## REMOVAL AND INSTALLATION (Continued)

3. Loosen hose clamp at cooler. Disconnect hose and drain fluid into a suitable container.
4. Remove shift mount bracket.
5. Cut tie straps and remove heat shield from steering gear.
6. Lower vehicle.
7. Loosen hose clamp at reservoir and disconnect return line.
8. Remove hose from vehicle.

**Installation**

1. Position reservoir-to-cooler hose in vehicle.
2. Connect hose to reservoir and tighten clamp to 1.4-2 N·m (13-17 lb-in).
3. Raise vehicle.
4. Position heat shield at steering gear and install tie straps.
5. Install shift mount bracket.
6. Connect hose to cooler and tighten clamp to 1.4-2 N·m (13-17 lb-in).
7. Lower vehicle.
8. Connect battery ground cable.
9. Fill system. Refer to Section 11-00.

### Cooler

**Taurus SHO**

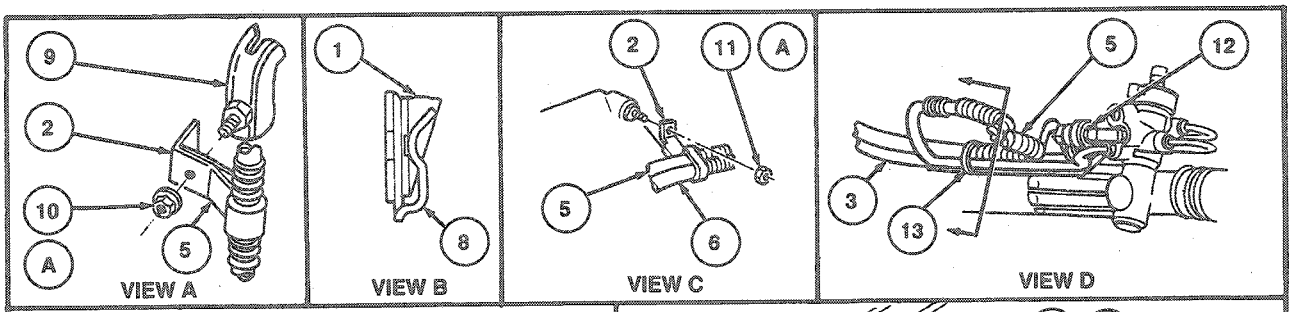
**Removal**

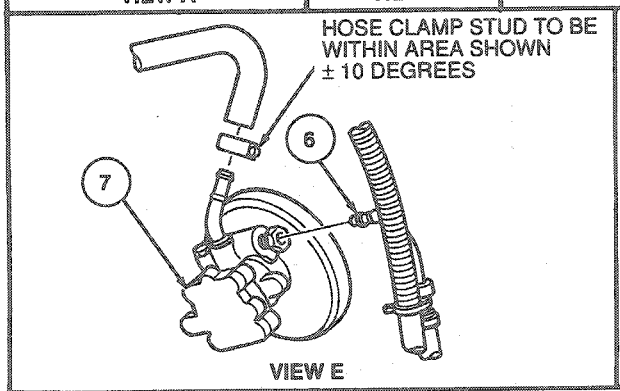
1. Disconnect battery cable.
2. Loosen hose clamps at cooler and remove return lines from cooler.
3. Remove two screws retaining cooler assembly to vehicle. Remove cooler.

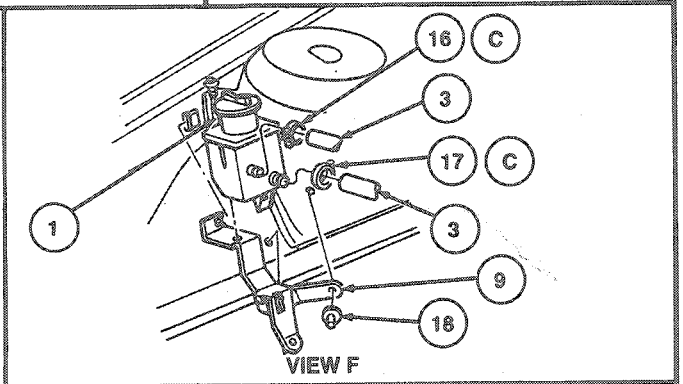
**Installation**

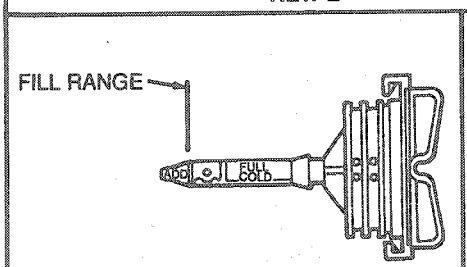
1. Position cooler and install two screws. Tighten to 18-28 N·m (14-20 lb-ft).
2. Connect return line hoses to cooler. Position hose clamps and tighten to 1.4-2 N·m (13-17 lb-in).
3. Connect battery ground cable.
4. Fill system. Refer to Section 11-00.

## REMOVAL AND INSTALLATION (Continued)

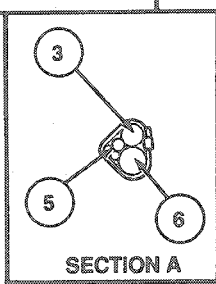


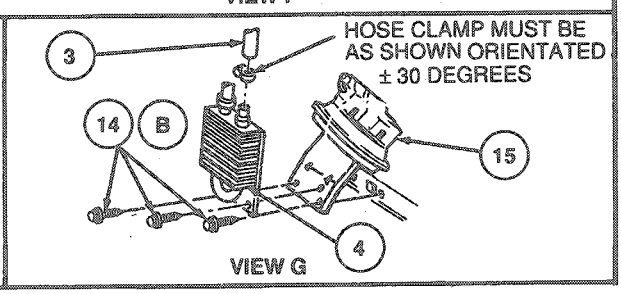



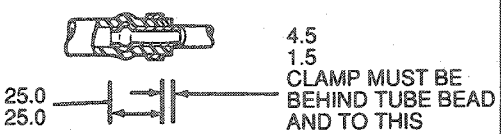




FLUID MUST SHOW ON DIPSTICK
AS SHOWN
VIEW OF POWER STEERING PUMP
DIPSTICK SHOWING FILL INSTRUCTIONS

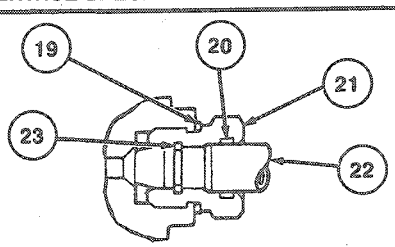


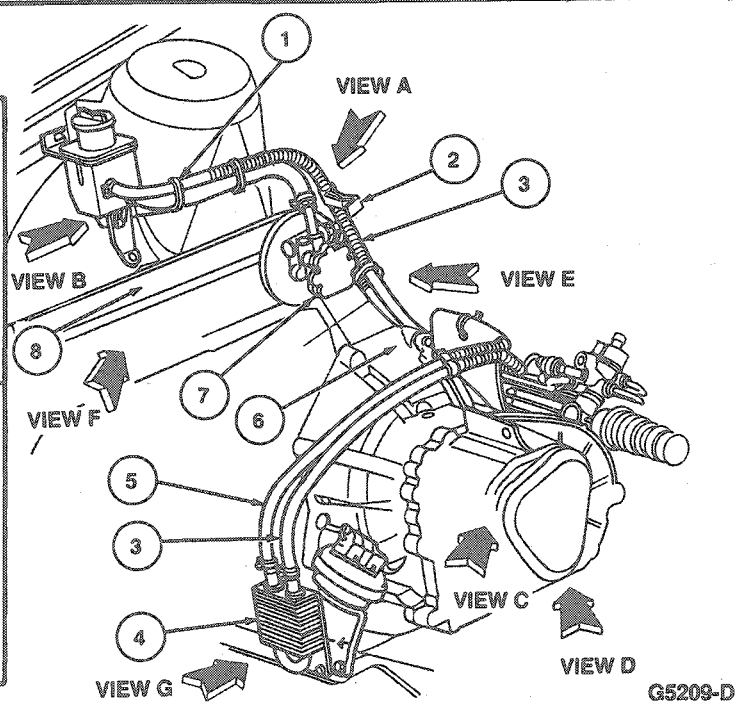

HOSE CLAMP




TYPICAL HOSE CLAMP CONNECTION.
ROTATIONAL POSITION OF CLAMP UNLESS OTHERWISE SPECIFIED.




QUICK CONNECT INSTALLATION AT PUMP



## REMOVAL AND INSTALLATION (Continued)

| Item | Part Number | Description |
|---|---|---|
| 1 | 3R700 | Power Steering Reservoir Assy |
| 2 | 3C510 | Clamp |
| 3 | 3F751 | Hose Assy |
| 4 | 3D746 | Cooler Assy |
| 5 | 3F731 | Hose Assy |
| 6 | 3A719 | Hose Assy |
| 7 | 3A674 | Power Steering Pump |
| 8 | 3490 | Bracket |
| 9 | — | Engine Mounted Stud |
| 10A | N621939-S2 | Nut |
| 11A | N801310-S | Nut |
| 12 | 3N803 | Actuator Assy |
| 13 | 95873 | Strap |

(Continued)

| Item | Part Number | Description |
|---|---|---|
| 14B | N610959-S2 | Screw (3 Req'd) |
| 15 | — | Speed Control Servo |
| 16C | 390462-S100 | Clamp (3 Req'd) |
| 17C | 383522-S | Clamp (2 Req'd) |
| 18 | N803710-S | Rivet (2 Req'd) |
| 19 | 388898-S | Seal |
| 20 | N804753-S | Seal |
| 21 | 3F656 | Housing |
| 22 | — | Hose or Tube Assy |
| 23 | N804753-S | Snap Ring |
| A | | Tighten to 23.3-31.7 N·m (17-23 Lb-Ft) |
| B | | Tighten to 4.0-5.6 N·m (35-50 Lb-in) |
| C | | Tighten to 1.6-2.2 N·m (14-20 Lb-in) |

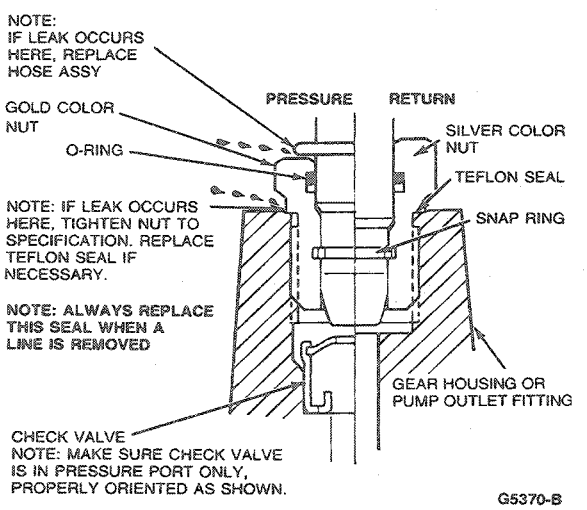
### Pressure and Return Line Fitting at Steering Gear and Power Steering Pump

**Tools Required:**

- Teflon Seal Installer D90P-3517-A3

**Seal Replacement**

If a leak occurs between the tubing and tube nut, replace the hose assembly. If a leak occurs between the tube nut and the aluminum gear housing or pump outlet fitting, replace the plastic washer.



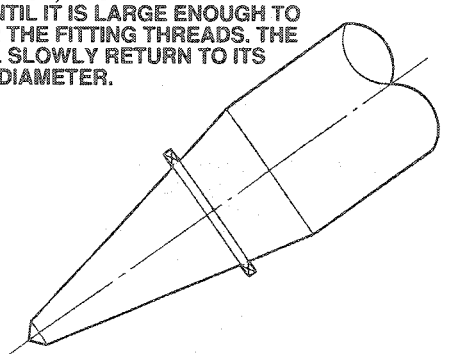

The following procedure should be used:

1. Check fittings to determine which fitting is leaking and whether leak is between tube and tube nut or between tube nut and gear housing or pump outlet fitting.

   **CAUTION: DO NOT over-tighten. If tube nuts are overtorqued stripping of housing threads may occur and bores may concave.**

2. If leak is between tube nut and gear housing or pump outlet fitting, check to ensure nut is tightened to 27-34 N·m (20-25 lb-ft).
3. If leak continues or if leak is between tube and tube nut, remove line.
4. Unscrew tube nut, and inspect plastic seal washer. Always replace plastic seal washer (pressure line plastic washer at gear, 388897-S, and return line plastic washer at gear or pump outlet, 388898-S) when line is removed. To facilitate assembly of new plastic seal washer, a tapered shaft may be required to stretch washer, so it may be slipped over tube nut threads.

**STRETCH PLASTIC SEAL OVER A TEFLON SEAL INSTALLER (D90P-3517-A3) OR A TAPERED TOOL, SUCH AS A CENTER PUNCH, UNTIL IT IS LARGE ENOUGH TO SLIP OVER THE FITTING THREADS. THE SEAL WILL SLOWLY RETURN TO ITS ORIGINAL DIAMETER.**




5. The rubber O-ring cannot be serviced with this design. If leak is due to the O-ring, replace the hose assembly.

## REMOVAL AND INSTALLATION (Continued)

6. Connect tube nuts and tighten to 27-34 N·m (20-25 lb-ft). Install plastic strap to attach pressure and return lines to LH turn transfer line.

The quick connect fittings may disengage if not fully assembled, if the snap ring is missing, or if the tube nut, or the hose end is not machined properly.

If the fitting disengages, replace the hose assembly. The fitting is fully engaged only when the hose will not pull out. To test for positive engagement, the system should be properly filled, the engine started, and the steering wheel cycled from lock-to-lock. Service hose assemblies have tube nuts, snap rings and O-rings already attached.

### Pressure Switch

**Tools Required:**

- Rotunda Digital Volt Ohmmeter 007-00001

The pressure switch uses an O-ring seal. If a leak occurs, check that the switch is properly tightened to 7-14 N·m (5-10 lb-ft). If the leak continues, replace the O-rings, then the pressure tube, and finally the pressure switch.

**Pressure Switch Functional Check**

Check operation of the switch if either or both of the following concerns are noted:

- Engine stalls during parking maneuvers.
- Engine idles at high speed.

The following test is based on the fact that the switch is normally closed. As power steering load increases, the switch opens and increases the idle speed.

1. Disconnect the electrical connector at the pressure switch.
2. Connect a continuity tester, Rotunda Digital Volt Ohmmeter 007-00001 or equivalent, across the pressure switch terminals.
3. Start engine and let idle.
4. Switch should be normally closed (zero ohms) with steering wheel straight ahead.
5. Turn steering toward either stop while watching continuity tester. Switch should open near the stops (no continuity or infinite reading on ohmmeter).
6. If switch fails either test, replace the switch. If switch is OK, check the engine idle speed control system.

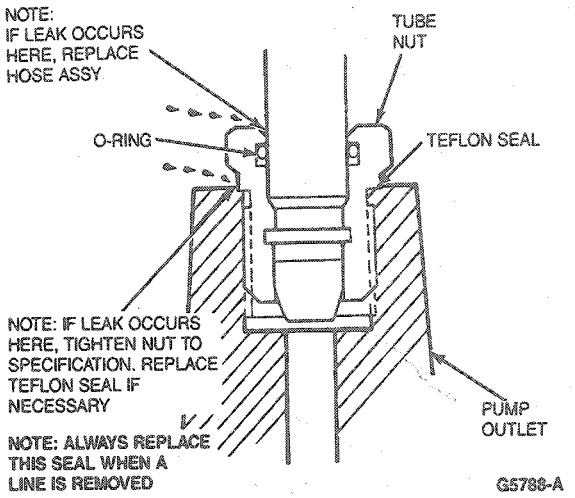
### Quick Connect Power Steering Fitting, CII

**Tools Required:**

- Teflon Seal Installer D90P-3517-A3

**Seal Replacement**

If a leak occurs between the tubing and tube nut, replace the hose assembly. If a leak occurs between the tube nut and the pump outlet, replace the plastic washer.

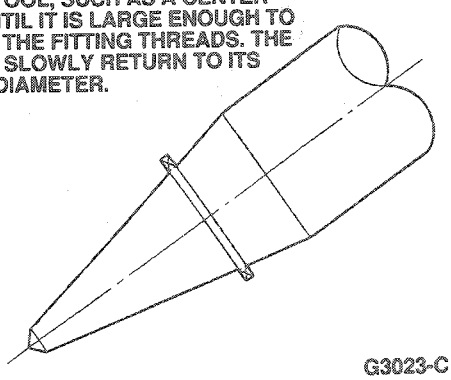



The following procedure should be used:

1. Check fitting to determine whether leak is between tube and tube nut or between tube nut and pump outlet

   **CAUTION: DO NOT over-tighten. If tube nuts are overtorqued, stripping of housing threads may occur and bores may concave.**
2. If leak is between tube nut and pump outlet, check to ensure nut is tightened to 27-34 N·m (20-25 lb-ft).
3. If leak continues or if leak is between tube and tube nut, remove line.
4. Unscrew tube nut, and inspect plastic seal washer. Always replace plastic seal washer (388898-S) when line is removed. To facilitate assembly of new plastic seal washer, a tapered shaft may be required to stretch washer, so it may be slipped over tube nut threads.

**STRETCH PLASTIC SEAL OVER A TEFLON SEAL INSTALLER (D90P-3517-A3) OR A TAPERED TOOL, SUCH AS A CENTER PUNCH, UNTIL IT IS LARGE ENOUGH TO SLIP OVER THE FITTING THREADS. THE SEAL WILL SLOWLY RETURN TO ITS ORIGINAL DIAMETER.**



## REMOVAL AND INSTALLATION (Continued)

5. The rubber O-ring cannot be serviced with this design. If leak is due to the O-ring, replace the hose assembly.
6. Connect tube nut and tighten to 27-34 N·m (20-25 lb-ft).

The quick connect fitting may disengage if not fully assembled, if the snap ring is missing, or if the tube nut or the hose end is not machined properly.

If the fitting disengages, replace the hose assembly. The fitting is fully engaged only when the hose will not pull out. To test for positive engagement, the system should be properly filled, the engine started, and the steering wheel cycled from lock-to-lock. Service hose assemblies have tube nuts, snap rings and O-rings already attached.

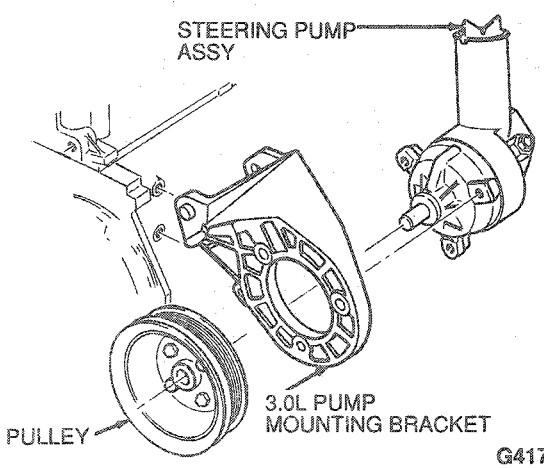
### Steering Pump

#### Removal

1. Remove radiator overflow bottle to gain access to three bolts retaining pulleys to pulley hub.
2. Mark both pulley-to-hub positions with grease pencil or paint daub for reassembly to maintain balance.
3. Remove the three bolts and two pulleys from pulley hub.

#### Installation

1. Install two pulleys on hub, aligning marks put on hub and pulleys during removal.
2. Install the three bolts and tighten to 21-32 N·m (15-23 lb-ft).
3. Install radiator overflow bottle.




### Steering Pump and Pulley Hub

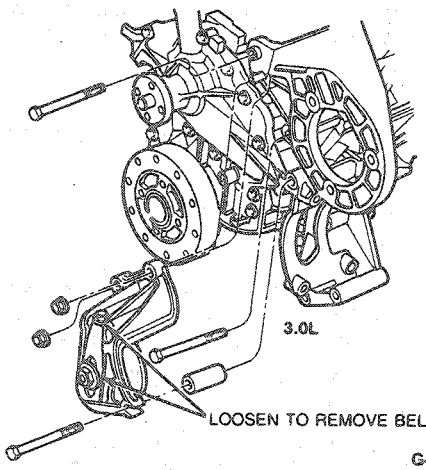
#### 3.0L Engine

#### Removal

1. Disconnect battery ground cable.
2. Loosen idler pulley and remove power steering belt.
3. Remove pulley from hub.
4. Remove return line from pump.
5. Completely back off pressure line nut. Line will separate when pump is removed from bracket.
6. Remove three pump retaining bolts and remove pump.

