

Hydraulic Brake System Bleeding

Notice: Brake fluid will damage electrical connections and painted surfaces. Use shop cloths, suitable containers, and fender covers to prevent brake fluid from contacting these areas. Always re-seal and wipe off brake fluid containers to prevent spills.

If air has entered the hydraulic brake system, bleed the system. You may need to bleed the hydraulic brake system at all four wheels due to one of the following conditions:

- Air entered the system due to a low fluid level.
- The brake pipes have been disconnected at the master cylinder.
- The brake pipes have been disconnected at the combination valve.
- The brake pipes have been disconnected at the Brake Pressure Modulator Valve (BPMV).

If a pipe is disconnected at one wheel, then only bleed that wheel.

If the master cylinder has been removed, bench bleed the master cylinder before installing it on the vehicle in order to reduce the time required to bleed the system. Refer to *Master Cylinder Bench Bleeding*.

If the BPMV has been replaced or has air trapped in it, refer to *Brake Pressure Modulator Valve Replacement* in Antilock Brake System.

Manual Bleeding

Tools Required

- J 28434 Wheel Cylinder Bleeder Wrench
- J 21472 Brake Bleeder Wrench

1. Apply the brakes several times with the ignition OFF in order to relieve the brake vacuum reserve.
2. Fill the master cylinder reservoirs with DOT 3 motor vehicle brake fluid.
3. Maintain the fluid level during bleeding.
4. If the master cylinder has air in the bore, bleed the master cylinder using the following procedure:
 - 4.1. Disconnect the forward brake pipe connector at the master cylinder.
 - 4.2. Allow the brake fluid to flow from the connector port.
 - 4.3. Connect the brake pipe connector. Do not tighten the brake pipe connector.
 - 4.4. Slowly apply the brake pedal and allow the air to bleed from the loose connector.
 - 4.5. Tighten the connector before releasing the brake pedal.
 - 4.6. Wait 15 seconds.
 - 4.7. Repeat this sequence, including the 15 second wait, until all air is purged from the master cylinder bore.
 - 4.8. Repeat this procedure for the rear brake pipe after you purge all the air from the forward pipe connection.

5. If the brake pressure modulator valve of the antilock brake system is replaced or if you suspect that air is trapped inside, bleed the brake pressure modulator valve next. Refer to *Brake Pressure Modulator Valve Replacement* in Antilock Brake System.
 6. Follow this sequence if it is necessary to bleed all four wheels:
 - 6.1. Right rear wheel cylinder or caliper.
 - 6.2. Left rear wheel cylinder or caliper.
 - 6.3. Right front wheel caliper.
 - 6.4. Left front wheel caliper.
 7. Use J 28434 to bleed the wheel cylinders.
 - 7.1. Place the hex end of the wrench over the wheel cylinder bleeder valve.
 - 7.2. Immerse the opposite end of the hose into a clear container partially filled with clean brake fluid.
 8. Use J 21472 to bleed the calipers.
 - 8.1. Place the proper size hex end of the wrench over the caliper bleeder valve.
 - 8.2. Place a clear tube over the caliper bleeder valve.
 - 8.3. Immerse the opposite end of the hose into a clear container partially filled with clean brake fluid.
 9. Slowly apply the brake pedal one time and hold.
 10. Loosen the bleeder valve in order to purge the air from the wheel cylinder or caliper.
 11. Tighten the bleeder valve and slowly release the brake pedal.
 12. Wait 15 seconds.
- Notice:** Refer to *Fastener Notice* in Cautions and Notices.
13. Repeat this sequence, including the 15-second wait, until all air is purged from the wheel cylinder or caliper.
- Tighten**
- Tighten the bleeder valve to 7 N·m (62 lb in).
14. Repeat steps 7–13 at each wheel until the brake system is bled.
 15. Clean any brake fluid off the vehicle that may have gotten on it during the bleeding procedure.
 16. Inspect the brake pedal for sponginess, and inspect the brake warning lamp for an indication of unbalanced pressure. Repeat the bleeding procedure in order to correct either of these conditions.
 17. Fill the master cylinder reservoir to the proper level. Refer to *Master Cylinder Reservoir Filling*.

Pressure Bleeding

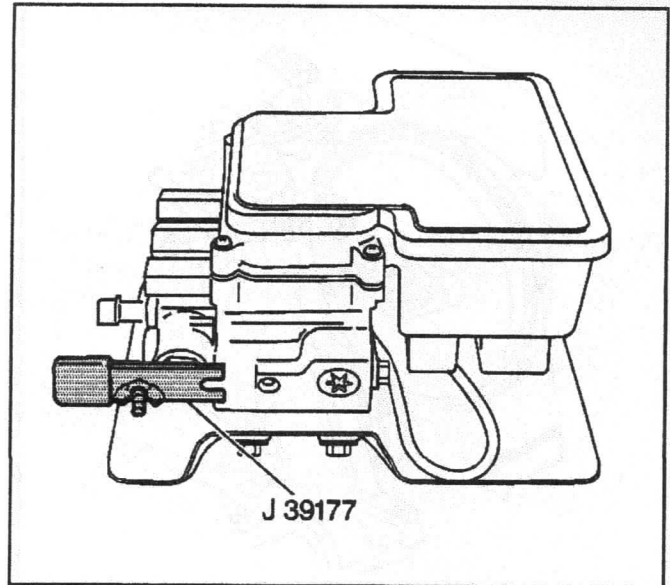
Use a diaphragm-type pressure bleeder. The pressure bleeder must have a rubber diaphragm between the air supply and the brake fluid. This prevents the following items from entering the hydraulic brake system:

