

# STEERING

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## POWER STEERING

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## GENERAL INFORMATION

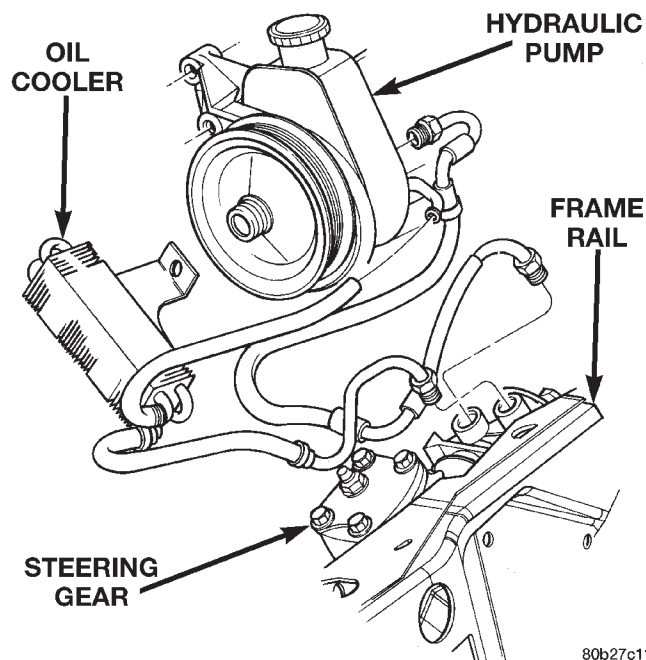
### STEERING SYSTEM

The power steering system consist of a steering column attached to the steering gear by a upper and lower intermediate shaft. The variable ratio power steering gear is mounting the left frame rail (Fig. 1). The gear has a pitman arm which is attached to the steering linkage.

Power assist is provided by an engine mounted hydraulic pump (Fig. 1). The pump supplies hydraulic fluid pressure to the steering gear. Some models are equipped with an oil cooler (Fig. 1) which is mounted below the power steering pump.

Power steering systems consist of:

- Steering column
- Upper and lower intermediate shaft
- Variable ratio recirculating-ball steering gear
- Steering linkage
- Belt driven hydraulic steering pump
- Pump pressure and return hoses
- Power steering cooler (optional)



**Fig. 1 Steering Pump, Cooler and Gear**

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## DIAGNOSIS AND TESTING

## POWER STEERING SYSTEM

There is some noise in all power steering systems. One of the most common is a hissing sound evident at a standstill parking. Or when the steering wheel is at the end of it's travel. Hiss is a high frequency noise similar to that of a water tap being closed slowly. The noise is present in all valves that have a high velocity fluid passing through an orifice. There is no relationship between this noise and steering performance.

## STEERING NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
OBJECTIONAL HISS OR WHISTLE	<ol style="list-style-type: none"> <li>1. Steering intermediate shaft to dash panel seal.</li> <li>2. Noisy valve in power steering gear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and repair seal at dash panel.</li> <li>2. Replace steering gear.</li> </ol>
RATTLE OR CLUNK	<ol style="list-style-type: none"> <li>1. Gear mounting bolts loose.</li> <li>2. Loose or damaged suspension components.</li> <li>3. Loose or damaged steering linkage.</li> <li>4. Internal gear noise.</li> <li>5. Pressure hose in contact with other components.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten bolts to specification.</li> <li>2. Inspect and repair suspension.</li> <li>3. Inspect and repair steering linkage.</li> <li>4. Replace gear.</li> <li>5. Reposition hose.</li> </ol>
CHIRP OR SQUEAL	<ol style="list-style-type: none"> <li>1. Loose belt.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust or replace.</li> </ol>
WHINE OR GROWL	<ol style="list-style-type: none"> <li>1. Low fluid level.</li> <li>2. Pressure hose in contact with other components.</li> <li>3. Internal pump noise.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill to proper level.</li> <li>2. Reposition hose.</li> <li>3. Replace pump.</li> </ol>
SUCKING AIR SOUND	<ol style="list-style-type: none"> <li>1. Loose return line clamp.</li> <li>2. O-ring missing or damaged on hose fitting.</li> <li>3. Low fluid level.</li> <li>4. Air leak between pump and reservoir.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace clamp.</li> <li>2. Replace o-ring.</li> <li>3. Fill to proper level.</li> <li>4. Repair as necessary.</li> </ol>
SCRUBBING OR KNOCKING	<ol style="list-style-type: none"> <li>1. Wrong tire size.</li> <li>2. Wrong gear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify tire size.</li> <li>2. Verify gear.</li> </ol>

## DIAGNOSIS AND TESTING (Continued)

*BINDING AND STICKING*

CONDITION	POSSIBLE CAUSE	CORRECTION
DIFFICULT TO TURN WHEEL STICKS OR BINDS	<ol style="list-style-type: none"> <li>1. Low fluid level.</li> <li>2. Tire pressure.</li> <li>3. Steering components (ball joints/tie rod ends).</li> <li>4. Loose belt.</li> <li>5. Low pump pressure.</li> <li>6. Column shaft coupler binding.</li> <li>7. Steering gear worn or out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill to proper level.</li> <li>2. Adjust tire pressure.</li> <li>3. Lube, inspect and repair as necessary.</li> <li>4. Adjust or replace.</li> <li>5. Pressure test and replace if necessary.</li> <li>6. Replace coupler.</li> <li>7. Repair or replace gear.</li> </ol>

*INSUFFICIENT ASST. OR POOR RETURN TO CENTER*

CONDITION	POSSIBLE CAUSE	CORRECTION
HARD TURNING OR MOMENTARY INCREASE IN TURNING EFFORT	<ol style="list-style-type: none"> <li>1. Tire pressure.</li> <li>2. Low fluid level.</li> <li>3. Loose belt.</li> <li>4. Lack of lubrication.</li> <li>5. Low pump pressure.</li> <li>6. Internal gear leak.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust tire pressure.</li> <li>2. Fill to proper level.</li> <li>3. Adjust or replace.</li> <li>4. Inspect and lubricate steering and suspension compnents.</li> <li>5. Pressure test and repair as necessary.</li> <li>6. Pressure and flow test, and repair as necessary.</li> </ol>
STEERING WHEEL DOES NOT WANT TO RETURN TO CENTER POSITION	<ol style="list-style-type: none"> <li>1. Tire pressure.</li> <li>2. Wheel alignment.</li> <li>3. Lack of lubrication.</li> <li>4. High friction in steering gear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust tire pressure.</li> <li>2. Align front end.</li> <li>3. Inspect and lubricate steering and suspension compnents.</li> <li>4. Test and adjust as necessary.</li> </ol>

*LOOSE STEERING AND VEHICLE LEAD*

CONDITION	POSSIBLE CAUSE	CORRECTION
EXCESSIVE PLAY IN STEERING WHEEL	<ol style="list-style-type: none"> <li>1. Worn or loose suspension or steering components.</li> <li>2. Worn or loose wheel bearings.</li> <li>3. Steering gear mounting.</li> <li>4. Gear out of adjustment.</li> <li>5. Worn or loose steering coupler.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect and repair as necessary.</li> <li>2. Inspect and repair or adjust bearings.</li> <li>3. Tighten gear mounting bolts to specification.</li> <li>4. Adjust gear to specification.</li> <li>5. Inspect and replace as necessary.</li> </ol>
VEHICLE PULLS OR LEADS TO ONE SIDE.	<ol style="list-style-type: none"> <li>1. Tire Pressure.</li> <li>2. Radial tire lead.</li> <li>3. Brakes dragging.</li> <li>4. Wheel alignment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust tire pressure.</li> <li>2. Rotate tires.</li> <li>3. Repair as necessary.</li> <li>4. Align front end.</li> </ol>

## POWER STEERING PUMP

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## DESCRIPTION AND OPERATION

## POWER STEERING PUMP

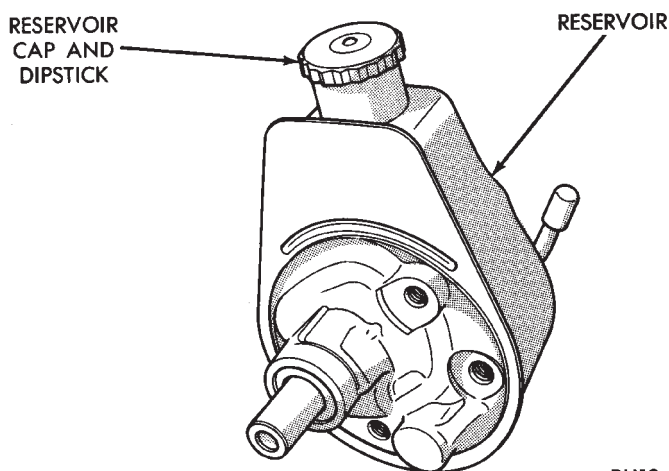
All vehicles use a P-Series pump (Fig. 1).

Hydraulic pressure is provided for the power steering gear by the belt driven power steering pump. The power steering pump is a constant flow rate and displacement, vane-type pump.

The pump is connected to the steering gear via the pressure hose and the return hose. The pump shaft has a pressed-on pulley that is belt driven by the crankshaft pulley.

Trailer tow option vehicles are equipped with a power steering pump oil cooler. The oil cooler is mounted to the front of the engine under the pump.

**NOTE:** Power steering pumps are not interchangeable with pumps installed on other vehicles.



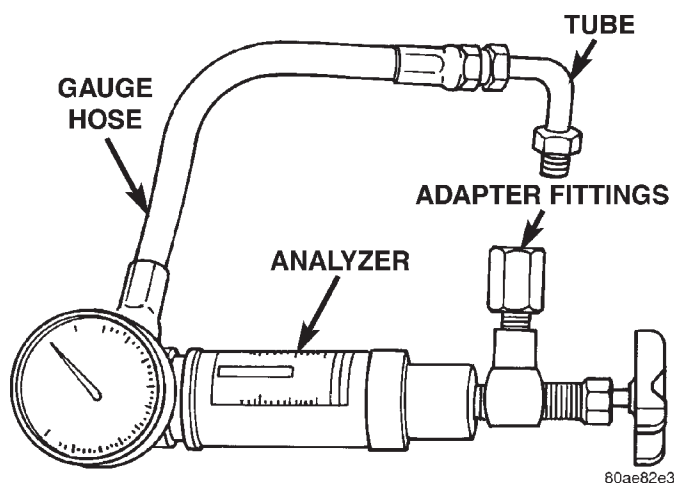
**Fig. 1 P-Series Pump**

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## DIAGNOSIS AND TESTING

## PUMP FLOW RATE AND PRESSURE

The following procedure is used to test the operation of the power steering system on the vehicle. This test will provide the gallons per minute (GPM) or flow rate of the power steering pump along with the maximum relief pressure. Perform test any time a power steering system problem is present. This test will determine if the power steering pump or power steering gear is not functioning properly. The following pressure and flow test is performed using Power Steering Analyzer Tool kit 6815 (Fig. 2) Adapter Kit 6893.



**Fig. 2 Analyzer With Tube and Adapter**

## FLOW AND PRESSURE TEST

- (1) Check the power steering belt to ensure it is in good condition and adjusted properly.
- (2) Connect pressure gauge hose from the Power Steering Analyzer to Tube 6844.
- (3) Connect Adapter 6826 to Power Steering Analyzer test valve end.

### DIAGNOSIS AND TESTING (Continued)

- (4) Disconnect the high pressure hose from the power steering pump.
- (5) Connect the tube to the pump hose fitting.
- (6) Connect the power steering hose from the steering gear to the adapter.
- (7) Open the test valve completely.
- (8) Start engine and let idle long enough to circulate power steering fluid through flow/pressure test gauge and to get air out of the fluid. Then shut off engine.
- (9) Check fluid level, add fluid as necessary. Start engine again and let idle.
- (10) Gauge should read below 862 kPa (125 psi), if above, inspect the hoses for restrictions and repair as necessary. The initial pressure reading should be in the range of 345-552 kPa (50-80 psi).
- (11) Increase the engine speed to 1500 RPM and read the flow meter. If the flow rate (GPM) is below specification, (refer to pump specification chart for GPM) the pump should be replaced.

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

(12) Close valve fully three times and record highest pressure indicated each time. **All three read-**

- ings 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.
- (13) Open the test valve and turn the steering wheel to the extreme left and right positions three times against the stops. Record the highest pressure reading at each position. Compare readings to the pump specifications chart. If pressures readings are not within 50 psi of each other, the gear is leaking internally and must be repaired.

**CAUTION:** Do not force the pump to operate against the stops for more than 2 to 3 seconds at a time because, pump damage will result.

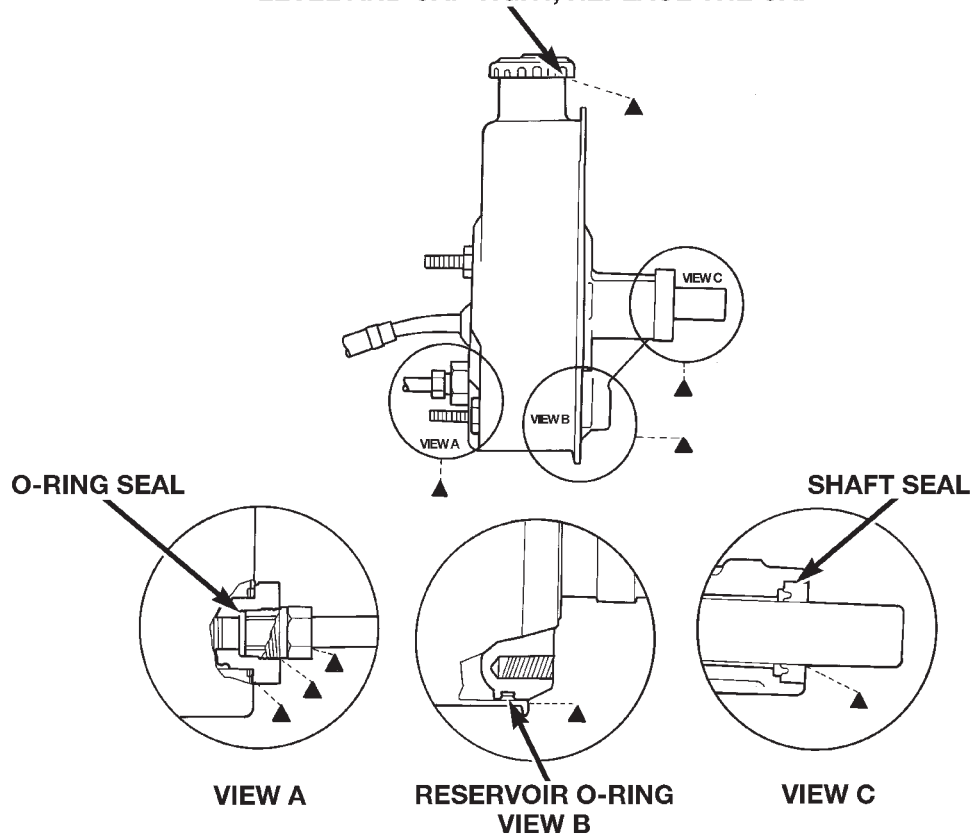
PUMP SPECIFICATION

ENGINE	RELIEF PRESSURE ± 50	FLOW RATE (GPM) AT 1500 RPM
3.9L	10342 kPa (1500 psi)	2.4 - 2.8
5.2L	10342 kPa (1500 psi)	2.4 - 2.8
5.9L	10342 kPa (1500 psi)	2.4 - 2.8

## DIAGNOSIS AND TESTING (Continued)

## PUMP LEAKAGE

**CHECK OIL LEVEL; IF LEAKAGE PERSISTS WITH THE CORRECT LEVEL AND CAP TIGHT, REPLACE THE CAP**



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## SERVICE PROCEDURES

## POWER STEERING PUMP - INITIAL OPERATION

**WARNING: THE FLUID LEVEL SHOULD BE CHECKED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING COMPONENTS.**

**CAUTION: Use MOPAR Power Steering Fluid or equivalent. Do not use automatic transmission fluid and do not overfill.**

Wipe filler cap clean, then check the fluid level. The dipstick should indicate **COLD** when the fluid is at normal temperature.

