

SECTION 5A

MASTER CYLINDER

CAUTION: Brake fluid may irritate eyes and skin. In case of contact, take the following actions:

- Eye contact – rinse thoroughly with water.
- Skin contact – wash with soap and water.

NOTICE: Avoid spilling brake fluid on any of the vehicle's painted surfaces, wiring cables or electrical connectors. Brake fluid will damage paint and electrical connections. If any fluid is spilled on the vehicle, flush the area with water to lessen damage.

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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GENERAL DESCRIPTION

MASTER CYLINDER ASSEMBLY

The brake master cylinder assembly is a composite design (plastic reservoir and aluminum body) incorporating a conventional front-to-rear brake system split. The brake master cylinder primary piston provides the fluid pressure to the front disc brakes, while the brake master cylinder secondary piston provides the fluid pressure to the rear drum or disc brakes. If pressure is lost from either system, the remaining system will function to stop the vehicle.

MASTER CYLINDER RESERVOIR

Figure 1

The reservoir (5) has a fluid level indicator mark located inside the neck of the reservoir fill opening. The reservoir cap must be removed to view the indicator mark.

BRAKE FLUID AND FLUID HANDLING

CAUTION: Brake fluid may irritate eyes and skin. In case of contact, take the following actions:

- Eye contact – rinse thoroughly with water.
- Skin contact – wash with soap and water.

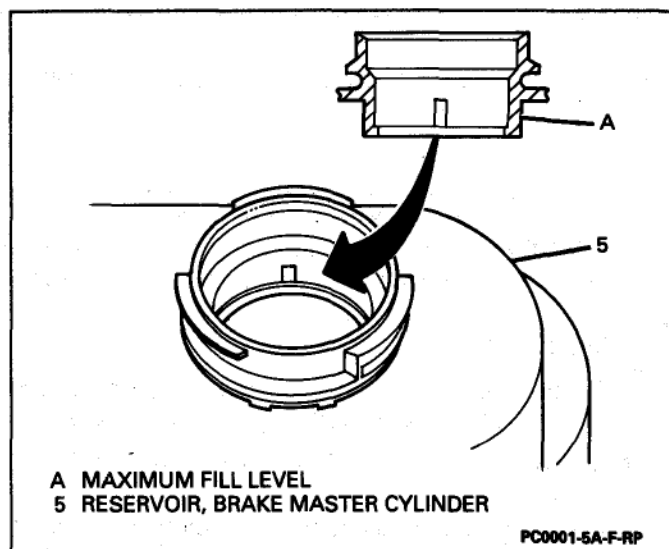


Figure 1 – Brake Fluid Level Indicator

NOTICE: Avoid spilling brake fluid on any of the vehicle's painted surfaces, wiring cables or electrical connections. Brake fluid will damage paint and electrical connections. If any fluid is spilled on the vehicle, flush with water to lessen damage.

Important

- Do not re-use brake fluid accumulated during brake hydraulic system bleeding.
- Always store fluid in a closed container. Reseal containers immediately after use. Do not use fluid left in an open or improperly sealed container as it absorbs moisture or may be contaminated.

Substandard or Contaminated Brake Fluid

Use only brake fluid GM P/N 1052535 or an equivalent DOT-3 fluid. **DO NOT** use power steering fluid, automatic transmission fluid or DOT-5 silicone hydraulic brake fluid.

This deterioration may be seen by a swollen brake master cylinder reservoir diaphragm or swollen brake master cylinder primary or secondary seals. Deterioration of the rubber components may result in costly damage to the brake pressure modulator valve assembly, disc brake caliper assemblies and rear wheel cylinders.

If rubber deterioration is evident, the entire brake system must be flushed and all rubber components replaced. Refer to SECTION 5.

DIAGNOSIS

MASTER CYLINDER ASSEMBLY CHECK

1. Check for cracked brake master cylinder body or brake fluid around brake master cylinder assembly.
 - Leaks are indicated only if there is at least a drop of fluid.
 - A damp condition is not abnormal.
2. Check for binding brake pedal assembly linkage and incorrect power brake booster power piston pushrod assembly length.
 - A. If both of these are satisfactory, disassemble brake master cylinder assembly and check for swollen or elongated primary or secondary piston seal(s).
 - B. If swollen primary or secondary seals are found, substandard or contaminated brake fluid should be suspected.
 - C. If contaminated, all components should be disassembled and cleaned. All rubber components, including those in the combination valve assembly, brake pressure modulator valve assembly, disc brake calipers and rear wheel cylinders, should be replaced and all brake pipe assemblies flushed.

