

Service Manual: STEERING WHEEL AND STEERING
COLUMN

SPECIFICATIONS > FASTENER SPECIFICATIONS

Application	Specification	
	Metric	English
Instrument Panel Steering Column Lower Trim Cover Bolt	2.5 N.m	22 lb in
Intermediate Steering Shaft Boot Nut	9 N.m	80 lb in
Intermediate Steering Shaft Lower Bolt	50 N.m	37 lb ft
Intermediate Steering Shaft Upper Bolt	36 N.m	27 lb ft
Mid Intermediate Steering Shaft Bolt	36 N.m	27 lb ft
Steering Column Lock Control Module Bolt	9 N.m	80 lb in
Steering Column Nut	22 N.m	16 lb ft
Steering Wheel Bolt	45 N.m	33 lb ft
Upper Intermediate Steering Shaft Upper Bolt	30 N.m	22 lb ft

SPECIFICATIONS > ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

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

**SCHEMATIC WIRING DIAGRAMS > STEERING WHEEL WIRING SCHEMATICS >
HEATED STEERING WHEEL (UVD)**

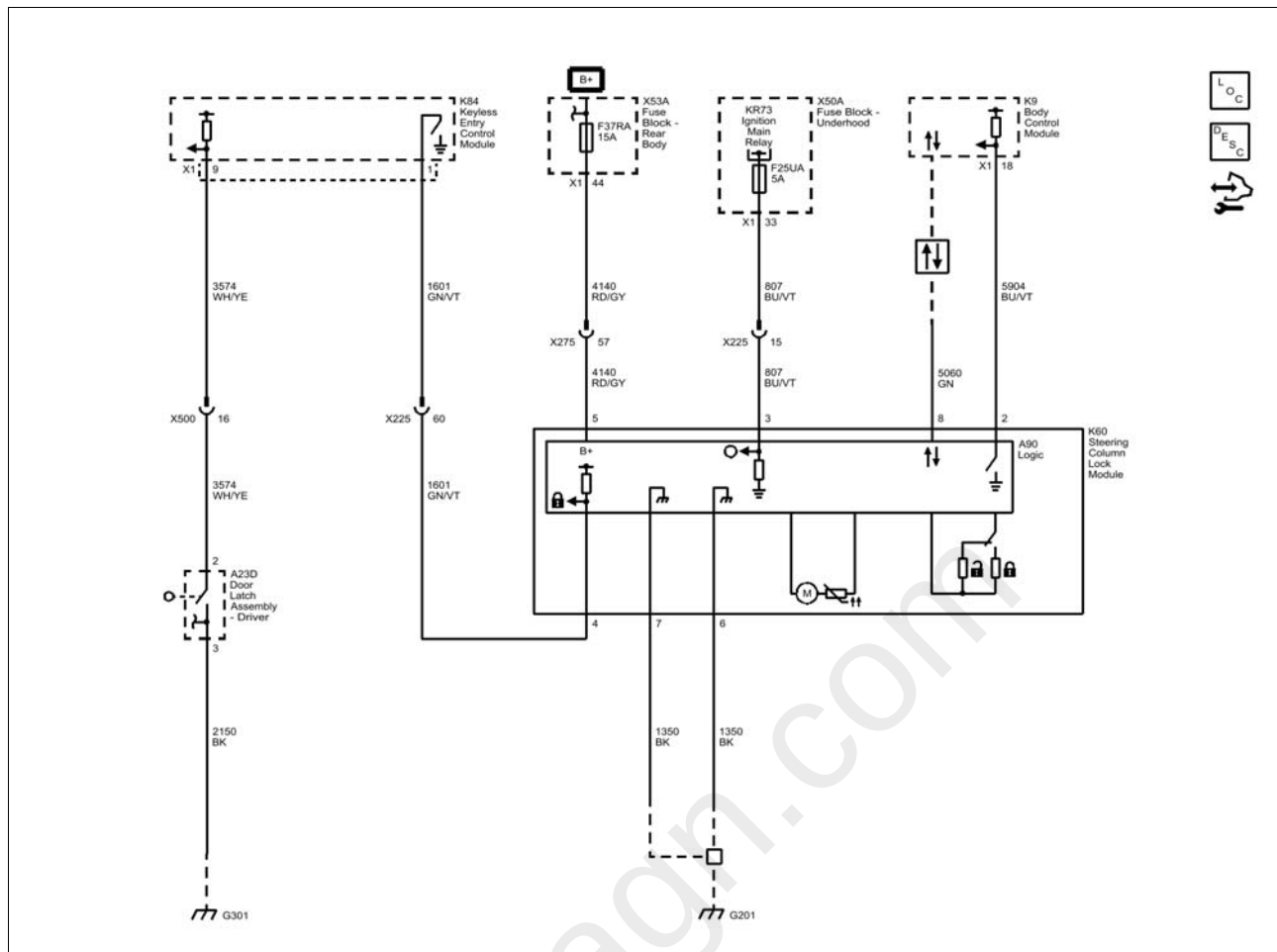
The diagram illustrates the electrical system for the 1997 Dodge Stratus, focusing on the ignition, interior lights, and steering wheel heating/air bag systems. Key components and their connections are as follows:

- Ignition System:**
 - KR73 Ignition Main Relay:** Connected to the battery (15A) and the ignition switch (11).
 - X50A Fuse Block - Underhood:** Contains the 15A fuse for the ignition system.
 - X53A Fuse Block - Rear Body:** Contains the 7.5A fuse for the rear body.
 - X55AE Fuse Holder - Steering Wheel Heater:** Contains the 75A fuse for the steering wheel heater.
 - X85 Steering Wheel Air Bag Coil:** Connected to the battery (15A) and the steering wheel heater (11).
 - X32 Steering Wheel Heating Control Module:** Connected to the battery (15A) and the steering wheel heater (11).
- Interior Lights:**
 - Interior Lights Dimming Schematics:** Shows the connection between the battery (15A) and the interior lights (11).
 - S70L Steering Wheel Controls Switch - Left:** Connected to the battery (15A) and the steering wheel heater (11).
- Steering Wheel Heating/Air Bag System:**
 - X85 Steering Wheel Air Bag Coil:** Connected to the battery (15A) and the steering wheel heater (11).
 - X85 Steering Wheel Heating Control Module:** Connected to the battery (15A) and the steering wheel heater (11).
 - X32 Steering Wheel Heating Control Module:** Connected to the battery (15A) and the steering wheel heater (11).

The diagram includes a legend for the symbols used: a circle with a dot for a ground connection, a circle with a cross for a battery connection, and a circle with a diagonal line for a switch connection.

SCHEMATIC WIRING DIAGRAMS > COLUMN LOCK WIRING SCHEMATICS > STEERING COLUMN LOCK (N06)

Fig 1: Steering Column Lock (N06)



Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > DTC DESCRIPTOR

DTC B1023 00

Integral Switch Malfunction

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering electrically. The steering column lock module is allowed to unlock when power mode transitions to a non off power mode and an authenticated driver identification device is present. Once the column is unlocked, a crank request can be allowed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

- The ignition is in OFF, ACCESSORY or RUN position.
- The system voltage is between 9-16 V.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > CONDITIONS FOR SETTING THE DTC

The steering column lock module detects an internal sensor malfunction resulting in lock status of invalid to be transmitted on serial data.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

- DTC B1023 is stored in memory.
- The driver information center displays the service column lock system warning message.
- The steering column lock indicator is ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

- No steering column lock module internal sensor malfunction so lock status of valid is transmitted on serial data.
- The condition for setting the DTC is no longer present.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Column Lock Schematics

Connector End View Reference

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Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON. Clear all DTCs.
2. Verify that the DTC does not set while operating the integral switch at the steering column lock within the conditions for running the DTC.
 1. **If the DTC sets**

Replace the K60 Steering Column Lock Module.
 1. **If the DTC does not set**
3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1023: INTEGRAL SWITCH MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for steering column lock module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED

RUN/START POWER RELAY CIRCUIT > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > DTC DESCRIPTORS

DTC B144C 01

Inverted Run/Start Power Relay Circuit Short to Battery

DTC B144C 06

Inverted Run/Start Power Relay Circuit Low Voltage/Open

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B144C 06	B144C 06	B144C 01	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering column electrically. The steering column lock module is allowed to unlock when power mode transitions to a non off power mode and an authenticated driver identification device is present. Once the column is unlocked, a crank request can be allowed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > CONDITIONS FOR RUNNING THE DTC

- The system voltage is between 9-16 V.
- The DTC can only run when the steering column lock module is awake.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED

RUN/START POWER RELAY CIRCUIT > CONDITIONS FOR SETTING THE DTC

B144C 01

The steering column lock module detects a short to voltage when the power mode is in the RUN or CRANK for greater than 5 s.

B144C 06

The steering column lock control detects a short to ground or an open in the ignition circuit when the power mode is in the OFF/ACC for greater than 3 s.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

- The steering column lock module will command the driver information center to display the service column lock warning message.
- The steering column lock module indicator is ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > CONDITIONS FOR CLEARING THE DTC

- The DTC will be current for as long as the fault is present.
- The DTC will be a history DTC when the voltage is present and the power mode is OFF or ACC or when voltage is not present and the power mode is RUN or CRANK.
- A history DTC will clear after 50 ignition cycles.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > REFERENCE INFORMATION

Schematic Reference

- Column Lock Schematics
- Power Moding Schematics

Connector End View Reference

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC B144B is not set.
 1. **If DTC B144B is set**
Refer to DTC B144B
 1. **If DTC B144B is not set**
3. Refer to Circuit/System Testing.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > CIRCUIT/SYSTEM TESTING

B144C 01

1. Ignition OFF, disconnect the harness connector at the K60 Steering Column Lock Module.
Ignition ON.
2. Test for less than 1 V between the ignition circuit terminal 3 and ground.
 1. **If 1 V or greater**
Repair the short to voltage on the circuit.
 1. **If less than 1 V**
3. Replace the K60 Steering Column Lock Module.

B144C 06

1. Ignition OFF, disconnect the harness connector at the K60 Steering Column Lock Module.
Connect a test lamp between the ignition circuit terminal 3 and ground.
2. Verify that a test lamp illuminates between the ignition circuit terminal 3 and ground.
 1. **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.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , refer to Power Mode Mismatch

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF, remove the test lamp
2. Test for infinite resistance between the ignition circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the K60 Steering Column Lock Module.

1. If the test lamp illuminates

3. Replace the K60 Steering Column Lock Module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B144C: INVERTED RUN/START POWER RELAY CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > DTC DESCRIPTOR

DTC B2515 5A

Steering Column Lock Motor Feedback Circuit Not Plausible

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > CIRCUIT/SYSTEM

DESCRIPTION

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering electrically. The steering column lock module is allowed to unlock when power mode transitions to a non off power mode and an authenticated driver identification device is present. Once the column is unlocked, a crank request can be allowed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > CONDITIONS FOR RUNNING THE DTC

- The ignition is in OFF, ACCESSORY or RUN position.
- The system voltage is between 9-16 V.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > CONDITIONS FOR SETTING THE DTC

The body control module (BCM) detects a not plausible feedback from the steering column lock module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > ACTION TAKEN WHEN THE DTC SETS

- DTC B2515 is stored in memory.
- The driver information center displays the service column lock system warning message.
- The steering column lock indicator is ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > CONDITIONS FOR CLEARING THE DTC

- The condition for setting the DTC is no longer present.
- The BCM detects a plausible feedback from the steering column lock module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > REFERENCE INFORMATION

Schematic Reference

Column Lock Schematics

Connector End View Reference

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

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON. Clear all DTCs.
2. Verify DTC B2515 does not set while operating the steering column lock module within the conditions for running the DTC.

1. If DTC B2515 sets

Refer to Circuit/System Testing.

1. If DTC B2515 does not set

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > CIRCUIT/SYSTEM TESTING

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K60 Steering Column Lock Module. It may take up to 5 minutes for all vehicle systems to power down.
2. Test for less than 3 V between the control circuit terminal 2 and ground.

1. If 3 V or greater

1. Disconnect the harness connector at the K9 Body Control Module. Ignition ON.



NOTE:

For vehicles with push button start, it is necessary to back out the terminal for the steering column lock status signal circuit at the K 9 Body Control Module harness. When the harness connector is removed, the vehicle cannot be put back into an Ignition ON state.

2. Test for less than 3 V between the control circuit terminal 2 and ground.

1. If 3 V or greater, repair the short to voltage on the circuit.
2. If less than 3 V, replace the K9 Body Control Module.

1. If less than 3 V

3. Ignition ON.

4. Test for B+ between the control circuit terminal 2 and ground.

1. If less than B+

1. Disconnect the harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the signal circuit terminal 2 and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 1. If infinite resistance
3. Test for less than 2 Ω in the signal circuit terminal 2 end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 1. If less than 2 Ω
4. Replace the K9 Body Control Module.

1. If B+

5. Replace the K60 Steering Column Lock Module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2515: STEERING COLUMN LOCK MOTOR FEEDBACK CIRCUIT NOT PLAUSIBLE > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > DTC DESCRIPTORS

DTC B2897

Steering Column Lock Motor Lock Circuit

For symptom byte information, refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Steering Column Lock Motor Lock Signal	B2897 02	B2897 05	B2897 01, 05	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering electrically. The steering column lock module is allowed to unlock when power mode transitions to a non off power mode and an authenticated driver identification device is present. Once the column is unlocked, a crank request can be allowed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > CONDITIONS FOR RUNNING THE DTC

- The ignition is in OFF, ACCESSORY or RUN position.
- The system voltage is between 9-16 V.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > CONDITIONS FOR SETTING THE DTC

B2897 02

The steering column lock enable input circuit is shorted to ground.

B2897 01 or 05

The steering column lock enable input circuit is open or shorted to battery.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

- DTC B2897 is stored in the steering column lock module memory.
- The steering column lock module will command the driver information center to display the Service Column Lock warning message.
- The steering column lock module indicator is ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > CONDITIONS FOR CLEARING THE DTC

The steering column lock module has received a lock command and detects no longer a malfunction in the steering column lock circuit.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > REFERENCE INFORMATION

Schematic Reference

Column Lock Schematics

Connector End View Reference

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- Testing for Intermittent Conditions and Poor Connections

- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the harness connector at the K60 Steering Column Lock Module.
Ignition ON.

2. Test for less than B+ between the control circuit terminal 4 and ground.

1. If B+

Repair the short to voltage on the circuit.

1. If less than B+

3. Ignition OFF.

4. Test for infinite resistance between the control circuit terminal 4 and ground.

1. If less than infinite resistance

1. Disconnect the X1 harness connector at the K84 Keyless Entry Control Module.

2. Test for infinite resistance between the control circuit terminal 4 and ground.

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

2. If infinite resistance, replace the K84 Keyless Entry Control Module.

1. If infinite resistance

5. Disconnect the X1 harness connector at the K84 Keyless Entry Control Module.

6. Test for less than 2 Ω in the harness connector control circuit terminal 4 at the K60 Steering Column Lock Module end to end.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

7. Replace the K60 Steering Column Lock Module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2897: STEERING COLUMN LOCK MOTOR LOCK CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for steering column lock module or keyless entry control module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > DTC DESCRIPTOR

DTC B2910

Steering Column Lock Password Incorrect

For symptom byte information, refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > CIRCUIT/SYSTEM DESCRIPTION

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering electrically. The steering column lock module is allowed to unlock when power mode transitions to a non off power mode and an authenticated driver identification device is present. Once the column is unlocked, a crank request can be allowed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > CONDITIONS FOR RUNNING THE DTC

- The ignition is in OFF, ACCESSORY or RUN position.
- The system voltage is between 9-16 V.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > CONDITIONS FOR SETTING THE DTC

The steering column lock module has not received the correct password or did not receive a password with the command to unlock the steering column.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > ACTION TAKEN WHEN THE DTC SETS

- DTC B2910 is stored in memory.
- The driver information center displays the Service Column Lock warning message.
- The steering column lock indicator is ON.
- The engine will not crank.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > CONDITIONS FOR CLEARING THE DTC

- The condition for setting the DTC is no longer present.
- The steering column lock module has received the correct password with the command to unlock the steering column.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > DIAGNOSTIC AIDS

This DTC may set if the BCM was replaced and the steering column lock module was not programmed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > REFERENCE INFORMATION

Schematic Reference

Column Lock Schematics

Connector End View Reference

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- Wiring Repairs

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > CIRCUIT/SYSTEM VERIFICATION



NOTE:

To ensure that the steering column lock password from the BCM is learned: turn ignition ON and then OFF, close all doors, and wait 5 minutes.

1. Ignition ON. Clear all DTCs.
2. Verify DTC B2910 does not set while operating the steering column lock module within the conditions for running the DTC.

1. If DTC B2910 sets

1. Program the K60 Steering Column Lock Module.
2. Ignition ON. Clear all DTCs.
3. Verify DTC B2910 does not set while operating the steering column lock module within the conditions for running the DTC.

1. If DTC B2910 sets, replace the K60 Steering Column Lock Module.

1. If DTC B2910 does not set

4. All OK.

1. If DTC B2910 does not set

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2910: STEERING COLUMN LOCK PASSWORD INCORRECT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for steering column lock module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > DTC DESCRIPTOR

DTC B305A 00

No Response From Steering Column Lock Received

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Steering Column Lock Status Signal	B305A 00	B305A 00 B2515 5A	B305A 00 B2515 5A	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > CIRCUIT/SYSTEM DESCRIPTION

The vehicle theft deterrent subsystem provides the capability to lock or unlock the steering electrically. The steering column lock module is allowed to unlock when power mode transitions to a non off power mode and an authenticated driver identification device is present. Once the column is unlocked, a crank request can be allowed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > CONDITIONS FOR RUNNING THE DTC

- The ignition is in OFF, ACCESSORY or RUN position.
- The system voltage is between 9-16 V.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > CONDITIONS FOR SETTING THE DTC

The body control module (BCM) has not received any response from the steering column lock module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > ACTION TAKEN WHEN THE DTC SETS

- DTC B305A is stored in the BCM memory.
- The driver information center displays the Service Steering Column Lock message.
- The steering column lock indicator is ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > CONDITIONS FOR CLEARING THE DTC

- The condition for setting the DTC is no longer present.
- The BCM has received response from the steering column lock module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > REFERENCE INFORMATION

Schematic Reference

Column Lock Schematics

Connector End View Reference

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON. Clear all DTCs.
2. Verify the scan tool communicates with the control module and there are no U codes set.
 1. **If the scan tool does not communicate with the control module and there are U codes set**

Refer to Diagnostic Trouble Code (DTC) List - Vehicle .
 1. **If the scan tool does not communicate with the control module and there are no codes set**

Refer to Scan Tool Does Not Communicate with Low Speed GMLAN Device .
 1. **If the scan tool communicates with the control module and there are no codes set**
3. Verify DTC B305A does not set while operating the steering column lock module within the conditions for running the DTC.
 1. **If DTC B305A sets**

Refer to Circuit/System Testing.
 1. **If DTC B305A does not set**
4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > CIRCUIT/SYSTEM TESTING

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K60 Steering Column Lock Module. It may take up to 5 minutes for all vehicle systems to power down.
2. Test for less than 2 Ω between the following terminals and ground.
 1. Terminal 6
 2. Terminal 7
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 1. If less than 2 Ω
3. Test for less than 3 V between the control circuit terminal 2 and ground.
 1. **If 3 V or greater**
 1. Disconnect the harness connector at the K9 Body Control Module. Ignition ON.



NOTE:

For vehicles with push button start, it is necessary to back out the terminal for the steering column lock status signal circuit at the K 9 Body Control Module harness. When the harness connector is removed, the vehicle cannot be put back into an Ignition ON state.

2. Test for less than 3 V between the control circuit terminal 2 and ground.

1. If 3 V or greater, repair the short to voltage on the circuit.
2. If less than 3 V, replace the K9 Body Control Module.

1. If less than 3 V

4. Ignition ON.

5. Test for B+ between the control circuit terminal 2 and ground.

1. If less than B+

1. Disconnect the harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the signal circuit terminal 2 and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 1. If infinite resistance
3. Test for less than 2 Ω in the signal circuit terminal 2 end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 1. If less than 2 Ω
4. Replace the K9 Body Control Module.

1. If B+

6. Replace the K60 Steering Column Lock Module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B305A: NO RESPONSE FROM STEERING COLUMN LOCK RECEIVED > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming and setup.

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 .

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - STEERING WHEEL AND COLUMN > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - STEERING WHEEL AND COLUMN > SYMPTOMS LIST

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Noise in Steering Column
- Looseness in Steering Column

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL INDICATOR MALFUNCTION > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL INDICATOR MALFUNCTION > 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

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL INDICATOR MALFUNCTION > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL INDICATOR MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Steering Wheel 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

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL INDICATOR MALFUNCTION > 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.

1. The steering wheel is always warm

Refer to Heated Steering Wheel Malfunction

2. The steering wheel does not become warm and the heater indicator is illuminated

Refer to Circuit/System Testing

1. 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.

1. The steering wheel does not become warm

Refer to Heated Steering Wheel Malfunction

2. The steering wheel becomes warm and the heater indicator does not illuminate

Refer to Circuit/System Testing

1. The steering wheel becomes warm and the heater indicator illuminates

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL INDICATOR MALFUNCTION > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the X5 in-line harness connector at the X85 Steering Wheel Air Bag Coil.

2. Test for less than 10 Ω between the ground circuit terminal 2 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

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

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

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

1. If less than 10 Ω

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition voltage circuit terminal 1 and ground.

1. 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.

1. If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to Power Mode Mismatch .

1. If 2 Ω or greater

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

1. If the in-line fuse is blown, replace the K32 Steering Wheel Heating Control Module.

2. If the in-line fuse is OK, repair the open/high resistance in the circuit.

1. 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.

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

2. If infinite resistance, replace the K32 Steering Wheel Heating Control Module.

1. If the test lamp illuminates

5. Ignition OFF, connect the X5 in-line harness connector. Disconnect the harness connector at the S70L Steering Wheel Control Switch - Left. Ignition ON.

6. Verify a test lamp illuminates between the signal voltage circuit terminal 7 and ground.

1. If the test lamp does not illuminate

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.

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

1. If infinite resistance

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

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , replace the S70R Steering Wheel Control Switch - Right.

1. If the test lamp illuminates

7. Ignition ON.

8. Test for less than 1 V between the control circuit terminal 6 and ground.

1. If greater than 1 V

1. Disconnect the K32 Steering Wheel Heating Control Module harness connector.

2. Test for less than 1 V between the control circuit terminal B and ground.

1. If greater than 1 V, repair the short to voltage on the circuit.

1. If less than 1 V

3. Replace the K32 Steering Wheel Heating Control Module.

1. If infinite resistance

9. Ignition OFF.

10. Test for infinite resistance between the control circuit terminal 6 and ground.

1. If less than infinite resistance

1. Disconnect the K32 Steering Wheel Heating Control Module in-line harness connector.

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

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

1. If infinite resistance

3. Replace the K32 Steering Wheel Heating Control Module.

1. If infinite resistance

11. Install a 3 A fused jumper wire between the ground circuit terminal 6 and ground. Ignition ON.

12. Verify the steering wheel heat indicator is illuminated.

1. If the steering wheel heat indicator does not illuminate

1. Disconnect the K32 Steering Wheel Heating Control Module in-line harness connector.

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

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. Replace the S70L Steering Wheel Control Switch - Left

1. If the steering wheel heat indicator illuminates

13. Replace the K32 Steering Wheel Heating Control Module.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL INDICATOR MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair

- Cruise Control Switch Replacement (Left Side) Cruise Control Switch Replacement (Right Side)
- Control Module References for control module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > 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.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > 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				

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

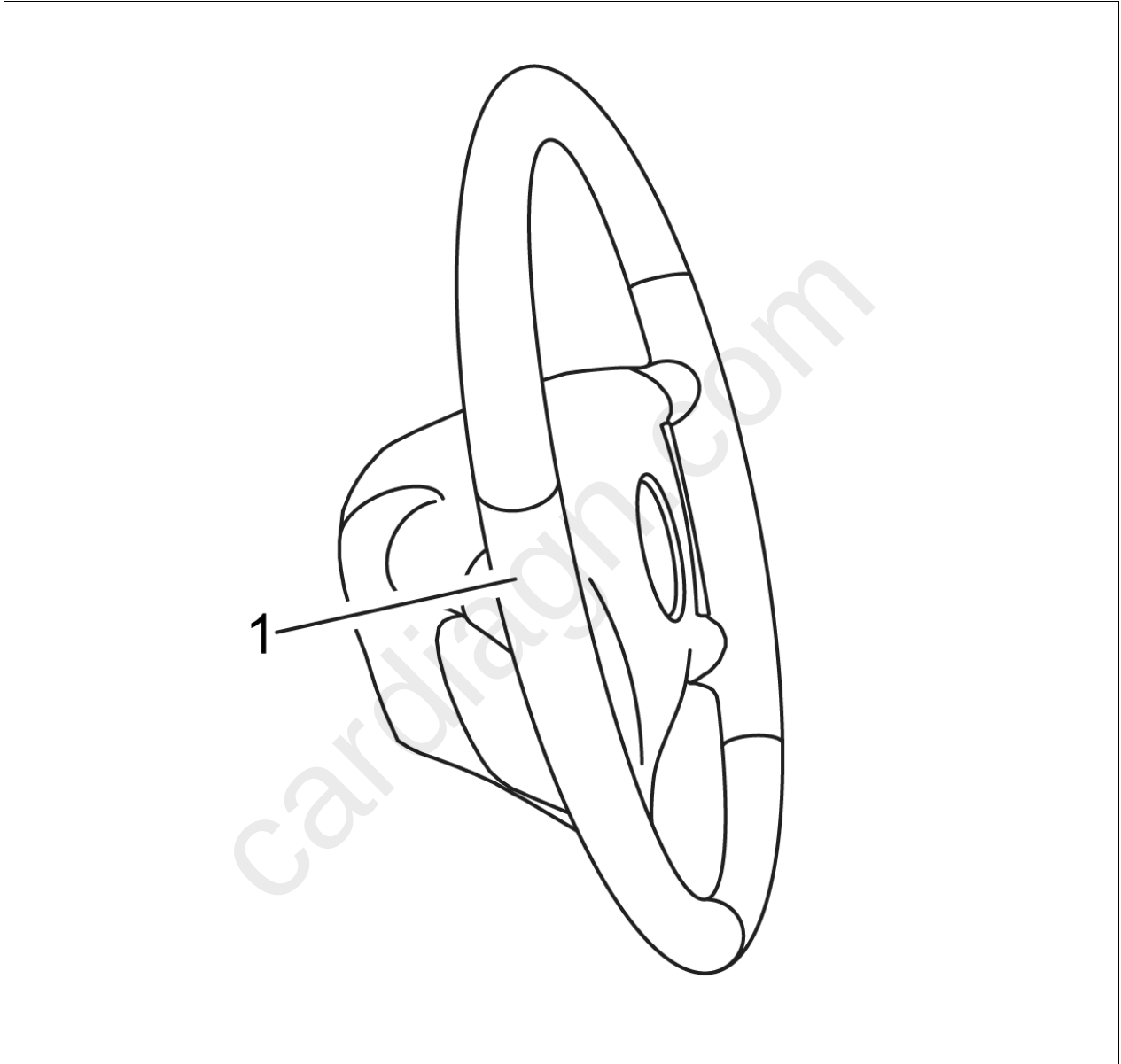
The heated steering wheel control module controls the heated steering wheel and the heated steering wheel ON indicator based on an input from the heated steering wheel switch. When the heated steering wheel switch is pressed, the switch signal circuit is pulled to ground. This indicates to the heating 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 INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > 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 1: Steering Wheel Rim 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 2: Temperature Measurement Points



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.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Steering Wheel Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Steering Wheel and Column Description and Operation

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- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

Using an Infrared Temperature Gun

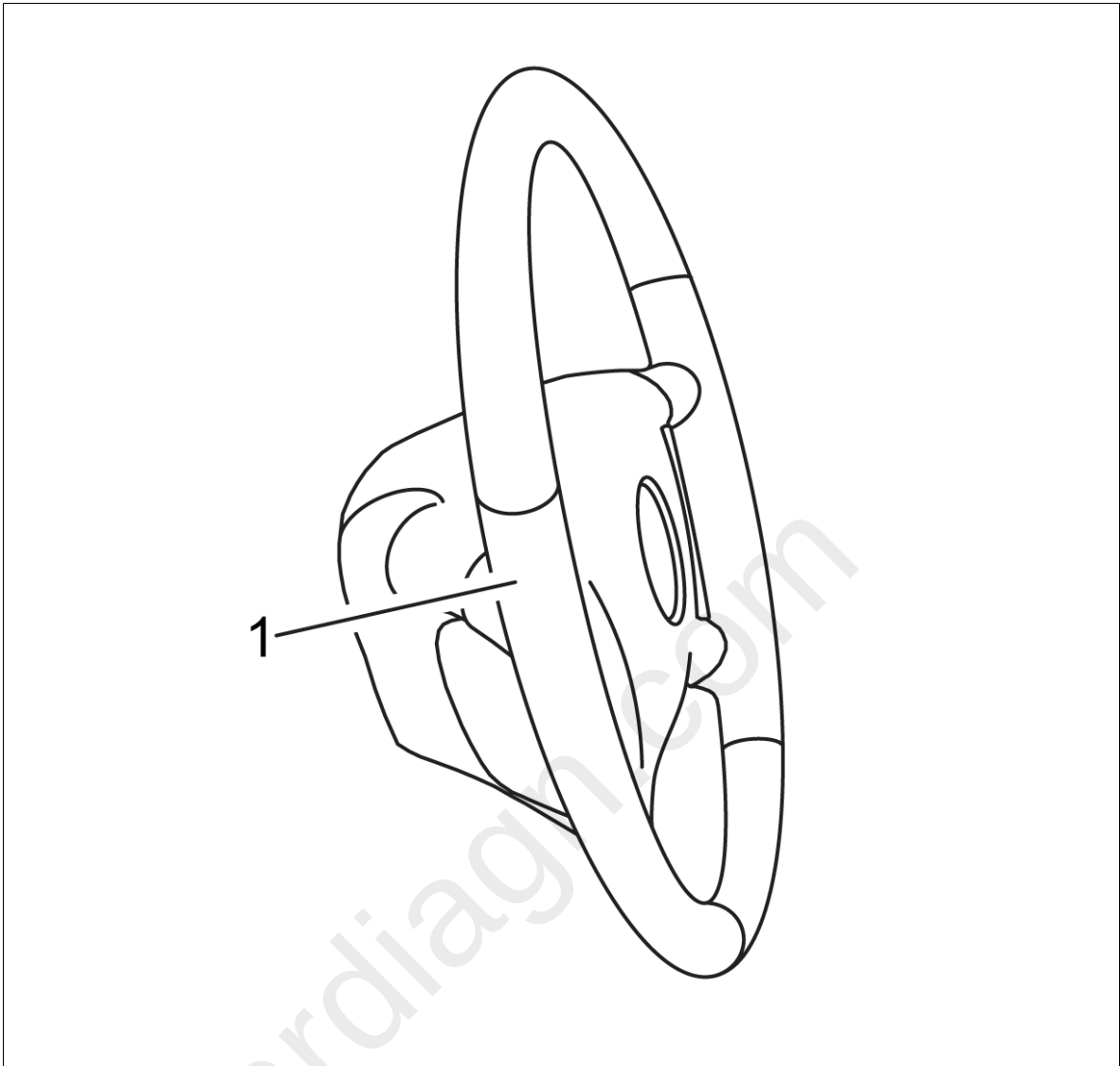
1. Engine running, all accessories OFF.
2. Verify the steering wheel heater switch is OFF and the steering wheel heater indicator should not be illuminated.

1. If the heater indicator is illuminated

Refer to Heated Steering Wheel Indicator Malfunction

1. If the heater indicator is not illuminated

Fig 1: Steering Wheel Rim Measurement Point



Courtesy of GENERAL MOTORS COMPANY



NOTE:

*The Infrared Temperature Gun should be within 50.8mm (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.
 1. **If the steering wheel temperature is greater than 25°C (77°F)**

Allow the steering wheel to cool before proceeding to next step.
 1. **If the steering wheel temperature is 25°C (77°F) or below**

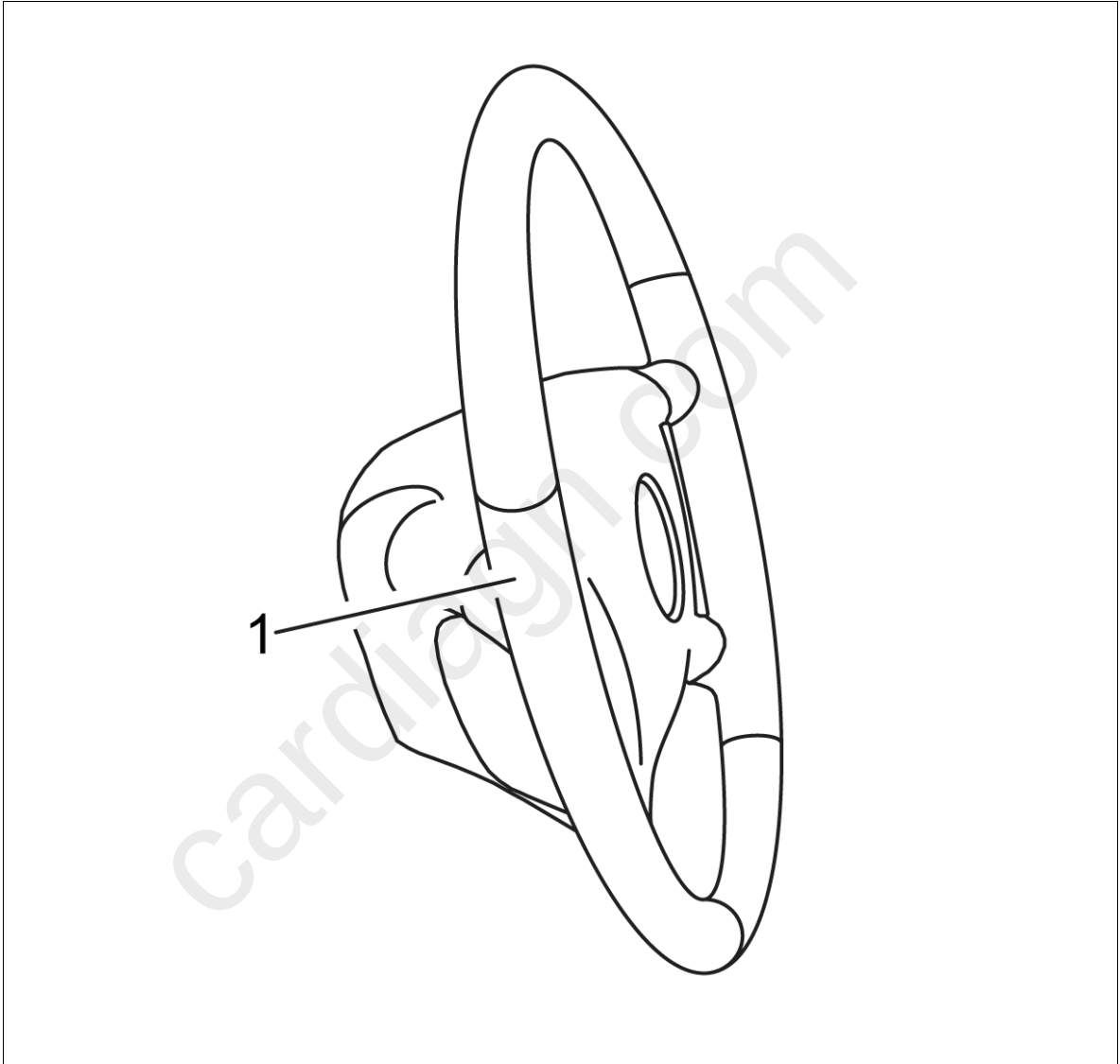
5. Press and release the steering wheel heater switch. The steering wheel heater indicator should illuminate. Allow the steering wheel to heat for a minimum of 10 min so that the temperature stabilizes.

1. **If the heater indicator does not illuminate**

Refer to Heated Steering Wheel Indicator Malfunction

1. **If the heater indicator illuminates**

Fig 2: Steering Wheel Rim Measurement Point



Courtesy of GENERAL MOTORS COMPANY



NOTE:

*The Infrared Temperature Gun should be within 50.8mm (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.

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

Refer to Circuit System Testing.

1. If after 20 minutes the measured temperature is 28°C (82.4°F) or greater

8. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the X5 in-line harness connector at the X85 Steering Wheel Air Bag Coil.

2. Test for less than 10 Ω between the ground circuit terminal 2 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

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

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

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

1. If less than 10 Ω

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition voltage circuit terminal 1 and ground.

1. 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.

1. If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to Power Mode Mismatch .

1. If 2 Ω or greater

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

1. If the in-line fuse is blown, replace the K32 Steering Wheel Heating Control Module.

2. If the in-line fuse is OK, repair the open/high resistance in the circuit.

1. 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.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the K32 Steering Wheel Heating Control Module.

1. If the test lamp illuminates

5. Ignition OFF, connect the in-line harness connector X5 at the X85 Steering Wheel Air Bag Coil. 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.

1. If 10 Ω or greater

1. Ignition OFF.
2. Test for less than 2 Ω in the ground circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

7. Ignition ON.
8. Test for B+ between the signal circuit terminal 2 and ground.

1. If less than B+

1. Ignition OFF, disconnect the in-line harness connector at the S70L Steering Wheel Controls Switch - Left.
2. Test for infinite resistance between the control circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 1. If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , replace the K32 Steering Wheel Heating Control Module.

