

STEERING SYSTEM - POWER

1986 Isuzu Trooper II

1986 STEERING
Isuzu - Power-Assisted Recirculating Ball
P'UP, Trooper II

DESCRIPTION

The power assisted recirculating ball steering system consists of the power steering gear assembly, hydraulic pump and hydraulic lines.

The power steering gear is an integral-type. It consists of the conventional ball/screw-type steering gear combined with a rotary and torsion bar-type control valve and power cylinder.

The oil pump is a constant delivery vane-type and is belt driven. The pump and gear assemblies are connected by hoses.

LUBRICATION

CAPACITY

1.1 qts. (1L).

FLUID TYPE

ATF Dexron.

FLUID LEVEL CHECK

1) Raise and support front end of vehicle. Fill fluid reservoir. With engine off, turn steering wheel lock-to-lock several times. Recheck fluid level. Refill fluid if necessary.

2) With engine at idle, turn steering wheel lock-to-lock several times. Recheck fluid level. Add fluid (if necessary). Lower vehicle. Turn steering wheel lock-to-lock with engine at idle.

NOTE: Avoid holding steering wheel at full lock position for more than 10 seconds or fluid temperature will increase sharply.

3) With steering wheel in straight-ahead position and engine off, look for fluid rising in reservoir. If fluid rises, air is trapped in system. Repeat bleeding procedure in step 2). Check fluid in reservoir. Check for leakage.

ADJUSTMENTS

BELT

The power steering belt is adjusted by rotating the pump body on mounting bolts. Deflection should be .40" (1 mm). See Fig. 1.

