

# Power Steering

## AUDI 100LS POWER-ASSISTED RACK & PINION

100

### DESCRIPTION

A power-assisted rack and pinion steering gear is used as standard equipment on Audi 100 models. The rack and pinion gear gains power assist from a rotary piston pinion gear assembly, a high-pressure oil pump, and an oil reservoir. The pump is mounted on the front of the engine and is belt driven. The oil reservoir is mounted near the firewall and is connected to the pump and to the gear by hydraulic fluid hoses and lines.

### GENERAL SERVICE

#### OIL LEVEL CHECK

Remove reservoir cover, start engine, and check that oil level is at the upper mark on the reservoir. If it is necessary to add oil, be sure engine is at idle. If fluid flow is too strong, air bubbles will be created which will cause foaming and make it necessary to bleed the system.

#### LUBRICANT TYPE

Manufacturer recommends using Dexron type B automatic transmission fluid.

**NOTE** — Do not reuse any fluid that has been drained from system.

#### HYDRAULIC SYSTEM BLEEDING

Start engine and allow to idle. Make sure fluid level is at the upper reservoir mark. Turn steering wheel rapidly from right to left lock position while observing fluid. Avoid using more pressure than necessary when turning wheel. Continue until fluid level remains at upper mark and no bubbles appear in reservoir. Add oil as necessary to maintain level. Turn off engine and check that oil level does not rise more than  $\frac{1}{16}$ " (11 mm) above upper mark.

#### ADJUSTMENT

##### PUMP BELT

Remove apron and disassemble pulley. Adjust belt tension by placing spacers between pulley halves to decrease tension or move spacers in front of outer pulley half to increase tension. Rotate engine by hand while tightening lock screw to avoid jamming belt.

