

# STEERING

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# POWER STEERING

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## DESCRIPTION AND OPERATION

### POWER STEERING SYSTEM

Turning of the steering wheel is converted into linear travel through the meshing of the helical pinion teeth with the rack teeth within the steering gear.

Power assist steering is provided by an open-center, rotary-type control valve. It is used to direct power steering fluid from the power steering 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 steering effort increases as in a turn, the torsion bar twists, causing relative rotary motion between the rotary valve body and valve spool. This movement directs fluid behind the integral rack piston, which in turn builds up hydraulic pressure and assists in the turning effort.

This vehicle comes with power steering as standard equipment and it is the only steering system

available. The power steering system consists of these major components:

- POWER STEERING PUMP
- POWER STEERING GEAR
- POWER STEERING FLUID RESERVOIR (mounted on the pump)
- POWER STEERING FLUID PRESSURE HOSE
- POWER STEERING FLUID RETURN HOSE
- POWER STEERING FLUID COOLER (on some models)

For information on the first two components, refer to their respective sections within this service manual group. Information on the third component can be found in POWER STEERING PUMP. Information on all other components can be found in this section of this service manual group.

## DESCRIPTION AND OPERATION (Continued)

**POWER STEERING FLUID HOSES**

The power steering fluid hoses connect the components of the power steering system. They transfer fluid from one component to the next.

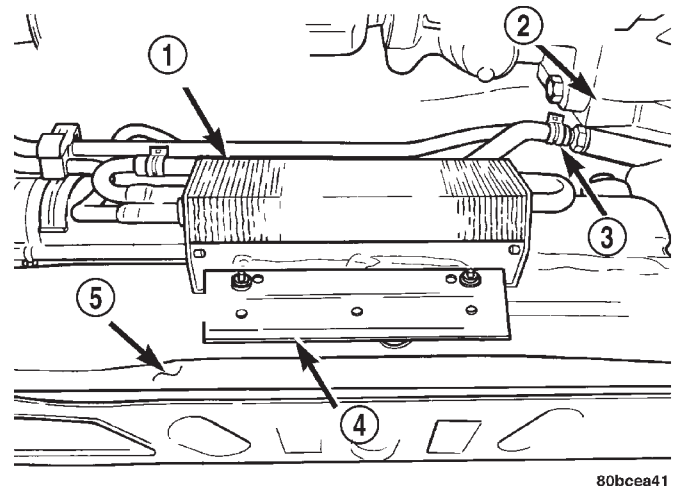
The power steering fluid pressure hose is a high pressure hose that connects the power steering pump to the gear. At both ends of the flexible hose portion are steel fittings that are pressure crimped to the flexible hose. A standard tube nut fitting with an O-ring is used at each end to connect it to either the power steering pump or the gear.

The power steering fluid return hose is a special rubber hose that connects the power steering gear or the power steering fluid cooler on some models, back to the fluid reservoir mounted on the power steering pump. The power steering gear has a steel fitting attached to its outlet port that the return hose is pushed onto. On vehicles equipped with a power steering fluid cooler, the return hose attaches to the cooler outlet tube instead of the steering gear steel fitting. The hose is secured to either component using a standard adjustable clamp. The other end of the power steering fluid return hose attaches to the power steering fluid reservoir on the power steering pump using a standard adjustable clamp.

**POWER STEERING FLUID COOLER**

Some models of this vehicle are equipped with a cooler for the power steering system fluid (Fig. 1). The purpose of the cooler is to keep the temperature of the power steering system fluid from rising to a level that would affect the performance of the power steering system.

The power steering fluid cooler is located at the front of the front suspension crossmember. It is mounted to the crossmember top surface using 2 fasteners.



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**Fig. 1 Power Steering Fluid Cooler**

- 1 - POWER STEERING FLUID COOLER
- 2 - TRANSAXLE
- 3 - CLAMP
- 4 - AIR DAM
- 5 - CROSSMEMBER

The cooler is placed in series with the power steering fluid return hose, between the steering gear fluid outlet port and the fluid return hose leading to the power steering fluid reservoir. The power steering gear has a steel fitting attached to its outlet port that a short hose leading to the cooler is pushed onto. This hose is secured to both the steering gear outlet fitting and the cooler using standard adjustable clamps. The cooler is secured to the power steering fluid return hose using a standard adjustable clamp.

The cooler used on this vehicle is referred to as a fluid-to-air type cooler. This means that the air flow across the tubes of the cooler is used to extract the heat from the cooler which it has absorbed from the power steering fluid flowing through it. Utilizing a small air dam mounted to its base to redirect air across its coils, the cooler lowers the temperature of the power steering fluid prior to it entering the power steering fluid reservoir where it is resupplied to the power steering pump.

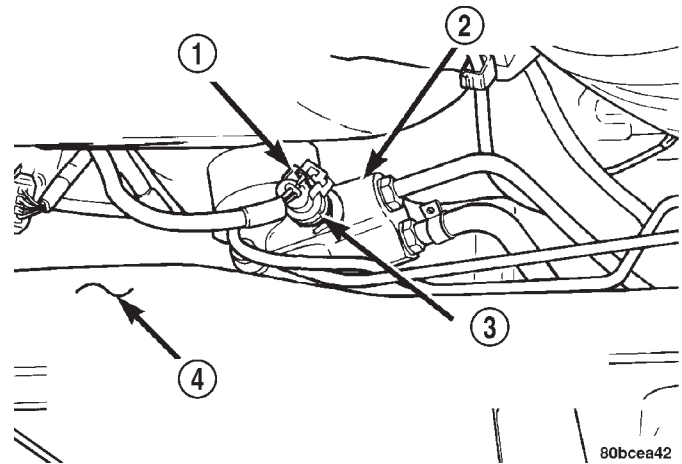
## DESCRIPTION AND OPERATION (Continued)

**POWER STEERING FLUID PRESSURE SWITCH**

A power steering pressure switch is used to improve the vehicle's idle quality. The pressure switch improves vehicle idle quality by causing a readjustment of the engine idle speed as necessary when increased fluid pressure is sensed in the power steering system.

The pressure switch functions by signaling the powertrain control module that an increase in pressure of the power steering system is putting additional load on the engine. This type of condition exists when the front tires of the vehicle are turned while the vehicle is stationary and the engine is at idle speed. When the powertrain control module receives the signal from the power steering pressure switch, it directs the engine to increase its idle speed. This increase in engine idle speed compensates for the additional load, thus maintaining the required engine idle speed and idle quality.

The power steering pressure switch is mounted directly to the power steering gear (Fig. 2).



**Fig. 2 Switch Location**

- 1 - WIRING HARNESS CONNECTOR
- 2 - POWER STEERING GEAR
- 3 - POWER STEERING FLUID PRESSURE SWITCH
- 4 - REAR OF FRONT SUSPENSION CROSSMEMBER

## DIAGNOSIS AND TESTING

## STEERING SYSTEM DIAGNOSIS CHARTS

## POWER STEERING NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
OBJECTIONABLE HISS OR WHISTLE*	<ol style="list-style-type: none"> <li>1. Damaged or mispositioned steering column shaft/coupling dash panel seal.</li> <li>2. Noisy valve in power steering gear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reposition or replace steering column shaft/coupling dash panel seal.</li> <li>2. Replace power steering gear.</li> </ol>
RATTLE OR CLUNK	<ol style="list-style-type: none"> <li>1. Power steering gear loose on front suspension crossmember.</li> <li>2. Front suspension crossmember mounting fasteners loose at frame.</li> <li>3. Loose tie rod (outer or inner).</li> <li>4. Loose lower control arm mounting bolts at front suspension crossmember.</li> <li>5. Loose strut assembly mounting fasteners at strut tower.</li> <li>6. Power steering fluid pressure hose touching the body of the vehicle.</li> <li>7. Internal power steering gear noise.</li> <li>8. Damaged front suspension crossmember.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to the specified torque.</li> <li>2. Tighten the front suspension crossmember mounting fasteners to the specified torque.</li> <li>3. Check tie rod pivot points for wear. Replace worn/loose parts as required.</li> <li>4. Tighten control arm mounting bolts to the specified torques.</li> <li>5. Tighten strut assembly fasteners to the specified torques.</li> <li>6. Adjust hose to proper position by loosening, repositioning, and tightening fitting to specified torque. Do not bend tubing.</li> <li>7. Replace power steering gear.</li> <li>8. Replace front suspension crossmember.</li> </ol>
CHIRP OR SQUEAL (POWER STEERING PUMP)	<ol style="list-style-type: none"> <li>1. Loose power steering pump drive belt.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and replace automatic belt tensioner as necessary. Replace belt if worn or glazed.</li> </ol>

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
WHINE OR GROWL (POWER STEERING PUMP)**	<ol style="list-style-type: none"> <li>1. Low fluid level.</li> <li>2. Power steering hose touching vehicle body or frame.</li> <li>3. Extreme wear of power steering pump internal components.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill power steering fluid reservoir to proper level and check for leaks.</li> <li>2. Adjust hose to proper position by loosening, repositioning, and tightening fitting to specified torque. Do not bend tubing. Replace hose if damaged.</li> <li>3. Replace power steering pump and flush system as necessary.</li> </ol>
SUCKING AIR SOUND	<ol style="list-style-type: none"> <li>1. Loose clamp on power steering fluid return hose.</li> <li>2. Missing O-Ring on power steering hose connection.</li> <li>3. Low power steering fluid level.</li> <li>4. Air leak between power steering fluid reservoir and power steering pump.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten or replace hose clamp.</li> <li>2. Inspect connection and replace O-Ring as required.</li> <li>3. Fill power steering fluid reservoir to proper level and check for leaks.</li> <li>4. Replace power steering pump (with reservoir).</li> </ol>
SQUEAK OR RUBBING SOUND	<ol style="list-style-type: none"> <li>1. Steering column shroud rubbing.</li> <li>2. Steering column shaft rubbing.</li> <li>3. Steering column shaft dry-rubbing seal at dash panel.</li> <li>4. Steering gear internally noisy.</li> </ol>	<ol style="list-style-type: none"> <li>1. Realign shrouds as necessary.</li> <li>2. Move or realign item rubbing shaft.</li> <li>3. Lubricate contact surface.</li> <li>4. Replace steering gear.</li> </ol>
SCRUBBING OR KNOCKING NOISE.	<ol style="list-style-type: none"> <li>1. Incorrect tire or wheel size.</li> <li>2. Interference between steering gear and other vehicle components.</li> <li>3. Steering gear internal stops worn excessively.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace incorrect size tire or wheel with size used as original equipment.</li> <li>2. Check for bent or misaligned components and correct as necessary.</li> <li>3. Replace steering gear.</li> </ol>

**NOTE: \*** There is some noise in all power steering systems. One of the most common is a hissing sound evident when turning the steering wheel when at a standstill or when parking and the steering wheel is at the end of its travel. Hiss is a very high frequency noise similar to that experienced while slowly closing a water tap. The noise is present in every valve and results when high velocity fluid passes valve orifice edges. There is no relationship between this noise and the performance of the steering system.

**NOTE: \*\*** Power steering pump growl results from the development of high pressure fluid flow. Normally this noise level should not be high enough to be objectionable.

## DIAGNOSIS AND TESTING (Continued)

## STEERING WHEEL FEEL

CONDITION	POSSIBLE CAUSES	CORRECTION
STEERING WHEEL/ COLUMN CLICKING, CLUNKING OR RATTLING.	<ol style="list-style-type: none"> <li>1. Steering column preload is not set properly.</li> <li>2. Loose steering coupling pinch bolt.</li> <li>3. Steering column bearings.</li> </ol>	<ol style="list-style-type: none"> <li>1. Loosen steering column coupling pinch bolt to reset steering column preload. Replace pinch bolt and torque to specifications.</li> <li>2. Replace pinch bolt and torque to specifications.</li> <li>3. Replace steering column.</li> </ol>
STEERING WHEEL HAS FORE AND AFT LOOSENESS.	<ol style="list-style-type: none"> <li>1. Steering wheel retaining nut not properly tightened and torqued.</li> <li>2. Steering column preload is not set properly.</li> <li>3. Steering column lower bearing spring retainer slipped on steering column shaft.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the steering wheel retaining nut to its specified torque.</li> <li>2. Loosen steering column coupling pinch bolt to reset steering column preload. Replace pinch bolt and torque to specifications.</li> <li>3. Replace steering column.</li> </ol>
STEERING WHEEL OR DASH VIBRATES DURING LOW SPEED OR STANDSTILL STEERING MANEUVERS.	<ol style="list-style-type: none"> <li>1. Air in the fluid of the power steering system.</li> <li>2. Tires not properly inflated.</li> <li>3. Excessive engine vibration.</li> <li>4. Loose tie rod end jam nut.</li> <li>5. Overcharged air conditioning system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Bleed air from system following the power steering pump initial operation service procedure.*</li> <li>2. Inflate tires to the specified pressure.</li> <li>3. Ensure that the engine is running properly.</li> <li>4. Tighten the inner to outer tie rod jam nut to the specified torque.</li> <li>5. Check air conditioning pump head pressure and correct as necessary.</li> </ol>
STEERING CATCHES, STICKS IN CERTAIN POSITIONS OR IS DIFFICULT TO TURN.	<ol style="list-style-type: none"> <li>1. Low power steering fluid level.</li> <li>2. Tires not inflated to specified pressure.</li> <li>3. Lack of lubrication in front suspension control arm ball joints.</li> <li>4. Lack of lubrication in steering gear outer tie rod ends.</li> <li>5. Loose power steering pump drive belt.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill power steering fluid reservoir to specified level and check for leaks.</li> <li>2. Inflate tires to the specified pressure.</li> <li>3. Lubricate ball joints if ball joints are not a lubricated for life type ball joint. If ball joint is a lubricated for life ball joint, replace ball joint or control arm.</li> <li>4. Lubricate tie rod ends if they are not a lubricated for life type. If tie rod end is a lubricated for life type, replace tie rod end.</li> <li>5. Check and replace automatic belt tensioner as necessary. If drive belt is worn or glazed, replace belt.</li> </ol>

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	6. Faulty power steering pump flow control (Follow Power Steering System Flow and Pressure Test procedure). 7. Excessive friction in steering column or intermediate shaft. 8. Binding upper strut bearing.  9. Excessive friction in power steering gear.	6. Replace power steering pump.  7. Isolate and correct condition.  8. Disassemble strut assembly. Correct binding condition in strut bearing or replace bearing. 9. Replace power steering gear.
STIFF, HARD TO TURN, SURGE, MOMENTARY INCREASE IN EFFORT WHEN TURNING.	1. Tires not properly inflated.  2. Low power steering fluid level.  3. Loose power steering pump drive belt.  4. Lack of lubrication in control arm ball joints.  5. Low power steering pump pressure (Follow Power Steering System Flow and Pressure Test procedure). 6. High internal leak in power steering gear (Follow Power Steering System Flow and Pressure Test procedure).	1. Inflate tires to specified pressure.  2. Add power steering fluid as required to power steering fluid reservoir to obtain proper level. Check for leaks. 3. Check and replace automatic belt tensioner as necessary. If drive belt is worn or glazed, replace belt. 4. Lubricate ball joints if ball joints are not a lubricated for life type ball joint. If ball joint is a lubricated for life ball joint, replace ball joint or control arm. 5. Replace the power steering pump as necessary.  6. Replace power steering gear.
STEERING WHEEL DOES NOT RETURN TO CENTER POSITION.	1. Tires not inflated properly.  2. Improper front wheel alignment.  3. Lack of lubrication in front suspension control arm ball joints.  4. Steering column coupling joints misaligned. 5. Steering wheel rubbing.**	1. Inflate tires to specified pressure.  2. Check and adjust wheel alignment as necessary. 3. Lubricate ball joints if ball joints are not a lubricated for life type of ball joint. If ball joint is a lubricated for life ball joint, replace ball joint or control arm. 4. Realign steering column coupling joints.  5. Adjust steering column shrouds to eliminate rubbing condition.

## DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	6. Damaged, mis-positioned or un-lubricated steering column coupler to dash seal.** 7. Binding upper strut bearing.  8. Tight shaft bearing in steering column. 9. Excessive friction in steering column coupling. 10. Excessive friction in power steering gear.	6. Replace, reposition, or lubricate dash seal.  7. Disassemble strut assembly. Correct binding condition in strut bearing or replace bearing. 8. Replace the steering column. 9. Replace steering column coupling. 10. Replace power steering gear.
<b>EXCESSIVE STEERING WHEEL KICKBACK OR TOO MUCH STEERING WHEEL FREE PLAY.</b>	1. Air in the fluid of the power steering system.  2. Power steering gear loose on front suspension crossmember.  3. Steering column coupling worn, broken or loose. 4. Free play in steering column.  5. Worn control arm ball joints.  6. Loose steering knuckle to ball joint stud pinch bolt. 7. Front wheel bearings loose or worn. 8. Loose outer tie rod ends.  9. Loose inner tie rod ends. 10. Defective steering gear rotary valve.	1. Bleed air from system following the the power steering pump initial operation service procedure.*  2. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to the specified torque. 3. Replace steering column coupling.  4. Check all components of the steering system and repair or replace as required. 5. Replace ball joint or control arm as required. 6. Inspect pinch bolts, replace as necessary, and tighten to specified torque. 7. Replace wheel bearing or knuckle as necessary. 8. Replace outer tie rod ends that have excessive free play. 9. Replace power steering gear. 10. Replace power steering gear.

**NOTE:** \* Steering shudder can be expected in new vehicles and vehicles with recent steering system repairs. Shudder should dissipate after the vehicle has been driven several weeks.

**NOTE:** \*\* To evaluate this condition, it may be necessary to disconnect the coupling at the base of the steering column. Turn the steering wheel and feel or listen for internal rubbing in steering column. To avoid damaging the column clockspring, note the

following. Before disconnecting coupling, place tires in the straight-ahead position and center steering wheel. Once disconnected, **DO NOT** rotate steering wheel more than one revolution in either direction and place steering wheel in original location before reconnecting coupling. If this position is lost, the steering column clockspring must be recentered following the procedure found within the procedure for steering column installation in the steering column section.



DIAGNOSIS AND TESTING (Continued)

POWER STEERING FLUID

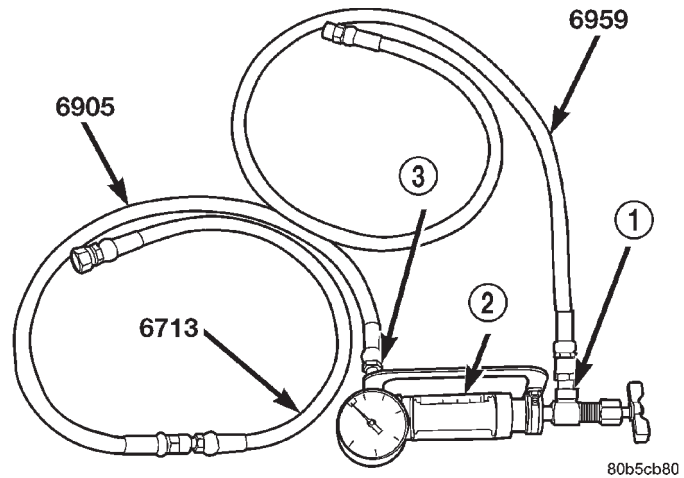
CONDITION	POSSIBLE CAUSES	CORRECTION
LOW FLUID LEVEL WITH VISIBLE LEAK.	1. Loose power steering hose fittings. 2. Damaged or missing fitting seal, gasket, or O-ring. 3. Power steering pump or power steering gear leaking.	1. Tighten the fitting to its specified torque. 2. Replace as necessary. 3. Repair or replace the leaking component as required.
AERATED FLUID.	1. Low fluid level.* 2. Air leak between power steering fluid reservoir and pump. 3. Cracked power steering pump housing.	1. Fill power steering fluid reservoir to proper level. 2. Inspect for proper sealing. Replace the power steering pump (with reservoir). 3. Replace the power steering pump.
RESERVOIR FLUID OVERFLOW AND FLUID IS MILKY IN COLOR	1. Water contamination.	1. Drain the power steering fluid from the system. Flush the system with fresh clean power steering fluid, drain, then refill to the proper level.

