

## BENDIX/DELCO-MORAINÉ DUAL PISTON MASTER CYLINDER

American Motors  
Chrysler Corp.  
Ford Motor Co.  
General Motors

### DESCRIPTION

Unit is a single cylinder with front and rear pistons and a separate reservoir and outlet for each piston. Rear piston is operated by pushrod. Front piston is operated by rear piston. In a combination drum and disc system, reservoir that feeds disc brakes is larger, to correspond with large size disc brake caliper cylinders. Master cylinder outlet that feeds drum brakes has a residual pressure valve under the tub seat. Disc brake outlet has no valve because disc brakes must not have any residual pressure. **NOTE** — Master cylinder used with 4-wheel drum brakes has residual pressure valves and springs in both brake line outlets. A stopscrew, which is screwed in from outside the cylinder, limits return stroke of front piston. Some master cylinders have one outlet on bottom and other outlet on side. A bleeder screw on these master cylinder allows trapped air to be released. **NOTE** — Dodge models do not have a residual valve for rear drum brakes. Cup expanders must be used on Monaco, Charger, Coronet, Challenger, and manual disc brakes on Dart models rear wheel cylinder.

### REMOVAL & INSTALLATION

**Removal** — On power brake systems disconnect hydraulic lines, remove cylinder mounting nuts and remove cylinder. Do not remove power unit. On manual brake systems disconnect hydraulic lines and pushrod at brake pedal under dash, then remove cylinder mounting nuts and remove cylinder.

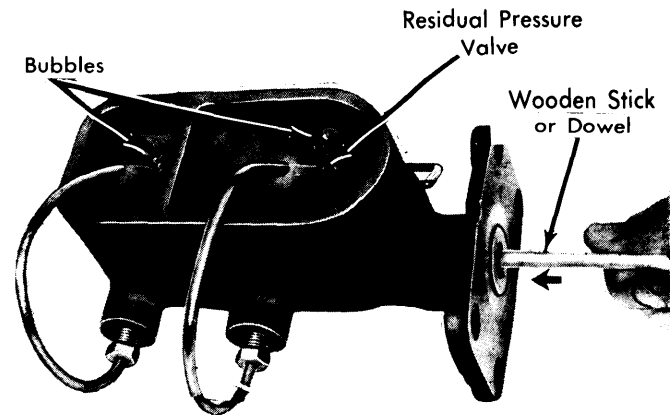
**Installation** — 1) Master cylinder must be filled with fluid and bled before bleeding complete system. Entire master cylinder bleeding job can be done on the car, but preferred method is to bleed the master cylinder on the bench with bleeding tubes. If master cylinder has a bleed screw, the bench bleeding should still be done, and when master cylinder is installed on car the bleed screw should be used as final check to free any trapped air.

2) Place master cylinder level in vice, attach bleeding tubes to cylinder and fill reservoirs with fluid so that ends of tubes are covered. See illustration. Tubes attached to disc brake outlets must have a residual pressure valve on the end of the tube to prevent fluid from siphoning.

3) Stroke piston in bore with a wooden stick or dowel until bubbles no longer appear at ends of tubes. Remove tubes and plug the master cylinder disc brake outlets to keep fluid from draining.

4) Install master cylinder on car, reversing removal procedure. Bleed master cylinder bleed screw first, if used, and then bleed remainder of system. See "Hydraulic Brake Bleeding" in this section.

5) Check master cylinder compensating ports by pumping brake pedal several times, ending with pedal held down. Remove master cylinder cover and slowly release pedal. Fluid should squirt up in each reservoir from the compensating ports.



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### BLEEDING MASTER CYLINDER

6) If a squirt of fluid is not seen in each reservoir, push rod may be too long or the port may be plugged. If port is open, adjust manual brake push rod at clevis, under dash. On power brakes, see Push Rod Adjustment under POWER BRAKE UNITS, in this section.

7) Pushrod should have a slight amount of play when in relaxed position, so that both master cylinder pistons will return to their stops when brakes are off. **CAUTION** — Do not use wire to check compensating ports. Wire may make a burr on port or damage cup.

### OVERHAUL

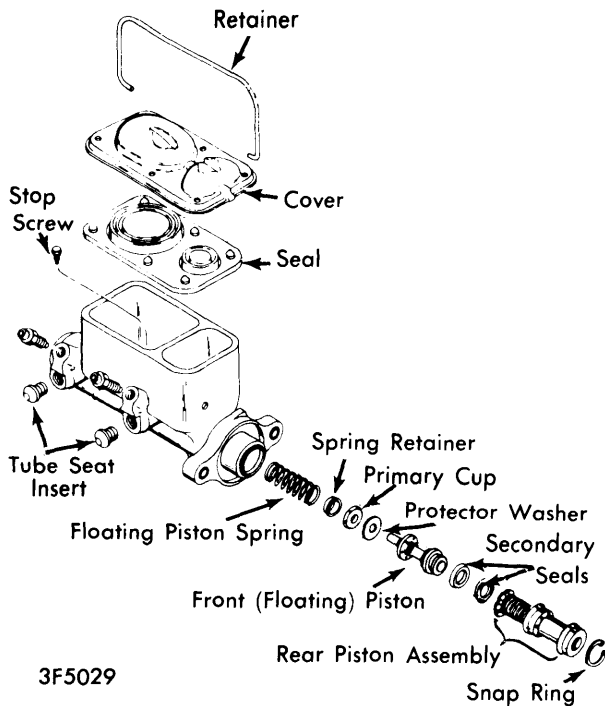
**Disassembly** — 1) With master cylinder in vise, remove reservoir cover and diaphragm type gasket. Depress piston and remove stop screw. **NOTE** — On all Cadillac models except Seville, there is no stop screw.

