Fastener Tightening Specifications

Application	Specification	
	Metric	English
Electronic Power Steering Motor Control Module Bracket Bolt	11.5 N·m	102 lb in
Steering Column Jacket Bolt	11 N·m	97 lb in
Steering Column Lower Trim Cover Screw	2 N·m	18 lb in
Steering Column Lower Support Bracket Bolt	25 N·m	18 lb ft
Steering Column Upper Support Bracket Bolt	25 N·m	18 lb ft
Steering Column Upper Trim Cover Bolt	2 N·m	18 lb in
Steering Shaft Coupling Bolt (at the steering column)		
With Electronic Power Steering	34 N·m	25 lb ft
With Hydraulic Power Steering	30 N·m	22 lb ft
With Two Mode Hybrid Steering	30 N·m	22 lb ft
Steering Shaft Coupling Bolt (at the steering gear)		
With Electronic Power Steering	34 N·m	25 lb ft
With Hydraulic Power Steering	33 N·m	24 lb ft
With Two Mode Hybrid Steering	33 N·m	24 lb ft
Steering Wheel Nut	41 N·m	30 lb ft

Steering Shaft Coupling Replacement

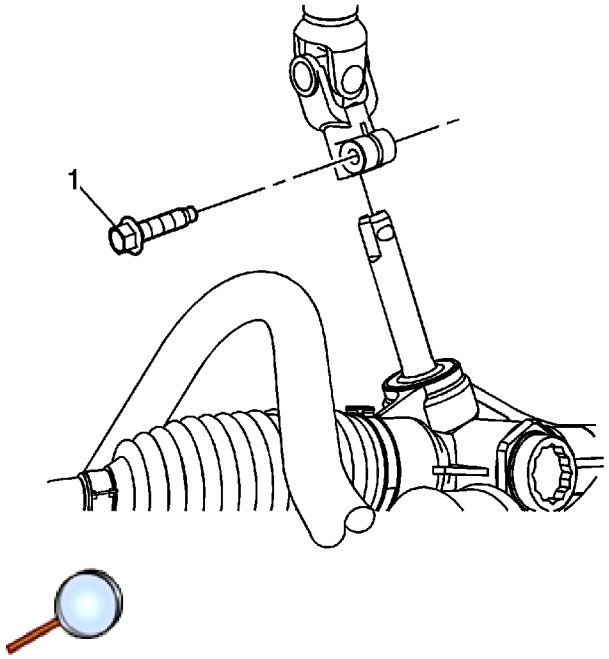
Removal Procedure

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.

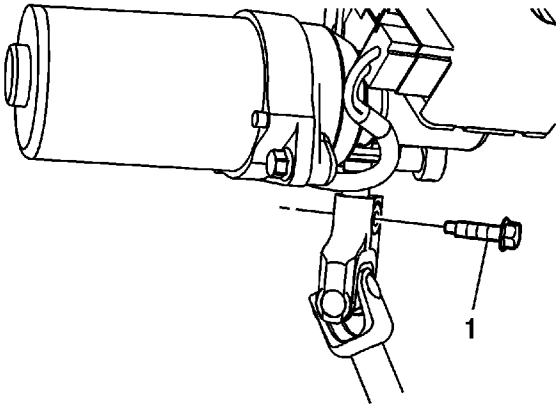
1. Turn the steering wheel to the straight forward position and lock it in place.
2. Remove the left front tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.



3. Remove the steering shaft coupling bolt (1) at the steering gear and discard it.

   The connection shown is for an electronic power steering gear. The connection at the hydraulic power and two mode hybrid steering gear is serviced the same way.

4. Disconnect the steering shaft coupling from the steering gear.
5. Disengage the steering shaft coupling seal from the body pass-through.



Note: Scribe marks on the steering shaft coupling and the steering column connection prior to removal.

6. Remove the steering shaft coupling bolt (1) at the steering column and discard it.

   The connection shown is for an electronic power steering column. The connection at the steering column for the hydraulic power and two mode hybrid power steering systems is serviced the same way.

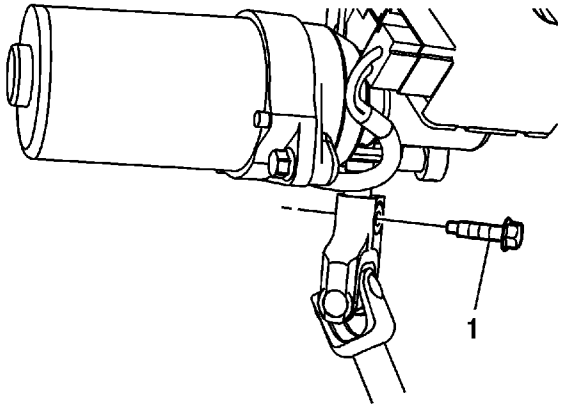
7. Disconnect the steering shaft coupling from the steering column.
8. Remove the steering shaft coupling from inside the vehicle.

Installation Procedure

Note: If replacing the steering shaft coupling, failure to transfer the scribed marks may result in an off-center steering wheel.

1. If a new steering shaft coupling is being installed then transfer the pre-scribed alignment marks on to the new part.
2. Install the steering shaft coupling from inside the vehicle.
3. Align the scribed marks on the steering shaft coupling to the scribed marks on the steering column and connect them.

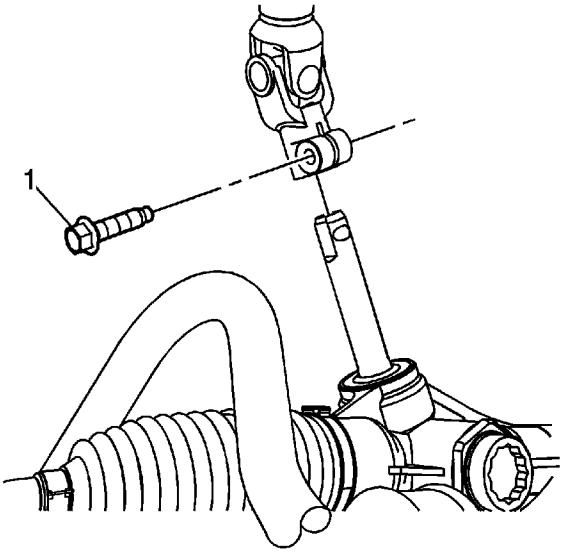
Caution: Refer to Fastener Caution in the Preface section.



4. For vehicles with non-hybrid electronic power steering, install the new steering shaft coupling bolt (1) at the steering column and tighten to **34 N·m (25 lb ft)**.

   The connection shown is for an electronic power steering column. The connection at the steering column for the hydraulic power and two mode hybrid power steering systems is serviced the same way.

5. For vehicles with hydraulic power steering, install the new steering shaft coupling bolt at the steering column and tighten to **30 N·m (22 lb ft)**.
6. For vehicle with two mode hybrid steering, install the new steering shaft coupling bolt at the steering column and tighten to **30 N·m (22 lb in)**.
7. Seat the steering shaft coupling seal into the body pass-through.
8. Connect the steering shaft coupling to the steering gear.



9. Install a new steering shaft coupling bolt (1) at the steering gear and tighten to **34 N·m (25 lb ft)**.

   The connection shown is for an electronic power steering gear. The connection at the hydraulic power and two mode hybrid steering gear is serviced the same way.