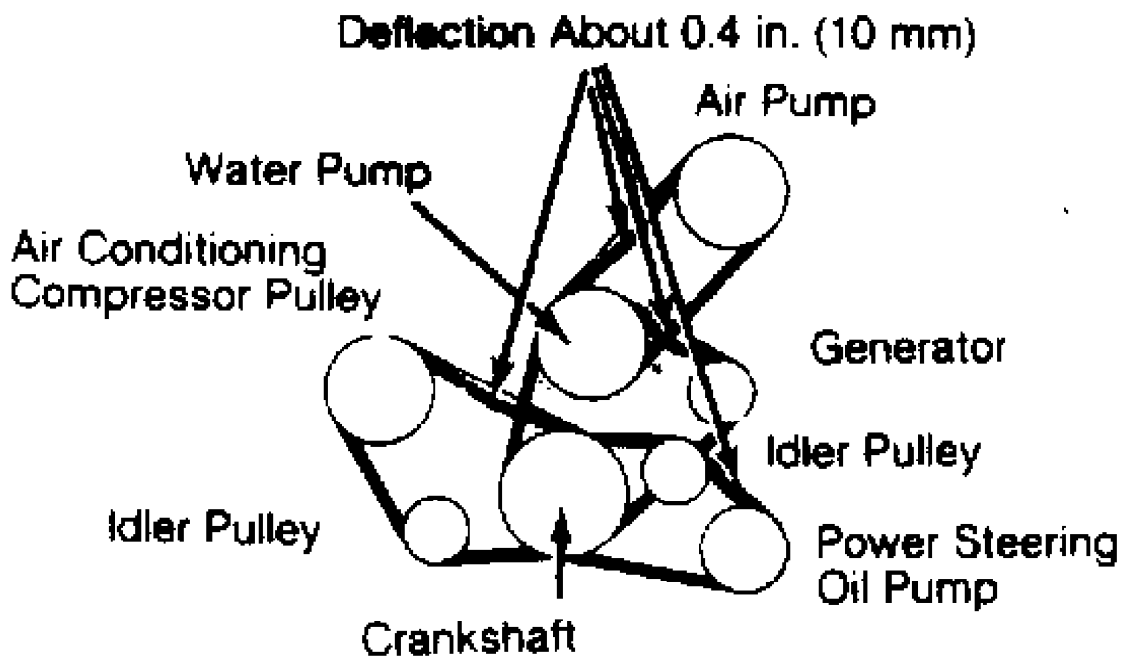
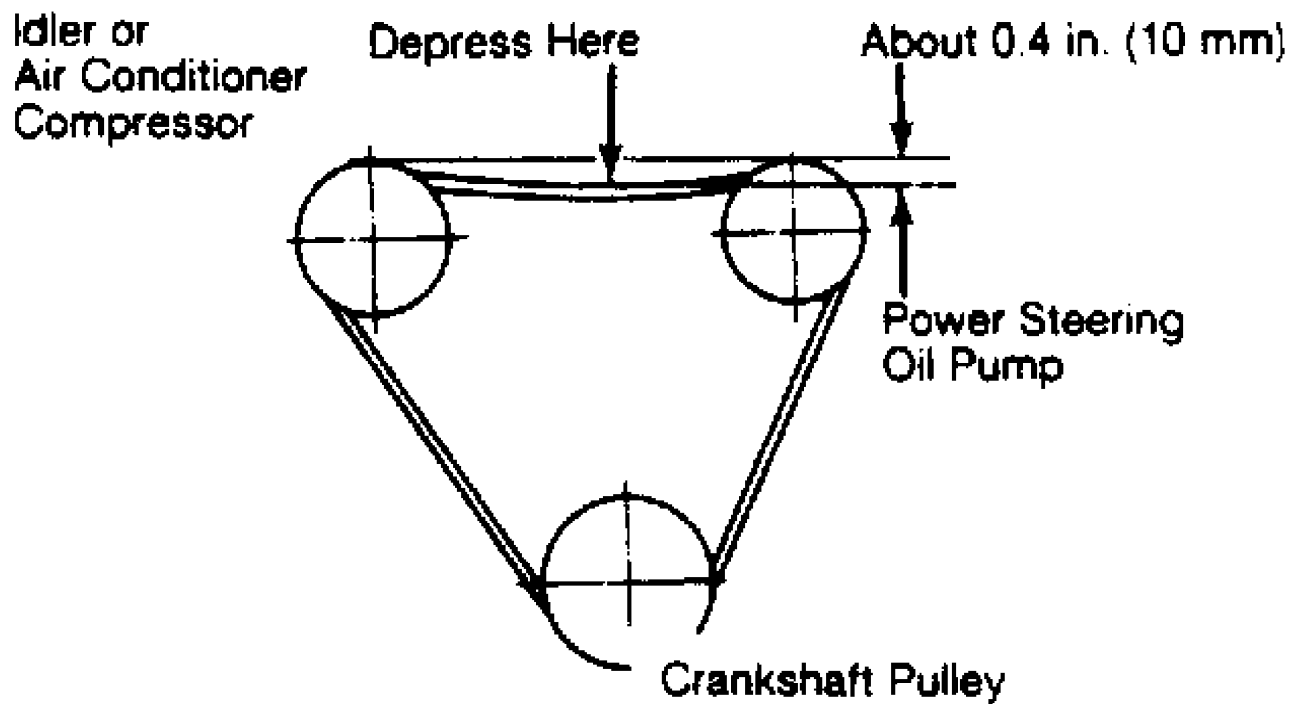


Fig. 1: Checking Power Steering Pump Belt Adjustment
Measure deflection at locations indicated.
Courtesy of Isuzu Motor Co.

NOTE: Sector gear backlash adjustment is part of steering gear reassembly procedure.

TESTING

HYDRAULIC SYSTEM TESTING

1) With engine off, disconnect pressure hose from pump. Using an extra hose, install Gauge (J-29877) and shut-off valve in hose. If using another pressure gauge, gauge capacity should exceed 1250 psi (88 kg/cm²). Pressure gauge must be connected between valve and pump.

2) Bleed system by holding gauge beneath fluid reservoir with shut-off valve open. With engine idling, check fluid level in reservoir. Refill (if necessary). Turn steering wheel from lock-to-lock several times until fluid has reached a temperature of 122°-140° F (50°-60° C).