1. If B+

9. Ignition OFF, disconnect the 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 A and ground.

1. If greater than 1 V

Repair the short to voltage on the circuit.

1. If less than 1 V

12. Ignition OFF, connect the 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 2 and terminal 1 at the S70L Steering Wheel Controls Switch - Left.

1. If less than infinite resistance

Replace the S70L Steering Wheel Controls Switch - Left.

1. If infinite resistance

15. Place the S70L Steering Wheel Controls Switch - Left in the ON position.

16. Test for less than 40 Ω between terminal 2 and terminal 1.

1. If 40 Ω or greater

Replace the S70L Steering Wheel Controls Switch - Left

1. If less than 40 Ω

17. Disconnect the in-line harness connector at the E15 Steering Wheel Heater.

18. Test for less than 10 Ω between the ground circuit terminal A at the K32 Steering Wheel Heating Control Module and ground.

1. If 10 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 10 Ω

19. Test for 1.5-3.0 Ω between the signal terminal B and the ground terminal A at the E15 Steering Wheel Heater.

1. If not within the specified range

Replace the E15 Steering Wheel Heater.

1. If within the specified range

20. Test for 9-11k Ω between the control circuit terminal C and the ground terminal D on the E15 Steering Wheel Heater.

1. If not within the specified range

Replace the E15 Steering Wheel Heater.

1. If within the specified range

21. Replace the K32 Steering Wheel Heating Control Module.

DIAGNOSTIC INFORMATION AND PROCEDURES > HEATED STEERING WHEEL MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Cruise Control Switch Replacement (Left Side) Cruise Control Switch Replacement (Right Side)
- Steering Wheel Replacement
- Control Module References for control module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > 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
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 . 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 . 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

DIAGNOSTIC INFORMATION AND PROCEDURES > 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	Go to Step 13	Go to Step 7

	• Lubrication • Wear • Proper seating Are the bearings in need of repair or replacement?		
7	Does the steering column tilt joint need to be lubricated?	Go to Step 14	Go to Step 8
8	 NOTE: <i>Inspect the intermediate steering shaft for noise while driving the vehicle, turning the steering wheel, and applying the brakes.</i> Inspect the intermediate steering shaft for noise. Is the intermediate steering shaft noisy?	Go to Step 15	Go to Step 9
9	 NOTE: <i>For vehicles equipped with a telescoping steering column, perform this step. If not equipped, go to next step.</i> 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
10	 NOTE: <i>If the steering column mounting features are damaged or sheared, replace the steering column. Refer to Steering Column Replacement .</i> 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 . 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: <i>If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to Steering Column Replacement .</i> 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

DIAGNOSTIC INFORMATION AND PROCEDURES > 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.	Go to Step 5	Go to Step 4

	Are the steering column mounting features loose or sheared?		
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: <i>If the steering column mounting features are damaged or sheared, replace the steering column. Refer to Steering Column Replacement .</i> Tighten the steering column mounting fasteners to specification. Refer to Fastener Specifications .Did you complete the repair?	Go to Step 7	-
6	 NOTE: <i>If the steering column upper and/or lower bearings are not serviceable, replace the steering column. Refer to Steering Column Replacement .</i> 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)
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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:

1. Use a sewing seam ripper, available from sewing supply stores, in order to cut open the harness in order to avoid wire insulation damage.
2. Use the DuraSeal splice sleeves on all types of insulation except Tefzel and coaxial.
3. 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:

1. When adding a length of wire to the existing harness, use the same size wire as the original wire.
2. Perform one of the following items in order to find the correct wire size:

1. Find the wire on the schematic and convert to regional wiring gauge size.
2. 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.

3. Strip approximately 5.0 mm (0.20 in) of insulation from each wire to be spliced.

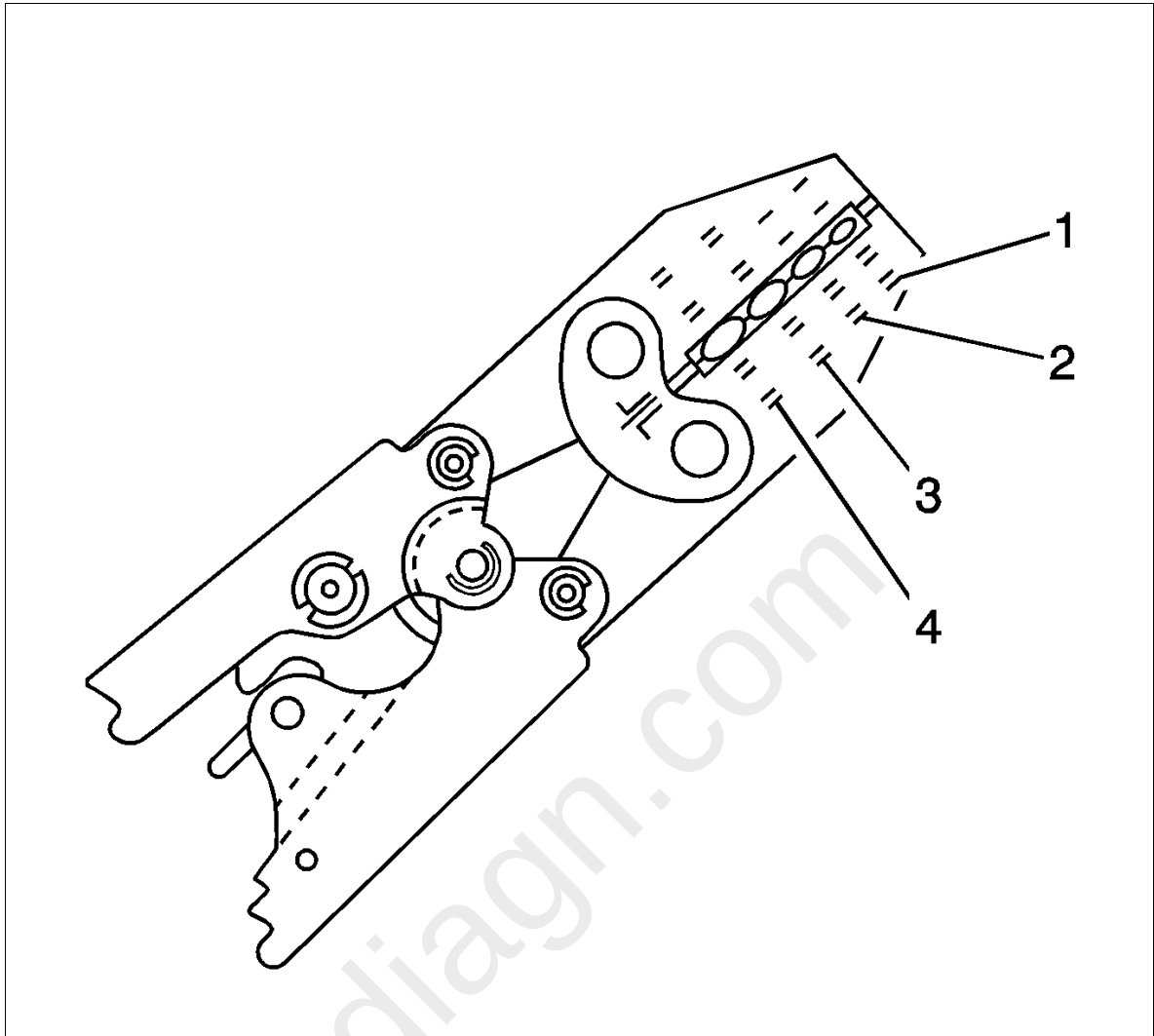
4. Do not nick or cut any of the strands. Inspect the stripped wire for nicks or cut strands.

5. If the wire is damaged, repeat this procedure after removing the damaged section.

4. For high temperature wiring, slide a section of high temperature SCT1 shrink tubing down the length of wire to be spliced. Ensure that the shrink tubing will not interfere with the splice procedure.

5. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.

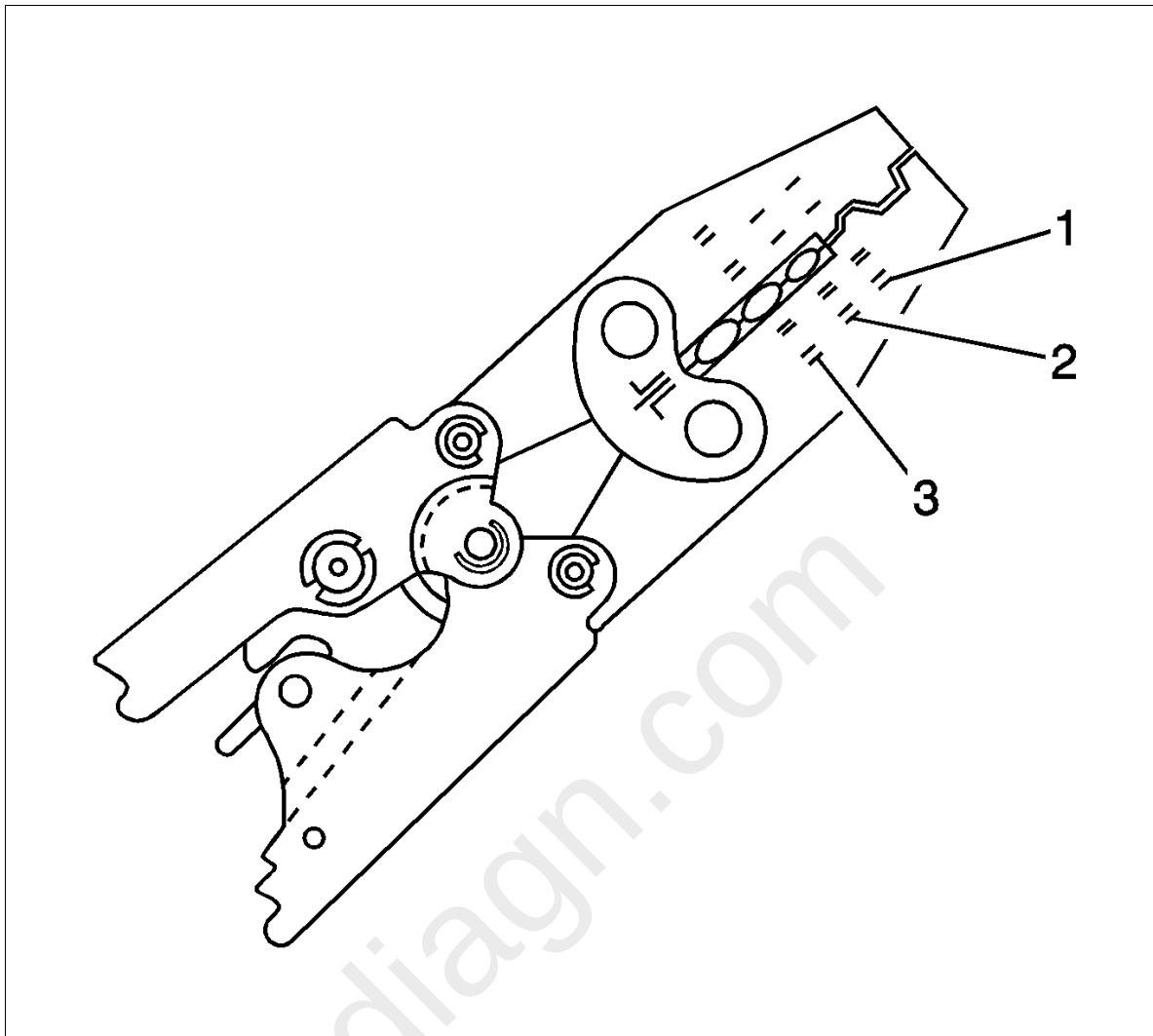
Fig 1: Crimping Tool



Courtesy of GENERAL MOTORS COMPANY

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

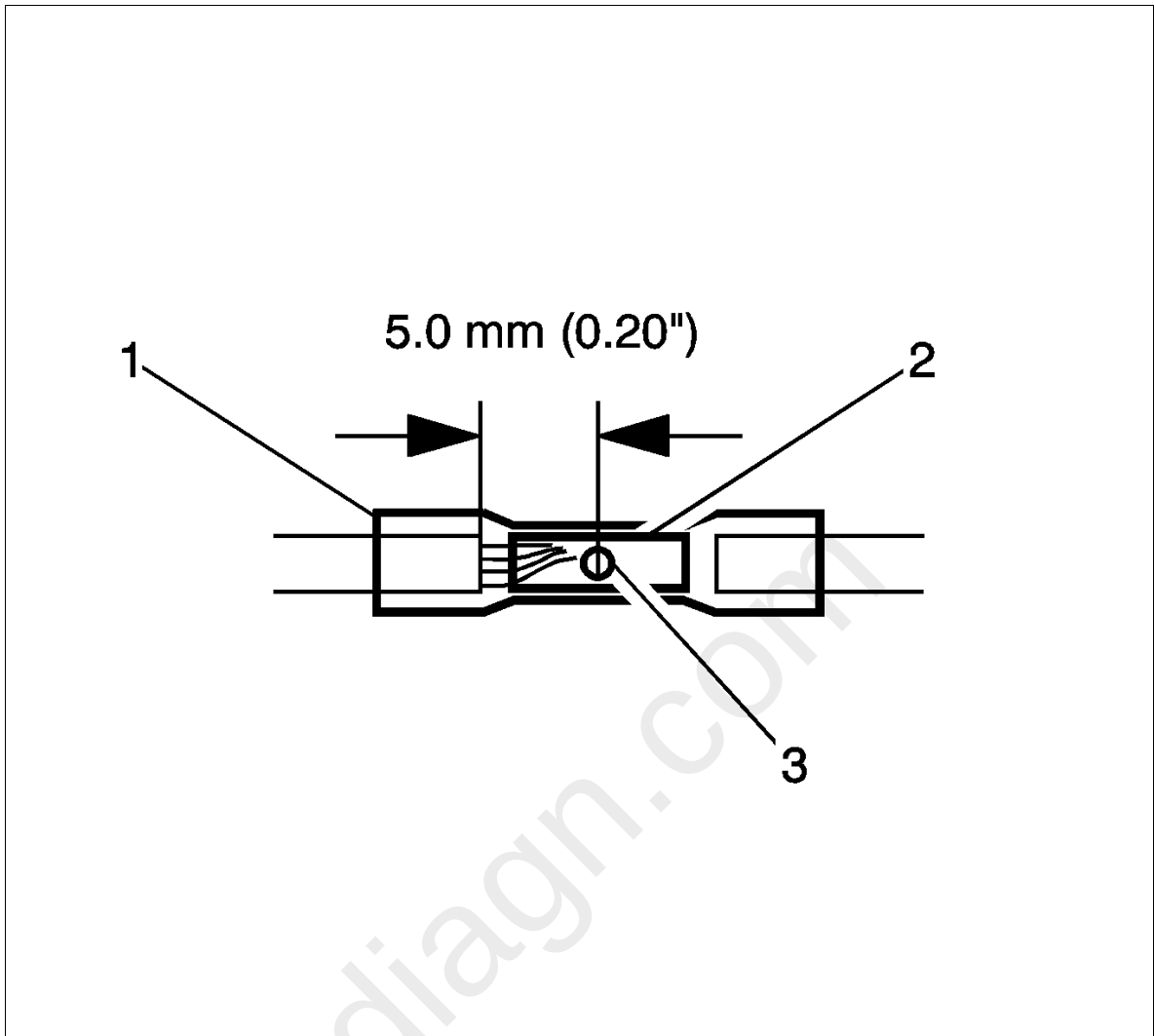
Fig 2: Splice Crimp Tool Nests Terminal Identification



Courtesy of GENERAL MOTORS COMPANY

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

Fig 3: Duraseal Splice Sleeve



Courtesy of GENERAL MOTORS COMPANY

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

Fig 4: Crimped Duraseal Splice Sleeve



Courtesy of GENERAL MOTORS COMPANY

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

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

Fig 5: Crimped Duraseal Splice Sleeve



Courtesy of GENERAL MOTORS COMPANY

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

REPAIR INSTRUCTIONS > WIRE TO WIRE REPAIR - STEERING > 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:
 1. The tubing will shrink completely as the heat is moved along the insulation.
 2. 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.

REPAIR INSTRUCTIONS > 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:

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

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - STEERING > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - STEERING > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - STEERING > CONTROL MODULE/COMPONENT VOLTAGE AND GROUNDS

Poor voltage or ground connections can cause widely varying symptoms.

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

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - STEERING > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - STEERING > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - STEERING > 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.



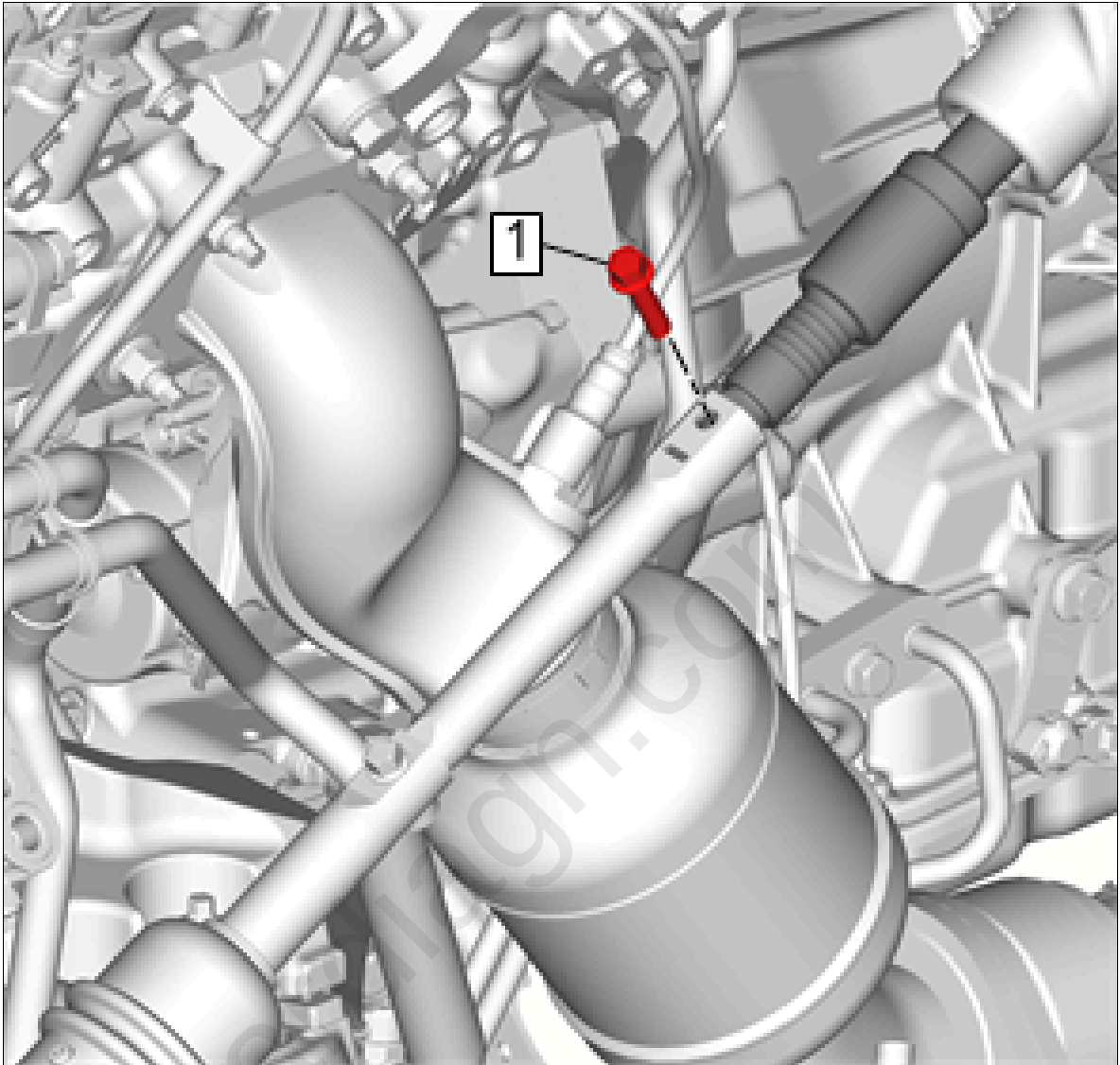
NOTE:

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.

REPAIR INSTRUCTIONS > UPPER INTERMEDIATE STEERING SHAFT REPLACEMENT (WITHOUT ROLLOBOOT, ON/AFTER VIN 1G1FB1RSXG0140963) > REMOVAL PROCEDURE

Fig 1: Upper Intermediate Steering Shaft (Without Rolloboot, On/After VIN 1G1FB1RSXG0140963)



Courtesy of GENERAL MOTORS COMPANY

1. Turn the steering wheel so the mid intermediate steering shaft bolt (1) is accessible from the engine compartment.
2. Remove Mid Intermediate Steering Shaft Bolt (1)
3. Turn the wheels of the vehicle back to the straight ahead position.

 CAUTION:

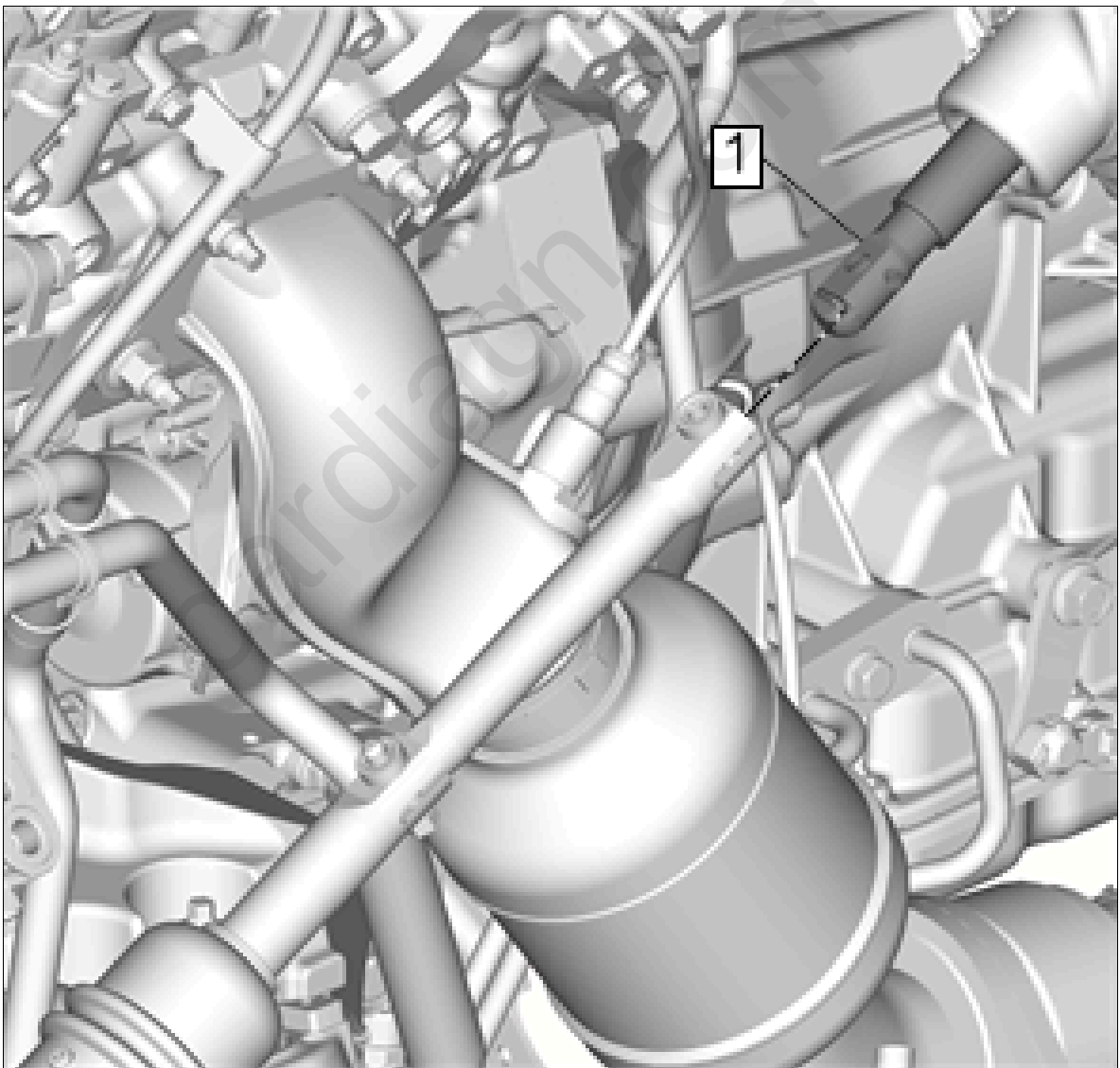
With wheels of the vehicle facing straight ahead, secure the steering wheel utilizing steering column anti-rotation pin, steering column lock, or a strap to prevent rotation. Locking of the steering column will prevent damage and a possible malfunction of the SIR system. The steering wheel must be secured in position before disconnecting the following components:

1. The steering column
2. The intermediate shaft(s)
3. The steering gear

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

4. With the wheels of the vehicle in the straight ahead position, LOCK the steering column.
5. Remove Steering Column - Steering Column Replacement

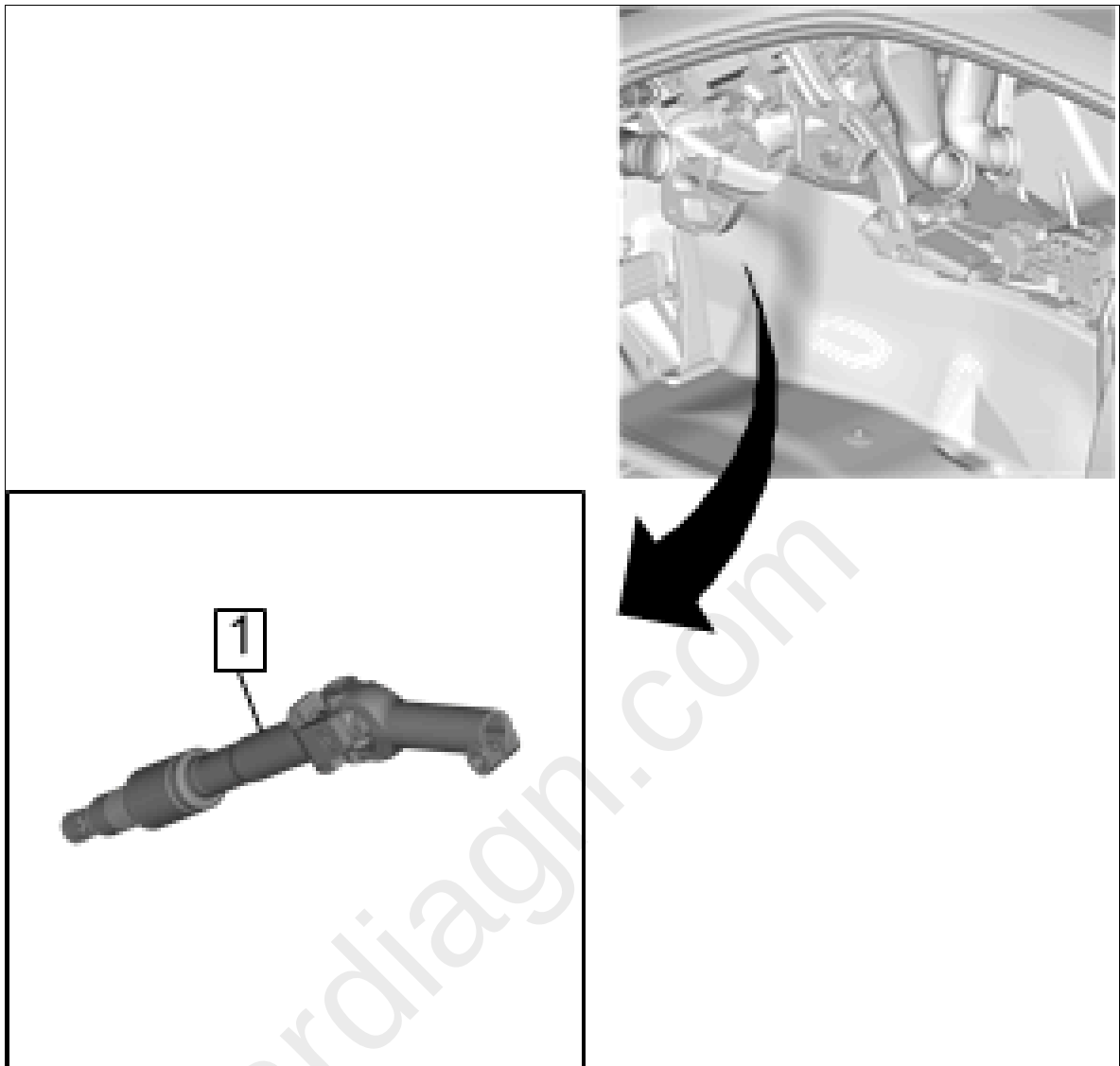
Fig 2: Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

6. Separate Upper Intermediate Steering Shaft (1) at Mid Intermediate Steering Shaft

Fig 3: Upper Intermediate Steering Shaft

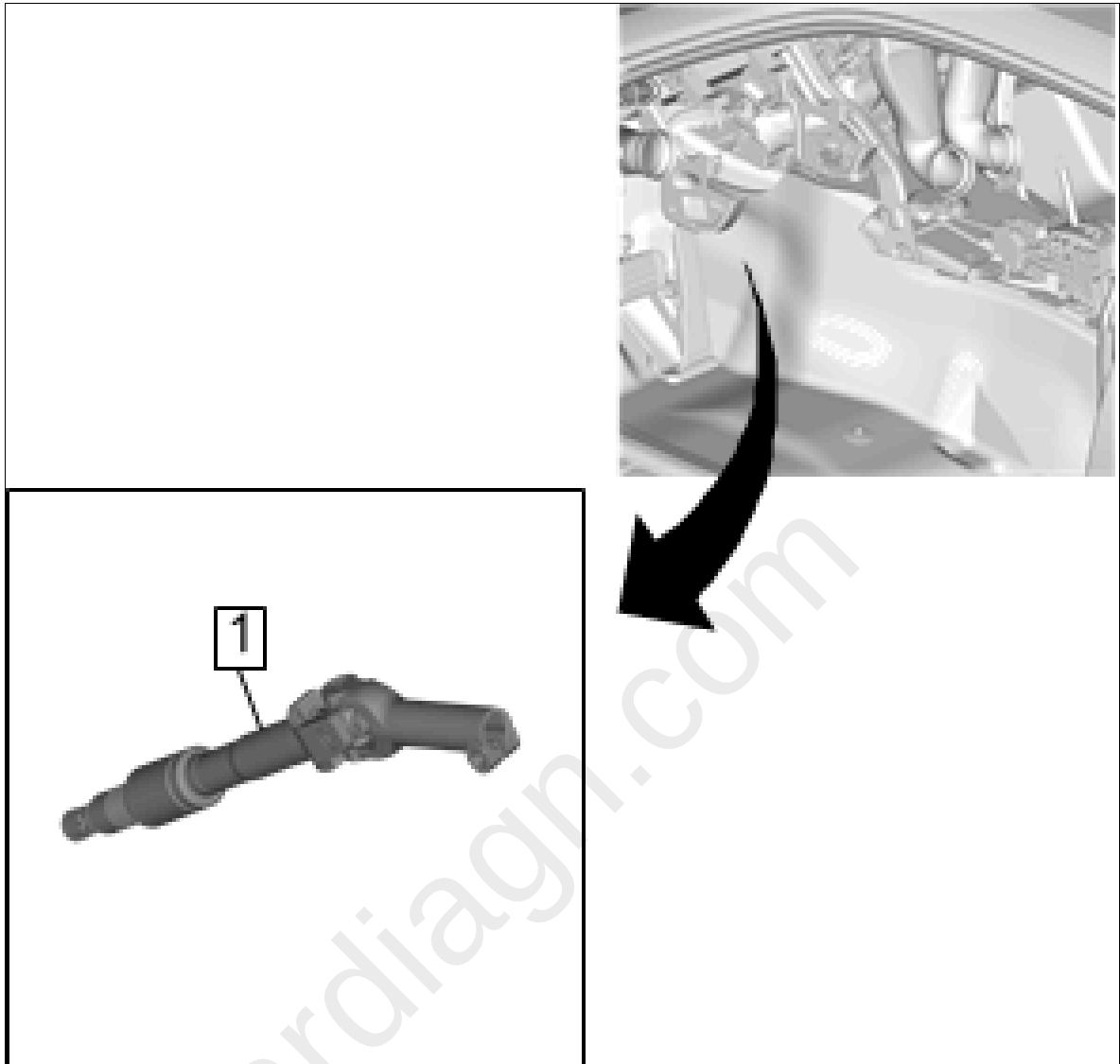


Courtesy of GENERAL MOTORS COMPANY

7. Carefully slide the upper intermediate steering shaft (1) through the intermediate steering shaft boot and the intermediate steering shaft inner boot and remove it from the inside of the vehicle.

**REPAIR INSTRUCTIONS > UPPER INTERMEDIATE STEERING SHAFT
REPLACEMENT (WITHOUT ROLLOBOOT, ON/AFTER VIN 1G1FB1RSXG0140963) >
INSTALLATION PROCEDURE**

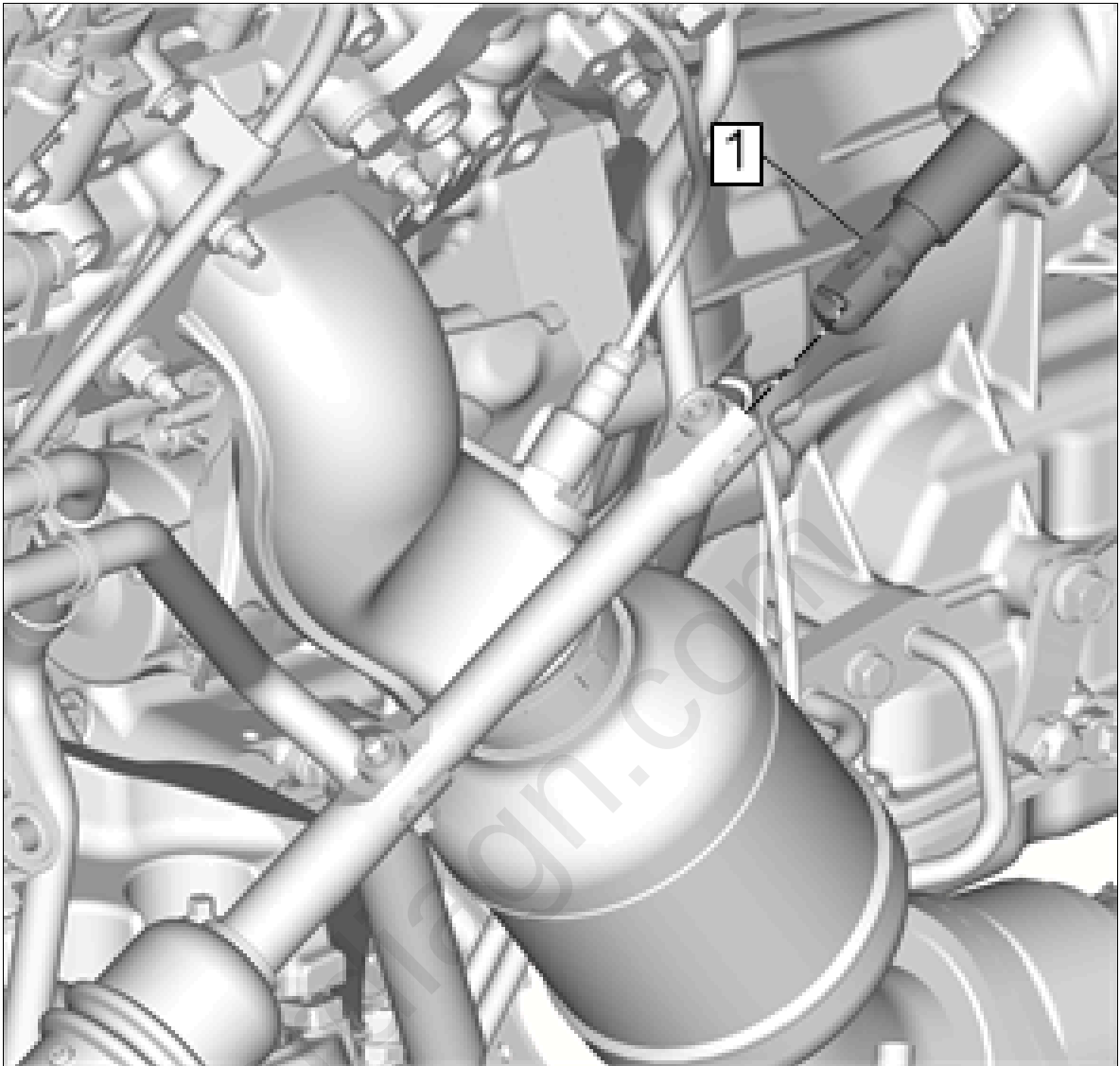
Fig 1: Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

1. Carefully slide the upper intermediate steering shaft (1) through the intermediate steering shaft inner boot and the intermediate steering shaft boot from the inside of the vehicle.