- (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 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) Slowly turn the steering wheel right and left, lightly contacting the wheel stops at least 20 times.

- (6) Check the fluid level add if necessary.

- (7) Lower the vehicle, start the engine and turn the steering wheel slowly from lock to lock.

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

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

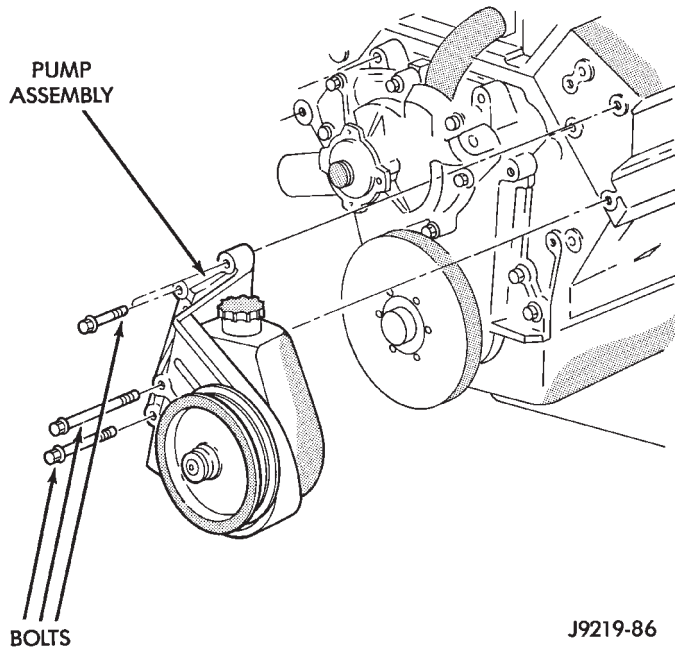
**CAUTION: Do not run a vehicle with foamy fluid for an extended period. This may cause pump damage.**

## REMOVAL AND INSTALLATION

### POWER STEERING PUMP

#### REMOVAL

- (1) Remove the serpentine drive belt, refer to Group 7 Cooling.
- (2) Clamp the fluid return hose and disconnect the hoses from the power steering pump. Cap the fittings.
- (3) Remove battery ground cable and bracket bolts.
- (4) Remove the pump assembly (Fig. 3).



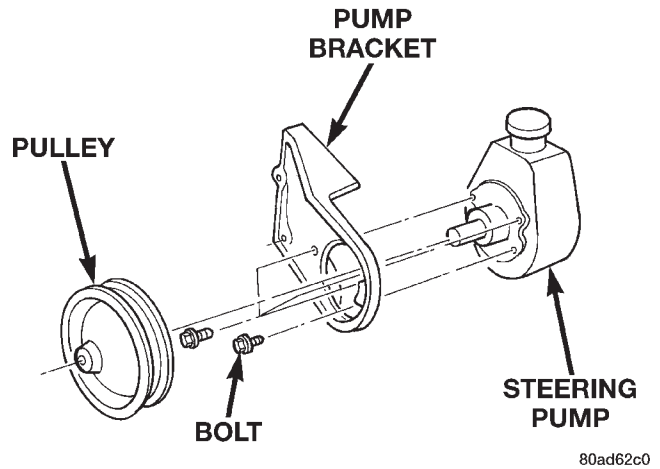
**Fig. 3 Pump Assembly**

- (5) Remove the pump pulley, refer to Pump Pulley Removal. This will allow access to the pump attaching screws.

- (6) Remove the pump bracket bolts (Fig. 4) and remove the bracket.

#### INSTALLATION

- (1) Install the bracket on the pump and tighten bolts to 41 N·m (30 ft. lbs.).
- (2) Install the pump pulley, refer to Pump Pulley Installation.
- (3) Install pump assembly on the engine block and tighten the bolts to 41 N·m (30 ft. lbs.).
- (4) Install the battery ground wire and tighten nut to 41 N·m (30 ft. lbs.).
- (5) Connect the fluid hoses to the pump.
- (6) Install the serpentine drive belt refer to Group 7 Cooling.
- (7) Fill the reservoir with power steering fluid, refer to Power Steering Pump Initial-Operation.



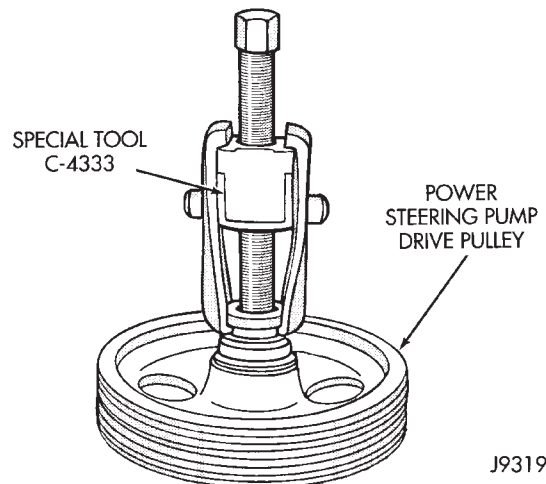
**Fig. 4 Pump Mounting Bracket**

### DISASSEMBLY AND ASSEMBLY

#### PUMP PULLEY

##### DISASSEMBLY

- (1) Remove pump assembly.
- (2) Remove pulley from pump with Puller C-4333 (Fig. 5).



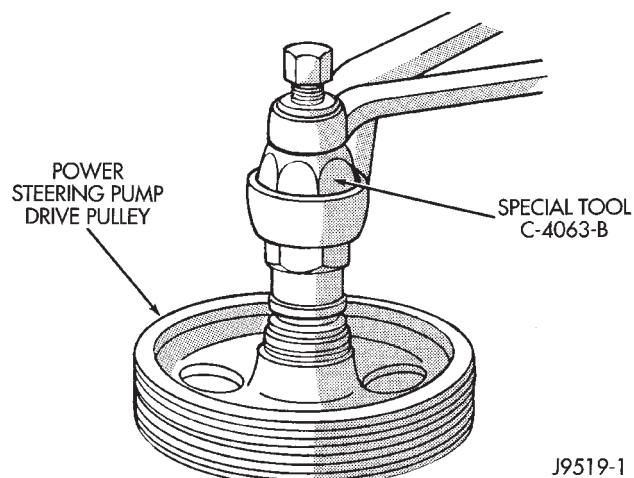
**Fig. 5 Pulley Removal**

##### ASSEMBLY

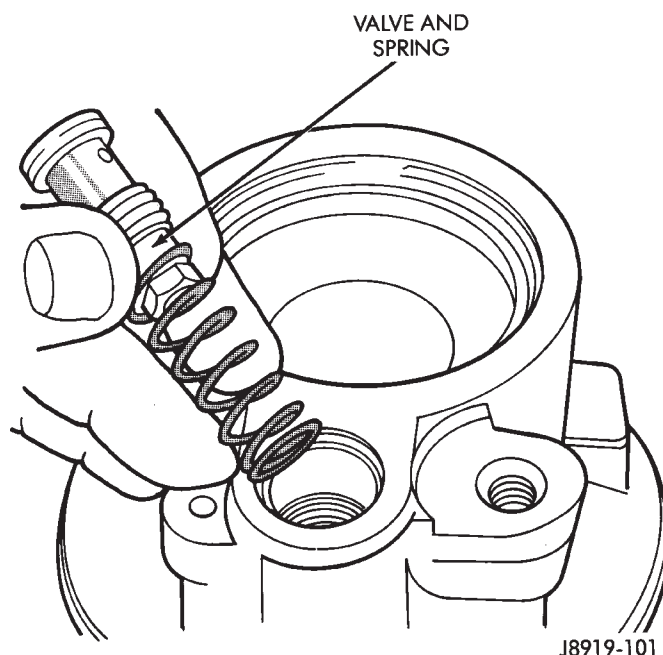
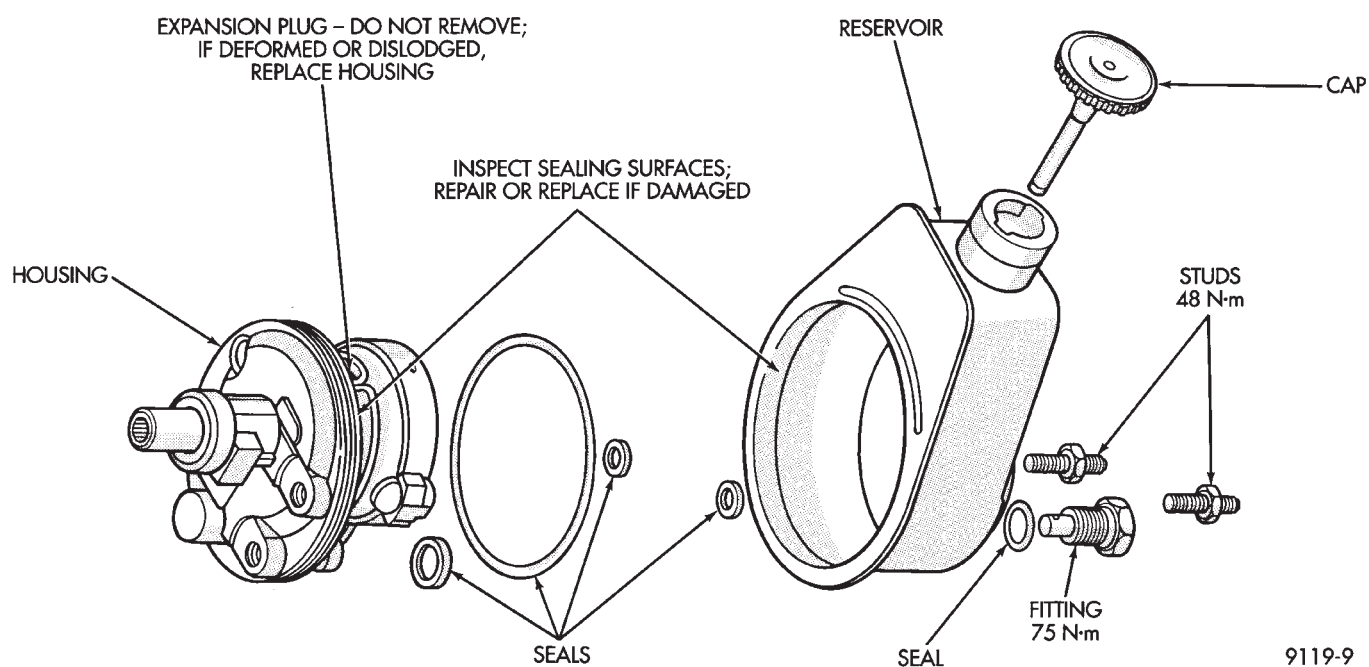
- (1) Replace pulley if bent, cracked, or loose.
- (2) Install pulley on pump with Installer C-4063-B (Fig. 6) flush with the end of the shaft. Ensure the tool and pulley remain aligned with the pump shaft.
- (3) Install pump assembly.
- (4) With Serpentine Belts; Run engine until warm (5 min.) and note any belt chirp. If chirp exists, move pulley outward approximately 0.5 mm (0.020 in.). If noise increases, press on 1.0 mm (0.040 in.). **Be careful that pulley does not contact mounting bolts.**



## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 6 Pulley Installation****P-SERIES PUMP RESERVOIR****DISASSEMBLY**

- (1) Remove pump assembly.
- (2) Remove mounting studs and pressure fitting. Rock reservoir by hand or use a soft face mallet and remove reservoir (Fig. 7).
- (3) Remove O-ring seals from housing and **discard**.
- (4) Remove flow control valve and spring from housing (Fig. 8).

**Fig. 8 Flow Control Valve****Fig. 7 Pump Reservoir**



DISASSEMBLY AND ASSEMBLY (Continued)

ASSEMBLY

**NOTE:** Clean all parts before installation. Lubricate new O-ring seals with MOPAR Power Steering Fluid or an equivalent product.

- (1) Install flow control valve and spring.
- (2) Install new O-ring seals on housing and install reservoir.
- (3) Install mounting studs and tighten to 48 N·m (35 ft. lbs.).
- (4) Install fitting in flow control valve bore tighten to 75 N·m (55 ft. lbs.).

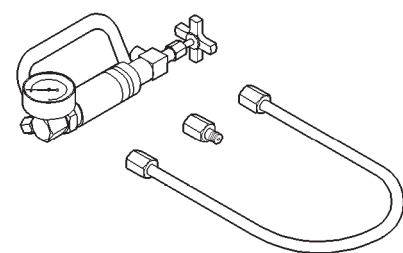
SPECIFICATIONS

TORQUE CHART

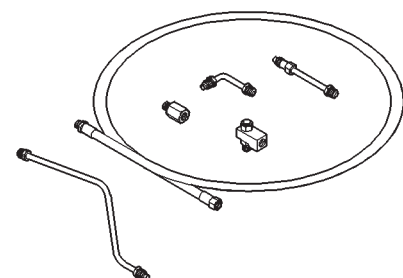
DESCRIPTION	TORQUE
<b>Power Steering Pump</b>	
Pump Bracket Bolts . . . . .	41 N·m (30 ft. lbs.)
Pump Mounting Bolts . . . . .	41 N·m (30 ft. lbs.)
Reservoir Bolts . . . . .	48 N·m (35 ft. lbs.)
Flow Control Valve . . . . .	75 N·m (55 ft. lbs.)
Pressure Line . . . . .	35 N·m (25 ft. lbs.)
Oil Cooler Mounting Bolts . . . .	41 N·m (30 ft. lbs.)

