

JAGUAR POWER-ASSISTED RACK & PINION

XJ6
XJ12
XJS

DESCRIPTION

Vehicles are equipped with a power assisted rack and pinion type steering system. The system consists of two main components: the rack and pinion steering gear and the power assist pump. The two components are connected by flexible fluid lines. The power assist pump and fluid reservoir are combined.

TESTING

Control Valve & Pinion – 1) Connect a 100 psi (7 kg/cm²) pressure gage into the pump return line, start engine and allow to idle. Pressure reading should be approximately 40 psi (2.8 kg/cm²). Turn steering gear left and right a small amount.

CAUTION – Gauge will be damaged if steering gear is turned excessively. Pressure increase, as wheel is turned, should register an equal amount on either side of center.

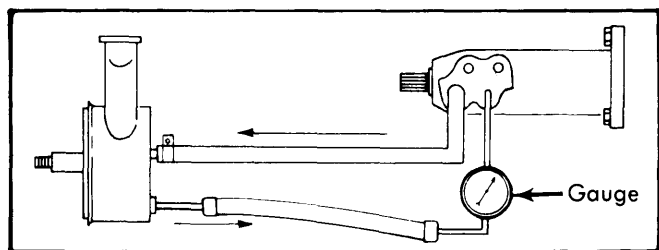


Fig. 1 Pressure Gauge Connection

2) Stop and restart engine and check that steering does not kick to one side.

Hydraulic System – 1) Connect a 1500 psi (100 kg/cm²) pressure gauge into the pump pressure line, start engine and allow to idle.

2) Turn steering to full lock and exert pressure on steering gear until gauge pressure ceases to rise. Pressure should be between 1100 psi (77.5 kg/cm²) and 1200 psi (84.4 kg/cm²).

NOTE – If pressure is below 1100 psi (77.5 kg/cm²) at idle, but rises with engine speed increase, the problem is either a defective pump control valve or internal leakage in rack and pinion. The following test will determine the location.

3) Connect a suitable tap (JD. 10-2) between pump and pressure gauge, isolating rack from pump (See Fig. 2)

4) Open tap, start engine and allow to idle. Turn steering gear to full lock and check that gauge exceeds 1100 psi (77.5 kg/cm²). If pressure is below this figure, CLOSE TAP AT ONCE, and note reading when tap reaches OFF position.

CAUTION – Tap must not be held closed for more than 5 seconds when engine is running.

5) If gauge reading increases to at least 1100 psi (77.5 kg/cm²) with tap off, leaks are located in steering unit, requiring overhaul. See OVERHAUL in this article.

