

## STEERING

### Steering Wheel and Column - Canyon, Colorado

## SPECIFICATIONS

### FASTENER SPECIFICATIONS

| Application                              | Specification |          |
|------------------------------------------|---------------|----------|
|                                          | Metric        | English  |
| Intermediate Steering Shaft Lower Bolt   | 45 N.m        | 33 lb ft |
| Intermediate Steering Shaft Upper Bolt   | 45 N.m        | 33 lb ft |
| Lower Steering Shaft Assembly Lower Bolt | 50 N.m        | 37 lb ft |
| Steering Column Lower Trim Cover Bolt    | 1.5 N.m       | 13 lb in |
| Steering Column Nut                      | 22 N.m        | 16 lb ft |
| Steering Wheel Bolt                      | 45 N.m        | 33 lb ft |
| Steering Wheel Spoke Cover Fastener      | 1.5 N.m       | 13 lb in |
| Turn Signal Switch Bracket Bolt          | 15 N.m        | 11 lb ft |

### ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

| Application                              | Type of Material        | GM Part Number |          |
|------------------------------------------|-------------------------|----------------|----------|
|                                          |                         | United States  | Canada   |
| Intermediate Steering Shaft Lower Bolt   | Thread Locking Adhesive | 12345382       | 10953489 |
| Intermediate Steering Shaft Upper Bolt   | Thread Locking Adhesive | 12345382       | 10953489 |
| Lower Steering Shaft Assembly Lower Bolt | Thread Locking Adhesive | 12345382       | 10953489 |
| Steering Wheel Bolt                      | Thread Locking Adhesive | 12345382       | 10953489 |

## DIAGNOSTIC INFORMATION AND PROCEDURES

### SYMPTOMS - STEERING WHEEL AND COLUMN

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

#### Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the steering wheel and column.
- 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:

- [Steering Column Tilt Function Inoperative](#)
- [Noise in Steering Column](#)

**STEERING COLUMN TILT FUNCTION INOPERATIVE**

| Step | Action                                                                                                                                                                                                               | Yes           | No                                                         |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------|
| 1    | Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?                                                                                                        | Go to Step 2  | Go to <a href="#">Symptoms - Steering Wheel and Column</a> |
| 2    | Verify that the steering column tilt function is inoperative.<br>Does the steering column tilt function operate normally?                                                                                            | System OK     | Go to Step 3                                               |
| 3    | If equipped, verify that the following components are not seized or corroded: <ul style="list-style-type: none"> <li>Tilt pivot pins</li> <li>Tilt head lock shoes</li> </ul> Are the components seized or corroded? | Go to Step 7  | Go to Step 4                                               |
| 4    | Inspect the tilt pivot pins for binding.<br>Are the tilt pivot pins binding?                                                                                                                                         | Go to Step 8  | Go to Step 5                                               |
| 5    | Inspect for a weak or broken steering column tilt spring.<br>Is the steering column tilt spring weak or broken?                                                                                                      | Go to Step 9  | Go to Step 6                                               |
| 6    | Inspect the steering column wiring harness routing for tightness.<br>Was the steering column wiring harness routed correctly?                                                                                        | Go to Step 11 | Go to Step 10                                              |
| 7    | Replace the steering column. Refer to <a href="#">Steering Column Replacement</a> .<br>Did you complete the repair?                                                                                                  | Go to Step 11 | -                                                          |
| 8    | If serviceable, replace the pivot pins. If not serviceable replace the steering column. Refer to <a href="#">Steering Column Replacement</a> .<br>Did you complete the repair?                                       | Go to Step 11 | -                                                          |
| 9    | If serviceable, replace the tilt spring.<br>Did you complete the repair?                                                                                                                                             | Go to Step 11 | -                                                          |
| 10   | Route the steering column wiring harness to the correct location.<br>Did you correctly route the wiring harness?                                                                                                     | Go to Step 11 | -                                                          |
| 11   | Operate the steering column tilt function in order to verify the repair.<br>Did you correct the condition?                                                                                                           | System OK     | Go to Step 3                                               |

**NOISE IN STEERING COLUMN**

| Step | Action                                                                                                        | Yes          | No                                                         |
|------|---------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------|
| 1    | Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections? | Go to Step 2 | Go to <a href="#">Symptoms - Steering Wheel and Column</a> |

|   | Action                                                                                                                                                                                                                                                                                                      | Yes                  | No                   |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 2 | Verify that noise is present in the steering column during operation.<br>Is noise present in the steering column during operation?                                                                                                                                                                          | Go to <b>Step 3</b>  | System OK            |
| 3 | Inspect the steering column mounting features for the following conditions: <ul style="list-style-type: none"> <li>• The steering column mounting fasteners are loose.</li> <li>• The steering column mounting features are sheared.</li> </ul> Are the steering column mounting features loose or sheared? | Go to <b>Step 10</b> | Go to <b>Step 4</b>  |
| 4 | Inspect the SIR/SRS coil for noise.<br>Is the SIR/SRS coil noisy?                                                                                                                                                                                                                                           | Go to <b>Step 11</b> | Go to <b>Step 5</b>  |
| 5 | If equipped, inspect the lock plate retaining ring for correct installation.<br>Is the lock plate retaining ring installed incorrectly?                                                                                                                                                                     | Go to <b>Step 12</b> | Go to <b>Step 6</b>  |
| 6 | Inspect the steering column upper and lower bearings for the following conditions: <ul style="list-style-type: none"> <li>• Damage</li> <li>• Lubrication</li> <li>• Wear</li> <li>• Proper seating</li> </ul> Are the bearings in need of repair or replacement?                                           | Go to <b>Step 13</b> | Go to <b>Step 7</b>  |
| 7 | Does the steering column tilt joint need to be lubricated?                                                                                                                                                                                                                                                  | Go to <b>Step 14</b> | Go to <b>Step 8</b>  |
| 8 | <b>NOTE:</b><br><b>Inspect the intermediate steering shaft for noise while driving the vehicle, turning the steering wheel, and applying the brakes.</b><br><br>Inspect the intermediate steering shaft for noise. Is the intermediate steering shaft noisy?                                                | Go to <b>Step 15</b> | Go to <b>Step 9</b>  |
| 9 | <b>NOTE:</b><br><b>For vehicles equipped with a telescoping steering column, perform this step. If not equipped, go to next step.</b><br><br>Inspect the steering column for noise while telescoping the column. Is the steering column noisy while telescoping?                                            | Go to <b>Step 16</b> | Go to <b>Step 17</b> |

|    | Action                                                                                                                                                                                                                                                                                                                             | Yes           | No           |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|
| 10 | <p><b>NOTE:</b><br/>If the steering column mounting features are damaged or sheared, replace the steering column. Refer to <a href="#">Steering Column Replacement</a>.</p> <p>Tighten the steering column mounting fasteners to specification. Refer to <a href="#">Fastener Specifications</a>. Did you complete the repair?</p> | Go to Step 17 | -            |
| 11 | <p>Replace the SIR/SRS coil. Refer to <a href="#">Steering Wheel Airbag Coil Replacement</a> . Did you complete the repair?</p>                                                                                                                                                                                                    | Go to Step 17 | -            |
| 12 | <p>Install the lock plate retaining ring correctly. Did you complete the repair?</p>                                                                                                                                                                                                                                               | Go to Step 17 | -            |
| 13 | <p><b>NOTE:</b><br/>If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to <a href="#">Steering Column Replacement</a>.</p> <p>Replace the steering column upper and/or lower bearings, if serviceable. Did you complete the replacement?</p>                               | Go to Step 17 | -            |
| 14 | <p>Lubricate the steering column tilt joint. Did you complete the repair?</p>                                                                                                                                                                                                                                                      | Go to Step 17 | -            |
| 15 | <p>Replace the appropriate intermediate steering shaft component. Did you complete the repair?</p>                                                                                                                                                                                                                                 | Go to Step 17 | -            |
| 16 | <p>Redistribute or add lubricant to the steering column lower jacket with the column telescoped to its end of outward travel. Did you complete the repair?</p>                                                                                                                                                                     | Go to Step 17 | -            |
| 17 | <p>Operate the system in order to verify the repair. Did you correct the condition?</p>                                                                                                                                                                                                                                            | System OK     | Go to Step 3 |

## LOOSENESS IN STEERING COLUMN

| Step | Action                                                                                                        | Yes          | No                                                         |
|------|---------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------|
| 1    | Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections? | Go to Step 2 | Go to <a href="#">Symptoms - Steering Wheel and Column</a> |
| 2    | Verify that the steering column is loose. Is the steering column loose?                                       | Go to Step 3 | System OK                                                  |
|      |                                                                                                               |              |                                                            |

|   | Action                                                                                                                                                                                                                                                                                                                             | Yes                 | No                  |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 3 | <p>Inspect the steering column mounting features for the following conditions.</p> <ul style="list-style-type: none"> <li>• The steering column mounting fasteners are loose.</li> <li>• The steering column mounting features are sheared.</li> </ul> <p>Are the steering column mounting features loose or sheared?</p>          | Go to <b>Step 5</b> | Go to <b>Step 4</b> |
| 4 | <p>Inspect the upper and/or lower bearings for looseness. Are any of the bearings worn or loose?</p>                                                                                                                                                                                                                               | Go to <b>Step 6</b> | Go to <b>Step 7</b> |
| 5 | <p><b>NOTE:</b><br/>If the steering column mounting features are damaged or sheared, replace the steering column. Refer to <a href="#">Steering Column Replacement</a>.</p> <p>Tighten the steering column mounting fasteners to specification. Refer to <a href="#">Fastener Specifications</a>. Did you complete the repair?</p> | Go to <b>Step 7</b> | -                   |
| 6 | <p><b>NOTE:</b><br/>If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to <a href="#">Steering Column Replacement</a>.</p> <p>Replace the upper and/or lower bearings, if serviceable. Did you complete the repair?</p>                                                    | Go to <b>Step 7</b> | -                   |
| 7 | <p>Operate the steering column in order to verify the repair. Did you correct the condition?</p>                                                                                                                                                                                                                                   | System OK           | Go to <b>Step 3</b> |

## REPAIR INSTRUCTIONS

### WIRE TO WIRE REPAIR - STEERING

#### Special Tools

- **EL-38125-10** Splice Sleeve Crimping Tool (non GMNA)
- **J-38125-5A** Ultra Torch Special Tool
- **J-38125-8** Splice Sleeve Crimping Tool (GMNA)

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

**WARNING:** In order to reduce the risk of personal injury, loss of high voltage isolation to ground and higher system impedance, do not attempt to repair any HV wiring, connector, or terminal that is damaged. High voltage coaxial type cables are not repairable. Never attempt to repair a coaxial type cable. The entire cable/harness

or component must be replaced in order to maintain system integrity and personal safety, never attempt to repair any high voltage wiring, cables, or terminals. Performing this procedure on high voltage circuits may result in serious injury or death.

**NOTE:** If the wiring harness internal to the transmission is damaged, the wiring harness must be replaced. The use of splice sleeves in an attempt to repair the internal transmission wires, connectors, or terminals could result in performance issues.

**NOTE:** Do not splice wires in Door Harness Grommets.

**NOTE:** The DuraSeal splice sleeves have the following 2 critical features:

- A special heat shrink sleeve environmentally seals the splice. The heat shrink sleeve contains a sealing adhesive inside.
- A cross hatched (knurled) core crimp provides the necessary low resistance contact integrity for these sensitive, low energy circuits.

Use only DuraSeal splice sleeves to form a one-to-one splice on all types of insulation except high voltage and specialty cables. Use DuraSeal splice sleeves where there are special requirements such as moisture sealing. Follow the instructions below in order to splice copper wire using DuraSeal splice sleeves.

#### Splice Sleeve Selection

| Splice Sleeve Color              | Crimp Tool Nest Color    |               | Wire Gauge mm <sup>2</sup> / (AWG) |
|----------------------------------|--------------------------|---------------|------------------------------------|
|                                  | 3 Crimp Nests            | 4 Crimp Nests |                                    |
| Salmon (Yellow-Pink)<br>19300089 | Red (1) or Red/Green (1) | Red (2)       | 0.22-0.8/(18-26)                   |
| Blue<br>19168447                 | Blue (2)                 | Blue (3)      | 1.0-2.0/(14-16)                    |
| Yellow<br>19168448               | Yellow (3)               | Yellow (4)    | 3.0-5.0/(10-12)                    |

**NOTE:** You must perform the following procedures in the listed order. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip with all of the wire strands intact.

