

## DELCO-MORAINE TANDEM DIAPHRAGM

**Buick  
Cadillac  
Chevrolet  
Oldsmobile  
Pontiac**

### OVERHAUL

#### DESCRIPTION

Unit is mounted on firewall and connected directly to brake pedal. A combination of vacuum and atmospheric pressure is used to provide power assist. Power cylinder houses power piston assembly, which contains primary and secondary diaphragms, pistons, floating control valve, reaction piston and disc.

#### REMOVAL & INSTALLATION

##### POWER BRAKE UNIT

**Removal** – 1) Without disconnecting hydraulic lines, remove master cylinder from power unit and position to one side. On models equipped with pipe distribution and switch mounting bolt, remove bolt before moving master cylinder away from power unit.

**CAUTION** – Do not bend or kink hydraulic lines.

2) Disconnect vacuum hose from check valve on front of power unit. Disconnect push rod from brake pedal.

**CAUTION** – Do not force push rod to the side when disconnecting.

3) Remove nuts mounting power unit to firewall and remove power unit.

**Installation** – Reverse removal procedure and check stop light and cruise control (if equipped) switch adjustments.

##### POWER BRAKE UNIT

**Disassembly (Power Cylinder)** – 1) Scribe a line across front and rear housings to aid in reassembly. Remove and discard vacuum check valve and grommet from front housing. Remove front housing seal and master cylinder piston push rod. Attach unit to suitable holding fixture (J-23456).

2) Rotate screw to apply downward pressure on handle, then rotate front housing counterclockwise to unlock housing.

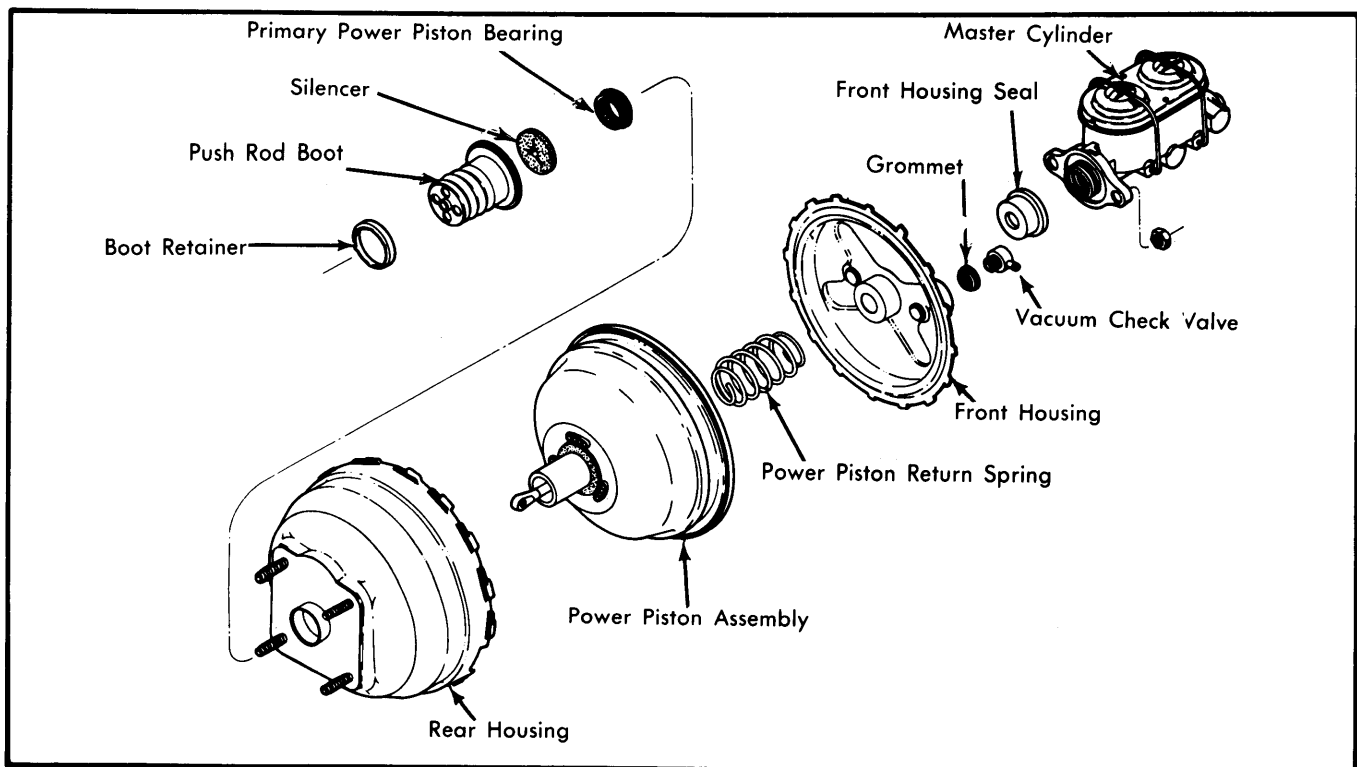
**CAUTION** – If it is necessary to pry housing apart, maintain tension with screw to prevent housing from separating suddenly.