10. For vehicles with hydraulic power steering, install the new steering shaft coupling bolt at the steering gear and tighten to **33 N·m (24 lb ft)**.
11. For vehicle with two mode hybrid steering, install the new steering shaft coupling bolt at the steering column and tighten to **33 N·m (24 lb ft)**.
12. Install the left front tire and wheel assembly. Refer to Tire and Wheel Removal and Installation.

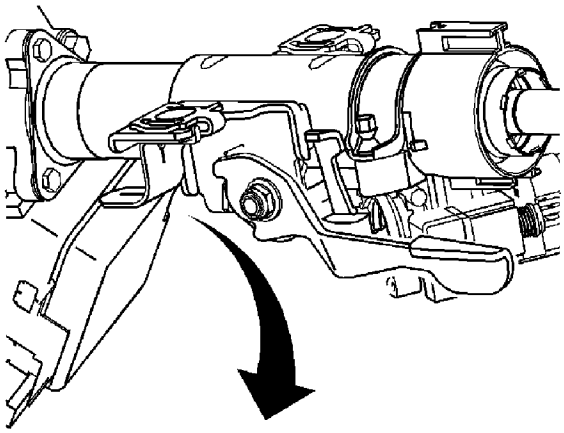
Steering Column Accident Damage Inspection (Without Electronic Power Steering)

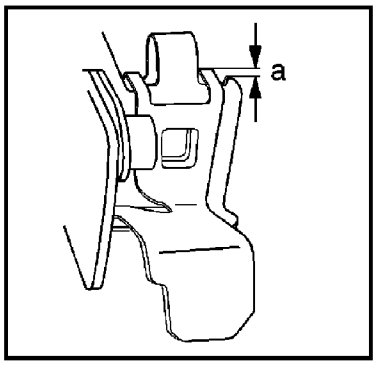
Collapse Measurement

A vehicle involved in an accident resulting in sheet metal damage or driver-side air bag deployment will require an inspection for steering column collapse. If the steering column collapse measurement is greater than 3 mm than the steering column must be replaced.

For steering column collapse measurement, use the following procedure:

1. Remove the steering column lower and upper trim covers. Refer to Steering Column Lower Trim Cover Replacement and Steering Column Upper Trim Cover Replacement.





2. Inspect the upper steering column mounting capsule nuts for movement (a). If the steering column collapse measurement is greater than 3 mm than the steering column must be replaced. Refer to Steering Column Replacement .
3. Install the steering column lower and upper trim covers. Refer to Steering Column Lower Trim Cover Replacement and Steering Column Upper Trim Cover Replacement.

Steering Column Accident Damage Inspection (With Electronic Power Steering)

Inspection

This vehicle is equipped with electric power steering (EPS), with the electric motor and torque sensor mounted on the steering column. When involved in an accident resulting in sheet metal damage or driver-side air bag deployment, the steering column must be inspected for both electrical system integrity and steering column collapse. Refer to Diagnostic System Check - Vehicle.

- If the steering column electrical system integrity is not within specifications, the complete steering column must be replaced. Refer to Steering Column Replacement.
- If the steering column collapse mechanism is not within specifications, but the electrical system integrity is within specifications, then the steering column upper jacket must be replaced. Refer to Steering Column Jacket Replacement.

Road test the vehicle when ever any steering system repairs or diagnostics have been performed.

Electric Power Steering (EPS) Inspection

1. Install a scan tool.
2. Start the engine.

Important: After centering the steering wheel, remove hands and other objects from the steering wheel. Ensure the suspension is relaxed and that no bias, or uneven force is being applied to the steering system.

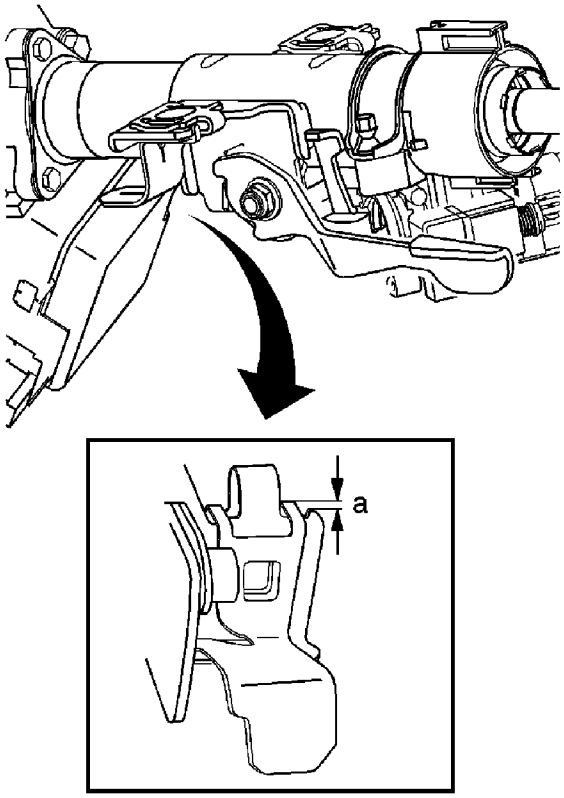
3. Turn the steering wheel 90 degrees to the left, then 90 degrees to the right, then return the steering wheel to center.
4. Using the scan tool, observe the Torque Sensor Main data parameter in the EPS data list. Correct parameter range for the torque sensor is <+ or - 1 N·m (0.7 lb ft).
5. If the value is greater than the specified range then replace the steering column assembly. Refer to Steering Column Replacement.

Collapse Measurement

A vehicle involved in an accident resulting in sheet metal damage or drivers-side air bag deployment will require an inspection for steering column collapse. If the steering column collapse measurement is greater than 3 mm than the steering column upper jacket must be replaced.

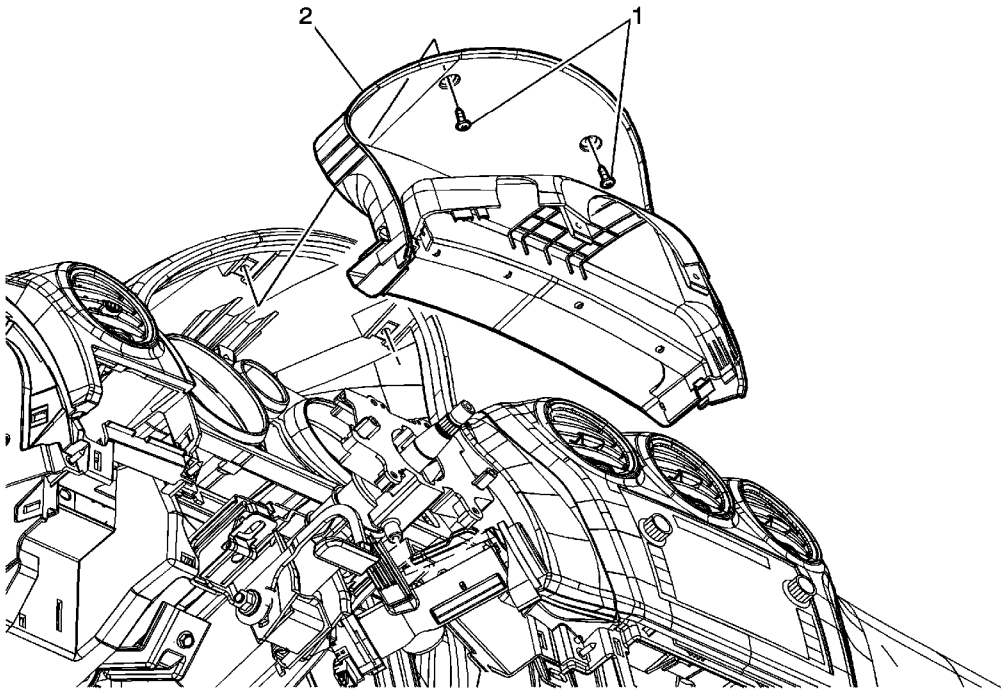
For steering column collapse measurement, use the following procedure:

1. Remove the steering column lower and upper trim covers. Refer to Steering Column Lower Trim Cover Replacement and Steering Column Upper Trim Cover Replacement.



