

# Power Steering System

## Specifications

### Fastener Tightening Specifications

Application	Specification	
	Metric	English
Ball Guide Clamp Screws	58 Nm	43 lb ft
Coupling Shield Retainer and Lock Nut	109 Nm	80 lb ft
Filler Neck Tube Bolt (4.3L)	20 Nm	15 lb ft
Front Differential Carrier Shield Bolts	25 Nm	19 lb ft
Lower Intermediate Shaft Coupling Bolt	40 Nm	29 lb ft
Pitman Arm Ball Stud to Relay Rod Nut (4WD)	83 Nm	61 lb ft
PitmanShaft Over-Center Preload <sup>1</sup>	0.7–1.7 Nm <sup>1</sup>	6–15 lb in <sup>1</sup>
Power Steering Connector and Fitting Assembly	75 Nm	55 lb ft
Power Steering Gear Adjuster Lock Nut	49 Nm	36 lb ft
Power Steering Gear Adjuster Nut Assembly	28-31 Nm	20-23 lb ft
Power Steering Gear Pressure Hose to Power Steering Gear (2.4L)	25 Nm	18 lb ft
Power Steering Gear Pressure Hose to Power Steering Gear (4.3L)	25 Nm	18 lb ft
Power Steering Gear Pressure Hose to Pump	25 Nm	18 lb ft
Power Steering Gear Return Hose to Power Steering Gear	25 Nm	18 lb ft
Power Steering Gear to Frame Mounting Bolts	75 Nm	55 lb ft
Power Steering Hose Clamps	2.5 Nm	22 lb in
Power Steering Pump Front Mounting Bolts (2.4L)	25 Nm	18 lb ft
Power Steering Pump Front Mounting Bolts (4.3L)	55 Nm	40 lb ft
Power Steering Pump Front Mounting Nut (4.3L)	41 Nm	30 lb ft
Power Steering Pump Rear Mounting Bracket Bolt (2.4L)	25 Nm	18 lb ft
Power Steering Pump Rear Mounting Bracket Nuts (2.4L)	25 Nm	18 lb ft
Power Steering Pump Rear Mounting Bracket Nut (4.3L)	41 Nm	30 lb ft
Pump Mounting Studs	41 Nm	30 lb ft

<sup>1</sup>This specification is in addition to the worm shaft thrust bearing preload and the valve and seal drag.

## Specifications

### Power Steering Pump Specifications

Engine Code	Engine Size	High Flow		Pressure Relief	
		Liters Per Minute	Gallons Per Minute	kPa	PSI
LG1	2.4L	9.1/10.6	2.4/2.8	7585/8274	1100/1200
LG3	4.3L	9.5/11	2.5/2.9	7585/8274	1100/1200

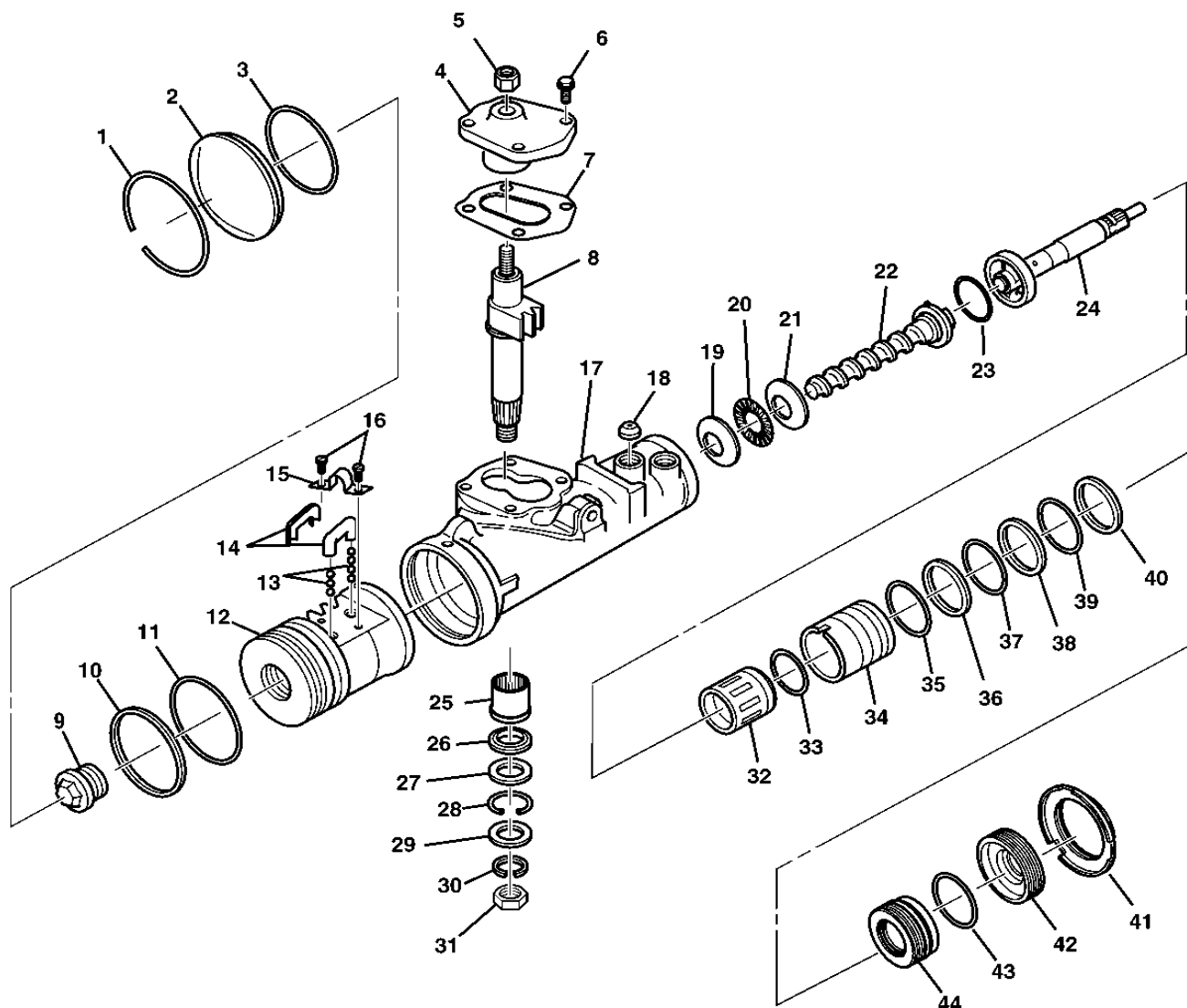
## Component Locator

### Power Steering Gear Disassembled View

# Steering

## Power Steering System-1

### Power Steering Gear:



1. Retaining Ring
2. Plug
3. O-ring Seal
4. Side Cover
5. Adjuster Lock Nut
6. Bolt
7. Gasket
8. Pitman Shaft
9. Plug
10. Teflon Ring
11. O-ring Seal
12. Rack Piston
13. Balls

14. Ball Guide
15. Clamp
16. Screw
17. Housing
18. Check Valve
19. Flat Race
20. Thrust Bearing
21. Flat Race
22. Worm Shaft
23. Seal
24. Stub Shaft
25. Needle Bearing
26. Pitman Shaft Seal

## Steering

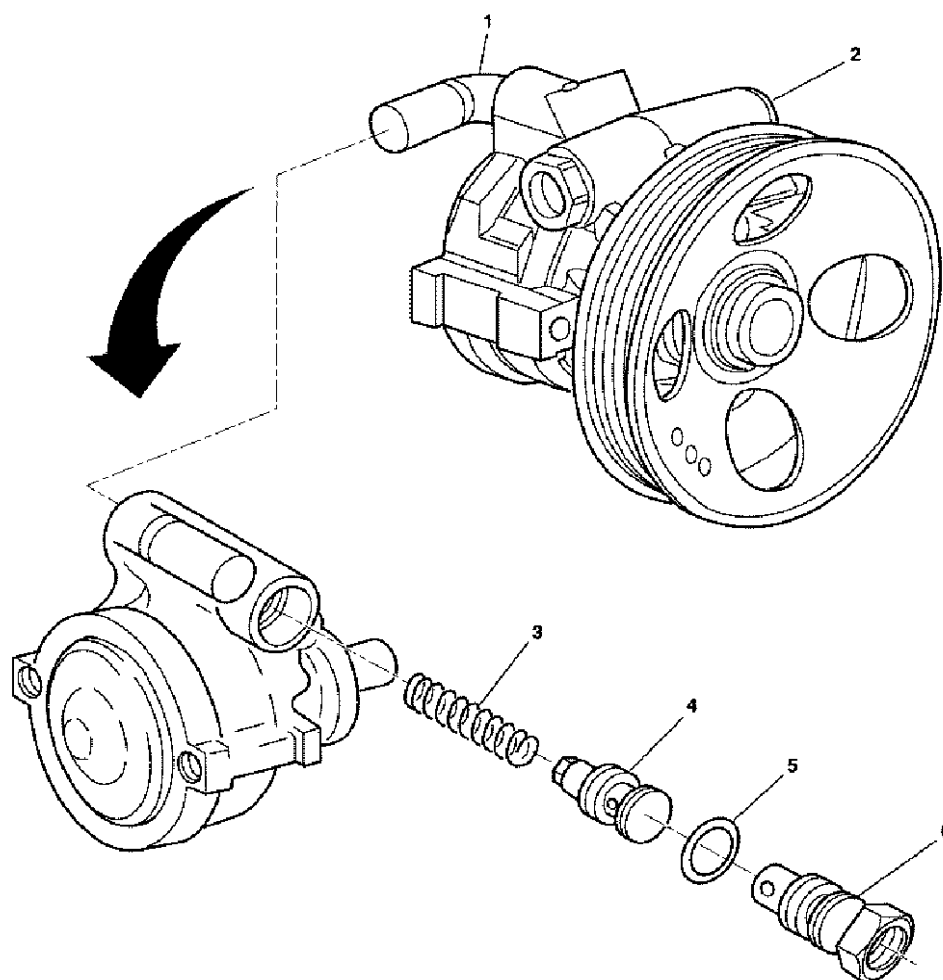
## Power Steering System-1

- |                            |   |
|----------------------------|---|
| 27. Backup Washer          | 36. Ring                                  |
| 28. Retaining Ring         | 37. O-ring Valve Body Seal                |
| 29. Dust Seal              | 38. Ring                                  |
| 30. Lock Washer            | 39. O-ring Valve Body Seal                |
| 31. Nut                    | 40. Ring                                  |
| 32. Valve Spool            | 41. Coupling Shield Retainer and Lock Nut |
| 33. Seal                   | 42. Adjuster Nut Assembly                 |
| 34. Valve Body             | 43. O-ring Seal                           |
| 35. O-ring Valve Body Seal | 44. Thrust Support Assembly               |

## Component Locator

### Power Steering Pump Disassembled View (CB Series)

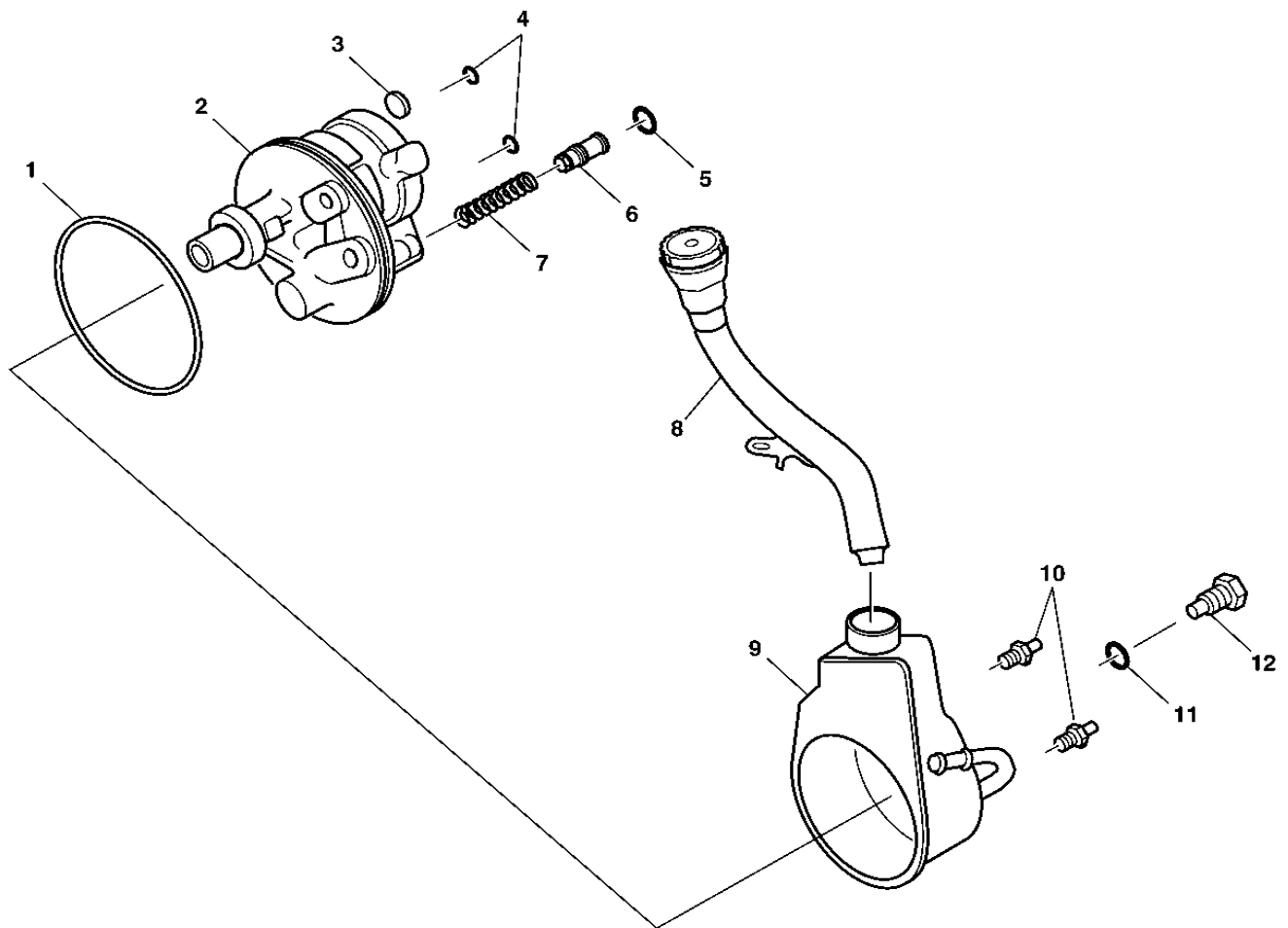
*Power Steering Pump:*



1. Return Line Fitting
2. Hydraulic Pump

**Steering****Power Steering System-1**

3. Flow Control Spring
4. Control Valve Assembly
5. O-Ring Seal
6. Connector and Fitting Assembly

**Component Locator****Power Steering Pump Disassembled View (P Series)***Power Steering Pump Reservoir:*

- |                                    |                                      |
|------------------------------------|--------------------------------------|
| 1. O-ring Seal                     | 7. Flow Control Spring               |
| 2. Hydraulic Pump Housing Assembly | 8. Reservoir Capstick Assembly       |
| 3. Magnet                          | 9. Hydraulic Pump Reservoir Assembly |
| 4. O-ring Seals                    | 10. Mounting Studs                   |
| 5. Rectangular Section Seal        | 11. O-ring Seal                      |
| 6. Control Valve Assembly          | 12. Connector and Fitting Assembly   |

## Steering

## Power Steering System-1

### Diagnostic Information and Procedures

#### Diagnostic Starting Point - Power Steering System

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **"Symptoms - Power Steering System"** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

### Diagnostic Information and Procedures

#### Symptoms - Power Steering System

Review the system description and operation in order to familiarize yourself with the system functions. Refer to **"Power Steering System Description and Operation"**.

#### Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the power steering system.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect the power steering reservoir for the proper power steering fluid level and condition.

#### Symptoms List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

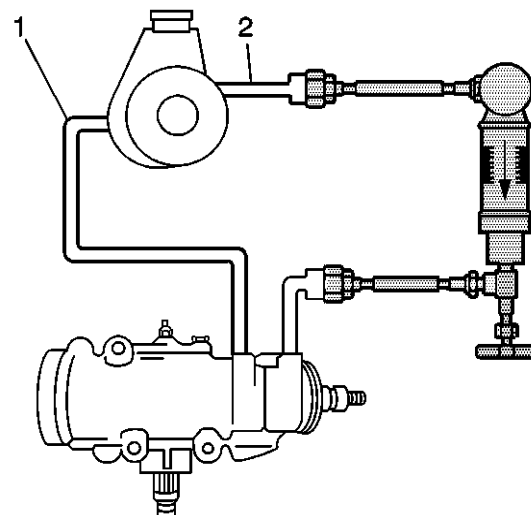
- **"Power Steering Fluid Leaks"**
- **"Rattle, Clunk, or Shudder Noise from the Power Steering System"**
- **"Whine or Growl Noise from the Power Steering System"**
- **"Steering Effort Hard in One or Both Directions"**
- **"Steering Effort Too Easy in One or Both Directions"**

### Diagnostic Information and Procedures

#### Power Steering System Test Procedure

2001-S/T TRK (China)

#### Recirculating Ball System:



1. Power Steering Return Hose
2. Power Steering Pressure Hose

#### Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the system for restrictions.
5. This step tests the following components for the following conditions:
  - The pump for internal leaks
  - The power steering pipes for kinks
6. This step tests the ability of the pump to regulate flow at maximum pressure.
8. This step tests the ability of the pump to regulate flow under normal operating conditions.
10. This step tests the internal components of the pump and the gear.

Step	Action	Values	Yes	No
<b>Notice:</b> If the power steering system has been serviced, an accurate fluid level reading cannot be obtained unless air is bled from the steering system. The air in the fluid may cause pump cavitation noise and may cause pump damage over a period of time.				
<b>Important:</b> In order to accurately diagnose the system, the malfunction must be present during the test procedure.				
<b>DEFINITION:</b> The Power Steering System Test Procedure will perform the following functions:				
	• Test the operation of the hydraulic power steering			
	• Test the operation of the power steering pump and power steering gear			
	• Identify restrictions in the system			

## Steering

## Power Steering System-1

1	<ol style="list-style-type: none"> <li>1. Turn the ignition switch to the OFF position.</li> <li>2. Place a drain pan under the vehicle in order to catch any power steering fluid.</li> <li>3. Disconnect the power steering pressure pipe/hose from the power steering pump or the power steering gear as necessary.</li> <li>4. Install the <a href="#">J 44721</a> Power Steering System Analyzer between the power steering pump and the power steering gear on the pressure side. Adapters may be required.</li> <li>5. Inspect and add ONLY approved power steering fluid as necessary in order to ensure that the power steering fluid is at the proper level and not contaminated. Refer to "<b>Checking and Adding Power Steering Fluid</b>".</li> </ol> <p>Is the fluid at the proper level and free from contamination?</p>	—	Go to <b>Step 3</b>	Go to <b>Step 2</b>
2	<p>Fill or drain and refill the fluid as necessary. Refer to "<b>Checking and Adding Power Steering Fluid</b>".</p> <p>Is the fluid at the proper level and free from contamination?</p>	—	Go to <b>Step 3</b>	—
3	<ol style="list-style-type: none"> <li>1. Fully open the <a href="#">J 44721</a> valve.</li> <li>2. Start the engine.</li> <li>3. <b>Notice:</b> Refer to Steering Wheel in the Full Turn Position Notice in Cautions and Notices.</li> <li>Turn the steering wheel and BRIEFLY hold the steering wheel against the steering stop in order to release any trapped air from the system.</li> <li>4. Inspect and ensure that all of the power steering pipe/hose connections are not leaking.</li> <li>5. Observe the pressure reading.</li> </ol> <p>Is the pressure reading greater than the specified value?</p>	1379 kPa (230 psi)	Go to <b>Step 4</b>	Go to <b>Step 5</b>
4	<p><b>Important:</b> A restriction may be present in the power steering system. Turn off the engine IMMEDIATELY.</p> <p>Locate and repair the restriction.</p> <p>Did you complete the repair?</p>	—	Go to <b>Step 16</b>	—
5	<ol style="list-style-type: none"> <li>1. Inspect and add ONLY approved power steering fluid as necessary in order to ensure that the power steering fluid is at the proper level. Refer to "<b>Checking and Adding Power Steering Fluid</b>".</li> <li>2. Allow the engine to run until the engine reaches full operating temperature.</li> <li>3. Record the pressure reading and flow reading (A).</li> <li>4. Partially close the <a href="#">J 44721</a> valve until the system pressure reaches the specified value, then record the FLOW reading (B).</li> <li>5. Subtract flow reading B from flow reading A.</li> </ol> <p>Is the flow DECREASE greater than 3.8 L (1 gal) per minute?</p>	4827 kPa (700 psi)	Go to <b>Step 11</b>	Go to <b>Step 6</b>
6	<p><b>Notice:</b> Do not leave the valve fully closed for more than 5 seconds, or the pump could be damaged internally.</p> <p>Fully close then open the <a href="#">J 44721</a> valve 3 times. Record all of the high pressure readings. Refer to "<b>Power Steering Pump Specifications</b>" for power steering system pressure relief specifications.</p> <p>Are the three high pressure readings within specifications?</p>	—	Go to <b>Step 7</b>	Go to <b>Step 13</b>
7	<p>Are the three high pressure readings within 245 kPa (50 psi) of each other?</p>	—	Go to <b>Step 8</b>	Go to <b>Step 12</b>
8	<ol style="list-style-type: none"> <li>1. Increase the engine speed to approximately 1500 RPM.</li> <li>2. Record the flow reading. Refer to "<b>Power Steering Pump Specifications</b>" for power steering system pressure specifications.</li> </ol> <p>Is the actual flow reading within specifications?</p>	—	Go to <b>Step 9</b>	Go to <b>Step 11</b>

## Steering

## Power Steering System-1

9	Is the difference between the actual flow reading and the maximum flow specification more than 3.8 L (1 gal) per minute?	—	Go to Step 14	Go to Step 10
10	<b>Notice:</b> Refer to Steering Wheel in the Full Turn Position Notice in Cautions and Notices. Turn the steering wheel from steering stop to steering stop and record the FLOW readings at each stop. Is the flow LOWER than 3.8 L (1 gal) per minute?	—	Go to Step 17	Go to Step 15
11	Replace the power steering pump. Refer to " <b>Power Steering Pump Replacement (2.4L)</b> " " <b>Power Steering Pump Replacement (4.3L)</b> ". Did you complete the replacement?	—	Go to Step 16	—
12	<ol style="list-style-type: none"> <li>1. Remove the power steering pump flow control valve. Refer to "<b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (P Series)</b>" "<b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (CB Series)</b>".</li> <li>2. Inspect the flow control valve.  If any burrs or scratches are noticed on the flow control valve, replace the flow control valve. Do NOT attempt to clean the flow control valve. Refer to "<b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (P Series)</b>" "<b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (CB Series)</b>".</li> <li>3. Inspect the flow control valve bore.  If any burrs or scratches are present in the control valve bore, replace the power steering pump. Refer to "<b>Power Steering Pump Replacement (2.4L)</b>" "<b>Power Steering Pump Replacement (4.3L)</b>".</li> </ol> Did you complete the repair?	—	Go to Step 16	—
13	Replace the power steering pump flow control valve. Refer to " <b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (P Series)</b> " " <b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (CB Series)</b> ". Did you complete the replacement?	—	Go to Step 16	—
14	<ol style="list-style-type: none"> <li>1. Remove the power steering pump flow control valve and inspect for any wear or damage. Do NOT disassemble the flow control valve.</li> <li>2. If the flow control valve is worn damaged, replace the flow control valve. Refer to "<b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (P Series)</b>" "<b>Power Steering Pump Flow Control Valve Replacement - Off Vehicle (CB Series)</b>".</li> </ol> Did you complete the repair?	—	Go to Step 16	—
15	The power steering gear is leaking across the piston or bypassing the valve circuit. Replace the power steering gear. Refer to " <b>Power Steering Gear Replacement (RWD)</b> " " <b>Power Steering Gear Replacement (4WD)</b> ". Did you complete the replacement?	—	Go to Step 16	—
16	Test the power steering system for the original condition. Does the original condition still exist?	—	Go to Step 1	Go to Step 17
17	<ol style="list-style-type: none"> <li>1. Disconnect and remove the <a href="#">J 44721</a> from the vehicle.</li> <li>2. Connect the vehicle power steering pipes/hoses.</li> <li>3. Bleed the power steering system and add fluid as necessary. Refer to "<b>Bleeding the Power Steering System</b>".</li> </ol> Did you complete the repair?	—	System OK	—

## Diagnostic Information and Procedures

## Power Steering Fluid Leaks

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to Step 2	Go to " <b>Symptoms - Power Steering System</b> "

