STEERING

CONTENTS

GENERAL INFORMATION

STEERING SYSTEM COMPONENTS

Power steering systems use the following (Fig. 1);

- Recirculating-ball steering gear
- Steering linkage
- Belt driven hydraulic steering pump with fluid reservoir
- Pump pressure and return hoses and fittings
- Steering column with shifter interlock
- Intermediate shaft between column and gear

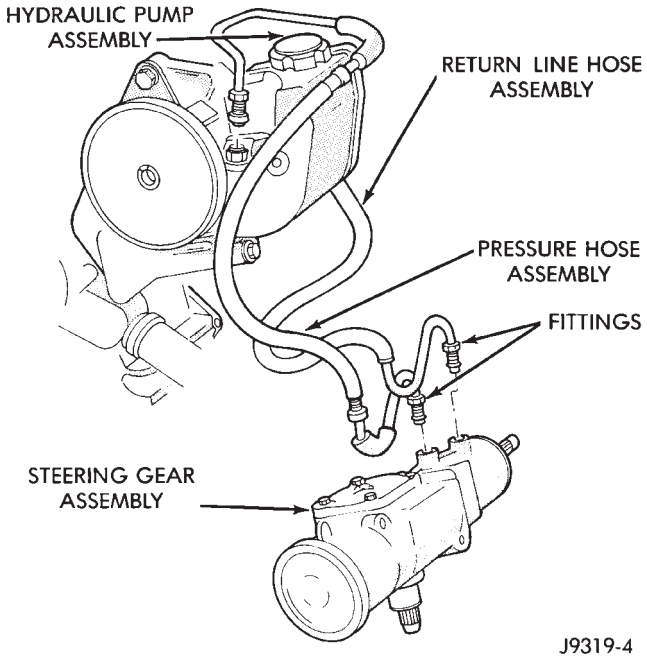

Fig. 1 Power Steering Systems

POWER STEERING GEAR

The steering gear is mounted on the left frame rail. The gear is joined to the intermediate shaft by a universal joint coupling. The coupling helps isolate noise and road shock from the interior.

The major internal components of the gear are the:

- Rotary valve assembly
- Steering worm shaft
- Rack piston assembly
- Pitman shaft

The movement of these parts, while turning or parking, is aided by hydraulic pressure and flow supplied by the pump. Manual steering is always available at times when the engine is not running or in the event of pump or belt failure. Steering effort is higher under such conditions.

The steering stub shaft, rotary valve, worm shaft, and rack piston assembly are all in line. All oil passages are internal within the gear housing except for the pressure and return hoses between the gear and the pump.

The power steering gear has a recirculating ball system. This acts as a rolling thread between the worm shaft and rack piston. The worm shaft is supported by a thrust bearing at the lower end and a bearing assembly at the upper end. When the worm shaft is turned right, the rack piston moves up in gear. Turning the worm shaft left moves the rack piston down in gear. The rack piston teeth mesh with the sector, which is part of the pitman shaft. Turning the worm shaft turns the pitman shaft, which turns the wheels through the steering linkage.

The control valve in the steering gear directs the power steering fluid to either side of the rack piston. The rack piston is assisted by hydraulic pressure. If the steering system loses hydraulic pressure, the vehicle can be controlled manually, but with higher steering effort.

An identification code located on the side cover designates the gear ratio (Fig. 2).

- Code AL designates 12.7:1 ratio without Trailer Tow
- Code MN designates 12.7:1 ratio with Trailer Tow

Trailer Tow gears have higher temperature resistant seals. Otherwise gears are interchangeable.

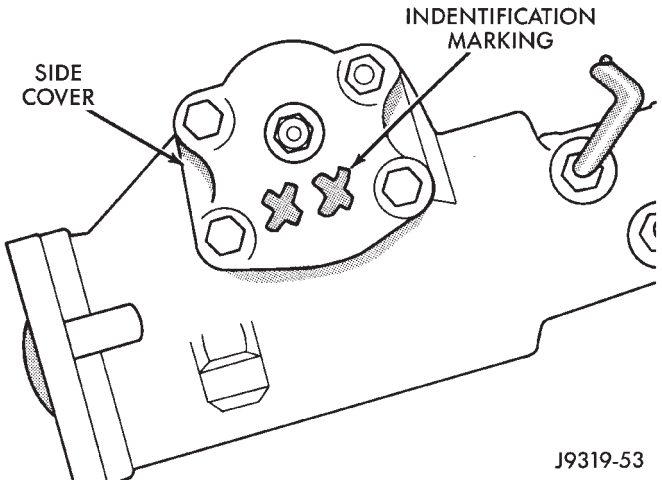

Fig. 2 Ratio Code Location

CAUTION: Vehicles equipped with H.D. Trailer Tow Package use high temperature seals in the power steering gear. The gears are identified with a YELLOW paint mark. The mark is on the pitman shaft side of the housing below the side cover. Use ONLY the correct seal kit when servicing the steering gear with this identification.

A recirculating ball steering gear is used with the power (assisted) steering system (Fig. 1). The power steering gear can be adjusted and internally serviced.

STEERING LINKAGE

The steering linkage consists of a pitman arm, drag link and tie rod. Adjustment sleeves are used on the tie rod and drag link for toe and steering wheel alignment. Refer to Group 2, Front Suspension and Axles for wheel alignment information.

POWER STEERING PUMP

Hydraulic pressure is provided for operation of the power steering gear by a belt driven power steering pump. The power steering pump is a constant flow rate and displacement, vane-type pump. The internal parts in the housing operate submerged in fluid. The flow control orifice is part of the high pressure line discharge fitting. The pressure relief valve inside the flow control valve limits the pump pressure.

Power steering pumps have different pressure and flow rates. They are not interchangeable with pumps installed in other vehicles.

The power steering pump is connected to the steering gear via high pressure and return hoses. The pump shaft has a pressed-on drive pulley that is belt driven by the crankshaft pulley (Fig. 3).

CAUTION: Vehicles equipped with H.D. Trailer Tow Package use high temperature seals in the power steering pump. The pumps are identified with a YELLOW label attached to the back of the reservoir. Use ONLY the correct seal kit when servicing the steering pump with this identification.

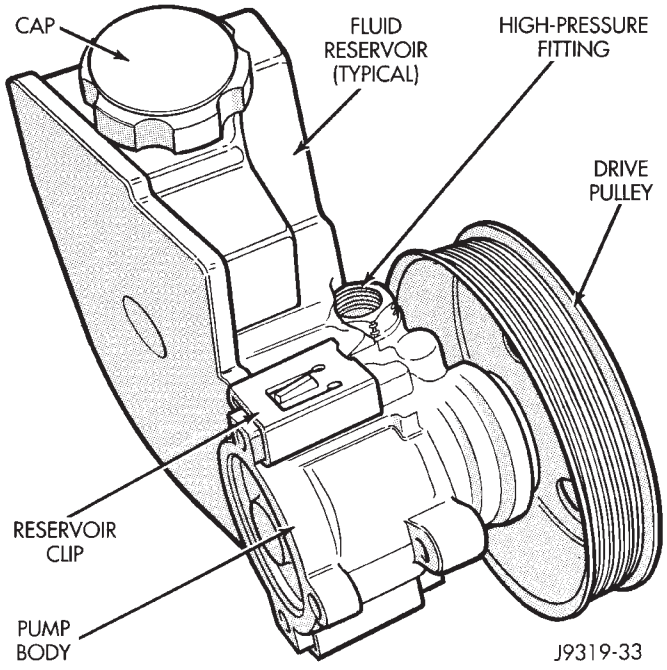

Fig. 3 TC-Series Pump

STEERING COLUMNS

Two general types of steering columns are installed on Grand Cherokee vehicles: a fixed, non-tilt column and a tilt column. The multi-position, tilt column is optionally available.

The column to gear intermediate shaft is equipped with universal joints. Rubber isolators are built into the shaft to absorb noise and vibration from the steering system.

Both types of steering columns have anti-theft provisions. They are energy-absorbing (collapse from impact in the event of a front end collision).

POWER STEERING SYSTEM DIAGNOSIS

HISS NOISE COMPLAINT

There is some noise in all power steering systems. One of the most common is a hissing sound most evident at stand still parking. Hiss is a high frequency noise similar to that experienced while slowly closing a water tap. The noise is present in every steering gear valve and results from high velocity fluid passing valve orifice edges. There is no relationship between this noise and performance of the steering. HISS MAY BE EXPECTED WHEN SLOWLY TURNING AT STANDSTILL. The noise transmission of this into the passenger compartment is controlled by the use of the universal joint coupling. There is a rubber isolator in the steering coupling (intermediate) shaft to muffle hiss. If hiss is extremely objectional, replace the shaft. If hiss is persistent, service the steering gear.

POWER STEERING PUMP PRESSURE TEST

(1) Check belt tension and adjust as necessary.

(2) Disconnect high pressure hose at gear or pump. Use a container for dripping fluid.

(3) Connect Gauge 7617 (J21567) to both hoses using adapter fitting (Fig. 1). Connect spare pressure hose to gear or pump.

(4) Open the test valve completely.

(5) Start engine and let idle.

(6) Check fluid level, add fluid as necessary.

(7) Gauge should read below 862 kPa (125 psi), if above, inspect the hoses for restrictions and repair as necessary. The initial pressure should be in the range of 345-552 kPa (50-80 psi).

CAUTION: The following test procedure involves testing maximum pump pressure output and flow control valve operation. Do not leave valve closed for more than 5 seconds as the pump could be damaged.

(8) Close valve fully three times and record highest pressure indicated each time. **All three readings must be above specifications and within 345 kPa (50 psi) of each other.**

- Pressures above specifications but not within 345 kPa (50 psi) of each other, replace pump.
- Pressures within 345 kPa (50 psi) of each other but below specifications, replace pump.

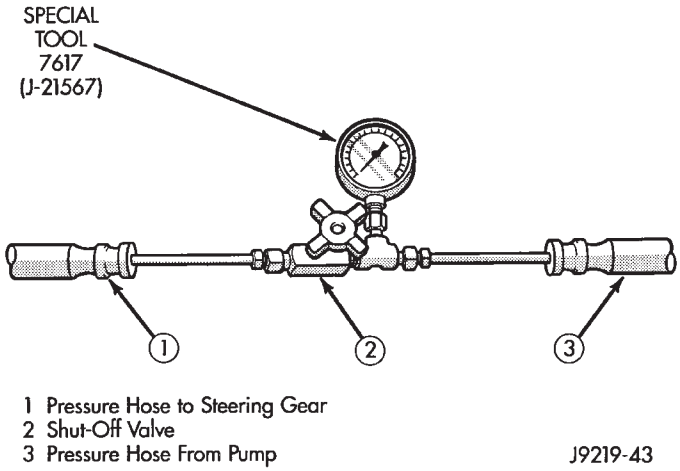

Fig. 1 Pressure Test Gauge

CAUTION: Do not force the pump to operate against the stops for more than 2 to 4 seconds at a time or pump damage will result.

(9) Open the test valve, turn steering wheel extreme left and right positions against the stops. Record the highest indicated pressure at each position. Compare readings to specifications. If highest output pressures are not the same against either stop, the gear is leaking internally and must be repaired.

The steering pump relief pressure is 1400 p.s.i. ± 50.

POWER STEERING SYSTEM DIAGNOSIS

PROBLEM	POSSIBLE CAUSE	CORRECTION
Objectionable "Hiss"	Noisy relief valve in the hydraulic pump. Steering gear valve noise is transmitted through the steering column or open air passages in the area where the column or controls pass through the floor into engine compartment.	There is some noise in all power steering systems. One of the most common is a hissing sound most evident at standstill parking. Hiss is a high frequency noise, that is present in every valve and results from high velocity fluid passing valve orifice edges. There is no relationship between this noise and performance of the steering. Do not replace the intermediate shaft or gear unless the hiss is extremely objectionable. Check the dashboard seals between the drivers area and under hood to eliminate open spaces.
Rattle Or Chuckle Noise In Steering Gear	1. Gear loose on the frame. 2. Steering linkage looseness. 3. Pressure hose touching other parts of vehicle. 4. Loose pitman arm. 5. Improper over-center adjustment. A slight rattle may occur on turns because of increase clearance off the "high point." This is normal and clearance must not be reduced below specified limits to eliminate this slight rattle.	1. Check the gear mounting bolts. Torque the bolts to specifications. 2. Check linkage pivot points for wear. Replace if necessary. 3. Adjust the hose position. Do not bend tubing by hand. 4. Torque the pitman arm bolt. 5. Adjust to specifications.

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POWER STEERING SYSTEM DIAGNOSIS

PROBLEM	POSSIBLE CAUSE	CORRECTION
Excessive Wheel Kick-Back Or Loose Steering	1. Air in the system. 2. Steering gear mounting loose. 3. Steering linkage joints worn. 4. Front wheel bearings incorrectly adjusted or worn. 5. Steering gear improperly adjusted. 6. Worn or missing poppet valve (steering gear). 7. Damaged or worn steering gear.	1. Add oil to the pump reservoir and bleed. Check hose connectors for proper torque. 2. Tighten attaching bolts to specified torque. 3. Replace loose parts. 4. Adjust the bearings or replace with new parts as necessary. 5. Adjust to specifications. 6. Replace the poppet valve. 7. Disassemble and repair the steering gear as outlined in the unit repair manual.
Vehicle Leads To One Side Or The Other (Keep In Mind The Road And Wind conditions). Test The Vehicle, Going In Both Directions, On A Flat Road.	1. Front end misaligned. 2. Unbalanced steering gear valve. If this is the cause, steering effort will be very light in direction of lead and heavy in opposite direction. 3. Steering shaft rubbing the ID of the shaft tube. 4. Steering linkage not level.	1. Adjust to specifications. 2. Replace the gear valve. 3. Align the column. 4. Adjust as required.
Momentary Increase In Effort When Turning The Wheel Quickly To The Right Or Left	1. Low oil level in the pump. 2. Pump belt slipping. 3. High internal leakage (steering gear or pump).	1. Add power steering fluid as required. 2. Tighten or replace belt. 3. Refer to "Pump Pressure Test" in this section.
Poor Return Of Steering	1. Tires under-inflated. 2. Lower coupling flange rubbing against the steering gear adjuster plug. 3. Steering wheel rubbing against directional signal housing. 4. Tight or frozen steering shaft bearings. 5. Steering linkage or ball joints binding. 6. Steering gear to column misalignment. 7. Tie rod pivots not centralized. 8. Lack of lubricant in the suspension ball joints and the steering linkage. 9. Stuck or plugged spool valve. 10. Rubber spacer binding in the shift tube. 11. Improper front end alignment. 12. Steering gear adjusted too tightly. 13. Kink in return hose.	1. Inflate to specified pressure. 2. Loosen the pinch bolt and assemble properly. 3. Adjust the steering jacket. 4. Replace the bearings. 5. Replace the affected parts. 6. Align the steering column. 7. Adjust tie rod ends as required to center pivots. 8. Lubricate. Refer to Group O – Lubrication and Maintenance. 9. Remove and clean or replace the valve. 10. Make certain the spacer is properly seated. Lubricate inside the diameter with silicone lubricant. 11. Check and adjust to specifications. 12. Adjust over-center and thrust bearing preload to specifications. 13. Replace the hose.
Steering Wheel Surges Or Jerks When Turning With Engine Running Especially During Parking	1. Low oil level in pump. 2. Loose pump belt. 3. Sticky flow control valve. 4. Insufficient pump pressure.	1. Add power steering fluid as required. 2. Adjust tension to specifications. 3. Replace or clean the control valve. 4. Refer to "Power Steering System Test" in this section.

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POWER STEERING SYSTEM DIAGNOSIS

PROBLEM	POSSIBLE CAUSE	CORRECTION
Hard Steering Effort In Both Directions	1. Low tire pressure. 2. Lack of lubricant in suspension or ball joints. 3. Steering gear to column misalignment. 4. Pump belt slipping. 5. Low fluid level in reservoir. 6. High internal leakage (steering gear or pump). 7. Sticky flow control valve. 8. Lower coupling flange rubbing against steering gear adjuster plug. 9. Steering gear adjusted too tight. 10. Improper front end alignment.	1. Adjust the tire pressure. 2. Lubricate and relubricate at proper intervals. Refer to Group O – Lubrication and Maintenance. 3. Align the steering column. 4. Tighten or replace belt. 5. Fill to proper level. Inspect lines and joints for external leakage. 6. Refer to "Pump Pressure Test" in this section. 7. Replace or clean the valve. 8. Loosen the pinch bolt and assembly properly. 9. Adjust over-center and thrust bearing preload to specifications. 10. Check and adjust to specifications.
Foaming Milky Looking Power Steering Fluid, Low Level And Possible Low Pressrue	Air in the fluid, and loss of fluid due to internal pump leakage causing overflow.	Check for leak and correct. Bleed system. Extremely cold temperatures will cause system aeration should the oil level be low. If oil level is correct and pump still foams, remove pump from vehicle and separate reservoir from housing. Check welsh plug and housing for cracks. If plug is loose or housing is cracked, replace housing.
Low Oil Pressure Due To Restriction In The Hose	1. Check for kinks in the hose. 2. Foreign object stuck in the hose.	1. Remove the kinks or replace the hose. 2. Remove the foreign object or replace the hose.
Low Oil Pressure Due To Steering Gear. Refer To "Power Steering System Test" In This Section	1. Pressure loss in cylinder due to worn piston ring or scored housing bore. 2. Leakage at the valve rings and valve body to the worm seal. 3. Leakage at the valve body or a loose fitting spool. 4. Damaged poppet valve.	1. Disassemble the steering gear as outlined in the unit repair manual. Inspect the ring and housing bore. Replace the affected parts. 2. Disassemble steering gear and replace seals. 3. Replace the valve. 4. Replace the poppet valve.
Low Oil Pressure Due To Steering Pump. Refer To "Pump Pressure Test" In This Section	1. Flow control valve stuck or inoperative. 2. Pressure plate not flat against the cam ring. 3. Extreme wear of cam ring. 4. Air in oil. 5. Low oil level. 6. Pump belt slipping. 7. Damaged hoses or steering gear.	1. Replace pump. 2. Replace pump. 3. Replace pump, flush system. 4. Locate source of leak and correct. Bleed the system. 5. Add power steering fluid as required. 6. Tighten or replace belt. 7. Replace as necessary.

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POWER STEERING SYSTEM DIAGNOSIS

PROBLEM	POSSIBLE CAUSE	CORRECTION
Chirp Noise In Steering Pump	Pump belt slipping.	Tighten or replace belt.
Belt Squeal (Particularly Noticeable At Full Wheel Travel And Standstill Parking)	Pump belt slipping.	Tighten or replace belt.
Growl Noise In Steering Pump	Excessive back pressure in hoses or steering gear caused by restriction.	Locate restriction and correct.
Growl Noise In Steering Pump (Particularly Noticeable At Standstill Parking)	1. Scored pressure plates, thrust plate or rotor. 2. Extreme wear of cam ring.	1. Replace pump. 2. Replace pump.
Groan Noise In Steering Pump	1. Low oil level. 2. Air in the oil. Poor pressure hose connection.	1. Add power steering fluid as required. 2. Torque the connector. Bleed the system.
Rattle Or Knock Noise In Steering Pump	1. Pump vanes sticking in rotor slots. 2. Pressure hose touching other parts of vehicle.	1. Replace pump, flush system. 2. Adjust hose position.
Swish Noise In Steering Pump	Faulty flow control valve.	Replace pump.
Whine Noise In Steering Pump	Pump shaft bearing scored.	Replace pump.

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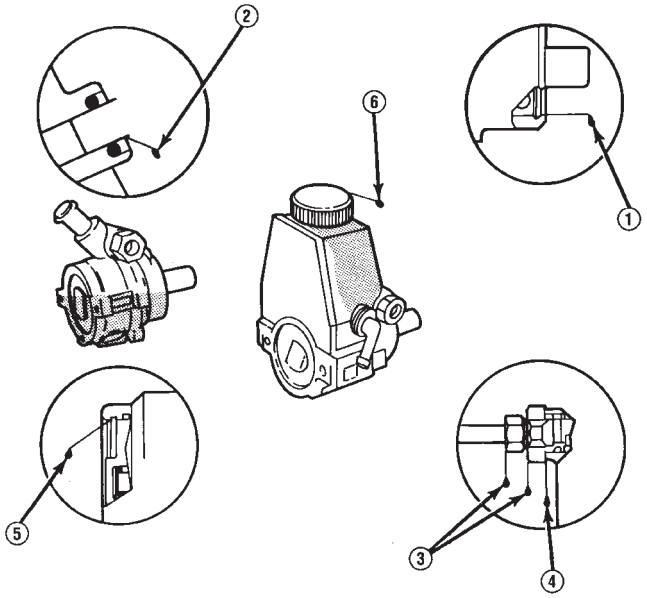
PUMP LEAKAGE DIAGNOSIS



1. BUSHING (BEARING) WORN, SEAL WORN. REPLACE PUMP.
2. REPLACE RESERVOIR O-RING SEAL.
3. TORQUE HOSE FITTING NUT TO 35 N•m (25 ft. lbs.). IF LEAKAGE PERSISTS, REPLACE O-RING SEAL.
4. TORQUE FITTING TO 75 N•m (55 ft. lbs.). IF LEAKAGE PERSISTS, REPLACE O-RING SEAL.
5. REPLACE PUMP.
6. CHECK OIL LEVEL; IF LEAKAGE PERSISTS WITH THE LEVEL CORRECT AND CAP TIGHT, REPLACE THE CAP.