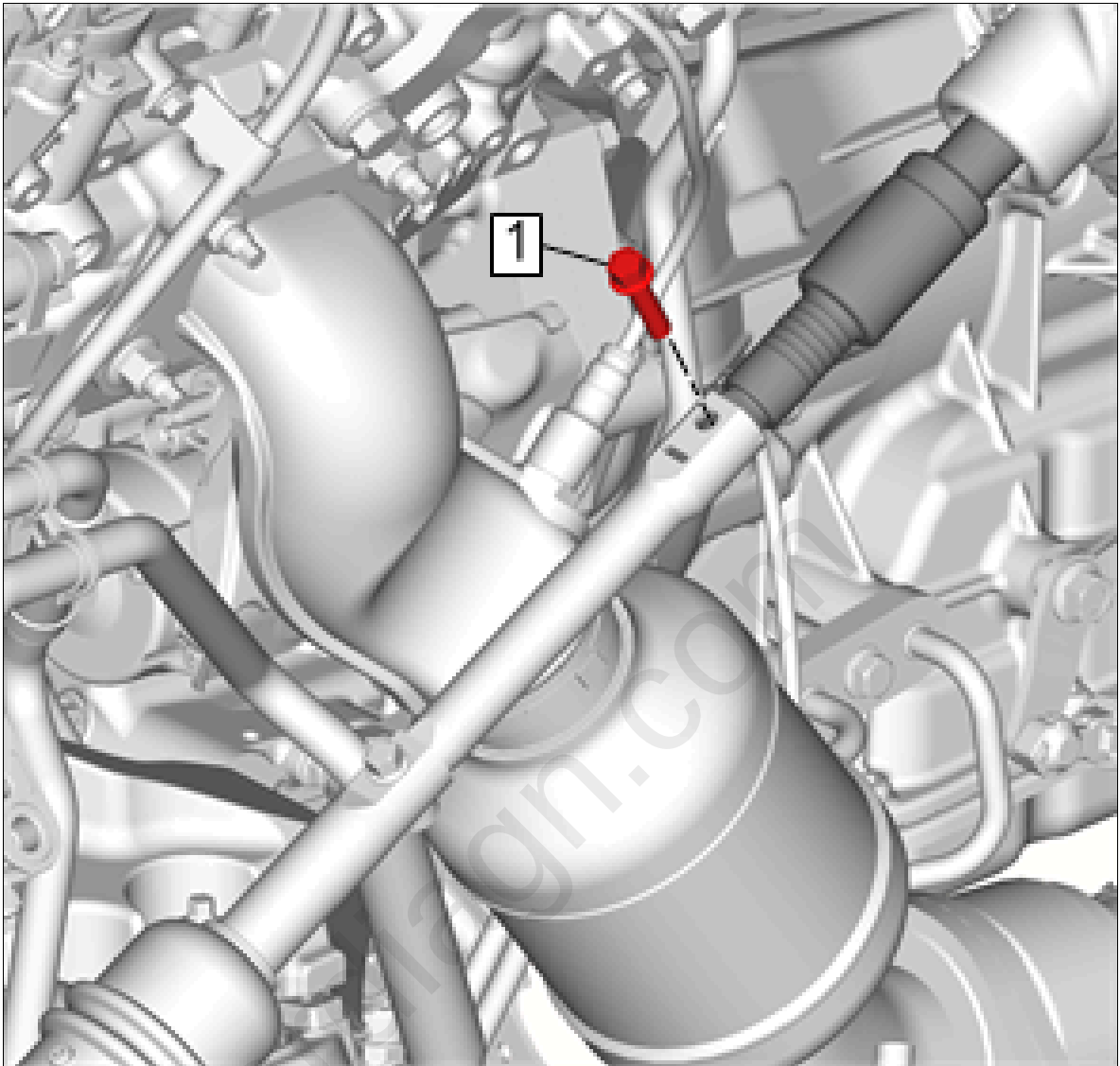
Fig 2: Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

2. Install Upper Intermediate Steering Shaft (1) at Mid Intermediate Steering Shaft
3. Steering Column»Install — Steering Column Replacement

Fig 3: Mid Intermediate Steering Shaft Bolt



Courtesy of GENERAL MOTORS COMPANY

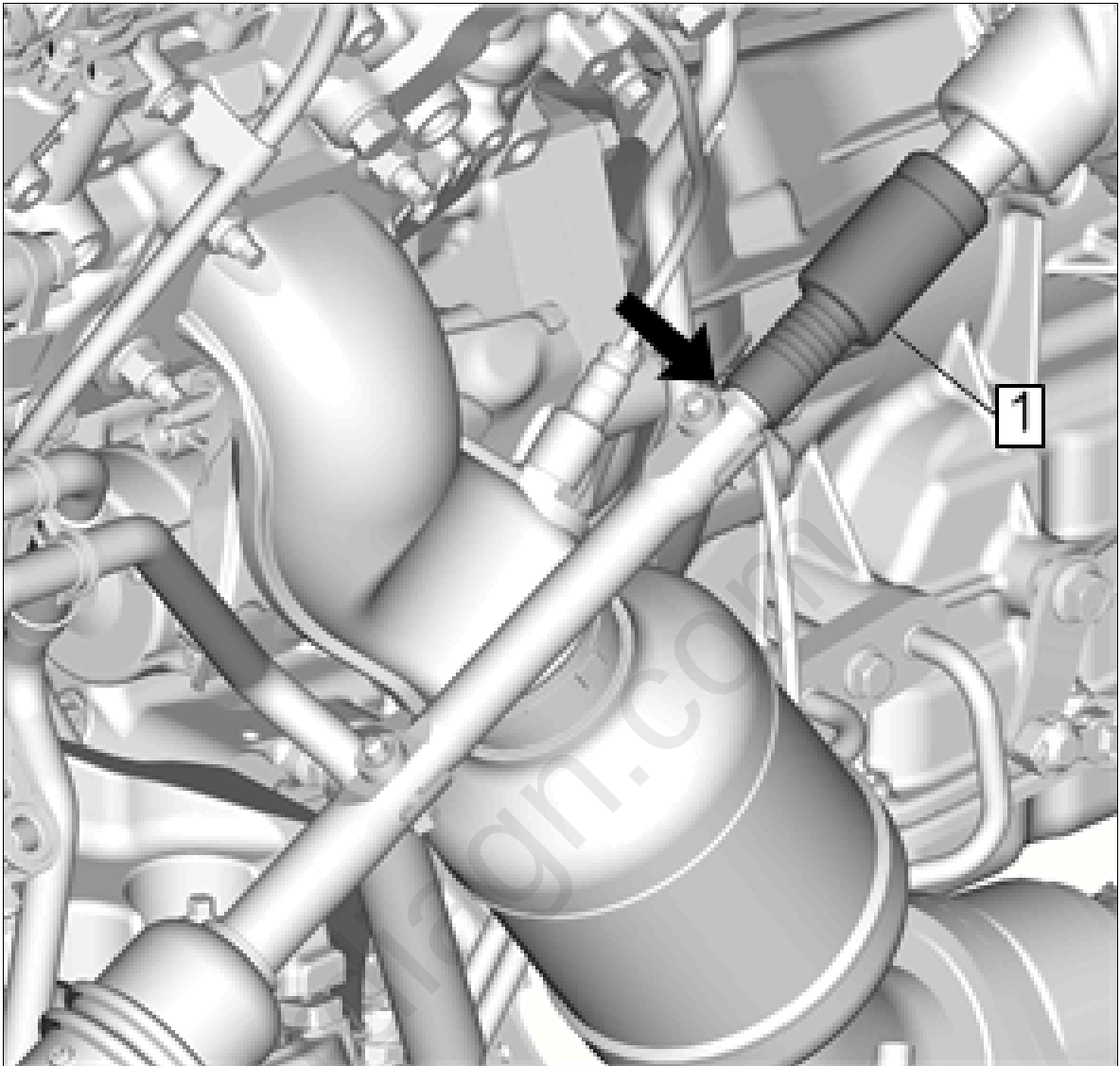
4. Unlock and turn the steering wheel so the mid intermediate steering shaft bolt (1) can be installed.

 **CAUTION:**

Refer to Fastener Caution .

5. Install Mid Intermediate Steering Shaft Bolt (1) and tighten to 36 N.m (27 lb ft)
 1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
 2. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers

Fig 4: Two-Piece Boot

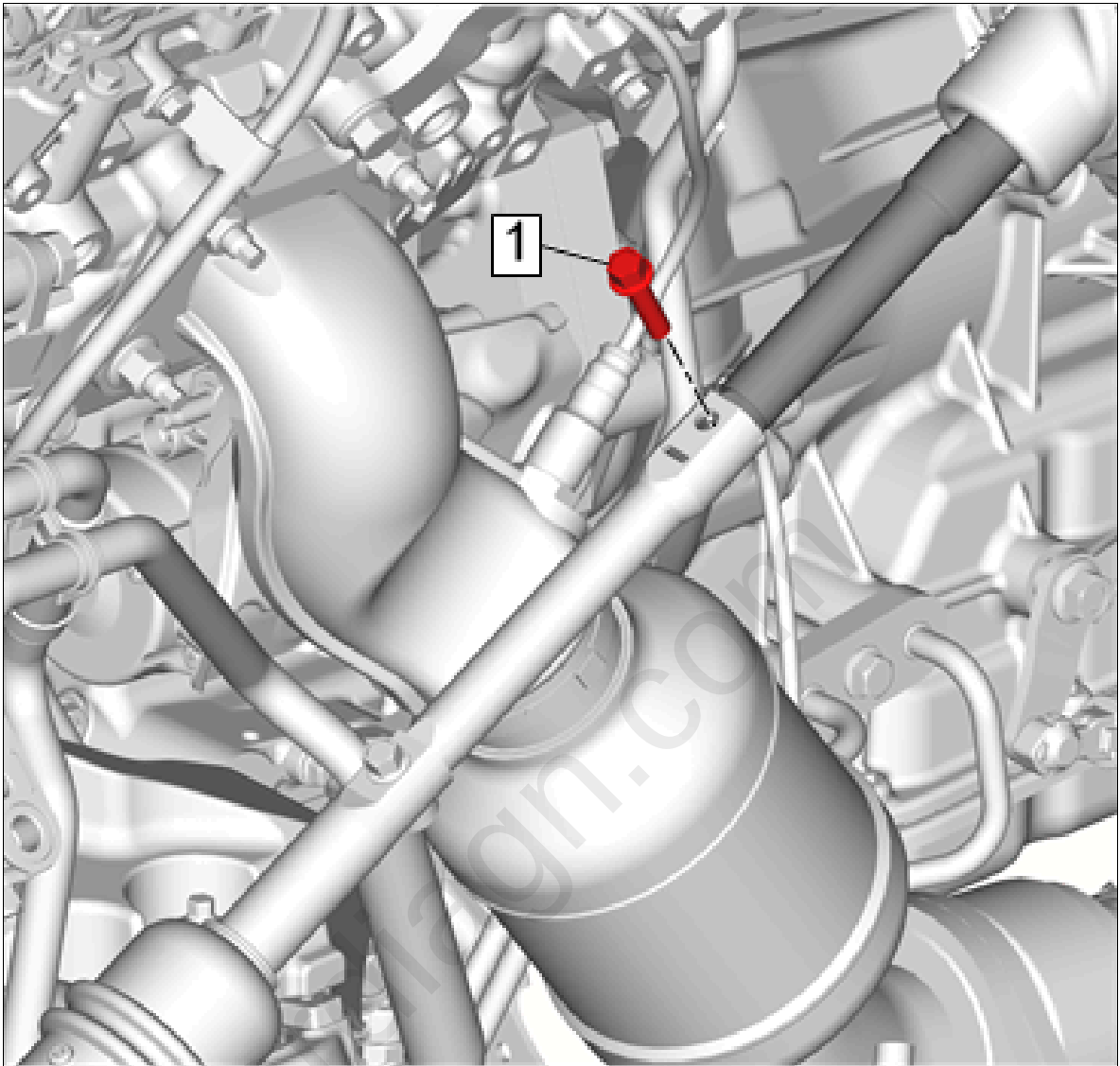


Courtesy of GENERAL MOTORS COMPANY

6. Inspect the two-piece boot (1) on the upper intermediate steering shaft and the connection point of the upper intermediate steering shaft and the mid intermediate steering shaft. Verify the connection point at the two steering shafts is assembled correctly and that the two-piece boot is NOT torn at any point. The two-piece boot is NOT serviceable. If the two-piece boot is torn, the entire upper intermediate steering shaft MUST be replaced.

**REPAIR INSTRUCTIONS > UPPER INTERMEDIATE STEERING SHAFT
REPLACEMENT (WITH ROLLOBOOT, BEFORE VIN 1G1FB1RSXG0140963) >
REMOVAL PROCEDURE**

Fig 1: Mid Intermediate Steering Shaft Bolt



Courtesy of GENERAL MOTORS COMPANY

1. Turn the steering wheel so the mid intermediate steering shaft bolt (1) is accessible from the engine compartment.
2. Remove Mid Intermediate Steering Shaft Bolt (1)
3. Turn the wheels of the vehicle back to the straight ahead position.

 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:

1. The steering column

2. The intermediate shaft(s)

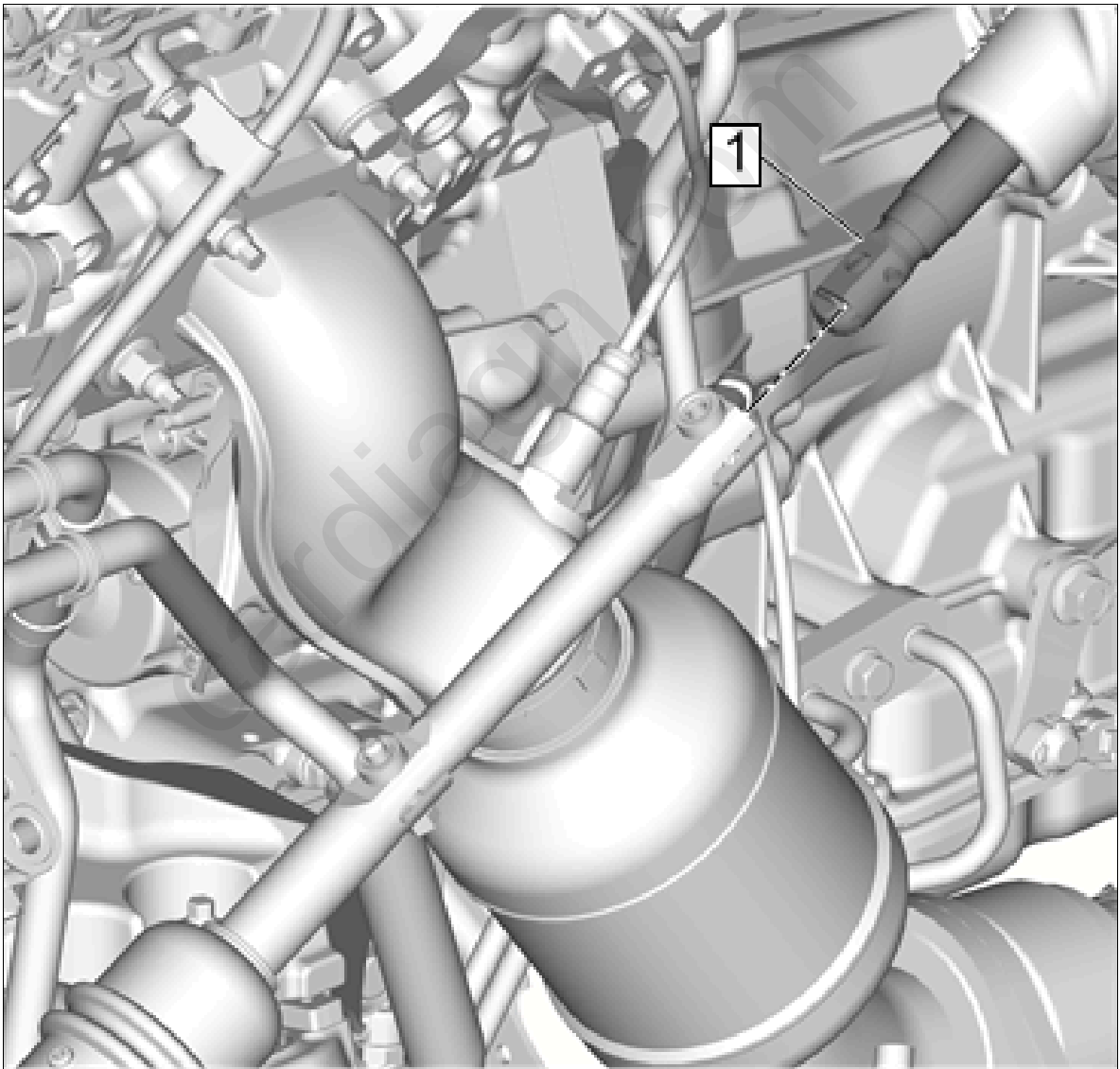
3. The steering gear

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

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

5. Remove Steering Column - Steering Column Replacement

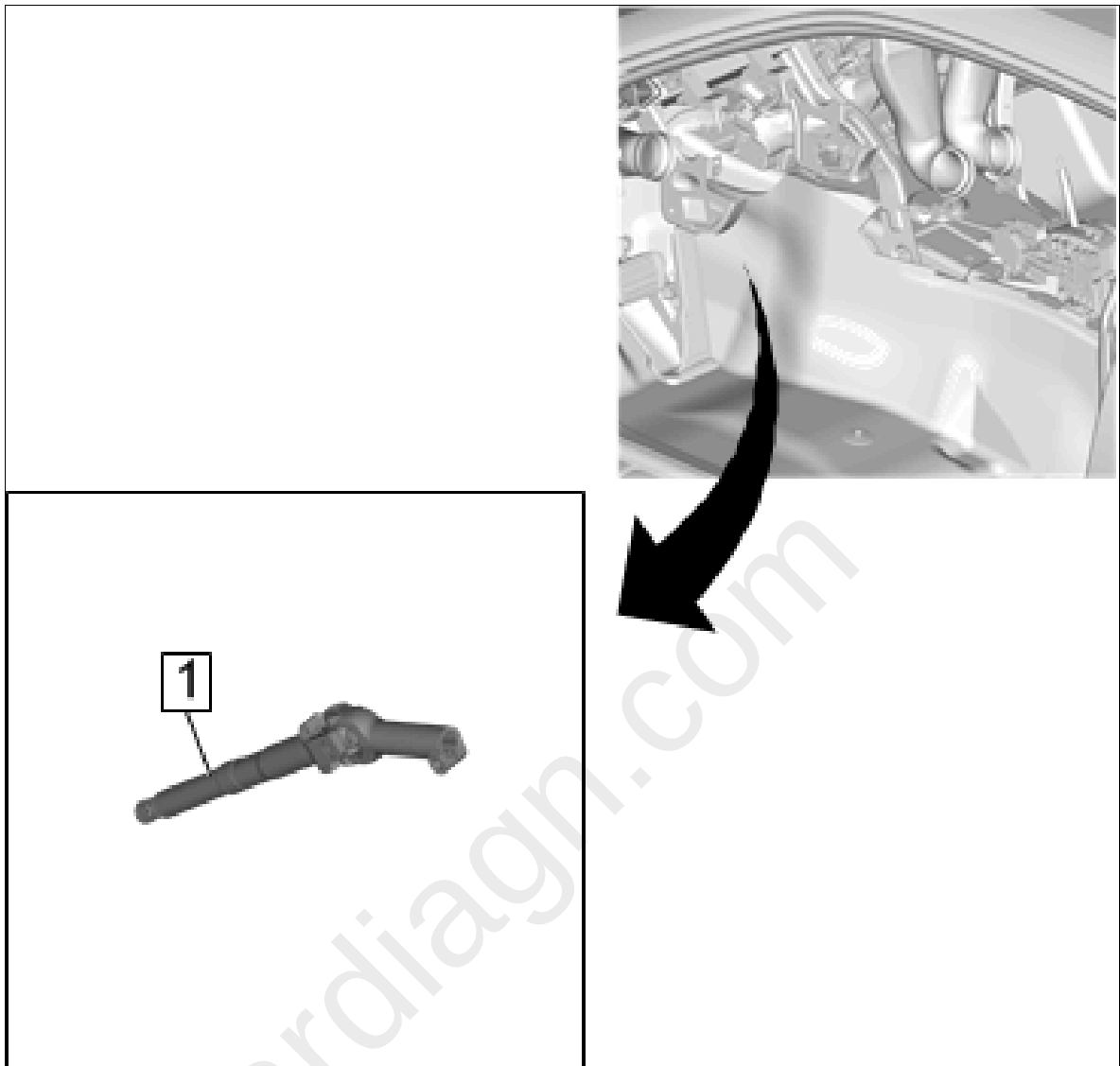
Fig 2: Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

6. Separate Upper Intermediate Steering Shaft (1) at Mid Intermediate Steering Shaft

Fig 3: Upper Intermediate Steering Shaft

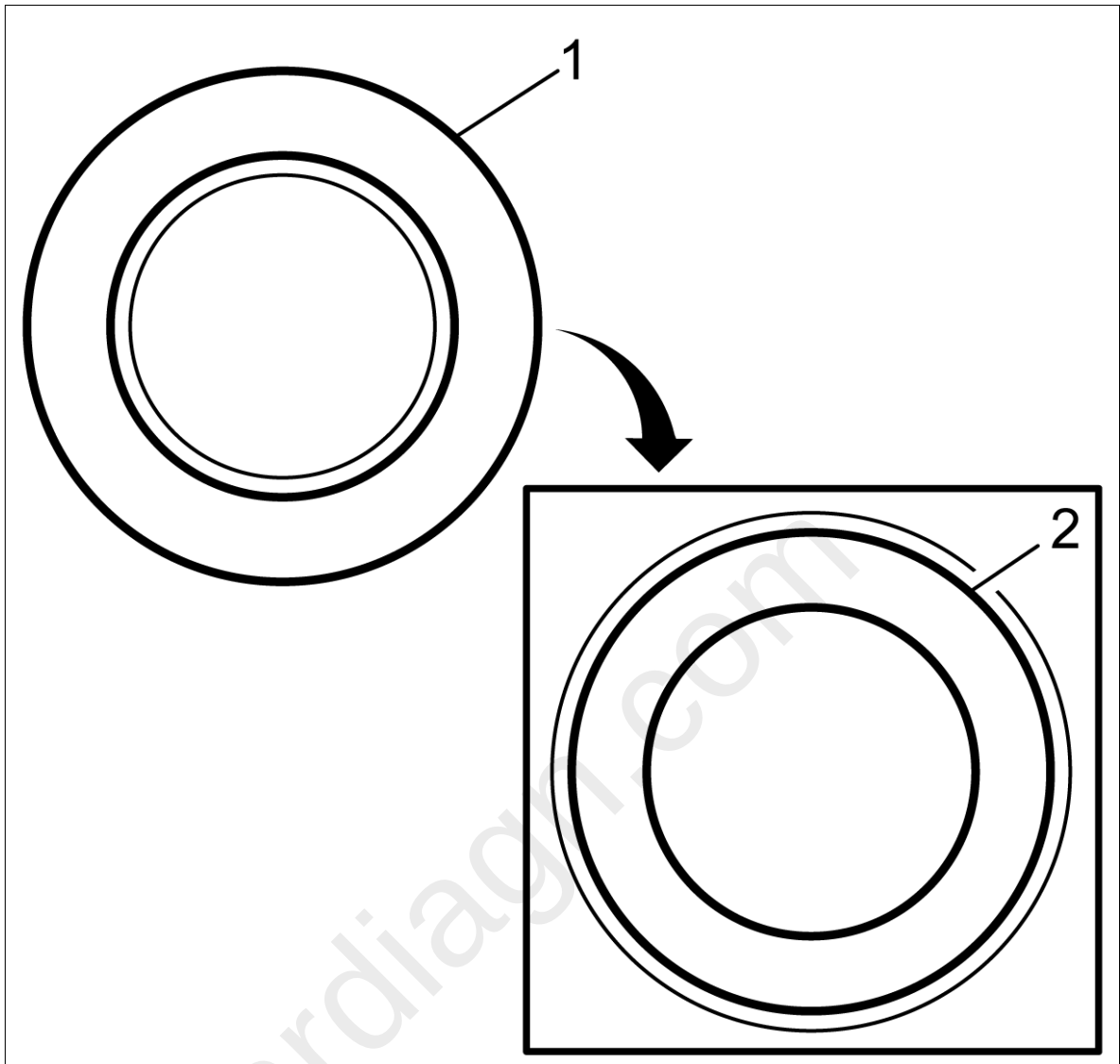


Courtesy of GENERAL MOTORS COMPANY

7. Carefully slide the upper intermediate steering shaft (1) through the intermediate steering shaft boot and the intermediate steering shaft inner boot and remove it from the inside of the vehicle.

**REPAIR INSTRUCTIONS > UPPER INTERMEDIATE STEERING SHAFT
REPLACEMENT (WITH ROLLOBOOT, BEFORE VIN 1G1FB1RSXG0140963) >
INSTALLATION PROCEDURE**

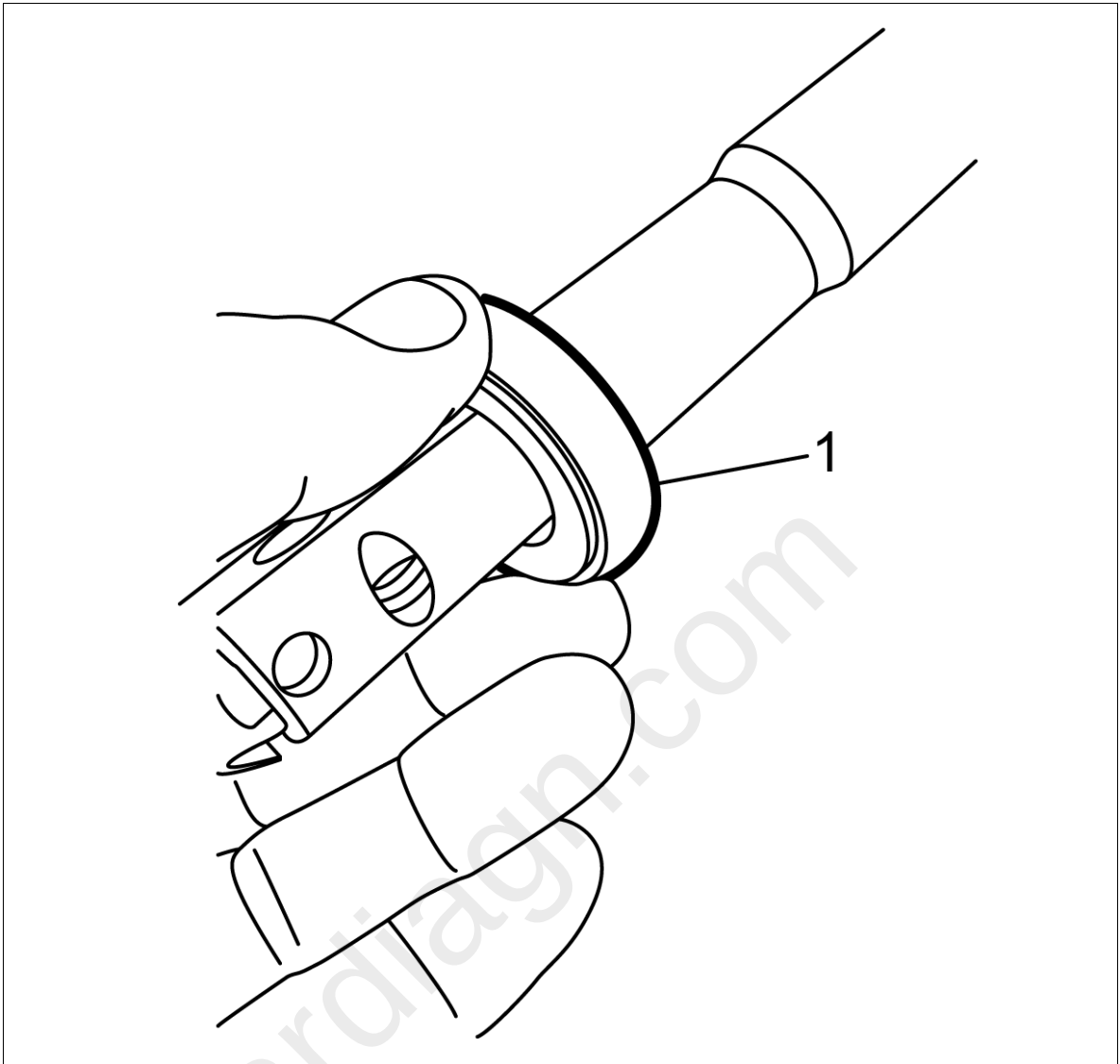
Fig 1: Rolloboot And Carrier Flange



Courtesy of GENERAL MOTORS COMPANY

1. The Rolloboot assembly contains the Rolloboot (1) and the carrier flange (2).

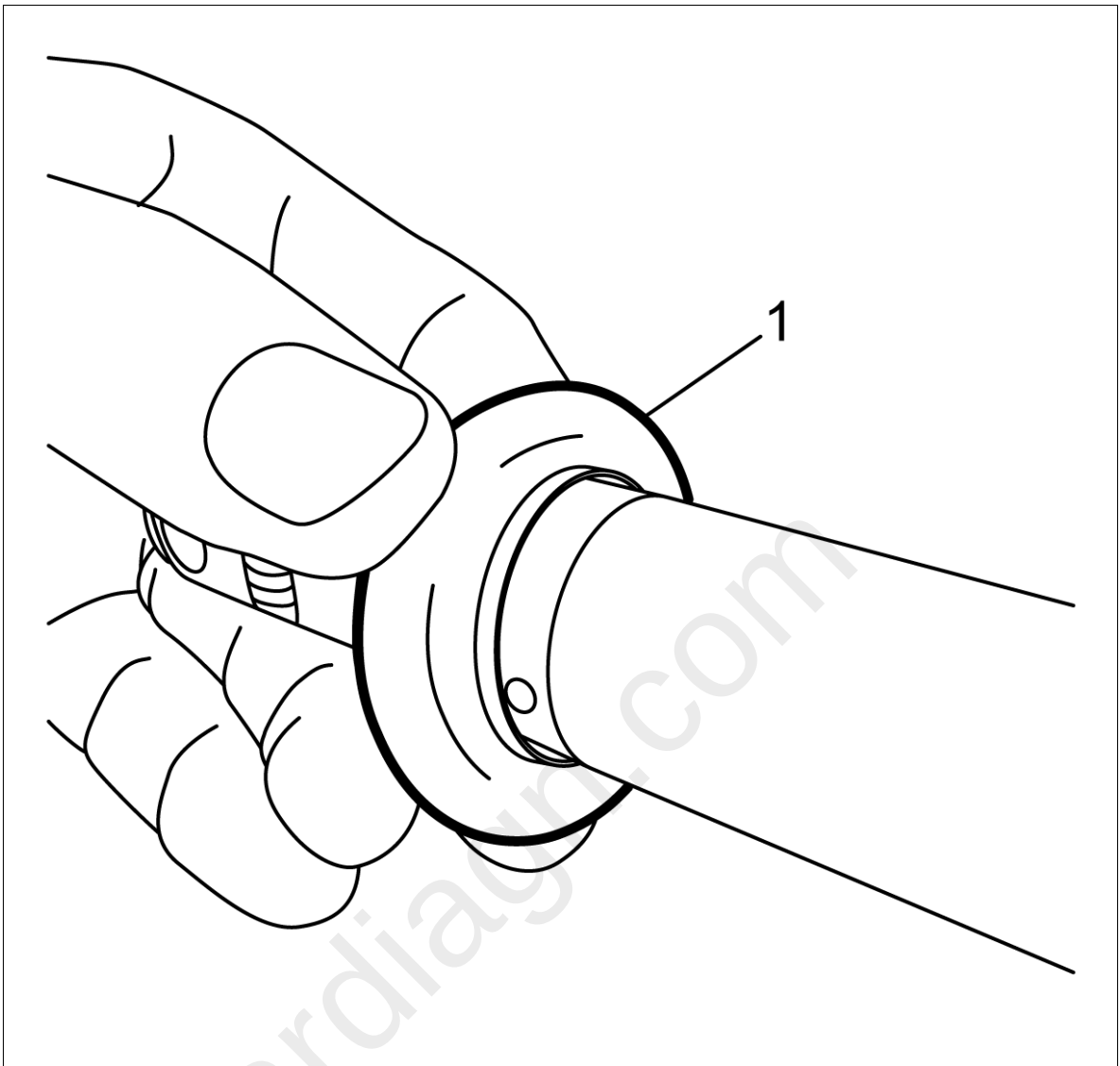
Fig 2: Rolloboot Assembly



Courtesy of GENERAL MOTORS COMPANY

2. Place the Rolloboot assembly (1) over the end of the upper intermediate steering shaft with the carrier flange toward the operator.

Fig 3: Rolloboot Assembly



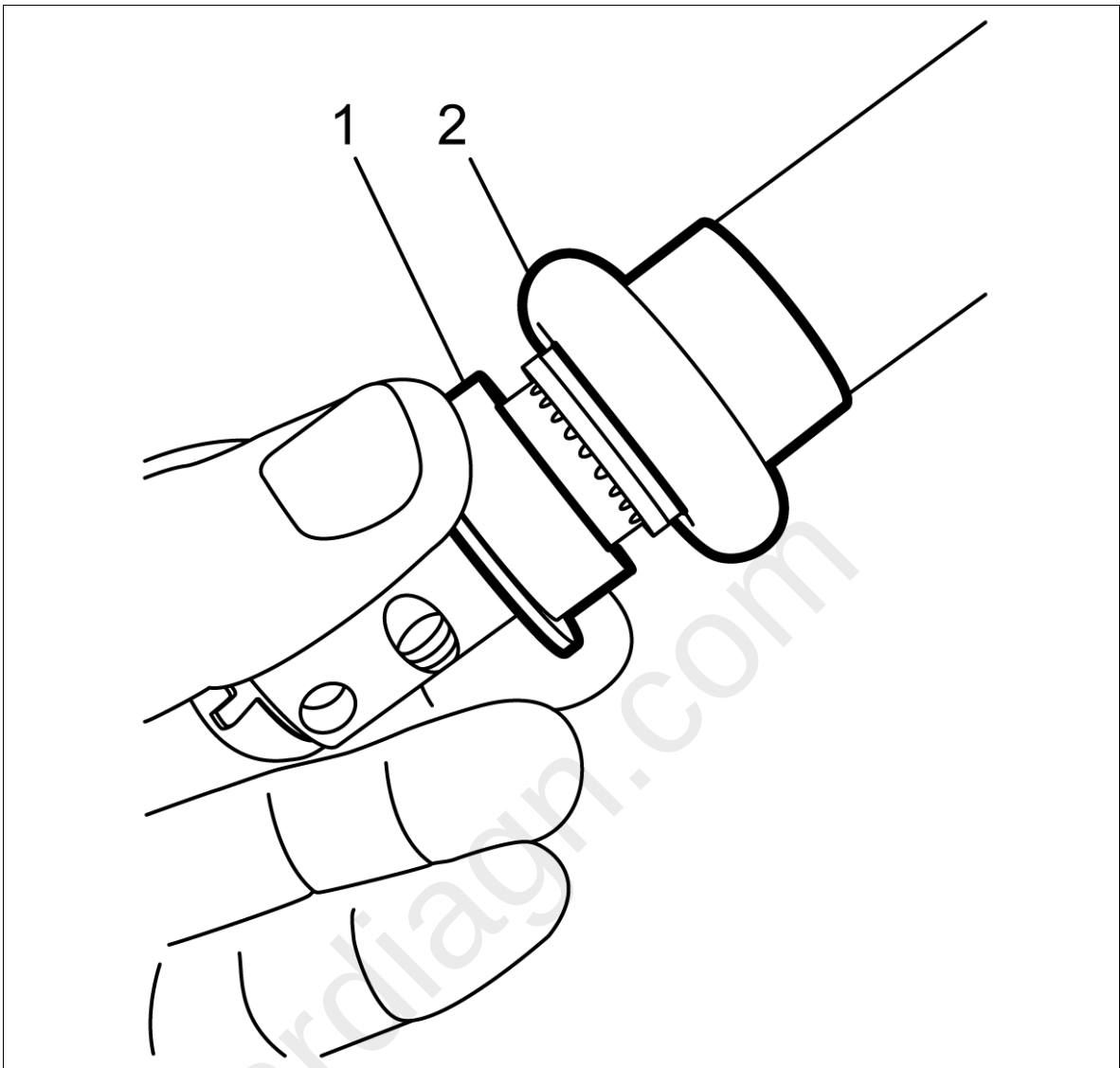
Courtesy of GENERAL MOTORS COMPANY

 NOTE:

There is a step in the bore of the carrier that will stop against the end of the outer tube.

3. Slide the Rolloboot assembly (1) up the upper intermediate steering shaft until the bore of the carrier engages with the end of the outer tube.

Fig 4: Rolloboot And Carrier



Courtesy of GENERAL MOTORS COMPANY

 NOTE:

After the Rolloboot is on the outer tube, the carrier will be free and can be set aside.

