

## 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.

### LUBRICANT

**Type** — ATF Dexron II

**Intervals** — Check power steering fluid every 3,000 miles.

### TESTING

**Control Valve & Pinion** — 1) Connect a 100 psi (7 kg/cm<sup>2</sup>) pressure gauge into pump return line, start engine and allow to idle. Pressure reading should be approximately 40 psi (2.8 kg/cm<sup>2</sup>). Turn steering gear left and right a small amount.

**CAUTION** — Excessive turning of steering gear will cause gauge damage.

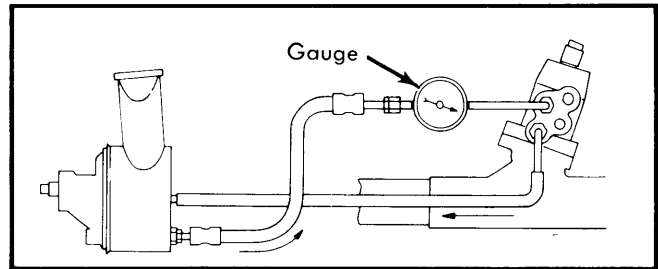


Fig. 1 Pressure Gauge Connection

2) Pressure should increase equal amounts as wheel is turned in either direction. A slight fall in pressure occurring before rise in pressure indicates a defective control valve. Stop and restart engine and check that steering does not kick to one side.

**Hydraulic System** — 1) Connect a 1500 psi (100 kg/cm<sup>2</sup>) 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/cm<sup>2</sup>) and 1200 psi (84.4 kg/cm<sup>2</sup>).

**NOTE** — If pressure is below 1100 psi (77.5 kg/cm<sup>2</sup>) at idle, but rises with engine speed increase, 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.