**Steering****Power Steering System-1**

Step	Action	Yes	No
2	Verify that power steering fluid leaks are present. Is the power steering system leaking?	Go to <b>Step 3</b>	System OK
3	Inspect the power steering system fittings. Are the fittings leaking?	Go to <b>Step 7</b>	Go to <b>Step 4</b>
4	Inspect the power steering hoses. Are the hoses leaking?	Go to <b>Step 8</b>	Go to <b>Step 5</b>
5	Inspect the power steering pump and the reservoir for leaks. Is the power steering pump or reservoir leaking?	Go to <b>Step 9</b>	Go to <b>Step 6</b>
6	Inspect the power steering gear for leaks. Is the power steering gear leaking?	Go to <b>Step 10</b>	—
7	Tighten the fittings. Refer to " <b>Fastener Tightening Specifications</b> ". Did you complete the repair?	Go to <b>Step 11</b>	—
8	Replace the power steering hoses. Refer to " <b>Power Steering Pressure Hose Replacement (2.4L)</b> " " <b>Power Steering Pressure Hose Replacement (4.3L)</b> " Did you complete the repair?	Go to <b>Step 11</b>	—
9	Replace the power steering pump or reservoir. Refer to " <b>Power Steering Pump Replacement (2.4L)</b> " " <b>Power Steering Pump Replacement (4.3L)</b> " or " <b>Power Steering Reservoir Replacement - Off Vehicle (P Series)</b> ". Did you complete the repair?	Go to <b>Step 11</b>	—
10	Replace the power steering gear. Refer to " <b>Power Steering Gear Replacement (RWD)</b> " " <b>Power Steering Gear Replacement (4WD)</b> ". Did you complete the repair?	Go to <b>Step 11</b>	—
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

**Diagnostic Information and Procedures****Rattle, Clunk, or Shudder Noise from the Power Steering System**

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to <b>Step 2</b>	Go to " <b>Symptoms - Power Steering System</b> "
2	Verify that a rattle, clunk or shudder noise is present. Is a rattle, clunk or shudder noise present?	Go to <b>Step 3</b>	System OK
3	Inspect the power steering hoses for proper routing and clearance. Is the routing or clearance of the power steering hoses incorrect?	Go to <b>Step 12</b>	Go to <b>Step 4</b>
4	Inspect the engine drive belt for cracking or excessive wear. Refer to " <b>Drive Belt Excessive Wear Diagnosis</b> " in Engine Mechanical-2.4L or " <b>Drive Belt Excessive Wear Diagnosis</b> " in Engine Mechanical-4.3L. Is the drive belt cracked or excessively worn?	Go to <b>Step 13</b>	Go to <b>Step 5</b>
5	Inspect the power steering pump pulley for damage. Is the power steering pump pulley damaged?	Go to <b>Step 14</b>	Go to <b>Step 6</b>
6	Inspect the power steering pump and the power steering mounting bracket/brace for the proper installation. Refer to " <b>Power Steering Pump Replacement (2.4L)</b> " " <b>Power Steering Pump Replacement (4.3L)</b> ". Is the power steering pump installation incorrect?	Go to <b>Step 15</b>	Go to <b>Step 7</b>
7	Inspect the power steering gear for the proper installation. Refer to " <b>Power Steering Gear Replacement (RWD)</b> " " <b>Power Steering Gear Replacement (4WD)</b> ". Is the power steering gear installation incorrect?	Go to <b>Step 16</b>	Go to <b>Step 8</b>
8	Inspect the steering gear bearing preload for the proper adjustment. Refer to " <b>Worm Thrust Bearing Preload Adjustment - Off Vehicle</b> ". Is the steering gear bearing preload adjustment incorrect?	Go to <b>Step 17</b>	Go to <b>Step 9</b>
9	Inspect the steering linkage. Refer to " <b>Steering Linkage Inspection</b> " in Steering Linkage. Is the steering linkage worn?	Go to <b>Step 18</b>	Go to <b>Step 10</b>
10	Inspect the suspension. Is the suspension worn?	Go to <b>Step 19</b>	Go to <b>Step 11</b>
11	Inspect the intermediate shaft. Is the intermediate shaft worn?	Go to <b>Step 20</b>	Go to <b>Step 3</b>
12	Adjust or replace the hoses. Refer to " <b>Power Steering Pressure Hose Replacement (2.4L)</b> " " <b>Power Steering Pressure Hose Replacement (4.3L)</b> " Did you complete the repair?	Go to <b>Step 21</b>	—



**Steering****Power Steering System-1**

Step	Action	Yes	No
13	Replace the engine drive belt. Refer to " <b>Drive Belt Replacement</b> " in Engine Mechanical-2.4L or " <b>Drive Belt Replacement</b> " in Engine Mechanical-4.3L. Did you complete the repair?	Go to <b>Step 21</b>	—
14	Replace the power steering pump pulley. Refer to " <b>Power Steering Pulley Replacement</b> ". Did you complete the repair?	Go to <b>Step 21</b>	—
15	Install the power steering pump correctly. Refer to " <b>Power Steering Pump Replacement (2.4L)</b> " " <b>Power Steering Pump Replacement (4.3L)</b> ". Did you complete the repair?	Go to <b>Step 21</b>	—
16	Install the power steering gear correctly. Refer to " <b>Power Steering Gear Replacement (RWD)</b> " " <b>Power Steering Gear Replacement (4WD)</b> ". Did you complete the repair?	Go to <b>Step 21</b>	—
17	Adjust the steering gear bearing preload. Refer to " <b>Worm Thrust Bearing Preload Adjustment - Off Vehicle</b> ". Did you complete the repair?	Go to <b>Step 21</b>	—
18	Replace the worn steering linkage. Refer to " <b>Steering Linkage Inspection</b> " in Steering Linkage. Did you complete the repair?	Go to <b>Step 21</b>	—
19	Replace the worn suspension components. Refer to " <b>Diagnostic Starting Point - Suspension General Diagnosis</b> " in Suspension General Diagnosis. Did you complete the repair?	Go to <b>Step 21</b>	—
20	Replace the intermediate shaft. Refer to " <b>Intermediate Steering Shaft Replacement - Upper</b> " or " <b>Intermediate Steering Shaft Replacement - Lower</b> " in Steering Wheel and Column - Standard or " <b>Intermediate Steering Shaft Replacement - Upper</b> " or " <b>Intermediate Steering Shaft Replacement - Lower</b> " in Steering Wheel and Column - Tilt. Did you complete the repair?	Go to <b>Step 21</b>	—
21	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

**Diagnostic Information and Procedures****Whine or Growl Noise from the Power Steering System**

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to <b>Step 2</b>	Go to " <b>Symptoms - Power Steering System</b> "
2	Verify that a whine or growl noise is present. Is a whine or growl noise present?	Go to <b>Step 3</b>	System OK
3	Perform the power steering test procedure in order to diagnose a hydraulic condition and repair or replace a component. Refer to " <b>Power Steering System Test Procedure</b> ". Did you repair or replace a power steering system component?	Go to <b>Step 10</b>	Go to <b>Step 4</b>
4	Using a stethoscope, inspect the power steering gear for a whine or growl noise. Is the noise present at the power steering gear?	Go to <b>Step 7</b>	Go to <b>Step 5</b>
5	Using a stethoscope, inspect the power steering pump for a whine or growl noise. Is the noise present at the power steering pump?	Go to <b>Step 8</b>	Go to <b>Step 6</b>
6	Using the stethoscope, inspect the power steering hoses for a whine or growl noise. Is the noise present at the power steering hoses?	Go to <b>Step 9</b>	Go to <b>Step 2</b>
7	Replace the power steering gear. Refer to " <b>Power Steering Gear Replacement (RWD)</b> " " <b>Power Steering Gear Replacement (4WD)</b> ". Did you complete the repair?	Go to <b>Step 10</b>	—
8	Replace the power steering pump. Refer to " <b>Power Steering Pump Replacement (2.4L)</b> " " <b>Power Steering Pump Replacement (4.3L)</b> ". Did you complete the repair?	Go to <b>Step 10</b>	—
9	Adjust the routing of the power steering hoses. Did you complete the repair?	Go to <b>Step 10</b>	—
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

**Diagnostic Information and Procedures****Steering Effort Hard in One or Both Directions**

Step	Action	Yes	No
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**Steering****Power Steering System-1**

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to <b>Step 2</b>	Go to " <b>Symptoms - Power Steering System</b> "
2	Verify that the steering effort is hard in one or both directions. Does the system operate normally?	System OK	Go to <b>Step 3</b>
3	Perform the power steering test procedure. Refer to " <b>Power Steering System Test Procedure</b> ". Did you complete the procedure?	Go to <b>Step 4</b>	—
4	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

**Diagnostic Information and Procedures****Steering Effort Too Easy in One or Both Directions**

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to <b>Step 2</b>	Go to " <b>Symptoms - Power Steering System</b> "
2	Verify that the steering effort is too easy in one or both directions. Does the system operate normally?	System OK	Go to <b>Step 3</b>
3	Perform the power steering test procedure. Refer to " <b>Power Steering System Test Procedure</b> ". Did you complete the procedure?	Go to <b>Step 4</b>	—
4	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 3</b>

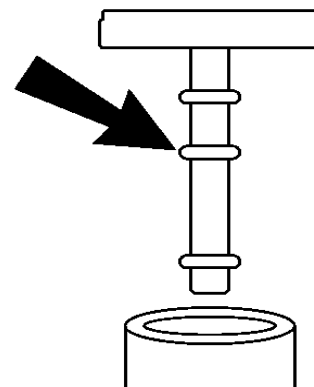
**Repair Instructions****Bleeding the Power Steering System****Tools Required**

- [J35555](#) Mity Vac
- [J43485](#) Power Steering Bleeder Adapter

**Notice:** If the power steering system has been serviced, an accurate fluid level reading cannot be obtained unless air is bled from the steering system. The air in the fluid may cause pump cavitation noise and may cause pump damage over a period of time.

**Notice:** When adding fluid or making a complete fluid change, always use the proper power steering fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks.

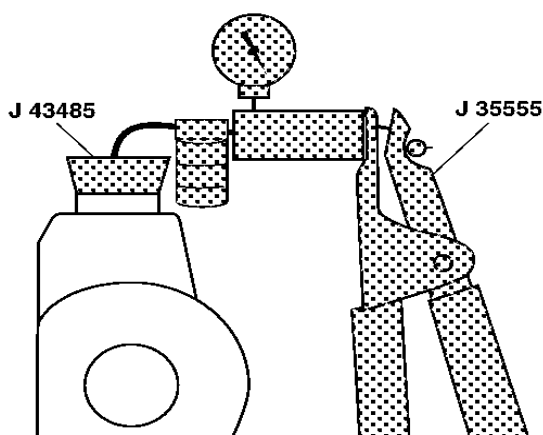
- **Important:** Hoses touching the frame, body, or engine may cause system noise.  
Verify that the hoses do not touch any other part of the vehicle.
- **Important:** Loose connections may not leak, but could allow air into the steering system.  
Verify that all hose connections are tight.



**Important:** Maintain the fluid level throughout the bleed procedure.

Remove the pump reservoir cap.

- **Important:** Use clean, new power steering fluid only.  
Fill the pump reservoir with fluid to the FULL COLD level. Refer to "**Checking and Adding Power Steering Fluid**".



Attach the [J 43485](#) to the [J 35555](#) or equivalent.

- Place the [J 43485](#) on or in the pump reservoir filler neck.
- Apply a vacuum of 68 kPa (20 in Hg) maximum.
- Wait 5 minutes.

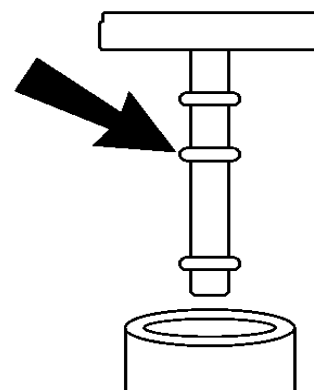
Typical vacuum drop is 7–10 kPa (2–3 in Hg). If the vacuum does not remain steady, refer to Excessive Vacuum Drop Diagnosis at the end of this procedure.

- Remove the [J 43485](#) and the [J 35555](#).
- Reinstall the pump reservoir cap.
- Start the engine. Allow the engine to idle.
- Turn off the engine.
- Verify the fluid level. Repeat steps 11–13 until the fluid stabilizes.

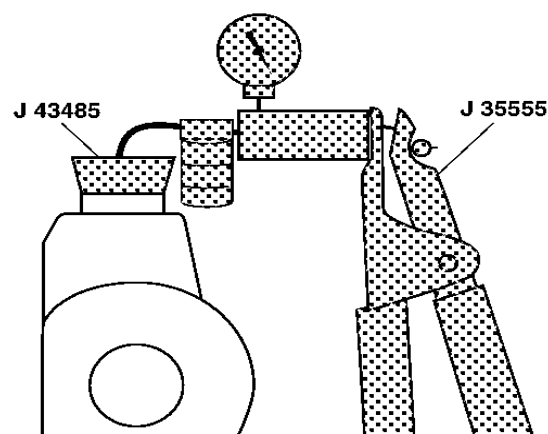
- **Important:** Do not turn steering wheel to lock.

Start the engine. Allow the engine to idle.

- Turn the steering wheel 180–360 degrees in both directions 5 times.
- Switch the ignition off.
- Verify the fluid level.

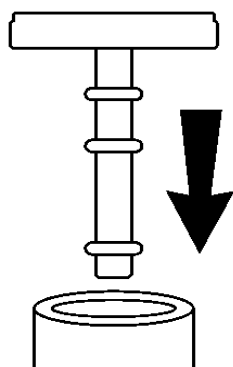


Remove the pump reservoir cap.



Attach the [J 43485](#) to the [J 35555](#) or equivalent.

- Place the [J 43485](#) on or in the pump reservoir filler neck.
- Apply a vacuum of 68 kPa (20 in Hg) maximum.
- Wait 5 minutes.
- Remove the [J 43485](#) and the [J 35555](#).
- Verify the fluid level.

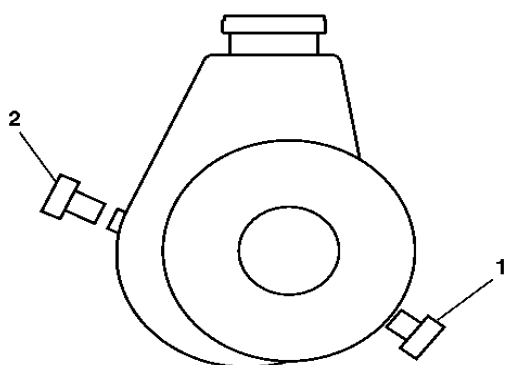


Reinstall the pump reservoir cap.

### Excessive Vacuum Drop Diagnosis

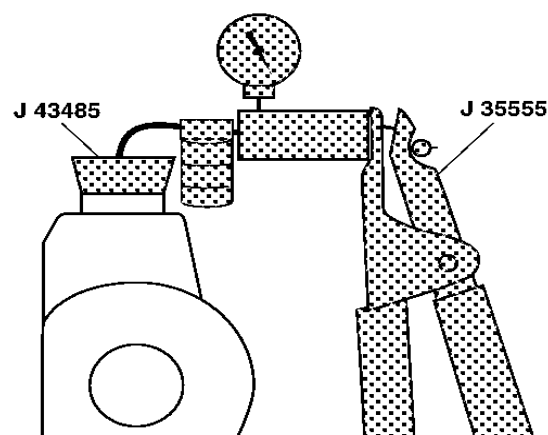
#### Tools Required

- [J 35555](#) Mity Vac
- [J 43485](#) Power Steering Bleed Adapter



If the vacuum continues to drop, remove the pressure and return hose from the pump.

- Install the plugs (1,2) supplied with the [J 43485](#) into the pressure and return port.



Attach the [J 43485](#) to the [J 35555](#) or equivalent.

- Place the [J 43485](#) on or in the pump reservoir filler neck.
- Apply a vacuum of 68 kPa (20 in Hg) maximum.
- If the vacuum drops again, repair or replace the pump. If the vacuum holds steady, continue to check the other parts of the steering system.
- **Important:** Fluid must be free from bubbles and foam. Be aware of periodic bubbles that indicate a loose connection or leaking O-ring seal in the return hose or the pressure hose. Fluid must be free from discoloration.

Observe the fluid.

- If condition persists, replace the following parts:
  - The return hose clamps
  - The return hose O-rings
  - The pressure hose O-rings
  - The gear cylinder line O-rings
  - The reservoir to pump O-ring
- Repeat the bleed procedure from the beginning.
- Drive the vehicle approximately 16 km in order to warm the system to operating temperature. Evaluate vehicle on a smooth flat surface.
- Verify the following conditions:
  - There is smooth power assist.
  - The vehicle operates quietly.
  - The pump maintains the proper fluid level.

## Steering

## Power Steering System-1

- There is no leaking in the steering system.
- The fluid is free of foam or discoloration.

## Repair Instructions

### Checking and Adding Power Steering Fluid

**Notice:** When adding fluid or making a complete fluid change, always use the proper power steering fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks.

1. Clean the area surrounding the reservoir cap.
2. Remove the reservoir cap.
3. Inspect the power steering pump fluid level at regular intervals. Use the appropriate procedure below.

Add fluid when required. Refer to "**Fluid and Lubricant Recommendations**" in Maintenance and Lubrication.

#### Fluid Is Cold

- Remove the reservoir cap.
- Inspect the fluid level on the capstick.
- Ensure that the fluid level is between the bottom of the COLD/FULL mark and the end of the capstick.

#### Fluid Is Hot

- Run the engine until the fluid reaches about 80° C (170°F).
- Turn the engine OFF.
- Remove the reservoir cap.
- Inspect the fluid level on the capstick.
- Ensure that the fluid level is between the HOT/FULL and the COLD/FULL marks on the capstick.

4. If the fluid level is low, add power steering fluid to the proper level.
5. Install the reservoir cap.
6. When checking the fluid level after servicing the steering system, bleed the air from the system. Refer to "**Bleeding the Power Steering System**".

## Repair Instructions

### Flushing the Power Steering System

**Important:** Do not reuse any drained power steering fluid regardless of appearance or condition.

1. Turn off the engine.

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2. Raise the front end of the vehicle off the ground until the tires and wheels turn freely. Refer to "**Lifting and Jacking the Vehicle**" in General Information.
3. Place a large container under the fluid return hose in order to collect the draining fluid.
4. Remove the fluid return hose at the power steering pump reservoir inlet connection.
5. Plug the reservoir return hose inlet connection on the power steering pump.
6. **Important:**
  - This step may require 2–4 quarts of power steering fluid until the draining fluid appears clear.
  - Do not run the engine without the power steering fluid level at FULL COLD.

Run the engine at idle while an assistant maintains the fluid level at FULL COLD in the reservoir using new approved power steering fluid.

7. Turn off the engine.
8. Turn the steering wheel fully to the left and to the right.
9. Remove the plug from the pump reservoir inlet connection.
10. Install the fluid return hose to the pump reservoir.
11. Maintain the fluid level at FULL COLD.
12. Operate the engine at idle for approximately 15 minutes.
13. Repeat steps 3–5.
14. Inspect the power steering fluid for the following indications of contamination:
  - Milky fluid (water)
  - Brown fluid (burnt)
  - Plastic debris or dirt chunks
15. If the fluid is contaminated, repeat steps 6–12 in order to complete a third flush.
16. Remove the plug from the pump reservoir inlet connection.
17. Install the fluid return hose to the pump reservoir.
18. Clean any spilled fluid.
19. Bleed the power steering system. Refer to "**Bleeding the Power Steering System**".

## Repair Instructions

## Steering

## Power Steering System-1

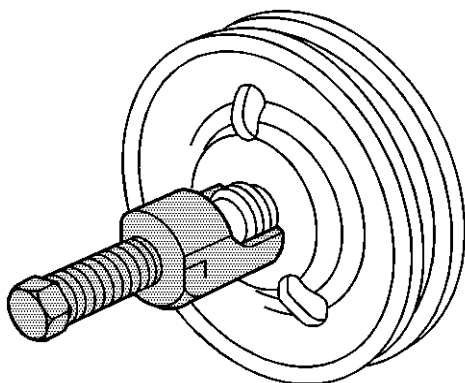
## Power Steering Pulley Replacement

## Tools Required

- [J 25034-C](#) Power Steering Pump Pulley Remover
- [J 25033-C](#) Power Steering Pump Pulley Installer

## Removal Procedure

▪

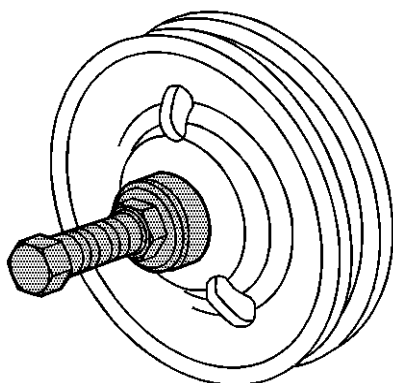


Remove the upper fan shroud. Refer to "**Fan Shroud Replacement**" in Engine Cooling.

- Remove the drive belt. Refer to "**Drive Belt Replacement**" in Engine Mechanical-2.4L or "**Drive Belt Replacement**" in Engine Mechanical-4.3L.
- Remove the power steering pump pulley using [J 25034-C](#).

## Installation Procedure

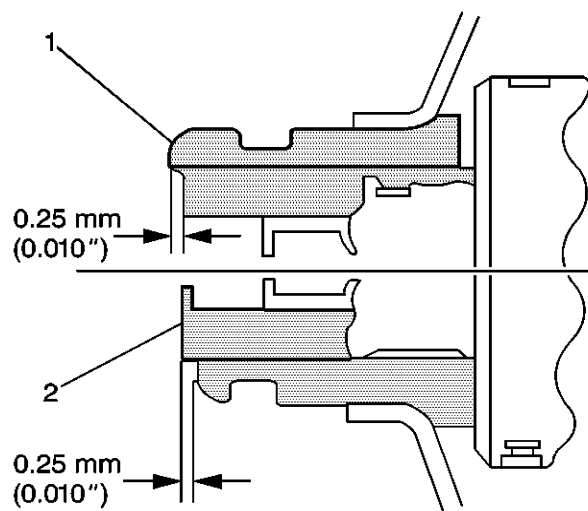
▪



Place the power steering pump pulley on the end of the power steering pump shaft.

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- Install the power steering pump pulley using [J 25033-C](#).
- 



Ensure that the power steering pump pulley (1) is flush against the power steering pump shaft (2), with an allowable variance of 0.25 mm (0.010 in).

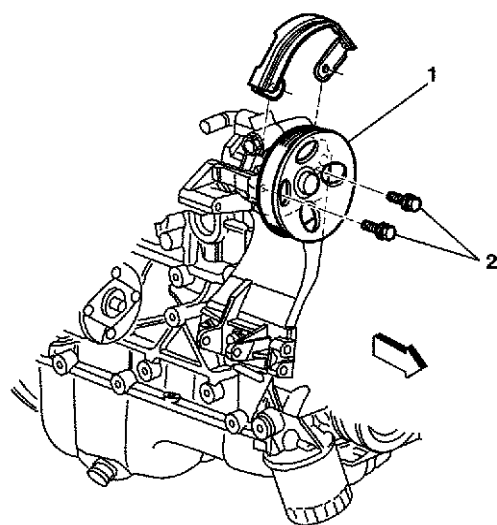
- Install the drive belt. Refer to "**Drive Belt Replacement**" in Engine Mechanical-2.4L or "**Drive Belt Replacement**" in Engine Mechanical-4.3L.
- Install the upper fan shroud. Refer to "**Fan Shroud Replacement**" in Engine Cooling.

## Repair Instructions

## Power Steering Pump Replacement (2.4L)

## Removal Procedure

▪



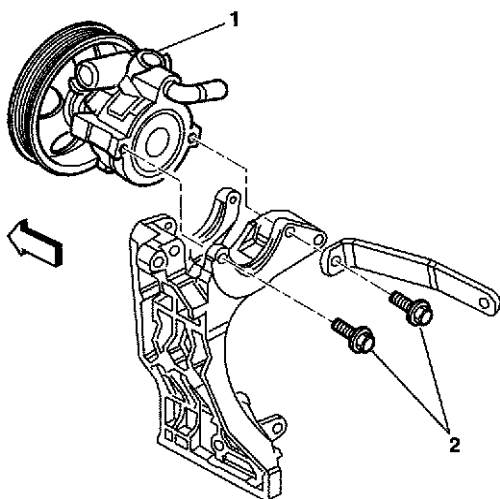
Place a drain pan below the pump.

- Remove the power steering hoses from the pump (1).

## Steering

## Power Steering System-1

- Cap the power steering hoses.
- Remove the drive belt. Refer to "**Drive Belt Replacement**" in Engine Mechanical-2.4L.
- Remove the front power steering pump bolts (2) through the holes in the power steering pump pulley.