**NOTE:** \* Extremely cold temperatures may cause power steering fluid aeration, if the power steering fluid is low.

POWER STEERING SYSTEM FLOW AND PRESSURE TEST

The following procedure is to be used to test the operation of the power steering system on this vehicle. This test will provide the flow rate of the power steering pump along with the maximum relief pressure. This test is to be performed any time a power steering system problem is present to determine if the power steering pump or power steering gear is not functioning properly. The following flow and pressure test is performed using the Power Steering Analyzer Kit, Special Tool 6815 (Fig. 3), hoses, Special Tools 6905 and 6959, and fittings from adapter kit, Special Tool 6893.

(1) Assemble hoses on Power Steering Analyzer, Special Tool 6815, as shown. Install Pressure Hose, Special Tool 6905 (in 6893 kit), in the inlet fitting on Power Steering Analyzer. Install Pressure Hose, Special Tool 6713 (in 6815 kit) on Pressure Hose, Special Tool 6905. Install Pressure Hose, Special Tool 6959, in the outlet fitting on Power Steering Analyzer.



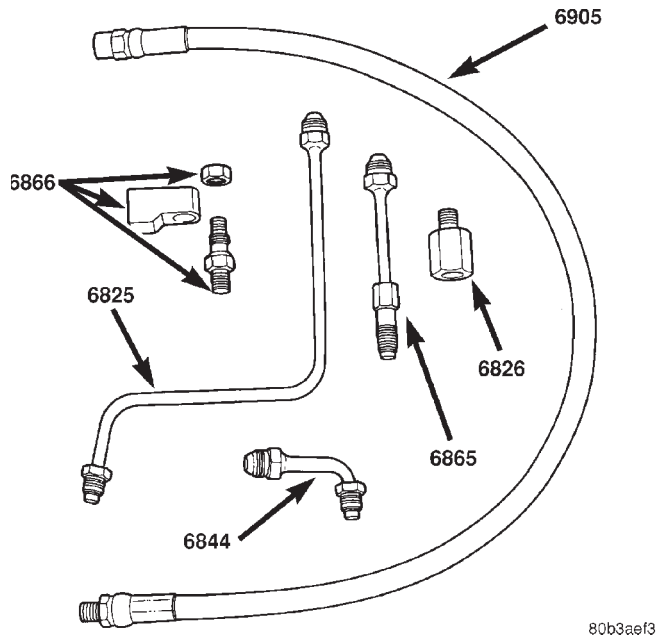
**Fig. 3 Power Steering Analyzer With Hoses Installed**

- 1 - OUTLET
- 2 - SPECIAL TOOL 6815
- 3 - INLET

**CAUTION:** To prevent personal injury, safety goggles should be worn at all times when performing any test procedures on the power steering system.

## DIAGNOSIS AND TESTING (Continued)

(2) Install Adapter Fitting, Special Tool 6844, on Pressure Hose, Special Tool 6713. Install Adapter Fitting, Special Tool 6826, on Pressure Hose, Special Tool 6959. Both Special Tool 6844 and 6826 can be found in Adapter Set, Special Tool 6893 (Fig. 4).



**Fig. 4 Power Steering Analyzer Adapters 6893**

(3) Unscrew the tube nut and disconnect the power steering fluid pressure hose from the power steering pump (Fig. 5).

(4) Connect Adapter Fitting, Special Tool 6844, attached to pressure hose from inlet (gauge end) of Power Steering Analyzer to the pressure fitting on the power steering pump. Tighten the tube nut to a torque of 34 N·m (25 ft. lbs.).

(5) Connect the vehicle's power steering fluid pressure hose to Adapter Fitting, Special Tool 6826, which should be already installed in the outlet hose (valve end) of Power Steering Analyzer. Tighten the tube nut to a torque of 34 N·m (25 ft. lbs.).

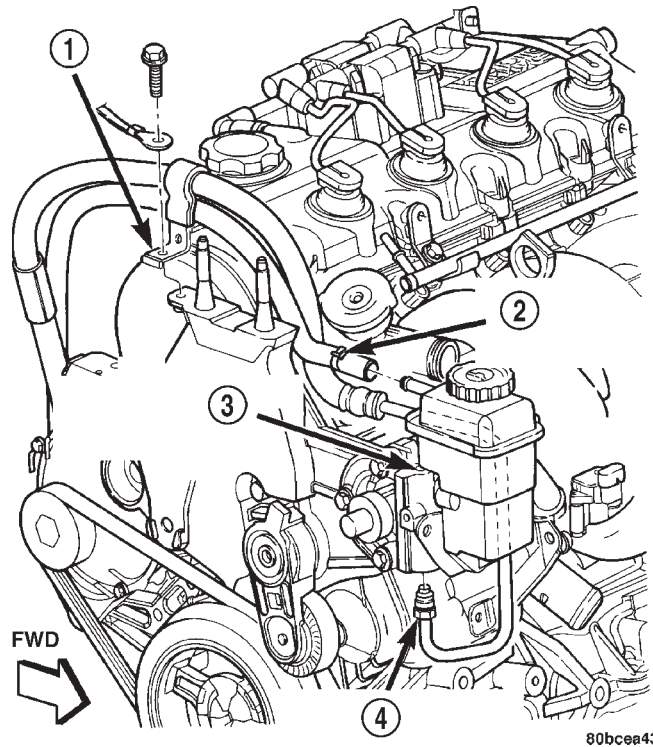
## TEST PROCEDURE

(1) Completely open the valve on the Power Steering Analyzer flow meter.

(2) Start the engine and let idle long enough to circulate power steering fluid through the analyzer and hoses, until the air is out of the fluid. Shut the off engine.

(3) Check the power steering fluid level and add fluid as necessary. Start the engine again and let idle.

(4) The analyzer 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). The flow meter should read between 1.1 and 1.3 GPM.



**Fig. 5 Hose At Pump**

- 1 - HOSE ROUTING CLIP
- 2 - RETURN HOSE CLAMP
- 3 - POWER STEERING PUMP AND RESERVOIR
- 4 - PRESSURE HOSE TUBE NUT

**CAUTION:** The following test procedure step 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.

**NOTE:** Power steering pump maximum relief pressure is 9308 to 9998 kPa (1350 to 1450 psi.).

(5) Close the flow meter 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.**

- If the power steering pump pressure's are above specifications, but not within 345 kPa (50 psi) of each other, replace the power steering pump.

- If the pressure's are within 345 kPa (50 psi) of each other, but below specifications, replace the power steering pump.

If the power steering pump requires replacement, refer to the section POWER STEERING PUMP within this group for the removal and installation procedure.

DIAGNOSIS AND TESTING (Continued)

**CAUTION:** Do not force the pump to operate against the stops for more than 5 seconds at a time as pump damage may result.

(6) Completely open the valve on the Power Steering Analyzer flow meter. Turn the steering wheel to the extreme left until the stop in the steering gear is met, then turn the steering wheel to the right until the right stop is met. Record the highest indicated pressure at each position. Compare the recorded readings to the specifications. If the highest output pressure reading against one stop is within 50 psi of the highest reading at the other stop, the steering gear is leaking internally and must be replaced.

If the power steering gear requires replacement, refer to the section POWER STEERING GEAR within this group for the removal and installation procedure.

SERVICE PROCEDURES

POWER STEERING SYSTEM FLUID LEVEL CHECK

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

Before opening power steering system, wipe the reservoir filler cap free of dirt and debris. Remove the cap and check the fluid level on its dipstick. When the fluid is at normal ambient temperature, approximately 21°C to 27°C (70°F to 80°F), the dipstick level should indicate **COLD**. Do not overfill the power steering system. In all power steering systems, use only Mopar Power Steering Fluid, or its equivalent.

**NOTE:** Do not use any type of automatic transmission fluid in the power steering system.

REMOVAL AND INSTALLATION

SERVICE WARNINGS AND CAUTIONS

**WARNING:** POWER STEERING FLUID, ENGINE PARTS AND 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.

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

**CAUTION:** When the system is open, cap all open ends of the hoses, power steering pump fittings or power steering gear ports to prevent entry of foreign material into the components.

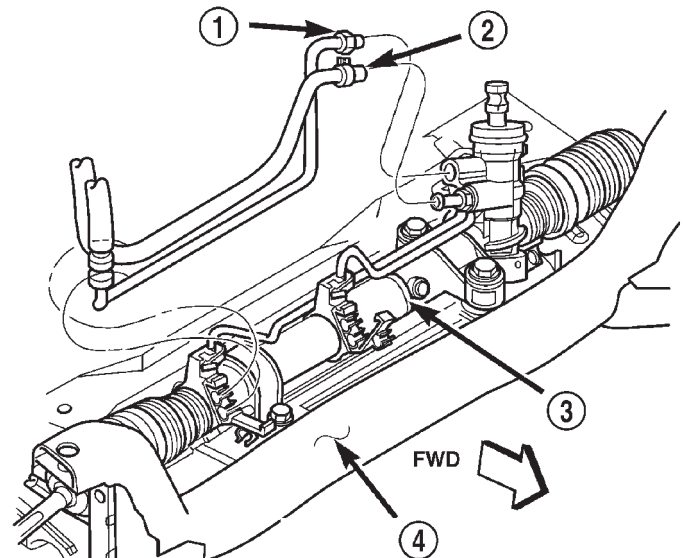
**NOTE:** Do not use any type of automatic transmission fluid in the power steering system.

POWER STEERING FLUID PRESSURE HOSE

**NOTE:** Before proceeding with this removal and installation procedure, review SERVICE WARNINGS AND CAUTIONS at the beginning of REMOVAL AND INSTALLATION in this section.

REMOVAL

- (1) Siphon as much fluid as possible from the power steering fluid reservoir.
- (2) Raise the vehicle. Refer to HOISTING in the LUBRICATION AND MAINTENANCE group in this service manual for the correct lifting procedure.
- (3) Back out the tube nut securing the power steering fluid pressure hose to the gear (Fig. 6).



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**Fig. 6 Power Steering Hoses At Gear**

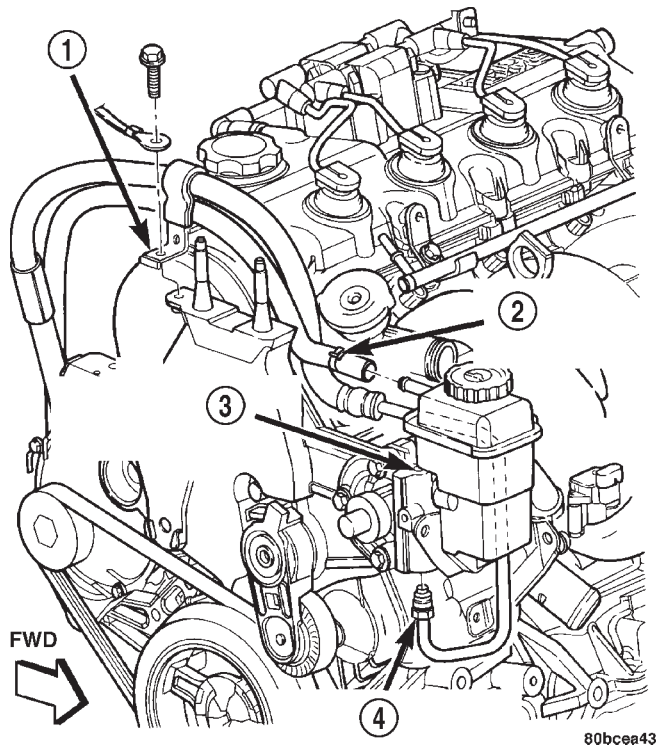
- 1 - PRESSURE HOSE TUBE NUT
- 2 - RETURN HOSE
- 3 - POWER STEERING GEAR
- 4 - FRONT SUSPENSION CROSSMEMBER

## REMOVAL AND INSTALLATION (Continued)

(4) Open the routing clips on the right side of the power steering gear and remove the power steering fluid pressure hose tube from the routing clips. At the same time, remove the pressure hose tube from the gear.

(5) Lower the vehicle.

(6) Remove the bolt securing the hose routing clip in place on the right engine motor mount (Fig. 7). Remove the power steering fluid pressure hose from the routing clip.



**Fig. 7 Power Steering Hoses At Pump**

- 1 - HOSE ROUTING CLIP
- 2 - RETURN HOSE CLAMP
- 3 - POWER STEERING PUMP AND RESERVOIR
- 4 - PRESSURE HOSE TUBE NUT

(7) Back out the tube nut securing the power steering fluid pressure hose to the power steering pump and remove the hose from the pump (Fig. 7).

(8) Remove the power steering pressure hose from the engine compartment.

### INSTALLATION

(1) Install the power steering pressure hose into the engine compartment from the top. First, guide the pump end of the hose under the pump, then route the rest of the hose along the right side of the engine. Guide the gear end of the hose down behind the back of the engine towards the power steering gear.

(2) Using a lint free towel, wipe clean the open power steering hose end and the power steering

pump port. Replace the used O-ring with new. Lubricate the O-ring with power steering fluid.

(3) Attach the power steering fluid pressure hose to the outlet fitting on the bottom of the power steering pump (Fig. 7). Tighten the pressure hose tube nut to a torque of 34 N·m (25 ft. lbs.).

(4) Install the power steering fluid pressure hose in the routing clip and attach the clip to the right engine mount (Fig. 7). Tighten the hose routing clip bolt to a torque of 12 N·m (105 in. lbs.).

(5) Raise the vehicle.

**CAUTION:** The power steering fluid hoses must remain away from the exhaust system, vehicle components, and unfriendly surfaces that can cause possible damage to the power steering hoses.

(6) Using a lint free towel, wipe clean the open power steering hose end and the power steering gear port. Replace the used O-ring with new. Lubricate the O-ring with power steering fluid.

(7) Attach the power steering fluid pressure hose to the port on the power steering gear (Fig. 6). Start the tube nut threads into the gear, but do not tighten it at this time.

(8) Open the routing clips on the right side of the power steering gear and install the power steering fluid pressure hose into the routing clips. Close the clips.

(9) Tighten the pressure hose tube nut at the gear to a torque of 34 N·m (25 ft. lbs.).

(10) Lower the vehicle.

(11) Perform the POWER STEERING PUMP INITIAL OPERATION service procedure which can be found in the POWER STEERING PUMP section of this group to properly fill and bleed the power steering system.

(12) Check for leaks at all hose connections.

### POWER STEERING FLUID RETURN HOSE

**NOTE:** Before proceeding with this removal and installation procedure, review **SERVICE WARNINGS AND CAUTIONS** at the beginning of **REMOVAL AND INSTALLATION** in this section.

### REMOVAL

(1) Siphon as much fluid as possible from the power steering fluid reservoir.

(2) Raise the vehicle. Refer to **HOISTING** in the **LUBRICATION AND MAINTENANCE** group in this service manual for the correct lifting procedure.

(3) If the vehicle is equipped with a power steering fluid cooler, remove the hose clamp securing the return hose to the cooler. Slide the hose off the end of the cooler tube.

## REMOVAL AND INSTALLATION (Continued)

(4) If the vehicle is not equipped with a power steering fluid cooler:

- Remove the hose clamp securing the return hose to the steel fitting in the outlet port on the power steering gear (Fig. 6).
- Slide the hose off the end of the steel fitting.
- Pull the hose loose from the C-clamps on the two routing clips located on the front of the steering gear (Fig. 6).

(5) Lower the vehicle.

(6) Remove the bolt securing the hose routing clip in place on the right engine mount (Fig. 7). Remove the power steering fluid return hose from the routing clip.

(7) Remove the hose clamp securing the return hose to the power steering fluid reservoir (Fig. 7). Slide the hose off the end of the reservoir fitting.

(8) Remove the power steering return hose from the engine compartment.

## INSTALLATION

(1) Slide a hose clamp onto the power steering pump end of the hose far enough to clear the fitting on the power steering fluid reservoir once the hose is installed.

(2) Install the power steering return hose into the engine compartment from the top. First, guide the pump end of the hose onto the fitting on the power steering fluid reservoir, then route the rest of the hose along the right side of the engine (Fig. 7). Guide the gear end of the hose down behind the back of the engine towards the power steering gear.

(3) Expand the hose clamp and slide it onto the fluid reservoir fitting. Secure the clamp once it is past the bead formed into the fluid reservoir fitting.

(4) Install the power steering fluid return hose in the hose routing clip and attach the clip to the right engine mount (Fig. 7). Tighten the hose routing clip bolt to a torque of 12 N·m (105 in. lbs.).

(5) Raise the vehicle.

**CAUTION:** The power steering fluid hoses must remain away from the exhaust system, vehicle components, and unfriendly surfaces that can cause possible damage to the power steering hoses.

(6) Using a lint free towel, wipe clean the open power steering hose end and the power steering gear port fitting or power steering fluid cooler port.

(7) Install a hose clamp onto the end of the hose far enough to clear the fitting on the steering gear or cooler once the hose is installed.

(8) If the vehicle is equipped with a power steering fluid cooler, slide the hose onto the end of the cooler tube. Install the hose clamp past the bead formed into the cooler tube and secure in place.

(9) If the vehicle is not equipped with a power steering fluid cooler:

- Slide the hose onto the end of the steel fitting in the steering gear outlet port (Fig. 6).
- Install the hose clamp past the bead formed into the steel fitting and secure in place.
- Align and attach the hose to the C-clamps on the two routing clips located on the front of the steering gear (Fig. 6).

(10) Lower the vehicle.

(11) Perform the POWER STEERING PUMP INITIAL OPERATION service procedure which can be found in the POWER STEERING PUMP section of this group to properly fill and bleed the power steering system.

(12) Check for leaks at all hose connections.

## POWER STEERING FLUID COOLER

**NOTE:** Before proceeding with this removal and installation procedure, review SERVICE WARNINGS AND CAUTIONS at the beginning of REMOVAL AND INSTALLATION in this section.

## REMOVAL

(1) Siphon as much fluid as possible from the power steering fluid reservoir.

(2) Raise the vehicle. Refer to HOISTING in the LUBRICATION AND MAINTENANCE group in this service manual for the correct lifting procedure.

(3) Remove the hose clamp, attaching the power steering fluid return hose to the power steering fluid cooler. Remove the return hose from the cooler.

(4) Remove the hose clamp attaching the power steering cooler fluid hose to the steel fitting in the power steering gear outlet port (Fig. 8).

(5) Remove the two screws securing the cooler to the front suspension crossmember. They are located behind the cooler. They can be accessed from above.

(6) Open the routing clip on the right front of the power steering gear housing and remove the cooler tube from it.

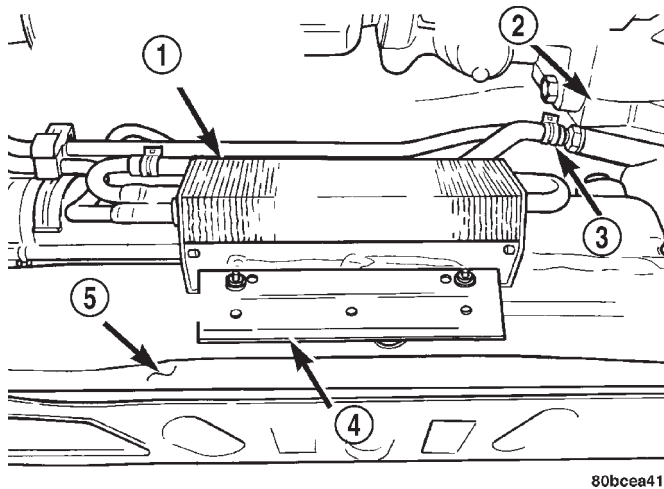
(7) Remove the cooler from the vehicle.