3) Remove front housing assembly and power piston return spring. Remove boot and retainer from rear housing and push rod. Remove felt silencer from inside boot.

**Disassembly (Power Piston)** – 1) Remove reaction retainer and piston rod from power piston. Remove silencer from power piston tube.

2) Turn power piston assembly upside down so that end of push rod is against a hard surface. Hold power piston assembly with both hands and use a slight force or impact on push rod to remove diaphragm retainer.

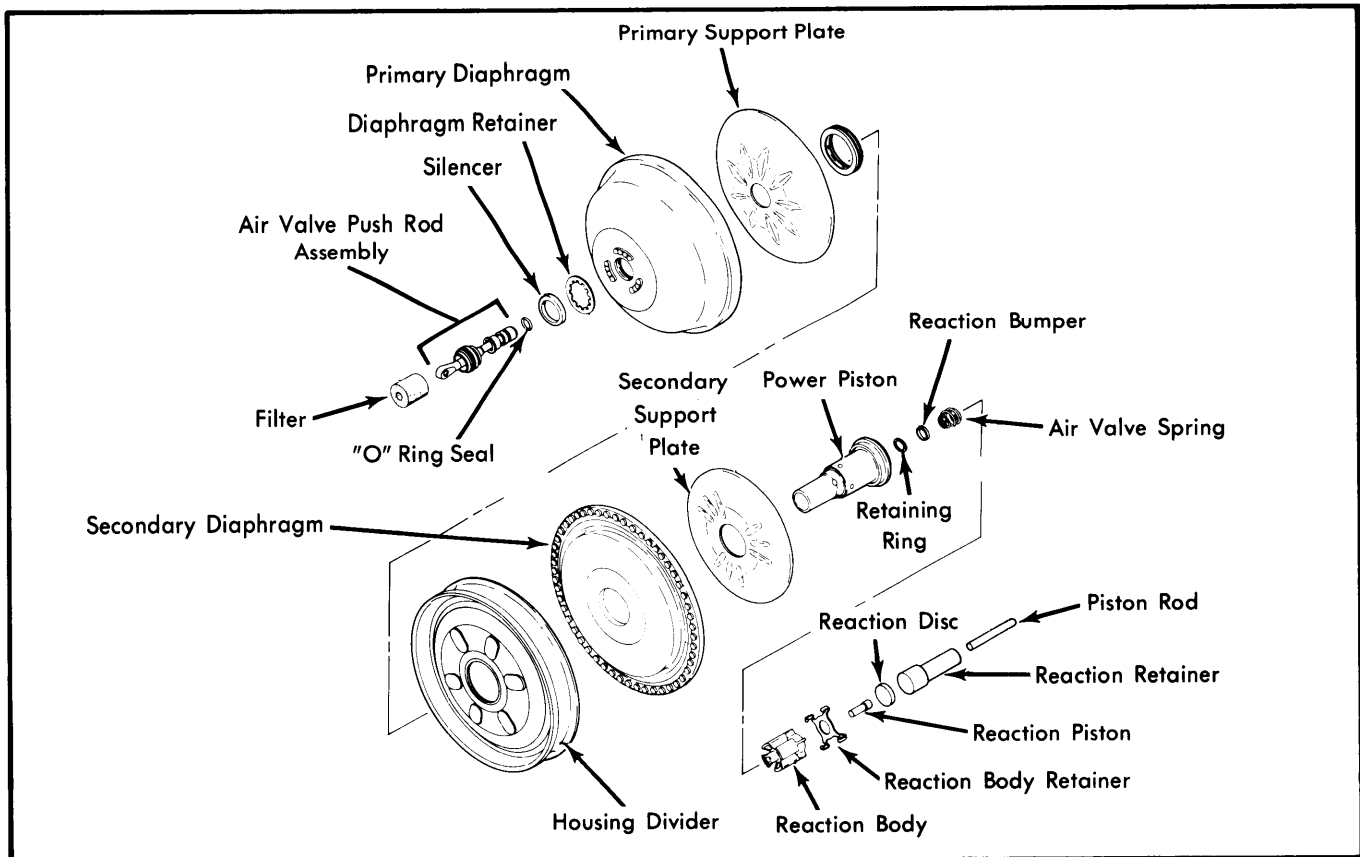
3) Remove diaphragms, support plates and divider from power piston. Separate both primary and secondary diaphragms from support plate.



