

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Intermediate Steering Shaft Bolt	22 N·m	16 lb ft
Steering Column Bolt	27 N·m	20 lb ft
Steering Column Lower Support Brace Bolt	10 N·m	89 lb in
Steering Column Lower Trim Cover Bolt	2 N·m	18 lb in
Steering Column Nut	27 N·m	20 lb ft
Steering Column Telescope Actuator Motor Adjustment Housing Bolt	8 N·m	71 lb in
Steering Column Telescope Actuator Motor Housing Bolt	6 N·m	53 lb in
Steering Column Tilt Wheel Actuator Motor Bolt	6 N·m	53 lb in
Steering Column Tilt Wheel Position Sensor Bolt	0.5 N·m	4 lb in
Steering Wheel Bolt	50 N·m	37 lb ft
Turn Signal Switch Bracket Bolt	9 N·m	80 lb in

Intermediate Steering Shaft Boot Replacement

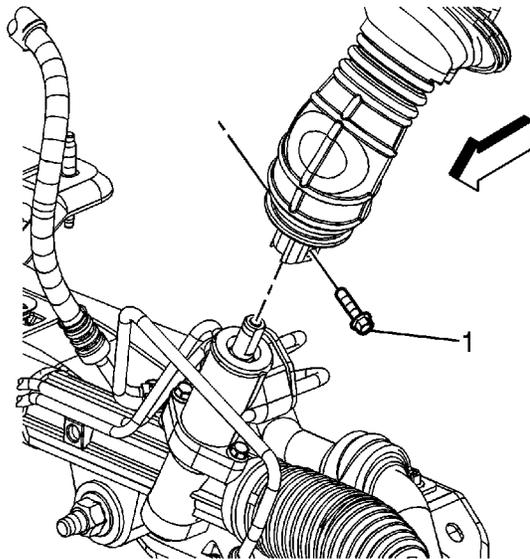
Removal Procedure

Caution: Secure the steering wheel utilizing 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:

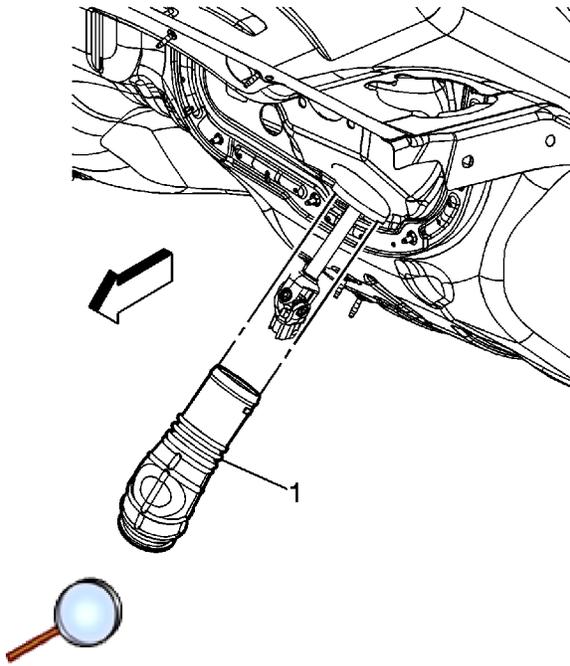
- The steering column
- The intermediate shaft
- The steering gear

After disconnecting these components, do not move the front tires and wheels. Failure to follow these procedures may cause improper alignment of some components during installation and result in possible damage to the SIR coil.

1. Turn the steering wheel to the straight forward position and lock it in place.
2. Remove the left front tire/wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
3. Disengage the intermediate steering shaft boot from the steering gear and the intermediate steering shaft upper seal.



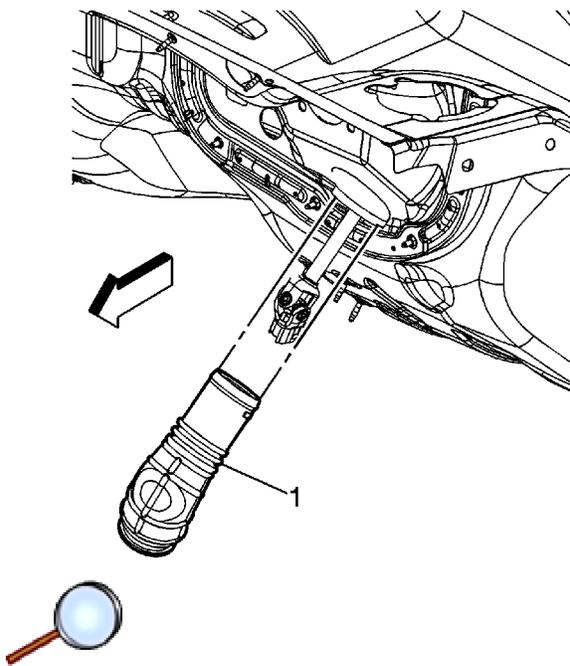
4. Remove the intermediate steering shaft bolt (1) and separate the intermediate steering shaft from the steering gear.



Note: Do not tear the intermediate steering shaft boot.

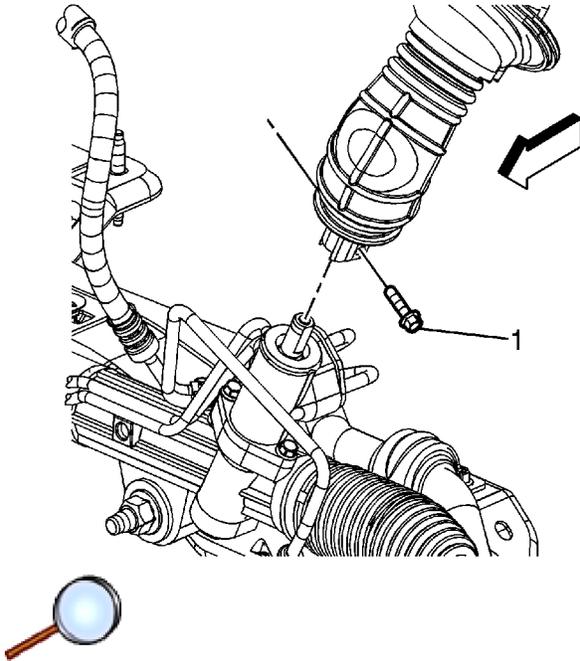
5. Remove the intermediate steering shaft boot (1).

Installation Procedure



1. Install the intermediate steering shaft boot (1).

Caution: Refer to [Fastener Caution](#) in the Preface section.



2. Install the intermediate steering shaft to the steering gear and install the intermediate steering shaft bolt (1) and tighten to **22 N·m (16 lb ft)**.

Note: Install intermediate steering shaft boot in the exact position it came out.

3. Install the intermediate steering shaft boot to the steering gear and the intermediate steering shaft upper seal.
4. Install the left front tire/wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).

