2 Brake hydraulic system - bleeding

Warning:
Brake fluid is poisonous; wash it off immediately and thoroughly in the case of skin contact, and seek immediate medical advice if any fluid is swallowed or gets into the eyes. Certain types of brake fluid are flammable, and may ignite when allowed into contact with hot components; when servicing any hydraulic system, it is safest to assume that the fluid is flammable, and to take precautions against the risk of fire as though it is gasoline that is being handled. Brake fluid is also an effective paint stripper, and will attack plastics; if any is spilled, it should be washed off immediately using large amounts of fresh water. Finally, it is hygroscopic (it absorbs moisture from the air) - old fluid may be contaminated and unfit for further use. When topping-up or replacing the fluid, always use the recommended type, and ensure that it comes from a freshly-opened container.

Warning:
BMW specifies pressure bleeding as the only acceptable method for bleeding the brake system. Do NOT rely on any other bleeding method.

Warning:
On models with All Season Traction (AST), bleeding of the brakes should be entrusted to a BMW dealer or other qualified repair shop.

General

1 The correct operation of any hydraulic system is only possible after removing all air from the components and circuit; this is achieved by bleeding the system.

2 During the bleeding procedure, add only clean, unused brake fluid of the recommended type; never re-use fluid that has already been bled from the system. Ensure that sufficient fluid is available before starting work.

3 If there is any possibility of incorrect fluid being already in the system, the brake components and circuit must be flushed completely with uncontaminated, correct fluid, and new seals should be installed on the various components.

4 If brake fluid has been lost from the system, or air has entered because of a leak, ensure that the fault is cured

before continuing further.

5 Park the vehicle on level ground, switch off the engine and select first or reverse gear, then chock the wheels and release the parking brake.

6 Check that all lines and hoses are secure, unions tight and bleed screws closed. Clean any dirt from around the bleed screws.

7 Unscrew the master cylinder reservoir cap, and top the master cylinder reservoir up to the “MAX” level line; install the cap loosely, and remember to maintain the fluid level at least above the “MIN” level line throughout the procedure, or there is a risk of further air entering the system.

Bleeding sequence

8 If the system has been only partially disconnected, and suitable precautions were taken to minimize fluid loss, it should be necessary only to bleed that part of the system.

9 If the complete system is to be bled, then it should be done working in the following sequence:

A. Right-hand rear brake.

B. Left-hand rear brake.

C. Right-hand front brake.

D. Left-hand front brake.

10 Conventional brake bleeding relies on brake pedal pressure. Pressure bleeding uses air pressure on the brake fluid in the master cylinder to push the fluid from the reservoir into the master cylinder, through the brake hoses and lines, and out to the calipers. There are two general types of pressure bleeders: those that use a hand-operated pump, and more expensive models that use compressed air. Pressure bleeders might also be available at some tool rental yards.

11 The following procedure is only a general guide to pressure bleeding. Be sure to read and follow the manufacturer’s instructions for your specific pressure bleeder.

12 Make sure that the master cylinder reservoir is filled to the MAX mark on the side of the reservoir, then hook up the pressure bleeder in accordance with the manufacturer’s instructions.

13 Place a box wrench over the bleeder screw nut on the right rear caliper, hook up a short section of clear plastic tubing to the bleeder screw and insert the other end of the tube into a suitable container **(see illustration)** . Do not open the bleeder screw yet.

2.13 When bleeding the brakes, a hose is connected to the bleeder valve at the caliper and then submerged in brake fluid - air will be seen as bubbles in the container and in the tube (all air must be expelled before continuing to the next wheel)

14 Pressurize the system to about 14.5-psi. **Caution:** *Do not pressurize the system beyond 29 psi. Higher pressure will damage the reservoir.*

15 With an assistant holding down the brake pedal, open the bleeder screw with the wrench. Have your assistant slowly pump the brake pedal about a dozen times with the bleeder screw open. Tell your assistant to hold down the pedal on the last stroke. When the fluid being expelled from the caliper is free of bubbles, close the bleeder screw. Your assistant can now release the brake pedal. **Caution:** *While the bleeder screw is open, make sure that the plastic tube remains immersed in the fluid in the container. Failure to do so might allow air to enter the system.*

16 Detach the plastic tube from the bleeder screw, remove the box wrench and move them to the left rear caliper. Refill the brake fluid reservoir and repressurize the system to 14.5 psi and repeat this procedure for the right rear caliper.

17 After the left rear caliper has been bled, repeat this procedure for the right front caliper, and then for the left front caliper.

18 When bleeding is complete, and firm pedal feel is restored, wash off any spilled fluid, tighten the bleed screws securely, and install their dust caps.

19 Check the brake fluid level in the master cylinder reservoir, and top-up if necessary (Chapter 1).

20 Discard any brake fluid that has been bled from the system; it will not be suitable for re-use.

21 Check the feel of the brake pedal. If it feels at all spongy, air must still be present in the system, and further bleeding is required. Failure to bleed satisfactorily after a reasonable repetition of the bleeding procedure may be due to worn master cylinder seals.