

## CHRYSLER CORP. IMPORTS POWER-ASSISTED RECIRCULATING BALL

Arrow Pickup  
Challenger  
Colt Wagon  
D50 Pickup  
Sapporo

## DESCRIPTION

## POWER STEERING GEAR BOX

The power steering gear box displaces fluid to provide hydraulic pressure assist when turning. A torsion bar transmits road feel to the driver. A one piece rack-piston nut is geared to the sector shaft. An adjusting screw on the shaft maintains backlash between the shaft and the rack-piston. There are 2 sizes of gear boxes, small and large. The small gear boxes are only used with the 1.6L engine. The large gear boxes are used with the 2.0L and the 2.6L engines. Both gear boxes are serviced in the same manner.

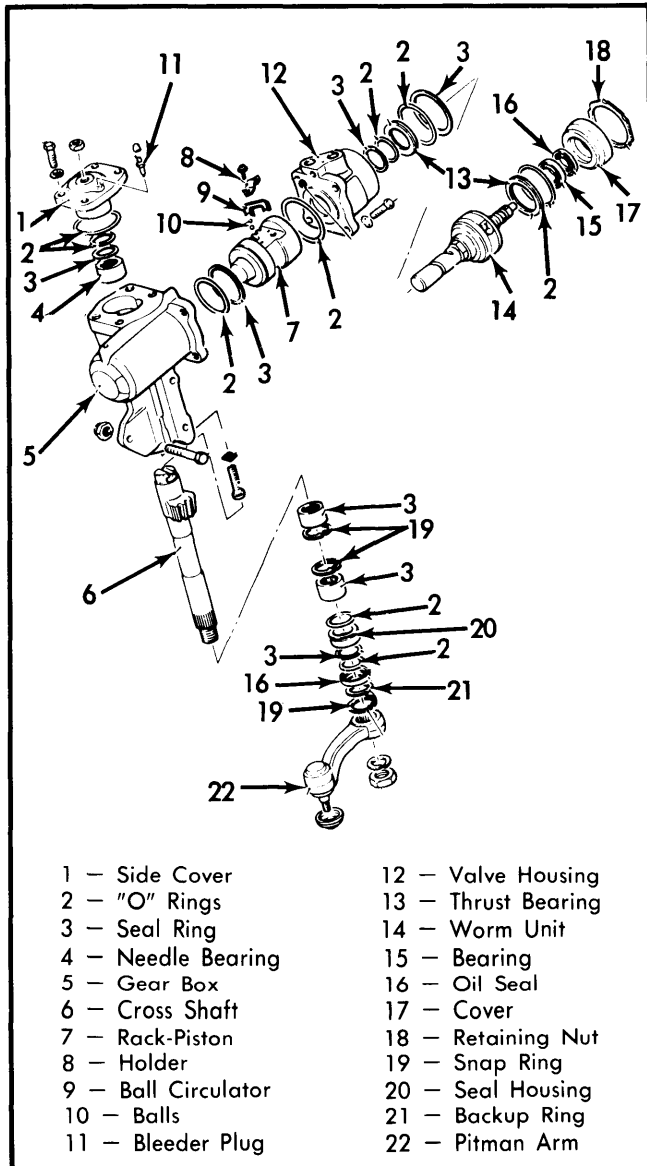


Fig. 1 Exploded View of Chrysler Corp. Power Steering Gear (Large and Small Gear Box Same)

## POWER STEERING PUMP

There are 3 different pumps used on these models: "A", "B" and "C". The "A" pump uses a retaining ring to hold pump end plate to pump housing and uses a separate reservoir. Pumps "B" and "C" use bolts to hold pump end plate to pump body. Pump "B" uses a separate reservoir while pump "C" uses an integral reservoir. Pump "A" can be used on all models. Pump "B" is only used on Challenger, Colt Wagon and Sapporo models. Pump "C" is only used on pickup models. All pumps are constant displacement vane type and are belt driven by the crankshaft.

## LUBRICATION

## Capacity

Pumps "A" and "B" - 1.1 qts.  
Pump "C" - 1 qt.

Type - ATF Dexron II

## ADJUSTMENT

## BELT TENSION ADJUSTMENT

With 22 lbs. (10 kg) pressure applied, belt deflection at center of belt should be .250-.375" (7-10 mm).

## STEERING WHEEL PLAY

Raise front of vehicle. Start engine and idle at 1000 RPM. With steering wheel in center position check that free play is within 1" (25 mm). If necessary, adjustment can be made at the steering gear housing adjusting bolt.