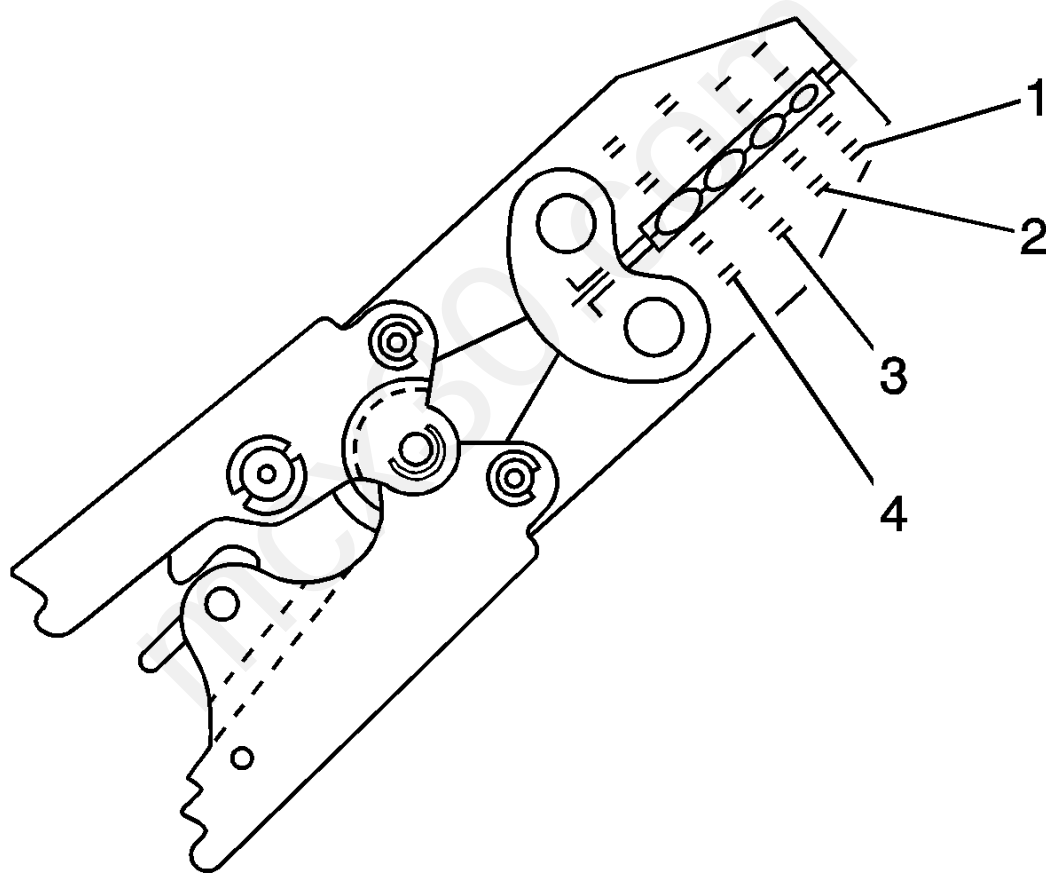
1. Open the harness by removing any tape:
  - Use a sewing seam ripper, available from sewing supply stores, in order to cut open the harness in order to avoid wire insulation damage.
  - Use the DuraSeal splice sleeves on all types of insulation except Tefzel and coaxial.
  - Do not use the crimp and DuraSeal splice sleeve to form a splice with more than 2 wires coming together.
2. Cut as little wire off the harness as possible. You may need the extra length of wire in order to change the location of a splice.

Adjust splice locations so that each splice is at least 40 mm (1.5 in) away from the other splices, harness branches, or connectors.

3. Strip the insulation:
  - When adding a length of wire to the existing harness, use the same size wire as the original wire.

perform one of the following items in order to find the correct wire size:

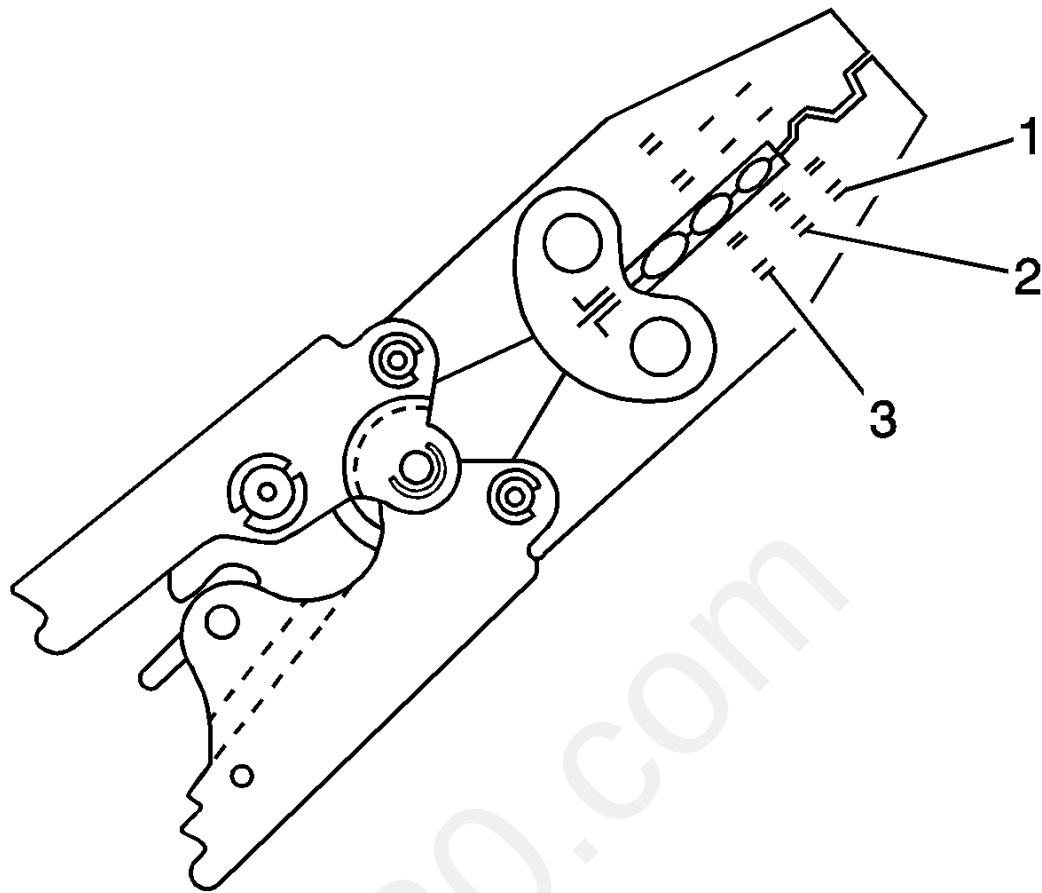
- Find the wire on the schematic and convert to regional wiring gauge size.
  - If you are unsure of the wire size, begin with the largest opening in the wire stripper and work down until achieving a clean strip of the insulation.
  - Strip approximately 5.0 mm (0.20 in) of insulation from each wire to be spliced.
  - Do not nick or cut any of the strands. Inspect the stripped wire for nicks or cut strands.
  - If the wire is damaged, repeat this procedure after removing the damaged section.
4. For high temperature wiring, slide a section of high temperature SCT1 shrink tubing down the length of wire to be spliced. Ensure that the shrink tubing will not interfere with the splice procedure.
  5. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.



**Fig. 1: Crimping Tool**

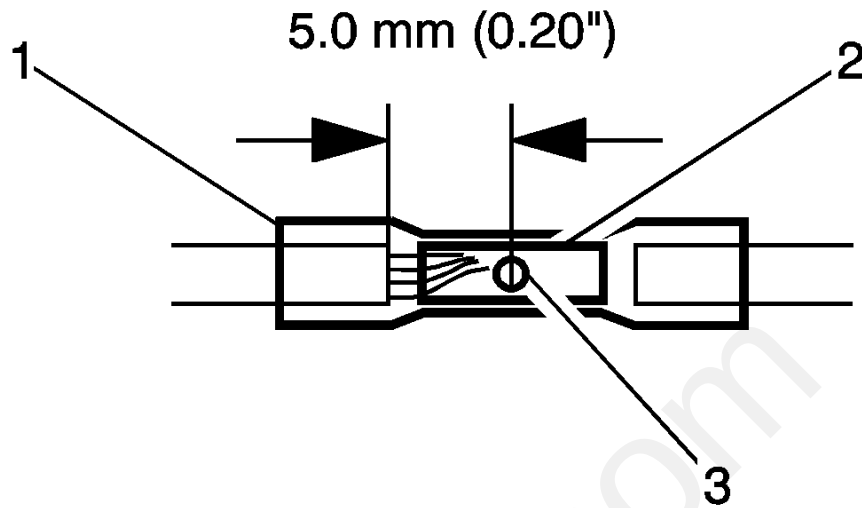
Courtesy of GENERAL MOTORS COMPANY

6. The **EL-38125-10** splice sleeve crimping tool has four crimp nests. The largest crimp nest (4) is used for crimping 10 and 12 gauge wires. The second largest crimp nest (3) is used for crimping 14 and 16 gauge wires. The third largest crimp nest (2) is used for crimping 18 and 20 gauge wires. The smallest crimp nest (1) is used for crimping 22 to 26 gauge wires. The crimp nests are referenced in the table (farther above) under the crimp tool nest color.



**Fig. 2: Identifying Splice Crimp Tool Nests Terminal Identification**  
 Courtesy of GENERAL MOTORS COMPANY

7. The **J-38125-8** splice sleeve crimping tool has three crimp nests. The largest crimp nest (3) is used for crimping 10 and 12 gauge wires. The second largest crimp nest (2) is used for crimping 14 and 16 gauge wires. The smallest crimp nest (1) is used for crimping 18 to 20 gauge wires. The crimp nests are referenced in the table (farther above) under the crimp tool nest color.
8. Use the splice sleeve crimp tool in order to position the DuraSeal splice sleeve in the proper color nest of the splice sleeve crimp tool. For the four crimp nest tool, use the three largest crimp nests to crimp the splice sleeves. For the three crimp nest tool, use all three crimp nests to crimp the splice sleeves. Use the four and three crimp tool diagrams (above) and the table (farther above) to match the splice sleeve with the correct crimp nest. The crimp tool diagram callout numbers match the numbers in the table (under crimp tool nest color).



**Fig. 3: Identifying Duraseal Splice Sleeve**

Courtesy of GENERAL MOTORS COMPANY

9. Place the DuraSeal splice sleeve in the nest. Ensure that the crimp falls midway between the end of the barrel and the stop. The sleeve has a stop (3) in the middle of the barrel (2) in order to prevent the wire (1) from going further. Close the hand crimper handles slightly in order to firmly hold the DuraSeal splice sleeve in the proper nest.



**Fig. 4: Crimped Duraseal Splice Sleeve**

**Courtesy of GENERAL MOTORS COMPANY**

10. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop. Refer to **Folded-Over Wire Repair** for splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes) and for splicing wires of different gauges.
11. Tightly close the handles of the crimp tool until the crimper handles open when released.

The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Repeat steps 4 and 6 for the opposite end of the splice.



**Fig. 5: Crimped Duraseal Splice Sleeve**

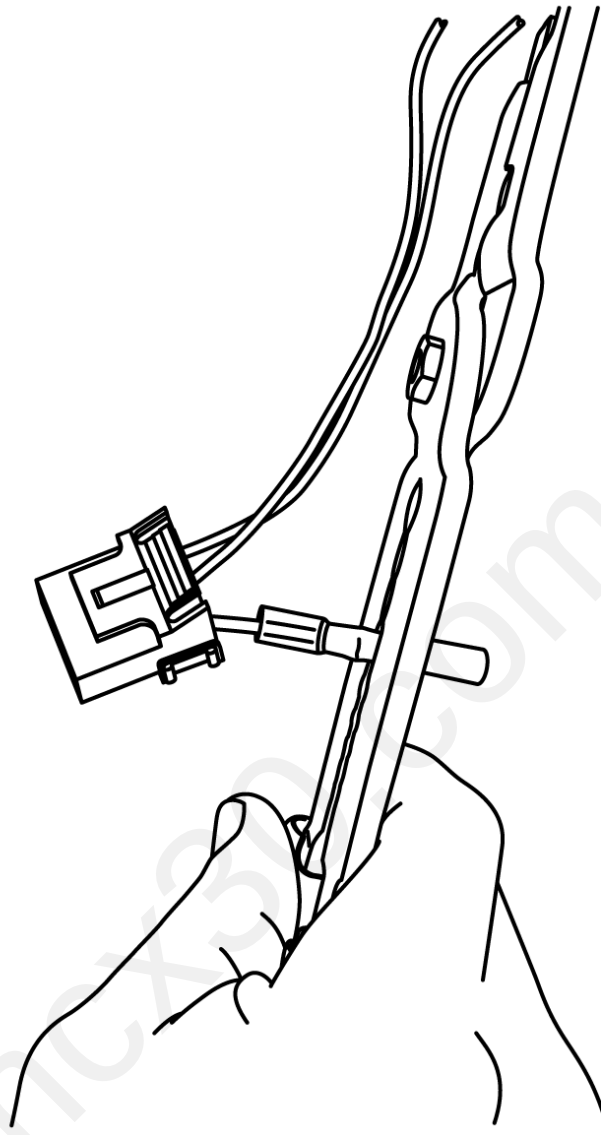
Courtesy of GENERAL MOTORS COMPANY

12. Using the heat torch, apply heat to the crimped area of the barrel.
13. Start in the middle and gradually move the heat barrel to the open ends of the tubing:
  - The tubing will shrink completely as the heat is moved along the insulation.
  - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

#### **Weatherpack™ Wiring Repair**

**NOTE:** Some replacement pigtail connectors may be delivered without the terminated leads installed into the connector. For Weatherpack™ connectors, all terminated leads included in the package should to be installed into the connector. If the connector end view shows that a terminal is not occupied, the extra terminated lead(s) need to be installed and the end(s) sealed using a DuraSeal splice sleeve and taped back into the harness.

ie wire into the splice sleeve barrel until the wire hits the barrel stop. Refer to [Folded-Over Wire Repair](#) for splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes) and for splicing wires of different gauges.



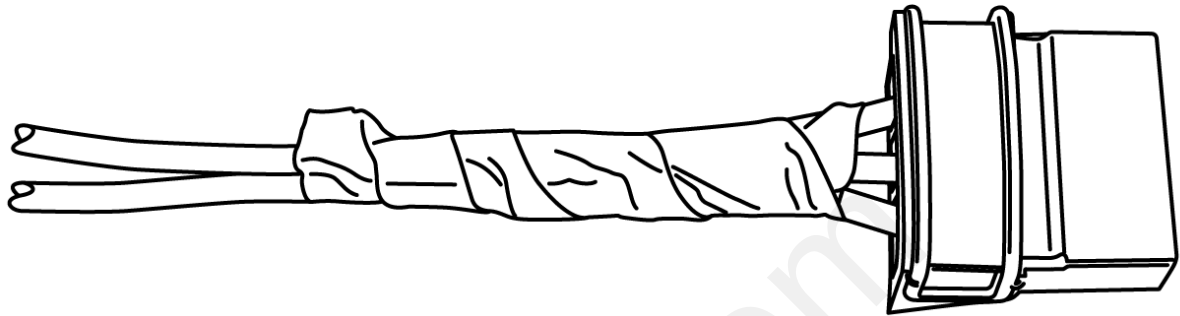
**Fig. 6: Tightly Close Handles Of Crimp Tool**  
Courtesy of GENERAL MOTORS COMPANY

2. Tightly close the handles of the crimp tool until the crimper handles open when released.

The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Holding the DuraSEAL with one hand gently tug on the wire to ensure it is crimped in the DuraSeal.

