

SECTION 5A

MASTER CYLINDER

NOTICE: Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. General Motors will call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and joint clamping force, and may damage the fastener. When you install fasteners, use the correct sequence and tightening specifications. Following these instructions can help you avoid damage to parts and systems.

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 area with water to lessen damage.

CONTENTS

| | | | |
|--|------|--------------------------------------|------|
| General Description..... | 5A-1 | Brake Fluid Level Switch | 5A-3 |
| Master Cylinder..... | 5A-1 | Master Cylinder Fluid Reservoir..... | 5A-3 |
| Brake Fluid Level Switch..... | 5A-2 | Master Cylinder..... | 5A-4 |
| Fluid and Fluid Handling | 5A-2 | Master Cylinder Bench Bleeding | 5A-5 |
| Substandard or Contaminated Brake Fluid... | 5A-2 | Bleeding Brake System | 5A-5 |
| Diagnosis | 5A-2 | Unit Repair..... | 5A-5 |
| Master Cylinder..... | 5A-2 | Master Cylinder..... | 5A-5 |
| On-Vehicle Service..... | 5A-2 | Specifications..... | 5A-7 |
| Filling Master Cylinder Fluid Reservoir..... | 5A-2 | Fastener Torques | 5A-7 |

GENERAL DESCRIPTION

MASTER CYLINDER

Figure 1

The master cylinder contains two pistons and three piston cups (Figure 1). Hydraulic pressure is produced when the pistons compress brake fluid

within the primary and secondary chambers. The hydraulic pressure in the primary chamber acts on the rear brakes - both right and left. The pressure produced in the secondary chamber acts on the right and left front brakes.

On vehicles equipped with the optional Antilock Braking System (ABS), the master cylinder hydraulic lines are connected to the Hydraulic Modulator. For detailed information concerning the ABS, refer to **SECTION 5E1**.

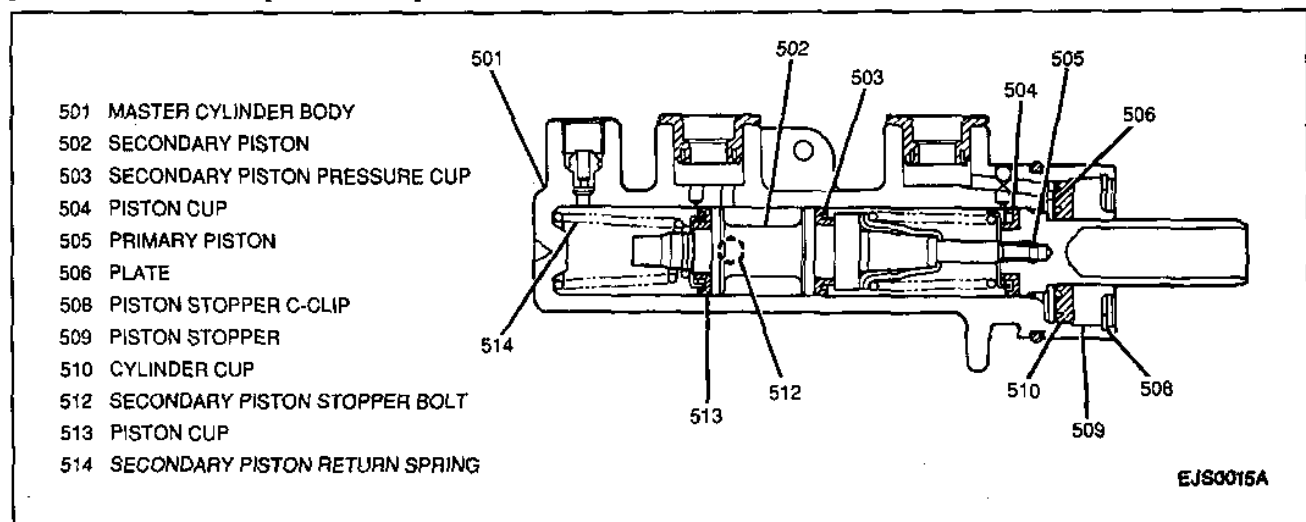


Figure 1—Master Cylinder Assembly

5A-2 MASTER CYLINDER

NOTICE: Replace all components included in the repair kits used to service this master cylinder. Lubricate rubber parts with clean fresh brake fluid to ease assembly. Do not use lubricated shop air on brake parts since damage to rubber components may result. If any hydraulic component is removed or a brake line is disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.

