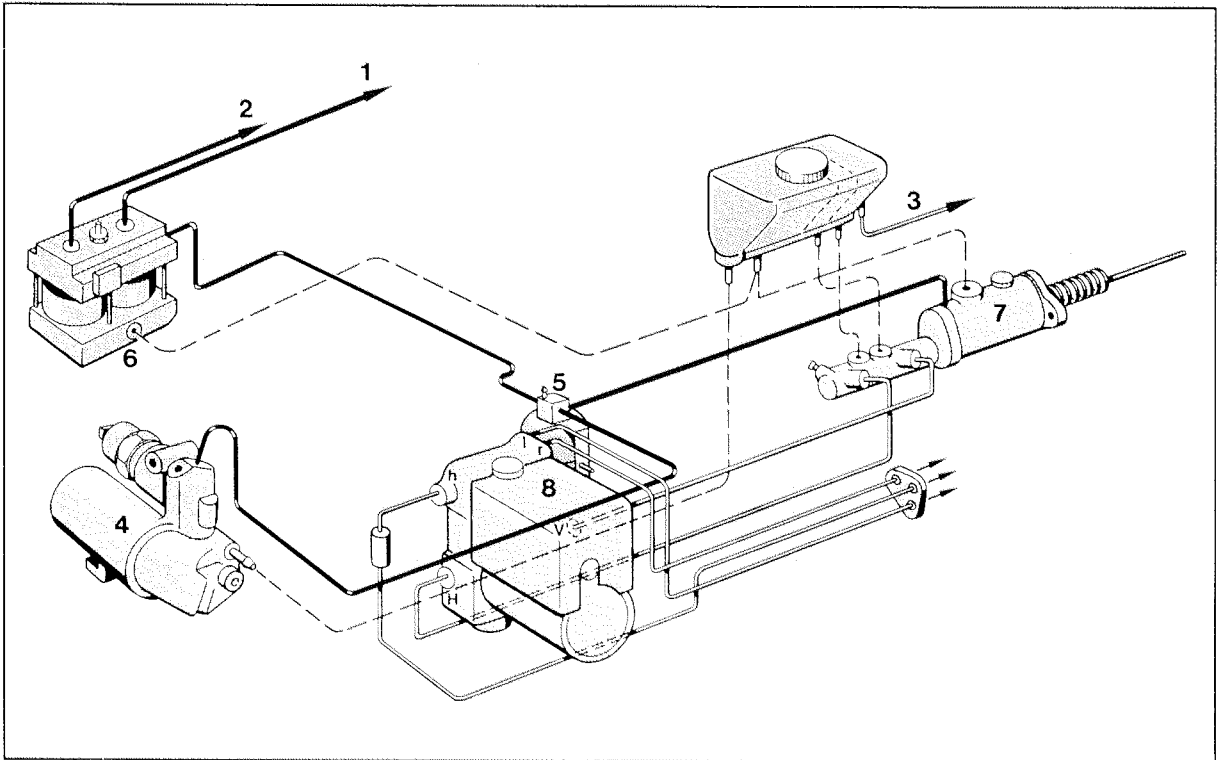


Replacing Brake Fluid / Bleeding Brakes and Lock Control

General Information

Since brake master cylinder circuits, consisting of the push rod circuit (for front axle) and intermediate piston circuit (for rear axle) with the ABS hydraulic control unit, are completely independent of the booster circuit (brake booster and lock control), brake fluid replacing and bleeding procedures are divided into different jobs (see next page).



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- ==== Brake master cylinder circuits (exception 3)
- ==== Booster circuit (brake booster and lock control)
- Return / feed or intake end
- 1 + 2 To axial and lateral lock cylinders (Q and L)
- 3 Feed to clutch master cylinder
- 4 Pump assembly
- 5 Pressure reservoir
- 6 Valve assembly (solenoids for axial and lateral locks)
- 7 Brake booster
- 8 ABS hydraulic control unit

Information

- Use only new brake fluid DOT 4.
Total brake fluid change quantity approx. 1.6 l.
- **Brake fluid change interval and fluid grade have been modified as of MY '93.** For details, refer to page 47 - 101 (911 Carrera 2).
- The brake fluid reservoir is subdivided into chambers approx. as from the middle section downwards.

Procedure/subdivision

1. Brake fluid change (brake, lock control and clutch) /
Bleed brake master-cylinder circuits*.
2. Bleed lock cylinders and pressure lines *insofar as the hydraulic system was opened after the valve block for lock actuation.*
3. Bleed the lock or brake booster circuit *insofar as parts of the booster circuit were replaced or if the system (also suction side of the pump assembly) was opened.*

Further to 1: (Brake fluid change)*

The brake fluid change is subdivided into two steps.

