

Power Steering

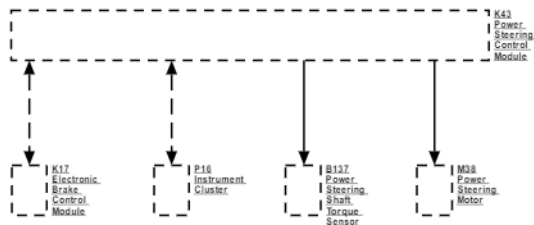
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Description and Operation

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Power Steering System Description and Operation (Electric Power Steering)



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The electric power steering system reduces the amount of effort needed to steer the vehicle. The system uses the body control module, power steering control module, torque sensor, discrete battery voltage supply circuit, electric power steering motor, serial data bus, and the instrument panel cluster message center to perform the system functions. Any electric power steering components diagnosed to be malfunctioning requires replacement of the steering column assembly, also known as the electric power steering assembly.

Torque Sensor

The power steering control module uses a torque sensor as it's main input for determining the amount of steering assist. The steering column has an input shaft, from the steering wheel to the torque sensor, and an output shaft, from the torque sensor to the steering shaft coupler. The input and output shafts are separated by a torsion bar, where the torque sensor is located. The sensor consists of a compensation coil, detecting coil and 3 detecting rings. These detecting rings have toothed edges that face each other. Detecting ring 1 is fixed to the output shaft, detecting rings 2 and 3 are fixed top the input shaft. The detecting coil is positioned around the toothed edges of detecting rings 1 and 2. As torque is applied to the steering column shaft the alignment of the teeth between detecting rings 1 and 2 changes, which causes the detecting coil signal voltage to change. The power steering control module recognizes this change in signal voltage as steering column shaft torque. The compensation coil is used to compensate for changes in electrical circuit impedance due to circuit temperature changes from the electrical current and voltage levels as well as ambient temperatures for accurate torque detection.

EPS Motor

The electric power steering motor is a 12-volt brushed DC reversible motor. The motor assists steering through a worm shaft and reduction gear located in the steering column housing.

Power Steering Control Module

The power steering control module uses a combination of torque sensor inputs, vehicle speed, calculated system temperature and the steering calibration to determine the amount of steering assist. When the steering wheel is turned, the power steering control module uses signal voltage from the torque sensor to detect the amount of torque being applied to the steering column shaft and the amount of current to command to the electric power steering motor. The power steering control module receives serial data from the engine control module to determine vehicle speed. At low speeds more assist is provided for easy turning during parking maneuvers. At high speeds, less assist is provided for improved road feel and directional stability. In this mode the power steering control module will limit the amount of current commanded to the electric power steering motor which reduces steering assist levels. The power steering control module also chooses which steering calibration to use when the ignition is turned ON, based on the production map number stored in the body control module. The power steering control module contains all 8 of the steering calibrations which are different in relation to the vehicles RPOs. The power steering control module has the ability to detect malfunctions within the electric power steering system. Any malfunction detected will cause the instrument panel cluster message center to display a warning message.

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Power Steering System Description and Operation (Hydraulic Power Steering)

The hydraulic power steering pump is a constant displacement vane-type pump that provides hydraulic pressure 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 2 basic types of power steering gears are listed below:

- A recirculating ball system
- A rack and pinion 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.

In the rack and pinion system, the rack and the pinion are the 2 components that convert steering wheel rotation to lateral movement. The steering shaft is attached to the pinion in the steering gear. The pinion rotates with the steering wheel. Gear teeth on the pinion mesh with the gear teeth on the rack. The rotating pinion moves the rack from side to side. The lateral action of the rack pushes and pulls the tie rods in order to change the direction of the vehicle's front wheels.

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.

Diagnostic Information and Procedures

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DTC C0176

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptor

DTC C017654

Control Module Temperature Sensor High Temperature

Circuit/System Description

The power steering control module monitors the temperature of the power steering system. The power steering control module uses voltage, current levels and input from an internal temperature sensor to calculate an estimated system temperature. If the power steering control module detects a high system temperature event is occurring, the amount of assist is decreased to reduce system temperature, in effort to prevent thermal damage to the power steering components.

Conditions for Running the DTC

- Ignition ON, engine running.
- Power steering system voltage is 9-16 V.
- Repetitive steering input applied.

Conditions for Setting the DTC

The power steering control module detects a high system temperature.

Action Taken When the DTC Sets

- DTC C017654 is stored in memory.
- Steering assist is reduced.

Conditions for Clearing the DTC

A current DTC will clear on the next malfunction-free ignition cycle.

Diagnostic Aids

- DTC C017654 does not indicate that a malfunction has occurred. Rather that the power steering control module had to limit current to the power steering motor to avoid thermal damage to the power steering system components. Discuss with the customer about driving conditions when the steering assist was reduced.
- Ensure that no steering components down stream of the power steering column assembly, such as ball joints, tie rod ends, universal joints, or the steering gear assembly, are mechanically binding.

Reference Information

Schematic Reference

[Power Steering Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Power Steering System Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information.

Circuit/System Verification

1. Verify that the DTC sets outside of the conditions for running and setting. Since most occurrences of this DTC are caused by excessive driver inputs, review with the customer the conditions under which the DTC set.
2.
 - **If the DTC did not set outside of the conditions for running and setting**
3.
 1. Ignition ON.
 2. Operate the vehicle within the conditions that the customer experienced, avoiding excessive inputs, and verify the DTC does not reset.
 3.
 - If the DTC is set
 4.
 1. Verify that no steering components down stream of the power steering column assembly are mechanically binding. Refer to [Steering Effort Hard or Too Easy in One or Both Directions](#)
 2.
 - If steering components are mechanically binding, replace the mechanically binding steering components.
 - If no steering components are mechanically binding, replace the steering column assembly.
 5.
 - If the DTC is not set
 6. All OK.
4.
 - **If the DTC set outside of the conditions for running and setting**
5. All OK. The power steering is operating as designed.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Steering Column Replacement](#)
- [Control Module References](#) for Power Steering Control Module replacement, programming and setup.

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DTC C0460

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptor

DTCâ€™C0460â€™00

Steering Wheel Angle Sensor Malfunction

DTCâ€™C0460â€™4B

Steering Wheel Angle Sensor Calibration Not Learned

Circuit/System Description

The power steering control module contains the steering wheel angle sensor. The steering wheel angle sensor identifies the position and direction of the steering wheel rotation. The steering wheel angle signal is sending a serial data to the GMLAN high speed bus.

Conditions for Running the DTC

- Ignition ON, engine running.
- Power steering system voltage is 9â€“16 V.

Conditions for Setting the DTC

DTCâ€™C0460â€™00

- Steering angle signal is not valid.
- Steering angle signal line is open.
- Steering angle signal cycle time is out of range.
- Steering angle signal duty cycle is out of range.

DTCâ€™C0460â€™4B

Steering sensor zero position is not set.

Action Taken When the DTC Sets

- DTCâ€™C0460 is stored in memory.
- No steering assist.

Conditions for Clearing the DTC

A current DTC will clear on the next malfunction-free ignition cycle.

Reference Information

Schematic Reference

[Power Steering Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Power Steering System Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information.

Circuit/System Verification

1. Ignition ON.
2. Verify the DTC is not set.
3.
 - **If the DTC is set**
4.
 1. Calibrate the K43 Power Steering Control Module. Refer to [K43 Power Steering Control Module: Programming and Setup](#)
 2. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC
 3.
 - If the DTC sets, replace the K43 Power Steering Control Module.
 4.
 - If the DTC is not set
 5. All OK.
5.
 - **If the DTC is not set**
6. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Control Module References](#) for control module replacement, programming and setup.

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DTC C0475

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptors

DTC C0475

Electric Steering Motor Circuit Malfunction

Circuit/System Description

The power steering control module continuously monitors the voltage and current levels being commanded to the 3-phase steering motor. The power steering control module compares the desired and actual current levels to detect malfunctions in the internal power steering motor circuits.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

The power steering control module detects a short to ground, short to voltage, or an open/high resistance on any of the internal power steering motor circuits.

Action Taken When the DTC Sets

- The DTC is stored in memory.
- No steering assist.

Conditions for Clearing the DTC

A history DTC will clear after 40 consecutive malfunction-free ignition cycles.

Reference Information

Schematic Reference

[Power Steering Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Power Steering System Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

[Control Module References](#) for scan tool information.

Circuit/System Testing

Note:

Check all connections for looseness, bent terminals, corrosion, contamination, deterioration, and/or damage before starting Circuit/System Testing.

1. Ignition ON.
2. Verify that DTC C0475 is not set.
3.
 - **If the DTC is set**
 - Note:
If the power steering assist motor is available as a service part, replace the motor instead of the entire steering column.
 - Replace the steering column assembly.
4.
 - **If the DTC is not set**
5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Steering Column Replacement](#)
- [Control Module References](#) for control module replacement, programming and setup.

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DTC C0545

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptor

DTC C0545

Steering Wheel Torque Sensor Malfunction

Circuit/System Description

The power steering control module continuously monitors the digital torque sensor signal. As the steering wheel is turned and torsional twist is applied to the steering shaft, the steering input and output shafts are monitored via the torque signal circuit and then processed by the power steering control module to calculate the steering torque.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

The power steering control module detects a short to ground, short to voltage, or an open/high resistance on any of the torque sensor circuits.

Action Taken When the DTC Sets

- DTC C0545 is stored in memory.
- No steering assist.

Conditions for Clearing the DTC

A history DTC will clear after 40 consecutive malfunction-free ignition cycles.

Reference Information

Schematic Reference

[Power Steering Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Power Steering System Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

[Control Module References](#) for scan tool information.

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool the steering input torque changes when turning the steering wheel.
3.
 - **If the parameter does not change**
 - Refer to Circuit/System Testing
4.
 - **If the parameter changes**
5. All OK.

Circuit/System Testing

Note:

Check all connections for looseness, bent terminals, corrosion, contamination, deterioration, and/or damage before starting Circuit/System Testing.

1. Ignition ON.
2. Verify that DTC P0545 is not set.
3.
 - **If the DTC is set**
 - Replace the steering column assembly.
4.
 - **If the DTC is not set**
5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Steering Column Replacement](#)
- [Control Module References](#) for Power Steering Control Module replacement, programming and setup.

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DTC C0569

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptors

DTC C0569

Calibration Not Programmed

Circuit/System Description

The power steering control module continuously monitors the parameters of the steering gear. The power steering control module performs a self-test diagnostic during power-up. The configuration is not complete from supplier.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

Electronic power steering control module configuration is not complete.

Action Taken When the DTC Sets

- DTC C0569 is stored in memory.
- No steering assist.

Conditions for Clearing the DTC

A history DTC will clear after 40 consecutive malfunction free ignition cycles.

Reference Information

Schematic Reference

[Power Steering Schematics](#)

Connector End View Reference

[Component Connector End Views](#)

Description and Operation

[Power Steering System Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

[Control Module References](#) for scan tool information.

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC P0569 is not set.
3.
 - **If the DTC P0569 is set**
4.
 1. Program the K43 Power Steering Control Module.
 2. Verify the DTC does not set.
 3.
 - If the DTC sets, replace the K43 Power Steering Control Module.
 4.
 - If the DTC does not set
5. All OK.
5.
 - **If the DTC P0569 is not set**
6. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Control Module References](#) for control module replacement, programming and setup.

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Symptoms - Power Steering System (Electric Power Steering)

Note:

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.

Symptoms List

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

- [Increase in Effort While Turning Steering Wheel](#)
- [Poor Return of Steering Wheel](#)
- [Steering Wheel Surges/Jerks While Turning](#)
- [Rattle, Clunk, Pop or Shudder Noise from the Power Steering System](#)
- [Whine or Growl Noise from the Power Steering System](#)

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Symptoms - Power Steering System (Hydraulic Power Steering)

Note:

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 for leaking power steering components. If necessary, refer to [Power Steering Fluid Leaks](#).
- Verify the power steering fluid level per operating specification.
- Inspect the power steering fluid for the following indications of contamination:
 - - Milky fluid “ water
 - Brown fluid “ burnt
 - Debris in fluid “ plastic or dirt
- If necessary, flush the power steering system.

Symptoms List

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

- [Power Steering Fluid Leaks](#)
- [Rattle, Clunk, Pop or Shudder Noise from the Power Steering System](#)
- [Whine or Growl Noise from the Power Steering System](#)
- [Steering Effort Hard or Too Easy in One or Both Directions](#)

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Power Steering System Test

Special Tools

J-25323-D Power Steering Analyzer

For equivalent regional tools, refer to [Special Tools](#).

