

Steering Shaft Torque Sensor Replacement

Special Tools

- GE-45126-5 Snap Ring Pliers Adapters
- J-45126 Snap Ring Pliers

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

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

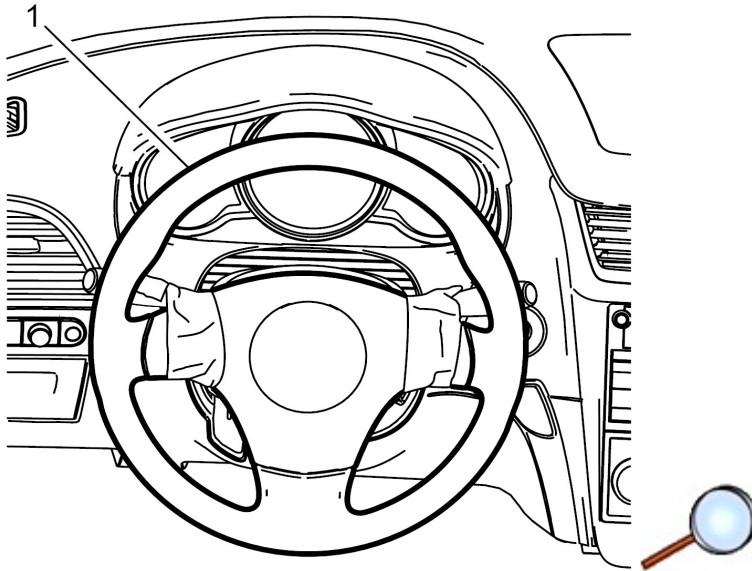
After disconnecting these components, do not rotate the steering wheel or move the front tires and wheels. Failure to follow this procedure may cause the SIR coil assembly to become un-centered and cause possible damage to the SIR coil. If you think the SIR coil has become un-centered, refer to your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

Caution: Once the steering column is removed from the vehicle, the column is extremely susceptible to damage. Dropping the column assembly on the end could collapse the steering shaft or loosen the plastic injections, which maintain column rigidity. Leaning on the column assembly could cause the jacket to bend or deform. Any of the above damage could impair the columns collapsible design. Do NOT hammer on the end of the shaft, because hammering could loosen the plastic injections, which maintain column rigidity. If you need to remove the steering wheel, refer to the Steering Wheel Replacement procedure in this section.

Removal Procedure

Caution: Refer to [SIR Caution](#).

1. Disable the supplemental inflatable restraint (SIR) system. Refer to [SIR Disabling and Enabling](#).
2. Remove the driver knee bolster bracket. Refer to [Driver Knee Bolster Bracket Replacement](#).
3. Rotate the steering wheel a small amount in both directions to relieve the steering system of any load.

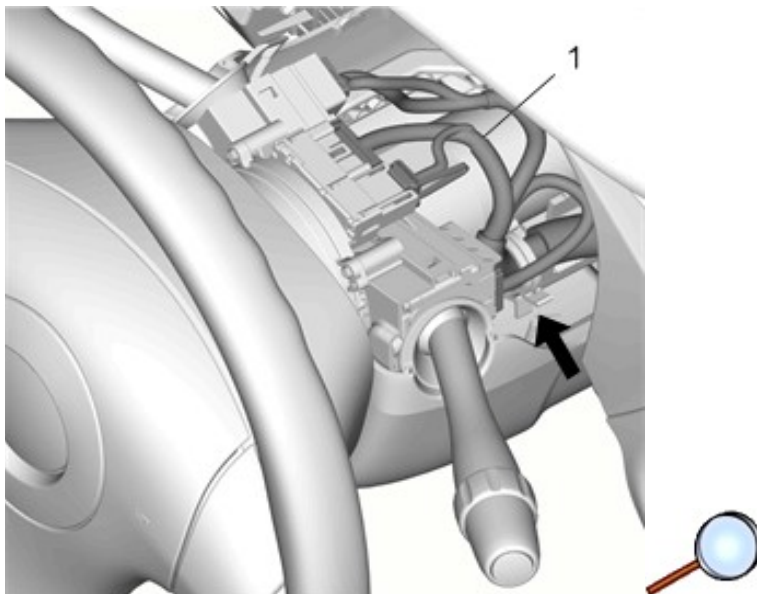


Note: Preventing the steering wheel from rotating with masking tape will protect the supplemental inflatable restraint (SIR) coil and will aid in the reassembly of the upper and lower steering column jackets.

4. Install enough masking tape around the steering wheel (1) and the turn signal and windshield wiper and washer switches to prevent the steering wheel from rotating during removal of the upper steering column jacket.

Note: On some applications, the steering column upper trim cover is attached to the instrument panel cluster trim plate bezel. Complete trim cover removal is NOT required, reposition the cover out of way.

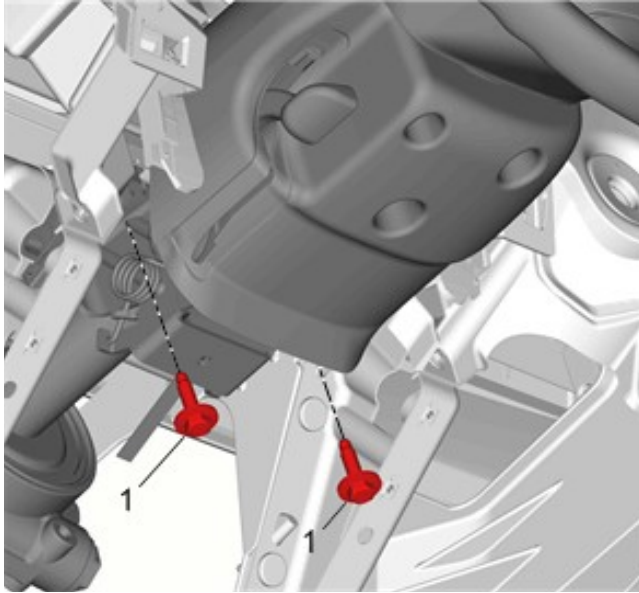
5. Remove or disengage the steering column upper trim cover (1) from the steering column lower trim cover. Refer to [Steering Column Trim Cover Replacement](#).



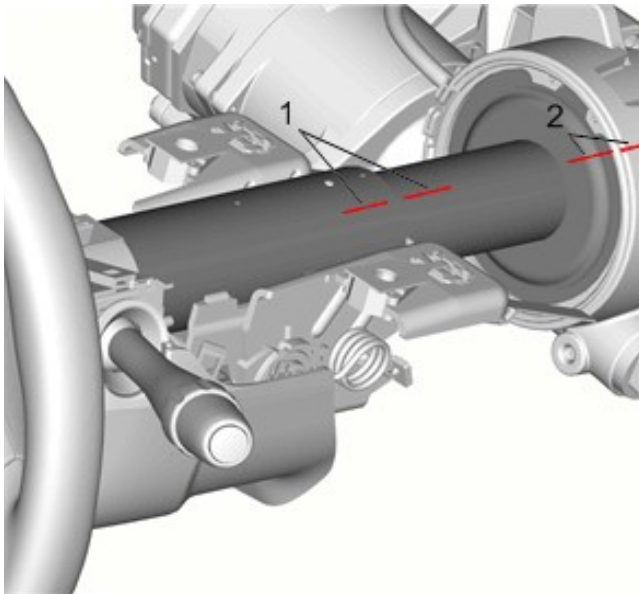
6. Disconnect any electrical connectors (1) from the steering column as necessary to remove the upper steering column jacket from the vehicle.

Note: Do NOT disconnect the brake pedal adjuster actuator cable.

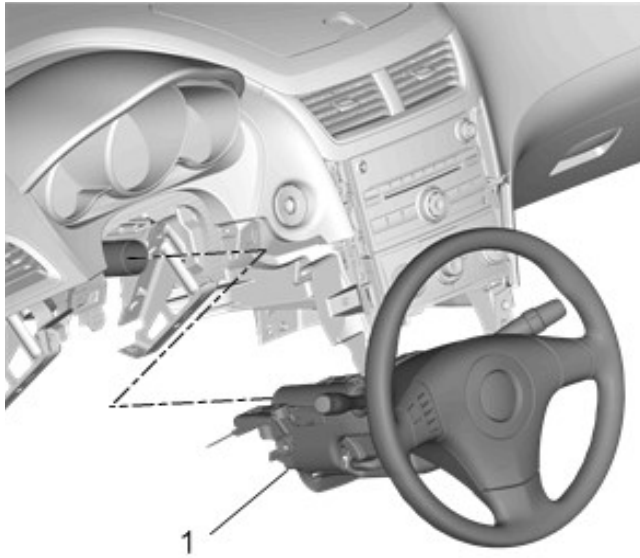
7. If equipped with adjustable pedals, remove the adjustable pedal bracket assembly and reposition the assembly leaving the brake pedal cable and motor attached. Refer to [Accelerator Pedal Bracket Replacement](#).