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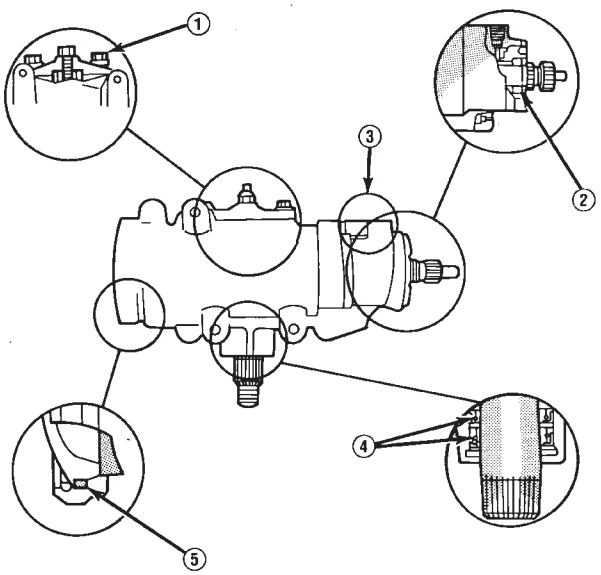
GEAR LEAKAGE DIAGNOSIS



1. SIDE COVER LEAK - TORQUE SIDE COVER BOLTS TO 60 N•m (45 FT. LBS.). REPLACE THE SIDE COVER SEAL IF THE LEAKAGE PERSISTS.
2. ADJUSTER PLUG SEAL - REPLACE THE ADJUSTER PLUG SEALS.
3. PRESSURE LINE FITTING - TORQUE THE HOSE FITTING NUT TO 27 N•m (20 FT. LBS.). IF LEAKAGE PERSISTS, REPLACE THE SEAL.
4. PITMAN SHAFT SEALS - REPLACE THE SEALS.
5. TOP COVER SEAL - REPLACE THE SEAL.

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POWER STEERING PUMP

INDEX

SERVICE INFORMATION

CAUTION: Vehicles equipped with H.D. Trailer Tow Package use high temperature seals in the power steering pump. The pumps are identified with a YELLOW label attached to the back of the reservoir. Use ONLY the correct seal kit when servicing the steering pump with this identification.

The power steering pump internal components are not be serviced or adjusted. If a malfunction or an internal fluid leak occurs, the complete unit must be replaced. A reservoir, cap, and O-ring seal kit are the only service components available.

PRESSURE AND RETURN HOSE REPLACEMENT

Cap hose open ends and pump/steering gear fittings to prevent entry of foreign material.

WARNING: POWER STEERING FLUID (AND PUMP COMPONENTS) AND THE EXHAUST SYSTEM CAN BE EXTREMELY HOT IF THE ENGINE HAS BEEN RECENTLY OPERATING. DO NOT START THE ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES. DO NOT ALLOW THE HOSES TO TOUCH A HOT EXHAUST MANIFOLD.

REMOVAL

(1) Place a drain pan under the pump and gear.

(2) Disconnect the pressure and return hose from the steering gear.

(3) Disconnect the pressure and return hose from the pump (Fig. 1). Drain the fluid from pump and reservoir (Fig. 1).

INSTALLATION

(1) Wipe hose ends, pump and gear unions clean.

(2) Install the pressure hose on the pump and gear. Rotate the pressure hose CLOCKWISE so the rubber insulators on the tube contacts the reservoir and gear side cover. Tighten the fittings at the pump and gear to 28 N•m (21 ft. lbs.) torque.

(3) Install the return hose on the pump and gear. Rotate the return hose CLOCKWISE so the tube contacts the pressure hose insulator. Tighten the fitting at the gear to 28 N•m (21 ft. lbs.) torque.

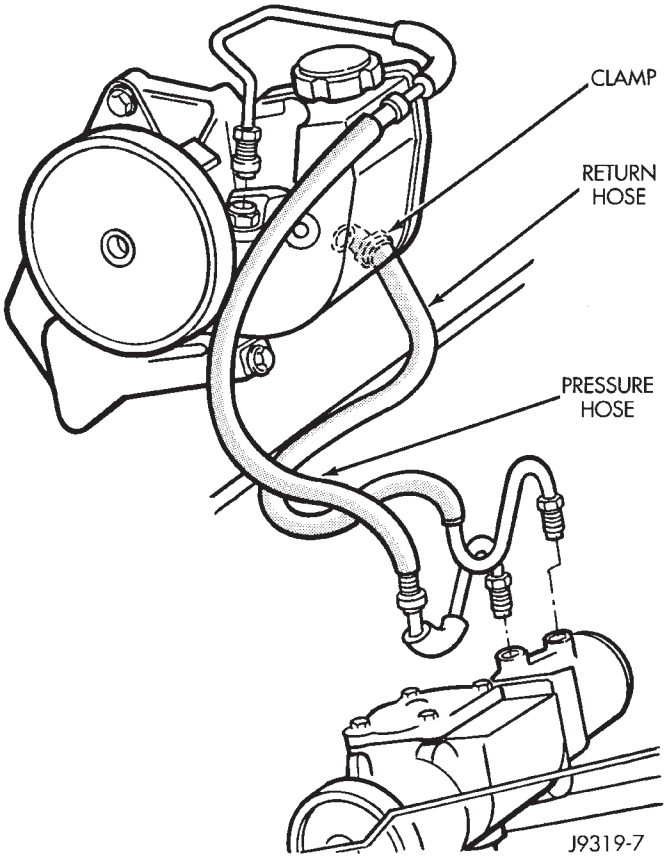


Fig. 1 Power Steering Lines

(4) Install a clamp on the return hose at the pump reservoir fitting.

(5) Add power steering fluid. Refer to Power Steering Pump Initial Operation in this section.

PUMP REPLACEMENT— 4.0L

REMOVAL

CAUTION: The drive belt tension must be released before removing the pump. If the belt is not loosened, the pump pulley could be damaged.

(1) Remove serpentine drive belt. Refer to Group 7, Cooling for additional information.

(2) Place a drain pan under pump.

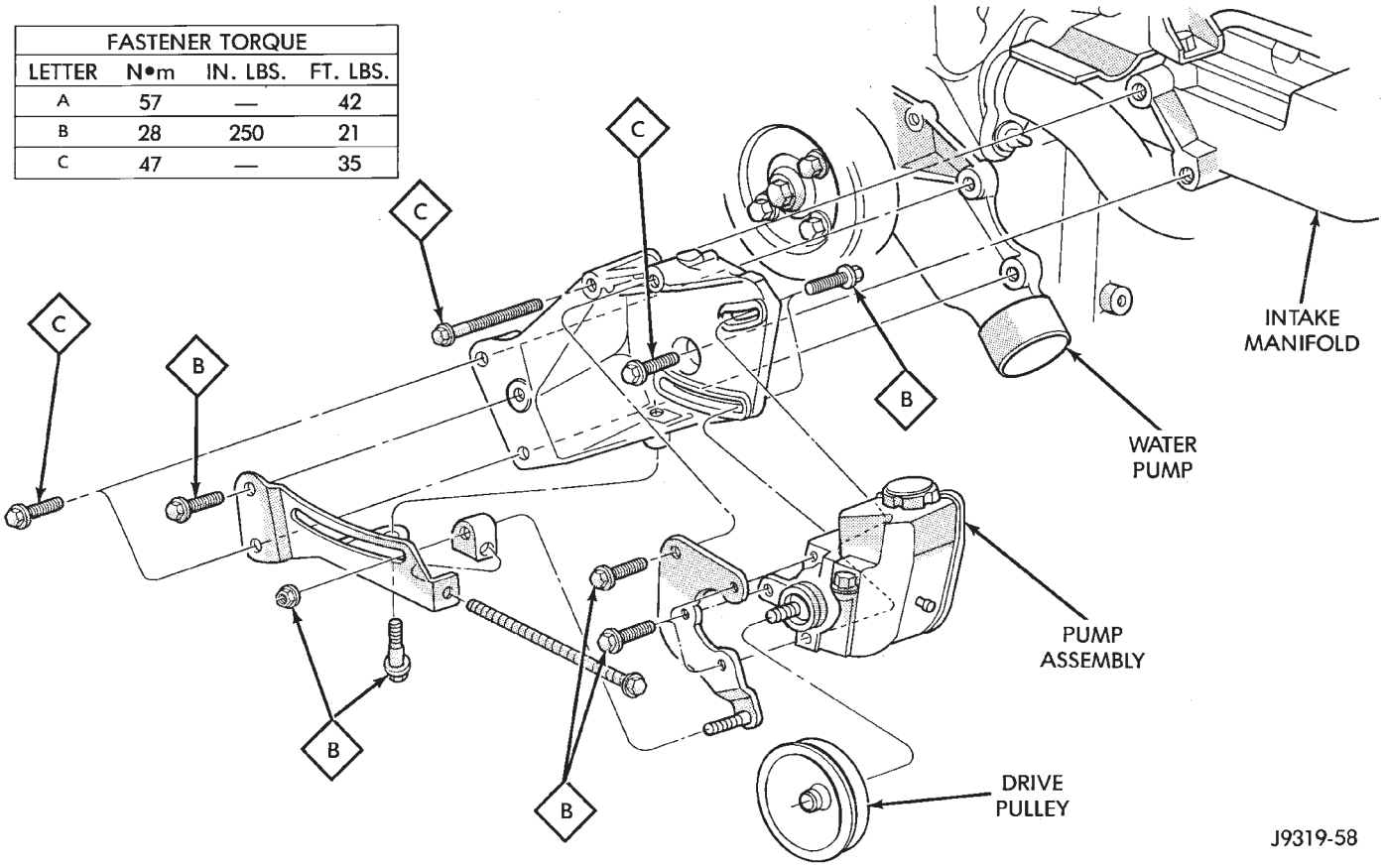


Fig. 2 Pump Mounting (4.0L I-6)

(3) Remove pressure and return hoses from pump. Refer to Pressure and Return Hose Replacement in this section.

(4) Remove 2 rear bracket-to-pump bolts (Fig. 2).

(5) Remove lower nut at adjustment bracket.

(6) Remove adjuster bolt.

(7) Remove upper pivot bolt.

(8) Tilt pump forward and remove pump and front bracket assembly from engine bracket.

(9) Remove adjuster collar at lower stud on pump bracket.

(10) Remove pulley from pump. Refer to Drive Pulley Replacement in this section (Fig. 4).

(11) Remove 3 adjustment bracket-to-pump bolts.

INSTALLATION

(1) Install 3 adjustment bracket-to-pump bolts. Tighten to 28 N•m (21 ft. lbs.) torque.

(2) Install pulley on pump. Refer to Drive Pulley Replacement in this section (Fig. 5).

(3) Install lower adjuster collar on adjuster bracket stud (Fig. 2).

(4) Tilt pump rearward and install pump onto engine bracket.

(5) Install upper pivot bolt.

(6) Install lower adjuster bolt.

(7) Install lower adjuster stud nut.

(8) Install 2 rear engine bracket to pump bolts. Tighten to 28 N•m (21 ft. lbs.) torque.

(9) Install the serpentine drive belt. Refer to Group 7, Cooling for additional information.

(10) Install the pressure and return hoses to pump. Refer to Pressure and Return Hose Replacement in this section.

(11) Add power steering fluid. Refer to Power Steering Pump Initial Operation in this section.

PUMP REPLACEMENT— 5.2L V/8

REMOVAL

CAUTION: The drive belt tension must be released before removing the pump. If the belt is not loosened, the pump pulley could be damaged.

(1) Remove the serpentine drive belt. Refer to Group 7, Cooling for additional information.

(2) Place a drain pan under the pump.

(3) Remove the pressure and return hoses from pump. Refer to Pressure and Return Hose Replacement in this section.

(4) Remove the bolts that attach the pump to the bracket on the engine block (Fig. 3).

(5) If necessary, remove the bracket to engine block bolts (Fig. 3).

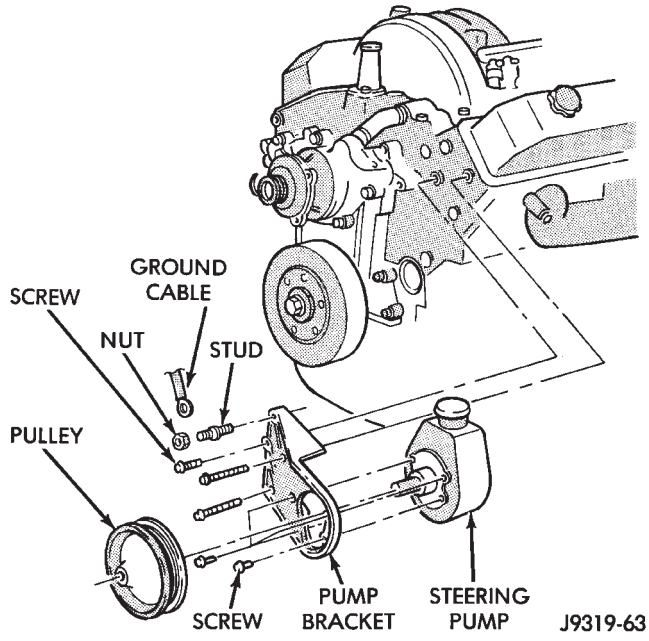


Fig. 3 Pump Mounting (5.2L V/8)

INSTALLATION

(1) Install the bracket to the engine block. Tighten the bolts to 41 N●m (30 ft. lbs.) torque.

(2) Mount the pump on the bracket.

(3) Install the bolts through the pump and into the bracket. Tighten the bolts to 27 N●m (20 ft. lbs.) torque.

(4) Install the serpentine drive belt. Refer to Group 7, Cooling for additional information.

(5) Install the pressure and return hoses to pump. Refer to Pressure and Return Hose Replacement in this section.

(6) Add power steering fluid. Refer to Power Steering Pump Initial Operation in this section.

DRIVE PULLEY REPLACEMENT

REMOVAL

(1) Remove power steering pump. Refer to Pump Replacement in this section.

(2) Remove the drive pulley with Puller C-4333 (J-25034-B) (Fig. 4).

Do not hammer on any part of drive pulley, damage will occur to the pump and pulley.

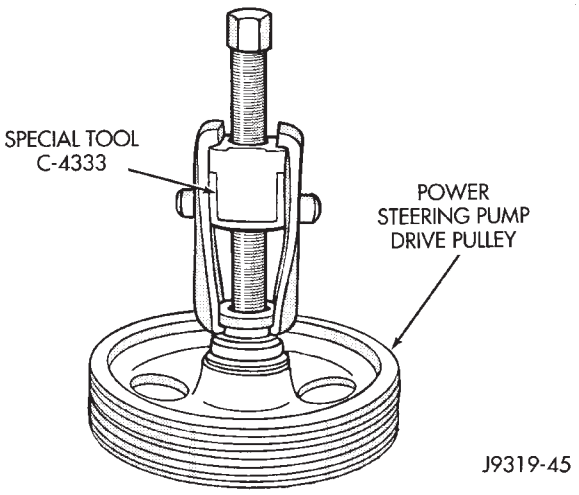


Fig. 4 Remove Drive Pulley (Typical)

INSTALLATION

(1) Install pulley with Installer C-4063 (J-25033-B) (Fig. 5). Do not use the tool adapters.

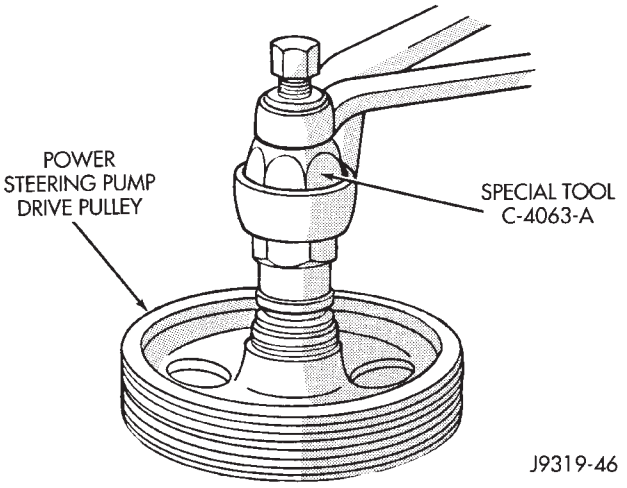


Fig. 5 Install Drive Pulley (Typical)

(2) Be sure tool and pulley remain aligned and NOT cocked with the pump shaft.

(3) Press the pulley flush with the end of the pump shaft (Fig. 6).

(4) Install power steering pump. Refer to Pump Replacement in this section.

RESERVOIR REPLACEMENT

REMOVAL

(1) Remove power steering pump. Refer to Pump Replacement in this section.

(2) Clean exterior of pump with solvent.

(3) Clamp the pump body in a soft jaw vice.

(4) Pry up tab and slide the retaining clip off (Fig. 7).

(5) Remove fluid reservoir from pump body. Remove and discard O-ring seal (Fig. 8).

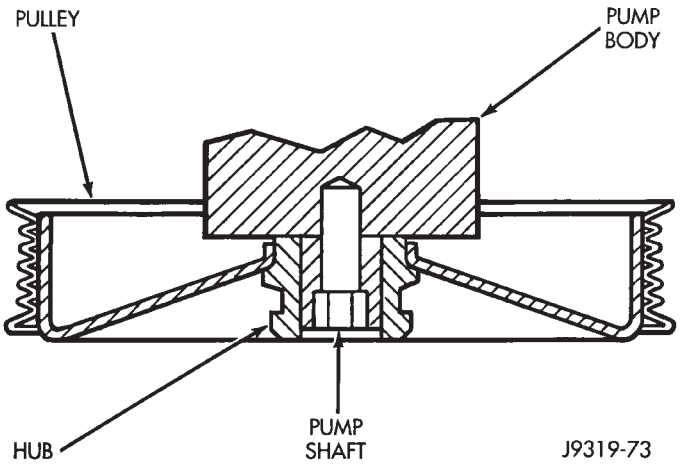


Fig. 6 Pump Shaft Location

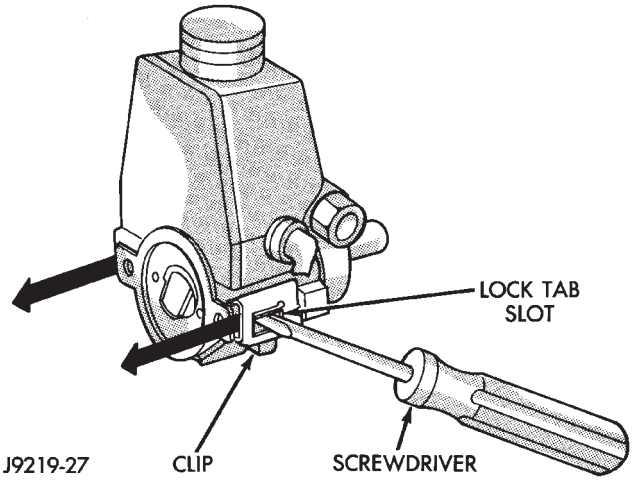


Fig. 7 Remove Reservoir Clips (Typical)

INSTALLATION

(1) Lubricate new O-ring Seal with Mopar Power Steering Fluid or equivalent.

(2) Install O-ring seal in housing.

(3) Install reservoir onto housing.

(4) Slide and tap in reservoir retainer clips until tab locks to housing.

(5) Install power steering pump. Refer to Pump Replacement in this section.

FLOW CONTROL VALVE FITTING O-RING SEAL

REMOVAL

(1) Clean area around fitting to prevent dirt from entering pump. Remove pressure hose from pump fitting.

(2) Remove fitting from pump housing (Fig. 9). **Prevent flow control valve and spring from sliding out of housing bore.**

(3) Remove and discard O-ring seal.

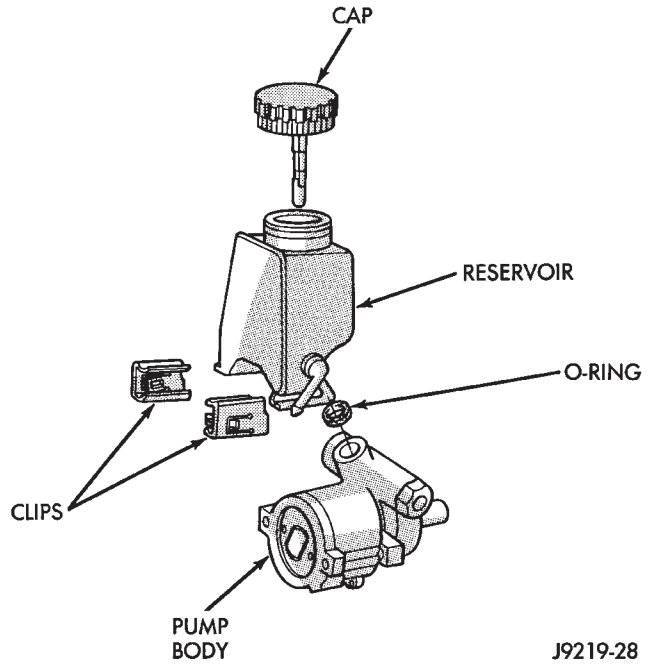


Fig. 8 Remove Reservoir (Typical)

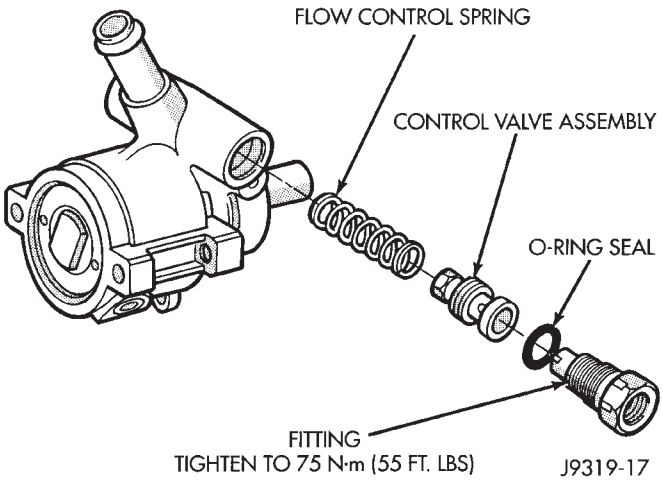


Fig. 9 Flow Control Valve Fitting

INSTALLATION

(1) If necessary, clean and install flow control valve and spring in pump housing bore. **Be sure the hex nut end of the valve is facing in toward the pump.**

(2) Install O-ring seal onto fitting (Fig. 9).