## INSTALLATION

(1) Slide a hose clamp onto the end of the power steering cooler fluid hose far enough to clear the steel fitting on the power steering gear once the hose is installed.

(2) Slide the hose (with cooler attached) onto the fitting on the steering gear, then align the tube on back of the cooler with the open routing clip on the right front of the power steering gear housing, and snap it into place. Close the clip.

## REMOVAL AND INSTALLATION (Continued)



**Fig. 8 Power Steering Fluid Cooler**

- 1 - POWER STEERING FLUID COOLER
- 2 - TRANSAXLE
- 3 - CLAMP
- 4 - AIR DAM
- 5 - CROSSMEMBER

(3) Install the hose clamp on the power steering cooler fluid hose past the bead formed into the steel fitting and secure in place.

(4) Install the two screws attaching the cooler to the front suspension crossmember. Tighten the cooler attaching screws to a torque of 10 N·m (90 in. lbs.).

(5) Install the power steering fluid return hose on the power steering fluid cooler tube. Install the hose clamp on the power steering return hose securing it to the power steering cooler. Be sure the hose clamp is installed on the return hose past the bead on the end of the cooler tube.

(6) Lower the vehicle.

(7) Perform the POWER STEERING PUMP INITIAL OPERATION service procedure which can be found in the POWER STEERING PUMP section of this group to properly fill and bleed the power steering system.

(8) Check for leaks at all connections.

## POWER STEERING FLUID PRESSURE SWITCH

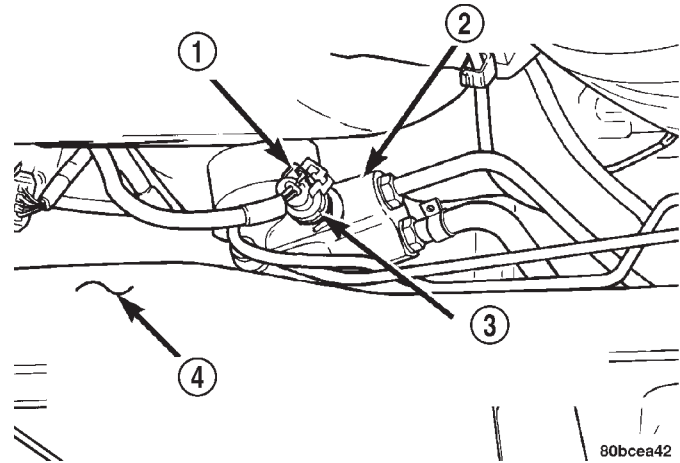
**NOTE:** Before proceeding with this removal and installation procedure, review **SERVICE WARNINGS AND CAUTIONS** at the beginning of **REMOVAL AND INSTALLATION** in this section.

### REMOVAL

(1) Disconnect negative battery cable from the negative post of the battery. Be sure cable is isolated from negative post on battery.

(2) Raise the vehicle. Refer to **HOISTING** in the **LUBRICATION AND MAINTENANCE** group in this service manual for the correct lifting procedure.

(3) Locate the power steering fluid pressure switch on the back side of the power steering gear (Fig. 9).



**Fig. 9 Switch Location**

- 1 - WIRING HARNESS CONNECTOR
- 2 - POWER STEERING GEAR
- 3 - POWER STEERING FLUID PRESSURE SWITCH
- 4 - REAR OF FRONT SUSPENSION CROSSMEMBER

(4) Remove the vehicle wiring harness connector from the power steering fluid pressure switch.

**NOTE:** When removing and installing the power steering pressure switch, use a 7/8 inch deep well socket. The deep well socket will prevent damage to the plastic electrical connector area of the power steering fluid pressure switch.

(5) Unscrew and remove the power steering fluid pressure switch from the power steering gear.

### INSTALLATION

(1) By hand, screw the power steering pressure switch into the power steering gear until it is fully seated (Fig. 9). Tighten the power steering pressure switch to a maximum torque of 8 N·m (70 in. lbs.). Over-torquing will result in stripping the threads out of the power steering pressure switch port in the steering gear.

(2) Install the vehicle wiring harness connector. Be sure the latch on the wiring harness connector is fully engaged with the locking tab on the power steering pressure switch.

(3) Lower the vehicle.

(4) Fill the power steering fluid reservoir to the correct fluid level. Use only Mopar® Power Steering Fluid, or equivalent.

(5) Connect the negative cable to the negative post of the battery.

REMOVAL AND INSTALLATION (Continued)

(6) Start the engine and turn the steering wheel several times stop-to-stop to bleed any air from the fluid in the power steering system. Stop the engine, check the fluid level, and inspect the system for leaks.

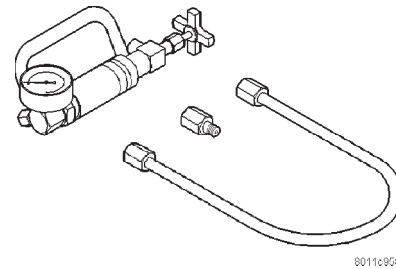
SPECIFICATIONS

POWER STEERING FASTENER TORQUE SPECIFICATIONS

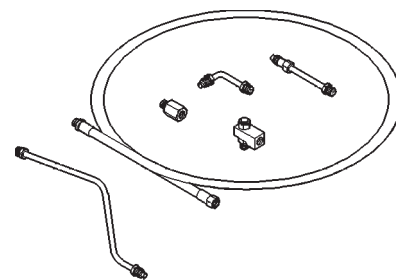
DESCRIPTION	TORQUE
<b>POWER STEERING HOSE:</b>	
Tube Nuts . . . . .	34 N·m (25 ft. lbs.)
Hose Routing Clip Bolt . . . . .	12 N·m (105 in. lbs.)
<b>POWER STEERING COOLER:</b>	
Mounting Screws . . . . .	10 N·m (90 in. lbs.)
<b>POWER STEERING FLUID PRESSURE SWITCH:</b>	
Switch . . . . .	8 N·m (70 in. lbs.)
<b>POWER STEERING PUMP:</b>	
Pressure Hose Tube Nut . . . . .	34 N·m (25 ft. lbs.)
Pressure Fitting . . . . .	88 N·m (65 ft. lbs.)
Front Mounting Bolts . . . . .	28 N·m (250 in. lbs.)
Rear Mounting Bolt . . . . .	28 N·m (250 in. lbs.)
Rear Support Bracket To Engine Bolts . . . . .	54 N·m (40 ft. lbs.)

SPECIAL TOOLS

POWER STEERING



*Power Steering Analyzer 6815*



*Adapters, Power Steering Analyzer 6893*

# POWER STEERING PUMP

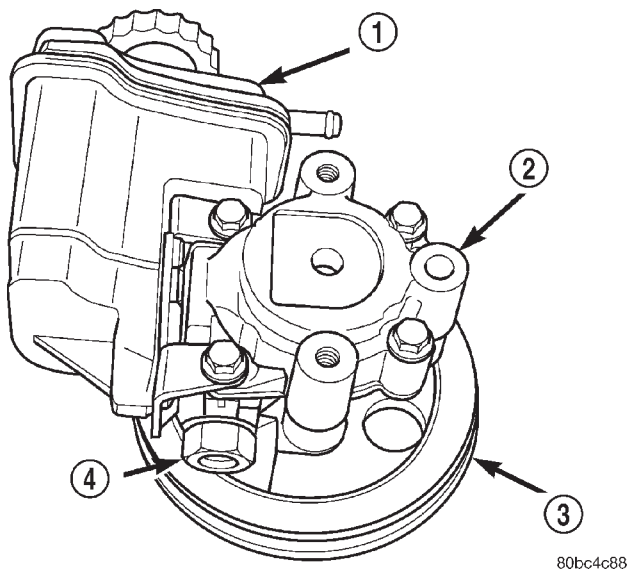
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## DESCRIPTION AND OPERATION

### POWER STEERING PUMP

The hydraulic pressure for operation of the power steering gear is provided by a belt driven power steering pump (Fig. 1) manufactured by TTA. The TTA power steering pump is a constant flow rate and displacement vane-type pump.



**Fig. 1 Power Steering Pump**

- 1 - POWER STEERING FLUID RESERVOIR
- 2 - POWER STEERING PUMP
- 3 - PULLEY
- 4 - PUMP PRESSURE FITTING

In the event of a power steering pump drive belt failure, manual steering control of the vehicle can still be maintained. However, under these conditions, steering effort will be significantly increased.

No repair procedures are to be done on the internal components of the power steering pump. The only serviceable components of the power steering pump are the power steering pump pulley and the pump itself. The power steering fluid reservoir is serviced with the pump.

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 all power steering pumps are 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 pump (Fig. 1). 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 hose.

Rectangular pumping vanes in the shaft driven rotor move power steering fluid from the intake to the cam ring pressure cavities of the power steering pump. As the rotor begins to turn, centrifugal 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, the 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.

As the high pressure area is filled, oil flows under the vanes in the rotor slots, forcing the vanes to follow the inside 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



## DESCRIPTION AND OPERATION (Continued)

reduces the power required to drive the pump and holds down temperature build-up.

When steering conditions exceed maximum pressure requirements, such as when the wheels are turned against the stops, the pressure built up in the steering gear exerts pressure on the spring end of the flow control valve. The 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 power steering pump operating conditions, pressure requirements of the pump are below maximum, causing the pressure relief valve to remain closed.

**POWER STEERING FLUID RESERVOIR**

The power steering fluid reservoir is mounted on the power steering pump using 3 bolts (Fig. 1). It stores fluid for the power steering system.

The power steering fluid reservoir is considered an integral part of the power steering pump and is not serviced separately.

**SERVICE PROCEDURES****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 over-fill.

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

- (1) Fill the power steering fluid reservoir to the proper level and let the fluid settle for at least two 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.

**REMOVAL AND INSTALLATION****SERVICE WARNINGS AND CAUTIONS**

**WARNING: POWER STEERING FLUID, ENGINE PARTS AND 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.**

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

**CAUTION:** When the system is open, cap all open ends of the hoses, power steering pump fittings or power steering gear ports to prevent entry of foreign material into the components.

**NOTE:** Do not use any type of automatic transmission fluid in the power steering system.

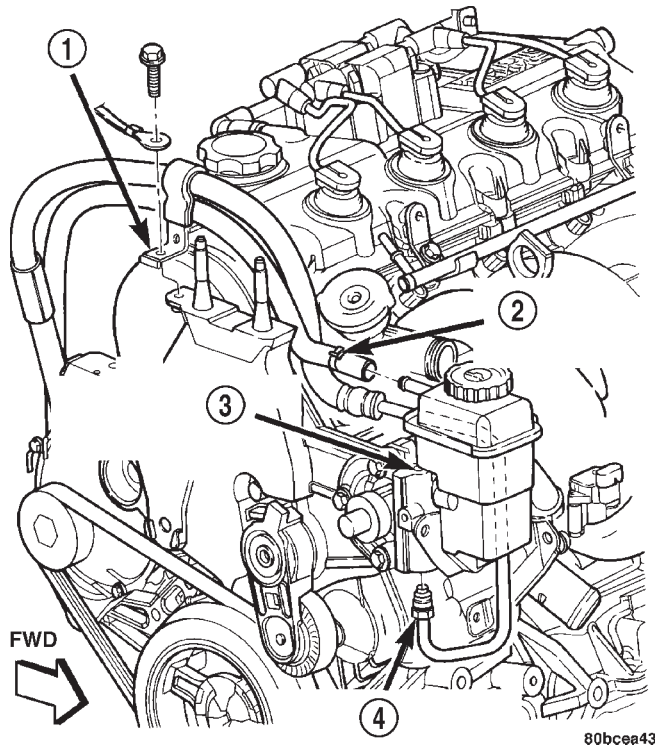
**POWER STEERING PUMP**

**NOTE:** Before proceeding with this removal and installation procedure, review **SERVICE WARNINGS AND CAUTIONS** at the beginning of **REMOVAL AND INSTALLATION** in this section.

**REMOVAL**

- (1) Remove battery cable from the negative post on the battery.
- (2) Siphon as much fluid as possible from the power steering fluid reservoir.
- (3) Remove the power steering pump drive belt from the power steering pump pulley. Refer to **ACCESSORY DRIVE BELTS** in the **COOLING SYSTEM** service manual group for the required removal and installation procedure.
- (4) Remove the hose clamp securing the return hose to the power steering fluid reservoir. Slide the hose off the end of the reservoir fitting. (Fig. 2).
- (5) Back out the tube nut securing the power steering fluid pressure hose to the power steering pump and remove the hose from the pump (Fig. 2).

## REMOVAL AND INSTALLATION (Continued)

**Fig. 2 Power Steering Hoses At Pump**

- 1 - HOSE ROUTING CLIP
- 2 - RETURN HOSE CLAMP
- 3 - POWER STEERING PUMP AND RESERVOIR
- 4 - PRESSURE HOSE TUBE NUT

(6) Remove the mounting bolt securing the support bracket to the rear of the power steering pump (Fig. 3).

(7) Loosen the two mounting bolts securing the support bracket to the engine block (Fig. 3).

(8) Remove the three mounting bolts holding the power steering pump to the cast bracket (Fig. 4). Access to the mounting bolts can be achieved through the holes in the pump pulley.

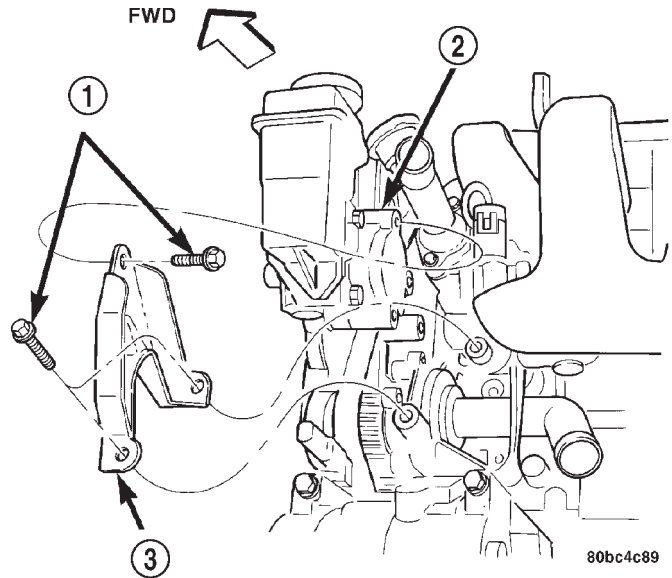
(9) Remove the power steering pump with reservoir from the engine.

(10) For removal and installation of the power steering pump pulley, refer to DISASSEMBLY AND ASSEMBLY in this section.

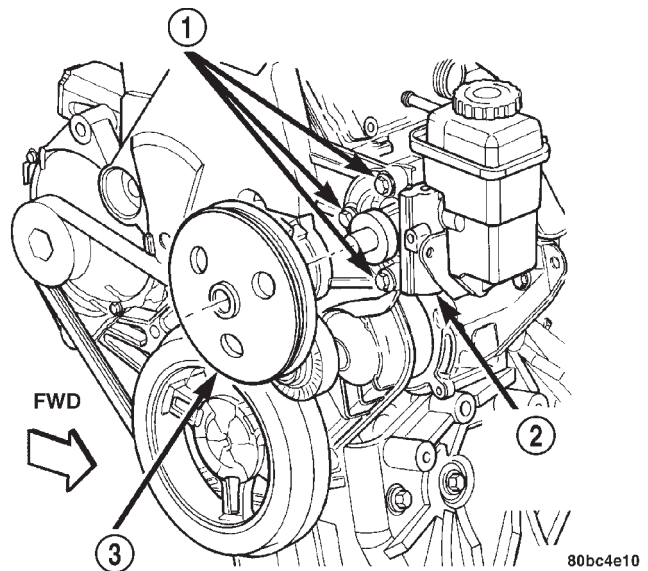
**INSTALLATION**

(1) Install the power steering pump with reservoir and pulley on the engine and install the three mounting bolts securing the pump to the cast bracket (Fig. 4). Tighten the three bolts to a torque of 28 N·m (250 in. lbs.).

(2) Install the mounting bolt securing the support bracket to the rear of the power steering pump (Fig. 3). Do not completely tighten the bolt at this time.

**Fig. 3 Power Steering Pump Support Bracket**

- 1 - MOUNTING BOLTS
- 2 - POWER STEERING PUMP
- 3 - SUPPORT BRACKET

**Fig. 4 Power Steering Pump Mounting Bolts**

- 1 - MOUNTING BOLTS
- 2 - POWER STEERING PUMP
- 3 - PULLEY

(3) Tighten the two mounting bolts securing the support bracket to the engine block (Fig. 3). Tighten the bolts to a torque of 54 N·m (40 ft. lbs.).

(4) Tighten the mounting bolt securing the support bracket to the rear of the power steering pump to a torque of 28 N·m (250 in. lbs.).

(5) Install the power steering pump drive belt on the power steering pump pulley. Refer to ACCES-

REMOVAL AND INSTALLATION (Continued)

SORY DRIVE BELTS in the COOLING SYSTEM service manual group for the required removal and installation procedure.

(6) Using a lint free towel, wipe clean all open power steering hose ends and power steering pump fittings.

(7) Install a new O-ring on the end of the power steering pressure hose. Lubricate the O-ring using clean power steering fluid.

(8) Attach the power steering fluid pressure hose to the pressure fitting on the lower end of the power steering pump (Fig. 2). Thread the tube nut securing the power steering fluid pressure hose into the power steering pump pressure fitting. Tighten the tube nut to at torque of 34 N-m (25 ft. lbs.).

(9) Slide the power steering fluid return hose onto the fluid reservoir fitting (Fig. 2). Position the hose clamp so it is installed on the hose past the bead formed into the fluid reservoir fitting.

(10) Perform the POWER STEERING PUMP INITIAL OPERATION service procedure found in this section of this group to properly fill and bleed the power steering system.

(11) Check for leaks.

DISASSEMBLY AND ASSEMBLY

POWER STEERING PUMP (PULLEY)

The only serviceable part of the power steering pump is the pulley. The following procedure is for the removal and installation of the pulley from the pump.

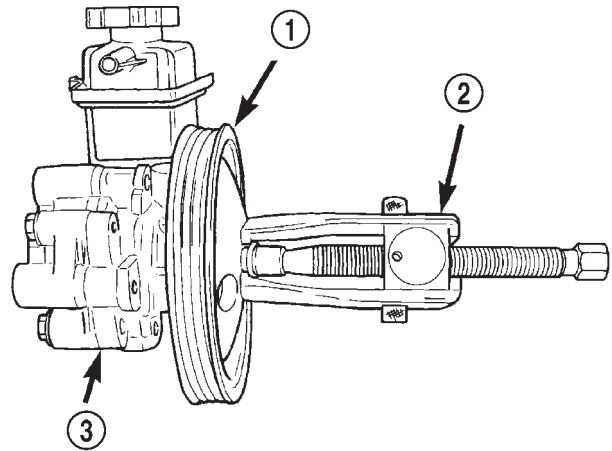
The power steering pump must be removed from the vehicle for power steering pump pulley service. Refer to POWER STEERING PUMP in REMOVAL AND INSTALLATION for the required procedure.

**CAUTION:** Use care when removing and installing the power steering pump pulley. It is made of plastic composite, except for the center shank. The special tools are to be used in the shank area only as described in the following procedure.