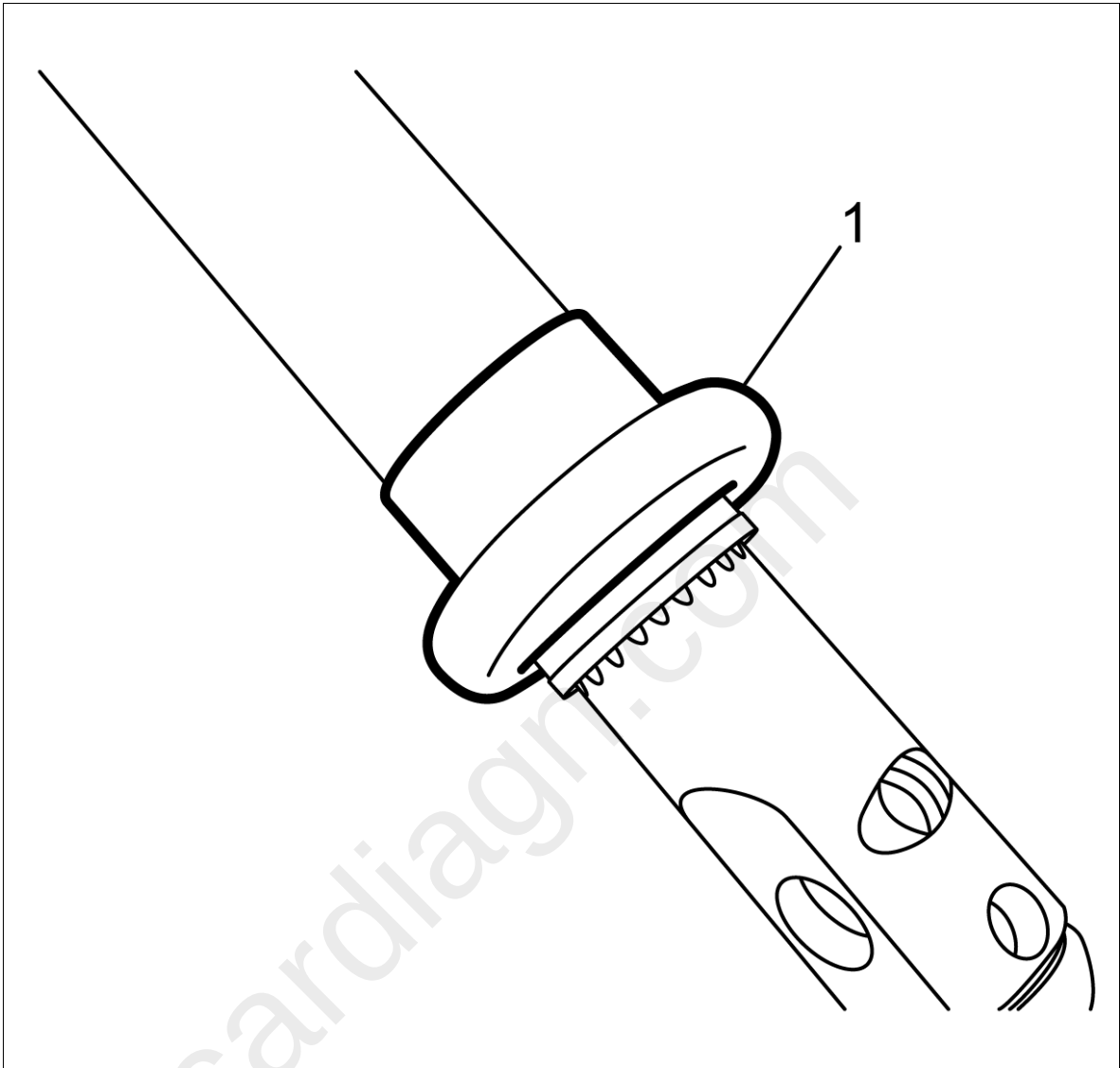
4. Holding the carrier (1) against the outer tube, push on the Rolloboot (2) and roll it onto the outer tube.

 NOTE:

If the Rolloboot does NOT "flap", you may need to use your fingers to help with this operation.

5. Continue to roll the Rolloboot (2) onto the outer tube until a portion of the Rolloboot unrolls and "flaps" onto the outer tube.

Fig 5: Rolloboot



Courtesy of GENERAL MOTORS COMPANY

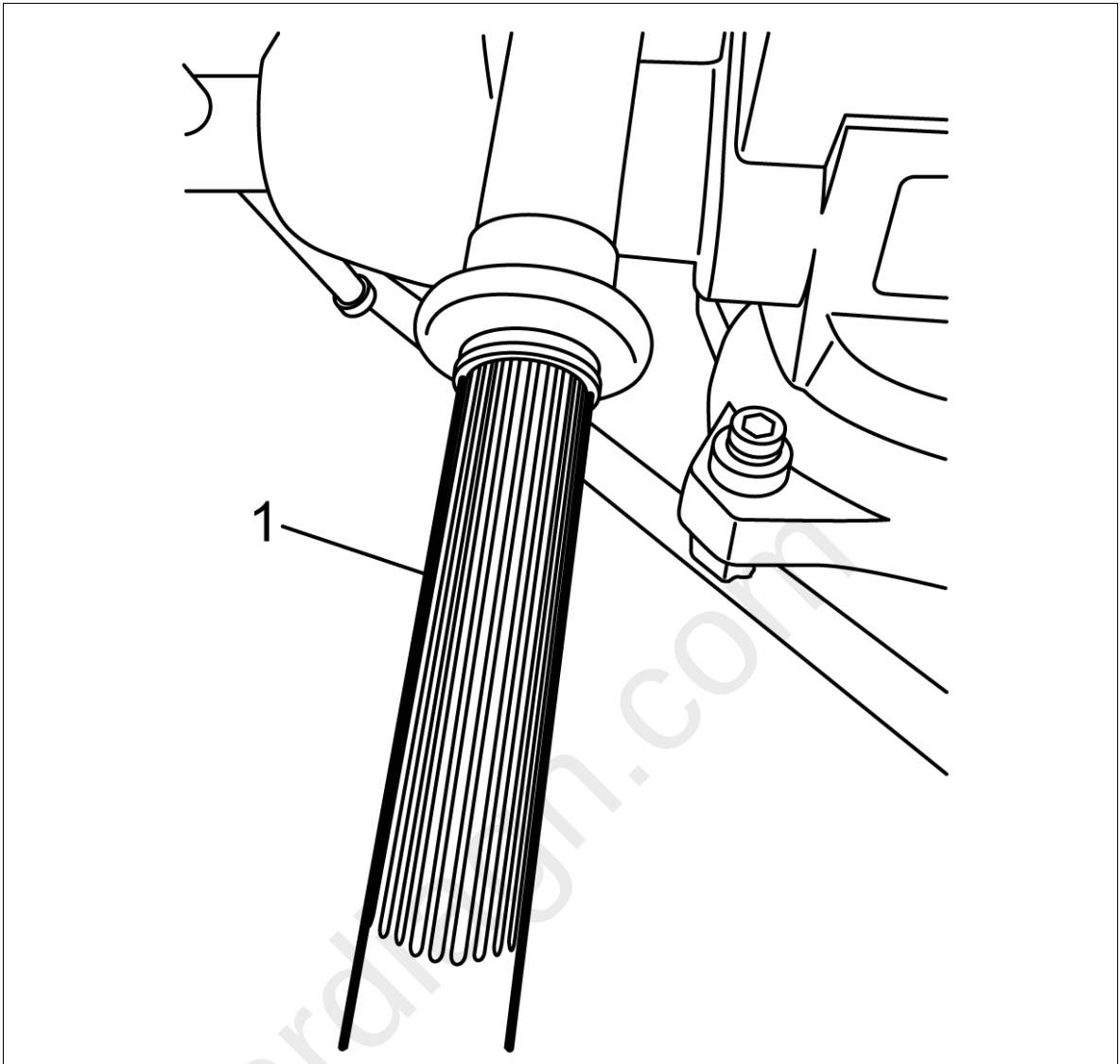


NOTE:

The graphic shows how the Rolloboot should look on the upper intermediate steering shaft prior to unrolling it.

6. Inspect the Rolloboot (1) and make sure it is installed correctly on the upper intermediate steering shaft.

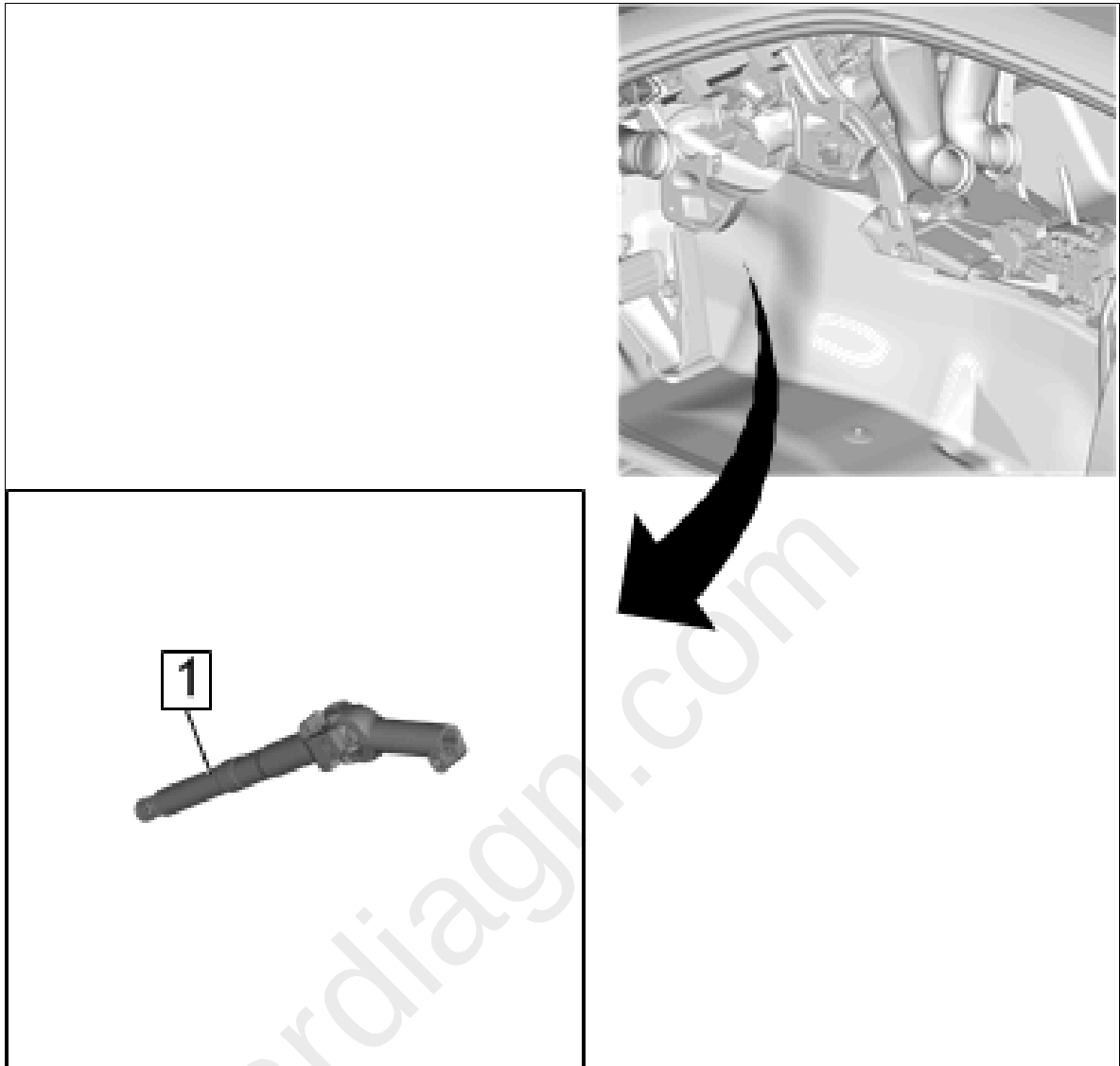
Fig 6: Inner Tube



Courtesy of GENERAL MOTORS COMPANY

7. Extend the inner tube (1) BEFORE unrolling the Rolloboot.

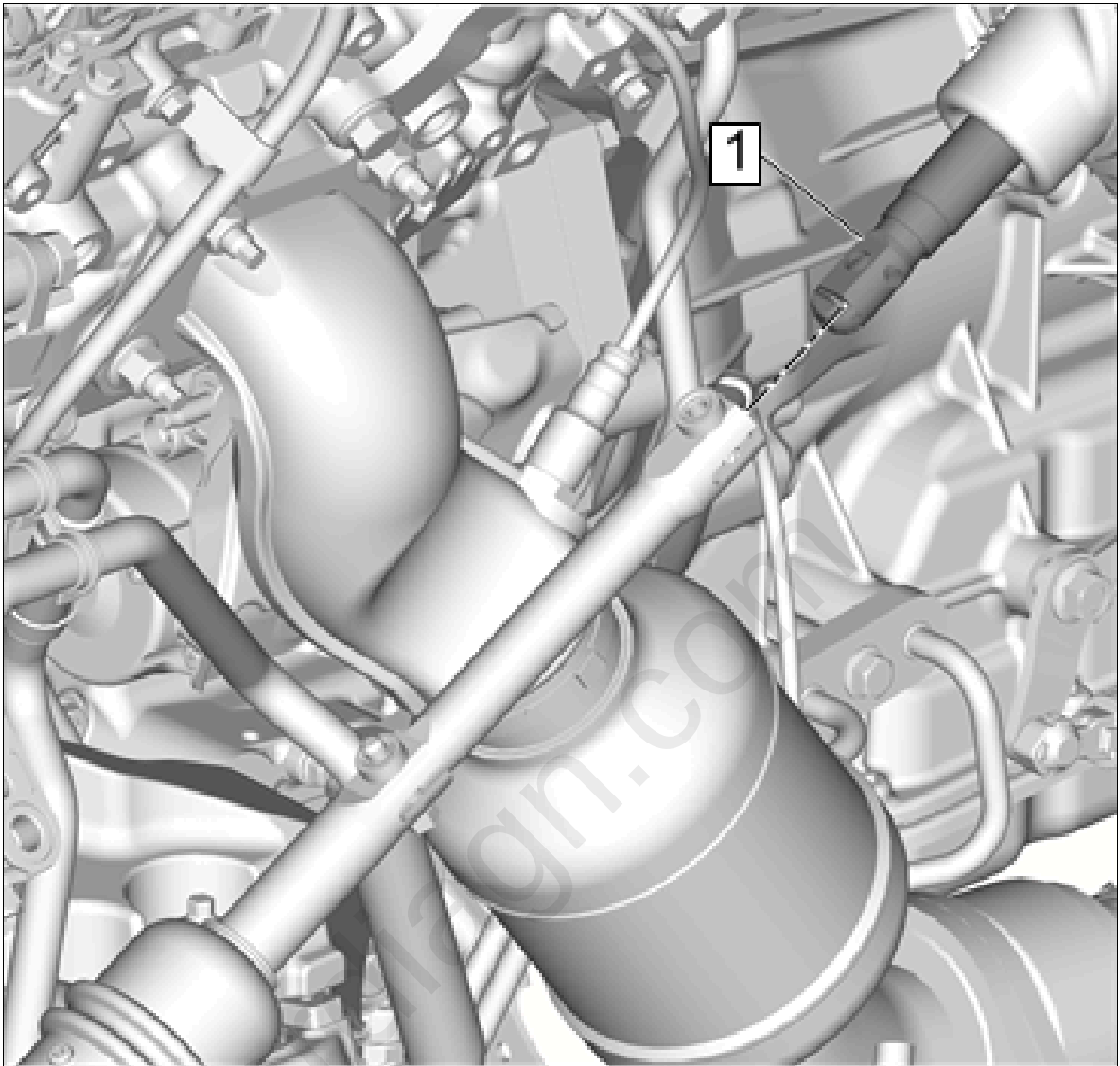
Fig 7: Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

8. Carefully slide the upper intermediate steering shaft (1) through the intermediate steering shaft inner boot and the intermediate steering shaft boot from the inside of the vehicle.

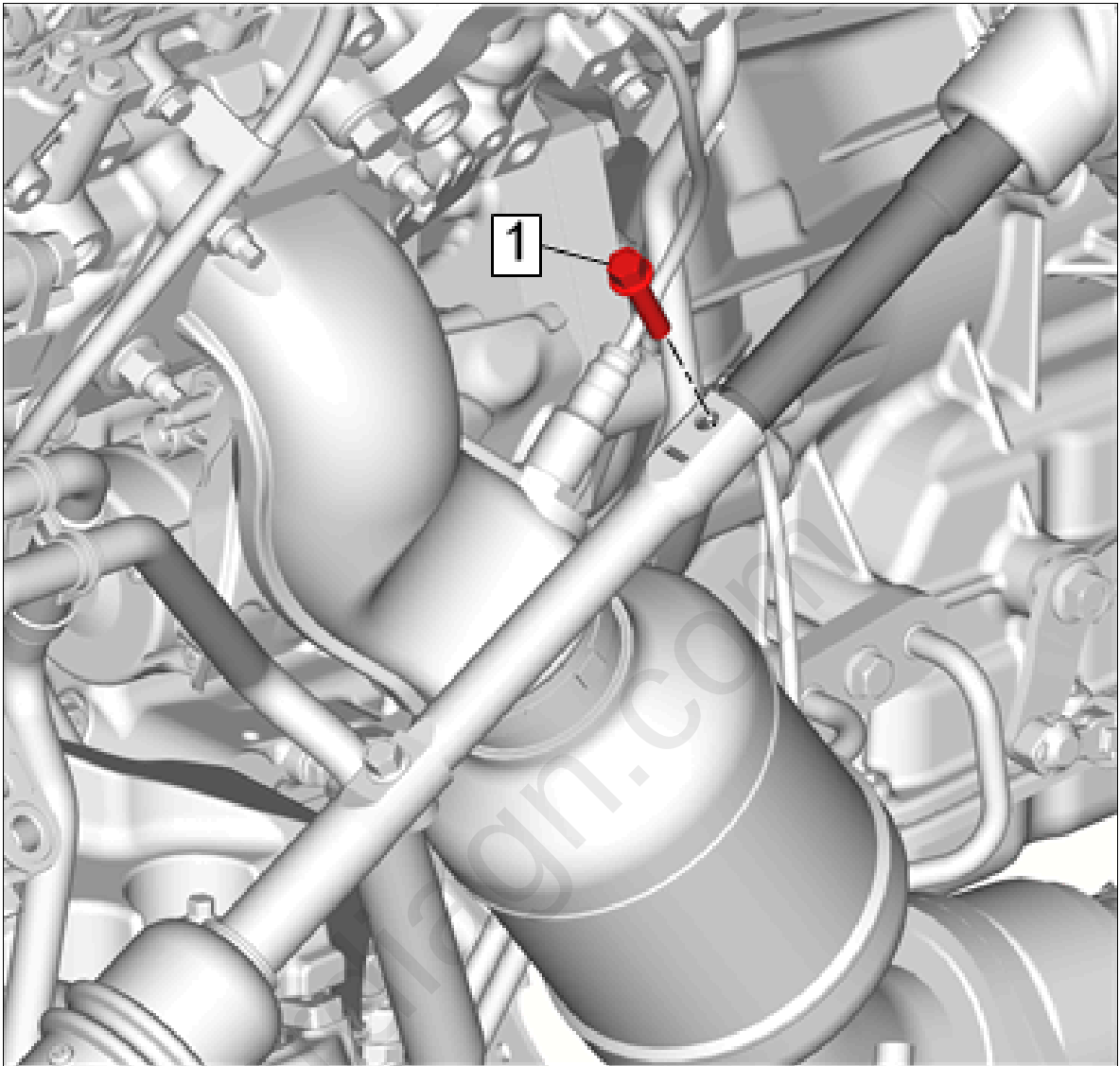
Fig 8: Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

9. Install Upper Intermediate Steering Shaft (1) at Mid Intermediate Steering Shaft
10. Install Steering Column Replacement

Fig 9: Mid Intermediate Steering Shaft Bolt



Courtesy of GENERAL MOTORS COMPANY

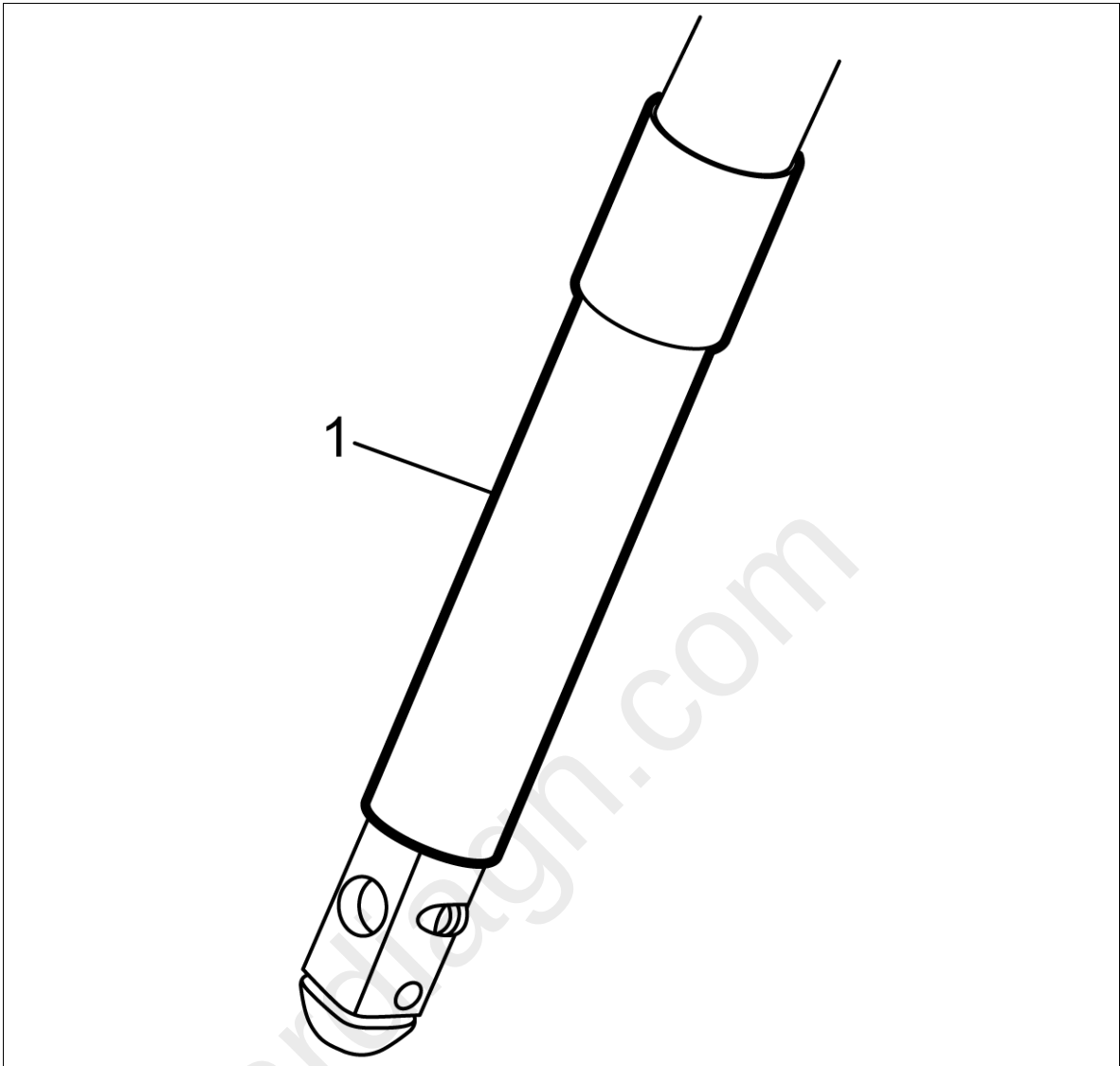
11. Unlock and turn the steering wheel so the mid intermediate steering shaft bolt (1) can be installed.

 **CAUTION:**

Refer to Fastener Caution .

12. Install Mid Intermediate Steering Shaft Bolt (1) and tighten to 36 N.m (27 lb ft)
 1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
 2. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers

Fig 10: Unroll Rolloboot



Courtesy of GENERAL MOTORS COMPANY



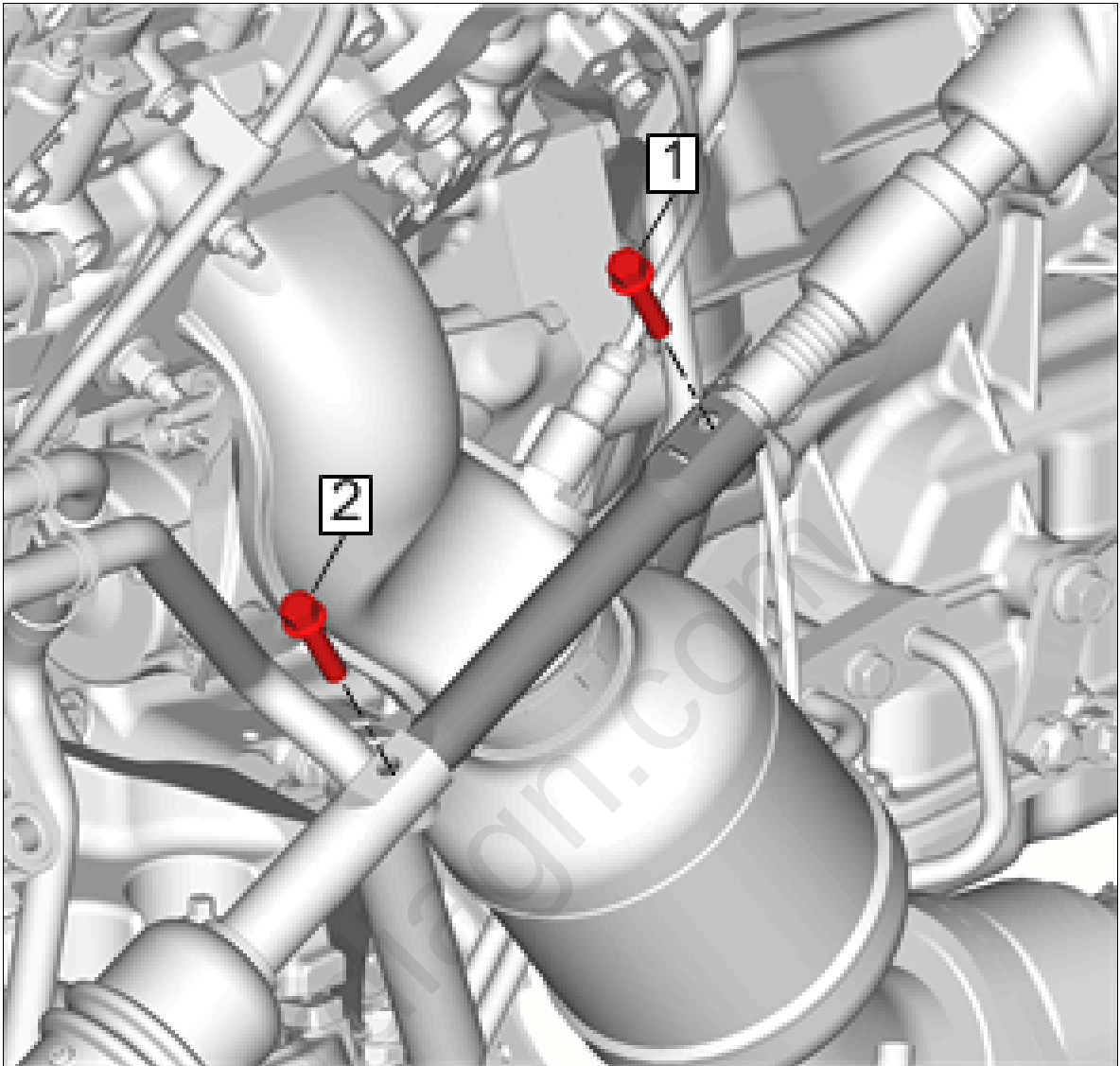
NOTE:

*The upper intermediate steering shaft and mid intermediate steering shaft **MUST** be connected and the mid intermediate steering shaft bolt tightened to specification **BEFORE** unrolling the Rolloboot.*

13. Unroll Rolloboot (1) completely to cover the upper intermediate steering shaft splines.

REPAIR INSTRUCTIONS > MID INTERMEDIATE STEERING SHAFT REPLACEMENT > REMOVAL PROCEDURE

Fig 1: Mid Intermediate Steering Shaft Bolt And Intermediate Steering Shaft Upper Bolt



Courtesy of GENERAL MOTORS COMPANY

1. Turn the steering wheel so the mid intermediate steering shaft bolt (1) and intermediate steering shaft upper bolt (2) are accessible from the engine compartment.
2. Remove Mid Intermediate Steering Shaft Bolt (1)
3. Remove Intermediate Steering Shaft Upper Bolt (2)
4. Turn the wheels of the vehicle back to the straight ahead position.

 CAUTION:

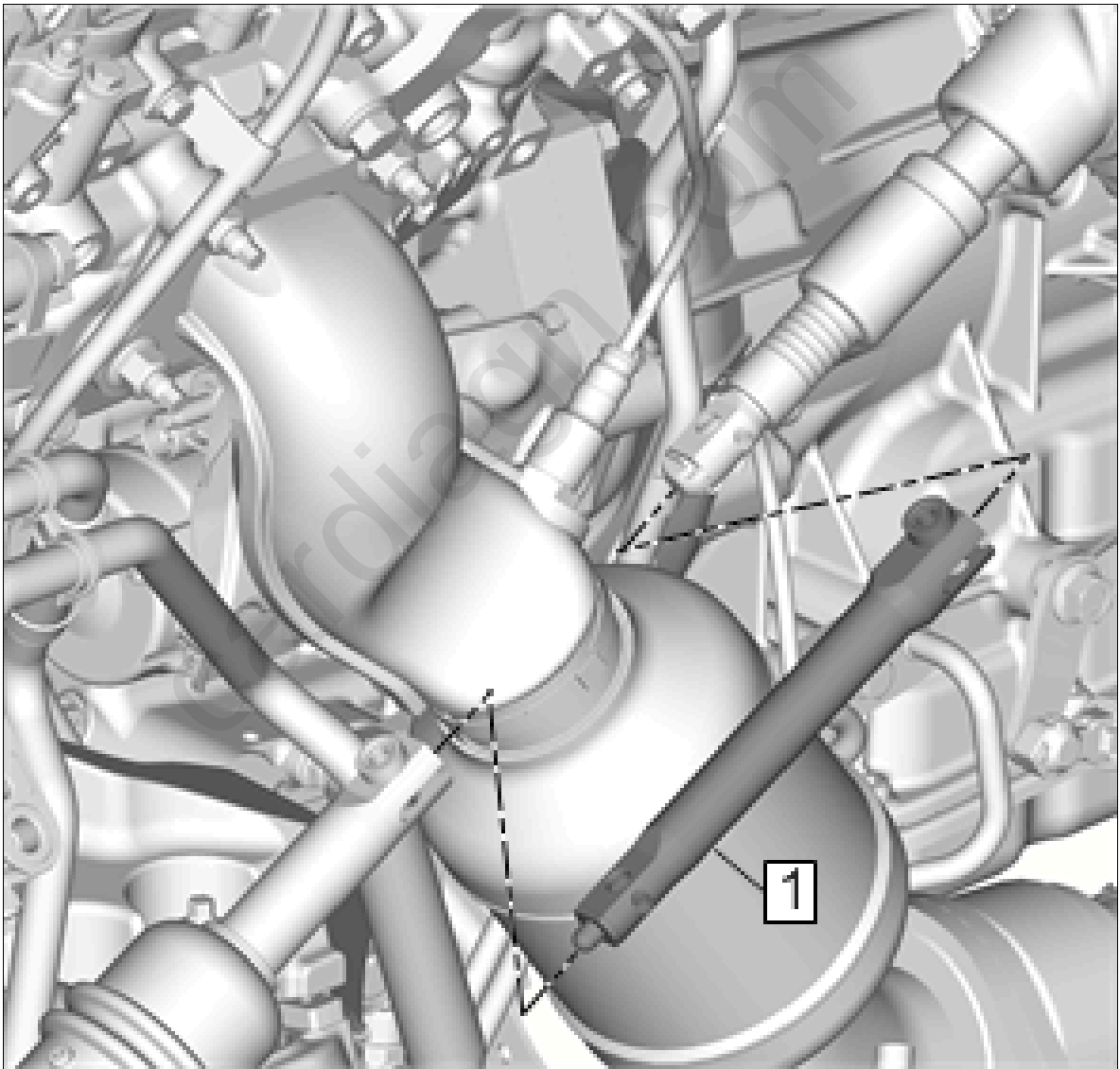
With wheels of the vehicle facing straight ahead, secure the steering wheel utilizing steering column anti-rotation pin, steering column lock, or a strap to prevent rotation. Locking of the steering column will prevent damage and a possible malfunction of the SIR system. The steering wheel must be secured in position before disconnecting the following components:

1. The steering column
2. The intermediate shaft(s)
3. 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.

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

Fig 2: Mid Intermediate Steering Shaft

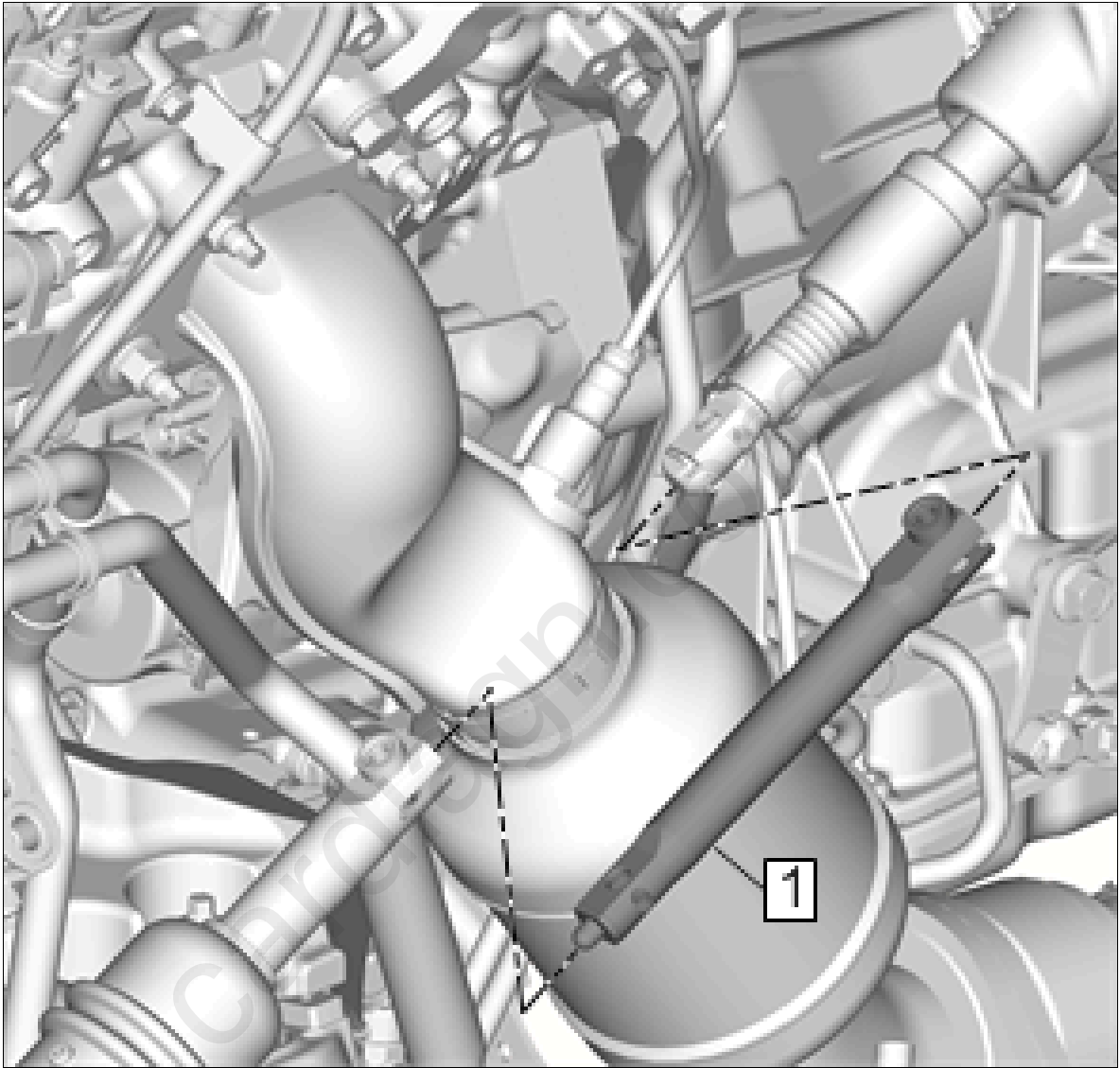


Courtesy of GENERAL MOTORS COMPANY

6. Remove the mid intermediate steering shaft (1) from the vehicle.

REPAIR INSTRUCTIONS > MID INTERMEDIATE STEERING SHAFT REPLACEMENT > INSTALLATION PROCEDURE

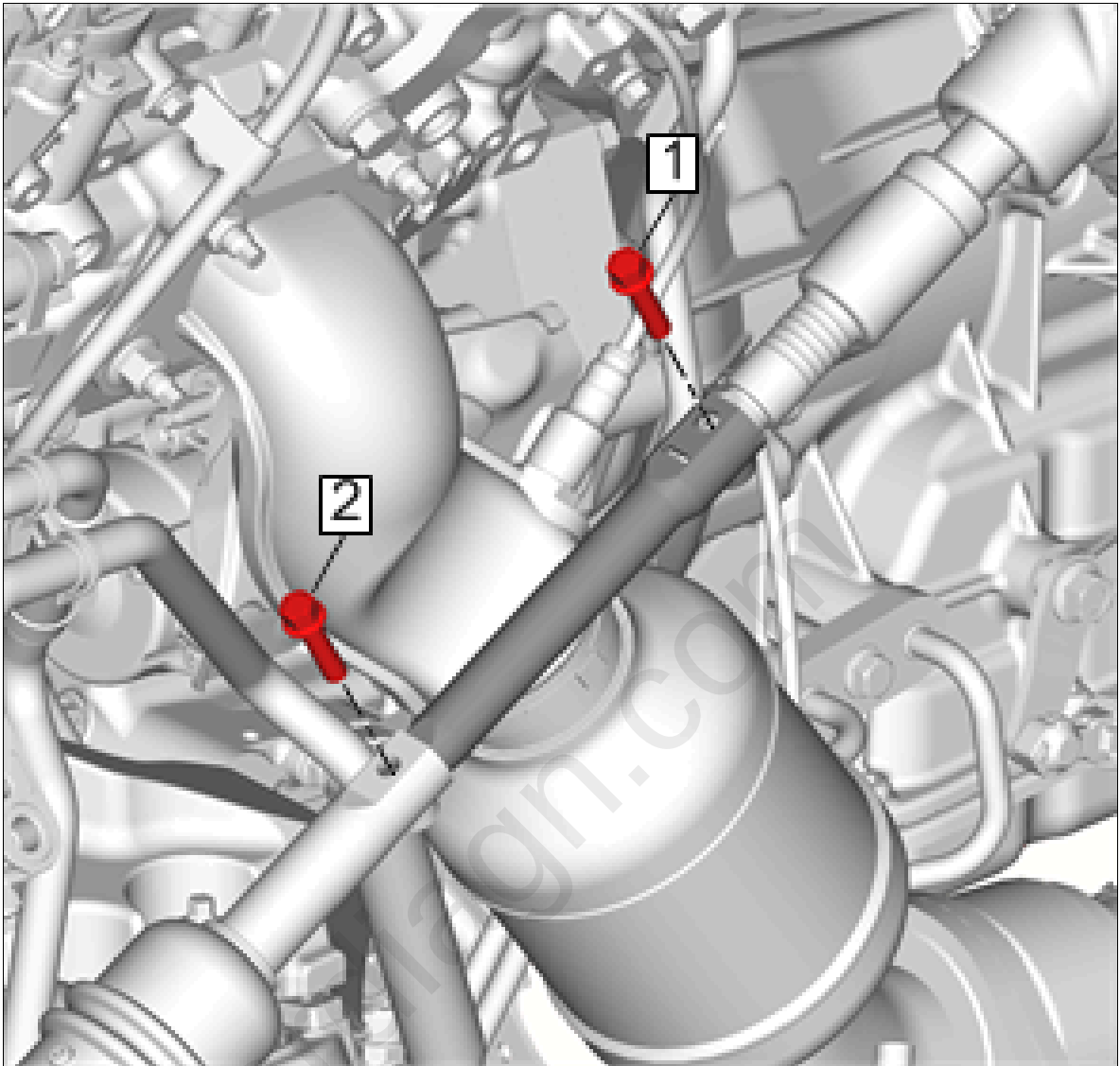
Fig 1: Mid Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

1. Position the mid intermediate steering shaft (1) on the vehicle.

Fig 2: Mid Intermediate Steering Shaft Bolt And Intermediate Steering Shaft Upper Bolt



Courtesy of GENERAL MOTORS COMPANY

2. UNLOCK and turn the steering wheel so the mid intermediate steering shaft bolt (1) and intermediate steering shaft upper bolt (2) can be installed.