2) Remove lock ring from groove in end of bore, or piston retainer and screw, if used, and remove rear (primary) piston assembly. **CAUTION** — Do not disassemble rear piston assembly or disturb adjustment of screw.

3) Front (secondary) piston may be removed with air pressure through compensating port in reservoir, or by pulling with wire hook or mechanical finger through end of cylinder. Remove front piston spring if it did not come out with piston. Remove splash seal and retainer from outside rear of cylinder, if used.

4) To gain access to check valves, remove tube seats in cylinder outlets. Use self-tapping removal kit if supplied in repair kit, or use one of the following methods: Thread a short screw into seat and pry screw and seat out with a screwdriver. Another method is to drill a  $\frac{1}{8}$ " hole through each seat. Then tap hole with a  $\frac{1}{4}$ -20 tap. Screw a tubing nut into outlet, then insert a  $\frac{1}{4}$ -20 machine screw (with washer) through nut and into tube seat. Hold screw from turning and unscrew the tubing nut to remove seat. Remove check valve and spring from drum brake outlet. **NOTE** — Ford does not recommend tube seat removal.

## BENDIX/DELCO-MORAINE DUAL PISTON MASTER CYLINDER (Cont.)



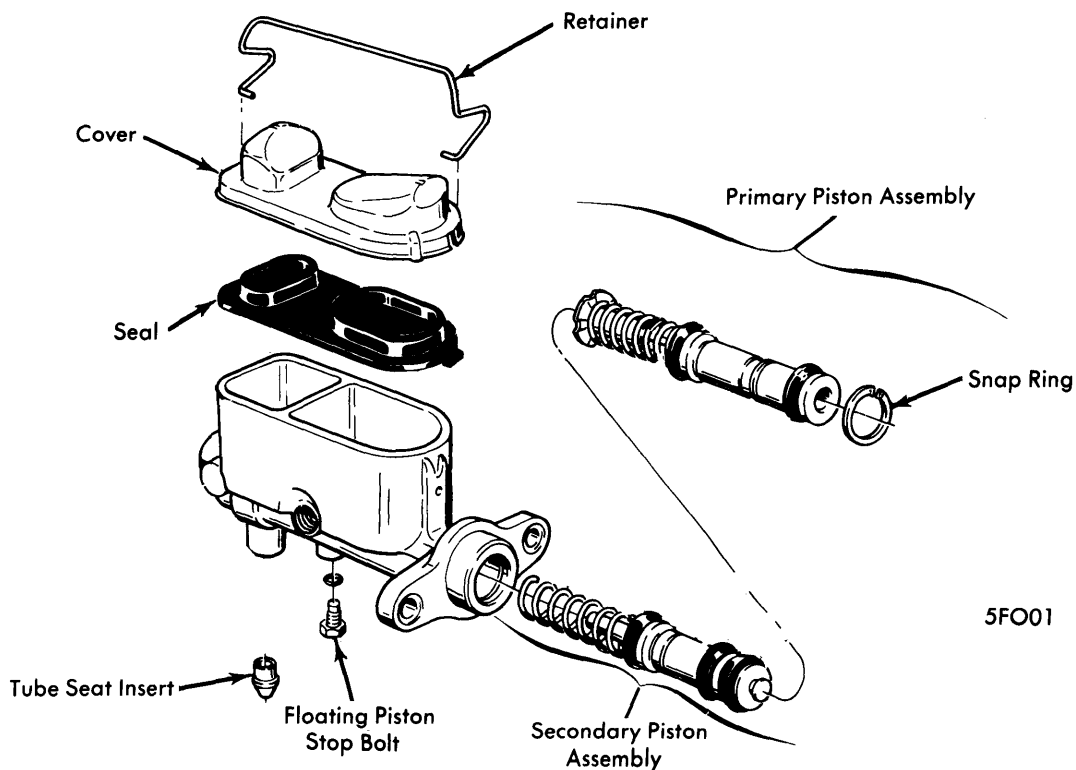
**DELCO-MORAINE MASTER CYLINDER  
(GENERAL MOTORS SHOWN)**

**Inspection** — Inspect cylinder bore for scoring or corrosion. Staining which has not pitted or roughened the surface can be removed with crocus cloth. Move cloth in circular manner. Never polish cylinder with lengthwise strokes. If cylinder is scored, corroded, or pitted, American Motors and General Motors recommend replacing the cylinder. Chrysler Corporation permits honing if diameter of bore is not increased beyond .002" oversize. Ford Motor Company permits honing if bore diameter increase is not over .003".