3) With engine running at 1500 RPM and with valve closed, fluid pressure must be between 1085-1210 psi (77-85 kg/cm²). If not, oil pump is malfunctioning.

NOTE: DO NOT leave shut-off valve fully closed more than 15 seconds or pump may be damaged internally.

4) If pressure is to specification, open valve fully to test steering gear assembly. With engine running, turn steering gear lock-to-lock. Note oil pressure. If steering gear assembly is okay, pressure will be between 1085-1210 psi (77-85 kg/cm²). If not, steering gear may require repair.

NOTE: Avoid holding steering wheel at lock position more than 5 seconds or fluid temperature will increase sharply.

REMOVAL & INSTALLATION

POWER STEERING PUMP

Removal

1) Disconnect hoses at pump. Secure ends of hoses to prevent drainage of oil. Cap hoses to prevent contamination. Cap pump fittings to prevent contamination.

2) On gasoline models, remove stone shield. Loosen bracket-to-pump mounting bolts. Remove pump belts. Remove brackets from pump. Remove pump.

Installation

To install pump, reverse removal procedure. Adjust belts as described under ADJUSTMENTS. Refill with fluid. Bleed system. Check for leaks.

POWER STEERING GEAR

Removal

1) Clean external surfaces of steering gear. Raise and support vehicle. On diesel models, remove intake air silencer and duct. Disconnect hoses at steering gear. Secure hoses to prevent drainage of fluid. Cap hoses to prevent contamination. Install plugs on gear fittings to prevent contamination.

NOTE: Before removing steering shaft coupler from stub shaft on gear assembly, mark location of coupler to shaft.

2) Remove universal joint pinch bolt. Remove 2 steering column-to-instrument panel bolts. Disconnect universal joint from stub shaft by pulling column and shaft approximately 2.0" (50 mm) in toward cab.

3) Remove pitman arm nut and washer. Using Puller (J-29107), remove pitman arm from shaft. Remove engine stone shield. Remove steering gear-to-frame attaching bolts. Remove gear assembly from vehicle.

