

AUDI 4000 POWER-ASSISTED RACK & PINION

DESCRIPTION

A power-assisted rack and pinion steering gear is only used on Audi 4000 models with a 5-cylinder engine and automatic transmission. The system consists of a vane pump, rotary piston pinion gear assembly and an oil reservoir. The vane pump draws fluid from the reservoir and supplies it to the flow control valve. The control valve supplies fluid to the proper side of the rack-piston as the steering wheel is turned. The pump is belt driven and mounted on the front of the engine. The reservoir is located near the firewall.

GENERAL SERVICE

Capacity – 1 qt.

Lubricant – ATF Dexron or Dexron II.

Oil Level Check – Remove reservoir cover, start engine and check fluid level. Fluid level should be at mark on upper inside of reservoir.

Hydraulic System Bleeding – Start engine and allow to idle. Check that fluid is at proper level. Turn steering wheel lock to lock several times quickly. Continue until fluid level remains at reservoir mark. Make sure that no bubbles appear in reservoir when steering wheel is turned. Shut off engine and check that oil level does not rise more than $\frac{3}{8}$ " above mark.

Oil Filter Replacement – Remove outer cover, gasket and spring from reservoir. Remove inner filter cover and filter insert. Replace filter. Install new filter, replace old filter cover, spring, gasket and top cover. Check fluid level.

NOTE – Oil filter insert must be replaced whenever repairs are made to power steering system.

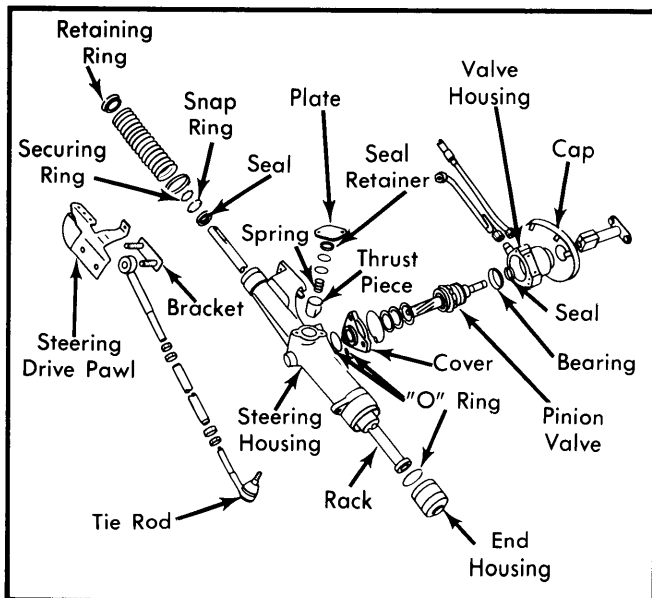


Fig. 1 Audi 4000 Power Steering Gear Exploded View

ADJUSTMENT

PUMP BELT

Remove belt from alternator and air conditioning compressor. Loosen 2 nuts on pump mounting bracket. Turn adjusting nut on bracket until belt deflection is $\frac{3}{8}$ " (9.5 mm) at center of

belt. Tighten nuts. Reinstall alternator and air conditioning belts.

STEERING GEAR

Loosen lock nut on steering gear. Hand tighten adjusting screw until it just touches the thrust plate. Hold adjusting screw and tighten lock nut. Check adjustment with engine idling. No play should be felt. Readjust if necessary.

TESTING

SYSTEM PRESSURE TEST

Install pressure gauge (US1074/2) between pressure hose and pressure pipe of valve housing, with the pressure gauge valve open. Run engine at idle. Turn steering wheel lock to lock several times. Check pressure. Correct pressure is 967-1166 psi (68-82 kg/cm²). If pressure is not within limits, replace steering gear.

PUMP PRESSURE TEST

1) With pressure gauge installed, start engine and idle. Close valve (no longer than 5 seconds) and check pressure. Correct pressure is 967-1166 psi (68-82 kg/cm²). If pressure differs, check pressure/flow limiting valve. If valve is all right, replace power steering pump.

2) To check limiting valve, inspect bores in valve and piston for obstructions, and that piston moves freely in housing. Install new valve if necessary.

LEAKAGE TEST

With engine idling, turn steering wheel to full lock and hold in position. Inspect all connections and tighten if necessary. If leak shows at steering pinion, replace housing seal and both intermediate cover seals. If pinion shaft seal is leaking, fluid will have entered gear housing. Check for fluid by loosening outer clamp on right steering boot and pushing boot in. If seal is leaking, disassemble steering gear and replace all seals.

REMOVAL & INSTALLATION

STEERING GEAR

Removal – Drain fluid from system. Disconnect pressure and return pipes from valve housing. Disconnect lower steering shaft from pinion shaft. Move cap out of way. Remove steering drive pawl and tie rod bracket nuts, then disconnect tie rods from bracket. Remove bolts attaching gear housing to body then remove gear housing.

Installation – Reverse removal procedures. To facilitate tie rod installation, install one tie rod to steering gear and tighten before installing other tie rod.

VANE PUMP

Removal – Remove alternator and vane pump belts. Disconnect pressure and suction lines from pump and cover openings. Remove mounting bolts from bracket and lift pump from engine.

Installation – Reverse removal procedures noting the following: Adjust belt deflection to $\frac{3}{8}$ " (9.5 mm) at center. After installation of pressure and suction lines, start engine and turn steering wheel to full lock and check for leaks in connections.

