

# STEERING

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## GENERAL INFORMATION

**Safety goggles should be worn at all times when working on any steering gear or pump.**

Throughout this group, references may be made to a particular vehicle by letter or number designation. A chart showing the breakdown of these designations is included in the Introduction Section at the front of this service manual.

The power steering system consists of these four major components. Power Steering Pump, Power Steering Gear, Pressure Hose, and Return Line. Turning of the steering wheel is converted into linear travel through the meshing of the helical pinion teeth with

the rack teeth. Power assist steering is provided by an open center, rotary type control valve. It is used to direct oil from the pump to either side of the integral steering rack piston.

Road feel is controlled by the diameter of a torsion bar which initially steers the vehicle. As required steering effort increases, as in a turn. The torsion bar twists, causing relative rotary motion between the rotary valve body and the valve spool. This movement directs oil behind the integral rack piston, which, in turn, builds up hydraulic pressure and assists in the turning effort.

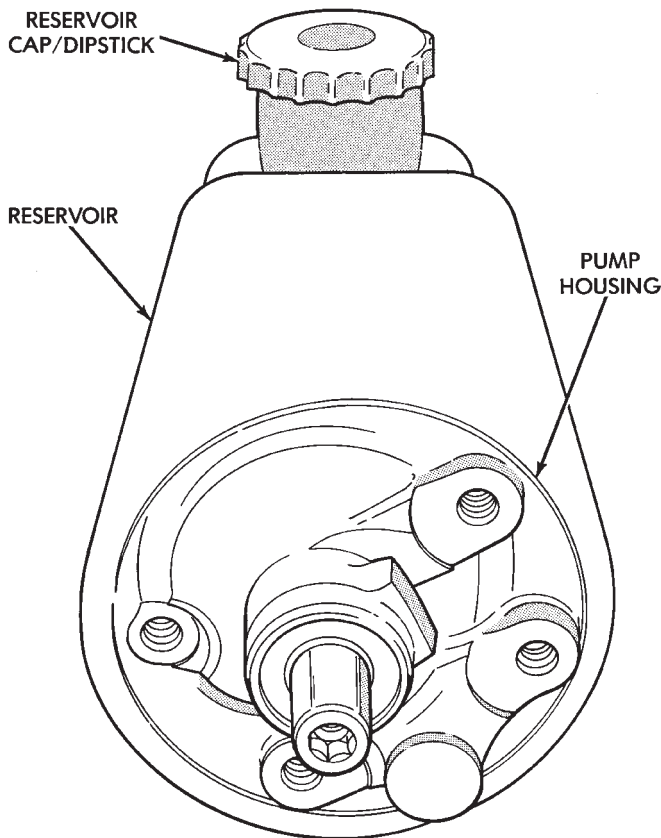
POWER STEERING PUMPS

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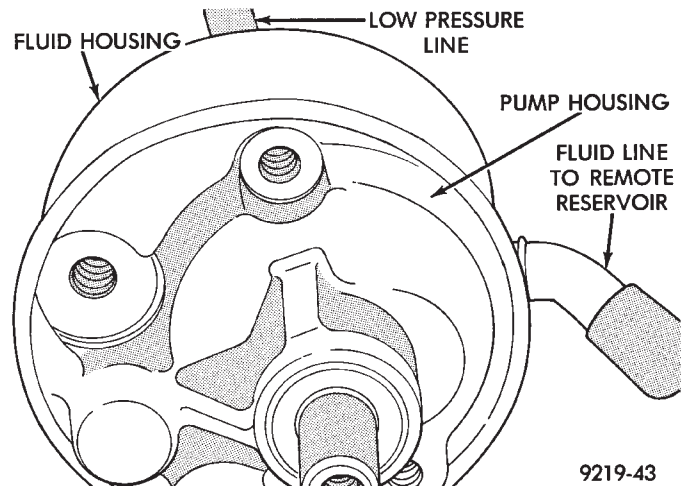
GENERAL INFORMATION

Hydraulic pressure for the operation of the power steering gear is provided by a belt driven power steering pump. The power steering pump is a constant flow rate and displacement vane type pump. Different styles of Saginaw power steering pumps are used depending on the engine application of the vehicle. On all four cylinder applications and 3.0-liter V-6 the Vane Submerged integral reservoir (Fig. 1) power steering pump is used. On the 3.3-liter V-6 applications the Vane-Submerged remote reservoir (Fig. 2) power steering pump is used.



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Fig. 1 Vane Submerged Power Steering Pump (Ham Can)



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Fig. 2 Vane Submerged Remote Reservoir Power Steering Pump

On the integral reservoir type pump (Fig. 1) the pump housing and internal components are combined with the reservoir to form a one-piece mechanism.

The remote reservoir type pump (Fig. 2) has the pump housing and internal components combined with the fluid housing. But it has a remote reservoir for the power steering fluid supply.

Drive tangs on the power steering pump pinion, mate loosely with the stub shaft of the pump. This is to allow manual steering control to be maintained, if the drive belt on the power steering pump should break. However, under these conditions, steering effort will significantly increase.



**STEERING COMPONENTS SERVICE DIAGNOSIS**

*POWER STEERING SERVICE DIAGNOSIS*

<b>STEERING NOISES</b>		
<p>There is some noise in all power steering systems. One of the most common is a hissing sound evident at standstill parking. Hiss is a high frequency noise similar to that experienced while slowly closing a water tap. The noise 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. Hiss may be expected when steering wheel is at end of travel or when slowly turning at standstill.</p>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
<p>OBJECTIONAL HISS OR WHISTLE</p>	<p>1. Noisy valve in gear</p>	<p>1. Check for proper seal between steering column coupling and dash seal.                  2. Ensure steering column lower coupling has no metal-to-metal contact within the coupling by performing an electrical continuity check. (Remove coupling for check.)                  3. If hiss is still extremely objectionable, replace steering gear.</p>
<p>RATTLE OR CLUNK</p>	<p>1. Gear loose on front crossmember                  2. Crossmember-to-frame bolts or studs loose                  3. Tie rod looseness (outer or inner)                  4. Pressure hose touching other parts of vehicle                  5. Noise internal to gear</p>	<p>1. Check gear-to-crossmember mounting bolts. Tighten to specification.                  2. Torque bolts and studs to specifications.                  3. Check tie rod pivot points for wear. Replace if necessary.                  4. Adjust hose to proper position by loosening, repositioning, and retightening fitting. Do not bend tubing.                  5. Replace gear.</p>
<p>CHIRP OR SQUEAL (IN THE AREA OF PUMP) PARTICULARLY NOTICEABLE AT FULL WHEEL TRAVEL AND DURING STANDSTILL PARKING</p>	<p>1. Loose belt</p>	<p>1. Adjust belt tension to specification.</p>

## POWER STEERING SERVICE DIAGNOSIS

**STEERING NOISES – Continued**

There is some noise in all power steering systems. One of the most common is a hissing sound evident at standstill parking. Hiss is a high frequency noise similar to that experienced while slowly closing a water tap. The noise 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. Hiss may be expected when steering wheel is at end of travel or when slowly turning at standstill.

CONDITION	POSSIBLE CAUSES	CORRECTION
<p>Pump growl results from the development of high pressure fluid flow. Normally this noise should not be high enough to be objectionable. Abnormal situations, such as a low oil level causing aeration or hoses touching the vehicle body, can create a noise level that could bring complaints.</p>		
<p>WHINE OR GROWL (PUMP NOISE)</p>	<ol style="list-style-type: none"> <li>1. Low fluid level.</li> <li>2. Hose touching vehicle body or frame.</li> <li>3. Extreme wear of pump internal parts.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill to proper level and perform leakage diagnosis. (Recheck after system is free of aeration.)</li> <li>2. Reposition hose. Replace hose if tube ends are bent.</li> <li>3. Replace pump and flush system.</li> </ol>
<p>SUCKING AIR SOUND</p>	<ol style="list-style-type: none"> <li>1. Loose return line clamp.</li> <li>2. Missing O-ring on hose connection.</li> <li>3. Low fluid level.</li> <li>4. Air leak between reservoir and pump.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten or replace clamp.</li> <li>2. Inspect connection and replace O-ring as required.</li> <li>3. Fill to proper level and perform leakage diagnosis.</li> <li>4. Inspect and replace reservoir as required.</li> </ol>
<p>SQUEAK OR RUB SOUND</p>	<ol style="list-style-type: none"> <li>1. Sound from steering column.</li> <li>2. Sound internal to steering gear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for squeak in steering column. Inspect for contact between shroud intermediate shaft, column, and wheel. (Realign if necessary.) (a) Check for lack of grease on steering column, dash to lower coupling seal.</li> <li>2. Replace gear.</li> </ol>
<p>SCRUBBING/KNOCKING</p>	<ol style="list-style-type: none"> <li>1. Incorrect tire size.</li> <li>2. Check clearance between tires and other vehicle components, through full travel.</li> <li>3. Check for interference between steering gear and other components.</li> <li>4. Incorrect gear supplied.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify tire size is the same as originally supplied.</li> <li>2. Correct as necessary.</li> <li>3. Correct as necessary.</li> <li>4. Replace gear.</li> </ol>



POWER STEERING SERVICE DIAGNOSIS

<b>BINDS STICKS SEIZED</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
CATCHES, STICKS IN CERTAIN POSITIONS OR DIFFICULT TO TURN	<ol style="list-style-type: none"> <li>1. Low fluid level</li> <li>2. Tires not properly inflated</li> <li>3. Lack of lube in ball joints</li> <li>4. Lack of lube in outer tie rod ends</li> <li>5. Loose pump belt</li> <li>6. Faulty pump flow control (Verify cause using Pump Test Procedure)</li> <li>7. Excessive friction in steering column or intermediate shaft</li> <li>8. Steering column coupling binding</li> <li>9. Excessive friction in gear</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill to proper level and perform leakage diagnosis.</li> <li>2. Inflate tires to proper pressure.</li> <li>3. Lubricate where possible.</li> <li>4. Lubricate where possible.</li> <li>5. Tighten or replace belt.</li> <li>6. Replace pump.</li> <li>7. Correct condition. (See Steering Column Service Procedure.)</li> <li>8. Realign as necessary.</li> <li>9. Replace gear.</li> </ol>
<b>SHAKE SHUDDER VIBRATION</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
VIBRATION OF THE STEERING WHEEL AND/OR DASH DURING DRY PARK OR LOW SPEED STEERING MANEUVERS	<ol style="list-style-type: none"> <li>1. Air in the power steering system</li> <li>2. Tires not properly inflated</li> <li>3. Excessive engine vibration</li> <li>4. Loose tie rod end</li> <li>5. Faulty accessory drive belt tensioner. (Poly-V belt systems only)</li> <li>6. Overcharged air conditioner</li> </ol>	<ol style="list-style-type: none"> <li>1. Steering shudder can be expected in new vehicles and vehicles with recent steering system repairs. Shudder should improve after the vehicle has been driven several weeks.</li> <li>2. Inflate tires to proper pressure.</li> <li>3. Make sure that engine is running properly.</li> <li>4. Check inner and outer tie rod and jam nut for excessive free play.</li> <li>5. Check dynamic belt tensioner for abnormal vibration. (See Drive Belt Adjustments.)</li> <li>6. Check air conditioning pump head pressure. (See Air Conditioning Refrigerant System Diagnosis.)</li> </ol>

## POWER STEERING SERVICE DIAGNOSIS

<b>LOW ASSIST, NO ASSIST, OR HARD STEERING</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
STIFF, HARD TO TURN, SURGES, MOMENTARY INCREASE IN EFFORT WHEN TURNING	<ol style="list-style-type: none"> <li>1. Tires not properly inflated</li> <li>2. Low fluid level</li> <li>3. Loose belt</li> <li>4. Lack of ball joint lubrication</li> <li>5. Low pressure pump (Verify using Pump Test Procedure)</li> <li>6. High internal leak gear</li> </ol>	<ol style="list-style-type: none"> <li>1. Inflate tires to proper pressure.</li> <li>2. Add power steering fluid as required and perform leakage diagnosis.</li> <li>3. Tighten or replace belt.</li> <li>4. Lubricate or replace as required.</li> <li>5. Verify cause using Pump Test Procedure. Replace pump if necessary.</li> <li>6. Check steering system using test procedure. If steering gear is at fault, replace steering gear.</li> </ol>
<b>POOR RETURN TO CENTER</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
STEERING WHEEL DOES NOT WANT TO RETURN TO CENTER POSITION	<ol style="list-style-type: none"> <li>1. Tires not properly inflated</li> <li>2. Improper front wheel alignment</li> <li>3. Lack of lubrication in ball joint</li> <li>4. Steering column U-joints misaligned</li> <li>5. Mispositioned dash cover</li> <li>6. Steering wheel rubbing</li> <li>7. Tight steering shaft bearings</li> <li>8. Excessive friction coupling universal joint</li> <li>9. High friction in the steering gear</li> </ol>	<ol style="list-style-type: none"> <li>1. Inflate tires to proper pressure.</li> <li>2. Check and adjust as necessary.</li> <li>3. Replace as required or lubricate.</li> <li>4. Realign steering column U-joints.</li> <li>5. Reposition dash cover. To evaluate items 6 and 7, disconnect the intermediate steering shaft. Turn the steering wheel and listen for internal rubbing in column.</li> <li>6. Adjust covers.</li> <li>7. Replace bearings.</li> <li>8. Replace U-joints.</li> <li>9. Replace steering gear.</li> </ol>



## POWER STEERING SERVICE DIAGNOSIS

<b>LOOSE STEERING</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
EXCESSIVE WHEEL KICKBACK OR TOO MUCH STEERING WHEEL PLAY	<ol style="list-style-type: none"> <li>1. Air in system</li> <li>2. Gear loose on crossmember</li> <li>3. Worn/broken intermediate shaft</li> <li>4. Free play in steering column</li> <li>5. Loose ball joints</li> <li>6. Pinch bolt loose on ball joint</li> <li>7. Front wheel bearings loose or worn</li> <li>8. Loose outer tie rod ends</li> <li>9. Loose inner tie rod ends</li> <li>10. Defective steering gear rotary valve</li> </ol>	<ol style="list-style-type: none"> <li>1. Add fluid.</li> <li>2. Check gear to crossmember mounting bolts. Tighten to specification.</li> <li>3. Check for worn universal joint and broken isolator. Replace intermediate shaft if worn.</li> <li>4. Check and replace as required.</li> <li>5. Check and replace as required.</li> <li>6. Check pinch bolts and tighten as required to specified torque.</li> <li>7. Tighten hub nut or replace with new parts as necessary.</li> <li>8. Check and replace as required.</li> <li>9. Replace gear.</li> <li>10. Replace gear.</li> </ol>
<b>VEHICLE LEADS TO THE SIDE</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTION</b>
WHEEL DOES NOT WANT TO RETURN TO CENTER POSITION	<ol style="list-style-type: none"> <li>1. Radial tire lead</li> <li>2. Front end misaligned</li> <li>3. Wheel braking</li> <li>4. Unbalanced steering gear valve. (If this is the cause, the steering efforts will be very light in direction of lead and heavier in the opposite direction)</li> </ol>	<ol style="list-style-type: none"> <li>1. Rotate tires as recommended in Tire Service.</li> <li>2. Align front end as recommended in Wheel Alignment Service Procedure.</li> <li>3. Check for dragging brakes as directed in Brake Service Procedure.</li> <li>4. Checking for pull with outer tie rod end disconnected. If verified, replace gear.</li> </ol>

## POWER STEERING SERVICE DIAGNOSIS

**FLUID LEAK**

CONDITION	POSSIBLE CAUSES	CORRECTION
LOW FLUID LEVEL WITH: • NO VISIBLE SIGNS OF LEAKS ON THE STEERING GEAR, PUMP, ON FLOOR, OR ANYWHERE ELSE  LOW FLUID LEVEL WITH: • VISIBLE LEAK ON STEERING GEAR, PUMP, FLOOR, OR ANYWHERE ELSE	1. Overfilled reservoir. 2. Hose connections at pump or gear.  3. Pump or gear leak.	1. Adjust fill level. 2. Check for loose fittings and tighten to specifications. If fittings are tight, examine for damaged or missing O-ring and replace as required.  3. Identify location of leak and repair or replace as indicated in Power Steering Pump and/or Gear sections of this service manual.

**FOAMY OR MILKY FLUID**

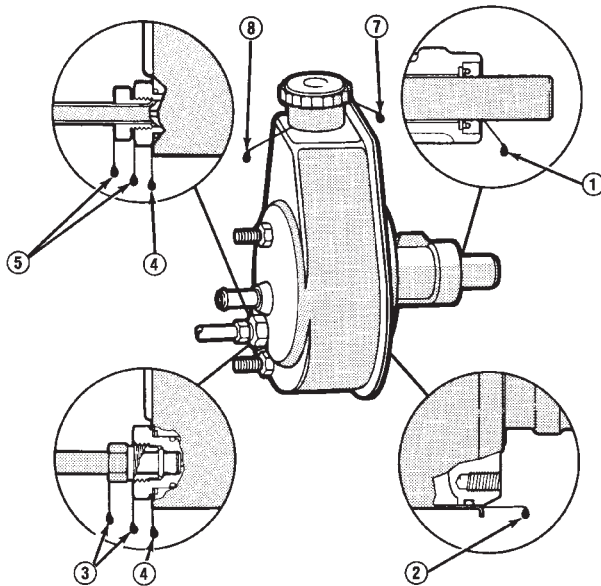
CONDITION	POSSIBLE CAUSES	CORRECTION
AERATION AND OVERFLOW OF FLUID	1. Air leaks.  2. Low fluid level.  3. Cracked pump housing.  4. Water contamination.	1. Check for air leak as described under sucking air and correct. 2. Extremely cold temperatures may cause system aeration if the oil level is low. Add fluid as required. 3. Remove pump from vehicle and separate reservoir from housing. Check expansion plug and housing for cracks. Replace pump as required. 4. Drain and refill fluid if there is evidence of contamination.



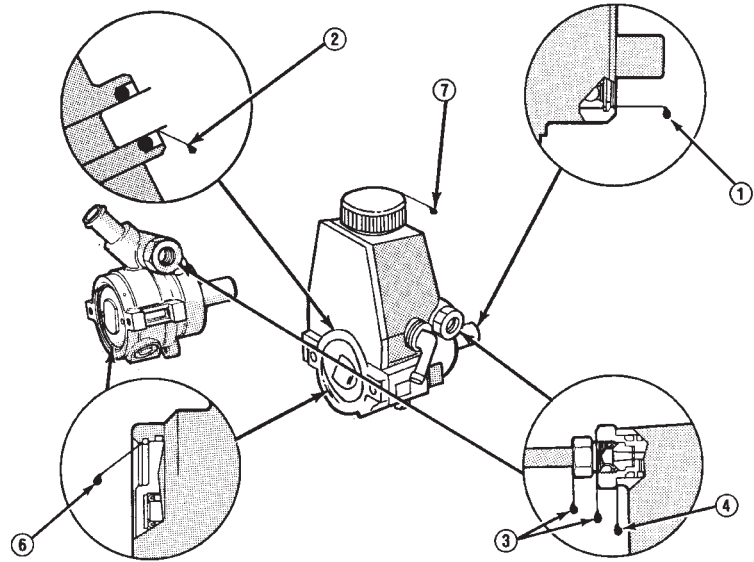


## PUMP LEAKAGE DIAGNOSIS

P-SERIES



TC-SERIES



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. Torque hose fitting nut to 48 N•m (35 ft. lbs.). If leakage persists, replace pump.
6. Replace pump.
7. Check oil level; if leakage persists with the level correct and cap tight, replace the cap.
8. If a cracked or bent reservoir is detected, replace reservoir.