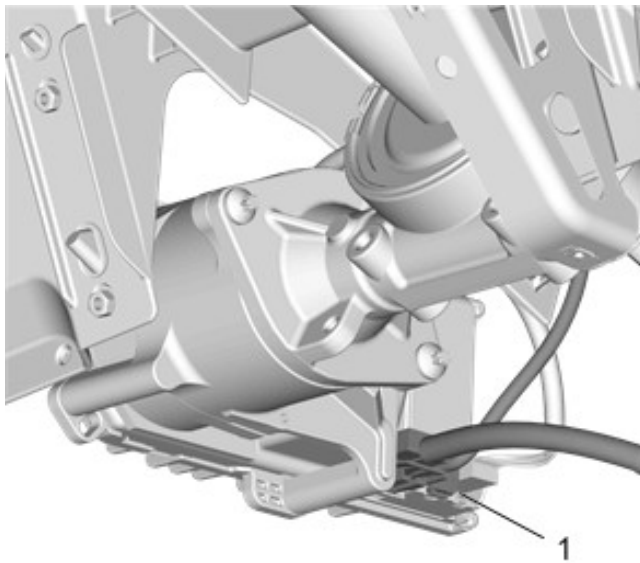
8. Remove the steering column upper bolts (1).



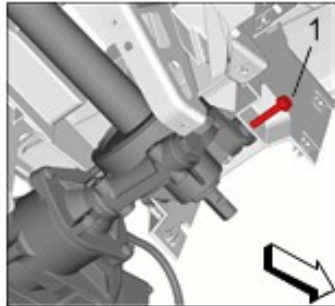
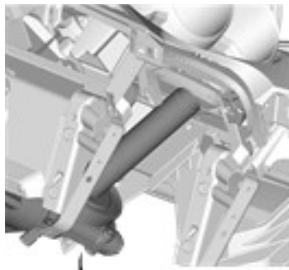
9. Lower the steering column and place match marks on the upper steering column jacket and the lower steering column jacket (1) and the lower steering column jacket, snap ring and lower steering column housing (2) to aid in alignment of the steering column's splined shafts during reassembly.



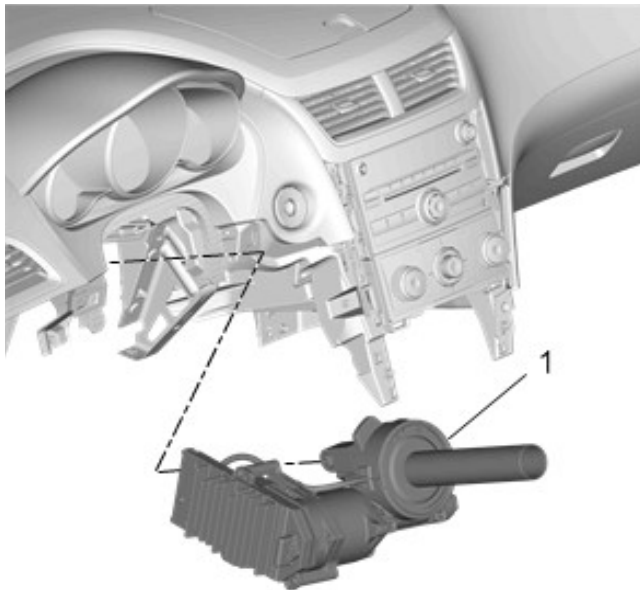
10. With the steering column fully assembled, remove the upper steering column jacket (1) from the lower steering column jacket and vehicle.
11. Disconnect the intermediate steering shaft from the steering column. Refer to [Intermediate Steering Shaft Replacement](#).



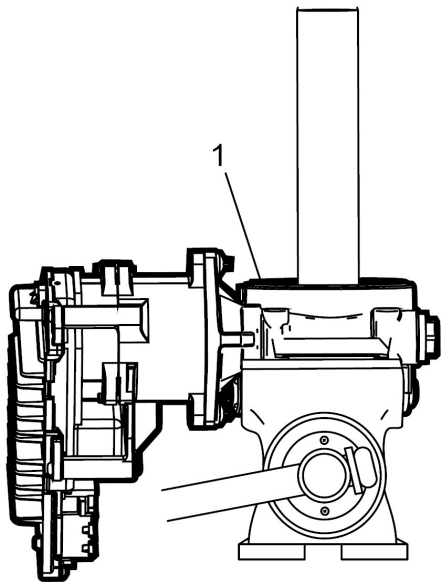
12. Disconnect any electrical connectors from the lower steering column and motor assembly as necessary to remove the lower steering column jacket from vehicle.



13. Remove the lower steering column pivot bolt (1).

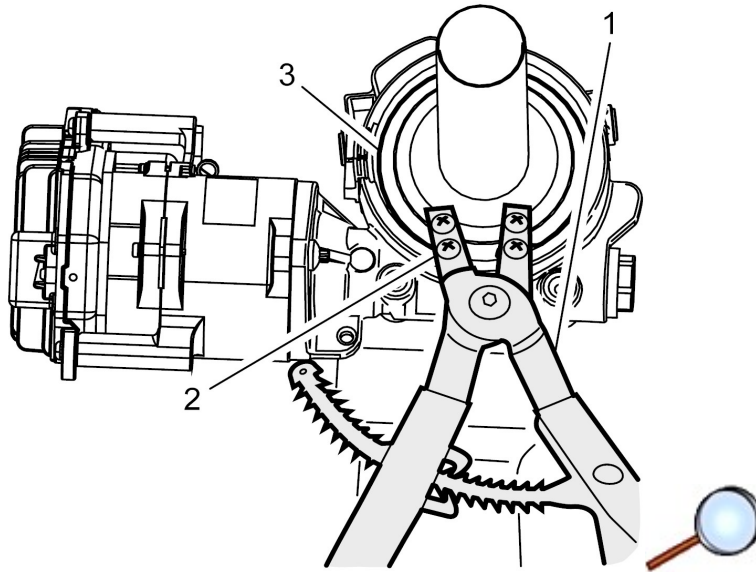


14. Remove the lower steering column jacket and motor assembly (1) from the vehicle.



Note: Do NOT clamp onto the lower steering column jacket when positioning the lower steering column jacket and motor assembly in the vise. Only secure the assembly in a vise around the lower steering column housing as shown. Only tighten the vise enough to secure the housing, do not overtighten.

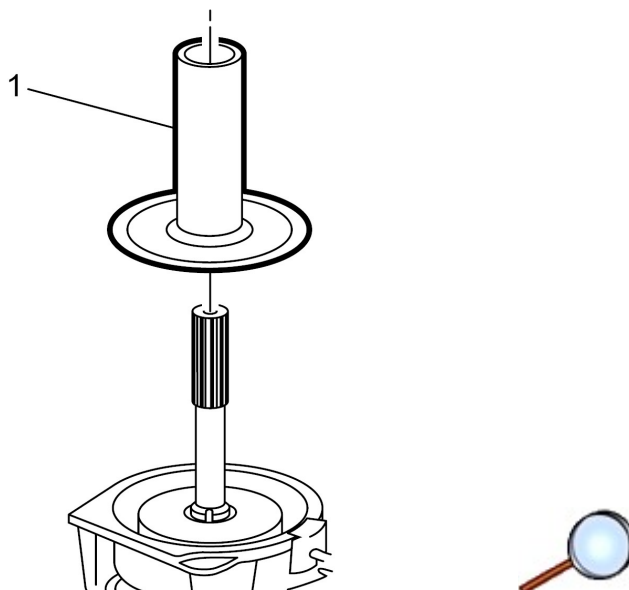
15. Place the lower steering column housing (1) in a vise with the snap ring ears facing the technician.



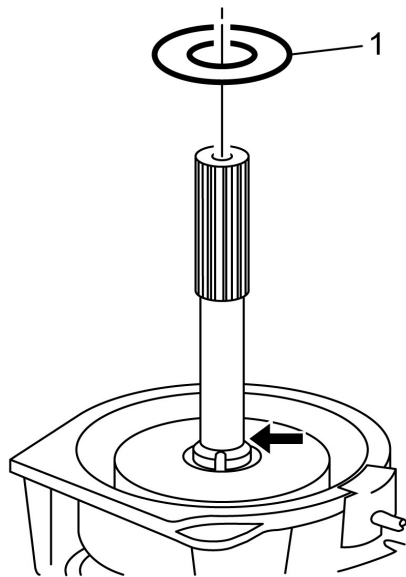
Warning: Removal or installation of the snap ring requires use of J-45126 and adapter GE-45126-5 snap ring pliers, using any tool other than J-45126 and adapter GE-45126-5 may result in personal injury. For your safety, always wear safety glasses when using J-45126 and adapter GE-45126-5. Failure to do so may result in personal injury.