Intermediate Steering Shaft Replacement

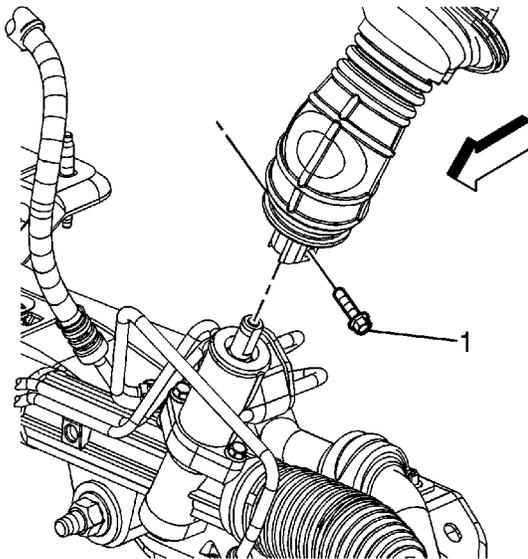
Removal Procedure

Caution: Secure the steering wheel utilizing 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:

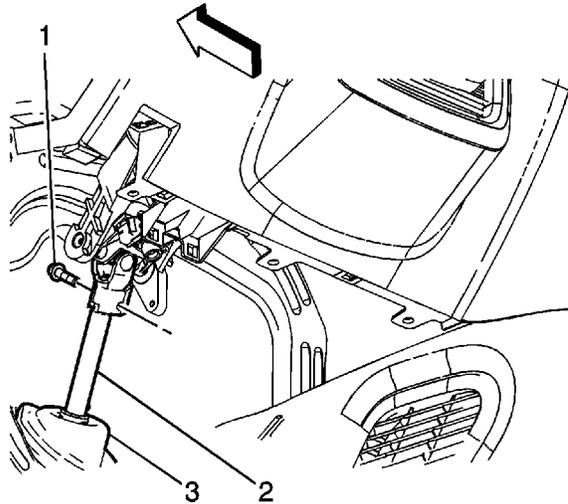
- The steering column
- The intermediate shaft
- The steering gear

After disconnecting these components, do not move the front tires and wheels. Failure to follow these procedures may cause improper alignment of some components during installation and result in possible damage to the SIR coil.

1. Turn the steering wheel to the straight forward position and lock it in place.
2. Hoist the vehicle and raise it. Refer to [Lifting and Jacking the Vehicle](#).
3. Disengage the intermediate steering shaft boot from the steering gear and the intermediate steering shaft upper seal.



4. Remove the intermediate steering shaft bolt (1) and separate the intermediate steering shaft from the steering gear.
5. Remove the left side instrument panel insulator panel. Refer to [Instrument Panel Insulator Panel Replacement - Left Side](#).



6. Remove the intermediate steering shaft bolt (1) at the steering column, separate the intermediate steering shaft (2), and pull the intermediate steering shaft upper seal (3) from its place.

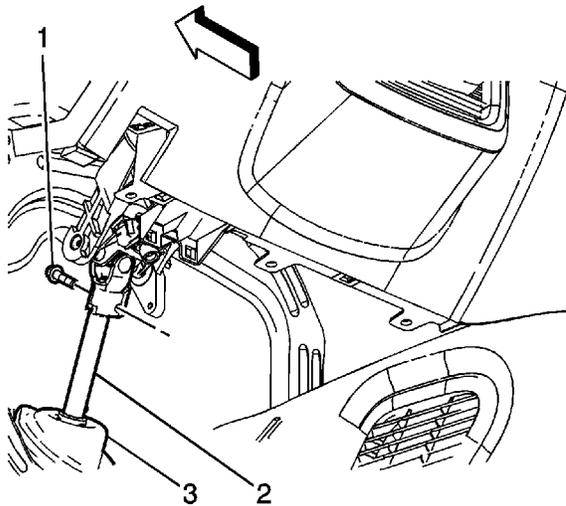
Note: Spreading both ends of the new or removed intermediate steering shaft while out of the vehicle will help with the installation.

7. Remove the intermediate steering shaft from inside the vehicle.

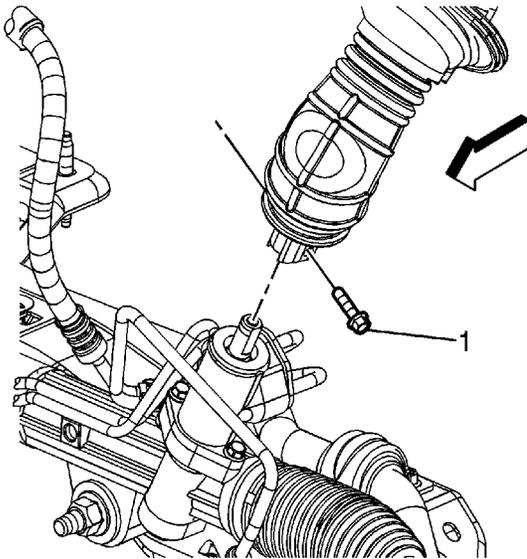
Installation Procedure

1. Install the intermediate steering shaft from inside the vehicle.

Caution: Refer to [Fastener Caution](#) in the Preface section.



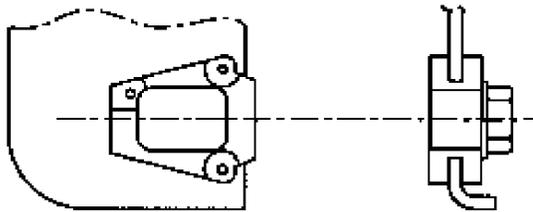
2. Install the intermediate steering shaft (2) to the steering column, install the intermediate steering shaft bolt (1), and tighten to **22 N·m (16 lb ft)**.
3. Position the intermediate steering shaft upper seal (3) back in place.
4. Install the left side instrument panel insulator panel. Refer to [Instrument Panel Insulator Panel Replacement - Left Side](#).



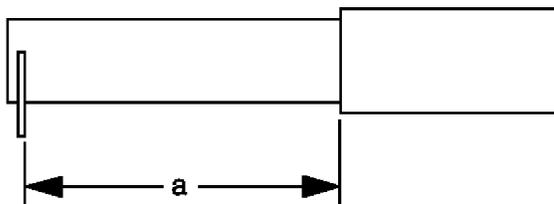
5. Position the intermediate steering shaft to the steering gear, install the intermediate steering shaft bolt (1), and tighten to **22 N·m (16 lb ft)**.
- Note:** Do not tear the intermediate steering shaft boot and install it the in the exact position it came out.
6. Install the intermediate steering shaft boot to the steering gear and the intermediate steering shaft upper seal.