#### Installation

1. Install pump on mounting bracket. Guide pressure line into pump outlet fitting while installing pump.
2. Install pressure and return lines.
3. Install pulley on hub.
4. Install steering pump drive belt and adjust tension. Refer to Section 03-05.
5. Connect battery ground cable.
6. Fill pump with fluid and check operation. Refer to Section 11-00.




### Pump Reservoir

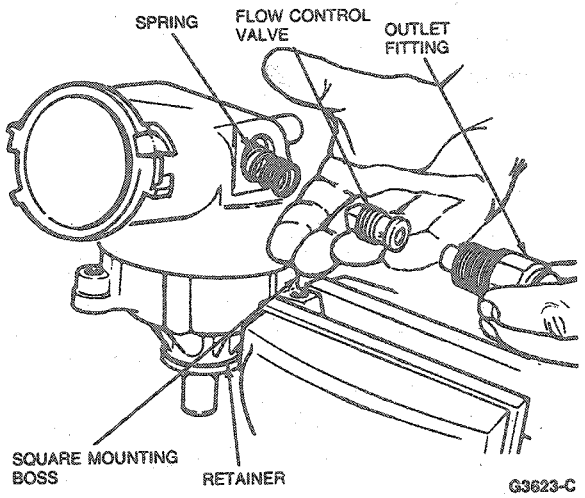
Take the following precautions when servicing the power steering pump reservoir:

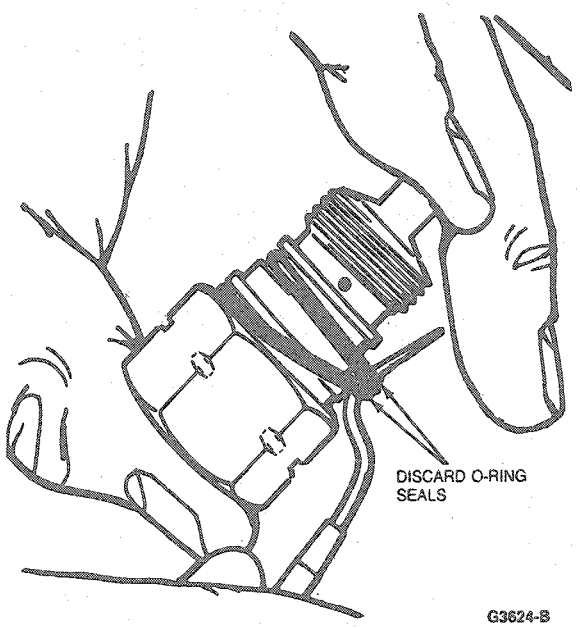
- Use clean work bench and tools.
- Plug inlet and outlet openings of pump with plugs or masking tape.
- Thoroughly clean exterior of pump with solvent.

## REMOVAL AND INSTALLATION (Continued)

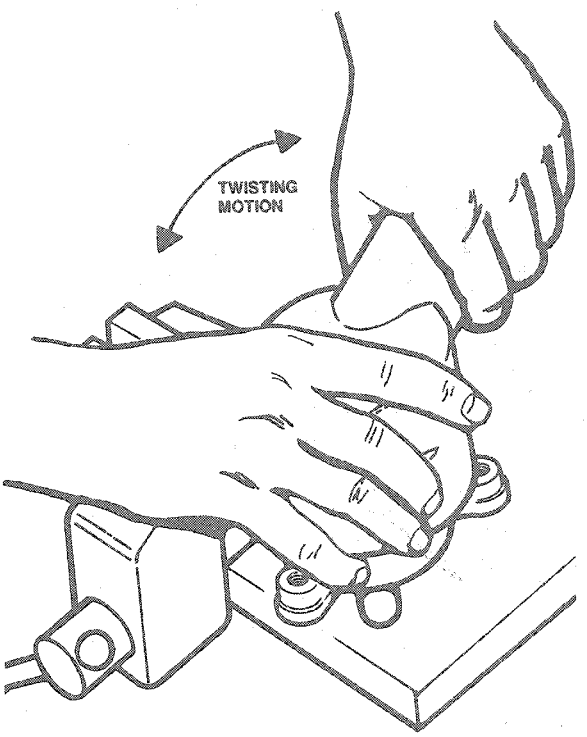
### Removal

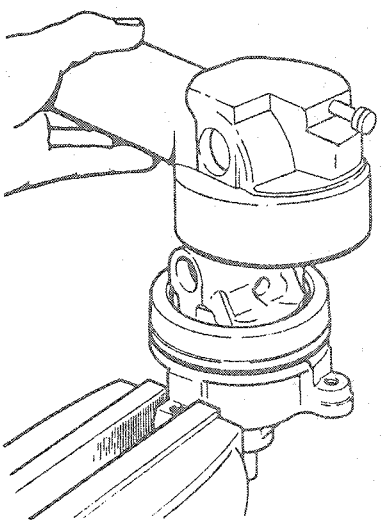
1. Place pump assembly in a bench vise with soft jaws and remove outlet fitting, flow control valve, and spring. Discard all seals.




2. Remove fiberglass reservoir by twisting side-to-side and lifting.

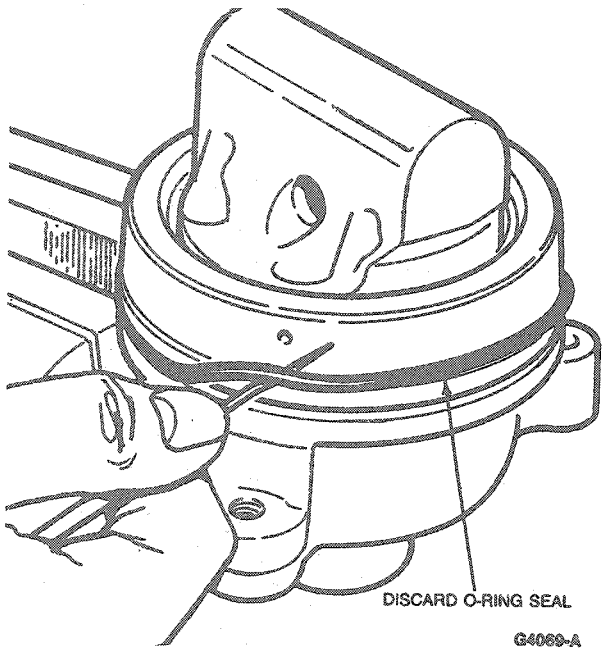



**CAUTION: Do not hammer on the reservoir.**

## REMOVAL AND INSTALLATION (Continued)

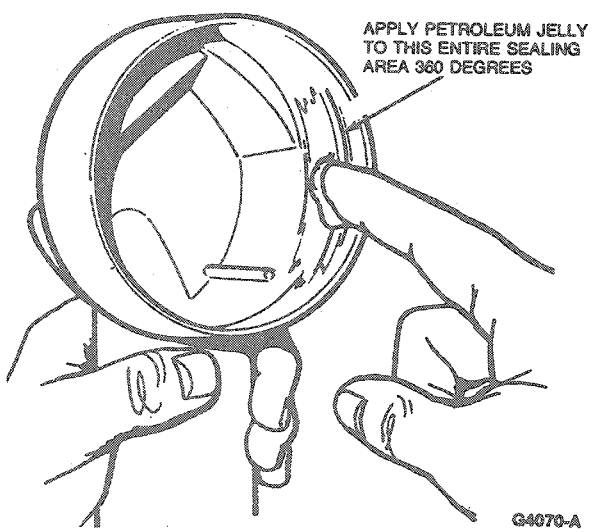
3. Discard O-ring seal on pump housing.




### Installation

1. Install a new O-ring seal on pump housing.
2. Apply petroleum jelly to reservoir O-ring seal and inside edge of reservoir. Do not twist O-ring seal.
3. Install reservoir over pump and align outlet fitting hole in reservoir with hole in valve cover.

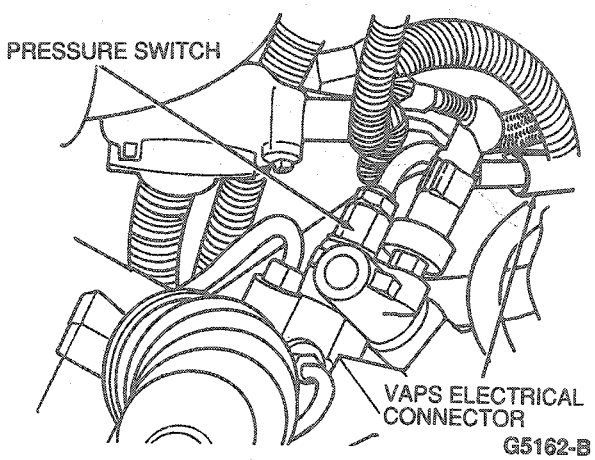
   **CAUTION: If valve is cocked, it may become stuck in the valve cover. Do not force valve forward. Forcing the valve may shear off metal and carry the metal chips into the valve bore.**
4. Place new O-ring seals on outlet fitting. Install flow control spring, flow control valve and outlet fitting into reservoir and valve cover. Tighten fitting to 33-47 N·m (25-34 lb-ft).




### Steering Gear Actuator

#### Removal

1. Remove air inlet duct for access to actuator.
2. Disconnect VAPS electrical connector from actuator.
3. Disconnect pressure switch.
4. Remove two actuator-to-steering gear retaining bolts.
5. Lift actuator from gear assembly.




#### Installation

NOTE: Ensure that the two seals (between the actuator and gear assembly) are in place when setting the actuator on the gear assembly.

1. Align actuator on steering gear.
2. Install two actuator-to-steering gear retaining bolts. Tighten to 27-34 N·m (20-25 lb-ft).
3. Reconnect pressure switch and VAPS electrical connector.
4. Install the air inlet duct.

### VAPS Module

The VAPS module is located below the instrument panel on the RH side of the steering column.

#### Removal

1. Disconnect wiring harness connector from VAPS module.
2. Remove three module fixture retaining screws from column mounting fixture and remove module.

#### Installation

1. Align mounting holes of new module to mounting holes on column mounting fixture.
2. Install three module fixture retaining screws and tighten to 4-5 N·m (35-45 lb-in).
3. Reconnect wiring harness connector to VAPS module.

## DISASSEMBLY AND ASSEMBLY

### Tie Rods, Bellows

**Tools Required:**

- Bench Mounted Holding Fixture T57L-500-B
- Nut Wrench T74P-3504-U
- Locknut Pin Remover D81P-3504-N

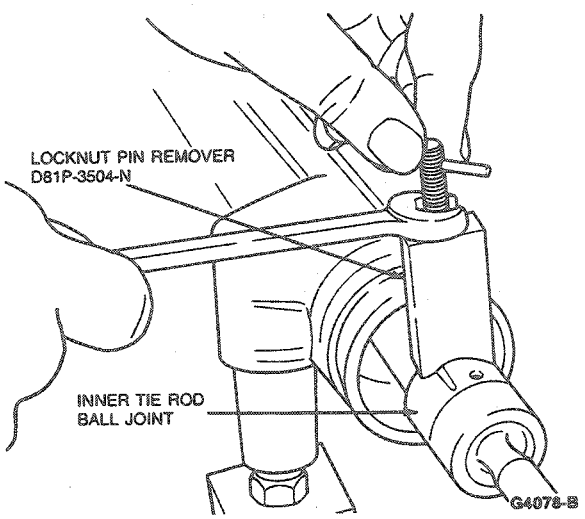
**Disassembly**

1. Mount gear assembly in Bench Mounted Holding Fixture T57L-500-B.

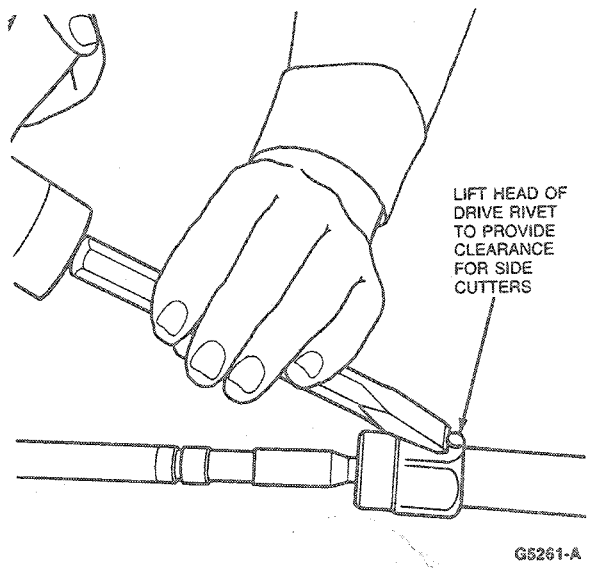
   NOTE: Drill out mounting holes in holding fixture with a 9/16-inch drill to allow the gear assembly mounting bolts to fit.
2. Remove tie rod ends.
3. Remove four clamps retaining bellows to gear housing and tie rods. Discard clamps if damaged or excessively corroded.

   **CAUTION: Use care not to damage bellows.**
4. Remove bellows along with breather tube.

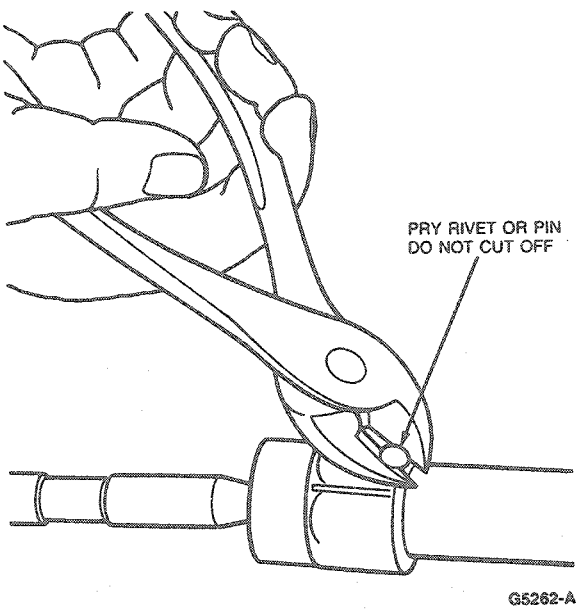
   NOTE: For units equipped with rivets in place of the coiled pins, perform Steps 6 and 7.
5. Using Locknut Pin Remover D81P-3504-N or equivalent, remove coiled lock pins from inner tie rod ball joints.




6. With a sharp chisel, gently tap around rivet head so it lifts away from ball joint. Use caution so the center pin is not sheared off.




7. Use side cutters to pry out drive pin.
8. Position rack so that several rack teeth are exposed. Hold rack with an adjustable wrench on end teeth only, while loosening ball joint nuts with Nut Wrench T74P-3504-U.

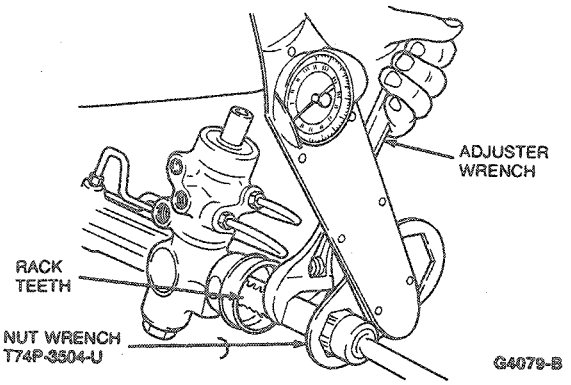



**Assembly**

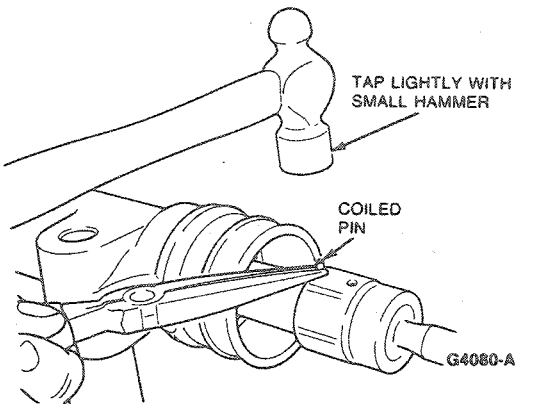
1. Expose several rack teeth and hold rack with adjustable wrench.

## DISASSEMBLY AND ASSEMBLY (Continued)

2. Tighten each ball joint assembly separately to 75-88 N·m (55-65 lb-ft) using Nut Wrench T74P-3504-U.

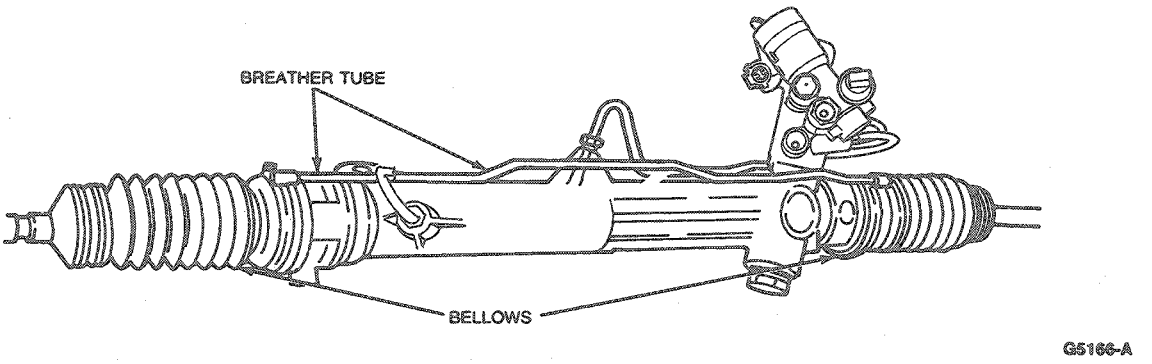



3. Install new coiled pins in tie rod ball housing by tapping lightly with a small hammer.




NOTE: Replenish any grease that may have been removed from rack teeth with Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent.

4. Thoroughly clean rack and housing bore of any foreign material. Any abrasive material is extremely harmful to high-pressure oil seals.
5. Apply Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent to groove in rods where bellows clamp to tie rod. This allows for toe-in adjustment without twisting bellows.
6. Install bellows and breather tube. Ensure breather tube is positioned as shown.

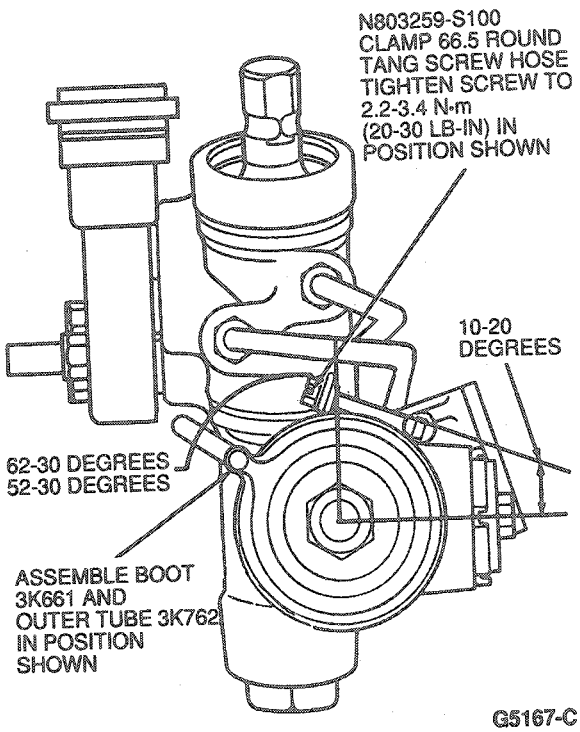



7. Install clamps and position screw axis as shown. Tighten to 2.2-3.4 N·m (20-30 lb-in).
8. Install new clamps retaining bellows to tie rods.

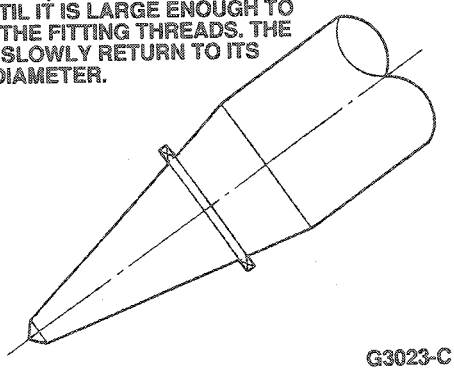
9. Apply Disc Brake Caliper Slide Grease D7AZ-19590-A (ESA-M1C172-A) or equivalent to tie rod threads.

## DISASSEMBLY AND ASSEMBLY (Continued)

10. Install tie rod outer ends.




STRETCH PLASTIC SEAL OVER A TEFLON SEAL INSTALLER (D90P-3517-A3) OR A TAPERED TOOL, SUCH AS A CENTER PUNCH, UNTIL IT IS LARGE ENOUGH TO SLIP OVER THE FITTING THREADS. THE SEAL WILL SLOWLY RETURN TO ITS ORIGINAL DIAMETER.