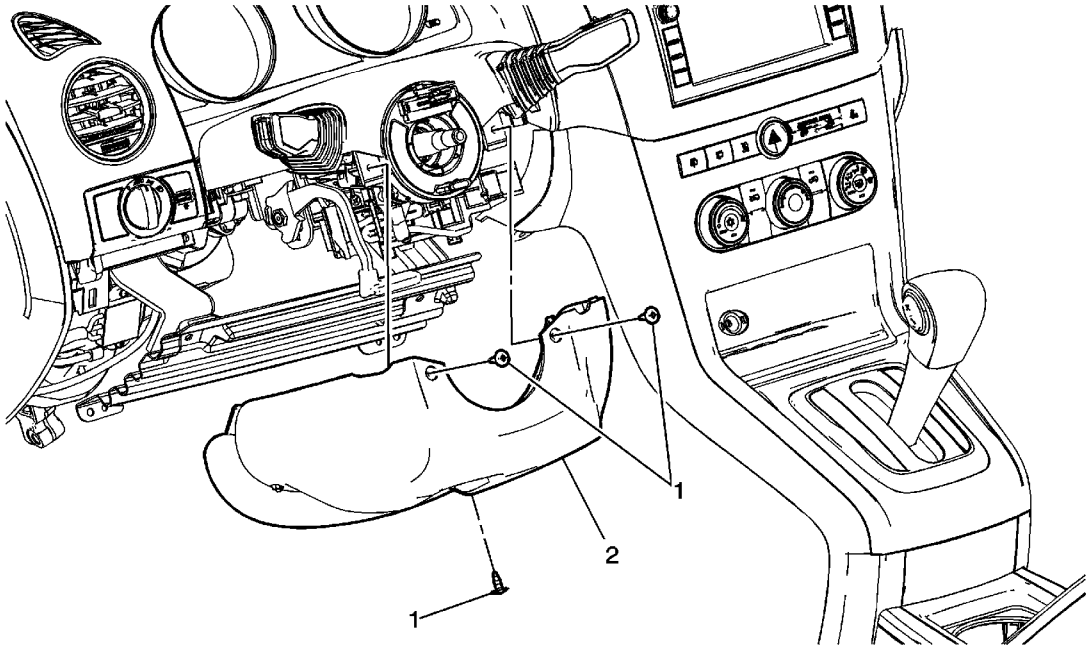
2. Inspect the upper steering column mounting capsule nuts for movement (a). If the steering column collapse measurement is greater than 3 mm than the steering column upper jacket must be replaced. Refer to Steering Column Jacket Replacement .
3. Install the steering column lower and upper trim covers. Refer to Steering Column Lower Trim Cover Replacement and Steering Column Upper Trim Cover Replacement.

Steering Column Upper Trim Cover Replacement



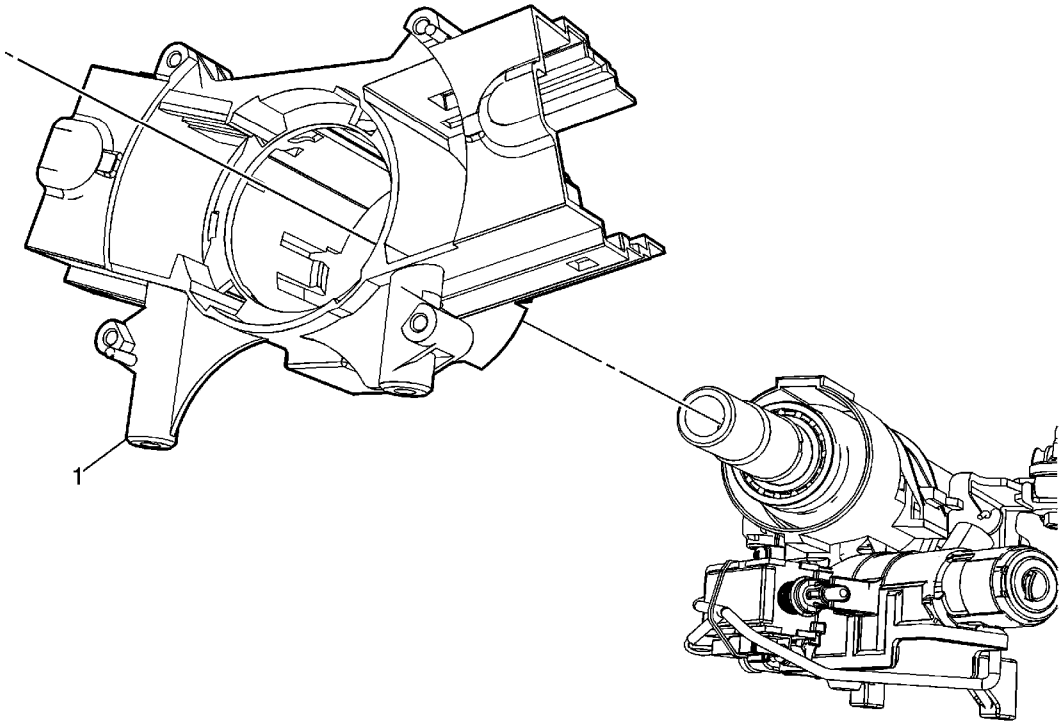
Callout	Component Name
Preliminary Procedure Remove the steering column lower trim cover. Refer to Steering Column Lower Trim Cover Replacement.	
1	Steering Column Upper Trim Cover Bolt (Qty: 2) **Caution:** Refer to Fastener Caution in the Preface section. **Tighten** 2 N·m (18 lb in)
2	Steering Column Upper Trim Cover **Tip** The steering column upper trim cover consists of both the cover AND the instrument panel cluster trim plate bezel. Do not try and separate these pieces, they are serviced as one part only.