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## POWER STEERING PUMP SERVICE

The service procedures for the Saginaw power steering pump are limited to the areas and components listed below. **No repair procedures are to be done on the internal components of Saginaw power steering pumps.**

- Repair of power steering fluid leaks from areas of the power steering pump sealed by O-rings is allowed (See Pump Leak Diagnosis). However power steering pump shaft seal leakage will require replacement of the pump.
- Power steering fluid reservoirs, related components and attaching hardware.
- Power steering fluid reservoir filler cap/dipstick assemblies.

Because of unique shaft bearings, flow control levels or pump displacements, power steering pumps may be used only on specific vehicle applications. Be sure that the pump is only replaced with a pump that is the correct replacement for that specific application.

Hydraulic pressure is provided for operation of the power steering gear by the belt driven power steering pumps (Fig. 1 & 2). It is a constant displacement, vane type pump. The power steering pump is connected to the steering gear by a power steering fluid pressure hose and return line.

Rectangular pumping vanes carried by a shaft driven rotor move the fluid from the intake to the cam ring pressure cavities. As the rotor begins to turn, centrifur-

gal force throws the vanes against the inside surface of the cam ring to pickup residual oil. This oil is then forced into the high pressure area. As more oil is picked up by the vanes. That additional oil is forced into the cavities of the thrust plate through two crossover holes in the cam ring and pressure plate. The crossover holes empty into the high pressure area between the pressure plate and the housing end cover.

When the high pressure area is filled. Oil flows under the vanes in the rotor slots, forcing the vanes to follow the inside oval surface of the cam ring. As the vanes reach the restricted area of the cam ring, oil is forced out from between the vanes. When excess oil flow is generated during high-speed operation. A regulated amount of oil returns to the pump intake side through a flow control valve. The flow control valve reduces the power required to drive the pump and holds down temperature build-up.

When steering conditions exceed maximum pressure requirements, such as turning the wheels against the stops. The pressure built up in the steering gear also exerts pressure on the spring end of the flow control valve. This end of the valve houses the

pressure relief valve. High pressure lifts the relief valve ball from its seat and allows oil to flow through a trigger orifice located in the outlet fitting. This reduces pressure on the spring end of the flow control valve which then opens and allows the oil to return to the intake side of the pump. This action limits maximum pressure output of the pump to a safe level.

Under normal operating conditions, the pressure requirements of the pump are below maximum, causing the pressure relief valve to remain closed.

### CHECKING POWER STEERING FLUID LEVEL

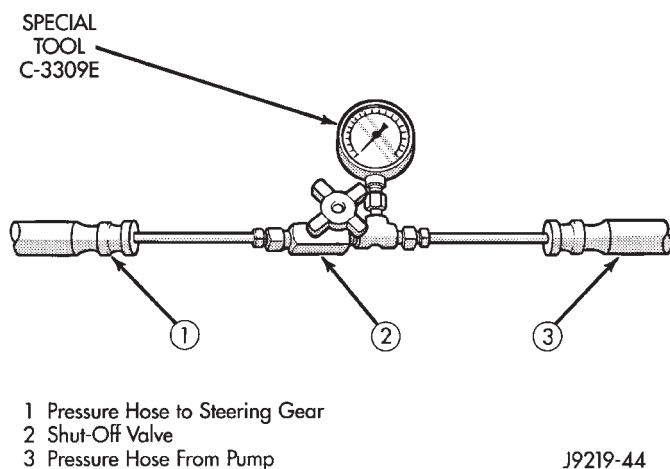
**WARNING: FLUID LEVEL SHOULD BE CHECKED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING PARTS. DO NOT USE AUTOMATIC TRANSMISSION FLUID IN THE POWER STEERING SYSTEM. DO NOT OVERFILL THE POWER STEERING SYSTEM.**

Wipe reservoir filler cap free of dirt. Then check fluid level. The dipstick should indicate FULL COLD when fluid is at normal ambient temperature, approximately 21°C to 27°C (70°F to 80°F). In all pumps add fluid as necessary, use only **Mopar® Power Steering Fluid, or equivalent. DO NOT USE ANY TYPE OF AUTOMATIC TRANSMISSION FLUID.**

### POWER STEERING PUMP PRESSURE TEST

The following procedure can be used to test the operation of the power steering system on the vehicle.

- (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 C-3309-E (Fig. 1) to both hoses using adapter fittings. Connect spare pressure hose to gear or pump.
- (4) Open the test valve completely.



**Fig. 1 Pressure Test Gauge**

- (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 five 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.**

**Power steering pump maximum relief pressure is 8275 to 8975 kPa (1200 to 1300 psi.).**

- 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.

**CAUTION: Do not force the pump to operate against the stops for more than 2 to 4 seconds at a time because, 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 steering gear is leaking internally and must be replaced.

### POWER STEERING HOSES

Service all power steering hoses with vehicle raised on hoist. Cap all open ends of hoses, power steering pump fittings and steering gear ports to prevent entry of foreign material into the components.

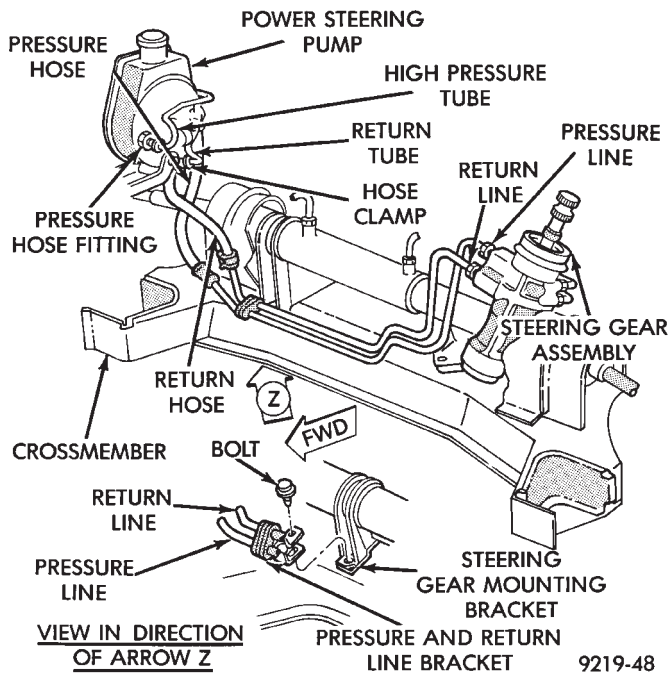
**WARNING: POWER STEERING OIL, ENGINE PARTS AND THE EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.**

For part reference and part location for the vehicle that is being serviced, refer to Figs. 1 to 4. These show the hose bracket locations, hose routings and fitting locations by the engine application of the vehicle. Use these figure numbers when referring to the removal or installation procedures for the power steering hoses listed below.

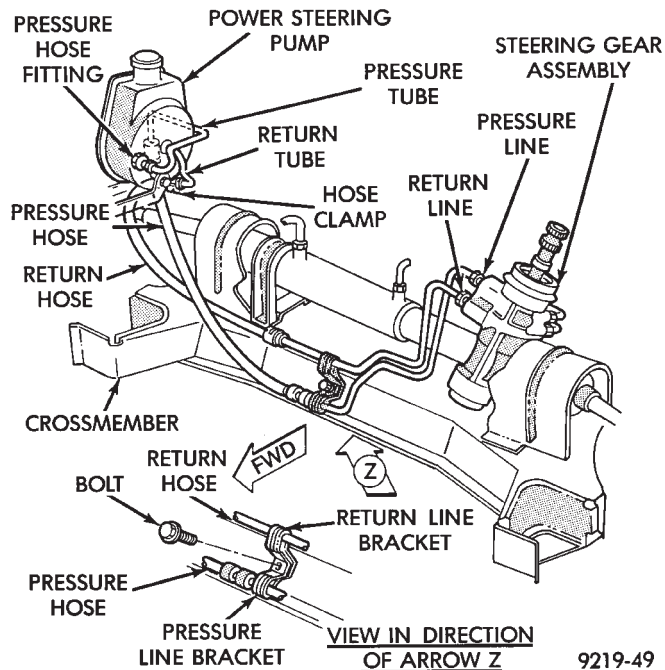


**REMOVAL**

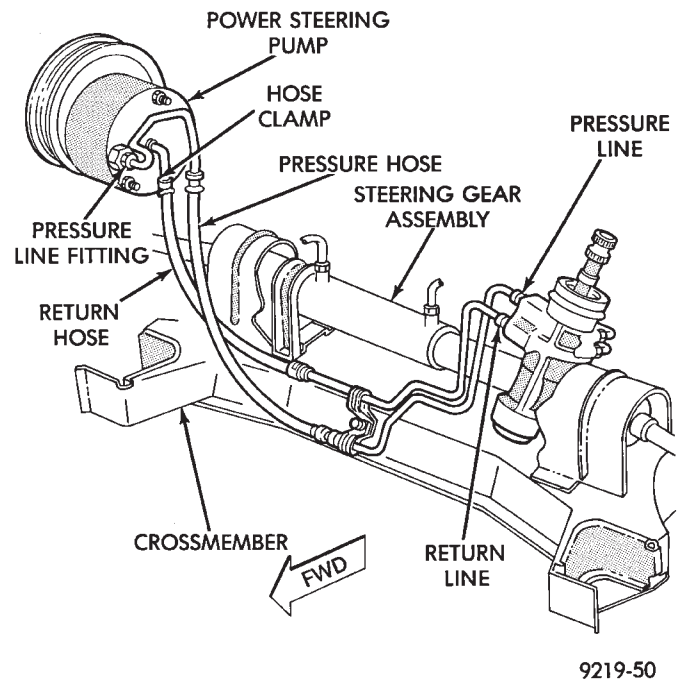
- (1) Remove bolts from power steering hose routing bracket to crossmember attachment points.
- (2) Disconnect power steering hose at opening nearest power steering gear assembly. Drain the power steering fluid from power steering pump and hose through open end of hose.
- (3) Disconnect opposite end of hose and remove power steering hose assembly from vehicle.
- (4) Discard O-ring at end of tube and/or the washer seal.



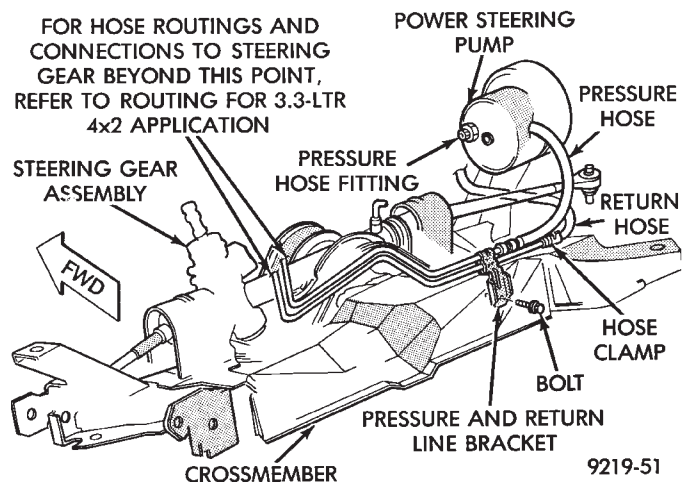
**Fig. 1 Power Steering Hose Routing 2.5L**



**Fig. 2 Power Steering Hose Routing 3.0L**



**Fig. 3 Power Steering Hose Routing 3.3L**



**Fig. 4 Power Steering Hose Routing 3.3L A.W.D.**

**INSTALLATION**

- (1) Using a lint free towel, wipe clean the open power steering hose ends, power steering pump and steering gear ports.
- (2) Install new O-rings and/or washer seals on the ends of the power steering hoses. Lubricate O-rings or washer seals using clean power steering fluid.
- (3) Attach power steering hose to the proper connections at the power steering pump and steering gear. Route hoses smoothly in their correct position avoiding tight bends or kinking. Install the power steering hose to crossmember routing bracket. Hoses must remain away from the exhaust system. Do not bend tube ends.
- (4) Tighten all fasteners shown for specific applications shown in (Fig. 1 to 4) to their correct torques listed below:



- Pump End Banjo Bolt — 34 N•m (25 ft. lbs.)
- Pump End Tube Nut — 34 N•m (25 ft. lbs.)
- Gear End Tube Nuts (2) — 34 N•m (25 ft. lbs.)
- Crossmember Bracket Bolt — 23 N•m (17 ft. lbs.)
- Pump Bracket Nut — 40 N•m (30 ft. lbs.)
- Gear Bracket Bolt — 68 N•m (50 ft. lbs.)

(5) When used, protective sponge sleeves must be properly positioned on power steering hoses. This is to prevent hose contact with other components.

(6) After hose is installed, check for leaks. (See Pump Installation).

## POWER STEERING PUMP REMOVAL

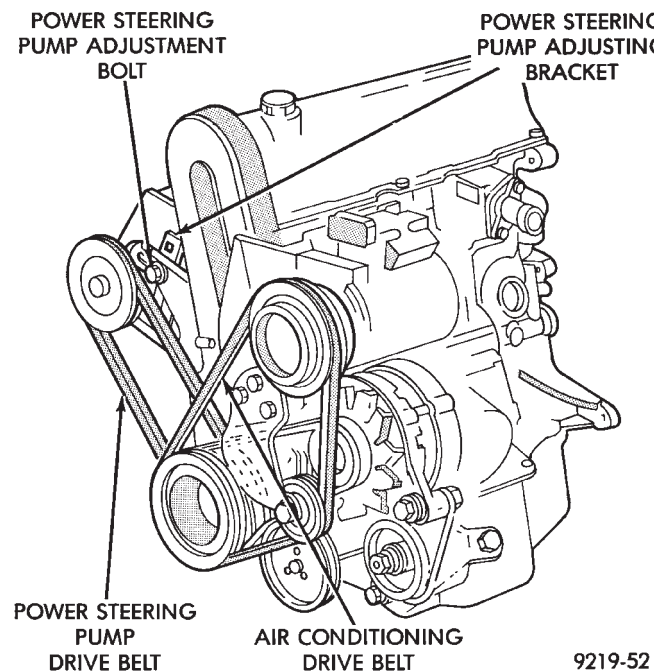
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### 2.5 LITER

#### REMOVE

(1) REMOVE THE (-) NEGATIVE BATTERY CABLE FROM THE BATTERY AND ISOLATE CABLE.

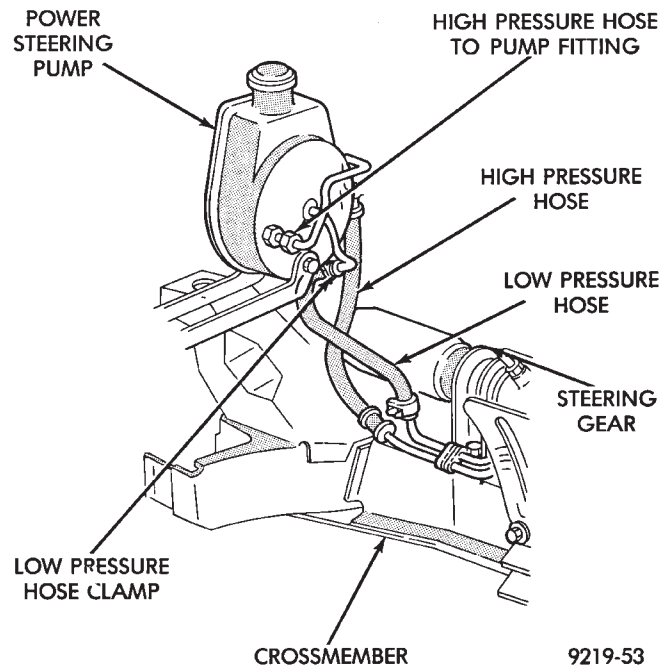
(2) Loosen power steering pump adjustment bolt and rotate the pump forward in bracket. Remove the power steering pump drive belt from pump (Fig. 1). It is not necessary to remove the power steering pump drive belt from engine.



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**Fig. 1 Power Steering Pump Drive Belt Removal**

(3) Raise vehicle See Hoisting, Group 0. Put oil drain pan under vehicle to catch power steering fluid. Remove hose clamp and low pressure fluid hose from power steering pump (Fig. 2).

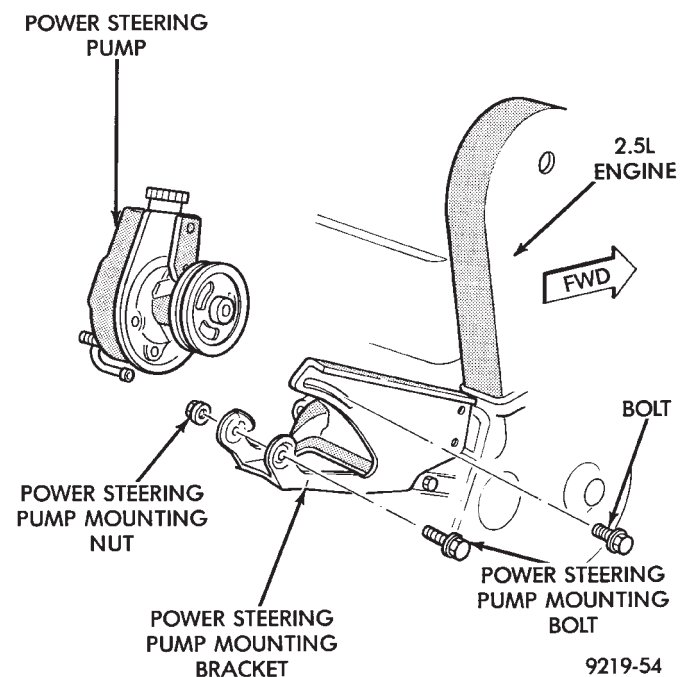


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**Fig. 2 Power Steering Fluid Hoses**

(4) Remove the power steering, fluid pressure line (Fig. 2) from the power steering pump. Drain excess power steering fluid from line.

(5) Loosen but do not remove, nut holding the back of the power steering pump to its mounting bracket (Fig. 3). Then remove bolt attaching the pulley side of the power steering pump to the mounting bracket (Fig. 3).



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**Fig. 3 Power Steering Pump Remove And Install**

(6) Lower Vehicle. Remove bolt retaining the power steering pump in adjusting slot of the power steering pump mounting bracket (Fig. 3).

(7) Remove power steering pump from vehicle. Pump is removable from the top of the vehicle. Lift power steering pump out of mounting bracket, rotate and lift it out between the engine dash panel.

(8) Transfer the required parts from the removed power steering pump, to the replacement power steering pump.

#### INSTALL

(1) Install power steering pump back in vehicle in the reverse order of removal.

(2) Install power steering pump back on mounting bracket. Be sure stud on back of power steering pump is in slotted hole in bracket. Install bolt attaching power steering pump to adjusting slot in bracket (Fig. 3). Do not tighten nut or bolt.

(3) Raise vehicle See Hoisting, Group 0.

(4) Install the bolt attaching the pulley side of the power steering pump to the mounting bracket (Fig. 3). **Do not fully tighten the bolts.**

(5) Install the power steering fluid pressure line onto the output fitting of the power steering pump (Fig. 2). Torque the pressure line pump fitting nut to 31 N•m (275 in. lbs.). **Before connecting the pressure line to power steering pump inspect the O-ring on the pressure line for damage.**

(6) Install the power steering fluid, low pressure return hose on the power steering pump low pressure fitting (Fig. 2). Install hose clamp on low pressure return hose. Be sure the clamp is installed on hose past upset bead on power steering pump tube.

