# 6 Clutch 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 quantities 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.

**Note:**
The manufacturer recommends that pressure-bleeding equipment is used to bleed the clutch hydraulic system.

## 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 and clutch 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 proceeding further.

5 To improve access, apply the parking brake, then jack up the front of the vehicle and support it securely on axle stands.

6 Where applicable, remove the underbody shield for access to the transmission bellhousing.

7 Check that the clutch hydraulic pipe(s) and hose(s) are secure, that the fittings are tight, and that the bleed screw on the rear of the clutch release cylinder (mounted under the vehicle on the lower left-hand side of the transmission bellhousing) is closed. Clean any dirt from around the bleed screw.

8 Unscrew the brake fluid reservoir cap, and top the fluid 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. Note that the brake fluid reservoir feeds both the brake and clutch hydraulic systems.

9 It is recommended that pressure- bleeding equipment is used to bleed the system. Alternatively, there are a number of one-man, do-it-yourself brake bleeding kits currently available from auto parts stores. These kits greatly simplify the bleeding operation, and also 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, which is described in detail below.

10 If pressure- bleeding equipment or a one-man kit is to be used, prepare the vehicle as described previously, and follow the equipment/kit manufacturer’s instructions, as the procedure may vary slightly according to the type being used; generally, they are as outlined below in the relevant sub-section.

11 Whichever method is used, the same basic process must be followed to ensure removal of all air from the system.

## Bleeding - basic (two-man) method

12 Obtain a clean glass or plastic jar, a length of plastic or rubber tubing which is a tight fit over the bleed screw, and a box-end wrench to fit the screw. The help of an assistant will also be required.

13 Where applicable, remove the dust cap from the bleed screw. Place the wrench and tube on the screw, place the other end of the tube in the jar, and pour in sufficient fluid to cover the end of the tube.

14 Ensure that the reservoir fluid level is maintained at least above the “MIN” level line throughout the procedure.

15 Open the bleed screw, then have the assistant fully depress the clutch pedal and hold it to the floor. Fluid and air will flow into the jar.

16 When the flow stops, tighten the bleed screw and have the assistant release the pedal slowly, then recheck the reservoir fluid level.

17 Repeat the steps given in Steps 15 and 16 until the fluid emerging from the bleed screw is free from air bubbles.

18 When no more air bubbles appear, tighten the bleed screw securely. Do not overtighten the bleed screw.

19 Temporarily disconnect the bleed tube from the bleed screw, and move the container of fluid to one side.

20 Unscrew the two securing nuts, and withdraw the release cylinder from the bellhousing, taking care not to strain the fluid hose.

21 Reconnect the bleed tube to the bleed screw, and submerge the end of the tube in the container of fluid.

22 With the bleed screw pointing vertically upwards, unscrew the bleed screw (approximately one turn), and slowly push the release cylinder pushrod into the cylinder until no more air bubbles appear in the fluid.

23 Hold the pushrod in position, then tighten the bleed screw.

24 Slowly allow the pushrod to return to its rest position. Do not allow the pushrod to return quickly, as this could cause air to enter the release cylinder.

25 Remove the tube and wrench, and install the dust cap on the bleed screw.

26 Install the release cylinder and tighten the nuts to the specified torque.

## Bleeding - using a one-way valve kit

27 As their name implies, these kits consist of a length of tubing with a one-way valve 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.

28 The kit is connected to the bleed screw, which is then opened. The user returns to the driver's seat, depresses the clutch pedal with a smooth, steady stroke, and slowly releases it; this is repeated until the expelled fluid is clear of air bubbles.

29 Note that these kits simplify work so much that it is easy to forget the reservoir fluid level; ensure that this is maintained at least above the "MIN" level line at all times.

## Bleeding - using a pressure-bleeding kit

30 These kits are usually operated by the reservoir of pressurized air contained in the spare tire. However, note that it will probably be necessary to reduce the pressure to a lower level than normal; refer to the instructions supplied with the kit.

31 By connecting a pressurized, fluid-filled container to the fluid reservoir, bleeding can be carried out simply by opening the bleed screw, and allowing the fluid to flow out until no more air bubbles can be seen in the expelled fluid.

32 This method has the advantage that the large reservoir of fluid provides an additional safeguard against air being drawn into the system during bleeding.

## All methods

33 When bleeding is complete, and firm pedal feel is restored, wash off any spilled fluid, check that the bleed screw is tightened securely, and install the dust cap.

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

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

36 Check the feel of the clutch pedal. If it feels at all spongy or soft, 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 or release cylinder seals.

37 On completion, where applicable install the underbody shield and lower the vehicle to the ground.