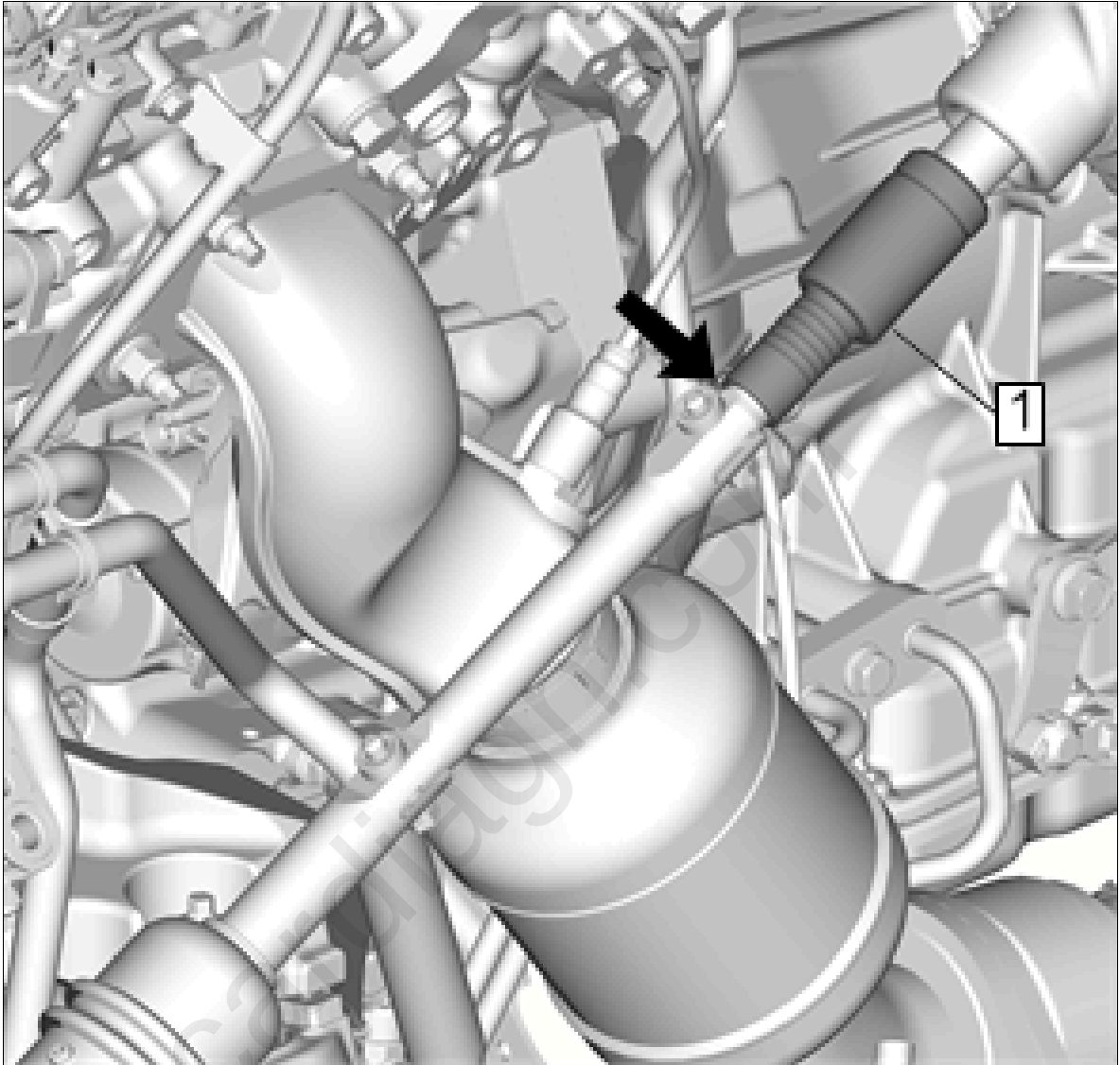
 **CAUTION:**

Refer to Fastener Caution .

3. Install Intermediate Steering Shaft Upper Bolt (2) and tighten to 36 N.m (27 lb ft)
 1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
 2. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers
4. Install Mid Intermediate Steering Shaft Bolt (1) and tighten to 36 N.m (27 lb ft)

1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
2. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers

Fig 3: Two-Piece Boot

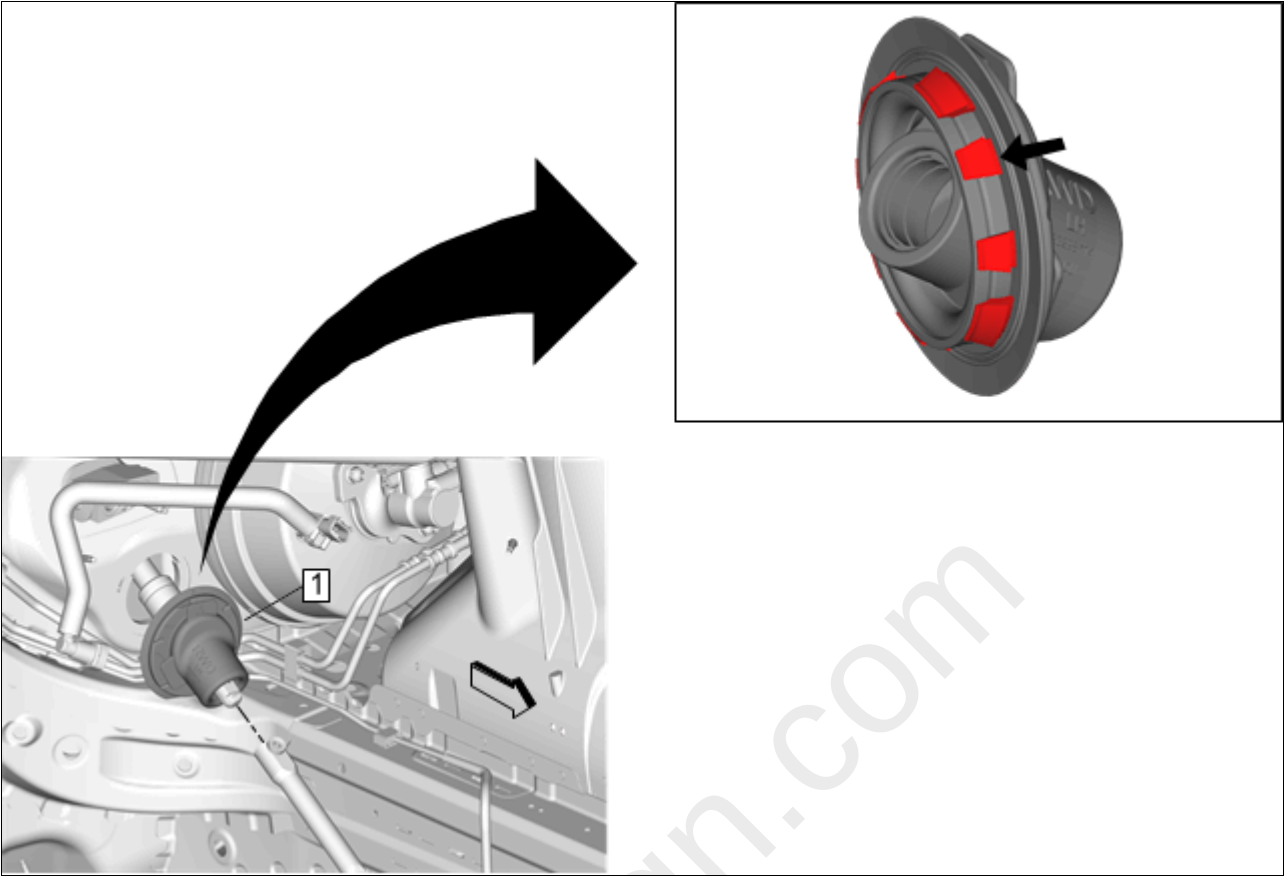


Courtesy of GENERAL MOTORS COMPANY

5. Inspect the two-piece boot (1) on the upper intermediate steering shaft and the connection point of the upper intermediate steering shaft and the mid intermediate steering shaft. Verify the connection point at the two steering shafts is assembled correctly and that the two-piece boot is NOT torn at any point. The two-piece boot is NOT serviceable. If the two-piece boot is torn, the entire upper intermediate steering shaft MUST be replaced.

REPAIR INSTRUCTIONS > INTERMEDIATE STEERING SHAFT BOOT REPLACEMENT

Fig 1: Intermediate Steering Shaft Boot

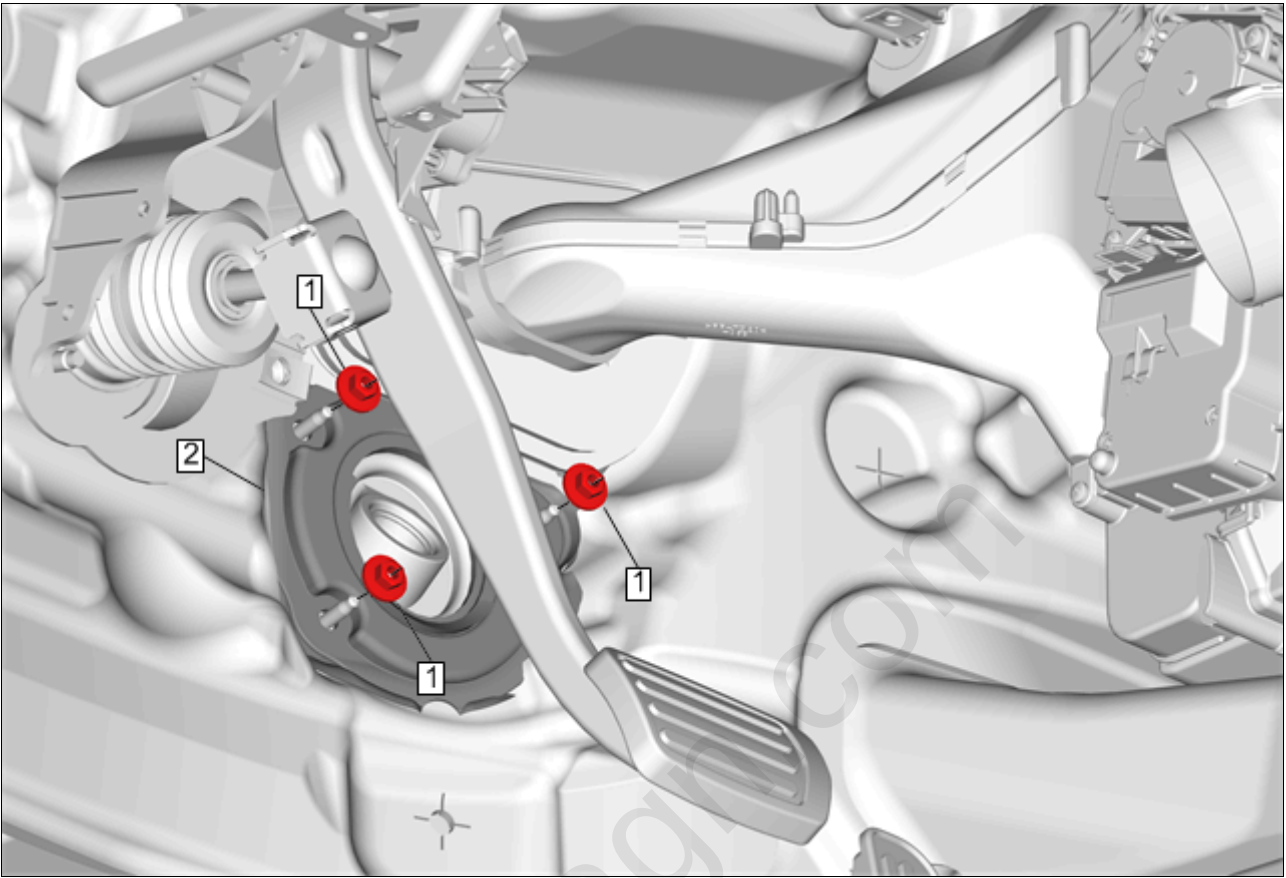


Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Separate Upper Intermediate Steering Shaft at Mid Intermediate Steering Shaft - Upper Intermediate Steering Shaft Replacement (Without Rolloboot, On/After VIN 1G1FB1RSXG0140963) Upper Intermediate Steering Shaft Replacement (With Rolloboot, Before VIN 1G1FB1RSXG0140963)	
1	Intermediate Steering Shaft Boot Procedure 1. To remove the intermediate steering shaft boot, lift the lip of the boot and use an appropriate tool to release the plastic clips holding the boot in place. 2. Slide the intermediate steering shaft boot down and off of the upper intermediate steering shaft. 3. When installing the intermediate steering shaft boot, ensure the boot is aligned under the hood by using the arrow on the boot as a guide.

REPLACEMENT

Fig 1: Intermediate Steering Shaft Inner Boot



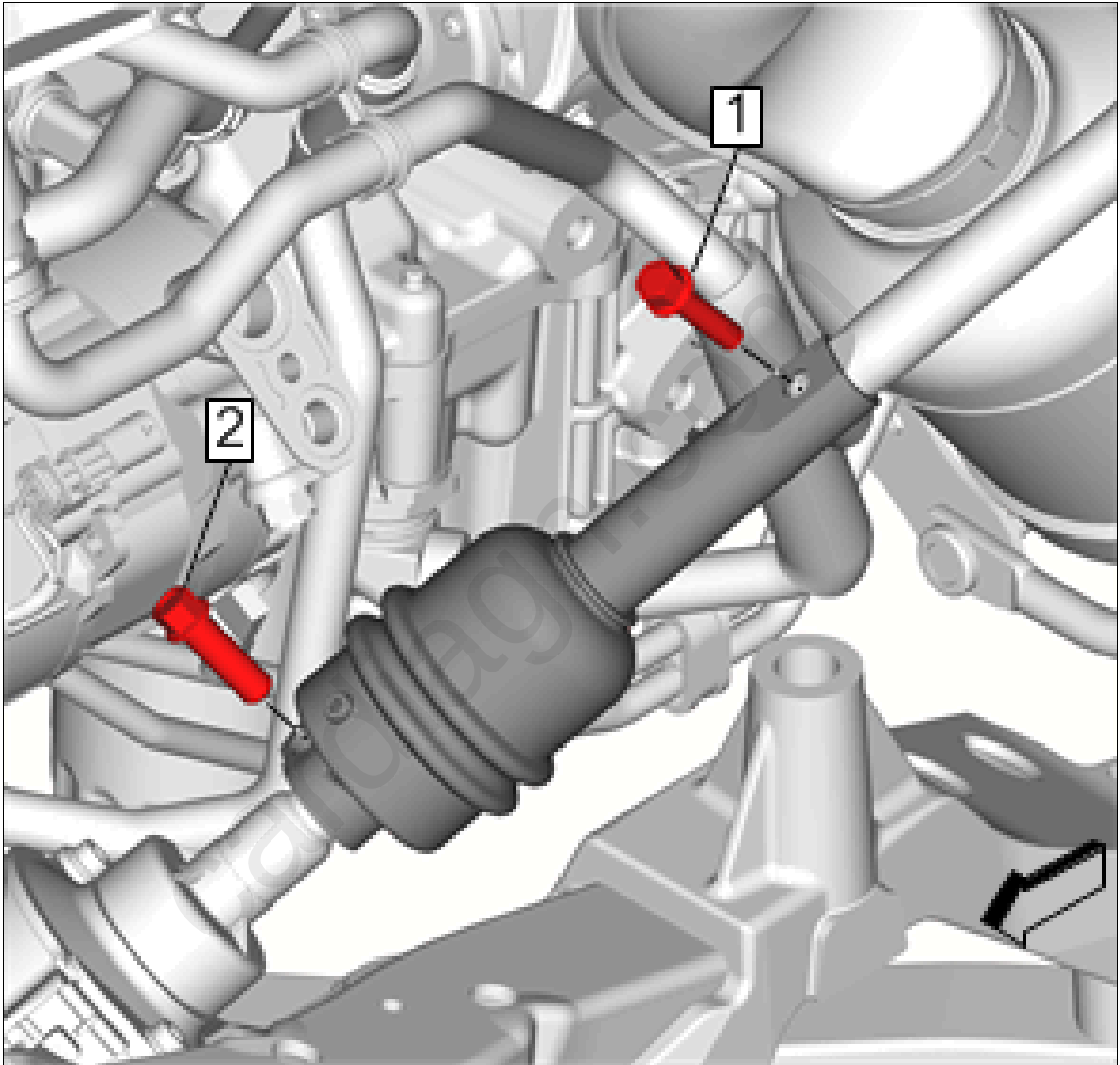
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Upper Intermediate Steering Shaft Replacement (Without Rolloboot, On/After VIN 1G1FB1RSXG0140963) Upper Intermediate Steering Shaft Replacement (With Rolloboot, Before VIN 1G1FB1RSXG0140963)	
1	Intermediate Steering Shaft Inner Boot Nut (3) <i>CAUTION:</i> <i>Refer to Fastener Caution .</i> Tighten 9 N.m (80 lb in)
2	Intermediate Steering Shaft Boot Procedure When installing the intermediate steering shaft inner boot, align the boot using the

alignment arrow on the outside of the boot and the alignment tab on the inside of the boot.

REPAIR INSTRUCTIONS > INTERMEDIATE STEERING SHAFT REPLACEMENT > REMOVAL PROCEDURE

Fig 1: Intermediate Steering Shaft Upper Bolt And Intermediate Steering Shaft Lower Bolt



Courtesy of GENERAL MOTORS COMPANY

1. Turn the steering wheel so the intermediate steering shaft upper bolt (1) and intermediate steering shaft lower bolt (2) are accessible from the engine compartment.
2. Remove Intermediate Steering Shaft Upper Bolt (1)
3. Remove Intermediate Steering Shaft Lower Bolt (2)
4. Turn the wheels of the vehicle back to the straight ahead position.

 CAUTION:

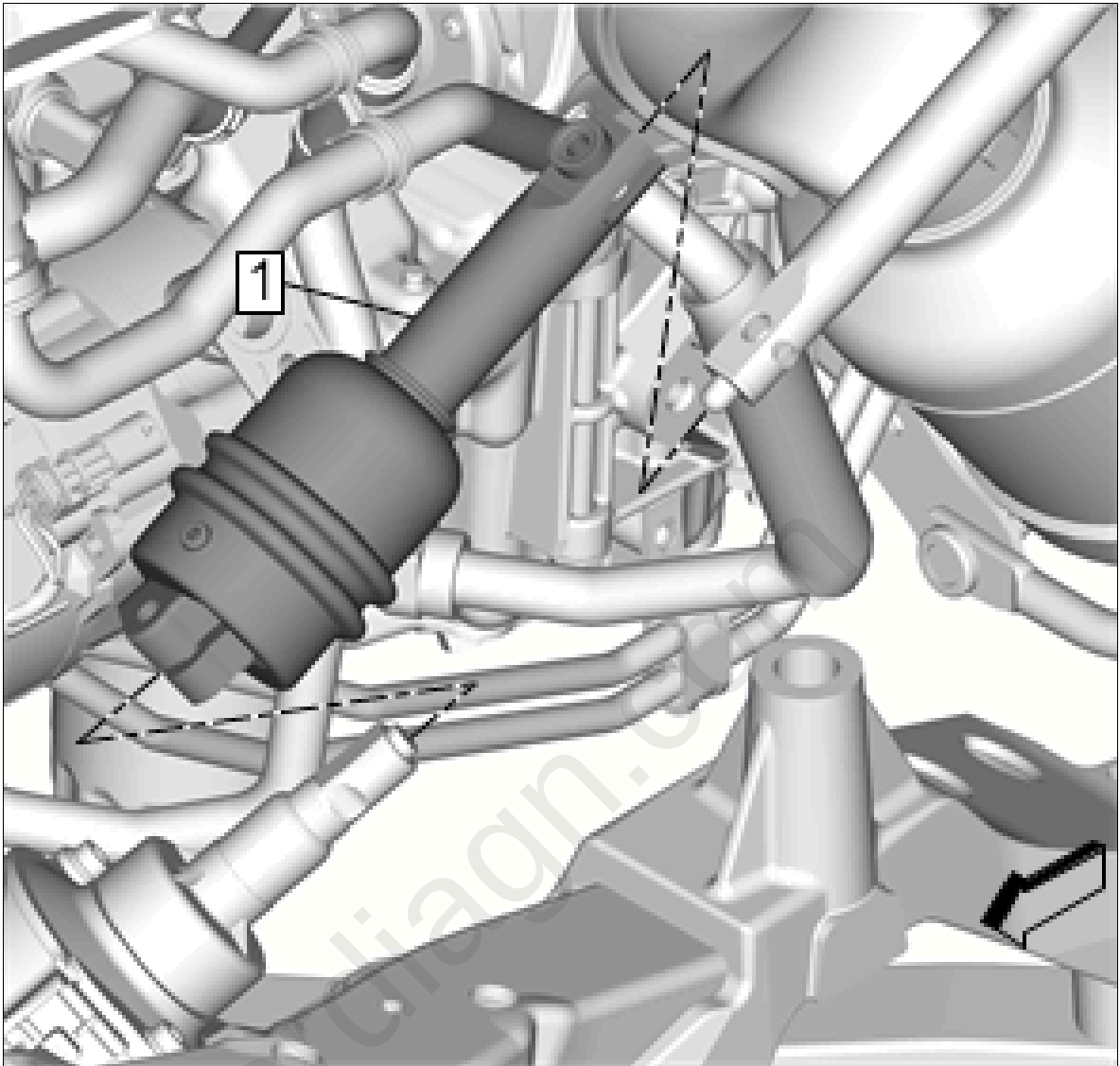
With wheels of the vehicle facing straight ahead, secure the steering wheel utilizing steering column anti-rotation pin, steering column lock, or a strap to prevent rotation. Locking of the steering column will prevent damage and a possible malfunction of the SIR system. The steering wheel must be secured in position before disconnecting the following components:

- 1. The steering column*
- 2. The intermediate shaft(s)*
- 3. 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.

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

Fig 2: Intermediate Steering Shaft

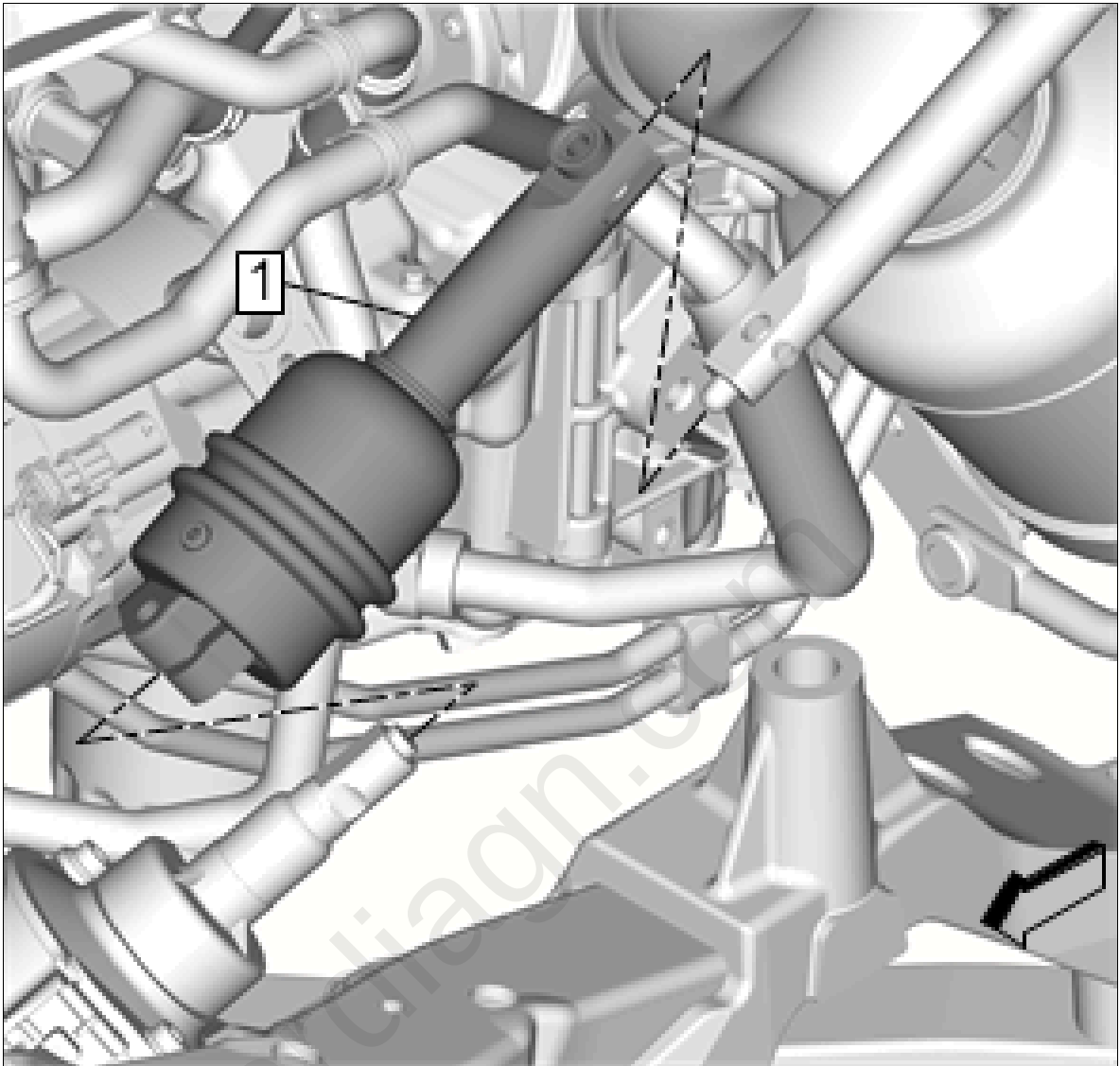


Courtesy of GENERAL MOTORS COMPANY

6. Remove the intermediate steering shaft (1) from the vehicle.

REPAIR INSTRUCTIONS > INTERMEDIATE STEERING SHAFT REPLACEMENT > INSTALLATION PROCEDURE

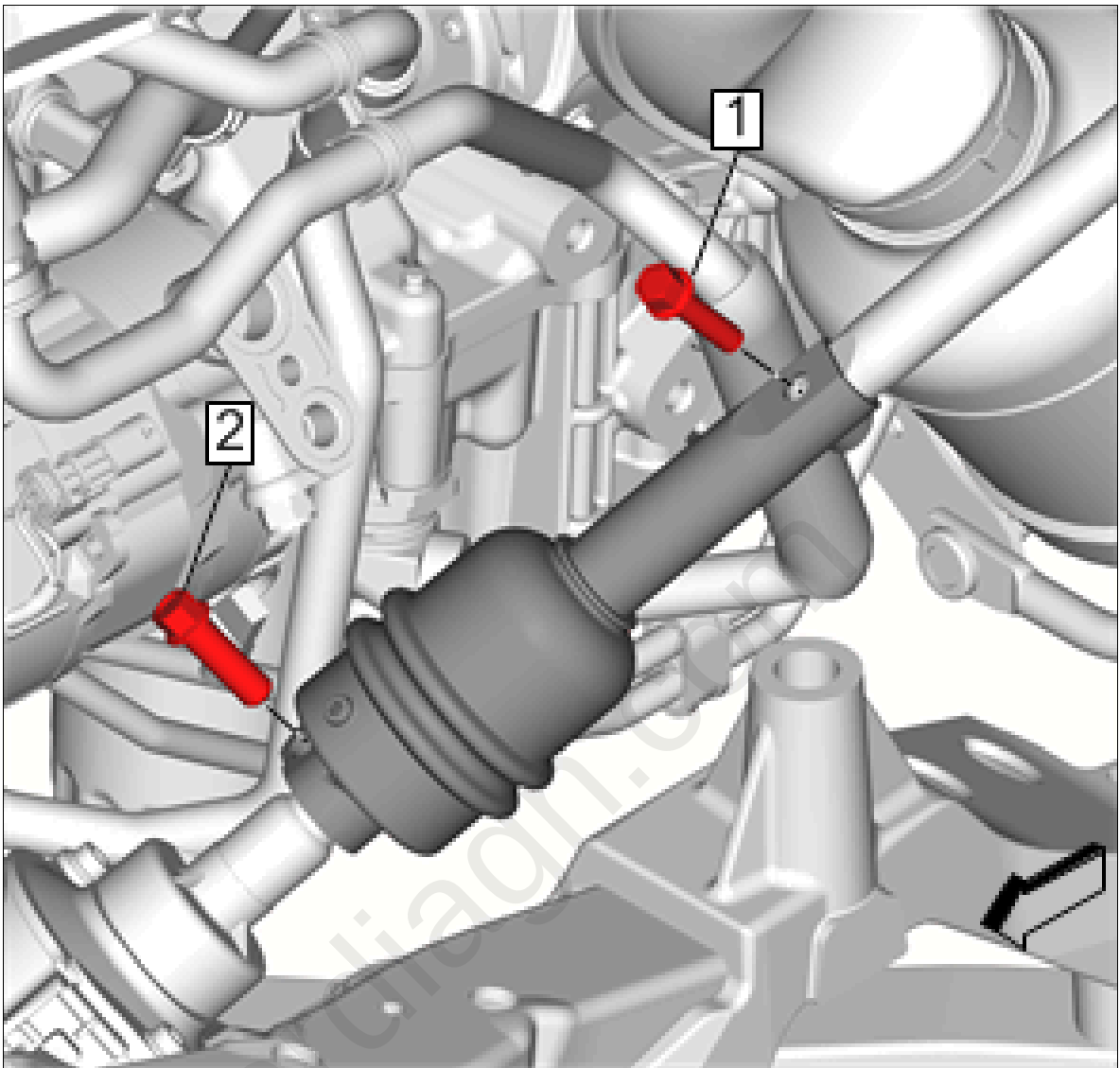
Fig 1: Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

1. Position the intermediate steering shaft (1) on the vehicle.

Fig 2: Intermediate Steering Shaft Upper Bolt And Intermediate Steering Shaft Lower Bolt



Courtesy of GENERAL MOTORS COMPANY

2. UNLOCK and turn the steering wheel so the intermediate steering shaft upper bolt (1) and intermediate steering shaft lower bolt (2) can be installed.

 **CAUTION:**

Refer to Fastener Caution .

3. Install Intermediate Steering Shaft Lower Bolt (2) and tighten to 50 N.m (37 lb ft)
 1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
 2. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers
4. Install Intermediate Steering Shaft Upper Bolt (1) and tighten to 36 N.m (27 lb ft)

1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
2. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers
5. Inspect the Cardan joint boot for proper positioning.

The boot MUST be pulled downwards to the original position, or such that the end of the boot is directly adjacent to the intermediate steering shaft lower bolt.

REPAIR INSTRUCTIONS > STEERING COLUMN ACCIDENT DAMAGE INSPECTION > INSPECTION PROCEDURE

1. Remove the turn signal switch bracket. Refer to Turn Signal Switch Bracket Replacement .



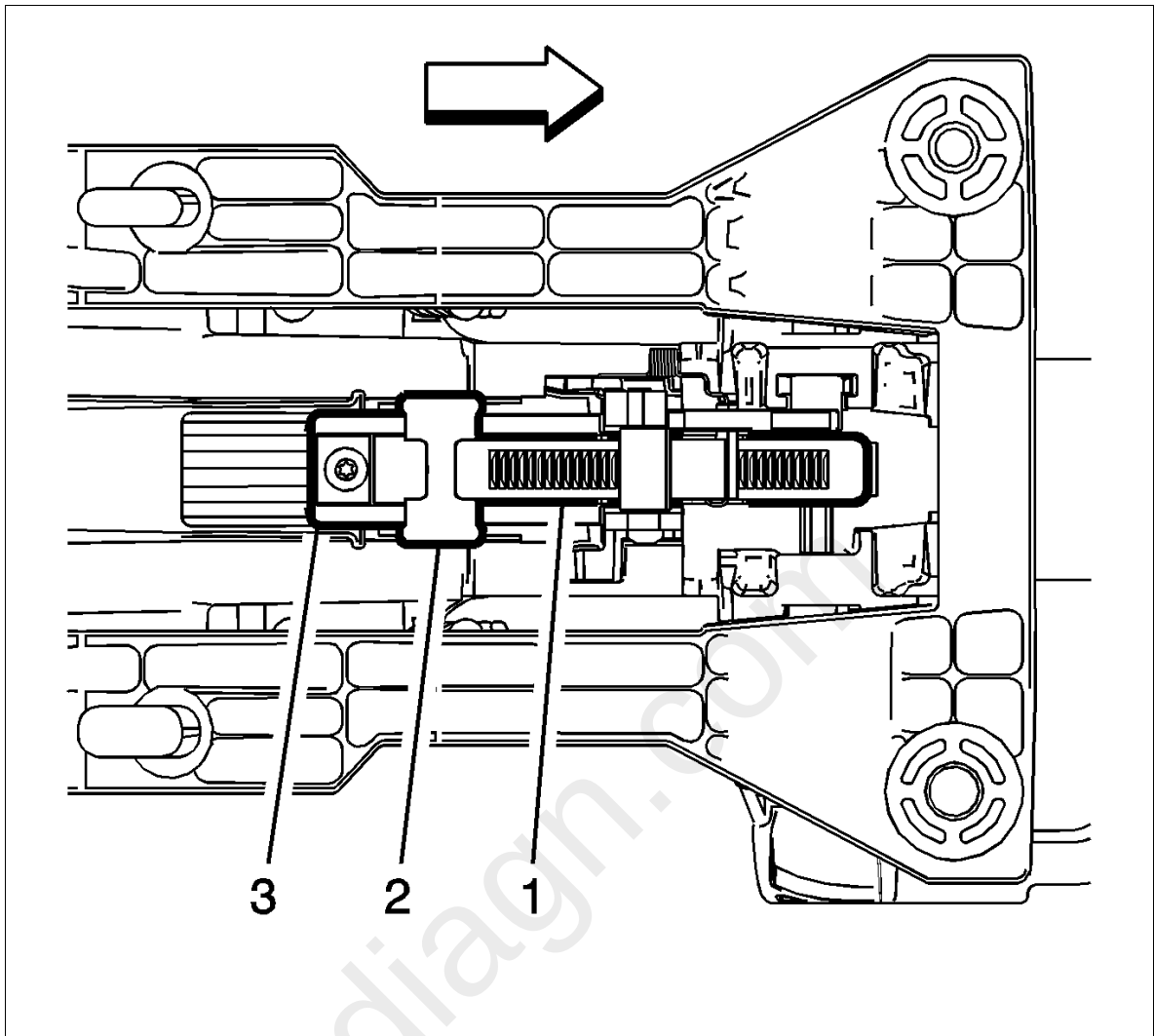
CAUTION:

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

1. *Frame damage*
2. *Major body damage*
3. *Sheet metal damage*
4. *If the steering column has been impacted*
5. *If the supplemental inflatable restraints system was deployed*

2. Remove the steering column from the vehicle. Refer to Steering Column Replacement .
3. Rotate the steering column shaft. Verify the shaft turns freely and without interference.