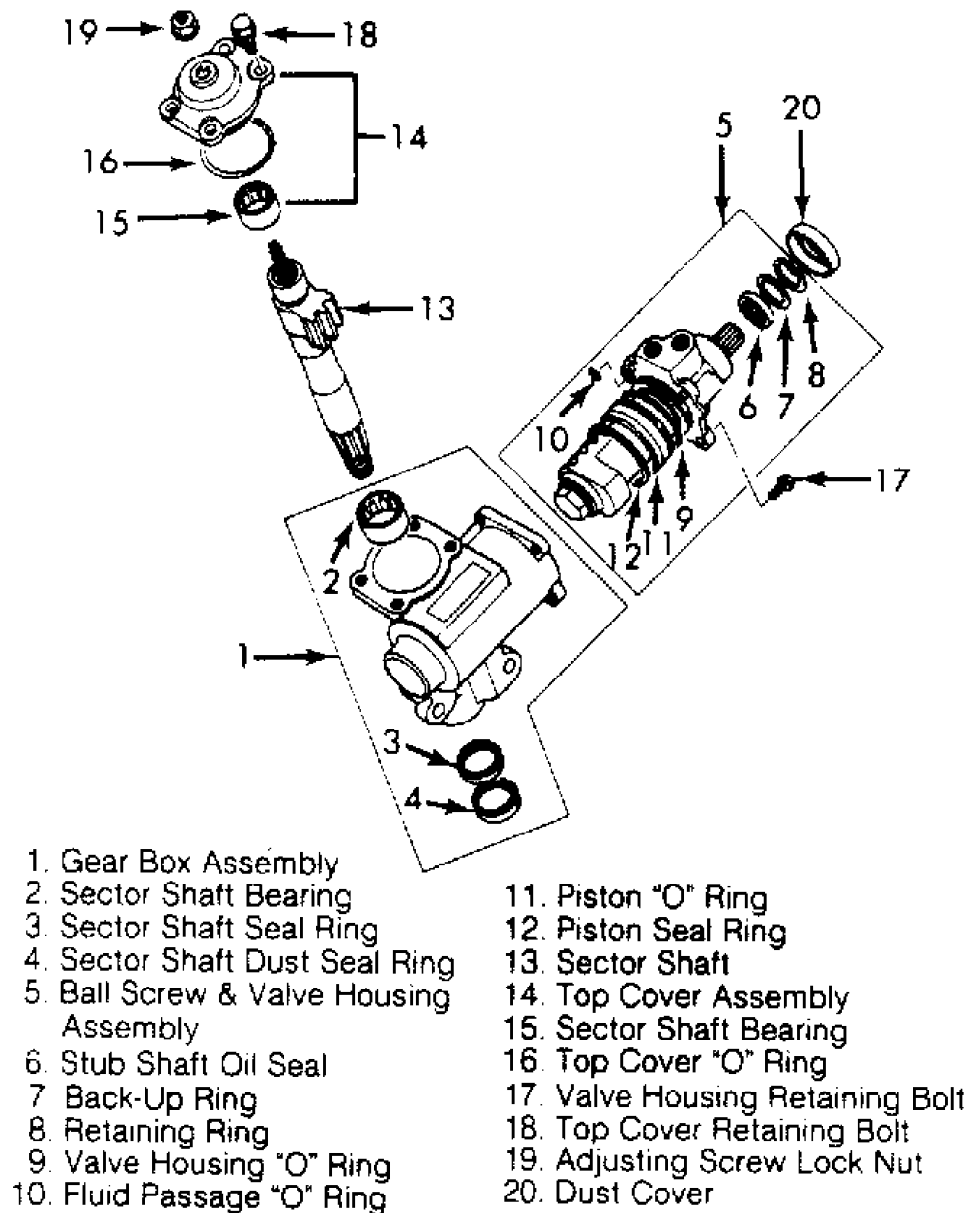


Fig. 2: Exploded View of Power Steering Gear Assembly
Courtesy of Isuzu Motor Co.

Installation

To install steering gear, reverse removal procedure. Replace

locking nuts and bolts. Tighten to specification. Refill system with fluid. Bleed system. Check for leaks.

OVERHAUL

POWER STEERING GEAR

NOTE: Avoid clamping steering gear in vise by power cylinder portion. Internal damage to cylinder may result.

