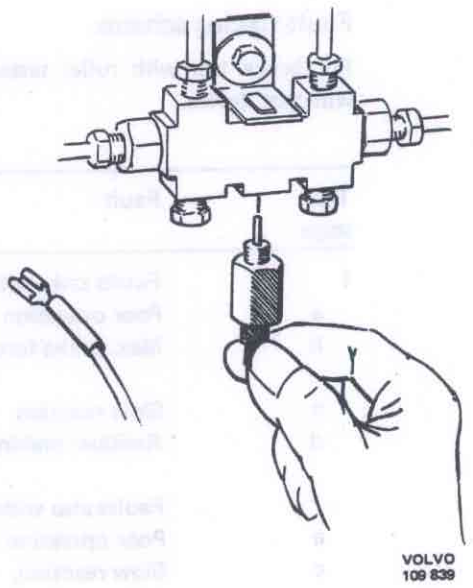

Fig. 50–8. Removing the contact

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 (5–15 kp/cm^2 = 71–108 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 lbftf). 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 kp/cm^2 = 284 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 kp/cm^2 = 1138 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)		One-way valve Servo units
	Pressure increases more than 0.5 MPa (5 kp/cm^2 = 71 lbf/in^2)		Servo units
5	Parking brake warning lamp does not go on		Electrical components
	Service brakes warning lamp does not go on		Contact on warning valve
	Warning at pressure difference other than 0.5–1.5 MPa (5–15 kp/cm^2 = 71–213 lbf/in^2)		Warning valve
	Warning lamp does not go out after being re-set		Warning valve
6	Faulty servo pressure		Servo units