

3.1 MASTER CYLINDER

REMOVE

1. Remove master reservoir cap temporarily and siphon brake fluid from reservoir. Reinstall reservoir cap.
2. Disconnect electrical connector from differential switch.
3. connect brake lines from master cylinder and plug lines and master cylinder port holes

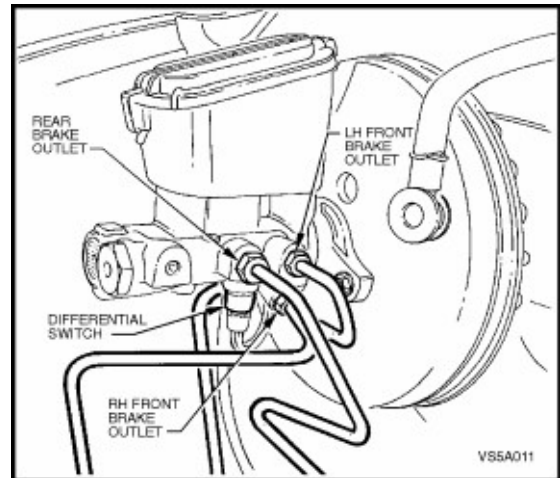


Figure 5A-11

4. Remove bracket securing master cylinder to adjacent spring tower.
5. Remove nuts securing master cylinder to brake booster and remove master cylinder.

NOTE:

Do not disturb brake booster push rod. Do not depress brake pedal with master cylinder removed or reaction disc may become dislodged in booster.

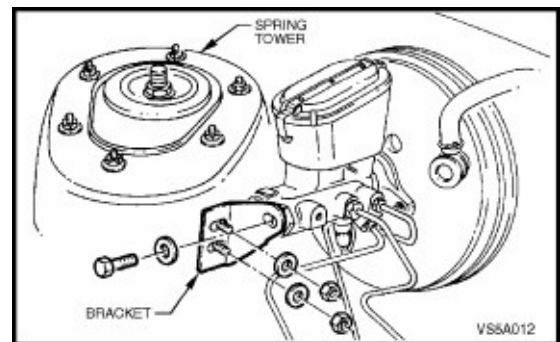


Figure 5A-12

DISASSEMBLE

1. Clean the outside of the master cylinder.
2. Remove reservoir cap and seal. Discard any fluid left in reservoir
3. Unscrew the reservoir to body retaining screw, located at the base of the reservoir.
4. Separate the plastic reservoir, by hand, from the body.
5. Remove the two reservoir sealing grommets from the body.

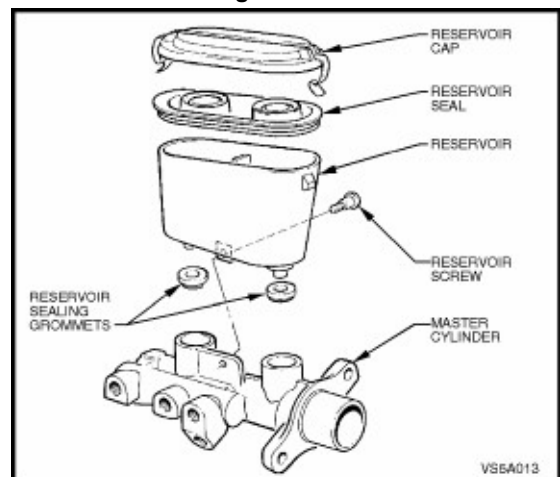


Figure 5A-13

6. Invert master cylinder body so that the reservoir ports face downwards. Depress the primary piston with a wood dowel or brass rod until the piston bottoms in the bore of the master cylinder body. The secondary piston stop pin should freely fall out.
7. Carefully remove primary piston from the main bore of the master cylinder.

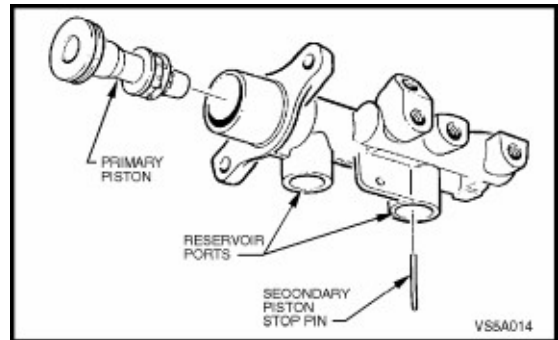


Figure 5A-14

8. Remove secondary piston and return spring by lightly tapping the open end of the master cylinder bore squarely onto a soft piece of wood.