### Steering Gear

Take the following precautions when servicing the steering gear:

1. Use a clean work bench and tools.
2. Thoroughly clean the exterior of the unit with solvent. Drain off excess hydraulic fluid.
3. Handle all parts carefully to avoid nicks, burrs, scratches and dirt.
4. Do not use solvent on seals.
5. Impact tools must not be used during any of the operations.

### Pressure and Return Line Fitting

**Tools Required:**

- Teflon Seal Installer D90P-3517-A3

**Seal Replacement**

If a leak occurs between the tubing and the tube nut, replace the hose assembly. If a leak occurs at the tube nut threads, replace the plastic washer. The following procedure should be used:

1. Check to ensure that nuts are tightened to specification. Do not over-tighten.
2. Unscrew tube nut, and replace plastic seal washer. To facilitate assembly of new TFE seal, a tapered shaft may be required to stretch the washer, so it may be slipped over tube nut threads.

### Tie Rod Ends, Bellows and Ball Joint Sockets

**Tools Required:**

- Bench Mounted Holding Fixture T57L-500-B
- Nut Wrench T74P-3504-U

**Disassembly**

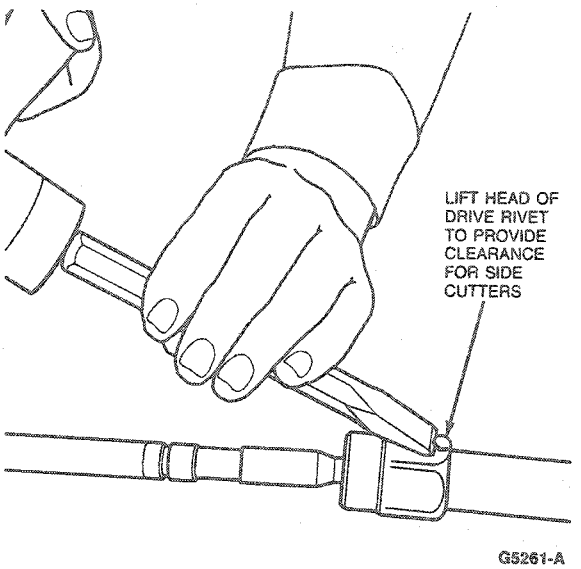
NOTE: Drill out mounting holes in holding fixture with a 9/16-inch drill to allow the gear assembly mounting bolts to fit.

1. Mount gear assembly in Bench Mounted Holding Fixture T57L-500-B.
2. Remove tie rod ends.
3. Remove four clamps retaining bellows to gear housing and tie rods. Discard clamps if damaged or excessively corroded.

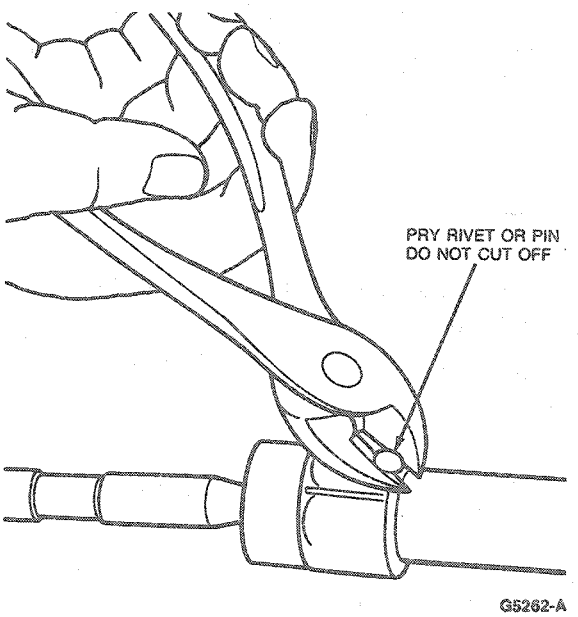
   **CAUTION: Use care not to damage bellows.**
4. Remove bellows along with breather tube.
5. If pinion requires removal, remove pinion before proceeding. Refer to Input Shaft and Valve Disassembly.

## DISASSEMBLY AND ASSEMBLY (Continued)

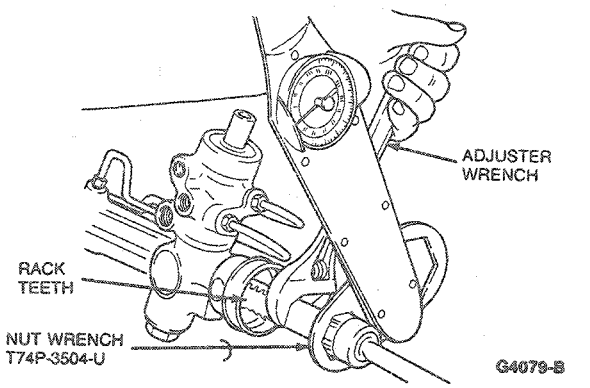
6. With a sharp chisel, gently tap around rivet head so it lifts away from ball joint. Use caution so the center pin is not sheared off.




7. Use side cutters to pry out drive pin.




8. Position rack so that several rack teeth are exposed. Hold rack with an adjustable wrench on end teeth only, while loosening ball joint nuts with Nut Wrench T74P-3504-U.

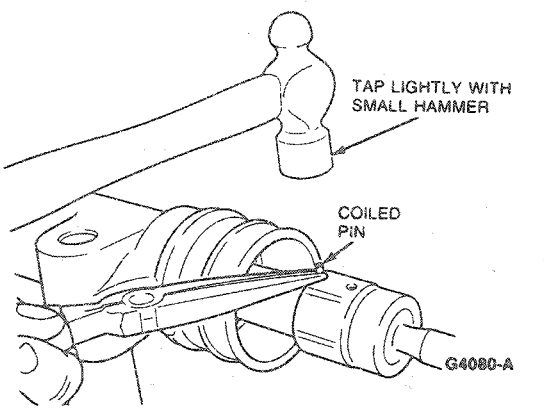



### Assembly

1. If pinion was not removed, expose several rack teeth and hold rack with adjustable wrench.

   Tighten each ball joint assembly separately to 75-88 N·m (55-65 lb-ft) using Nut Wrench T74P-3504-U.

2. If valve assembly was removed, hold one ball joint nut with a 1-5/16 inch open-end or box wrench while tightening other nut to 75-88 N·m (55-65 lb-ft) with Nut Wrench T74P-3504-U. Both ends are tightened simultaneously by this method.
3. Install new coiled pins in tie rod ball housing by tapping lightly with small hammer.



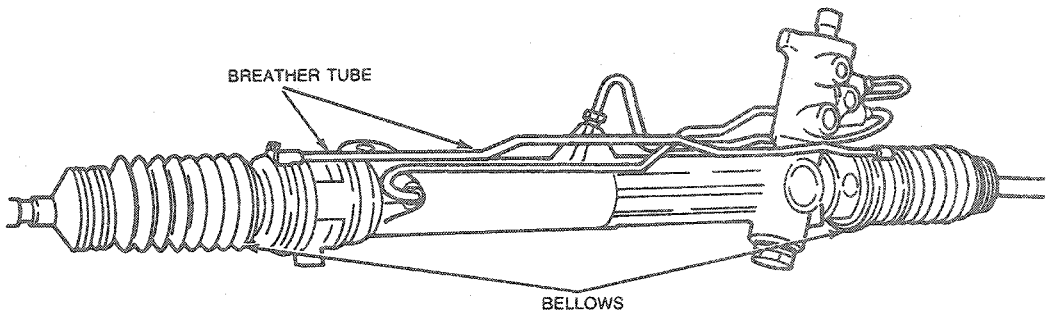

4. If valve assembly was removed, install valve assembly as outlined in Input Shaft and Valve Assembly.

   NOTE: Replenish any grease that may have been removed from rack teeth with Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent.

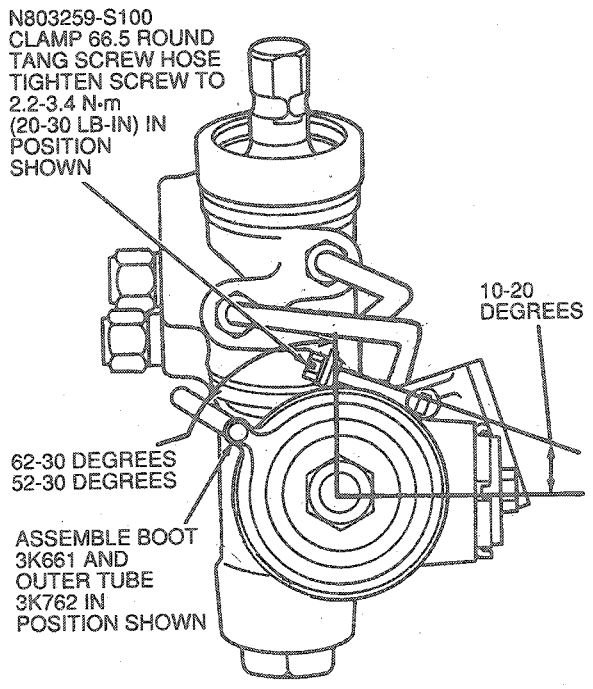
5. Thoroughly clean rack and housing bore of any foreign material. Any abrasive material is extremely harmful to high pressure oil seals.
6. Apply Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent to groove in rods where bellows clamp to tie rod. This allows for toe-in adjustment without twisting bellows.

## DISASSEMBLY AND ASSEMBLY (Continued)

7. Install bellows and breather tube. Ensure breather tube is positioned as shown.




8. Install screw-type clamps and position screw axis as shown. Tighten to 2.2-3.4 N·m (20-30 lb-in).




9. Install new clamps retaining bellows to tie rods.
10. Apply Disc Brake Caliper Slide Grease D7AZ-19590-A (ESA-M1C172-A) or equivalent to tie rod threads.
11. Install tie rod outer ends.

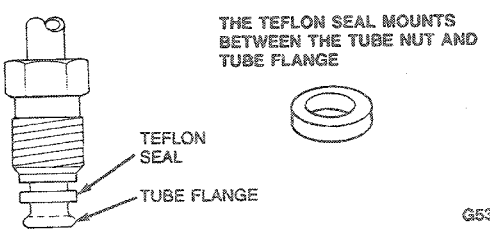
### Input Shaft and Valve Assembly

**Tools Required:**

- Impact Slide Hammer T50T-100-A
- Bench Mounted Holding Fixture T57L-500-B
- Puller Attachment T58L-101-B
- Pinion Shaft Torque Adapter T74P-3504-R
- Seal Installation Kit T75L-3517-A1, A2, A3 and A4
- Valve Body (Screw) T78P-3504-B
- Valve Body Insert Tool T78P-3504-C
- Lower Pinion Bearing Replacer T78P-3504-G
- Upper Pinion Bearing Seal Replacer T78P-3504-D
- Retaining Ring Pliers D79L-7000-A
- Valve Body Puller (Bridge) T86P-3504-D
- Lower Pinion Seal Remover T86P-3504-F
- Lower Pinion Seal Replacer T86P-3504-G
- Lower Pinion Seal Remover Guide T86P-3504-J

**Disassembly**

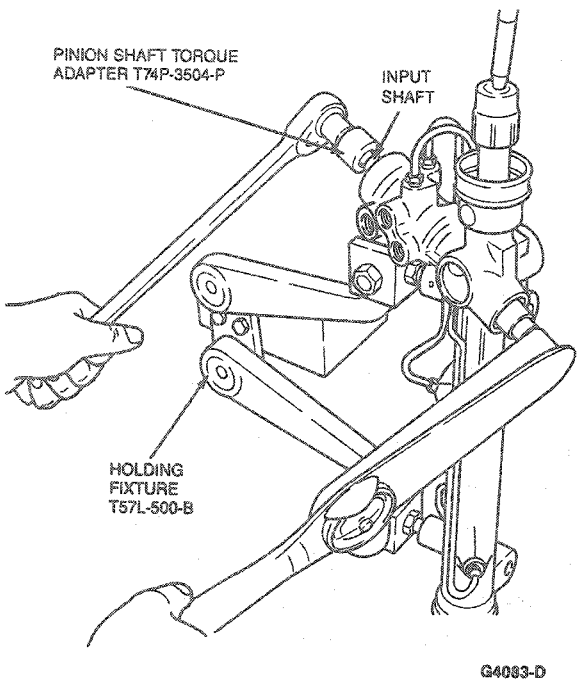
1. Thoroughly clean areas of input shaft valve housing, yoke locknut and plug, and pinion bearing plug.
2. Mount gear in the Bench Mounted Holding Fixture T57L-500-B. Drill out mounting holes in holding fixture with a 9/16-inch drill to allow gear assembly retaining bolts to fit.
3. Do not remove transfer tubes (RH and LH turn lines), unless they are leaking or damaged. If these lines are removed, new Teflon® seals must be installed.



## DISASSEMBLY AND ASSEMBLY (Continued)

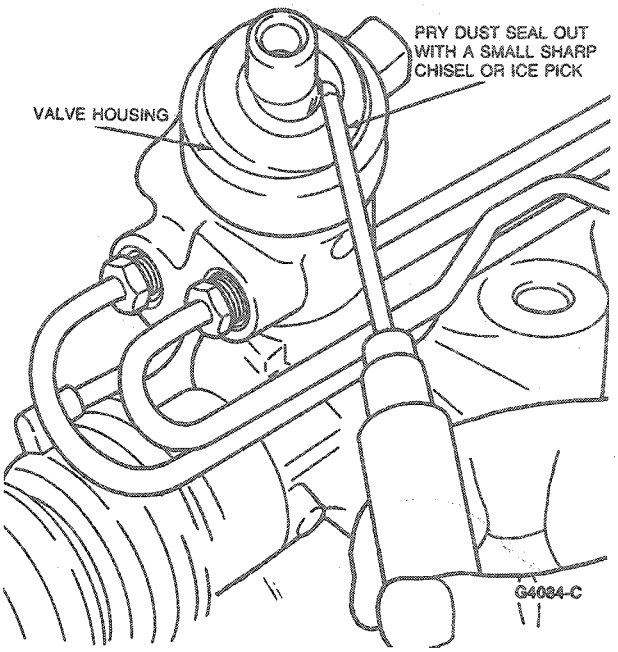
4. Loosen yoke plug locknut and yoke plug to relieve preload on rack.
5. Remove pinion bearing cap.

   **CAUTION: Do not allow rack to reach full travel when loosening or tightening the locknut, as damage to rack teeth may occur.**
6. Install Pinion Shaft Torque Adapter T74P-3504-R on input shaft. Hold input shaft, and remove pinion bearing locknut with an 11/16-inch socket. Discard locknut.

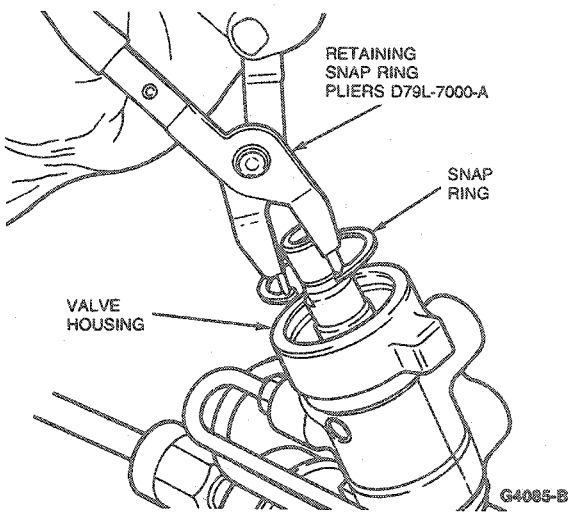



**CAUTION: Use care not to damage any valve housing surfaces.**

7. Pry input shaft dust seal out of valve housing with a small, sharp chisel or ice pick.

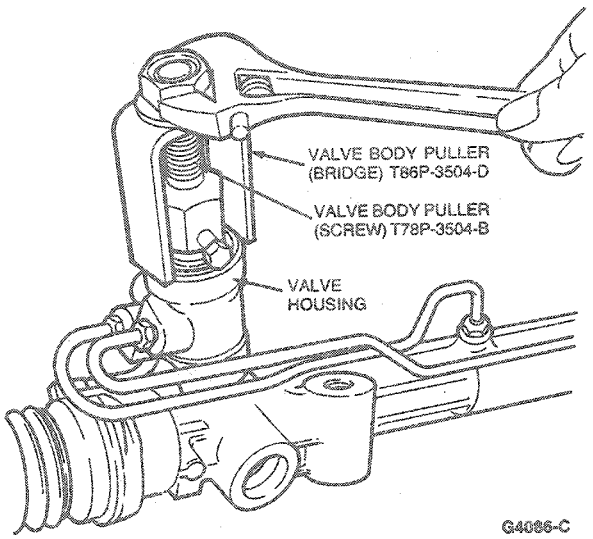



8. Using Retaining Ring Pliers D79L-7000-A or equivalent, remove retaining snap ring, located under dust seal from valve housing.

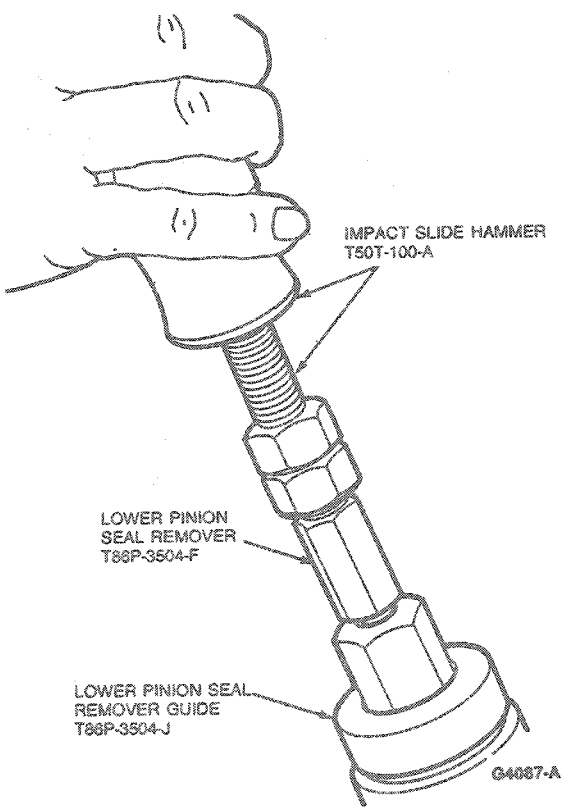


## DISASSEMBLY AND ASSEMBLY (Continued)

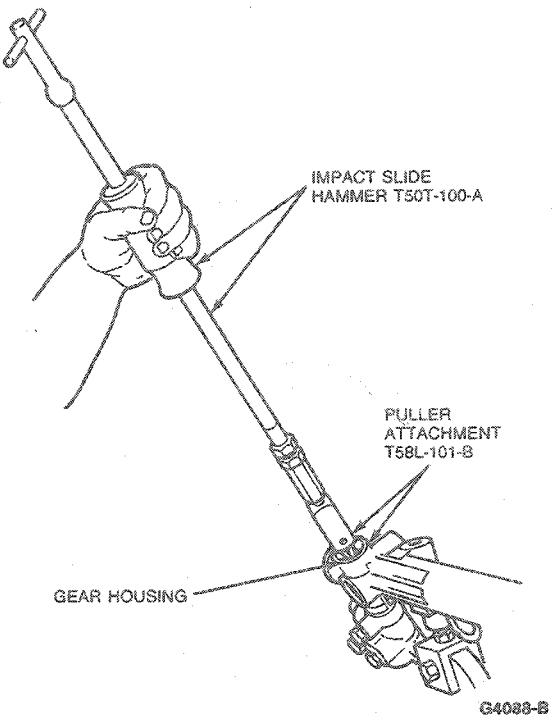
9. Attach Valve Body Puller (Bridge) T86P-3504-D and Valve Body Puller (Screw) T78P-3504-B, to input shaft. Turn nut to remove valve. Input shaft seal and bearing will come out with valve body.




10. To remove lower pinion shaft seal, insert Lower Pinion Seal Remover T86P-3504-F until it bottoms along with Lower Pinion Seal Remover Guide T86P-3504-J. Activate expander with a pair of wrenches by holding large nut and turning small nut until expander fully tightens. Pull tool and seal with Impact Slide Hammer T50T-100-A.