SPECIAL TOOLS

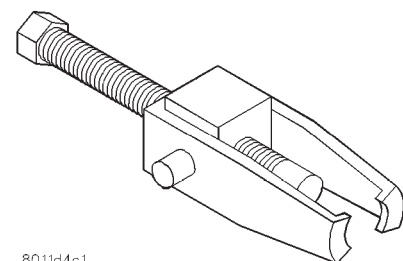
POWER STEERING PUMP



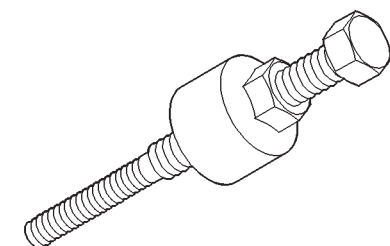
***Analyzer Set, Power Steering Flow/Pressure 6815***



***Adapters, Power Steering Flow/Pressure Tester 6893***



***Puller C-4333***



***Installer, Power Steering Pulley C-4063-B***

## POWER STEERING GEAR

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## DESCRIPTION AND OPERATION

## POWER STEERING GEAR

A recirculating ball type gears (Fig. 1) is used on this vehicle. The gear has a variable ratio of 16-13 to 1.

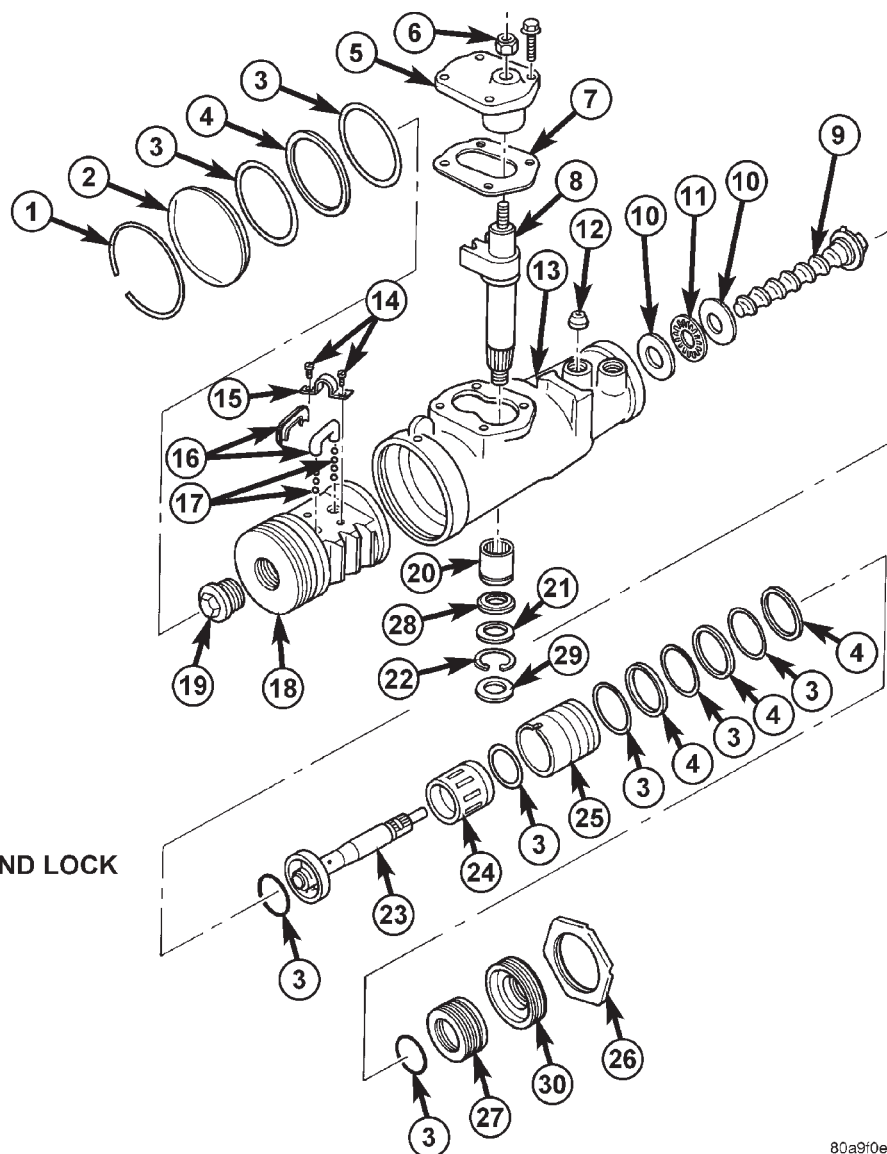
The gear acts as a rolling thread between the worm shaft and rack piston. The worm shaft is supported by a thrust bearing at the lower end and a bearing assembly at the upper end. When the worm

shaft is turned the rack piston moves. The rack piston teeth mesh with the pitman shaft. Turning the worm shaft turns the pitman shaft, which turns the steering linkage.

**CAUTION:** Components attached with a nut and cotter pin must be first torqued to specification. If the slot in the nut does not line up with the cotter pin hole, tighten nut until it is aligned. Never loosen the nut to align the cotter pin hole.

## DESCRIPTION AND OPERATION (Continued)

- 1 — RING, RETAINING
- 2 — PLUG
- 3 — SEAL, O-RING
- 4 — RING, TEFLON
- 5 — COVER, SIDE
- 6 — NUT, ADJUSTER LOCK
- 7 — GASKET
- 8 — SHAFT, PITMAN
- 9 — SHAFT, WORM
- 10 — RACE
- 11 — BEARING, THRUST
- 12 — VALVE, CHECK
- 13 — HOUSING
- 14 — SCREW
- 15 — CLAMP
- 16 — GUIDE, BALL
- 17 — BALLS
- 18 — PISTON, RACK
- 19 — PLUG
- 20 — BEARING, NEEDLE
- 21 — WASHER, BACKUP
- 22 — RING, RETAINING
- 23 — SHAFT, STUB
- 24 — SPOOL, VALVE
- 25 — BODY, VALVE
- 26 — NUT, COUPLING SHIELD RET. AND LOCK
- 27 — THRUST SUPPORT ASSEMBLY
- 28 — SEAL, PITMAN SHAFT
- 29 — SEAL, DUST
- 30 — NUT, ADJUSTER

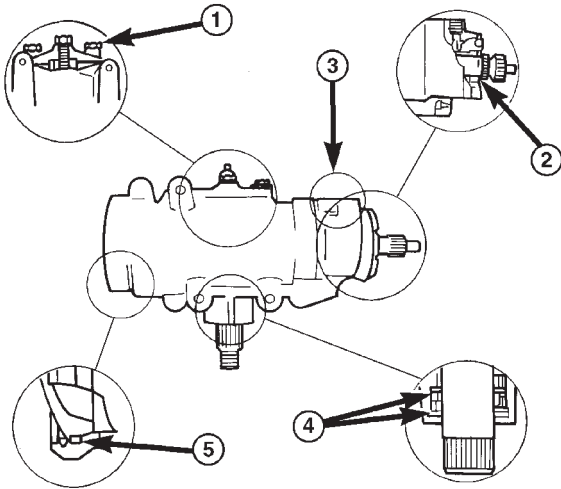


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**Fig. 1 Recirculating Ball Gear-Typical**

## DIAGNOSIS AND TESTING

## POWER STEERING GEAR LEAKAGE DIAGNOSIS



1. SIDE COVER LEAK - TORQUE SIDE COVER BOLTS TO SPECIFICATION. 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 SPECIFICATIONS. IF LEAKAGE PERSISTS, REPLACE THE SEAL.
4. PITMAN SHAFT SEALS - REPLACE THE SEALS.
5. TOP COVER SEAL - REPLACE THE SEAL.

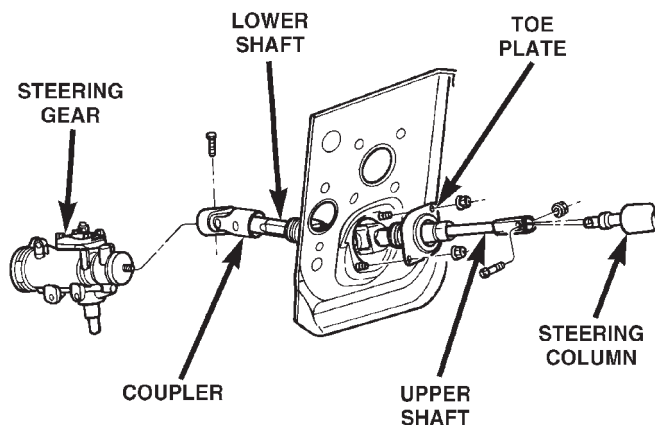
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## REMOVAL AND INSTALLATION

## STEERING GEAR

## REMOVAL

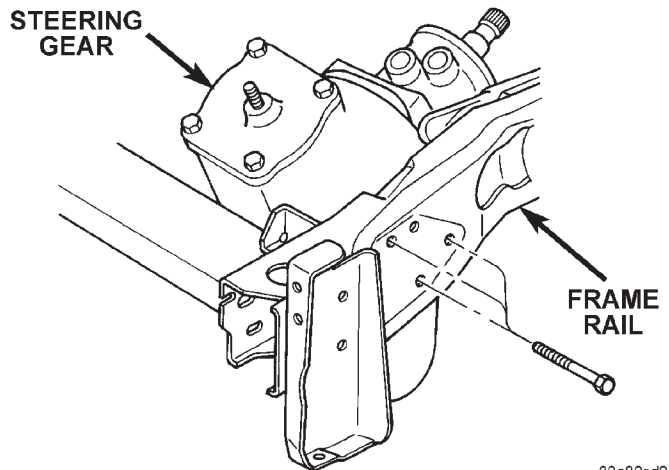
- (1) Place the front wheels in the straight ahead position with the steering wheel centered.
- (2) Disconnect and cap the fluid lines from the steering gear.
- (3) Remove the lower shaft coupler bolt and slide coupler off the gear (Fig. 2).



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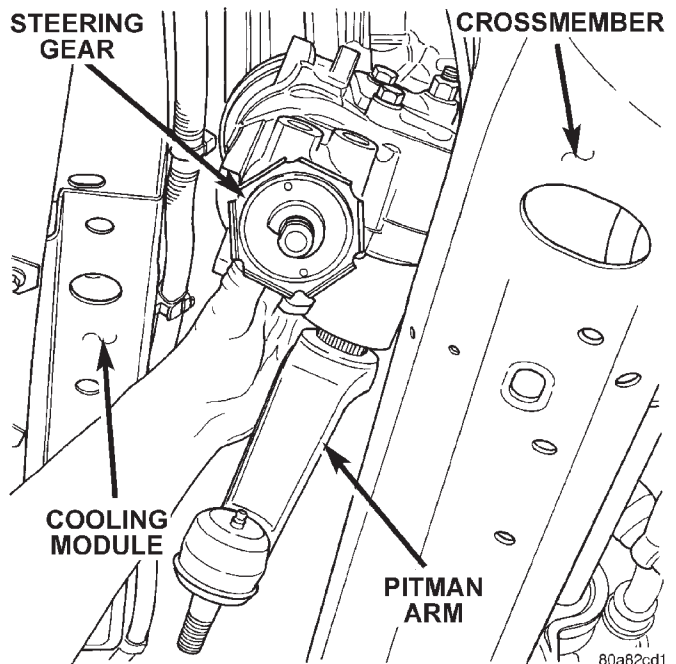
Fig. 2 Steering Gear Coupler

- (4) Raise and support the vehicle.
- (5) Remove the cotter pin and nut from the pitman arm ball stud.
- (6) Separate the pitman arm from the center link with Puller C-3894-A.
- (7) Remove splash shield under cooling module.
- (8) Remove the steering gear mounting bolts (Fig. 3). Remove steering gear from the vehicle by lowering it through the opening between the cooling module and the frame crossmember (Fig. 4).
- (9) Remove pitman arm from the gear with Remover C-4150A (Fig. 5).



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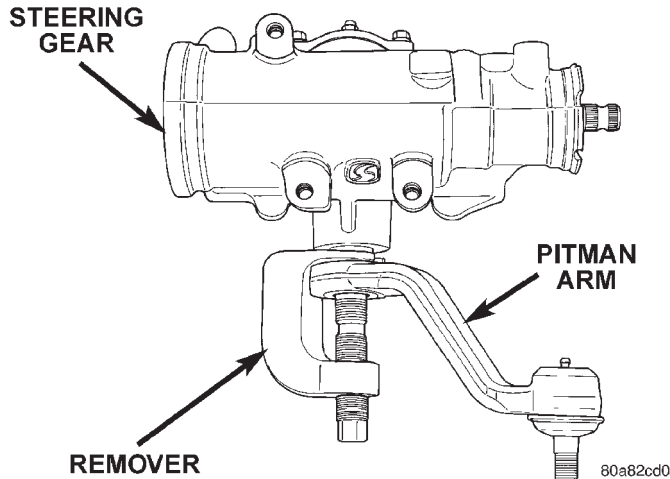
Fig. 3 Steering Gear Mounting



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Fig. 4 Steering Gear Removal

## REMOVAL AND INSTALLATION (Continued)



**Fig. 5 Pitman Arm**

### INSTALLATION

**NOTE:** Gear mounting bolts must be replaced or use Mopar Lock 'N Seal or Loctite® 242 on existing bolts.

- (1) Align and install the pitman arm on gear and tighten to 231 N·m (185 ft. lbs.).
- (2) Install steering gear on the frame rail and tighten the bolts to 88 N·m (65 ft. lbs.).
- (3) Install pitman arm ball stud in center link and tighten nut to 88 N·m (65 ft. lbs.). Install new cotter pin.
- (4) Remove support and lower vehicle.
- (5) Install shaft coupler on the steering gear and tighten coupler bolt to 49 N·m (36 ft. lbs.).
- (6) Connect fluid hoses to steering gear and tighten to 35 N·m (25 ft. lbs.).
- (7) Fill power steering pump, refer to Power Steering Pump-Initial Operation.

