

2018 STEERING

Steering Wheel And Column - Equinox & Terrain

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Threaded Fastener/Component Tightening Specifications

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	Specification
	Metric (English)
Steering Column Lock Control Module Bolt-Front	-
Steering Column Lock Control Module Bolt-Lower	-
Steering Wheel Bolt	45 N.m (33 lb ft)

Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Intermediate Steering Shaft Lower Bolt	49 N.m (36 lb ft)
Intermediate Steering Shaft Upper Bolt	49 N.m (36 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 Spoke Cover Fastener	1.5 N.m (13 lb in)

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada
Steering Wheel Bolt	Thread Locking Adhesive	19333511	10953489

SCHEMATIC WIRING DIAGRAMS

STEERING WHEEL WIRING SCHEMATICS

Heated Steering Wheel (UVD)

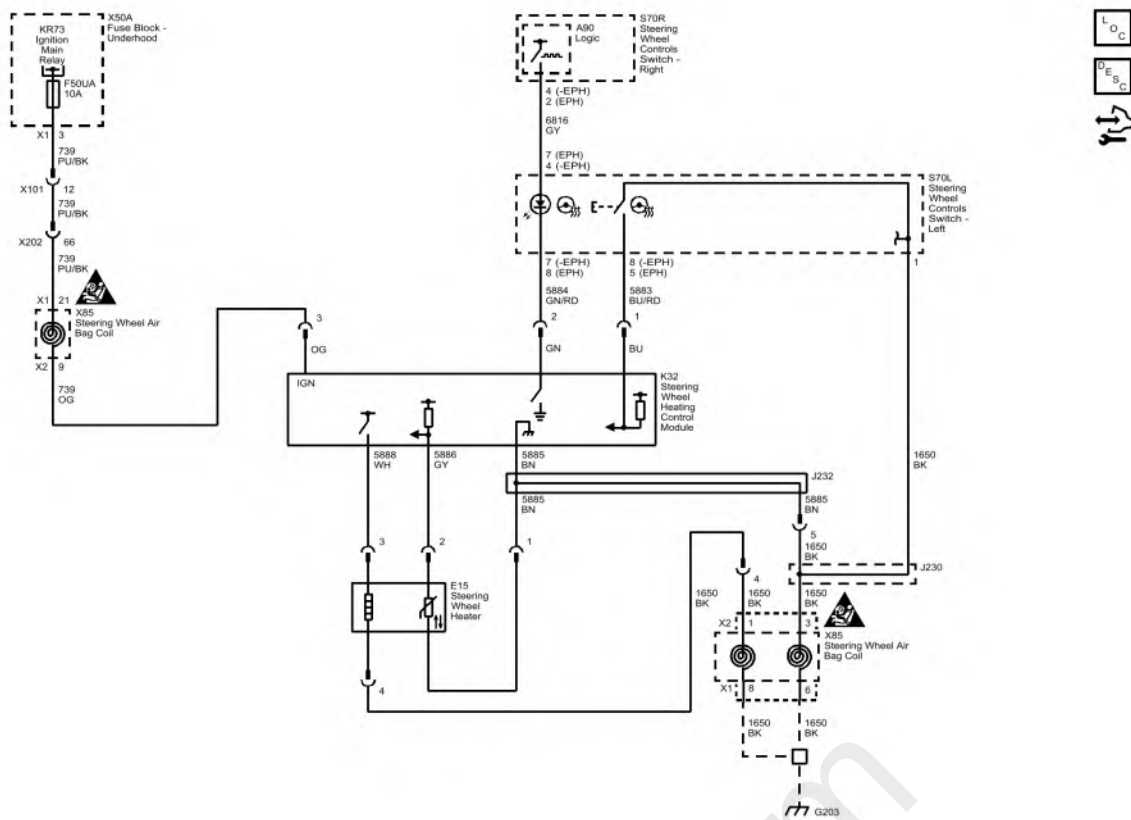


Fig. 1: Heated Steering Wheel (UVD)
Courtesy of GENERAL MOTORS COMPANY

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](#)
- [High Effort While Tilting Column](#)
- [Noise While Driver Adjusting Column](#)
- [Noise in Steering Column](#)
- [Looseness in Steering Column](#)

HEATED STEERING WHEEL INDICATOR MALFUNCTION (WITHOUT EPH)

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	1	-	-
Switch Signal	2	1	-	-
Indicator Dimming Control 2	3	3	-	-
Heated Steering Wheel Switch LED Control	4	3	3	-
Switch Ground	-	1	-	-
Module Ground	-	1	-	-
1. Heated Steering Wheel System Inoperative 2. Heated Steering Wheel Always ON 3. LED Inoperative 4. LED Always ON				

Circuit/System Description

The Steering Wheel Heating Control Module controls the heated steering wheel and the heated steering wheel ON indicator based on an input from the heated steering wheel switch. When the heated steering wheel switch is pressed, the switch signal circuit is pulled to ground. This indicates to the heating steering wheel control module that steering wheel heat is requested. When the request is seen, the heated steering module supplies voltage to the indicator lamp and supplies voltage to the heating elements, which are internal to the steering wheel.

Reference Information

Schematic Reference

Steering Wheel Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Steering Wheel and Column Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Verification

1. Ignition ON.
2. Verify the S70L Steering Wheel Controls Switch - Left is OFF. The steering wheel heater indicator should not be illuminated and the left and right sides of the steering wheel should not be warm.
 - **The steering wheel is always warm**
Refer to [Heated Steering Wheel Malfunction \(Without EPH\)](#)
 - **The steering wheel does not become warm and the heater indicator is illuminated**
Refer to Circuit/System Testing
 - **Go to next step: The steering wheel does not become warm and the heater indicator is not illuminated**

3. Press and release the S70L Steering Wheel Controls Switch - Left. The steering wheel heater indicator should illuminate and the left and right sides of the steering wheel should become warm.

- **The steering wheel does not become warm**

Refer to [Heated Steering Wheel Malfunction \(Without EPH\)](#).

- **The steering wheel becomes warm and the heater indicator does not illuminate**

Refer to Circuit/System Testing

- **Go to next step: The steering wheel becomes warm and the heater indicator illuminates**

4. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.

2. Test for less than 10 Ω between the following ground circuit terminals and ground:

- Terminal 4
- Terminal 5
- **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

- **Go to next step: If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition voltage circuit terminal 3 and ground.

- **If the test lamp does not illuminate and the circuit fuse is good**

1. Ignition OFF, remove the test lamp.

2. Test for less than 2 Ω in the ignition circuit end to end.

- If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to [Power Mode Mismatch](#).
- If 2 Ω or greater

3. Verify the in-line fuse is OK and there is voltage at the fuse.

- If the in-line fuse is blown, replace the K32 Steering Wheel Heating Control Module.
- If the in-line fuse is OK, repair the open/high resistance in the circuit.

- **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF.

2. Test for infinite resistance between the ignition voltage circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K32 Steering Wheel Heating Control Module.

- **Go to next step: If the test lamp illuminates**

5. Ignition OFF, connect the X1 in-line harness connector. Disconnect the harness connector at the S70L Steering Wheel Control Switch - Left. Ignition ON.

6. Test for 10 - 13 V between the signal voltage circuit terminal 4 and ground.

- **If less than 10 V**

1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Control Switch - Right.

2. Test for infinite resistance between the signal circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance

3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the S70R Steering Wheel Control Switch - Right.

• **Go to next step: If within 10 - 13 V**

7. Ignition ON.

8. Test for less than 1 V between the control circuit terminal 7 and ground.

• **If greater than 1 V**

1. Disconnect the X1 in-line harness connector at the K32 Steering Wheel Heating Control Module.
2. Test for less than 1 V between the control circuit terminal 2 and ground.
 - If greater than 1 V, repair the short to voltage on the circuit.
 - If less than 1 V
3. Replace the K32 Steering Wheel Heating Control Module.

• **Go to next step: If less than 1 V**

9. Ignition OFF.

10. Test for infinite resistance between the control circuit terminal 7 and ground.

• **If less than infinite resistance**

1. Disconnect the X1 in-line harness connector at the K32 Steering Wheel Heating Control Module.
2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Replace the K32 Steering Wheel Heating Control Module.

• **Go to next step: If infinite resistance**

11. Connect the S70L Steering Wheel Control Switch - Left.

12. Install a 3 A fused jumper wire between the ground circuit terminal 2 and ground. Ignition ON.

13. Verify the steering wheel heat indicator is illuminated.

• **If the steering wheel heat indicator does not illuminate**

1. Disconnect the K32 Steering Wheel Heating Control Module harness connector.
2. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the S70L Steering Wheel Control Switch - Left

• **Go to next step: If the steering wheel heat indicator illuminates**

14. Replace the K32 Steering Wheel Heating Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair

- Refer to [Cruise Control Switch Replacement \(Equinox\)](#), [Cruise Control Switch Replacement \(Terrain\)](#)
- Refer to [Steering Wheel Replacement \(Equinox\)](#), [Steering Wheel Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for control module replacement, programming and setup

HEATED STEERING WHEEL INDICATOR MALFUNCTION (EPH)

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	1	-	-
Switch Signal	2	1	-	-
Indicator Dimming Control 2	3	3	-	-
Heated Steering Wheel Switch LED Control	4	3	3	-
Switch Ground	-	1	-	-
Module Ground	-	1	-	-
1. Heated Steering Wheel System Inoperative 2. Heated Steering Wheel Always ON 3. LED Inoperative 4. LED Always ON				

Circuit/System Description

The Steering Wheel Heating Control Module controls the heated steering wheel and the heated steering wheel ON indicator based on an input from the heated steering wheel switch. When the heated steering wheel switch is pressed, the switch signal circuit is pulled to ground. This indicates to the heating steering wheel control module that steering wheel heat is requested. When the request is seen, the heated steering module supplies voltage to the indicator lamp and supplies voltage to the heating elements, which are internal to the steering wheel.

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- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Verification

1. Ignition ON.
2. Verify the S70L Steering Wheel Controls Switch - Left is OFF. The steering wheel heater indicator should not be illuminated and the left and right sides of the steering wheel should not be warm.
 - **The steering wheel is always warm**
Refer to [Heated Steering Wheel Malfunction \(EPH\)](#)
 - **The steering wheel does not become warm and the heater indicator is illuminated**
Refer to Circuit/System Testing
 - **Go to next step: The steering wheel does not become warm and the heater indicator is not illuminated**

3. Press and release the S70L Steering Wheel Controls Switch - Left. The steering wheel heater indicator should illuminate and the left and right sides of the steering wheel should become warm.

- **The steering wheel does not become warm**

Refer to [Heated Steering Wheel Malfunction \(EPH\)](#).

- **The steering wheel becomes warm and the heater indicator does not illuminate**

Refer to Circuit/System Testing

- **Go to next step: The steering wheel becomes warm and the heater indicator illuminates**

4. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.

2. Test for less than 10 Ω between the following ground circuit terminals and ground:

- Terminal 4
- Terminal 5
- **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

- **Go to next step: If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition voltage circuit terminal 3 and ground.

- **If the test lamp does not illuminate and the circuit fuse is good**

1. Ignition OFF, remove the test lamp.

2. Test for less than 2 Ω in the ignition circuit end to end.

- If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to [Power Mode Mismatch](#).
- If 2 Ω or greater

3. Verify the in-line fuse is OK and there is voltage at the fuse.

- If the in-line fuse is blown, replace the K32 Steering Wheel Heating Control Module.
- If the in-line fuse is OK, repair the open/high resistance in the circuit.

- **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF.

2. Test for infinite resistance between the ignition voltage circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K32 Steering Wheel Heating Control Module.

- **Go to next step: If the test lamp illuminates**

5. Ignition OFF, connect the X1 in-line harness connector. Disconnect the harness connector at the S70L Steering Wheel Control Switch - Left. Ignition ON.

6. Test for 10 - 13 V between the signal voltage circuit terminal 7 and ground.

- **If less than 10 V**

1. Ignition OFF, disconnect the harness connector at the S70R Steering Wheel Control Switch - Right.

2. Test for infinite resistance between the signal circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance

3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the S70R Steering Wheel Control Switch - Right.
- **Go to next step: If within 10 - 13 V**
7. Ignition ON.
8. Test for less than 1 V between the control circuit terminal 8 and ground.
 - **If greater than 1 V**
 1. Disconnect the X1 in-line harness connector at the K32 Steering Wheel Heating Control Module.
 2. Test for less than 1 V between the control circuit terminal 2 and ground.
 - If greater than 1 V, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Replace the K32 Steering Wheel Heating Control Module.
 - **Go to next step: If less than 1 V**
9. Ignition OFF.
10. Test for infinite resistance between the control circuit terminal 8 and ground.
 - **If less than infinite resistance**
 1. Disconnect the X1 in-line harness connector at the K32 Steering Wheel Heating Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Replace the K32 Steering Wheel Heating Control Module.
 - **Go to next step: If infinite resistance**
11. Connect the S70L Steering Wheel Control Switch - Left.
12. Install a 3 A fused jumper wire between the ground circuit terminal 2 and ground. Ignition ON.
13. Verify the steering wheel heat indicator is illuminated.
 - **If the steering wheel heat indicator does not illuminate**
 1. Disconnect the K32 Steering Wheel Heating Control Module harness connector.
 2. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the S70L Steering Wheel Control Switch - Left
 - **Go to next step: If the steering wheel heat indicator illuminates**
14. Replace the K32 Steering Wheel Heating Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair

- Refer to [Cruise Control Switch Replacement \(Equinox\)](#), [Cruise Control Switch Replacement \(Terrain\)](#)
- Refer to [Steering Wheel Replacement \(Equinox\)](#), [Steering Wheel Replacement \(Terrain\)](#)
- Refer to [Control Module References](#) for control module replacement, programming and setup

HEATED STEERING WHEEL MALFUNCTION (WITHOUT EPH)

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	1	-	-
Switch Signal	2	1	-	-
Switch and LED Ground	-	1	-	-
Temperature Sensor Signal	3	3	3	-
Temperature Sensor Ground	-	3	-	-
Heater Element Control	3	3	2	-
Heater Element Ground	-	3	-	-
Module Ground	-	1	-	-
1. Heated Steering Wheel System Inoperative 2. Heated Steering Wheel Always ON 3. Heated Steering Wheel Inoperative				

Circuit/System Description

The heated steering wheel control module controls the heated steering wheel and the heated steering wheel ON indicator based on an input from the heated steering wheel switch. When the heated steering wheel switch is pressed, the switch signal circuit is pulled to ground. This indicates to the heating steering wheel control module that steering wheel heat is requested. When the request is seen, the heated steering wheel control module supplies voltage to the indicator lamp and supplies voltage to the heating elements, which are internal to the steering wheel.

Diagnostic Aids

- Before replacing the steering wheel for complaints of not getting hot enough, a reliable infrared temperature gun should be used to measure the temperature at various points around the rim. The steering wheel's normal operating temperature is 32°C (89.6°F) and takes approximately 10 min to reach that temperature. It may take up to 20 min for the normal operating temperature to stabilize within the steering wheel rim. There may be spike in temperature during the first 3 - 4 min before it stabilizes at normal operating temperature. The steering wheel will take longer to heat up if the vehicle temperature is below -21°C (-5.8°F). The steering wheel heater will not operate when the steering wheel temperature is above 32°C (89.6°F).

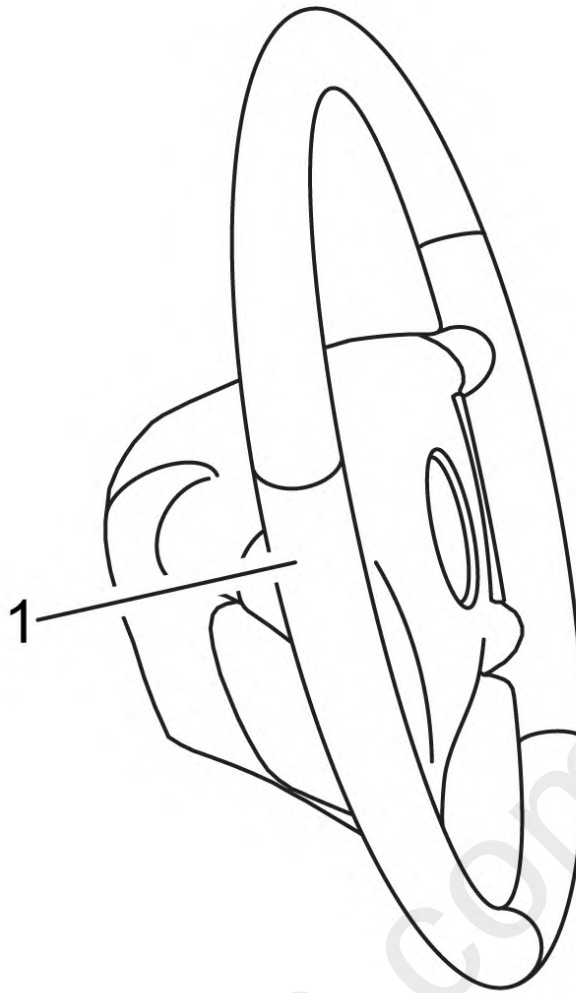


Fig. 2: Steering Wheel Rim Infrared Measurement Point
Courtesy of GENERAL MOTORS COMPANY

- The infrared measurements are made at the rim (1) at the 3 and 9 o'clock positions of the steering wheel.

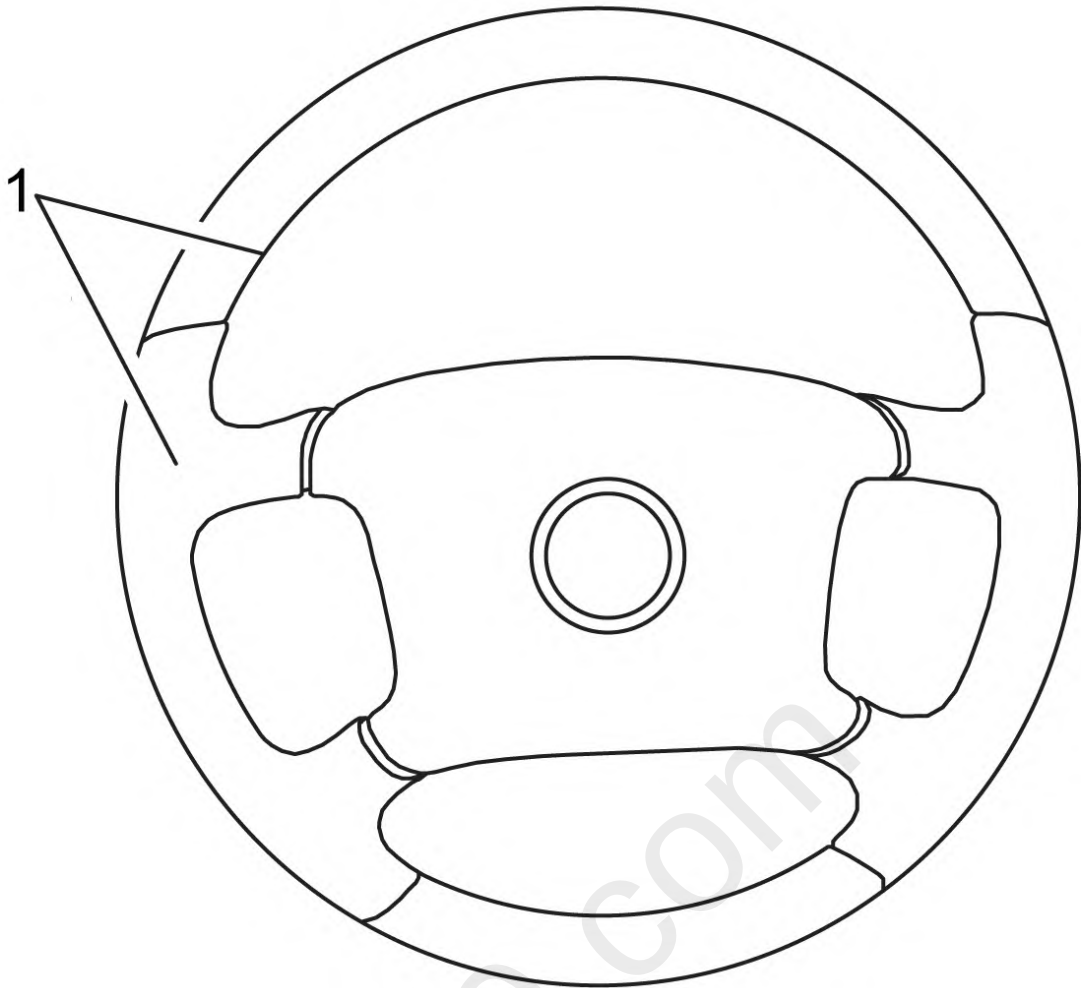


Fig. 3: Temperature Measurements Should Not Be Made On Face
Courtesy of GENERAL MOTORS COMPANY

- The wood sections and the stitching are not heated. Temperature measurements should not be made on the face (1) to insure accurate temperature readings.

Reference Information

Schematic Reference

Steering Wheel Wiring Schematics

Connector End View Reference

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Description and Operation

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- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Circuit/System Verification

Using an Infrared Temperature Gun

1. Engine running, all accessories OFF.
2. Verify the steering wheel heater switch is OFF and the steering wheel heater indicator should not be illuminated.

- **If the heater indicator is illuminated**

Refer to [Heated Steering Wheel Indicator Malfunction \(Without EPH\)](#).

- **Go to next step: If the heater indicator is not illuminated**

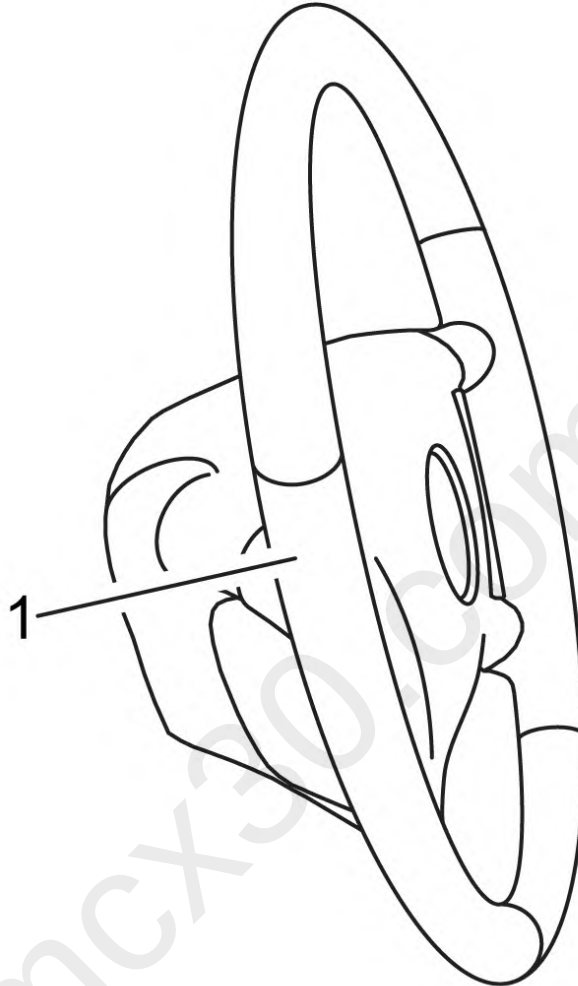


Fig. 4: Steering Wheel Rim Infrared Measurement Point

Courtesy of GENERAL MOTORS COMPANY

NOTE: The Infrared Temperature Gun should be within 50.8 mm (2 in) and parallel to the steering wheel rim when taking temperature readings.

3. Measure the temperature readings at the 3 and 9 o'clock positions on the steering wheel rim (1).
4. Verify that the steering wheel temperature is 25°C (77°F) or below.

- **If the steering wheel temperature is greater than 25°C (77°F)**

Allow the steering wheel to cool before proceeding to next step.

- **Go to next step: If the steering wheel temperature is 25°C (77°F) or below**

5. Press and release the steering wheel heater switch. The steering wheel heater indicator should illuminate. Allow the steering wheel to heat for a minimum of 10 min so that the temperature stabilizes.

- **If the heater indicator does not illuminate**

Refer to [Heated Steering Wheel Indicator Malfunction \(Without EPH\)](#).

- Go to next step: If the heater indicator illuminates

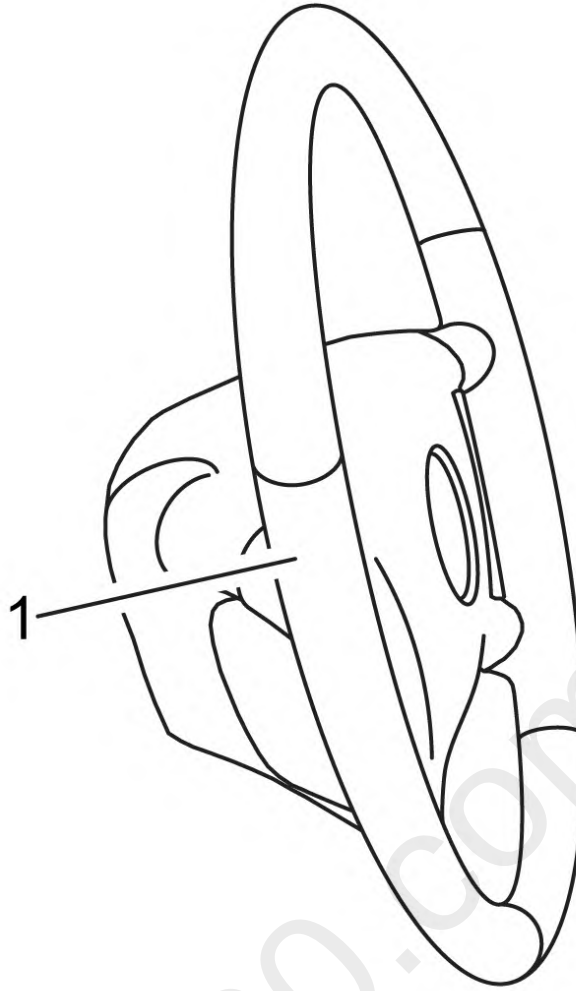


Fig. 5: Steering Wheel Rim Infrared Measurement Point

Courtesy of GENERAL MOTORS COMPANY

NOTE: The Infrared Temperature Gun should be within 50.8 mm (2 in) and parallel to the steering wheel rim when taking temperature readings.

6. Measure the temperature readings at the 3 and 9 o'clock positions on the steering wheel rim (1).
7. Verify that the steering wheel temperature is greater than 28°C (82.4°F) within 20 min.

- If after 20 minutes the measured temperature is less than 28°C (82.4°F)

Refer to Circuit System Testing below.

- Go to next step: If after 20 minutes the measured temperature is 28°C (82.4°F) or greater

8. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.
2. Test for less than $10\ \Omega$ between the following ground circuit terminals and ground:

- Terminal 4
- Terminal 5
- If $10\ \Omega$ or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

• **Go to next step: If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition voltage circuit terminal 3 and ground.

• **If the test lamp does not illuminate and the circuit fuse is good**

1. Ignition OFF, remove the test lamp.

2. Test for less than 2 Ω in the ignition circuit end to end.

- If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to [Power Mode Mismatch](#).
- If 2 Ω or greater

3. Verify the in-line fuse is OK and there is voltage at the fuse.

- If the in-line fuse is blown, replace the K32 Steering Wheel Heating Control Module.
- If the in-line fuse is OK, repair the open/high resistance in the circuit.

• **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF.

2. Test for infinite resistance between the ignition voltage circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K32 Steering Wheel Heating Control Module.

• **Go to next step: If the test lamp illuminates**

5. Ignition OFF, connect the X1 in-line harness connector. Disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left.

6. Test for less than 10 Ω between the ground circuit terminal 1 and ground.

• **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

• **Go to next step: If less than 10 Ω**

7. Ignition ON.

8. Test for B+ between the signal circuit terminal 8 and ground.

• **If less than B+**

1. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Steering Wheel Heating Control Module.

2. Test for infinite resistance between the control circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance

3. Test for less than 2 Ω in the control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K32 Steering Wheel Heating Control Module.

• **Go to next step: If B+**

9. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.

10. Ignition ON.

11. Test for less than 1 V between the signal circuit terminal 1 and ground.

• **If greater than 1 V**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

12. Ignition OFF, connect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.
13. Place the S70L Steering Wheel Controls Switch - Left in the OFF position.
14. Test for infinite resistance between terminal 8 and terminal 1 at the S70L Steering Wheel Controls Switch - Left.

- **If less than infinite resistance**

Replace the S70L Steering Wheel Controls Switch - Left.

- **Go to next step: If infinite resistance**

15. Place the S70L Steering Wheel Controls Switch - Left in the ON position.
16. Test for less than 60 Ω between terminal 8 and terminal 1.

- **If 60 Ω or greater**

Replace the S70L Steering Wheel Controls Switch - Left

- **Go to next step: If less than 60 Ω**

17. Disconnect the X2 in-line harness connector at the E15 Steering Wheel Heater.
18. Test for less than 10 Ω between the low reference circuit terminal 4 at the K32 Steering Wheel Heating Control Module and ground.

- **If 10 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 10 Ω**

19. Test for 1.5 - 3.0 Ω between the control circuit terminal 3 and the low reference circuit terminal 4 at the E15 Steering Wheel Heater.

- **If not within the specified range**

Replace the E15 Steering Wheel Heater.

- **Go to next step: If within the specified range**

20. Test for 9 - 12 k Ω between the signal circuit terminal 2 and the voltage reference circuit terminal 1 on the E15 Steering Wheel Heater.

- **If not within the specified range**

Replace the E15 Steering Wheel Heater.

- **Go to next step: If within the specified range**

21. Replace the K32 Steering Wheel Heating Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Cruise Control Switch Replacement \(Equinox\)](#), [Cruise Control Switch Replacement \(Terrain\)](#).
- Refer to [Steering Wheel Replacement \(Equinox\)](#), [Steering Wheel Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for control module replacement, programming and setup.

HEATED STEERING WHEEL MALFUNCTION (EPH)

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
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Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	1	-	-
Switch Signal	2	1	-	-
Switch and LED Ground	-	1	-	-
Temperature Sensor Signal	3	3	3	-
Temperature Sensor Ground	-	3	-	-
Heater Element Control	3	3	2	-
Heater Element Ground	-	3	-	-
Module Ground	-	1	-	-
1. Heated Steering Wheel System Inoperative 2. Heated Steering Wheel Always ON 3. Heated Steering Wheel Inoperative				

Circuit/System Description

The heated steering wheel control module controls the heated steering wheel and the heated steering wheel ON indicator based on an input from the heated steering wheel switch. When the heated steering wheel switch is pressed, the switch signal circuit is pulled to ground. This indicates to the heating steering wheel control module that steering wheel heat is requested. When the request is seen, the heated steering wheel control module supplies voltage to the indicator lamp and supplies voltage to the heating elements, which are internal to the steering wheel.

Diagnostic Aids

- Before replacing the steering wheel for complaints of not getting hot enough, a reliable infrared temperature gun should be used to measure the temperature at various points around the rim. The steering wheel's normal operating temperature is 32°C (89.6°F) and takes approximately 10 min to reach that temperature. It may take up to 20 min for the normal operating temperature to stabilize within the steering wheel rim. There may be spike in temperature during the first 3 - 4 min before it stabilizes at normal operating temperature. The steering wheel will take longer to heat up if the vehicle temperature is below -21°C (-5.8°F). The steering wheel heater will not operate when the steering wheel temperature is above 32°C (89.6°F).