DISASSEMBLY

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

(1) Install Puller, Special Tool C-4333, or an equivalent, on the steering pump pulley as shown (Fig. 5). Tighten the puller screw drive and remove the pulley from the power steering pump shaft.



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Fig. 5 Pulley Removal

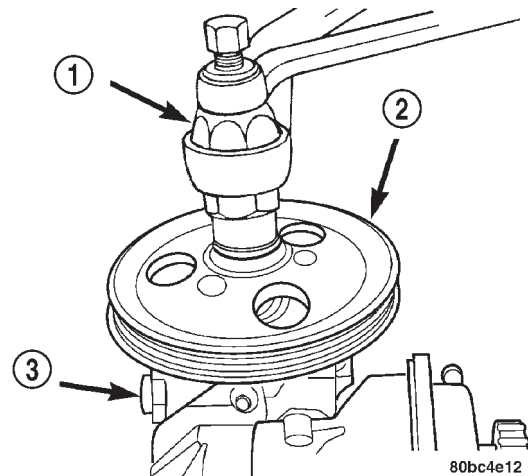
- 1 - PULLEY
- 2 - C-4333
- 3 - POWER STEERING PUMP

**NOTE:** Replace the power steering pump pulley if it is cracked or loose.

(2) Remove the puller from the power steering pump pulley.

ASSEMBLY

(1) Place the power steering pump pulley squarely on end of the power steering pump shaft. Mount Installer, Special Tool C-4063, or an equivalent, in the internal threads of the power steering pump shaft and against power steering pump pulley (Fig. 6).



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Fig. 6 Pulley Installation

- 1 - C-4063
- 2 - PULLEY
- 3 - POWER STEERING PUMP

DISASSEMBLY AND ASSEMBLY (Continued)

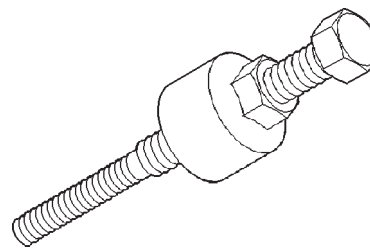
(2) Ensuring that the installer and the pulley remain aligned with pump shaft, turn the installer outer nut and force the pulley onto the power steering pump shaft until it is flush with the end of the pump shaft. Once the pulley is flush with the end of the shaft, the installer outer nut will no longer be able to turn.

(3) Remove the installer from the power steering pump.

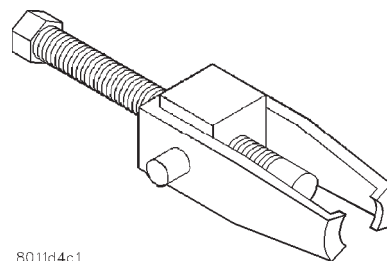
(4) Install the power steering pump back on the engine. Refer to POWER STEERING PUMP in REMOVAL AND INSTALLATION for the required procedure.

SPECIAL TOOLS

POWER STEERING PUMP



**Installer C-4063B**



8011d4c1

**Puller C-4333**

SPECIFICATIONS

POWER STEERING PUMP FLOW SPECIFICATIONS

**Power Steering Pump Flow:**

At 1500 RPM And Minimum

Pressure . . . 4.2 to 4.9 Liters/Min (1.1 to 1.3 GPM)

Control Valve Pressure

Relief . . . . . 9308 to 9998 kPa (1350 to 1450 psi)

POWER STEERING FASTENER TORQUE SPECIFICATIONS

<b>DESCRIPTION</b>	<b>TORQUE</b>
--------------------	---------------

**POWER STEERING HOSE:**

Tube Nuts . . . . . 34 N·m (25 ft. lbs.)

Hose Routing Clip Bolt . . . . . 12 N·m (105 in. lbs.)

**POWER STEERING COOLER:**

Mounting Screws . . . . . 10 N·m (90 in. lbs.)

**POWER STEERING FLUID PRESSURE SWITCH:**

Switch . . . . . 8 N·m (70 in. lbs.)

**POWER STEERING PUMP:**

Pressure Hose Tube Nut . . . . . 34 N·m (25 ft. lbs.)

Pressure Fitting . . . . . 88 N·m (65 ft. lbs.)

Front Mounting Bolts . . . . . 28 N·m (250 in. lbs.)

Rear Mounting Bolt . . . . . 28 N·m (250 in. lbs.)

Rear Support Bracket To Engine Bolts . . . 54 N·m

(40 ft. lbs.)

# STEERING GEAR

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## DESCRIPTION AND OPERATION

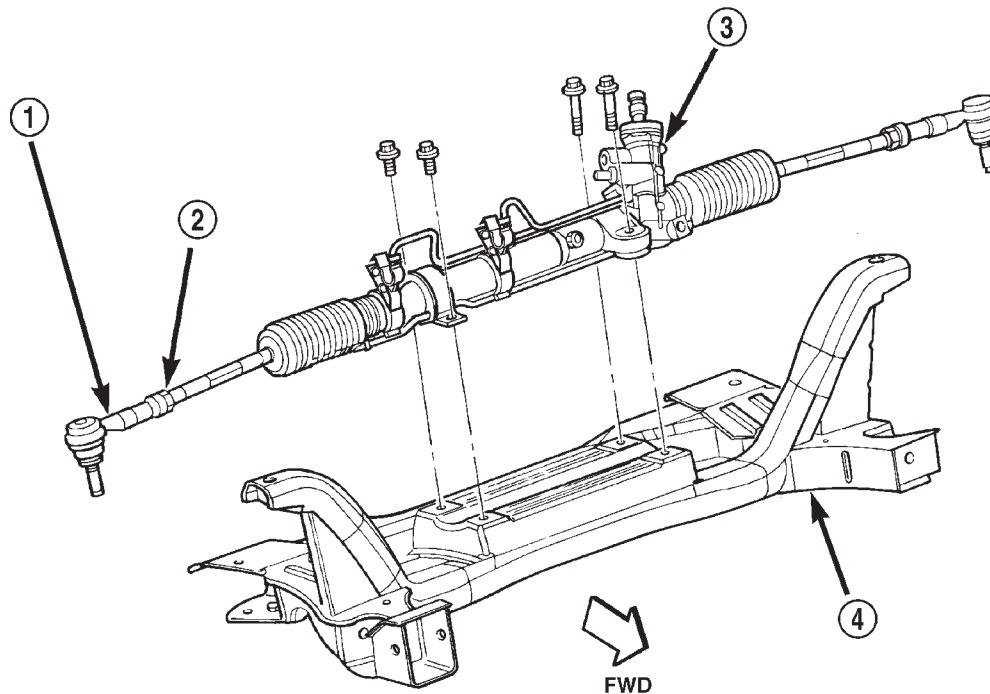
### POWER STEERING GEAR

The power steering gear is mounted on the front suspension crossmember (Fig. 1). The outer ends of the outer tie rods attach to the steering knuckles.

The power steering gear operates as follows: Turning of the steering wheel is converted into linear travel through the meshing of the helical pinion teeth with the rack teeth of the gear. Power assist steering is provided by a pump supplying fluid to either side of the integral rack piston.

Road feel is controlled by the diameter of a torsion bar which initially steers the vehicle. This movement directs oil behind the integral rack piston, which, in turn, builds up hydraulic pressure and assists in the turning effort.

The drive tangs on the pinion of the power steering gear mate loosely with a stub shaft. This is 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.



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**Fig. 1 Power Steering Gear**

- 1 - OUTER TIE ROD
- 2 - JAM NUT

- 3 - STEERING GEAR
- 4 - FRONT SUSPENSION CROSSMEMBER

## DESCRIPTION AND OPERATION (Continued)

**NOTE:** The power steering gear should not be serviced or adjusted. If a malfunction or oil leak occurs with the steering gear, the complete steering gear needs to be replaced.

## REMOVAL AND INSTALLATION

## SERVICE WARNINGS AND CAUTIONS

**WARNING: POWER STEERING FLUID, ENGINE PARTS AND 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.**

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

**CAUTION:** When the system is open, cap all open ends of the hoses, power steering pump fittings or power steering gear ports to prevent entry of foreign material into the components.

**NOTE:** Do not use any type of automatic transmission fluid in the power steering system.

## POWER STEERING GEAR

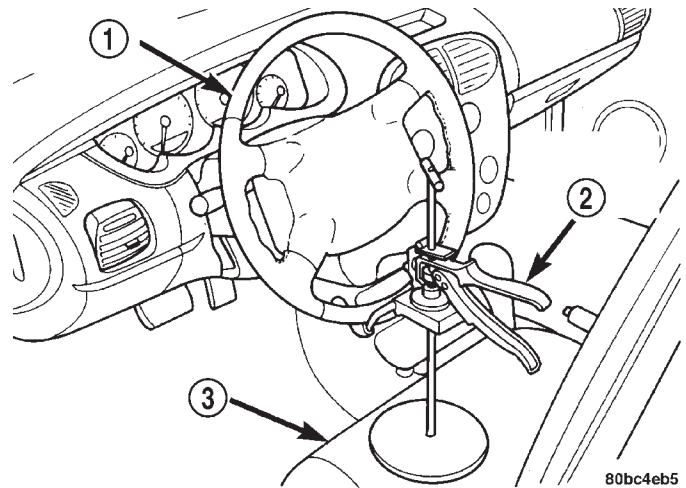
**NOTE:** Before proceeding with this removal and installation procedure, review **SERVICE WARNINGS AND CAUTIONS** at the beginning of **REMOVAL AND INSTALLATION** in this section.

## REMOVAL

(1) Place the steering wheel in the STRAIGHT-AHEAD position. Using a steering wheel holder, lock the steering wheel in place to keep it from rotating (Fig. 2). This keeps the clockspring in the proper orientation.

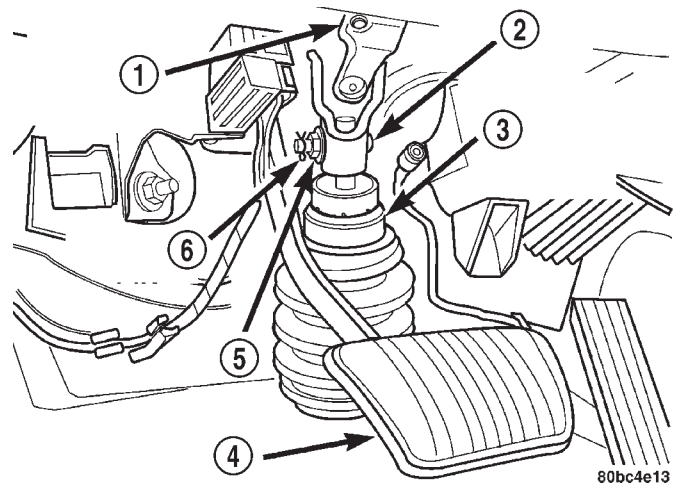
(2) Inside the passenger compartment, remove the steering column coupling retainer pin, back off the pinch bolt nut, and remove the steering column coupling pinch bolt (Fig. 3) (the pinch bolt nut is caged to the coupling and is not removable). Separate the upper and lower steering column couplings.

(3) Raise the vehicle. Refer to **HOISTING** in the **LUBRICATION AND MAINTENANCE** group in this service manual for the correct lifting procedure.



**Fig. 2 Steering Wheel Holder**

- 1 - STEERING WHEEL
- 2 - STEERING WHEEL HOLDER
- 3 - DRIVERS SEAT



**Fig. 3 Steering Column Couplings**

- 1 - STEERING COLUMN UPPER COUPLING
- 2 - PINCH BOLT
- 3 - STEERING COLUMN LOWER COUPLING
- 4 - BRAKE PEDAL
- 5 - NUT
- 6 - RETAINER PIN

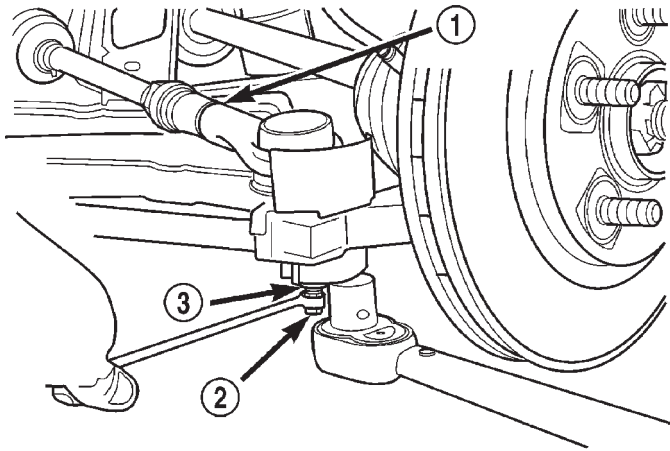
(4) Remove both front tire and wheel assemblies from the vehicle.

(5) Remove nuts attaching both outer tie rods to the steering knuckles (Fig. 4). Remove each nut by holding the tie rod stud stationary while loosening and removing the nut with a wrench.

(6) Remove the outer tie rod from the steering knuckles using Remover, Special Tool MB991113 (Fig. 5).

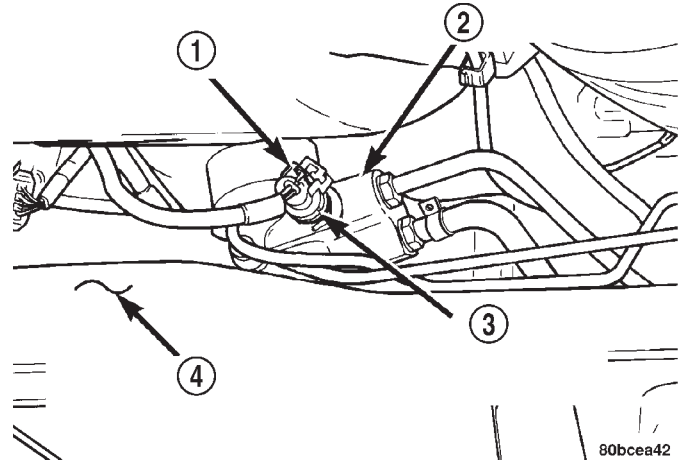
(7) Remove the tie rod heat shield.

REMOVAL AND INSTALLATION (Continued)



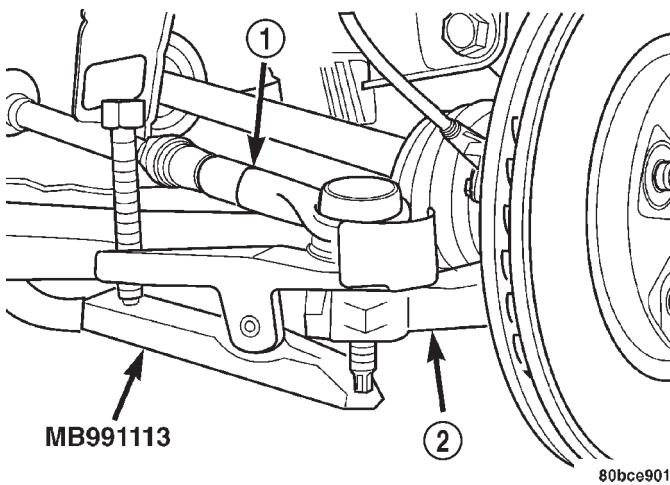
**Fig. 4 Tools On Outer Tie Rod Nut**

- 1 - OUTER TIE ROD
- 2 - STUD
- 3 - NUT



**Fig. 6 Power Steering Fluid Pressure Switch**

- 1 - WIRING HARNESS CONNECTOR
- 2 - POWER STEERING GEAR
- 3 - POWER STEERING FLUID PRESSURE SWITCH
- 4 - REAR OF FRONT SUSPENSION CROSSMEMBER



**Fig. 5 Tie Rod Removal From Knuckle**

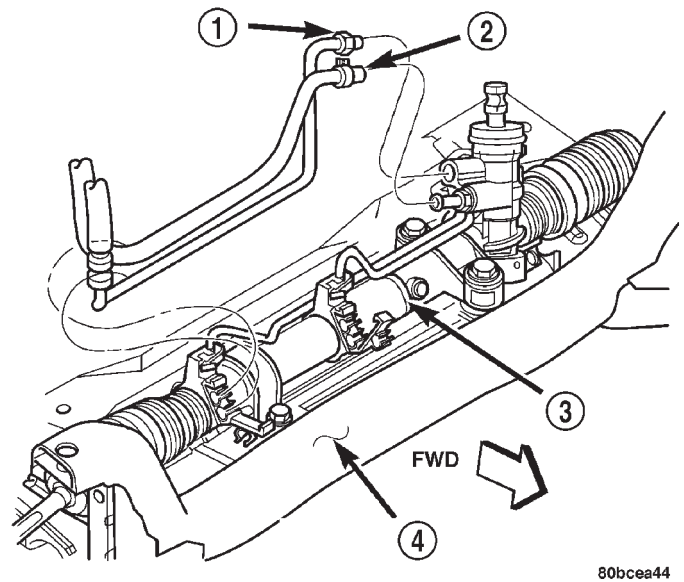
- 1 - OUTER TIE ROD
- 2 - STEERING KNUCKLE

(8) Release the locking tab on the wiring harness connector for the power steering fluid pressure switch before connector removal. Remove the wiring harness connector from the power steering fluid pressure switch (Fig. 6).

(9) Back out the tube nut securing the power steering fluid pressure hose to the gear (Fig. 7).

(10) On vehicles without a power steering fluid cooler, loosen the clamp, then disconnect the power steering fluid return hose from the gear. If the vehicle is equipped with a power steering fluid cooler, disconnect the cooler hose from the gear in place of the power steering fluid return hose.

(11) If the vehicle is not equipped with a power steering cooler, remove the power steering return



**Fig. 7 Power Steering Hoses At Gear**

- 1 - PRESSURE HOSE TUBE NUT
- 2 - RETURN HOSE
- 3 - POWER STEERING GEAR
- 4 - FRONT SUSPENSION CROSSMEMBER

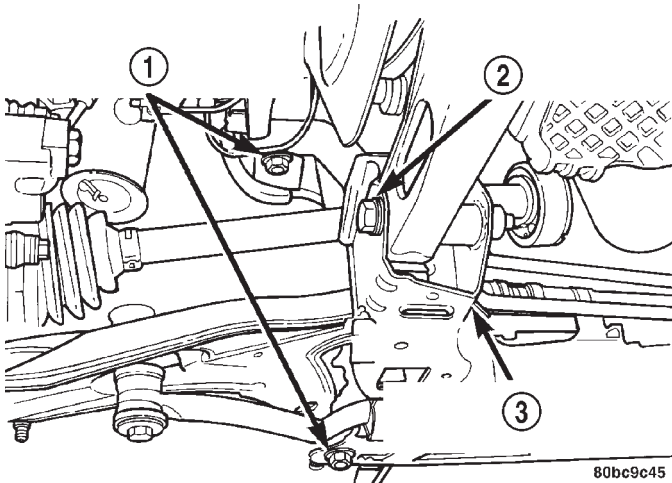
hose from the C-clamps on the outside of the two routing clips on the front of the power steering gear.

(12) Open the routing clips on the front of the power steering gear and remove the power steering fluid pressure hose from the routing clips. At the same time, if the vehicle is equipped with a power steering cooler, remove the cooler tube from the right routing clip.