## FLUID REPLACEMENT

1) Disconnect suction hose at reservoir and drain fluid. Disconnect pressure hose at pump and drain fluid. Disconnect coil high tension wire.

2) Raise and support vehicle. Turn steering wheel lock to lock several times while cranking engine to drain fluid from gear box. Reconnect all hoses and fill power steering system with fluid. Bleed system.

## AIR BLEEDING

**NOTE** - Make sure reservoir is filled before bleeding. Add fluid as needed during bleeding.

1) Raise and support front of vehicle. Disconnect coil high tension wire. Turn steering wheel lock to lock, 5 or 6 times, while cranking engine.

2) Lower vehicle and install a 20" (500 mm) hose to bleeder screw of gear box. Place other end of hose in a container. Connect coil wire.

3) Start engine and idle. Turn steering wheel to left lock and loosen bleeder screw. Repeat this until no more bubbles appear in container (from hose). Remove hose and tighten

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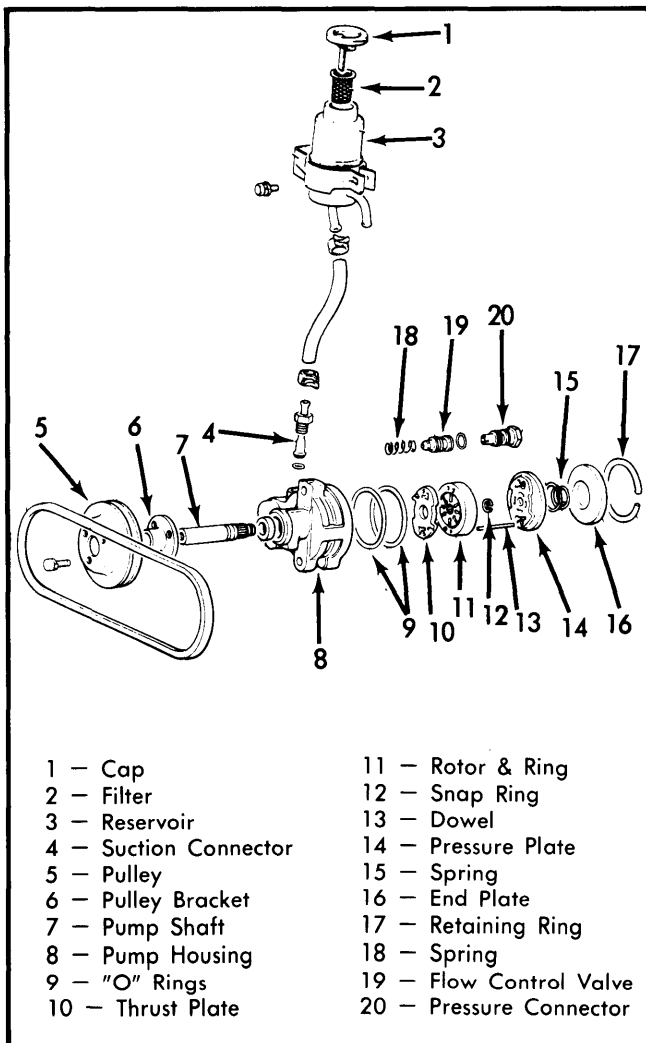
bleeder screw. Check fluid level, add fluid if necessary. Turn steering wheel lock to lock and note that fluid level in reservoir does not change more than .12-.16" (3-4 mm).

**CAUTION** — Abrupt rising of fluid level after engine is shut off signals incomplete bleeding. Repeat procedure as needed.