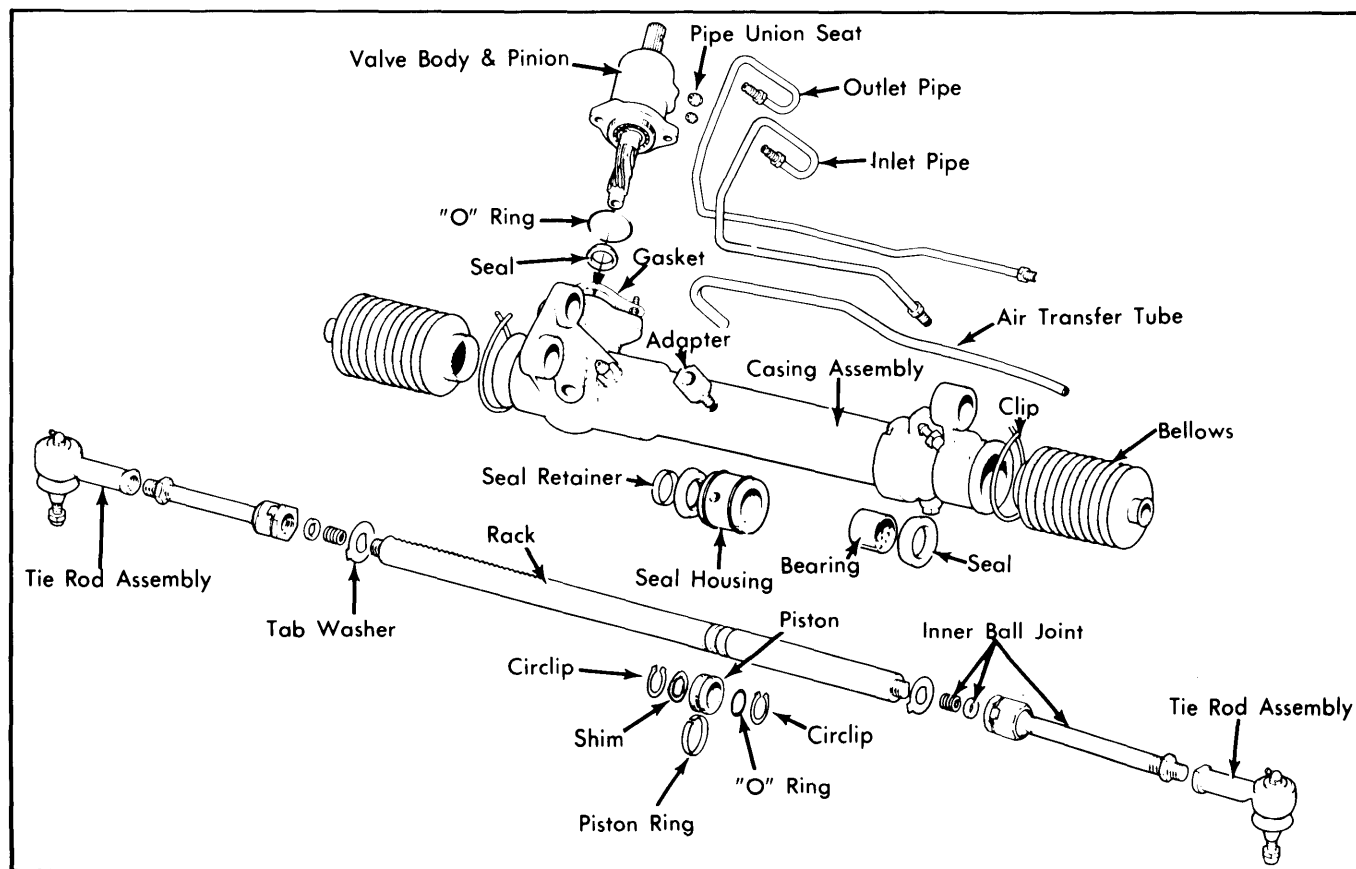


Fig. 2 Exploded View of Power Assisted Rack and Pinion

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6) If gauge reading is above 1200 psi (84.4 kg/cm²), problem is a blocked filter located in pump discharge port.

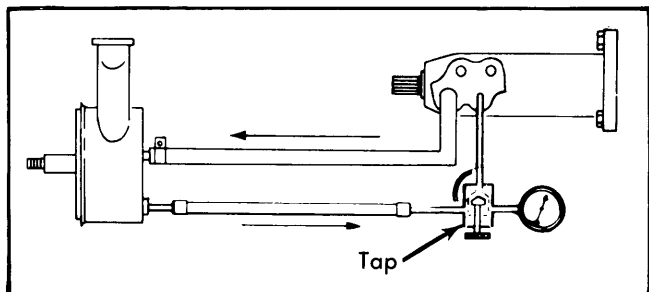


Fig. 3 Pressure Gauge and Tap Connection

SYSTEM BLEEDING

Fill reservoir to full mark on dipstick. Start engine and turn steering from lock to lock several times (to expel all air). Recheck fluid level and refill as required.

REMOVAL & INSTALLATION

STEERING GEAR

Removal — **NOTE** — Amount and location of all washers and spacers must be noted for correct installation. Disconnect high and low pressure lines, drain gear oil, and block off pipe connections. Remove nuts and washers and disconnect track rod ball joints from steering arms. Remove pinion pinch bolt. Unbolt and remove rack assembly from vehicle.