NOTE:

- a. The caged spring of the secondary piston has been set to a predetermined length. Do not attempt to adjust or remove the caged spring.
- b. The centre valve is part of the secondary piston assembly and is not serviced as a separate part.

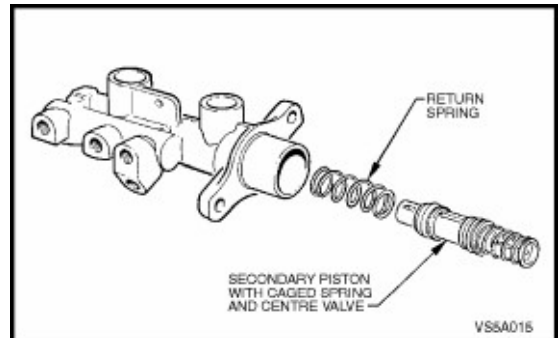


Figure 5A-15

9. Remove the seal retainer from the primary piston by using a small screwdriver to carefully pry apart the seal retainer legs.
10. Remove the recuperating guide and seal from the primary piston.
11. Remove all rubber seals from both pistons, taking EXTREME CARE not to damage the pistons.

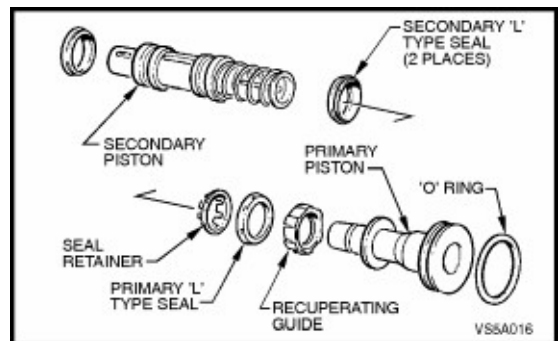


Figure 5A-16

12. Using suitable circlip pliers, remove the circlip retaining the fast fill valve located in the primary reservoir port of the master cylinder.
13. Face the master cylinder reservoir ports downwards to allow the fast fill valve to fall out. If the valve is stuck, lightly tap the master cylinder on a piece of wood to assist removal.
14. Remove the valve sealing 'O' ring from the bottom of the reservoir port.

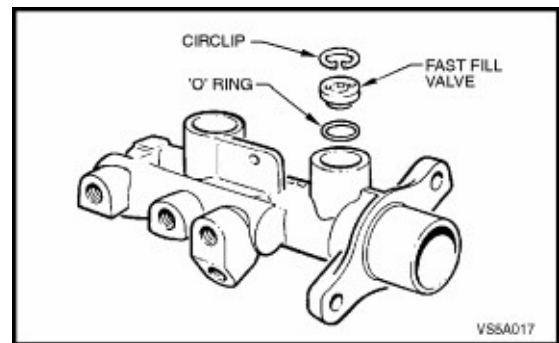


Figure 5A-17

15. **With all but Utility models (with Proportioning Valve),** unscrew and remove the end plug from the master cylinder body.
16. Remove the differential switch from the master cylinder, ensuring that the electrical earthing spring remains on the switch plunger.
17. Remove the proportioning valve assembly by lightly tapping the 'end plug' end of the cylinder bore squarely onto a soft piece of wood to dislodge the proportioning valve assembly.

CAUTION:

Do not damage the proportioning valve assembly by attempting to pull it out of the bore with pliers.

NOTE:

Do not disassembly the proportioning valve assembly as this valve is only serviced as a complete assembly.