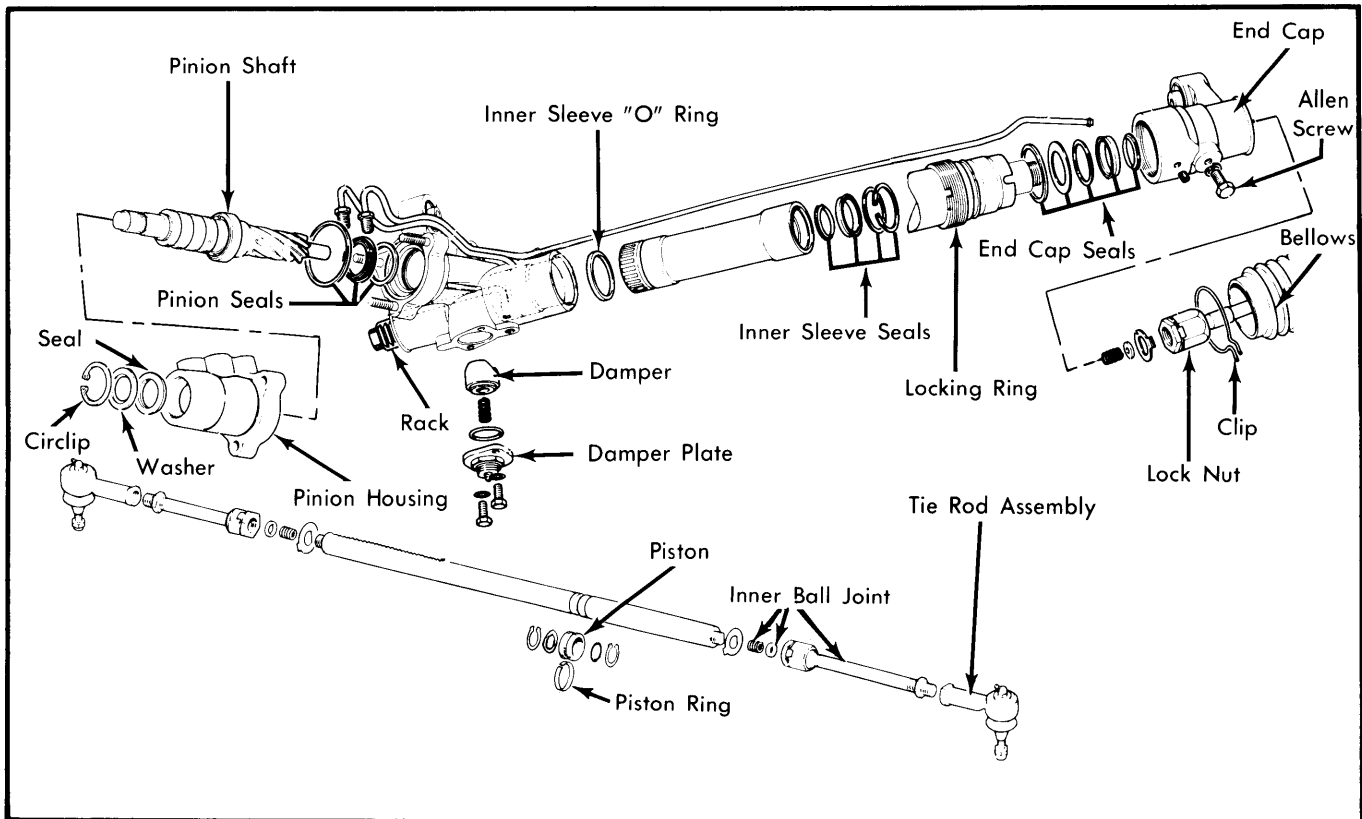


Fig. 2 Exploded View of Jaguar Power Assisted Rack and Pinion

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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/cm<sup>2</sup>). 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/cm<sup>2</sup>) with tap off, leaks are located in steering unit, requiring overhaul. See *OVERHAUL* in this article.

6) If gauge reading is above 1200 psi (84.4 kg/cm<sup>2</sup>), problem is a blocked filter located in pump discharge port.

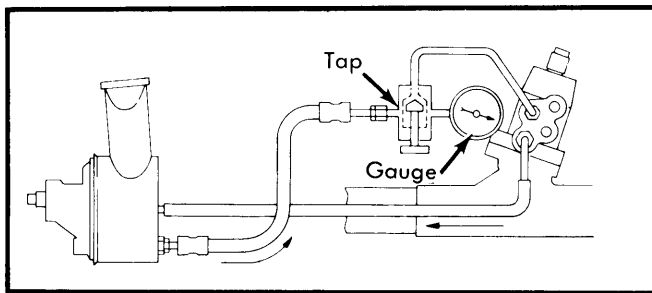


Fig. 3 Pressure Gauge and Tap Connection

### SYSTEM BLEEDING

Turn wheels to full left lock, add fluid to "COLD" level mark on dipstick. Start engine and idle. Turn steering wheel lock to lock to expell air. Check fluid level. Straighten wheels and run engine for several minutes. Turn off engine, check fluid level. Fluid should be up to "HOT" mark on dipstick.

### REMOVAL & INSTALLATION

#### STEERING GEAR

**NOTE** — Amount and location of all washers and spacers must be noted for correct installation.

**Removal** — 1) Remove lower steering column. Drain fluid from pump. Disconnect pressure and return lines, cap openings. Remove tie-rod to steering arm nut on right and left sides. Separate tie-rods from steering arms.

2) Remove bolt securing rack to suspension. Save heatshield mounting bracket and spacers. Remove remaining bolts from rack mounting. Save washers. Withdraw rack from suspension.

**Installation** — 1) Position rack against mounting brackets. Center lugs on bracket and insert shims between lug and bracket to insure a gap of .05" (1.3 mm) on either side of rack lug and mounting bracket. Insert mounting bolts but do not tighten.

2) Repeat step 1) on upper and lower mountings on pinion side of rack, ensuring that heatshield mounting bracket is located on upper mounting bolt. Remove clip securing rubber bellows to rack housing. Fold back bellows to expose inner ball joints.