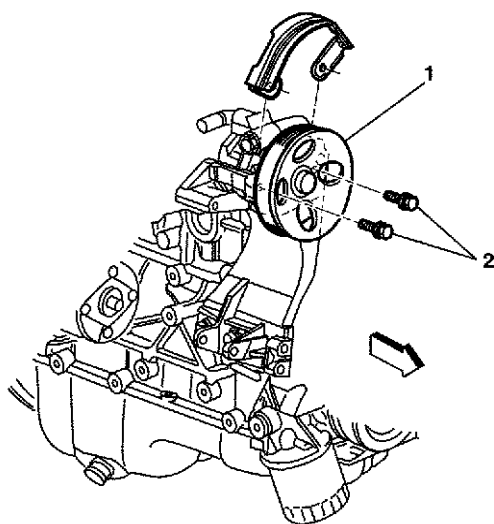


Remove the power steering pump rear mounting bracket nuts and bolts (2).

- Remove the power steering pump (1).

## Installation Procedure

- 



Install the power steering pump.

- **Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the power steering pump front mounting bolts (2).

**Tighten:** Tighten the power steering pump front mounting bolts (2) to 25 Nm (18 lb ft).

- Install the power steering pump rear mounting bracket nuts and bolts (2).

**Tighten:** Tighten the nuts to 25 Nm (18 lb ft).

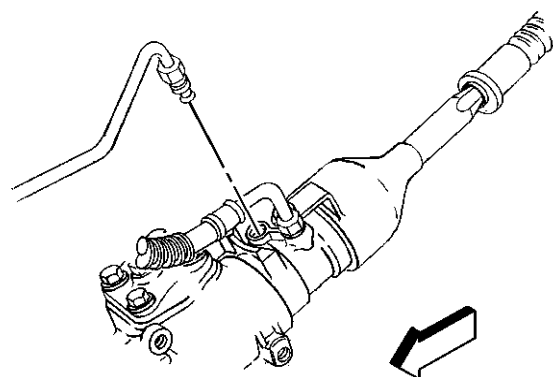
- Install the drive belt. Refer to "**Drive Belt Replacement**" in Engine Mechanical-2.4L.
- Install the power steering pump hoses.
- Fill the power steering system. Refer to "**Checking and Adding Power Steering Fluid**".
- Bleed the system. Refer to "**Bleeding the Power Steering System**".
- Inspect the hoses for clearance away from the frame and other components.
- Remove the drain pan.

## Repair Instructions

## Power Steering Pump Replacement (4.3L)

## Removal Procedure

- 

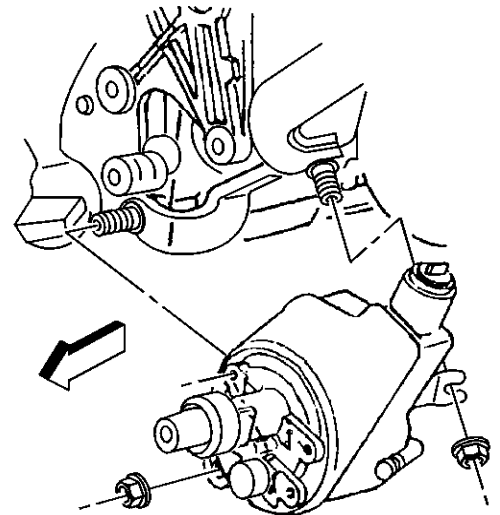
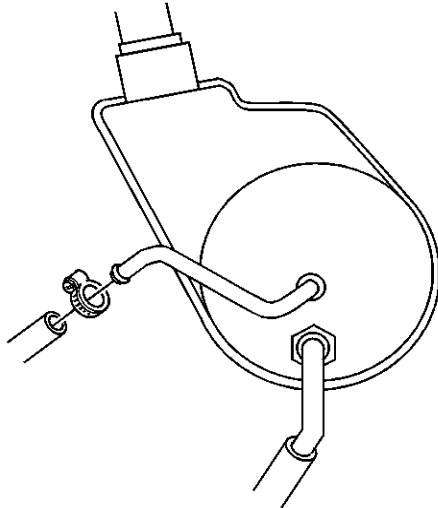


Remove the fan clutch from the water pump. Refer to "**Fan Clutch Replacement**" in Engine Cooling.

- Remove the drive belt. Refer to "**Drive Belt Replacement**" in Engine Mechanical-4.3L.
- Remove the power steering pump pulley. Refer to "**Power Steering Pulley Replacement**".
- Raise and suitably support the vehicle. Refer to "**Lifting and Jacking the Vehicle**" in General Information.

**Steering****Power Steering System-1**

- Remove the steering linkage shield. Refer to "**Steering Linkage Shield Replacement**" in Steering Linkage.
- Place a drain pan below the pump.
- Disconnect the power steering pressure hose from the power steering pump.

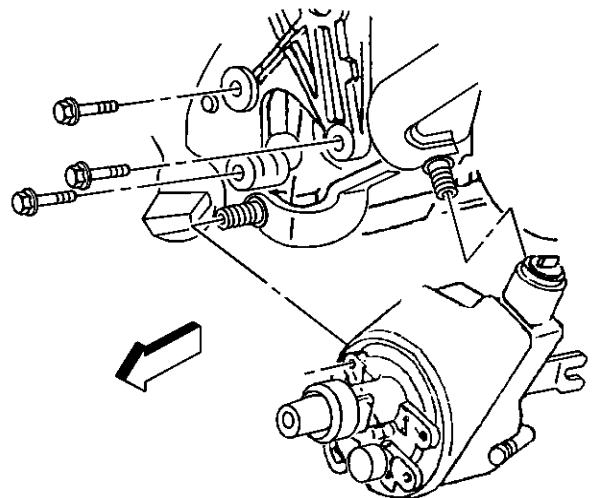
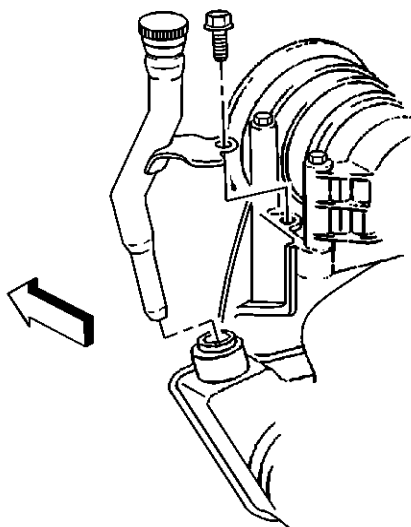


Remove the power steering rear mounting bracket nut from the engine stud.

- Remove the power steering lower mounting nut from the engine stud.

Lower the vehicle.

- Remove the air cleaner assembly. Refer to "**Air Cleaner Assembly Replacement**" in Engine Controls-4.3L.
- Disconnect the power steering return hose from the power steering pump.
- Cap the power steering pump hoses.



Remove the power steering pump front mounting bolts.

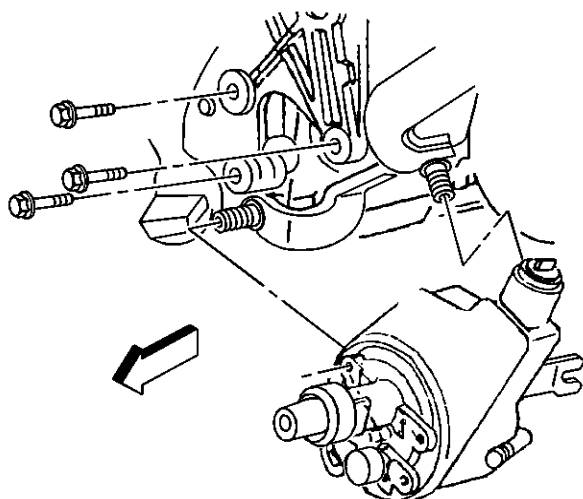
- Remove the power steering pump.

**Installation Procedure**

Remove the filler neck tube mounting bolt.

- Remove the filler neck tube.



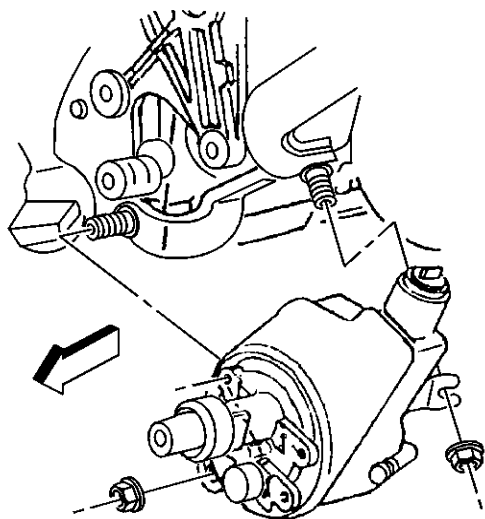


Install the power steering pump.

- **Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the power steering pump front mounting bolts.

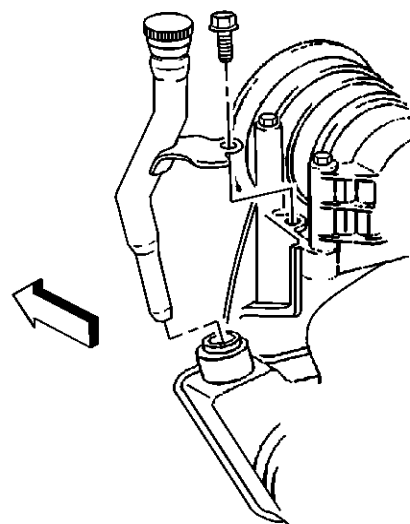
**Tighten:** Tighten the power steering pump front mounting bolts to 55 Nm (40 lb ft).



Install the power steering pump rear mounting bracket nut to the engine stud.

- Install the power steering pump lower mounting nut to the engine stud.

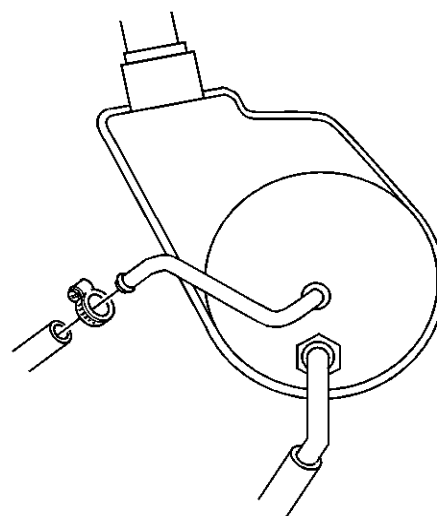
**Tighten:** Tighten the power steering pump rear mounting bracket nut and the power steering pump front mounting nut to 41 Nm (30 lb ft).



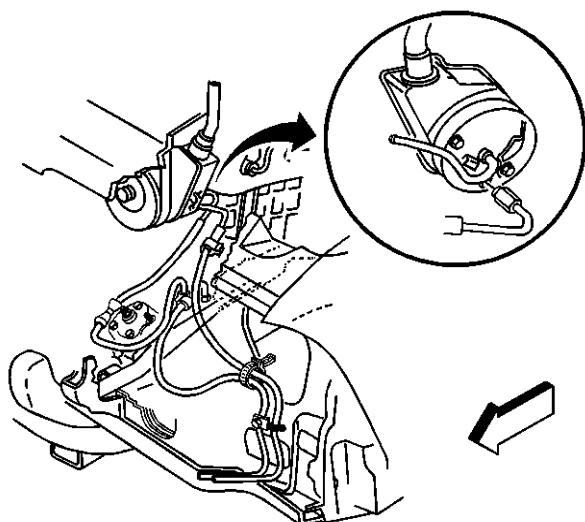
Install the filler neck tube.

- Install the filler neck tube mounting bolt.

**Tighten:** Tighten the filler neck tube mounting bolt to 20 Nm (15 lb ft).



Connect the power steering gear outlet hose to the power steering pump.



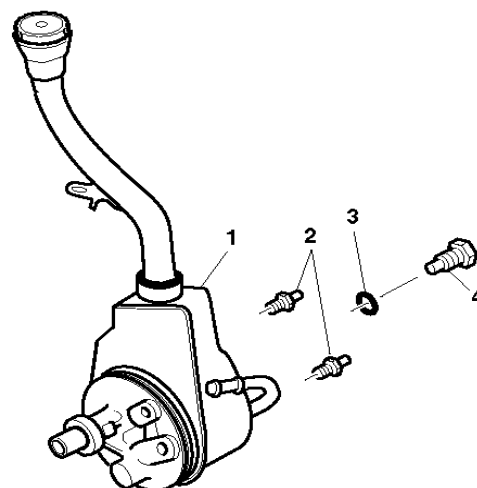
Install the air cleaner assembly. Refer to "**Air Cleaner Assembly Replacement**" in Engine Controls-4.3L.

- Raise and suitably support the vehicle. Refer to "**Lifting and Jacking the Vehicle**" in General Information.
- Connect the power steering pressure hose to the power steering pump.
- Install the steering linkage shield. Refer to "**Steering Linkage Shield Replacement**" in Steering Linkage.
- Lower the vehicle.
- Install the power steering pump pulley. Refer to "**Power Steering Pulley Replacement**".
- Install the drive belt. Refer to "**Drive Belt Replacement**" in Engine Mechanical-4.3L.
- Install the fan clutch to the water pump. Refer to "**Fan Clutch Replacement**" in Engine Cooling.
- Fill the power steering system. Refer to "**Checking and Adding Power Steering Fluid**".
- Bleed the system. Refer to "**Bleeding the Power Steering System**".
- Inspect the hoses for clearance away from the frame and other components.

## Repair Instructions

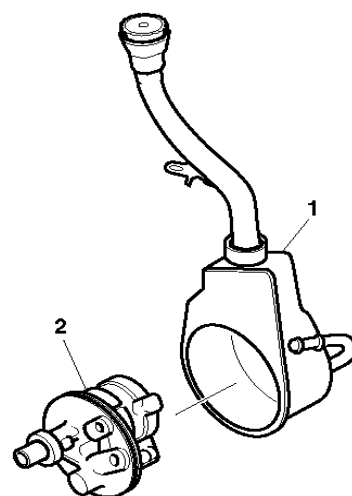
### Power Steering Reservoir Replacement - Off Vehicle (P Series)

#### Disassembly Procedure

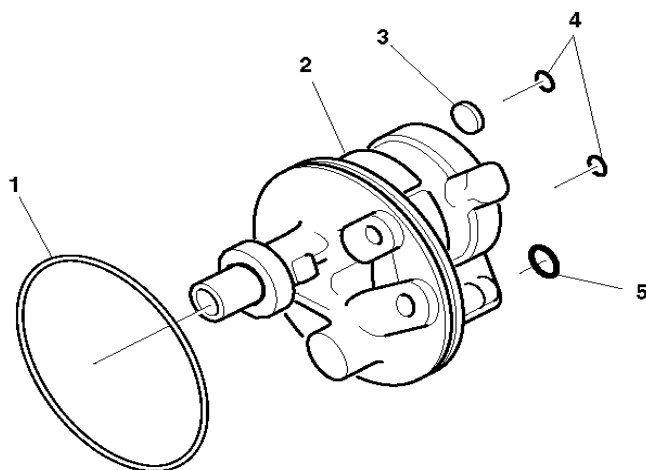


Drain the power steering fluid from the power steering pump.

- Remove the pump mounting studs (2).
- Remove the connector and fitting assembly (4).
- Remove the O-ring seal (3).



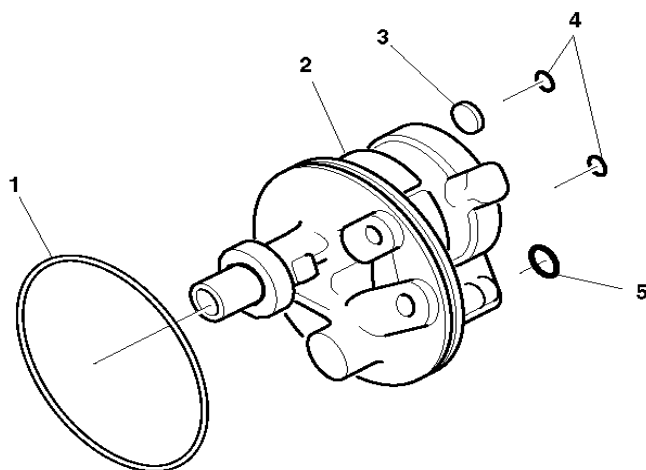
Remove the reservoir assembly (1) from the pump housing assembly (2).



Remove the O-ring seals (1, 4, 5).

- Remove the magnet (3).
- Clean the magnet (3).
- Inspect the welch plug in the power steering pump housing (2). Do not remove. If the welch plug is deformed or dislodged, replace the power steering pump housing (2).

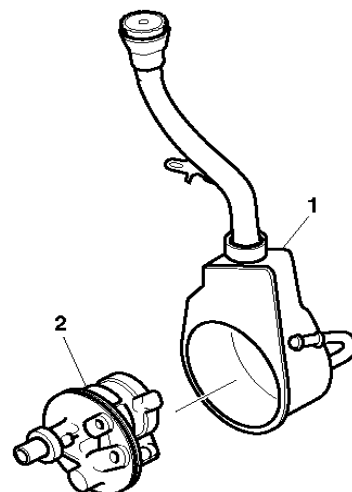
### Assembly Procedure



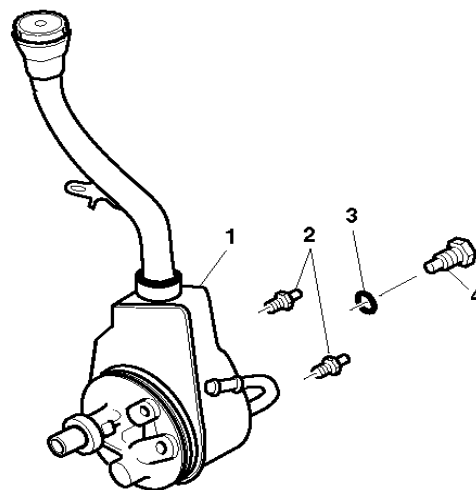
**Important:** Use new O-ring seals when assembling the power steering pump assembly.

Lubricate the O-ring seals (1, 4, 5) with power steering fluid.

- Install the O-ring seals (1, 4, 5) to the pump housing assembly.
- Install the magnet (3) to the pump housing assembly (2).



Connect the reservoir assembly (1) to the pump housing assembly (2).



Install the O-ring seal.

- **Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the connector and fitting assembly (4) to the pump housing (1).

Install the pump mounting studs (2) to the pump housing (1).

### Tighten

- Tighten the pump mounting studs (2) to 41 Nm (30 lb ft).
- Tighten the connector and fitting assembly (4) to 75 Nm (55 lb ft).

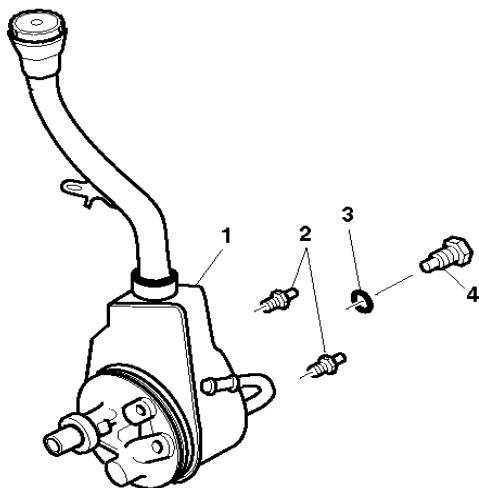
## Repair Instructions

## Steering

## Power Steering System-1

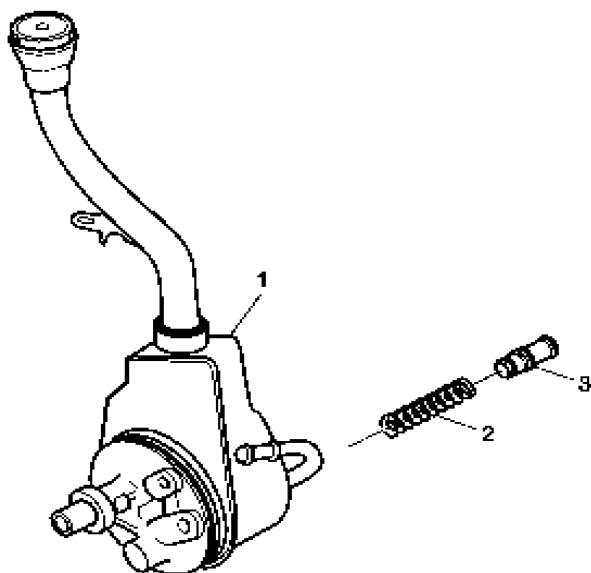
### Power Steering Pump Flow Control Valve Replacement - Off Vehicle (P Series)

#### Disassembly Procedure



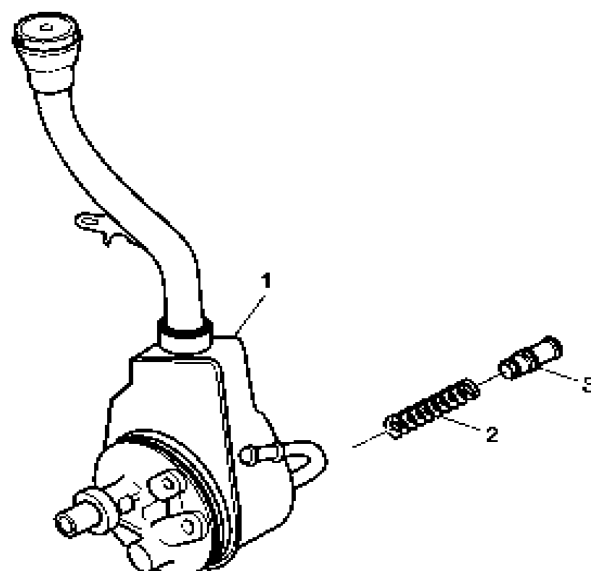
Drain the power steering fluid from the power steering pump.

- Remove the connector and fitting assembly (4).
- Remove the O-ring seal (3).



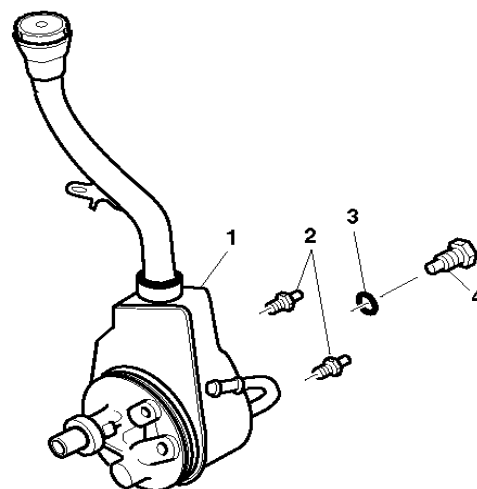
Remove the control valve assembly (3) and the flow control spring (2) from the pump housing assembly (1).

#### Assembly Procedure



Install the flow control spring (2) to the pump housing assembly (1).

- Install the control valve assembly (3) to the flow control spring (2).



Install the O-ring seal (3) to the connector and fitting assembly (4).

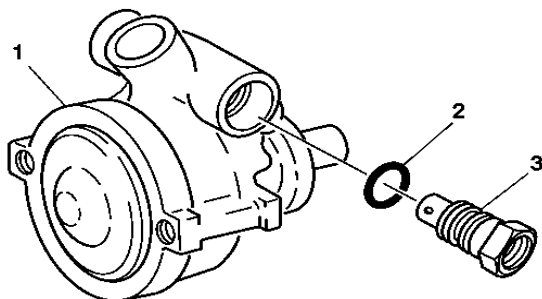
- Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the connector and fitting assembly (4) to the pump housing (1).

**Tighten:** Tighten the connector and fitting assembly (4) to 75 Nm (55 lb ft).

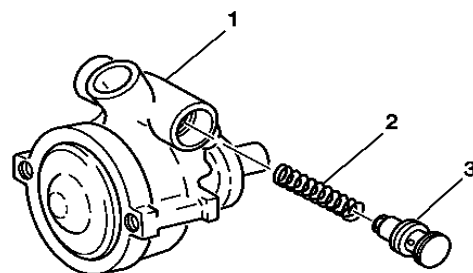
## Repair Instructions

### Power Steering Pump Flow Control Valve Replacement - Off Vehicle (CB Series)

**Steering****Power Steering System-1****Disassembly Procedure**

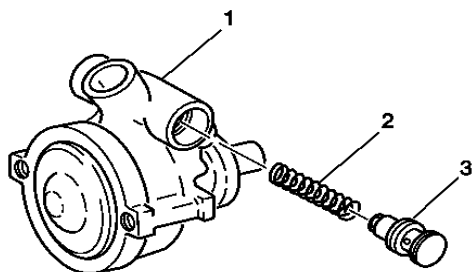
Remove the connector and fitting assembly (3).

- Remove the O-ring seal (2).

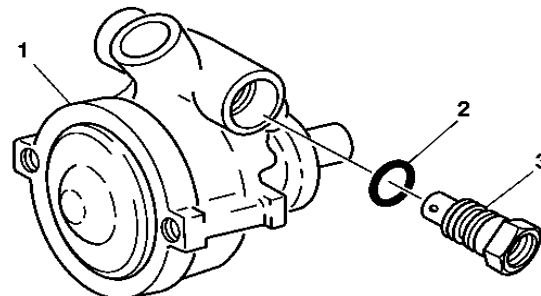


Install the flow control spring (2) to the pump housing assembly (1).