Check the fluid pressure as follows to determine whether the trouble is in the pump or the gear unit.

Test Procedure

1. Check the power steering fluid level and the power steering pump belt tension. Refer to [Power Steering System Bleeding](#)
2. Apply the park brake.
3. Disconnect the high pressure line at the pump. Use a small container to catch any fluid.
4. Connect the power steering analyzer to the power steering pressure hose from the power steering pump.
5. Place the gear selector lever in PARK if the vehicle is equipped with the automatic transaxle or NEUTRAL if the vehicle is equipped with the manual transaxle.
6. Open the gauge valve fully.
7. Start the engine and let it idle.
8. Turn the steering wheel from lock to lock several times to warm the fluid to operating temperature.
9. Increase the engine speed to 1,500â€‰%RPM.
10. Caution:
Do not leave the valve fully closed for more than 5 seconds, or the pump could be damaged internally.
11. Close the gauge valve fully, and read the pressure. Refer to [Power Steering Pump Specifications](#).
12. Immediately open the gauge valve fully.
13. Turn the steering wheel all the way to the left and the right. If the pressure is within the specified limits, the problem is not in the pump.

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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 Power Steering System Description and Operation
2	Verify that power steering fluid leaks are present. Is the power steering system leaking?	Go to Step 3	System OK
3	Inspect the power steering system fittings. Are the fittings leaking?	Go to Step 7	Go to Step 4
4	Inspect the power steering hoses/pipes. Are the hoses/pipes leaking?	Go to Step 8	Go to Step 5
5	Inspect the power steering pump and the reservoir for leaks. Is the power steering pump or reservoir leaking?	Go to Step 9	Go to Step 6
6	Inspect the power steering pump, reservoir and pump drive shaft for leaks. Is the power steering pump, reservoir or pump drive shaft leaking?	Go to Step 10	Go to Step 8
7	Caution: Refer to Fastener Caution . Tighten the fittings. Refer to Fastener Specifications . Did you complete the repair?	Go to Step 11	â€”
8	Replace the power steering hoses/pipes. Refer to the appropriate procedure(s): Power Steering Fluid Reservoir Outlet Hose Replacement Power Steering Gear Inlet Pipe/Hose Replacement Power Steering Gear Outlet Pipe/Hose Replacement Did you complete the repair?	Go to Step 11	â€”
9	Replace the power steering pump or reservoir or pump drive shaft seal. Refer to the appropriate procedure(s): Power Steering Pump Replacement Power Steering Pump Bracket Replacement Did you complete the repair?	Go to Step 11	â€”
10	Replace the power steering gear. Refer to Steering Gear Replacement . Did you complete the repair?	Go to Step 11	â€”
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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Rattle, Clunk, Pop or Shudder Noise from the Power Steering System (Hydraulic Power Steering)

Step	Action	Yes	No
1	Did you review the Power Steering General Description and perform the necessary inspections?	Go to Step 2	Go to Power Steering System Description and Operation
2	Verify that a rattle, clunk or shudder noise is present. Is a rattle, clunk or shudder noise present?	Go to Step 3	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 Step 11	Go to Step 4
4	Inspect the pump drive belt for cracking or excessive wear. Refer to Drive Belt Chirping, Squeal, and Whine Diagnosis Is the drive belt cracked or excessively worn?	Go to Step 12	Go to Step 5
5	Inspect the power steering pump pulley for damage. Is the power steering pump pulley damaged?	Go to Step 13	Go to Step 6
6	Inspect the power steering pump and the power steering mounting bracket/brace for the proper installation. Refer to Power Steering Pump Replacement or Power Steering Pump Bracket Replacement .	Go to Step 14	Go to Step 7
7	Inspect the power steering gear for the proper installation. Refer to Steering Gear Replacement . Is the power steering gear installation incorrect?	Go to Step 15	Go to Step 8
8	Inspect for looseness in the inner and outer tie rod ends. Did you find looseness in the tie rod ends?	Go to Step 16	Go to Step 9
9	Inspect the suspension. Is the suspension worn?	Go to Step 17	Go to Step 10
10	Inspect the intermediate shaft. Is the intermediate shaft worn?	Go to Step 18	Go to Step 3
11	Adjust or replace the hoses. Refer to the appropriate procedure(s): Power Steering Gear Inlet Pipe/Hose Replacement. Power Steering Gear Outlet Pipe/Hose Replacement. Did you complete the repair?	Go to Step 19	â€”
12	Replace the pump drive belt. Refer to the appropriate procedure. Refer to Drive Belt Chirping, Squeal, and Whine Diagnosis . Did you complete the repair?	Go to Step 19	â€”
13	Replace the power steering pump. Refer to Power Steering Pump Replacement . Did you complete the repair?	Go to Step 19	â€”
14	Install the power steering pump correctly. Refer to Power Steering Pump Replacement . Did you complete the repair?	Go to Step 19	â€”
15	Install the power steering gear correctly. Refer to Steering Gear Replacement . Did you complete the repair?	Go to Step 19	â€”
16	Replace the tie rod. Refer to Steering Linkage Outer Tie Rod Replacement . Did you complete the repair?	Go to Step 19	â€”
17	Replace the worn suspension components. Did you complete the repair?	Go to Step 19	â€”

Step	Action	Yes	No
18	Replace the intermediate shaft. Refer to Intermediate Steering Shaft Replacement . Did you complete the repair?	Go to Step 19	â€”
19	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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Rattle, Clunk, Pop or Shudder Noise from the Power Steering System (Electric Power Steering)

Condition	Action
Verify the customer complaint.	Test the vehicle on a shop hoist or road test (if necessary). It may be necessary to compare to a like vehicle to determine if an issue is present.
Confirm no DTC are present.	If DTC is present, refer to the appropriate DTC diagnostic table. If no DTC is present, continue to the next condition.
Noise in the steering linkage or suspension system: Inspect the steering linkage and suspension system for loose, worn or damaged components. • Tie rods (inner & outer) • Ball joints • Upper strut mount Lubricate the tie rod ends and ball joints, if applicable.	If loose, worn or damaged components are identified, replace or tighten the loose fastener and/or repair the worn or damaged component(s). Refer to the appropriate repair procedure.
Noise at the intermediate steering shaft: Inspect the intermediate steering shaft for looseness, wear or damage.	If looseness is identified at the fasteners, replace the fastener and tighten to specification. Intermediate Steering Shaft Replacement If wear or binding is identified, replace the affected component. Intermediate Steering Shaft Replacement
Noise at the steering gear bushing: Inspect the steering gear bushings for signs of cracks, wear, damage, or fluid leaks.	If the steering gear bushing damage are identified, replace the worn or damaged part. • Intermediate Steering Shaft Lower Seal Replacement • Steering Gear Replacement
Noise at the power steering gear: Inspect the steering gear fasteners for looseness.	If looseness is identified at the fasteners, replace the fastener and tighten to specification. Steering Gear Replacement
Noise at the power steering gear: Inspect the steering assist motor for looseness, wear or damage.	With the intermediate shaft disconnected, use a wrench to rotate the steering gear input shaft from the left of center to the right of center. If power steering assist motor damage is identified, replace power steering assist motor. Power Steering Assist Motor Replacement
Noise at the power steering gear: Inspect the steering gear components wear or damage. • Steering gear end stops • Steering gear pinion(s) • Steering gear boot(s) • Steering gear inner tie rod end(s) • Steering gear outer tie rod end(s)	Note: The steering gear is required to be replaced for steering gear pinion, rack bar, or ends stops damage, if applicable. With the intermediate shaft disconnected, use a wrench to rotate the steering gear input shaft from the left of center to the right of center. If worn or damaged components are identified, replace the worn or damaged part. • Steering Gear Replacement • Steering Gear Boot Replacement • Steering Linkage Inner Tie Rod Replacement • Steering Linkage Outer Tie Rod Replacement

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Whine or Growl Noise from the Power Steering System (Hydraulic Power Steering)

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 Symptoms - Power Steering System
2	Verify that a whine or growl noise is present. Is a whine or growl noise present?	Go to Step 3	System OK
3	Inspect the power steering fluid for the following indications of contamination: • Milky fluid “water • Brown fluid “burnt • Debris in fluid “plastic or dirt Is the fluid free of contamination?	Go to Step 5	Go to Step 4
4	Flush the power steering system. Refer to Power Steering System Bleeding . Did you complete the procedure?	Go to Step 11	Go to Step 5
5	Inspect the power steering gear for a whine or growl noise, preferably by using a listening device. Is the noise present at the power steering gear?	Go to Step 8	Go to Step 6
6	Inspect the power steering pump for a whine or growl noise, preferably by using a listening device. Is the noise present at the power steering pump?	Go to Step 9	Go to Step 7
7	Inspect the power steering hoses for a whine or growl noise, preferably by using a listening device. Is the noise present at the power steering hoses?	Go to Step 10	Go to Step 2
8	Replace the power steering gear. Refer to Steering Gear Replacement . Did you complete the repair?	Go to Step 11	“
9	Replace the power steering pump. Refer to Power Steering Pump Replacement . Did you complete the repair?	Go to Step 11	“
10	Adjust the routing of the power steering hoses. Did you complete the repair?	Go to Step 11	“
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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Whine or Growl Noise from the Power Steering System (Electric Power Steering)

Condition	Action
Verify the customer complaint.	Test the vehicle on a shop hoist or road test (if necessary). It may be necessary to compare to a like vehicle to determine if an issue is present.
Confirm no DTC are present.	If DTC is present, refer to the appropriate DTC diagnostic table. If no DTC is present, continue to the next condition.
Noise at the power steering assist motor: Inspect the power steering assist motor for a whine or growl noise using the J-39570 chassis ear.	If abnormal noise (whine or growl) is identified at the power steering assist motor, replace power steering assist motor. Power Steering Assist Motor Replacement
Noise at the power steering gear: Inspect the power steering gear components for a whine or growl noise using the J-39570 chassis ear. - Steering gear end stops - Steering gear rack bar - Steering gear inner tie rod end(s) - Steering gear pinion(s)	Note: The steering gear is required to be replaced for steering gear pinion, rack bar, or ends stops damage, if applicable. If abnormal noise (whine or growl) is identified at the power steering gear, replace power steering gear. Steering Gear Replacement

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Increase in Effort While Turning Steering Wheel (Electronic Power Steering)

Step	Action	Yes	No
1	Did you review the Power Steering System Description and Operation and perform the necessary inspections?	Go to Step 2	Go to Power Steering System Description and Operation
2	Verify that there is an increase in effort while turning is present. Does the system operate normally?	System OK	Go to Step 3
3	Check for the following conditions: - Incorrect tire inflation - Refer to Vehicle Certification, Tire Placard, Anti-Theft, and Service Parts ID Label. - Improper tire size Did you find and correct the condition?	Go to Step 10	Go to Step 4
4	1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Check for a binding or worn steering linkage outer tie rod. Is the tie rod binding or worn?	Go to Step 7	Go to Step 5
5	Check for a worn or binding intermediate steering shaft. Is the intermediate steering shaft worn or binding?	Go to Step 8	Go to Step 6
6	Check for a worn or binding steering gear. Is the steering gear worn or binding?	Go to Step 9	System OK
7	Replace the steering linkage outer tie rod. Refer to Steering Linkage Outer Tie Rod Replacement . Did you complete the repair?	Go to Step 10	â€”
8	Replace the intermediate steering shaft. Refer to Intermediate Steering Shaft Replacement . Did you complete the repair?	Go to Step 10	â€”
9	Replace the steering gear. Refer to Steering Gear Replacement . Did you complete the repair?	Go to Step 10	â€”
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

Related Part Information

Part Name	Catalog Name	Part Code
Steering Wheel WHEEL PKG,STRG		SJ534
Steering Wheel WHEEL PKG,STRG		SS153
Steering Wheel WHEEL,STRG (W/AIRBAG MDL)		0045A
Steering Wheel WHEEL,STRG		0049Y
Steering Wheel WHEEL,STRG		0050A
Steering Wheel WHEEL,STRG		0050B
Steering Wheel WHEEL KIT,STRG		SG013

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Poor Return of Steering Wheel (Electric Power Steering)