**Fig. 1 Exploded View of Delco-Moraine Tandem Power Cylinder**

# Power Brake Units

## DELCO-MORAINE TANDEM DIAPHRAGM (Cont.)



**Fig. 2 Exploded View of Delco-Moraine Tandem Power Piston**

4) Using a screwdriver, remove reaction body retainer and reaction body. Remove reaction disc and reaction piston from body by pushing down on end of reaction piston with a small, blunt punch.

5) Remove air valve spring and reaction bumper from air valve. Using pliers, remove retaining ring from air valve. Remove air filter from power piston.

6) Remove air valve push rod assembly from push rod end of power piston in the following steps.

- Place power piston in a press and press air valve push rod assembly out bottom of power piston tube with a  $\frac{1}{2}$ " diameter rod.
- Another method is to insert a heavy round shanked screwdriver on both sides of push rod. Using considerable force, pull air valve push rod assembly straight out.

7) Removal of air valve push rod assembly will disassemble the control valve retainer. Remove "O" ring from air valve.

**Cleaning & Inspection** — Clean all plastic, metal and rubber parts in denatured alcohol. Blow out all passages, orifices and valve holes. Air dry all parts. Slight rust on housing may be cleaned with crocus or emery cloth. Do not reinstall any rubber parts with cuts, nicks or distortion. If in doubt, replace the part.

**NOTE** — Prior to installation of rubber, plastic, and metal friction parts, lubricate with suitable silicone lube (5459912).

**Reassembly** — 1) Insert NEW grommet in front housing and NEW vacuum check valve into grommet. Place "O" ring on air valve. Lubricate floating control valve on air valve. If floating control valve is damaged, replace complete air valve assembly.

2) Place air valve end of air valve push rod assembly into the tube of power piston. Push air valve push rod assembly into power piston until floating control valve bottoms in tube section of power piston.

3) Place lip of retainer on the outside diameter of a suitable installer tool (J-23175, pipe of correct diameter will work) and press the retainer until seated in the power piston tube. Install filter element over push rod and press into power piston tube.

4) Using snap ring pliers, place snap ring into the groove on air valve. Install reaction bumper on end of air valve. Install reaction spring on end of air valve.

5) Install reaction body with large inside diameter hole up. Replace reaction body retainer and install reaction piston into reaction body with large diameter up.

6) Lubricate reaction disc and place in cavity of reaction body. Place power piston on bench with push rod up. Place a suitable installation cone (J-28458) over push rod end of piston.