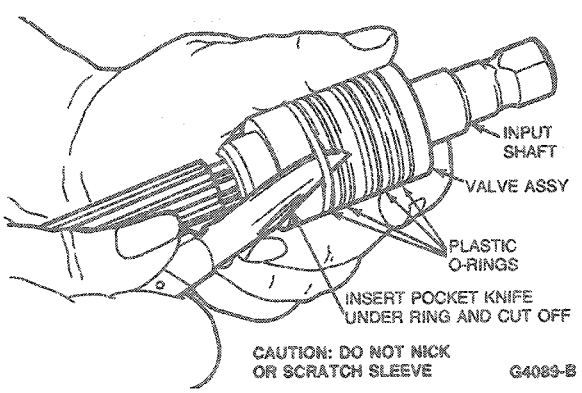



11. Remove pinion bearing from gear housing with Impact Slide Hammer T50T-100-A and Puller Attachment T58L-101-B.




**CAUTION: Use care not to scratch valve sleeve. Internal leaking could occur causing power steering fluid to leak under the seals.**

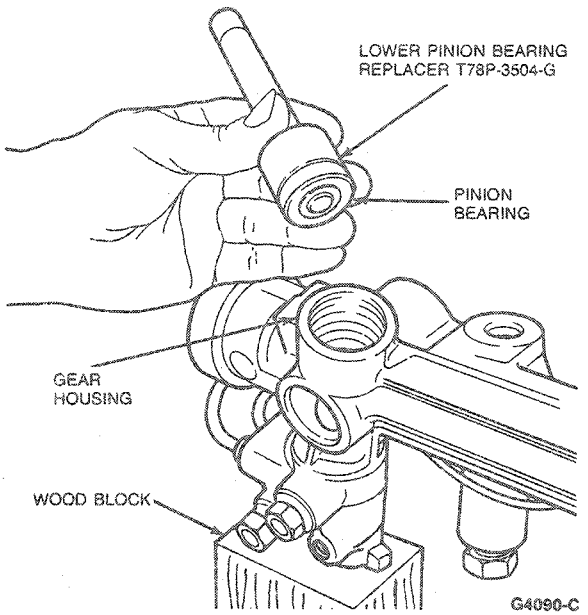
12. The only serviceable components of the input shaft and valve assembly are four plastic O-rings. Remove O-rings by pushing rings to one side, inserting a small pointed pocket knife under each ring, and cutting it off.



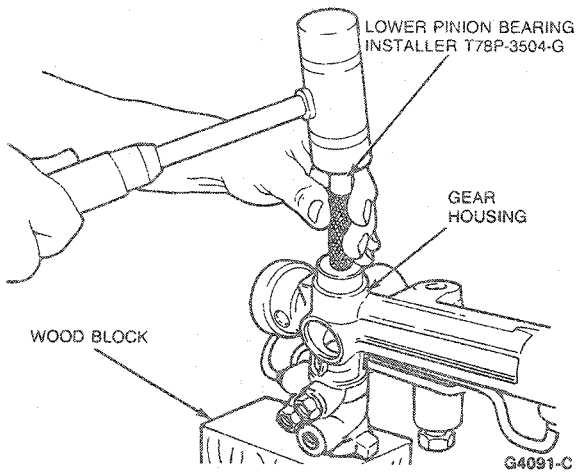
## DISASSEMBLY AND ASSEMBLY (Continued)

### Assembly

1. Install steering gear pinion bearing in gear housing using Lower Pinion Bearing Replacer T78P-3504-G.

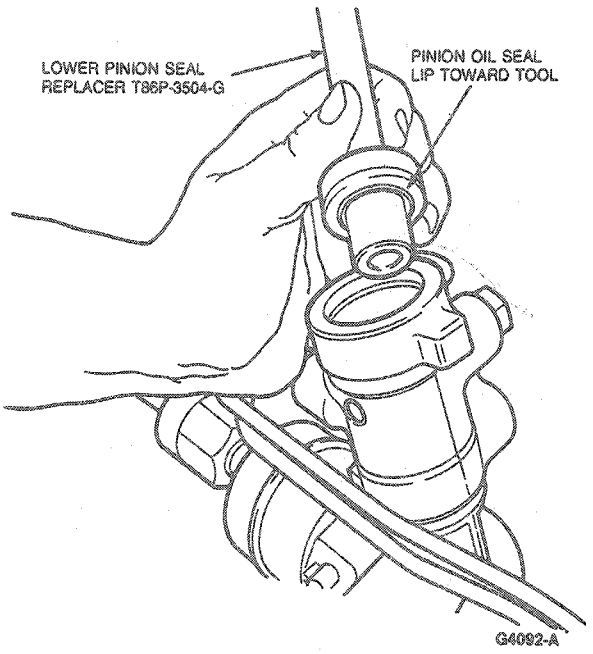



Seat bearing against shoulder in bore. Support valve housing with a wood block when seating pinion bearing.




2. Apply Steering Gear Grease C3AZ-19578-A (ESA-M1C172-A) or equivalent to pinion oil seal, and place it on Lower Pinion Seal Replacer T86P-3504-G or equivalent with seal lip toward tool. Support pinion housing on a flat clean surface.

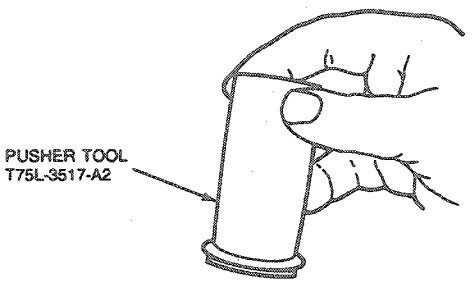
   Install seal in valve bore, seating it against shoulder.

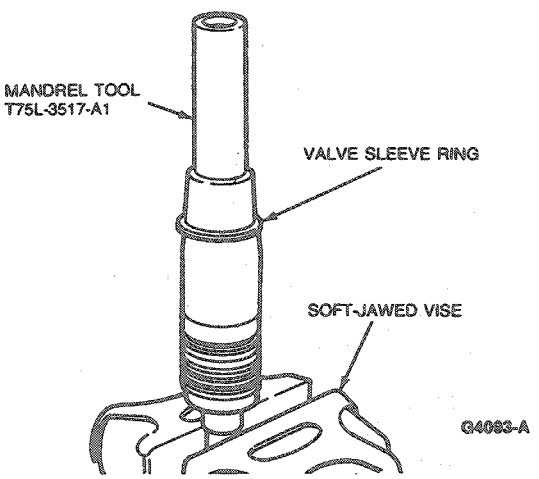



3. Mount input shaft end of valve assembly in a soft-jawed vise. Clamp shaft outside bearing and seal surface.
4. Lubricate Mandrel T75L-3517-A1 with power steering fluid and install over valve assembly. Slide one valve sleeve ring over tool.

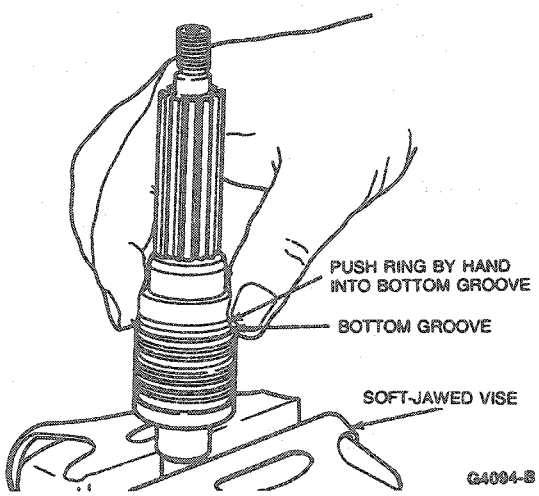
## DISASSEMBLY AND ASSEMBLY (Continued)

5. Slide Pusher T75L-3517-A2 over mandrel. Rapidly push down on pusher tool, forcing ring down ramp onto valve sleeve.

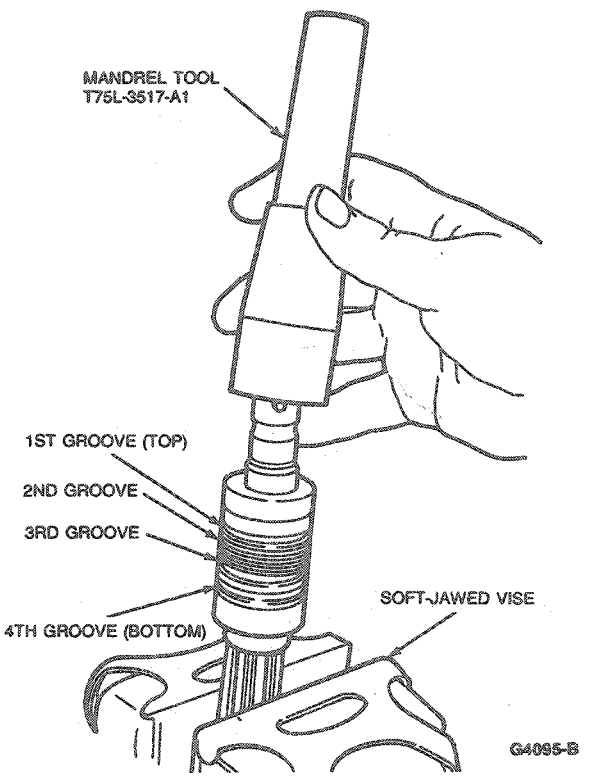



Complete installation by pushing ring into bottom groove.



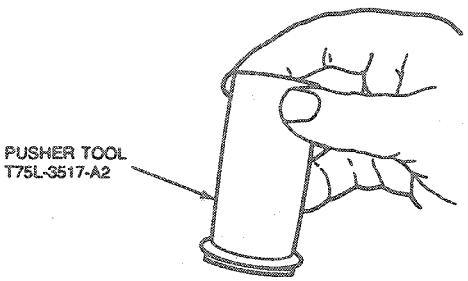

6. Remove valve assembly from vise and regrip it with pinion gear teeth.
7. Install Mandrel T75L-3517-A1 over input shaft. Mandrel will align with the third (next to bottom) groove.

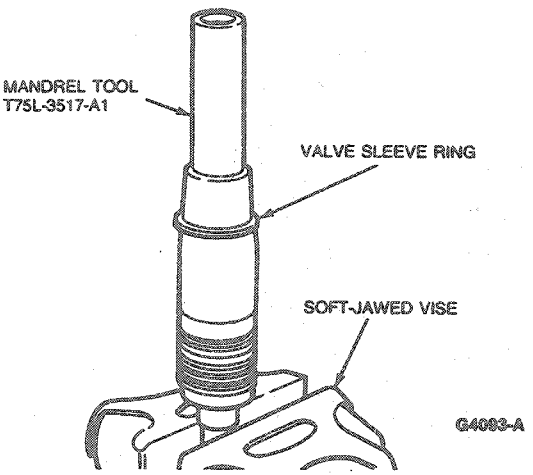



NOTE: Seal grooves do not have port holes. Ensure seals are installed in proper grooves.

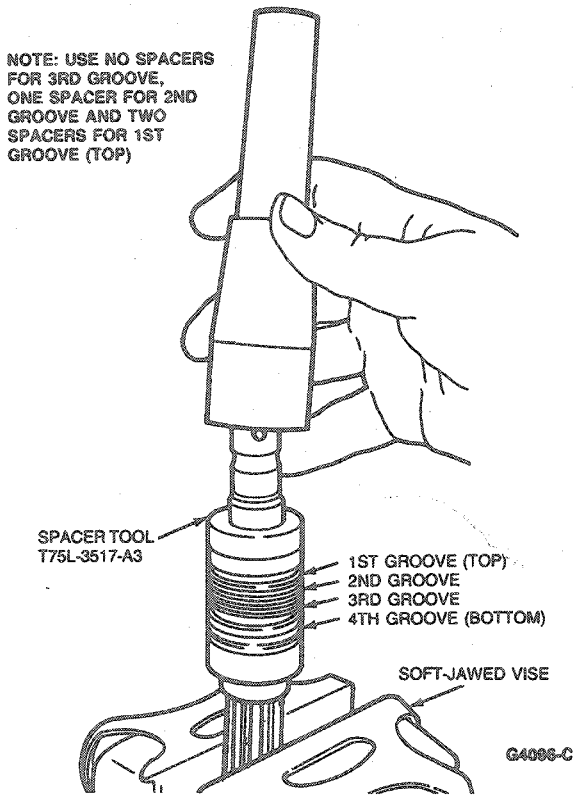
## DISASSEMBLY AND ASSEMBLY (Continued)

Install third valve sleeve ring by pushing on it rapidly with Pusher T75L-3517-A2. The ring will snap into proper groove.

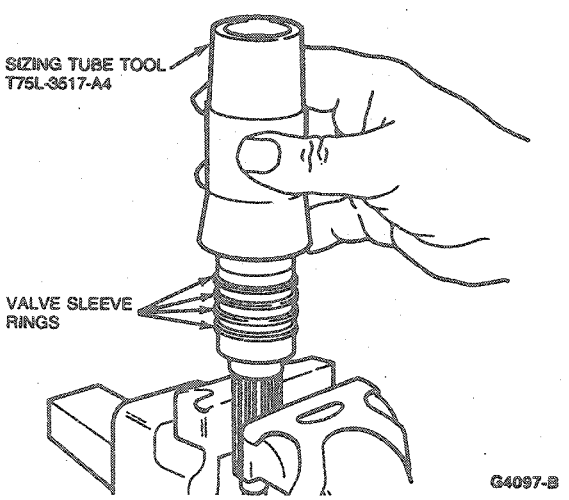



8. Repeat Step 7 using one spacer for second valve sleeve ring (Spacer T75L-3517-A3).



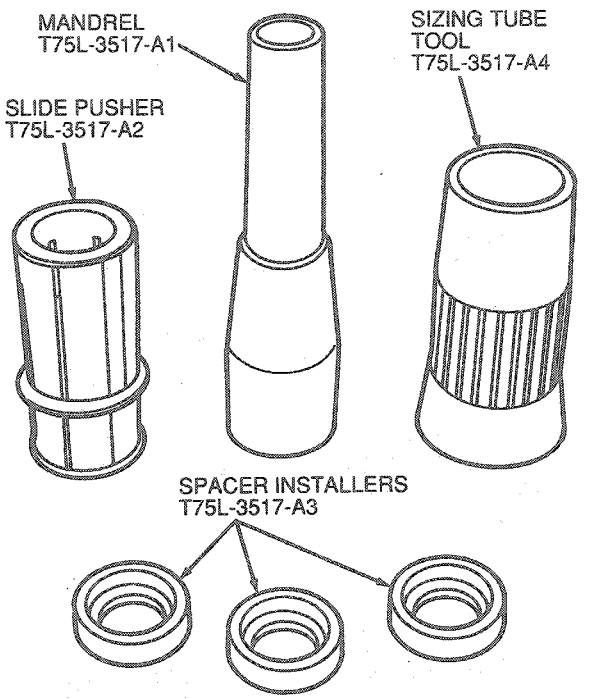

9. Repeat Step 7 using two spacers for the first (top) valve sleeve ring (Spacer T75L-3517-A3).
10. After installing four valve sleeve rings, apply a light coat of Steering Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent to sleeve and rings.
11. Slowly install Sizing Tube T75L-3517-A4 over sleeve valve end of input shaft onto valve sleeve rings. Ensure that rings are not being bent over as tube is slid over them.



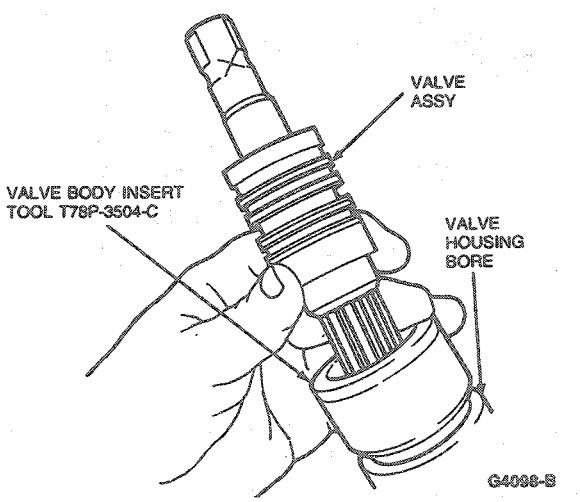

Remove sizing tube, and check condition of rings. Ensure that rings turn freely in grooves.

## DISASSEMBLY AND ASSEMBLY (Continued)

The complete set of tools needed to perform the above operations is shown in the illustration. The Tool Kit is T75L-3517-A.

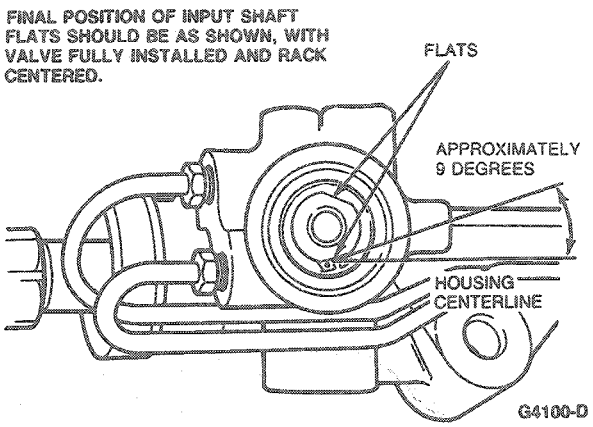



12. Center rack in housing so that equal amounts of rack shaft stick out of each end of housing. Position rack teeth so they will mesh with pinion.
13. Position Valve Body Insert Tool T78P-3504-C in valve housing bore.

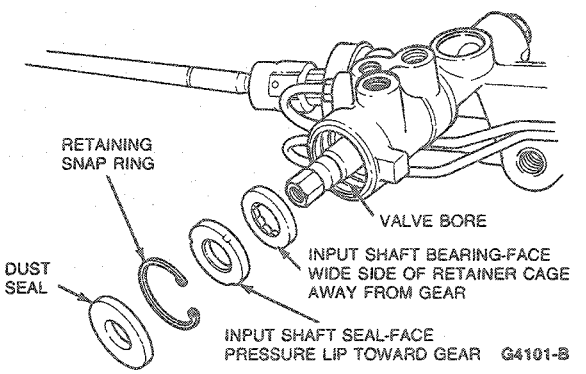



NOTE: If pinion is off one tooth, it will be obvious, since one tooth equals 45 degrees.

14. Insert valve assembly with flats on input shaft in position shown.

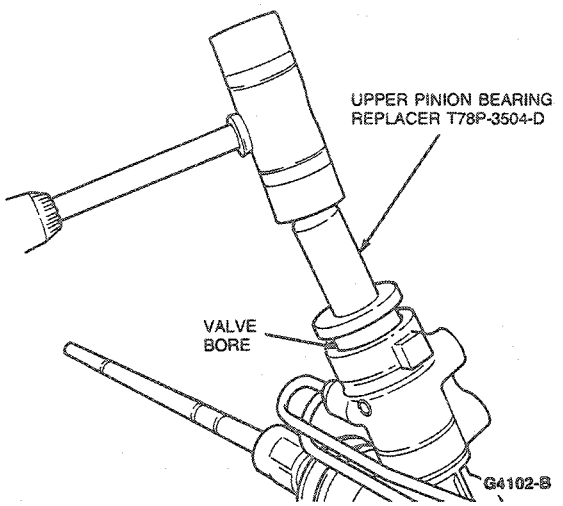



15. Using Pinion Shaft Torque Adapter T74P-3504-R count total turns, stop-to-stop (2.5 turns). From one stop, back off half the total (1-1/4 turns). The position should be as shown in illustration under Step 14. If it is approximately 45 degrees (one tooth) away from position, pull valve assembly out far enough to disengage pinion teeth and install to obtain proper position.
16. Install bearing assembly in valve bore and seat with Upper Pinion Bearing Seal Replacer T78P-3504-D.
17. Apply a film of Steering Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent to input shaft seal, and install with lip toward valve.

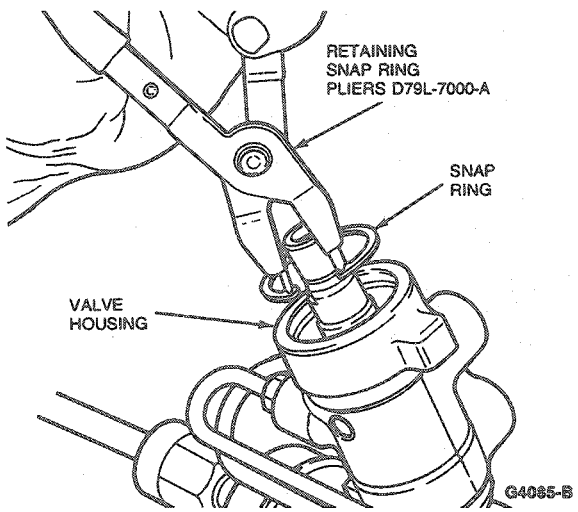


## DISASSEMBLY AND ASSEMBLY (Continued)

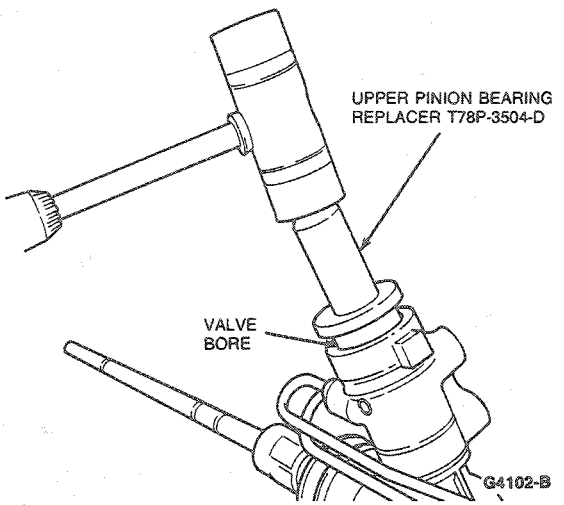
18. Seat seal with Upper Pinion Bearing Seal Replacer T78P-3504-D.