## DISASSEMBLY AND ASSEMBLY

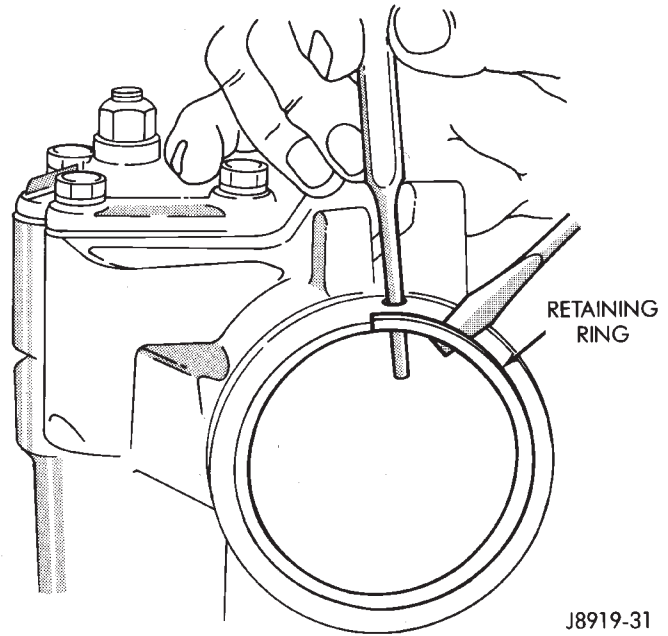
### HOUSING END PLUG

#### DISASSEMBLY

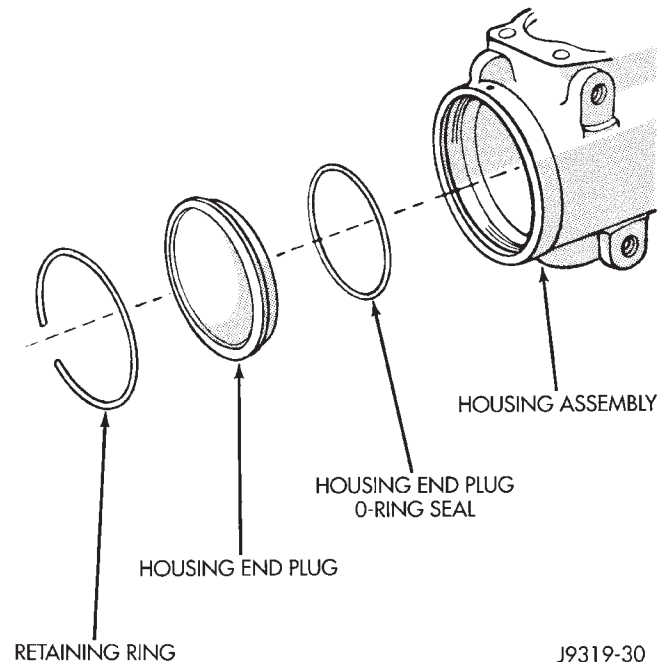
- (1) Unseat and remove retaining ring from groove with a punch through the hole in the end of the housing (Fig. 6).
- (2) Slowly rotate stub shaft with 12 point socket COUNTER-CLOCKWISE to force the end plug out from housing.

**CAUTION:** Do not turn stub shaft any further than necessary. The rack piston balls will drop out of the rack piston circuit if the stub shaft is turned too far.

- (3) Remove O-ring from the housing (Fig. 7).



**Fig. 6 End Plug Retaining Ring**

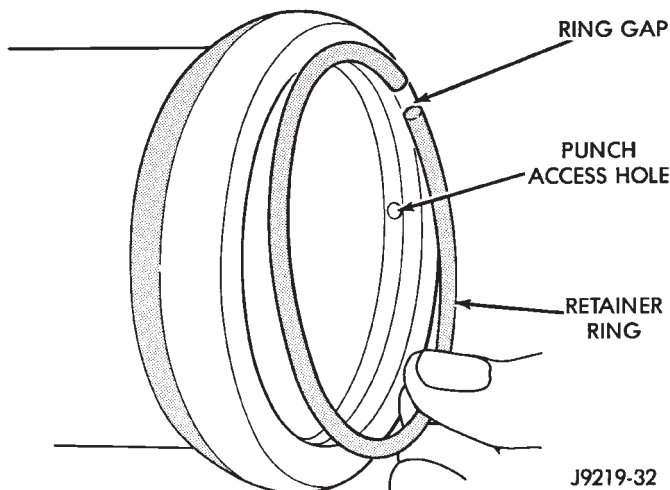


**Fig. 7 End Plug Components**

#### ASSEMBLY

- (1) Lubricate O-ring with power steering fluid and install into the housing.
- (2) Install end plug by tapping the plug lightly with a plastic mallet into the housing.
- (3) Install retaining ring so one end of the ring covers the housing access hole (Fig. 8).

## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 8 Installing The Retaining Ring****PITMAN SHAFT/SEALS/BEARING****DISASSEMBLY**

- (1) Clean exposed end of pitman shaft and housing with a wire brush.
- (2) Remove preload adjuster nut (Fig. 9).
- (3) Rotate the stub shaft with a 12 point socket from stop to stop and count the number of turns.
- (4) Center the stub shaft by rotating it from the stop 1/2 of the total amount of turns.
- (5) Remove side cover bolts and remove side cover, gasket and pitman shaft as an assembly (Fig. 9).

**NOTE:** The pitman shaft will not clear the housing if it is not centered.

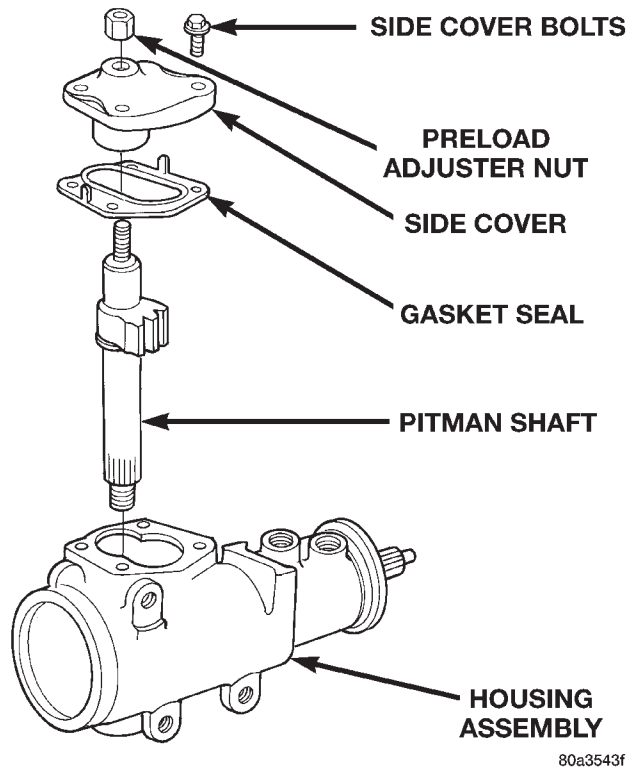
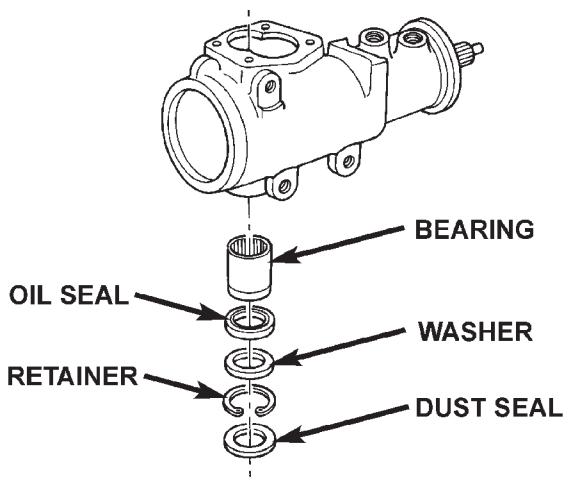
- (6) Remove pitman shaft from the side cover.
- (7) Remove dust seal from the housing with a seal pick (Fig. 10).

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

- (8) Remove retaining ring with snap ring pliers.
- (9) Remove washer from the housing.
- (10) Remove oil seal from the housing with a seal pick.
- (11) Remove pitman shaft bearing from housing with a bearing driver and handle (Fig. 11).

**ASSEMBLY**

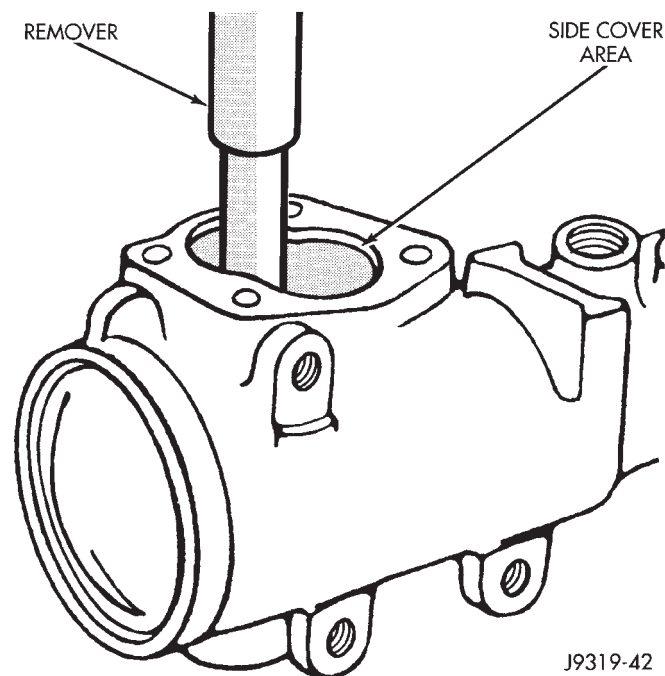
- (1) Install pitman shaft bearing into housing with a bearing driver and handle.
- (2) Coat the oil seals and washer with grease.
- (3) Install the oil seal with a driver and handle.
- (4) Install backup washer.
- (5) Install the retainer ring with snap ring pliers.
- (6) Install dust seal with a driver and handle.

**Fig. 9 Side Cover and Pitman Shaft****Fig. 10 Pitman Shaft Seals & Bearing**

- (7) Install pitman shaft to side cover by screwing shaft in until it fully seats to side cover.
- (8) Install preload adjuster nut. **Do not tighten nut until after Over-Center Rotation Torque adjustment has been made.**
- (9) Install gasket to side cover and bend tabs around edges of side cover (Fig. 9).
- (10) Install pitman shaft assembly and side cover to housing.
- (11) Install side cover bolts and tighten to 60 N·m (44 ft. lbs.).
- (12) Adjust Over-Center Rotation Torque.



# DISASSEMBLY AND ASSEMBLY (Continued)

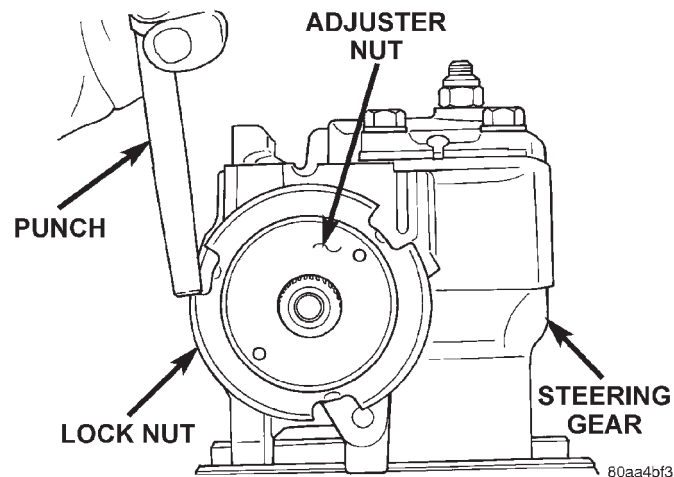


**Fig. 11 Needle Bearing Removal**

## SPOOL VALVE

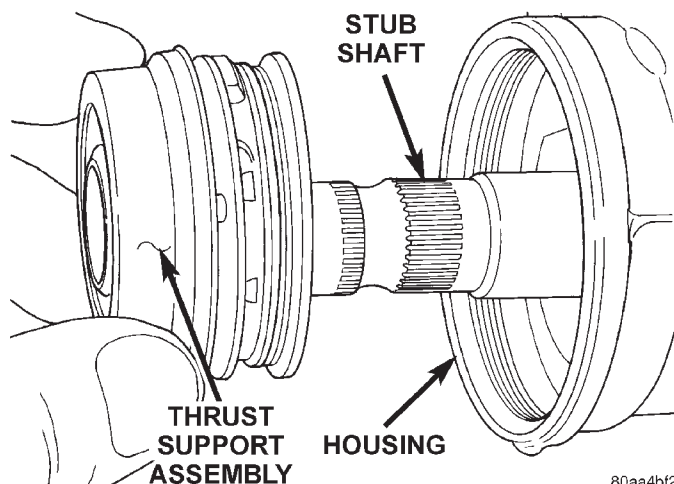
### DISASSEMBLY

- (1) Remove lock nut (Fig. 12).
- (2) Remove adjuster nut with Spanner Wrench C-4381.
- (3) Remove thrust support assembly out of the housing (Fig. 13).
- (4) Pull stub shaft and valve assembly from the housing (Fig. 14).

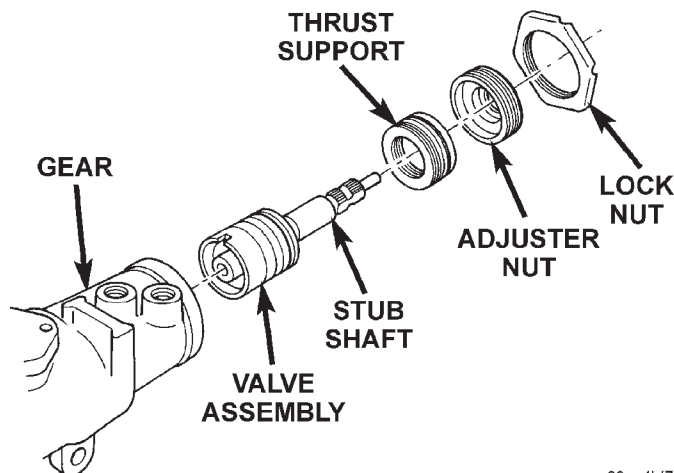


**Fig. 12 Lock Nut and Adjuster Nut**

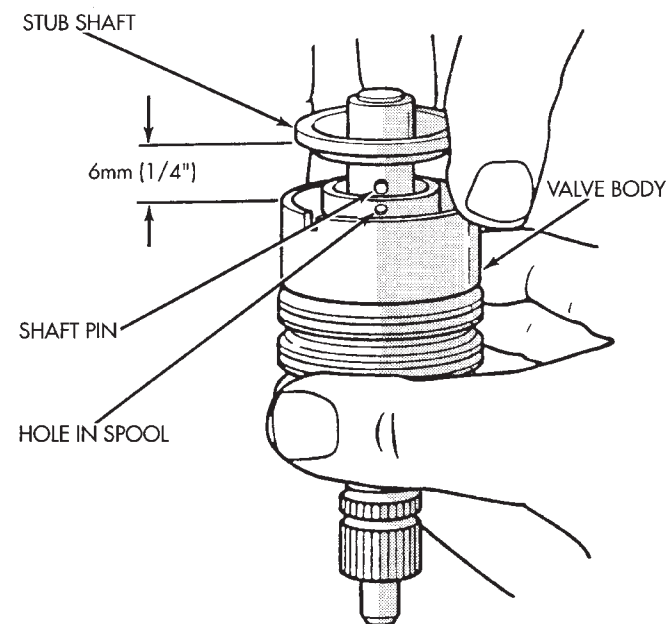
- (5) Remove stub shaft from valve assembly by lightly tapping shaft on a block of wood to loosen shaft. Then disengage stub shaft pin from hole in spool valve and separate the valve assembly from stub shaft (Fig. 15).



