CHRYSLER CORP. IMPORTS POWER-ASSISTED RECIRCULATING BALL

Challenger
Colt Wagon
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.

POWER STEERING PUMP

The power steering pump is a constant displacement vane type. The pump has a rotor with 12 radial vanes and is belt driven by the crankshaft.

LUBRICATION

Capacity – 1.10 qts.

Type – ATF Type Dexron

ADJUSTMENTS

BELT TENSION ADJUSTMENT

With 22 lbs. (10 kg) pressure applied, belt deflection at center of belt should be .28-.39" (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.

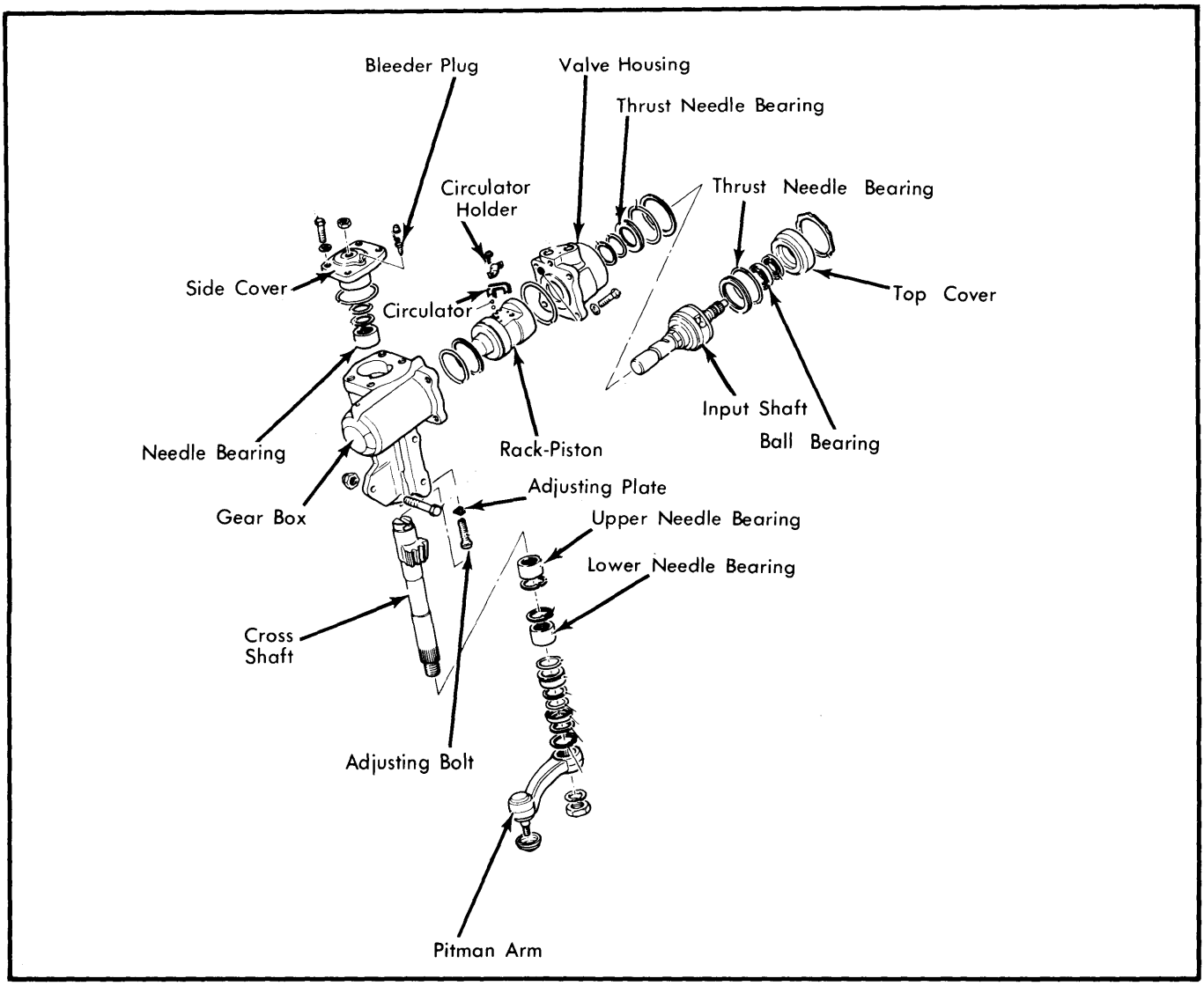

Fig. 1 Power Steering Gear Box Exploded View

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FLUID REPLACEMENT

1) Disconnect suction hose at reservoir and drain fluid. Crank engine several times, but do not start. Disconnect pressure hose at pump and drain fluid.