Power Steering

AUDI 4000 POWER-ASSISTED RACK & PINION (Cont.)

OVERHAUL

NOTE — Before disassembling steering gear, check output and system pressure. Always use all parts in repair kit (811 498 020) and always use new self-locking nuts.

PINION HOUSING SEALS

Disassembly — 1) Remove attaching bolts from valve housing and remove housing. Remove pinion gear and intermediate cover.

2) Remove "O" rings from intermediate cover (1 on each side) and, using suitable tool, drive out intermediate cover oil seal. Anchor housing in padded vise and drive out oil seal from the back.

3) Install new seals from the inside cover and housing. Make sure that seal lip on housing seal faces intermediate cover, and seal lip of cover seal faces valve housing. Replace both intermediate cover "O" rings.

Reassembly — Reverse removal procedure noting the following: Protect pinion teeth on shaft when replacing intermediate cover. Do not damage "O" rings during installation.

STEERING GEAR

Disassembly — 1) With steering gear assembly removed from vehicle, remove pinion valve housing and pinion valve assembly. Remove plate, seal retainer, spring and thrust piece from steering housing.

2) Remove retaining ring, clamp and boot from steering housing. Remove securing ring and snap ring from steering housing.

3) Remove end housing and "O" ring from steering housing. Pull rack out of steering housing. Using oil seal puller, remove oil seal from steering housing.

Reassembly — 1) To install new oil seal to steering housing, place oil seal on flat surface and push sleeve (available in repair kit 811 498 020) into oil seal. Slide rack into steering housing then slide oil seal with sleeve over rack and into steer-

ing housing using suitable tools (VW 426 and VW 4166). Remove sleeve. Install snap ring and securing ring.

2) Install end housing with new "O" ring. Install thrust piece, spring, "O" ring, seal retainer and plate. Install clamp, boot and retaining ring. Then install pinion valve assembly as previously described.

VANE PUMP OIL SEAL

Disassembly — 1) With pump removed from vehicle, remove pulley and Woodruff key from vane shaft. Disengage outer snap ring and screw pulley nut onto pinion shaft.

2) Anchor pulley nut and shaft in padded vise, strike pump housing with mallet to drive out vane shaft. Remove from vise and disengage inner snap ring.

3) Insert extractor into housing and tighten nut on extractor until jaws on extractor engage metal case of seal. Anchor nut of extractor in vise and strike pump housing with mallet to drive out seal.

Reassembly — Lubricate space between lips of new seal. Drive seal onto seat with seal lips facing interior of housing. Install inner snap ring. Carefully drive pump shaft onto seat with mallet, watching alignment of pump shaft and vane splines. Install outer snap ring, Woodruff key, pulley and nut.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
End Housing	37 (5.1)
Pressure-Flow Limiting Valve Cap	43 (5.9)
Pressure Pipe	29 (4.0)
Return Pipe	
On Pump	29 (4.0)
On Valve Housing	22 (3.0)
Steering Drive Pawl	32 (4.4)
Tie Rod-to-Steering Drive Pawl	32 (4.4)
Valve Housing Bolts	14 (1.9)

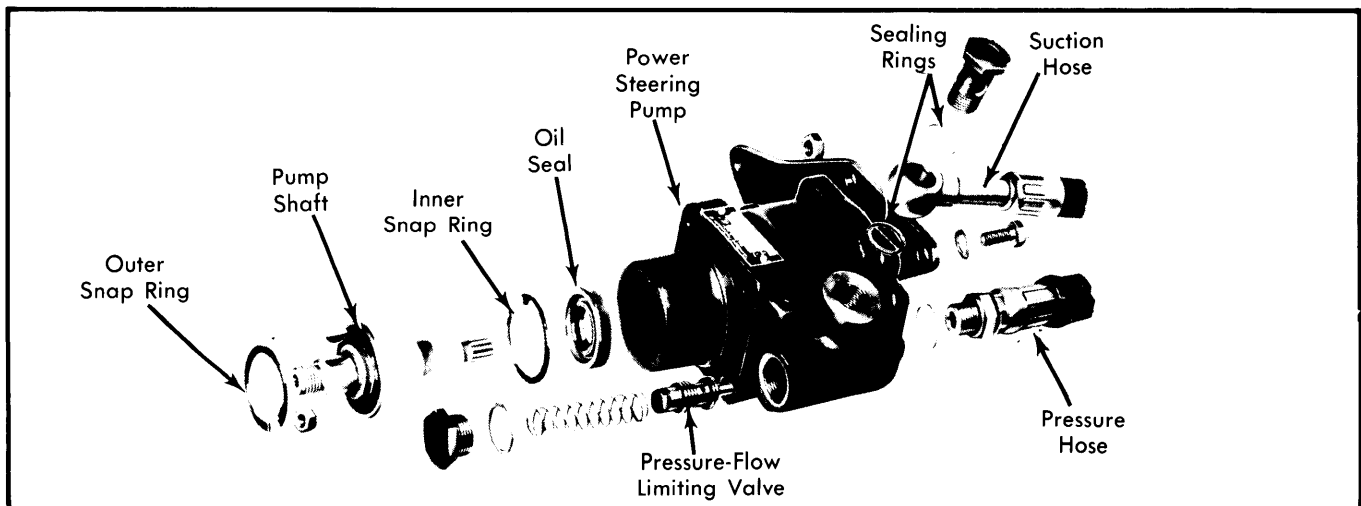


Fig. 2 Exploded View of Vane Pump Assembly