Condition	Action
Verify the customer complaint.	Test the vehicle on a shop hoist or road test (if necessary). It may be necessary to compare to a like vehicle to determine if an issue is present.
Confirm no DTC are present.	If DTC is present, refer to the appropriate DTC diagnostic table. If no DTC is present, continue to the next condition.
Is the wheel alignment out of specification? Inspect the wheel alignment.	If wheel alignment is out of specification, adjust the wheel alignment. Wheel Alignment Measurement
Binding in the steering linkage or suspension system: Inspect the steering linkage and suspension system for worn or damaged components. • Tie rods (inner & outer) • Ball joints • Upper strut mount Lubricate the tie rod ends and ball joints, if applicable.	If worn or damaged components are identified, replace and/or repair the worn or damaged component(s). Refer to the appropriate repair procedure.
Binding in the steering column: Inspect the steering assist motor looseness, wear or damage.	With the intermediate shaft disconnected, inspect the steering assist motor for looseness, worn or damage. If looseness or damage is identified at the power steering assist motor, replace the power steering assist motor. Power Steering Assist Motor Replacement
Binding in the steering column: Inspect the steering column for looseness, worn or damaged components. • Steering column shaft • Steering column bearing(s) • Steering column shear capsules	With the intermediate shaft disconnected, inspect the steering column for looseness, worn or damage. If damage to the steering column is identified, replace the steering column. Steering Column Replacement
Binding in the intermediate steering shaft and/or boot: Inspect for one or more of the intermediate steering shaft boot(s) for wear or damage.	If worn or damaged intermediate steering shaft boot(s) were identified, replace the affected intermediate steering shaft boot or intermediate shaft. • Intermediate Steering Shaft Upper Seal Replacement • Intermediate Steering Shaft Replacement
Binding in the intermediate steering shaft and/or boot: Inspect the intermediate steering shaft joints and/or fasteners for looseness, wear or damage.	If looseness is identified at the fasteners, replace the fastener and tighten to specification. Intermediate Steering Shaft Replacement If wear or damage is identified, replace the affected component. Intermediate Steering Shaft Replacement

Condition	Action
Binding in the power steering gear: Inspect the steering gear components for looseness, wear or damage. - Steering gear end stops - Steering gear rack bar - Steering gear pinion(s) - Steering gear Boot(s) - Steering gear inner tie rod end(s) - Steering gear outer tie rod end(s)	Note: The steering gear is required to be replaced for steering gear pinion, rack bar, or ends stops damage, if applicable. With the intermediate shaft disconnected, use a wrench to rotate the steering gear input shaft from the left of center to the right of center. If looseness, wear or damage is identified, replace the worn or damaged part. Steering Gear Replacement Steering Gear Boot Replacement Steering Linkage Inner Tie Rod Replacement Steering Linkage Outer Tie Rod Replacement

Related Part Information

Part Name	Catalog Name	Part Code
Steering Wheel WHEEL PKG,STRG		SJ534
Steering Wheel WHEEL PKG,STRG		SS153
Steering Wheel WHEEL,STRG (W/AIRBAG MDL)		0045A
Steering Wheel WHEEL,STRG		0049Y
Steering Wheel WHEEL,STRG		0050A
Steering Wheel WHEEL,STRG		0050B
Steering Wheel WHEEL KIT,STRG		SG013

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Steering Wheel Surges/Jerks While Turning (Electric Power Steering)

Condition	Action
Verify the customer complaint.	Test the vehicle on a shop hoist or road test (if necessary). It may be necessary to compare to a like vehicle to determine if an issue is present.
Confirm no DTC are present.	If DTC is present, refer to the appropriate DTC diagnostic table. If no DTC is present, continue to the next condition.
Loss of voltage at the steering column: Check for proper battery voltage.	Inspect and test the battery(s). Replace as necessary.
Loss of voltage at the steering column: Inspect cables and terminal looseness, corrosion, and/or damage.	Inspect and test the battery cable(s). Replace as necessary.
Loss of voltage at the steering column: Inspect wiring harness, connectors and terminals leading to the steering column for looseness, corrosion, and/or damage.	If the wiring harness, connectors and terminals are loose, re-connect or re-tighten to the proper specification. If the wiring harness, connectors and terminals are corroded and/or damaged, replace the wiring harness.
Loss of voltage at the steering column: Inspect wiring harness, connectors and terminals at the steering column for looseness, corrosion, and/or damage.	If the wiring harness, connectors and terminals are loose, re-connect or re-tighten to the proper specification. If the wiring harness, connectors and terminals are damaged and/or corroded at the power steering assist motor, replace the power steering assist motor. Power Steering Assist Motor Replacement
Loss of communication with the steering column: Inspect wiring harness, connectors and terminals at the power steering torque sensor for looseness, corrosion, and/or damage.	If the wiring harness, connectors and terminals are loose, re-connect or re-tighten to the proper specification. If the wiring harness, connectors and terminals are damaged and/or corroded at the power steering torque sensor, replace the steering column. Steering Column Replacement
Binding in the steering linkage or suspension system: Inspect the steering linkage and suspension system for worn or damaged components. • Tie rods (inner & outer) • Ball joints • Upper strut mount Lubricate the tie rod ends and ball joints, if applicable.	If worn or damaged components are identified, repair the worn or damaged component(s). Refer to the appropriate repair procedure.
Binding in the power steering assist motor: Inspect the steering assist motor looseness, wear or damage.	With the intermediate shaft disconnected, inspect the steering assist motor for looseness, wear or damage. If looseness, wear or damage is identified at the power steering assist motor, replace the power steering assist motor. Power Steering Assist Motor Replacement
Binding in the steering column: Inspect the steering column for looseness, wear or binding. • Steering column shaft • Steering column bearing(s) • Steering column shear capsules	With the intermediate shaft disconnected, inspect for looseness wear or binding within the steering column. Steering Column Replacement

Condition	Action
Binding in the intermediate steering shaft and/or boot: Inspect for one or more of the intermediate steering shaft boot(s) is binding.	If binding was identified at the intermediate steering shaft boot(s), adjust or replace the affected intermediate steering shaft boot(s). • Intermediate Steering Shaft Upper Seal Replacement • Intermediate Steering Shaft Replacement
Binding in the intermediate steering shaft and/or boot: Inspect the intermediate steering shaft joints and/or fasteners for looseness, wear or damage.	If looseness is identified at the fasteners, replace the fastener and tighten to specification. Intermediate Steering Shaft Replacement If wear or damage is identified, replace the affected component. Intermediate Steering Shaft Replacement
Binding in the power steering gear: Inspect the steering gear for looseness, wear or damage. • Steering gear end stops • Steering gear rack bar • Steering gear pinion(s) • Steering gear Boot(s) • Steering gear inner tie rod end(s) • Steering gear outer tie rod end(s)	Note: The steering gear is required to be replaced for steering gear pinion, rack bar, or ends stops damage, if applicable. With the intermediate shaft disconnected, use a wrench to rotate the steering gear input shaft from the left of center to the right of center. If looseness, wear or damage is identified, replace the worn or damaged part. • Steering Gear Replacement • Steering Gear Boot Replacement • Steering Linkage Inner Tie Rod Replacement • Steering Linkage Outer Tie Rod Replacement

Related Part Information

Part Name	Catalog Name	Part Code
Steering Wheel	WHEEL PKG,STRG	SJ534
Steering Wheel	WHEEL PKG,STRG	SS153
Steering Wheel	WHEEL,STRG (W/AIRBAG MDL)	0045A
Steering Wheel	WHEEL,STRG	0049Y
Steering Wheel	WHEEL,STRG	0050A
Steering Wheel	WHEEL,STRG	0050B
Steering Wheel	WHEEL KIT,STRG	SG013

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Steering Effort Hard or 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 Step 2	Go to Symptoms - Power Steering System
2	Verify that the steering effort is hard or too easy in one or both directions. Does the system operate normally?	System OK	Go to Step 3
3	Perform the power steering test procedure. Refer to Power Steering System Bleeding . Did you complete the procedure?	Go to Step 4	â€”
4	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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Steering Effort Hard in One or Both Directions (Electric Power Steering)

Condition	Action
Verify the customer complaint.	Test the vehicle on a shop hoist or road test (if necessary). It may be necessary to compare to a like vehicle to determine if an issue is present.
Confirm no DTC are present.	If DTC is present, refer to the appropriate DTC diagnostic table. If no DTC is present, continue to the next condition.
Loss of voltage at the steering column: Check for proper battery voltage.	Inspect and test the battery(s). Replace as necessary.
Loss of voltage at the steering column: Inspect cables and terminal looseness, corrosion, and/or damage.	Inspect and test the battery cable(s). Replace as necessary.
Loss of voltage at the steering column: Inspect wiring harness, connectors and terminals leading to the steering column for looseness, corrosion, and/or damage.	If the wiring harness, connectors and terminals are loose, re-connect or re-tighten to the proper specification. If the wiring harness, connectors and terminals are corroded and/or damaged, replace the wiring harness.
Loss of communication with the steering column: Inspect wiring harness, connectors and terminals at the steering column for looseness, corrosion, and/or damage.	If the wiring harness, connectors and terminals are loose, re-connect or re-tighten to the proper specification. If the wiring harness, connectors and terminals are damaged and/or corroded at the power steering assist motor, replace the power steering assist motor. Power Steering Assist Motor Replacement
Loss of voltage at the steering column: Inspect wiring harness, connectors and terminals at the power steering torque sensor for looseness, corrosion, and/or damage.	If the wiring harness, connectors and terminals are loose, re-connect or re-tighten to the proper specification. If the wiring harness, connectors and terminals are damaged and/or corroded at the power steering torque sensor, replace the steering column. Steering Column Replacement
Binding in the steering linkage or suspension system: Inspect the steering linkage and suspension system for worn or damaged components. • Tie rods (inner & outer) • Ball joints • Upper strut mount Lubricate the tie rod ends and ball joints, if applicable.	If worn or damaged components are identified, repair the worn or damaged component(s). Refer to the appropriate repair procedure.
Binding in the power steering assist motor: Inspect the steering assist motor looseness, worn or damaged components.	With the intermediate shaft disconnected, inspect the steering assist motor for looseness, or binding. If looseness or binding is identified at the power steering assist motor, replace the power steering assist motor. Power Steering Assist Motor Replacement
Binding in the steering column: Inspect the steering column for looseness, worn or damaged components. • Steering column shaft • Steering column bearing(s) • Steering column shear capsules	With the intermediate shaft disconnected from the steering column, inspect the steering column for looseness wear or damaged components. If looseness, wear or damage is identified, replace the steering column. Steering Column Replacement

Condition	Action
Binding in the intermediate steering shaft and/or boot: Inspect for one or more of the intermediate steering shaft boot(s) for wear or damage.	If binding was identified at the intermediate steering shaft boot(s), adjust or replace the affected intermediate steering shaft boot(s). • Intermediate Steering Shaft Upper Seal Replacement • Intermediate Steering Shaft Replacement
Binding in the intermediate steering shaft and/or boot: Inspect the intermediate steering shaft joints and/or fasteners for looseness, wear or damage.	If looseness is identified at the fasteners, replace the fastener and tighten to specification. Intermediate Steering Shaft Replacement If wear or binding is identified, replace the affected component. Intermediate Steering Shaft Replacement
Binding in the power steering gear: Inspect the steering gear for looseness, worn or damaged components. • Steering gear end stops • Steering gear rack bar • Steering gear pinion(s) • Steering gear Boot(s) • Steering gear inner tie rod end(s) • Steering gear outer tie rod end(s)	Note: The steering gear is required to be replaced for steering gear pinion, rack bar, or ends stops damage, if applicable. With the intermediate shaft disconnected, use a wrench to rotate the steering gear input shaft from the left of center to the right of center. If binding is identified, replace the worn or damaged component. • Steering Gear Replacement • Steering Gear Boot Replacement • Steering Linkage Inner Tie Rod Replacement • Steering Linkage Outer Tie Rod Replacement

Repair Instructions

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Power Steering System Bleeding

1. Note:

- Use clean, new power steering fluid type only. See the Maintenance and Lubrication subsection for fluid specifications.
- Hoses touching the frame, body or engine may cause system noise. Verify that the hoses do not touch any other part of the vehicle.
- Loose connections may not leak, but could allow air into the steering system. Verify that all hose connections are tight.

2. Note:

Power steering fluid level must be maintained throughout bleed procedure.

3. Fill pump reservoir with fluid to minimum system level, FULL COLD level, or middle of hash mark on cap stick fluid level indicator.

4. Note:

With hydro-boost only, the oil level will appear falsely high if the hydro-boost accumulator is not fully charged. Do not apply the brake pedal with the engine OFF. This will discharge the hydro-boost accumulator.