Steering Column Lower Trim Cover Replacement



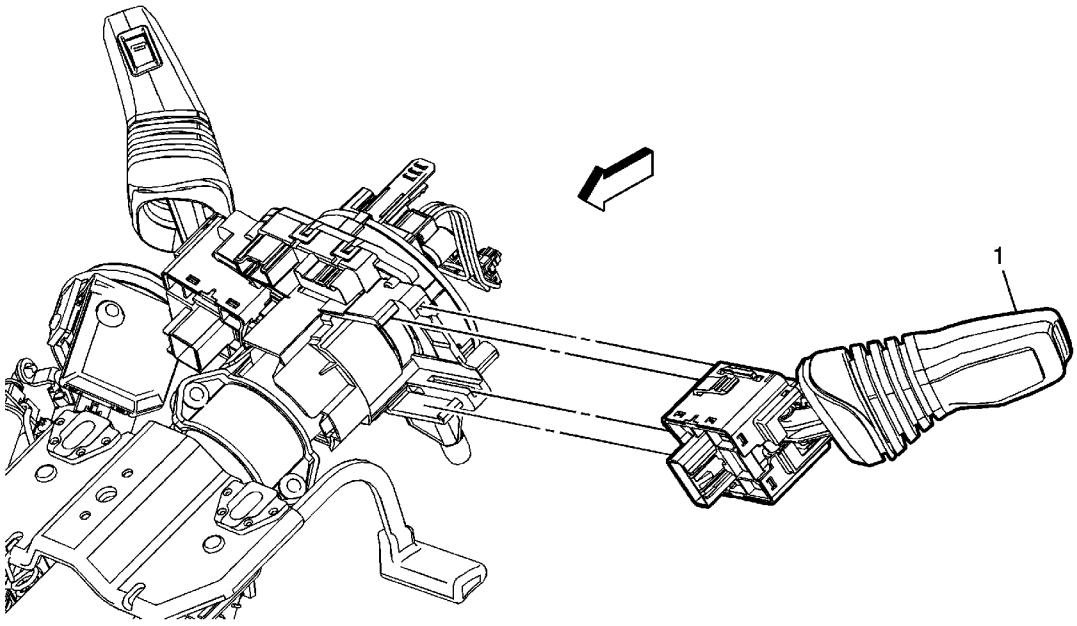
Callout	Component Name
Preliminary Procedure 1. Remove the steering wheel. Refer to Steering Wheel Replacement. 2. Remove the driver knee bolster. Refer to Driver Knee Bolster Replacement.	
1	Steering Column Lower Trim Cover Screw (Qty: 3) **Caution:** Refer to Fastener Caution in the Preface section. **Tighten** 2 N·m (18 lb in)
2	Steering Column Lower Trim Cover **Tip** The steering column lower trim cover may need to be turned slightly to maneuver it around the steering column tilt lever.

Turn Signal Switch Bracket Replacement



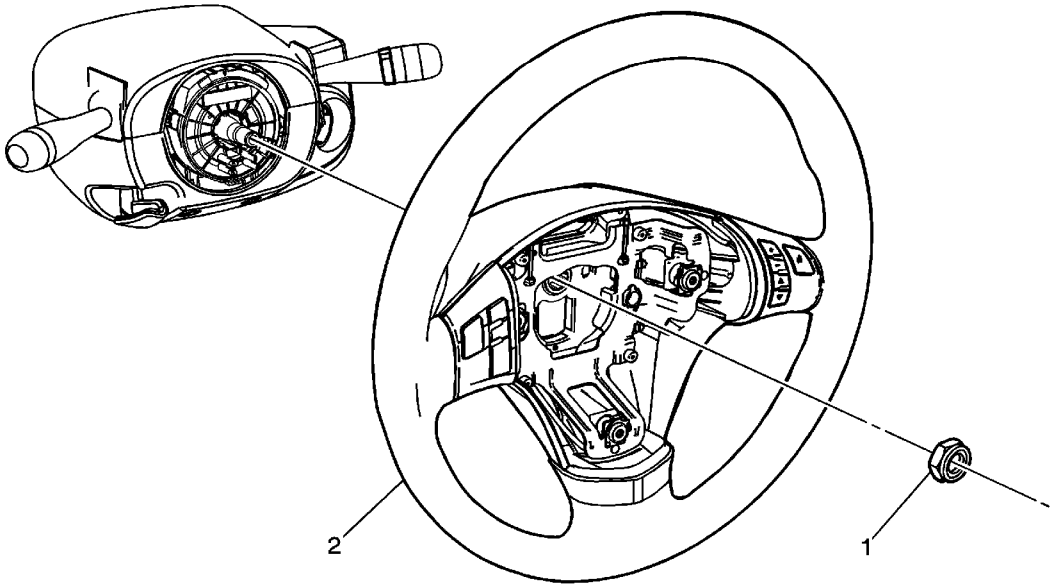
Callout	Component Name
Preliminary Procedures 1. Remove the inflatable restraint steering wheel module coil. Refer to Steering Wheel Inflatable Restraint Module Coil Replacement. 2. Remove the turn signal multifunction switch. Refer to Turn Signal Multifunction Switch Replacement. 3. Remove the windshield wiper and washer switch. Refer to Windshield Wiper and Washer Switch Replacement.	
1	Turn Signal Switch Bracket **Procedure** Release the 2 plastic retaining tabs and pull on the bracket to remove the turn signal switch bracket from the steering column.

Turn Signal Multifunction Switch Replacement



Callout	Component Name
Preliminary Procedure Remove the steering column upper trim cover. Refer to Steering Column Upper Trim Cover Replacement.	
1	Turn Signal Multifunction Switch **Procedure** 1. Disconnect any electrical connectors as needed. 2. Depress the locking tabs and pull on the turn signal multifunction switch to remove it.

Steering Wheel Replacement



Callout	Component Name
Preliminary Procedure Remove the inflatable restraint steering wheel module. Refer to Steering Wheel Inflatable Restraint Module Replacement.	
1	Steering Wheel Nut **Caution:** Refer to Fastener Caution in the Preface section. **Tighten** 41 N·m (30 lb ft)
2	Steering Wheel **Procedure** 1. Disconnect any electrical connectors as needed. 2. Remove the steering wheel using the *J 1859-A* puller and the *J 36541-A* puller legs

Special Tools

- *J 1859-A* Steering Wheel Puller
- *J 36541-A* Steering Wheel Puller Legs

Steering Column Replacement

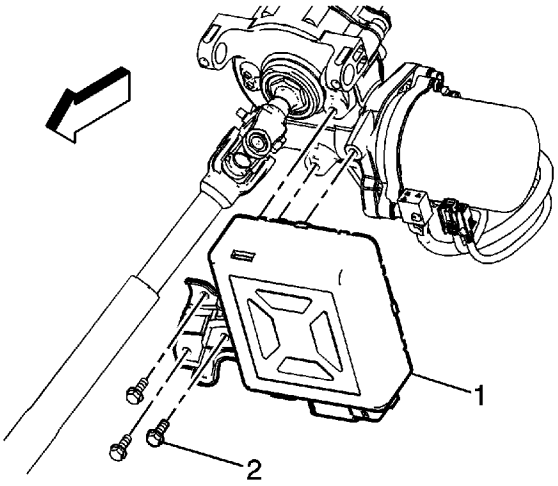
Removal Procedure

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:

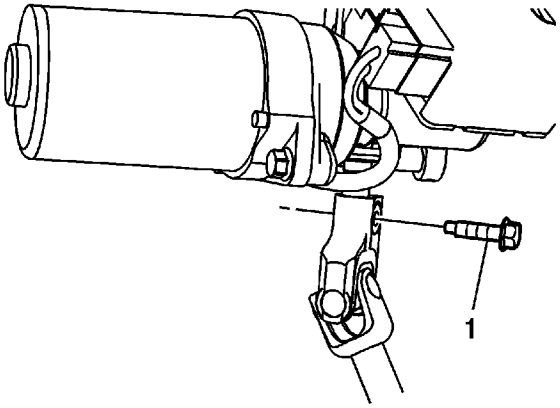
- The steering column
- The intermediate shaft
- The steering gear

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 driver knee bolster reinforcement. Refer to Driver Knee Bolster Reinforcement Replacement.
2. Remove the steering column upper trim cover. Refer to Steering Column Upper Trim Cover Replacement.
3. Disconnect any electrical connectors as needed.



4. If equipped with an electronic power steering column, remove the 3 electronic power steering motor control module bracket bolts (2) and the electronic power steering motor control module and bracket assembly (1).