(3) Install flow control valve in pump housing and tighten to 75 N●m (55 ft. lbs.) torque.

(4) Install pressure hose to valve.

POWER STEERING PUMP INITIAL OPERATION

CAUTION: The fluid level should be checked with engine off to prevent injury from moving components. Use only Mopar Power Steering Fluid. Do not use automatic transmission fluid. Do not overfill.

Wipe filler cap clean, then check the fluid level. The dipstick should indicate FULL COLD when the fluid is at normal temperature 21°C to 27°C (70°F to 80°F).

(1) Fill the pump fluid reservoir to the proper level and let the fluid settle for at least two (2) minutes.

(2) Start the engine and let run for a few seconds. Then turn the engine off.

(3) Add fluid if necessary. Repeat the above procedure until the fluid level remains constant after running the engine.

(4) Raise the front wheels off the ground.

(5) Start the engine. Slowly turn the steering wheel right and left, lightly contacting the wheel stops.

(6) Add power steering fluid if necessary.

(7) Lower the vehicle and turn the steering wheel slowly from lock to lock.

(8) Stop the engine. Check the fluid level and refill as required.

(9) If the fluid is extremely foamy, allow the vehicle to stand a few minutes and repeat the above procedure.

STEERING LINKAGE

INDEX

SERVICE INFORMATION

The steering linkage consists of a pitman arm, drag link, tie rod, and steering dampener. Adjustment sleeves are used on the tie rod and drag link for toe and steering wheel alignment.

Refer to Group 2, Front Suspension and Axle for additional information.

The tie rod end ball stud seals should be inspected during all oil changes.

A damaged ball stud seal requires removal of the seal. Inspect the tie rod end ball stud at the throat opening. Check for lubricant loss, contamination, ball stud wear or corrosion. If these conditions exist, replace the tie rod. A replacement seal can be installed if lubricant is in good condition. Otherwise, a complete replacement ball stud end should be installed. Lubricate the tie rod end with MOPAR® Multi-Mileage Lubricant, or equivalent product.

Use a Puller tool for tie rod removal. Failure to use this tool could damage the ball stud and seal (Fig. 1).

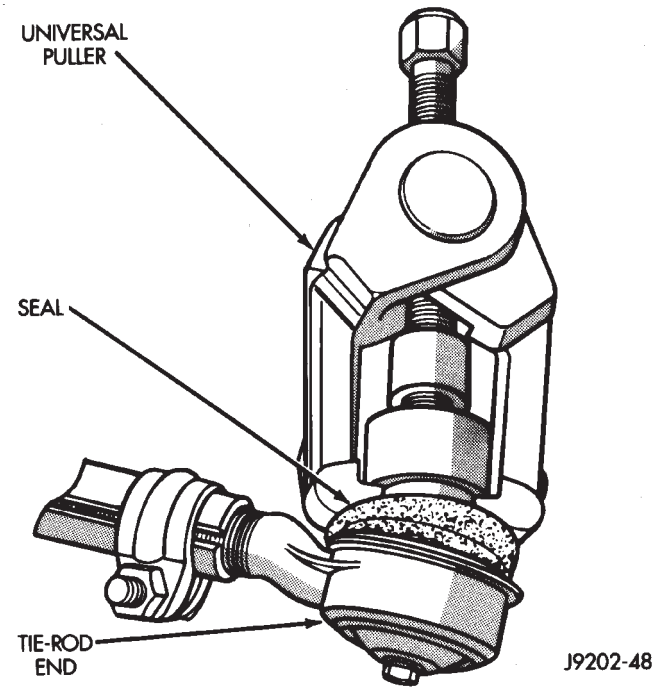


Fig. 1 Ball Stud Removal

TIE ROD

REMOVAL

(1) Remove the cotter pins and nuts at the steering knuckle and drag link (Fig. 2).

(2) Loosen the ball studs with a puller tool to remove the tie rod.

(3) If necessary, loosen the end clamp bolts and remove the tie rod ends from the tube.

INSTALLATION

(1) If necessary, install the tie rod ends in the tube (Fig. 2). Position the tie rod clamp as shown (Fig. 3). Tighten to 27 N•m (20 ft. lbs.) torque.

(2) Install the tie rod on the drag link and steering knuckle. Install the retaining nuts.

(3) Tighten the ball stud nut on the steering knuckle to 74 N•m (55 ft. lbs.) torque. Tighten the ball stud nut to drag link to 75 N•m (55 ft. lbs.) torque. Install new cotter pins.

DRAG LINK

REMOVAL

(1) Remove the cotter pins and nuts at the steering knuckle and drag link (Fig. 2).

(2) Remove the steering dampener ball stud from the drag link with a puller tool.

(3) Remove the drag link from the steering knuckle with a puller tool. Remove the same for tie rod and pitman arm.

(4) If necessary, loosen the end clamp bolts and remove the tie rod end from the link.

INSTALLATION

(1) Install the drag link adjustment sleeve and tie rod end. Position clamp bolts as shown (Fig. 3).

(2) Position the drag link at the steering linkage (Fig. 2).

Install the drag link to the steering knuckle nut. Do the same for the tie rod and pitman arm.

(3) Tighten the nut at the steering knuckle to 74 N•m (55 ft. lbs.) torque. Tighten the pitman and tie rod ball stud nuts to 74 N•m (55 ft. lbs.) torque. Install new cotter pins.

(4) Install the steering dampener onto the drag link. Tighten the nut to 74 N•m (55 ft. lbs.) torque. Install a new cotter pin.

FASTENER TORQUE			
LETTER	N•m	IN. LBS.	FT. LBS.
A	251	—	185
B			
C	74	—	55
D			
E	49	—	36
F	27	—	20

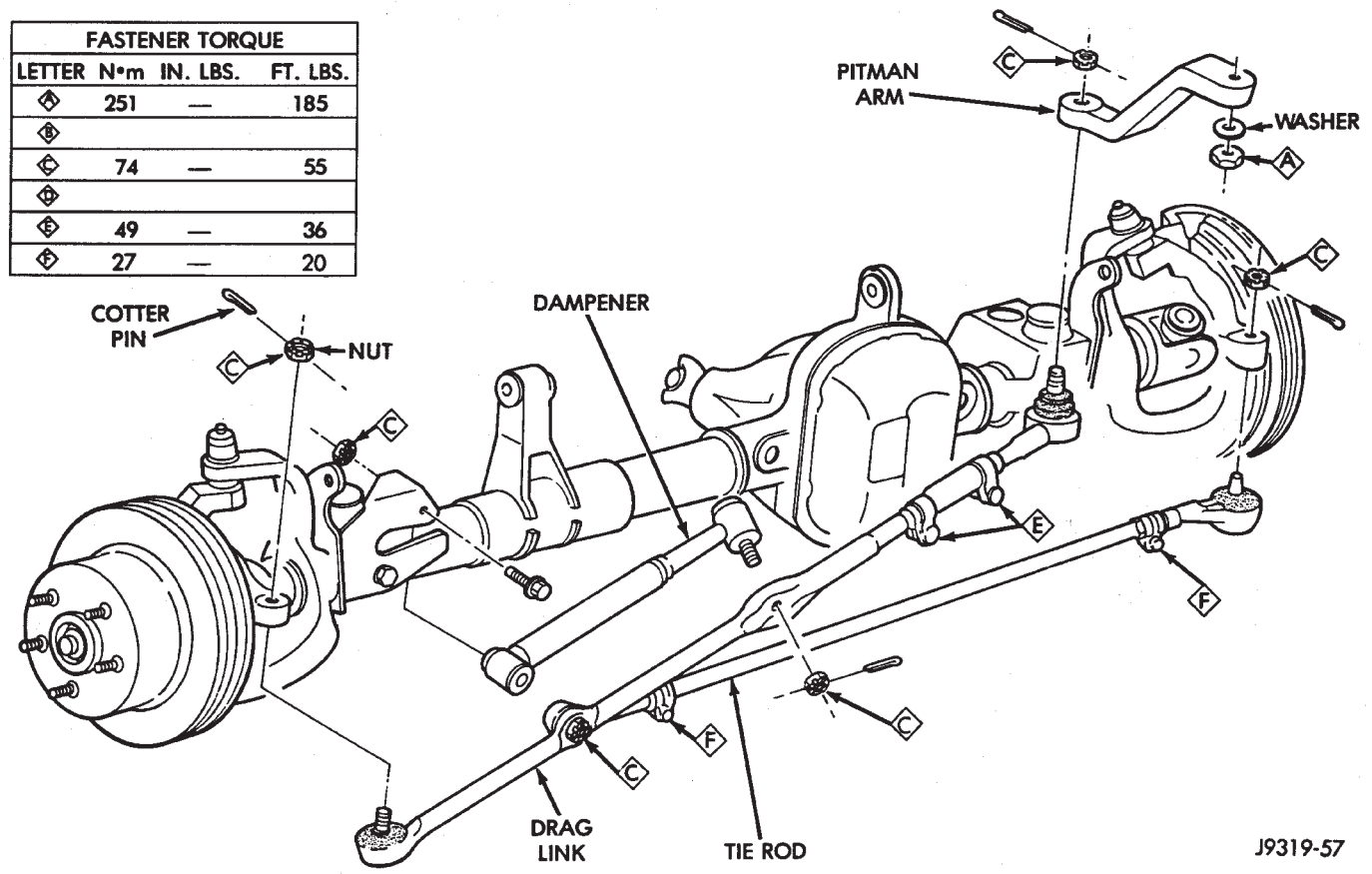


Fig. 2 Steering Linkage

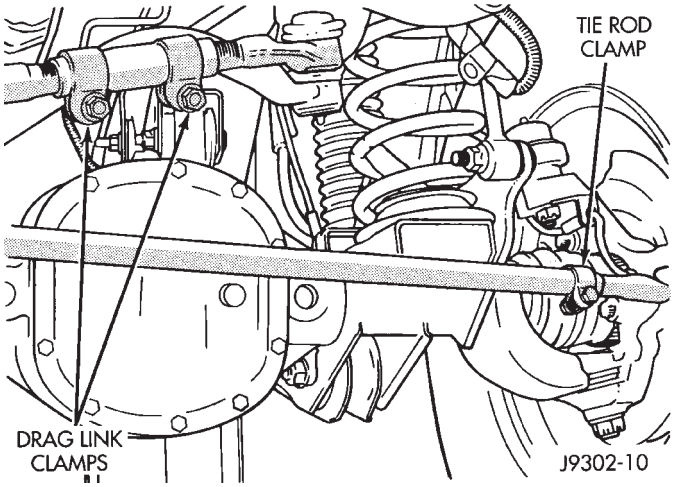


Fig. 3 Tie Rod/Drag Link Clamp Bolt

STEERING DAMPENER

REMOVAL

(1) Place the front wheels in a straight ahead position.

(2) Remove the steering dampener retaining nut and bolt from the axle bracket (Fig. 2).

(3) Remove the cotter pin and nut from the ball stud at the drag link (Fig. 2).

(4) Remove the steering dampener ball stud from the drag link with a puller tool.

INSTALLATION

(1) Install the steering dampener to the axle bracket and drag link.

(2) Install the steering dampener bolt in the axle bracket. Tighten the nut to 74 N•m (55 ft. lbs.) torque.

(3) Install the ball stud nut at the drag link. Tighten the nut to 74 N•m (55 ft. lbs.) torque. Install a new cotter pin.

PITMAN ARM

REMOVAL

(1) Remove the cotter pin and nut from the drag link at the pitman arm.

(2) Remove the drag link ball stud from the pitman arm with a puller.

(3) Remove the nut and washer from the steering gear shaft. Mark the pitman shaft and pitman arm for installation reference. Remove the pitman arm from steering gear with Puller 7998 or C-4150 (Fig. 4).

INSTALLATION

(1) Align and install the pitman arm on steering gear shaft.

(2) Install the washer and nut on the shaft. Tighten the nut to 251 N•m (185 ft. lbs.) torque.

(3) Install drag link ball stud to pitman arm (Fig.

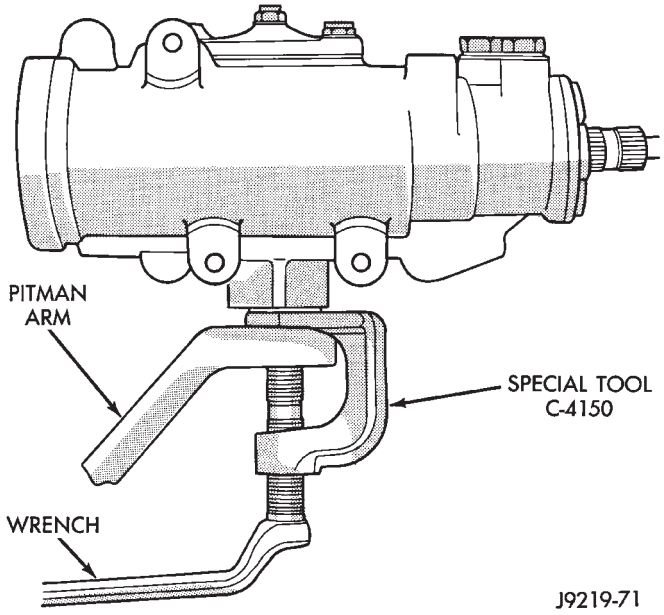


Fig. 4 Pitman Arm Removal

4). Install and tighten nut to 74 N●m (55 ft. lbs.) torque. Install a new cotter pin.

RECIRCULATING BALL POWER STEERING GEAR

INDEX

SERVICE INFORMATION

CAUTION: Vehicles equipped with H.D. Trailer Tow Package use high temperature seals in the power steering gear. The gears are identified with a YELLOW paint mark. The mark is on the pitman shaft side of the housing below the side cover. Use ONLY the correct seal kit when servicing the steering gear with this identification.

A recirculating ball steering gear is used with the power (assisted) steering system (Fig. 1). The power steering gear can be adjusted and internally serviced.

Discard all O-ring seals during disassembly, they are not re-usable.

Safety goggles should be worn at all times when involved with power steering gear or pump service.

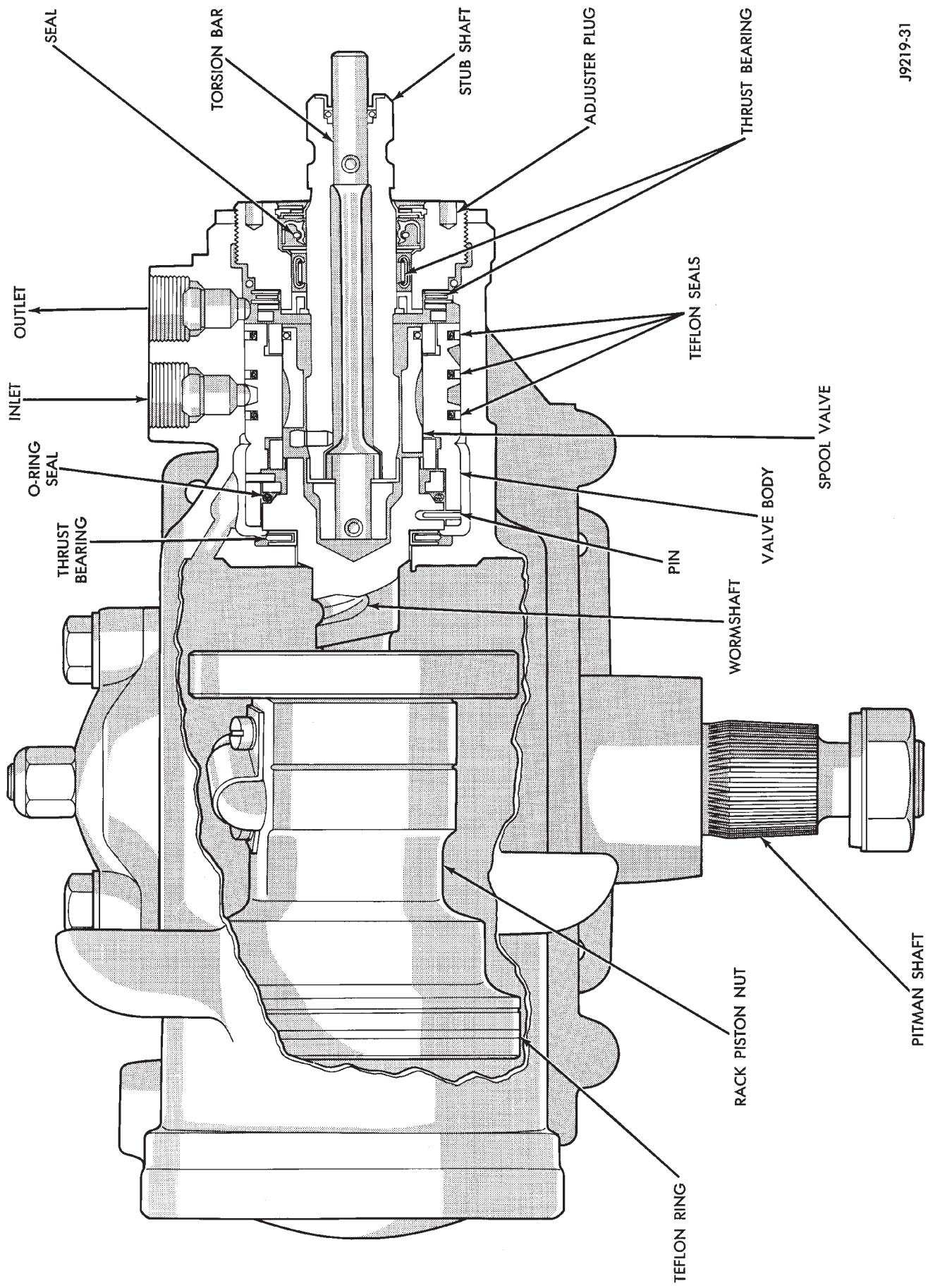


Fig. 1 Power Steering Gear

PITMAN SHAFT SEALS—IN CAR REPLACEMENT

REMOVAL

(1) Remove pitman arm from gear. Refer to Pitman Arm Removal in Steering Linkage.

(2) Clean exposed end of pitman shaft and housing. Use a wire brush to clean the shaft splines.

(3) Remove retaining ring with snap ring pliers (Fig. 2).

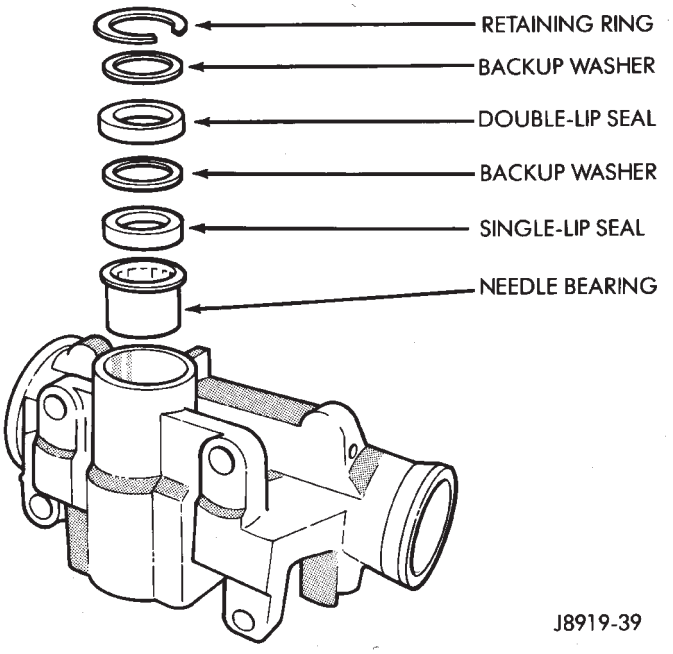


Fig. 2 Pitman Shaft Seals

CAUTION: Use care not to score the housing bore when prying out seals and washers.

(4) Remove backup washer and double lip seal with screwdriver.

- Start the engine and turn the steering wheel fully to the LEFT to force out the seals and washers.
- Stop the engine.

(5) Remove backup washer and single lip seal with screwdriver.

(6) Inspect the housing for burrs and remove if necessary. Inspect the pitman shaft seal surface for roughness and pitting. If pitted replace shaft.

INSTALLATION

(1) Install single lip seal with Installer or a suitable size deep socket (Fig. 3).

(2) Coat the double lip seal and washer with grease.

(3) Install the backup washer.

(4) Install the double lip seal.

(5) Install the backup washer.

(6) Install the retainer ring with snap ring pliers.

(7) Center the steering gear.

(8) Install the pitman arm. Refer to Pitman Arm Installation in Steering Linkage.

