

SECTION : 4B

MASTER CYLINDER

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SPECIFICATIONS

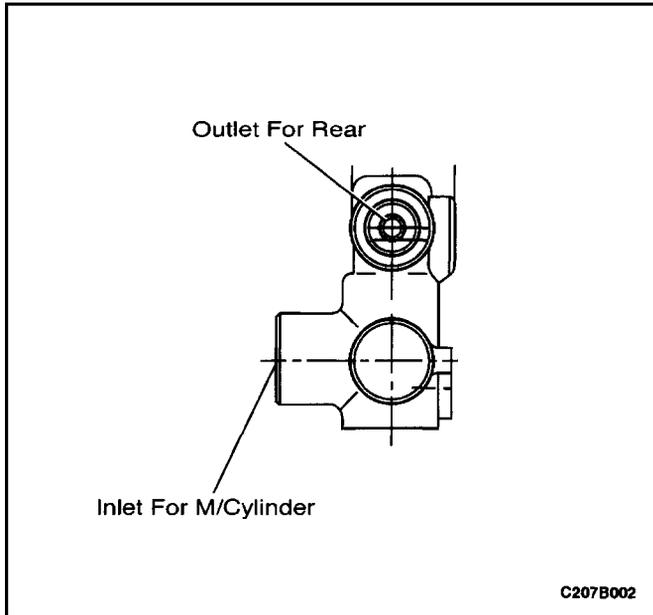
FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Master Cylinder Mounting Nuts	13	–	115
Master Cylinder Brake Lines	16	12	–
Proportioning Valve Brake Lines	10	–	89
Proportioning Valve Nut	10	–	89

DIAGNOSIS

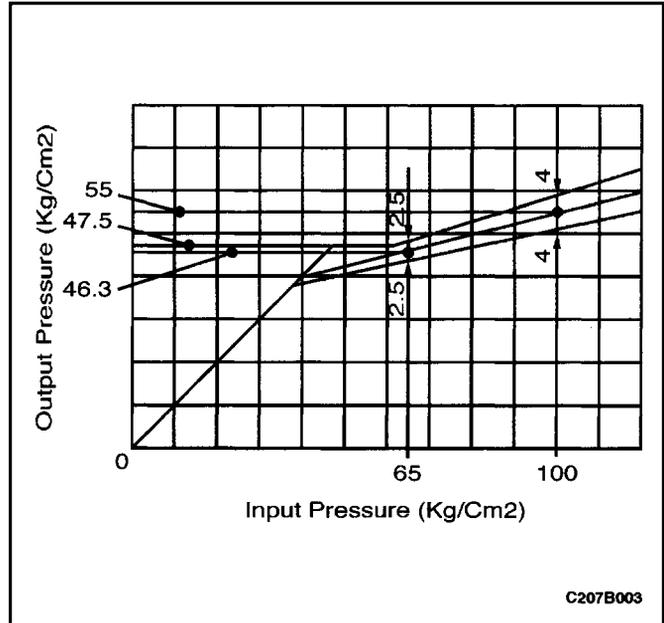
CHECKING BRAKE PROPORTIONING VALVE

This proportioning valve, designed to work in conjunction with the ABS unit, is located on the bulkhead, and regulates the distribution of the fluid pressure to the rear brakes.



Using two brake pressure gauges, one on the input side and the other on the output side of the proportioning valve, measure the pressure with the appropriate brake lines disconnected, using the following steps:

1. With the brakes applied, measure the input and out-put pressure. If the measured pressures are within the ranges as illustrated, the proportioning valve is good.
2. Connect the brake lines in their original positions and bleed the system. Refer to *Section 4F, Anti-lock Brake System and Traction Control System*.
3. If the proportioning valve requires replacement, refer to "Proportioning Valve" in this section.



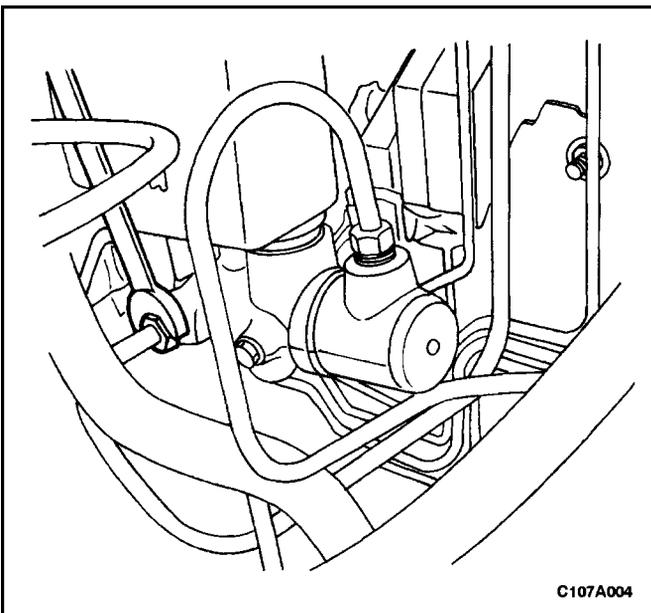
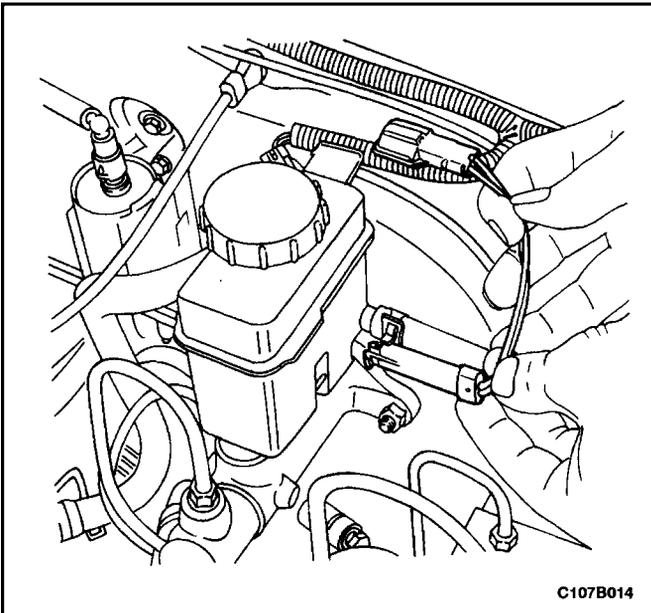
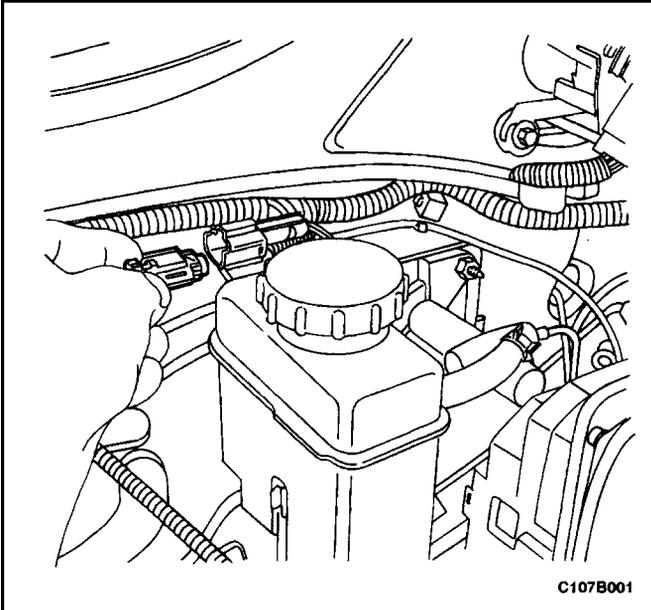
MAINTENANCE AND REPAIR