3. Using the heat torch, apply heat to the crimped area of the barrel.





**Fig. 8: Taping Extra Terminated Leads Back Into Harness**  
Courtesy of GENERAL MOTORS COMPANY

5. Tape the extra terminated lead(s) back into the harness.

### High Temperature Wiring Repairs

Use the following procedures to perform high temperature wiring repairs:

1. Center the high temperature SCT1 shrink tube over the DuraSeal splice sleeve.
2. Using the heat torch, apply heat to the high temperature heat shrink tubing.
3. Gradually move the heat from the center to the open end of the tubing:
  - The tubing will shrink completely as the heat is moved along the insulation.
  - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.
4. Replace any reflective tape and clips that may have been removed during the repair.

## CONNECTOR RECONNECTION - STEERING

### Special Tools

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

When the condition is not currently present, but is indicated in DTC history, the cause may be intermittent. An intermittent may also be the cause when there is a customer complaint, but the symptom cannot be duplicated. Refer to the Symptom Table of the system that is suspect of causing the condition before trying to locate an intermittent condition.

Most intermittent conditions are caused by faulty electrical connections or wiring. Inspect for the following items:

- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- Poor terminal to wire connection - Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself, and corrosion in the wire to terminal contact area, etc.
- Pierced or damaged insulation can allow moisture to enter the wiring causing corrosion. The conductor can corrode inside the insulation, with little visible evidence. Look for swollen and stiff sections of wire in the suspect circuits.
- Wiring which has been pinched, cut, or its insulation rubbed through may cause an intermittent open or short as the bare area touches other wiring or parts of the vehicle.
- Wiring that comes in contact with hot or exhaust components
- Refer to [Inducing Intermittent Fault Conditions](#) in order to duplicate the conditions required, in order to verify the customer concern.
- Refer to [Testing for Electrical Intermittents](#) for test procedures to detect intermittent open, high resistance, short to ground, and short to voltage conditions.
- Refer to [Scan Tool Snapshot Procedure](#) for advanced intermittent diagnosis and Vehicle Data Recorder operation.

### Testing for Terminal Fretting

Some intermittent conditions can be caused by wire terminal fretting corrosion. Fretting corrosion is a build-up of insulating, oxidized wear debris that can form when there is a small motion between electrical contacts. The oxidized wear debris can pile up enough at the electrical contact spots that the electrical resistance across the connection increases. Movement between the contacting surfaces as small as 10 to 100 microns can cause fretting. To put this in perspective, a sheet of paper is about 100 microns thick, so fretting motion is small and hard to see. Vibration and thermal expansion/contraction are the main sources that create fretting motion. Since vehicles vibrate and can experience large temperature swings, they are a good source for fretting motion. Tin, copper, nickel, and iron surfaces are all susceptible to fretting corrosion. Fretting corrosion can be difficult to see but it looks like small, dark smudges on the terminals contact surface.

To correct a fretting condition disconnect the suspect connector and add dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087) to both sides of the connector terminals. Then reconnect the connector and wipe away any excess lubricant. This will correct the additional terminal contact resistance due to the terminal fretting corrosion.

### Testing for Proper Terminal Contact

It is important to test terminal contact at the component and any inline connectors before replacing a suspect component. Mating terminals must be inspected to ensure good terminal contact. A poor connection between the male and female terminal at a connector may be the result of contamination or deformation.

n may be caused by the connector halves being improperly connected. A missing or damaged connector seal, damage to the connector itself, or exposing the terminals to moisture and dirt can also cause contamination. Contamination, usually in the underhood or underbody connectors, leads to terminal corrosion, causing an open circuit or intermittently open circuit.

Deformation is caused by probing the mating side of a connector terminal without the proper adapter. Always use the **EL-35616** kit when probing connectors. Other causes of terminal deformation are improperly joining the connector halves, or repeatedly separating and joining the connector halves. Deformation, usually to the female terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

### **Testing for Proper Terminal Contact in Bussed Electrical Centers**

It is very important to use the correct test adapter when testing for proper terminal contact of fuses and relays in a bussed electrical center. Use the **EL-35616** kit to test for proper terminal contact. Failure to use the **EL-35616** kit can result in improper diagnosis of the bussed electrical center.

Follow the procedure below in order to test terminal contact:

1. Separate the connector halves.
2. Visually inspect the connector halves for contamination. Contamination may result in a white or green build-up within the connector body or between terminals. This causes high terminal resistance, intermittent contact, or an open circuit. An underhood or underbody connector that shows signs of contamination should be replaced in its entirety: terminals, seals, and connector body.
3. Using an equivalent male terminal/terminated lead, verify that the retention force is significantly different between a known good terminal and the suspect terminal. Replace the female terminal in question.

### **Flat Wire Connectors**

There are no serviceable parts for flat wire connectors on the harness side or the component side.

Follow the procedure below in order to test terminal contact:

1. Remove the component in question.
2. Visually inspect each side of the connector for signs of contamination. Avoid touching either side of the connector as oil from your skin may be a source of contamination as well.
3. Visually inspect the terminal bearing surfaces of the flat wire circuits for splits, cracks, or other imperfections that could cause poor terminal contact. Visually inspect the component side connector to ensure that all of the terminals are uniform and free of damage or deformation.
4. Insert the appropriate adapter into the flat wire harness connector in order to test the circuit in question.

### **Control Module/Component Voltage and Grounds**

Poor voltage or ground connections can cause widely varying symptoms.

- Test all control module voltage supply circuits. Many vehicles have multiple circuits supplying voltage to a control module. Other components in the system may have separate voltage supply circuits that may also need to be tested. Inspect connections at the module/component connectors, fuses, and any intermediate connections between the voltage source and the module/component. A test lamp or a DMM may indicate that voltage is present, but neither tests the ability of the circuit to carry sufficient current. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) , and [Power Distribution Schematics](#) .
- Test all control module ground and system ground circuits. The control module may have multiple ground circuits. Other components in the system may have separate grounds that may also need to be tested. Inspect grounds for clean and tight connections at the grounding point. Inspect the connections at the component and

packs, where applicable. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) , and [Ground Distribution Schematics](#) .

### Temperature Sensitivity

- An intermittent condition may occur when a component/connection reaches normal operating temperature. The condition may occur only when the component/connection is cold, or only when the component/connection is hot.
- Freeze Frame, Failure Records, Snapshot, or Vehicle Data Recorder data may help with this type of intermittent condition, where applicable.
- If the intermittent is related to heat, review the data for a relationship with the following:
  - High ambient temperatures
  - Underhood/engine generated heat
  - Circuit generated heat due to a poor connection, or high electrical load
  - Higher than normal load conditions, towing, etc.
- If the intermittent is related to cold, review the data for the following:
  - Low ambient temperatures - In extremely low temperatures, ice may form in a connection or component. Inspect for water intrusion.
  - The condition only occurs on a cold start.
  - The condition goes away when the vehicle warms up.
- Information from the customer may help to determine if the trouble follows a pattern that is temperature related.
- If temperature is suspected of causing an intermittent fault condition, attempt to duplicate the condition. Refer to [Inducing Intermittent Fault Conditions](#) in order to duplicate the conditions required.

### Electromagnetic Interference and Electrical Noise

Some electrical components/circuits are sensitive to electromagnetic interference or other types of electrical noise. Inspect for the following conditions:

- A mis-routed harness that is too close to high voltage/high current devices such as secondary ignition components, motors, generator etc. - These components may induce electrical noise on a circuit that could interfere with normal circuit operation.
- Electrical system interference caused by a malfunctioning relay, or a control module driven solenoid or switch - These conditions can cause a sharp electrical surge. Normally, the condition will occur when the malfunctioning component is operating.
- Installation of non-factory or aftermarket add on accessories such as lights, 2-way radios, amplifiers, electric motors, remote starters, alarm systems, cell phones, etc. - These accessories may create interference in other circuits while operating and the interference would disappear when the accessory is not operating. Refer to [Checking Aftermarket Accessories](#) .
- Test for an open diode across the A/C compressor clutch and for other open diodes. Some relays may contain a clamping diode.
- The generator may be allowing AC noise into the electrical system.

### Incorrect Control Module

- There are only a few situations where reprogramming a control module is appropriate:
  - A new service control module is installed.
  - A control module from another vehicle is installed.
  - Revised software/calibration files have been released for this vehicle.

: **DO NOT re-program the control module with the SAME software/calibration files that are already present in the control module. This is not an effective repair for any type of concern.**

- Verify that the control module contains the correct software/calibration. If incorrect programming is found, reprogram the control module with the most current software/calibration. Refer to [Control Module References](#) for replacement, setup, and programming.

## **LOWER STEERING SHAFT ASSEMBLY REPLACEMENT**

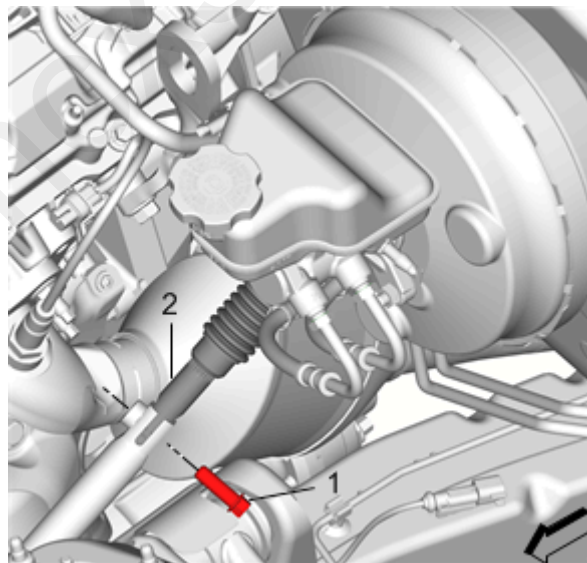
### **Removal Procedure**

**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

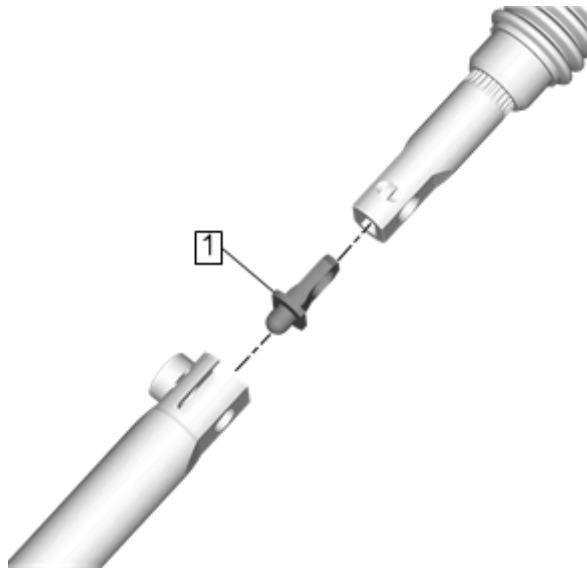
After disconnecting these components, do not rotate the steering wheel or move the front tires and wheels. Failure to follow this procedure may cause the SIR coil assembly to become un-centered and cause possible damage to the SIR coil. If you think the SIR coil has become un-centered, refer to your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

1. With the steering wheel in the straight ahead position, LOCK the steering column.



**Fig. 9: Intermediate Steering Shaft Lower Bolt**  
Courtesy of GENERAL MOTORS COMPANY

2. Remove Intermediate Steering Shaft Lower Bolt (1).
3. Separate Intermediate Steering Shaft (2) @Lower Steering Shaft Assembly



**Fig. 10: Plastic Insert**

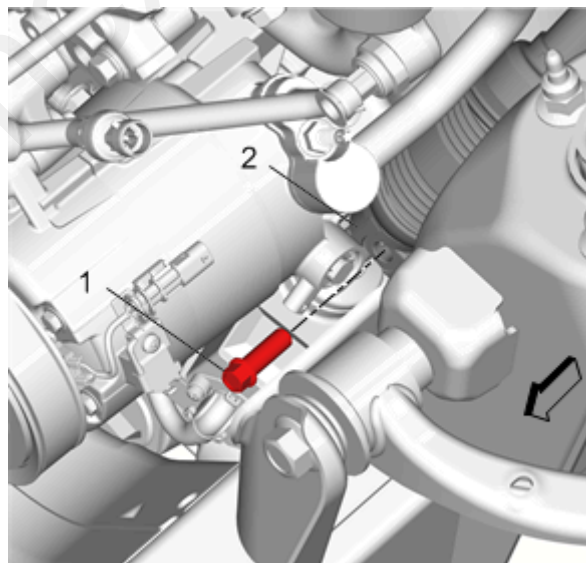
Courtesy of GENERAL MOTORS COMPANY

**WARNING:** Prior to intermediate steering shaft reassembly, remove the plastic insert located at the bottom of the intermediate steering shaft. Failure to remove this insert may result in binding in the steering system or possible bodily injury.

4. Remove the plastic insert (1) located at bottom of the intermediate steering shaft.

DISCARD the insert.