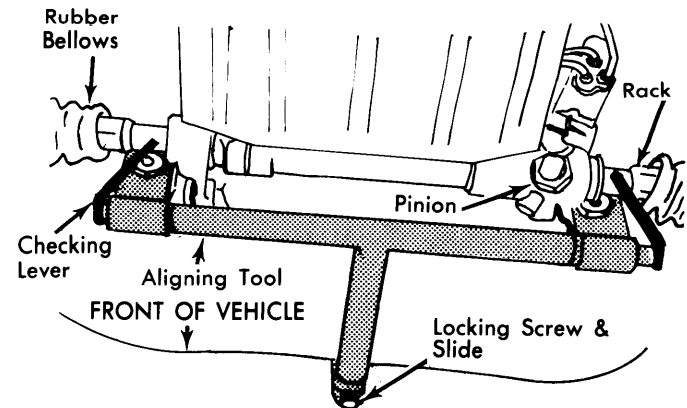


Fig. 4 Installing Rack and Pinion Gear

3) Locate attachment brackets of alignment tool JD36A over large hex head bolts on lower control arms. It may be necessary to bend shields slightly to locate tool correctly.

4) Release locking screw and slide collar along tool to front of suspension unit until slot engages front weld flange of crossbeam. Lock slide in this position. Rotate alignment tool until legs rest on tie-rods. To adjust slack, loosen lock nut of single bolt mounting and raise or lower same side of rack assembly.

5) Remove tool, fully tighten rack mounting lock nuts. Reposition bellows and secure clips. Reinstall tie-rods and hoses. Refill and bleed system. Check wheel alignment.

### POWER STEERING PUMP

**Removal** — 1) Remove right air cleaner. Partially drain radiator. Remove upper radiator hose. Drain fluid from pump. Disconnect pressure and return hose from rear of pump. Loosen nut securing adjuster rod to timing cover.

2) Remove bolt securing adjuster rod to pump, swing adjuster clear of pump. Remove lower pump pivot nut. Move pump toward engine and remove belt. Remove lower pivot bolt. Lift pump from car.

**Installation** — Replace pump in reverse of removal procedures, noting the following: Make sure hose connections are clean. Adjust drive belt deflection to .16" (4.1 mm) at mid point. Bleed system.

### CONTROL VALVE AND PINION

**NOTE** — No adjustment or repair is possible except the replacement of the pinion seal.

**Removal** — Remove rack assembly. Clean rack and pinion housing. Loosen nuts securing pressure and return lines. Remove nuts holding pinion housing to rack tube. Remove pinion assembly from rack. Discard gasket.

**Installation** — Reverse removal procedures, noting the following: Replace gasket in joint of pinion assembly to rack. Ensure that recess on pinion shaft is in position with pinion housing.

## JAGUAR POWER-ASSISTED RACK & PINION (Cont.)

### OVERHAUL

#### RACK ASSEMBLY

**Disassembly** – 1) Clean rack and pinion housing. Remove clips holding bellows and fold bellows back to expose inner ball joints. Do not disturb outer ball joints. Straighten lock tab of washer securing tie-rod inner lock nuts. Loosen lock nuts and unscrew tie-rod assemblies from rack. Retain thrust springs and packing washers.

2) Remove fluid feed lines from rack housing. Remove pinion housing from rack tube. Remove and discard pinion seals in housing recess. Remove Allen screw from end cap. Remove locking ring from end cap and remove end cap. Remove air transfer pipe from rack.

3) Remove end cap "O" ring seal, washer, nylon spacer, seal and seal seat. Remove rack damper plate, seal and spring. Remove damper from rack tube, carefully remove rack from tube.

4) Remove rack inner sleeve from tube. Remove circlip from inner sleeve along with nylon washer, seal and seal seat. Remove "O" ring from inner sleeve and seal from seal carrier from rack bar.

**Cleaning & Inspection** – Clean all parts in solvent and blow dry. Check all parts for wear, fatigue or cracks. Replace all seals during overhaul.

**Reassembly** – 1) Lubricate all seals and "O" rings before installation. Fit seal seat, seal and nylon washer to inner sleeve and replace circlip. Fit "O" ring to inner sleeve. Insert grooved end of inner sleeve into rack tube and align inner sleeve hole with rack tube hole.