MASTER CYLINDER ASSEMBLY

CONDITION	POSSIBLE CAUSE	CORRECTION
Grabby Brakes (Apparent On-Off Condition)	1. Insufficient brake fluid in master cylinder assembly.	1. Fill master cylinder reservoirs with approved brake fluid and check for leaks.
	2. Faulty master cylinder primary or secondary piston seals.	2. Repair or replace as necessary.
	3. Cracked master cylinder body.	3. Replace.

These checks will not determine all master cylinder assembly malfunctions. Refer to SECTION 5.

ON-VEHICLE SERVICE

NOTICE: Do not use lubricated shop air on brake parts as damage to rubber components may result.

Important

- Replace all components included in repair kits used to service this brake master cylinder assembly.
- Lubricate rubber parts with clean brake fluid to ease assembly.
- If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake hydraulic system.

- The torque values specified are for dry, unlubricated fasteners.
- Perform service operations on a clean bench, free from all mineral oil materials.

FILLING MASTER CYLINDER RESERVOIR

The brake master cylinder reservoir must be kept properly filled to insure adequate reserve and to prevent air from entering the brake hydraulic system. However, because of expansion due to heat absorbed from the brakes and from the engine, the reservoir must **not** be overfilled.

A drop in brake fluid level is normal as the pads and linings wear. Filling the master cylinder reservoir before installing new pads and linings may result in brake fluid spillage once the new pads and linings are in place. Unless there is a leak in the brake hydraulic system, or if the brake hydraulic system has been serviced, topping off the master cylinder reservoir should not be necessary.

Thoroughly clean the master cylinder reservoir cap before removal to avoid getting dirt in reservoir. Remove reservoir cap and reservoir diaphragm.

NOTICE: Use only DOT-3 brake fluid from a clean, sealed container. Do not use any fluid from a container which is contaminated with water. Do not use DOT-5 silicone brake fluid. Improper brake fluid, mineral oil or water in the brake fluid may cause it to boil or the rubber components to deteriorate. Keep all containers capped to prevent contamination.

Add brake fluid GM P/N 1052535 or equivalent as required to bring fluid level to line located inside the neck of the reservoir fill opening.

MASTER CYLINDER ASSEMBLY

Figure 2

Remove or Disconnect

1. Brake fluid from reservoir (5).
 - Discard old fluid.

2. Brake pipe assemblies (1 and 2).

- Plug brake pipe assemblies (1 and 2) to prevent fluid loss and contamination.

3. Nuts (18).

4. Master cylinder assembly (15).

Install or Connect

NOTICE: See "Notice" on page 5A-1 of this section.