Installation — 1) Position rack against mounting brackets. Center lug between crossbeam brackets using proper shims to assure a gap of .10-.12" (2.54-3.05 mm) exists between rubber faces of thrust washers and inner faces of crossbeam lugs. **NOTE** — The use of an assistant is required for this operation.

2) Check that pinion shaft has entered universal joint and insert mounting bolts, but do not fully tighten self-locking nuts. Detach inner end of rubber bellows and push back from housing. Locate two attachment brackets of suitable service tool (JD. 36) on two large hex head bolts of lower control arms (See Fig. 4).

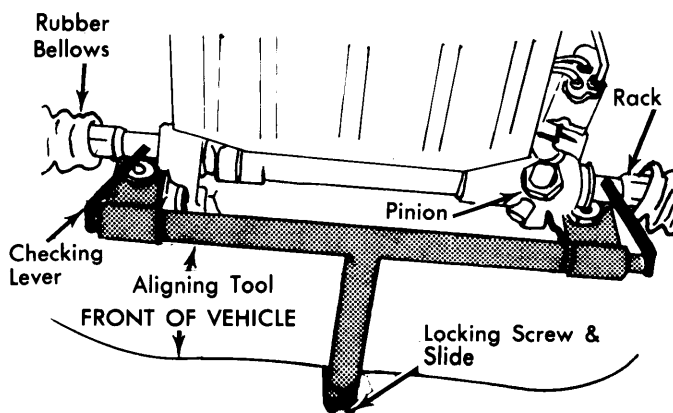


Fig. 4 Installing Rack and Pinion Gear

3) Release locking screw and adjust service tool slide until slot engages front weld flange of crossbeam, then lock slide in this position. Lift two coupled checking levers until contact is made with one or both rack shafts. Adjust position of rack assembly, if necessary, to bring both levers into contact. Tighten nuts of three securing bolts to lock in this position.

4) Remove checking tool. Replace bellows, using new clamps. Reverse remaining removal procedures. Refill system with recommended fluid and bleed. See *System Bleeding* in this article. Check wheel alignment. See appropriate article in *WHEEL ALIGNMENT* Section.

NOTE — It is important that distance between rubber faces of thrust washers and adjacent crossbeam lugs be no less than .01" (2.54 mm). This is necessary to allow adequate rack movement. If a replacement rack is installed, it will be necessary to detach lower column from upper column to obtain correct centering of splines. See appropriate article in *STEERING COLUMN* Section.

POWER STEERING PUMP

Removal — 1) Unscrew nut securing pump mounting bracket bottom bolt and remove set screw and washer securing adjusting link to water pump. Swing pump inboard, lift pulley against spring pressure, and remove pump drive belt.

2) Detach low pressure hose, drain fluid, and remove high pressure line. Block all hose connection. Unbolt and remove pump from mounting bracket, noting any spacing shims for replacement in original position.

Installation — Replace pump in reverse of removal procedure, noting the following: Make sure hose connections are clean before replacement. Fill reservoir with suitable fluid and bleed by turning pulley counterclockwise a few times to dispel any air. After pump is fully installed, bleed system. See *System Bleeding* in this article.

CONTROL VALVE AND PINION

NOTE — Pinion assembly may be removed without detaching rack housing from vehicle. No adjustment or repair is possible except the replacement of the pinion seal.

Removal — Remove lower steering column. See appropriate article in *STEERING COLUMN* Section. Clean pinion and rack housing, then disconnect all lines from valve housing. Remove self locking nuts securing pinion and valve housing to rack unit. Release rack adjuster lock nut and loosen adjuster threaded plug. Mark pinch bolt recess-to-housing for later reassembling. Withdraw valve and pinion housing.

CAUTION — Do not move wheels or turn steering column after pinion has been withdrawn.

Installation — Reverse removal procedures noting the following: Install new joint gasket and check that pinch bolt recess is correct in relation to housing before connecting universal joint.