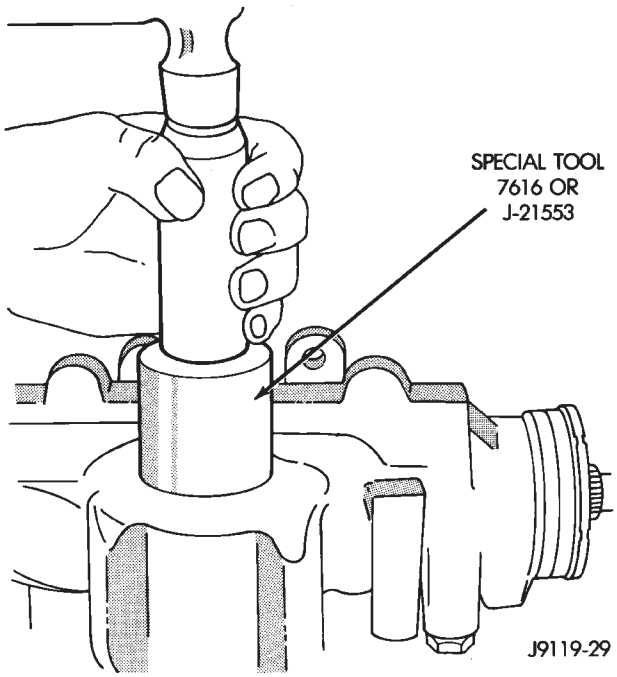


Fig. 3 Pitman Shaft Seal Installation

(9) Add power steering fluid. Refer to Power Steering Initial Operation.

INTERMEDIATE (COUPLING) SHAFT

REMOVAL

(1) Place the front wheels in the straight ahead position.

(2) Remove the column intermediate (coupling) shaft stone shield (Fig. 4).

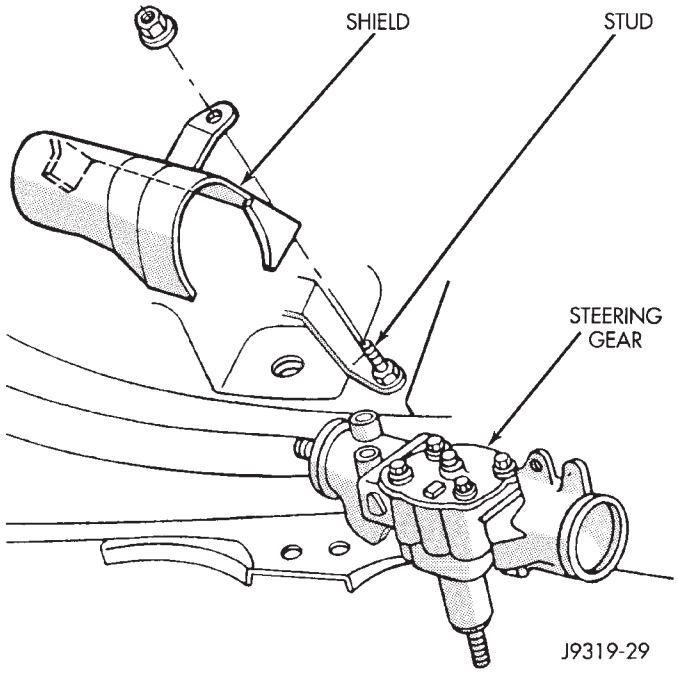


Fig. 4 Shaft Stone Shield

(3) Remove the shaft pinch bolt at the steering gear and column (Fig. 5). Unbolt steering gear from frame rail to remove shaft. Refer to Steering Gear Replacement in this section.

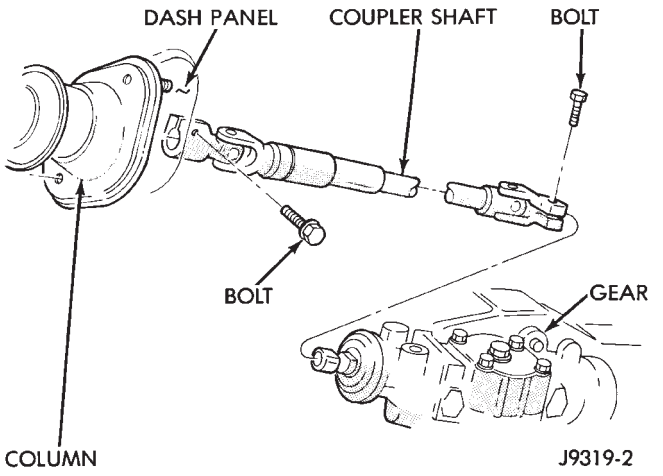


Fig. 5 Coupling Shaft

INSTALLATION

(1) Align the intermediate (coupling) shaft to the steering gear and column.

(2) Position the steering gear on the frame. Refer to Steering Gear Replacement in this section.

(3) Install and tighten the pinch bolts to 45 N•m (33 ft. lbs.) torque.

(4) Install the intermediate (coupling) shaft stone shield.

STEERING GEAR REPLACEMENT

REMOVAL

(1) Place the front wheels in the straight ahead position with the steering wheel centered.

(2) Disconnect and cap the fluid hoses from steering gear. Refer to Pressure and Return Hose Replacement in this group.

(3) Remove the column coupler shaft from the gear. Refer to the removal procedures in this section.

(4) Remove pitman arm from gear. Refer to Pitman Arm Removal in the Steering Linkage section.

(5) Remove the steering gear retaining bolts and nuts. Remove the steering gear from the vehicle (Fig. 6).

INSTALLATION

(1) Align the column coupler shaft to steering gear. Refer to Column Coupler installation in this section.

(2) Position the steering gear on the frame rail and install the bolts. Tighten the bolts to 88 N•m (65 ft. lbs.) torque.

(3) Align and install the pitman arm. Refer to Pitman Arm Installation in the Steering Linkage section.

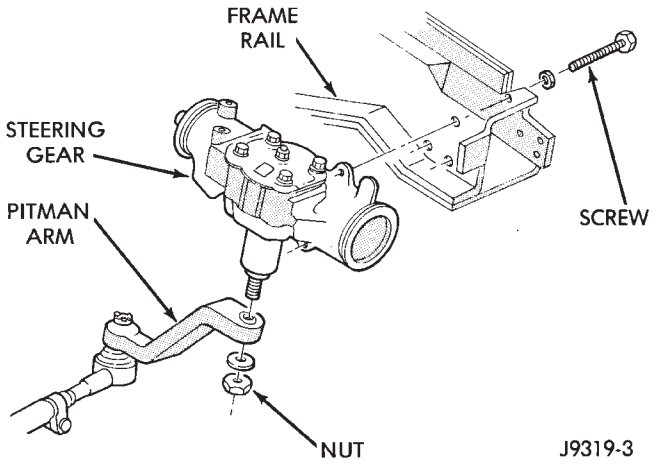


Fig. 6 Steering Gear Mounting

(4) Connect fluid hoses to steering gear. Refer to Pressure and Return Hose Replacement in this group.

STEERING GEAR ADJUSTMENTS

SERVICE INFORMATION

Adjusting the steering gear in the vehicle is **NOT** recommended. Remove the gear from the vehicle and mount in a vise. Drain the power steering fluid and make the following adjustments in this order:

- FIRST - worm thrust bearing preload
- SECOND - over-center preload adjustment

WORM THRUST BEARING PRELOAD ADJUSTMENT

(1) Remove adjuster plug locknut (Fig. 7).

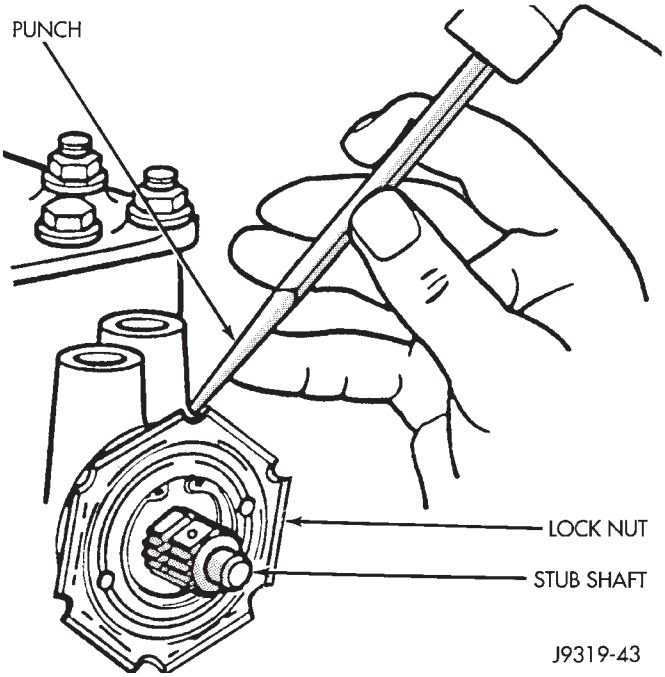


Fig. 7 Loosening the Adjuster Plug Locknut

(2) Turn the adjuster in with Spanner Wrench C-4381 (J7624). Tighten the plug and thrust bearing in the housing until firmly bottomed in housing.

(3) Place an index mark on the housing even with one of the holes in adjuster plug (Fig. 8).

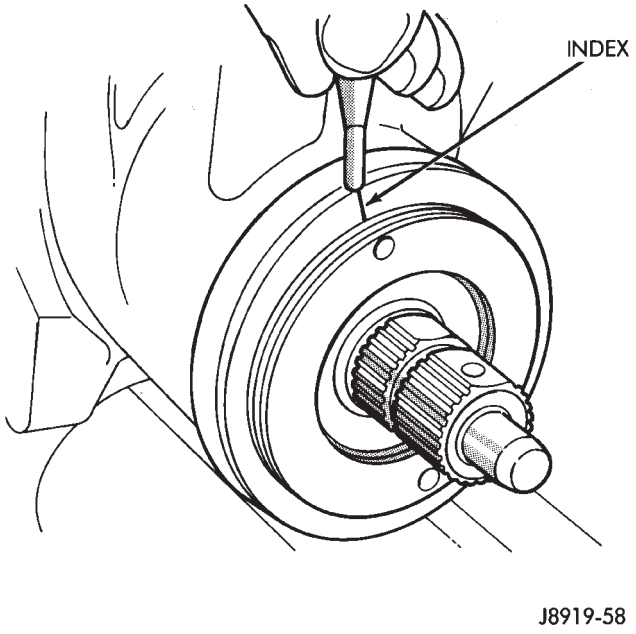


Fig. 8 Alignment Marking On Housing

(4) Measure back (counterclockwise) 13 mm (0.50 in) and mark housing (Fig. 9).

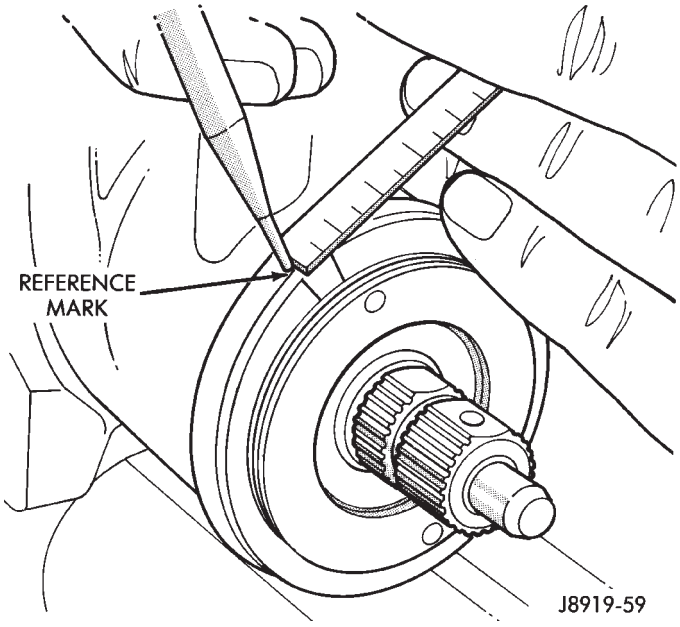


Fig. 9 Remarking The Housing

(5) Rotate adjustment cap back (counterclockwise) with spanner wrench until hole is aligned with the second mark (Fig. 10).

(6) Install and tighten locknut to 109 N●m (80 ft. lbs.) torque. Be sure adjustment cap does not turn while tightening the locknut.

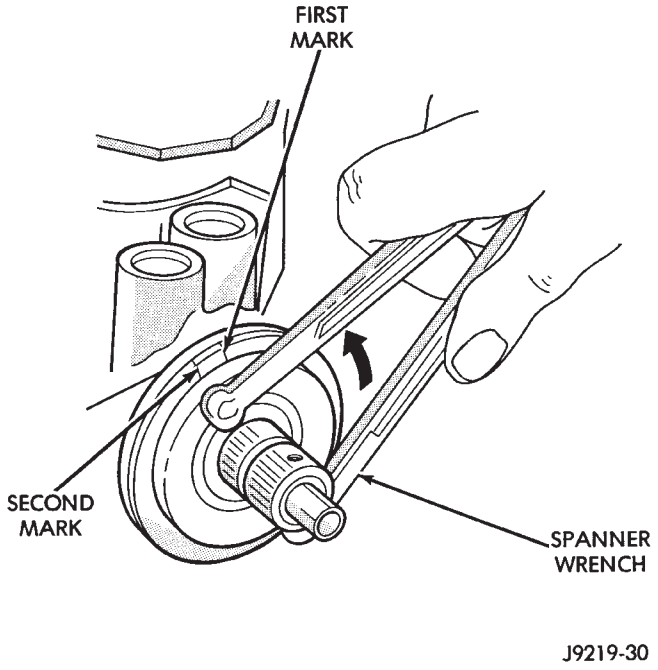


Fig. 10 Aligning To The Second Mark

OVER-CENTER ADJUSTMENT

(1) Rotate the stub shaft from stop to stop and count the number of turns.

(2) Starting at either stop turn the stub shaft back 1/2 the total number of turns. This is the center of the gear travel (Fig. 11).

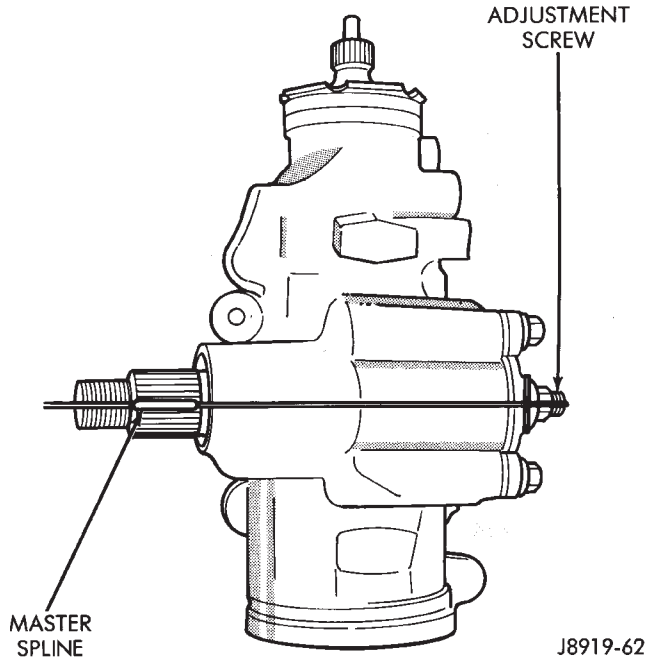


Fig. 11 Steering Gear Centered

(3) Turn the pitman shaft adjuster screw back (COUNTERCLOCKWISE) until extended, then turn back in (CLOCKWISE) one full turn.

(4) Place the torque wrench in the vertical position on the stub shaft. Rotate the wrench 45 degrees each side of the center and record the highest rotational torque on center (Fig. 12).

(5) Turn the adjuster in until torque to turn stub shaft is 0.6 to 1.2 N●m (6 to 10 in. lbs.) more than reading in Step 4.

(6) Prevent the adjuster screw from turning while tightening adjuster lock nut. Tighten the adjuster lock nut to 49 N●m (36 ft. lbs.).

GEAR DISASSEMBLY INFORMATION

CAUTION: Cleanliness is extremely important when repairing a power steering gear. Keep the bench, tools and components clean at all times. Thoroughly clean the exterior of the gear with cleaning solvent before disassembly. Drain as much of the fluid as possible. Use protective vise jaws at all times when clamping components. During assembly, lubricate all components with power steering fluid except when instructed otherwise (Fig. 13).

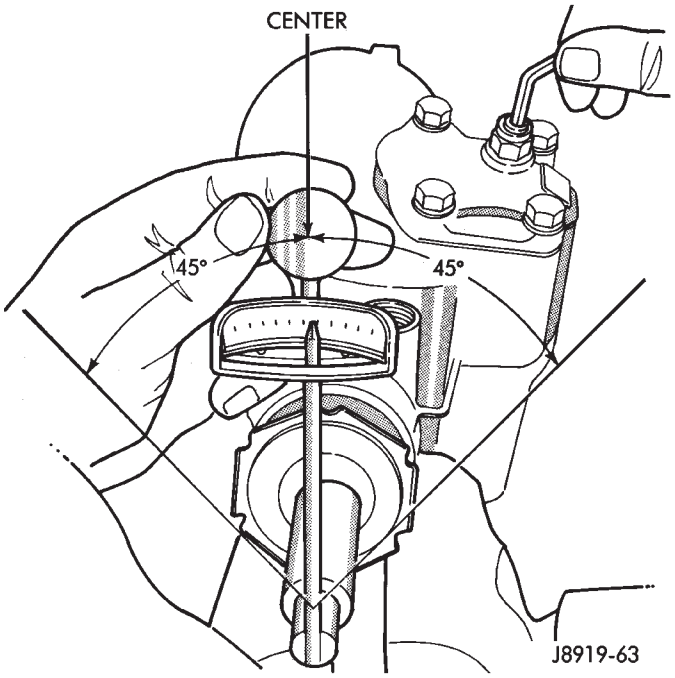
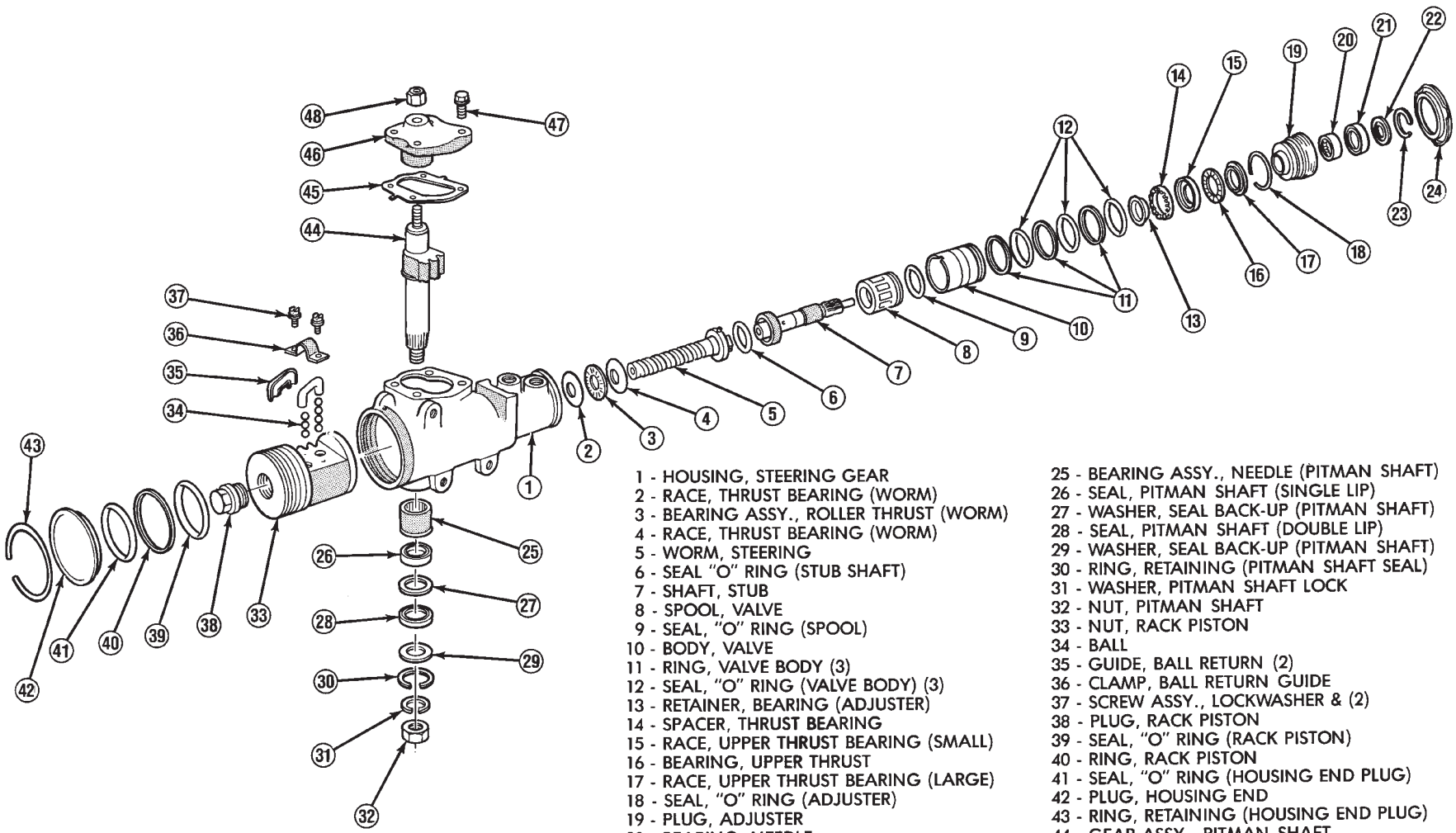


Fig. 12 Checking Over-center Rotation Torque



1 - HOUSING, STEERING GEAR
2 - RACE, THRUST BEARING (WORM)
3 - BEARING ASSY., ROLLER THRUST (WORM)
4 - RACE, THRUST BEARING (WORM)
5 - WORM, STEERING
6 - SEAL "O" RING (STUB SHAFT)
7 - SHAFT, STUB
8 - SPOOL, VALVE
9 - SEAL, "O" RING (SPOOL)
10 - BODY, VALVE
11 - RING, VALVE BODY (3)
12 - SEAL, "O" RING (VALVE BODY) (3)
13 - RETAINER, BEARING (ADJUSTER)
14 - SPACER, THRUST BEARING
15 - RACE, UPPER THRUST BEARING (SMALL)
16 - BEARING, UPPER THRUST
17 - RACE, UPPER THRUST BEARING (LARGE)
18 - SEAL, "O" RING (ADJUSTER)
19 - PLUG, ADJUSTER
20 - BEARING, NEEDLE
21 - SEAL, STUB SHAFT
22 - SEAL, STUB SHAFT DUST
23 - RING, RETAINING
24 - NUT, ADJUSTER PLUG LOCK
25 - BEARING ASSY., NEEDLE (PITMAN SHAFT)
26 - SEAL, PITMAN SHAFT (SINGLE LIP)
27 - WASHER, SEAL BACK-UP (PITMAN SHAFT)
28 - SEAL, PITMAN SHAFT (DOUBLE LIP)
29 - WASHER, SEAL BACK-UP (PITMAN SHAFT)
30 - RING, RETAINING (PITMAN SHAFT SEAL)
31 - WASHER, PITMAN SHAFT LOCK
32 - NUT, PITMAN SHAFT
33 - NUT, RACK PISTON
34 - BALL
35 - GUIDE, BALL RETURN (2)
36 - CLAMP, BALL RETURN GUIDE
37 - SCREW ASSY., LOCKWASHER & (2)
38 - PLUG, RACK PISTON
39 - SEAL, "O" RING (RACK PISTON)
40 - RING, RACK PISTON
41 - SEAL, "O" RING (HOUSING END PLUG)
42 - PLUG, HOUSING END
43 - RING, RETAINING (HOUSING END PLUG)
44 - GEAR ASSY., PITMAN SHAFT
45 - SEAL ASSY., GASKET
46 - COVER ASSY., HOUSING SIDE
47 - BOLT, HEX. HEAD (SIDE COVER) (4)
48 - NUT, LASH ADJUSTER

J9219-64

Fig. 13 Power Steering Gear

PITMAN SHAFT AND SIDE COVER REPLACEMENT

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

(2) Remove pitman arm from steering gear. Refer to Pitman Arm Removal in the Steering Linkage section.

