## DELCO-MORAINE SINGLE DIAPHRAGM

**Chevrolet**
**GMC**
**Jeep**

### DESCRIPTION

A combined vacuum-hydraulic unit which uses a combination of intake manifold vacuum and atmospheric pressure to provide power assist. Reserve vacuum supply and vacuum check valve allow several brake applications, with vacuum assist, after engine has stopped. Unit is composed of two main sections: vacuum power cylinder and dual master cylinder. Vacuum power cylinder contains power piston assembly, which houses control valve, reaction mechanism, and power piston return spring.

### REMOVAL & INSTALLATION

**Removal & Installation** – Remove vacuum line from power unit and hydraulic lines from master cylinder (plug lines). Disconnect stop light switch wires, if necessary. Detach power unit push rod from brake pedal assembly. Unbolt power unit from firewall and remove from vehicle (with master cylinder). To install, reverse removal proceure and bleed system.

### OVERHAUL

NOTE – *Jeep Corp. does not recommend overhaul of this unit; it is serviced as an assembly.*

**Disassembly** – 1) Scribe a mark on bottom of front and rear housings for reassembly. Attach a suitable holding fixture (J-22805) to front of housing. Make sure holding fixture is bolted down tight against housing to prevent damage to studs.

2) Clamp base of holding fixture in a vise. Make sure power section is up. If the unit has a straight mounting bracket, attach a suitable spanner wrench (J-9504) to studs on rear of housing. Make sure nuts are tight to avoid damaging studs.

3) If the unit has a tilt mounting bracket, place a suitable adapter (J-22893) inside tilt bracket. Place spanner wrench on adapter and tighten nuts on studs.

4) On all type units, press down on spanner wrench and rotate rear housing counterclockwise to unlocked position. Care must be taken as housing is loosened as it is spring loaded. Remove tools.

5) Remove rear housing and power piston assembly from unit. Remove return spring. Remove retaining ring on push rod then remove silencer. Remove seal, vacuum check valve and grommet from front housing.

NOTE – *Care must be taken during the following procedures to prevent damage to diaphragm.*

6) Remove power piston assembly from rear housing. Remove silencer from neck of power piston tube. Remove power piston lock ring by prying out one end from under large divided locking lug. Now pull ring from 2 locking lugs on power piston.

7) Remove reaction retainer, piston, reaction plate, 3 reaction levers and air valve spring. Remove reaction bumper and air valve spring retainer from air valve.

8) Place the square shank of a suitable power piston wrench (J-21524) in a vise. Pull diaphragm edges away from support plate so that hands grip steel support plate. Now place assembly on wrench in vise so that 3 lugs on tool fit 3 notches in power piston.

9) Press down on support plate and rotate counterclockwise until support plate separates from power piston. Remove diaphragm from support plate and lay to side.

10) Drill a 1 3/8" hole in the center of a 2" x 4" x 8" wood block. Place power piston with tube down in wood block. Place block in a vise and clamp in place. Make sure tube is not clamped.

11) Remove snap ring on air valve. Place power piston, tube down in a press. Using a 3/8" drive extension, press out air valve assembly. Now remove floating control valve, floating valve retainer, push rod limiter washer and air filter.

12) Remove floating control valve assembly from push rod. Discard control valve as a new one must be installed. Remove master cylinder push rod then remove "O" ring from push rod.

**Cleaning & Inspection** – Use denatured alcohol to clean all metal brake parts. Blow out all passages, orifices, and valve holes with clean, dry air. If any rust is found inside housings, remove with crocus cloth. Make sure there are no nicks, cuts or abnormalities in diaphragm.

**Reassembly** – 1) Install a new vacuum check valve and rubber grommet in front housing. Position a new seal in front housing. Make sure flat surface of cup lies against bottom of depression in housing.