7) Assemble secondary diaphragm to secondary support plate. Press raised flange on the inside diameter of diaphragm through center hole of support plate. Make sure edge of support plate center hole fits into groove in raised flange of diaphragm.

## DELCO-MORAINE TANDEM DIAPHRAGM (Cont.)

8) Lubricate inside diameter of secondary diaphragm and install secondary diaphragm and support plate assembly over power piston until it bottoms on power piston.

9) Hold housing divider so that formed over flange of divider faces down. Place power piston bearing into inside diameter of divider so that extended lip of bearing faces up.

10) Lubricate inside diameter of power piston bearing. Hold housing divider so the formed over flange of divider faces up. Press divider down over installer cone onto power piston tube until it rests against secondary diaphragm.

11) Remove installer cone and fold primary diaphragm away from the outside diameter of primary support plate. Place primary support plate and diaphragm assembly over power piston and push down until it bottoms.

12) Place diaphragm retainer over power piston and onto diaphragm. Place large end of installer cone (J-28458) over power piston and onto diaphragm. Strike with hammer until retainer is locked on neck of power piston.

13) Install silencer over power piston and up to retainer. Lubricate outside diameter of piston rod retainer. Insert master cylinder piston rod retainer into cavity of power piston so that flat end bottoms against reaction disc at bottom of cavity.

14) Place power piston bearing in rear housing center hole so that formed flange of housing center hole fits into groove of power piston bearing. The thin lip of bearing will protrude to the outside of housing.

15) Lubricate inside diameter of power piston bearing with silicone.

16) Mount suitable holding fixture (J-23456) in vise and position rear housing in fixture. Place power piston return spring over inset in front housing.

17) Install power piston assembly in rear housing by pressing tube of power piston through rear housing bore. Press down until housing divider seats in rear housing and power piston bottoms against housing.

18) Place piston rod retainer plate on end of power piston return spring in front housing. Place rear housing (mounting studs up) over front housing.

**NOTE** — Make sure piston rod retainer does not move from position in power piston.

19) Place rear housing on front housing so that when tangs are locked, scribe marks made during disassembly will be aligned. Lower rear housing onto front housing.

20) Make sure power piston spring seats in depression of power piston retainer. Make sure bead on outside of secondary diaphragm is positioned between edges of housing.

21) Bolt spanner wrench to rear housing studs. Press down on spanner wrench and twist rear housing clockwise until it is locked with front housing. Remove spanner wrench.