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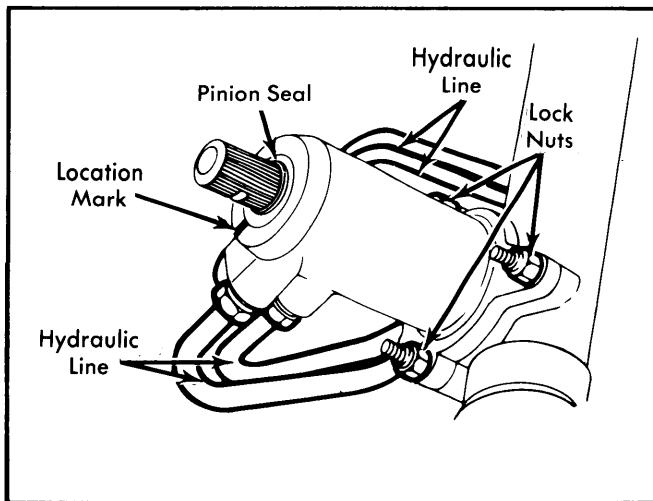


Fig. 5 Control Valve and Pinion

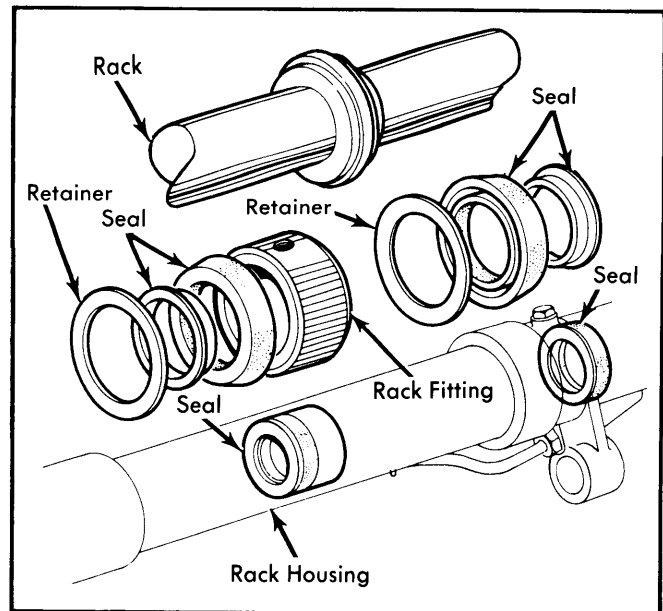


Fig. 6 Rack Seal Installation

OVERHAUL

RACK ASSEMBLY

Disassembly – 1) Thoroughly clean outside of rack assembly before attempting to dismantle. **NOTE** – Do not disturb outer ball joints unless they are to be replaced. Remove external lines from pinion housing. Unclamp and back off bellows to expose inner ball pins. Straighten lock tab of washer securing inner ball pin to rack shaft. Remove inner ball pin and track rod as a unit (do not dismantle ball pin assembly). Retain thrust spring and spacer.

2) Remove control valve and pinion assembly. See *Removal in this article*.

3) Remove air transfer line from end caps and unscrew ring nut from end cap. Remove end cap with bushing, seal, retaining washer and "O" ring and withdraw rack and piston.

4) Remove adaptor and seal from center of housing and withdraw pipe fitting from bore of housing, then take out seal and retainer. Discard seal. Check union insert seats and replace if necessary. Remove retainer and seal from end cap and discard seal.

Reassembly – 1) Install retainers and new seals onto rack with open side of seal facing toward center. **NOTE** – Protect seal from rack teeth with tape.

2) Check piston ring and housing bore for damage, replace if necessary. Install rack into housing, rack end first. Check that hole in rack fitting is aligned with hole in housing. Install adaptor and seal, then tighten securely. Install retainer and seal (open side toward washer) onto rack, then install housing onto rack and secure with ring nut.

3) Reverse disassembly procedures for the remainder of components, noting the following: Tighten lock nuts fully. Adjust threaded plug (Fig. 6) to give minimum of .010" (.254 mm) end play.

4) Coat both tie rod ends with grease, then install bellows. Inject 1 oz. (28 g) grease into damper grease plug. **NOTE** – Do not overfill to the point where bellows are extended. Refill system with a recommended fluid and bleed system. See *System Bleeding in this article*. Check wheel alignment. See *appropriate article in WHEEL ALIGNMENT Section*.