- Install the control valve assembly (3) to the flow control spring (2).



Remove the control valve assembly (3) and the flow control spring (2) from the pump housing assembly (1).

**Assembly Procedure**

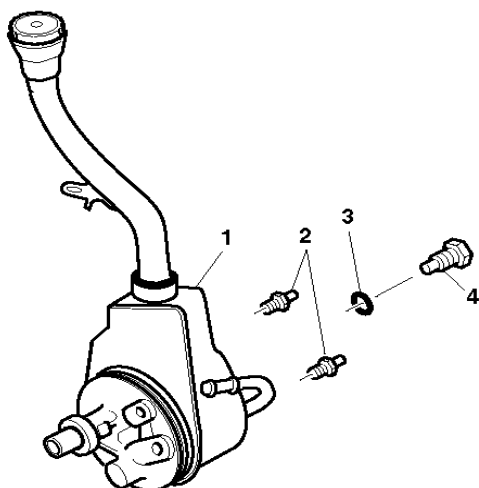
Lubricate the O-ring seal (2) with power steering fluid.

- Install the O-ring seal (2).
- Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the connector and fitting assembly (3) to the pump housing (1).

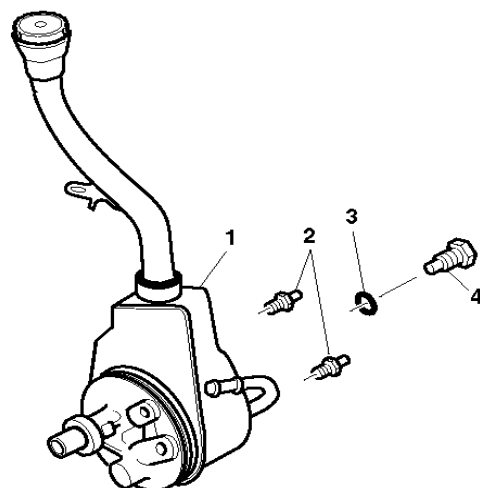
**Tighten:** Tighten the connector and fitting assembly (3) to 75 Nm (55 lb ft).

**Repair Instructions****Power Steering Pump Disassemble (P Series)**

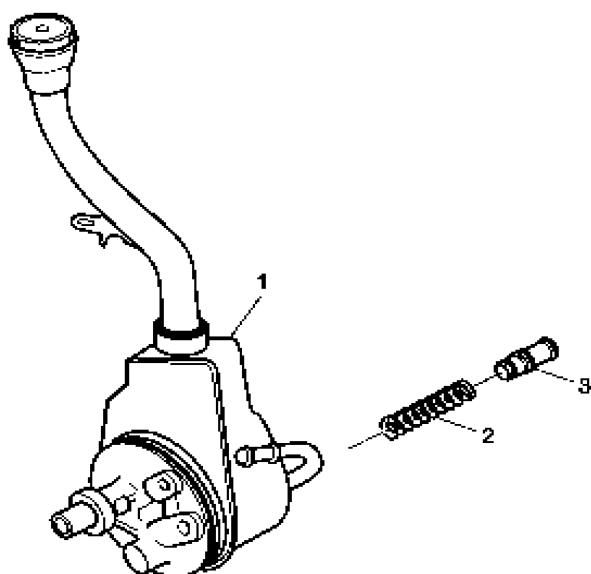


Drain the power steering fluid from the power steering pump (1).

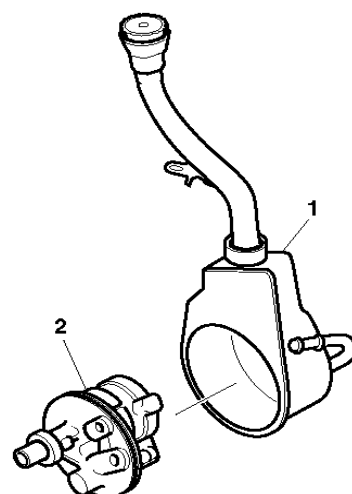
- Remove the connector and fitting assembly (4).
- Remove the O-ring seal (3).



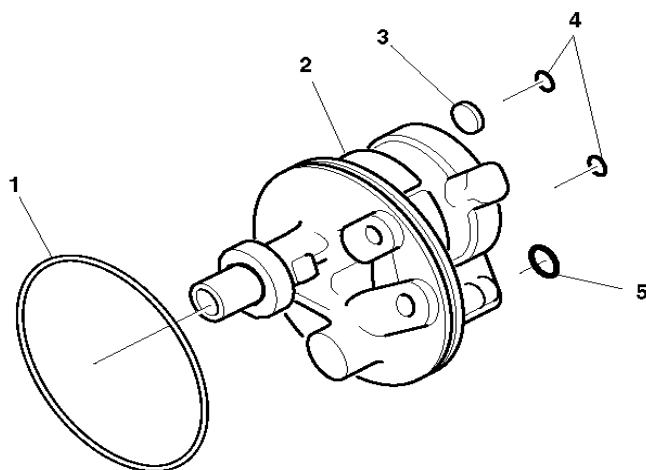
Remove the pump mounting studs (2).



Remove the control valve assembly (3) and the flow control spring (2) from the pump housing assembly (1).

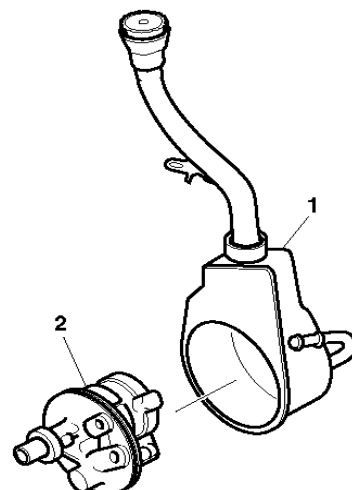


Remove the reservoir assembly (1) from the pump housing assembly (2).



Remove the O-ring seals (1, 4, 5).

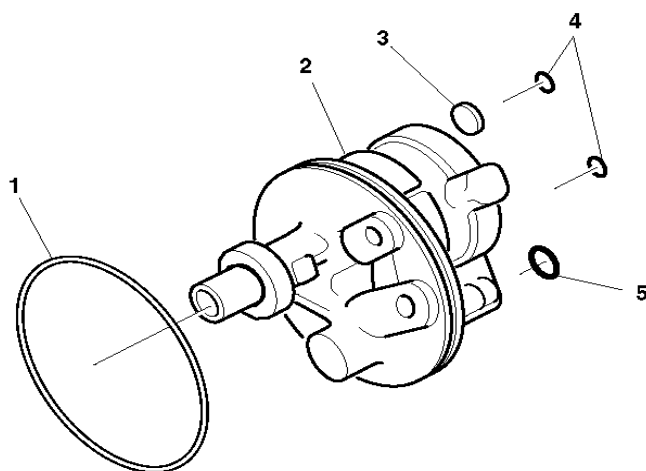
- Remove the magnet (3).



Connect the reservoir assembly (1) to the pump housing assembly (2).

## Repair Instructions

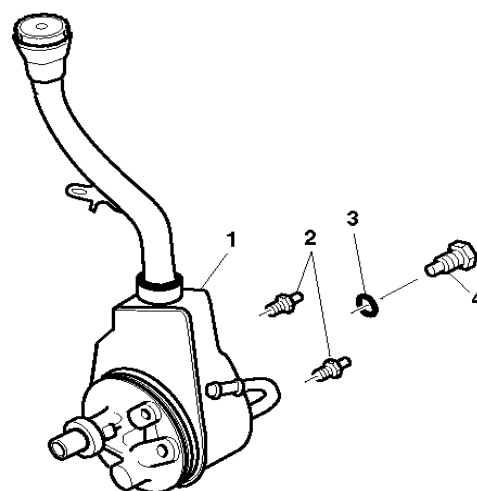
### Power Steering Pump Assemble (P Series)



**Important:** Use new O-ring seals when assembling the power steering pump assembly.

Lubricate the O-ring seals (1, 4, 5) with the power steering fluid.

- Install the O-ring seals (1, 4, 5) to the pump housing assembly.
- Install the magnet (3) to the pump housing assembly (2).



Install the O-ring seal (3).

- Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the connector and fitting assembly (4) to the pump housing (1).

- Install the pump mounting studs (2) to the pump housing (1).

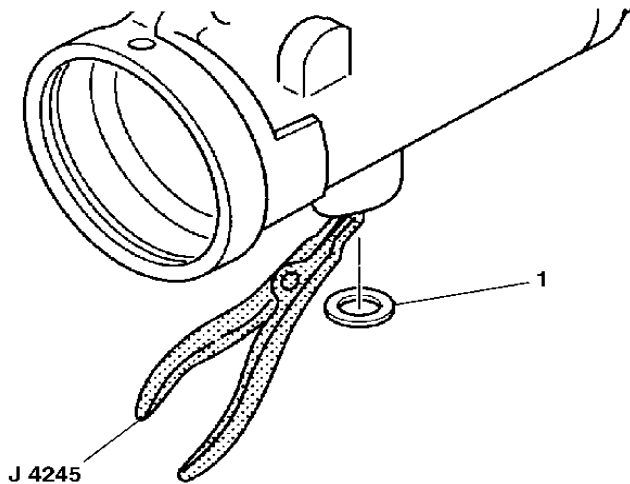
#### Tighten:

- Tighten the pump mounting studs (2) to 41 Nm (30 lb ft).
- Tighten the connector fitting assembly (4) to 75 Nm (55 lb ft).

## Repair Instructions

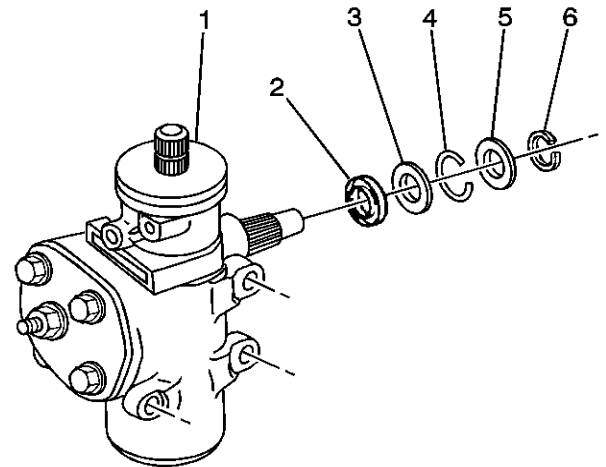
**Steering****Power Steering System-1****Pitman Shaft Seal Replacement - On Vehicle (RWD)****Tools Required**

- [J 4245](#) Snap Ring Pliers
- [J 6219](#) Pitman Shaft Oil Seal Installer

**Removal Procedure**

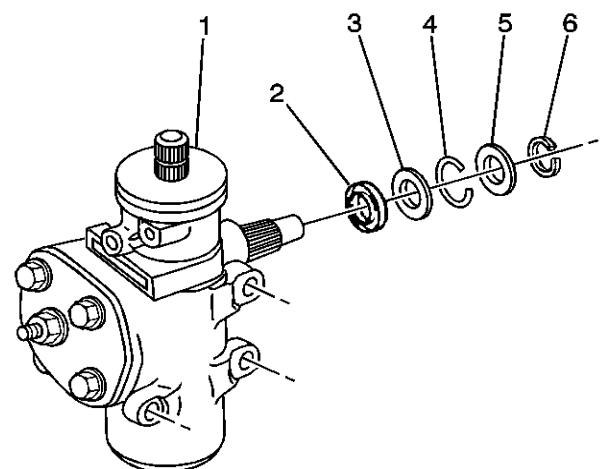
Remove the pitman arm from the pitman shaft. Refer to "**Pitman Arm Replacement (RWD)**" "**Pitman Arm Replacement (4WD)**" in Steering Linkage.

- Remove the snap ring (1) using [J 4245](#) .
- Place a drain pan under the steering gear.
- Start the engine.
- Turn the steering wheel from stop to stop.  
Bounce the wheel off the stops.
- Turn OFF the engine.



Remove the following components from the power steering gear (1):

- The dust seal (5)
  - The return ring (4)
  - The washer (3)
  - The Pittman shaft oil seal (2)
- Inspect the pitman shaft seal surfaces for roughness or pitting.  
Replace the pitman shaft if the shaft is pitted.
  - Clean the pitman shaft and seal areas using a wire brush.

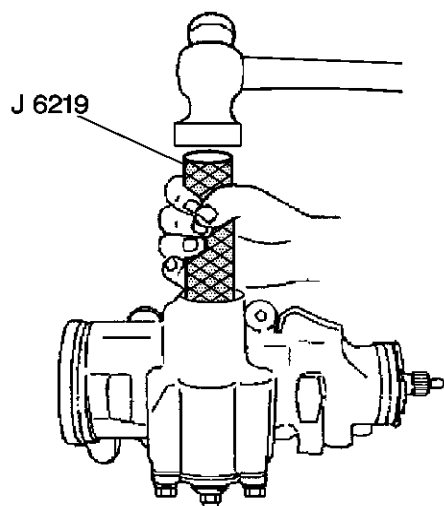
**Installation Procedure**

Lubricate the new seals with grease.



**Steering****Power Steering System-1**

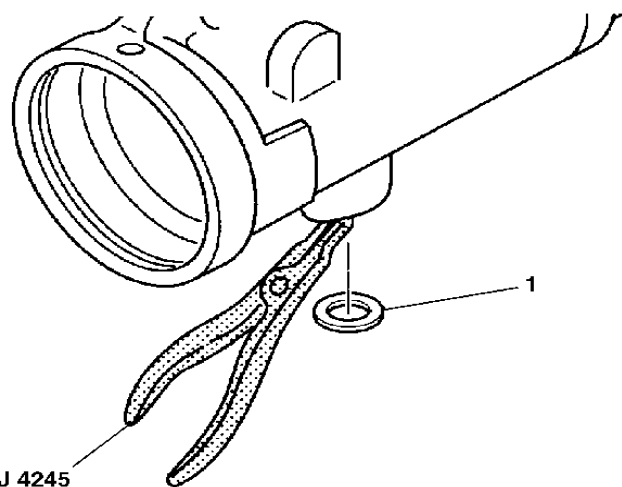
- Apply a single layer of tape to the pitman arm shaft in order to avoid damaging the seals.
- Install the pitman shaft oil seal (2) and washer (3) to power steering gear.
- 



Use [J 6219](#) in order to seat the pitman shaft oil seal and the washer into the power steering gear.

The seal should be in far enough to install the return ring, dust seal, and snap ring.

- Install the return ring and dust seal to the power steering gear.
- Use [J 6219](#) in order to seat the return ring and dust seal into the power steering gear.
- 



Install the snap ring (1) to the pitman arm shaft using [J 4245](#).

- Center the steering gear.
- Line up steering gear to pitman arm.

2001-S/T TRK (China)

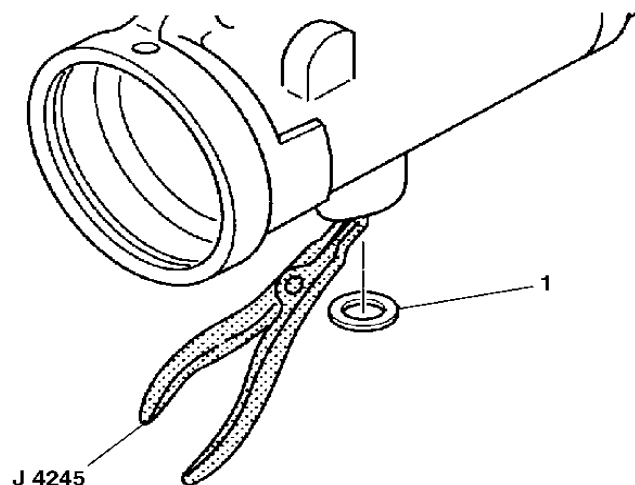
- Install the pitman arm. Refer to "**Pitman Arm Replacement (RWD)**" "**Pitman Arm Replacement (4WD)**" in Steering Linkage.
- Bleed the power steering system. Refer to "**Bleeding the Power Steering System**".

**Repair Instructions****Pitman Shaft Seal Replacement - On Vehicle (4WD)****Tools Required**

- [J 4245](#) Snap Ring Pliers
- [J 6219](#) Pitman Shaft Oil Seal Installer

**Removal Procedure**

- 

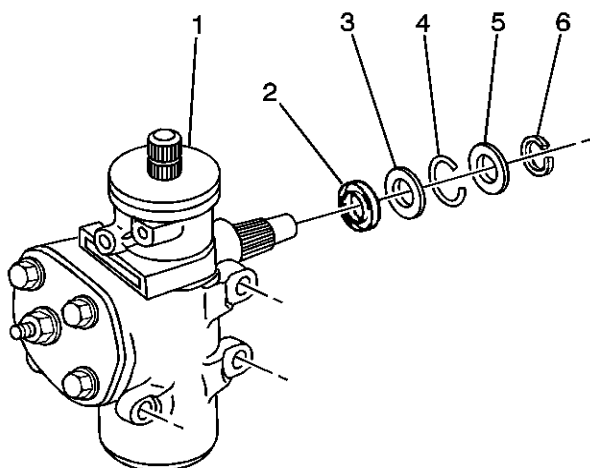


Remove the pitman arm. Refer to "**Pitman Arm Replacement (RWD)**" "**Pitman Arm Replacement (4WD)**".

- Remove the snap ring (1) using [J 4245](#).

## Steering

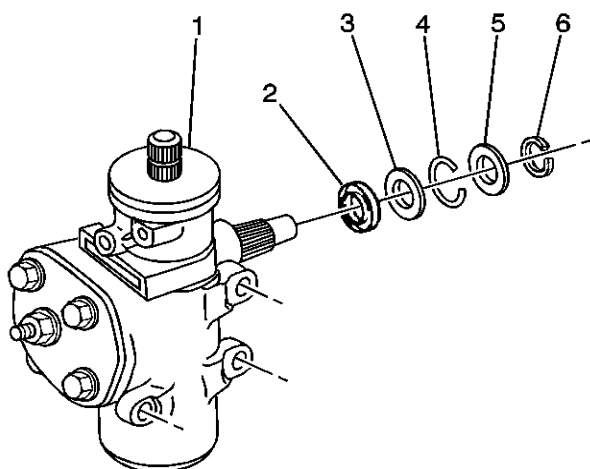
## Power Steering System-1



Remove the following components from the power steering gear (1):

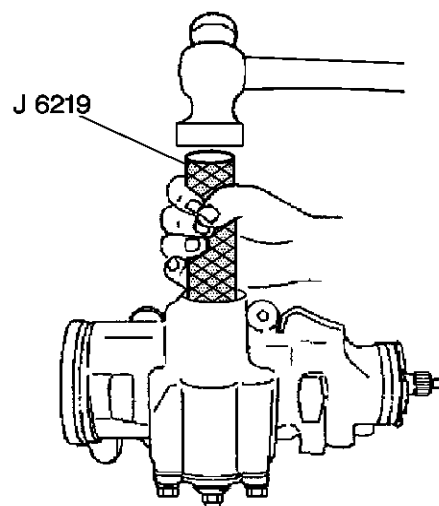
- The dust seal (5)
  - The return ring (4)
  - The washer (3)
  - The pitman shaft oil seal (2)
- Inspect the pitman shaft seal surfaces for roughness or pitting.
- Replace the pitman shaft if the shaft is pitted.
- Clean the pitman shaft and seal areas using a wire brush.

## Installation Procedure



Lubricate the new seals with grease.

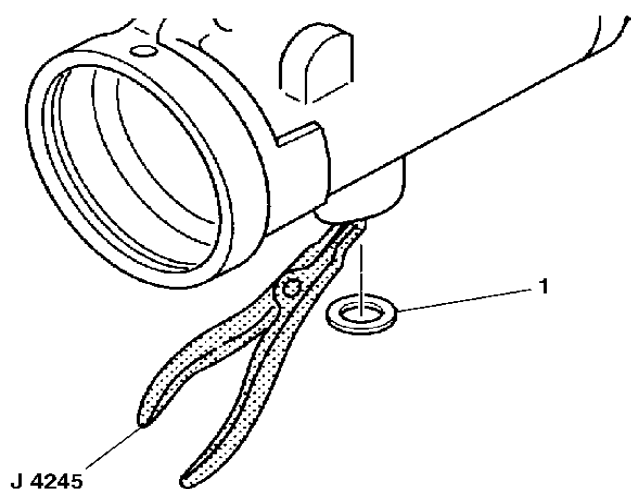
- Apply a single layer of tape to the pitman arm shaft in order to avoid damaging the seals.
- Install the pitman shaft oil seal (2) and washer (3) to power steering gear.
- 



Use [J 6219](#) in order to seat the pitman shaft oil seal and the washer into the power steering gear.

The seal should be in far enough to install the return, dust seal, and snap ring.

- Install the return ring and dust seal to the power steering gear.
- Use [J 6219](#) in order to seat the return ring and dust seal into the power steering gear.
- 



Install the snap ring (1) to the pitman arm shaft using [J 4245](#).

**Steering****Power Steering System-1**

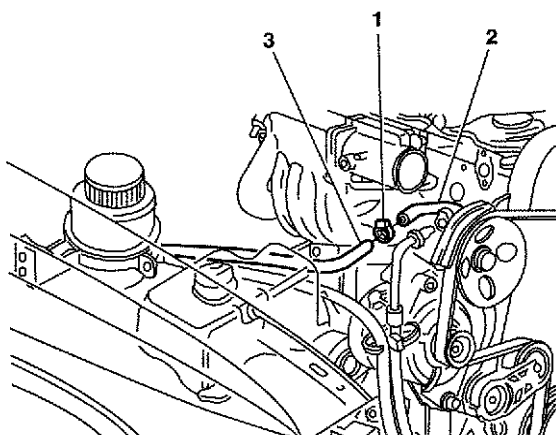
- Install the pitman arm. Refer to "Pitman Arm Replacement (RWD)" "Pitman Arm Replacement (4WD)" .

**Repair Instructions****Power Steering Reservoir Outlet Pipe/Hose Replacement (2.4L Pump to Reservoir)****Removal Procedure**

- **Notice:** Refer to Power Steering Hose Disconnected Notice in Cautions and Notices.

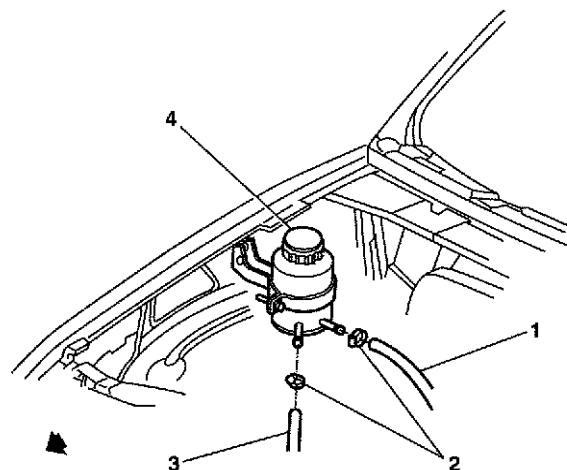
Remove the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls-2.4L.

- Install a drain pan under the vehicle.



Disconnect clamp (1) from the power steering pump (2).

- Remove the hose (3) from the power steering pump (2) and allow the fluid to drain.

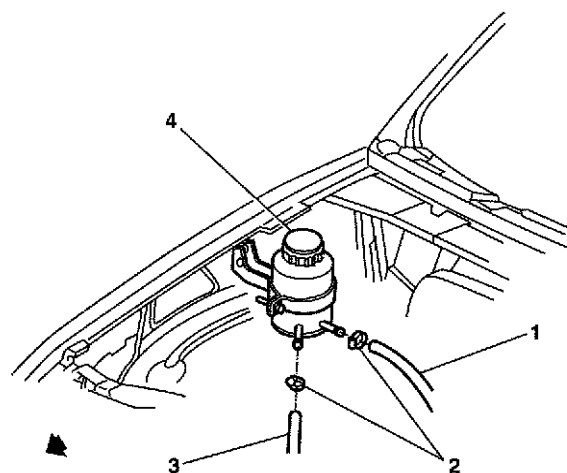


Disconnect the clamp (2) from the hose (1).

- Remove the power steering return hose (1) from the reservoir (4).
- Remove the power steering return hose from the vehicle.

**Installation Procedure**

- 



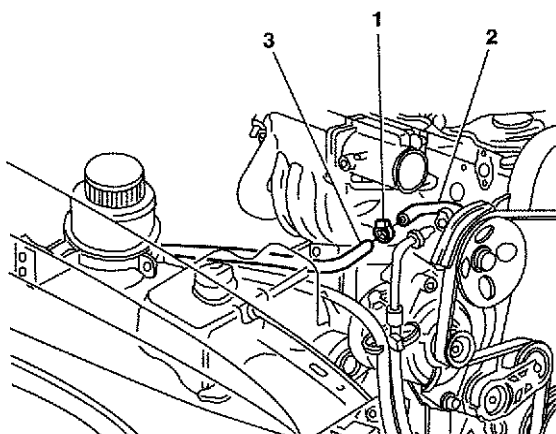
**Notice:** Refer to Installing Hoses Without Twists or Bends Notice in Cautions and Notices.