(3) Rotate stub shaft back and forth to drain power steering fluid.

DISASSEMBLE

- Clean exposed end of pitman shaft and housing
- Clean pitman shaft spline with a wire brush

(1) Remove preload adjuster nut.

(2) Remove side cover bolts. Rotate stub shaft with socket to center gear.

(3) Remove side cover, gasket and pitman shaft as an assembly.

(4) Remove pitman shaft from the side cover (Fig. 14).

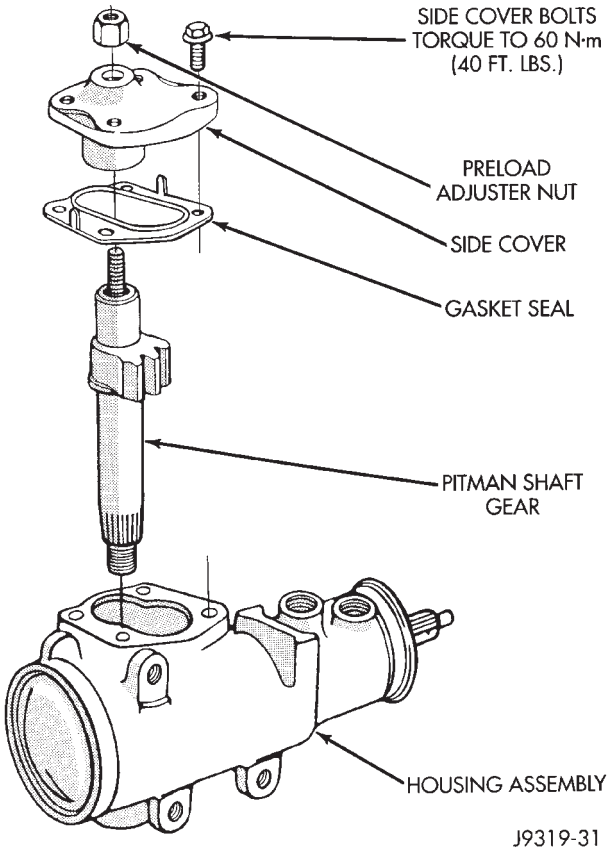


Fig. 14 Side Cover and Pitman Shaft

ASSEMBLE

(1) Install pitman shaft to side cover by screwing shaft in until it fully seats to side cover.

(2) Install preload adjuster nut. **Do not tighten nut until after pitman shaft adjustment has been made.**

(3) Install gasket to side cover and bend tabs around edges of side cover.

(4) Install pitman shaft assembly and side cover to housing.

(5) Install side cover bolts and tighten to 60 N•m (44 ft. lbs.).

(6) Adjust pitman shaft, refer to Over-Center Adjustment.

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

(2) Install pitman arm onto steering gear. Refer to Steering Linkage in this group.

HOUSING END PLUG

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

(2) Remove pitman arm from steering gear. Refer to Steering Linkage in this group.

(3) Rotate stub shaft back and forth to drain power steering fluid.

DISASSEMBLE

- Rotate stub shaft back and forth to drain fluid

(1) Rotate retaining ring until one end is under the hole in the housing. Unseat and force ring from groove (Fig. 15).

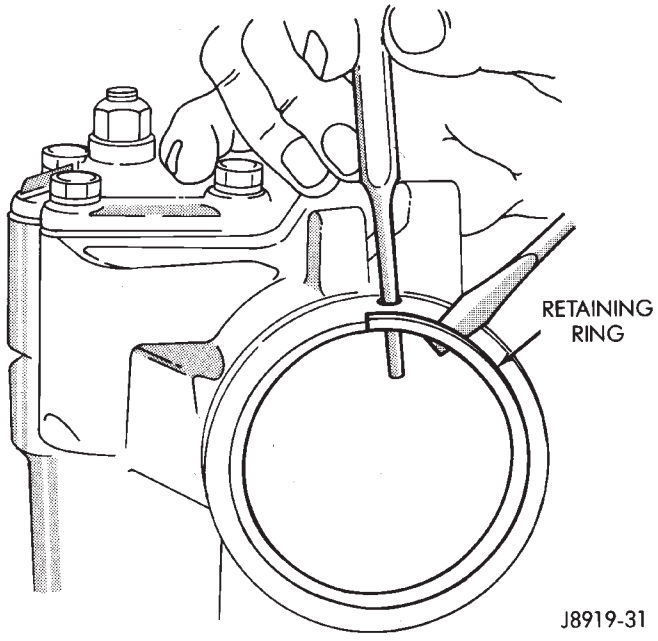


Fig. 15 End Plug Retaining Ring

(2) Rotate stub shaft slowly COUNTER-CLOCKWISE to remove end plug out from housing (Fig. 16).

CAUTION: Do not turn stub shaft any farther than necessary. The recirculating balls will drop out of the rack piston circuit and fall inside the rack piston chamber.

(3) Remove O-ring seal (Fig. 16).

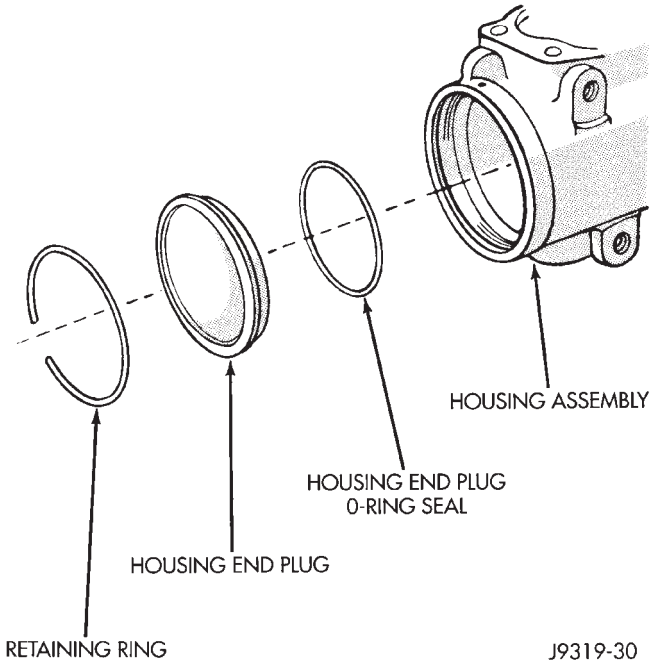


Fig. 16 End Plug Components

ASSEMBLE

- Lubricate O-ring seal with power steering fluid

(1) Install O-ring into housing.

(2) Install plug, tap lightly with a plastic mallet to seat it.

(3) Install retaining ring with open end 25 mm (1 inch) from access hole (Fig. 17).

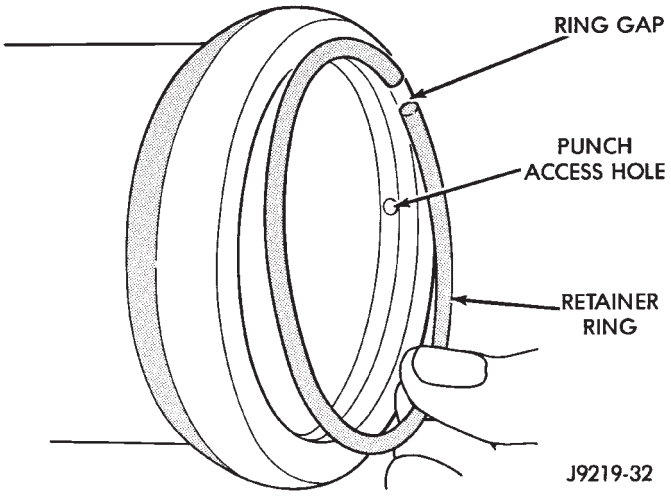


Fig. 17 Installing The Retaining Ring

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

(2) Install pitman arm onto steering gear. Refer to Steering Linkage in this group.

ADJUSTER PLUG ASSEMBLY REPLACEMENT

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

DISASSEMBLE

(1) Remove adjuster plug lock nut from housing.

(2) Remove adjuster plug from housing with Spanner Wrench C-4381 (J7624) (Fig. 18).

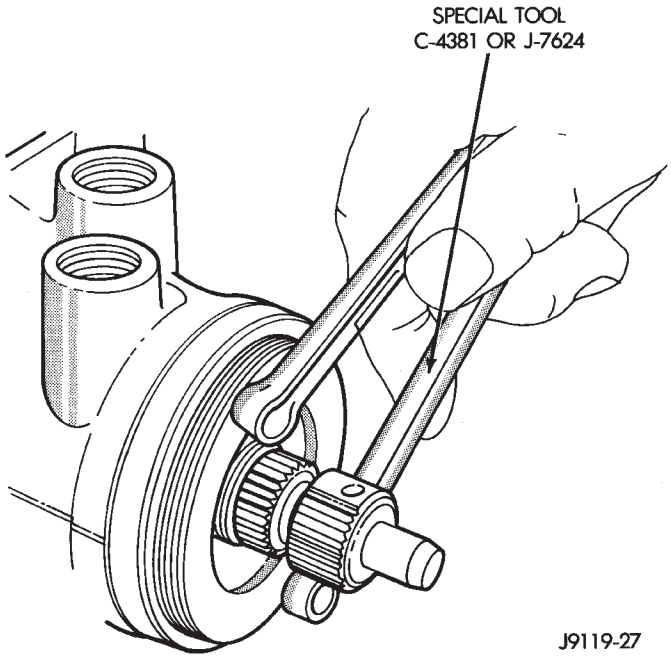


Fig. 18 Remove/Install Adjustment Plug

(3) Remove thrust washer bearing retainer from adjuster plug with screwdriver (Fig. 19).

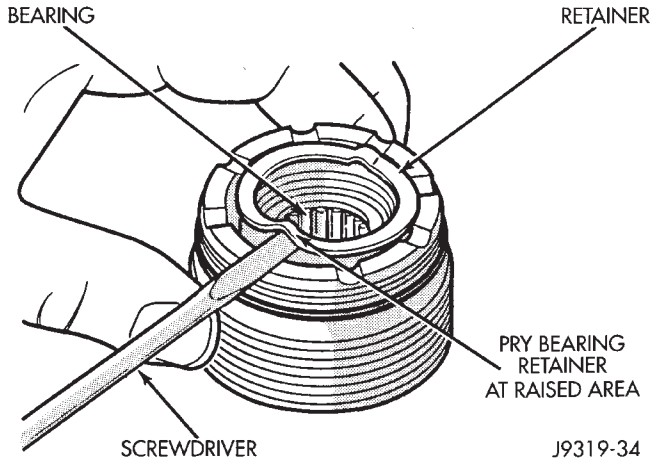


Fig. 19 Remove Retainer

(4) Remove bearing spacer, races and thrust bearing (Fig. 20).

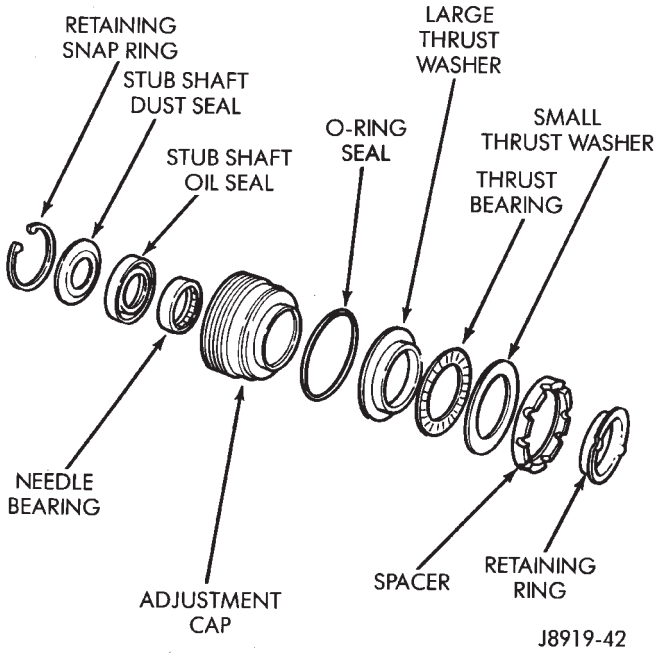


Fig. 20 Adjustment Plug (Cap) Components

(5) Remove O-ring seal.
(6) Remove retaining snap ring.
(7) Remove needle bearing, dust seal and lip seal with an appropriate tool (Fig. 21).

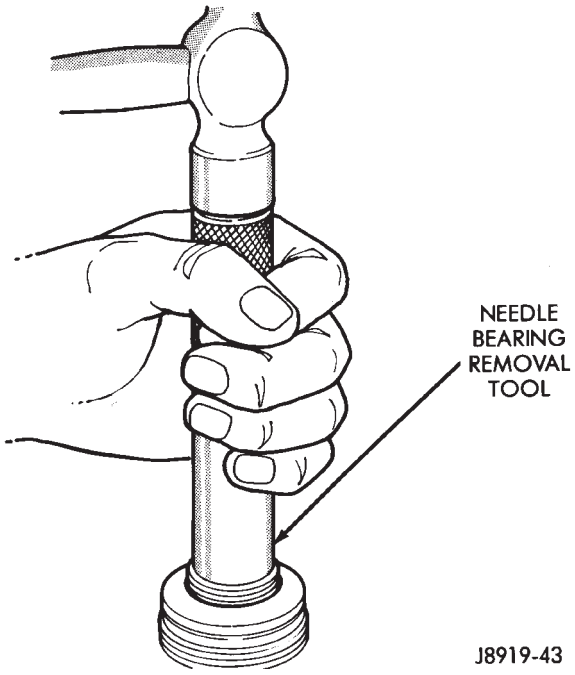


Fig. 21 Needle Bearing Removal

ASSEMBLE

CAUTION: Needle bearing must be installed with identification on bearing facing tool to prevent damage to bearing.

(1) Install needle bearing into adjuster plug with an appropriate tool.
(2) Install lip seal and dust seal into adjuster plug with an appropriate tool.
(3) Install retainer snap ring.
(4) Install O-ring seal to adjuster plug.
(5) Install large bearing race, thrust bearing, small bearing race and bearing spacer to adjuster plug.
(6) Install thrust washer bearing retainer to adjuster plug (Fig. 22).

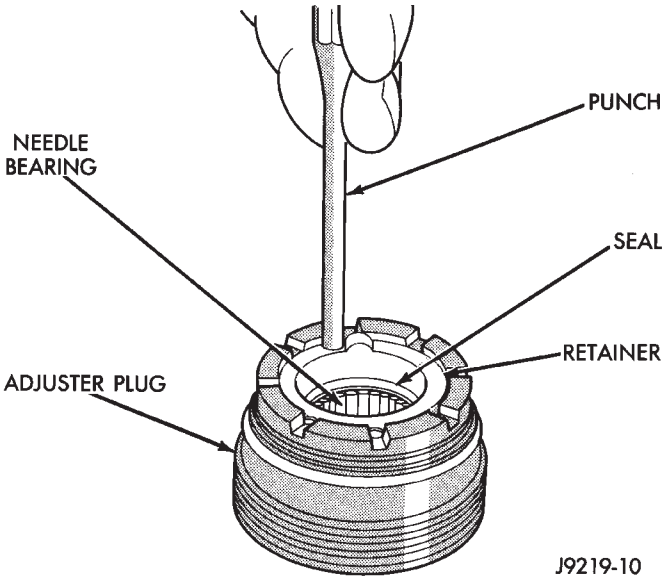


Fig. 22 Install Retainer

CAUTION: When installing adjuster plug, care should be taken NOT to cut the seals.

(7) Install adjuster plug into housing with Spanner Wrench C-4381 (J7624).
(8) Adjust bearing preload, refer to Thrust Bearing Preload Adjustment.
(9) Install adjuster plug lock nut, and using a punch (drift) in a notch, tighten securely (Fig. 23). **Hold adjuster plug to maintain alignment of the marks.**
(10) Adjust pitman shaft. Refer to Over-Center Adjustment.

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

VALVE REPLACEMENT

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

DISASSEMBLE

(1) Remove adjuster plug, refer to Adjuster Plug Assembly Replacement.

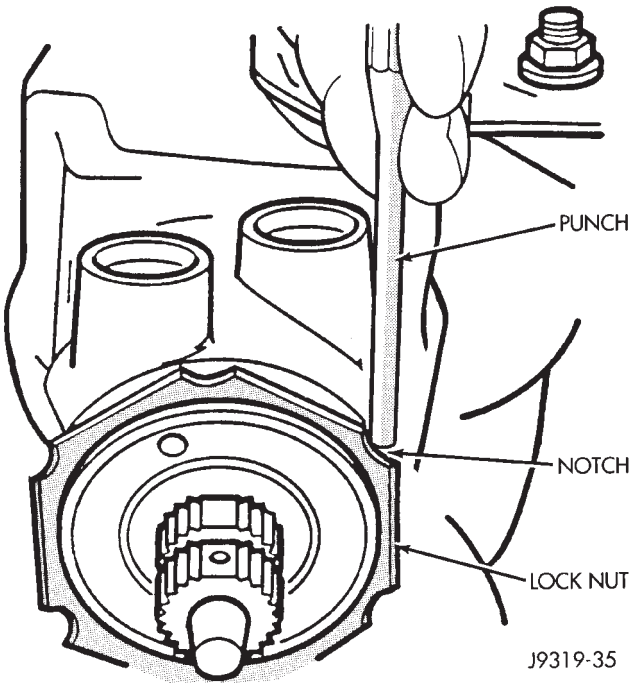


Fig. 23 Tighten Lock Nut

(2) Remove stub shaft and valve assembly (Fig. 24).

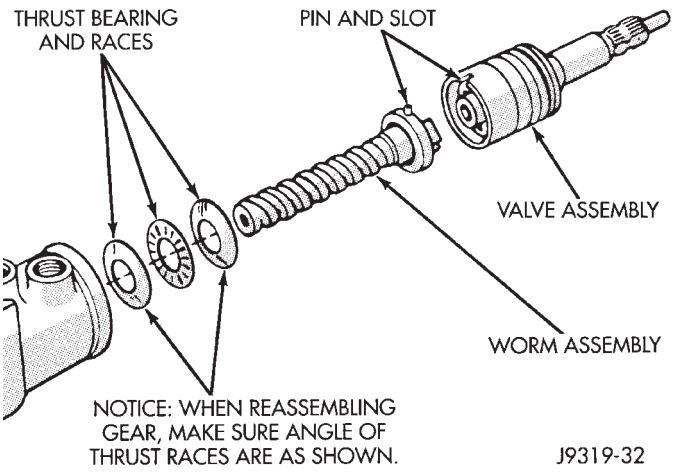


Fig. 24 Bearing, Worm and Valve Assembly

(3) Remove stub shaft from valve assembly, if necessary.

- Tap stub shaft lightly on a block of wood to loosen shaft cap
- Pull cap and valve body and disengage stub shaft pin from hole in valve body (Fig. 25).

(4) Remove valve assembly if necessary.

- Remove valve spool by pulling and rotating from valve body (Fig. 26).
- Remove valve spool O-ring seal
- Remove valve body teflon rings and O-ring seals (Fig. 27).