Warning: Do not use GE-45126-5 tips with J-45126 snap ring pliers for any service procedure other than Steering Shaft Torque Sensor Replacement (Electronic Power Steering). Using J-45126 and adapter GE-45126-5 for any other service procedure may result in personal injury.

16. Use the J-45126 pliers (1) and the GE-45126-5 adapters (2) to remove the snap ring (3) from the lower steering column housing.

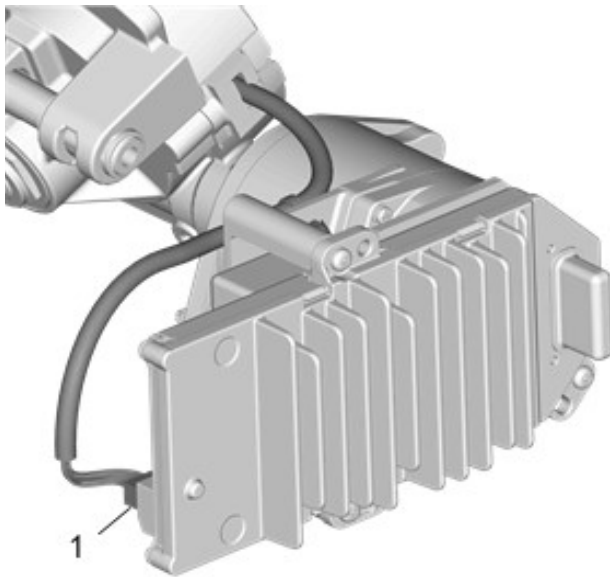


17. Remove the lower steering column jacket (1) from the lower steering column shaft and housing.

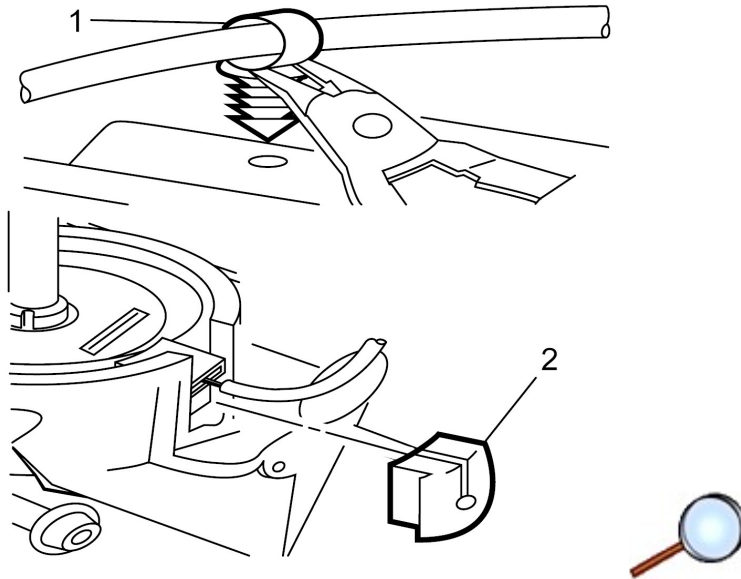


Note: The felt ring washer is a NEW part and is not included in the original steering column assembly.

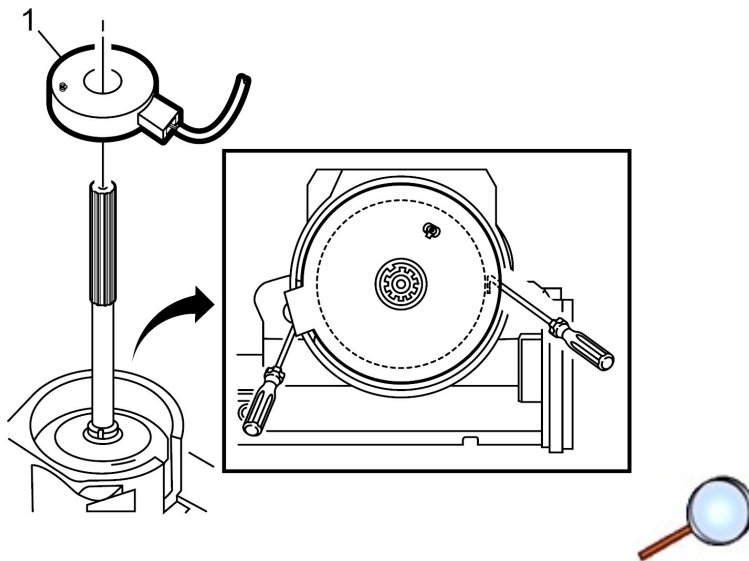
18. If equipped, remove the felt ring washer (1) from the lower steering column shaft and housing.



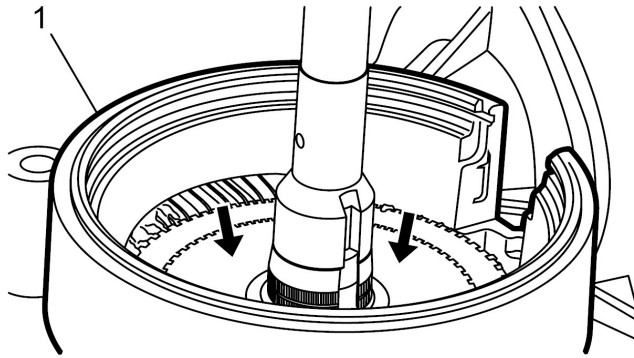
19. Release the lock tab on the steering shaft torque sensor electrical connector (1) and disconnect the sensor from the steering column module.



20. Remove the steering shaft torque sensor wiring harness clip (1) from the steering column module bracket and remove the wiring harness seal (2).



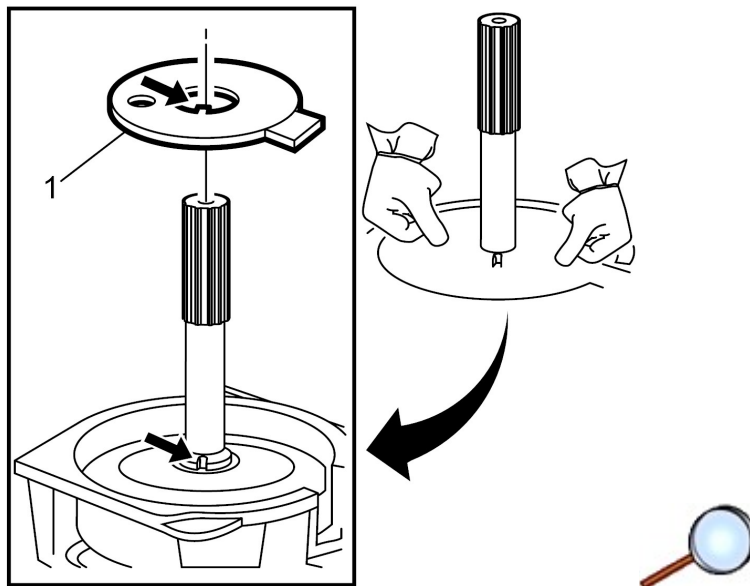
21. Use a flat bladed screwdriver under the tab of the steering shaft torque sensor (1) and a pick on the opposite side to carefully pry up and remove the sensor from the lower steering column housing.



Note: Leave the grease in the lower steering column housing. Adding additional grease is NOT necessary.

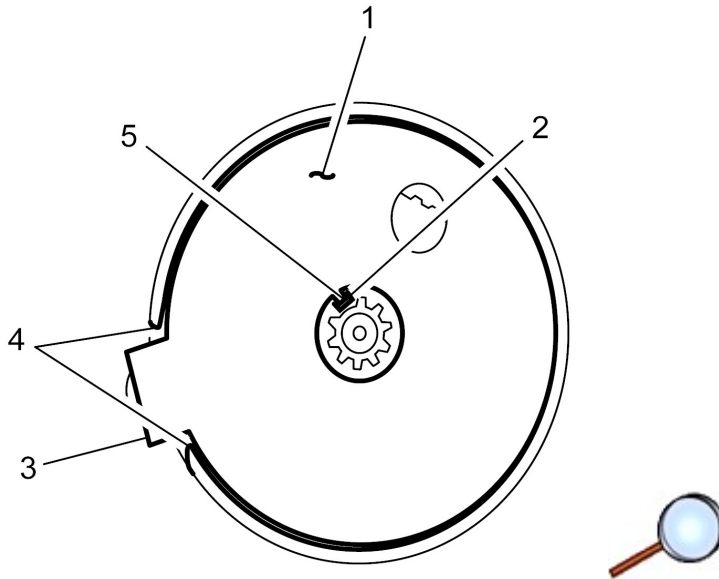
22. Inspect the steering shaft torque sensor cavity in the lower steering column housing (1) for debris. If debris is present, remove the debris carefully with a pick tool or needle nose pliers. Also inspect the steering column shaft slot (keyway) for any visible damage.