Brake Fluid Level Switch

The brake fluid level switch senses low brake fluid level in the master cylinder reservoir. If a low fluid level is sensed, the "BRAKE" indicator lights.

FLUID AND FLUID HANDLING

Substandard or Contaminated Brake Fluid

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 reduce possible damage.

Important

- Use only hydraulic brake fluid GM P/N 1052535, or equivalent DOT-3 fluid.
- Do not use power steering or transmission fluid in the brake system.
- Do not reuse brake fluid collected during system bleeding.
- Always store brake fluid in a closed container. Reseal brake fluid containers immediately after use. Do not use brake fluid left in an open or improperly sealed container because it can absorb moisture or become contaminated.

Improper brake fluid, mineral oil (i.e., power steering fluid and transmission fluid) or water in the fluid may cause the brake fluid to boil or the rubber components in the hydraulic system to deteriorate.

If primary piston cups are swollen, then the rubber parts have deteriorated. This deterioration may be evidenced by swollen wheel cylinder piston cups on the drum brake wheels, substandard, or contaminated brake or master cylinder cover diaphragm.

If deterioration of rubber is evident, disassemble all hydraulic parts and wash with alcohol. Dry these parts with compressed air before assembly to keep alcohol out of the system. Replace all rubber parts in the system, including hoses. Also, when working on the brake mechanisms, check for fluid on the linings. If excessive fluid is found, replace the linings.

If master cylinder piston seals are satisfactory, check for leakage or excessive heat conditions. If condition is not found, drain fluid, flush with brake fluid, refill and bleed system.

The system must be flushed if there is any doubt as to the grade of the fluid in the system or if fluid has been exposed to parts that have been subjected to contaminated fluid.

DIAGNOSIS

MASTER CYLINDER

Refer to the "BRAKE SYSTEM DIAGNOSIS" in SECTION 5 for diagnosis of the brake system including the master cylinder. The chart covers many problems and causes associated with the hydraulic brake system, along with reference to correct section(s) for further diagnosis.

ON-VEHICLE SERVICE

FILLING MASTER CYLINDER FLUID RESERVOIR

Figure 2

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

The master cylinder fluid reservoir is attached to the top of the master cylinder which is located under the hood on the left-side of the bulkhead.

Thoroughly clean fluid reservoir cap before removal to avoid getting dirt into reservoir.

Important

- Use only hydraulic brake fluid GM P/N 1052535, or equivalent DOT-3 fluid.
- Do not use power steering or transmission fluid in the brake system.
- Do not reuse brake fluid collected during system bleeding.
- Do not use brake fluid left in an open or improperly sealed container because it can absorb moisture or become contaminated.

Improper brake fluid, mineral oil (i.e., power steering fluid and transmission fluid) or water in the fluid may cause the brake fluid to boil or the rubber components in the hydraulic system to deteriorate.

Add brake fluid as required to bring fluid level to the "MAX" line located on the front side of the fluid reservoir (Figure 2).