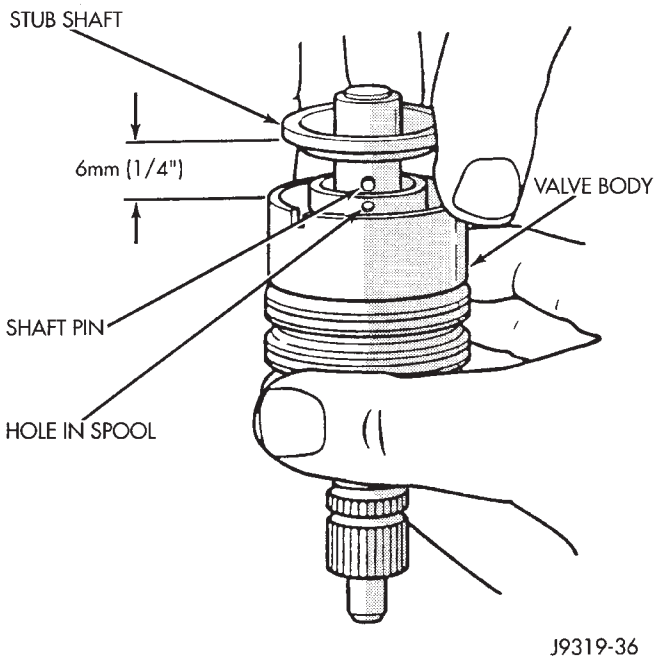


Fig. 25 Remove and Install Stub Shaft

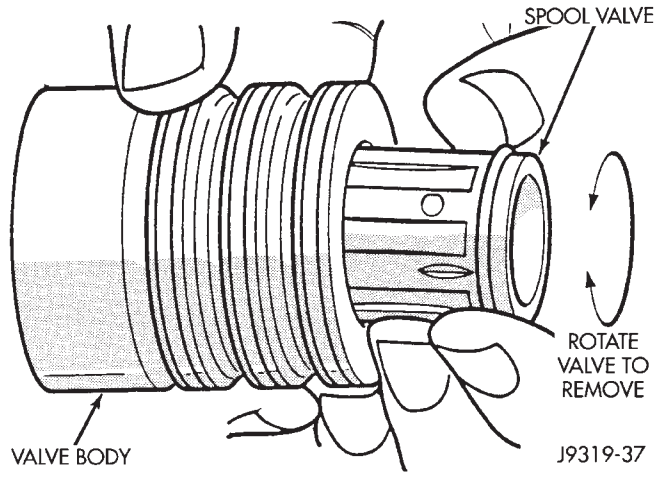


Fig. 26 Remove and Install Spool

ASSEMBLE

(1) Install valve spool O-ring seal to valve spool.

(2) Lubricate valve spool and O-ring seal with power steering fluid.

(3) Install valve spool to valve body by pushing and rotating. Hole in valve spool for stub pin must be accessible from opposite end of valve body.

(4) Assemble stub shaft to valve spool, if necessary and insert pin (Fig. 28).

- Notch in stub shaft cap MUST fully engage valve body pin and seat against valve body shoulder.

(5) Install O-ring seals and teflon rings to valve body.

(6) Lubricate O-ring seals and teflon rings with power steering fluid.

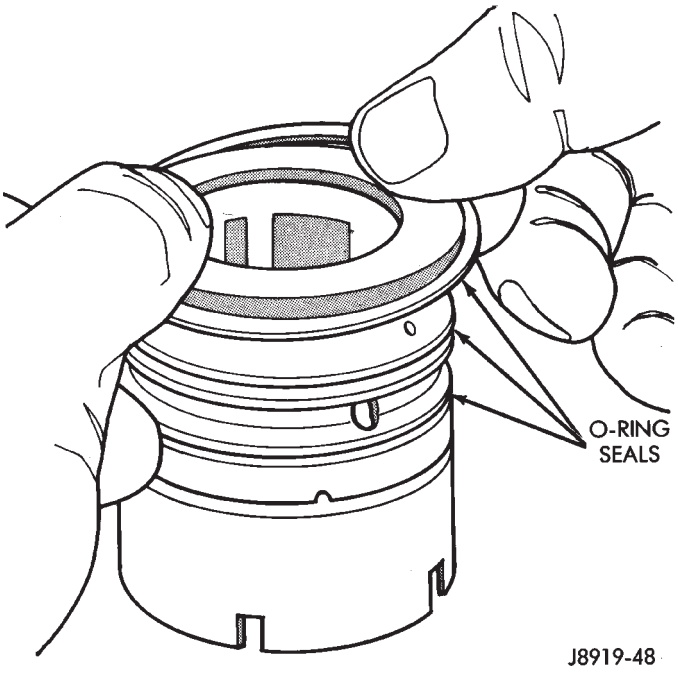


Fig. 27 Remove and Install Valve Seals

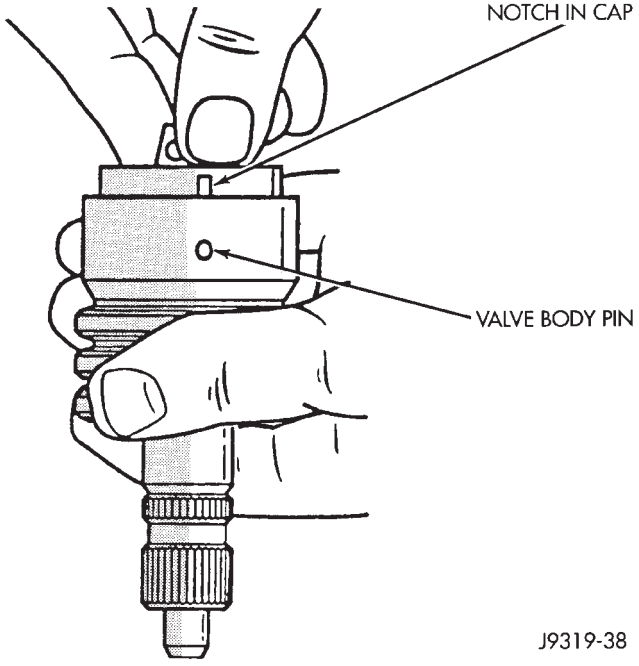


Fig. 28 Stub Shaft Installation

(7) Install stub shaft and valve assembly to worm shaft, fitting on worm shaft to slot in the valve assembly.

(8) Adjust Thrust Bearing Preload Adjustment and Over-Center Adjustment. Refer to Steering Gear Adjustments in this section.

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

RACK PISTON AND WORM SHAFT REPLACEMENT

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

DISASSEMBLE

(1) Remove pitman shaft and side cover. Refer to Side Cover and Pitman Shaft Replacement in this section.

(2) Remove housing plug end. Refer to Housing End Plug Replacement in this section.

(3) Turn stub shaft COUNTERCLOCKWISE until the rack piston begins to come out of the housing.

(4) Remove rack piston plug (Fig. 29).

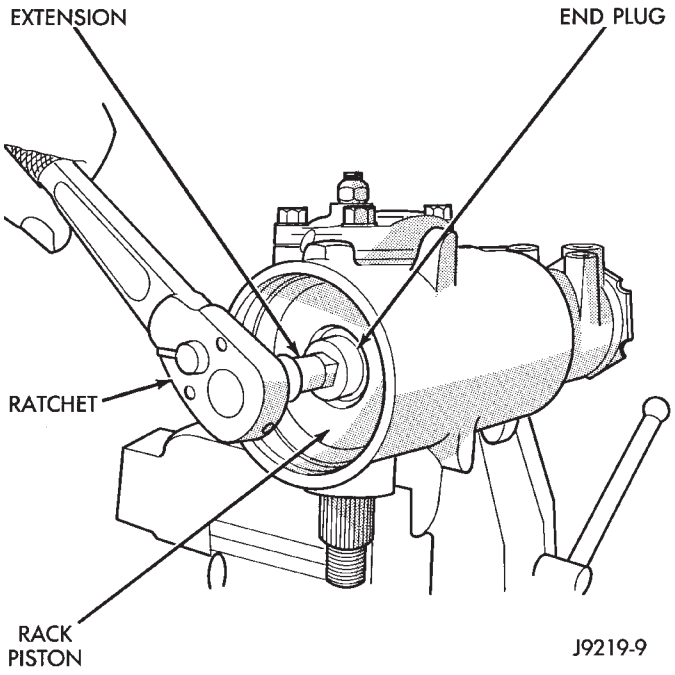


Fig. 29 Remove and Install Rack Piston End Plug

(5) Insert Arbor C-4175 (J-21552) into bore of rack piston (Fig. 30). Hold tool tightly against worm shaft while turning the stub shaft COUNTERCLOCKWISE.

• The rack piston will be forced onto the tool and hold the rack piston balls in place.

(6) Remove the rack piston, rack balls, and tool together from housing.

(7) Remove valve. Refer to Valve Replacement in this section.

(8) Remove worm shaft.

(9) Remove thrust bearing and races.

(10) Remove tool from rack piston.

(11) Remove rack piston balls.

(12) Remove screws, clamp and ball guide.

(13) Remove teflon ring and O-ring seal (Fig. 31).

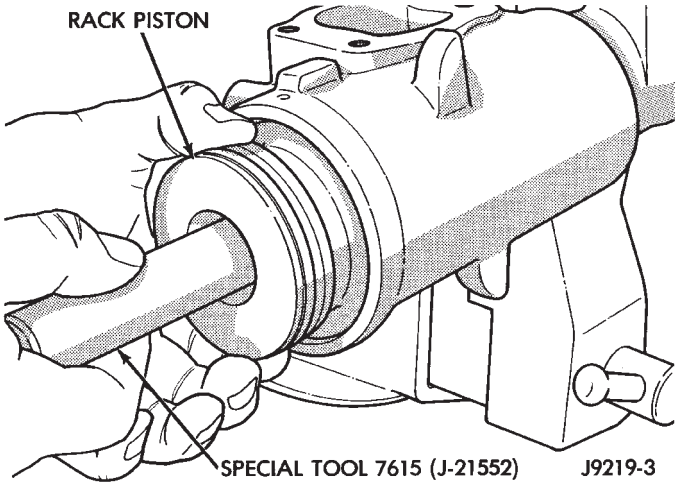


Fig. 30 Remove and Install Rack Piston

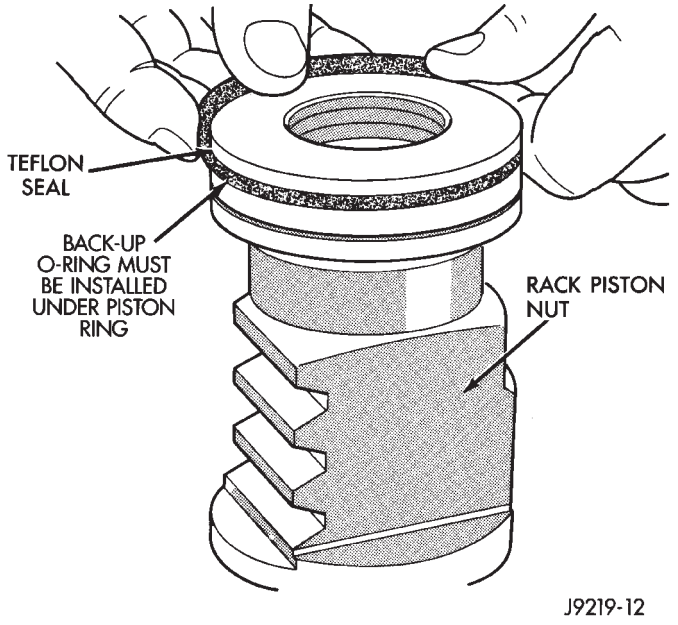


Fig. 31 Remove and Install Seal on Rack Piston

CLEAN AND INSPECTION

(1) Wash all components in clean solvent and dry with compressed air.

(2) Check for scores, nicks or burrs on the rack piston finished surface. Slight wear is normal on the worm gear surfaces.

ASSEMBLE

(1) Install O-ring seal and teflon ring and lubricate with power steering fluid.

(2) Install worm shaft to rack piston outside of housing. Fully seat worm shaft to rack piston and align worm shaft spiral groove with rack piston ball guide hole (Fig. 32).

WARNING: MAKE SURE ALL RACK PISTON BALLS ARE REINSTALLED IN THE RACK PISTON. IMPROPER INSTALLATION MAY RESULT IN PERSONAL INJURY.

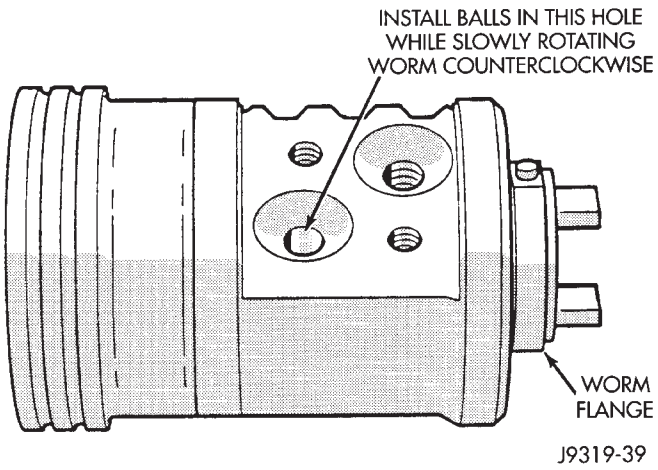


Fig. 32 Installing Balls in Rack Piston

There are 24 balls in the rack piston circuit, 12 are black and 12 are silver (Chrome). The black rack piston balls are smaller than the silver balls. THE BLACK AND SILVER BALLS MUST BE INSTALLED ALTERNATELY INTO THE RACK PISTON AND BALL GUIDE. This procedure will maintain worm shaft preload.

(3) Lubricate and install rack piston balls through return guide hole while turning wormshaft COUNTERCLOCKWISE.

(4) Install remaining balls to guide using grease or petroleum jelly at each end to hold in place (Fig. 33).

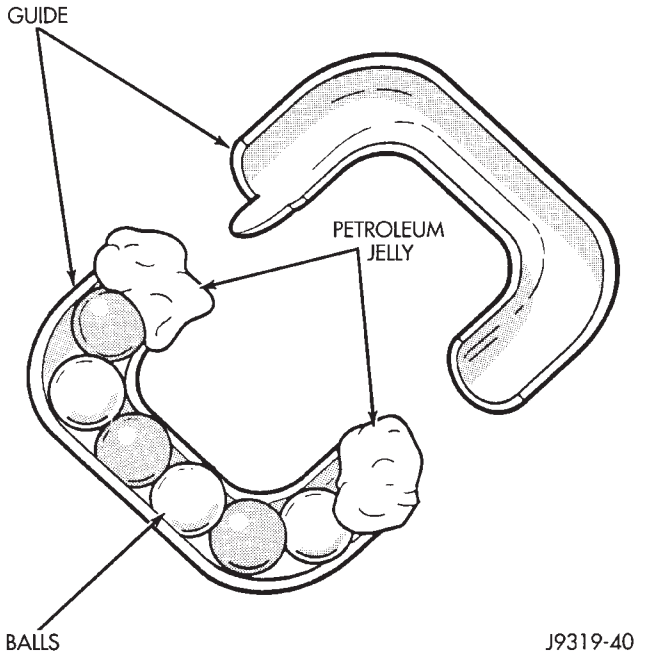


Fig. 33 Balls in the Return Guide

(5) Install guide onto rack piston and return with clamp and screws. Tighten screws to 58 N●m (43 in. lbs.) torque.

(6) Insert Arbor C-4175 (J-21552) into bore of rack piston. Hold tool tightly against worm shaft while

turning the stub shaft COUNTERCLOCKWISE.
• The rack piston will be forced onto the tool and hold the rack piston balls in place.
(7) Install the races and thrust bearing to worm shaft (Fig. 34).

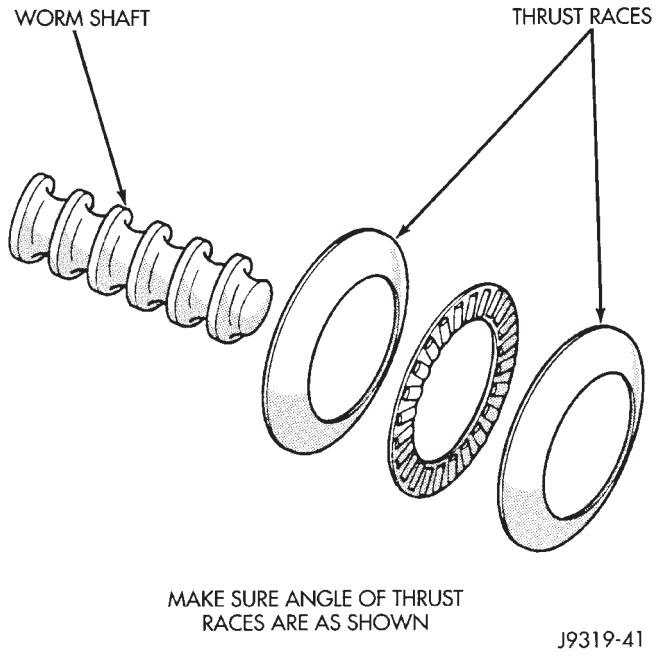


Fig. 34 Worm Shaft and Bearing

(8) Install worm shaft to housing.
(9) Install valve. Refer to Valve Replacement in this section.
(10) Install rack piston to worm shaft from tool, compress seals.
• Hold Arbor tightly against worm shaft and turn stub shaft CLOCKWISE until rack piston is seated on worm shaft.

WARNING: MAKE SURE ALL RACK PISTON BALLS ARE REINSTALLED IN THE RACK PISTON. IMPROPER INSTALLATION MAY RESULT IN PERSONAL INJURY.

(11) Install rack piston plug and tighten to 150 N•m (111 ft. lbs.) torque.
(12) Install housing end plug. Refer to Housing End Plug Replacement in this section.
(13) Install pitman shaft and side cover. Refer to Side Cover and Pitman Shaft Replacement in this section.
(14) Adjust steering gear. Refer to Steering Gear Adjustments in this section.

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

PITMAN SHAFT SEALS AND BEARING REPLACEMENT

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

DISASSEMBLE

(1) Remove pitman arm from gear. Refer to Pitman Arm Removal in Steering Linkage.
(2) Clean exposed end of pitman shaft and housing. Use a wire brush to clean the shaft splines.
(3) Remove retaining ring with snap ring pliers (Fig. 35).

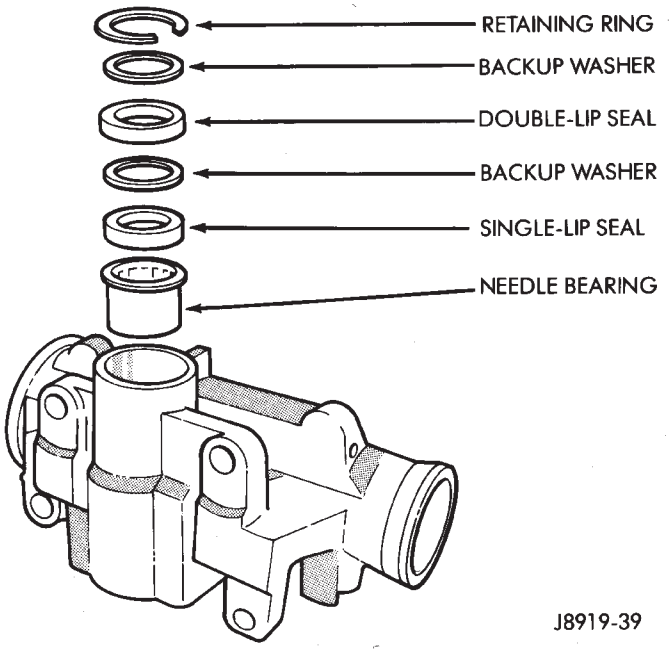


Fig. 35 Pitman Shaft Seals

CAUTION: Use care not to score the housing bore when prying out seals and washers.

(4) Remove backup washer and double lip seal with screwdriver.
(5) Remove backup washer and single lip seal with screwdriver.
(6) Inspect the housing for burrs and remove if necessary.
(7) Remove needle bearing from side cover area of housing (Fig. 36).

ASSEMBLE

(1) Install needle bearing into housing (Fig. 37).
(2) Install single lip seal with Installer or a suitable size socket (Fig. 38).
(3) Coat the double lip seal and washer with grease.
(4) Install the backup washer.
(5) Install the double lip seal.
(6) Install the backup washer.