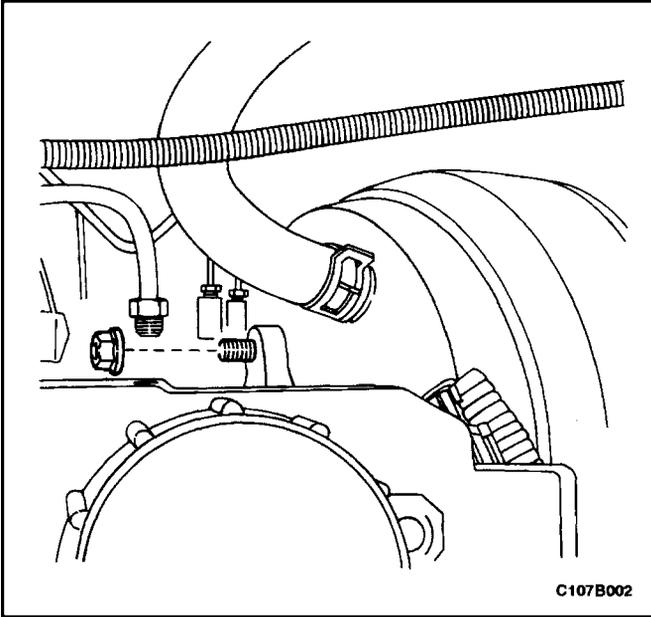
ON-VEHICLE SERVICE

MASTER CYLINDER ASSEMBLY

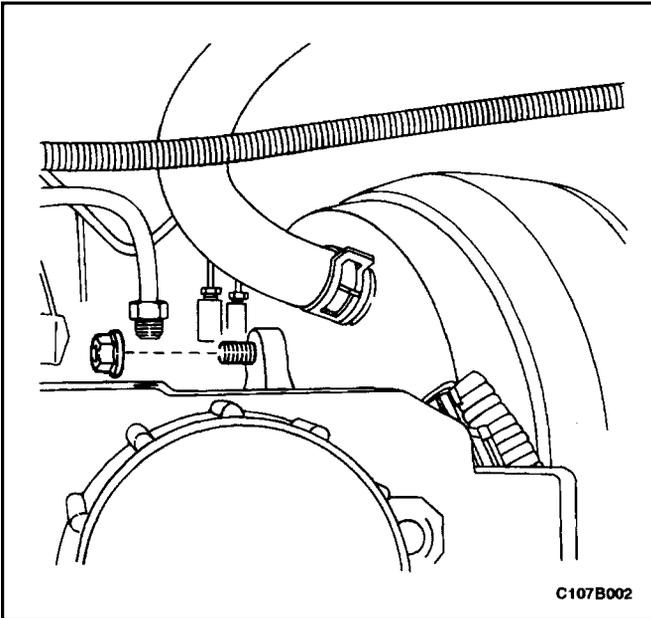
Removal Procedure

1. Disconnect the harness connector that is mounted to the top of the brake fluid reservoir.
2. Remove the brake fluid level switch by sliding it out of the reservoir. It is not necessary to drain the reservoir.
3. Remove the brake fluid level switch and wire harness from the brake fluid reservoir.
4. Disconnect the brake lines from the master cylinder body.
5. For vehicles with the manual transaxle, disconnect the clip that secures the clutch hose connection to the master cylinder and move the clip out of the way.
6. Remove the clutch hose from the master cylinder.
7. Plug the opening to the brake lines to prevent the loss or contamination of the fluid.





8. Remove the master cylinder mounting nuts.
9. Remove the master cylinder assembly.
10. Drain the brake fluid.

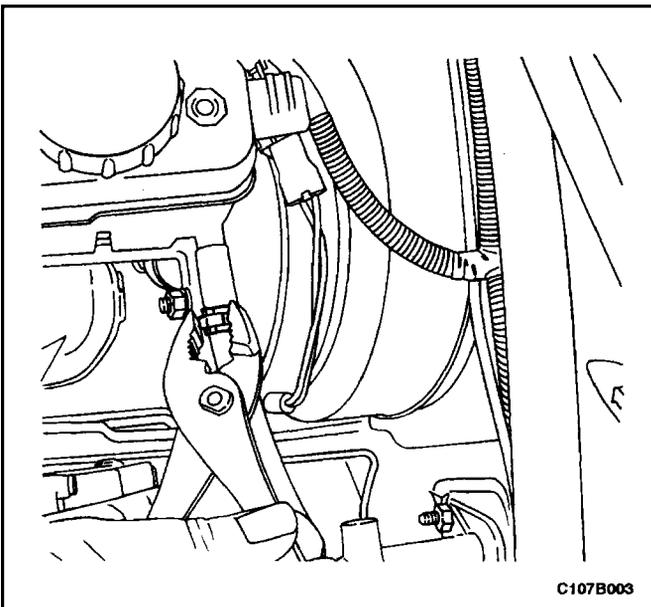


Installation Procedure

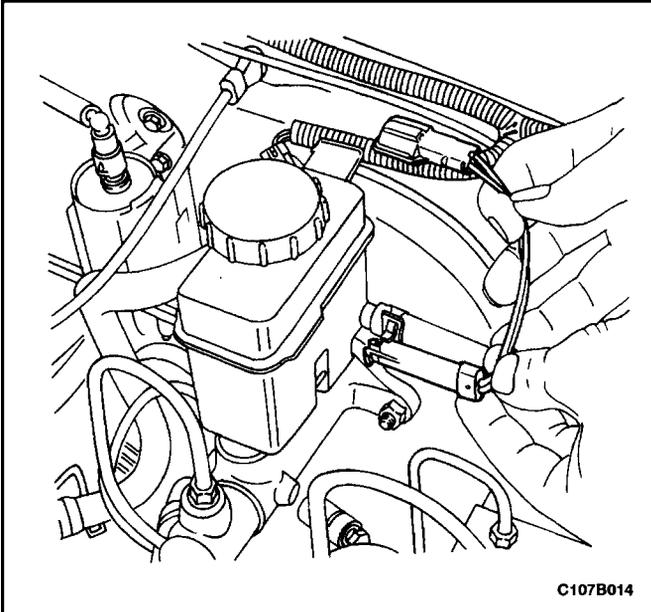
1. Install the master cylinder assembly with the mounting nuts.