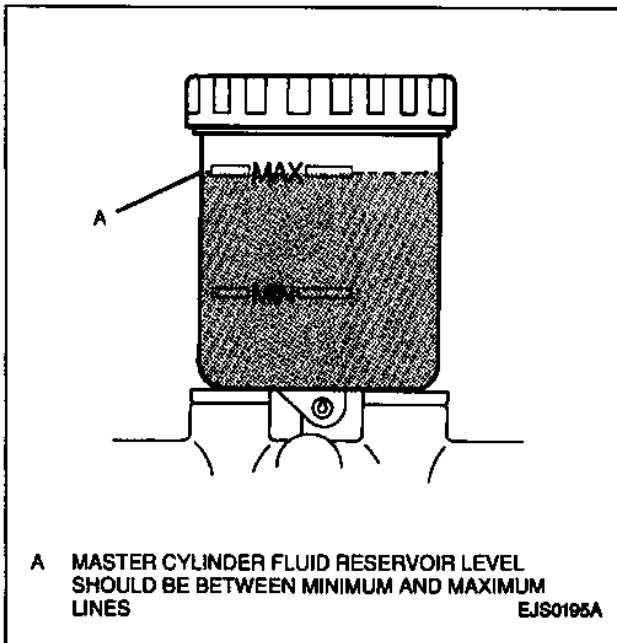


Figure 2—Master Cylinder Fluid Reservoir Fluid Level

Brake Fluid Level Switch

The brake fluid level switch is not serviced separately. The brake fluid level switch is serviced as part of the master cylinder fluid reservoir. For master cylinder fluid reservoir service procedures, refer to "Master Cylinder Fluid Reservoir" later in this section.

MASTER CYLINDER FLUID RESERVOIR

Figures 3, 4 and 5

Remove or Disconnect

1. Negative (-) battery cable.
2. Brake fluid level switch electrical connector.

NOTICE: Brake fluid is extremely damaging to paint. If fluid should touch painted surface, immediately wipe fluid from paint and clean painted surface.

3. Master cylinder fluid reservoir cap and syphon brake fluid from reservoir (Figure 3).
4. Clean outside of reservoir.
5. Master cylinder fluid reservoir roll pin using a hammer and a punch (Figure 4).
6. Master cylinder fluid reservoir and connector grommets from master cylinder.

Install or Connect

1. New master cylinder fluid reservoir connector grommets into master cylinder. Lubricate grommets with new, clean brake fluid. Make sure grommets are seated properly (Figure 5).
2. Master cylinder fluid reservoir to master cylinder.
3. Master cylinder fluid reservoir roll pin using a hammer and a punch.