- 1st step: Change brake fluid of the brake master-cylinder circuits and clutch hydraulics (conventional). Also valid for bleeding of the brake master-cylinder circuits and clutch hydraulics.
- 2nd step: Change the brake fluid of the booster circuit (brake booster and lock control).
Operate the lock solenoid valve with system tester 9288 and remove brake fluid at each lock cylinder.

* Bleeding the brake master-cylinder circuit and the clutch hydraulics:
Same procedure as for 1st step for the brake fluid change.

Use of an electric filling and bleeding machine is recommended to guarantee fast and practical **replacement of the brake fluid**.

- Pour new brake fluid in the supply tank until the level reaches the upper edge. Connect bleeder on the supply tank. **Clamp the overflow hose (venting) with a hose clamp.**
Switch on bleeding machine.
- A bottle must be used to catch the escaping brake fluid and therefore be able to check it for dirt and air bubbles as well as to determine the brake fluid consumption. Change volume for each wheel: approx. 250 cc. Bleed on both bleeder valves of each wheel.
- Also drain about 50 to 100 cc of brake fluid on the bleeder valve of the clutch slave cylinder.
- **Switch off and disconnect the bleeding machine.**
Remove hose clamp on the overflow hose (venting).

Note

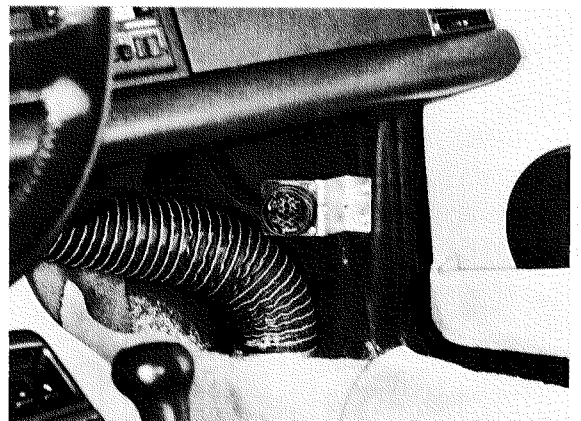
The rear underside trim panel must first be removed for the next step (booster circuit). If applicable for reasons of space, unscrew and also remove the engine splash guard. In addition, the battery should be in well charged condition.

- Connect System Tester 9288 in conjunction with connecting lead 9288/1 in the diagnostics socket in the passenger's footwell (underneath a cover).

Turn on ignition and tester. Select type of vehicle and PDAS system afterwards. Then go into the drive menu.

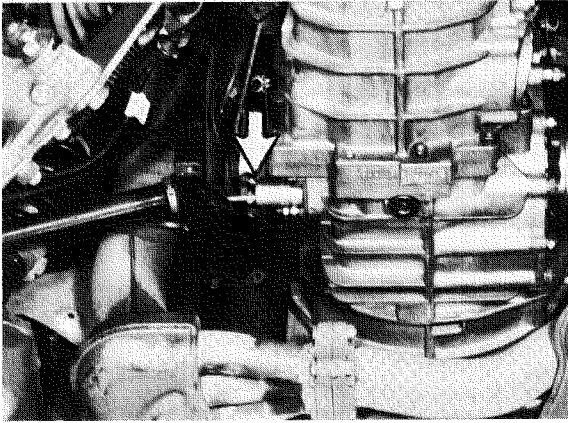


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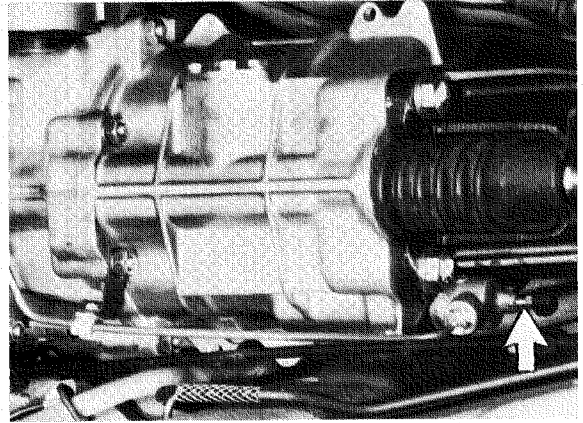
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- **Select the bleeding position in the drive menu.** Unscrew bleeder valve on the lateral lock cylinder and **drain about 250 to 300 cc (max. 300 cc) of brake fluid** after pressing the start key displayed in the tester.
Press stop key and tighten the bleeder valve.
Go into the pressure discharging position with the tester.