2) Raise front of vehicle and turn steering wheel from lock to lock to drain gear box. Connect hoses to pump and reservoir and fill with fluid. Bleed system.

AIR BLEEDING

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

1) Raise front of vehicle. Turn steering wheel lock to lock until no air bubbles appear in reservoir fluid.

2) Lower vehicle and turn the wheel lock to lock several times while engine is idling. Attach 1'6" long tube to bleeder screw of gear box. Place other end of tube in container to drain.

3) Start engine, set to idle. Turn steering wheel fully to right and loosen bleeder screw. Continue loosening until no air bubbles come out of drain tube. Tighten bleeder screw to specifications. Check fluid level and replace as necessary.

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 (MB990662). Start engine and place thermometer in reservoir until fluid temperature reaches 122°F. 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. Pressure with valve closed should be 925 to 1067 psi. With valve open pressure should be 142 psi.

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.

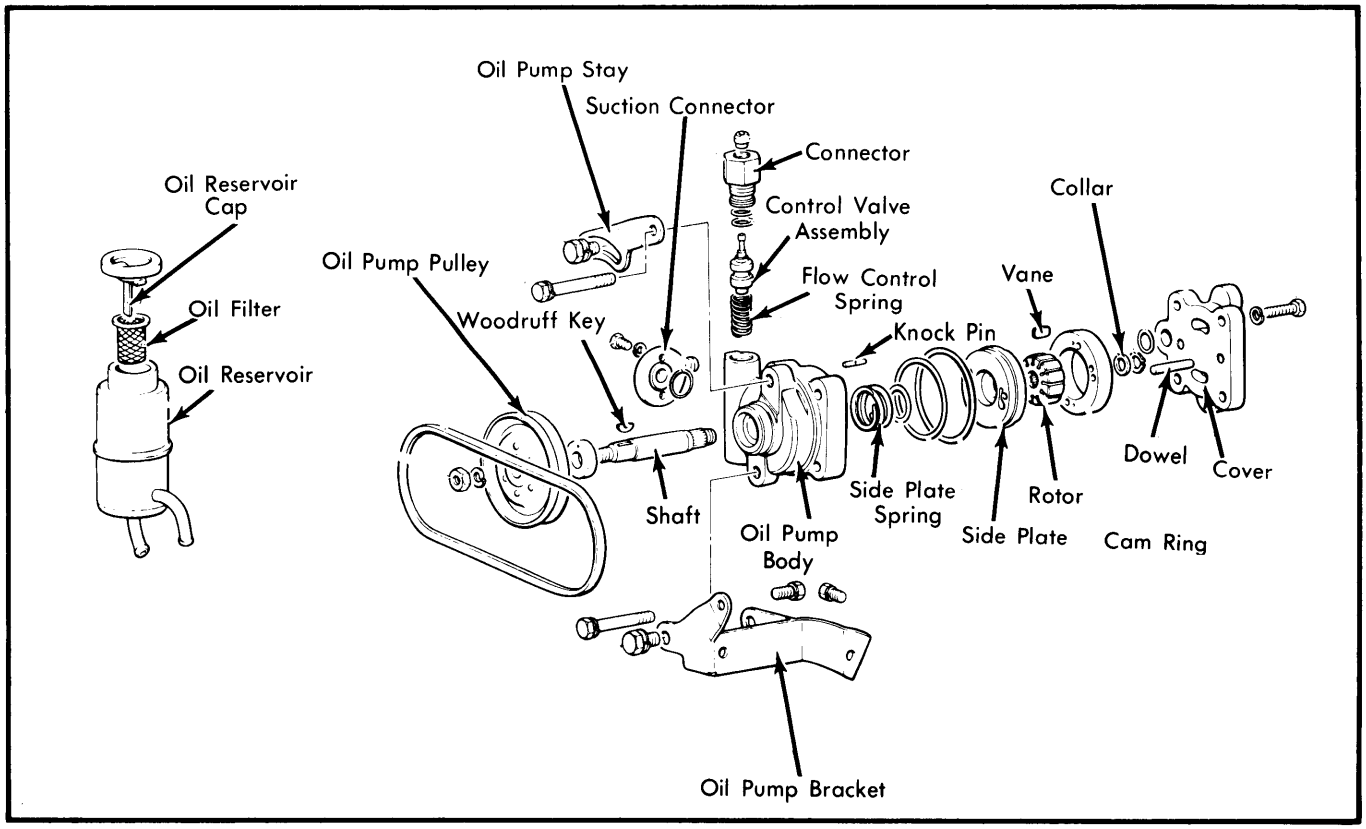

Fig. 2 Oil Pump Exploded View

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Installation – 1) 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" +.16" or –.04"