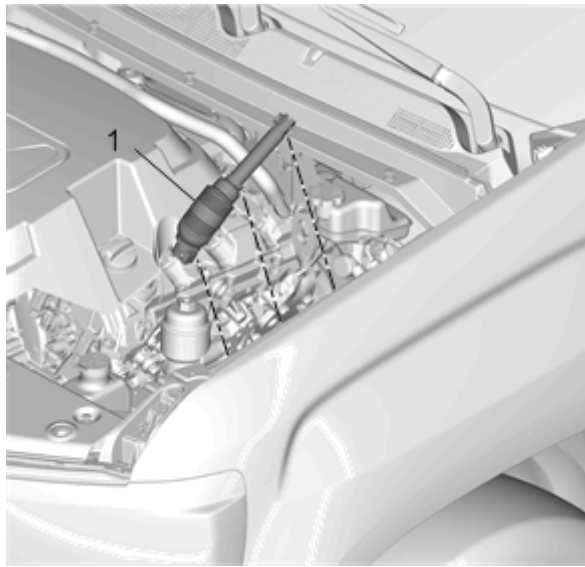
5. If the plastic insert (1) is missing, it may have fallen into the lower steering shaft assembly. The insert **MUST** be removed prior to intermediate steering shaft reassembly.
6. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)



**Fig. 11: Lower Steering Shaft Assembly Lower Bolt**

Courtesy of GENERAL MOTORS COMPANY

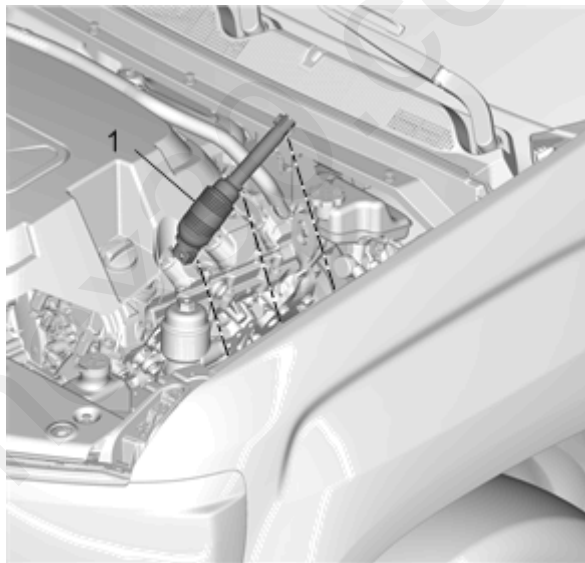
7. Remove Lower Steering Shaft Assembly Lower Bolt (1).
8. Separate Lower Steering Shaft Assembly (2) @Steering Gear



**Fig. 12: Lower Steering Shaft Assembly**  
Courtesy of GENERAL MOTORS COMPANY

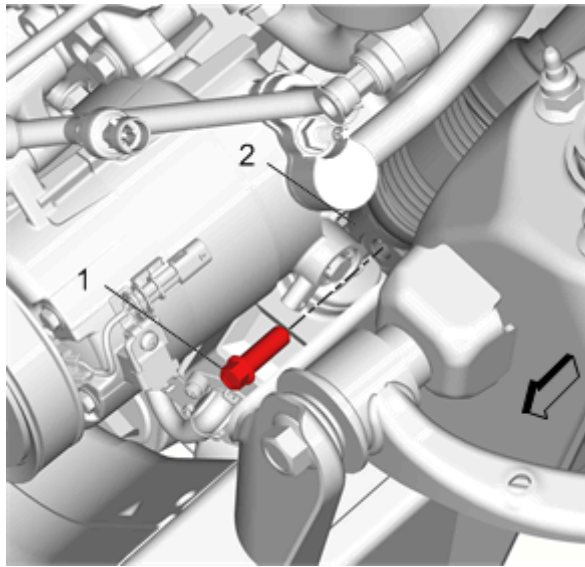
9. Remove Lower Steering Shaft Assembly (1)

#### **Installation Procedure**



**Fig. 13: Lower Steering Shaft Assembly**  
Courtesy of GENERAL MOTORS COMPANY

1. Install Lower Steering Shaft Assembly (1)

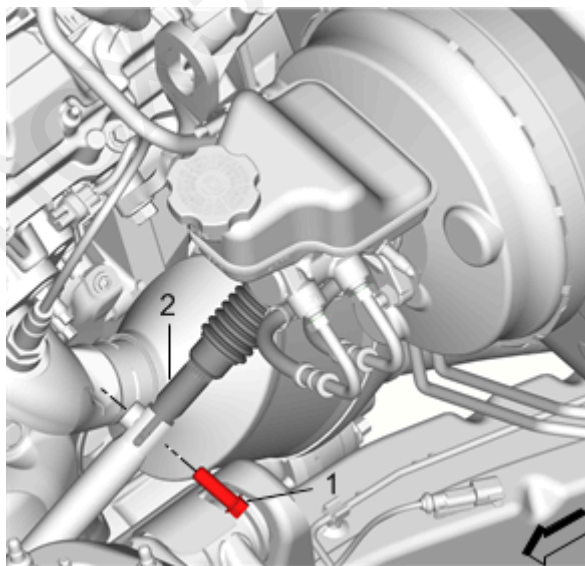


**Fig. 14: Lower Steering Shaft Assembly Lower Bolt**  
**Courtesy of GENERAL MOTORS COMPANY**

2. Install Lower Steering Shaft Assembly (2) @Steering Gear.
3. Install Lower Steering Shaft Assembly Lower Bolt (1)
  1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
  2. Apply thread locking adhesive to the bolt. [Adhesives, Fluids, Lubricants, and Sealers](#)

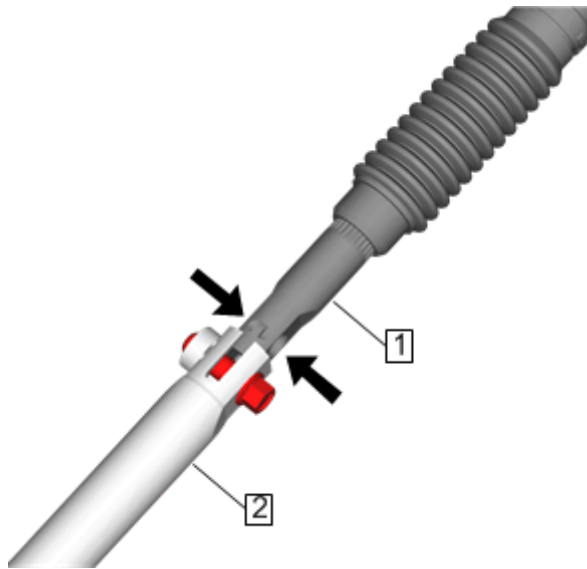
**CAUTION:** Refer to [Fastener Caution](#) .

4. Lower Steering Shaft Assembly Lower Bolt (1) Tighten 50 N.m (37 lb ft)



**Fig. 15: Intermediate Steering Shaft Lower Bolt**  
**Courtesy of GENERAL MOTORS COMPANY**

5. Install Intermediate Steering Shaft (2) @Lower Steering Shaft Assembly.
6. Install Intermediate Steering Shaft Lower Bolt (1), but do NOT tighten
  1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
  2. Apply thread locking adhesive to the bolt. [Adhesives, Fluids, Lubricants, and Sealers](#)



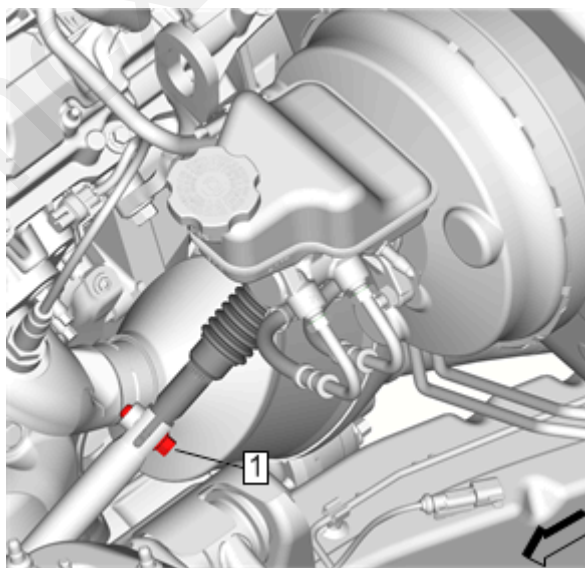
**Fig. 16: Intermediate Steering Shaft**

Courtesy of GENERAL MOTORS COMPANY

**WARNING:** The intermediate steering shaft must be **FULLY INSERTED** into the lower steering shaft assembly prior to tightening the intermediate steering shaft lower bolt. Failure to properly assemble the intermediate steering shaft to the lower steering shaft assembly may result in loss of steering or possible bodily injury.

7. To ensure the intermediate steering shaft (1) is installed in the lower steering shaft assembly (2) correctly, pull each shaft in opposite directions to try and separate the shafts.

If the shafts separate, as shown in the graphic, then remove the bolt and connect the shafts correctly. The bolt **MUST** go through **BOTH** of the shafts for correct installation.

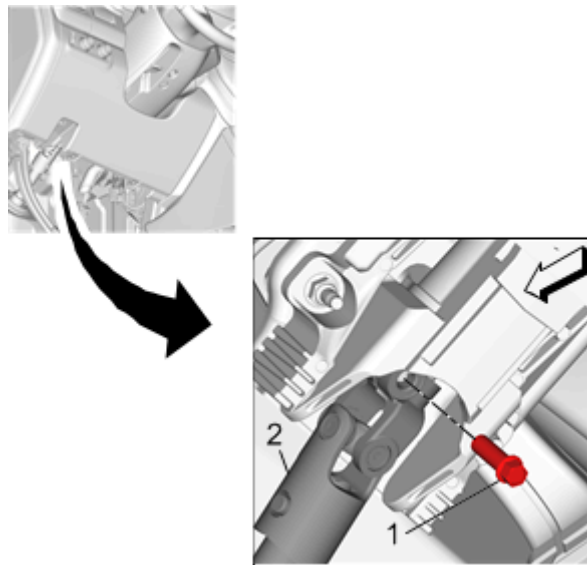


**Fig. 17: Intermediate Steering Shaft Lower Bolt**

Courtesy of GENERAL MOTORS COMPANY

8. Intermediate Steering Shaft Lower Bolt (1) Tighten 45 N.m (33 lb ft)

## **INTERMEDIATE STEERING SHAFT REPLACEMENT**



**Fig. 18: Intermediate Steering Shaft And Upper Bolt**

Courtesy of GENERAL MOTORS COMPANY

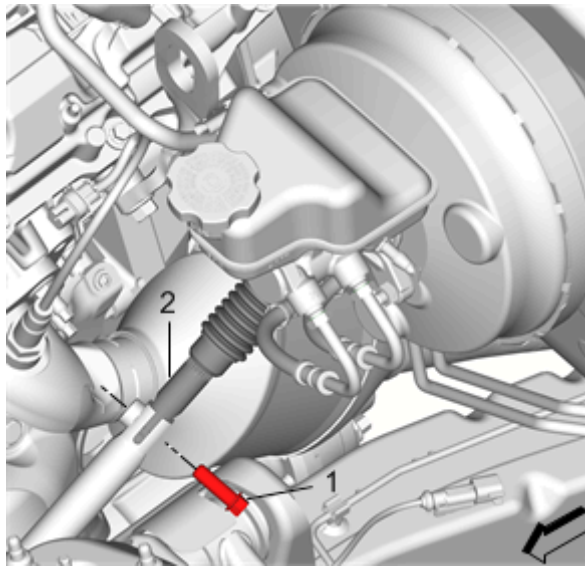
1. Rotate the intermediate steering shaft (2) until the head of the intermediate steering shaft upper bolt (1) is exposed.
2. Remove Intermediate Steering Shaft Upper Bolt (1).
3. Do NOT disconnect the intermediate steering shaft (2) from the steering column.

**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

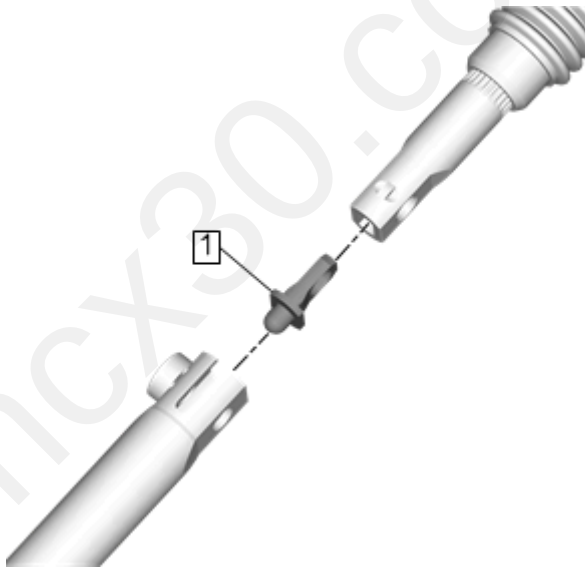
**After disconnecting these components, do not rotate the steering wheel or move the front tires and wheels. Failure to follow this procedure may cause the SIR coil assembly to become un-centered and cause possible damage to the SIR coil. If you think the SIR coil has become un-centered, refer to your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

4. Return the steering wheel to the straight ahead position and LOCK the steering column.
5. Separate Intermediate Steering Shaft (2) @Steering Column



**Fig. 19: Intermediate Steering Shaft Lower Bolt**  
 Courtesy of GENERAL MOTORS COMPANY

6. Remove Intermediate Steering Shaft Lower Bolt (1)
7. Separate Intermediate Steering Shaft (2) @Lower Steering Shaft Assembly



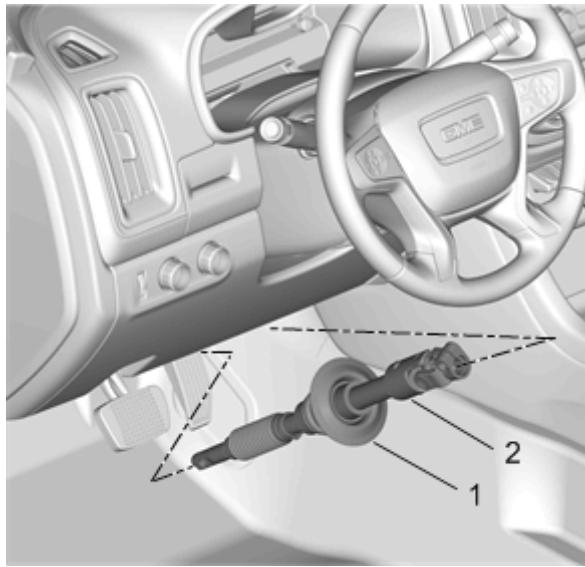
**Fig. 20: Plastic Insert**  
 Courtesy of GENERAL MOTORS COMPANY

**WARNING:** Prior to intermediate steering shaft reassembly, remove the plastic insert located at the bottom of the intermediate steering shaft. Failure to remove this insert may result in binding in the steering system or possible bodily injury.