Installation Procedure



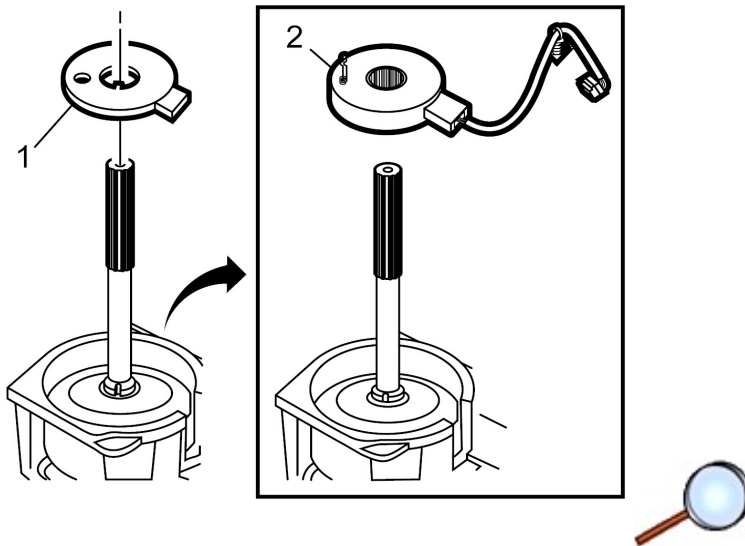
Note: You MUST align the alignment tool spline key to the slot (keyway) in the lower steering column shaft and the tab on the alignment tool to the cutout in the lower steering column housing. This aligns the lower shaft to the lower housing to assist in the installation of the NEW steering shaft torque sensor. It may be necessary to rotate the lower shaft slightly for the alignment tool to drop into the lower housing.

1. Install the supplied alignment tool (1), with the flat side of the tool facing up, over the lower steering column shaft and into the lower steering column housing.



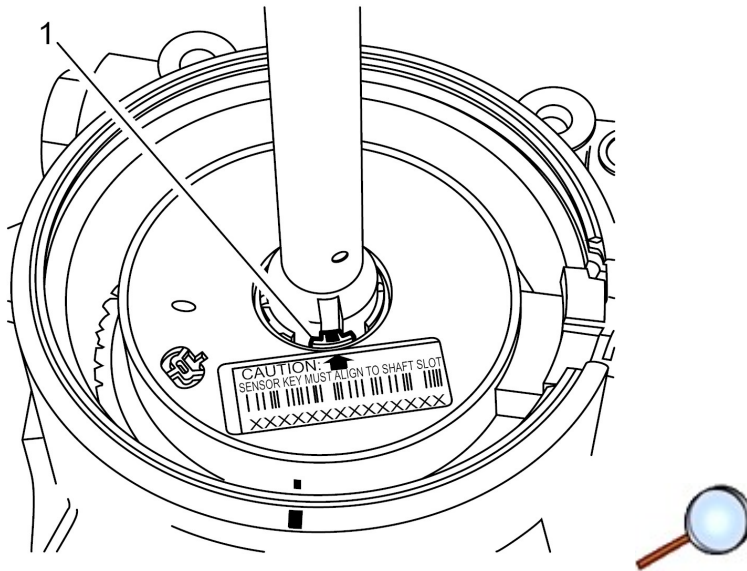
Note: Ensure the alignment tool spline key is centered in the lower steering column shaft slot (keyway). The tool should move freely and not bind against the lower shaft or lower housing.

- Using the alignment tool (1), ensure the spline key on the alignment tool (5) and the slot (keyway) (2) in the lower steering column shaft and the tab on the alignment tool (3) and the lower steering column housing cutout (4) are aligned. If aligned correctly, the tool will be fully seated in the lower housing and will not bind against the lower shaft or lower housing.



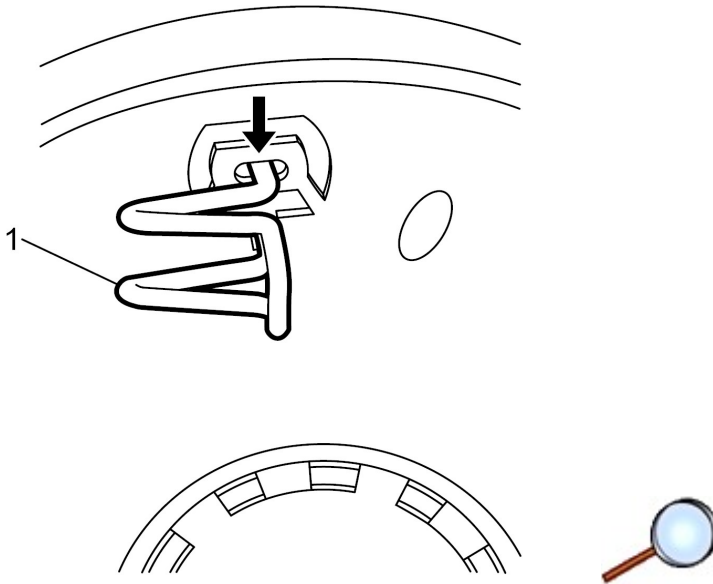
Warning: Ensure the spline key on the sensor does not get damaged during installation or injury may result. Make sure that the spline key is centered in the steering column shaft slot keyway before seating sensor on to steering column shaft. If Spline key is damaged or missing, discard sensor and replace with new sensor.

- Remove the alignment tool (1) and place the steering shaft torque sensor (2) over the lower steering column shaft and into the lower steering column housing.

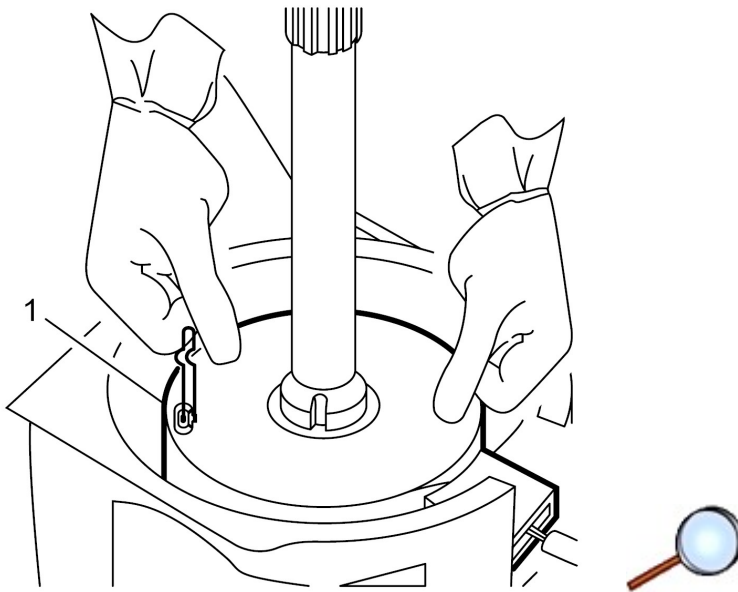


Note: While handling the steering shaft torque sensor, verify the orientation of the spline key. The spline key is marked with a paint dot and an arrow label.

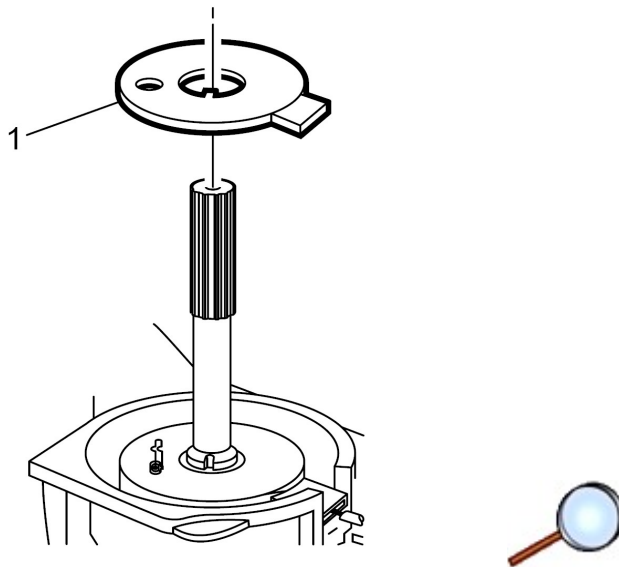
4. Ensure the steering shaft torque sensor (1) is oriented with the labels and steel alignment pin facing upward. Also ensure the spline key and tab on the steering shaft torque sensor are aligned to the lower steering column shaft and lower steering column housing before seating the sensor.