**Fig. 13 Thrust Support Assembly**



**Fig. 14 Valve Assembly With Stub Shaft**

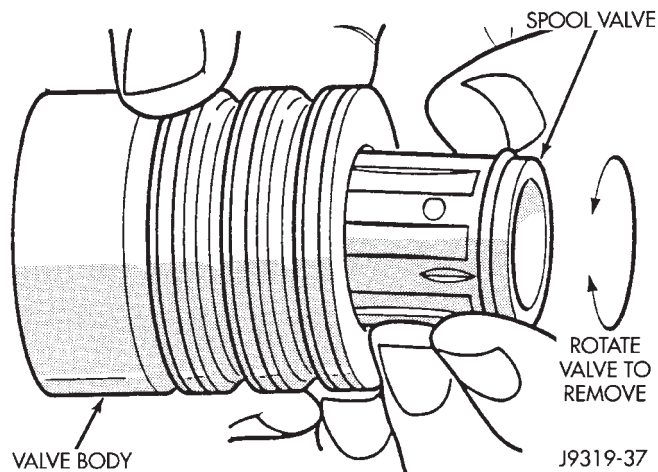


**Fig. 15 Stub Shaft**



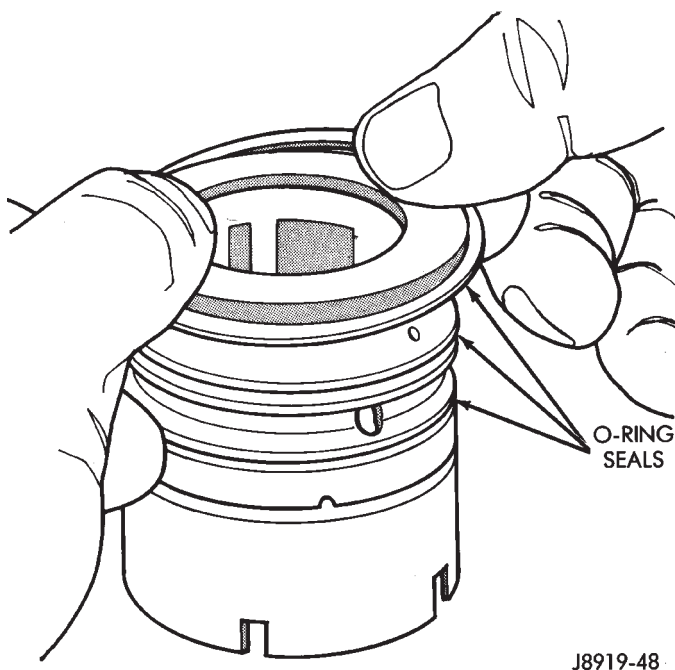
## DISASSEMBLY AND ASSEMBLY (Continued)

(6) Remove spool valve from valve body by pulling and rotating the spool valve from the valve body (Fig. 16).



**Fig. 16 Spool Valve**

(7) Remove spool valve O-ring and valve body teflon rings and O-rings underneath the teflon rings (Fig. 17).



**Fig. 17 Valve Seals**

(8) Remove the O-ring between the worm shaft and the stub shaft.

## ASSEMBLY

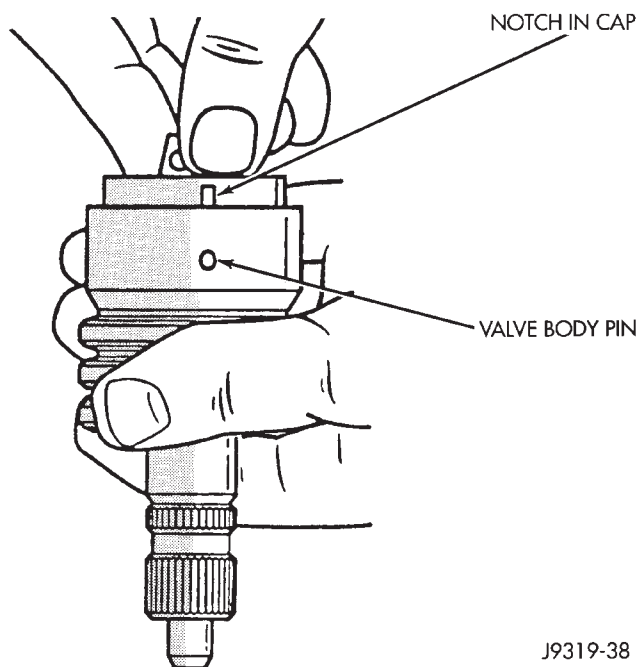
**NOTE:** Clean and dry all components, then lubricate with power steering fluid.

(1) Install spool valve spool O-ring.

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

(3) Install stub shaft in valve spool and engage locating pin on stub shaft into spool valve hole (Fig. 18).

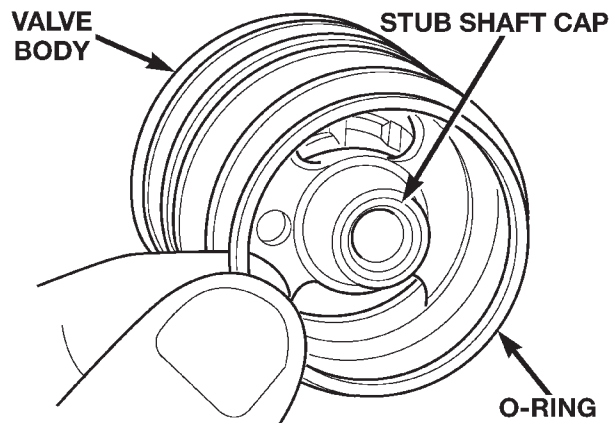
**NOTE:** Notch in stub shaft cap must fully engage valve body pin and seat against valve body shoulder.



**Fig. 18 Stub Shaft Installation**

(4) Install O-rings and teflon rings over the O-rings on valve body.

(5) Install O-ring into the back of the stub shaft cap (Fig. 19).



**Fig. 19 Stub Shaft Cap O-Ring**

## DISASSEMBLY AND ASSEMBLY (Continued)

(6) Install stub shaft and valve assembly in the housing. Line up worm shaft to slots in the valve assembly.

(7) Install thrust support assembly.

**NOTE:** The thrust support is serviced as an assembly. If any component of the thrust support is damaged the assembly must be replaced.

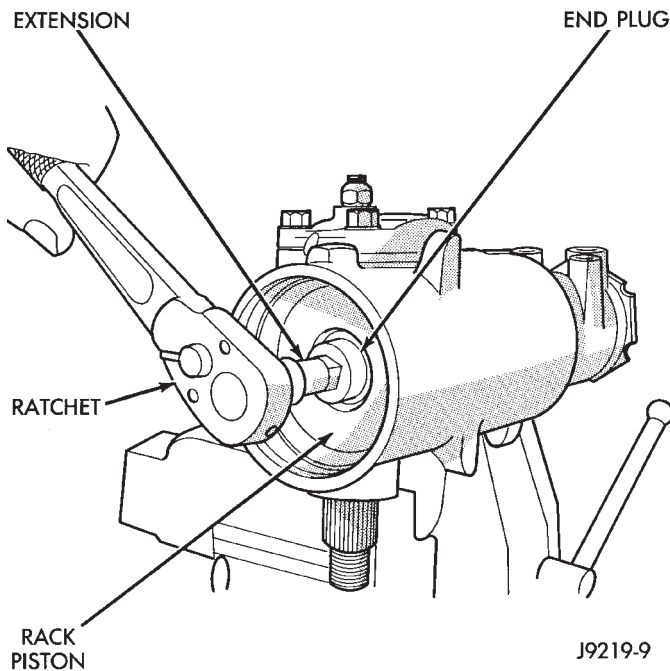
(8) Install adjuster nut and lock nut.

(9) Adjust Thrust Bearing Preload and Over-Center Rotating Torque.

## RACK PISTON AND WORM SHAFT

### DISASSEMBLY

- (1) Remove housing end plug.
- (2) Remove rack piston plug (Fig. 20).
- (3) Remove side cover and pitman shaft.



**Fig. 20 Rack Piston End Plug**

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

(5) Insert Arbor C-4175 into bore of rack piston (Fig. 21) and hold tool tightly against worm shaft.

(6) Turn the stub shaft with a 12 point socket COUNTERCLOCKWISE, this will force the rack piston onto the tool and hold the rack piston balls in place.

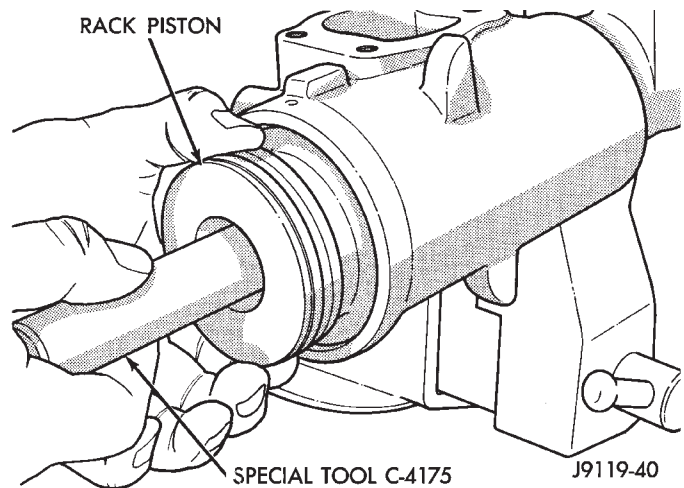
(7) Remove the rack piston and tool together from housing.

(8) Remove tool from rack piston.

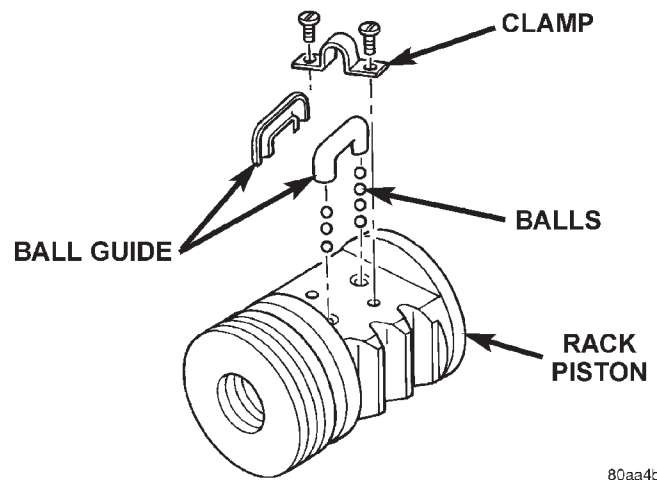
(9) Remove rack piston balls.

(10) Remove clamp bolts, clamp and ball guide (Fig. 22).

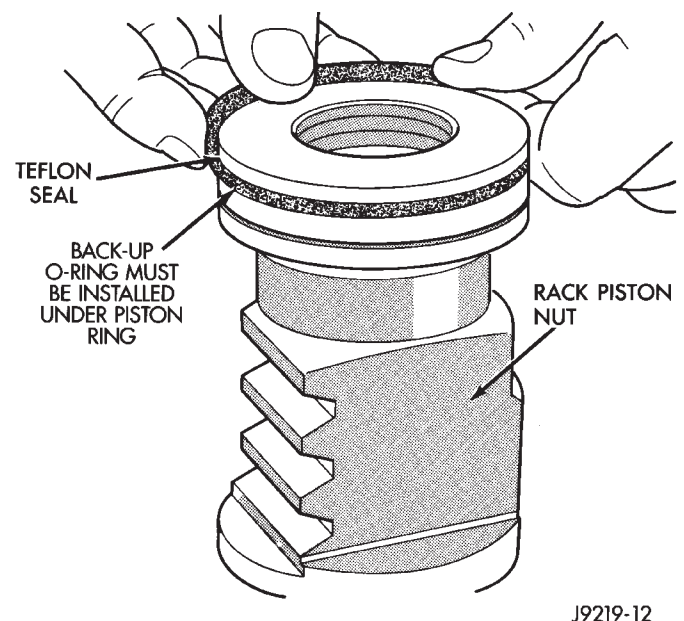
(11) Remove teflon ring and O-ring from the rack piston (Fig. 23).



**Fig. 21 Rack Piston with Arbor**



**Fig. 22 Rack Piston**



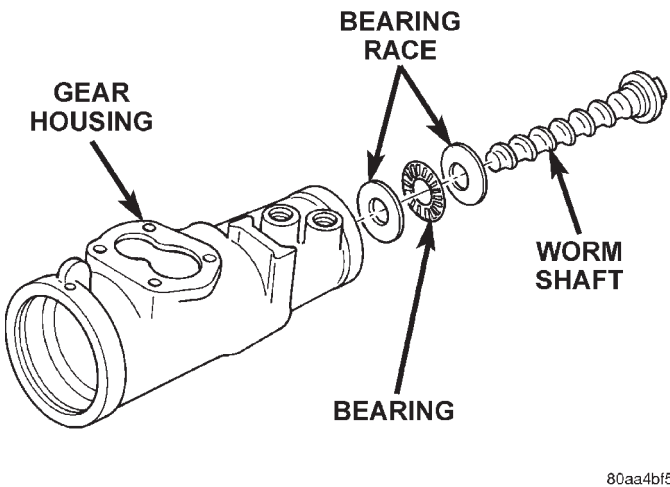
**Fig. 23 Rack Piston Teflon Ring and O-Ring**

## DISASSEMBLY AND ASSEMBLY (Continued)

(12) Remove the adjuster lock nut and adjuster nut from the stub shaft.

(13) Pull the stub shaft with the spool valve and thrust support assembly out of the housing.

(14) Remove the worm shaft from the housing (Fig. 24).



**Fig. 24 Worm Shaft**

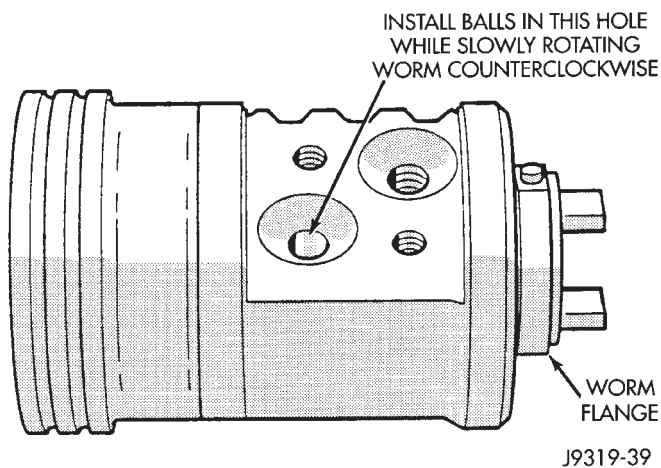
## ASSEMBLY

**NOTE:** Clean and dry all components and lubricate with power steering fluid.

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

(2) Install O-ring and teflon ring on the rack piston.

(3) Install worm shaft in the rack piston and align worm shaft spiral groove with rack piston ball guide hole (Fig. 25).