8. Remove the plastic insert (1) located at bottom of the intermediate steering shaft.

DISCARD the insert.

9. If the plastic insert (1) is missing, it may have fallen into the lower steering shaft assembly. The insert **MUST** be removed prior to intermediate steering shaft reassembly.

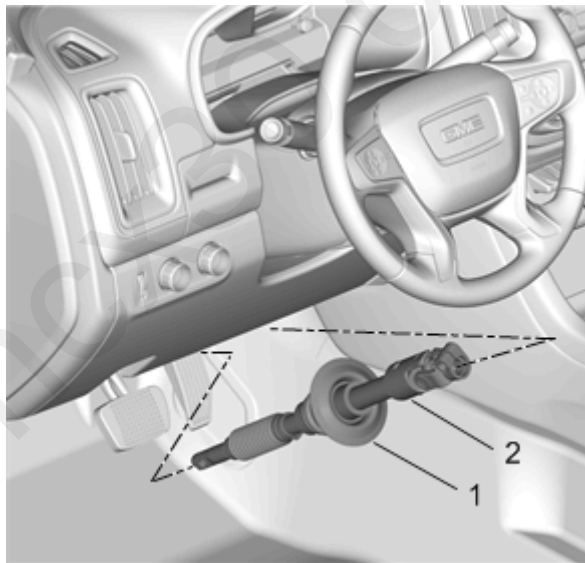


**Fig. 21: Dash Panel**

Courtesy of GENERAL MOTORS COMPANY

10. Separate the intermediate steering shaft seal from the dash panel (1).
11. Remove Intermediate Steering Shaft (2).

#### Installation Procedure



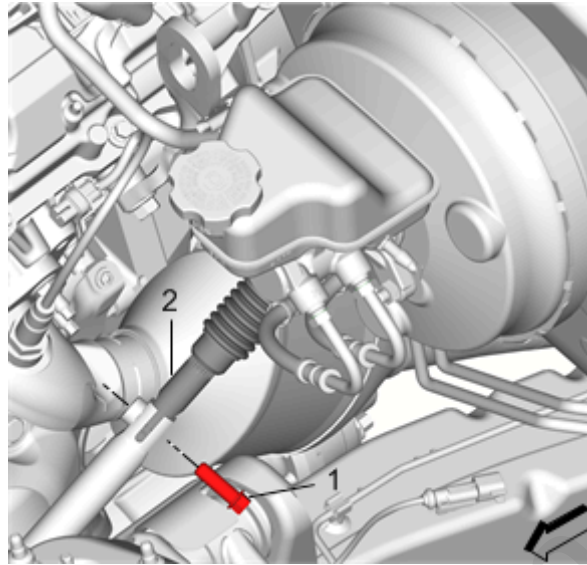
**Fig. 22: Dash Panel**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** There is a yellow stripe on the intermediate steering shaft seal. Once the yellow stripe is visible from the engine compartment side of the dash panel, then the seal is fully seated.

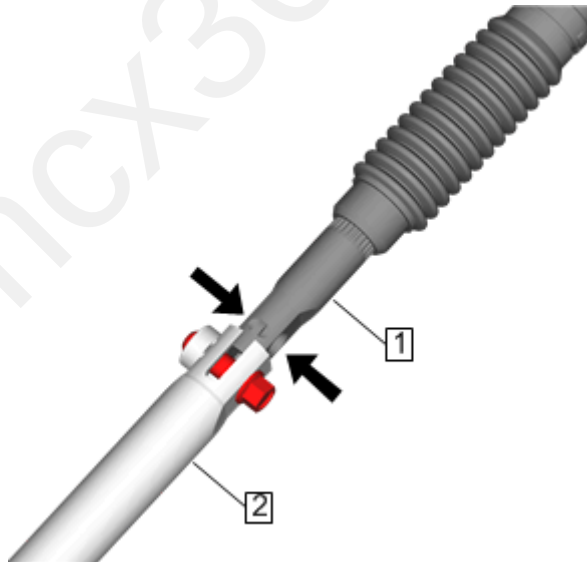
1. Position the intermediate steering shaft in the vehicle using the following steps:
  1. Push the intermediate steering shaft (2) and boot through the dash panel from inside the passenger compartment.
  2. Pull the intermediate steering shaft and boot from the engine compartment side until the intermediate steering shaft seal (1) is fully seated.

nsure the yellow stripe on the intermediate steering shaft seal (1) is showing on the engine compartment side of the dash panel.



**Fig. 23: Intermediate Steering Shaft Lower Bolt**  
Courtesy of GENERAL MOTORS COMPANY

2. Install Intermediate Steering Shaft (2) @Lower Steering Shaft Assembly
3. Install Intermediate Steering Shaft Lower Bolt (1), but do NOT tighten
  1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
  2. Apply thread locking adhesive to the bolt. [Adhesives, Fluids, Lubricants, and Sealers](#)

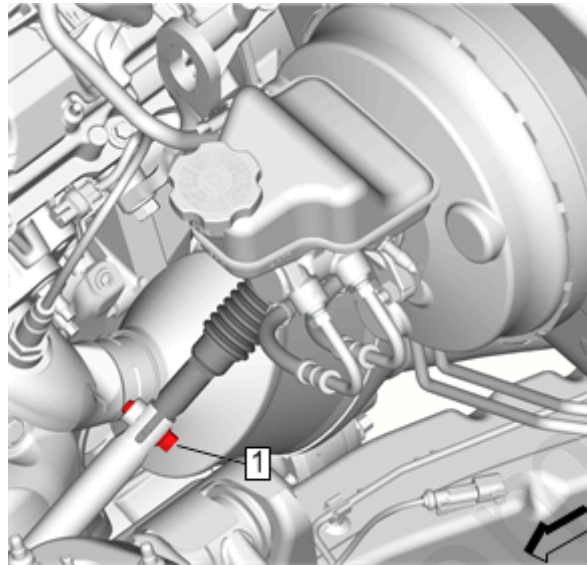


**Fig. 24: Intermediate Steering Shaft**  
Courtesy of GENERAL MOTORS COMPANY

**WARNING:** The intermediate steering shaft must be FULLY INSERTED into the lower steering shaft assembly prior to tightening the intermediate steering shaft lower bolt. Failure to properly assemble the intermediate steering shaft to the lower steering shaft assembly may result in loss of steering or possible bodily injury.

re the intermediate steering shaft (1) is installed in the lower steering shaft assembly (2) correctly, pull each shaft in opposite directions to try and separate the shafts.

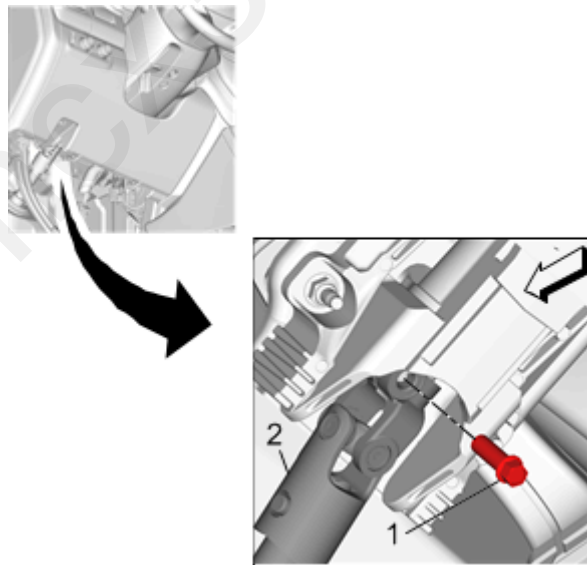
If the shafts separate, as shown in the graphic, then remove the bolt and connect the shafts correctly. The bolt **MUST** go through **BOTH** of the shafts for correct installation.



**Fig. 25: Intermediate Steering Shaft Lower Bolt**  
Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Refer to **Fastener Caution** .

5. Intermediate Steering Shaft Lower Bolt (1) Tighten 45 N.m (33 lb ft)



**Fig. 26: Intermediate Steering Shaft And Upper Bolt**  
Courtesy of GENERAL MOTORS COMPANY

6. Install Intermediate Steering Shaft (2) @Steering Column
7. UNLOCK the steering column and turn the steering wheel until the intermediate steering shaft upper bolt (1) can be installed.
8. Install Intermediate Steering Shaft Upper Bolt (1)

lean the threads of the bolt with denatured alcohol or equivalent and allow to dry.

2. Apply thread locking adhesive to the bolt. [Adhesives, Fluids, Lubricants, and Sealers](#)

9. Intermediate Steering Shaft Upper Bolt (1) Tighten 45 N.m (33 lb ft)

## STEERING COLUMN ACCIDENT DAMAGE INSPECTION

**CAUTION:** Vehicles involved in accidents that result in any of the following kinds of damage or situations, may also have a damaged or misaligned steering column:

- Frame damage
- Major body damage
- Sheet metal damage
- If the steering column has been impacted
- If the supplemental inflatable restraints system was deployed

### Inspection Procedure

1. If the steering wheel airbag was deployed, replace the steering column. [Steering Column Replacement](#)

2. Remove Turn Signal Switch Bracket [Turn Signal Switch Bracket Replacement](#).

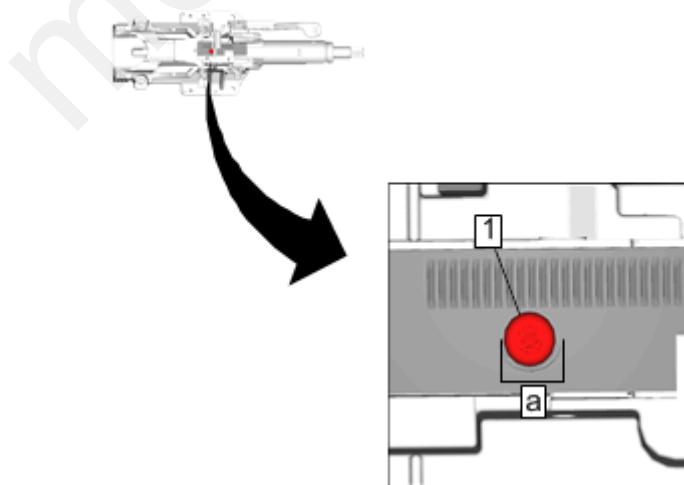
3. Unlock the steering column adjustment lever before removing the steering column from the vehicle:

- Replace the steering column if the adjustment lever cannot be fully unlocked.
- In the vehicle, with the adjustment lever unlocked, press forward on the steering wheel with a force of 50 N (11 lbf)-100 N (22 lbf) while adjusting the steering column up and down. If there is evidence of ratcheting teeth or the steering column will not adjust up and down, replace the steering column.

### [Steering Column Replacement](#)

4. Remove Steering Column. [Steering Column Replacement](#)

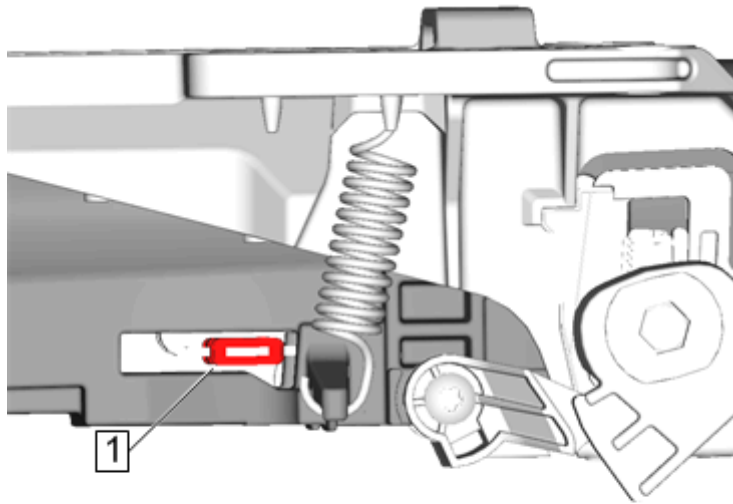
5. Rotate the steering column shaft and verify the shaft turns freely and without interference.



**Fig. 27: E/A Strap Retaining Screw**

Courtesy of GENERAL MOTORS COMPANY

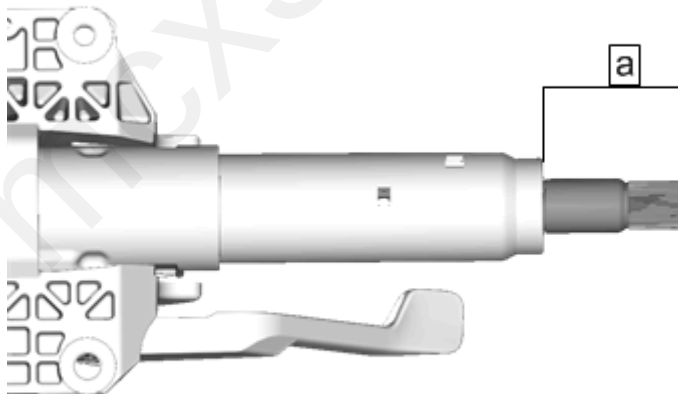
6. Verify there is no visual damage to the Energy Absorbing (E/A) strap and that the E/A strap is not deformed. On Rake and Telescope steering columns, verify the E/A strap retaining screw (1) is centered within +/- 0.7 mm (0.028 in) to the screw access hole (a) in the E/A strap.