Install the hose (3) on the reservoir (1).

- **Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the clamp (2), on the power steering return hose (3).

**Tighten:** Tighten the hose clamp to 2.5 Nm (22 lb in).



Install the hose (1) to power steering pump (3).

- Install the clamp (2) on the hose (3).

**Tighten:** Tighten the hose clamp to 2.5 Nm (22 lb in).

- Fill the power steering system. Refer to "**Checking and Adding Power Steering Fluid**".
- Bleed the power steering system. Refer to "**Bleeding the Power Steering System**".
- Install the air cleaner assembly. Refer to "**Air Cleaner Assembly Replacement**" in Engine Controls-2.4L.
- Remove the drain pan from under the vehicle.

## Repair Instructions

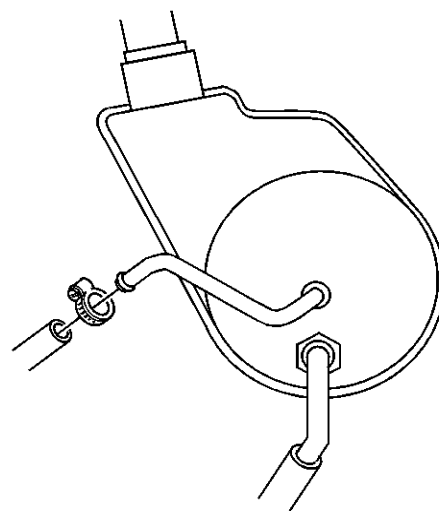
### Power Steering Reservoir Outlet Pipe/Hose Replacement (4.3L)

#### Removal Procedure

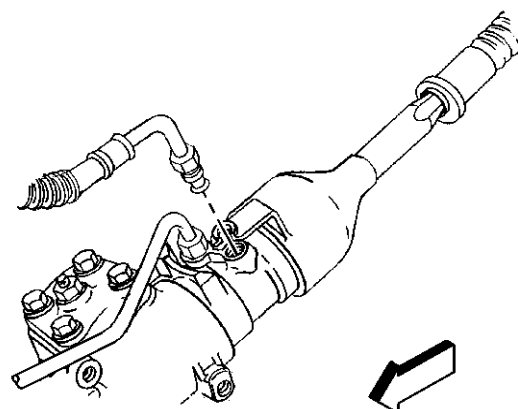
- Notice:** Refer to Power Steering Hose Disconnected Notice in Cautions and Notices.

Remove the air cleaner assembly. Refer to "**Air Cleaner Assembly Replacement**" in Engine Controls-4.3L.

- Install a drain pan under the vehicle.



Disconnect the power steering gear return hose from the power steering pump.



Disconnect the power steering gear return hose from the power steering gear.

- Remove the power steering gear return hose from the vehicle.

#### Installation Procedure

**Notice:** Refer to Installing Hoses Without Twists or Bends Notice in Cautions and Notices.

- Install the power steering gear return hose to the vehicle.

- Remove the drain pan from under the vehicle.

## Repair Instructions

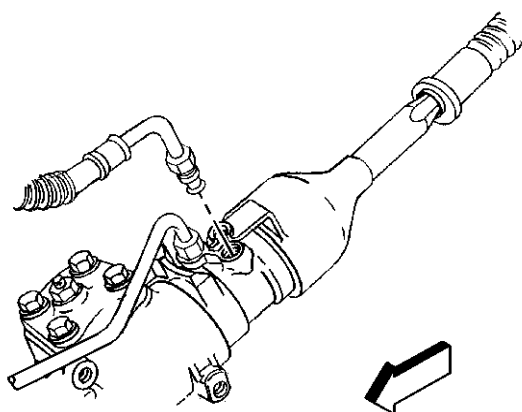
### Power Steering Reservoir Outlet Pipe/Hose Replacement (2.4L Reservoir to Gear)

#### Removal Procedure

- Notice:** Refer to Power Steering Hose Disconnected Notice in Cautions and Notices.

Remove the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls-2.4L.

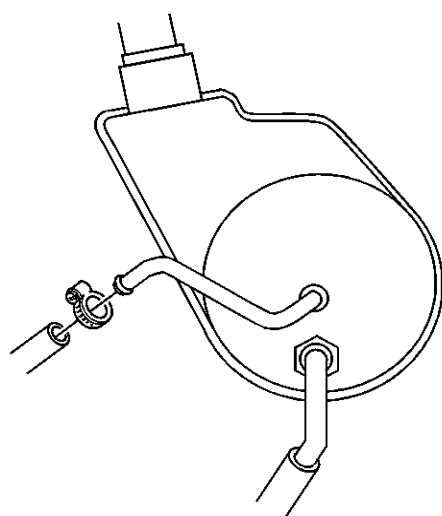
- Install a drain pan under the vehicle.



**Notice:** Refer to Fastener Notice in Cautions and Notices.

Connect the power steering gear return hose to the power steering gear.

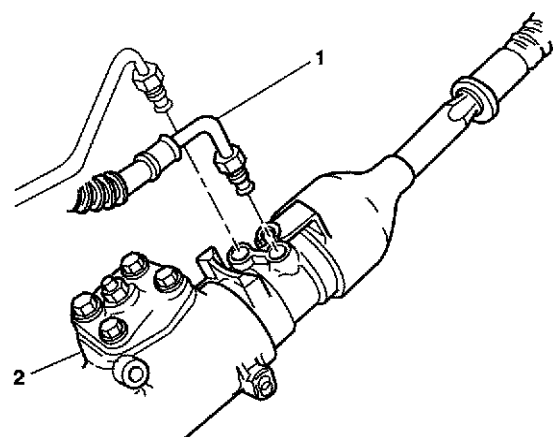
**Tighten:** Tighten the power steering gear return hose to the power steering gear to 25 Nm (18 lb ft).



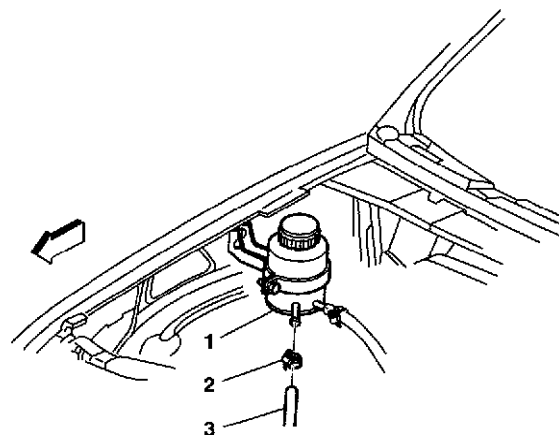
Connect the power steering gear return hose to the power steering pump.

**Tighten:** Tighten the power steering hose clamp to 2.5 Nm (22 lb in).

- Fill the power steering system. Refer to "Checking and Adding Power Steering Fluid" .
- Bleed the power steering system. Refer to "Bleeding the Power Steering System" .
- Install the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls-4.3L.



Disconnect the hose (1) from power steering gear (2). Allow the fluid to drain.



Disconnect the clamp (2) from the hose (3).

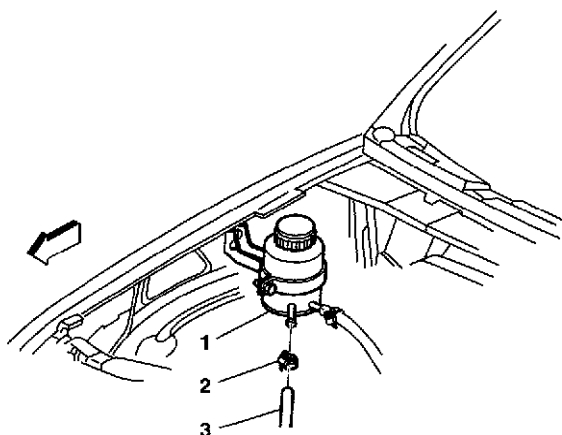
## Steering

## Power Steering System-1

- Remove the power steering return hose (3) from the reservoir (1).
- Remove the power steering return hose from the vehicle.
- Remove the hose from the clamps.

### Installation Procedure

■



**Notice:** Refer to Installing Hoses Without Twists or Bends Notice in Cautions and Notices.

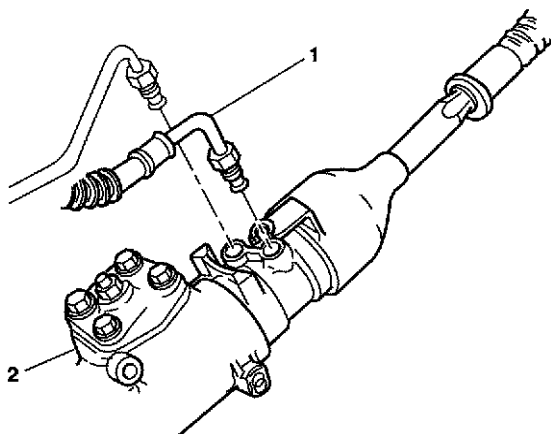
Install the hose (3) on the reservoir (1).

- Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the clamp (2), on the hose (3).

**Tighten:** Tighten the power steering return hose clamp to 2.5 Nm (22 lb in).

■



Install the hose (1) to the power steering gear (2).

**Tighten:** Tighten the power steering hose to 25 Nm (18 lb ft).

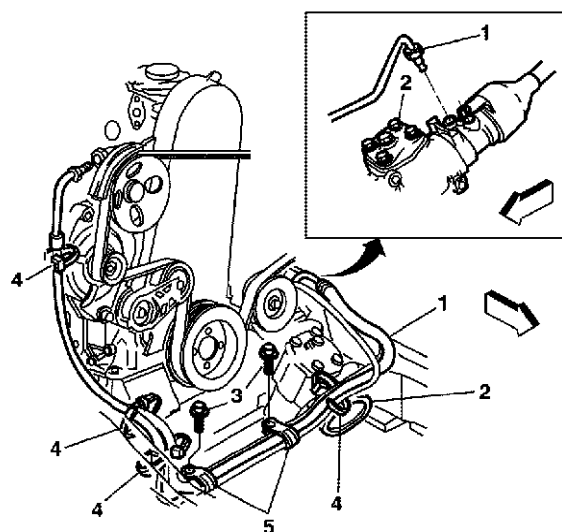
- Fill the power steering system. Refer to "Checking and Adding Power Steering Fluid" .
- Bleed the power steering system. Refer to "Bleeding the Power Steering System" .
- Install the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls–2.4L.
- Remove the drain pan from under the vehicle.

## Repair Instructions

### Power Steering Pressure Hose Replacement (2.4L)

#### Removal Procedure

- Remove the air cleaner assembly.
- Install a drain pan under the vehicle.
- 



**Notice:** Refer to Power Steering Hose Disconnected Notice in Cautions and Notices.

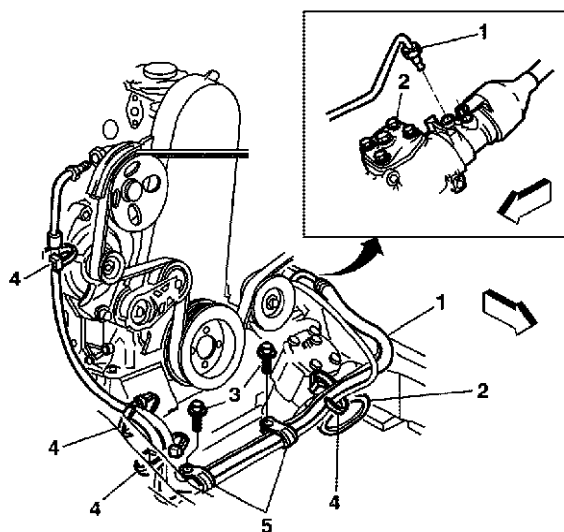
Disconnect the power steering gear pressure hose (1) from the power steering pump.

- Disconnect the power steering gear pressure hose (1) from the power steering gear.
- Disconnect the tie wraps (4).
- Remove the bolts (3) from the power steering hose retainers (5).
- Remove the retainers.
- Remove the power steering gear pressure hose from the vehicle.

## Steering

## Power Steering System-1

### Installation Procedure



**Notice:** Refer to Installing Hoses Without Twists or Bends Notice in Cautions and Notices.

Install the power steering gear pressure hose to the vehicle.

- **Notice:** Refer to Fastener Notice in Cautions and Notices.

Connect the power steering gear pressure hose (1) to the power steering gear (2).

**Tighten:** Tighten the power steering gear pressure hose to the power steering gear to 25 Nm (18 lb ft).

- Install the power steering hose retainers (5) and bolts (3).
- Install the tie wraps (4).
- Connect the power steering gear pressure hose (1) to the power steering pump.

**Tighten:** Tighten the power steering gear pressure hose to the power steering pump to 25 Nm (18 lb ft).

- Remove the drain pan from under the vehicle.
- Install the air cleaner assembly.
- Bleed the power steering system. Refer to "**Bleeding the Power Steering System**".

## Repair Instructions

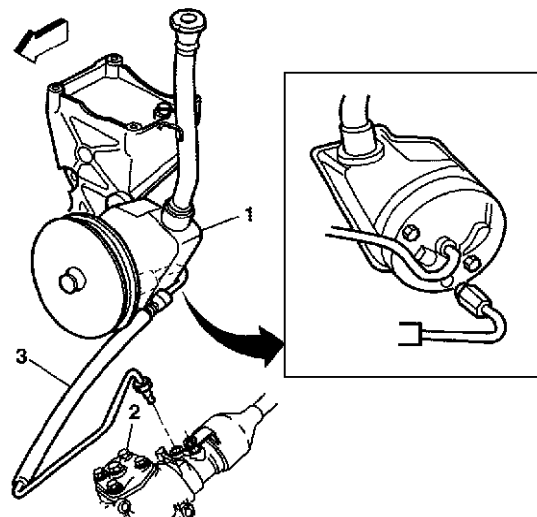
### Power Steering Pressure Hose Replacement (4.3L)

#### Removal Procedure

- **Notice:** Refer to Power Steering Hose Disconnected Notice in Cautions and Notices.

Raise and suitably support the vehicle. Refer to "**Lifting and Jacking the Vehicle**" in General Information.

- Remove the steering linkage shield, if equipped. Refer to "**Steering Linkage Shield Replacement**" in Steering Linkage.
- Install a drain pan under the vehicle.
- 



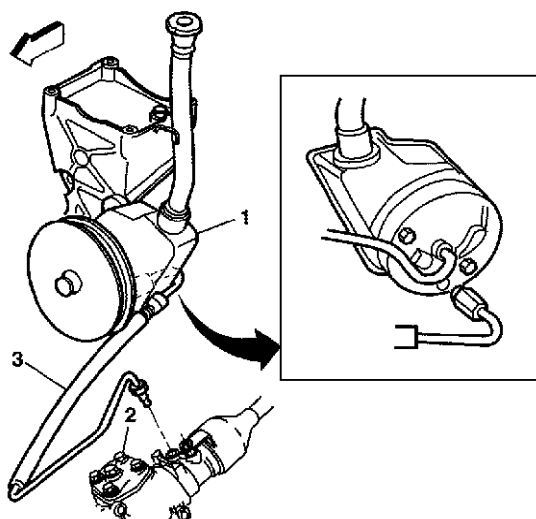
Disconnect the pressure hose (3) from the power steering pump (1).

- Lower the vehicle.
- Remove the air cleaner assembly. Refer to "**Air Cleaner Assembly Replacement**" in Engine Controls-4.3L.
- Disconnect the power steering gear pressure hose (3) from the power steering gear (2).
- Remove the power steering gear pressure hose (3) from the vehicle.

#### Installation Procedure

- **Notice:** Refer to Installing Hoses Without Twists or Bends Notice in Cautions and Notices.

Install the power steering gear pressure hose to the vehicle.



**Notice:** Refer to Fastener Notice in Cautions and Notices.

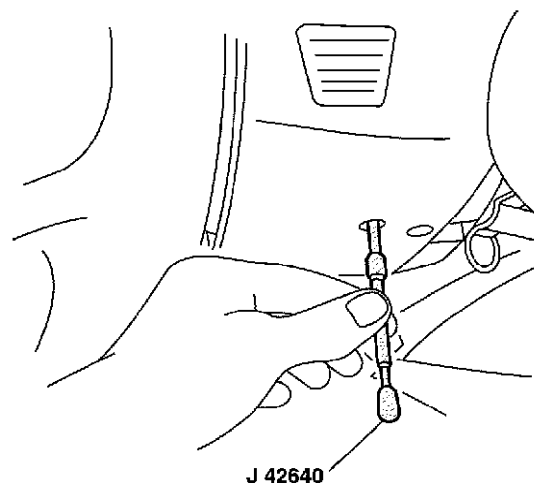
Connect the power steering gear pressure hose to the power steering gear.

**Tighten:** Tighten the power steering gear pressure hose to the power steering gear to 25 Nm (18 lb ft).

- Install the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls–4.3L.
- Raise the vehicle. Refer to "Lifting and Jacking the Vehicle" in General Information.
- Connect the power steering gear pressure hose (3) to the power steering pump (1).

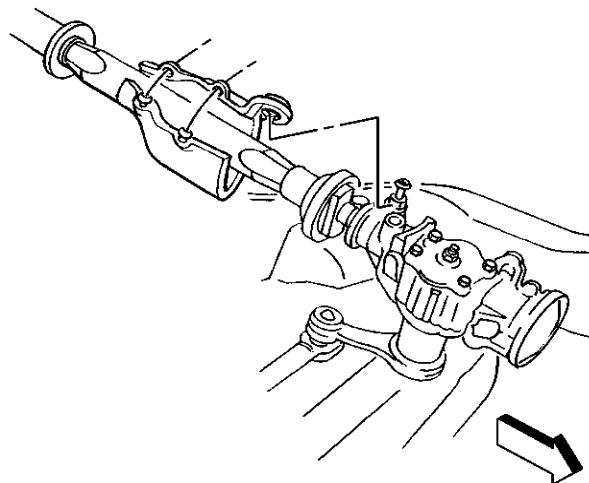
**Tighten:** Tighten the power steering gear pressure hose to the power steering pump to 25 Nm (18 lb ft).

- Install the steering linkage shield, if equipped. Refer to "Steering Linkage Shield Replacement" in Steering Linkage.
- Remove the drain pan from under the vehicle.
- Lower the vehicle.
- Bleed the power steering system. Refer to "Bleeding the Power Steering System" .



Lock the steering column through the access hole in the steering column lower trim cover using the [J 42640](#) .

- Remove the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls–2.4L or "Air Cleaner Assembly Replacement" Engine Controls–2.4L.



Remove the intermediate shaft shield from the steering gear.

## Repair Instructions

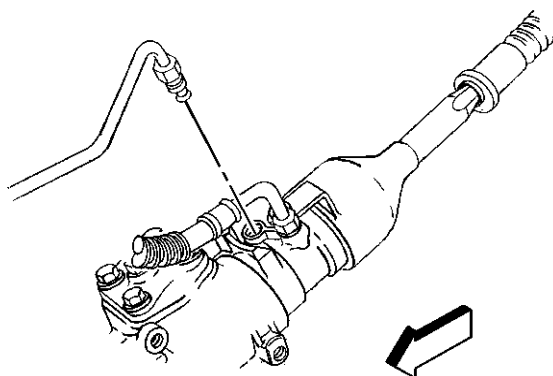
### Power Steering Gear Replacement (RWD)

#### Tools Required

[J42640](#) Steering Column Anti-Rotation Pin

#### Removal Procedure

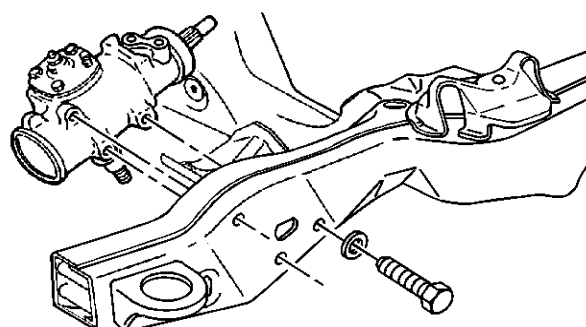




Place a drain pan below the steering gear.

- Remove the pressure and the return hoses from the power steering gear.

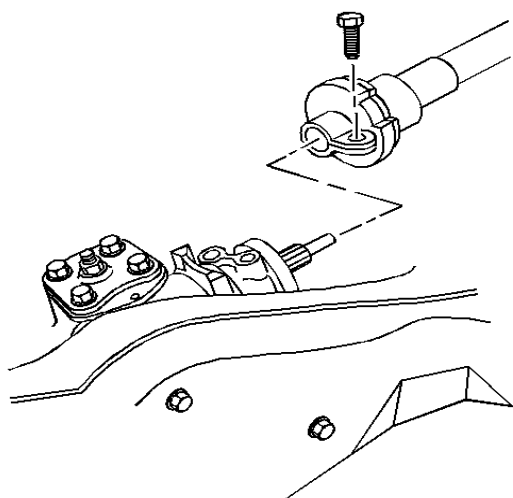
Cap or tape the ends of the hoses and the gear fittings in order to prevent dirt from entering the system.



Remove the steering gear mounting bolts and the washers from the frame.

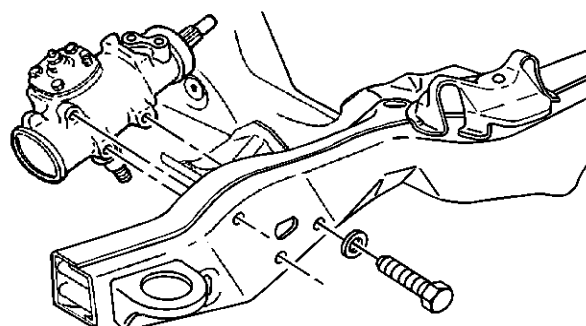
- Remove the steering gear.

### Installation Procedure



Remove the lower intermediate shaft coupling bolt.

- Draw alignment marks on the lower intermediate shaft coupling and the steering gear shaft.
- Remove the lower intermediate shaft coupling from the steering gear shaft.
- Remove the pitman arm. Refer to "**Pitman Arm Replacement (RWD)**" "**Pitman Arm Replacement (4WD)**" in Steering Linkage.



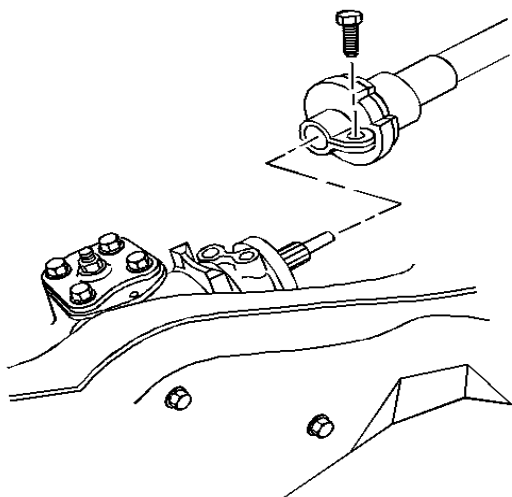
Install the steering gear.

- Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the power steering gear to the frame washers and the mounting bolts.

**Tighten:** Tighten the power steering gear to frame mounting bolts to 75 Nm (55 lb ft).

- Install the pitman arm. Refer to "**Pitman Arm Replacement (RWD)**" "**Pitman Arm Replacement (4WD)**" in Steering Linkage.

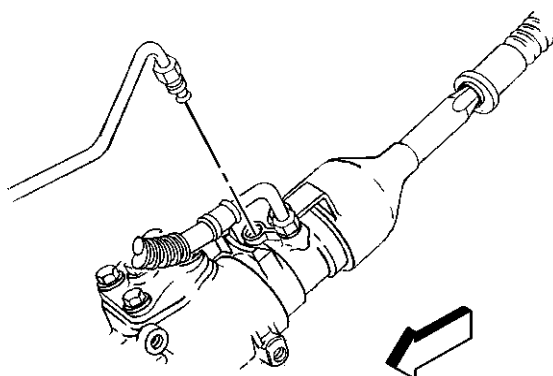


Install the lower intermediate shaft to the power steering gear.

Ensure that the alignment marks line up.

- Install the lower intermediate shaft coupling bolt.