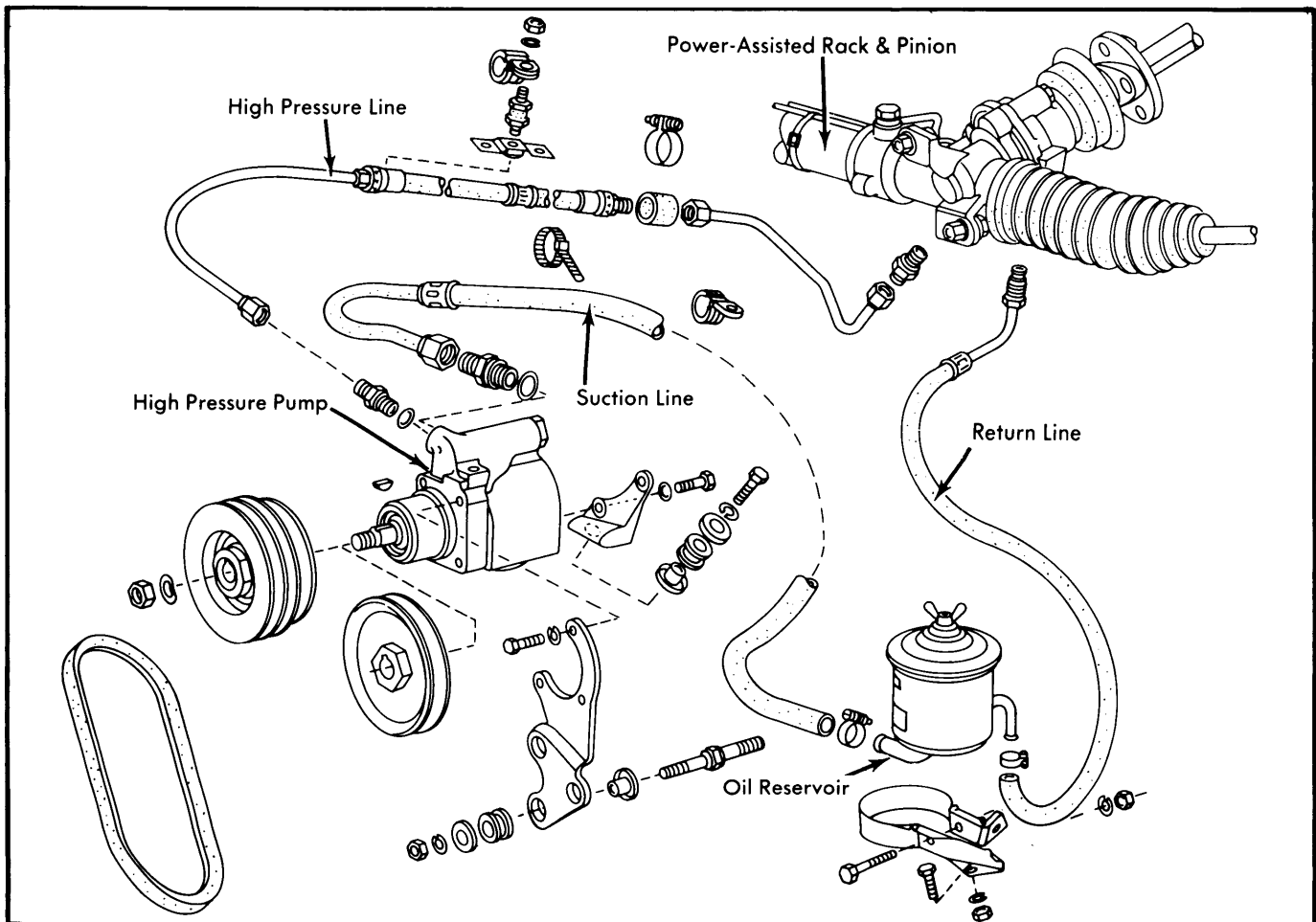


Fig. 1 Exploded View of Audi 100 Power Steering

## AUDI 100LS POWER-ASSISTED RACK & PINION (Cont.)

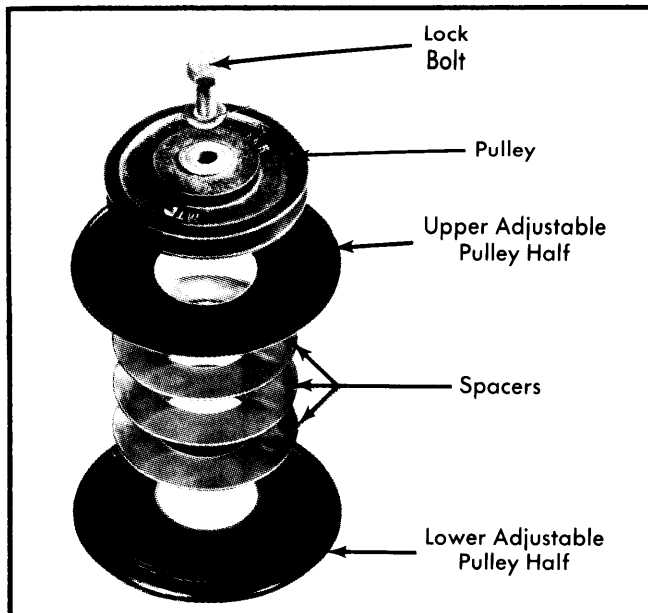


Fig. 2 Adjusting Belt Tension

### TESTING

#### SYSTEM PRESSURE TEST

**Pump Pressure Test** – 1) Install a 0-1450 psi (0-102 kg/cm<sup>2</sup>) pressure gauge in line between power steering pump and piston rotary valve. Gauge must be equipped with a cutoff valve.

2) With engine running at idle, close cutoff valve and read gauge pressure. **CAUTION** – Do not close valve for longer than five seconds or excessive heat buildup in pump will occur. Pressure reading on gauge must be 540-1166 psi (38-82 kg/cm<sup>2</sup>). If outside range, check operation of pressure and flow control valve. Repair or replace valve as required. If pressure is still too low, replace pump.

**System Pressure Test** – With gauge still installed and engine at idle. Open cutoff valve, then read gauge as steering wheel is turned full right and left lock to lock. Pressure should remain 540-1166 psi (38-82 kg/cm<sup>2</sup>). If gauge reading is outside this range (to high or to low) replace entire steering gear.

**Installation & Adjustment** – To install, reverse removal procedure, then perform adjustment as follows: Bolt steering assembly to outer steering tube. Attach gear to crossmember, but do not tighten bolts. Loosen upper control arm mounting bolts on both sides and install special steering gauge 41-102 so that gauge rests firmly on upper control arm. Turn rack until it rests on ruler of gauge. Adjust other side in same manner and tighten mounting bolts to 18 ft. lbs. (2.5 mkg). See Fig. 2.

### REMOVAL & INSTALLATION

#### STEERING GEAR

**Removal** – 1) If vehicle is equipped with automatic transmission, perform the following in addition to regular removal procedures described below: Drain oil, disconnect lines at steering rack, and detach steering column at gear

housing. Remove power brake unit (if vehicle is equipped with brake vent jets on both sides only). Detach brake hose at adaptors on transmission. Remove rear transmission crossmember. Detach front engine support bearing and lower engine (also remove stabilizer if necessary).