**Fig. 28: Telescope Bumper**

Courtesy of GENERAL MOTORS COMPANY

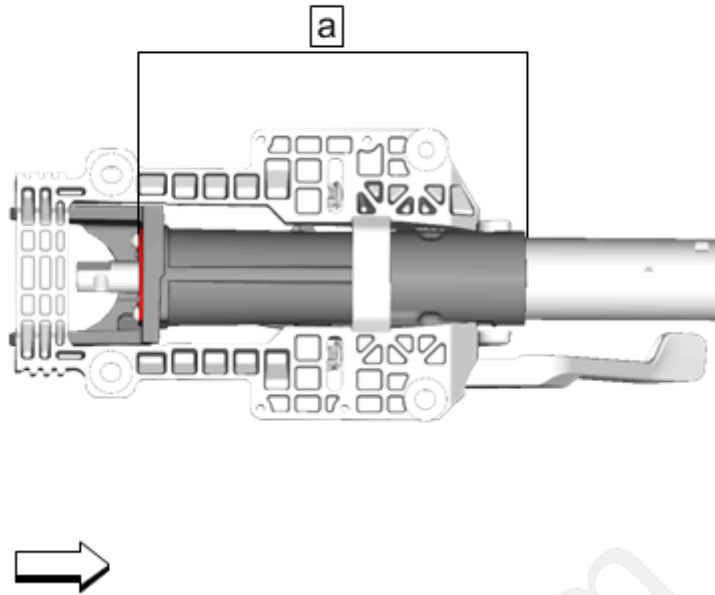
7. Verify that the telescope bumper (1) on the E/A strap does not contact the upper or lower surfaces of the lower steering column jacket opening during telescoping of the steering column.



**Fig. 29: Measure Length Of Upper Steering Shaft**

Courtesy of GENERAL MOTORS COMPANY

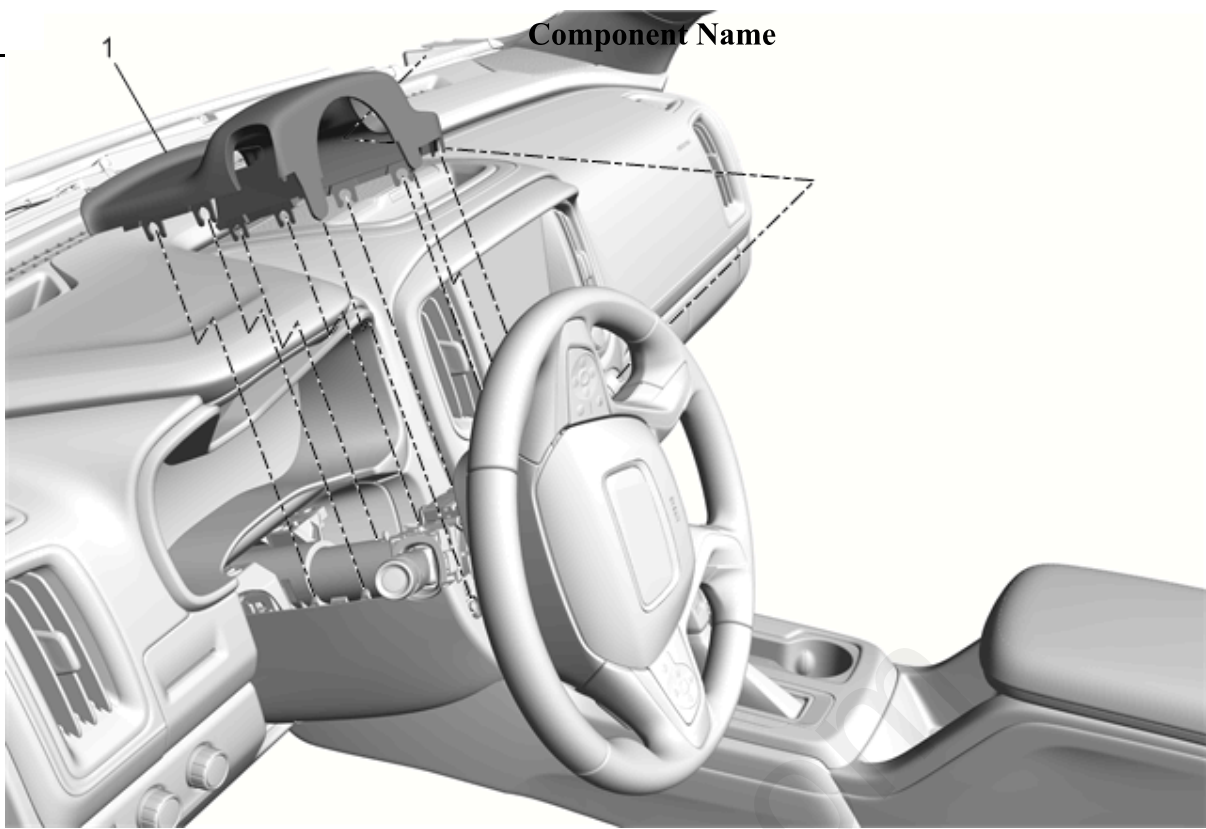
8. Measure the length of the upper steering shaft from the end of the shaft to the steering column upper jacket:
  - Rake Only: The measured length (a) must be greater than 61 mm (2 in).
  - Rake and Telescope: The measured length (a) must be greater than 61 mm (2 in).



**Fig. 30: Measure Length Of Upper Steering Column Jacket**  
Courtesy of GENERAL MOTORS COMPANY

9. Telescope the steering column to the full extended position and measure the length of the upper steering column jacket and lower steering column jacket INCLUDING the lower bearing adapter:
  - Rake Only: The measured length (a) must be greater than 365 mm (14 in).
  - Rake and Telescope: The measured length (a) must be greater than 385 mm (15 in).
10. If the steering column fails ANY of the measurement specifications, replace the steering column. **Steering Column Replacement**
11. If the steering column passes ALL of the measurement specifications, install the OLD steering column and reassemble all components. **Steering Column Replacement**

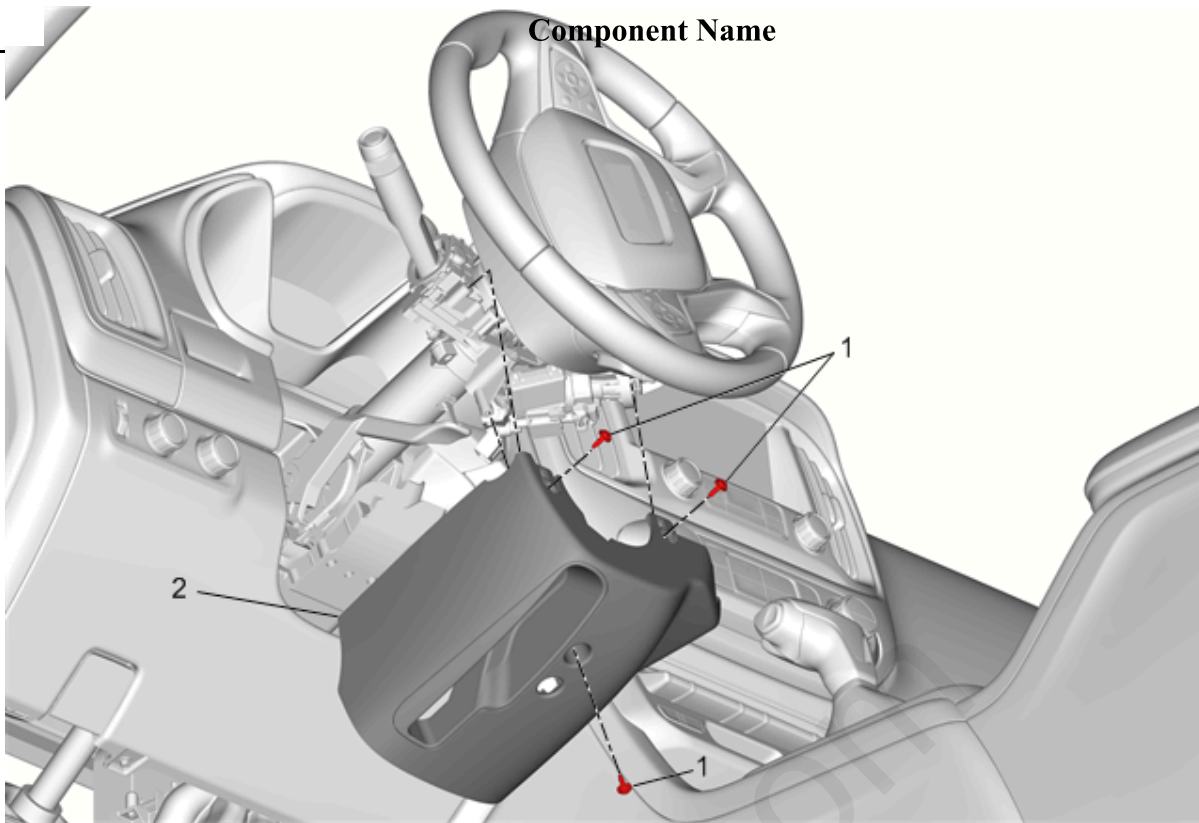
## **STEERING COLUMN UPPER TRIM COVER REPLACEMENT**



**Fig. 31: Steering Column Upper Trim Cover**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                                                                                                                  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Steering Column Upper Trim Cover<br><b>Procedure</b><br>Use a flat bladed plastic trim tool in order to release the tabs securing the upper trim cover to the lower trim cover. |

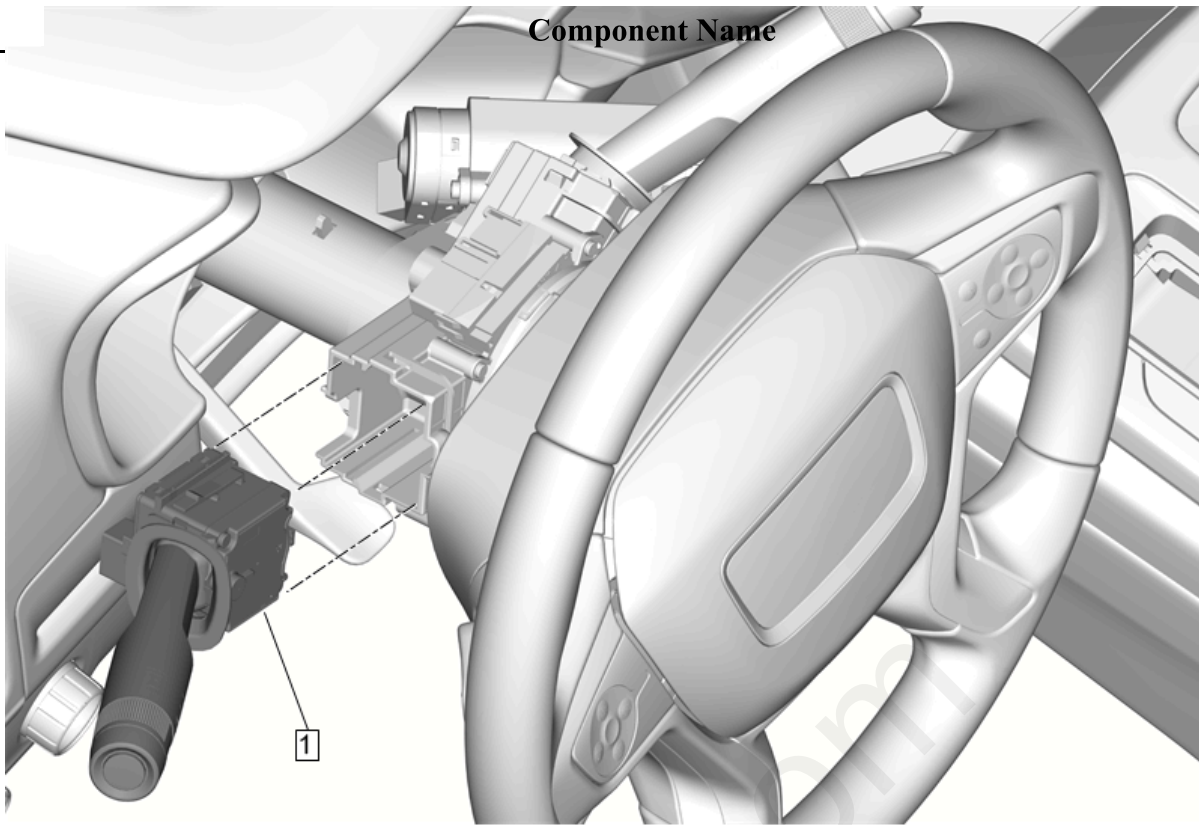
## STEERING COLUMN LOWER TRIM COVER REPLACEMENT



**Fig. 32: Steering Column Lower Trim Cover**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                              | Component Name                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the steering column upper trim cover. Refer to <a href="#">Steering Column Upper Trim Cover Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                           |
| 1                                                                                                                                                    | Steering Column Lower Trim Cover Bolt (Qty: 3)<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>1.5 N.m (13 lb in)                                                                                                                                                                                          |
| 2                                                                                                                                                    | Steering Column Lower Trim Cover<br><br><b>Procedures</b> <ol style="list-style-type: none"> <li>1. Extended the steering column to its furthest point to clear the instrument panel knee bolster.</li> <li>2. Turn the steering wheel left and right to access the fasteners securing the lower trim cover to the turn signal switch bracket.</li> </ol> |