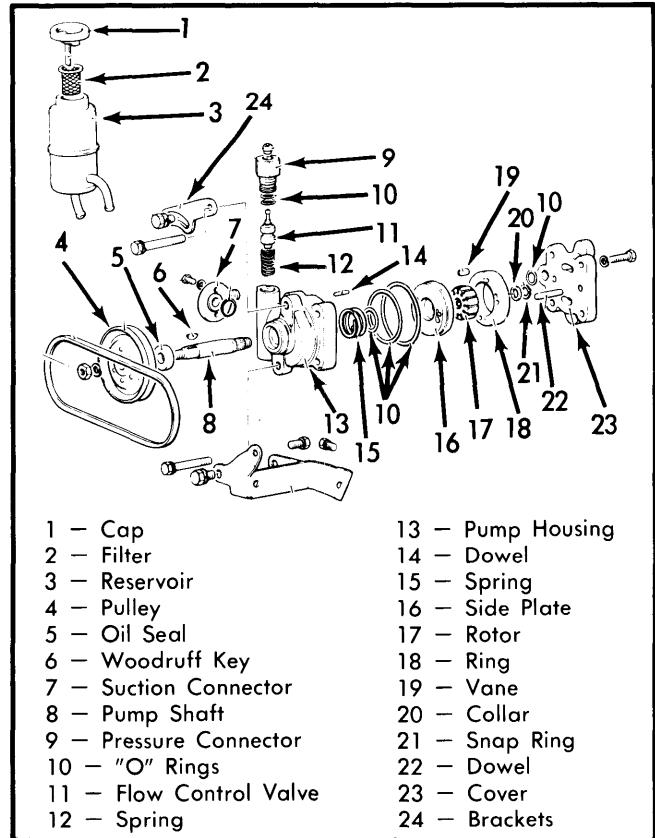
### FLUID PRESSURE TESTING

1) Remove pressure hose from oil pump and attach adapter for special pressure gauge (C3309E). Start engine and place thermometer in reservoir until fluid temperature reaches 122°F (50°C). Bleed system if necessary.

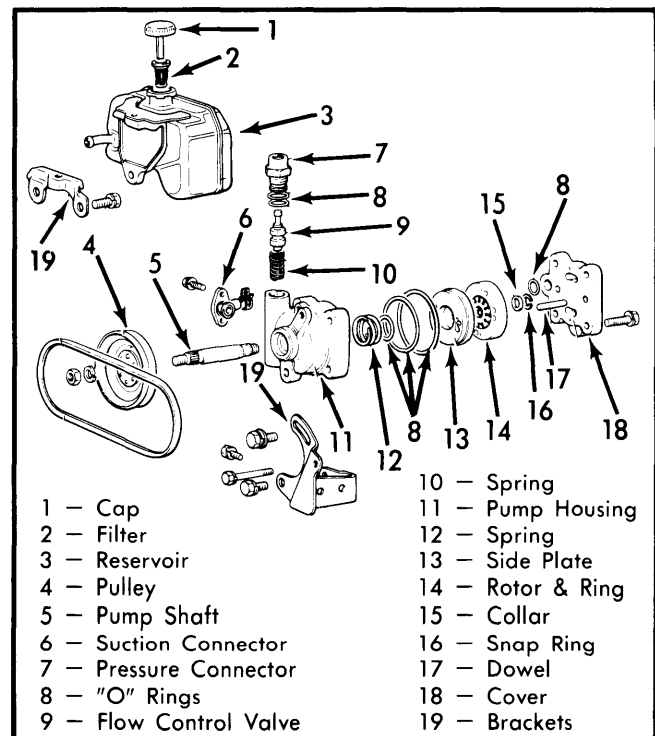
2) Start engine and let idle. Close and then fully open the shut-off valve of the pressure gauge and read fluid pressure. Valve closed pressure for the "A" type of pump should be 1066-1210 psi (75-85 kg/cm<sup>2</sup>) and 925-1066 psi (65-75 kg/cm<sup>2</sup>) for "B" and "C" type of pumps. Valve open pressure should be 142 psi (10 kg/cm<sup>2</sup>) for all pumps.



**Fig. 2 Exploded View of Power Steering Pump (Type "A")**



**Fig. 3 Exploded View of Power Steering Pump (Type "B")**



**Fig. 4 Exploded View of Power Steering Pump (Type "C")**

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3) Reinstall pressure hose, taking care not to twist it or make it interfere with adjacent parts.

**CAUTION** — Do not keep shut-off valve closed more than three seconds at a time. Do not keep steering wheel fully turned more than 10 seconds at a time.

### REMOVAL & INSTALLATION

#### POWER STEERING GEAR BOX

**Removal** — 1) Disconnect steering shaft from gear box. Disconnect tie rod from relay rod and the pitman arm from relay rod. Remove air cleaner. Disconnect the pressure and return hoses from gear box. Remove under-cover.

2) Loosen steering shaft joint bolt, kickdown linkage shield and bolts, and remove gear box downward. Remove pitman arm from gear box.

**Installation** — Install in reverse of removal procedures, noting the following: When connecting cross shaft to pitman arm, align slit of cross shaft tip to marking of pitman arm. Insure that clearance between bolt hole at bottom of gear box and pitman arm is within tolerance. Standard value is .77" (19.6 mm).