2) For vehicles equipped with air conditioning, note the following additional procedures which must be performed (without disconnecting A/C hoses) before removal of gear assembly may be attempted: Disconnect activated carbon container, air cleaner, and other vacuum hoses obstructing work. Bend open or unscrew A/C hose mounting parts. Disconnect thermostat. Unscrew evaporator cover. Disconnect and remove blower motor. Pull temperature sensor out of evaporator. Remove evaporator (two screws on top, two screws inside). Place unit on carburetor. Detach accelerator linkage.

3) On vehicles without air conditioning and/or automatic transmission, or after having performed necessary operations as previously described, the following general removal procedure applies: Drain oil. Disconnect and plug pressure lines. Pry both tie rods from steering knuckles using suitable tool (VW 266 H). Detach steering from crossmember. Disconnect steering column from gear at flexible coupling. Loosen tube connection and pull off tube. Disconnect accelerator linkage connection. Slide gear assembly into right wheel housing, then up and out of vehicle.

**Installation & Adjustment** – To install, reverse removal procedure, then perform adjustment as follows: Bolt steering to outer steering tube. Attach gear to crossmember, but do not tighten bolts. Loosen upper control arm mounting bolts on both sides and install special steering gauge 41-102 so that gauge rests firmly on upper control arm (see Steering Gauge Installation illustration). Turn rack until it rests on ruler of gauge. Adjust other side in same manner and tighten mounting bolts to 18 ft. lbs. (2.5 mkg).

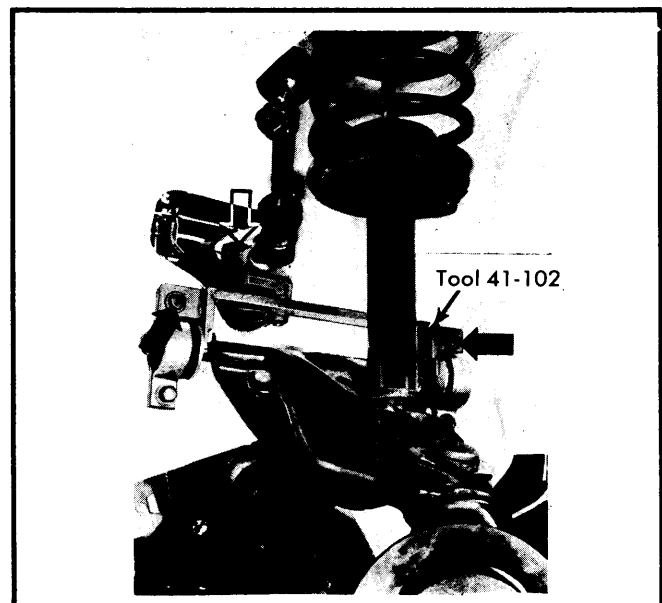


Fig. 3 Steering Gauge Installed on Upper Control Arm

# Power Steering

## AUDI 100LS POWER-ASSISTED RACK & PINION (Cont.)

### OVERHAUL

Manufacturer does not recommend overhaul of the steering gear, however, leaking seals may be replaced using the following procedures.

### PINION HOUSING SEALS

**NOTE** – The steering gear assembly must be removed from the vehicle in order to replace any of the seals.

**Disassembly** – 1) Release pressure plate by loosening bolts, do not remove plate. Unscrew three attaching bolts and remove rotary piston valve housing.

2) Pry seal from intermediate cover and drive out seal from housing using appropriate tool.

3) Insert new seals from the inside on cover and housing and drive into seat with suitable tools (2056 and VW 295a).

**Reassembly** – To reassemble, reverse disassembly procedure: noting the following: Protect pinion teeth before installing intermediate cover, then tighten cover-to-housing bolts.

### RACK ASSEMBLY SEALS

**Disassembly** – 1) Lock rack by removing plug and inserting suitable tool (41-103). Position pinion with flat side aligned with upper bore in valve housing (See Fig. 4).