5. If equipped with hydro-boost, fully charge the hydro-boost accumulator using the following procedure:

6.

1. Start the engine.
2. Firmly apply the brake pedal 10 to 15 times.
3. Turn the engine OFF.

7. Raise the vehicle until the front wheels are off the ground. Refer to [Lifting and Jacking the Vehicle](#).

8. Note:

Vehicles equipped with hydro-boost systems or longer length power steering hoses may require turns up to 15 to 20 stop to stops.

9. Key on engine OFF, turn the steering wheel from stop to stop 12 times.

10. Verify power steering fluid level per operating specification. Refer to [Checking and Adding Power Steering Fluid](#).

11. Start the engine. Rotate steering wheel from left to right. Check for sign of cavitation or fluid aeration (pump noise/whining).

12. Verify the fluid level. Repeat the bleed procedure, if necessary.

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Checking and Adding Power Steering Fluid

1. Caution:

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.

2. Clean the area surrounding the reservoir cap.
3. Remove the reservoir cap.
4. Inspect the power steering pump fluid level at regular intervals. Use the appropriate procedure below.
5. Add fluid when required. Refer to [Fluid and Lubricant Recommendations](#).

- 6.

Fluid Is Hot

1. Run the engine until the fluid reaches about 80°C (170°F).
 2. Turn the engine OFF.
 3. Remove the reservoir cap.
 4. Inspect the fluid level on the capstick.
 5. Ensure that the fluid level is at the HOT/FULL/MAX mark on the capstick.
7. If the fluid level is low, add power steering fluid to the proper level.
 8. Install the reservoir cap.
 9. When checking the fluid level after servicing the steering system, bleed the air from the system. Refer to [Power Steering System Bleeding](#).

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Power Steering System Flushing

Note:

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

1. Turn OFF the engine.
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](#).
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. Note:

This step may require 4â€”(4â€”qt) of power steering fluid until the draining fluid appears clear.

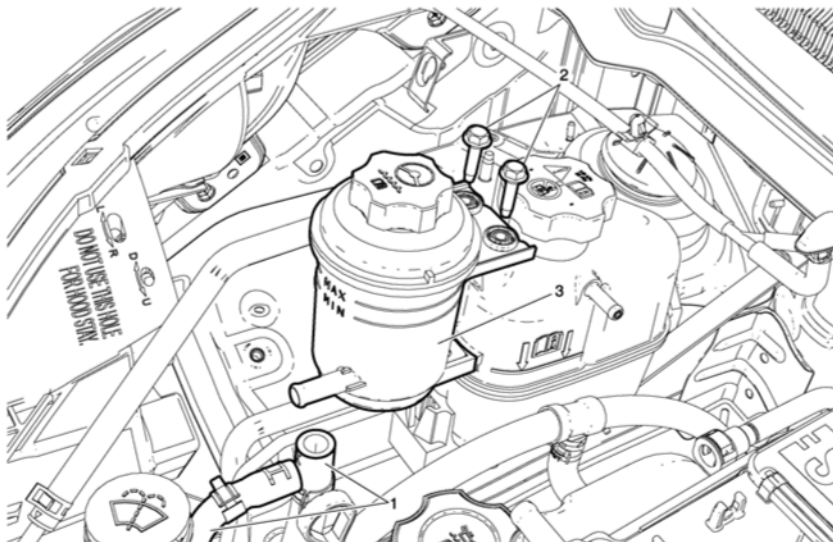
7. Note:

Do NOT run the engine without the power steering fluid at a minimum system level.

8. With the key on engine off, turn the steering wheel fully to the left and to the right while an assistant maintains the minimum fluid level in the reservoir using new approved power steering fluid. Continue until the fluid from the return hose runs clear.
9. Remove the plug from the pump reservoir inlet connection and install the fluid return hose to the pump reservoir.
10. Bleed the power steering system. Refer to [Power Steering System Bleeding](#).
11. Inspect the power steering fluid for the following indications of contamination:
12.
 - Milky fluid â€” water
 - Brown fluid â€” burnt
 - Plastic debris or dirt chunks
13. If the fluid is contaminated, repeat stepsâ€”9.
14. Lower the vehicle and check the power steering system for leaks.

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Power Steering Fluid Reservoir Replacement





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Callout	Component Name
	Preliminary Procedure 1. Remove as much power steering fluid from the remote power steering fluid reservoir as possible. 2. Place drain pans under the vehicle as needed.
1	Hose Clamp Procedure 1. Compress the power steering fluid reservoir outlet and inlet hose clamp from the power steering fluid reservoir. 2. Remove outlet and inlet hose from power steering fluid reservoir.

Callout	Component Name
2	Power Steering Fluid Reservoir Screw Caution: Refer to Fastener Caution. Tighten 9â€%N-m (80â€%lbâ€%in)
3	Power Steering Fluid Reservoir Procedure Fill and bleed the power steering system. Refer to Power Steering System Bleeding. Tip Clean any excess power steering fluid from the vehicle.

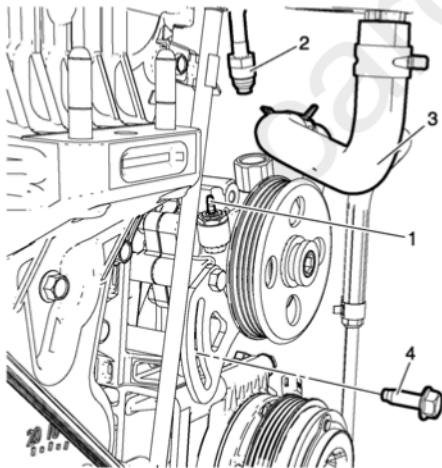
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Power Steering Pump Replacement

Removal Procedure

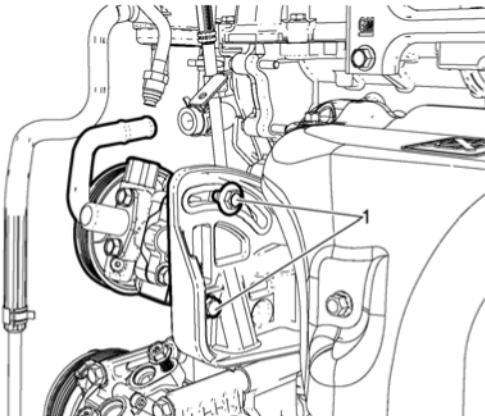
1. Remove the power steering pump belt. Refer to [Power Steering Pump Belt Replacement](#).
2. Place drain pans under the vehicle as needed.



3.

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4. Disconnect the fluid pressure switch connectorâ€“(1) from the pump.
5. Disconnect the inlet hoseâ€“(2) from the pump.
6. Disconnect the outlet pipe fittingâ€“(3) from the pump.
7. Remove the front shackle boltâ€“(4) from the pump.



8.

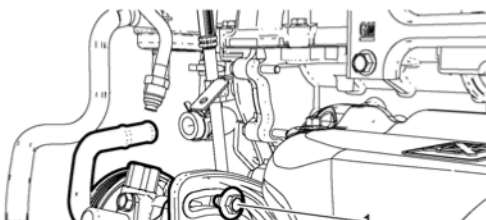
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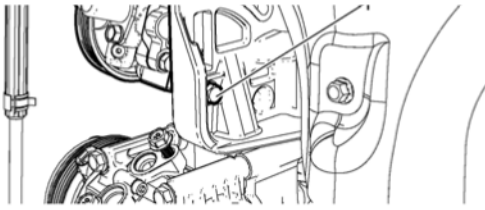
9. Remove the rear shackle bolts(1) from the pump.

10. Remove the power steering pump and shackle assembly from the vehicle.

Installation Procedure

1. Install the power steering pump.





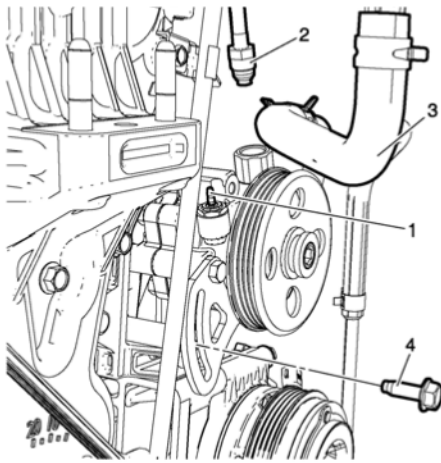
2.

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3. Caution:

Refer to [Fastener Caution](#).

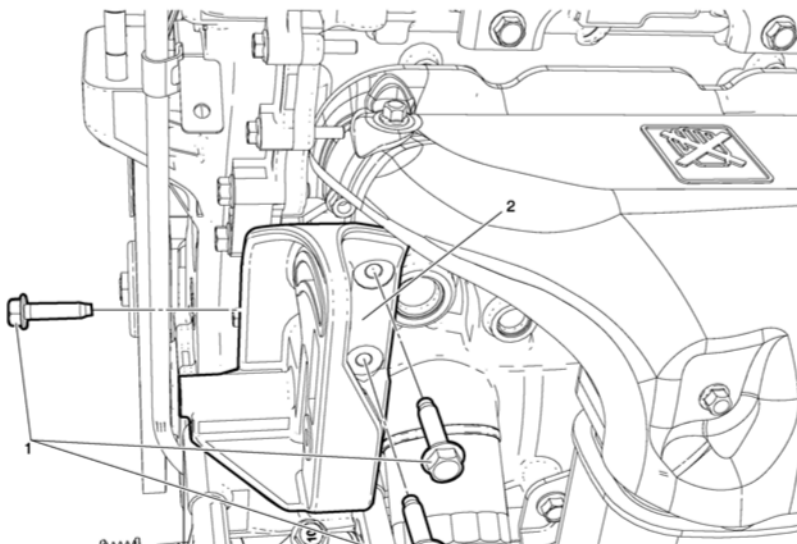
4. Install the power steering pump rear shackle bolts (1) and tighten to 22 N-m (16 lb-ft).



5. [Click here for full size](#)
6. Install the power steering pump front shackle bolt(4) and tighten to 22â€‰N-m (16â€‰lbâ€‰ft).
7. Install the power steering pump outlet pipe fitting(3) and tighten to 28â€‰N-m (21â€‰lbâ€‰ft).
8. Connect the power steering pump inlet hose(2).
9. Connect the fluid pressure switch connector(1).
10. Install the power steering pump belt. Refer to [Power Steering Pump Belt Installation](#).
11. Fill and bleed the power steering system. Refer to [Power Steering System Bleeding](#).

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Power Steering Pump Bracket Replacement (LKY)





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Callout	Component Name
Preliminary Procedure	
Remove the power steering pump. Refer to Power Steering Pump Replacement .	
1	Power Steering Pump Bracket Bolt Caution: Refer to Fastener Caution . Tighten 22â€%N-m (16â€%lbâ€%ft)
2	Power Steering Pump Bracket

Related Part Information

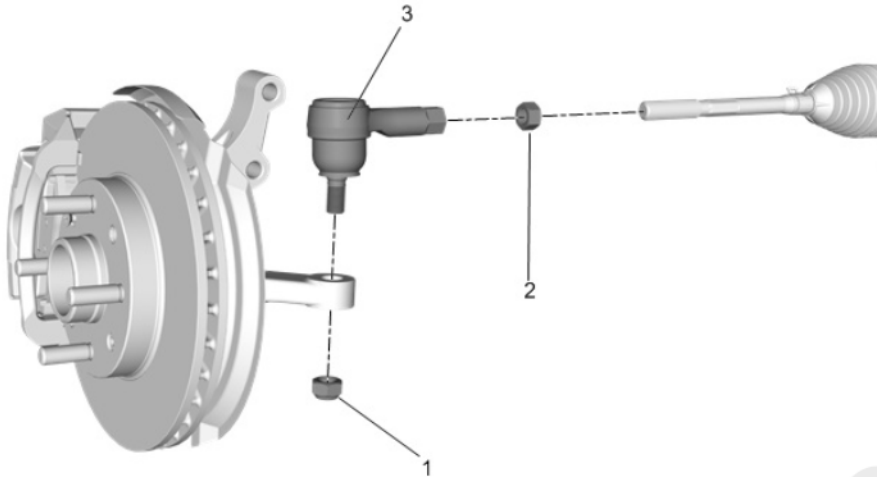
Part Name	Catalog Name	Part Code
Power Steering Pump Bracket	BRACKET,P/S PUMP(W/DRV BELT TENS)	0845A

Part Name	Catalog Name	Part Code
Power Steering Pump Bracket	BRACKET,P/S PUMP	0850A
Power Steering Pump Bracket	BRACKET,P/S PUMP	0900A
Power Steering Pump Bracket	BRACKET,P/S PUMP (MCHG)	0900G
Power Steering Pump Bracket	BRACKET,P/S PUMP (CSTG)	0900H

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Steering Linkage Outer Tie Rod Replacement



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Callout	Component Name
Preliminary Procedure	
Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .	
1	Steering Linkage Tie Rod Nut Caution: Refer to Fastener Caution. Tighten 50â€%N-m (37â€%lbâ€%ft)
2	Steering Linkage Inner Tie Rod Nut Tighten 75â€%N-m (55â€%lbâ€%ft)
3	Steering Linkage Outer Tie Rod Procedure 1. Use <i>CH-161-B</i> puller to separate the steering linkage outer tie rod from the steering knuckle. 2. Inspect the steering linkage inner tie rod for bent or damaged threads. 3. Clean the tapered surface of the steering knuckle. 4. Lubricate the steering linkage inner tie rod threads with chassis lubricant. 5. Adjust the front toe. Refer to Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment. Special Tools <i>CH-161-B</i> Puller For equivalent regional tools, refer to Special Tools.