Steering Column Accident Damage Inspection

Inspection Procedure



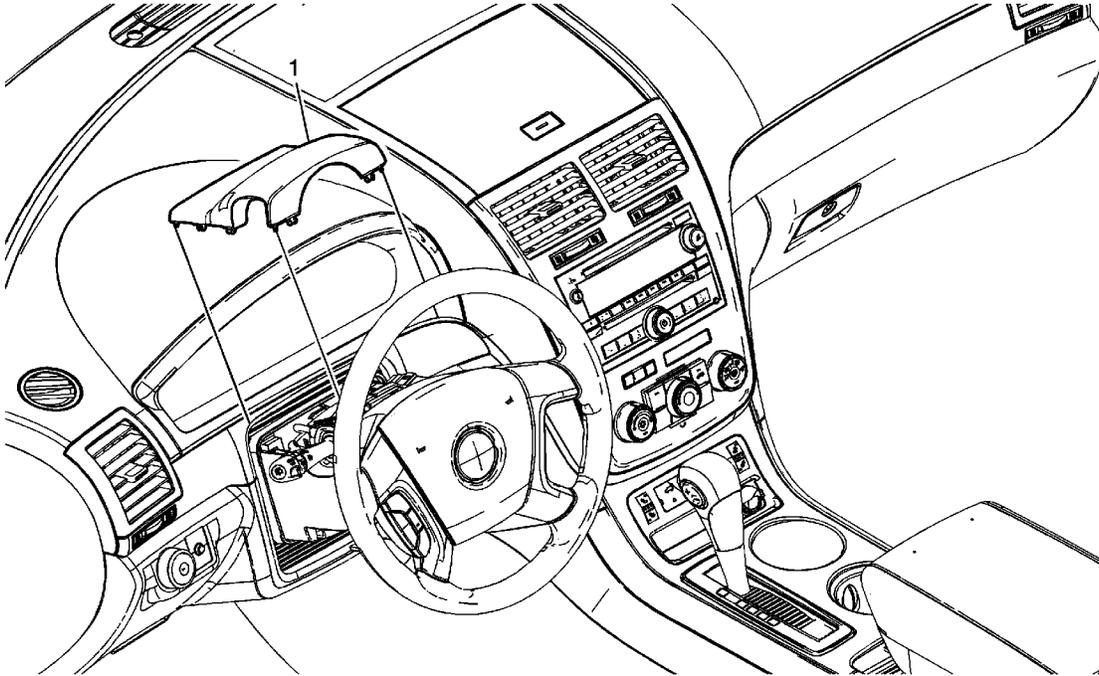
1. Inspect the capsules on the steering column bracket assembly. Verify that the capsules are seated securely in the bracket slots and inspect the capsules for any loose conditions when pushed or pulled by hand. If the capsules are not secure, perform one of the following procedures:
 - If the bracket is bolted to the jacket assembly, replace the bracket.
 - If the bracket is welded to the jacket assembly, replace the jacket assembly.





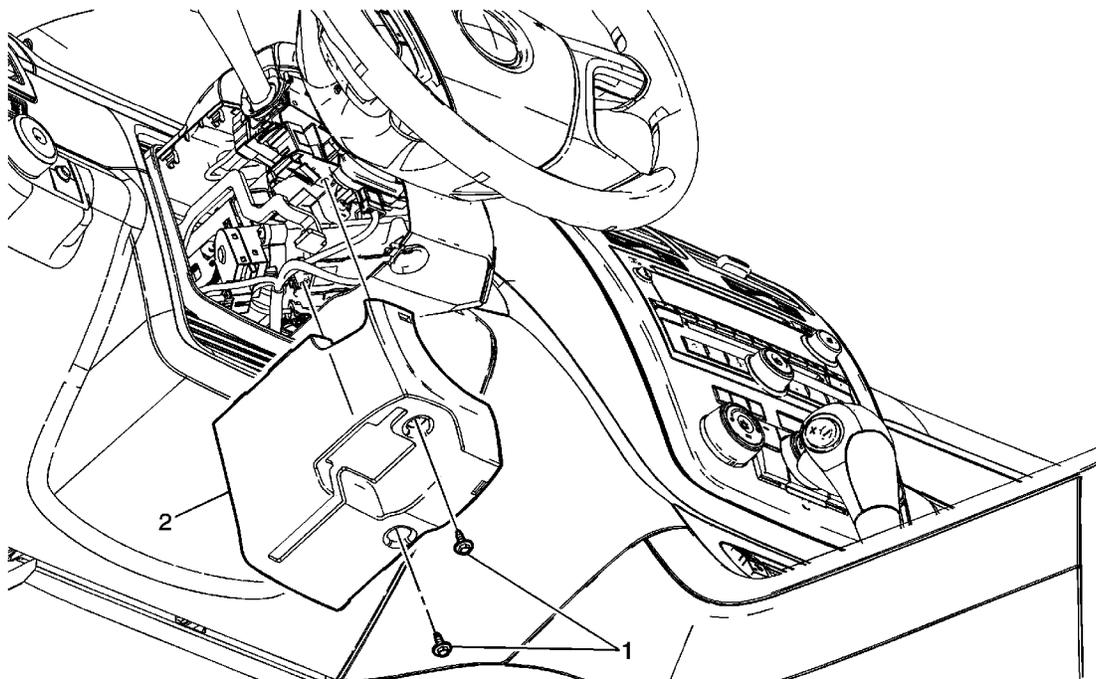
2. Inspect the jacket assembly for collapse by measuring the distance from the lower edge of the upper jacket to a defined point on the lower jacket. If measured dimensions (A), are not within specifications (100 mm), install a steering column.

Steering Column Upper Trim Cover Replacement



Callout	Component Name
1	Steering Column Upper Trim Cover Tip Use gentle pressure to dislocate the steering column upper trim cover.

Steering Column Lower Trim Cover Replacement



Callout	Component Name
<p>Preliminary Procedure</p>	
<p>Remove the ignition lock cylinder opening trim cover bolts. Refer to Ignition Lock Cylinder Opening Trim Cover Replacement.</p>	
<p>1</p>	<p>Steering Column Lower Trim Cover Bolt (Qty: 2)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 2 N·m (18 lb in)</p>
<p>2</p>	<p>Steering Column Lower Trim Cover</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Unclip the steering column lower trim cover from the ignition lock cylinder opening trim cover. 2. Separate the steering column lower trim cover from the steering column upper trim cover.