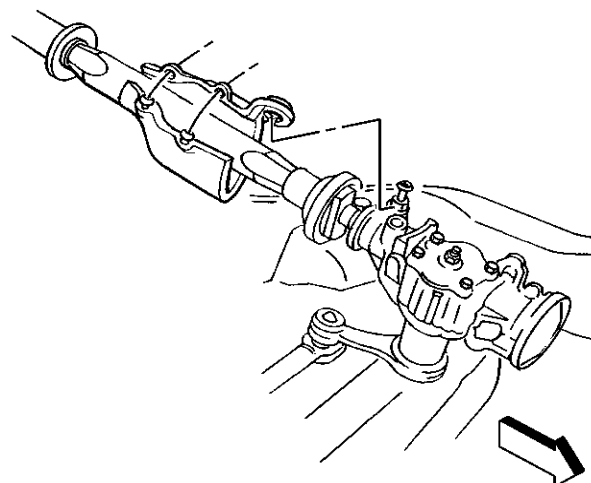
**Tighten:** Tighten the lower intermediate shaft coupling bolt to 40 Nm (29 lb ft).



Install the pressure and the return hoses to the power steering gear.

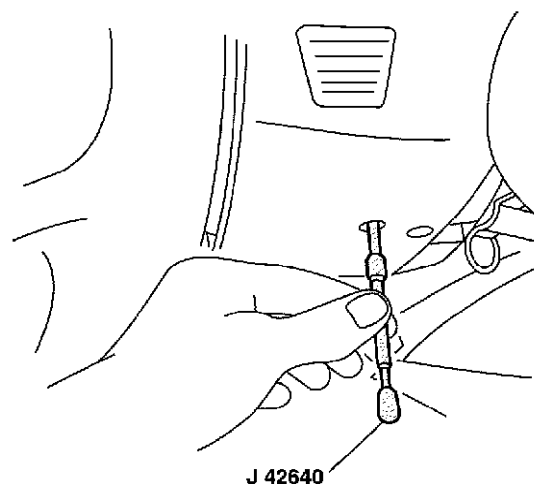
**Tighten:**

- Tighten the pressure hose to 25 Nm (18 lb ft).
- Tighten the return hose to 25 Nm (18 lb ft).



Install the intermediate shaft shield to the power steering gear.

- Install the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls–2.4L or "Air Cleaner Assembly Replacement" Engine Controls–2.4L.



Unlock the steering column by removing the [J 42640](#) from the steering column lower steering column trim cover access hole.

- Bleed the power steering system. Refer to "Bleeding the Power Steering System".

## Repair Instructions

### Power Steering Gear Replacement (4WD)

Tools Required

- [J24319-B](#) Steering Linkage Puller

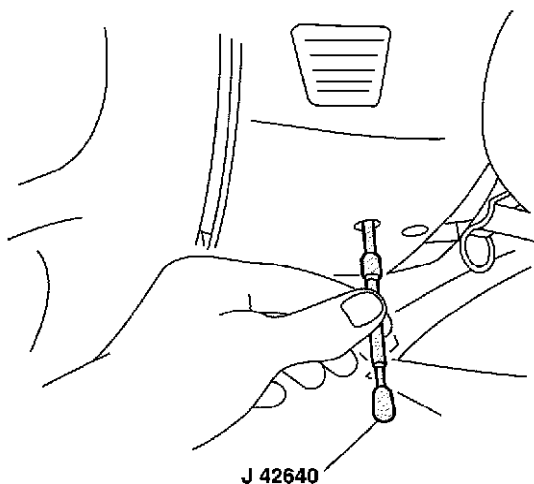
## Steering

## Power Steering System-1

- [J 42640](#) Steering Column Anti-Rotation Pin
- [J 29193](#) Steering Linkage Installer (12 mm)
- [J 29194](#) Steering Linkage Installer (14 mm)

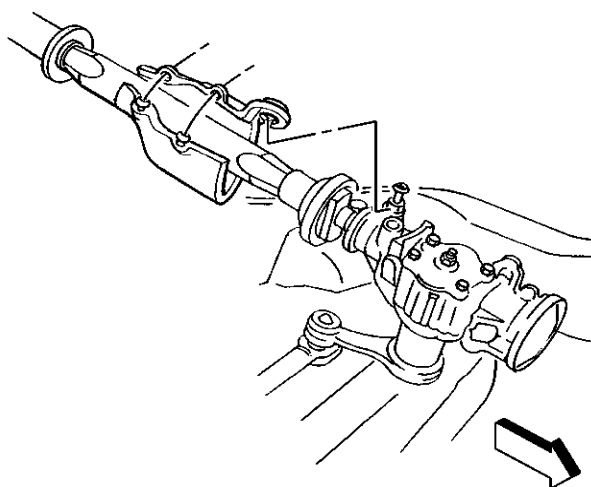
### Removal Procedure

- **Notice:** Do not rotate steering shaft after steering column has been removed. Damage to SIR components may occur.

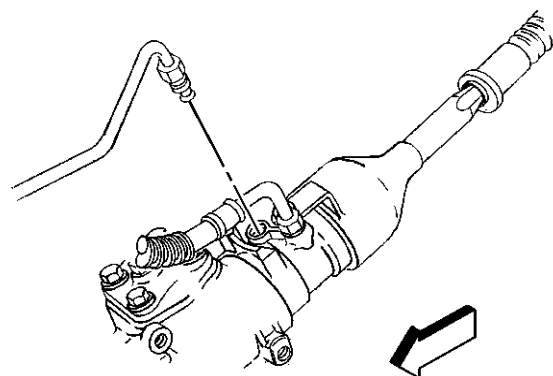


Lock the steering column through the access hole in the steering column lower trim cover using [J 42640](#).

- Remove the air cleaner assembly. Refer to "Air Cleaner Assembly Replacement" in Engine Controls—4.3L.



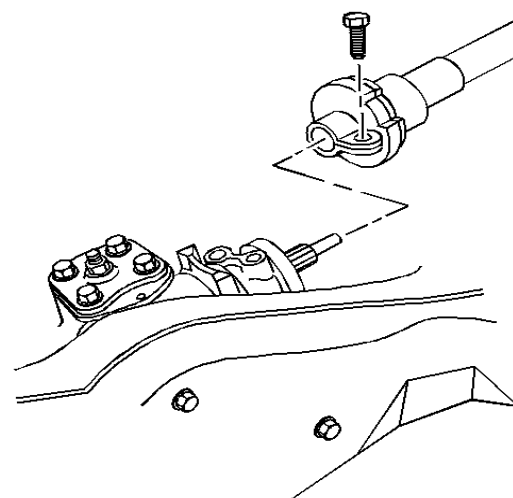
Remove the intermediate shaft shield from the steering gear.



Place a drain pan below the steering gear.

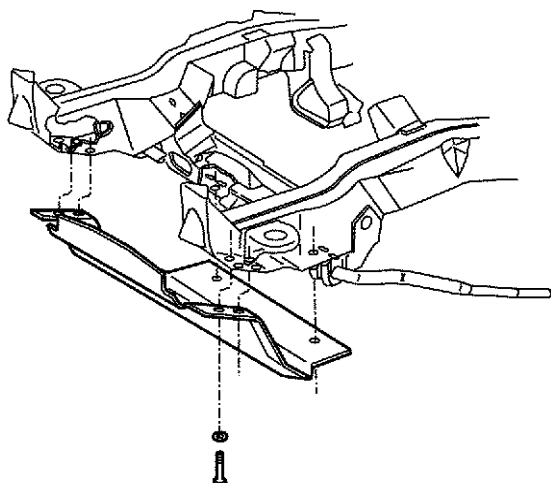
- Remove the pressure and the return hoses from the power steering gear.

Cap or tape the ends of the hoses and the gear fittings in order to prevent dirt from entering the system.

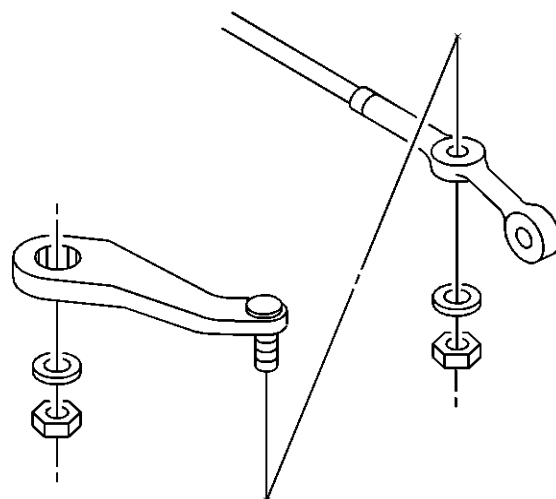


Remove the lower intermediate shaft coupling bolt.

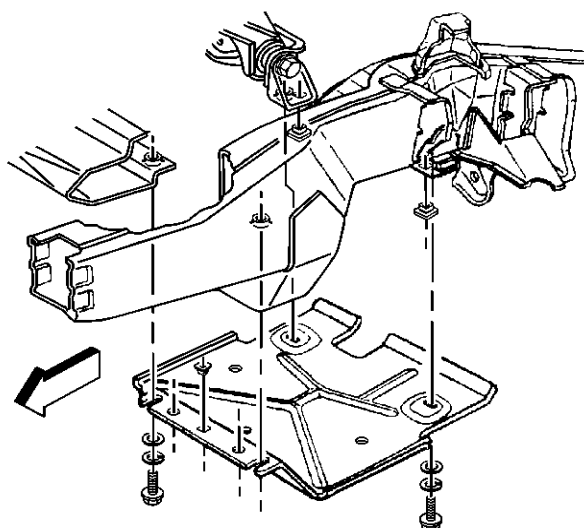
- Draw alignment marks on the lower intermediate shaft coupling and the steering gear shaft.
- Remove the lower intermediate shaft coupling from the steering gear shaft.
- Raise the vehicle. Refer to "Lifting and Jacking the Vehicle" in General Information.



Remove the steering linkage shield. Refer to "**Steering Linkage Shield Replacement**" in Steering Linkage.

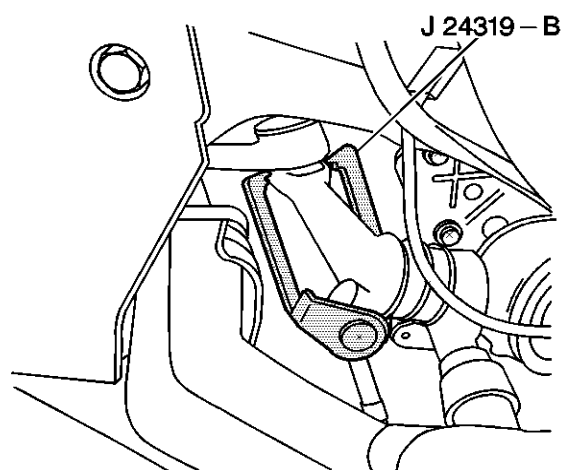


Remove the pitman arm ball stud nut at the relay rod.



Remove differential carrier shield mounting bolts.

- Remove the differential carrier shield.

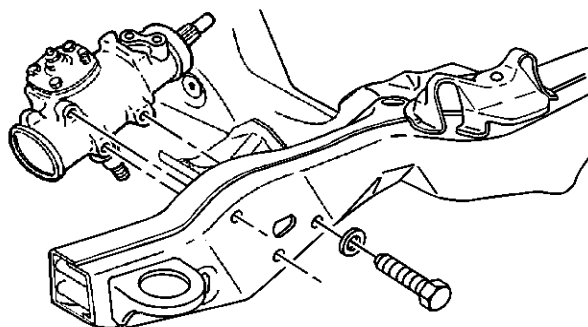


Disconnect pitman arm from relay rod using [J 24319-B](#).

## Steering

## Power Steering System-1

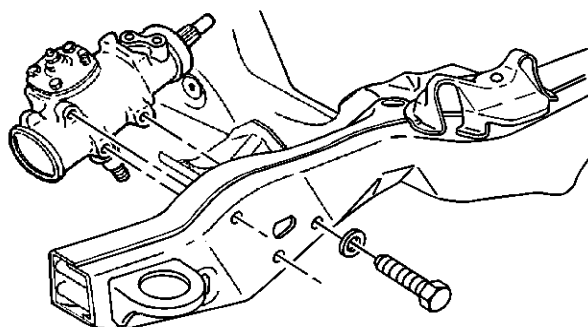
**Tighten:** Tighten the power steering gear to frame mounting bolts to 75 Nm (55 lb ft).



Remove the steering gear mounting bolts and the washers from the frame.

- Remove the steering gear.
- Remove the pitman arm. Refer to "**Pitman Arm Replacement (RWD)**" "**Pitman Arm Replacement (4WD)**" in Steering Linkage.

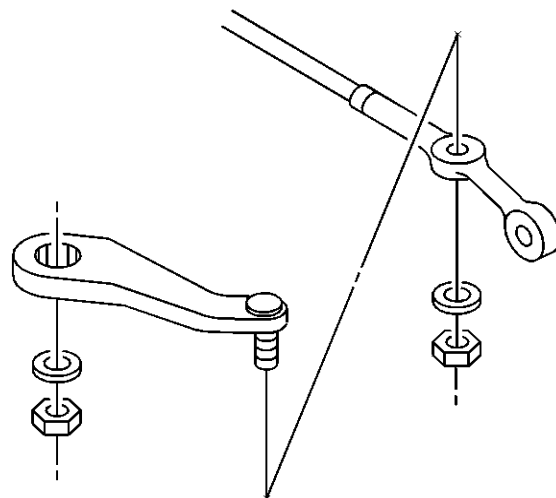
### Installation Procedure



Install the pitman arm. Refer to "**Pitman Arm Replacement (RWD)**" "**Pitman Arm Replacement (4WD)**" in Steering Linkage.

- Install the steering gear.
- Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the power steering gear to the frame washers and mounting bolts.



Connect the relay rod to the pitman arm ball stud.

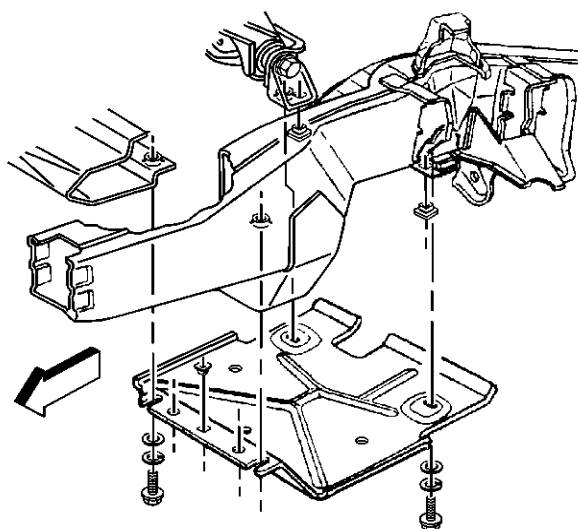
Ensure the seal is on the stud.

- Seat the taper using [J 29193](#) or [J 29194](#).

**Tighten:** Tighten [J 29193](#) or [J 29194](#) to 52 Nm (40 lb ft).

- Remove [J 29193](#) or [J 29194](#) from the pitman arm ball stud.
- Install the new nut to the pitman arm ball stud at the relay rod.

**Tighten:** Tighten the pitman arm ball stud nut at the relay rod to 83 Nm (61 lb ft).

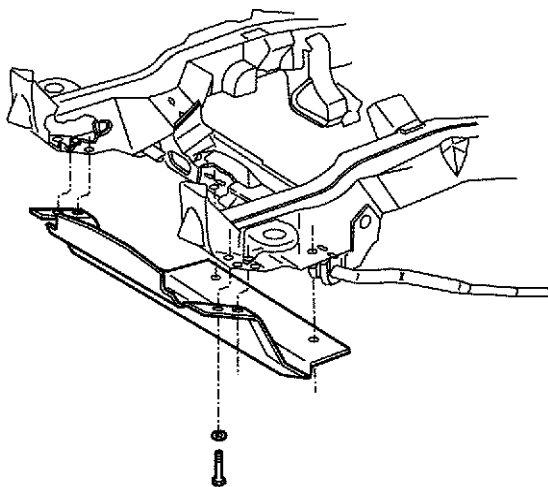


Install differential carrier shield.

- Install the differential carrier shield mounting bolts.

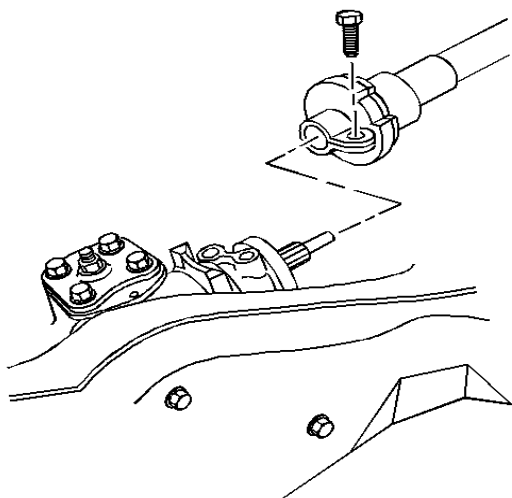
**Steering****Power Steering System-1**

**Tighten:** Tighten the differential carrier shield mounting bolts to 25 Nm (18 lb ft).



Install the steering linkage shield. Refer to "**Steering Linkage Shield Replacement**" in Steering Linkage.

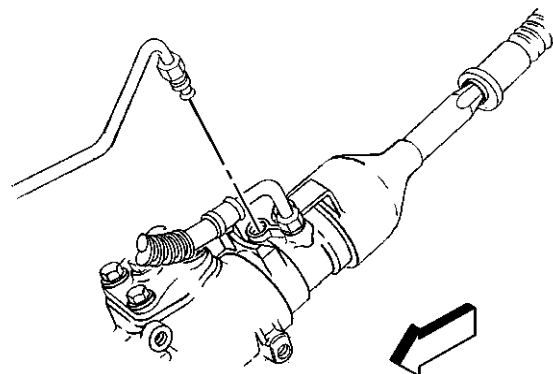
Lower the vehicle.



Install the lower intermediate shaft to the power steering gear.

- Ensure that the alignment marks line up.
- Install the lower intermediate shaft coupling bolt.

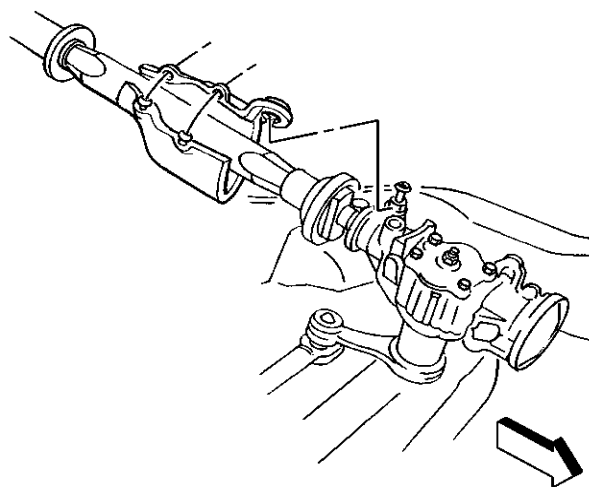
**Tighten:** Tighten the lower intermediate shaft coupling bolt to 40 Nm (29 lb ft).



Install the pressure and return hoses to the power steering gear.

**Tighten:**

- Tighten the pressure hose to 25 Nm (18 lb ft).
- Tighten the return hose to 25 Nm (18 lb ft).

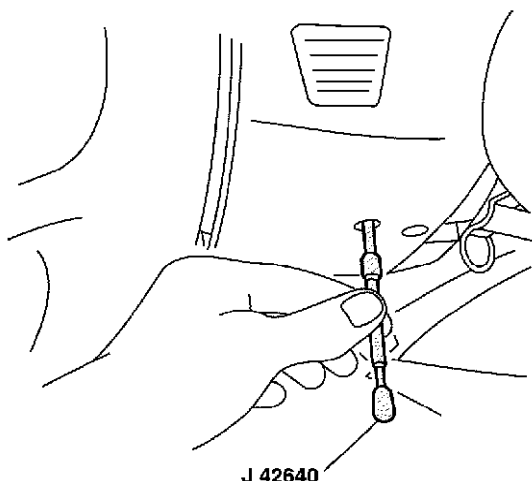


Install the intermediate shaft shield to the power steering gear.

- Install the air cleaner assembly. Refer to "**Air Cleaner Assembly Replacement**" in Engine Controls-4.3L.

## Steering

## Power Steering System-1



Unlock the steering column by removing the [J 42640](#) from the steering column lower steering column trim cover access hole.

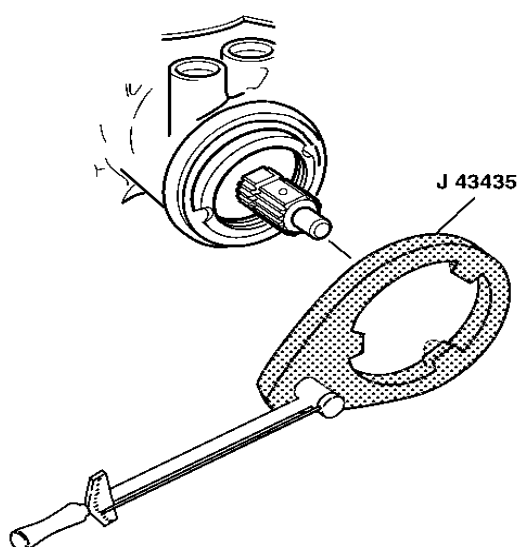
- Bleed the power steering system. Refer to "**Bleeding the Power Steering System**".

## Repair Instructions

## Worm Thrust Bearing Preload Adjustment - Off Vehicle

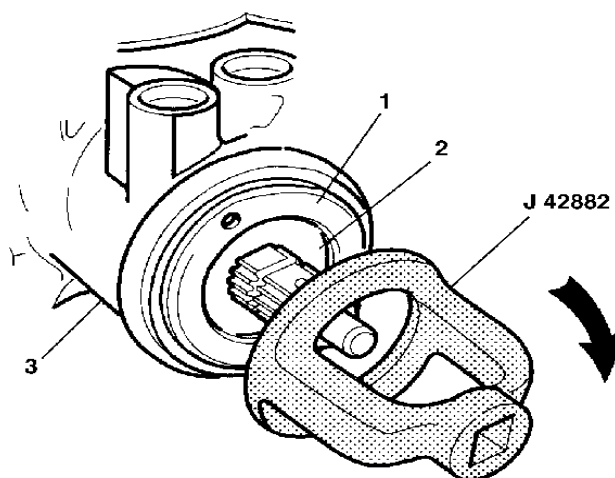
## Tools Required

- [J 42882](#) Adjuster Nut Socket
- [J 43435](#) Adjuster Lock Nut Wrench



Rotate the stub shaft back and forth in order to drain the power steering fluid.

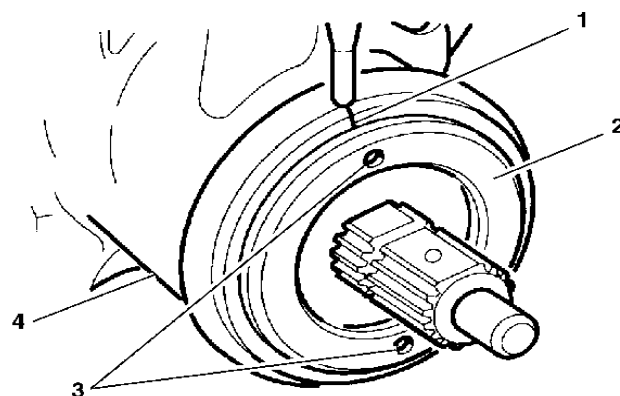
- Remove the coupling shield retainer and the lock nut from the steering gear housing using [J 43435](#) and a torque wrench.



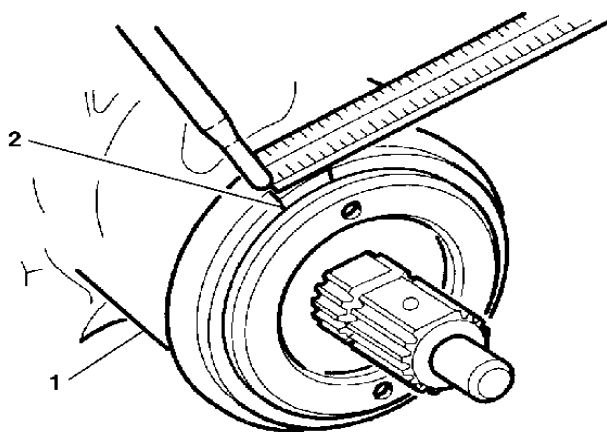
**Notice:** Refer to Fastener Notice in Cautions and Notices.

Turn the adjuster nut assembly (1) clockwise using [J 42882](#) until the adjuster nut assembly (1) and the thrust support assembly (2) are firmly bottomed in the steering gear housing (3).