POWER STEERING OIL PUMP

Removal – Loosen pulley nut before removing belt. 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 two turns to measure backlash. Backlash service limit is .0039" (.10 mm). If backlash exceeds limit replace ball screw unit and rack-piston as an assembly.

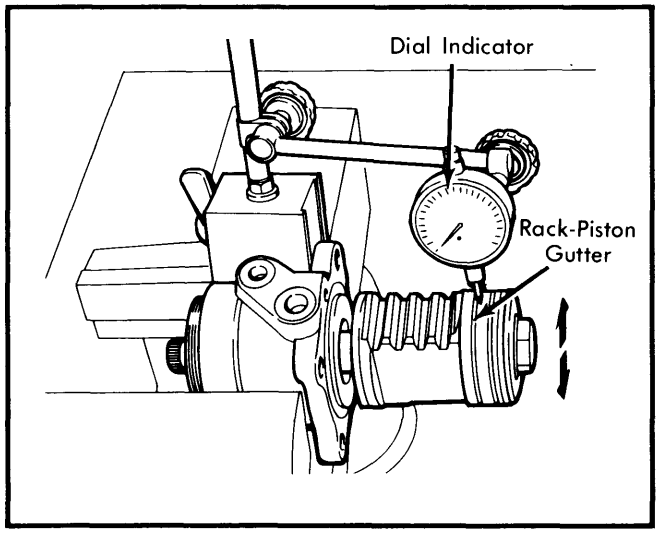

Fig. 3 Measuring Backlash of Gutter and Ball

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.

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.

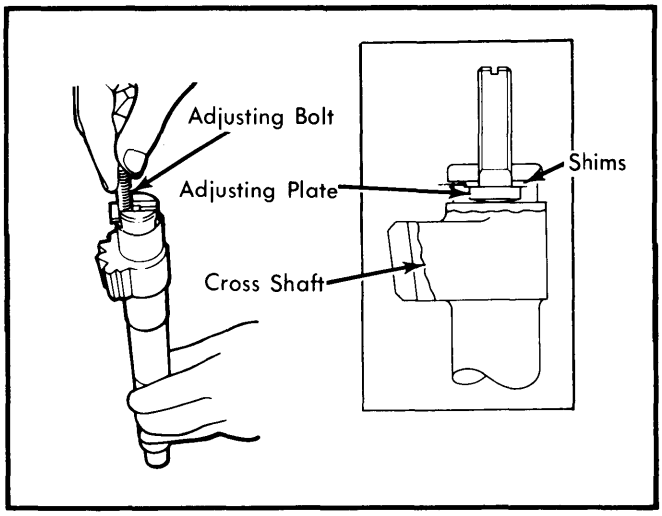

Fig. 4 Adjusting the Cross Shaft "T" Slot

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

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.*

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4) Install "O" ring and seal ring into valve housing. Fit two "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. Measure input worm unit preload. Torque is 3.5-6.9 INCH lbs. Adjust if necessary, by loosening valve housing nut.

5) Fit "O" ring and seal ring to rack-piston. Insert rack -piston into worm shaft and turn worm unit to align ball sliding surfaces. Install 20 circulator balls into rack-piston through the two openings.

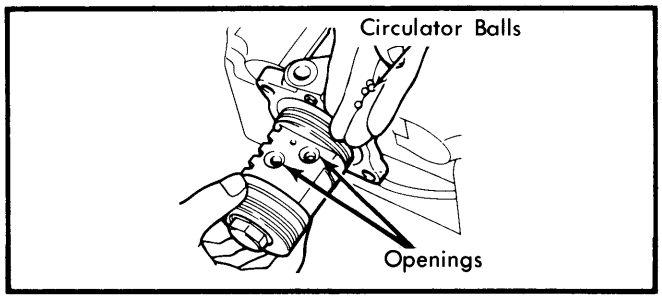

Fig. 5 Installing the Circulator Balls

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

6) After installing 20 balls measure distance from rack -piston to the ball. If distance is more than .08" (2 mm), remove rack - piston and reinstall balls. Insert remaining 8 balls and install circulator holder. 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.