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Steering Gear Boot Replacement

Special Tools

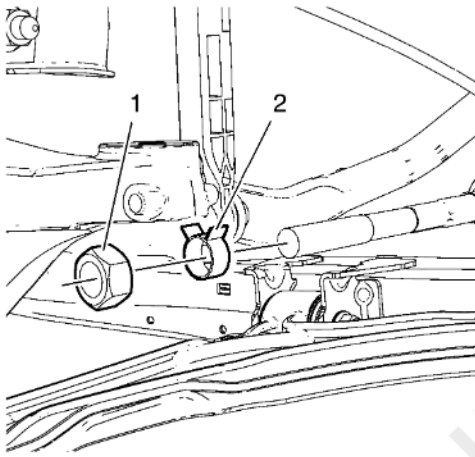
CH-804 Drive Axle Seal Clamp Pliers

For equivalent regional tools, refer to [Special Tools](#).

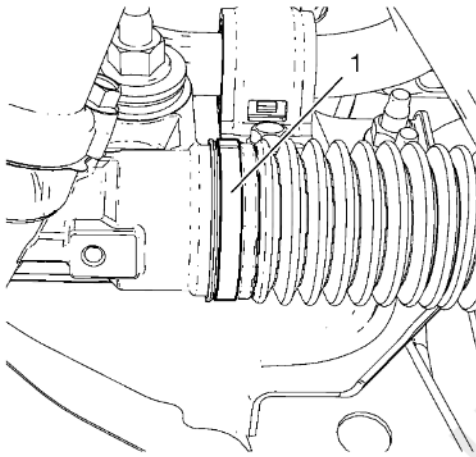
Removal Procedure

1. Remove the front wheel and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
2. Remove the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).

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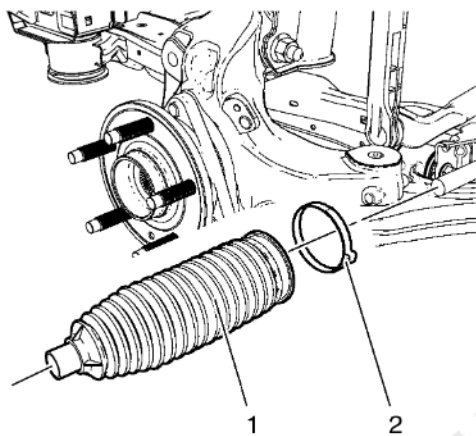
3. [Click here for full size](#)
4. Remove the steering linkage outer tie rod. Refer to [Steering Linkage Outer Tie Rod Replacement](#).
5. Remove the steering linkage inner tie rod nut(1).
6. Remove the steering gear outer boot clamp(2).



7.

[Click here for full size](#)

8. Loosen the steering gear inner boot clamp(1).



9.

[Click here for full size](#)

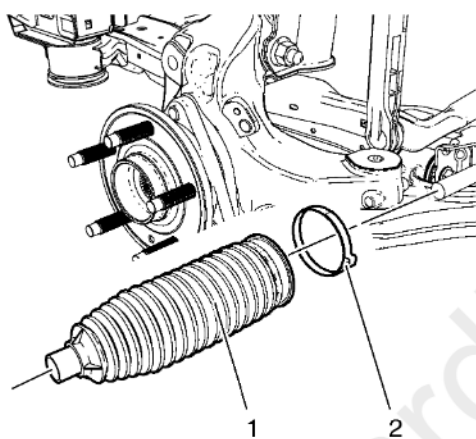
10. Note:

After removing the boot, inspect the steering linkage inner tie rod for evidence of corrosion or contamination. If none is evident, continue with the repair. If corrosion or contamination is evident, replace the inner tie rod.

11. Remove the steering gear boot(1).

12. Remove the steering gear inner boot clamp(2).

Installation Procedure



1. [Click here for full size](#)
2. Install a new clamp(2) loosely on the inner part of the steering gear boot.

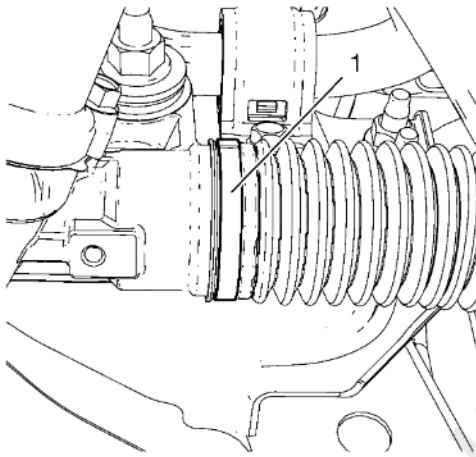
3. Apply grease from the service kit to the indicated locations.

4. Note:

The steering gear boot must seat in the appropriate groove on the steering gear.

5. Install the steering gear boot(1) over the steering linkage inner tie rod and onto the steering gear.

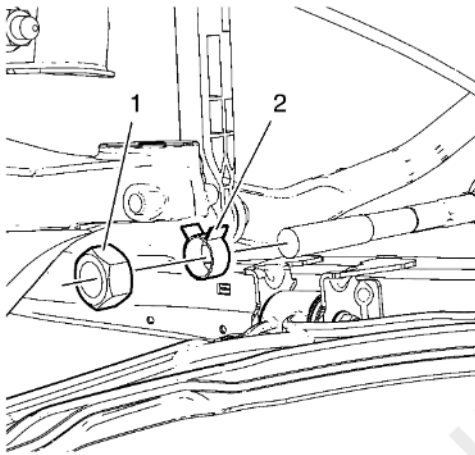
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6.

[Click here for full size](#)

7. Using *CH-804* pliers crimp the inner steering gear boot clamp(1).



8. [Click here for full size](#)
9. Install the steering gear outer boot clamp(2).
10. Install the steering linkage inner tie rod nut(1).
11. Install the steering linkage outer tie rod. Refer to [Steering Linkage Outer Tie Rod Replacement](#).

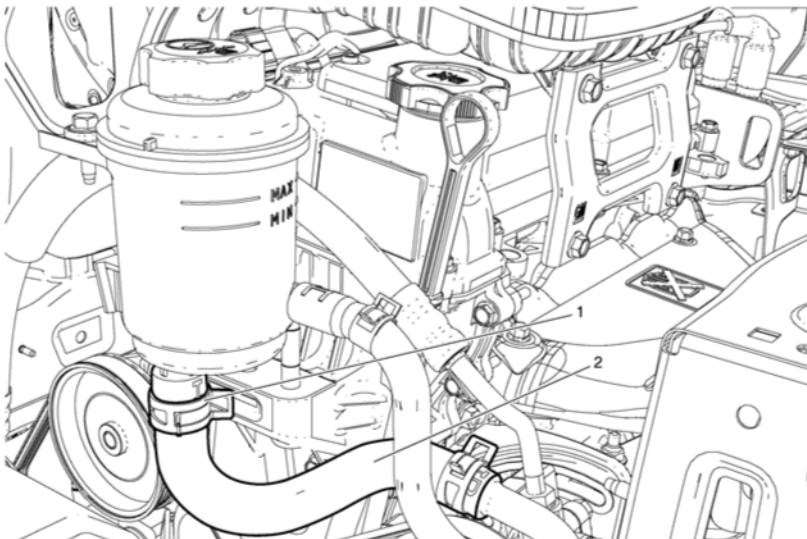
12. Install the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).
13. Install the front wheel and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
14. Adjust the front toe. Refer to [Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment](#).

Related Part Information

Part Name	Catalog Name	Part Code
Steering Gear Boot	BOOT,S/GR	X0106
Steering Gear Boot	BOOT KIT,S/GR	X0207
Steering Gear Boot	BOOT,S/GR	X0374

1. STEERING
2. POWER STEERING
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Power Steering Fluid Reservoir Outlet Hose Replacement





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Callout	Component Name
	Preliminary Procedures 1. Remove as much power steering fluid from the remote power steering fluid reservoir as possible. 2. Place drain pans under the vehicle as needed.
1	Hose Clamp Procedure Compress the power steering fluid reservoir outlet hose clamp from the power steering pump and power steering fluid reservoir.
2	Power Steering Fluid Reservoir Outlet Hose Procedure Fill and bleed the power steering system. Refer to Power Steering System Bleeding. Tip Clean any excess power steering fluid from the vehicle.

Related Part Information

Part Name	Catalog Name	Part Code
Power Steering Fluid Reservoir Hose	HOSE,P/S FLUID RSVR	4095A
Power Steering Fluid Reservoir Hose	HOSE,P/S FLUID RSVR	4100A
Power Steering Fluid Reservoir Outlet Hose	HOSE,P/S FLUID RSVR OTLT	4116Z
Power Steering Fluid Reservoir Outlet Hose	HOSE,P/S FLUID RSVR OTLT	4117A
Power Steering Fluid Reservoir Outlet Hose	HOSE,P/S FLUID RSVR OTLT (AT ENG)	4117B

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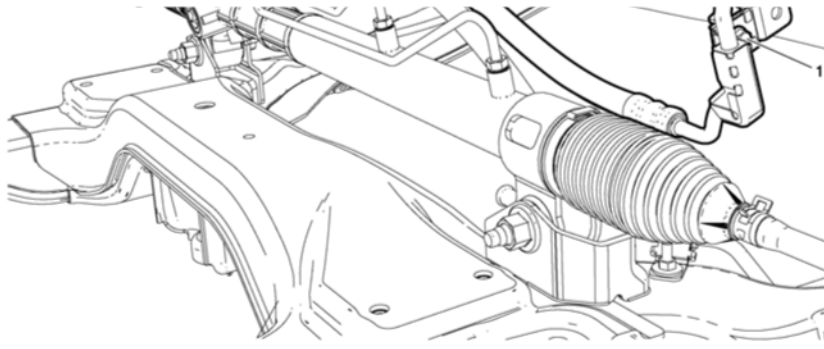
1. STEERING
2. POWER STEERING
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- 4.

Power Steering Gear Inlet Pipe/Hose Replacement

Removal Procedure

1. Remove the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).
2. Remove as much power steering fluid from the power steering fluid reservoir as possible.
3. Place drain pans under the vehicle as needed.

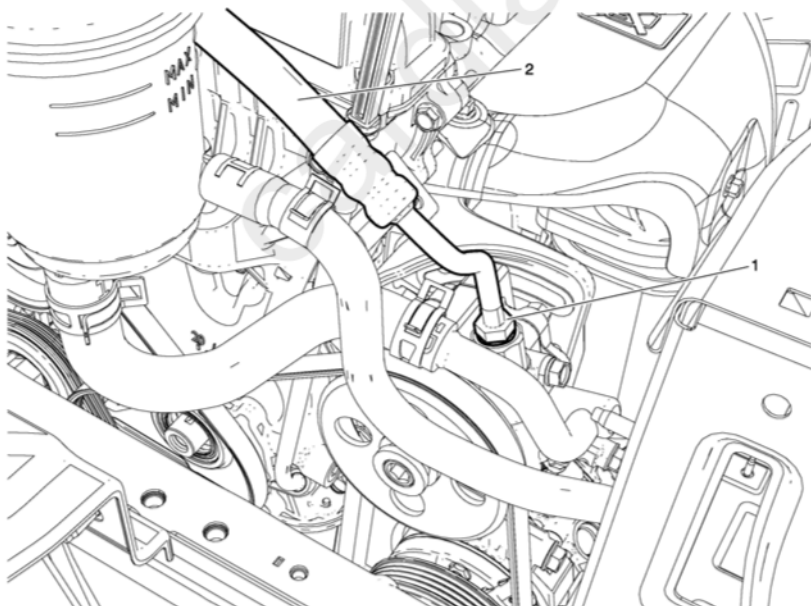




4.