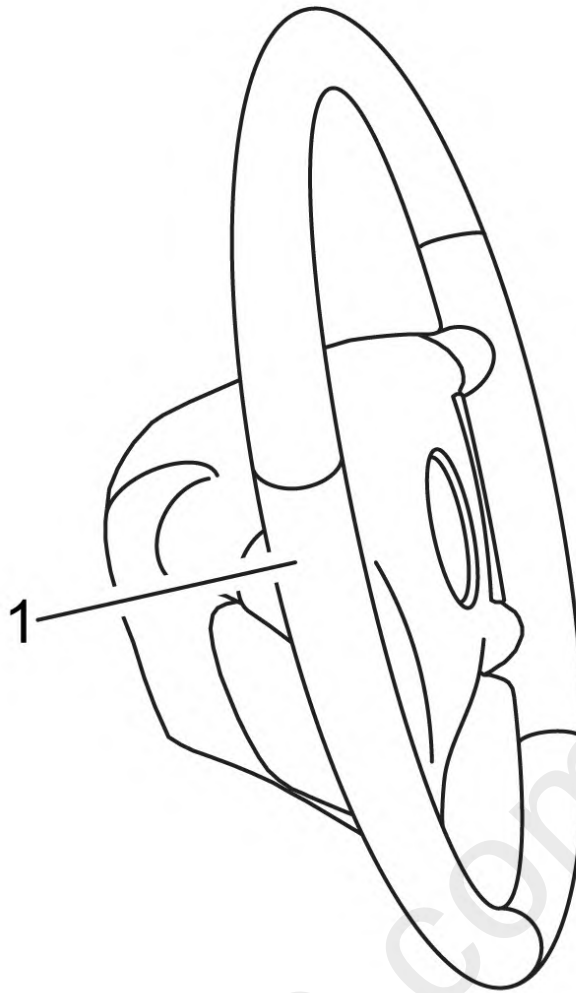


Fig. 6: Steering Wheel Rim Infrared Measurement Point
Courtesy of GENERAL MOTORS COMPANY

- The infrared measurements are made at the rim (1) at the 3 and 9 o'clock positions of the steering wheel.

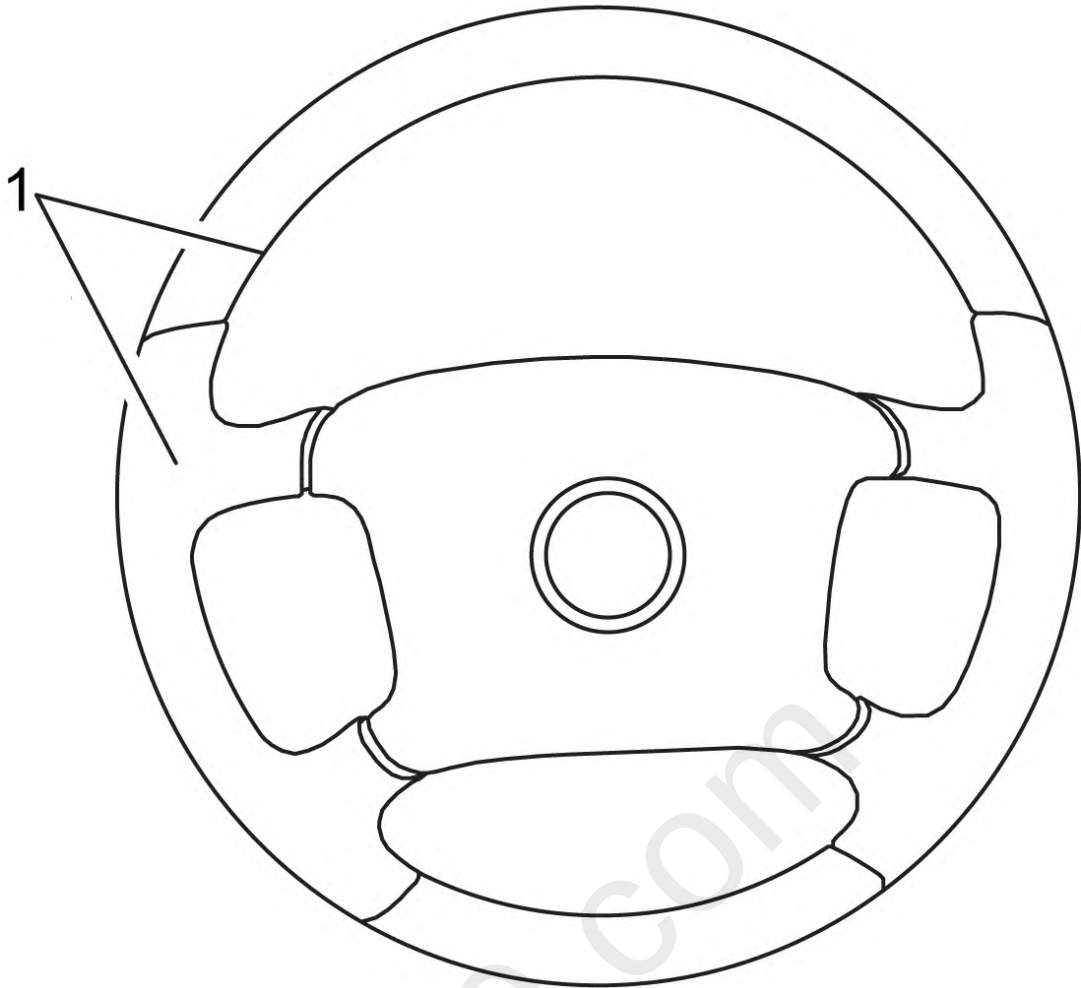


Fig. 7: Temperature Measurements Should Not Be Made On Face
Courtesy of GENERAL MOTORS COMPANY

- The wood sections and the stitching are not heated. Temperature measurements should not be made on the face (1) to insure accurate temperature readings.

Reference Information

Schematic Reference

Steering Wheel Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Steering Wheel and Column Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Verification

Using an Infrared Temperature Gun

1. Engine running, all accessories OFF.
2. Verify the steering wheel heater switch is OFF and the steering wheel heater indicator should not be illuminated.

- **If the heater indicator is illuminated**

Refer to [Heated Steering Wheel Indicator Malfunction \(EPH\)](#).

- **Go to next step: If the heater indicator is not illuminated**

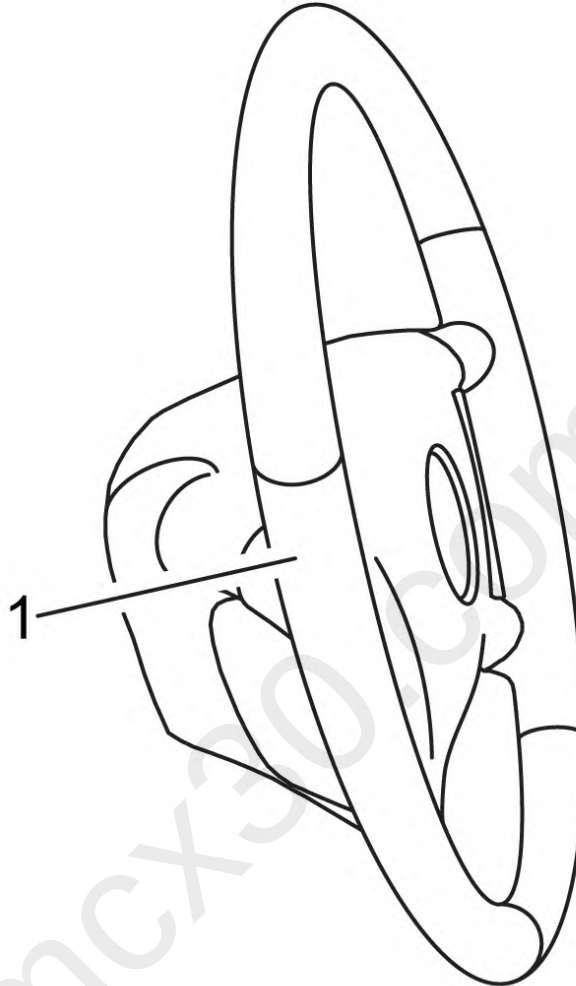


Fig. 8: Steering Wheel Rim Infrared Measurement Point

Courtesy of GENERAL MOTORS COMPANY

NOTE: The Infrared Temperature Gun should be within 50.8 mm (2 in) and parallel to the steering wheel rim when taking temperature readings.

3. Measure the temperature readings at the 3 and 9 o'clock positions on the steering wheel rim (1).
4. Verify that the steering wheel temperature is 25°C (77°F) or below.

- **If the steering wheel temperature is greater than 25°C (77°F)**

Allow the steering wheel to cool before proceeding to next step.

- **Go to next step: If the steering wheel temperature is 25°C (77°F) or below**

5. Press and release the steering wheel heater switch. The steering wheel heater indicator should illuminate. Allow the steering wheel to heat for a minimum of 10 min so that the temperature stabilizes.

- **If the heater indicator does not illuminate**

Refer to [Heated Steering Wheel Indicator Malfunction \(EPH\)](#).

- Go to next step: If the heater indicator illuminates

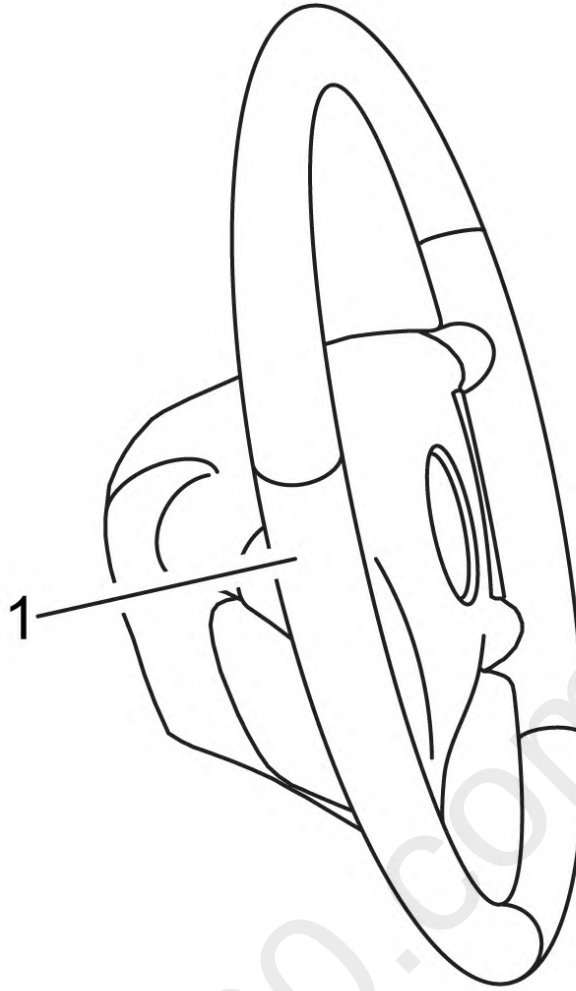


Fig. 9: Steering Wheel Rim Infrared Measurement Point

Courtesy of GENERAL MOTORS COMPANY

NOTE: The Infrared Temperature Gun should be within 50.8 mm (2 in) and parallel to the steering wheel rim when taking temperature readings.

6. Measure the temperature readings at the 3 and 9 o'clock positions on the steering wheel rim (1).

7. Verify that the steering wheel temperature is greater than 28°C (82.4°F) within 20 min.

- If after 20 minutes the measured temperature is less than 28°C (82.4°F)

Refer to Circuit System Testing.

- Go to next step: If after 20 minutes the measured temperature is 28°C (82.4°F) or greater

8. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.

2. Test for less than $10\ \Omega$ between the following ground circuit terminals and ground:

- Terminal 4
- Terminal 5
- If $10\ \Omega$ or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

• **Go to next step: If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition voltage circuit terminal 3 and ground.

• **If the test lamp does not illuminate and the circuit fuse is good**

1. Ignition OFF, remove the test lamp.

2. Test for less than 2 Ω in the ignition circuit end to end.

- If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to [Power Mode Mismatch](#).
- If 2 Ω or greater

3. Verify the in-line fuse is OK and there is voltage at the fuse.

- If the in-line fuse is blown, replace the K32 Steering Wheel Heating Control Module.
- If the in-line fuse is OK, repair the open/high resistance in the circuit.

• **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF.

2. Test for infinite resistance between the ignition voltage circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K32 Steering Wheel Heating Control Module.

• **Go to next step: If the test lamp illuminates**

5. Ignition OFF, connect the X1 in-line harness connector. Disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left.

6. Test for less than 10 Ω between the ground circuit terminal 1 and ground.

• **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

• **Go to next step: If less than 10 Ω**

7. Ignition ON.

8. Test for B+ between the signal circuit terminal 5 and ground.

• **If less than B+**

1. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Steering Wheel Heating Control Module.

2. Test for infinite resistance between the control circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance

3. Test for less than 2 Ω in the control circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K32 Steering Wheel Heating Control Module.

• **Go to next step: If B+**

9. Ignition OFF, disconnect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.

10. Ignition ON.

11. Test for less than 1 V between the signal circuit terminal 1 and ground.

• **If greater than 1 V**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

12. Ignition OFF, connect the X1 in-line harness connector at the K32 Heated Steering Wheel Control Module.
13. Place the S70L Steering Wheel Controls Switch - Left in the OFF position.
14. Test for infinite resistance between terminal 5 and terminal 1 at the S70L Steering Wheel Controls Switch - Left.

- **If less than infinite resistance**

Replace the S70L Steering Wheel Controls Switch - Left.

- **Go to next step: If infinite resistance**

15. Place the S70L Steering Wheel Controls Switch - Left in the ON position.
16. Test for less than 60 Ω between terminal 5 and terminal 1.

- **If 60 Ω or greater**

Replace the S70L Steering Wheel Controls Switch - Left

- **Go to next step: If less than 60 Ω**

17. Disconnect the X1 in-line harness connector at the E15 Steering Wheel Heater.
18. Test for less than 10 Ω between the low reference circuit terminal 4 at the K32 Steering Wheel Heating Control Module and ground.

- **If 10 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 10 Ω**

19. Test for 1.5 - 3.0 Ω between the control circuit terminal 3 and the low reference circuit terminal 4 at the E15 Steering Wheel Heater.

- **If not within the specified range**

Replace the E15 Steering Wheel Heater.

- **Go to next step: If within the specified range**

20. Test for 9 - 12 k Ω between the signal circuit terminal 2 and the voltage reference circuit terminal 1 on the E15 Steering Wheel Heater.

- **If not within the specified range**

Replace the E15 Steering Wheel Heater.

- **Go to next step: If within the specified range**

21. Replace the K32 Steering Wheel Heating Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Cruise Control Switch Replacement \(Equinox\)](#), [Cruise Control Switch Replacement \(Terrain\)](#).
- Refer to [Steering Wheel Replacement \(Equinox\)](#), [Steering Wheel Replacement \(Terrain\)](#).
- Refer to [Control Module References](#) for control module replacement, programming and setup.

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 Symptoms - Steering Wheel and Column

Step	Action	Yes	No
2	Verify that the steering column tilt function is inoperative. 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: • Tilt pivot pins • Tilt head lock shoes Are the components seized or corroded?	Go to Step 7	Go to Step 4
4	Inspect the tilt pivot pins for binding. 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. 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. Was the steering column wiring harness routed correctly?	Go to Step 11	Go to Step 10
7	Replace the steering column. Refer to Steering Column Replacement (Equinox) Steering Column Replacement (Terrain) . 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 Steering Column Replacement (Equinox) Steering Column Replacement (Terrain) . Did you complete the repair?	Go to Step 11	-
9	If serviceable, replace the tilt spring. Did you complete the repair?	Go to Step 11	-
10	Route the steering column wiring harness to the correct location. Did you correctly route the wiring harness?	Go to Step 11	-
11	Operate the steering column tilt function in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

HIGH EFFORT WHILE TILTING COLUMN

Condition	Action
The pivot bolt is damaged or misaligned.	Replace the steering column. Refer to Steering Column Replacement (Equinox) Steering Column Replacement (Terrain) .
The tilt lever assembly or the tilt teeth are damaged.	Replace the steering column. Refer to Steering Column Replacement (Equinox) Steering Column Replacement (Terrain) .

NOISE WHILE DRIVER ADJUSTING COLUMN

Condition	Action
Interference occurs in the column assembly pivot path.	Inspect the column jacket for wear patterns. Ensure that the mounting and the pivot bolts are properly installed and that the column is properly aligned in the vehicle.

Condition	Action
The tilt lever assembly is damaged.	Replace the steering column. Refer to Steering Column Replacement (Equinox) Steering Column Replacement (Terrain) .

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 Symptoms - Steering Wheel and Column
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation?	Go to Step 3	System OK
3	Inspect the steering column mounting features for the following conditions: - The steering column mounting fasteners are loose. - The steering column mounting features are sheared. Are the steering column mounting features loose or sheared?	Go to Step 10	Go to Step 4
4	Inspect the SIR/SRS coil for noise. Is the SIR/SRS coil noisy?	Go to Step 11	Go to Step 5
5	If equipped, inspect the lock plate retaining ring for correct installation. Is the lock plate retaining ring installed incorrectly?	Go to Step 12	Go to Step 6
6	Inspect the steering column upper and lower bearings for the following conditions: - Damage - Lubrication - Wear - Proper seating Are the bearings in need of repair or replacement?	Go to Step 13	Go to Step 7
7	Does the steering column tilt joint need to be lubricated?	Go to Step 14	Go to Step 8
8	NOTE: Inspect the intermediate steering shaft for noise while driving the vehicle, turning the steering wheel, and applying the brakes. Inspect the intermediate steering shaft for noise. Is the intermediate steering shaft noisy?	Go to Step 15	Go to Step 9
9	NOTE: For vehicles equipped with a telescoping steering column, perform this step. If not equipped, go to next step. Inspect the steering column for noise while telescoping the column. Is the steering column noisy while telescoping?	Go to Step 16	Go to Step 17

Step	Action	Yes	No
10	NOTE: If the steering column mounting features are damaged or sheared, replace the steering column. Refer to Steering Column Replacement (Equinox)Steering Column Replacement (Terrain). Tighten the steering column mounting fasteners to specification. Refer to Fastener Specifications. Did you complete the repair?	Go to Step 17	-
11	Replace the SIR/SRS coil. Refer to Steering Wheel Airbag Coil Replacement (Equinox)Steering Wheel Airbag Coil Replacement (Terrain). Did you complete the repair?	Go to Step 17	-
12	Install the lock plate retaining ring correctly. Did you complete the repair?	Go to Step 17	-
13	NOTE: If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to Steering Column Replacement (Equinox)Steering Column Replacement (Terrain). Replace the steering column upper and/or lower bearings, if serviceable. Did you complete the replacement?	Go to Step 17	-
14	Lubricate the steering column tilt joint. Did you complete the repair?	Go to Step 17	-
15	Replace the appropriate intermediate steering shaft component. Did you complete the repair?	Go to Step 17	-
16	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?	Go to Step 17	-
17	Operate the system in order to verify the repair. Did you correct the condition?	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 Symptoms - Steering Wheel and Column
2	Verify that the steering column is loose. Is the steering column loose?	Go to Step 3	System OK
3	Inspect the steering column mounting features for the following conditions. - The steering column mounting fasteners are loose. - The steering column mounting features are sheared. Are the steering column mounting features loose or sheared?	Go to Step 5	Go to Step 4

Step	Action	Yes	No
4	Inspect the upper and/or lower bearings for looseness. Are any of the bearings worn or loose?	Go to Step 6	Go to Step 7
5	NOTE: If the steering column mounting features are damaged or sheared, replace the steering column. Refer to Steering Column Replacement (Equinox)Steering Column Replacement (Terrain). Tighten the steering column mounting fasteners to specification. Refer to Fastener Specifications . Did you complete the repair?	Go to Step 7	-
6	NOTE: If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to Steering Column Replacement (Equinox)Steering Column Replacement (Terrain). Replace the upper and/or lower bearings, if serviceable. Did you complete the repair?	Go to Step 7	-
7	Operate the steering column in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

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 ² / (AWG)
	3 Crimp Nests	4 Crimp Nests	
Salmon (Yellow-Pink) 19300089	Red (1) or Red/Green (1)	Red (2)	0.22 - 0.8/(18 - 26)
Blue 19168447	Blue (2)	Blue (3)	1.0 - 2.0/(14 - 16)
Yellow 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.

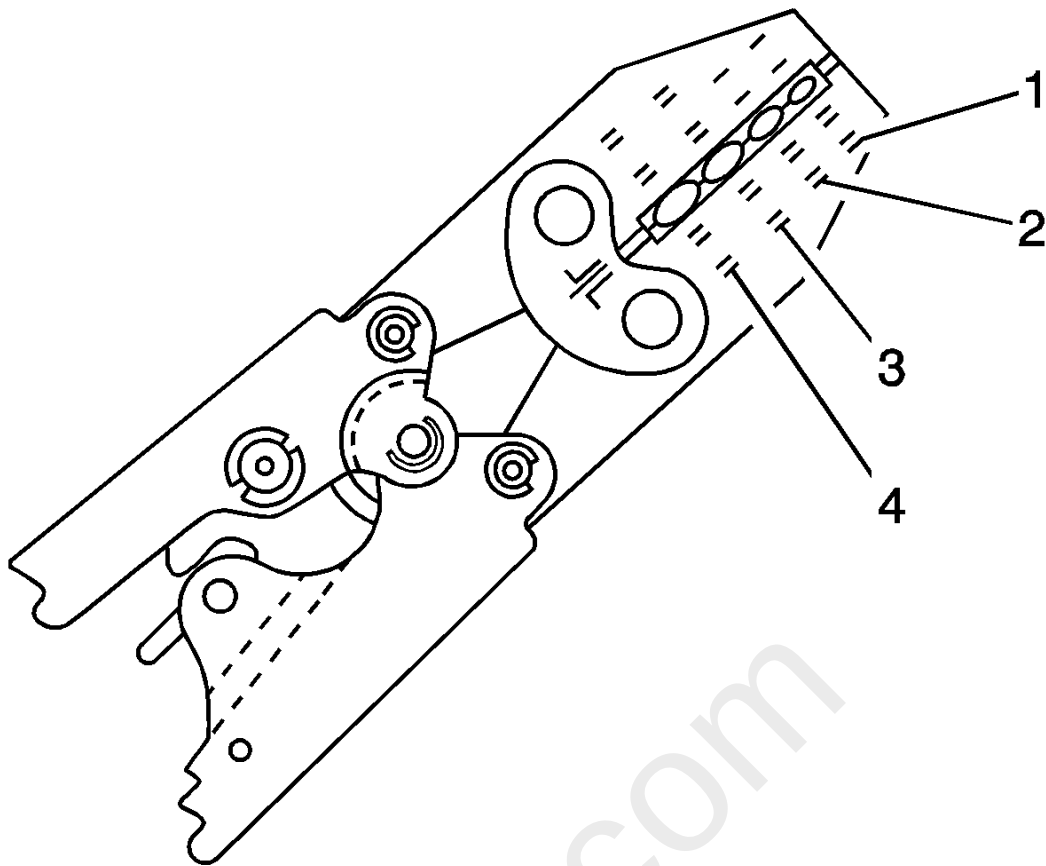


Fig. 10: Splice Sleeve Crimping Tool With 4 Crimp Nests

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.

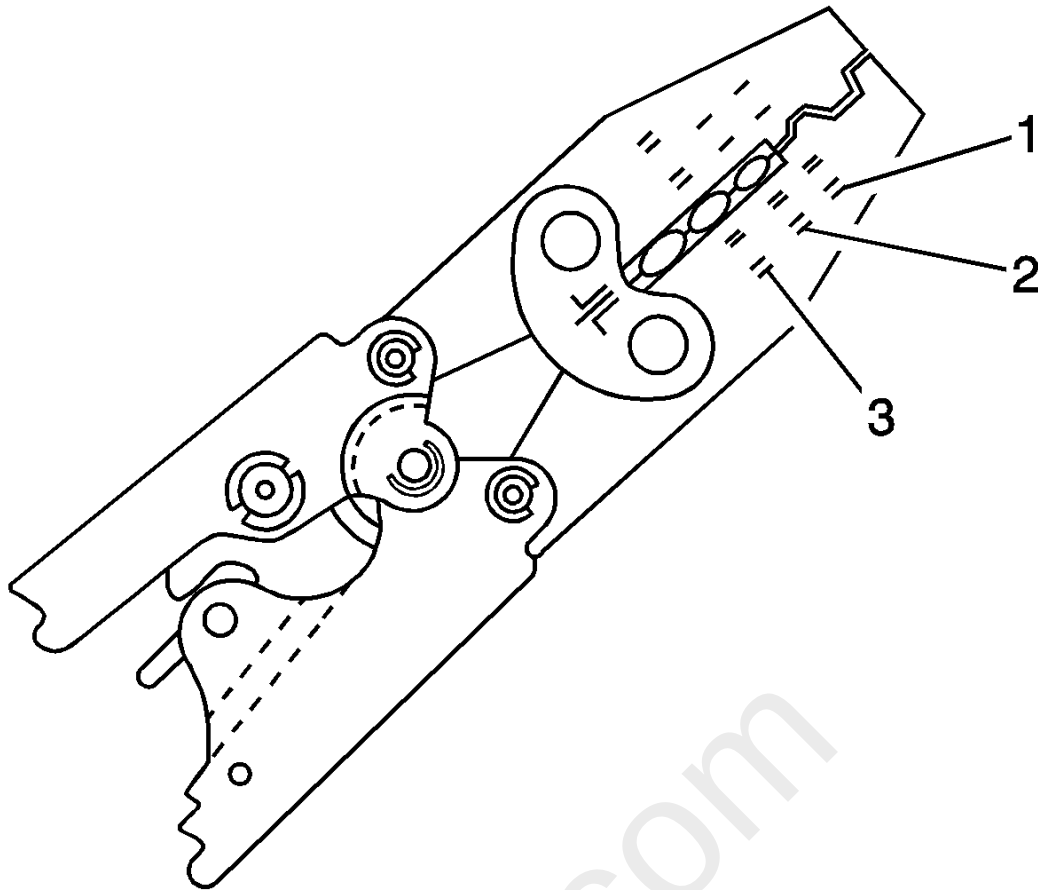


Fig. 11: Splice Sleeve Crimping Tool With 3 Crimp Nests
Courtesy of GENERAL MOTORS COMPANY

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).

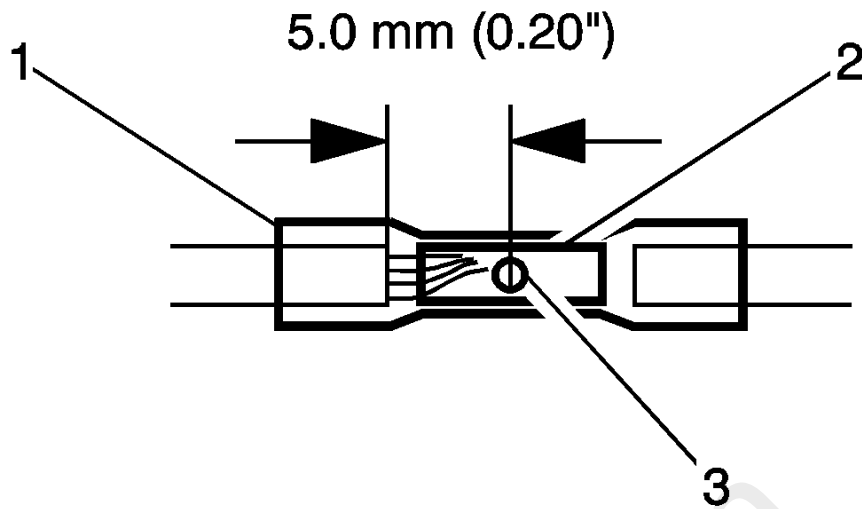


Fig. 12: Identifying DuraSeal Splice Sleeve
Courtesy of GENERAL MOTORS COMPANY

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. 13: 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. 14: Heated 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.

1. 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.

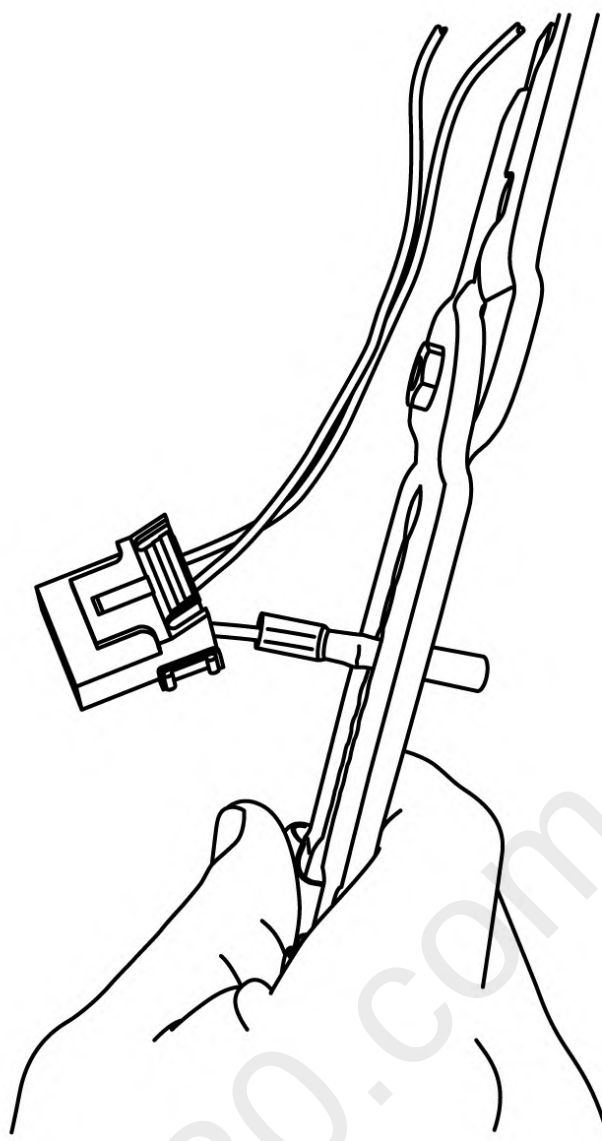


Fig. 15: Tightly Close Handles Of Crimp Tool
Courtesy of GENERAL MOTORS COMPANY

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.

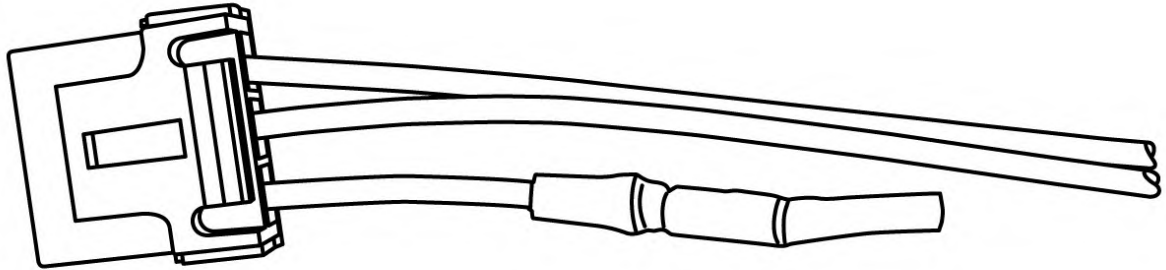


Fig. 16: Heat To Crimped Area Of Barrel

Courtesy of GENERAL MOTORS COMPANY

4. 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.

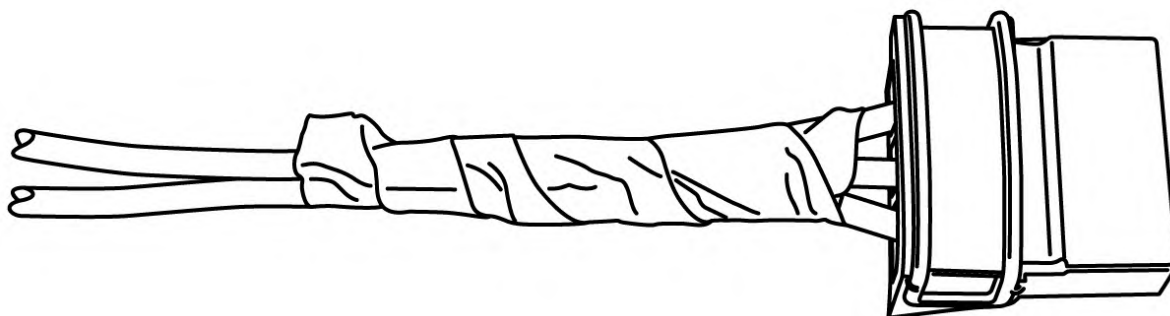


Fig. 17: Taping Extra Terminated Leads Back Into Harness
Courtesy of GENERAL MOTORS COMPANY

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

EL-35616 Terminal Test Probe Kit

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:

- Loose, corroded, or painted terminal stud/fastener
- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- A terminal not seated all the way into the connector body
- 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.