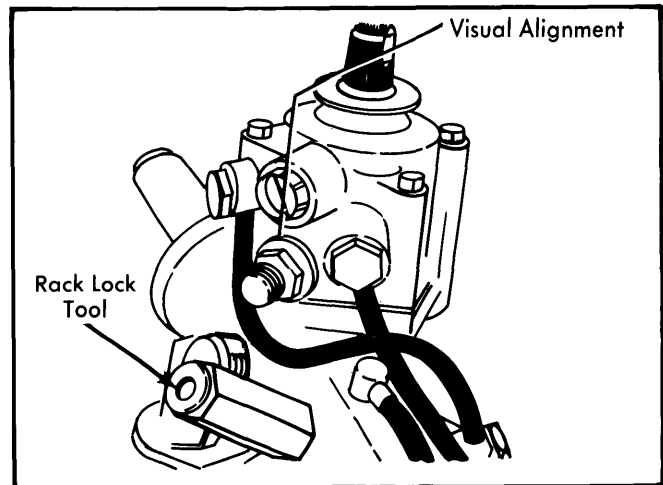


Fig. 4 Valve Housing Alignment & Rack Lock

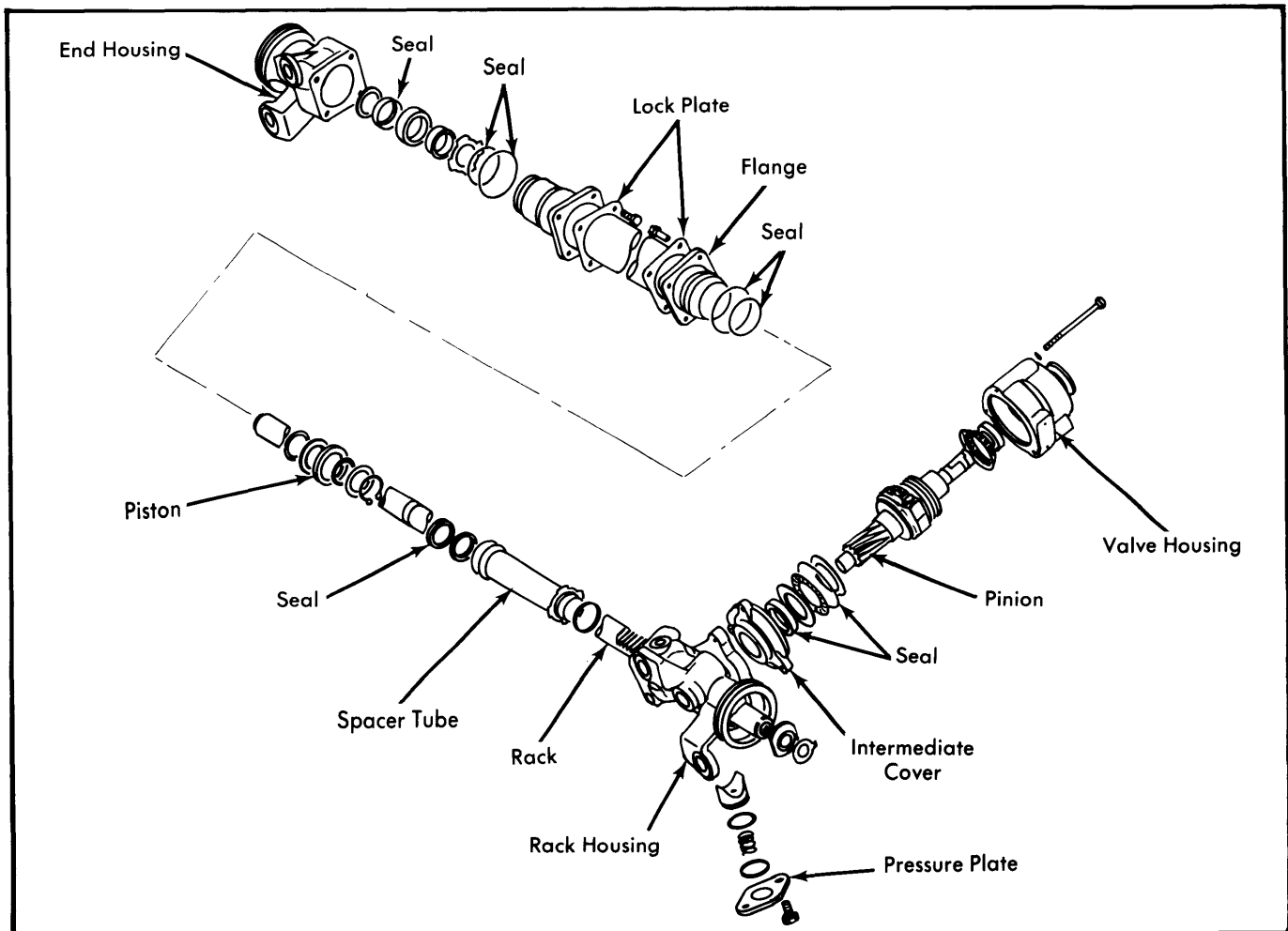
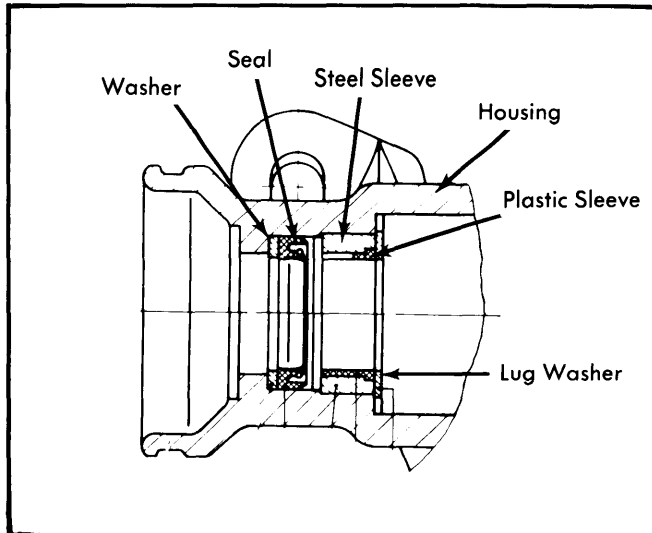