Tighten

Tighten the master cylinder mounting nuts to 13 N•m (115 lb-in).

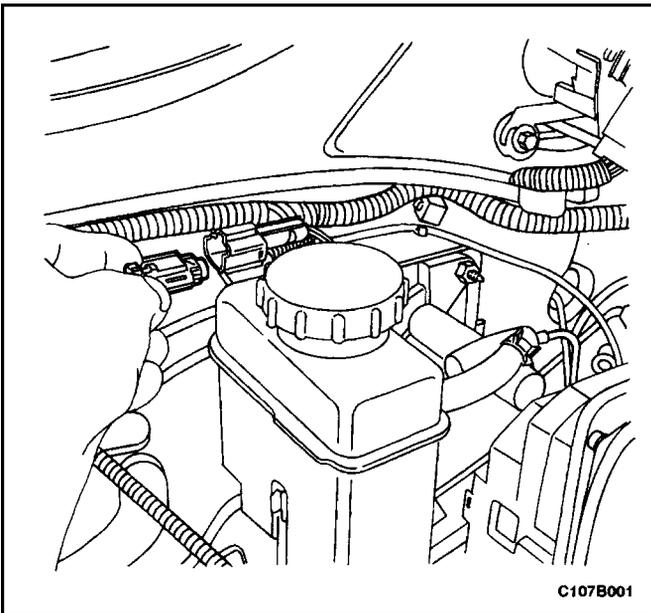


2. Install the brake lines to the master cylinder body.
Tighten
Tighten the master cylinder brake lines to 16 N•m (12 lb-ft).
3. For vehicles with the manual transaxle, install the clutch hose connection to the master cylinder with the clip.



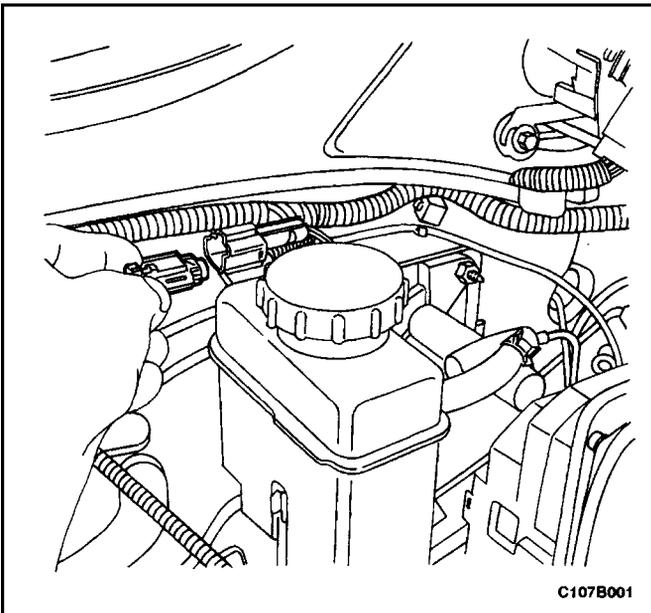
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4. Install the low brake fluid level switch by pushing it into the side of the brake fluid reservoir opposite the engine.



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5. Install the connector for the low brake fluid level switch by sliding it into its mount on the top of the brake fluid reservoir.
6. Connect the brake fluid level switch to the wiring harness.
7. Add the brake fluid.
8. Check for leaks.
9. Recheck the fluid level.
10. Bleed the brake system. Refer to *Section 4F, Anti-lock Brake System and Traction Control System*.



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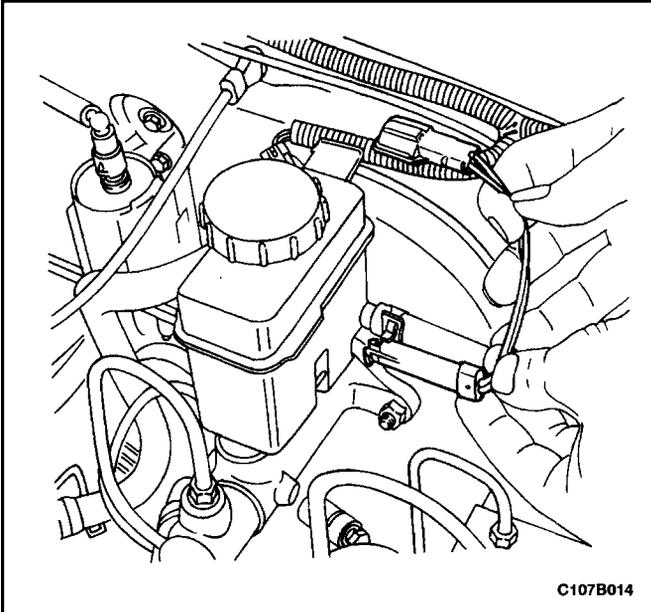
BRAKE FLUID RESERVOIR

Removal Procedure

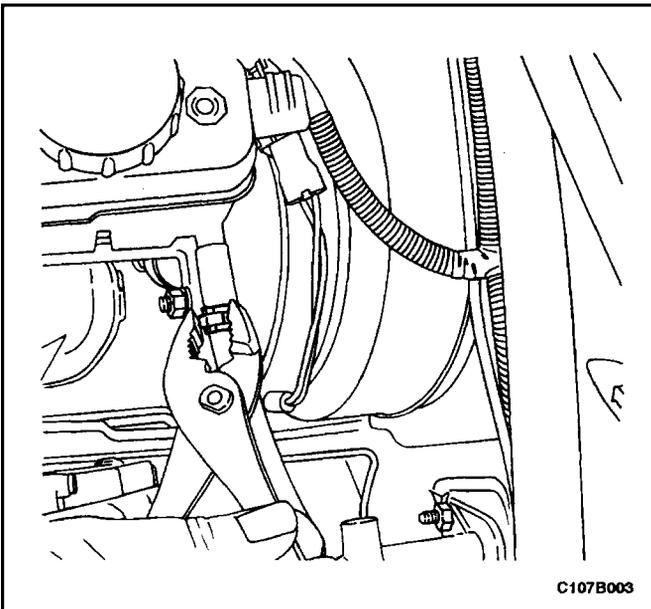
Important : Remove the brake fluid reservoir only when it must be replaced because of damage or leaks.