Contamination 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 Wiring 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 (screw or stud). Inspect the connections at the component and in splice packs, where applicable. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#), and Ground Distribution Wiring 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.

NOTE: **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.

INTERMEDIATE STEERING SHAFT REPLACEMENT (EQUINOX)

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 wheels of the vehicle in the straight ahead position, LOCK the steering column.



Fig. 18: Left Side Floor Front Air Outlet Duct

Courtesy of GENERAL MOTORS COMPANY

2. Remove Floor Front Air Outlet Duct - Left Side (1). Refer to [Floor Front Air Outlet Duct Replacement - Left Side](#)

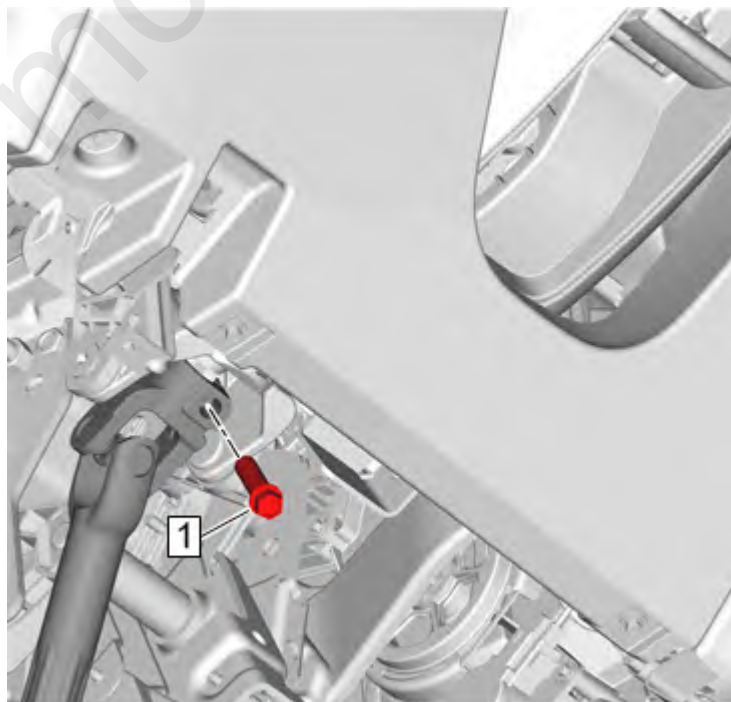


Fig. 19: Intermediate Steering Shaft Upper Bolt

Courtesy of GENERAL MOTORS COMPANY

3. Remove Intermediate Steering Shaft Upper Bolt (1)



Fig. 20: Intermediate Shaft Pinch Bolt

Courtesy of GENERAL MOTORS COMPANY

4. Remove Intermediate Steering Shaft Lower Bolt (1)

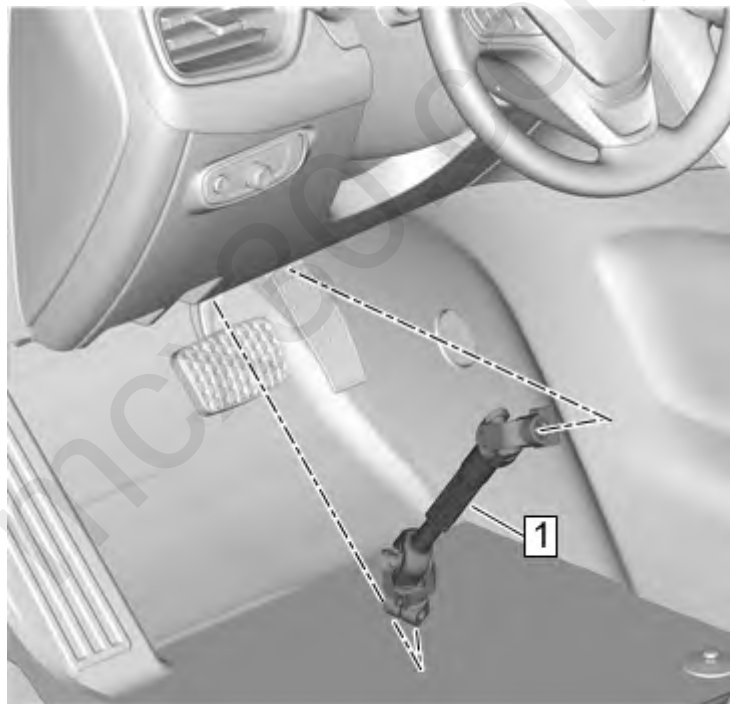


Fig. 21: Intermediate Steering Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Remove the intermediate steering shaft (1) from the vehicle using the following steps:
 1. Disconnect the intermediate steering shaft from the steering column.
 2. Disconnect the intermediate steering shaft from the steering gear.
 3. Collapse the intermediate steering shaft and remove it from the vehicle.

Installation Procedure

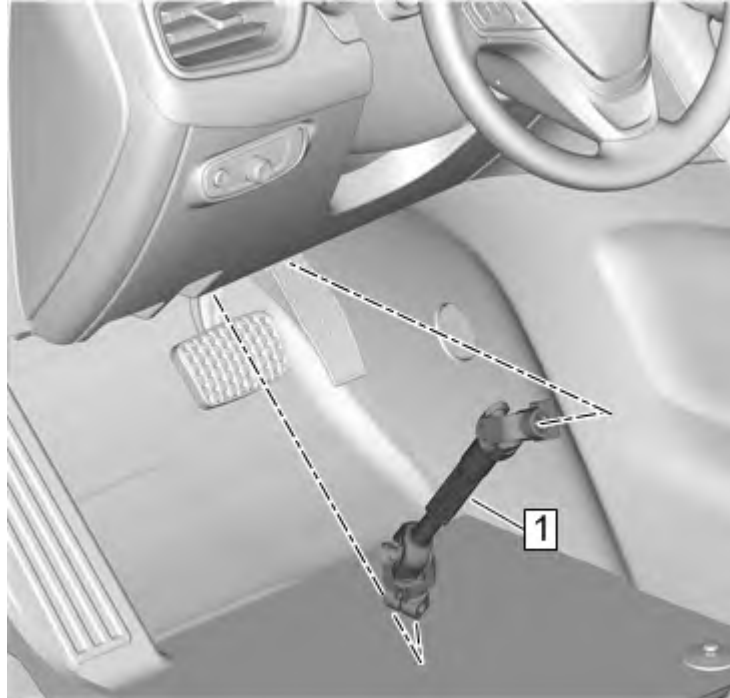


Fig. 22: Intermediate Steering Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Install the intermediate steering shaft (1) in the vehicle using the following steps:
 1. Collapse the intermediate steering shaft and position it in the vehicle.
 2. Connect the intermediate steering shaft to the steering gear.
 3. Expand the intermediate steering shaft and connect it to the steering column.

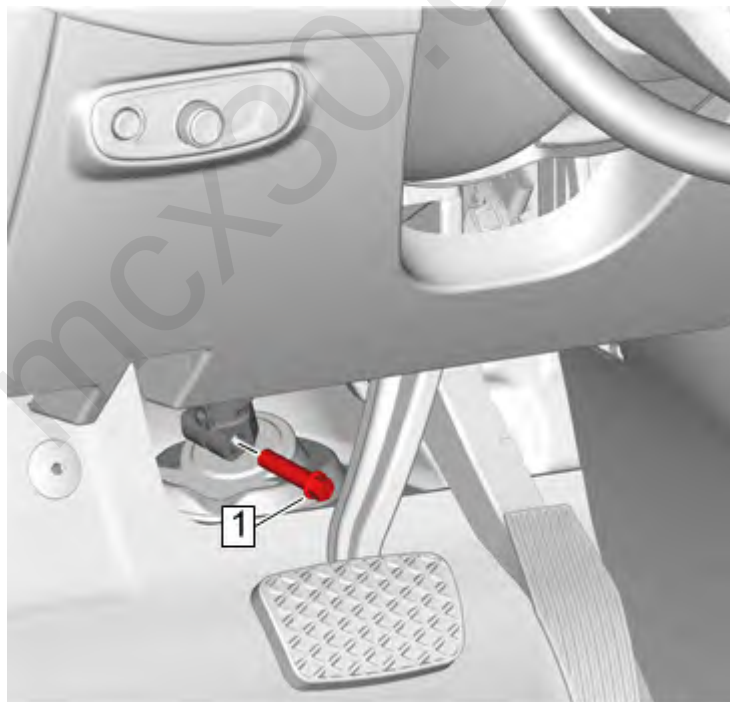


Fig. 23: Intermediate Shaft Pinch Bolt

Courtesy of GENERAL MOTORS COMPANY

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

2. Install and tighten Intermediate Steering Shaft Lower Bolt (1) to 49 N.m (36 lb ft)

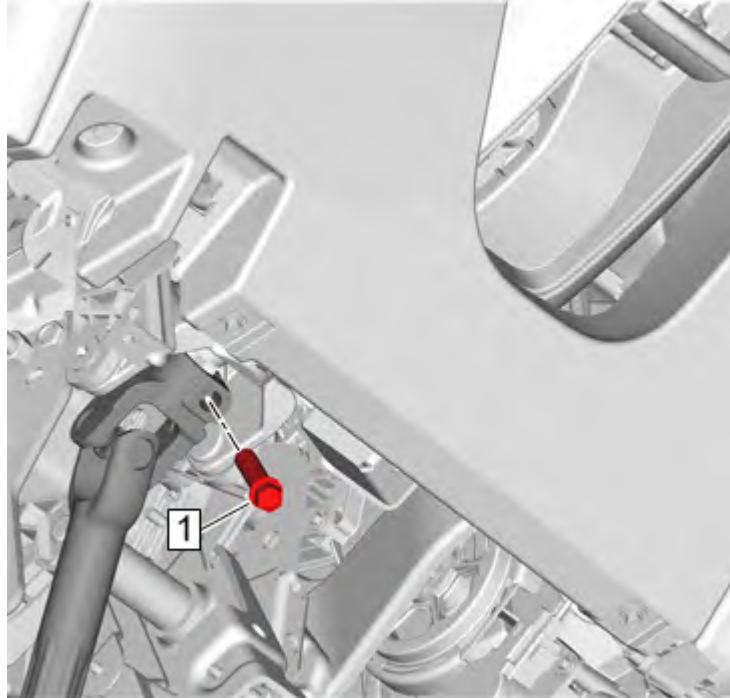


Fig. 24: Intermediate Steering Shaft Upper Bolt
 Courtesy of GENERAL MOTORS COMPANY

3. Install and tighten Intermediate Steering Shaft Upper Bolt (1) to 49 N.m (36 lb ft)



Fig. 25: Left Side Floor Front Air Outlet Duct
 Courtesy of GENERAL MOTORS COMPANY

4. Install Floor Front Air Outlet Duct - Left Side (1). Refer to [Floor Front Air Outlet Duct Replacement - Left Side](#)

INTERMEDIATE STEERING SHAFT REPLACEMENT (TERRAIN)

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 wheels of the vehicle in the straight ahead position, LOCK the steering column.

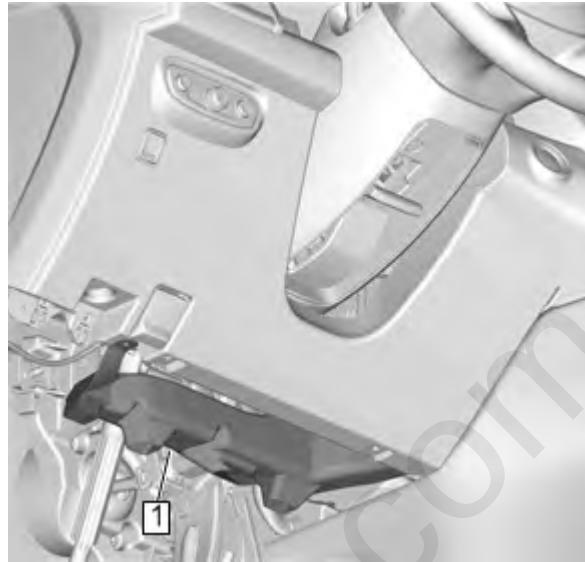


Fig. 26: Left Side Floor Front Air Outlet Duct
Courtesy of GENERAL MOTORS COMPANY

2. Remove Floor Front Air Outlet Duct - Left Side (1). Refer to **Floor Front Air Outlet Duct Replacement - Left Side**

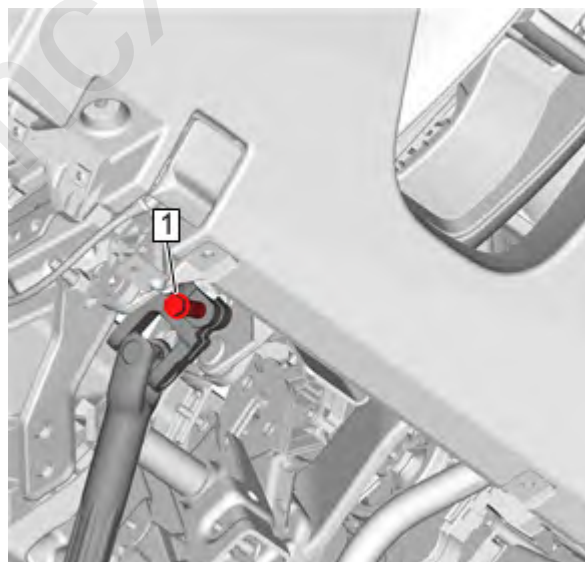


Fig. 27: Intermediate Steering Shaft Upper Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove Intermediate Steering Shaft Upper Bolt (1)

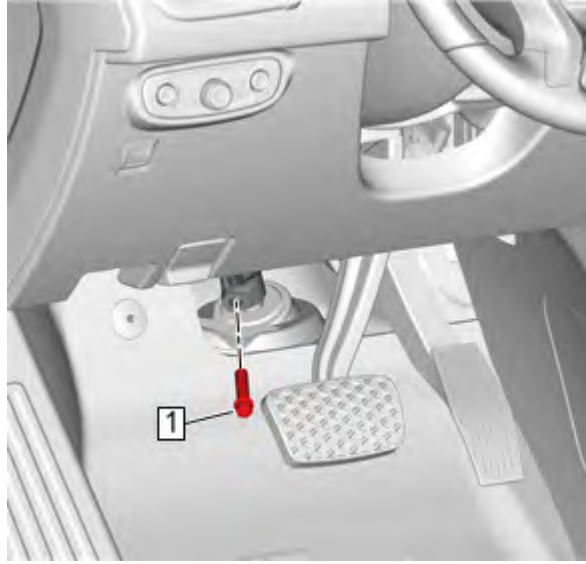


Fig. 28: Intermediate Steering Shaft Lower Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove Intermediate Steering Shaft Lower Bolt (1)

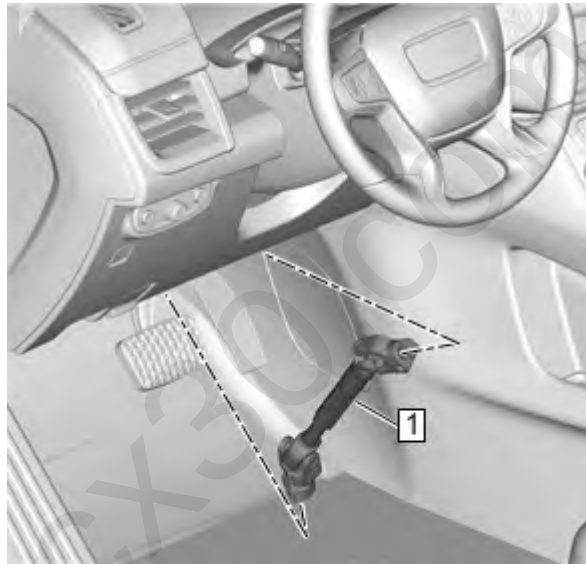


Fig. 29: Intermediate Steering Shaft
Courtesy of GENERAL MOTORS COMPANY

5. Remove the intermediate steering shaft (1) from the vehicle using the following steps:
1. Disconnect the intermediate steering shaft from the steering column.
 2. Disconnect the intermediate steering shaft from the steering gear.
 3. Collapse the intermediate steering shaft and remove it from the vehicle.

Installation Procedure

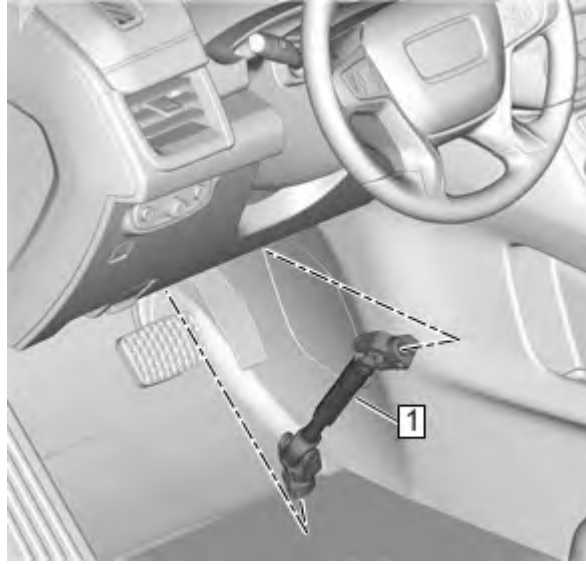


Fig. 30: Intermediate Steering Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Install the intermediate steering shaft (1) in the vehicle using the following steps:
 1. Collapse the intermediate steering shaft and position it in the vehicle.
 2. Connect the intermediate steering shaft to the steering gear.
 3. Expand the intermediate steering shaft and connect it to the steering column.

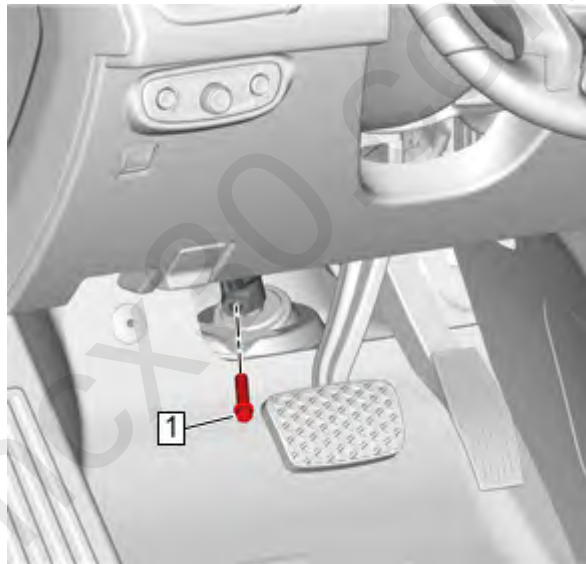


Fig. 31: Intermediate Steering Shaft Lower Bolt

Courtesy of GENERAL MOTORS COMPANY

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

2. Install and tighten Intermediate Steering Shaft Lower Bolt (1) to 49 N.m (36 lb ft)

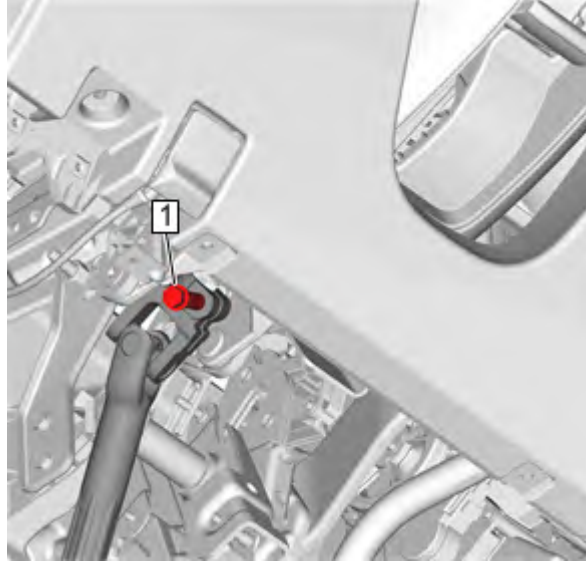


Fig. 32: Intermediate Steering Shaft Upper Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install and tighten Intermediate Steering Shaft Upper Bolt (1) to 49 N.m (36 lb ft)



Fig. 33: Left Side Floor Front Air Outlet Duct
Courtesy of GENERAL MOTORS COMPANY

4. Install Floor Front Air Outlet Duct - Left Side (1). Refer to [Floor Front Air Outlet Duct Replacement - Left Side](#)

STEERING COLUMN UPPER TRIM COVER REPLACEMENT (EQUINOX)

Removal Procedure

1. Extend the steering column to the fully telescoped position.

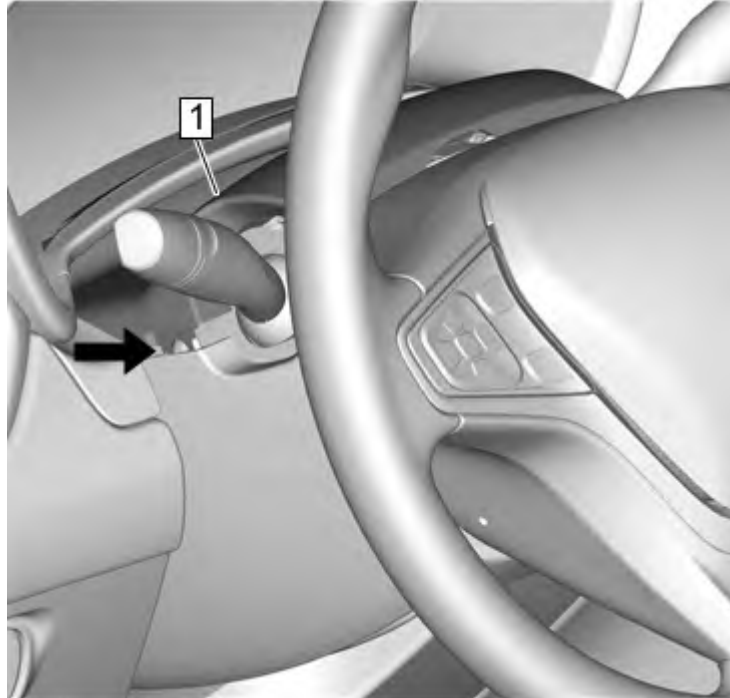


Fig. 34: Steering Column Upper Trim Cover

Courtesy of GENERAL MOTORS COMPANY

2. Use a flat bladed plastic trim tool to separate the steering column upper trim cover (1) from the steering column lower trim cover.

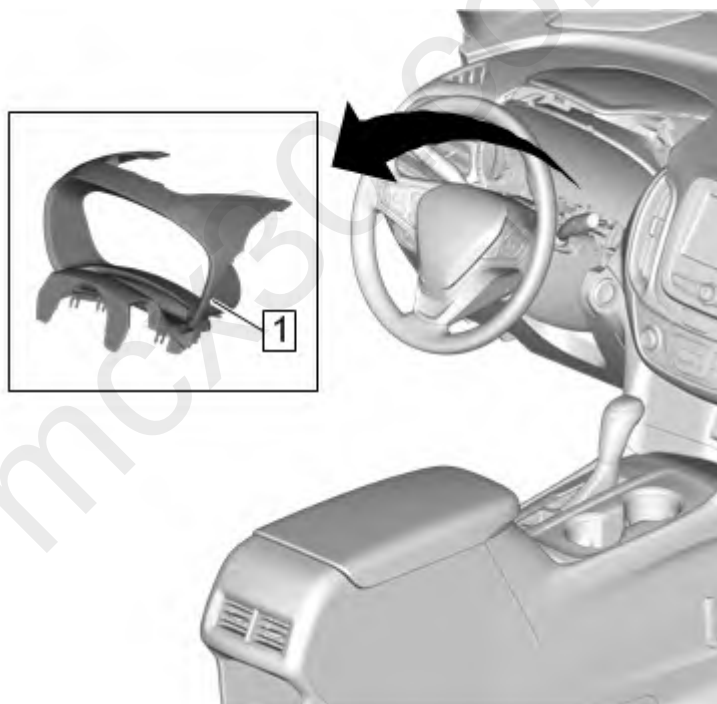


Fig. 35: Instrument Panel Cluster Trim Plate

Courtesy of GENERAL MOTORS COMPANY

3. Remove Instrument Panel Cluster Trim Plate (1). Refer to [Instrument Panel Cluster Trim Plate Replacement \(Equinox\)](#)

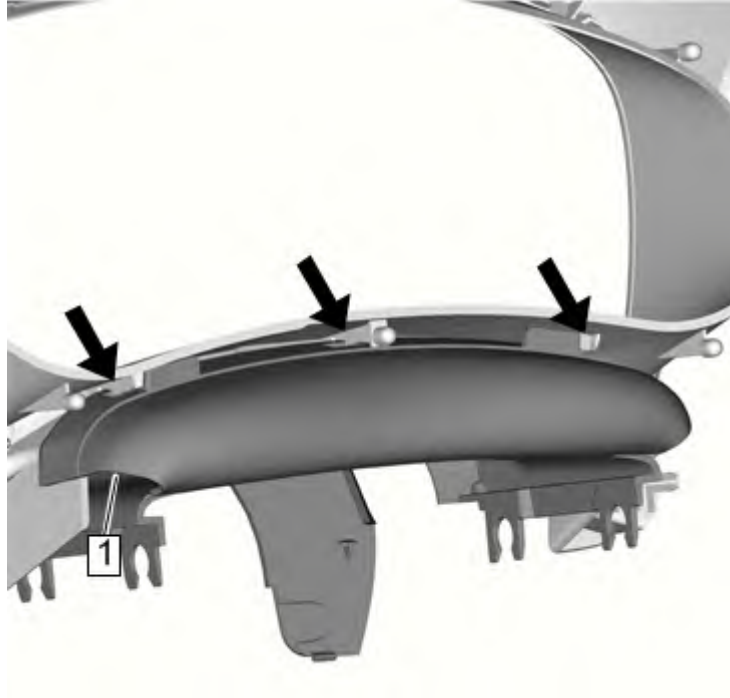


Fig. 36: Steering Column Upper Trim Cover Closeout
Courtesy of GENERAL MOTORS COMPANY

4. Release the steering column upper trim cover closeout (1) from the instrument panel cluster trim plate.

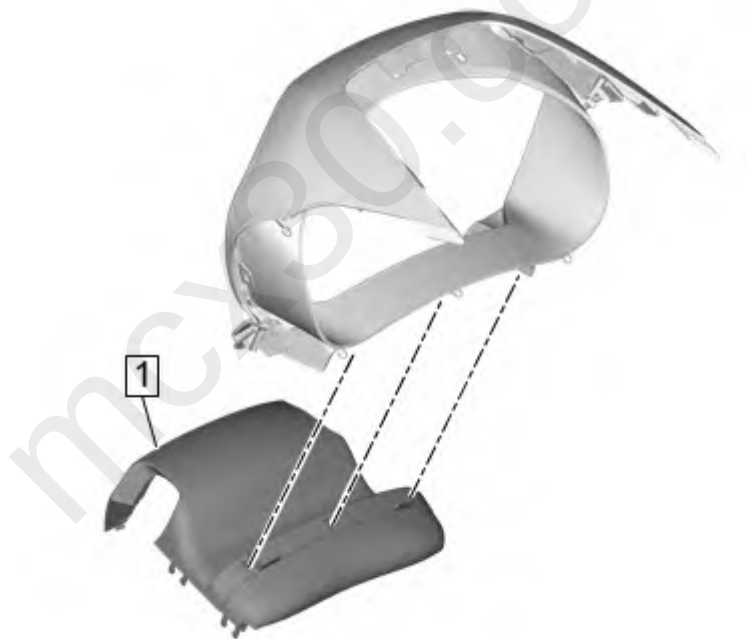


Fig. 37: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

5. Separate the steering column upper trim cover (1) from the instrument panel cluster trim plate.

Installation Procedure

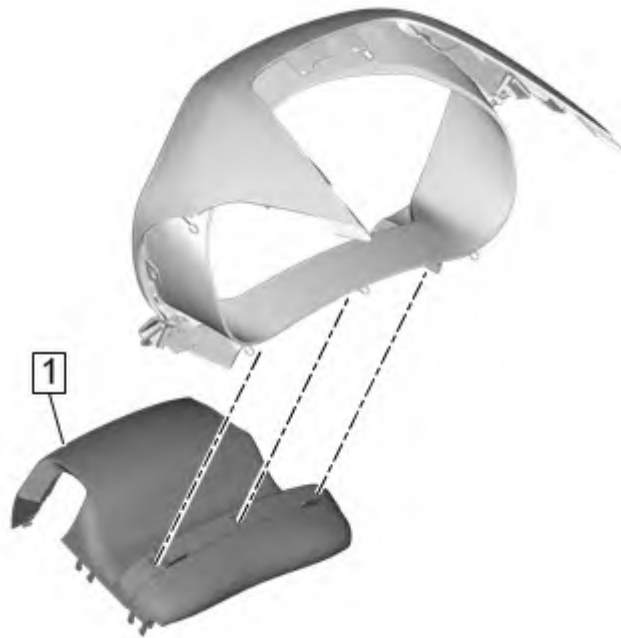


Fig. 38: Steering Column Upper Trim Cover

Courtesy of GENERAL MOTORS COMPANY

1. Align the steering column upper trim cover (1) to the instrument panel cluster trim plate.

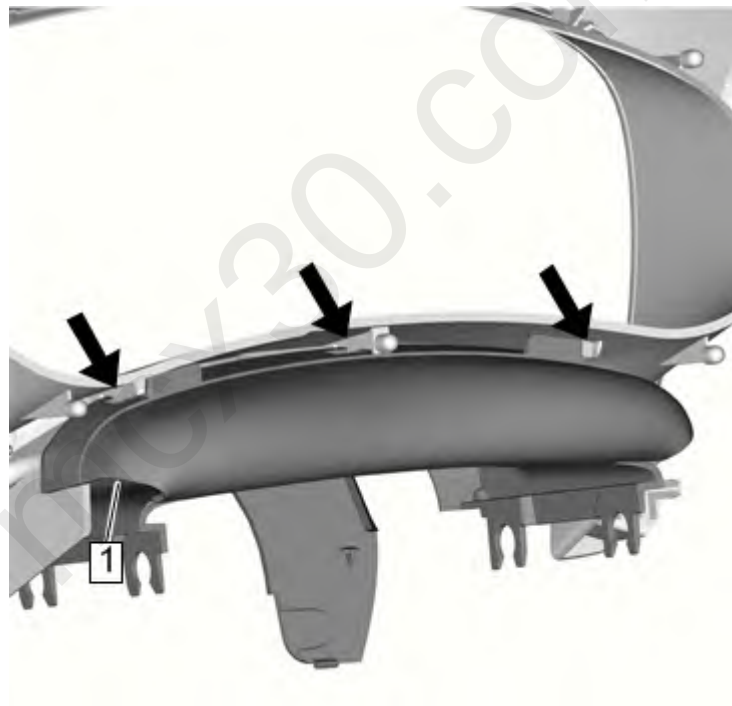


Fig. 39: Steering Column Upper Trim Cover Closeout

Courtesy of GENERAL MOTORS COMPANY

2. Secure the steering column upper trim cover closeout (1) to the instrument panel cluster trim plate.

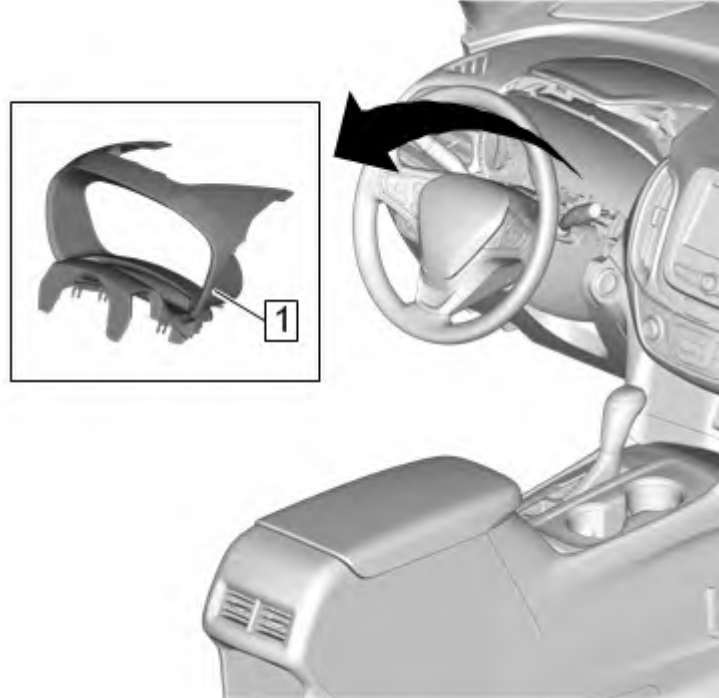


Fig. 40: Instrument Panel Cluster Trim Plate
 Courtesy of GENERAL MOTORS COMPANY

3. Install Instrument Panel Cluster Trim Plate (1). Refer to [Instrument Panel Cluster Trim Plate Replacement \(Equinox\)](#).