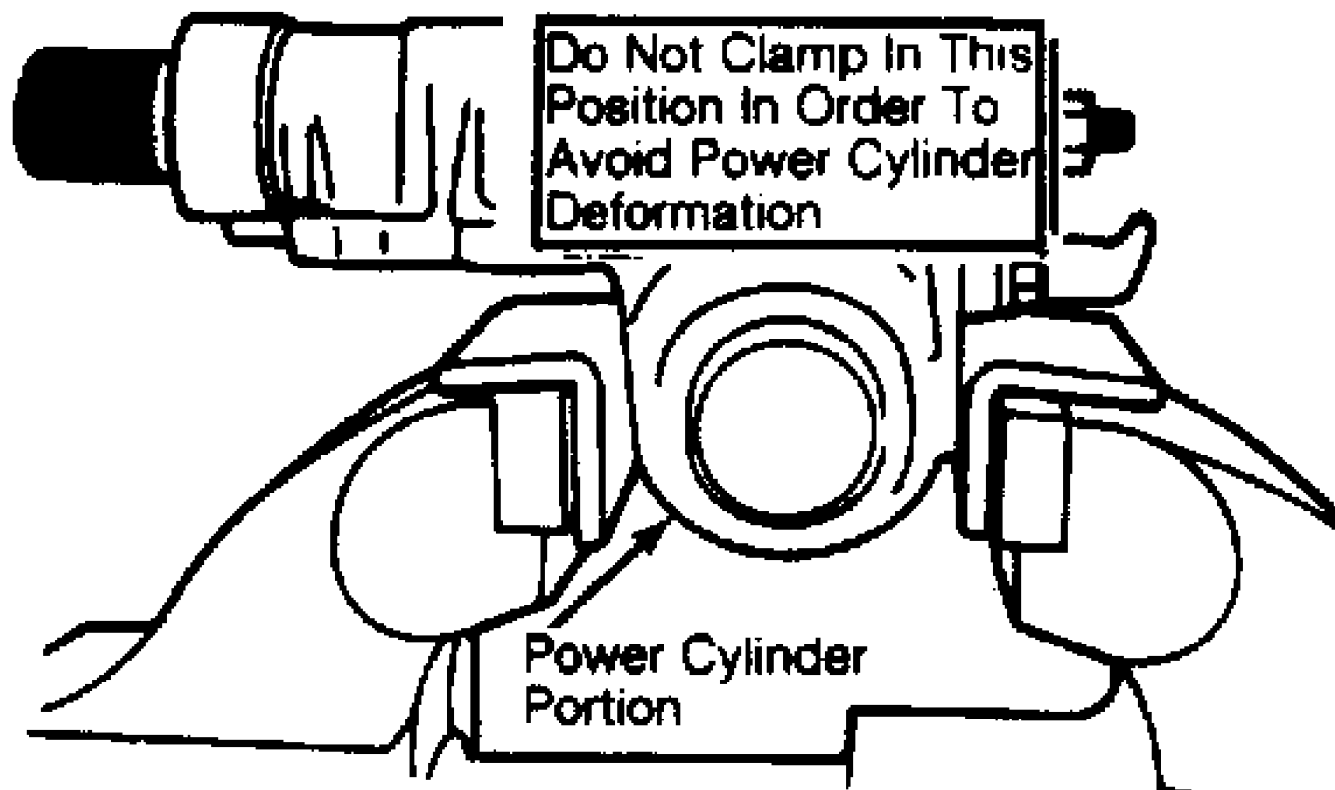


Fig. 3: Incorrect Clamping of Power Steering Gear Assembly
Gear assembly must be clamped by the sector shaft portion to prevent damage. Courtesy of Isuzu Motor Co.

Disassembly

1) Mount steering gear assembly in vise. See Fig. 3. Remove dust cover from stub shaft. Ensure clean faces of stub shaft extend outward. Remove retaining ring and back-up ring.

2) Remove stub shaft seal by plugging hose fitting on inlet side. Remove seal by applying compressed air through hole in outlet side. Remove adjusting screw lock nut.

3) Turn adjusting screw counterclockwise to remove the preload between sector gear and rack piston. Remove top cover bolts. Hold top cover stationary. Turn adjusting screw clockwise to raise and free cover. Remove cover. Ensure clean faces of sector shaft extend outward.

4) Rotate stub shaft into straight-ahead position. Remove sector shaft from gear assembly. See Fig. 4. Hold sector shaft in straight-ahead position when removing it from gear assembly.

CAUTION: DO NOT drive sector shaft out with hammer or other impact tool.