7) Measure starting torque of input shaft and adjust to 5.2-8.7 INCH lbs. Tighten valve housing nut. Measure preload after tightening. Connect cross shaft with pitman arm.

POWER STEERING OIL PUMP

Disassembly – 1) Remove woodruff key from shaft. With pump anchored in vise, remove cover and snap ring. Take out the following parts from the pump body: collar, cam ring, rotor, vane, "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 shaft by tapping it with a plastic hammer. Remove "O" ring, oil seal and suction connector. Remove flow control spring, control valve assembly and "O" ring.

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 cam 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 and flow control spring for sagging. Check sliding surfaces and ports of flow control valve for obstruction.

Reassembly – 1) Install flow control spring and control valve assembly to pump body and tighten connector. Install oil seal

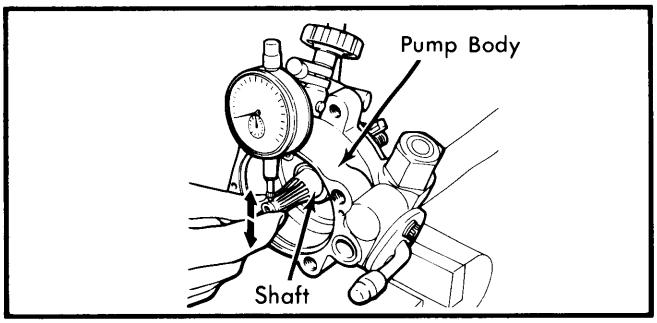

Fig. 6 Measuring Clearance Between Shaft and Pump Body

into pump body. Insert shaft into pump body and install the following parts into pump body: "O" rings (2), side plate spring, side plate, dowel, cam ring, rotor and 12 vanes.

NOTE – *When installing cam ring, direct arrowhead on outer surface toward side plate. Place chamfered face of rotor toward side plate. Vanes must be positioned so that round tip is toward sliding surface of cam ring.*

2) Install collar and snap ring with chamfered edge to rotor. Check that clearance between pump shaft and body does not exceed .0035" (.09 mm). Install "O" ring to pump body and tighten cover. Install "O" ring and suction connector. Install woodruff key in shaft.

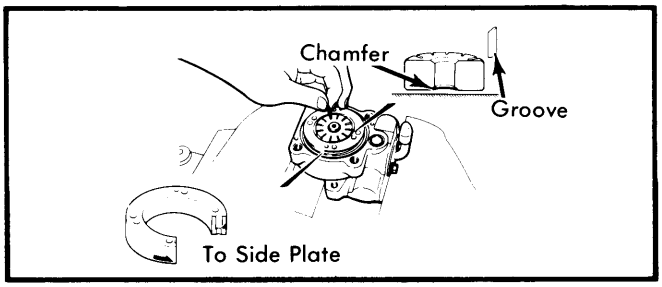

Fig. 7 Distinction of Cam Ring and Rotor

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Gear Box to Frame	40-47 (5.5-6.5)
Pitman Arm to Cross Shaft	94-109 (13-15)
Bleeder Screw	4.3-6.5 (.59-.89)
Oil Pump Bracket to Housing Bolt	20-30 (2.7-4.1)
Oil Pump Bracket to Cylinder Block Bolts	10-15 (1.3-2)
Oil Pump Brace to Oil Pump Housing	20-30 (2.7-4.1)
Oil Pump Brace to Cylinder Block Bolts	10-15 (1.3-2)
Oil Pump Pulley to Shaft	12-15 (1.6-2)
Return Pressure Hose	29-36 (3.9-4.9)
Input Pressure Hose	36-43 (4.9-5.9)
Oil Pump Cover	22-29 (3-4)
Tie Rod to Relay Rod	29-36 (3.9-4.9)
Valve Housing	33-40 (4.5-5.5)
Side Cover	33-40 (4.5-5.5)
Valve Housing Nut	130-166 (17.9-22.9)
Flow Control Connector	51-72 (7-9.9)
Suction Connector	4-7 (.55-.96)
Input Worm Unit Preload	3.5-6.9 (.48-.96)