#### POWER STEERING OIL PUMP

**Removal** — On power steering pump types "B" and "C", loosen pulley nut before removing belt. On all pumps, remove pulley and belt. Disconnect pressure and suction hoses and cap openings. Remove oil pump attaching bolts and remove pump.

**Installation** — Install in reverse of removal procedures, noting the following: Check oil pump bracket for slack and tighten if necessary. Start engine after reinstallation and run at 2000 RPM for 5 minutes to check for fluid leaks.

### OVERHAUL

#### POWER STEERING GEAR BOX

**Disassembly** — 1) Loosen adjusting lock nut and remove. Remove side cover bolts and screw in the adjusting bolt 2 or 3 turns. With gear in neutral position, tap bottom of cross shaft with plastic hammer and remove.

2) Remove valve housing nut and bolts. Remove valve housing and rack piston, holding rack-piston up to avoid rotation and to prevent piston from falling.

3) Place valve housing in vise and move rack-piston up and down to check backlash between circulator balls and rack-piston gutter. Turn the rack-piston fully into the valve housing and then loosen 2 turns to measure backlash. Backlash service limit should be .008" (.2 mm) for small gear box or .004" (.1 mm) for large gear box. If backlash exceeds limit, replace ball screw unit and rack-piston as an assembly.

4) Remove rack-piston by turning counterclockwise. Do not lose circulator balls. Remove top cover and "O" ring from

valve housing. Remove input worm unit from housing. Remove circulator, circulator holder, seal ring and "O" ring from the rack-piston. Remove bearings, plates and rings from input worm unit and valve housing.

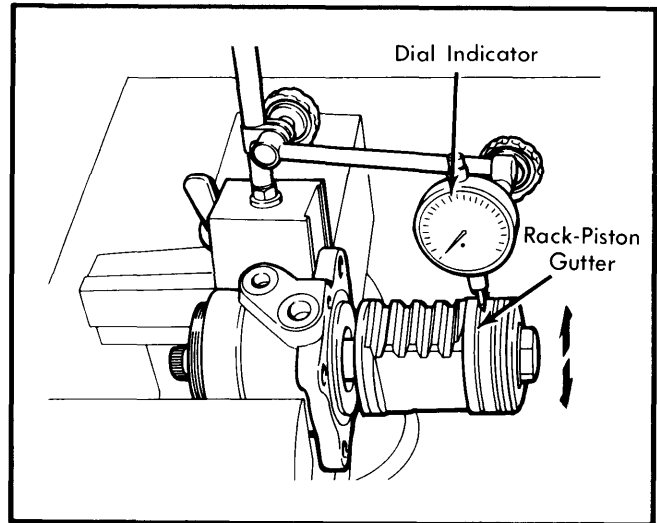


Fig. 5 Measuring Backlash of Gutter and Ball

5) Screw in adjuster bolt at tip of cross shaft and remove side cover. Remove "O" ring, bearing and adjusting plate. Do not remove bleeder plug unless necessary. Remove seal ring and "O" ring from valve housing. Remove bearing and oil seal from top cover. Remove oil seal and seal ring from gear box.

**NOTE** — Replace all "O" rings, seal rings and oil seals once they have been removed. When replacing, lubricate with power steering fluid before insertion.

**Inspection** — 1) Inspect cross shaft bearing surface for peeling or pitting. Check stepped wear of adjusting bolt shank. Inspect for damage to gear teeth on cross shaft and rack-piston.

2) Inspect for uneven wear of circulator rolling surface on rack-piston. Check for damage to balls. Inspect for peeling or pitting on thrust needle roller bearing, and bearing surface of thrust plate on worm unit. Check ball rolling surface of worm shaft for peeling and sealing surface of input shaft for damage. If thrust bearing or thrust plate is defective, replace both as a set.

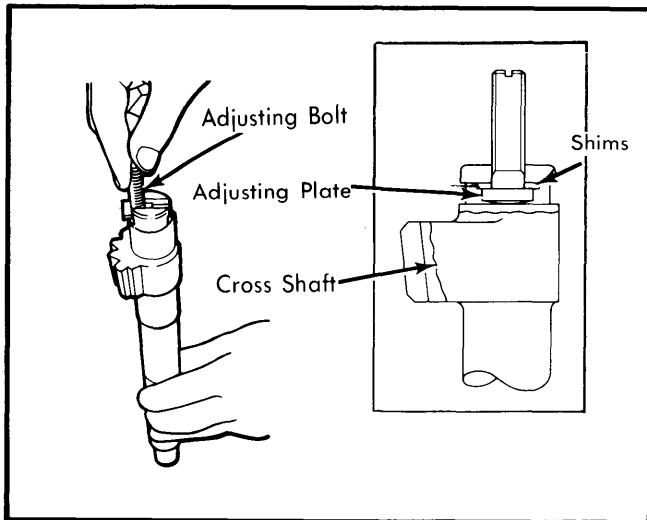
3) Inspect valve housing for damage to seal ring-to-housing contact surface. Inspect "O" ring sealing surface of seal housing, valve housing and side cover.