1. Disconnect the harness connector that is mounted to the top of the brake fluid reservoir.

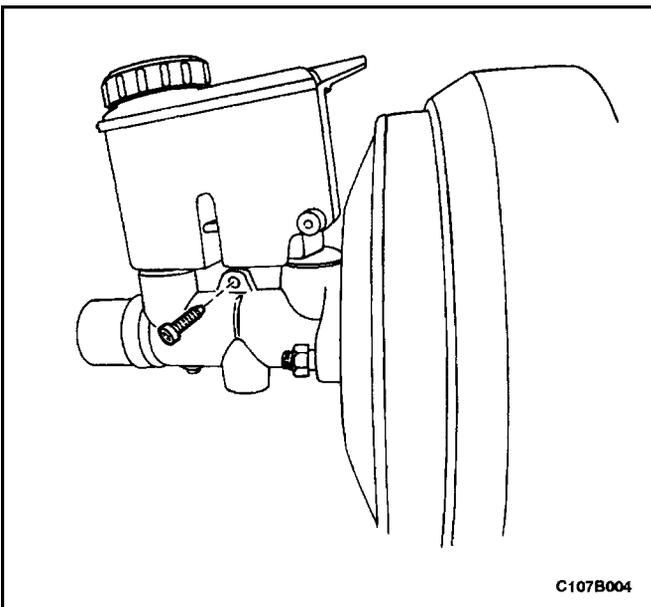
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2. Remove the brake fluid level switch and wire harness. Slide the switch out of the reservoir. It is not necessary to drain the fluid.

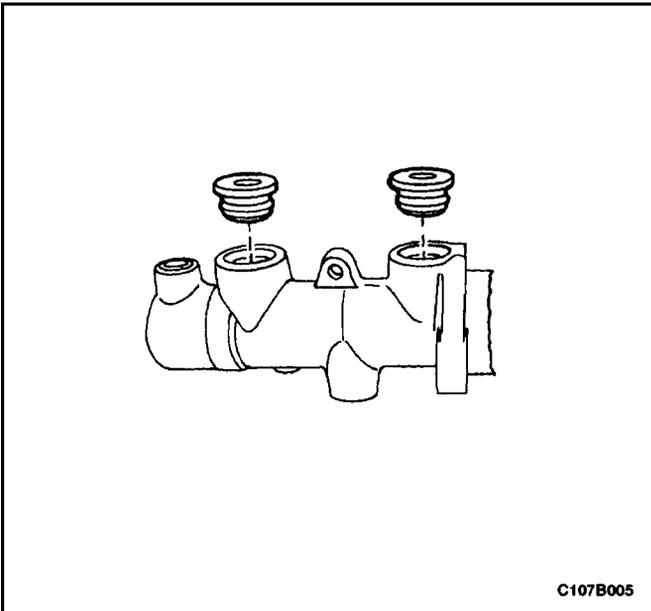
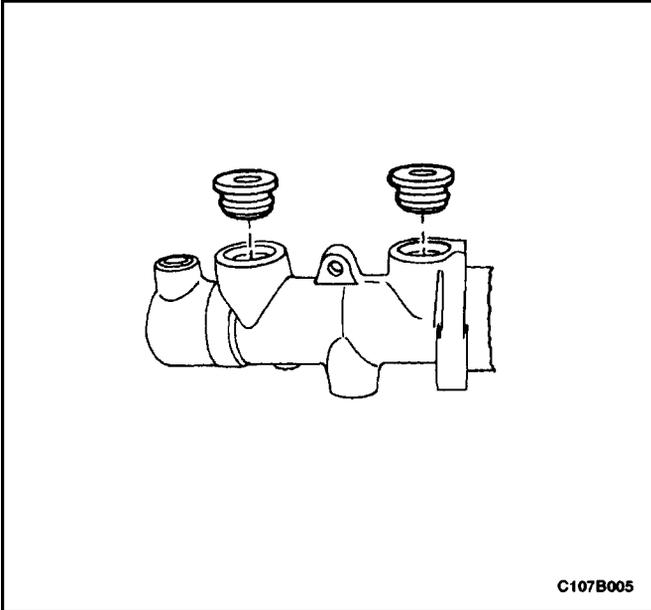


3. For vehicles with the manual transaxle, disconnect the clip that secures the clutch hose connection to the master cylinder and move the clip out of the way.
4. Remove the clutch hose from the master cylinder.



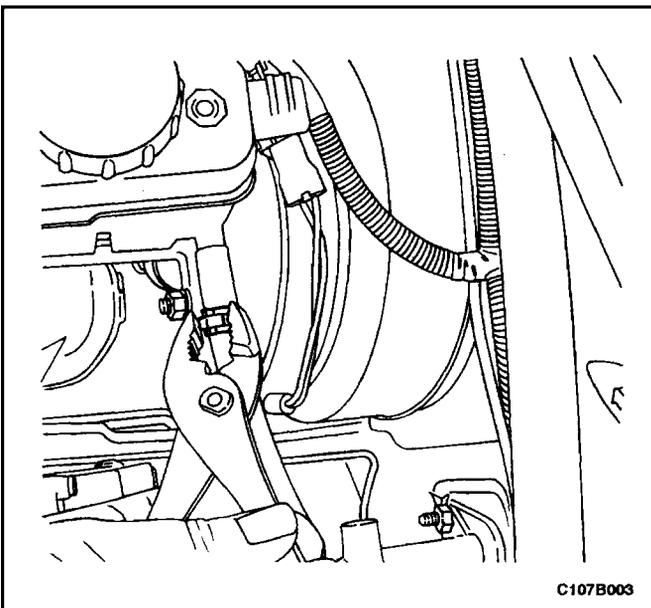
5. Remove the screw that holds the brake fluid reservoir to the master cylinder body.
6. Remove the reservoir from the retaining clamps by gently prying the reservoir upward with a screwdriver.
7. Remove the brake fluid reservoir from the master cylinder body by tilting the reservoir and pulling it upward.