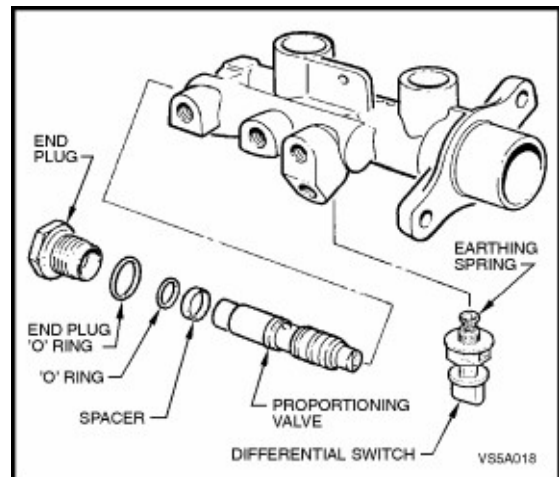


Figure 5A-18

18. **With Utility models (without Proportioning Valve),** unscrew and remove the end plug from the master cylinder body.
19. Remove the differential switch from the master cylinder, ensuring that the electrical earthing spring remains on the switch plunger.
20. Remove the spool valve by lightly tapping the 'end plug' end of the cylinder bore squarely onto a soft piece of wood to dislodge the poppet valve and spool.

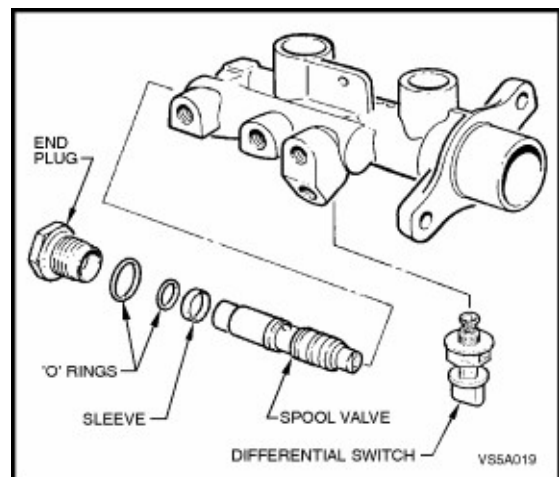


Figure 5A-19

CLEAN AND INSPECT

NOTE:

Ensure work area is clean and free of dust or other contaminants. These can affect the performance of all the seals in the master cylinder.

1. Wash master cylinder body, reservoir and cap in clean methylated spirits.
2. Wash all internal parts in brake fluid.
3. Check all recesses, openings and passages to ensure they are open and free of foreign matter.
4. Place all parts on a clean surface.
5. Inspect the master cylinder bores for signs of etching, pitting, scoring or rust. If in poor condition, replace the cylinder.

IMPORTANT:

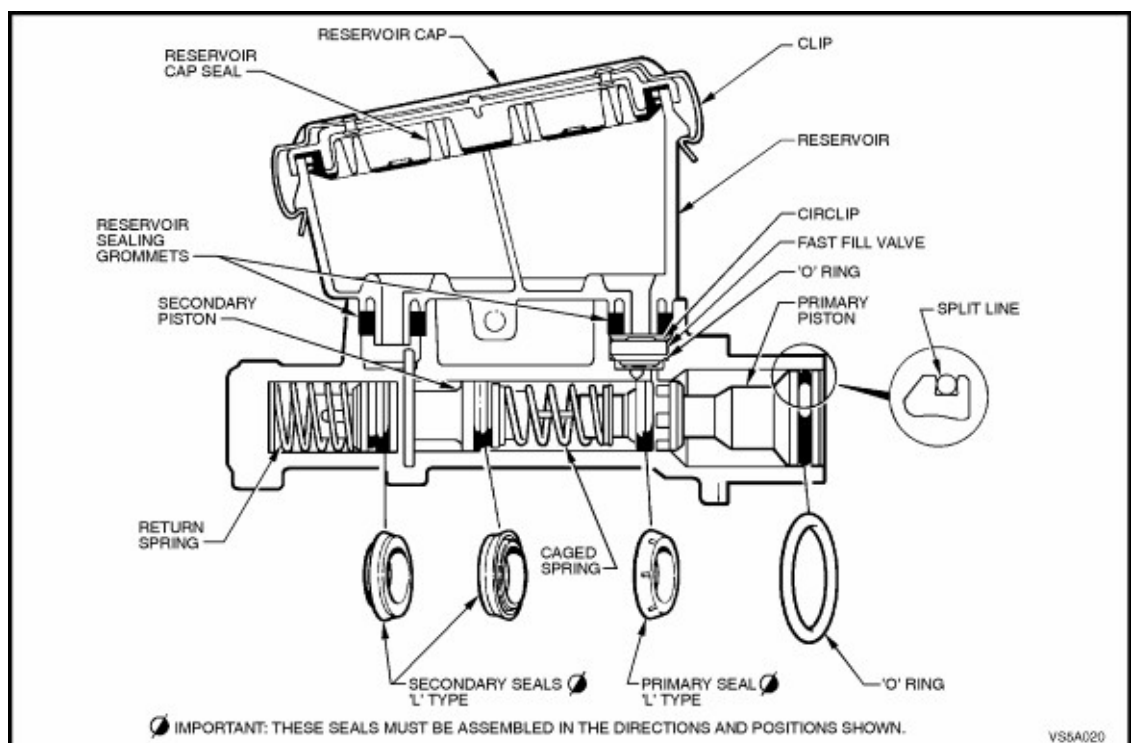
Do not hone the master cylinder bore.