1. Bench bleed master cylinder assembly. Refer to "Master Cylinder Assembly Bench Bleeding" in this section.

2. Master cylinder assembly (15).

3. Nuts (18).

Tighten

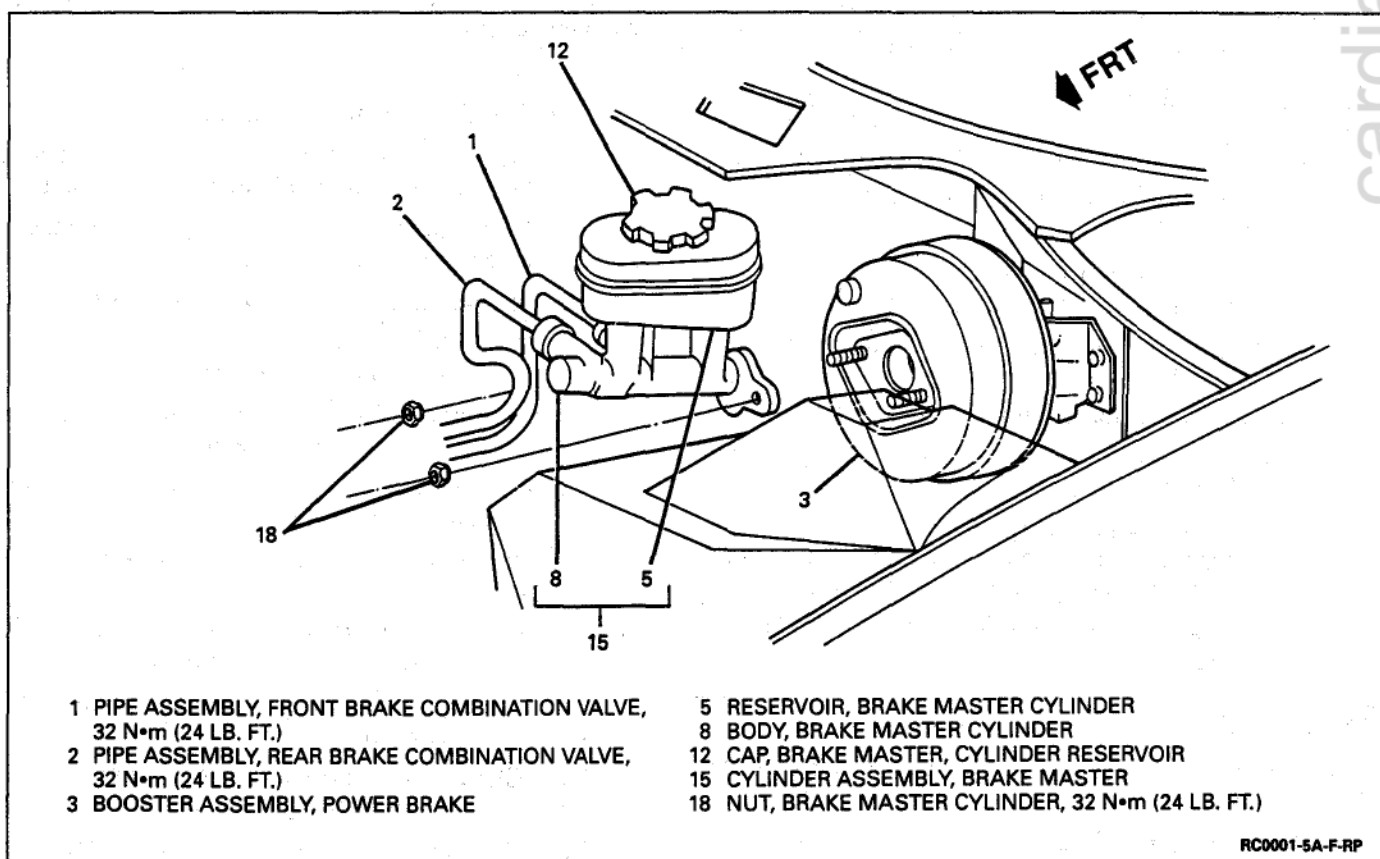
- Nuts (18) to 32 N•m (24 lb. ft.).

4. Fill master cylinder reservoir. Refer to "Filling Master Cylinder Reservoir" in this section.

5. Brake pipe assemblies (1 and 2) to master cylinder assembly (15) one at a time.

- A. Remove locally fabricated plug.

- B. Install brake pipe assembly fitting finger tight.



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Figure 2 - Brake Master Cylinder Assembly

6. Have assistant depress brake pedal assembly to remove air at loose brake pipe assembly fittings.



Tighten

- Fittings of brake pipe assemblies (1 and 2) to 32 N•m (24 lb. ft.).
7. Have assistant quickly release and pump brake pedal assembly several times.
 8. If brake pedal assembly remains high and firm, start vehicle. If brake pedal assembly still feels firm, test drive vehicle. If brake pedal assembly feels soft or spongy, bleed entire brake hydraulic system. Refer to SECTION 5E1.

UNIT REPAIR

MASTER CYLINDER ASSEMBLY

Figure 3



Important

- Reservoir cap (12) and reservoir diaphragm (13) can be inspected and/or serviced without removing the master cylinder assembly from the vehicle.



Remove or Disconnect

- Brake master cylinder assembly. Refer to "Master Cylinder Assembly" under "On-Vehicle Service" in this section.



Disassemble

1. Cap (12) and diaphragm (13) from reservoir (5).
 - Wipe cap (12) and reservoir (5) clean before removing.
2. Empty brake fluid from reservoir (5).

NOTICE: Take care not to damage the piston bore or retainer groove during primary piston retainer ring removal.

3. Ring (14) while depressing primary piston (20).
4. Primary piston (20), secondary piston (21), retainer (6) and spring (4).
 - To remove parts, apply clean, low pressure dry compressed air into outlet port near closed end of bore with other outlet port plugged.
5. Seals (7 and 10) and retainer (6) from secondary piston (21).



