

Manual Steering

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Description and Operation

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1. STEERING

2. MANUAL STEERING

3. DESCRIPTION AND OPERATION

4.

### **Manual Steering Gear Description and Operation**

The manual rack and pinion steering system consists of 2 main components: the rack and the pinion. The motion of the pinion is transferred through the pinion teeth that mesh with the teeth on the rack, which moves the rack. The force is then transmitted through the arms on the struts, which turn the wheels.

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Diagnostic Information and Procedures

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## **Symptoms - Manual Steering Gear**

Note::

Review the system description and operation in order to familiarize yourself with the system functions. Refer to [Manual Steering Gear Description and Operation](#).

### **Visual/Physical Inspection**

- Inspect for aftermarket devices which could affect the operation of the manual 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.

- [Hard Steering](#)
- [Poor Returnability](#)

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**Hard Steering**

Perform the following steps:

- Inspect the ball studs, the tie rod ends, and the steering gear for the following conditions:
  - - Wear
    - Damage
    - Lack of lubrication
- Inspect the wheel alignment
- Inspect the steering gear for proper operation
- Inspect the tires for adequate inflation.

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**Poor Returnability**

Perform the following steps:

- Inspect the wheel alignment.
- - The ball studs
  - The tie rod ends
- Inspect the ball studs for binding.
- Inspect the steering column for binding.
- Inspect the wheel alignment.
- Inspect the steering gear adjustment.

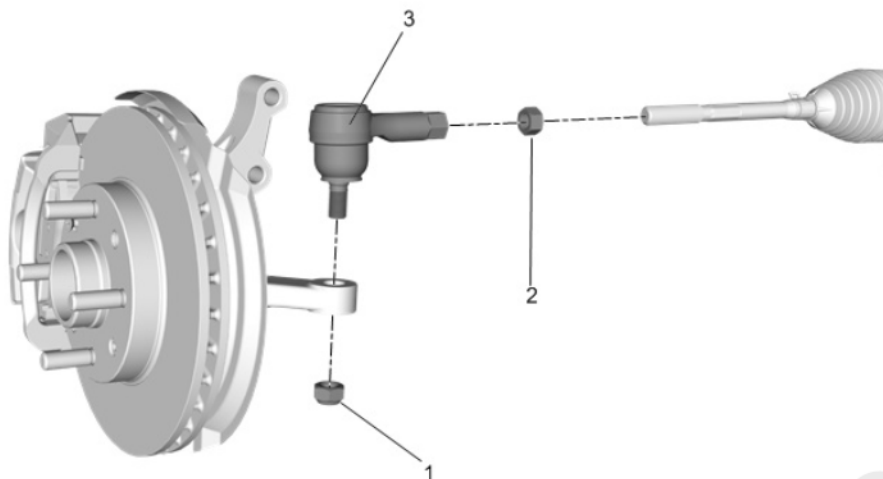
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Repair Instructions

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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 <a href="#">Tire and Wheel Removal and Installation</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1                                                                                                      | <p>Steering Linkage Tie Rod Nut</p> <p>Caution:</p> <p>Refer to <a href="#">Fastener Caution</a>.</p> <p>Tighten</p> <p>50â€‰N-m (37â€‰lbâ€‰ft)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2                                                                                                      | <p>Steering Linkage Inner Tie Rod Nut</p> <p>Tighten</p> <p>75â€‰N-m (55â€‰lbâ€‰ft)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3                                                                                                      | <p>Steering Linkage Outer Tie Rod</p> <p>Procedure</p> <ol style="list-style-type: none"> <li>1. Use <i>CH-161-B</i> puller to separate the steering linkage outer tie rod from the steering knuckle.</li> <li>2. Inspect the steering linkage inner tie rod for bent or damaged threads.</li> <li>3. Clean the tapered surface of the steering knuckle.</li> <li>4. Lubricate the steering linkage inner tie rod threads with chassis lubricant.</li> <li>5. Adjust the front toe. Refer to <a href="#">Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment</a>.</li> </ol> <p>Special Tools</p> <p><i>CH-161-B</i> Puller</p> <p>For equivalent regional tools, refer to <a href="#">Special Tools</a>.</p> |