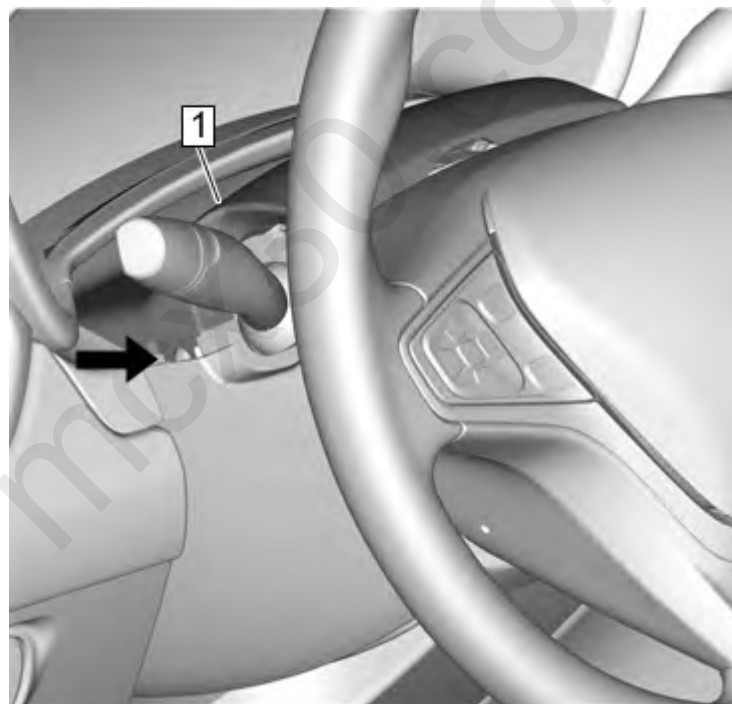


Fig. 41: Steering Column Upper Trim Cover
 Courtesy of GENERAL MOTORS COMPANY

4. Secure the steering column upper trim cover (1) to the steering column lower trim cover.

STEERING COLUMN UPPER TRIM COVER REPLACEMENT (TERRAIN)

Removal Procedure

1. Extend the steering column to the fully telescoped position.

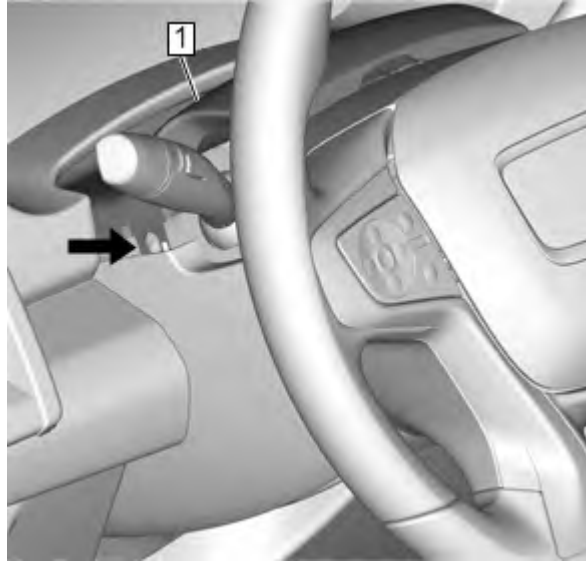


Fig. 42: Steering Column Upper Trim Cover

Courtesy of GENERAL MOTORS COMPANY

2. Use a flat bladed plastic trim tool to separate the steering column upper trim cover (1) from the steering column lower trim cover.

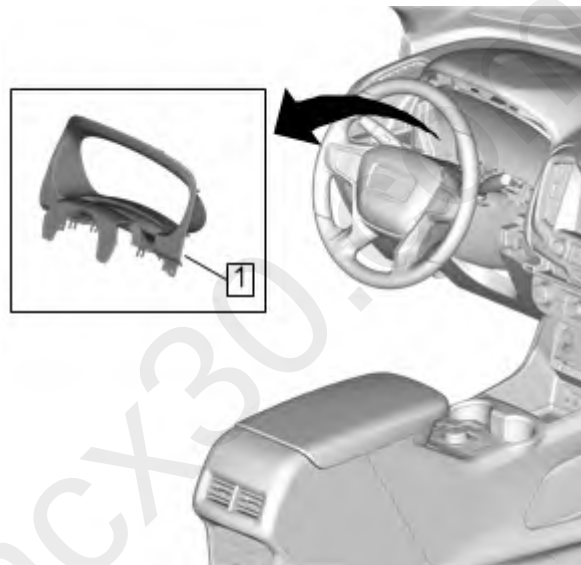


Fig. 43: Instrument Panel Cluster Trim Plate

Courtesy of GENERAL MOTORS COMPANY

3. Remove Instrument Panel Cluster Trim Plate (1). Refer to [Instrument Panel Cluster Trim Plate Replacement \(Terrain\)](#)

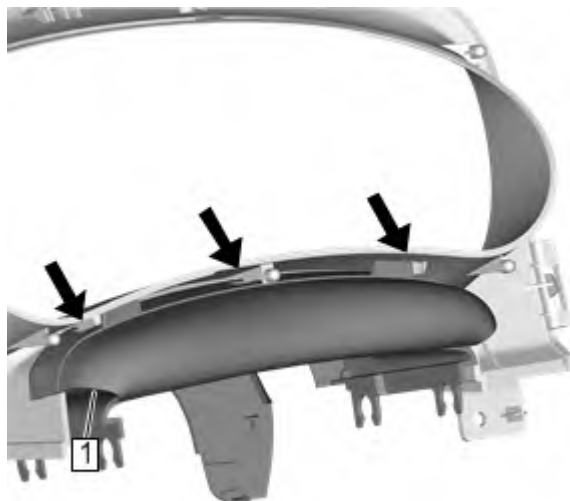


Fig. 44: Steering Column Upper Trim Cover Closeout
Courtesy of GENERAL MOTORS COMPANY

4. Release the steering column upper trim cover closeout (1) from the instrument panel cluster trim plate.

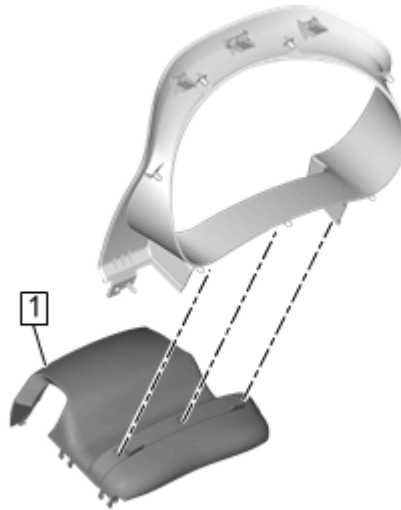


Fig. 45: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

5. Separate the steering column upper trim cover (1) from the instrument panel cluster trim plate.

Installation Procedure

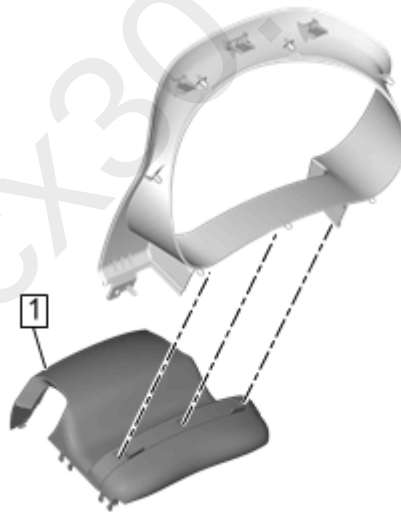


Fig. 46: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

1. Align the steering column upper trim cover (1) to the instrument panel cluster trim plate.

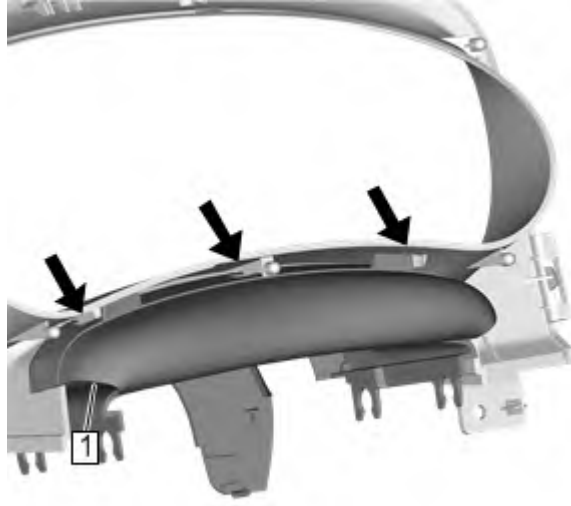


Fig. 47: Steering Column Upper Trim Cover Closeout
 Courtesy of GENERAL MOTORS COMPANY

2. Secure the steering column upper trim cover closeout (1) to the instrument panel cluster trim plate.

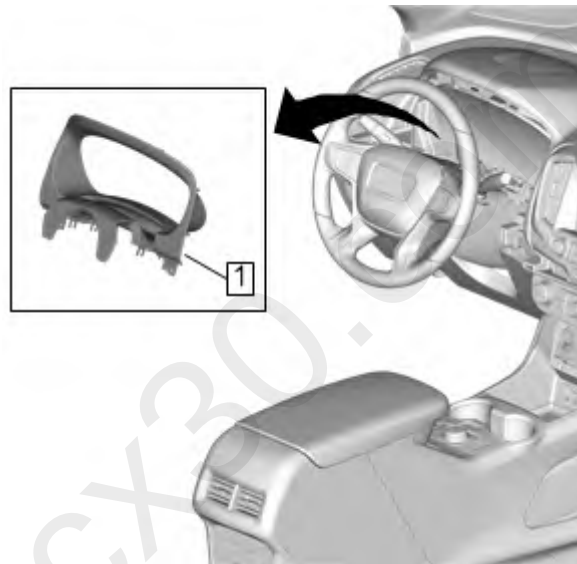


Fig. 48: Instrument Panel Cluster Trim Plate
 Courtesy of GENERAL MOTORS COMPANY

3. Install Instrument Panel Cluster Trim Plate (1). Refer to [Instrument Panel Cluster Trim Plate Replacement \(Terrain\)](#)

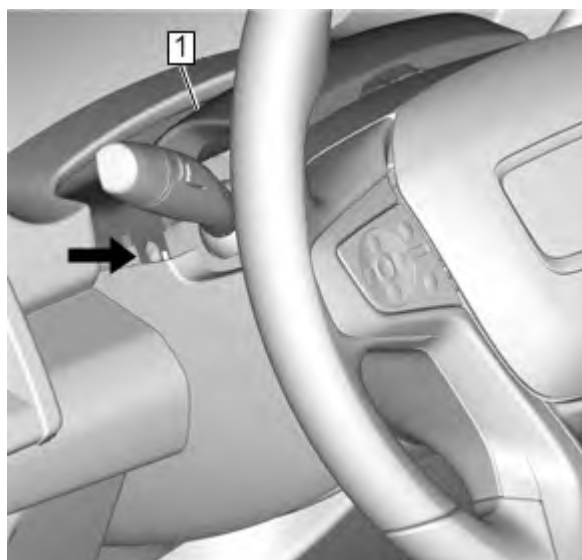


Fig. 49: Steering Column Upper Trim Cover
 Courtesy of GENERAL MOTORS COMPANY

4. Secure the steering column upper trim cover (1) to the steering column lower trim cover.

STEERING COLUMN LOWER TRIM COVER REPLACEMENT (EQUINOX)

Removal Procedure

1. Extend the steering column to the fully telescoped position.

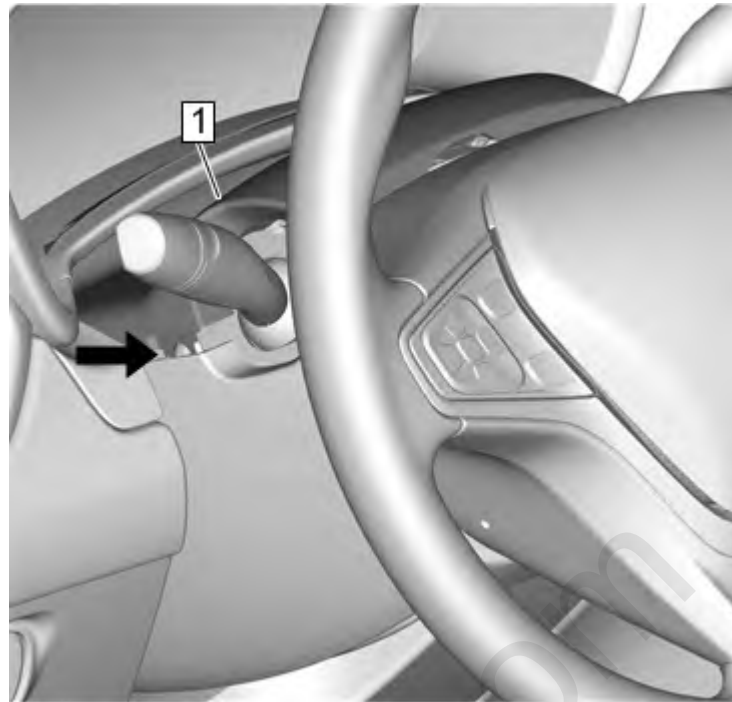


Fig. 50: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

2. Use a flat bladed plastic trim tool to separate the steering column upper trim cover (1) from the steering column lower trim cover.
3. Position the steering column upper trim cover (1) cover out of the way.
4. Turn the steering wheel approximately 90 degrees to the left of the centered position.

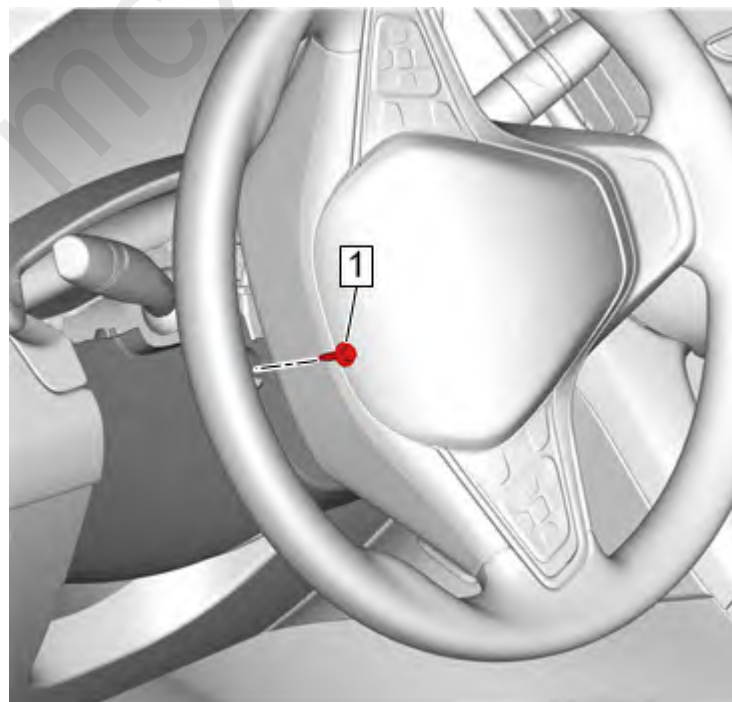


Fig. 51: Steering Column Lower Trim Cover Bolt
Courtesy of GENERAL MOTORS COMPANY

5. Remove Steering Column Lower Trim Cover Bolt (1)
6. Turn the steering wheel approximately 90 degrees to the right of the centered position.

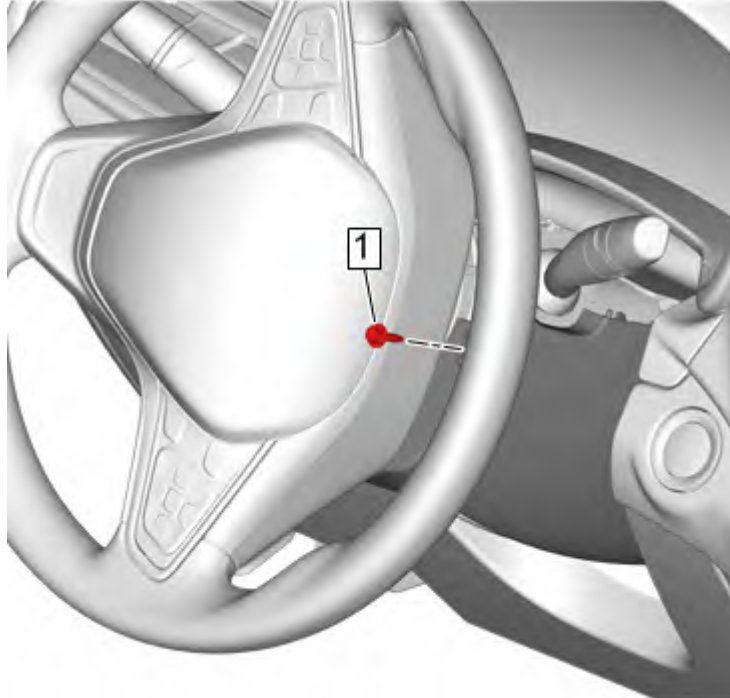


Fig. 52: Steering Column Lower Trim Cover Bolt
 Courtesy of GENERAL MOTORS COMPANY

7. Remove Steering Column Lower Trim Cover Bolt (1)
8. Turn the steering wheel to the centered position.

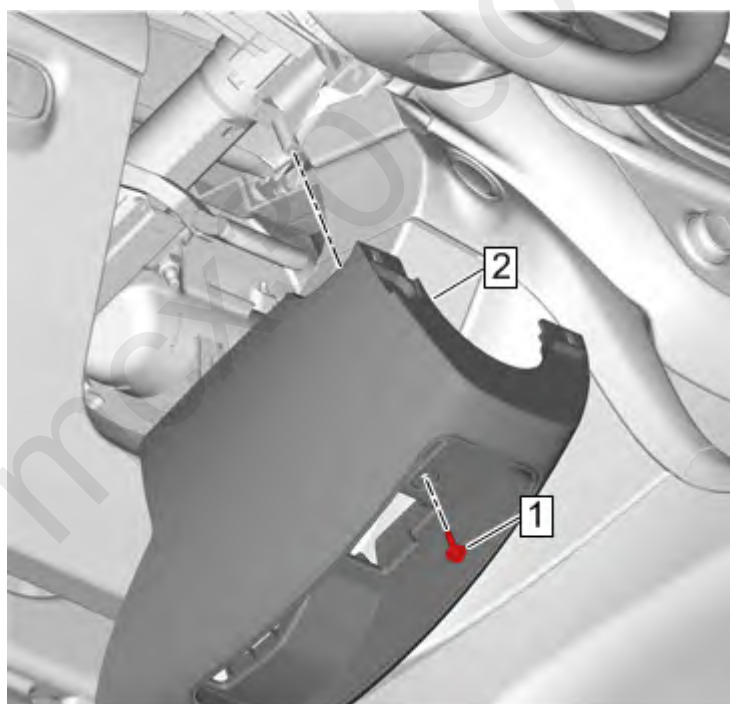


Fig. 53: Steering Column Lower Trim Cover And Bolt
 Courtesy of GENERAL MOTORS COMPANY

9. Remove Steering Column Lower Trim Cover Bolt (1)

NOTE: Maneuver the steering column lower trim cover around the steering column tilt and telescoping lever as necessary.

10. Remove the steering column lower trim cover (2) from the steering column.

Installation Procedure

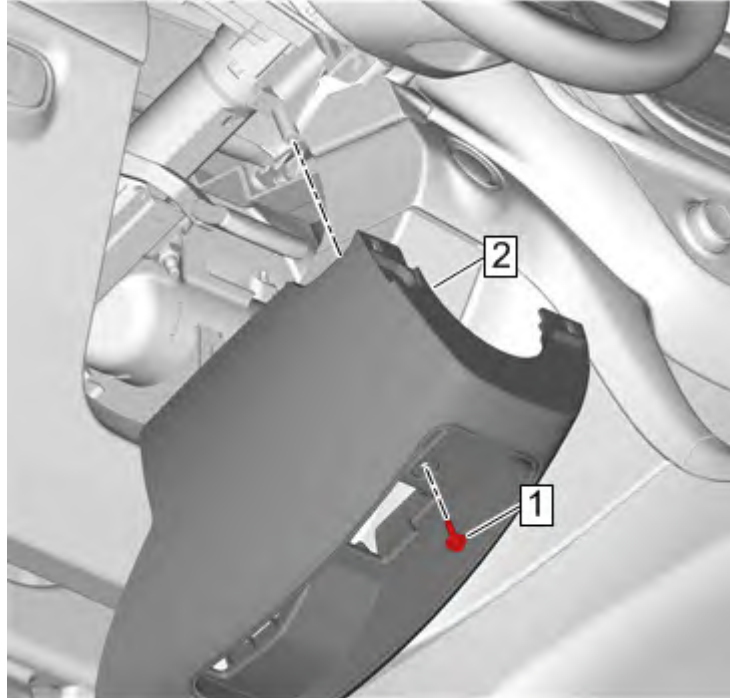


Fig. 54: Steering Column Lower Trim Cover And Bolt
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Maneuver the steering column lower trim cover around the steering column tilt and telescoping lever as necessary.

1. Position the steering column lower trim cover (2) on the steering column.

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

2. Install and tighten Steering Column Lower Trim Cover Bolt (1) to 1.5 N.m (13 lb in)
3. Turn the steering wheel approximately 90 degrees to the right of the centered position.

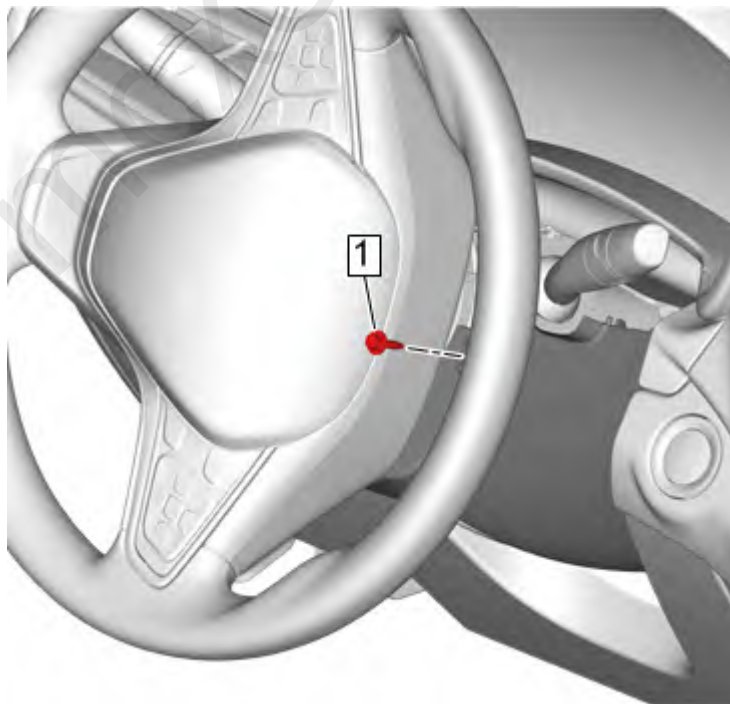


Fig. 55: Steering Column Lower Trim Cover Bolt
 Courtesy of GENERAL MOTORS COMPANY

4. Install and tighten Steering Column Lower Trim Cover Bolt (1) to 1.5 N.m (13 lb in)
5. Turn the steering wheel approximately 90 degrees to the left of the centered position.

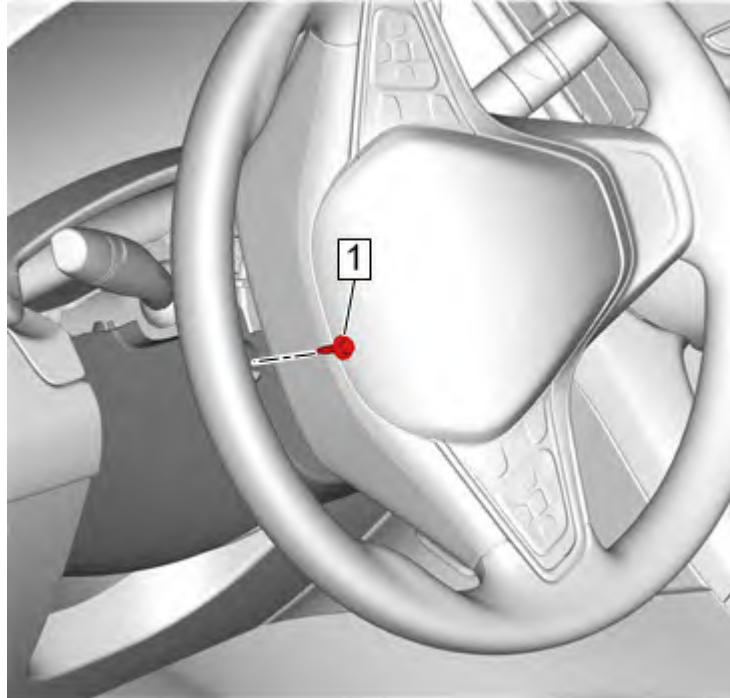


Fig. 56: Steering Column Lower Trim Cover Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Install and tighten Steering Column Lower Trim Cover Bolt (1) to 1.5 N.m (13 lb in)
7. Turn the steering wheel to the centered position.

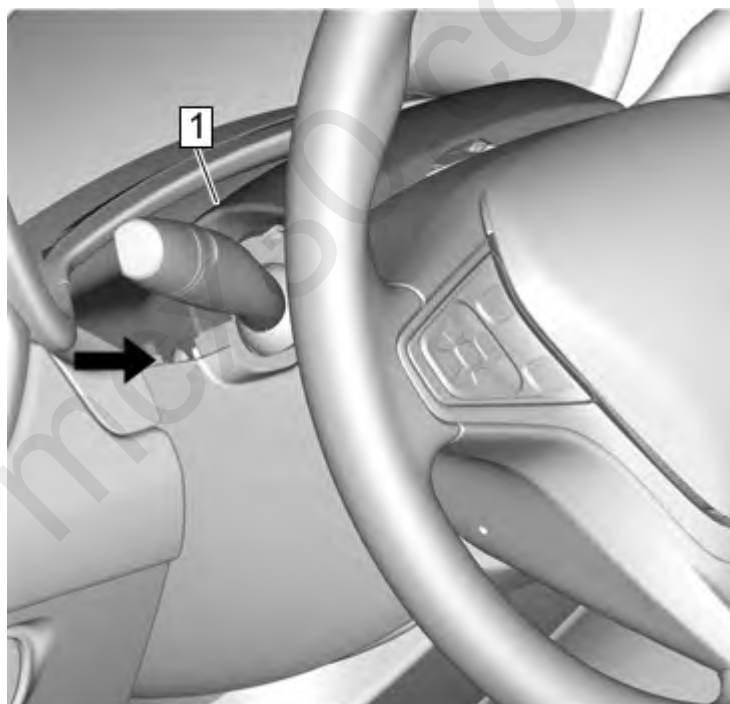


Fig. 57: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

8. Secure the steering column upper trim cover (1) to the steering column lower trim cover.

STEERING COLUMN LOWER TRIM COVER REPLACEMENT (TERRAIN)

Removal Procedure

1. Extend the steering column to the fully telescoped position.

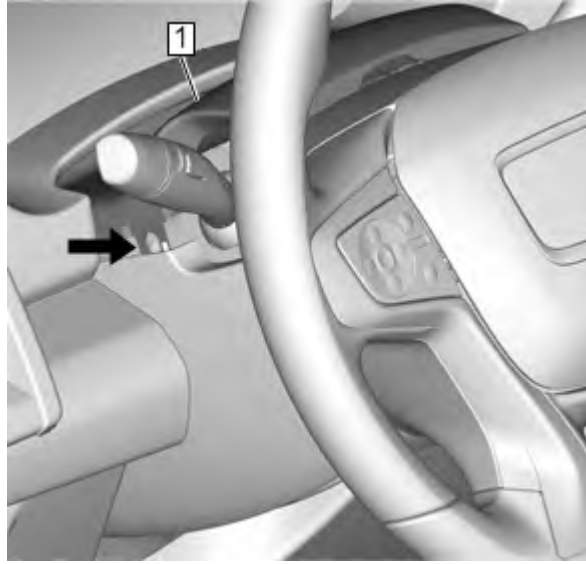


Fig. 58: Steering Column Upper Trim Cover

Courtesy of GENERAL MOTORS COMPANY

2. Use a flat bladed plastic trim tool to separate the steering column upper trim cover (1) from the steering column lower trim cover.
3. Position the steering column upper trim cover (1) cover out of the way.
4. Turn the steering wheel approximately 90 degrees to the left of the centered position.

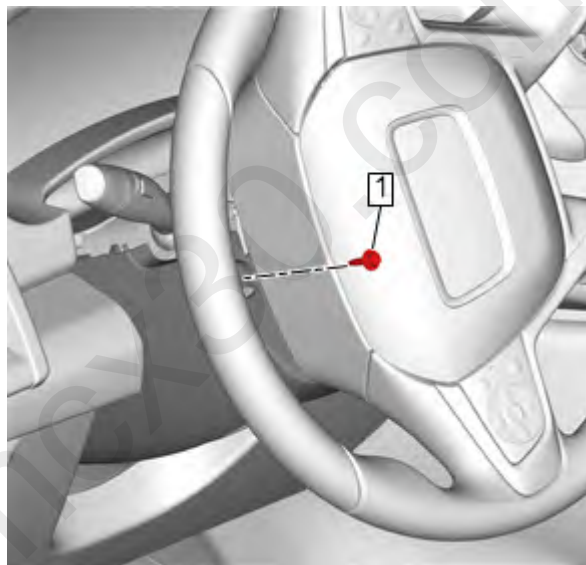


Fig. 59: Steering Column Lower Trim Cover Bolt

Courtesy of GENERAL MOTORS COMPANY

5. Remove Steering Column Lower Trim Cover Bolt (1)
6. Turn the steering wheel approximately 90 degrees to the right of the centered position.