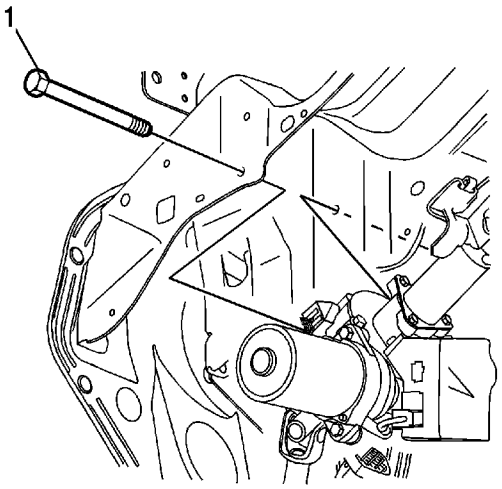


Note: Place alignment marks on the steering shaft coupling and the steering column shaft prior to removal in order to mark the correct alignment of the pieces.

5. Remove the steering shaft coupling bolt (1) at the steering column and discard it.

   An electronic power steering column is shown, a hydraulic power and two mode hybrid steering column is serviced the same way.

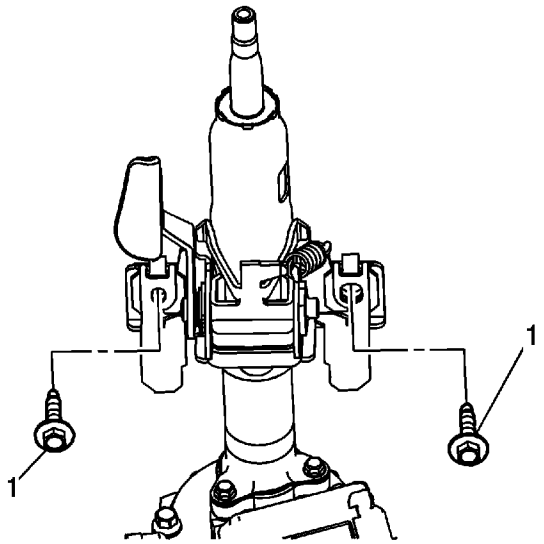
6. Separate the steering shaft coupling from the steering column.



7. Remove the steering column lower support bracket bolt (1).

   An electronic power steering column is shown, a hydraulic power and two mode hybrid

steering column is serviced the same way.



8. Remove the steering column upper support bracket bolts (1).

   An electronic power steering column is shown, a hydraulic power and two mode hybrid steering column is serviced the same way.

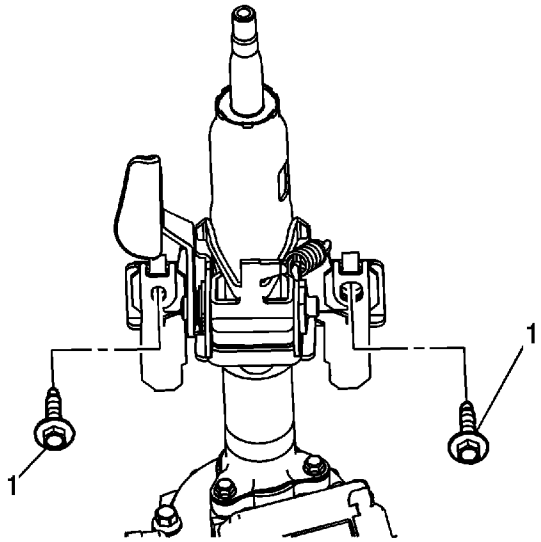
9. Remove the steering column from the vehicle and transfer any parts as needed.

Installation Procedure

Note: If replacing the steering column, failure to transfer the scribed marks may result in an off-center steering wheel.

1. If a new steering column is being installed then transfer the pre-scribed alignment marks on to the new part.
2. Position the steering column to the vehicle.

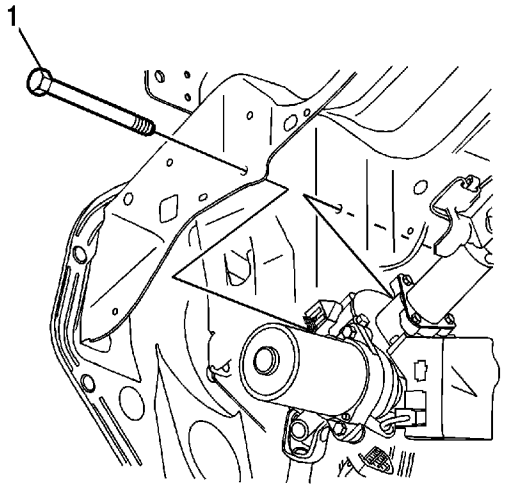
   Caution: Refer to Fastener Caution in the Preface section.



Note: Hand tighten all steering column support bracket bolts before finalizing any torques.

3. Install the steering column upper support bracket bolts (1) and tighten to **25 N·m (18 lb ft)**.

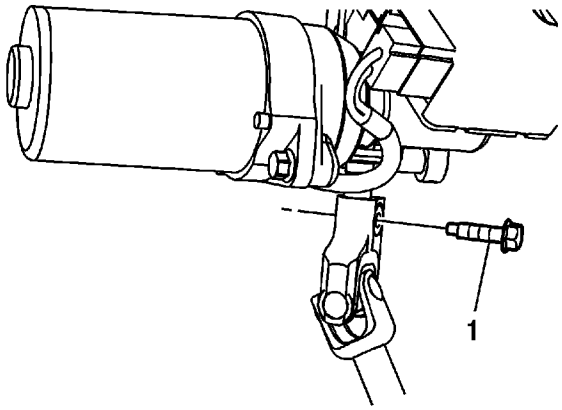
   An electronic power steering column is shown, a hydraulic power and two mode hybrid steering column is serviced the same way.



4. Install the steering column lower support bracket bolt (1) and tighten to **25 N·m (18 lb ft)**.

   An electronic power steering column is shown, a hydraulic power and two mode hybrid steering column is serviced the same way.

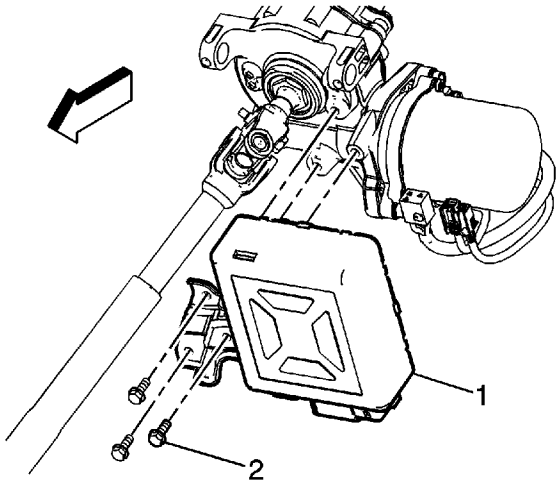
5. Align the scribed marks on the steering shaft coupling to the scribed marks on the steering column shaft and connect them.



6. Install the new steering shaft coupling bolt (1) at the steering column and tighten to **34 N·m (25 lb ft)**.

   An electronic power steering column is shown, a hydraulic power and two mode hybrid steering column is serviced the same way.

7. For vehicles with hydraulic power steering, install the new steering shaft coupling bolt at the steering column and tighten to **30 N·m (22 lb ft)**.
8. For vehicles with two mode hybrid steering, install the new steering shaft coupling bolt at the steering column and tighten to **30 N·m (22 lb ft)**.



9. If equipped with an electronic power steering column, position the electronic power steering

motor control module and bracket assembly (1).