## REMOVAL AND INSTALLATION (Continued)

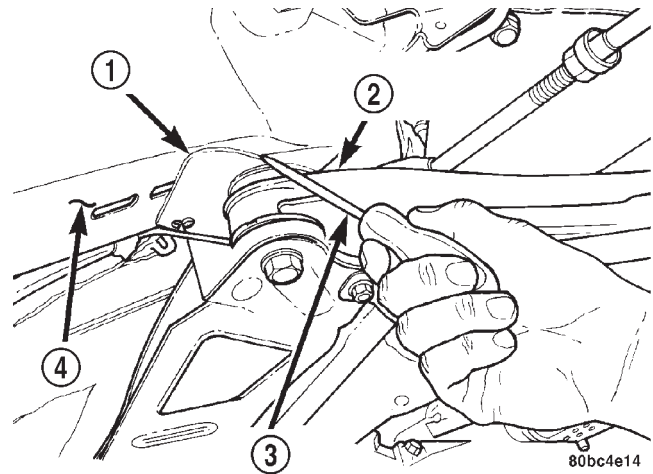
(13) If the vehicle is equipped with a power steering fluid cooler, remove the two screws securing the cooler to the front suspension crossmember. They are located behind the cooler and can be accessed from above. Allow the cooler to hang out of the way.

(14) Remove the bolt mounting the engine torque strut to the right forward corner of the front suspension crossmember (Fig. 8).



**Fig. 8 Mounting Bolts**

- 1 - FRONT SUSPENSION CROSSMEMBER MOUNTING BOLTS
- 2 - ENGINE TORQUE ISOLATOR STRUT MOUNTING BOLT
- 3 - FRONT SUSPENSION CROSSMEMBER



**Fig. 9 Marking Crossmember Location**

- 1 - SCRIBED LINE
- 2 - FRONT SUSPENSION CROSSMEMBER
- 3 - AWL
- 4 - BODY

**NOTE:** Before removing the front suspension crossmember from the vehicle, the location of the crossmember must be scribed on the body of the vehicle (Fig. 9). Do this so that the crossmember can be relocated upon reinstallation against the body of vehicle in the same location as before removal. If the front suspension crossmember is not reinstalled in exactly the same location as before removal, the preset front wheel alignment settings (caster and camber) will be lost.

(15) Using an awl, scribe a line (Fig. 9) marking the location of where the front suspension crossmember is mounted against the body of the vehicle.

(16) Position a transmission jack under the center of the front suspension crossmember and raise it to support the bottom of the crossmember.

(17) Loosen and completely remove the two front bolts (one right and one left) attaching the front suspension crossmember to the frame rails of vehicle. The right side bolt can be viewed in the mounting bolt figure (Fig. 8). The left side bolt is located in the same location on the other side of the vehicle.

(18) Loosen the two rear bolts (one right and one left) attaching the front suspension crossmember and lower control arms to the body of the vehicle until they release from the threaded tapping plates in the body of the vehicle. Do not completely remove the rear bolts because they are designed to disengage from the body threads yet stay within the lower control arm rear isolator bushing. This allows the lower control arm to stay in place on the crossmember. The right side bolt can be viewed in the mounting bolt figure (Fig. 8). The left side bolt is located in the same location on the other side of the vehicle.

(19) Lower the front suspension crossmember using the transmission jack enough to allow the power steering gear to be removed from the rear of the crossmember (Fig. 10). When lowering front suspension crossmember, do not let crossmember hang from lower control arms. The weight should be supported by the transmission jack.

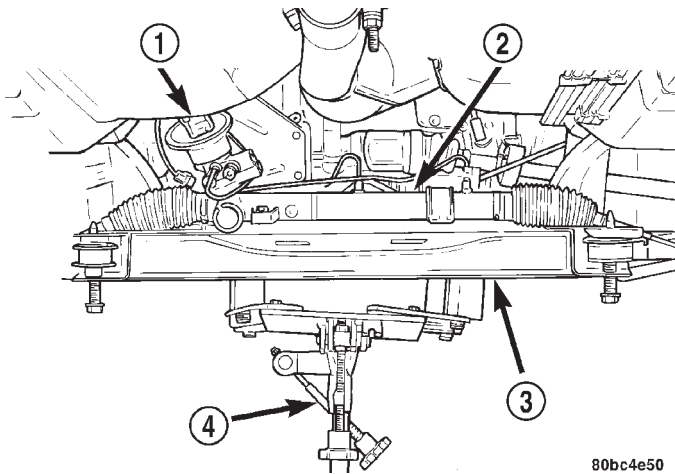
(20) Remove the roll pin securing the steering column lower coupling to the power steering gear pinion shaft using a roll pin punch (Fig. 11). Push the steering column lower coupling up and off of the power steering gear pinion shaft.

(21) Release the pinion shaft dash cover seal from the tabs cast into the power steering gear housing and remove the seal from the power steering gear (Fig. 12).

(22) Loosen and remove the four bolts attaching the power steering gear to the front suspension crossmember (Fig. 1). Remove the power steering gear from the front suspension crossmember.



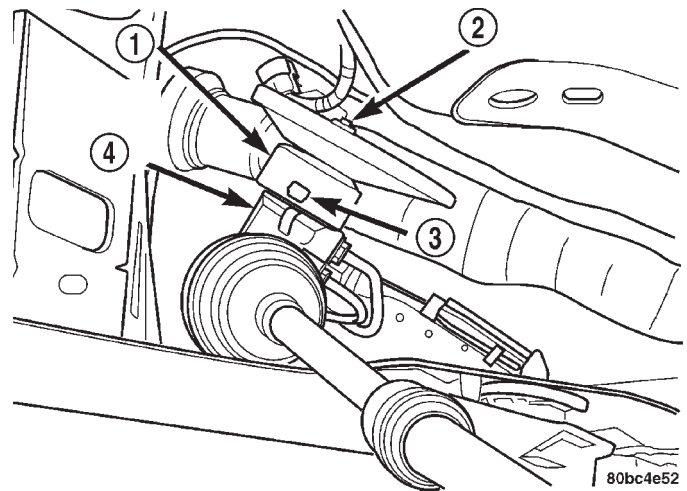
REMOVAL AND INSTALLATION (Continued)



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**Fig. 10 Crossmember Lowered**

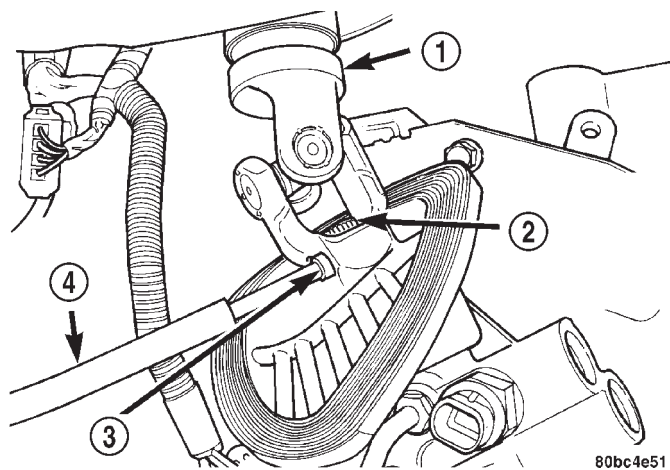
- 1 - STEERING COLUMN LOWER COUPLING
- 2 - POWER STEERING GEAR
- 3 - FRONT SUSPENSION CROSSMEMBER
- 4 - TRANSMISSION JACK



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**Fig. 12 Pinion Shaft Dash Cover Seal**

- 1 - SEAL
- 2 - PINION SHAFT
- 3 - TAB
- 4 - POWER STEERING GEAR



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**Fig. 11 Coupling Roll Pin**

- 1 - STEERING COLUMN LOWER COUPLING
- 2 - POWER STEERING GEAR PINION SHAFT
- 3 - ROLL PIN
- 4 - ROLL PIN PUNCH

**INSTALLATION**

(1) Install the steering gear on the front suspension crossmember (Fig. 1). Install the four power steering gear mounting bolts. Tighten the mounting bolts to a torque of 61 N·m (45 ft. lbs.).

(2) Install the pinion shaft dash cover seal over the power steering pinion shaft and onto the power steering gear housing. Align the holes on each side of the seal with the tabs cast into the power steering gear housing (Fig. 12).

(3) With the steering column lower coupling pushed partway up through its hole in the dash panel, match the flat on the inside of the steering

column lower coupling to the flat on the power steering gear pinion shaft and slide the coupling onto the top of the pinion shaft. Align the roll pin hole in the coupling with the groove in the pinion shaft and install the roll pin through the coupling until it is centered (Fig. 11).

(4) Center the power steering gear rack in its travel.

(5) Using the transmission jack, raise the front suspension crossmember and power steering gear until the crossmember contacts its mounting spot against the body and frame rails of the vehicle. As the crossmember is raised, carefully guide the steering column lower coupling up through its hole in the dash panel.

(6) Start the two rear crossmember mounting bolts into the tapping plates mounted in the body. The right side bolt can be viewed in the mounting bolt figure (Fig. 8). The left side bolt is located in the same location on the other side of the vehicle. Next, install the two front mounting bolts attaching front suspension crossmember to frame rails of vehicle. Lightly tighten all four mounting bolts to a approximately 2 N·m (20 in. lbs.) to hold the front suspension crossmember in position.

**NOTE:** When reinstalling the front suspension crossmember back in the vehicle, it is very important that the crossmember be attached to the body in exactly the same spot as when it was removed. Otherwise, the vehicle's wheel alignment settings (caster and camber) will be lost.

## REMOVAL AND INSTALLATION (Continued)

(7) Using a soft face hammer, tap the front suspension crossmember back-and-forth or side-to-side until it is aligned with the previously scribed positioning marks on the body of the vehicle (Fig. 9). Once the front suspension crossmember is correctly positioned, tighten the rear two crossmember (and rear lower control arm) mounting bolts to a torque of 203 N·m (150 ft. lbs.), then tighten the front two crossmember mounting bolts to a torque of 142 N·m (105 ft. lbs.).

(8) Fasten the engine torque strut to the right forward corner of the front suspension crossmember using its mounting bolt (Fig. 8). Follow the procedure described in the ENGINE service manual group to properly align and tighten the torque strut and its mounting bolts.

(9) Using a lint free towel, wipe clean the open power steering hose ends and the power steering gear ports. Replace the pressure hose used O-ring with new. Lubricate the O-ring with power steering fluid.

(10) Attach the power steering fluid pressure hose to its port on the power steering gear (Fig. 7). Start the tube nut threads into the gear, but do not tighten them at this time. On vehicles equipped with a power steering fluid cooler, reconnect the cooler line to the gear in place of the power steering fluid return hose.

(11) Open the routing clips on the front of the steering gear housing and install the power steering fluid pressure hose into the routing clips.

(12) On vehicles equipped with a power steering fluid cooler, place the cooler in mounting position and snap the cooler tube going to the gear into the right routing clip.

(13) Close both routing clips.

(14) Tighten the power steering fluid pressure hose tube nut at the gear to a torque of 34 N·m (25 ft. lbs.).

(15) If the vehicle is equipped with a power steering fluid cooler, install the two screws securing the cooler to the front suspension crossmember. They are located behind the cooler.

(16) On vehicle's with a power steering fluid cooler, place the hose clamp on the hose far enough from the end to clear the steel fitting on the gear. Do the same for the fluid return hose on a vehicle that is not equipped with a cooler.

(17) Push either hose listed in the above step onto the steel fitting, then move and secure the clamp on the hose past the bead on the steel fitting in the steering gears outlet port (Fig. 7).

(18) Route the fluid return hose along the front of the steering gear, clipping it into place in the C-clamps on the outside of the routing clips on the front of the power steering gear housing.

(19) Reconnect the wiring harness connector from the power steering fluid pressure switch (Fig. 6). Be

sure the locking tab on the wiring harness connector is securely latched.

(20) Perform the following to each outer tie rod:

- Place the tie rod heat shield on the knuckle's steering arm, aligning the hole in the shield with the hole in the knuckle and the tangs on the outside of the shield with the outside configuration of the steering arm. The shield should now be facing outboard, away from the power steering gear and tie rod (Fig. 4).

- Attach the outer tie rod end to its steering knuckle.

- Start the attaching nut onto the stud of the outer tie rod.

- While holding the stud of the tie rod stationary with a wrench, tighten the attaching nut (Fig. 4).

- Using a crowfoot wrench attached to a torque wrench, tighten the attaching nut to 55 N·m (40 ft. lbs.).

(21) Install the tire and wheel assemblies back on vehicle. Tighten the wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(22) Lower the vehicle to ground level.

(23) Install the dash-to-lower coupling seal in place over the lower coupling's plastic collar.

**NOTE: Verify that grease is present on the lip of the dash-to-coupling seal where it contacts the coupling's plastic collar.**

(24) Inside the passenger compartment, reconnect the steering column lower coupling to the steering column upper coupling (Fig. 3). Install the coupling pinch bolt and tighten the pinch bolt nut to a torque of 28 N·m (250 in. lbs.). Install the pinch bolt retainer pin.

(25) Remove the steering wheel holder.

(26) While looking under the instrument panel at the lower coupling, rotate the steering wheel back-and-forth to verify that the lower coupling does not squeak against the dash-to-coupling seal.

(27) Perform the POWER STEERING PUMP INITIAL OPERATION service procedure which can be found in the POWER STEERING PUMP section of this group to properly fill and bleed the power steering system.

(28) Check for fluid leaks.

(29) Adjust the front toe setting on the vehicle. Refer to WHEEL ALIGNMENT in the SUSPENSION service manual group.

## OUTER TIE ROD

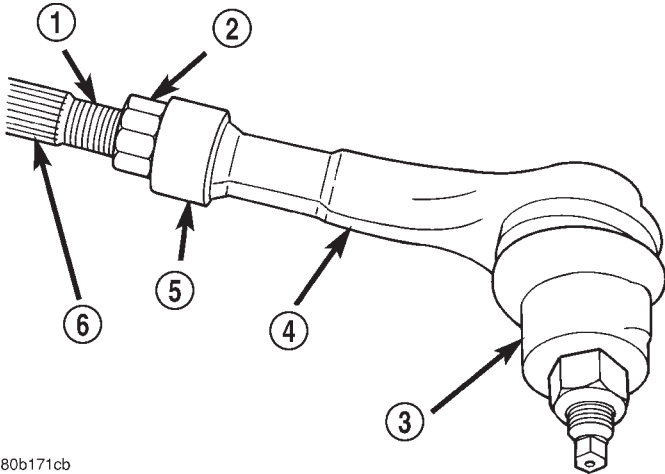
### REMOVAL

(1) Raise the vehicle. Refer to HOISTING in the LUBRICATION AND MAINTENANCE group in this service manual for the correct lifting procedure.

REMOVAL AND INSTALLATION (Continued)

(2) Remove the tire and wheel assembly from the vehicle.

(3) Loosen tie rod jam nut (Fig. 13). Thread the jam nut far enough up the inner tie rod to pull the collar away from the outer tie rod end. Pull the collar off the end of the outer tie rod.

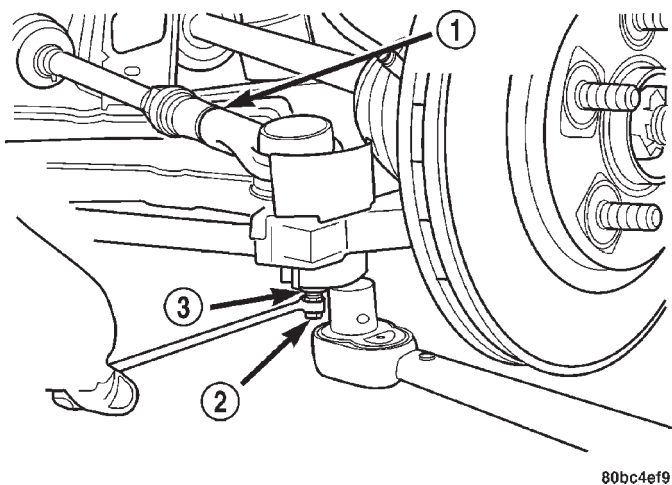


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**Fig. 13 Outer Tie Rod**

- 1 - INNER TIE ROD
- 2 - OUTER TIE ROD JAM NUT
- 3 - STEERING KNUCKLE
- 4 - OUTER TIE ROD END
- 5 - COLLAR
- 6 - INNER TIE ROD SERRATION

(4) Remove the nut attaching the outer tie rod end to steering knuckle (Fig. 14). Remove the nut by holding the tie rod stud stationary while loosening and removing the nut with a wrench.

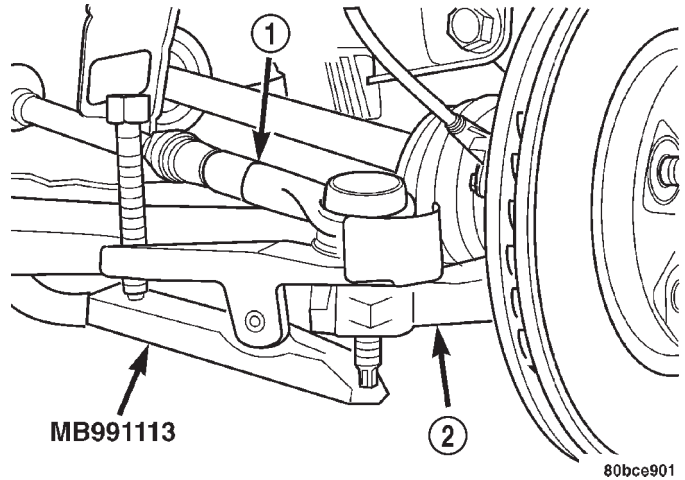


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**Fig. 14 Tools On Outer Tie Rod Nut**

- 1 - OUTER TIE ROD
- 2 - STUD
- 3 - NUT

(5) Remove the outer tie rod from the steering knuckle using Remover, Special Tool MB991113 (Fig. 15).



MB991113

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**Fig. 15 Tie Rod Removal From Knuckle**

- 1 - OUTER TIE ROD
- 2 - STEERING KNUCKLE

(6) Remove the tie rod heat shield.  
 (7) Remove the outer tie rod from the inner tie rod by unthreading it.

**INSTALLATION**

(1) Install the jam nut on the inner tie rod threads if it is not already installed (Fig. 13).

**NOTE:** Be sure the collar is installed on the inner tie rod with the flat end of the collar against jam nut and the open end of the collar facing the outer tie rod end.

- (2) Install the collar on the inner tie rod (Fig. 13).
- (3) Thread the outer tie rod onto the inner tie rod.
- (4) Position the collar around the end of the outer tie rod (Fig. 13).
- (5) Thread the jam nut down the inner tie rod far enough to hold the collar in place on the outer tie rod. Do not tighten the jam nut.
- (6) Place the tie rod heat shield on the knuckle's steering arm, aligning the hole in the shield with the hole in the knuckle and the tangs on the outside of the shield with the outside configuration of the steering arm. The shield should now be facing outboard, away from the power steering gear and tie rod (Fig. 14).
- (7) Attach the outer tie rod end to the steering knuckle.
- (8) Start the attaching nut onto the stud of the outer tie rod.

## REMOVAL AND INSTALLATION (Continued)

(9) While holding the stud of the tie rod stationary with a wrench, tighten the attaching nut (Fig. 14).

(10) Using a crowfoot wrench attached to a torque wrench, tighten the attaching nut to 75 N·m (55 ft. lbs.).

(11) Install the tire and wheel assembly.

(12) Lower the vehicle.

(13) Adjust the front toe setting on the vehicle. Refer to WHEEL ALIGNMENT in the SUSPENSION service manual group.

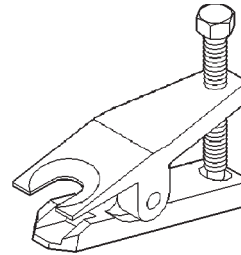
## SPECIFICATIONS

## POWER STEERING GEAR FASTENER TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
<b>FRONT SUSPENSION CROSSMEMBER:</b>	
Front Mounting Bolts . . . . .	142 N·m (105 ft. lbs.)
Rear Mounting Bolts . . . . .	203 N·m (150 ft. lbs.)
<b>STEERING GEAR:</b>	
Mounting Bolts . . . . .	61 N·m (45 ft. lbs.)
<b>OUTER TIE ROD:</b>	
Steering Knuckle Nut . . . . .	55 N·m (40 ft. lbs.)
Tie Rod Jam Nut . . . . .	75 N·m (55 ft. lbs.)
<b>POWER STEERING HOSE:</b>	
Tube Nuts . . . . .	34 N·m (25 ft. lbs.)