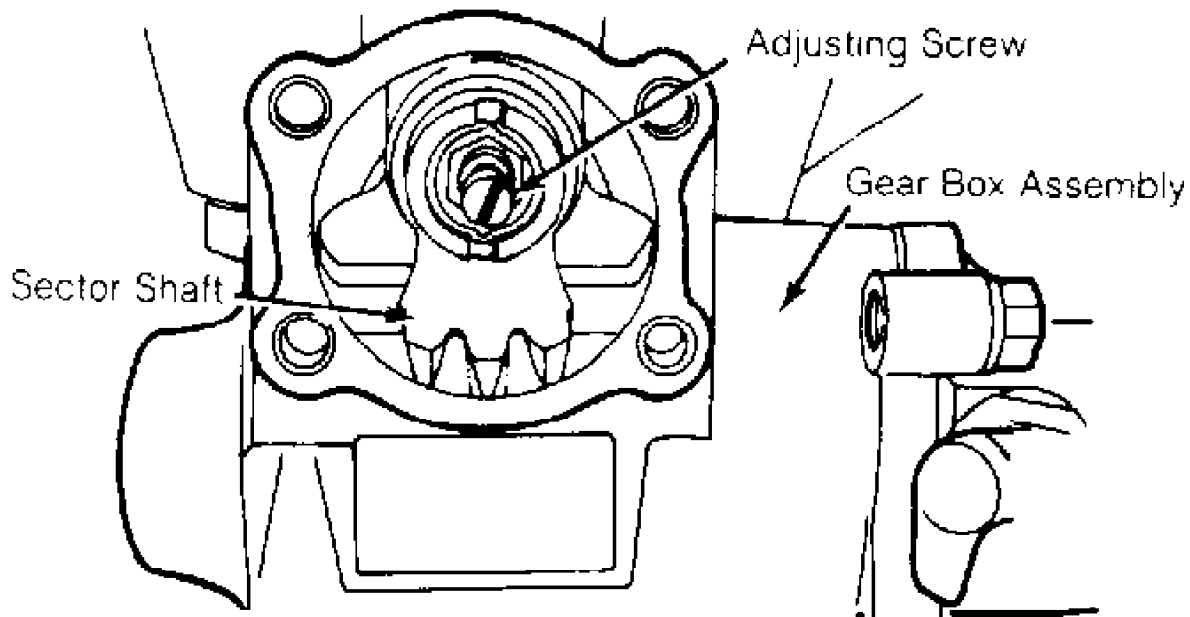


Fig. 4: Removing Sector Shaft
Courtesy of Isuzu Motor Co.

NOTE: Always keep ball screw and valve housing assembly in a horizontal position. If held vertically, rack piston will fall off onto the end of worm, slip out, and balls will separate.

5) Remove 4 bolts retaining valve housing to gear box.
Remove ball screw and valve housing assembly from gear assembly.

6) Remove valve housing "O" rings, piston seal ring with "O" ring and top cover "O" ring. Using a wire, remove sector shaft seals. Discard "O" rings.

Inspection

Wash all parts in solvent. Check gear assembly parts for wear, chipping or other damage. If any internal parts are damaged, entire ball screw and valve housing parts should be replaced as an assembly. Oil seal, hose fitting and dust cover may be replaced individually.

Reassembly

1) If sector shaft bearing was removed, install new bearing into top cover and gear housing. Install sector shaft seal ring and dust seal ring in gear housing. Apply a thin coat of grease to lip of seals and rack piston "O" ring.

NOTE: Install bearing flush with recessed face of housing and with name on bearing facing out.

2) Install "O" ring on rack piston carefully to prevent twisting. Install seal ring to rack piston over "O" ring by expanding it. See Fig. 5. Apply a coat of grease to entire circumference of seal ring.