6. Discard all rubber parts together with the secondary piston assembly (the secondary piston assembly incorporates; the secondary piston, the centre valve and the caged spring). **Only new parts from the genuine service kit should be used to reassemble the master cylinder.**

REASSEMBLE

NOTE:

- a. Before assembly, lubricate internal parts and master cylinder bores with clean, recommended brake fluid from a sealed container.
- b. Prior to assembly, ensure that the primary piston, without seals fitted to it, is free to move the full piston stroke in the large bore.



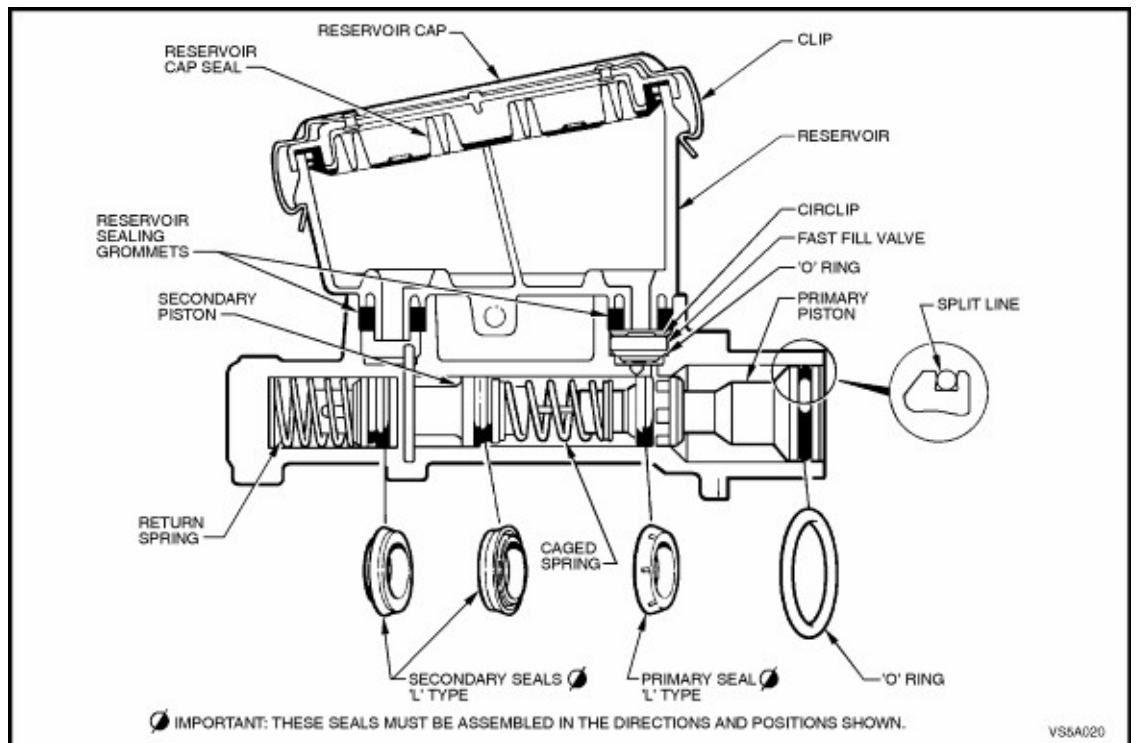


Figure 5A-20

1. Install 'O' ring seal into the groove at the end of the primary piston.
2. Install the recuperating guide followed by the primary 'L' type seal onto the end of the primary piston. The sealing face of the 'L' type seal must face away from the recuperating guide.