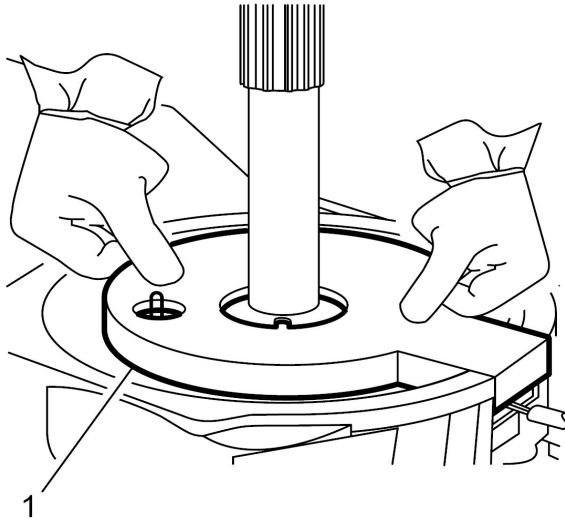
5. Before partially seating the steering shaft torque sensor onto the lower steering column shaft, ensure the steering shaft torque sensor alignment pin (1) is centered in the slot. If the pin is shifted to either side of the slot, slightly rotate the lower steering column shaft until the pin is in the center of the slot as shown.



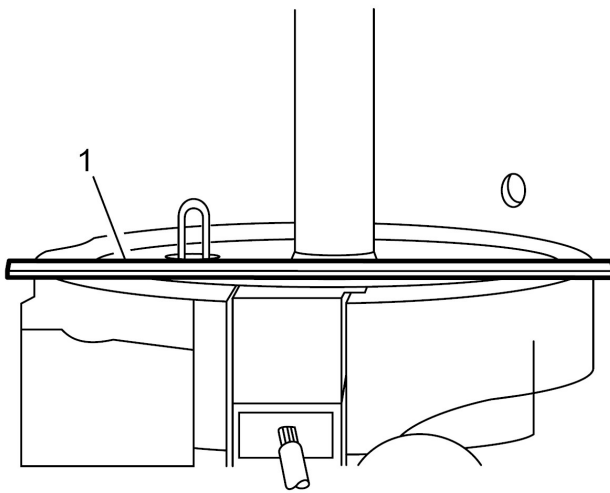
6. With the steering shaft torque sensor alignment pin centered in the slot, place your thumbs on each side of the steering shaft torque sensor (1) and gently push down on the sensor to partially seat it onto the lower steering column shaft and into the lower steering column housing. The torque sensor should be recessed into the lower housing approximately **3.2 mm (0.125 in)**. The next step will fully seat the torque sensor into position.



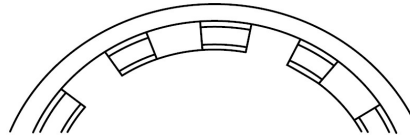
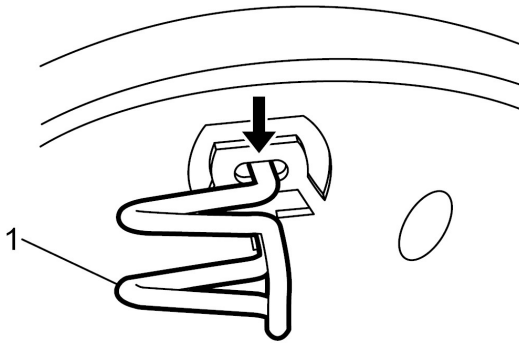
7. Reinstall the alignment tool (1) onto the lower steering column shaft and into the lower steering column housing to ensure the steering shaft torque sensor is fully seated and the torque sensor is aligned to the lower shaft.



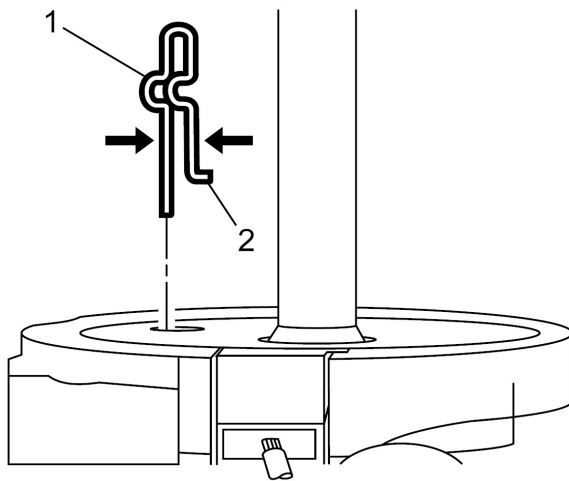
8. With the alignment tool (1) properly aligned with the lower steering column shaft slot and lower steering column housing cutout, press down on the tool to complete the seating of the steering shaft torque sensor.



9. Place a ruler (or straight edge) (1) over the lower steering column housing and alignment tool to confirm that the steering shaft torque sensor is properly seated. The tool should be flush with or slightly below the lower housing and the ruler (or straight edge) should not rock.

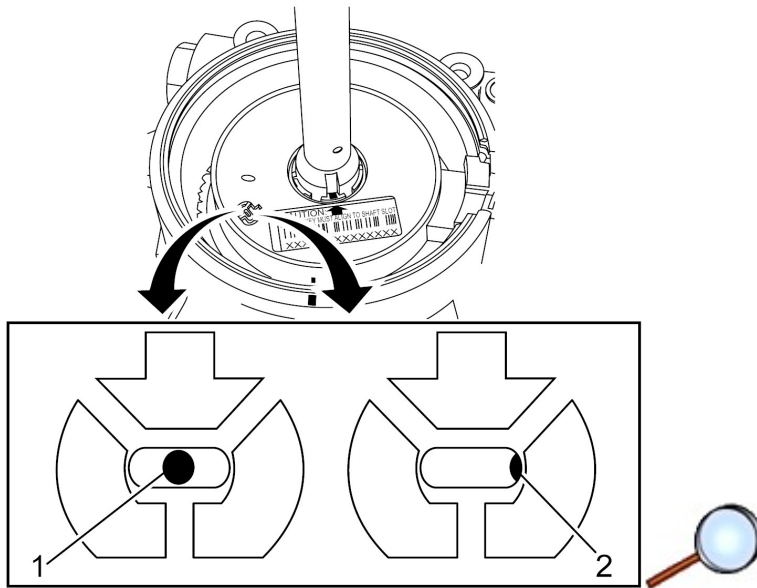


10. With the alignment tool still installed, ensure the steering shaft torque sensor alignment pin (1) is centered in the slot in the steering shaft torque sensor before removing the pin. If the pin is shifted to either side of the slot, slightly rotate the lower steering column shaft until the pin is in the center of the slot as shown.

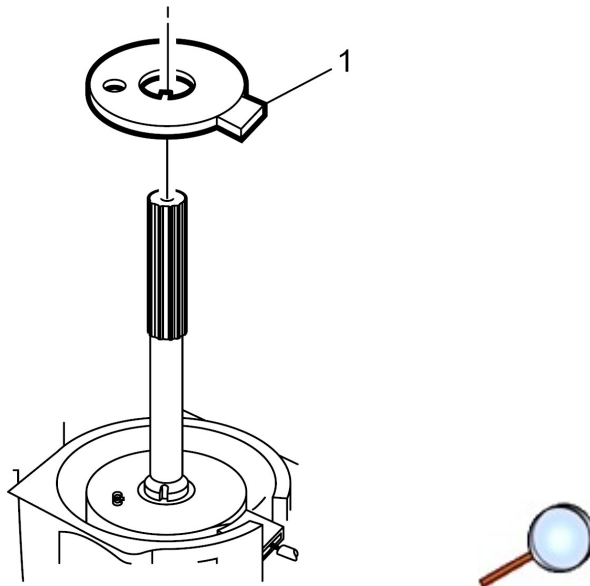


Note: The steering shaft torque sensor alignment pin has a hook on one end of the pin. Ensure the hook on the pin clears the sensor housing while removing and the sensor remains centered. The pin should NOT have any resistance during removal.