POWER STEERING PUMP

Disassembly – 1) Drain pump fluid. Detach rear mounting bracket and note size and location of all spacers. Withdraw two set screws and lock washers and detach trunion front mounting bracket and spacers. Thoroughly clean pump exterior before proceeding.

2) Remove pulley. Detach high pressure outlet union and two mounting studs. Separate pump reservoir from body and remove "O" rings from pump body recess. Insert suitable pin punch in hole of pump body and push retaining ring away from groove. Pry ring out with screwdriver.

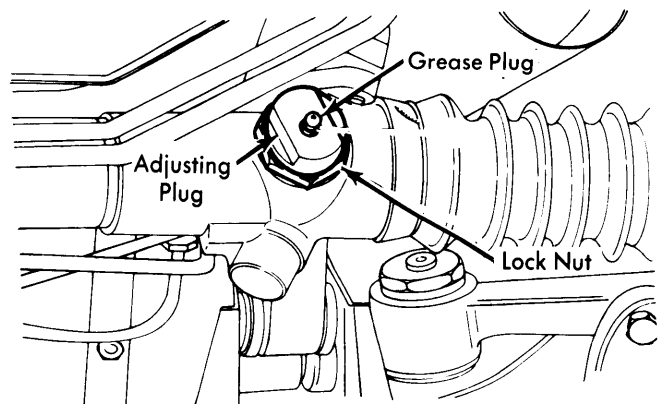


Fig. 7 Rack End Play Adjustment

Power Steering

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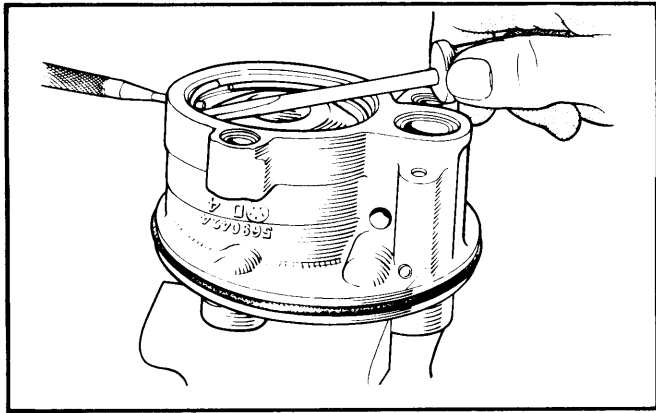


Fig. 8 Prying Out End Plate Ring

3) Remove end plate (tap lightly to free, if necessary). Remove spring. Withdraw end plate "O" ring from internal recess in pump body. Remove control valve and spring. Remove key and tap shaft and rotor assembly out of pump body.

4) Separate rotor assembly components, taking care not to damage rotor vanes. Remove circlip and release rotor and thrust plate. Remove drive shaft oil seal.

Inspection — Clean all parts in solvent and replace all "O" rings and seals. **NOTE** — Do not immerse new seals in solvent. Check all parts for scoring or other damage. If bushing on shaft is damaged, shaft assembly must be replaced. Check flow control valve for free movement in bore.

Assembly — 1) Lubricate a new shaft seal with petroleum jelly and place seal to pump body. Insert pump shaft, splined end first (from hub end of body). Insert dowel pins with ported face up.

2) Fit rotor to splined shaft with countersunk side downward (toward thrust plate). Rotor must be free on splines. Fit retaining clip to groove in end of shaft. Position pump ring to dowel pins with rotation arrow upward.