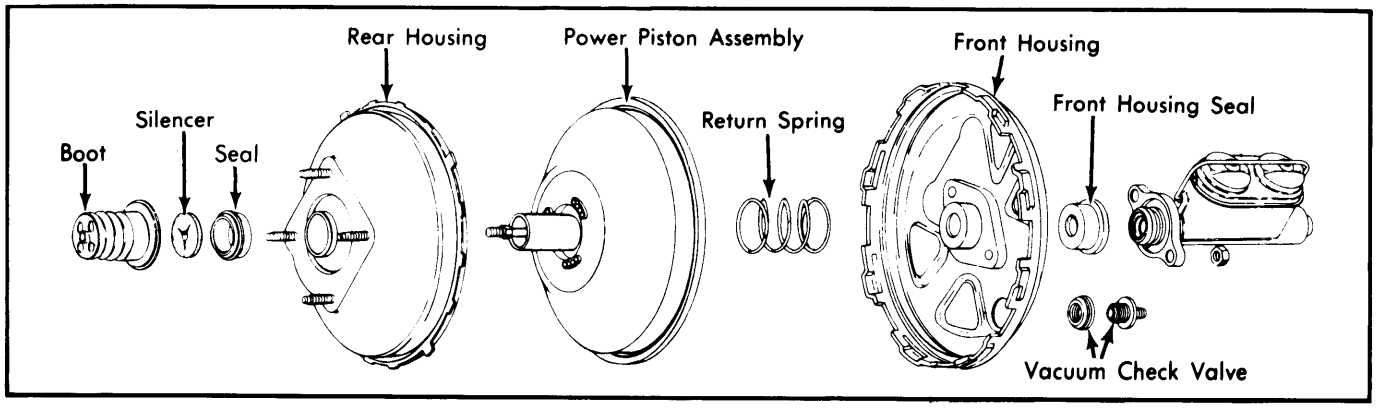


*Fig. 1 Exploded View of Delco-Moraine Single Diaphragm Power Unit*

## DELCO-MORAINE SINGLE DIAPHRAGM (Cont.)

**2)** Place a new "O" ring in master cylinder push rod. Wipe a thin film of power brake lubricant on "O" ring. Insert master cylinder push rod through reaction retainer. Round end of rod protrudes from tube end of retainer.

**3)** Place power piston wrench (21524) in a vise. Place power piston on wrench so that lugs in wrench align with notches in power piston. Place a new "O" ring in second groove on push rod end of air valve.

**4)** Place a new floating control valve on push rod air-valve assembly. Make sure plate face of floating valve seats against valve seat on air valve.

**5)** Place a thin coat of power brake lubricant on outer diameter of floating control valve and on "O" ring on air valve. Press air valve push rod assembly onto seat in tube of power piston.

**6)** Place floating control valve retainer over push rod so that flat side seats on floating control valve. Start floating control valve and retainer into power piston tube.

**7)** Press floating control valve and retainer into tube until seated. Install retainer by pushing down using a suitable installation tool (J-21601-01).

**8)** With floating control valve seated, position rod limiter washer over push rod and down into floating control valve. Stretch air filter element over push rod and press into power piston tube.

**9)** Assemble power piston diaphragm to support plate from side of support plate opposite locking tangs. The raised flange on diaphragm is presssed through hole in center of support plate.

**10)** Make sure edge of center hole fits into groove in diaphragm flange. Pull diaphragm away from outer diaphragm of support plate so that both hands can be used to grip support plate.

**11)** With power piston still positioned on tool in vise, coat bead portion of diaphragm that contacts power piston with power brake lubricant.

**12)** Hold metal portion of support plate by hand with locking tangs down. Position support plate and diaphragm over power piston tube. Diaphragm flange will fit into power piston groove.

**13)** Press down and rotate support plate clockwise until lugs on power piston stop against notches in support plate. Place assembly over wood block fabricated during disassembly. Clamp assembly and wood block in a vise.

**14)** Install snap ring in groove in air valve. Place air valve spring retainer on snap ring. Install reaction bumper into groove in end of air valve. Place air valve with large end down on spring retainer.

**15)** Place 3 reaction levers into position in power piston with wide end in slots. The narrow end will rest on top of air valve return spring.

**16)** Place reaction plate, with numbered side up, on top of reaction levers. Press down on plate until large ends of reaction levers pop up so that plate rests on lever flats. Make sure plate is centered.

**17)** With round end of master cylinder push rod up and reaction retainer held toward top of rod, place small end of rod in center of reaction plate. Line up ears on reaction retainer with notches in power piston. Push reation retainer down until ears seat in notches.

**18)** Maintain pressure on retainer and install large lock ring over push rod. Place one end of lock ring under lug with raised divider in center and to one side of divider.

**19)** As the lock ring is worked its way around, it goes over an ear of reaction retainer, under a lug on power piston and so forth. The other end of lock ring should end up under other half of lug with divider.

**20)** Place a new power piston bearing in center of rear housing. Make sure flange on center hole of housing fits into power piston bearing groove. The large power piston bearing flange will be on stud side of housing.

**21)** Coat inside of power piston bearing with power brake lubricant. Place silencer over holes on tube of power piston. Apply power brake lubricant to power piston tube.

**22)** Install power piston on rear housing. Apply power brake lubricant to reaction retainer tube. Attach a suitable holding fixture (J-22805) to front housing.

**23)** Clamp base of holding fixture in a vise. Install power piston return spring over insert in front housing. Apply power brake lubricant to inside diameter of support plate seal, reaction retainer tube, and beaded edge of diaphragm.

**24)** Position rear housing assembly over front housing assembly. Align scribe marks made during disassembly. On models with straight mounting bracket, bolt spanner wrench to rear housing studs.