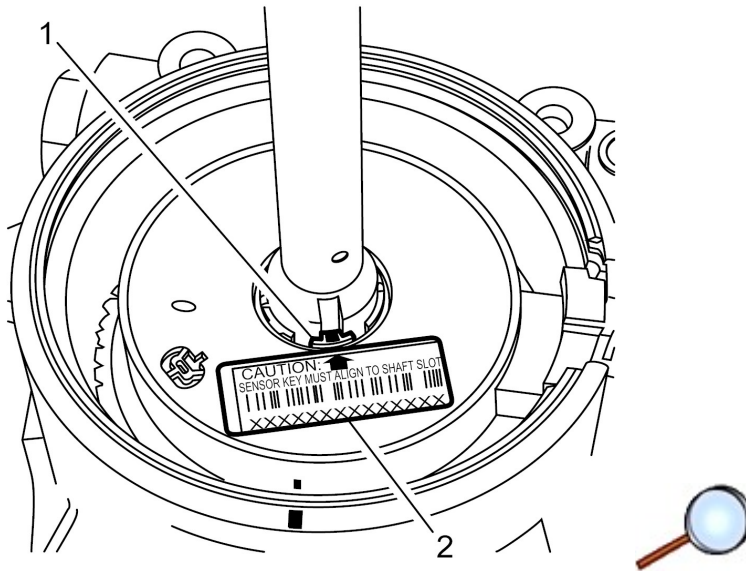
11. While holding the alignment tool in position, squeeze and remove the steering shaft torque sensor alignment pin (1) from the steering shaft torque sensor. Ensure the hook (2) on the pin clears the sensor.



12. Verify that the alignment pin hole in the steering shaft torque sensor is completely visible within the alignment slot after alignment pin removal:
 - 12.1. If the alignment pin hole (1) is completely visible, continue with the installation procedure.
 - 12.2. If the alignment pin hole (2) is NOT completely visible, remove and DISCARD the torque sensor. Install a NEW torque sensor and repeat steps 1 to 11 of the installation procedure.

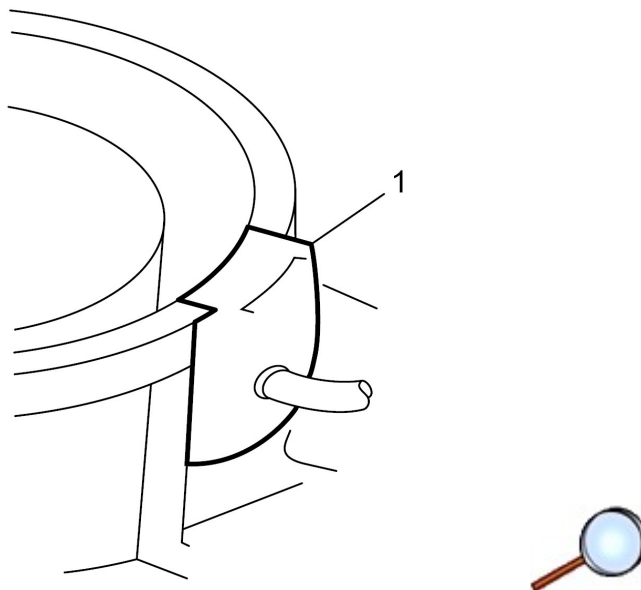


13. Remove the alignment tool (1) from the lower steering column housing and lower steering column shaft.

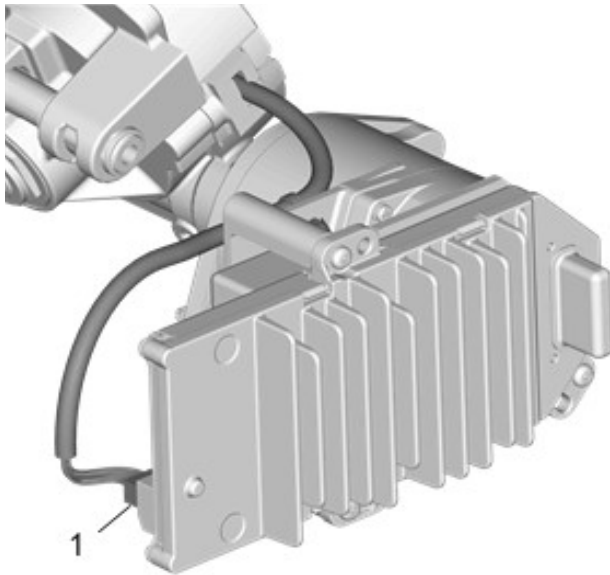


Warning: Ensure the spline key on the sensor does not get damaged during installation or injury may result. Make sure that the spline key is centered in the steering column shaft slot keyway before seating sensor on to steering column shaft. If Spline key is damaged or missing, discard sensor and replace with new sensor.

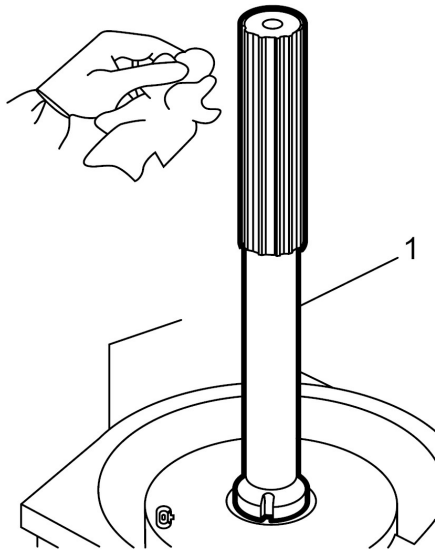
14. Check to ensure that the steering shaft torque sensor spline key (1) is in the lower steering column shaft slot before installing the lower steering column jacket. The torque sensor spline key has a paint dot on it to aid in identification. If the torque sensor spline key is missing, it means the spline key broke off during the assembly process and the torque sensor is damaged and MUST be replaced. If the torque sensor spline key is not missing, continue to next step.
15. Document the last 9 digits of the NEW steering shaft torque sensor on the vehicle repair order. The serial number is located on the bottom of the caution label (2).



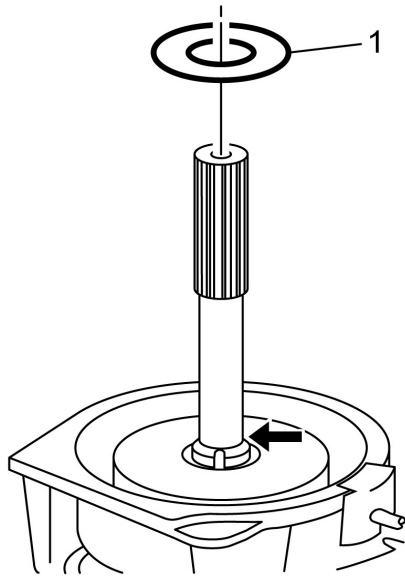
16. Install the NEW steering shaft torque sensor wiring harness seal (1) and connect the wiring harness clip in the steering column module bracket.



17. Connect the steering shaft torque sensor electrical connector (1) to the steering column module and install the lock tab.

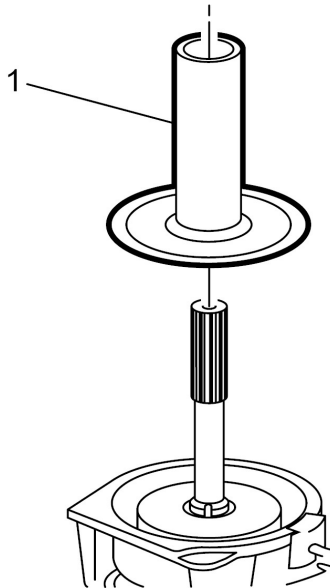


18. Carefully clean the lower steering column shaft (1) to ensure the lower shaft is dry and free of oil or any other contamination.

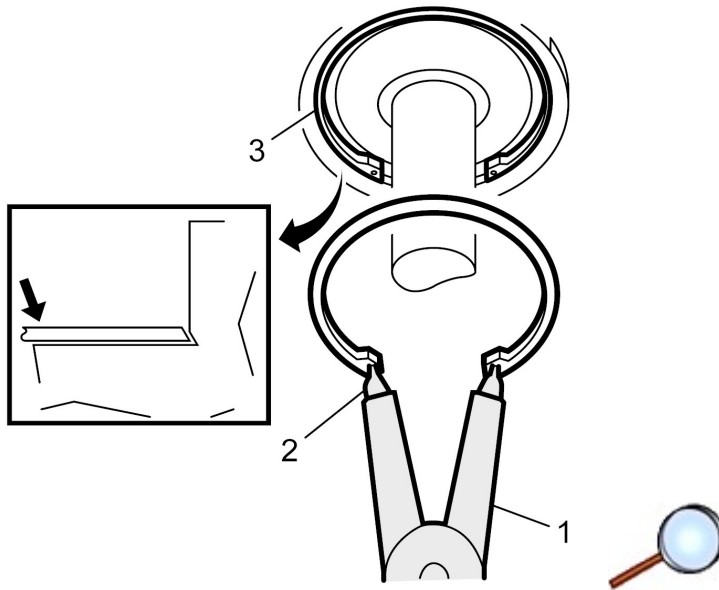


Note: The felt ring washer is a NEW part and is not included in the original steering column assembly.