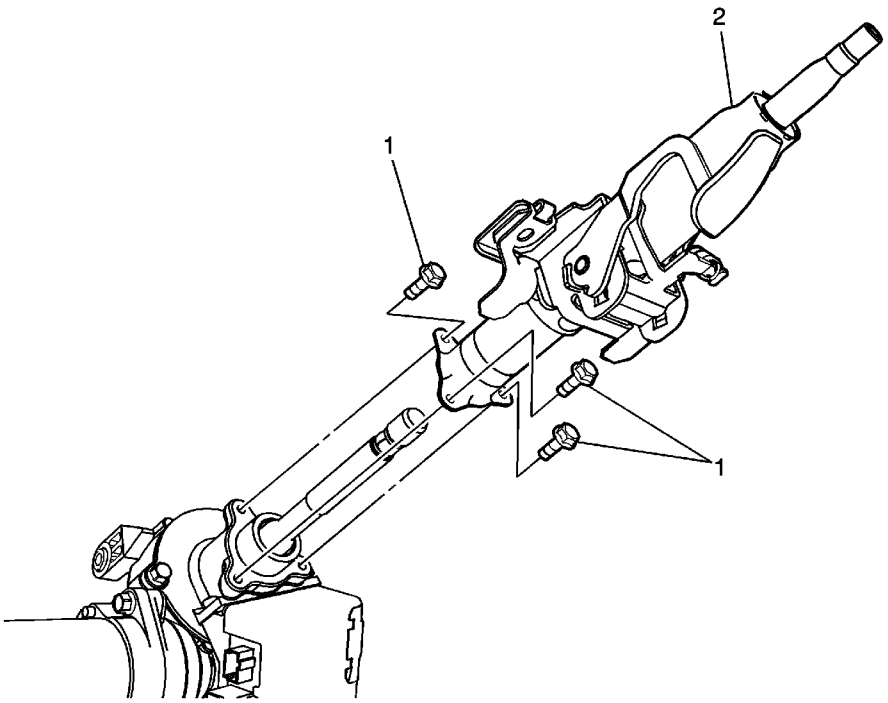
10. Install the 3 electronic power steering motor control module bracket bolts (2) and tighten to **11.5 N·m (102 lb in)**.
11. Connect any electrical connectors as needed.

Note:

- When installing a NEW service replacement electronic power steering column (non-two mode hybrid), the Saturn Service Stall (SSS) must be utilized to properly program the electronic power steering controller contained with the electronic power steering column.
- Ensure the steering wheel alignment is in the 12 o'clock position.

12. Refer to Control Module References for programming and setup information if equipped with electronic power steering.
13. Install the steering column upper trim cover. Refer to Steering Column Upper Trim Cover Replacement.
14. Install the driver knee bolster reinforcement. Refer to Driver Knee Bolster Reinforcement Replacement.

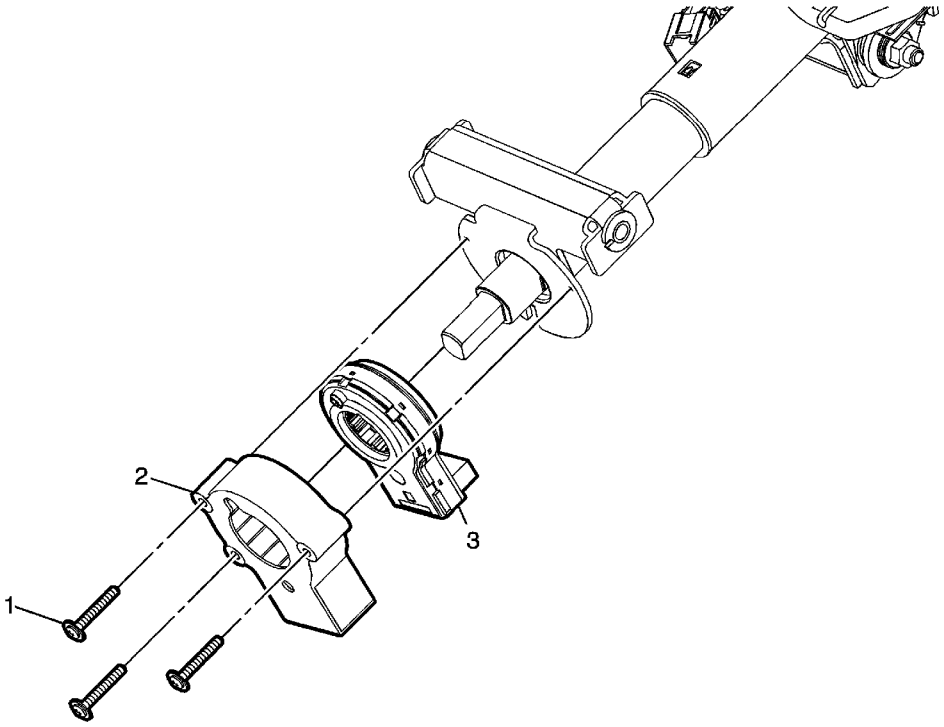
Steering Column Jacket Replacement (With Electronic Power Steering)



Callout	Component Name
Preliminary Procedure Remove the ignition and start switch housing. Refer to Ignition and Start Switch Housing Replacement.	
1	Steering Column Jacket Bolt (Qty: 3) **Caution:** Refer to Fastener Caution in the Preface section. **Tighten** 11 N·m (97 lb in)
2	Steering Column Jacket **Procedure** 1. Remove the steering column upper and lower support bracket bolts and support the steering column while in the vehicle. Refer to Steering Column Replacement.

2. Slide the steering column jacket over the steering column shaft.
3. Transfer any parts as needed.

Steering Angle Sensor Replacement (Two Mode Hybrid)



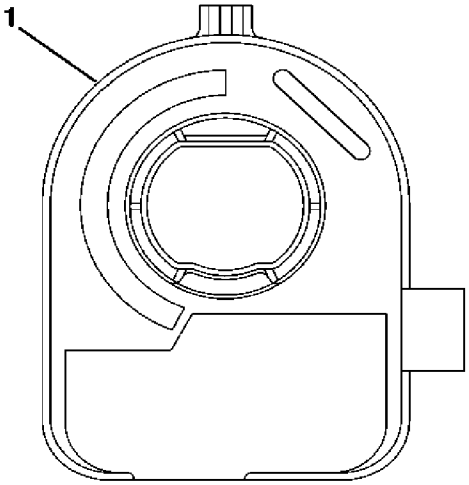
Callout	Component Name
Preliminary Procedure Remove the steering column. Refer to Steering Column Replacement.	
1	Steering Angle Sensor Cover Bolt (Qty: 3)
2	Steering Angle Sensor Cover
3	Steering Angle Sensor **Procedure** 1. Disconnect any electrical connectors as needed. 2. A new steering angle sensor will come with a pin installed in the sensor and will not need to be centered. DO NOT remove the pin until the steering angle sensor is properly seated. 3. If re-centering of the steering angle sensor is needed for any reason, refer to Steering Angle Sensor Centering.

Steering Angle Sensor Centering

Removal Procedure

Note: Identify the type of steering angle sensor from the illustrations shown BEFORE removing the sensor from the steering column. Once you have identified the steering angle sensor, follow the instructions listed in the removal procedure.