8. Remove and discard the brake fluid reservoir seals from the master cylinder body.

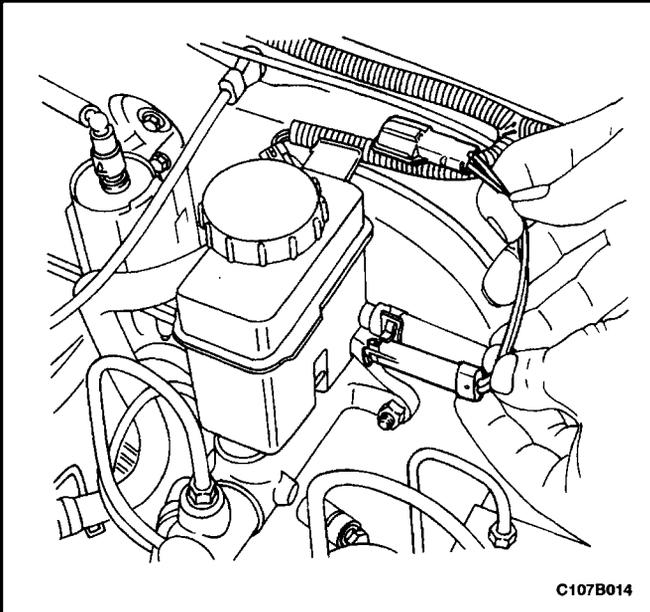


Installation Procedure

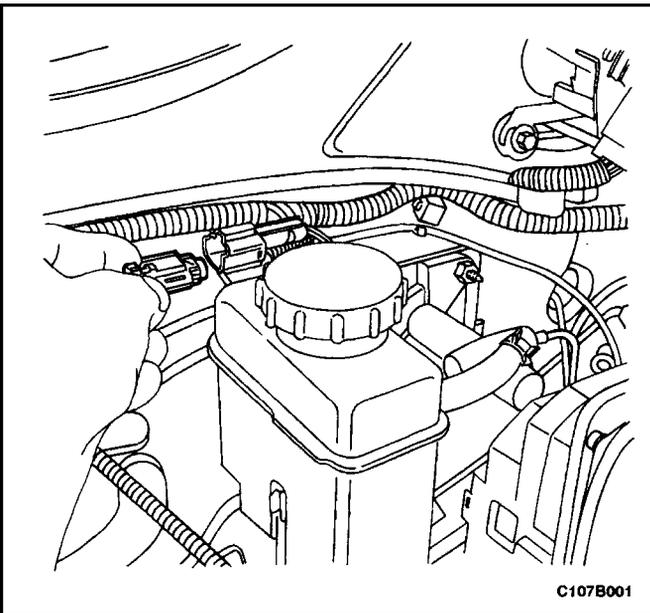
1. Lubricate the new brake fluid reservoir seals with clean brake fluid.
2. Install the brake fluid reservoir seals into the master cylinder body.
3. Install the brake fluid reservoir onto the master cylinder body.



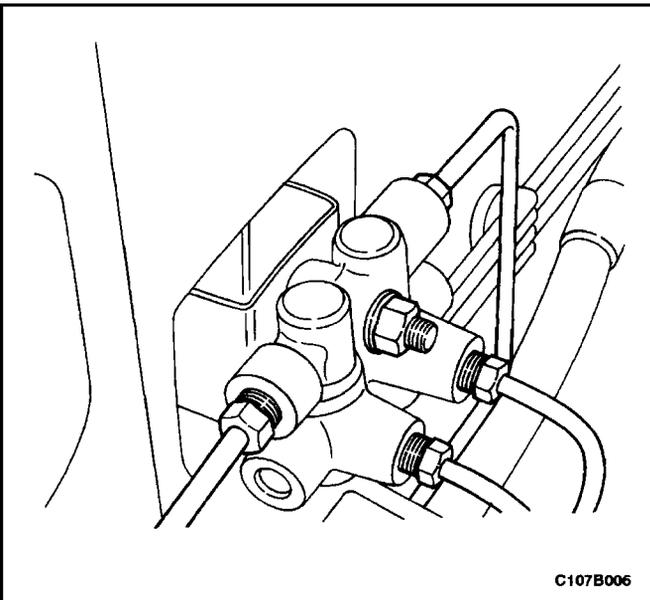
4. For vehicles with the manual transaxle, install the clutch hose connection to the master cylinder with the clip.



5. Add the brake fluid.
6. Raise and suitably support the vehicle.
7. Bleed the brake system. Refer to *Section 4F, Anti-lock Brake System and Traction Control System*.
8. Bleed the clutch master cylinder. Refer to *Section 5C, Clutch*.
9. Lower the vehicle.
10. Install the low brake fluid level switch by pushing it into the side of the brake fluid reservoir opposite the engine.



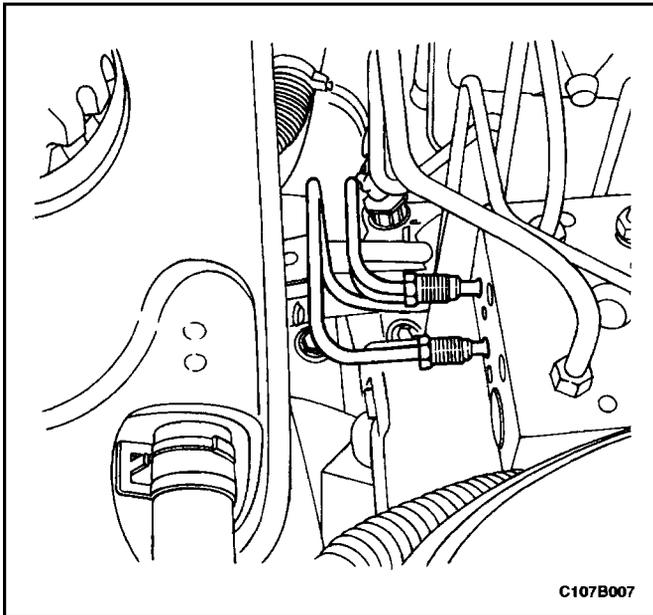
11. Install the connector for the low brake fluid level switch assembly by sliding it into its mount on the top of the brake fluid reservoir.
12. Connect the brake fluid level switch to the wiring harness.