19. Install a NEW felt ring washer (1) onto the lower steering column shaft and push the washer to the bottom of lower shaft as shown.



20. Install the lower steering column jacket (1) over the lower steering column shaft and position it on the lower steering column housing. Use the match marks made previously to assist in installation.

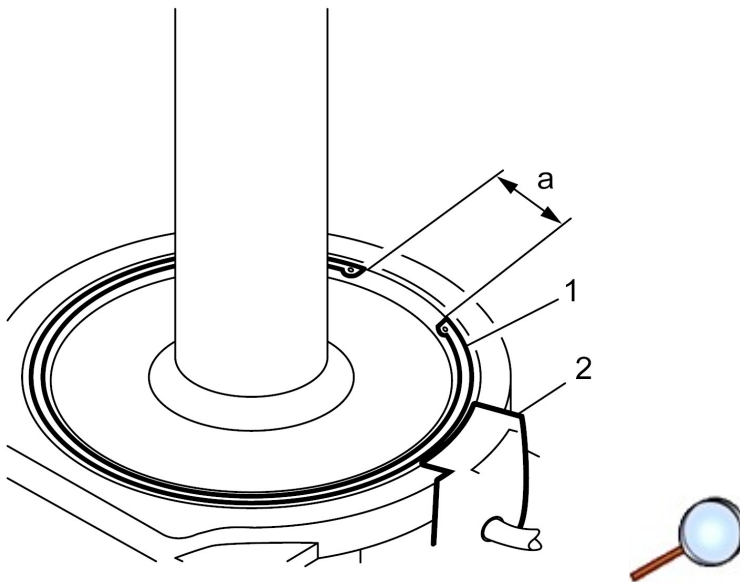


Warning: Removal or installation of the snap ring requires use of J-45126 and adapter GE-45126-5 snap ring pliers, using any tool other than J-45126 and adapter GE-45126-5 may result in personal injury. For your safety, always wear safety glasses when using J-45126 and adapter GE-45126-5. Failure to do so may result in personal injury.

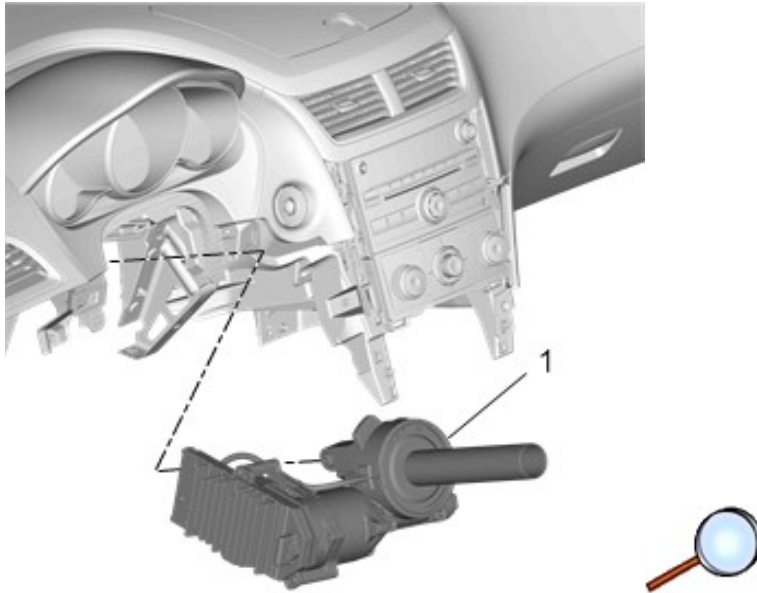
Warning: Do not use GE-45126-5 tips with J-45126 snap ring pliers for any service procedure other than Steering Shaft Torque Sensor Replacement (Electronic Power Steering). Using J-45126 and adapter GE-45126-5 for any other service procedure may result in personal injury.

Note: During installation of the snap ring, ensure the beveled edge of the snap ring is facing upward as shown. If the snap ring is not installed correctly, it will not seat in the lower steering column housing properly.

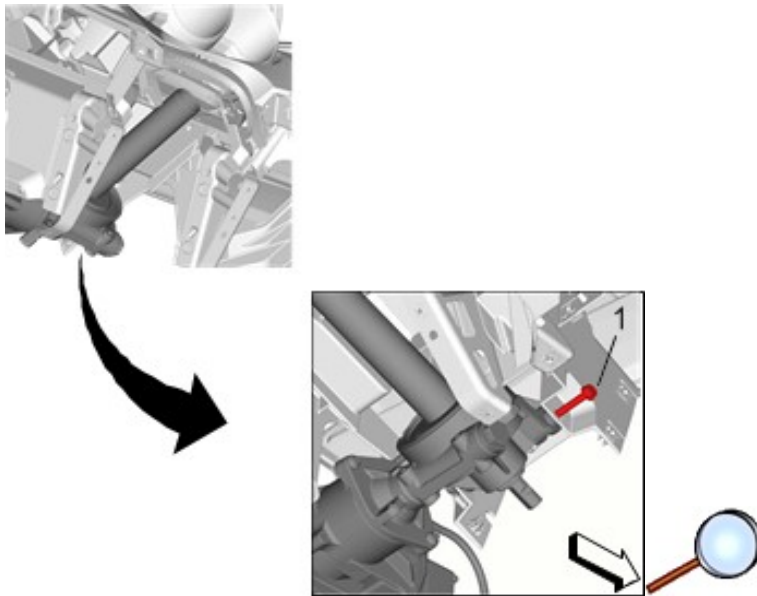
21. Use the J-45126 pliers (1) and the GE-45126-5 adapters (2) to install the snap ring (3) in the lower steering column housing.



22. Measure the gap (a) between the snap ring ears. The gap must be **20 mm (0.79 in)** or larger and the snap ring ear (1) must be positioned approximately **90 degrees** from the steering shaft torque sensor wiring harness grommet (2).



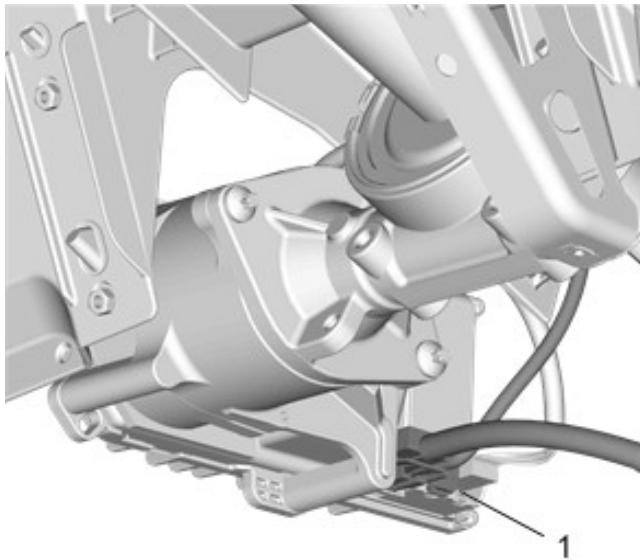
23. Position the lower steering column jacket and motor assembly (1) in the vehicle.



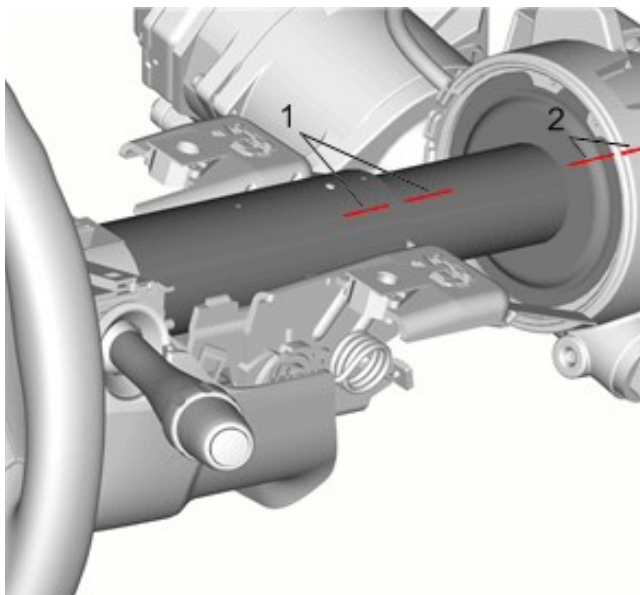
Note:

- Start all steering column fasteners by hand before tightening to specification.
- Do NOT bend the steering column energy absorbing straps located on the upper steering column mounting bracket during installation.