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5. Remove the power steering gear inlet pipe clamp bolt(1).
6. Disconnect the power steering gear feed tube fittings(2).
7. Disconnect the power steering gear inlet pipe fittings(3).



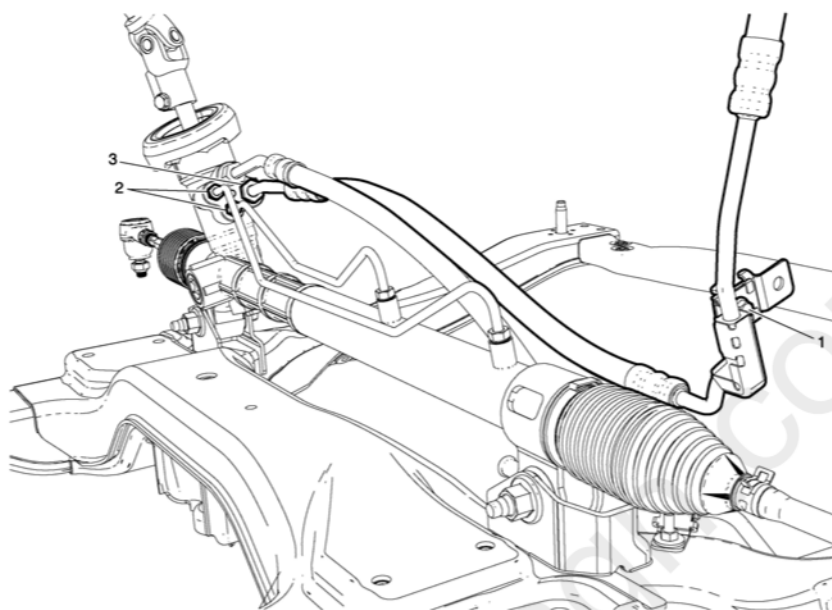
8.

[Click here for full size](#)

9. Disconnect the power steering pump outlet pipe fitting(1).

10. Remove the power steering gear inlet pipe/hose(2) from the vehicle.

Installation Procedure



1.

[Click here for full size](#)

2. Install the power steering gear inlet pipe/hose to the vehicle.

3. Caution:

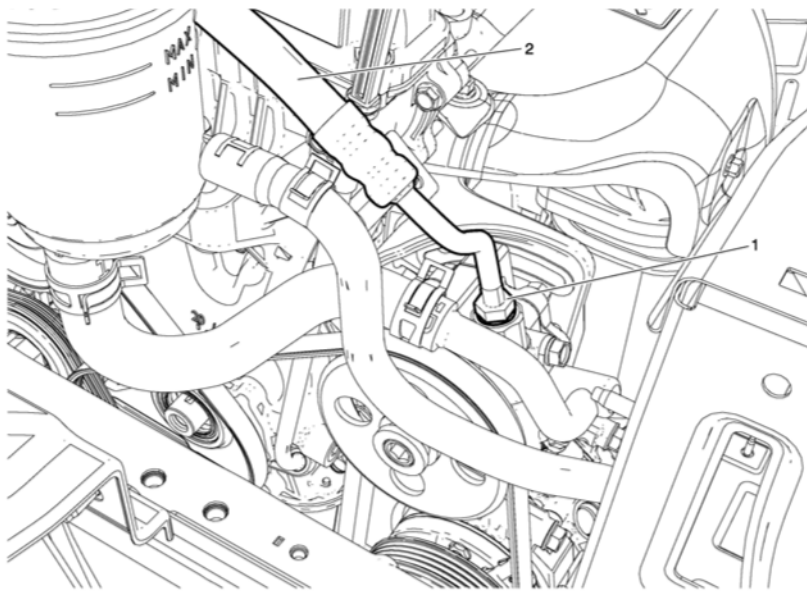
Refer to [Fastener Caution](#).

4. Install the power steering gear inlet pipe fitting(3) and tighten to 28â€‰N-m (21â€‰lbâ€‰ft).

5. Install the power steering gear feed tube fitting(2) and tighten to 13â€‰N-m (10â€‰lbâ€‰ft).

6. Install the power steering gear inlet pipe/hose clamp bolt and tighten to 9â€‰N-m (80â€‰lbâ€‰in).

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7.

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8. Install the power steering pump outlet pipe fitting(1) and tighten to 28N·m (21lb·ft).
9. Clean any excess power steering fluid from the vehicle and remove the drain pans.

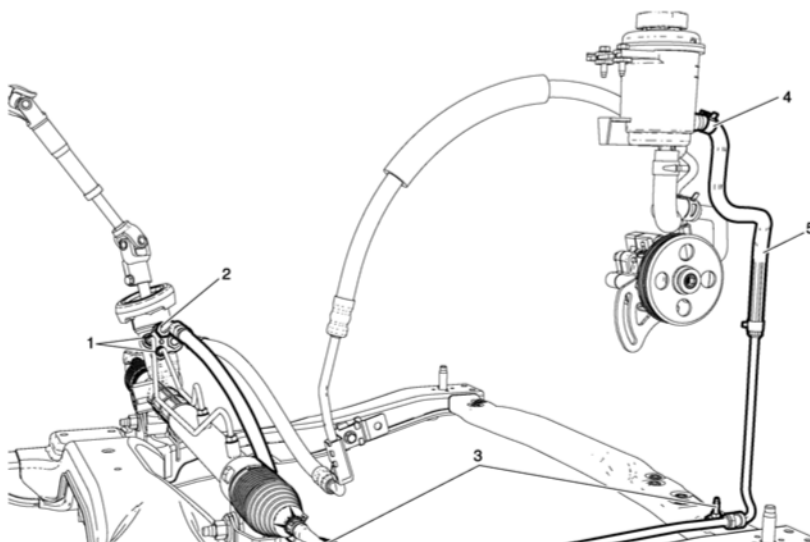
10. Install the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).
11. Fill and bleed the power steering system. Refer to [Power Steering System Bleeding](#).

Related Part Information

Part Name	Catalog Name	Part Code
Steering Gear Pipe	PIPE,S/GR	X0104
Steering Gear Pipe	PIPE KIT,S/GR	X0261
Steering Gear Pipe	PIPE,S/GR	X0263
Power Steering Gear Inlet Hose	HOSE KIT,P/S GR INL	4649Z
Power Steering Gear Inlet Hose	HOSE,P/S GR INL	4650A
Power Steering Gear Inlet Hose	HOSE,P/S GR INL	4650B
Power Steering Gear Inlet Pipe	PIPE,P/S GR INL	4800A
Power Steering Gear Inlet Pipe	PIPE,P/S GR INL	4801A
Power Steering Gear Inlet Pipe	PIPE,P/S GR INL (S/GR SI)	4865A
Power Steering Gear Inlet Hose	HOSE,P/S GR INL (S/GR SI)	4865P
Power Steering Gear Inlet Pipe	PIPE,P/S GR INL (PUMP SI)	4867A
Power Steering Gear Inlet Hose	HOSE,P/S GR INL (PUMP SI)	4867P
Power Steering Gear Inlet Hose	HOSE,P/S GR INL (RH PROC)	X0101

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Power Steering Gear Outlet Pipe/Hose Replacement





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Callout	Component Name
Preliminary Procedure 1. Remove the drivetrain and front suspension frame skid plate, if equipped. Refer to Drivetrain and Front Suspension Frame Skid Plate Replacement. 2. Remove as much power steering fluid from the remote power steering fluid reservoir as possible. 3. Place drain pans under the vehicle as needed.	
1	Power Steering Gear Feed Tube Fitting Caution: Refer to Fastener Caution. Tighten 13â€%N-m (10â€%lbâ€%ft)

Callout	Component Name
2	Power Steering Gear Outlet Pipe Fitting Tighten 28â€%N-m (21â€%lbâ€%ft)
3	Power Steering Gear Outlet Pipe Clamp Nut Tighten 9â€%N-m (80â€%lbâ€%ft)
4	Hose Clamp Procedure Compress the power steering fluid reservoir outlet hose clamp from the power steering fluid reservoir.
5	Power Steering Gear Outlet Hose Procedure Fill and bleed the power steering system. Refer to Power Steering System Bleeding . Tip Clean any excess power steering fluid from the vehicle.

Related Part Information

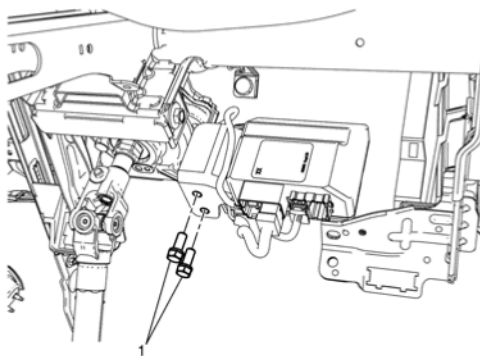
Part Name	Catalog Name	Part Code
Steering Gear Pipe	PIPE,S/GR	X0104
Steering Gear Pipe	PIPE KIT,S/GR	X0261
Steering Gear Pipe	PIPE,S/GR	X0263
Power Steering Gear Outlet Hose	HOSE,P/S GR OTLT	4875A
Power Steering Gear Outlet Hose	HOSE,P/S GR OTLT (W/ FLUID CLR)	4876A
Power Steering Gear Outlet Hose	HOSE,P/S GR OTLT	4900A
Power Steering Gear Outlet Pipe	PIPE,P/S GR OTLT	5500A
Power Steering Gear Outlet Pipe	PIPE,P/S GR OTLT	5501A
Power Steering Gear Outlet Pipe	PIPE,P/S GR OTLT (S/GR SI)	5860A
Power Steering Gear Outlet Hose	HOSE,P/S GR OTLT (S/GR SI)	5860P
Power Steering Gear Outlet Pipe	PIPE,P/S GR OTLT (PUMP SI)	5862A
Power Steering Gear Outlet Hose	HOSE,P/S GR OTLT (PUMP SI)	5862P

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Power Steering Control Module Replacement

Removal Procedure

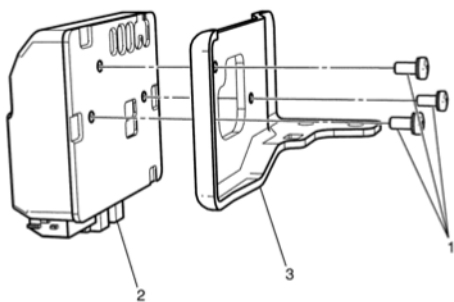
1. Disconnect the battery negative cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
2. Remove the steering column lower trim cover. Refer to [Steering Column Lower Trim Cover Replacement](#).
3. Remove the inflatable restraint instrument panel lower module replacement of driver side, if equipped.
4. Remove the steering column opening filler. Refer to [Steering Column Opening Filler Replacement](#).
5. Remove the instrument panel lower reinforcement bracket.
6. Disconnect the electric power steering module connectors.



7.

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8. Remove the electric power steering module bracket bolts (1).
9. Remove the electric power steering module and bracket assembly from the vehicle.



10.

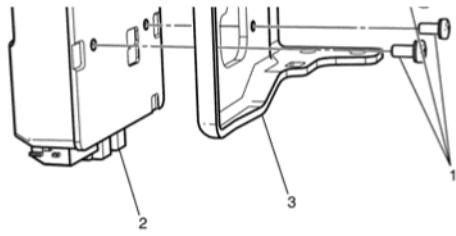
[Click here for full size](#)

11. Remove the electric power steering module to bracket bolts(1).

12. Remove the electric power steering module(2) from the electric power steering module bracket(3).

Installation Procedure

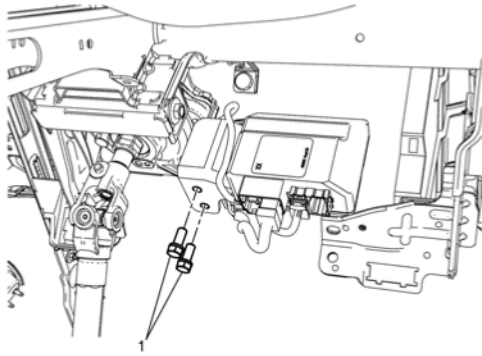




1.