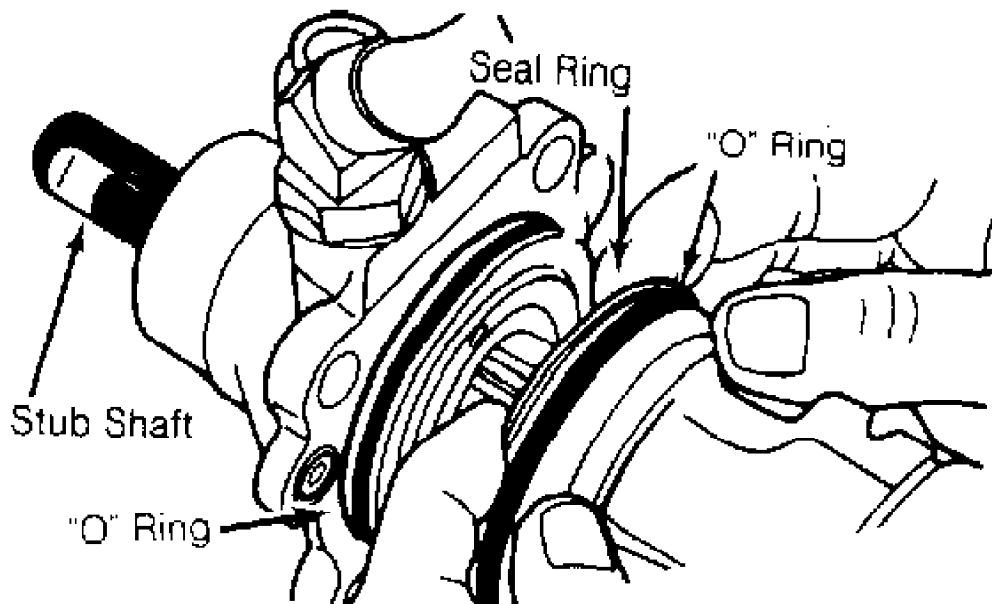


Fig. 5: Installing Rack Piston Seals
Courtesy of Isuzu Motor Co.

3) Apply a thin coat of grease to valve housing "O" ring and top cover "O" ring. Install "O" rings in grooves carefully to prevent twisting. Insert ball screw and housing assembly into gear assembly, while keeping it horizontal. Install valve housing retaining bolts.

4) Install new stub shaft oil seal into valve housing. Using Seal Driver (J-26508), install back-up ring, retaining ring and dust cover in reverse order of disassembly. Back-up ring and retaining ring should be installed so that the faces with rounded outer circumferences are turned toward oil seal.

5) If hose was removed, install hose fitting to valve housing with a new "O" ring. Tape sector shaft spline to protect seal rings. Install sector shaft while aligning sector and rack in the straight-ahead position. See Fig. 4.

6) Thread adjusting screw into top cover. Turn adjusting screw counterclockwise until the top cover contacts gear housing. Continue for 2 more turns. Install cover bolts.

7) Check if sector and rack are installed properly by turning the stub shaft lock-to-lock. Sector and rack are installed properly if stub shaft turns more than 4 turns.