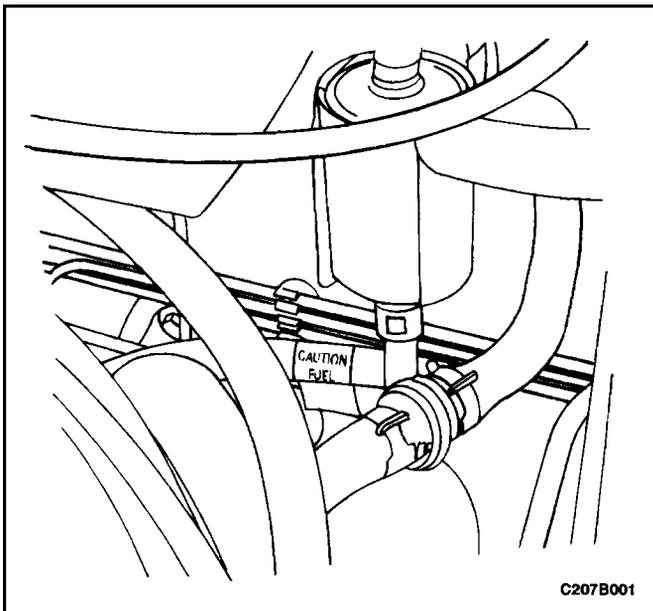
PROPORTIONING VALVE

Removal Procedure

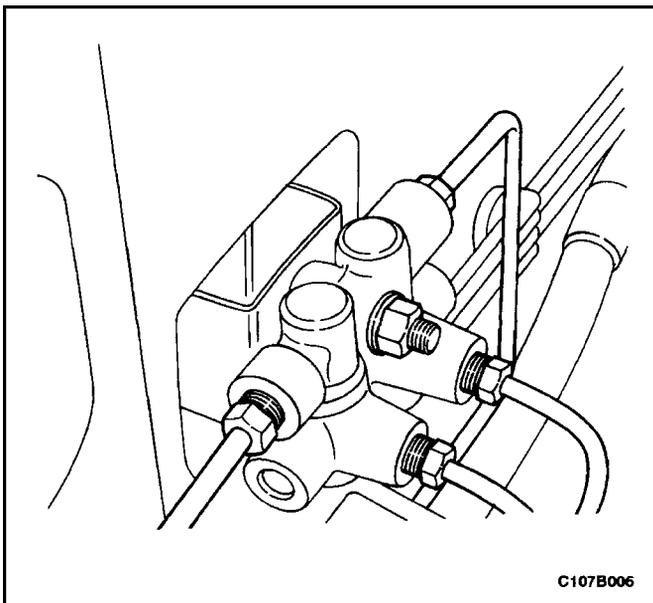
1. Disconnect the brake lines from the proportioning valve.
2. Remove the nut that secures the proportioning valve to the bulkhead.



3. Remove the brake lines from the hydraulic modulator.

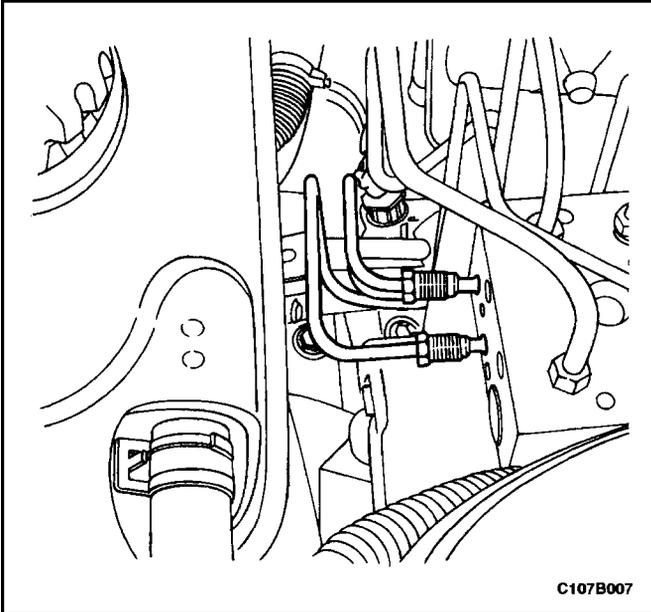


4. Unsnap the brake lines from the brackets along the bulkhead.



Installation Procedure

1. Install the proportioning valve to the bulkhead.
Tighten
 Tighten the proportioning valve nut to 10 N•m (89 lb-ft).
2. Connect the brake lines to the proportioning valve.
Tighten
 Tighten the proportioning valve brake lines to 10 N•m (89 lb-ft).



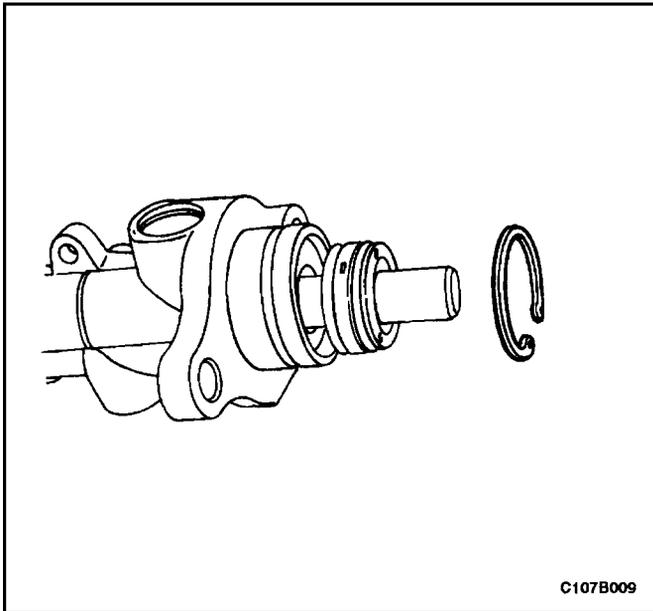
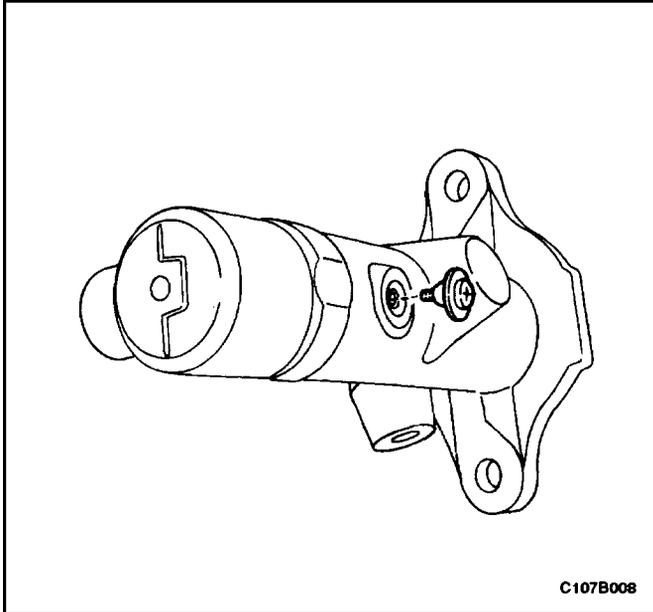
3. Install the brake lines to the hydraulic modulator.
4. Raise and suitably support the vehicle.
5. Bleed the brake system. Refer to *Section 4F, Anti-lock Brake System and Traction Control System*.
6. Lower the vehicle.