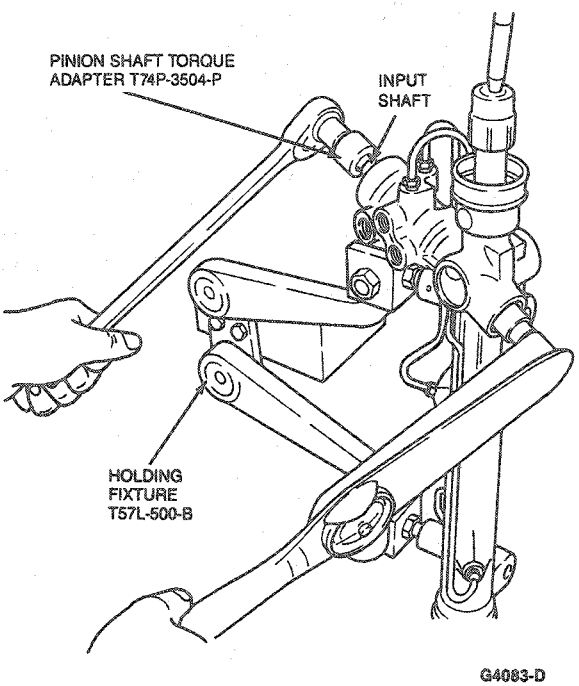

19. Install retaining snap ring in valve bore using Retaining Ring Pliers D79L-7000-A or equivalent.




20. Coat ID and OD of dust seal and input shaft with Multi-Purpose Grease D0AZ-19584-AA (ESR-M1C159-A and ESB-M1C93-A) or equivalent.
21. Install dust seal with Upper Pinion Bearing Seal Replacer T78P-3504-D.




22. Install nut on pinion end of valve assembly. Holding input shaft with Pinion Shaft Torque Adapter T74P-3504-R, tighten nut to 41-54 N·m (31-39 lb-ft). Rack must be away from stops during this operation.




23. Install steering gear pinion bearing cap. Tighten to 54-68 N·m (40-50 lb-ft).
24. Set rack yoke preload as outlined.

### Gear Housing, Rack Yoke Plug, Rack Assembly, Rack Bushing and Oil Seals

**Tools Required:**

- Impact Slide Hammer T50T-100-A

## DISASSEMBLY AND ASSEMBLY (Continued)

- O-Ring Tool T71P-19703-C
- Outer Rack Seal Replacer T74P-3504-F
- Teflon Ring Replacer T74P-3504-G
- Rack Seal Protector Sleeve T74P-3504-J
- Rack Oil Seal Remover T78P-3504-J
- Rack Bushing Holding Tool T78P-3504-L
- Teflon Ring Sizing Tool T78P-3504-M
- Rack Seal Protector T85L-3504-B
- Pinion Housing Yoke Locknut Wrench T86P-3504-E
- Yoke Plug Torque Gauge T88P-3504-A

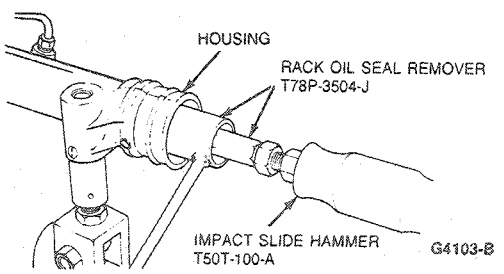
### Disassembly

1. Remove tie rod and socket assemblies from both ends of the rack. Loosen yoke plug lock nut and yoke plug to relieve preload on rack. Remove valve assembly from gear housing as outlined. Refer to Input Shaft and Valve Assembly, Disassembly.

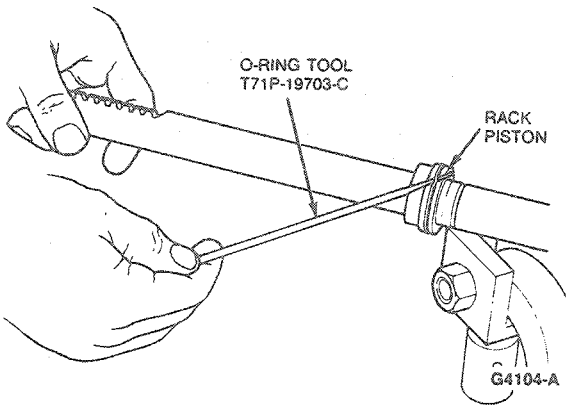
   NOTE: Yoke cannot be removed at this time.
2. Remove yoke plug and spring.
3. Working from RH side of gear (opposite pinion end), push rack in just far enough to facilitate removal of snap ring.
4. Remove snap ring from right end of housing.

   **CAUTION: Do not hammer on the rack, aluminum rack bushing or housing. Damage may occur.**
5. Slowly pull rack out of RH side of housing until rack piston contacts aluminum rack bushing. Apply pulling effort on rack until bushing is withdrawn from housing. Remove rack from the housing.

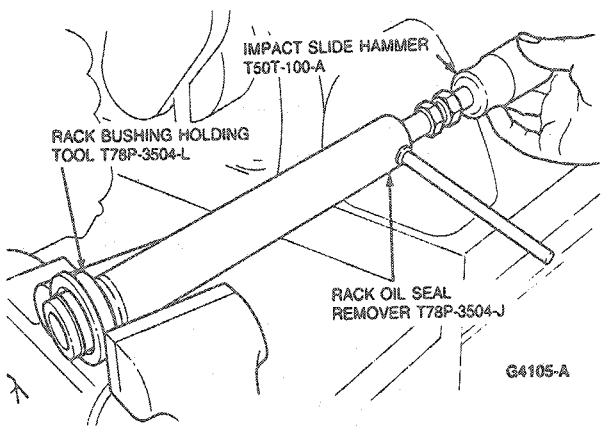
   NOTE: On the first attempt, the nylon ring may pull out of the seal, leaving the seal in the gear. Repeat the procedure, and the seal will come out.
6. To remove internal high-pressure rack oil seal, insert Rack Oil Seal Remover T78P-3504-J into housing until it bottoms. Activate expander with a wrench until expander fully tightens. Remove tool with oil seal from housing using Impact Slide Hammer T50T-100-A threaded into expander end. Discard seal.



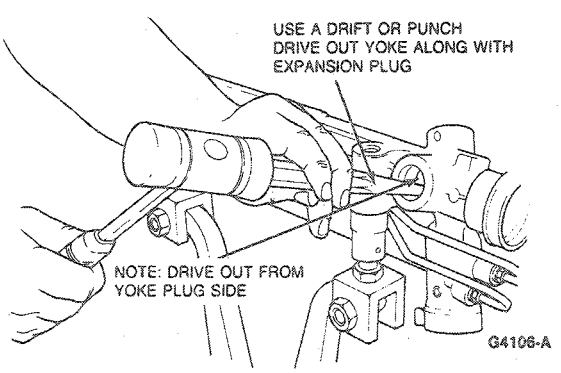

7. Remove plastic O-ring and rubber O-ring from rack piston with O-Ring Tool T71P-19703-C.




8. Insert rack bushing into Rack Bushing Holding Tool T78P-3504-L, seal end first. Place tool and bushing in vise. With Rack Oil Seal Remover T78P-3504-J and Impact Slide Hammer T50T-100-A, remove seal.



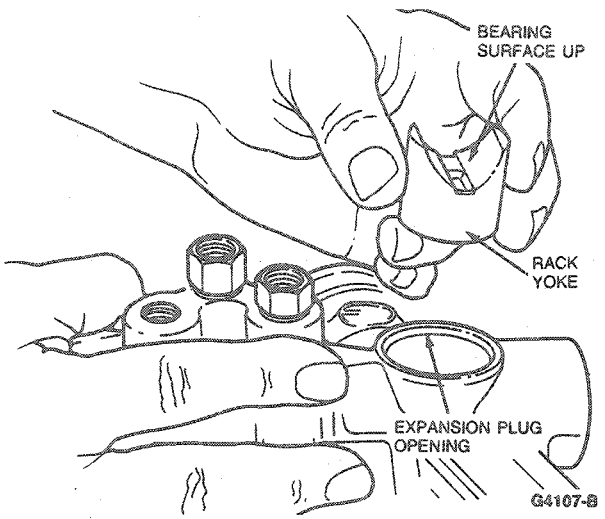

9. Remove rubber O-rings from rack bushing.
10. Inspect rack yoke while still in gear housing. If it is in good condition, do not remove it.
11. If yoke needs replacing, use a drift or punch to knock it out, along with expansion plug.



## DISASSEMBLY AND ASSEMBLY (Continued)

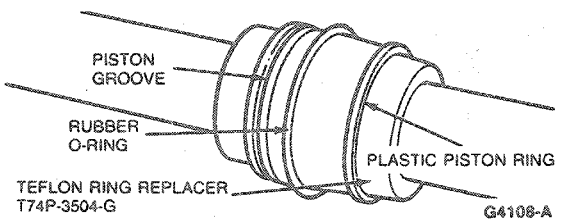
### Assembly

1. If yoke was removed during disassembly, a new yoke is required. Coat new yoke with Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent and install through expansion plug opening, rack bearing surface up.



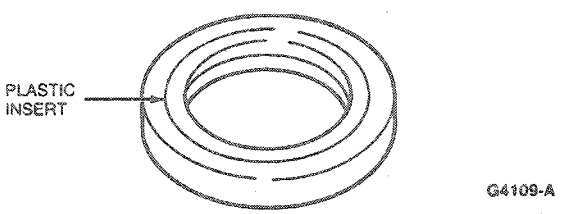

2. Slide Teflon Ring Replacer T74P-3504-G over plain end (without teeth) of rack up to piston.

   Roll rubber O-ring into piston groove, then slide plastic piston ring into piston groove over O-ring.

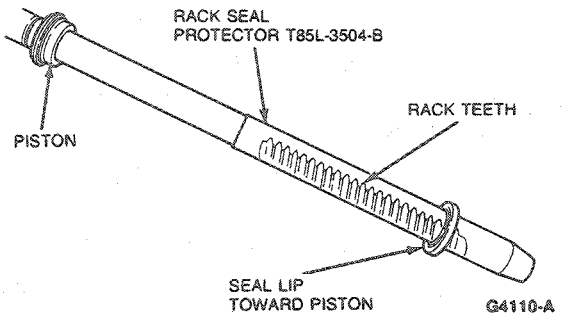



   NOTE: Insert is integral part of seal. It is removed only to avoid damage during installation.

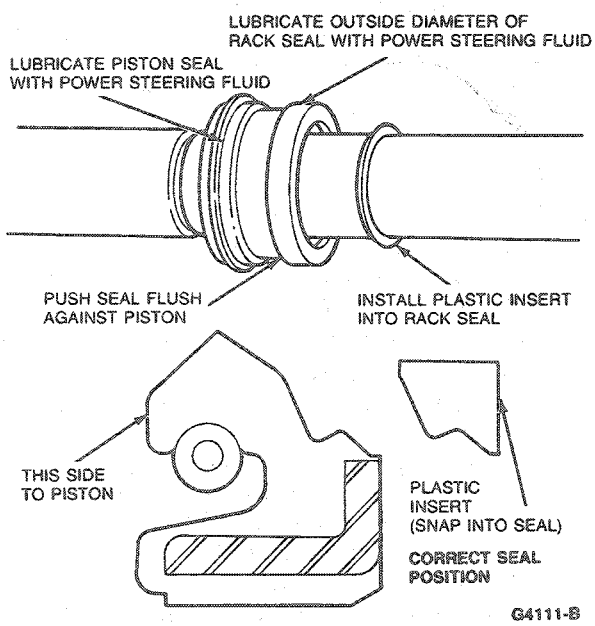
3. Remove plastic insert from rack seal. Save insert for installation.



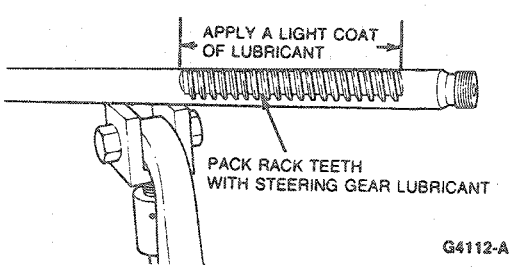

4. Install Rack Seal Protector T85L-3504-B over rack teeth.
5. Lubricate rack seal protector and rack with power steering fluid.
6. Install seal with lip toward piston. Push seal all the way against piston. Remove rack seal protector.




7. Install plastic insert in rack seal.



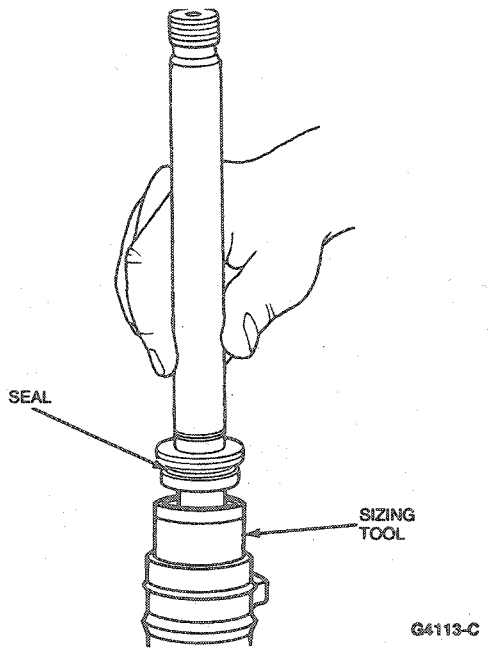

8. Pack rack teeth with Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent. Apply a light coat of steering gear lubricant to yoke contact area on back of rack teeth.



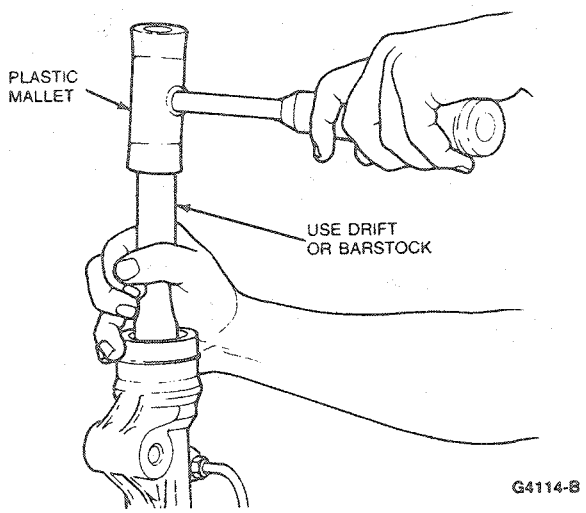

9. Lubricate piston seal and rack seal outside diameter with power steering fluid. Refer to the illustration under Step 7.
10. Install Teflon Ring Sizing Tool T78P-3504-M into end of gear housing.
11. Ensure yoke is all the way in when installing rack.

## DISASSEMBLY AND ASSEMBLY (Continued)

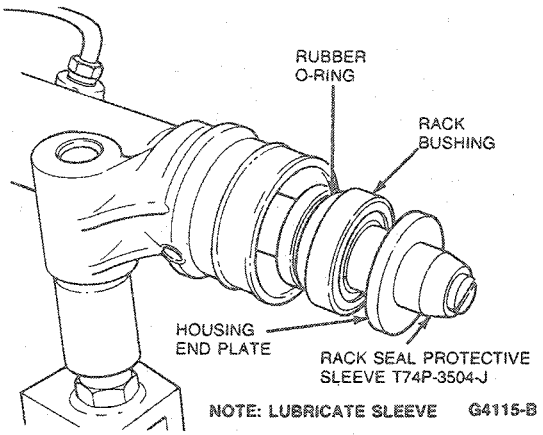
12. Install rack, taking care NOT to scratch housing piston bore.
13. Carefully push piston through sizing tool. Continue pushing on rack until it bottoms. Remove sizing tool.



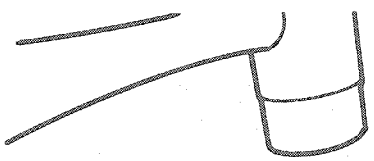

14. Seat rack seal with rack by driving end of rack with a drift or brass bar stock and plastic mallet. Several hits may be required to ensure proper seating. **DO NOT remove rack.**

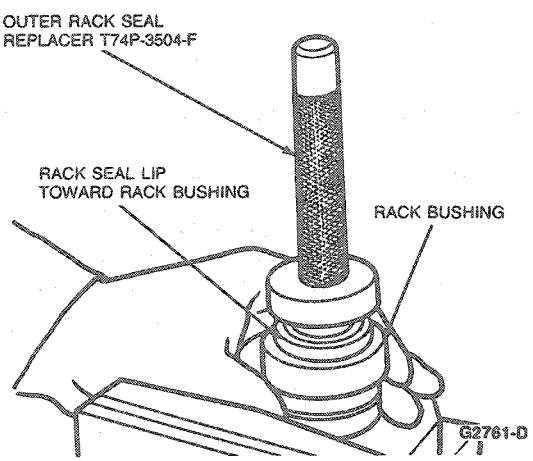



15. Move rack so it is centered in housing.
16. Thread Rack Seal Protector Sleeve T74P-3504-J over threads on RH side of rack. Apply power steering fluid to protective sleeve.




17. Install rubber O-ring on aluminum rack bushing.
18. Apply Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent to the outer rack oil seal. With Outer Rack Seal Replacer T74P-3504-F, install high-pressure oil seal in rack bushing. Lip spring must face the inside of the bushing.

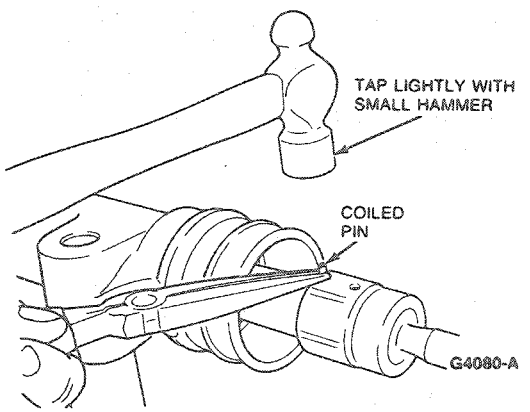





19. Lubricate short Rack Seal Protective Sleeve T74P-3504-J on rack end and rubber O-rings on rack bushing with Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent. Refer to illustration under Step 16.

## DISASSEMBLY AND ASSEMBLY (Continued)

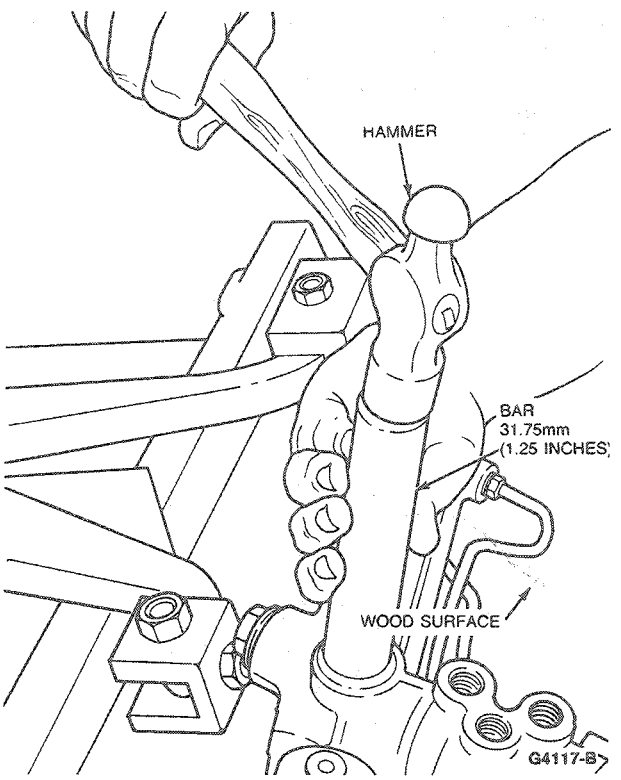
20. Start bushing, seal facing out, on rack. Pass bushing and seal over protecting sleeve and into housing bore. Place end plate against rack bushing. With Teflon Ring Sizing Tool T78P-3504-M apply hand pressure to end plate and rack bushing until bushing seats in gear housing. If rack bushing will not seat with hand pressure, a 1 1/8-inch deep socket (or larger) and a plastic mallet may be used to tap bushing in place. Install retaining ring (snap ring). Remove protective sleeve.
21. Install rod assemblies. Tighten both tie rod ball joint nuts simultaneously to 75-88 N·m (55-65 lb-ft) by holding one and turning the other.
22. Install coiled pins in ball joint nuts by lightly tapping with hammer until seated.