(7) Lower vehicle.

(8) Install the power steering pump drive belt on pump pulley. Using the power steering pump adjusting bracket (Fig. 1), rotate pump in bracket to obtain correct belt tension. Tighten bolt at power steering pump mounting bracket adjusting slot (Fig. 1) to 54 N•m (40 ft. lbs.). Torque the power steering pump to mounting bracket pivot, nut and bolt (Fig. 1) to 54 N•m (40 ft. lbs.).

**CAUTION: Do not use automatic transmission fluid in power steering system. Only use Mopar®, Power Steering Fluid, or equivalent.**

(9) Fill the power steering pump reservoir to correct fluid level.

(10) Connect the negative battery cable back on the negative battery post.

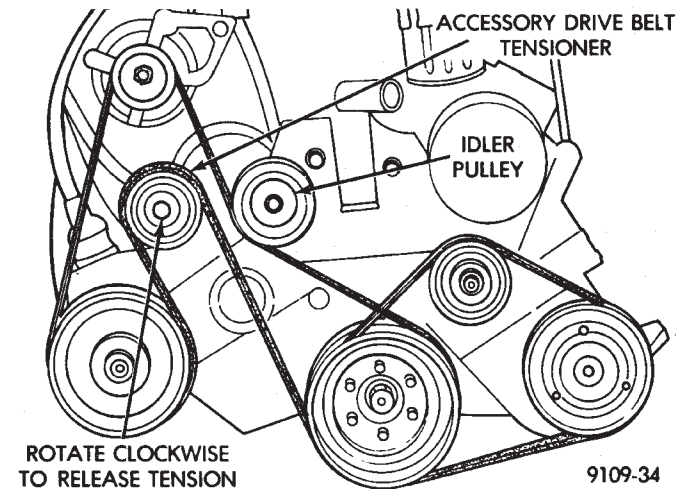
(11) Start engine and turn steering wheel several times from stop to stop to bleed air from fluid in system. Stop engine, check fluid level, and inspect system for leaks. See Checking Fluid Level.

#### 3.0 LITER

#### REMOVE

(1) REMOVE THE (-) NEGATIVE BATTERY CABLE FROM THE BATTERY AND ISOLATE CABLE.

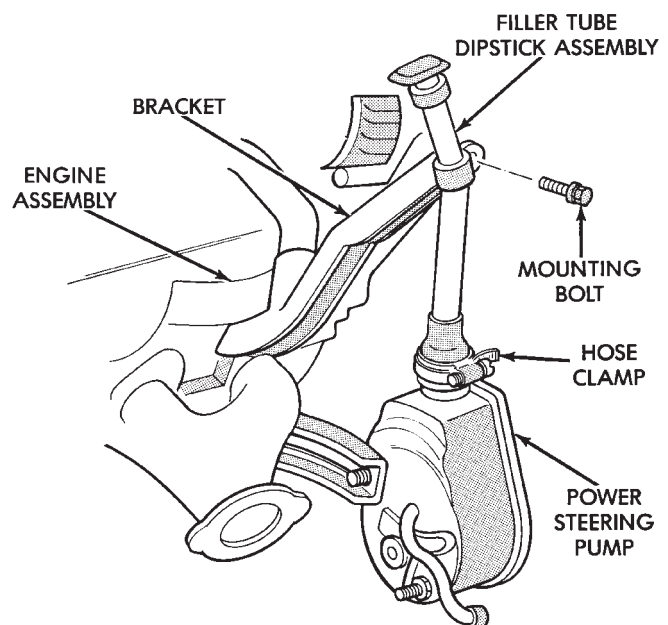
(2) Remove the serpentine accessory drive belt from engine (Fig. 4). See Cooling, Group 7 for detailed removal procedure.



**Fig. 4 3.0l Serpentine Drive Belt Routing**

(3) Remove the hose clamp and bolt mounting the power steering pump filler tube and dipstick assembly (Fig. 5) to power steering pump and alternator bracket. Remove filler tube and dipstick assembly from power steering pump.

(4) Raise vehicle See Hoisting, Group 0.

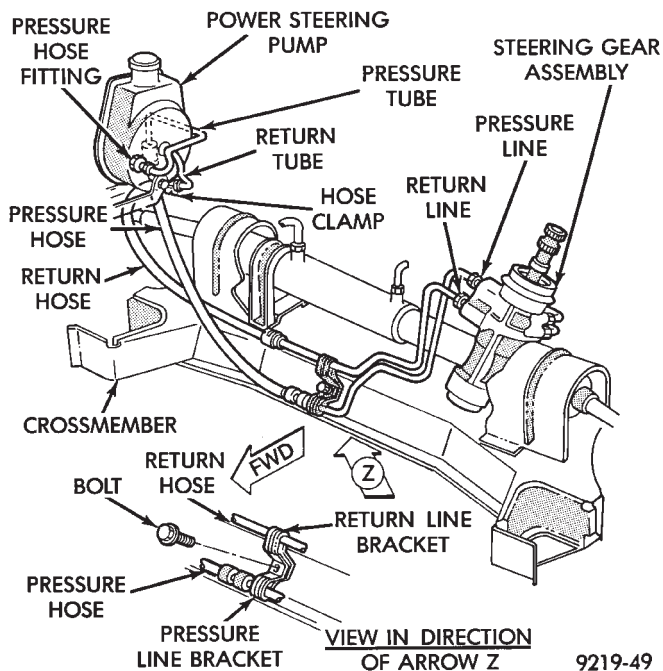


**Fig. 5 Power Steering Pump Filler Tube/Dipstick Assembly**

(5) Remove the 2 nut, bolt and spring assemblies attaching the exhaust pipe to exhaust manifold. Remove exhaust pipe from exhaust manifold and move to left side of vehicle. **This is required for clearance to remove power steering pump from vehicle.**

(6) Put oil drain pan under vehicle to catch power steering fluid. Remove hose clamp and low pressure fluid hose, from power steering gear fluid tube (Fig. 6). Allow excess power steering fluid to drain from power steering pump and hose.

(7) Loosen the high pressure power steering fluid line fitting at the power steering pump (Fig. 6). Then remove high pressure power steering fluid line from power steering pump.



**Fig. 6 Power Steering Hose Remove/Replace**

(8) Remove nut holding the power steering pump rear support bracket to pump (Fig. 7). Then remove the 2 bolts (Fig. 7) mounting the power steering pump support bracket to engine and remove bracket from vehicle.

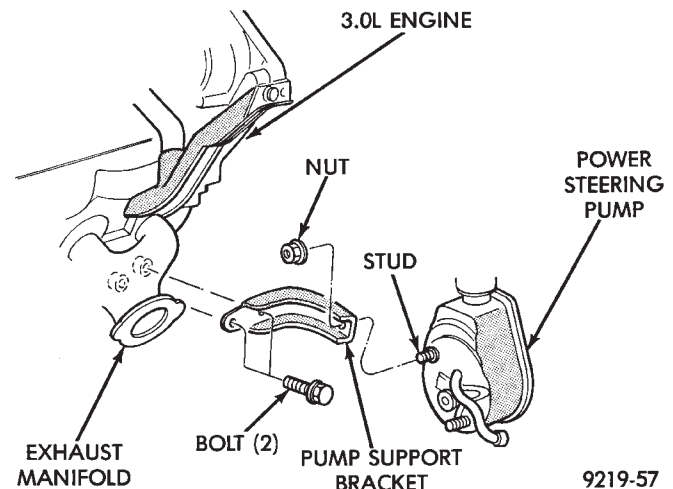
(9) Remove the 2 bolts that mount the front of the power steering pump to the mounting plate (Fig. 8). Access to the mounting bolts is through the holes in power steering pump pulley using a deep well socket.

(10) Remove the power steering pump and pulley assembly from vehicle. Remove pump assembly from vehicle in area between floor pan and front suspension crossmember. Pump will fit through area of exhaust pipe tunnel in floor pan.

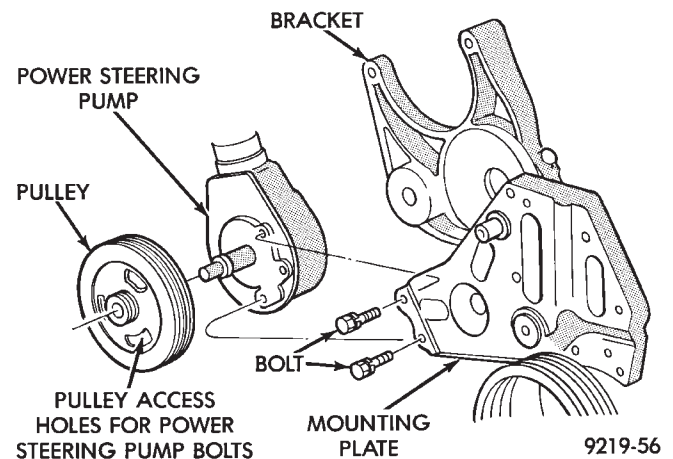
(11) Transfer Required parts to the new power steering pump assembly before installing in vehicle.

#### INSTALL

(1) Install the power steering pump assembly back in vehicle in reverse order of removal.



**Fig. 7 Power Steering Support Bracket**



**Fig. 8 Power Steering Pump Mounting 3.0L**

(2) Hold power steering pump against mounting plate. Align power steering pump mounting holes with mounting holes in plate and install bolts (Fig. 8). Torque the 2 power steering pump to mounting plate bolts to 54 N•m (40 ft. lbs.).

(3) Install the rear power steering pump to engine block support bracket, onto the stud on back of power steering pump (Fig. 7). Then install the 2 bolts mounting the support bracket to the engine block. Torque the 2 support bracket to engine block mounting bolts to 54 N•m (40 ft. lbs.).

(4) Install the nut on stud of power steering pump attaching pump to rear support bracket (Fig. 7). Torque nut to 54 N•m (40 ft. lbs.).

(5) Install the high pressure power steering fluid line on the power steering pump outlet fitting (Fig. 6). Torque the high pressure fluid line to power steering pump fitting to 31 N•m (275 in. lbs.).

(6) Install the low pressure power steering fluid hose onto the power steering gear fluid tube (Fig. 6). Install hose clamp on hose. **Be sure hose clamp is installed beyond upset bead on tube.**

(7) Install the exhaust pipe back on the exhaust manifold. Install the nut, bolt and spring assemblies





and torque bolts to 28 N•m (250 in. lbs.).

(8) Lower vehicle.

(9) Install the power steering pump filler tube and dip stick assembly on the neck of the power steering pump (Fig. 5). Install the bolt (Fig. 5) attaching the filler tube/dip stick assembly to the alternator bracket. Torque the bolt to 11 N•m (100 in. lbs.).

(10) Position the hose clamp on the filler tube assembly rubber boot and adequately tighten hose clamp.

(11) Install the serpentine accessory drive belt on engine (Fig. 4). See Cooling, Group 7 for detailed installation procedure.

**CAUTION:** Do not use automatic transmission fluid in power steering system. Only use Mopar®, Power Steering Fluid, or equivalent.

(12) Fill power steering pump reservoir to correct fluid level.

(13) Connect the negative battery cable back on the negative battery post.

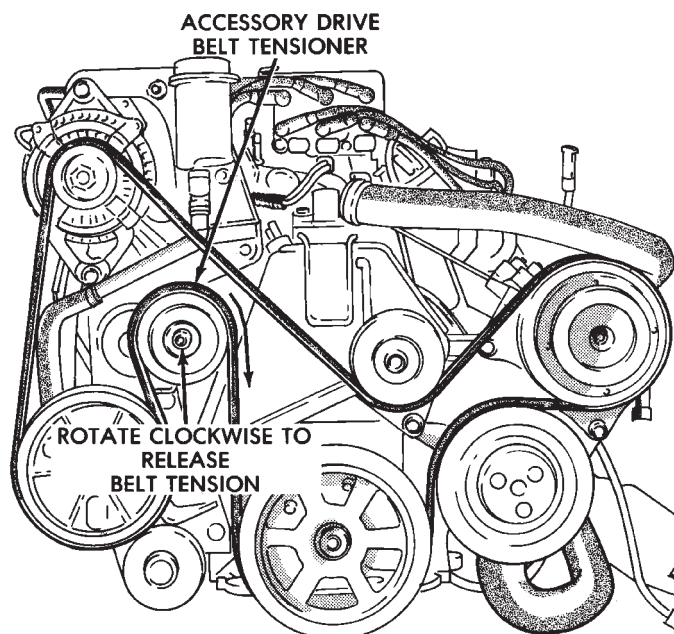
(14) Start engine and turn steering wheel several times from stop to stop to bleed air from fluid in system. Stop engine, check fluid level, and inspect system for leaks. See Checking Fluid Level.

### 3.3 LITER F.W.D. & A.W.D

#### REMOVE

(1) Remove the (-) negative battery cable from the battery and isolate cable.

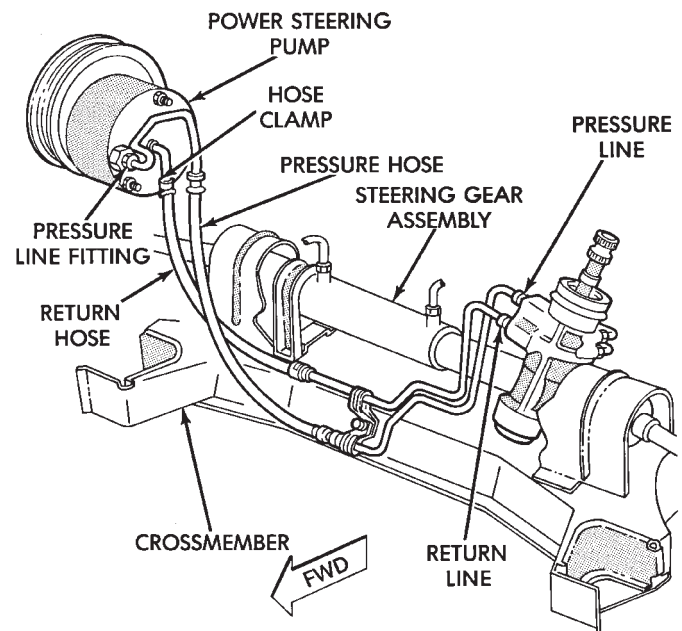
(2) Remove the serpentine accessory drive belt from engine (Fig. 9). See Cooling, Group 7 for detailed removal procedure.



9107-26

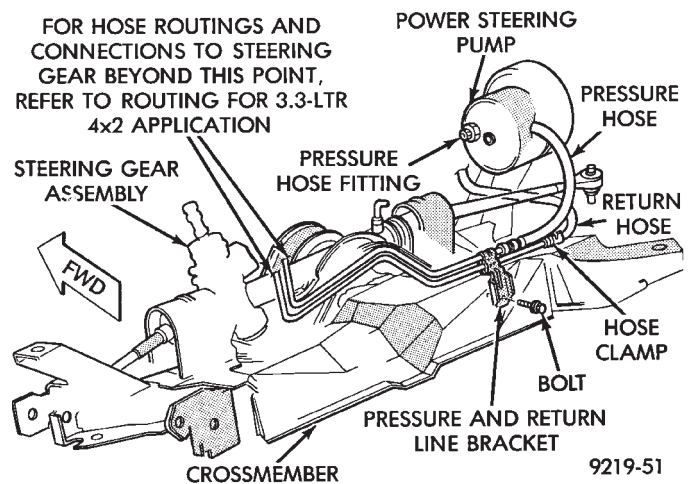
**Fig. 9 Serpentine Drive Belt Routing**

(3) Raise vehicle See Hoisting, Group 0. Put oil drain pan under vehicle to catch power steering fluid. Remove hose clamp and low pressure fluid hose from power steering pump (Fig. 10 or 11).



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**Fig. 10 Power Steering Hose Routing 3.3L F.W.D.**

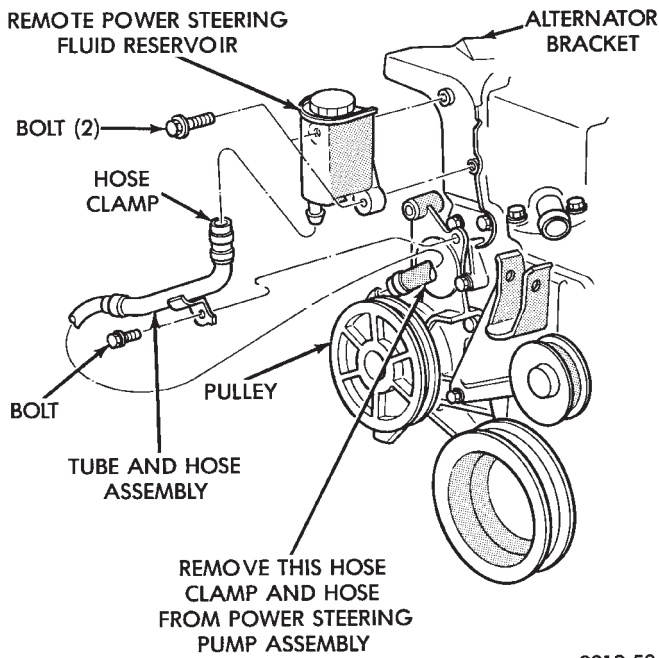


9219-51

**Fig. 11 Power Steering Hose Routing 3.3L A.W.D.**



(4) Remove hose clamp and hose to the power steering pump, from the remote fluid reservoir (Fig 12). Drain off excess power steering fluid from hoses.



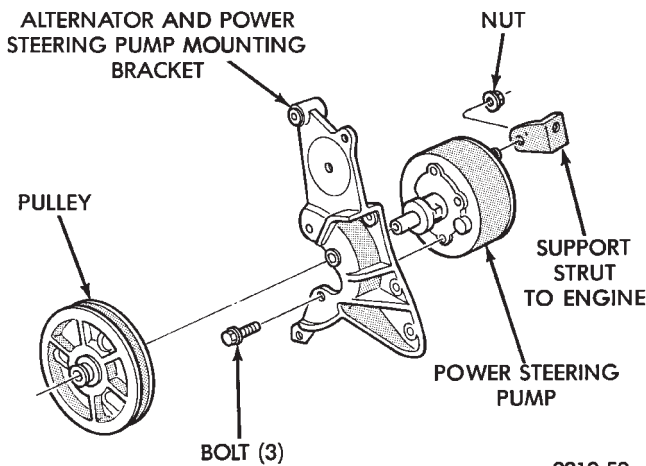
9219-58

**Fig. 12 Power Steering Remote Fluid Reservoir And Tube**

(5) Remove the power steering, fluid pressure line (Fig. 10 or 11) from the power steering pump. Drain excess power steering fluid from tube.

(6) Remove right front wheel and tire from vehicle. This will aid in access to the power steering pump mounting bolts.

(7) Remove the 3 bolts holding the power steering pump to the alternator, power steering and belt tensioner mounting bracket (Fig. 13).