UNIT REPAIR

MASTER CYLINDER OVERHAUL

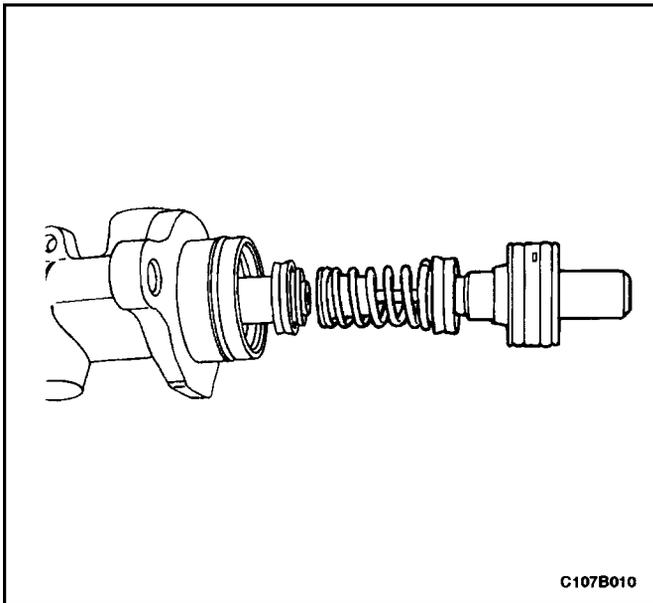
Disassembly Procedure

1. Remove the master cylinder. Refer to "Master Cylinder Assembly" in this section.
2. Remove the brake fluid reservoir. Refer to "Brake Fluid Reservoir" in this section.
3. Remove the screw from the cylinder.

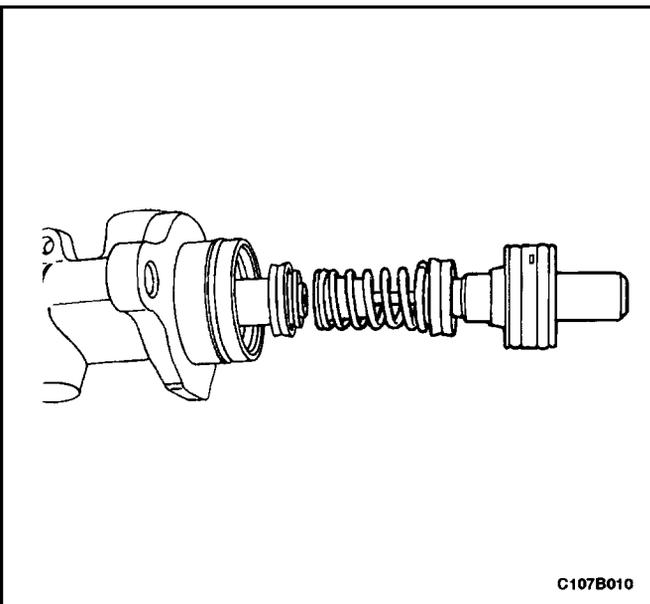
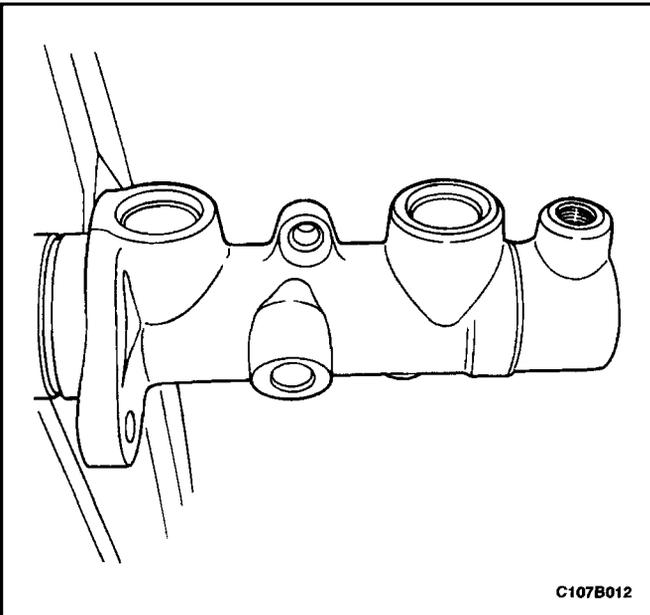
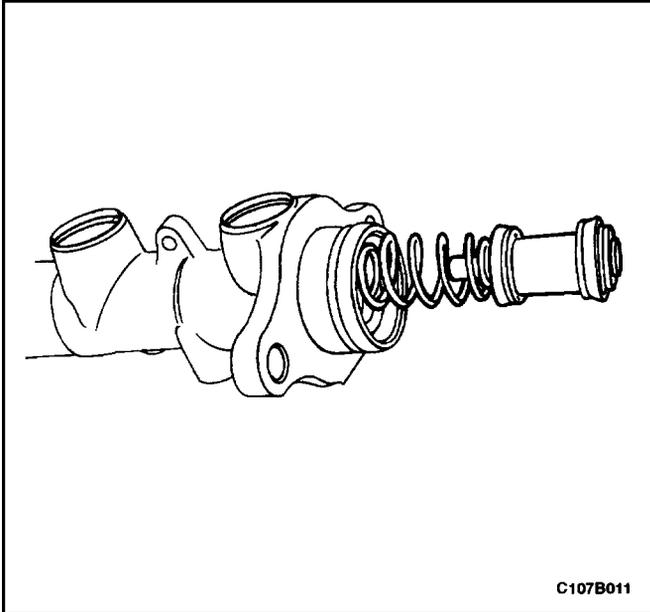


Notice : When removing the retaining ring, avoid damaging the piston or the cylinder wall.

4. Remove and discard the retaining ring from the cylinder body by pressing the hollow shaft and using needle-nosed pliers to grasp and squeeze the retaining ring.