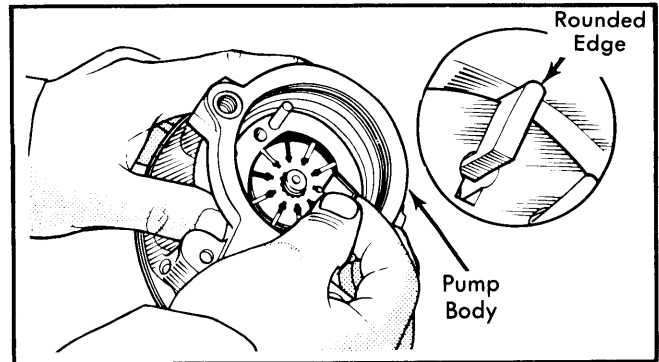


Fig. 9 Placing Vanes in Rotor Plate

3) Place vanes in rotor slot, making sure rounded edge of each vane faces outward (See Fig. 9). Coat pressure plate "O" ring with petroleum jelly and install in lowest groove in pump body.

4) Lubricate circumference of pressure plate and install over dowel pins, with circular recess for spring, upward. **NOTE** — Do not tap plate into position. Coat "O" ring with petroleum jelly and install in groove in pump body. Position spring into groove in pressure plate.

5) Grease circumference of end plate with petroleum jelly to avoid damaging "O" ring. Place end plate in position with retaining ring on top. Make sure gap in clip is not opposite hole used for removal. Place assembly under a press and apply pressure until clip seats into body groove.

6) Insert valve (spring first) into pump bore. Position new "O" rings for reservoir retaining bolts and outlet union. Coat large reservoir "O" ring with petroleum jelly and fit into body groove. Install reservoir on pump body and secure with retaining studs and outlet union. Replace pulley key and pulley; secure with tab washer and nut.

7) Refill system with recommended fluid and bleed. See *System Bleeding in this article*.

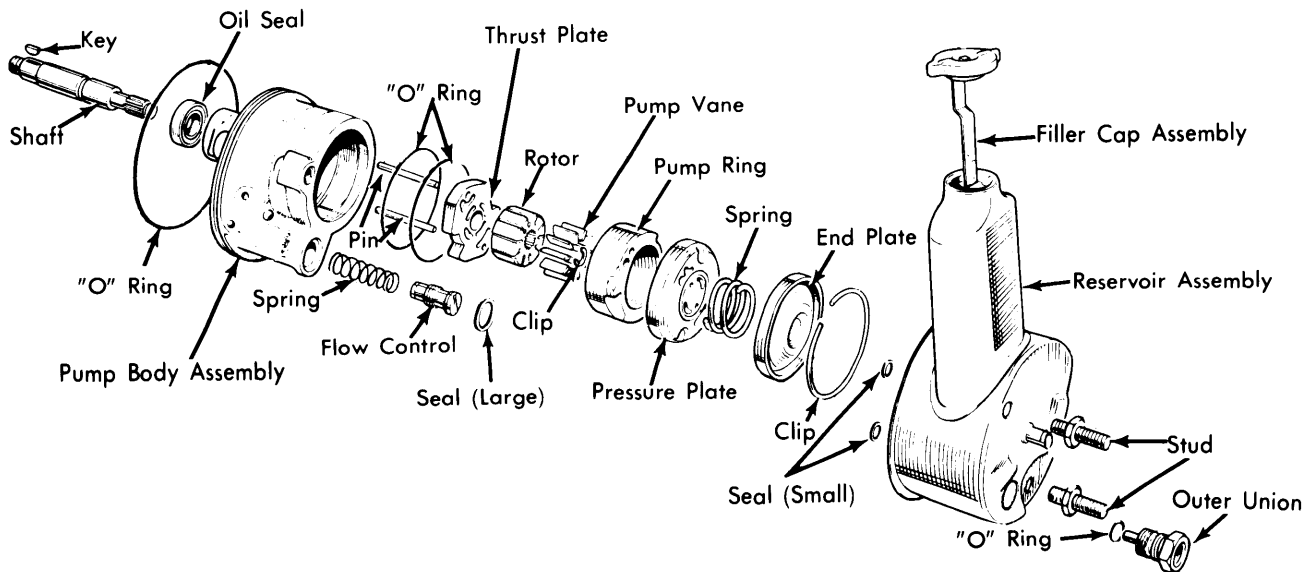


Fig. 10 Exploded View of Jaguar Power Steering Pump