[Click here for full size](#)

2. Install the electric power steering module (2) to the electric power steering module bracket (3).
3. Install the electric power steering module to bracket bolts (1) and tighten to 3 N-m (27 lb-in).
4. Install the electric power steering module and bracket assembly to the vehicle.



5. [Click here for full size](#)
6. Install the electric power steering module bracket bolts (1) and tighten to 18 N-m (13 lb-ft).
7. Connect the electric power steering module connectors.
8. Install the instrument panel lower reinforcement bracket.
9. Install the steering column opening filler. Refer to [Steering Column Opening Filler Replacement](#)
10. Install the inflatable restraint instrument panel lower module replacement of driver side, if equipped.
11. Install the steering column lower trim cover. Refer to [Steering Column Lower Trim Cover Replacement](#).
12. Connect the battery negative cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
13. If a new electric power steering control module is installed, program the electric power steering control module. Refer to [Control Module References](#).

Related Part Information

Part Name	Catalog Name	Part Code
-----------	--------------	-----------

Part Name	Catalog Name	Part Code
Power Steering Control Module	MODULE KIT,P/S CONT	0024Y
Power Steering Control Module	MODULE KIT,P/S CONT	0024Z
Power Steering Control Module	MODULE,P/S CONT	0025A
Power Steering Control Module	MODULE,P/S CONT	0025B

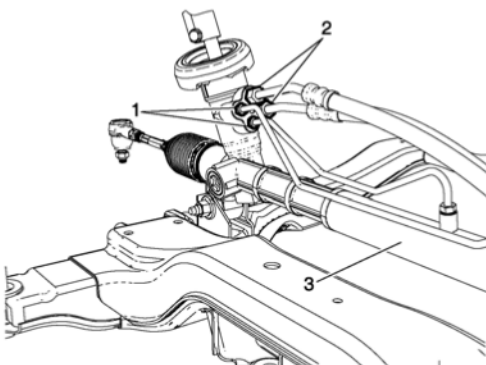
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Steering Gear Replacement (Hydraulic Power Steering)

Removal Procedure

1. Turn the front wheels to the straight forward position and secure the steering wheel from moving.
2. Remove the intermediate steering shaft lower bolt. Refer to [Intermediate Steering Shaft Replacement](#).
3. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
4. Remove the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
5. Remove the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).
6. Remove the steering linkage outer tie rod nut and disconnect the tie rod from the steering knuckle. Refer to [Steering Linkage Outer Tie Rod Replacement](#).
7. Place a large container under the vehicle in order to collect the draining fluid.

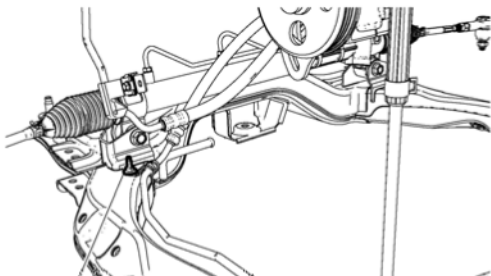


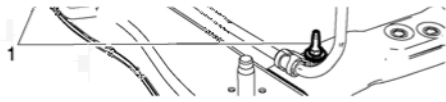
8.

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9. Remove the power steering gear feed tube fittings(1).

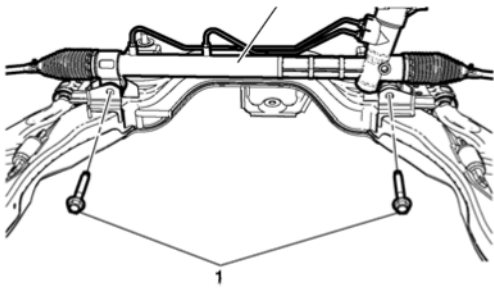
10. Remove the power steering gear inlet and outlet pipe fittings(2) from the steering gear(3).





11. [Click here for full size](#)
12. Remove the power steering gear outlet pipe/hose clamp nut (1). Refer to [Power Steering Gear Outlet Pipe/Hose Replacement](#).
13. Remove the drivetrain and front suspension frame from the vehicle. Refer to [Drivetrain and Front Suspension Frame Replacement](#).





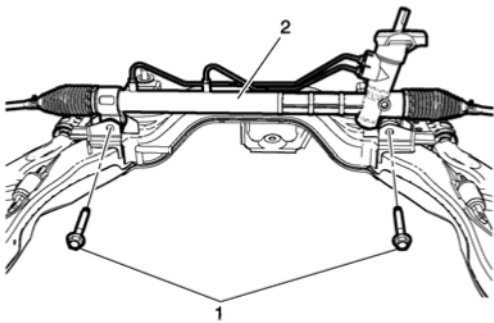
14.

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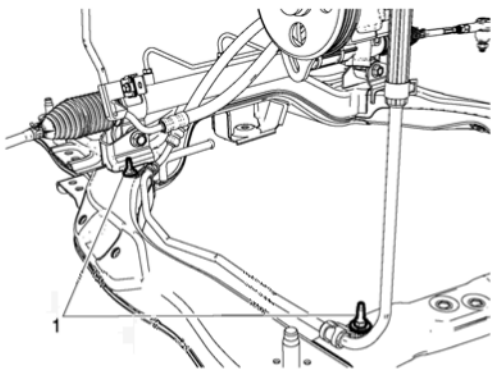
15. Remove the power steering gear bolts(1)

16. Remove the power steering gear assembly(2).

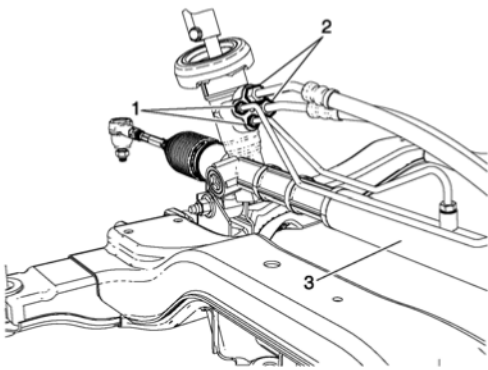
Installation Procedure



1. [Click here for full size](#)
2. Install the power steering gear assembly (2).
3. Caution:
Refer to [Fastener Caution](#).
4. Install the power steering gear bolts (1) and tighten to 110 N·m (81 lb·ft).
5. Install the drivetrain and front suspension frame to the vehicle. Refer to [Drivetrain and Front Suspension Frame Replacement](#).



6. [Click here for full size](#)
7. Install the power steering gear outlet pipe/hose clamp nut(1) and tighten to 9â€”N-m (80â€”lbâ€”). Refer to [Power Steering Gear Outlet Pipe/Hose Replacement](#).



8. [Click here for full size](#)
9. Install the power steering gear inlet and outlet pipe fittings(2) to the steering gear(3) and tighten to 28â€%N-m (21â€%lbâ€%ft).

10. Install the power steering gear feed tube fittings (1) and tighten to 13 N-m (10 lb-ft).
11. Connect the tie rod to the steering knuckle and install the steering linkage outer tie rod nut and tighten to 50 N-m (37 lb-ft). Refer to [Steering Linkage Outer Tie Rod Replacement](#).
12. Install the drivetrain and front suspension frame skid plate, if equipped. Refer to [Drivetrain and Front Suspension Frame Skid Plate Replacement](#).
13. Install the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
14. Install the intermediate steering shaft lower bolt. Refer to [Intermediate Steering Shaft Replacement](#).
15. Adjust the front toe. Refer to [Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment](#).
16. Fill and bleed the power steering system. Refer to [Power Steering System Bleeding](#).

Related Part Information

Part Name	Catalog Name	Part Code
Steering Gear	GEAR,STRG (W/ PIT ARM)	0049A
Steering Gear	GEAR,STRG(W/PUMP)	0049E
Steering Gear	GEAR,STRG (W/STRG LNKG TIE ROD)	0049F
Steering Gear	GEAR,STRG (W/ MOT)	0049G
Steering Gear	GEAR,STRG (W/ MOT) (W/O OTR TIE ROD)	0049H
Steering Gear	GEAR PKG,STRG	0049Y
Steering Gear	GEAR,STRG	0050A
Steering Gear	GEAR,STRG	0050B
Steering Gear	GEAR KIT,STRG	0050C
Steering Gear	GEAR KIT,STRG	0050D
Steering Gear	GEAR,STRG (W/O OTR TIE ROD)	0053A
Steering Gear	GEAR,STRG (W/O INR & OTR TIE ROD)	0054A
Rack and Pinion Steering Gear	GEAR,R/PINION STRG	0210A

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Steering Gear Replacement (Electric Power Steering)

Removal Procedure

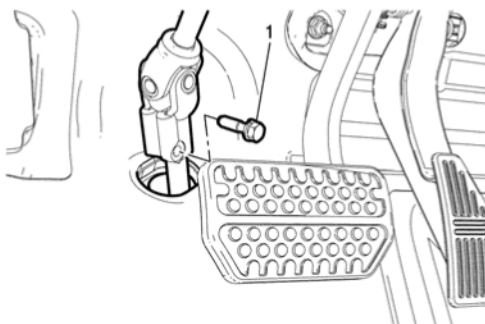
1. Caution:

With wheels of the vehicle facing straight ahead, secure the steering wheel utilizing steering column anti-rotation pin, steering column lock, or a strap to prevent rotation. Locking of the steering column will prevent damage and a possible malfunction of the SIR system. The steering wheel must be secured in position before disconnecting the following components:

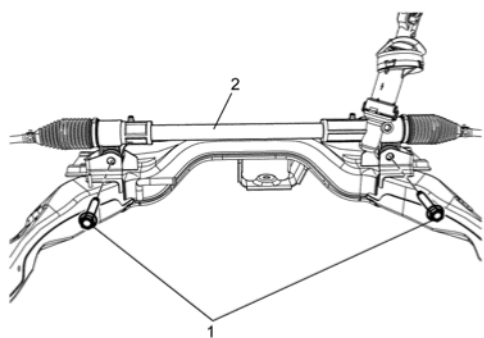
- The steering column
- The intermediate shaft(s)
- The steering gear

After disconnecting these components, do not rotate the steering wheel or move the front tires and wheels. Failure to follow this procedure may cause the SIR coil assembly to become un-centered and cause possible damage to the SIR coil. If you think the SIR coil has become un-centered, refer to your specific SIR coil's centering procedure to re-center SIR Coil.

2. Turn the steering wheel to the straight ahead position and lock it in place.
3. Remove the front tire/wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).



4. [Click here for full size](#)
5. Remove the intermediate steering shaft lower bolt (1) and disconnect the intermediate steering shaft from the steering gear assembly. Refer to [Intermediate Steering Shaft Replacement](#).
6. Separate both of the steering linkage outer tie rod ends. Refer to [Steering Linkage Outer Tie Rod Replacement](#).
7. Remove both of the upper stabilizer shaft link nuts and separate the left and right stabilizer shaft link from the strut. Refer to [Stabilizer Shaft Link Replacement](#)
8. Remove the transmission rear mount.
9. Using a suitable support, lower the drivetrain and front suspension frame to replace the power steering gear. Refer to [Drivetrain and Front Suspension Frame Replacement](#).



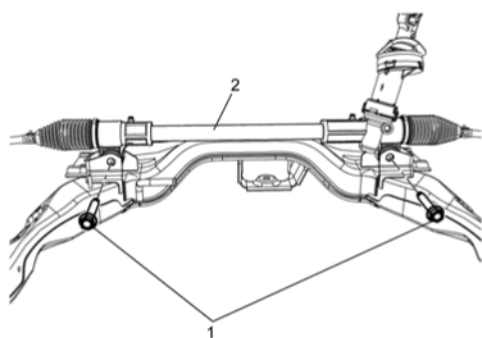
10.

[Click here for full size](#)

11. Remove the steering gear bolts (1).

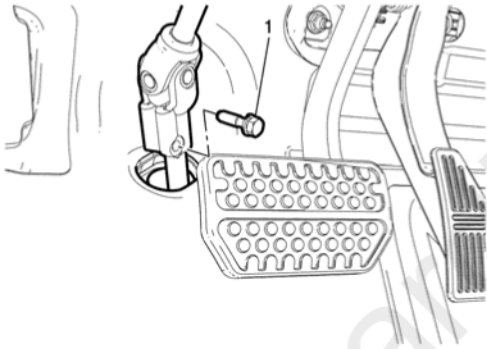
12. Remove the steering gear (2) from the drivetrain and front suspension frame.