**Tighten:** Tighten the adjuster nut assembly (1) to 28–31 Nm (20–23 lb ft).

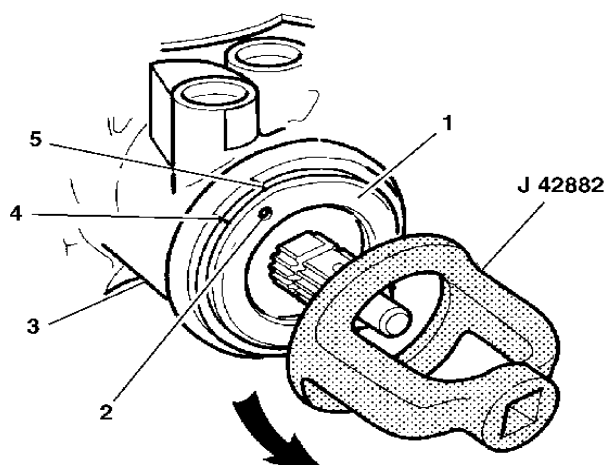


Place an index mark (1) on the steering gear housing (4) parallel with one of the holes (3) in the adjuster nut assembly (2).

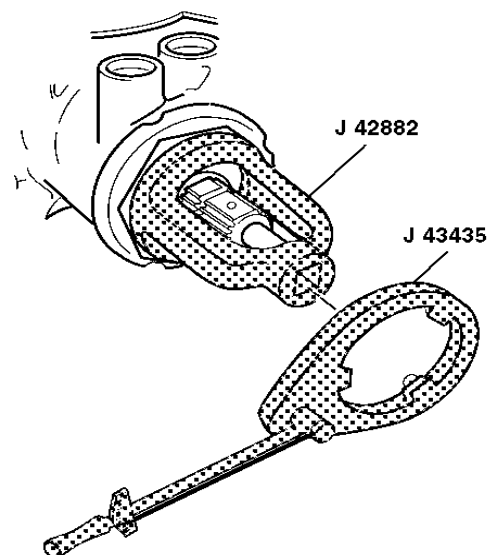


Measure back counterclockwise 13 mm (1/2 in.).

- Place a second mark (2) on the steering gear housing (1).



Using [J 42882](#) and a torque wrench, turn the adjuster nut assembly (1) counterclockwise 15–25 degrees to align the hole (2) in the adjuster nut assembly (1) with the second mark (4) on the steering gear housing (3).



Install the coupling shield retainer and the lock nut.

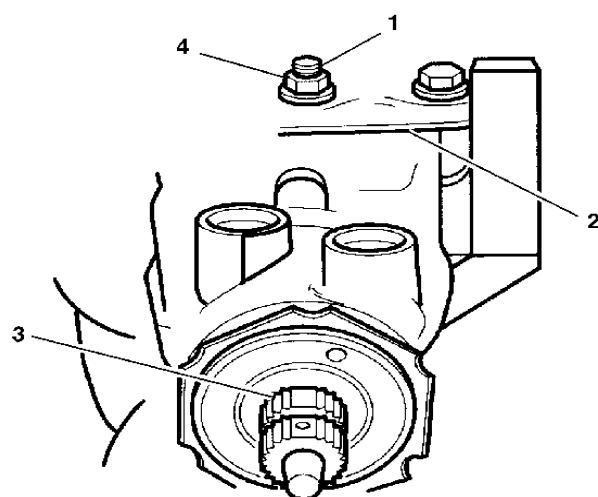
- Hold the adjuster nut assembly in position to maintain alignment of the marks.
- Tighten the coupling shield retainer and the lock nut using [J 43435](#) and a torque wrench.

**Tighten:** Tighten the coupling shield retainer and the lock nut (2) to 109 Nm (80 lb ft).

## Repair Instructions

### Pitman Shaft Over-Center Preload Adjustment - Off Vehicle

▪



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

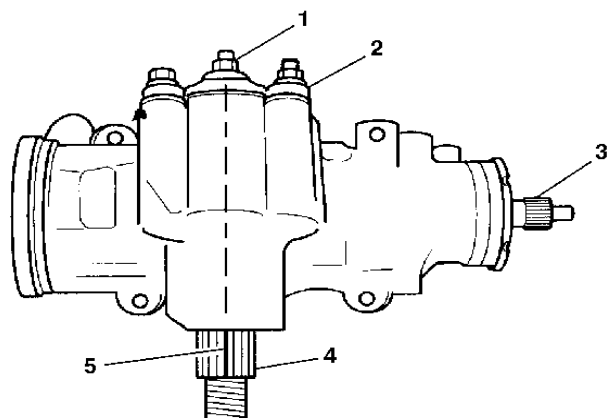
- Loosen the adjuster lock nut (4).
- Turn the pitman shaft adjuster screw (1) counterclockwise until the screw is fully extended.



## Steering

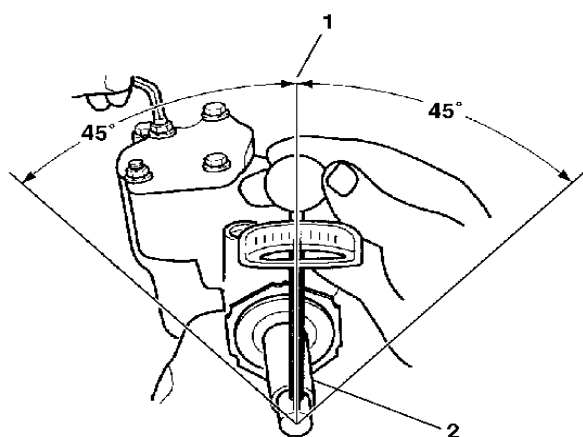
## Power Steering System-1

- Turn the pitman shaft adjuster screw (1) clockwise 1 full turn.
- Rotate the stub shaft (3) from stop to stop using a 12-point socket while counting the number of turns.
- Starting at either stop, turn the stub shaft (3) back half of the total number of turns. This is the center of the gear.



Make sure that the gear is centered by checking the following items:

- The flat on the stub shaft (3) faces upward.
- The flat on the stub shaft (3) is parallel with the side cover (2).
- Align the master spline (5) on the pitman shaft (4) with the adjuster screw (1).



Place a torque wrench on the stub shaft (2) with the handle in the vertical position.

- Rotate the stub shaft (2) 45 degrees from each side of the center of the stub shaft. The stub shaft (2) must rotate smoothly.
- Record the worm bearing preload measured on or near the center (1). The recorded bearing preload must be 0.7–1.7 Nm (6–15 lb in) with the worm and the ball nut installed. If the torque is outside of this range, readjust or repair the steering gear assembly as required.
- **Notice:** Refer to Fastener Notice in Cautions and Notices.

To obtain the correct preload torque, adjust the over-center torque by turning the pitman shaft adjuster screw clockwise.

- Add 0.7–1.1 Nm (6–10 lb in) torque to the previously measured worm bearing preload torque.

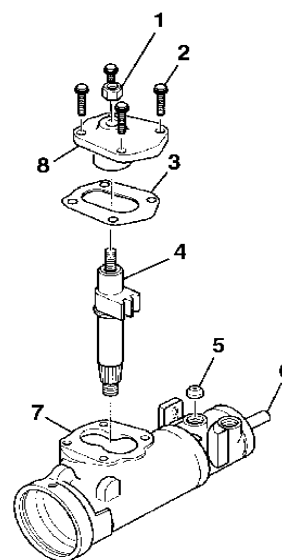
**Tighten:** Tighten the adjuster lock nut to 49 Nm (36 lb ft). Prevent the adjuster screw from turning while tightening the adjuster lock nut.

## Repair Instructions

## Steering Gear Pitman Shaft and Housing Cover Replacement - Off Vehicle

## Disassembly Procedure

▪



Loosen and remove the adjuster lock nut (1).

- Remove the bolts (2).
- Rotate the stub shaft (6) using a 12-point socket to center the steering gear (7).
- Remove the following items as an assembly:
  - The side cover (8)
  - The gasket (3)

## Steering

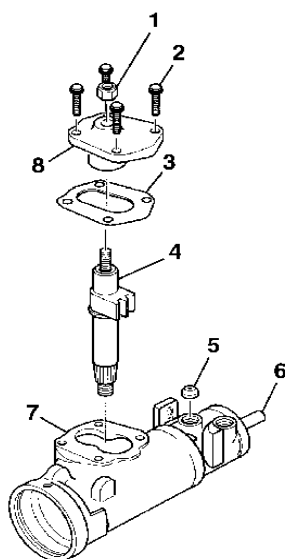
## Power Steering System-1

- The pitman shaft (4)

- Remove the pitman shaft (4) from the side cover (8).

## Assembly Procedure

▪



Screw the pitman shaft (4) to the side cover (8) until it fully seats to the side cover (8).

- Install the adjuster lock nut (1). Do not tighten the adjuster lock nut (1) until the pitman shaft adjustment is completed.
- Install the gasket (3) to the side cover (8).
- Bend the gasket tabs around the edges of the side cover (8).
- Install the pitman shaft assembly (4) and the side cover (8) to the steering gear housing (7).
- **Notice:** Refer to Fastener Notice in Cautions and Notices.

Install the bolts (2).

**Tighten:** Tighten the bolts (2) to 60 Nm (45 lb ft).

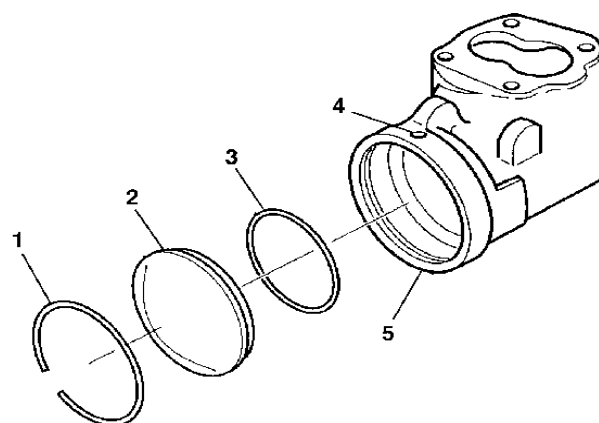
- Refer to "Pitman Shaft Over-Center Preload Adjustment - Off Vehicle" to adjust the pitman shaft (4).

## Repair Instructions

## Steering Gear Housing End Plug Replacement - Off Vehicle

## Disassembly Procedure

▪

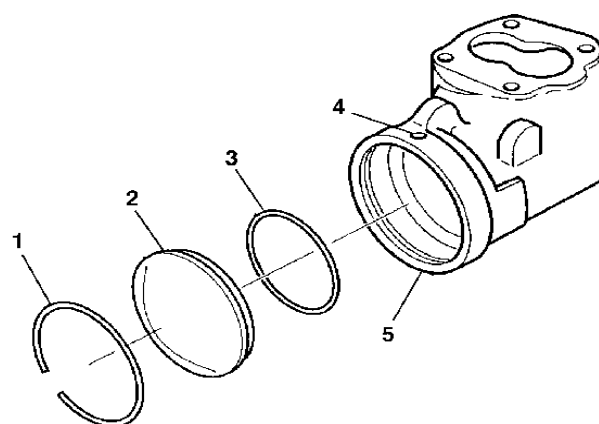


Rotate the stub shaft back and forth to drain the fluid.

- Insert a punch into the housing access hole to unseat the retaining ring (1).
- Remove the plug (2).
- Remove the O-ring seal (3).

## Assembly Procedure

▪



Lubricate the O-ring seal (3) with power steering fluid.

- Install the O-ring seal (3) into the steering gear housing (5).
- Install the plug (2).
- Install the retaining ring (1). Ensure that the retaining ring open end is approximately 25 mm (1 in) from the access hole in the steering gear housing (5).

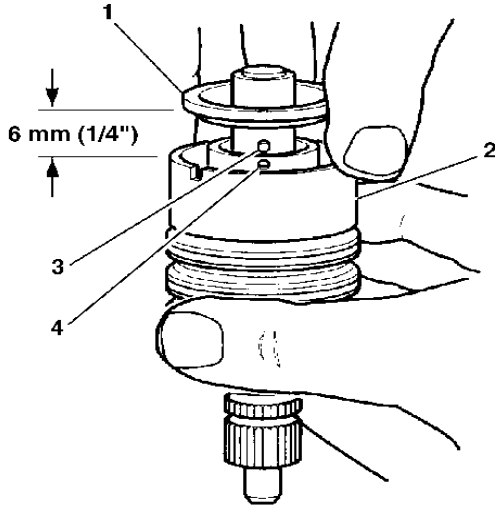
## Repair Instructions

## Steering

## Power Steering System-1

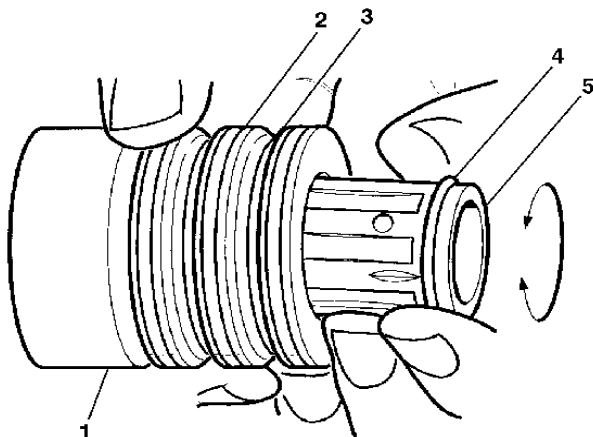
### Steering Gear Valve Replacement - Off Vehicle

#### Disassembly Procedure



Remove the thrust support assembly. Refer to "Steering Gear Thrust Support Replacement - Off Vehicle".

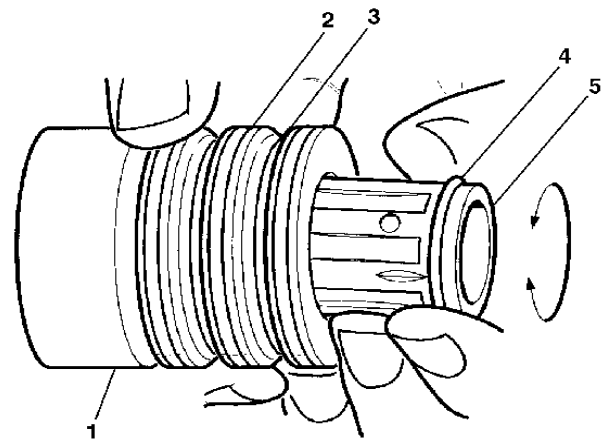
- Remove the stub shaft (1) and the valve assembly (2) from the thrust support assembly.
- If necessary, remove the stub shaft (1) from the valve assembly (2) in the following manner:
  1. Tap the stub shaft (1) lightly on a wood block in order to loosen the cap.
  2. Pull the cap and the valve spool out from valve body (2) 6 mm (1/4 in).
  3. Disengage the stub shaft pin (3) from the hole in the valve spool (4).



If the valve assembly needs repair, disassemble the valve in the following manner:

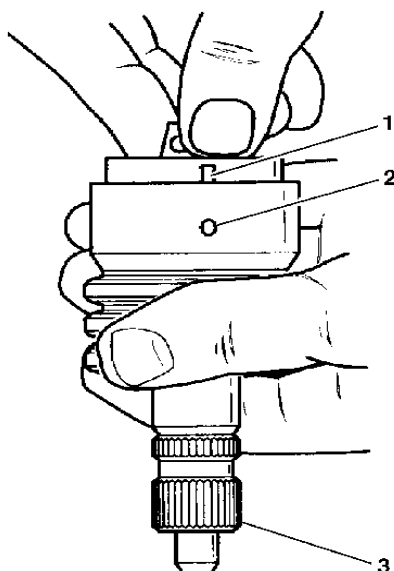
1. Simultaneously pull and rotate the valve spool (5) from the valve body (1).
2. Remove the valve spool O-ring seal (4).
3. Alternately remove the valve body Teflon rings (2) and the O-ring seals (3).

#### Assembly Procedure



If disassembled, reassemble the valve assembly in the following manner:

1. Install the valve spool O-ring seal (4) to the valve spool (5).
2. Lubricate the valve spool (5) and O-ring seal (4) with power steering fluid.
3. Simultaneously push and rotate the valve spool (5) into the valve body (1) until the hole in the valve spool for the stub shaft pin is accessible from the opposite end of the valve body (1).

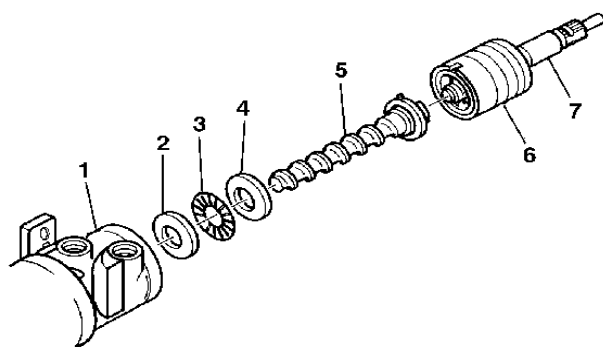


If necessary, install the stub shaft to the valve spool in the following manner:

1. Insert the stub shaft (3) into the valve spool.
2. Insert the pin.
3. **Important:** Make sure that the shaft cap notch (1) is mated with the valve body pin before installing the valve body into the steering gear assembly.

The notch in the cap (1) must fully engage the valve body pin (2). Seat the cap against the valve body shoulder.

4. Alternately install the O-rings seals and the Teflon rings to the valve body.
5. Lubricate the O-ring seals and the Teflon rings with power steering fluid.



Install the stub shaft (7) and valve assembly (6) to the worm shaft (5). Ensure the pin fits in the worm shaft to the slot in the valve assembly.

- Install the thrust support assembly. Refer to "**Steering Gear Thrust Support Replacement - Off Vehicle**".

## Repair Instructions

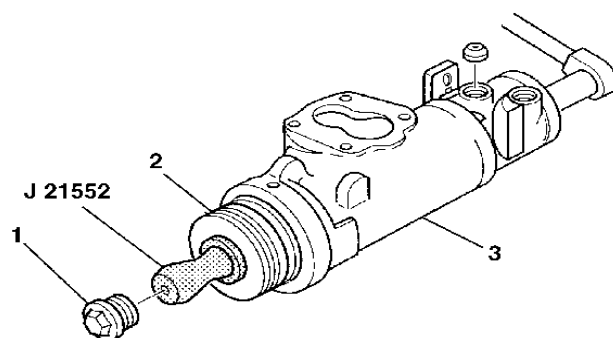
### Rack Piston and Worm Shaft Replacement - Off Vehicle (700 Gear)

#### Tools Required

- [J21552](#) Rack Piston Arbor
- [J8947](#) Rack Piston Teflon Ring Compressor

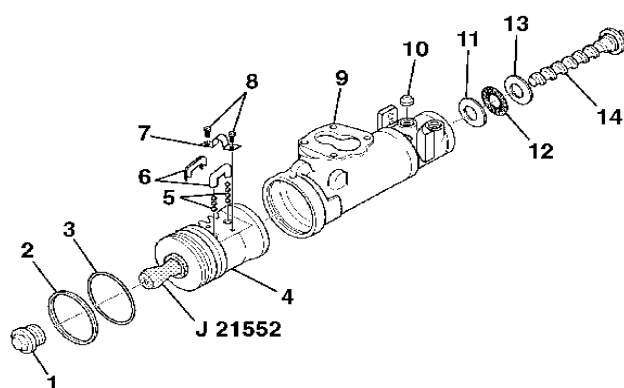
#### Disassembly Procedure

▪



Remove the Pitman shaft and side cover. Refer to "**Steering Gear Pitman Shaft and Housing Cover Replacement - Off Vehicle**".

- Remove the housing end plug (1). Refer to "**Steering Gear Housing End Plug Replacement - Off Vehicle**".
- Turn the stub shaft counterclockwise until the rack piston (2) begins to come out of the steering gear housing.
- Remove the rack piston plug (1).
- Insert [J21552](#) into the bore of the rack piston (2).
- Hold [J21552](#) tightly against the worm shaft while turning the stub shaft counterclockwise. Turning the stub shaft forces the rack piston (2) onto [J21552](#). The rack piston balls remain in place.

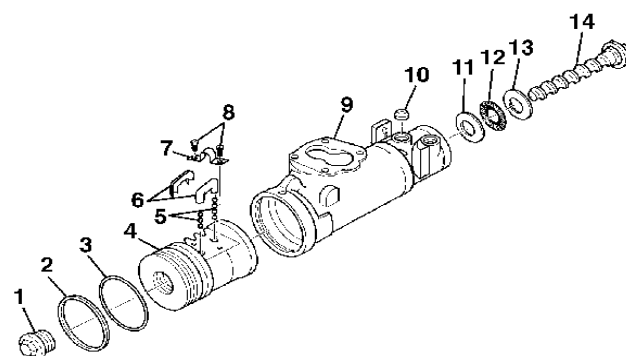


Remove the following items as an assembly from the steering gear housing (9):

- The rack piston (4)
- The rack piston balls (5)
- [J 21552](#)
- Remove the valve. Refer to "Steering Gear Valve Replacement - Off Vehicle" .
- Remove the worm shaft (14).
- Remove the thrust bearing (12) and the flat races (11, 13).
- Remove the flat races (11).
- Remove [J 21552](#) from the rack piston (4).
- Remove the rack piston balls (5).
- Remove the following items from the rack piston (4):
  1. The screws (8)
  2. The clamp (7)
  3. The ball guide (6)
- Remove the Teflon ring (2).
- Remove the O-ring seal (3).
- Clean all of the disassembled parts.
- Inspect all of the disassembled parts for wear.
- Replace the parts if necessary.

### Assembly Procedure

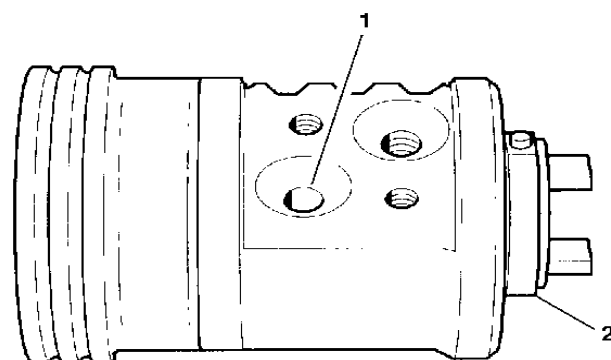
2001-S/T TRK (China)



Install the O-ring seal (3) and the Teflon ring (2).

- Lubricate both parts with power steering fluid.
- Install the worm shaft (14) to the rack piston (4) outside of the steering gear housing (9).
- **Caution:** Reinstall all of the rack piston balls in the rack piston. Improper rack piston ball installation may result in personal injury.

Fully seat the worm shaft to the rack piston.



Align the worm shaft spiral groove with the rack piston ball return guide hole (1).

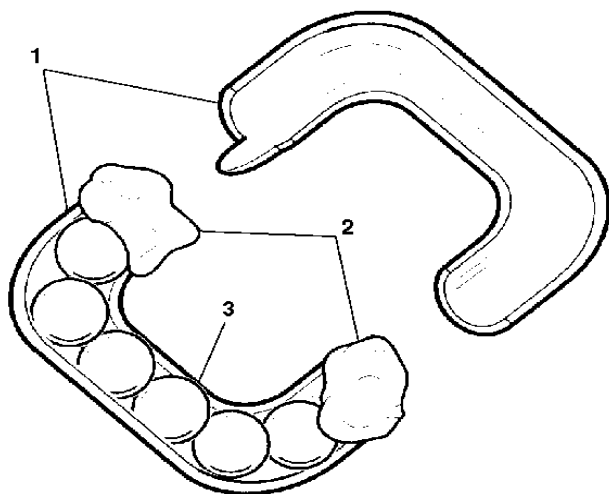
- **Important:** The black rack piston balls are smaller than the silver rack piston balls. Install the black and the silver rack piston balls alternately into the rack piston and the ball guide to maintain the rack piston to the worm shaft preload.

Lubricate the rack piston balls with power steering fluid.

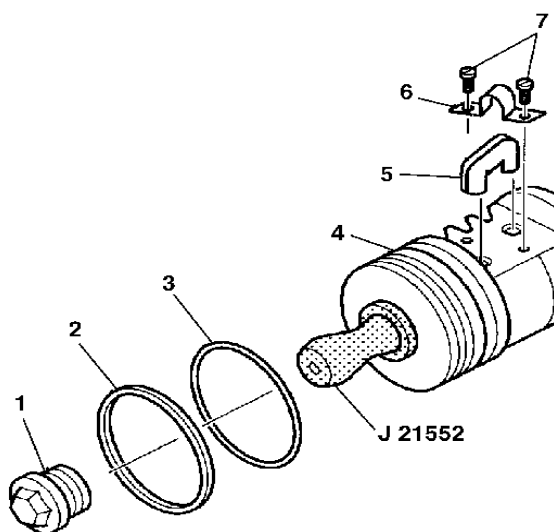
## Steering

## Power Steering System-1

- Insert the rack piston balls through the ball return guide hole (1) while turning worm shaft (2) counterclockwise in order to install the rack piston balls into the rack piston.



Install the remaining rack piston balls (3) into the ball guide (1) using grease at each end (2) to retain the rack piston balls (3).



Install the ball guide (5) to the rack piston (4).