Fig. 5 Exploded View of Audi 100 Power Steering Gear

## AUDI 100LS POWER-ASSISTED RACK & PINION (Cont.)

2) Remove end housing bolts and cut off lock plate, then remove lug washer, plastic sleeve, steel sleeve, seal, and washer from housing. Drive out end housing seal and replace new seal from inside housing using suitable tool (3013).

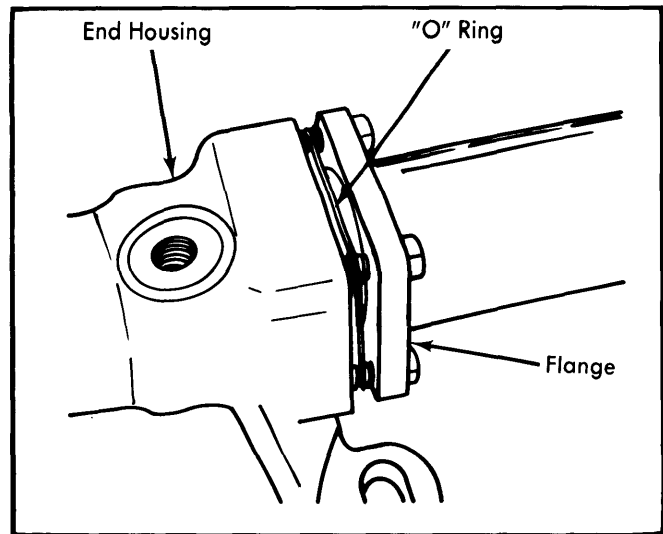


**Fig. 6 Valve Housing Components**

3) Remove flange bolts and cut off lock ring. Mount rack in padded vise, remove two circlips and remove piston and spacer tube from rack.

4) Drive out seal from spacer tube, then press in replacement seal with lip facing out.

**Reassembly** – Reverse disassembly procedures noting the following: Clean sealant from end housing flange and partially install lock bolts, then stretch "O" ring around all lock bolts to form a gasket. Tighten bolts, then fill spacer tube grooves with heavy grease and push tube into housing.



**Fig. 7 End Housing Flange Seal**

### HIGH PRESSURE PUMP SEAL

**Disassembly** – 1) Remove nut, pulley, and Woodruff key. Remove circlips and partially screw pulley nut back on pulley shaft.

2) Clamp nut (installed on shaft) in vise and strike pump housing with plastic hammer to drive out pump shaft. Install a suitable seal extractor on seal, clamp nut of extractor in vise and strike housing with plastic hammer to drive out seal.

**NOTE** – Pump must be replaced if shaft or bearing is worn.

**Reassembly** – Reverse disassembly procedures noting the following: Fill spaces between lips of seal with multipurpose grease. Drive seal into seat with seal lips facing impeller. Drive pump shaft onto seat, being careful that alignment is correct.