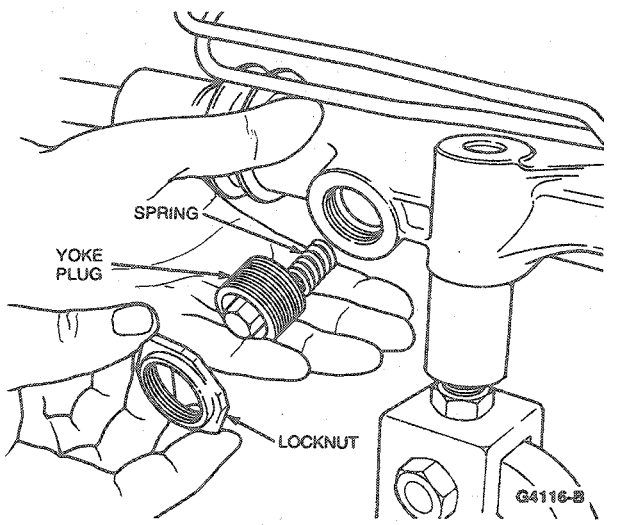

23. Install valve assembly.

    NOTE: Do not perform Step 24 if yoke was not removed.
24. Support gear on wood surface at yoke plug opening. Using a 31.75mm (1.25-inch) bar with a flat end and a hammer, flatten expansion plug until flat portion is approximately one-half to three-quarters of the total plug diameter.

    NOTE: Do not flatten plug completely or it will fall out.

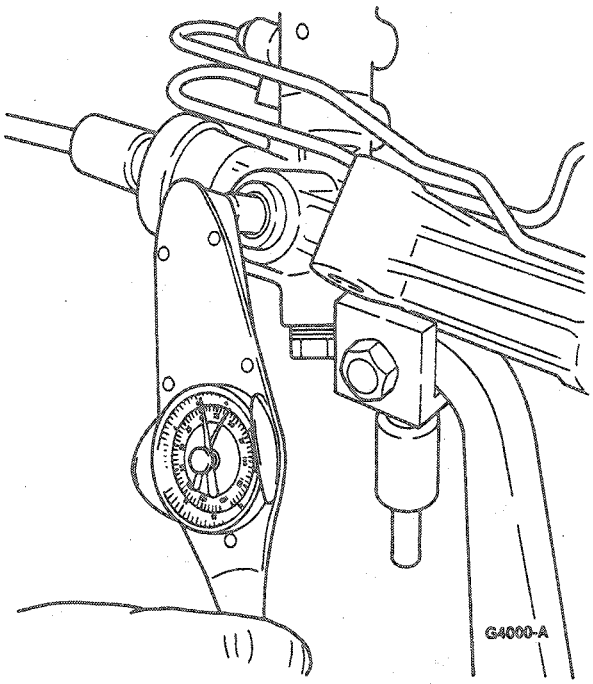



25. Install spring, plug, and locknut.

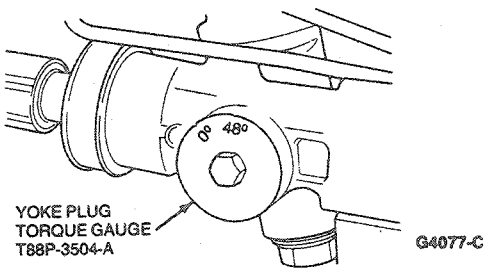


## DISASSEMBLY AND ASSEMBLY (Continued)

26. With rack at center of travel, tighten yoke plug to 5-5.6 N·m (45-50 lb-in). Clean threads of yoke plug prior to tightening to prevent a false reading.



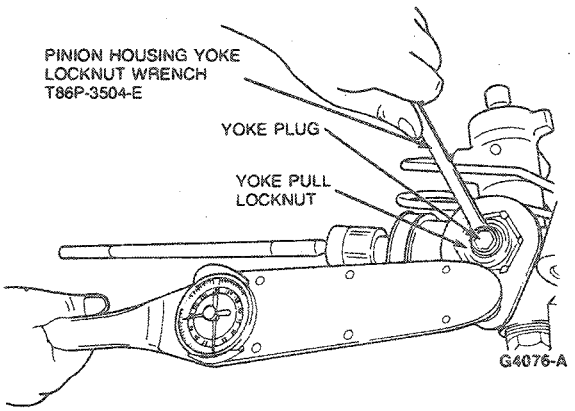

27. Install Yoke Plug Torque Gauge T88P-3504-A. Mark location of zero degree mark on housing. Back off adjuster so 48 degree mark lines up with zero degree mark.




**CAUTION: Do not allow yoke plug to move while tightening or preload will be affected.**

28. Place Pinion Housing Yoke Locknut Wrench T86P-3504-E on yoke plug locknut. While holding yoke plug, tighten locknut to 54-68 N·m (40-50 lb-ft). Refer to illustration following Step 5.

    Check input shaft torque after tightening locknut.




29. If external transfer tubes were removed, they must be replaced with new service lines. Clean out Teflon® seal shreds from housing ports prior to installation of new lines.
30. Fully extend LH end of rack, so rack teeth are exposed. Using 57 grams (2 oz) of Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent, pack rack teeth and pack any remaining grease into left end of gear housing. Return rack to center position.
31. Apply Steering Gear Grease C3AZ-19578-A (ESW-M1C87-A) or equivalent to groove in tie rods where bellows clamp to tie rods. This is required to keep bellows from twisting during toe-in adjustment.
32. Install bellows and pressure equalizer tube. Install clamps retaining bellows to gear housing.
33. Install clamps retaining bellows to tie rods.
34. Install jam nuts and tie rod ends on tie rods.

### Pressure and Return Line Fitting

**Tools Required:**

- Teflon Seal Installer D90P-3517-A3

**Seal Replacement**

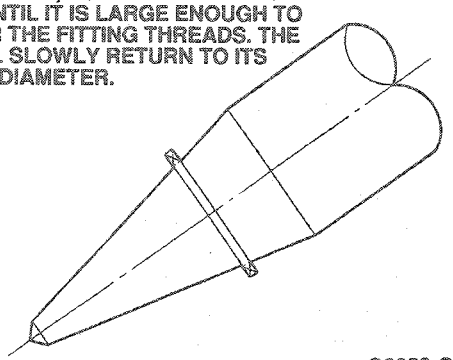
If a leak occurs between the tubing and the tube nut, the entire hose assembly, with a new fitting must be replaced. If a leak occurs between the tube nut and the aluminum gear housing, replace the plastic washer. The following procedure should be used:

1. Check fittings to determine which fitting is leaking and whether leak is between tube and tube nut or between tube nut and gear housing.
2. Check to ensure that nuts are tightened to specification. Do not over-tighten.

## DISASSEMBLY AND ASSEMBLY (Continued)

3. Unscrew tube nut, and replace plastic seal washer. To facilitate assembly of new TFE seal, a tapered shaft may be required to stretch the washer, so it may be slipped over tube nut threads.

**STRETCH PLASTIC SEAL OVER A TEFLON SEAL INSTALLER (D90P-3517-A3) OR A TAPERED TOOL, SUCH AS A CENTER PUNCH, UNTIL IT IS LARGE ENOUGH TO SLIP OVER THE FITTING THREADS. THE SEAL WILL SLOWLY RETURN TO ITS ORIGINAL DIAMETER.**



G3023-C

### Steering Pump

**Tools Required:**

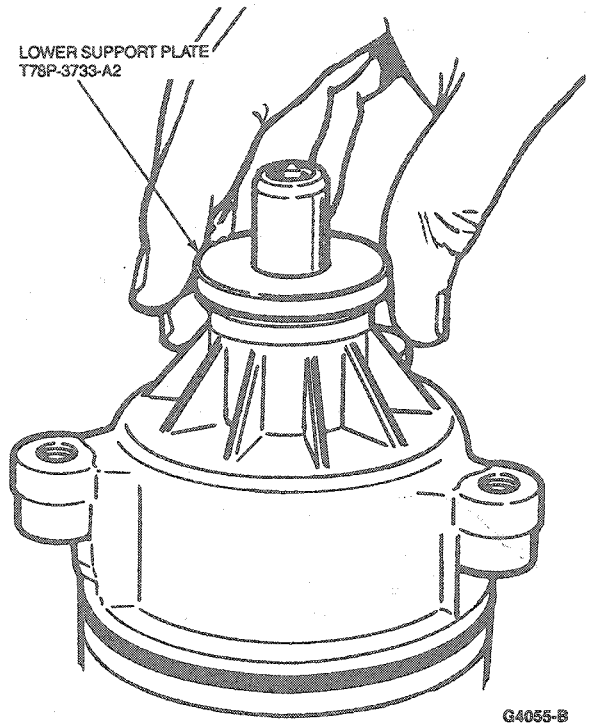
- C-Frame and Clamp Assy T74P-3044-A1
- Upper Support Plate T78P-3733-A1
- Lower Support Plate T78P-3733-A2
- Seal Driver T78P-3733-A3

The following precautions must be observed when servicing the power steering pump:

1. Use clean work bench and tools.
2. Thoroughly clean exterior of unit with solvent. Drain as much fluid from pump as possible.
3. If only the reservoir is to be removed, clean as outlined under Reservoir Removal.
4. Do not use cleaning solvents on seal.

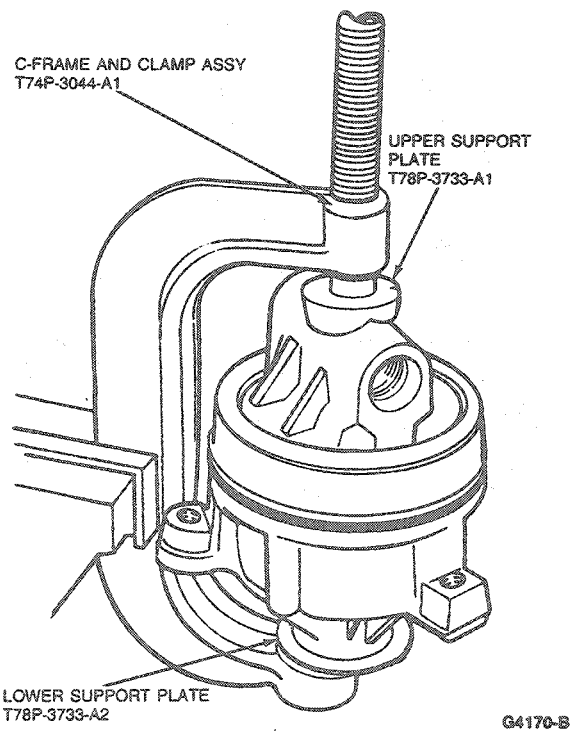
**Disassembly**

1. Remove pump pulley as outlined.
2. Remove outlet fitting, flow control valve, and flow control spring from pump. Remove pump reservoir as outlined.
3. Place C-Frame and Clamp Assembly T74P-3044-A1 in a bench vise.
4. Place Lower Support Plate T78P-3733-A2 over pump rotor shaft.




G4055-B

5. Install Upper Support Plate T78P-3733-A1 into upper portion of C-clamp.
6. Holding upper support plate, place pump assembly into C-clamp with rotor shaft facing down.

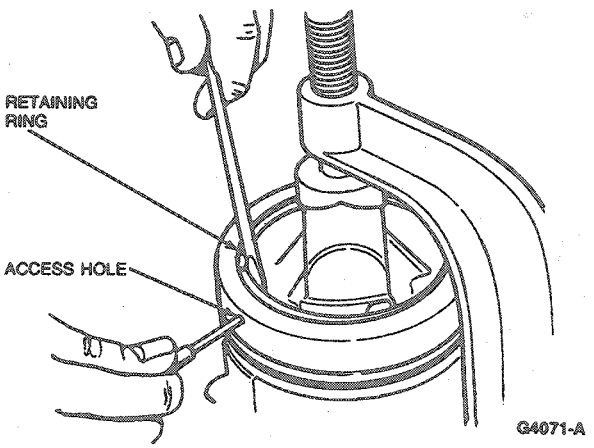



G4170-B

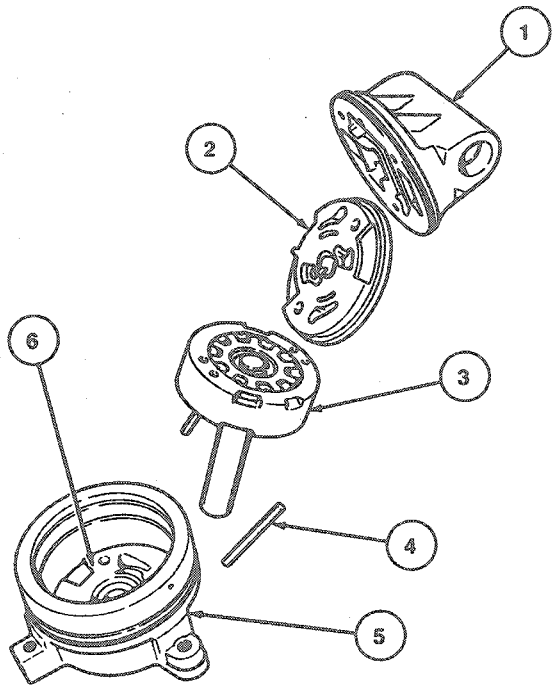
7. Tighten C-clamp until slight bottoming of valve cover is felt.

## DISASSEMBLY AND ASSEMBLY (Continued)

8. In the side of the pump housing is a small hole. Through this hole, insert a small drift or suitable tool, and push inward on valve cover retaining ring. While applying inward pressure on retaining ring, place screwdriver under edge of retaining ring. Remove the ring.



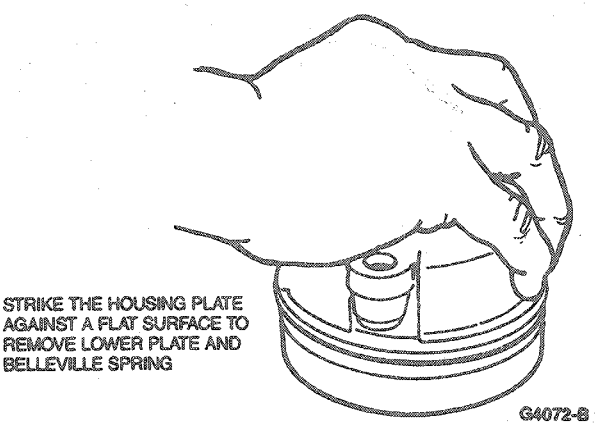

9. Loosen C-clamp, upper compressor plate and pump assembly.
10. Remove pump valve cover. Discard O-ring seal.
11. Push on rotor shaft to remove shaft, upper plate, rotating group assembly and two dowel pins.




| Item | Part Number | Description |
|---|---|---|
| 1 | 3C544 | Valve Cover Assy |
| 2 | 3D590 | Lower Plate |
| 3 | 3D607 | Cam and Rotor Assy |
| 4 | 387579-S | Dowl Pin (2 Req'd) |
| 5 | 3D643 | Pump Housing Plate |
| 6 | 3A645 | Upper Plate |

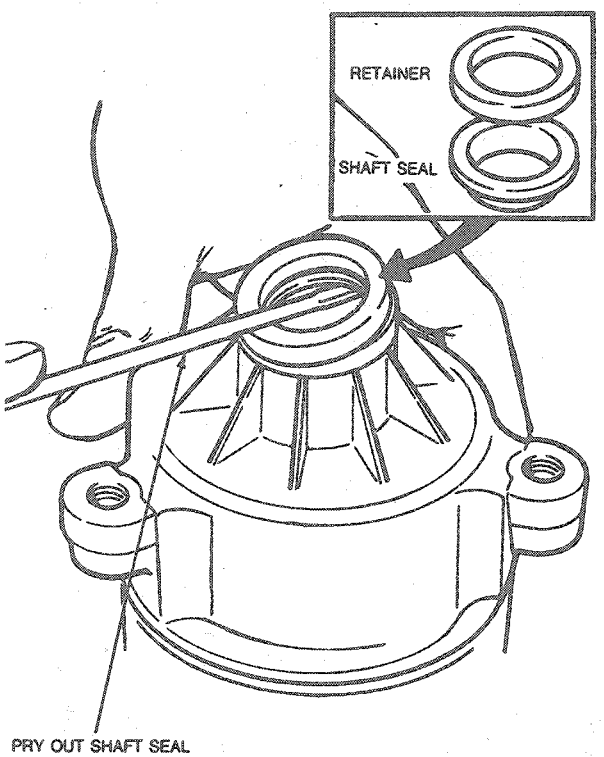
TG4173B

12. The lower plate and Belleville spring will remain in pump housing. To remove, place pump housing on a flat surface. Raise slightly and strike housing against flat surface until lower plate and Belleville spring fall out. Discard O-ring seals.



## DISASSEMBLY AND ASSEMBLY (Continued)

13. Remove rotor shaft seal and seal retainer simultaneously by prying out with a screwdriver.

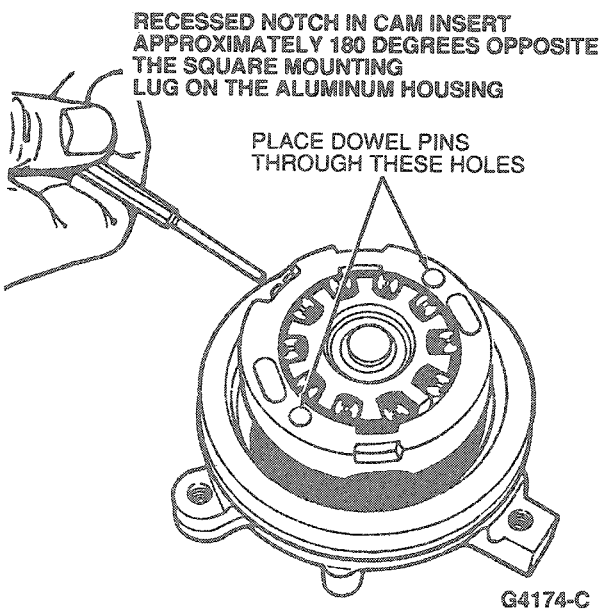



### Assembly

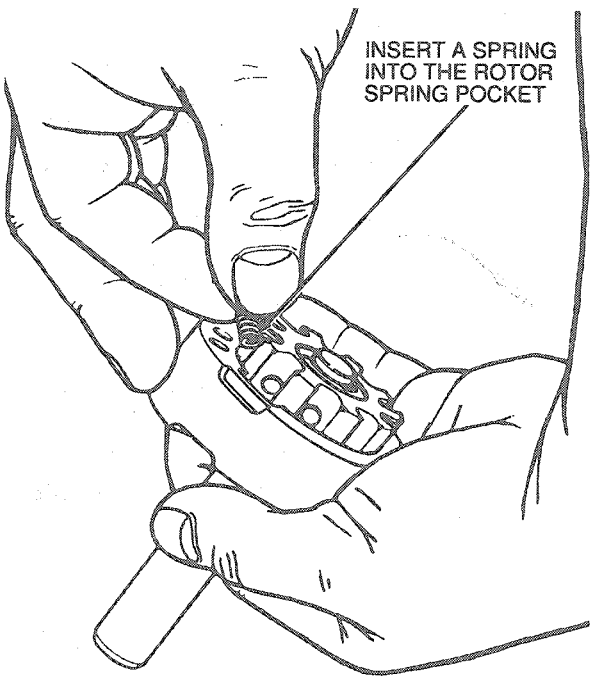
If the rotating group was disassembled for cleaning and inspection, assemble as follows:

NOTE: Rotor is symmetrical, so it can be installed either way.