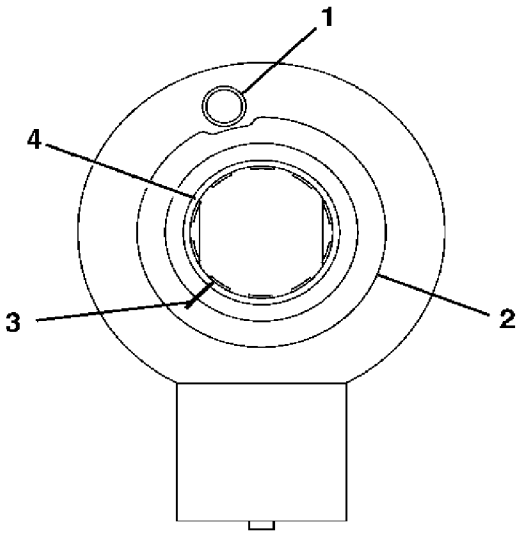
1. Verify the type of steering angle sensor.



2. From the technicians point of view of the FRONT of the sensor (1), the connector will be on the right.

Note: If you are reusing the existing sensor, you do not have to align the sensor before removal. Centering is not necessary in order to install the old sensor.

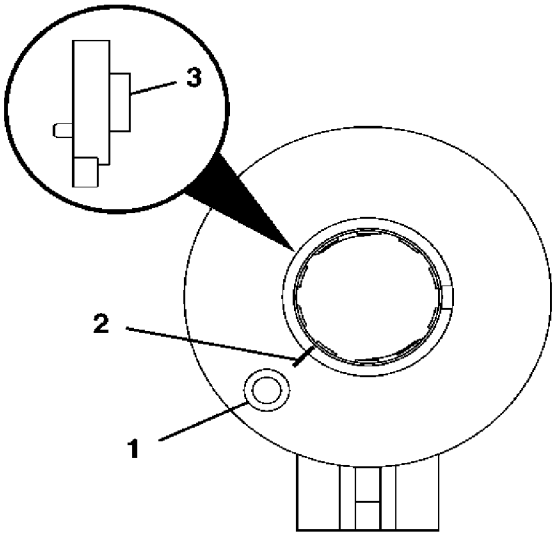
3. Remove the connector from the sensor.
4. Remove the sensor from the adapter and bearing assembly.
5. To install the sensor, proceed to step 1 in the installation procedure.



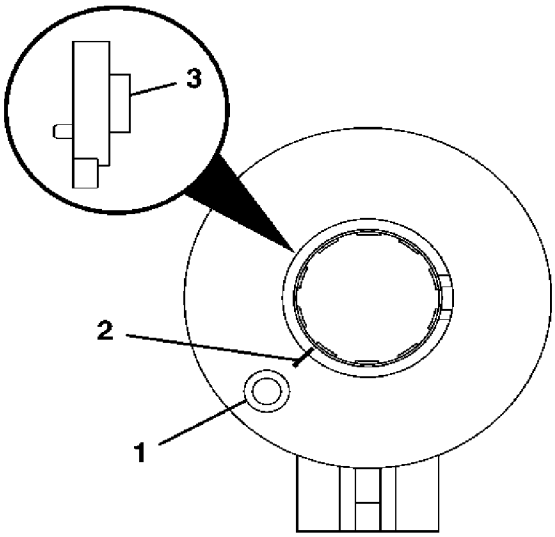
6. From the technicians point of view, the FRONT of the sensor will have:
   - A foam ring (2)
   - A pin hole (1) for the centering the pin--Note the location of the pin hole.
   - A flush rotor flange cuff (4)

   Note: If you are reusing the existing sensor, make an alignment mark (3) on the rotor flange cuff before removing the sensor. Failure to do so will cause misalignment of the old sensor. Replace a misaligned sensor with a new sensor.

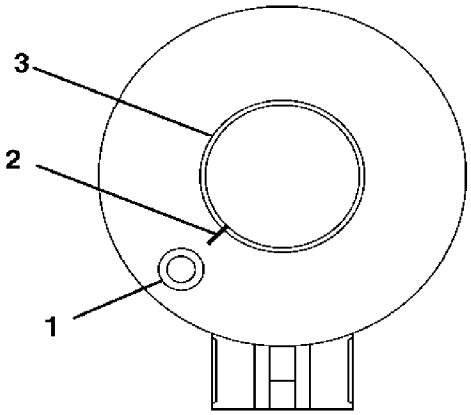
7. Make an alignment mark on the flush rotor flange cuff.
8. Remove the connector from the sensor.
9. Remove the sensor from the adapter and bearing assembly.
10. To install the sensor, proceed to step 4 in the installation procedure.



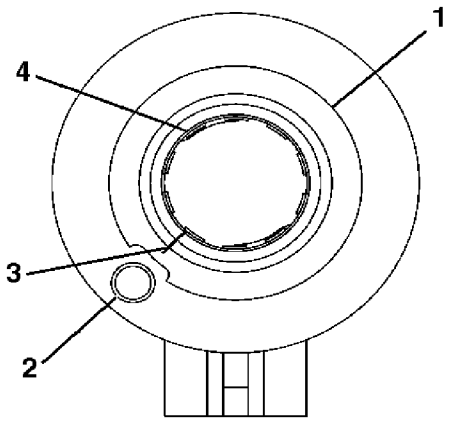
11. From the technicians point of view, the FRONT of the sensor will have:
    - A raised rotor flange cuff (3)
    - An alignment mark (2) on the rotor flange cuff for installation
    - A pin hole (1) for the centering pin--Note the location of the pin hole.
12. Remove the connector from the sensor.
13. Remove the sensor from the adapter and bearing assembly.
14. To install the sensor, proceed to step 8 in the installation procedure.



15. From the technicians point of view, the FRONT of the sensor will have:
    - A raised rotor flange cuff (3)
    - An alignment mark (2) on the rotor flange cuff for installation
    - A pin hole (1) for the centering pin--Note location of the pin hole.
    - A sensor clip in FRONT of the sensor
16. Remove the connector from the sensor.
17. Remove the sensor clip from the sensor.
18. Remove the sensor from the adapter and bearing assembly.
19. To install the sensor, proceed to step 12 in the installation procedure.



20. From the technicians point of view, the FRONT of the sensor will have:
    - A flush rotor flange cuff (3)
    - A pin hole (1) for the centering pin--Note the location of the pin hole.
    - An alignment mark (2) on the flush rotor flange cuff for installation
21. Remove the connector from the sensor.
22. Remove the sensor from the adapter and bearing assembly.
23. To install the sensor, proceed to step 16 in the installation procedure.

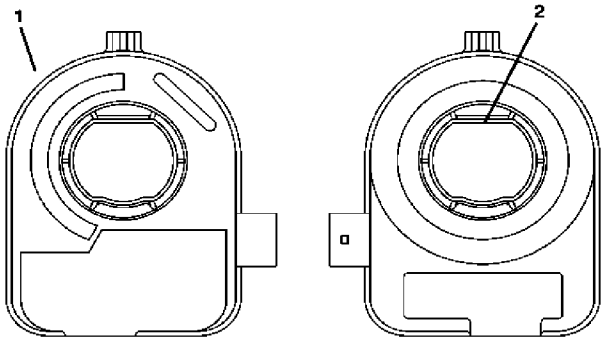


24. From the technicians point of view, the FRONT of the sensor will have:
    - A flush rotor flange cuff (4)
    - A pin hole (2) for the centering pin--Note the location of the pin hole.
    - An alignment mark (3) on the flush rotor flange cuff for installation

- A foam ring (1)

25. Remove the connector from the sensor.
26. Remove the sensor from the adapter and bearing assembly.
27. To install the sensor, proceed to step 20 in the installation procedure.