**25)** On tilt mounting bracket, assemble adapter and spanner wrench used in disassembly. On all units, press down on spanner wrench and turn rear housing clockwise until fully locked with front housing.

**26)** Remove tools from unit. Push felt silencer over push rod and seat against end of power piston tube. Install snap ring to secure silencer against tube. Place plastic boot against rear housing. Raised tabs on side of boot will locate in holes in center of brackets.

**28)** Stake front and rear housing in 2 places 180° apart using a $\frac{1}{8}$" diameter rod (or equivalent).

**CAUTION** – *The interlock tabs should not be staked more than once. Stake 2 of the remaining tabs. When all tabs have been staked. housing must be replaced.*

## DELCO-MORAINE SINGLE DIAPHRAGM (Cont.)

### ADJUSTMENT

### PUSH ROD ADJUSTMENT

**NOTE** – *Chevrolet and GMC production push rod is not adjustable. If production rod is reused, gauging is to check proper assembly. If service push rod, which is adjustable, is used to replace production rod, gauging is to set correct rod length.*

**Chevrolet & GMC** – Place suitable gauge (J-22647) over piston rod in a position which will allow gauge to be slipped to left or right without contacting studs. Center section of gauge has two levels. Piston rod should always contact longer section (lower level), and never contact shorter section (higher level). Any variation beyond these two limits would require replacement of production piston rod or adjustment of service piston rod.

**Jeep** – Piston rod of replacement units is preset at factory and require no field adjustment.

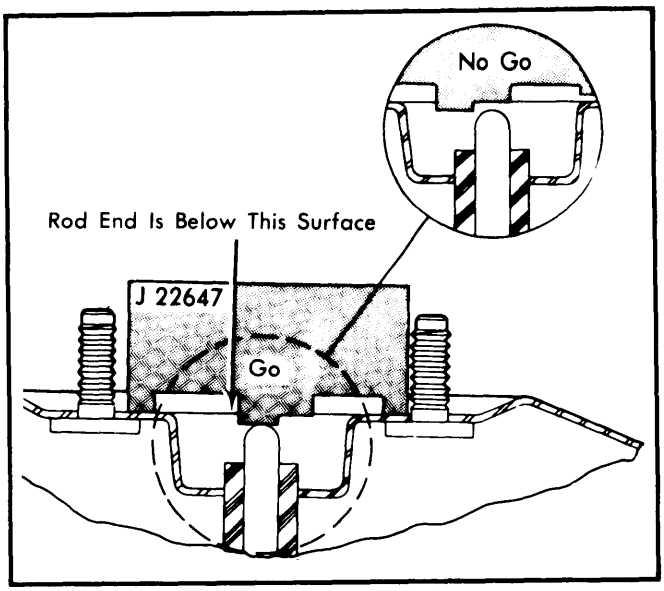


*Fig. 2 Checking Piston Rod Height Nonadjustable Production Rod Shown*

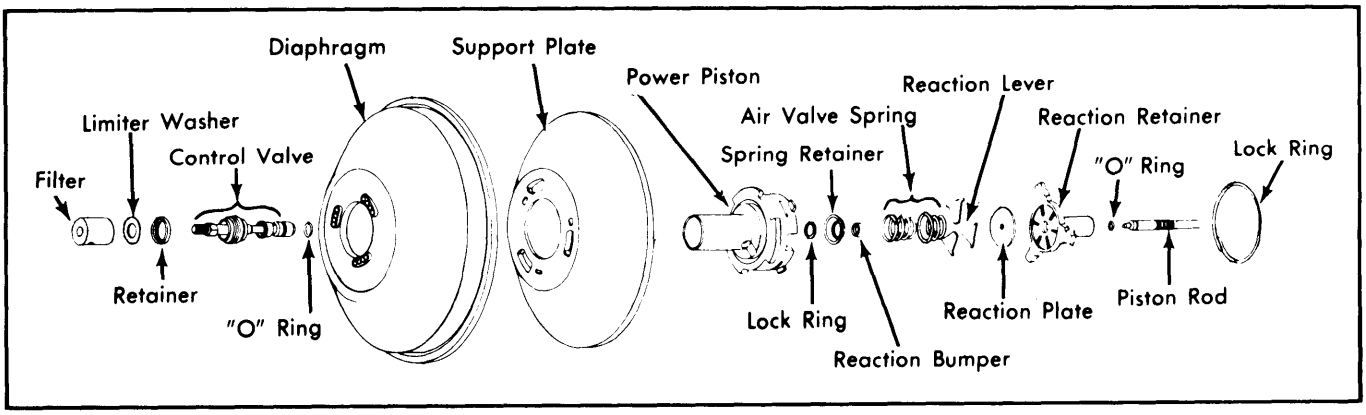


*Fig. 3 Exploded View of Power Piston Assembly*