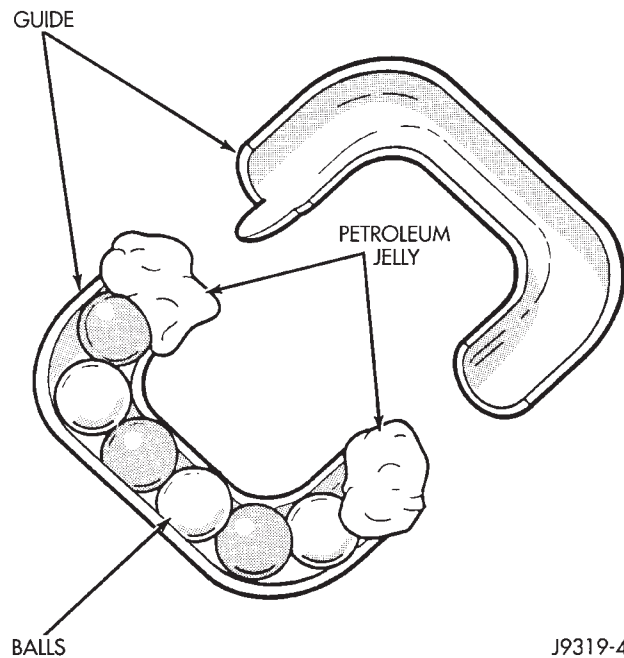
**Fig. 25 Installing Balls in Rack Piston**

**CAUTION:** The rack piston balls must be installed alternately into the rack piston and ball guide. This

maintains worm shaft preload. There are 12 black balls and 12 silver (Chrome) balls. The black balls are smaller than the silver balls.

(4) Lubricate and install rack piston balls through return guide hole while turning worm shaft COUNTERCLOCKWISE (Fig. 25).

(5) Install remaining balls in guide using grease to hold the balls in place (Fig. 26).



**Fig. 26 Balls in the Return Guide**

(6) Install the guide onto rack piston and install clamp and clamp bolts. Tighten bolts to 58 N·m (43 ft. lbs.).

(7) Insert Arbor C-4175 into bore of rack piston and hold tool tightly against worm shaft.

(8) Turn the worm shaft COUNTERCLOCKWISE while pushing on the arbor. This will force the rack piston onto the arbor and hold the rack piston balls in place.

(9) Install the races and thrust bearing on the worm shaft and install shaft in the housing (Fig. 24).

(10) Install the stub shaft with spool valve, thrust support assembly and adjuster nut in the housing.

(11) Install the rack piston and arbor tool into the housing.

(12) Hold arbor tightly against worm shaft and turn stub shaft CLOCKWISE until rack piston is seated on worm shaft.

(13) Install pitman shaft and side cover in the housing.

(14) Install rack piston plug and tighten to 150 N·m (111 ft. lbs.).

(15) Install housing end plug.

(16) Adjust worm shaft thrust bearing preload and over-center rotating torque.

## ADJUSTMENTS

### STEERING GEAR

**CAUTION:** Steering gear must be adjusted in the proper order. If adjustments are not performed in order, gear damage and improper steering response may result.

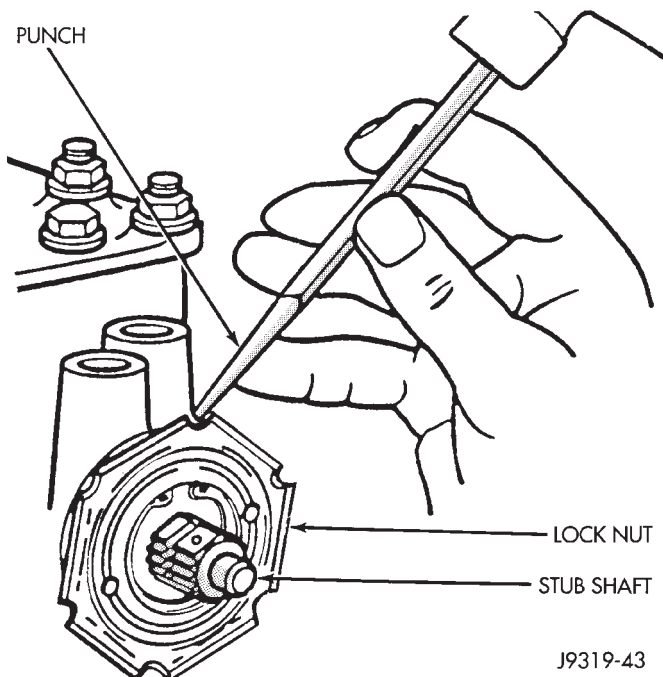
**NOTE:** Adjusting the steering gear in the vehicle is not recommended. Remove gear from the vehicle and drain the fluid. Then mount gear in a vise to perform adjustments.

#### WORM THRUST BEARING PRELOAD

- (1) Mount the gear carefully into a vise.

**CAUTION:** Do not overtighten the vise on the gear case. This may affect the adjustment

- (2) Remove adjuster plug locknut (Fig. 27).
- (3) Rotate the stub shaft back and forth with a 12 point socket to drain the remaining fluid.

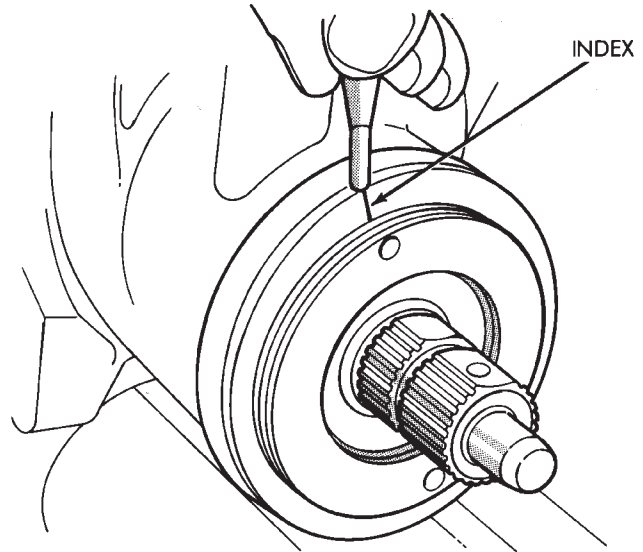


**Fig. 27 Loosening the Adjuster Plug**

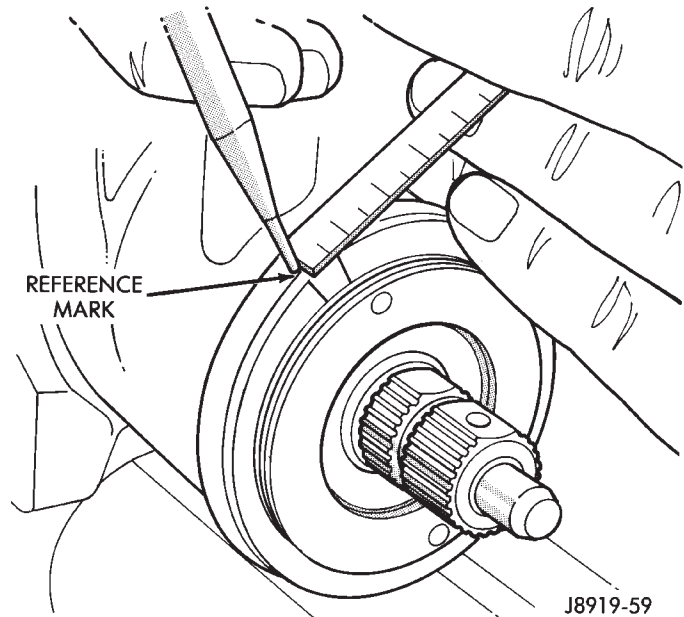
- (4) Turn the adjuster in with Spanner Wrench C-4381. Tighten the plug and thrust bearing in the housing until firmly bottomed in the housing about 34 N·m (25 ft. lbs.).

- (5) Place an index mark on the housing even with one of the holes in adjuster plug (Fig. 28).

- (6) Measure back (counterclockwise) 10 mm (0.40 in) and mark housing (Fig. 29).



**Fig. 28 Alignment Marking On Housing**



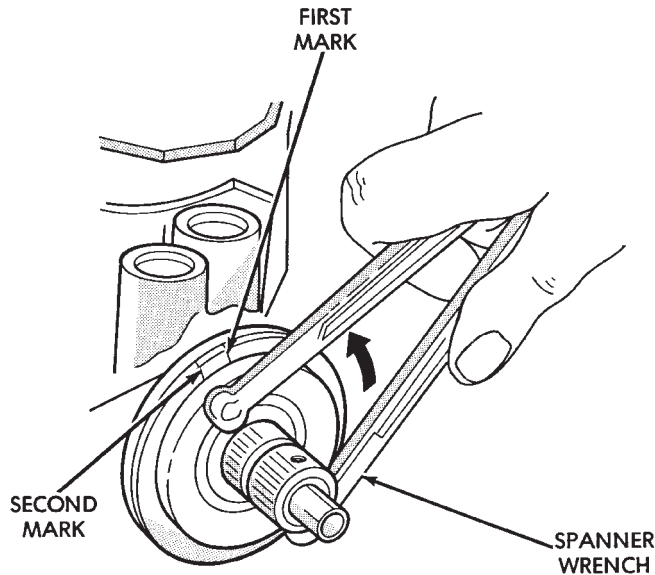
**Fig. 29 Second Marking On Housing**

- (7) Rotate adjustment cap back (counterclockwise) with spanner wrench until hole is aligned with the second mark (Fig. 30).

- (8) Install and tighten locknut to 108 N·m (80 ft. lbs.). Be sure adjustment cap does not turn while tightening the locknut.



## ADJUSTMENTS (Continued)

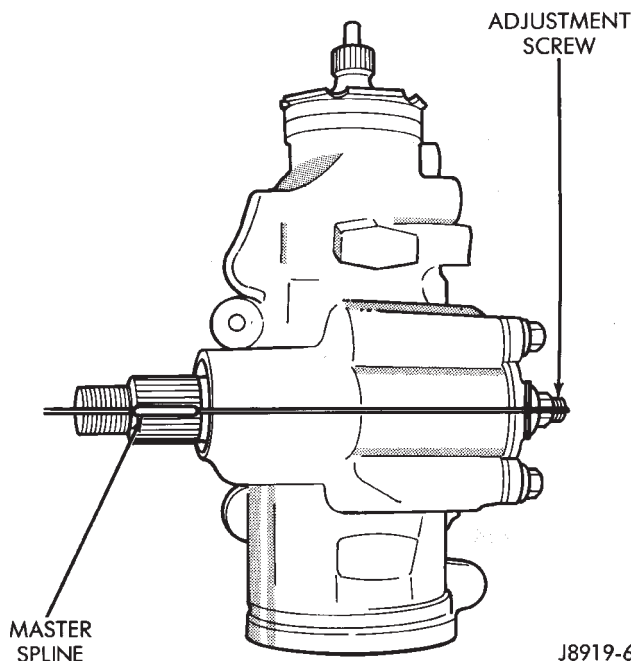


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**Fig. 30 Aligning To The Second Mark****OVER-CENTER**

**NOTE:** Before performing this procedure, the worm bearing preload adjustment must be performed.

- (1) Rotate the stub shaft with a 12 point socket 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. 31).



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**Fig. 31 Steering Gear Centered**

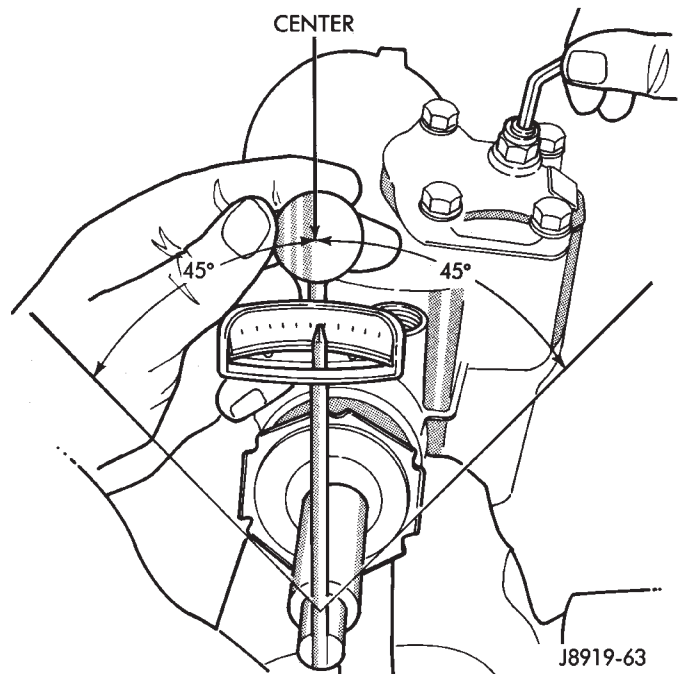
- (3) Place the torque wrench in the vertical position on the stub shaft. Rotate the wrench 45 degrees each side of the center and record the highest rotational torque in this range (Fig. 32). This is the Over-Center Rotating Torque.

**NOTE:** The stub shaft must rotate smoothly without sticking or binding.

- (4) Rotate the stub shaft between 90° and 180° to the left of center and record the left off-center preload. Repeat this to the right of center and record the right off-center preload. The average of these two recorded readings is the Preload Rotating Torque.

- (5) The Over-Center Rotating Torque should be 0.45-0.9 N·m (4-8 in. lbs.) **higher** than the Preload Rotating Torque.

- (6) If an adjustment to the Over-Center Rotating Torque is necessary, first loosen the adjuster lock nut. Then turn the pitman shaft adjuster screw back (COUNTERCLOCKWISE) until fully extended, then turn back in (CLOCKWISE) one full turn.



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**Fig. 32 Checking Over-center Rotation Torque**

- (7) Remeasure Over-Center Rotating Torque. If necessary turn the adjuster screw and repeat measurement until correct Over-Center Rotating Torque is reached.

**NOTE:** To increase the Over-Center Rotating Torque turn the screw **CLOCKWISE**.

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

## SPECIFICATIONS

### POWER STEERING GEAR

#### Steering Gear

Type ..... Recirculating Ball  
Variable Ratio ..... 16-13:1

#### Wormshaft Bearing

Preload ..... 0.56-1.36 N·m (5-12 in. lbs.)

#### Pitman Shaft Overcenter

Rotating Torque .... 0.45-0.90 N·m (4-8 in. lbs.) +  
Preload Rotating Torque

## TORQUE CHART

### DESCRIPTION

#### Steering Gear

Gear to Frame Bolts ..... 88 N·m (65 ft. lbs.)  
Pitman Shaft Nut ..... 251 N·m (185 ft. lbs.)  
Adjustment Cap Locknut ... 108 N·m (80 ft. lbs.)  
Adjustment Screw Locknut ... 49 N·m (36 ft. lbs.)  
Rack Piston Plug ..... 102 N·m (75 ft. lbs.)  
Side Cover Bolts ..... 61 N·m (45 ft. lbs.)  
Pressure Line ..... 35 N·m (25 ft. lbs.)  
Return Line ..... 35 N·m (25 ft. lbs.)  
Return Guide Clamp Bolt ..... 5 N·m (4 ft. lbs.)