## SPECIAL TOOLS

## POWER STEERING GEAR



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**Remover MB991113**

# STEERING COLUMN

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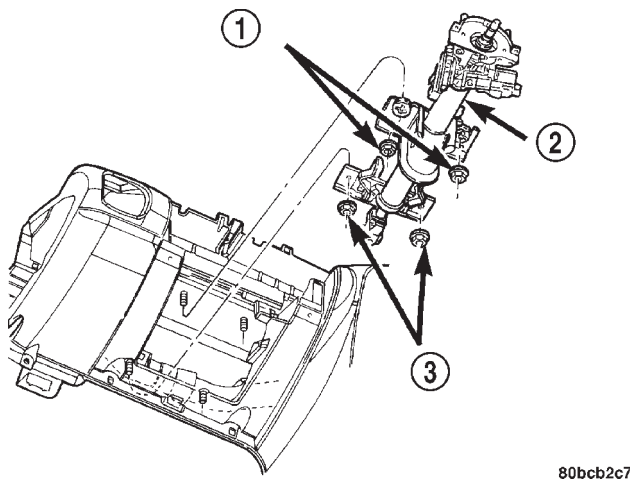
## DESCRIPTION AND OPERATION

### STEERING COLUMN

This vehicle is equipped with both tilt and non-tilt steering columns. Both steering columns have been designed to be serviced only as complete assemblies if an internal component is found to be defective (Fig. 1). The shaft, bearings and upper coupling are all serviced with the column.

- the trim shrouds
- the steering wheel
- the driver airbag module

These components can be serviced without removal of the steering column from the vehicle. Refer to the appropriate group and section of this service manual for servicing these components separately.



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**Fig. 1 Steering Column**

- 1 - UPPER MOUNTING NUTS
- 2 - STEERING COLUMN
- 3 - LOWER MOUNTING NUTS

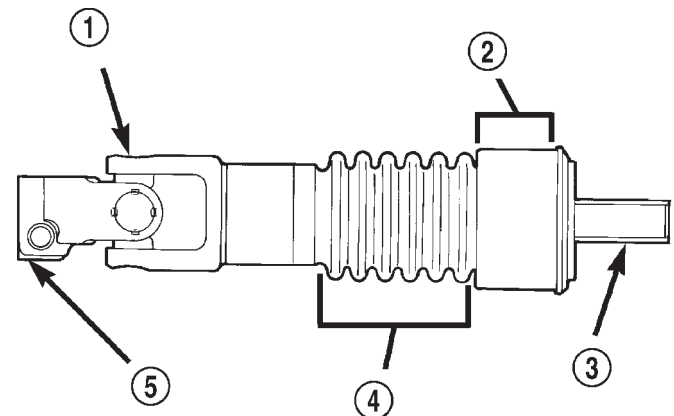
The replaceable components on the steering column assembly are:

- the key cylinder
- the ignition switch
- the multi-function switch
- the clockspring

### STEERING COLUMN LOWER COUPLING

This vehicle uses a corrugated design lower coupling to connect the steering column to the steering gear (Fig. 2).

This coupling has a hollow corrugated tube that allows the coupling to bend rather than collapse when a vehicle is involved in a collision.



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**Fig. 2 Steering Column Lower Coupling**

- 1 - FLEX JOINT
- 2 - SEAL COLLAR SEALING SURFACE
- 3 - TO STEERING COLUMN
- 4 - CORRUGATED TUBE SECTION
- 5 - TO STEERING GEAR

## DIAGNOSIS AND TESTING

### STEERING COLUMN

For diagnosis of conditions relating to the steering column, refer to the STEERING SYSTEM DIAGNOSIS CHARTS in DIAGNOSIS AND TESTING in the POWER STEERING section of this service manual group.

### STEERING COLUMN LOWER COUPLING

The steering column coupling must be inspected whenever a vehicle is involved in an impact or whenever any of the following conditions exist:

- whenever a vehicle is involved in a collision which deploys the air bag, regardless of the extent of damage done to the vehicle.
- if a vehicle is involved in an impact of the vehicle's front suspension or under carriage, which results in any type of damage to the front suspension cross-member.
- under any conditions which result in the steering column assembly or steering column shaft receiving a force great enough to move the steering column or shaft forward or rearward in a vehicle.

### STEERING COLUMN COUPLING INSPECTION PROCEDURE

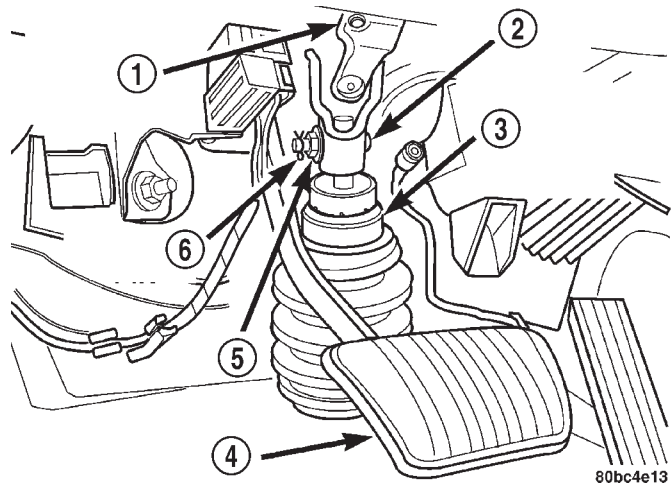
(1) Place the steering wheel in the STRAIGHT-AHEAD position. Using a steering wheel holding clamp, lock the steering wheel in place to keep it from rotating. This keeps the clockspring in the proper orientation.

(2) Inside the passenger compartment, remove the steering column coupling retainer pin, back off the pinch bolt nut, and remove the steering column coupling pinch bolt (Fig. 3) (the pinch bolt nut is caged to the coupling and is not removable). Separate the upper and lower steering column couplings.

(3) Remove the silencer seal enclosing the steering column coupling (Fig. 4).

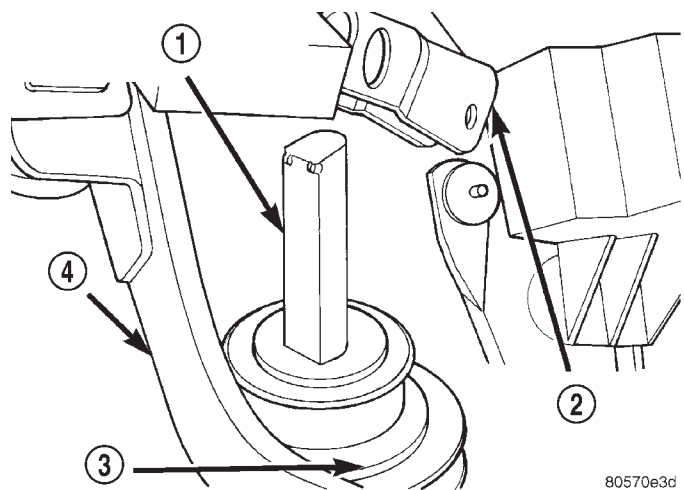
(4) Inspect steering column lower coupling in the following areas for signs of damage:

- Inspect the sealing collar on the lower coupling (Fig. 5) to ensure it is not cracked, broken, or otherwise damaged requiring coupling replacement.
  - Inspect the corrugated section (Fig. 5) of the lower coupling for the following conditions or any other visible signs of damage.
    - Uneven spacing between the corrugations on the coupling.
    - Dings or dents in the corrugations of the coupling or anywhere else on the coupling wall.
    - A bend in the corrugated section of the coupling.
    - Inspect the lower coupling flex joint for binding.
- If any of the preceding conditions exist, the steering column lower coupling must be replaced.



**Fig. 3 Steering Column Couplings**

- 1 - STEERING COLUMN UPPER COUPLING
- 2 - PINCH BOLT
- 3 - STEERING COLUMN LOWER COUPLING
- 4 - BRAKE PEDAL
- 5 - NUT
- 6 - RETAINER PIN



**Fig. 4 Steering Column Coupling Seal**

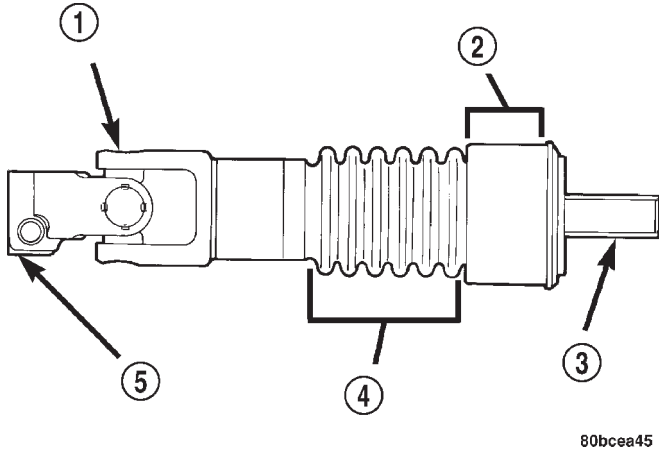
- 1 - LOWER STEERING COLUMN COUPLER
- 2 - UPPER STEERING COLUMN SHAFT COUPLER
- 3 - SILENCER SEAL
- 4 - BRAKE PEDAL

Inspect the steering column upper coupling for damage or binding. If the upper coupling needs to be replaced, the steering column must be replaced.

**NOTE:** Verify that grease is present on the lip of the dash-to-coupling seal where it contacts the lower coupling's plastic collar.

(5) If the lower coupling does not require replacement, install the dash panel-to-steering column coupling silencer seal (Fig. 4) back on the vehicle.

DIAGNOSIS AND TESTING (Continued)



**Fig. 5 Lower Coupling Inspection**

- 1 - FLEX JOINT
- 2 - SEAL COLLAR SEALING SURFACE
- 3 - TO STEERING COLUMN
- 4 - CORRUGATED TUBE SECTION
- 5 - TO STEERING GEAR

**NOTE:** Do not tighten the coupling pinch bolt anytime the vehicle is not at curb riding height. It may cause unwanted conditions within the steering column if the vehicle is suspended in any manner when the pinch bolt is tightened.

(6) Ensure front wheels of vehicle are positioned STRAIGHT-AHEAD, then align and attach the steering column upper coupling to the lower coupling. Install the coupling pinch bolt (Fig. 3). Tighten the pinch bolt nut to a torque of 28 N·m (250 in. lbs.).

- (7) Install the coupling pinch bolt retainer pin.
- (8) Remove the steering wheel holding clamp.

REMOVAL AND INSTALLATION

SERVICE WARNINGS AND CAUTIONS

**WARNING:** BEFORE BEGINNING ANY SERVICE PROCEDURES THAT INVOLVES REMOVING THE AIR BAG. 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.

**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.

**WARNING:** WHEN HANDLING AN UNDEPLOYED AIR BAG MODULE DURING SERVICING OF THE STEERING COLUMN, THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED:

- AT NO TIME SHOULD ANY SOURCE OF ELECTRICITY BE PERMITTED NEAR THE INFLATOR ON THE BACK OF THE AIR BAG MODULE.
- WHEN CARRYING A LIVE MODULE, THE TRIM COVER SHOULD BE POINTED AWAY FROM THE BODY TO MINIMIZE INJURY IF THE MODULE SHOULD ACCIDENTLY DEPLOY.
- IF THE AIR BAG MODULE IS PLACED ON A BENCH OR OTHER SURFACE, THE PLASTIC COVER SHOULD BE FACE-UP TO MINIMIZE MOVEMENT, IN CASE OF ACCIDENTAL DEPLOYMENT.

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

**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

**NOTE:** Before proceeding with this removal and installation procedure, review SERVICE WARNINGS AND CAUTIONS at the beginning of REMOVAL AND INSTALLATION in this section.

## REMOVAL AND INSTALLATION (Continued)

## REMOVAL

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

(2) Before beginning removal of the steering column, be sure the front wheels of vehicle are in the STRAIGHT-AHEAD position.

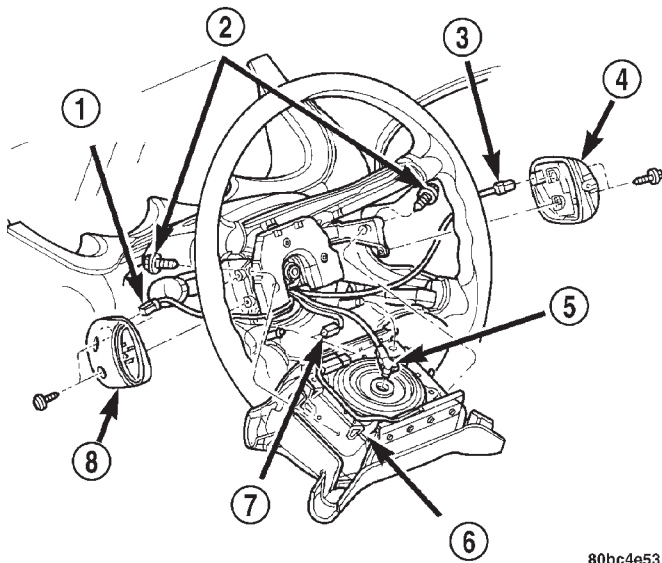
(3) Remove the screw securing the left end of the top cover to the instrument panel. It is located just above the left instrument panel end cap.

(4) Starting on the driver's end, push upward on the instrument panel top cover, disengaging its retainer clips along the face of the instrument panel. Disengage just enough clips to allow access to the upper ends of the instrument cluster bezel.

(5) Disengage the clips along the outer edge of the instrument cluster bezel and remove the bezel from the vehicle.

(6) Remove the two screws along the bottom of the steering column cover that mounts below the steering column on the instrument panel. Disengage the clips on the upper end of the steering column cover and remove the cover by pulling it straight away from the instrument panel.

(7) If the vehicle is equipped with speed control, remove the speed control switches from the steering wheel (Fig. 6).

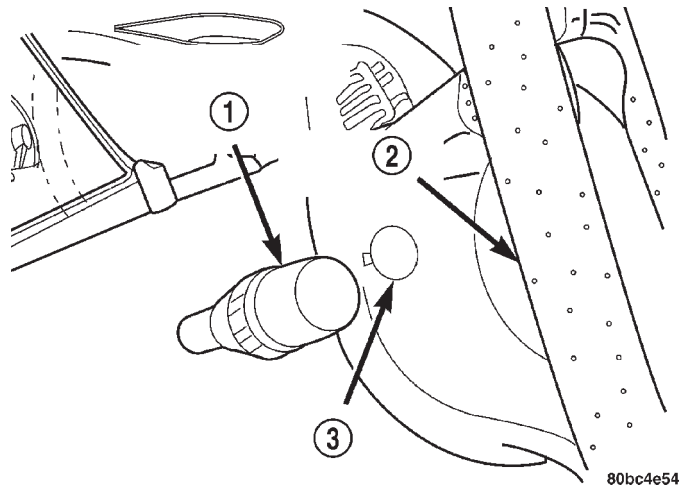


**Fig. 6 Steering Wheel Components**

- 1 - ELECTRICAL CONNECTOR
- 2 - AIRBAG MOUNTING SCREWS
- 3 - ELECTRICAL CONNECTOR
- 4 - SPEED CONTROL SWITCH
- 5 - AIRBAG MODULE ELECTRICAL CONNECTOR
- 6 - AIRBAG MODULE
- 7 - HORN SWITCH ELECTRICAL CONNECTOR
- 8 - SPEED CONTROL SWITCH

**WARNING: WHEN AN UNDEPLOYED AIRBAG MODULE IS TO BE REMOVED FROM THE STEERING WHEEL, FIRST DISCONNECT THE BATTERY GROUND CABLE AND ISOLATE IT. ALLOW THE SYSTEM CAPACITOR TO DISCHARGE FOR A MINIMUM OF TWO MINUTES, THEN BEGIN THE AIRBAG REMOVAL.**

(8) If the vehicle is not equipped with speed control, remove the airbag mounting screw trim caps from the steering wheel rear cover (Fig. 7). There is one on each side of the steering wheel.



**Fig. 7 Trim Caps**

- 1 - MULTIFUNCTION SWITCH LEVER
- 2 - STEERING WHEEL
- 3 - TRIM CAP

(9) Remove the two mounting screws, one on each side of steering wheel, attaching the airbag module to the steering wheel (Fig. 6).

(10) Lay the airbag module back away from the center of the steering wheel (Fig. 6). Disconnect the clockspring and horn switch electrical connectors from the back of the airbag module. Remove the airbag module from the steering wheel.

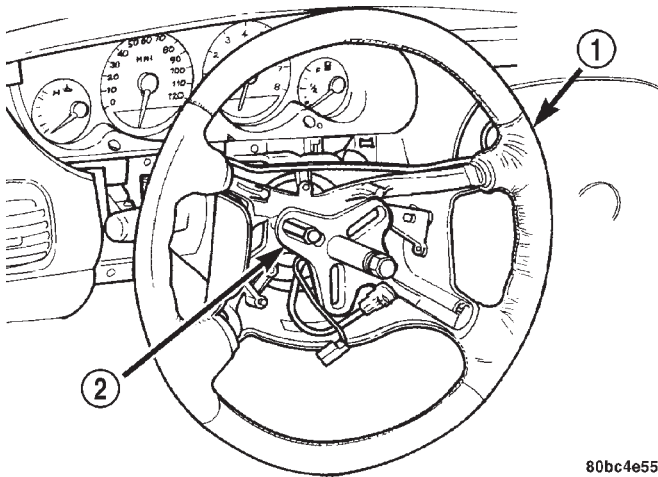
(11) Holding the steering wheel firmly in place, remove the steering wheel retaining nut from the steering column shaft in the center of the steering wheel. If equipped, remove the damper weight from the steering wheel.



REMOVAL AND INSTALLATION (Continued)

**CAUTION:** When installing a wheel puller on the steering wheel, be sure the puller bolts are fully seated in the threaded holes on the steering wheel. If the bolts are not fully seated in the threaded holes, the threads may be stripped out of the steering wheel when attempting to remove the steering wheel. Also, thread the retaining nut back on the end of the shaft until it is flush with the shaft end to avoid damage to the shaft threads by the wheel puller.

(12) Install a steering wheel puller on the steering wheel (Fig. 8).



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**Fig. 8 Steering Wheel Puller Installed**

- 1 - STEERING WHEEL
- 2 - STEERING WHEEL PULLER

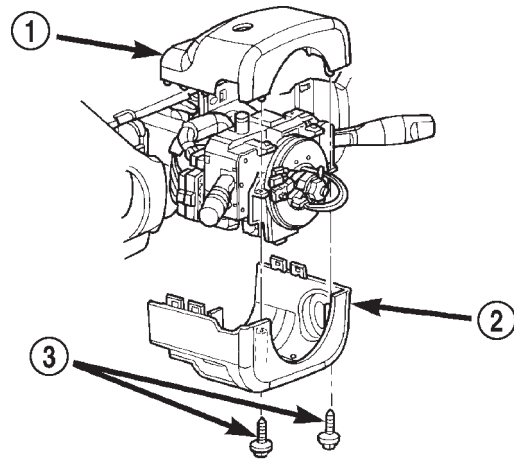
**CAUTION:** Do not bump or hammer on steering wheel or steering column shaft when removing steering wheel from steering column.