Inspect

- Cap (12) and diaphragm (13) for cuts, cracks, nicks and deformation.
- Brake master cylinder body bore for scoring or corrosion. If noted, replace cylinder body (8).
- Replace damaged parts.



Clean

- All parts in clean denatured alcohol.
- Dry with unlubricated compressed air.
- Abrasives should not be used in brake master cylinder body bore.



Assemble

1. Lubricate rubber parts with clean brake fluid to ease assembly.
2. Seals (7 and 10) and retainer (6) to secondary piston (21).
3. Lubricated secondary piston (21) and spring (4) into brake master cylinder body bore.
4. Lubricated primary piston (20) into brake master cylinder body bore.
5. Ring (14) while depressing primary piston (20).
6. Diaphragm (13) into cap (12).
7. Cap (12) onto reservoir (5).
8. Bench bleed master cylinder assembly. Refer to "Master Cylinder Assembly Bleeding" in the following procedure.

MASTER CYLINDER ASSEMBLY BENCH BLEEDING

Materials necessary for master cylinder assembly bench bleeding:

- One 11 x 1.5 mm tube fitting nut
- One 12 x 1.0 mm tube fitting nut
- Two pieces of 4.75 mm (3/16 inch) brake pipe tube approximately 50 mm (2 inches) long

1. Locally fabricate two plugs for plugging master cylinder assembly outlet ports.
 - A. Fashion ISO flares on one end of each tube. Refer to SECTION 5.
 - B. Install nuts onto flared tubes.
 - C. One at a time, place approximately 13 mm (1/2 inch) of unflared tube in vise.
 - D. Compress tube end with vise so that tube collapses completely.
 - E. With tube still in vise, bend it to a 90 degree angle.
 - F. Remove tube from vise and reinstall to fold tube end against itself to form air-tight seal.

2. Plug master cylinder assembly outlet ports with locally fabricated plugs.

NOTICE: Do not overtighten vise or damage to the master cylinder assembly will result.

3. Place shop towels around master cylinder assembly to absorb bleed fluid and mount master cylinder assembly in vise with front end tilted slightly down.