- Air
- Moisture
- Oil
- Other contaminants

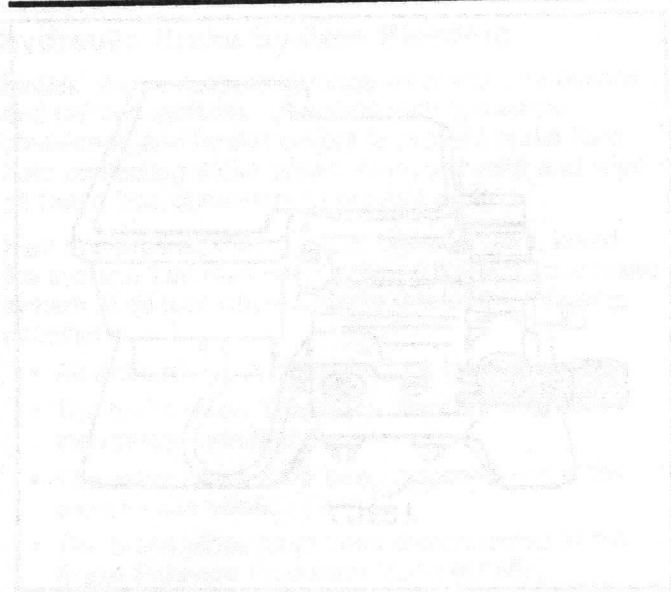
Tools Required

- J 35589 Master Cylinder Pressure Bleeder Adapter
- J 39177 Combination Valve Pressure Bleeding Tool
- J 28434 Wheel Cylinder Bleeder Wrench
- J 21472 Brake Bleeder Wrench

1. Fill the pressure bleeder tank at least 2/3 full of brake fluid.
2. Charge the pressure bleeder with 140–170 kPa (20–25 psi) air pressure.
3. Bleed the pressure bleeder each time fluid is added in order to remove any trapped air.
4. Use the J 39177 in order to depress and hold the valve stem on the combination valve.
5. Remove the master cylinder reservoir cap and install the master cylinder pressure bleeder adapter, J 35589, to the reservoir.
6. If the brake pressure modulator valve of the antilock brake system is replaced, or if you suspect that air is trapped inside, bleed the brake pressure modulator valve first. Refer to *Brake Pressure Modulator Valve Replacement* in Antilock Brake System.
7. Follow this sequence if it is necessary to bleed all four wheels:
 - 7.1. Right rear wheel cylinder or caliper.
 - 7.2. Left rear wheel cylinder or caliper.
 - 7.3. Right front wheel caliper.
 - 7.4. Left front wheel caliper.
8. Connect the hose from the pressure bleeder to the adapter at the master cylinder.
9. Open the tank valve.
10. Use J 28434 to bleed the wheel cylinders.
 - 10.1. Place the hex end of the wrench over the wheel cylinder bleeder valve.
 - 10.2. Immerse the opposite end of the hose into a clear container partially filled with clean brake fluid.



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11. Use *J 21472* to bleed the calipers.
 - 11.1. Place the proper size hex end of the wrench over the caliper bleeder valve.
 - 11.2. Place a clear tube over the caliper bleeder valve.
 - 11.3. Immerse the opposite end of the hose into a clear container partially filled with clean brake fluid.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

12. Slowly open the wheel cylinder or caliper bleeder valve at least $3/4$ of a turn. Allow the fluid to flow until you see no more air in the fluid.

Tighten

Tighten the wheel cylinder or caliper bleeder valve to 7 N·m (62 lb in).

13. Repeat steps 10–12 at each wheel until the brake system is bled.
14. Clean any brake fluid off the vehicle that may have gotten on it during the bleeding procedure.
15. Inspect the brake pedal for sponginess. Inspect the brake warning lamp for an indication of unbalanced pressure. Repeat the bleeding procedure in order to correct either of these conditions.
16. Disconnect the hose from the bleeder adapter.
17. Remove the bleeder adapter.
18. Fill the master cylinder to the proper level. Refer to *Master Cylinder Reservoir Filling*.
19. Install the master cylinder reservoir cap.

Hydraulic Brake System Flushing

Important: Flush the hydraulic brake system at each bleeder valve.

1. Open the bleeder valve $1\ 1/2$ turns.
2. Force brake fluid through the pipes, hoses, and bleeder valves until the brake fluid comes out clear in color. Refer to *Hydraulic Brake System Bleeding*.

Important: Inspect the master cylinder fluid level after you flush at each bleeder valve.

3. Refill the master cylinder as required.
4. After you flush the hydraulic brake system at each bleeder valve, fill the master cylinder to the correct fluid level. Refer to *Master Cylinder Reservoir Filling*.