NOTE:

The primary 'L' type seal for the primary piston can be identified by the six shallow grooves around the seals outer surface.

3. Assemble the seal retainer onto the primary piston. Using a small screwdriver, clip the retaining legs of the retainer into the groove on the primary piston. Care should be taken to avoid damage to the piston or seal.

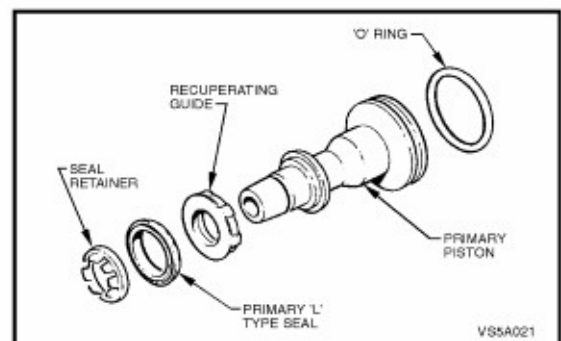


Figure 5A-21

4. Assemble the small end of the return spring over the end of the secondary piston. This should be a slight interference fit.

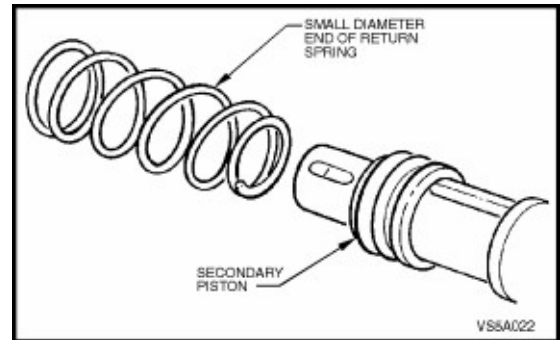


Figure 5A-22

5. Carefully insert the secondary piston, caged spring end last, through the large bore and into the smaller bore of the master cylinder until the return spring 'bottoms'. Ensure the secondary spring does not dislodge from the piston assembly during this operation.

NOTE:

To assemble the secondary piston assembly into the body, align the slot in the secondary piston with the hole in the reservoir ports. This must be done so that the secondary piston stop pin can be inserted into secondary reservoir port in the master cylinder.

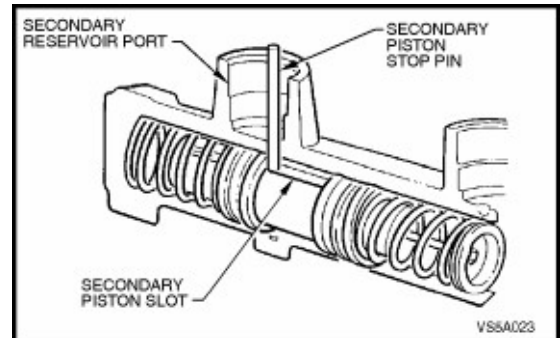


Figure 5A-23

Fully stroke the secondary piston using a soft dowel and while held at the bottom of the bore, install the secondary piston stop pin into the secondary reservoir port. The piston stop pin should easily fit through the larger hole of the two holes located in the secondary reservoir port. The top of the secondary piston stop pin should not protrude more than 6mm above the bottom of the reservoir port.

6. Insert the primary piston into the main bore, against the secondary piston and caged spring assembly. The carefully push both pistons down the bore until the primary piston is flush with the bore opening.
7. Stroke pistons and check that the primary piston returns to the end of the bore after each stroke. Ensure movement is not sticky.