Installation Procedure



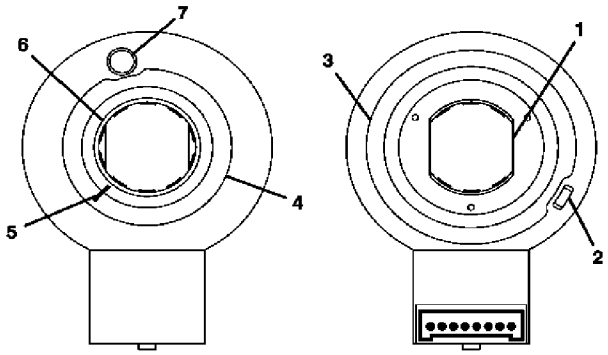
Note: If you are reusing the existing sensor, centering of the old sensor is not necessary.

If you are installing a new sensor, the new sensor will come with a pin. Do not remove the pin until the sensor is seated.

1. From the technicians point of view of the FRONT of the sensor (1), the connector will be on your right.

   From the technicians point of view of the BACK of the sensor (2), the connector will be on your left.

2. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install the sensor to the adapter and bearing assembly.
3. Install the connector to the sensor.

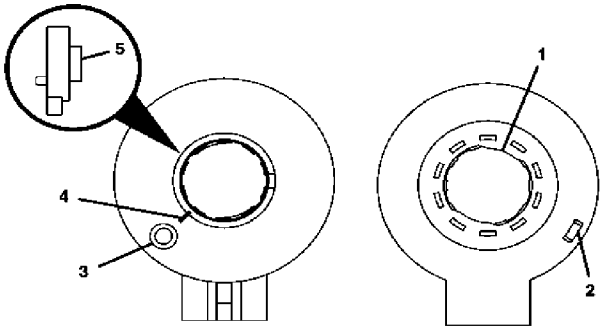


4. From the technicians point of view, the FRONT of the sensor will have:
   - A foam ring (4)
   - A pin hole (7) for the centering pin--Note the location of the pin hole.
   - A flush rotor flange cuff (6)
   - An alignment mark (5) for installation
5. From the technicians point of view, the BACK of the sensor will have:
   - Double D flats (1)
   - A foam ring (3)
   - An alignment tab (2) for installing the sensor to the adapter and bearing assembly
   - A view of the inside of the connector

   Note: If you are reusing the existing sensor, align the marks on the flush rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

   If you are installing a new sensor, the new sensor will come with a pin. Do not remove the pin until the sensor is seated. If the pin is not installed in the sensor, order a new sensor.

6. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install the sensor to the adapter and bearing assembly.
7. Install the connector to the sensor.

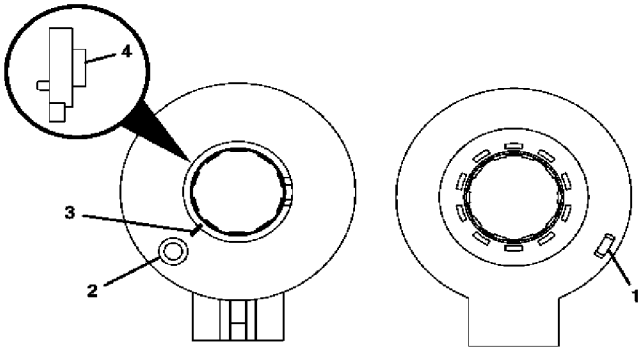


8. From the technicians point of view, the FRONT of the sensor will have:
   - A pin hole (3) for the centering pin--Note location of the pin hole.
   - A raised rotor flange cuff (5)
   - An alignment mark (4) for installation
9. From the technicians point of view, the BACK of the sensor will have:
   - Double D flats (1)
   - An alignment tab (2) for installing the sensor to the adapter and bearing assembly

Note: If you are reusing the existing sensor, align the marks on the raised rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

If you are installing a new sensor, the new sensor will come with a pin. Do not remove the pin until the sensor is seated. If the pin is not installed in the sensor, order a new sensor.

10. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install the sensor to the adapter and bearing assembly.
11. Install the connector to the sensor.

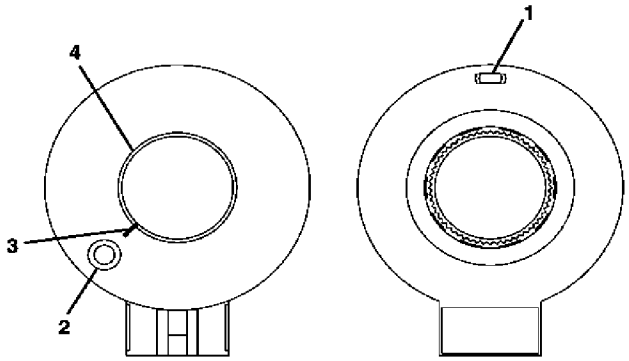


12. From the technicians point of view, the FRONT of the sensor will have:
    - A pin hole (2) for the centering pin--Note the location of the pin hole.
    - A raised rotor flange cuff (4)
    - An alignment mark (3) for installation
13. From the technicians point of view, the BACK of the sensor will have an alignment tab (1) for installation. This sensor does not have double D flats.

    Note: If you are reusing the existing sensor, align the marks on the raised rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

    If you are installing a new sensor, the new sensor will come with a pin. Do not remove the pin until the sensor is seated. If the pin is not installed in the sensor, order a new sensor.

14. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install the sensor to the adapter and bearing assembly.
15. Install the connector to the sensor.

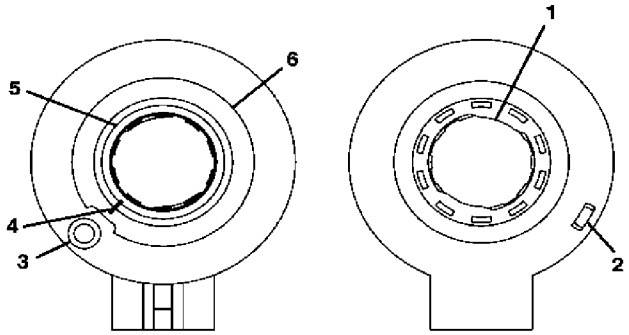


16. From the technicians point of view, the FRONT of the sensor will have:
    - A pin hole (2) for the centering pin--Note the location of the pin hole.
    - A flush rotor flange cuff (4)
    - An alignment mark (3) for installation
17. From the technicians point of view, the BACK of the sensor will have an alignment tab (1) for installation. This sensor does not have double D flats.

    Note: If you are reusing the existing sensor, align the marks on the flush rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

    If you are installing a new sensor, the new sensor will come with a pin. Do not remove the pin until the sensor is seated. If the pin is not installed in the sensor, order a new sensor.

18. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install the sensor to the adapter and bearing assembly.
19. Install the connector to the sensor.



20. From the technicians point of view, the FRONT of the sensor will have:
    - A pin hole (3) for the centering pin--Note location of the pin hole.
    - A flush rotor flange cuff (5)
    - An alignment mark (4) for installation
    - A foam ring (6)
21. From the technicians point of view, the BACK of the sensor will have:
    - Double D flats (1)
    - An alignment tab (2) for installing the sensor to the adapter and bearing assembly

Note: If you are reusing the existing sensor, align the marks on the flush rotor flange cuff before installation. The alignment mark must stay aligned until the sensor is seated into the adapter and bearing assembly.

If you are installing a new sensor, the new sensor will come with a pin. Do not remove the pin until the sensor is seated. If the pin is not installed in the sensor, order a new sensor.

22. Looking at the FRONT of the sensor, align the sensor with the steering shaft and install the sensor to the adapter and bearing assembly.
23. Install the connector to the sensor.