**Reassembly** — 1) Put check valve spring in drum brake outlet. **CAUTION** — Check valve in disc brake outlet will cause disc brakes to lock up. Put check valve on top of spring and insert tube seat in outlet against valve. Use a spare tube nut, and screw nut into outlet to bottom tube seat. Remove nut and inspect for burrs or shavings caused by installing seat.

2) Install new secondary cups on rear of front (secondary) piston, with cup lips facing away from each other. Some front pistons use a cup in the rear grooves and an "O" ring in the second groove from the rear, with the cup lip facing forward and back of cup against protector washer. **NOTE** — Protector washer may be permanently attached to cup.

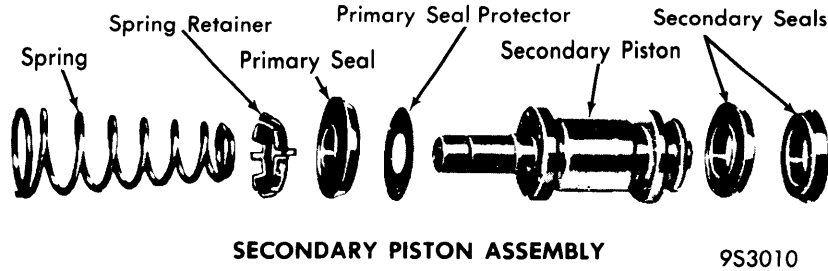
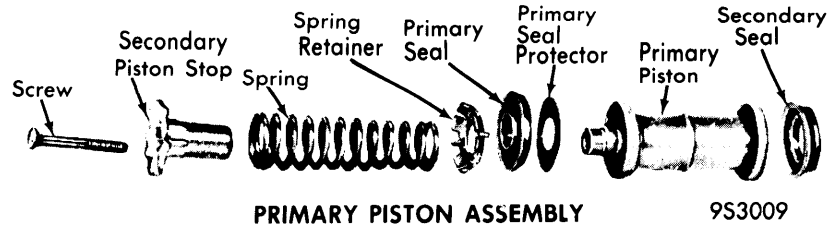
3) If it is necessary to disassemble rear (primary) piston for replacement of parts see "Primary Piston Assembly" illustration.



**BENDIX MASTER CYLINDER (FORD MOTOR CO. SHOWN)**

# Brake Systems

## BENDIX/DELCO-MORAINE DUAL PISTON MASTER CYLINDER (Cont.)



4) Coat bore of cylinder and all cups with brake fluid, then put spring retainer on end of front spring and put spring on end of front piston so that retainer is seated inside cup. Hold open end of cylinder down and push front spring and piston up into bore until spring seats against end of cylinder.

5) Hold cylinder with open end up and insert rear piston assembly, spring end first, into master cylinder. Install lock ring in groove, or screw and retainer, if used. Push rear piston into bore and install stop screw and "O" ring, if used. **CAUTION** — Stop screw is a special screw. Do not substitute with any other type. **CAUTION** — On all Cadillac models except Seville, there is no stop screw installed even though a drilled and tapped hole may be provided. If a stop screw is installed, damage to master cylinder piston or seal will result.

6) Install master cylinder cover and gasket with beaded side of gasket facing cylinder casting. On manual brake systems, assemble pushrod through retainer, if used, and push retainer over end of master cylinder. Install new boot over pushrod and press boot down over pushrod retainer.

TIGHTENING SPECIFICATIONS	
Application	Ft. Lbs.
<b>American Motors</b>	
Master Cylinder-to-Firewall .....	20-35
Master Cylinder-to-Power Unit .....	20-35
Brake Line-to-Master Cylinder .....	10-15
<b>Chrysler Corp.</b>	
Master Cylinder-to-Firewall .....	17
Master Cylinder-to-Power Unit .....	7-17
Brake Line-to-Master Cylinder	
$\frac{3}{8}$ - $\frac{7}{16}$ " .....	7-13
$\frac{1}{2}$ - $\frac{9}{16}$ " .....	10-15
<b>Ford Motor Co.</b>	
Master Cylinder-to-Firewall .....	13-25
Master Cylinder-to-Power Unit .....	13-25
Brake Line-to-Master Cylinder	
$\frac{3}{8}$ - $\frac{7}{16}$ " .....	10-15
$\frac{1}{2}$ - $\frac{9}{16}$ " .....	10-17
<b>General Motors</b>	
Master Cylinder-to-Firewall .....	24
Master Cylinder-to-Power Unit .....	24
Brake Line-to-Master Cylinder .....	14