Telescoping Steering Column Calibration

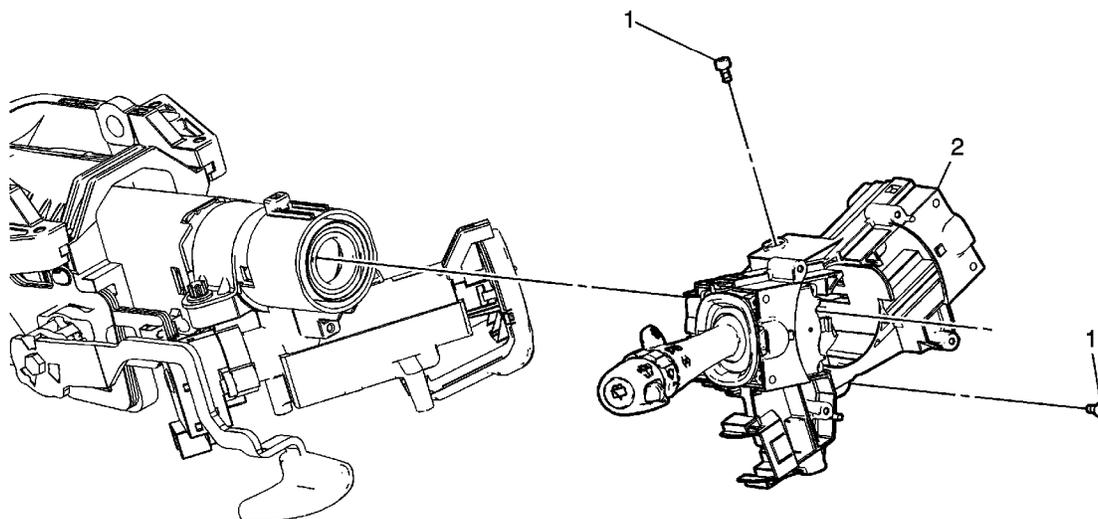
Tilt/Telescoping Soft Stops

After replacement of the memory seat module (MSM), it is necessary to program the tilt/telescoping soft stops. Each soft stop is a programmable end of travel that is set approximately 1.3 cm (0.5 in) from the mechanical end of travel. The steering column has a soft stop set at each end of the telescoping in/out and tilt up/down movement. The system uses soft stops to prevent wear on the system by ensuring that the steering column movement stops before it reaches its mechanical end of travel in any direction. The soft stops are initially programmed at the factory. The stop positions may be reprogrammed, which is necessary any time the MSM, the tilt actuator or telescope actuators replaced, as described in the following procedure.

Tilt/Telescoping Soft Stop Programming Procedure

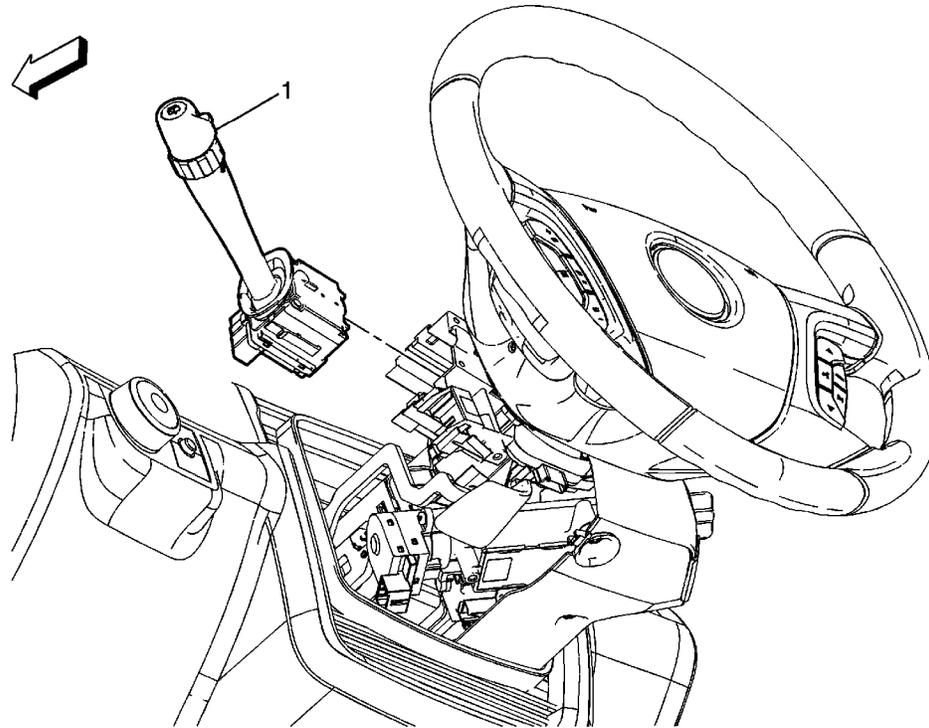
1. Turn ON the ignition, with the engine OFF.
2. Connect a scan tool to the vehicle.
3. Select Model Year.
4. Select LD Truck.
5. Select Buick.
6. Product Line (R).
7. Select Body.
8. Select Memory Seat
9. Select Special Functions
10. Select Driver Seat.
11. Select Learn Column Soft Stops.
12. Follow the scan tool on-screen instructions.

Turn Signal Switch Bracket Replacement



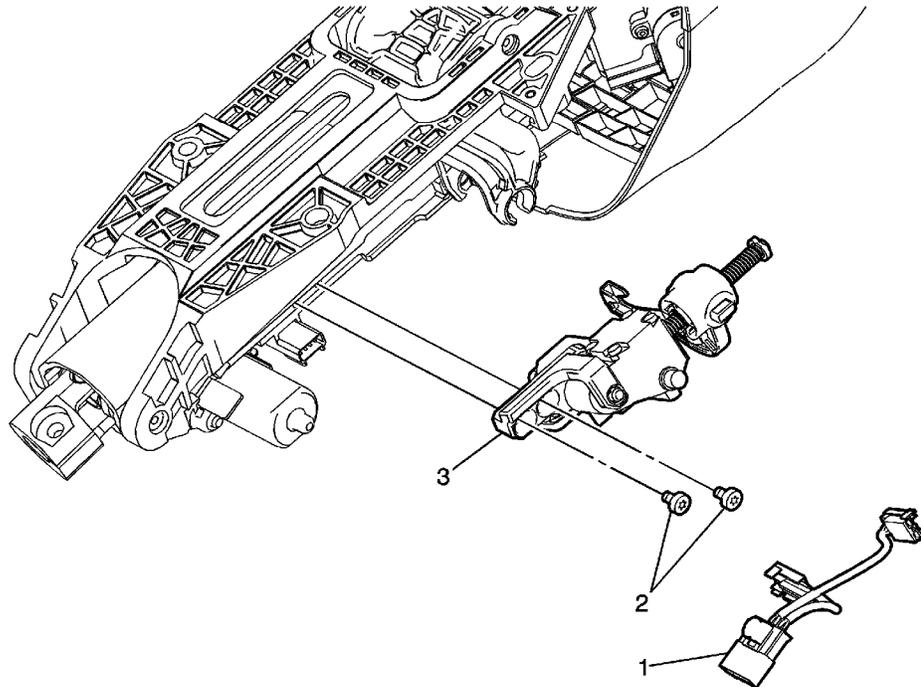
Callout	Component Name
<p>Preliminary Procedure</p>	
<p>Remove the inflatable restraint steering wheel module coil. Refer to Inflatable Restraint Steering Wheel Module Coil Replacement.</p>	
<p>1</p>	<p>Turn Signal Switch Bracket Bolt (Qty: 2)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 9 N·m (80 lb in)</p>
<p>2</p>	<p>Turn Signal Switch Bracket</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Disconnect any electrical connectors as needed. 2. Release the plastic retaining tabs to release the turn signal switch bracket from the steering column.