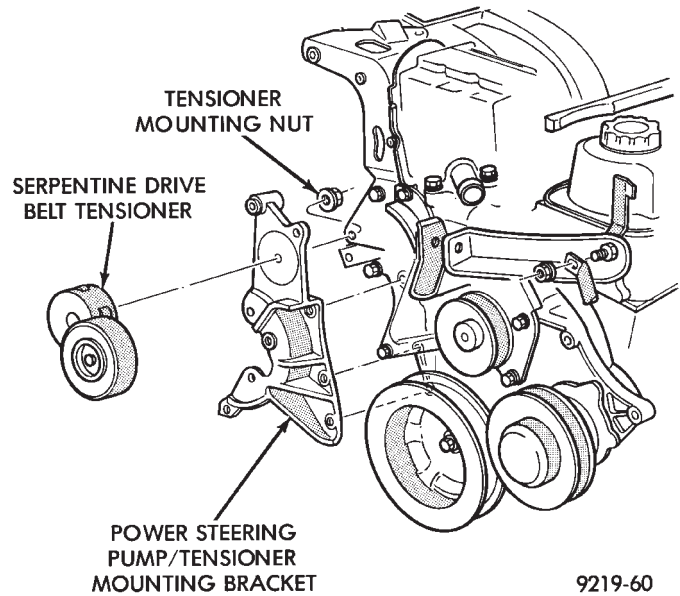
9219-59

**Fig. 13 Power Steering Pump Mounting 3.3L**

(8) Remove nut and bolt holding the engine block, to power steering pump support strut. Remove strut from engine and power steering pump (Fig. 13). **Lay the**

**power steering pump assembly down on top of the steering gear. It will be removed later from the top.**

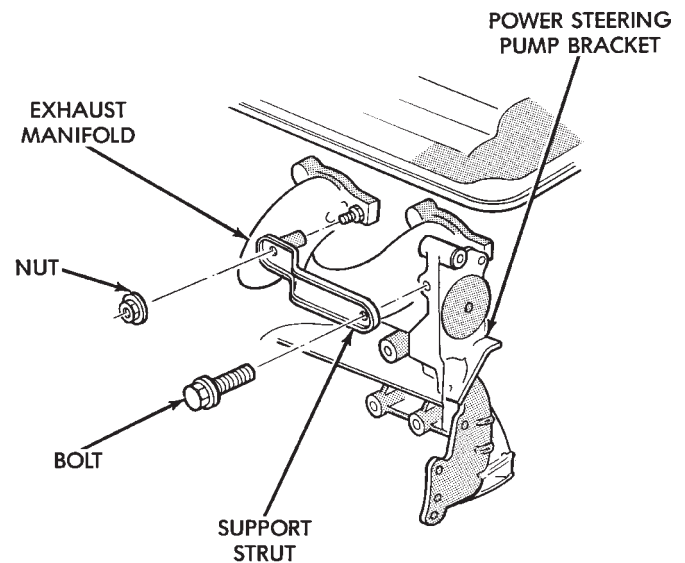
(9) Remove nut which holds serpentine drive belt tensioner to its mounting bracket (Fig. 14). Remove tensioner assembly from bracket.



9219-60

**Fig. 14 Serpentine Belt Tensioner**

(10) Remove nut and bolt attaching the alternator/power steering pump bracket, support strut (Fig. 15).



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**Fig. 15 Bracket Support Strut**

(11) Lower vehicle.

(12) Remove the 2 bolts holding the power steering fluid reservoir to the alternator bracket. Remove the bolt attaching the tube/hose assembly to the power



steering pump bracket (Fig. 16). Then remove the fluid reservoir and tube/hose as an assembly from vehicle.

(13) Remove the engine wiring harness routing clip

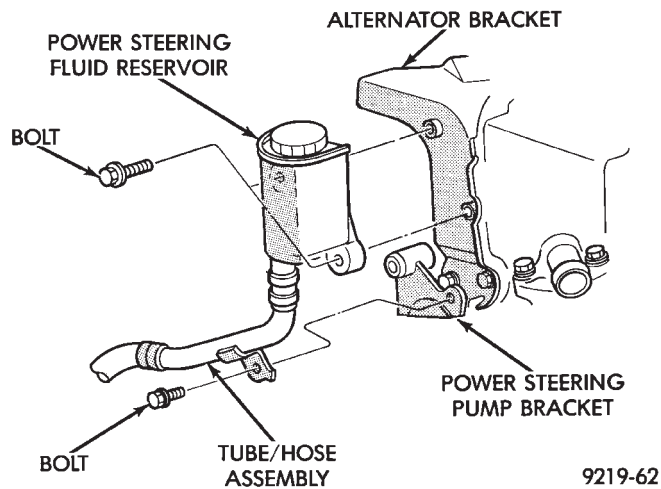


Fig. 16 Power Steering Fluid Reservoir Mounting

from the alternator bracket.

(14) Loosen but **DO NOT REMOVE** the bolt (Fig. 17) holding the engine bracket assembly to the engine support assembly.

(15) Remove upper alternator to alternator bracket

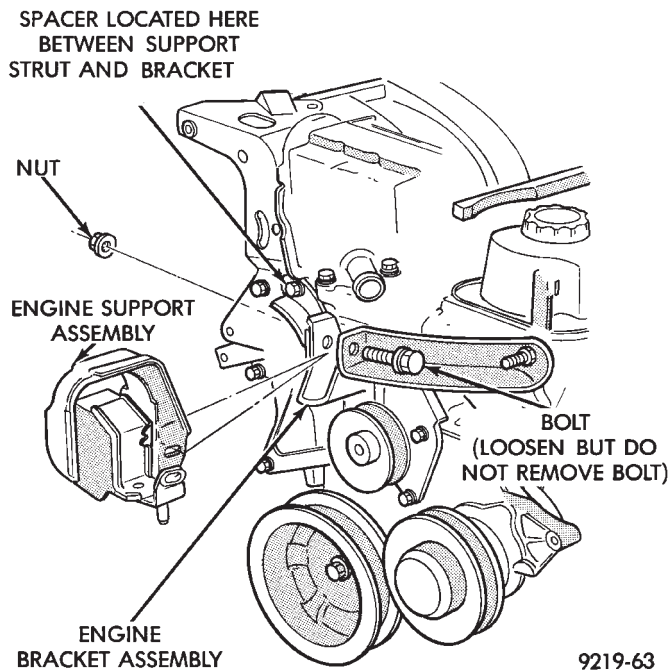
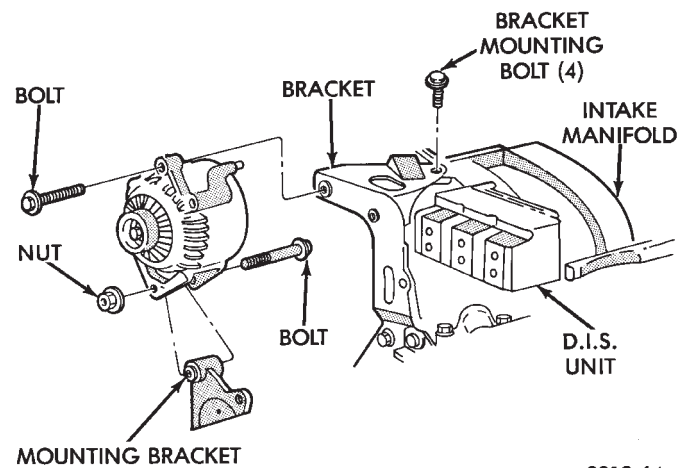


Fig. 17 Engine Bracket Support Assembly

mounting bolt (Fig. 18). Rotate the alternator assembly back toward the dash panel.

(16) Remove the 4 bolts holding the alternator bracket to the engine and intake manifold (Fig. 18). Remove alternator bracket from engine.

(17) Remove the alternator assembly, to lower alternator bracket bolt (Fig. 18). With out removing wiring



9219-64

Fig. 18 Alternator Mounting

harness from alternator, remove alternator from bracket and lay alternator on top of intake manifold.

(18) Remove the power steering pump out through the top, in the area between engine and dash panel where the alternator was mounted.

(19) Transfer the required parts from the removed power steering pump, to the replacement power steering pump.

#### INSTALL

(1) Install power steering pump back in vehicle, laying it on the steering gear. Do not mount it to the power steering pump bracket.

(2) Install alternator back on the lower alternator bracket and install bolt and nut (Fig. 18). Do not tighten bolt at this time.

(3) Install the alternator bracket back on engine and intake manifold. Loosely install the 4 alternator bracket to engine attaching bolts (Fig. 18). **Be sure the SPACER (Fig. 17) is installed between the engine mounting strut and the alternator bracket.**

(4) Temporarily install the serpentine belt tensioner bolt through both alternator brackets to align all bracket mounting holes (Fig. 14). Then torque the 4 alternator bracket to engine and intake manifold mounting bolts to 54 N•m (40 ft. lbs.). Then remove the serpentine belt tensioner from bracket.

(5) Tighten the bolt holding the engine bracket assembly to the engine support assembly (Fig. 17) to 150 N•m (110 ft. lbs.).

(6) Attach the engine wiring harness routing clip to the alternator bracket.

(7) Install the alternator to alternator bracket attaching bolt (Fig. 17). Torque bolt to 54 N•m (40 ft. lbs.). Tighten the lower alternator pivot bolt to 54 N•m (40 ft. lbs.).

(8) Install the power steering pump fluid reservoir and tube/hose assembly onto the power steering pump bracket and alternator bracket (Fig. 16). Torque the 2 bolts holding the reservoir to the alternator bracket to 5 N•m (45 in. lbs.). Torque the 1 bolt

holding the tube/hose assembly to the power steering pump bracket to 12 N•m (105 in. lbs.).

(9) Raise vehicle See Hoisting, Group 0.

(10) Install the strut assembly power steering/alternator bracket to engine (Fig. 15). Torque the nut and bolt holding the strut assembly to bracket and the intake manifold stud to 54 N•m (40 ft. lbs.).

(11) Install the serpentine drive belt tensioner onto the power steering/alternator bracket (Fig. 14). Install the tensioner to bracket retaining nut and torque to 54 N•m (40 ft. lbs.).

(12) Install the power steering pump on bracket, by aligning the 3 mounting holes in pump with mounting holes in bracket (Fig. 13). Install the 3 power steering pump to bracket mounting bolts. Torque power steering pump mounting bolts to 54 N•m (40 ft. lbs.).

(13) Install the support strut, engine block to power steering pump on pump stud (Fig. 13). Install the nut and bolt holding the strut to the power steering pump and engine block and torque to 54 N•m (40 ft. lbs.).

(14) Install the power steering fluid pressure line onto the output fitting of the power steering pump (Fig. 10 or 11). Torque the pressure line pump fitting nut to 31 N•m (275 in. lbs.). **Before connecting the pressure line to power steering pump inspect the O-ring on the pressure line for damage.**

(15) Install the power steering fluid, low pressure return hose on the power steering pump low pressure fitting (Fig. 10 or 11). Then install the hose from the remote reservoir onto the power steering pump (Fig. 12). Be sure all hose clamps are properly reinstalled.

(16) Install right front tire and wheel on vehicle. Install the wheel stud nuts and torque to 129 N•m (95 ft. lbs.).

(17) Lower vehicle.

(18) Install the serpentine drive belt. Refer to (Fig. 9) for correct serpentine belt routing. See Cooling, Group 7 for detailed installation procedure.

**CAUTION: Do not use automatic transmission fluid in power steering system. Only use Mopar®, Power Steering Fluid, or equivalent.**

(19) Fill power steering pump reservoir to correct fluid level.

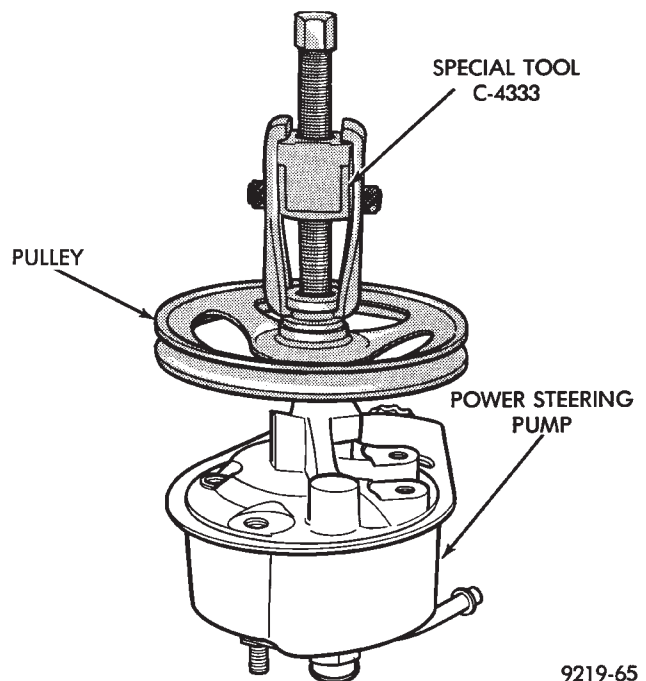
(20) Connect the negative battery cable on the negative battery post.

(21) Start engine and turn steering wheel several times from stop to stop to bleed air from fluid in system. Stop engine, check fluid level, and inspect system for leaks. See Checking Fluid Level.

## POWER STEERING PUMP PULLEY

### REMOVAL

(1) Remove the pulley with Puller C-4333 (C-4068) (Fig. 1).



9219-65

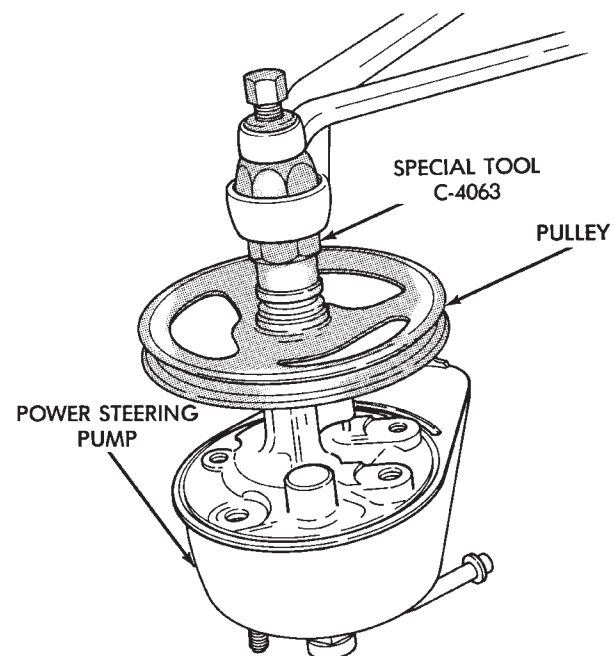
Fig. 1 Pulley Removal (Typical)

**CAUTION: Do not hammer on power steering pump pulley. This will damage the pulley and the power steering pump.**

(2) Replace pulley if bent, cracked, or loose.

### INSTALLATION

(1) Install the pulley with Installer C-4063 (Fig. 2). Do not use the tool adapters.



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Fig. 2 Pulley Installation (Typical)

(2) Ensure that the tool and the pulley remain aligned with the pump shaft. Prevent the pulley from being cocked on the shaft.

(3) Force pulley flush with the end of the shaft.  
 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.**

**POWER STEERING PUMP FLUID RESERVOIR**

**REMOVE**

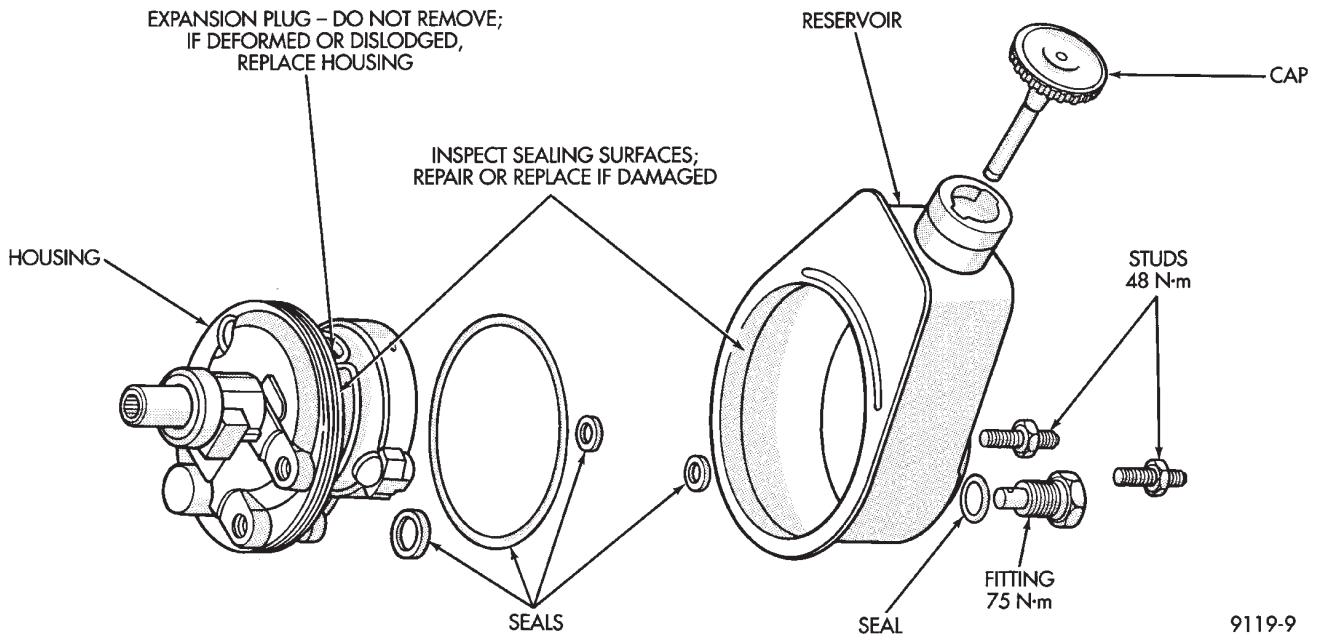
**Discard all O-ring seals during disassembly, they are not re-usable.**

(1) Remove the filler cap and drain the fluid from reservoir before removing parts.

**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.



**Fig. 1 Pump and Reservoir**

(2) Remove mounting studs and pressure fitting (Fig. 1). Rock reservoir by hand or use a soft face mallet to remove.

(3) Remove O-ring seals from housing and reservoir (Fig. 1).

(4) Remove flow control valve and spring from housing.

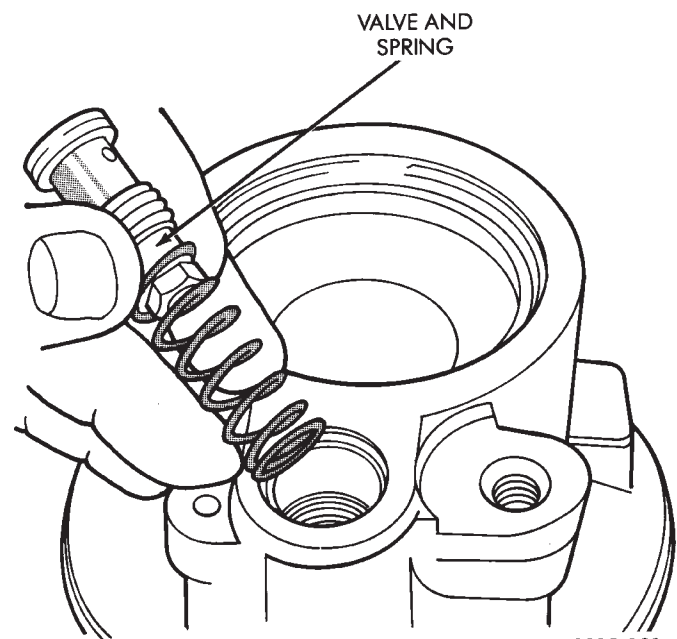
**INSTALL**

**Clean all parts before installation. Lubricate new O-ring seals with Mopar® Power Steering Fluid or equivalent.**

(1) Install flow control valve and spring (Fig. 2).