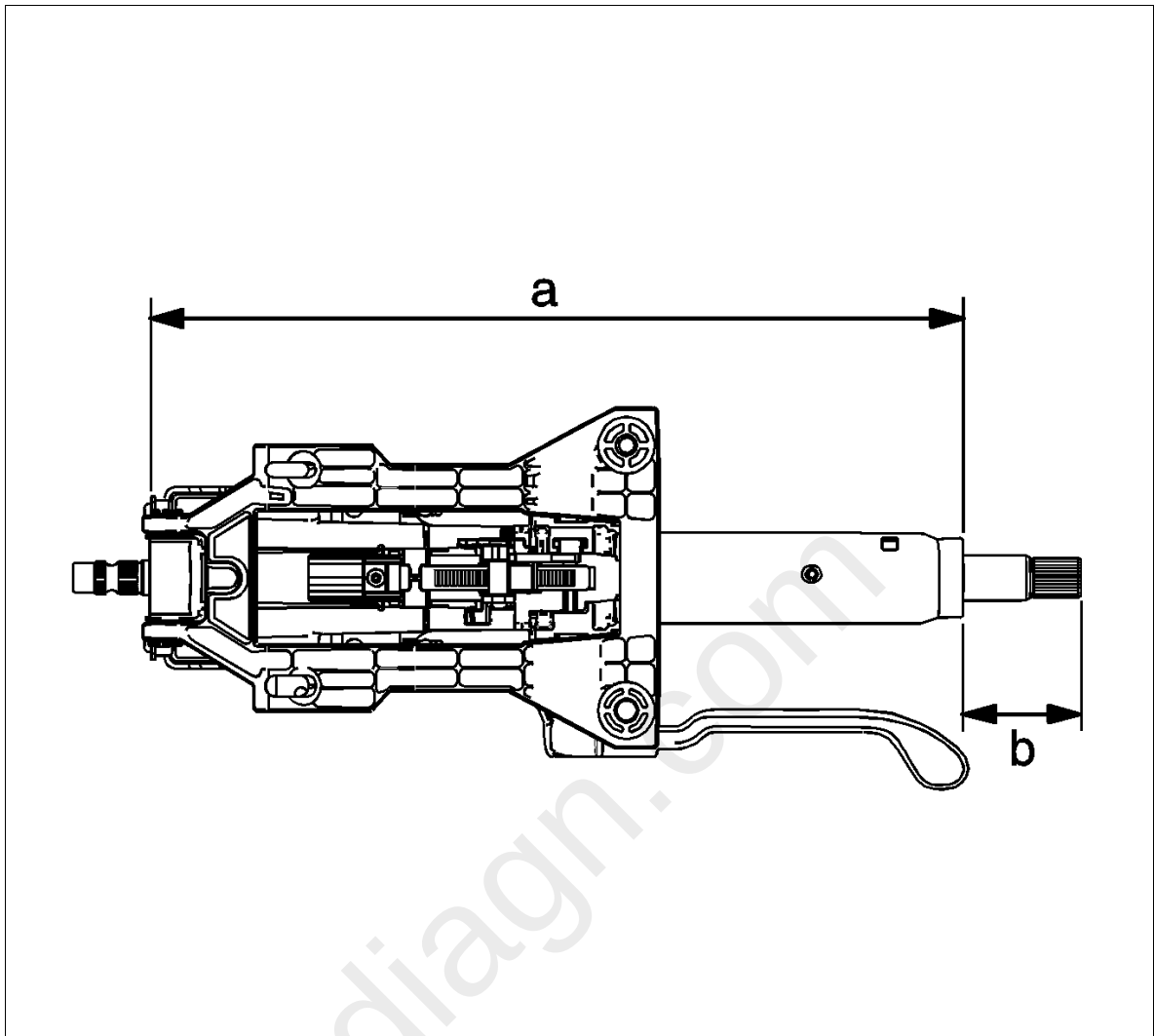
Fig 1: E/A strap



Courtesy of GENERAL MOTORS COMPANY

4. Verify the there is no visual damage to the E/A strap (1) and that the E/A strap is not unrolled. To verify the strap in not unrolled, confirm the bumper (2) is seated against the retainer (3).

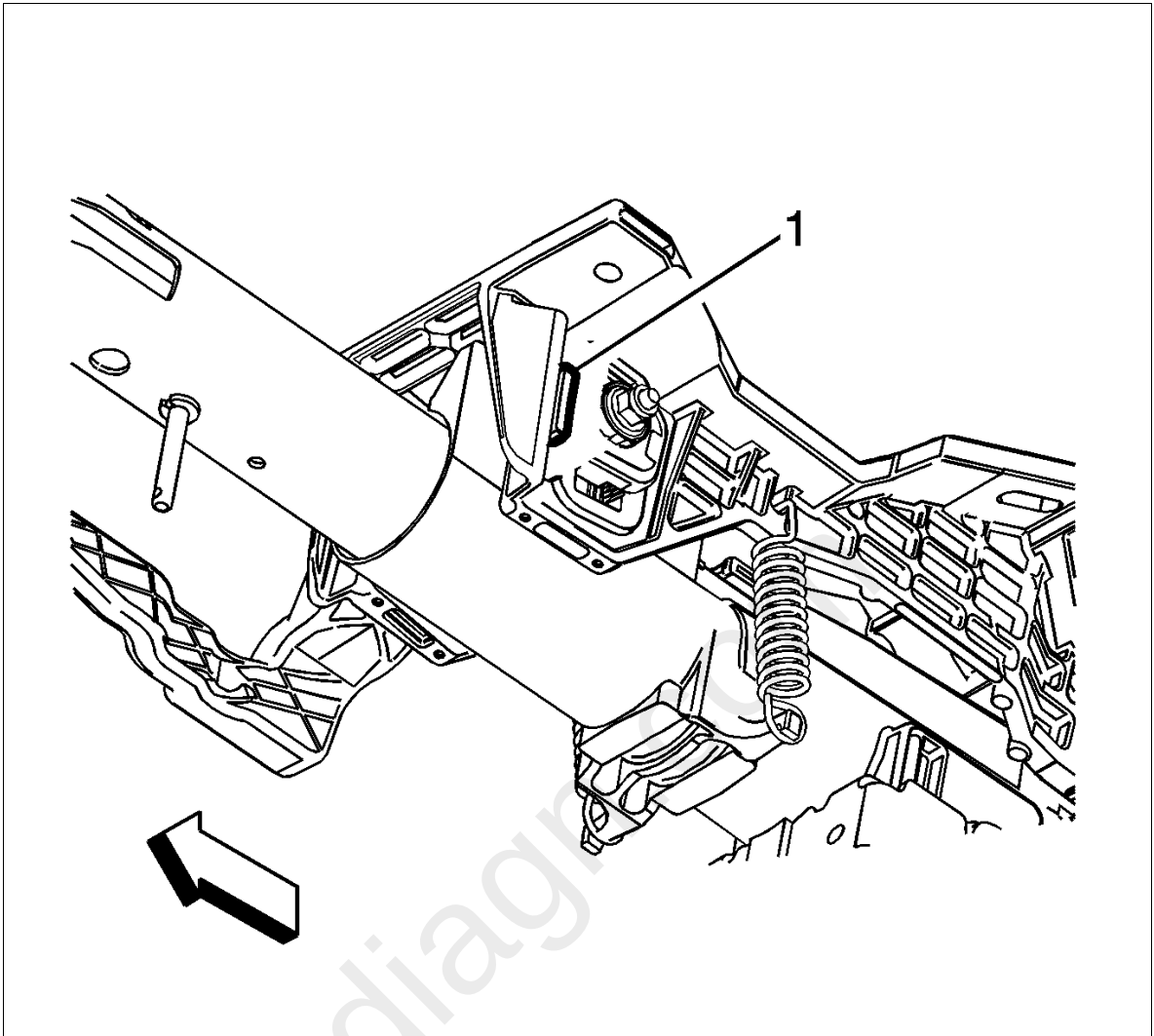
Fig 2: Upper Shaft & Lower Bearing Adapter Lengths



Courtesy of GENERAL MOTORS COMPANY

5. Measure the length of the upper shaft (b) from the end of the upper jacket to the tip. The length of the upper shaft must be greater than 60 mm (2.36 in).
6. Unlock the rake lever and telescope the upper jacket to the full telescope in position. Measure the length of the upper and lower jacket assembly including the lower bearing adapter (a). The length of the upper and lower jacket assembly must be greater than 419 mm (16.5 in).

Fig 3: Left And Right Hand Rake Guides

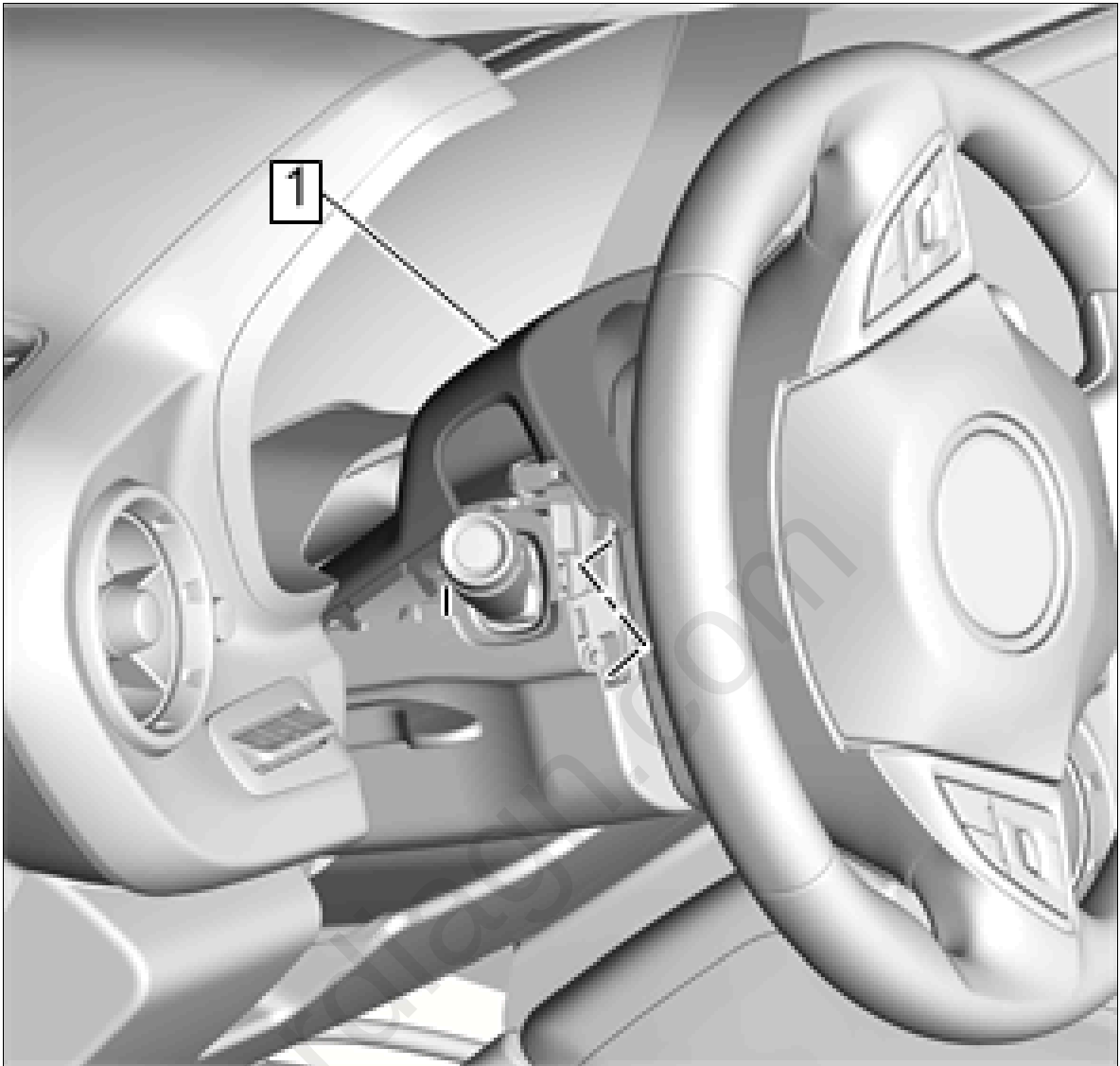


Courtesy of GENERAL MOTORS COMPANY

7. Verify that both the left and right hand rake guides (1) are not fractured.
8. If the steering column does not meet the specifications, the steering column is damaged. Discard the damaged steering column. Install a NEW steering column.
9. If the steering column meets the specifications, install the steering column. Refer to Steering Column Replacement .
10. Install the turn signal switch bracket. Refer to Turn Signal Switch Bracket Replacement .

REPAIR INSTRUCTIONS > STEERING COLUMN TRIM COVER REPLACEMENT > REMOVAL PROCEDURE

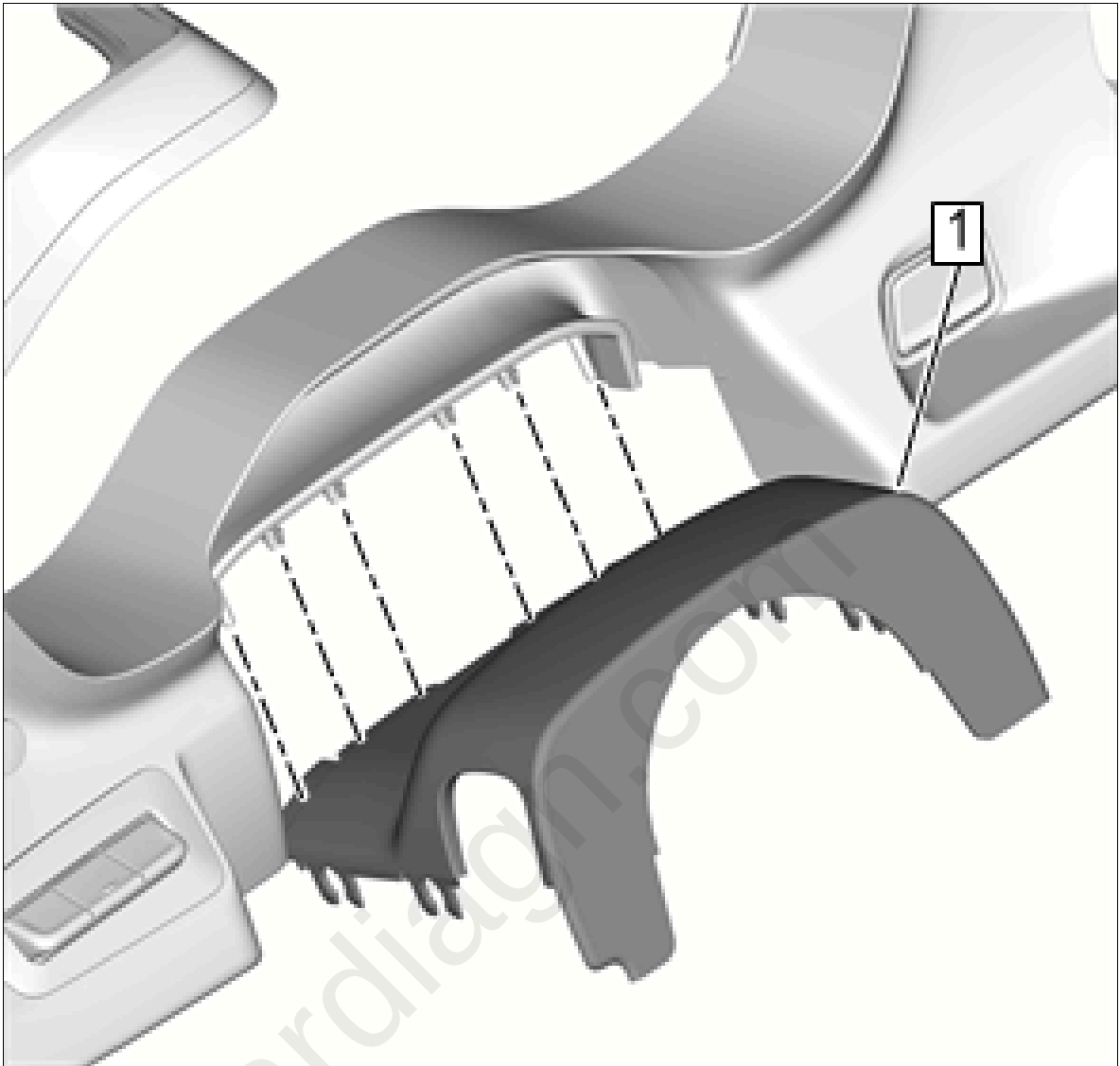
Fig 1: Steering Column Trim Cover



Courtesy of GENERAL MOTORS COMPANY

1. Use a flat bladed plastic trim tool.
2. Turn the steering wheel to the left and right in order to release the tabs securing the upper trim cover (1) to the lower trim cover.
3. Release the retainers along the sides of the upper trim cover (1) securing it to the lower trim cover.

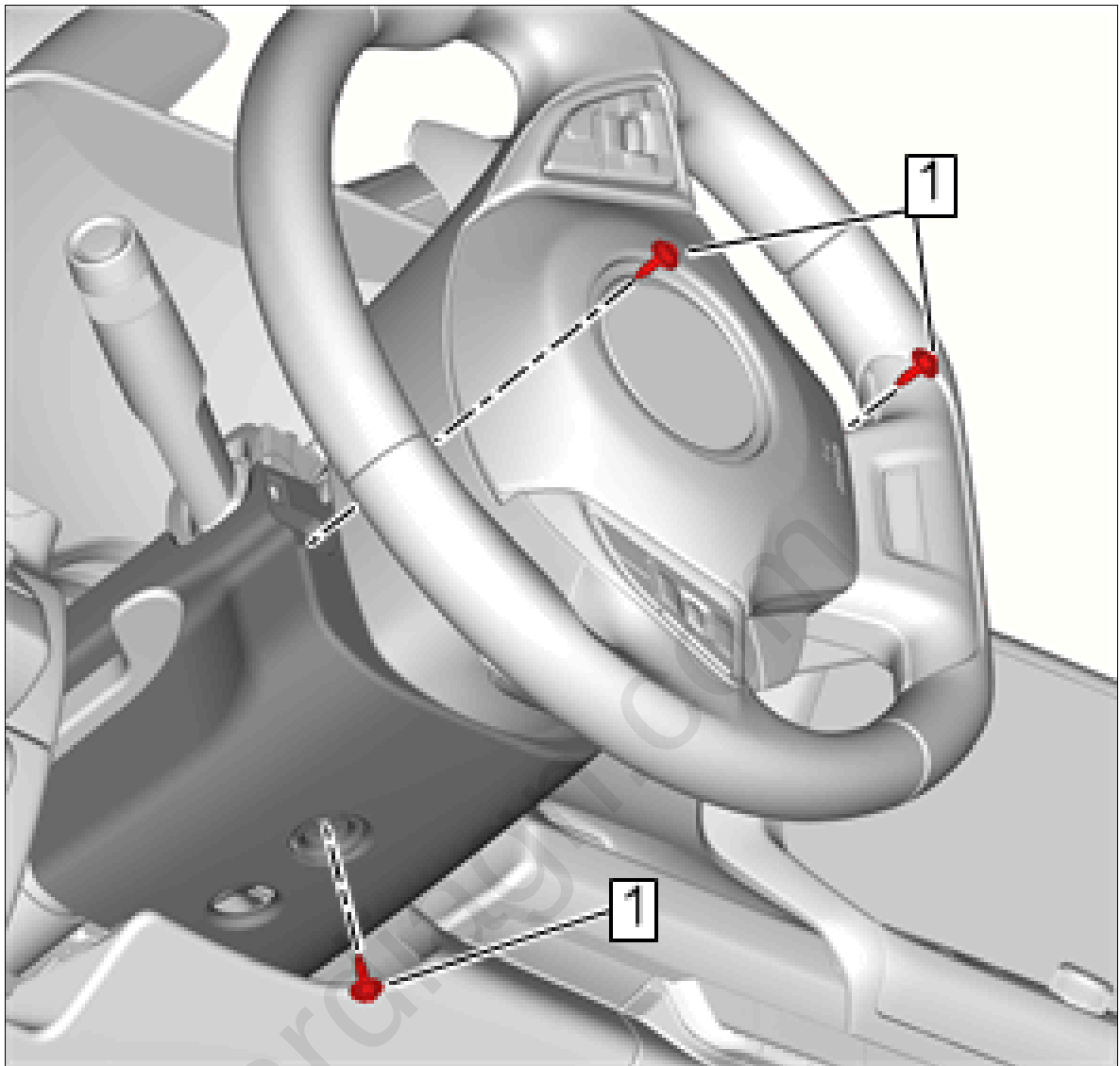
Fig 2: Upper Trim Cover



Courtesy of GENERAL MOTORS COMPANY

4. Reposition the upper trim cover (1) to access and release the tabs on the bottom side of the steering column opening closeout.

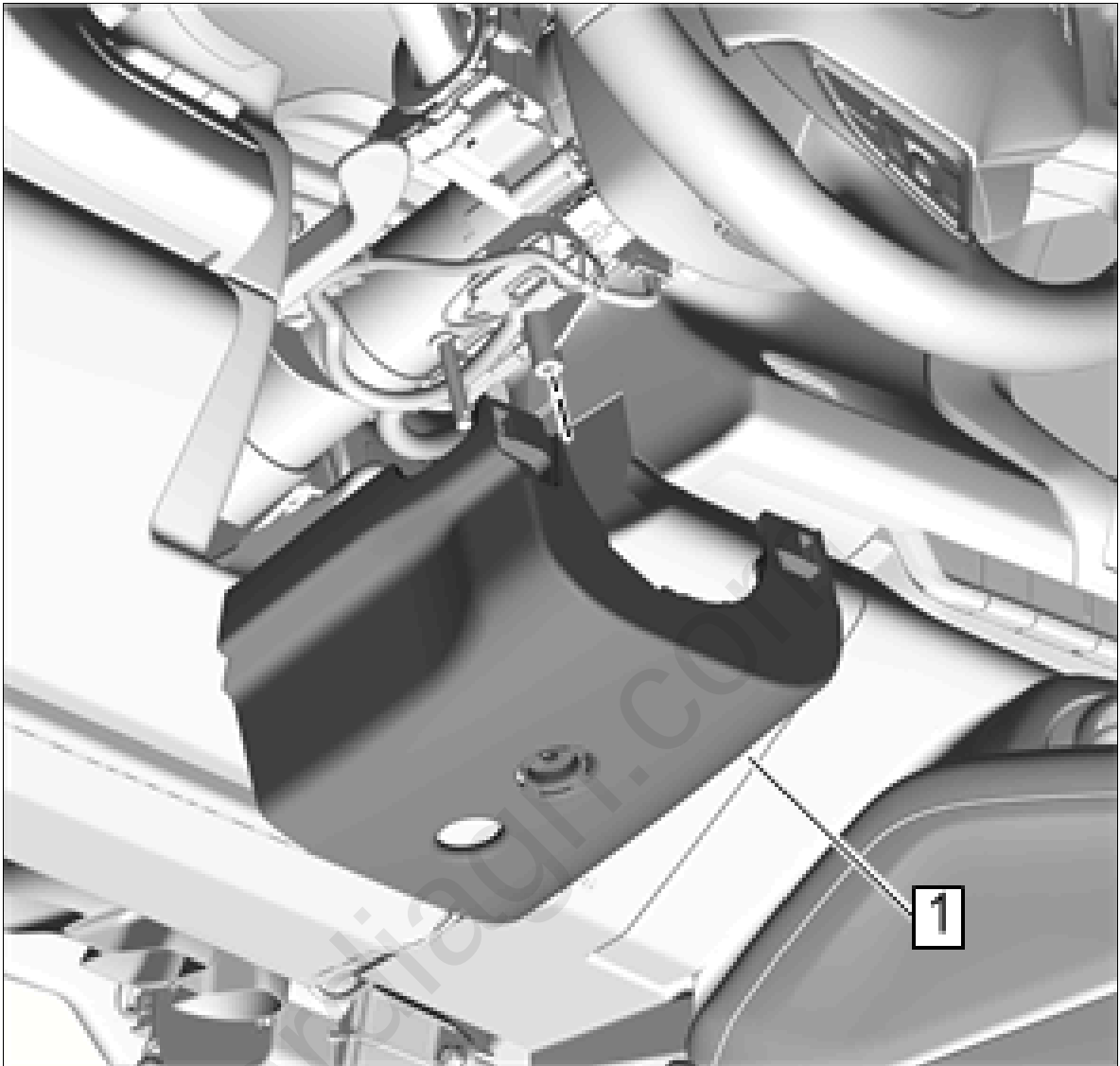
Fig 3: Instrument Panel Steering Column Lower Trim Cover Bolt



Courtesy of GENERAL MOTORS COMPANY

5. Remove Instrument Panel Steering Column Lower Trim Cover Bolt (1) (Qty: 3)

Fig 4: Steering Column Lower Trim Cover

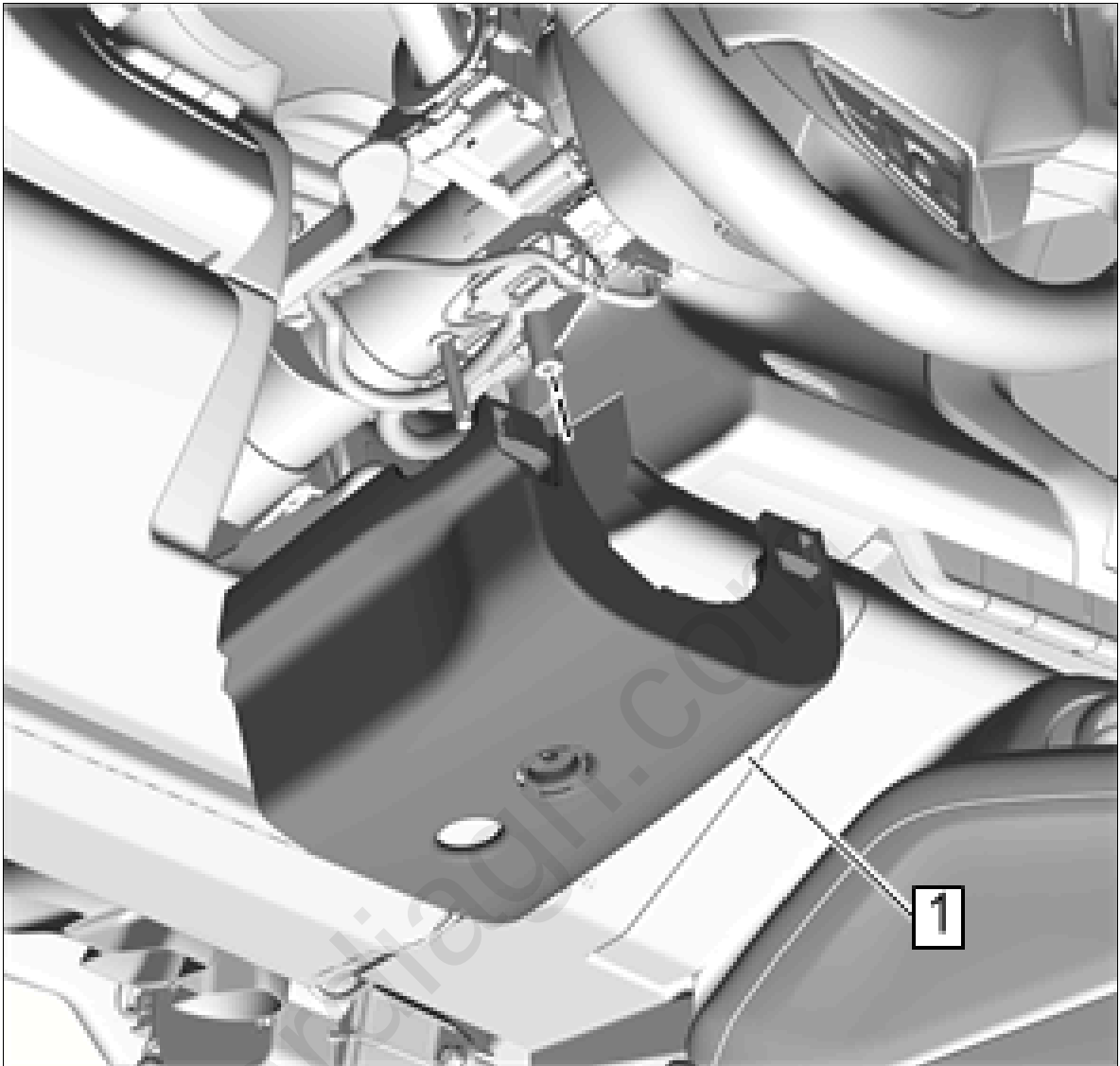


Courtesy of GENERAL MOTORS COMPANY

6. Remove Steering Column Lower Trim Cover (1)

**REPAIR INSTRUCTIONS > STEERING COLUMN TRIM COVER REPLACEMENT >
INSTALLATION PROCEDURE**

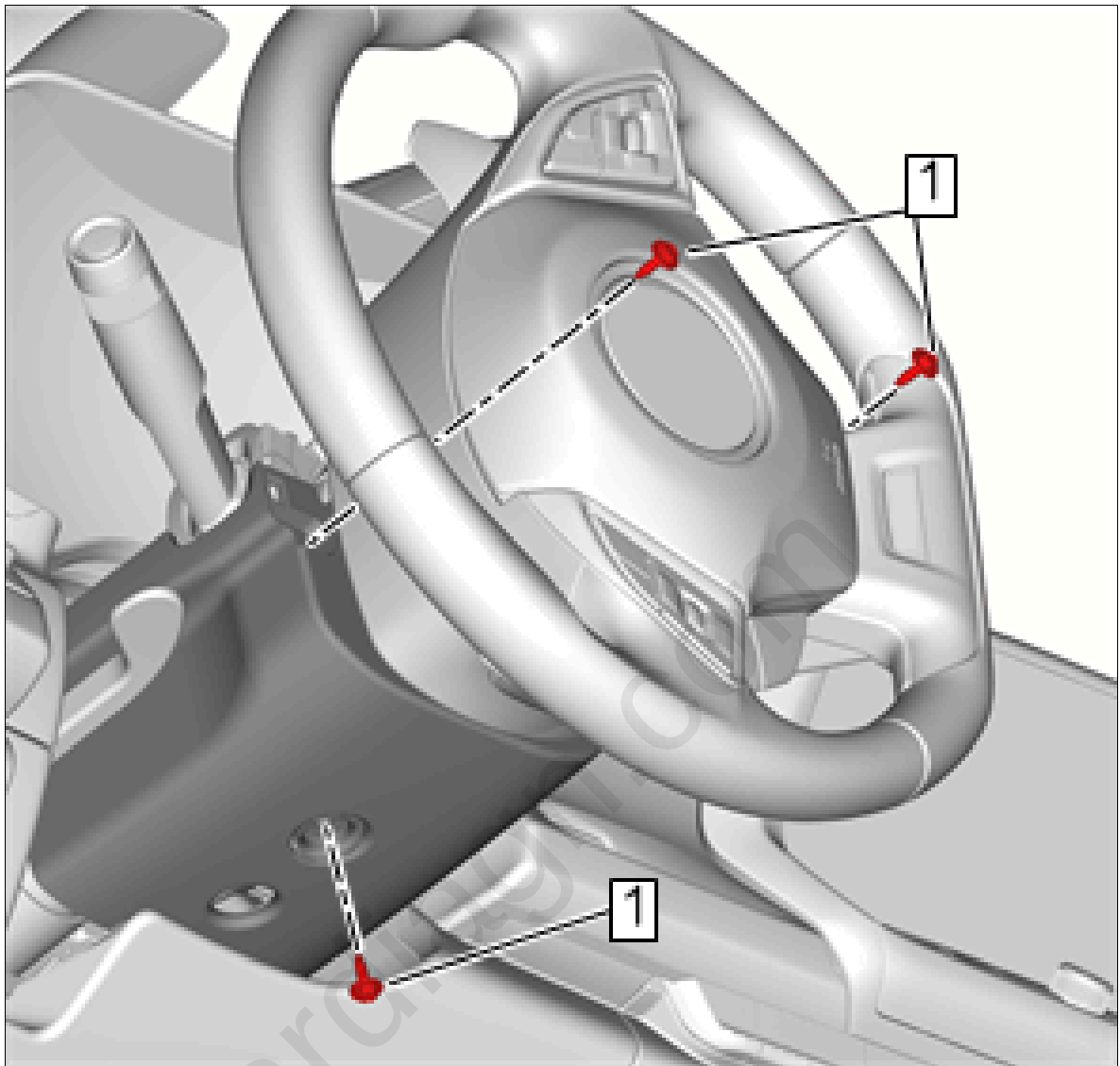
Fig 1: Steering Column Lower Trim Cover



Courtesy of GENERAL MOTORS COMPANY

1. Install Steering Column Lower Trim Cover (1)

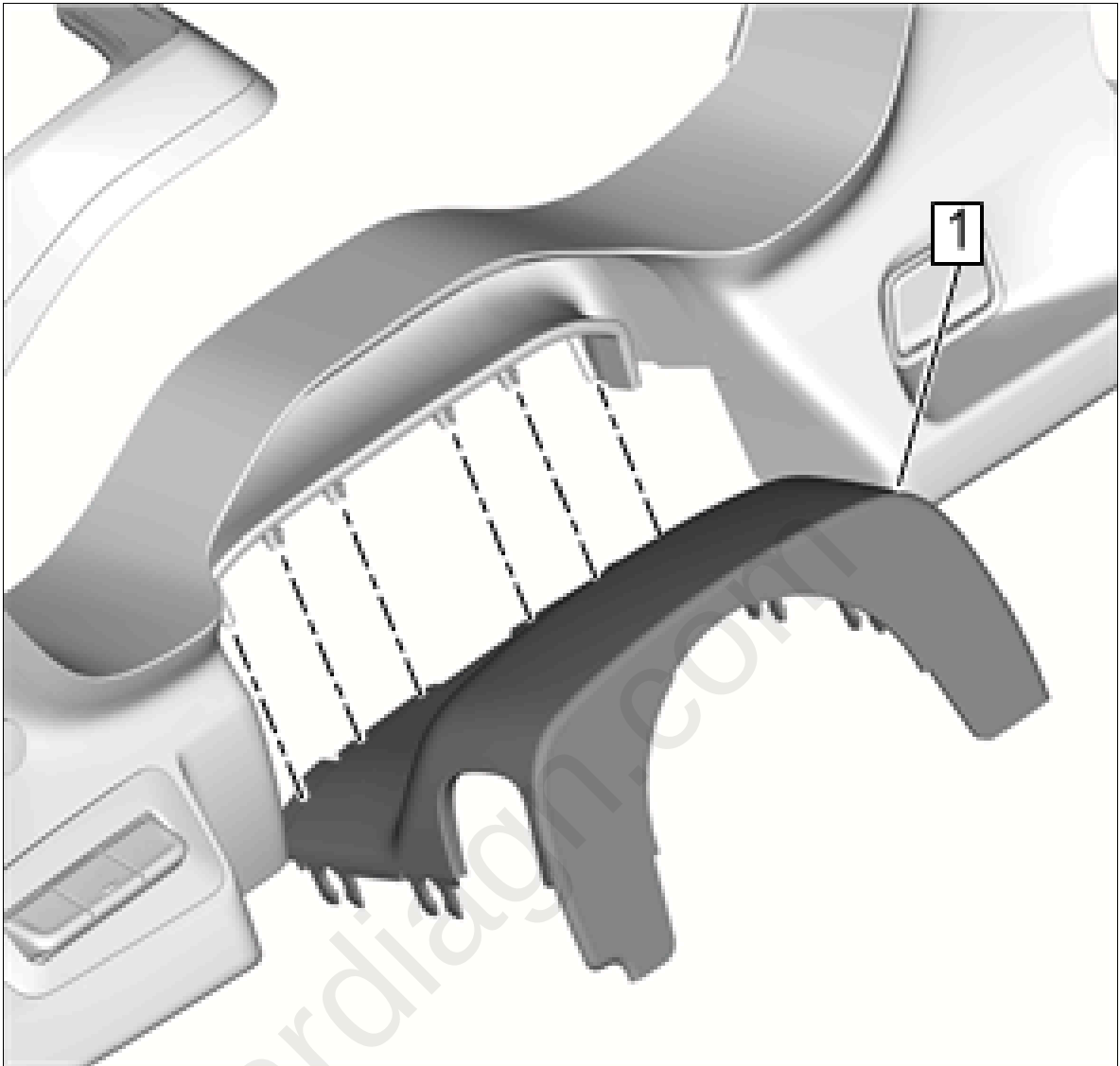
Fig 2: Instrument Panel Steering Column Lower Trim Cover Bolt