Turn Signal Multifunction Switch Replacement



Callout	Component Name
<p>Preliminary Procedures</p> <ol style="list-style-type: none"> 1. Remove the steering column upper trim cover. Refer to Steering Column Upper Trim Cover Replacement . 2. Remove the steering column lower trim cover. Refer to Steering Column Lower Trim Cover Replacement . 	
<p>1</p>	<p>Turn Signal Multifunction Switch</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Disconnect any electrical connectors as needed. 2. Release the plastic retaining tabs.

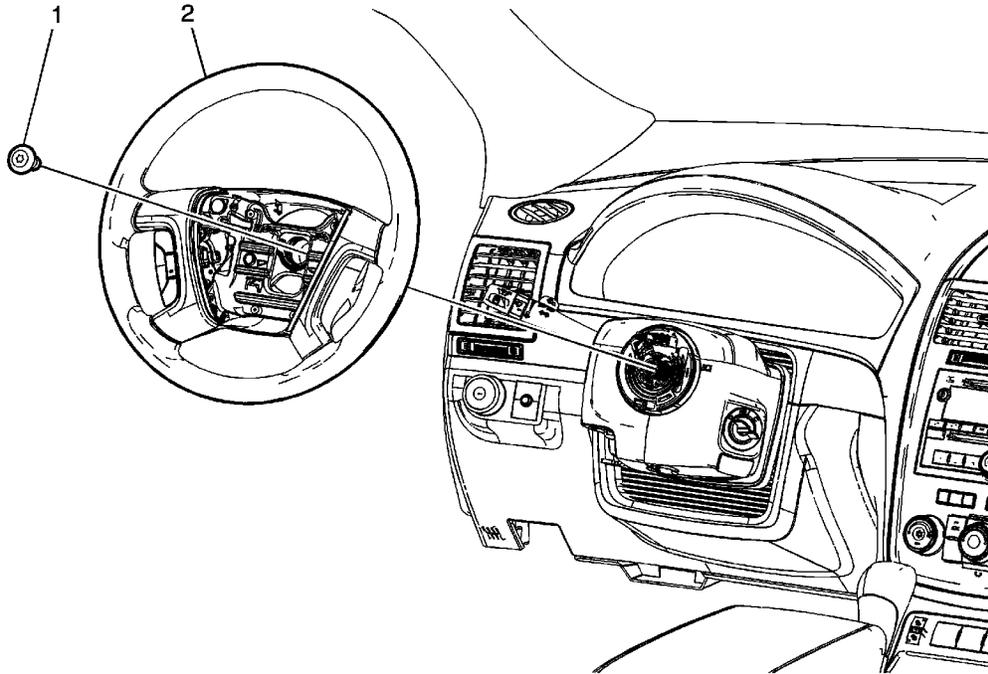
Steering Column Tilt Wheel Actuator Motor Replacement



Callout	Component Name
<p>Preliminary Procedure</p> <p>Remove the steering column. Refer to Steering Column Replacement.</p>	
<p>1</p>	<p>Steering Column Tilt Wheel And Telescope Actuator Motor Harness</p> <p>Tip The connectors on this harness can only be used once. The harness must be replaced when either connector or both connectors are removed.</p>
<p>2</p>	<p>Steering Column Tilt Wheel Actuator Motor Bolt (Qty: 2)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tip</p> <ul style="list-style-type: none"> • Make sure the position arm on the actuator motor is aligned to the steering column tilt wheel position sensor. • When replacing the motor the steering column housing may need to be adjusted. Remove the lower two bolts from the steering column telescope <p>© 2010 General Motors Corporation. All rights reserved.</p>

	<p>actuator motor so the steering column housing can be slide to the appropriate position. Refer to Steering Column Telescope Actuator Motor Replacement.</p> <p>Tighten 6 N·m (53 lb in)</p>
3	<p>Steering Column Tilt Wheel Actuator Motor</p> <p>Procedure</p> <p>After repairs, perform the telescoping steering column calibration. Refer to Telescoping Steering Column Calibration.</p> <p>Tip Cover up any openings to the steering column while servicing the motor. Absolutely nothing can be dropped into the steering column. Be sure nothing has been dropped in the column before reinstalling.</p>

Steering Wheel Replacement

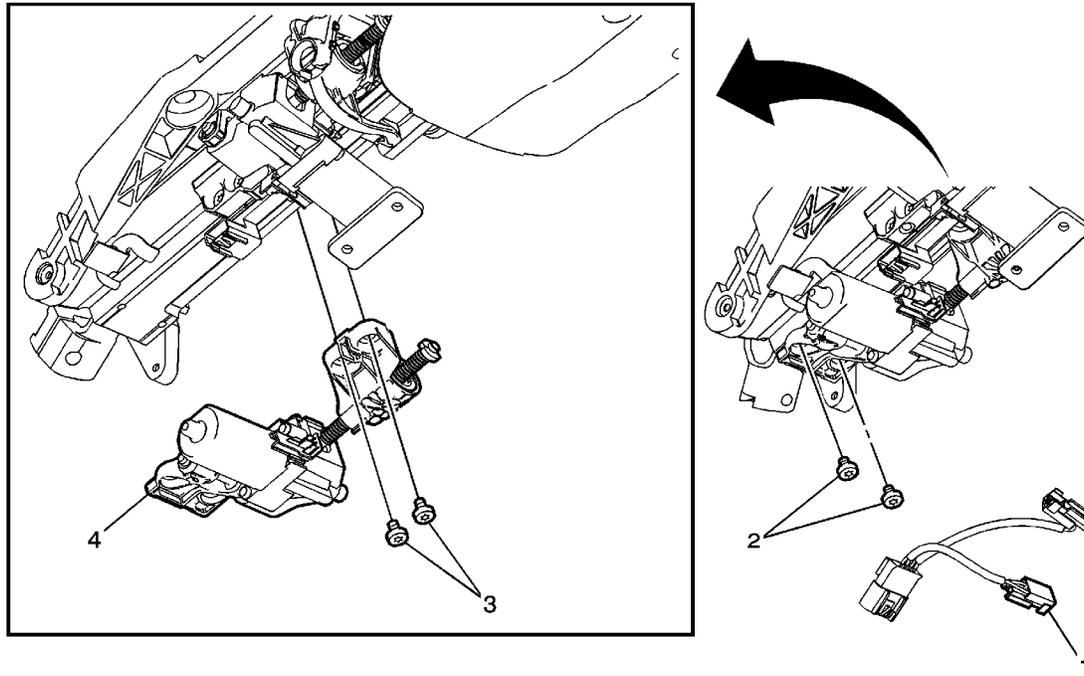


Callout	Component Name
<p>Preliminary Procedure</p>	
<p>Remove the inflatable restraint steering wheel module. Refer to Inflatable Restraint Steering Wheel Module Replacement.</p>	
<p>1</p>	<p>Steering Wheel Bolt</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 50 N·m (37 lb ft)</p>
<p>2</p>	<p>Steering Wheel</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Disconnect all electrical connectors as needed. 2. Remove the steering wheel using the <i>J 1859-A</i> puller and the <i>J 42578</i> puller legs . <p>Special Tools</p>