(2) Install new O-ring seals in housing (Fig. 1). Install the pump housing assembly into the fluid reservoir. Tighten mounting studs to 48 N•m (35 ft. lbs.) torque.

(3) Install fitting in flow control valve bore. Tighten the fitting to 75 N•m (55 ft. lbs.) torque.



**Fig. 2 Flow Control Valve/Spring Installation**



The dipstick should indicate **FULL COLD** when the fluid is at normal temperature of approximately 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.

## POWER STEERING GEAR

### INDEX

	page		page
General Information .....	20	Steering Gear Service (All Wheel Drive) .....	23
Outer Tie Rod .....	26	Steering Gear Service (Front Wheel Drive) .....	21
Steering Gear Boot Seal .....	27		

### GENERAL INFORMATION

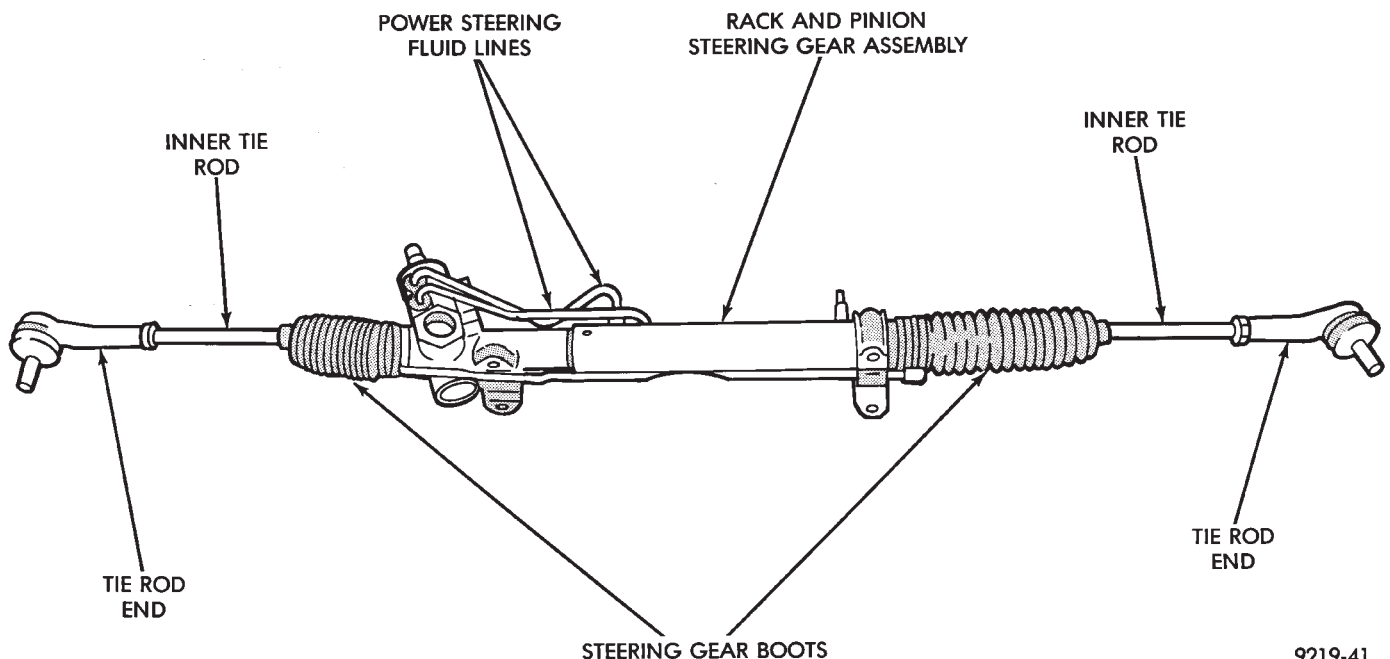
**The power steering gear (Fig. 1) should NOT be serviced or adjusted. If a malfunction or oil leak occurs. The complete steering gear should be replaced.**

If a steering gear boot needs to be replaced due to damage, refer to the power steering gear service section in this manual for proper procedure.

The power steering system consists of these four major components. Power Steering Gear, Power Steering Pump, Pressure Hose, and Return Line. Turning of the steering wheel is converted into linear travel through the meshing of the helical pinion teeth with the rack teeth. Power assist steering is provided by an

open center, rotary type control valve which directs oil from the pump to either side of the integral rack piston.

Road feel is controlled by the diameter of a torsion bar which initially steers the vehicle. As required steering effort increases, as in a turn. The torsion bar twists, causing relative rotary motion between the rotary valve body and the valve spool. This movement directs oil behind the integral rack piston, which, in turn, builds up hydraulic pressure and assists in the turning effort.



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**Fig. 1 Power Steering Gear Assembly**



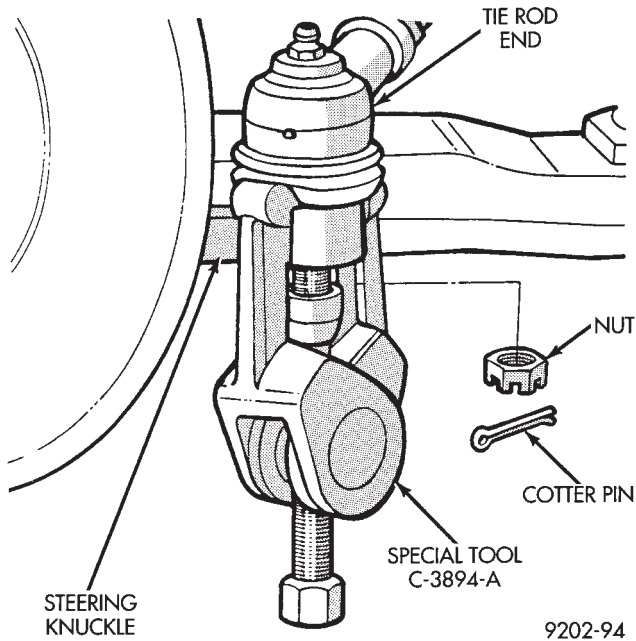
The drive tangs on the pinion mate loosely with a stub shaft to permit manual steering control to be maintained if the drive belt on the power steering pump should break. However, under these conditions, steering effort will be increased.

**STEERING GEAR SERVICE (FRONT WHEEL DRIVE)**

**The power steering gear should NOT be serviced or adjusted. If a malfunction or oil leak occurs. The complete steering gear should be replaced.**

**REMOVAL**

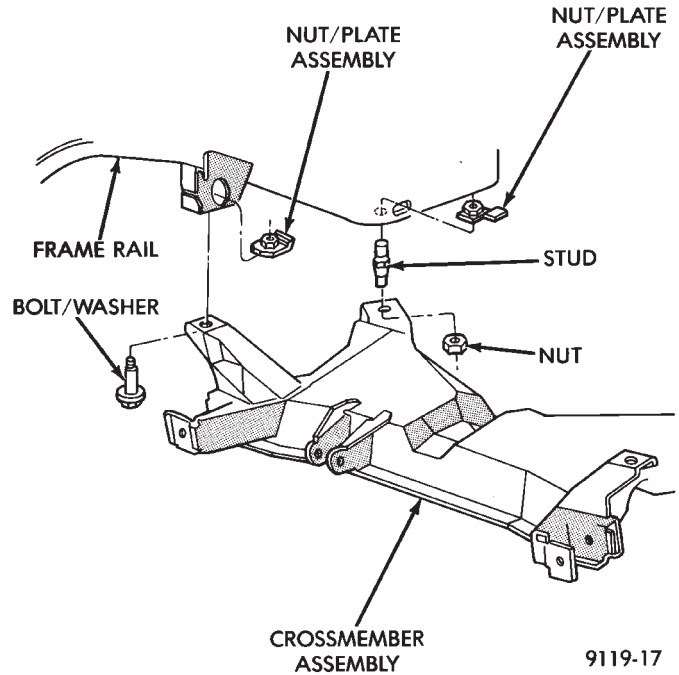
- (1) Raise vehicle See Hoisting, Group 0. Put oil drain pan under vehicle to catch power steering fluid.
- (2) Remove front road wheels.
- (3) Remove both tie rod ends from steering knuckles, using Puller Special Tool C-3894-A (Fig. 1).



**Fig. 1 Tie Rod End Removal**

(4) Disconnect engine damper strut from crossmember (if so equipped).

(5) Remove the 3 front suspension crossmember attaching bolts and the nut (Fig. 2) from the locating stud. Lower front suspension crossmember, using transmission jack, so that the steering gear can be disconnected from the steering column.



**Fig. 2 Crossmember Remove/Replace**



(6) Remove fluid tubes (Fig. 3) from the power steering pump to the steering gear. See hose removal procedure.

(7) Remove the 4 bolts (Fig. 3) attaching steering gear to front suspension crossmember.

(8) Remove steering gear assembly from crossmember.

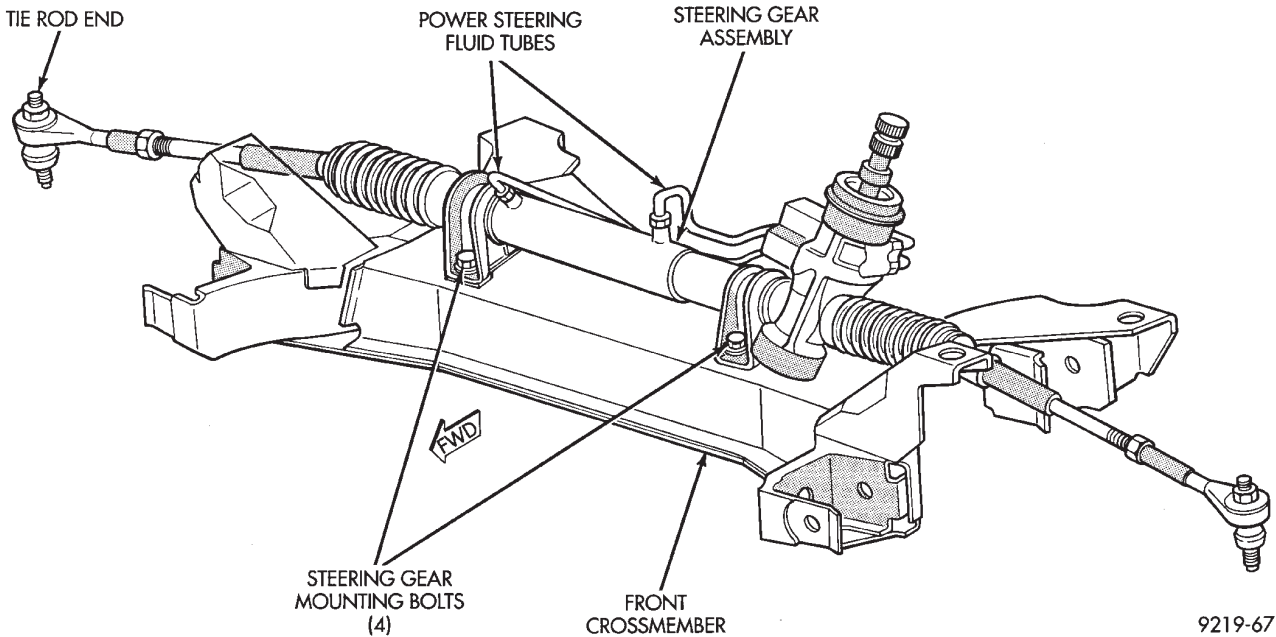
**INSTALLATION**

**An assistant will be required in the vehicle, at the time of steering gear replacement. To help guide the steering column coupling onto the steering gear assembly.**

(1) Install steering gear assembly on the front crossmember. Install the 4 steering gear to front crossmember mounting bolts (Fig. 3).

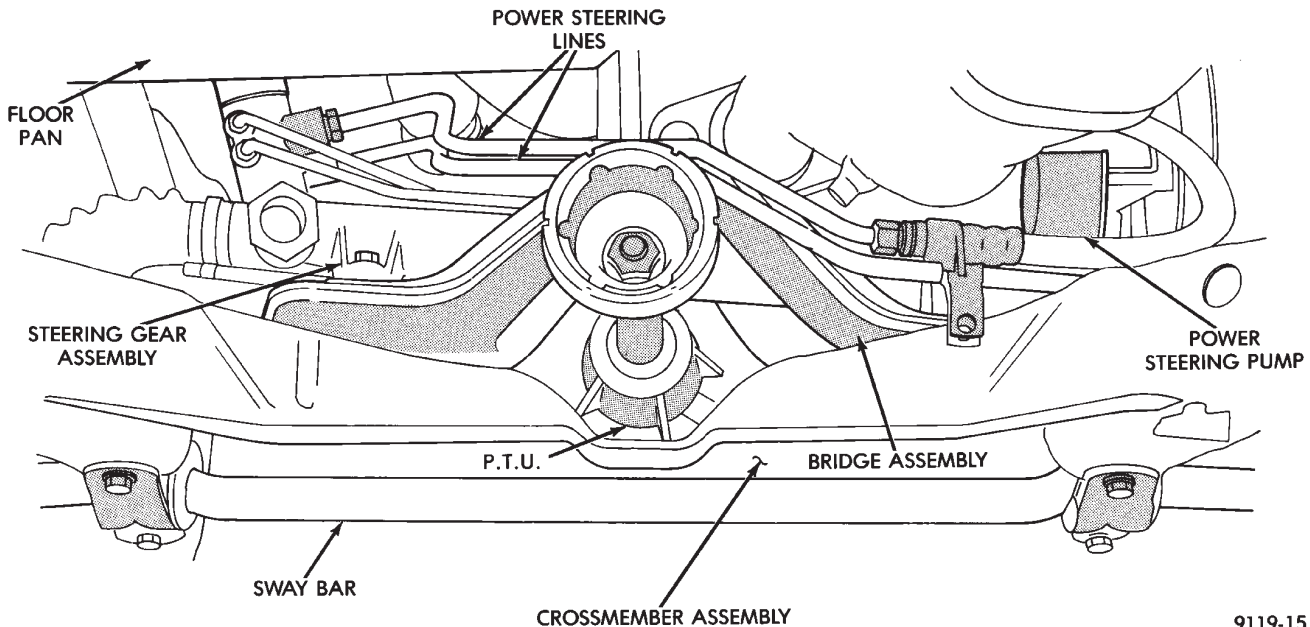
(2) Using a transmission jack raise the front crossmember and steering gear against the frame rails. Install the 3 crossmember to frame rail attaching bolts and nut on locating stud (Fig. 2). **The right rear crossmember stud is a pilot that correctly locates the crossmember. Tighten down this bolt first, then torque all 4 crossmember fasteners to 122 N•m (90 ft. lbs.).**

**CAUTION:** Proper torque on the crossmember to frame rail mounting bolts is very important.



**Fig. 3 Steering Gear And Crossmember**

**STEERING GEAR ALL WHEEL DRIVE**



(3) Torque the 4 bolts (Fig. 3) attaching the steering gear assembly to front crossmember, to 68 N•m (50 ft. lbs.). **To ensure proper alignment of the steering gear tighten left front bolt first.**

(4) Attach the engine damper strut from the engine to the crossmember (if so equipped).

(5) Attach the fluid tubes (Fig. 3) from the power steering pump to the fittings on the steering gear. Torque the fluid pressure line to steering gear tube nut to 31 N•m (275 in. lbs.).

(6) Mount the outer tie rod ends to the steering knuckles. Install the tie rod end to steering knuckle attaching nuts. Torque the tie rod end to steering knuckle nuts to 52 N•m (38 ft. lbs.). Install cotter pin in tie rod end.

(7) Install the front tire and wheel assemblies on vehicle. Install the wheel lug nuts and torque to 129 N•m (95 ft. lbs.).

(8) Lower vehicle.

**CAUTION: Do not use automatic transmission fluid.**

(9) Start engine and turn steering wheel several times from stop to stop to bleed air from fluid in system. Stop engine, check fluid level, and inspect system for leaks. **Fill pump reservoir to correct level with Mopar®, Power Steering Fluid, or equivalent.** See Checking Fluid Level.

(8) Adjust toe (Refer to Group 2 Suspension).

### STEERING GEAR SERVICE (ALL WHEEL DRIVE)

**The power steering gear should NOT be serviced or adjusted. If a malfunction or oil leak occurs. The complete steering gear should be replaced.**

#### REMOVAL

(1) Remove front tire and wheel assemblies from vehicle.

(2) Remove the steering column assembly from the vehicle. **(STEERING COLUMN MUST BE REMOVED FROM VEHICLE, TO ALLOW CLEARANCE FOR STEERING GEAR REMOVAL ON THE ALL WHEEL DRIVE APPLICATIONS).** (Refer to Steering Column Removal in this section of the manual)

(3) Remove both tie rod ends from steering knuckles, using Puller Special Tool C-3894-A (Fig. 4).

(4) Remove the 2 bolts and the 2 nuts attaching the bridge to the front crossmember. The bolts and nuts are accessible through hole in the top of the bridge assembly (Fig. 5).