## TURN SIGNAL SWITCH REPLACEMENT

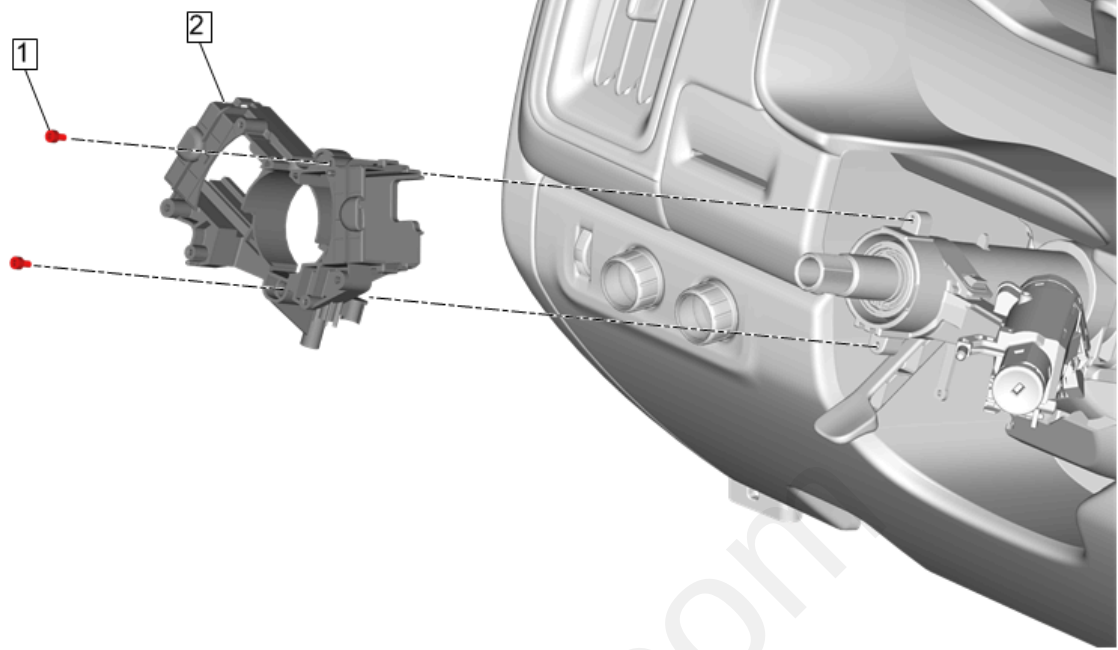


**Fig. 33: Turn Signal Switch**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                             | Component Name                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Steering Column Lower Trim Cover Replacement</u> |                                                                                                                                                                                                                                                            |
| 1                                                                                   | Turn Signal Switch Bracket<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Release the retaining tabs and remove the turn signal switch from the turn signal switch bracket.</li> </ol> |

## TURN SIGNAL SWITCH BRACKET REPLACEMENT



**Fig. 34: Turn Signal Switch Bracket**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                                                                                           | Component Name                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br><br>1. <a href="#">Steering Wheel Airbag Coil Replacement</a><br>2. <a href="#">Turn Signal Switch Replacement</a><br>3. <a href="#">Windshield Wiper and Washer Switch Replacement</a><br>4. <a href="#">Theft Deterrent Module Replacement</a> |                                                                                                                                                                  |
| 1                                                                                                                                                                                                                                                                                 | Turn Signal Switch Bracket Bolt (Qty: 2)<br><br><b>CAUTION:</b><br><b>Refer to <a href="#">Fastener Caution</a> .</b><br><br><b>Tighten</b><br>15 N.m (11 lb ft) |
| 2                                                                                                                                                                                                                                                                                 | Turn Signal Switch Bracket                                                                                                                                       |

**STEERING WHEEL REPLACEMENT**

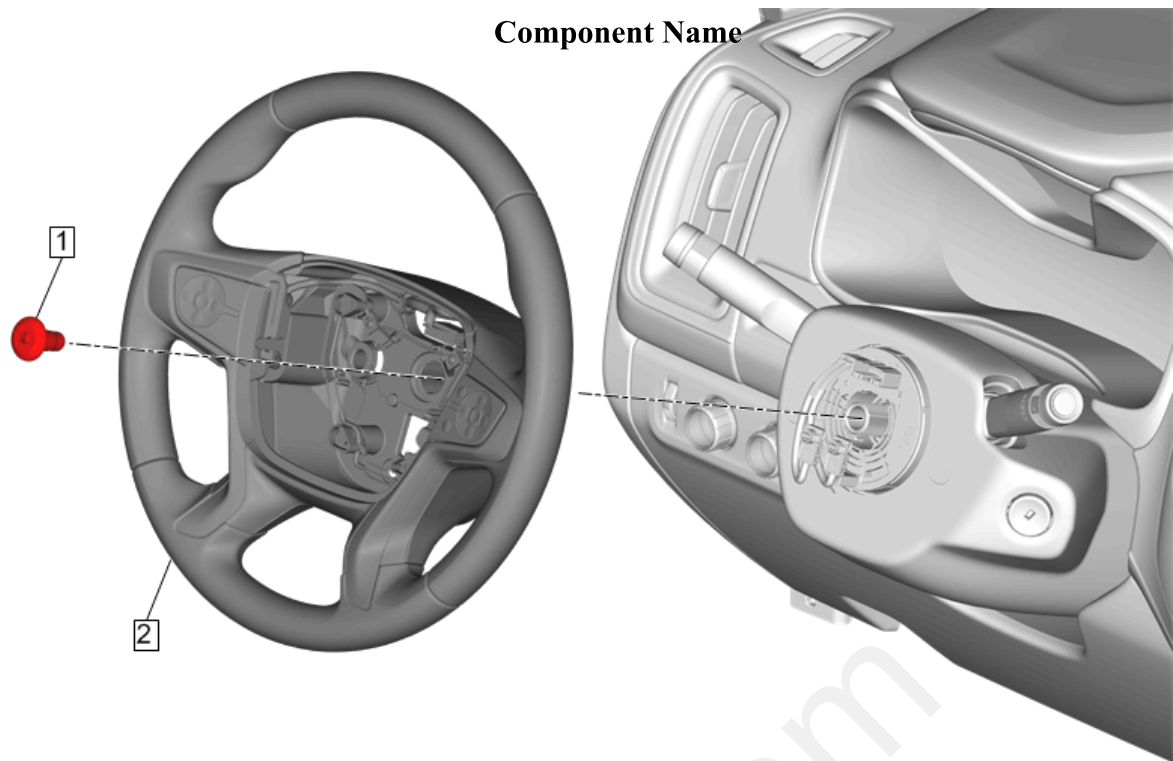


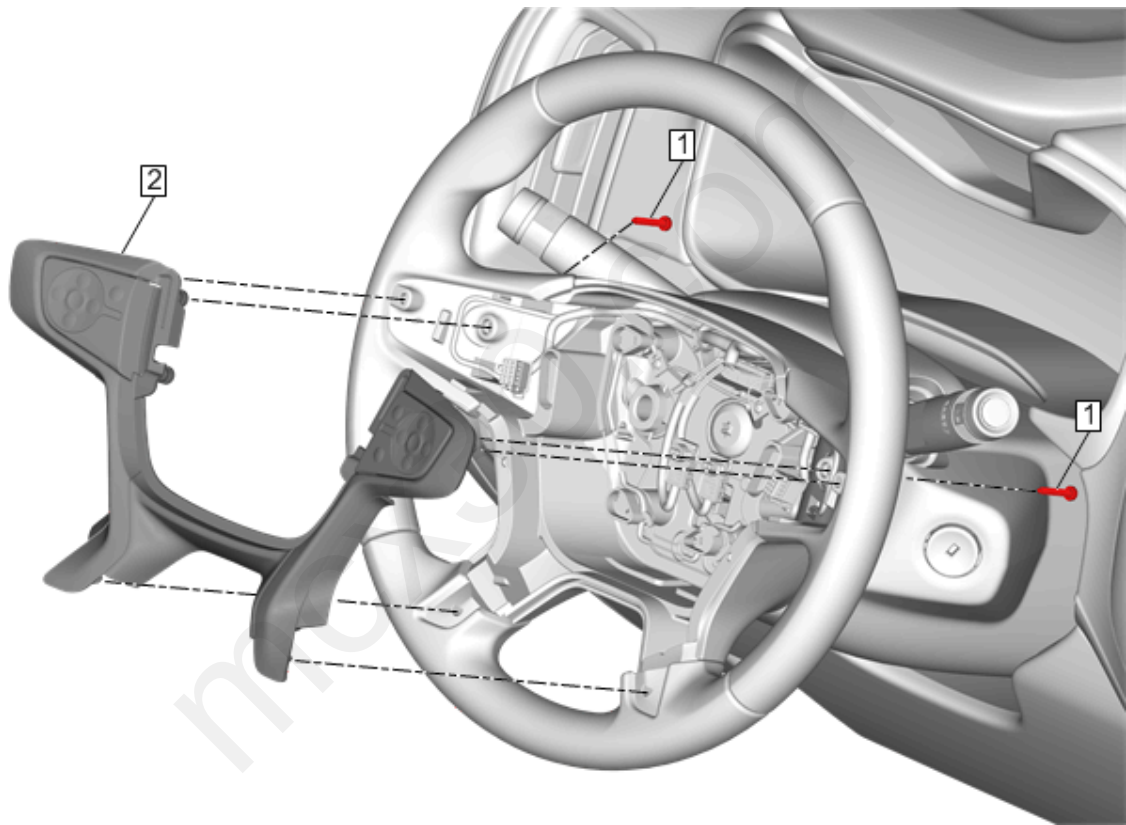
Fig. 35: Steering Wheel

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                  | Component Name                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Steering Wheel Airbag Replacement</u> |                                                                                                                                                                                                                                                                                                                                                                    |
| 1                                                                        | <p>Steering Wheel Bolt</p> <p><b>CAUTION:</b><br/>Refer to <u>Fastener Caution</u> .</p> <p><b>Procedure</b></p> <p>1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.</p> <p>2. Apply thread locking adhesive to the bolt. <u>Adhesives, Fluids, Lubricants, and Sealers</u></p> <p><b>Tighten</b><br/>45 N.m (33 lb ft)</p> |

| Component Name |                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2              | Steering Wheel                                                                                                                                                                                                                                                                                                                                                                                |
|                | <b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connectors.</li> <li>2. Install the steering wheel bolt until 2 to 3 threads are engaged.</li> <li>3. Wiggle the steering wheel until the wheel disengages completely.</li> <li>4. Steering Wheel Bolt»Remove</li> <li>5. Steering Wheel»Remove</li> <li>6. Transfer components as necessary.</li> </ol> |

**STEERING WHEEL SPOKE COVER REPLACEMENT (GMC, WITH RADIO CONTROLS)**

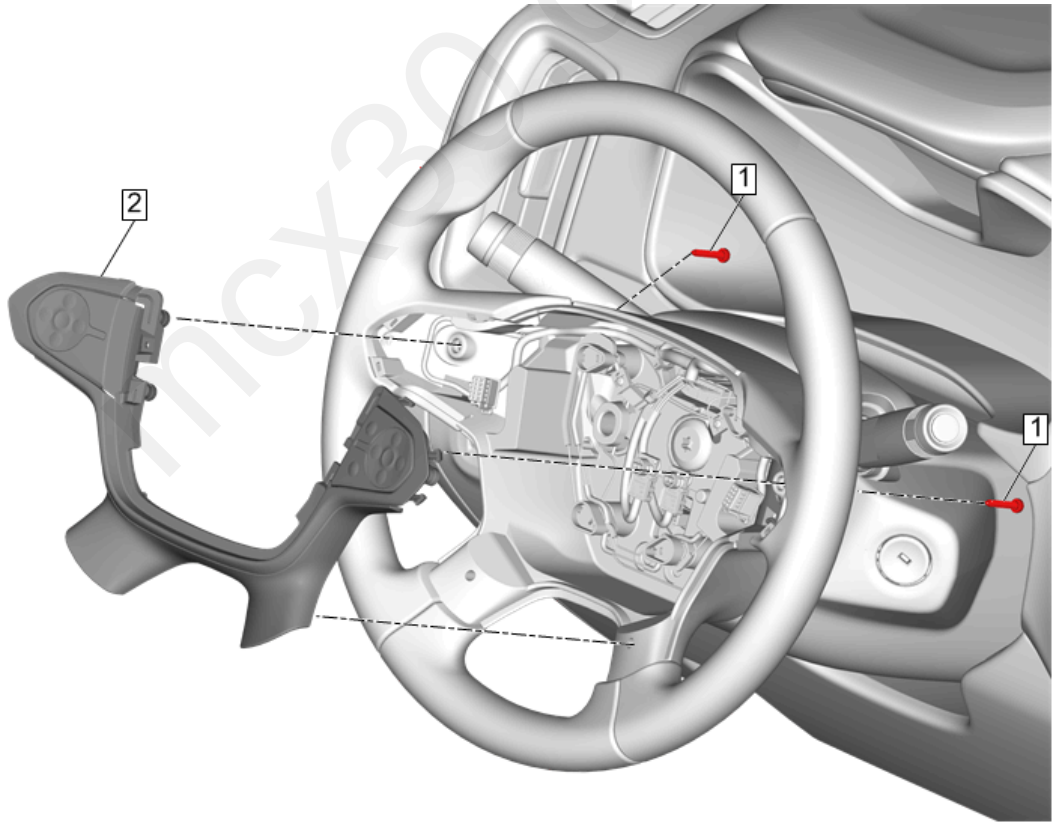


**Fig. 36: Steering Wheel Spoke Cover (GMC)**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                  | Component Name |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Preliminary Procedures</b> <ol style="list-style-type: none"> <li>1. <a href="#">Steering Wheel Airbag Replacement</a></li> <li>2. <a href="#">Radio Control Switch Replacement - Rear</a></li> </ol> |                |
|                                                                                                                                                                                                          |                |

| Component Name |                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | <p>Steering Wheel Spoke Cover Fastener (Qty: 2)</p> <p><b>CAUTION:</b><br/>Refer to <a href="#">Fastener Caution</a> .</p> <p><b>Tighten</b><br/>1.5 N.m (13 lb in)</p>                                                                                                                                                                                                                           |
| 2              | <p>Steering Wheel Spoke Cover</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"> <li>1. Use the appropriate tool to gently release the retaining tabs on the cover.</li> <li>2. Disconnect the electrical connectors.</li> <li>3. Transfer components as necessary.</li> </ol> <p><b>NOTE:</b><br/>Gently release the tabs one by one, using care to avoid snapping any tabs off.</p> |