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- *J 1859-A* Steering Wheel Puller
- *J 42578* Steering Wheel Puller Legs

Steering Column Telescope Actuator Motor Replacement

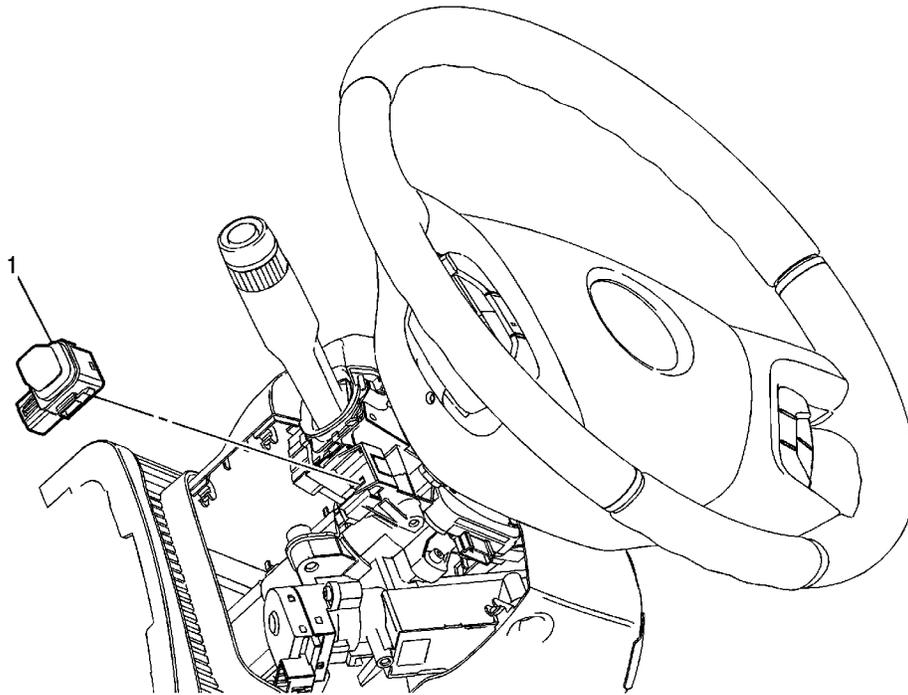


Callout	Component Name
Preliminary Procedure	
Remove the steering column. Refer to Steering Column Replacement .	
1	Steering Column Tilt Wheel And Telescope Actuator Motor Harness Tip The connectors on this harness can only be used once. The harness must be replaced when either connector or both connectors are removed.
2	Steering Column Telescope Actuator Motor Adjustment Housing Bolt (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tip <ul style="list-style-type: none"> • Make sure the position arm on the actuator motor is aligned to the steering column tilt wheel position sensor. • When replacing the motor the steering column housing may need to be adjusted for alignment purposes.

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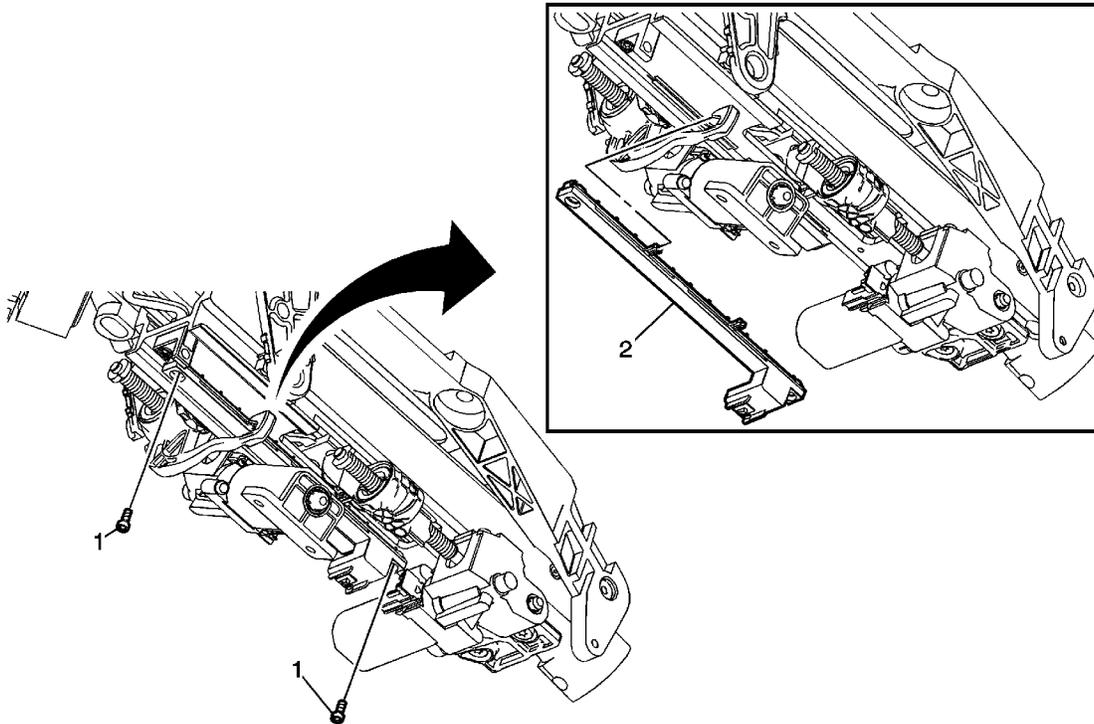
	Tighten 8 N·m (71 lb in)
3	Steering Column Telescope Actuator Motor Housing Bolt (Qty: 2) Tighten 6 N·m (53 lb in)
4	Steering Column Telescope Actuator Motor Procedure After repairs, perform the telescoping steering column calibration. Refer to Telescoping Steering Column Calibration . Tip Cover up any openings to the steering column while servicing the motor. Absolutely nothing can be dropped into the steering column. Be sure nothing has been dropped in the column before reinstalling.

Steering Column Tilt Wheel and Telescope Switch Replacement



Callout	Component Name
<p>Preliminary Procedure</p> <p>Remove the steering column lower trim cover. Refer to Steering Column Lower Trim Cover Replacement.</p>	
<p>1</p>	<p>Steering Column Tilt Wheel and Telescope Switch</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Disconnect any electrical connectors as needed. 2. Release the plastic retaining tabs to release the switch from the turn signal switch bracket.