5. Remove the washer and the primary piston assembly.



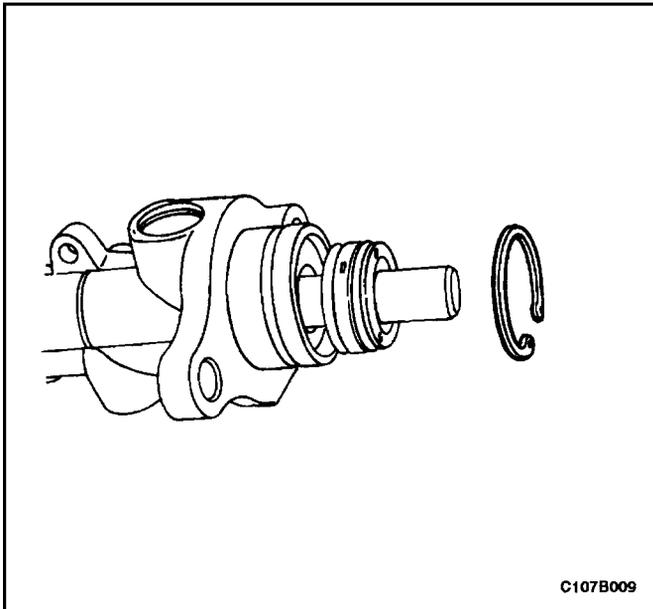
6. Carefully remove the secondary piston assembly, including the spring, from the master cylinder bore.

Assembly Procedure

Notice : Do not use abrasives in the master cylinder bore. Abrasives can damage the bore.

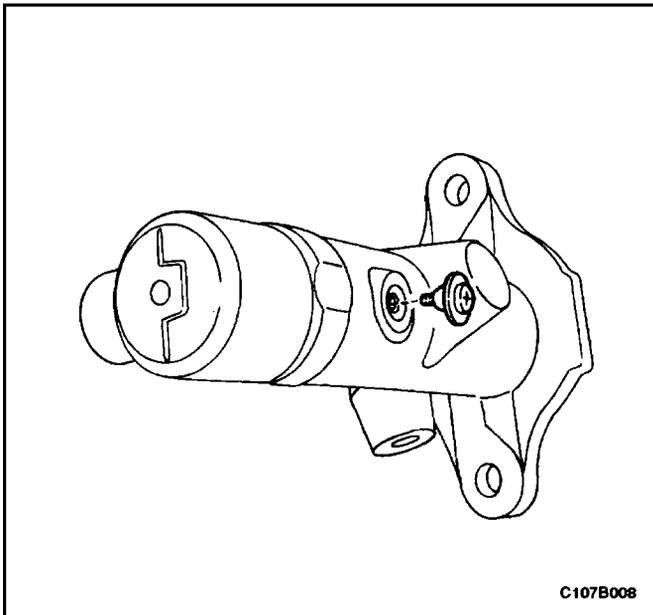
Important : Rubber parts and retaining rings must be discarded and replaced with new parts.

1. Clean all the parts with denatured alcohol or clean brake fluid. Dry the parts with compressed air.
2. Inspect the master cylinder bore for scoring or corrosion. If scoring or corrosion is evident, replace the master cylinder body.
3. Lubricate the master cylinder bore with clean brake fluid.
4. Carefully insert the secondary piston assembly bore until the secondary piston contacts the base of the cylinder body. Use a wood or a plastic drift, if necessary.
5. Insert the primary piston assembly and the washer.



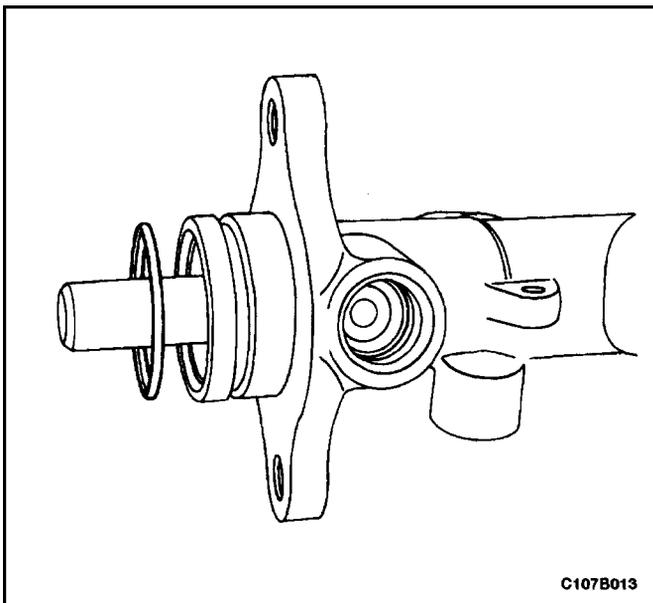
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- Notice :** When installing the washer and the new retaining ring, take care not to damage the cylinder bore.
6. Press the pistons into the cylinder bore using a wooden or a plastic drift.
 7. Insert the washer and the new retaining ring into the groove in the cylinder bore.



C107B008

8. Install the retaining screw in the bottom of the master cylinder and tighten it until it bottoms out on the internal piston assembly.



C107B013

9. Insert a new O-ring over the cylinder body.
10. Install the brake fluid reservoir. Refer to "Brake Fluid Reservoir" in this section.
11. Install the master cylinder. Refer to "Master Cylinder Assembly" in this section.
12. Raise and suitably support the vehicle.
13. Bleed the brake system. Refer to *Section 4F, Anti-lock Brake System and Traction Control System*.
14. Lower the vehicle.

GENERAL DESCRIPTION AND SYSTEM OPERATION

MASTER CYLINDER

The master cylinder is designed for use in a diagonally split system. One front and one diagonally opposite rear brakes are served by the primary piston. The opposite front and rear brakes are served by the secondary piston. The master cylinder incorporates the functions of the standard dual master cylinder, plus a low fluid level indicator. The proportioning valve mounted to the bulkhead limits the outlet pressure to the rear brakes after a predetermined master cylinder pressure has been reached.

Notice : Do not use lubricated shop air on the brake parts, because oil will damage the rubber components.

- Replace all the components included in the repair kits used to service the master cylinder.
- Lubricate the 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 system. Refer to *Section 4F, Anti-lock Brake System and Traction Control System*.
- The torque values specified are for dry, unlubricated fasteners.
- Perform all service operations on a clean bench, free from all traces of mineral oil.

PROPORTIONING VALVE

The proportioning valve limits the outlet pressure to the rear brakes after a predetermined master cylinder pressure has been reached. This is used when less rear application force is needed to obtain optimum braking.

FLUID LEVEL SENSOR

The master cylinder reservoir is equipped with a fluid level sensor. The sensor will activate the BRAKE lamp when the fluid level is low. The BRAKE lamp is also activated by the parking brake lever, and it turns on for a bulb test when the ignition is ON and the engine is not running. For diagnosis of the BRAKE lamp, refer to *Section 4A, Hydraulic Brakes*.