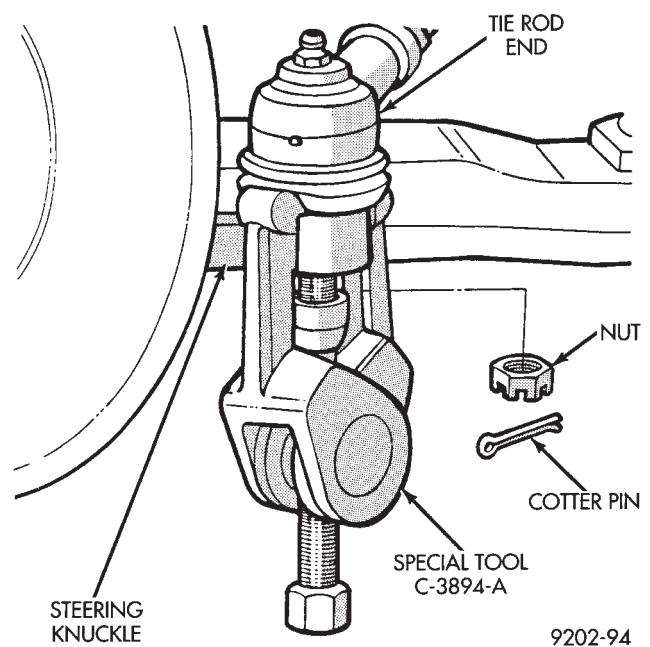


Fig. 4 Tie Rod End Removal

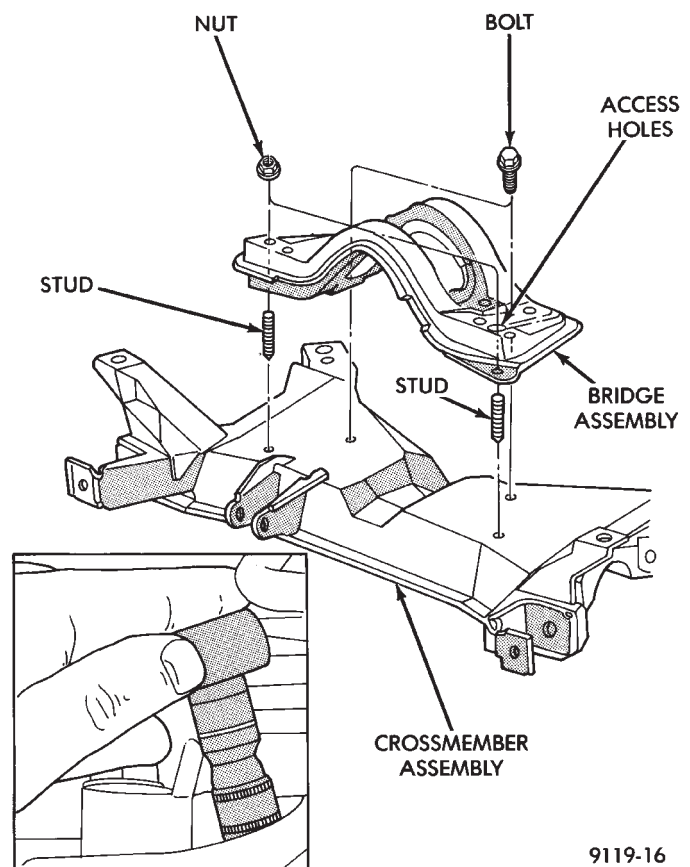
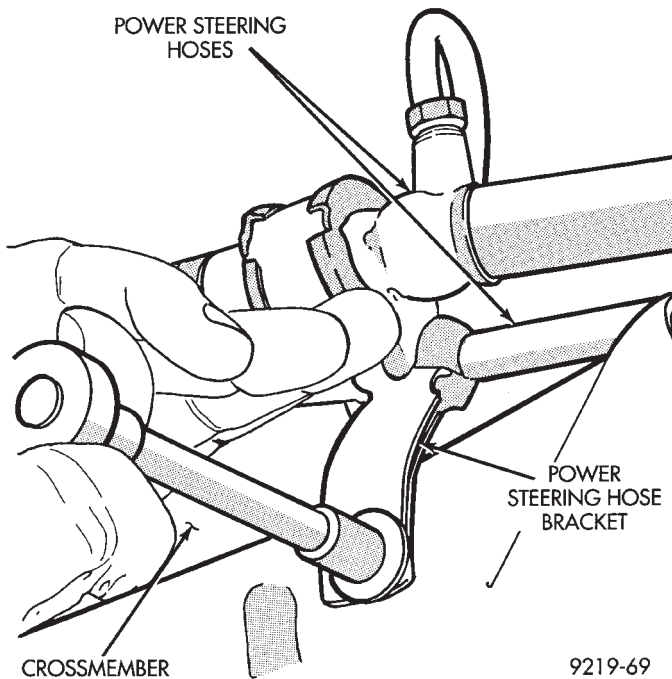


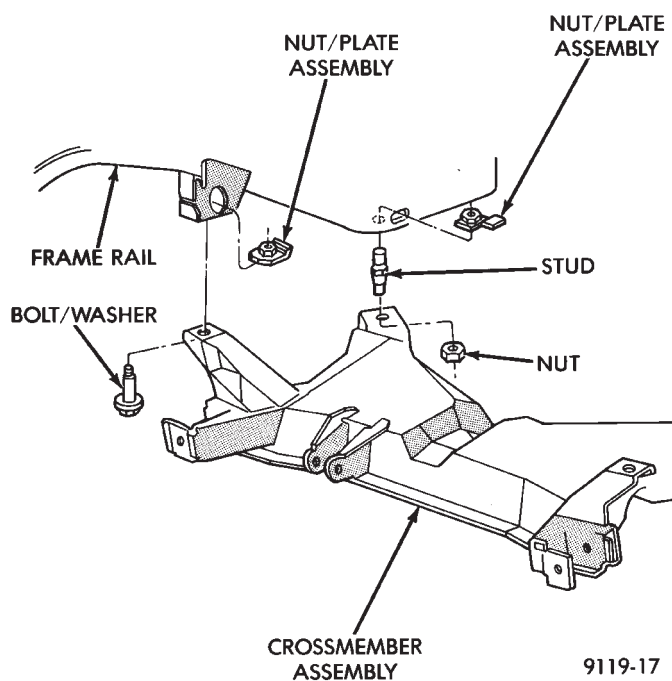
Fig. 5 Bridge Assembly Remove/Replace

(5) Remove the bracket holding the power steering hoses to the crossmember (Fig. 6).



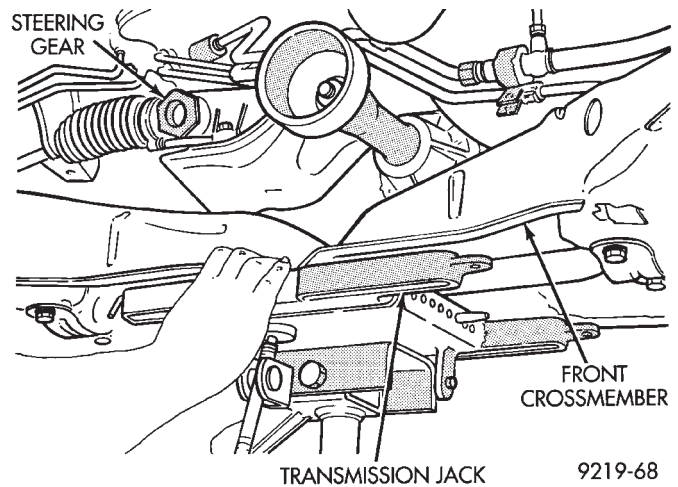
**Fig. 6 Power Steering Hoses**

(6) Remove the 3 front suspension crossmember to frame rail attaching bolts and the nut (Fig. 7) from the locating stud.

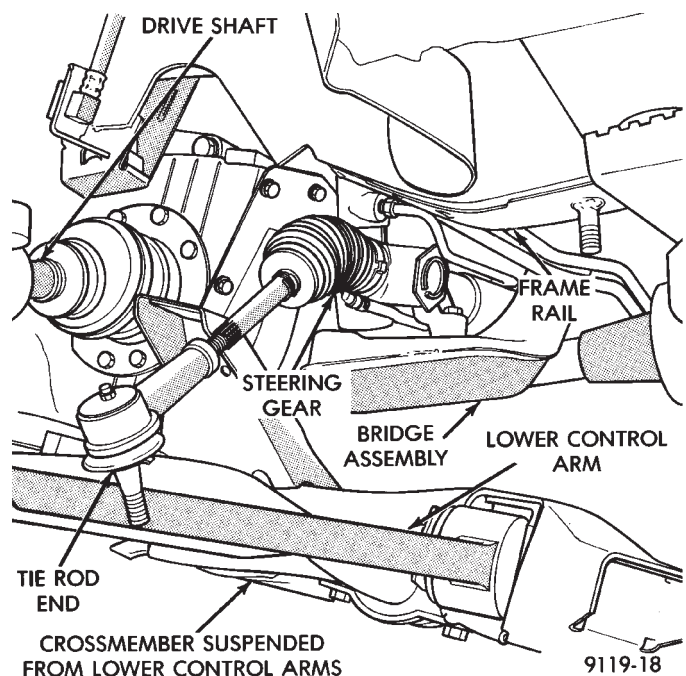


**Fig. 7 Crossmember Assembly Remove/Replace**

(7) Using a transmission jack, (Fig. 8) lower the front suspension crossmember suspending it from the lower control arms (Fig. 9). It is not necessary to completely remove crossmember from vehicle



**Fig. 8 Lowering Front Crossmember**



**Fig. 9 Crossmember Assembly Lowered in Vehicle**

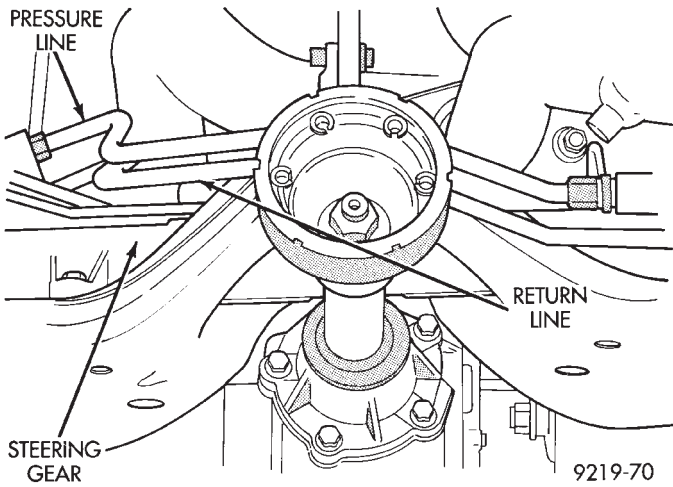
(8) Remove the power steering pump fluid pressure and return lines (Fig. 10) from the steering gear. See Power Steering Hose Removal in this section of the service manual for detailed procedure.

(9) Remove the 4 bolts attaching the steering gear to the crossover

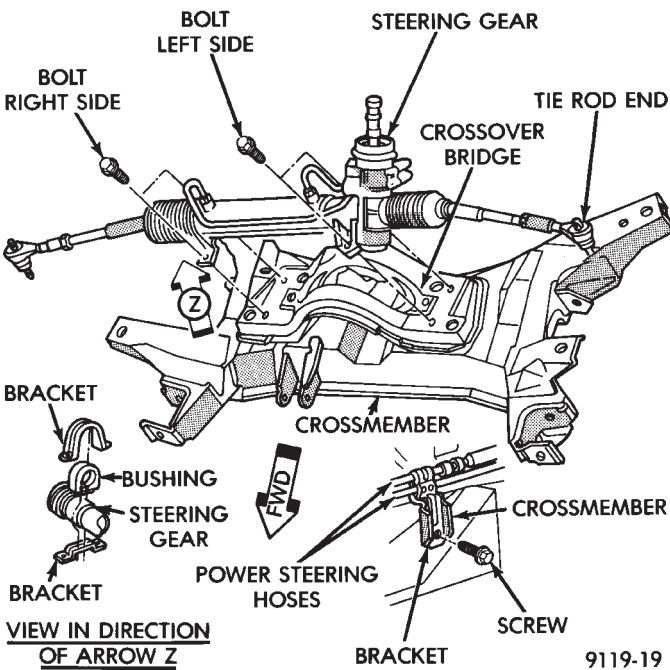
bridge (Fig. 11). **Note the location of the bolts, they are different for the left and right steering gear mounting brackets.**

(10) Remove the lower steering column coupling from the steering gear. Drive the steering coupler roll pin (Fig. 12) from the coupler using a suitable drift. Then separate steering coupler from steering gear shaft. **THIS IS REQUIRED TO HAVE ADEQUATE CLEARANCE BEFORE TRYING TO REMOVE THE STEERING GEAR FROM THE VEHICLE.**



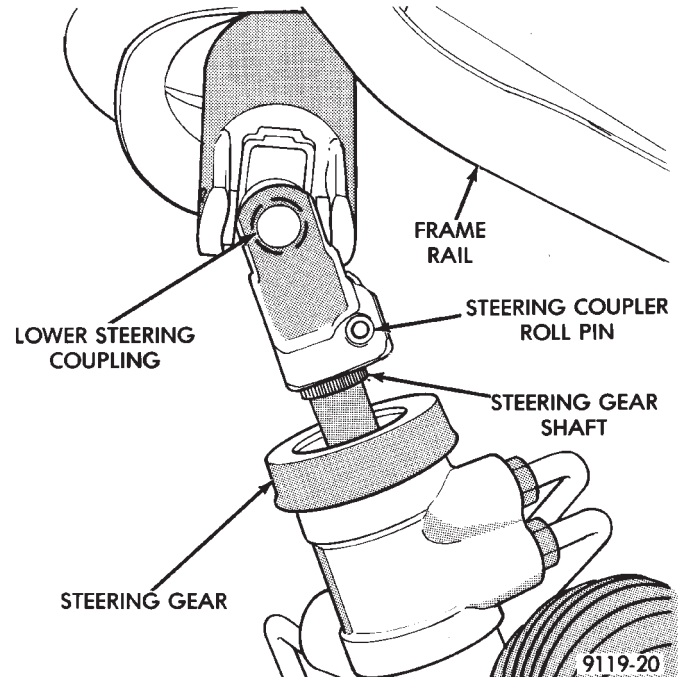


**Fig. 10 Power Steering Fluid Lines**

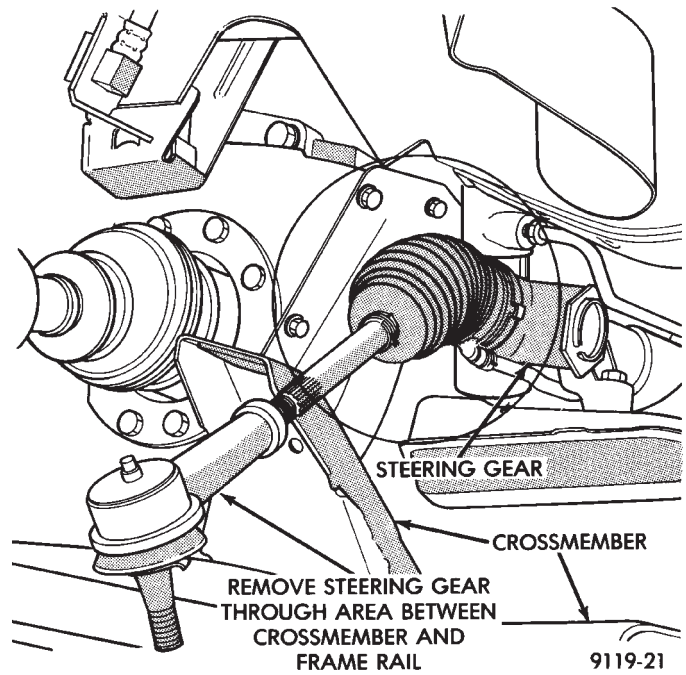


**Fig. 11 Steering Gear Remove/Replace**

(11) Remove the steering gear from the vehicle by pulling it out the driver side wheel well. Rotate the gear as required to clear the frame rail as you are sliding the gear out of the vehicle (Fig. 13).



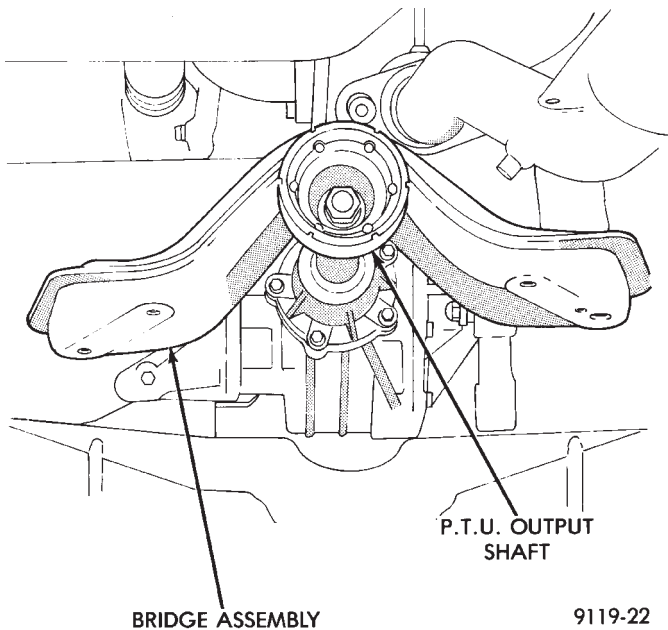
**Fig. 12 Steering Coupler Remove/Replace**



**Fig. 13 Steering Gear Removal From Vehicle**

### INSTALLATION

(1) If the bridge assembly was removed from the vehicle. Lay the bridge assembly on the output shaft of the P.T.U. (Fig. 14).



**Fig. 14 Bridge Assembly Installed**

(2) Install the steering gear into the vehicle (Fig. 13) in the reverse order of its removal, through left wheel well.

(3) Install the lower steering column coupler onto the steering gear shaft (Fig. 12). Be sure the roll pin is fully installed through the coupler housing. **The roll pin retains the steering coupler to the splined shaft on the steering gear.**

(4) Install the 4 bolts that mount the steering gear to the bridge assembly, (Fig. 11) but do not torque them. **The bolts holding the steering gear to the bridge assembly. Must be replaced in the same steering gear mount location they were removed from.** Be sure the power steering hose bracket is reinstalled under the right steering gear bracket.

(5) Install the power steering pump fluid, pressure and return lines (Fig. 10) onto the correct steering gear fittings. Torque the fluid line to steering gear tube nuts to 31 N•m (275 in.lbs.).

(6) Using a Transmission Jack, (Fig. 8) raise and install the crossmember assembly in the vehicle. Tighten the 4 crossmember to frame rail fasteners (Fig. 7) to the torque specifications listed below. **The right rear crossmember stud is a pilot that correctly locates the crossmember. Tighten down this bolt first, then torque all 4 crossmember fasteners to 122 N•m (90 ft. lbs.).**

**CAUTION:** Proper torque on the crossmember to frame rail mounting bolts is very important.

(7) Install the bridge assembly onto the crossmember assembly (Fig. 5) and torque the 4 fasteners to 68 N•m (50 ft. lbs.).

(8) Install the routing bracket for the power steering lines (Fig. 6) onto the crossmember assembly. Torque screw to 8 N•m (70 in. lbs.).

(9) Install the outer tie rod ends on the steering knuckles. Install the tie rod end to steering knuckle attaching nuts and torque to 52 N•m (38 ft. lbs.). **The cotter pin that retains the tie rod end nut must be installed.**

(10) Start up the vehicle and check all power steering fluid hose fittings for oil leaks.

(11) Check and or adjust toe setting on vehicle after steering gear is installed (Refer to Group 2 Suspension).

### OUTER TIE ROD

#### REMOVAL

(1) Loosen inner tie rod to outer tie rod jam nut (Fig. 1).

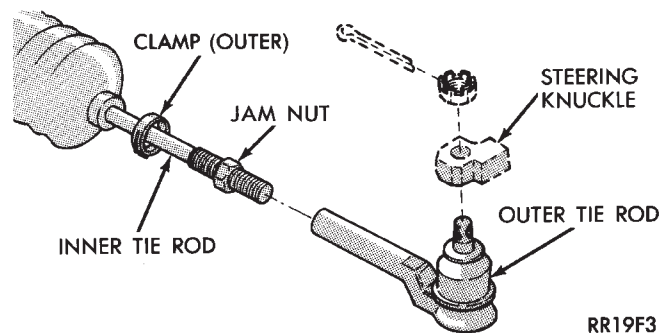
(2) Remove outer tie rod to steering knuckle cotter pin and attaching nut (Fig. 1).

(4) Remove the tie rod end from steering knuckles, using Puller Special Tool C-3894-A (Fig. 2).

(5) Remove outer tie rod from inner tie rod.

#### INSTALLATION

(1) Install outer tie rod onto inner tie rod. **Make sure jam nut is on inner tie rod (Fig. 1).**



**Fig. 1 Outer Tie Rod**

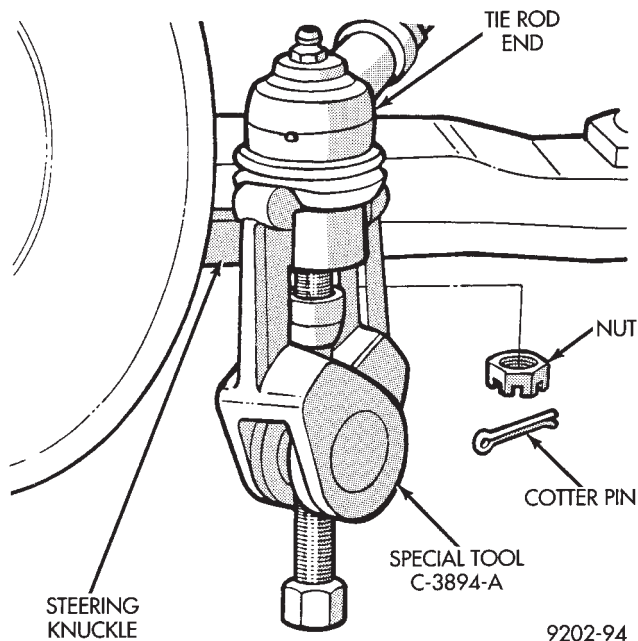


Fig. 2 Tie Rod End Removal

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(2) Do not tighten jam nut.