Courtesy of GENERAL MOTORS COMPANY

2. Install Instrument Panel Steering Column Lower Trim Cover Bolt (1) (Qty: 3) and tighten to 2.5 N.m (22 lb in)

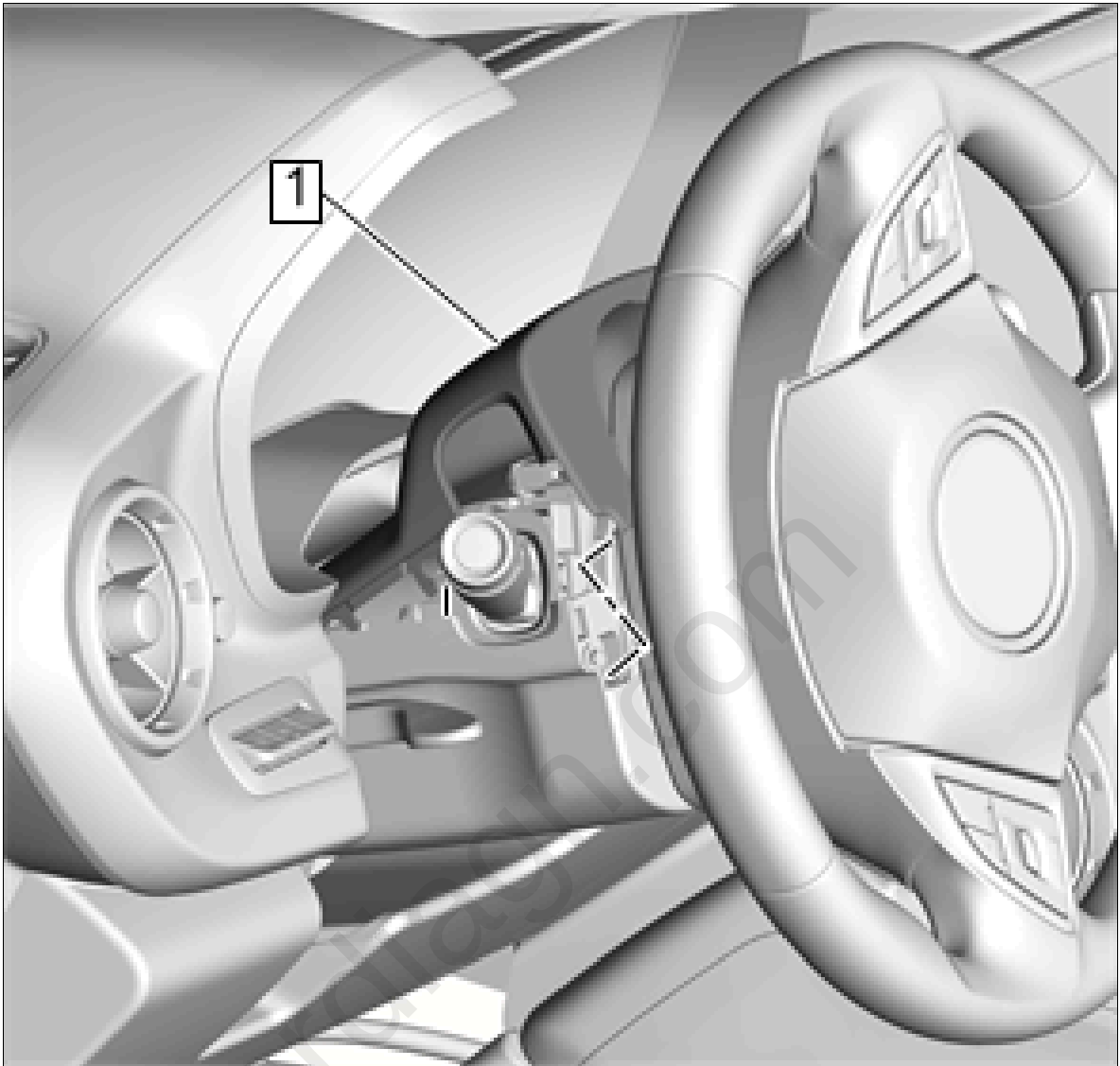
Fig 3: Upper Trim Cover



Courtesy of GENERAL MOTORS COMPANY

3. Snap the upper trim cover (1) to the steering column opening closeout.

Fig 4: Steering Column Upper Trim Cover

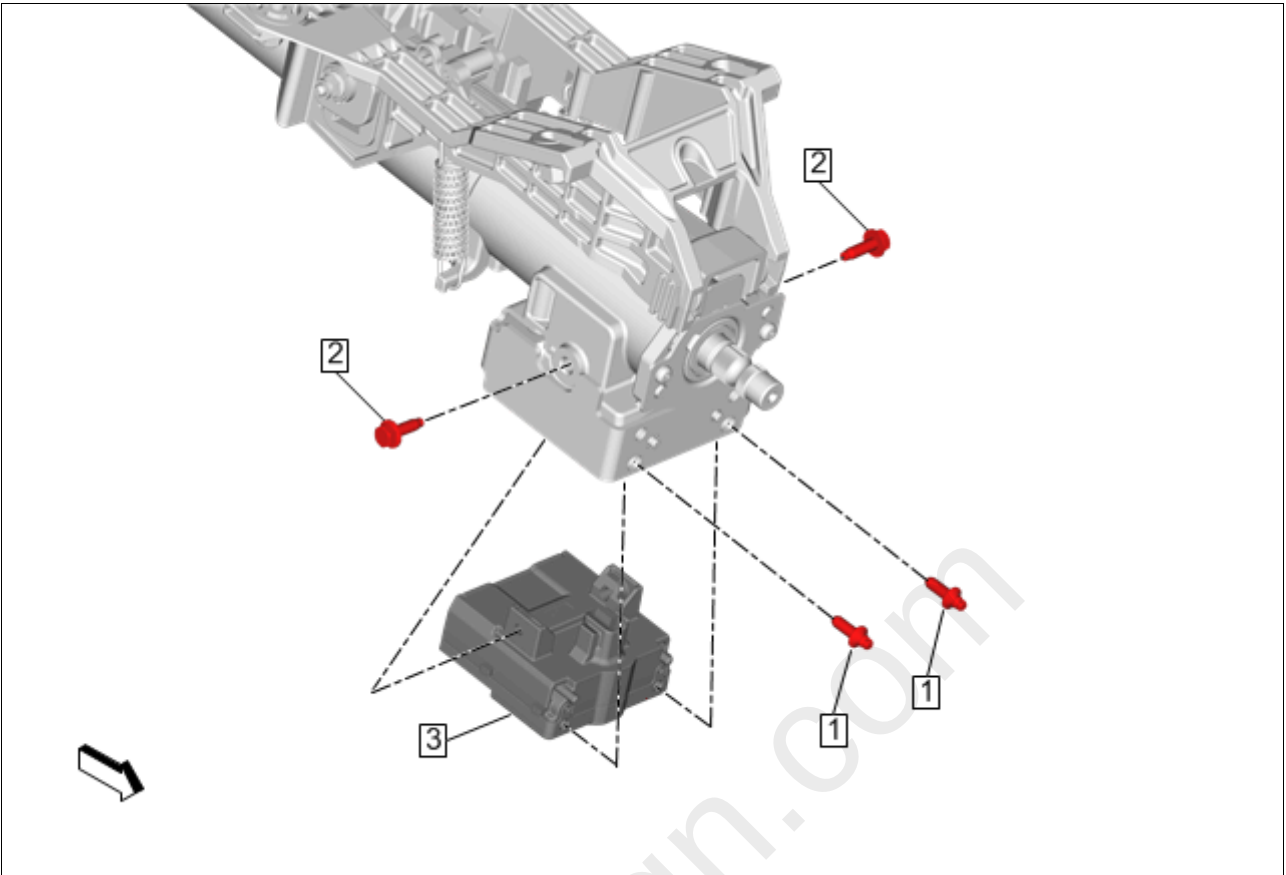


Courtesy of GENERAL MOTORS COMPANY

4. Install Steering Column Upper Trim Cover (1)

REPAIR INSTRUCTIONS > STEERING COLUMN LOCK CONTROL MODULE REPLACEMENT

Fig 1: Steering Column Lock Control Module



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Ensure the steering wheel and the front wheels are in the straight ahead position. 2. Floor Front Air Outlet Duct Replacement - Left Side 3. 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 ACCESSORY mode and unlock the steering column for 5 minutes. 4. Turn the steering wheel to verify the steering column is NOT locked. 5. Disconnect the steering column lock control module electrical connectors. 6. 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.	
1	Steering Column Lock Control Module Bolt (Qty: 2)

CAUTION:

Refer to Fastener Caution .

Procedure

1. Remove the OLD steering column lock control module bolts.

DISCARD the bolts.

2. Install the NEW steering column lock control module bolts.

Tighten the bolts until the bolt heads break off.



NOTE:

Start ALL bolts by hand before breaking the bolt heads off or misalignment of the steering column lock control module may occur.

2

Steering Column Lock Control Module Bolt (Qty: 2)

Tighten

9 N.m (80 lb in)

3

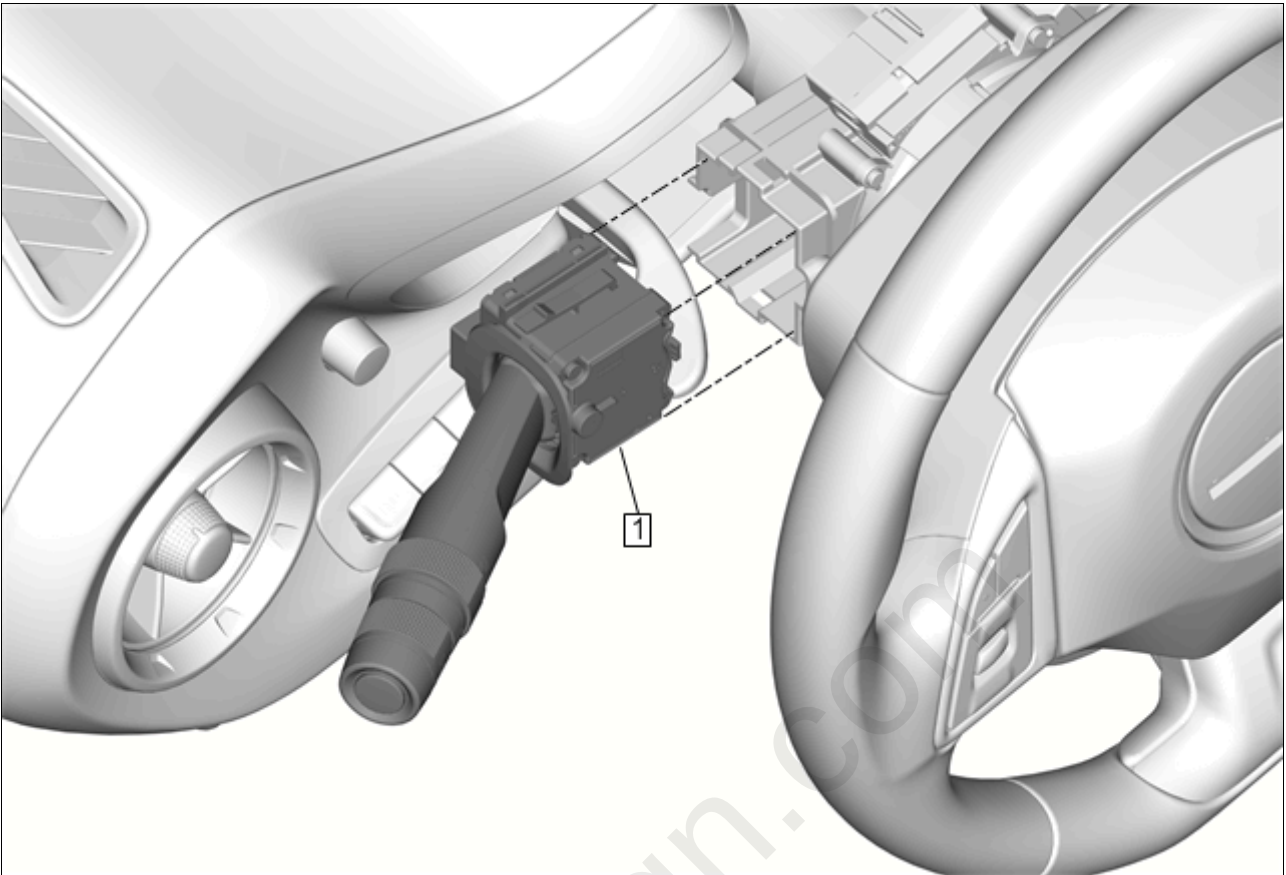
Steering Column Lock Control Module

Procedure

Program the steering column lock control module. Control Module References

REPAIR INSTRUCTIONS > TURN SIGNAL SWITCH REPLACEMENT

Fig 1: Turn Signal Switch

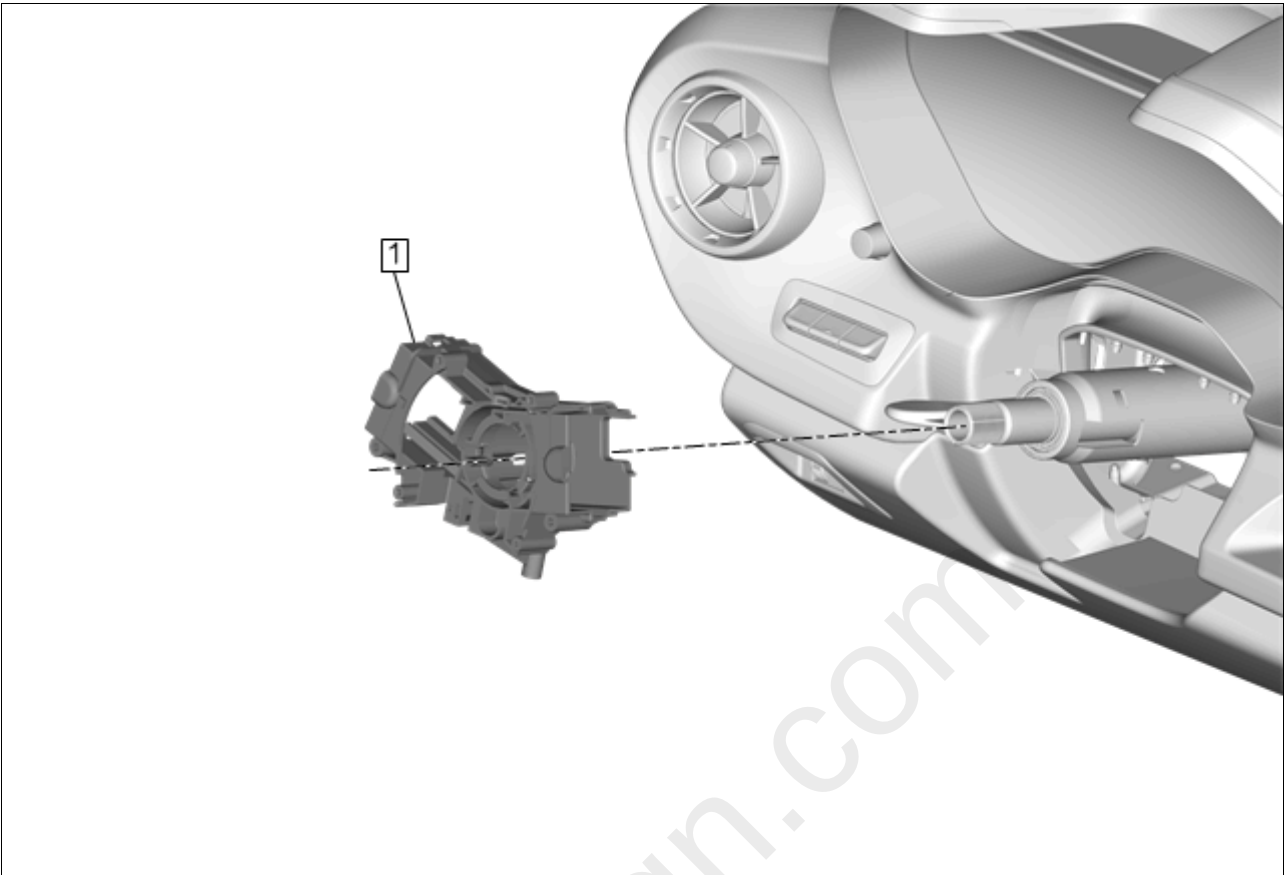


Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
1. Remove the steering column lower trim cover. Steering Column Trim Cover Replacement	
2. Reposition the steering column upper trim cover as necessary.	
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.

REPAIR INSTRUCTIONS > TURN SIGNAL SWITCH BRACKET REPLACEMENT

Fig 1: Turn Signal Switch Bracket

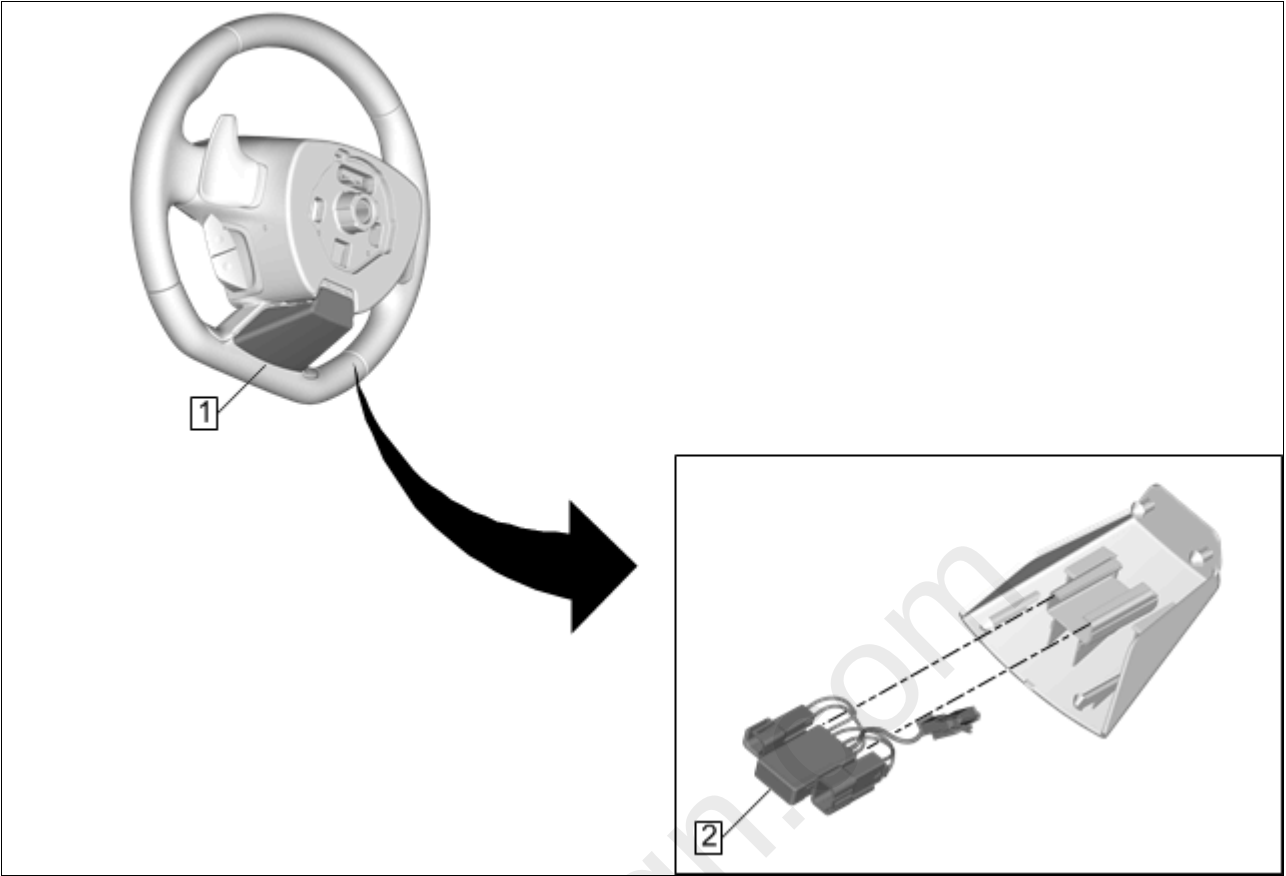


Courtesy of GENERAL MOTORS COMPANY

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

REPAIR INSTRUCTIONS > STEERING WHEEL HEAT CONTROL MODULE REPLACEMENT

Fig 1: Steering Wheel Heat Control Module

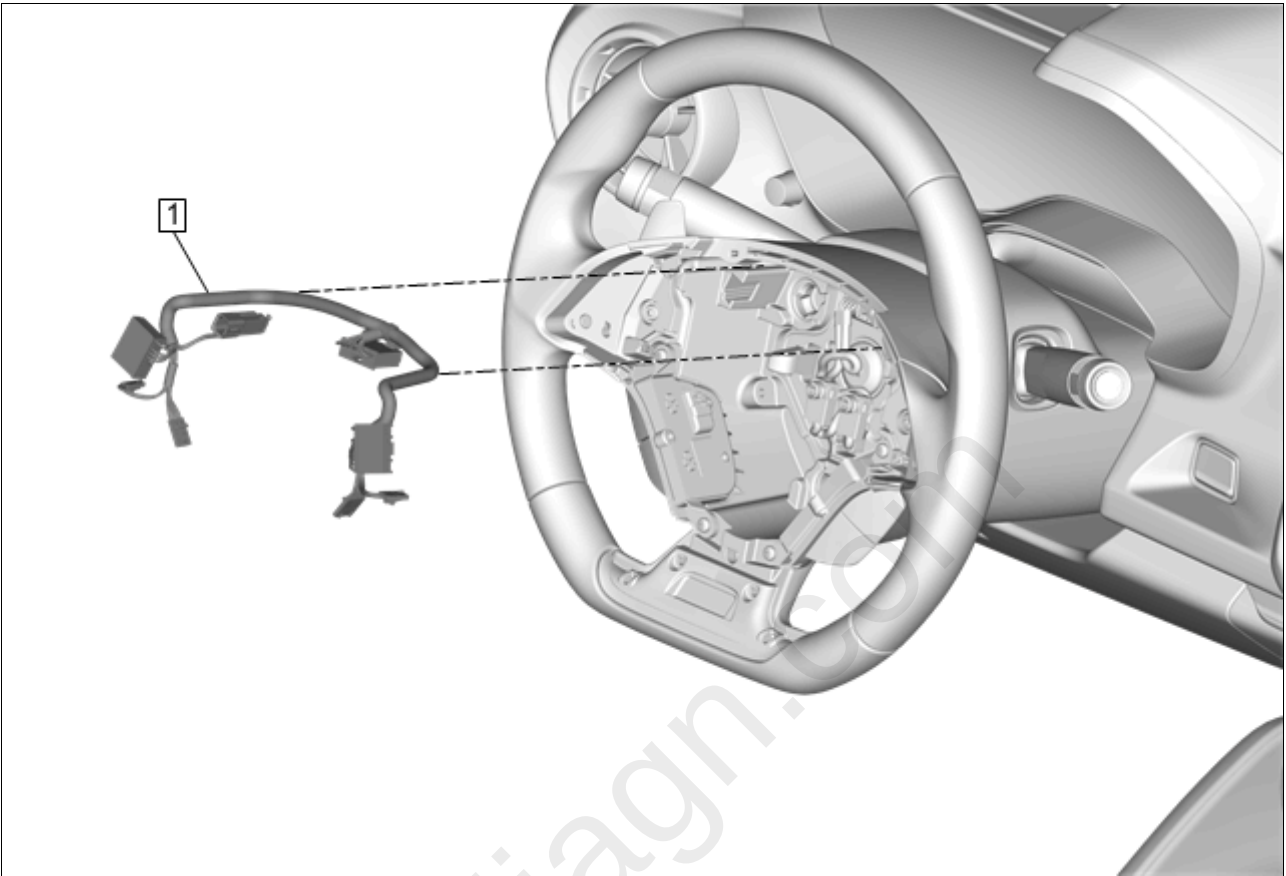


Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Steering Wheel Heat Control Module Cover Procedure 1. Release and lower the steering wheel heat control module cover to access the electrical connectors. 2. Disconnect the electrical connectors.
2	Steering Wheel Heat Control Module Procedure 1. Release the steering wheel heat control module electrical connectors from the steering wheel heat control module cover. 2. Remove the steering wheel heat control module from the steering wheel heat control module cover.

REPAIR INSTRUCTIONS > STEERING WHEEL HORN SWITCH HARNESS
REPLACEMENT (WITHOUT UVD)

Fig 1: Steering Wheel Horn Switch Harness (Without UVD)

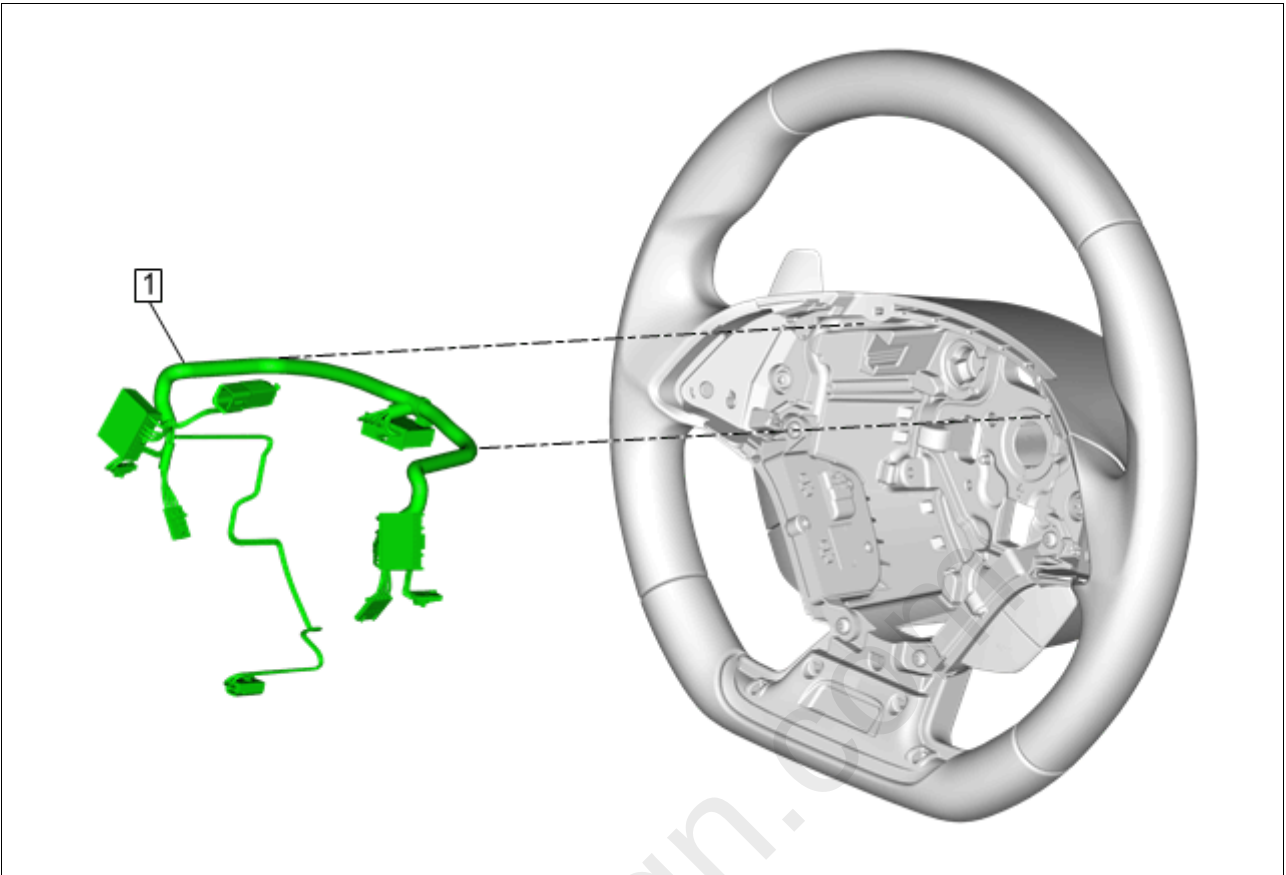


Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Steering Wheel Spoke Cover Replacement	
1	Steering Wheel Horn Switch Harness Procedure 1. Disconnect the electrical connectors. 2. Remove the steering wheel horn switch harness from the steering wheel.

REPAIR INSTRUCTIONS > STEERING WHEEL HORN SWITCH HARNESS
REPLACEMENT (WITH UVD)

Fig 1: Steering Wheel Horn Switch Harness (With UVD)

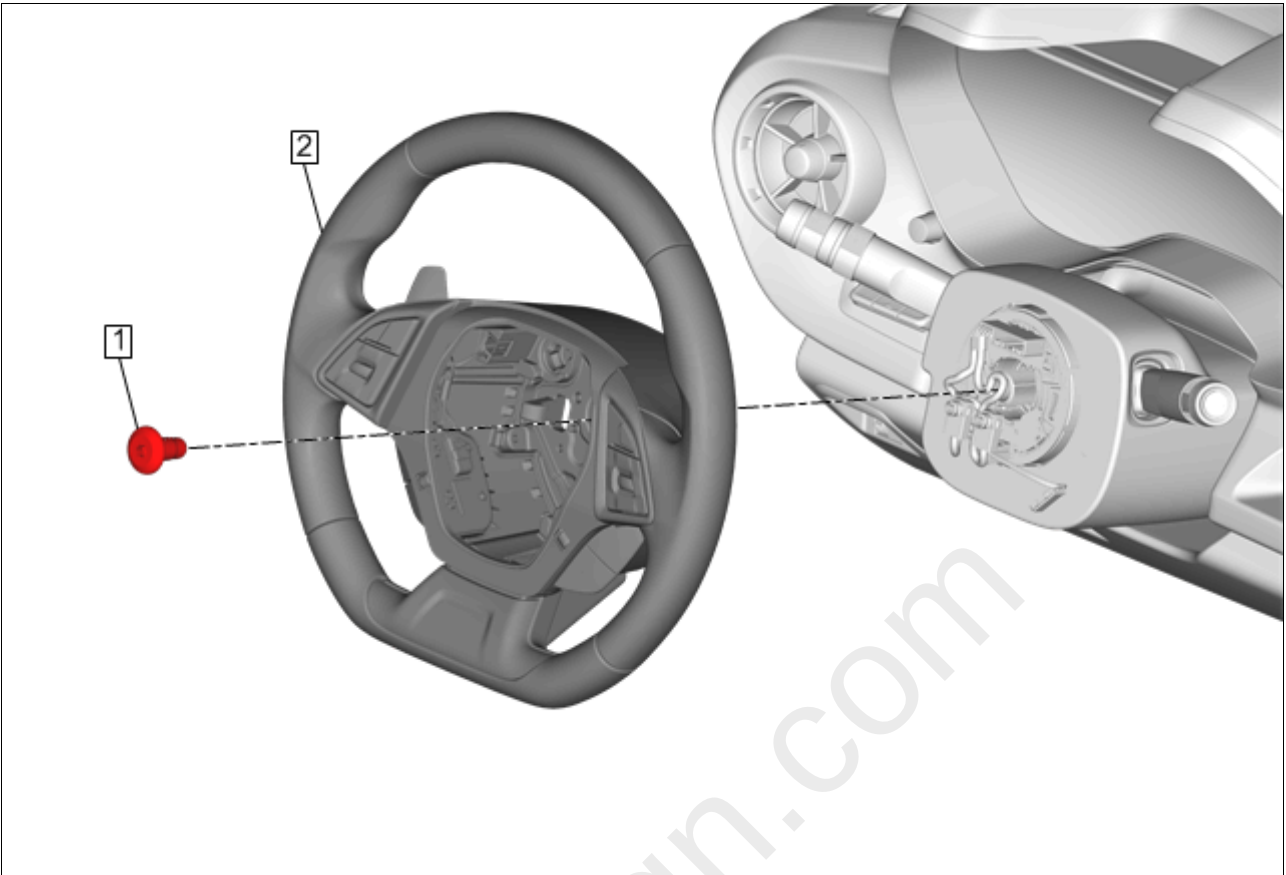


Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	
1. Steering Wheel Spoke Cover Replacement	
2. Steering Wheel Heat Control Module Replacement	
1	Steering Wheel Horn Switch Harness Procedure 1. Disconnect the electrical connectors. 2. Remove the steering wheel horn switch harness from the steering wheel.

REPAIR INSTRUCTIONS > STEERING WHEEL REPLACEMENT

Fig 1: Steering Wheel



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Steering Wheel Airbag Replacement	
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. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers Tighten 45 N.m (33 lb ft)

Steering Wheel

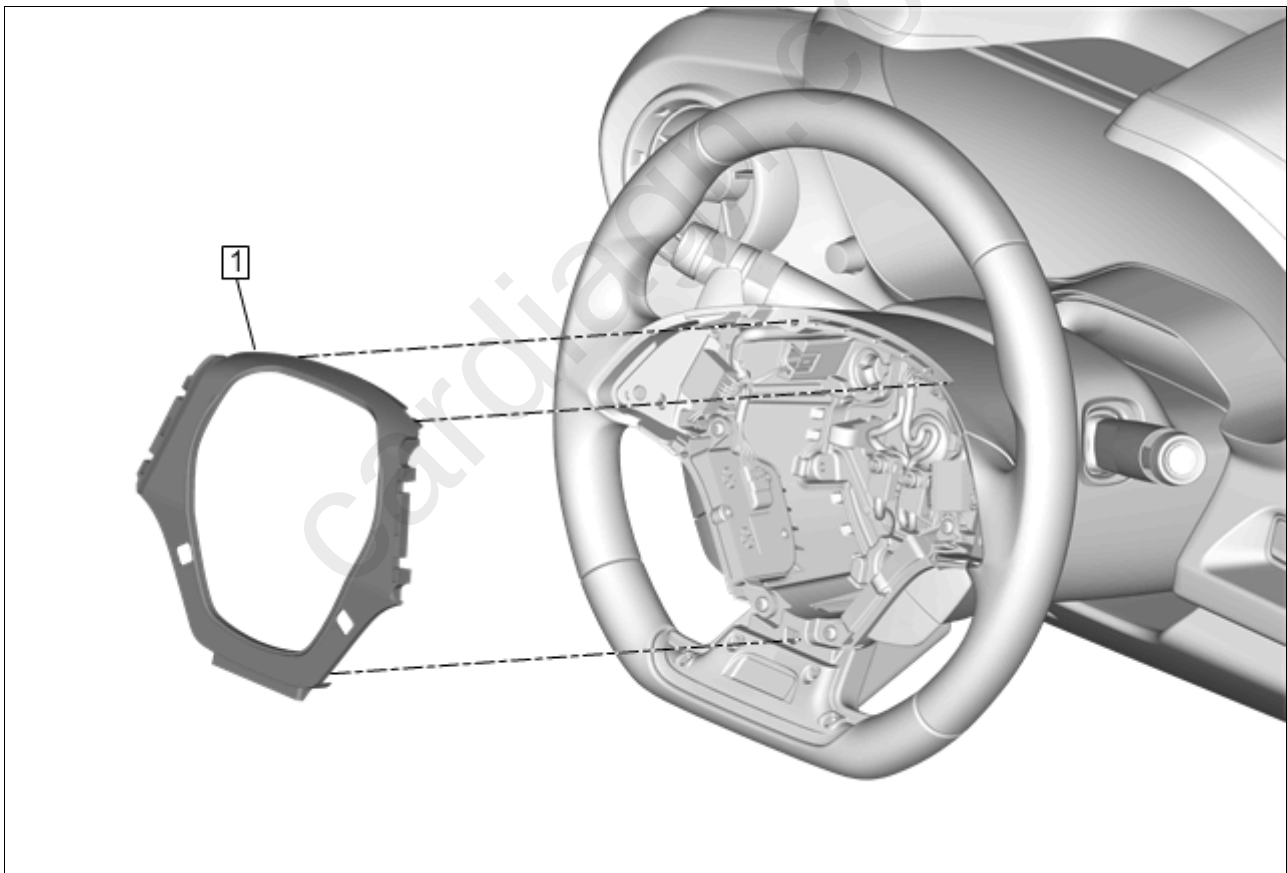
Procedure

2

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. Steering Wheel Bolt»Remove
5. Steering Wheel»Remove
6. Transfer components as necessary.

REPAIR INSTRUCTIONS > STEERING WHEEL SPOKE COVER REPLACEMENT

Fig 1: Steering Wheel Spoke Cover



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures	

1. Steering Wheel Airbag Replacement
2. Steering Wheel Spoke Lower Cover Replacement
3. Remove the left side steering wheel spoke cover. Steering Wheel Spoke Cover Replacement
4. Remove the right side steering wheel spoke cover. Steering Wheel Spoke Cover Replacement

1

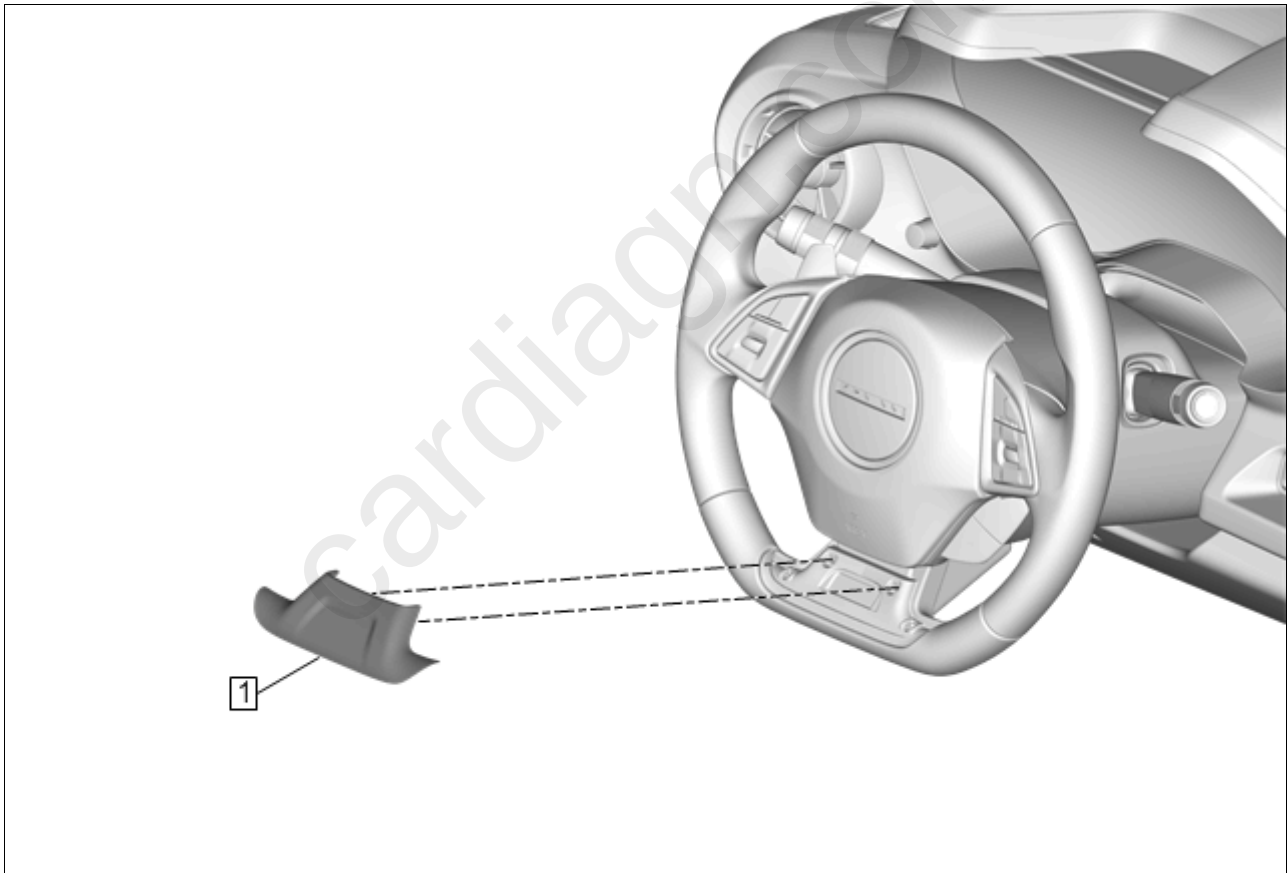
Steering Wheel Spoke Cover

Procedure

Use a flat bladed plastic tool to remove.