(13) Holding the steering wheel firmly in the straight-ahead position, remove steering wheel from the steering column shaft using the puller.

(14) Remove the ignition key from the ignition key cylinder.

(15) Remove the two screws attaching the lower shroud to the steering column and upper shroud (Fig. 9). After removing the screws, unclip the shrouds from each other by applying hand pressure along the seams where the shrouds connect on the sides, then remove the lower shroud from the upper shroud and column. Remove the upper shroud from the steering column.

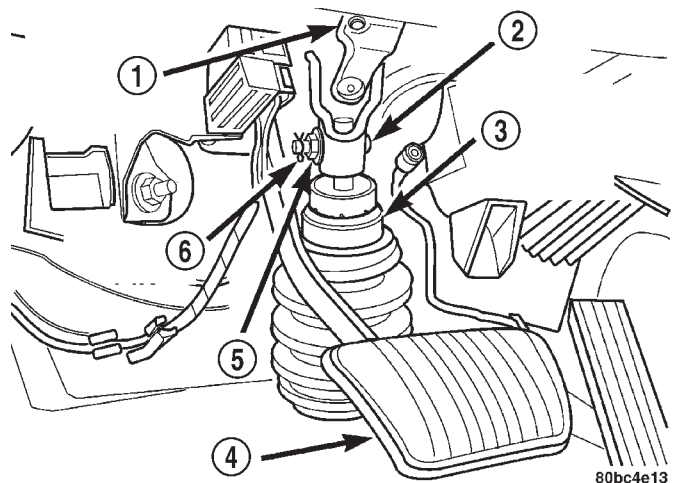
(16) At the base of the column, remove the steering column coupling retainer pin, back off the pinch bolt nut, and remove the steering column coupling pinch bolt (Fig. 10) (the pinch bolt nut is caged to the coupling and is not removable). Separate the upper and lower steering column couplings.



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**Fig. 9 Steering Column Shrouds**

- 1 - UPPER SHROUD
- 2 - LOWER SHROUD
- 3 - MOUNTING SCREWS



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**Fig. 10 Steering Column Couplings**

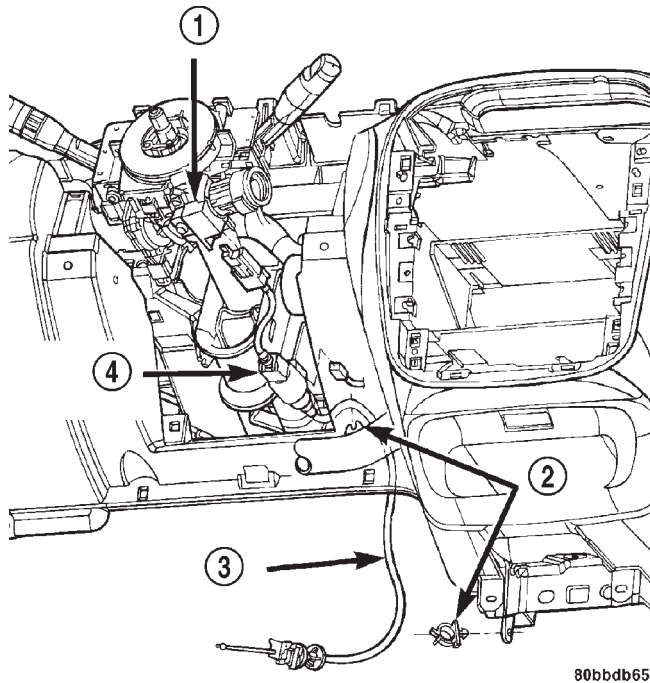
- 1 - STEERING COLUMN UPPER COUPLING
- 2 - PINCH BOLT
- 3 - STEERING COLUMN LOWER COUPLING
- 4 - BRAKE PEDAL
- 5 - NUT
- 6 - RETAINER PIN

(17) If the vehicle is equipped with a automatic transaxle, disconnect the automatic transaxle ignition interlock cable from the steering column. Depress the tab on top of the cable connector and remove the cable from the back side of the steering column ignition cylinder housing (Fig. 11).

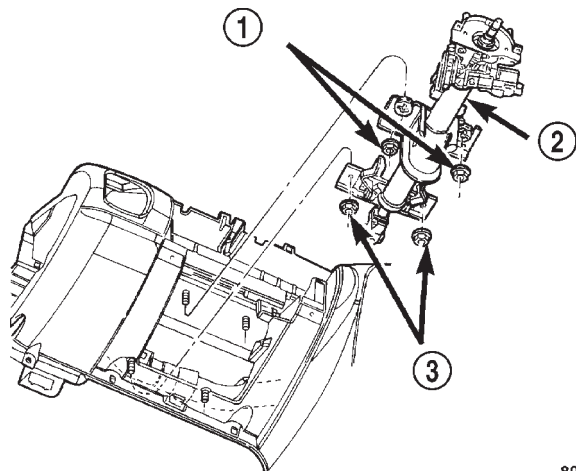
(18) Remove the two lower mounting nuts attaching the steering column to the instrument panel (Fig. 12).

(19) Remove the two upper mounting nuts attaching the steering column to the instrument panel (Fig. 12).

## REMOVAL AND INSTALLATION (Continued)

**Fig. 11 Interlock Cable**

- 1 - IGNITION SWITCH
- 2 - CLIP
- 3 - INTERLOCK CABLE
- 4 - BTSI SOLENOID

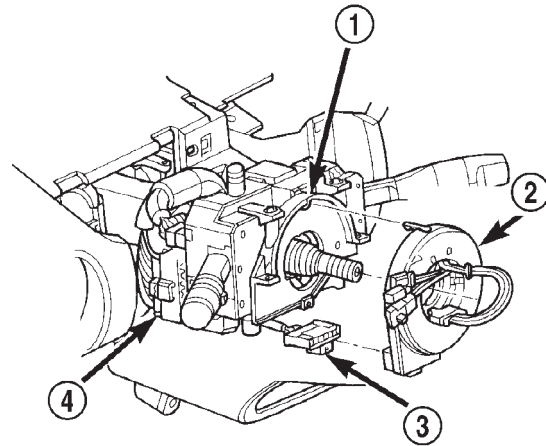
**Fig. 12 Steering Column Mounting Nuts**

- 1 - UPPER MOUNTING NUTS
- 2 - STEERING COLUMN
- 3 - LOWER MOUNTING NUTS

(20) Lower the steering column away from the instrument panel.

(21) Disconnect the wiring harness electrical connector from the clockspring (Fig. 13).

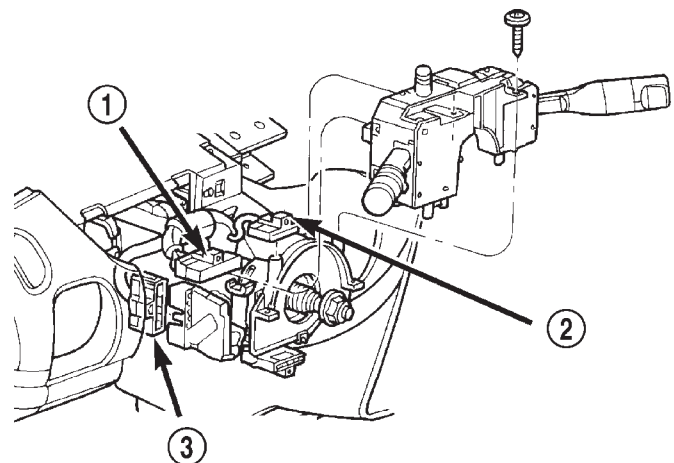
(22) Disconnect the wiring harness electrical connectors from the multi-function switch, windshield wiper switch, and ignition switch (Fig. 14).



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**Fig. 13 Clockspring Electrical Connector**

- 1 - STEERING COLUMN
- 2 - CLOCKSPRING
- 3 - CLOCKSPRING ELECTRICAL CONNECTOR
- 4 - IGNITION SWITCH ELECTRICAL CONNECTOR



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**Fig. 14 Electrical Connectors**

- 1 - MULTI-FUNCTION SWITCH ELECTRICAL CONNECTOR
- 2 - WINDSHIELD WIPER SWITCH ELECTRICAL CONNECTOR
- 3 - IGNITION SWITCH ELECTRICAL CONNECTOR

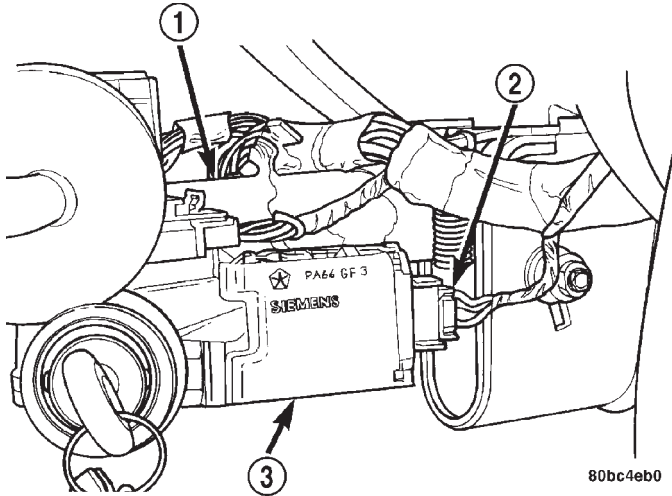
(23) If the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), disconnect its electrical connector (Fig. 15).

(24) Remove the steering column from the vehicle.

(25) If the steering column is being replaced, perform the following:

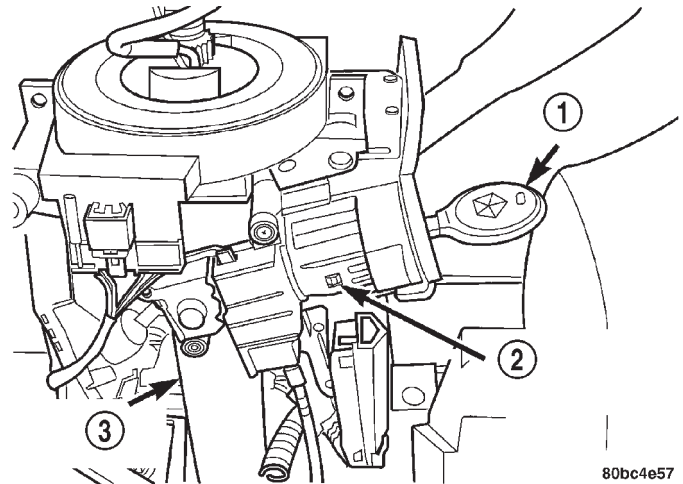
- (a) Remove the ignition key cylinder from the steering column. To do this, insert the key and turn the ignition key cylinder to the ON position. Next, depress the retaining tab and remove the Ignition key cylinder by pulling the key and cylinder straight out of the column together (Fig. 16).

REMOVAL AND INSTALLATION (Continued)



**Fig. 15 SKIM Electrical Connector**

- 1 - STEERING COLUMN
- 2 - SKIM ELECTRICAL CONNECTOR
- 3 - SKIM



**Fig. 16 Ignition Key Cylinder Retaining Tab**

- 1 - IGNITION KEY
- 2 - RETAINING TAB
- 3 - STEERING COLUMN

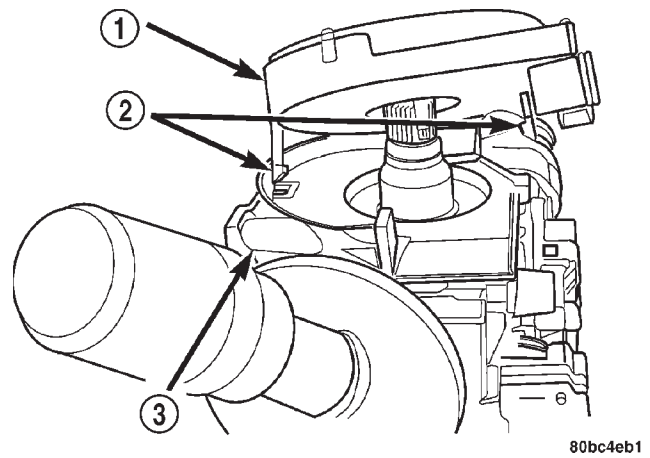
(b) Disengage the latch hooks on the back of the clockspring by lifting the clockspring slightly to clear the column housing with the top latch hook. Next, lower the clockspring slightly to do the same for the lower latch hook (Fig. 17). Remove the clockspring from the column.

(c) Remove the two screws securing the multi-function/windshield wiper switch to the steering column (Fig. 18). Pull the switch straight away from the column to remove it.

(d) If the column is equipped with a SKIM, remove the module from the column by removing the two mounting screws and sliding the SKIM off the non-halo trim ring (Fig. 19).

(e) Remove the non-halo trim ring from the column by unclipping it from the ignition cylinder housing (Fig. 19).

(f) Remove the ignition switch from the steering column by first removing the mounting screw (Fig. 20). Once the screw is removed, pull the switch straight out away from the column ignition cylinder housing.



**Fig. 17 Clockspring Latch Hooks**

- 1 - CLOCKSPRING
- 2 - LATCH HOOKS
- 3 - STEERING COLUMN

**INSTALLATION**

(1) If the steering column is being replaced, perform the following on the column before installing it on the vehicle:

(a) Ensure the ignition switch is positioned in the ON position.

(b) Install the ignition switch on the steering column by pushing the tapered end onto the shaft and steering column ignition cylinder housing. Install the screw securing the switch to the column (Fig. 20).

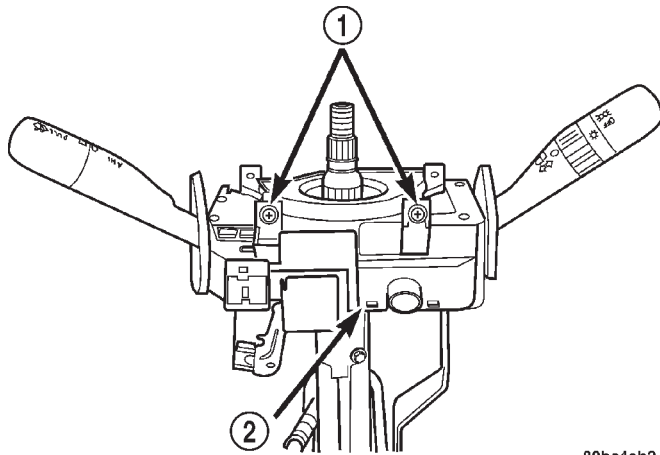
(c) Install the non-halo trim ring on the column until its tabs snap into place on the ignition cylinder housing (Fig. 19).

(d) If the column is equipped with a Sentry Key Immobilizer Module (SKIM), install the module on the column by sliding the module onto the non halo trim ring and installing the two mounting screws (Fig. 19). Tighten the mounting screws to a torque of 3 N·m (25 in. lbs.).

(e) Position the multi-function/windshield wiper switch in onto the top of the column and install the two screws securing the switch in place (Fig. 18).

(f) Place the clockspring onto the end of the column engaging the clockspring latch hooks into the column (Fig. 17).

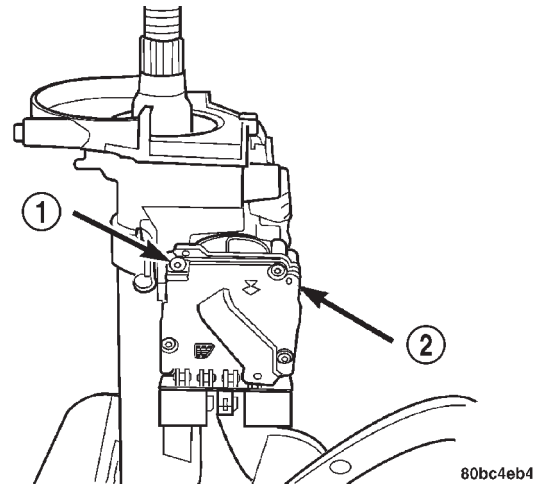
## REMOVAL AND INSTALLATION (Continued)



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**Fig. 18 Multi-function/Wiper Switch Mounting**

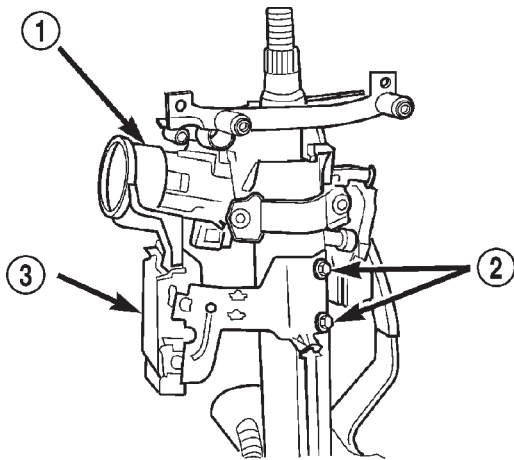
- 1 - MOUNTING SCREWS  
2 - MULTI-FUNCTION/WINDSHIELD WIPER SWITCH ASSEMBLY



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**Fig. 20 Ignition Switch Mounting**

- 1 - MOUNTING SCREW  
2 - IGNITION SWITCH



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**Fig. 19 SKIM Mounting**

- 1 - HALO TRIM RING  
2 - MOUNTING SCREWS  
3 - SKIM

(g) Install the ignition key cylinder in the steering column. To do this, first position the key cylinder in the ON position (with the key in it) so the retaining tab can be depressed. Push key cylinder into the column ignition cylinder housing until the retaining tab locks into place (Fig. 16).

**NOTE:** When installing a tilt column, do not release the tilt lever from the locked position until after the column is installed on the instrument panel.

(2) Install the steering column into steering column access opening in the lower instrument panel.

(3) If the vehicle is equipped with a SKIM, Connect its wiring harness electrical connector (Fig. 15).

(4) Connect the wiring harness electrical connectors to the multi-function switch, windshield wiper switch, and ignition switch (Fig. 14).

(5) Connect the wiring harness electrical connector to the clockspring (Fig. 13).

(6) Align the slots in the mounting brackets on the steering column with the studs in the instrument panel (Fig. 12) Attach the column to the instrument panel by first installing the two upper mounting nuts (Do not completely tighten the two upper mounting nuts at this time). Next, install the two lower mounting nuts. Tighten all four mounting nuts to a torque of 17 N·m (150 in. lbs.).

(7) If the vehicle is equipped with an automatic transaxle, connect the automatic transaxle ignition interlock cable to the steering column by pushing the end of the cable into the back side of the ignition cylinder housing until it snaps into place (Fig. 11).

(8) Position the steering column shaft in the correct position for mounting to the lower coupling. To do this, turn the steering wheel end of the shaft until the missing spline area on that end of the shaft faces straight up.

(9) Verify the front wheels of vehicle are in the STRAIGHT-AHEAD position.

**NOTE:** Do not tighten the coupling pinch bolt anytime the vehicle is not at curb riding height. It may cause unwanted conditions within the steering column if the vehicle is suspended in any manner when the pinch bolt is tightened.

(10) Reconnect the steering column lower coupling to the steering column upper coupling (Fig. 10). Install the coupling pinch bolt and tighten the pinch

## REMOVAL AND INSTALLATION (Continued)

bolt nut to a torque of 28 N·m (250 in. lbs.). Install the pinch bolt retainer pin.

(11) Install the upper and lower steering column shrouds onto the steering column (Fig. 9). Snap the two shrouds together and then install and tighten the two screws securing the shrouds to the column.

(12) Install the steering column cover that mounts below the steering column on the instrument panel by first aligning the retainer clips and snapping the cover into place. Install the two screws along the bottom of the steering column cover.

(13) Align the clips along the outer edge of the instrument cluster bezel with the mounting holes in the instrument panel and install the bezel.