Steering Column Tilt Wheel Position Sensor Replacement



Callout	Component Name
<p>Preliminary Procedure</p> <p>Remove the steering column. Refer to Steering Column Replacement.</p>	
<p>1</p>	<p>Steering Column Tilt Wheel Position Sensor Bolt (Qty: 2)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 0.5 N·m (4 lb in)</p>
	<p>Steering Column Tilt Wheel Position Sensor</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Disconnect any electrical connectors as needed. 2. When installing, align the position sensor arms with both actuator motors. 3. After repairs, perform the telescoping steering column calibration. Refer to Telescoping Steering Column Calibration.

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Tip

- Cover up any openings to the steering column while servicing the motor. Absolutely nothing can be dropped into the steering column. Be sure nothing has been dropped in the column before reinstalling.
- The connectors on the steering column tilt wheel and telescope actuator harness can only be used once. The harness must be replaced when either connector or both connectors are removed.
- When installing a new sensor one or both of the actuator motors may need to be temporarily repositioned to remove and install the sensor. Refer to [Steering Column Tilt Wheel Actuator Motor Replacement](#) or [Steering Column Telescope Actuator Motor Replacement](#).

Steering Column Replacement

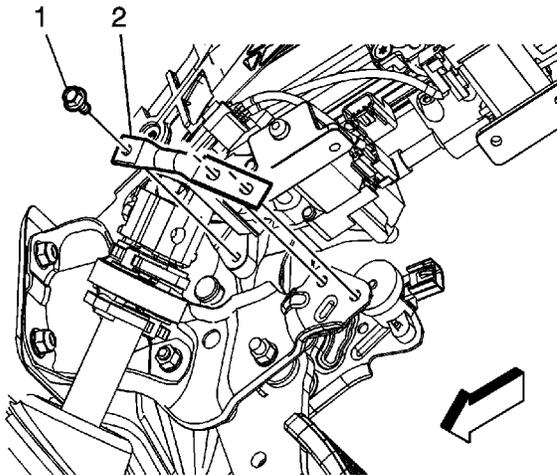
Removal Procedure

Caution: Secure the steering wheel utilizing 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:

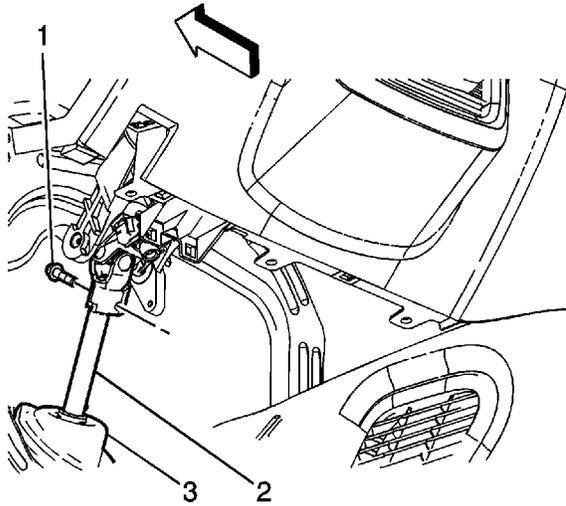
- The steering column
- The intermediate shaft
- The steering gear

After disconnecting these components, do not move the front tires and wheels. Failure to follow these procedures may cause improper alignment of some components during installation and result in possible damage to the SIR coil.

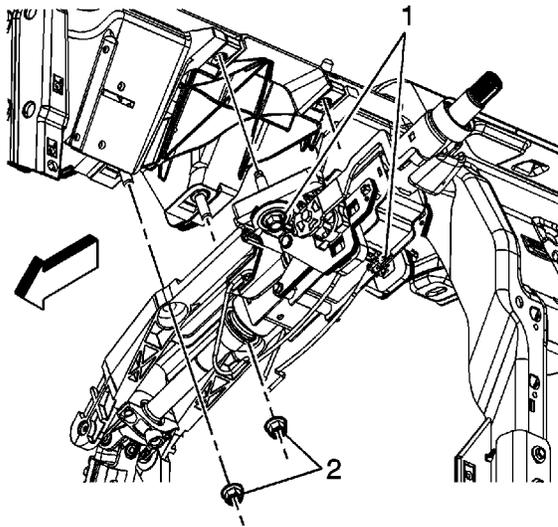
1. Remove the left side instrument panel (I/P) insulator panel. Refer to [Instrument Panel Insulator Panel Replacement - Left Side](#).
2. Remove the driver knee bolster. Refer to [Driver Knee Bolster Replacement](#).
3. Remove the I/P cluster trim plate applique for Buick. Refer to [Instrument Panel Cluster Trim Plate Applique Replacement](#).
4. Remove the I/P Instrument Cluster Trim Plate for GMC, Saturn, and Chevrolet. Refer to [Instrument Panel Cluster Trim Plate Replacement](#).
5. Remove the steering column housing cover bolts. Refer to [Steering Column Housing Cover Replacement](#).
6. Disconnect all electrical connectors as needed.



7. If equipped, remove the steering column lower support brace bolts (1) and steering column lower support brace (2).

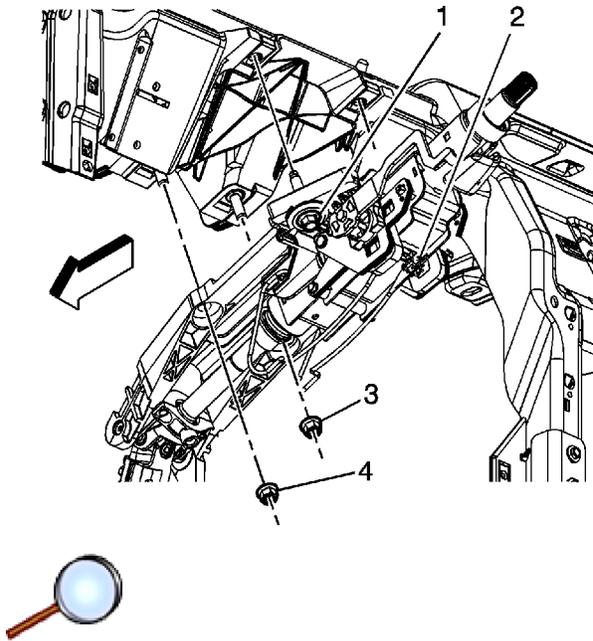


8. Remove the intermediate steering shaft bolt (1) at the steering column and separate the intermediate steering shaft (2). Do not pull the intermediate steering shaft upper seal (3) from its place.



9. Remove the steering column nuts (2) and the steering column bolts (1).
10. Remove the steering column from the vehicle.
11. Transfer any parts as needed.

