

The first step is to check out all the mechanical components of your hydraulic braking system. Then follow either of these bleeding procedures to remove any air bubbles that may be in the system.

MECHANICAL CHECKS & OTHER TIPS

- Hydraulic hoses should not be more than -3 (3/16 ID). Only -3 flexible hose is suitable. Steel tubing should be either Bundy weld type or S/S annealed 3/16 x .035 welded or seamless hydraulic line.
- All lines must be secured to resist vibration. Do not allow any interference with the wheel or suspension system components at any position of wheel lock, bump, or droop.
 - Brake pedals should be rigidly mounted. Under panic conditions you can exert more than 300 pounds on a brake pedal.
 - Be sure master cylinder reservoirs are big enough to allow pads or lines to fully wear before the fluid level gets about 1/2 inch above the bottom of the reservoir.
 - Brake fluid. Use DOT-3, or better (wet boiling point) and DOT-4, or better, (dry boiling point). The specifications are on the can.

- WARNING--Silicone brake fluid is NOT suitable for high temperature racing application. It has two problems. ONE--gassing off or boiling of rubber swelling additives. TWO--at high temperatures silicone fluid has four times the compressibility of glycol based fluids. It becomes "spongy". The hotter it gets the more spongy, until the pedal goes to the floor! If you are unaware of this characteristic this is a hard one to find out why. Because when the silicone fluid cools off it returns to normal compressibility!!!!**
- Minimize the exposure of glycol based fluids to the air. Particularly on humid days. All glycol based fluids are hygroscopic. That is they absorb water. Do not shake a can of brake fluid--EVER. Shaking will introduce air into the fluid. This is a no-no.

BRAKE BLEEDING PROCEDURES

THREE PERSON METHOD

- Obtain some short lengths of clear plastic hose of a size that will slip tightly over the bleed screws. You can get this stuff at a hardware, aquarium store. Then get two clear glass bottles. If your car uses two master cylinders, with or without a balance bar, both the front and rear systems must be bled at the same time. This is necessary to make sure the master cylinder makes full strokes.
- This will require three people. One for a front brake, one for a rear brake, and one for the master cylinder position.
- Begin the procedure by pouring in enough fluid into each glass jar and connect the short plastic bleed hose to the bleed screws of the most distant (from the master cylinder) front and rear brake bleed screws. Be sure there is always enough fluid in the jars to cover the end of the plastic hose connected to each bleed screw.
- Fill the master cylinder, and if the system is dry, prime the master cylinder by loosening the output lines at the master cylinders and then GENTLY depress and release the pedal until fluid emerges. If possible use your hand for this procedure. Never push a pedal more than about halfway before releasing for another push. It is possible to damage the cup seals of the master cylinder.
- Once the master cylinders are primed, open the bleed screws of the most distant brakes and leave them open.
- The pedal should be GENTLY cycled. Carefully watch the fluid levels in both the reservoirs and jars to assure the fluid always covers the reservoir outputs. If this is done there is no need to open and close the bleed screws with each cycle. Just be sure the bleed hose ends are always submerged in the brake fluid. This is why you need a person at each bleed hose end.
- As the pedal is GENTLY cycled, fluid will be pumped into the brake cylinders. Be sure to check the master cylinder fluid levels at frequent intervals. Keep GENTLY cycling the master cylinders until no air bubbles appear in the clear plastic hoses. Then close the bleed screws. Repeat with the next closest brake cylinders to the master cylinders.

ONE PERSON METHOD

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| <ol style="list-style-type: none">1. Using this method, you won't need to pump the brake pedal, but you will need a small hand operated vacuum pump available in some auto parts stores. If your local supply house doesn't have it you can order one from J.C. Whitney, Part No. 15-6048W, page 133, Catalog 415B or 417B, \$21.95, plus shipping.2. Again always start out with the brake cylinder farthest away from the master cylinder.3. If you are starting with dry master cylinders fill and prime by loosening the output lines. GENTLY cycle the pedal until fluid appears at the loosened connectors. Then tighten the connectors before the next step. | <ol style="list-style-type: none">4. Now connect the vacuum pump to the most distant brake cylinder bleed screw. Loosen the bleed screw and SLOWLY draw fluid from the master cylinder. When no more air bubbles appear in the line, close the bleed screw and move to the next most distant brake cylinder bleed screw.5. Repeat step 4. at each bleed screw until all the brake lines are free of air. Be sure to check the master cylinder fluid level often.6. Never push a pedal more than about halfway before releasing for another push. It is possible to damage the cup seals of the master cylinder. |
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FINISHING THE JOB

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| <ol style="list-style-type: none">1. If after bleeding all the lines, the brake pedal is still spongy then there is probably air still trapped in the system. Air bubbles can sometimes be jarred loose by gently tapping the brake cylinders with a plastic hammer.2. If the fluid level in the master cylinder falls under steady brake pedal pressure then there is a leak somewhere in the system. If there is no external leak then there is an internal leak within the master cylinder and it must be rebuilt or replaced. If a lot of honing is needed and the bore is enlarged beyond specifications, then a new master cylinder must be installed. | <ol style="list-style-type: none">3. Regardless of the bleeding technique, always finish the job by having someone press hard on the brake pedal and inspect all the connections and bleed screws for leaks while under pressure.4. The clutch hydraulic system can be done in the same manner as the brake system. As a matter of fact if the clutch slave cylinder is lower than the master cylinder then gravity will do the work for you. Slowly maybe, but it will work. |
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This material was obtained from the Tilton Engineering Catalog (Buellton, CA) plus an article in Stock Car Magazine.

Bob Ritchie, Dec. 81