2 Brake hydraulic system - bleeding

Warning:
If the high-pressure hydraulic system linking the master cylinder, hydraulic (DSC) unit and (where equipped) accumulator has been disturbed, then bleeding of the brakes should be entrusted to a BMW dealer or other qualified brake shop. They will have access to the special service tester which is needed to operate the ABS modulator pump and bleed the high-pressure hydraulic system safely.

Warning:
Wear eye protection when bleeding the brake system. If the fluid comes in contact with your eyes, immediately rinse them with water and seek medical attention.

Caution:
Don't allow brake fluid to come into contact with the paint as it will damage the finish.

Note:
Bleeding the brake system is necessary to remove any air that's trapped in the system when it's opened during removal and installation of a hose, line, caliper, wheel cylinder or master cylinder .

General

1 It will probably be necessary to bleed the system at all four brakes if air has entered the system due to low fluid level, or if the brake lines have been disconnected at the master cylinder.

2 During the bleeding procedure, add only clean, unused brake fluid of the recommended type (see Chapter 1); never re-use fluid that has already been bled from the system. Ensure that sufficient fluid is available before starting work.

3 If the system has been filled with the incorrect fluid, the brake system must be flushed completely with uncontaminated, correct fluid, and new seals should be installed to the various components.

4 If fluid has been lost from the system, or air has entered because of a leak, ensure that the problem is fixed before continuing.

5 Park the vehicle on level ground, switch off the engine and place the transmission in Park (automatic), or First or Reverse (manual). Block the wheels and release the parking brake.

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

7 Remove the master cylinder reservoir cap and fill the reservoir with brake fluid. Reinstall the cap. **Note:** *Check the fluid level often during the bleeding operation and add fluid as necessary to prevent the fluid level from falling low enough to allow air bubbles into the master cylinder.*

8 There are a number of one-man, do-it-yourself brake bleeding kits currently available from auto parts stores. It is recommended that one of these kits is used whenever possible, as they greatly simplify the bleeding operation, and reduce the risk of expelled air and fluid being drawn back into the system. If such a kit is not available, the basic (two-man) method must be used.

9 If a kit is to be used, prepare the vehicle as described previously, and follow the kit manufacturer's instructions, as the procedure may vary slightly according to the type being used.

10 Whichever method is used, the same sequence must be followed (Steps 11 and 12) to ensure the removal of all air from the system.

Bleeding sequence

11 If a brake line was disconnected only at a wheel, then only that caliper or wheel cylinder must be bled. If a brake line is disconnected at a fitting located between the master cylinder and any of the brakes, that part of the system served by the disconnected line must be bled.

12 If the complete system is to be bled, then it should be done in the following order:

- Right rear brake
- Left rear brake
- Right front brake
- Left front brake

Warning:
After bleeding the system on models with Dynamic Stability Control (DSC), the operation of the braking system should be checked by a BMW dealer or suitably-equipped specialist.

Bleeding

Basic (two-man) method

13 Have an assistant on hand, as well as a supply of new brake fluid, an empty clear plastic container, a length of plastic, rubber or vinyl tubing to fit over the bleeder valve and a wrench to open and close the bleeder valve.

14 Beginning at the right rear wheel, remove the dust cap and loosen the bleeder screw slightly, then tighten it to a point where it's snug but can still be loosened quickly and easily. Place one end of the tubing over the bleeder screw fitting and submerge the other end in brake fluid in the container.

15 Ensure that the master cylinder reservoir fluid level is maintained at least above the MIN level line throughout the procedure.

16 Have the assistant depress the brake pedal several times, then hold it in the depressed position.

17 While the pedal is held depressed, open the bleeder screw just enough to allow a flow of fluid to leave the valve. Watch for air bubbles to exit the submerged end of the tube. When the fluid flow slows after a couple of seconds, tighten the screw and have your assistant release the pedal. Recheck the reservoir level.

18 Repeat Steps 16 and 17 until no more air is seen leaving the tube, then tighten the bleeder. Be sure to check the fluid in the master cylinder reservoir frequently. If the master cylinder has been drained and refilled, and air is being bled from the first screw in the sequence, allow about 5 seconds between cycles for the master cylinder passages to refill.

19 When no more air bubbles appear, tighten the bleeder screw securely, remove the tube and wrench, and reinstall the dust cap. Do not overtighten the bleeder screw.

20 Repeat the procedure on the remaining screws in the sequence, until all air is removed from the system and the brake pedal feels firm again.

Using a one-way valve kit

21 These kits consist of a length of tubing, with a one-way valve attached to prevent expelled air and fluid being drawn back into the system; some kits include a translucent container, which can be positioned so that the air bubbles can be more easily seen flowing from the end of the tube **(see illustration)** .

2.21 Bleeding a rear brake caliper using a one-way valve kit

22 Connect the kit to the bleeder screw, then open the bleeder screw. Depress the brake pedal with a smooth, steady stroke, and slowly release it; repeat this step until the expelled fluid is clear of air bubbles.

23 Remember to check the master cylinder reservoir fluid level; ensure that it is maintained at least above the MIN level line at all times.

Using a pressure-bleeding kit

24 These kits are usually operated by the reservoir of pressurized air contained in a small chamber that can be metered. However, it will probably be necessary to reduce the pressure to a lower level than normal; refer to the instructions supplied with the pressure bleeder. **Note:** *BMW specifies that a pressure of 29 psi should not be exceeded in the brake hydraulic system.*

25 By connecting a pressurized, fluid-filled container to the master cylinder reservoir, bleeding can be carried out simply by opening each screw in turn (in the specified sequence), and allowing the fluid to flow out until no more air bubbles can be seen in the expelled fluid.

26 This method provides an additional safeguard against air being drawn into the system during bleeding.

27 Pressure- bleeding is particularly effective when bleeding difficult systems, or when bleeding the complete system at the time of routine fluid replacement.

All methods

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

29 Check the fluid level in the master cylinder reservoir, and top-off if necessary (see Chapter 1).

30 Discard any fluid that has been bled from the system; it is contaminated and cannot be reused.

31 Check the operation of the brakes. The pedal should feel solid when depressed, with no sponginess. If necessary, repeat the entire process. If the system cannot be bled of all air after several attempts, it may be a sign of worn master cylinder seals. **Warning:** *Do not operate the vehicle if you are in doubt about the effectiveness of the brake system. It is possible for air to become trapped in the anti-lock brake system hydraulic control unit, so, if the pedal continues to feel spongy after repeated bleedings or the BRAKE or ANTI-LOCK light stays on, have the vehicle towed to a dealer service department or other qualified shop to be bled with the aid of a scan tool.*

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