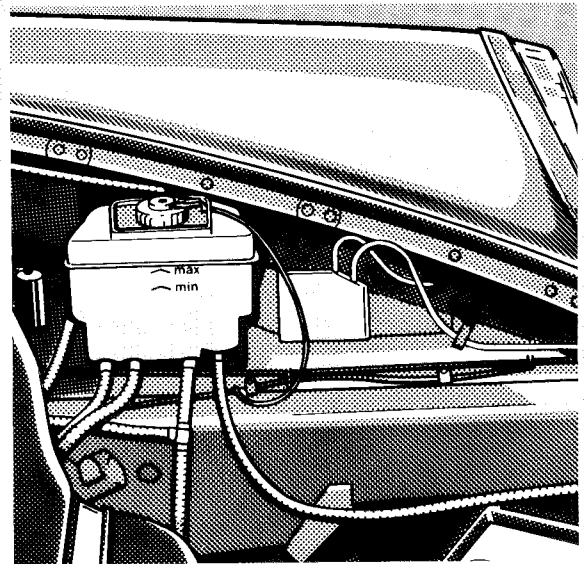
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- **Pour in new brake fluid.** Operate the brake pedal several times while the ignition remains turned on.
- Afterwards activate the solenoids again with a 9288 System Tester (bleeding position in the drive menu) and **drain about 200 cc of brake fluid** on the bleeder valve of the **axial lock cylinder**.



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- Disconnect system tester.
- Correct the brake fluid level.
This requires operating the brake pedal first so many times (with the ignition on) until the pump assembly is operated.
Correct the brake fluid level only after the pump assembly has been switched off.
Never pour in so much brake fluid that the level is above the "max." mark.



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Further to 2: (Bleeding the lock cylinders and pressure lines)

Information

These instructions apply only if:

- the longitudinal or transverse lock cylinder has been replaced
- the hydraulic system was opened after the valve block (solenoid valves for longitudinal and transverse locks)
- it is suspected that the bleeding condition of the lock control (lock actuating) is not optimum.

Explanation:

Checking of the bleeding condition in the workshop is too time-consuming or not possible. For this reason, perform bleeding again if in doubt.

If the pump assembly, pressure accumulator or the valve block has been replaced or removed, these instructions are not sufficient. Other work must be performed previously.

Description as from Page 47-6.

The underbody cladding must be dismantled at the rear for the following steps.

For space reasons, undo or also dismantle the assembly under-protection if necessary. In addition, the battery should be in well-charged condition.

Bleeding

- Fill the fluid reservoir with new brake fluid up to the top edge.
- Connect the system tester 9288 to the diagnosis socket (right in the passenger footwell) with the connecting cable 9288/1.
- **Switch on ignition and tester. Select vehicle type and then the system PDAS. Go into the drive link menu.**
- **Select the item "Bleeding" in the drive link menu.** Open the bleeder valve on the transverse lock cylinder and remove brake fluid after pressing the start key indicated by the tester.
Continue bleeding until brake fluid free of air bubbles emerges (max. 300 cm³). Press the stop key and close the bleeder valve.
Change to pressure reduction position with the tester.
- **Fill with the new brake fluid (depending on quantity removed).**
- Then operate the solenoid valve again with the system tester 9288 (in the drive link menu / item "Bleeding") and **also remove brake fluid at the bleeder valve of the longitudinal lock cylinder until the fluid is free of air bubbles (remove max. 300 cm³).**
- Disconnect the system tester and correct the brake fluid level (refer to Page 47-4). **Do not fill over the "max. marking" under any circumstances.**

Further 3: (Bleeding the lock or brake booster circuit)

Information

Bleeding is divided into three steps. The first step can be omitted where appropriate.

1st step: Preparatory measures for first assembly or re-installation

2nd step: Bleeding the pressure accumulator and the valve block

3rd step: Bleeding the lock cylinders and pressure lines (as on Page 47 - 5)

In the case of replacement or removal of the pump assembly, pressure accumulator and valve block, these instructions (procedures) must be observed exactly. If a different procedure is followed, heavy foaming of the brake fluid may occur.

When working on the booster circuit (for removal and installation of corresponding parts), first depressurize this circuit.