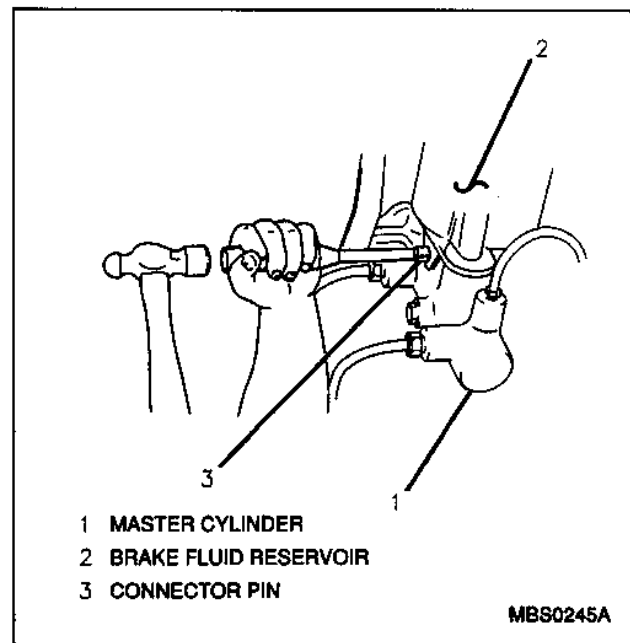


Figure 3—Driving Out Master Cylinder Fluid Reservoir Roll Pin

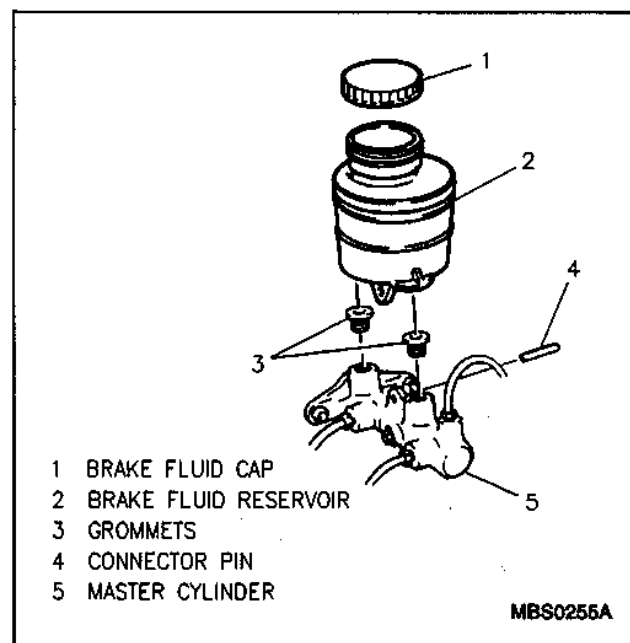


Figure 4—Master Cylinder Fluid Reservoir Connector Grommets

4. Brake fluid level switch electrical connector.
5. Refill reservoir with brake fluid GM P/N 1052535, or equivalent.
6. Check for fluid leakage.
7. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N.m (11 lbs. ft.).
8. Bleed brake system. Refer to SECTION 5.

5A-4 MASTER CYLINDER

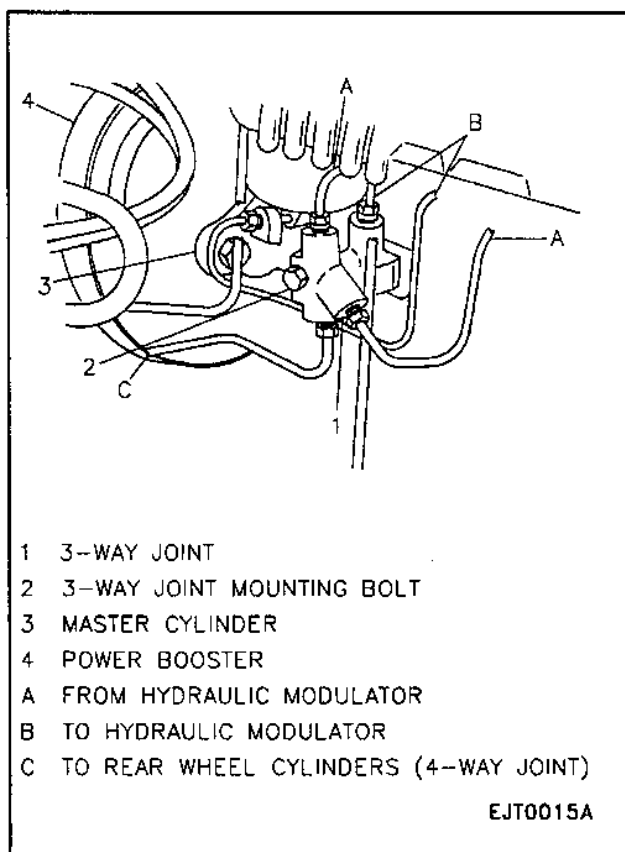


Figure 5—Master Cylinder Pipes / 3-Way Joint (ABS-Equipped)

MASTER CYLINDER

Figures 5 and 6

Remove or Disconnect

1. Negative (-) battery cable.

NOTICE: Brake fluid is extremely damaging to paint. If fluid should touch painted surface, immediately wipe fluid from paint and clean painted surface.

2. Master cylinder fluid reservoir cap and syphon brake fluid from reservoir.
3. On vehicles equipped with ABS: One bolt securing the three-way joint and set it aside (Figure 5).
4. Three brake pipe flare nuts (two brake flare nuts on ABS-equipped vehicles) and brake pipes from master cylinder (Figure 6).
5. Brake fluid level switch electrical connector.
6. Two nuts and master cylinder from vehicle (Figure 6).