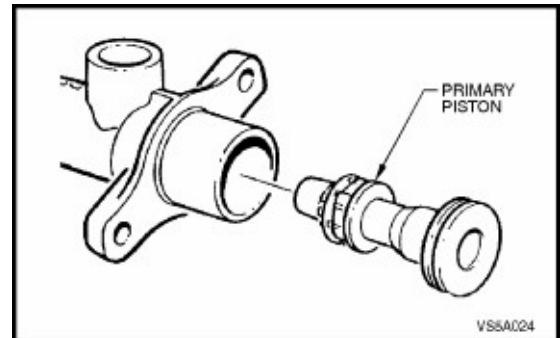


Figure 5A-24

With all but Utility Models (with Proportioning Valve)

8. Fit new 'O' rings onto proportioning valve.
9. Ensure spacer and 'O' ring are fitted over the proportioning valve spool and that they are installed the right way (spacer first followed by the 'O' ring).
10. Insert proportioning valve into the bore, capped end first. Extreme care should be taken when inserting the valve to ensure that the 'O' rings are not damaged. If 'O' rings are damaged, the master cylinder will not function correctly and will leak brake fluid. The proportioning valve assembly must be bottomed in the bore of the master cylinder.
11. Assemble a new 'O' ring onto the end plug, and screw the end plug into the master cylinder body.

END PLUG

TORQUE SPECIFICATION

25 - 30 Nm

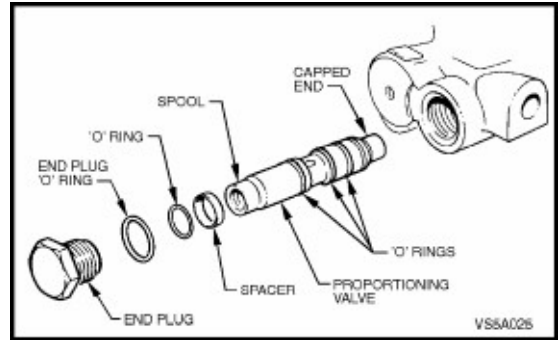


Figure 5A-25

With Utility Models (Without Proportioning Valve)

10. Insert spool valve into the bore.
11. Assemble a new 'O' ring onto the end plug, and screw the end plug into the master cylinder body.

END PLUG

TORQUE SPECIFICATION

25 - 30 Nm

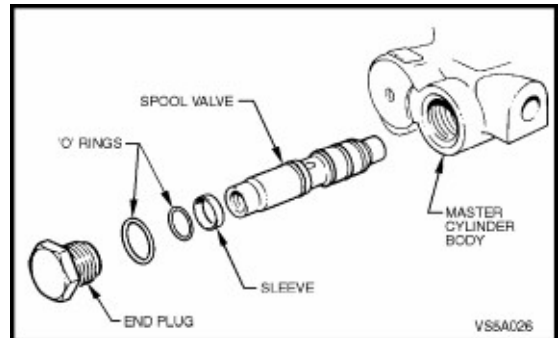


Figure 5A-26

12. Reinstall differential switch and spring. Do not over tighten.

NOTE:

Ensure the earthing spring on the differential switch is installed on the plunger, refer Fig. 5A-27. If necessary, the small end of the spring may need to be closed down slightly to give the required attachment.

DIFFERENTIAL SWITCH

TORQUE SPECIFICATION

2 Nm

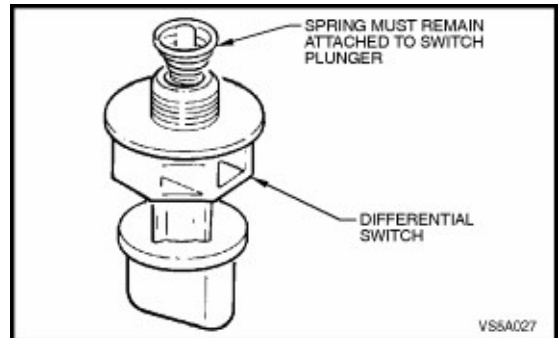


Figure 5A-27

13. Carefully install the fast fill valve 'O' ring in the bottom shoulder of the primary reservoir port.
14. Fit the fast fill valve into the primary reservoir port, ensuring the rubber base with six dimples is faced downwards. Secure valve with circlip.