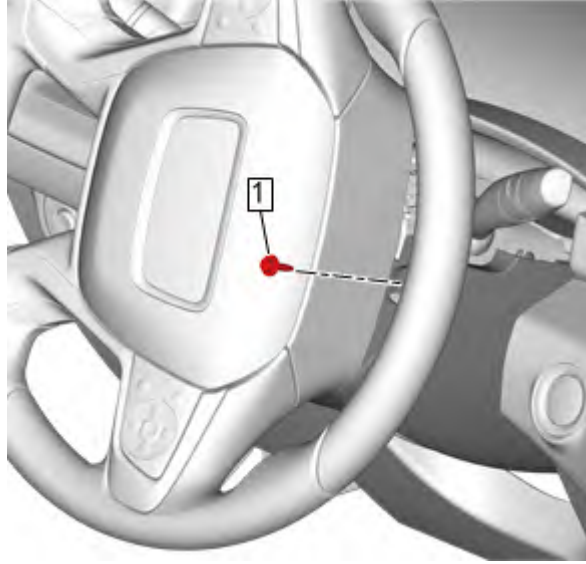


Fig. 60: Steering Column Lower Trim Cover Bolt
Courtesy of GENERAL MOTORS COMPANY

7. Remove Steering Column Lower Trim Cover Bolt (1)
8. Turn the steering wheel to the centered position.

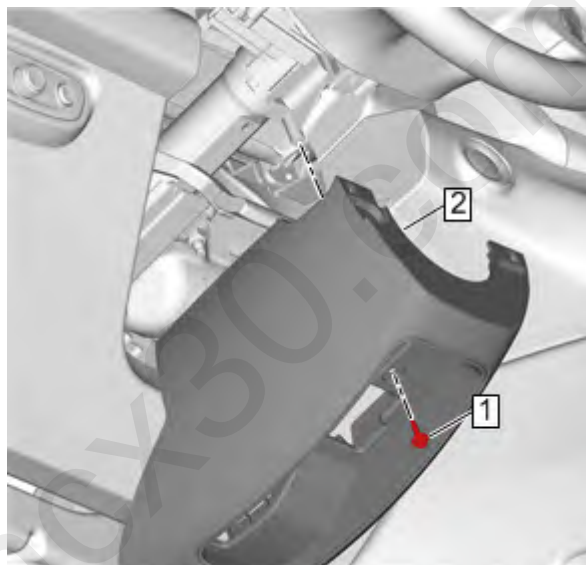


Fig. 61: Steering Column Lower Trim Cover And Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Remove Steering Column Lower Trim Cover Bolt (1)

NOTE: Maneuver the steering column lower trim cover around the steering column tilt and telescoping lever as necessary.

10. Remove the steering column lower trim cover (2) from the steering column.

Installation Procedure

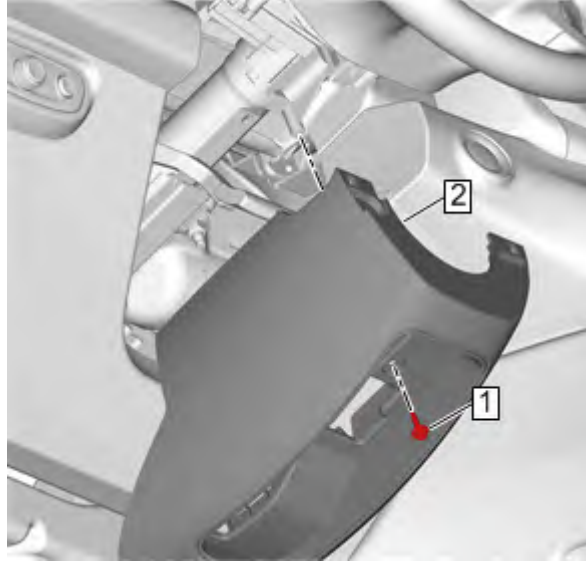


Fig. 62: Steering Column Lower Trim Cover And Bolt
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Maneuver the steering column lower trim cover around the steering column tilt and telescoping lever as necessary.

1. Position the steering column lower trim cover (2) on the steering column.

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

2. Install and tighten Steering Column Lower Trim Cover Bolt (1) to 1.5 N.m (13 lb in)
3. Turn the steering wheel approximately 90 degrees to the right of the centered position.

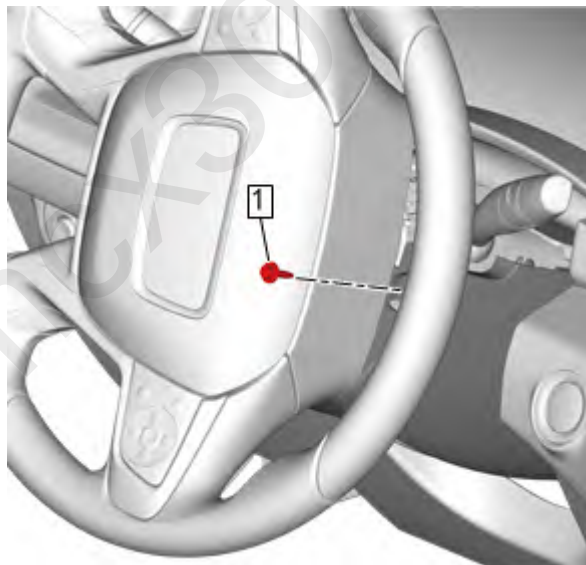


Fig. 63: Steering Column Lower Trim Cover Bolt
 Courtesy of GENERAL MOTORS COMPANY

4. Install and tighten Steering Column Lower Trim Cover Bolt (1) to 1.5 N.m (13 lb in)
5. Turn the steering wheel approximately 90 degrees to the left of the centered position.

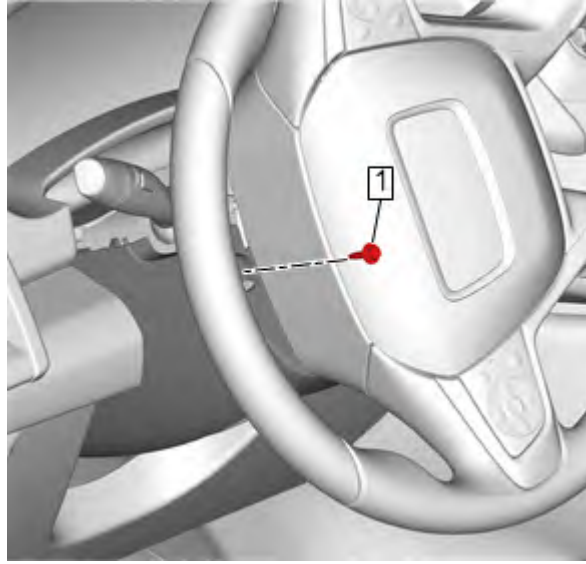


Fig. 64: Steering Column Lower Trim Cover Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Install and tighten Steering Column Lower Trim Cover Bolt (1) to 1.5 N.m (13 lb in)
7. Turn the steering wheel to the centered position.

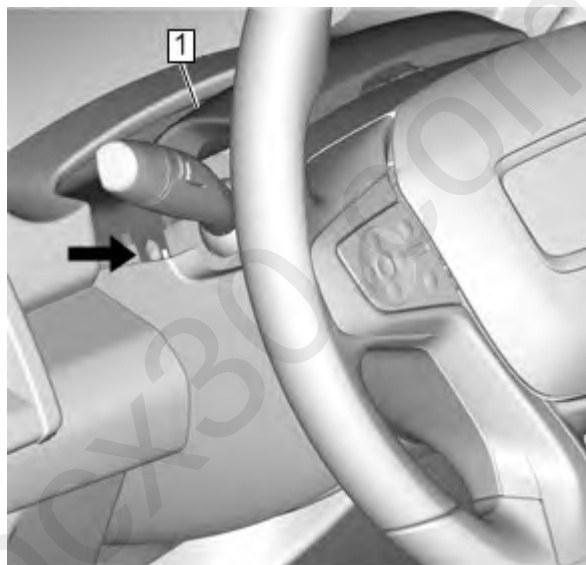


Fig. 65: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

8. Secure the steering column upper trim cover (1) to the steering column lower trim cover.

TURN SIGNAL SWITCH REPLACEMENT (EQUINOX)

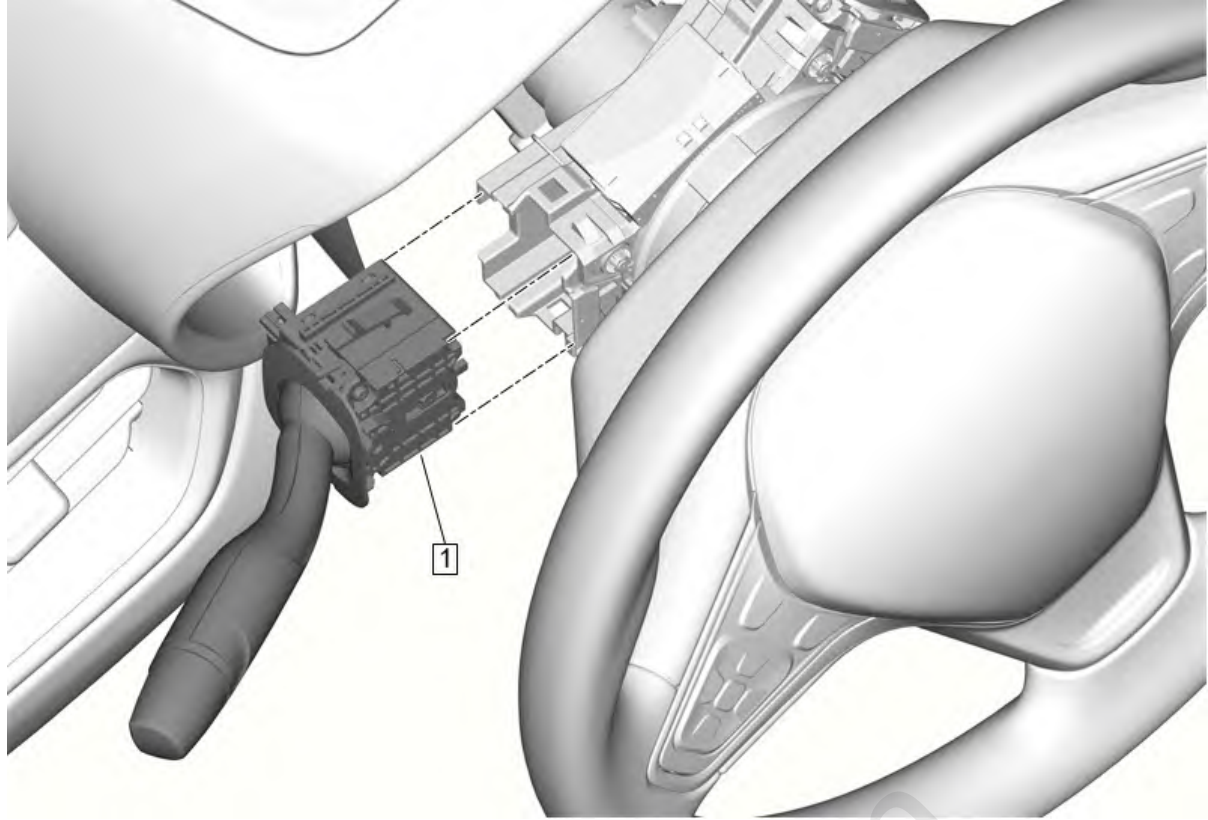


Fig. 66: Turn Signal Switch (Equinox)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Column Lower Trim Cover. Refer to Steering Column Lower Trim Cover Replacement (Equinox) .	
1	Turn Signal Switch Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs and remove the turn signal switch from the turn signal switch bracket.

TURN SIGNAL SWITCH REPLACEMENT (TERRAIN)

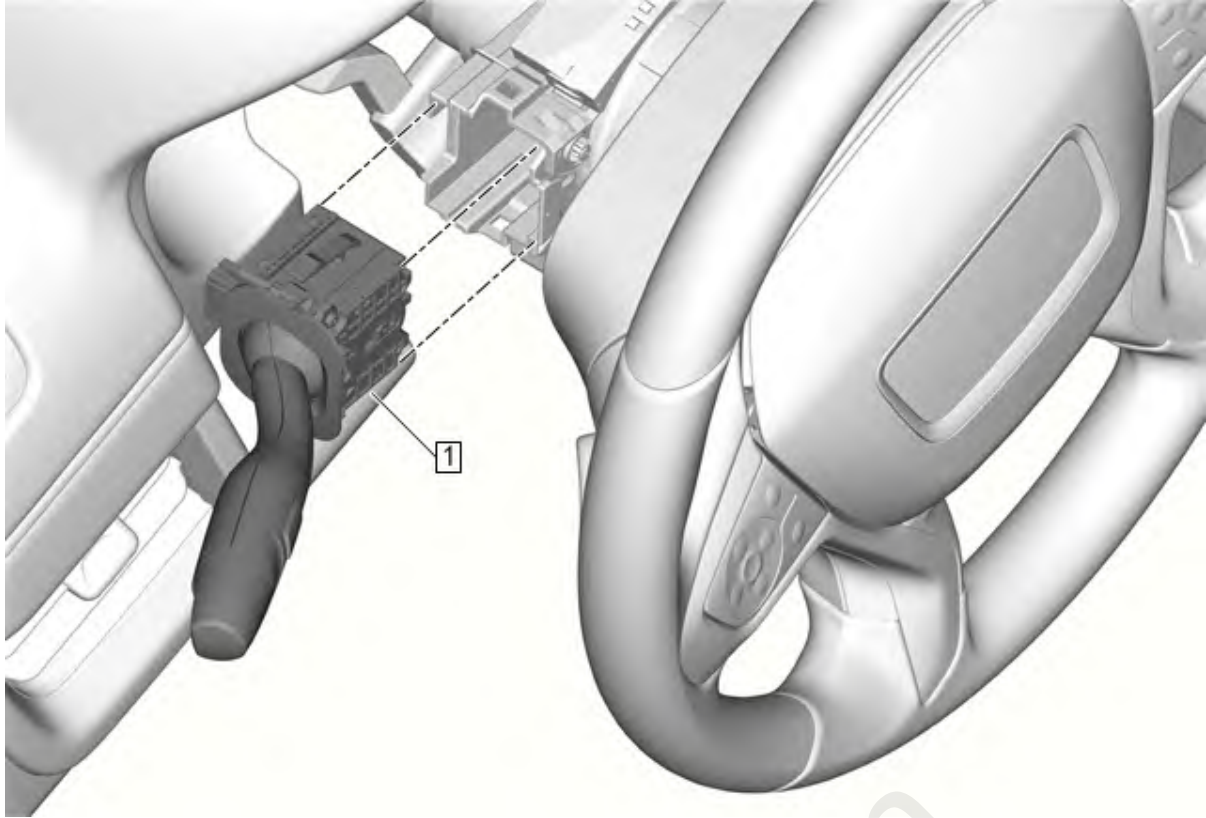


Fig. 67: Turn Signal Switch (Terrain)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Column Lower Trim Cover. Refer to Steering Column Lower Trim Cover Replacement (Terrain) .	
1	Turn Signal Switch Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs and remove the turn signal switch from the turn signal switch bracket.

TURN SIGNAL SWITCH BRACKET REPLACEMENT (EQUINOX)

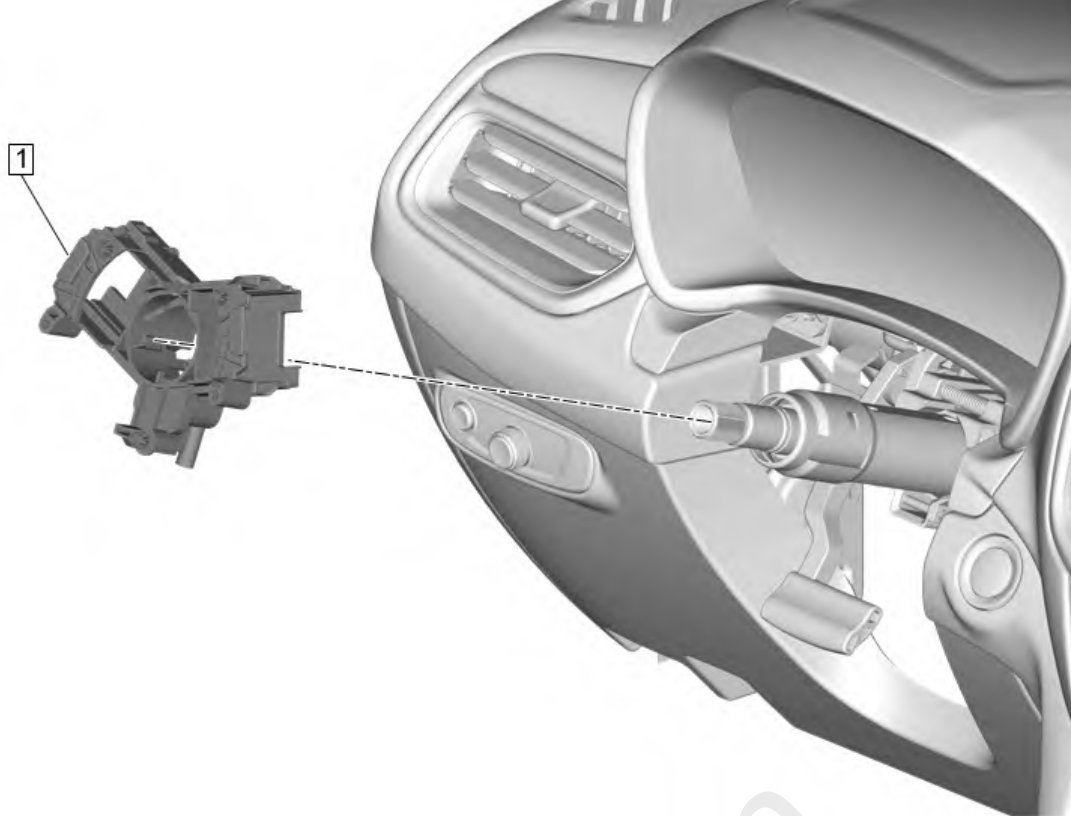


Fig. 68: Turn Signal Switch Bracket (Equinox)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove Steering Wheel Airbag Coil. Refer to Steering Wheel Airbag Coil Replacement (Equinox). 2. Remove Turn Signal Switch. Refer to Turn Signal Switch Replacement (Equinox). 3. Remove Windshield Wiper and Washer Switch. Refer to Windshield Wiper and Washer Switch Replacement (Equinox).	
1	Turn Signal Switch Bracket Procedure Release the retaining tabs and remove the turn signal switch bracket from the steering column.

TURN SIGNAL SWITCH BRACKET REPLACEMENT (TERRAIN)

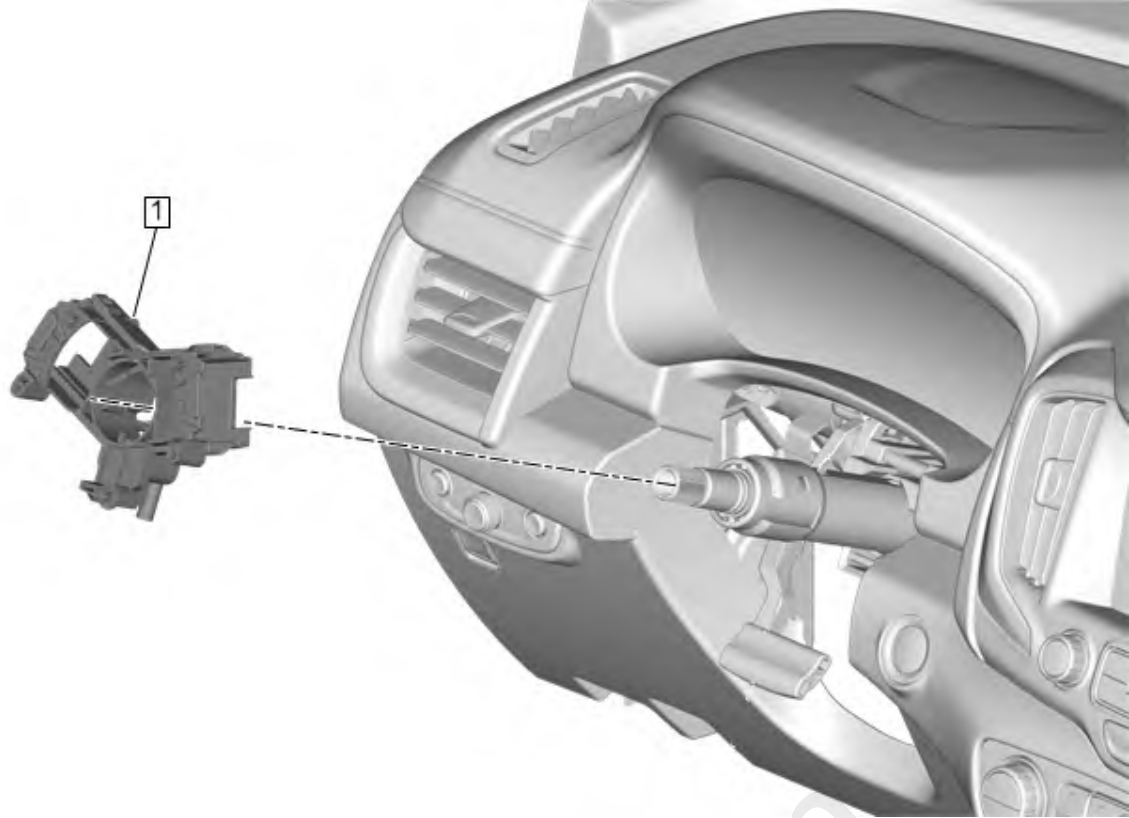


Fig. 69: Turn Signal Switch Bracket (Terrain)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove Steering Wheel Airbag Coil. Refer to Steering Wheel Airbag Coil Replacement (Terrain). 2. Remove Turn Signal Switch. Refer to Turn Signal Switch Replacement (Terrain). 3. Remove Windshield Wiper and Washer Switch. Refer to Windshield Wiper and Washer Switch Replacement (Terrain).	
1	Turn Signal Switch Bracket Procedure 1. Release the retaining tabs and remove the turn signal switch bracket from the steering column. 2. Remove the wire harness retainer from the turn signal switch bracket.

STEERING WHEEL PAD ACCESSORY WIRING HARNESS REPLACEMENT (EQUINOX)

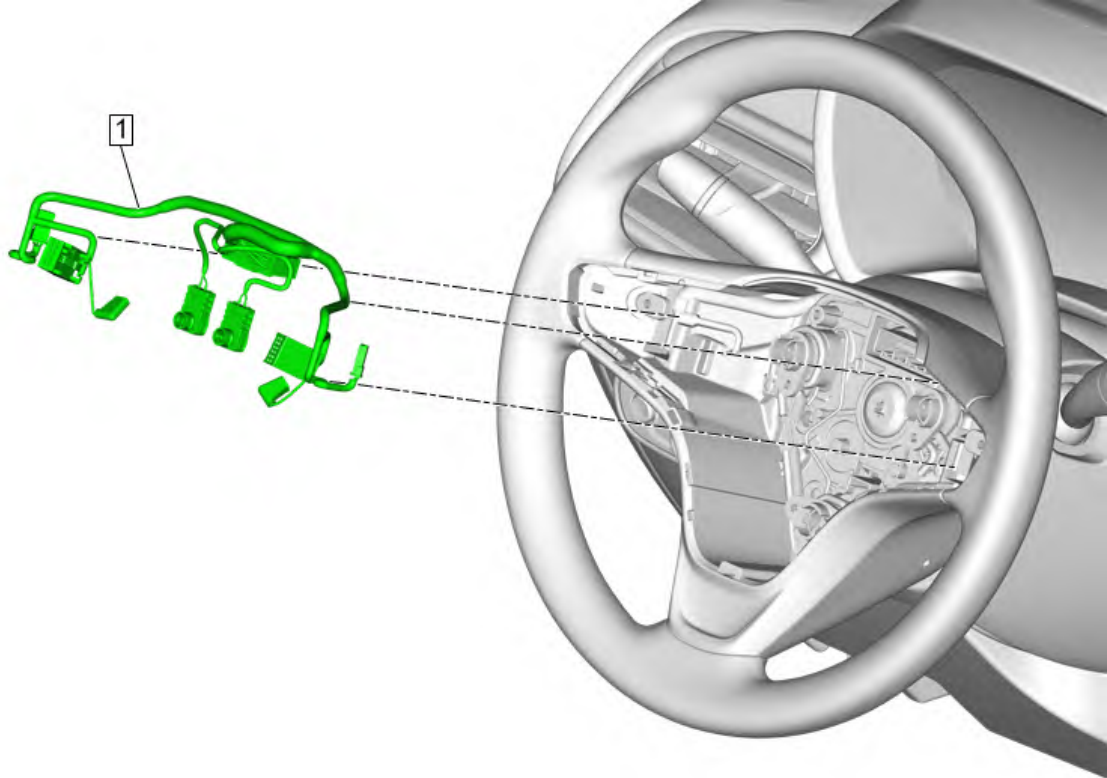


Fig. 70: Steering Wheel Pad Accessory Wiring Harness (Equinox)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove Steering Wheel Spoke Cover. Refer to Steering Wheel Spoke Cover Replacement (Equinox). 2. Remove the left rear radio control switch. Refer to Radio Control Switch Replacement - Steering Wheel (Equinox, Left Rear). 3. Remove the right rear radio control switch. Refer to Radio Control Switch Replacement - Steering Wheel (Equinox, Right Rear).	
1	Steering Wheel Pad Accessory Wiring Harness Procedure Disconnect the electrical connectors.

STEERING WHEEL HEAT CONTROL MODULE REPLACEMENT (EQUINOX)

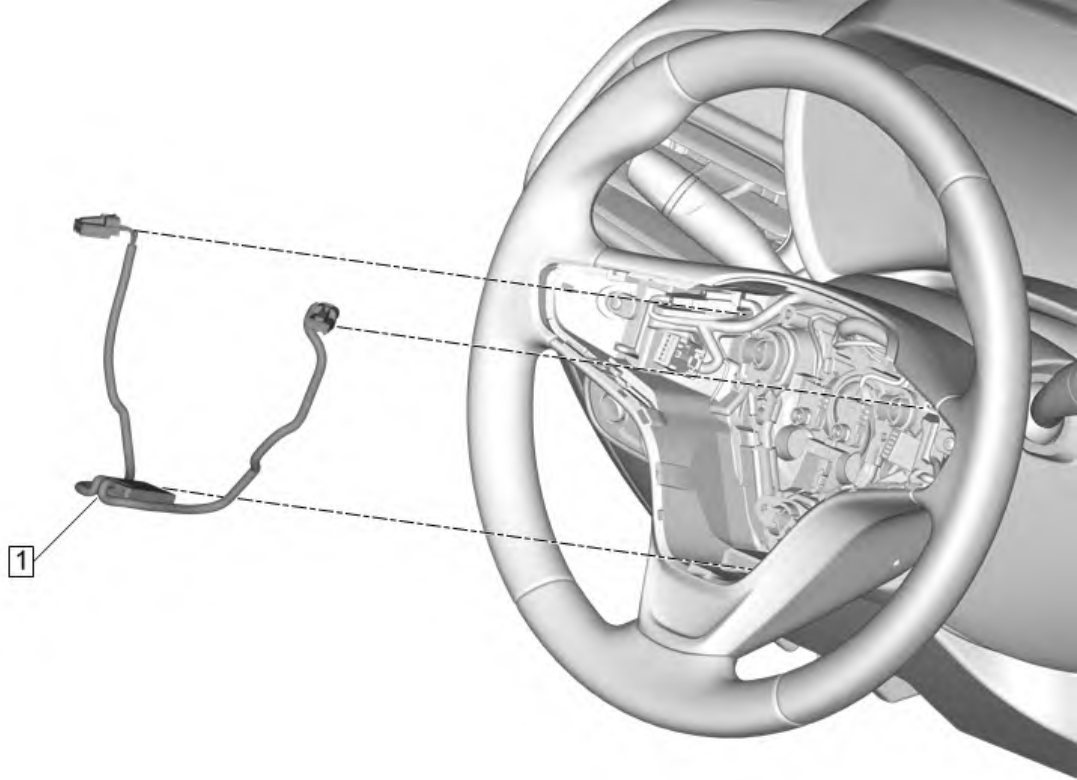


Fig. 71: Steering Wheel Heat Control Module (Equinox).

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Wheel Spoke Cover. Refer to Steering Wheel Spoke Cover Replacement (Equinox) .	
1	Steering Wheel Heat Control Module Procedure 1. Disconnect the electrical connectors. 2. Remove the steering wheel heat control module wiring harness from the steering wheel. 3. Remove the steering wheel heat control module from the steering wheel.

STEERING WHEEL HEAT CONTROL MODULE REPLACEMENT (TERRAIN)

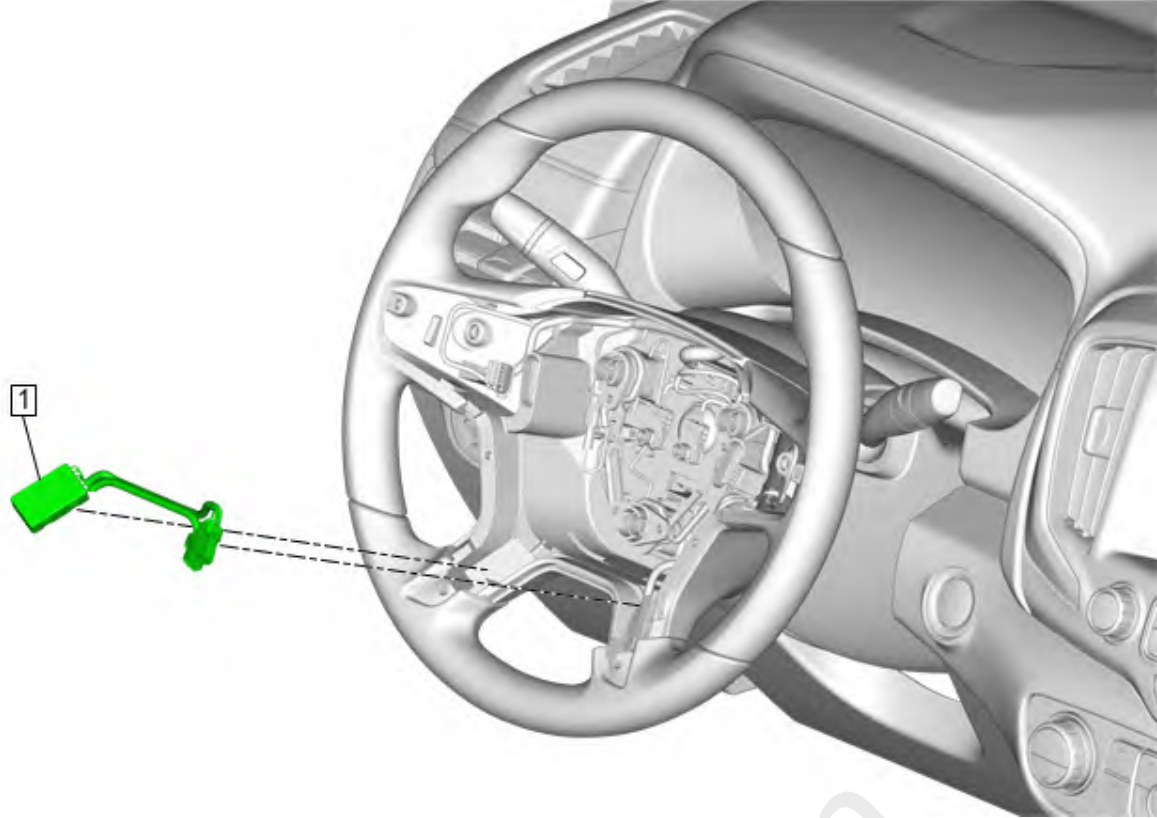


Fig. 72: Steering Wheel Heat Control Module (Terrain).

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Wheel Spoke Cover. Refer to Steering Wheel Spoke Cover Replacement (Terrain) .	
1	Steering Wheel Heat Control Module Procedure 1. Disconnect the electrical connectors. 2. Remove the steering wheel heat control module wiring harness from the steering wheel. 3. Remove the steering wheel heat control module from the steering wheel.