(3) Install outer tie rod onto steering knuckle. Install tie rod to steering knuckle attaching nut and torque to 52 N•m (38 ft. lbs.).

**CAUTION:** During this procedure do not allow the steering gear boot to become twisted. (See Wheel Alignment in the suspension section of this service manual).

(4) Make toe adjustment by turning inner tie rod.

(5) Tighten the inner to outer tie rod jam nut to 75 N•m (55 ft. lbs.) torque. Lubricate tie rod boot groove with silicone type lubricant before installing outer boot clamp, making sure boot is not twisted.

### STEERING GEAR BOOT SEAL

The removal and installation of the following components must be performed with the rack and pinion assembly removed from the vehicle.

#### REMOVAL

(1) Remove outer tie rod from steering knuckle (Fig. 1).

(2) Loosen the inner to outer tie rod jam nut (Fig. 2). Remove the outer tie rod from the inner tie rod.

(3) Remove jam nut.

(4) Using pliers expand outer boot, to tie rod clamp (Fig. 3) and remove from steering gear boot.

(5) Use pliers to expand boot snorkel clamp (Fig. 3) and slide clamp off boot and leave on breather tube.

(6) Remove inner, boot to steering gear clamp (Fig. 3).

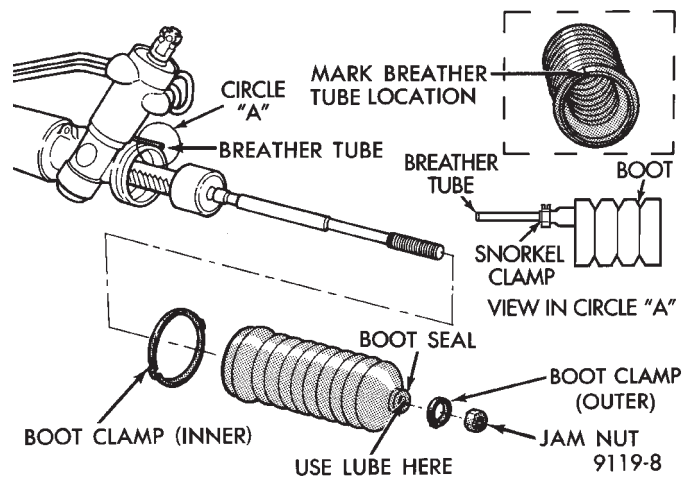


Fig. 3 Boot Seal Remove Install

After removing inner boot clamps, a very small screwdriver should be used to lift boot from its groove, then the boot can be removed from the steering gear.

#### INSTALLATION

(1) Install boot seal on inner tie rod.

(2) Align vent hole in boot seal (Fig. 3) with steering gear breather tube.

(3) Install boot seal over steering gear housing lip and onto the end of the breather tube (Fig. 3).

(4) Install boot seal to breather tube snorkel clamp (Fig. 3)

(5) Install new inner boot seal to steering gear clamp (Fig. 3)

(6) Lubricate inner tie rod boot groove with silicone type lubricant, then install outer boot seal to inner tie rod clamp (Fig. 3).

(Clamp will have to be loosened for toe adjustment.)

(7) Install inner to outer tie rod jam nut (Fig. 2) on inner tie rod.

(8) Install outer tie rod on inner tie rod (Fig. 2). Do not tighten jam nut.

(9) Install outer tie rod onto steering knuckle. Install tie rod to steering knuckle attaching nut and torque to 52 N•m (38 ft. lbs.).

**CAUTION:** During this procedure do not allow the steering gear boot to become twisted. (See Wheel Alignment in the suspension section of this service manual).

(10) Make toe adjustment by turning inner tie rod.

(11) Tighten the inner to outer tie rod jam nut to 75 N•m (55 ft. lbs.) torque. Lubricate tie rod boot groove with silicone type lubricant, before installing outer boot clamp, making sure boot is not twisted.

## ACUSTAR STANDARD AND TILT STEERING COLUMN

## INDEX

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General Information .....	1	Steering Column Component Service .....	33
Ignition Switch Service .....	34	Steering Column Service Procedures .....	1

## GENERAL INFORMATION

**WARNING: THE AIR BAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL 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 AND ARE SPECIFICALLY DESIGNED FOR THE AIR BAG 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.**

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

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

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

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

**CAUTION: Do not attempt to remove the pivot pins to disassemble the tilting mechanism. Damage will occur.**

## STEERING COLUMN SERVICE PROCEDURES

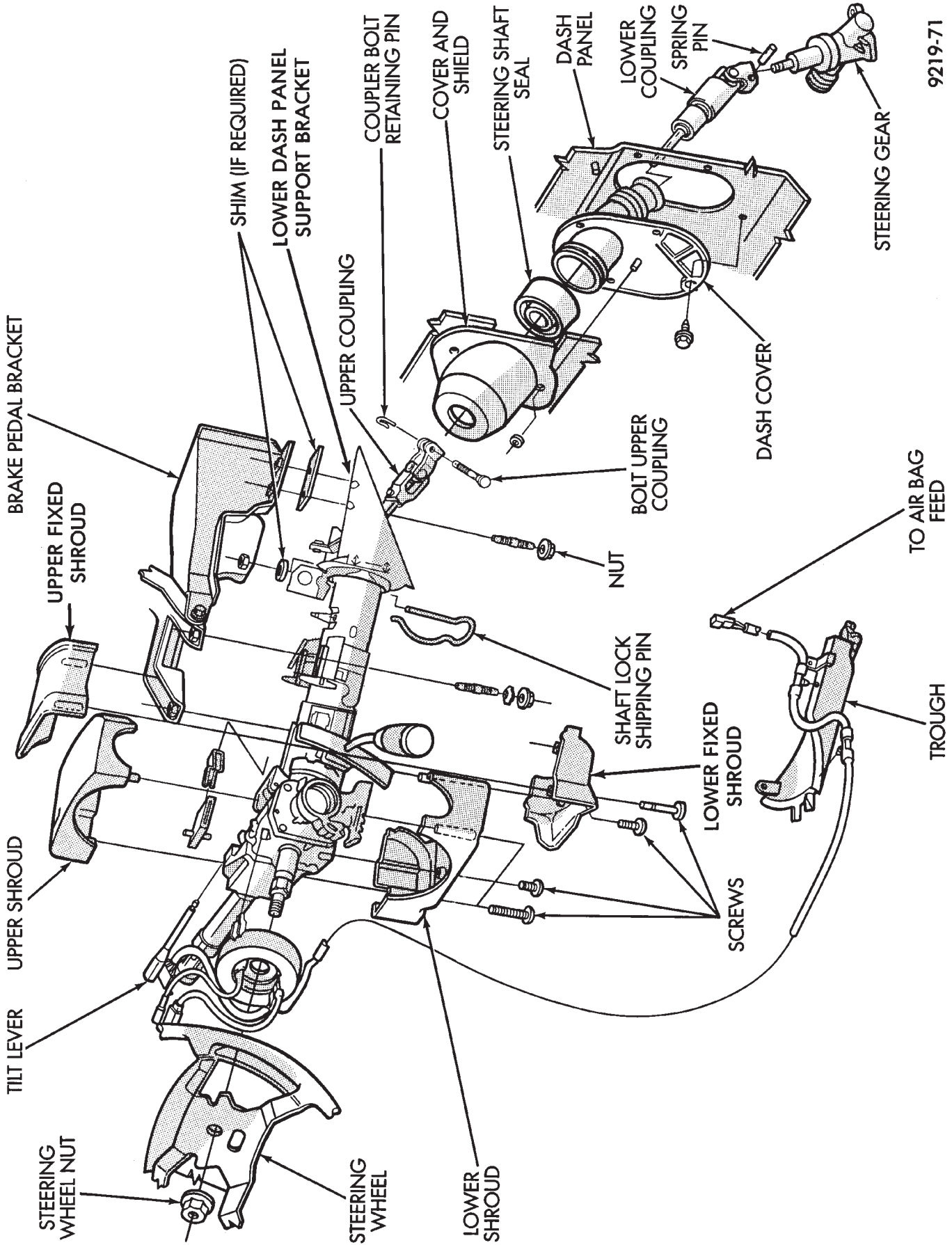
To service the steering wheel and its components or the air bag, refer to Group 8M, Restraint Systems. Follow all WARNINGS.

To service the switches, refer to the appropriate section of Group 8, Electrical.

To replace the steering column assembly, refer to the steering column removal procedure. For location of components referred to in the procedure see (Fig. 1).

**WARNING: BEFORE BEGINNING ANY AIR BAG SYSTEM COMPONENT INSTALLATION OR REMOVAL PROCEDURES. REMOVE AND ISOLATE THE NEGATIVE (-) BATTERY CABLE (GROUND) FROM THE VEHICLE BATTERY. THIS IS THE ONLY SURE WAY TO DISABLE THE AIR BAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIR BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.**





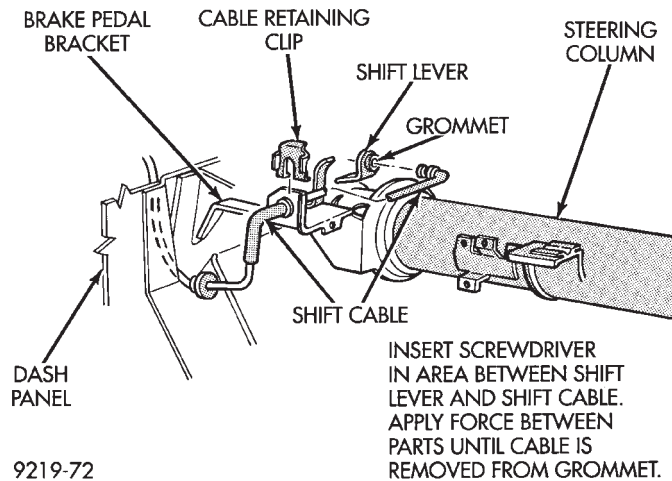
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Fig. 1 Acustar Standard and Tilt Steering Column



**STEERING COLUMN REMOVAL**

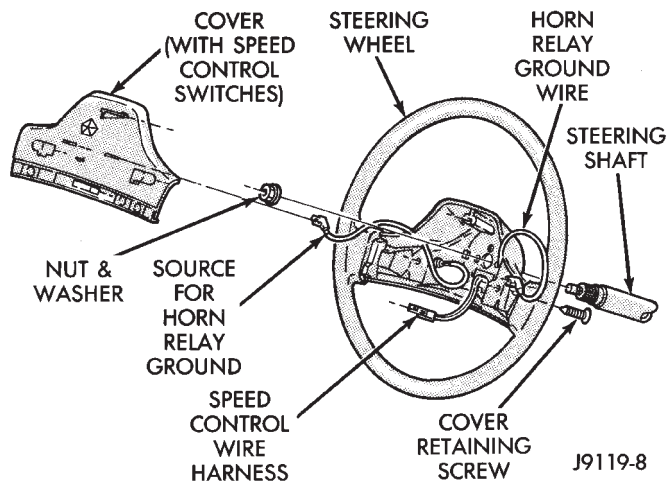
- (1) Make sure the front wheels of the vehicle are in the **straight ahead** position.
- (2) Disconnect the negative (ground) cable from the battery and isolate cable.
- (3) For vehicles equipped with a column shift. Disconnect the transmission shift cable from the steering column by prying it out of the grommet in the shift lever (Fig. 2).



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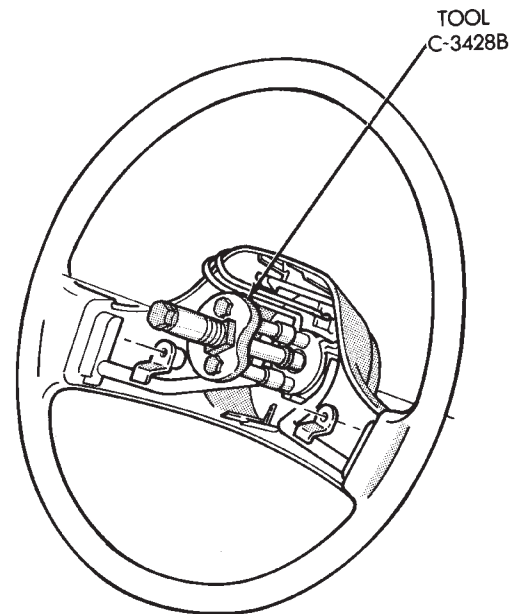
**Fig. 2 Shift Cable Removal From Grommet**

- (4) Remove the steering wheel center pad and disconnect electrical components such as horn lead, air bag lead and speed control switch lead (if equipped) (Fig. 3).



**Fig. 3 Horn Pad Removal (Typical)**

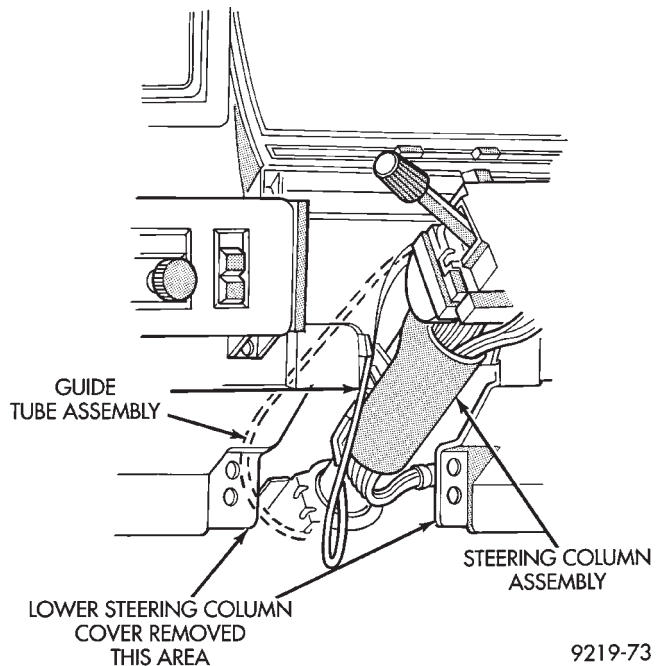
- (5) Remove the steering wheel retaining nut from the steering column shaft. Remove steering wheel from shaft using Puller, Special Tool C-3428-B (Fig. 4). **Do not bump or hammer on steering column shaft to remove wheel.**



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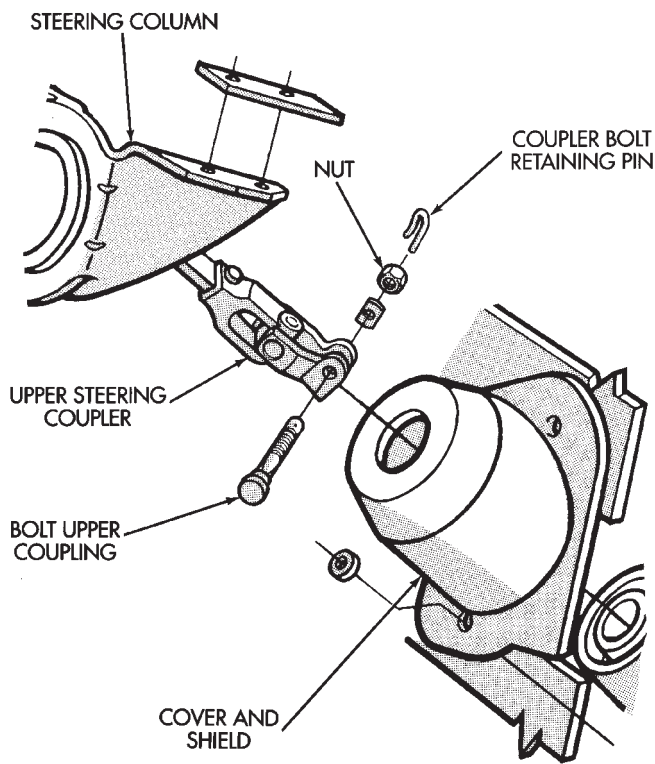
**Fig. 4 Removing Steering Wheel (Typical)**

- (6) Remove the lower steering column cover (Fig. 5).
- (7) Remove the retaining pin in the upper to lower



**Fig. 5 Steering Column Cover Removed**

- steering coupler retaining bolt (Fig. 6).
- (8) Remove the upper to lower steering coupler retaining nut and pinch bolt (Fig. 6). Remove the upper steering coupler from the lower steering coupler shaft.
- (9) Place the gear shift lever in either the neutral or park position.

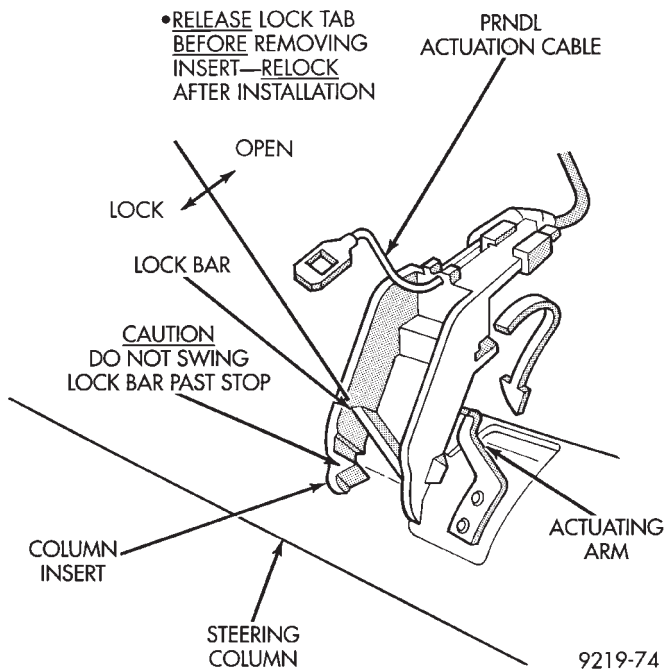


9119-12

**Fig. 6 Steering Column Coupler Remove and Install**

(10) Remove the PRNDL indicator actuation cable from the steering column actuating arm (Fig. 7).

(11) Release the lock bar on the column insert.



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**Fig. 7 PRNDL Cable Removal**

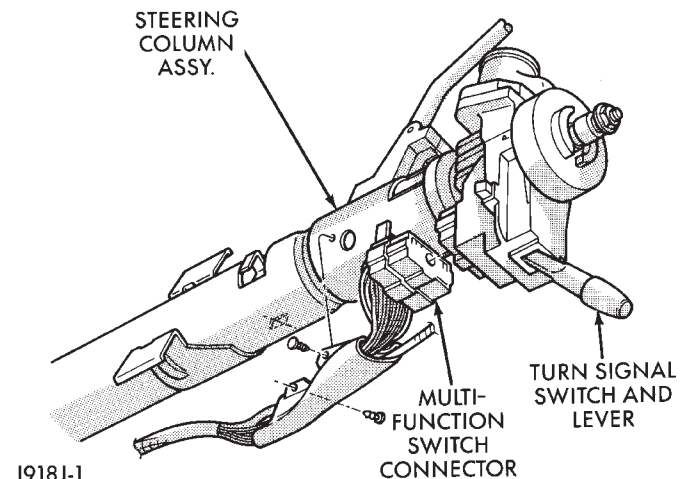
Squeeze the legs of the column insert together and remove insert from steering column assembly (Fig. 7).