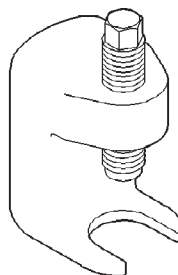
### TORQUE

## SPECIAL TOOLS

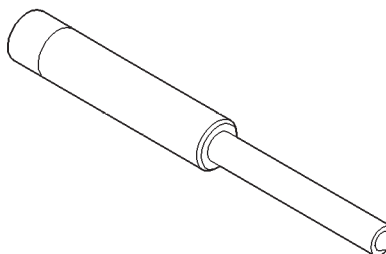
### POWER STEERING GEAR



*Remover/Installer, Steering Plug C-4381*



*Remover, Pitman Arm C-4150A*



*Remover/Installer Steering Rack Piston C-4175*

## STEERING COLUMN

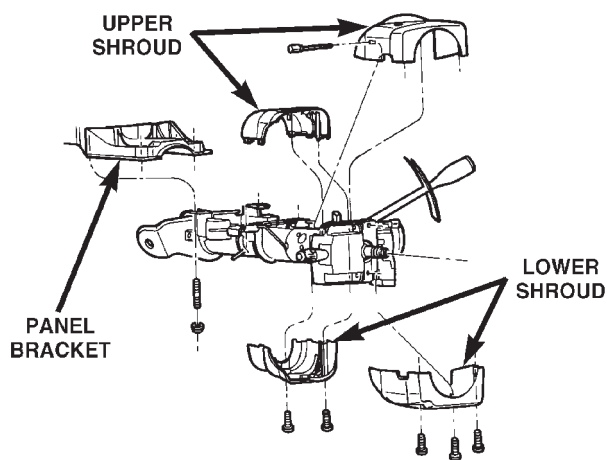
## INDEX

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## GENERAL INFORMATION

## STEERING COLUMN

The tilt and standard column (Fig. 1) has 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 steering column from the vehicle.



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Fig. 1 Steering Column

## SERVICE PRECAUTIONS

Safety goggles should be worn at all times when working on steering columns.

To service the steering wheel, switches or airbag, refer to Group 8M and follow all WARNINGS and CAUTIONS.

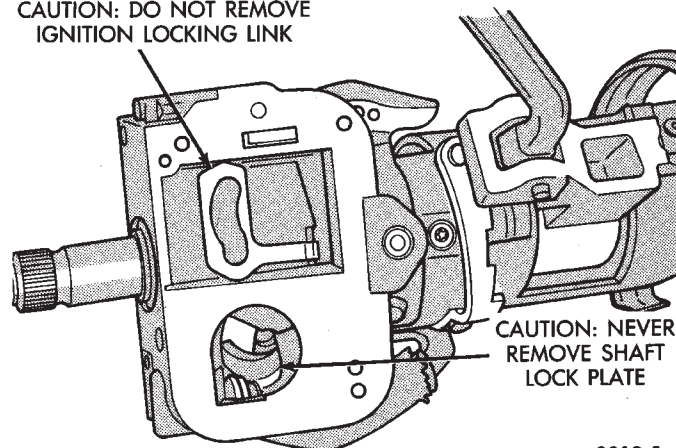
**WARNING: THE AIRBAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL THE AIRBAG SYSTEM COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DIS-**

**CHARGE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIRBAG AND POSSIBLE PERSONAL INJURY. THE FASTENERS, SCREWS, AND BOLTS, ORIGINALLY USED FOR THE AIRBAG COMPONENTS, HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANYTIME A NEW FASTENER IS NEEDED, REPLACE WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR FASTENERS LISTED IN THE PARTS BOOKS.**

**CAUTION:** Do not hammer on steering column shaft or shift tube. This may cause the shaft or shift tube to collapse.

**CAUTION:** Do not attempt to remove the pivot pins to disassemble the tilting mechanism. Do not remove ignition locking link, shaft lock plate or plate retainer. This will damage the column (Fig. 2) and (Fig. 3).

**CAUTION: DO NOT REMOVE  
IGNITION LOCKING LINK**



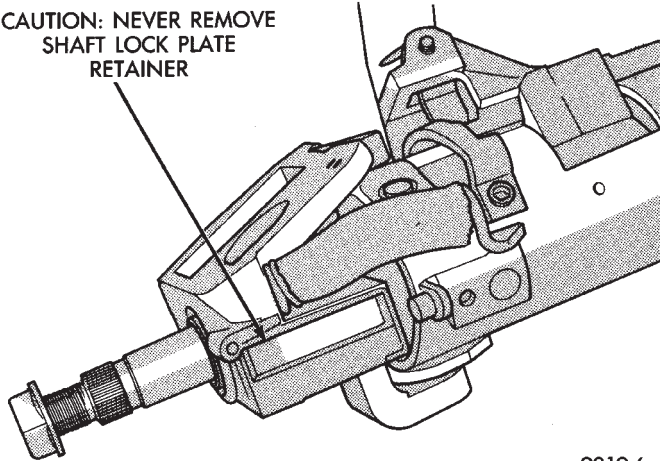
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Fig. 2 Observe Cautions



## GENERAL INFORMATION (Continued)

CAUTION: NEVER REMOVE  
SHAFT LOCK PLATE  
RETAINER



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**Fig. 3 Observe Cautions**

## DIAGNOSIS AND TESTING

## IGNITION SWITCH

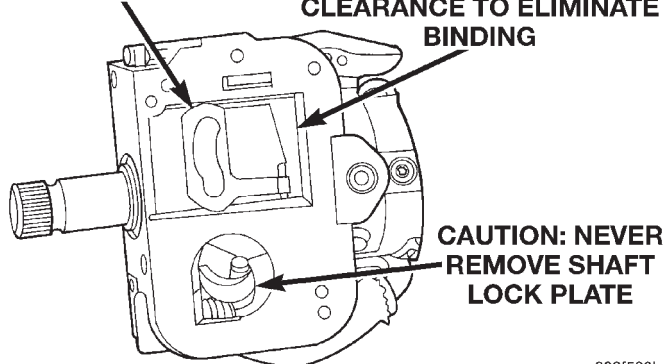
## TEST AND REPAIR

If the ignition switch effort is excessive, remove the ignition switch from the steering column. Refer to Group 8D Ignition System. Using a key cylinder, check the turning effort of the switch. If the ignition switch binds look for the following conditions.

(1) Look for rough areas or flash in the casting and if found remove with a file (Fig. 4).

CAUTION: DO NOT  
REMOVE IGNITION  
LOCKING LINK

FILE THIS AREA TO REMOVE  
FLASHING AND PROVIDE  
CLEARANCE TO ELIMINATE  
BINDING



CAUTION: NEVER  
REMOVE SHAFT  
LOCK PLATE

803f589b

**Fig. 4 Steering Column Flash Removal And  
Non-Serviceable Components**

(2) Remove the link and slider and check the link to see if it is bent. If so replace with a new part.

(3) Put the slider in its slot in the sleeve and verify a loose fit over the length of the slot. If the slider binds in the slot at any point lightly file the slider until clearance is achieved.

(4) If no binding is found, lightly file the ramp on the ignition switch, (The ramp fits into the casting) until binding no longer occurs.

## REMOVAL AND INSTALLATION

## STEERING COLUMN

**WARNING: BEFORE SERVICING THE STEERING COLUMN THE AIRBAG SYSTEM MUST BE DISARMED, REFER TO GROUP 8M RESTRAINT SYSTEMS FOR SERVICE PROCEDURES. FAILURE TO DO SO MAY RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIRBAG AND POSSIBLE PERSONAL INJURY.**

**CAUTION: All fasteners must be torqued to specification to ensure proper operation of the steering column.**

## REMOVAL

- (1) Position front wheels straight ahead.
- (2) Remove the negative (ground) cable from the battery.
- (3) Remove the airbag, refer to Group 8M Restraint Systems.
- (4) Remove the steering wheel with an appropriate puller.

**CAUTION: Ensure the puller bolts are fully engaged into the steering wheel and not into the clockspring, before attempting to remove the wheel. Failure to do so may damage the steering wheel/clockspring.**

(5) Remove the steering column opening cover and knee blocker, refer to Group 8E Instrument Panel Systems.

(6) Disconnect shift cable (column shift vehicles). Pry shift cable from the shift lever and remove from cable bracket (Fig. 5).

(7) Remove PRNDL cable (column shift vehicles). Put shift lever in **Park** position. Pull cable and twist to remove from PRNDL lever. Push tab on top of cable retainer, then squeeze sides to remove retainer from the column (Fig. 6).

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

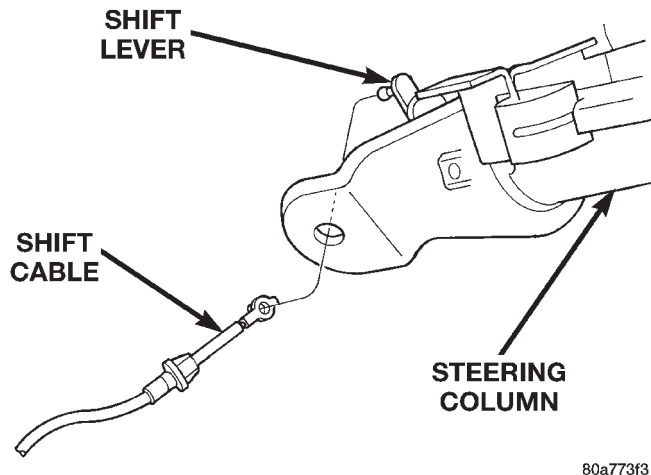
(9) Remove the lower and upper shrouds (Fig. 7).

(10) Remove the turn signal multi-function switch connector with a 7 mm socket (Fig. 8).

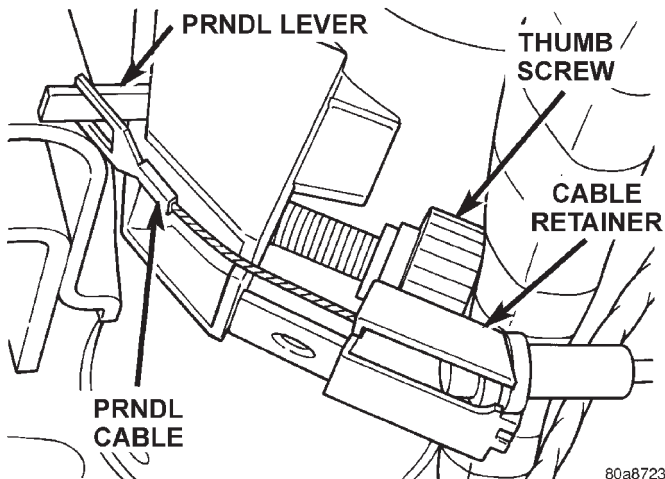
(11) Remove remaining electrical connections from the column switches (Fig. 8).

(12) Remove the bolt and nut from upper intermediate shaft (Fig. 9). Slide upper intermediate shaft off column shaft.

## REMOVAL AND INSTALLATION (Continued)



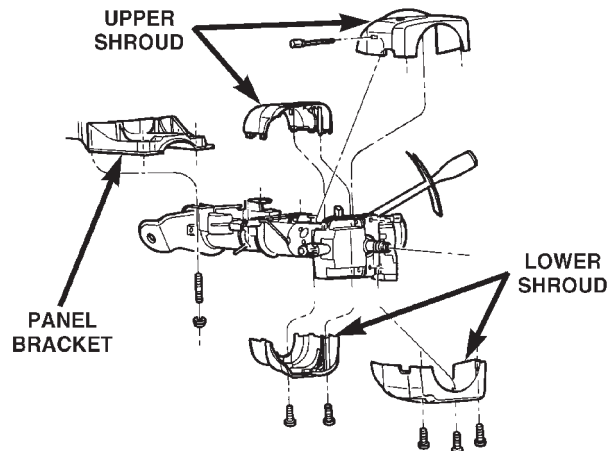
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**Fig. 5 Shift Cable**

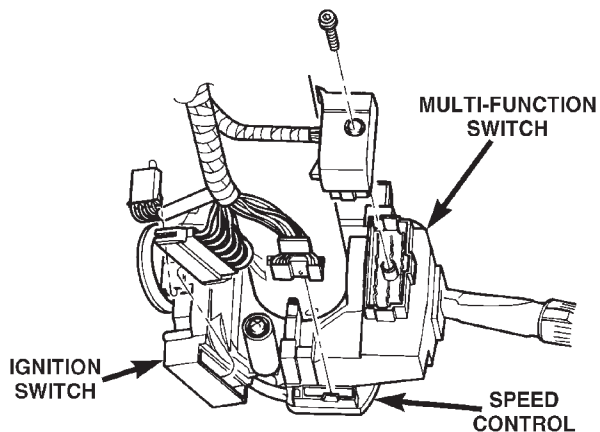
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**Fig. 6 PRNDL Drive Cable**

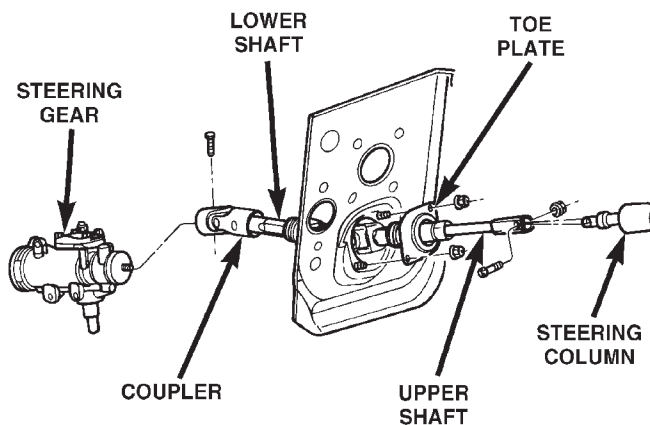
- (13) Remove column mounting nuts (Fig. 10).
- (14) Remove column from vehicle.
- (15) Remove clock spring, switches and key cylinder, refer to Group 8 Electrical for procedures.