24. Install the lower steering column pivot bolt (1) but do not tighten at this time.

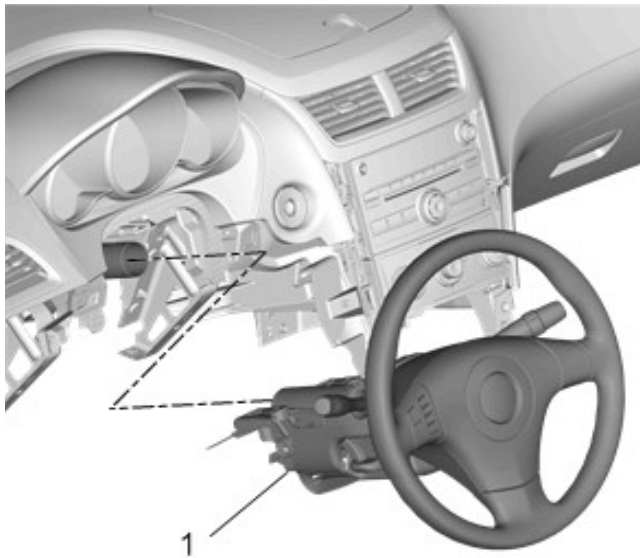


25. Connect any electrical connectors (1) to the lower steering column as necessary.
26. Before connecting the intermediate steering shaft to the steering column, extend the intermediate steering shaft all the way and cycle the shaft up and down several times to distribute the grease in the shaft.
27. Connect the intermediate steering shaft to the steering column. Refer to [Intermediate Steering Shaft Replacement](#).

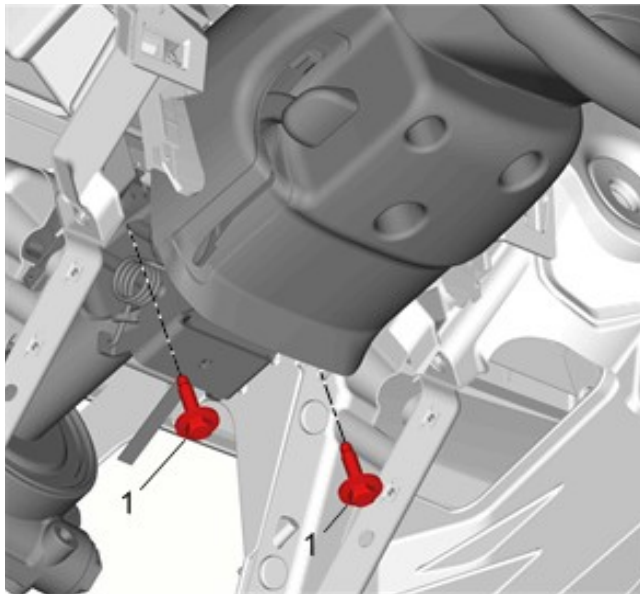


Note: The lower steering column jacket is equipped with an external spline shaft with a block tooth and must be aligned with the upper steering column jacket internal spline during installation.

28. Align the match marks previously made on the lower steering column jacket and the upper steering column jacket (1).



29. Install the upper steering column jacket (1) to the lower steering column jacket.



Note:

- Start all steering column fasteners by hand before tightening to specification.
- Do NOT bend the steering column energy absorbing straps located on the upper steering column mounting bracket during installation.

30. Raise the steering column and install the steering column upper bolts (1) but do not tighten at this time.

Warning: In order to ensure the intended function of the steering column in a vehicle during a crash and in order to avoid personal injury to the driver, perform the following:

- Tighten the steering column lower fasteners before you tighten the steering column upper fasteners. Failure to do this can damage the steering column.
- Tighten the steering column fasteners to the specified torque. Overtightening the upper steering column fasteners could affect the steering column collapse.

Notice: Refer to [Fastener Notice](#).

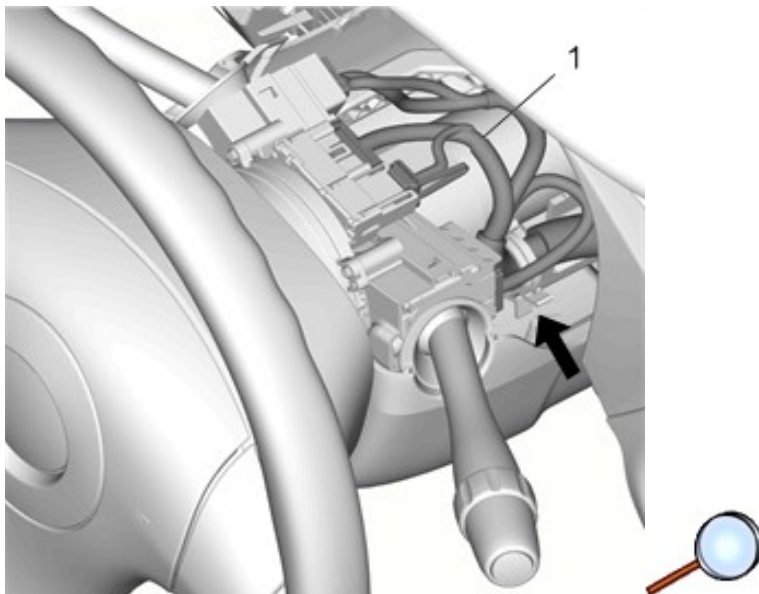
31. Tighten the steering column bolts in the following sequence:

31.1. Tighten the lower steering column pivot bolt to **27 N•m (20 lb ft)**.

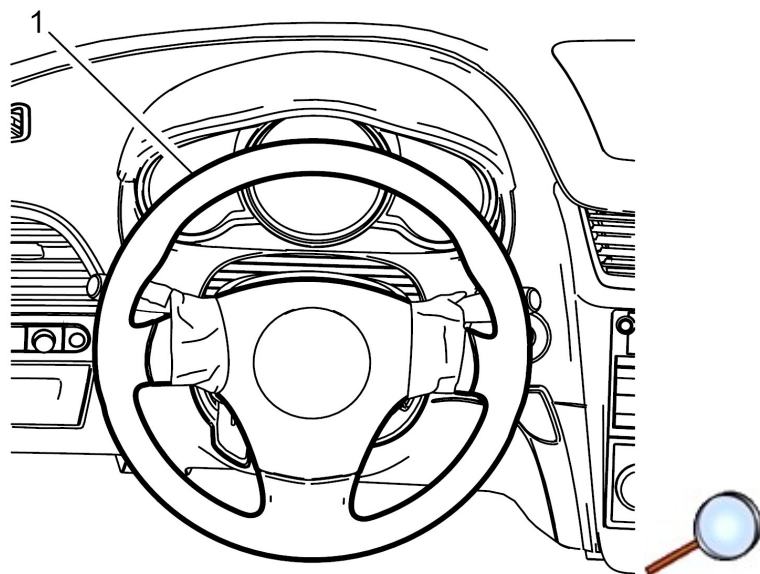
31.2. Tighten the left steering column upper bolt **27 N•m (20 lb ft)**.

31.3. Tighten the right steering column upper bolt **27 N•m (20 lb ft)**.

32. If equipped with adjustable pedals, install the adjustable pedal bracket assembly. Refer to [Accelerator Pedal Bracket Replacement](#).



33. Connect any electrical connectors (1) to the upper steering column as necessary.
34. Install or engage the steering column upper trim cover to the steering column lower trim cover. Refer to [Steering Column Trim Cover Replacement](#).



35. Remove all masking tape from around the steering wheel (1) and the turn signal and windshield wiper and washer switches.
36. Enable the supplemental inflatable restraint (SIR) system. Refer to [SIR Disabling and Enabling](#).
37. Calibrate the steering shaft torque sensor. Refer to [Power Steering Control Module Programming and Setup](#).

Warning: Keep hands away from steering wheel when turning on ignition for the first time. If steering column torque sensor was not properly installed, the steering wheel may move to the end stop and injury may occur.

38. Perform the following steps to test the steering shaft torque sensor for proper installation:

- 38.1. With your hands completely off of the steering column, start the vehicle. If steering wheel rotates on its own to one of the end stops, the steering shaft torque sensor has been damaged and MUST be replaced.
 - 38.2. If steering wheel does not move, rotate the steering wheel to each end stop and then remove your hands from the steering wheel. If the steering wheel rotates on its own to one of the end stops, the steering shaft torque sensor has been damaged and MUST be replaced.
 - 38.3. If steering wheel does not rotate with any input, the repair is complete.
39. Install the driver knee bolster bracket. Refer to [Driver Knee Bolster Bracket Replacement](#).