STEERING WHEEL REPLACEMENT (EQUINOX)

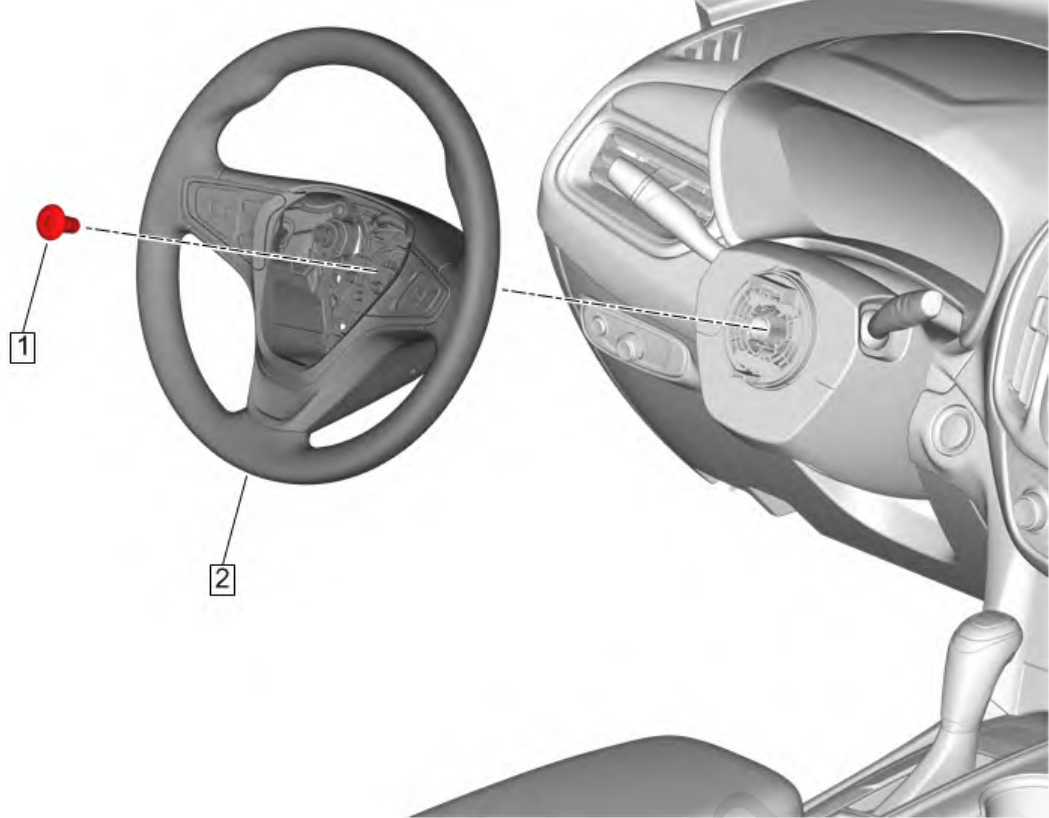


Fig. 73: Steering Wheel (Equinox)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
1. Remove Steering Wheel Airbag. Refer to Steering Wheel Airbag Replacement (Equinox)	
1	Steering Wheel Bolt CAUTION: Refer to Fastener Caution NOTE: • The ONLY acceptable bit for removing and installing the steering wheel bolt is a T50 bit. Do NOT use any other size bit or a worn T50 bit or the bolt recess MAY strip and the bolt may NOT be removable. • If a power tool is used to remove the steering wheel bolt, the tool must have a torque rating greater than 75 N.m (55 lb ft) and both the power tool and the T50 bit MUST be positioned perpendicular to the bolt recess. Tighten 45 N.m (33 lb ft)

Callout	Component Name
2	Steering Wheel Procedure 1. Disconnect the electrical connectors. 2. Install the steering wheel bolt until 2 to 3 threads are engaged. 3. Wiggle the steering wheel until the wheel disengages completely. 4. Remove the steering wheel bolt and DISCARD. 5. Transfer components as necessary. NOTE: Before installing the steering wheel, ensure that any debris or OLD adhesive patch is removed from the steering column shaft and the steering wheel mating surfaces.

STEERING WHEEL REPLACEMENT (TERRAIN)

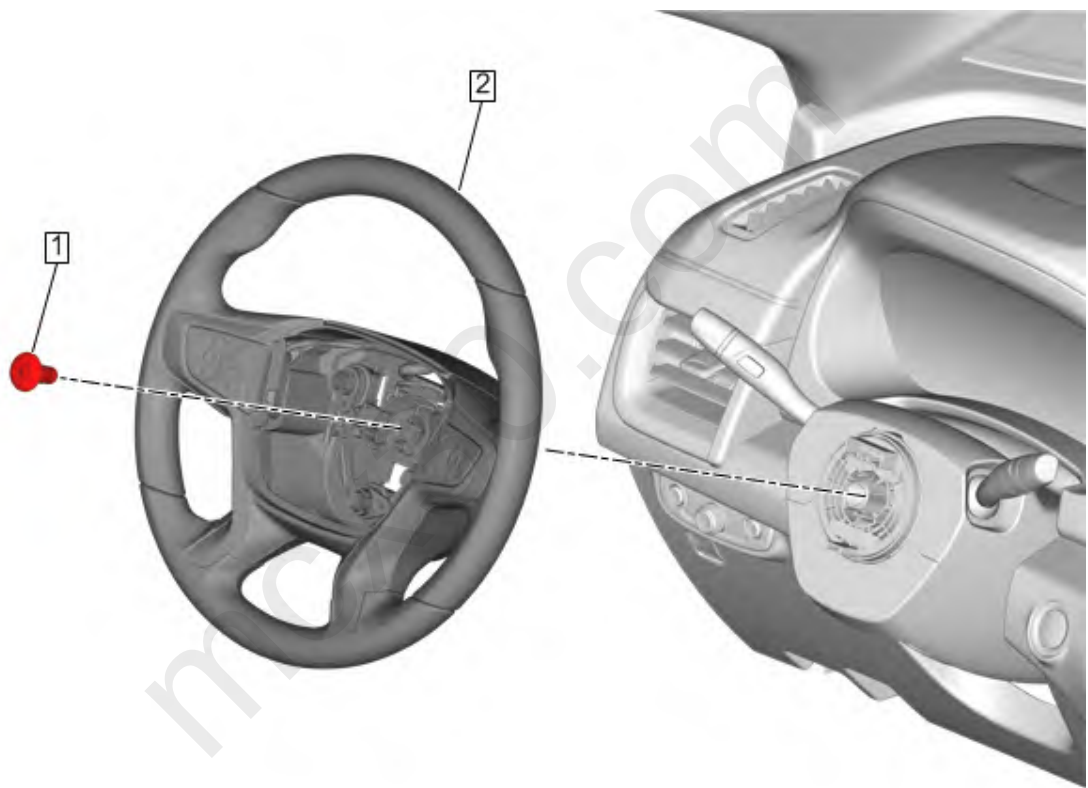


Fig. 74: Steering Wheel (Terrain)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Wheel Airbag. Refer to Steering Wheel Airbag Replacement (Terrain).	
Empty space for additional procedure steps	

Callout	Component Name
1	Steering Wheel Bolt CAUTION: Refer to Fastener Caution . Procedure 1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry. 2. Clean the threads inside of the upper steering column shaft with denatured alcohol or equivalent and allow to dry. 3. Apply thread locking adhesive to the bolt. Refer to Adhesives, Fluids, Lubricants and Sealers NOTE: The threads inside of the upper steering column shaft MUST be cleaned of ALL thread locking adhesive before tightening the steering wheel bolt or a false torque reading MAY occur. Tighten 45 N.m (33 lb ft)
2	Steering Wheel Procedure 1. Disconnect the electrical connectors. 2. Install the steering wheel bolt until 2 to 3 threads are engaged. 3. Wiggle the steering wheel until the wheel disengages completely. 4. Remove Steering Wheel Bolt 5. Remove Steering Wheel 6. Transfer components as necessary.

STEERING WHEEL VIBRATION DAMPENER REPLACEMENT (EQUINOX)

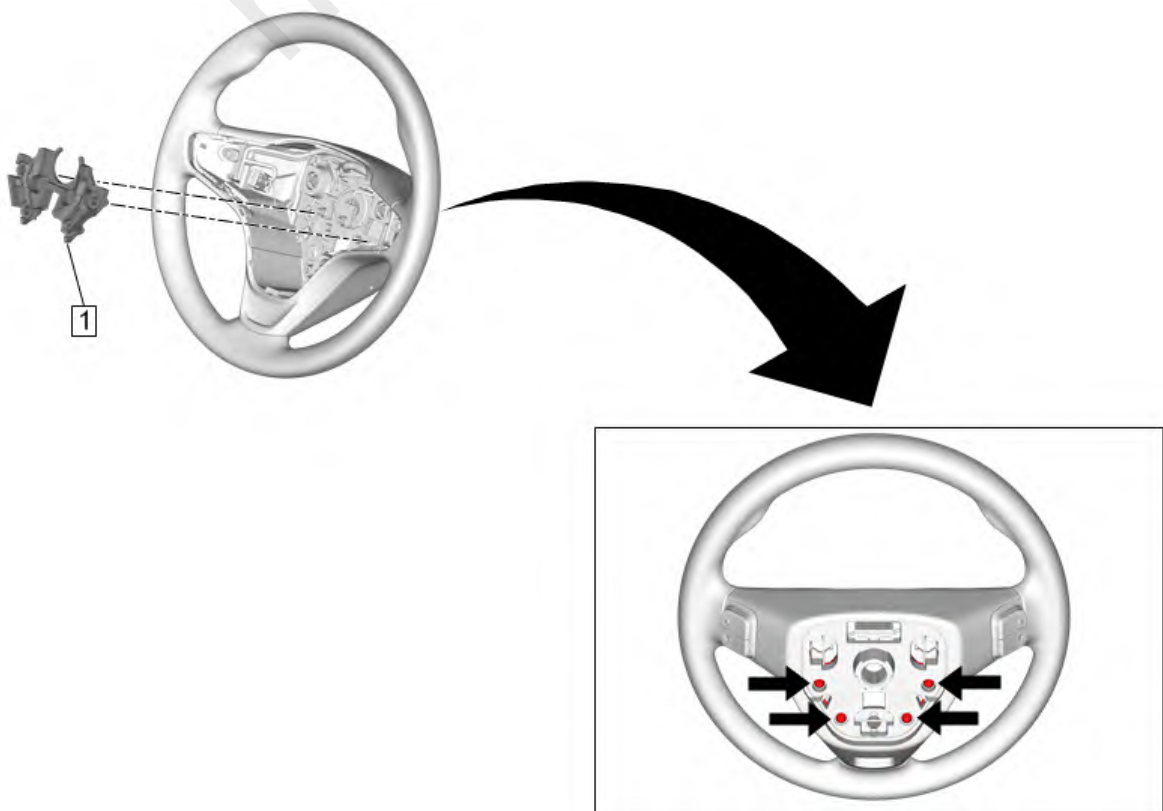


Fig. 75: Steering Wheel Vibration Dampener (Equinox).
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove Steering Wheel Spoke Cover. Refer to Steering Wheel Spoke Cover Replacement (Equinox). 2. Remove Steering Wheel Horn Contact. Refer to Steering Wheel Horn Contact Replacement (Equinox).	
1	Steering Wheel Vibration Dampener Procedure Push the steering wheel vibration dampener at each retaining position on the backside of the steering wheel to release and remove the dampener.

STEERING WHEEL VIBRATION DAMPENER REPLACEMENT (TERRAIN)

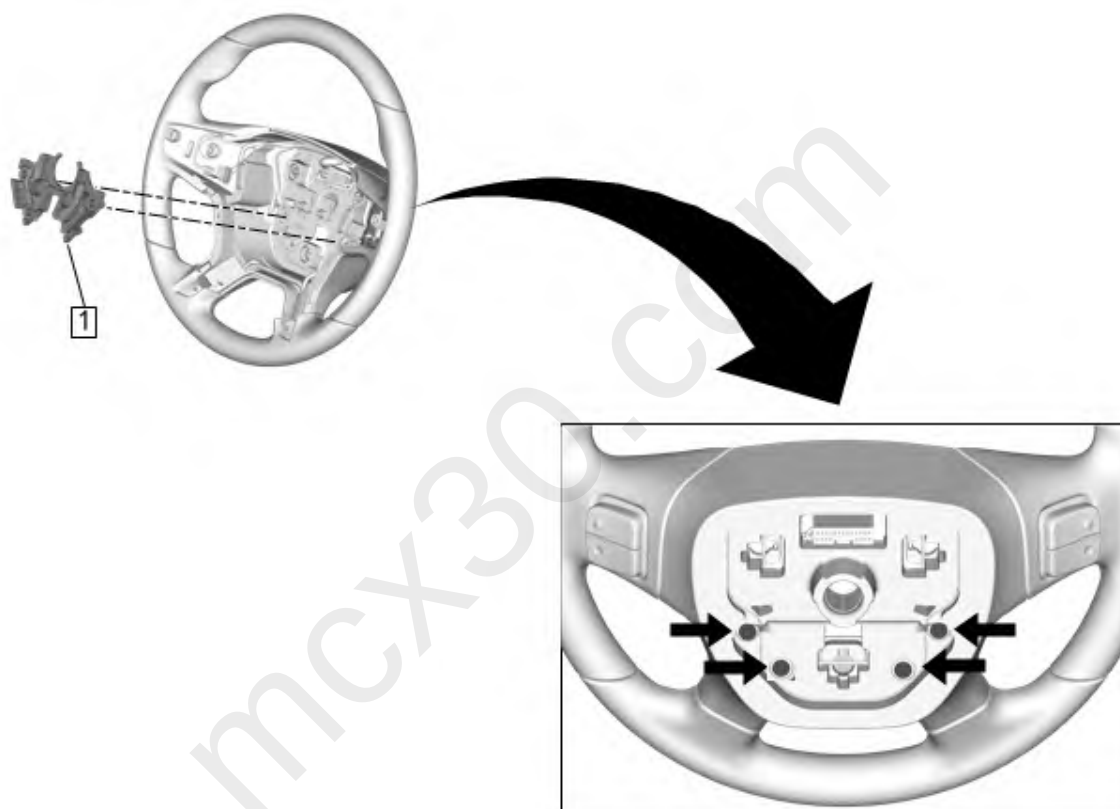


Fig. 76: Steering Wheel Vibration Dampener (Terrain).
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove Steering Wheel Spoke Cover. Refer to Steering Wheel Spoke Cover Replacement (Terrain). 2. Remove Steering Wheel Horn Contact. Refer to Steering Wheel Horn Contact Replacement (Terrain).	
1	Steering Wheel Vibration Dampener Procedure Push the steering wheel vibration dampener at each retaining position on the backside of the steering wheel to release and remove the dampener.

STEERING WHEEL SPOKE COVER REPLACEMENT (EQUINOX)

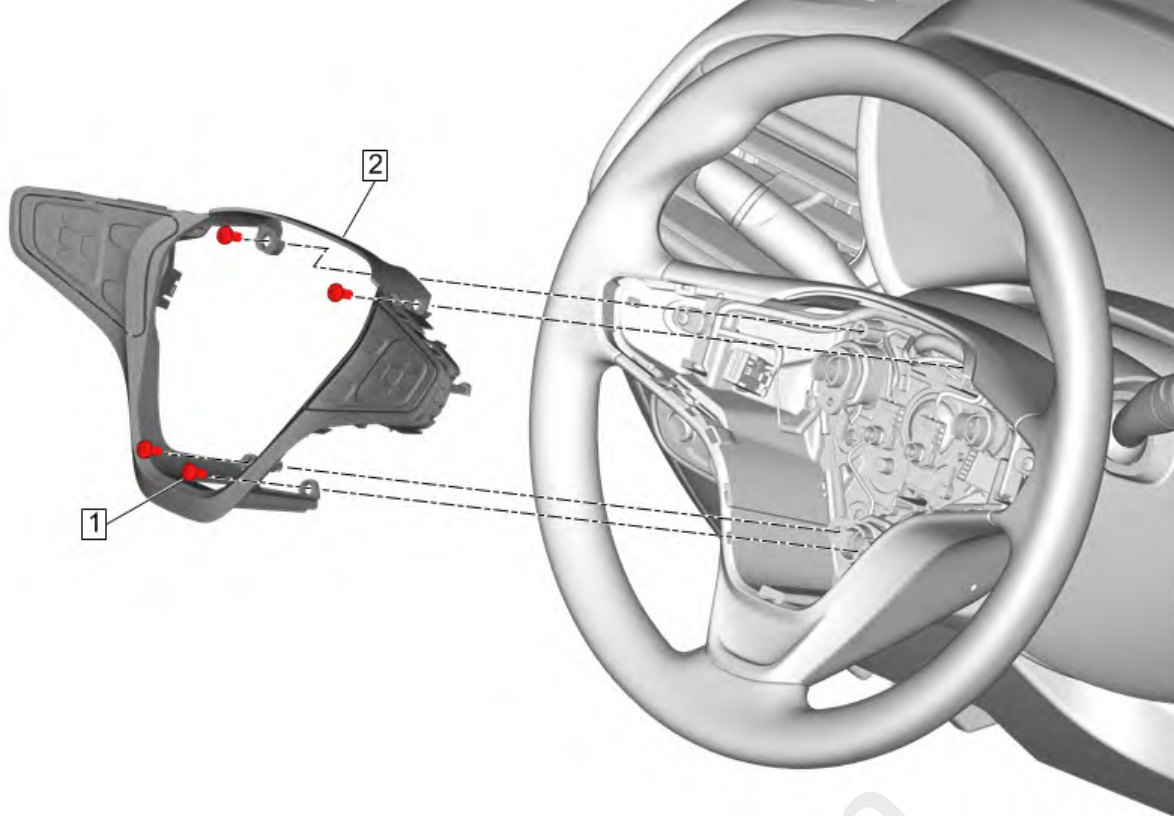


Fig. 77: Steering Wheel Spoke Cover (Equinox)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Wheel Airbag. Refer to Steering Wheel Airbag Replacement (Equinox)	
1	Steering Wheel Spoke Cover Fastener (Qty: 4) CAUTION: Refer to Fastener Caution . Tighten 1.5 N.m (13 lb in)
2	Steering Wheel Spoke Cover Procedure 1. Use a flat bladed plastic tool to remove. 2. Disconnect the electrical connectors. 3. Transfer components as necessary.

STEERING WHEEL SPOKE COVER REPLACEMENT (TERRAIN)

Removal Procedure

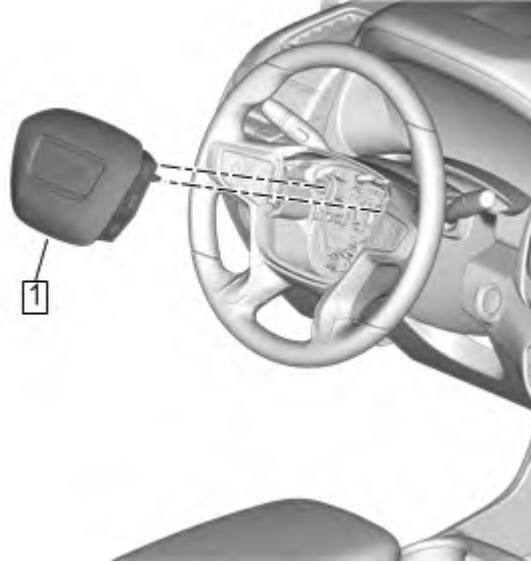


Fig. 78: Steering Wheel Airbag

Courtesy of GENERAL MOTORS COMPANY

1. Remove Steering Wheel Airbag (1). Refer to [Steering Wheel Airbag Replacement \(Terrain\)](#).

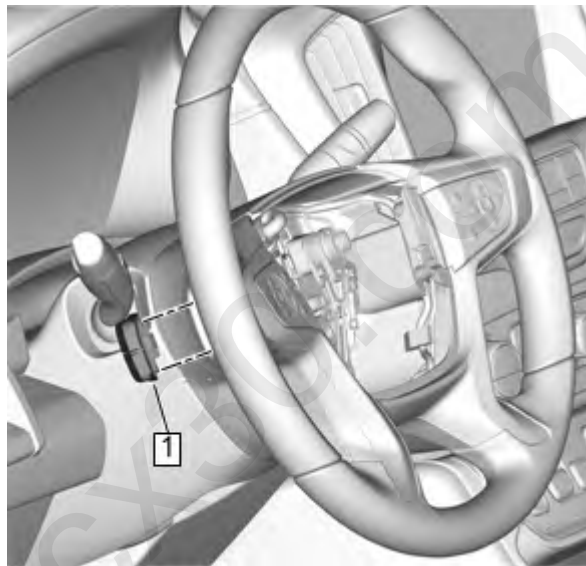


Fig. 79: Left Rear Radio Control Switch - Steering Wheel

Courtesy of GENERAL MOTORS COMPANY

2. Remove Radio Control Switch - Steering Wheel-Left Rear (1). Refer to [Radio Control Switch Replacement - Steering Wheel \(Terrain, Left Rear\)](#).

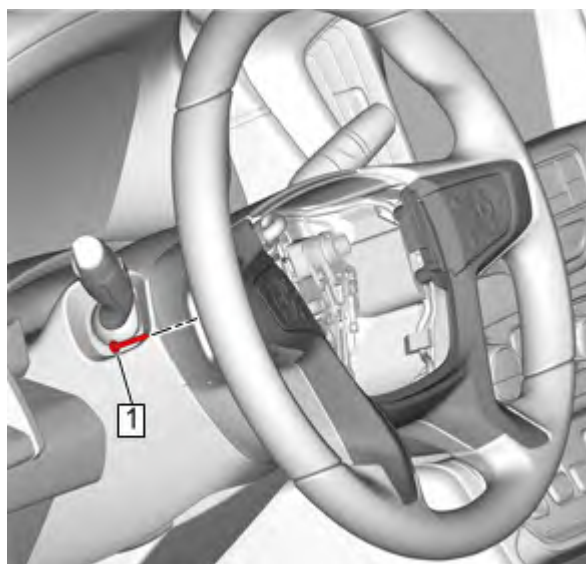


Fig. 80: Left Rear Steering Wheel Spoke Cover Fastener

Courtesy of GENERAL MOTORS COMPANY

3. Remove Steering Wheel Spoke Cover Fastener-Left Rear (1)

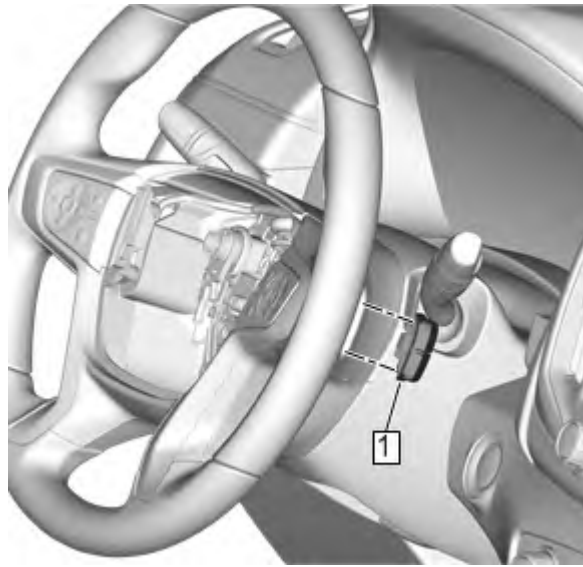


Fig. 81: Right Rear Radio Control Switch - Steering Wheel
Courtesy of GENERAL MOTORS COMPANY

4. Remove Radio Control Switch - Steering Wheel-Right Rear (1). Refer to [Radio Control Switch Replacement - Steering Wheel \(Terrain, Right Rear\)](#).

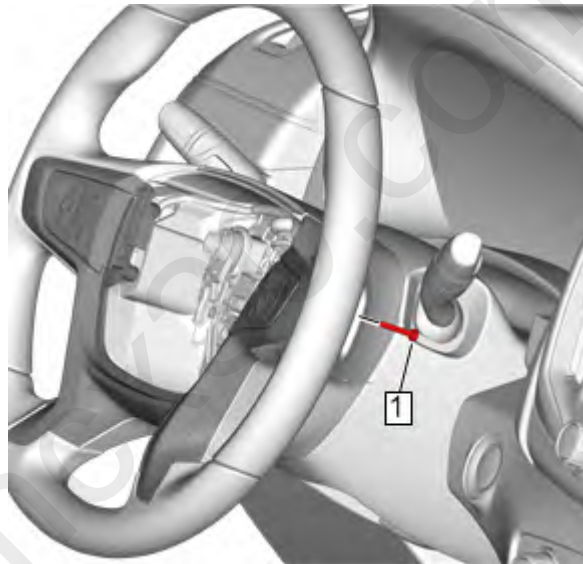


Fig. 82: Right Rear Steering Wheel Spoke Cover Fastener
Courtesy of GENERAL MOTORS COMPANY

5. Remove Steering Wheel Spoke Cover Fastener-Right Rear (1)

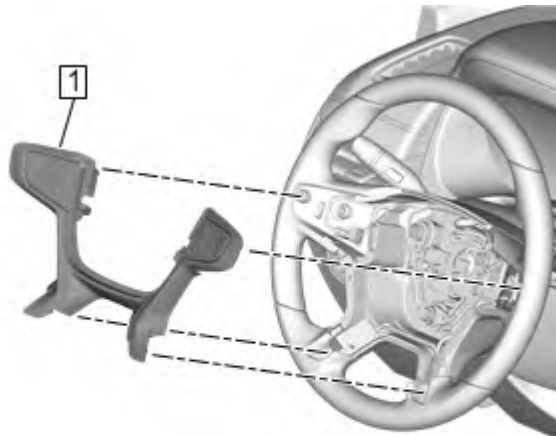


Fig. 83: Steering Wheel Spoke Cover
Courtesy of GENERAL MOTORS COMPANY

6. Perform the following steps to remove the steering wheel spoke cover (1):
 1. Use a flat bladed plastic tool to remove.
 2. Disconnect the electrical connectors.
7. Transfer components as necessary.

Installation Procedure

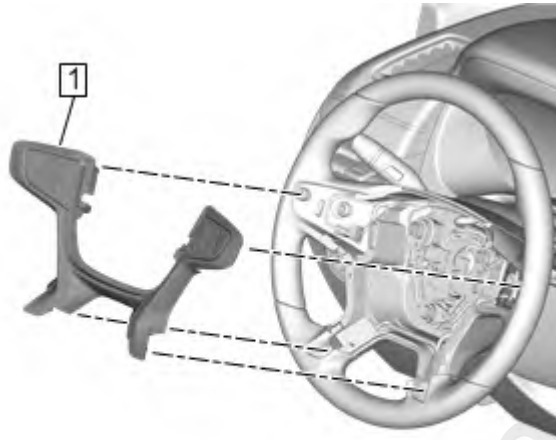


Fig. 84: Steering Wheel Spoke Cover
Courtesy of GENERAL MOTORS COMPANY

1. Perform the following steps to install the steering wheel spoke cover (1):
 1. Connect the electrical connectors.
 2. Secure the spoke cover and control switches to the steering wheel.

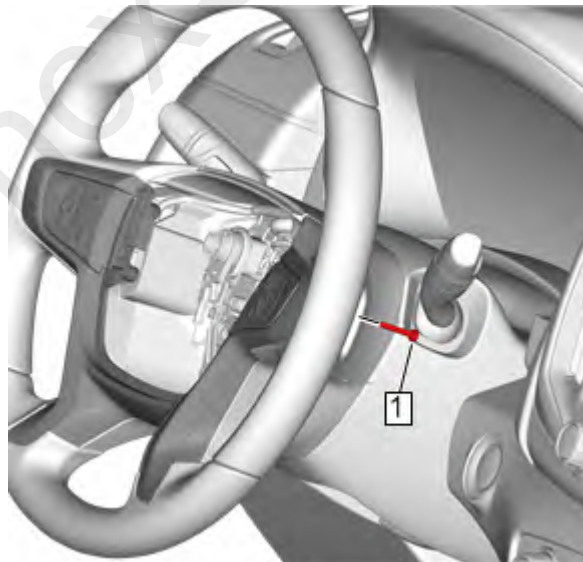


Fig. 85: Right Rear Steering Wheel Spoke Cover Fastener
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

2. Install and tighten Steering Wheel Spoke Cover Fastener-Right Rear (1) to 2.5 N.m (22 lb in)

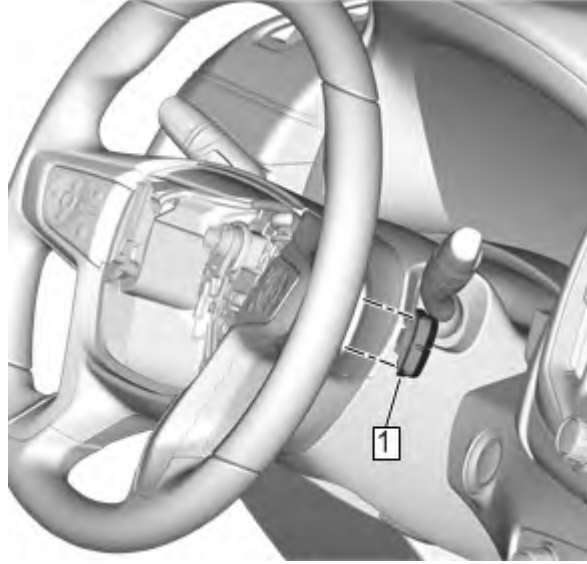


Fig. 86: Right Rear Radio Control Switch - Steering Wheel
Courtesy of GENERAL MOTORS COMPANY

3. Install Radio Control Switch - Steering Wheel-Right Rear (1). Refer to [Radio Control Switch Replacement - Steering Wheel \(Terrain, Right Rear\)](#).

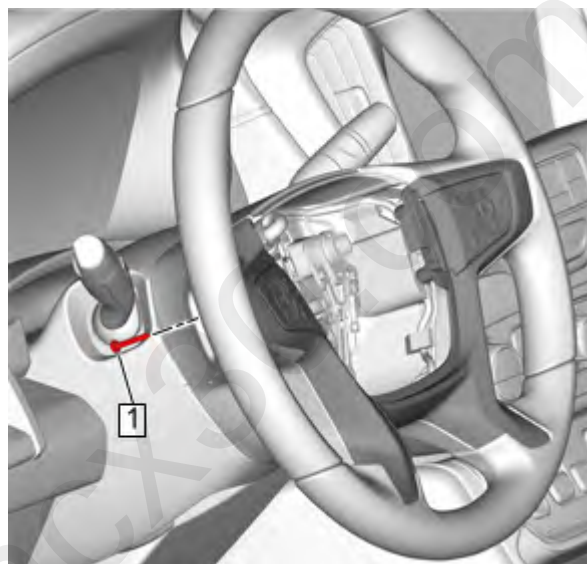


Fig. 87: Left Rear Steering Wheel Spoke Cover Fastener
Courtesy of GENERAL MOTORS COMPANY

4. Install and tighten Steering Wheel Spoke Cover Fastener-Left Rear (1) to 2.5 N.m (22 lb in)

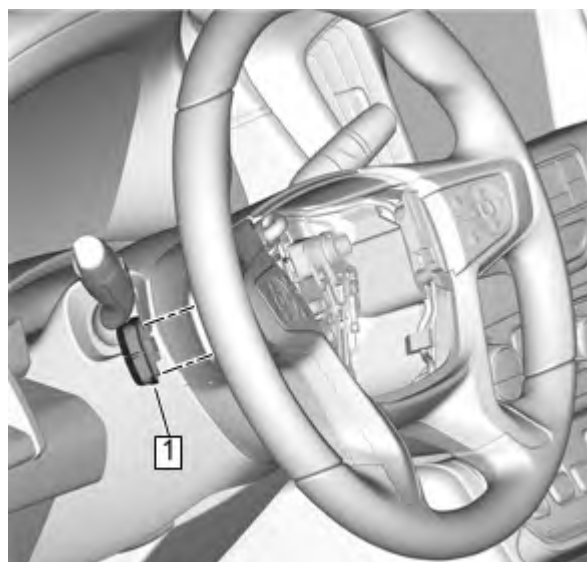


Fig. 88: Left Rear Radio Control Switch - Steering Wheel
Courtesy of GENERAL MOTORS COMPANY

5. Install Radio Control Switch - Steering Wheel-Left Rear (1). Refer to [Radio Control Switch Replacement - Steering Wheel \(Terrain, Left Rear\)](#).