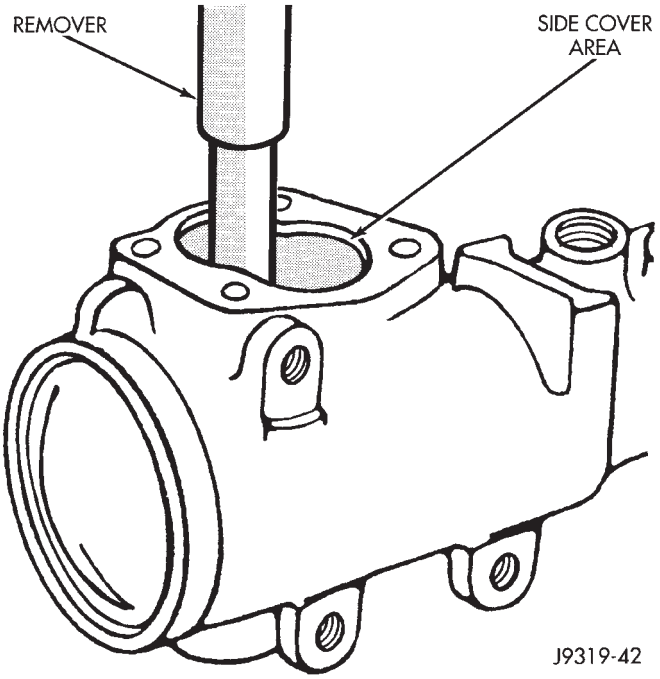


Fig. 36 Needle Bearing Removal

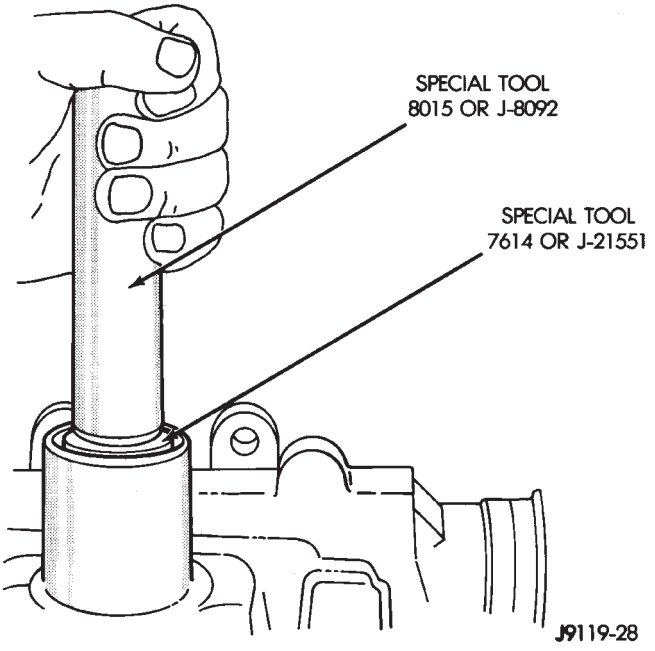


Fig. 37 Pitman Shaft Bearing Installation

(7) Install the retainer ring with snap ring pliers.

(8) Install the pitman shaft and side cover. Refer to Side Cover and Pitman Shaft Replacement in this section.

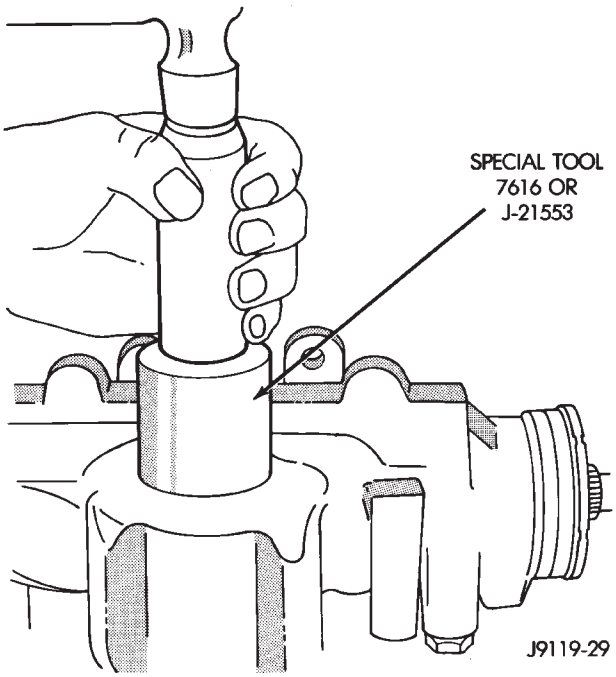


Fig. 38 Pitman Shaft Seal Installation

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

CHECK VALVE REPLACEMENT

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

DISASSEMBLE

CAUTION: Use care not to damage the threads of the housing when prying out check valve.

(1) Remove valve by prying from housing with a small screwdriver.

ASSEMBLE

(1) Install the valve into the housing with a 3/8-inch diameter piece of tubing 100 mm (4 inches) long.

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

POWER STEERING GEAR SPECIFICATIONS

Steering Gear Type . . . . . Recirculating ball with hydraulic assist.

Ratio Code (Top of Gear)
- BH, NZ 14:1
- BF, XS 13-16:1
- AL 12.7:1

Steering Gear Hydraulic Fluid . . . . . Use Mopar Power Steering Fluid, or equivalent.

Steering Gear Lubricants . . . . . Lubricate pitman shaft seals, bearings races, and rack piston recirculating balls with petroleum jelly. Lubricate all other parts with power steering fluid.

Steering Gear Adjustments:
Wormshaft Bearing Preload Torque . . . . . 0.45–1.13 N·m (4 to 10 in-lbs)

Pitman Shaft Overcenter Drag Torque:
New Gear
(less than 400 miles/640 km) . . . . . 0.45–0.90 N·m (4 to 8 in-lbs) in addition to wormshaft bearing preload but not to exceed combined total of 2 N·m (18 in-lbs).

Used Gear
(over 400 miles/640 km) . . . . 0.5–0.6 N·m (4 to 5 in-lbs) in addition to wormshaft bearing preload but not to exeed combined total of 2 N·m (18 in-lbs).

Caution: Gears must be adjusted exactly as outlined in Steering Gear Adjustments-On Bench. Failure to adhere to the recommended procedures may result in gear damage or improper steering response.

J9319-44

STEERING COLUMN

INDEX

SERVICE INFORMATION

WARNING: THE AIR BAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO SERVICE THE AIR BAG SYSTEM COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIR BAG AND POSSIBLE PERSONAL INJURY.

THE FASTENERS, SCREWS, AND BOLTS, ORIGINALLY USED FOR THE AIR BAG COMPONENTS, HAVE SPECIAL COATINGS. THIS HARDWARE IS SPECIFICALLY DESIGNED FOR THE AIR BAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. REPLACE WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR FASTENERS IN THE PARTS BOOK.

BEFORE SERVICING A COLUMN EQUIPPED WITH AIR BAG, REFER TO GROUP 8M, ELECTRICAL FOR PROPER AND SAFE PROCEDURES.

The Acustar columns (Fig.1) have been designed to be serviced as an assembly; less wiring, switches, shrouds, steering wheel, etc. Most steering column components can be serviced without removing the column from the vehicle. For additional information on electrical components refer to Group 8, Electrical.

CAUTION: Bumping, jolting and hammering on the steering column shaft must be avoided during all service procedures.

CAUTION: Disconnect negative (ground) cable from the battery before servicing any component on the column.

Safety goggles should be worn at all times when involved with steering column service.

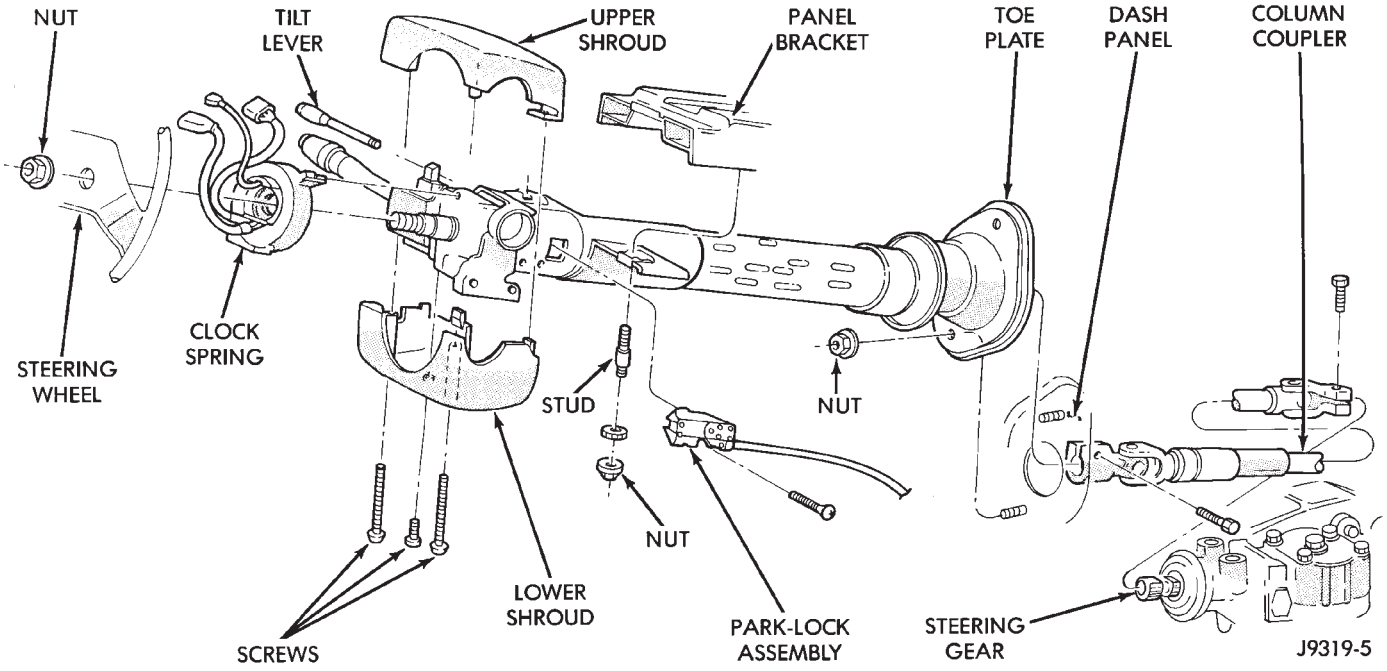


Fig. 1 Acustar Steering Column

STEERING WHEEL

WARNING: BEFORE SERVICING AIR BAG SYSTEM, REMOVE AND ISOLATE THE BATTERY NEGATIVE (-) CABLE (GROUND) FROM THE VEHICLE BATTERY. THIS IS THE ONLY SURE WAY TO DISABLE THE AIR BAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIR BAG DEPLOYMENT AND POSSIBLE INJURY. WHEN AN UNDEPLOYED AIR BAG ASSEMBLY IS TO BE REMOVED FROM THE STEERING WHEEL, DISCONNECT THE BATTERY GROUND CABLE AND ISOLATE. ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR 2 MINUTES, THEN BEGIN AIR BAG REMOVAL.

REMOVAL

(1) Make sure the front wheels are in the **straight ahead** position and steering column locked in place.

(2) Disconnect the battery negative (ground) cable and isolate.

(3) Wait 2 minutes for the reserve capacitor to discharge before removing undeployed air bag module.

(4) Remove the air bag module and speed control switch (if equipped) and disconnect the wire feeds (Fig. 2).

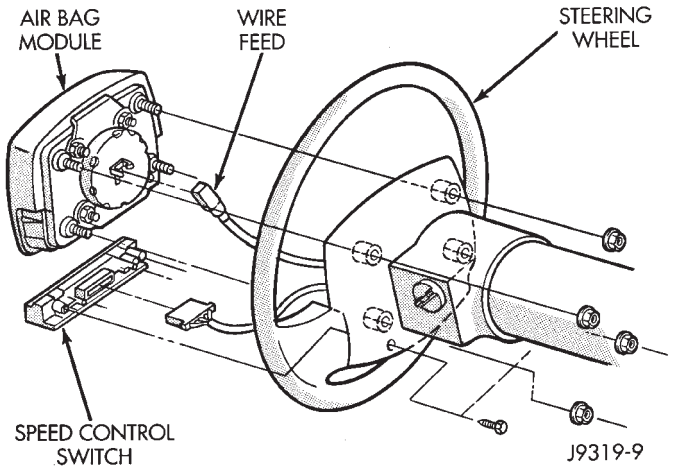


Fig. 2 Air Bag Module and Speed Control

(5) Disconnect the wire feed to the horn buttons.

(6) Remove the steering wheel retaining nut. Score or paint alignment marks on the column shaft and steering wheel (if none exist) for installation reference.

(7) Remove the steering wheel with a universal puller (Fig. 3). **Do not hammer or jolt the steering column or shaft during removal of the wheel.**

INSTALLATION

(1) Install the steering wheel on column with the scored marks or master splines aligned. Ensure the wheel compresses the 2 lock tabs on the clockspring.

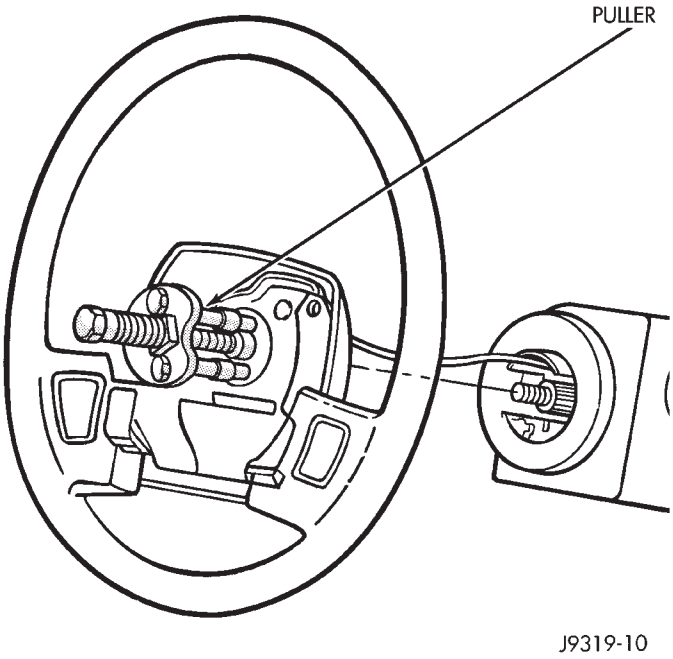


Fig. 3 Steering Wheel Removal

(2) Pull the air bag and speed control wires through the lower, larger hole in the steering wheel. Pull the horn wire through the smaller hole at the top.

WARNING: ENSURE THE AIR BAG WIRES ARE NOT PINCHED.

(3) Install the retaining nut and tighten to 61 N•m (45 ft. lbs.) torque. **Force the steering wheel down on the shaft with the retaining nut only. Do not hammer or shock the column with sudden impact to install the wheel.**

(4) Connect the wire feed to the horn buttons.

(5) Connect the wire feeds to the air bag module and speed control switch (Fig. 2). Tighten the air bag module nuts to 10 N•m (90 in. lbs.) torque.

WARNING: ENSURE THE AIR BAG WIRE CONNECTION IS COMPLETELY SEATED. THE LATCHING CLIP ARMS MUST BE VISIBLE ON TOP OF THE CONNECTOR HOUSING ON THE MODULE.

(6) Do not connect the battery ground (negative) cable. Refer to Air Bag System Check within Group 8M for additional information.

CLOCKSPRING

WARNING: BEFORE SERVICING AIR BAG SYSTEM, REMOVE AND ISOLATE BATTERY NEGATIVE (-) CABLE (GROUND) FROM VEHICLE BATTERY. THIS IS THE ONLY SURE WAY TO DISABLE THE AIR BAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIR BAG DEPLOYMENT, AND POSSIBLE INJURY. WHEN AN UNDEPLOYED AIR BAG ASSEMBLY IS TO BE REMOVED FROM THE STEERING WHEEL, DISCONNECT THE BATTERY GROUND CABLE AND ISOLATE. ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR 2 MINUTES, THEN BEGIN AIR BAG REMOVAL.

REMOVAL

(1) Place the front wheels in the straight ahead position before starting the repair.

(2) Disconnect battery negative cable and isolate.

(3) Wait 2 minutes for the reserve capacitor to discharge before removing undeployed module.

(4) Remove the steering wheel and air bag, refer to Steering Wheel Removal.

(5) Remove upper and lower steering column shrouds to gain access to the clockspring wiring.

(6) Release wire connector at clockspring.

(7) Pull clockspring assembly from column by lifting locking fingers as necessary. The clockspring cannot be repaired, and must be replaced if faulty.

INSTALLATION

(1) Snap clockspring assembly onto column. If clockspring is not properly positioned, follow the centering procedures before installing steering wheel.

(2) Connect the wire connector to the clockspring.

WARNING: ENSURE CLOCKSPRING WIRE CONNECTION IS COMPLETELY SEATED. THE LATCHING CLIP ARMS MUST BE PROPERLY ENGAGED ON THE MODULE.

(3) Install upper and lower steering column shrouds. Be sure wiring is inside of shrouds and not pinched.

(4) Install the steering wheel and air bag module, refer to Steering Wheel Installation.

CENTERING PROCEDURE

If the rotating tape within the clockspring is not positioned properly, the clockspring may fail during use. The following procedures MUST BE USED to center the clockspring;

- If it is not known to be properly positioned
- If the front wheels were moved from the straight ahead position

(1) Place the front wheels in the straight ahead position before starting the procedure.

(2) Depress the 2 locking tabs to disengage the locking mechanism (Fig. 4).

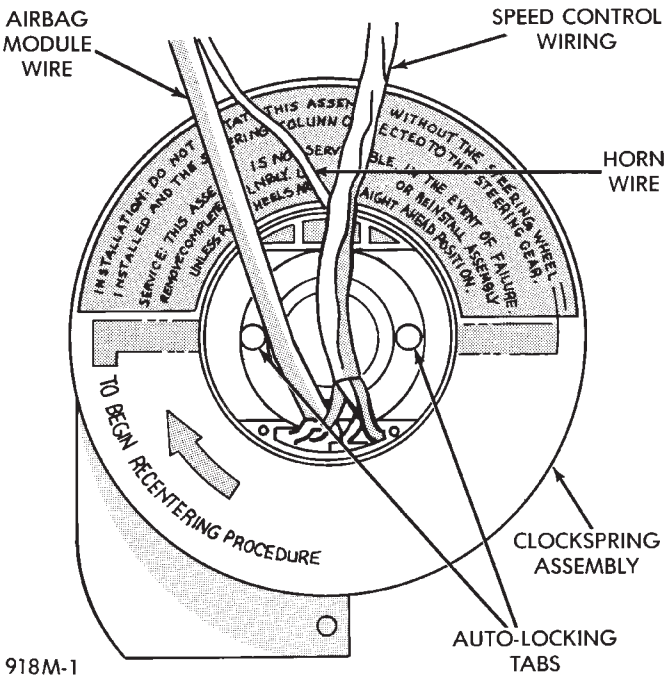


Fig. 4 Clockspring (Auto-Locking)

(3) Keeping the mechanism disengaged, rotate the clockspring rotor in the CLOCKWISE DIRECTION to the end of the travel. Do not apply excessive torque.

(4) From the end of travel, rotate the rotor 2 1/2 full turns in the COUNTER CLOCKWISE direction. The horn wire should end up at the top and the squib wire at the bottom (Fig. 4).

(5) Install the steering wheel and air bag module, refer to Steering Wheel Installation.

COLUMN ASSEMBLY REPLACEMENT

CAUTION: Bumping, jolting and hammering on the steering column shaft and gear shift tube must be avoided during all service procedures.

REMOVAL

(1) Make sure the front wheels are in the **straight ahead** position.

(2) Observe Cautions and disconnect the negative (ground) cable from the battery.

(3) Remove steering wheel from column, refer to Steering Wheel-Removal and observe Cautions/Warnings.

(4) Remove column coupler upper pinch bolt (Fig. 5).

(5) Remove the trim panel column cover and support plate (Fig. 6).

(6) Remove tilt lever (if equipped) from column.

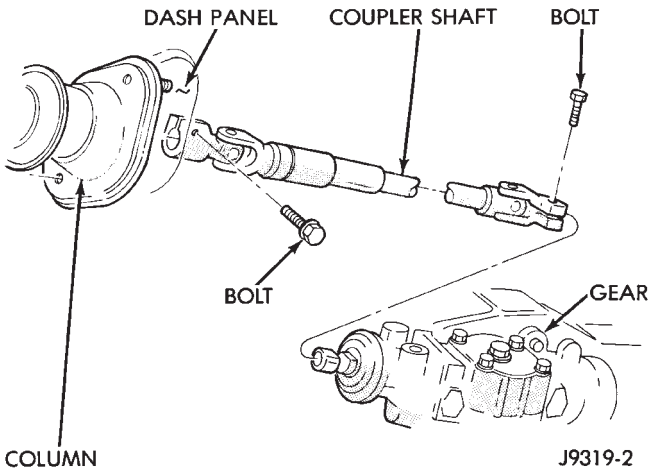


Fig. 5 Column Coupler Shaft

(7) Remove the upper and lower lock housing shrouds (Fig. 1).

(8) Remove the heater cross over tube from under the column.

(9) Loosen the panel bracket nuts/studs to allow the column to drop.

(10) Remove the wiring harness from steering column (Fig. 7).

(11) Remove the Interlock cable from the steering column. Refer to Automatic Transmission Shifter/Ignition Interlock in this group.

(12) Remove the toe plate to dash panel nuts (Fig. 1).

(13) Remove the panel bracket nuts/studs and remove the column. Use care to avoid damaging the paint or trim.

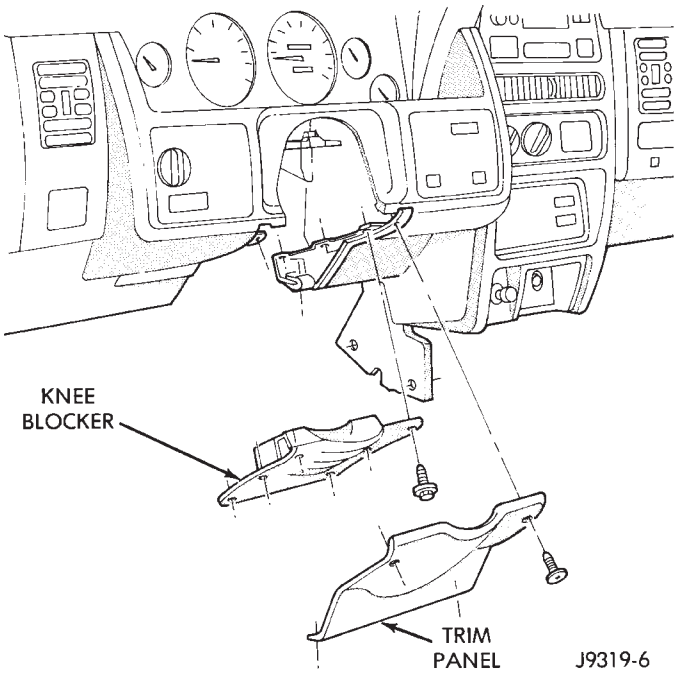


Fig. 6 Trim Panel Column Cover

INSTALLATION

CAUTION: Bumping, jolting and hammering on the steering column shaft and gear shift tube must be avoided during all service procedures.