**Reassembly** — 1) Lubricate bearing surface of side cover and install needle roller bearings. Insert adjusting bolt and plate into the "T" slot on top of cross shaft, and set play with adjusting shims. Cross shaft play is 0-.002" (0-0.5 mm). When installing adjusting shims place chamfered edge of adjusting plate to contact surface of cross shaft. Install side cover "O" ring. See Fig. 6.

2) Align cross shaft with side cover and tighten with adjusting bolt. Tighten lock nut temporarily. Install ball bearing and oil seal in top cover. Gently insert "O" ring and seal ring into seal housing and install housing in gear box with "O" ring side

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toward the main shaft. Install oil seal back-up ring and snap ring in gear box.



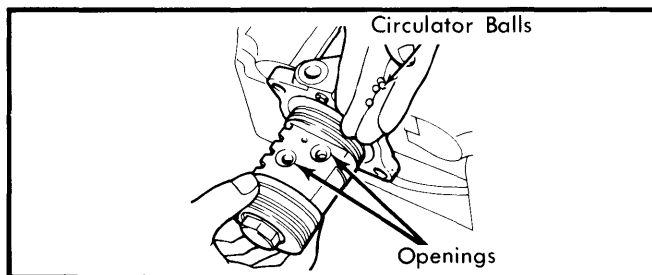
**Fig. 6 Adjusting the Cross Shaft "T" Slot**

3) Install "O" ring and seal ring to input worm shaft. Install thrust plates and needle bearings in input worm unit.

**NOTE** — Install top cover side thrust plate with smaller outside diameter first.

4) Install "O" ring and seal ring into valve housing. Fit 2 "O" rings in groove at end of valve housing. Install input worm unit in valve housing. Fit top cover "O" ring, and install top cover to valve housing. Tighten nut. Measure input worm unit preload. Torque should be 2.2-5.8 INCH lbs. (2.5-6.6 cmkg). Adjust, if necessary, by loosening valve housing nut and retightening.

5) Fit "O" ring and seal ring to rack-piston. Insert rack-piston into worm unit and turn worm unit to align ball sliding surfaces. Install 19 balls, into small gear box or 20 balls into large gear box, into rack-piston through the 2 openings.



**Fig. 7 Installing Circulator Balls to Rack-Piston**

**NOTE** — Do not move rack-piston when installing balls, as balls may fall into wrong groove.

6) After installing specified number of balls, measure distance from rack-piston to the ball. If distance is more than .5" (13 mm) on small gear box or .08" (2 mm) on large gear box, this

indicates a ball has fallen into wrong groove. Remove balls then reinstall them, being sure all balls are installed correctly. Insert remaining 7 balls (on small gear box) or 6 balls (on large gear box) and install circulator holder.

7) Install rack-piston of the ball screw unit assembly to gear box and tighten. Install seal ring of rack-piston and place rack-piston in neutral (center) position. Install cross shaft and side cover and tighten.

8) Measure starting torque of input shaft and adjust to 4.3-7.8 INCH lbs. (5.1-9.2 cmkg) on large gear box or to 3.5-7.0 INCH lbs. (4.1-8.2 cmkg) on small gear box. Tighten valve housing nut. Measure preload after tightening. Connect cross shaft with pitman arm.

### POWER STEERING PUMP

**Disassembly (Pump Type "A")** — 1) Remove pulley bracket with puller then remove suction connector. Remove pressure connector. Remove retaining ring using small punch inserted in hole of pump housing, opposite flow control valve hole, and then pry out ring with screwdriver.

2) Remove end plate and "O" ring. Remove flow control valve and spring. Tap on pump shaft with plastic hammer just enough to loosen pressure plate. Remove pressure plate, pump shaft, ring, vanes and rotor.