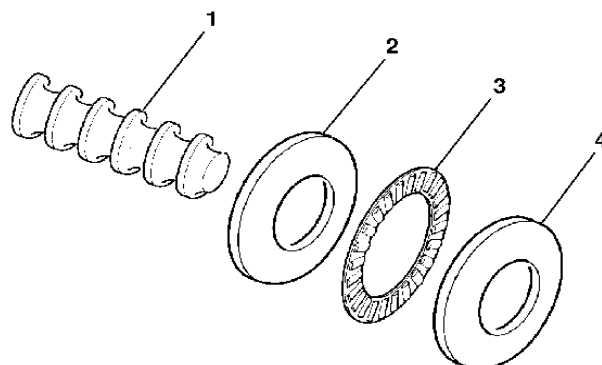
- Install the ball guide clamp (6).
- Notice:** Refer to Fastener Notice In Cautions and Notices.

Install the screws (7).

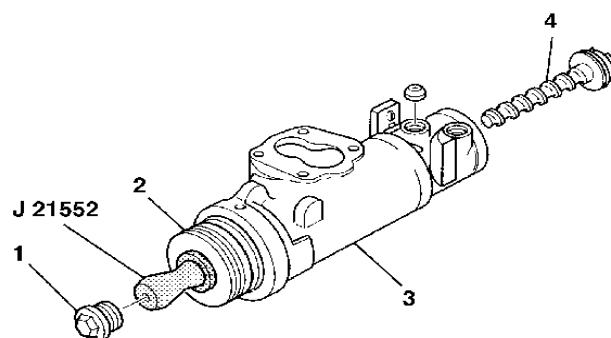
**Tighten:** Tighten the ball guide clamp screws (7) to 58 Nm (43 lb ft).

- Insert [J 21552](#) into the bore of the rack piston while turning the worm shaft counterclockwise. The turning

of the worm shaft forces the rack piston onto [J 21552](#). The rack piston balls remain in place.



Install the flat races (2, 4) and the thrust bearing (3) onto the worm shaft (1).



Install the worm shaft (4) to the steering gear housing (3).

- Install the valve. Refer to "Steering Gear Valve Replacement - Off Vehicle".
- Install the rack piston (2) to the worm (4) from [J 21552](#) using [J 8947](#) to compress the seals.
- Caution:** Reinstall all of the rack piston balls into the rack piston. Improper rack piston ball installation may result in personal injury.

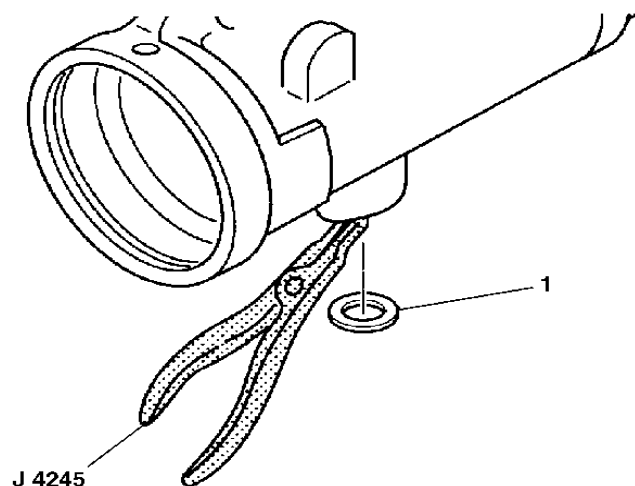
Hold [J 21552](#) tightly against the worm shaft (4).

- Turn the stub shaft clockwise until the rack piston (2) is seated on the worm shaft (4).

## Steering

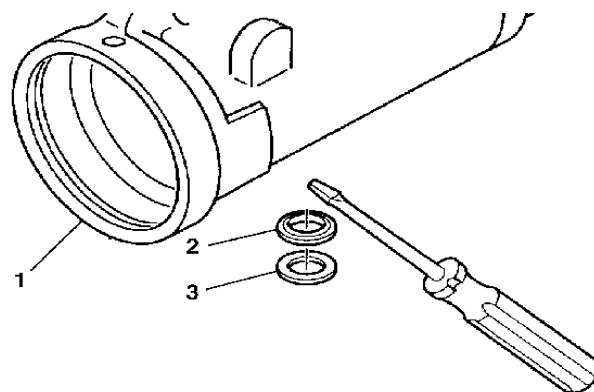
## Power Steering System-1

- Install the rack piston plug.
- **Tighten:** Tighten the rack piston plug to 150 Nm (111 lb ft).
- Install the housing end plug (1). Refer to "**Steering Gear Housing End Plug Replacement - Off Vehicle**".
- Install the pitman shaft and side cover. Refer to "**Steering Gear Pitman Shaft and Housing Cover Replacement - Off Vehicle**".
- To adjust the steering gear. Refer to the following procedures:
  1. "**Worm Thrust Bearing Preload Adjustment - Off Vehicle**".
  2. "**Pitman Shaft Over-Center Preload Adjustment - Off Vehicle**".



Remove the dust seal (1).

- Remove the retaining ring using the [J 4245](#).
- 



**Important:** Use care not to score the steering gear housing bore when prying out the seals and the washers.

Use a screwdriver to pry the backup washer (3) and the double lip seal (2) from the steering gear housing (1).

- Inspect the steering gear housing (1) for burrs.

## Repair Instructions

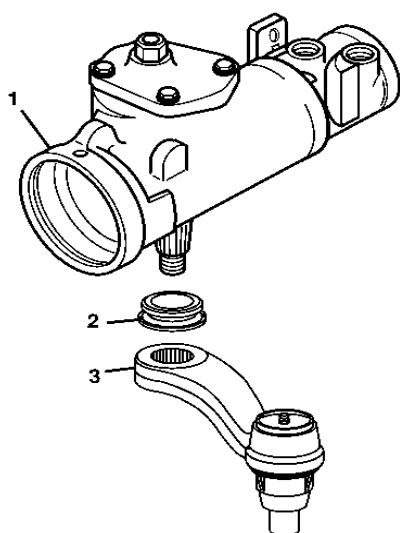
### Pitman Shaft Seals and Bearing Replacement - Off Vehicle (700 Gear)

#### Tools Required

- [J 6278](#) Pitman Shaft Bearing Remover and Installer
- [J 4245](#) Internal Snap Ring Pliers

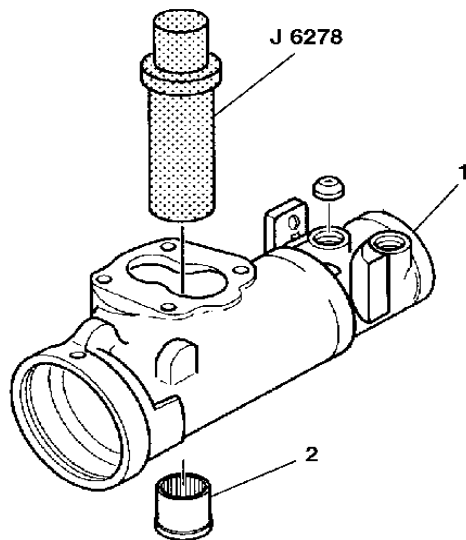
#### Disassembly Procedure

- 



Remove the pitman shaft and the side cover. Refer to "**Steering Gear Pitman Shaft and Housing Cover Replacement - Off Vehicle**".

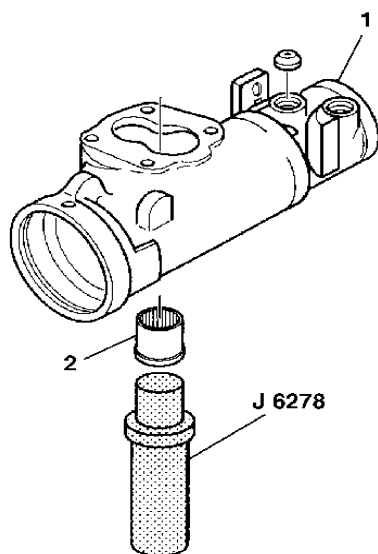
- Remove the pitman arm (3) from the steering gear (1).
- Remove the pitman shaft boot (2).



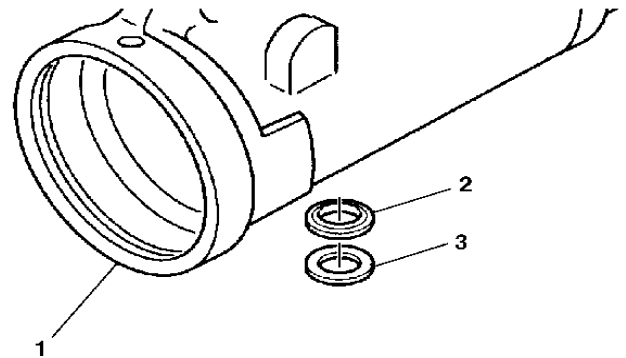
Insert [J 6278](#) through the hole in the top of the steering gear housing (1).

- Drive out the needle bearing (2).

### Assembly Procedure

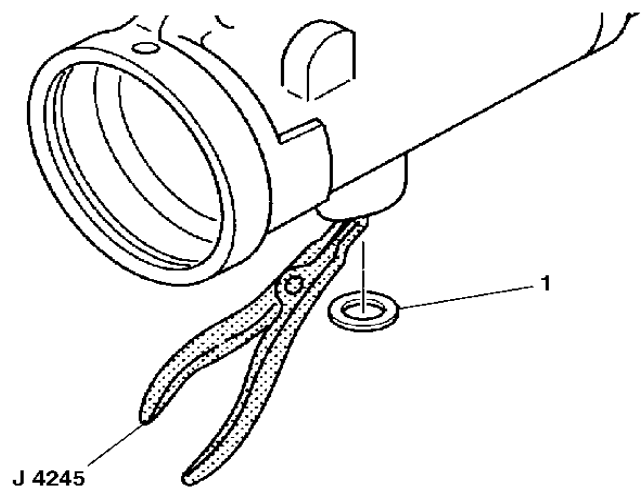


Install the needle bearing (2) to the steering gear housing (1) using the [J 6278](#).



Coat the double lip seal (2) and the washer (3) with grease.

- Install the double lip seal (2).
- Install the backup washer (3).



Install the retaining ring using the [J 4245](#).

- **Important:** Do not install the lock washer and nut until complete installation of the pitman arm and it's components have been installed. Do not adjust the pitman shaft until all components have been installed on the steering gear housing.

Install the pitman shaft and the side cover. Refer to "Steering Gear Pitman Shaft and Housing Cover Replacement - Off Vehicle".

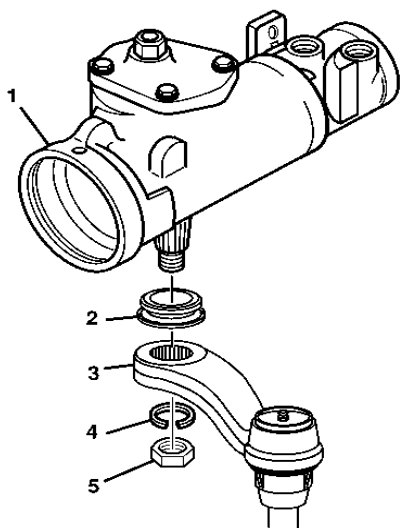
- Install the dust seal (1).



## Steering

## Power Steering System-1

### Assembly Procedure



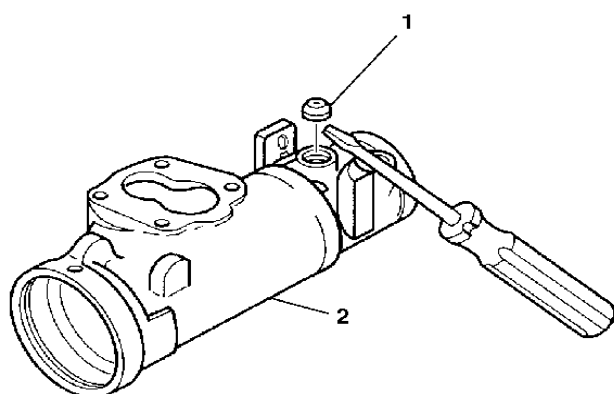
Install the pitman shaft boot (2).

- Install the pitman arm (3) to the steering gear (1).
- Install the lock washer (4).
- Install the nut (5).
- Refer to "Pitman Shaft Over-Center Preload Adjustment - Off Vehicle" to adjust the pitman shaft.

### Repair Instructions

#### Steering Gear Check Valve Replacement - Off Vehicle

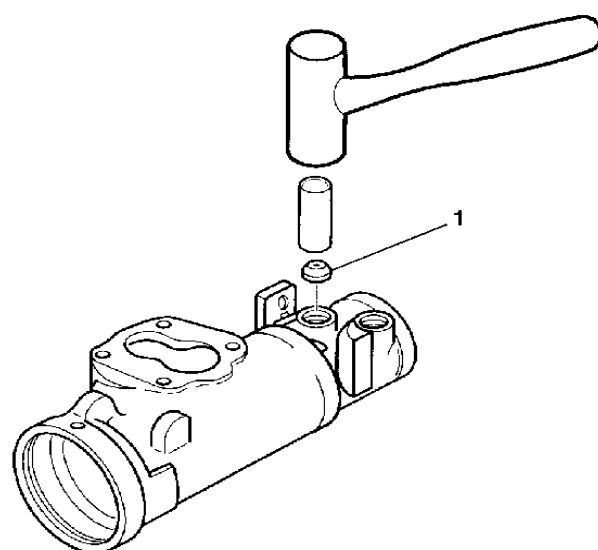
##### Disassembly Procedure



**Important:** Do not to damage the threads of the steering gear housing when removing the check valve.

Remove the check valve (1) from the steering gear housing (2) using a small screwdriver.

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Install the check valve (1) using a 3/8 inch diameter piece of tubing 100 mm (4 in) long to drive into the steering gear housing.

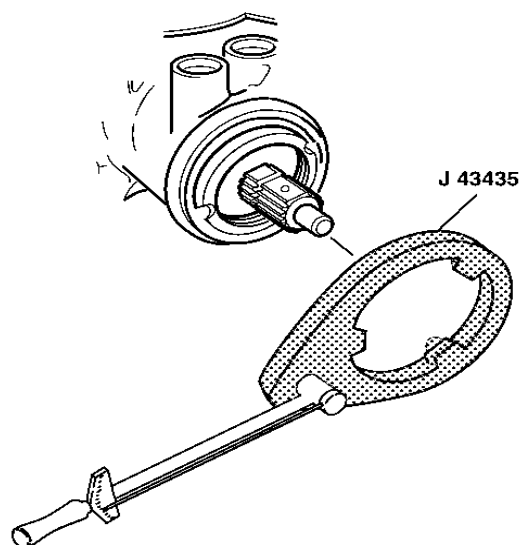
### Repair Instructions

#### Steering Gear Thrust Support Replacement - Off Vehicle

##### Tools Required

- [I42882](#) Adjuster Nut Socket
- [J6222-A](#) Shaft Seal Protector
- [J43435](#) Adjuster Lock Nut Wrench

##### Disassembly Procedure

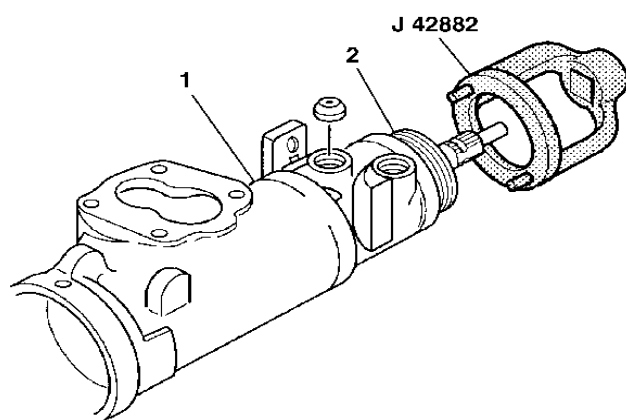


Rotate the stub shaft back and forth in order to drain the power steering fluid.

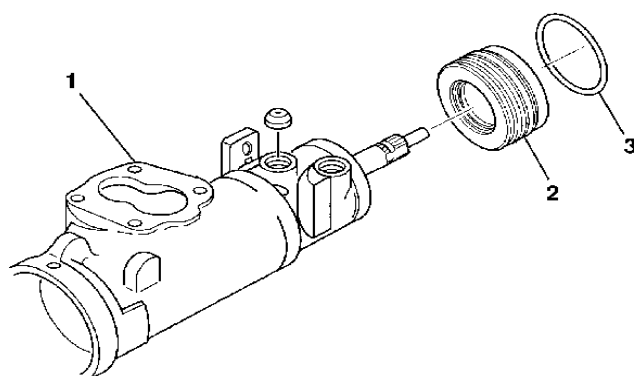
## Steering

## Power Steering System-1

- Remove the coupling shield retainer and the lock nut from the steering gear housing using [J 43435](#) and a torque wrench.



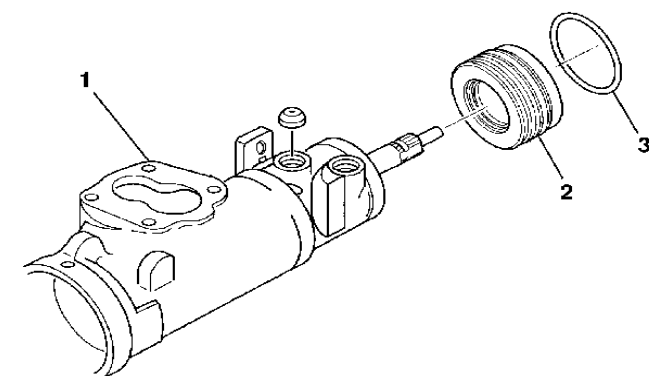
Remove the adjuster nut assembly (2) from the steering gear housing (1) using [J 42882](#).



Remove the thrust support assembly (2) from the steering gear housing (1).

- Remove the O-ring seal (3) from the thrust support assembly (2).

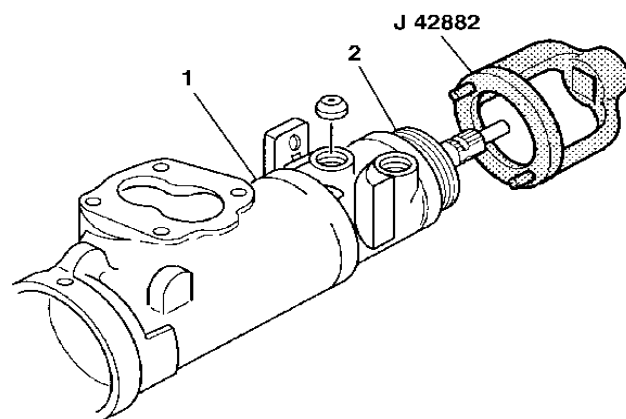
### Assembly Procedure



**Important:** Install a new O-ring seal each time the thrust support assembly is removed from the steering gear.

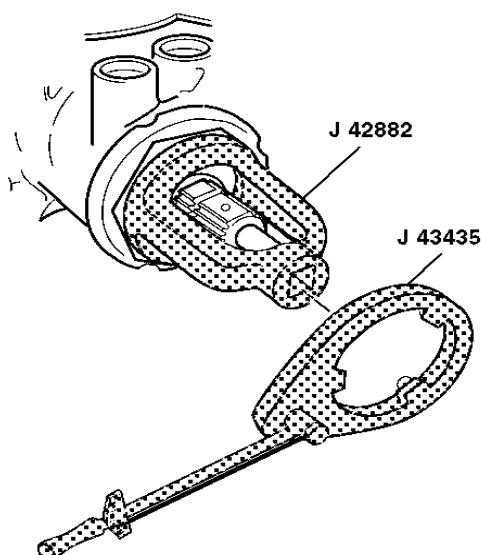
Lubricate the new O-ring seal (3).

- Install the new O-ring seal (3) on the thrust support assembly (2).
- Install the thrust support assembly (2).



Connect the adjuster nut assembly (2) to the steering gear housing (1) using [J 42882](#).

- Install the coupling shield retainer and the lock nut (1) to the adjuster nut assembly.
- Refer to "**Worm Thrust Bearing Preload Adjustment - Off Vehicle**" to adjust the thrust bearing preload.
- Install the coupling shield retainer and the lock nut.



Hold the adjuster nut assembly in position to maintain alignment of the marks.

- **Notice:** Refer to Fastener Notice in Cautions and Notices.
- Tighten the coupling shield retainer and the lock nut using [J 43435](#) and a torque wrench.
- Tighten:** Tighten the coupling shield retainer and the lock nut (2) to 109 Nm (80 lb ft).
- Refer to "**Pitman Shaft Over-Center Preload Adjustment - Off Vehicle**" to adjust the pitman shaft over – center preload.

## Description and Operation

### Power Steering System Description and Operation

The hydraulic power steering pump is a constant displacement vane-type pump that provides hydraulic and flow for the power steering gear. The hydraulic power steering pumps are either belt-driven or direct-drive (cam-driven).

The power steering fluid reservoir holds the power steering fluid and may be integral with the power steering pump or remotely located. The following locations are typical locations for the remote reservoir:

- Mounted to the front of the dash panel
- Mounted to the inner fender
- Mounted to a bracket on the engine

The basic type of power steering gear is a recirculating ball system. In the recirculating ball system, a worm gear converts steering wheel movement to movement of a sector shaft. A pitman arm attached to the bottom of the sector shaft actually moves one tie rod and an intermediate rod move the other tie rod.

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The power steering pressure hose connects the power steering pump union fitting to the power steering gear and allows pressurized power steering fluid to flow from the pump to the gear.



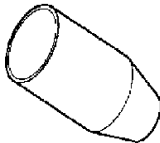
The power steering return hose returns fluid from the power steering gear back to the power steering fluid reservoir. The power steering return line may contain an integral fin-type or line-type power steering fluid cooler.

In a typical power steering system, a pump generates hydraulic pressure, causing fluid to flow, via the pressure hose, to the steering gear valve assembly. The steering gear valve assembly regulates the incoming fluid to the right and left chambers in order to assist in right and left turns.

Turning the steering wheel activates the valve assembly, which applies greater fluid pressure and flow to one side of the steering gear piston, and lower pressure and flow to the other side of the piston. The pressure assists the movement of the gear piston. Tie rods transfer this force to the front wheels, which turn the vehicle right or left.

## Special Tools and Equipment

### Special Tools

Illustration	Tool Number/Description
	J 4245 Internal Snap Ring Pliers
	J 6219 Pitman Shaft Oil Seal Installer
	J 6222-A Shaft Seal Protector
	J 6278 Pitman Shaft Bearing Remover and

**Steering****Power Steering System-1**

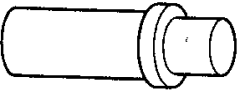

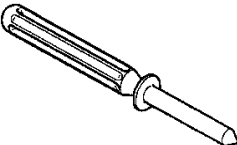
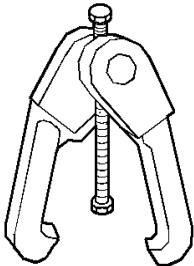
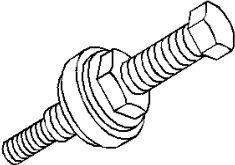
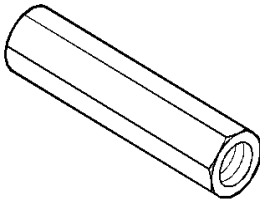
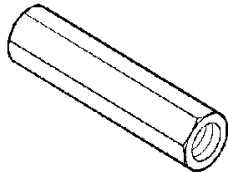
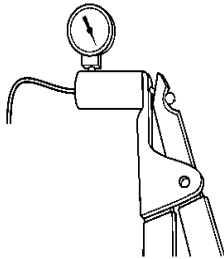
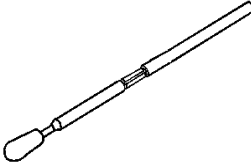
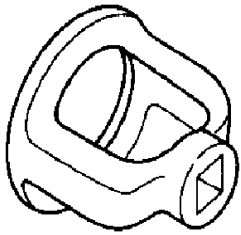
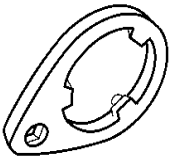
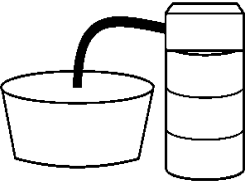
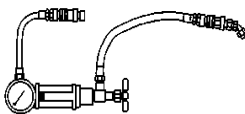
Illustration	Tool Number/Description
	Installer
	J 8947 Rack Piston Teflon Ring Compressor
	J 21552 Rack Piston Arbor
	J 24319-B Universal Steering Linkage Puller
	J 25033-C Power Steering Pump Pulley Installer
	J 25034-C Power Steering Pump Pulley Remover

Illustration	Tool Number/Description
	J 29193 Steering Linkage Installer (12 mm)
	J 29194 Steering Linkage Installer (14 mm)
	J 35555 Mity Vac
	J 42640 Steering Column Anti-Rotation Pin
	J 42882 Adjuster Nut Socket

**Steering****Power Steering System-1**

Illustration	Tool Number/Description
	
	J 43435 Adjuster Lock Nut Wrench
	J 43485 Power Steering Bleeder Adapter
	J 44721 Power Steering System Analyzer