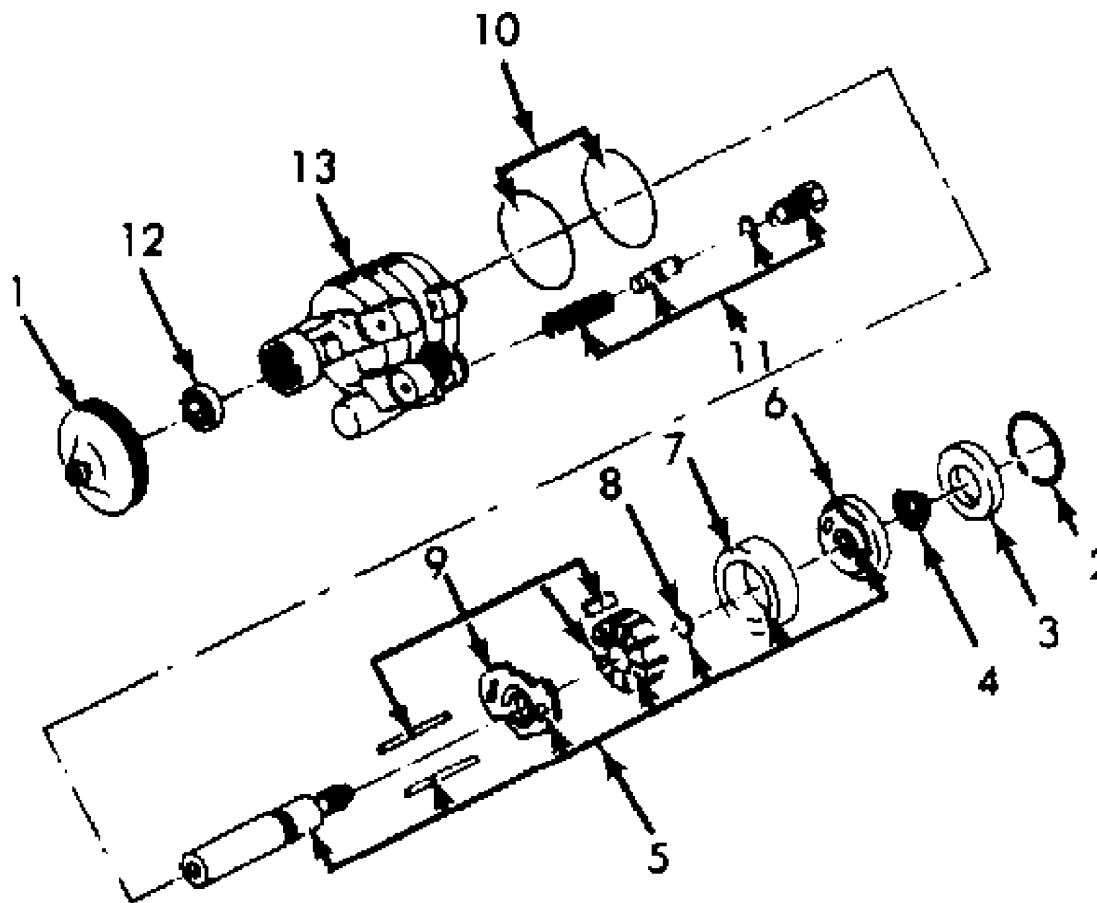
8) Adjust backlash between rack piston and sector by placing relative parts in a straight-ahead position and rotating stub shaft with a torque wrench and socket. Starting torque should be between 62-94 INCH lbs. (.6-.9 N.m). If not, adjust by turning adjusting screw. To decrease backlash, turn clockwise. Install new lock nut.

POWER STEERING PUMP

Disassembly

Remove pulley, end plate retaining ring, end plate, pressure plate spring, pump cartridge and shaft. Remove pressure plate, cam, retaining ring, rotor, vane thrust plate and dowel pins. Remove "O"

rings, control valve assembly, oil seal and pump housing. See Fig. 6.



1. Pulley
2. End Plate Retaining Ring
3. End Plate
4. Pressure Plate Ring
5. Pump Cartridge & Shaft
6. Pressure Plate
7. Cam
8. Retaining Ring
9. Rotor, Vane, Thrust Plate & Dowel Pins
10. "O" Rings
11. Control Valve Assembly
12. Oil Seal
13. Pump Housing

41890

Fig. 6: Exploded View of Power Steering Pump
Courtesy of Isuzu Motor Co.

Inspection

- 1) Check that groove in rotor is free from excessive wear

and that vane slides smoothly. Check that sliding faces of vanes are free from wear. Check that inner face of cam has a trace of uniform contact.

2) Pump cartridge should be replaced as an entire assembly (if necessary). Check pressure plate and thrust plate sliding surfaces for ridges. Parts may be reused after lapping face.

3) Check that sliding face of valve is free of burrs and damage. Parts with minor scores may be reused after polishing with emery cloth (No. 800 or finer). Needle bearing face must be free from abrasions and wear.

Reassembly

To reassemble, reverse disassembly procedure. Install new seals. Install pulley with a press.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Pitman Arm-to-Intermediate	
Linkage Attaching Nut	39-47 (53-64)
Pitman Arm-to-Steering	
Gear Attaching Nut	145-174 (197-236)
Pump Front-to-Rear Body Bolts	36-43 (49-58)
Steering Damper Attaching Nut	39-47 (53-64)
Steering Gear Mounting Bolt	29-36 (39-49)
Steering Housing Cover Bolt	29-40 (39-54)
Tie Rod End-to-Spindle Nut	39-47 (53-64)
Tie Rod-to-Tie Rod End Lock Nut	80-90 (109-122)
Valve Housing Retaining Bolt	29-40 (39-54)