REPAIR INSTRUCTIONS > STEERING WHEEL SPOKE LOWER COVER REPLACEMENT

Fig 1: Steering Wheel Spoke Lower Cover



Courtesy of GENERAL MOTORS COMPANY

Callout

Component Name

1

Steering Wheel Spoke Lower Cover

Procedure

Use a flat bladed plastic tool to remove.

REPAIR INSTRUCTIONS > STEERING COLUMN REPLACEMENT > REMOVAL PROCEDURE

CAUTION:

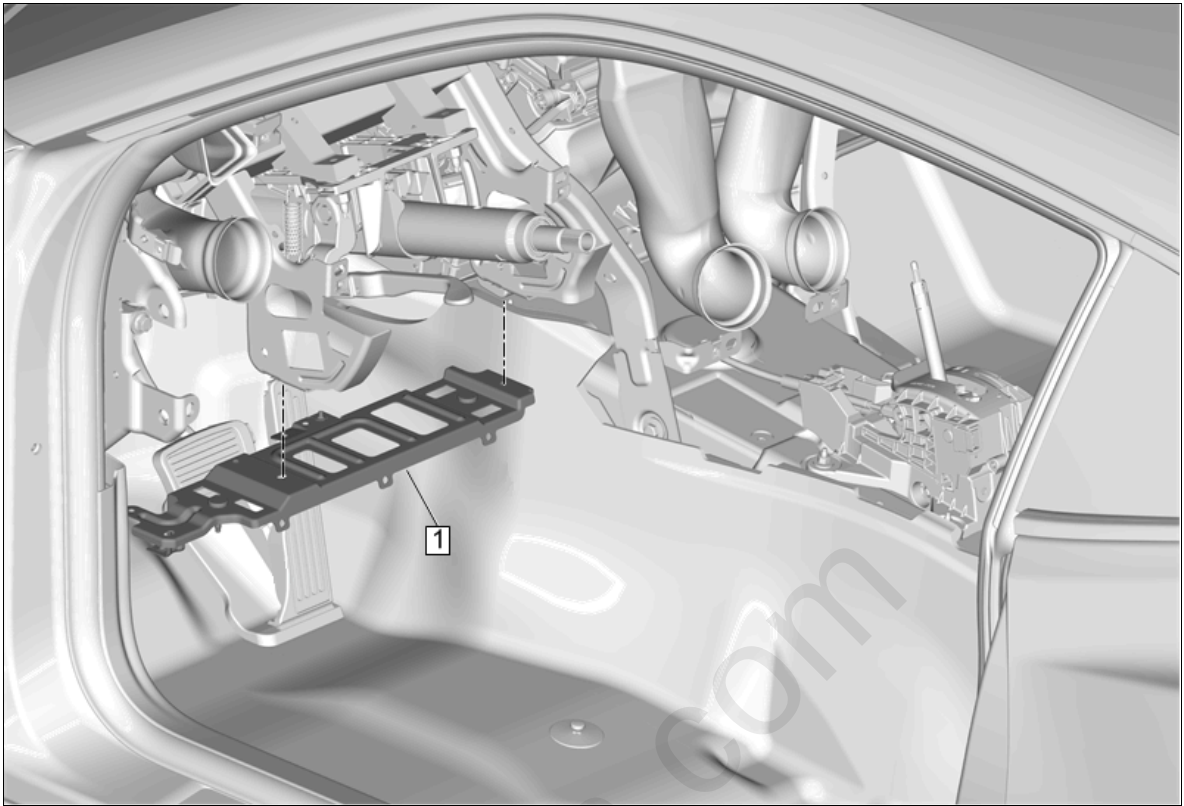
With wheels of the vehicle facing straight ahead, secure the steering wheel utilizing steering column anti-rotation pin, steering column lock, or a strap to prevent rotation. Locking of the steering column will prevent damage and a possible malfunction of the SIR system. The steering wheel must be secured in position before disconnecting the following components:

- 1. The steering column*
- 2. The intermediate shaft(s)*
- 3. 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. If replacing the steering column, verify the front wheels are in the straight ahead position and LOCK the steering column using the lock pin from the NEW steering column.
2. If removing and reinstalling the steering column, verify the front wheels are in the straight ahead position and SECURE the steering column as best as possible to prevent any rotation of the steering column shaft and steering wheel.

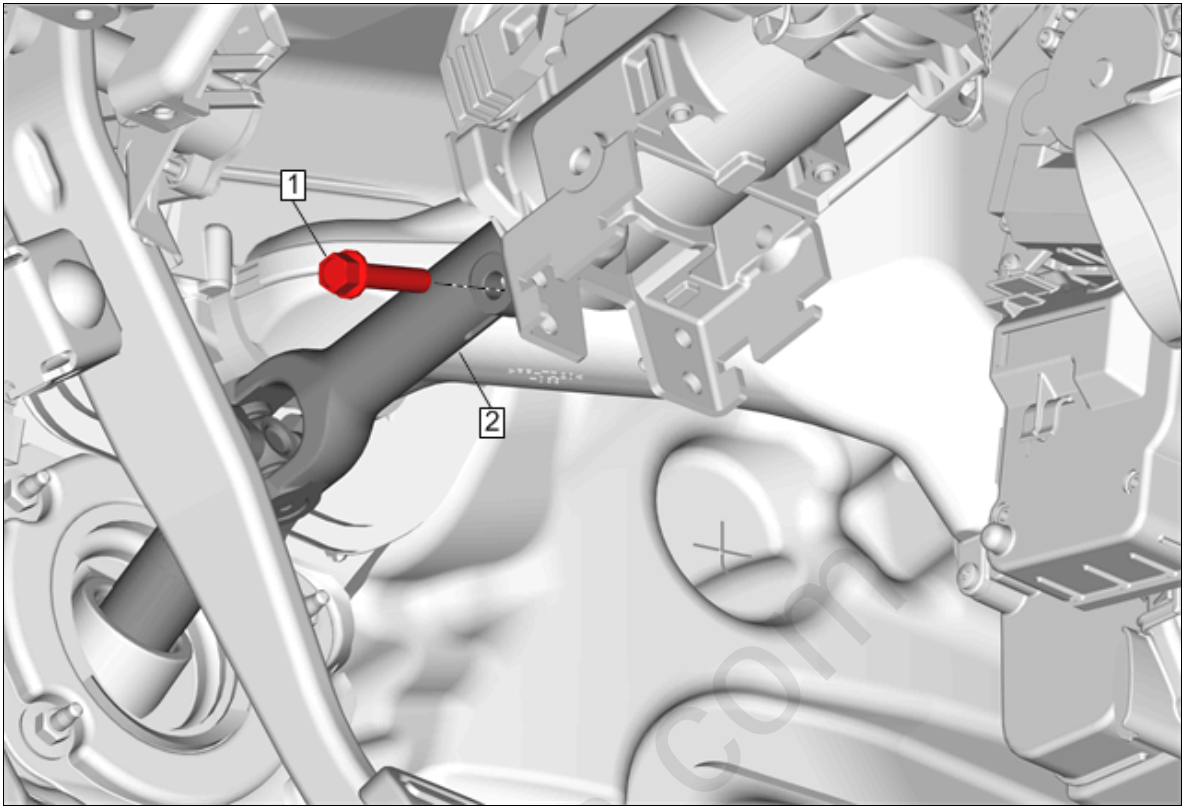
Fig 1: Instrument Panel Lower Airbag Bracket



Courtesy of GENERAL MOTORS COMPANY

3. Remove Instrument Panel Lower Airbag Bracket (1) - Instrument Panel Lower Airbag Bracket Replacement
4. Place match marks on the steering column shaft and the intermediate steering shaft to aid in installation.

Fig 2: Upper Intermediate Steering Shaft Upper Bolt And Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

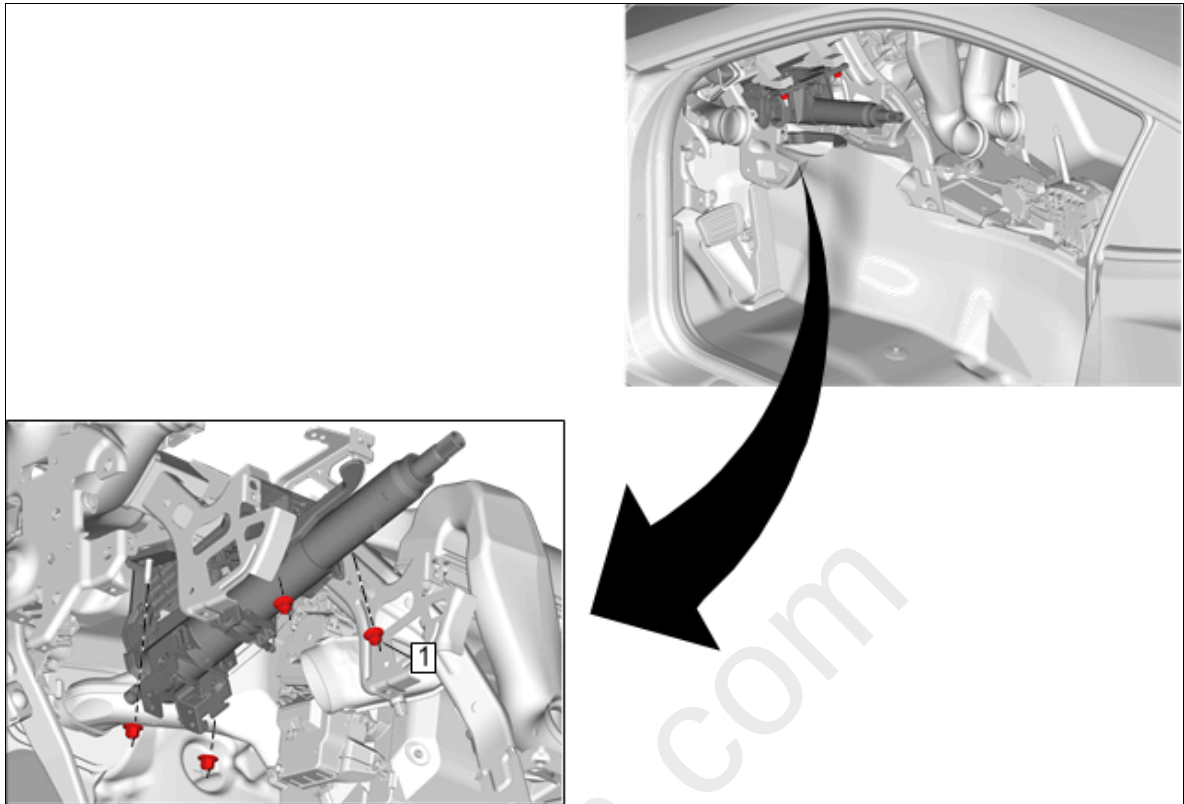
 NOTE:

The upper intermediate steering shaft will NOT disengage from the steering column entirely until the steering column is removed from the vehicle.

5. Remove Upper Intermediate Steering Shaft Upper Bolt (1)
6. Separate Upper Intermediate Steering Shaft (2) at Steering Column.

After separation, collapse the upper intermediate steering shaft as far as possible.

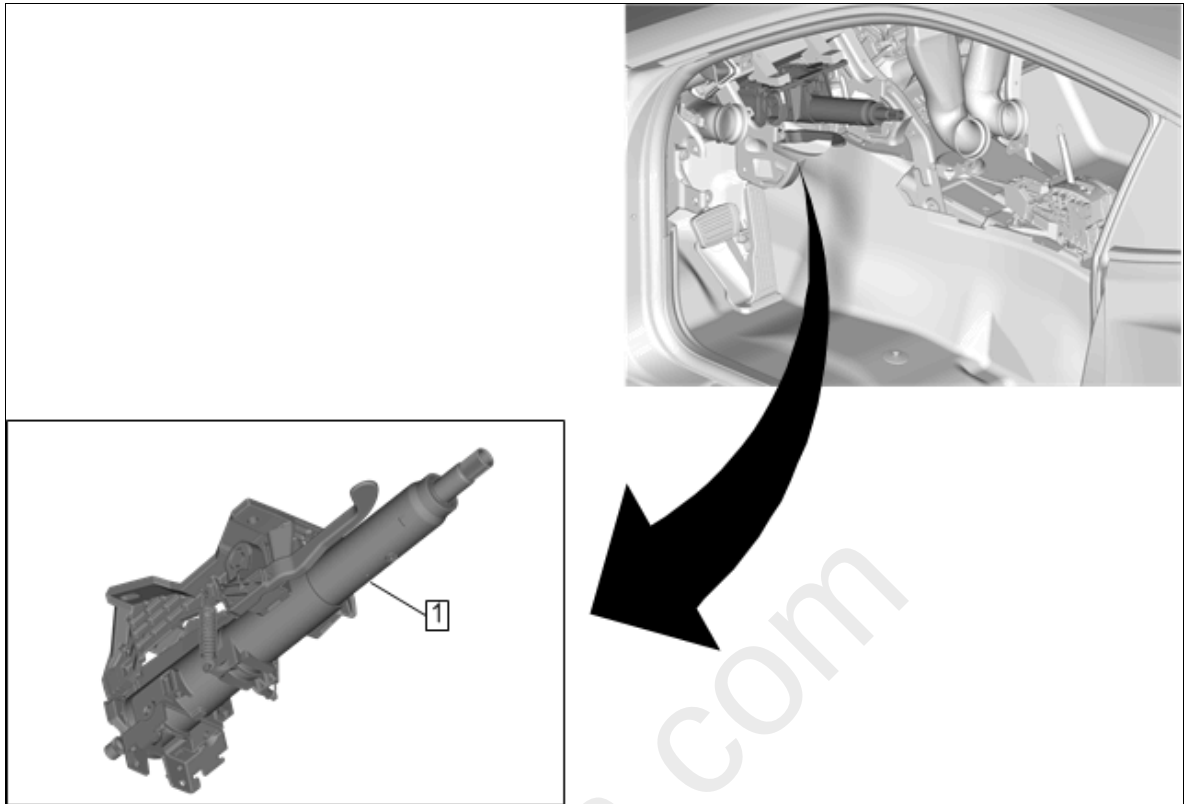
Fig 3: Steering Column Nut



Courtesy of GENERAL MOTORS COMPANY

7. Remove Steering Column Nut (1) (Qty: 4)

Fig 4: Steering Column



Courtesy of GENERAL MOTORS COMPANY

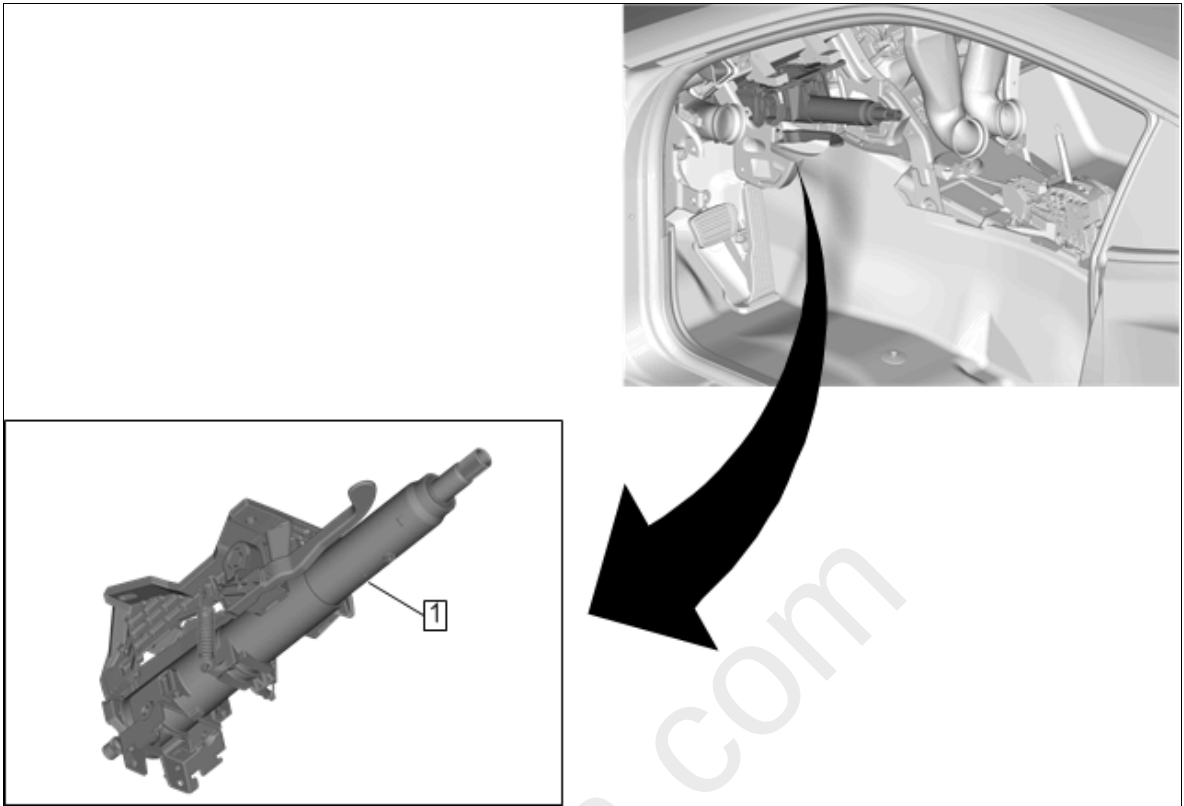
 CAUTION:

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

8. Remove the steering column (1) from the vehicle.
9. If replacing the steering column, transfer components as necessary.
10. If replacing the steering column, copy the match marks from the OLD steering column to the NEW steering column.

**REPAIR INSTRUCTIONS > STEERING COLUMN REPLACEMENT > INSTALLATION
PROCEDURE**

Fig 1: Steering Column



Courtesy of GENERAL MOTORS COMPANY

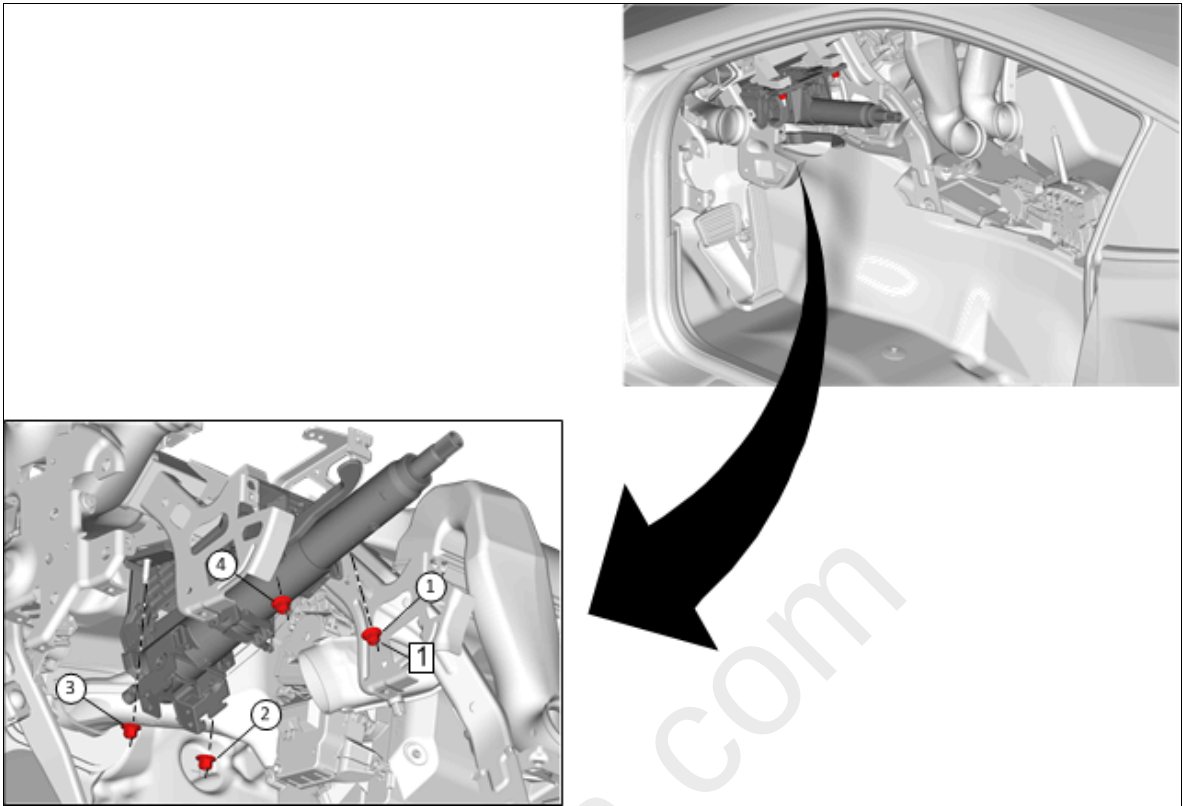


NOTE:

- 1. When installing the steering column, align the upper intermediate steering shaft with the steering column shaft while positioning the steering column in the vehicle.*
- 2. Ensure the match marks on steering column shaft and the intermediate steering shaft are aligned.*

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

Fig 2: Steering Column Nuts



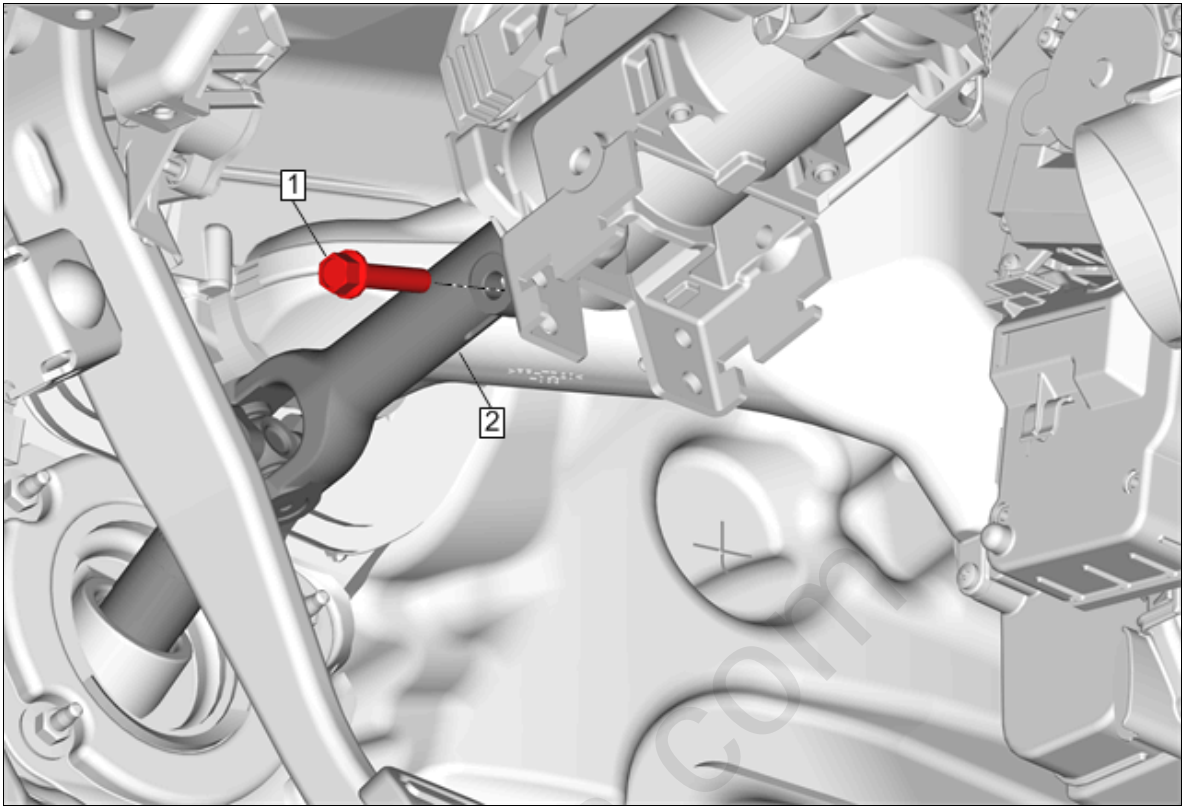
Courtesy of GENERAL MOTORS COMPANY

 **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).

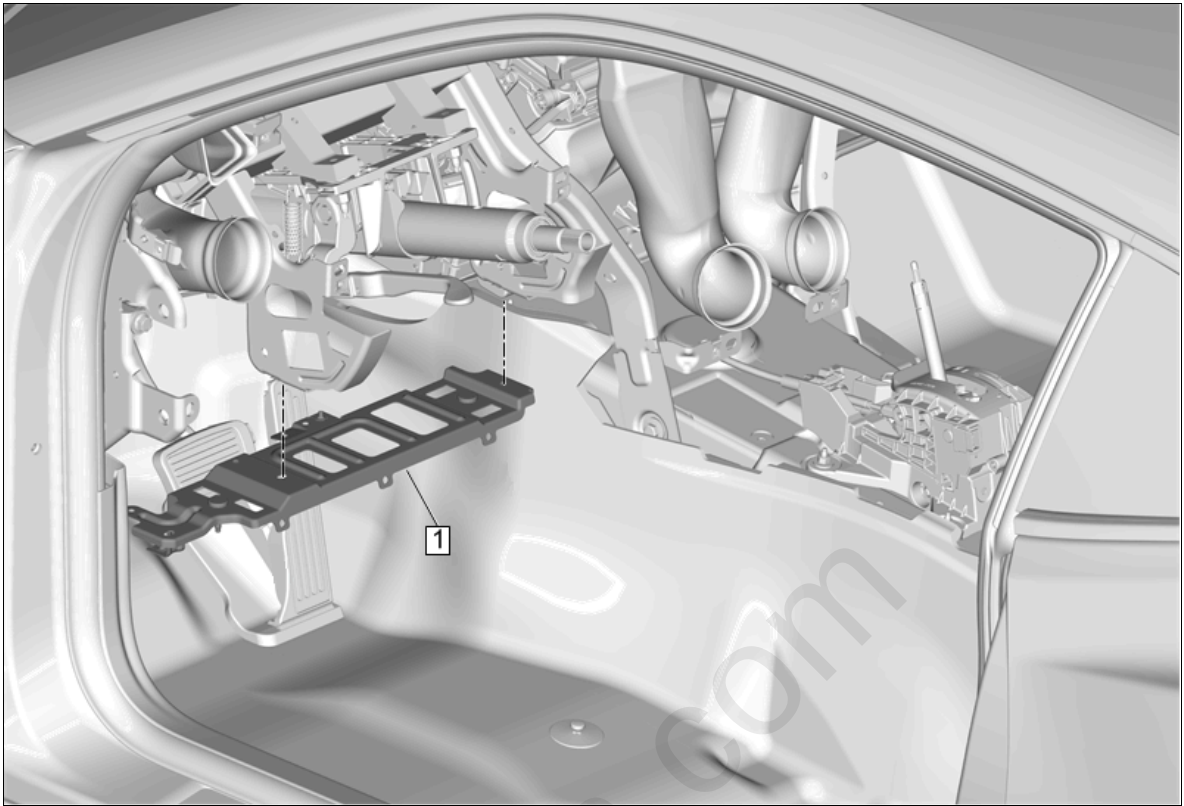
Fig 3: Upper Intermediate Steering Shaft



Courtesy of GENERAL MOTORS COMPANY

3. Before continuing, ensure the upper intermediate steering shaft (2) is completely installed on the steering column shaft.
4. Before continuing, ensure the bearings in the intermediate steering shaft boots are positioned correctly and moving freely.
5. Install Upper Intermediate Steering Shaft Upper Bolt (1) and tighten to 30 N.m (22 lb ft)
 1. Clean the threads of the bolt with denatured alcohol or equivalent and allow to dry.
 2. Apply thread locking adhesive to the bolt. Adhesives, Fluids, Lubricants, and Sealers

Fig 4: Instrument Panel Lower Airbag Bracket

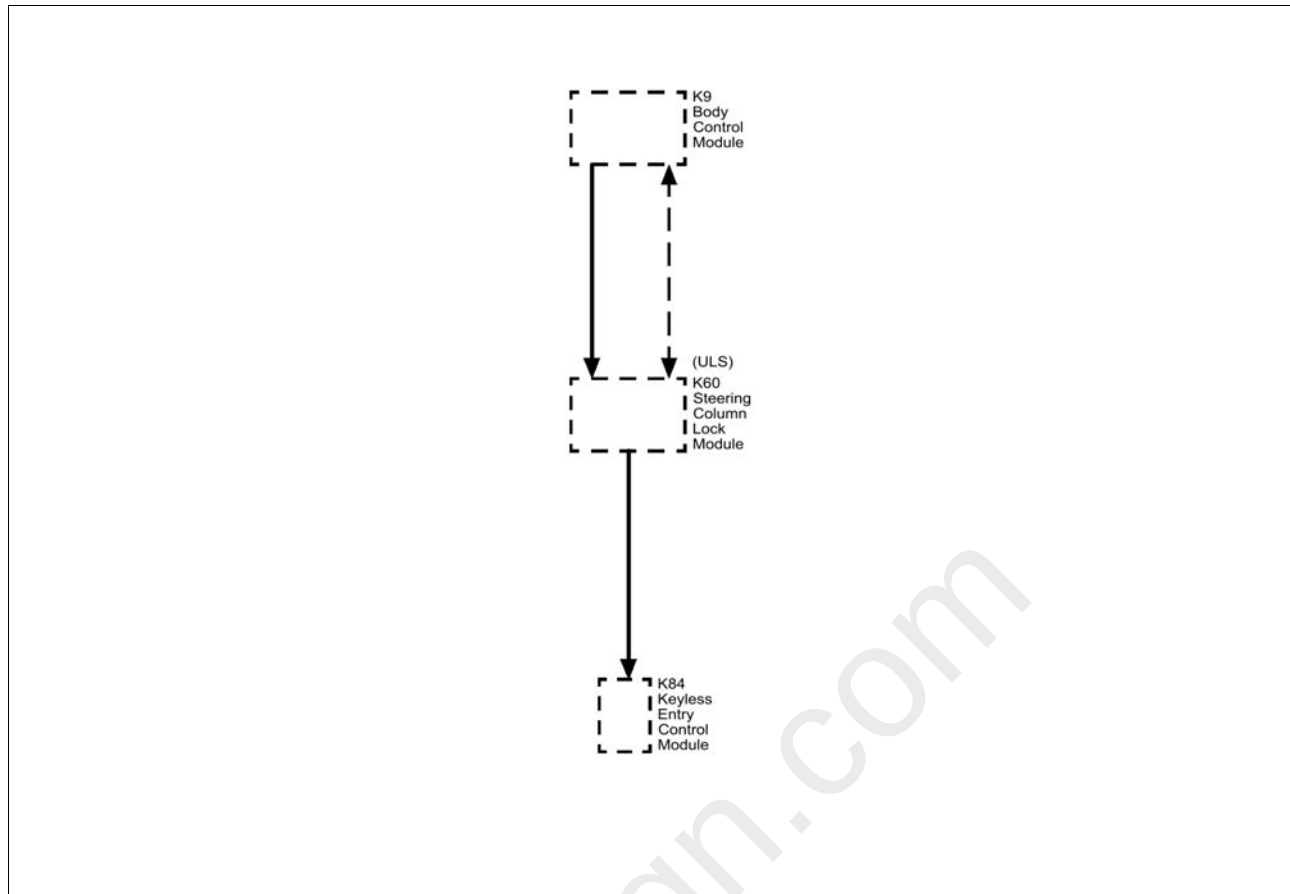


Courtesy of GENERAL MOTORS COMPANY

6. Install Instrument Panel Lower Airbag Bracket (1) - Instrument Panel Lower Airbag Bracket Replacement
7. Install Instrument Panel Knee Bolster - Instrument Panel Knee Bolster Replacement (Driver Knee Bolster Reinforcement)
8. { If equipped }Program the steering column lock control module. Control Module References
9. Center the steering angle sensor. Steering Angle Sensor Centering

**DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN DESCRIPTION
AND OPERATION > STEERING COLUMN LOCK**

Fig 1: 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.

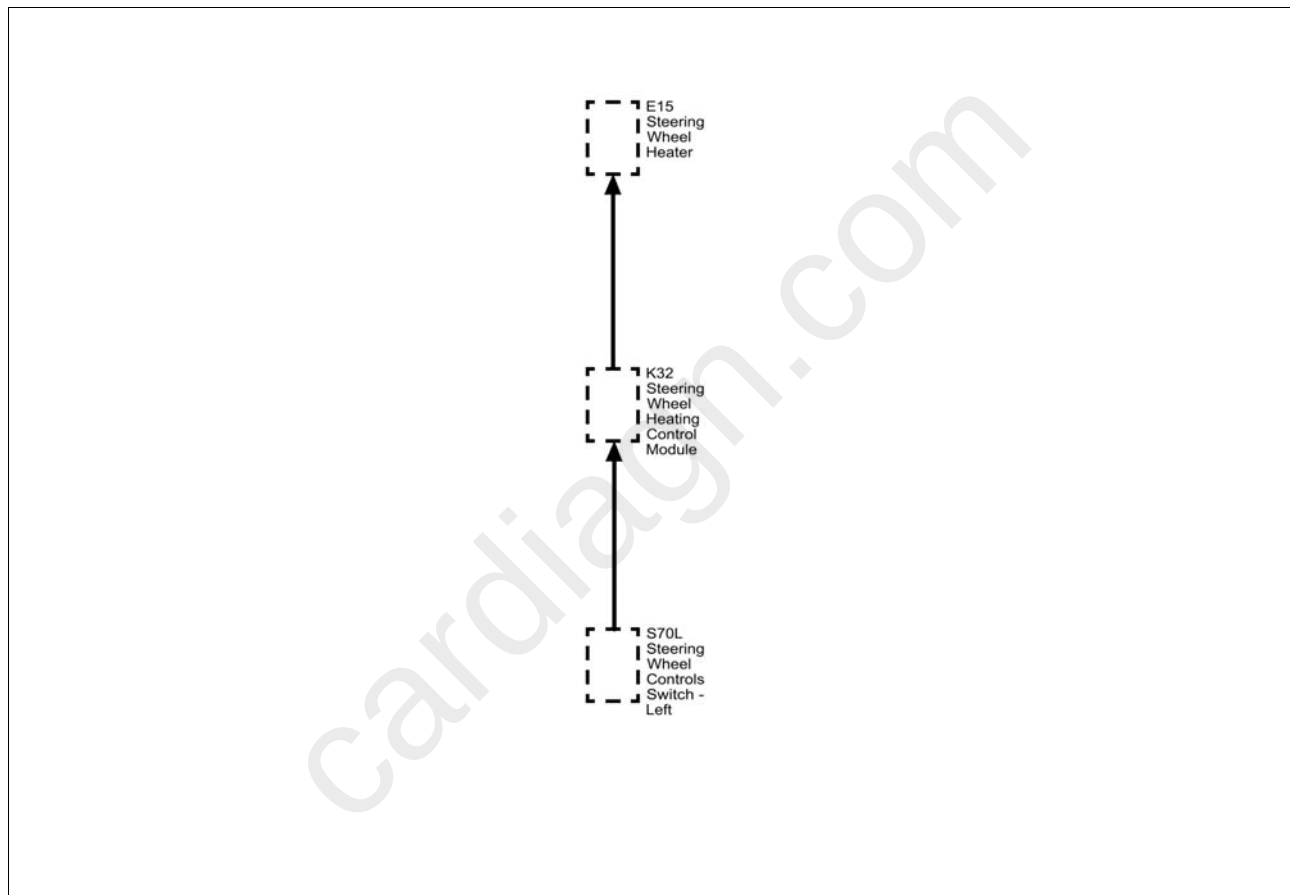
DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION > DRIVER SAFETY

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.

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION > HEATED STEERING WHEEL

Fig 1: Heated Steering Wheel Block Diagram



Courtesy of GENERAL MOTORS COMPANY



NOTE:

During a remove vehicle start, the heated steering wheel does not turn on.

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).

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