Install or Connect

1. Master cylinder to vehicle, secure with two nuts.

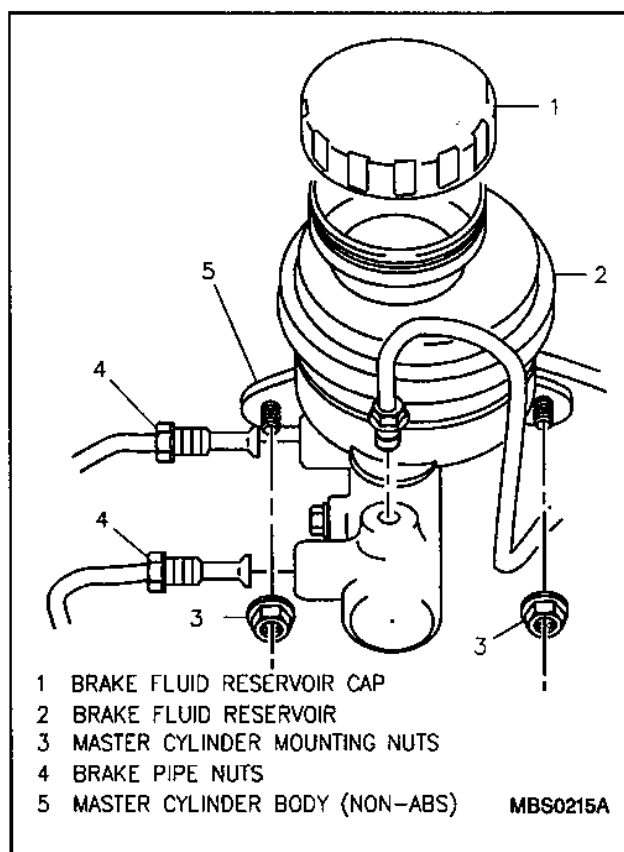


Figure 6—Master Cylinder Brake Pipes-Typical (Non-ABS Shown)

Tighten

- Master cylinder nuts to 13 N.m (9.5 lbs. ft.)
2. Brake fluid level switch electrical connector.
 3. Brake pipes to master cylinder; secure with flare nuts.

Tighten

- Brake pipe flare nuts to 16 N.m (12 lbs. ft.).
4. Three-way joint to master cylinder; secure with one bolt (if vehicle equipped with ABS).
 5. Refill brake fluid reservoir with brake fluid GM P/N 1052535, or equivalent.
 6. Check for fluid leakage.
 7. Negative (-) battery cable.

Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N.m (11 lbs. ft.).
8. Bleed brake system. Refer to SECTION 5.

MASTER CYLINDER BENCH BLEEDING

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: Brake fluid is extremely damaging to paint. If fluid should touch painted surface, immediately wipe fluid from paint and clean painted surface.

NOTICE: Use only hydraulic brake fluid, GM P/N 1052535, or equivalent DOT-3 brake fluid from a clean, sealed container. Do not use any fluid from a container which is wet with water. Do not use DOT-5 silicone brake fluid.

Fill master cylinder fluid reservoir with brake fluid and keep full throughout entire bleeding procedure. Install adapters into each master cylinder outlet port. Attach a piece of plastic tubing to each adapter and submerge other end in the master cylinder reservoir. Make sure the tubes remain submerged in brake fluid. Using a wooden or plastic dowel, slowly push in the master cylinder piston and release. Repeat until there is no sign of air (bubbles) in the brake fluid.

BLEEDING BRAKE SYSTEM

For vehicles without ABS, refer to SECTION 5 for manual and pressure bleeding procedures. For vehicles equipped with ABS, refer to SECTION SE1 for manual and pressure bleeding procedures.

UNIT REPAIR

MASTER CYLINDER

Figures 7 through 10

Remove or Disconnect

1. Piston stopper C-clip (Figure 8).
2. Piston stopper, cylinder cup, plate and primary piston.

3. Secondary piston stopper bolt.

CAUTION: Be careful when blowing secondary piston out of master cylinder with compressed air. The piston can exit the cylinder with explosive force.

4. Secondary piston using compressed air through the piston stopper bolt hole (Figure 9).
5. Return spring secondary seat and secondary piston return spring.



Clean

- All master cylinder parts with clean brake fluid.



Install or Connect

1. Secondary piston return spring and return spring secondary seat (Figure 7).
2. Secondary piston into cylinder.
3. Primary piston, cylinder cup, plate and piston stopper into cylinder.
4. Using a wooden or plastic dowel, compress piston, cylinder cup, plate and piston stopper (Figure 10).
5. Piston stopper C-clip (Figure 10).
6. Secondary piston stopper bolt with piston pushed all the way in.