(14) Align the clips on the bottom of the instrument panel top cover with the mounting holes in the instrument panel and install the top cover by pushing it down into place.

(15) Install the screw securing the left end of the top cover to the instrument panel.

**CAUTION:** If there is any question as to whether the clockspring is in the centered position, the clock spring needs to be recentered before installing the steering wheel. If the clockspring is not centered, it may be overextended, causing the clockspring to become inoperative.

(16) Center the clockspring using the following procedure:

- Using your fingers, rotate the clockspring rotor in the **CLOCKWISE DIRECTION** to the end of the travel. Do not apply excessive torque.
- From the end of travel, rotate the rotor two full turns and an additional half turn in the counter-clockwise direction. (The wires should end up at the bottom of the clockspring).

**CAUTION:** Do not install the steering wheel onto the shaft of the steering column by driving it onto the shaft.

(17) Feed the clockspring wiring leads through the hole in the steering wheel (Fig. 6). Align the steering wheel's wide mounting spline with the steering column shaft missing spline area and push the wheel onto the shaft. Make sure the clockspring squares up with the back of the wheel and does not bind.

(18) Install the steering wheel retaining nut and tighten it until the steering wheel is fully installed on shaft. Tighten the steering wheel retaining nut to a torque of 61 N·m (45 ft. lbs.).

(19) Connect the clockspring electrical leads to the speed control switches and reinstall the switches on the steering wheel (Fig. 6).

(20) Install the airbag electrical lead from the clockspring into the connector on the back of the air-

bag module (Fig. 6). Be sure electrical connector from clockspring is securely latched into airbag module connector.

(21) Connect the horn switch electrical lead to the connector on the back of the airbag module (Fig. 6).

**CAUTION:** The fasteners originally used for the airbag components are specifically designed for the airbag system. They must never be replaced with any substitutes. Anytime a new fastener is needed, replace it with only the correct fastener listed in the parts book.

(22) Install the airbag module into the center of the steering wheel. Align the airbag module mounting holes with the bolt holes in steering wheel (Fig. 6). Install only the two original or identical replacement airbag module mounting screws. Tighten the two air bag module attaching bolts to a torque of 10 N·m (90 in. lbs.).

(23) Install the airbag mounting screw trim caps on the steering wheel rear cover (Fig. 7). One belongs on each side of the steering wheel.

**NOTE:** When reconnecting the battery on a vehicle that has had the airbag module removed, the following procedure should be used.

(24) Reconnect the ground cable to the negative post of the battery in the following manor:

- Connect a scan tool (DRBIII®) to the data link diagnostic connector located below the steering column.
- Turn the ignition key to the ON position. Exit the vehicle with the scan tool leaving the scan tool harness plugged in.
- Ensuring that there are no occupants in the vehicle, connect the ground (-) cable to the negative post of the battery.
- Using the scan tool, read and record any fault codes. Refer to the DRIVER AND PASSENGER AIRBAG SYSTEM diagnostic manual if any faults are found.
- Erase any stored faults if there are no active fault codes. If a problem exists, the fault code will not erase.
- Reach around the back of the steering wheel (in front of the instrument cluster) and turn the ignition key to OFF, then back ON while observing the instrument cluster airbag lamp. It should go on for six to eight seconds, then go out. This will indicate that the airbag system is functioning normally. If airbag warning lamp fails to light, blinks on and off, or goes on and stays on, there is an airbag system malfunction. Refer to the BODY DIAGNOSTIC PROCEDURES manual to diagnose the system malfunction.

## REMOVAL AND INSTALLATION (Continued)

(25) Turn the key to OFF and remove the scan tool from the vehicle.

(26) Test the operation of the horn, wipers and any other functions that are steering column operated. If applicable, reset the radio and the clock.

(27) If the steering column is a tilt column, verify the tilt mechanism operates properly.

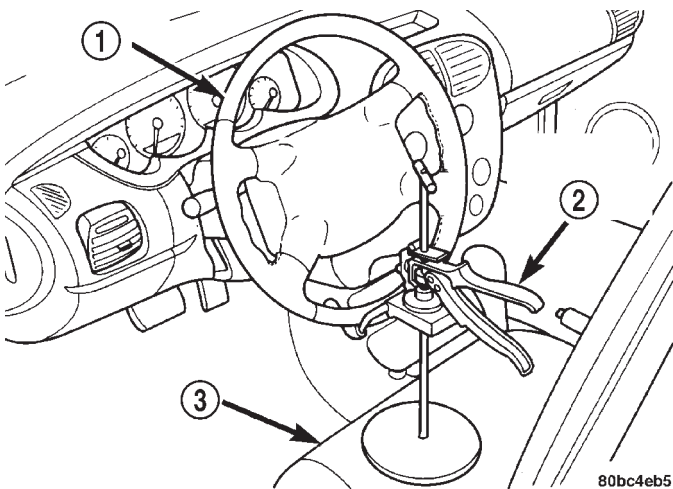
(28) Road test the vehicle to ensure proper operation of the steering system and the speed control system.

## STEERING COLUMN LOWER COUPLING

**NOTE:** Before proceeding with this removal and installation procedure, review **SERVICE WARNINGS AND CAUTIONS** at the beginning of **REMOVAL AND INSTALLATION** in this section and in **STEERING GEAR**.

## REMOVAL

(1) Place the steering wheel in the **STRAIGHT-AHEAD** position. Using a steering wheel holder, lock the steering wheel in place to keep it from rotating (Fig. 21). This keeps the clockspring in the proper orientation.

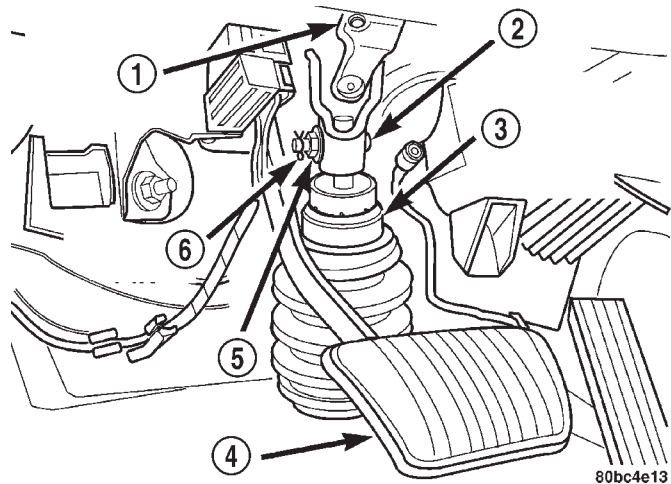


**Fig. 21 Steering Wheel Holder**

- 1 - STEERING WHEEL
- 2 - STEERING WHEEL HOLDER
- 3 - DRIVERS SEAT

(2) Inside the passenger compartment, remove the steering column coupling retainer pin, back off the pinch bolt nut, and remove the steering column coupling pinch bolt (Fig. 22) (the pinch bolt nut is caged to the coupling and is not removable). Separate the upper and lower steering column couplings.

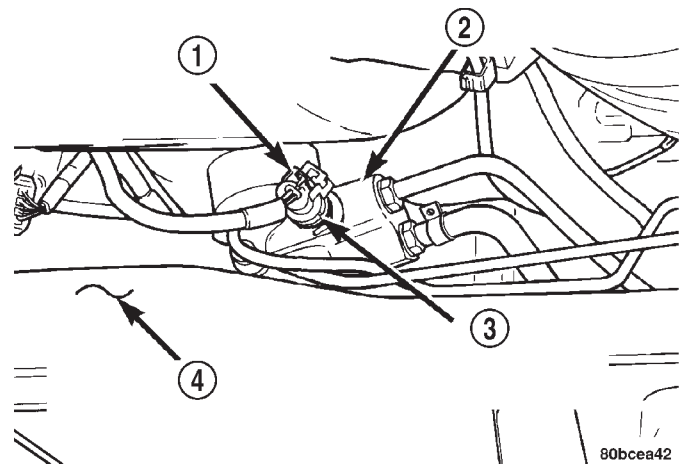
(3) Raise the vehicle. Refer to **HOISTING** in the **LUBRICATION AND MAINTENANCE** group in this service manual for the correct lifting procedure.



**Fig. 22 Steering Column Couplings**

- 1 - STEERING COLUMN UPPER COUPLING
- 2 - PINCH BOLT
- 3 - STEERING COLUMN LOWER COUPLING
- 4 - BRAKE PEDAL
- 5 - NUT
- 6 - RETAINER PIN

(4) Release the locking tab on the wiring harness connector for the power steering fluid pressure switch before connector removal. Remove the wiring harness connector from the power steering fluid pressure switch (Fig. 23).

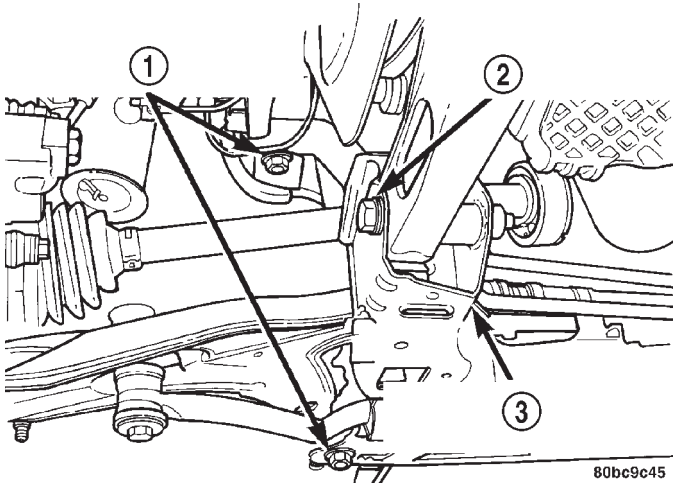


**Fig. 23 Power Steering Fluid Pressure Switch**

- 1 - WIRING HARNESS CONNECTOR
- 2 - POWER STEERING GEAR
- 3 - POWER STEERING FLUID PRESSURE SWITCH
- 4 - REAR OF FRONT SUSPENSION CROSSMEMBER

(5) Remove the bolt mounting the engine torque strut to the right forward corner of the front suspension crossmember (Fig. 24).

REMOVAL AND INSTALLATION (Continued)

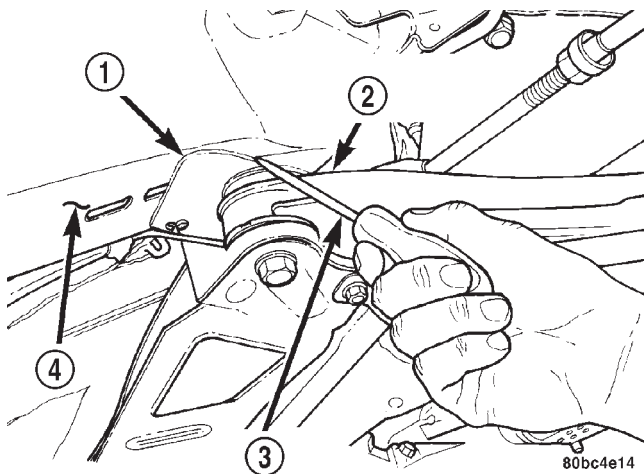


**Fig. 24 Mounting Bolts**

- 1 - FRONT SUSPENSION CROSSMEMBER MOUNTING BOLTS
- 2 - ENGINE TORQUE ISOLATOR STRUT MOUNTING BOLT
- 3 - FRONT SUSPENSION CROSSMEMBER

**NOTE:** Before removing the front suspension crossmember from the vehicle, the location of the crossmember must be scribed on the body of the vehicle (Fig. 9). Do this so that the crossmember can be relocated upon reinstallation against the body of vehicle in the same location as before removal. If the front suspension crossmember is not reinstalled in exactly the same location as before removal, the preset front wheel alignment settings (caster and camber) will be lost.

(6) Using an awl, scribe a line (Fig. 25) marking the location of where the front suspension crossmember is mounted against the body of the vehicle.



**Fig. 25 Marking Crossmember Location**

- 1 - SCRIBED LINE
- 2 - FRONT SUSPENSION CROSSMEMBER
- 3 - AWL
- 4 - BODY

(7) Position a transmission jack under the center of the front suspension crossmember and raise it to support the bottom of the crossmember.

(8) Loosen and completely remove the two front bolts (one right and one left) attaching the front suspension crossmember to the frame rails of vehicle. The right side bolt can be viewed in the mounting bolt figure (Fig. 24). The left side bolt is located in the same location on the other side of the vehicle.

(9) Loosen the two rear bolts (one right and one left) attaching the front suspension crossmember and lower control arms to the body of the vehicle until they release from the threaded tapping plates in the body of the vehicle. Do not completely remove the rear bolts because they are designed to disengage from the body threads yet stay within the lower control arm rear isolator bushing. This allows the lower control arm to stay in place on the crossmember. The right side bolt can be viewed in the mounting bolt figure (Fig. 24). The left side bolt is located in the same location on the other side of the vehicle.

**CAUTION:** Lower the steering gear slowly, paying special attention to the power steering fluid hoses coming down from the power steering pump. Do not strain or over extend the hoses coming to the gear. Damage to the hoses or connecting hardware could occur.

(10) Lower the front suspension crossmember using the transmission jack enough to allow sufficient access to the steering column lower coupling (Fig. 26). When lowering front suspension crossmember, do not let crossmember hang from lower control arms or power steering hoses. The weight should be supported by the transmission jack.

(11) Remove the roll pin securing the steering column lower coupling to the power steering gear pinion shaft using a roll pin punch (Fig. 27). Push the steering column lower coupling up and off of the power steering gear pinion shaft.

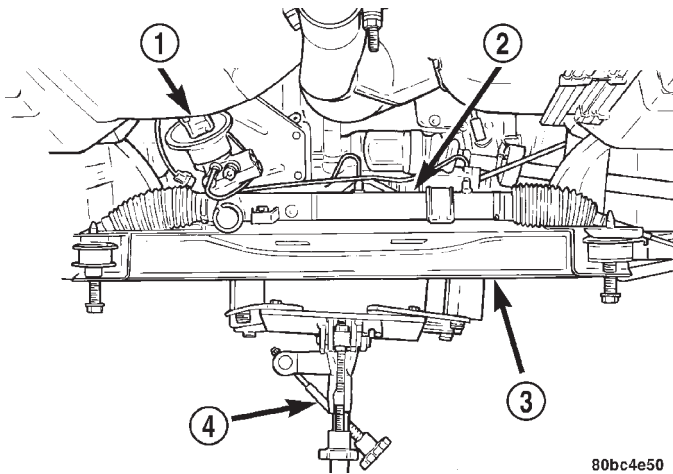
**INSTALLATION**

(1) Push the column end of the steering column lower coupling partway up through its hole in the dash panel, then match the flat on the inside of the steering column lower coupling to the flat on the power steering gear pinion shaft and slide the coupling onto the top of the pinion shaft. Align the roll pin hole in the coupling with the groove in the pinion shaft and install the roll pin through the coupling until it is centered (Fig. 27).

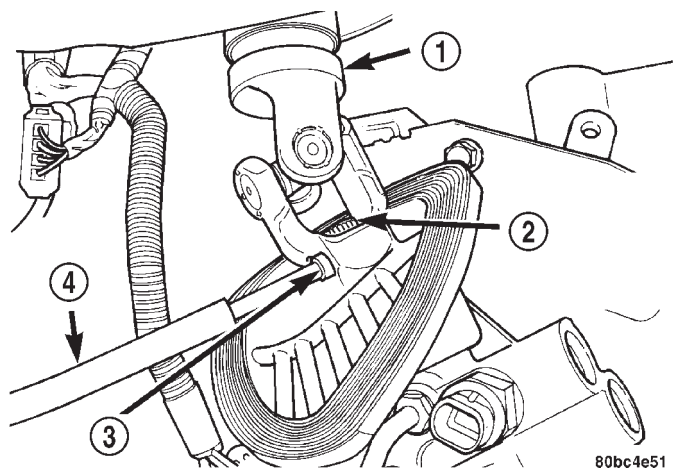
(2) Center the power steering gear rack in its travel.

(3) Using the transmission jack, raise the front suspension crossmember and power steering gear until the crossmember contacts its mounting spot

## REMOVAL AND INSTALLATION (Continued)

**Fig. 26 Crossmember Lowered**

- 1 - STEERING COLUMN LOWER COUPLING
- 2 - POWER STEERING GEAR
- 3 - FRONT SUSPENSION CROSSMEMBER
- 4 - TRANSMISSION JACK

**Fig. 27 Coupling Roll Pin**

- 1 - STEERING COLUMN LOWER COUPLING
- 2 - POWER STEERING GEAR PINION SHAFT
- 3 - ROLL PIN
- 4 - ROLL PIN PUNCH

against the body and frame rails of the vehicle. As the crossmember is raised, carefully guide the steering column lower coupling up through its hole in the dash panel.

(4) Start the two rear crossmember mounting bolts into the tapping plates mounted in the body. The right side bolt can be viewed in the mounting bolt figure (Fig. 24). The left side bolt is located in the same location on the other side of the vehicle. Next, install the two front mounting bolts attaching front suspension crossmember to frame rails of vehicle. Lightly tighten all four mounting bolts to a approxi-

mately 2 N-m (20 in. lbs.) to hold the front suspension crossmember in position.

**NOTE:** When reinstalling the front suspension crossmember back in the vehicle, it is very important that the crossmember be attached to the body in exactly the same spot as when it was removed. Otherwise, the vehicle's wheel alignment settings (caster and camber) will be lost.

(5) Using a soft face hammer, tap the front suspension crossmember back-and-forth or side-to-side until it is aligned with the previously scribed positioning marks on the body of the vehicle (Fig. 25). Once the front suspension crossmember is correctly positioned, tighten the rear two crossmember mounting bolts to a torque of 203 N-m (150 ft. lbs.), then tighten the front two crossmember mounting bolts to a torque of 142 N-m (105 ft. lbs.).

(6) Fasten the engine torque strut to the right forward corner of the front suspension crossmember using its mounting bolt (Fig. 24). Follow the procedure described in the ENGINE service manual group to properly align and tighten the torque strut mounting bolts.

(7) Reconnect the wiring harness connector to the power steering fluid pressure switch (Fig. 23). Be sure the locking tab on the wiring harness connector is securely latched.

(8) Lower the vehicle to ground level.

(9) Install the dash-to-lower coupling seal in place over the lower coupling's plastic collar.

**NOTE:** Verify that grease is present on the lip of the dash-to-coupling seal where it contacts the coupling's plastic collar.

(10) Inside the passenger compartment, reconnect the steering column lower coupling to the steering column upper coupling (Fig. 22). Install the coupling pinch bolt and tighten the pinch bolt nut to a torque of 28 N-m (250 in. lbs.). Install the pinch bolt retainer pin.

(11) Remove the steering wheel holder.

(12) While looking under the instrument panel at the lower coupling, rotate the steering wheel back-and-forth to verify that the lower coupling does not squeak against the dash-to-coupling seal.



## SPECIFICATIONS

### STEERING COLUMN FASTENER TORQUE SPECIFICATIONS

<b>DESCRIPTION</b>	<b>TORQUE</b>
<b>STEERING WHEEL:</b>	
Retaining Nut . . . . .	61 N·m (45 ft. lbs.)
Airbag Mounting Screws . . . .	10 N·m (90 in. lbs.)
Speed Control Switch Screws .	2 N·m (20 in. lbs.)
<b>STEERING COLUMN:</b>	
Mounting Nuts . . . . .	17 N·m (150 in. lbs.)
SKIM Mounting Screws . . . . .	3 N·m (25 in. lbs.)
<b>STEERING COLUMN LOWER COUPLING:</b>	
Pinch Bolt . . . . .	28 N·m (250 in. lbs.)