1. Place rotor on rotor shaft splines.

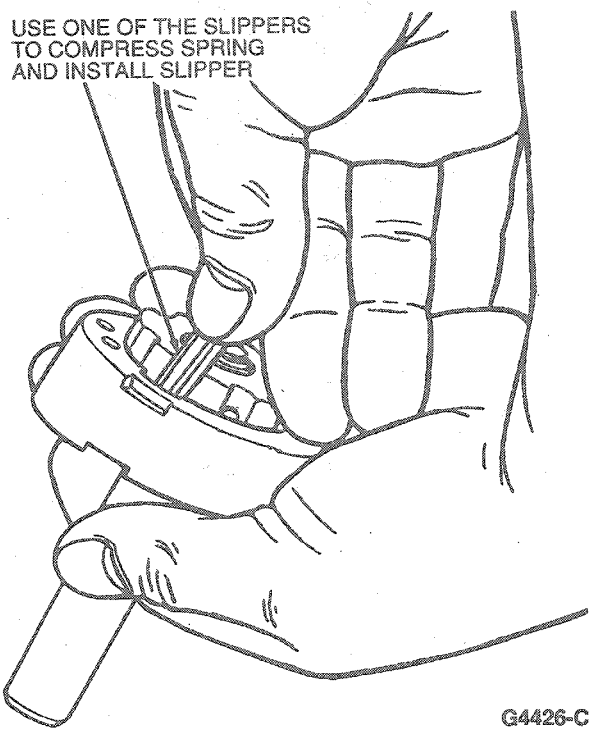



2. Install retaining ring in groove at end of rotor shaft.
3. Place insert cam over rotor. Ensure recessed notch on insert cam faces up.
4. With rotor extended upward approximately half way out of the cam, insert a spring into a rotor spring pocket. Work in rotor cavity directly beneath recessed flats on cam.



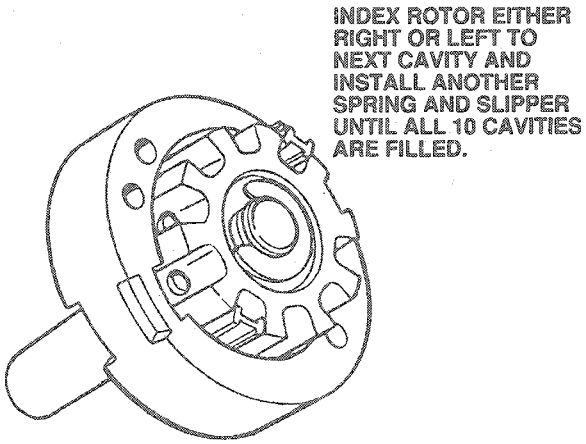
## DISASSEMBLY AND ASSEMBLY (Continued)

5. Use one of the slippers to compress spring, and install slipper with groove facing cam profile. Repeat Steps 4 and 5 on slipper cavity beneath opposite inlet recess.



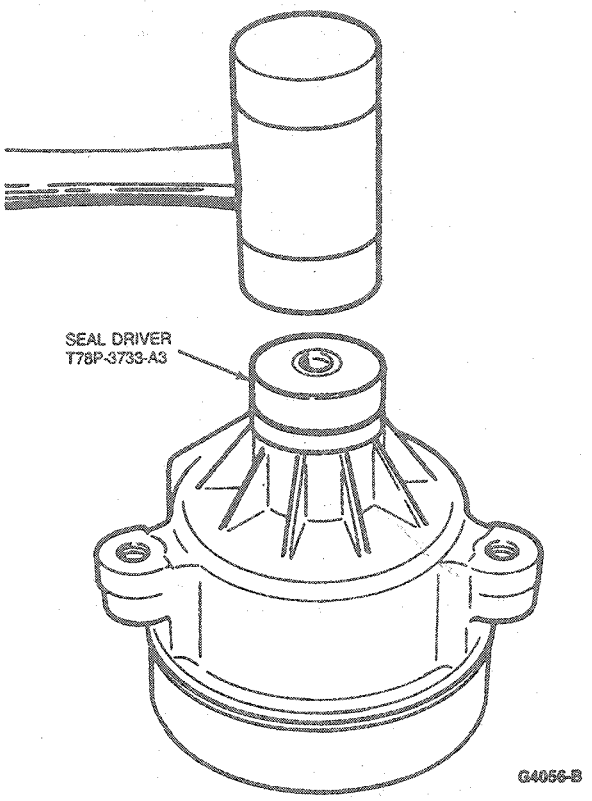

G4426-C

6. Holding cam stationary, index rotor either right or left one space and install another spring and slipper until all 10 rotor cavities have been filled. Turn rotor carefully so that springs and slippers already installed do not fall out.




G4427-D

7. Install a rotor shaft seal using Seal Driver T78P-3733-A3. Using a plastic mallet, drive seal into bore until it bottoms. Install seal retainer in same manner.

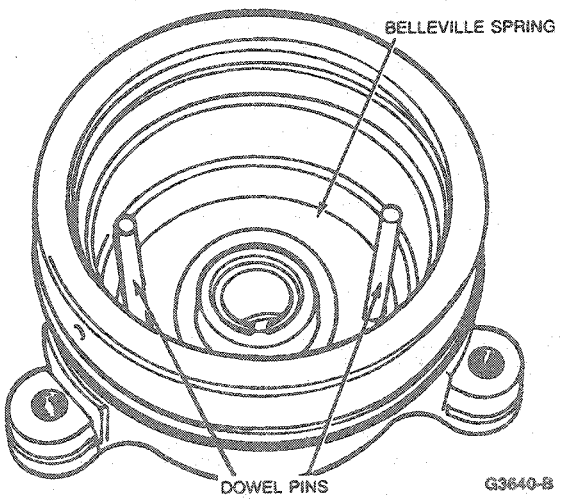



G4056-B

8. Place pump housing plate on flat surface with pulley side facing down.

   NOTE: The Belleville spring must be inserted with the dished surface upward.

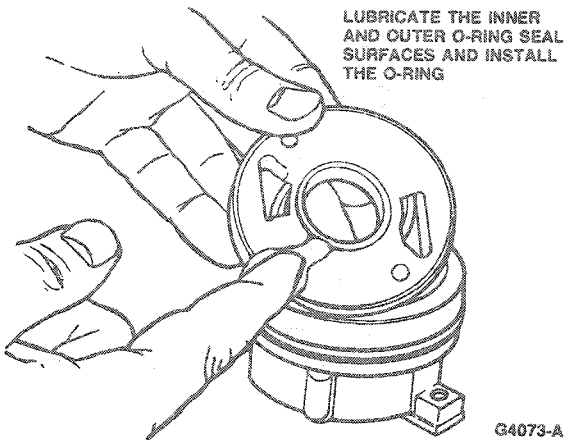
9. Insert two dowel pins and Belleville spring into housing.



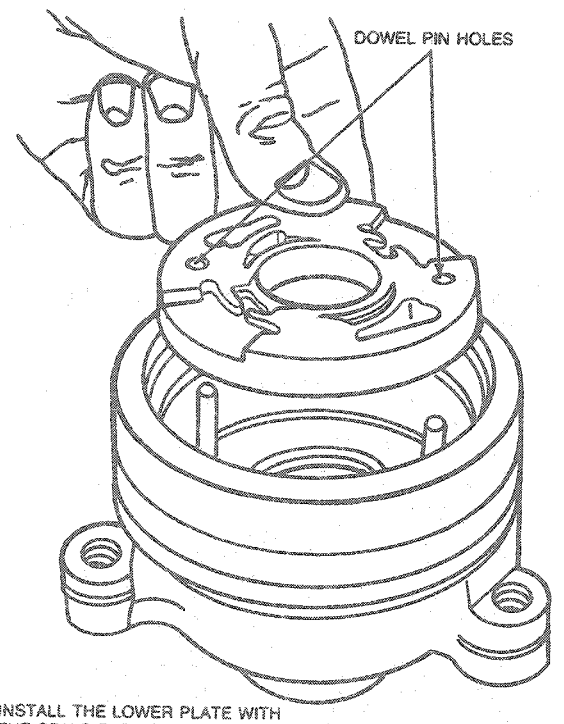

G3640-B

## DISASSEMBLY AND ASSEMBLY (Continued)

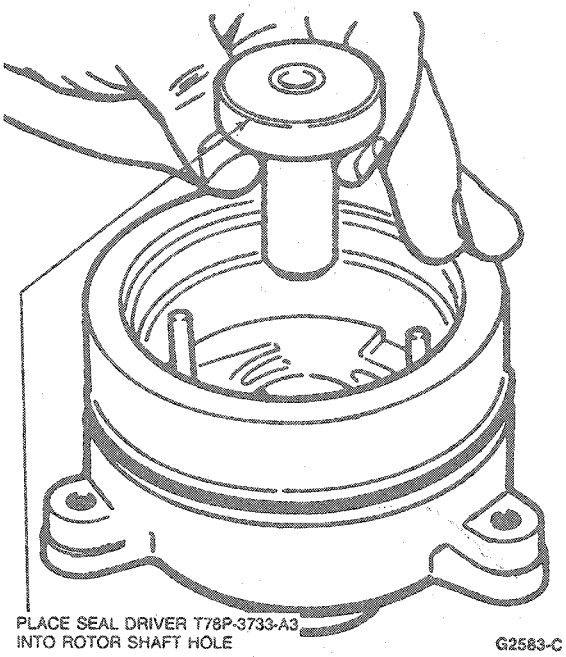
10. Lubricate inner and outer O-ring seals with specified power steering fluid, and install these seals on lower pressure plate.

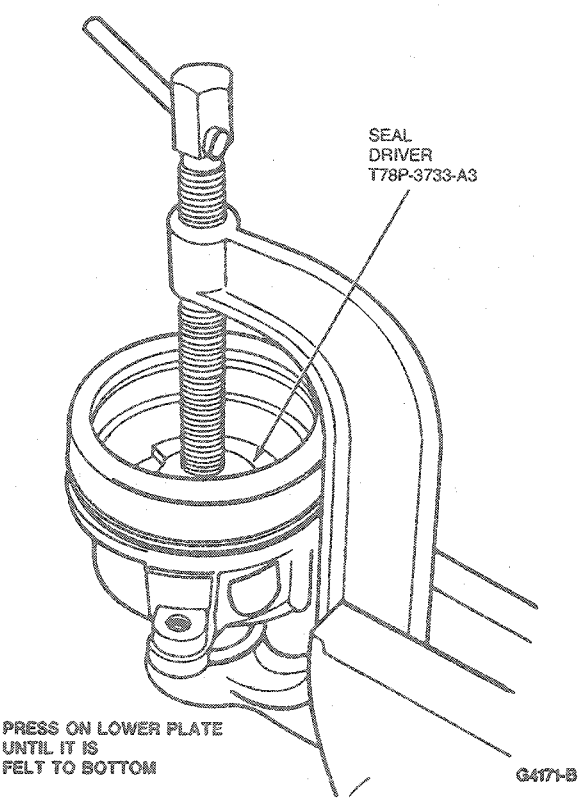



11. Insert lower pressure plate with O-ring seals toward front of pump into housing and over dowel pins.




12. Place entire assembly on C-Frame and Clamp Assembly T74P-30441-A1. Place Seal Driver T78P-3733-A3 into rotor shaft hole. Press on lower plate lightly until it is felt to bottom into pump housing. This operation will seat outer O-ring seal.

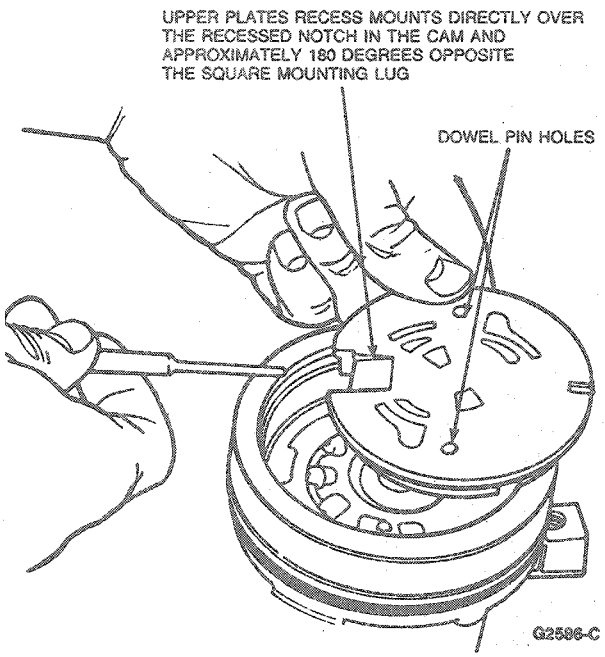



NOTE: When installing this assembly into pump housing, stepped holes must be used for dowel pins, and the recessed notch in cam insert must face toward reservoir and approximately 180 degrees opposite the square mounting lug on aluminum housing. Refer to the illustration under Assembly, Step 1.

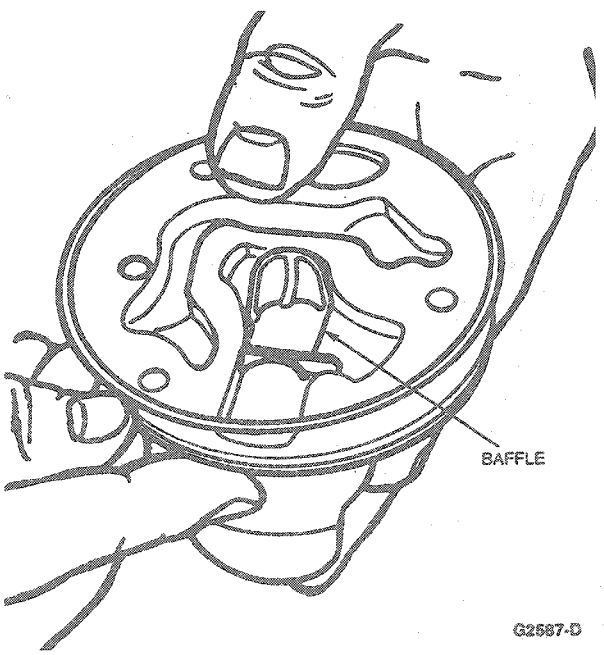
## DISASSEMBLY AND ASSEMBLY (Continued)

13. Install cam, rotor and slippers, and rotor shaft assembly into pump housing over dowel pins.
14. Place upper pressure plate over dowel pins with recess directly over recessed notch on cam insert and approximately 180 degrees opposite square mounting lug.

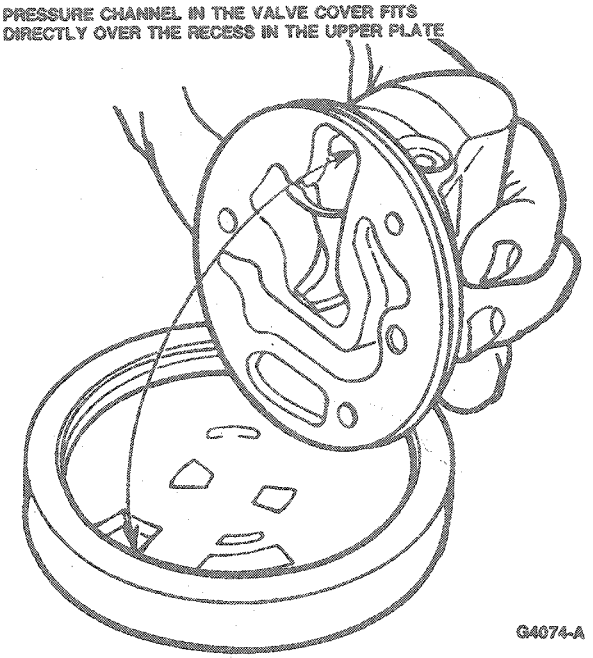



15. Place a new O-ring seal on valve cover. Lubricate this seal with specified power steering fluid.

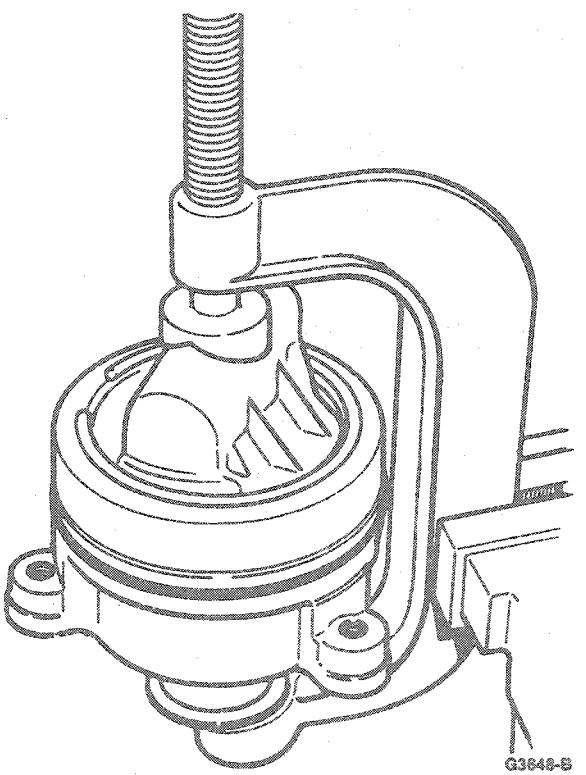
    NOTE: Ensure the plastic baffle is securely in place in valve cover. If baffle is loose, apply a coating of petroleum jelly on the baffle, and install it into location on the valve cover.




16. Insert valve cover over dowel pins. Ensure fitting hole in valve cover is directly in line with square mounting lug of aluminum housing.



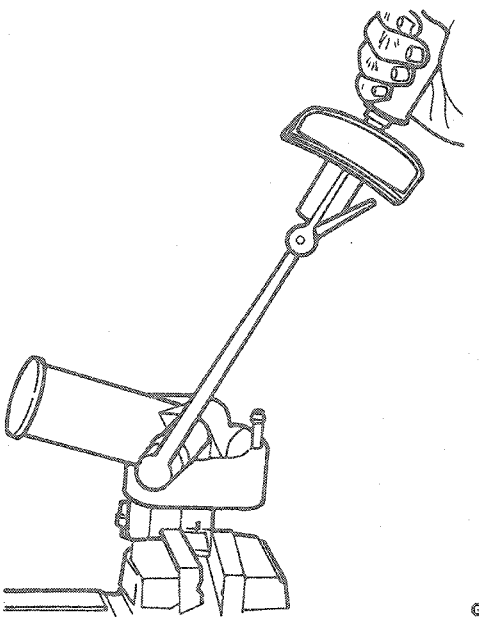

17. Place entire assembly in C-clamp tool and compress valve cover into pump housing, until retaining ring groove is exposed in pump housing.
18. Install valve cover retaining ring with ends near access hole in pump housing.



## DISASSEMBLY AND ASSEMBLY (Continued)

19. Remove pump assembly from C-clamp tool.
20. Place a new O-ring seal on pump housing. Lubricate this O-ring seal with specified power steering fluid.
21. Install power steering reservoir.
22. Install flow control spring and flow control valve into valve cover.
23. Place new O-ring seals on outlet fitting. Lubricate these seals with specified power steering fluid.

    **CAUTION: If the flow control valve is cocked, it may become stuck in the valve cover. Do not force the valve forward. Forcing the valve may shear off metal and carry the metal chips into the valve bore.**
24. Install outlet fitting into valve cover. Tighten to 33-47 N·m (25-34 lb-ft).
25. Install pulley as outlined.



G3649-B

## CLEANING AND INSPECTION

### Steering Gear, Power

#### Cleaning

1. Use a clean work bench and tools.
2. Clean the exterior of the gear with solvent. If necessary, drain off excess hydraulic fluid.
3. Handle parts carefully to avoid nicks, burrs, scratches and dirt. Do not use solvent on seals.

#### Inspection

1. Inspect input shaft bearing. Check fit of bearing on input shaft. Replace bearing if necessary.
2. Inspect valve housing for wear, scoring or burrs.
3. Check fluid passages for obstruction or leakage.
4. Inspect gear housing for cracks and stripped threads and mating surfaces for burrs. Inspect piston bore for scoring or wear. If necessary, replace housing.
5. Ensure input shaft bearing rotates freely.
6. Inspect piston rack-and-pinion shaft teeth for nicks and burrs.

### Steering Gear, Power—Flushing

Always flush power steering gear when replacing pump due to fluid contamination.

1. Disconnect fluid return hose at pump and place end in a container. Plug return hose nipple on reservoir.
2. Fill reservoir with Premium Power Steering Fluid E6AZ-19582-AA (ESW-M2C33-F) or equivalent.
3. Disconnect ignition coil wire and raise front wheels off floor. Refer to Section 00-02.
4. While adding approximately 1.9 liters (0.5 gallon) of fluid, turn ignition to START position (using the ignition key) and crank engine with starter while turning steering wheel from lock-to-lock.
5. When all fluid has been added, turn ignition to OFF position and connect ignition coil wire.
6. Remove plug from the reservoir return hose nipple. Attach return hose to nipple.
7. Check fluid level. Add fluid if necessary.