Installation Procedure



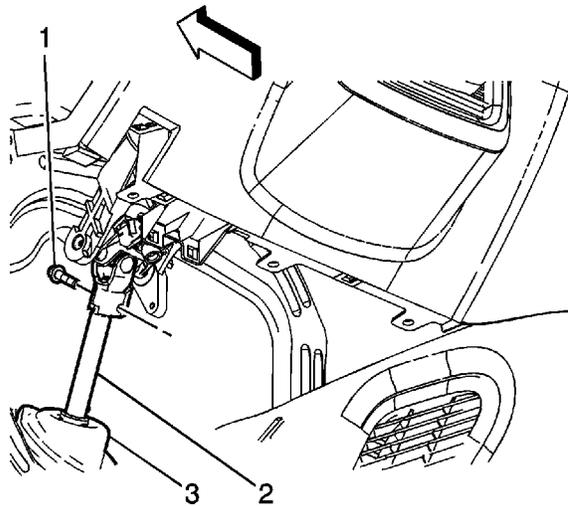
Note: The following sequence **MUST** be followed. Make sure to hand tighten **ONLY** in the sequence specified and **DO NOT** apply any clamping force.

1. Install the steering column to the vehicle and start the steering column nuts (3, 4) and bolts (1, 2) by hand using the following sequence:
 - 1.1. Place the steering column in place.
 - 1.2. Hand start the steering column nuts (3, 4).
 - 1.3. Hand start the steering column bolts (1, 2).
 - 1.4. Hold the steering column flush against the I/P carrier.
 - 1.5. Hand tighten steering column nut (3).
 - 1.6. Hand tighten steering column nut (4).
 - 1.7. Hand tighten steering column bolt (1).
 - 1.8. Hand tighten steering column bolt (2).

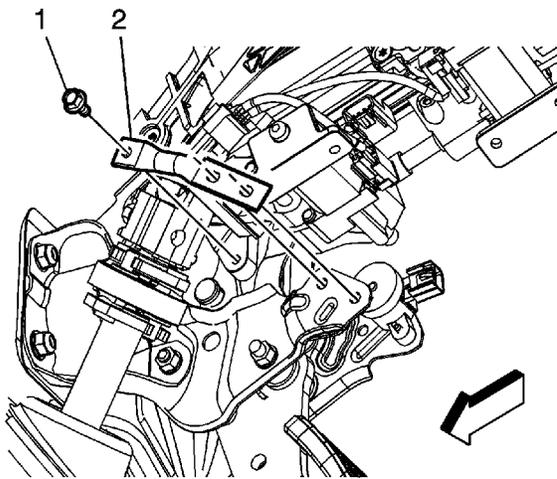
Caution: Refer to [Fastener Caution](#) in the Preface section.

Note: The following torque sequence **MUST** be followed.

2. Tighten the steering column nuts (3, 4) and bolts (1, 2) in the following sequence:
 - 2.1. Tighten steering column nut (3) to **27 N·m (20 lb ft)**.
 - 2.2. Tighten steering column nut (4) to **27 N·m (20 lb ft)**.
 - 2.3. Tighten steering column bolt (1) to **27 N·m (20 lb ft)**.
 - 2.4. Tighten steering column bolt (2) to **27 N·m (20 lb ft)**.

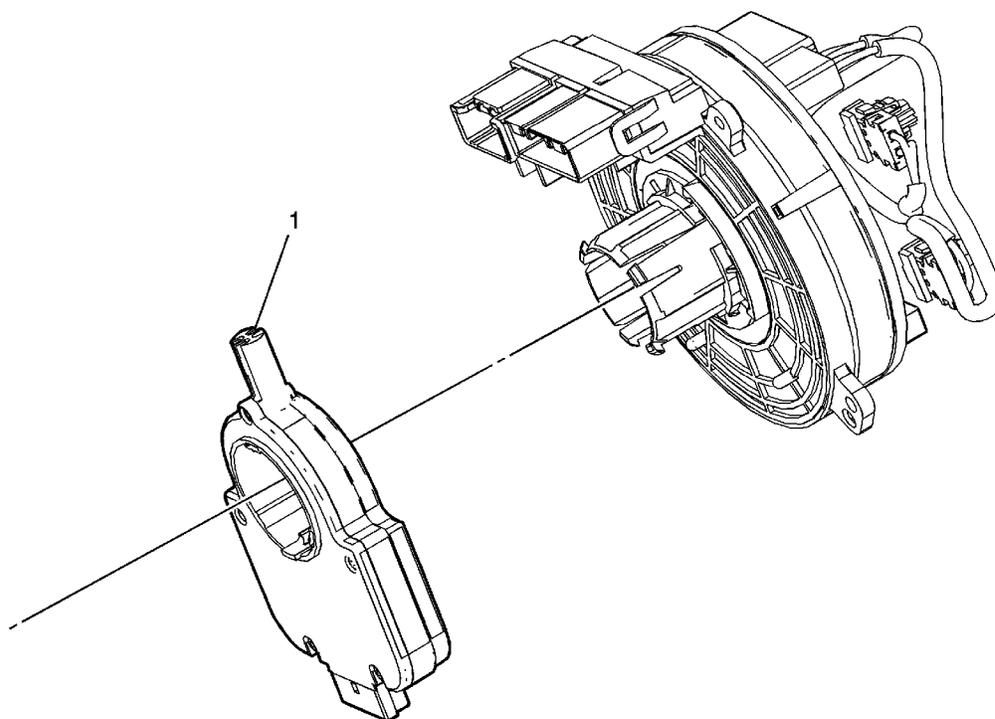


3. Install the intermediate steering shaft (2) and intermediate steering shaft bolt (1). Make sure the intermediate steering shaft upper seal (3) is seated correctly.



4. If equipped, install the steering column lower support brace (2) and steering column lower support brace bolts (1) and tighten to **10 N·m (89 lb in)**.
5. Connect all electrical connectors as needed.
6. Install the steering column housing cover bolts. Refer to [Steering Column Housing Cover Replacement](#).
7. Install the I/P Instrument Cluster Trim Plate for GMC, Saturn, and Chevrolet. Refer to [Instrument Panel Cluster Trim Plate Replacement](#).
8. Install the I/P cluster trim plate applique for Buick. Refer to [Instrument Panel Cluster Trim Plate Applique Replacement](#).
9. Install the left side I/P insulator panel. Refer to [Instrument Panel Insulator Panel Replacement - Left Side](#).

Steering Angle Sensor Replacement



Callout	Component Name
<p>Preliminary Procedure</p>	
<p>Remove the inflatable restraint steering wheel module coil. Refer to Steering Wheel Inflatable Restraint Module Coil Replacement.</p>	
<p>1</p>	<p>Steering Angle Sensor</p> <p>Procedure</p> <ol style="list-style-type: none"> 1. Disconnect any electrical connectors as needed. 2. Squeeze the plastic retaining tabs on the supplemental inflatable restraint steering wheel module coil to release and disengage the steering angle sensor. 3. After installation, center the steering angle sensor. Refer to Steering Angle Sensor Centering.