**Inspection** — Check flow control valve, rotor and ring, end plates and pump shaft for damage, scoring or excessive wear. Inspect pump housing for cracks or signs of visual damage. Check "O" ring seats for scratches or burrs. Inspect pump shaft bushing, in pump housing. If bushing is damaged, replace pump housing. Replace any parts necessary. If any internal pump parts are found to be damaged, flush steering gear or disassemble and clean gear.

**NOTE** — Lubricate "O" rings and all internal pump components with ATF Dexron II fluid before reassembly.

**Reassembly** — 1) Install new pump shaft seal in pump housing. Install new pressure plate "O" ring to 3rd groove from end of pump housing. Insert both dowel pins into pump housing. Install thrust plate and rotor to pump shaft, then install new snap ring to pump shaft. Make sure rotor is installed with counter-sunk side toward thrust plate.

2) Install pump shaft into pump housing, making sure thrust plate slides over dowel pins properly. Install ring into pump housing, over dowel pins and with arrow (on ring) toward rear of pump housing. Install vanes in rotor and make sure rounded edge of vanes face outward.

3) Install pressure plate into pump housing and over dowel pins. Make sure circular depression (for spring) is toward rear of housing. Install new "O" ring in 2nd groove from rear of pump housing. Place spring on pressure plate, then install end plate to pump housing. Depress end plate just enough to install retaining ring. Make sure retaining ring seats properly.

**Disassembly (Pump Types "B" & "C")** — 1) Remove Woodruff key from pump shaft on pump type "B" or the reservoir from pump type "C". On both types of pumps, place pump housing in vise, loosen and remove pump cover. Remove snap

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ring, then take out following parts from pump body: collar, ring, rotor, vanes, "O" rings, dowel, side plate and side plate spring.

**2)** Measure clearance between shaft and pump body. If clearance is more than .0035" (.09 mm), replace pump body as an assembly. Remove pump shaft by tapping it with a plastic hammer. Remove oil seal and suction connector. Remove pressure connector, flow control valve, spring and "O" rings.

**Inspection - 1)** Inspect pump shaft oil seal lip and bushing end for damage. Inspect groove of rotor vane and cam surface for stepped wear. Check vane for damage and ring and rotor sides for grooving. Replace entire assembly if any damage is seen.

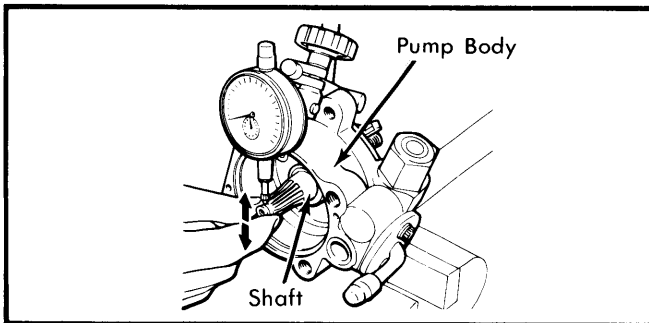
**2)** Inspect side plate and pump cover for grooving. Check side plate spring. Minimum length should be .61" (15.5 mm) for

pump type "B" or .67" (17 mm) for pump type "C". Check flow control spring. Minimum length should be 1.95" (49.5 mm) for both types of pumps. Check sliding surfaces and ports of flow control valve for obstructions.

**Reassembly - 1)** Install flow control spring, valve, "O" ring and pressure connector to pump housing. Install oil seal to pump housing. Install pump shaft to pump housing, being careful not to damage oil seal.

**2)** Install following parts to pump shaft: side plate, rotor and collar. Tighten pulley attaching nut temporarily, hold snap ring on pump shaft with snap ring pliers. Push rotor and collar upward until collar seats over snap ring.

**3)** Install "O" ring, side plate spring, ring, and shaft assembly to pump housing. Make sure side of ring with small diameter bores face side plate. Install vanes with rounded edge out to ring. Install "O" ring and cover. Install reservoir on pump type "C". Install Woodruff key to pump shaft on pump type "B".



**Fig. 8 Measuring Clearance Between Shaft and Pump Body**

### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Gear Box-to-Frame .....	40-47 (5.5-6.5)
Oil Pump Cover .....	22-29 (3.0-4.0)
Pitman Arm-to-Cross Shaft .....	94-109 (13.0-15.1)
Pressure Connector .....	51-72 (7.1-10.0)
Side Cover .....	33-40 (4.6-5.5)
Valve Housing .....	33-40 (4.6-5.5)
Valve Housing Nut .....	130-166 (18.0-23.0)