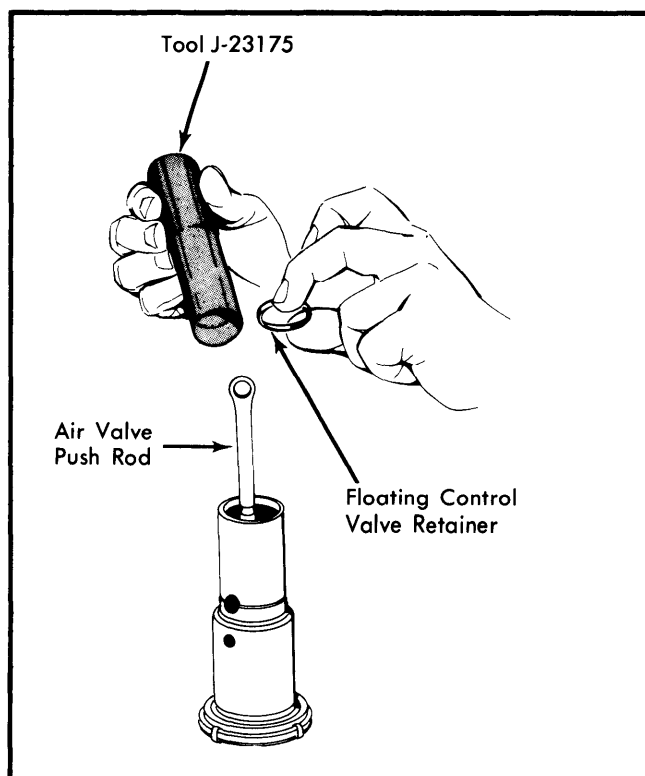


Fig. 3 Installing Floating Control Valve Retainer

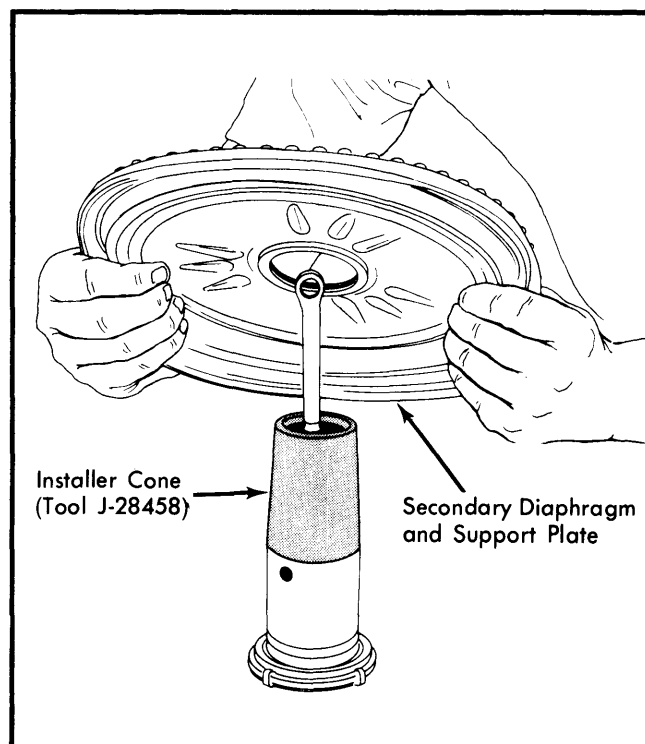


Fig. 4 Installing Secondary Diaphragm and Support Plate

# Power Brake Units

## DELCO-MORAINE TANDEM DIAPHRAGM (Cont.)

22) Insert silencer in closed end of power head boot. Push retainer over boot. Stretch boot over push rod and flange in center of rear housing. Remove power unit from holding fixture. Stake tabs on housing.

### PUSH ROD ADJUSTMENT

1) Place power unit in padded vise with front housing up. Do not clamp tight. Insert master cylinder piston rod, flat end first, into piston rod retainer. Ensure rod is properly seated. Remove front housing seal to assure no vacuum is in unit.

2) Place suitable gauge (J-22647) over piston rod, in a position which will allow gauge to be moved right or left without contacting studs. Piston rod should contact longer section of gauge. Rod is non-adjustable, and if out of limits, must be replaced with adjustable service rod. With service rod, adjust self-locking screw to meet gauging specifications.

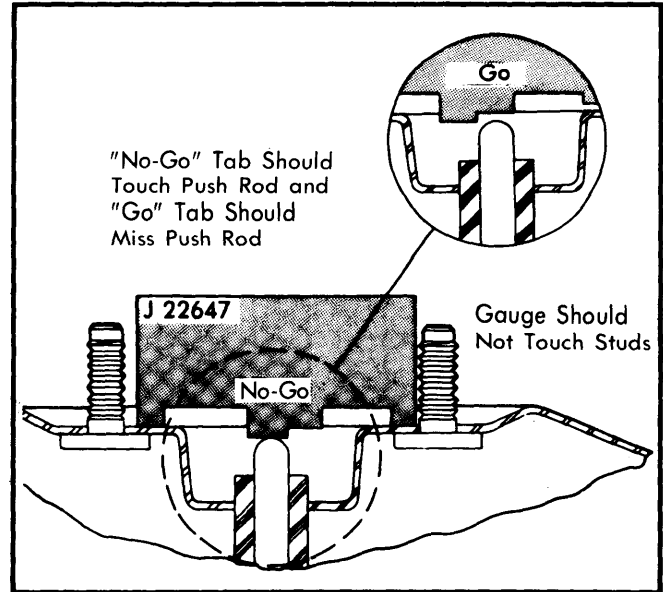


Fig. 5 Gauging Push Rod with Special Gauge