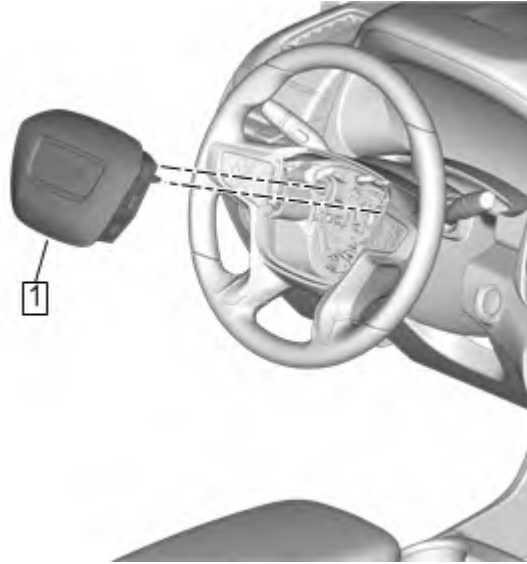


Fig. 89: Steering Wheel Airbag

Courtesy of GENERAL MOTORS COMPANY

6. Install Steering Wheel Airbag (1). Refer to [Steering Wheel Airbag Replacement \(Terrain\)](#).

STEERING COLUMN REPLACEMENT (EQUINOX)

Removal Procedure

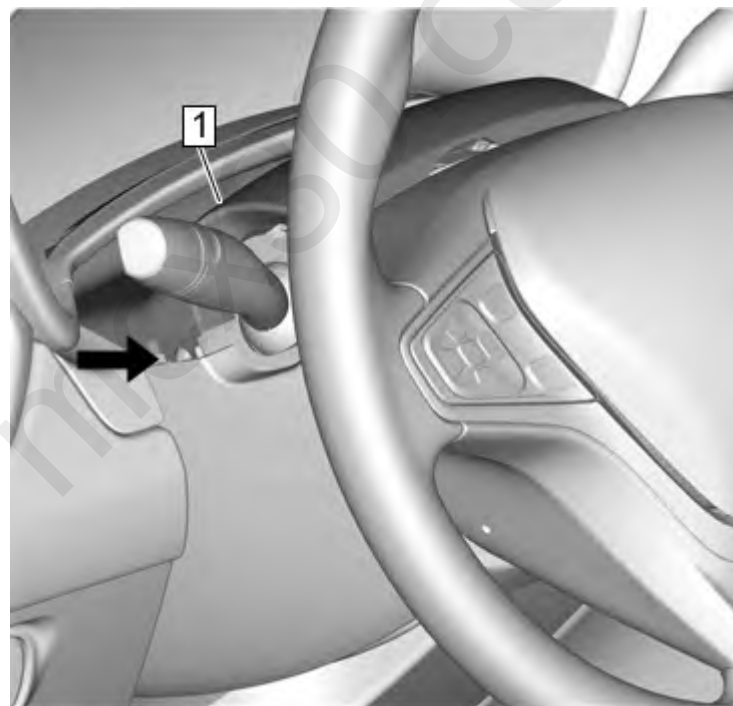


Fig. 90: Steering Column Upper Trim Cover

Courtesy of GENERAL MOTORS COMPANY

1. Use a flat bladed plastic trim tool to separate the steering column upper trim cover (1) from the steering column lower trim cover.
2. Position the steering column upper trim (1) cover out of the way.

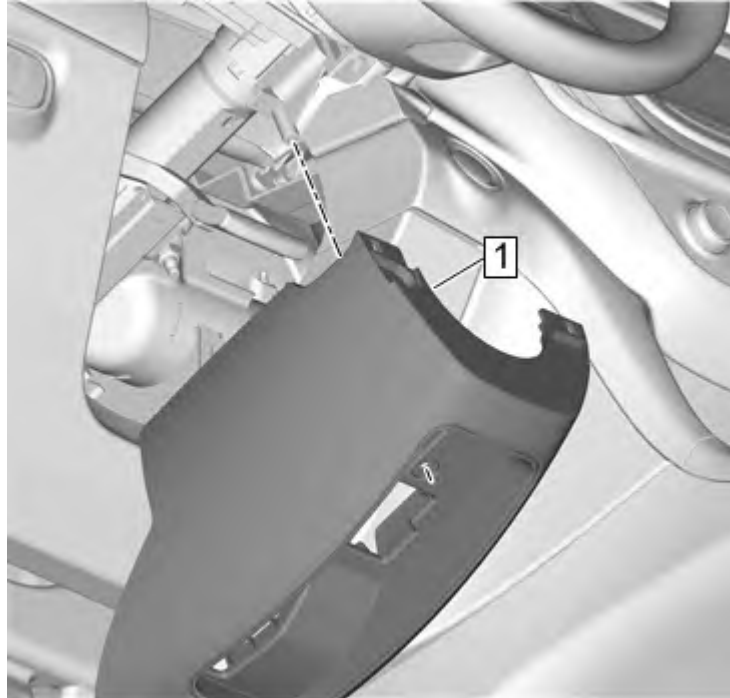


Fig. 91: Steering Column Lower Trim Cover

Courtesy of GENERAL MOTORS COMPANY

3. Remove Steering Column Lower Trim Cover (1). Refer to [Steering Column Lower Trim Cover Replacement \(Equinox\)](#)

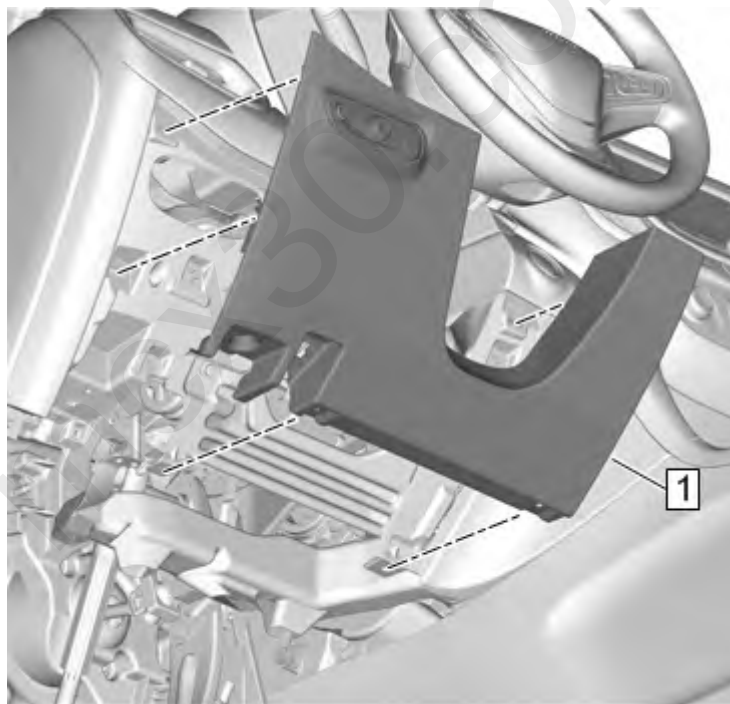


Fig. 92: Instrument Panel Knee Bolster

Courtesy of GENERAL MOTORS COMPANY

4. Remove Instrument Panel Knee Bolster (1). Refer to [Instrument Panel Knee Bolster Replacement \(Equinox\)](#)
5. Ensure the steering wheel and the front wheels are in the straight ahead position.
 1. With foot OFF the brake pedal and the shift lever in the PARK position put the vehicle in the accessory mode. This will unlock the steering column for 5 minutes.
 2. Turn the steering wheel to verify the steering column is NOT locked.
 3. Disconnect the steering column lock control module electrical connectors.
 4. With foot OFF the brake pedal and the shift lever in the PARK position, press the ignition and start switch once. This will place the ignition system in the OFF mode and leave the steering column unlocked as long as the electrical connectors are disconnected.

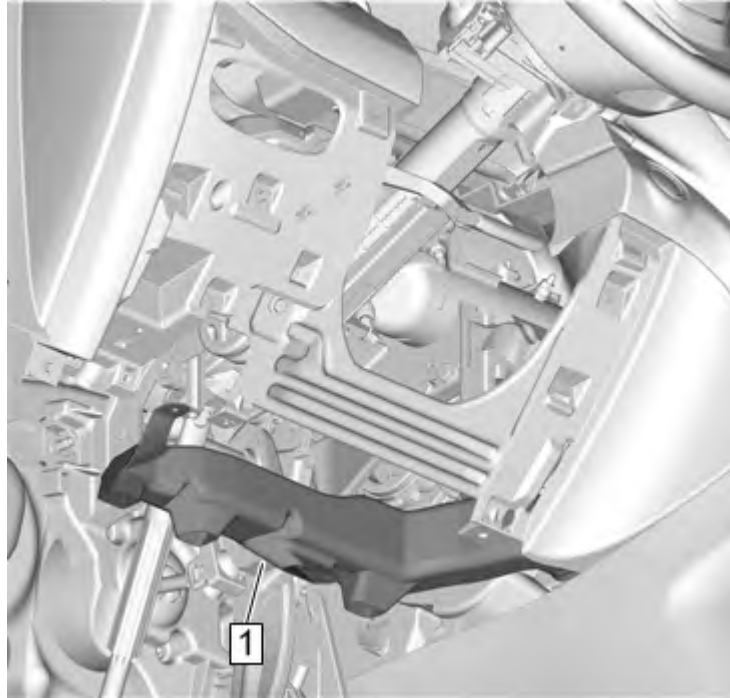


Fig. 93: Left Side Floor Front Air Outlet Duct

Courtesy of GENERAL MOTORS COMPANY

6. Remove Floor Front Air Outlet Duct - Left Side (1). Refer to [Floor Front Air Outlet Duct Replacement - Left Side](#)

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.

7. With the wheels of the vehicle in the straight ahead position, LOCK the steering column.

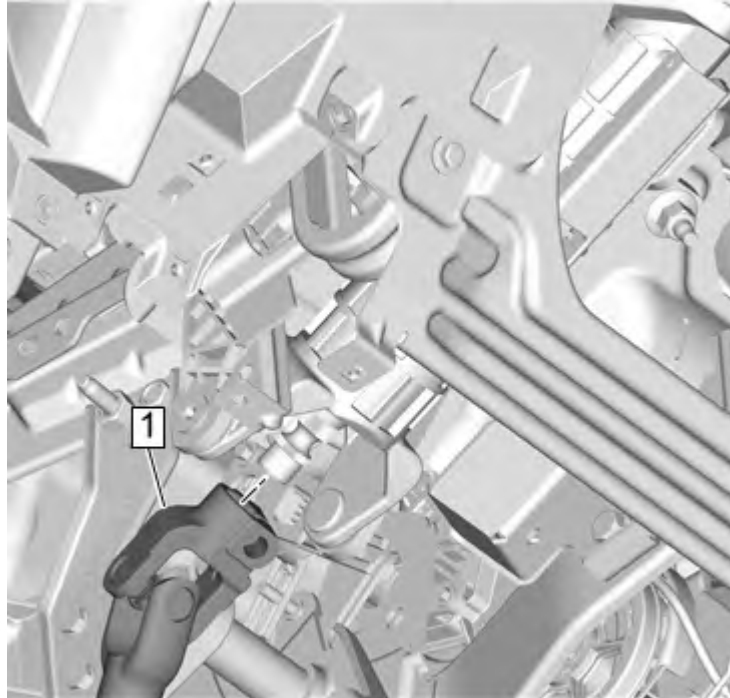


Fig. 94: Intermediate Steering Shaft

Courtesy of GENERAL MOTORS COMPANY

8. Separate Intermediate Steering Shaft (1) @ Steering Column. Refer to [Intermediate Steering Shaft Replacement \(Equinox\)](#).
9. Disconnect the steering column electrical connectors as necessary.

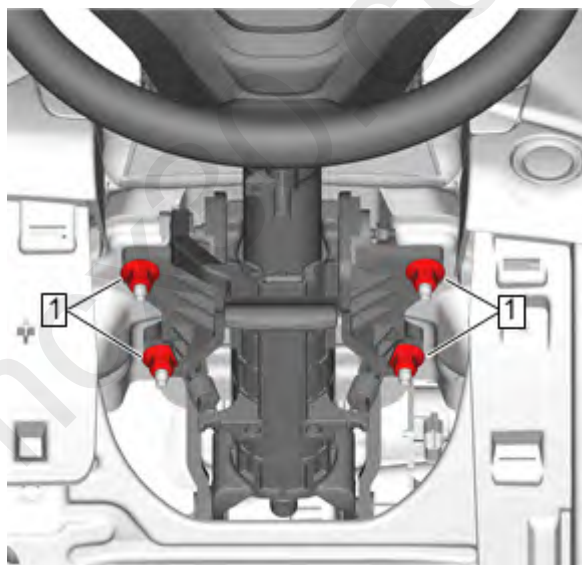


Fig. 95: Steering Column Nuts

Courtesy of GENERAL MOTORS COMPANY

10. Remove Steering Column Nuts (1) (Qty: 4)

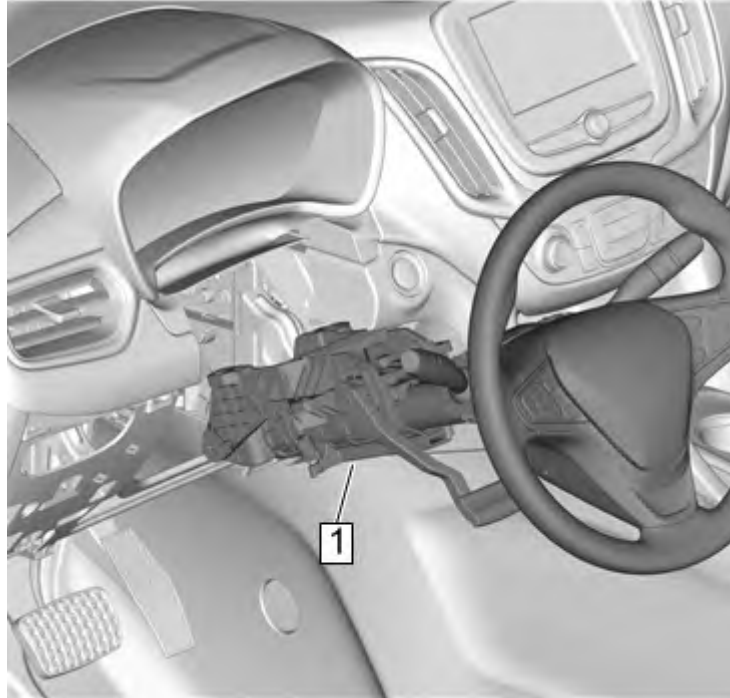


Fig. 96: Steering Column

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Once the steering column is removed from the car, the column is extremely susceptible to damage. Dropping the column on its end could collapse the steering shaft or loosen the plastic injections which maintain column rigidity. Leaning on the column could cause the jacket to bend or deform. Any of the above damage could impair the column's collapsible design. If it is necessary to remove the steering wheel, use only the specified steering wheel puller. Under no conditions should the end of the shaft be hammered upon as hammering could loosen plastic injections which maintain column rigidity.

11. Remove the steering column (1) from the vehicle.
12. Transfer components as necessary.

Installation Procedure

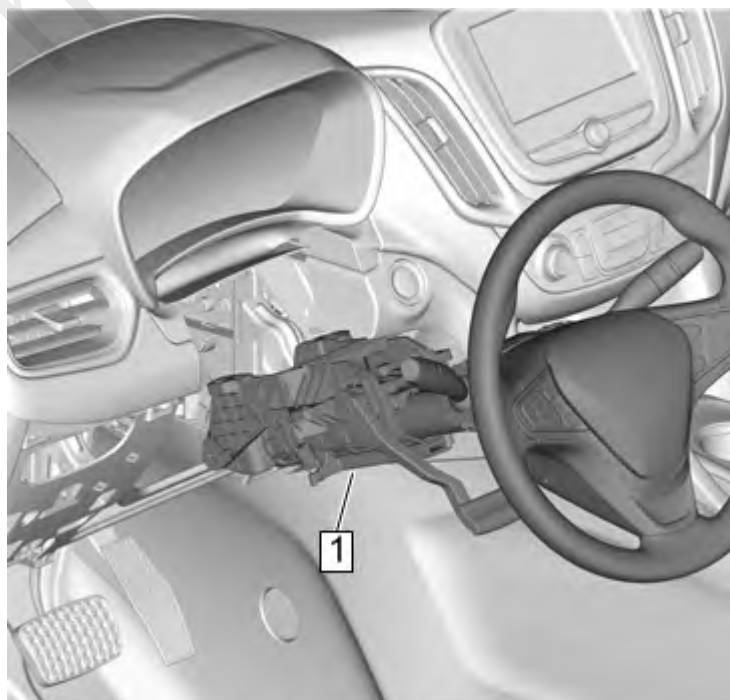


Fig. 97: Steering Column

Courtesy of GENERAL MOTORS COMPANY

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

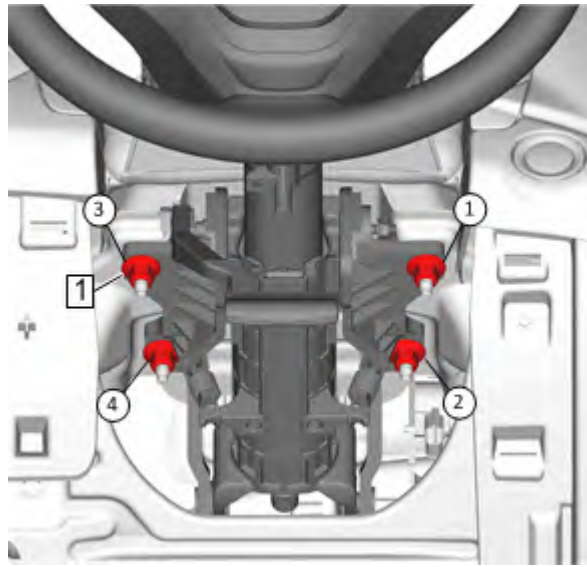


Fig. 98: Steering Column Nut Tightening Sequence
Courtesy of GENERAL MOTORS COMPANY

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

2. Install the steering column nuts (1) and tighten in the sequence shown to 22 N.m (16 lb ft).
3. Connect the steering column electrical connectors.

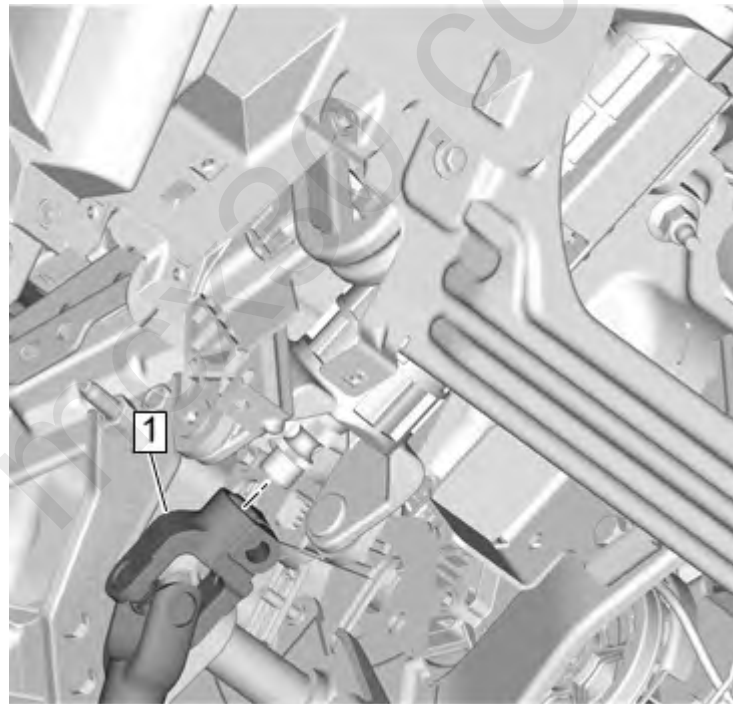


Fig. 99: Intermediate Steering Shaft
Courtesy of GENERAL MOTORS COMPANY

4. Install Intermediate Steering Shaft (1) @ Steering Column. Refer to [Intermediate Steering Shaft Replacement \(Equinox\)](#).

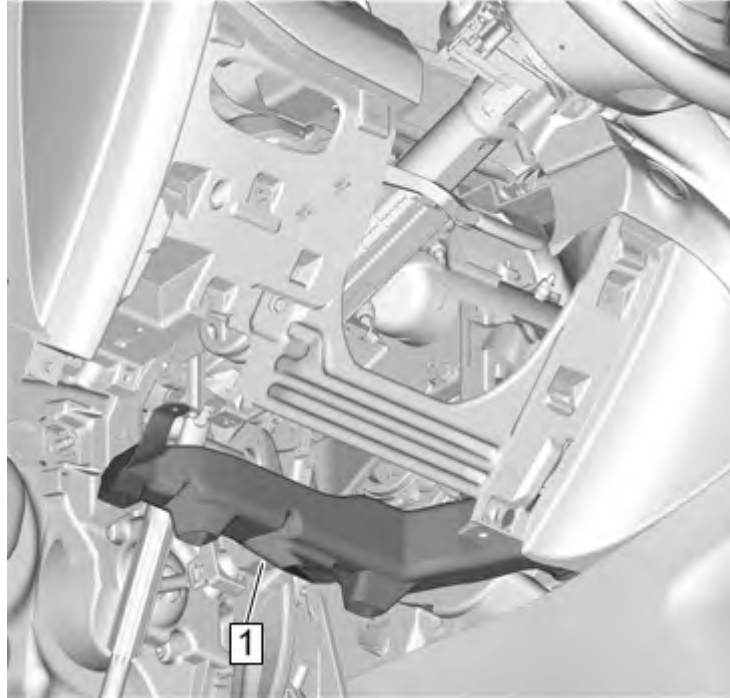


Fig. 100: Left Side Floor Front Air Outlet Duct
 Courtesy of GENERAL MOTORS COMPANY

5. Install Floor Front Air Outlet Duct - Left Side (1). Refer to [Floor Front Air Outlet Duct Replacement - Left Side](#)

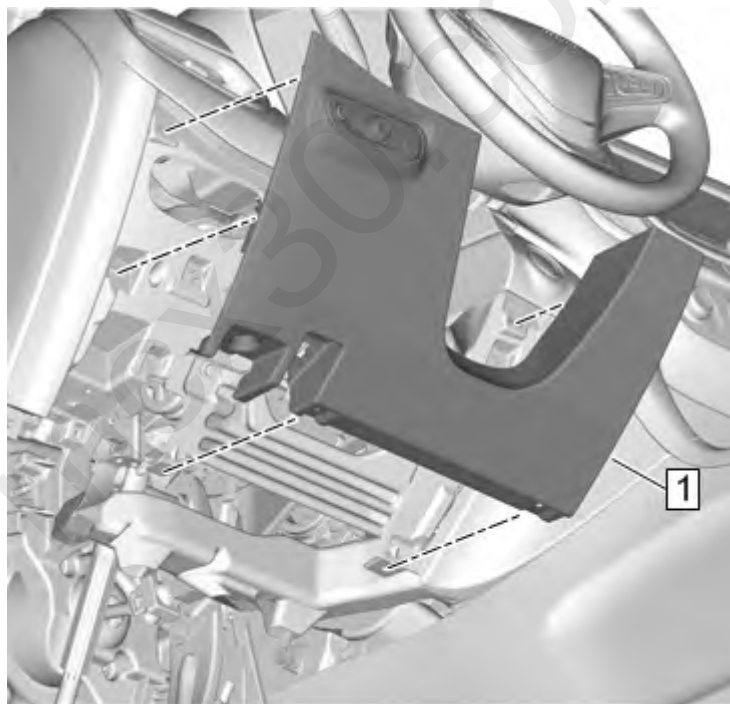


Fig. 101: Instrument Panel Knee Bolster
 Courtesy of GENERAL MOTORS COMPANY

6. Install Instrument Panel Knee Bolster (1). Refer to [Instrument Panel Knee Bolster Replacement \(Equinox\)](#)
7. Unlock the steering column.

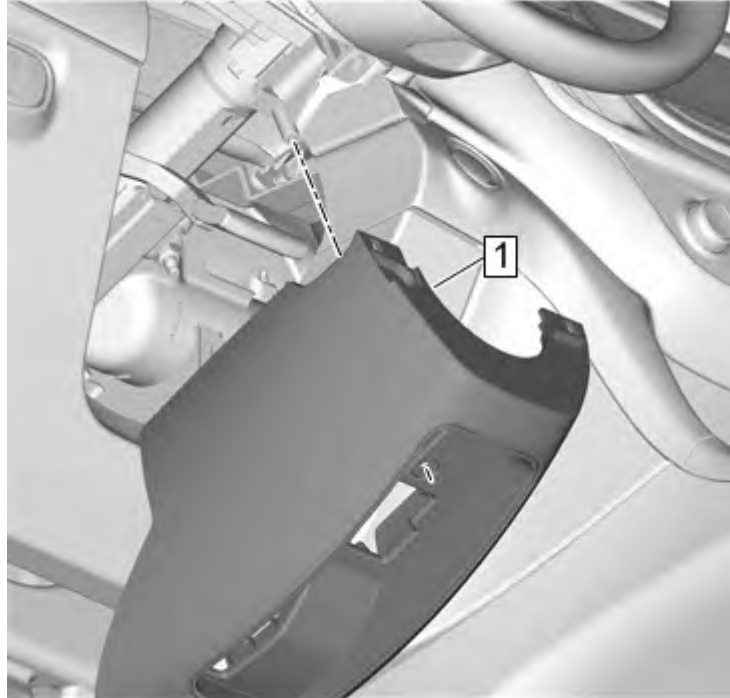


Fig. 102: Steering Column Lower Trim Cover
 Courtesy of GENERAL MOTORS COMPANY

8. Install Steering Column Lower Trim Cover (1). Refer to [Steering Column Lower Trim Cover Replacement \(Equinox\)](#).

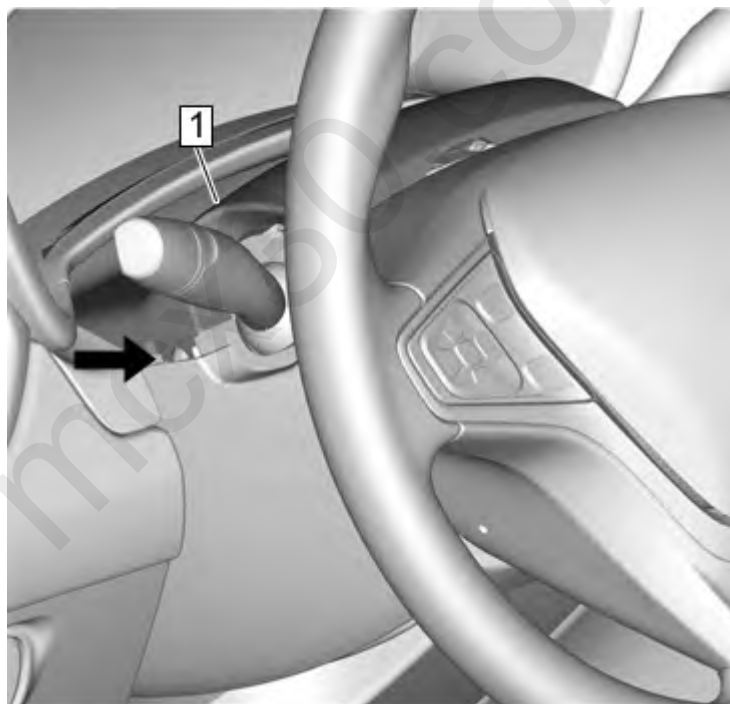


Fig. 103: Steering Column Upper Trim Cover
 Courtesy of GENERAL MOTORS COMPANY

9. Secure the steering column upper trim (1) to the steering column lower trim cover.
10. Center the steering angle sensor. Refer to [Steering Wheel Angle Sensor Centering](#)

STEERING COLUMN REPLACEMENT (TERRAIN)

Removal Procedure

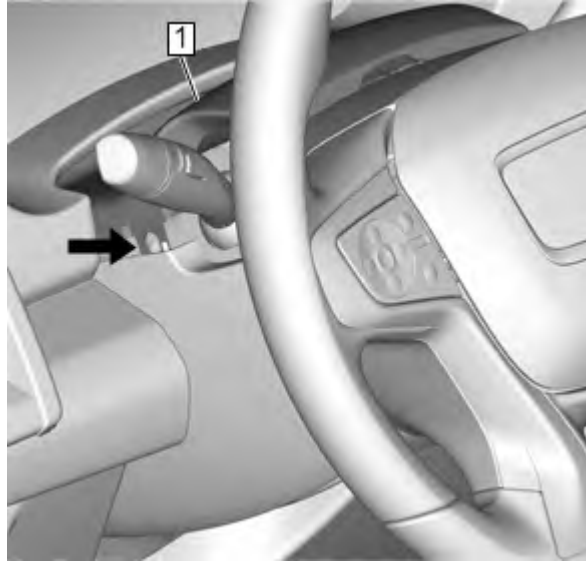


Fig. 104: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

1. Use a flat bladed plastic trim tool to separate the steering column upper trim cover (1) from the steering column lower trim cover.
2. Position the steering column upper trim (1) cover out of the way.

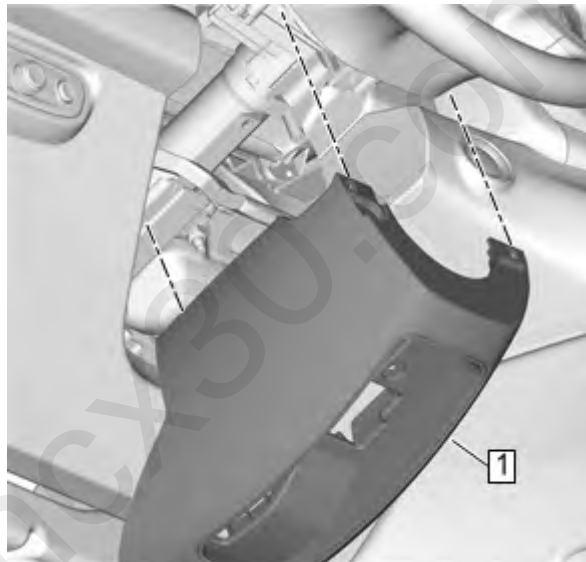
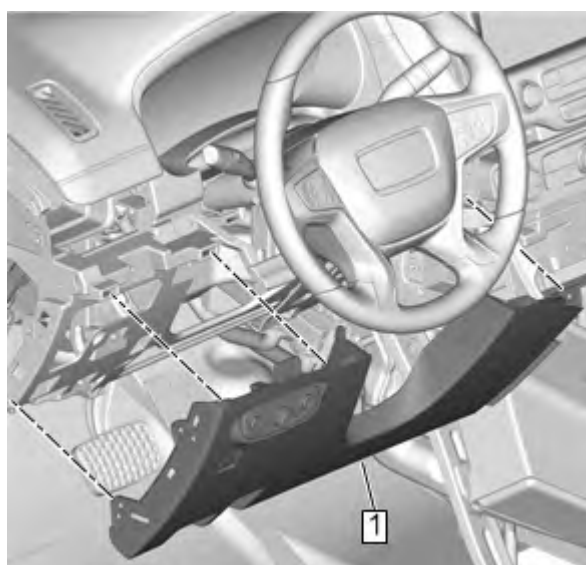


Fig. 105: Steering Column Lower Trim Cover
Courtesy of GENERAL MOTORS COMPANY

3. Remove Steering Column Lower Trim Cover (1). Refer to [Steering Column Lower Trim Cover Replacement \(Terrain\)](#)



4. Remove Instrument Panel Knee Bolster (1). Refer to **Instrument Panel Knee Bolster Replacement (Terrain)**
5. Ensure the steering wheel and the front wheels are in the straight ahead position.
 1. With foot OFF the brake pedal and the shift lever in the PARK position put the vehicle in the accessory mode. This will unlock the steering column for 5 minutes.
 2. Turn the steering wheel to verify the steering column is NOT locked.
 3. Disconnect the steering column lock control module electrical connectors.
 4. With foot OFF the brake pedal and the shift lever in the PARK position, press the ignition and start switch once. This will place the ignition system in the OFF mode and leave the steering column unlocked as long as the electrical connectors are disconnected.