(1) With the front wheels in the straight ahead position. Align and install the column to coupler. **Do not apply force at the top of the steering column shaft.**

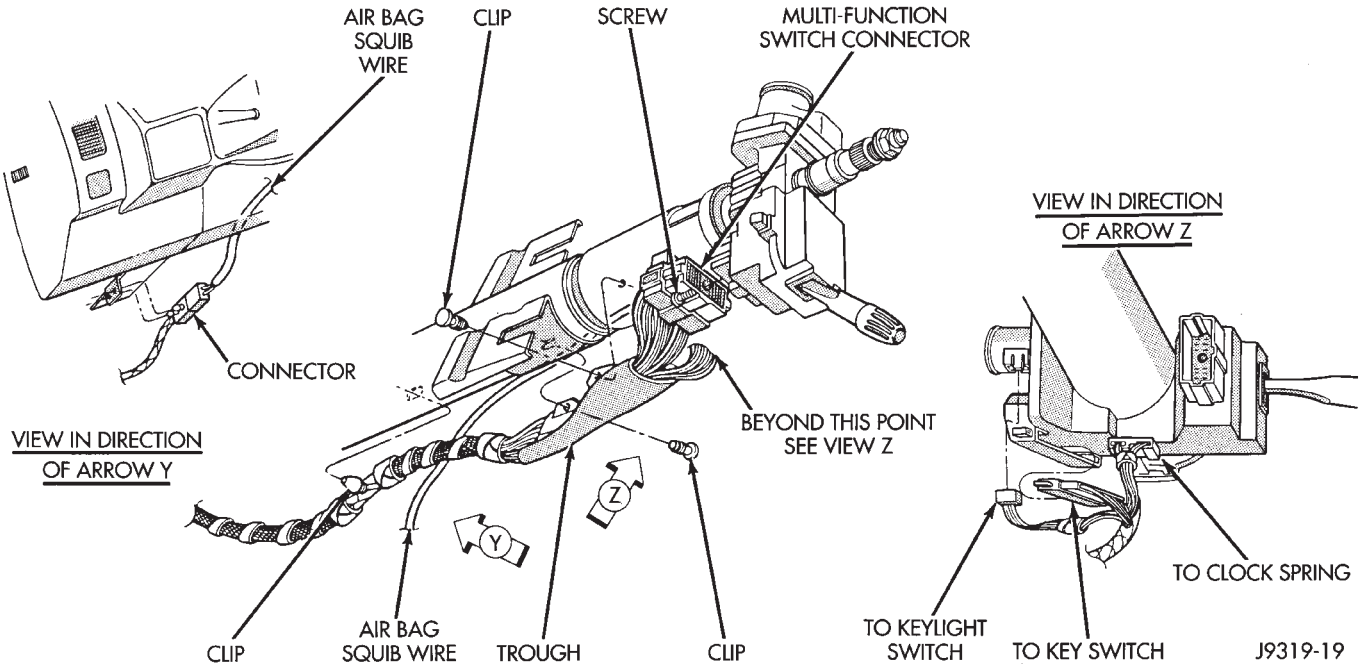


Fig. 7 Steering Column Wiring Harness

(2) Ensure the ground clip is on the left spacer slot (Fig. 8).

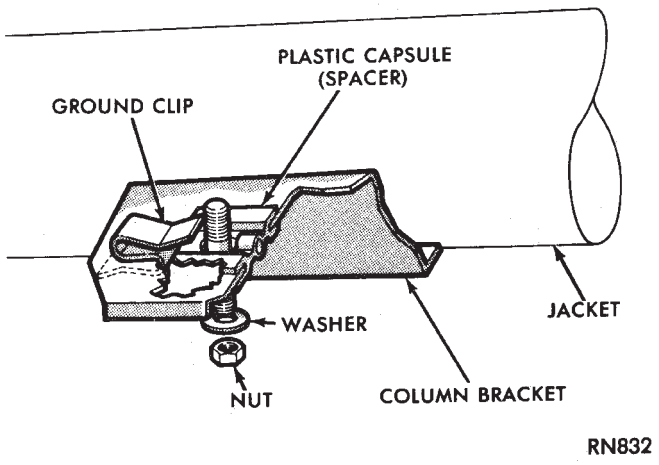


Fig. 8 Ground Clip & Spacer Installation

(3) Install the Interlock cable from the steering column. Refer to Automatic Transmission Shifter/Ignition Interlock in this group.

(4) Install wiring harness connections to steering column (Fig. 7).**Ensure the wiring is not pinched and all connections are correctly locked in place.**

(5) Install shaft coupler pinch bolt loose, load column up to panel bracket.

(6) Be sure both spacers are fully seated in the column support bracket. Tighten the column panel bracket support nuts/studs to 12 N●m (105 in. lbs.) torque. **Ensure the nut is installed on the SHORT threaded side of the stud (Fig. 1).**

(7) Tighten the toe plate attaching nuts (Fig. 1) to 12 N●m (105 in. lbs.) torque.

(8) Tighten the coupler pinch bolt to 47 N●m (35 ft. lbs.) torque.

(9) Install the heater cross over tube under the column.

(10) Install the upper and lower shrouds. Install the tilt lever (if equipped).

(11) Install the trim panel column cover and support plate.

(12) Install the steering wheel, refer to Steering Wheel Installation and observe cautions.

(13) Remove the column shaft shipping lock pin (installed in service column).

(14) Connect the battery ground (negative) cable.

COLUMN COMPONENT SERVICE

The Acustar columns have been designed to be serviced as an assembly; less wiring, switches, shrouds, steering wheel, etc. Also most steering column components can be serviced without removing the column from the vehicle. For additional information on electrical components refer to Group 8, Electrical.

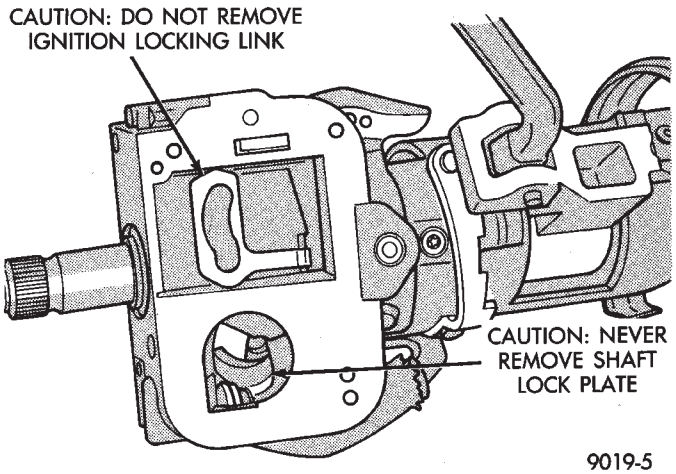


Fig. 9 Observe Cautions

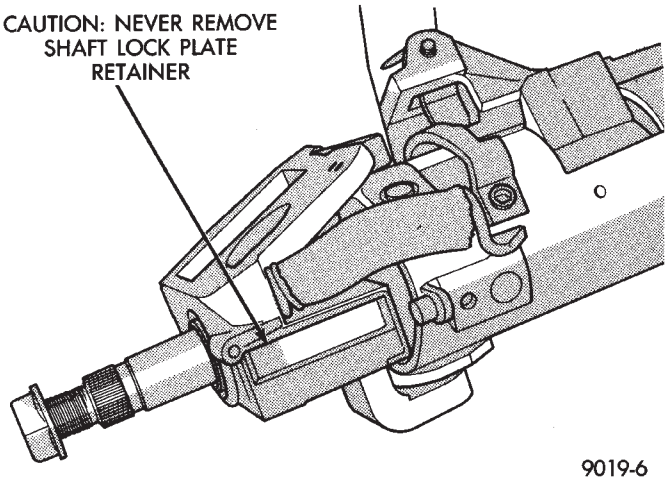


Fig. 10 Observe Cautions

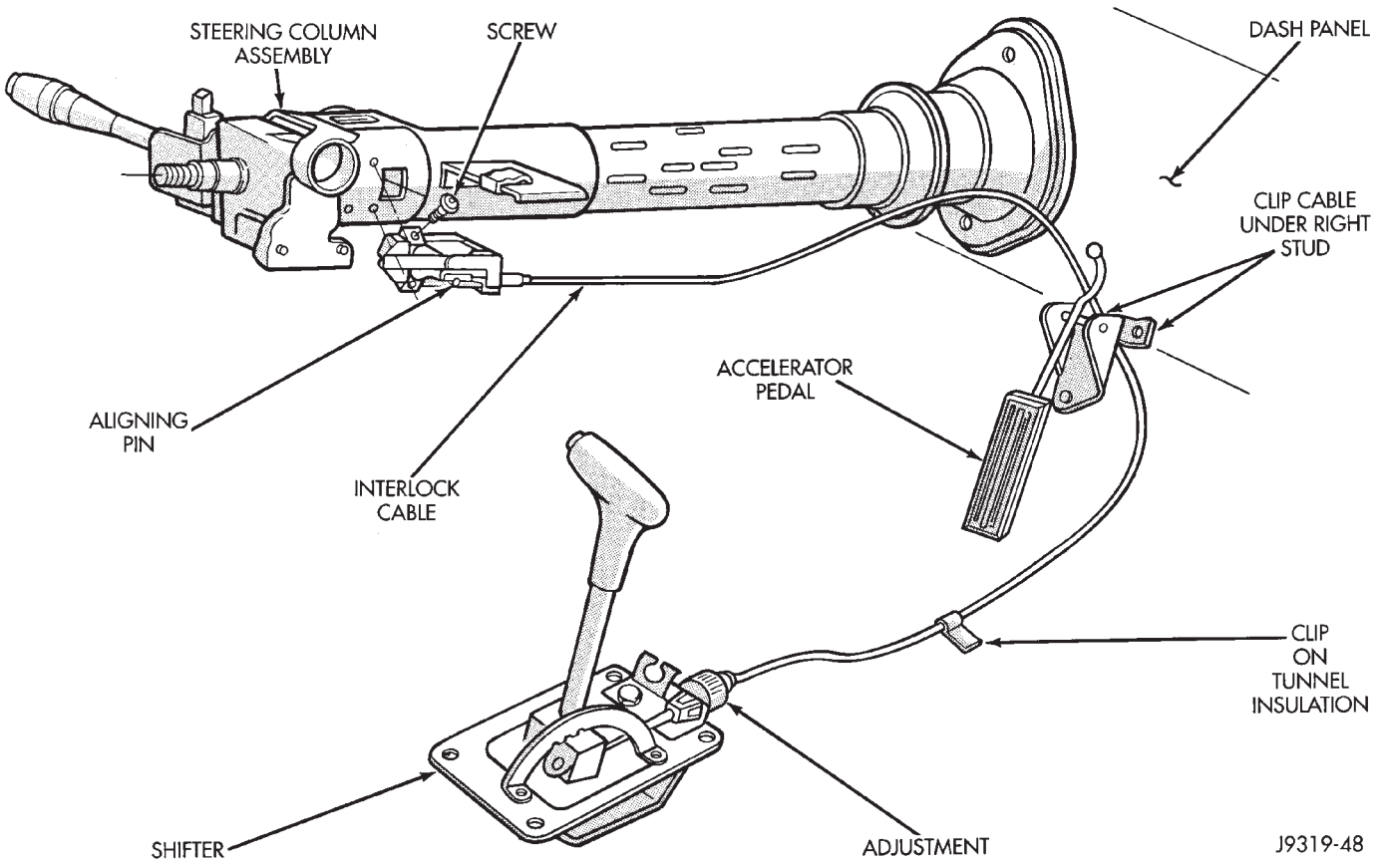


Fig. 1 Ignition Interlock Cable Routing

AUTOMATIC TRANSMISSION SHIFTER/IGNITION INTERLOCK MECHANISM

The automatic transmission Shifter/Ignition Interlock, is a cable operated system. It interconnects the automatic transmission floor mounted shifter to the steering column ignition switch (Fig. 1). The system locks the shifter into the PARK position. The Interlock system is engaged whenever the ignition switch is in the LOCK or ACCESSORY position. When the key is in the OFF or RUN position the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position (Fig. 2). Unless the shifter is fully locked into the PARK position.

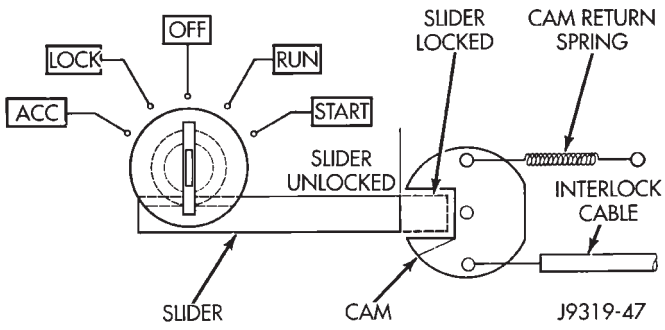


Fig. 2 Ignition Key Cylinder Actuation

INTERLOCK CABLE REPLACEMENT

REMOVAL

(1) Lower the steering column. Refer to Column Assembly Replacement in this group.

(2) Remove two screws retaining the interlock mechanism to the column (Fig. 3). Unsnap the mechanism from column.

(3) Remove the center console and related trim. Refer to Group 23, Body.

(4) Disconnect the cable eyelet from the bellcrank (Fig. 4).

(5) Disconnect and remove the cable from the shift bracket.

(6) Remove the accelerator pedal (the cable routes under the pedal), refer to Group 14, Fuel Systems. Release the cable from the accelerator pedal clip. Move the carpet as necessary to remove the cable.

INSTALLATION/ADJUSTMENT

(1) Snap the cable base assembly into the large square opening in the steering column.

(2) Secure the plastic base with two (2) self tapping screws (Fig. 3).

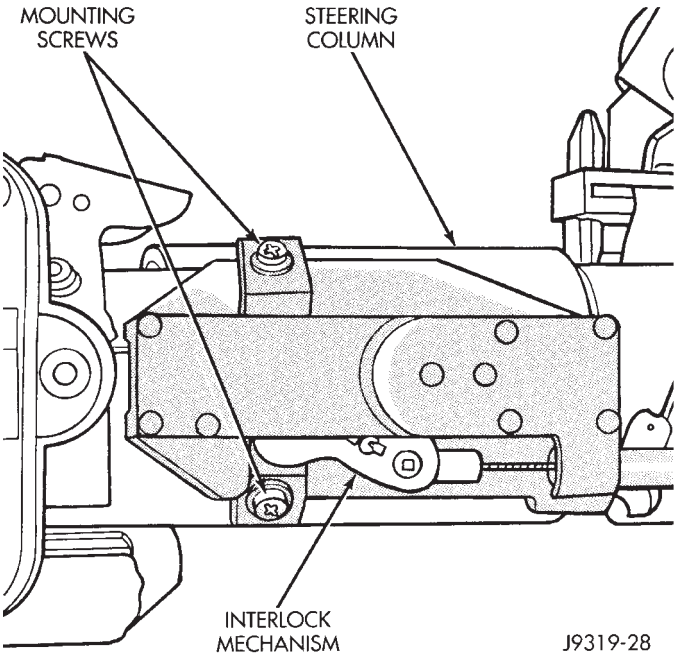


Fig. 3 Interlock Mechanism on Column

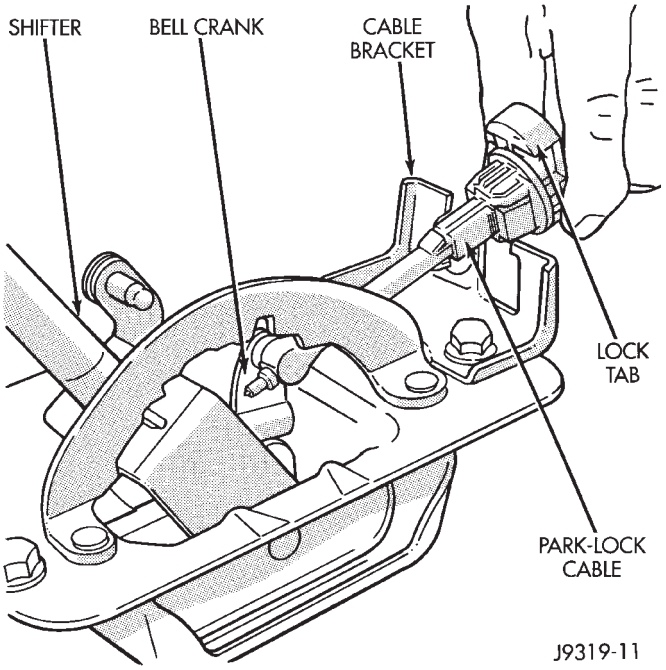


Fig. 4 Cable and Shifter

CAUTION: Interlock cable must be clipped to the RIGHT HAND STUD under the throttle pedal. This is to prevent interference with the throttle pedal.

(3) Route the cable between the accelerator pedal mounting studs and secure with clip (Fig. 1). Be sure clip is on right hand stud.

(4) Place the ignition key cylinder in the ACCESSORY position.

(5) Remove shipping pin from plastic base.

(6) Connect the cable eyelet to the bellcrank pin (Fig. 10).

(7) Place gear selector in PARK.

(8) Push the spring-loaded cable adjuster forward and snap cable into bracket (Fig. 3).

(9) Push the cable adjuster lock clamp downward to lock it.

(10) Install the center console and related trim. Refer to Group 23, Body.

(11) Test the park-lock cable operation.

(12) Load the steering column up to the bracket. Refer to Column Assembly Replacement in this group.

TEST/INSPECTION

(1) Turn the ignition switch key to the LOCK position.

(2) Press inward on the gear selector handle release button, the button should not move.

(3) Turn the ignition switch key to the ON position.

(4) Press inward on the gear selector handle release button.

(5) Move the gear selector handle to the DRIVE or NEUTRAL position.

(6) Attempt to turn the ignition switch key to the LOCK position.

(7) If the park-lock cable is correctly adjusted, the key will not turn to the LOCK position.

(8) Press inward on the gear selector handle release button and move the gear selector handle to the PARK position.

(9) Turn the ignition switch key to the LOCK position. If the park-lock cable is correctly adjusted, the key will turn to the LOCK position.

(10) If additional cable adjustment is required, slide the adjuster forward or rearward to obtain the correct position. Refer to Group 21, Transmission for additional information involving shift cable adjustment.

TORQUE SPECIFICATIONS

STEERING GEAR

DESCRIPTION	TORQUE
Adjustment Plug Initial Adjustment	109 N•m (80 ft. lbs.)
Adjustment Plug Locknut	109 N•m (80 ft. lbs.)
Adjustment Screw Locknut	49 N•m (36 ft. lbs.)
Coupler Shaft Pinch Bolts	44 N•m (33 ft. lbs.)
Gear to Frame Bolts	88 N•m (65 ft. lbs.)
Pitman Arm (Shaft) Nut	251 N•m (185 ft. lbs.)
Return Guide Clamp Screw	58 N•m (43 in. lbs.)
Rack-Piston Plug	102 N•m (75 ft. lbs.)
Side Cover Bolts	60 N•m (44 ft. lbs.)

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STEERING LINKAGE

DESCRIPTION	TORQUE
Drag Link to Steering Knuckle Nut	74 N•m (55 ft. lbs.)
Drag Link to Pitman Arm Nut	74 N•m (55 ft. lbs.)
Drag Link Adjustment Clamp Nut	49 N•m (36 ft. lbs.)
Pitman Arm (Shaft) Nut	251 N•m (185 ft. lbs.)
Steering Dampener to Axle Bracket Nut	74 N•m (55 ft. lbs.)
Steering Dampener to Drag Link Nut	74 N•m (55 ft. lbs.)
Tie Rod to Steering Knuckle Nut	47 N•m (35 ft. lbs.)
Tie Rod Clamp Nut	27 N•m (20 ft. lbs.)

J9319-77

STEERING PUMP

DESCRIPTION	TORQUE
Adjustment Bracket Bolts	28 N•m (21 ft. lbs.)
Flow Control Valve to Pump Body	75 N•m (55 ft. lbs.)
High Pressure Fluid Fitting at Pump and Gear	28 N•m (21 ft. lbs.)
Return Fluid Fitting at Gear	28 N•m (21 ft. lbs.)
5.2L Pump Bracket to Block	41 N•m (30 ft. lbs.)
5.2L Pump Body to Bracket	27 N•m (20 ft. lbs.)

J9319-78

STEERING COLUMN

DESCRIPTION	TORQUE
Air Bag Module Nuts	10 N·m (90 in. lbs.)
Steering Wheel to Column Shaft Nut	61 N·m (45 ft. lbs.)
Toe Plate Bolts/Nuts	12 N·m (105 in. lbs.)
Upper Bracket Support Stud/Nuts	12 N·m (105 in. lbs.)

J9319-52