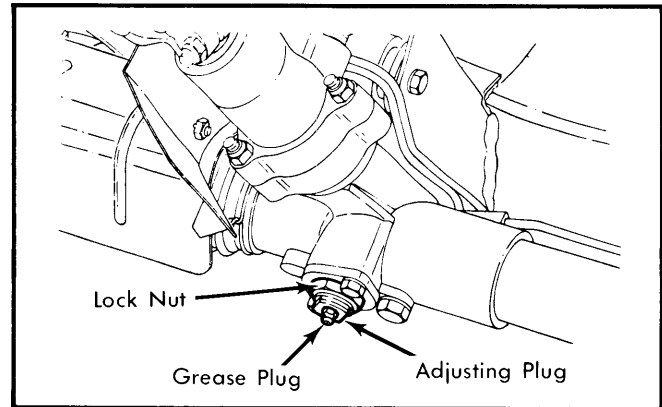
2) Fit locating bolt to end casing. Install new nylon seal to seal carrier on rack bar. Tape rack teeth, carefully insert rack into rack tube and inner sleeve. Install seal seat, seals, nylon washer, metal washer and "O" ring to end cap. Fit "O" rings to air transfer pipe.

3) Install end cap making sure that holes in rack tube and end cap line up. Fit locating bolt to end cap. Install air transfer pipe. Rotate threaded sleeve and secure end cap to rack tube. Fit Allen screw to sleeve. Remove tape from rack teeth.

4) Install washer, "O" ring and seal to pinion housing. Insert pinion assembly into housing, aligning teeth with pinion shaft. Secure pinion to housing. Replace damper to housing. Fit "O" ring, seal and spring to damper. Replace damper cover plate. Install pressure and return hoses. Replace tie-rods. Coat inner ball joints with grease. Adjust rack damper and lubricate.

#### POWER STEERING PUMP

**Disassembly** – 1) Remove rear mounting plate and pulley from pump. Remove front mounting plate from pump and clean pump body. Remove pressure outlet union and mounting plate studs from rear of pump. Tip pump and remove flow control valve and spring.



**Fig. 5 Rack End Play Adjustment**

2) Place pump in padded vise and tap pump casing from body. Remove "O" rings from pump body and magnet from flange. With suitable pin punch, push retaining ring free from groove and lever from body. Remove spring retaining plate and spring. Remove "O" ring from recess in pump body.

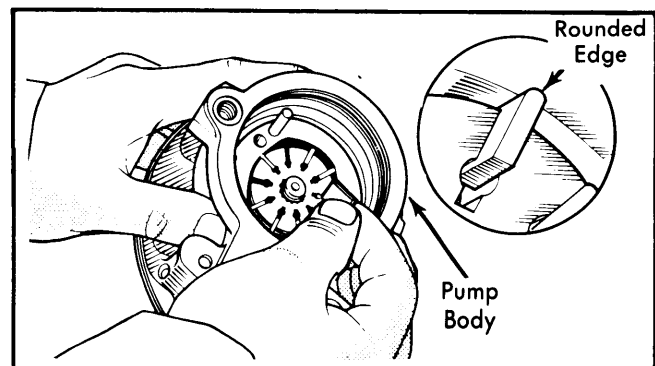
3) Remove woodruff key from shaft. Tap roller spindle toward body and remove pump assembly from body. Remove "O" ring from recess in pump body. Remove dowel pins.

4) Remove rotor housing top plate and rotor housing. Remove rotor vanes and circlip securing rotor to drive shaft. Remove drive shaft oil seal from pump body.

**Cleaning & Inspection** – Clean all parts with lint-free cloth. Replace all "O" rings, seals, rotor housing and vanes. Check flow control valve for free movement in bore.

**Reassembly** – 1) Lubricate drive shaft seal and fit into pump shaft housing. Fit "O" ring to lower recess in pump body. Place dowel pins in locating holes. With cutaway face uppermost, fit bottom plate to drive shaft.