(12) Secure the insert and actuation cable out of the way.

(13) Remove tilt lever (if equipped) from steering column.

(14) Remove the upper and lower lock housing shrouds (Fig. 1) from the steering column assembly. Remove the lower fixed shroud from the steering column assembly. The shroud fasteners are **Torx-head** screws.

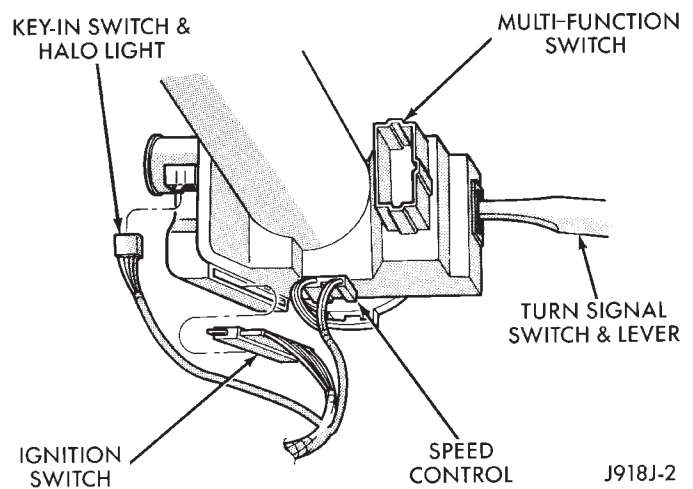
(15) Remove the wiring harness connector to the turn signal/multi-function switch using a 7mm socket as shown in (Fig. 8).



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**Fig. 8 Multi-function Switch Wiring Harness Connector**

(16) Remove the electrical connections from the Key-in Switch & Halo Light, Main Ignition Switch, Horn connection or Clock Spring (Speed Control Equipped) (Fig. 9).

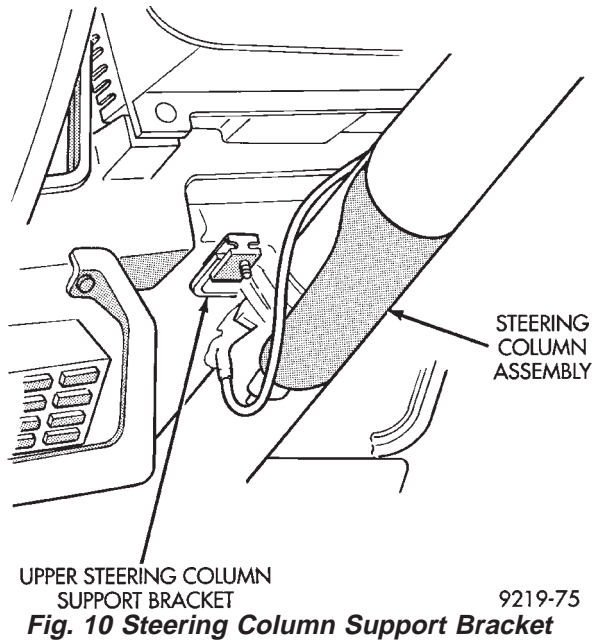


J918J-2

**Fig. 9 Steering Column Wiring**

(17) Loosen the upper steering column support bracket nuts (Fig. 10) to allow some slack. This will aid in removal of the upper fixed shroud.

(18) Remove the upper fixed shroud (Fig. 1) from the steering column assembly. Remove the wiring



**Fig. 10 Steering Column Support Bracket**

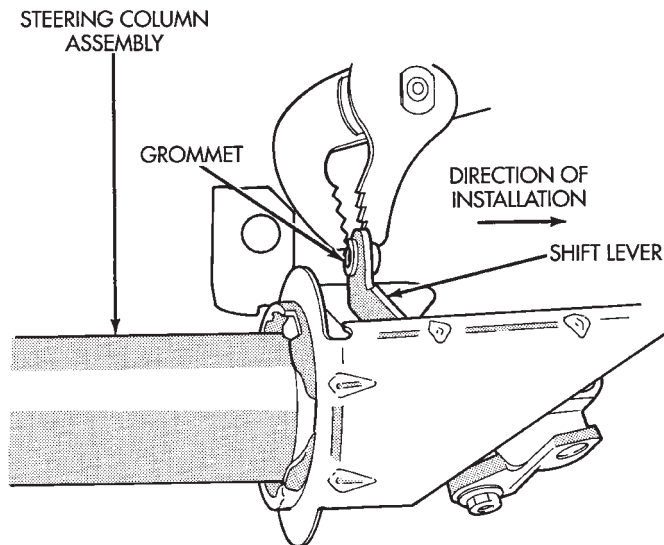
harness from the steering column assembly by prying out the plastic retainer buttons (Fig. 8).

(19) Remove the lower dash panel and support bracket standoff fasteners (Fig. 1).

(20) Remove the steering column assembly out through the passenger compartment. Use care to avoid damaging the paint or interior trim.

**STEERING COLUMN INSTALLATION**

(1) For column shift vehicles, install a **new cable attaching grommet into the steering column shift lever (Fig. 11). Install grommet from the cable side of the lever.** Use pliers and a back-up washer to snap the grommet into place (Fig. 11). Use Mopar® Multipurpose Lubricant, or equivalent, to aid

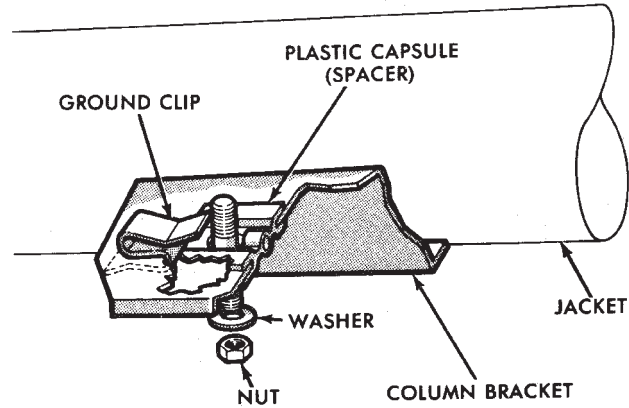


**Fig. 11 Replacement Cable Grommet Installation**

installation of the grommet. **A replacement grommet should be used whenever the rod is disconnected from the lever.**

(2) Install the ground clip on the left capsule slot (Fig. 12). The plastic capsules should be pre-assembled in the bracket slots. **Remove the shipping lock pin (Fig. 1) located on lower column jacket when installing a new steering column.** Insert the column through the floor pan opening while being careful to avoid damaging the interior paint and trim.

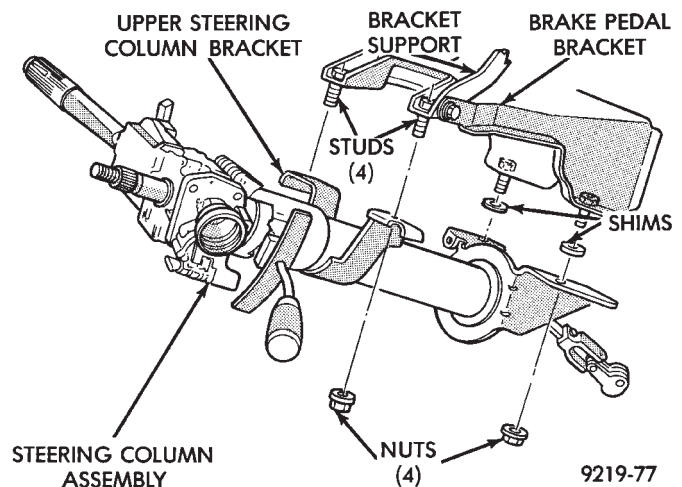
(3) Position the steering column assembly in the



**Fig. 12 Ground Clip & Spacer Installation**

vehicle. Align the steering column assembly mounting bracket slots on the brake pedal bracket attaching studs (Fig. 13). Install, but **loose assemble** the two upper column bracket, washers and nuts.

(4) Make sure the front wheels are in the straight-



**Fig. 13 Steering Column Mounting**

ahead position. Align and assemble the upper steering coupler to lower steering coupler. Install the upper to lower steering coupler retaining bolt and nut. Torque the retaining bolt nut to 28 N•m (250 in.



lbs.). **Be sure to install the upper to lower steering coupler retaining bolt retention pin (Fig. 6).**

(5) Install the buttons which retain the multi function switch wiring harness to the steering column. Connect the multi-function switch wiring harness connector to the multi-function switch. Torque the connector retaining bolt to 2 N•m (17 in. lbs) using a 7mm socket (Fig. 8).

(6) Install the upper fixed shroud onto the steering column assembly.

(7) Be sure both breakaway capsules are fully seated in the slots of the steering column upper support bracket. Torque the 2 upper steering column assembly to support bracket nuts to 12 N•m (105 in. lbs.). Torque the 2 lower steering column assembly to mounting bracket nuts to 12 N•m (105 in. lbs.).

(8) Complete the wiring harness connections to the remaining steering column switches (Fig. 9). Install the lower fixed shroud onto the steering column.

(9) Route the PRNDL actuator assembly under left steering column wing and along left side of steering column. Insert the flange of the PRNDL actuator steering column insert into the steering column jacket (Fig. 7). Squeeze the legs of the steering column insert together and install tabs under steering column jacket. Engage lock bar to secure the actuator assembly into the steering column jacket (Fig. 7).

(10) Hook the PRNDL actuator cable eyelet to the steering column actuator arm (Fig. 7). Move the shift lever to neutral, check pointer location, should indicate neutral. If pointer does not indicate neutral adjust actuator with tool (Fig. 14) to center pointer on N (Neutral) and then check pointer location in other gears.

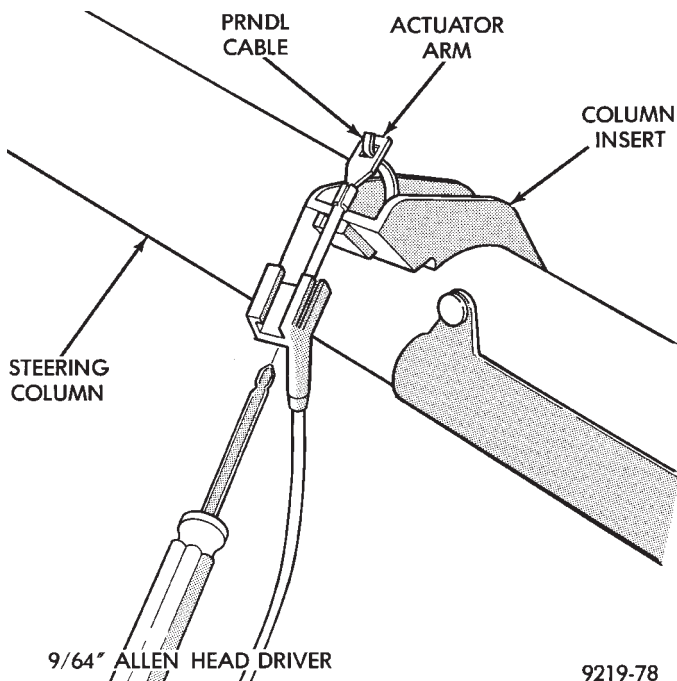


Fig. 14 PRNDL Actuator Cable Adjustment

(11) Install the lock housing shrouds. The shroud fasteners are **Torx-head** screws. Install the tilt lever (if equipped).

(12) Install the lower dash panel cover.

(13) For steering wheel installation with speed control refer to Group 8 Electrical. For non-speed control, place the steering wheel on the steering column shaft with the master splines aligned. Install the steering wheel to column shaft retaining nut. Tighten retaining nut to 61 N•m (45 ft. lbs.) torque. **Do not force the steering wheel onto the column shaft by driving it on with a heavy object. Pull steering wheel down onto column shaft using ONLY the steering wheel retaining nut.**

(14) For vehicles equipped with a column shift. Pass the transmission shift cable through its mounting bracket on the steering column assembly. Connect the transmission shift cable to the shift lever on the steering column assembly. Install the shift cable to mounting bracket retaining clip (Fig. 2). **The grommet must be installed in the shift lever (Fig. 11) before the cable is inserted into the grommet.** Use Mopar® Multipurpose Lubricant, or an equivalent product, to aid installation of shift link rod into grommet.

(15) Re-adjust the transmission shift linkage. **Whenever the steering column is loosened or removed, the shift linkage MUST be adjusted and tested.** Refer to Group 21 Transmission for the shift linkage adjustment procedure.

(16) Connect the battery ground (negative) cable. Test the operation of the lights and horns. If applicable, reset the clock and radio.

## STEERING COLUMN COMPONENT SERVICE

The Acustar tilt and standard steering columns (Fig. 1) 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 steering column from the vehicle. For additional information on electrical components refer to **Group 8H Electrical**.

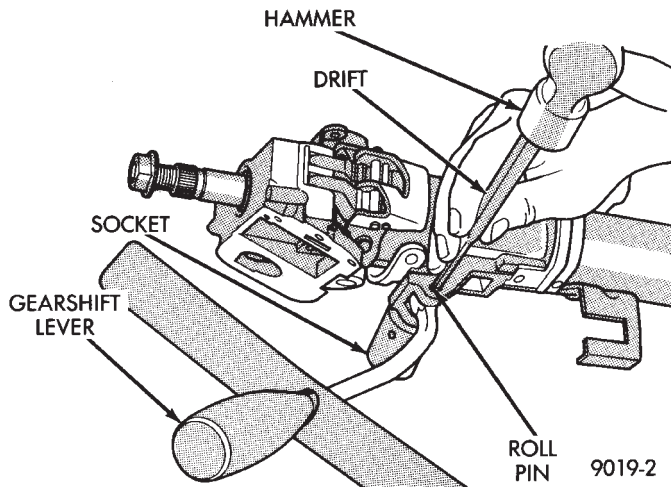
### GEAR SHIFT LEVER

The gear shift lever (if equipped) is a serviceable component of the Acustar steering column assembly.

**REMOVE**

(1) Support the steering column assembly as shown in (Fig. 1) 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 (Fig. 1). Remove the gear shift lever from the steering column assembly.



**Fig. 1 Gear Shift Lever Removal**

**INSTALL**

(1) Support the steering column assembly as shown in (Fig. 1) using a suitable size socket.

(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.

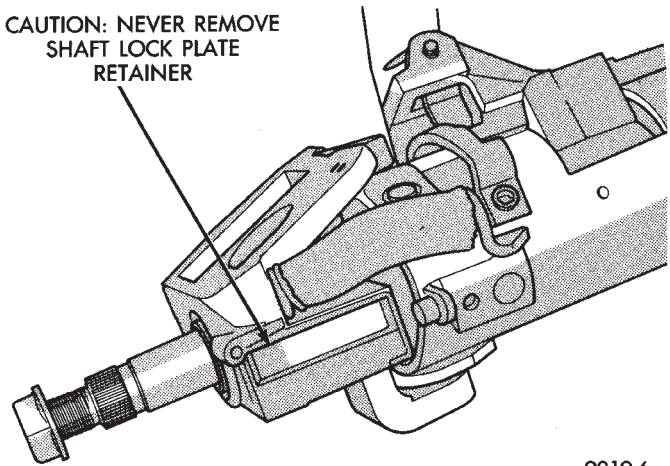
**IGNITION SWITCH SERVICE****TEST AND REPAIR**

If the ignition switch effort seems to be excessive due to binding. Follow the procedure outlined below to determine the cause.

When service procedures are performed on the Acustar steering column there are certain areas of the column that can not be tampered with. If a problem related to these areas of the steering column are detected. The entire steering column (less the removable components) should be replaced see (Fig. 2 and 3).

(1) Remove the ignition switch from the steering column. Refer to **Group 8H Electrical**.

CAUTION: NEVER REMOVE  
SHAFT LOCK PLATE  
RETAINER



**Fig. 2 Steering Column Non-Serviceable Components**

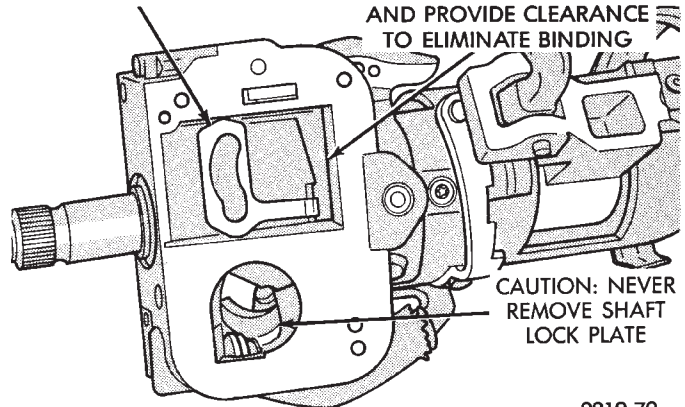
(2) Using a key cylinder, check the turning effort of the switch.

• 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. 3).

CAUTION: DO NOT REMOVE  
IGNITION LOCKING LINK

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



**Fig. 3 Steering Column Flash Removal And Non-Serviceable Components**

(2) Remove the link and slider.

(3) Check the link to see if it has been bent and if so replace with a new part.

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.

• If no binding is found.

Lightly file the ramp on the ignition switch, (The ramp fits into the casting) until binding no longer occurs.



## SPECIFICATIONS AND TIGHTENING REFERENCE

## TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
Steering Gear To Crossmember Bolts .....	68 N•m (50 ft. lbs.)
Tie Rod End To Steering Knuckle Attaching Nut.....	52 N•m (35 ft. lbs.)
Outer Tie Rod To Inner Tie Rod Lock Nut.....	75 N•m (55 ft. lbs.)
Power Steering Pressure Hose Tube Nuts.....	34 N•m (25 ft. lbs.)
Return Tube Nut.....	34 N•m (25 ft. lbs.)
Pressure Hose Locating Bracket To Front Crossmember .....	23 N•m (17 ft. lbs.)
Return Tube Locating Bracket To Front Crossmember .....	28 N•m (21 ft. lbs.)
Power Steering Fluid Pressure Hose Banjo Bolt .....	34 N•m (25 ft. lbs.)
Power Steering Pump Discharge Fitting (Saginaw).....	75 N•m (55 ft. lbs.)
Power Steering Pump To Bracket Mounting Stud M-10.....	48 N•m (35 ft. lbs.)
Power Steering Pump To Bracket Bolt And Nut M-10 .....	40 N•m (30 ft. lbs.)
Power Steering Pump To Bracket Mounting Bolts M-8.....	28 N•m (21 ft. lbs.)
Steering Wheel To Shaft Nut.....	61 N•m (45 ft. lbs.)
Steering Column Clamp Stud .....	2 N•m (20 in. lbs.)
Steering Column Clamp Stud Nut.....	12 N•m (105 in. lbs.)
Steering Column Clamp Bolt .....	12 N•m (105 in. lbs.)

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## POWER STEERING PUMP SPECIFICATIONS

Output Flow at 1500 rpm and Minimum Pressure.....	6.4 Liters/Min. (1.7 gpm)
Pressure Relief .....	8275 to 8975 kPa (1200 to 1300 psi)
Power Steering Oil Return Hose Length .....	280mm (11 inches)

IF RETURN HOSE IS REPLACED, USE ONLY HYPALON OR CPE MATERIAL.

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