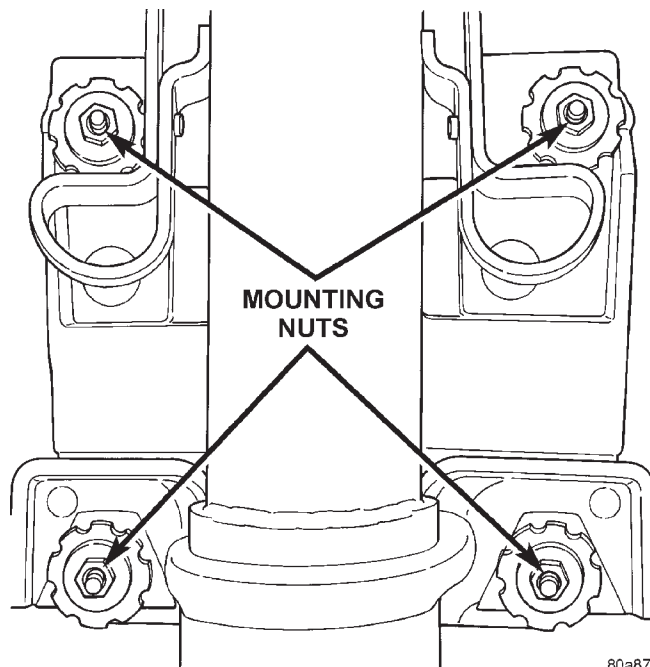
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**Fig. 7 Column Shrouds**

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**Fig. 8 Multi-function Switch & Column Wiring**

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**Fig. 9 Column Shafts & Couplers**

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**Fig. 10 Column Mounting Nuts**

## REMOVAL AND INSTALLATION (Continued)

### INSTALLATION

- (1) Install switches, clock spring and key cylinder, refer to Group 8 Electrical for procedures.
- (2) Remove the shipping lock pin if necessary.
- (3) Position the column to the panel bracket and attaching studs. Install, but **loose assemble** the mounting nuts.
- (4) Slide upper intermediate column shaft onto the column shaft. Install a **new** bolt and nut and tighten to 49 N·m (36 ft. lbs.).
- (5) Tighten column mounting nuts to 12 N·m (105 in. lbs.).
- (6) Connect the multi-function switch wiring and tighten with 7mm socket to 2 N·m (17 in. lbs.).
- (7) Install the wiring connections to the column switches.
- (8) Install the lower and upper shrouds.
- (9) Install the PRNDL cable (column shift vehicles). Place shifter in Park position. If indicator needs adjusting turn thumb screw on cable retainer to adjust cable.
- (10) Install shift cable (column shift vehicles).
- (11) Install the tilt lever (if equipped).
- (12) Install the knee blocker and steering column opening cover, refer to Group 8E Instrument Panel Systems for procedures.
- (13) Install steering wheel and tighten nut to 47 N·m (35 ft. lbs.).
- (14) Install airbag, refer to Group 8M Restraint Systems for procedure.
- (15) Connect the battery ground (negative) cable.
- (16) Check operation of the automatic transmission shift linkage and adjust as necessary. Refer to Group 21, Transmission and Transfer Case for adjustment procedure.

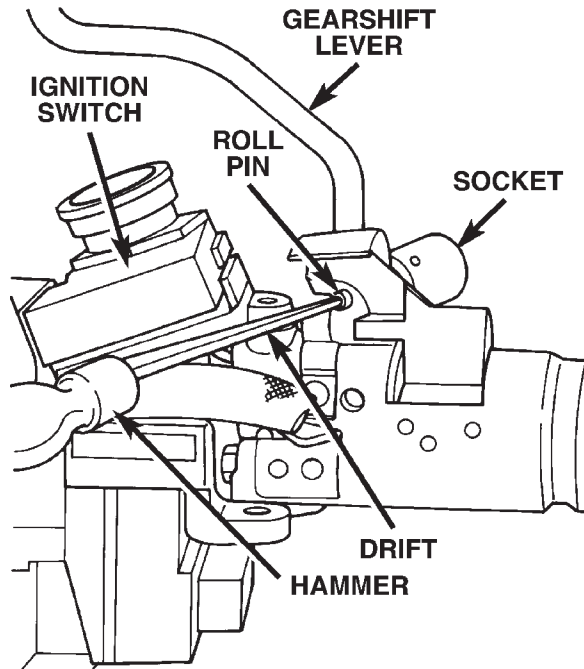
### GEAR SHIFT LEVER

#### REMOVAL

- (1) Support the steering column assembly as shown in (Fig. 11) using a suitable size socket.
- (2) Using a drift of the appropriate size drive the roll pin out of the steering column and gear shift lever. Remove the gear shift lever from the steering column assembly.

#### INSTALLATION

- (1) Support the steering column using a suitable size socket.



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**Fig. 11 Gear Shift Lever**

- (2) Install the gear shift lever into the steering column assembly. Align the roll pin holes in the gear shift lever and the steering column assembly.
- (3) Carefully Install the roll pin into the steering column assembly and through the shift lever. If the roll pin binds check the alignment on the holes. Be sure roll pin is fully installed into the steering column assembly.

## SPECIFICATIONS

### TORQUE CHART

#### DESCRIPTION

##### Steering Column

DESCRIPTION	TORQUE
Steering Wheel Nut . . . . .	47 N·m (35 ft. lbs.)
Column Bracket Nuts . . . . .	12 N·m (105 in. lbs.)
Shaft Coupler Bolts . . . . .	49 N·m (36 ft. lbs.)
Multi-function Switch Bolt . . . .	2 N·m (17 in. lbs.)

## STEERING LINKAGE

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## GENERAL INFORMATION

## STEERING LINKAGE

The steering linkage consists of a pitman arm, idler arm, center link, and tie rod ends (Fig. 1).

**CAUTION:** Components attached with a nut and cotter pin must be first torqued to specification. If the slot in the nut does not line up with the cotter pin hole, tighten nut until it is aligned. Never loosen the nut to align the cotter pin hole.

**NOTE:** Periodic lubrication of the steering system components is required. Refer to Group 0, Lubrication And Maintenance for the recommended maintenance schedule.

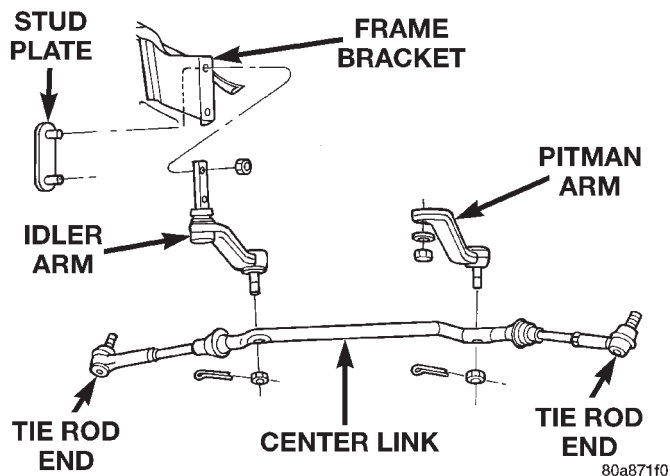


Fig. 1 Steering Linkage

## SERVICE PROCEDURES

## STEERING LINKAGE

The tie rod end and ball stud seals should be inspected during all oil changes. If a seal is damaged, it should be replaced. Before installing a new seal,

inspect 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.

**CAUTION:** If any steering components are replaced or serviced an alignment must be performed, to ensure the vehicle meets all alignment specifications.

**CAUTION:** Components attached with a nut and cotter pin must be torqued to specification. Then if the slot in the nut does not line up with the cotter pin hole, tighten nut until it is aligned. Never loosen the nut to align the cotter pin hole.

**NOTE:** Periodic lubrication of the steering system components is required. Refer to Group 0, Lubrication And Maintenance for the recommended maintenance schedule.

**NOTE:** When servicing the steering linkage, use care to avoid damaging ball stud seals. Use Remover MB-991113 to remove outer tie rod ends.

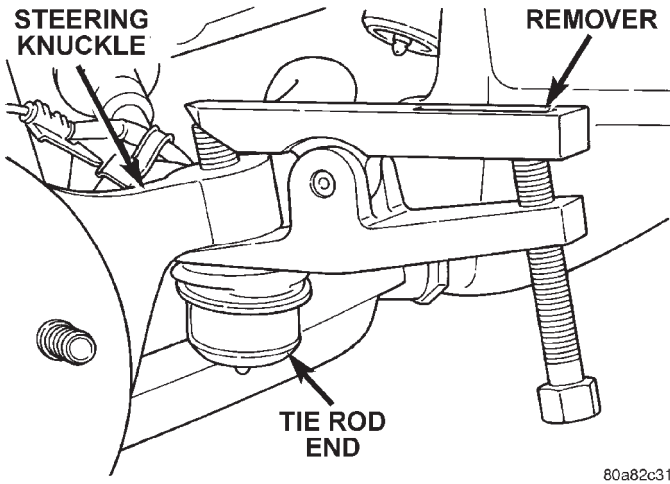
## REMOVAL AND INSTALLATION

## TIE ROD END

## REMOVAL

- (1) Remove the cotter pins and nuts at the steering knuckle.
- (2) Separate the tie rod ball stud from the knuckle with Remover MB-991113 (Fig. 2).
- (3) Loosen the jam nut and unthread the tie rod end from the tie rod.

## REMOVAL AND INSTALLATION (Continued)



**Fig. 2 Tie Rod End**

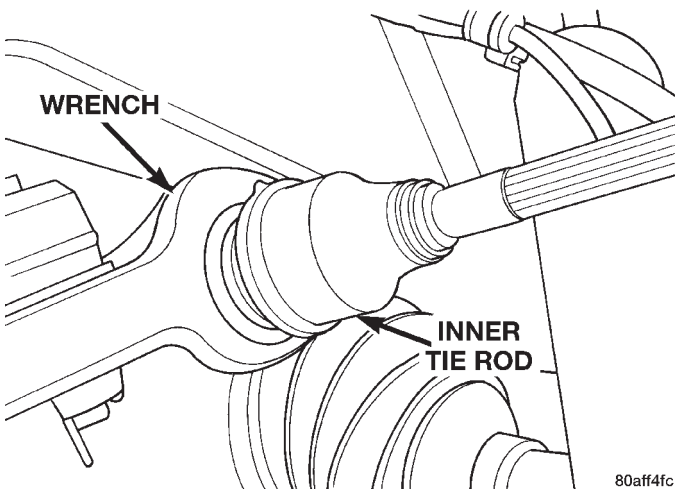
### INSTALLATION

- (1) Thread the tie rod end onto the tie rod, to its original position.
- (2) Install the tie rod ball stud to the steering knuckle.
- (3) Tighten the ball stud nut on the steering knuckle to 88 N·m (65 ft. lbs.). Install new cotter pin.
- (4) Tighten jam nut to 75 N·m (55 ft. lbs.).
- (5) Set wheel toe pattern, refer to Group 2 Front Suspension for Alignment adjustment.

### INNER TIE ROD END

#### REMOVAL

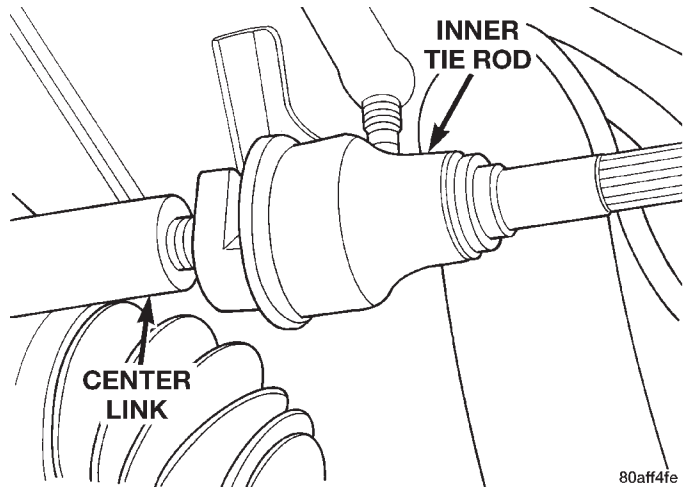
- (1) Raise and support the vehicle.
- (2) Remove the tire and wheel assembly.
- (3) Remove outer tie rod end.
- (4) Remove inner tie rod end from the center link (Fig. 3).



**Fig. 3 Inner Tie Rod**

### INSTALLATION

- (1) Thread the inner tie rod end into the center link (Fig. 4).
- (2) Tighten the inner tie rod end to 68 N·m (50 ft. lbs.).
- (3) Install the out tie rod end.
- (4) Install the tire and wheel assembly.
- (5) Remove support and lower the vehicle.
- (6) Set wheel toe pattern, refer to Group 2 Suspension.



**Fig. 4 Center Link & Inner Tie Rod**

### PITMAN ARM

To remove the pitman arm the steering gear must be removed from the vehicle. Refer to steering gear removal for the procedure.

### IDLER ARM

#### REMOVAL

- (1) Remove the cotter pin and nut from the idler arm at the center link.
- (2) Separate idler arm from the center link with Puller C-3894-A.
- (3) Remove nuts from the stud plate and remove idler arm (Fig. 1).

#### INSTALLATION

- (1) Position the idler arm on the stud plate and tighten the nuts to 136 N·m (110 ft. lbs.).
- (2) Install idler arm to the center link and tighten nut to 88 N·m (65 ft. lbs.). Install a new cotter pin.

### CENTER LINK

#### REMOVAL

- (1) Remove the outer and inner tie rod ends from the center link.
- (2) Remove cotter pins and nuts from the idler arm and pitman arm (Fig. 1).



## REMOVAL AND INSTALLATION (Continued)

(3) Separate the idler arm and pitman arm from the center link with Puller C-3894-A.

(4) Remove center link.

## INSTALLATION

(1) Install the center link on the pitman arm and idler arm.

(2) Tighten the pitman arm nut to 88 N·m (65 ft. lbs.). Install new cotter pin.

(3) Tighten the idler arm nut to 88 N·m (65 ft. lbs.). Install new cotter pin.

(4) Install the inner and outer tie rod ends on the center link.

(5) Set toe pattern, refer to Group 2 Suspension.

## SPECIFICATIONS

## TORQUE CHART

## DESCRIPTION

## TORQUE

**Centerlink**

Idler Arm Nut . . . . . 88 N·m (65 ft. lbs.)

Pitman Arm Nut . . . . . 88 N·m (65 ft. lbs.)

**Tie Rod**

Knuckle Nut . . . . . 88 N·m (65 ft. lbs.)

Jam Nut . . . . . 75 N·m (55 ft. lbs.)

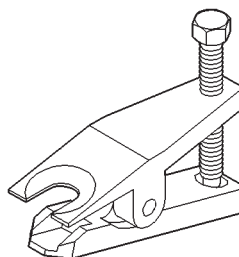
Inner Tie Rod . . . . . 68 N·m (50 ft. lbs.)

**Idler Arm**

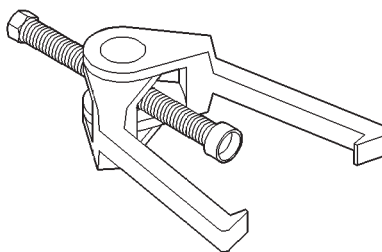
Frame Nuts . . . . . 136 N·m (110 ft. lbs.)

## SPECIAL TOOLS

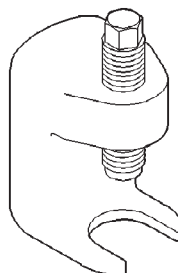
## STEERING LINKAGE



**Remover Ball Stud MB-991113**



**Puller Tie Rod C-3894-A**



**Remover Pitman C-4150A**