Tighten

- Secondary piston stopper bolt to 10 N.m (89 lbs. in.).

5A-6 MASTER CYLINDER

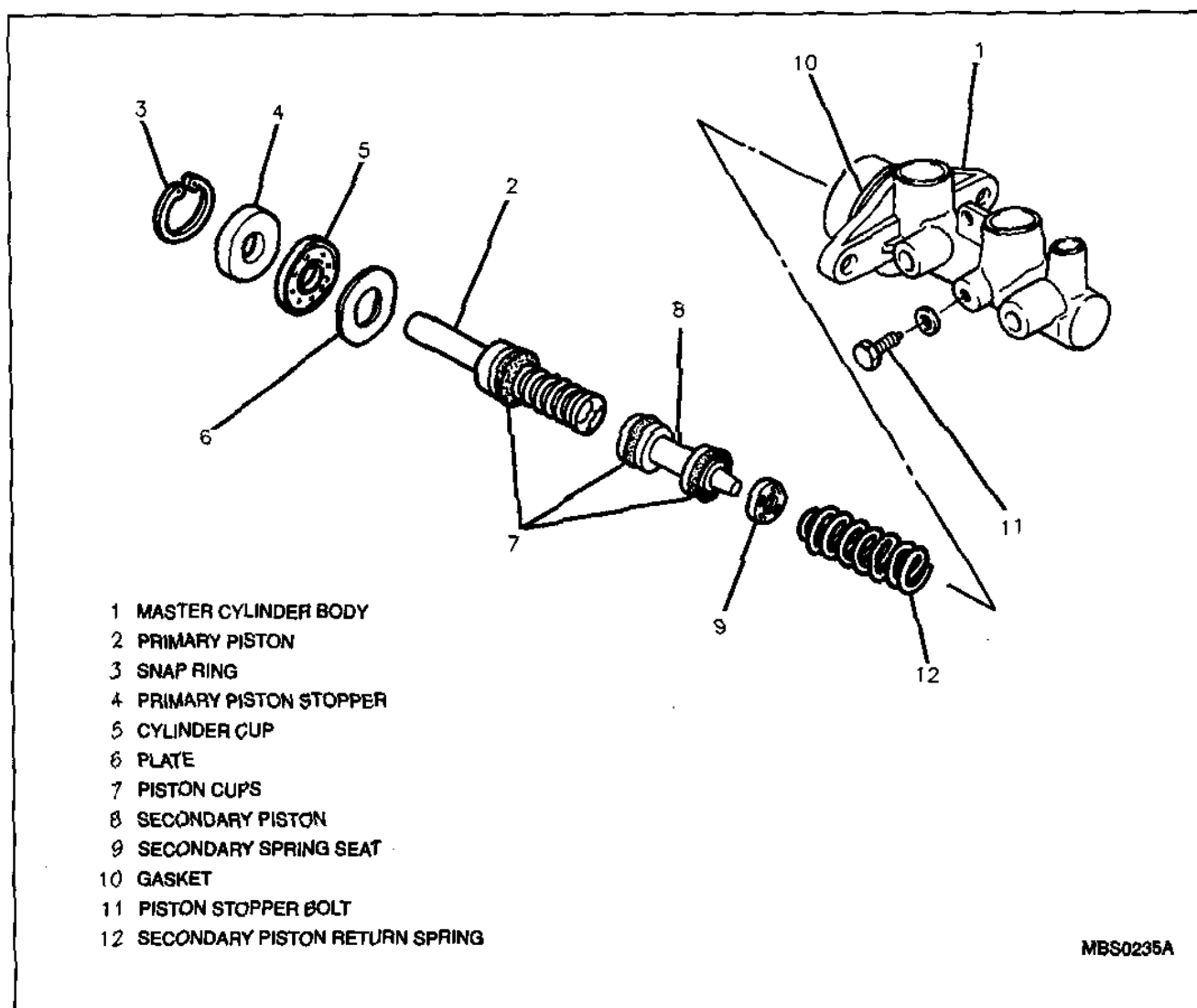


Figure 7—Master Cylinder Components

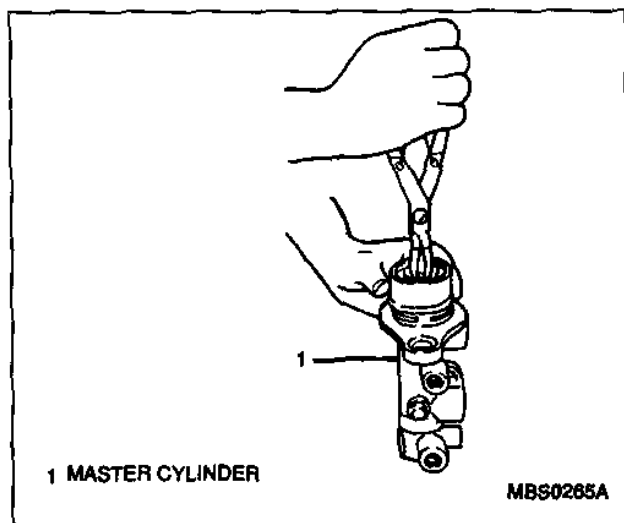


Figure 8—Removing Piston Stopper C-Clip

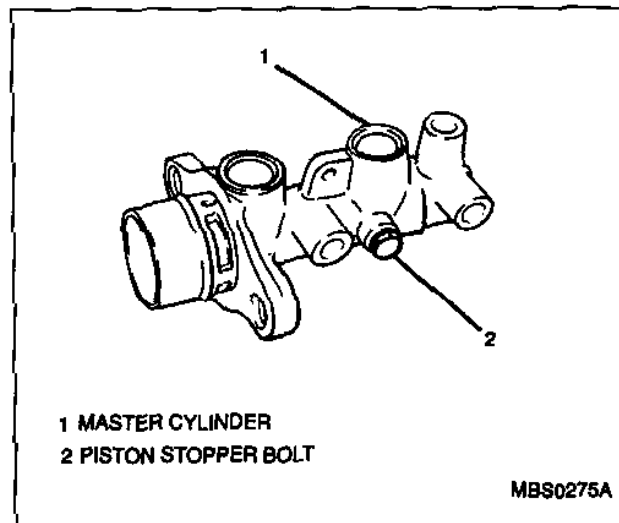


Figure 9—Piston Stopper Bolt

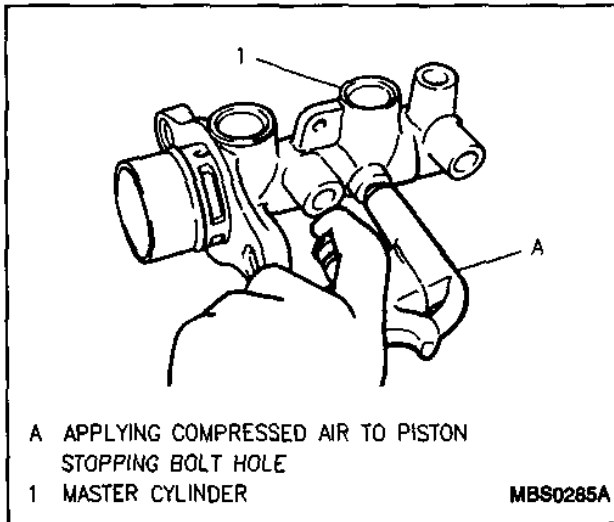


Figure 10—Removing Secondary Piston

SPECIFICATIONS

FASTENER TORQUES

| | |
|---|-----------------------|
| Brake Pipe Flare Nuts | 16 N.m (12 lbs. ft.) |
| Master Cylinder Nuts | 13 N.m (9.5 lbs. ft.) |
| Negative (-) Battery Cable-to-Negative (-) Battery Terminal Retainer..... | 15 N.m (11 lbs. ft.) |
| Secondary Piston Stopper Bolt | 10 N.m (89 lbs. in.) |