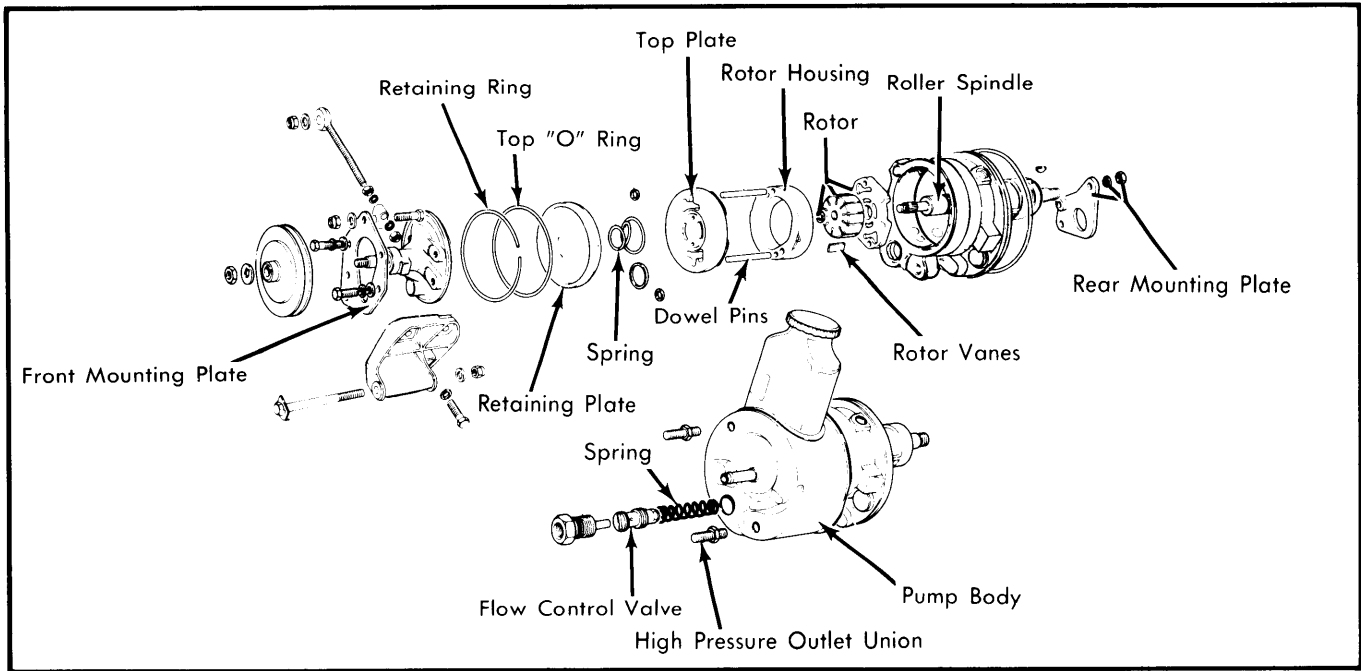
2) Fit rotor over splines of drive shaft and secure with circlip. Insert vanes in rotor with curved edge out. Fit drive shaft and rotor to pump body, ensuring that dowel pins locate through smallest holes of bottom plate. With arrow up, place pump ring chamber over rotor and dowel pins.



**Fig. 6 Placing Vanes in Rotor Plate**

# Power Steering

## JAGUAR POWER-ASSISTED RACK & PINION (Cont.)



**Fig. 7 Exploded View of Jaguar Power Steering Pump**

3) With spring recess up, fit chamber top plate over dowel pins. Push complete pump assembly home. Fit "O" ring into upper recess of pump body. Fit spring to recess in top plate. Place retaining plate over spring and push into body. Fit "O" rings to port recess, and large "O" ring to outside pump body and magnet to flange.

4) Place pump casing over body. Locate mounting studs into outer casing and into pump body. Place outer casing over pump body. Tighten mounting studs. Install spring and flow control valve. Fit pressure outlet union. Place Woodruff key in drive shaft spindle. Replace pulley and mounting plates. Refill system with fluid and bleed system.

### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Pinion Housing Cover Plate .....	14-18 (2-2.5)
Rack-to-Track Rod Ball End .....	45-55 (6.2-7.6)
Rack Hydraulic Connections .....	8-9 (1-1.2)
Rack Locking Bolt .....	27-32 (3.7-4.4)
Rack Adaptor .....	49-55 (6.8-7.6)