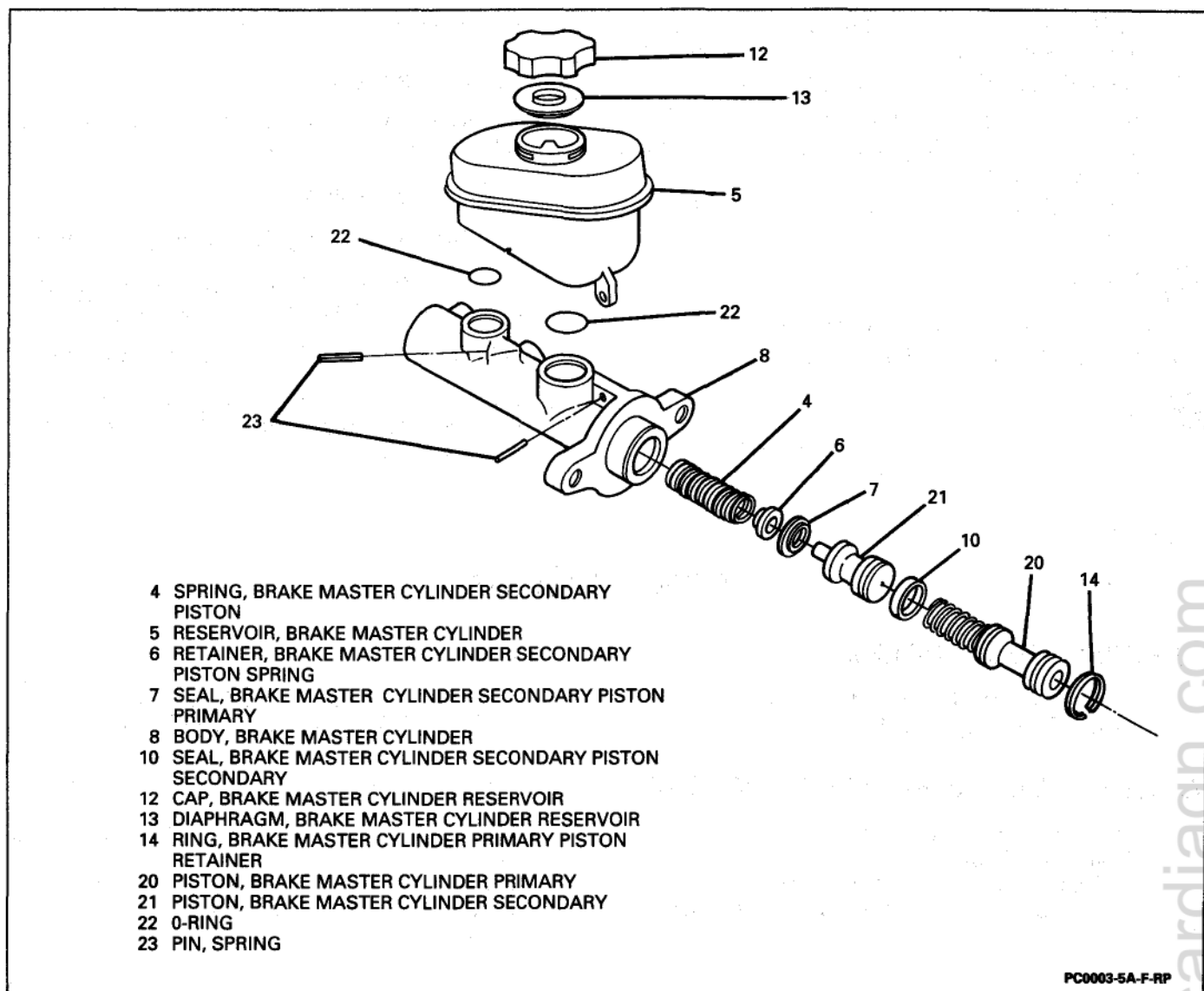


Figure 3 – Brake Master Cylinder Assembly Components

4. Fill master cylinder assembly with clean brake fluid.
5. Using tool with smooth rounded end, stroke primary piston about 25 mm (1 inch) several times.

! Important

- As air is bled from master cylinder assembly, with outlets plugged, resistance to primary piston travel will not allow full 25 mm (1 inch) stroke.
6. Reposition master cylinder assembly in vise with front end of master cylinder assembly tilted slightly up. Again, stroke primary piston about 25 mm (1 inch) several times.
 7. Reposition master cylinder assembly in vise to level position. Loosen two locally fabricated plugs one at a time and push primary piston into master cylinder bore to force air out of master cylinder assembly.

! Important

- To prevent air from being sucked back into master cylinder assembly, tighten locally fabricated plugs before allowing primary piston to return to its original position. Repeat this step until no air escapes past locally fabricated plugs.
8. Install master cylinder assembly into vehicle. Refer to "Master Cylinder Assembly" under "On-Vehicle Service" in this section.

MASTER CYLINDER RESERVOIR

Figures 2 and 3

↔ Remove or Disconnect

1. Brake master cylinder assembly. Refer to "Master Cylinder Assembly" under "On-Vehicle Service" in this section.

NOTICE: Do not clamp housing area of master cylinder body in vise or the part may be damaged.

- 2. Clamp flange of cylinder body (8) in a vise.
- 3. Drive out spring pins (23) using 1/8-inch punch.
- 4. Reservoir (5) by pulling straight up and away from cylinder body (8).
- 5. O-rings (22) from grooves in reservoir (5) and discard.

 Inspect

- Reservoir (5) for cracks or deformation.
- Replace reservoir (5), if damaged.

 Clean

- 1. Reservoir (5) with clean denatured alcohol.

- 2. Dry with unlubricated compressed air.

 Install or Connect

- 1. Lubricate new O-rings (22) and grooves in reservoir (5) with clean brake fluid.
- 2. O-rings (22) into grooves in reservoir (5).
 - Make sure O-rings (22) are properly seated.
- 3. Reservoir (5) to cylinder body (8) by pressing straight down by hand into cylinder body (8).
- 4. Drive in spring pins (23) to retain reservoir (5).
- 5. Brake master cylinder assembly. Refer to "Master Cylinder Assembly" under "On-Vehicle Service" in this section.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Brake Master Cylinder Body Bore Diameter	25.4 mm (1.00")
Hydraulic Brake (Glycol) Fluid	GM P/N 1052535 or equivalent DOT-3 fluid

FASTENER TIGHTENING SPECIFICATIONS

Brake Master Cylinder Nut	32 N•m (24 lb. ft.)
Brake Pipe Fittings	
Front Brake Combination Valve Pipe Assembly	32 N•m (24 lb. ft.)
Rear Brake Combination Valve Pipe Assembly	32 N•m (24 lb. ft.)

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