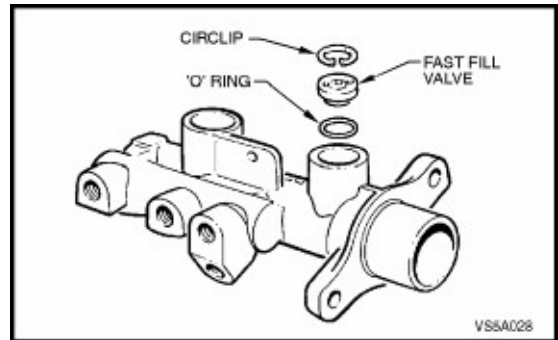


Figure 5A-28

15. Lightly smear the bores of the reservoir ports and sealing grommets with clean brake fluid.
16. Carefully assemble sealing grommets into the bores of the reservoir ports to locate them against the shoulder in each bore.
17. Reinstall reservoir by pushing the reservoir into the sealing grommets until the hole for the retaining screw in the reservoir aligns with the master cylinder body. Install retaining screw and tighten to specified torque. The retaining screw should just protrude from the hole in the master cylinder body when tightened.

NOTE:

Both reservoir and master cylinder holes must be aligned when installing the reservoir retaining screw to avoid cross threading.

**RESERVOIR NUT
TORQUE SPECIFICATION** **4.0 - 5.0 Nm**

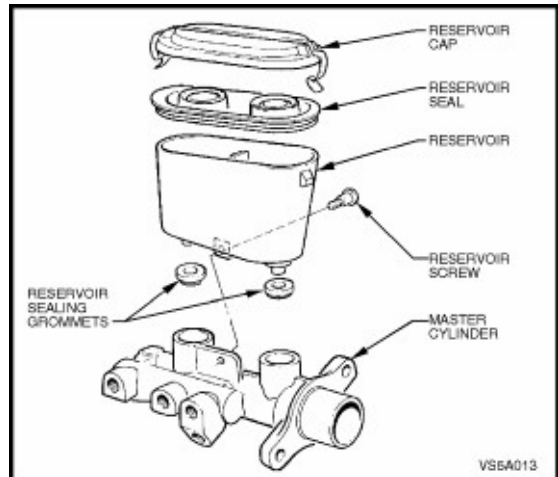


Figure 5A-29

18. Fill the master cylinder with fresh, recommended brake fluid and bleed on the bench prior to replacing on the vehicle. After bleeding, block master cylinder outlet ports to prevent fluid escaping.
19. Assemble new reservoir seal into reservoir cap. Lubricate inside of the reservoir lips with clean brake fluid to accept the reservoir cap seal.
20. Reinstall cap seal and cap.

REINSTALL

1. Reinstall master cylinder assembly on brake booster taking care not to disturb brake booster push rod. Tighten master cylinder nuts to specified torque.

**MASTER CYLINDER ATTACHING
NUT TORQUE SPECIFICATION** **13
- 14 Nm**

2. Reinstall bracket securing master cylinder to adjacent spring tower. Tighten nuts and bolt to specified torque.

**MASTER CYLINDER BRACKET
NUT TORQUE SPECIFICATION** **15
- 20 Nm**

3. Unplug brake lines and master cylinder outlet ports, reinstall pipes to master cylinder and tighten to specified torque.

**BRAKE PIPE TO MASTER
CYLINDER FLARED NUT
TORQUE SPECIFICATION**

8 - 11 Nm

4. Reconnect electrical connector to differential switch.
5. Bleed brake system, refer [Operation 2.2](#) in this section of the Service Manual Supplement.

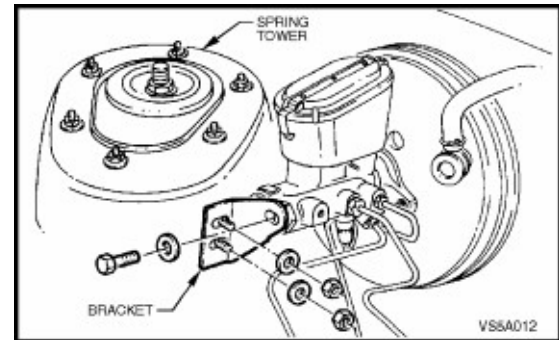


Figure 5A-30