**Related Part Information**

| Part Name                      | Catalog Name              | Part Code |
|--------------------------------|---------------------------|-----------|
| Steering Linkage Outer Tie Rod | ROD,STRG LNKG OTR TIE     | 1880A     |
| Steering Linkage Outer Tie Rod | ROD,STRG LNKG OTR TIE     | X0025     |
| Steering Linkage Outer Tie Rod | ROD KIT,STRG LNKG OTR TIE | X0039     |

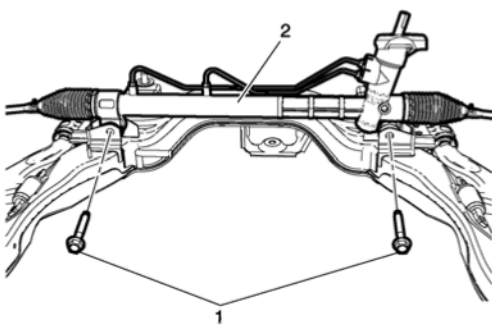
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## **Steering Gear Replacement**

### **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 steering linkage outer tie rod nut and disconnect the tie rod from the steering knuckle. Refer to [Steering Linkage Outer Tie Rod Replacement](#).
6. Remove the drivetrain and front suspension frame from the vehicle. Refer to [Drivetrain and Front Suspension Frame Replacement](#).



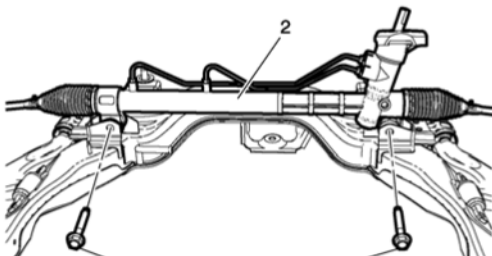
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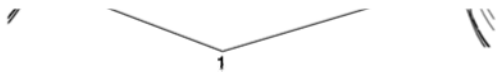
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8. Remove the power steering gear bolts (1).

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

### Installation Procedure





1. [Click here for full size](#)
2. Install the power steering gear assembly(2).
3. Install the power steering gear bolts(1) and tighten to 110â€”N-m (81â€”lbâ€”ft).
4. Install the drivetrain and front suspension frame to the vehicle. Refer to [Drivetrain and Front Suspension Frame Replacement](#).
5. Connect the tie rod to the steering knuckle and install the steering linkage outer tie rod nut and tighten to 50â€”N-m (37â€”lbâ€”ft). Refer to [Steering Linkage Outer Tie Rod Replacement](#).
6. Install the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#),
7. Install the intermediate steering shaft lower bolt. Refer to [Intermediate Steering Shaft Replacement](#).
8. 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                 | 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     |

Specifications

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Fastener Specifications

Reusable Threaded Fastener Tightening Specifications

| Application                                                     | Specification         |
|-----------------------------------------------------------------|-----------------------|
|                                                                 | Metric (English)      |
| Note:                                                           |                       |
| All fasteners listed in this table can be reused after removal. |                       |
| Steering Gear Bolt                                              | 100â€‰N·m(74â€‰lb·ft) |
| Steering Gear to Steering Knuckle Nut                           | 50â€‰N·m(37â€‰lb·ft)  |
| Steering Linkage Tie Rod Nut                                    | 75â€‰N·m(55â€‰lb·ft)  |

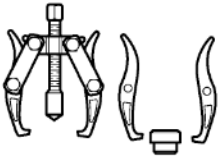
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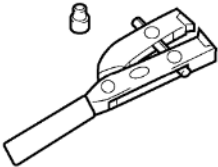
Special Tools and Equipment

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Special Tools

| Illustration                                                                      | Tool Number/<br>Description                                              |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|  | CH-161-B<br>KM-161-B<br>87-91-343<br>J-22888-20A<br>J-22888-35<br>Puller |
| <a href="#">Click here for full size</a>                                          |                                                                          |

| Illustration                                                                      | Tool Number/<br>Description                                                                                                     |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|  | <p>CH-804</p> <p>MKM-804</p> <p>J-35566</p> <p>Drive Axle Seal Clamp Pliers</p> <p><a href="#">Click here for full size</a></p> |