   **CAUTION: Do not overfill reservoir.**
8. Lower vehicle.
9. Start engine and turn steering wheel slowly from lock-to-lock several times. Check fluid level and adjust as required.

### Steering Pump, Power—Flushing

If dirt is found in power steering gear, flush pump as follows:

1. Making sure all other hoses are connected, disconnect pressure hose at gear.
2. Place end of hose in a container.
3. Fill reservoir with Premium Power Steering Fluid E6AZ-19582-AA (ESW-M2C33-F) or equivalent.
4. Disconnect ignition coil wire.
5. While adding approximately 1.9 liters (0.5 gallon) of fluid, turn ignition to START position and crank engine with starter. As soon as all fluid has been added, turn ignition to OFF position.
6. Attach pressure hose at gear.
7. Check fluid level.
8. Connect ignition coil wire.
9. Start engine and turn steering wheel slowly from lock-to-lock to expel any air trapped in the system. Check and adjust fluid level.

## CLEANING AND INSPECTION (Continued)

### Steering Pump, Power

#### Cleaning

Wash all parts except seals in a chlorinated solvent and dry with compressed air.

#### Inspection

To determine when to replace power steering pump components, follow these guidelines.

NOTE: Some components must be replaced regardless of condition.

1. Reuse outlet fitting if corners are not rounded and threads are intact.
2. Replace all seals except the rotor shaft seal. Do not remove rotor shaft seal if it does not leak.
3. Reuse reservoir assembly if O-ring surfaces are not damaged.
4. Reuse housing or housing assembly if O-ring and snap ring surfaces are not damaged.
5. Reuse upper and lower pressure plates if there is no scoring on wear surface. Polish phosphate coating, if necessary, but do not remove it.
6. Reuse rotor and cam assembly if wear is limited to removal of phosphate coating on cam contour. Do not disassemble unit. Push rotor part-way through cam insert, being careful not to dislodge slippers and springs. Check cam ID for scoring or burring. Check rotor faces and OD for scoring and chipping.

   **Do not service or refinish the upper and lower pressure plates, cam or rotor assembly. If wear or burring is evident, replace them with new components.**
7. Install a new rotor and cam assembly if slippers are worn. Replace springs if they are bent or broken.
8. Reuse rotor shaft if thrust faces, bushing diameter and shaft seal diameter are not excessively worn or scored.
9. Reuse housing and bushing assembly if all threaded holes are not damaged beyond service, and bushing diameter is not scored or worn 0.01mm (0.0005-inch) over 18mm (0.6897-inch) maximum. Service threaded holes by drilling out the damaged threads and installing helicoil inserts. If bushing is scored or excessively worn, install a new housing and bushing assembly.
10. Reuse valve body if valve bore is free of nicks and scoring. Valve must fall freely in valve bore. Replace valve housing and / or valve if valve sticks in bore.

## ADJUSTMENTS

### Rack Yoke Plug Clearance

**Tools Required:**

- Bench Mounted Holding Fixture T57L-500-B
- Pinion Shaft Torque Adapter T74P-3504-R
- Pinion Housing Yoke Locknut Wrench T78P-3504-H
- Seal Installer D90P-3517-A3

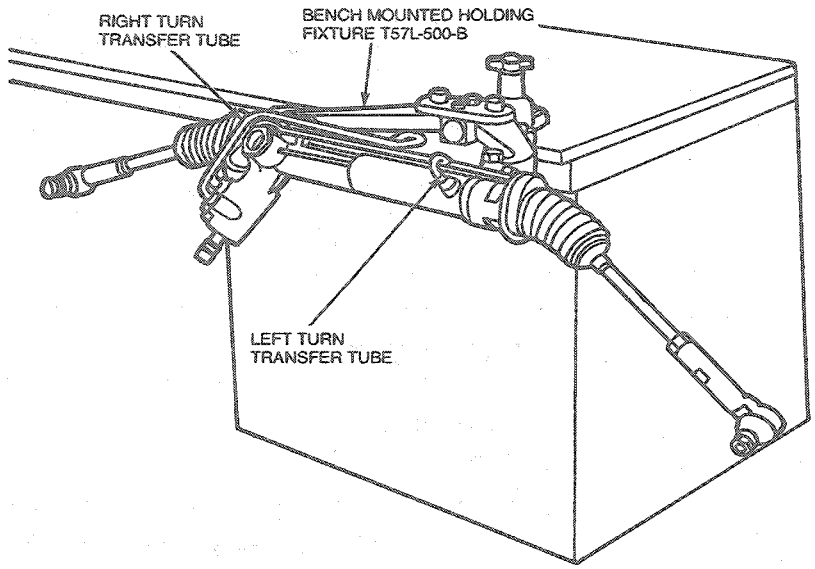
#### Steering Gear Removed

NOTE: The rack yoke clearance adjustment is not a normal service adjustment. It is only required when the input shaft and valve assembly is removed.

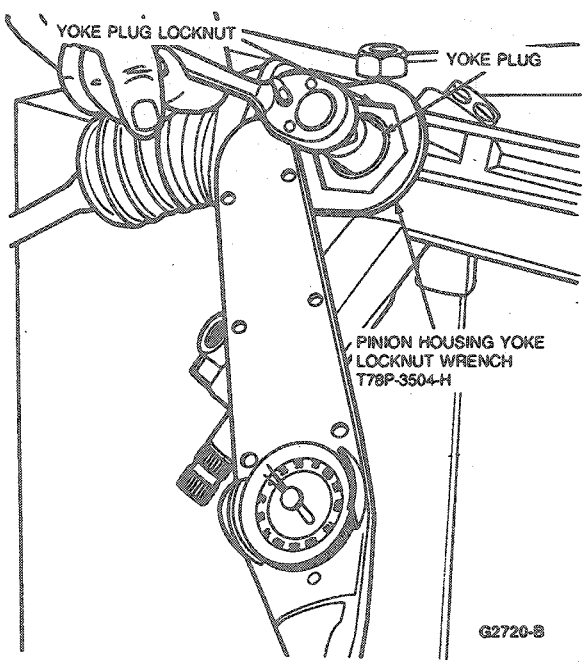
1. Clean exterior of the steering gear thoroughly.

## ADJUSTMENTS (Continued)

2. Install two long bolts and washers through the bushings, and attach to the Bench Mounted Holding Fixture T57L-500-B.



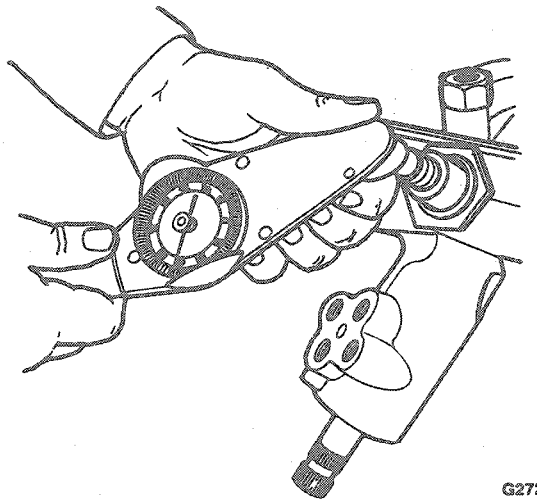

3. Do not remove the external transfer tubes unless they are leaking or damaged. If these lines are removed, they must be replaced with new lines.
4. Drain the power steering fluid by rotating the input shaft lock-to-lock twice using Pinion Shaft Torque Adapter T74P-3504-R. Cover ports on valve housing with shop cloth while draining gear to avoid possible oil spray.
5. Insert a lb-in torque wrench with maximum capacity of 3.39-6.77 N-m (30-60 lb-in) into the Pinion Shaft Torque Adapter T74P-3504-R. Position the adapter and wrench on the input shaft splines.
6. Loosen the yoke plug locknut with Pinion Housing Yoke Locknut Wrench T78P-3504-H.




7. Loosen yoke plug with a 3/4-inch socket wrench.

## ADJUSTMENTS (Continued)

8. With the rack at the center of travel, tighten the yoke plug to 5-5.6 N·m (45-50 lb-in). Clean the threads of the yoke plug prior to tightening to prevent a false reading.



G2721-C

9. Back-off the yoke plug approximately one-eighth turn (44 degrees minimum to 54 degrees maximum) until the torque required to initiate and sustain rotation of the input shaft is to 0.78-2.03 N·m (7-18 lb-in).

   **CAUTION: Do not allow the yoke plug to move while tightening or the preload will be affected.**

10. Place Pinion Housing Yoke Locknut Wrench T78P-3504-H on the yoke plug locknut. While holding the yoke plug, tighten the locknut to 60-89 N·m (44-66 lb-ft).

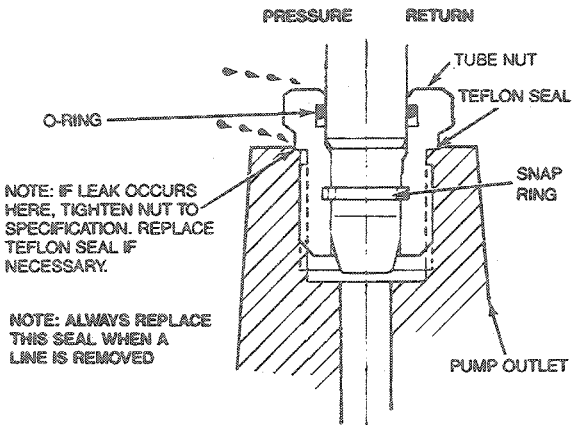
    Check input shaft torque (Step 9) after tightening locknut.

11. If the external transfer tubes were removed, they must be replaced with new service line. Remove the plastic seals from the housing ports prior to installation of new lines.

### Quick Connect Power Steering Fitting, Atsugi

#### Seal Replacement

If a leak occurs between the tubing and tube nut, replace the hose assembly. If a leak occurs between the tube nut and the pump outlet, replace the plastic washer.




G5248-B

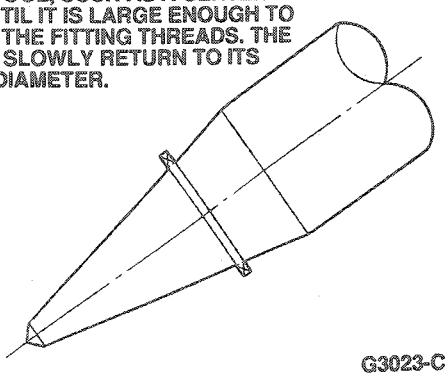
The following procedure should be used:

1. Check fitting to determine whether leak is between tube and tube nut or between tube nut and pump outlet fitting.

   **CAUTION: DO NOT over-tighten. If tube nuts are overtorqued, stripping of housing threads may occur and bores may concave.**

2. If leak is between tube nut, check to ensure nut is tightened to 20-35 N·m (15-25 lb-ft).
3. If leak continues or if leak is between tube and tube nut, remove line.
4. Unscrew tube nut, and inspect plastic seal washer. Always replace plastic seal washer (Part No. 388898-S) when line is removed. To facilitate assembly of new plastic seal washer, a tapered shaft may be required to stretch washer, so it may be slipped over tube nut threads.

**STRETCH PLASTIC SEAL OVER A TEFLON SEAL INSTALLER (D90P-3517-A3) OR A TAPERED TOOL, SUCH AS A CENTER PUNCH, UNTIL IT IS LARGE ENOUGH TO SLIP OVER THE FITTING THREADS. THE SEAL WILL SLOWLY RETURN TO ITS ORIGINAL DIAMETER.**



G3023-C

5. The rubber O-ring cannot be serviced with this design. If leak is due to the O-ring, replace the hose assembly.

## ADJUSTMENTS (Continued)

6. Connect tube nut and tighten to 20-35 N·m (15-25 lb-ft).

The quick connect fitting may disengage if not fully assembled, if the snap ring is missing, or the tube nut, or the hose end is not machined properly.

If the fitting disengages, replace the hose assembly. The fitting is fully engaged only when the hose will not pull out. To test for positive engagement, the system should be properly filled, the engine started, and the steering wheel cycled from lock-to-lock. Service hose assemblies have tube nuts, snap rings and O-rings already attached.

## SPECIFICATIONS

| Description | Specifications |
|---|---|
| Gear Ratio | 15:1 |
| Number of Turns | 2.5 |
| Pinion, Rack Lubricant Capacity | 23-27 Grams |
| Power Steering Fluid Capacity (Including Steering Pump) | 2.5 Pints |
| Pinion, Rack and Pinion Bearing Lubricant | C3AZ-19578-A (ESW-M1C87-A) |
| Seal Lubricant (Cavity under Dust Seal) | D0AZ-19584-A (ESB-M1C93-A) |
| Premium Power Steering Fluid | E6AZ-19582-AA ESW-M2C33-F |
| Effort Required to Initiate Proper Input Shaft Rotation (Power Cylinder drained and gear removed from Vehicle) | 0.78-2.03 N·m (7-18 lb-in) |
| Tie Rod Articulation Effort (On Pull Scale) | 2-10 lbs. |
| Tie Rod Outer End Lubricant | None (Bonded Rubber Design) |

### TORQUE SPECIFICATIONS

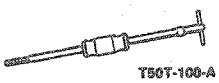
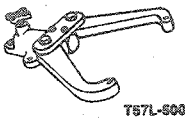
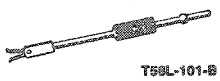
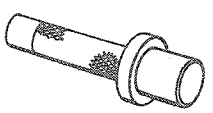
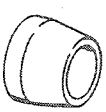
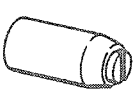
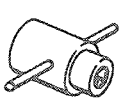
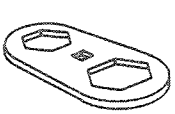
| Description | N·m | Lb-Ft |
|---|---|---|
| Pressure Line Fitting (at Pump) | 14-20 | 10-15 |
| Gear-to-Crossmember Mounting Bolt Nut | 115-135 | 85-100 |
| Tie Rod End-to-Spindle Arm Nut | 48-63 | 35-47 |
| Intermediate Shaft-to-Steering Gear Bolt | 41-51 | 30-38 |
| Intermediate Shaft-to-Steering Column (2 Nuts) | 21-33 | 15-25 |
| Weather Boot-to-Dash Panel | 5.5-6.7 | 4-5 |
| Bellows Clamp Screw | 2.2-3.4 | 20-30 (Lb-In) |
| Yoke Plug | 5-5.6 | 45-50 (Lb-In) |
| Yoke Plug Locknut | 60-89 | 44-66 |
| Pressure Line Fitting at Gear | 20-35 | 15-25 |
| Return Line Fitting at Gear | 20-35 | 15-25 |
| Transfer Tube Fittings at Power Cylinder (Right and Left Turn Lines) | 13-27 | 10-20 |
| Pinion Bearing Locknut | 41-54 | 31-39 |
| Pinion Bearing Cap | 54-68 | 40-50 |
| Tie Rod Ball Socket Assembly to Rack | 75-88 | 55-65 |
| Rack and Pinion Shield Screws | 5.5-8 | 49-71 (Lb-In) |

(Continued)

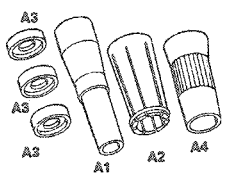
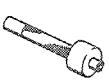
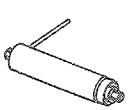
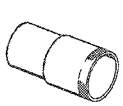
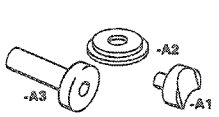
### TORQUE SPECIFICATIONS (Cont'd)

| Description | N·m | Lb-Ft |
|---|---|---|
| Reservoir Screws | 6-8 | 54-70 (Lb-In) |
| Hose Clamps | 1.4-2 | 13-17 (Lb-In) |
| Pump Retaining Bolts | 20-32.5 | 15-24 |
| Wheel Lug Nuts | 115-142 | 85-105 |
| Power Steering Line and Bracket | 4.5-5.7 | 40-50 (Lb-In) |
| Bracket Assembly Bolt | 21-32 | 15-23 |
| Pump Cooler Screws | 18-28 | 14-20 |
| Tube Nut and Gear Housing Fitting | 27-34 | 20-25 |
| Pressure Switch | 7-14 | 5-10 |
| Outlet Fitting to Reservoir and Valve Cover | 33-47 | 25-34 |
| Jam Nut | 47-68 | 35-50 |
| Module Fixture Screws | 4-5 | 35-45 (Lb-In) |
| Power Steering Line Fittings | 34-46 | 26-33 |
| Clamp Nut | 21-32 | 15-23 |
| Actuator-to-Steering Gear Retaining Bolts | 27-34 | 20-25 |

## SPECIAL SERVICE TOOLS

| Tool Number / Description | Illustration |
|---|---|
| T50T-100-A<br>Impact Slide Hammer |  <br>T50T-100-A |
| T57L-500-B<br>Bench Mounted Holding Fixture |  <br>T57L-500-B |
| T58L-101-B<br>Puller Attachment |  <br>T58L-101-B |
| T71P-19703-C<br>O-Ring Tool |  <br>T71P-19703-C |
| T74P-3044-A1<br>C-Frame and Clamp Assembly |  <br>T74P-3044-A1 |
| T74P-3504-F<br>Outer Rack Seal Replacer |  <br>T74P-3504-F |
| T74P-3504-G<br>Teflon® Ring Replacer |  <br>T74P-3504-G |
| T74P-3504-J<br>Rack Seal Protector Sleeve |  <br>T74P-3504-J |
| T74P-3504-R<br>Pinion Shaft Torque Adapter |  <br>T74P-3504-R |
| T74P-3504-U<br>Nut Wrench |  <br>T74P-3504-U |
| T74P-3504-Y<br>Hook Spring Scale |  <br>T74P-3504-Y |

(Continued)

| Tool Number / Description | Illustration |
|---|---|
| T75L-3517-A<br>Seal Installation Set<br>Consists of:<br>T75L-3517-A1<br>Mandrel<br>T75L-3517-A2<br>Slide Pusher<br>T75L-3517-A3<br>Spacer<br>T75L-3517-A4<br>Sizing Tube |  <br><br>T75L-3517-A |
| T78P-3504-C<br>Valve Body Insert Tool |  <br>T78P-3504-C |
| T78P-3504-D<br>Upper Pinion Bearing Seal Replacer |  <br>T78P-3504-D |
| T78P-3504-G<br>Lower Pinion Bearing Replacer |  <br>T78P-3504-G |
| T78P-3504-H<br>Pinion Housing Yoke Locknut Wrench |  <br>T78P-3504-H |
| T78P-3504-J<br>Rack Oil Seal Remover |  <br>T78P-3504-J |
| T78P-3504-L<br>Rack Bushing Holding Tool |  <br>T78P-3504-L |
| T78P-3504-M<br>Teflon® Ring Sizing Tool |  <br>T78P-3504-M |
| T78P-3733-A1<br>Upper Support Plate<br>T78P-3733-A2<br>Lower Support Plate<br>T78P-3733-A3<br>Seal Driver |  <br><br>T78P-3733-A |

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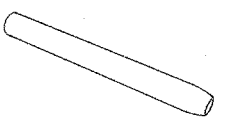
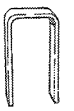
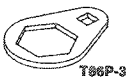
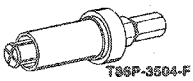
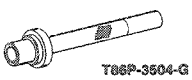
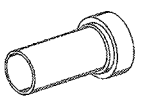
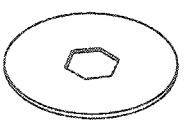
## SPECIAL SERVICE TOOLS (Continued)

| Tool Number/ Description | Illustration |
|---|---|
| T85L-3504-B<br>Rack Oil Seal Protector |  <br>T85L-3504-B |
| T86P-3504-D<br>Valve Body Puller (Bridge) |  <br>T86P-3504-D |
| T86P-3504-E<br>Pinion Housing Yoke Locknut Wrench |  <br>T86P-3504-E |
| T86P-3504-F<br>Lower Pinion Seal Remover (Small OD) |  <br>T86P-3504-F |
| T86P-3504-G<br>Lower Pinion Seal Replacer |  <br>T86P-3504-G |
| T86P-3504-J<br>Part of Lower Pinion Seal Remover (Large OD) |  <br>T86P-3504-J |
| T88P-3504-A<br>Yoke Plug Torque Gauge |  <br>T88P-3504-A |

| Tool Number | Description |
|---|---|
| D79L-7000-A | Retaining Ring Pliers |
| D81P-3504-N | Locknut Pin Remover |
| D90P-3517-A3 | Seal Installer |
| TOOL-3290-D | Tie Rod End Remover |

### ROTUNDA EQUIPMENT

| Model | Description |
|---|---|
| 007-00001 | Digital Volt Ohmmeter |
| 059-00010 | Inductive Dwell-Tach-Volt-Ohm Tester |