**STEERING WHEEL SPOKE COVER REPLACEMENT (CHEVROLET, WITH RADIO CONTROLS)**



**Fig. 37: Steering Wheel Spoke Cover (Chevrolet)**  
 Courtesy of GENERAL MOTORS COMPANY

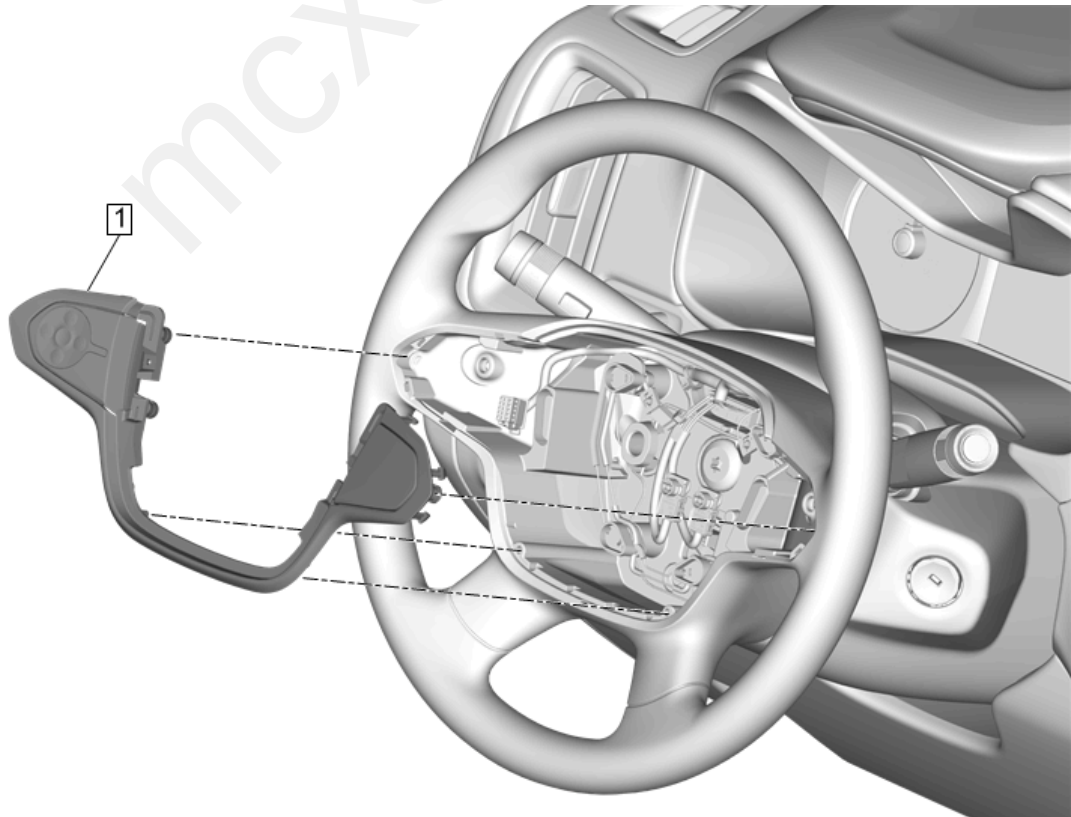
| Callout | Component Name |
|---------|----------------|
|         |                |

**Preliminary Procedures**

1. Steering Wheel Airbag Replacement
2. Radio Control Switch Replacement - Rear

|   |                                                                                                                                                                                                                                                                                                                                                                                                   |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Steering Wheel Spoke Cover Fastener (Qty: 2)</p> <p><b>CAUTION:</b><br/>Refer to <u>Fastener Caution</u> .</p> <p><b>Tighten</b><br/>1.5 N.m (13 lb in)</p>                                                                                                                                                                                                                                    |
| 2 | <p>Steering Wheel Spoke Cover</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"> <li>1. Use the appropriate tool to gently release the retaining tabs on the cover.</li> <li>2. Disconnect the electrical connectors.</li> <li>3. Transfer components as necessary.</li> </ol> <p><b>NOTE:</b><br/>Gently release the tabs one by one, using care to avoid snapping any tabs off.</p> |

**STEERING WHEEL SPOKE COVER REPLACEMENT (CHEVROLET OR GMC, WITHOUT RADIO CONTROLS)**

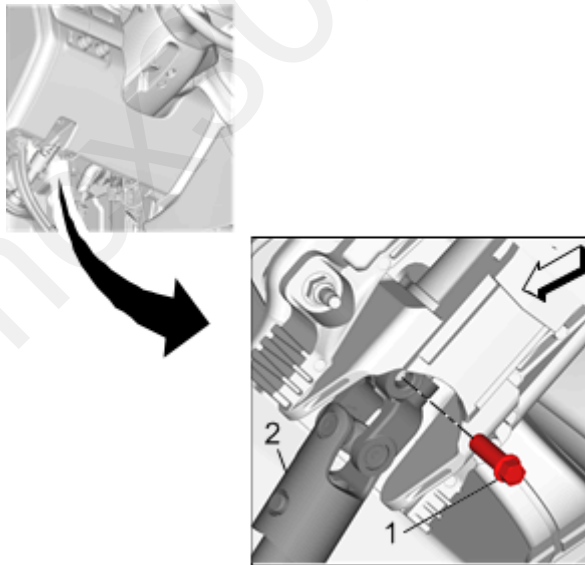


| Callout                                                                  | Component Name                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Steering Wheel Airbag Replacement</u> |                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1                                                                        | Steering Wheel Spoke Cover<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Use the appropriate tool to gently release the retaining tabs on the cover.</li> <li>2. Disconnect the electrical connector.</li> <li>3. Transfer components as necessary.</li> </ol> <p><b>NOTE:</b><br/><b>Gently release the tabs one by one, using care to avoid snapping any tabs off.</b></p> |

## STEERING COLUMN REPLACEMENT

### Removal Procedure

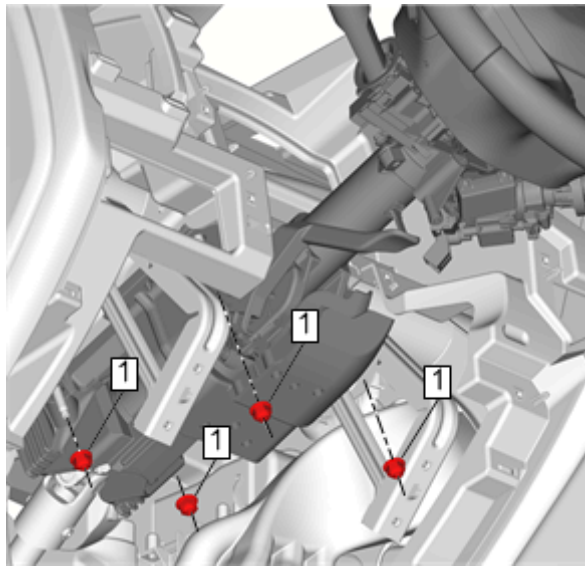
1. Remove Instrument Panel Assembly. Instrument Panel Assembly Replacement
2. Remove Instrument Panel Steering Column Opening Closeout. Instrument Panel Steering Column Opening Closeout Replacement



**Fig. 39: Intermediate Steering Shaft And Upper Bolt**

Courtesy of GENERAL MOTORS COMPANY

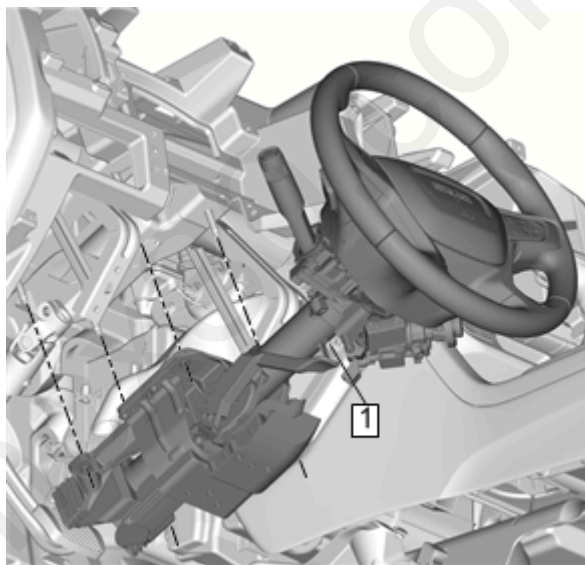
3. Separate Intermediate Steering Shaft (1) @Steering Column. Intermediate Steering Shaft Replacement
4. Remove Steering Column Lower Trim Cover. Steering Column Lower Trim Cover Replacement
5. Disconnect the steering column electrical connectors as necessary.



**Fig. 40: Steering Column Nut**

Courtesy of GENERAL MOTORS COMPANY

6. Remove Steering Column Nut (1).

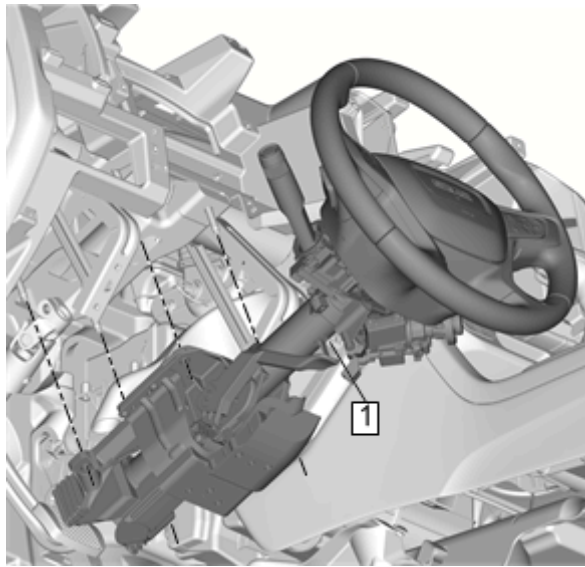


**Fig. 41: Steering Column**

Courtesy of GENERAL MOTORS COMPANY

7. Remove the steering column (1) from the vehicle.
8. Transfer components as necessary.

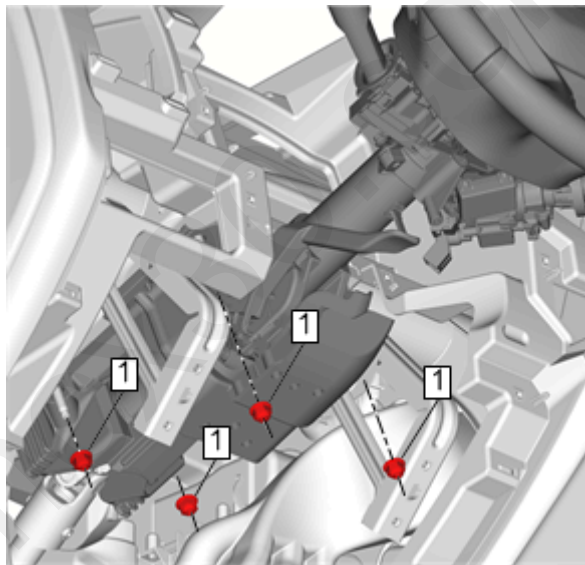
### **Installation Procedure**



**Fig. 42: Steering Column**

Courtesy of GENERAL MOTORS COMPANY

1. Position the steering column (1) in the vehicle.

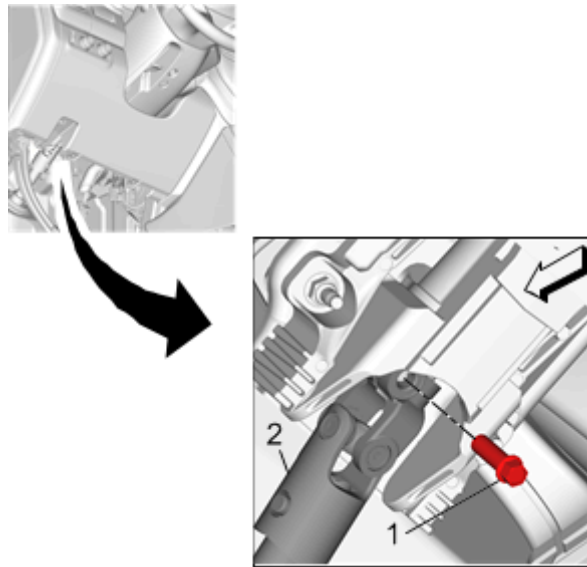


**Fig. 43: Steering Column Nut**

Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Refer to [Fastener Caution](#) .

2. Install Steering Column Nut (1) and tighten 22 N.m (16 lb ft)
3. Connect the steering column electrical connectors.
4. Install Steering Column Lower Trim Cover. [Steering Column Lower Trim Cover Replacement](#)



**Fig. 44: Intermediate Steering Shaft And Upper Bolt**  
**Courtesy of GENERAL MOTORS COMPANY**

5. Install Intermediate Steering Shaft (1) @Steering Column. [Intermediate Steering Shaft Replacement](#)
6. Install Instrument Panel Steering Column Opening Closeout. [Instrument Panel Steering Column Opening Closeout Replacement](#)
7. Install Instrument Panel Assembly. [Instrument Panel Assembly Replacement](#)

## **DESCRIPTION AND OPERATION**

### **STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION**

The steering wheel and column have the following 4 primary functions:

- Vehicle steering
- Vehicle security
- Driver convenience
- Driver safety

#### **Vehicle Steering**

The steering wheel is the first link between the driver and the vehicle. The steering wheel is fastened to a steering shaft within the steering column. At the lower end of the steering column, the intermediate steering shaft connects the steering column to the steering gear.

#### **Vehicle Security**

The steering wheel and column may have theft deterrent components mounted and designed into the steering column.

#### **Driver Convenience**

The steering wheel and column may have driver controls attached for convenience and comfort.

#### **Driver Safety**

The steering column has safety features to protect the driver.

## **Energy-Absorbing Steering Column**

The energy-absorbing steering column compresses in the event of a front-end collision, which reduces the chance of injury to the driver. The energy-absorbing feature, collapsible steering shaft, and break away mounting features help reduce the injury in the event of an accident.

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