Installation Procedure



1. [Click here for full size](#)
2. Install the steering gear(2) from the drivetrain and front suspension frame.
3. Caution:
Refer to [Fastener Caution](#).
4. Install the steering gear bolts(1) and tighten to 110N-m(81lb-ft).
5. Install the drivetrain and front suspension frame to the vehicle. Refer to [Drivetrain and Front Suspension Frame Replacement](#).
6. Install the transmission rear mount.
7. Install the left and right stabilizer shaft link to the strut. Refer to [Stabilizer Shaft Link Replacement](#).

8. Install both of the steering linkage outer tie rod ends. Refer to [Steering Linkage Outer Tie Rod Replacement](#).



9.

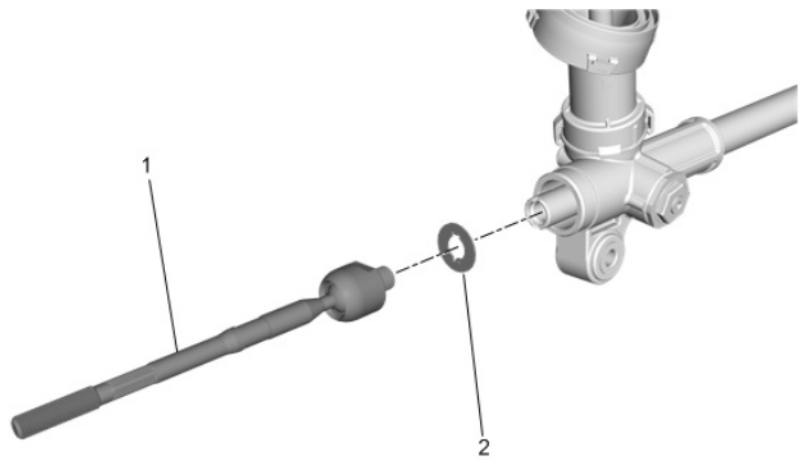
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10. Install the lower intermediate steering shaft to the steering gear and install the intermediate steering shaft lower bolt (1). Refer to [Intermediate Steering Shaft Replacement](#).
11. Install the front tire/wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
12. Adjust the front toe. Refer to [Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment](#).

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Steering Linkage Inner Tie Rod Replacement



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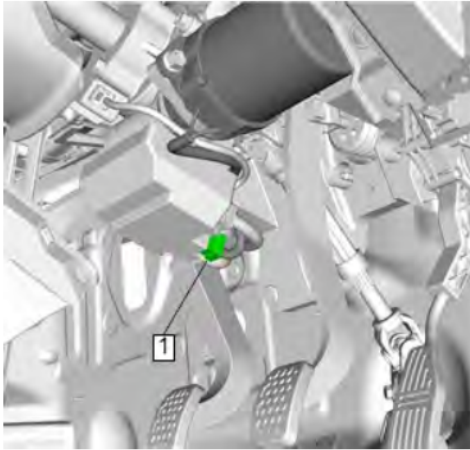
Callout	Component Name
	Preliminary Procedures Steering Gear Replacement Steering Linkage Outer Tie Rod Replacement Steering Gear Boot Replacement
1	Steering Linkage Inner Tie Rod Caution: Refer to Fastener Caution. Tighten 88â€%N-m (65â€%lbâ€%ft)
2	Steering Linkage Idler Arm Washer Procedure - Install the steering linkage idler arm washer. - Install the steering linkage inner tie rod. - Note: - The steering linkage idler arm washer needs to be crimped in order to prevent the steering linkage inner tie rod from getting loose. - Crimp the steering linkage idler arm washer using the appropriate tool.

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Power Steering Assist Motor Replacement

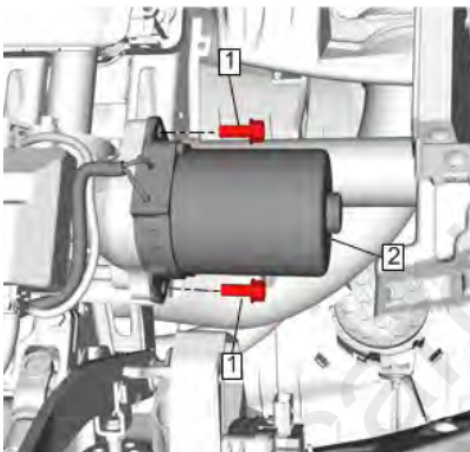
Removal Procedure

1. Steering Column Opening Filler >> Remove - [Steering Column Opening Filler Replacement](#)



2. [Click here for full size](#)

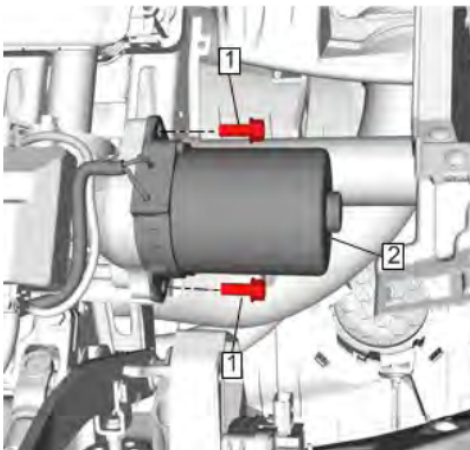
3. Electric Power Steering Motor Electrical Connector (1) @ Electric Power Steering Motor Control Module >> Disconnect



4. [Click here for full size](#)

5. Electric Power Steering Motor Bolt (1) >> Remove [2x]
6. Electric Power Steering Motor (2) @ Steering Column >> Remove

Installation Procedure



- 1.

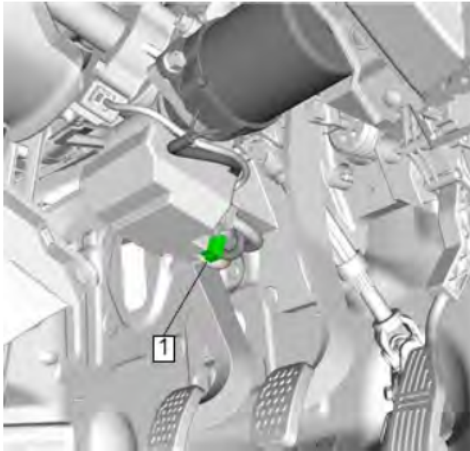
[Click here for full size](#)

2. Electric Power Steering Motor (2) @ Steering Column >> Install

3. Caution :

[Fastener Caution](#)

4. Electric Power Steering Motor Bolt (1) >> Install and tighten [2x]18â€‰N-mâ€‰ (13â€‰lbâ€‰ft)



5. [Click here for full size](#)

6. Electric Power Steering Motor Electrical Connector (1) @ Electric Power Steering Motor Control Module >> Connect

7. Steering Column Opening Filler >> Install - [Steering Column Opening Filler Replacement](#)

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Specifications

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Fastener Specifications

Single Use Non-Threaded Fasteners/Components

Application
Note:
All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.
Steering Gear Boot Inner Clamp

Reusable Threaded Fastener Tightening Specifications

Application	Specification
	Metric (English)
Note:	
All fasteners listed in this table can be reused after removal.	
Intermediate Steering Shaft Lower Bolt	25â€‰N-mâ€‰(18â€‰lbâ€‰ft)
Power Steering Fluid Reservoir Bolts	9â€‰N-mâ€‰(80â€‰lbâ€‰in)
Power Steering Gear Feed Tube Fitting	13â€‰N-mâ€‰(10â€‰lbâ€‰ft)
Power Steering Gear Inlet and Outlet Pipe Fitting	28â€‰N-mâ€‰(21â€‰lbâ€‰ft)
Power Steering Gear Inlet Pipe Clamp Bolt	9â€‰N-mâ€‰(80â€‰lbâ€‰in)
Power Steering Gear Outlet Pipe Clamp Nut	9â€‰N-mâ€‰(80â€‰lbâ€‰in)
Power Steering Pump Bolt	22â€‰N-mâ€‰(16â€‰lbâ€‰ft)
Power Steering Pump Bracket Bolt	22â€‰N-mâ€‰(16â€‰lbâ€‰ft)
Power Steering Pump Outlet Pipe Fitting	28â€‰N-mâ€‰(21â€‰lbâ€‰ft)
Steering Gear Bolt	100â€‰N-mâ€‰(74â€‰lbâ€‰ft)
Steering Gear to Steering Knuckle Nut	50â€‰N-mâ€‰(37â€‰lbâ€‰ft)
Steering Linkage Tie Rod Nut	75â€‰N-mâ€‰(55â€‰lbâ€‰ft)

1. STEERING
2. POWER STEERING
3. SPECIFICATIONS
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Power Steering Pump Specifications

Vehicle	Engine Code	High Flow		Pressure Relief	
				mPa	PSI
Spark	LXV/LLW	A/T	7.2CC/rev	6.1â€™6.9	885â€™1000
		M/T	7.2CC/rev	7.1â€™7.9	1030â€™1146

Related Part Information

Part Name	Catalog Name	Part Code
Power Steering Pump	PUMP,P/S(W/MOT)	0049A
Power Steering Pump	PUMP,P/S	0050A
Power Steering Pump	PUMP,P/S	0050B
Power Steering Pump	PUMP KIT,P/S	0050C
Power Steering Pump	PUMP KIT,P/S	0050D
Power Steering Pump	PUMP KIT,P/S (W/FLUID RSVR)	0050E
Power Steering Pump	PUMP,P/S	0051A
Power Steering Pump	PUMP,P/S (W/ P/S PUMP PUL)	0052A

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1. STEERING
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Approximate Fluid Capacities

Application	Specification	
	Metric	US English
Power Steering System	0.31â€”L	0.66â€”qt

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Schematic and Routing Diagrams

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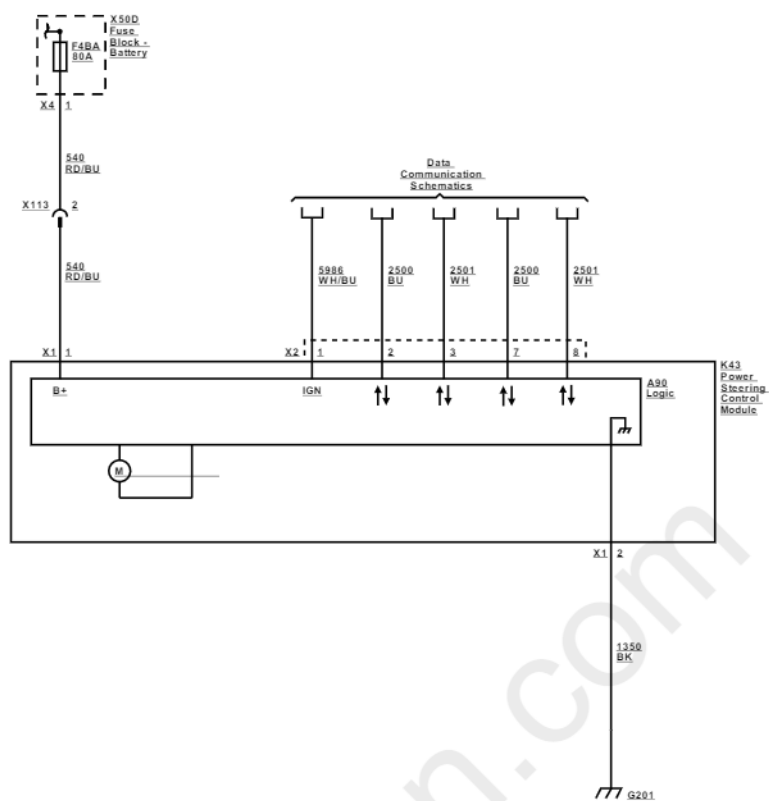
Power Steering Schematics

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Power Steering (NJ1)

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Special Tools and Equipment

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- 1. STEERING
- 2. POWER STEERING
- 3. SPECIAL TOOLS AND EQUIPMENT
- 4.

Special Tools

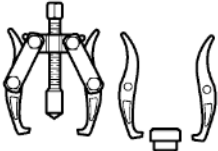
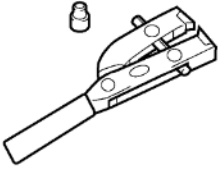
Illustration	Tool Number/Description
	CH-161-B KM-161-B 87-91-343 J-22888-20A J-22888-35 Bearing Puller
Click here for full size	

Illustration	Tool Number/Description
	CH-804 MKM-804 J-35566 Drive Axle Seal Clamp Pliers Click here for full size