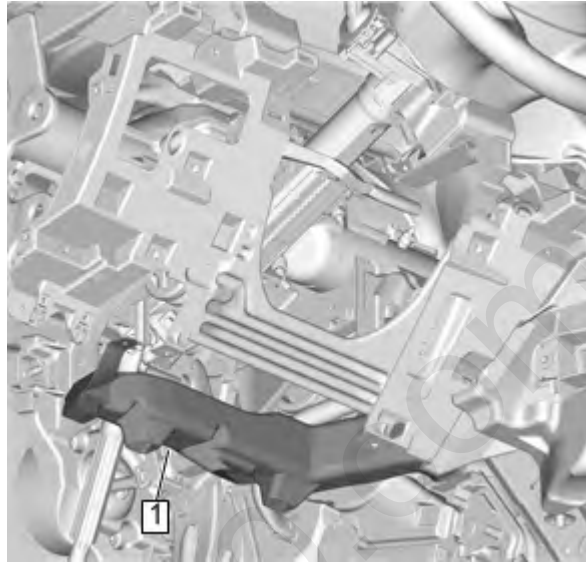


Fig. 107: Left Side Floor Front Air Outlet Duct
Courtesy of GENERAL MOTORS COMPANY

6. Remove Floor Front Air Outlet Duct - Left Side (1). Refer to **Floor Front Air Outlet Duct Replacement - Left Side**

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.

7. With the wheels of the vehicle in the straight ahead position, LOCK the steering column.

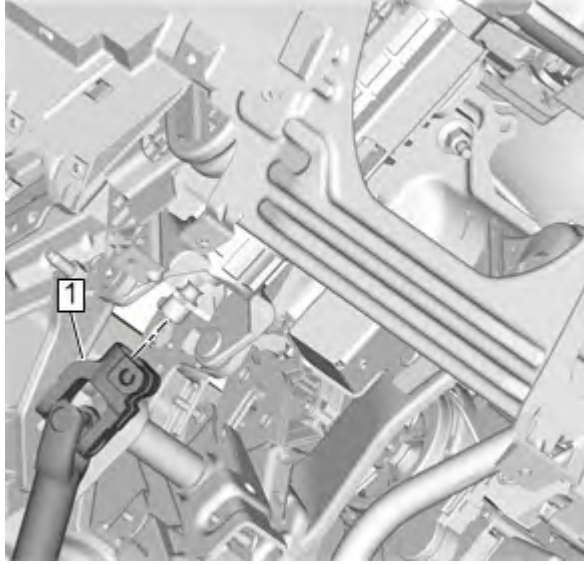


Fig. 108: Intermediate Steering Shaft

Courtesy of GENERAL MOTORS COMPANY

8. Separate Intermediate Steering Shaft (1) @ Steering Column. Refer to [Intermediate Steering Shaft Replacement \(Terrain\)](#).
9. Disconnect the steering column electrical connectors as necessary.

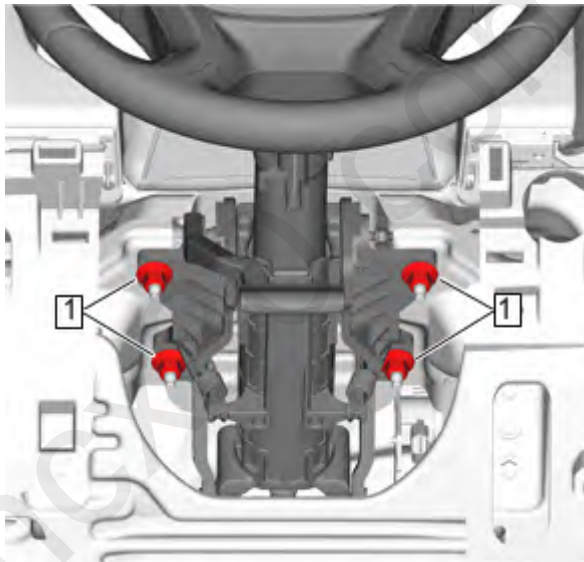
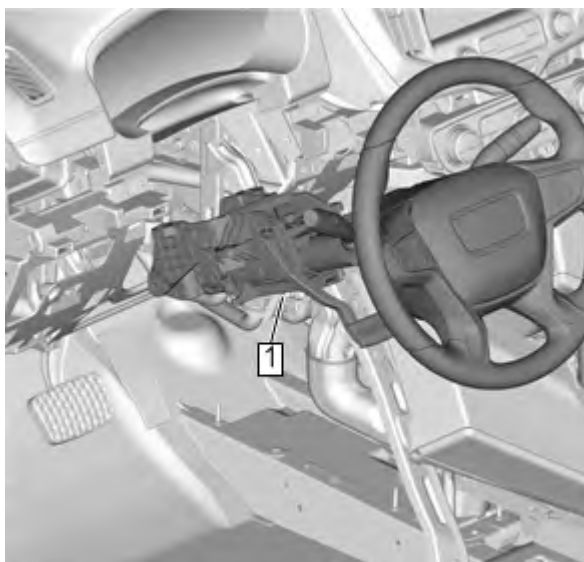


Fig. 109: Steering Column Nuts

Courtesy of GENERAL MOTORS COMPANY

10. Remove Steering Column Nuts (1) (Qty: 4)



CAUTION: Once the steering column is removed from the car, the column is extremely susceptible to damage. Dropping the column on its end could collapse the steering shaft or loosen the plastic injections which maintain column rigidity. Leaning on the column could cause the jacket to bend or deform. Any of the above damage could impair the column's collapsible design. If it is necessary to remove the steering wheel, use only the specified steering wheel puller. Under no conditions should the end of the shaft be hammered upon as hammering could loosen plastic injections which maintain column rigidity.

11. Remove the steering column (1) from the vehicle.
12. Transfer components as necessary.

Installation Procedure

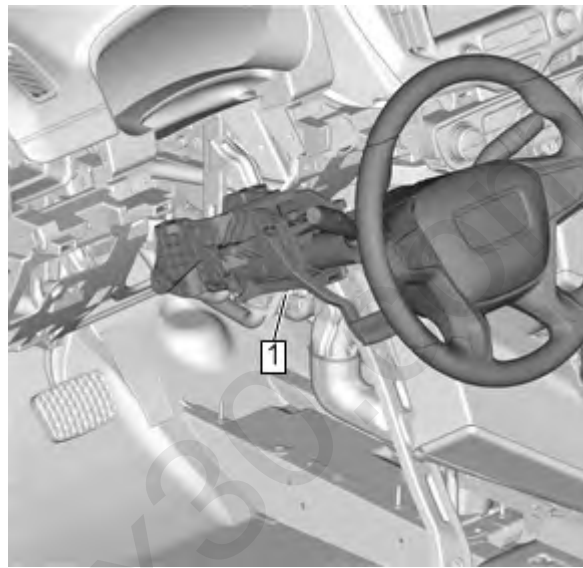


Fig. 111: Steering Column
Courtesy of GENERAL MOTORS COMPANY

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

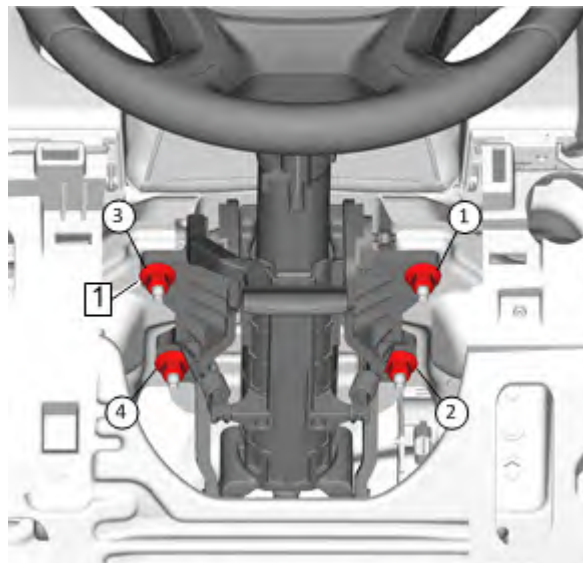


Fig. 112: Steering Column Nut Tightening Sequence
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

2. Install the steering column nuts (1) and tighten in the sequence shown to 22 N.m (16 lb ft).
3. Connect the steering column electrical connectors.

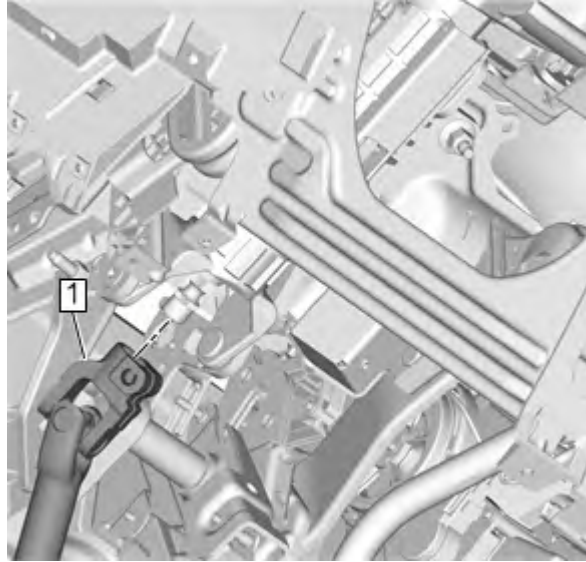


Fig. 113: Intermediate Steering Shaft

Courtesy of GENERAL MOTORS COMPANY

4. Install Intermediate Steering Shaft (1) @ Steering Column. Refer to [Intermediate Steering Shaft Replacement \(Terrain\)](#)

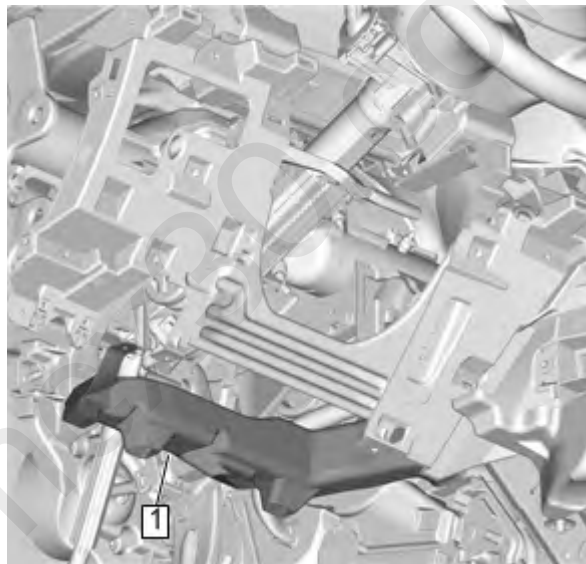


Fig. 114: Left Side Floor Front Air Outlet Duct

Courtesy of GENERAL MOTORS COMPANY

5. Install Floor Front Air Outlet Duct - Left Side (1). Refer to [Floor Front Air Outlet Duct Replacement - Left Side](#)

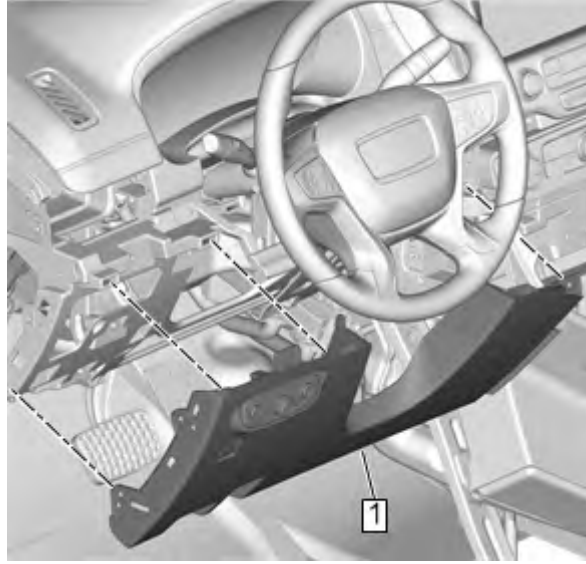


Fig. 115: Instrument Panel Knee Bolster

Courtesy of GENERAL MOTORS COMPANY

6. Install Instrument Panel Knee Bolster (1). Refer to [Instrument Panel Knee Bolster Replacement \(Terrain\)](#)
7. Unlock the steering column.

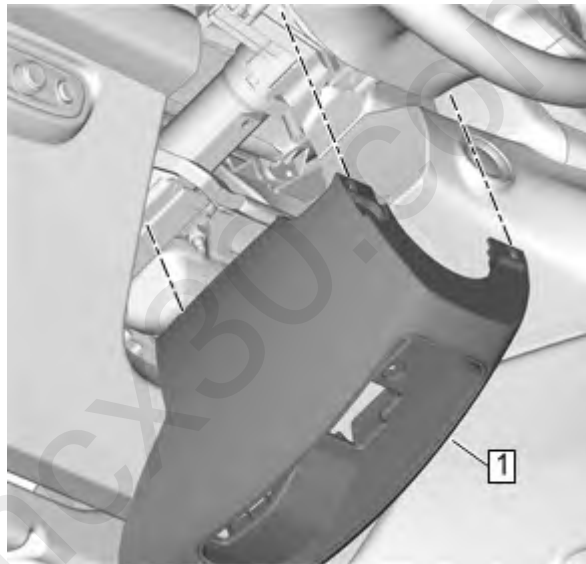


Fig. 116: Steering Column Lower Trim Cover

Courtesy of GENERAL MOTORS COMPANY

8. Install Steering Column Lower Trim Cover (1). Refer to [Steering Column Lower Trim Cover Replacement \(Terrain\)](#)

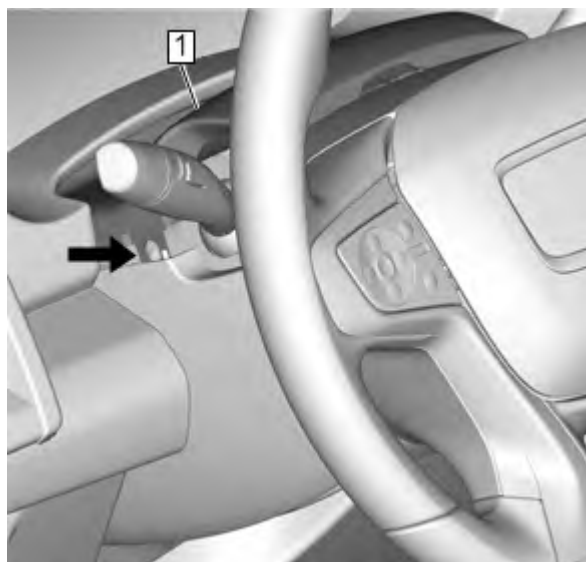


Fig. 117: Steering Column Upper Trim Cover
Courtesy of GENERAL MOTORS COMPANY

9. Secure the steering column upper trim (1) to the steering column lower trim cover.
10. Center the steering angle sensor. Refer to [Steering Wheel Angle Sensor Centering](#)

STEERING COLUMN DASH INNER SEAL REPLACEMENT (EQUINOX)

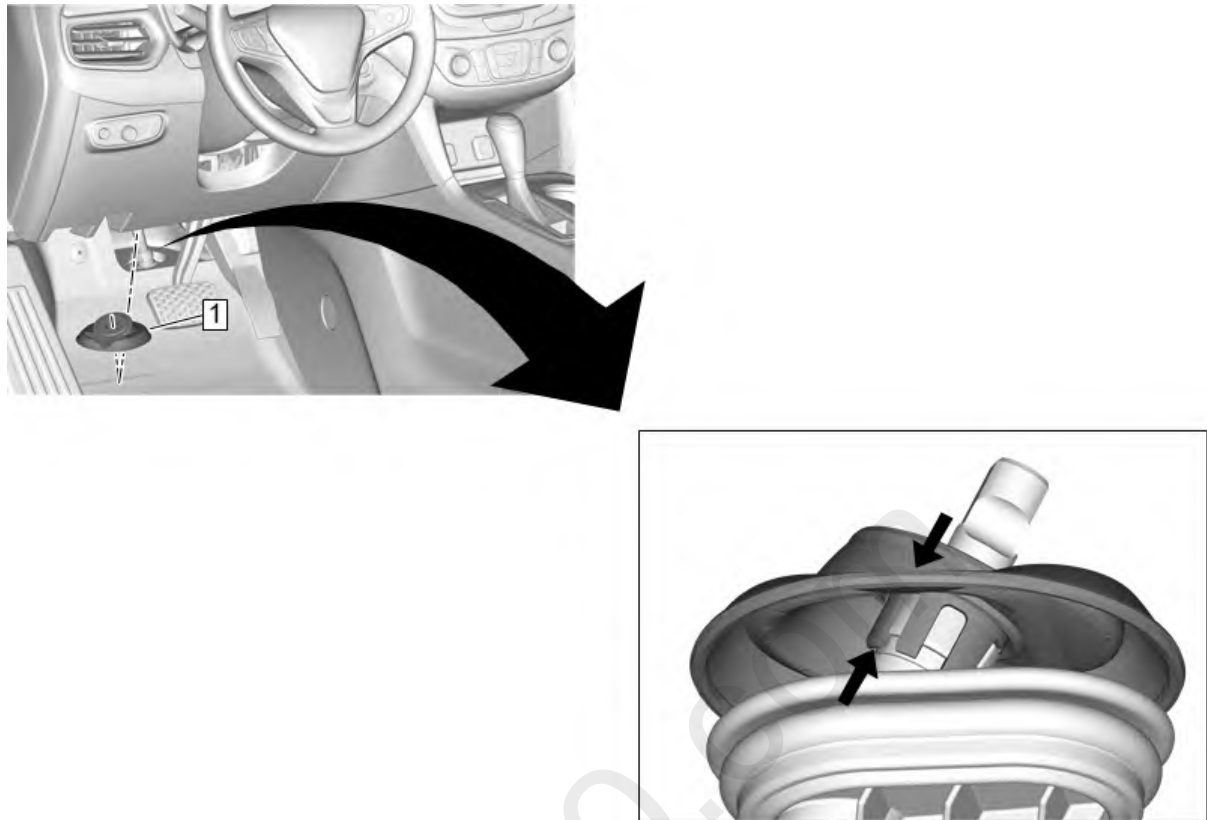


Fig. 118: Steering Column Dash Inner Seal (Equinox)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Separate Intermediate Steering Shaft @ Steering Gear. Refer to Intermediate Steering Shaft Replacement (Equinox)	
1	Steering Column Dash Inner Seal Procedure 1. To remove the steering column dash inner seal, lift the edge of the seal and release the plastic retaining tabs from the steering gear input shaft. 2. To install the steering column dash inner seal, push the seal until the plastic retaining tabs engage the steering gear input shaft.

STEERING COLUMN DASH INNER SEAL REPLACEMENT (TERRAIN)

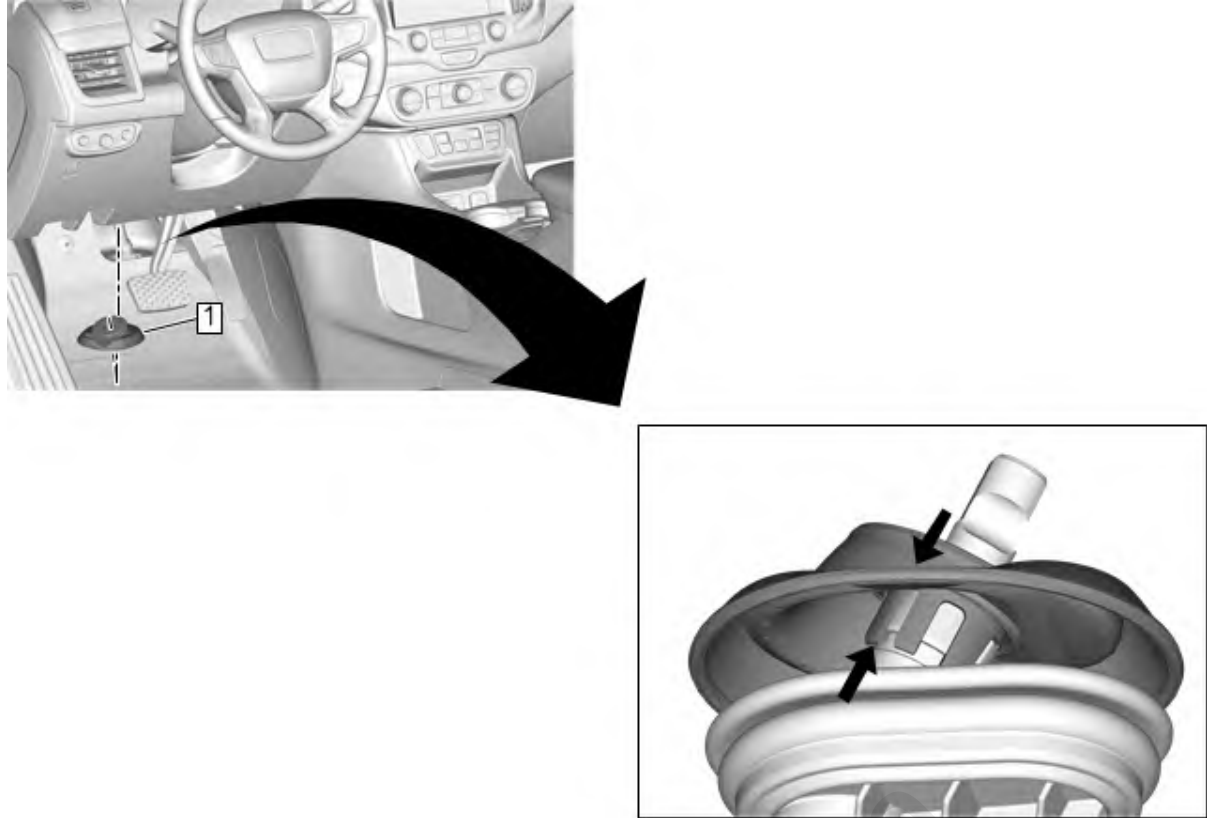


Fig. 119: Steering Column Dash Inner Seal (Terrain).
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Separate Intermediate Steering Shaft @ Steering Gear. Refer to Intermediate Steering Shaft Replacement (Terrain)	
1	Steering Column Dash Inner Seal Procedure 1. To remove the steering column dash inner seal, lift the edge of the seal and release the plastic retaining tabs from the steering gear input shaft. 2. To install the steering column dash inner seal, push the seal until the plastic retaining tabs engage the steering gear input shaft.

STEERING COLUMN DASH OUTER SEAL REPLACEMENT (EQUINOX, TERRAIN)

Removal Procedure

1. Remove Steering Column Dash Inner Seal. Refer to [Steering Column Dash Inner Seal Replacement \(Equinox\)](#)[Steering Column Dash Inner Seal Replacement \(Terrain\)](#)
2. Lower the drivetrain and front suspension cradle. Refer to [Drivetrain and Front Suspension Cradle Replacement \(Front Wheel Drive\)](#) [Drivetrain and Front Suspension Cradle Replacement \(All Wheel Drive\)](#)

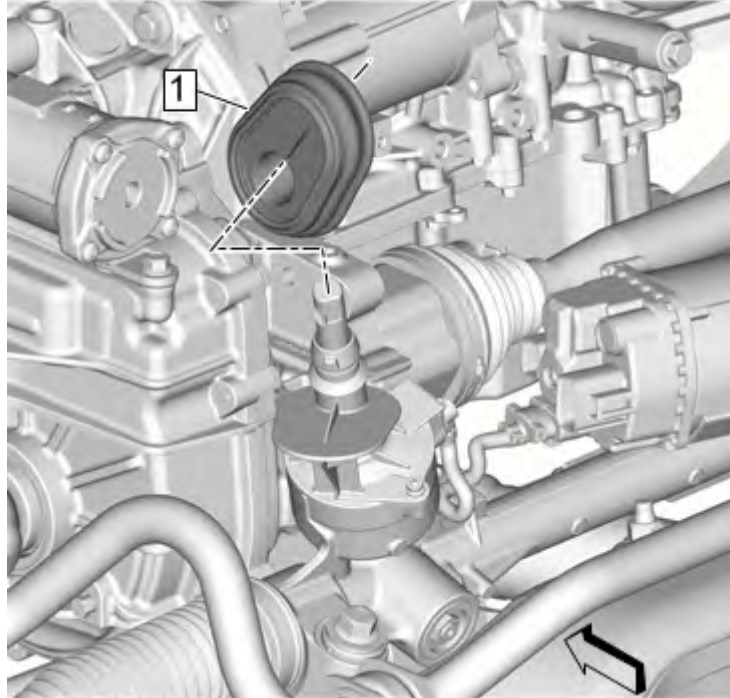


Fig. 120: Steering Column Dash Outer Seal
Courtesy of GENERAL MOTORS COMPANY

3. To remove the steering column dash outer seal (1), perform the following steps:
 1. Lift the lower lip of the seal and work the seal upwards until it is fully disengaged from the mounting surface.
 2. Slide the seal over the steering gear input shaft.

Installation Procedure

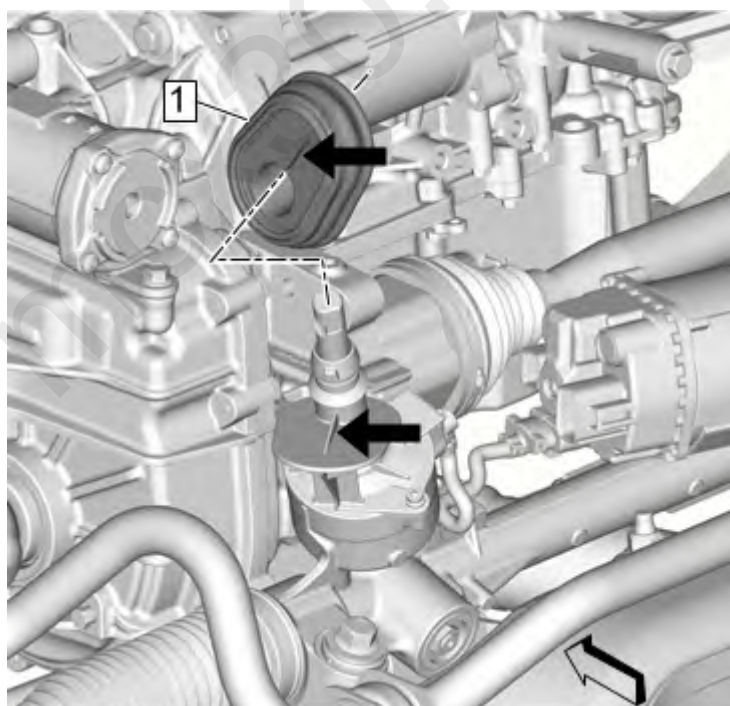


Fig. 121: Steering Column Dash Outer Seal
Courtesy of GENERAL MOTORS COMPANY

1. To install the steering column dash outer seal (1), perform the following steps:
 1. Slide the seal over the steering gear input shaft.
 2. Align the slot in the seal with the raised section on the mounting surface.
 3. Lift the lower lip of the seal and work the seal downwards until it is fully engaged with the mounting surface.
2. Install the drivetrain and front suspension cradle. Refer to [**Drivetrain and Front Suspension Cradle Replacement \(Front Wheel Drive\)**](#) [**Drivetrain and Front Suspension Cradle**](#)

Replacement (All Wheel Drive)

3. Install Steering Column Dash Inner Seal. Refer to [Steering Column Dash Inner Seal Replacement \(Equinox\)](#)[Steering Column Dash Inner Seal Replacement \(Terrain\)](#)

DESCRIPTION AND OPERATION

STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION

Steering Column Lock

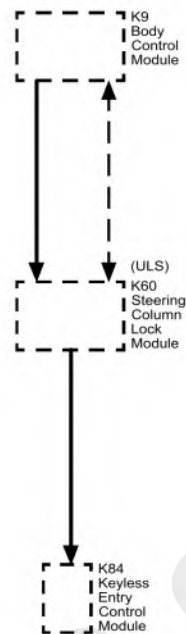


Fig. 122: Steering Column Lock Module Block Diagram

Courtesy of GENERAL MOTORS COMPANY

The Steering Column Lock Module (SCLM) controls the steering wheel theft deterrent lock function, which allows the column to be electronically locked. When a valid key is used to start the vehicle, the BCM recognizes this and will send the encrypted password to the SCLM. The SCLM will compare its own stored password to the encrypted password sent by the BCM. If the data matches, the steering column will be unlocked.

In order for the steering column to be locked the SCLM has to see 3 inputs.

1. The BCM power mode is OFF.
2. The vehicle is stationary based on zero speed reported from all ABS wheel speed sensors.
3. The driver or passenger door is opened reported by the PEPS module.

When the SCLM receives these inputs, the steering column will be locked.

The SCLM monitors the column lock system and will set DTC codes when the module detects malfunctions within the system. When a malfunction occurs the driver information center (DIC) will display the Service Column Lock Now message indicating DTC codes are set within the SCLM.

Driver Safety

The steering wheel and column has safety features to protect the driver. The following components may be mounted on or near the steering column:

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.

Heated Steering Wheel

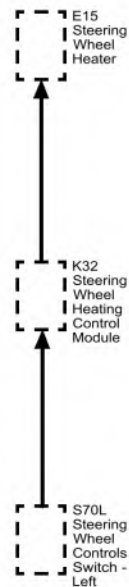


Fig. 123: Heated Steering Wheel System Block Diagram

Courtesy of GENERAL MOTORS COMPANY

The heated steering wheel system consists of a heated steering wheel, a heated steering wheel switch, and a steering wheel heat module. The heated steering wheel includes non-serviceable heating elements and a temperature sensor. The heating elements and sensor are located in the left and right sides of the rim of the steering wheel. The heated steering wheel switch is located in the left steering wheel control switch assembly. The steering wheel heat control module is located at the bottom of the steering wheel center hub. When the switch is pressed, the switch signal circuit is grounded and the heat module turns the heated steering wheel on. The system then remains on until the customer turns it off. The wheels normal operating temperature is 32°C (89.6°F). The wheel takes approximately 3 to 4 minutes to reach the normal operating temperature. The wheel will take longer to heat up if the vehicle temperature is below -21°C (-5.8°F). The built-in temperature sensor provides input to the controller to limit the temperature to the normal operating temperature. The wheel will not operate if the vehicle temperature is at or above 32°C (89.6°F).

HEATED STEERING WHEEL DESCRIPTION AND OPERATION

Heated Steering Wheel

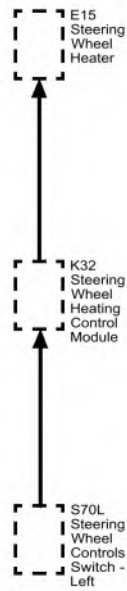


Fig. 124: Heated Steering Wheel System Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
E15	E15 Steering Wheel Heater
K32	K32 Steering Wheel Heating Control Module
S70L	S70L Steering Wheel Controls Switch - Left

The heated steering wheel system consists of a heated steering wheel, a heated steering wheel switch, and a steering wheel heat module. The heated steering wheel includes non-serviceable heating elements and a temperature sensor. The heating elements and sensor are located in the left and right sides of the rim of the steering wheel. The heated steering wheel switch is located in the left steering wheel control switch assembly. The steering wheel heat control module is located at the bottom of the steering wheel center hub. When the switch is pressed, the switch signal circuit is grounded and the heat module turns the heated steering wheel on. The system then remains on until the customer turns it off. The wheels normal operating temperature is 32°C (89.6°F). The wheel takes approximately 3 to 4 minutes to reach the normal operating temperature. The wheel will take longer to heat up if the vehicle temperature is below -21°C (-5.8°F). The built-in temperature sensor provides input to the controller to limit the temperature to the normal operating temperature. The wheel will not operate if the vehicle temperature is at or above 32°C (89.6°F).