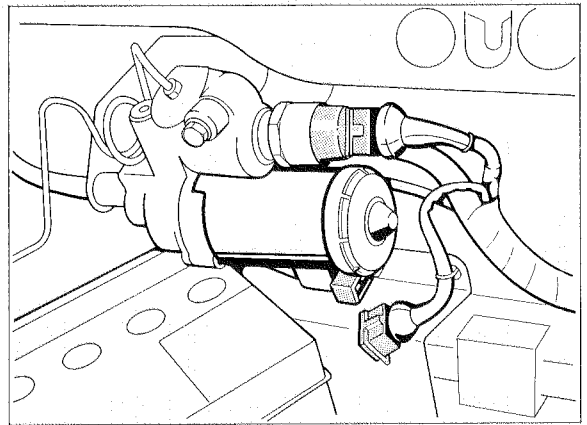
To do this, disconnect the electrical plug on the pressure pump (pump assembly) (refer to drawing 348-47) and then operate the brake pedal approx. 25 times.

To remove and plug in the electrical plug, press in the center on the plug locking clip.

Preparatory measures for first assembly or reinstallation

This work step (1st step) is required only in the event of replacement or re-installation of the pump assembly, pressure accumulator and valve block. In addition, it is also necessary if the suction line has been opened or if the fluid reservoir was previously empty. Otherwise, start with the 2nd step. (Bleeding the pressure accumulator and the valve block).

- Ensure that the electrical plug at the pressure pump (pump assembly) has been disconnected.



348-47

- Immediately after assembly of the parts, fill the fluid reservoir with new brake fluid up to the top edge. Connect the bleeding device to the fluid reservoir.
Clamp off the overflow hose (ventilation) with a hose clamp.
Switch on the bleeding device. Bleeding pressure approx. 1.5 bar.

Note

The brake pedal must not be operated as long as the bleeding device is connected, otherwise the return line may be forced out of the rubber plug of the brake booster.

Continue with bleeding the pressure accumulator and valve block.

Bleeding the pressure accumulator and valve block (step 2)

If step 1 was not performed, discharge any accumulator pressure. To do this, disconnect the electrical plug at the pressure pump (pump assembly) and **slowly open** the bleeder valve at the pressure accumulator with connected collection bottle.

Hold the bleeding hose firmly.

Caution:

A pressure of up to 180 bar exists at the bleeder nipple of the solenoid valve and also at that of the pressure accumulator. Open the bleeder valve only very carefully. Ensure that the bleeder hose is securely fitted!

Wear protective goggles and protective gloves.

If not already done (if the system was already depressurized), **connect the collection bottle to the pressure accumulator bleeder valve and open the valve.**

Move the steering/ignition-starter lock to position 1 (necessary for pump operation). Plug the electrical plug onto the pump. As soon as no air bubbles are visible any more at the transparent bleeder line of the collection bottle, disconnect the electrical plug and close the bleeder valve.

Note

Insofar as the filling and bleeding device is not connected (is required only for step 1), always check the fluid level in the fluid reservoir between the bleeding operations and top up with new brake fluid if necessary.

Open the bleeder valve at the valve block.

Plug the electrical plug onto the pump. Disconnect the electrical plug and close the bleeder valve as soon as the brake fluid emerges without air bubbles.

Now completely fill the pressure accumulator (bleeder valves closed). For this purpose, connect the electrical plug. As soon as the pump has audibly switched off, **disconnect the electrical plug** and completely discharge the pressure at the bleeder valve of the pressure accumulator. Slowly open the bleeder valve and hold the bleeder hose tightly.

Caution: A pressure of up to 180 bar is present.

Wear protective goggles and protective gloves.

Repeat the last operation (completely fill the pressure accumulator and then completely drain the accumulator pressure) approx. 1-2 times (brake fluid must be free of air bubbles).

- **Also bleed the valve block in the same way (as for the pressure accumulator) approx. 1-2 times.**
- When it is guaranteed that bleeding has been performed so that there are no longer any air bubbles, securely tighten the bleeder valves and plug the electrical plug onto the pump.
Ensure that the plug engages properly.
- **Switch off the bleeding device if appropriate and disconnect. Also remove the hose clamp from the overflow hose (ventilation).**
- Press the brake pedal several times. (The bleeding device must not be connected.)
- Continue with bleeding the lock cylinders and pressure lines.

Bleeding the lock cylinders and pressure lines (step 3)

In the following work step, the solenoid valves are operated with the system tester 9288. The high pressure present at the solenoid valves is thus supplied in pulse form into the pressure lines and to the lock cylinders via the check valves.

Remove brake fluid at the bleeder valves of the lock cylinders until no air bubbles appear anymore. (Top up fluid reservoir in between if necessary).

The exact work sequence is described on Page 47-5.